Commuter Retreat
A refuge in the middle of rush-hour

Graduation project
PS Presentation
Studio Border Conditions - New York City
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Research Context

Border Conditions New York City

The ‘Commuter Retreat’ project was developed in the context of the Border Conditions graduation studio. This studio emphasizes on an experimental approach to architecture, based on the development of specific techniques of representation to describe specific urban and architectural phenomena. The first part of the studio focuses on the urban investigation of a specific city and the second part consist of an architectural design, derived from the discourse developed in the first part of the studio.

The project is located in New York City. Travelling through this specific city as an outsider, our understanding of it is largely limited by the scope of the Rapid Transit network, as this is the primary means of public transportation that is available. This very much limits the scope of what one experiences of the city to a reasonable walking distance from subway stations. The New York City of our experience is thereby limited by areas of about a quarter-mile in diameter located along the public transport lines.

Inspired by this notion of our limited experience of the city by the constraint of its public transportation network, the project departs with the development of a notation system for the representation of different networks and connections between networks in the city. To develop a notion of these determine our experience of the city. Based on this notion of networks and nodes, the project follows a very methodological approach which focuses on the genesis of architectural form based on flow and movement and the architectural and constructive expression of specific complex 3 dimensional geometries, generated from these flows and movements. In this approach the process and method are the driving force that prevails over esthetic or formal decisions.

The analysis of the rapid transit network was limited to 24 stations, as shown in the next image. It primarily focused on the functioning of two specific Elevated and Underground stations and the sequencing of the transition from one network into the other. The design itself was developed in the Queens Plaza area (red circle), where the Manhattan and Brooklyn portions of the network come together but remain strangely disconnected.
Node and network
Mapping movement, exchange, connectivity, transition and phasing
Flow and movement
Queens plaza as a multi-layered network system

The analysis of the design location, Queens plaza, developed some interesting insights into the functioning of this location as a node in the transport networks of New York city, as well as into the notion of networks as an architectural tool in general.

Queens plaza itself is an important interchange for the borough of Queens, where large numbers of commuters to and from Manhattan pass through each day. It is highly chaotic, disorganised and hard to read. The different public transport networks on the location are hardly connected to each other and difficult to interchange. The primary aim of the commuter retreat is to reintegrate and connect these networks and (re-)develop Queens plaza as a node. It aims to create a direct passage from the Subway to the Elevated train system and develop a contradictory program, a health and conference centre, within this passage.

The analysis also points out that the notion of network is a good way to describe the patterns of use by different modes of transportation on a specific location. The notion of network is used to describe the constellation of flows, which are in turn a description of the movement of users through an urban configuration. When combined with specific information about speed of movement and numbers of users, a 3-dimensional spatial representation of these flow patterns can be developed. This notion in combination with the hierarchical branching of the flow patterns that becomes visible, is the driving idea behind the architectural development of the newly introduced connections that form the building.
Connection

Introduction of a new network layer and additional program

The design of the Commuter Retreat is based on the notions of flow, movement, connectivity and the network as a basic means of notating these phenomena.

The design was generated from these notions and aims to test these notions as architectural tools by means of 3D computer modeling with Nurbs surfaces.

This is crucial, as these surfaces are defined in space by vectors, which have a specific speed and direction, rather than by points, which are static. This type of modeling is fundamental to a different way of thinking about and dealing with 3 dimensional spaces, which can now be based on movement and transformation rather than stasis.

The primary function of the building is to connect the underground subway station to the Elevated station above ground, in order to create a new connection between two separate networks. In to this basic connection the function of a retreat centre, consisting of a Health centre, with several pools and spa’s and a conference centre is added. This program is divided into three main elements. These main elements are each organized along one path connecting the two stations. Each of these paths branches into four specific routes, with specific speed of use and privacy. The programmatic units of each of the elements are ordered along these paths according to their specific requirements. The elements are then ordered on the location in plan and section and assigned a specific location in the 3D space of the location. The shape of the routes is determined by these locations and so by the specific programmatic requirements. The building now consists of twelve specific routes with connected program.
Point

Line

Polygon surface

Vector

Spline

Nurbs surface
Distribution of programmatic elements over four paths per route according to speed of action and privacy level.
Distribution of programmatic elements on each path according to privacy level
Distribution of programmatic elements determines the location of control points in section.

Contingency: Z - Coordinate

Dependency of elements: Z & X coordinates
Distribution of programmatic elements determines the location of control points in plan.

Scale and location of program X & Y coordinates.
Path 2.4- Spa pools and retreat spaces
Data Points:
- Control point at -10 m
- Control point at -05 m
- Control point at -03 m
- Control point at +00 m
- Control point at +03 m
- Control point at +05 m
- Control point at +10 m
- Control point at +15 m
Transformation
Manipulation of a 3 dimensional diagram to a spatial configuration

From the basic 2D diagrams created in the previous phase, the basic 3D model is developed. Through a series of transformations, each time a new layer of information is added and the basic spatial configuration of the building is determined. The location and basic shape of the program is consolidated as well as the set-up of the double layered skin that is intended to deal with the specific requirements of each element of the building. The inner layer of skin is to become specific to the characteristics of the programmatic elements and the flow pattern and the outer skin is meant to deal with external factors of load-bearing and shielding from the elements.
Extrusion of a basic geometry along defined spline
Path 2.4- Spa pools and retreat spaces
Scale width of the geometry with the curvature to accommodate the scale of the program
Path 0.3 - Bar and restaurant
Path 2.4- Spa pools and retreat spaces
Sweep nurbs section along modified path to create the geometry of the outer skin
Path 2.4- Spa pools and retreat spaces
Insert programmatic volumes and stairs into the developed geometry.
Path 0.3 - Bar and restaurant
Path 2.4- Spa pools and retreat spaces
Sweep nurbs geometry along paths outside inserted programmatic volumes to create the basic inner skin.
Path 0.3 - Bar and restaurant
Path 2.4- Spa pools and retreat spaces
Deformation
Manipulating 3 dimensional geometries to accommodate specific requirements

In this phase the two layers of skin, are deformed and manipulated to the specificity of the programmatic in fill on the inside and the structural requirements on the outside, in order to develop an architectural expression for the diagrammatic 3D model. By means of developing sequences of sections that are designed specific to the local programmatic requirements, the diagrammatic 3D model is rebuild and made specific.
Branching and deformation allowing programmaticblah
Deformation shaping programmatic space

Standard

Straight

Theater

Pool
Path 2.4- Spa pools and retreat spaces
Information

Developing the architectural expression of the 3D model

Onto the deformed 3D model a constructive grid is projected that runs in three directions, in order to deal with the load-bearing requirements. This grid is developed as steel sections that carry the separate layers of skin and accommodate their shape. The outer, structural skin is developed by projecting simple construction elements onto the complex 3D skin and have the computer calculate their specific parametric deformation. (Parametric modelling). This information can be directly used for the computer aided manufacturing of these elements. The specificity of the inner skin to the programmatic requirements is developed through the manipulation of the control points of the nurbs surfaces. The shape now becomes specific to the level of benches and cabinets. To be able to control these manipulation, a grid with four directions, a diagrid, is projected onto the model. The supportive functions and technical requirements like installations are solved in between the two layers of skin.
Grid → Constructive grid → Diagrid
Consolidation

Technical development of the architectural model

In this final phase the principles of file-to-factory techniques are developed to the level of a conceptual detailing. The basic set up of the nodes in the structural system and the possible deformation they can accommodate is modelled and tested. The complete approach of CAD/CAM is tested by making a scale model of the building, based on the smaller version of these techniques.
Investigation of structural models on basic section type

Steel sections connected by triangulated steel mesh (open)

Steel sections connected by triangulated steel mesh (clad)

Steel sections connected by triangulated steel mesh on top and segmented concrete bottom (partly underground sections)

Segmented solid section (underground sections)
Cardboard 3.0 mm:

Cardboard 3.0 mm:

Cardboard 3.0 mm:

Cardboard 3.0 mm:
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