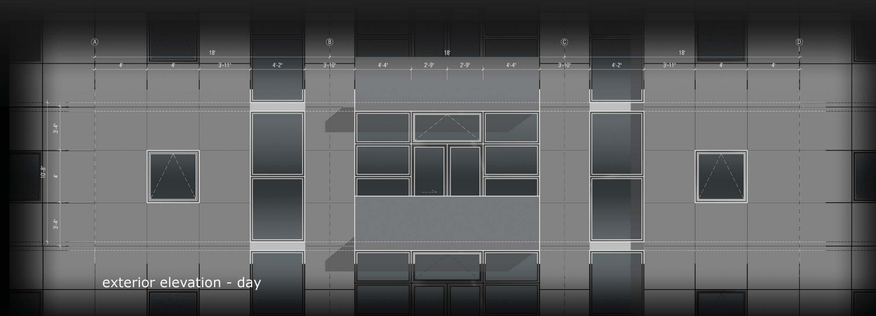
# FACADE RETROFIT

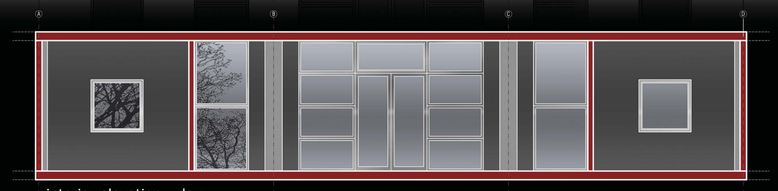
## HIGH PERFORMANCE FACADE SYSTEMS FOR AN EXISTING BUILDING

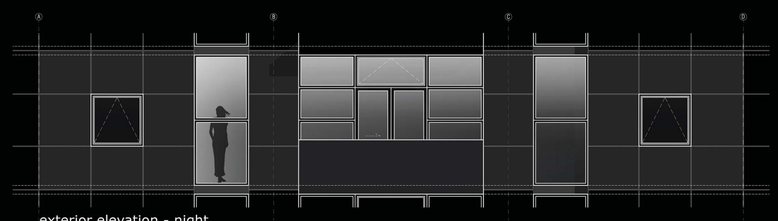


THE BUILDING 939 W HURON CHICAGO

## EXISTING



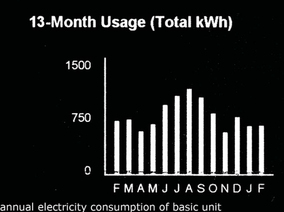

EXISTING CONDITION ANALYSIS

advantages:

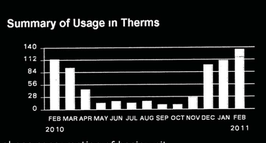
- relatively low E consumption in winter due to heat gain through the facade with west exposure
- daylight conditions in living space
- acceptable design solution

disadvantages:

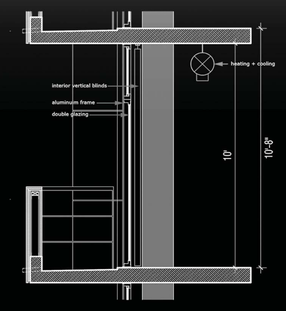
- insufficient daylight in two smaller spaces
- thermal discomfort in all spaces both in winter and summer
- strong air current through window frames
- condensation at glass surface and window frames during winter
- thermal bridges at slab edge and balcony
- design and daylight disruption of balcony railing
- high E consumption during summer due to overheating

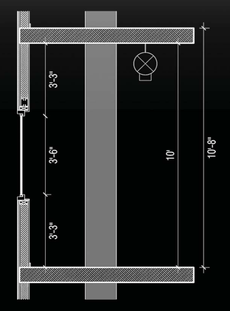


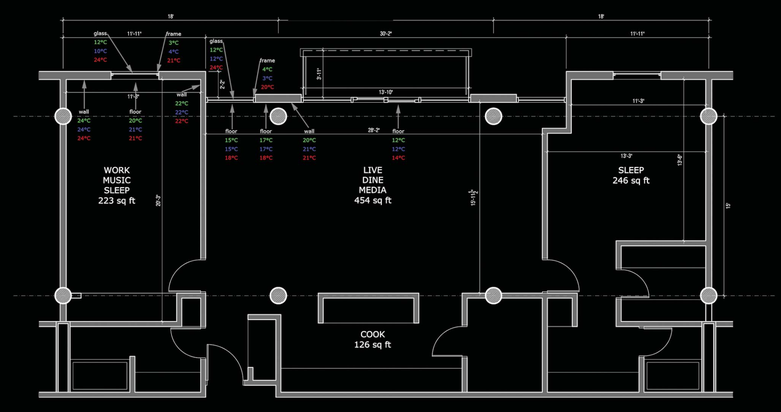

annual electricity consumption of basic unit




annual gas consumption of basic unit

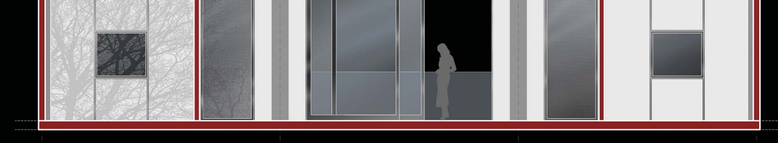


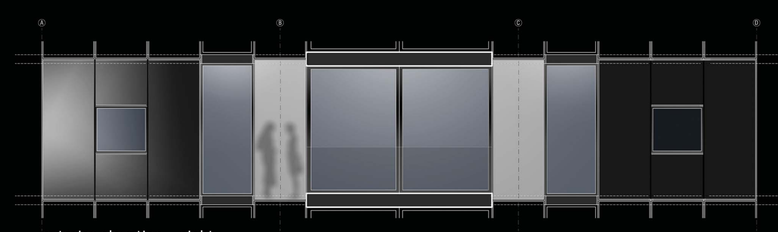




basic unit: plan

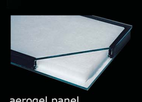
## SYSTEM 01


SYSTEM_1: PERFORMANCE + DAYLIGHT

This facade system serves two main goals. First, to achieve a significantly **higher performance** values than the existing facade and second, to bring into all spaces of the residential unit sufficient amounts of **daylight.** The system is **constructable with materials that are currently available** on the market, such as translucent aerogel glass panels, VIPs, triple glazed windows and exterior shading out of stainless steel rods.
Architecturally the solution follows the **existing facade design** as it maintains the position of transparent glass elements and the overall module of 4'.
Additional daylight is introduced through the translucent panels that allow for the facade to be animated throughout the course of the day and simultaneously maintain a level of privacy required by residential use.

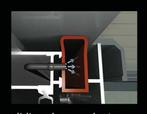


aerogel panel
Solera S®

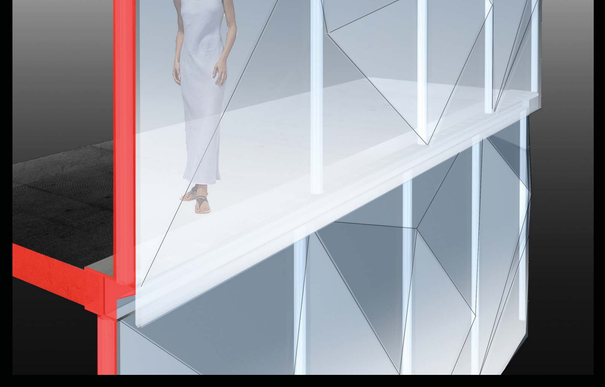
triple glazing
air-lux® system

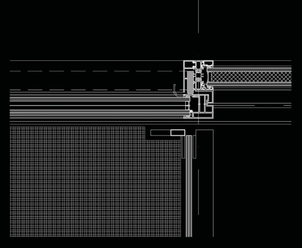
shading -
stainless steel rods

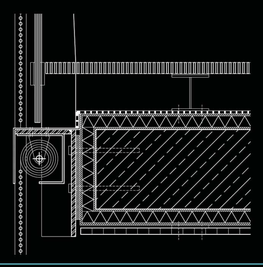
VIPs

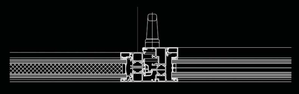


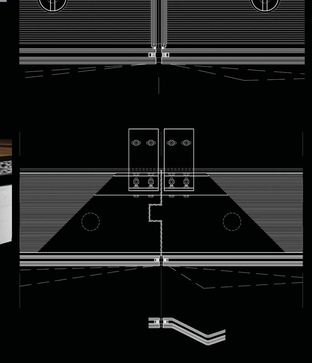
sliding door sealant
air-lux® system



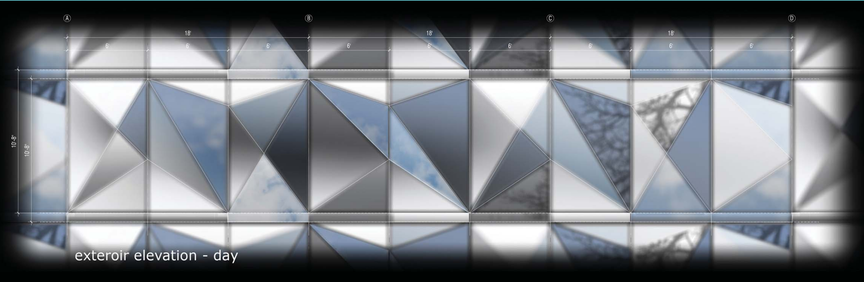




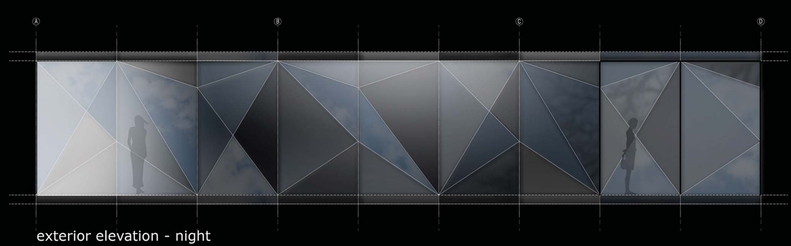




## SYSTEM 02

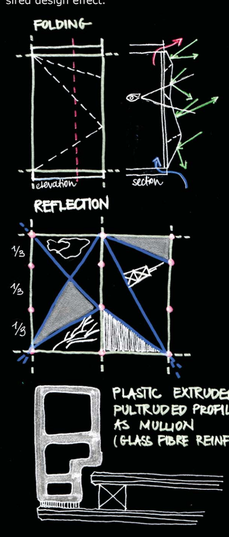




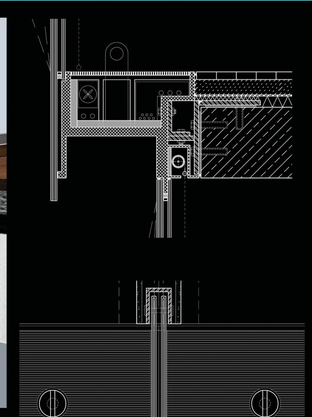



SYSTEM_2: FOLDED TRANSPARENCY

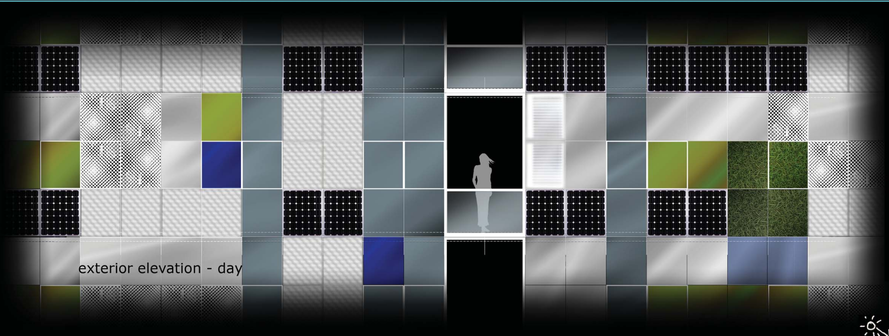
"Folded Transparency" is about achieving the **minimal structure** that is necessary to support a **fully glazed** facade system, which permits **unobstructed views** to the exterior and plenty of **daylight**. The principle of folding a flat surface in order to stiffen it is applied to the glass which results in the opportunity to **eliminate the vertical mullions**. Extra strong plastic extruded pultruded (glass reinforced) horizontal mullions with excellent thermal properties are being used at the slab edge.
Low-E coatings applied to the glass reduce the energy gain in Summer and the energy loss in winter while maintaining a relatively high VLT-value and good view. The resulting outer glass reflectivity of the environment is a desired design effect.

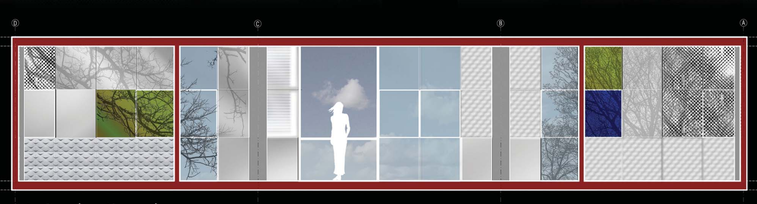


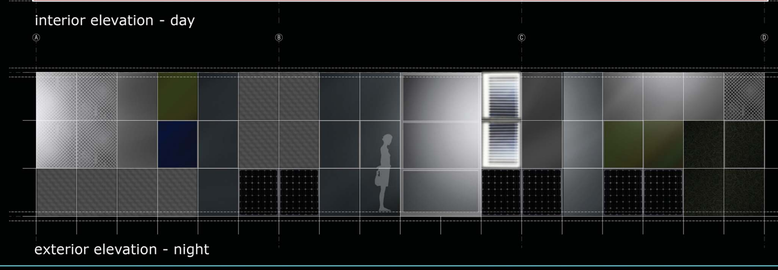


## SYSTEM 03

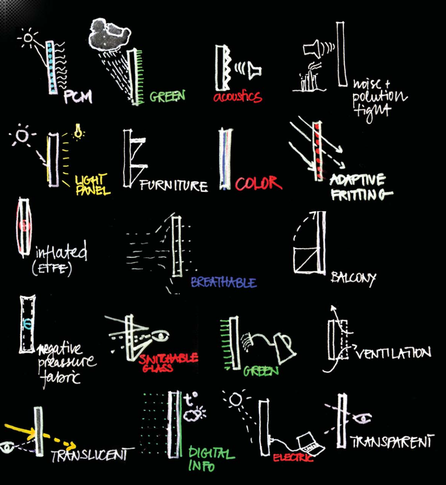


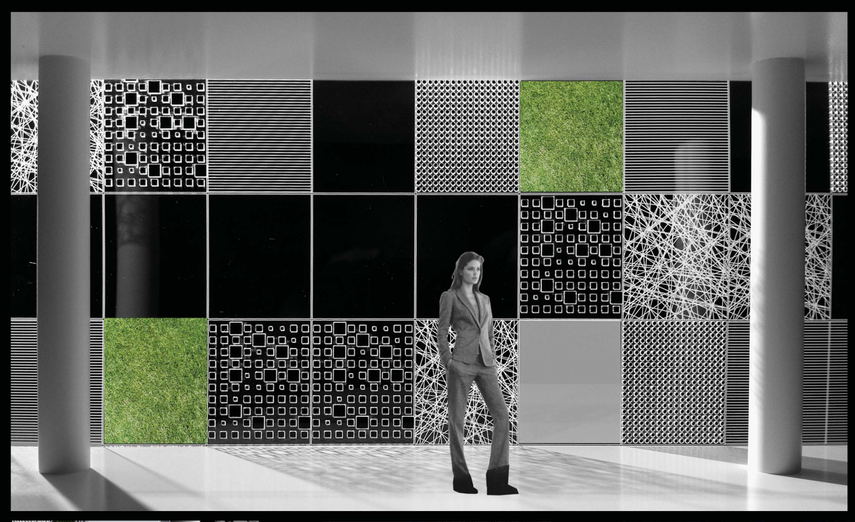



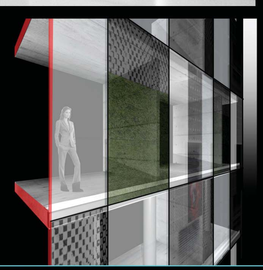



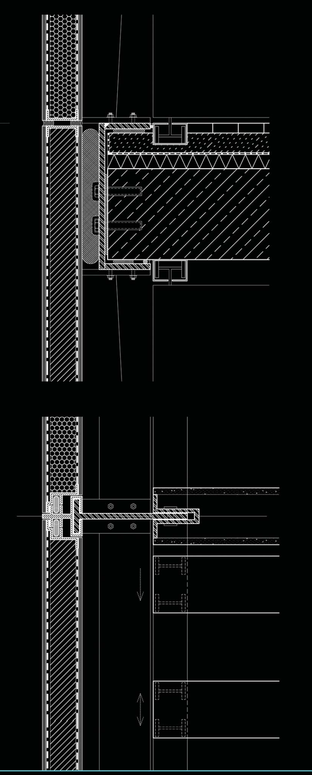

SYSTEM_3:
ADAPTIVE SKIN - TRANSFORMABLE SPACE

The facade system consists out of **modular panels with different functions.** These panels are user-friendly, leasable, easy to transport and assemble and they can be exchanged with minimum effort. In this way the facade becomes **a surface for manipulation**, where the relationship between the skin of the building and the user is being reestablished.
The panels are **adaptive both to the exterior and the interior** of the building and thus are able to respond to ongoing transformations of the layout, which could allow for efficient use of space where the overall dimension of an apartment unit is minimized. The architectural consequences of a vibrant mixture of functions and their appearance are assumed to be acceptable, especially in the case of a building retrofit.







student: Dipl. - Ing. Gergana Velichkova

advisor: Prof. Dr. Dr. E.h. Werner Sobek