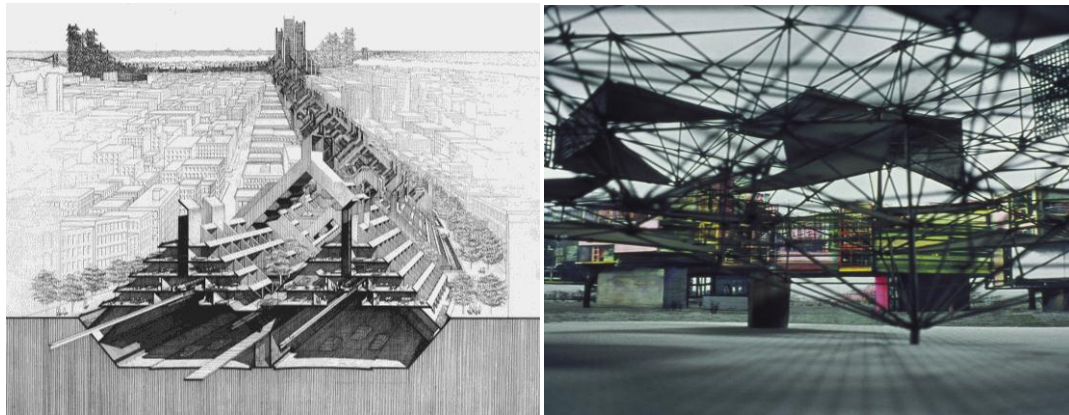


Architectural Infrastructure: Addressing Stockholm's Growth



Paul Rudolph, Lower Manhattan Expressway, 1967 | Constant Nieuwenhuys, New Babylon, 1959 - 1974

Introduction

Stockholm faces a drastic challenge in the next 15 years: to house half a million new inhabitants. This condition presents Stockholm with the possibility of overtaking London as the fastest growing city in Europe. It also, however, raises serious questions regarding how our profession will approach this challenge and how we will take part in shaping the future of Stockholm, the largest Scandinavian metropolis.

Addressing large-scale development through a pragmatic and environmental approach, we will propose research and projects that aim to combine infrastructural needs with architectural outcomes. We will study and design new ways to connect the tremendous efforts (and expense) currently being made in the infrastructural sector with the building sector in an attempt to redefine "urban development". If infrastructure can literally set the foundation for architecture to occur, we will join our efforts and explore ways to densify the urban geography, in order to create new experiences of the city and achieve higher levels of efficiency for society. This approach to Architectural Infrastructure may better balance expenses and new values for society and the environment – and address environmental concerns in a new way.

Studio 9 Teaching Methodology

Studio 9 explores the critical integration of planning, design, and computational techniques within architectural design practice. This year the studio takes on the question of how architecture can use new potentials in infrastructural situations. Using diagrammatical mapping techniques, iterative model-making and advanced digital design, simulation and fabrication techniques, the studio will critically investigate how scenarios can be developed into built structures, supported through direct links to digital fabrication technologies, and informed by expertise in other fields. The studio also has the support from structural engineers Tyréns, who will provide feedback on structural solutions in each project. They will also participate in the electable final full-scale project.

Emphasis will be put on the following aspects:

- In depth research as basis for design strategies
- Design proposals that range from a tactile relation to human interaction to an organizational effect on urban life.
- Solutions for details, structure, materiality and fabrication appropriate to scale and context.
- The roles that scenarios, design and prototyping techniques can play in architectural practice.

Experienced and 5th year students are encouraged to define their own agendas within the framework of the studio, but will also take part in team development. Previous knowledge in design and modelling software is not compulsory, but preferred – computational development will be supported by experienced tutors. Of particular importance is the *design portfolio*, where students will archive all work throughout the process. A template will be provided, but students are free to graphically format the portfolio. The design portfolio should be updated continuously, and provide a support to the design process. In the end, it should present the complete process from analysis to design proposals.

Resources and Requirements

All resources, briefs and schedules are available on our studio blog, on KTH Social.

We will use the Group Wiki on the studio blog to announce news and schedule tutorials, and you will find links to resources as well as our server space.

<https://www.kth.se/social/group/studio-9-bridging-te/> (or google *kth studio9 social*)

In order to pass each project, all deliveries needs to be handed in at appropriate quality. There is also a compulsory 80 % attendance on all scheduled events. Study trips (tbc) are not compulsory, but we strongly advise you to attend.

Project 1: On the Tram Route

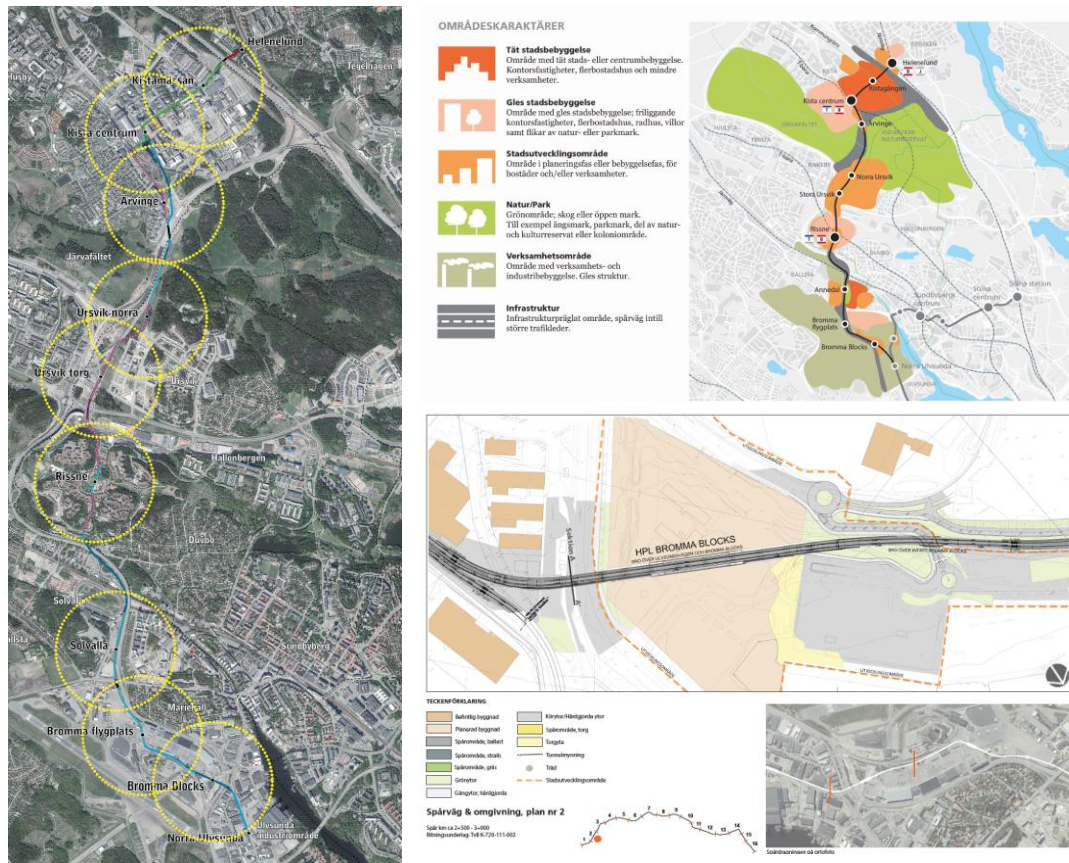


Field Operations, Diller Scofidio + Renfro, High Line | Houston Main St. light rail station proposal, Neil Denari | Snøhetta, Calgary public library and railway station

In Project 1, the planned Kista extension of tvärbanan, the circle tram line of Stockholm, will provide a selection of sites for urban intervention. Students will select sites ranging from urban to rural, including a new link to Bromma Airport, in the design of small-scale residential development linked with services. Computational design approaches will include modeling, structural evaluation, and graphic representation of information.

The project is divided into two phases. An initial 2 week analysis phase will provide an understanding of the current status of the tram system in Stockholm, as well as an understanding of the local contexts along the planned new line. In parallel, computational design and analysis techniques will be presented as resources along with other analogue and digital methods. For the main project, students will be allocated different sites in teams, each with an epicenter of a planned tram stop along the planned new tram line, and are asked to consider a radius of ca 500 meters from this center. The final design phase will see the development of integrated architectural and infrastructural projects.

Sites + programs



Given sites along the line, basic map of area characteristics, sample of current planning document of Bromma Blocks site.

The team sites are centered on the current planned tram stops, but the specific project locations can be selected along the line within the area (this may or may not include a proposed move of the tram stop). The character of the sites differ, from dense urban contexts to industrial and nature reserve areas. All teams should consider specific strategies to densify their selected areas, considering local contexts, and local as well as regional needs. Housing is a main program, but should be coupled with additional services and other functions during the analysis phase. With the shifting conditions between each site, no specific program will be given. This should instead be part of the initial analysis stage.

Additional resources such as planning documents are provided, but students are required to find additional information at relevant sources.

Phase 1 Investigations

Week 1

- Studio introduction Monday 10 – 12, Teams given areas to cover on existing line, and the sites for development along the new line.
- Tramline excursion Tuesday 10 – 13
Documentation of existing line and new sites 13 – 17
- Pinup initial site investigations Friday 13 – 15.

Pinup deliverables:

- Graphically formatted presentations in A3 – Existing line 2 A3, New line 2 A3.
- Photographs showing contexts (existing line + new sites)
- Annotated maps including platform configurations, other infrastructure intersection, relation to architectural elements (existing line)
- Annotated maps including proposed line and tram stop, intersecting infrastructure and expected people flow.

Week 2

The second week will see further development and refinement of analysis based on previous documentation, as well precedence studies and computational techniques introduction. Furthermore, students are asked to speculate on potential programs, sites for integrated infrastructural/architectural interventions and alternate tram stop locations along the given part of the new line. The initial analyses of the site should address current conditions, as well as expected new conditions that will arise with the new tram connection. This analyses should cover a study of urban morphology, pedestrian and vehicle traffic flow, important site lines, daylight conditions, quality of green spaces, programmatic use and samples of architectural identities.

- Digital modeling and computational design introduction Tuesday 9 – 12, Thursday 9 – 12
- Tutorials Tuesday 13 – 17, Thursday 13 – 17
- Pinup and review of analysis phase Tuesday week 3

Deliverables:

- Graphically formatted presentations in A3
- Diagrammatic representation of current and future context.
- Suggestion for project site for integrated infrastructural/architectural intervention, including analytical reasons.
- Definition of programmatic content of phase 2 proposal, and a diagrammatic strategy for design (types of services, residential typologies, tram stop location, infrastructural connections).
- Relevant precedence.

Phase 2 Design and Development

The second phase goes into design of each given site, through development of the associated programs of housing and services based on the outcome of phase 1. The additional program/s should use areas otherwise only occupied by the tramline, and the tram station may or may not be part of the scheme. The station could be either an open or enclosed space. Students will work in the same teams as in phase 1.

The proposals should consider dense urban conditions appropriate to the site. They should be regarded as developable today, yet acting as catalysts for urban change.

The following aspects are of particular concern:

- The integration of infrastructural and architectural elements, in particular making use of the areas and space otherwise occupied only by the tram infrastructure.
- The tramline itself should be considered a design element, including the specific position of the stop, structural elements such as bridges and footpaths, as well as roofs and canopies providing shelter.
- The tram rail, station and added housing and/or services above should be easily reached from both sides and function as a passageway, not be a barrier in the area.
- Material and structural systems should operate beyond structure – to provide shelter or other programmatic and spatial qualities.
- All proposals should follow general accessibility regulations.

Week 3 Conceptual Development

- Pinup of phase 1, Tuesday 9 – 12
- Tutorials, Tuesday 13 - 17
- Computational design techniques – material systems, Thursday 9 – 12
- Tutorials, Thursday 13 - 17

Week 4 Formal and Structural Development

- Tutorials, Tuesday 9 - 17
- Computational design techniques - fabrication, Thursday 9 - 12
- Tutorials, Thursday 13 - 17

Week 5 Preliminary design and Interim Review

- Tuesday 9 – 17 Computational design support and tutorials
- Interim review Thursday 9 - 17

Week 6 Design development

- Tutorials, Tuesday 9 – 17
- Computational design techniques - fabrication, Thursday 9 - 12
- Tutorials, Thursday 13 - 17

Week 7 Final Review

- Tutorials, Tuesday 9 – 17
- Final Review Thursday 9 – 17

Phase 2 deliverables:

- Phase 1 analysis and vision through relevant plans, diagrams and other representations.
- Plans, sections, elevations scale 1:100/1:200, site plan 1:500/1:1000 (depending on the size).
- Exterior and interior illustrations, appropriate diagrams.
- Diagrammatic structural principle.
- Physical model of appropriate scale.
- Refined design proposal for selected part, with a particular concern for the link between infrastructure and public space.
- Design Portfolio showing process from analysis to final proposals.

Project 2 – In the Subway Network



Diller Scofidio + Renfro, Penn Station | Marc Mimram, Montpellier TGV Station (proposal) | John Wardle + Grimshaw, Flinders Street Station, Melbourne

Project 2 will take on the Stockholm subway, including the existing network as well as new extensions. Students will select sites appropriate for densification along the lines, including the planned Blue Line extension to the Meatpacking District and Nacka, combining residential development with small-scale industries and services. Computational design approaches will include digital fabrication, daylight evaluation, and performance simulation. A detailed brief for project 2 will be provided at the start of the project. Project starts 3/11, and final review date is set to Thursday 17/12.

Project 3 – On the Road



Leila Araghian, Tabiat Bridge | WORK + Zhubo + ARUP + Balmori, Hua Qiang Bei Road | Michael Maltzan, Sixth Street Viaduct Los Angeles

*In Project 3, selected locations on Stockholm's road network will become sites for new urban environments including the existing network as well as new extensions; car traffic as well as pedestrian and biking connections. This may include turning existing bridges into habitation, or architectural interventions on new planned routes such as Förfärd Stockholm (Stockholm's Bypass) or the Danvikslösen tunnel. Computational design approaches will include advanced design techniques, structural analysis, advanced fabrication and noise simulation. A detailed brief for project 3 will be provided at the start of the project. Project starts **February 1st 2016**, and final review date is tentatively set to Thursday **March 17th 2016**.*

Project 4 – Into the Wide Open



Snøhetta, Cable Car for Bolzano | Höweler + Yoon, Shareway 2030 | Laarman + Heijmans, 3d-printed steel bridge | Block Research Groups, MLK Jr Park Vault

*Project 4 provides the option of a novel infrastructural/architectural design project, or the design and development of the yearly full-scale installation. The design project will take on new infrastructural modes in relation to urban development. The full-scale installation will explore computational design, material performance, and structural capacity in relation to infrastructure, and serve as a showcase of the work of the complete studio. A detailed brief for project 4 will be provided at the start of the project. Project starts **March 29th 2016**, and final review date is tentatively set to Thursday **May 19th 2016**.*

Julien De Smedt, Kayrokh Moattar, Jonas Runberger, Elsa Wifstrand + Tyréns