Bus Stops as Facilitators of Mobility and Social Connectedness in Older Adults

Research Distinction

by

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Abstract

Social isolation is a major factor in the wellness of aging adults. Many people begin to experience issues with their physical mobility as they age, which can increase their likelihood of social isolation. However, having social connections is very important, as it is one of the key elements to aging well, alongside health, financial security, and adequate housing. This project, developed in conjunction with the Upper Arlington Commission on Aging and the Age Friendly Innovation Center, is centered around the idea of supporting the social connectedness and mobility of older adults in Upper Arlington. In the coming months these organizations will introduce a bus to the city of Upper Arlington, nicknamed the Community Connector, that addresses the needs of older adults by providing rides throughout the neighborhood. As the system grows its ridership, it will decrease the need for older adults to drive their own personal vehicles while encouraging mobility, social connection, and sustainable practices within the neighborhood. This project focuses on the design of a network of bus stops that enhances the experience of using the Community Connector so that it becomes an appealing mode of transportation even for older adults who are still able to drive themselves. The resulting bus stops will become engaging community spaces where all members of the community have the opportunity to form genuine social connections with their neighbors.

Introduction

The city of Upper Arlington is a suburb of Columbus, Ohio about 10 minutes west of the Ohio State University's main campus. According to the US census, the 2020 population of Upper Arlington was estimated to be 36,800 (U.S. Census Bureau). Approximately 17.2% of Upper Arlington's population consists of people aged 65 and older (UACOA), which is slightly higher than the portion of the national population that is 65 and older, estimated to be 16% in 2019 (Administration for Community Living).

In the first meeting with the project partners, the Upper Arlington Commission on Aging (UACOA) and the Age-Friendly Innovation Center (an organization established by Ohio State's College of Social Work), the concept of a new circulator bus system was brought up. UACOA will be introducing the bus, which began pilot testing in early 2022, to provide older adults with a mode of transportation that is created specifically to address their needs, and would provide service to and from various destinations in Upper Arlington. This proposed bus system became the basis of the design project.

Survey

A valuable resource at the beginning of the research process was a report which documented the findings of a community survey conducted by UACOA. The survey was sent out to older adults who resided in Upper Arlington and asked a variety of questions about the respondent's life. Shown is a sample of the results.



Sample questions and results from the survey conducted by UACOA.

Driving is the most common mode of transportation amongst Upper Arlington residents, and older adults are no exception. In the survey conducted by UACOA, 95.3% of respondents aged 65 and over said that they primarily drove themselves to get where they needed to go. This can border on dangerous, as it is fairly common for older adults to continue driving past the point where it is no longer safe for them to do so. The survey also asked older adults about how they would want to get around if their primary means was no longer an option. In this case, 68.4% of respondents said that they would rely on their friends, family, and neighbors to drive them to appointments and run errands- another situation in which personal vehicles are the primary mode of transportation.

In addition to the UACOA survey, two of my classmates and I formed a research group and designed our own online survey to collect information about the physical and digital mobility of older adults. The survey consisted of 6 multiple choice and 2 open-ended response questions that took approximately 1-2 minutes to complete. We sent the survey out over text and in group messages on social media to those who knew older adults or to older adults themselves and filtered responses by age, ensuring that all of the data we analyzed came from those who were 65 or older. Shown is a sample of the questions asked.

What mode of transportation do you take most frequently?

| Walking |
|---|
| Car: driving self |
| Car: rides from friends or family |
| Car: from Uber, Lyft, taxi, or similar service |
| Public Transportation (ex. bus) |
| Other |
| |
| What are some activities you currently enjoy? Does mobility (whatever this term means to you) impact your ability to participate in these activities? |
| |
| |
| How confident do you feel learning new technologies (apps, websites, devices, etc.)? |

| Very Confident | |
|----------------------|--|
| Pretty Confident | |
| Somewhat Confident | |
| A little Confident | |
| Not Confident at All | |

Sample questions from the student research group survey.

Of the responses we received, 12 responses were from people aged 65+. We analyzed this data and used it in conjunction with the results of the comprehensive survey conducted recently by the Upper Arlington Commission on Aging to inform further research and design efforts.

Data from the Upper Arlington Commission on Aging survey and my research group's survey was analyzed and combined to create the following infographic:

The Mobility of Older Adults in Upper Arlington

According to the US census, the city of Upper Arlington has a population of about



About 17.1% of these residents are aged 65+



 46.1% of UACOA survey respondents had a graduate or professional degree and 33.3% of respondents had a bachelors degree.



Infographic summarizing the data collected with the UACOA and student research group survey.

Secondary Research

The secondary research for this project consisted of reading a broad range of articles that related to my focus of mobility and social connectedness of older adults. Topics included intergenerational connection, walkable cities, reduced fare transportation models, caregiving robots, urban planning models, the effects of aging on one's physical, emotional, and psychological health, and how aging populations affect political and economic policy in various countries around the world.

Social connectedness is a key aspect of the problem space, and was a component of many of the articles read during the secondary research phase. Loneliness impacts more than just one's mental and emotional health: studies have actually shown associations between loneliness in older adults and physical health problems, like higher blood pressure and dementia. Additionally, loneliness has been linked to risky health behaviors like smoking and physical inactivity (Span).

Another study that was influential in this project was from 2019 and analyzed nationwide car accidents involving older adults. There are 1.6 million Ohio drivers that are age 65 or older- the sixth most of all U.S. states. Older adults account for 20 percent of all Ohio drivers, the 15th largest percentage of any state. In 2016, 250 people were killed in crashes involving at least one driver who was 65 or older, accounting for 22 percent of all fatal crashes in Ohio- the 11th highest rate in the U.S. (TRIP). These statistics suggest that driving does in fact become dangerous for older adults as they get older, and that there is a need for alternative transportation solutions for older adults. These statistics help to justify the existence of a bus that would provide rides around to older adults in Upper Arlington.

Three key insights regarding public transit stops were extracted from a study conducted by TransitCenter, a foundation that aims to improve public transit in cities across the U.S. The study suggested that Americans are more likely to use public transit if they can walk to it and have a comfortable place to wait. Additionally, amenities at bus stops make the wait easier to endure and can make riders feel safer, especially women who perceive their surroundings to be unsafe. Lastly, bus stops market the existence and quality of the service itself, helping to retain existing riders while also attracting new ones (TransitCenter). These insights informed the decision to pursue the design of bus stops that support the bus, nicknamed the Community Connector, in Upper Arlington.

Primary Research

After the secondary research, my research group ran two codesign sessions with groups of 5-7 older adults in Upper Arlington. We wanted to know more about how older adults in Upper Arlington get around currently and whether a new circulator system would even be a relevant addition to the neighborhood. We used a variety of codesign methods to gain insights about the mobility and social connectedness of themselves as well as other older adults they know. In one activity we asked our participants to write down some of the issues they've faced with their existing methods of transportation, and some features that they would find appealing in future modes of transportation.



Results of the first codesign activity: a collection of the issues participants have experienced with existing modes of transportation as well as ideas for appealing features in future modes of transportation.

Through this activity we learned that our participants were frustrated with the inconsistencies of the COTA bus system. They expressed that information about exactly when buses were coming was often lacking, which made planning and scheduling a hassle. Participants discussed the multiple times that they have waited at the bus stop for a bus to come, only to find out a half an hour later that the bus that they had intended on taking had broken down. On some occasions, COTA sent another bus in its place that didn't arrive until much later, but on other occasions, our participants told us that a replacement bus was never sent at all, forcing them to reconfigure their travel plans. Participants stressed that it was often impossible to make time-sensitive plans if they intended on taking the bus. One of our participants, who is unable to drive, told us he

moved to his current apartment building specifically because it was near a bus stop that was originally serviced by three different COTA lines. However, the bus lines have since been rerouted so that only one line still services that specific bus stop. The inconsistencies extended to bus stops as well: our participants explained that some stops offered those who were waiting for the bus a covered bench and a map of COTA's routes, while other stops were little more than a pole stuck into the grass on the side of the road- not a very comfortable or weather-resistant environment for someone who is waiting for their bus.

Our codesign participants also spoke about their own experiences with social connectivity during the codesign sessions. Participants stated that they thought staying connected within the community was incredibly important and many had a variety of ways in which they did so. One participant described the annual neighborhood block parties that she likes to attend. A second cited participating in book clubs, visiting the library, and attending activities at the senior center as ways that she stays connected. Another spoke highly about events like music in the park and the annual Upper Arlington Labor Day arts festival as places where she can meet new people and maintain existing friendships.

In another codesign activity we presented participants with a variety of strange and thought-provoking transportation concepts. We presented a bulleted list of details about each concept, as well as a photo to help our participants visualize the concept. We asked participants to imagine each concept being implemented in Upper Arlington, and then asked them for their criticism of each concept. We presented participants with a few prompts to get the conversation started, such as: Is there something about the concept that would dissuade you or other people you know from using a service like this? Are there issues with the specific features you see in the images? Do you think there would be logistical issues (like issues with the scheduling or management of the service)? Are there any other concerns you have? Examples of the transportation concepts we presented are below:



- pedal pub type of transportation
- older adults are picked up from preselected locations and driven around town
- passengers are able to get in some exercise as they chat with fellow riders and go from place to place
- passengers gain unlimited access by purchasing a \$20 monthly pass
- can also order food and beverages at an extra cost, like a snack bar on wheels
- service from march to november



- a sort of rickshaw carriage service
- younger person is called to bring older adults from a location of their choice to a location of their choice and then back
- expect a wait time of about an hour
- passengers sit in an open carriage in the front
- rides are free for older adults, but there is a small cost if an older adult wants to bring a younger guest (younger than 65) with them
- year-round service



- delivery robot runs errands for you
- place your order through an app, your order is brought to your door
- can pick up online orders from the grocery store, pharmacy, dry cleaners, clothing stores, etc
- capsules in robots are insulated to keep goods cold/warm
- travel restricted to UA city limits
- expect a delivery time of 1-2 hours from the time you place the order to the time the robot shows up at your door
- year-round service

Examples of the transportation concepts presented to participants in the second codesign activity.

This activity gave us a lot of interesting insights. Rather than ask our participants what they liked about each concept and get generic responses, asking them what they disliked gave our participants the freedom to get specific about the flaws that they saw. By hearing the specific aspects that participants didn't like about a concept and why they didn't like them, we received information that we could take with us through the design process, which would allow us to make informed design decisions that avoided those aspects that our older adult participants were opposed to.

Conjecturing

Another research method used during the research phase of the project was design conjecturing. Conjectures are theoretical solutions that are intentionally only half thought out. This allows the user to quickly generate different ideas without getting bogged down by the details. Conjectures are helpful in exploring the possibilities and constraints of a problem space using a wide breadth of solutions.



Conjecture one: intergenerational programming

The conjecture shown above is based on the ideas of purposeful existence, intergenerational connection, and passing down traditional skills and knowledge. A community organization such as the YMCA would facilitate this weekly program that brings together older adults and children for classes in various crafting techniques. Each week a different older adult would lead the children and other adults in a skill or technique they know from their own childhood as a way of sharing their own culture. This would be an opportunity for children to learn more about the world around them and the history of various people, places, and skills through making. The older adults would be able to create their own craft while helping children they are partnered up with complete the activity. The program would help children develop hard skills specific to the activity and soft skills like communication, teamwork, open-mindedness, and creativity, while older adults engage in social connection and gain a greater understanding of the children and younger adults in their community. Weekly activities include weaving, cooking, calligraphy, sewing/embroidery, paper cutting, beadwork, and traditional methods of planting and harvesting.



Conjecture two: autonomous vehicle

The conjecture above imagines a mobility solution driven by artificial intelligence and automation. Mobility aids that are meant for individual users such as scooters and walkers would be connected to the same system as a larger, more communal mobility aid, such as an autonomous shuttle bus for older adults. Artificial intelligence that has been integrated into the personal mobility aid would allow older adults to summon the shuttle to their exact location or to a designated shuttle stop. Users would simply need to activate the AI with a phrase (similar "Hey Siri" or "Alexa,") and enter in their request. They would then get an ETA for the shuttle while their request is entered into a queuing system. Once the older adult has boarded the shuttle, screens located around the interior would give each adult on the bus an idea of the shuttle's ETA at their intended destination. Each shuttle would have the capacity to transport up to 8 older adults at a time, with the idea being that a handful of shuttles would be driving around Upper Arlington simultaneously. Older adults on the shuttle would be able to speak to a human

representative if needed through a video call screen on the bus. Meanwhile, interior space that would otherwise be allotted to a driver and steering mechanisms could instead be used to make the interior of the shuttle comfortable for users.



Conjecture three: pedestrian paths

The above conjecture draws upon the concept of the '20-minute city' model of city planning and the idea of beautifying streets as a way of increasing pedestrian traffic. In this conjecture, a parkway is created from the two center lanes of one of the larger roadways in Upper Arlington (think Lane Ave, Fishinger Road, or West Henderson Road) and are transformed for pedestrian use. Cars still use the outer two lanes of the road, but a median is created from the middle two lanes with greenery to beautify the space and a meandering pedestrian path for cyclists, joggers, and walkers to use. Biking and cycling offer a greener alternative to driving cars (or riding in buses) and allow pedestrians to connect with their neighbors as they pass one another on the trail. Benches are dotted along the path to encourage people to sit and chat with one another. Bus stops could even be integrated into the design of this parkway, allowing it to be serviced by buses. This would create even greater connectivity between the different parts of Upper Arlington.



Conjecture four: community hub

The conjecture above draws primarily upon the idea of the Garden City- particularly the idea of a large glass building that hosts a marketplace, which is located at the heart of every Garden City. This large building in Upper Arlington would serve as the community hub and essentially be a cross between a YMCA, a co-op marketplace, and a bus terminal. The building would have space to host community events and activities for all generations, like those that would typically be found at a community center. The building would also house a marketplace for people from Upper Arlington and other nearby communities to sell foods that they cook or grow and handcrafted goods that they make. Lastly, the building would serve as a major hub for bus services like COTA, where people would be able to switch bus lines as needed. Not only would this hub foster all kinds of social connections within the community, but it would also streamline running errands while encouraging the use of sustainable forms of transportation. A hub like this would make it easy for people to take a bus to a single location where they can get the things that they need, rather than taking their own car to multiple locations to get everything they need. The

architectural style of the building blends a glass greenhouse-type structure with the revival styles that are common in Old Arlington, further integrating this hub into the city.

Objectives

The primary goal of this project is to design a solution that enhances the experience of using the circulator created to assist older adults in Upper Arlington. The solution should make the circulator appealing so that older adults who can still drive will want to use the circulator instead. It should create opportunities for genuine social connection and relationship building amongst community members. It would also be beneficial if the solution can make the circulator experience something other generations want to enjoy in addition to the older adults who will primarily be using it, or even if the solution can make the circulator experience something to attract older adults to move to Upper Arlington.

Stakeholders

Many groups will be impacted by this proposed circulator solution. The primary group is older adults in Upper Arlington, who will have access to a new mode of transportation that is designed to suit their needs. Our project partners, the Upper Arlington Committee on Aging and the Age-Friendly Innovation Center, will be overseeing the circulator's implementation and operation. The city of Upper Arlington municipal government and residents will be affected by this new mode of transportation in their city, as will the people involved in maintaining the circulator including bus drivers and maintenance staff. Even Upper Arlington shop owners and employees could be impacted, as they may see an uptick in revenue if their business happens to be located near a circulator bus stop.

Features and Attributes

Since the solution will be located outside, it is important that its elements are weather resistant. The solution should also have the ability to store goods that are picked up while users are out, such as groceries or dry cleaning, and should be comfortable and/or ergonomic for users, particularly in regards to furniture. The solution should be a casual, informal space that encourages socialization, and will ideally fit in with the aesthetics of the various neighborhoods in Upper Arlington.

Methodology

Initial idea generation began with a session of writing down concepts that came to mind when thinking about mobility and social connectedness. In this stage, it was important to think about the times when the bus is not running (meaning the stops are not being serviced) in the design. The bus stops should still be places where people want to\ congregate, which meant considering design elements that may be thought of as non-traditional at most bus stops and thinking of the spaces more in terms of parks or small plazas. Playful seating like swings and rocking chairs, as well as the incorporation of art and gardening were two elements that were deliberated here.



Initial brainstorming related to mobility and social connectedness.

Programming that would foster a stronger sense of community at the stops was also considered. Based on space and location constraints, the incorporation of a community bulletin board at the stops had potential, along with games and conversational prompts designed to encourage socialization amongst users of the bus stops.



Mind map of pain points experienced by bus riders.

The mind map above documents some of the pain points of a typical bus system. The participants here are industrial design and visual communications fourth year students. While they aren't the target users for this project, their responses were still useful in getting an idea of some of the common problems surrounding bus stops that needed to be considered. Some issues are physical, like wet seats and overhead covers. Some are more interpersonal, like feeling uncomfortable with the strangers at the bus stop.

One particular generative design method used for this project was the Shifting Perspectives method. This method involves thinking about the problem space from six different perspectives that heavily influence design: the domestic world, the world of opinion, the civic world, the industrial world, the market world, and the world of inspiration.

Since it supports a service that is for the community, the project naturally lends itself to the perspective of the civic world. With this method, things like incorporating a community garden into the stop, as well as using it as a way to generate funding or find volunteers for local nonprofits were considered. The industrial perspective is heavily influenced by efficiency. Many of the ideas generated with this method are based on scheduling, which is important, but not the focus of this particular project. In terms of a bus stop, programming the space to be a major asset to the community, and ways for the stop to generate its own power were examined.

The world of inspiration, or artistic perspective, produced quite a bit of community-based ideas, like a chalk/ bulletin board, a gallery wall for local artists, and ways to incorporate the history of UA into the design through the inclusion of artworks or murals. The market-driven perspective led to thinking about advertising space- already a common concept at bus stops- as well as leasing out space at the stop for vendors to sell their goods (like the Sohud Collective in Columbus). Incentives/subsidies for taking the bus instead of driving were also considered.

The fourth conjecture (the all in one bus stop, marketplace, and community center) was used as a jumping off point for the domestic world perspective. Ways in which the bus stop could become more than just a bus stop were considered. The world of opinion perspective generated ideas like a bus stop that would function similar to a space station or shipping port. Another interesting thought to come out of this perspective is different types of programming that would give the stop another purpose beyond just a bus stop. Some of the ideas that were generated, like a library or small cafe, would be more feasible than others, such as a zoo or bed and breakfast.



First iteration of the mood board.

Aesthetic Exploration

The first iteration of the mood board for this project, seen above, focused on images that conveyed an informal playfulness. It was designed to tie into the aesthetics of a scheduling app that was being designed alongside the bus stops, and which also supported the Community Connector system by allowing older adults to plan and schedule their rides. When shown to others, however, many people expressed reservations with this direction. While the colors were appealing, respondents wondered how these aesthetics would fit in with the rest of Upper Arlington, especially in the Old Arlington neighborhood and commercial spaces around the city. A fourth year visual communications major, when asked for their opinion, stated that they liked the colors and patterns, but that it felt too youthful; like it was designed with children in mind rather than older adults. A resident of Old Arlington stated that it stood out against the traditional architecture in the neighborhood- a direct conflict with one of the project objectives. This feedback made clear that revisions were needed. Collecting images of the types of architectural styles, materials, colors, amenities, and motifs around Upper Arlington generated a sense of the aesthetics that already exist in the city. The final assemblage of images, seen below, is a mix that combines the playful spirit of the first iteration with the more traditional infrastructure that already exists in Upper Arlington.



Final iteration of the mood board.

Form Development

In the iterative sketches below, different types of seating, overhead structures, the integration of plants, and ways of defining the space are examined and combined to create a breadth of designs. At the same time, practical things like safety, theft, and effective use of space are assessed.





















Iterative sketches exploring seating, space planning, overhead structures, and greenery.

Different roof lines for the pergola are assembled below. The pergola and the canopy provides shade and introduces color to the stop. The design of the pergola is more traditional and draws from elements of the traditional romantic revival architecture styles that are common in the houses and shops in Upper Arlington south of Lane Avenue.



Exploration of pergola forms.

Further development in the form of the planters can be found in the sketches below. The planters sit along the edge of the bus stop and define the space while also providing support to the pergola. The simple form of the contemporary planter boxes draws out the contemporary elements of the more traditional pergola.



Exploration of planter forms.

Further iterations on the seating can be found below. The final design consists of two benches and a rounded table that complements the design of the benches. Perforations in the metal on the horizontal surfaces of the benches and table allows for water drainage, while the bright color and rounded back contribute to the informal and welcoming feel of the bus stop.



Exploration of furniture forms.

Different rug patterns are assessed for painting on the pavement at each bus stop, seen in the images below. The rug patterns are reminiscent of Kilim rugs, which are rugs with geometric patterns that originate in the Middle East. These rugs are designed to be painted with a series of three stencils which makes the application of the intricate and precise patterns relatively simple.



Exploration of rug patterns.

Form iterations of the bus stop lighting can be seen below. The inspiration for these light sconces comes from gas lanterns that can be found coupled with the romantic architectural styles in

Upper Arlington and in places around the world that have old-world charm. The sconces for the bus stop, however, have been designed with a simplistic and geometric take that allows the sconces to pair with the contemporary planter boxes.



Exploration of lighting forms.



The final Community Connector bus stop design.

Solution

The final design is an informal, outdoor living space that serves as a bus stop for the Community Connector system and a space for people in the neighborhood to congregate. Each Community Connector bus stop has benches that can comfortably seat 2-3 people and are angled slightly towards one another to encourage conversation. Bags or boxes that are picked up while people run errands can be placed on the bench, which prevents them from being set on the ground where they might otherwise become wet, dirty, or a tripping hazard. The painted rug defines the space and contributes to the community living room atmosphere. The sconces provide light to help visitors at the stops feel safer as it gets dark. Elements such as the rug pattern and plant varieties can be easily interchanged with different variations, which allows each stop to be differentiated from other stops in the system.

These stops will be located around Upper Arlington along the Community Connector's route. The stops are designed to fit within the dimensions of a standard parking space, which means they can be installed in the parking lots of popular destinations like grocery stores, restaurants, banks, parks, libraries, doctor's offices, and more. The exact number of stops depends on the route, which has yet to be planned. As the service expands, the number of CC stops would increase accordingly.

The design of the stops includes architectural plants which have bold and distinctive shapes, while the integration of bright flowers acts as another source of color in the design. Suggested varieties for planting are included below, and take into account the mature size of each plant, whether the plant attracts wildlife like butterflies, and the time of year in which the plant blooms.



Evergreen Boxwood



Dichondra Silver Falls



Dwarf Fountain Grass

- full sun
- little upkeep
- typically grows only
- 1-2 inches annually
- hearty to -10 F
- 2-4 ft tall to 3 ft wide
- medium moisture
- full sun to partial shade
- heat and drought
- tolerant - tendrils grow 2-4 ft
- long - dry to average soil
- moisture



Yarrow



Plume Celosia



Black-eyed Susan



- well drained soil
- 1.5 ft-6 ft tall
- drought resistant
- blooms July-October
- food source for birds

and butterflies

- full sun

- well drained soil
- approx 1 ft tall
- blooms all summer until
- first frost (10 weeks)
- two varieties: plume
- and cockscomb
- full sun
- average moisture soil
- 1-3 ft tall
- drought and pollution tolerant
- red, yellow, white



Butterfly Weed

full sun
may have to wait 2-3 years for blooms
2-3 ft tall
blooms mid to late summer, great in fall
average to dry soil moisture

- attracts butterflies

Suggested plant varieties.

Scenario of Use

The bus stops have two primary functions: serving as a bus stop for the Community Connector and creating a space for the community to gather. Older adults who are waiting to board the Community Connector are able to socialize with one another at the stops. When the bus service isn't running, the stops can be visited not only by the older adults who use the service, but also by older adults who don't, as well as community members of other age groups. When the bus isn't in service, these spaces could be used by local community organizations to host events like book clubs, play board games, or hold picnics, further solidifying their statuses as hubs for community engagement and interaction between neighbors.

Materials

The pergola structure is constructed out of wood, based on the idea that planks could be easily found at any hardware store and purchased relatively inexpensively. Precut lumber is easy to work with, and can be stained a variety of shades. The canopies are made out of high density polyethylene, which is a breathable fabric that resists mold and mildew and provides protection from UV rays. The knitted construction resists tearing and fraying and can be easily cleaned with water. The planters are constructed out of powder-coated aluminum since the powder coat is durable and prevents rust. Powder-coated aluminum is also cheaper than steel, another metal that can be powder-coated. Aluminum was selected for the planters because while aluminum is lighter than steel, the weight of plants and soil makes the planters heavy enough to deter theft. The powder-coated benches, on the other hand, are made out of steel. Though powder-coated steel is more expensive than aluminum, a heavier metal is needed in this situation to deter the theft of the furniture. The rugs are stenciled onto the pavement using acrylic paint, which is the go-to paint for asphalt professionals. The acrylic paint is water-soluble, won't cause damage to asphalt, and is easy to find in a variety of colors. The lighting sconces consist of a powder-coated aluminum frame with frosted glass panels, which allows light to come through the glass without having to see the bulb within.

Maintenance

Many of our codesign participants mentioned that they enjoyed volunteering in their community. As such, much of the maintenance could be done by older adult volunteers who use the Community Connector service. Maintenance performed by volunteers would include tasks such as planting and watering the plants and to a lesser extent, maintaining the furniture. The furniture at the stop is designed to be durable, but when the furniture eventually breaks or needs repair, businesses could be contracted to perform this maintenance. The painted rugs wouldn't necessarily need to be cleaned, but they would likely need a fresh coat of paint every few years depending on wear.

The weight of the furniture pieces and planters deters theft, but additional anti-theft measures may include chaining the pieces together or bolting them to the asphalt, either permanently or on a nightly basis. If nightly, volunteers who live near each stop may be recruited to lock down furniture at night and unlock furniture in the morning. An incentive could also be given to volunteers who help maintain the stop, such as vouchers for local businesses.

Further Exploration

There are plenty of opportunities for further exploration in regards to the final solution. One opportunity is assessing how this space functions in adverse weather conditions, namely rain and snow. Further testing regarding the accessibility of the stops is also needed: Is there enough room for older adults to get around? Can they get in and out of the benches? Is the stop wheelchair accessible? An additional opportunity for exploration is consideration for the exact location and number of bus stops, which depends on the route for the Community Connector route- another space that is not fully developed yet. Another important element that has not been designed yet is signage that would indicate that these are bus stops for the Community Connector service. Lastly, once the stops are in use it would be interesting to evaluate how they are being used. Do the stops do their job to encourage socialization, or is additional programming needed?

Impact

The Community Connector bus stop system supports the Community Connector service and its tenets of mobility, social connection, and sustainable practices by providing older adults with a casual and comfortable place to wait for their bus. The Community Connector provides those who cannot drive with the opportunity to get around without relying on friends or family to drive them places. The system makes the transition away from driving easier for older adults who are nearing the age where it is no longer safe for them to drive. It provides seniors who still can drive with a more leisurely and sociable alternative, and reduces the number of personal vehicles on the road, producing fewer emissions and making Upper Arlington a safer, greener, and more enjoyable city to live in.

This project began with a focus on designing bus stops that provided older adults with a place to socialize with one another, but over time it evolved to become not just a bus stop, but a place to meet with friends and neighbors of all ages. The bus stops are designed for implementation in the city of Upper Arlington specifically, but the concept could easily be adapted for implementation in other towns. The project opens up an opportunity to explore future evolutions of bus stops that address the unique social and economic needs of all kinds of communities locally, as well as in a much broader context.

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