Location
the site is in Beijing, near the city center, where the land value is very high and the situation is more complex than other places.
local residential
ground floor commercial
abandoned commercial
isolated fast car road
4-star hotel
Conclusion: around the site, multiple neighborhoods of different age, knowledge, and income level are separated by the complicated traffic situation.
urban strategy: **1. underground the car-roads**
**2. new commercial functions and public functions**

problems of the existing traffic system:
1. complex traffic situation, potential security risks.
2. separation between surrounding neighborhoods.
3. noise pollution.
4. air pollution.

benefits of underground the car-roads:
1. the money earned from the commercial functions can be used as the feedback of the whole project.
   - for demolishing the abandoned restaurant.
   - reclaim the investment money for the underground roads construction.
2. the public functions can connect the separated neighborhoods as a more united area. Stimulate the regional economy.
3. reduce the noise and air pollution.
potential communication activities - neighborhood communication center

- restaurants (traditional Chinese food)
- performances (Peking Opera)
- languages courses
- universities’ info exchange (for students wanting to study abroad)
- preschool education (part-time)
- student club activities (caring for the elderly)
- part-time looking after the children
- vocational skills retraining courses

- local people (especially elderly people)
- tourists
- students, teachers
- migrant workers
- children (mainly migrants’)

exchange (for students wanting to study abroad)
green space based landscape architecture
(providing various kinds of communication spaces for both formal and informal communication)

formal ways
informal ways

indoor spaces
outdoor spaces
semi-outdoor spaces

ways of communication

-lectures
-meetings
...
-exhibitions
-peking opera
...

-restaurants
-cafe, bars
...
-
-Festival temple fair
-open markets
...

-BBQ
-outdoor picnic
...

-outdoor fitness
...
urban context function research

people groups distribution

existing function distribution

service function distribution

<table>
<thead>
<tr>
<th>Groups</th>
<th>Living area (m²)</th>
<th>Numbers of people</th>
<th>Proportion (%)</th>
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<tr>
<td>Immigrants</td>
<td>81394</td>
<td>3710</td>
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<td>Residents</td>
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<table>
<thead>
<tr>
<th>Groups</th>
<th>m²</th>
<th>%</th>
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Legend:
- Residential
- Culture & sports
- Commercial
- Community services
- Public facility
- Others
Environmental Parameter Research

Graphs showing:
- Light/Low Temperature over months
- Relative Humidity with specific data points for Jan 31, Aug 4, Jul 20
- Wind Direction of Different Month (data for Oct and Nov are missing)
- Daily Hours of Daylight and Twilight
NOISE
The bridge passing cross the site are isolated by the noise isolation wall thus the spaces under the bridge actually are not influenced by the noise. Since the bridge is not covered at its top, noise level will increase when the space moves vertically.

HUMIDITY
The humidity and temperature analyse indicate that in summer it is hot and moist while in winter it is cold and dry. Both situations need ventilation to adjust the humidity. Although the situation is brutal, comparing Beijing with other cities like Wuhan or Guangzhou, it is not the worst. Wuhan and Guangzhou need mechanical ventilation because of a worse humidity situation, while it is more suitable for Beijing to use natural

SUN
The over-solar-radiated period in Beijing is only in summer. All through the year, the solar radiation has a small fluctuation. This means during the whole year, it is potential to use solar energy. The only problem is the consideration of shading in summer.

WIND
The Wind during the whole year has a small fluctuation except two months, which are Feb and Nov. This means the wind speed is stable. For spring and autumn, the natural ventilation can be used totally for changing the temperature and humidity inside buildings, because the outdoor temperature is also comfortable. For winter and summer, the ventilated fresh air will need precooling or preheating. This can be combined with the use of solar energy.

noise and sunhours are two significant environment parameters which will be set up into database later to influence the design.
function program inner relationship
COMPUTATIONAL STRATEGY

- Passive environment parameters
- Proactive environment parameters

- Design parameters
- Algorithm systems
- Technical support

- Static
- Dynamic
- New functions
- Surrounding functions
- Global shape
- Community entrances
- Tspline shape modeling

Swarm behavior multi_group_agents
environment data establishment

chosen paramaters:
- sunlight hours & noise levels

noise reduction formation:
\[ a = A - \log_{10}(4\pi x^2) \]

- \( a \): the noise result of a testing point
- \( A \): the decibel number of a noise source point
- \( X \): the distance between a testing point and the source point
neighborhood sun-light optimization

- sun path
- sunlight optimization control point

generated surface

new function
existing building
different A, S, C of different agents enable agents behave according to their own distribution rules.

multi_agents system.
simulation processes

simulation result option 1
starting random seed: 1

simulation result option 2
starting random seed: 3

simulation result option 3
starting random seed: 6

simulation result option 4
starting random seed: 8

building functions simulation result

plant elements simulation result

total simulation result
neighborhood sun-light optimization
generated programs

program connection
program height research

global shape
urban accesses & green interactions openings

urban context sunlight optimization
urban sunlight situation before optimization

urban sunlight situation after optimization
configuration result
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<thead>
<tr>
<th>Number</th>
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<tbody>
<tr>
<td>1</td>
<td>free reading</td>
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<td>2</td>
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</tr>
<tr>
<td>4</td>
<td>management</td>
</tr>
<tr>
<td>5</td>
<td>small vadio room</td>
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<tr>
<td>6</td>
<td>big vadio room</td>
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<tr>
<td>7</td>
<td>public study</td>
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<tr>
<td>8</td>
<td>lecture room</td>
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<td>Number</td>
<td>Location</td>
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<td>public reading room</td>
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</table>
1, culture center exhibition room  2, restaurant  3, fast car road  4, public reading room
5, underground car road  6, student dormitory  7, local residential building

east elevation
1, culture center exhibition room  2, restaurant  3, fast car road  4, public reading room
5, underground car road  6, student dormitory  7, local residential building

south elevation
one portion further development-construction & fabrication
structure analyze

finishing layer
- glass fibers reinforcement frames
- sprayed glass fibers
- CNC milled polystyrene foam segment
surface opening
<table>
<thead>
<tr>
<th></th>
<th>grass</th>
<th>sun hating bushes</th>
<th>sun loving</th>
<th>bamboo</th>
<th>low trunk trees</th>
<th>high trunk trees</th>
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</thead>
<tbody>
<tr>
<td>sunlight</td>
<td>65%</td>
<td>25%</td>
<td>85%</td>
<td>70%</td>
<td>50%</td>
<td>75%</td>
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<tr>
<td>noise absorbing</td>
<td>10%</td>
<td>20%</td>
<td>60%</td>
<td>80%</td>
<td>50%</td>
<td></td>
</tr>
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</table>
construction process

prefabricated components
constructed on site
spraying glass fiber
surface finishing
construction

finishing layer (5mm)
spayed glass fibers (18mm)
CNC prefabricated polystyrene foam

finishing layer (5mm)
glass fibers
wooden frame (20mm thickness)
steel connecting bolt

wooden frame connection
finishing layer (5mm)
sprayed glass fibers (18mm)
CNC prefabricated polystyrene foam
wood panel (60mm)
rubber layer
concrete
foundation steel pipe

finishing layer (5mm)
sprayed glass fibers (18mm)
CNC prefabricated polystyrene foam
glass fibers
wooden frame (20mm thickness)
steel connecting bolt
finishing layer (5mm)
spayed glass fibers (18mm)
reinforcement glass fiber
wood panel (60mm)
rubber layer
concrete

CNC prefabricated polystyrene foam
steel-nail
steel-bolt
prefabricated steel profile
triple glass
thank you for your attention