

Mobility Avant Garde

Tsinghua-NUS Sharing Cities Joint
Studio 2020: Tsinghua Studio

Gono, Clarisse
Huang, Katherine
Lee, Tsunxian
Mehl, Nathan

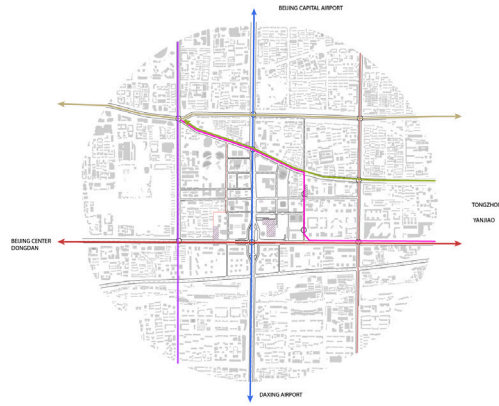


Introduction

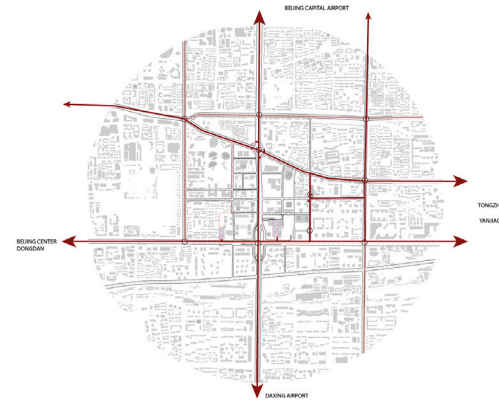
Mobility is more than just moving around. It must ensure equal access to places, activities, and opportunities to the public.

In our project, we aim to express and integrate a clear thorough accessible linkage between land use and transportation planning. Whilst exploring and integrating technology into the urban environment, we strive to create an accessible mobility transportation system that can be shared by everyone.

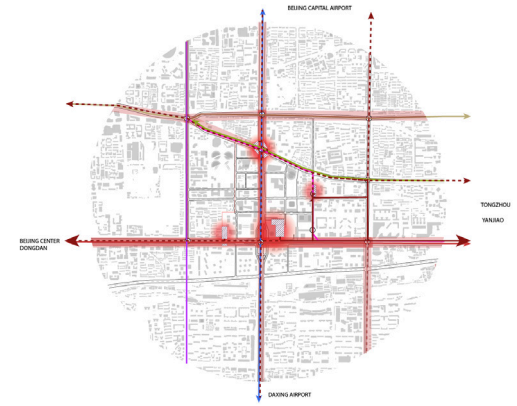
The proposal also explores the possibility of introducing new technological transportation modes into the system to unlock the potential of future technology as technology is constantly moving forward and innovations in artificial intelligence allow safe and efficient movement of people.



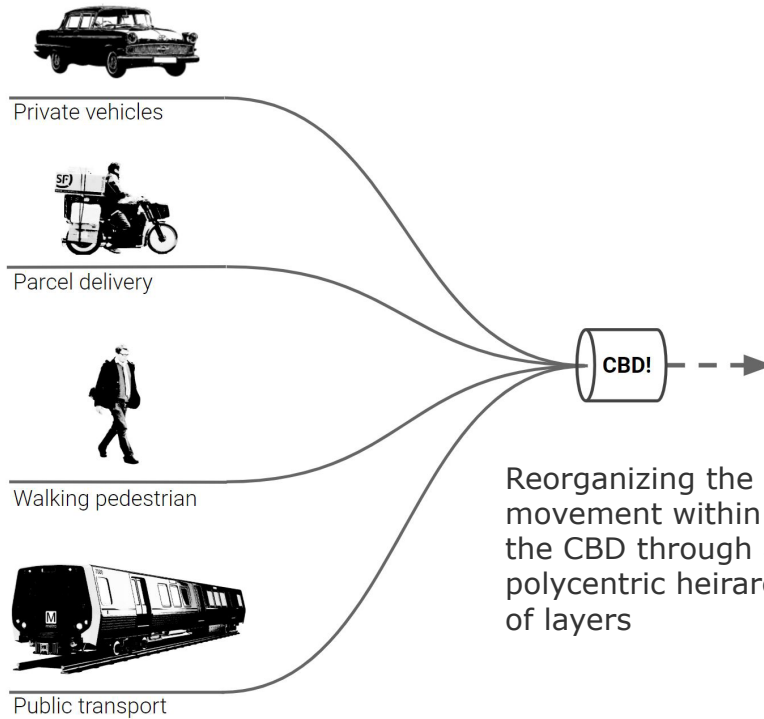
District Scale: Metro Lines



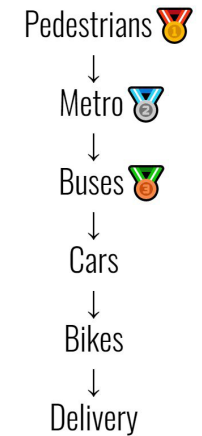
District Scale: Bus/ Vehicles

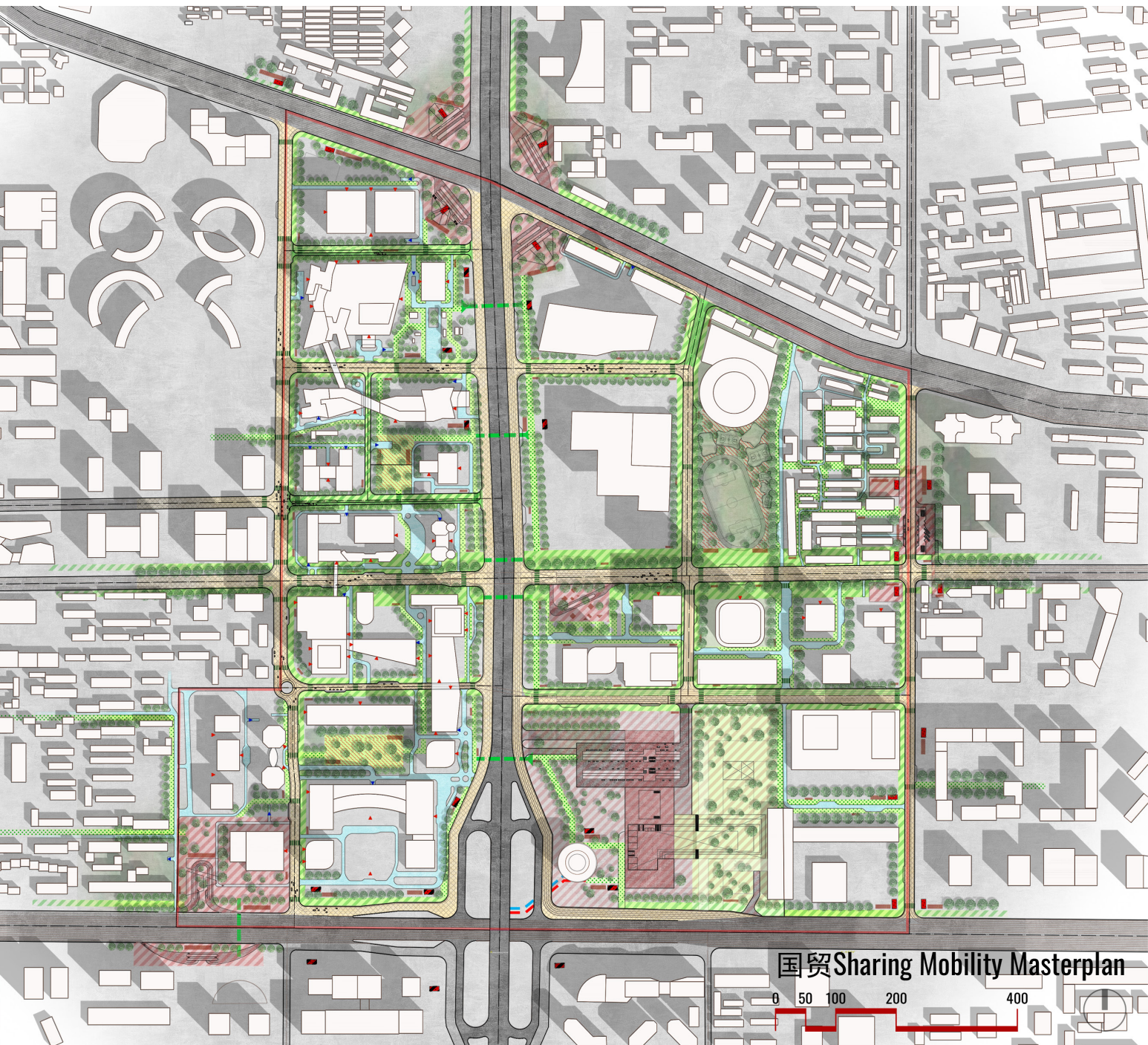


District Scale: Pressure Points



Hierarchy of Mobility





Legend

- Pedestrian & Bicycle path
- Pedestrian & Bicycle path (Newly Proposed)
- Pedestrian & Bicycle path (Redeveloped)
- Wayfinding Plaza
- Transportation Hub, Nodes
- Areas in the realm of Transportation Hub, Nodes
- Street surface (Reorganized)
- Street surface (Newly Proposed)
- Street surface
- Internal Roads
- Subway Exits (Newly Proposed)
- Subway Exits
- Bicycle, Individual electric vehicle Facilities
- Pedestrian and Bicycle underpass
- Metro underpass
- Site Boundary
- Building Entrance
- Parking Entrance
- Zebra Crossing

国贸 Sharing Mobility Masterplan

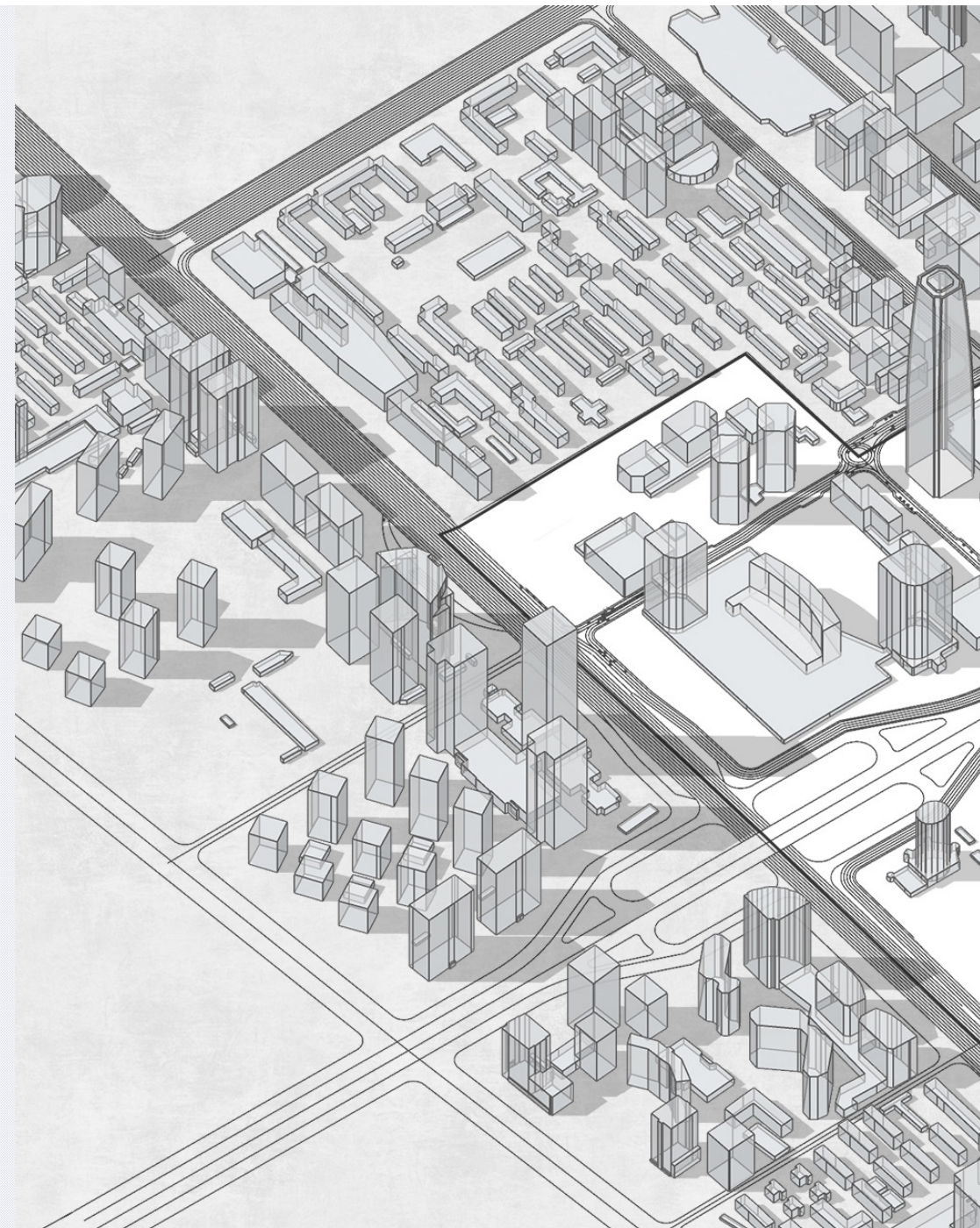
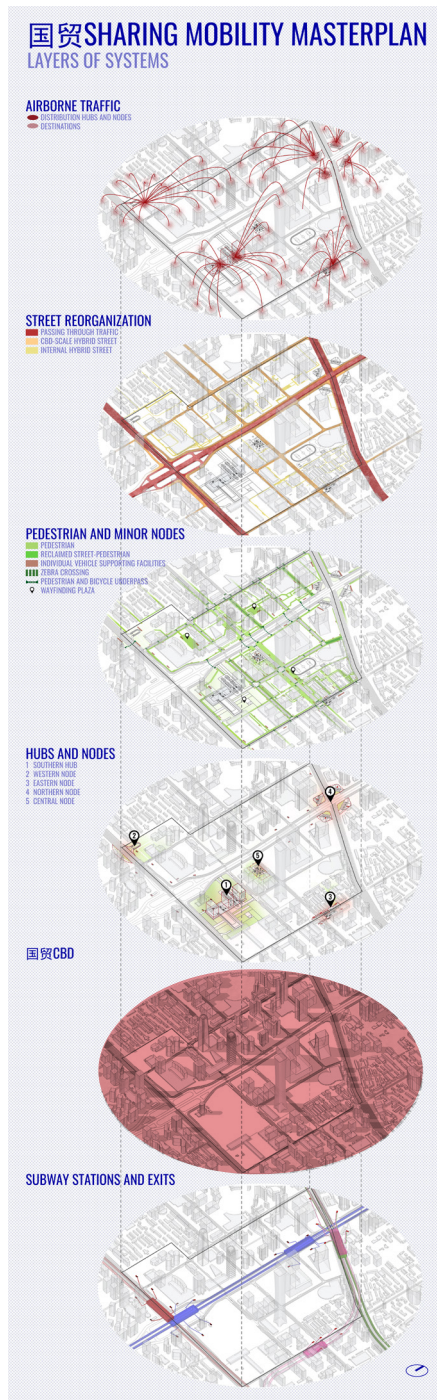


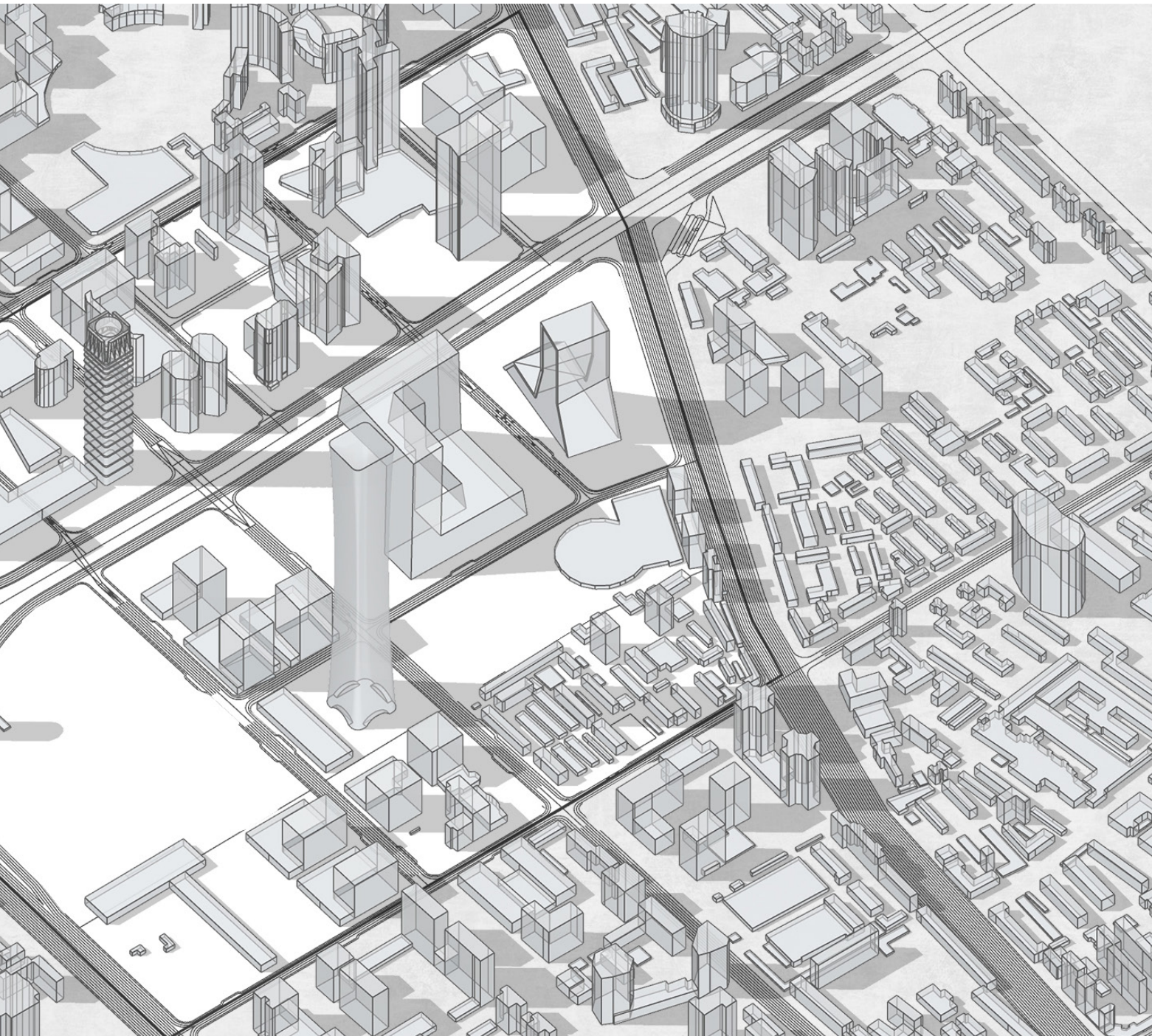
Urban Design of Guomao Central Business District, Beijing

Background & Actual Data

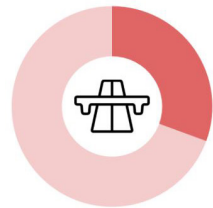
Beijing Central Business District's (Guomao) mobility network can be described as chaotic. This is because of a pronounced overlap between mass transit and a car centric road network that creates a bottleneck along the 3rd Ring Road, the central axis of the CBD.

The problem is exacerbated by the over reliance on the ground level layer to support most of the movement within. This makes it hard for people to enter, resulting in an uneven distribution of people going around the district.

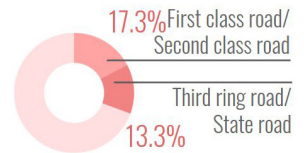




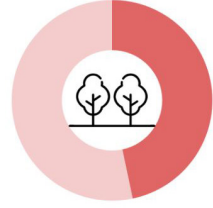
Infrastructure (370,767m²)



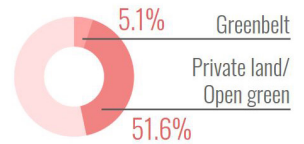
30.6%



Open Space (693,973m²)



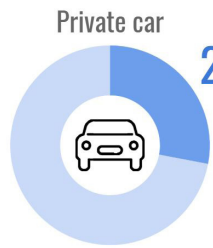
46.7%



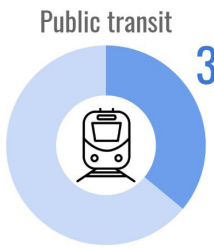
Building Footprint (274,958m²)



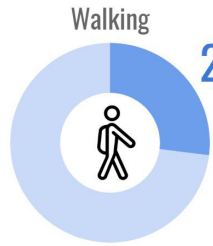
22.7%



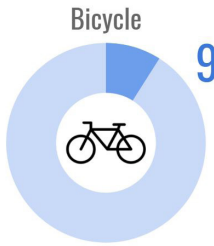
Private car
28%



Public transit
36%



Walking
27%



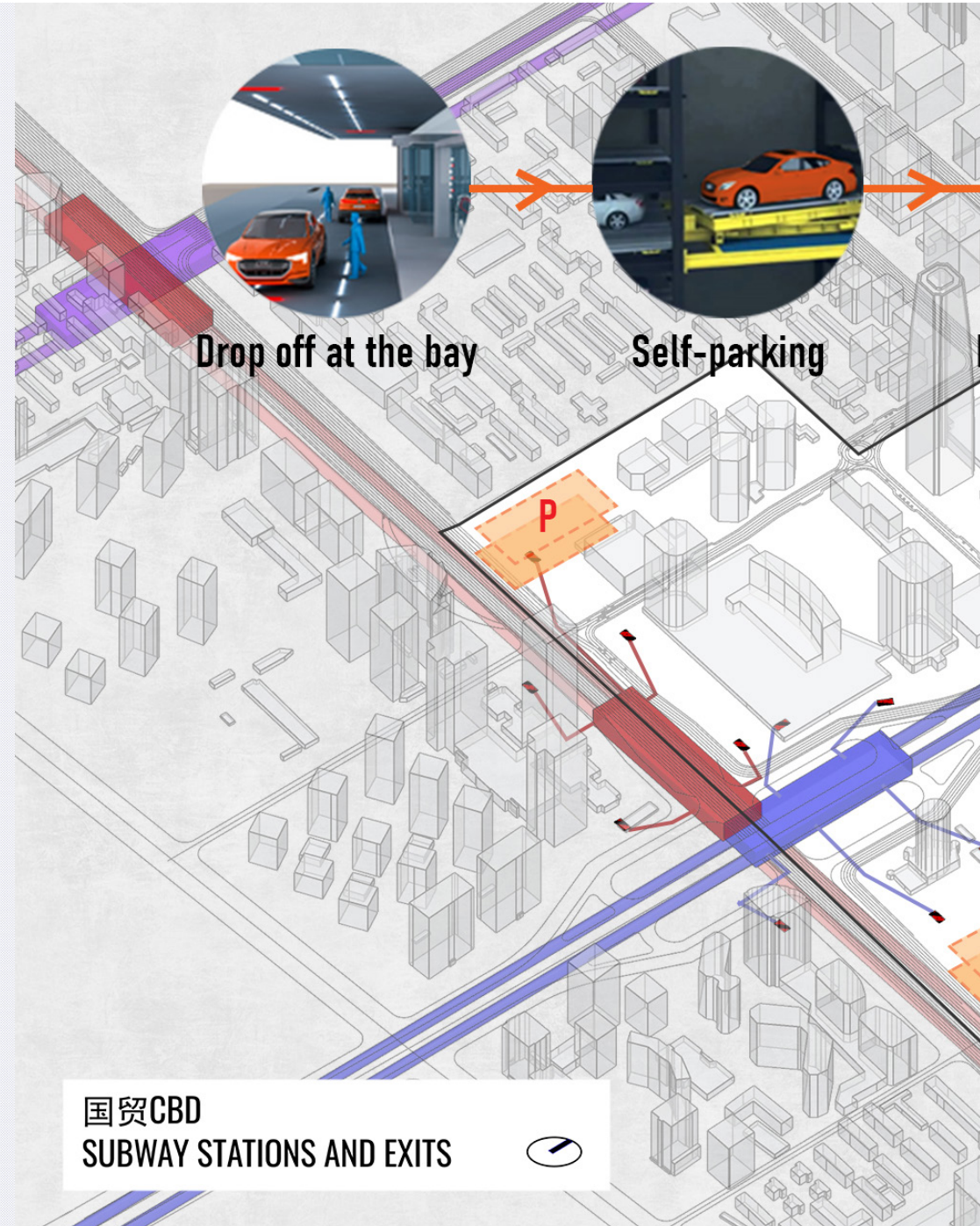
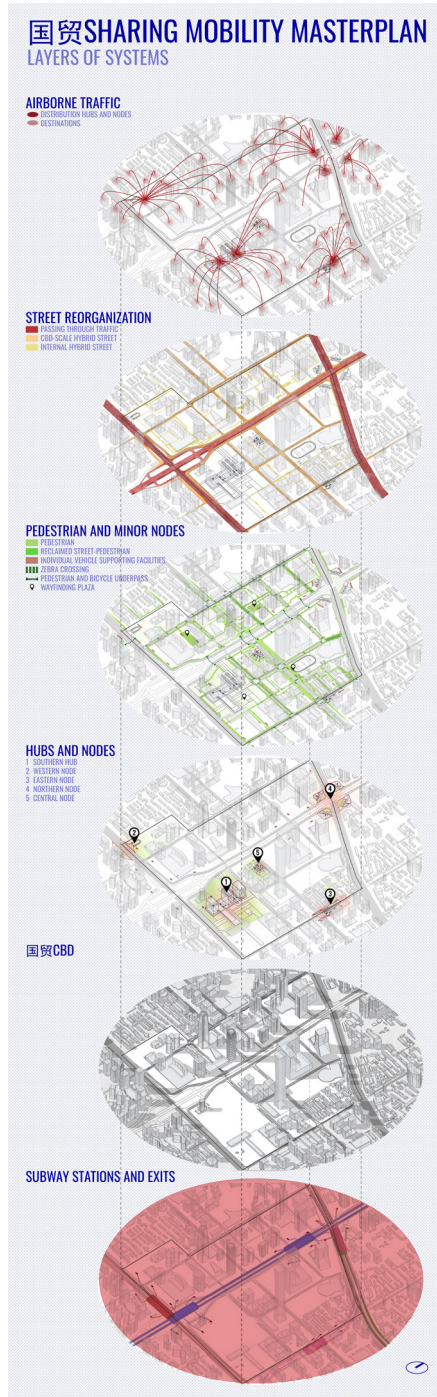
Bicycle
9%

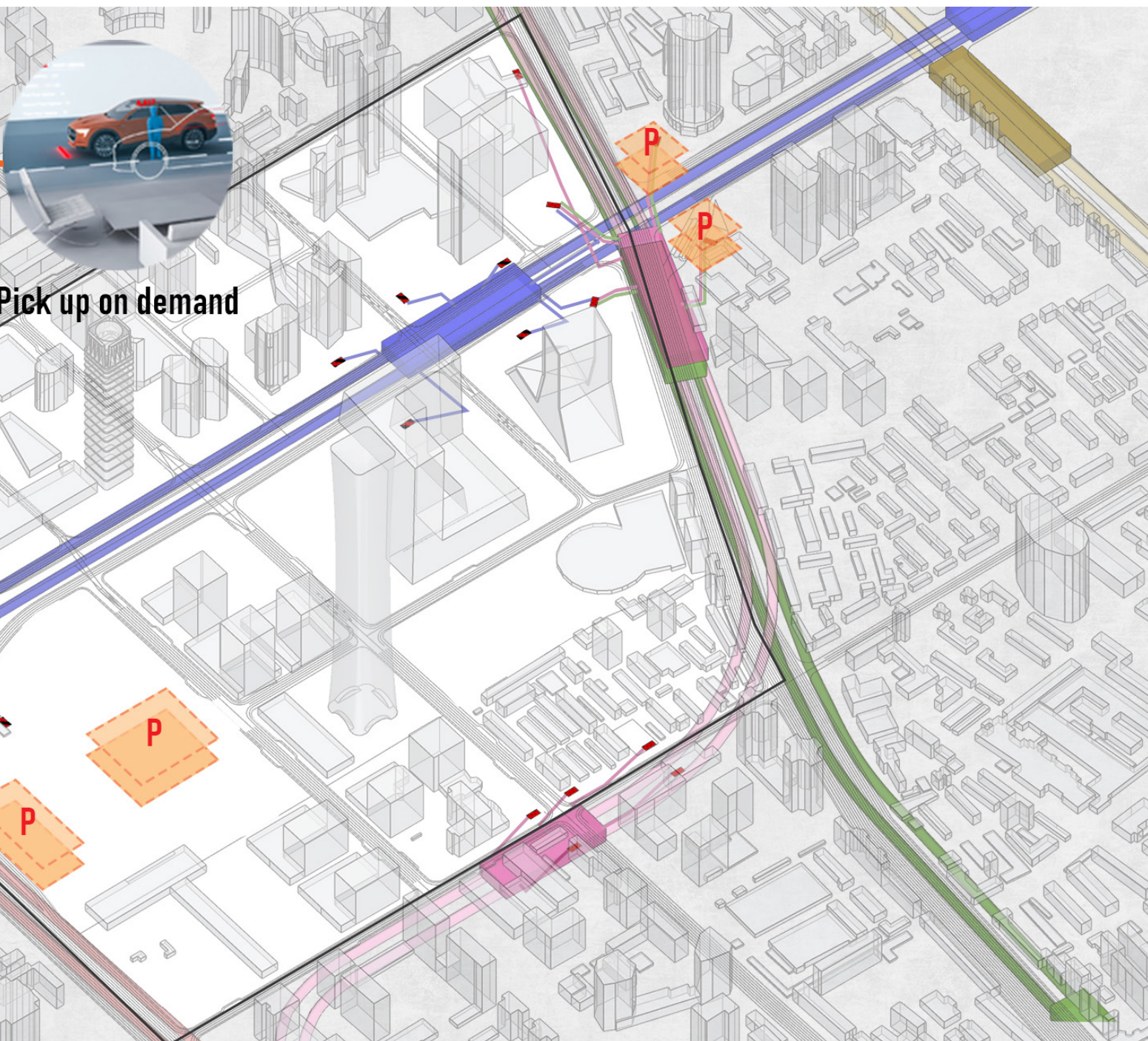
Source: Deloitte City Mobility Index for Beijing

Urban Design of Guomao Central Business District, Beijing

Underground Layer

When beginning the design process, we first took into consideration the existing and future train stations that are located within the area. This not only helps in determining the points where a large group of people will or are expected to come from but is also where we begin to build our transportation networks.





Parking Stations

In an effort to encourage less cars moving within the district, underground parking garages are proposed within certain hubs to accommodate the passengers wanting to come into the CBD.

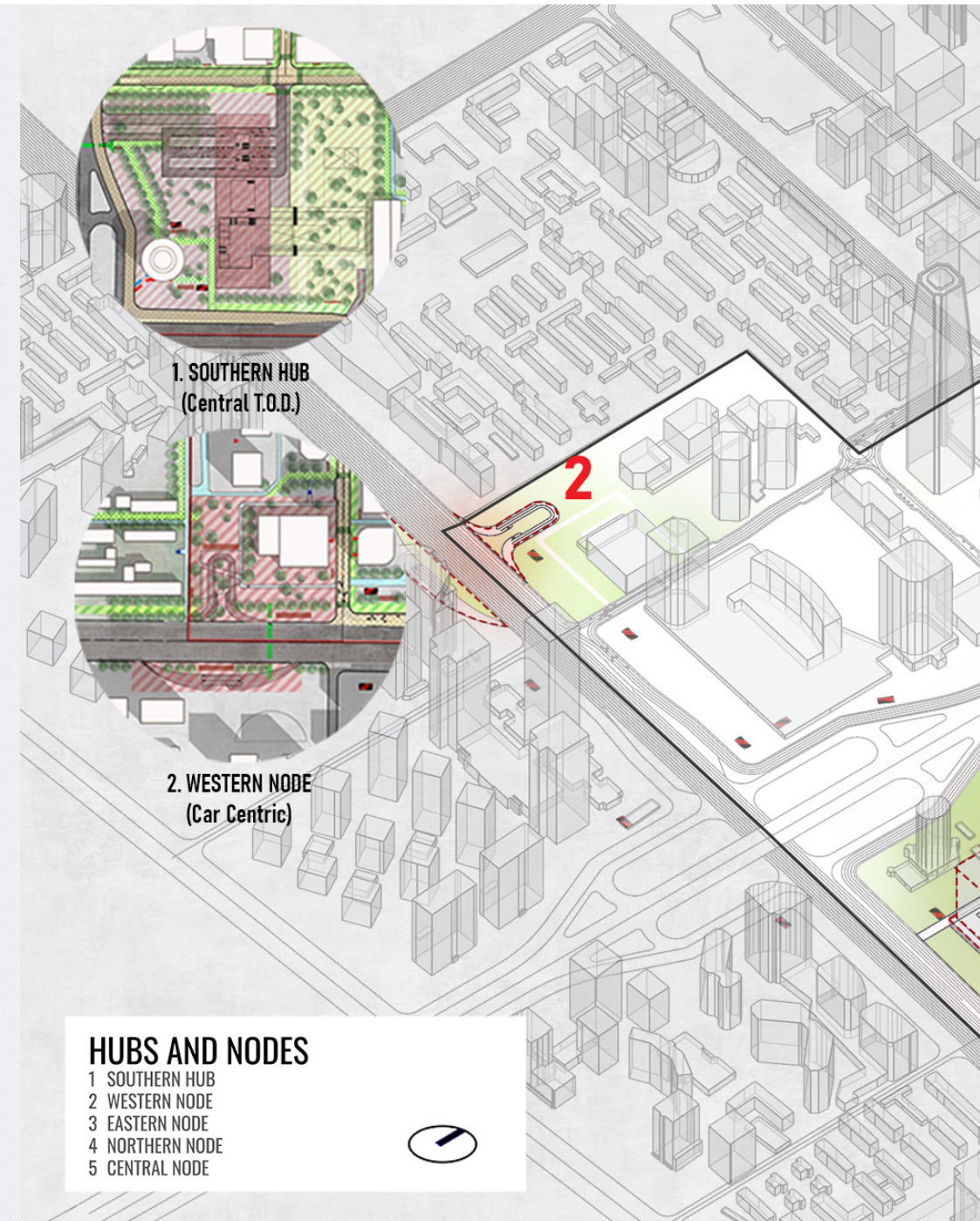
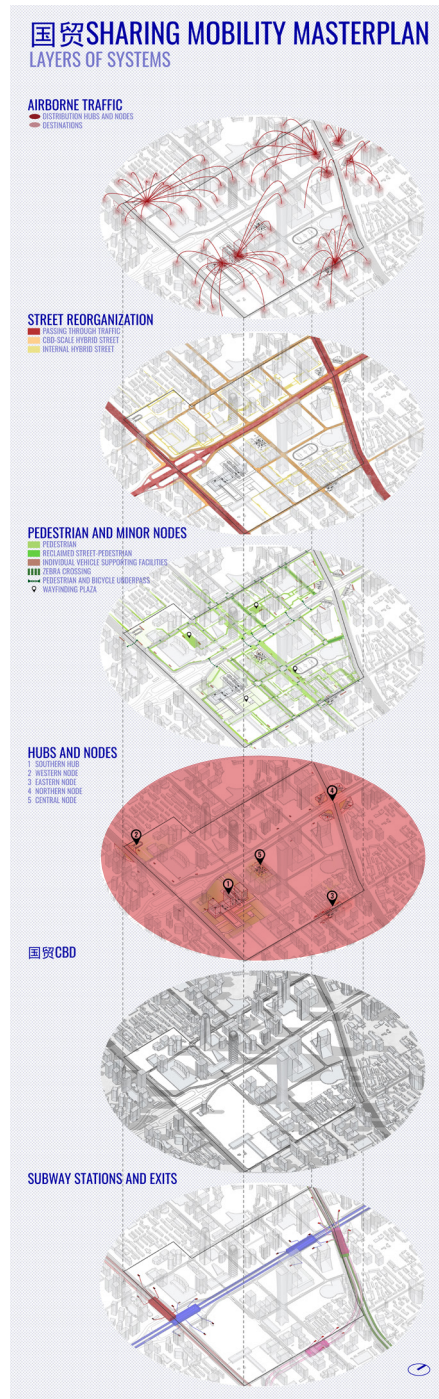
This is because a majority of the traffic encountered within the CBD is due to an influx and outflow of vehicles that pass through the district during the peak hours of the day. With these smart parking points, one need only bring his vehicle to a designated autonomous parking station where the cars will be stored, allowing the user to utilize instead the various district scale public transportation which will be provided within the hub/ nodes. The user can then have the car delivered to a separate withdrawal platform when exiting the district later on in the day.

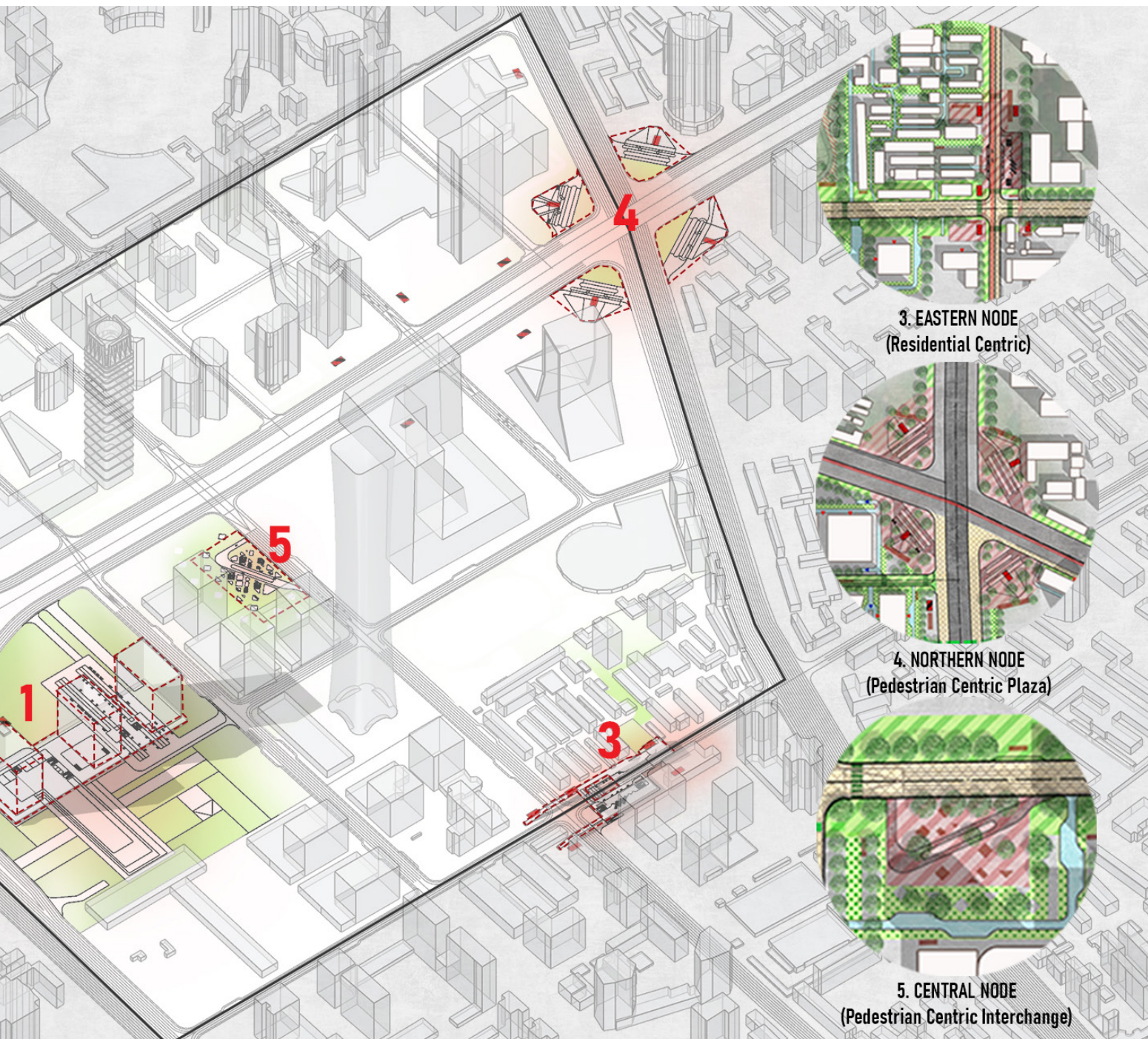
Mobility Avant Garde

The cornerstone of this design is a main hub and four nodes that integrate current and future mobility systems, reorganizing the hierarchy from car centric to public driven space.

These are designed to complement the different needs of the people living, and working in the area.

It will be a mix of existing systems such as bus terminals, metro stations, bicycle rental and parking whilst also making room for new technology including drone assisted delivery, autonomous vehicles, and automated parking systems. Thus creating a more convenient public network that decreases the CBD's reliance on private vehicles.





Urban Design of Guomao Central Business District, Beijing

Interlaced Design

The hub and nodes are supported by a robust multi modal network, reworking existing roads into a more vibrant public realm.

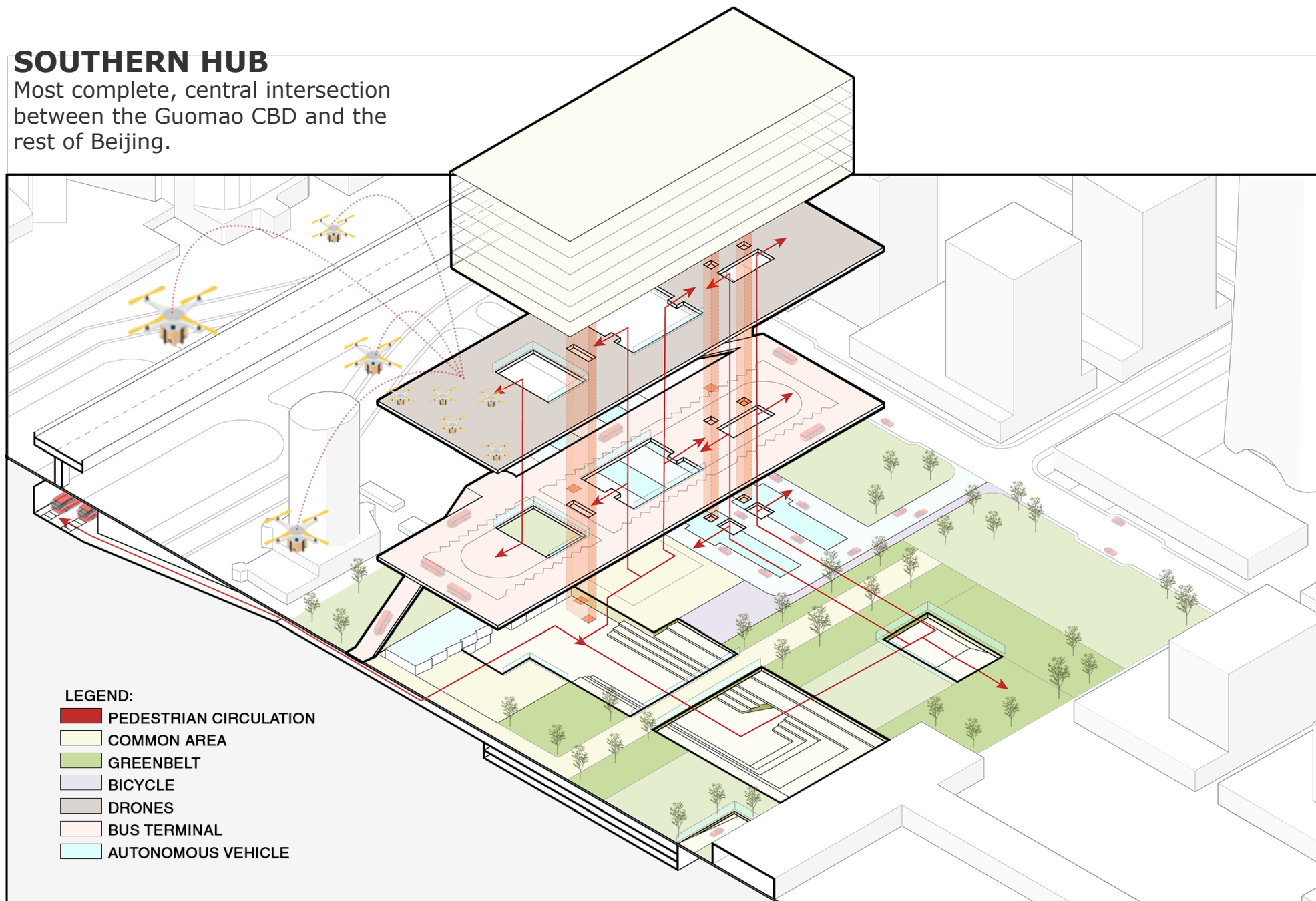
The traditional system of a road is broken, dividing the space into a dynamic street occupied by autonomous public transport with an enhanced bicycle infrastructure, leaving plenty of space for pedestrians and nature. Smart technology such as AI controlled traffic and digital wayfinding manage the flow of people, adjusting according to the volume of traffic.

During the day food stalls, markets, and other neighborhood activities can take place in between daily commutes while at night, events, concerts, and light installations can temporarily take over roads that are not as hectic.

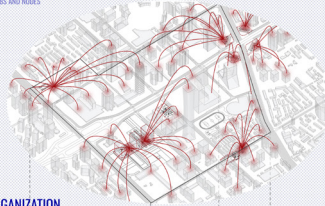


SOUTHERN HUB

Most complete, central intersection between the Guomao CBD and the rest of Beijing.

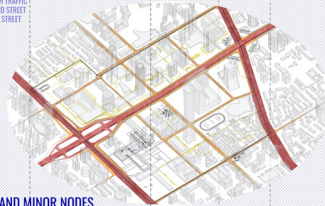


AIRBORNE TRAFFIC
 ● AIRBORNE HUB AND NODES
 ● DESTINATIONS



STREET REORGANIZATION

- PASSING THROUGH TRAFFIC
- CORE SCALE HYBRID STREET
- INTERNAL HYBRID STREET



PEDESTRIAN AND MINOR NODES

- PEDESTRIAN
- RECLAIMED STREET-PEDESTRIAN
- INDIVIDUAL VEHICLE SUPPORTING FACILITIES
- ZEBRA CROSSING
- PEDESTRIAN AND BICYCLE UNDERPASS
- WAYFINDING PLAZA

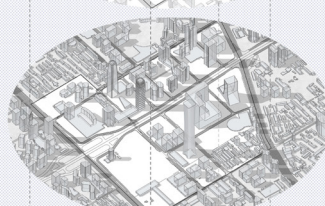


HUBS AND NODES

- 1. SOUTHERN HUB
- 2. WESTERN NODE
- 3. EASTERN NODE
- 4. NORTHERN NODE
- 5. CENTRAL NODE



国贸CBD



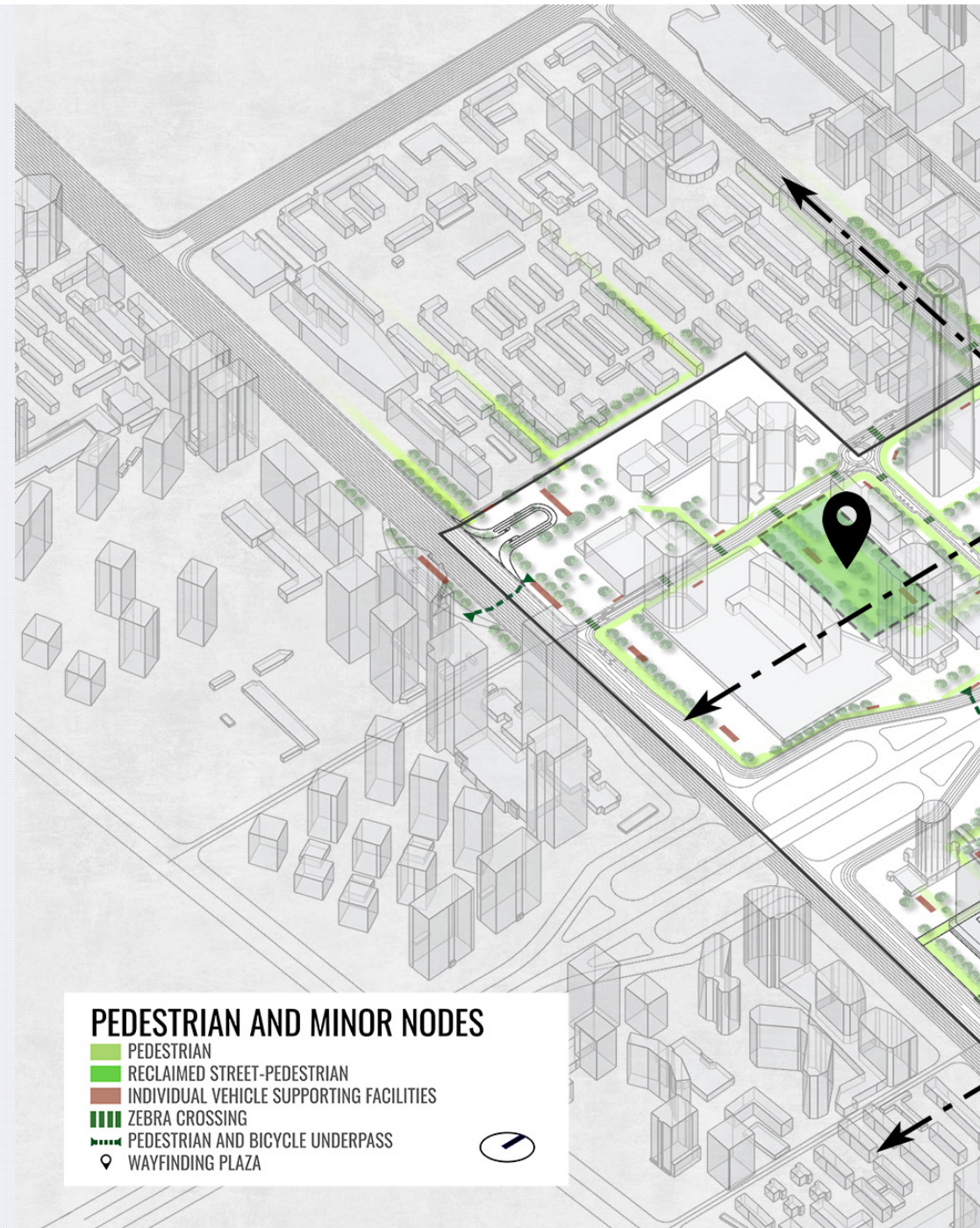
SUBWAY STATIONS AND EXITS



Pedestrians First

In this passive design, we established major axis that cut across the site along with some wayfinding plazas in each segment of the CBD, closely linking them with green corridors and underground passes.

This allows people to orientate around CBD with these open pockets of green common space. Smart technology such as AI controlled traffic, pavement sensors and changeable streetscape assist in making the streets more sensitive to pedestrians' needs. This data collected from the smart streets can be processed to generate useful information for future use.

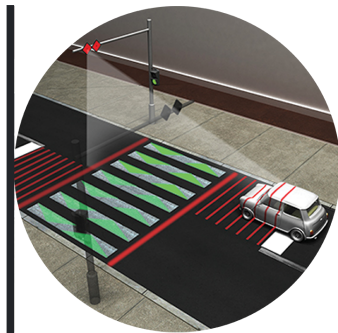


PEDESTRIAN AND MINOR NODES

- PEDESTRIAN
- RECLAIMED STREET-PEDESTRIAN
- INDIVIDUAL VEHICLE SUPPORTING FACILITIES
- ZEBRA CROSSING
- PEDESTRIAN AND BICYCLE UNDERPASS
- WAYFINDING PLAZA



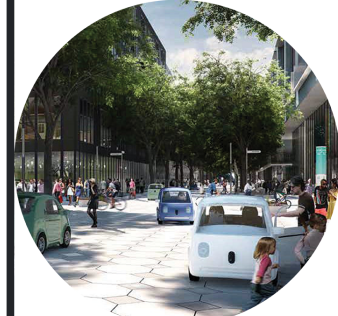
Urban Design of Guomao Central Business District, Beijing



Smart Traffic Assistant



Pavement sensor for data collection



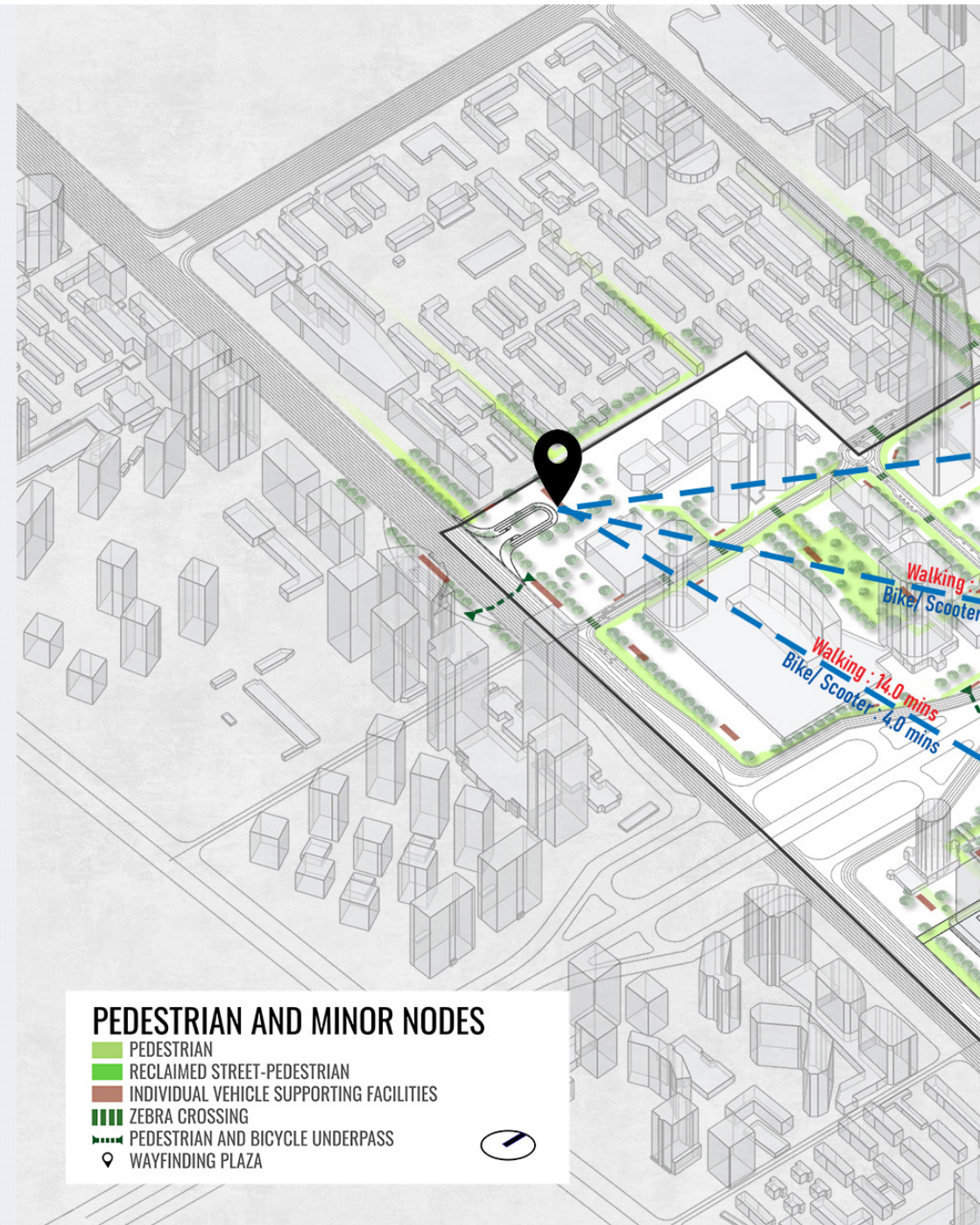
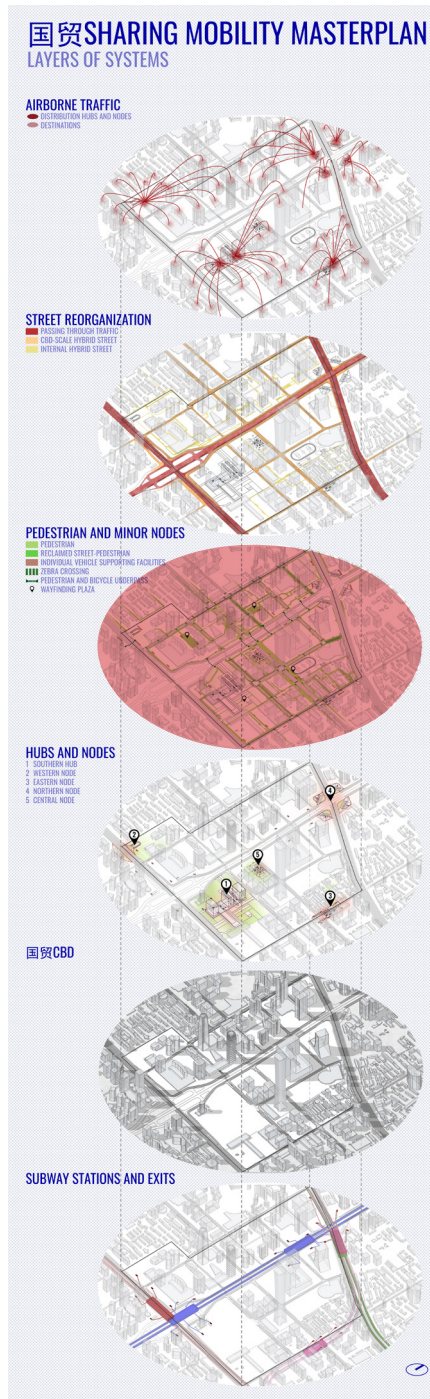
Dynamic curb
Changeable streetscape

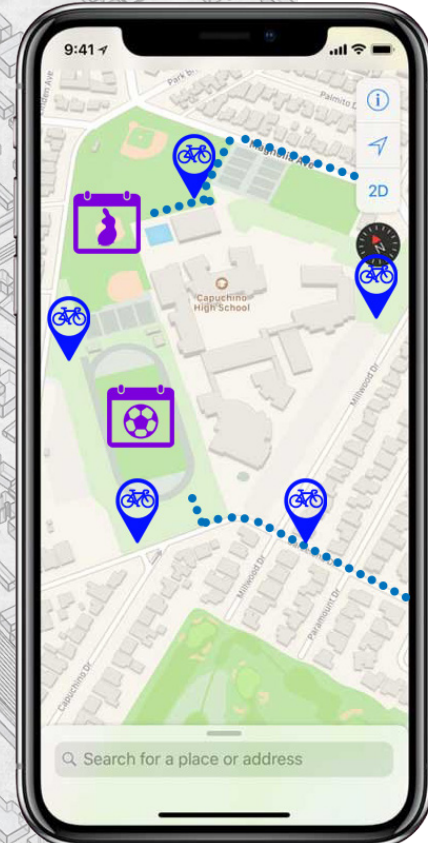
Collected data will be sent to the monitoring system for further processing and eventually generate useful information and design advices

Digital Wayfinding

The new system also proposes an internal mobility system in conjunction with smart technology, for instance with collaboration with Gaode Map or Baidu Map, not just to showcase the fastest travelling time, but also with more personalised advice, perhaps some help to find nearest shared mobiles, the smart tech can also come with suggestions for more real-time events around the site, making a more interesting experience for city exploration.

With the proposed integration of AI tech within the whole mobility system, we can also implement a smart traffic and pavement system that would allow all autonomous cars to be operated under one algorithm. Monitored by systems and real-time messages are sent out instantly to advise all the vehicles on the road to avoid unnecessary accidents.





In APP Lifestyle Integration

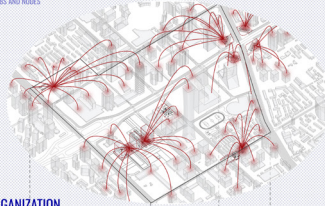
"5 minutes away from destination. Arrival to office is registered."

"Autonomous Transit Points that nears you. Register the bike now!"

"Football Match at Greenbelt Field! Wanna check it out?"

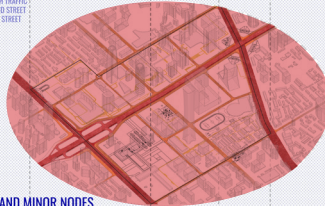
...And other various activities and notifications can be integrated in a city wide mobile network.

AIRBORNE TRAFFIC
 AIRBORNE TRAFFIC HUBS AND NODES
 DESTINATIONS



STREET REORGANIZATION

- PASSING THROUGH TRAFFIC
- CBD-SCALE HYBRID STREET
- INTERNAL HYBRID STREET



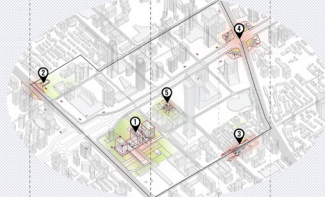
PEDESTRIAN AND MINOR NODES

- PEDESTRIAN
- RECLAIMED STREET PEDESTRIAN
- INDIVIDUAL VEHICLE STOPPING FACILITIES
- ORBITA CROSSING
- PEDESTRIAN AND BICYCLE LORBERIES
- WAYFINDING PLAZA

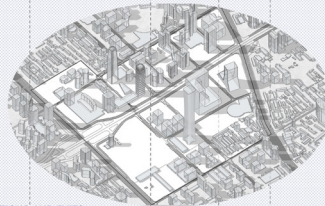


HUBS AND NODES

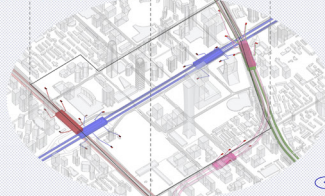
- 1 SOUTHERN HUB
- 2 WESTERN HUB
- 3 EASTERN HUB
- 4 NORTHERN HUB
- 5 CENTRAL HUB



国贸CBD



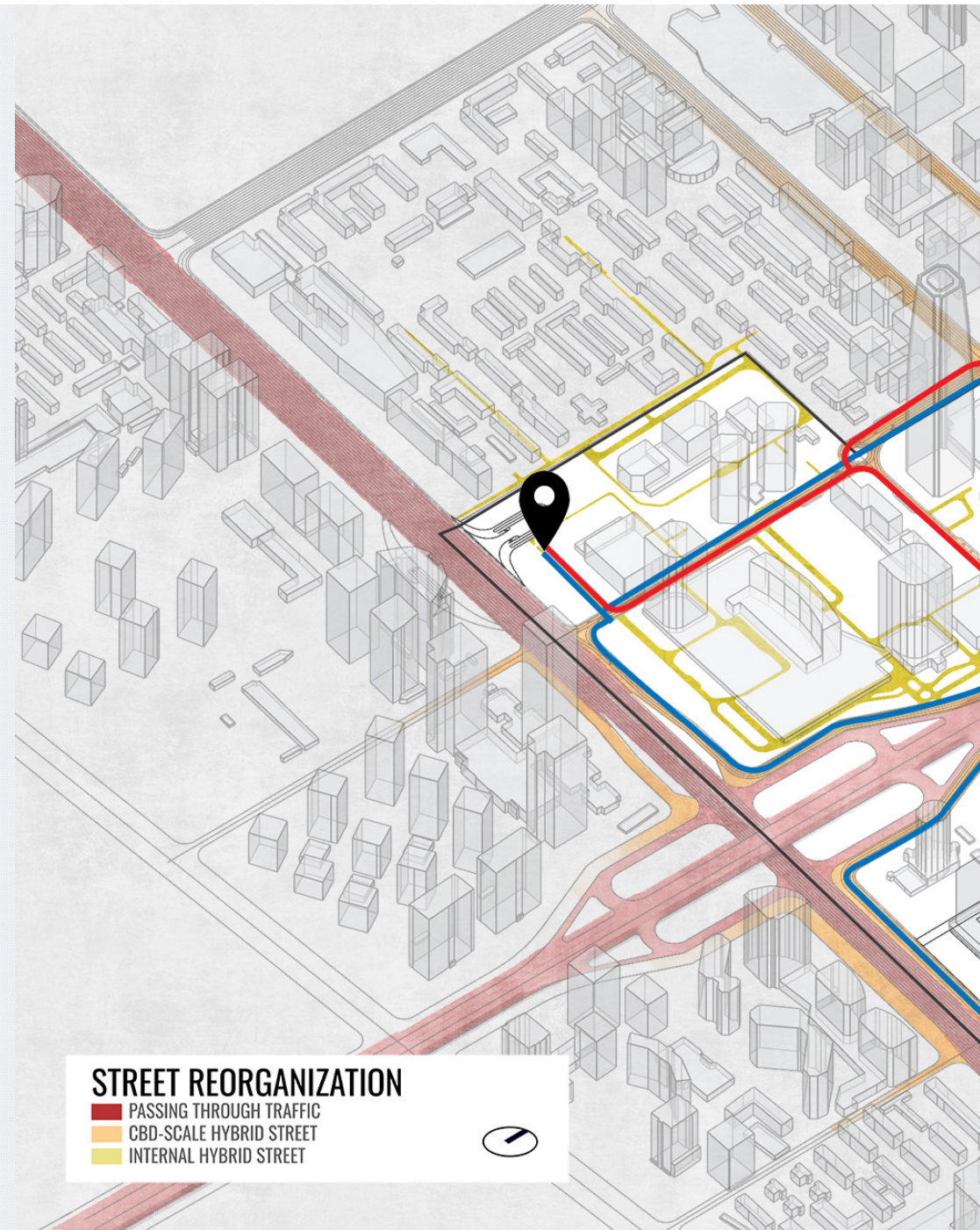
SUBWAY STATIONS AND EXITS



Hybrid Roads

With the reorganization of the internal street system of the CBD to give priority to the smart pedestrian system, the streets are categorized into three groups in how vehicles access the new system; streets provided for traffic passing through the CBD for example the third ring road, followed by CBD scale hybrid street, and then internal hybrid streets.

The design of the hybrid network was meant to integrate autonomous transit network within the mobility system. Trying to encourage less cars moving within the district, underground parking garages are proposed within each hub and node to accommodate the passengers wanting to come into the CBD, they can park the cars in the periphery of the CBD and join the district smart network.



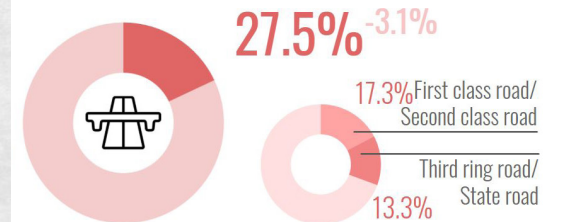
STREET REORGANIZATION

- PASSING THROUGH TRAFFIC
- CBD-SCALE HYBRID STREET
- INTERNAL HYBRID STREET

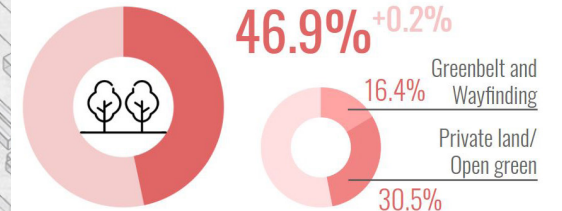




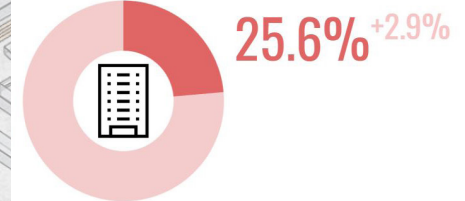
Infrastructure (332,733m²)



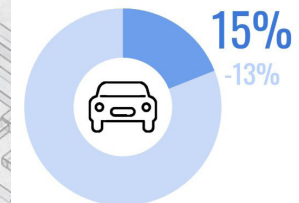
Open Space (722,058m²)



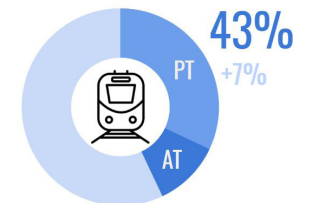
Building Footprint (324,958m²)



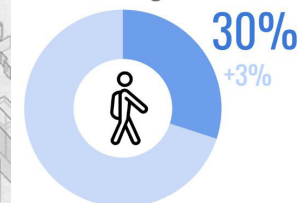
Private car



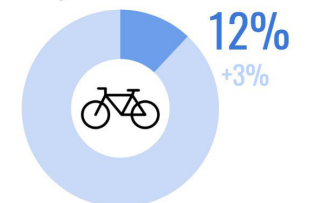
Public transit + CBD autonomous transit



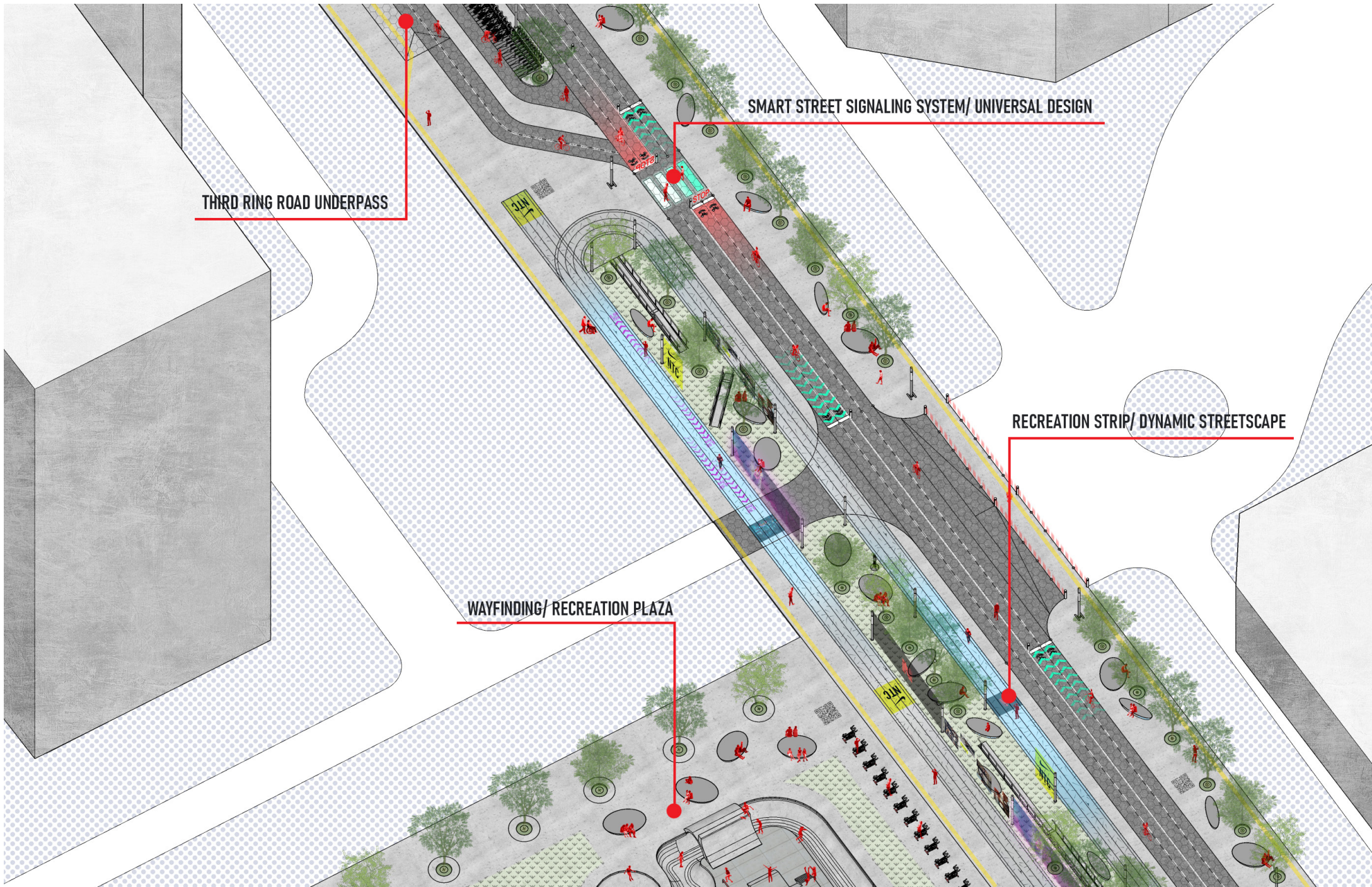
Walking



Bicycle + e-scooter



Urban Design of Guomao Central Business District, Beijing



THIRD RING ROAD UNDERPASS

SMART STREET SIGNALING SYSTEM/ UNIVERSAL DESIGN

RECREATION STRIP/ DYNAMIC STREETSCAPE

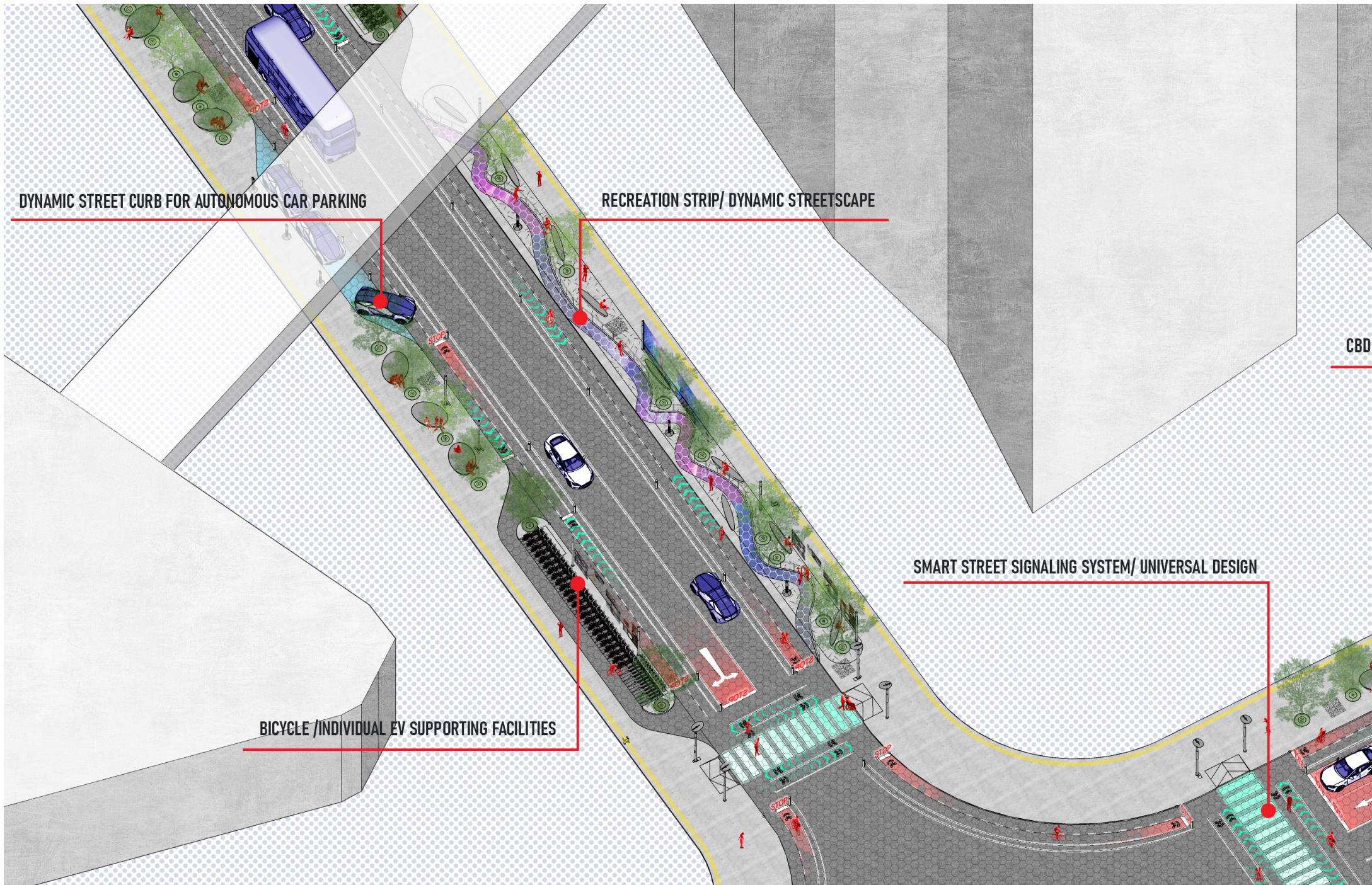
WAYFINDING/ RECREATION PLAZA

Adaptable Hybrid Streets

The hybrid street is a restructuring of the current road networks without building extra lanes. These existing lanes are reconfigured and integrated with smart technology that allows less private vehicles, but more people in general to utilize them.

During peak hours, roads are prioritised for cars and the pods are used for pick up/drop off zones that provide ride-hail passenger loading zones during rush-hour. It then transforms into public spaces during non-peak hours.





DYNAMIC STREET CURB FOR AUTONOMOUS CAR PARKING

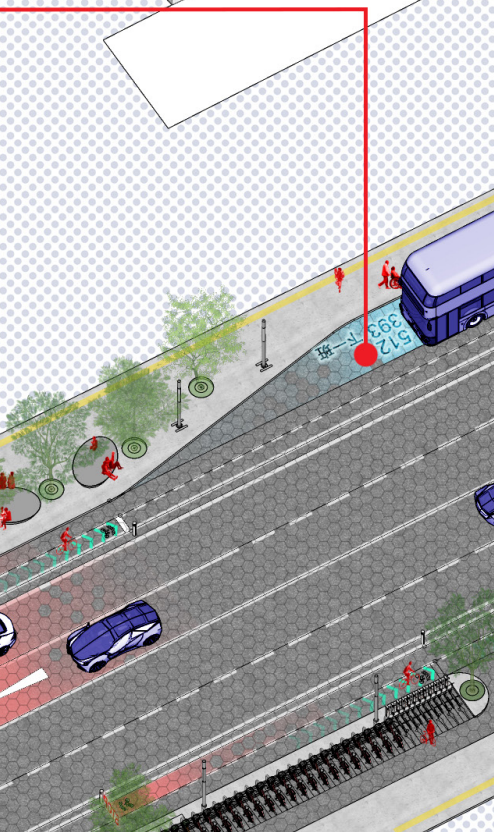
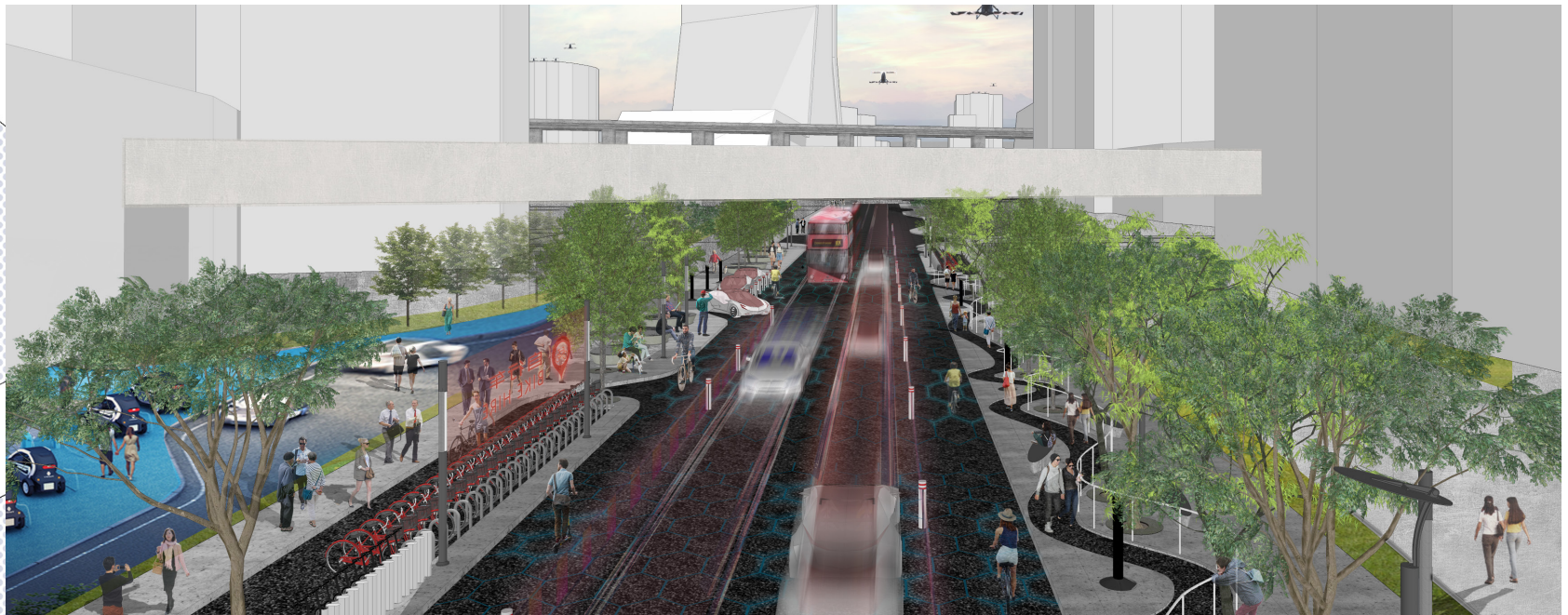
RECREATION STRIP/ DYNAMIC STREETSCAPE

SMART STREET SIGNALING SYSTEM/ UNIVERSAL DESIGN

BICYCLE /INDIVIDUAL EV SUPPORTING FACILITIES

CBD

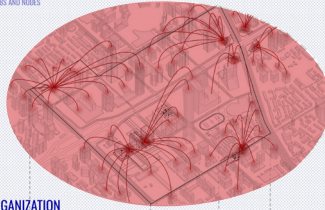
SCALE TRANSPORTATION BUS STOP



Urban Design of Guomao Central Business District, Beijing

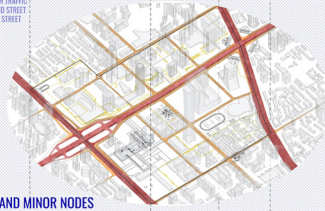
国贸SHARING MOBILITY MASTERPLAN
LAYERS OF SYSTEMS

AIRBORNE TRAFFIC
DISTRIBUTION HUBS AND NODES
DESTINATIONS



STREET REORGANIZATION

- RECLAIMED THROUGH TRAFFIC
- ROAD SCALE HYBRID STREET
- INTERNAL HYBRID STREET



PEDESTRIAN AND MINOR NODES

- PEDESTRIAN
- RECLAIMED STREET PEDESTRIAN
- INDIVIDUAL VEHICLE STOPPING FACILITIES
- ORBITA CROSSING
- PEDESTRIAN AND BICYCLE UNDERPASS
- WAYFINDING PLAZA

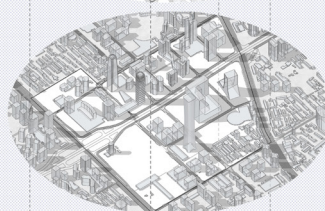


HUBS AND NODES

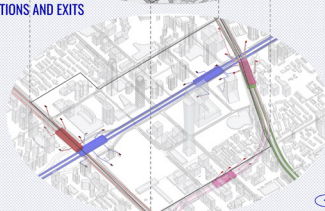
- 1 SOUTHERN HUB
- 2 WESTERN NODE
- 3 EASTERN NODE
- 4 NORTHERN NODE
- 5 CENTRAL NODE



国贸CBD



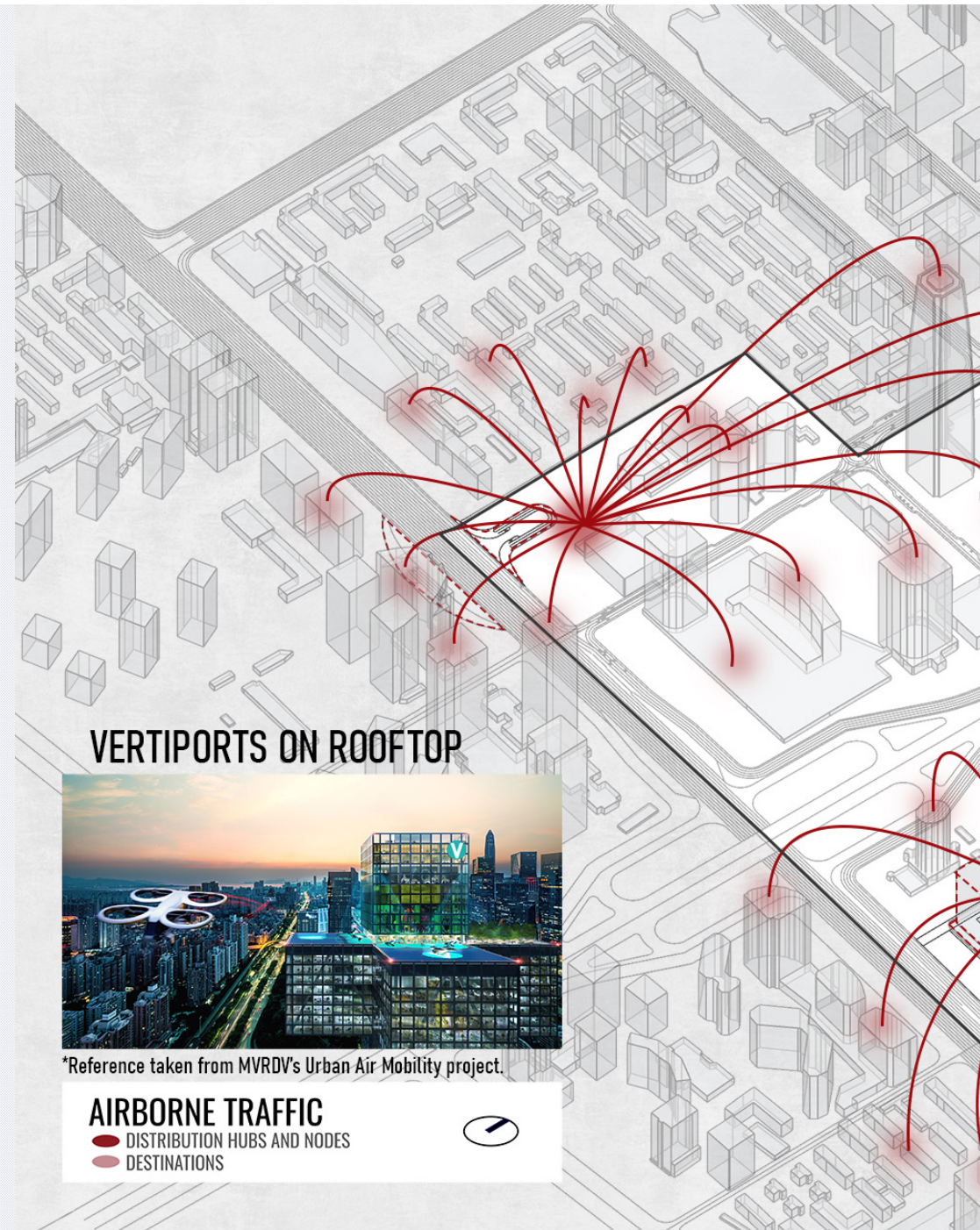
SUBWAY STATIONS AND EXITS



Polycentric Design

Our project seeks to resolve the local needs and problems of shared mobility in the current context of the location. It explores an avant garde solution by creating a multiple scaled system of hubs and nodes that divert the pressure of the current mobility system by evenly distributing the flow of traffic into various areas spread across the CBD.

By creating a polycentric design, this in turn is strengthened by a dynamic reassignment of space aiming to take back the roads designated for cars, and returning them to the public realm. By creating a system that takes into consideration the integration of future technology into the current urban fabric, we are able to facilitate the transformation of this district into an ideal CBD of the future.



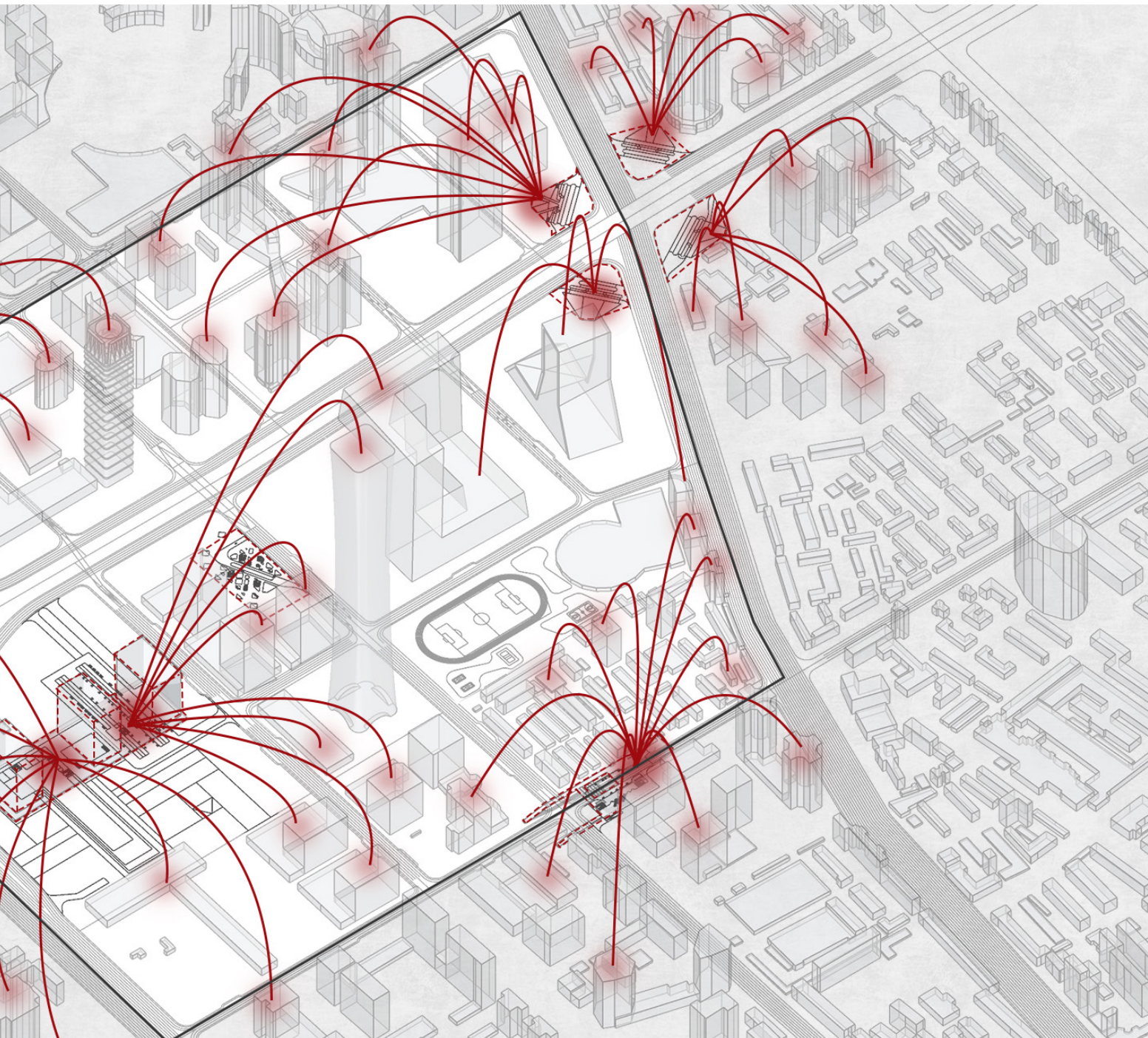
VERTIPORTS ON ROOFTOP



*Reference taken from MVRDV's Urban Air Mobility project.

- AIRBORNE TRAFFIC**
- DISTRIBUTION HUBS AND NODES
 - DESTINATIONS





Urban Design of Guomao Central Business District, Beijing

Conclusion

This multi-layered architectural approach to urban design envisions a comprehensive shared mobility system that provides people travelling to and within the CBD an advantageous transport choice.

From choosing the hub that is closest to their destination, to the district scale transportation used to increase mobility within the area, commuters are able to move from point a to b as efficiently and smoothly as possible.

This ensures equitable access for all and improves the quality of life, creating a seamless transition of people within the hyper busy Guomao area and envisioning the future of mobility and its positive impact to the city.