ARCH 384: Airport, Security, Circulation

Fluid Trajectory

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The competition was an opportunity to explore, to a considerable depth, some of the many facets of what is a highly complex and largely pre-defined typology: the airport. For both designers, this was our first - exposure to the type, and so, we spent a generous amount of time becoming familiar with the conventions of airport design before pursuing innovative design strategies.

During this research phase we were both astounded to find that much of the existing airport architecture conformed rather rigidly to a set of programmatic relationships and limited "innovation" to mere formal explorations (i.e. the ubiquitous "roof evoking flight" approach to airport design). We felt, quite strongly, that substantial innovation in architecture is not to be achieved through explorations of form, but rather through explorations of programmatic relationships and redefinitions of program itself. The bottom line is user experience, and innovative form has a very superficial effect in this area when compared with the paradigm altering effects of innovative programming. It's important to note that the notion of type is largely based on the idea that many forms may express the same programmatic essence. And so, this project seeks to explore the potential of the airport as a type, with aim to increasing its functionality, safety, and expressive potential.

The airport takes precedent from the experimentation of Zaha Hadid. Special consideration was given to her design for the Terminus Hoenheim-Nord in Strasbourg, France. This project deals with many of the themes of the airport such as transitions between types of transportation and the expression of movement in stable and concrete forms.

"The overall concept towards the planning of the car park and the station is one of overlapping fields and lines that knit together to form a constantly shifting whole. Those fields are the patterns of movement engendered by cars, trams, bicycles and pedestrians. Each has a trajectory and a trace, as well as a static fixture. It is as thought the transition between transportation types (car to tram, train to tram) is rendered as the material and spatial transitions of the station, the landscaping and the context."

-Zaha Hadid

As in Hoenheim-Nord, the plan of the airport terminal is defined by the large streams of traffic that pass thorough. Each mode of transportation is given a complimentary circulation trajectory. The purpose of the airport, as is the case in any transit hub, is to organize flows of traffic. As a result, the terminal is designed to create a series of processional routes that guide travellers through the building and on to their airplane. As well as being affected by the character of the mode of transportation, these trajectories also respond to the landscape of the site. In Strasbourg, Hadid bends the flow of traffic to compliment that of the nearby Canal de la Marne, which in turn flows into the Rhine. Similarly, the airport, located in Little Rock, sits alongside a gentle bend in the Arkansas River and bends to compliment the natural flow of the river.

The flow of trajectories through the airport and the resulting organization can be explained as follows. The initial entry to the site is made by motor vehicles (cars and busses). Their trajectories make a smooth transition between the angle of the existing road from which traffic enters and the airport terminal curb side, by which traffic passes. This trajectory is both informed by the freeway-speed turning radius of common vehicles as well as the bend of the Arkansas River. At this point, the vehicle trajectories split vertically into three levels in order to accommodate the transition between vehicular and pedestrian transit at three locations, arrivals curb side, departures curb side and transit hub. These rising roadways form the roofs of the parking garage at the beginning of the access road and eventually rise to define the rooflines of the transit terminal. The rooflines themselves are an integral part of the airport's architecture meant, in part, to evoke the landscape of the American mid-west. More importantly, the rooflines articulate the project's focus on passenger circulation and allow the project's underlying exploration of programmatic relationships to achieve a formal expression. Departing passenger circulation is filtered through its necessary functions (ticketing, landside concessions and washrooms) and gathered at a single point, the security checkpoint. From here, the trajectory of pedestrian traffic flows around an office block and through the airside concessions. The construction of the airport becomes significantly lighter, and far more open as the passenger enters the airside concessions area. A transition from the heavy, subterranean concrete structure of the landside structure to a structure of steel and glass allows views outwards. As the -- passengers enter the airside concessions court they descend down a gently sloping ramp. At the top of the ramp a view of the airfield beyond the airside concessions is captured. As the passenger descends into the concession area the view of the airfield is obstructed and in its place a view of the Arkansas River is revealed. From the concessions area, circulation splits along two piers. A short pier extending southwards leads to the gates used by smaller airlines while the long pier which extends eastward leads passengers to the gates used by major airlines.
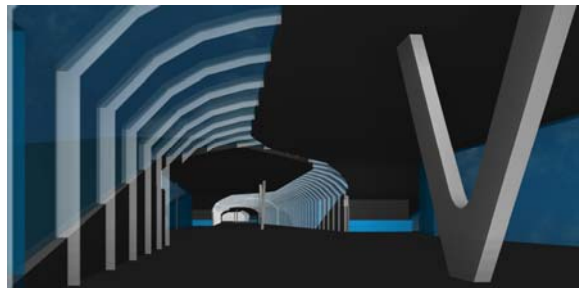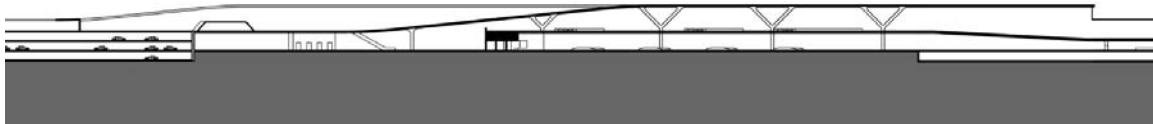
The piers can be broken into two types of volumes the circulation path of the pier and the gates which overlap it at interval and act as the connection between the airside concourse and the passenger's flight. Each type receives a different form of architectural expression which corresponds to the program it is designed to accommodate. The circulation path is a prismatic construction sheltered by a steel and glass roof. This path extends into the airfield in a straight line, and accommodates the travel of passengers on the upper levels and airport services below. As this portion of the pier services no function other than circulation, it is given little architectural expression other than the repeated module of its structure and enclosure. The gates, on the other hand express a relationship between the airfield and the circulation corridor of the pier. A concrete slab rises up from the airfield and overlaps the corridor, referencing back to the architecture of the airport terminal and defining a space that is neither corridor nor airfield but is intrinsically related to both. Each of the gates structures defines a lounge area in its centre and a gate on either side. The lounge area acts as a gathering space from which passengers can directly access the boarding queue.

Our design addresses many issues of security. We placed greatest emphasis on programming solutions rather than technological or structural ones. For example, the layout of the landside spaces seeks to protect passengers in case of a security threat by reducing the need for crowding and, where necessary providing spaces that are protected from harm where crowding can occur. A 125' setback is established between the departures curb side and the ticketing queue in order to ensure that people aren't forced to wait inside a bomb blast radius. In another security strategy, connections between the landside and airside portions of the building are minimized to the point of being virtually non existent. The only instance of connection occurs at the security check point. This reduces the severity of the threat of security breaches between airside and landside. To further reduce the severity of threats, police offices are located directly alongside the security checkpoints, allowing for immediate security backup in case of emergency.

We did take some technical precedent from the SOM design for 7 world trade center, the first tower completed in the new WTC complex. SOM collaborated with James Carpenter, a glass artist and curtain wall expert, to create a glass enclosure to the tower's lobby that would withstand a bomb blast. The glass panels are suspended from a net of steel cables which are tensioned such that the glass is held still in normal conditions. In case of a bomb blast, the net of cables is able to expand in order to absorb energy from the blast. The flexibility of the cables prevents the glass panels from shattering during this process. The same principles where applied to our curb side curtain wall to further prevent injury to passengers in case of emergency.
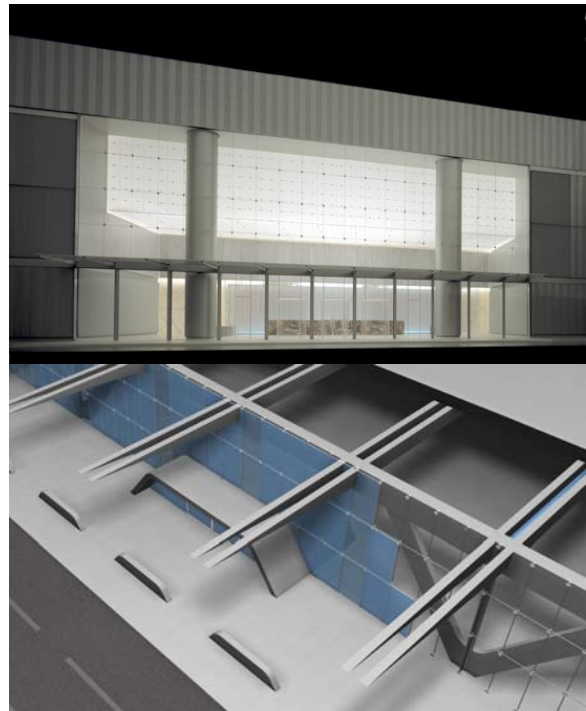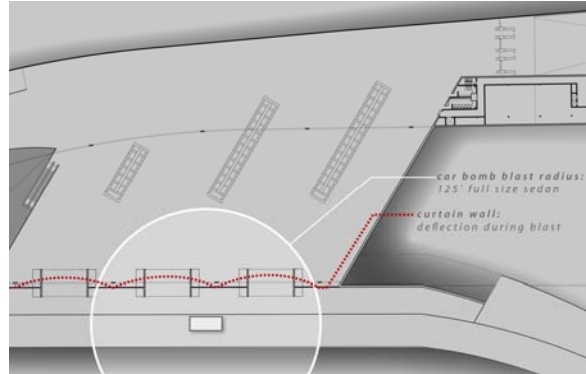
In sum, our project relies on a variety of precedent. First, our project relies heavily on the logic of conventional airport design and benefits from the historic development of these conventions. Secondly, the project takes precedent from architects such as Zaha Hadid and their development of an architectural language that gives formal expression to the functions of a building. Finally, our project takes precedent from projects with similar security demands. In the end our airport aims to integrate these influences into a transit hub that is safe, functional and expressive.

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