

ECO- STOP

Urban Design Out of Recycled Materials Promoting Eco-Consumption

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UNIVERSITY OF TECHNOLOGY

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Master Thesis at Chalmers School of Architecture

Master Programme of Architecture and Planning Beyond Sustainability

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ABOUT AUTHOR

I am Yanyi Zhang. I come from China where I grew up and did my bachelor in Landscape Architecture and Engineering at Nanjing Forestry University. I started my master study in Chalmers since 2015 and had been involved in various studios. During this period, I have been to cities around Europe and Africa, working together with local organizations and Universities with different projects. I stepped further to know the world of 'sustainable' and 'recycle', which gradually formed my thesis.

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Chapter 1.0

INTRODUCTION

Rapid consumption has brought with huge wastes. The habit of take-away food has added up to the growth of disposable products. Gothenburgs consume more than 2 cups of coffee per person daily, among which many coffee to-go. This phenomenon attracts me and becomes my initial approach of looking into waste recycling in my research.

This proposal is aimed at molding an 'Eco-stop', which initially start up with the trend of less to-go coffee cups consumption by serving personal coffee bottle refilling rather than selling with paper cups. It brings in the fact and solutions behind the market, as well as recycling solutions of local society. Step further, the design also calls for an activity of 'shopping with less or no packaging'. The temporary infrastructure applied a regenerative playground in Brunnsparken that invites everyone to come and have a good time.



Figure 1. A Visual Survey of NYC Coffee Cups (Henry Phillips, 2016). CC-BY.

ABSTRACT

Gothenburgs live on coffee, popular for their 'Fika' tradition. Cafe clusters along roads, brings a mixture fragrance of coffee and deserts. Rapid pace of city life generates a habit of buying 'to-go' products. Thus, a typical kind of waste, disposable coffee cups derive from this consumption. This item together with other inside coating packages are concluded as 'paper packaging waste'.

How does the paper packaging waste being recycled? A research for design method start from broad view of waste and its management worldwide, then gradually zoom in to specific paper packaging waste and recycling based in the local context of Gothenburg. The approach highlights the recycled materials by their practical utilization in the design.

Located in center Brunnsparken, the project enjoys a vivid atmosphere of activities, transportation, retails, busy current of people and etc. The proposal creates an Eco-stop neighboring to other functions (e.g. cafes, bars, library, retails only use recycled materials). It is aimed at promoting eco-consumption through an activity of 'shopping with no packaging' in the pavilion built up by recycled materials. It also meets the vision of Gothenburg city of creating the best city in the world in the rain.

In this design, recycling is not only an altitude, but also seen as a concept of educational role. Possible exhibitions and other public functions supporting vibrant public activities in the site.

Examiner: Emilio Brandao

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PURPOSE

The purpose of this project is to explore how paper packaging waste is being recycled. The result of the research generates the idea of using recycled materials for construction in the design.

AIM

It is aimed at promoting eco-consumption through an activity of 'shopping with no packaging' in the pavilion built up by recycled materials. To achieve that, the cafe in the Eco-stop offers a service of refilling your own coffee bottles instead of using paper to-go cups.

RESEARCH QS

The researches are followed by questions listed below:

- What is the current lifecycle situation of disposable coffee cups in the context of Sweden?
- How to design a public space that promotes the idea of eco-consumption?

METHODS

- 'Research for Design' as the main method, while merging 'Research by Design' sometimes in need of
- Case study of waste recycling and recycled material utilization
- Study visit of Stena Recycling AB, and Ecocentrum
- Research on the solution of distributing disposable paper cups (and similar wastes of paper packaging waste group) based in Swedish local context
- Site selection by evaluation, site visit and study insitu
- Literature study
- Reference projects and documents

FOCUS & DELIMITATIONS

FOCUS & SCOPE OF ACTION

- Choose one certain waste.
- Focus on the contrast between installation and landscape, instead of planting diversification.
- Interaction with city life.
- Try to find an organization or a group to cooperate with.

DEFINE AIM & RESEARCH FIELD

- The proposal aimed at triggering environmental lifestyle via an epitome of reality.
- Research field: people's daily activities, waste, mapping environment.
- Test field: materials and form of installation cooperate with waste, city, people and planting.

SUSTAINABLE DISCOURSE

- Reservation & Transformation
- Materials & Installation construction
- Weaving relationships with daily city life

READING INSTRUCTIONS

The project is initially raised from to-go coffee cups, a frequent seeing product in our daily lives. It then generates to broader views of the relevant issues of urban waste, recycling process and recycled materials which can benefit for architecture utilizations. The process is carried out under a research for design method with referenced cases, study visits and etc. In connection with a local context of Gothenburg, the project site is chosen after city-wide analysis and cross-comparison among small areas. The design ideas and strategies of Eco-stop come from the overall researches and analysis. It is an experimental unit of temporary existence which longing for further exploration in other projects and places.

Chapter 2.0

BACKGROUND THEORY OF URBAN WASTE RECYCLING

Waste is expensive. Recycled materials generate from waste benefit our environment as well as constructions. The reutilization of materials save a lot of expense, natural resources, and create unique characters compared with first-handed ones. Generates from disposable coffee cups, an exploration of the recycling process behind paper packaging materials is carried out.

2.1 DEFINITIONS

With increasing needs for industrials and manufacturing, the consumption of raw materials are expanding. While some of them can be regenerated, the vast majority are non-renewable. For sustainable reasons both ecologically and economically, reusing resources is a must trend now and in the future. There are 3 common words when mentioned my topic, and below are their definitions:

WASTE

- Unwanted material left over from a production process, or output which has no marketable value. Process or materials that do not (from the viewpoint of the customer) add value to a good or service. (Business Dictionary, 2018)



Figure 2. Waste. Author's own copyright.

WASTE MANAGEMENT

- The collection, transportation, and disposal of garbage, sewage, and other waste products. Waste management encompasses management of all processes and resources for proper handling of waste materials. (Business Dictionary, 2018)



Figure 3. Waste Management. Author's own copyright.

RECYCLING

- Waste minimization strategy in which reusable materials are recovered from a waste stream, and put to the original or different use. (Business Dictionary, 2018)



Figure 4. Recycling. Author's own copyright.

2.1.1 FACTS BEHIND URBAN WASTE

- Europe creates about over 1.8 billion tons of waste each year. This means each person creates about 3.5 tonnes on average. (All about waste, eSchoolToday, 2017)
- In 2010, Americans generated about 250 million tons of trash and recycled and composted over 85 million tons of this material, equivalent to a 34.1 percent recycling rate (see Figure 1 and Figure 2). On average, we recycled and composted 1.51 pounds out of our individual waste generation of 4.43 pounds per person per day. —EPA, USA. (All about waste, eSchoolToday, 2017)

Nowadays, people have sorted waste into hundreds of different categories. However, it does not mean that all these aspects are recycled. Some of them are under well processing, e.g. aluminium and iron, plastic bottles and wood. Others are being calculated into 'disposable waste' which cannot be recycled as valuable as origin, and most of them end up in landfills.

Municipal waste landfilling rates in 32 European countries, 2001 and 2010

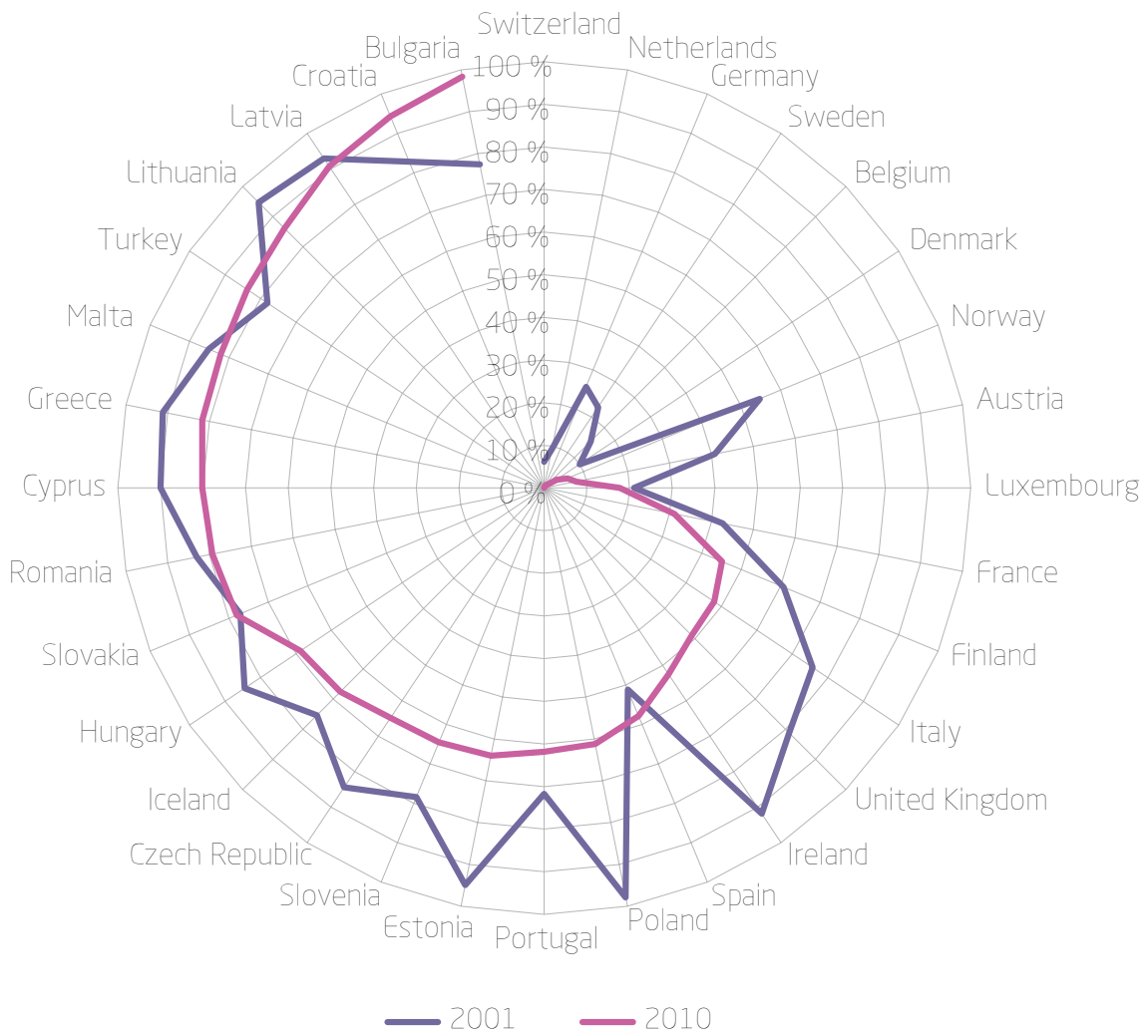


Figure 5. Municipal waste landfilling rates in 32 European countries, 2001 and 2010 (EEA, 2013). CC-BY.

According to the Swedish situation nowadays, most waste is burned down for energy, and sometimes even buys in waste for burning. This explains the low land filling percentage shown in the above table. However, it is uncertain to tell whether a good method or not to burn all types of waste.

Why should we avoid sending waste to landfills?

Diverting waste away from landfills prevents pollution that can harm our health and the environment. Reducing, re-using and recycling waste can bring economic gains and secure access to critical raw material. More jobs at higher income levels are also created by recycling than by landfilling or incinerating waste. (EEA, 2016)



Figure 6. Why should we avoid sending waste to landfills (EEA, 2013). CC-BY.

2.2 SWEDISH RECYCLING BACKGROUND

Five-Point Program

From 2014-2020, the Swedish Government has adopted higher recycling targets which can briefly entailed into 'Five-point Program' below (FTI, 2014):

- Recycling stations. A clear focus on the refurbishment and care of recycling stations. (FTI, 2014)
- Curbside collection services. A focus on expanded curbside collection services for households, up to 50 percent. (FTI, 2014)
- Partnerships. Clearly defined partnership agreements with all of Sweden's 290 municipalities. FTI also aims to continue implementing various development and partnership projects with municipalities and other stakeholders. (FTI, 2014)
- Quality control. Regular quality assessments along the entire recycling chain, where household ratings serve as guidance for improvement. (FTI, 2014)
- Communication initiative. FTI aims to develop support for municipalities, to ensure that households receive effective information. (FTI, 2014)

Five categories waste recycled by FTI in 2014, and target by 2017 and 2020

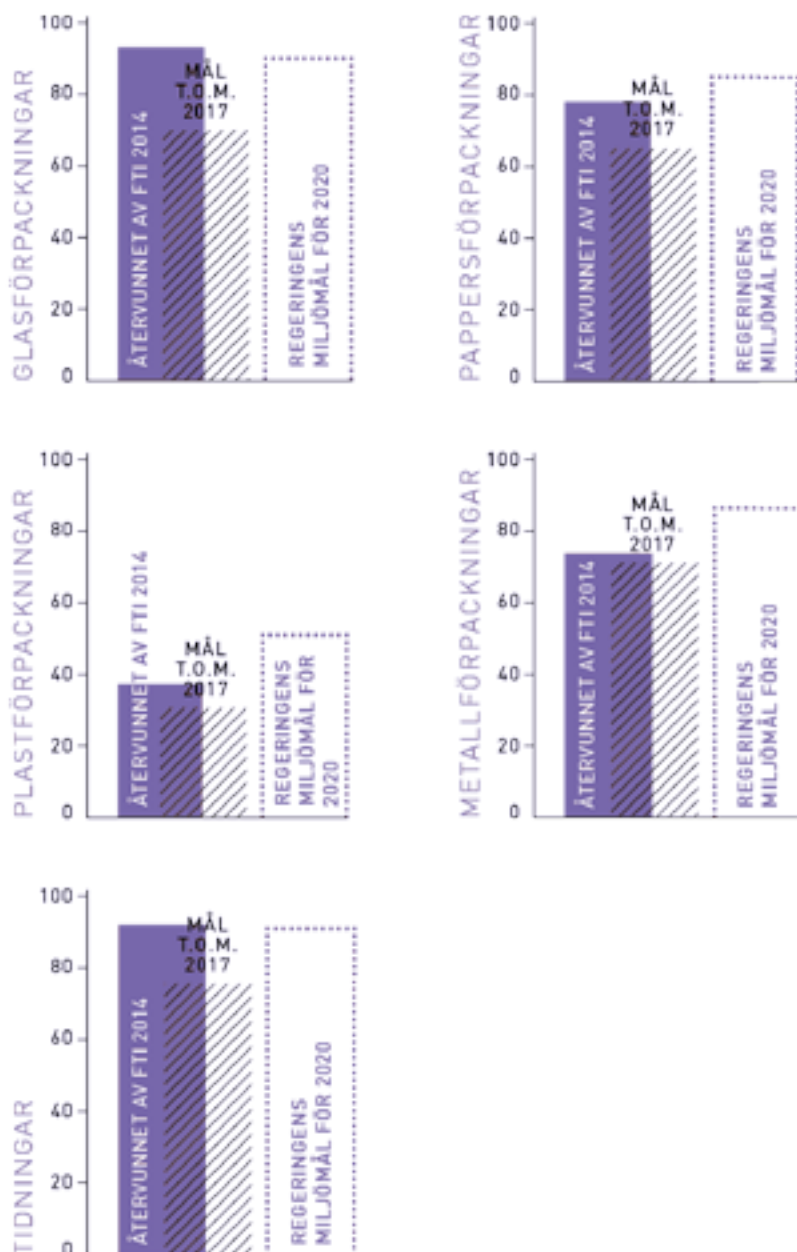


Figure 7. Five categories waste recycled by FTI in 2014, and target by 2017 and 2020 (FTI, 2014). CC-BY.

Reference Study - Stena Recycling AB

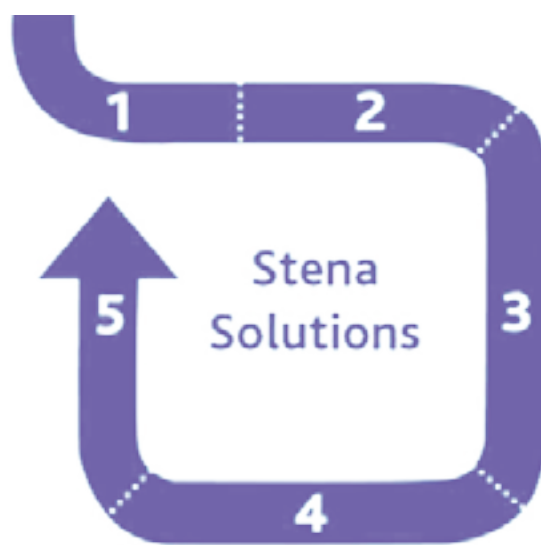
Stena Recycling basically handles all waste from Gekas, except combustible. In addition to corrugated board and plastic, 100 tons of metal are handled, all hazardous waste, fire extinguishers, aerosols, chemicals, waste oil, packaging and transport of games from packaged foods. (Stena Recycling AB, 2017)

"Waste is expensive."

IN ONE YEAR:

- About 25,000 tons of magazines and newspapers are returned for recycling. (Stena Recycling AB, 2017)
- The return volumes are a resource that saves 350,000 adult trees every year, which corresponds to a forest that is 1,600 football plans big. (Stena Recycling AB, 2017)
- 25 tons of soft recycled plastic are used to make new yellow boxes, while 175 tons will be manufactured to 2.7 million ordinary-sized plastic bags that sold at the stores. (Stena Recycling AB, 2017)
- 3,000 tons of corrugated board were recycled and became new cartons in 2016. (Stena Recycling AB, 2017)

Stena Recycling Solutions



- 1 Unique solution
- 2 Resource optimization
- 3 Training and information
- 4 All types of waste
- 5 Reporting and monitoring

Figure 8. Stena Recycling Solutions (Stena Recycling, 2017). CC-BY.

2.3 RECYCLED MATERIAL IN ARCHITECTURE

Architecture construction consumes lots of materials including water, electric, wood, brick and concrete distinguished from its typology. Correspondingly, it brings with horrible waste after tearing down or transformation. The construction wastes not only require huge spaces for stocking but also do harm to the environment. So, why not take advantages of waste materials to build up diversified architecture?

- RECLAIMED TIMBER

Age gives reclaimed timber more strength and durability. Been allowed to grow for a longer time, the rings in reclaimed timber are wider than in newer timber. There will also be more knots and other interesting markings to give the wood a unique and charming character. It also benefits for woodland animals for less cutting down trees. (Reclaimed Flooring Co., 2016)

- PLASTIC

The use of plastic materials such as carry bags, packing material etc. is increasing day by day as it is very convenient carrier to carry small things anywhere. Instead of being throw out as garbage, it can also used for producing perforated polymer concrete after heating, aggregating and blocking. (NBMCW, 2011)



Figure 9. Art out of recycled plastic trash (Carter Z., 2015).
CC-BY.

Reference Study - Shigeru Ban 's Paper Tube Structure

As an Architect who has been devoted working on simple, low-cost, recyclable shelters and community buildings for the disaster victims over 20 years, Shigeru Ban creates his own material of paper tube used widely around his constructions. It is recyclable, economical, light-weighted and easy-construct.

"When I started working this way, almost thirty years ago, nobody was talking about the environment. But this way of working came naturally to me. I was always interested in low cost, local, reusable materials."



Figure 10. Garage Center for Contemporary Culture Temporary Pavilion, Moscow, Russia (Shigeru Ban, 2012). CC-BY.



Figure 11. Football Pavilion (Shigeru Ban, 2014). CC-BY.



Figure 12. Paper log houses in Kobe, Japan (Shigeru Ban, 1995). CC-BY.



Figure 13. Paper emergency shelters for UNHCR Dyumba Refugee Camp, Rwanda (Shigeru Ban, 1999). CC-BY.



Figure 14. Paper partition system (Shigeru Ban, 2011). CC-BY.

Materials for build up temporary rooms:

- Paper Tube (Large/Medium/Small)
- White Canvas
- Pins, Clips

2.4 GOTHENBURG LOCAL CONTEXT RECYCLING & DISPOSABLE WASTE

*"The words Cafe and Culture could have been invented for
Gothenburg, on the west coast of Sweden."
- The Guardian, 2014*

The above sentence consists of my first impression of Gothenburg when I surfed on the city website before came to Sweden. With lines of cozy cafes where one can easily have a traditional 'fika', a habit of to go with your coffee has rooted in local's genes. After living nearly three years in this city, this custom naturally affects my daily life.

Another mind that built up all the way is the consciousness of recycling. Of course, as a student of Architecture and Planning beyond Sustainability, study life is surrounded by the words such as 'sustainable', 'eco', 'recycle' and etc. In spare time, recycling is also part of my daily life. Under detailed instructions on sorting and distributing, it is easy to do household waste management.

However, though much trained of waste management, there is still doubts on sorting specific items like the to-go paper coffee cups.

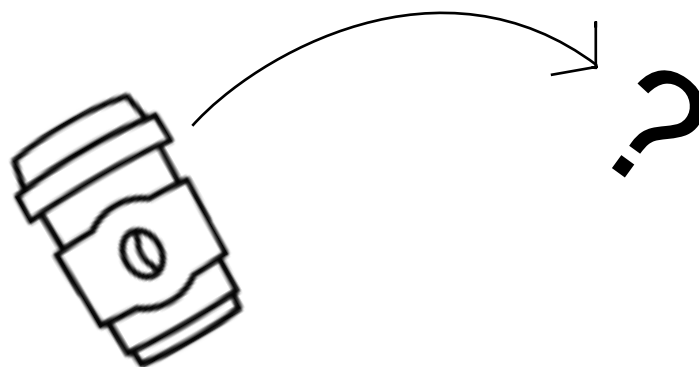


Figure 15. Where is disposable coffee cups' destination. Author's own copyright.

24.1 DISPOSABLE CUP CRISIS

In fact, people have already realized this severe issue that brings by our invention for convenience.

- Worldwide 'disposable cup crisis'
- More than 58 BILLION throw-away cups are sent to U.S. landfills each year. The cup trash can circle the earth 1,011 times. (Steelys Drinkware, 2013)
- More than 3 BILLION coffee cups are sold in Australia, and most of them are piling up in landfills. (Are takeaway coffee cups recyclable, choice.com.au, 2017)
- The UKs use 4,861 disposable paper cups a minute, which is over seven million a day and right now, less than one in 400 cups are recycled. (itsnicethat.com, 2017)

News has reported all over the world calling for turning to different choices, put recycling into process, as well as turning to new materials.



Figure 16. Disposable coffee cup (Executive coffee service, 2018). CC-BY.

24.2 SWEDISH RECYCLING SYSTEM

FTI, as mentioned before, arranges the collection and recycling of paper, plastic, metal, glass packaging and newspapers on behalf of their producers. The recycled bins in our communities are always marked as 6 main categories below. In addition, electricity, clothes, batteries, bulbs and other specific types are separate sorted from these main kinds.



Figure 17. Paper Packaging (FTI, 2017). CC-BY.



Figure 18. Plastic Packaging (FTI, 2017). CC-BY.



Figure 19. Metal Packaging (FTI, 2017). CC-BY.



Figure 20. Colored glass packaging (FTI, 2017). CC-BY.



Figure 21. Clear glass Packaging (FTI, 2017). CC-BY.



Figure 22. Newspaper (FTI, 2017). CC-BY.

24.3 PAPER PACKAGING RECYCLING IN SWEDEN

Fiskeby Board AB in Norrköping is the only manufacturer in Sweden that makes cardboard from waste fiber. Recycling paper is basically simple. The waste paper is sorted into different grades, mixed with lots of water and processed, and any contaminants are removed. Paper can be recycled 6 to 7 times before the fibers become too short to use. (FTI AB, 2017)

- Every third paper package in your grocery store is made from recycled paper packaging. (FTI AB, 2017)
- Using recycled paper packaging to make pulp and paper requires less energy. Only 1/3 of the energy required to produce new carton. (FTI AB, 2017)
- Approximately 20 trucks of waste paper are delivered to Fiskeby Board every day, both packaging materials and other waste paper. (FTI AB, 2017)
- FTI delivered 75,000 tons of waste cardboard to Fiskeby Board every year. Recycling saves huge amounts of energy. (FTI AB, 2017)
- Imagine a 3.7-meter wide roll that stretches all the way from Norrköping to Malmö. That's how much cardboard is made in Fiskeby Board every day from recycled paper packaging. (FTI AB, 2017)

How Paper Cups Are Distributed

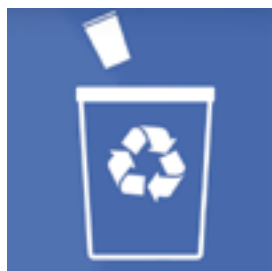


Figure 23. Collection of used cups (Cupcycling, 2018). CC-BY.



Figure 24. Sort and bale (Cupcycling, 2018). CC-BY.



Figure 25. Separation (Cupcycling, 2018). CC-BY.

After emptying coffee inside, the disposable coffee cups are collected in the waste bins around the city. Then the cups are delivered to the factory. They are sorted in different grades, mixed with lots of water and processed in the machine before baling into cubic paper bales at about 700kg each. Tepid water and paper bales are rotating together in the drum pulper. It works like the washing machine as paper and its coating are broken down and torn apart. (Stena Recycling AB, 2017)

2.4.4 DESTINATION OF COFFEE CUPS

After recognizing the cups' construction and the city recycling guidance, the disposable cups' recycling loop is quite clear. And it ends up becoming part of our daily packages in the markets.

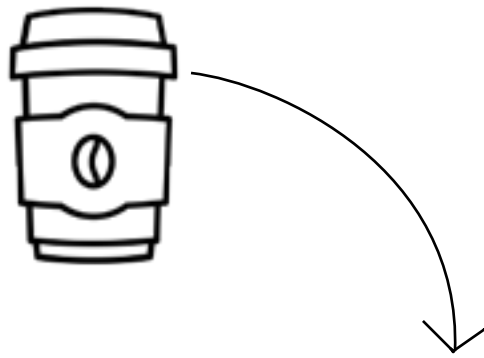


Figure 26. Disposable coffee cups return to the market. Author's own copyright.

Reference Project Study - G. F. Smith



Figure 27. From cup to paper (Guy Archard, 2017). CC-BY.

G. F. Smith working together with CupCycling Co. launches new paper made from disposable coffee cups. CupCycling Co. was created by James Cropper and is the world's first recycling process dedicated to up cycling takeaway disposable cups.

Chapter 3.0

CONTEXT ANALYSIS

Brunnsparken, Swedish for 'Well Park', is a central square in Gothenburg. It is seated in between Nordstan and Arkaden, sandwiched between two of the oldest local streets. Shopping center around made it one of the most popular meeting places in Gothenburg.

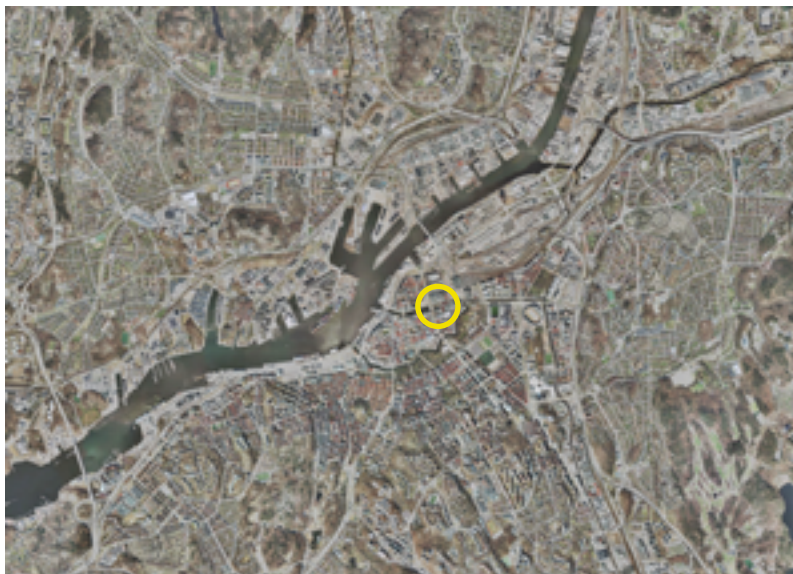


Figure 28. Brunnsparken area. Author's own copyright.

 Brunnsparken area

3.1 DESIGN PRELUDE

Vision for Gothenburg 2021

'By 2021 Gothenburg will be internationally known as a courageous pioneer in the field of sustainable growth. We are an innovative, open, inclusive city where all residents feel important and involved.'
- Goteborg Official

THE BEST CITY IN THE WORLD WHEN IT'S RAINING
- WATER AS A SUSTAINABLE RESOURCE

It rains on average every third day in Gothenburg. And with the climate change, the severe slopes will increase. Therefore, Gothenburg is aiming to become world-leading as a rain city, both in building a sustainable city that takes care of large amounts of rain and taking advantage of the rain's opportunity to provide unique experiences. (goteborg2021.com)

2018 GO GLOBAL

The ambition is that the whole city should be engaged in the celebrations. We prepare to welcome the world to Gothenburg and the Volvo Ocean Race. Gothenburg City Triennial provides a three-week consultation period. Planning begins for the anniversary year programme. (goteborg2021.com)

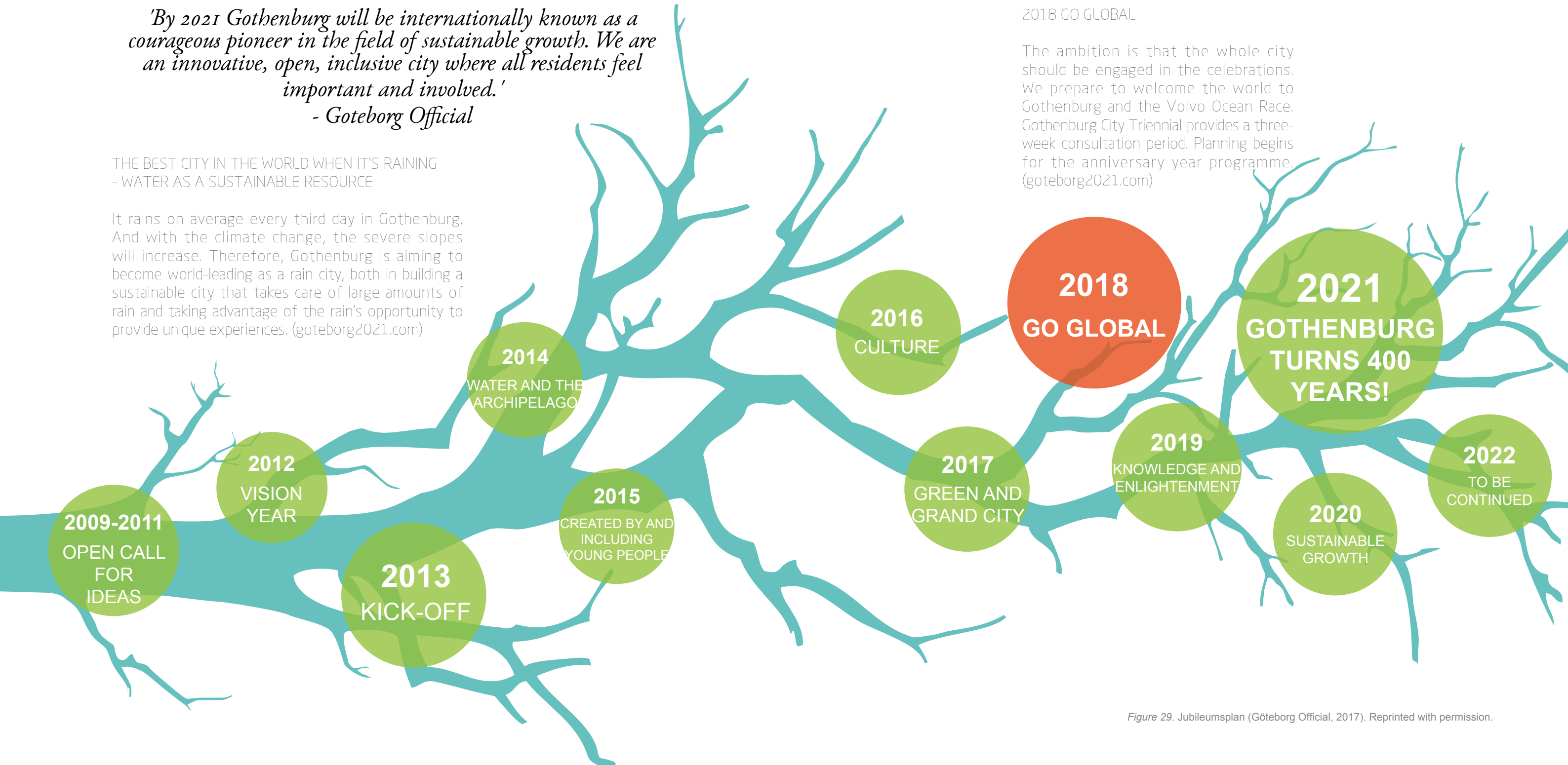


Figure 29. Jubileumsplan (Göteborg Official, 2017). Reprinted with permission.

3.2 DESIGN PHILOSOPHY

My design is aimed at building an Eco-stop that has strong connections stimulations with surrounding facilities, behaviors and environment. Emphasizing recycling materials by introducing the recycle loop of coffee cups in a coffee zone, the proposal is following a 'cradle to cradle' concept.

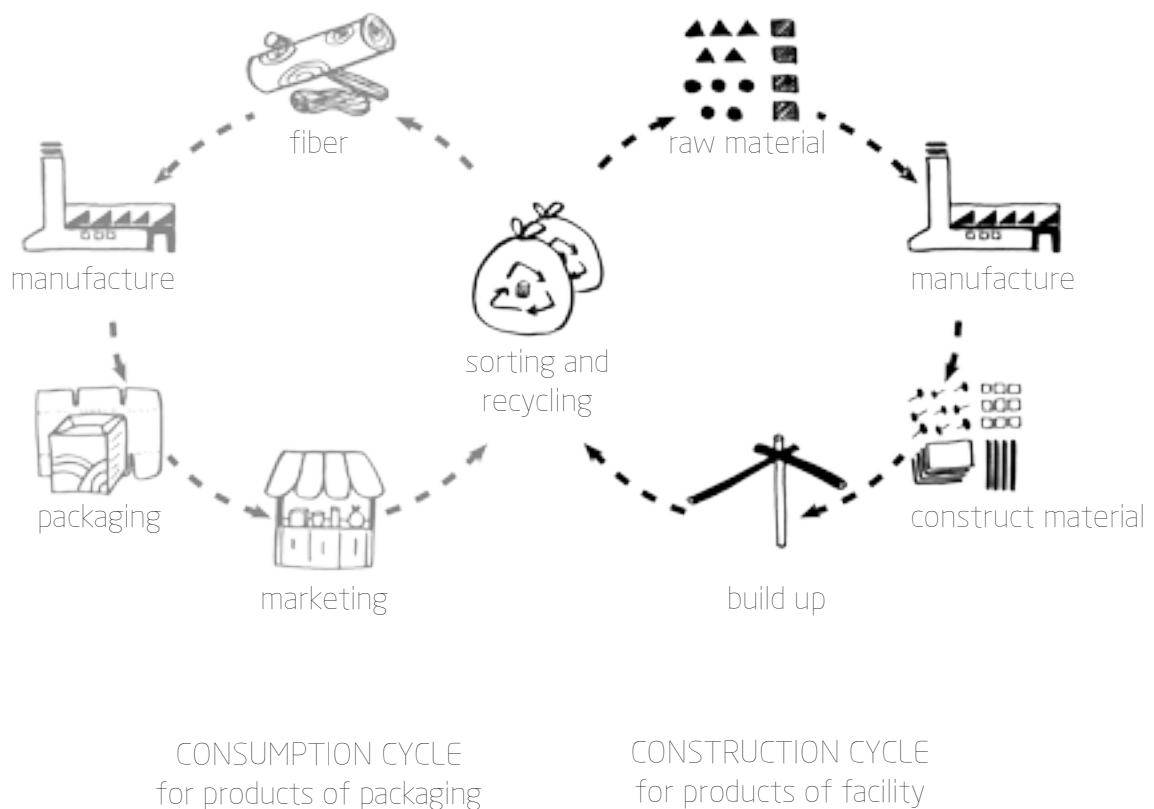


Figure 30. Design Philosophy. Author's own copyright.

3.3 EVALUATION OF 6 AREAS & SELECTION OF THE PROJECT SITE



Figure 31. Stenpiren, Gothenburg (Google map, 2018). Reprinted with permission.



Figure 32. Esperantoplatsen, Gothenburg (Google map, 2018). Reprinted with permission.



Figure 33. Saltholmen, Gothenburg (Google map, 2018). Reprinted with permission.

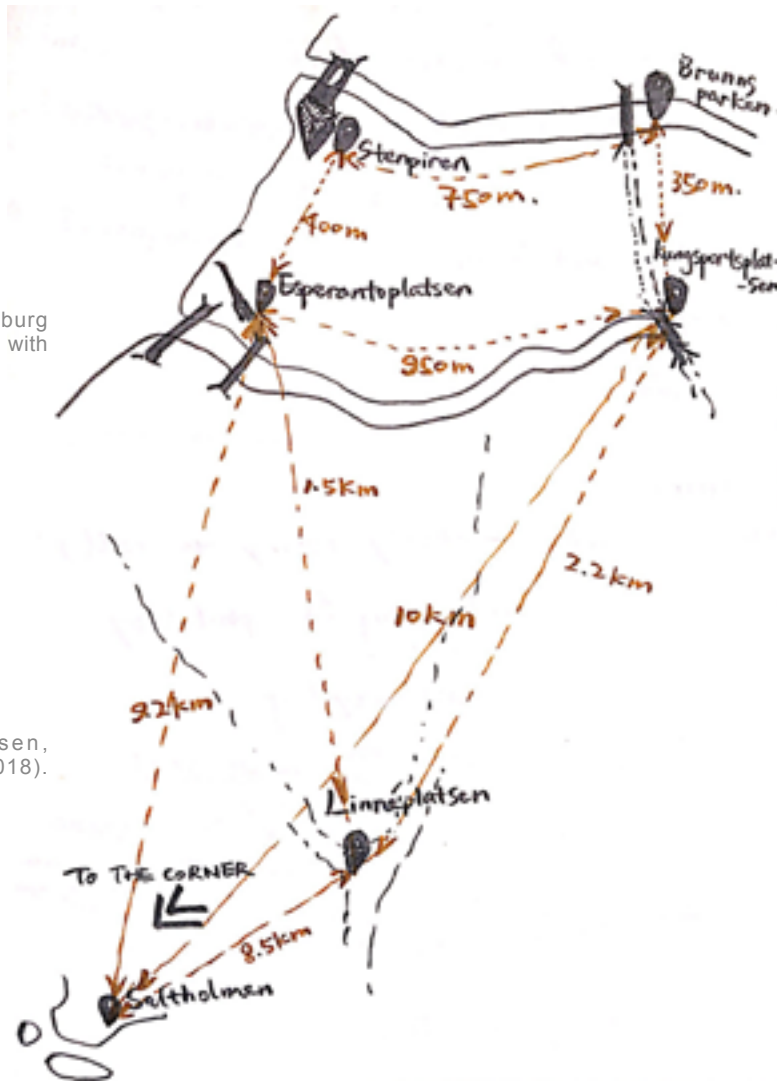


Figure 34. Brunnsparken, Gothenburg (Google map, 2018). Reprinted with permission.



Figure 35. Kungssportsplatsen, Gothenburg (Google map, 2018). Reprinted with permission.



Figure 36. Linneplatsen, Gothenburg (Google map, 2018). Reprinted with permission.

Evaluation of 6 potential areas

	Stenpiren	Esperantoplatsen	Brunnsparken	Kunssportsplatsen	Saltholmen	Linneplatsen
High demand for services (e.g. cafe)	High demand for services (e.g. cafe)	Not too much as a simple transportation hub.	Not too much as its original nice restaurant atmosphere.	High demand as large flow passing and stay.	Not too much as close to the walking zone with plenty.	High demand as compact current wait. Simple kiosk is enough for the service.
Noise	Varied.	Average.	High.	High.	Varied.	Average.
Places to sit in & out	YES. Most inside.	YES. Both in & out.	YES. Both in & out.	YES. Both in & out.	YES. Both in & out.	YES. But few.
Traffic (Varied of modes)	Busy harbor in the center.	Tram & bus, no stop.	Tram & bus, busy center.	Tram & bus, busy center.	Busy harbor on the city border.	Tram and bus, connect to high-ways.
Function zone	Offices, restaurants, transportation.	Offices, retails, restaurants.	A hub of different functions.	A hub of different functions.	Retails, transportation.	Retails, restaurants, transportation.
Pedestrian flow	Large, move & stay, but seasonally.	Average.	Large, move & stay.	Large, move & stay.	Large, move directly.	Large, move.

The privileged destination for the site listed above is marked in blue. The following descriptions are the content of this table, and the reason for my convincing Brunnsparken to be the project site out of the total six areas.

DESCRIPTION

- High demand for services

The project aims at creating Eco-center that has a close relationship with neighboring services, including cafes, pubs, library, existing eco-shops, and etc. To meet this standard, the place should be located in an convenient place close to abundant services.

- Noise

The noise level is the only aspect that does not benefit the selection result. For my opinion, it is hard to tell whether the sound is too noisy for my design, as the noise is varied from time to time and noun of them reach the 'noisy' level. High noise was achieved in Brunnsparken and Kungssportsplatsen. Average known as at an medium noise (not much disturbing) was experienced in Esperantoplatsen and Saltholmen. The level of average means noise varied a lot during the day.

- Place to sit in & out

This item is viewed as potential functions that may benefit my future design. It includes both the public seats on site and private seats inside and outside in the surroundings like cafes, restaurants, etc.

- Traffic

Traffic will not only provide convenience to approach the site, but also invite potential current. People choose different modes of traffic when they are heading to different directions. Therefore, a mixture of ample traffic modes somehow equals to ample possibilities.

- Function zone

Diversified functions result in varied groups of people, which is benefit for promoting the idea of eco-shopping and recycling.

- Pedestrian flow

Passengers are the most popular participants on site. Their behaviors and attention are easily being influenced by the surrounding happenings on their ways.

Site selection

The motive aspects for potential privileged choices are concluded as below:

- Enough space to seat in and out.
- The site is well accessible to transport and a good flow of services and people.
- A mixture of variety functions are provided with easy access of people existing and potential.
- Pedestrians are allowed to move around freely, but still available spaces to sit.

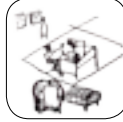
Despite Brunnsparken and Kunsportplatsen has the same score, I still choose BRUNNSPARKEN to be the site. The site has a long history, while the small nature area right located in between two of the busiest roads. All these characters push me to the final decision.

34 SITE LOCATION

SHOPPING CENTER
A series of markets, restaurants and cafes. Wastes mainly derived from here.



FACILITIES
Residential, business and public blocks.



TRANSPORT CENTER
Train, ferry, tram, bus zone with busy current.



Figure 37. Brunnsparken site zoning analysis. Author's own copyright.

SQUARE
Public activity and gathering place, with large quantity of flow.



SITE

3.5 SITE HISTORY

- 1624 Brunnsparken is originally named by Jarnbagsplatsen after the 'the Wheel of Life' statue located.
- 1822 A French-styled park was designed, and the name of Brunnsparken generated.
- 1861 The canal was refilled.
- 1883 Fountain Johanna was placed.
- 1889 Brunnsparken was renovated as below.

(Source from Forstudie Brunnsparken, Gotobors Stad, 2017)



Figure 38. Speakers' Corner 17/8: 'The city I dream of - my Göteborg in 20 years' (Unknown, 2016). CC-BY.

3.6 MAP OF THE SITE

Brunnsparken Today

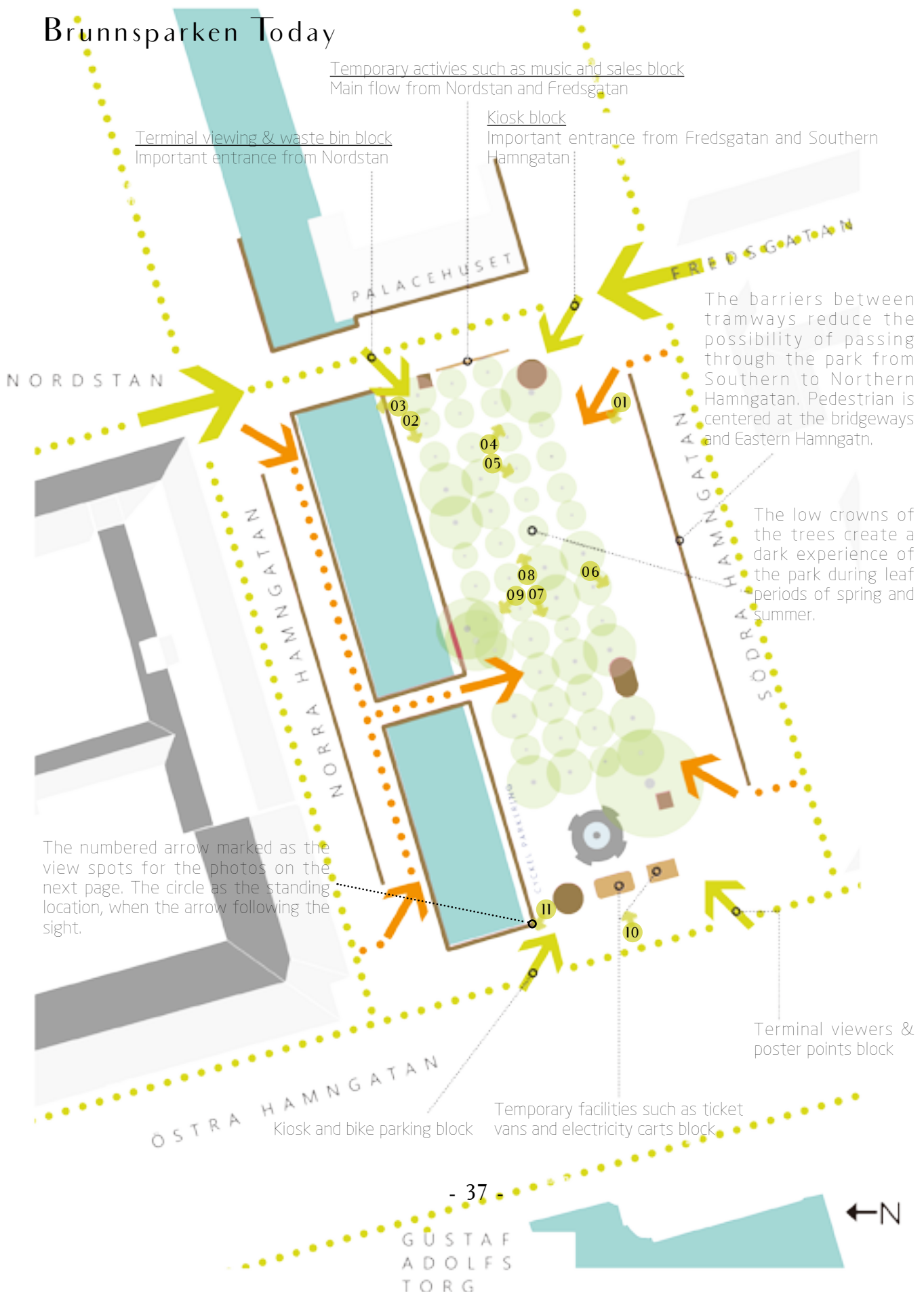


Figure 39. Brunnsparken today (Goteborgs Stad, 2017). Reprinted with permission.



Figure 40. Photos from Brunnsparken. Author's own copyright.

3.6.1 TREES & VEGETATION ON THE SITE

There are 51 trees in total in Brunnsparken area (Goteborgs Stad, 2017):

- 10 Corylus Columna (Turkish hassel)
- 9 Acer Platanoides (Maple)
- 15 Tilia Europaea (Basswood)
- 13 Fraxinus Exelsior 'Westhofs Glorie' (White wax)
- 1 Acer Pseudoplatanus (Sycamore)
- 1 Ulmus (Elm)
- 1 Tilia (Linden)

The height of tree stems are around 3m, while the canopy height differs from 5m-10m. The large maples and linden that stand outside the 'wooden grid', leaning over the canal have very low crowns approximately 2.5m, which reduces the transparency of Northern Hammngatan and gives the area a dusky character. (Goteborgs Stad, 2017)

The chandeliers are hidden behind branches. Light struggles though during leaf seasons, while odd shadows for the rest times of the year. Concrete paving snake its way over the area does not meet the needs for the passerbys.

Birds are still occupying the ground, though feeding is not allowed. The area is a basin of leaves and mud after rainfall, which creates an unpleasant walking experience.

Brunnsparken Landscape



Figure 41. Brunnsparken landscape (Goteborgs Stad, 2017). Reprinted with permission.

Scale 1 : 300

3.6.2 SITE OBSERVATIONS



Figure 42. Birds. Author's own copyright.

- Ground is occupied by birds.
- Feeding while not allowed.



Figure 43. Land. Author's own copyright.

- Muddy area after rainfall.
- No convenient paving path.



Figure 44. Trees. Author's own copyright.

- Too shady on the ground.



Figure 45. Chairs. Author's own copyright.

- Seats on one side.



Figure 46. Lights. Author's own copyright.

- Hidden Street Lights.

Chapter 4.0

DESIGN

The design is an Eco-stop situated in the city center of Gothenburg, with the intention of promoting 'Eco-shopping with no packaging' via the practical utilization of recycled materials.

4.1 PROGRAMME

Design Criteria

RECYCLING

The concept of recycling has followed the whole project. It derives from common behaviors, city life, and daily observation. Using recycled materials to build a cozy atmosphere, the design itself, is also an approach of promoting potential eco city life. Instead of perform a serious character of speaking loudly; it permeates into our lives from tiny behaviors, which in return, brings with fancy possible results.



Figure 48. Diversified Activities. Author's own copyright.

ECO-SHOPPING WITH NO PACKAGING

After previous researching, this idea comes to me naturally. Some packages are tied to their products; others belong to our own choice. What about start the journey of cutting down using packages by bringing our own fabric bags when shopping? Take bottles to fill coffee, refill wine with empty bottles, and etc.



Figure 47. Recycling. Author's own copyright.

DIVERSIFIED ACTIVITIES

The site Brunnsparken has a long history of being a park, which still is, is also a top center place for gathering. To create a nice environment on site is one of my design criteria. I believe that a pleasant space should invite people to join with their own activities. The design aims for light and multi-utilization infrastructures. Meanwhile, it increases safety by adding potential functions.



Figure 49. Eco-shopping with no packaging. Author's own copyright.

Design Diagram

The diagram describes the relationship among three criteria. They cooperate with each other and accelerate potential utilization. It also generates the following design strategies. All of these are naturally formed from previous research analysis. The frame concretes the foundation of my detailed design.

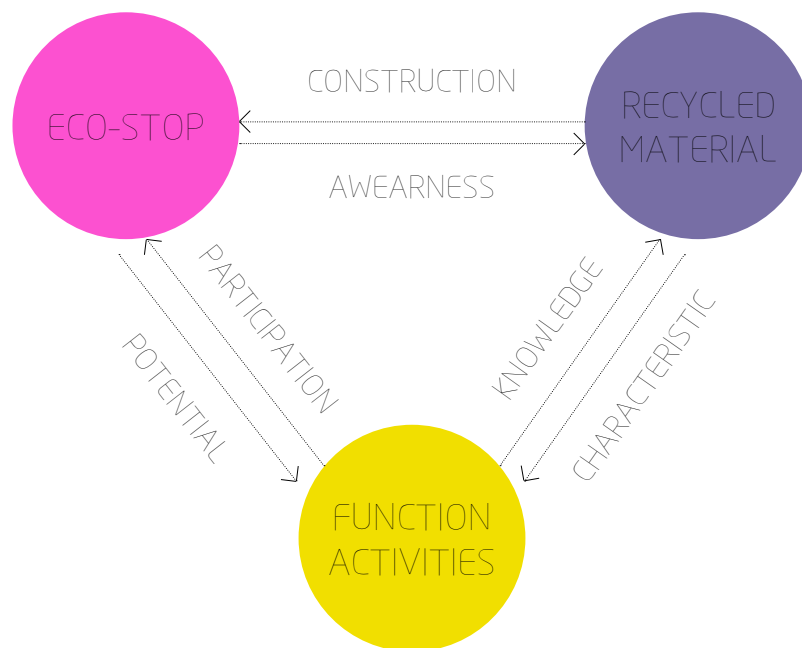


Figure 50. Design Diagram. Author's own copyright.

4.2 DESIGN STRATEGY



- Cultural history
Absorbing and continue its original city role as a downtown park. Born to have a strong background, the design is target for creating a pleasant place as it was in a new approach.



- Benefit & potential
Analyzing various aspects of the current situation on site. The potentials are in between the advantages and shortages. The latter ones are to be solved via the design project.



- Surrounding links
Connecting with two large, neighboring shopping zones, huge amount of services and people are brought to this area. Daily happenings on site are highly influenced by surrounding activities.



- Material characters
The project aiming for the small effect in the environment, low cost, especially, less waste. Using a mixture of recycled material, the whole object can be re-recycled.



- Keep & regenerate
The existing nature and part of the facilities are kept, while some merge into the design functions. The basic rule for choice is to redisplay an inviting atmosphere on site.



- Open & shelter
Followed by the city instructions, a roofed place is somewhere adorable in local context at most time due to the weather. Open spaces leave a good view for eye-contact.



- Multi-functions
The project promotes the idea of eco city life with enhancing eco-shopping via eco-cafe. It also functioned taking turns as a pop-up library, bar, and etc.



- Future visualization
Though the short display of the project, it brings with lots of feedbacks that will be the basic support for further trials. Building with recycling is a trend and also good for environment.

Figure 51. Strategy icons (the Nounproject, 2018). Reprinted with permission.

4.3 A NEW STORY OF COFFEE CUP

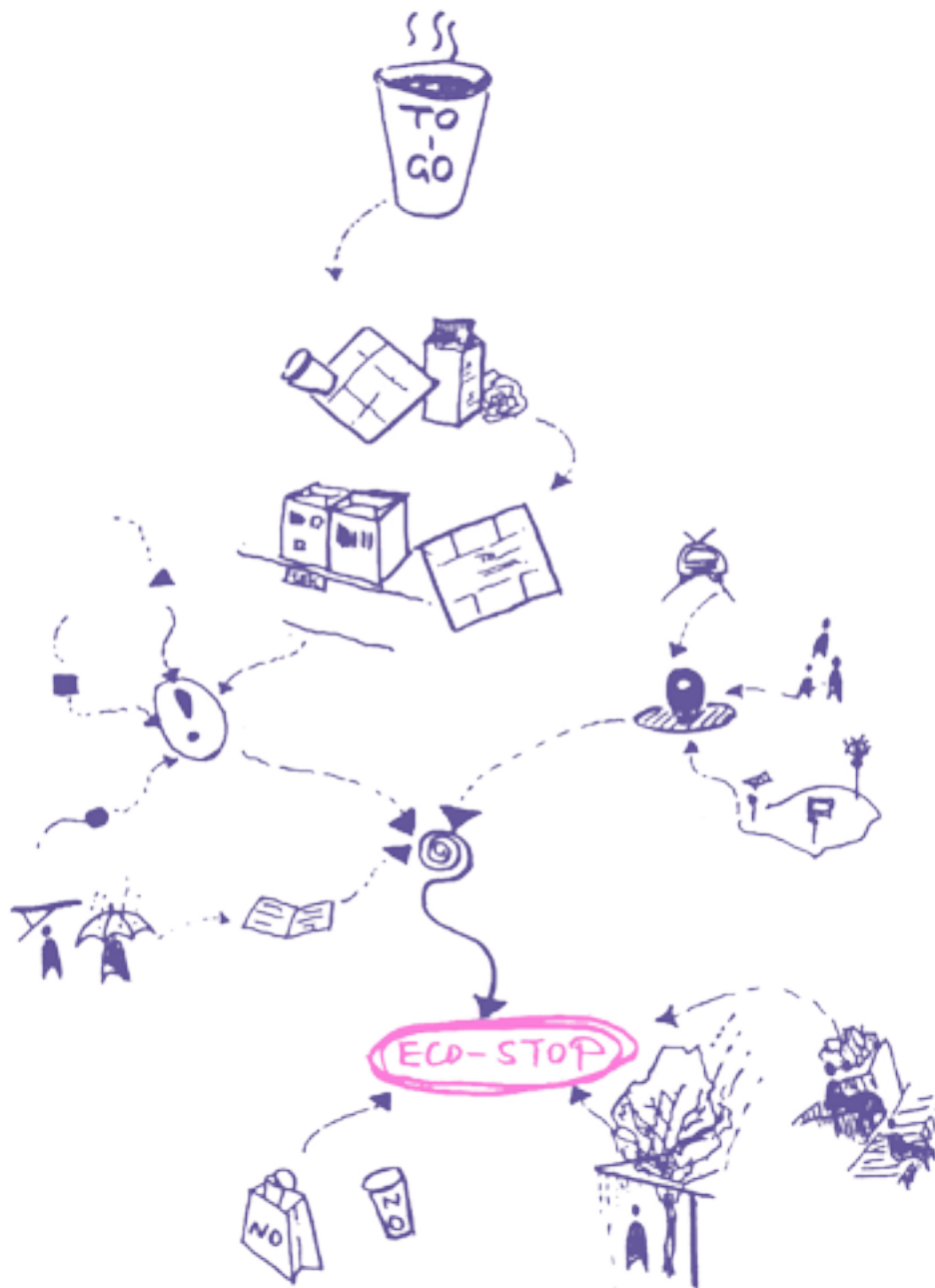


Figure 52. A New Story of Coffee Cup. Author's own copyright.



MATERIALS

Constructed by recycled wood as the main frame and recycled plastic board as rooftop. The two types of material in construction are relevant to the materials of disposable coffee cups, as paper generate from wood fibers while plastic recycled from inside coating. The regenerated paper boards from disposable coffee cups are contributed to furnishing the ECO-CAFE in the ECO-STOP.



TEMPORALITY

ECO-STOP is a project aimed for 1-year-round, exploring reality and people's reaction towards pure recycled-materials construction in the city center; promoting eco-consumption, reducing waste while enhancing recycling and reutilization. The whole year period brings materials and reaction feedbacks from all four seasons which will benefit for further development phases and applications in other projects.



FUNCTIONS

Instead of serving with disposable coffee cups, the ECO-STOP promotes an eco-consumption of 'Filling your own coffee bottles' based 'Shopping with no packaging'. ECO-STOP provides a sheltered space on site in response to Gothenburg's city goal of 'Creating the best city in the world when it's raining'. The whole project creates a public space fits for Brunnsparcken that emphasis urban lifecycle, city function zoning and relationship by promoting the value of recycled materials.



EDUCATIONAL ROLE

Not only functioned as a place of promoting eco-consumption and recycling, the whole area is faced to the society as a show room of exhibition, music, lectures and etc.

4.4 DESIGN PROPOSAL

The Eco-stop situated in the city center of Gothenburg, with the intention of promoting Eco-shopping with no packaging via the practical utilization of recycled materials. Responding to the vision of Gothenburg to become the best city in the rain, the design provides a shelter on site. The surrounding environment provides plenty services, including cafes, bars, retails, eco-shops, convenient transportation, large flow of people, seats, canal and etc. with plenty of resources and opportunities.

Eco-stop on its first stage, targets to start up with a retail of Eco-cafe. It means that there is no paper to-go coffee cup service in the store. It also welcomes renting out towards the neighbor cafes and around the city. Customers need to bring their own coffee cups to enjoy a cup of coffee, which calls for the activity 'shopping with no packaging'. The design is situated in the area of existing greenery, with respect to the local context; the idea is to preserve existing trees.

As a temporary project for 1-year-round, the place is also suitable for adequate sized music activities and flea markets.

Recycled materials applied in the proposal:

- Recycled wood, plastic board and nails construct the main body of the Eco-center.
- Recycled paperboard creates the furniture.

Preserved facilities and objects:

- The existing flow of people.
- Major functions of Brunnsparken, e.g. public transportation, shops and local services.
- Plants and paving.

Regenerate facilities:

- Kiosk is replaced by the Eco cafe. The original service is also moved to the new one.
- Traffic station on the same side of the road is now under the same rooftop of Eco-center, passengers are convenient to have a short stay in the center when waiting for the traffic lines.

44.1 CONTEXT PLAN

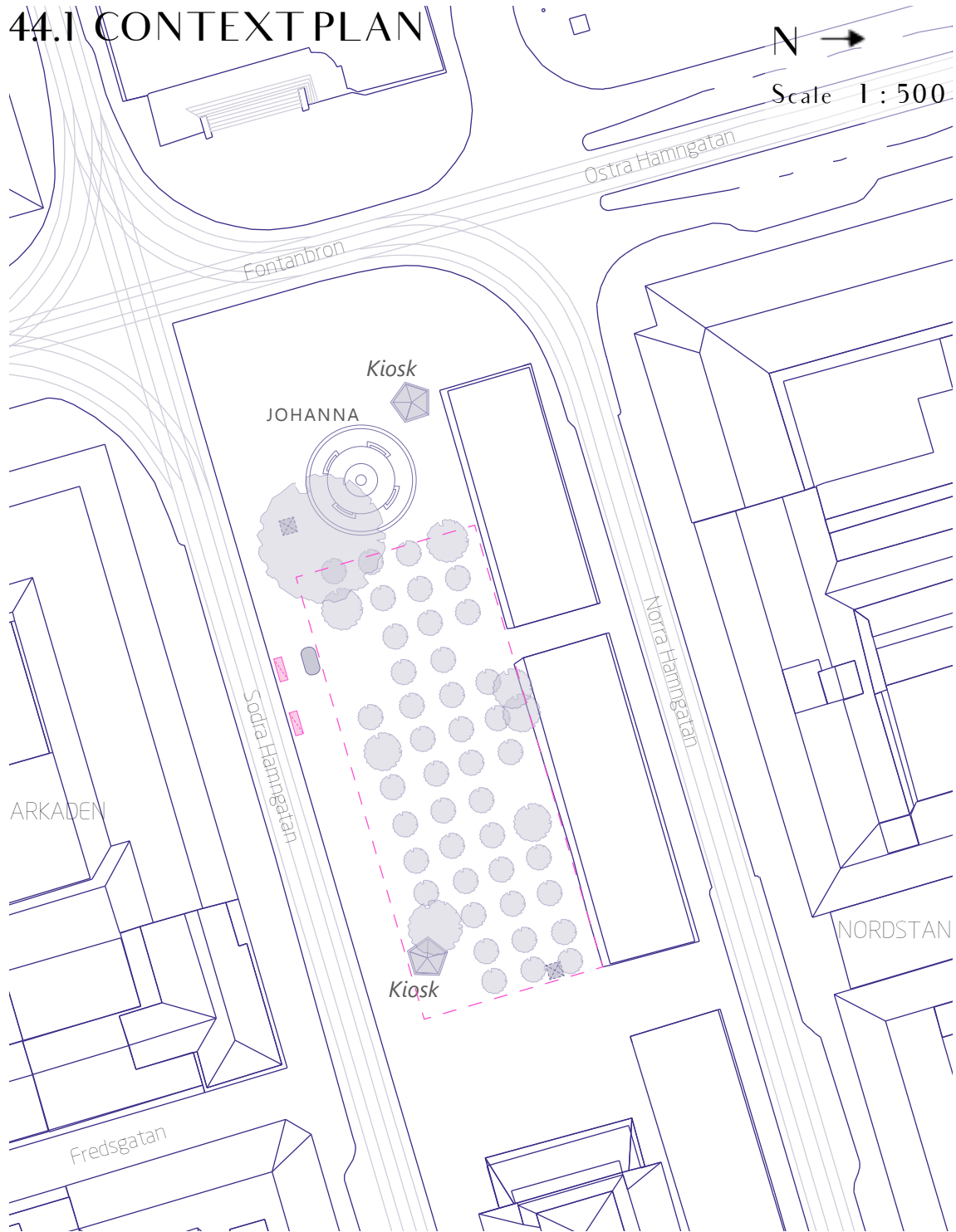
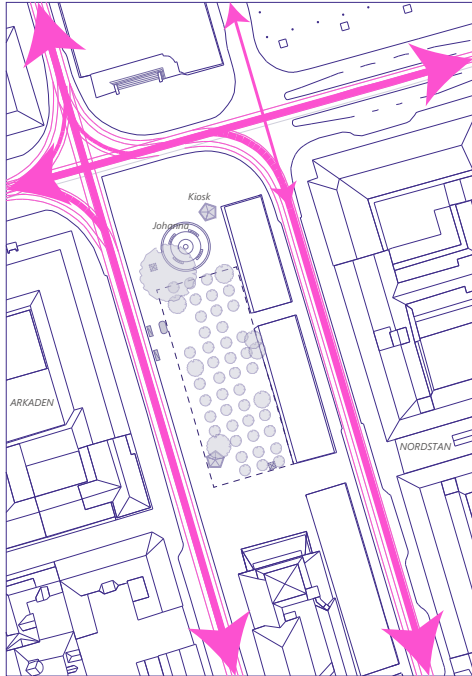


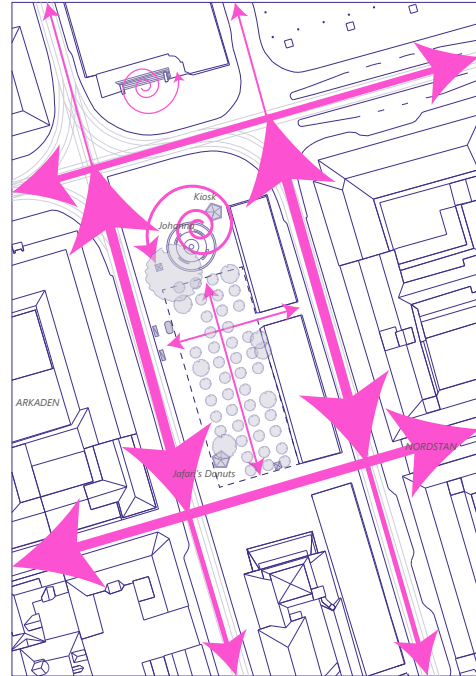
Figure 53. Context Plan. Author's own copyright.

The pink area on above map marks the site location in the local district. The color pink also refers to design and regenerative constructions, while blue represents plants, public toilet, and other existing facilities to be preserved in the design.

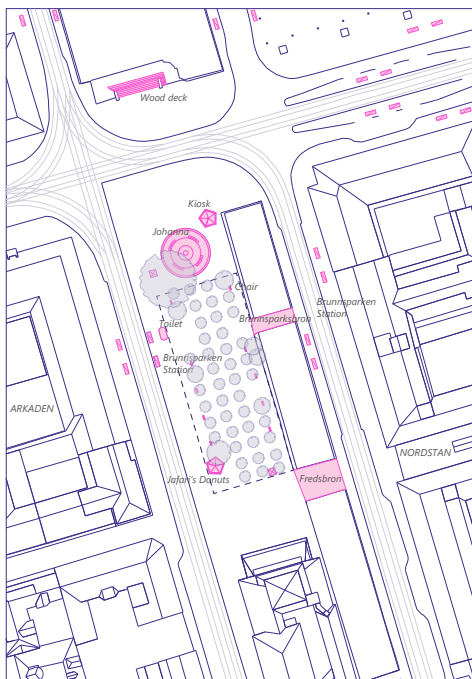
DIAGRAM ANALYSIS



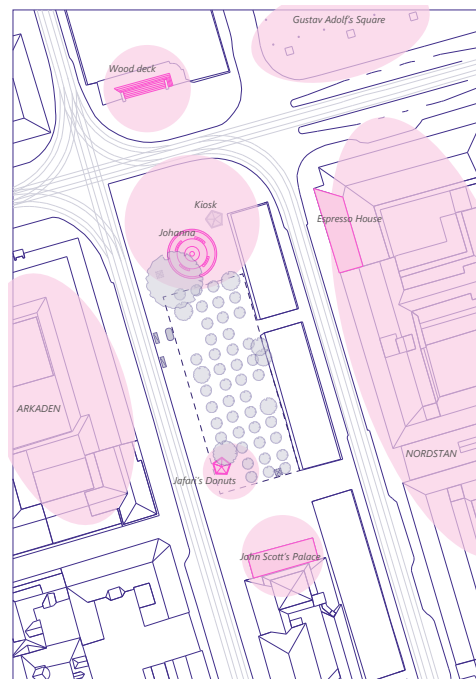
Traffic flow



Flow of people



Public facility elements



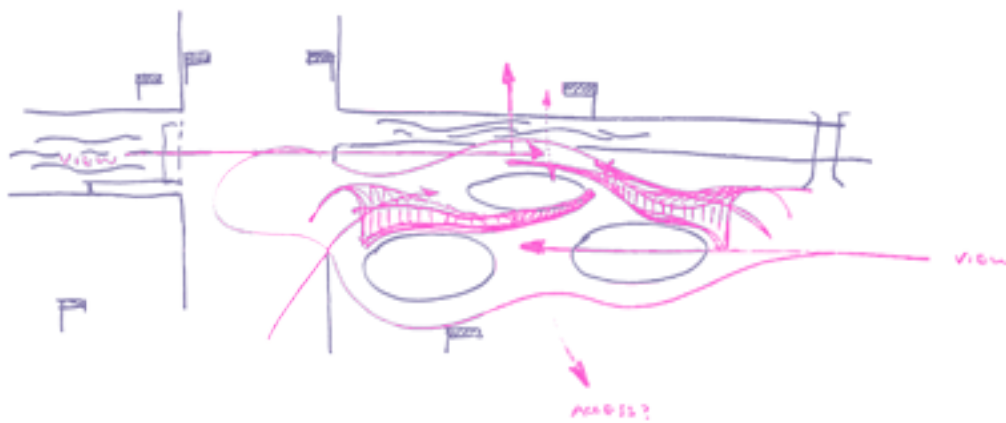
Popular stop points

Figure 54. the Above 4 Diagram Analysis. Author's own copyright.

44.2 DESIGN CONCEPT



BROAD VIEW: Benefit from the location and surrounding environment, the design targets for people passing by and also from neighboring zones.

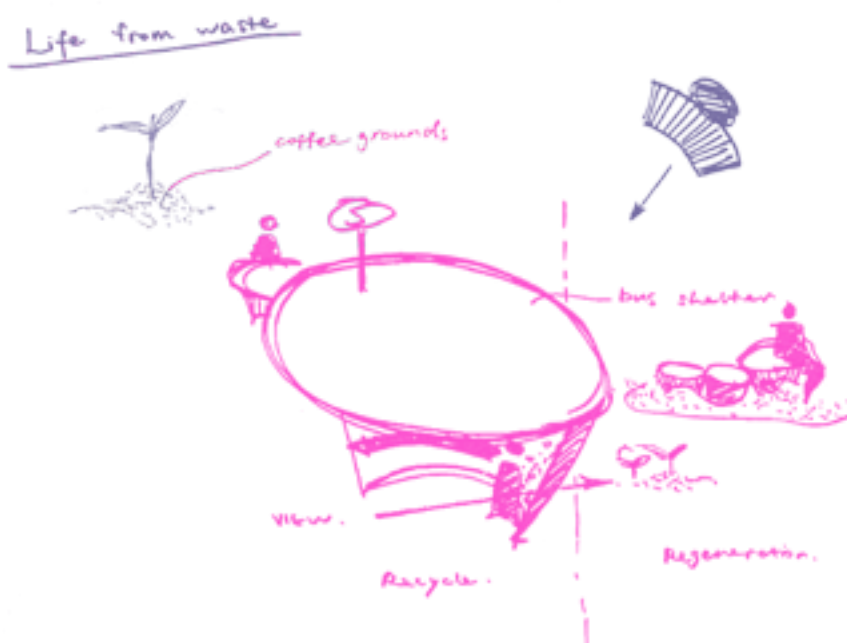


PHYSICAL & VISUAL: Eco-Stop is not stopping physical and visual contact from both sides, but more of a tunnel that invites people to come in.

Figure 55. the Above 2 Design Concepts. Author's own copyright.



CHARACTER: People create their own directions and spaces in Eco-Stop.

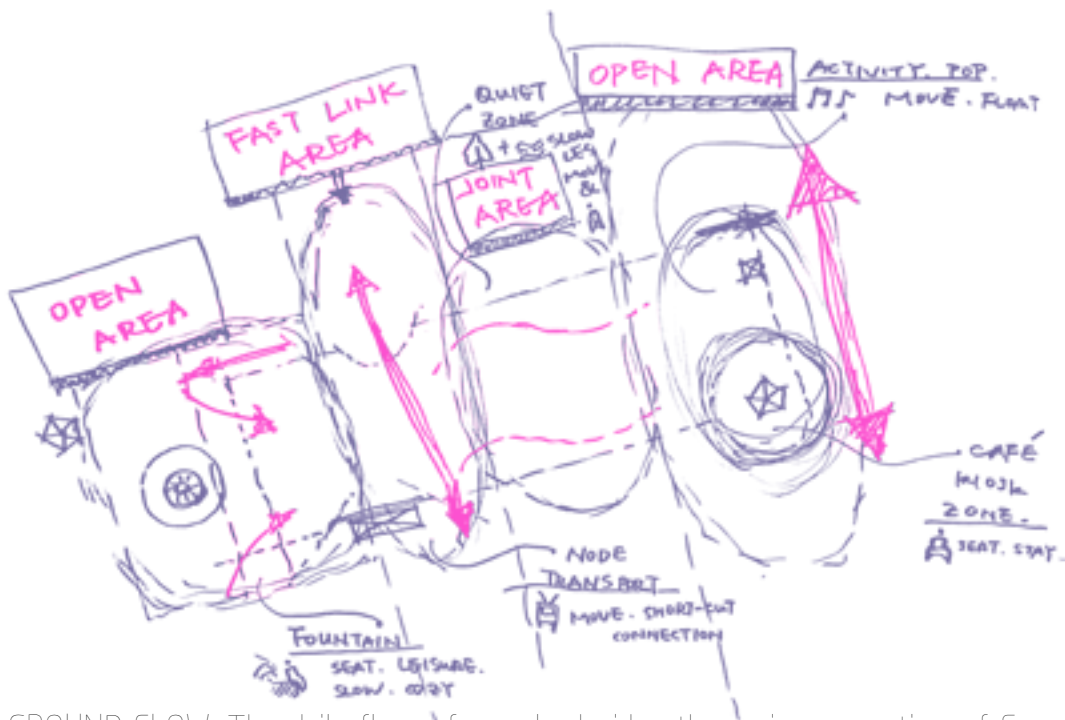


FACILITY: The transport station on the same side is also part of Eco-Stop. People who are waiting for transportation can have a rest there directly.

Figure 56. the Above 2 Design Concepts. Author's own copyright.

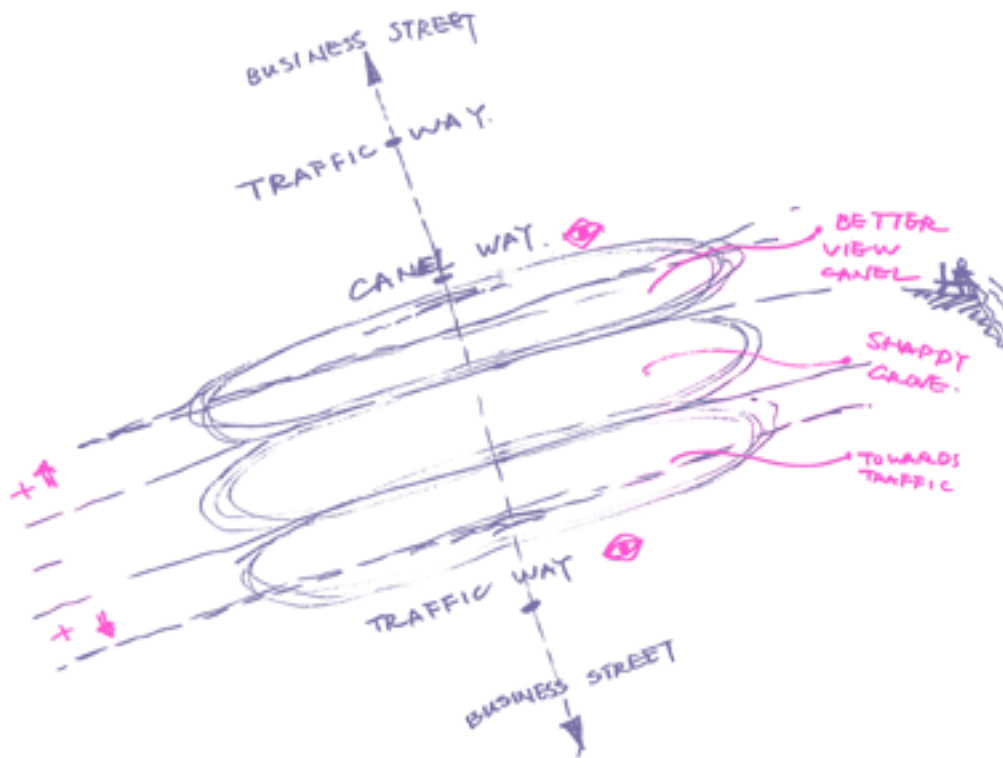


SPACE: A combination of wooden planting boxes create a space of multi-height, steps and vegetation, open and shelter that offers diversified views.

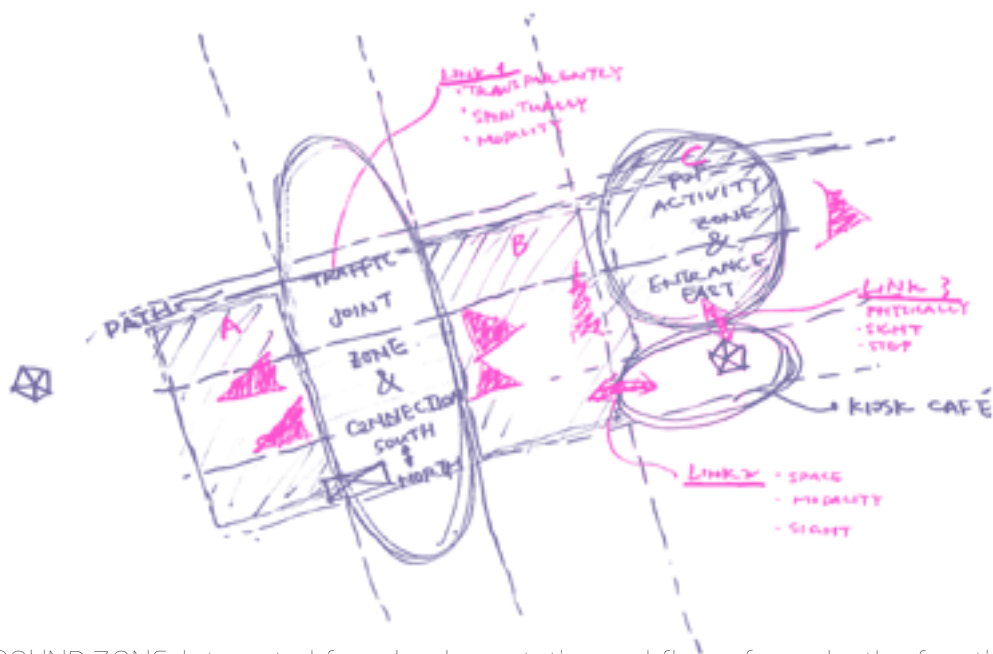


GROUND FLOW: The daily flow of people decides the main connection of Eco-Stop located in the fast link area while most activities in the joint area.

Figure 57. the Above 2 Design Concepts. Author's own copyright.

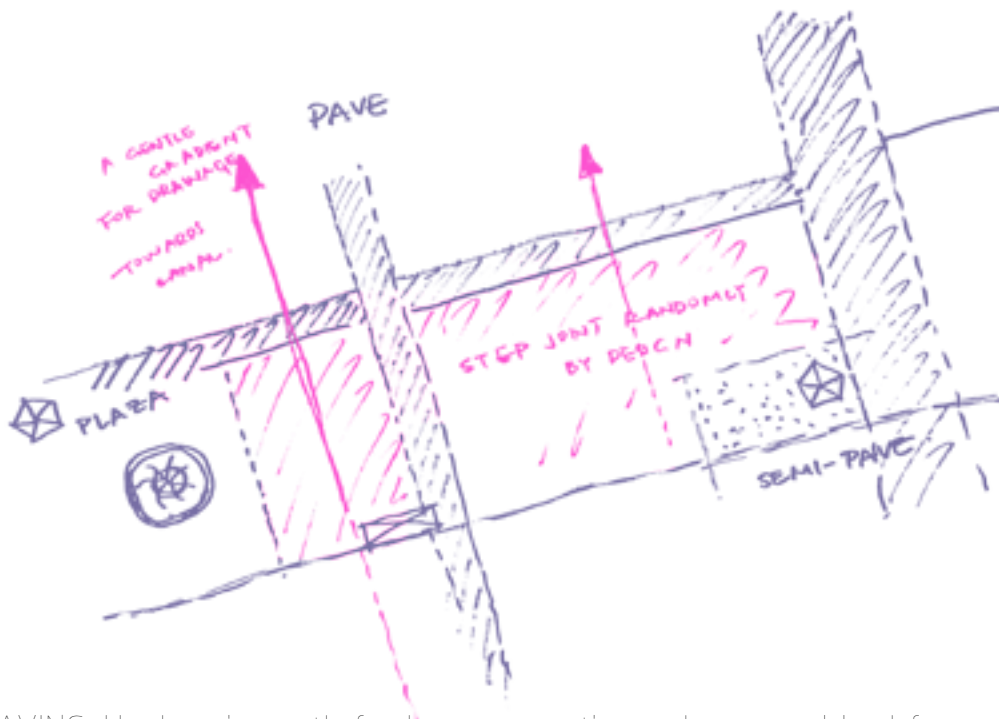


GROUND VIEW: Four rows of trees create three paths in between. The design aims to enhance the view contact from outside, while functional spaces in middle part.

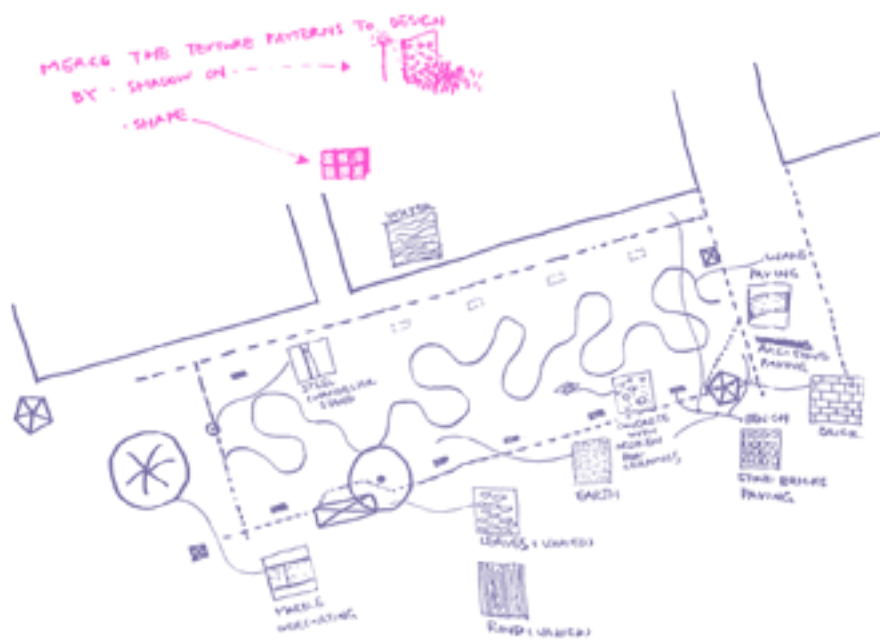


GROUND ZONE: Integrated from local vegetation and flow of people, the function zones of Eco-Stop are formed.

Figure 58. the Above 2 Design Concepts. Author's own copyright.

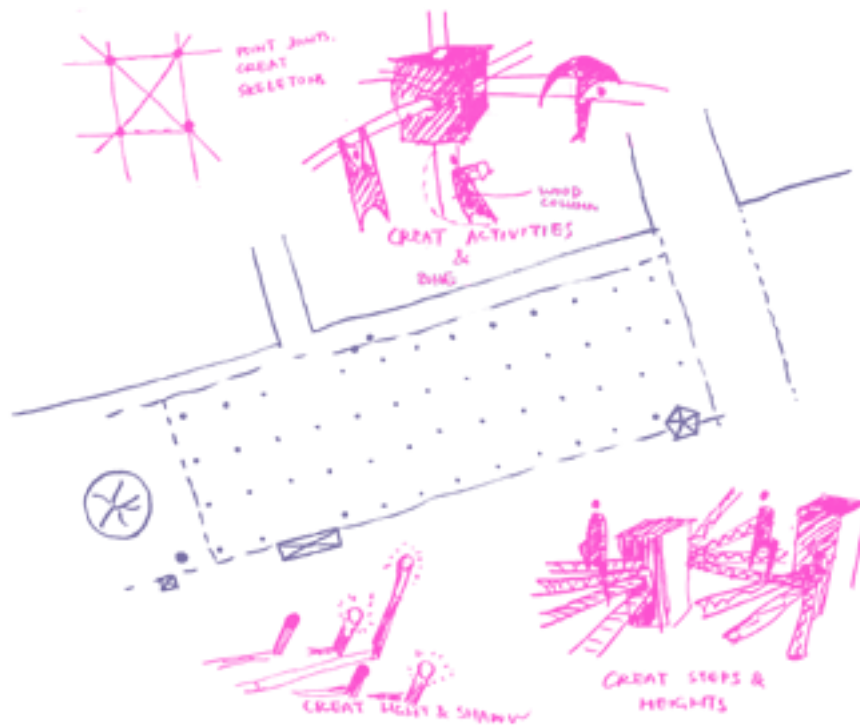


PAVING: Hard paving path for busy connections when gravel land for good drainage.

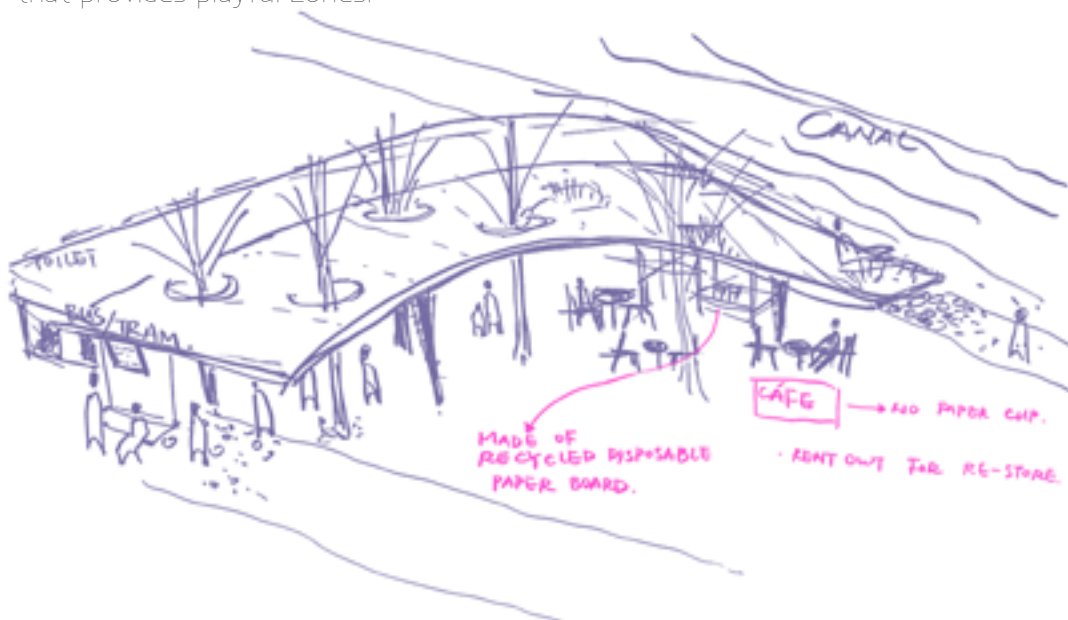


STRUCTURES & TEXTURES: The textures of Eco-Stop share the same patterns with existing facilities and environment on the site.

Figure 59. the Above 2 Design Concepts. Author's own copyright.

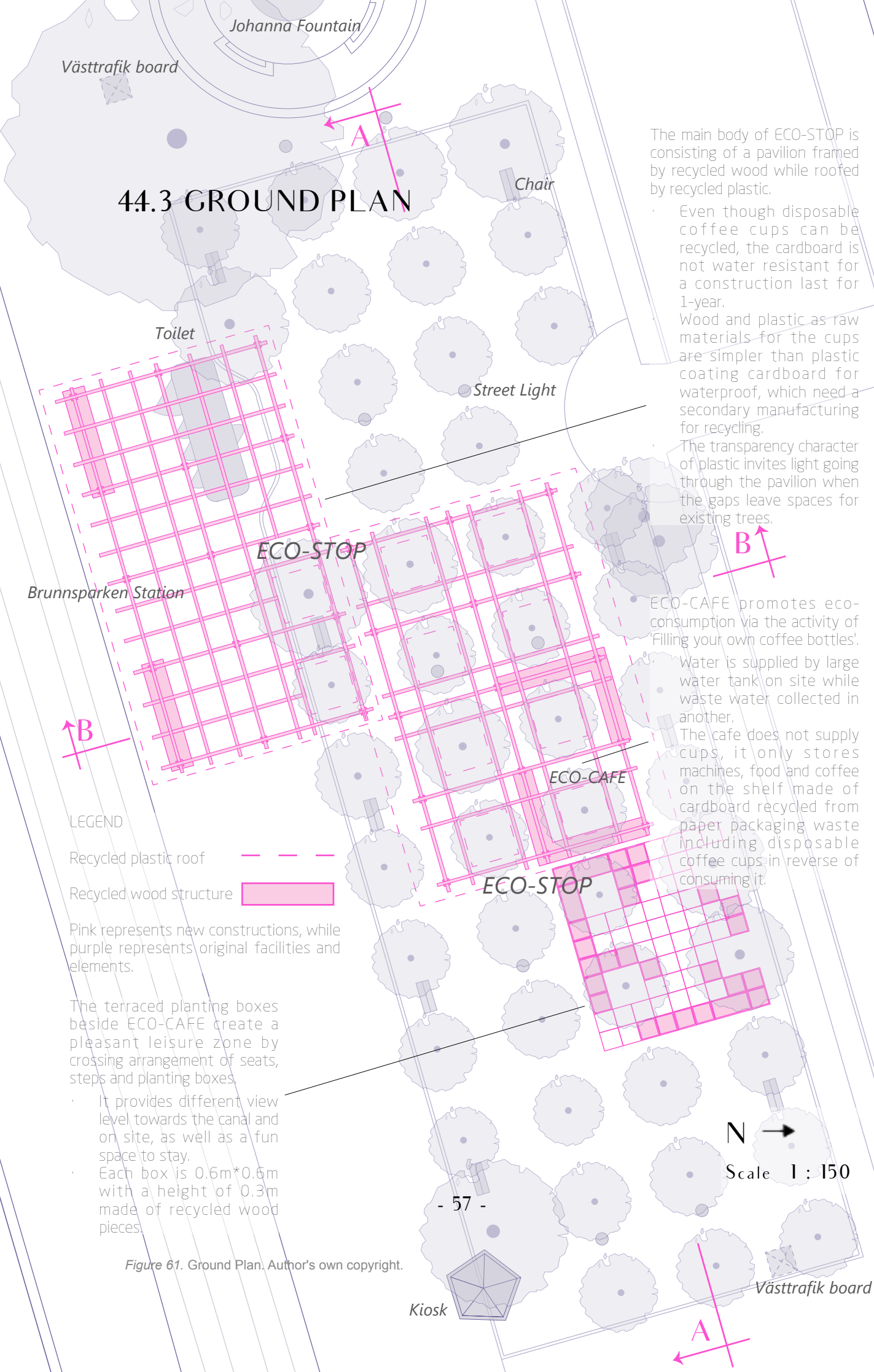


CONSTRUCTION TYPOLOGY: Existing trees mesh the ground into cubic spaces that provides playful zones.



RECYCLED PAPER PACKAGE MATERIAL IN USE: Furniture in the cafe is made of cardboards recycled from paper packaging waste including disposable coffee cups. The shape of rooftop in the sketch does not affect the final design and will be further explored.

Figure 60. the Above 2 Design Concepts. Author's own copyright.



The main body of ECO-STOP is consisting of a pavilion framed by recycled wood while roofed by recycled plastic.

- Even though disposable coffee cups can be recycled, the cardboard is not water resistant for a construction last for 1-year.

- Wood and plastic as raw materials for the cups are simpler than plastic coating cardboard for waterproof, which need a secondary manufacturing for recycling.

- The transparency character of plastic invites light going through the pavilion when the gaps leave spaces for existing trees.

ECO-CAFE promotes eco-consumption via the activity of 'Filling your own coffee bottles'.

- Water is supplied by large water tank on site while waste water collected in another.

- The cafe does not supply cups, it only stores machines, food and coffee on the shelf made of cardboard recycled from paper packaging waste including disposable coffee cups in reverse of consuming it.

444 SECTION A



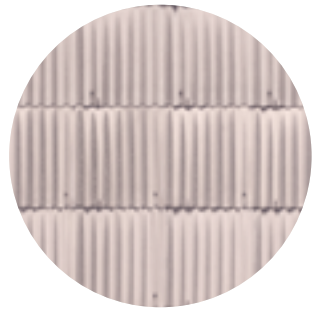
Figure 62. Section A. Author's own copyright.

SECTION B



Figure 63. Section B. Author's own copyright.

44.5 PERSPECTIVES



ROOF MADE OF RECYCLD PLASTIC BOARD

The transparent plastic board roof not only provides a shelter when it's raining, but also enable light goes through during sunny days. The weaving pattern of the board is helpful for drainage.

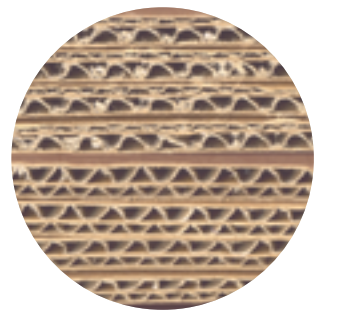


PAVILION MADE OF RECYCLD WOOD

The main body of Eco-Stop including columns and beams are made of recycled wood pieces tearing down from other buildings. The aging material of characteristic textures is harmonious with surrounding environment.

CAFE FURNITURES MADE OF CARDBOARD

The recycled disposable coffee cups are turned into cardboard after manufacturing. The cafe in Eco-Stop is furnished by piled cardboard, which benefits for its light-weight, easy-built and low-cost.



- 60 -

- 61 -

Figure 64. Perspective. Author's own copyright.

ECO-STOP

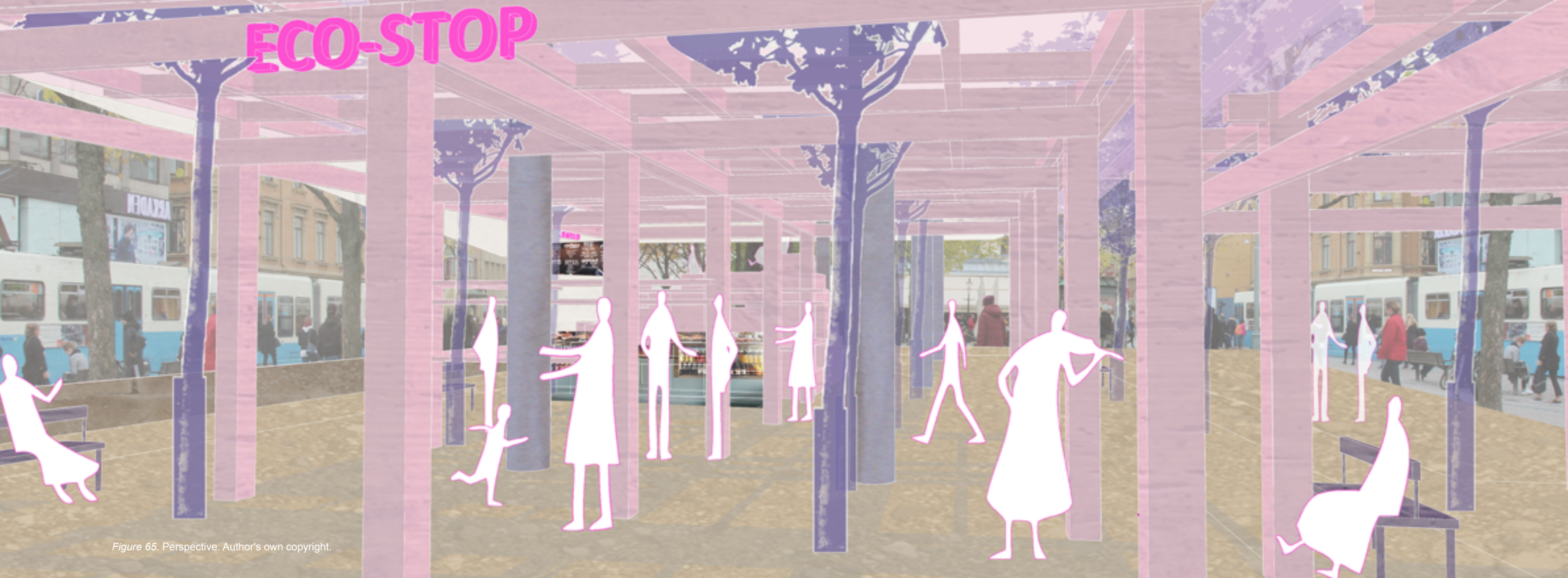


Figure 65. Perspective. Author's own copyright.



- 62 -

- 63 -

Figure 66. Perspective. Author's own copyright.

Chapter 5.0

SUM UP

This chapter includes a discussion about my findings and difficulties during this project. After that, a short conclusion is presented.

DISCUSSION

- Too much waste, too many types

I was once plunged into misery during the thesis working load when I was doing the waste research. I intend to limit myself hard focusing on the cups and its relevancies, however, every time flows to the vast world of the others. There is too much waste and incredible amount of waste types, like a bible. Except for the large quantity, the waste types are also confusing. Different countries and recycling factories have different guidelines of how to sort waste. It occurs that one article is sorted in two directions which lead to more questions. For example, when I look into the market, I find that the carton for juice, milk and yogurt are different inside depending on its expiration period. Those who last for a long time are coated with aluminum while others plastic. However, all these carton boxes, as well as disposable cups are sorting as paper packaging. Too much parallel options result in hesitation of making choice.

- Eco but not friendly

The activity of "eco-shopping with no packaging" aims at producing less waste during our consumption activities. However, the convenience is somehow the first consideration come to mind. As an temporary build up project, it is also a challenge to the perceivers. We all know the importance of using fabric bags and individual bottles, but other social elements will affect our minds which result in unknowns.

CONCLUSION

Start with a question of whether disposable coffee cups are recyclable; the project has proved that in the Swedish context, they can be transformed into paper board back to markets and daily packaging again based on researches in the paper waste fields. The evaluation among 6 areas for site choosing has framed the initial concept of my design after on site studies.

The challenge occurs mainly due to the lack of knowledge and less systemic theories. Large amount of materials pump into mind every one step further and therefore make confusions. However, the challenges in another way, is also an opportunity. New attempts may lead to new discoveries. Through the research of waste and its management initially generated from disposable coffee cups, I am convinced by the efficient recycling system of Gothenburg city. With the strong support of the manufacturing process, lots of waste can be recycled and come back to stage in our lives in new appearances. After frequent observations of Brunnsparken and feedbacks from citizens, various activities happen naturally in this area due to the large flow of passengers. There is huge potential here which is an advantage for my design. Many eco-shops in the surrounding area have already formed a positive atmosphere of eco-consumption, and thus a welcome attitude towards upcoming 'shopping with no packaging' for my design.

Though the idea of eco-stop in a center area causes a lot of doubt, in another perspective, it also achieves attractions and reflections. The idea of eco-shopping and building with recycled materials can be further developed in the further and in other cases.

Chapter 6.0

REFLECTIONS

Working on the project, I find my lacking of the waste management knowledge. Even though followed the instruction marks on the waste bins, still not capable enough to sort all of them. By doing waste researching for the project, I have went to the Stena Recycling AB that dealing with the daily waste in Gothenburg. Even though do not have the access of an inside visit, talking with their colleagues and observation of their specific sorted recycle bins made me realize the working process of initial waste treatments.

The design of Eco-stop is encouraging people to make less waste through tiny efforts in their consumption. It is also my job to contribute to the activity. The project as a journey, I have learnt that the disposable coffee cup together with its paper packages family is under efficient recycling solutions in the Swedish context. I feel happy as a resident live here while the cup crisis still exists over the world.

As far as I am concerned, tiny effort can be made for sustainable living, such as preparing fabric containers in every one of your bag in case of missing. Using to-go cups made from coffee grounds instead of disposable ones also makes sense.

Chapter 7.0

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Chapter 8.0

APPENDIX

This chapter includes a layout of poster during the exhibition.

TITLE	WASTE-RECYCLED MATERIALS		LOCAL CONTEXT		STRATEGY		DESIGN	
<p>ECO - STOP</p> <p>Illegale verkoop van afvalstoffen op straat</p> <p>WED. J. VAN DER WOUDE</p> <p>COFFEE CUP</p> <p>De afval van een koffiecup gebruikt voor de productie van de nieuwe cup</p> <p>RESPONSIBEL COFFIN</p> <p>De afval van een koffiecups wordt gebruikt voor de productie van de nieuwe koffiecups</p>	<p>WAFU</p> <p>Waste asfalt fundering Waste beton fundering Waste beton vloer</p>	<p>WAFU</p> <p>Waste asfalt fundering Waste beton fundering Waste beton vloer</p>	<p>STANDARDS</p> <p>Waste asfalt fundering Waste beton fundering Waste beton vloer</p>	<p>STANDARDS</p> <p>Waste asfalt fundering Waste beton fundering Waste beton vloer</p>	<p>STANDARDS</p> <p>Waste asfalt fundering Waste beton fundering Waste beton vloer</p>	<p>STANDARDS</p> <p>Waste asfalt fundering Waste beton fundering Waste beton vloer</p>	<p>STANDARDS</p> <p>Waste asfalt fundering Waste beton fundering Waste beton vloer</p>	<p>STANDARDS</p> <p>Waste asfalt fundering Waste beton fundering Waste beton vloer</p>
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