

***a (town) of
comings and
goings***

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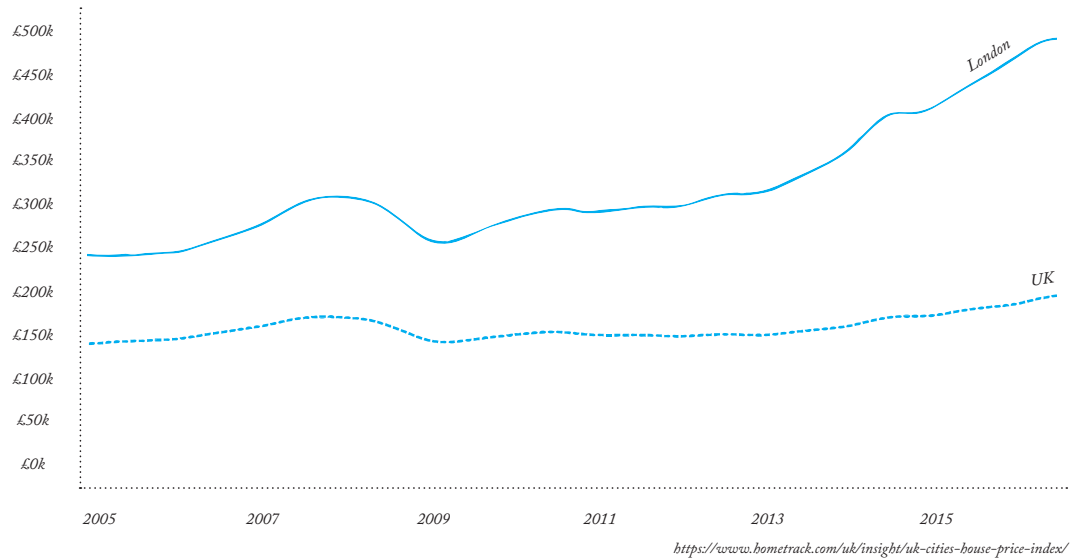
House Prices

Top

House prices in London are growing at a vastly higher rate than those in the rest of the UK.

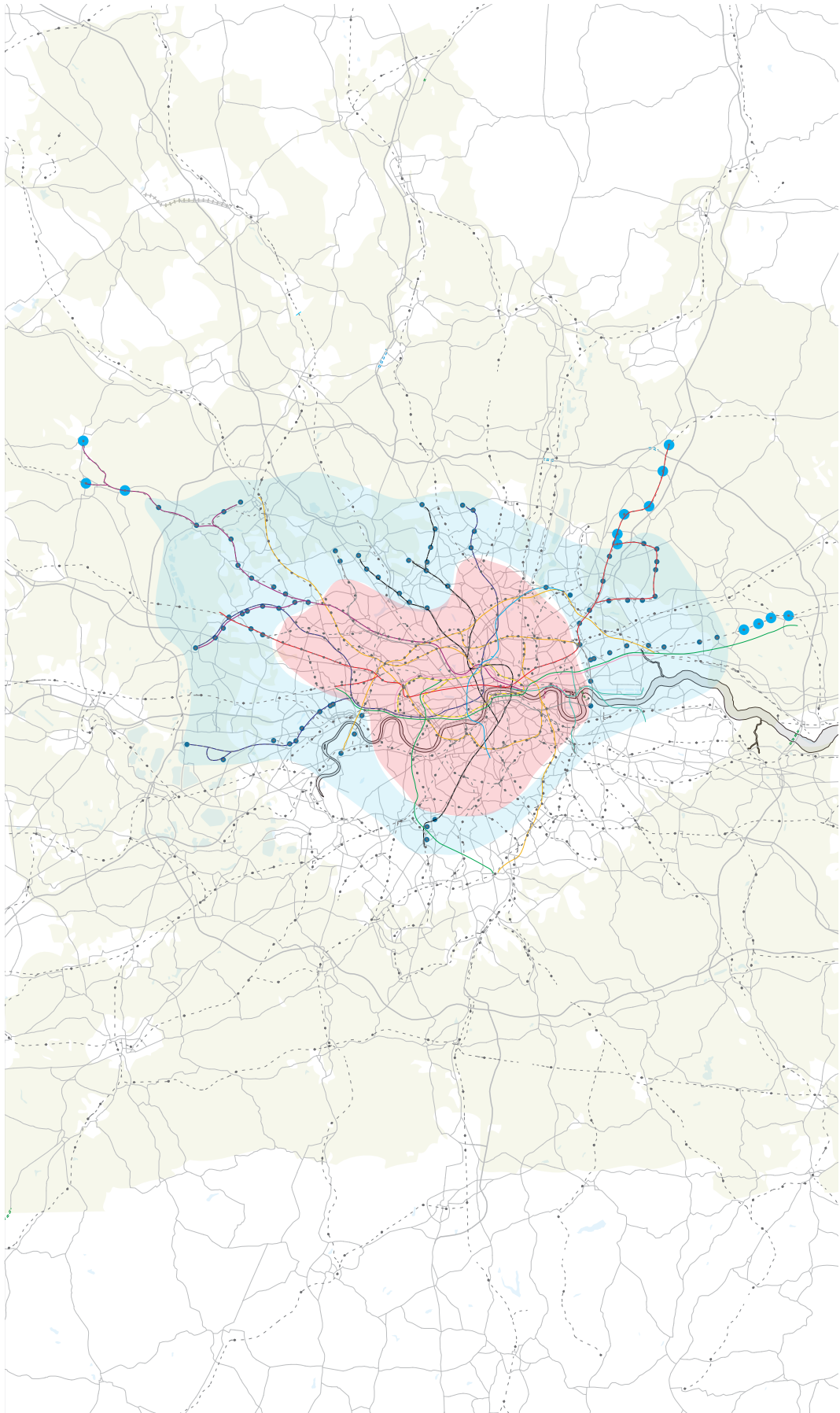
Bottom

Central London is becoming unaffordable – This map from the housing charity Shelter shows only stations that are ‘difficult to afford’ or ‘affordable’. Clearly, most of London is not affordable for the majority of people.



Unaffordability in London

Geographically mapped, this unaffordability is concentrated on the red centre. The pale blue area is difficult to afford, and the larger blue dots show affordable areas. These areas are all much further into the green belt of London.



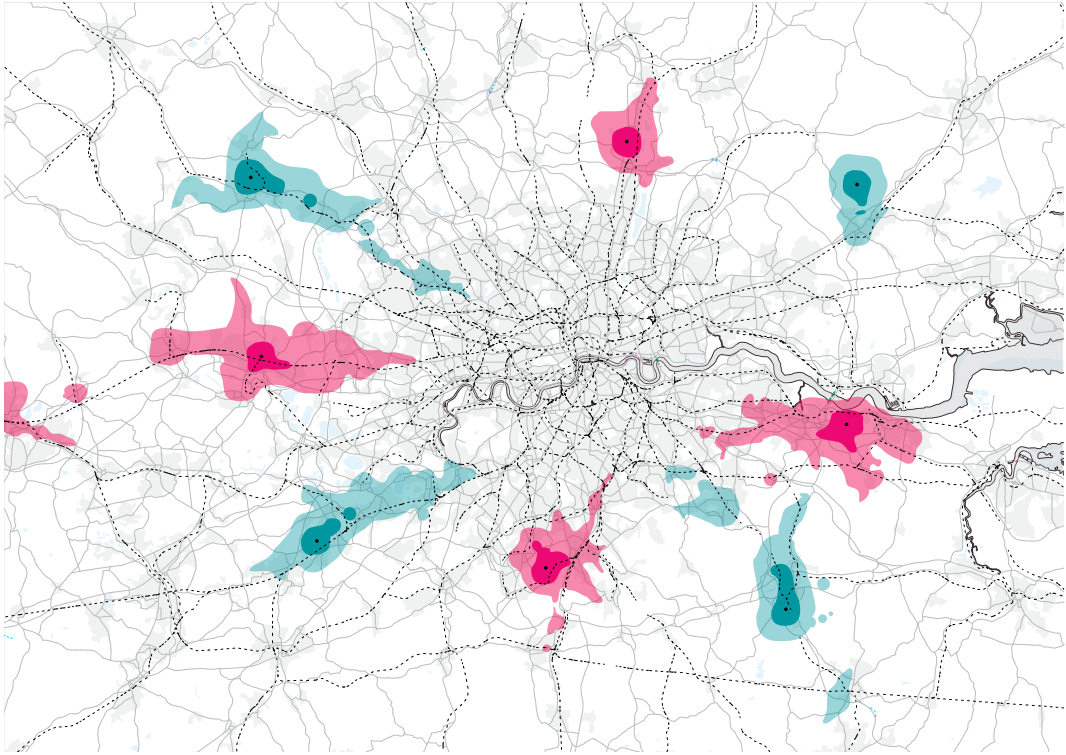
Public Transport Problems to and from the Suburbs

If we take a few examples of similarly affordable areas in London's green belt, and map the distances coverable by public transport, the results are striking.

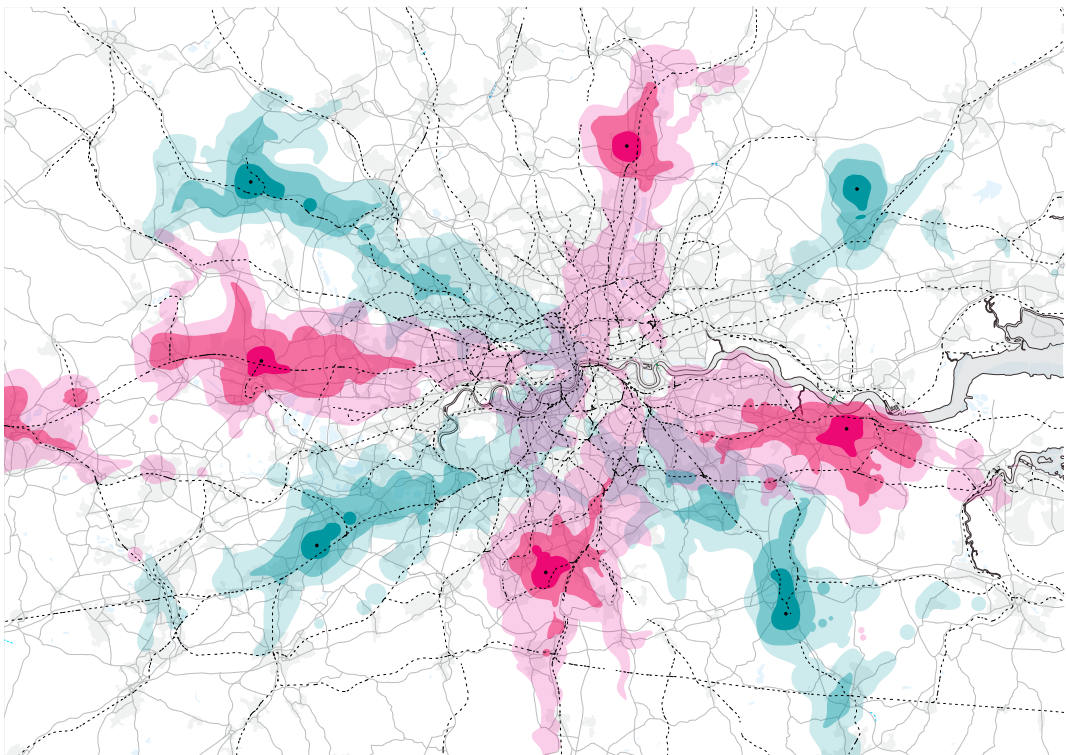
There is a clear radial wedge pattern from these outskirts to the centre of London, with few links around the outside. While it may take 60 minutes to reach central London, it would take much longer to reach a point geographically much closer.



20 minutes by public transport from black node



40 minutes

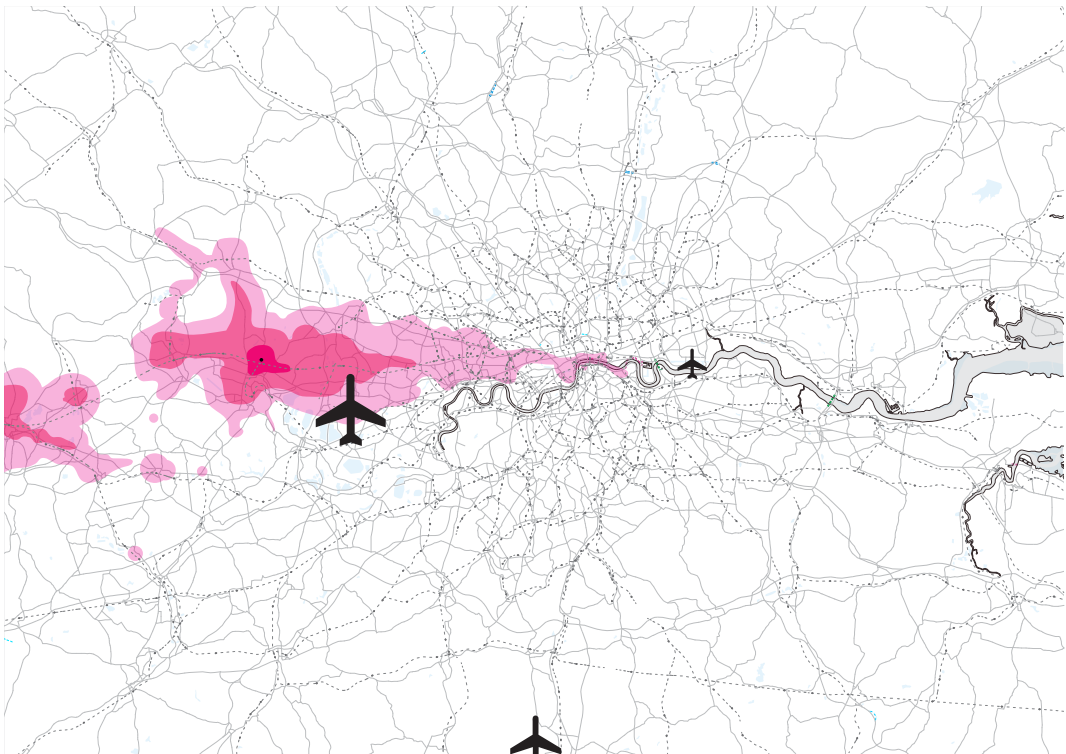
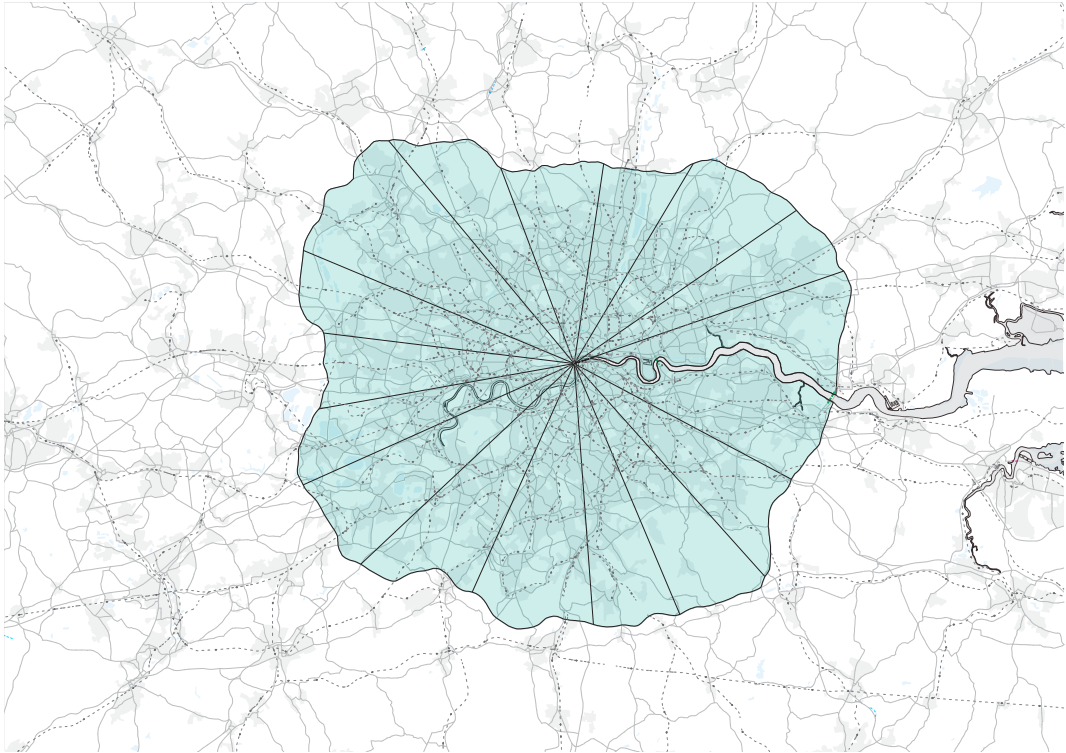


60 minutes

London as a Series of Wedges

London's train network divides the city into a series of wedges. The radiality of the network means that the focus is on Central London, and not its outskirts.

A particularly interesting wedge is that in the west, which includes Heathrow Airport, one of the busiest airports in the world. Most of London's other airports are located much further outside of the city (discounting London City Airport, which is much smaller and focussed on short haul flights).



Proposed Transport Links in the Western Wedge

Several transport links have been proposed for this wedge, which will reinforce the city's radiality.

There are two proposals that will do this in particular: Crossrail, proposed completion 2019; and Western Rail Link to Heathrow, proposed completion 2024.

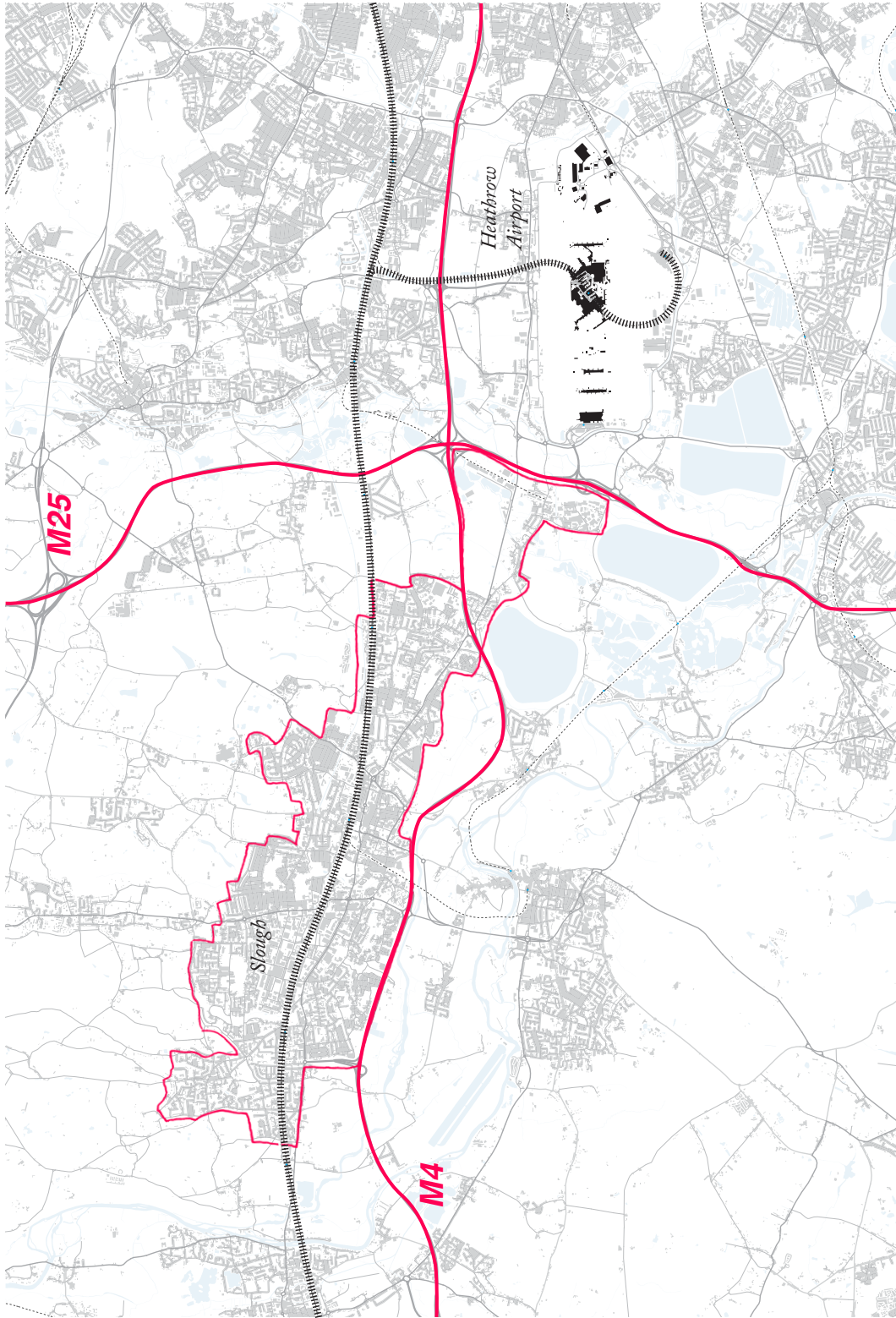


Western Rail Link to Heathrow

Critical Point in the Western Wedge

This is a critical point on the wedge system – it is the node between the M25 and M4, combined with the presence of Heathrow Airport and a number of plans for rail extension in the area. It is also the boundary line for London, Slough is the first town outside of the City's jurisdiction that is connected to Heathrow in terms of work and businesses.





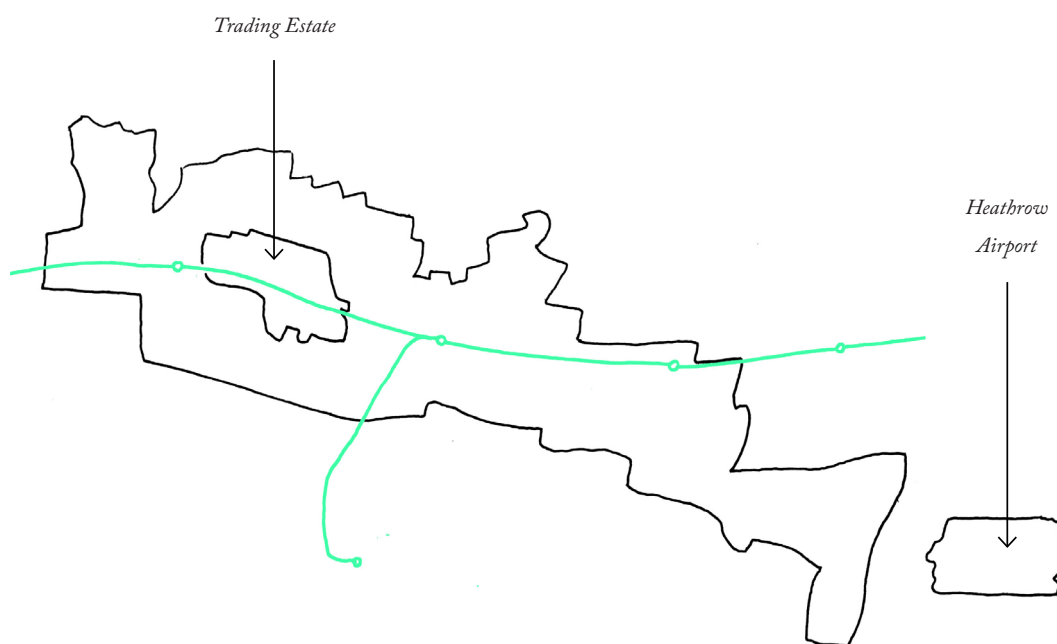


Slough's History

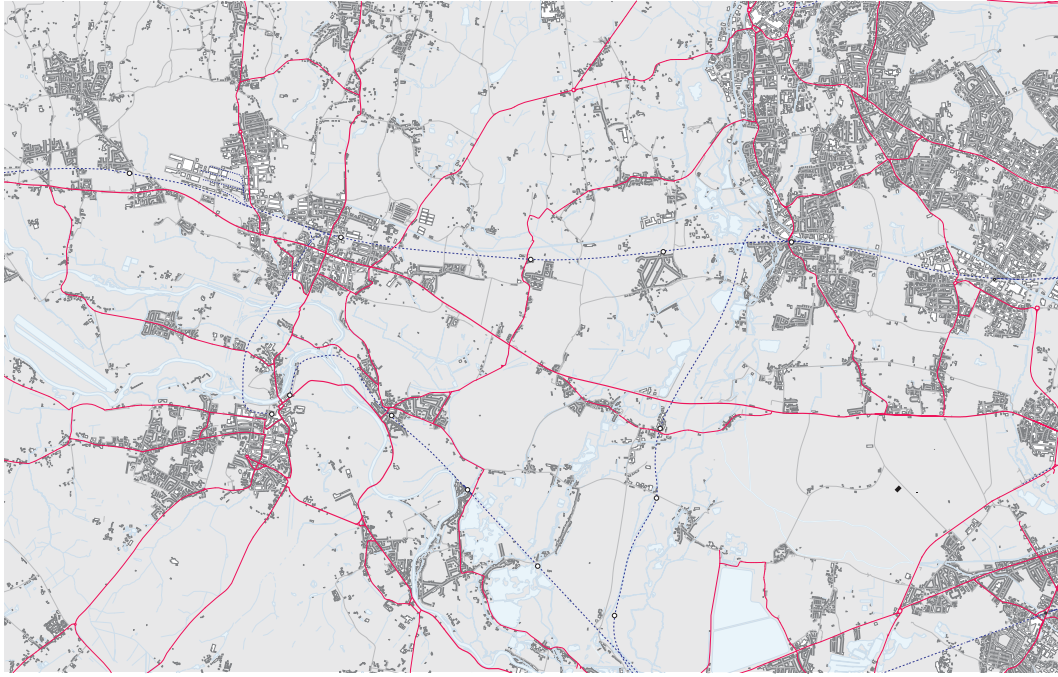
Slough has developed over the last century around two important points: the Slough Trading Estate and Heathrow Airport. The Trading Estate owes much of its success to the Airport, on which the town's employment is also heavily reliant.

The Trading Estate was built in the 1920s, the first of its kind in Europe.

Heathrow developed in the 1950s, as air travel became popular.

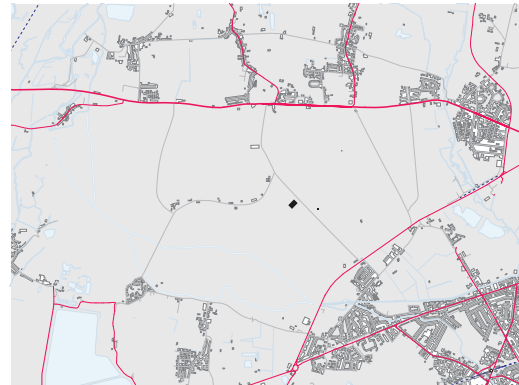


1945



Town / Trading Estate

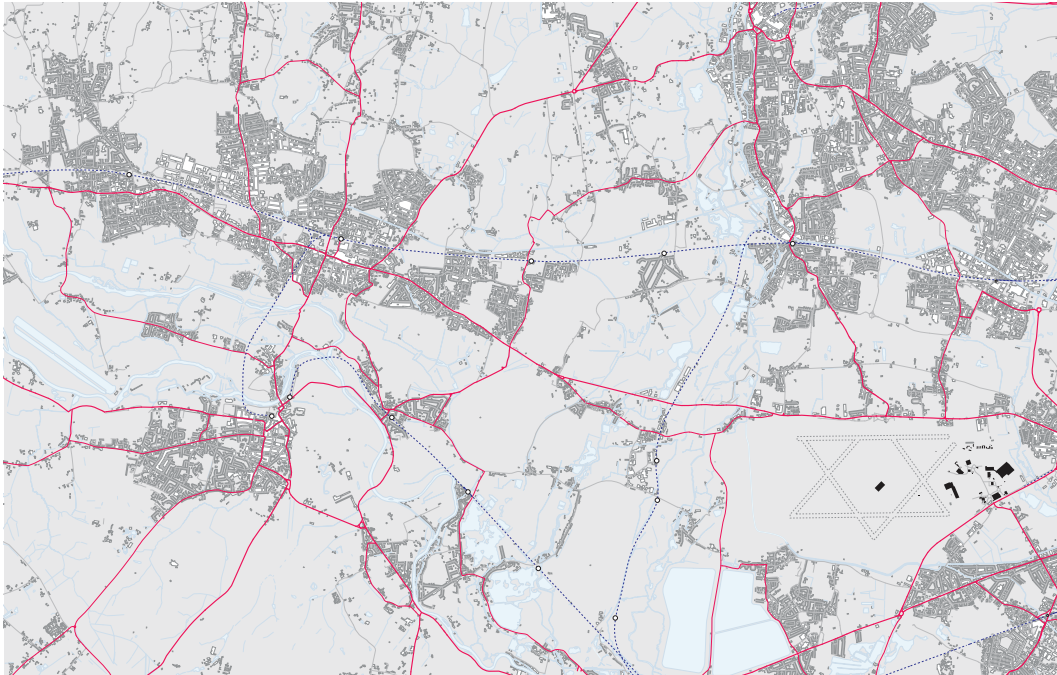
Airport



- *The town is growing around the station*
- *The Trading Estate is linked to the train lines and depends on this connection*
- *Many current areas of Slough are, at this point, still independent towns*

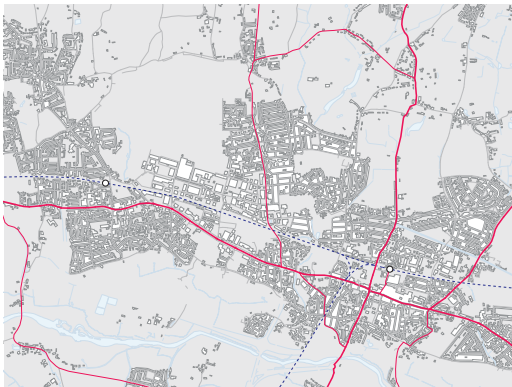
- *During WW2 a small aerodrome at Heath Row was used*
- *The area is mostly farm land, with a few very small hamlets*
-

1960

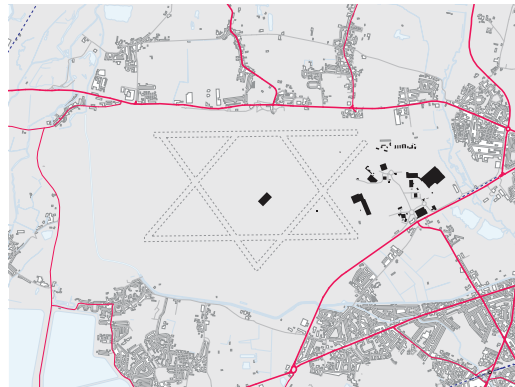


Town / Trading Estate

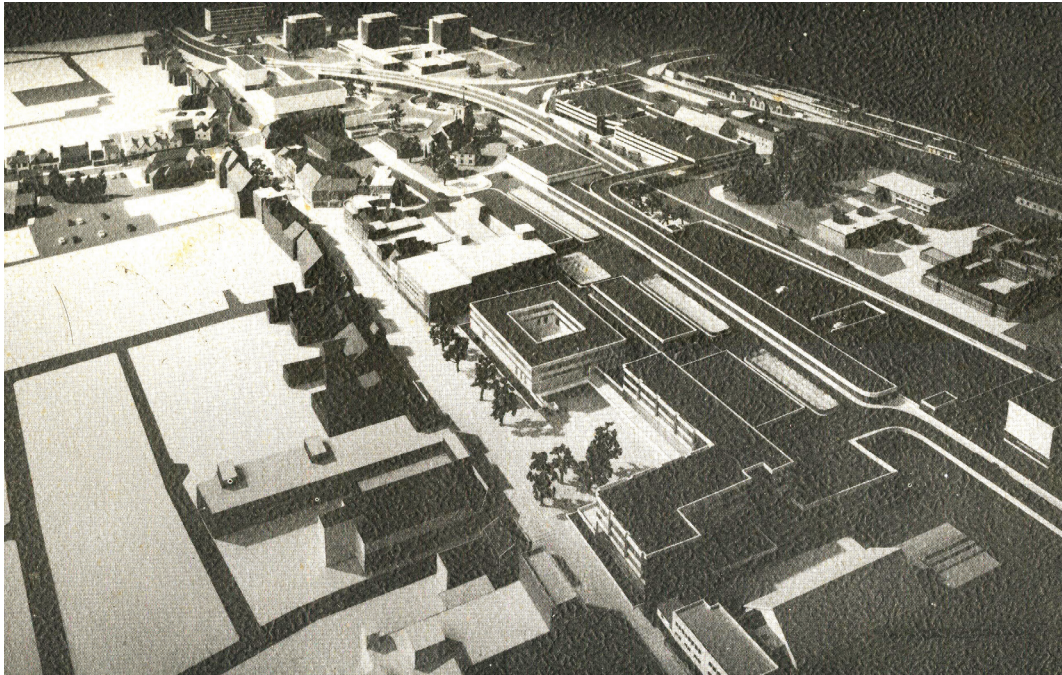
Airport



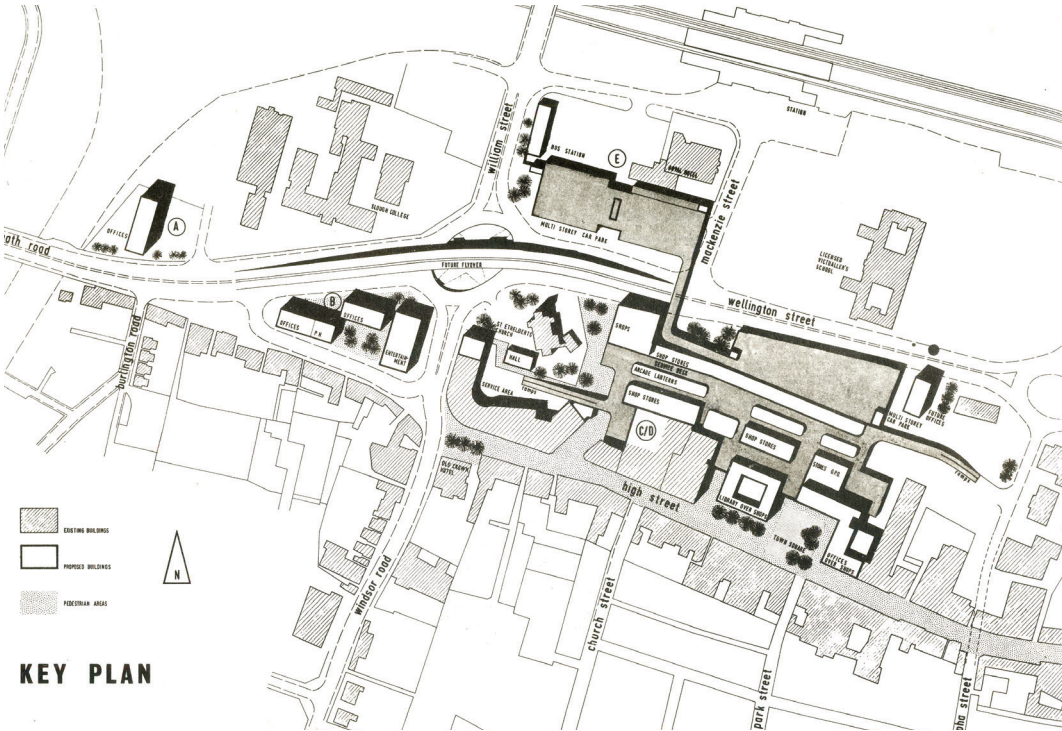
- Roads through Slough becoming more major
- Trading Estate still on the edge of Slough
- Trading Estate directly served by rail – mostly manufacturing industries



- After WW2 and into the 1950s, 6 runways are built in a star formation
- Terminal buildings built in central area
- Still no underground or rail connection to the airport



In the 1960s, there was huge redevelopment of the centre of Slough, demolishing the historic High Street and replacing it with large concrete shopping centres, for better separation between traffic and pedestrians.



Slough Today and Development Plans

2016



Town / Trading Estate



- Lots of major roads through Slough
- M4 and M25 now serve Slough (M25 opened 1986)
- Trading Estate has been enveloped by Slough
- Trading Estate no longer served directly by rail: service
- industries have taken over manufacturing

Airport



- Airport now has 5 terminals
- Served by rail and underground
- Roads re-routed around the area
- Very close to M25

2015



2020

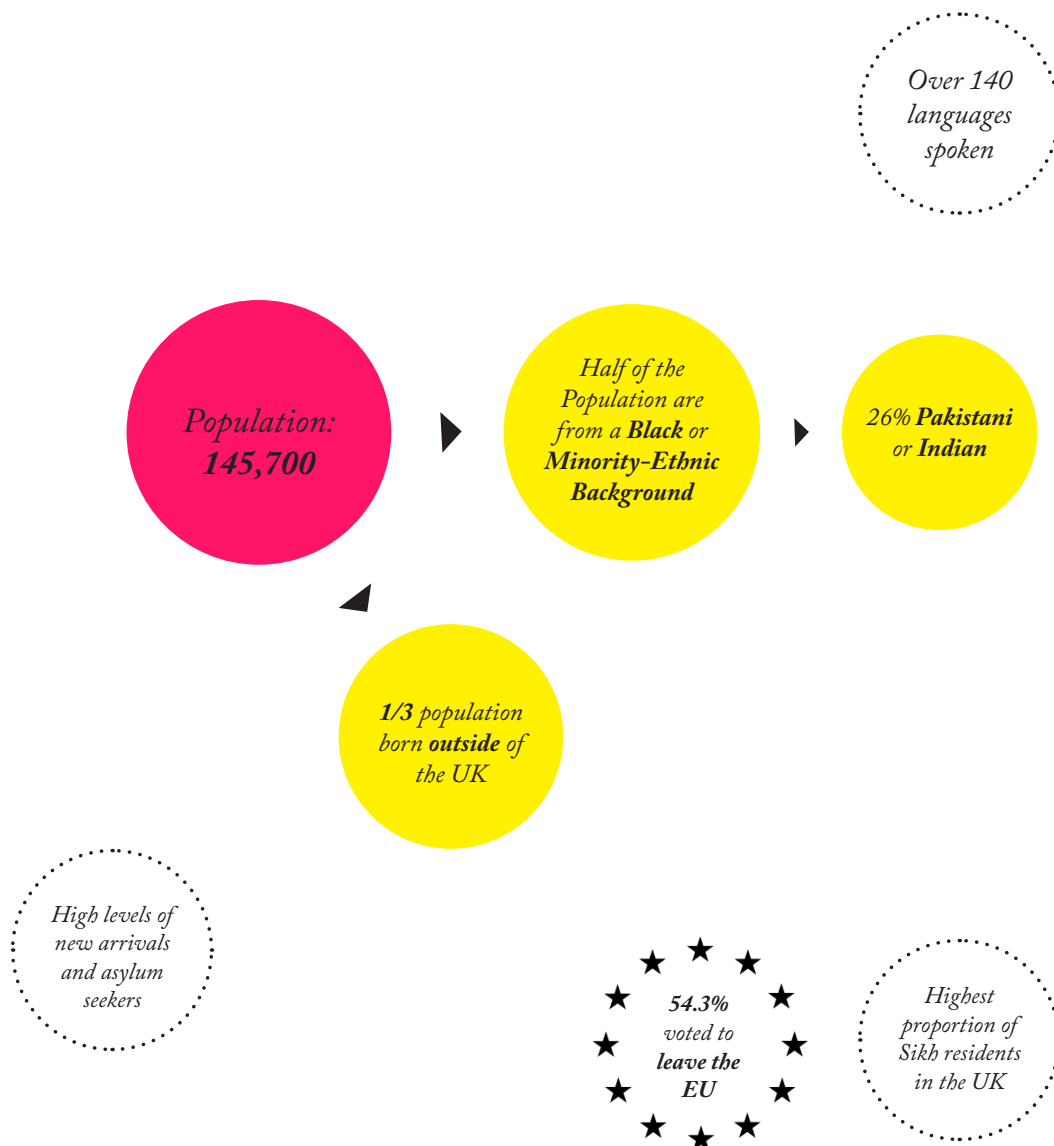


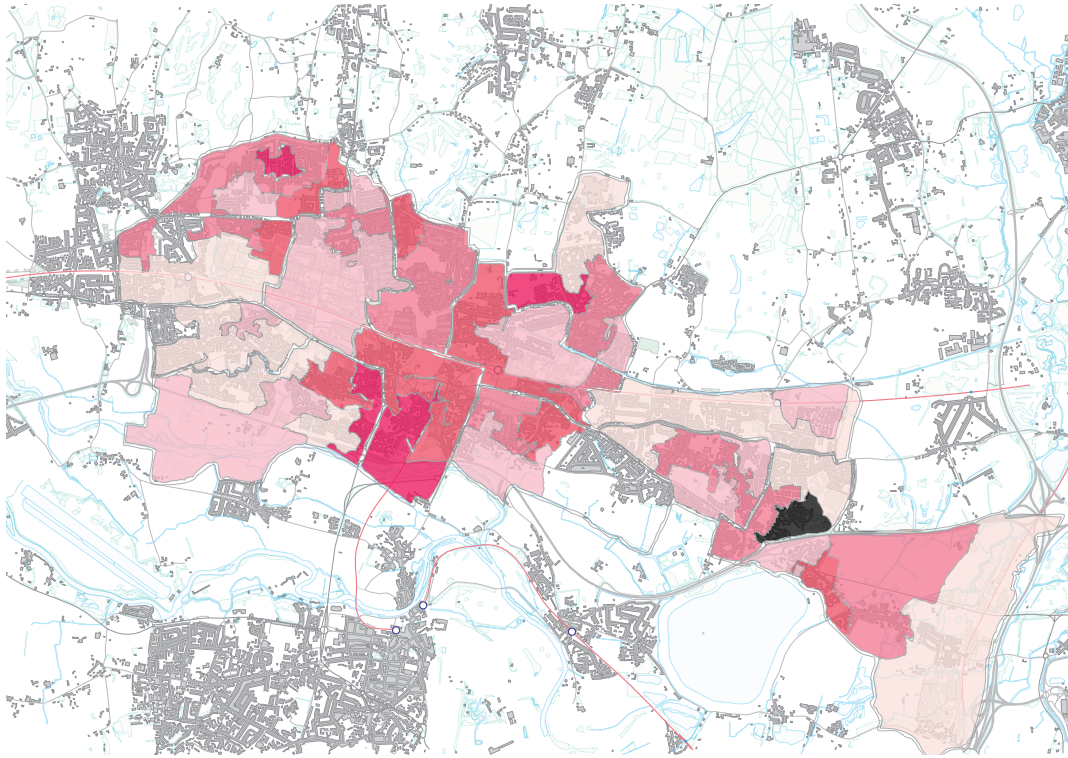
Over £45m of public money has already been spent on or is committed to the redevelopment of: 1,600 homes; a Cultural Centre; 70,000 sqm of office space; Retail and leisure spaces; 120 bed hotel and a bus station.

Slough

Slough is a critical point on this western wedge. Situated just outside the M25, and on an increasling high speed link into London, Slough is strangely unconnected to Heathrow Airport, just next door.

The town is hugely diverse, and somewhat left behind other neighbourhoods in the region – levels of deprivation in this area are much higher than the surrounding districts.





deprivation in Slough

Slough is relatively deprived compared to the areas surrounding it and the rest of England. This deprivation is a culmination of: Crime, barriers to housing and services, living environment, income, education skills and training, and health and disability.

The image above shows the more deprived areas with darker pink and the most deprived area – Foxborough – in black.



The city centre is made up of heavy traffic roads and busy roundabouts and intersections



The High Street – Mainly low cost shops and large shopping centres



The shopping centres are large shed buildings that take up huge amounts of space in the city centre



Just off the Hight Street, the town becomes residential, with low, two-story family houses

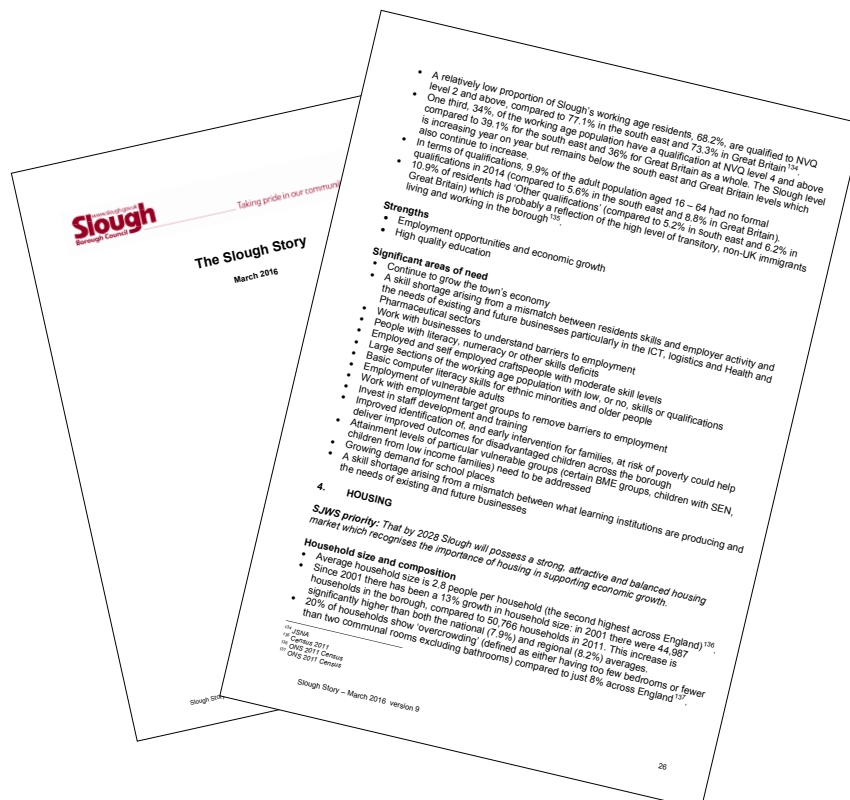
Employment in Slough

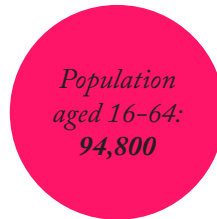
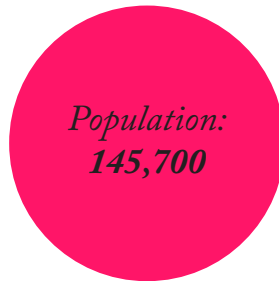
Slough is described as having a 'comparatively high employment, low wage economy'. It does not have huge employment problems, but those who are in work do not earn huge amounts.

One of the key features of Slough is the daily turnover in inhabitants – about half of the working population leaves Slough to work in low-skilled employment elsewhere (either at Heathrow or in the surrounding areas). These inhabitants are replaced by about 40,000 people who work on the trading estate in relatively high skilled jobs. The figures opposite demonstrate the disparity between the earnings of those who live in Slough but work elsewhere and those who live elsewhere and work in Slough. Although not a huge difference, this indicates a difference in skills sets between the two groups.

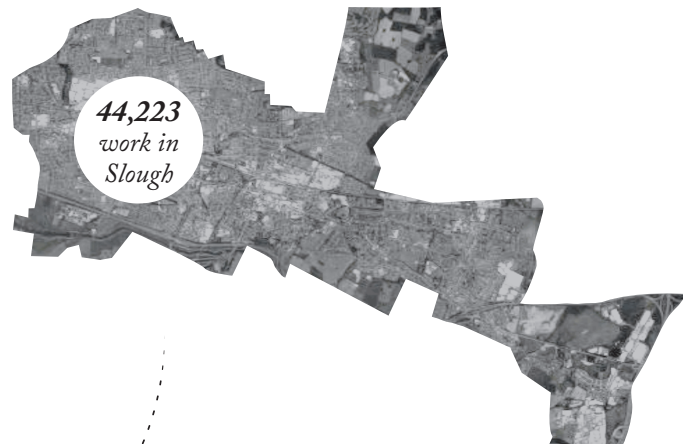
**1 in 10 jobs in
Slough
directly attributable
to Heathrow**

**28% - 40%
jobs reliant on
Heathrow**





£574.20
(gross p/w)



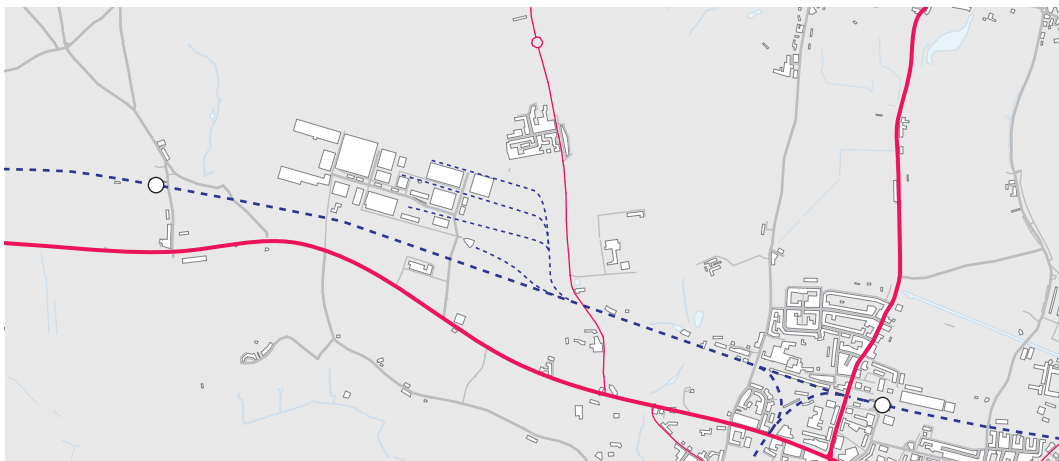
different
●
skills sets



£528.60
(gross p/w)

Slough Trading Estate: Origins

A large part of the employment of Slough is based in or reliant upon the Trading Estate. Opened in the 1920s, it was the first business park in Europe, designed to draw employment from Central London. Originally, the Trading Estate contained light industry, connected to the main train network with a series of rail tracks.



1920s



1945



Famously characterised in the poem by John Betjemen, Slough and its Trading Estate have always had a bad reputation.

“ Come, bombs and blow to smithereens
Those air -conditioned, bright canteens,
Tinned fruit, tinned meat, tinned milk, tinned beans,
Tinned minds, tinned breath.

*Mess up the mess they call a town-
A house for ninety-seven down
And once a week a half a crown
For twenty years.*

*And get that man with double chin
Who'll always cheat and always win,
Who washes his repulsive skin
In women's tears:*

*And smash his desk of polished oak
And smash his hands so used to stroke
And stop his boring dirty joke
And make him yell.*

*But spare the bald young clerks who add
The profits of the stinking cad;
It's not their fault that they are mad,
They've tasted Hell. ”*

*[extract] Slough
by John Betjemen 1937*

Slough Trading Estate: Today

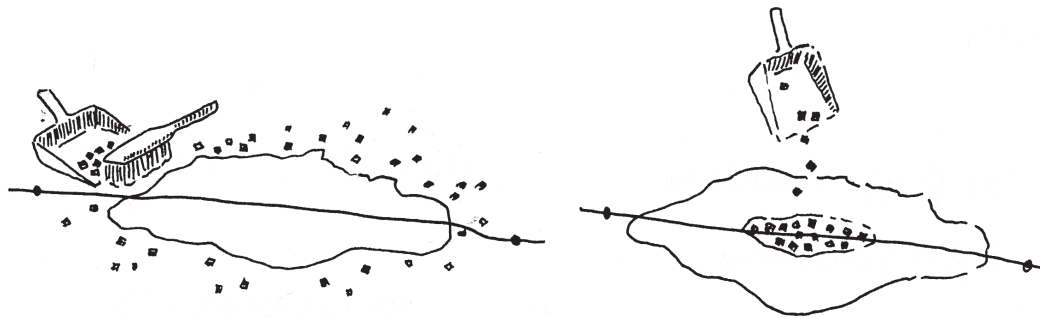
Nowadays, the Trading Estate has been swallowed up by the town. Residential areas have grown up around it and it has become the centre. This has resulted in the opposite to the conventional urban form of a town: where usually the light industry and services surround the outskirts, in Slough they are the centre.



1960



2016



above *Slough has a very strange urban structure. Whereas most towns are surrounded by light industrial buildings, in Slough these make up the centre - it is as if they have been swept up and dropped in the middle.*

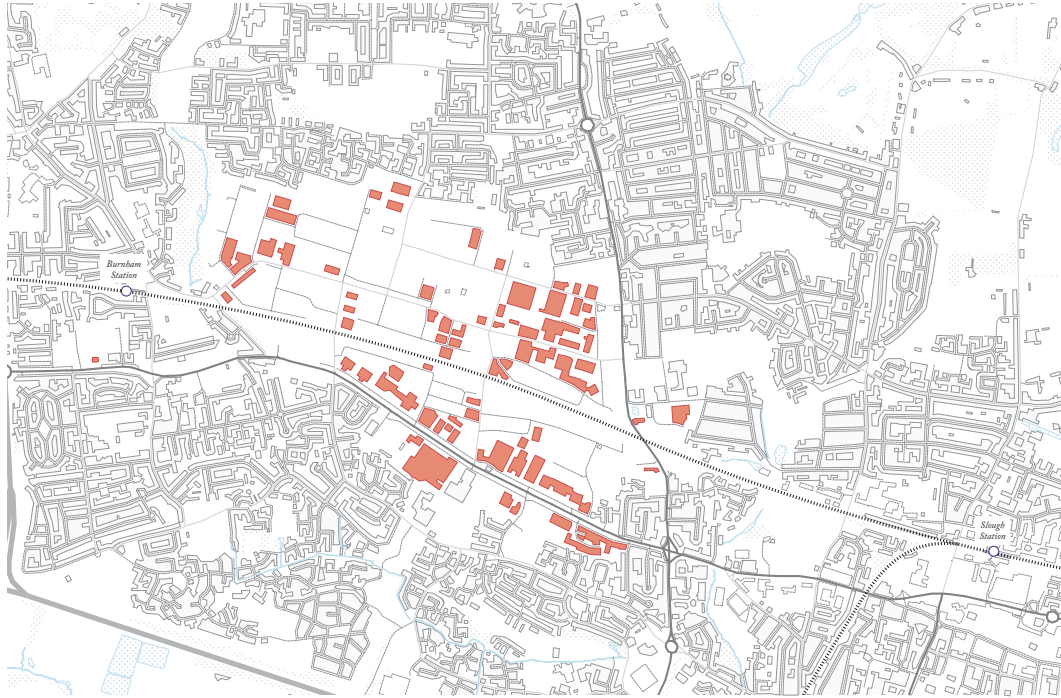
right *Slough Trading Estate was characterised in the sitcom 'The Office'. It shows something about Slough that they chose it as the backdrop for the generic office environment they were trying to portray.*



right *Slough Trading Estate today. Mostly shed buildings and large offices, the area has little character and is completely car-centric.*



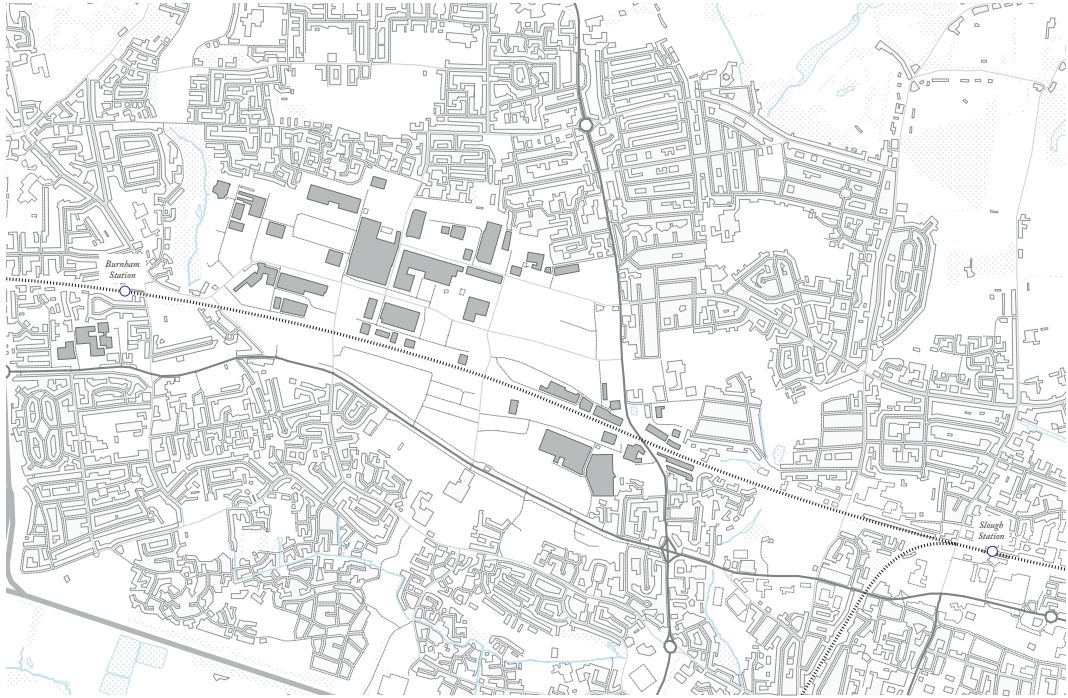
Slough Trading Estate: Typologies



1. Offices



2. Retail

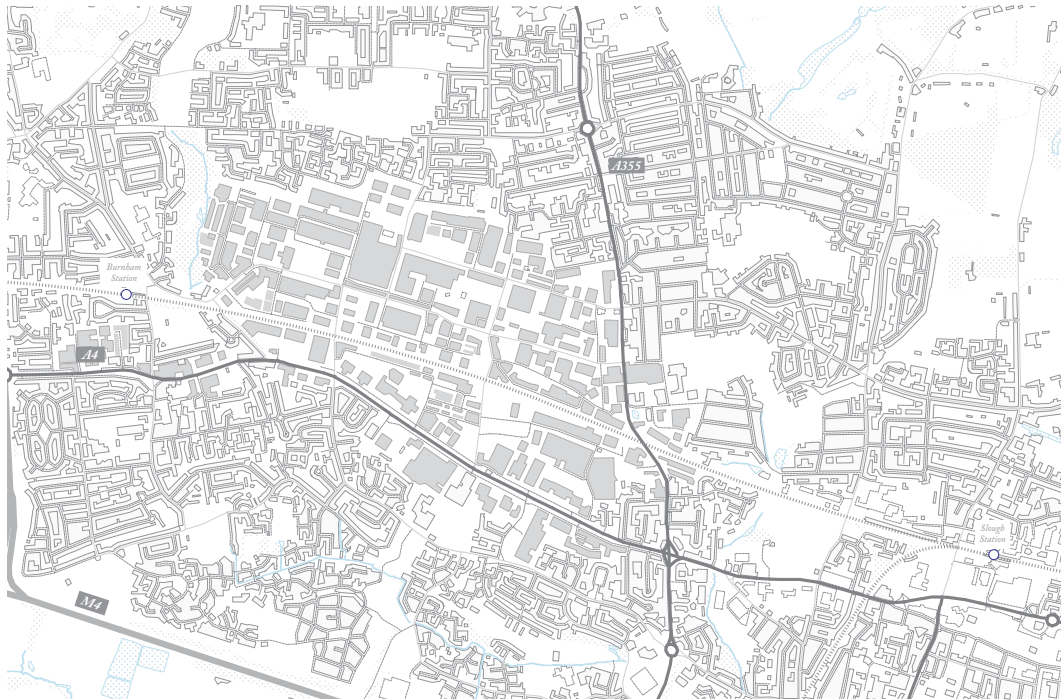


3. Warehouses

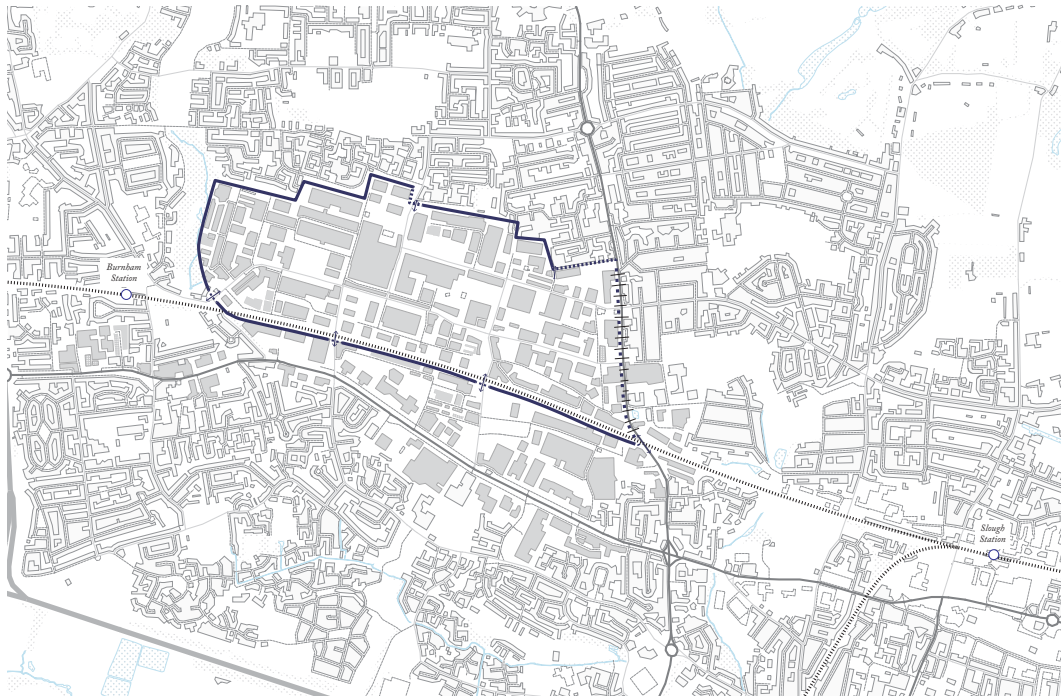


4. Light Industrial / Small offices

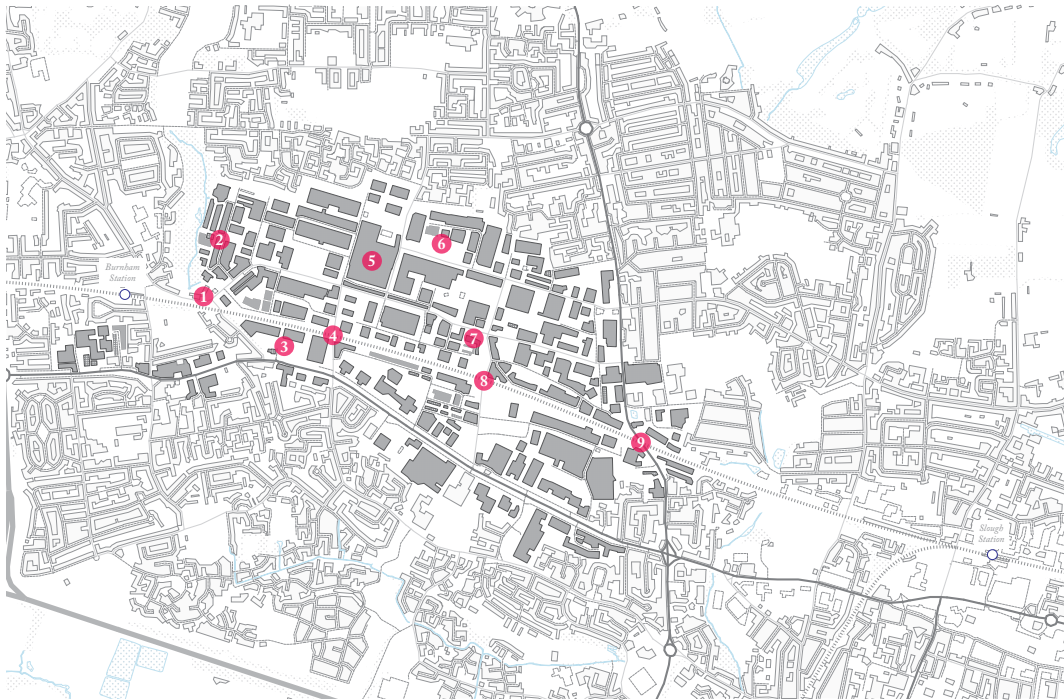
Slough Trading Estate



Important roads: The site is bounded on two sides by important routes to nearby towns.



Accessibility: The northern and north-western edges of the site are mostly impenetrable. The site is bounded on its southern edge by the mainline railway line. The eastern edge is the most permeable, lined with large scale retail units such as building merchants and supermarkets.



Points of interest

- 1** **Entrance to Trading Estate**
From Burnham Station
- 2** **The Source Cafe:**
The only public cafe in this area
- 3** **Retail Outlets**
Large warehouse-like shops – used by public
- 4** **Entrance to Trading Estate**
Over railway bridge
- 5** **Mars Factory**
Only large scale manufacturers left on the site
- 6** **Slough Heat and Power**
Power Station
- 7** **Public Amenities**
Small shops, banks – mostly lunchtime custom
- 8** **Entrance to Trading Estate**
Over railway bridge
- 9** **Entrance to Trading Estate**
Via key road in Slough: A335



1

**Entrance to
Trading Estate**
*From Burnham
Station*





2

The Source Cafe
*The only public
cafe in this area*





3

Retail Outlets

*Large warehouse-like
shops used by public*





4

**Entrance to
Trading Estate**
Over railway bridge





6

**Slough Heat and
Power**
Power Station

5

Mars Factory
*Only large scale
manufacturers
left on the site*





7

Public Amenities

*Small shops, banks
- mostly lunchtime
custom*





9

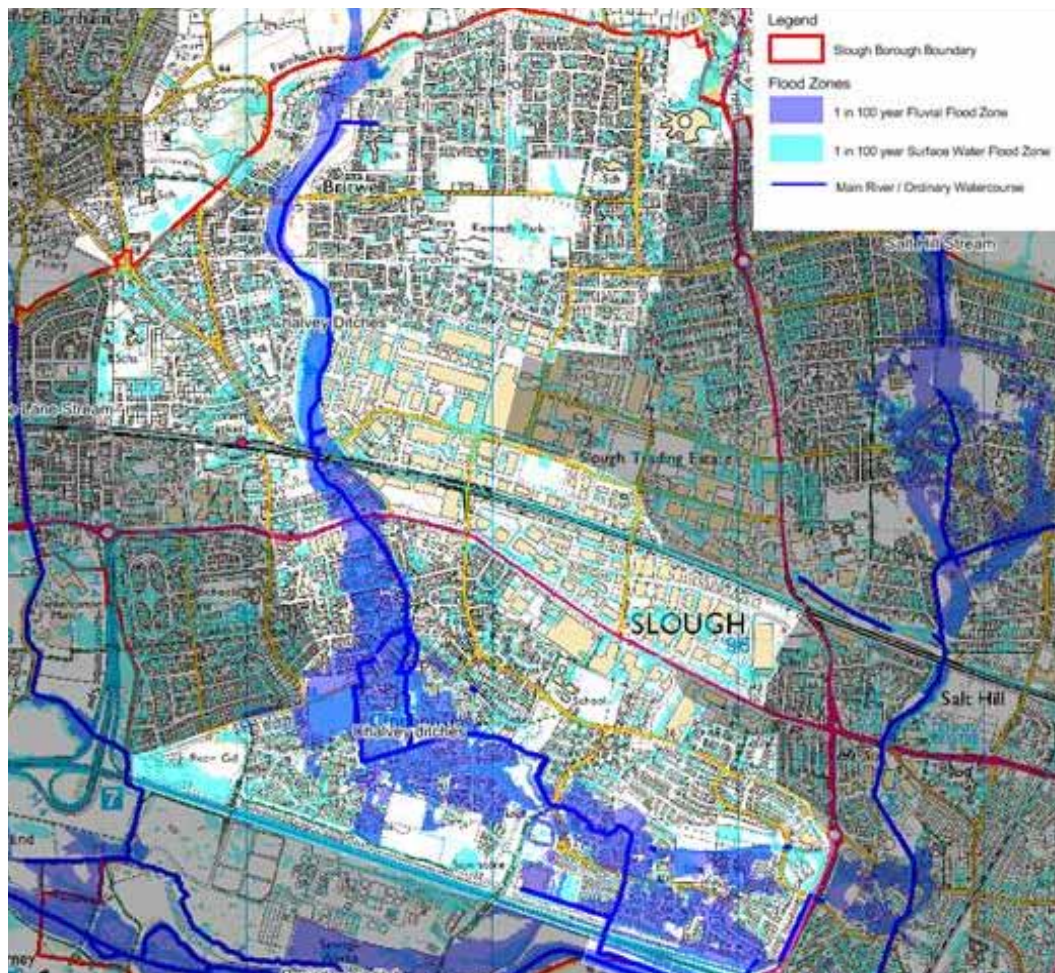
**Entrance to
Trading Estate**
*Via key road in
Slough: A335*

8

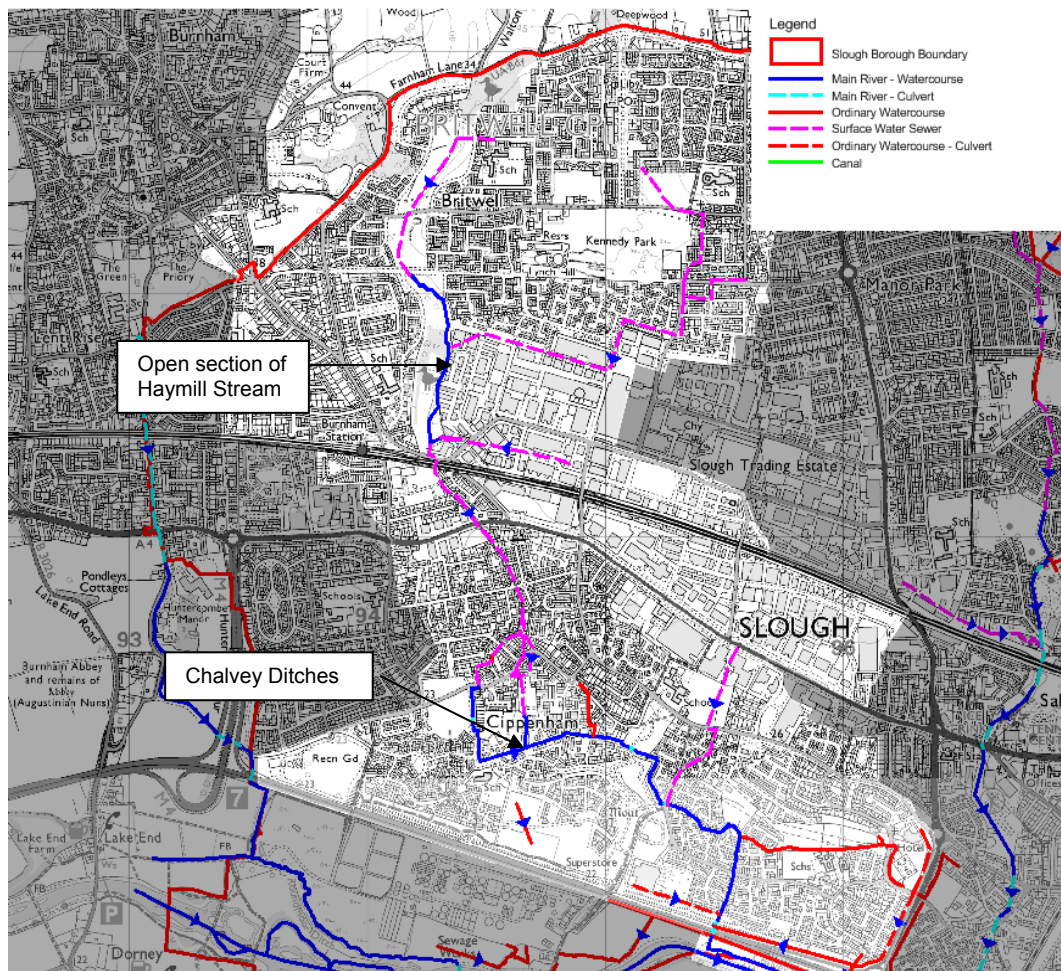
**Entrance to
Trading Estate**
Over railway bridge



Flood Risk on the Trading Estate



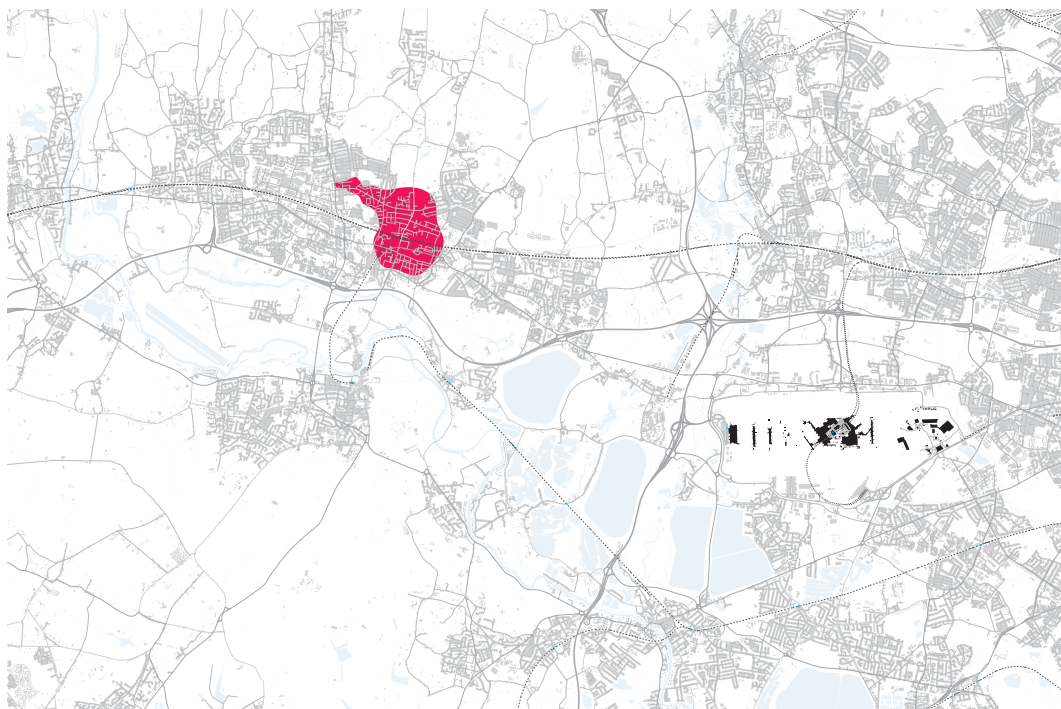
Risk of surface flooding is relatively serious on the Trading Estate, and risk of fluvial flooding is relatively great in the green area to the west of the site. Two important drainage sewers are present running across the Trading Estate (opposite).



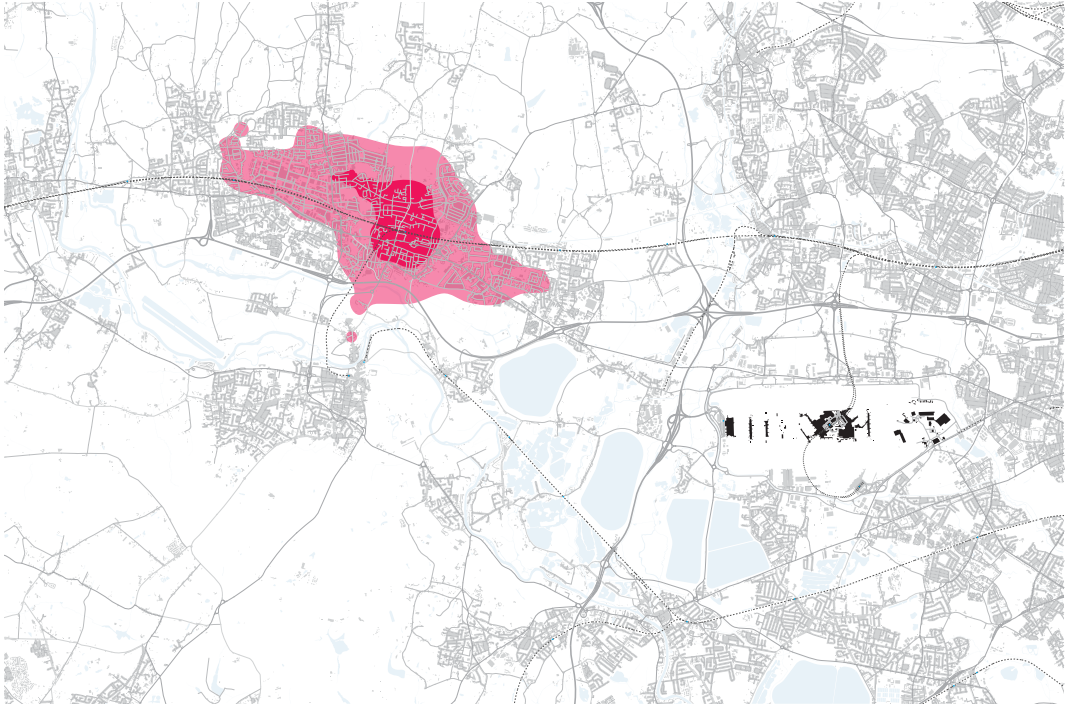
Public Transport Links from Slough

With Slough Station as a starting point, these maps show the distance that can be covered on public transport in 10-minute increments. Clearly, the train line allows travel to other towns along the same line within half an hour, but the problem is connecting to the outskirts of Slough.

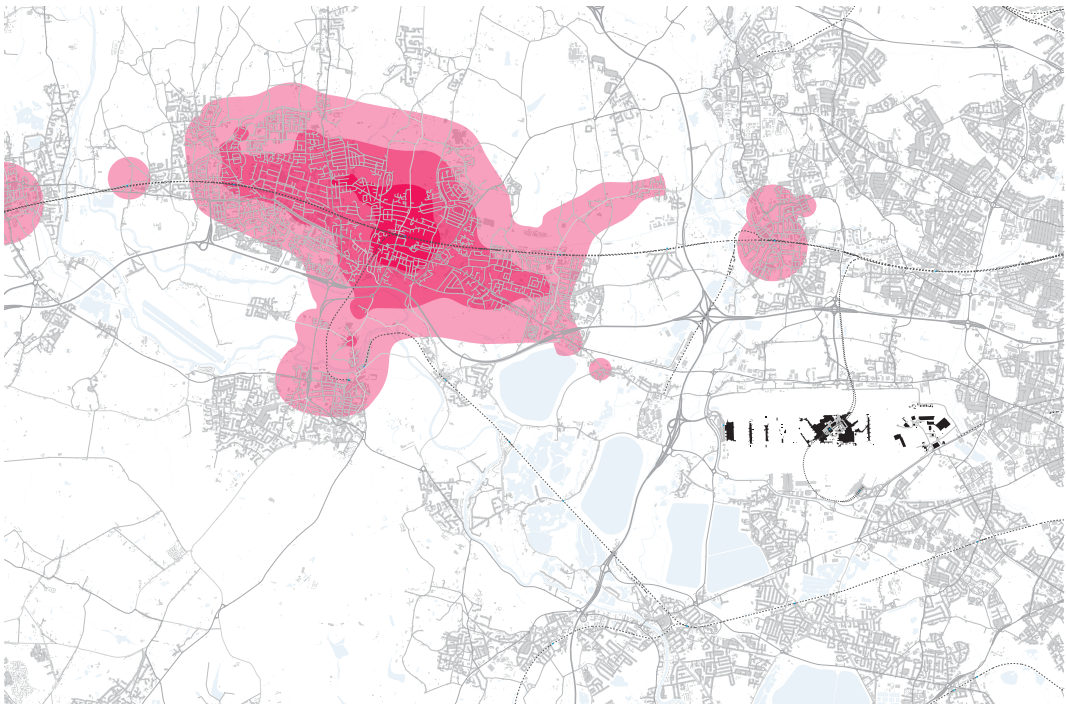
10 minutes



20 minutes

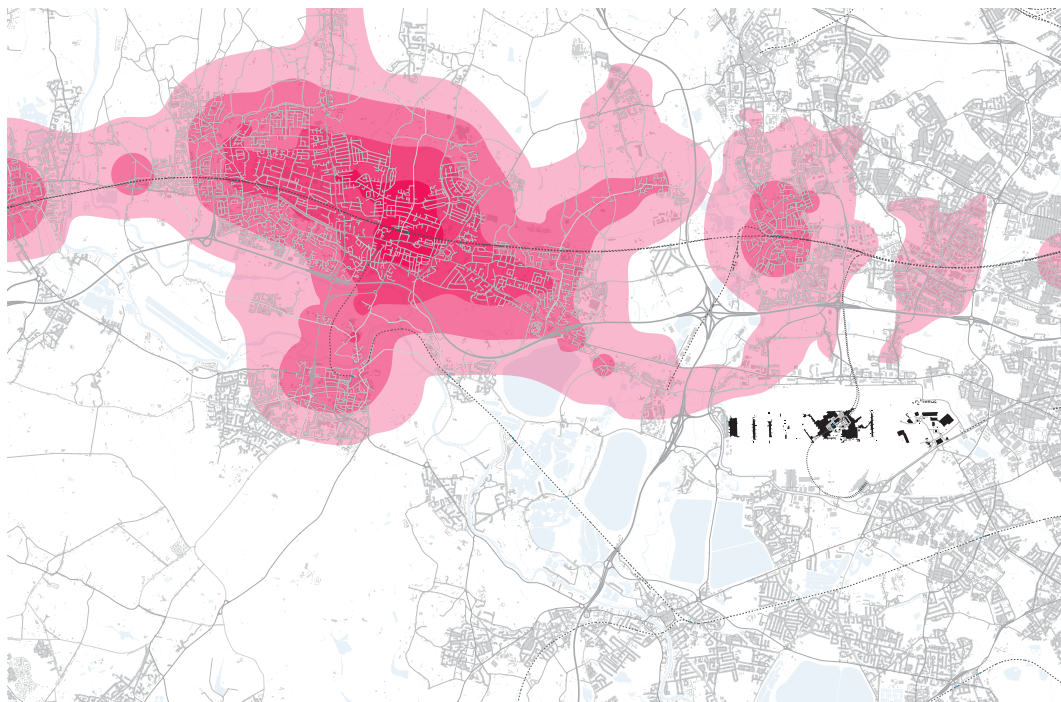


30 minutes

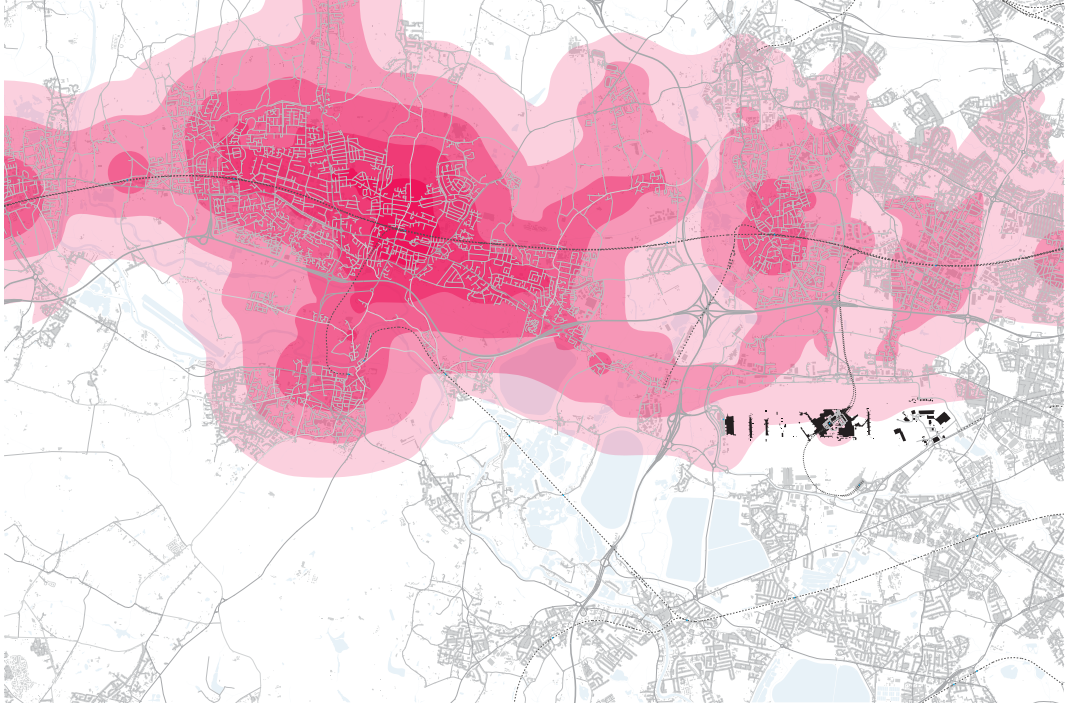


Although it is possible to reach Central London in less than an hour from Slough Station, it is more difficult to reach places that are less far. For example, to reach Heathrow Airport, which should take 12 minutes in the car with no traffic, takes around 50 minutes on public transport. With regards to reaching other surrounding areas, the problem is even more pronounced.

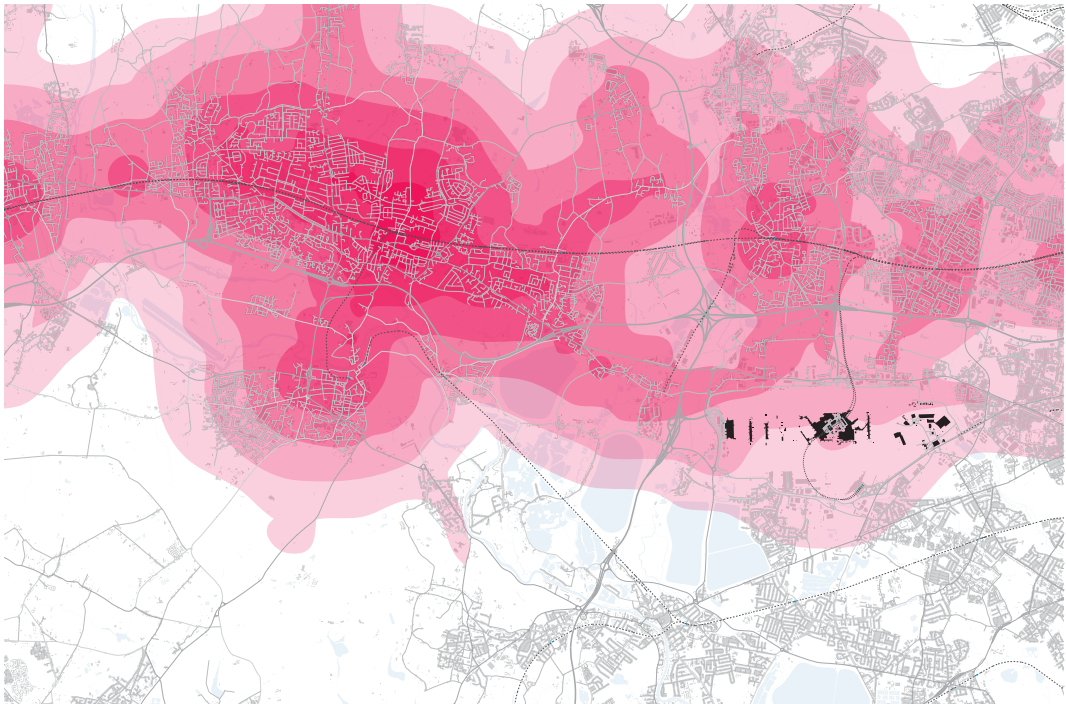
40 minutes



50 minutes



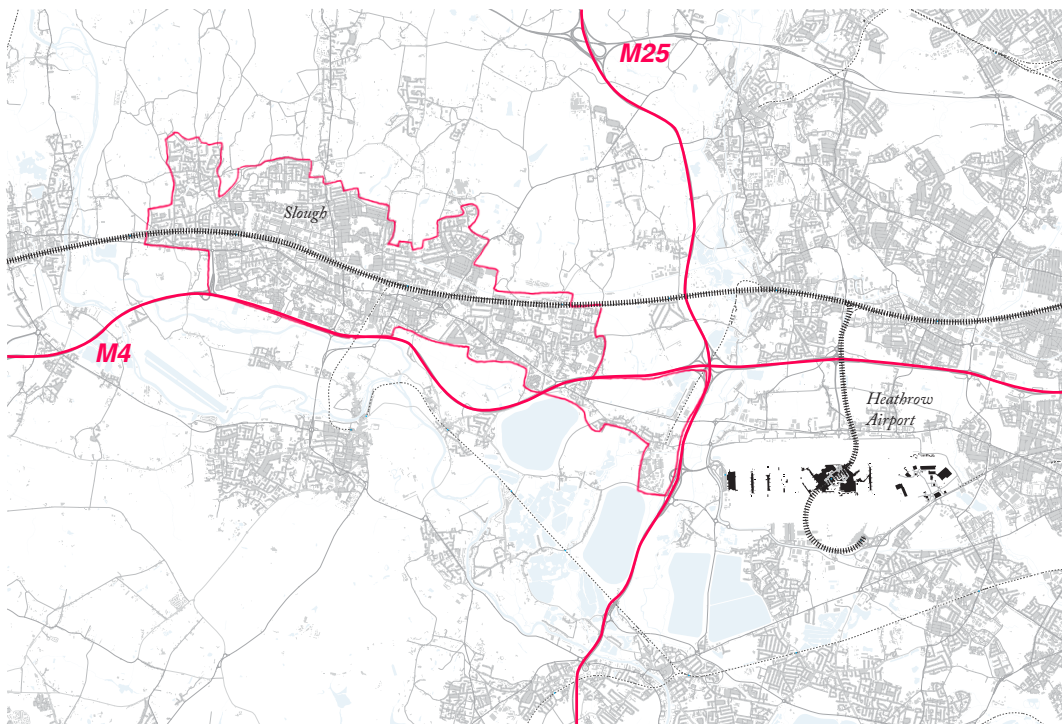
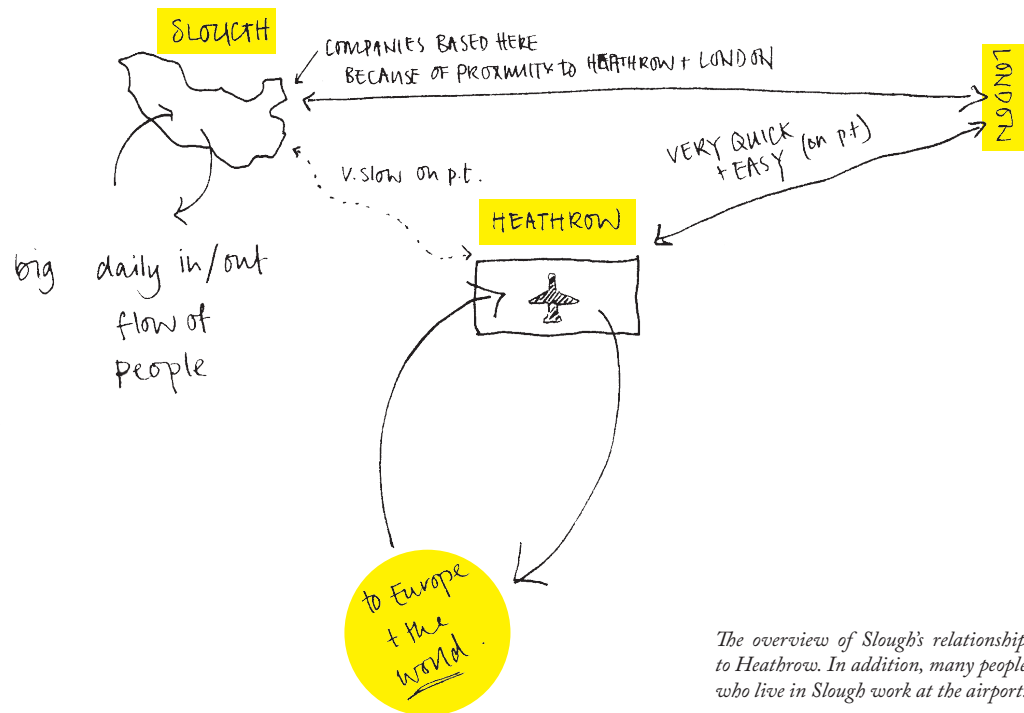
60 minutes



The Wider Picture

Slough's built area is made up mostly from large sheds, or semi-detached housing. This is especially striking in this image, which shows the disconnection between the residential and the business districts. Part of Slough's problem is that the money made in the Trading Estate does not always make its way down to the people who live there.





The Trading Estate's Development Plans

Equally, there are plans to develop the Trading Estate. The proposal plans to introduce more public space and improve pedestrian access.

On top of this, there is clearly an intention to raise the profile of the business park, by building with glass and steel for a more 'business like' feel. This may make the area more of a business district than trading estate, but may not solve some of the area's real problems, such as the disconnection to the rest of Slough.





Top 10 Busiest Airports in the World, 2015:

(total passenger numbers)



1.	<i>Hartsfield-Jackson Atlanta Airport (United States)</i>	101,491,106
2.	<i>Beijing Capital Airport (China)</i>	89,938,628
3.	<i>Dubai International Airport (United Arab Emirates)</i>	78,014,841
4.	<i>Chicago O'Hare Airport (United States)</i>	76,942,493
5.	<i>Tokyo Haneda Airport (Japan)</i>	75,316,718
6.	<i>London Heathrow Airport (United Kingdom)</i>	74,985,748
7.	<i>Los Angeles Airport (United States)</i>	74,937,004
8.	<i>Hong Kong Airport (China)</i>	68,283,407
9.	<i>Paris Charles de Gaulle Airport (France)</i>	65,766,986
10.	<i>Dallas/Fort Worth Airport (United States)</i>	64,072,468

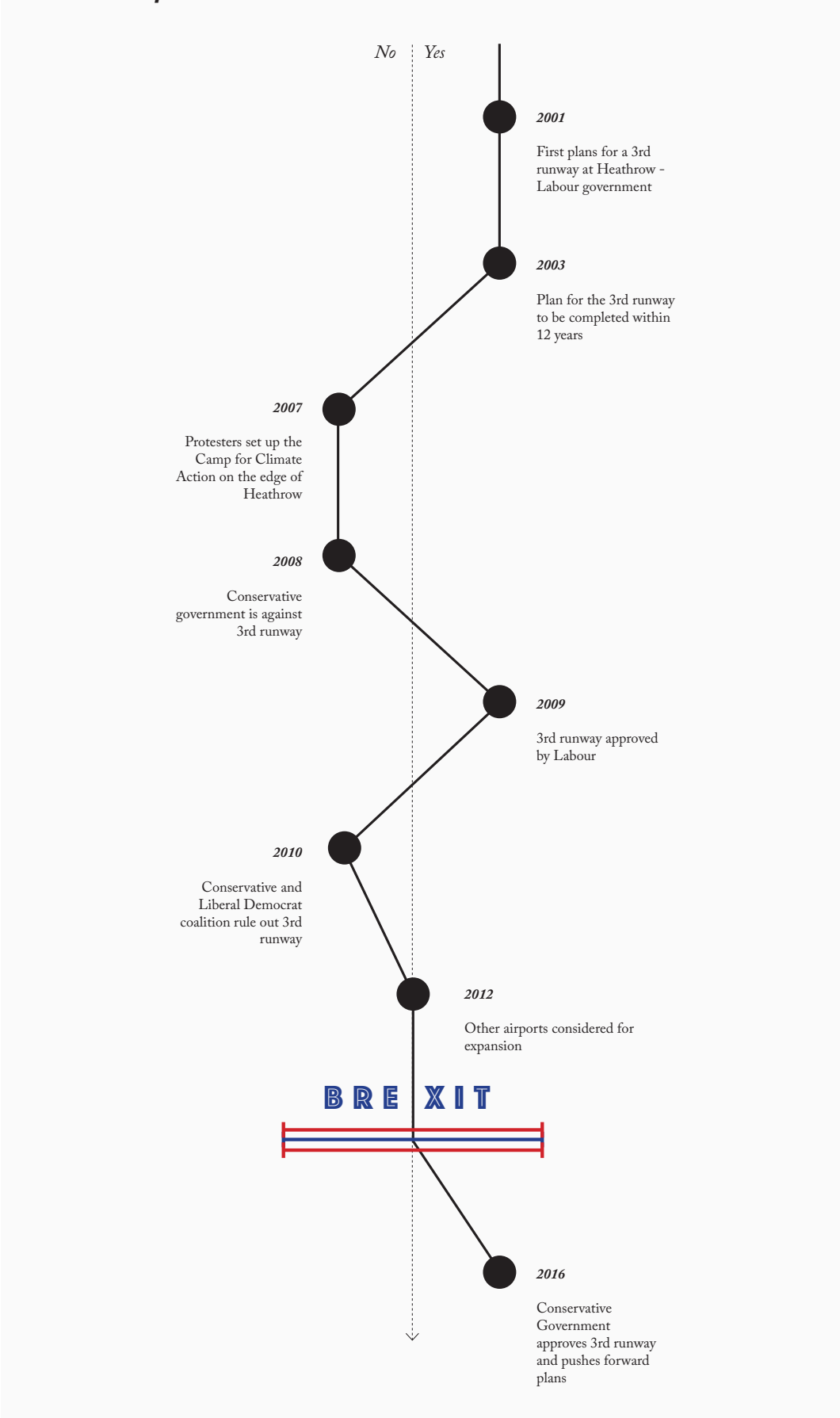
Top 10 Busiest Airports in Europe, 2015:

(total passenger numbers)



1.	<i>London Heathrow Airport (United Kingdom)</i>	74,985,748
2.	<i>Paris Charles de Gaulle Airport (France)</i>	65,766,986
3.	<i>Istanbul Atatürk Airport (Turkey)</i>	61,322,729
4.	<i>Frankfurt Airport (Germany)</i>	61,032,022
5.	<i>Amsterdam Airport Schiphol (Netherlands)</i>	58,285,118
6.	<i>Madrid Barajas Airport (Spain)</i>	46,828,279
7.	<i>Munich Airport (Germany)</i>	40,981,522
8.	<i>Rome Fiumicino Airport (Italy)</i>	40,463,208
9.	<i>London Gatwick Airport (United Kingdom)</i>	40,269,087
10.	<i>Barcelona Airport (Spain)</i>	39,711,276

Heathrow Expansion



Heathrow's expansion has been an ongoing discussion since the late 1990s. Historically, the conservative government was always against the addition of a third runway. After the EU Referendum, however, this has changed. The expansion is a clear message to the world that the UK is keen to trade and establish business relations with the rest of the world.

*“its about creating links to the world and saying:
**Britain is open for business,
post-referendum”***

Transport secretary, Chris Grayling



Heathrow Expansion: Slough Opinions



Local Councillor Sobail Munawar

“ – We are extremely pleased with the government’s decision to support a third runway at Heathrow.”

“ – The third runway is a terrible idea, they should take it to Stansted or Gatwick instead.”

“ – It feels like those at the top are pushing it through and we who live here don’t get a say.”

*bakery employee:
Lives and works in Slough*



“ – The third runway could be good for Slough – a new terminal means more jobs”

*Bus driver:
Lives in Uxbridge, works in Slough*



Suraya – Marks and Spencer Bakery:

- *The third runway is a terrible idea, they should take it to Stansted or Gatwick instead.*
- *There are already planes going overhead every 20 seconds, and they say they don't go in the night but she says they do – they definitely don't need more!!*
- *She lives just round the corner (from the m and s) and its still bad*
- *Her husband is partially deaf and it makes it very difficult for him when using the garden*
- *Refugee problems will get worse with the new runway*
- *Trading estate: has been there forever, but changing. Her grandma used to work there, for a castor factory. Now all services and phone companies, gyms etc. Lots of the people who come into M&S are the office workers.*
- *Its not a negative thing because they have known it forever.*

Bus Driver:

- *Doesn't actually live in Slough, lives in Uxbridge*
- *Thinks it will be worse for Sipson etc than for Slough*
- *Probably be good for Slough, new terminal will bring new jobs etc*

Boots Employee:

- *Lives in Slough*
- *Doesn't think third runway will make as much of a difference as cross rail in terms of house prices etc*
- *Might bring more jobs etc*
- *Not a negative impact on Slough*

Robert Dyas:

- *Doesn't think the runway will make a huge difference*
- *Its a long way away*
- *But large presence of Heathrow in Slough*
- *Knows lots of people who work at Heathrow – baggage handlers, air stewards etc.*

Station:

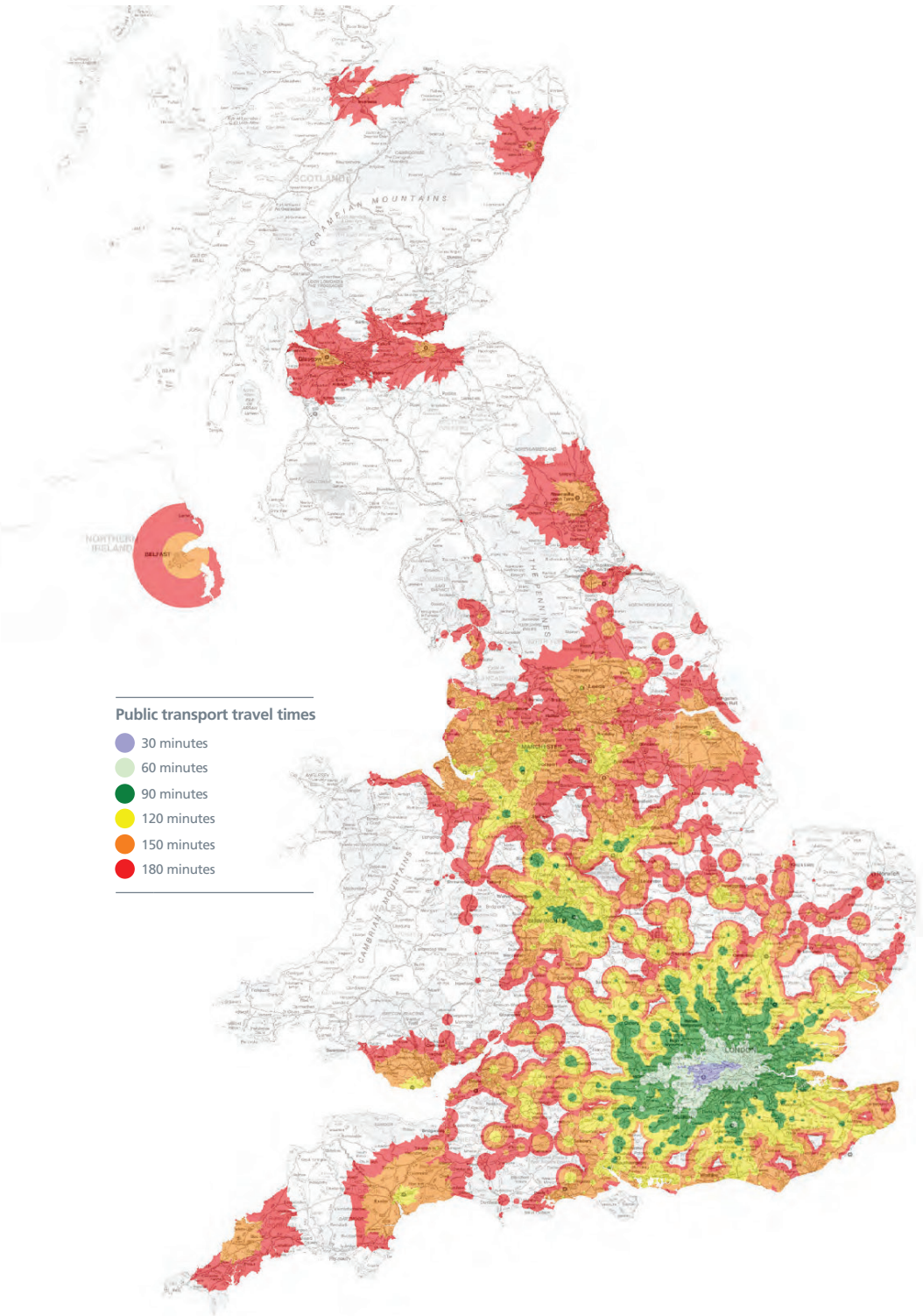
- *Live in Reading so don't care!*

Guardian Comments:

- *'Slough has always puzzled me – in terms of why the places are unaffordable, the Berkshire town has proximity to London, great transport links (soon to be ameliorated by Crossrail) and a number of European corporate hqs.*

The town is investing massively (admittedly some are dubious vanity projects), and yet for the south east, house prices are way out of kilter. Coupled with some excellent schools, I struggle to understand this. Surely these macro factors outweigh the fact that the town centre is a dump? It seems gentrification proof.'

Improved Transport Links to Heathrow

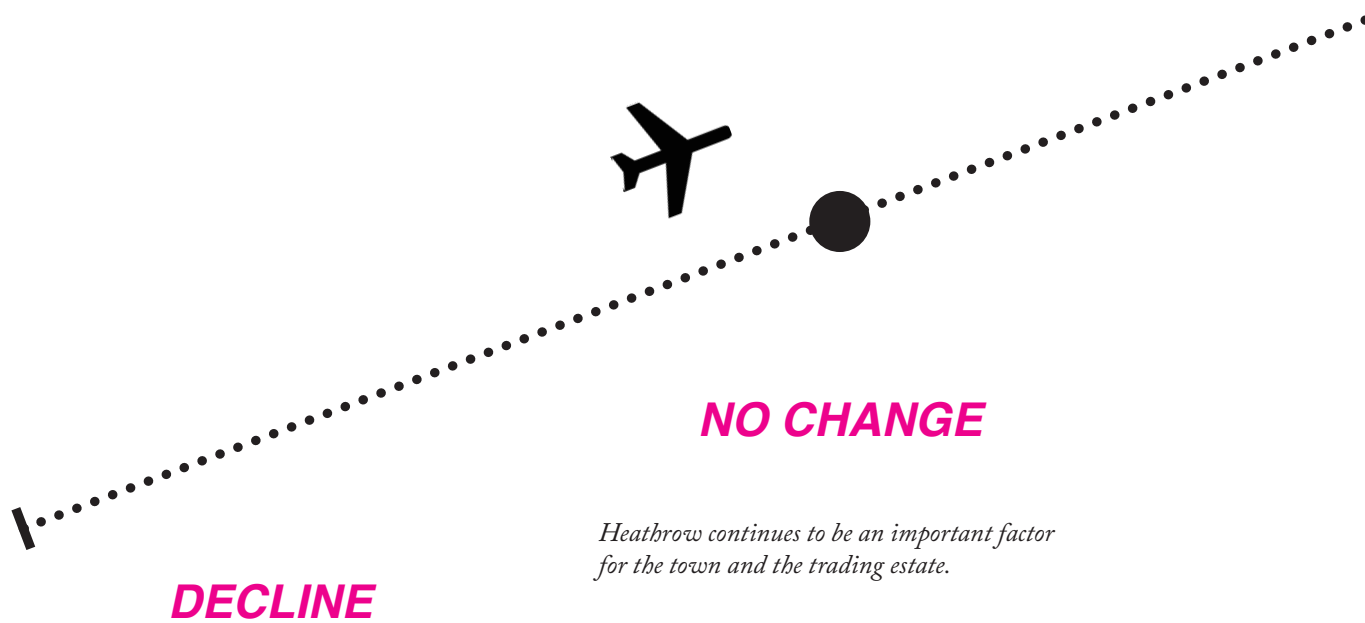


<http://www.airportsineurope.com/flight-info/busiest-airports-europe/>

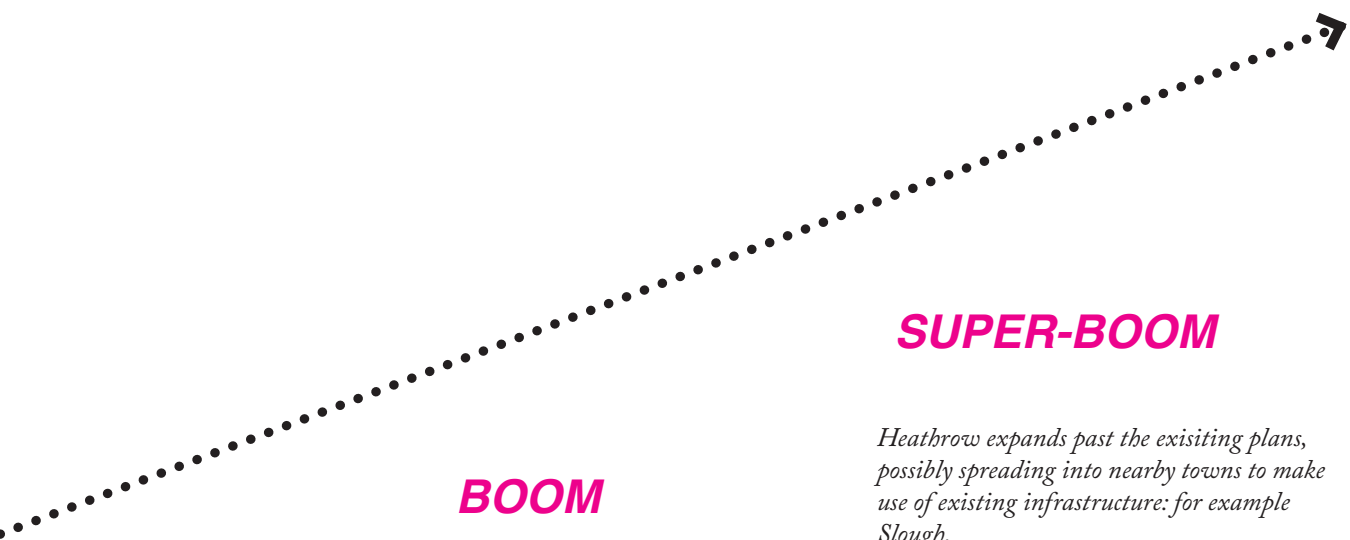
By 2030, 70% of the UK will be within 3 hours of Heathrow on public transport. Although much of this will come through London, a large quantity will come from the north and west via Slough.

Although trains may not stop in Slough, there will be heavy loads on train running through it, and so Heathrow's transport hub may have to change.

Heathrow's possible Futures



A super-hub opens elsewhere, moving to a location outside the city with unimpeded space for growth. Two hub airports are not necessary for the UK, Heathrow would decline.



BOOM

Heathrow expansion means that the town and (particularly) the Trading Estate boom.

SUPER-BOOM

Heathrow expands past the existing plans, possibly spreading into nearby towns to make use of existing infrastructure: for example Slough.

How might these affect Slough?

Heathrow

DECLINE

NO CHANGE

EMPLOYMENT

BUSINESSES RELOCATE FOR PROXIMITY TO A NEW HUB

If a new hub were to be built, the likelihood is that Heathrow would close. Larger businesses would relocate to be closer to the new hub, leaving slough.

EMPLOYMENT PATTERNS CONTINUE AS THEY ARE

Currently, unemployment in slough is low, but employment tends to be low-paid. There is a disparity in skills between those who come to work in slough and those who leave slough to work.

INFRASTRUCTURE

INFRASTRUCTURE IMPROVEMENTS WILL FOCUS ON THE NEW HUB

Crossrail and other links are being built anyway, but will become less focused on heathrow. This may reduce the urgency that is currently felt to finish them

IMPROVEMENTS IN INFRASTRUCTURE: CROSSRAIL, WESTERN RAIL LINK TO HEATHROW

Infrastructure improvements are already in the pipeline, due to open within the next 5-10 years.

MOVEMENT IN/OUT

MOVEMENT IN / OUT STAGNATES AS BUSINESSES MOVE ELSEWHERE

As the businesses that require high skilled workers retreat, the daily movement in and out will decline. People might tend to live and work in slough.

LARGE MOVEMENT OF THE WORKFORCE CONTINUES

Instead of people settling in slough, the current trend will continue: people living in surrounding regions will continue to work in slough, and vice versa.

PROPERTY PRICES

PROPERTY PRICES DECREASE AS BUSINESSES MOVE OUT

As slough becomes less desirable to businesses, the economy falters and the town loses its main income. Property prices decline.

HOUSE PRICES RISE DUE TO IMPROVEMENTS IN INFRASTRUCTURE

Regardless of whether heathrow expands, house prices are already going up as a result of crossrail.

Slough

BOOM

SUPER-BOOM

MORE JOBS CREATED BOTH AT HEATHROW AND IN SLOUGH

Heathrow expansion means a huge influx of new businesses to the area, as well as new jobs created at the airport itself.

EVEN MORE JOBS CREATED AS THE AIRPORT COMES TO SLOUGH

Heathrow expands to take in the towns surrounding it. More offices, passenger terminals and cargo handling may come to Slough, providing more employment.

IMPROVEMENTS IN INFRASTRUCTURE: CROSSRAIL, WESTERN RAIL LINK TO HEATHROW

Infrastructure improvements are already in the pipeline, due to open within the next 5-10 years.

NEW TRANSPORT HUBS MAY DEVELOP AS HEATHROW REACHES CAPACITY

New transport hubs may spring up close to the airport, which could include check-in and other airport functions, to take the strain off Heathrow.

MORE PEOPLE MOVE IN TO SLOUGH, FORCING OTHERS TO MOVE OUT.

As Slough becomes more desirable, people will want to move in. As a result, others will be forced to move out to find cheaper areas.

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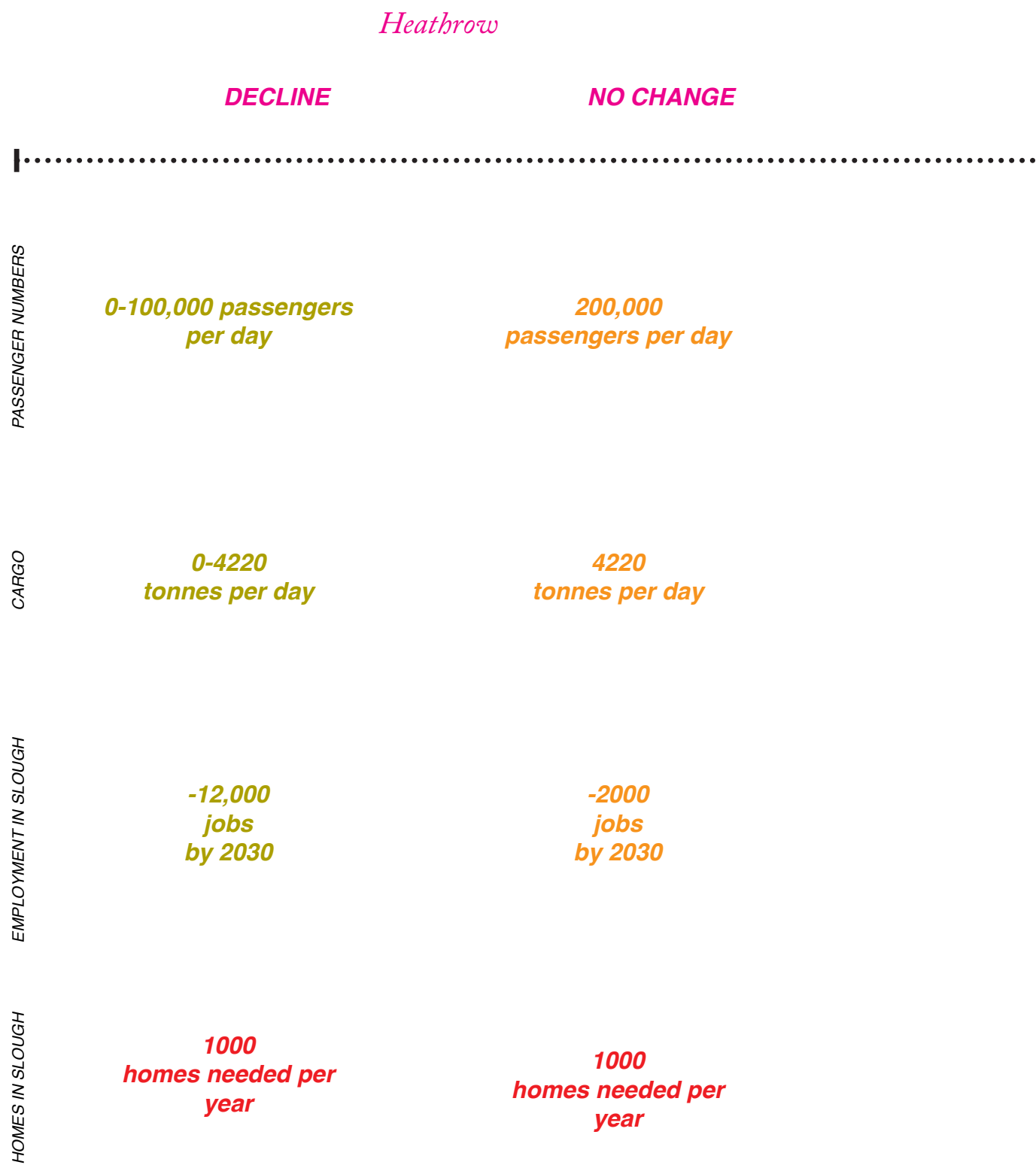
PROPERTY PRICES RISE DUE TO INCREASED DESIRABILITY OF THE AREA

Prices will increase as heathrow becomes a hotspot for businesses. House prices should go up but may face problems due to air and noise pollution.

PROPERTY PRICES RISE DUE TO INCREASED DESIRABILITY OF THE AREA

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Heathrow's Expansion in Numbers



BOOM

SUPER-BOOM

**400,000 passengers
per day**

**600,000 passengers
per day**

**8440
tonnes per day**

**12650
tonnes per day**

**+5,500
jobs
by 2030**

**+10,000
jobs
by 2030**

**1550
homes needed per
year**

**2000
homes needed per
year**

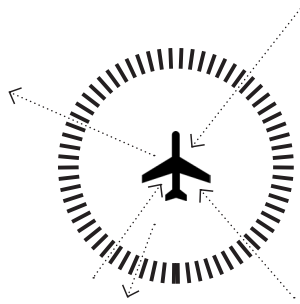
Wider Uncertainties

Airports

Airports are outdated systems, developed over time from original functions and needs. As technology improves, and needs change, the airport will no doubt need to reform.



a) Airports continue to become super high-security areas and increasingly complex systems



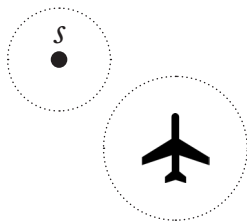
b) Security in airports changes: screening for intent rather than capability means that the systems become simplified and reduced



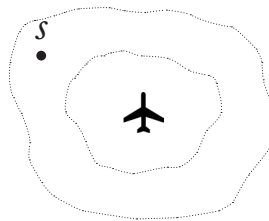
c) Data becomes increasingly important in the airport system – the network of data extends far beyond just the passenger and controls the whole industry

Heathrow Expansion

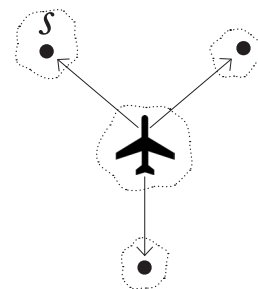
The third runway at Heathrow is only the start of major expansion. As one of the major global airports, it must develop to meet the needs of the global air travel industry.



a) Heathrow and Slough continue to grow as separate entities



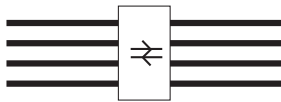
b) Heathrow expands to consume Slough – the airport truly becomes a city



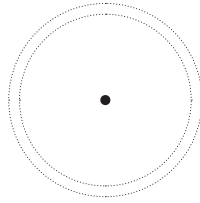
c) Heathrow grows satellites to support expansion

Infrastructure

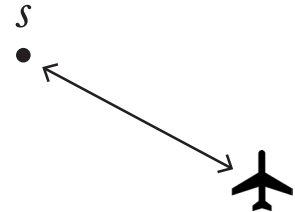
As travel habits change and the focus is put more on public transport than private, major infrastructure will change. At Heathrow, this is especially important.



a) Heathrow becomes a major transport hub, which can bypass London



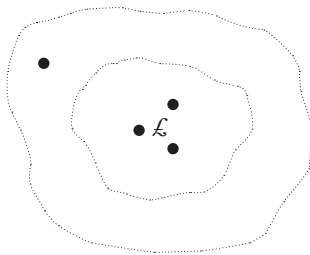
b) 2nd M25 to take strain of Heathrow Expansion



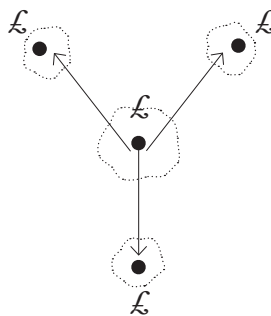
c) Connection made between Slough and Heathrow

Trading Estate Development

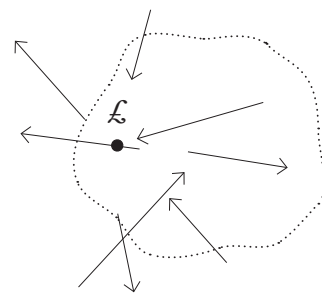
The Trading Estate is vital for Slough's economy, but does not necessarily contribute directly to the town. In future, perhaps this relationship will change.



a) Trading Estate expands to consume all of Slough



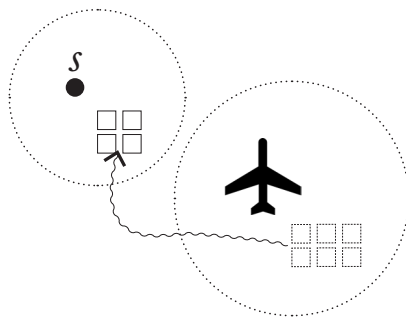
b) Trading Estate grows satellites to support expansion



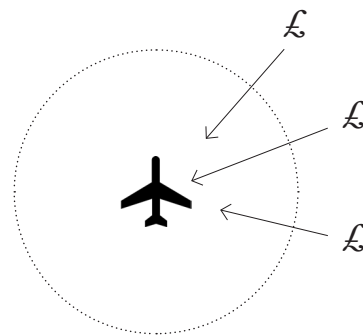
c) Trading Estate and residential areas merge for more diversity

Industry

Industry and businesses around Heathrow will change as Heathrow changes. Costs for land on the airport site may increase, and demand may reach increasingly high levels.



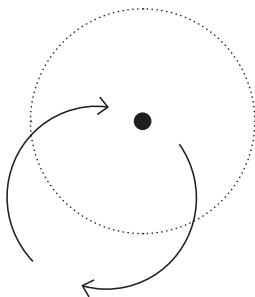
a) Light industry from Heathrow pushed out towards surrounding area



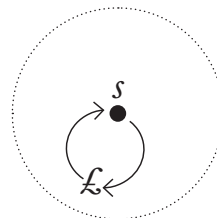
b) More industry attracted to the area because of Heathrow Expansion

Slough

The focus of the town and its aims could go in several different directions – towards economic growth, providing for its most disadvantaged or towards a new focus altogether.



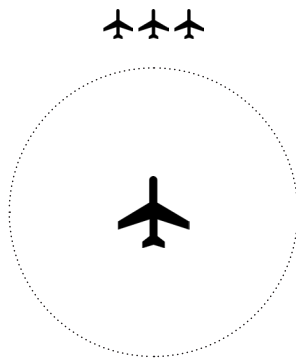
a) Young professionals and the marginalised both grow in numbers – the transient quality of the town increases. The money made in Slough continues to leave



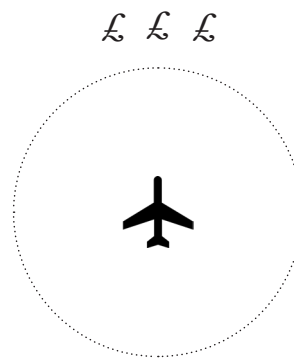
b) People stay put as Slough is a more desirable place to live and work – the money made in Slough stays in Slough

Left-Behind Towns

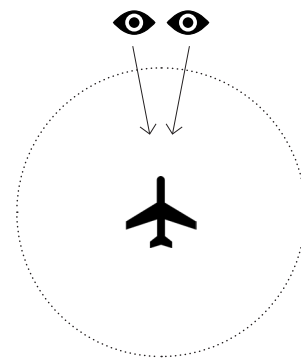
The areas that are demolished (or half demolished) will undoubtedly become ghost towns where nobody wants to live. What functions might work in this location?



a) The airport or airlines buy up the towns for company purposes – where being close to the airport is vital



b) Cheap housing or office space is now available in close proximity to the airport – small businesses have an opportunity for premises



c) The only people who want to live near an airport are those who work there, or who are fascinated by planes: planespotters



Limbo

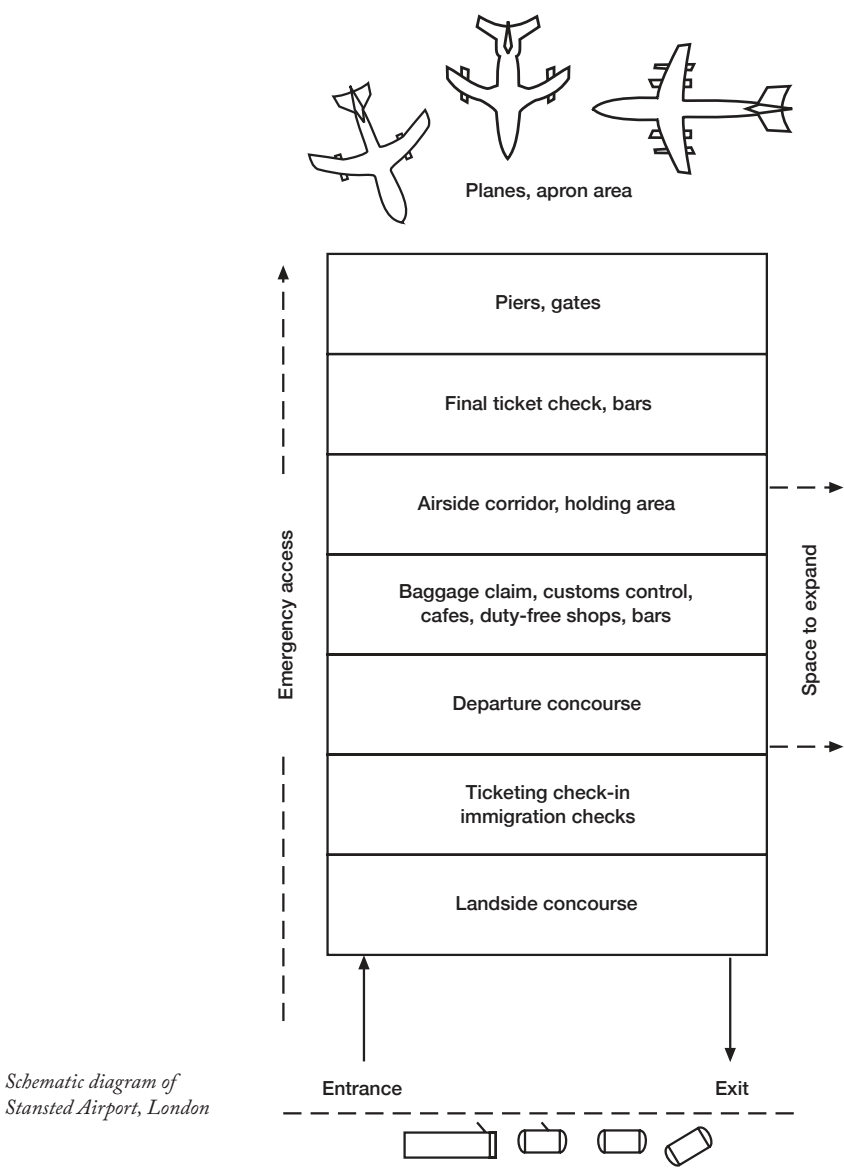
Slough is effectively 'in Limbo' while decisions about Heathrow are made. Employment, housing and infrastructure in the town will depend heavily on whether expansion at the airport goes ahead.

*Christ in Limbo, Follower of Hieronymus Bosch
c. 1575*

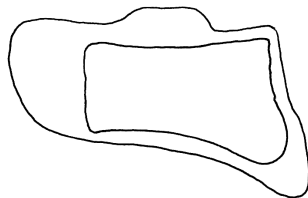
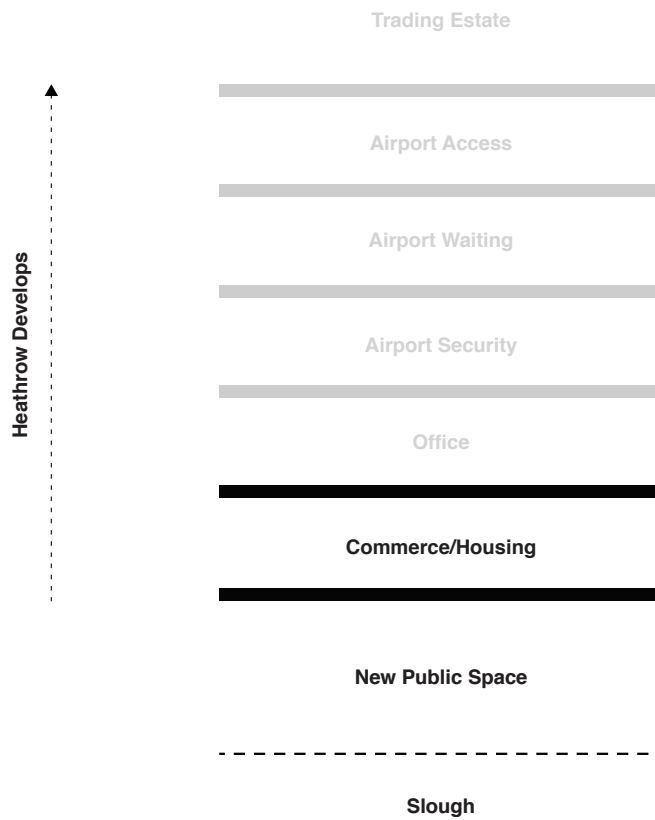


Airport Layouts : Layering

Schematically, layering is important to the airport layout. Passengers process further into the airport as they come closer to departure. Layering also gives the building space to expand on either side.

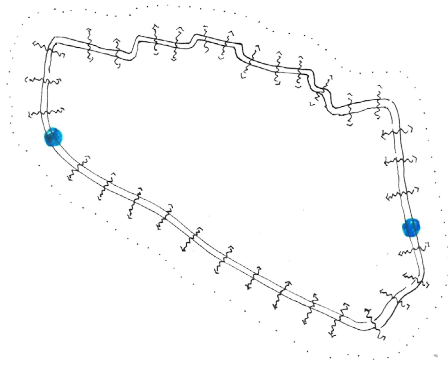


Schematic diagram of Stansted Airport, London



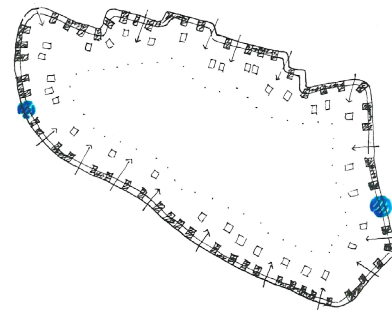
For my project, what is important about this diagram is the possibility to add and remove layers. Without the airport layers, the airport becomes public space and commerce. If the airport is never to come to Slough, these are all that will be necessary. Airport layers can be added later, as required.

Proposal at P3 - Overview



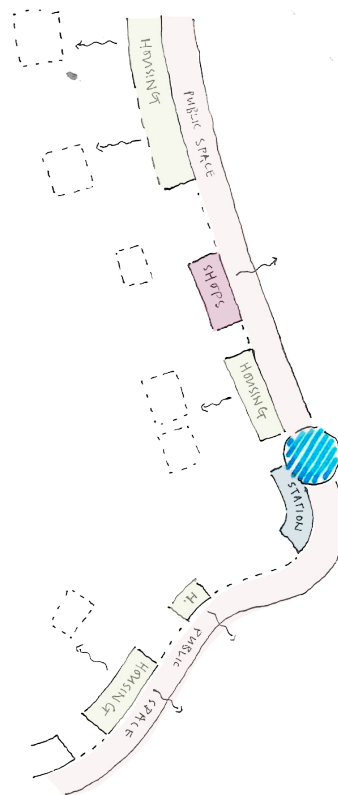
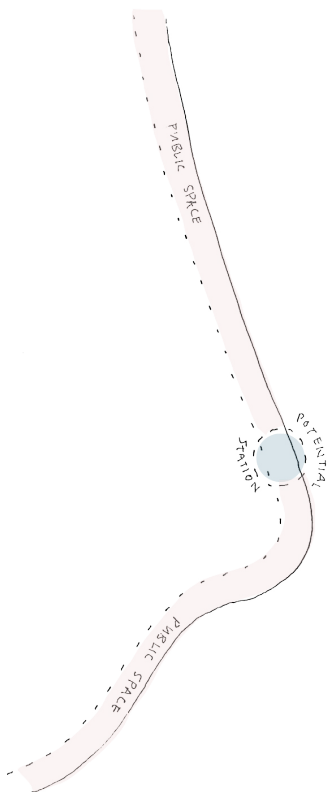
Heathrow Doesn't Change

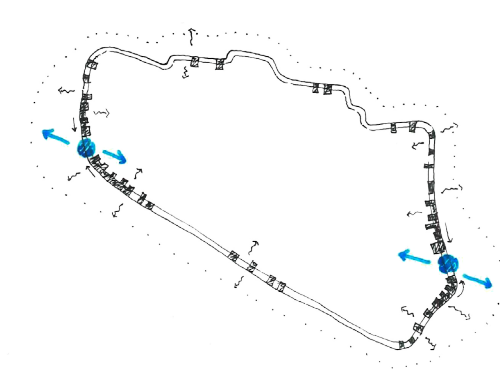
If no expansion or contraction occurs at Heathrow, then the Trading Estate requires only a buffer zone to create a better relationship with the rest of the town.



Heathrow Declines

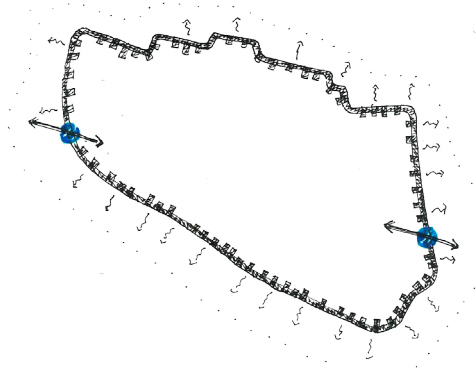
If Heathrow declines, businesses will begin to leave the Trading Estate, and it will need to return to 'town' functions. This will mean the need for housing, but also cheap office space for local businesses.





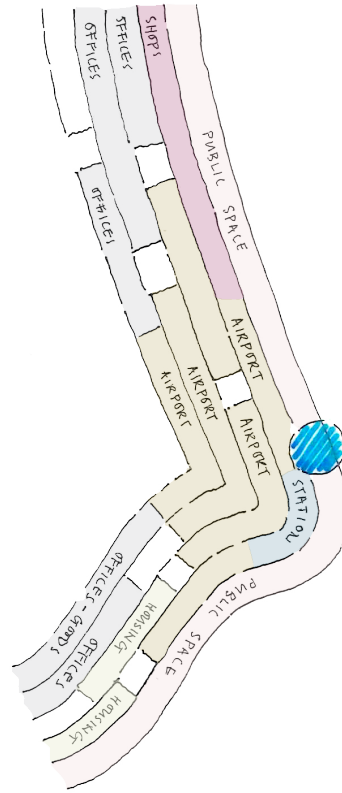
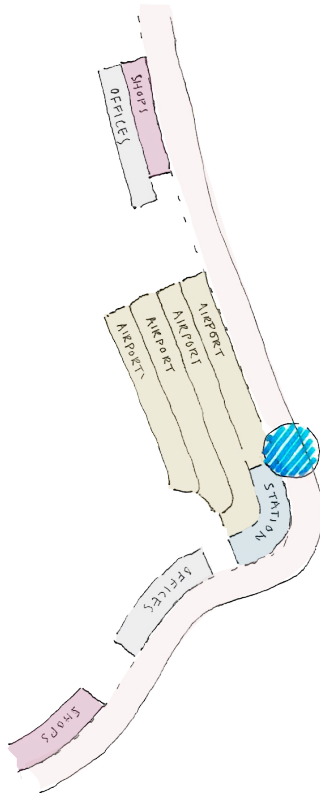
Heathrow Booms

If Heathrow is to boom, the link with the Trading Estate will be strengthened, as businesses continue to move to the area for its proximity to the airport. A link to the terminal buildings will be created and new office space.

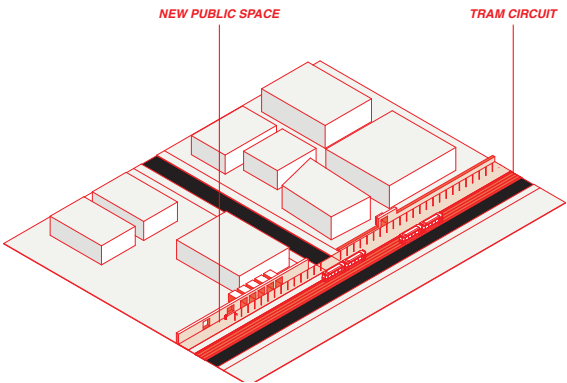
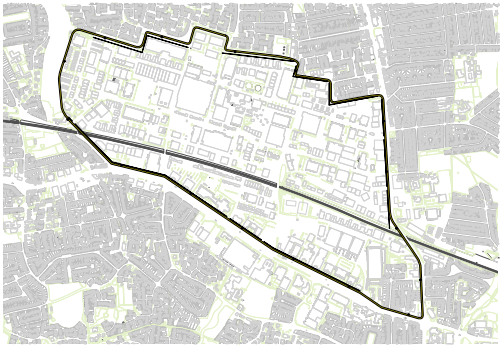


Heathrow Super-Booms

If Heathrow is to expand on a greater level, Slough may become part of a decentralised system, taking on business functions of the airport. It may become a hub for interchange, as well as a free trade zone in the centre.

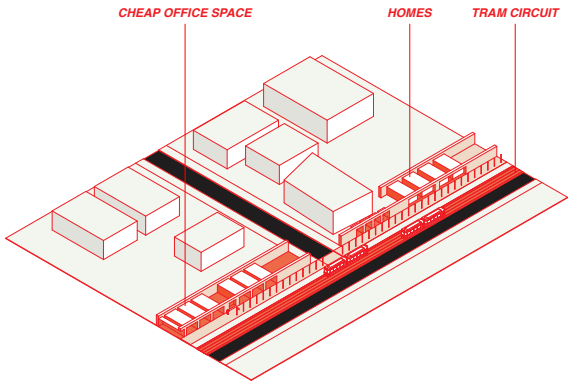
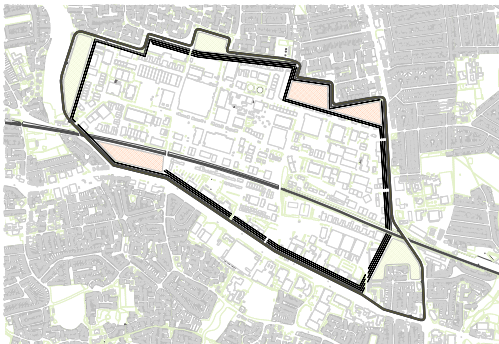


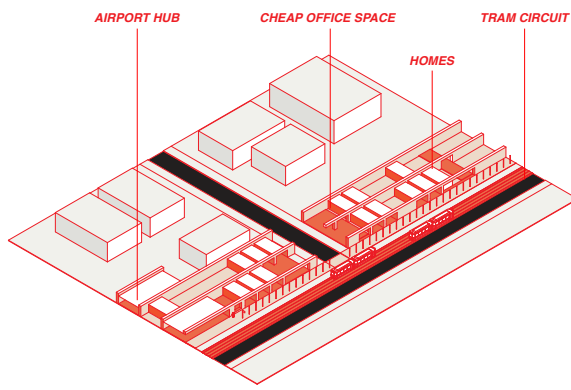
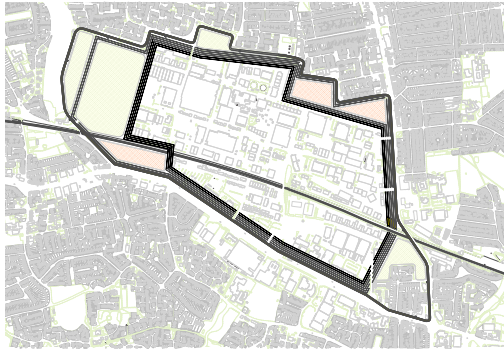
Proposal at P3



Heathrow Doesn't Change

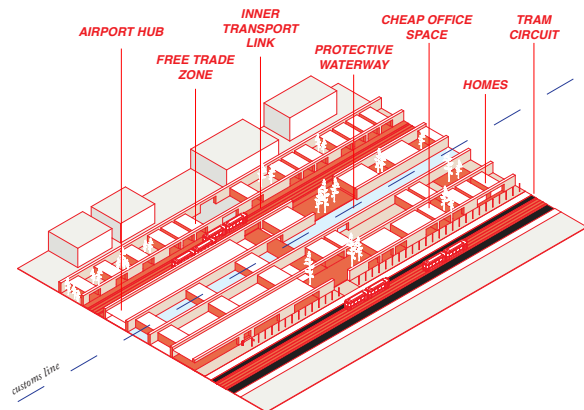
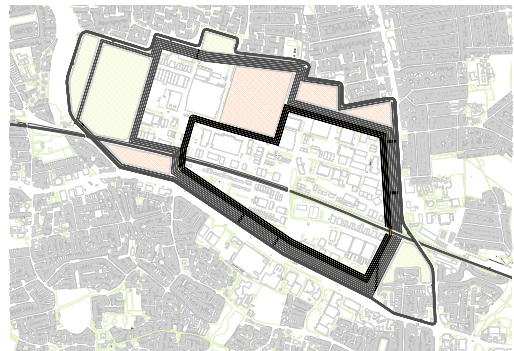
Heathrow Declines



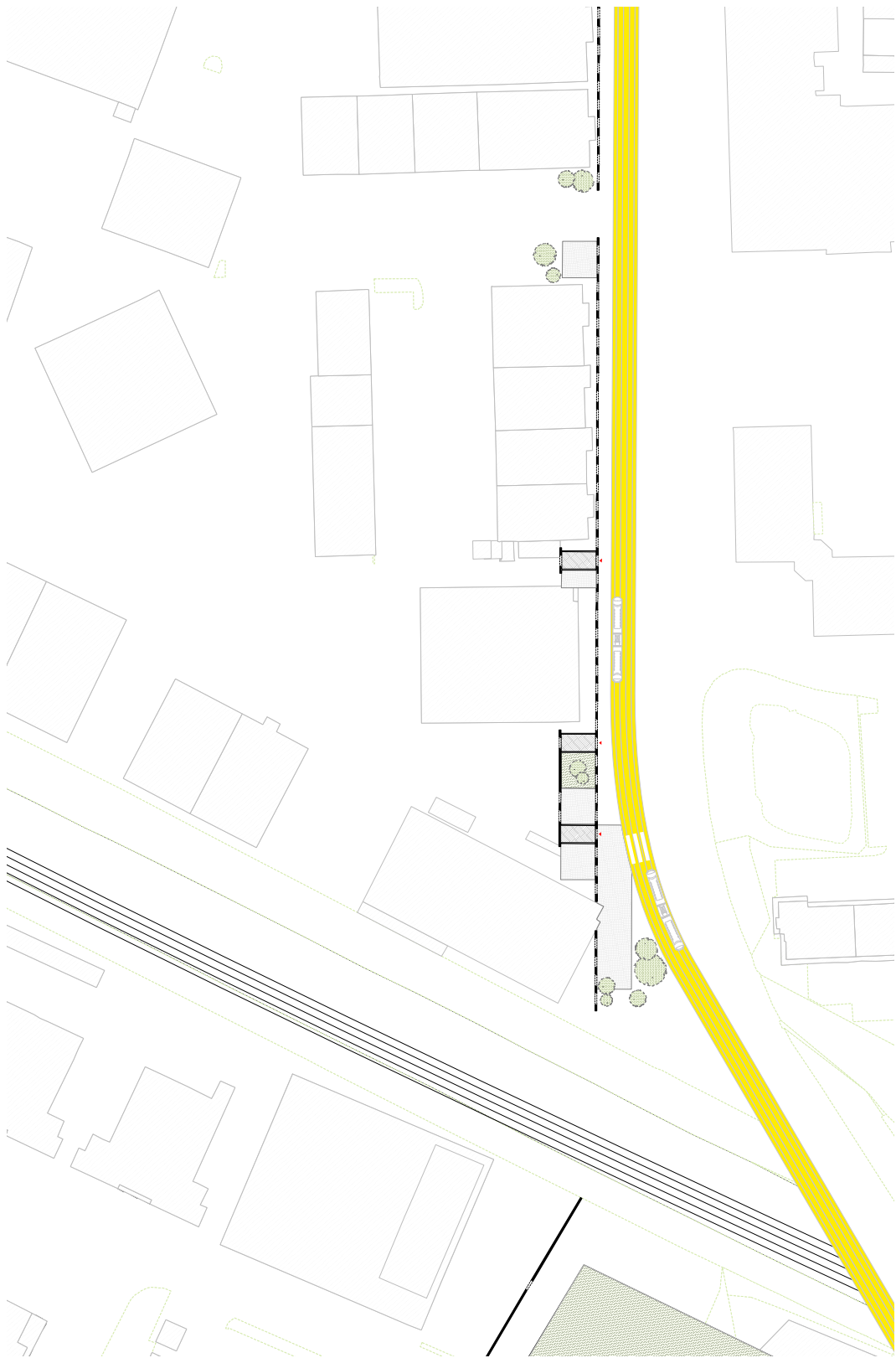


Heathrow Booms

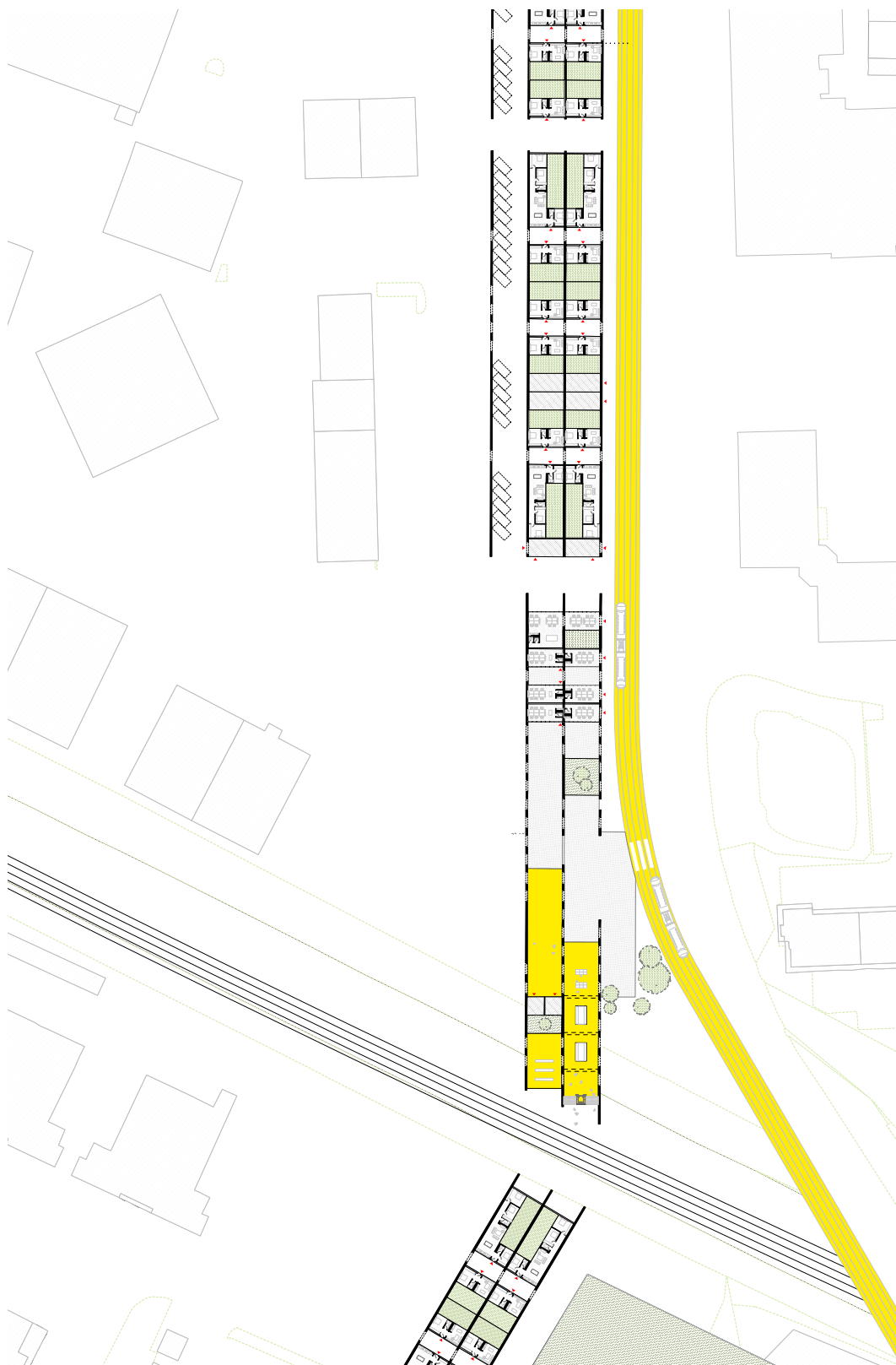
Heathrow Super-Booms



Proposal at P3



Plan - Scenario 1: no change
1:1000

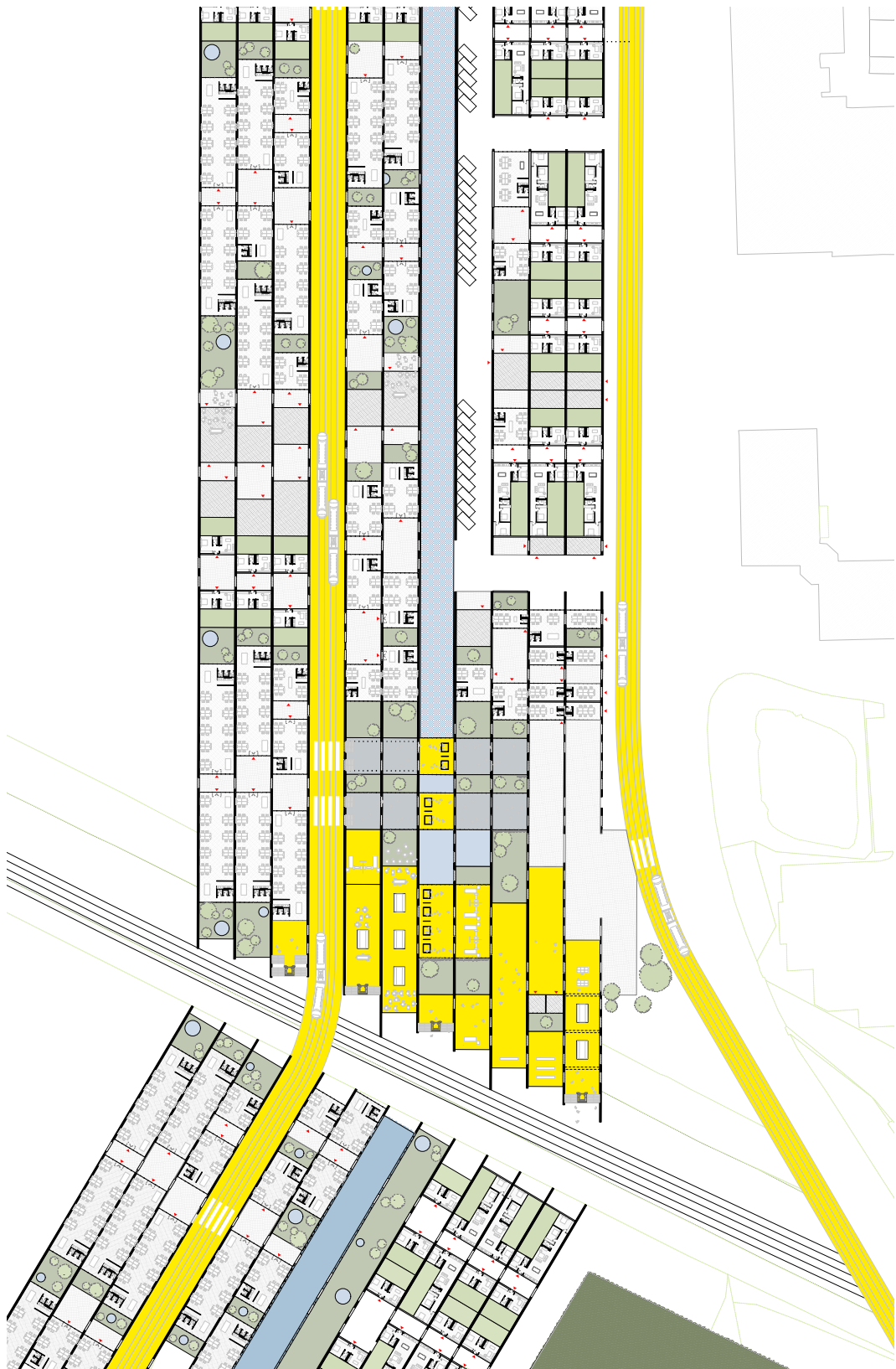


Plan - Scenario 2: decline
1:1000

Proposal at P3



Plan - Scenario 3: boom
1:1000



Plan - Scenario 4: super-block
1:500

Proposal at P3 - Visualisations



Scenario 1: no change



Scenario 2: decline

Proposal at P3 - Visualisations



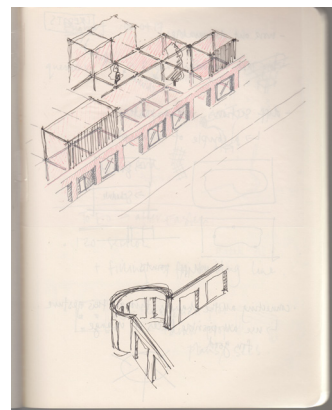
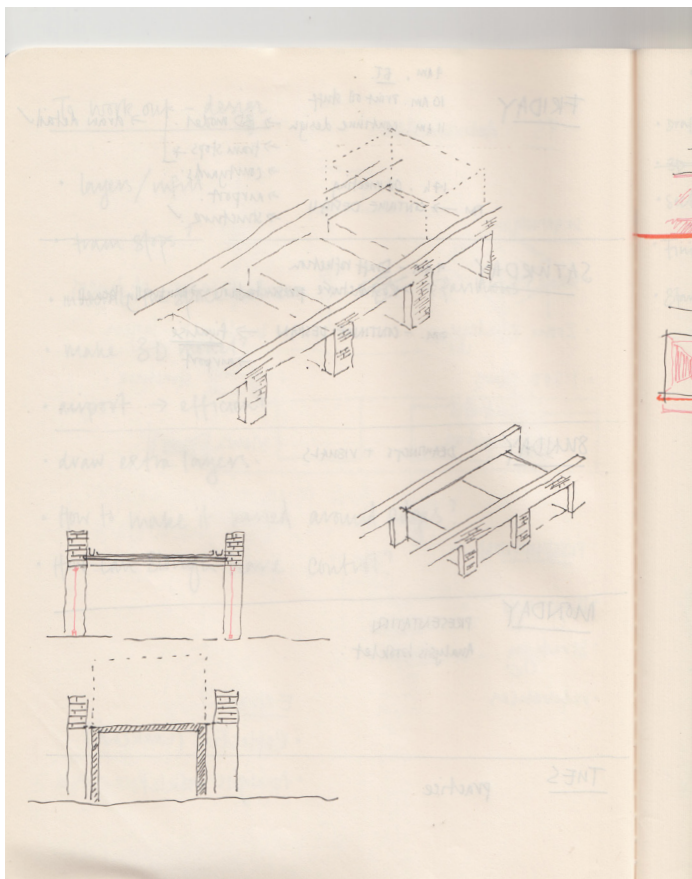
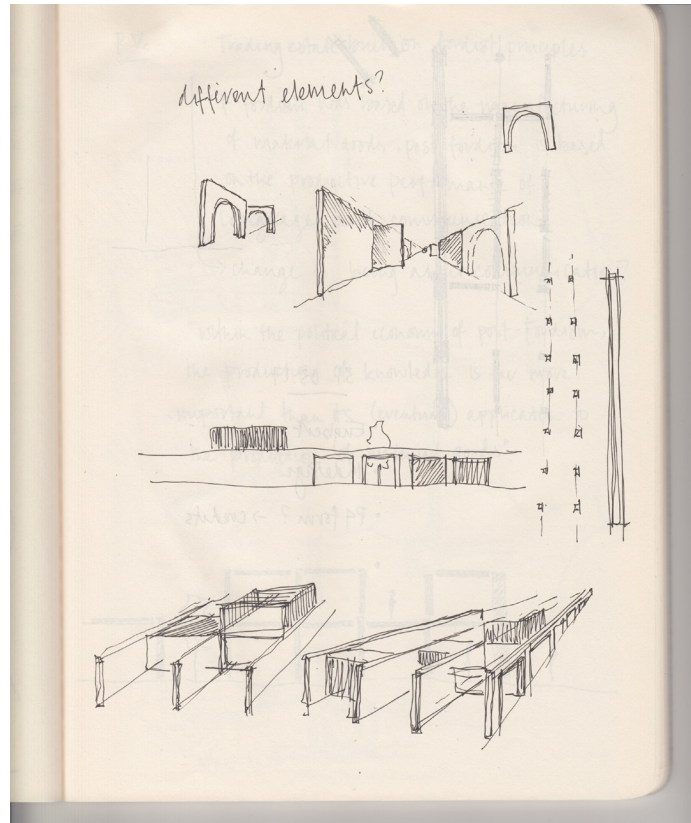
Scenario 3: boom

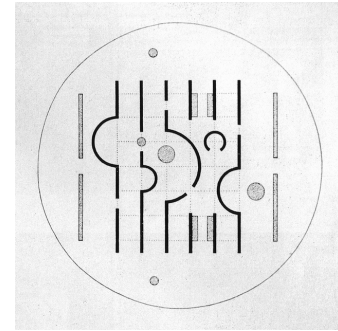
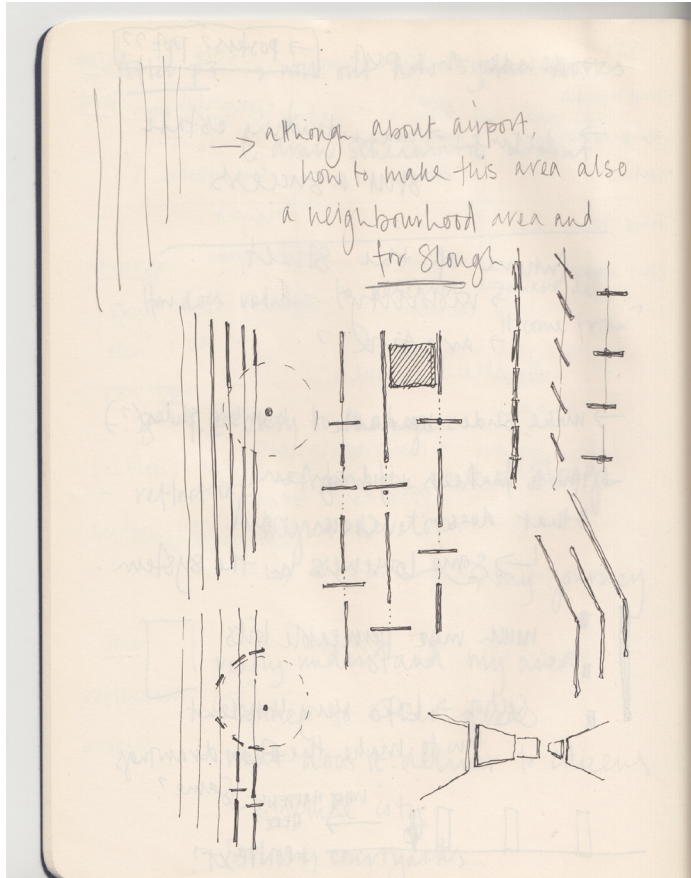


Scenario 4: super-boom

Post P3 Development

Post P3, the focus started with how to loosen the wall structures. The aim was to make them less overbearing and rigid, and create a better sort of public space for Slough.



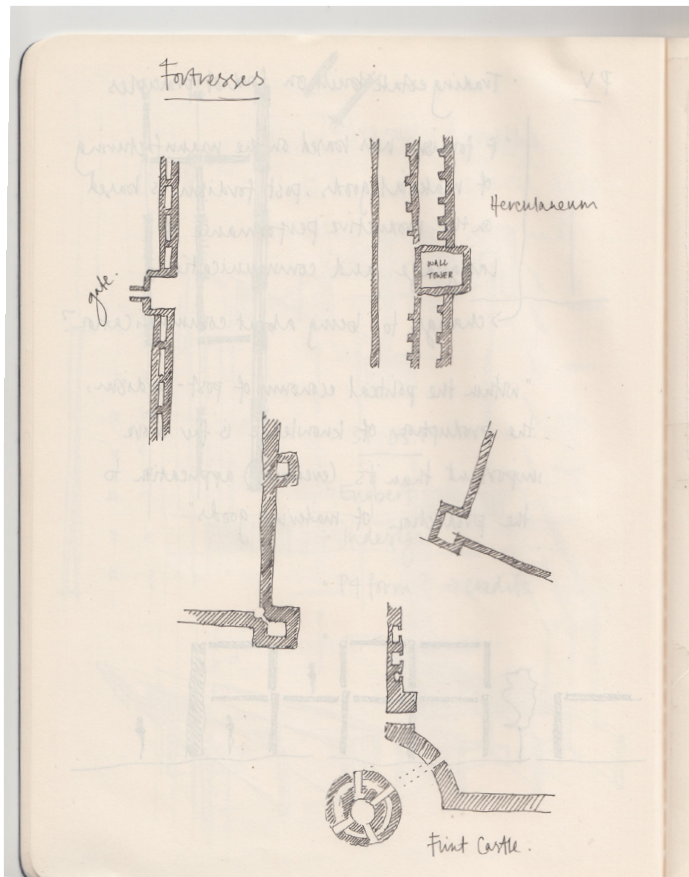


*Sonsbeek Pavillion , Aldo van Eyck,
1966*

The focus was on how different configurations of walls can change space. Van Eyck's Sonsbeek pavillion is an example of introducing other forms, whereas Per Kirkeby's sculpture shows how folding the wall can create complex arrangements.

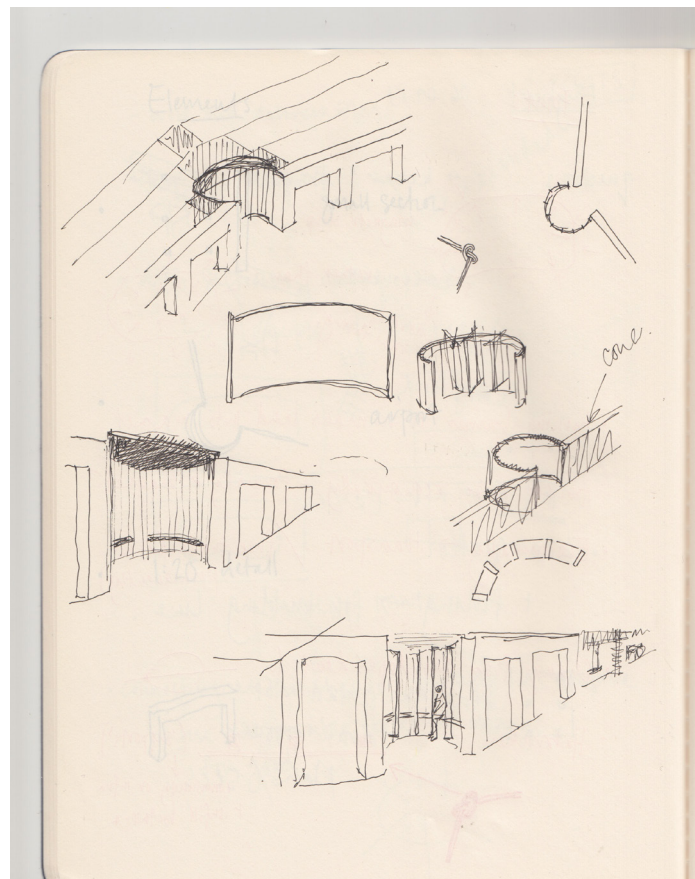


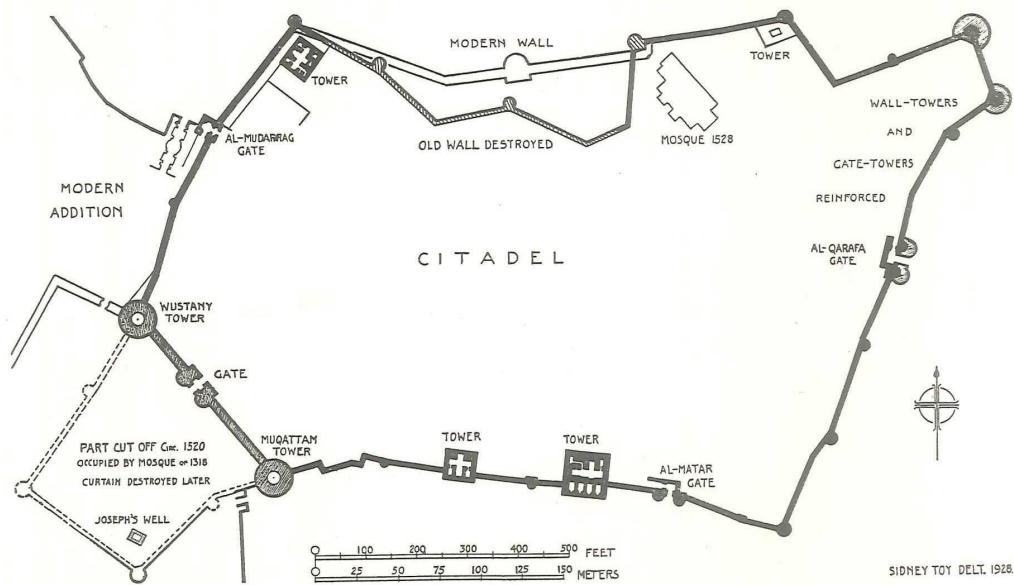
Brick Sculptures , Per Kirkeby



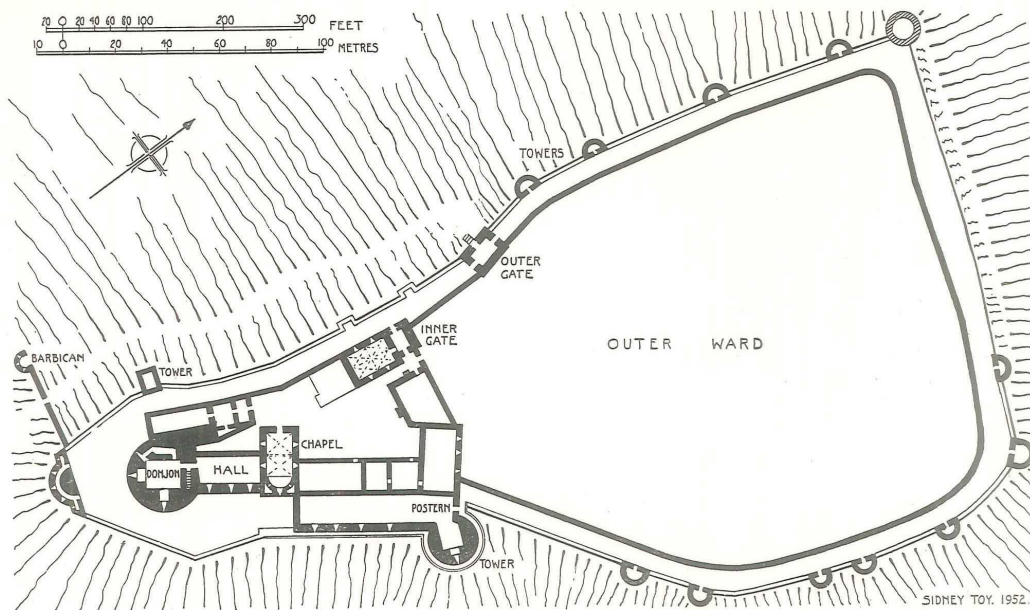
I began to look at how walls can turn corners – especially in the case of castle and fortress architecture. This was interesting to me because of the association of the Trading Estate with a fortress.

These points where the wall changes direction also often house functions, which I reflected in my proposal. The tram stops are points where the wall turns.





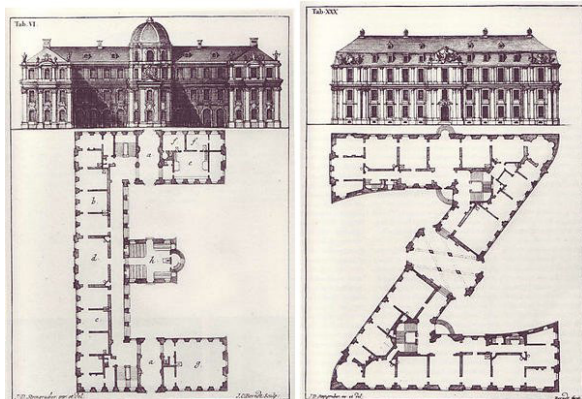
CAIRO: PLAN OF THE CITADEL



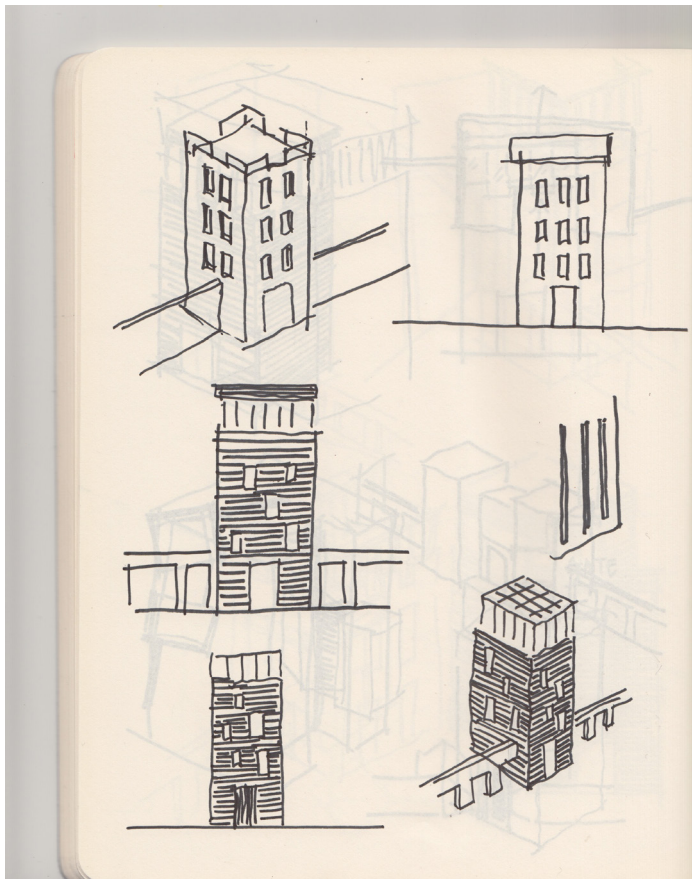
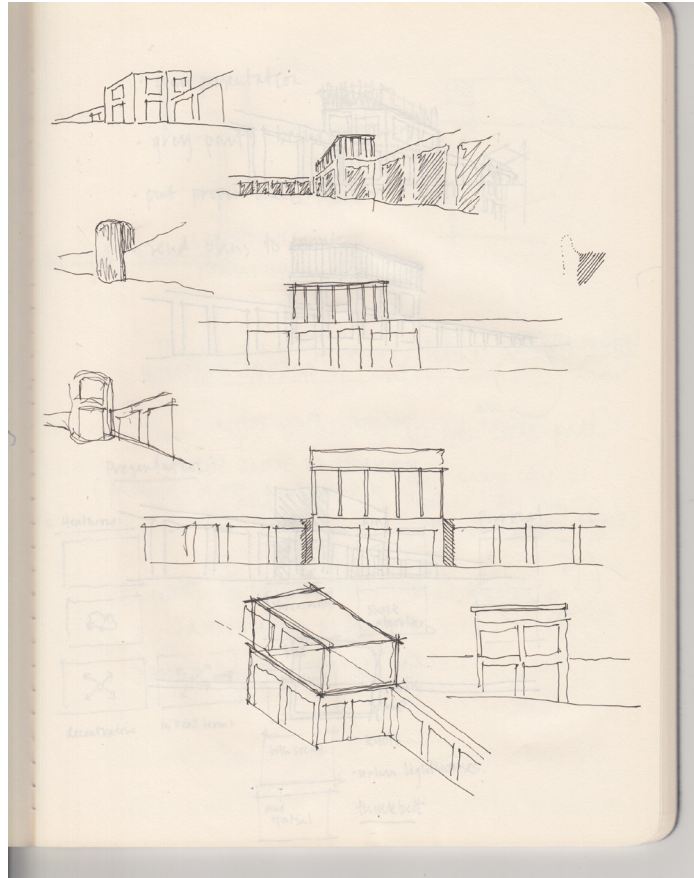
PLAN OF MARGAT CASTLE

Steingruber's drawings use changes in direction to house services such as circulation, which I also incorporated into the proposal – in the landmark buildings.

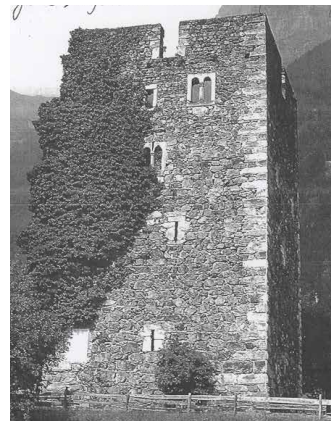
Architectural Alphabet, Johann David Steingruber, 1773

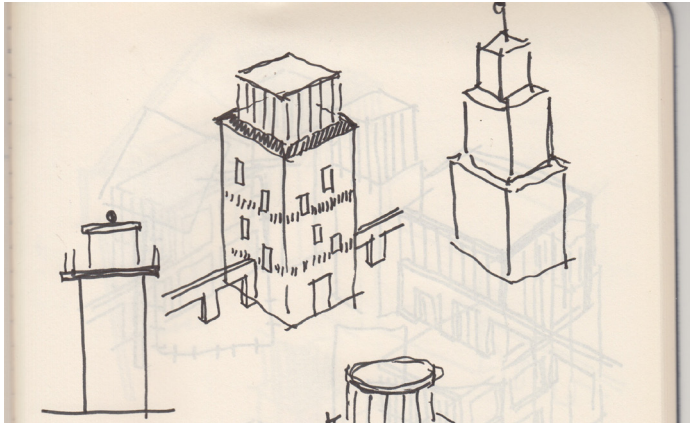


Studies in how to place the landmark building in the wall: should it sit in front, behind or on top of the wall?



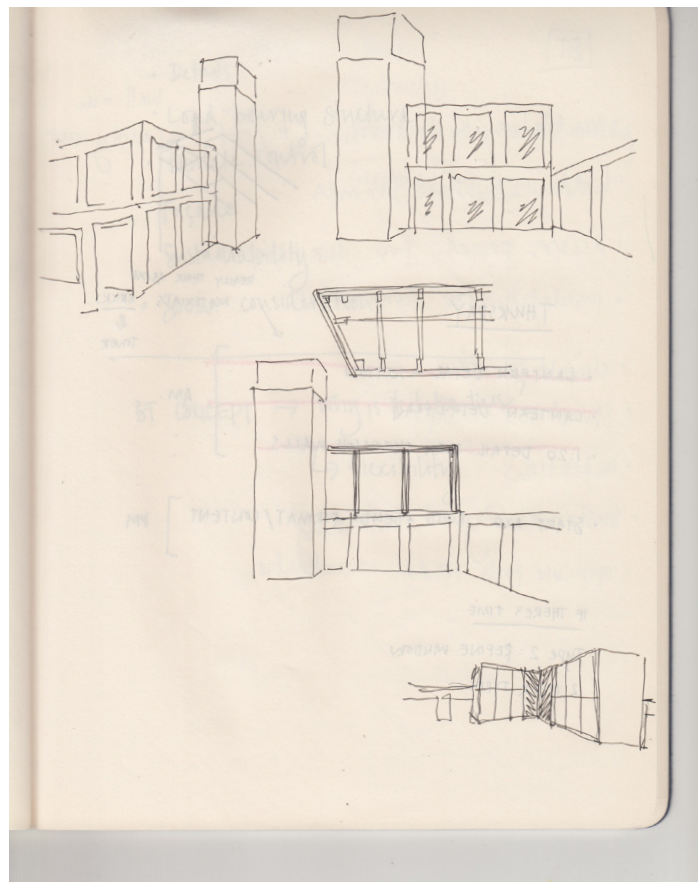
This led to looking at traditional castle towers. The landmarks in my proposal come from the simplicity of the medieval tower. They also become part of the mass of the wall, following the traditional fortified wall.





The other source of reference for the tower was the lighthouse, as a clear landmark. In the end, I looked most at modern interpretations of 'lighthouses', as below.

*Somerville College Student Housing ,
Niall McLaughlin Architects, 2011*



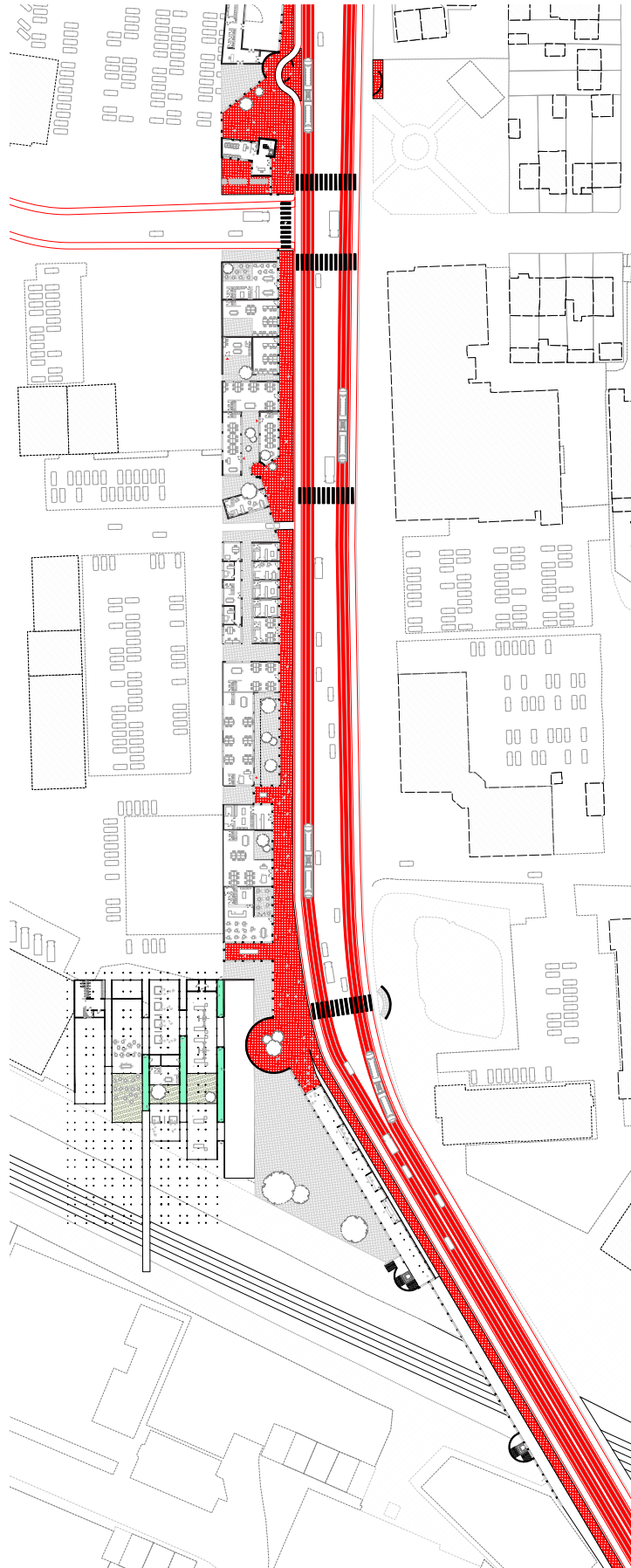
*Tate Modern , Herzog & de Meuron
2000*

The Decision to Leave ‘Phase 2’ Behind

At a certain point, I realised that the idea of having ‘phases’ was completely counter to my intentions of creating a totally flexible proposal. In trying to design what might later connect to the wall (right), it was clear that this was almost impossible, given all of the uncertainties that I found through my research.

Instead, I decided to leave the idea of phases behind, and instead create something that was resilient enough to take whatever might one day become a part of it.

The wall is, therefore, not part of larger system, but a spine which keeps totally different and unforeseeable futures in check. It is designed for the current situation and any new development must address it. This is the purpose of the wall: to force buildings to interact with the town.





Self Reflection : P4

The Design as Politics theme for this year is migration, which was the starting point for this project. I took this to mean, in general, 'movement' – rather than migration across countries for economic reasons or from danger zones as refugees. Instead, I decided to focus more on how the daily migration of people affects the spaces in which we live, and how this may negatively impact those places where people migrate in and out on a regular basis.

This led me to choosing my site, Slough, based on a daily migration of people in and out of the town for work, resulting in a daily turnover of inhabitants. This will soon be reinforced with the building of Crossrail – a high speed railway line crossing London, bringing central London much closer. In addition, access to Heathrow Airport will be improved, encouraging migration to further afield. The project, as it stands, combines these two aspects of migration as it links the Slough Trading Estate (where much of the daily migration happens), to Heathrow Airport and thus the world.

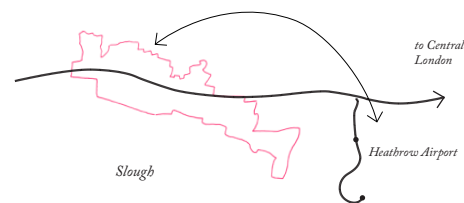
My case study is about Slough and Heathrow, and in particular what will happen to Slough if Heathrow is to expand, as planned, with a third runway. As something very unpredictable, the project became about how to create a shock absorber in Slough that could take any changes that might happen at Heathrow, which would greatly affect the town of Slough. The daily migration of people in Slough relies on the presence of Heathrow and the Trading Estate which sits at Slough's core.

The approach of Design as Politics is generally to focus on research about both the project itself, but also a much wider social context. The parameters set by the studio are incredibly wide, which meant that it took a long time for this project to reach a point from which it could be developed. I undertook research into policy surrounding the Heathrow expansion and what this meant in real terms and political terms, as well as looking at plans for Slough and the area I am focusing on – the Trading Estate. This was an interesting approach as it really began from a much bigger picture, from which I had to distill the project down to something specific to the site, but still with the larger intentions.

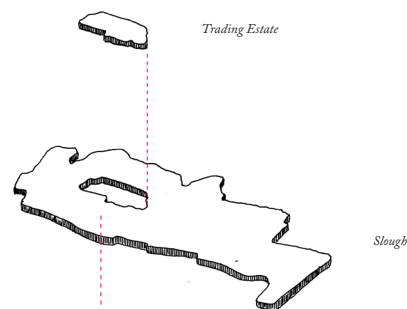
In a wider social context, the project is not only a hub for Heathrow and the Trading Estate, but acts as a shock absorber for Slough. In uncertain times, where it is unknown whether the airport will decline or expand, the project aims to use architecture to take the shock of any eventuality, ultimately fortifying Slough in terms of economy and liveability through strengthening a



Crossrail: the new line will connect East (including Slough and Heathrow) and West with central London



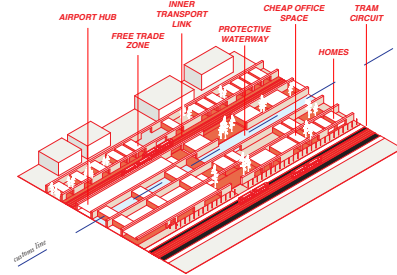
How will the relationship between Slough and Heathrow change as Heathrow expands?



The Trading Estate sits in the centre of Slough and provides much of its income, although the town itself is still very deprived, indicating that much of this revenue must go back into the Trading Estate.

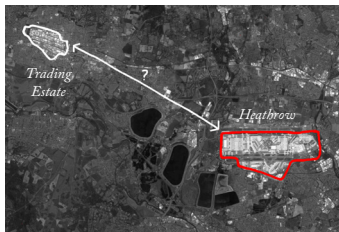
partnership with Heathrow. In terms of migration, the scheme aims to balance the difference between those who commute into Slough and those who commute out – a difference which is based on education and skills.

Looking back, the research-based approach of the studio meant that it took me some time to work out who my project was intended for. To begin with, my focus on Heathrow and the future of airports took the project down a path which separated the site in the centre of Slough from the town itself, creating a 'mini-Heathrow' at its core. This was not really my intention, however, and it took some time to reach a scheme which rather than strengthening Heathrow's position and creating an economic zone in central Slough, dealt with some of the town's many social problems, through an architectural intervention. It was important to use Heathrow's potential as a catalyst for my project, but to make it a mutually beneficial relationship, rather than solely to benefit Heathrow. It was important to see that Slough had the space and opportunities which Heathrow is lacking.



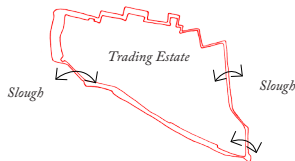
Proposal at P3 stage showing the airport-focus of the project, which has become more relaxed and more Slough-centric for the P4.

As such, the three intentions of the project are:



1. To make the relationship between Heathrow Airport and Slough town mutually beneficial.

Heathrow is a successful business which needs to expand, but which has little space to do so. Slough is a nearby town with an independent economy and its own business park, located on the railway line to Heathrow. As airports will, in future, begin to decentralise (due to changes in systems from physical handling of goods to an internet-based sharing economy), this is a relationship which should be strengthened.



2. To bridge the physical and social gap between Slough and the Trading Estate.

There is a clear disparity between the level of education of people who live in Slough (low skilled), and those who work in the Trading Estate (high skilled) – a disparity which has been highlighted by Slough council as a problem which needs addressing. The physical zone between the town and the trading estate at its heart is also problematic in urban terms. The project therefore intends to fill this gap with a sensitive architectural solutions which incorporates adult educational facilities.

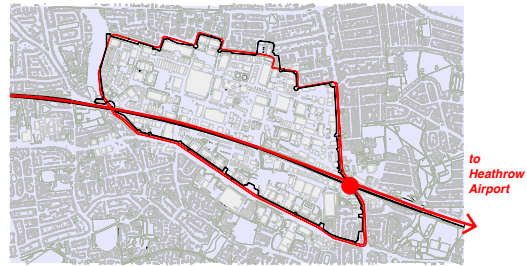


3. To create something which acts both economically and formally as a magnetic strip across the problematic site, which can absorb changes that happen at Heathrow.

Whereas currently the site repels any sort of development – it is a sort of 'no-man's-land' – the project aims to bring something of value in both economic and formal terms. It should encourage development around the ring which can absorb any changes in employment, housing or transport which may be triggered by changes at Heathrow.

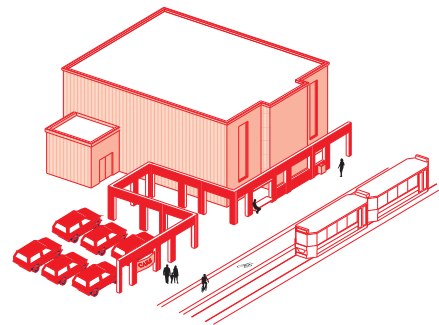
In order to implement these ambitions, the project had to be able to provide incentives for both Slough and Heathrow, in order for the relationship to be truly mutually beneficial. For the project to be credible, the first step must be to attract Heathrow to the site in Slough, before any development could even begin to take place.

The first step, therefore, is to improve mobility: if movement around the Trading Estate and between the Trading Estate and Heathrow is improved, then links are established and the Trading Estate can begin to become part of Heathrow's wider operations. Just as businesses benefit from being just outside airport complexes, they will benefit from Slough's improved links, but with the added benefit of being in a town with proper amenities. In addition, the town will benefit from better mobility around this ring (which incorporates several residential areas) and the direct link to Heathrow and Central London.



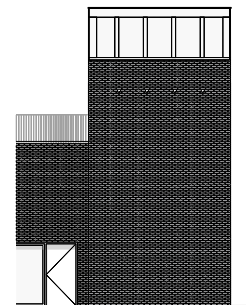
First Step: Mobility

Alongside this ring of mobility comes the architectural intervention. It was my intention to place something physical in this void which would be a catalyst for change, as well as an instant improvement in spatial terms. The simple intervention is a brick colonnade which runs around the Trading Estate, creating a human scale buffer zone between the developments within the business park, which are mostly poor in architectural terms. My position is that regardless of how these buildings or future developments behind the wall might look, the colonnade takes the impact and still presents as unified, high quality front to Slough. The use of red brick suggests robustness and is a familiar material in Slough. It has a textural quality which breaks the monotony of such a long structure.



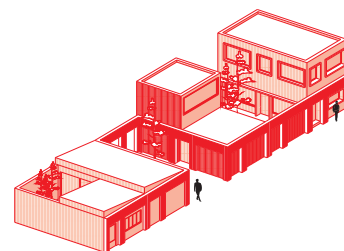
Architectural Intervention: Creating urban space around the Trading Estate.

The colonnade, finally, is punctuated with 'landmark' buildings which house adult training centres. These not only help to bridge the social gap between the town and the Trading Estate, by educating people from the town in order that they might carry out higher skilled jobs, but also act as landmarks along the colonnade. They are taller than the surrounding buildings, creating some variety along the ring which might otherwise be monotonous, and helping orientation.



Adult training centres act as landmarks along the wall and start to bridge the gap between the social differences of the town and the Trading Estate.

As the area develops and employment rises or more housing is needed, smaller amenities or housing can connect to the wall, which can become a residential street or commercial high street, as required. If no development occurs, the wall is simply infrastructure, housing tram stops along the tram line and the 'landmark' adult training centres, which have already been identified as a necessity by Slough Council. It was important to allow the colonnade to be flexible, but not too flexible. As such, the wall itself is permanent but it has the capacity for additions and subtractions to be made. If the wall, one day, needs to be dismantled, the bricks can be taken down and reused elsewhere in the surroundings. The project is also a demonstration of how other business parks might develop to become satellite airport hubs, whilst strengthening the relationship with its surroundings – a condition that rarely occurs in the current climate.

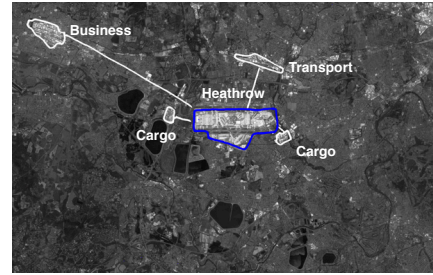


Other things connecting to the wall: housing

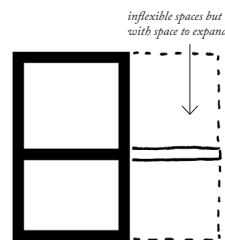
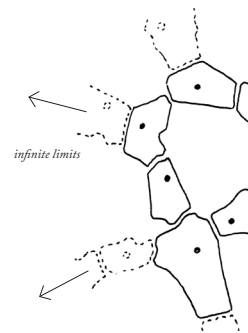
In a wider architectural context, this project's relevance

lies in how it deals with uncertainty, a common problem in architecture today. Having looked at different ways that buildings can be flexible, in terms of use, structure or form, I came to the conclusion that this project, rather than being a fully flexible system which can be dismantled and assembled, instead would be a self-sufficient structural spine, onto which parts can be added as necessary, when necessary. I take the position that although there are several scenarios of what might happen to Heathrow (it might stay the same, expand a little, expand a lot, or even decline), it is the current that is most important. The project is about dealing with problems of the present, while facilitating development in the future. It is a foundation on which later developments can rely, but which fortifies the town as it is.

This project has spent some time in uncertainty itself, partly as a result of this ambition to solve all problems of present and future at once. This is a difficult aspiration, as it is easy to design such flexibility that nothing is defined. In the end, it has been most useful to think about the balance between Slough town and Heathrow, and how this relationship can truly be mutually beneficial. In hindsight, it became clear that the first phase of the project was the most important – from this any development would evolve naturally. What has been most challenging has been deciding how to (or even whether to) define parts which are complete uncertainties. I think the project has reached a balance where enough is defined to allow development, but not too much is defined to hinder what might be ultimately needed in future.



Other business parks around Heathrow might follow the same route as Slough



Some research into different examples of flexibility in architecture

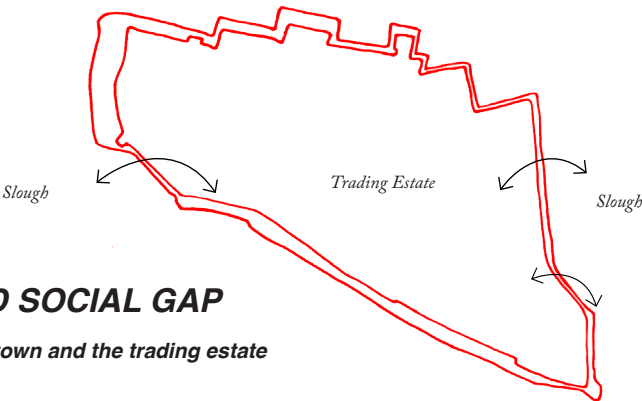
Proposal at P4 - Intentions

intention 



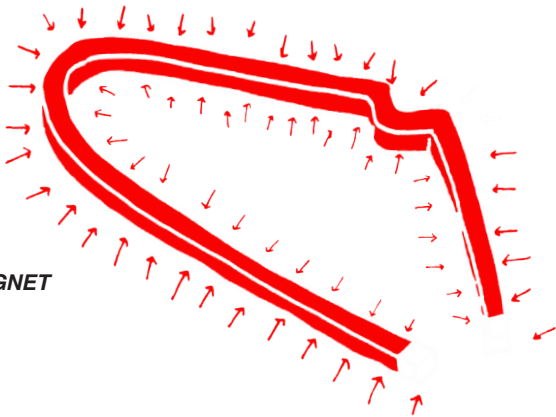
To make this relationship
MUTUALLY BENEFICIAL

intention 



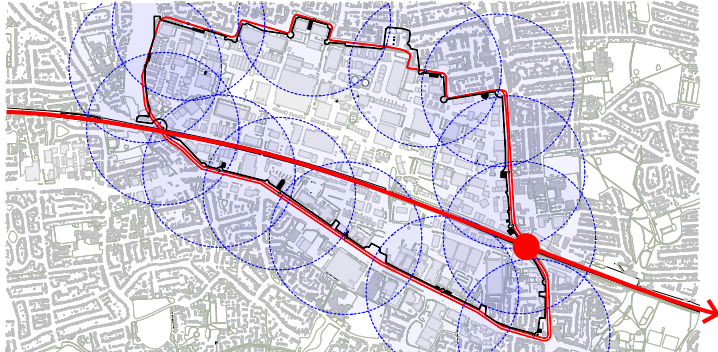
To bridge the
PHYSICAL AND SOCIAL GAP
between the town and the trading estate

intention 



To be economically and formally a **MAGNET**
to fortify the town and
ABSORB changes at Heathrow

The Ring: A String of Knots

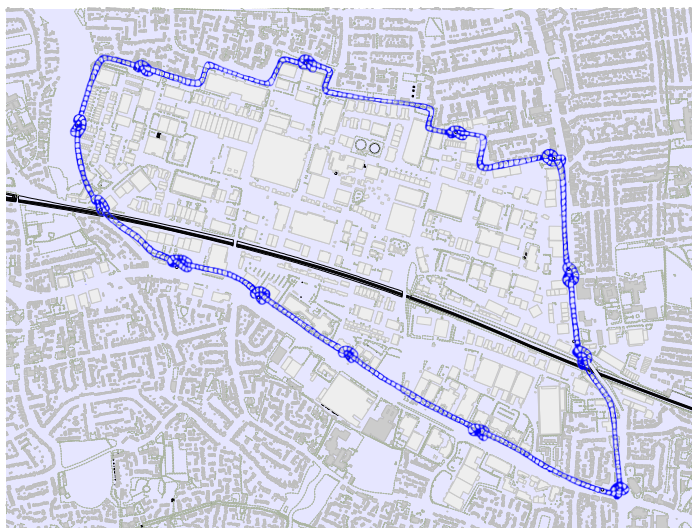


In order to fulfill these three ambitions, the proposal is to create a ring around the Trading Estate which deals with the three issues of: mobility/education/public space.

MOBILITY

EDUCATION

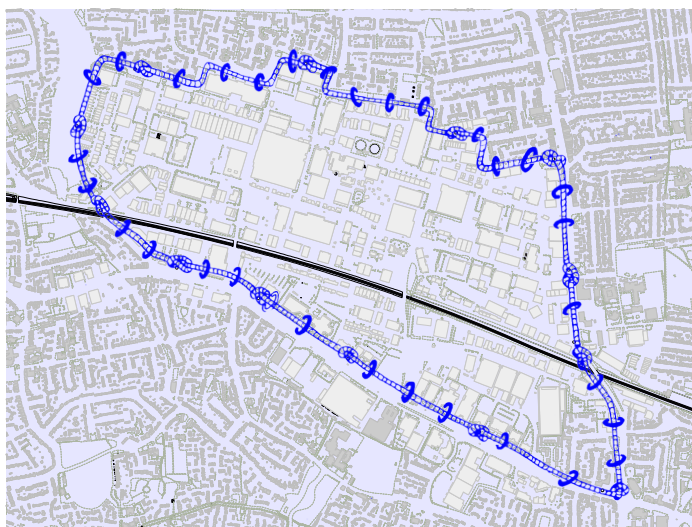
PUBLIC SPACE



The ring can be compared to knots on a string: the continuous loop has nodes, places of activity, along its length.

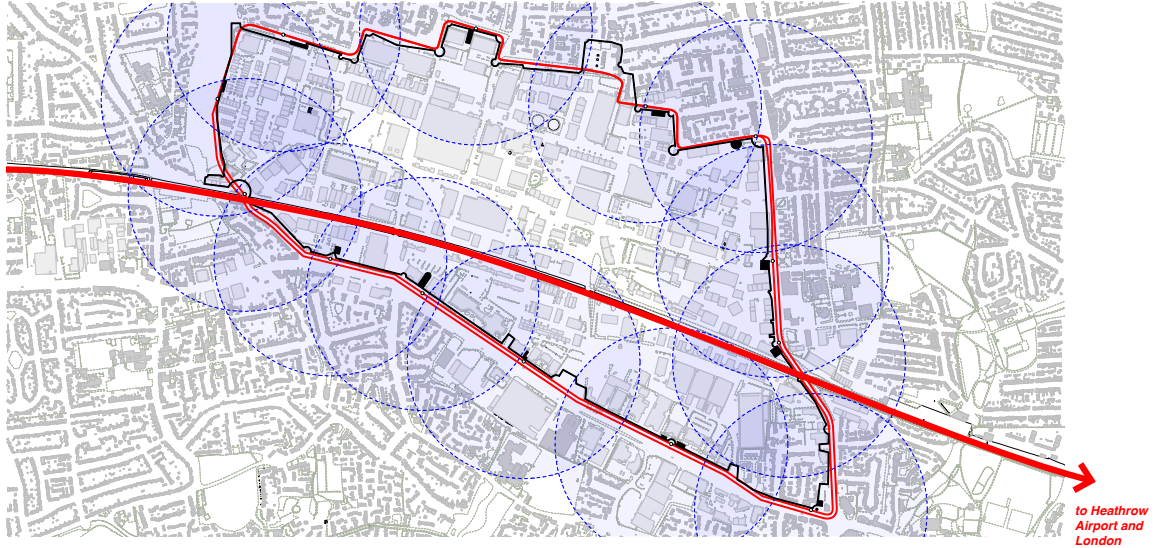
Not only are these points of interest but also control points where the design is most important, where the focus on public space will be. At each 'knot' there is a tram stop and an adult education centre. They can be seen as gateways to the Trading Estate, both physically and socially.

At the 'looser' points between the knots, the design is less defined, and is simply a single fibre.



In future, developments along these looser stretches of the ring will be able to attach to it. The loop acts as an anchor onto which new buildings can connect.

Mobility



One of the key parts of the proposal is the new and improved mobility that the ring brings. The first phase is the introduction of a new interchange on the mainline railway, connecting to a new tramline which circles the Trading Estate.

The benefits of this are:

For Heathrow:

- Frees up space on site at the airport, as some functions can move to be a satellite of the airport.

- New businesses will move to the Trading Estate in order to use this fast connection to Heathrow: the airport's capacity is not compromised, but interest is increased.

For the Trading Estate:

- Businesses are attracted to the area as a result of this improved connection to Heathrow.

- The new tram link improves mobility to and around the Trading Estate - most sites are within a 5 minute walking distance from a tram stop.

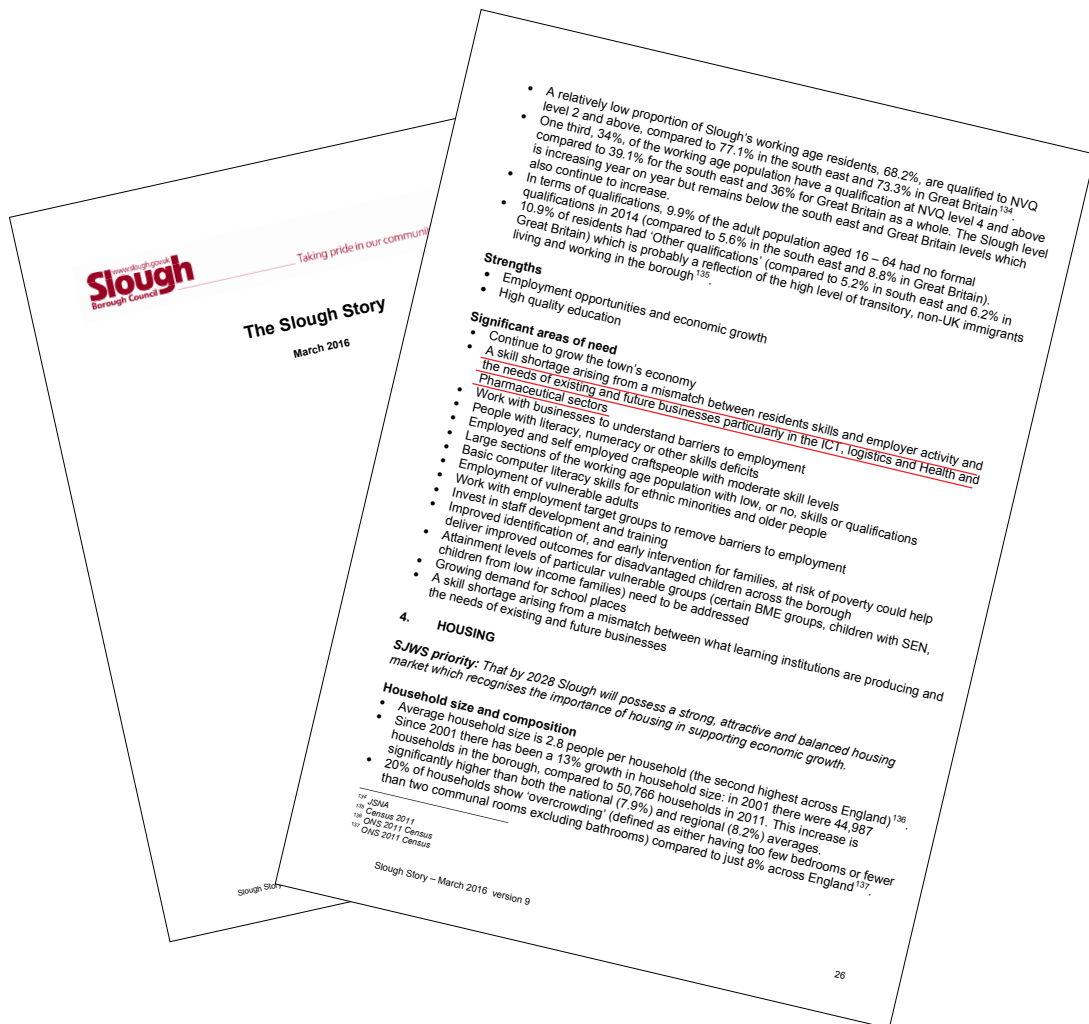
For Slough:

- A new tram line improves mobility around Slough.

- The implementation of this new public transport reduces car use and emissions in the Slough area (most people currently drive to work).

- A new connection to London and Heathrow is created.

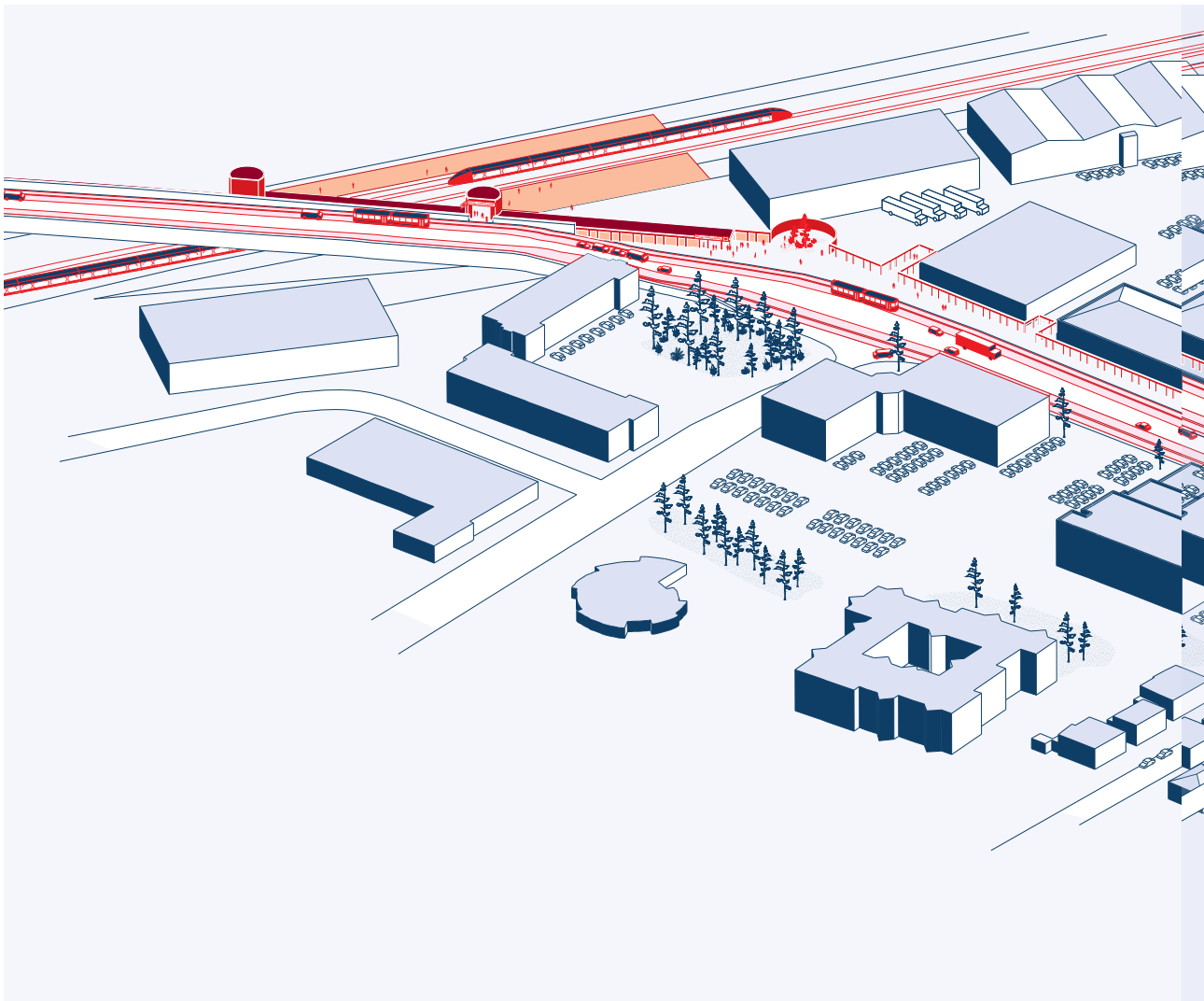
Education



At each node, there is an adult education centre. These aim to combat the problems identified by Slough Council, shown above, by improving the qualification levels of adult residents of Slough and teaching skills which may help them to work on the Trading Estate.

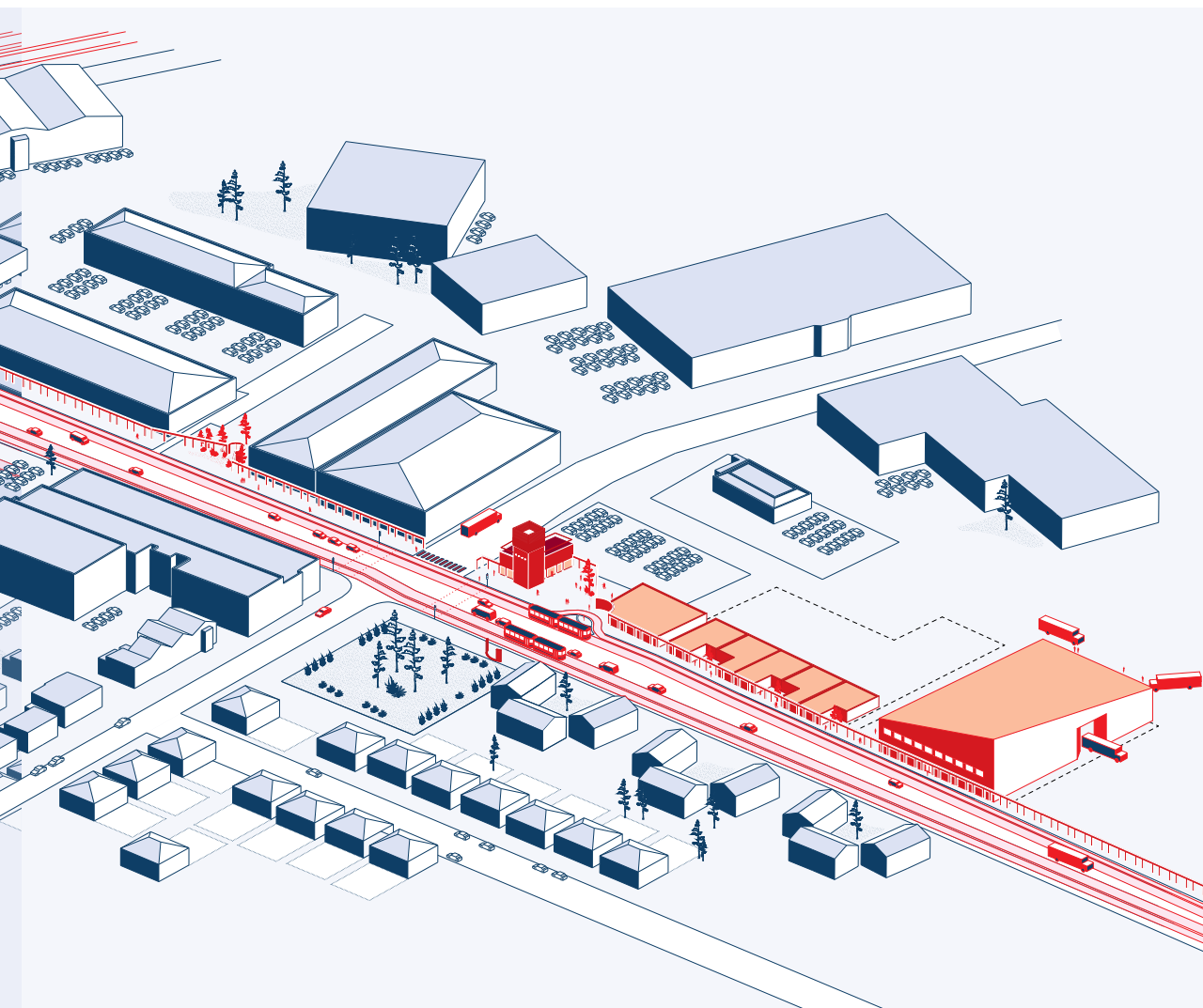
Public Space: Ambitions

- *Address the 'no man's land' between the two zones*
- *Create a human scale*
- *Force the Trading Estate to address the town, rather than turning away*
- *Create something with the potential to absorb decline or development in the Trading Estate as a result of changes at Heathrow*
- *Add something which creates continuity around the zone (but not too much)*
- *Create a threshold between the Trading Estate and Slough, which gives the town much-needed public space.*

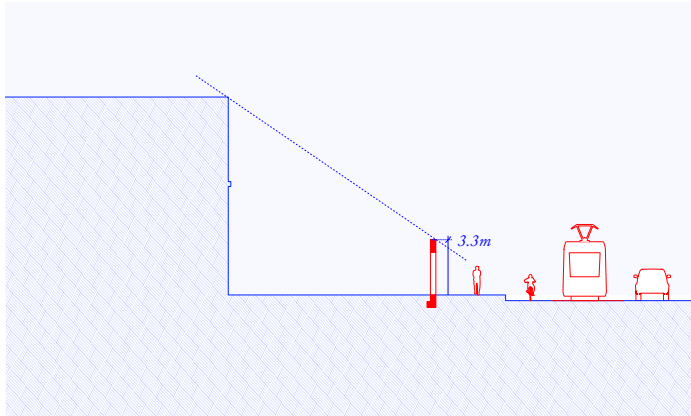


Public Space: Elements

- *Tram line*
- *Tram stops*
- *Colonnade*
- *Landmarks*
- *'Rooms'*

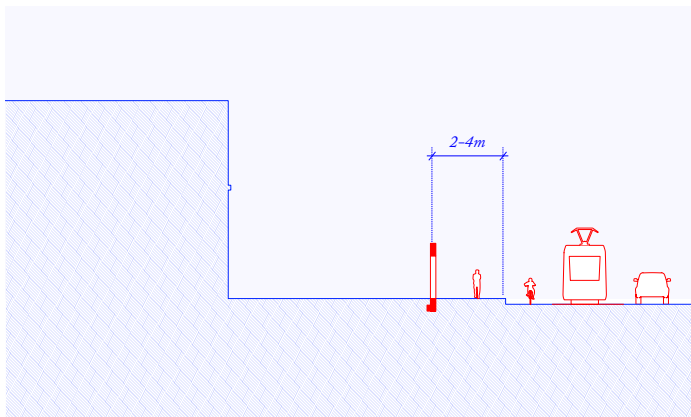


Proposal: The Colonnade



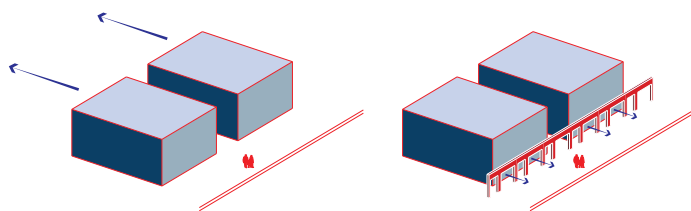
The colonnade lowers the height of the street presence to 3.3m, a much more human scale than that of the warehouses.

HUMAN SCALE



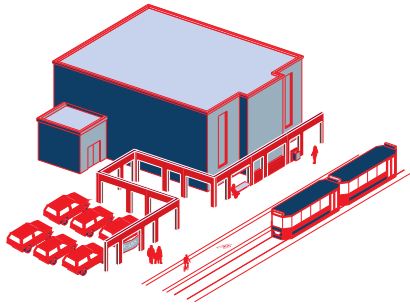
Whereas the pedestrian area around the Trading Estate varies between 2m and 10m, the colonnade is placed to create a variable space of 2-4m on the Slough side.

THRESHOLD

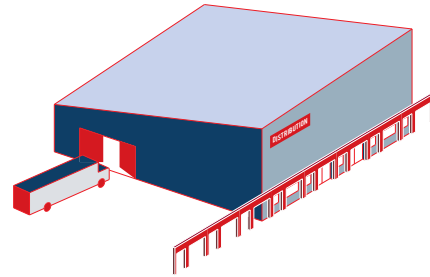


ADDRESS THE TOWN, NOT THE TRADING ESTATE

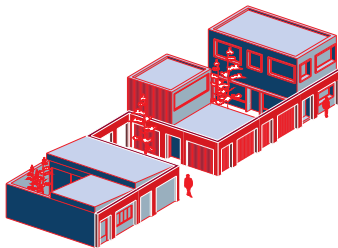
One of the key reasons for the colonnade is to force the Trading Estate to have a frontage onto Slough. Whether or not buildings are accessible through the colonnade, it forces them to engage with the street in front. The openings in the colonnade mimic the openings in a street and create continuity.



With the Trading Estate as it is, the colonnade creates a buffer zone which mediates the poor quality of the buildings and creates a zone of public space along the pavement.

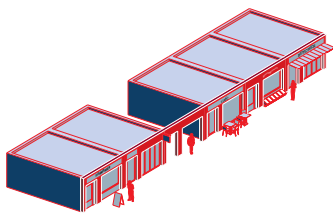


In future, if other warehouses or office buildings come to the edge of the Trading Estate, they will be forced to interact with the colonnade. This may mean that openings on the building are created on the street side, or simply that the continuity of the colonnade is broken.



Other functions in future may include housing, small offices for small local businesses, or commerce such as shops, cafes, bars.

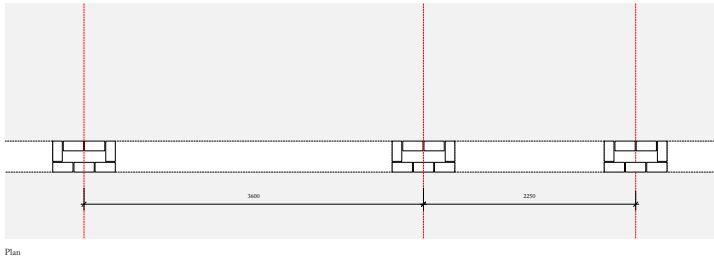
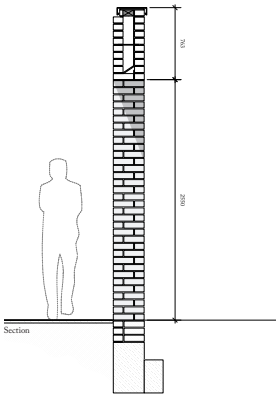
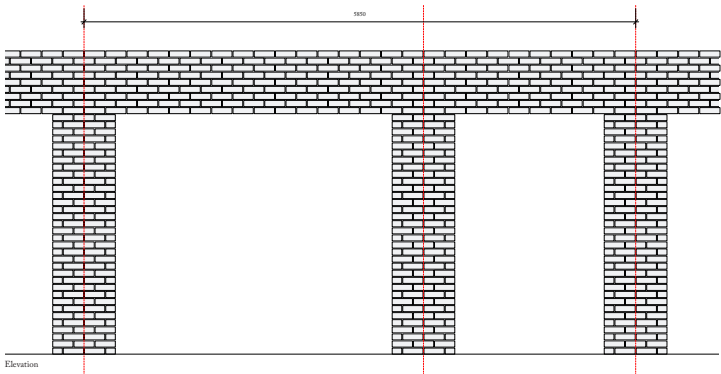
The colonnade allows for flexibility in the sense that it acts as a spine onto which these functions can connect.



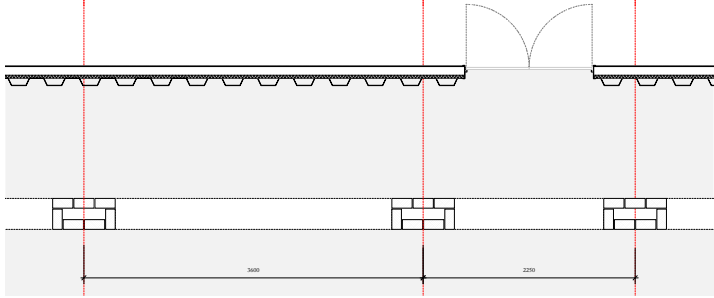
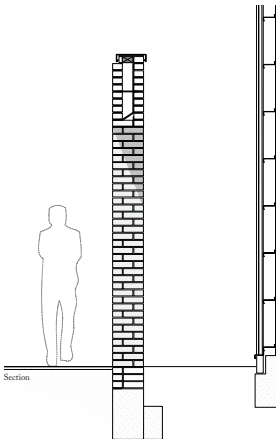
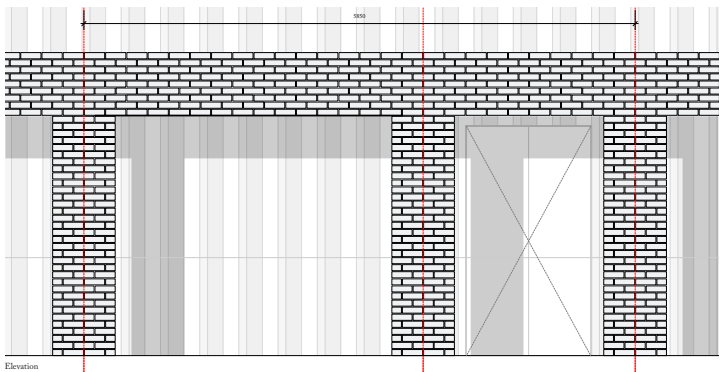
Finally, the colonnade creates interesting spaces when it loosens from the existing pavement and road, creating 'rooms' or public space along the route. These can be squares, parks or parking, but create some variety along the route.

Proposal: The Colonnade

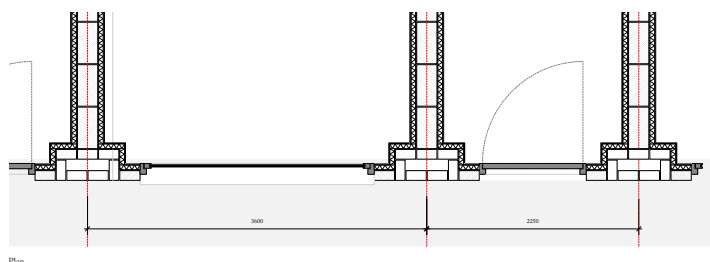
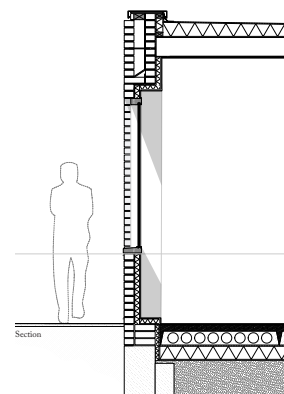
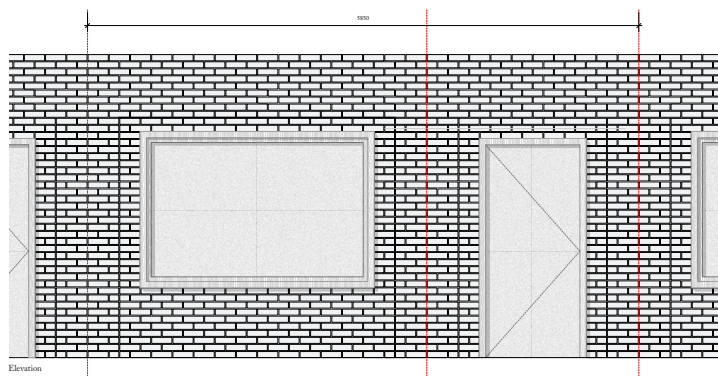
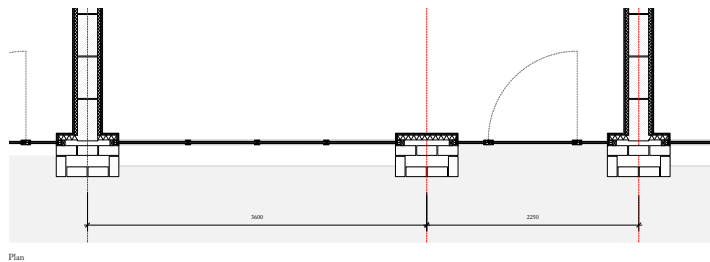
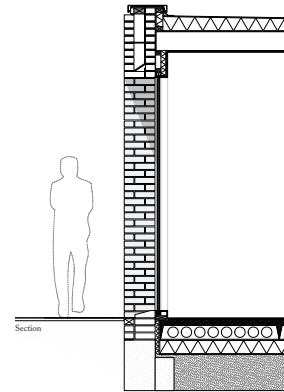
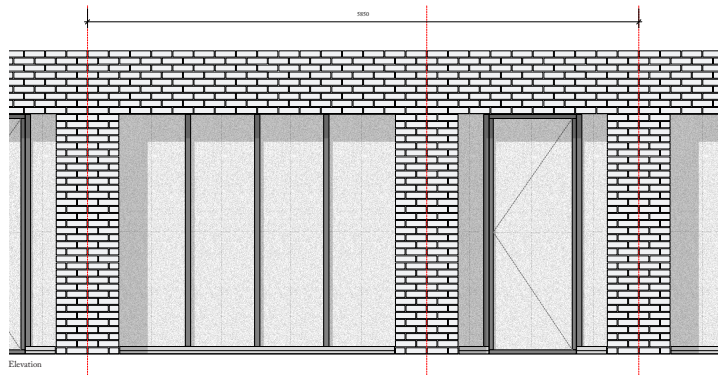
Different positioning of infills in the colonnade create a rhythm and some variety in the wall.



Plan



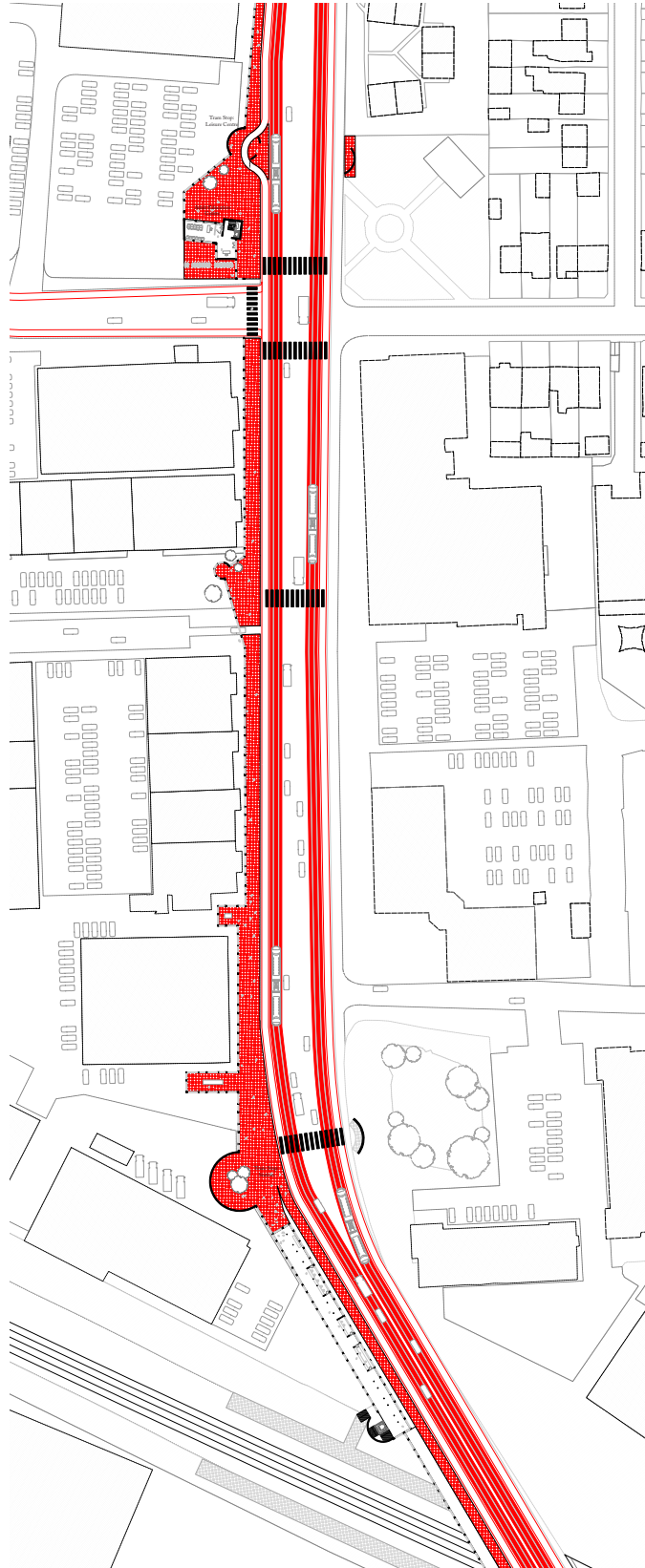
Plan



Proposal at P4

The focus in this proposal is on the public space created by the wall, and the buffer zone it creates.

Two nodes, or 'knots', are shown in this plan – the first is a generic node with an adult education centre and a tram stop, the other is the anomaly: the transport interchange where the tram meets the railway.



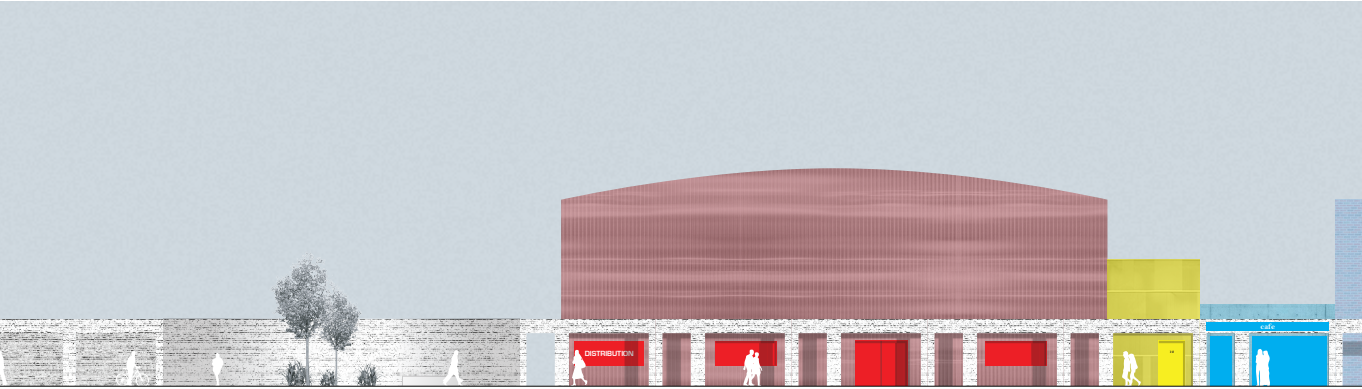
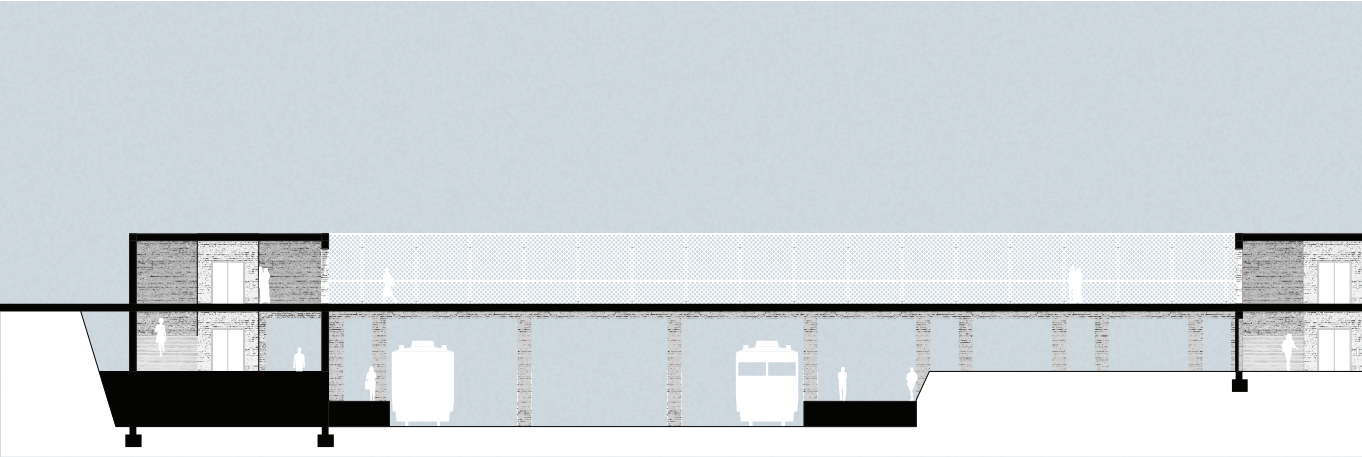


Generic portion of the Colonnade



Landmark at one of the 'Knots'

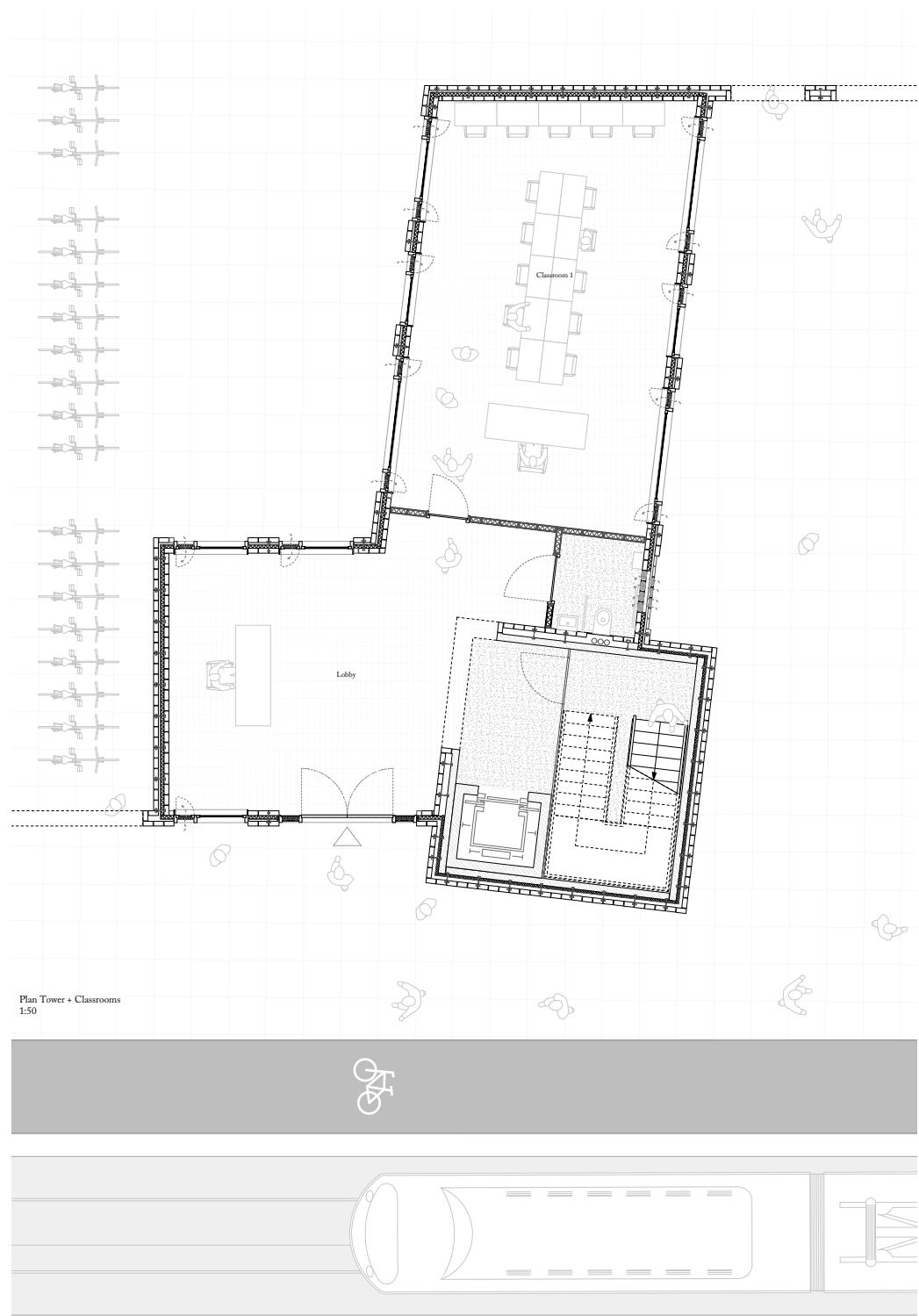
Proposal at P4: Long Section

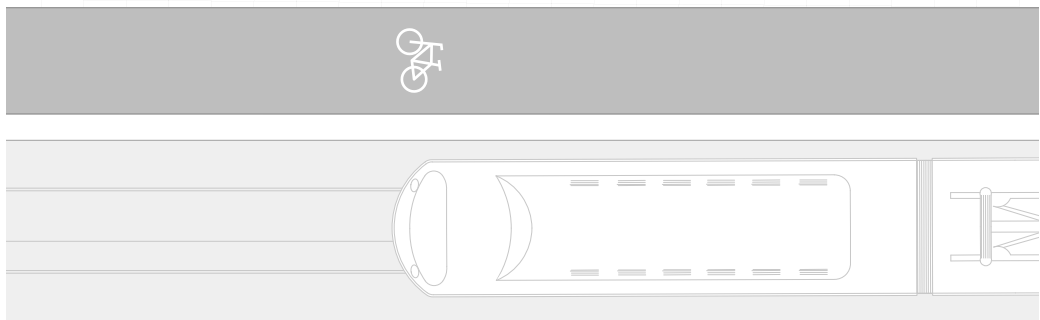
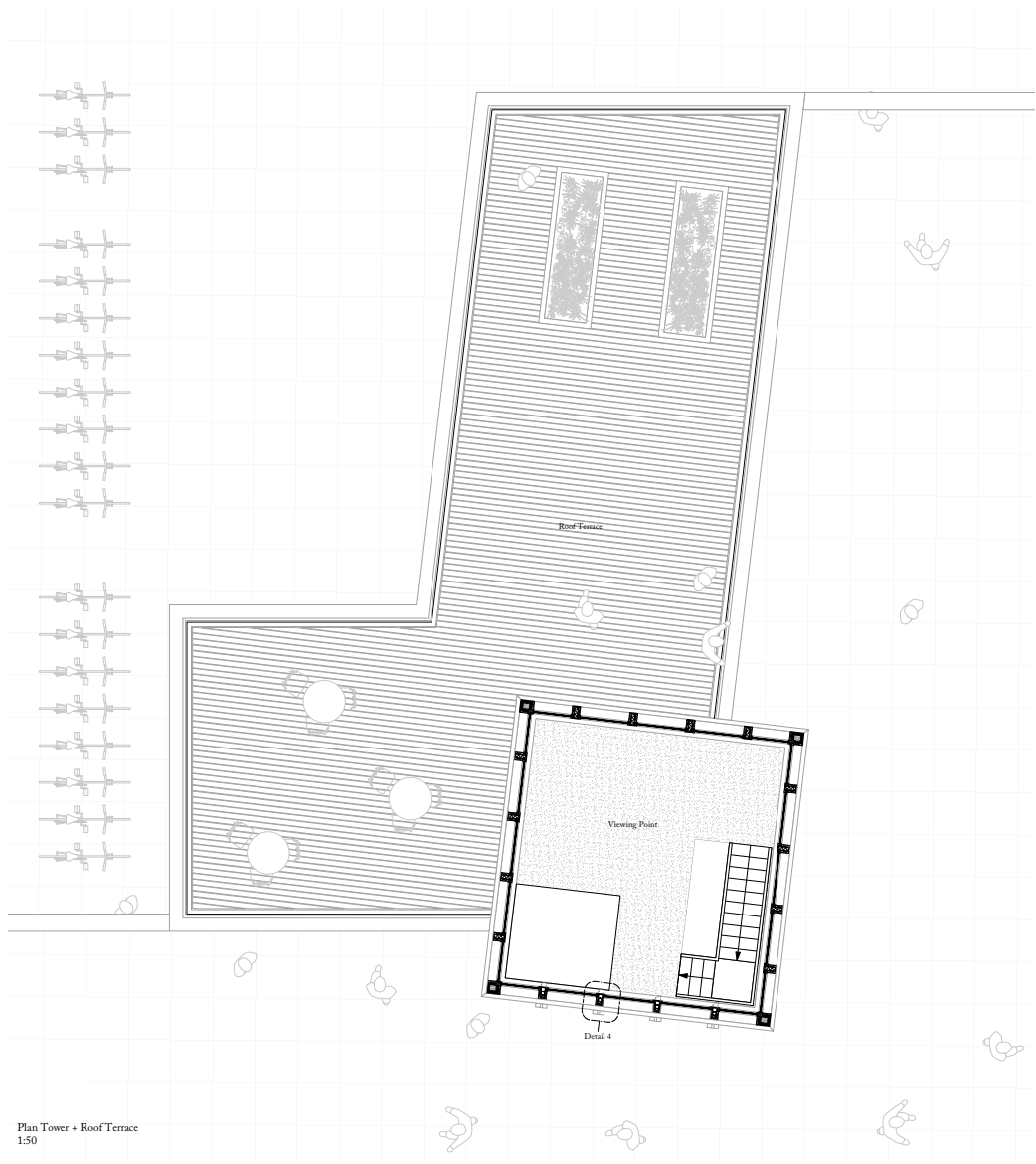


The aim of this long section is to show how the wall is a mediator of quality of the things behind it. No matter what is built, the colonnade maintains a level of quality and continuity which benefits the Slough side.

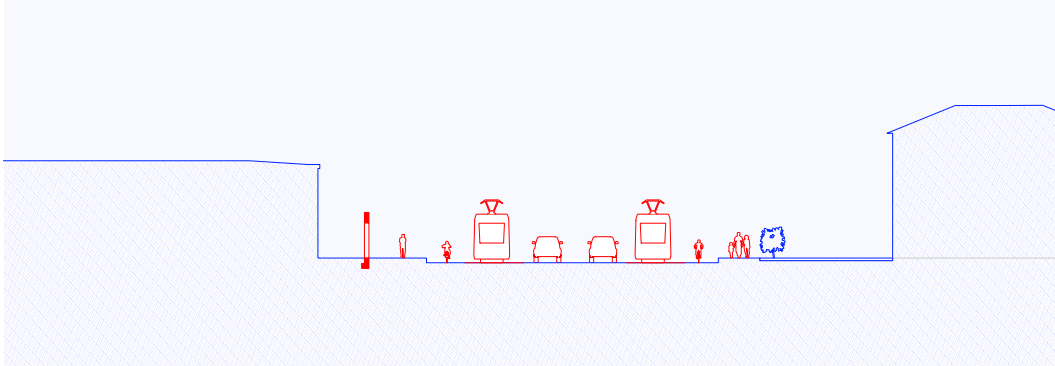


Proposal at P4: Plans

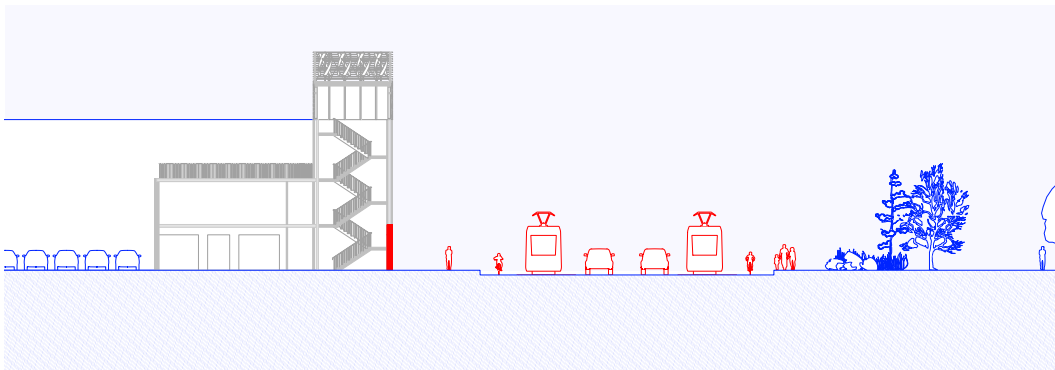




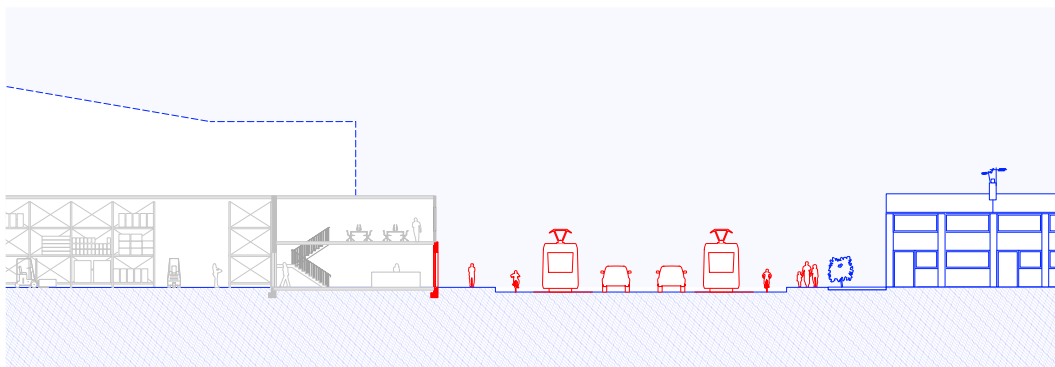
Proposal at P4: Sections



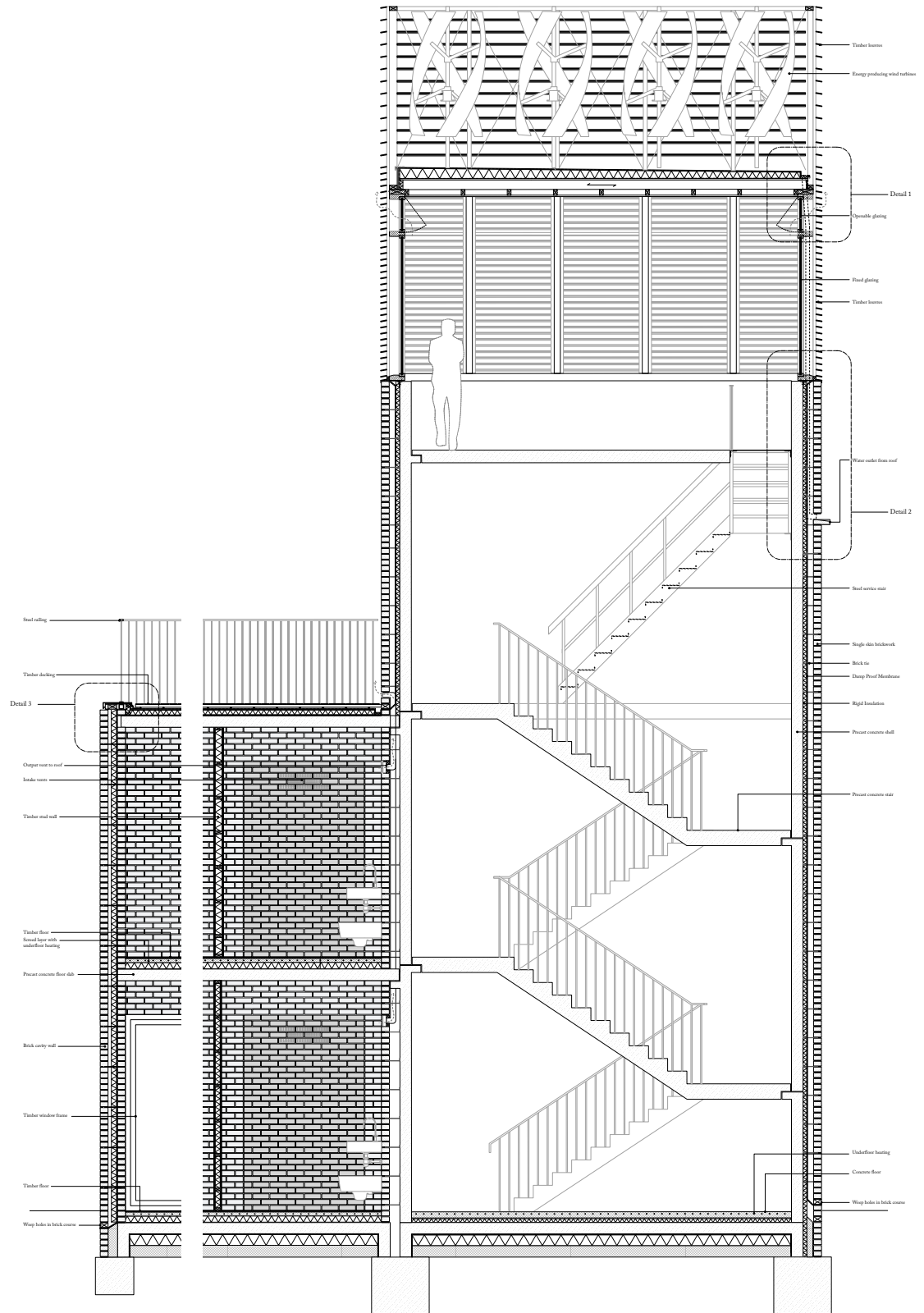
Section AA
1:200



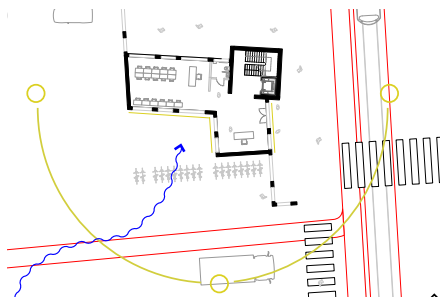
Section BB
1:200

Section CC
1:200

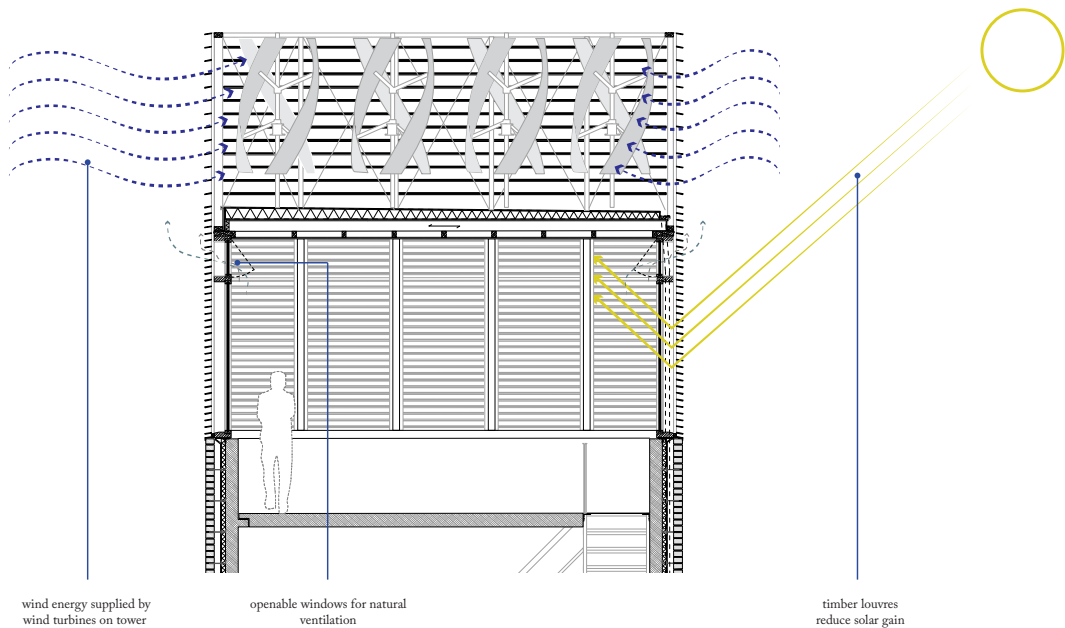
Proposal at P4: Detail Section



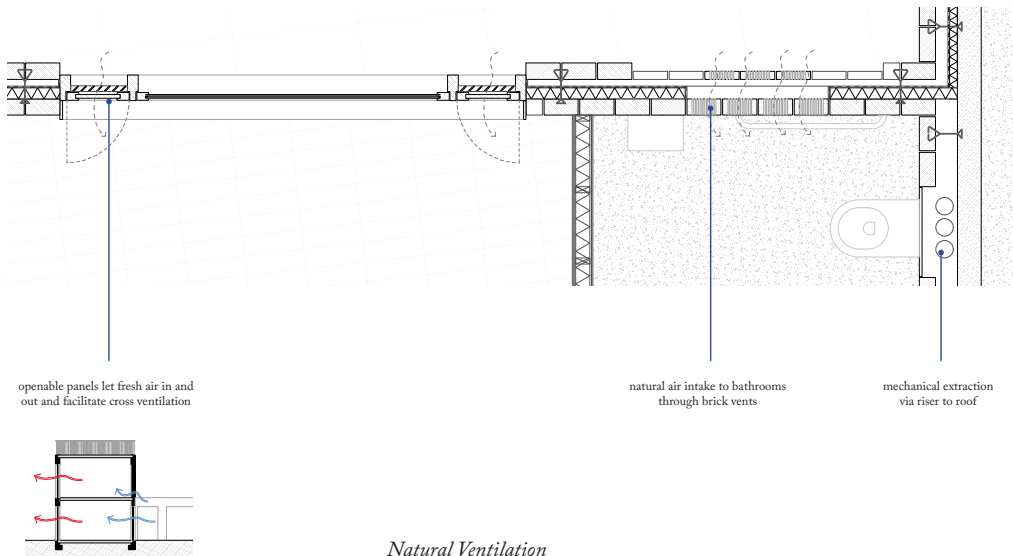
Proposal at P4: Climate



Orientation

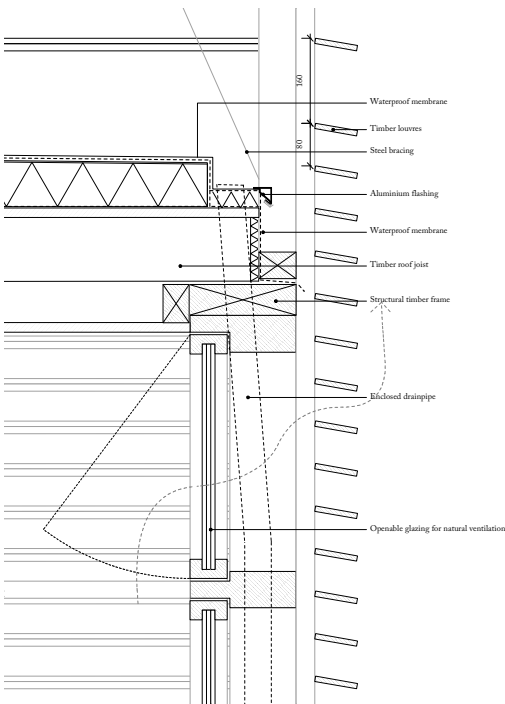


The Tower

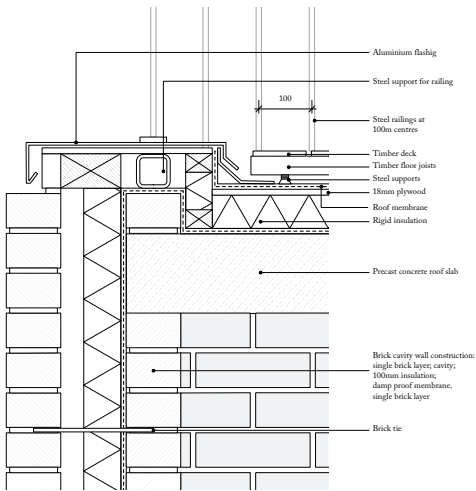


Natural Ventilation

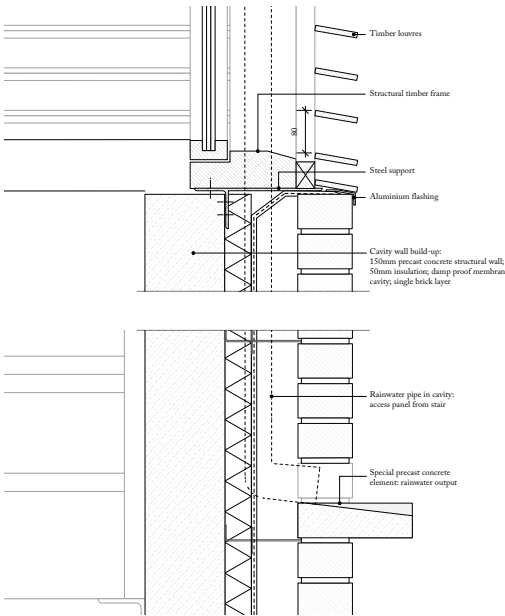
Proposal at P4: Details



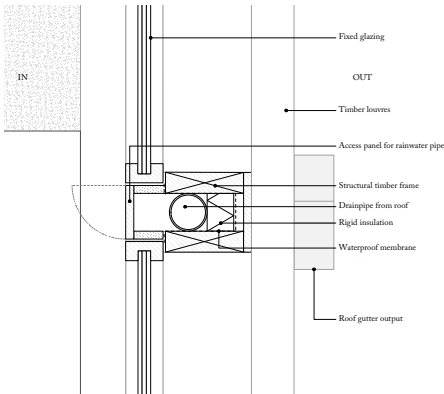
Detail 1



Detail 3



Detail 2



Detail 4

P4: Comments

Roberto Cavallo

- *Public space needs to be defined*
- *What can happen behind the wall in the Trading Estate?*
- *How did you pick these points around the perimeter? What happens at these points? Are the landmark buildings different depending on their context?*
- *Think carefully about flexibility – how can the wall be integrated into new Trading Estate activities?*
- *It might not have a positive effect on the outside*
- *Is the same flexibility as is needed on the Trading Estate side wanted on the Slough side?*
- *It would be nice to understand more about the 'rooms' and to incorporate the neighbourhood more*

Engbert van der Zaag

- *Stability of the wall – steel profiles needed for wind load?*
- *Think about the climate design/sustainability of the whole project*

Leo van den Burg

- *Strategy: What is the deal that Slough would make with Heathrow? What is the part that Heathrow plays? How do they come to this trade-off?*
- *Who pays for the wall?*
- *It could be that the gesture is seen to mask all of the nasty things that will happen inside the Trading Estate?*
- *It seems completely in contrast to the billion dollar ugly buildings behind the wall.*
- *Use the illustrations to better explain the qualities of this public space.*
- *Should make my case much stronger: 'they are making millions of pounds and all we get is this wall!'*

Wil Zonneveld

- *Would the plan be unfeasible if the tramline was never built?*
- *The images should be more representative of the real materiality*

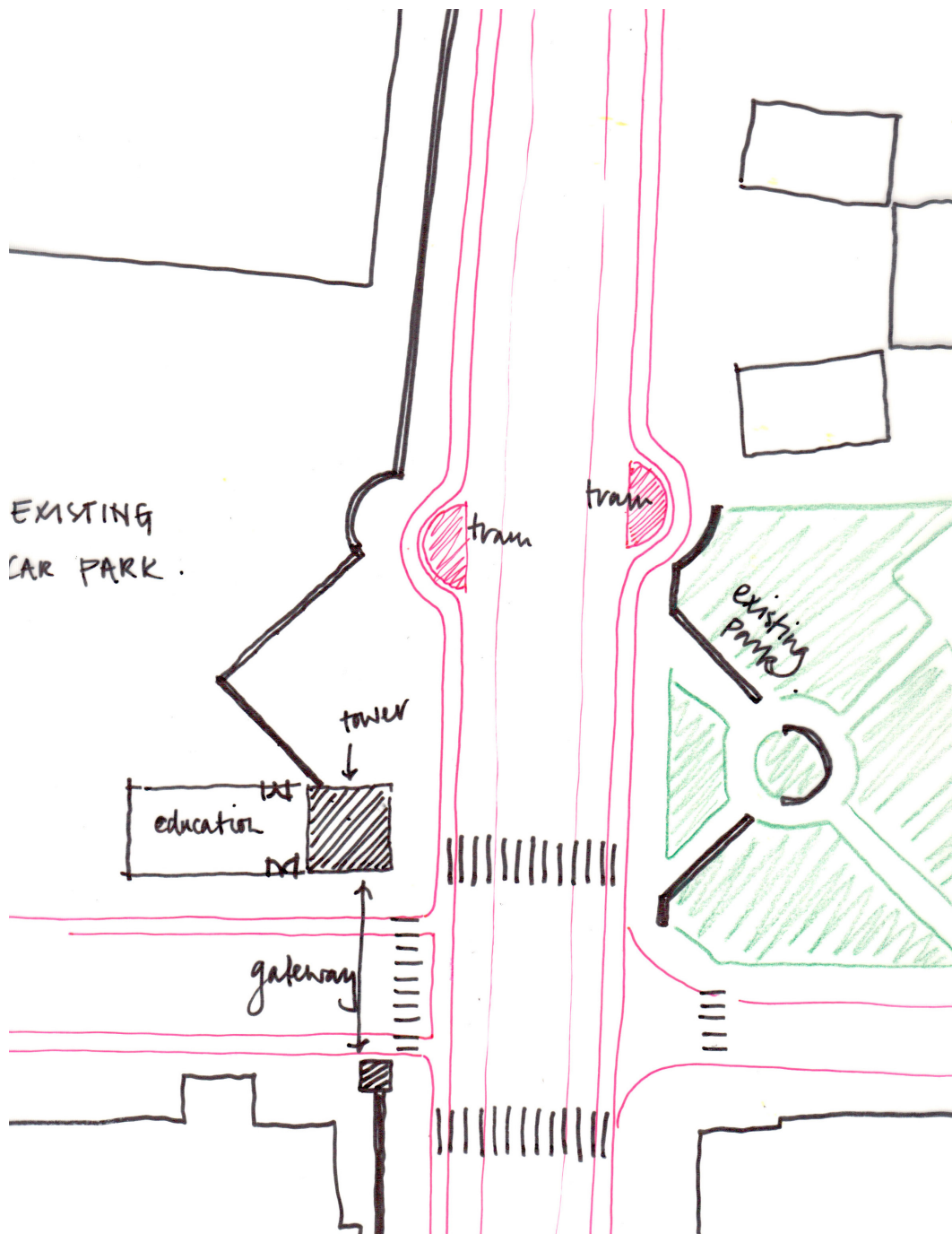
General

- *Find a name for the intervention which describes it best*
- *What is the added value of this intervention and what does it look like?*
- *It should have its own character*
- *The design of the wall and the knots needs to be more thorough: specific points of public space and connections with the reality of Slough at these points*
- *Elaborate on the colonnade and its banal simplicity with regards to the studio topic and the specifics of the area*
- *What is my position? Make this clear*
- *Make a very precise statement about why this is the 'right intervention' and what the results are*
- *Materiality / colour / model fragment / qualities of the quality control*

Summary

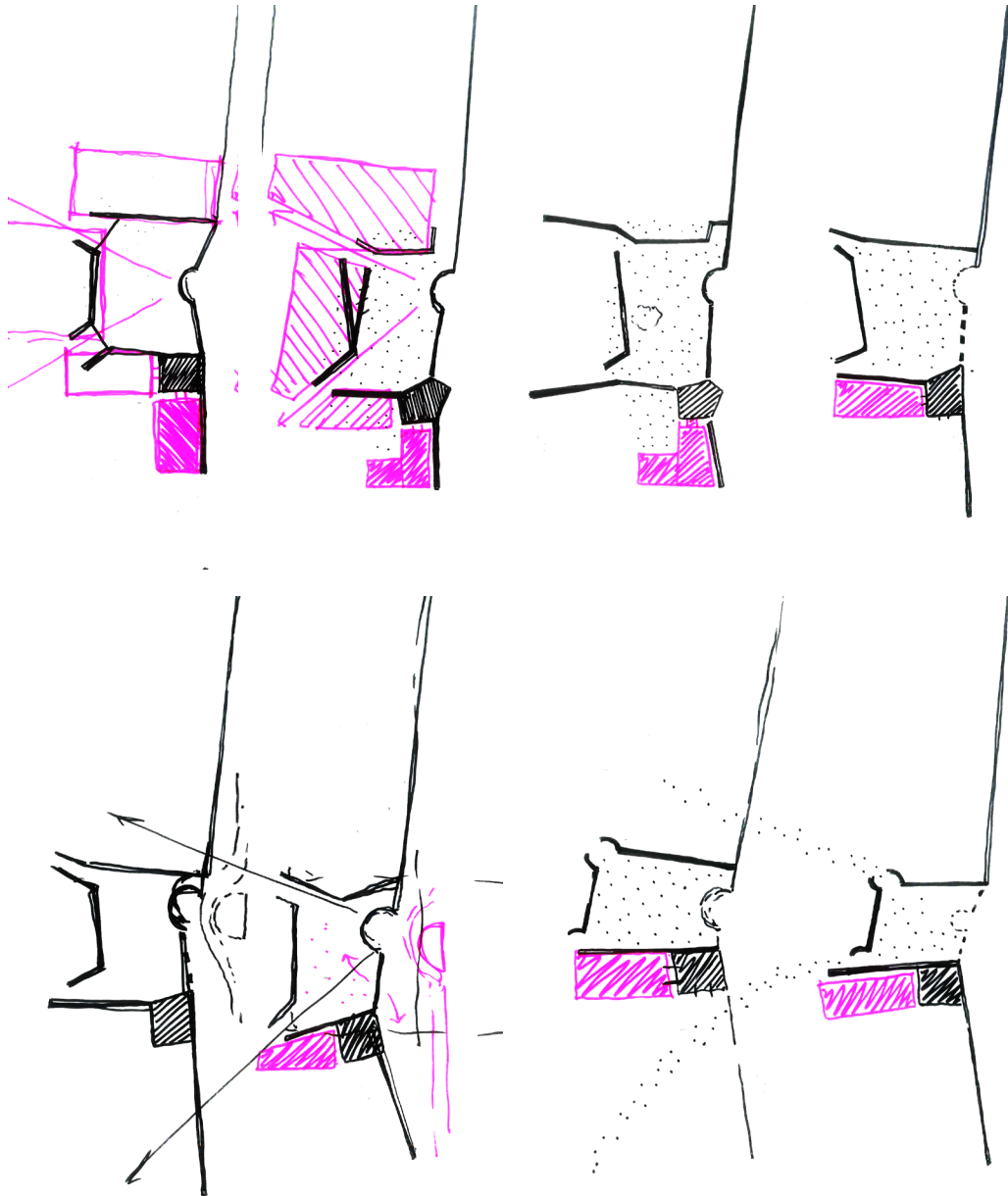
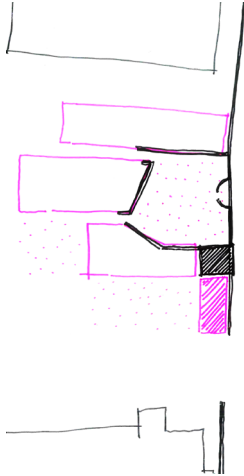
- *How does this relate to 'migration'? Stress the daily in/out flow of people in the drawings*
- *Develop the 'knots' – really work out what the landmarks and tram stops are*
- *Explore how these points will spill out into the neighbourhood*
- *Focus on materiality and show the positive qualities of these new spaces*
- *Develop climate concept – could this be a bigger strategy?*

Post P4 Development: defining the public space

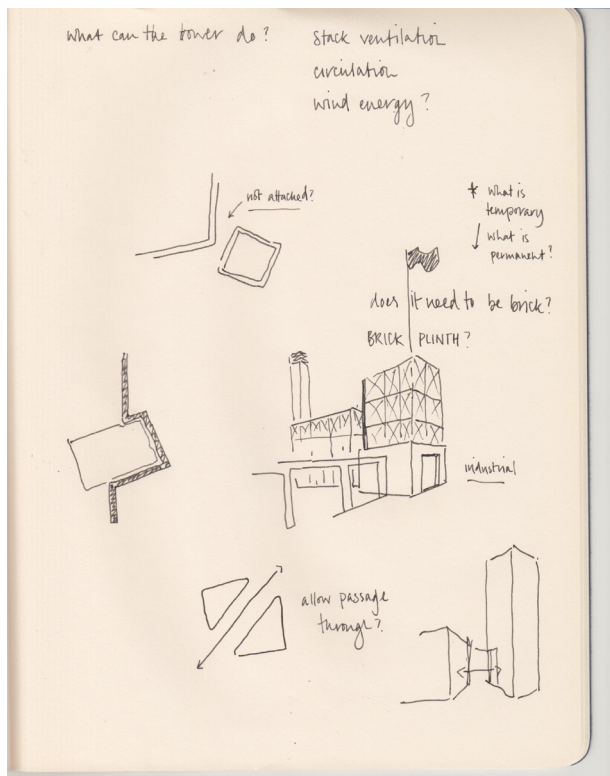


Development of the new public square at the new node

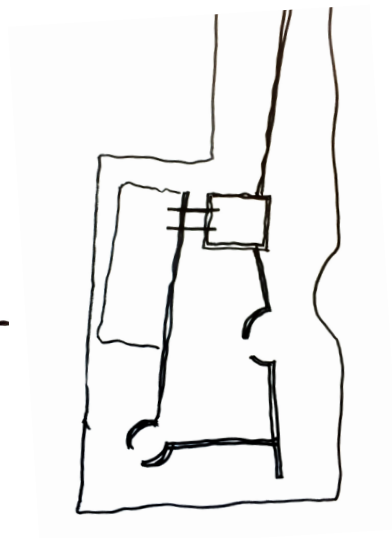
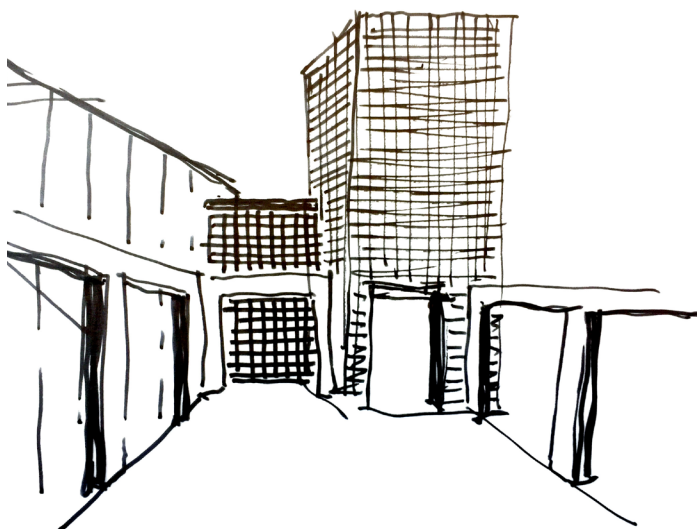
*Development of the new public square at
the new node: routes and directions*



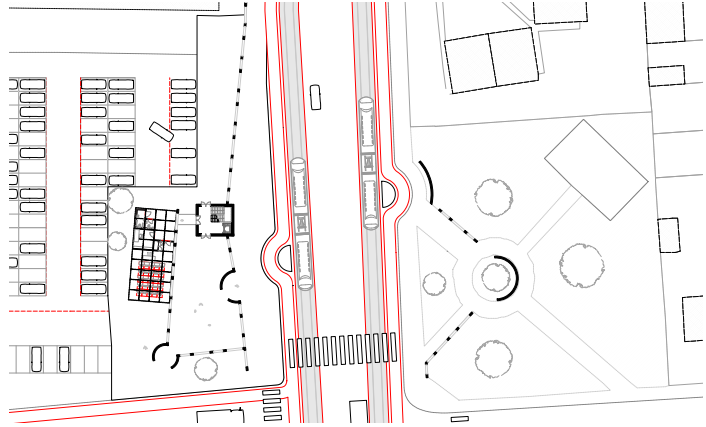
Post P4 Development: the tower



Developing the tower into something more industrial

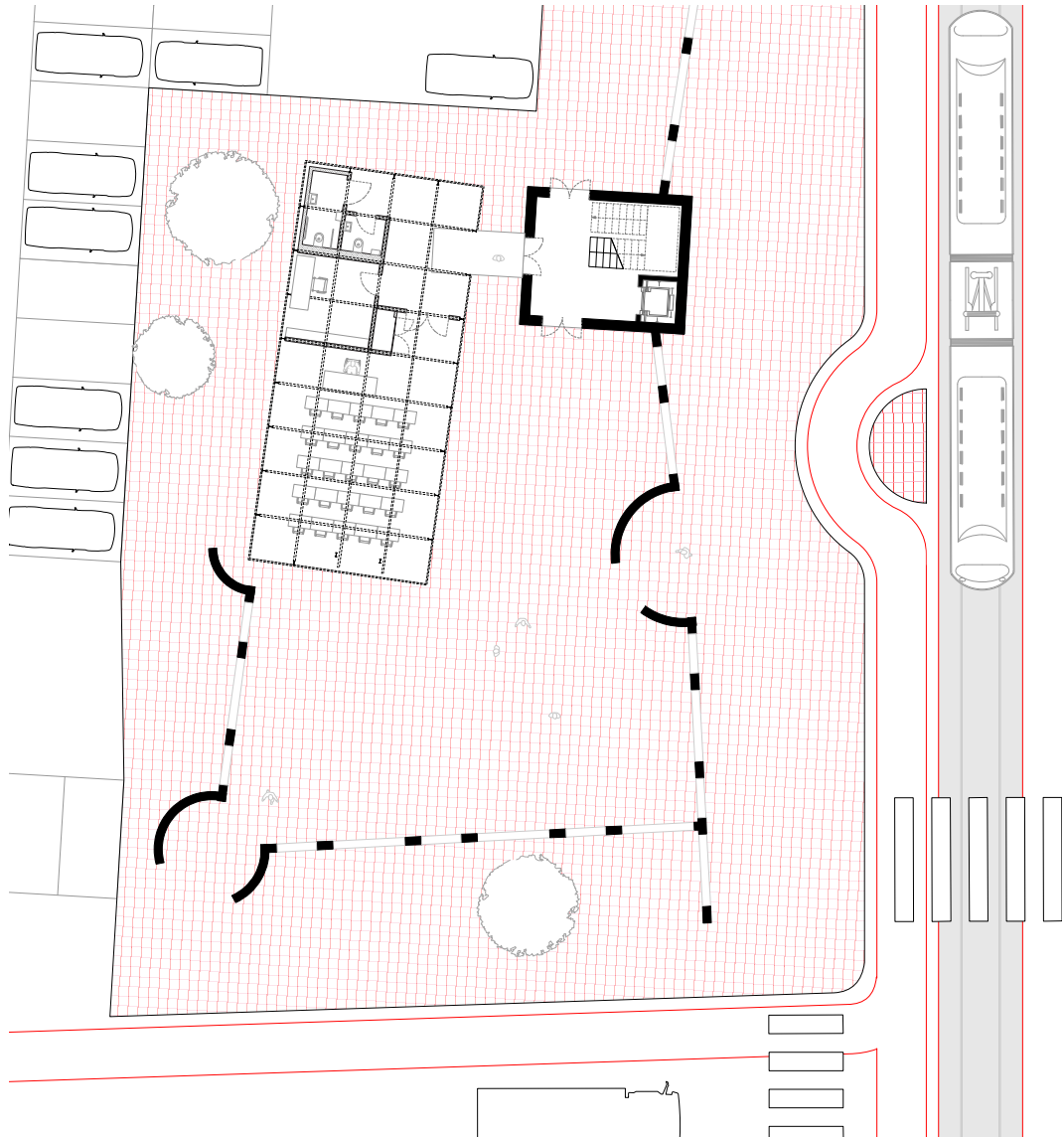


right: starting to include the existing park in the wall and node



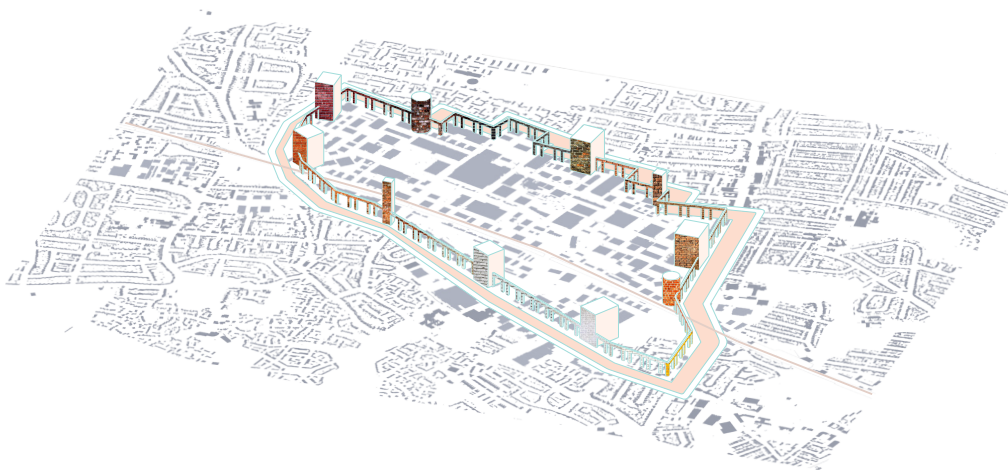
The new square: routes guide people from the tram stop into the trading estate, avoiding the car park.

The tower is simply infrastructure, housing only a stair core and toilets

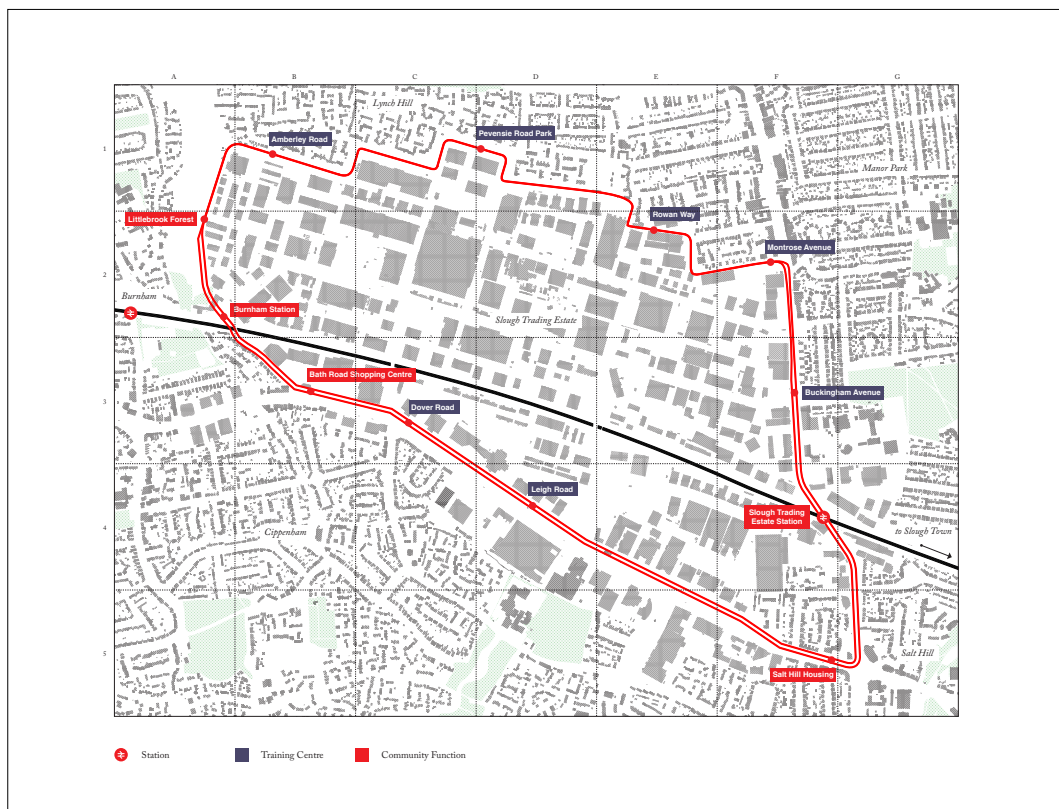
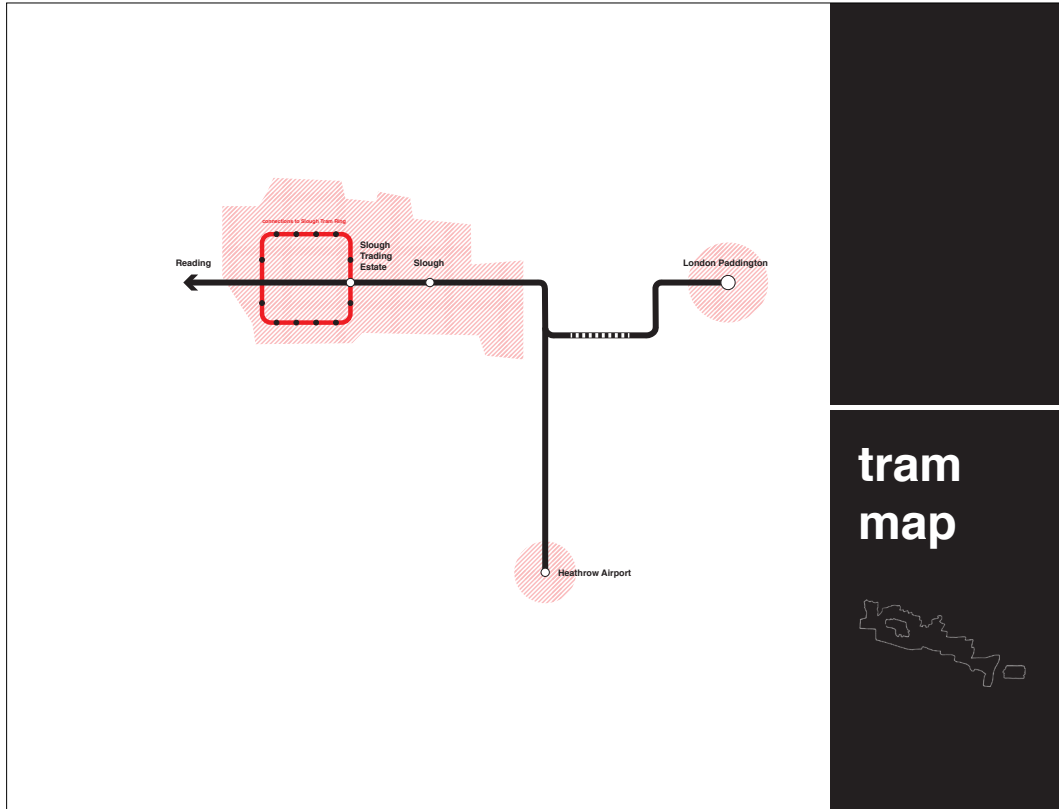




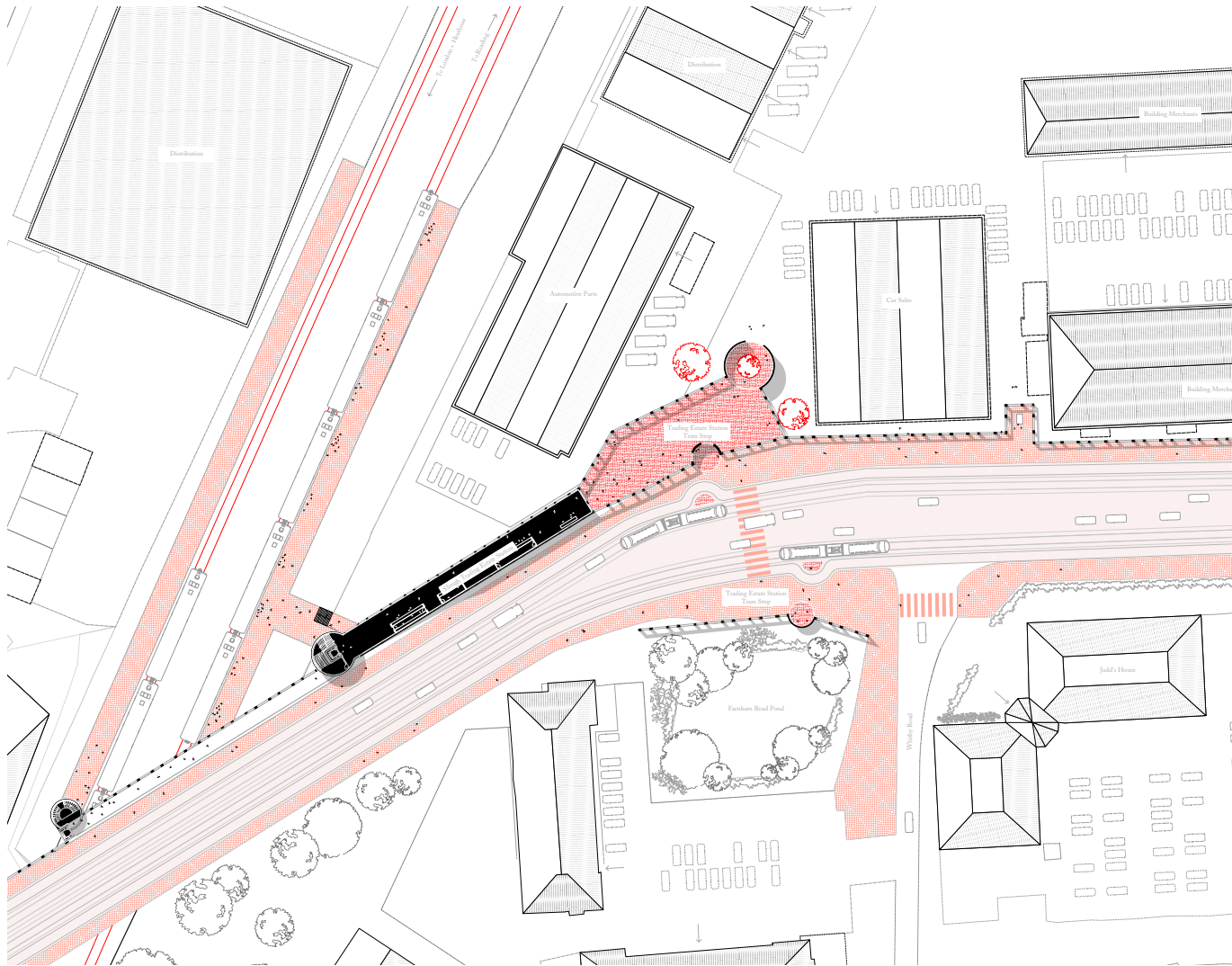
Masterplan: Brick Ring and Transport



The project is a ring which surrounds the Trading Estate, both containing it and creating a front to the town. The ring is made up of a tram line (which connects to the mainline railway), a continuous colonnade, and a series of landmark buildings which contain adult education facilities.

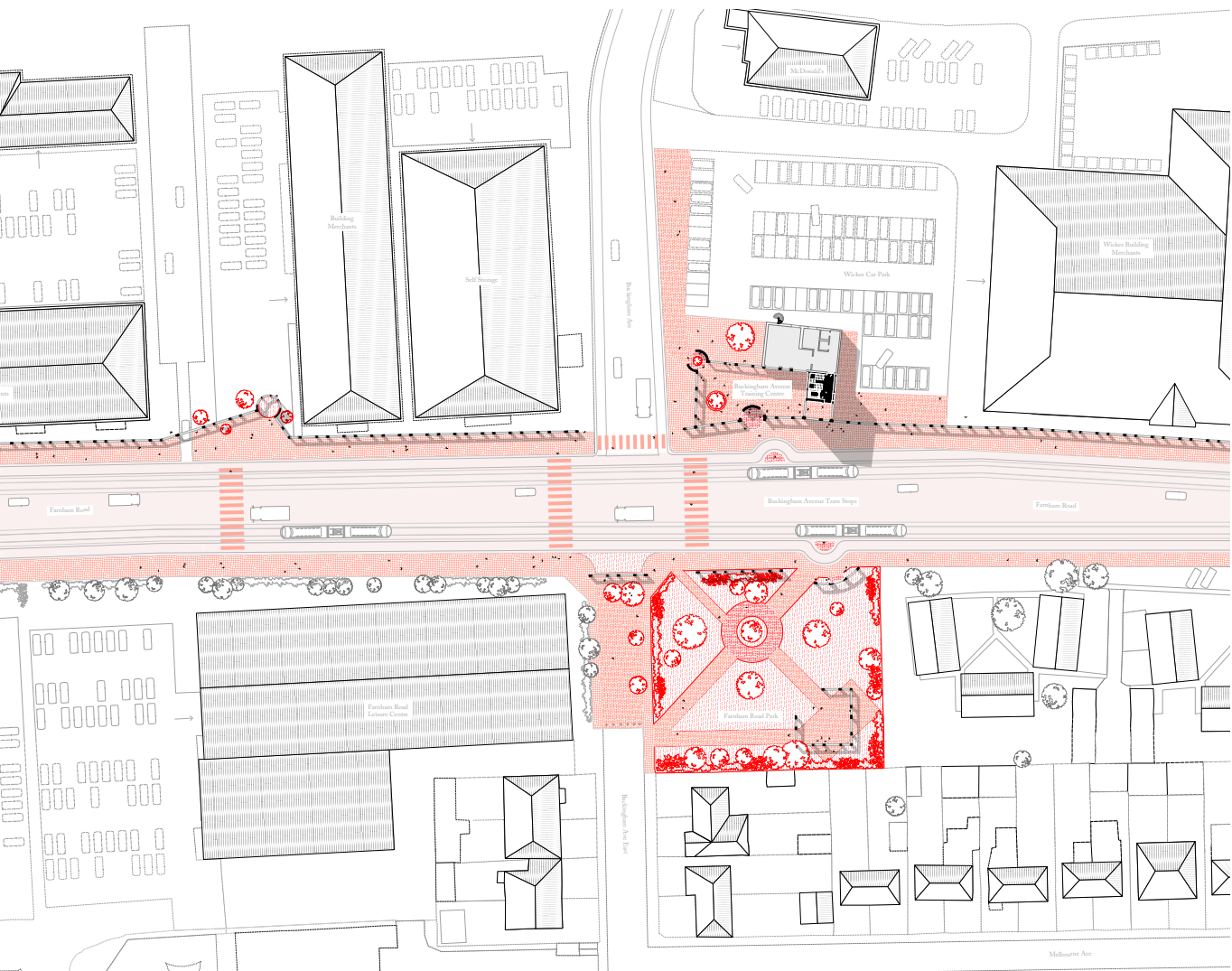


A section in more detail



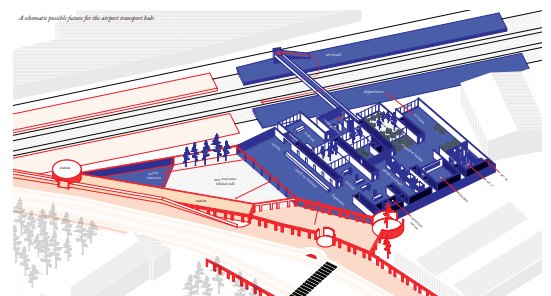
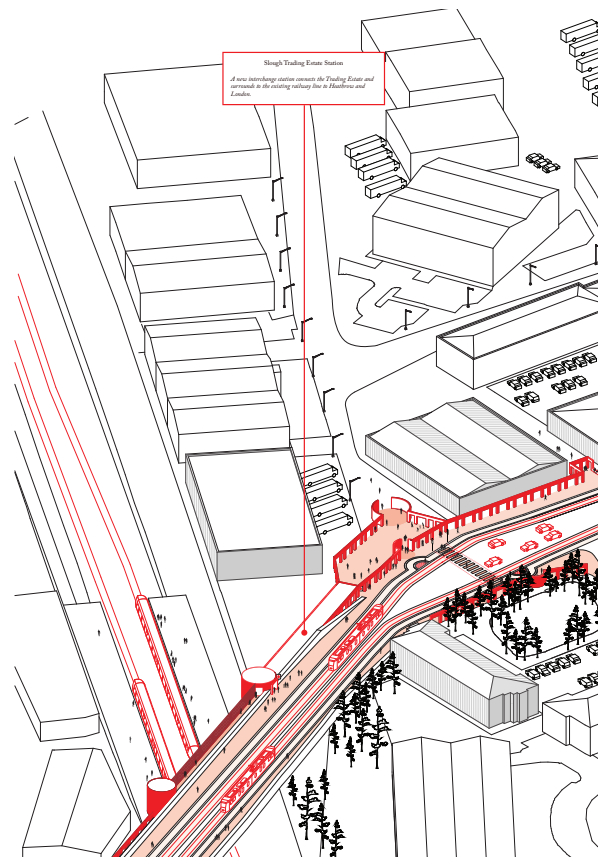
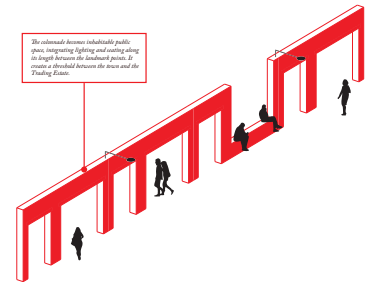
The project focuses on this stretch – between the station and another node. This node is an indicator of what the other nodes might be like.

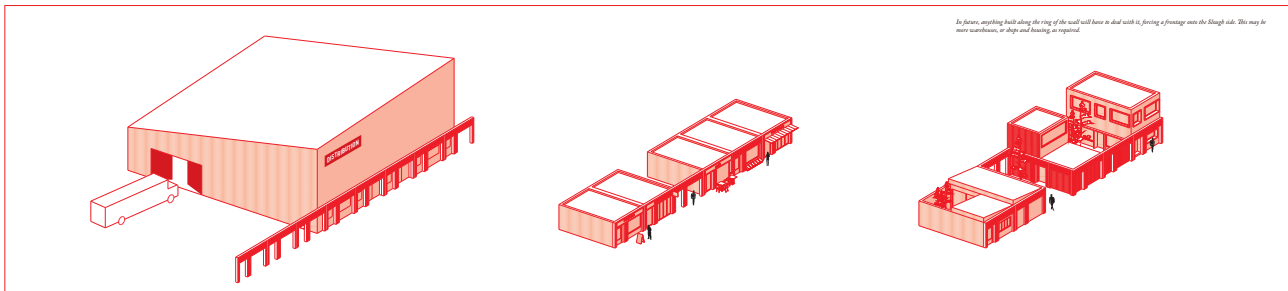
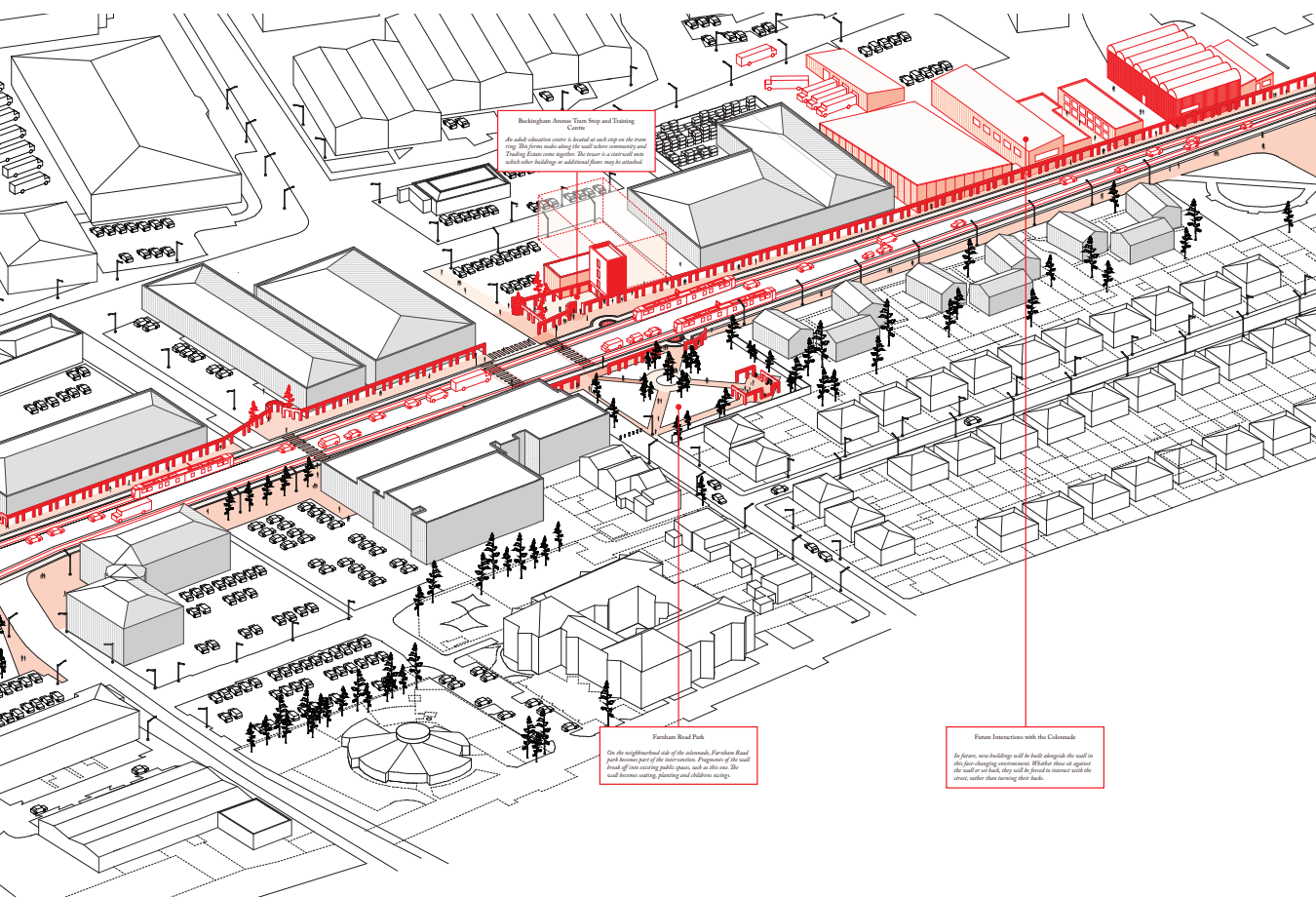
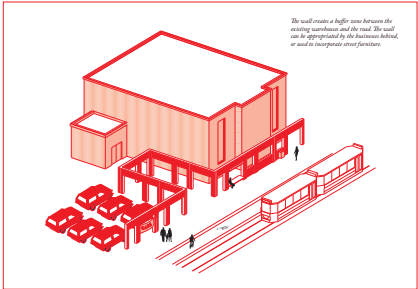




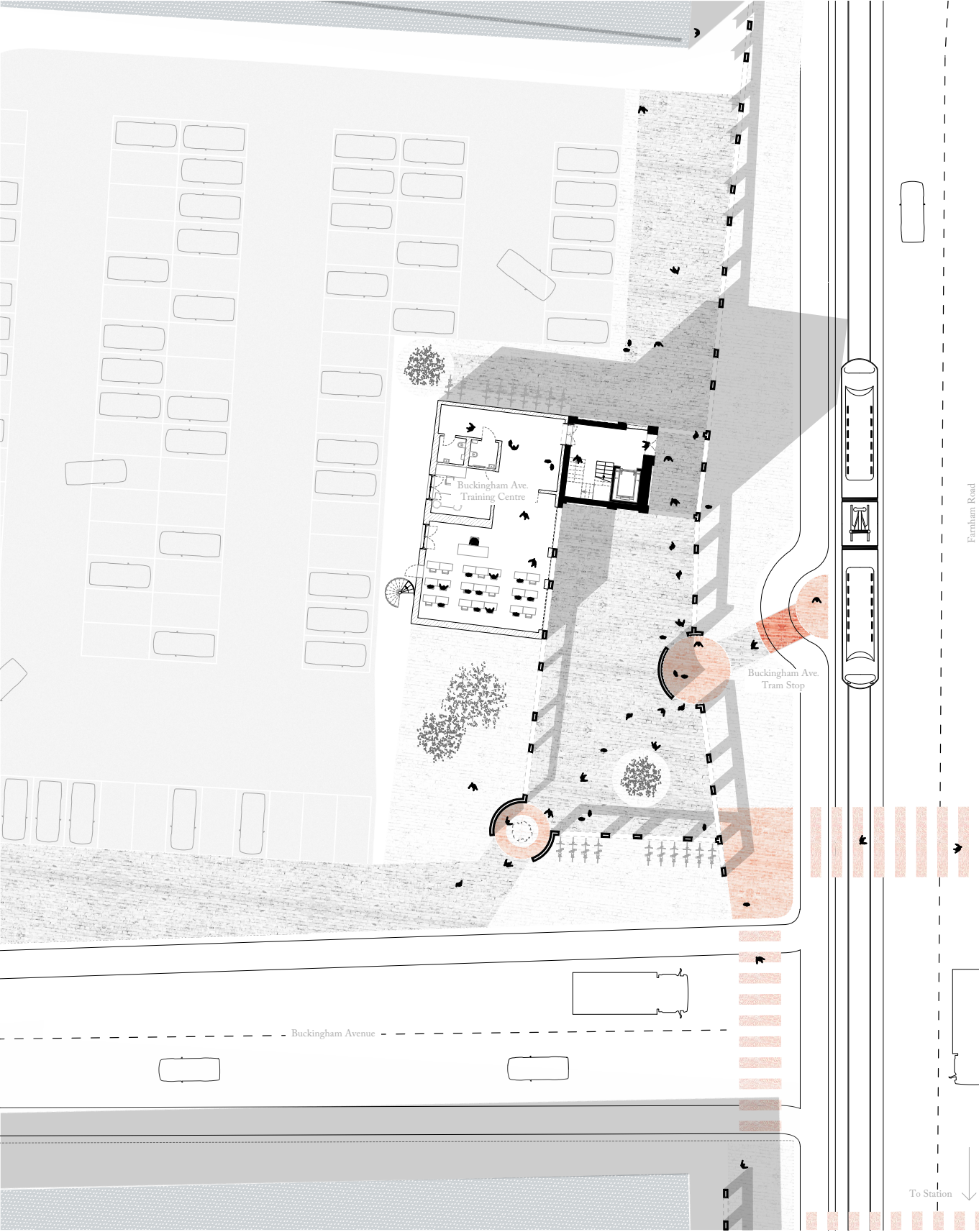
Axonomic: the colonnade and flexibility

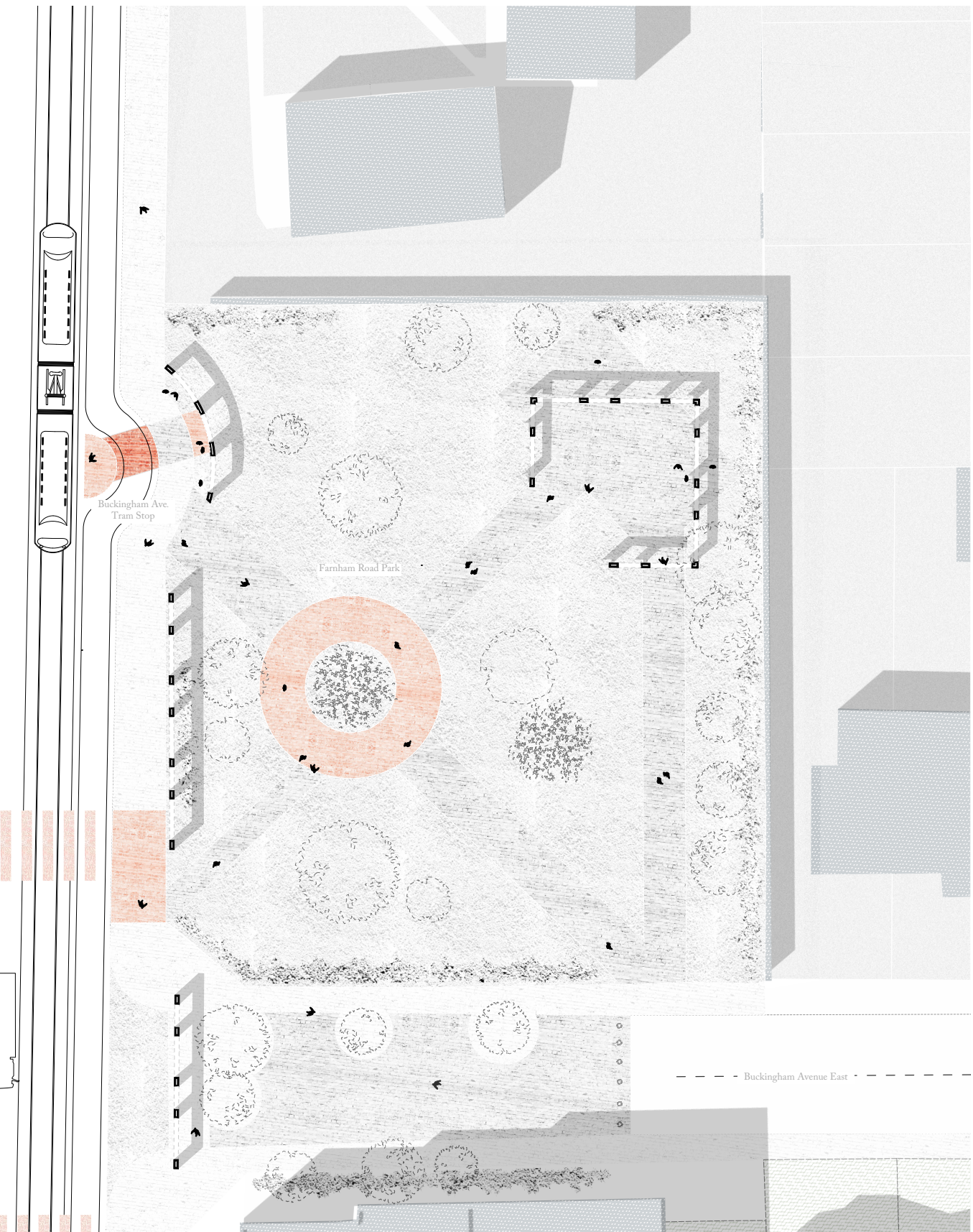
The colonnade is a permanent spine onto which more temporary developments will attach, as required. This might be housing, commerce or warehouses. If nothing is required, the wall acts on its own. It creates public space in spaces where there was previously none.



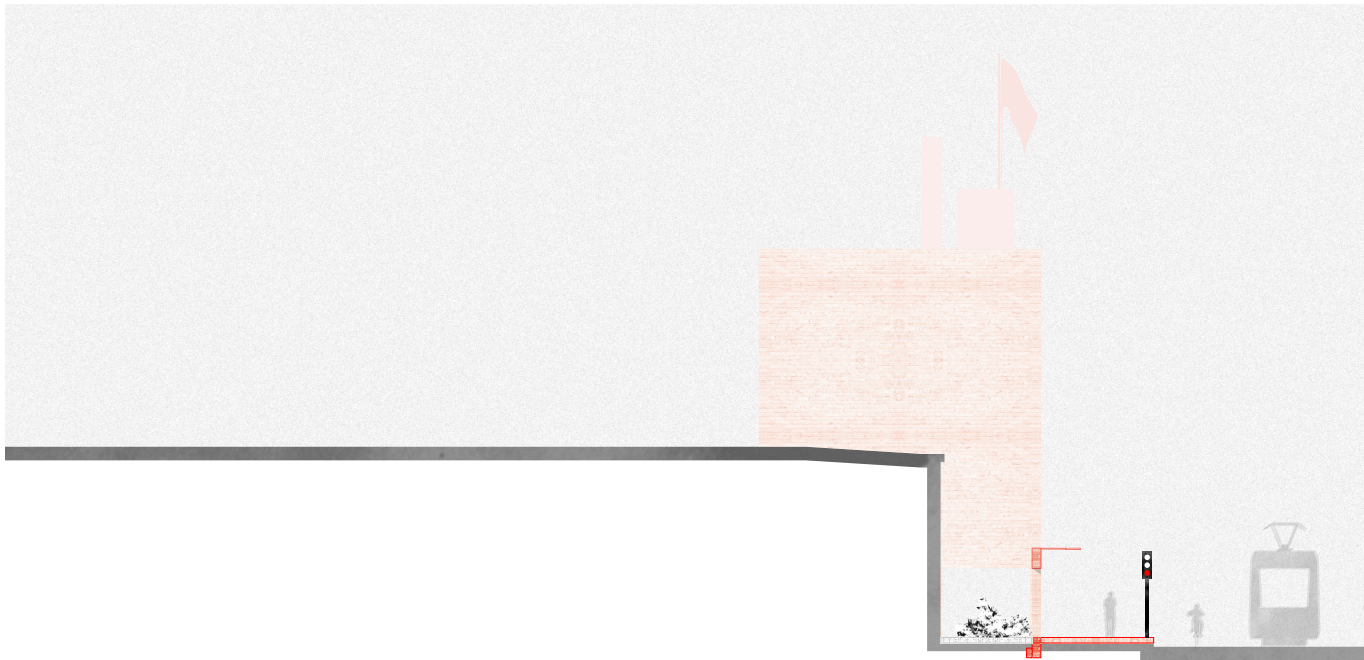


The new node in more detail: incorporatnig the Slough side





Sections: Different conditions



The colonnade as a standalone object with the tower in the background



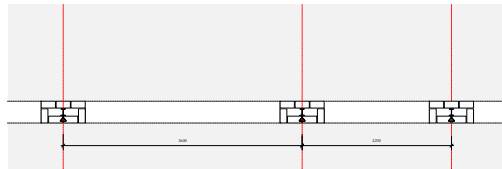
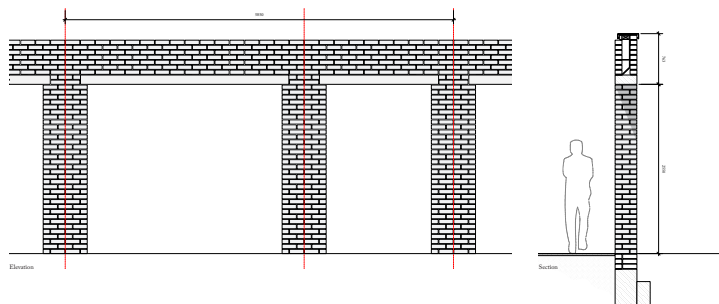
The colonnade as part of a new warehouse development



The Colonnade: Incorporating new developments

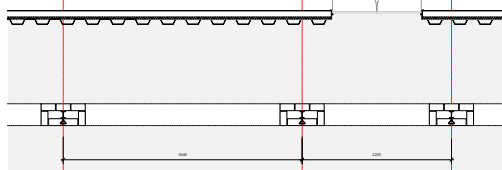
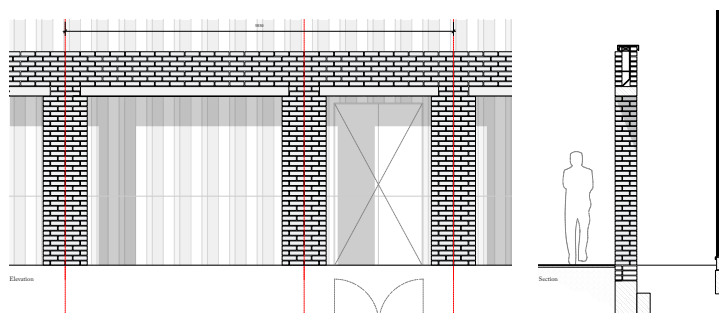
The dimensions of the colonnade are designed for ultimate flexibility for future use. There are alternating sizes of opening: the smaller is a good size for a generous door opening, the larger for a shop front or large window opening. The overall width fits a standard hollowcore slab, should that be required behind.

These sections show how different approaches to building behind the wall will change the front face of it – creating a rhythm and breaking the continuity of the colonnade.



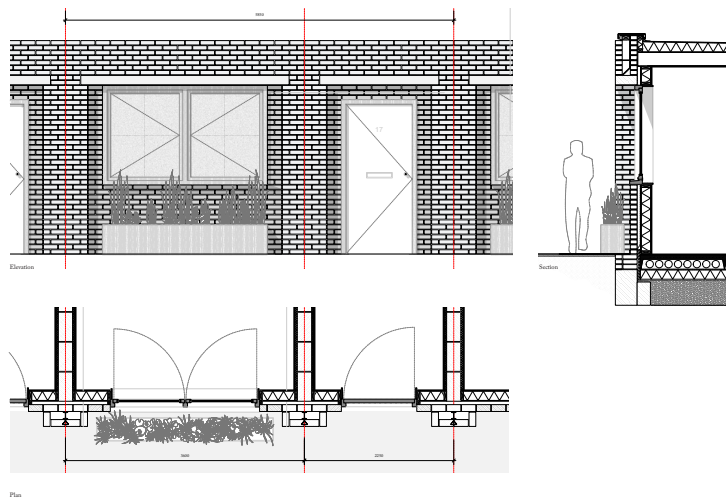
Plan

Colonnade

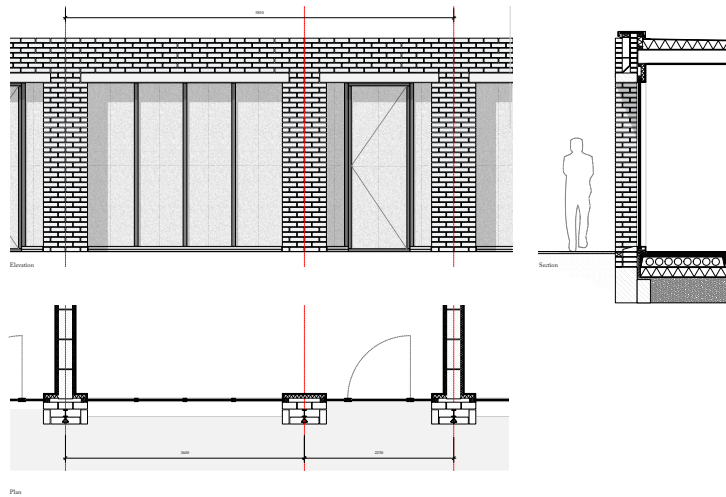


Plan

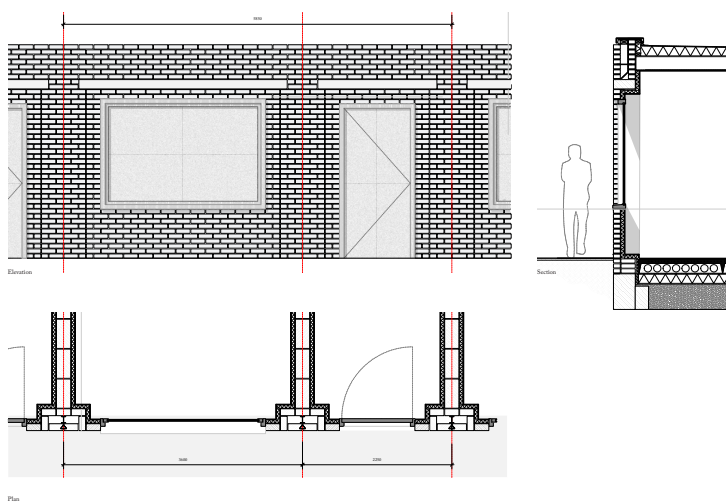
Warehouse: set back from colonnade



House: part of colonnade



Glazed openings to colonnade



Brick infills to colonnade

Visualisations

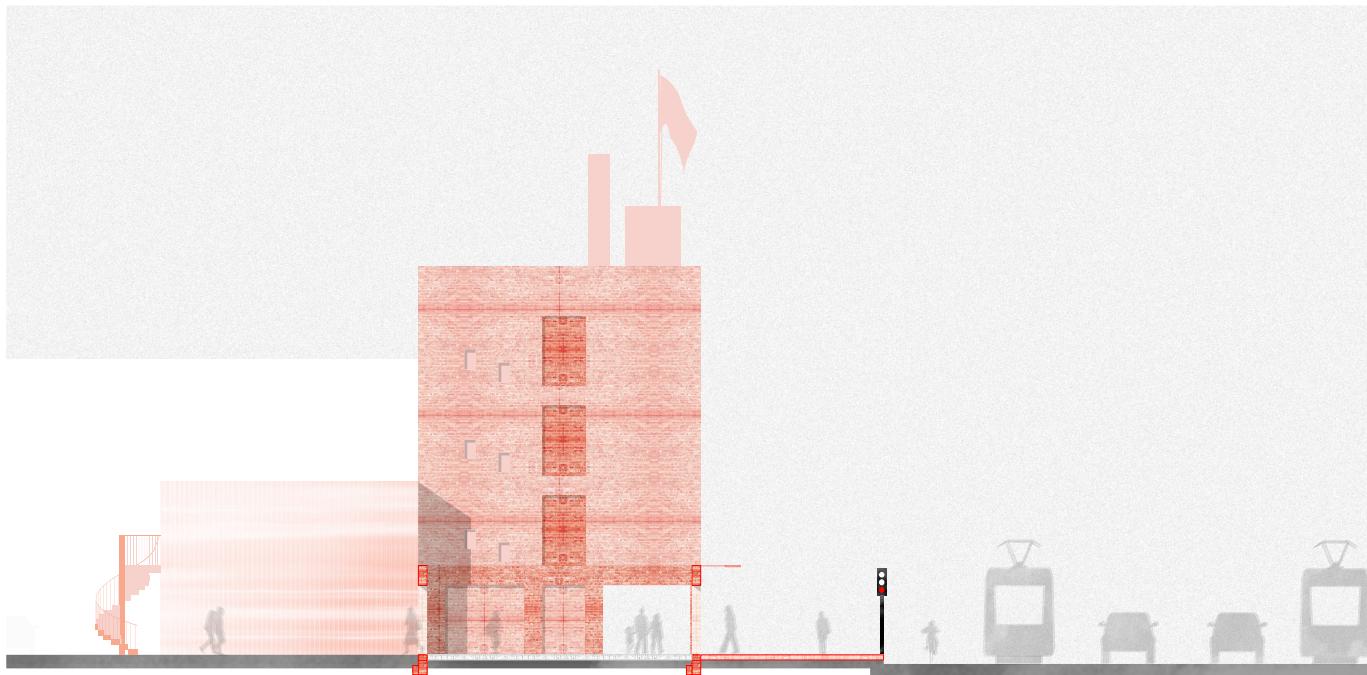
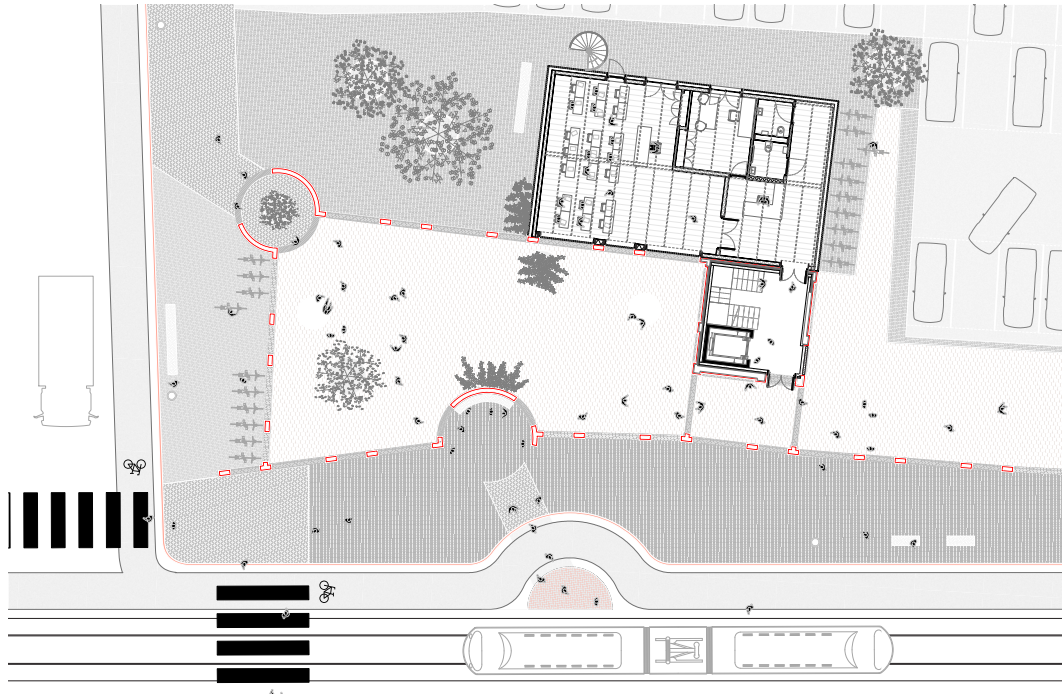


The colonnade along a normal stretch: parts of the wall have been inhabited by small shops on the left hand side. In the foreground sits a tram stop, an example of where the wall starts to enter the Slough side.



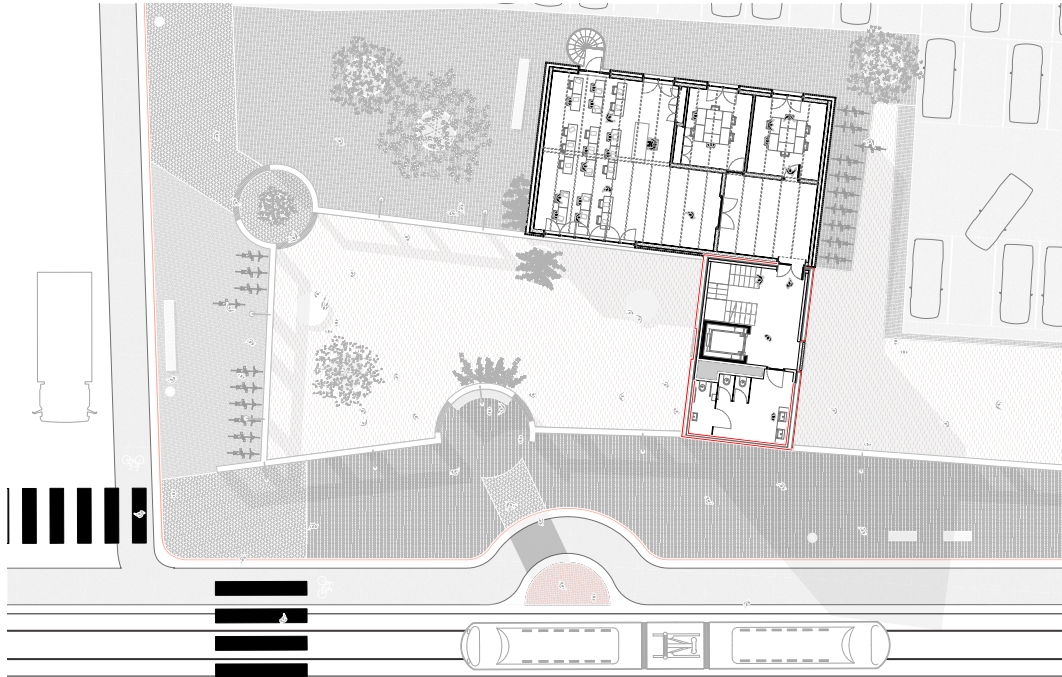
A tower at one of the nodes. The flag on the top of the tower helps to add height and identity to the space – the flags are designed by members of the community and change often. The square creates a room behind the wall which can be occupied, making a change from the poor public space which was available previously.

The node: Tram Stop and Training Centre



The tower is part of the wall and houses a stair core and toilets: pure infrastructure. Onto this, a polycarbonate building attaches which houses the training centre.

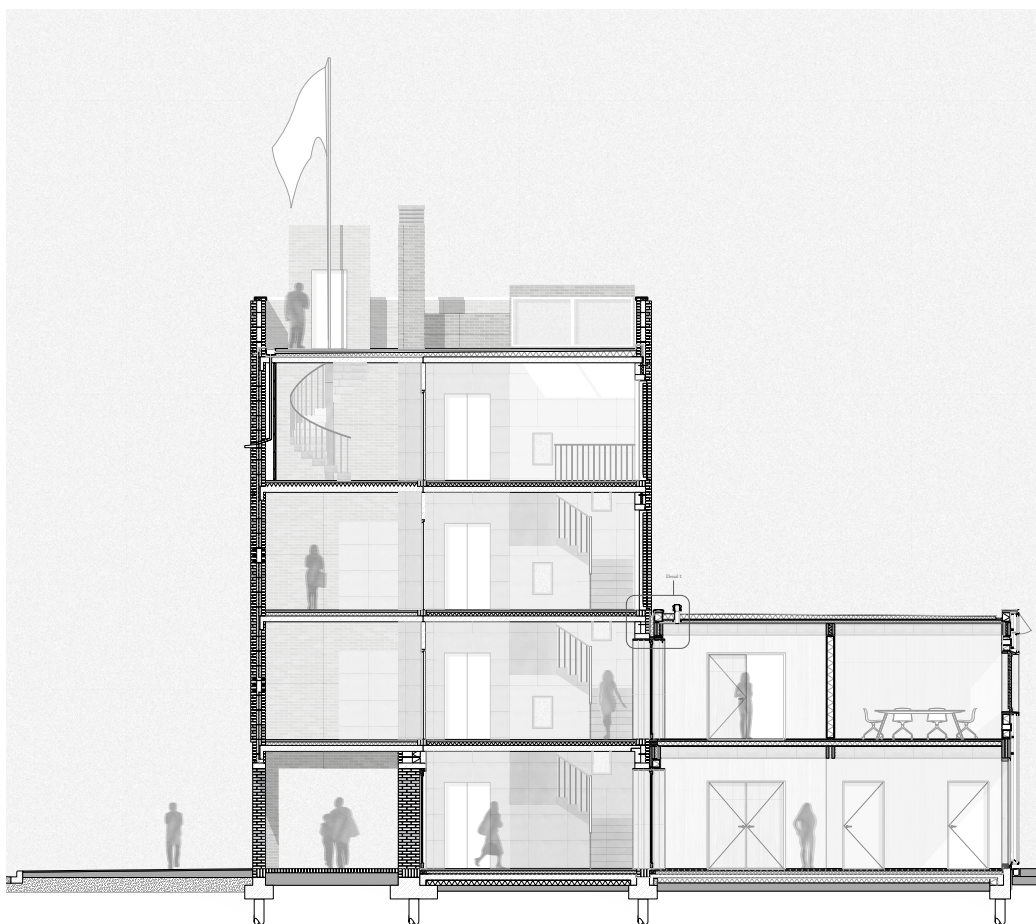
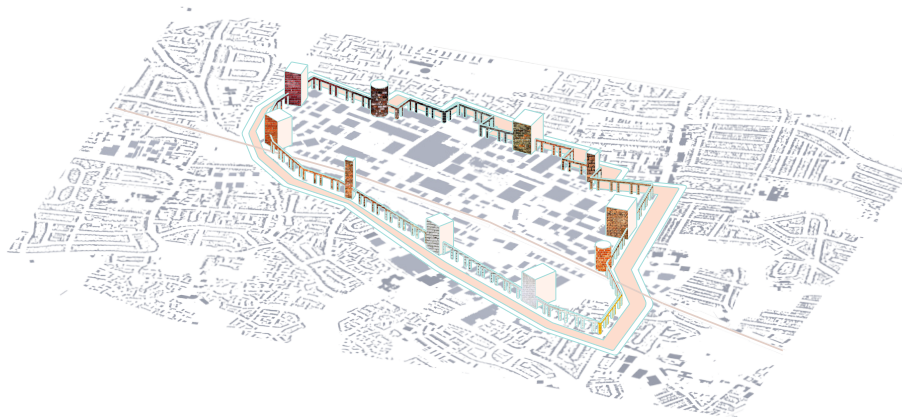
The tower is 4 stories tall – the planning limit on the Trading Estate – and has knock out panels on the higher floors, which can be removed to accommodate future developments.

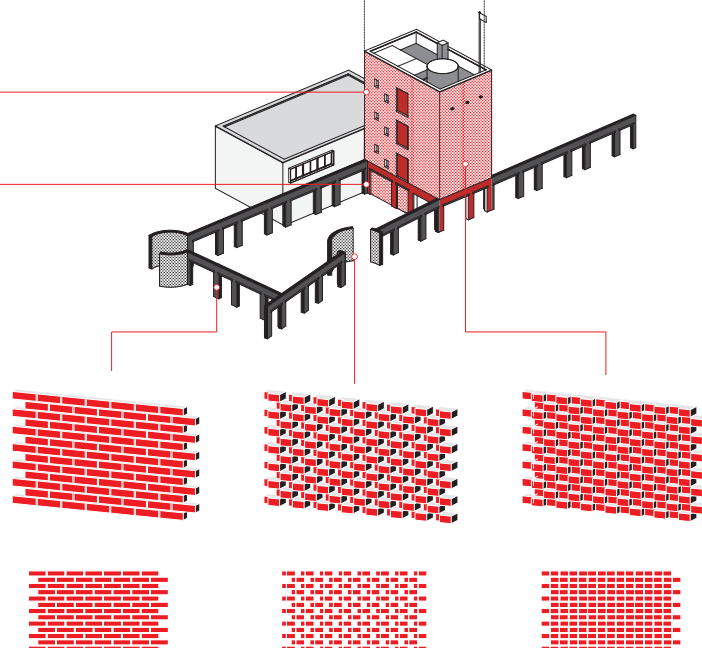
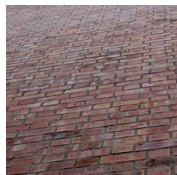
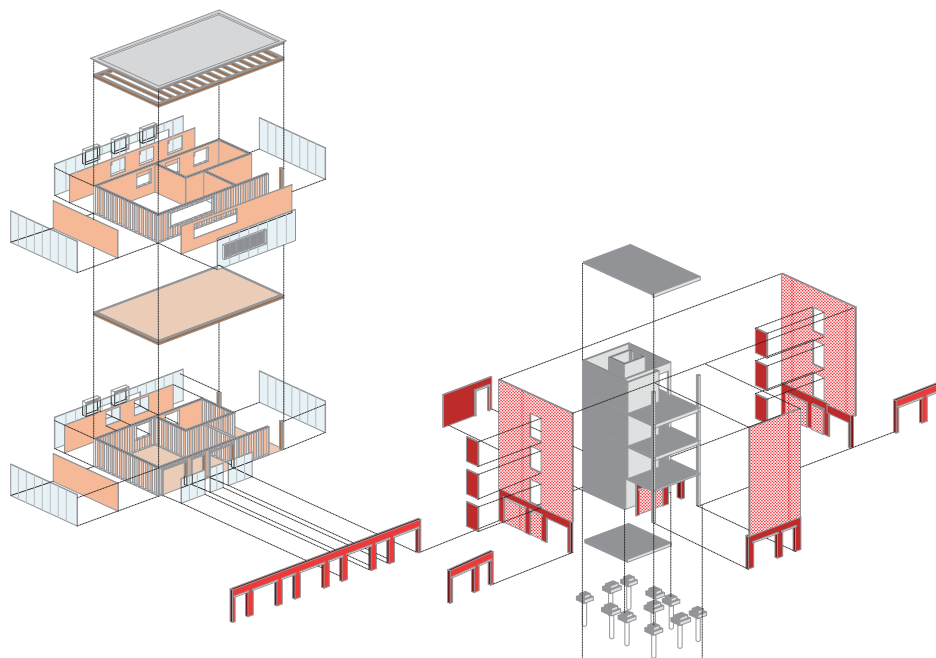


The Tower: Materiality

The wall is constructed from reclaimed brick, designed to vary around the length of the wall – progressing from bright white/yellow at the town side, to darker black or purple bricks towards the back.

The towers are made of stwo bricks: pecial L-shaped bricks which create a textured surface on the upper half, and dark glazed bricks which form the plinth and knock-out panels in the facade.

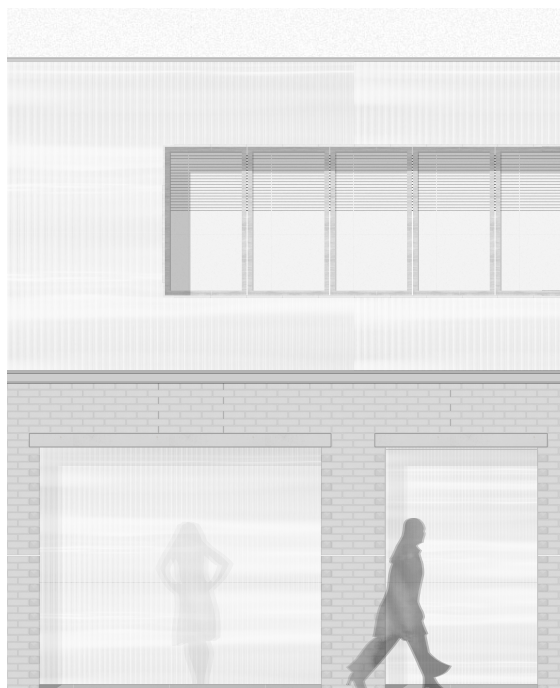




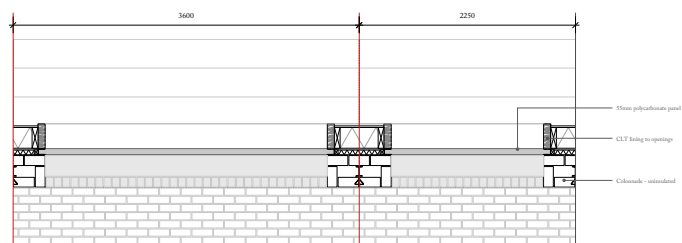
The Training Centre in detail

The training centre is of a much more temporary construction than the tower itself, and much more industrial in character. It sits just behind the wall, using its openings but with an autonomous structure.

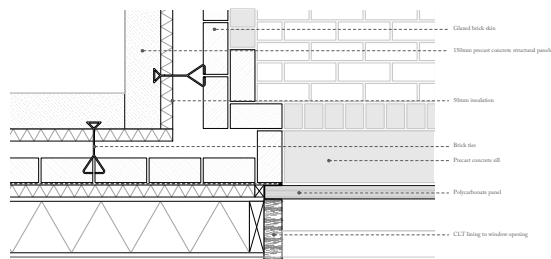
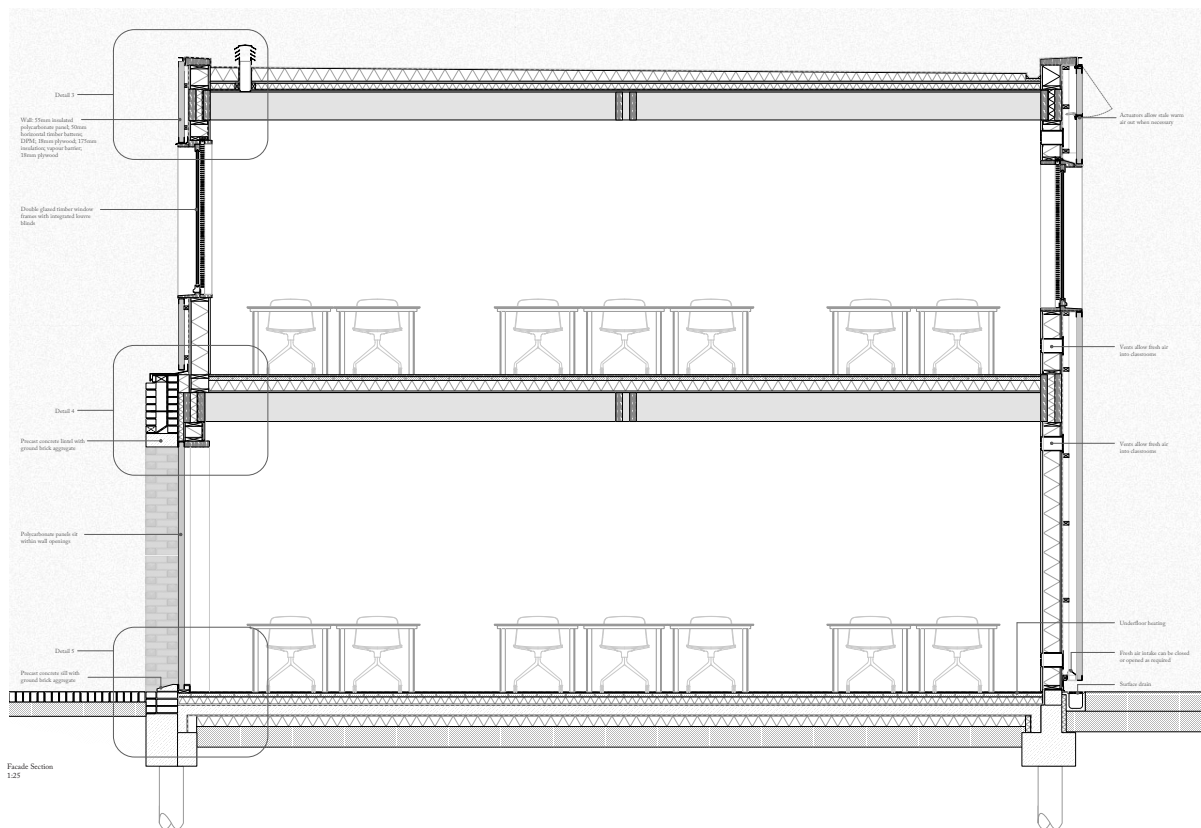
The polycarbonate wall allows ventilation and creates a second skin which can provide prewarmed air in winter or extra ventilation in summer.



Facade Elevation
1:25

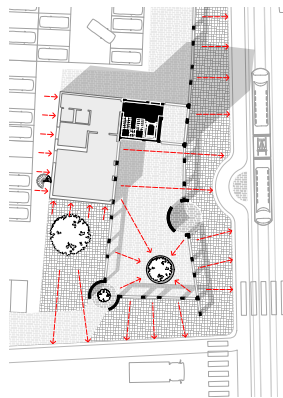


Facade Plan
1:25

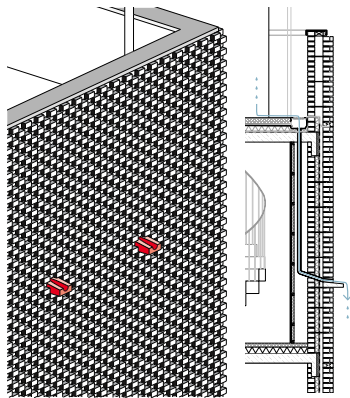


Detail 2 - Plan tower to timber educational building
Scale 1:10

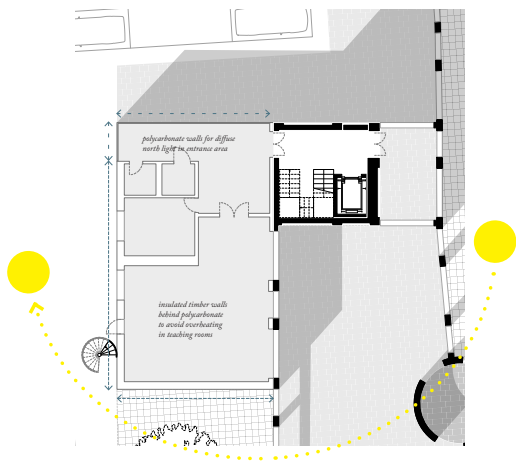
Climate Considerations



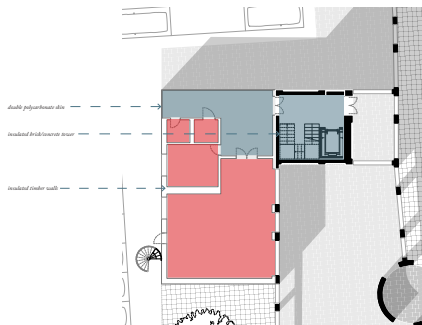
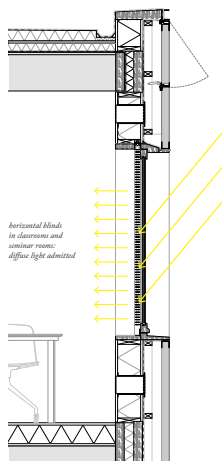
Surface Drainage



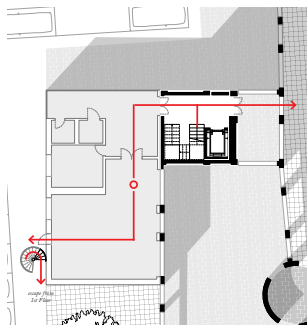
Tower Drainage



Orientation and Sun Shading



Heated/Unheated Spaces



Fire Strategy

