

# I PRO 360:

## GREEN BUILDING DESIGN CONCEPT AND INTEGRATION

### MISSION STATEMENT:

We aim to find a balance among economy, need, and sustainability to satisfy the unique needs of the owner. Our design must not only create a functional and comfortable live/work space for the owner but must also be financially viable. The consolidation of the owner's home and business into a single building will provide a basis of efficiency which we will employ to achieve increased performance in sustainability and economy.

### THE CLIENT:

The client is a trader who owns and runs a trading company, which operates 24/7, in Oak Park, Illinois. He acquired a plot of land in Oak Park on which he would like to construct a new building to house his business and possibly include a retail space, a house for his family, and apartments/condos to rent/sell. He has multiple visions or plans for the space, and approached the I PRO team to solve his dilemma of which scheme was financially best to do with the site, including even selling the land. After hearing the client present what he needs and wants, it was established that the best use of the land both for him and his checkbook was a retail space (or two) at street level, a commercial space for his business on the 2nd floor, and an elaborate loft-like home for him and his family on the 3rd and 4th floors.

### SUSTAINABILITY:

The purpose of the sustainability group was to incorporate environmentally conscious design elements into the architectural design. Opportunities with green building in today's design are endless but our goal was to choose the most environmentally and economically feasible systems that can be incorporated into a mixed use building.

Our first priority was to fulfill the owners needs; in order to do this we conducted a short survey to see what aspects of the sustainable design were most important to him. We asked him to rate the importance of specific aspects of the design on a scale of 1 to 5, 1 being least important and 5 being most important. A brief summary of the results are as follows:

INITIAL COST	4
MAINTENANCE	5
ENERGY EFFICIENCY	3
METERING	2
SOLAR & GEOTHERMAL SYSTEMS	2
TEMPERATURE CONTROL	2

From this short survey we can conclude the owner is most interested in building systems that are low maintenance and do not have a high initial cost as opposed to the most energy efficient systems. In our initial interview, the owner expressed interest in specific systems such as a geothermal heat pump system, solar panel systems, and a green roof. We began our building load calculations using the Hourly Analysis Program 4.41 (HAPS). With these preliminary loads we could estimate the feasibility of the desired systems.

### I PRO 360 PROJECT GROUPS

#### BUILDING SYSTEMS:

Alejandro Aguilar  
Leon Chan  
Joe Kerrigan  
Bryan Zacharias

#### SUSTAINABILITY:

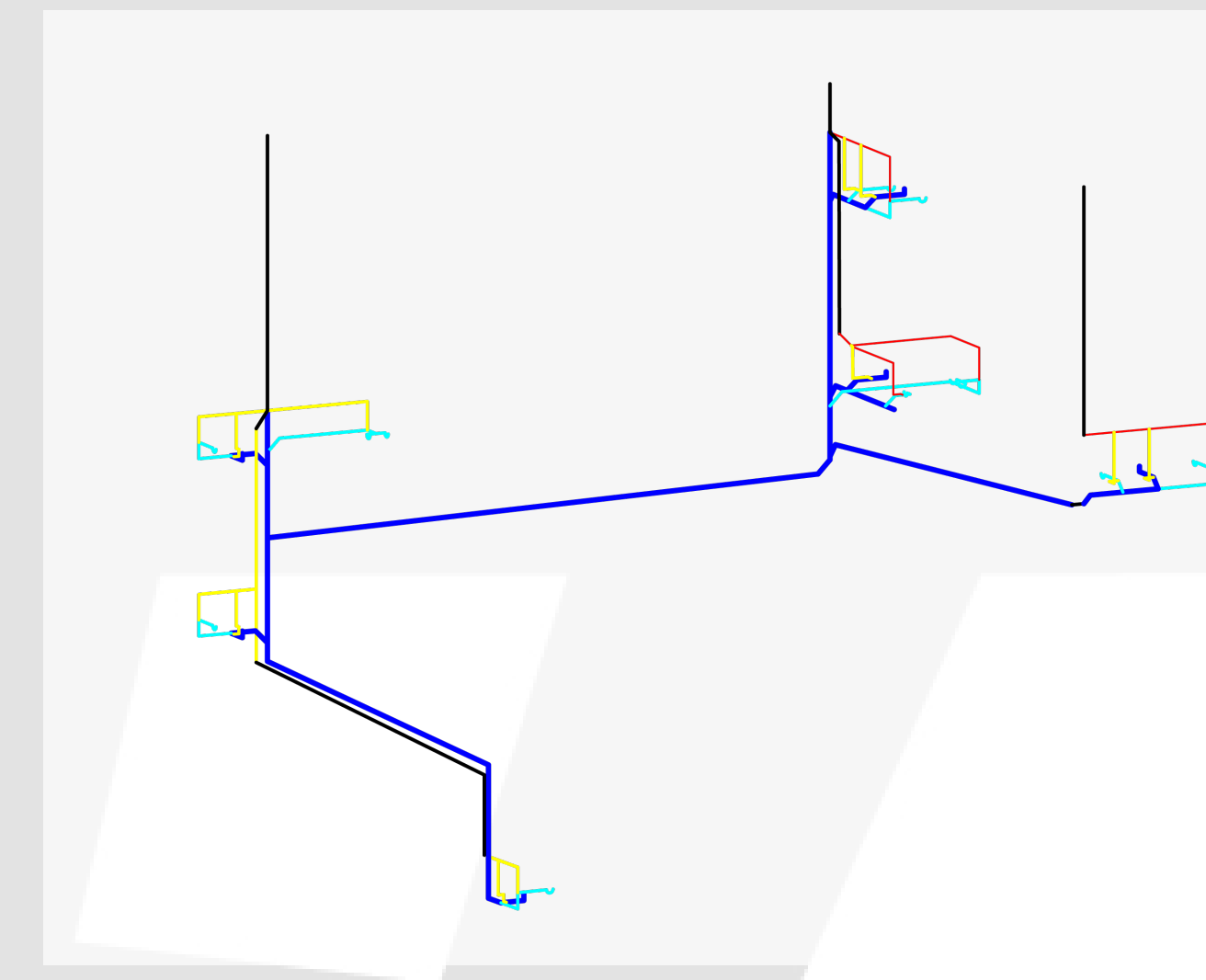
Aubrey Vander Heyden  
Michael Walters

#### BUSINESS PLAN:

Chinedu Azodoh  
Melissa Cheviron

#### DESIGN:

Jon Achs  
Yehuda Gutstein  
Madison Kelly  
Tyler Stellwag



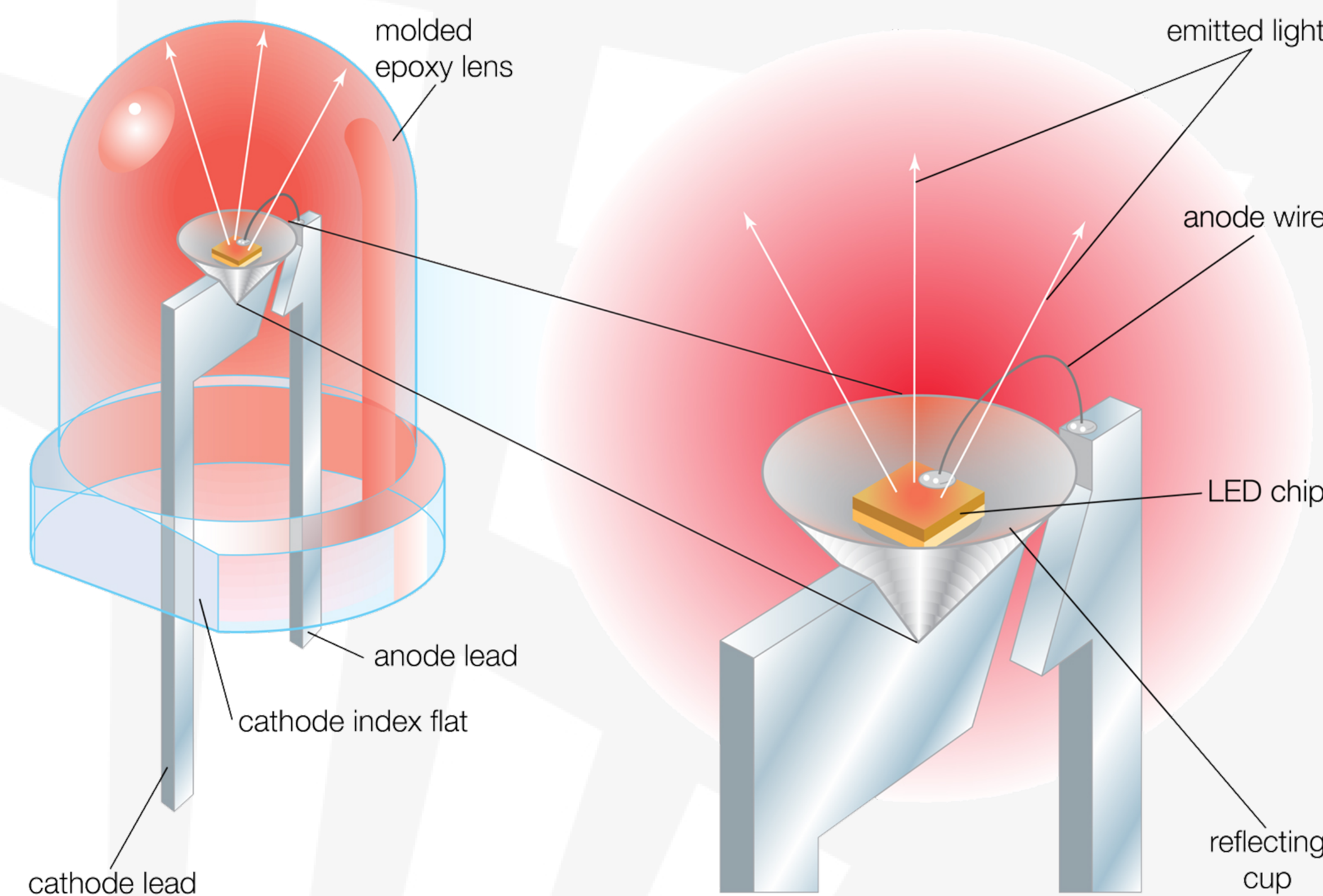
### PLUMBING:

The Plumbing system is designed based on the probability of each of the Plumbing fixtures to be used at the same time. This is quantified using what we call fixture units. Each fixture, depending on its use, is assigned a certain amount of fixture units. Based on the fixture units the size of pipe is chosen. For stacks and branches, the fixture units are added and the sizes are determined. There are rules about venting as well. Every trap must have a vent. Venting is also sized based on fixture units.

### ELECTRICITY:

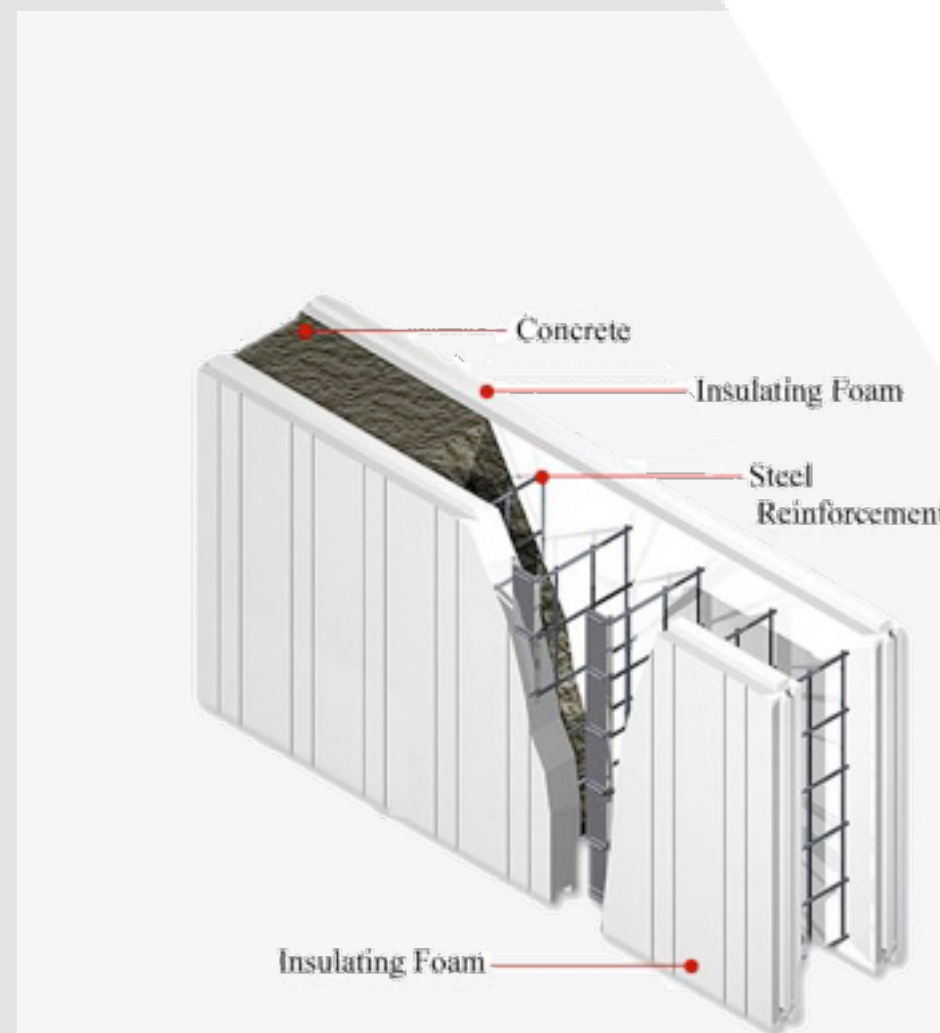
Due to lighting being the most power consuming system in most modern buildings, a focus on reducing this demand has been made. All lights residentially used will be compact fluorescent and LED based due to their low-wattage input, high efficacy, and extended lifetime. In terms of the commercial space, there has been a transition from the typical ceiling based lighting needs to the more practical task lighting for each work space. Light sensors are also to be installed on the ceiling based light system to work with and not compete against the natural lighting the space will be open to.

Specifically for the residential space, we encourage the enrollment in ComEd's 'Real-time Pricing Program', which allows users to select a target price level -- 10c to 14c per kWh-- to avoid using high energy appliances during peak billing hours. This program aims to work with the monthly, daily, and hourly price fluctuations.



### STRUCTURE:

The structural design of the building mainly consists of two concrete shear walls and the hollow core planks that span between them. The walls are going to be site cast with ICF instead of plywood forms. ICF stands for insulated concrete forms and is mainly made of foam blocks. The foam blocks are left on after the concrete is casted and used as insulation. This is an efficient building method which reduces the waste produced from construction. The flooring system consists of 10" thick hollow core planks. These are prestressed planks that have been hollowed out to reduce self weight. This system was chosen because its relatively small thickness allows more floor-to-ceiling height in each story of the building.



### COST ESTIMATE:

	Total	Total incl O&P	% of Total	
Site Civil	\$21,658.60	\$25,183.40	2.52	excavation + parking lot + drainage
Structural	\$330,107.60	\$430,601.41	43.10	framing + floors + foundation
Architectural	\$197,523.36	\$247,301.64	24.76	windows + doors + ceiling/flooring + roof covers
Electrical	\$121,025.39	\$147,828.00	14.80	wiring + lighting + power supply + elevator + solar panels
Mechanical	\$124,755.00	\$148,067.00	14.82	plumbing + radiant floor tubing + HVAC
<b>TOTAL</b>	<b>\$795,069.95</b>	<b>\$988,981.45</b>	<b>100.00</b>	

