

Charge on the go, with Micro.

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Design Proposal

Encourage the widespread use of electric scooters such as the Emicro One as well as reinforcing the fact that electric scooters are a useful and convenient urban transport option. Establish a Micro exclusive “world first” approach to convenience and urban mobility by providing a service which is effective in encouraging the use of Micro scooters in Wellington.

My aim is to design & develop a complimentary charging service for Micro customers, which can be installed around Wellington’s CBD. This service will offer a convenient and appealing way to charge Micro electric scooters, as well as offering an area to rest and socialise. Micro already go over and above by offering a spare parts service for all of their scooters, as well as taking a world leading/pioneering approach to scooter development and urban mobility. My aim is to design with these two brand values in mind to develop a free charging service for Micro customers.

Micro recharge station

The most promising design concept which I arrived at after the completion of projects 1 & 2 was a public bench which incorporates a built-in charging system, powered by renewable solar energy. This recharge bench concept is intended to support the first & last mile philosophy of Micro Mobility by providing Emicro users with the option to charge their scooter on the go.

The bench is designed to fit within Wellington’s shared spaces, for instance Cuba Street. Such areas of Wellington are frequently used by pedestrians and cyclists and form some of our city’s vital transportation links.

The solar panels which provide electricity are positioned overhead, and act as a sun shelter while also providing the necessary surface area to absorb sunlight. The aesthetic for the bench and solar tower are a typical urban concrete & slatted wood design with the metal work made from galvanised steel. The electronics and battery cells to store energy long term would be housed within a cement housing, so they are not able to be tampered with or stolen. The scooter is parked standing up with a frame to support it. The owner is then able to sit down on the bench and read the paper or browse the internet while the scooter charges.

This early concept still needs refinement as there are some significant issues with the design. The main problem is the security of the Emicro scooter which is being left for a long period of time, possibly unattended. Also, the solar panels would need to be significantly larger than they are in the concept render.

It was suggested that the large surface area required for the solar panels may be taken advantage of and used to create a large shelter which protects the bench and the user from the weather.

Recharge station interaction scenario

A patron who we will call Mike is using his Emicro scooter as a convenient mode of urban transport to reach his favourite coffee shop. Mike travels all the way from Aro Valley to the preferred coffee shop near Cuba Street with the Emicro set to sport mode (high speed + and drains the battery). The regenerative braking on the Emicro does help to conserve some battery power, however Mike finds a significant portion of the power has been drained along his journey.

Mike orders his coffee to takeaway, and heads over to lower Cuba Street to sit down. It is there that he notices a charging bench, specifically for Micro scooters. Mike is able to charge his scooter while he drinks his coffee and checks his social media. After a 15-minute stop, he has finished his coffee and his Emicro has gained around 25% of a full charge.

Pictured below are the early concept renders, front and side views detailing interaction details and functional components of frame which supports the scooter during charging.



Charge on the go, development.

Designing for comfort & usability

In the previous stage of the design, the bench had been designed to charge 3 scooters while providing space for up to 2 people to comfortably sit. With this error in mind, I worked on designing the bench to provide enough room to seat all of the people who may be using it any given time, as well as ensuring it provided enough space for further activities such as having lunch, reading a book or doing work on a laptop. I looked to pre-existing benches on Cuba Street for inspiration and found two main examples; the red Cuba bench and the flat cement benches on lower Cuba street (pictured below).

The red Cuba street benches feature an ergonomic design which supports the lumbar and thoracic regions of the spine, making this bench suitable to be sat down at for a longer period of time. The second bench is the flat cement bench found on lower Cuba street. These benches are positioned beside the road where the Cuba street night market held. Although they may not be suitable for a long stay, the large flat surface makes it suitable for eating food or drinking. With inspiration from these precedents I arrived at the concept below, which aims to fuse the versatility of the two bench styles together, providing users with the option to sit at the more supportive slatted bench or to sit on the flat cement area.

The slatted section of the recharge bench is recessed at a slight angle, allowing a comfortable decline when the user sits down. The flat section of the bench does not have any incline and therefore is slightly lower than the slatted section, making it easy to sit at for an extended period of time. The bench also features a section which may be used to hold a backpack or groceries while the user is resting. The steel sections were designed with the use of galvanised sheet steel in mind, with the form being brake pressed or bent into the desired shape. The wooden slats could then be bolted into place through the steel support.

Designing for scooter security

With the ability to leave your scooter unattended as it charges, it is important to ensure that it can be securely locked up until the owner is ready to retrieve it. For this reason, the bench has been designed to use a locking system to keep the scooter safely contained for a set duration of time. The system is comprised of several locking doorways which each lead to a cavity beneath the bench in which the scooter is charged and housed. This keeps the scooter protected from weather and from potential theft or vandalism.



Charge on the go, development.

Individual locks

Since it is possible for many different people to come and go while using the recharge station's locking system to secure their scooter, the method for locking the scooter would need to be resettable for each person. For this reason, using a digital locking system which connects to the user's smartphone via an app may prove to be the best option. Such a system may also be used to alert the user when their scooter is fully charged and when there are other people waiting to use the recharge station.



QR code located on recharge station can be scanned to "set" the lock with your smartphone.



The location & lock status are displayed on your smartphone through the app's user interface.



Your Emicro's charge status is updated in real time via CBD Wifi, along with estimated finishing time.



When the user returns, the scooter can be unlocked by using the app, to ensure nobody else has access.

Compartments for charging

Since the scooter may be left for a long period of time during charging, the compartment would need to be weatherproof and unable to be tampered with, to keep the scooter safe & secure. It is for this reason that the cement foundation of the bench would act as the impenetrable housing for all electrical components including battery cells, charging equipment and each customer's scooter. Along with the smartphone locking method, each doorway would be protected against theft or vandalism by using double thickness galvanised steel (10mm or more) to create an extremely durable theft proof container for the user's scooter.



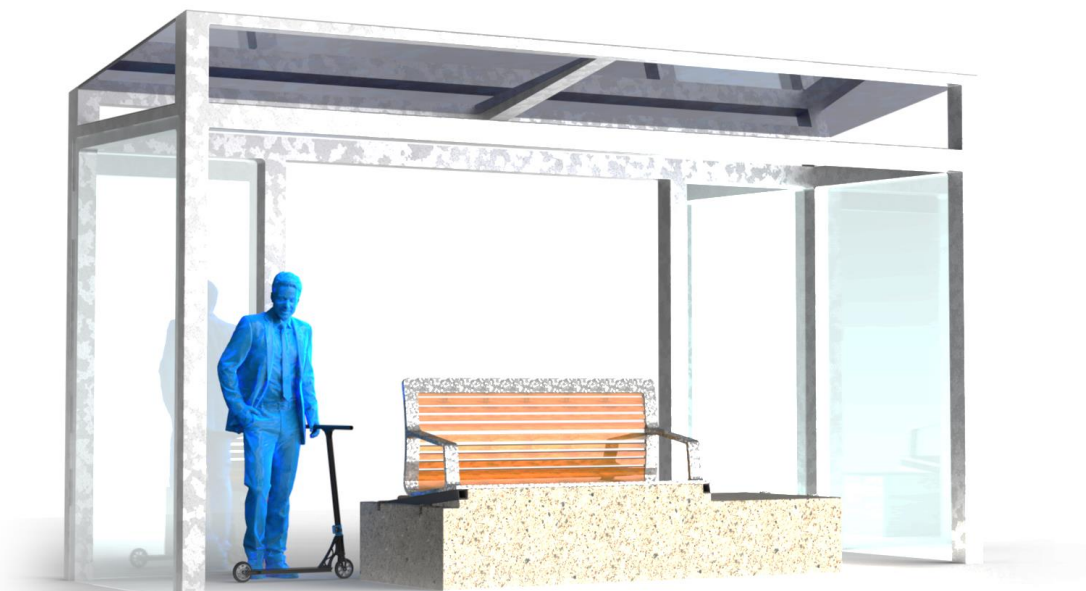
Charge on the go, development.

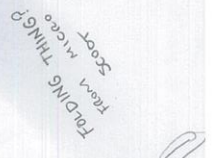
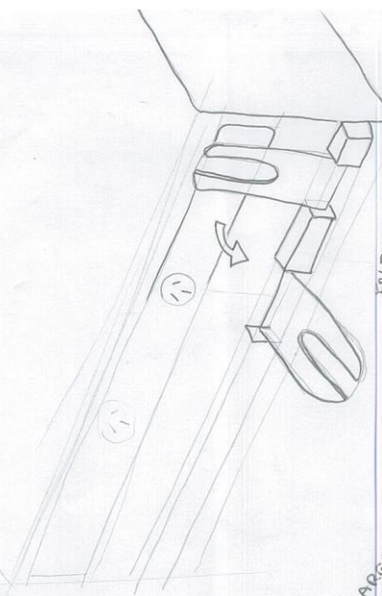
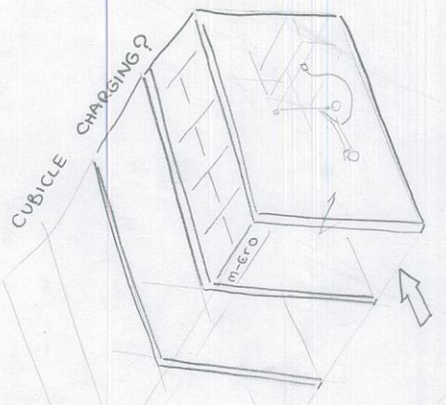
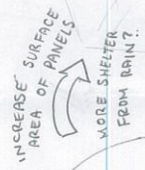
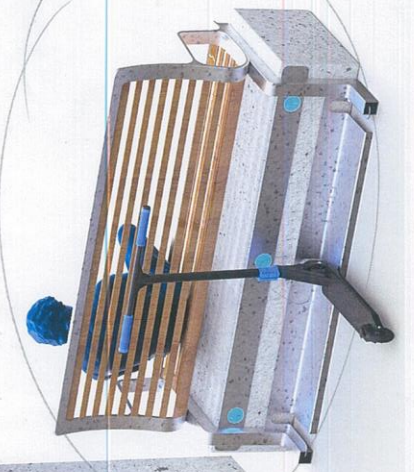
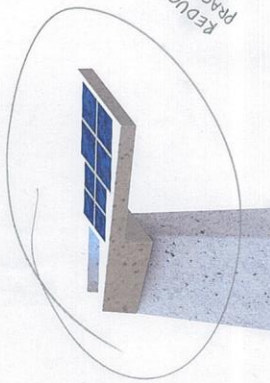
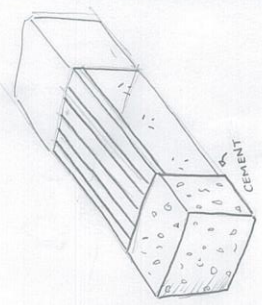
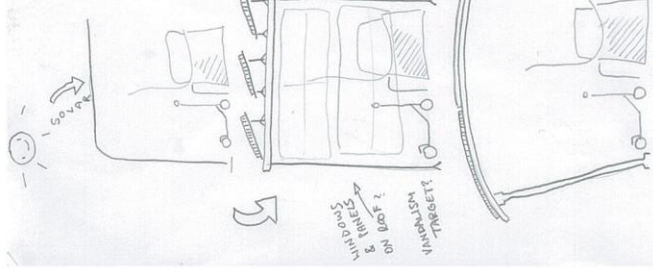
Solar panels

To power the recharge station, the electricity would be sourced renewably and stored in a battery bank housed beneath the bench. Due to the large surface area required from the solar panels, they will be incorporated into a shelter that would look like a bus stop, which will shade the user and protect from the wind & rain. The shelter would need to allow enough room for the user to access the back section of the bench, so an accessway would need to be incorporated into the design so there is plenty of space to move the scooter in & out. The solar panels would need to be positioned correctly to make best use of sunlight, and this may determine the actual placing of the recharge station on Cuba Street. It would need to be in an area which is exposed to a lot of sunlight in order to gain the most benefit of free energy. The solar power may also provide electricity for users to charge their smartphone which will ensure they are always able to use the app to access their scooter. There may also need to be a backup power options such as offsite solar panels, possibly positioned on building tops in order to boost the total amount of electricity available for charging or for storage in batteries. Or, for worst case scenario, electricity may need to be drawn from the electrical grid for situations where no power can be generated by the solar panels.



The iterations above demonstrate the various configurations possible for the solar panels, with a simple overhead cantilevered design, through to a fully inclusive shelter with windows included for more protection from the elements. These iterations were designed with the use of general structural steel in mind, H beams & T beams for the cantilevered design, and box section & H beams for the other concepts. It may be possible to incorporate Micro's branding into these shelters, especially on the far-right concept which offers the large flat surfaces which could be used to display information about how to use the recharge station, as well as information about Micro as a brand; for example, their website and store location on Garrett street. As an advertising method, it may also be interesting to use QR codes to link users to the Micro website.





put ya' backpack
there while
you sit down

Could serve as
a table?

WOODEN SLAT

ALTERNATIVELY
FLAT SEATING
AREA ALSO
AVAILABLE

GAUL STEEL SHEET
5mm

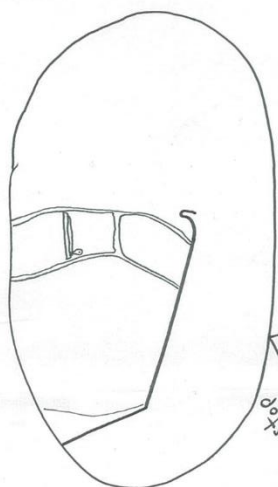
MILD STEEL
SECTION
GAIL BOX
140mm

Reduced Seated
140mm
400mm

BACK VIEW

FRONT VIEW

CEMENT BASE

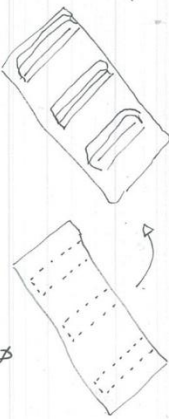


Small lip on it to stop
your bag sliding off
you want white
order backpack go
area to store

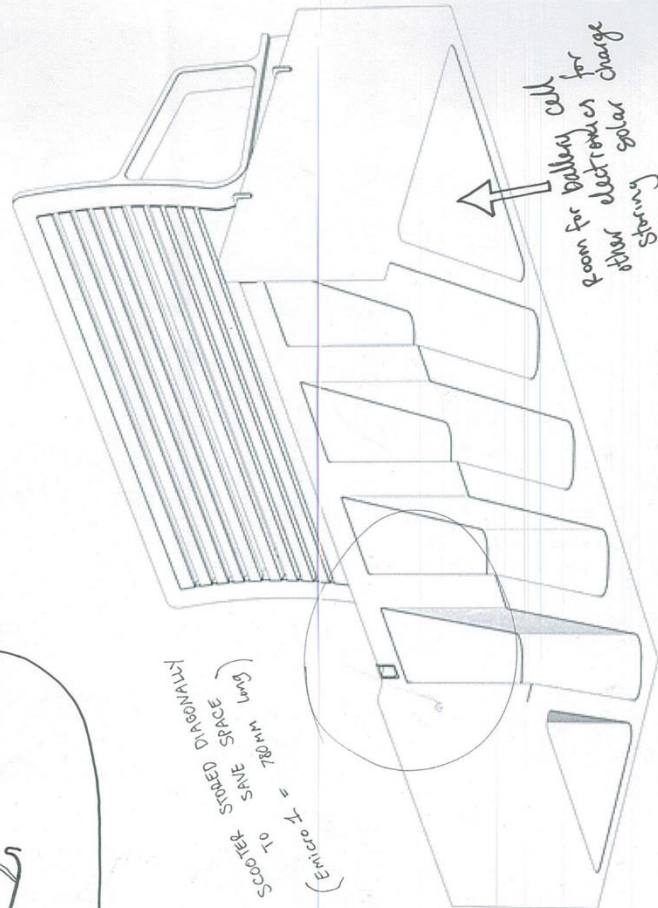
SCOOTER STOOD
DIAGONALLY
TO SAVE
SPACE
(Emilio L. = 700mm long)

STOP SKATEBOARDERS

SECTION FOR BAGS: 15mm gaul steel
& then bent (back press) into shape
Could be at front of bag



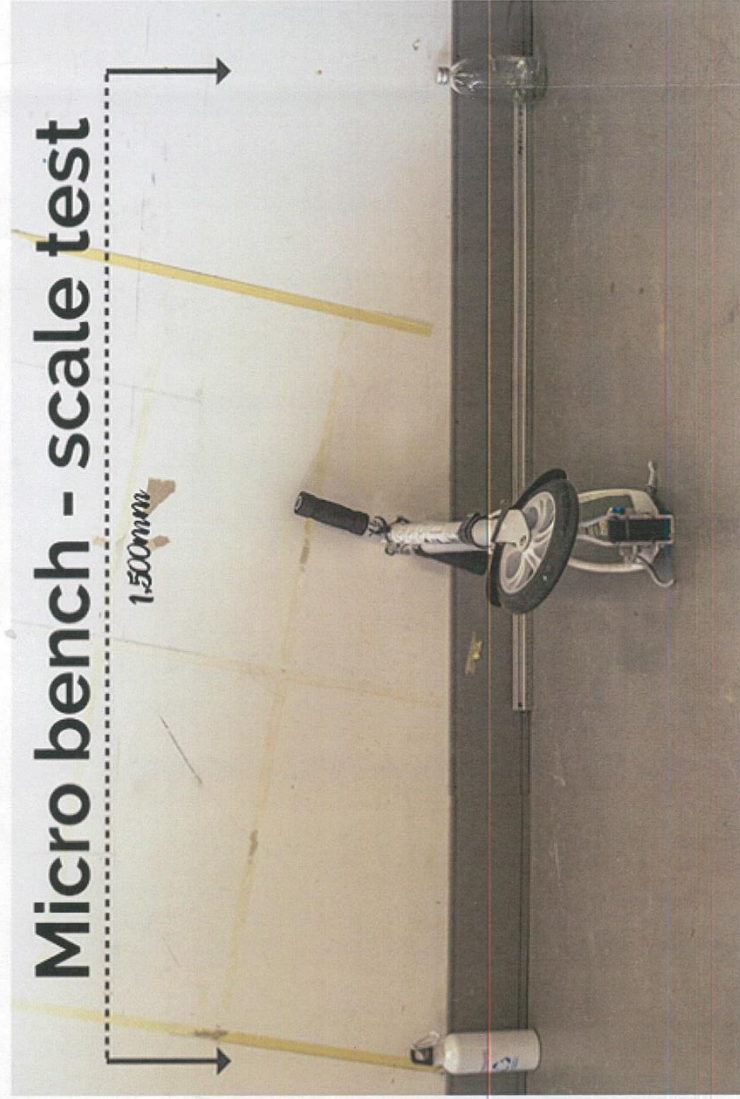
room for battery cell
other electronics for
solar charge
storing



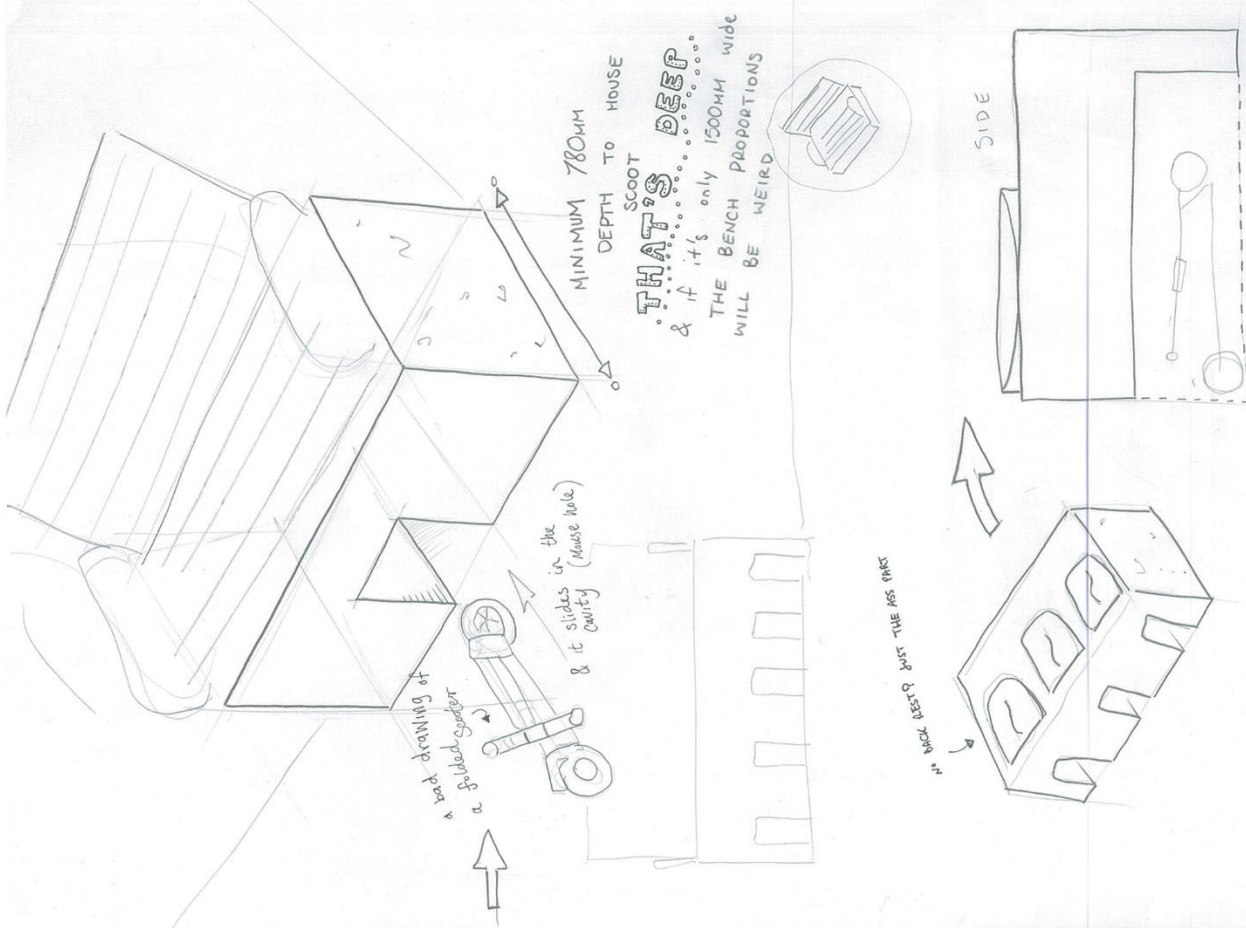
eMicro technical specifications

Motor power	500 Watt
Torque	4 Newton metres
Battery capacity	36 V, 2.2 Ah (82 Wh = portable in an aeroplane)
Charging time	1 hour
Weight	7.5 kilograms
Dimensions	780 x 490 x 995 mm
Dimensions folded	780 x 490 x 250 mm
Maximum load capacity	100 kilograms
Wheel size	Front wheel: 150 mm; Rear wheel: 120 mm

Micro bench - scale test



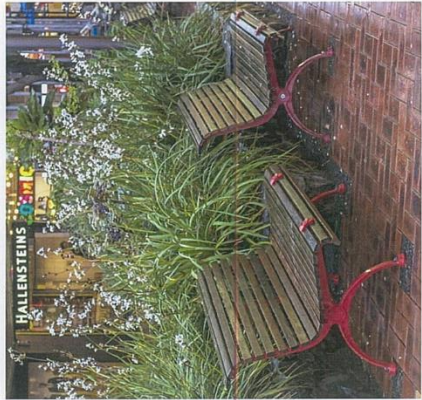
NOT
EMILIO
BUT
SCALE
SIMILAR
REPRESENTATION





↑ GREAT TO SIT DOWN & HAVE FOOD
BUT NOT OVERLY COMFORTABLE

↑ COMFORTABLE FOR A LONG
STAY BUT NOT GREAT
FOR FOOD OR LAPTOP



FLAT CEMENT BENCHES LOWER CUBA STREET

APPROPRIATE FOR A QUICK SIT DOWN
ROOM TO HAVE YOUR LUNCH OR DINNER - CUBA STREET NIGHT MARKETS
ROOM TO PUT YOUR BAG DOWN OR OPEN A LAPTOP
SIMPLE CONSTRUCTION

STRONG AND LESS OF A TARGET FOR VANDALISM OR WEAR & TEAR
CAN BE MOVED AROUND AND USED AS A BARRICADE IN SHARED SPACES

MINIMAL | CEMENT | SPACIOUS | DURABLE

CUBA MALL RED BENCHES

APPROPRIATE FOR A LONGER REST
ERGONOMIC LUMBAR & THORACIC SPINE SUPPORT
COMPLEX CONSTRUCTION, LEGS ARE DIE CAST
MULTIPLE MATERIALS & FIXINGS
ATTACHED TO GROUND - STATIC
EXCLUSIVE TO CUBA STREET

WOOD | COMPLEX | ERGONOMIC

Context area for M-Cro bench

- Cuba St.
- near Micro shop
- commuter passage
- shared space
- even if people just use the bench to advertise Micro's brand name in Cuba St.
- sit, it could still other benches in Cuba St.
- there are a lot of users to sit on.
- there are non-scooter for

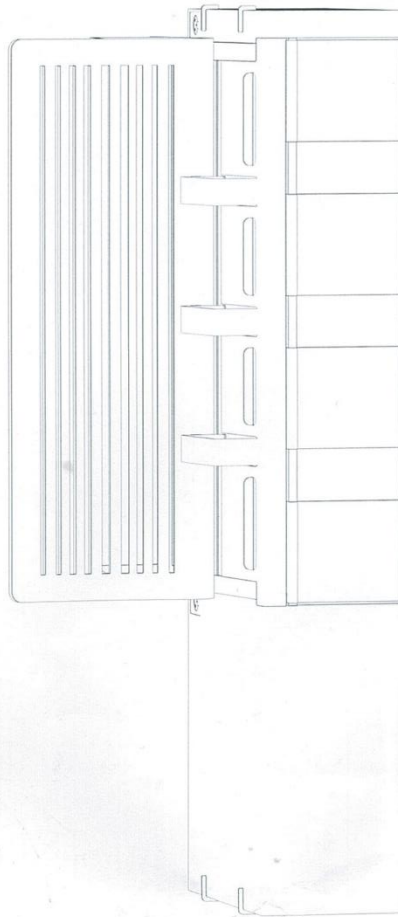
MINIMAL COMPLEXITY WITH
ASSEMBLY OF PARTS BY USING
STANDARD BENT SHEET METAL
& CAST CEMENT + WOOD

INSPIRED BY THE TWO
"BENCHES" THAT COMMONLY
EXIST IN CUBA STREET
BENCHES

INCORPORATE A PARTICULAR ELEMENT WHICH
MAKES IT KNOWN THAT THIS IS A M-CRO
BENCH. eg BEANDING, LIGHT ETC.

STILL NEED TO RESOLVE
DOORWAY & LOCK
- SHAPED
- REID

BACK VIEW



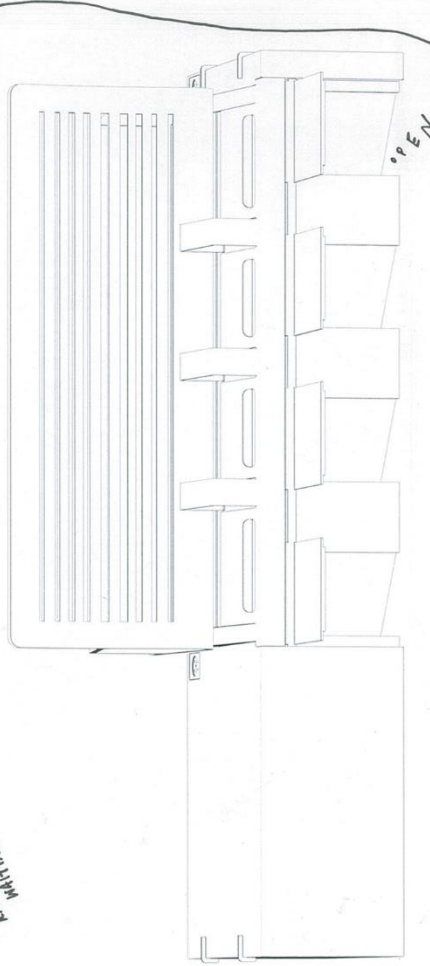
ENTRANCE / LOCK UP FOR SCOOTER
INDIVIDUAL DOORWAYS WHICH LOCK
- WITH ELECTRONICALLY CONTROLLED
SOLENOID SWITCH

CHARGE TIME ON EMICRO ONE = 60 MINS
DOOR MAY AUTOMATICALLY OPEN AFTER
THE TIME LIMIT TO DISCOURAGE
CUSTOMERS FROM LEAVING SCOOTER
TOO LONG

IF A BENCH FILLS UP, A NOTIFICATION IS SENT TO ALL ACTIVE USERS SO THEY KNOW OTHER PEOPLE ARE WAITING

APP COULD USE GPS DATA IF THE USER MOVES FURTHER AWAY, THE TIMER INCREASES TO 90 MINS (10 MINS FURTHER)

THE APP COULD COMMUNICATE WITH THE BENCH, SEND INFO ABOUT CHARGE TIME, GPS DATA



USE RFID TO OPEN LOCK

CUSTOMERS COULD SIGN UP TO "MICRO LOCK LOYALTY ACCESS KEY"

PEOPLE MIGHT JUST LOCK THEIR SCOOTER ALL DAY WHILE AT WORK ETC.

EVERY DOORWAY HAS A UNIQUE QR CODE WHICH CAN BE SCANNED BY m-cro LOCK APP, USER CAN USE MOBILE PHONE TO SET LOCK & UNLOCK.

- IF YOUR PHONE DIES, YOU MAY LOSE ACCESS? UNLESS A TIMEOUT OF 60 MINUTES

IF YOU LEAVE YOUR SCOOTER & CAN'T GET BACK WITHIN 1 HOUR, YOU COULD EXTEND THE TIME LIMIT FOR EMERGENCY.

