

Fresh Forward

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Fresh Forward is the contribution for the collective project on the food industry in the Netherland and beyond, reflatng on the notion of automation and its spatial implication.

This contribution proposed a design for a new kind of restaurant that utilizes contemporary technology to achieve a fully automated process, from production space to sales floor; while, at the same time,— adopting modernist cooking techniques to provide a new dining experience to the customer.

Located in a hectare of land in the Hundewiese of Frankfurt. This contribution reconstructs the conventional restaurant layout, provides an aesthetic experience— from the uniformity and repetition provided by the automated machine to the contrasting organic beauty of nature—to the customer.

Inside its production facility, Fresh Forward collaborates with chefs and culinary artists to innovate on new recipes - through the adaptation of the modernist cooking techniques - to serve freshly made, sustainable, and tasty meals that highlight the uniqueness of each raw ingredient’s flavors.

Moreover, automat can extend the reach of its service by distributing pre-cook ingredients and seasonings to supermarkets or automat points throughout the Blue Banana network.

The Netherlands is internationally recognized as one of the world’s largest food exporters due to its excellent connectivity throughout Europe and is home to world-class research institutions. It is—in effect—feeding the world. Driven by the anticipation for a renewable future, the country’s journey towards optimization, sustainability, and health requires a paradigm shift in the food industry.

As the COVID-19 pandemic has reshaped the retail market in unprecedented ways, consumers shifted around lifestyle and value. This demanded new spatial configurations of the supermarket, transitioning between a pre-COVID-19 and a post-COVID-19 society. Resting within its etymology—where “super” alludes to supremacy concerning size, quality, and quantity, while “market” refers to trading in goods of value—the supermarket, selling food and household goods, first originated in the 19th century with the novel concept of a self-serve store. As a platform of recurring successful innovations, their profits increased during the COVID-19 pandemic, underscoring that supermarkets are now an essential service - representing a new civic presence.

The collective project on the spatial implications of the food industry in the Netherlands and beyond seeks to redesign the supermarket—currently occupying the most densely used square meters in a city—to implement developments within the meticulously designed sales floor via craft, reshoring, protectionism, automation, and extinction—for an immersive consumer experience—and the concealed back of house through the notions of tastemaking, scarcity, sensorialism, inclusivity, and trade—associated with the product’s supply chain—ensuring a frictionless future for shoppers.

These ten contributions explore the architectural and urban design possibilities within the future of the food industry across sites within the Blue Banana—the European Megalopolis—transporting products and radiating back to the Albert Heijn shelves in Delft. They collectively form a project for the design of a future supermarket on the current site of the Albert Heijn XL on Martinus Nijhofflaan in Delft. These contributions provide modifications in the supply chain, product distribution, and store planning, in relation to the products,

their associated building types, and their extensive territories. The collective design of this Albert Heijn XL will raise issues of scenography, product flow, human interaction, digital technology, and consumer experience, in an attempt to address the future of the food industry.

At a time when the world is pulling through the COVID-19 pandemic, faced anew with the impending environmental crisis, the collective project raises questions about the ever-changing relation of architecture and the food industry in the Netherlands and beyond.



Figure 1
Illustration of the Pork Packing process from Killing, Cutting, Rendering, and Salting. Ehrgott & Krebs, "Pork Packing in Cincinnati" US, 1873 (©Library of Congress)



Figure 4
Woman getting a dish of baked beans. Arthur Rothstein, New York, 1955 from an automat

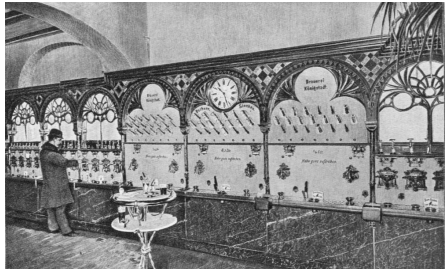


Figure 2
The world's first automat "Quisisana" at 13 Leipziger Straße in Berlin Germany.1897. Unknown newspaper, Wikimedia commons, access on media.org/wikipedia/commons/9/91/StollwerckAutomatenrestaurant1896.jpg



Figure 5
Photograph of new yorkers getting their meal from the glass shelves of an automat. Most of the interior space was occupied by seating areas similar to what we could find in today's fast food restaurants. J. Baylor Roberts, "Automat", National Geographic, New York, 1942



Figure 7
Keedoozle back of the house. Employees manually fill the shelves in the supply room. Francis Miller, "Keedoozle, the automatic grocery store", the Life Picture Collection, 1948



Figure 8
A transparent cooking robot which can make burgers from artisanal ingredients and is able to slice, grate, toast, season, grill and customize a burger freshly when ordered. Creator's Automatic Burger Cooking Machine, California, 2018.

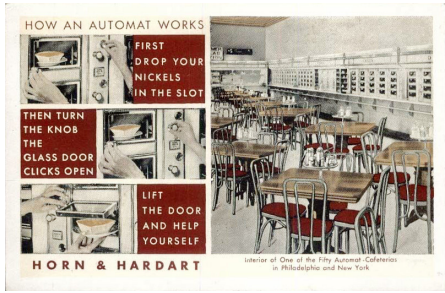


Figure 3
Postcard photo of a Horn & Hardart automat depicting how the automat works.1930's. Christopher Klein, The automat the birth of fast food nation. 2018. access on August 14, 2021: <https://www.history.com/news/the-automat-birth-of-a-fast-food-nation>



Figure 6
Keedoozle interior with glass boxes that display grocery items. Francis Miller, "Keedoozle, the automatic grocery store", the Life Picture Collection, 1948



Figure 9
A pizza dispenser machine that can make pizza from dough in three minutes. Storefront of Pizza Mr.Go, Roma, 2021

As the industrialized world enters a new era of widespread automation, the food industry will have to adapt to a more robust production and manufacturing system to provide consumers with sustainable, convenient, and healthy meals, especially after the COVID-19 pandemic. However, the adaptation of automated machines will also transform the way we inhabit space in our urban spaces as the convenience of automation shifts closer to our living environment.

Automation describes a wide range of technologies that reduce human intervention in various processes. It has always been an intriguing subject as it brings many benefits to human life, yet simultaneously poses a risk to the role of human workers in our ecosystem. Furthermore, the fourth industrial revolution—the increased application and development of automated technologies—has helped improve traditional manufacturing and industrial practices with the assistance of smart technology, machine-to-machine communication, and the Internet of Things.¹ Current technology could automate 45% of the activities humans are paid to perform, helping people boost their productivity and save time, and by 2050, half of today's work activities are projected to be automated.² However, most of today's automation infrastructure takes place outside our urban territory. The most suitable environment for automated machines does not need human presence and often requires their absence to function; this automated infrastructure—automated agriculture, manufacturing, logistics, and data centers—works in the background to fulfill our daily needs.

The integration of machine landscapes in our urban fabric is nevertheless inevitable. To achieve a greater level of convenience through the automation of our lives, we will eventually need to bring these machines closer to our urban territory. There appears to be very little architectural thinking behind these spaces that already have such an enormous scale and a profound impact on our modern experience, and it is therefore necessary to start an architectural discourse on how to include these infrastructures in our urban territory and how humans will interact with

these machine landscapes. Automation will change not only our daily activities but also the spaces where we live as these automated machines will need a different kind of scale and climate than conventional domestic spaces.

With every technological advancement, the way we consume our food is changing, and so is the space needed to grow and process it. The food industry is also one of the most susceptible markets for technology advancement, and it has become the one that demonstrates technology's capabilities for automation. One of the first production lines was used by the meatpacking industry (see fig. 1), creating such growth for itself and other convenience food factories that it led to the rise of grocery stores where staple foods became available in cans.

Quisisana, the world's first automat—a type of vending machine canteen—opened its door in Berlin more than a century ago, becoming a pilot project to show the capabilities of technology in the food industry (see fig. 2). Using the technology from Quisisana, the US food service company Horn & Hardart opened the first US automat in the early twentieth century, becoming a staple source of food for millions of New Yorkers (see fig. 3). By 1920, Horn & Hardart became the largest restaurant in New York City, capable of feeding 10,000 customers a day using a system that ran on an assembly line.³ The Horn & Hardart automat was modern living at its best—American food served in a sleekly designed space using the latest technology (see figs. 4 and 5).

In 1937, Clarence Saunders, who invented the self-serving store concept, also tried to integrate automation into grocery stores. His prototype was Keedoozle, a fully automated grocery store letting consumer inspect the product through glass cabinets. Despite Keedoozle's interior similarity to that of the Horn & Hardart automat (see fig. 6), the stores did not long owing to the complicated system that regularly mixed up orders (see fig. 7). The fully automated concept proved to be too slow and inefficient to handle high demand so early in its development.⁴ Keedoozle closed its doors for good in 1949, while the last Horn & Hardart Automat closed

Automation

in 1991 due to its inflexibility in the payment method.

With the technology available today, it is possible to accommodate a fully automated restaurant and be more consumer friendly. Automation will make it possible for an automat to produce food and, at the same time, act as the storefront through which to sell it. In 2019, a start-up called Creators invented a hamburger-cooking machine that could reportedly assemble, cook, and serve 360 burgers with artisanal ingredients in an hour.⁵ The machine provides user interaction by displaying the process of burger-making (see fig. 8), similar to the concept of Mr. Go Piza in Rome, providing a storefront with an automated machine demonstrating pizza-making from dough to oven (see fig. 9).⁶ From this, we can clearly see how a store's architecture can react to automation by providing an accessible, comfortable waiting space, and most importantly, showcase automated machines to attract customers.

Automation technology has nevertheless changed how we grow, buy, and consume our food. It has its benefits, but it requires huge investment capital to adapt current technology into fully automated processes. Moreover, the domination of automated machines in the food industry would lead to the disappearance of several jobs that exist today; therefore, what is the human's role in the food industry when most tasks could be automated? How would we redefine our role in a fully automated society? To adopt automation in human space of food-consumption, we would need to redefine our conventional views that position human scale, vision, and pattern of occupation at the center of the structure that we design.⁷ Although we have rarely seen fully automated infrastructure in our urban territory, these types of infrastructure are already present on the outskirts. They occupy a space in which all architectural parameters are configured to anticipate the logic of machine perception rather than human comfort. The Facebook Data Center in Prineville is filled with servers containing the personal lives of 1.9 billion global users, while only one engineer is needed to maintain 25,000 servers each day (see fig. 10). Without human presence,



Figure 10
Interior of the data center showing repetition of server shelves. Jonnu Singleton, “Facebook Prineville Data Center”, Prineville, 2011.



Figure 11
Google data center campus, Eemshaven, 2019. Bloomberg, 2019

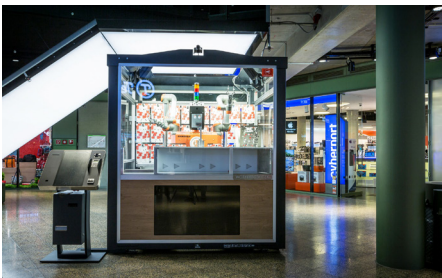


Figure 12
A humanoid sales robot sells the 3d Toybot which she assembles right in front of the customers’ eyes. The customer interacts with Gisele via touch display on the left side. Roboter dame Gisele, the robot-sales tending automatic kiosk in Bikini Berlin, Berlin, 2018.

architectural building qualities such as light, proportion, scale, and materiality also disappear. Data centers, automated assembly lines, logistical hubs, and warehouses are mostly housed in giant boxes filled machines and hidden in our rural territory (see fig. 11).

During the COVID-19 pandemic, extended lockdown periods were possible due to the proliferation of automation and the internet. Global trade could continue functioning smoothly because it involved very few humans, and almost all farm work was done by machines that are immune to disease. Moreover, modern container ship like the OOCL Hong Kong—the largest ever built—can carry 200,000 tons of goods while requiring only 22 crew members.⁸ A marine transport facility in Bayonne, New Jersey, could move and organize tons of shipping containers by a mechanical algorithm with humans intervening only remotely, and even then lasting no more than 10 seconds at a time. Concerns around the pandemic and the necessity to protect our food supply chains have further spurred the investment and adaptation of automation technology. In a post-pandemic society, the automat will become the model of the future restaurant where food preparation has minimal human intervention.

The landscapes for human and machine spaces are currently divided, raising the question about the architectural significance of automated infrastructures and their design potential if human and machine spaces were intermixed.⁹ While there are some efforts to integrate these automated machines into our environment, most are isolated from humans yet are built to imitate human space and behaviors that are not necessarily effective and productive for the machines. An example of this can be seen in an automated kiosk at Bikini Berlin, where an anthropomorphic sales robot tends to the store, yet—and perhaps as a result—it takes almost two minutes to pick merchandise (see fig. 12). Another way to bridge the interaction between humans and machines is to bring people out from their urban territory and enter the rural area of the machine landscape. OMA founder Rem Koolhaas has proposed to use the architectural configuration of a data center for a museum in the countryside to make it accessible to people. In any case, integration will need a new

architectural approach to move beyond the human scale if machine landscapes come into our ecosystem or we move into theirs. These machines could reconstruct our former human territory and give us new ways to inhabit shared spaces.

The food industry will lead the way in adapting automation into its work processes. Current technology could automate nearly three-quarters of food service and accommodation tasks, and the COVID-19 pandemic has further accelerated the transition towards a safer, more efficient, and more robust food supply system.¹⁰ The food industry will redefine new types of architecture and landscapes where humans and machines share spaces.

The automat will provide a space where humans can enjoy the fully automated experience—through machine learning and artificial intelligence, it could mimic human chefs to produce high-quality cuisine. Meanwhile, human chefs could be left to experiment with new recipes to find new flavors, tastes, and textures that require human senses to perfect. Dangerous and unhealthy jobs can also be given to machines, as well as tasks that are boring or unfulfilling. Automated grocery stores, mobile retail units, and self-driving food delivery vehicles could also revolutionize how food retail works, redefining the jobs performed by people and the space they inhabit. Humans could have the option to focus on innovative and creative tasks while machines cover tedious and repetitive assignments.

Automation will create new typologies with different imperatives, scales, and measurements, questioning conventional architecture with the potential to generate a new kind of aesthetic. In order to have a fully automated experience in our urban territory—especially in the food industry—the architecture of an automat will need to mediate space for human comfort and, at the same time, provide the optimal size and climate required by the machine to work best. With the adaptation of automation, we could imagine a new kind of architecture where we enjoy accessibility and convenience provided by machines, all while admiring the machine’s revolutionary new aesthetic in our urban territory.

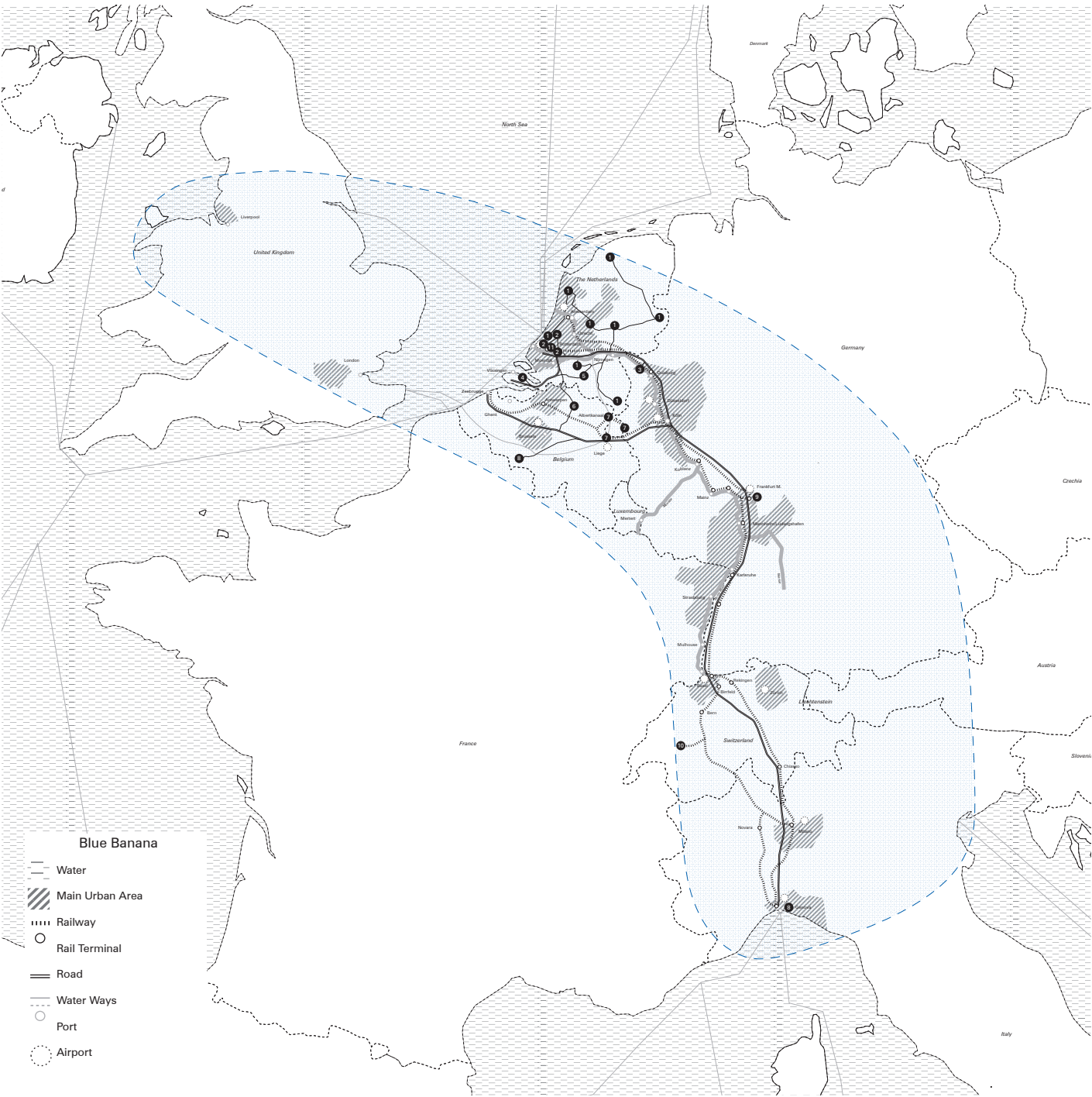
Endnotes:

1. “The Fourth Industrial Revolution,” Foreign Affairs, accessed October 4, 2021, <https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial-revolution>.
2. “Harnessing automation for a future that works,” McKinsey, accessed October 4, 2021, <https://www.mckinsey.com/featured-insights/digital-disruption/harnessing-automation-for-a-future-that-works>.
3. William Grimes, *Appetite city: a culinary history of New York* (New York: North Point Press, 2009).
4. “We Hardly Knew Ye: Remembering America’s First Automated Grocery”, Life, accessed August 8, 2021, <https://www.life.com/people/keedoozle-americas-first-automated-grocery/>.
5. “Where machine could replace human – and where they can’t (yet),” McKinsey, accessed October 4, 2021, <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet>.
6. “Rome Gets Its First Pizza Vending Machine. Will Romans Bite?,” The New York Times, accessed October 4, 2021, <https://www.nytimes.com/2021/06/07/world/europe/rome-pizza-vending-machines.html>.
7. Liam Young, “Neo-Machine,” in ed. Liam Young, *Machine Landscape: Architecture of the Post-Anthropocene* (Oxford: John Wiley & Sons, 2019).
8. “Lesson from a year of Covid,” Financial Times, accessed October 4, 2021, <https://www.ft.com/content/f1b30f2c-84aa-4595-84f2-7816796d6841>.
9. “Architecture without People: The Built Environment of Machines,” ArchDaily, accessed October 4, 2021, <https://www.archdaily.com/949162/architecture-without-people-the-built-environment-of-machines>.
10. “Automation from farm to table: Technology’s impact on the food industry,” Brookings, accessed October 4, 2021, <https://www.brookings.edu/blog/up-front/2020/11/23/automation-from-farm-to-table-technologys-impact-on-the-food-industry/>.

The Blue Banana

The Blue Banana—a term coined in 1989 by a group of French geographers—is a name used to describe a European corridor of almost continuous urbanization. Home to 110 million people, the corridor contains metropolitan areas, industrial sites, and major economic centers, stretching all the way from Manchester to Milan, connecting the Irish Sea to the Mediterranean.

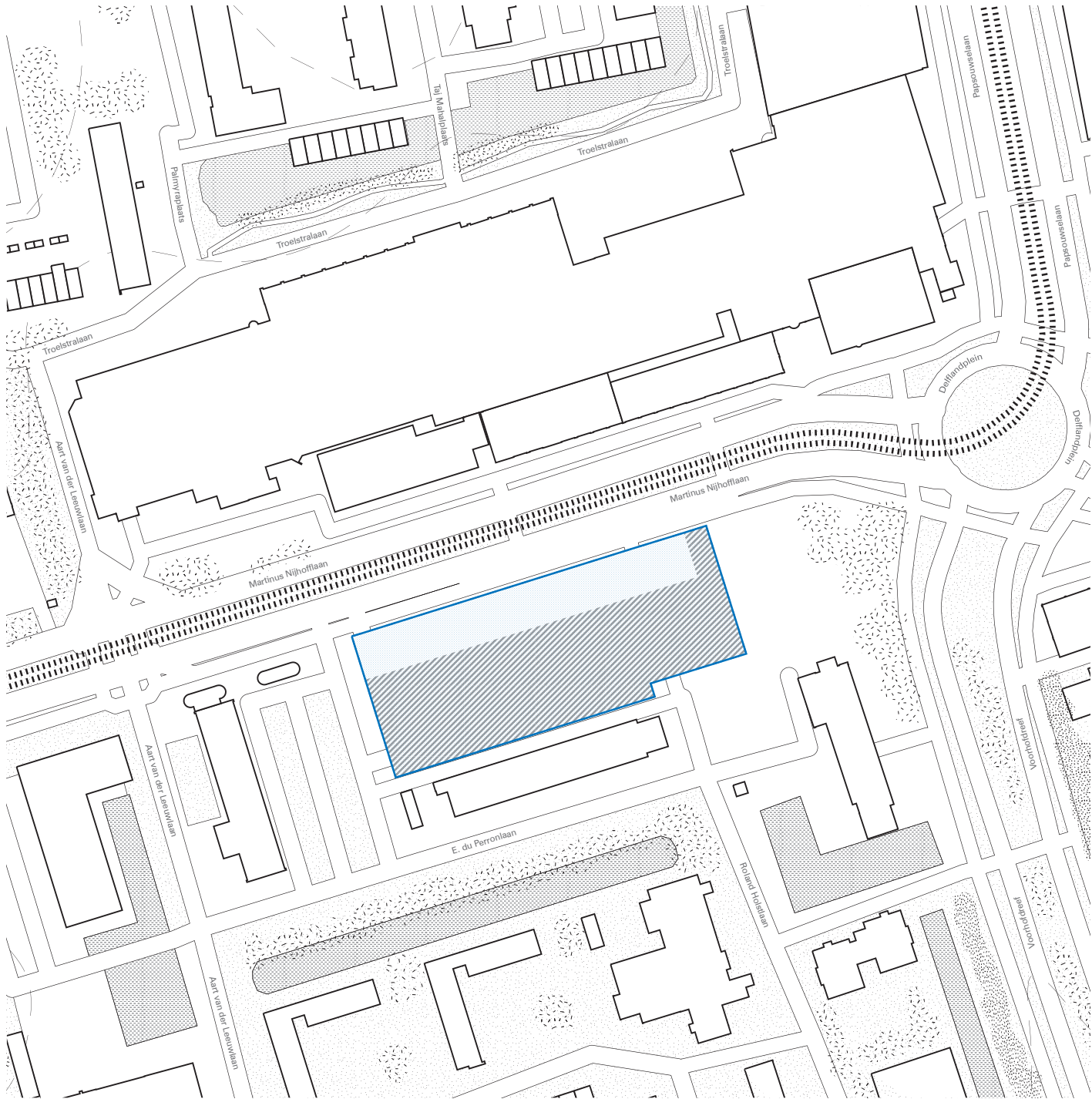
Ten contributions speculate upon the spatial implications of the food industry across the Blue Banana—the European Megalopolis—responding to the specificity of the sites, while, at the same time, providing modifications throughout the supply chain in relation to their respective products that radiate back to the supermarket shelves in Delft.



- | | | |
|--------------------------|------------------------|----------------------|
| 1 Lab Oratory | 5 Aardket | 9 Fresh Forward |
| 2 Whole Milk | 6 Sensatorium | 10 Crafted with Care |
| 3 Pink is Not a Color | 7 Domus Leo | 11 Albert |
| 4 The Tastemaking Estate | 8 Food Utility Network | |

Albert Heijn XL

The collective project for the design of a future supermarket is located on the current site of the Albert Heijn XL on Martinus Nijhofflaan in Delft. Amidst a densifying residential area, with a variety of stores on the ground floor and social housing above, multicultural demography, proximity to the parking garage, and excellent connectivity to road infrastructure and public transport, the location of the Albert Heijn XL provides the opportunity to reciprocate with its adjacent and peripheral territory.



The collective research—focused on the food industry in the Netherlands and beyond—commenced with the typological analysis of a supermarket. Analysing a local Albert Heijn, it examined the relation between products, their associated building types, and territories, from raw materials to supermarket shelves.

While a supermarket operates within a highly efficient tailored space, how do design decisions vary between intervening in an existing canal house and a purpose-built suburban supermarket?

Transitioning from the mimicry of local markets to promotions on digital screens, what role does scenography play in the design of a supermarket’s storefront?

How does the prediction of supply and demand through data-driven decision-making and automation affect the organization, product distribution, and design within supermarkets and the ever-changing future of retail?

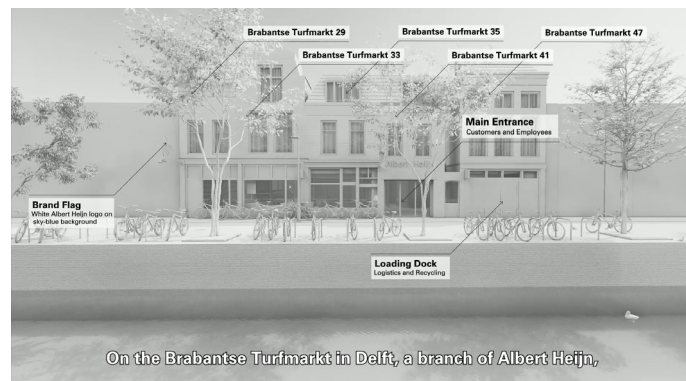
How does the incorporation of a supermarket reciprocate with its adjacent and peripheral demography, real estate, and territory and in turn affect land appreciation?

How does the design of the layout of the concealed back of house relate to the meticulously designed sales floor?

With a constant flow of products, what spatial consequences are posed by the standardized packaging sizes, product distribution, and store planning on the supply chain of a supermarket?

With ever-increasing reliance on e-commerce and perpetually improving digital experiences, what will the future hold for supermarkets in the Netherlands?

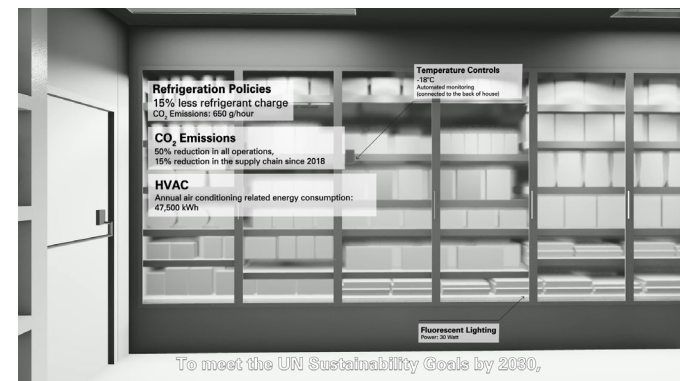
The annotated analysis of Albert Heijn reveals the dichotomy within the functioning of a supermarket, between the meticulously designed sales floor for an immersive consumer experience and the concealed back of house associated with the product’s supply chain.



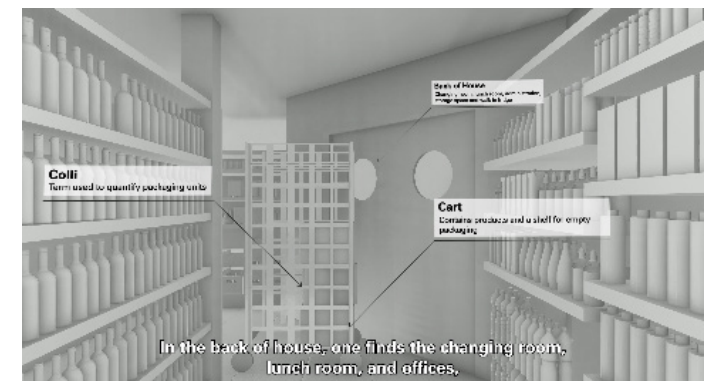
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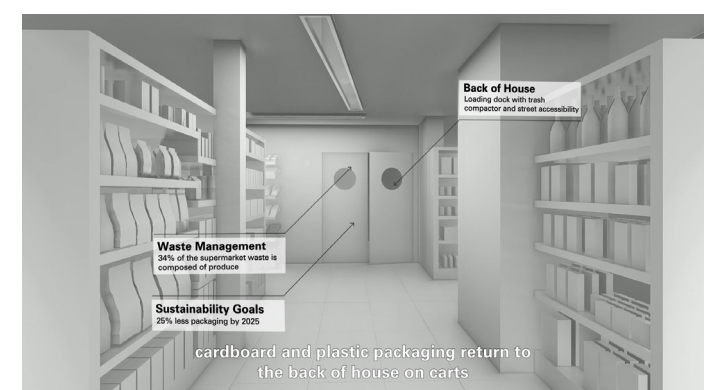
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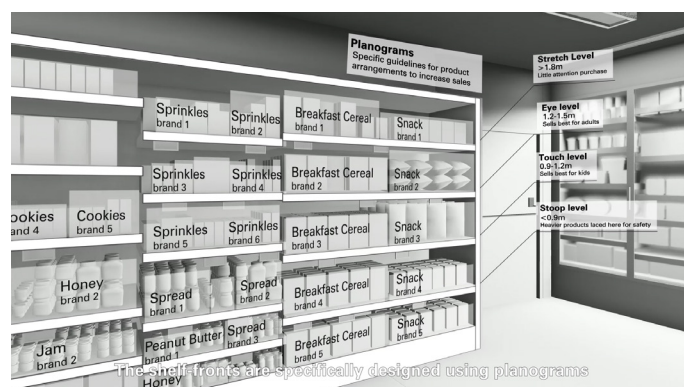
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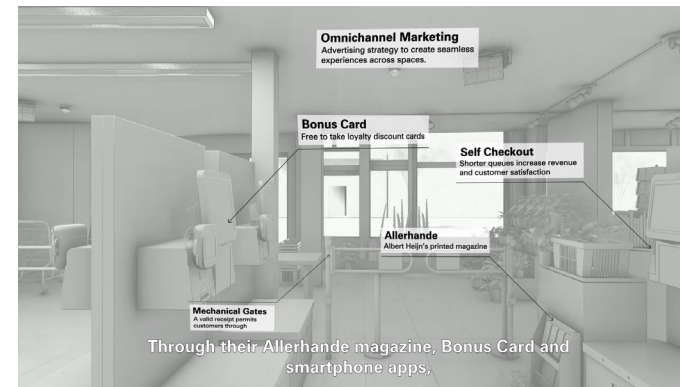
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5



6



11

Scenes from annotated analysis of Albert Heijn

1 Facade

2 Fresh Produce

3 Fresh Produce

4 Bakery

5 Bakery

6 Condiments and Spreads

7 Refrigerated Section

8 Back of House

9 Confections

10 Loading Dock

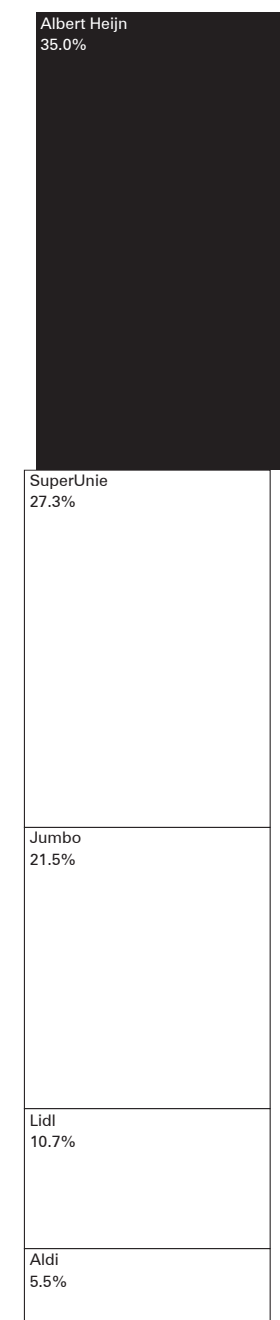
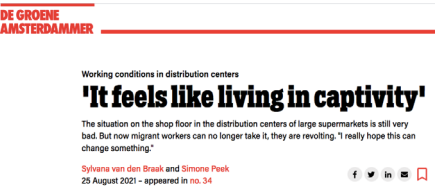
11 Point of Sale



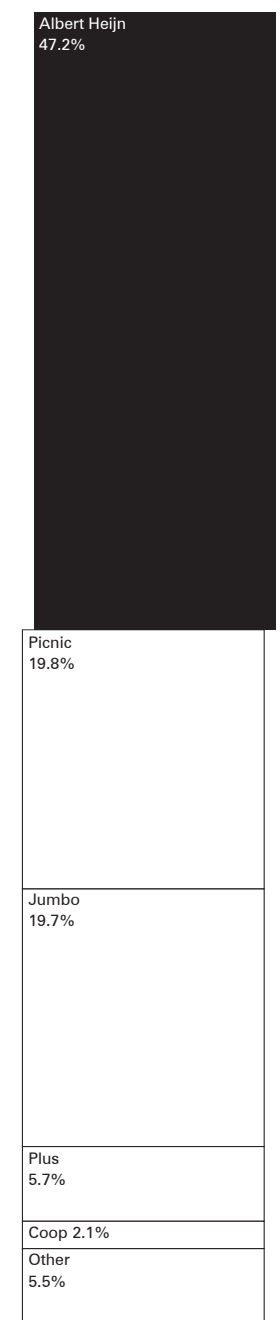
The Supermarket Reconstructed.



On automation- An automated pizza-making machine showcases the spectacle of proliferating digital technology in the supermarket.



Market Share (2020)
Supermarkets



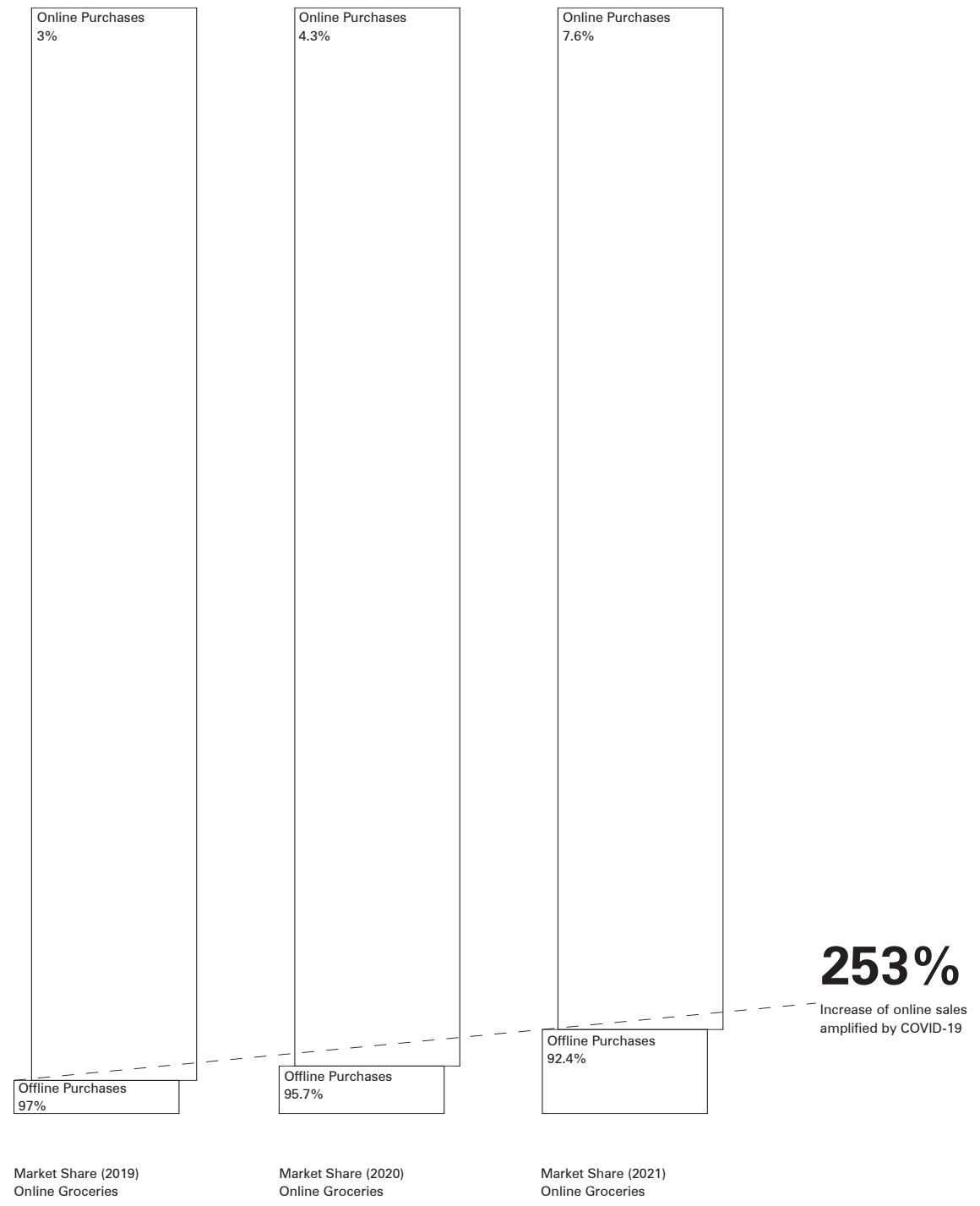
Market Share (2020)
Online Groceries

Recent headlines describe the supermarket and its distribution network in the Netherlands as a highly competitive sector, with questionable

working conditions, while unregulated competitors are set out to disrupt the market.

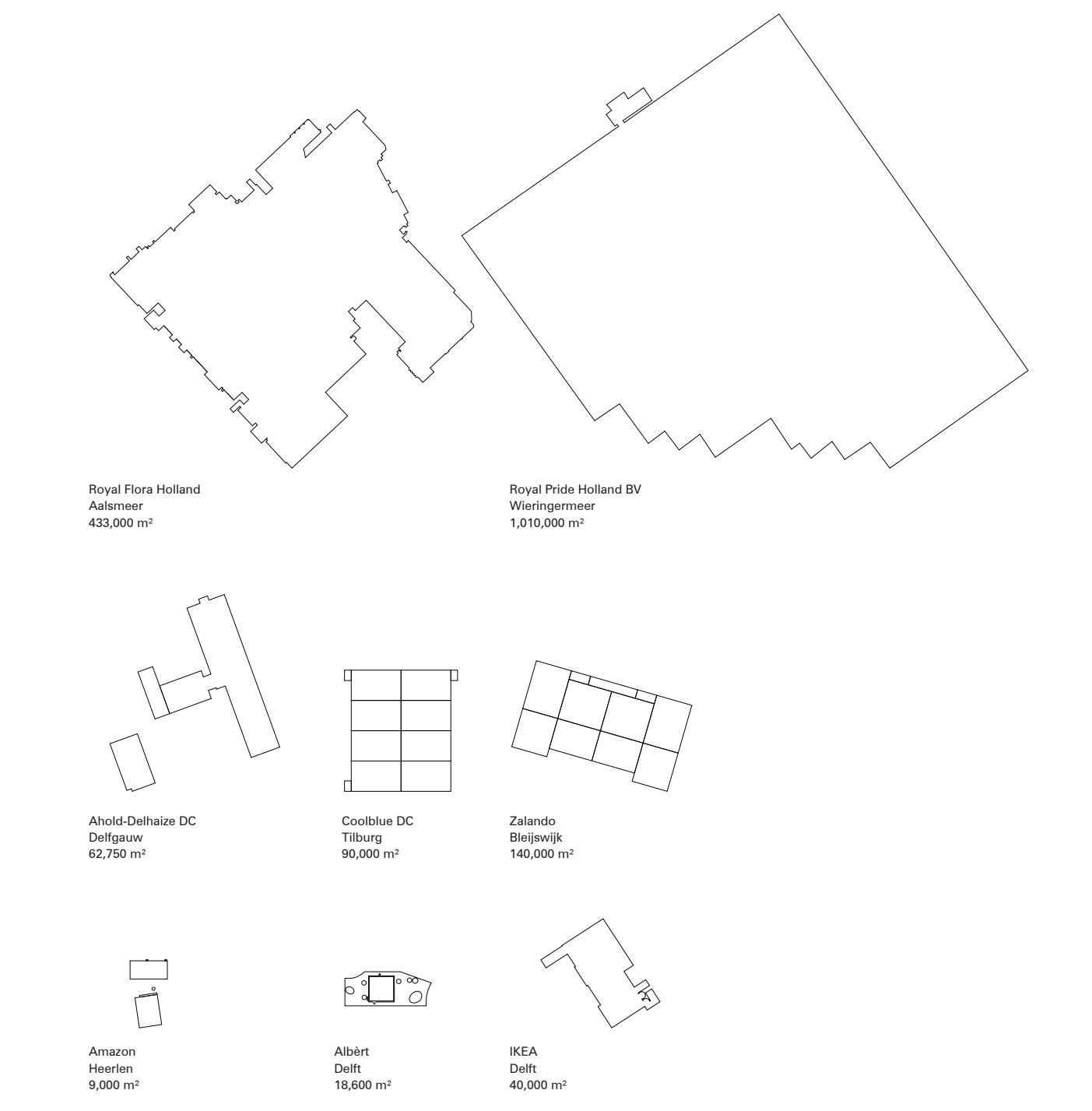
The “supermarket war” in the Netherlands, has led to a consolidation of companies and a seemingly oligopolized landscape of grocers, in

which Albert Heijn has the greatest market share in both physical and digital stores.



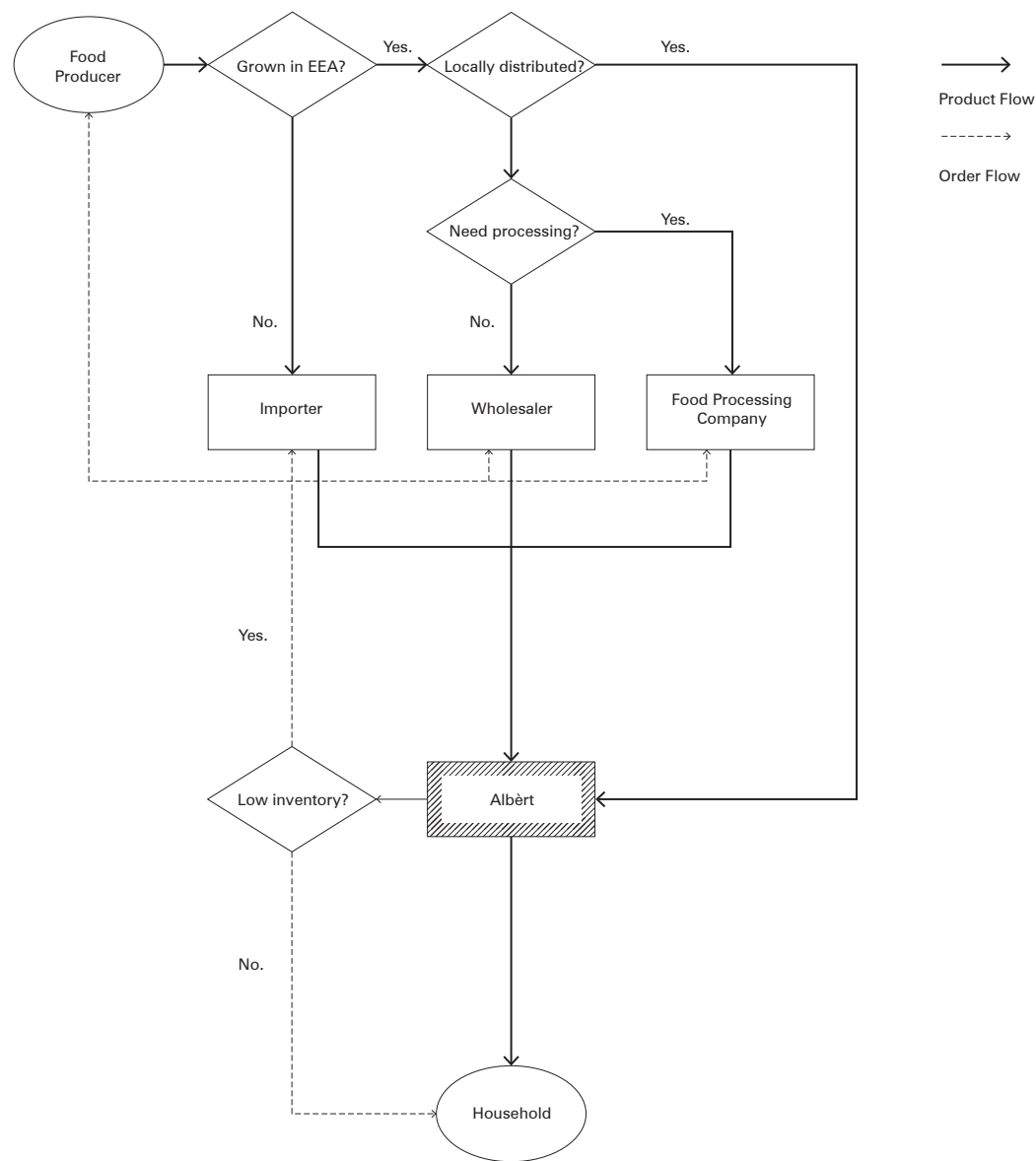
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The concealed back of house extends to the peripheries of the Dutch urban areas, taking upon a variety of spatial dimensions, accommodating different

quantities of workers, and serving a range of regions.



Producers and suppliers respond to complex market dynamics through just-in-time production, relying on automation, logistics, and infrastructure

within the Blue Banana, allowing supermarkets to optimize their stocking to shopper's demand.



Employees keep track of just-in-time arrivals of products, while their prices are informed by market conditions and proximity.

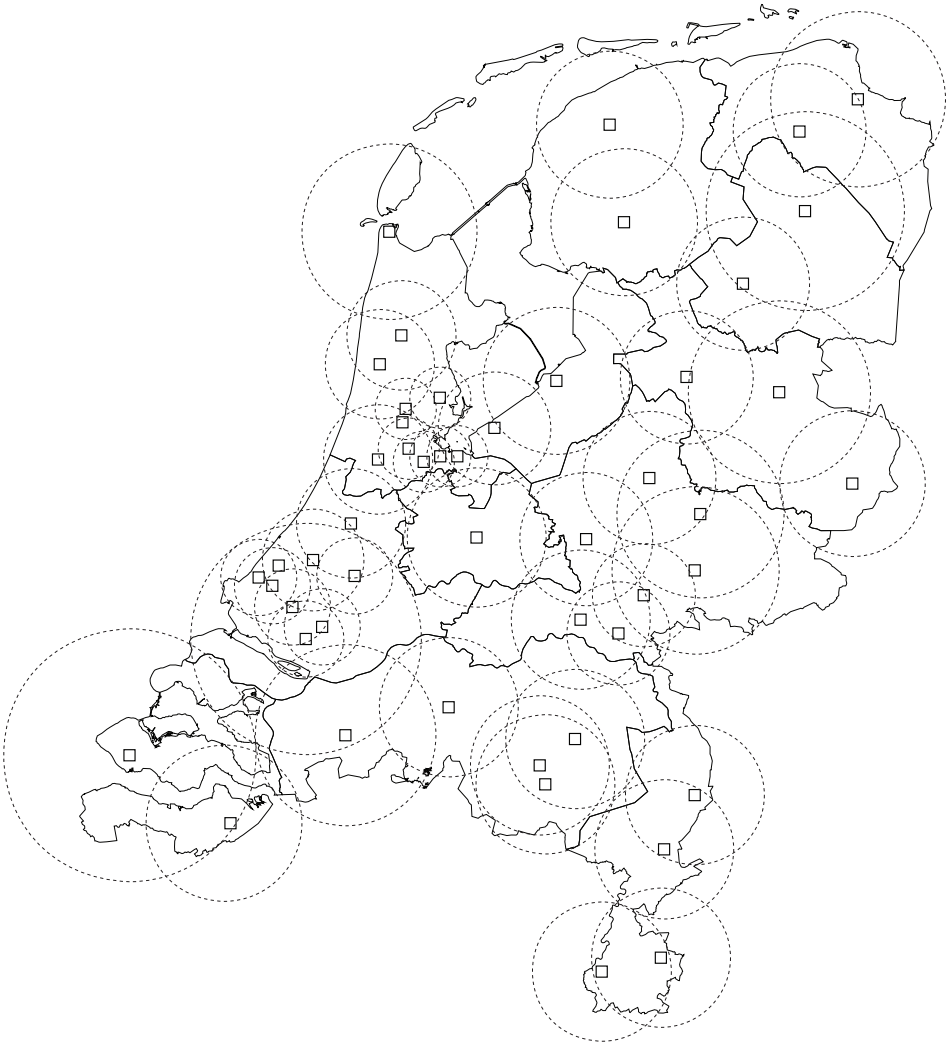
2022

- National Distribution Center
- National Refrigeration Center
- Regional Distribution/Refrigeration Center
- x Home Shopper Distribution Center



2030

□ Albèrt



In an effort to break open the centralized and concealed distribution network of the supermarket, the role of the distribution centers is shifted to

large-scale supermarkets such as Albert Heijn XL—now Albèrt—with a floor area of at least two thousand square meters,

ready to serve a larger region through e-commerce.



The number of supermarkets and their siting are regulated through municipal planning, leading to an even distribution over Delft's urban expansion areas.

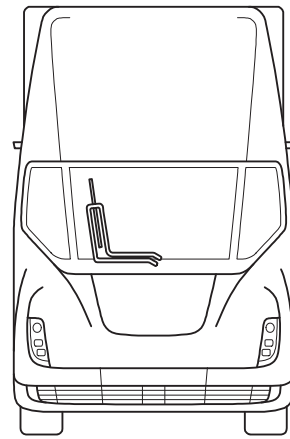
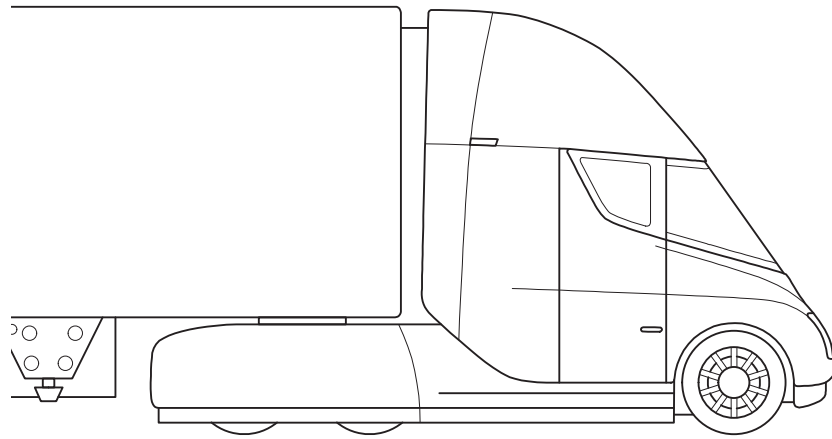
Delft's historic center, however, exhibits a high density of supermarkets and speed delivery hubs, responding to valuable shoppers in their proximity.

This informs the future distribution of Albèrt and smaller-footprint Albèrtjes.

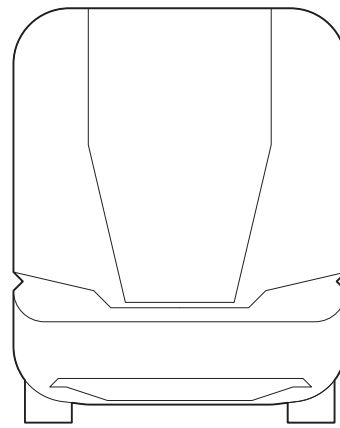
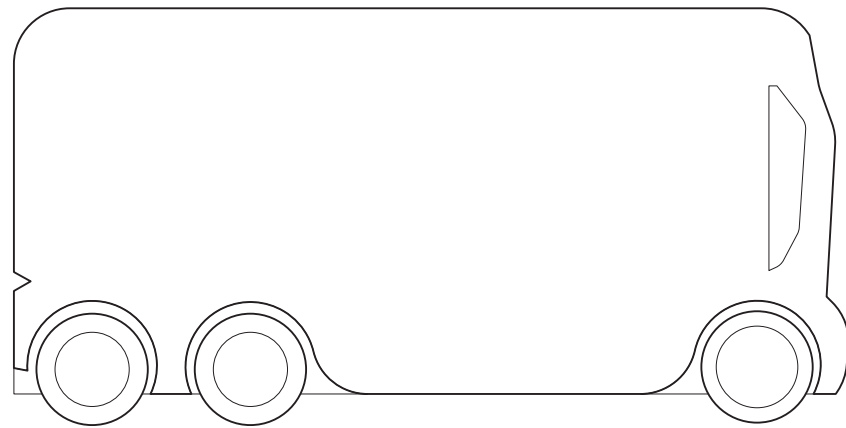


The essential products in these multiple Albèrtje stores within each city are fed by the distribution centers integrated within each Albèrt, while also having

products directly sourced from local suppliers within the city, with the choice of having fine quality products and essential goods at the same place.



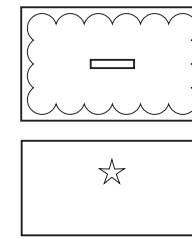
Freight-truck



Albèrt truck



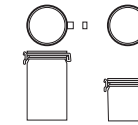
PET Bottle 1.5 l



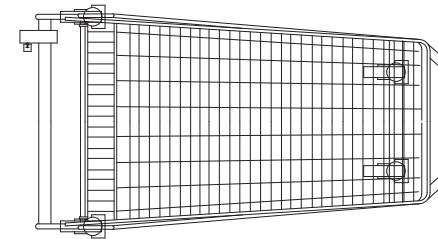
Crate and Glass Bottle, 33 cl



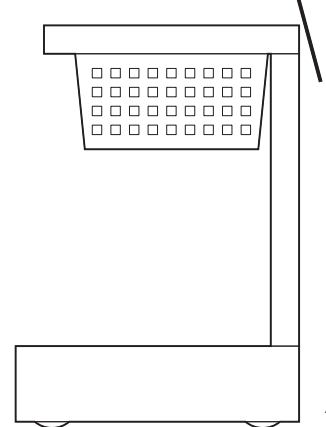
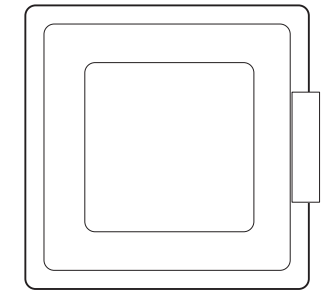
Albèrt Smart Cart



Pieter Pot Reusable Glass Jars, various volumes



Supermarket shopping cart and shopping basket



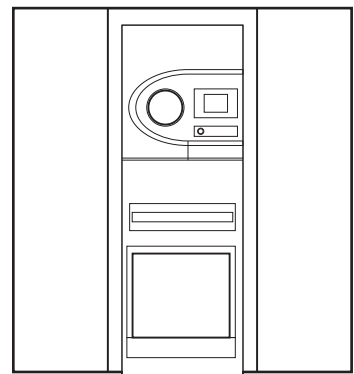
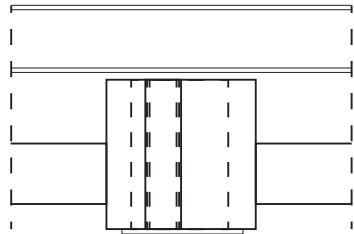
Albèrt Smart Cart

By distributing the supply chain from centralized warehouses to large supermarkets in the vicinity, electric semi-trucks with shorter roundtrips take

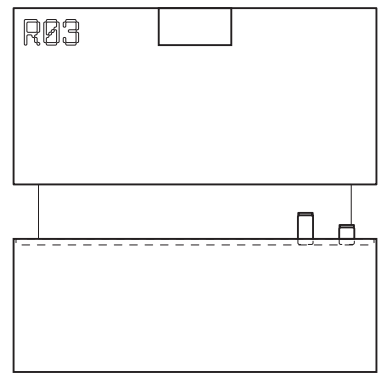
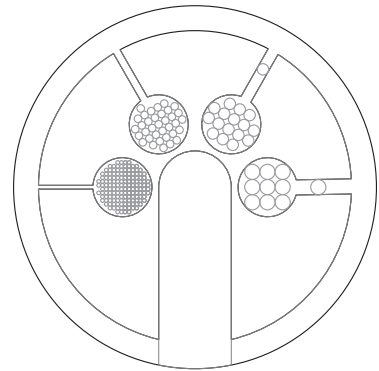
care of transport between producers, supermarkets, and homes.

To eliminate single-use packaging and optimize logistic processes, a unified container-deposit system is introduced, limiting the variety of product

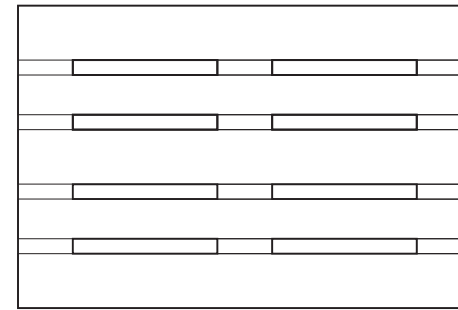
dimensions in Albèrt. Displays on the smart cart and supermarket hosts guide shoppers in finding their products.



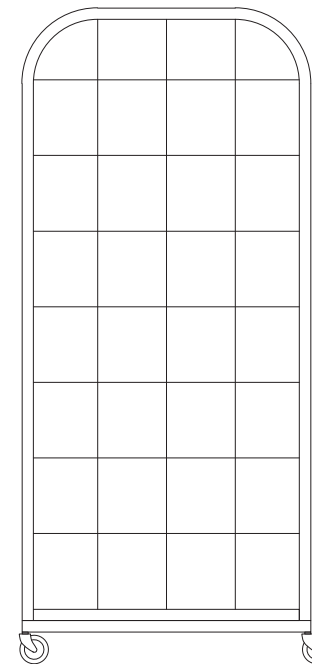
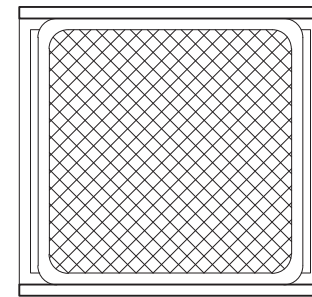
Container-deposit machine



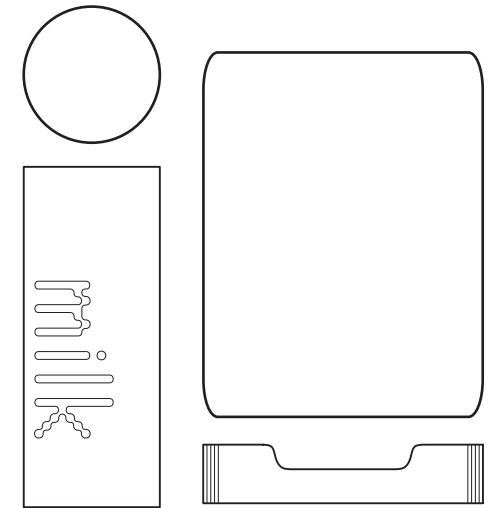
Albert Container Return Point



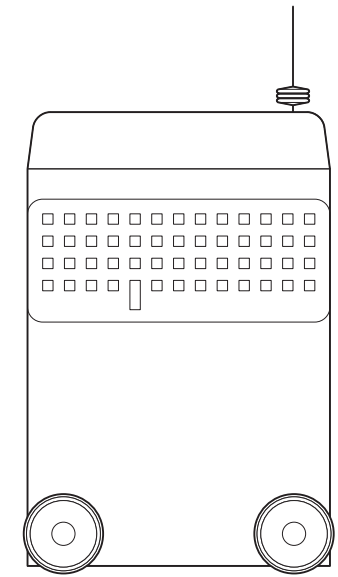
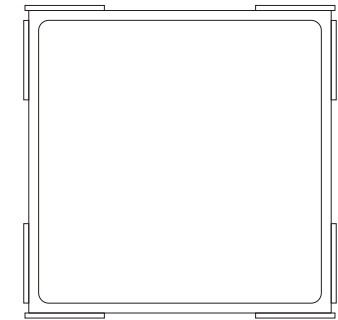
EPAL-Pallet



Stocking Cart



Albert Bulk Containers and Crates

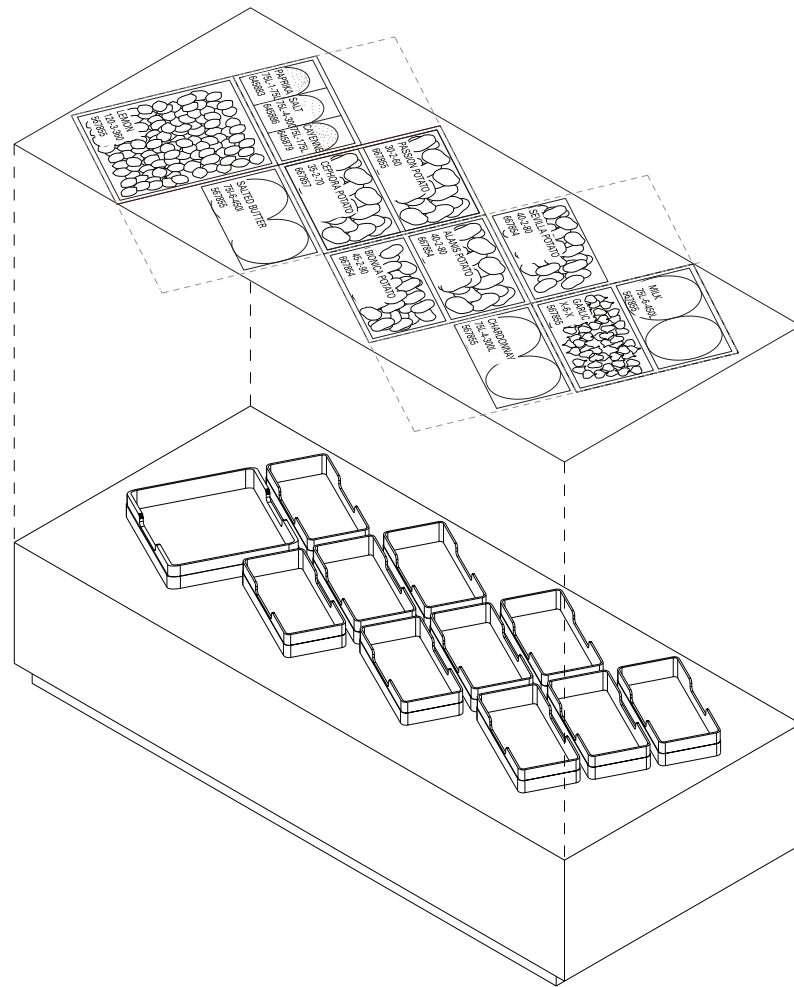
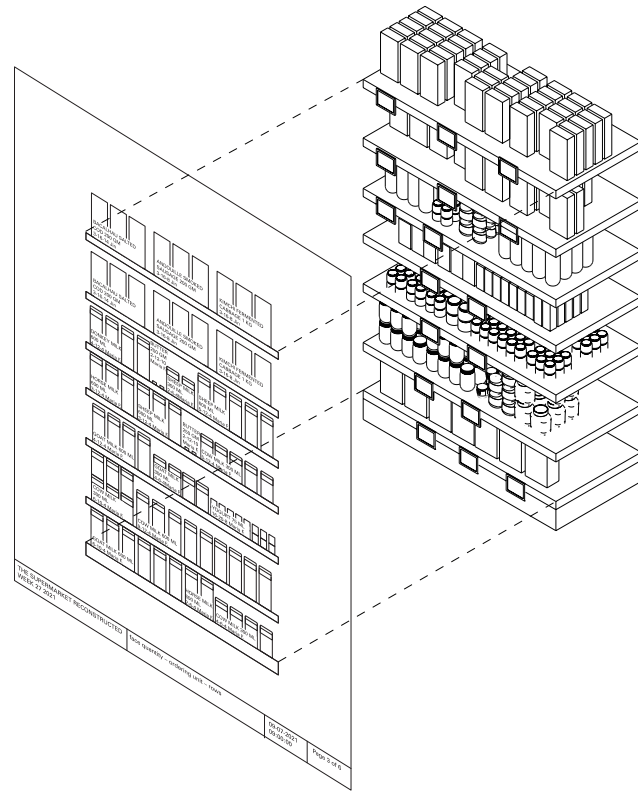


Ocado Robot

Albert's container deposit system utilizes the shopper's existing familiarity with return points for used bottles and crates.

Albert's automatized warehouse, making use of Ocado robots, considers legacy dimensions based on the

EPALpallet, by adhering to an 80 x 80 cm grid.



Planograms are an elevational system to optimize the relation between shoppers and the grocer's shelves, in order to maximize sales and minimize

wasted space. By introducing a flexible automatized stocking system, the planogram is transformed into a planar organization, in which the retail

experience can be dynamically adjusted to market conditions and seasonality.

€ 1.98



1970
Thermal printed price label with European Article Number and unit price
120 x 100 mm

Self-service store with checkout counters
~170 m²



1936
Self adhesive price label
21 x 12 mm

Hypermarket with checkout counters
~6000 m²



2020
Electronic Shelf labeling system with dynamic display
70 x 36 mm

Modern Supermarket with omi-channel checkouts
~3000 m²



2030
NFC tag embedded in the crate
Ø3 mm

2030
Albèrt with smart carts
Ø3 mm

The introduction of the fixed price—attached to a product through a sticker—has allowed the grocer to develop into self-service stores,

informing the architectural type of the supermarket. Technological developments such as thermal printing, e-ink, NFC tags, and computer vision

reintroduce dynamic pricing while offering novel spatial solutions for the supermarket, such as the elimination of the physical check-out point.

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3. Bright and Werkend Landschape, “Black Boxes “, *Bright*, (Design & Development: LAVA Amsterdam, 2017), Accessed August 19, 2021, <https://bright.coop/black-boxes/>

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An interview with the CEO of Ahold Delhaize about the financial positioning of supermarkets after COVID-19.

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7. Frank Viviano, “This Tiny Country Feeds The World”, *National Geographic*. (September, 2017).

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8. Franziska Bollerey, *Setting the Stage for Modernity: Cafés, Hotels, Restaurants, Places of Pleasure and Leisure* (Jovis Verlag GmbH, 2019).

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11. Lia Ryerson, “Bigger Hauls, Fewer Choices: How the Pandemic Has Changed Our Grocery Shopping Habits Forever,” *The Washington Post*, September 1, 2020.

An article cataloguing new market trends in the American supermarket after COVID-19.

12. Marcus Case and Ember Smith, “Automation From Farm to Table: Technology’s Impact on the Food Industry,” *Brookings*, November 23, 2020.

An article bringing up the incorporation of automation in different parts of the food industry along with its potential impacts on policy and labor.

13. Marten Kuijpers and Ludo Groen, “Automated Landscapes and the Human Dream of Relentlessness,” *Strelka Mag*, March 3, 2020.

An article about large automated production spaces in the Netherlands and their effects on people and land.

14. Melissa Repko, “Grocery Shoppers Trade Up From Dried Beans and Rice to Premium Foods as Covide Cases Rise,” *CNBC*, November 12, 2020.

American market trends toward higher quality groceries after COVID-19.

15. Michelle Dunne and Angela Wright, *Local and Artisan Food: A Case For Supermarket Space?* (11th Annual Tourism and Hospitality Research in Ireland Conference (THRIC), 2015).

A literary and market study on the possibility of the placement of local and artisan foods in Irish supermarkets.

16. Nicola Twilley, “The Coldscape: From the Tank Farm to the Sushi Coffin.” *Cabinet*, published 2012, <https://www.cabinetmagazine.org/issues/47/twilley.php>

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18. Peter Del Tredici, “The Flora of the Future”, in *Projective Ecologies*, ed. Chris Reed and Nina-Marie Lister (New York: Actar D, Harvard Graduate School of Design, 2014).

An article claiming the significance of biodiversity in urban areas.

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21. Matthijs Van Sterkenburg, “The Power of Prediction: How AholdDelhaize is Using Data and AI to Provide More Personalised Shopping Experiences,” *Microsoft Pulse*, accessed August 10, 202, <https://pulse.microsoft.com/en/transform-en/retail-en/fa2-the-power-of-prediction-how-aholddelhaize-is-using-data-and-ai-to-provide-more-personalised-shopping-experiences/>

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A Business and Consumer Studies thesis from Wageningen University on the communication versus actual sustainability at Dutch supermarkets.

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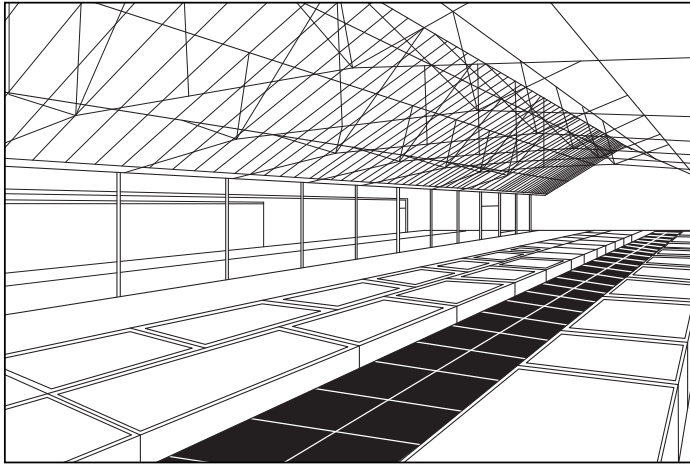
24. David Wallace-Wells, “What Happens When All the Bugs Die?”, *New York Magazine*, July 31, 2021.

An interview with Dave Goulson about Silent Earth, a book on insects and the possibility of extinction they face.

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An article on the connection between GM crops and pest control and the opposing views and policies surrounding the use of GM crops in South Africa.

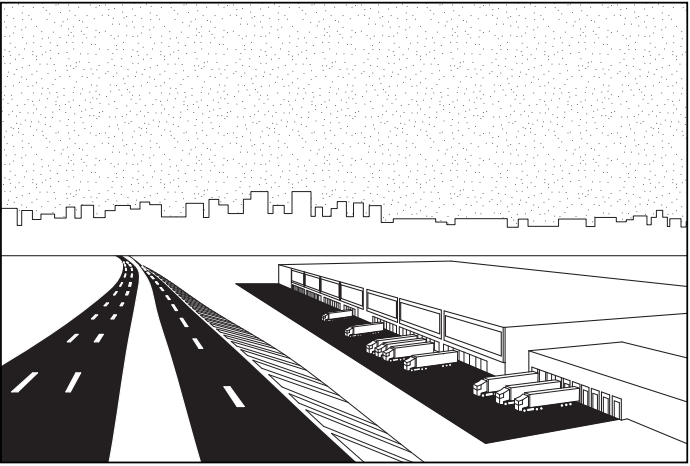
	Description
<div data-bbox="59 115 1958 588"> <p>Supermarket is a collective project on the spatial implications of the food industry in the Netherlands and beyond, redesigning this now considered essential architecture to entail a paradigm shift in its journey towards optimization, sustainability, and health consciousness. It imagines a future supermarket that integrates retail experiences with distribution, supply chains, and product display to ensure a frictionless future for conscious consumers; while, at the same time, creating a new civic presence for the city and its residents.</p> </div> <div data-bbox="59 588 1958 1081"> <p>The envisioned supply chain for the future supermarket commences with the Blue Banana, enhancing the position of the Netherlands— one of the world’s largest food exporters and home to world-class research institutions—in this urbanized trade corridor. From Genoa to Delft, and from the supermarket’s back of house to the sales floor, Supermarket addresses multifaceted aspects of the food industry— scarcity, trade, inclusivity, sensorialism, tastemaking, craft, reshoring, protectionism, automation, and extinction—through ten architectural and urban design contributions.</p> </div> <div data-bbox="59 1081 1958 1659"> <p>Ten products, along with their associated building types and territories demonstrate how a modified food distribution network converges at the future supermarket—Albèrt—on Martinus Nijhofflaan in Delft. Albèrt seeks to display products and their supply chain by integrating the once stand-alone and distant distribution center with an automated Ocado grid system, asserting itself as the generator of a just-in-time production system—thereby disrupting the seriality of infinite supermarket aisles. With all Albèrt supermarkets operating as distribution centers for multiscalar Ahold Delhaize branches—such as Albert Heijn and Albertje—the supply chain, and its resultant territories, are condensed and reconfigured.</p> </div> <div data-bbox="59 1659 1958 1942"> <p>Albèrt offers an omni-channel consumer experience in both physical and digital forms. It reflects on the traditional supermarket’s backstory, effectuating sustainability goals throughout a reimagined supply chain. The supermarket assures optimization in unison with the country’s circular economy by implementing reusable</p> </div>	<div data-bbox="1958 115 2908 588"> <p>packaging for all Albèrt products, extending shelf-life from data-driven decision making, offering digitized scanners informing conscious consumers of product particularities, and by providing dynamic pricing for food security.</p> <p>Along with a flexible open-plan allowing various iterations of product displays to maximize profits and render a unique shopping experience, Albèrt ‘s business models are diversified, generating revenues from branded products staged in shop-in-shops and electric car-sharing facilities to encourage consumer traffic.</p> </div> <div data-bbox="1958 588 2908 1942"> <p>The supermarket—previously conceived as a destination— incorporates a pathway to meet the constant movement of divergent consumers with the conjunction of fast-paced pick-up zones—promoting cycling, delivery, and e-commerce— and slow-paced demonstration zones offering novel tasting experiences along with the green public spaces on the periphery. Albèrt demonstrates an innovative retail experience beyond the technology of the new integrated distribution center, extending its perimeter toward the Delft city center to establish a new civic presence.</p> </div>



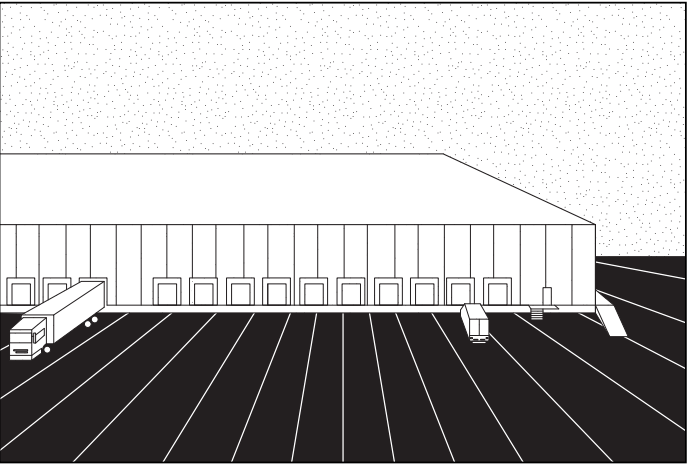
The Netherlands is internationally recognized as one of the world's largest food exporters due to its excellent connectivity throughout Europe. Home to world-class research institutions, it is—in effect—feeding the world. However, food production and consumption are responsible for around 25% of the total emission of greenhouse gases and for 60% of the terrestrial loss of variation in plant and animal species. When it comes to the food industry, the country's journey towards optimization, sustainability, and health requires a paradigm shift.



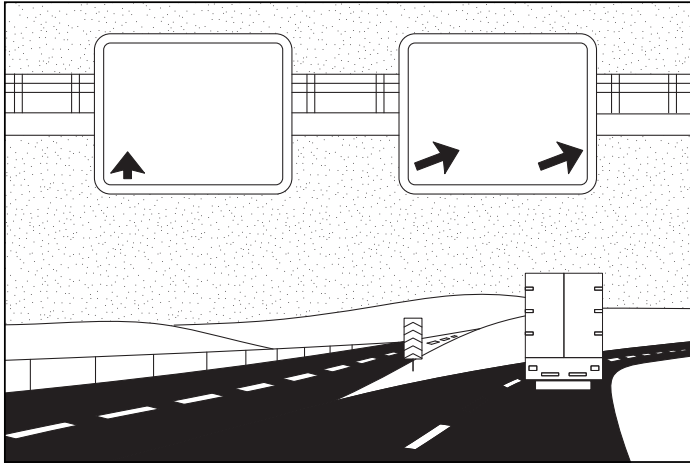
Ten architectural and urban design contributions sited within the Blue Banana—a European corridor of almost continuous urbanization—originating from supermarket products, <<<redesign the future supermarket of 2030.



These ten contributions provide modifications to the supply chain, product distribution, and store planning, in relation to the products, their associated building types, and their extensive territories through a vast network of transportation nodes.



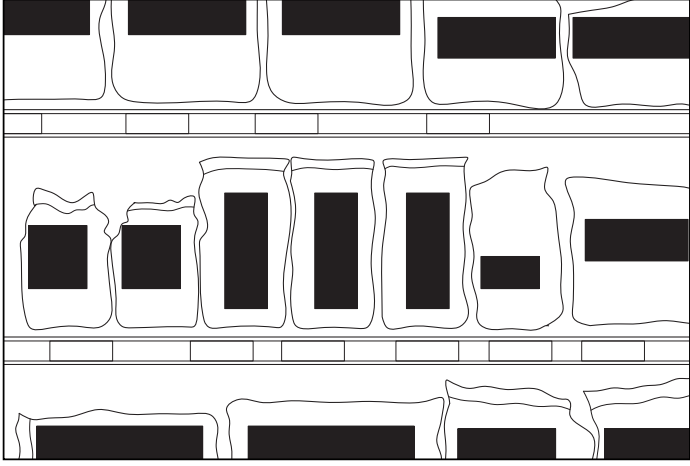
For this purpose, distribution centers currently serve as the epicenter, exploring the resultant spatial characteristics, and linking these ten contributions with the future supermarket.



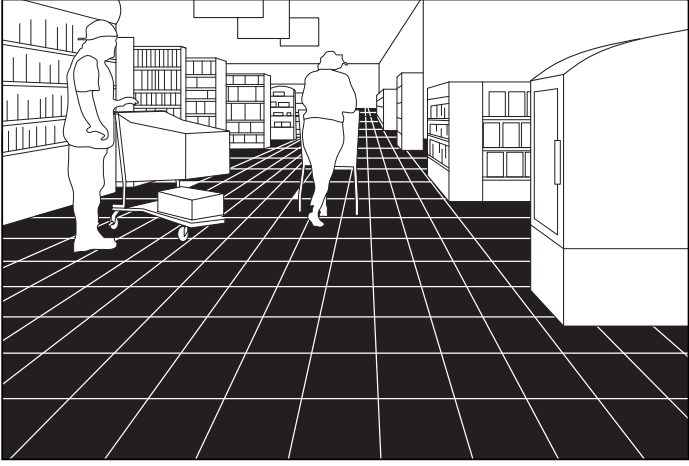
A continuous supply of products and materials, to and from the current supermarket, is made possible through a vast network of roads, rails, and waterways, connecting it to various infrastructural nodes and European trade routes within the Blue Banana.



Supermarkets occupy the most densely used square meters in a city. Resting within its etymology—where «super» alludes to supremacy concerning size, quality, and quantity, while «market» refers to trading in goods of value—the supermarket, selling food and household goods, first originated in the 19th century with the novel concept of a self-serve store.



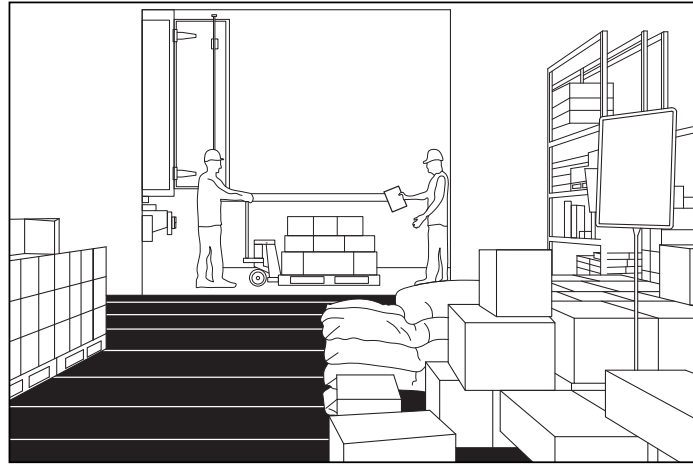
Fixed prices that originated in order to accelerate grocery sales had a huge impact on consumer experience. From standardization of price tags to uniformity of products, and from barcodes to electronic shelf labeling, the improved logistics, shorter employee training periods, a monitored supply system, and efficient shelf organization.



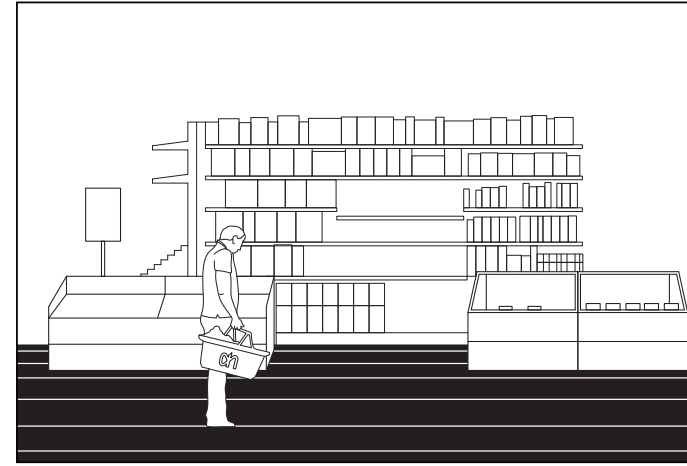
As the COVID-19 pandemic has reshaped the retail market in unprecedented ways, consumers shift around lifestyle and value. Its profits increased up to 40% and physical stores overflowed with people seeking to maintain a sense of normalcy, underscoring it as an essential service, one that represents a new civic presence. This demands new spatial configurations of a supermarket transitioning between a pre-COVID-19 and a post-COVID-19 society.



Home delivery and e-commerce businesses grew up to 5 times faster than before the pandemic, giving rise to an online distribution center that offers the convenience of a digital supermarket.



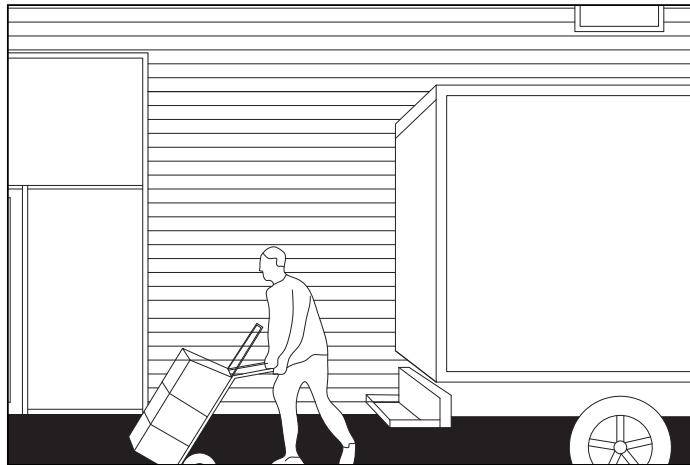
The supermarket analysis reveals its functional logic through the concealed back of house that is associated with the product's supply chain. Regarded as the employee's domain, the back of house is concerned with product flow, supply, and demand through data-driven decision-making, standardized packaging sizes, and product distribution via tastemaking, scarcity, sensorialism, inclusivity, trade, and biodiversity.



Secondly, the meticulously designed sales floor provides an immersive consumer experience. The sales floor raises issues of scenography, human interaction, digital technology, and the organization of supermarkets within the ever-changing future of retail through the notions of craft, reshoring, protectionism, automation, and extinction.



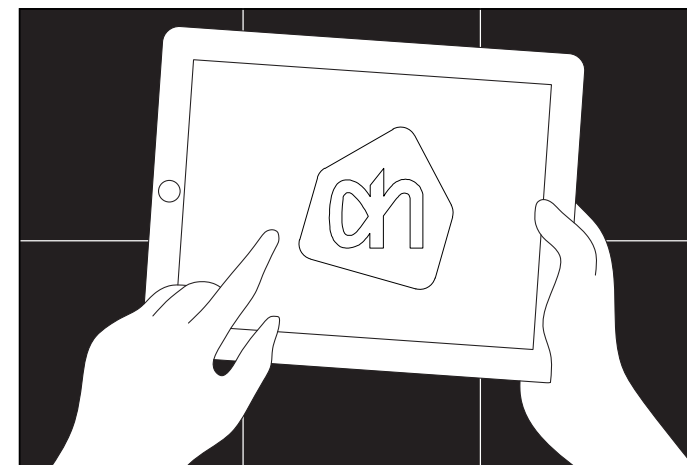
The collective project on the spatial implications of the food industry in the Netherlands and beyond redesigns a future supermarket on the current site of the Albert Heijn XL on Martinus Nijhofflaan in Delft, implementing developments on the sales floor and the back of house ensuring a frictionless future for shoppers.



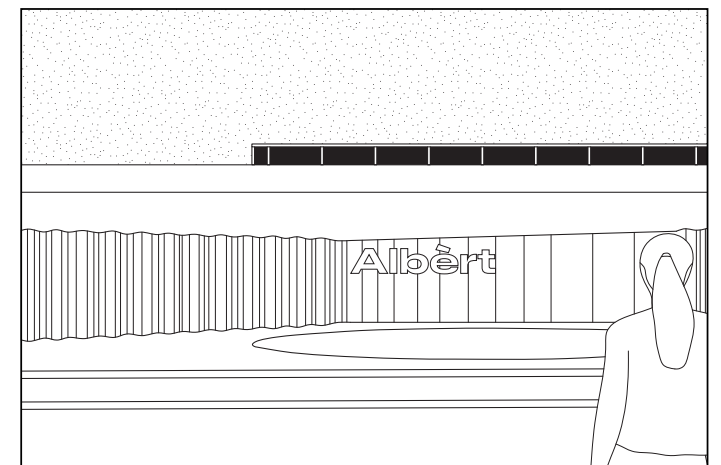
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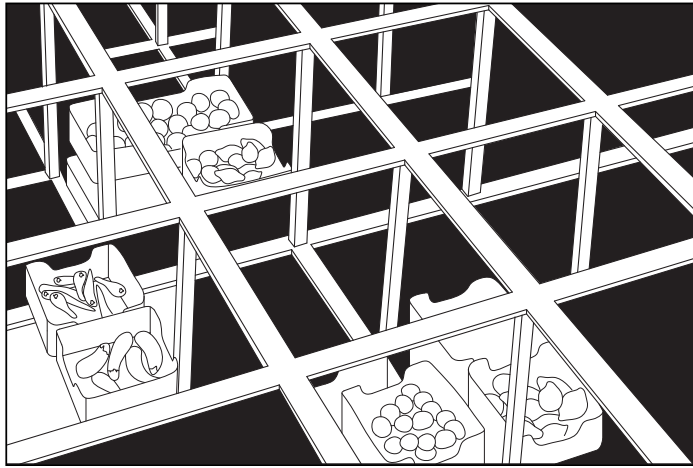
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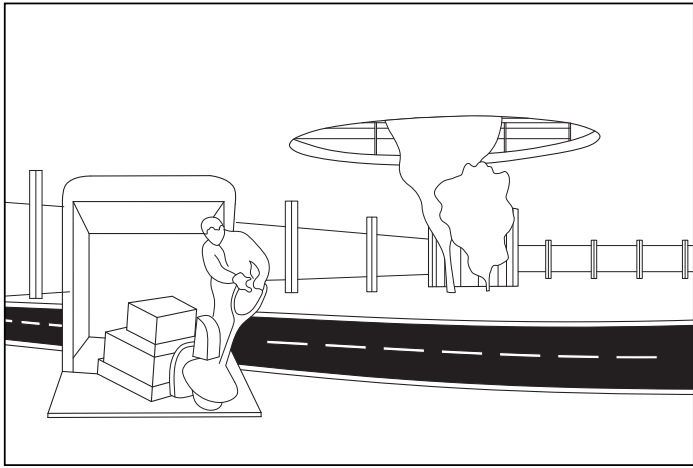
Situated in a densifying expansion area of Delft, a forecasted demography of (international) students, families, and elderly will make use of this supermarket and its e-commerce services.



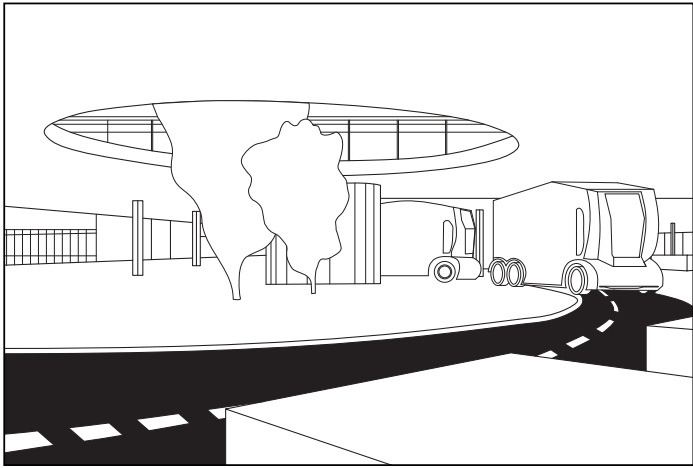
Responding to technical, environmental, and societal demands from the Blue Banana's urbanized corridor to the new Albèrt, and from the supermarket's back of house to the sales floor, new spatial propositions redefine the future supermarket of 2030.



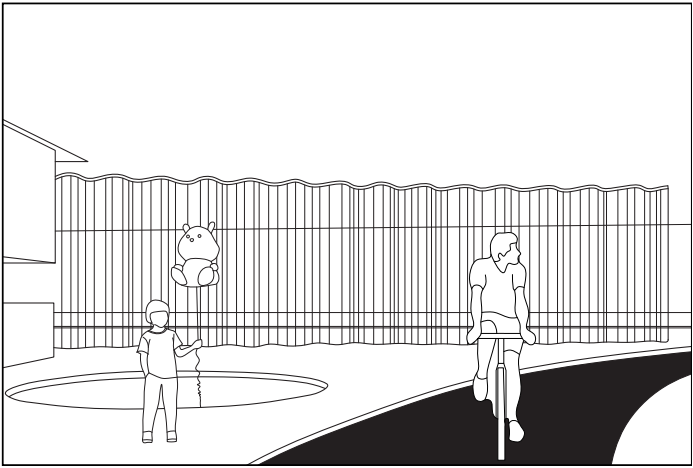
The reimagined supermarket—Albèrt—seeks to display both the product and its supply chain, in turn, the sales floor and the back of house, by integrating the distribution center with an automated Ocado grid system, asserting itself as the generator of a just-in-time production system.



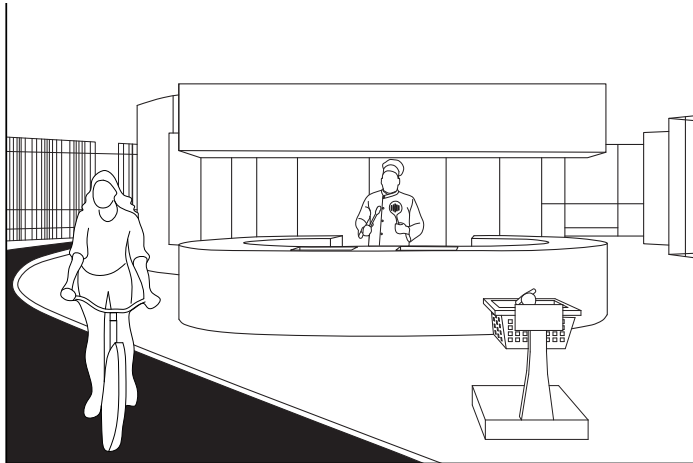
With all Albèrt supermarkets functioning as distribution centers for multi-scale Ahold Delhaize branches—such as Albert Heijn and Albèrtje—the supply chain, and its resultant territories are condensed and redefined. Product distribution within each network thus densifies within smaller radii, becoming open to more local suppliers frequenting small-batch deliveries, while also providing proximity to consumers in the city.



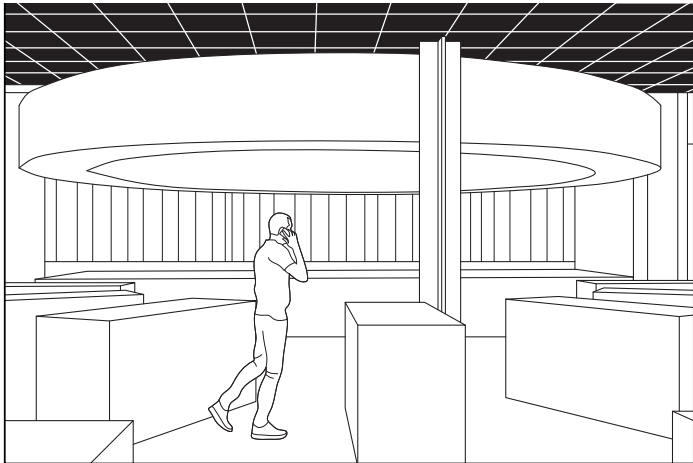
The relationship between the supermarket and the city changes with a modified transitional system that showcases the dynamic loading dock and its functioning on the sales floor, diverts private vehicular flow, e-trucks, and car-sharing services towards the Albèrt parking on the site, and promotes cyclists by providing access on the sales floor through the incorporation of a pathway for fast-paced pick-up zones with an increase in delivery and e-commerce.



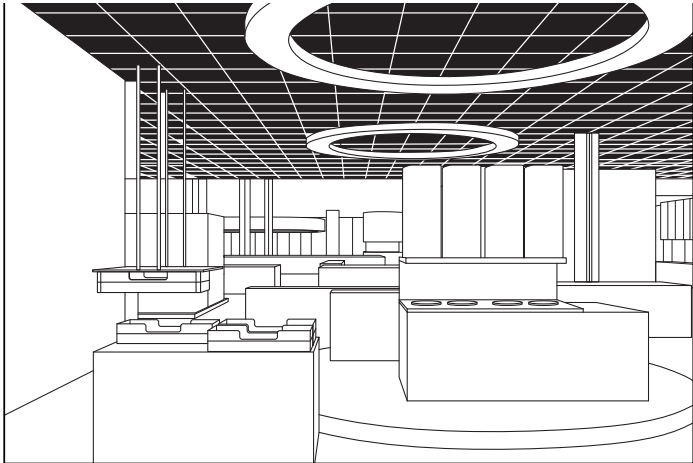
The supermarket provides several entrances—strategically located near high traffic zones—to move away from a one-directional circulation path to a multi-directional circulation pattern within the organic layout of the facade that is designed in response to the surrounding context.



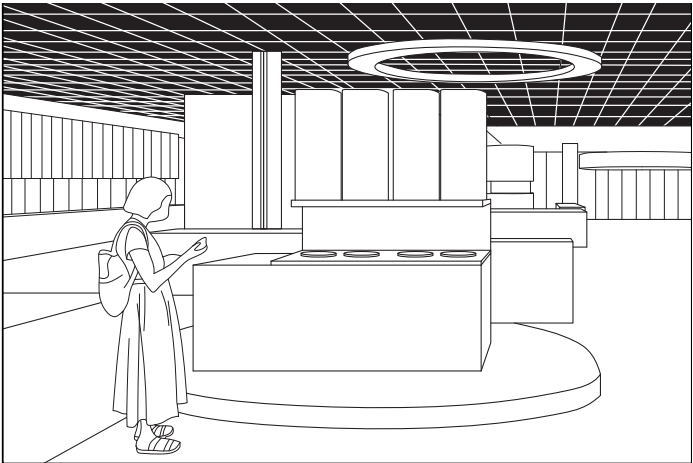
The storefront of the supermarket moves beyond blocked-off rows of checkout lanes and security gates to designated slow-paced zones with product demonstrations, workshops, and exclusive shops that entice consumers into the supermarket.



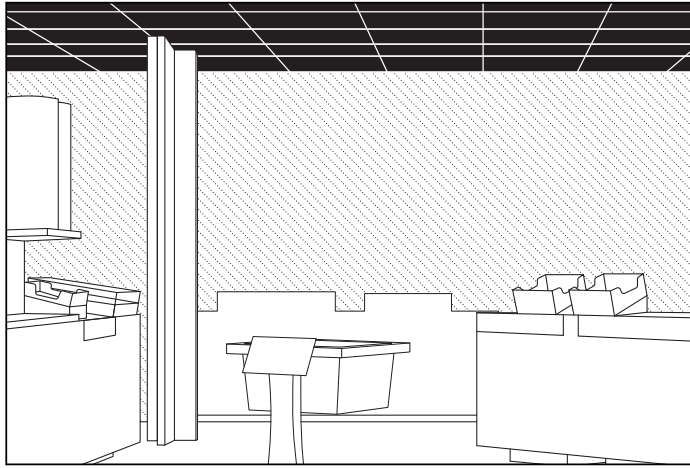
The automated Ocado system in the distribution center above allows for the diversion of labor in the supermarket towards hospitality and social interaction through various host stands—strategically placed to encounter pedestrian flows—offering a tailored shopping experience.



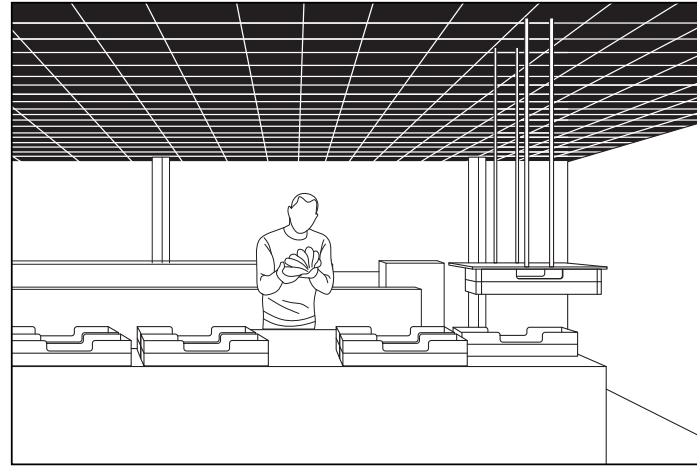
The supermarket is reorganized according to the central high yield automated distribution center within a static grid ceiling that offers dynamic robotic movements, allowing various iterations of product displays in reaction to seasonality and specialties, to render an open floor plan shopping experience.



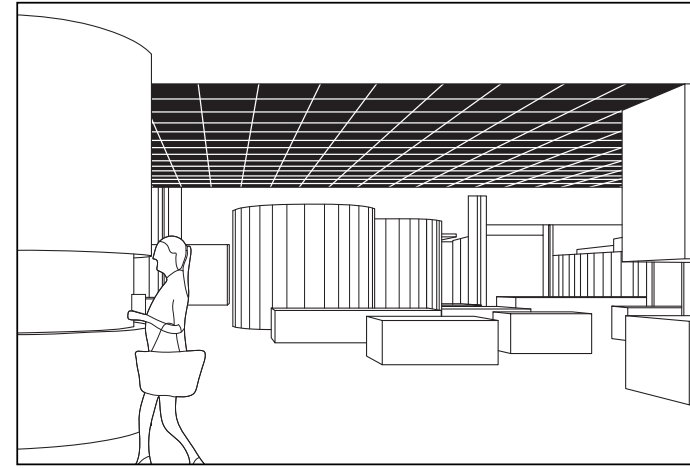
Stores will continue to use planograms, working on existing principles of increasing sales. From bulk shelves to fresh produce crates, shelving systems within the open plan generate new episodic formats of planograms, while accommodating changes in circulation with the incorporation of electronic signage to guide the consumers.



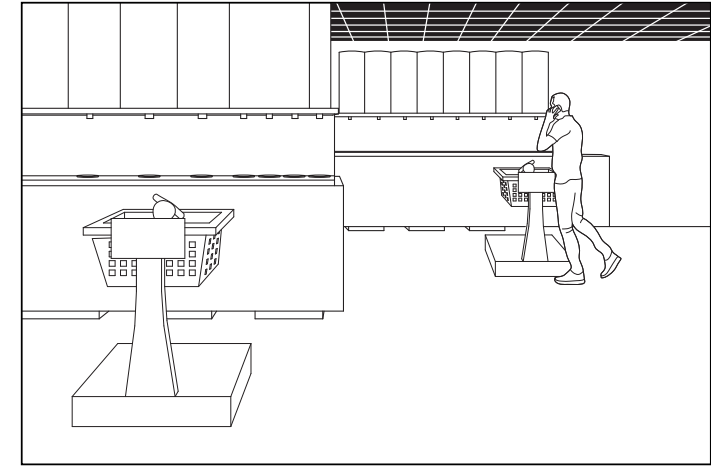
Responding to the supermarket's visibility of the supply chain, vertical experiential walk-in refrigerators represent the ripening rooms and recreate the conditions of refrigerated trucks to extend the distribution center to the sales floor with a convenient product flow, allowing consumers to momentarily enter the varied environments of the food supply chain.



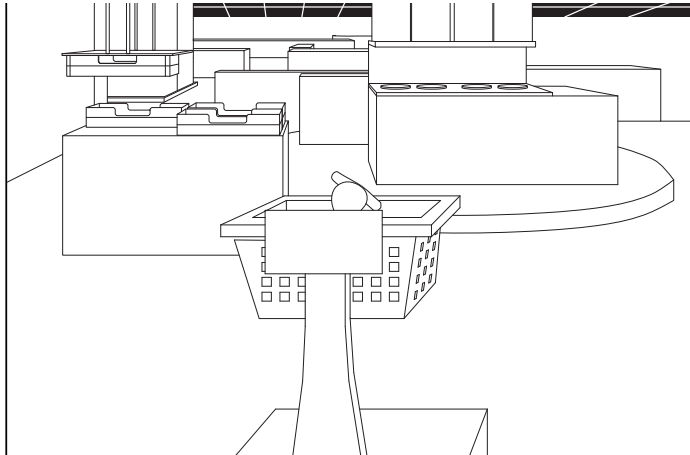
All new shelves, carts, packaging, and delivery methods work within the 800mm x 800mm grid to ensure full standardization within the supply chain system starting from the cargo pallet itself.



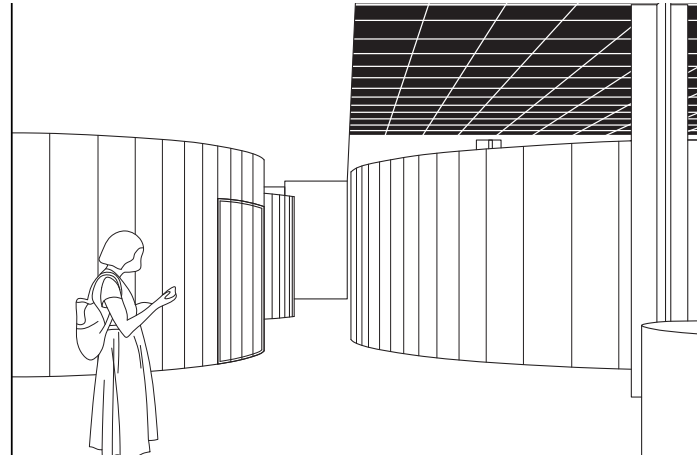
The future supermarket addresses sustainability goals through a reimagined supply chain with reusable packaging for all Albèrt products that are collected, cleaned, and redistributed on site in various return points, cleaning stations, and end-cap gondolas respectively, that remain scattered throughout the sales floor.



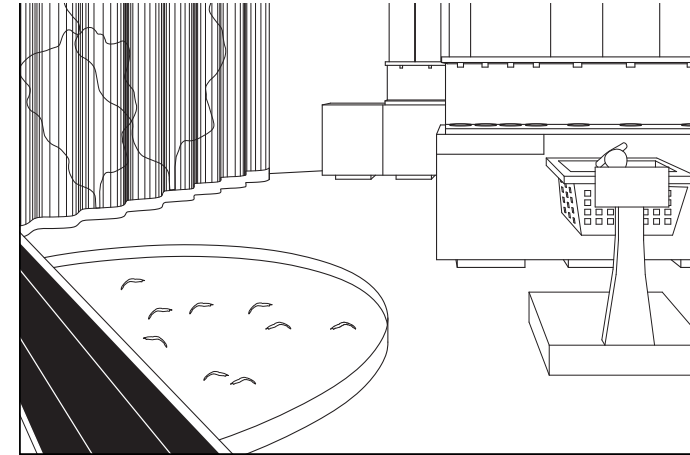
Smart carts with digitized scanners react to the particularities of the product on the shelf with information on the provenance of products for conscious consumers. Electronic displays are connected to expiration dates, supply, and demand through dynamic pricing monitored by data-driven decision-making.



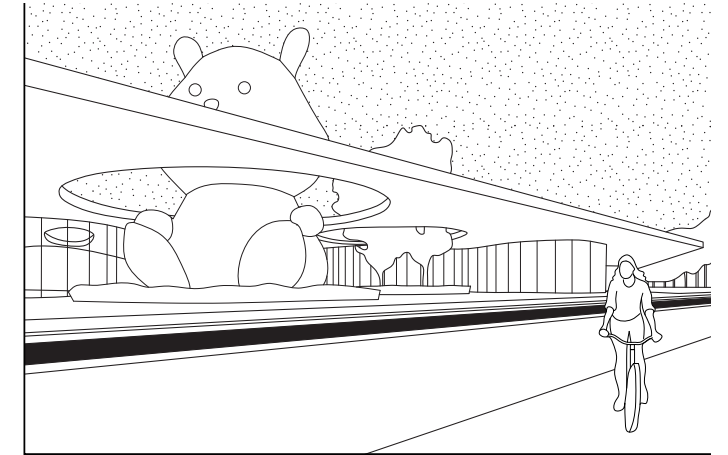
Once an item is delivered, the screen on the smart cart displays other useful items, or the next item on the shopping list while still incorporating key supermarket sales concepts and experiences like cross-merchandising and impulse buys.



Business models and real-estate strategies—introduced through independent areas defined for peripheral store-in-stores—promote collaborations with exclusive brands and local entrepreneurs by bringing in highly curated experiences, catering to the experimental and diverse tastes of Delft residents.



As an essential service, the supermarket's design incorporates several public green zones amidst the sales floor to entice the consumers to spend more time inside, while at the same time providing a healthier working environment, through biodiverse farming solutions, integrated agriculture strategies, and a green roofscape.



Albèrt offers a new retail experience open to Delft by putting both the product and its supply chain on display. A flexible open plan within and beyond the high yield automated distribution center—now a part of the supermarket—extends its perimeter towards the city and its residents, establishing a new civic presence.



The introduction of fast-paced zones in the supermarket spreads along the bike lane, featuring a demonstration kitchen and pick-up points.



Live shrimps and small-batch milk deliveries demonstrate freshness and reusable packaging within a just-in-time production system.



Permaculture as a new farming method inside the supermarket boosts biodiversity and rewards the cultivation of GMOs



View of the automated Ocado grid system and the distribution center on the ceiling from the concierge desk on the sales floor.



The smart cart eliminates the boundaries of the supermarket's sales floor while dynamic pricing

and digitalized labels inform the consumers about the product's supply chain and provenance.



Dynamic robotic movement above the open sales floor allows for various iterations of product displays, according to seasonality, discounts, and specialties.



Free food is no longer shameful, facing the luxury products of the Hermès store-in-a-store.



The walk-in refrigerator extends the distribution center to the sales floor, offering a momentary experience in the

varied environments of the food supply chain.

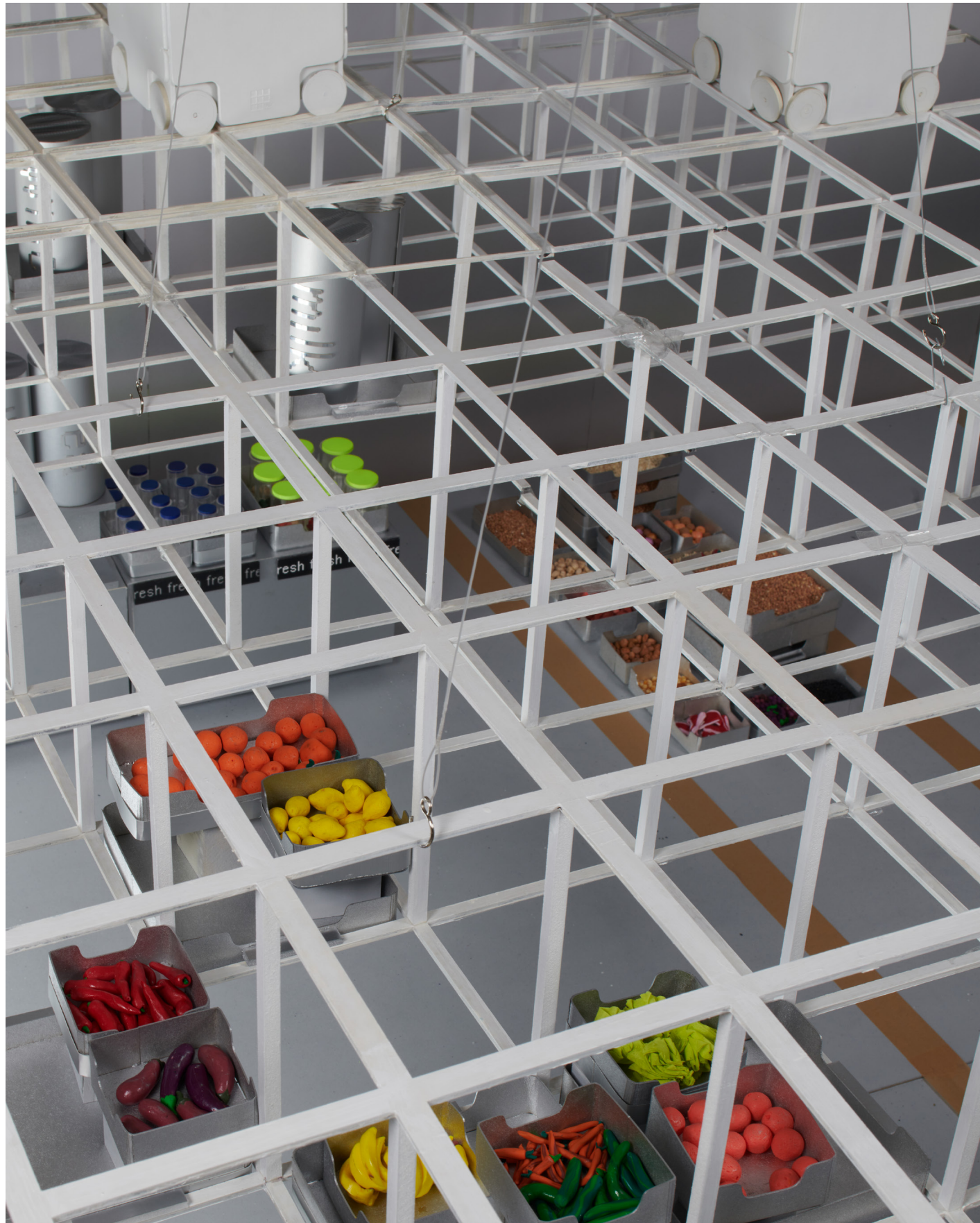


A wine bar next to an automat restaurant are part of the slow-paced zones of the supermarket, introducing a novel

tasting experience next to a public green terrace.



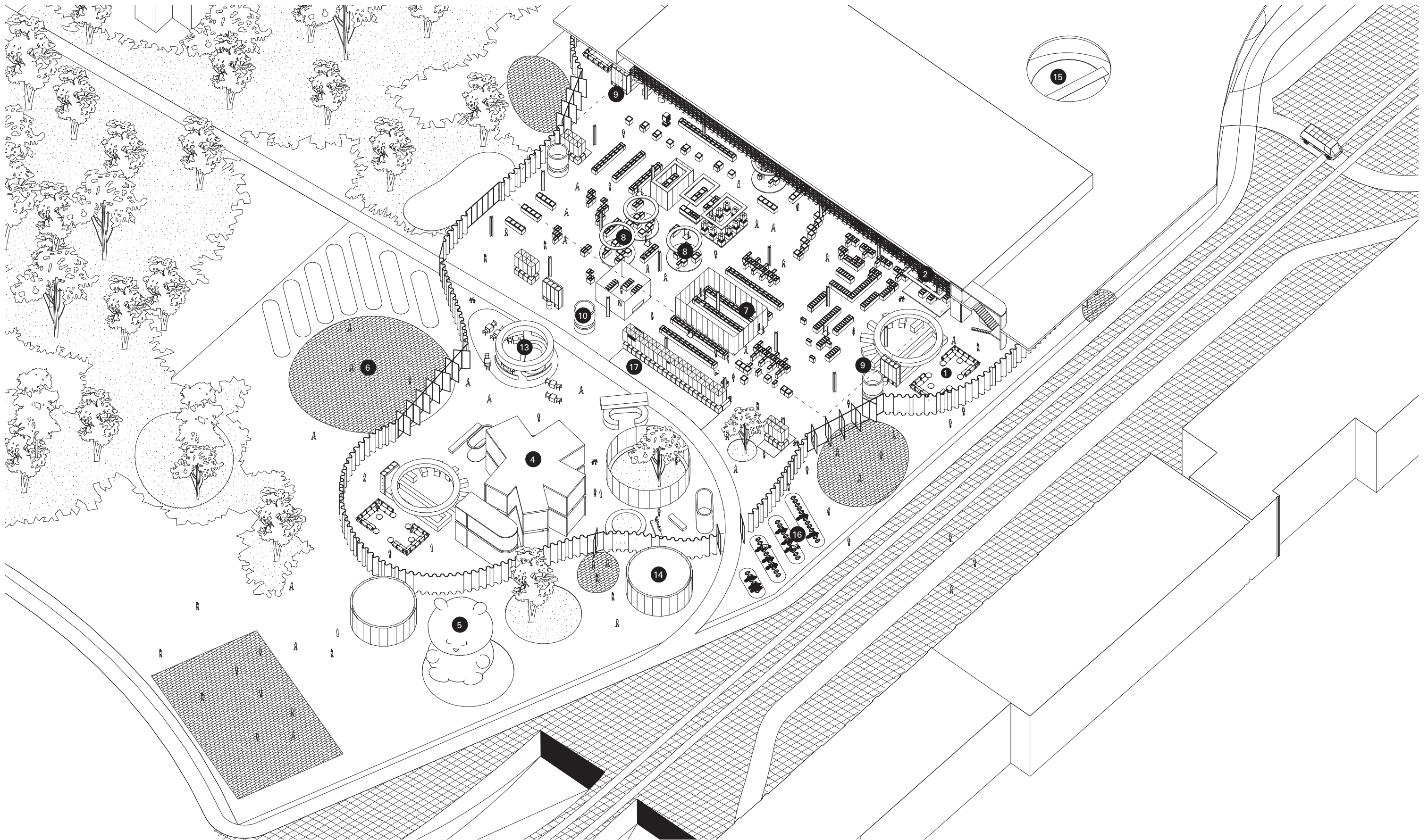
Beyond the internal core, Albèrt offers an innovative retail experience, opening up the supermarket's perimeter towards the city.



View of the loading dock on the sales floor from the automated distribution center on the ceiling.



A green roofscape amidst the residential neighborhood, provides a healthy working and living environment.



A cut-out axonometric exposing the blurred boundaries between the supermarket, the landscape, and the city of Delft.

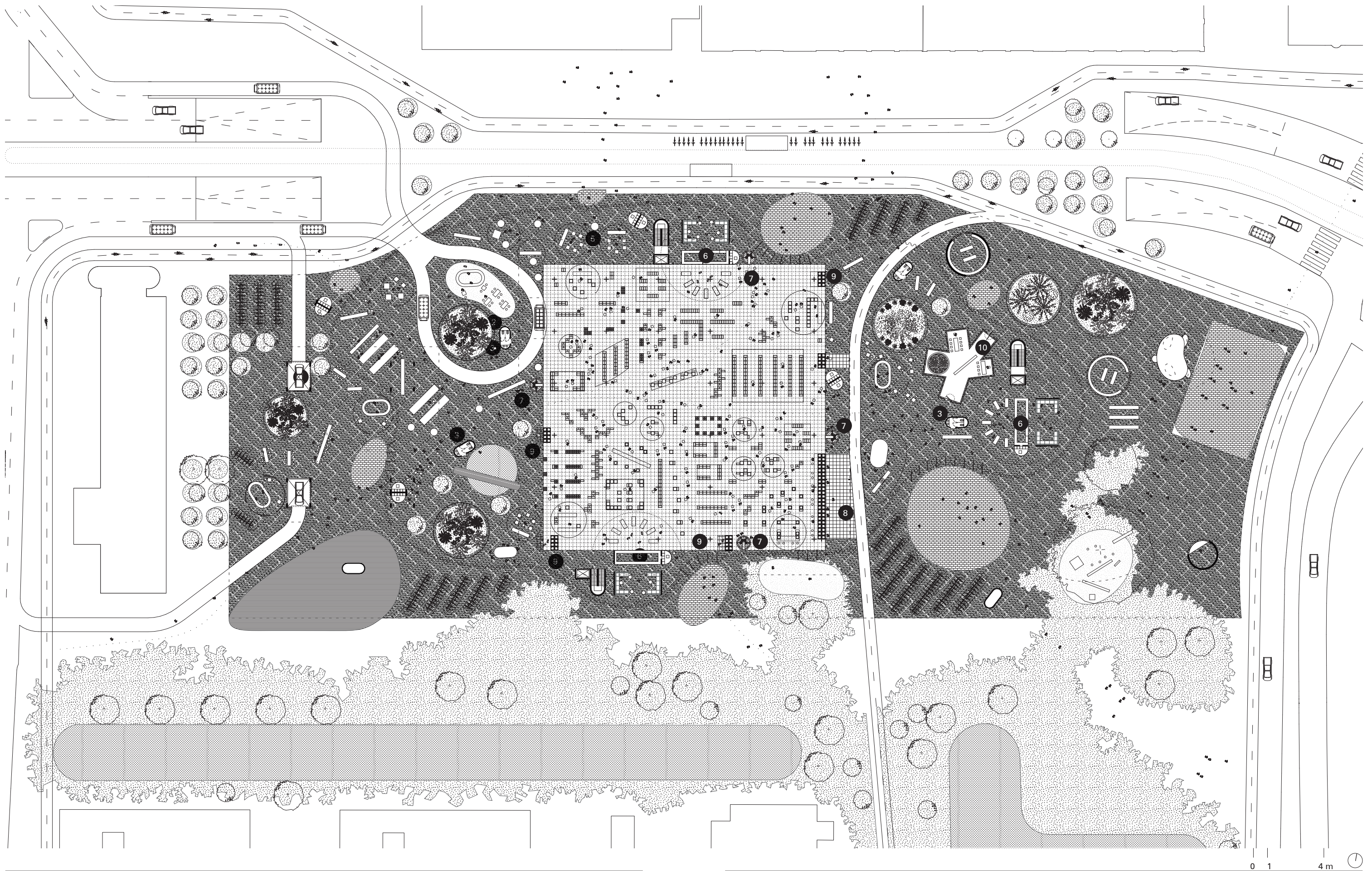
- 1 Concierge
- 2 Automated Ocado grid
- 3 Vertical circulation core
- 4 Kindergarten

- 5 Sculpture of Albert's mascot
- 6 Entrance
- 7 Refrigerated area
- 8 Specialty displays

- 9 Smart cart station
- 10 Return points
- 11 Pick up points
- 12 Cycle track

- 13 Demonstration kitchen
- 14 Shop-in-shops
- 15 Shrimp pond
- 16 Bicycle parking

- 17 Automat



Albért offers a new retail experience with a flexible open plan within and beyond the high yield automated distribution center to display both

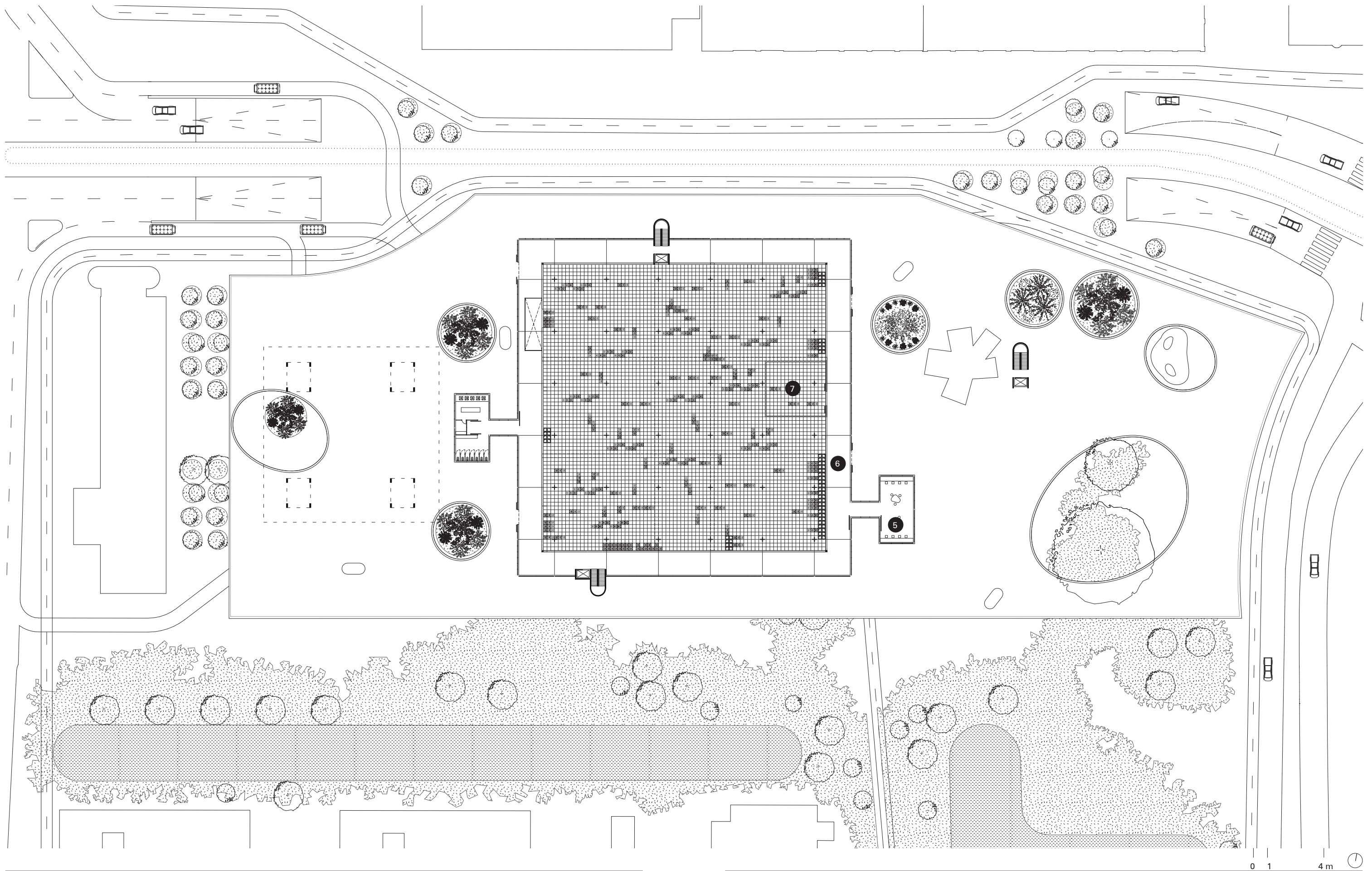
the product and its supply chain. The supermarket is organized in three different zones, consisting of the central high yield core, the interior

periphery of the glass facade, and the outdoor facilities covered by the cantilevered roof.

- 1 Access to Parking
- 2 Loading dock
- 3 Estructural cores, toilets, HVAC
- 4 Shrimp pond

- 5 Shop-in-shop
- 6 Concierge
- 7 Return point
- 8 Automat

- 9 Pick up points
- 10 Kindergarten

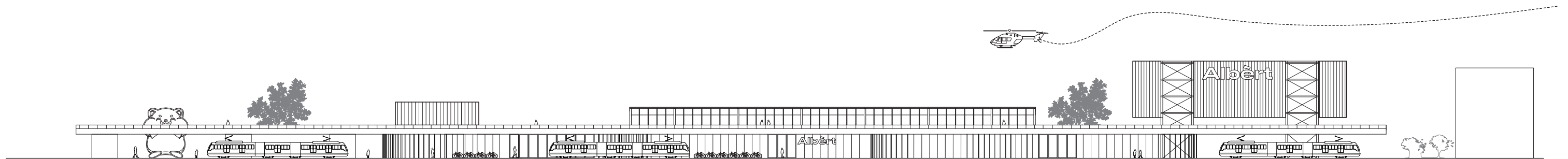
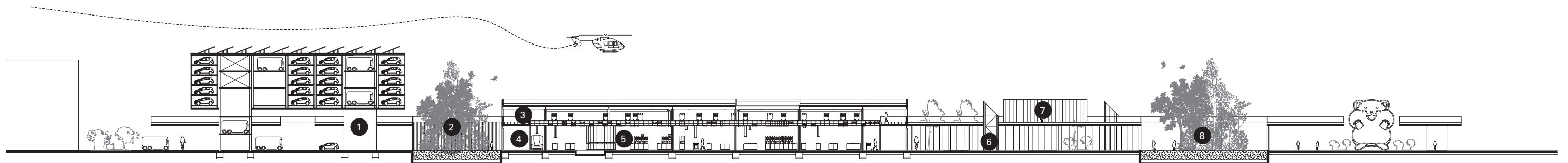


The back of house operates as a distribution center above the sales floor, consisting of the automated Ocado system in the static grid ceiling

core that offers dynamic robotic movements.

- 1 Maintenance point
- 2 Toilets
- 3 Automated Ocado grid
- 4 Vertical core

- 5 Offices
- 6 Perimeter for humans
- 7 Refrigerated area

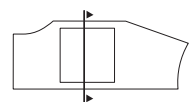
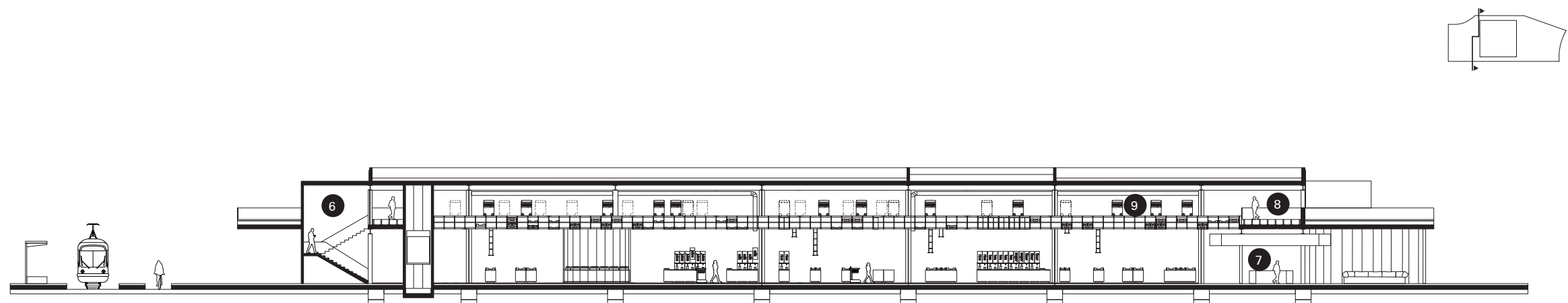
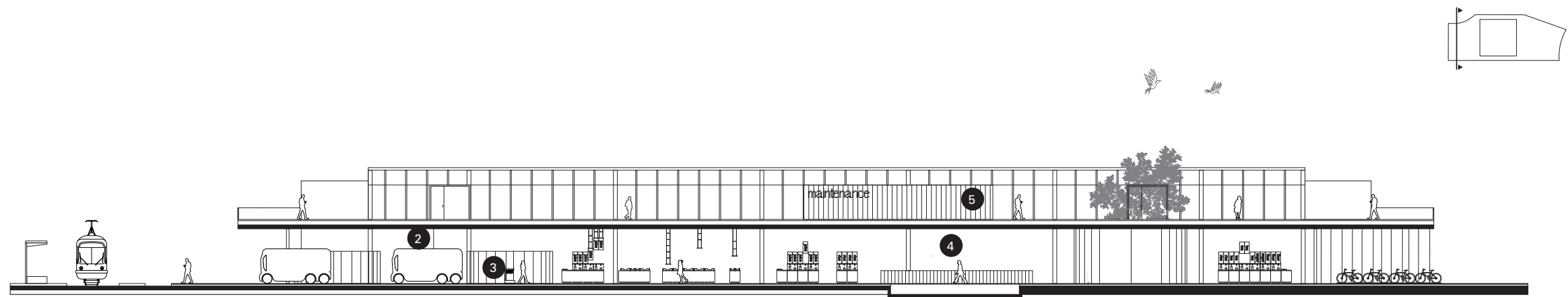
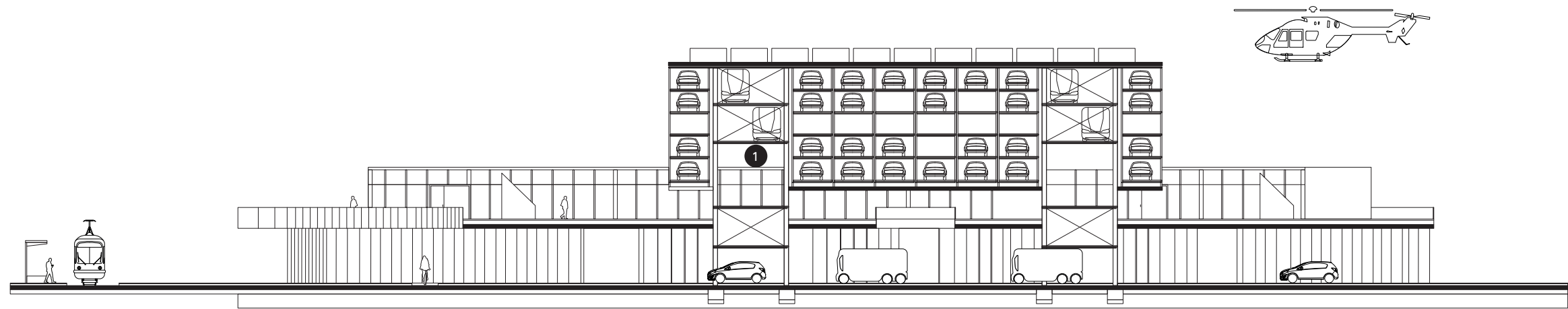


The reimagined relationship between the supermarket's sales floor and back of house is vertical, juxtaposed with the additional Albèrt car-sharing facilities

and parking on the site that caters to the supermarket's customers, e-trucks, and the neighborhood's needs.

- 1 Maintenance point
- 2 Toilets
- 3 Automated Ocado grid
- 4 Vertical core





0 2.5 10 m

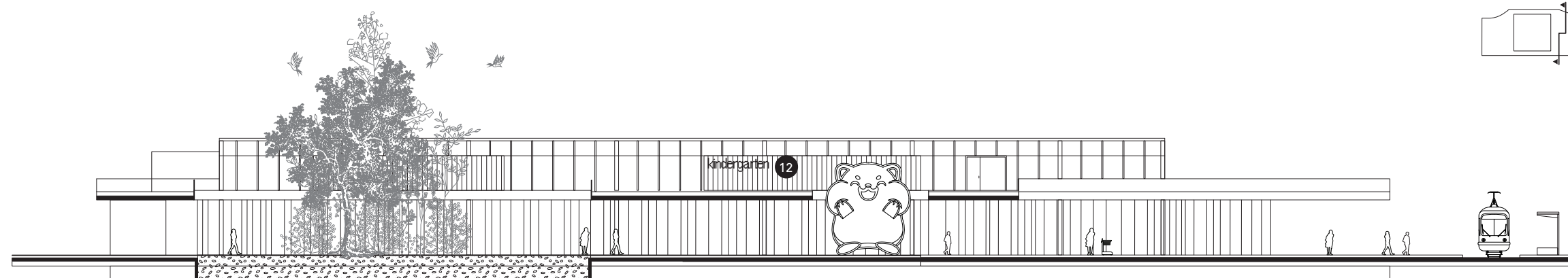
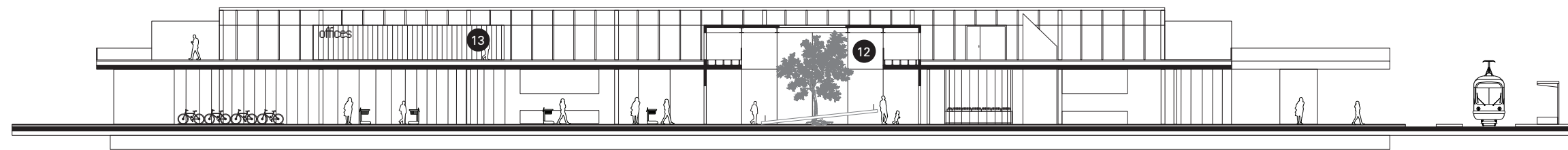
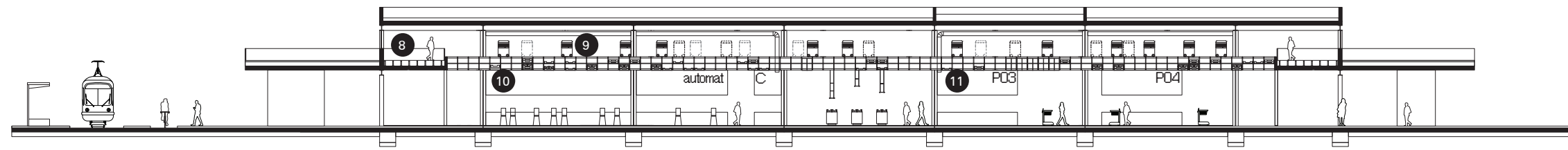
The organization of the building around the central high yield distribution center allows for various iterations of product displays on the sales floor, disrupting

the infinite seriality of the supermarket aisles.

- 1 Automated parking
- 2 Loading dock
- 3 Shop-in-shop
- 4 Shrimp pond

- 5 Maintenance point
- 6 Vertical core
- 7 Concierge
- 8 Perimeter for humans

- 9 Automated Ocado grid



0 2.5 10 m

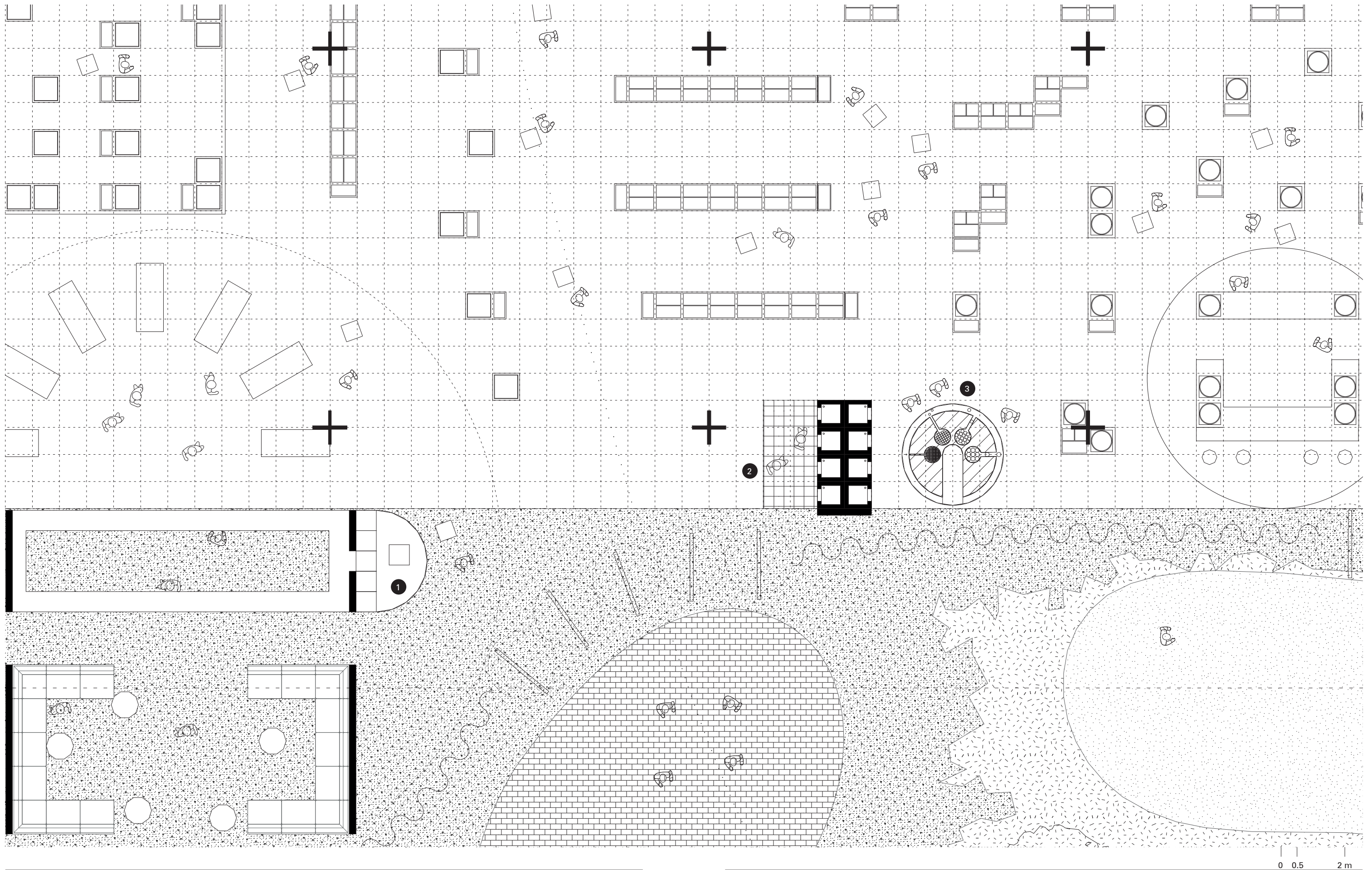
The organization of the building around the central high yield distribution center allows for various iterations of product displays on the sales floor, disrupting

the infinite seriality of the supermarket aisles.

- 1 Automated parking
- 2 Loading dock
- 3 Shop in shop
- 4 Shrimp pond

- 5 Maintenance point
- 6 Vertical core
- 7 Host
- 8 Perimeter for humans

- 9 Automated ceiling
- 10 Automat
- 11 Pick up points
- 12 Kindergarten



The dynamic robotic movements allow for the reconfiguration of the supermarket shelves in reaction to seasonality and specialties, rendering a

unique shopping experience.

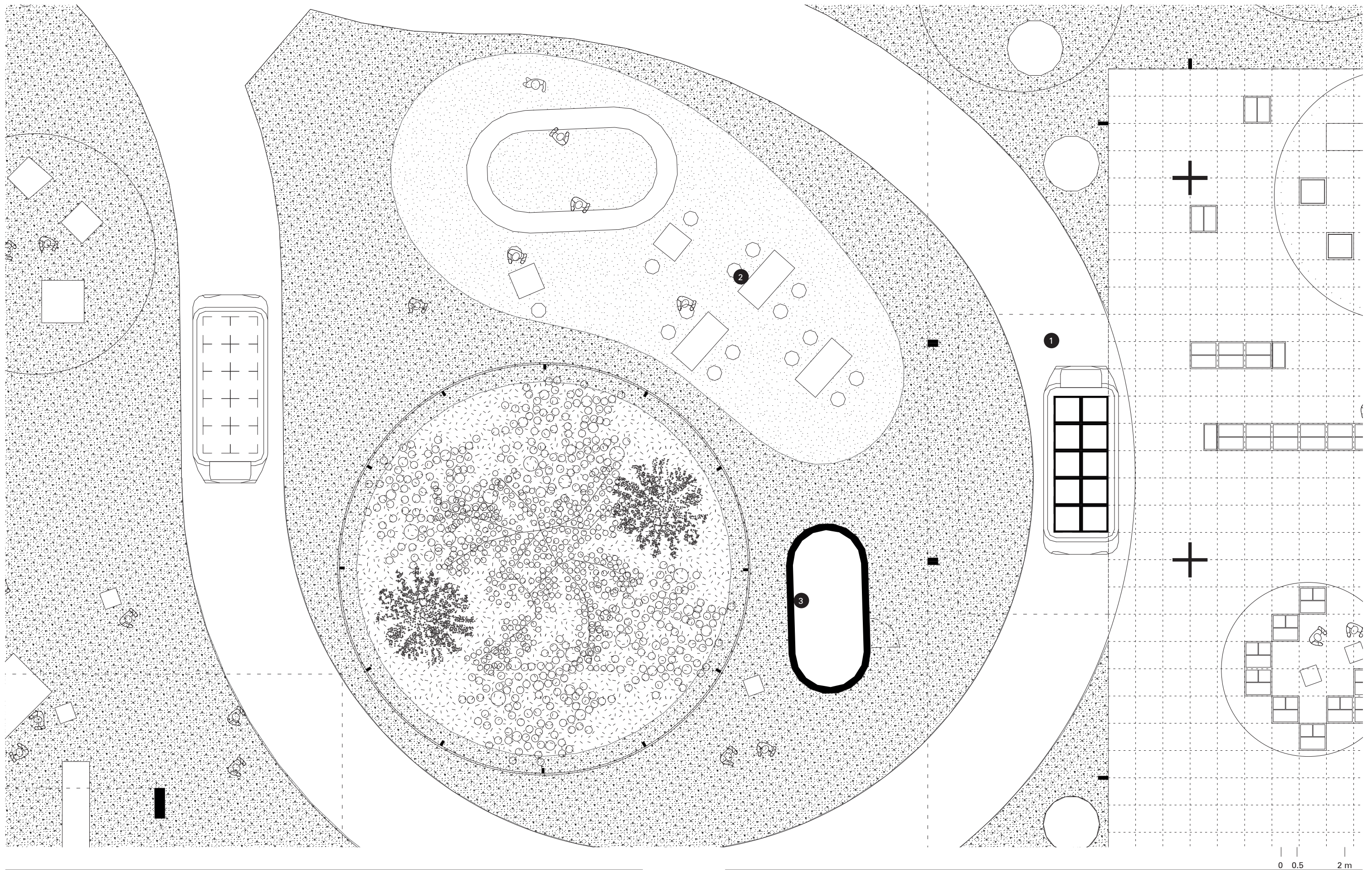
- 1 Concierge
- 2 Pick up points
- 3 Returning point



The dynamic robotic movements allow for the reconfiguration of the supermarket shelves in reaction to seasonality and specialties, rendering a

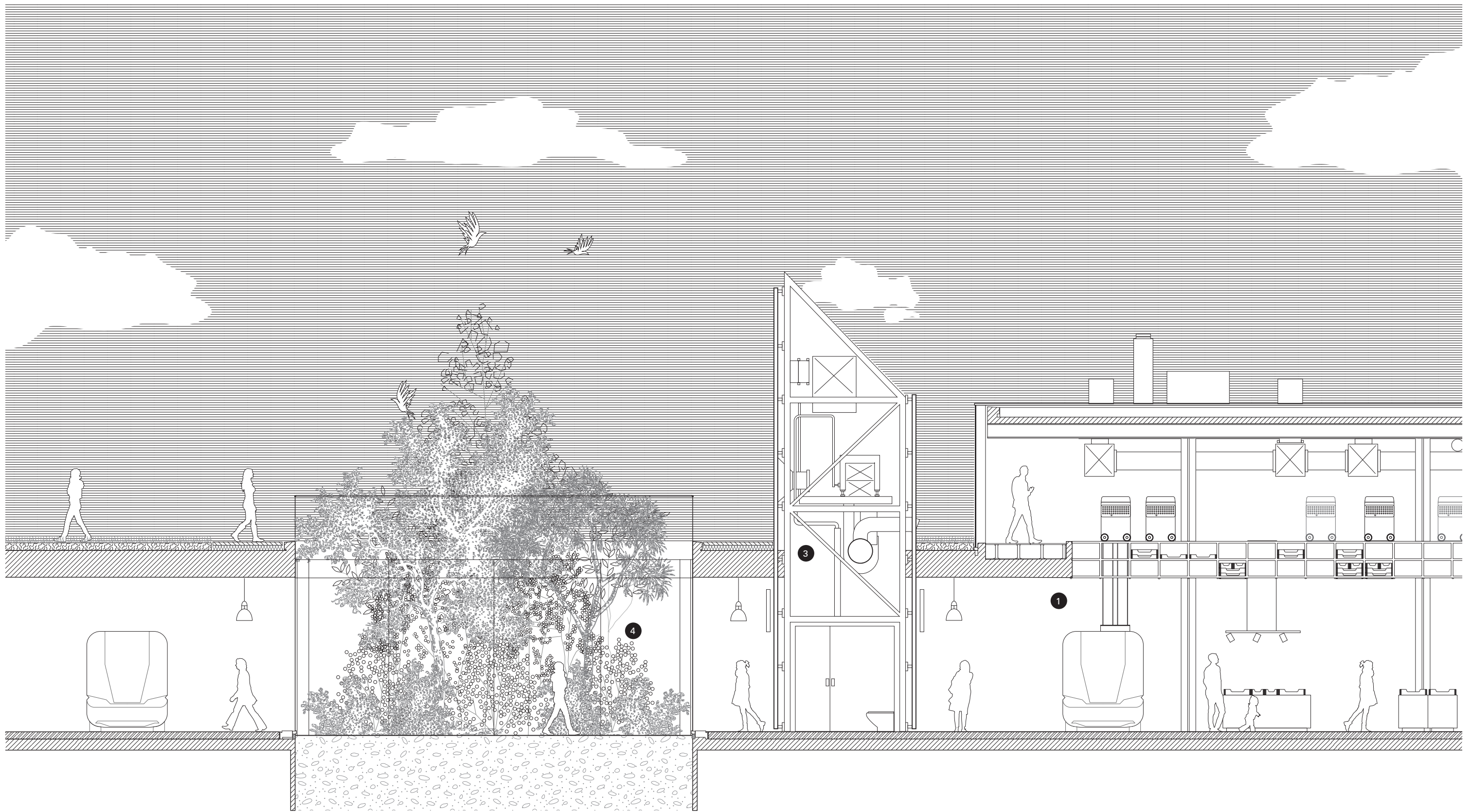
unique shopping experience.

- 1 Host
- 2 Cart station



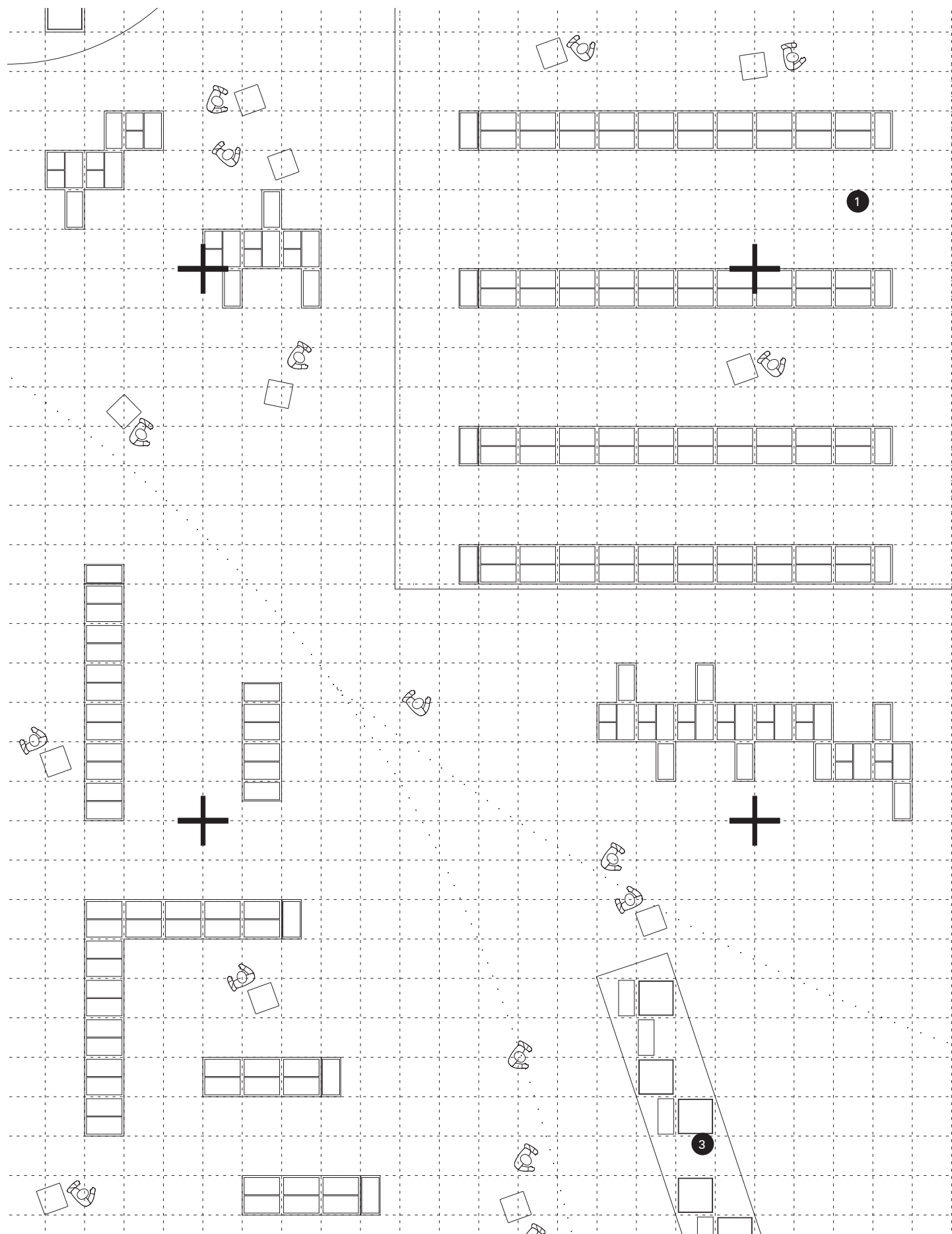
A ritual of loading and unloading is experienced on the sales floor, exposing the supermarket's supply chain to the conscious consumers.

- 1 Loading dock
- 2 Bar
- 3 Structural core and HVAC
- 4 Permaculture



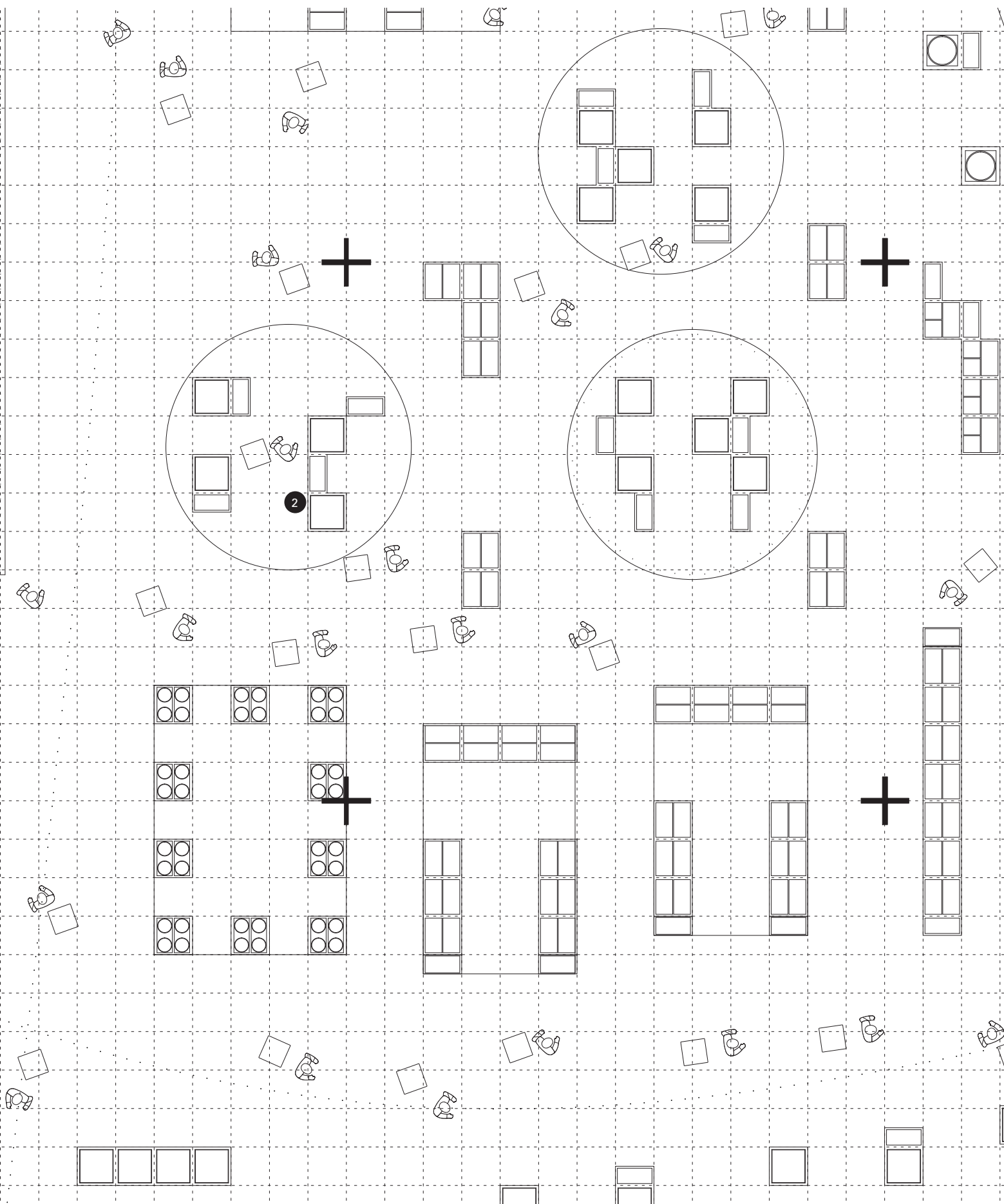
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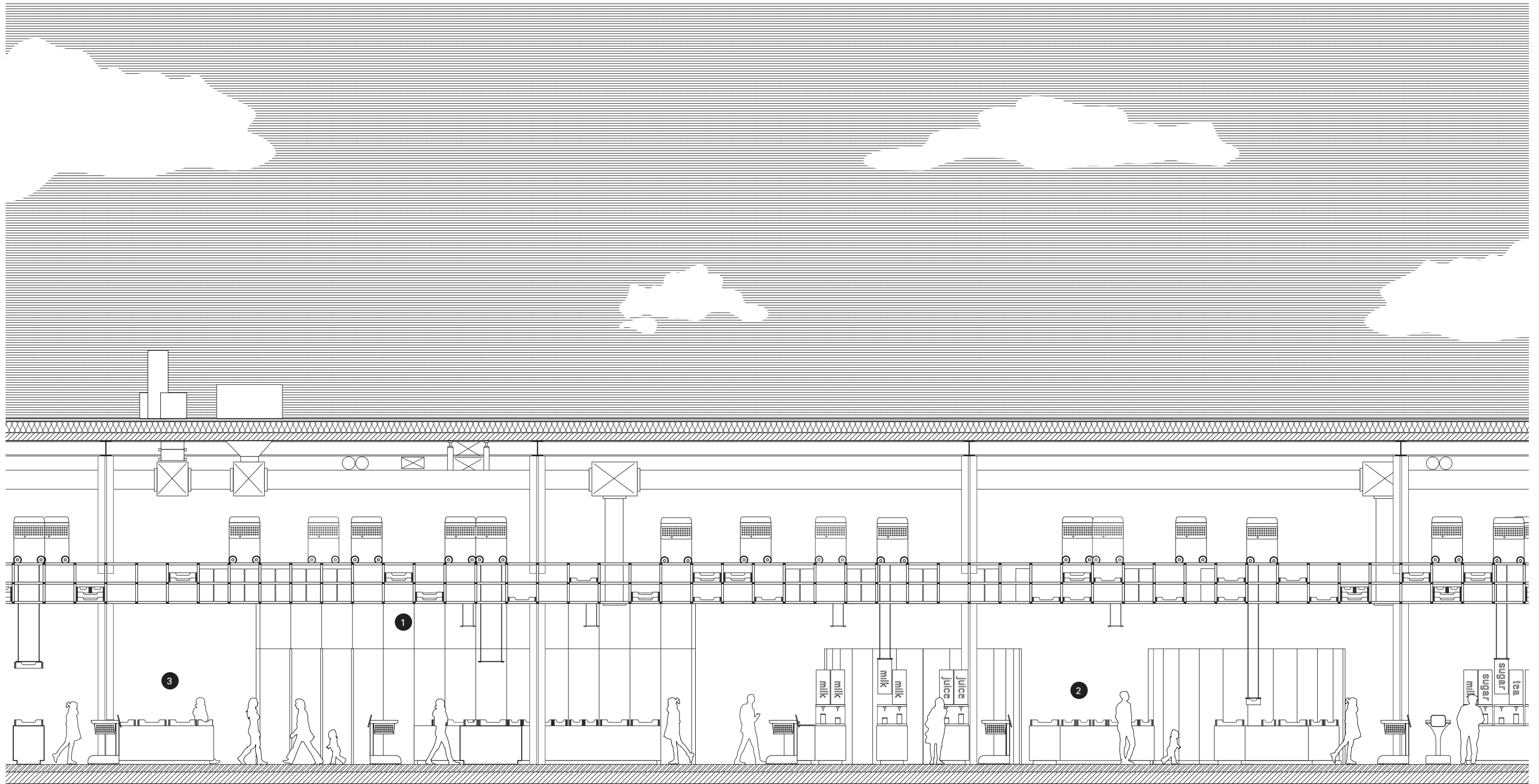


The dynamic robotic movements allow for the reconfiguration of the supermarket shelves in reaction to seasonality and specialties, rendering a

unique shopping experience.



- 1 Refrigerated room
- 2 Sesonal products
- 3 Bonus



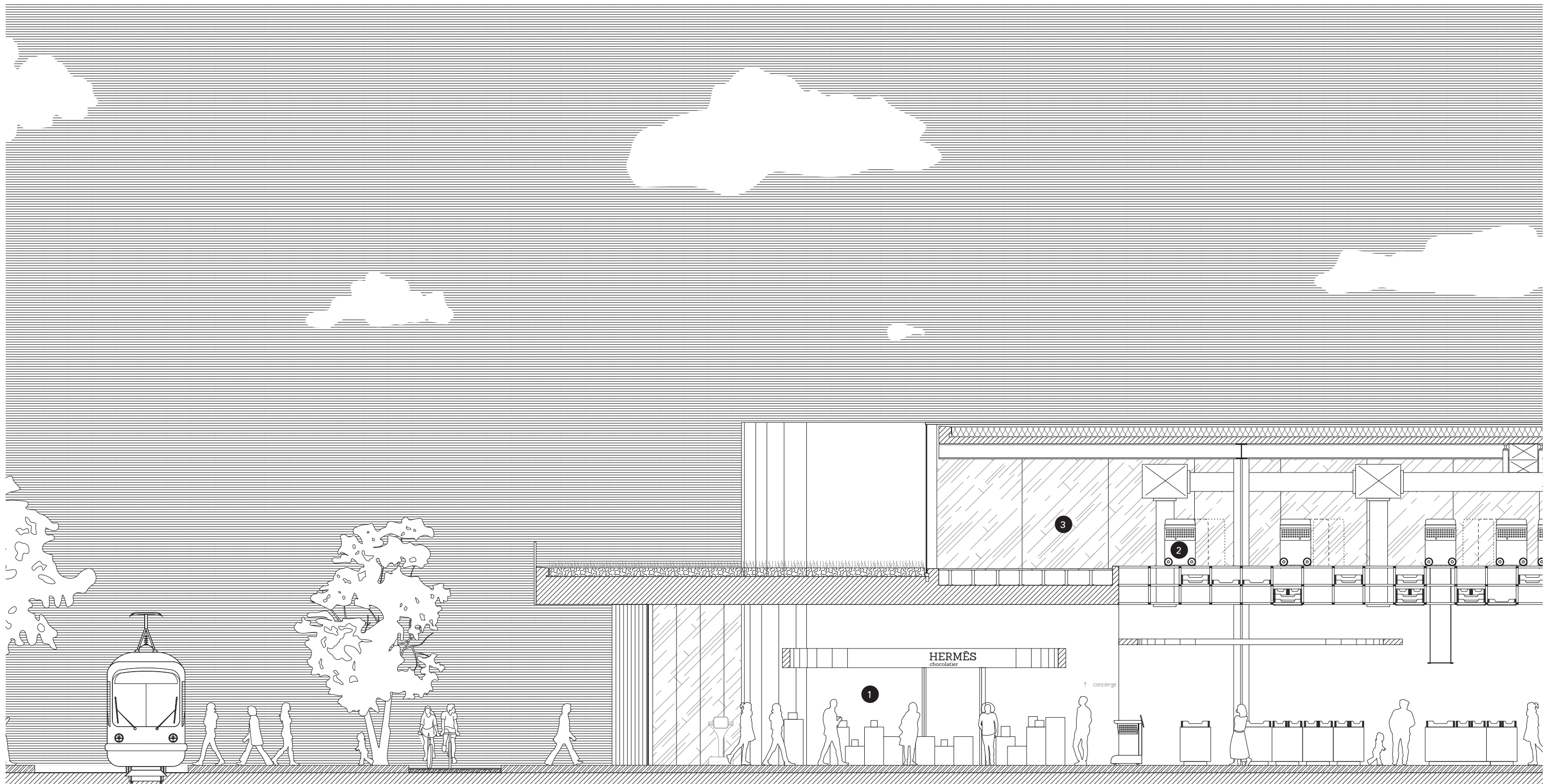
The dynamic robotic movements allow for the reconfiguration of the supermarket shelves in reaction to seasonality and specialties, rendering a

unique shopping experience.

- 1 Refrigerated room
- 2 Seasonal products
- 3 Bonus

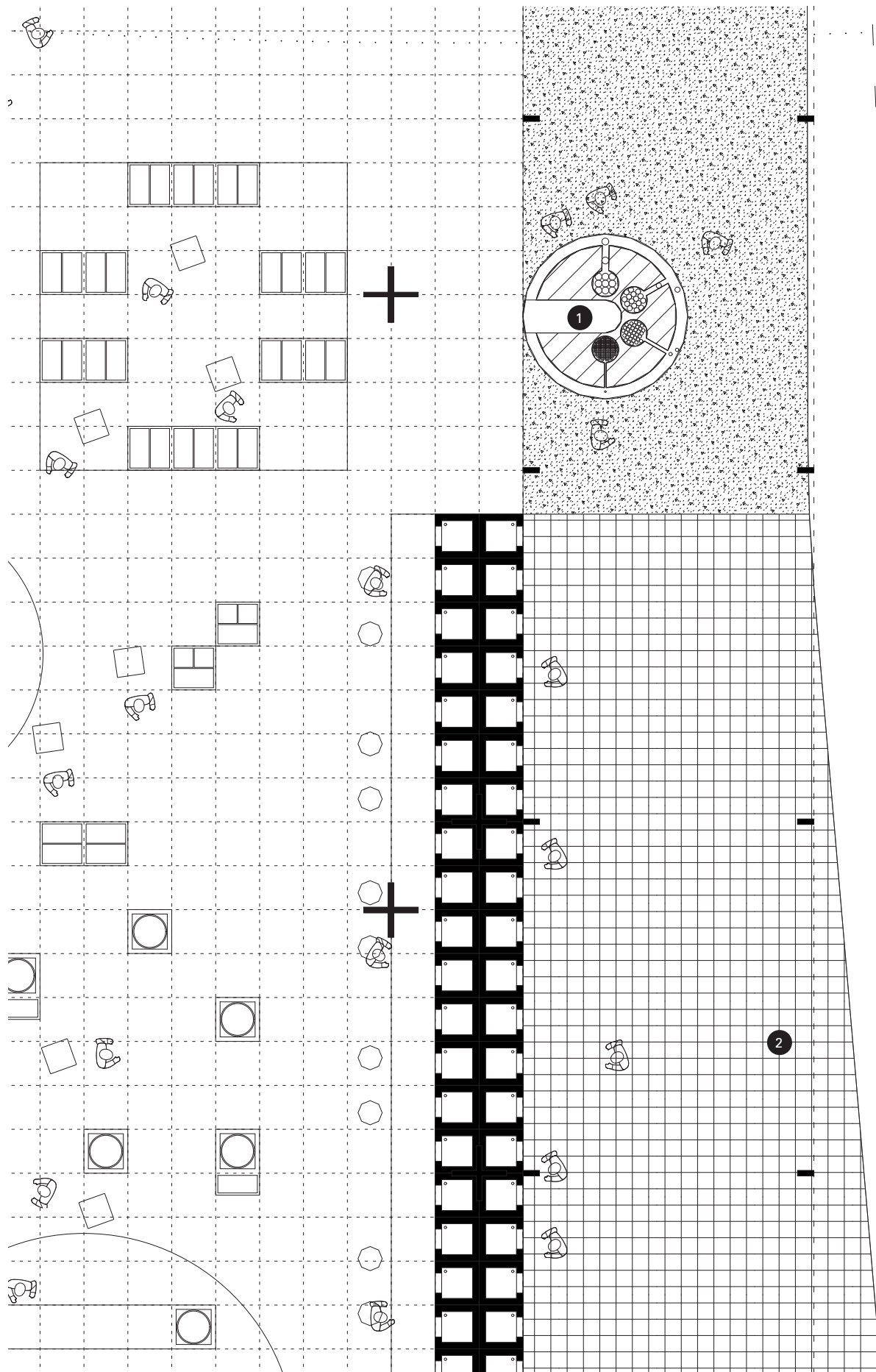
Independent areas are defined for peripheral store-in-stores, promoting collaborations with exclusive brands and local entrepreneurs.

- 1 Shop-in-shop
- 2 Sales floor
- 3 Vertical core
- 4 Loading dock



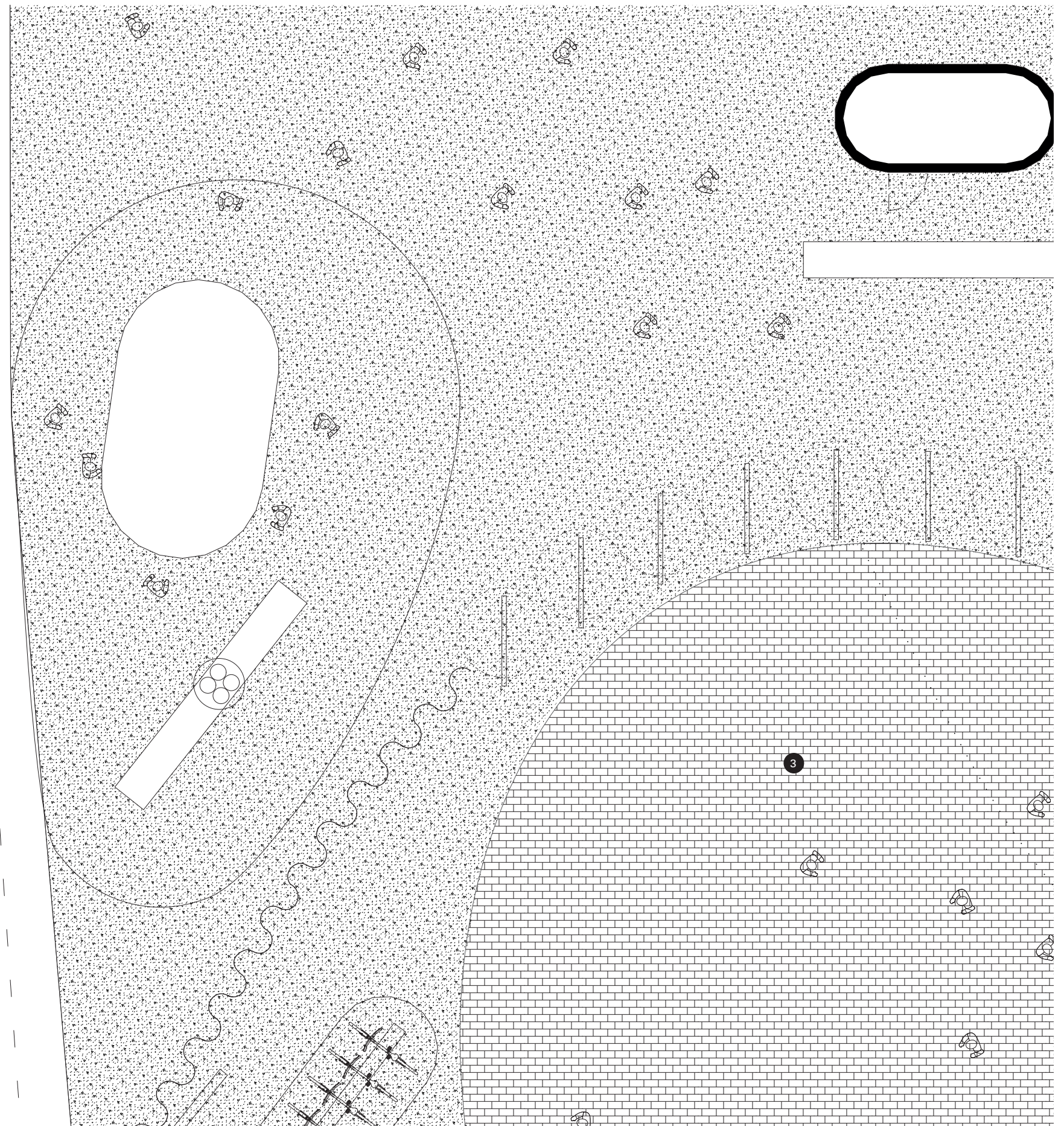
Independent areas are defined for peripheral store-in-stores, promoting collaborations with exclusive brands and local entrepreneurs.

- 1 Shop-in-shop
- 2 Sales floor
- 3 Vertical core
- 4 Loading dock

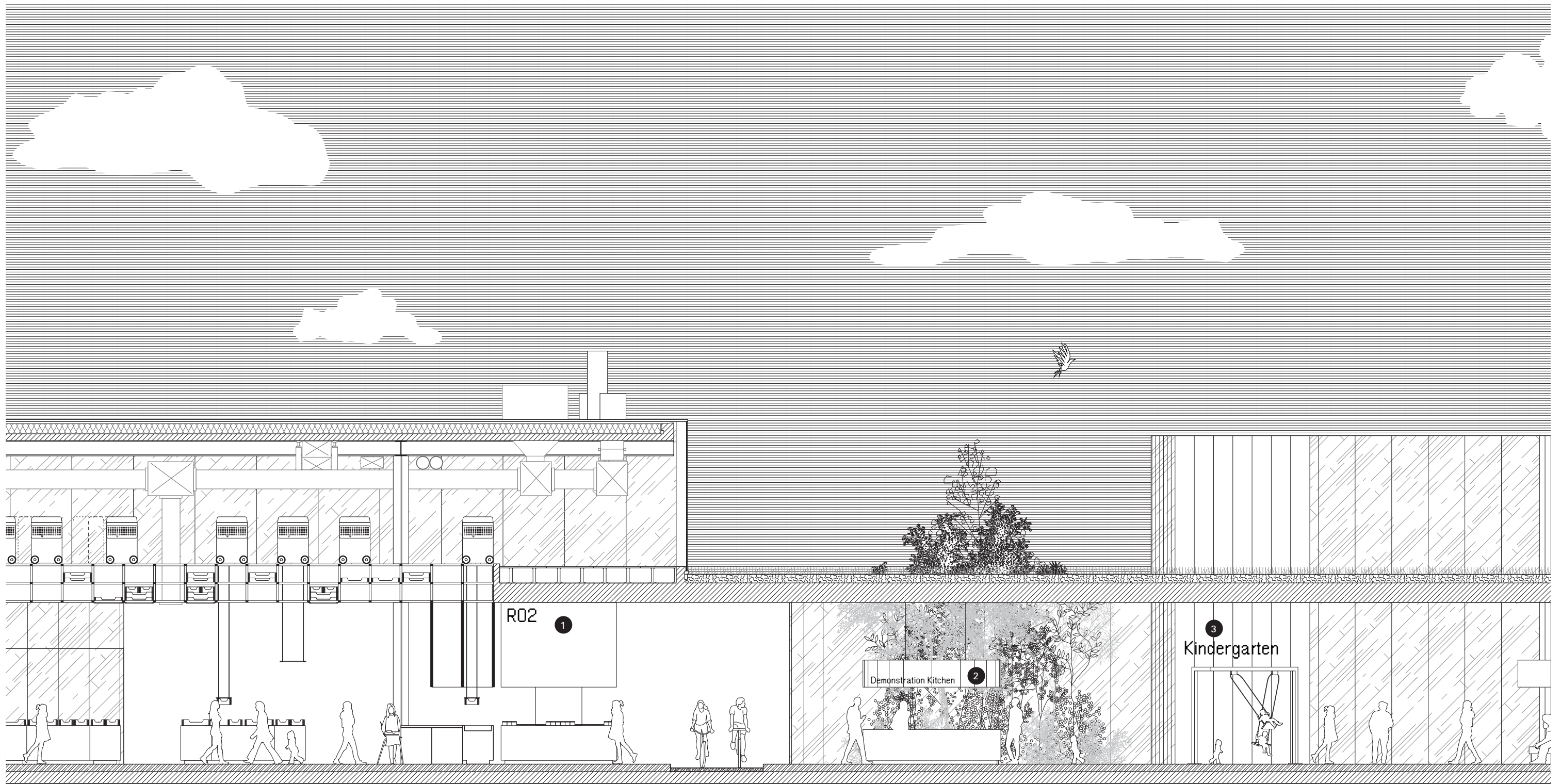


Designated slow-paced zones with product demonstrations, workshops, and exclusive shops are developed around the periphery of the

supermarket sales floor, in juxtaposition with fast-paced pick-up zones along the bike pathway to promote cyclists, delivery, and e-commerce.



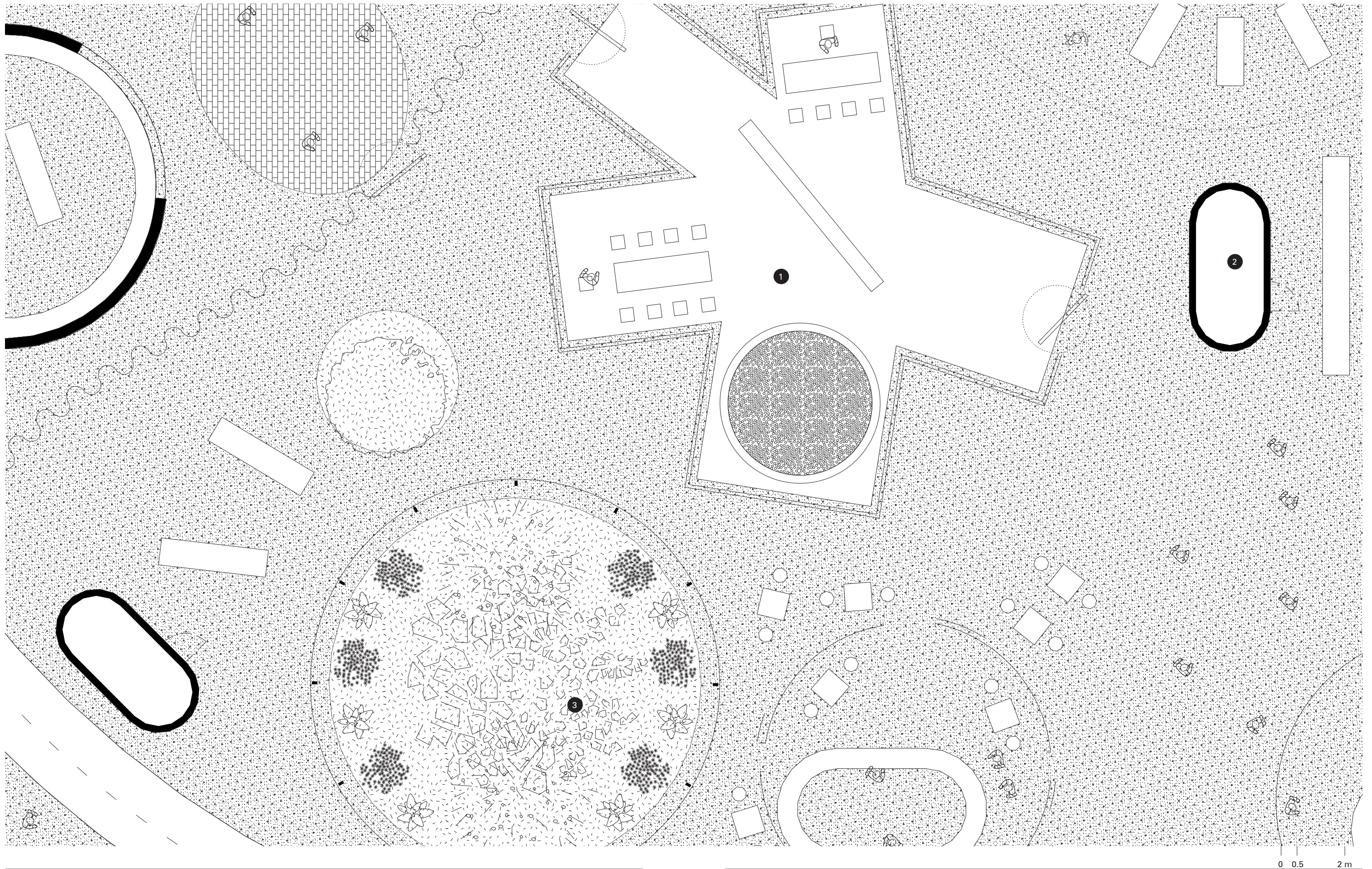
- 1 Returning point
- 2 Automat
- 3 Entrance



Designated slow-paced zones with product demonstrations, workshops, and exclusive shops are developed around the periphery of the

supermarket sales floor, in juxtaposition with fast-paced pick-up zones along the bike pathway to promote cyclists, delivery, and e-commerce.

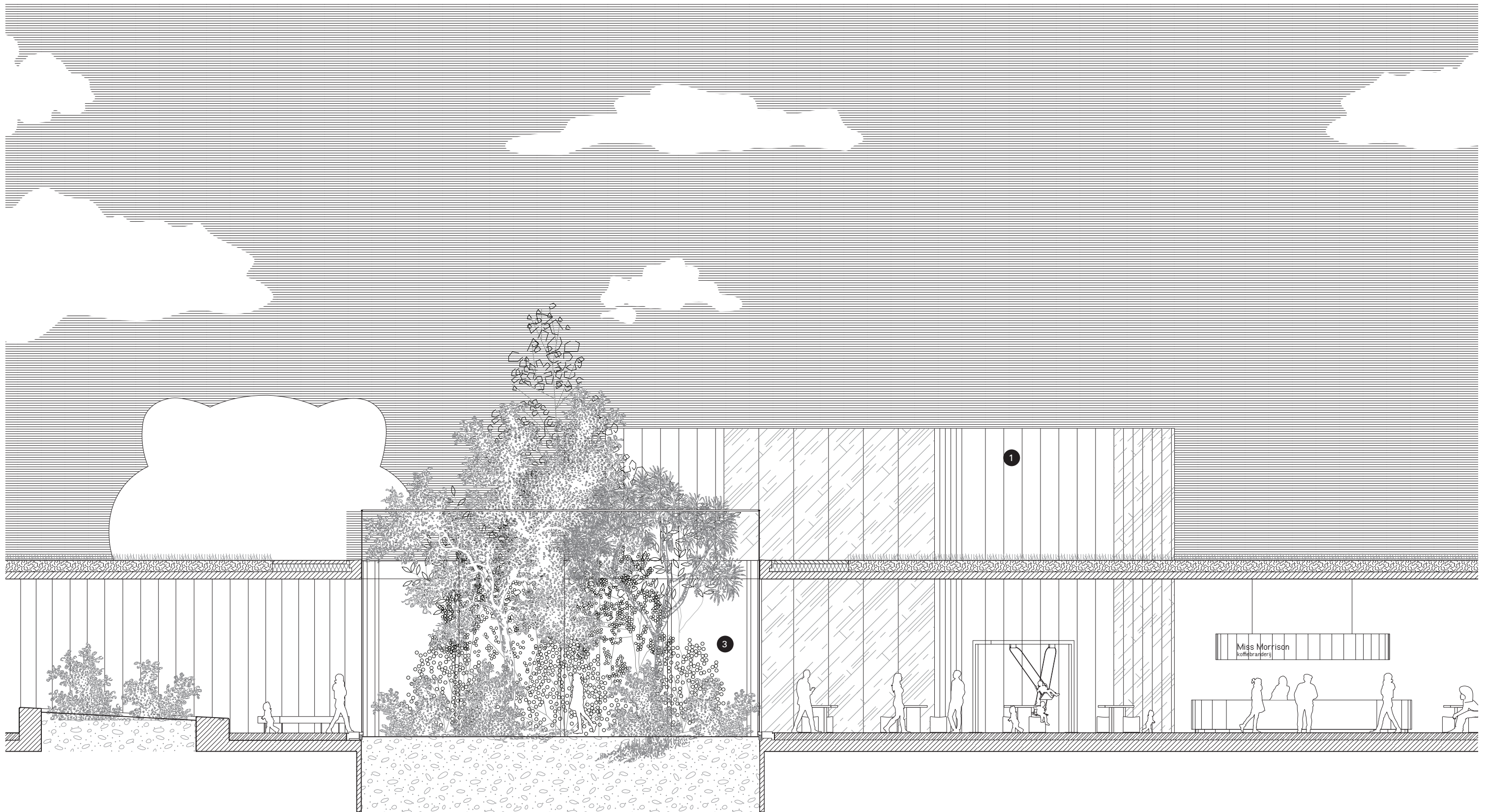
- 1 Returning point
- 2 Automat
- 3 Entrance



Public green zones are incorporated amidst the sales floor to entice the consumers to spend more time inside,

while also providing a green roofscape for the neighborhood.

- 1 Kindergarten
- 2 Structural core, toilets, HVAC
- 3 Public green areas



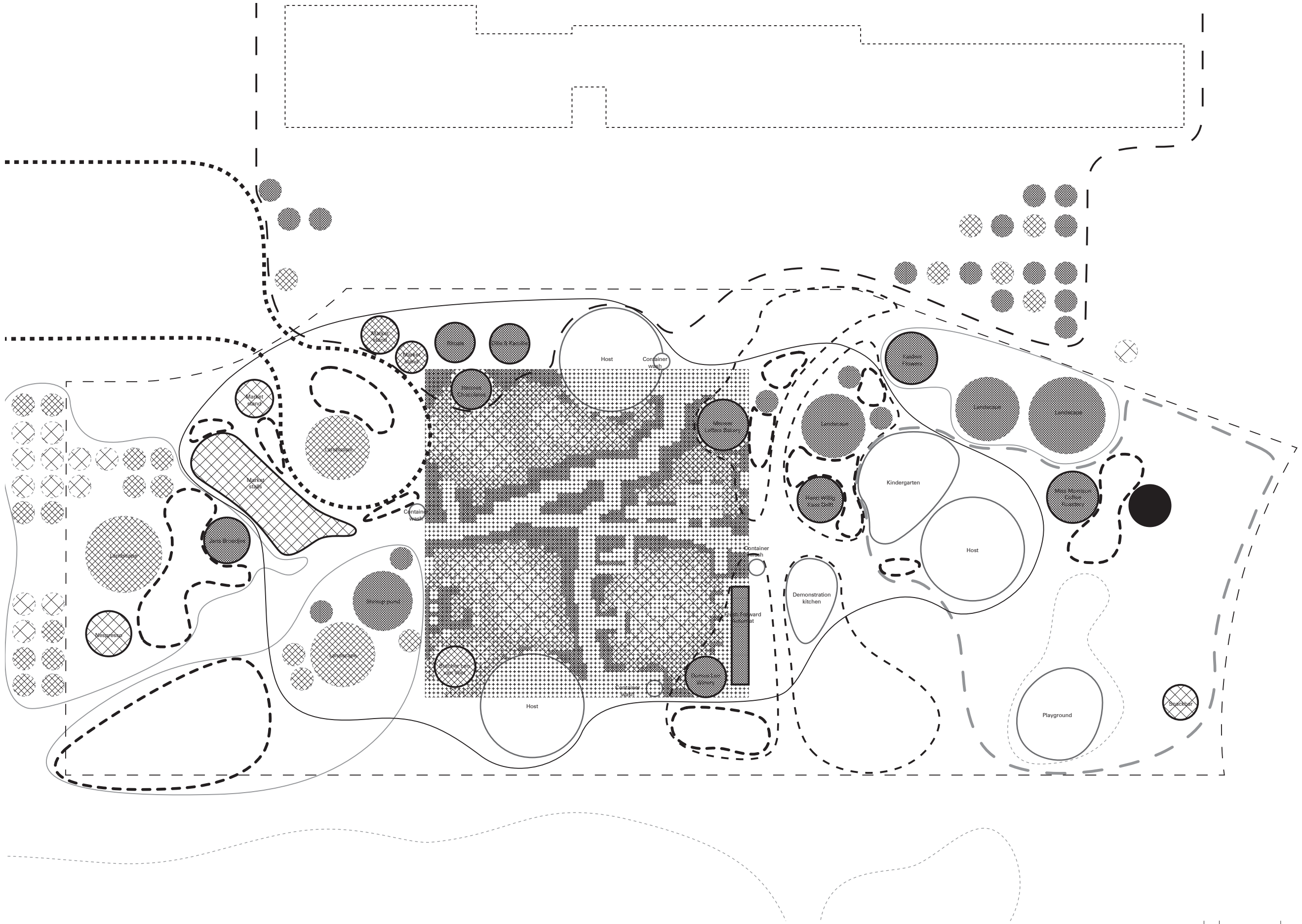
0 0.5 2 m

Public green zones are incorporated amidst the sales floor to entice the consumers to spend more time inside,

while also providing a green roofscape for the neighborhood.

- 1 Kindergarten
- 2 Structural core, toilets, HVAC
- 3 Public green areas

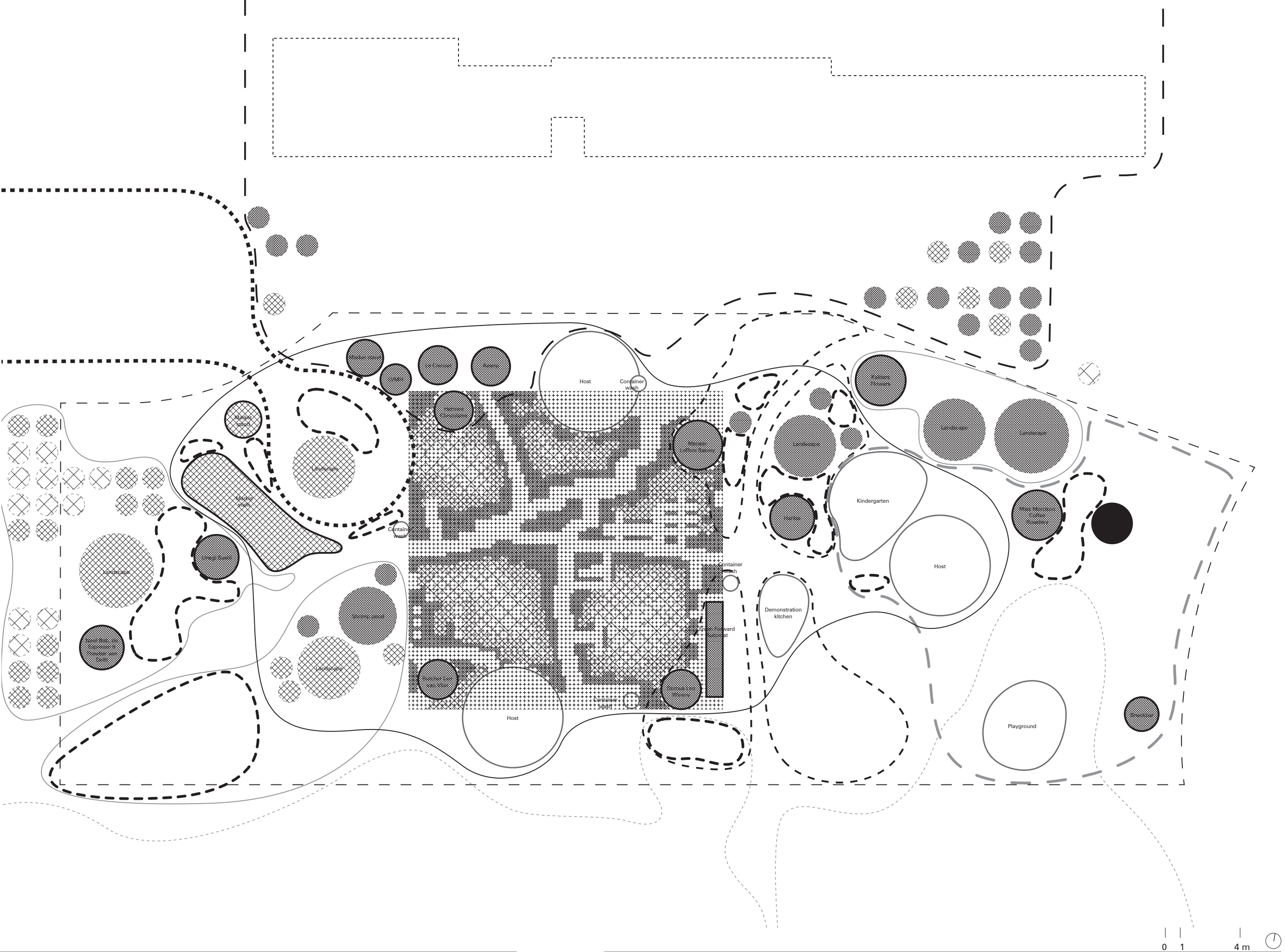
- Loading dock
- Public square
- Public Seating
- Public art
- Supermarket throughway
- City mainstreet
- Indoor mall
- Landscape
- Merchandized landscape
- Alber amenities
- Leased shops
- Retail property value



From bulks to fresh produce crates, standardized shelving systems within the open plan generate new episodic formats of planograms. No longer

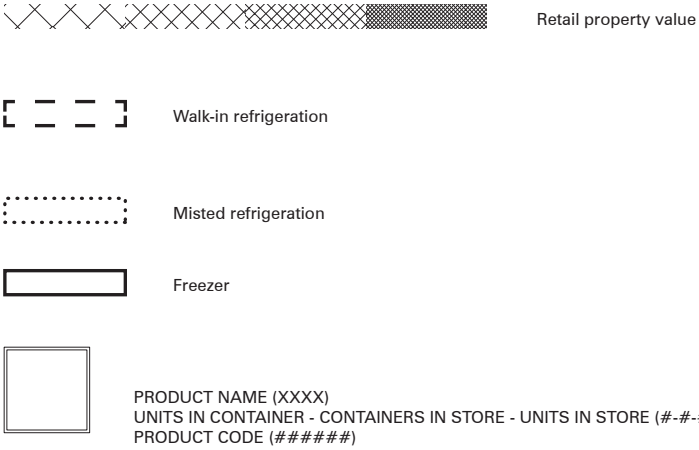
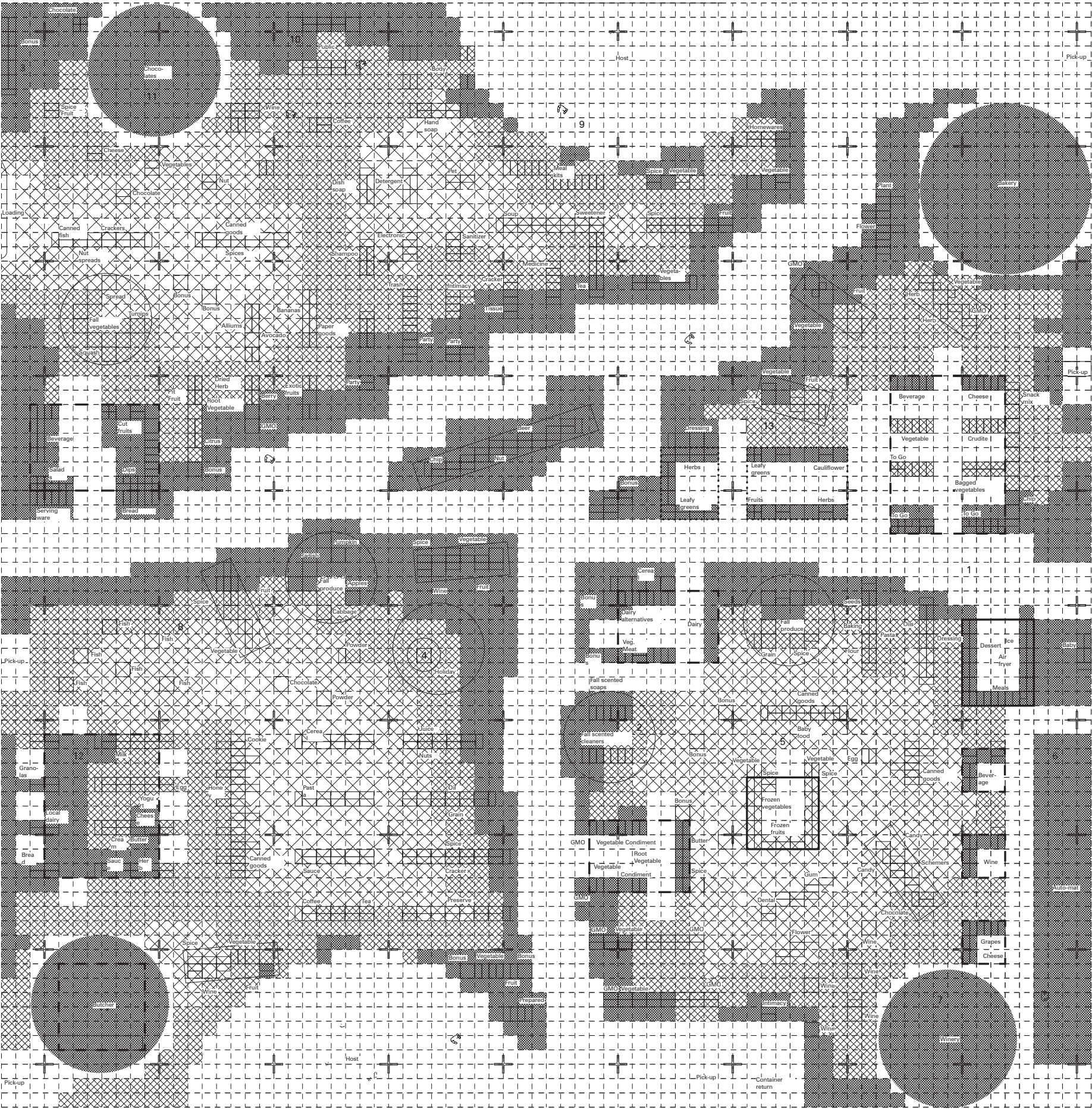
vertical and detached from each other, the new planograms dictate the dynamic floor plan.

- Loading dock
- Public square
- Public Seating
- Public art
- Supermarket throughway
- City mainstreet
- Indoor mall
- Landscape
- Merchandized landscape
- Albératernities
- Leased shops
- Retail property value



From bulks to fresh produce crates, standardized shelving systems within the open plan generate new episodic formats of planograms. No longer

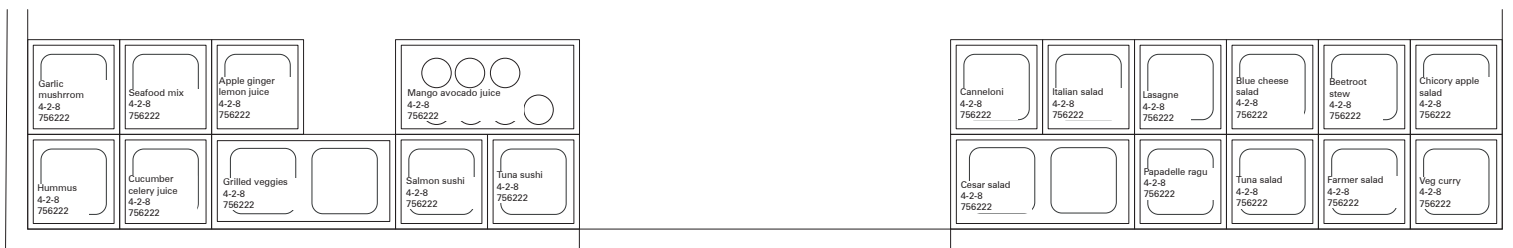
vertical and detached from each other, the new planograms dictate the dynamic floor plan.



The supermarket sales floor as a real estate platform reveals business strategies in order to generate profit. Albert's business approach offers a

wide range of products through a binary financial model that incorporates all Albert products within the efficient automated grid system, while real

estate strategies—such as store-within-a-store—for branded products remain exclusively and independently staged.

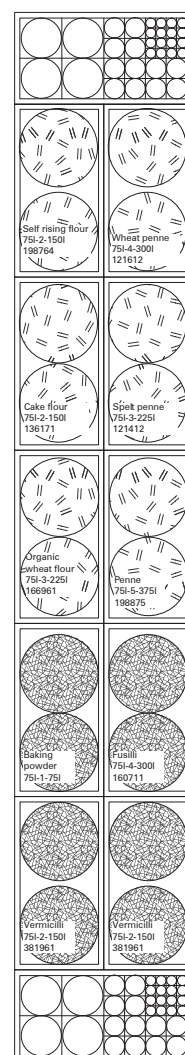


Pick-up

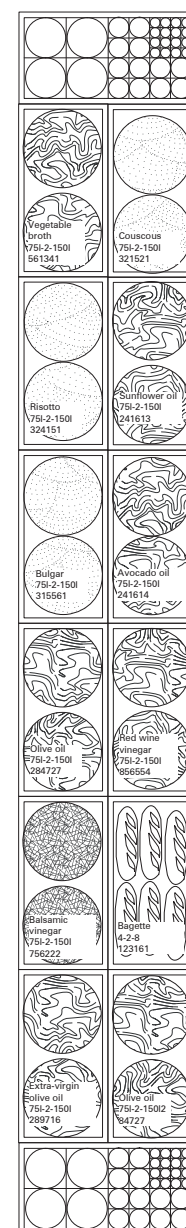
Path

Seating

Bike path

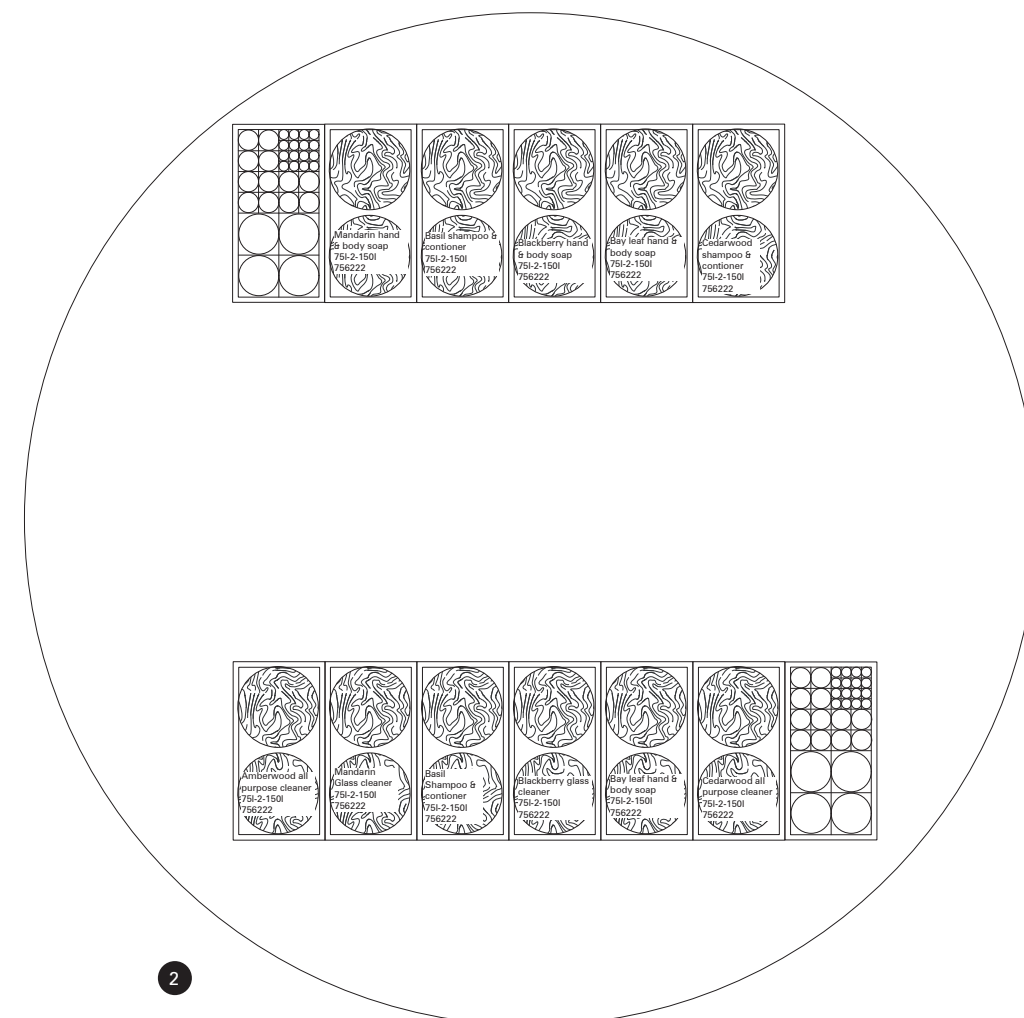


1



Holiday

Path



2

0 200 1000 mm

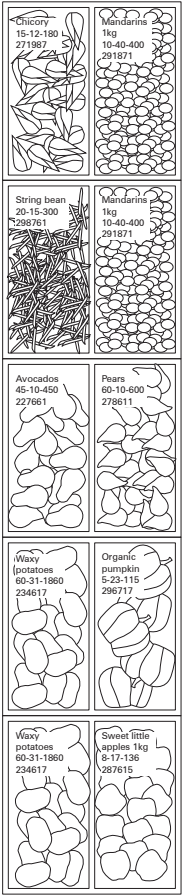
From bulks to fresh produce crates, standardized shelving systems within the open plan generate new episodic formats of planograms. No longer

vertical and detached from each other, the new planograms dictate the dynamic floor plan.

- 1 Bike path convenience
- 2 Fall scented cleaners

Saturday market stall

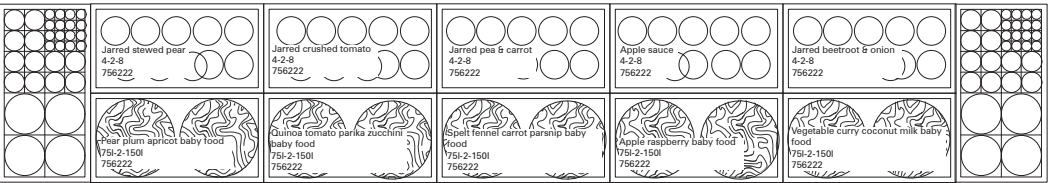
Saturday market stall



Loading dock

3

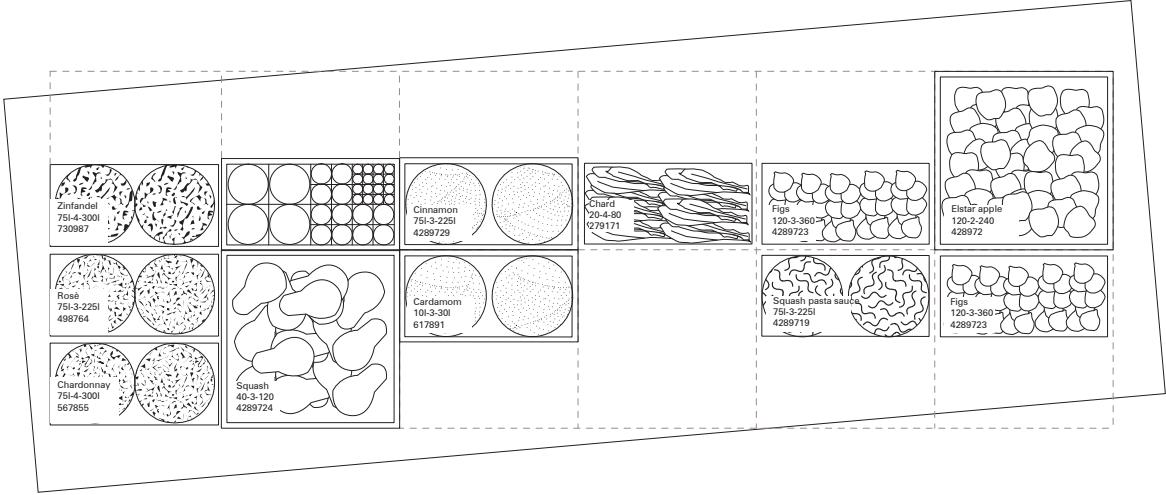
Fall produce



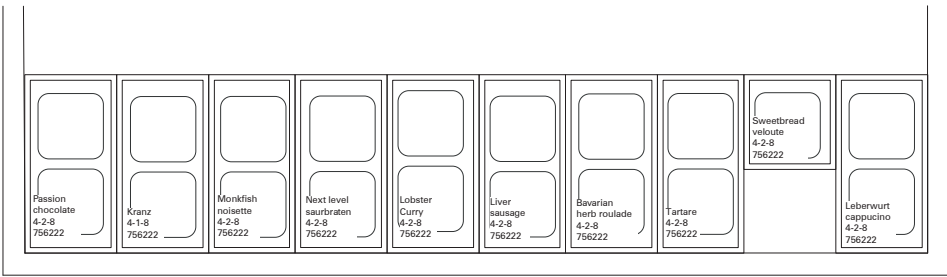
5

Frozen produce

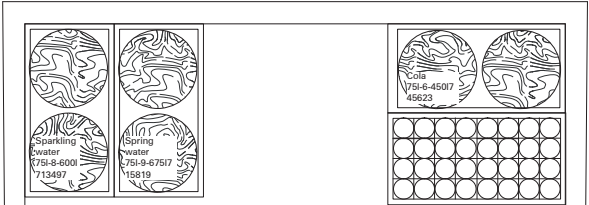
Path



Path



Fresh forward automat



Seating

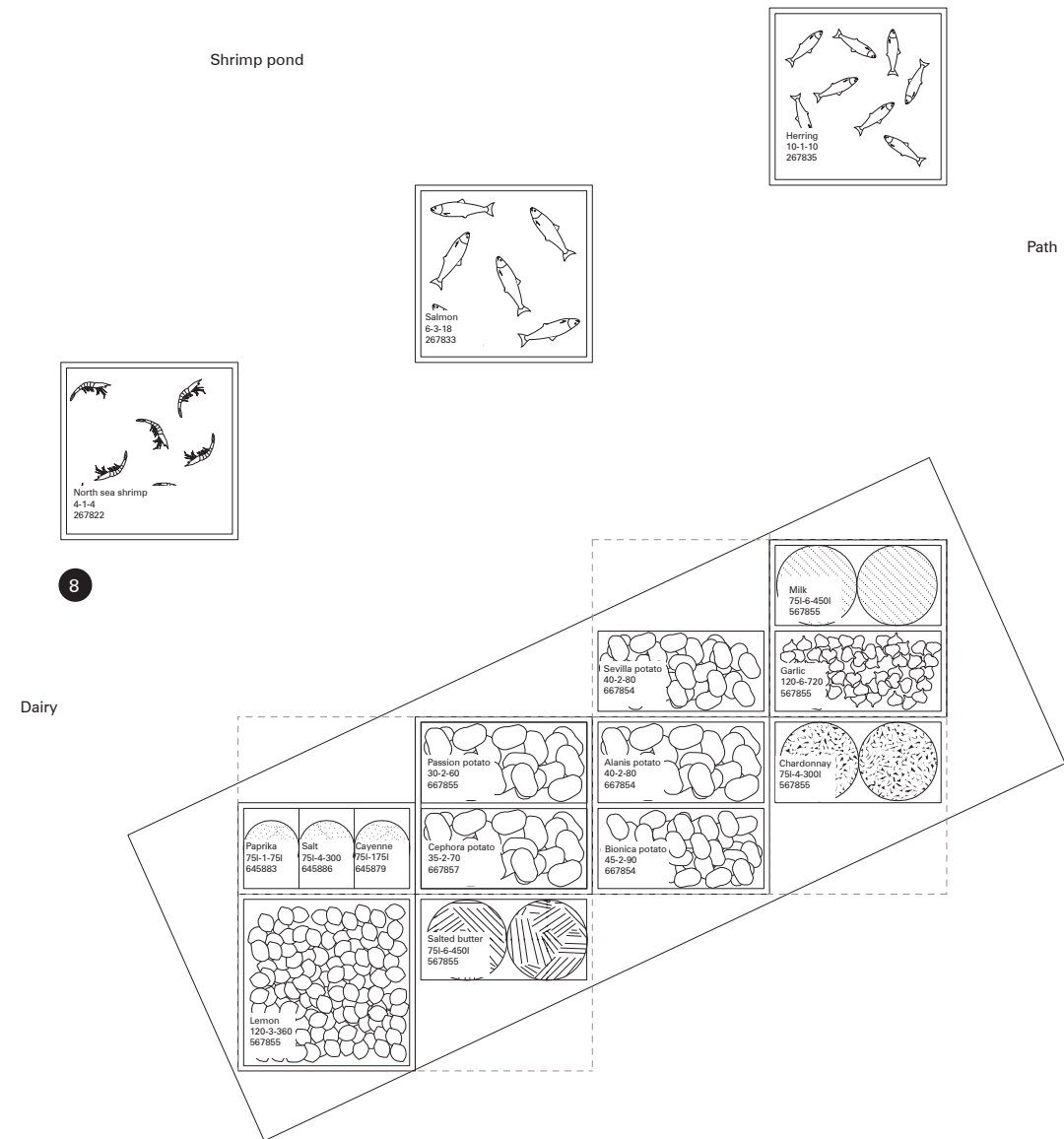
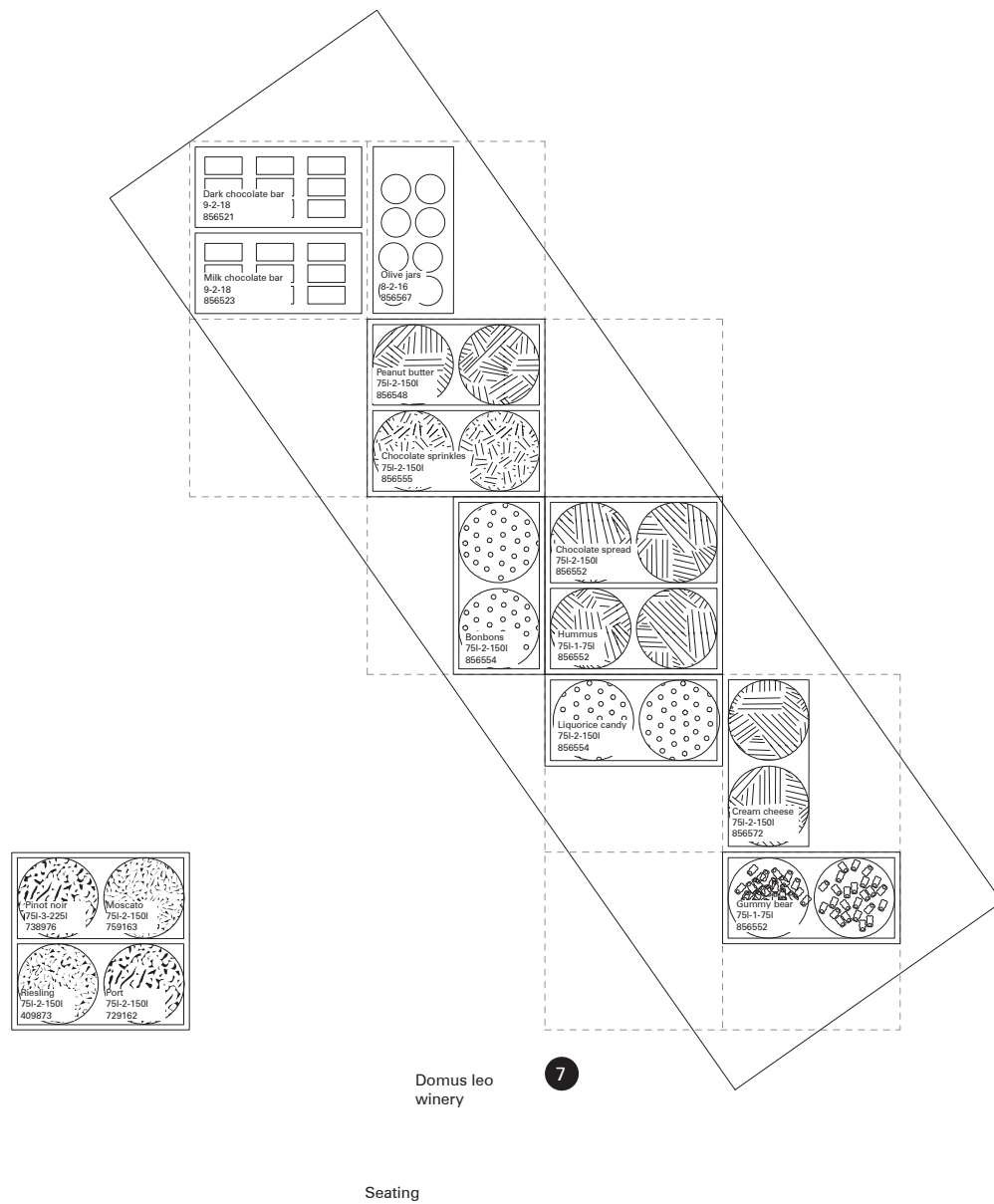
6

0 200 1000 mm

From bulks to fresh produce crates, standardized shelving systems within the open plan generate new episodic formats of planograms. No longer

vertical and detached from each other, the new planograms dictate the dynamic floor plan.

- 3 Saturday market aisles
- 4 Holyberry merchandising
- 5 Baby products and pantry
- 6 Automat merchandising



0 200 1000 mm

From bulks to fresh produce crates, standardized shelving systems within the open plan generate new episodic formats of planograms. No longer

vertical and detached from each other, the new planograms dictate the dynamic floor plan.

7 Wine merchandising
8 Fishmonger merchandising

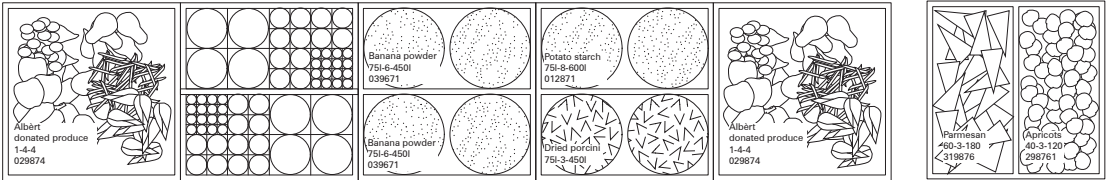
Main street

Entrance

Le creuset

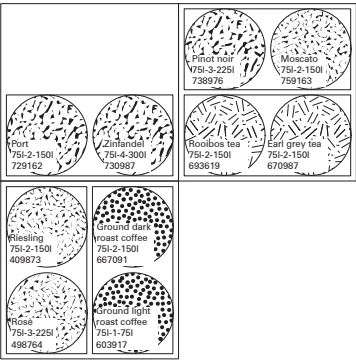
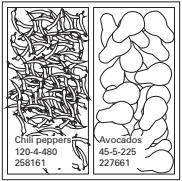
Aesop

Hermès chocolate



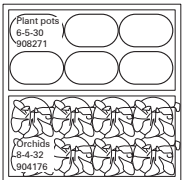
Main street

Hermès chocolate

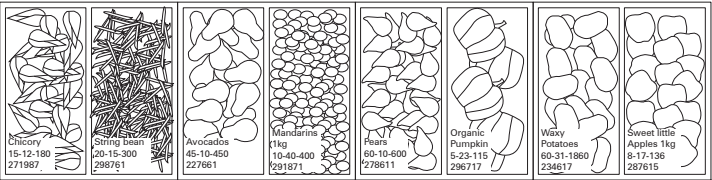
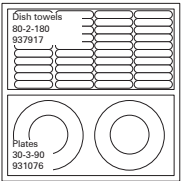


10

11



Host



9

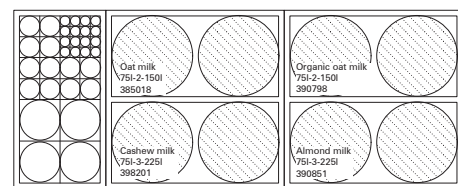
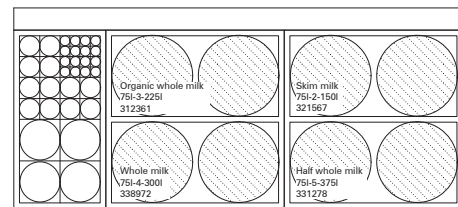
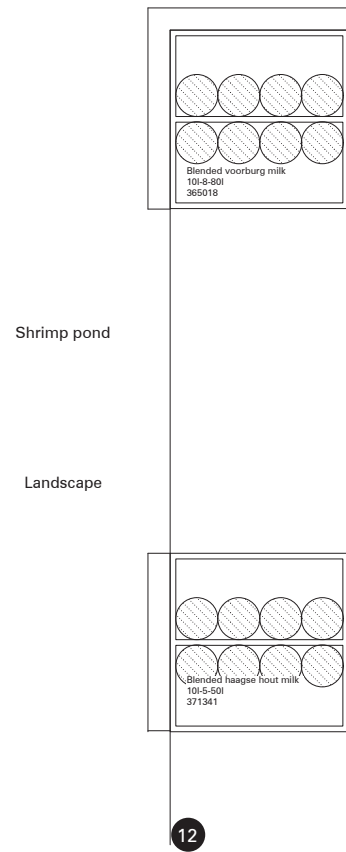


From bulks to fresh produce crates, standardized shelving systems within the open plan generate new episodic formats of planograms. No longer

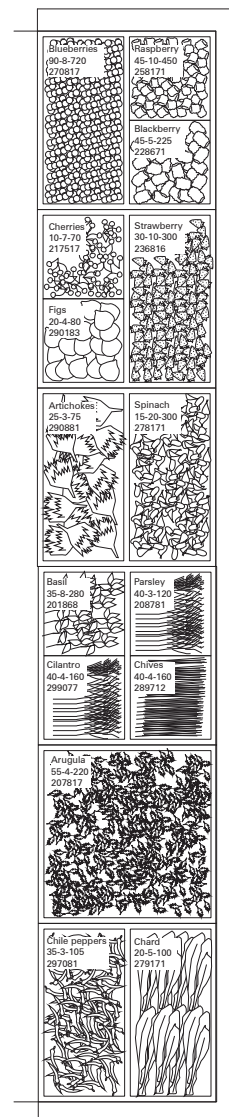
vertical and detached from each other, the new planograms dictate the dynamic floor plan.

9 Albert lifestyle
10 Public products
11 Chocolate merchandising

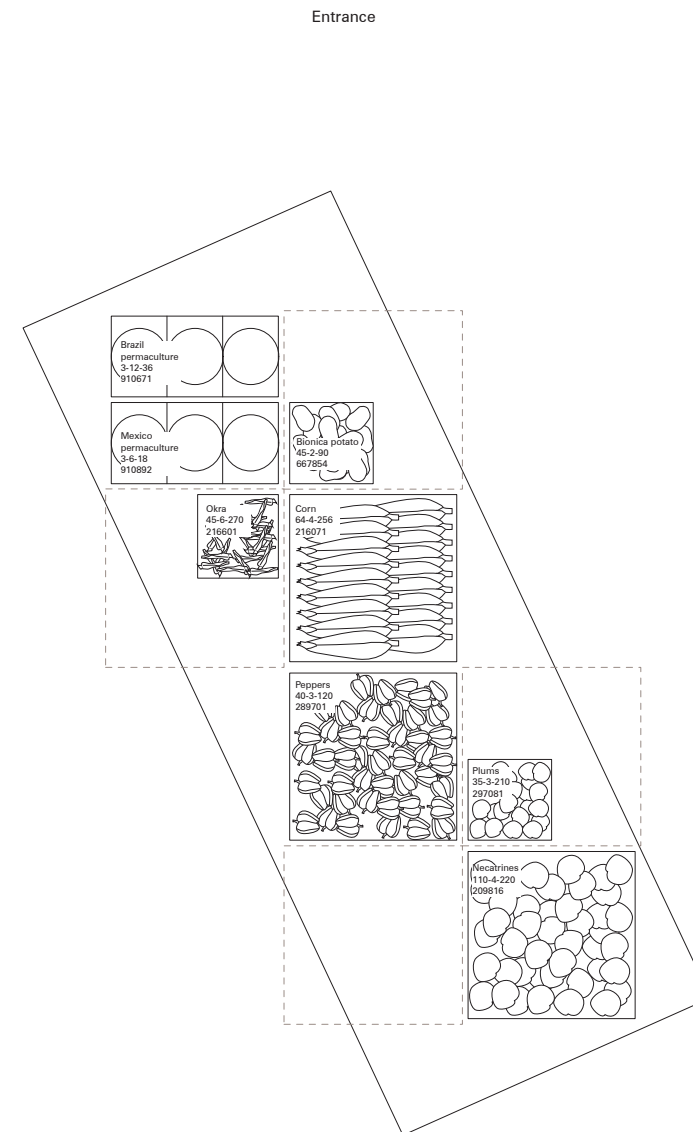
0 200 1000 mm



13



Path

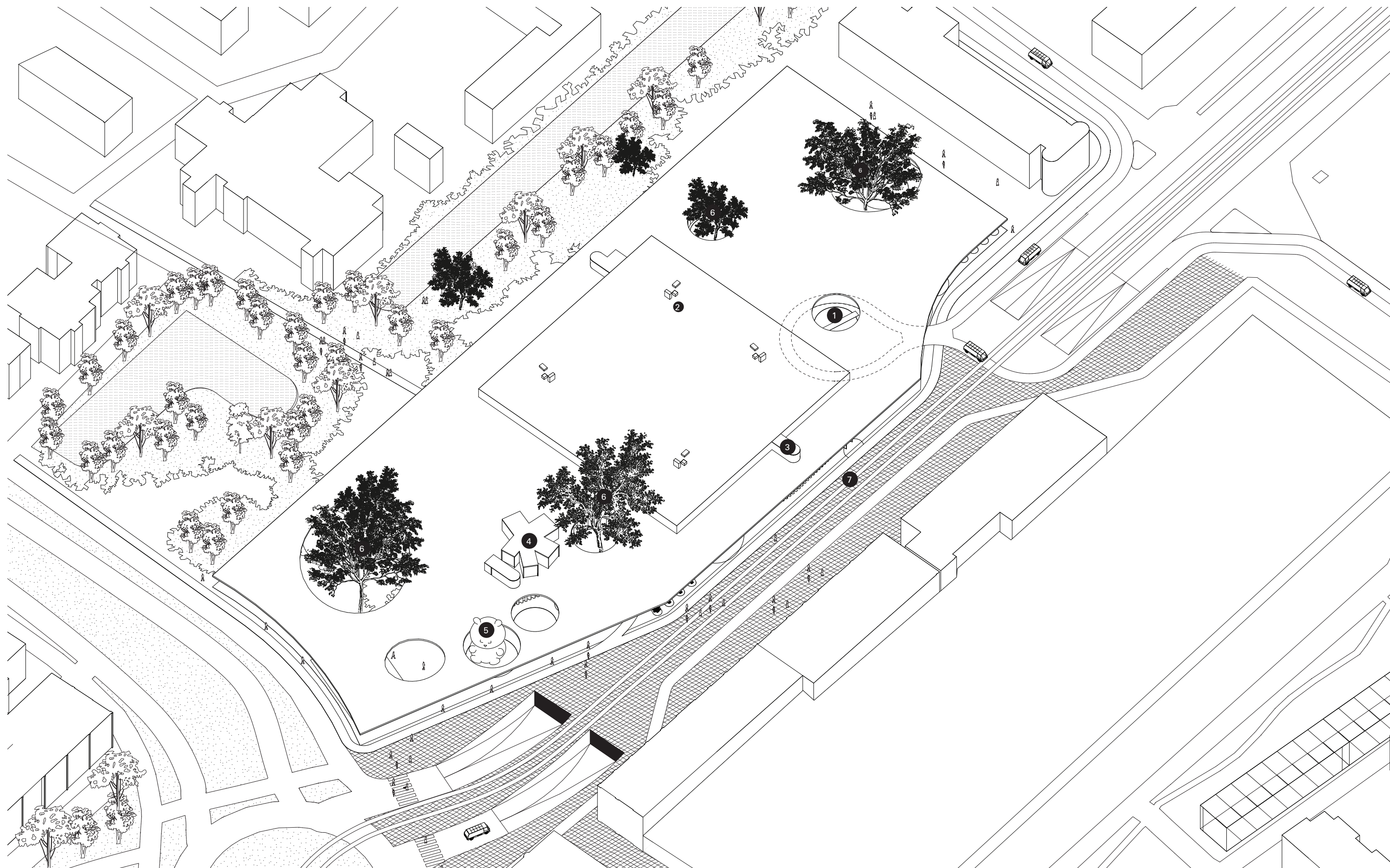


0 200 1000 mm

From bulks to fresh produce crates, standardized shelving systems within the open plan generate new episodic formats of planograms. No longer

vertical and detached from each other, the new planograms dictate the dynamic floor plan.

12 Dairy walk-in
13 Fresh produce display



Amidst a transportation node and a public square, featuring a green roofscape, Albèrt extends its perimeter towards the city and its residents,

establishing a new civic presence.

1 Loading
2 Automated ceiling
3 Vertical core
4 Kindergarten

5 Sculpture of Albèrt's mascot
6 Garden
7 Tram



Stills from the walk-through video on the reimagined supermarket of the future, Albèrt.





Stills from the walk-through video on the reimagined supermarket of the future, Albèrt.





Stills from the walk-through video on the reimagined supermarket of the future, Albèrt.





Stills from the walk-through video on the reimagined supermarket of the future, Albèrt.





Stills from the walk-through video on the reimagined supermarket of the future, Albèrt.



1 From The Hague to Genoa, the supply chain of the future supermarket will span across the Blue Banana trade corridor, addressing multifaceted aspects of the food industry in the Netherlands and beyond, through the notions of scarcity, trade, inclusivity, sensorialism, tastemaking, craft, reshoring, protectionism, automation, and extinction.

2 The reimagined supermarket—Albèrt—displays both the product and its supply chain for the conscious consumers by integrating the distribution center with an automated Ocado grid system above the supermarket, rendering a completely open sales floor.

3 In an attempt to reduce waste and address sustainability goals, Albèrt operates within a just-in-time production system of non-disposable packaging and dynamic pricing, maintaining small batches of products in the integrated Distribution Center.

4 No longer an enclosed and controlled retail space, the supermarket uses various strategies—such as store-in-a-store rentals for exclusive brands and specialty displays for seasonal products—to create a flexible sales floor in order to maximize profit, operating as a real estate platform.

5 Novel tasting experiences and green public spaces—along with the dynamic robotic movement that diverts human labor towards hospitality and social interaction—blur the boundaries between the supermarket and the city, introducing a new civic presence.



1



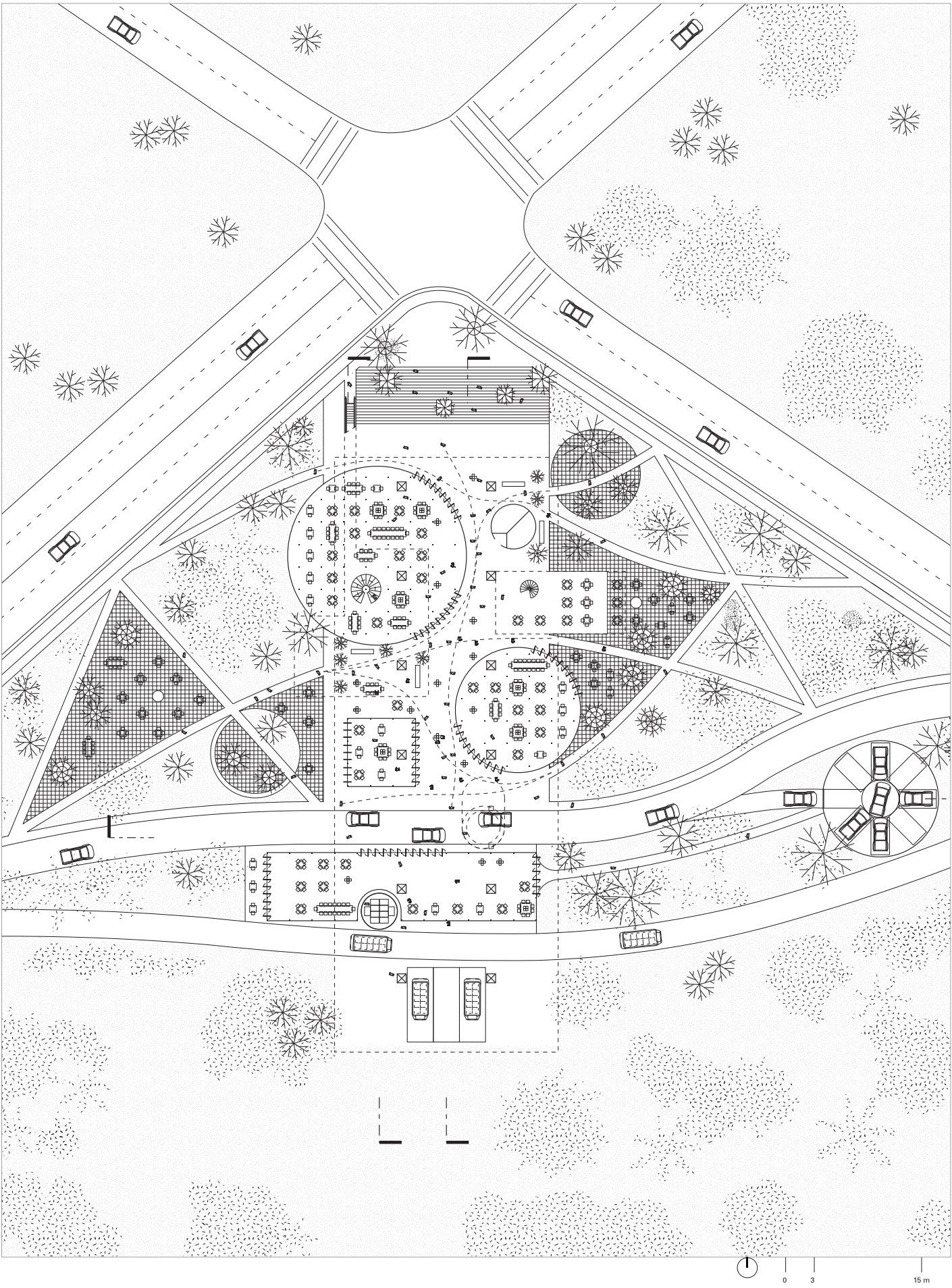
2



3

1 View from Bundesstraße 43. Google Earth image.
2 View from Niederrader Landstraße. Google Earth image.

3 View along Bundesstraße 43 to the Frankfurt Airport.



The site in Hundewiese is located in the junction of Bundesstraße 43 and Niederrader Landstraße, which strategically placed in between

Frankfurt Hbf and Frankfurt Airport.



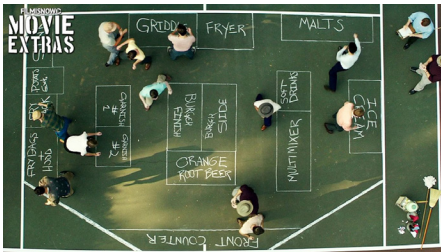
Color Code Utility Pipes of Centre Pompidou. The aesthetic of machine in built environment.
Source: David Noble. courtesy of RSHP. Paris. 1977huizen/Kolk22.html



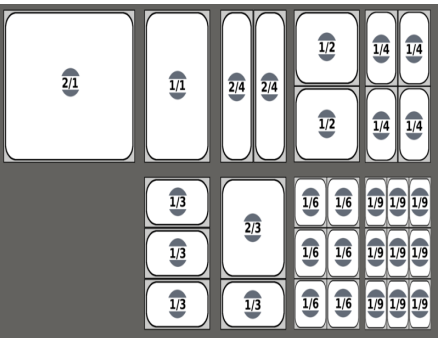
Infinity Kitchen by Spyce
Source: Spyce.com



Beastro by Kitchen Robotics
Source: Kitchen robotics



McDonald's speedee service system, using assembly-line system of factory to deliver fast food
Source: John Lee Hancock, The Founder, 2016



Gastronorm, European standard for kitchenware tray and container sized, commonly seen worldwide in the catering and professional food industry.
Source: Brezh, Wikipedia, 2014

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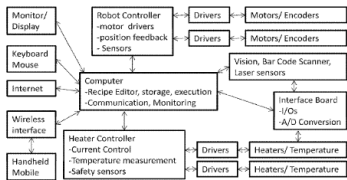


FIG. 13

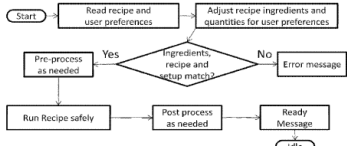


FIG. 14

Patent Application Publication Apr. 30, 2015 Sheet 6 of 6 US 2015/0114236 A1

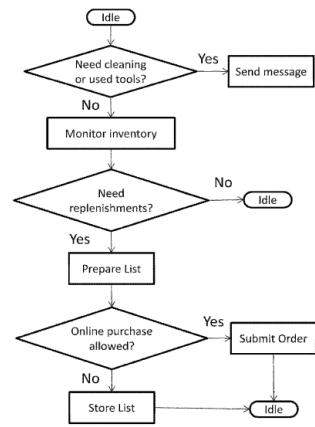
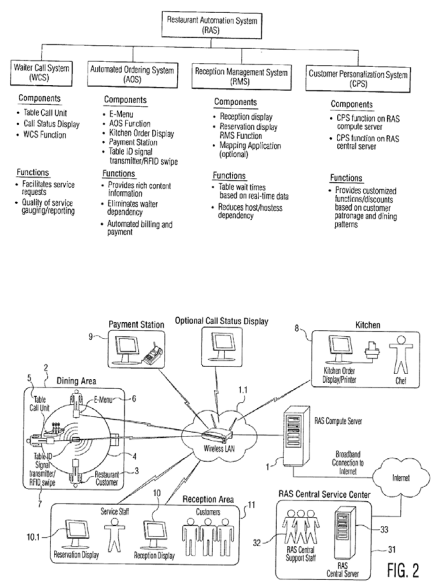


FIG. 15



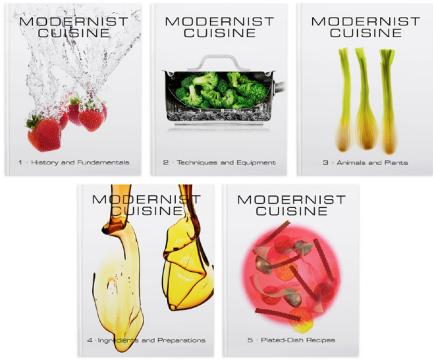
Patent on Restaurant Automation System
Source: Yogin Suthar, Restaurant Automation System, Google Patent, United States, 2003



Ice You, frozen food food service from Moscow, Russia. They pack their food in rectangular and circular size inside a plastic vacuum bag.
Source: Ice You, 2021



Ice You utilize acoustic freezing technique that preserve ingredient cell structure and quality, thus meals can be kept up to 6 months while maintain the freshness.
Source: Ice You, 2021



Color Code Utility Pipes of Centre Pompidou. The aesthetic of machine in built environment.
Source: David Noble, courtesy of RSHP, Paris.
1977huizen/Kolk22.html



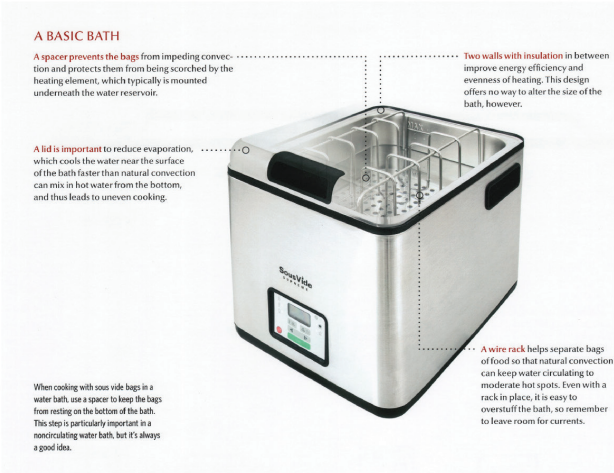
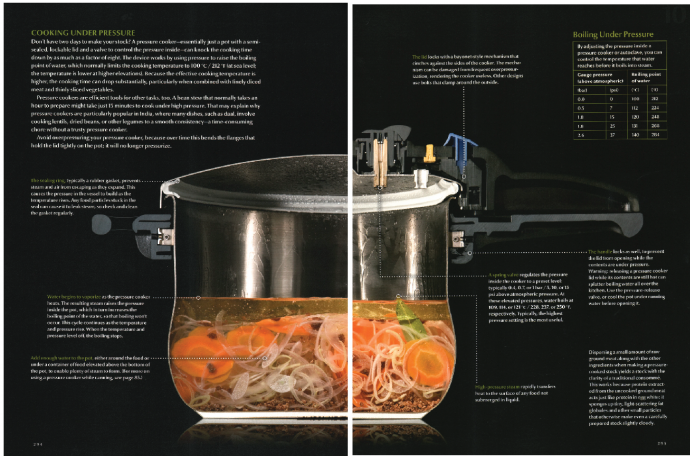
Large capacity of an autoclave allows many portions to be cooked at once with simple, automatic, and accurate control of the process.
(Other ways to cook sous vide)



9

Modern chefs are blessed with a wide range of choices in sous vide cooking equipment that can produce results that are as good as or better than those of any spit boy-and can do so more reliably and nearly automatically.

A digitally controlled immersion circulator has fast become a feature of the modern professional kitchen. This and similar equipment give cooks unrivaled control over cooking.



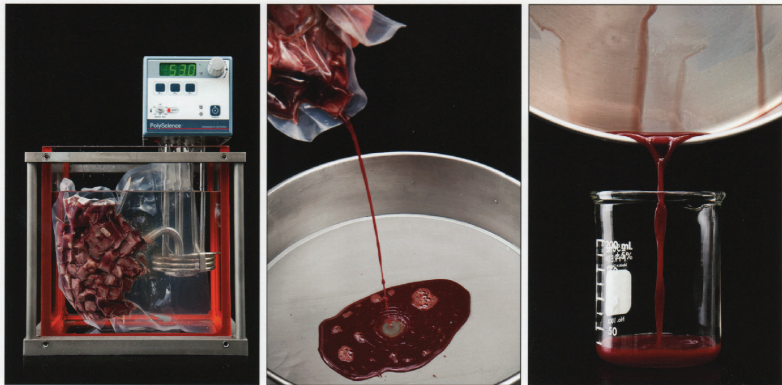
For many vegetable and seafood stocks, extraction at low temperature yields a better flavor than high-temperature pressure-cooking does. In such cases, prepare the stock sous vide, which minimizes turbulence while accurately controlling the temperature for hours at a time.



Right to left : Champion-style Juice, Centrifugal Juicer, Food Press



A cook has many options for intensifying the flavor of liquids that come from food . The alternatives range from the traditional boiling pot on the stove to the more exotic and expensive, such as Genevac's Rocket Evaporator, which is part centrifuge and part distillery.



This process can be applied to all types of meats. Using the resulting juice, although more costly than water, is a more flavorful alternative than using water to make broths and sauces.



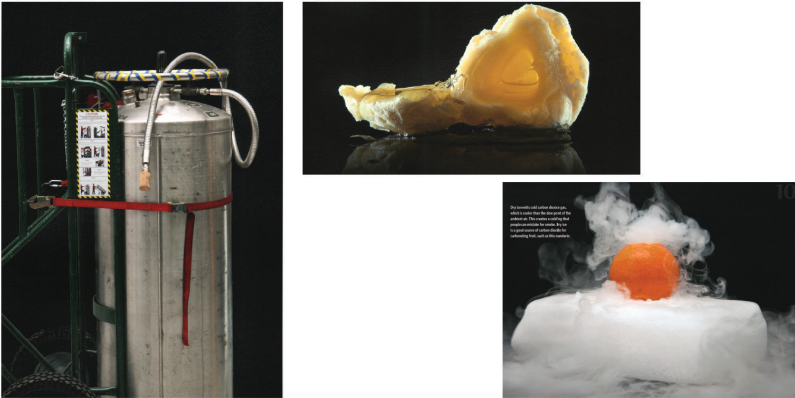
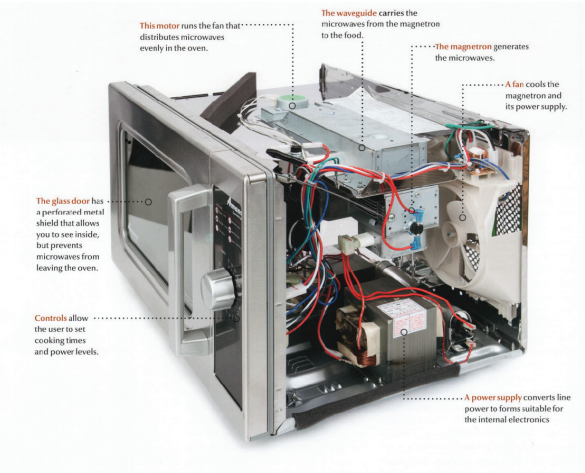
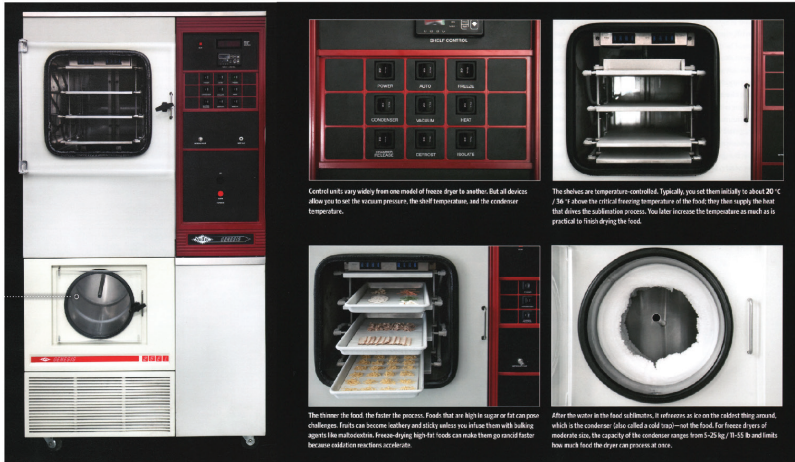
Paco Jet, Rotor-stator homogenizer, Colloid Mill



"Centrifuges use rotational force to separate food into layers by density. Eight different layers are clearly visible above in the centrifuged stewing juices"



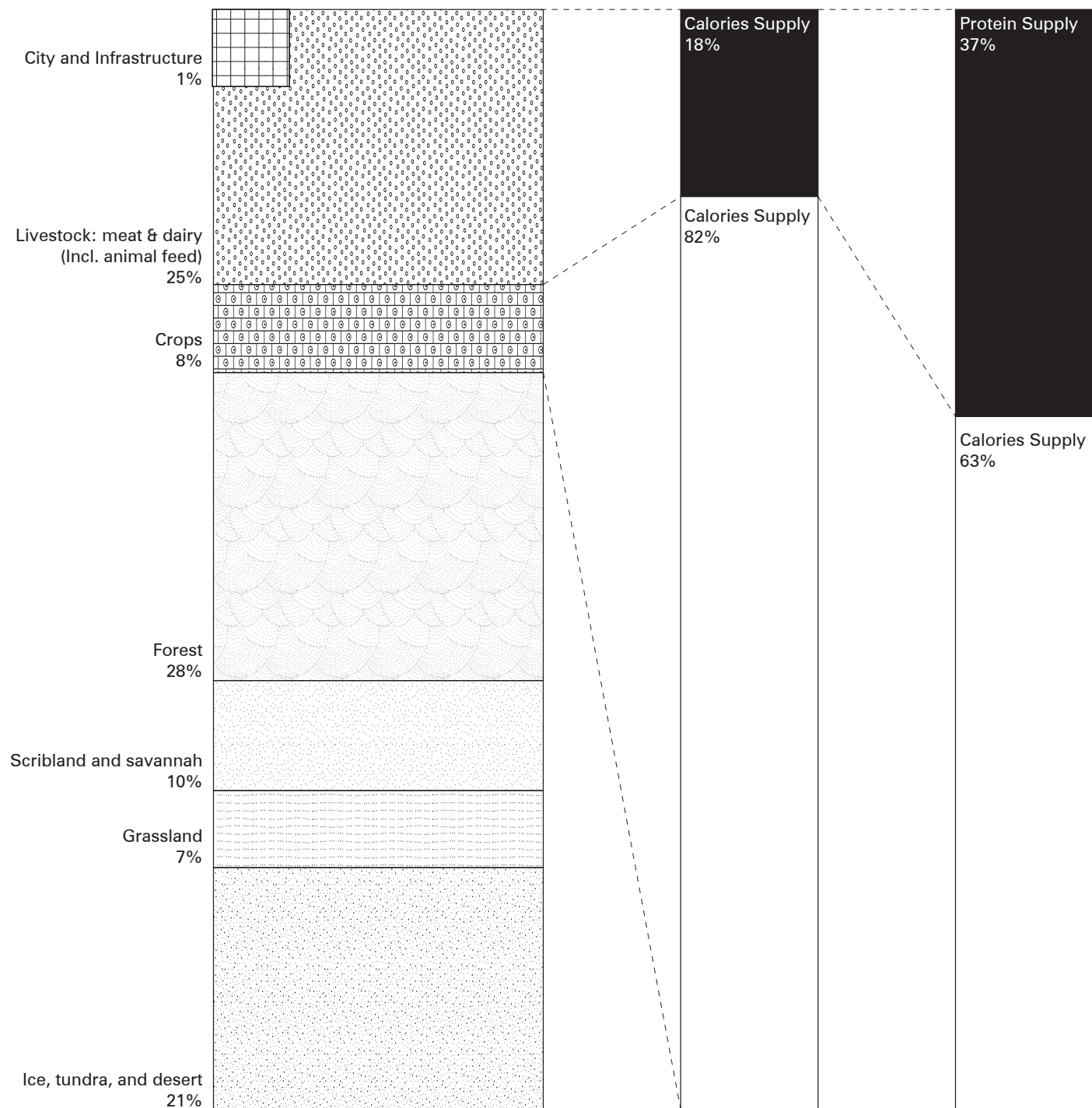
Hot water rehydrates a freeze-dried ramen and dissolves its packaging, turning it into something you can eat.



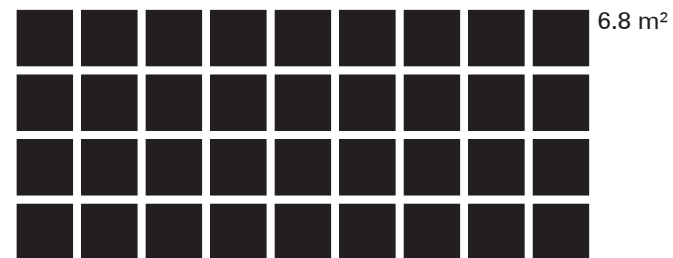
Modernist cooks have learned to use liquid nitrogen to create unexpected food textures. These freezing agents make possible novel foods, such as ice creams with ultrafine textures and deep-fried pork roast that is succulent on the inside with perfectly crisped skin on the outside.



The combi oven's ability to use both steam and circulating hot and dry air, either alone or in combination, can reproduce, in a single appliance, many cooking techniques: steaming, proofing, incubating, dehydrating, baking, grilling, frying, and more. Cooks can program combi ovens to automate routine tasks, and the machines are self-cleaning.



Beef
1.8 kg CO₂



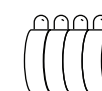
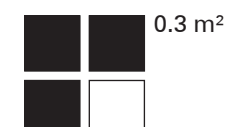
Egg
0.2 kg CO₂



Cheese
0.9 kg CO₂



Vegan
Burger
0.2 kg CO₂



Pork
0.5 kg CO₂



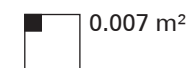
Legumes
0.04 kg CO₂

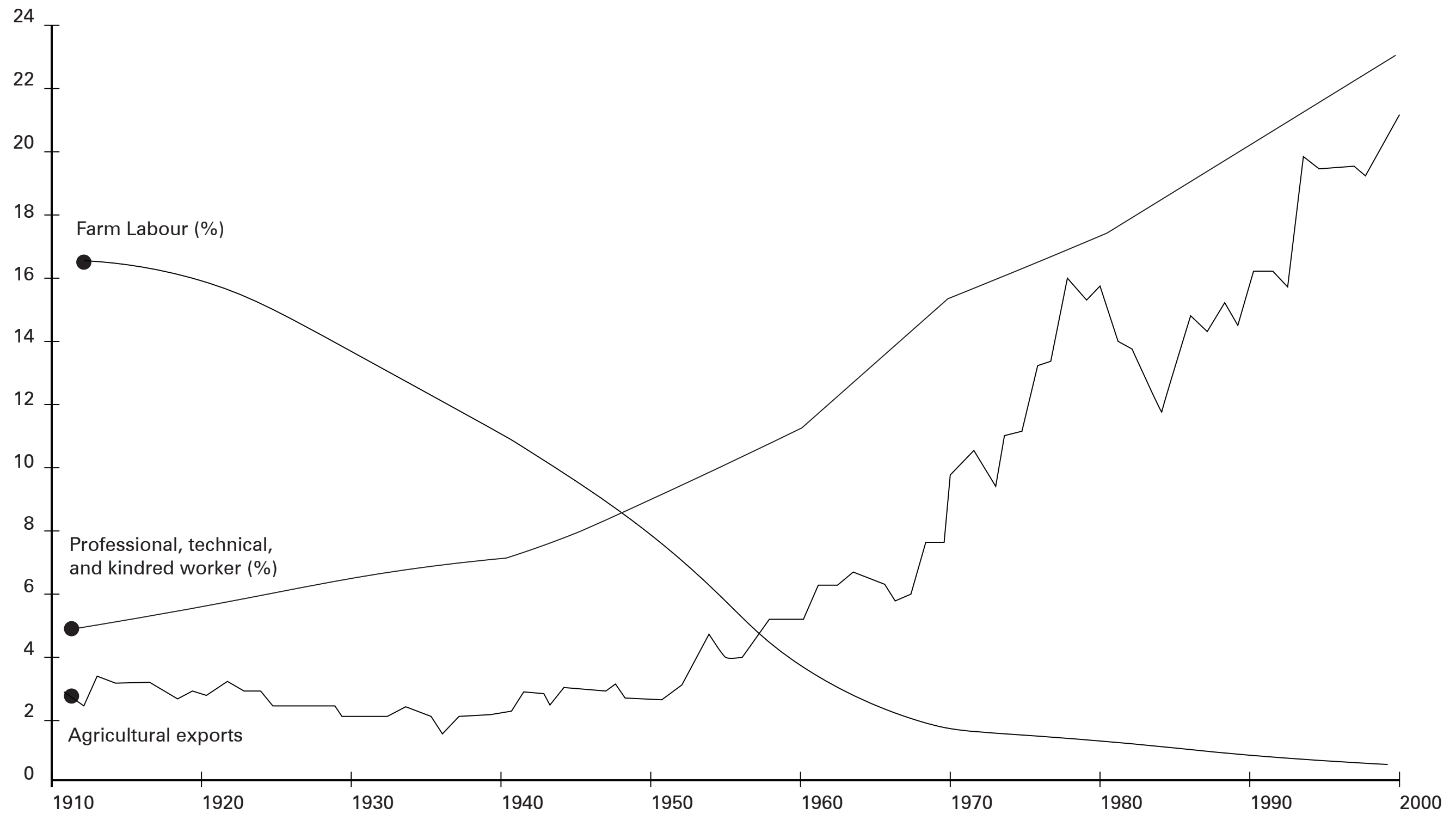


Chicken
0.4 kg CO₂



Vegetable
0.04 kg CO₂







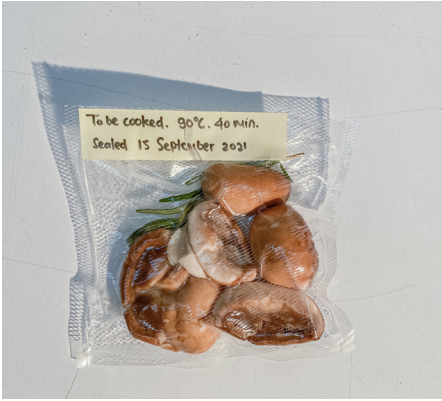
Food and seasoning are stored inside a 15x15 cm vacuum bag. Each bag is for one portion of meals/ recipe.



Food packages, that are ready to be stored before cook, are labelled with cooking instruction and sealed date.



Food package is boiled with specific temperature in sous vide technique.



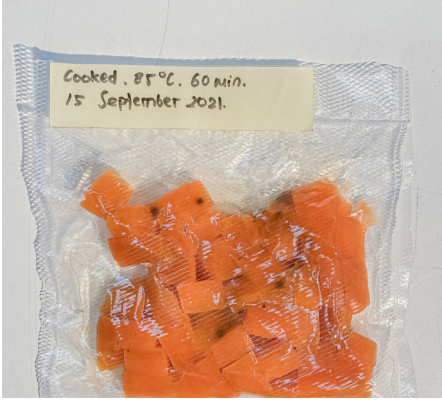
Food packages, that are ready to be stored before cook, are labelled with cooking instruction and sealed date.



Blueberry sous vide in 60°C water in 60 minutes to extract its juice.



Sous vide package ready to be cooked or store in a freezer.



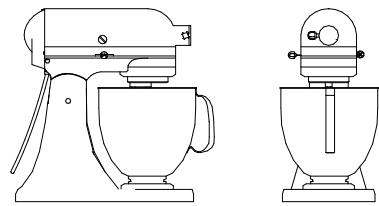
Sweet potato sous vide in 85°C water in 60 minutes.



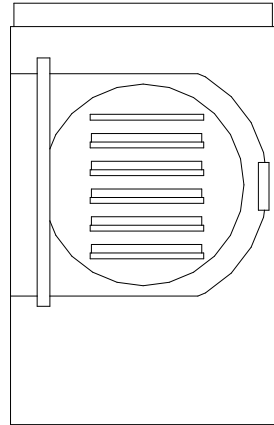
Medium-rare steak with blueberry sauce serve with champignon and mashed sweet potato. 3-4 food package can be combine to serve one full meal.



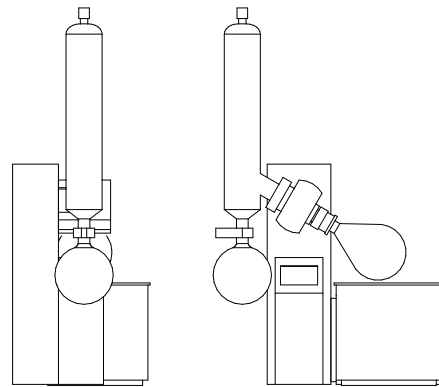
1 minutes cooking of sous vide steak.



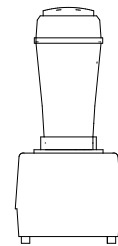
Planetary Mixer



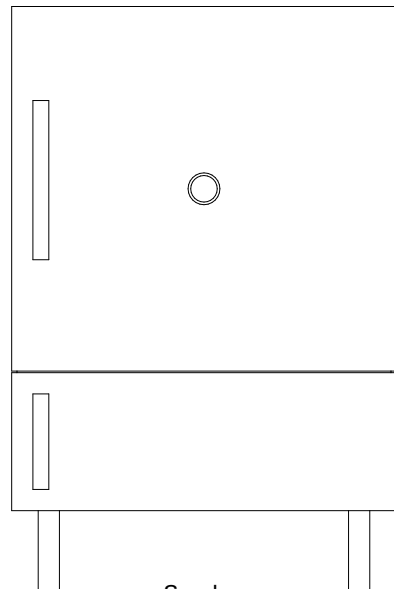
Freezer Dryer



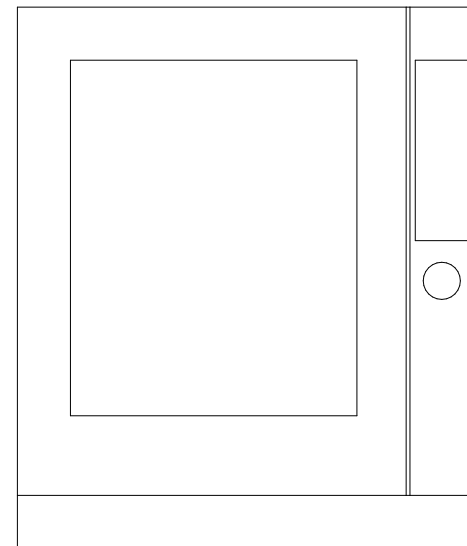
Rotary Evaporator



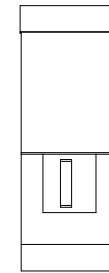
Blender



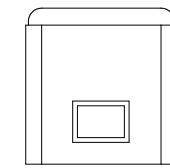
Smoker



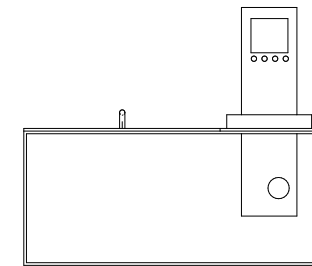
Shock Freezer



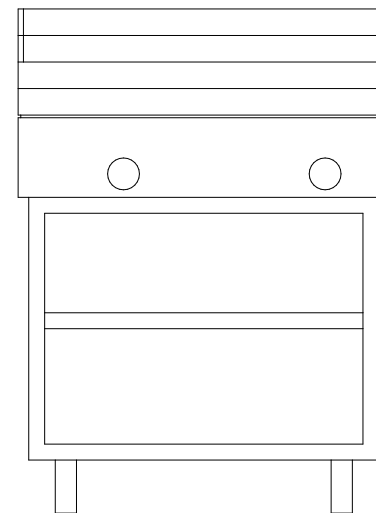
Paco Jet



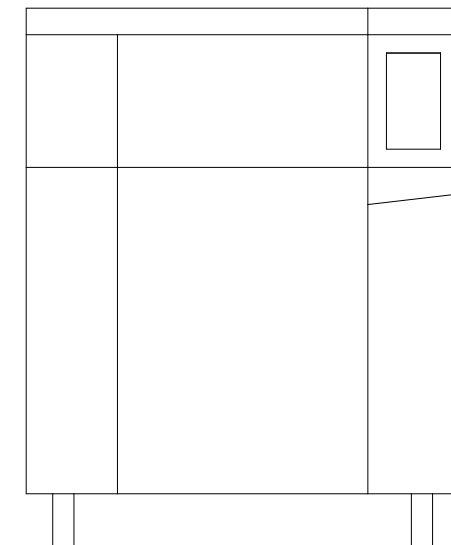
Vacuum Chamber



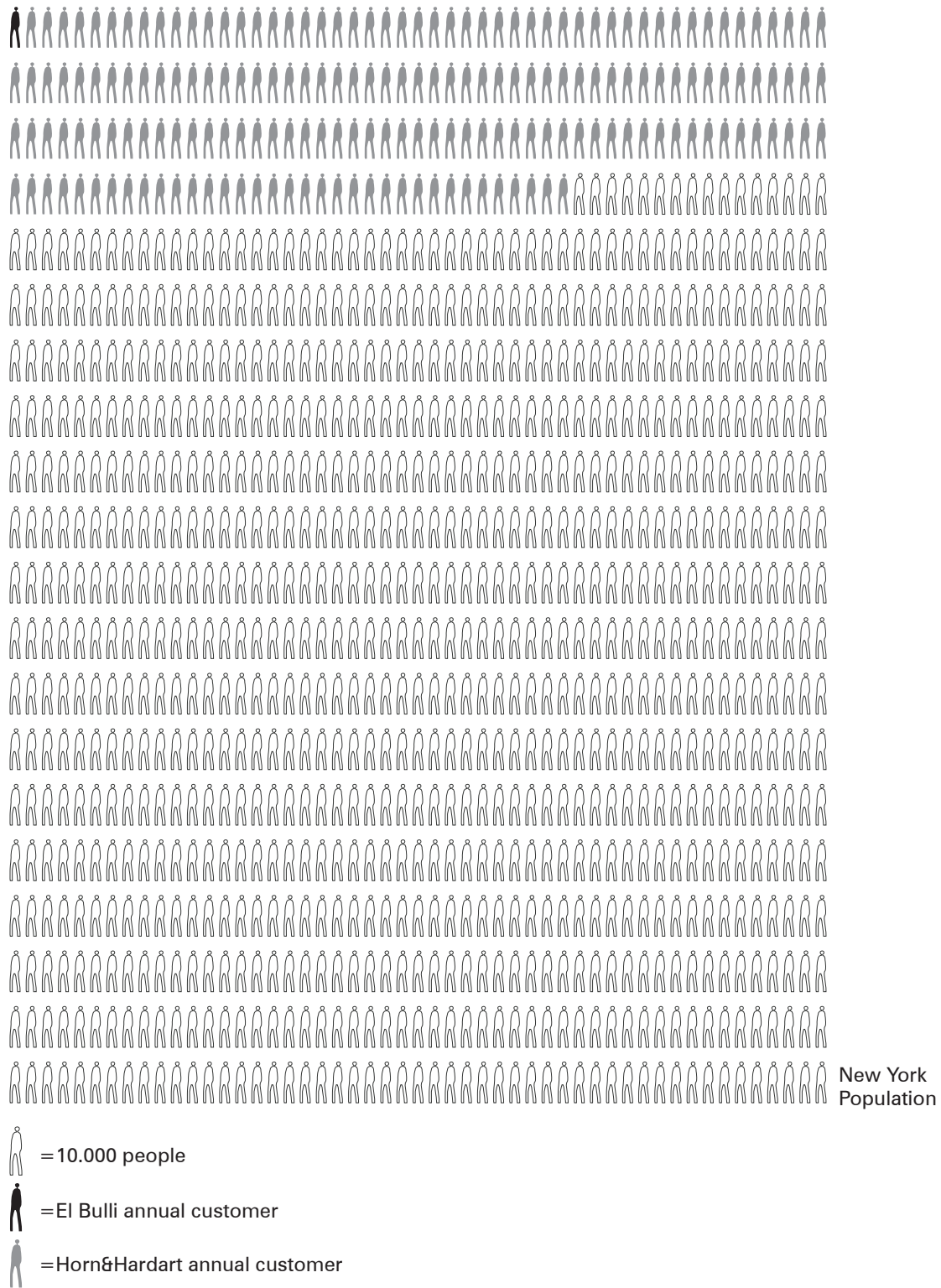
Immersion Circulator



Griddle/Plancha



Centrifuge



Zev Miller

General Manager of Kitchen Robotics, an automated cooking robot manufacturer. They manufacture Beastro, a robotic kitchen that can cook up to 60 meals per hour.

Ryan Ridge: Hi, Thank you for your time. First, I want to know about Kitchen Robotics a bit, because in the website it's written that the target market is the ghost kitchen, but how do you collaborate with the chef or restaurant if it's possible and why you prefer ghost kitchen because we also aware that there's other restaurant that use automation technologies like Spyce Kitchen and Creator Burger that are operate as a commercial restaurant?

Zev Miller : Well, one of our targets is of course, ghost kitchens, but not only. And the Beastro by Kitchen Robotics is a very good fit for existing restaurants as well, not only ghost kitchens, one of the reasons that we targeted ghost kitchens and see them as a very good use case for automation, is because many of the ghost kitchens, or generally, in the food and beverage industry, across North America, across Europe, there is a very big shortage in labor in the kitchen. And one of the difficulties and challenges in the world of restaurants and kitchens is that it's the same repetitive tasks again, and again, doing the same thing chopping, cutting, mixing, stirring, washing, cleaning again and again. And when you try to solve that kind of a difficulty, one of the simplest solutions to imagine is robotics and automation, that can help out very much with reducing the number of employees necessary to handle the same volume, and allow the people to focus more on interaction with the customers, to make sure that the customers served properly and having a nice visit at this restaurant. So, it's not only a solution for ghost kitchens. And there are many other concerns as well, for instance, hygiene. How do you keep the kitchens clean? How do you make sure that the food is satisfactory as far as health concerns? So, if you reduce the human touch in the preparation of food, then obviously, you're improving the hygiene aspect of the food preparation as well.

RR: Yes, but because of the reduction of these human touch sometimes it became the one of the main issues with automation, the loss of the human senses. How fat is the machine could go independently? and how the machine could judge if the ingredients goes bad or something like that?

ZM: that's one of the first questions that you asked is regarding how do you interact with it? So, the way we've designed Beastro is with very, very simple software that you don't need to be an IT professional, you can be a regular person that knows how to use a mouse and the website and basically with drop down menus the chef of the restaurant he decides what the recipe is which ingredients will be included and what the different steps for this for this recipe. what the steps are for example, first add olive oil then add onions Okay, and then cook for two minutes to make the onion soft to sauteed onions and then add pasta and then add sauce and then add mushrooms. So, the chef, he defines the recipe, I don't provide the recipes, the chef of the restaurant provides them, and he adjusts the flavor and adjust the portion size until the recipe is exactly what he wants. And this is a very important point because once a robot or a machine is preparing the food, you gain consistency. So that every single dish will have the same quantities and the same amounts and the flavor will be the same and there's less room for error. For example, if a chef in a regular restaurant, he supervises his workers, one worker adds a little more salt. Another one doesn't like pepper, okay, and so the flavor isn't consistent. When the machine is preparing it, when our robot prepares it, the flavor is consistent every single time. And imagine if you have more than one location, for example, in ghost kitchens, or a chain of restaurants that has a few branches in every city across the Netherlands. You know, think consider a restaurant like Vapiano, they're all over the place. They're serving pasta with sauce. And they need to train the worker, in Den Haag and in Amsterdam, and in all the different locations. With the software, you define the recipe and send it out to all the locations, and it's just all online. And all

of the Beastro that all of your locations will be preparing the same dish that we designed it, that the chef designed it. And so that's a very nice aspect of controlling not only one single location with software, but multiple locations and having consistent flavor. Another challenge, of course, is the mistakes or errors, okay? When, and I'm sure that you have ordered a meal online before and you order delivery and sometimes you get something that is wrong or wasn't prepared the way you asked for it. Let's say for example, that you ordered a stir fry, and you got it with chicken but really you prefer tofu. This type of mistake can be reduce because the robot follows the orders all the time.

RR: How does this automatic kitchen like Beastro influenced our production kitchen that exists right now? What do you see in the major change that you can observe with the introduction of this technology to how we produce or how the people are consuming their food or the people isn't even aware this is happening?

ZM: I read in your intro that you are also discussing the architectural side? Yes. One of the things that is interesting to consider. And it's not a trend yet, but you know, that's one of the things that as you mentioned correctly, it's a little bit in the future. If you go you personally, when you go to sit in a restaurant, will you enjoy eating food prepared by a robot? Yes, or no? Would you like to see the robot in action that make your experience better or not? I can tell you, for example, that my mother who doesn't like technology, all that much, she wants a human chef preparing her food, but with the younger generation. They sit there and say, "Wow, that's fantastic". And so, does the robot need to be hidden in the back of the house? Where no one can see it, or shouldn't it be presented? Many restaurants now have the kitchen, the human kitchen, they have it visible to the diners so you can see it's clean to see how they prepare things, and it's part of the experience. And I think that the discussion about robots in the kitchen will be the same discussion.

RR: Yes, and also to some extent, these

technologies also cannot workby itself, right? We still need a human to operate it.

ZM: For our Beastro has one operator. He makes sure that the ingredient containers are full. If the pasta is empty, so you refill the pasta. The second thing is that when your dish, the one that you ordered is ready, he packages it for takeaway. And so that's one employee. Now if you consider a restaurant that handles, let's say, up to 60 dishes per hour, that's what the Beastro handles usually and its need between 3 or 4 kitchen workers to do that volume. And we're doing that with one input with one employee. And so, if you consider that many or most restaurants operate with two shifts, afternoon and night shift. I've reduced six employees and that's a lot of labor cost reduction.

RR: How do you envision this into the future, because adaptation of this technology is open many more possibilities, and from your point of view that's working a lot with this automation, what, what is the future promises from the adaptation of the automation?

ZM: I'd say that one of the, one of the interesting use cases for automation and robotics and the industry is that you allow fresh food to be prepared at locations, which could not handle fresh food. For example, imagine a very busy train station or a transportation hub, where you don't really have the option to set up a big proper kitchen with cooks and chefs and all that. But machines of this type definitely can handle that. Imagine locations where there is no customization like in a large factory, for example, and you have a big dining room for all the workers, they come in, usually there's, you know, three choices for the day. And those are the salads, those are the proteins, and you make your choice. Once you introduce our type of solution, then you can allow each employee to make his own order and to order the type of food that he wants. And when he would like to eat it at 14:15, not at 12:30. So, we can expand the hours of availability, we can allow customization, we can allow fresh food to be prepared, you know, at locations where it wasn't easily possible earlier.

RR: You've mentioned about the train station and the place that people usually in hurry, however to make fresh food you need the right timing for the waiting time and how Beastro operate to cater this need?

ZM: Software allows you to place an order online. Okay, and when you order it, if you order it to be ready at 14:15 because you know that your train is at 14:25 and you will walk by in 14:15 your order will be ready already. Because unlike a kitchen and unlike a human operation where you don't know the timings, exactly, it's all computerized, I know the volume of orders coming in, and I can plan accordingly. So I know that my Beastro is at 100% capacity and I cannot accept additional orders until 13:35 so from 13:35 I will begin producing your order.

RR: That's a really nice solution. But, somehow in the Netherlands, for example, we don't see this type of technology introduced yet. The closest thing that I can find for this convenience service is a FEBO. So, what is the challenge of introducing this technology to the to the current market because it's not really visible yet, in the Netherlands, maybe because in Europe, people still also have this nostalgic and romantisation of dining in the restaurant with a chef, what do you think about this?

ZM: So let me tell you that from all the countries in Europe, the country that has approached kitchen robotics the most times the highest number of companies interested in our solution in the entire European continent, east and west, is the Netherlands. By far, the next one is the UK, United Kingdom. And so, I understand that you may have not seen it yet. But the restaurant operators in the Netherland are really working hard on finding a solution for automation in the kitchen. You can imagine a little bit out your grandparent's generation, when they wanted a fresh loaf of bread, for example, they had to go to a bakery. Right, they would go to a bakery and buy a fresh loaf of bread that was baked in the bakery this morning. We don't do that as often, we go to the supermarket, we buy bread that was made on the machine. The breads

are the same and we don't even think about it. And if you want something special, maybe you'll go to that bakery. And I think that that's the idea here is very similar to that, that when you are looking for a unique experience with a chef, a Michelin star, or double star chef, and the plate will be plated exactly and beautifully. And the visual, you know, the visual of your dish will be so special and unique. That is a different experience. But if you're going to order a bowl of stir-fried chicken with noodles or you're ordering pasta with tomato sauce, why am I waiting in line for that? Yes, good, it's fresh, hey, I can do the same thing with automation.

RR: I know this is a bit out of your expertise, but i hope you can talk a little bit about more advance cooking technique like sous vide or other techniques that is being introduced by the modernist cuisine cookbook. What do you think about the future of automation in relation to this development of the cooking techniques? Is it possible to do this, not only like fried food, but also with more complicated dishes? ZM: I think that with time anything is possible. When building a company, you also have to take into account the barriers to entry barriers, how expensive it is to do something, how complicated it is to do something, and the more complex the task that you are trying to solve, the more expensive it will be. And that, you know, creates barriers to designing it. But it also creates barriers for the restaurant operator to purchase it. Okay, if a restaurant operator and I assume that you know this, their profitability margins, their profit margins are very low. Okay. The restaurant industry is a very difficult industry. How much money are they willing to invest in a solution like that? So that that, I think is the question because the math, the mathematics of the equation, have to work across the entire equation? The company that is producing it and the restaurant operator and the diner.

RR: The how robotic kitchen robotics works with the initial investment? Do you work a lot with much bigger company that want to invest in automation, or do you see is the future of smaller, independent restaurant that's interested in this and it's become

Interview with Laura Saphiro		On Food Industry
much more affordable?		them as restaurants. They’re convenient and that’s all.
ZM: So, a financial model that we developed a kitchen robotics makes renting a bistro with a monthly payment very affordable, so we designed a leasing model, so then any restaurant can afford this. And of course, there are also very larger international companies who are who are interested in this as well and for their money. The cost is not so high. And that is in our case, other companies do it differently. Other companies are selling the robot, many hundreds of thousands of dollars. That’s how much it costs. Just to start.	RR: I think that’s all my question. Thank you for sharing your knowledge, I think it’s really helpful for my research.	I think Modernist cuisine and all the science-lab innovations that became famous at El Bulli and elsewhere have absolutely nothing to do with the way real people cook at home, and they never will. These innovations are restaurant gimmicks -- they make it possible for rich people to spend more money on food, and that is all. Very few restaurants use these gimmicks, at least in the U.S., apart from foams and sous-vide. I think the whole notion is exactly the opposite of what cooking and eating are all about.
RR: What about the maintenance? especially since you’ve mentioned that the robot is leased, what can you say about the perfect condition for this machine?		I’m afraid I’m not qualified to say much about the future of food in terms of the climate, environment and economic challenges ahead.
ZM: So, we designed this job to have a very minimal footprint, about two by three meters. And that is a very good size for existing kitchens. It can even fit on the back of a truck. So that’s, that’s one-use case. Now regarding operating temperatures, it can operate at the temperature that exists in the restaurant kitchen. Normally, there are certain health standards and health requirements to keep things refrigerated, etc. Beastro also refrigerate the ingredients on its own. So that the ingredients sitting in the Bistro are not at room temperature, but like inside the refrigerator. temperature is okay. If this is out in the desert, and it’s 50 Celsius, that that will be a problem. But if it’s normal operating temperature for a kitchen, let’s say 30 up to 30 degrees Celsius. That’s normal.		My favorite place to eat is a big, very casual restaurant near Lake Michigan in the town where we spend August every summer. They serve just a few sandwiches and pizzas, they do everything very well, they’re friendly and easy-going, and they have done a huge amount to support the community not only in the summer but year-round. So I like everything about the place, including its politics. And of course, for us it’s associated with summer and vacation and general well-being.
RR: So what about colder climate? And if you put it into a truck food truck, you don’t have a really good insulation. So it’s, how did they work with this extreme condition?		RR: I am currently researching the food industry and its future prediction, and my research has led me to study further about the modernist cuisine book. Unfortunately, most of the time the discussion is about the integration of food science, and the gimmicks that you have mentioned are considered as the future. You also mentioned the notion of the modernist cuisine technique is the opposite of what cooking and eating are all about, can you elaborate more about what is the value of our food culture? and how can we integrate all the knowledge invented by these scientific experiments without losing the quality and core value in our cooking and eating activity?
ZM: So, we haven’t tested it in a frozen environment? Okay, because most of the use cases that we’re working on now are within kitchens, not on the back of a truck outside. And within the kitchen. Humans also need to be able to work there. They’re not outside, you know, in minus 10 degrees.		LS: Some cooks want to feed people, other cooks want to show off. I think “modernist cuisine” is entirely about the latter. As far as I can tell, there is no reason on earth for the El Bulli-inspired restaurants to exist -- they don’t nourish people in any important way -- all they do is give chefs the chance

to use their imaginations and charge vast amounts of money for the results. It is a cuisine entirely about wealth. It wouldn't exist without rich people -- rich people so bored with all the other expensive restaurants they go to that they are seeking more and more exotic thrills. Of course there is a long history of very elaborate, very expensive cuisine created to be served to rich people, so in a way modernist cuisine simply takes its place as a new version of something that goes back to medieval times. But that doesn't mean we have to honor it, celebrate it, or give it any credibility whatever. The tradition of people gathering at the table to eat together is a wonderful one, all food-lovers treasure that tradition, and it has nothing to do with what happens at a modernist-cuisine table. Each elaborately fabricated course arrives, is described, is admired, is eaten according to the instructions, and then you wait to be astonished by the next. Maybe it's theater, but it's not about eating together. For people who are eating together, the food is a pleasure but it's pleasure awakened by each other -- by the sharing, the generosity, the camaraderie, the conversation, by everything that's going on at the table that isn't about food. And if you're not rich, you can still participate in all those pleasures, for the food can be the simplest on earth as long as the company is thriving.

Something else that interests me about the whole fad for modernist cuisine is that back in the late 19th century, women were doing exactly what Ferran Adria decided to do, though they used very different materials. These women invented the domestic science movement in America -- a movement that saw cooking as a branch of science, and believed every home kitchen should be viewed as a laboratory. They wrote textbooks and cookbooks on this theme, and created many many recipes -- all aimed at elevating the science of cooking while ignoring the role of taste or even logic in putting ingredients together. Today's modernist chefs are far more attuned to taste and they're certainly more sophisticated cooks, but like the domestic scientists of the past, they are honoring science above all. One reason domestic science (which became home economics) fell from favor is that it was a women's culinary

movement. One reason modernist cuisine is seen as such a grand and important enterprise is that it is, largely, a male culinary movement. I really hope there is no future for modernist cuisine, either in restaurants or in homes. We don't need it.

RR: It is interesting when you explain the contrast between the two, food as a social catalyst where people are gathering and enjoying their time around the table together; and the others use food as the main attraction, to enjoy dining individually. And I agree we should preserve, encourage and nurture the former type to be integrated more into the future of our food culture. However, it is sad when I observe the fast-food industry nowadays which promote to eat a quick meal and go on with your life, we don't really interact anymore in these restaurants, that is why also the Automat concept is attractive to me because from the achieved that I found it shows much social interaction happening inside the restaurant. I am also interested in these 19th-century domestic science movements in America, the aim to elevate and invented new flavors are indeed what modernist cuisine is all about. Can you share some instances or names of these women which initiated these movements?

LS: My first book, "Perfection Salad: Women and Cooking at the Turn of the Century," was about the rise of the domestic science movement in America. I'm sure you can get a copy from one of the used-book websites (I always use abebooks.com, and there's also alibris.com). The latest edition is from University of California Press. The problem with comparing domestic science and modernist cuisine -- and I fully recognize this -- is that the domestic scientists had no interest in the pleasures of flavor and texture. They were focused strictly on nutrition, and on teaching women to cook according to rules and printed recipes. So a great deal of the food was very plain. However, there was another side to the movement, one that encouraged women to do all sorts of decorative and fanciful things to food. This was an aspect of domestic science that appealed to upper-middle-class homemakers who liked the idea of using food to show off their affluence -- Veblen's term "con-

spicuous consumption" may be familiar to you. There was always some kind of scientific or faux-scientific rationale for these elaborate, often ridiculous-looking dishes, and that is the point of comparison I see most clearly with modernist cuisine.

RR: Thank you for the book reference, I'll make sure to read it and get back to you if there is any further question.

Thank you very much for the great references and insights related to our food history, Our discussion really help me to develop a better understanding of my research.

I hope you have a nice day.

Kind regards,
Ryan

Interview with Ilya Pisarsky

Ilya Pisarsky

Owner of IceYou, an online food delivery, located in Moscow, Russia. He utilizes acoustic freezing technology to preserve the meals. The conversation happened through question and answer over several email exchanges.

Ryan Ridge:

Hi ilya,

My name is Ryan, I am Masha's friend from the Berlage. I have several question about you vacuum-bag meal which Masha shared.

First, How IceYou work? Can you elaborate a bit about the business model? Is it a restaurant? Do you also serve the circle shape food inside the restaurant? Second, I am really interest in the packaging, why do you make it into circle shape? Is it because the packaging machine or is it because there is another concept for the shape? Third, what the benefit of using vacuum bag in the process? and how the customer reheat the food later? is there any specific instruction on it?

Ilya Pisarsky: Well, it is not a restaurant but an online delivery service based on a web-site and accounts in social network (Instagram). We use/rent kitchen of one of the Moscow restaurants and cook the food there. Then we freeze it there by using a special new Russian freezing technology that is called acoustic freezing. You find out a lot about it on this website - <https://ru.aefrus.com/general/general>, there is an English version that describes all the advantages and details of the technology. After freezing (2-3 hours) we put it in a refrigerator where the dishes can be stored for up to 18 months. So then the dishes just wait for the customers to make the order using the website. When the order comes to us (for example - 3 soups, 2 steaks and 1 fish fillet), we take these dishe from the refrigerator, give it to the delivery guy and he brings it to the client. The payment is made online through the website or in cash to the delivery guy.

The shape is our authentic idea. Previously we wanted to make rectangles (look at the first photo) and then

thought that we all eat from the round plates - so why not to make the same shapes for the dishes? The shape is more familiar to a customer and fits properly in a plate of any depth (look at the second photo).

The vacuum packages are the best solution from these points of view:

- the client can see dish as it is + can see the logo ("we eat with our eyes, not with our stomach")
- it is light and does not take much space in the bag of a delivery guy
- it can be left as it is without removing during the process of defrosting (below I describe three ways to defrost a dish)

So, here are three ways to defrost:

- in a microwave (I don't know how it is in other countries, but in Russia many people are afraid of microwaves because they think it is dangerous) - 5-7 minutes
- in a pan or frying pan - 4-5 minutes
- in the boiling water (as I mentioned, without removing the package) - 7-8 minutes

Anyway, we are only at the very beginning. The menu includes 21 dishes only, but if it all works, we will expand it. Now we are making the website that should be ready by the end of the month. When it is done, I will send you the link.

RR: Thank you for sharing the beautiful food photographs.

I have some follow up questions about the acoustic freezer and a bit of the process of making the meals. First, for the preparation of the food to be able to be compressed into circle/rectangle shape, does the ingredients need to be cut into specific size or do you have specific food criteria for it? and in the making process, do you involve some specific technology/machine to cook the meals? Second, for the acoustic freezing technique, all cooked food need to be put inside the freezer for 3 hours? how many meals can be frozen in one batch of freezing?

IP: We have a professional cooking team (chef + 2 assistants) that are making all the meals. Well, you can

On Food Industry

put a lot of different meals into a circle shape - from porridges to all kind of soups, pastas, risottos or anything else. Maybe except steaks or salads - that is why we are not making them. The only criteria is that a meal has to have liquid so it can form a logo during the freezing process.

Yes, around 70 meals (10 shelves with 7 meals on each one). For soups it can be 2 hours. The more liquid is inside the meals, the faster is it freezed.

RR: Thank you for your answers and insights.

Have a nice weekend!

Best,
Ryan

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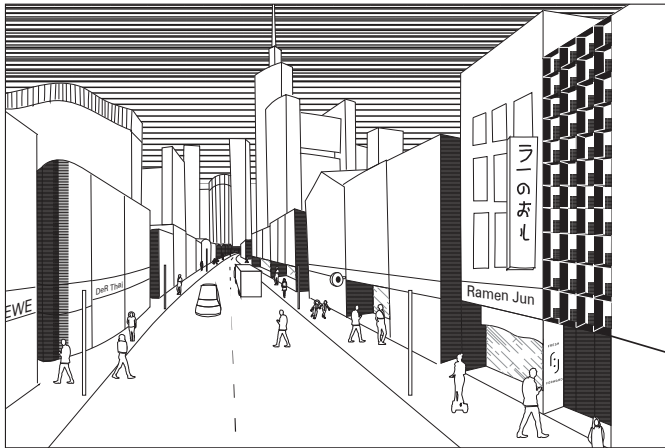
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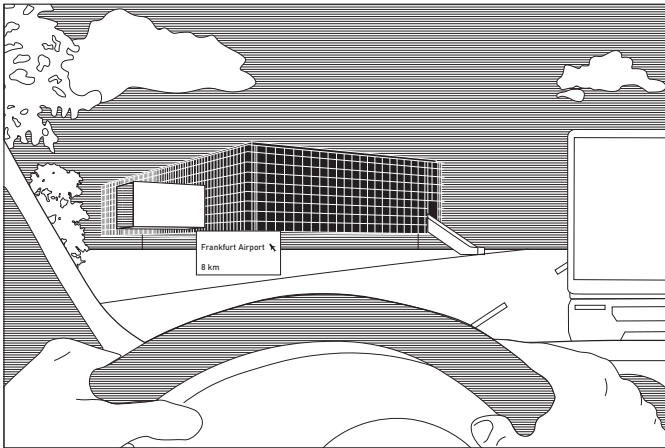
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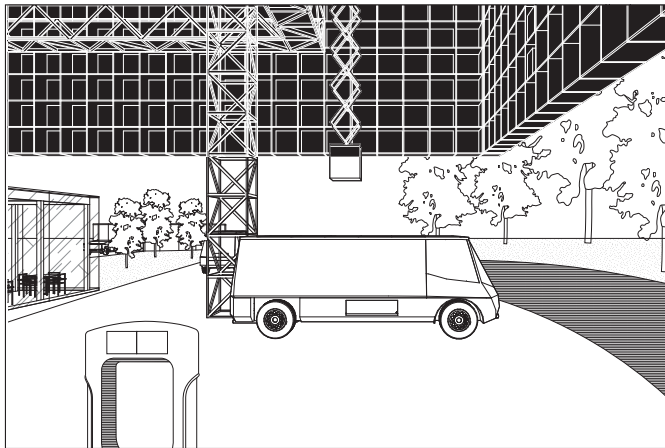
	Description
	<p>Fresh Forward is the design of an automat, a restaurant that aims to provide a new automated dining experience to the food industry. The automat is located in Germany—home to the world’s first automat—on a hectare of land in the Hundewiese of Frankfurt, which has the proximity to the Main and Rhine Rivers, gives the automat restaurant access to the larger region of the Blue Banana territory. Fresh Forward demonstrates fully automated dining facilities from the production to the restaurant space. Ingredients will arrive at the back end of the production space, go through a series of preparations and finally serve to the guest in the restaurant through an automat locker.</p> <p>Inside its production facility, Fresh Forward collaborates with chefs and culinary artists to innovate on new recipes - through the adaptation of the modernist cooking techniques - to serve freshly made, sustainable, and tasty meals that highlight the uniqueness of each raw ingredient’s flavors. With the help of automation technology, the cooking process of the newly created dishes will be replicated by the automated kitchen. Therefore, chefs can focus on experimenting and perfecting their dishes. Moreover, the kitchen focuses on using cultured meat and plant-based ingredients, which are suitable to have homogenous quality and size, that enable the design of a fully automated kitchen and a more sustainable food production process.</p> <p>Through this contribution, the division between human and machine landscape will be blurred inside the territory of the automat. The adaptation of automation technology has made the food production space relieve itself from the restriction of human scales and dimensions, therefore the conventional relationship between kitchen and dining space can be reconstructed and generate a new kind of aesthetic relationship between human and machine territory. The production kitchen works relentlessly to cook food without human intervention to ensure cleanliness, sanitation, and good hygienic practice in the food preparation process. At the same time, diners could enjoy their meals while spectating the raw ingredients dance before their very eyes in the automated kitchen in their overhead space, and then miraculously arrive in front of them.</p> <p>While the automat restaurant in</p>
	<p>Hundewiese acts as a prototype of extensive automation capabilities in the food industry, pre-cook ingredients and seasonings will be distributed to a network of supermarkets or automat points, a smaller counterpart of automat which has a specialized menu, to extend the reach of its service replacing the fast food industry with high-quality and freshly made food.</p>



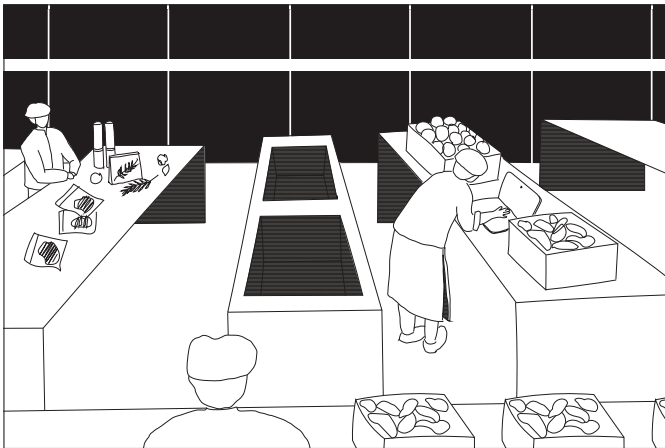
During chaotic lunch-hour in the Kaiserstrasse, in the central financial district of Frankfurt. Fresh Forward, an automat restaurant, aims to provide a new dining experience to the Frankfurters. Through automation technology and modernist cooking techniques, the automat can provide freshly made, high-quality cuisine that fits the busy lunch hour of Frankfurt's executives.



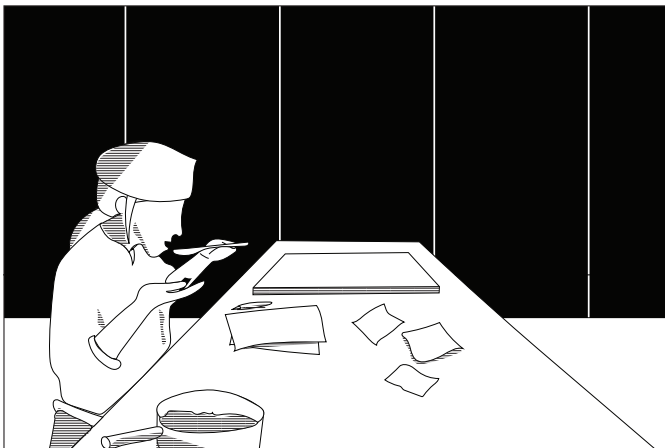
Just 3 km outside the center, Fresh Forward opens its door to invite visitors to dine in and see its production process. The complex demonstrates fully automated dining facilities from the production to the restaurant space. Ingredients will arrive at the back end of the production space, go through a series of preparation finally serve to the guest in the restaurant through an automat locker.



Utilizing artificial intelligence and machine learning technology, raw ingredients will automatically ordered from local suppliers in Frankfurt and delivered by a driverless e-truck. The magnetic robot claw will bring all the pallets through the e-truck roof and store it into the storage area surrounding the building facade.



Inside the sorting and storage facility, a team of chefs will inspect the new supply of raw ingredients' quality and size. The Chef engineer will make sure every ingredient is up to Fresh Forward standard of hygiene and quality.



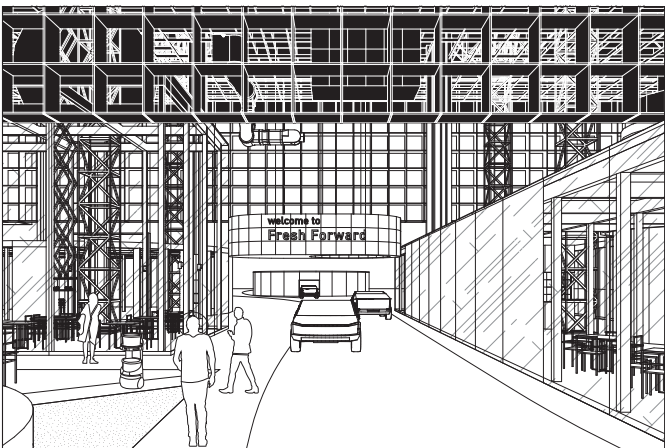
Every menu is created by culinary artists at Fresh Forward's trial kitchen facility. They employ the modernist cooking technique to find a new way and flavors to enjoy food. With the help of automation technology, the cooking process of the newly created dishes will be replicated by the automated cooking station. Therefore, chefs can focus on creating and perfecting their dishes.



The raw ingredients will be cooked and stored in the sous vide technique until perfect. Basic ingredients will be stored in a 15x15 cm silicon vacuum-sealed bag and cooked to the perfect doneness before being stored in the freezer. This method will also provide a longer shelf-life for the ingredients.



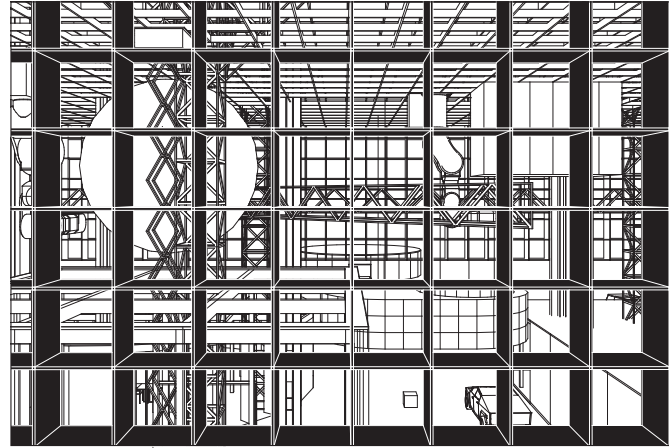
All ingredients in Fresh Forward are mainly cultured meat and plant-based ingredients to have similar size and quality. The ingredients packaged inside a vacuum-sealed bag with seasoning and garnish. These bags will be pre-cooked in sous vide technique at a specific temperature. After the boil time is up, the bag would be put into an ice bath and stored in the freezer.



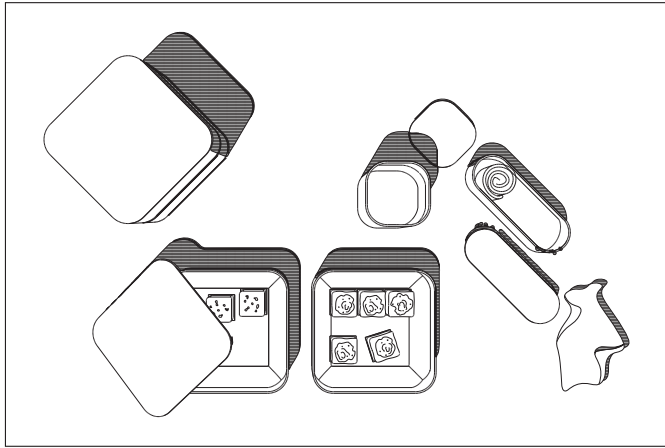
At the entrance, customers can have a glimpse of the raw ingredients being pre-processed and pre-cooked in sous vide at different boiling temperatures depends on the food types. Surrounding the cooking machine, can be seen a wall of glass cabinet filled with vacuum ingredients that is ready to be cooked and served to the diners.



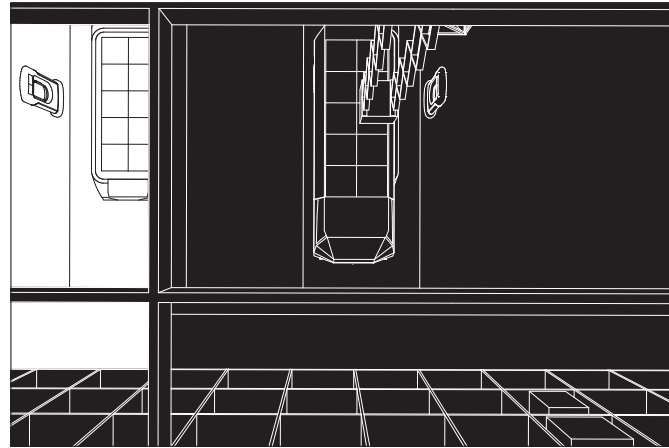
The automated kitchen area can be seen from the dining hall. The cooking tools are composed to efficiently cook several ingredients at the same time, the machines can infuse extracted broth or juice from ingredients to intensify the taste and flavors. Visitors can spectate their food being cooked and transported to the shelves above the automat locker.



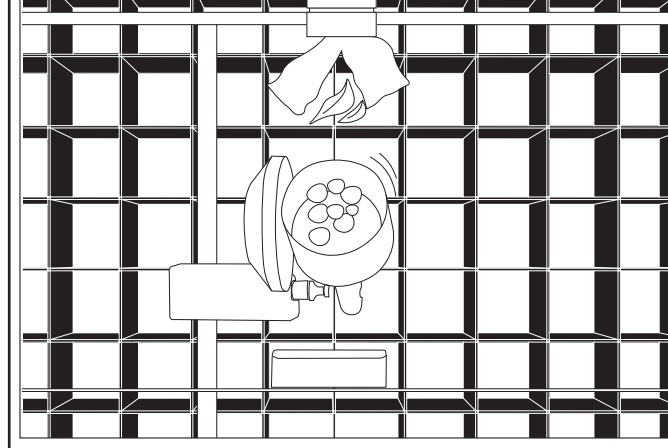
The kitchen space shows the uniformity and repetition that is required by automated machines as aesthetic elements. The kitchen will exhibit the process of ingredients flowing from one part to another in rhythm, creating an eye-pleasing motion, which attracts the customer to observe this process.



Food will be served in a sleek design food tray. Visitors can enjoy their food in the indoor or outdoor dining hall around the restaurant complex. The packaging design provides a simple and convenient design for diners to easily consume their meal without any utensils.



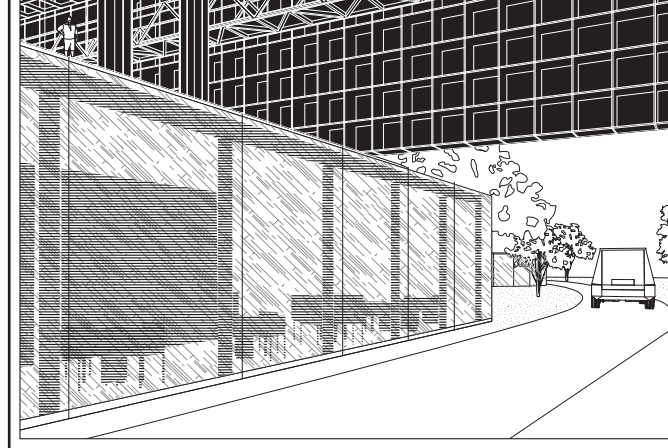
To reduce food waste, pre-cooked ingredients that have a short expiration date left will be cooked, froze through the flash-freezing process, and packed into ready-to-heat frozen foods. Frozen foods and pre-cook ingredients are distributed to local supermarkets, such as REWE in Germany or Albèrt in the Netherlands, to strategically expand Fresh Forward's service territory.



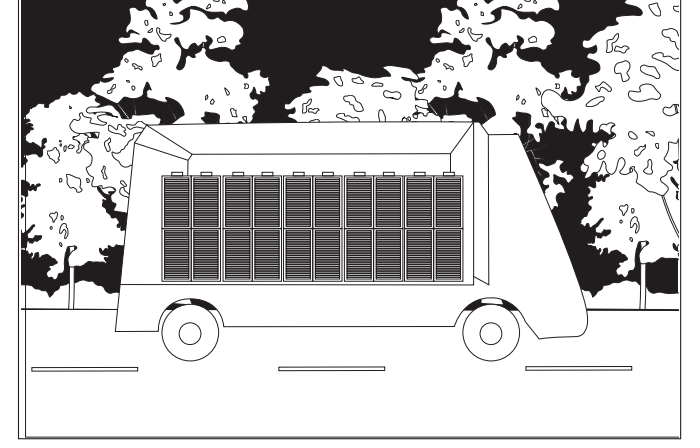
When orders are being made, inside the cooking machine, the sous-vide vacuum bag will be ripped, and food ingredients will be cooked with seasonings.



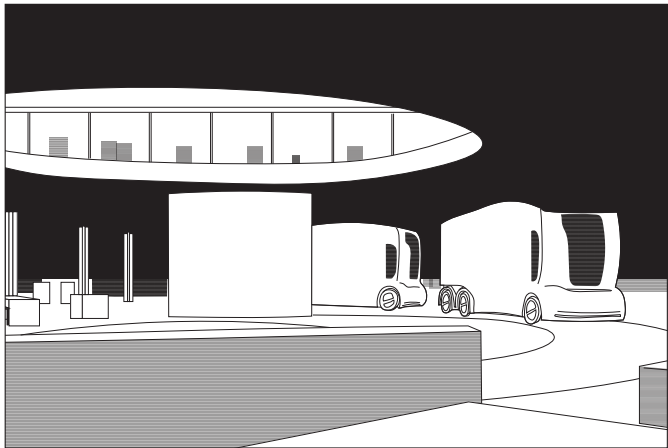
Meals will be delivered through pick-up points which are scattered in the Fresh Forward dining hall. Vertical relationship between automated kitchen and dining space gives flexibility for spatial organisation of the sales floor that enhance the visitor dining experience.



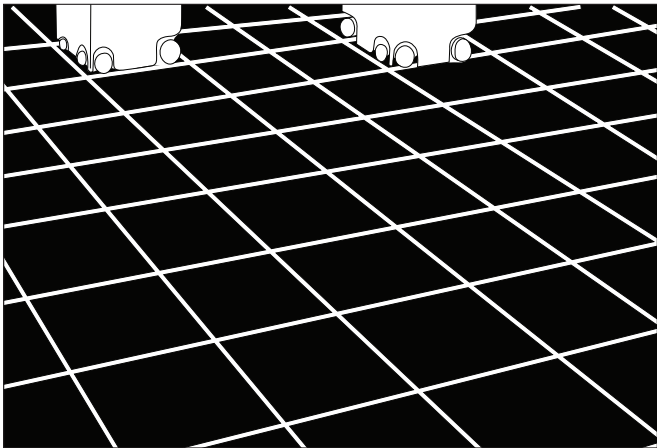
Ready-to-heat frozen foods and pre-cooked vacuum bags will be sold in the frozen shelves inside the Fresh Forward complex. The shelves will be the prototype of how Fresh Forward's products can fit inside a supermarket.



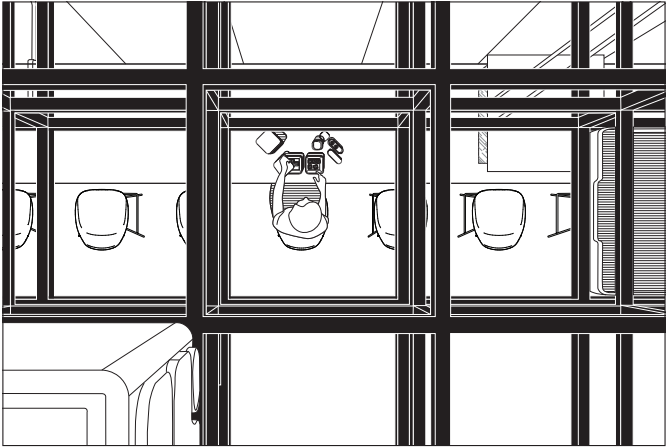
Fresh Forward goods are easily loaded and transported to partners stored due to their modularity and ready-to-attach system. One pallet of 80x80x180 cm can contain 360 frozen food packages or 1440 vacuum-sealed ingredients. All the packaging is ready to mount to the automat locker to re-supply food ingredients and frozen foods in partner stores.



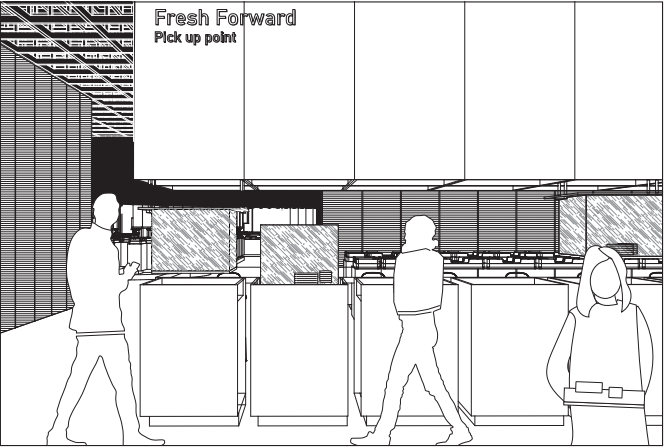
Eventually, Fresh Forward’s pre-cooked ingredients and frozen foods will arrive at the Albèrt in Martinus Nijhoflaan. Packaging from Fresh Forward fits with the dimension of crates inside of the ocado grid system of Albèrt, therefore it is optimizing the loading process and storage space.



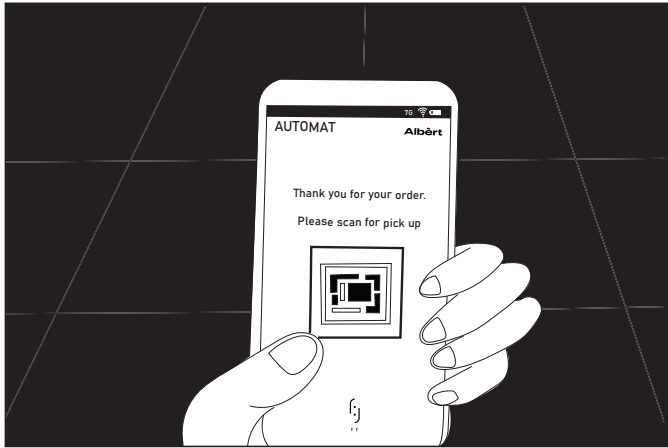
All the frozen food packages and pre-cooked vacuum bags will be stored on cold shelves inside the ocado grid storage system.



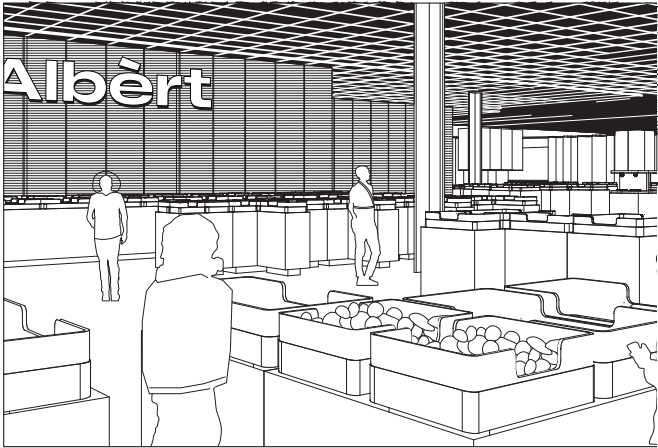
When the products arrive at the Albèrt, all Fresh Forward’s packages can be directly mounted into the mini automated kitchen inside Albèrt. When the food is cooked and ready to serve, the Ocado bot will serve the food directly to the consumer table.



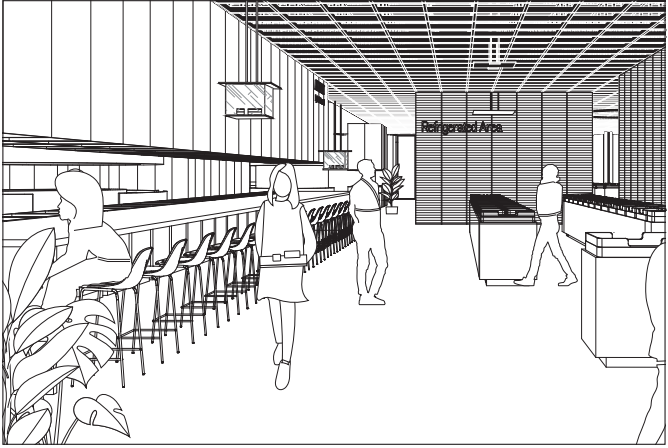
Inside the automat, the process of ingredients and frozen foods loaded into the lockers is visible to the visitor through the ocado grid system. Cooking stations display the abilities of the machine to imitate master-chefs to cooks and preparing the pre-cook ingredients into mouth-watering artisanal cuisine.



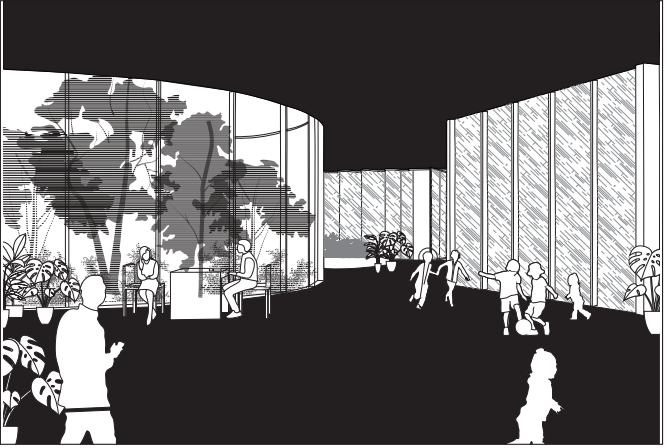
From the Albèrt online application, customers in the Netherlands can access Fresh Forward’s ordering apps to place and pick up their orders. They have the option to pick up at the Albèrt store or get their food delivered via Albèrt’s instant delivery service. The customer will receive a QR-code to pick up their orders from the automat pick up point.



The customer of Albèrt can order their food while do their grocery shopping. Fresh Forward is presented in the Albèrt store to complement the visitor experience in the supermarket. Visitors can enjoy affordable, high-quality artisanal cuisine made by celebrated chefs in their local supermarket.



There are three options of Fresh Forward’s goods available in Albèrt Martinus Nijhoflaan store, hot meals, frozen foods, and vacuum-sealed ingredients. Customers can directly take out goods from the refrigerated area, while they need to wait 3-5 minutes for hot meals to be prepared.



Finally, the customers can enjoy their meal in their preferred environment settings around Albèrt civic space. Enjoying Frankfurt high quality cuisine while enjoying the beauty of permaculture garden is now available in Albèrt.

FRESH



FORWARD

The Fresh Forward's way

Menu of the day - the most sustainable way to enjoy Fresh Forward dishes

30.00

Act 1 - Exposition - 2 min prep

Leberwurst Cappucino - 189 cal

Cultured liver serve with bacon powder, milk-nutmeg foam on lingonberry plate

or

Sweetbreads velouté - 240 cal

Beans and mushroom tapenade with lemon foam on truffle juice plate

Act 2 - Turning Point - 5 min prep

Bavarian herb roulade - 380 cal

Crispy bacon cells with herb and potato cream on cabbage stock plate

or

Tartare - 340 cal

Tartare with egg cream and silver onions on pickled cucumber plate

Act 3 - Climax - 10 min prep

Next level Saurbraten - 530 cal

In-vitro steak with onion brioche, cherries and potatoes foam on sauerbraten sauce plate

or

Konigsberger Karlsbries - 624 cal

Roasted sweetbreads with bake apple and carrot foam on caper sauce plate

Epilogue - 10 min prep

Frankfurter Kranz - 190 cal

Biscuit with almond brittle, raspberry cream and sorbet

or

Passion chocolate - 234 cal

Hot passion fruit marshmallow with chocolate pearls on fresh coconut milk plate

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FORWARD

The Cuts

First act - Exposition - 2 min prep

Leberwurst Cappucino - 189 cal

Cultured liver serve with bacon powder, milk-nutmeg foam on lingonberry plate

5.00

Sweetbreads Velouté - 240 cal

Beans and mushroom tapenade with lemon foam on truffle juice plate

5.00

Retroprogressives tomatensüppchen - 160 cal

Tomato soup with crème fraiche foam

5.00

Second act - Turning Point - 5 min prep

Bavarian Herb Roulade - 380 cal

Crispy bacon cells with herb and potato cream on cabbage stock plate

9.00

Lobster curry - 298 cal

Lobster with sweet granadilla foam on cardamom paste plate

9.00

Tartare - 340 cal

Tartare with egg cream and silver onions on pickled cucumber plate

9.00

Leipziger Allerlei - 274 cal

Crayfish tail with pea on morel and asparagus soup plate

9.00

Schinkennudeln Deluxe 491

Udon noodle with dehydrated black forest ham chips and truffle foam on cream plate

9.00

Blutwurst Gyoza - 380 cal

Crispy gyoza with black pudding, sauerkraut and truffle mustard

9.00

Third act - Climax - 10 min prep

Next level Saurbraten - 530 cal

In-vitro steak with onion brioche, cherries and potatoes foam on sauerbraten sauce plate

12.00

Monkfish noisette - 465 cal

Baby monkfish with lemon egg yolk foam on pine nut oil and beurre noisette plate

12.00

Konigsberger Karlsbries - 624 cal

Roasted sweetbreads with bake apple and carrot foam on caper sauce plate

12.00

Falscher Hase - 570 cal

Lab-grown meatloaf with egg and milk foam on mushroom cream plate

12.00

Hühnerfrikassee - 600 cal

Pfaffenschnittchen with rice powder and carrot cream on pea and shallot plate

12.00

Epilogue - 10 min prep

Frankfurter Kranz - 190 cal

Biscuit with almond brittle, raspberry cream and sorbet

7.00

Passion chocolate - 234 cal

Hot passion fruit marshmallow with chocolate pearls on fresh coconut milk plate

7.00

Götterspeise - 290 cal

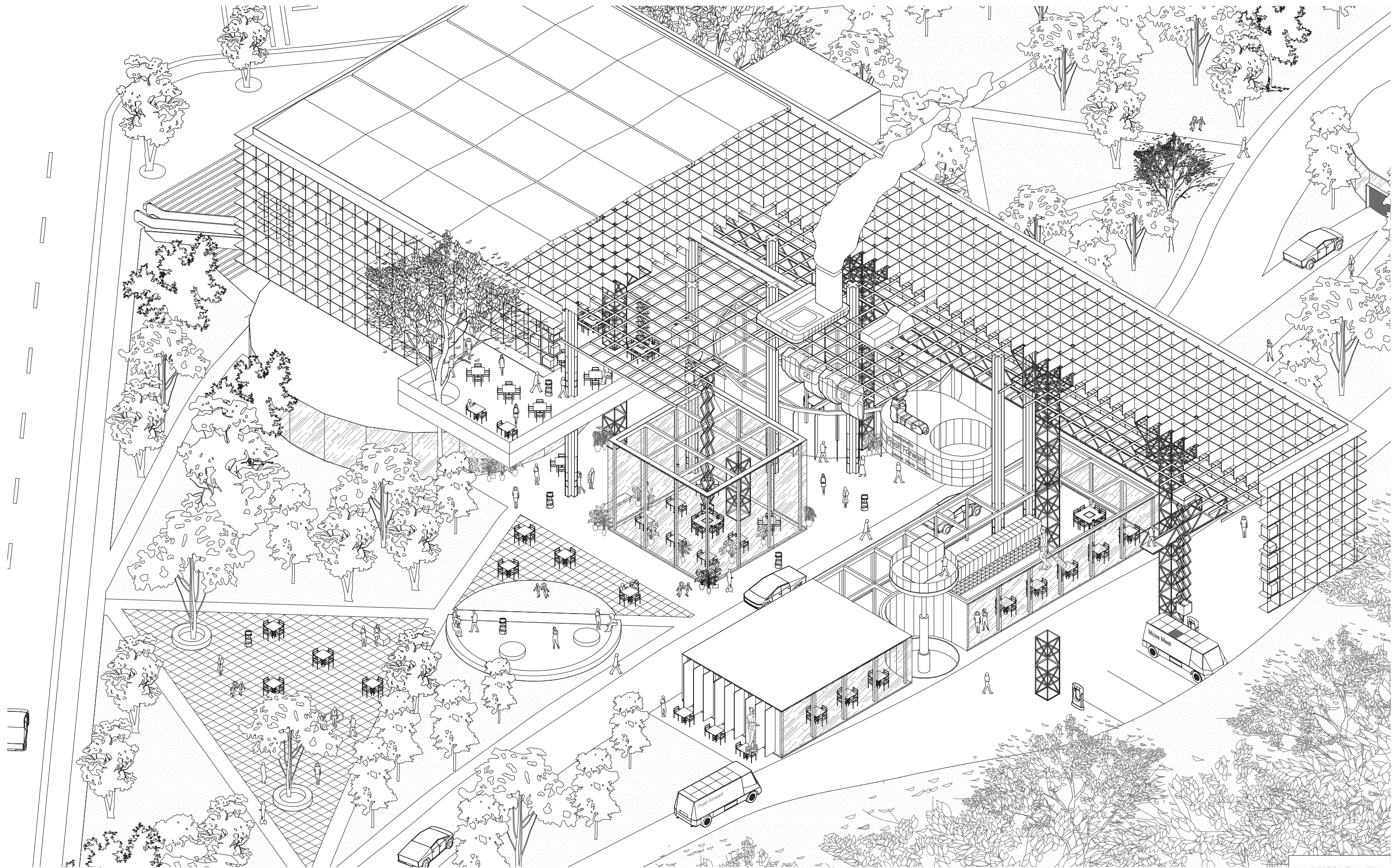
Woodruff jello with caramel crumble and ice cream

7.00

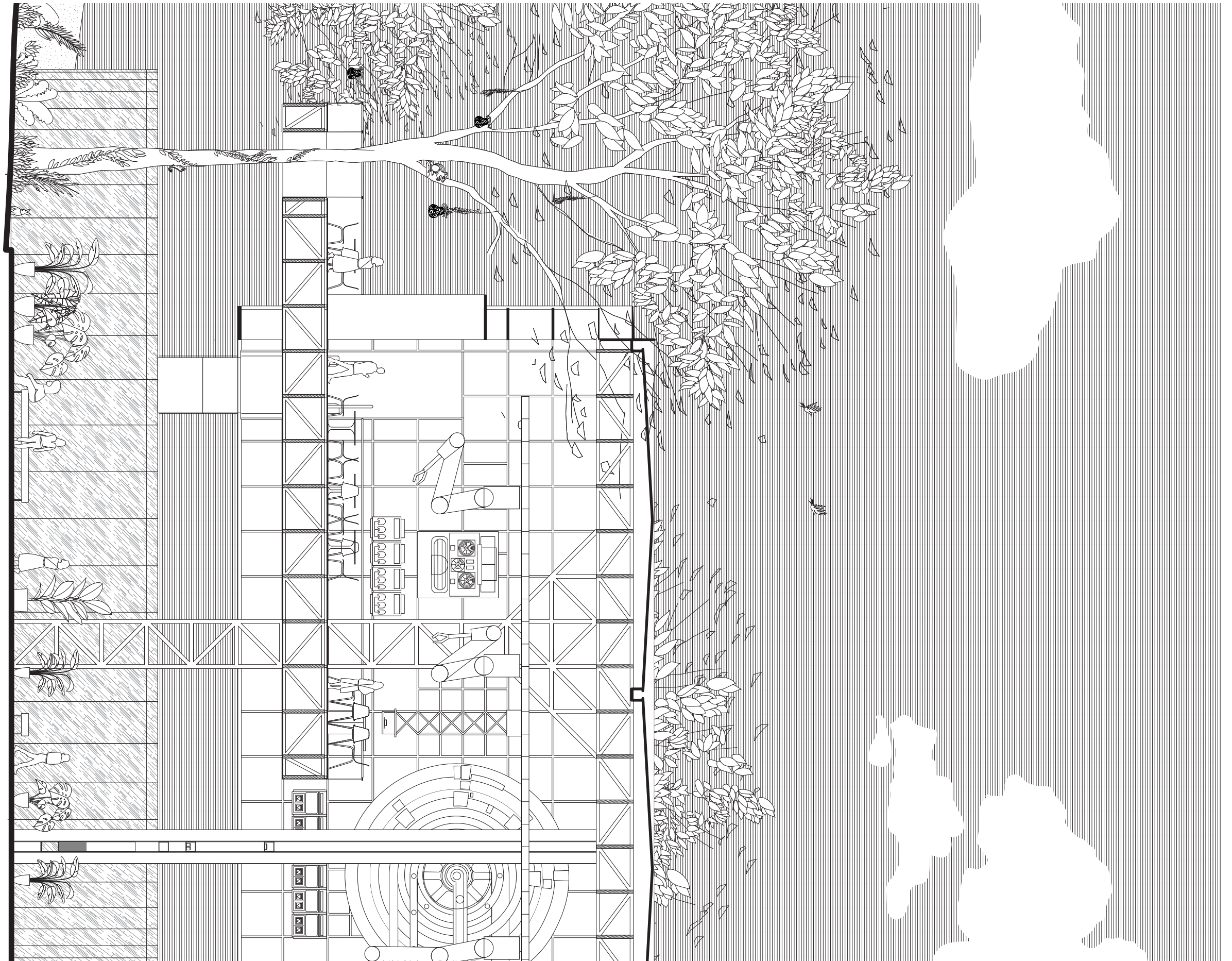
@Freshforward | +49 5650 4006

Fresh Forward meal's menu 2030 display a new approach to food consumption as an experiential sequence. Automation made precise

calculation of preparation timing and food nutrition available in the food industry.

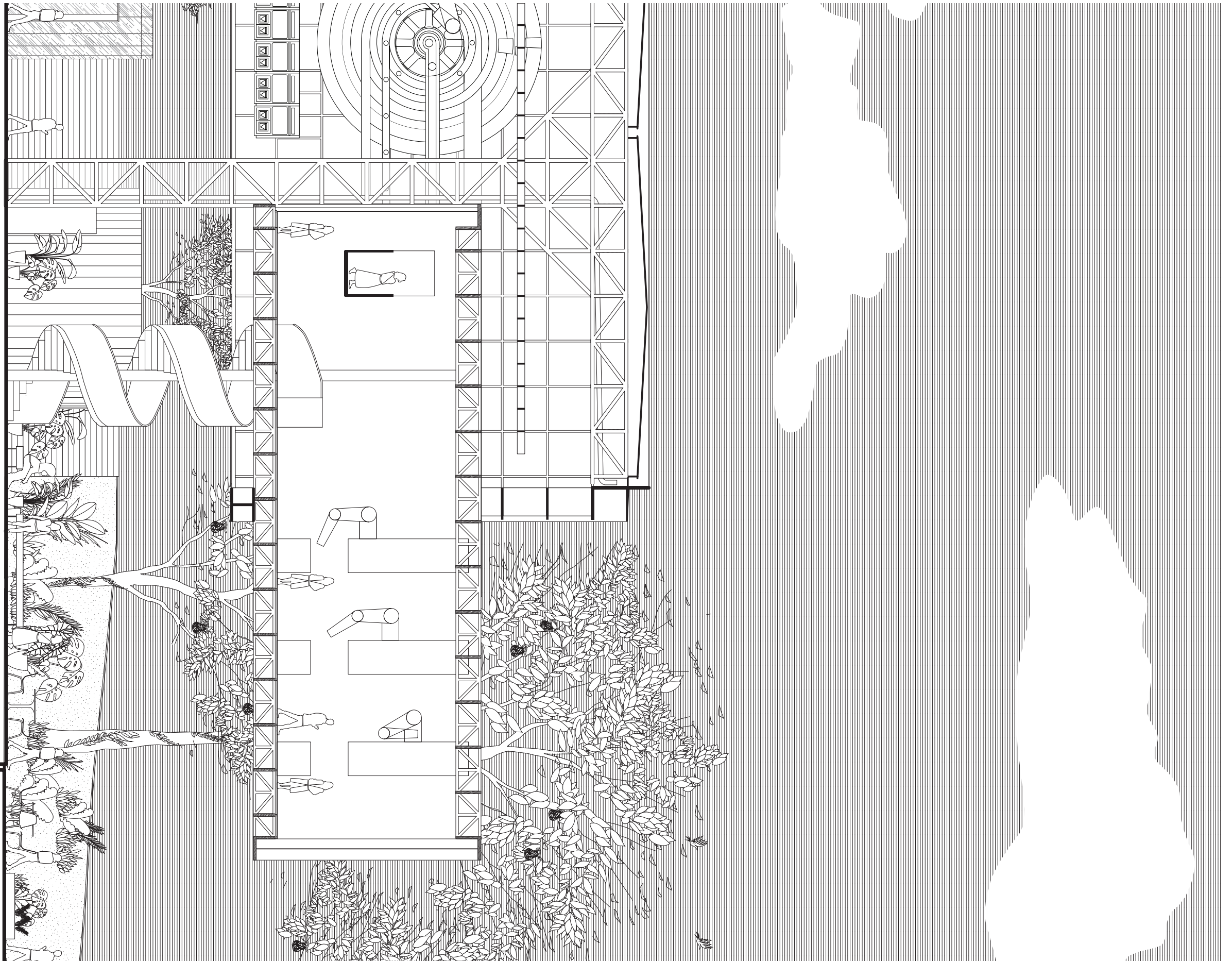


Welcome to Fresh Forward, an experience where humans, machines, and nature meet together.



This contribution provides an aesthetic experience—from the uniformity and repetition provided from the automated machine to the contrasting organic

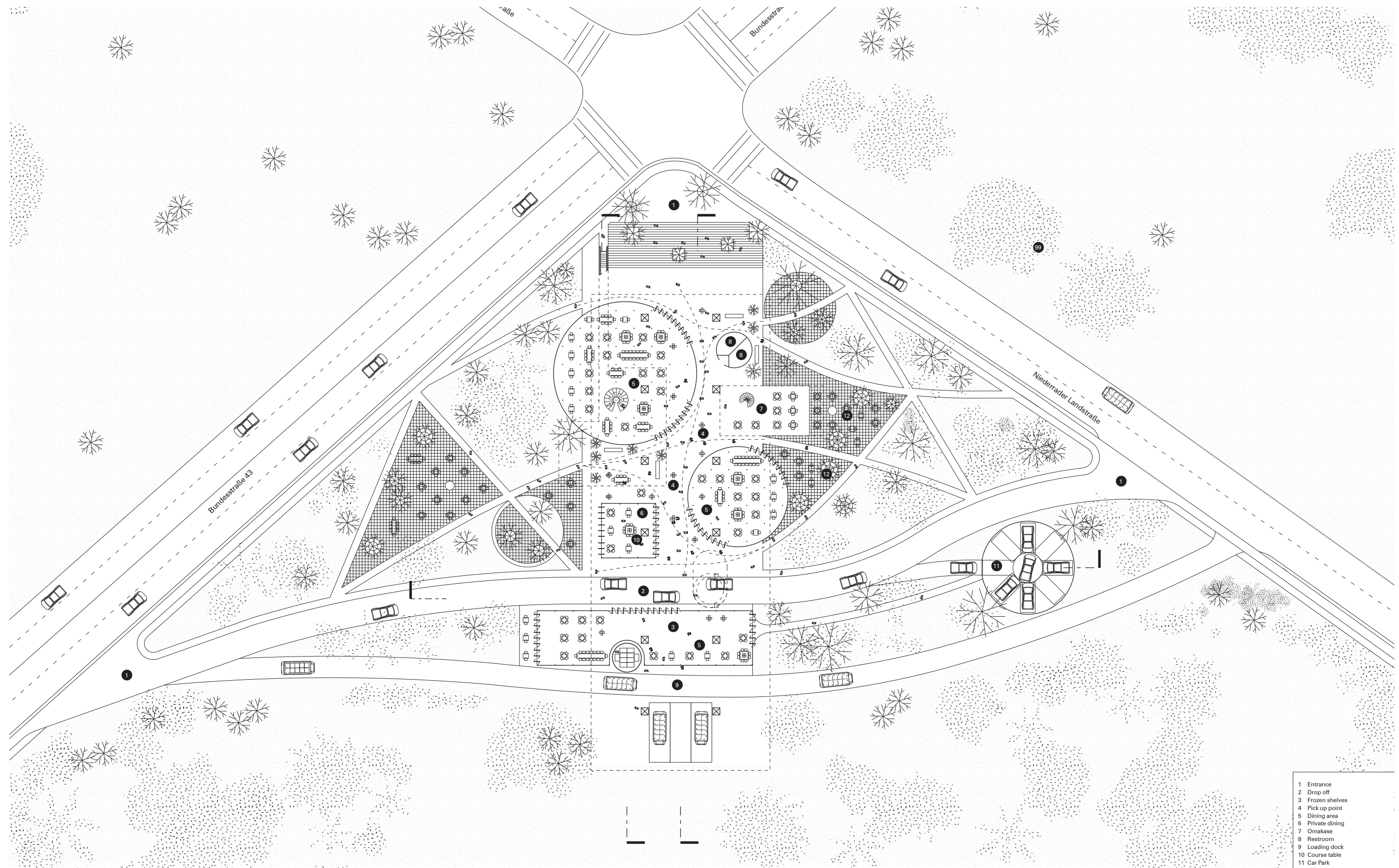
beauty of nature—where the customers can enjoy their meal in their preferred environment settings.



Inside the trial kitchen, culinary artists can focus on the innovative task of creating perfect dishes; while the automated kitchen works relentlessly to

prepare and cook food for the diners.

- 1 Maintenance point
- 2 Toilets
- 3 Automated Ocado grid
- 4 Vertical core
- 5 Offices
- 6 Perimeter for humans
- 7 Refrigerated area



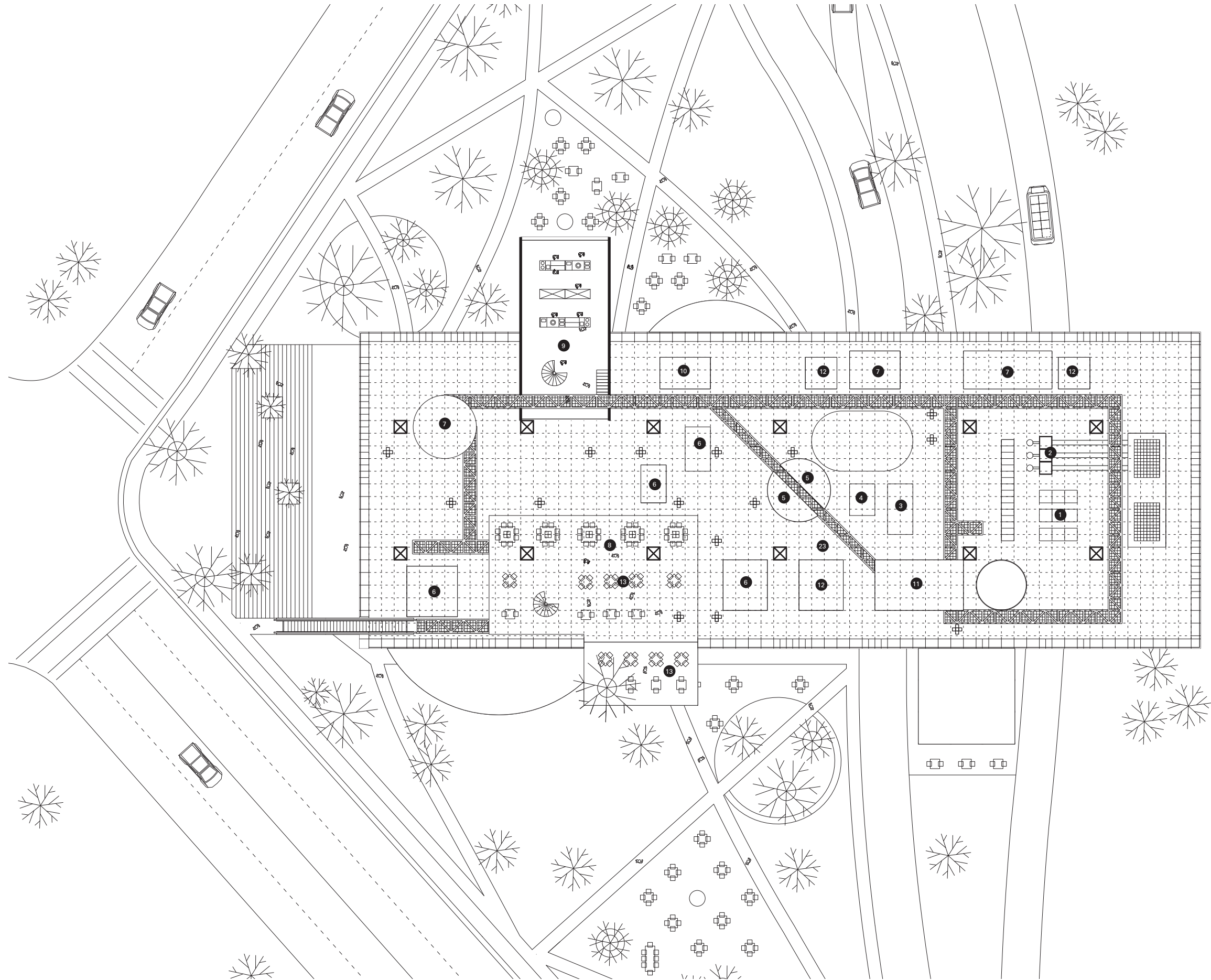
Situated just outside Frankfurt's city center, this contribution reconstructs the conventional restaurant layout, placing the automated kitchen in the

upper level to give freedom in spatial organization of the ground floor.

1 Entrance
2 Drop off
3 Frozen shelves
4 Pick up point

5 Dining area
6 Private dining
7 Omakase
8 Restroom

9 Loading dock
10 Course table
11 Car Park
12 Outdoor dining



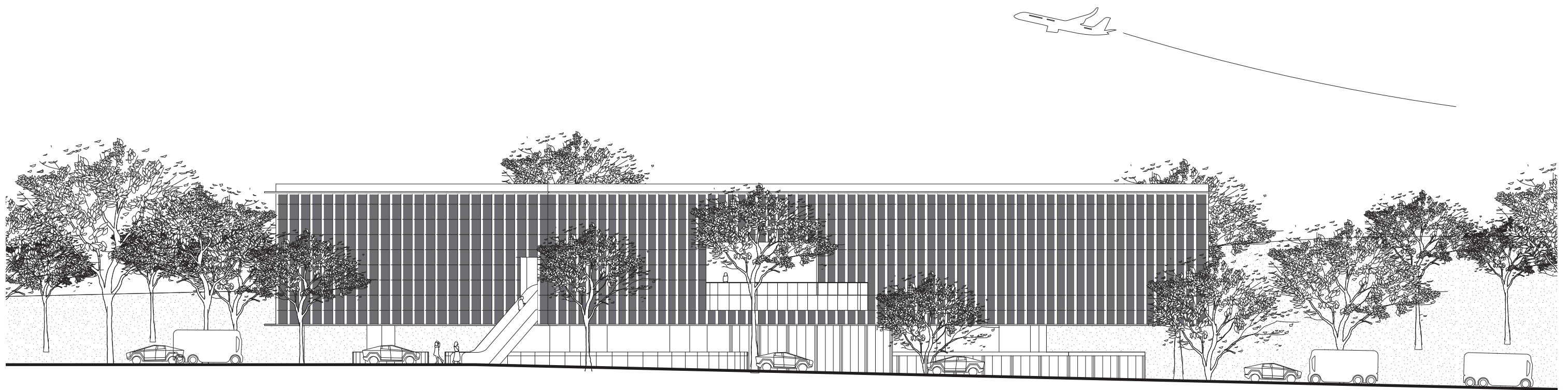
The automated kitchen floor follows strict orthogonal organization, which is dictated by size of raw ingredients and cooking machines.

- 1 Preparation area
- 2 Vacuum chamber
- 3 Hot water bath
- 4 Ice bath

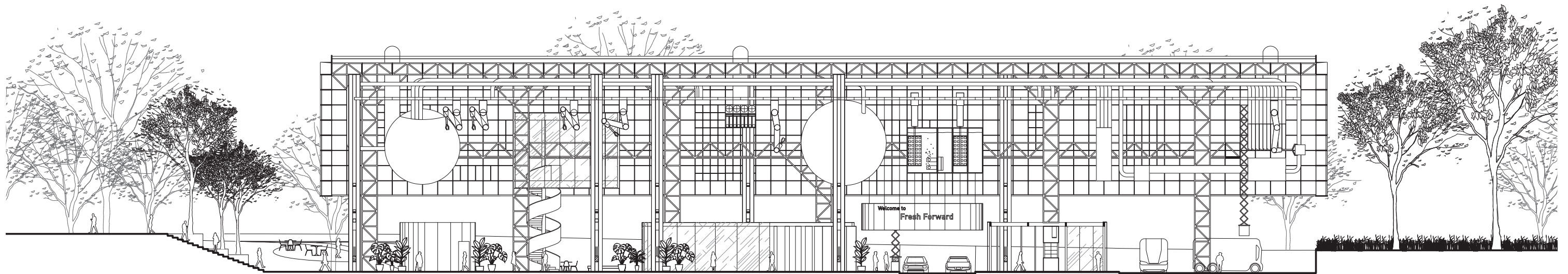
- 5 Homogenizer & flavor extraction
- 6 Cooking station
- 7 Serving station
- 8 Chef's table

- 9 Trial kitchen
- 10 Staff area
- 11 Quality control
- 12 Container station

- 13 Dining area

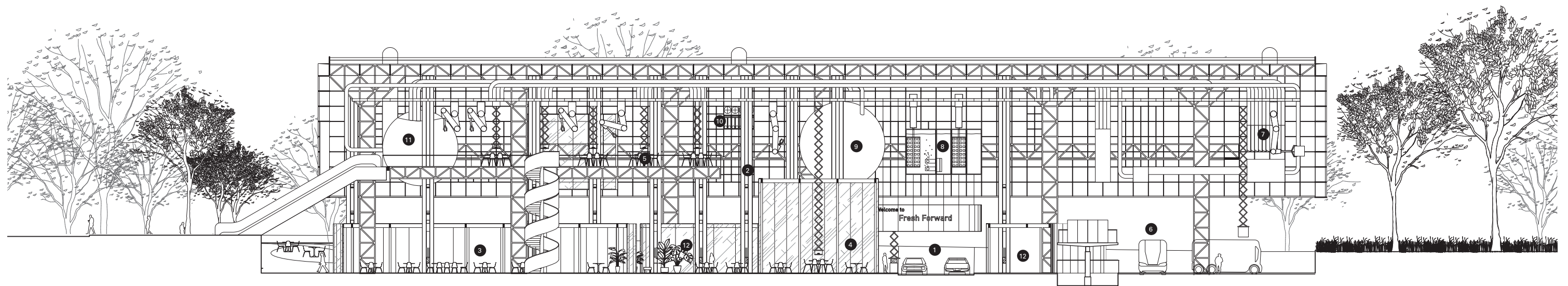


A street elevation from Bundesstrasse 43, depicting the facade as both a banner and welcome signage for visitors.



The section depicts the vertical relationship between the automated kitchen space and the dining space. It accentuates how diners can choose

how and where they can enjoy their food.



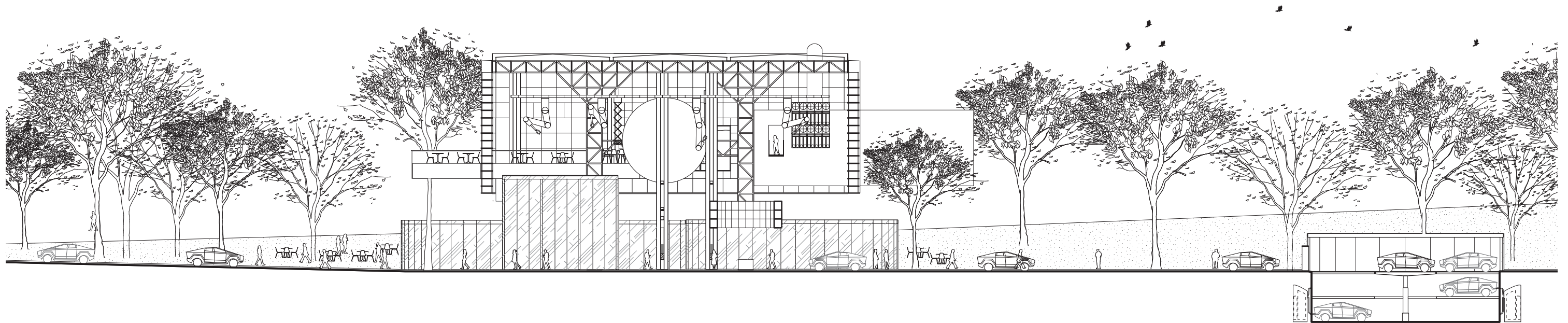
Diners can experience their meals being automatically prepared, processed, and cooked. The design of the building's section allows for the

visualization of the automated kitchen's linear process, along with how food is being delivered through automat locker in the restaurant space.

1 Drop off
2 Automat pickup point
3 Dining area
4 Private dining

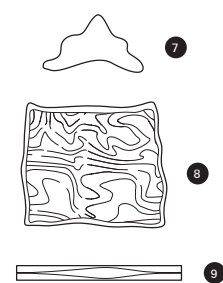
5 Chef's table
6 Loading dock
7 Preparation area
8 Sous vide station

9 Homogenizer & extraction
10 Cooking station
11 Serving station
12 Frozen kiosk

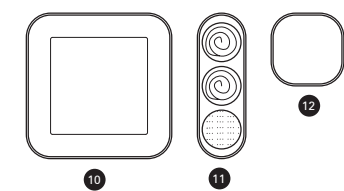


The open plan enables multiple modes of transportation to arrive in the center of the restaurant space.

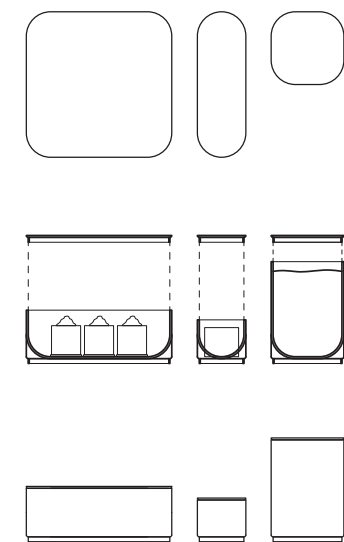
The Food



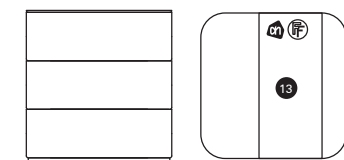
The Serving



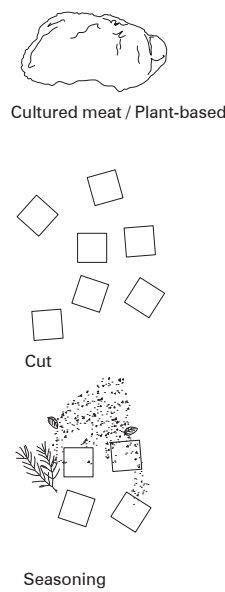
The Packaging



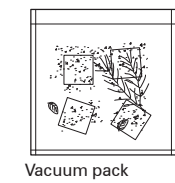
The Frozen Package



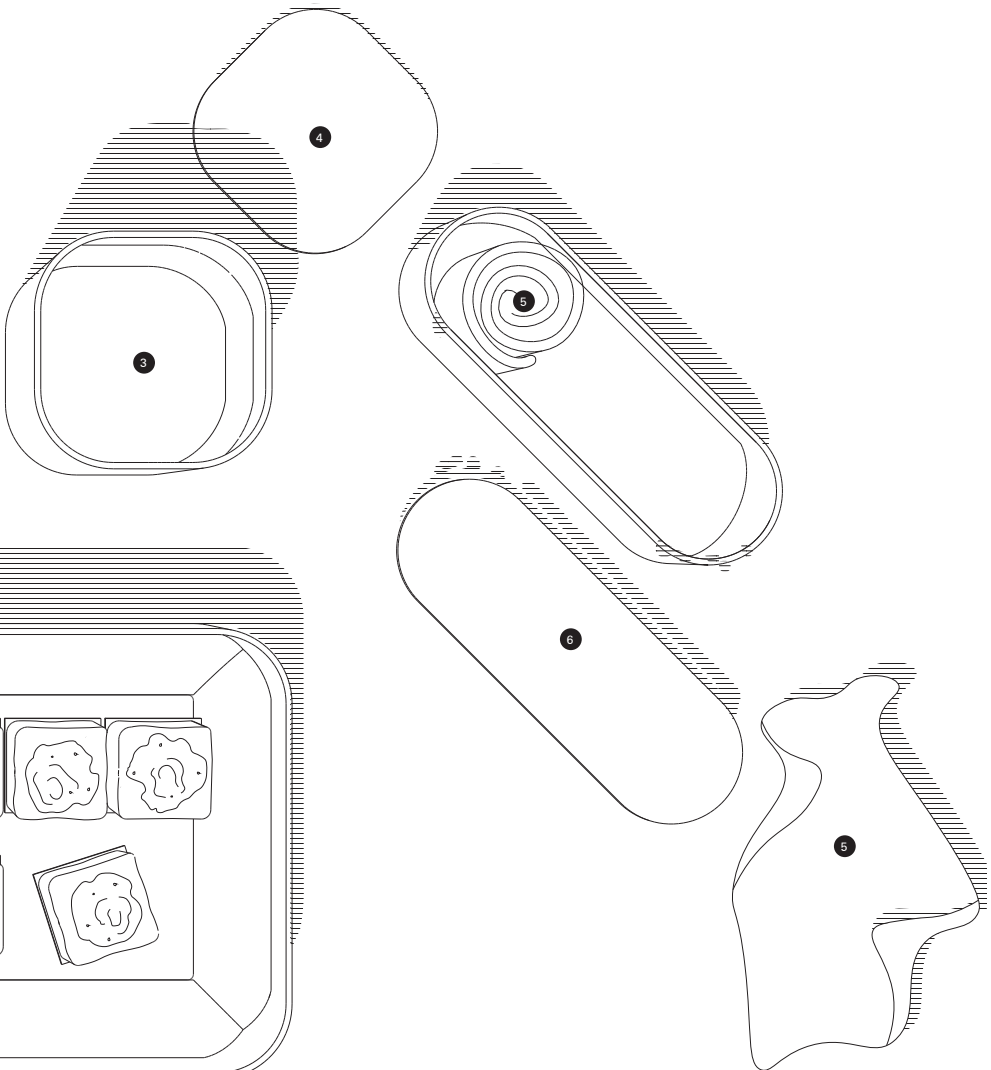
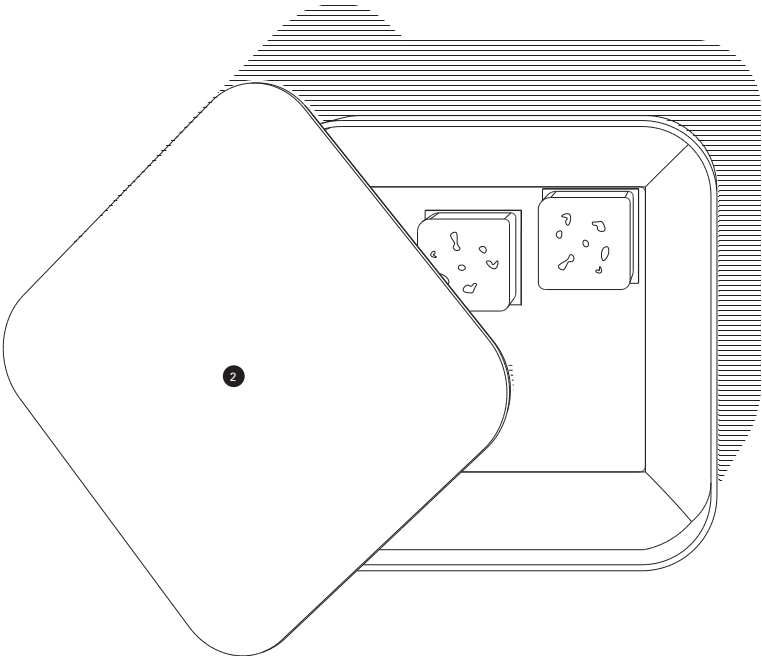
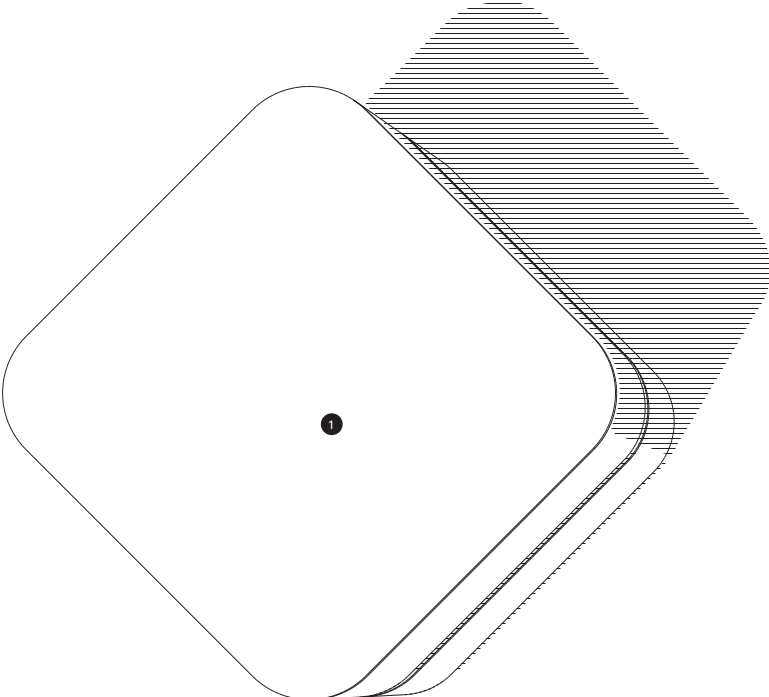
The Ingredients



Seasoning



Vacuum pack



This contribution provides a new dining experience for customers all over Blue Banana to enjoy artisanal freshly-made cuisine. Moreover, the

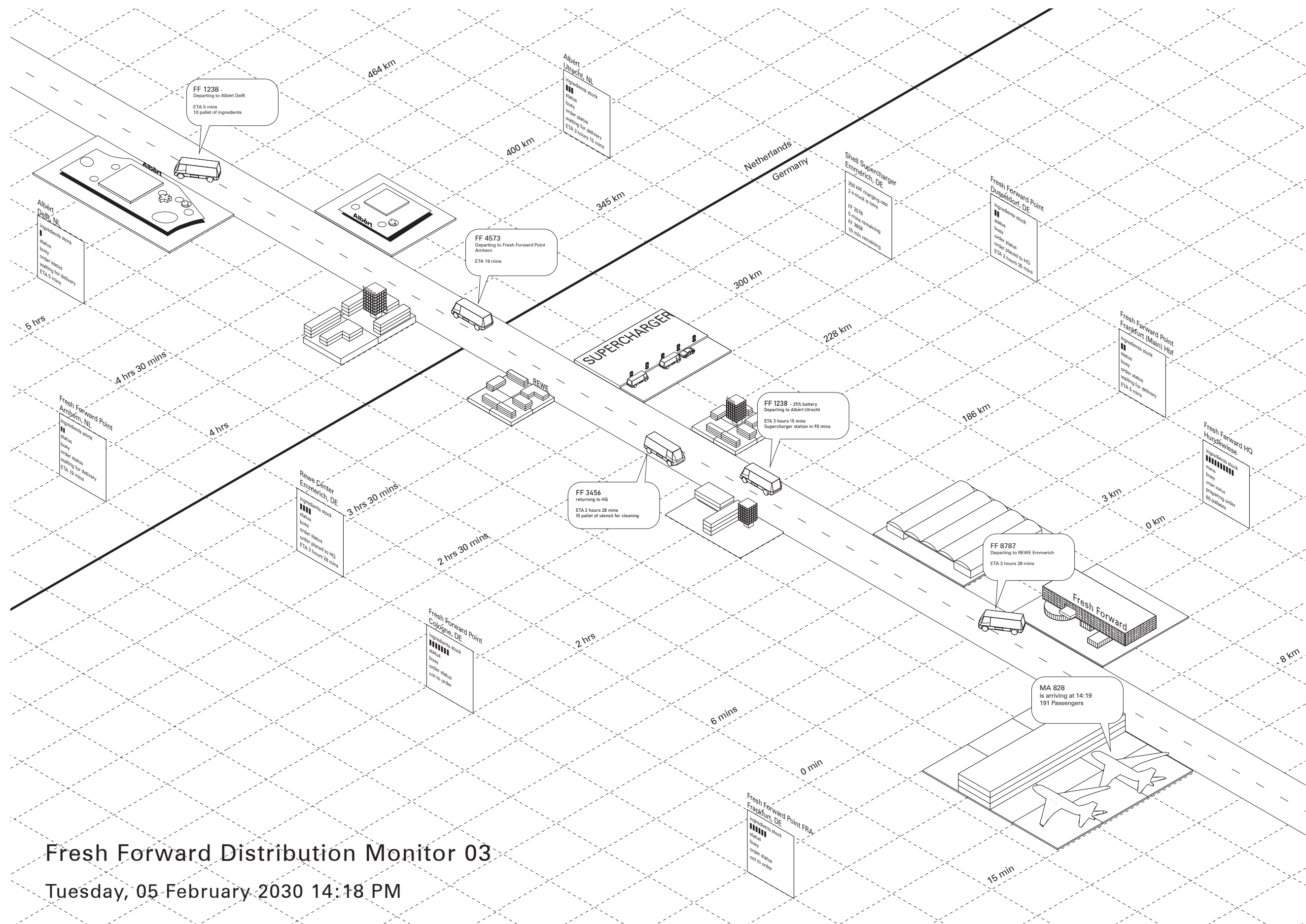
packaging design provides a simple and convenient design for diners to easily consume their meal without any utensils

1 Food package
2 Vacuum lid
3 Liquid container
4 Liquid lid

5 Sanitized towel
6 Towel lid
7 Culinary foam
8 Solid dishes

9 Infuse crystal plate
10 Serving plate
11 Sanitized Towel
12 Serving Glass

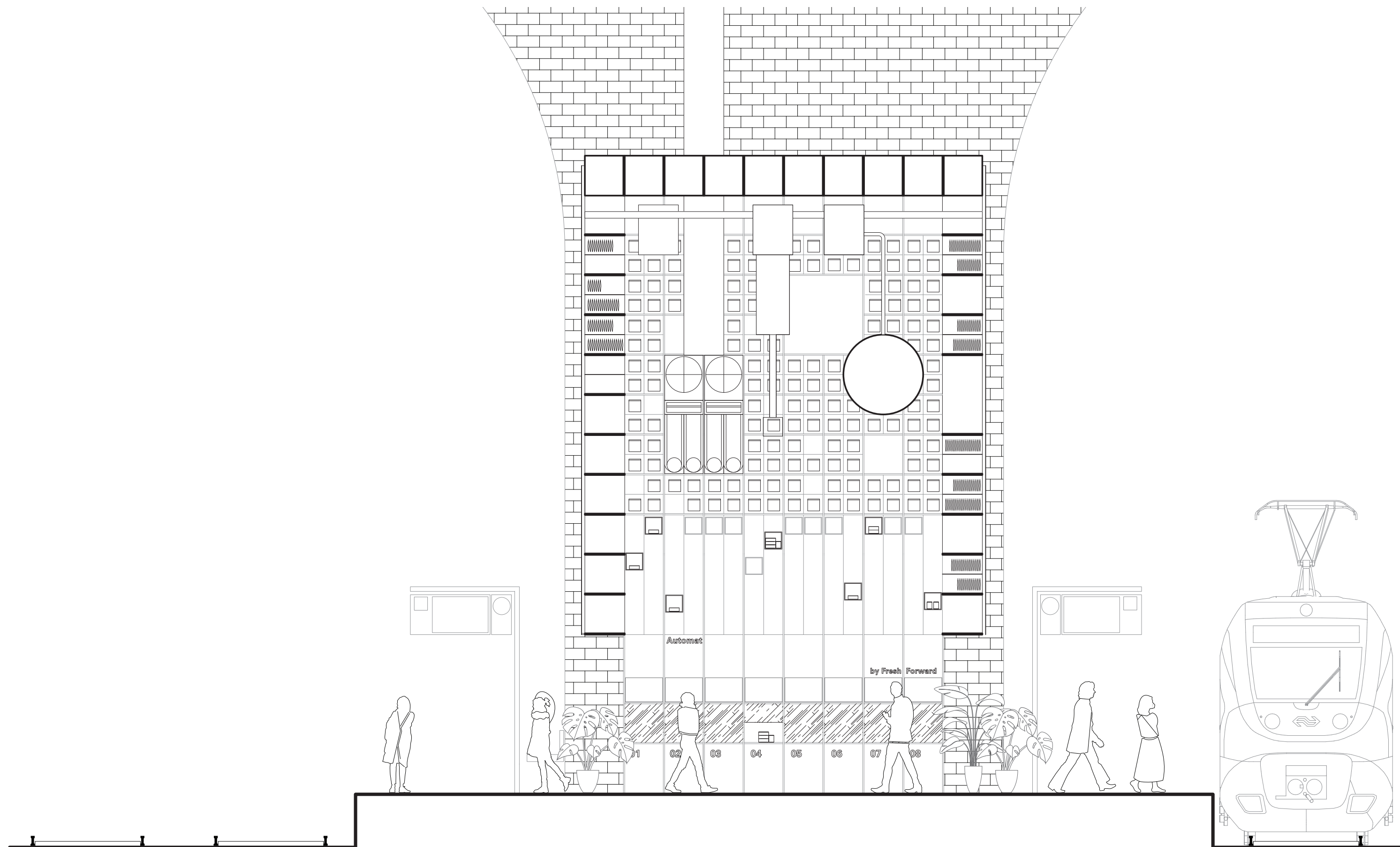
13 Brand label



This contribution serves a larger network in the Blue Banana territory, utilizing artificial intelligence and machine learning technology in

the food distribution network. The diagrammatic map shows the captured moment of the Fresh Forward distribution line from Frankfurt Airport

to Albert in Delft.



By adopting the automation technology, the contribution ensure convenient access to freshly made food in a place that usually does not

have the luxury of space and labor, such as a busy train station, to enjoy freshly cooked meals made by artisanal chefs. It proposes a new way of healthy

consumption especially for commuters, workers, and businessmen.

Propositions
1 The integration of automation technology to the food industry will allow for the diversion of human labor towards more creative and high-impact tasks, furthermore ensuring a robust and rapid food supply system - proposes a new way of healthy consumption especially for commuters, workers, and businessmen.
2 Modernist cooking techniques with innovative recipes from culinary artists will be a significant adaptation in the future of the food industry to accentuate the uniqueness of each raw ingredients’ taste and flavors, while utilizing automation for a more precise, consistent, fresh, and sustainable approach towards food preparation.
3 Automation in the food industry will transform the inhibition of space to mitigate the rigidity of human scale, reconstruct the conventional relationship between the back of the house and sales floor, thus, creating a newfound aesthetic experience between the human, machine, and nature within our urban environment.
4 The revolutionary production of lab-grown meat and plant-based ingredients—incentivized due to the introduction of livestock rights—will ensure the possibility of homogeneity within the quality and size of raw ingredients, and will in turn enable the design of the fully automated kitchen.
5 The food distribution network, especially inside the Blue Banana territory, will be modified through the implementation of artificial intelligence and machine learning technology, ensuring convenient access to freshly made food, furthermore replacing frozen and fast food.

This contribution is part of *Supermarket*, a collective project on the spatial implications of the food industry in the Netherlands and beyond, redesigning the now considered essential architecture of a supermarket.

Fresh Forward proposed a design for a new kind of restaurant that utilizes contemporary technology to achieve a fully automated process, from production space to sales floor; while, at the same time, – adopting modernist cooking techniques to provide a new dining experience to the customer.

The Berlage Center for
Advanced Studies in Architecture
and Urban Design

Faculty of Architecture and
the Built Environment

Delft University of Technology

Thesis advisory team

Salomon Frausto
Benjamin Groothuijse
Michiel Riedijk

Thesis examination committee

Dick van Gameren
Kees Kaan
Daniel Rosbottom
Paul Vermeulen
Nathalie de Vries

Students

Ana Herreros Cantis ^(ES)
Jin Young Chang ^(KR)
Maria Christopoulou ^(GR)
Matthew Cook ^(UK)
Maria Finagina ^(RU)
Georgia Katsi ^(GR)
Jacklyn Mickey ^(US)
Ryan Ridge Rahardja ^(ID)
Nishi Shah ^(IN)
Michael Tjia ^(NL)
Heng Yu ^(TW)

Director of Studies

Salomon Frausto