



# URBAN POWER GAUGE

Dallas Power Art Competition  
Michael Beene | August 2011

citydesignstudio



NATIONAL  
ENDOWMENT  
FOR THE ARTS

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## THE PROBLEM OF INFRASTRUCTURE

Electrical substations don't really have names. They exist anonymously, consistently humming in the background of urban life.

Never do you hear your friends say "let's meet by the substation" or "turn left at the transformers". In fact, the only time the substation crosses one's mind is when it stops working. Once fixed, it slips out of memory once again.

At times energy infrastructure enjoys a moment in the spotlight. An evening news segment announces: RESIDENTS PROTEST CONSTRUCTION OF NEW POWER SUBSTATION. Fears of dangerous electromagnetic radiation create a negative image that no other part of our infrastructure has had to bear. Understandably, it often finds itself in the center of many "not in my backyard" campaigns.

But perhaps the substation isn't actually ugly at all. Perhaps it is just misunderstood.

Few people really understand the exact role of the substation. Our interaction with power companies rarely goes beyond a monthly bill. Yet there is a fascinating story behind the delivery of electricity from its sources to the homes of our communities. By unveiling this story, the mystery that surrounds the electrical substation will subside and it will finally become a welcomed part of the urban fabric.

The goal of this design is to celebrate the substation's existence by educating the surrounding West Dallas community about their power grid. This document details a plan that consists of two parts: an immediate, non-architectural approach and a design for a park space in front of the substation in West Dallas.



*A common reaction to substation construction (Photo by Donald Sullivan, Tappan, NY)*

## PHASE 1: MyEnergy

An online “app”, **MyEnergy** is created that educates its users about their energy infrastructure.

Currently, vast amounts of data regarding the production and transfer of energy is made available online, but in a spreadsheet format that is difficult to interpret.

MyEnergy increases the impact of this information by presenting it visually in real-time. Users will have the ability to track energy flow from its sources, to their neighborhood substation, and to their own home.

By elucidating the connections between the power sources, substations, transformers, and users, the substation will become a more accepted part of the community.

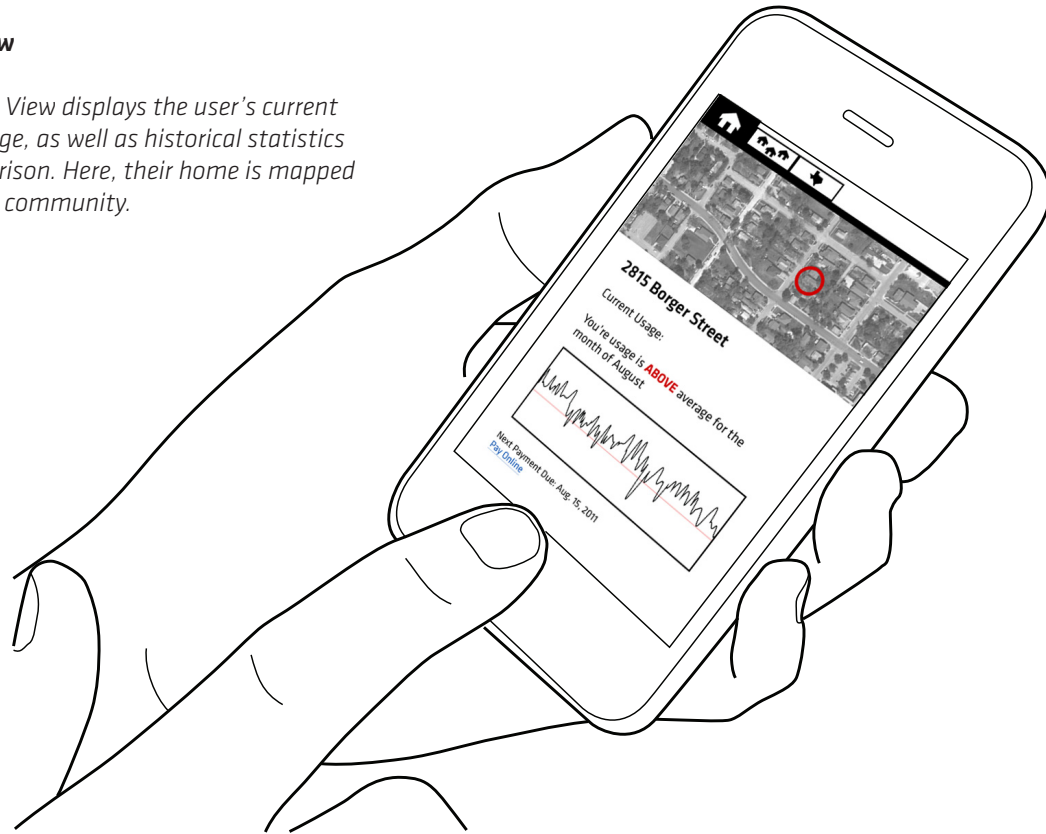


# MyEnergy

**“Users will have the ability to track energy flow from its sources, to their neighborhood substation, and to their own home.”**

### 1 Home View

The Home View displays the user's current power usage, as well as historical statistics for comparison. Here, their home is mapped within the community.



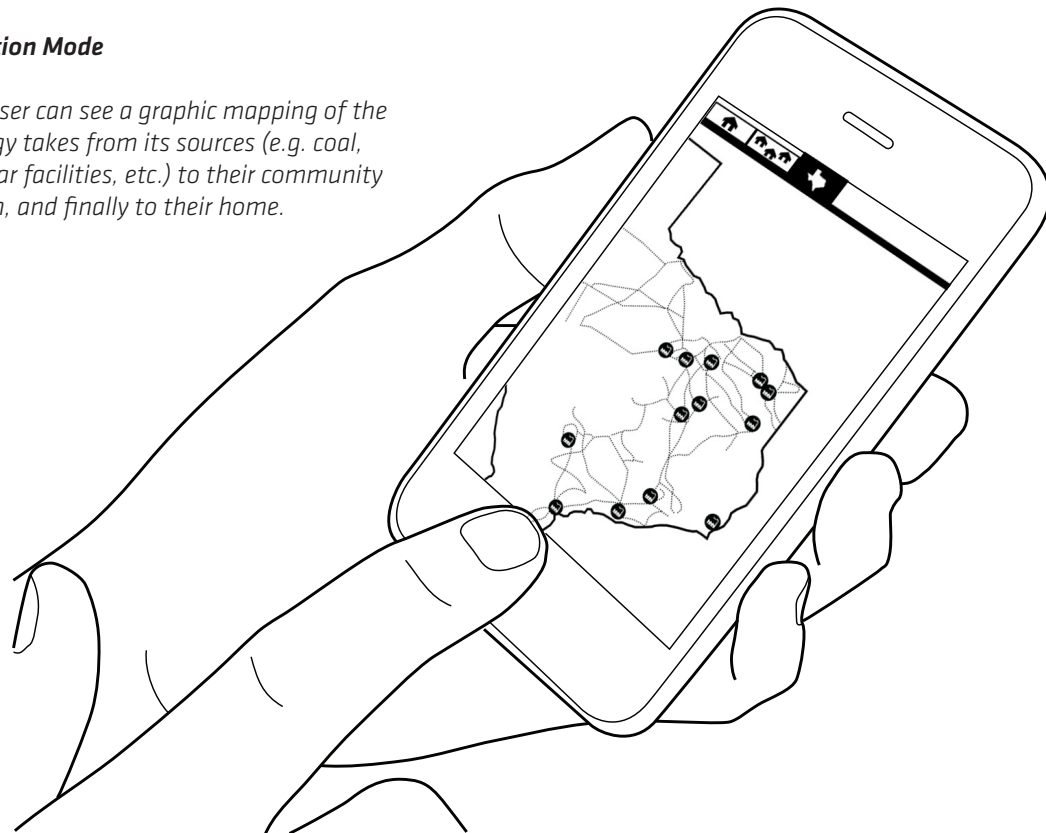
### 2 Community View

This part of the program displays the tributary area for the user's substation. Here, the user can see average usage statistics for their community as well as historical data for comparison.



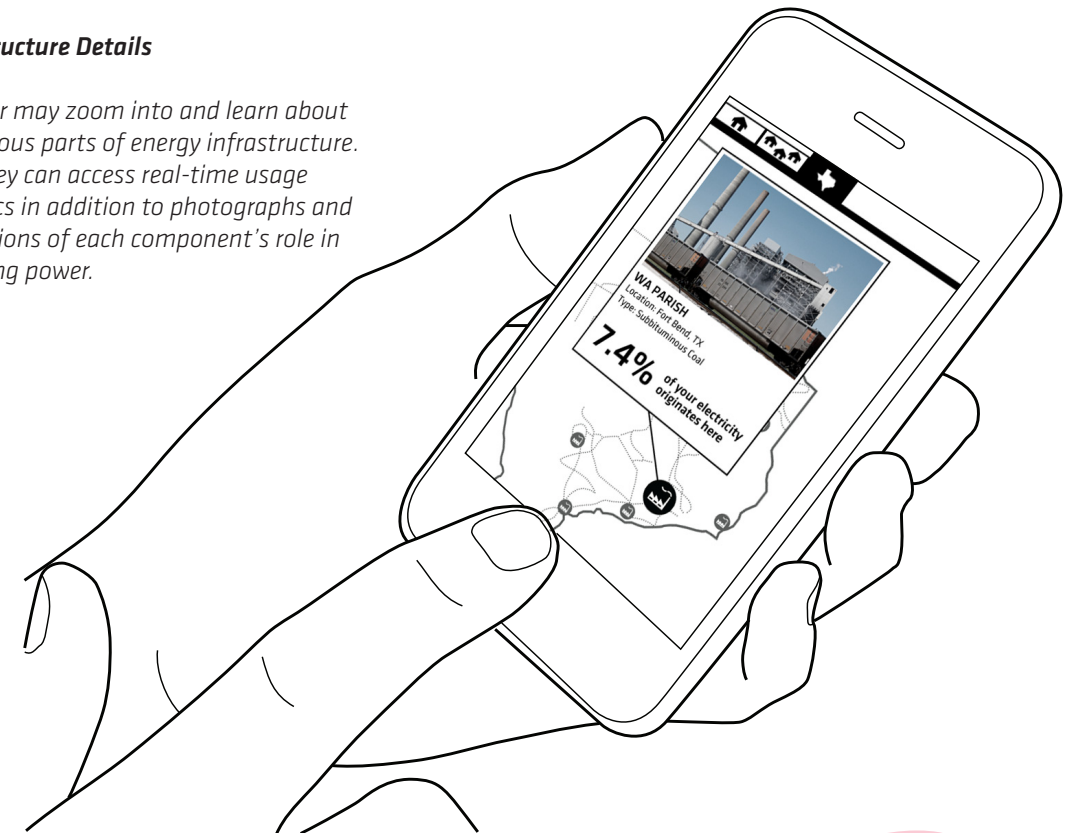
### 3 Visualization Mode

Here the user can see a graphic mapping of the path energy takes from its sources (e.g. coal, gas, nuclear facilities, etc.) to their community substation, and finally to their home.



### 4 Infrastructure Details

The user may zoom into and learn about the various parts of energy infrastructure. Here they can access real-time usage statistics in addition to photographs and explanations of each component's role in delivering power.



## CONCEPT

Urban Power Gauge integrates the substation into the community not through disguise or distraction, but through critical interaction.

The centerpiece of the Urban Power Gauge is an LED-lit wall that reacts in real-time to the energy consumption of the West Dallas Community. As the sun sets on West Dallas and the televisions, microwaves, and dishwashers turn on, the wall reacts in a real-time spectacle of light: an urban aurora borealis.

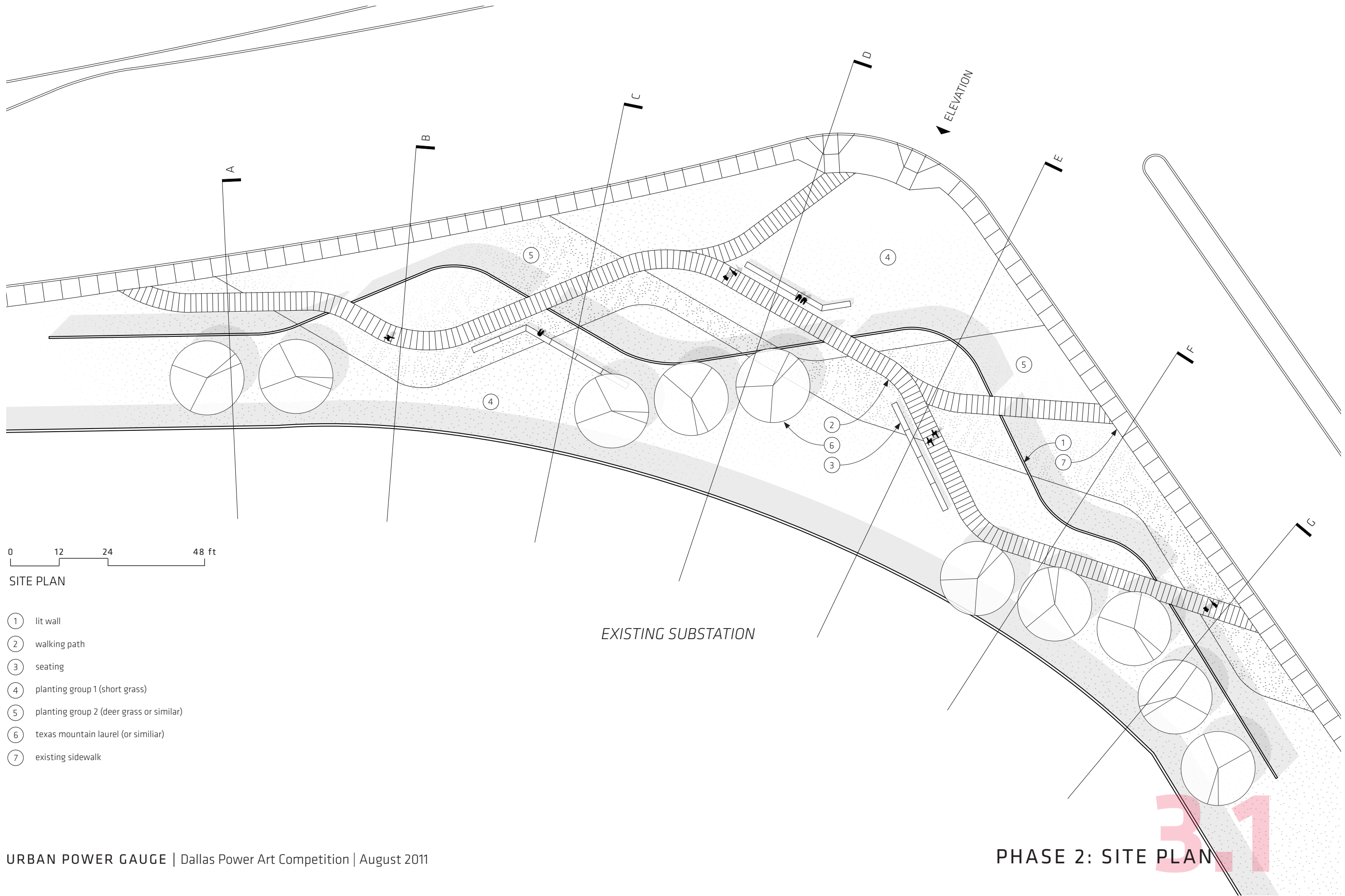
Real-time energy data is currently available through the ERCOT website and can easily be ported into readily available microcontrollers that alter the display of light in the wall.

Embedded in the lit wall are the names of the different neighborhoods that compose the West Dallas community, establishing the substation as a valued focal point. As people meander through the Urban Power Gauge, their figures become whimsical silhouettes surrounded by the energy of their community.

# URBAN POWER GAUGE



“A REAL-TIME  
SPECTACLE  
OF LIGHT: AN  
URBAN AURORA  
BOREALIS”



0 12 24 48 ft

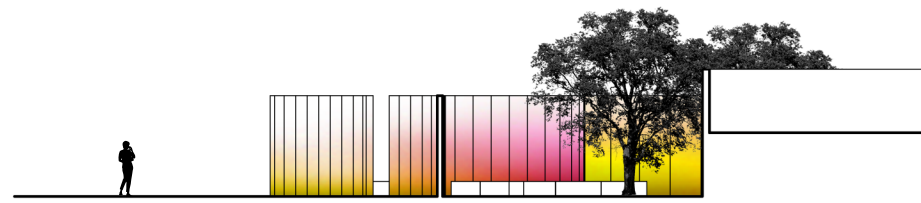
SITE PLAN

- ① lit wall
- ② walking path
- ③ seating
- ④ planting group 1 (short grass)
- ⑤ planting group 2 (deer grass or similar)
- ⑥ texas mountain laurel (or similar)
- ⑦ existing sidewalk

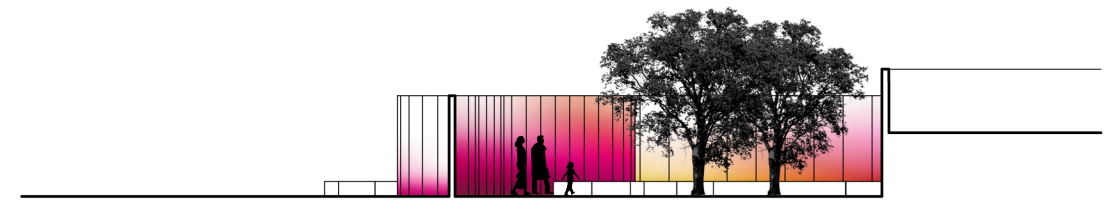
EXISTING SUBSTATION

ELEVATION

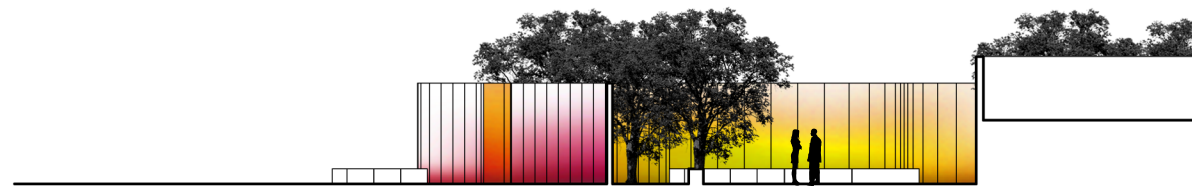
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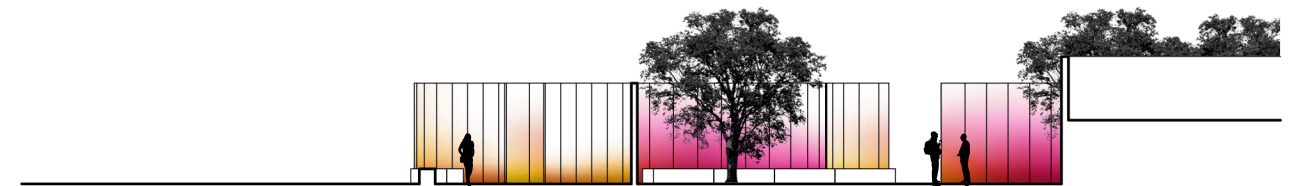
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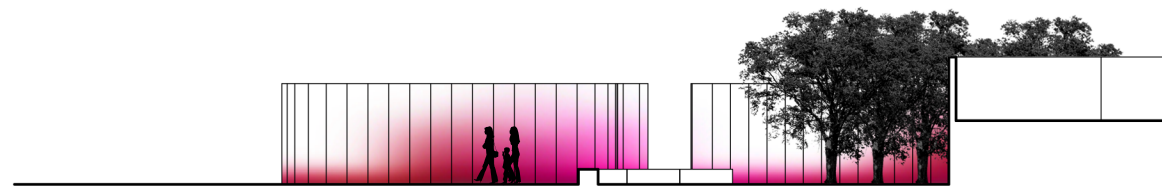
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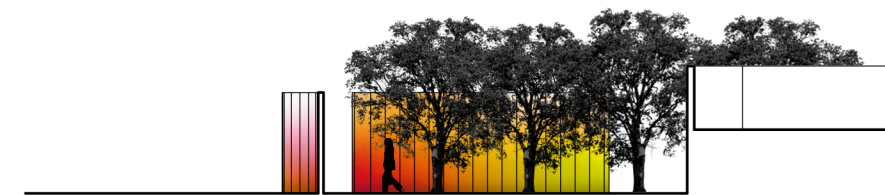
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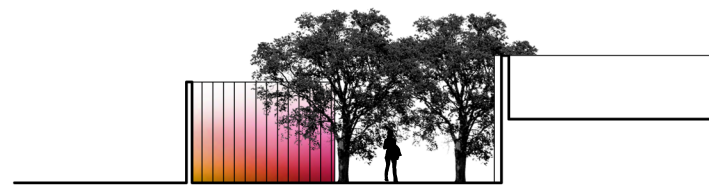
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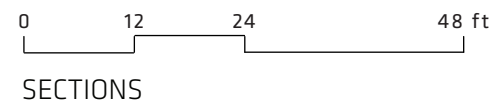
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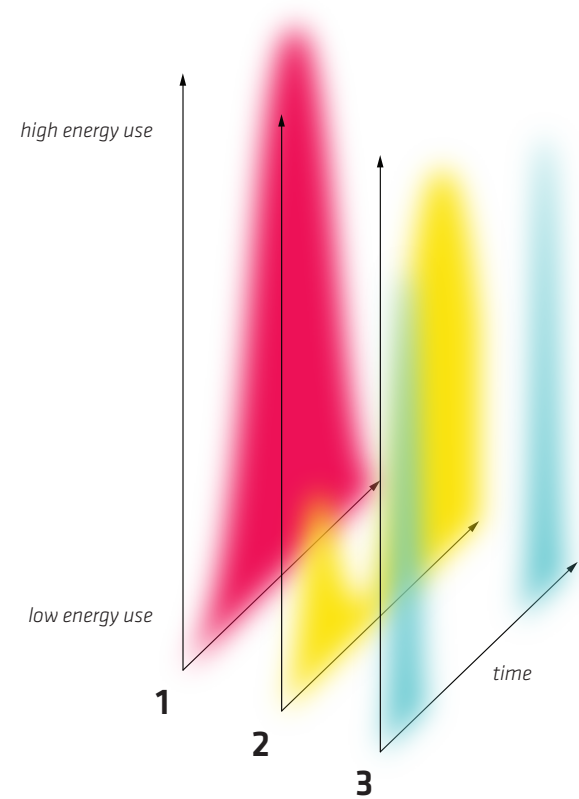
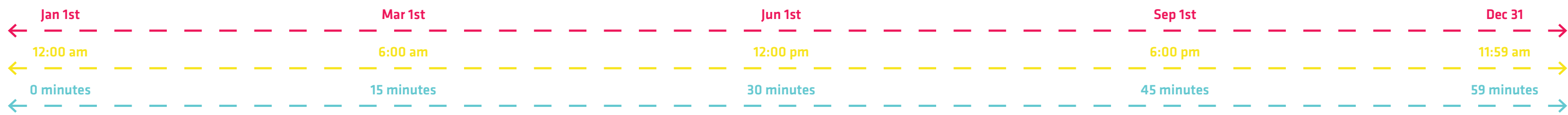
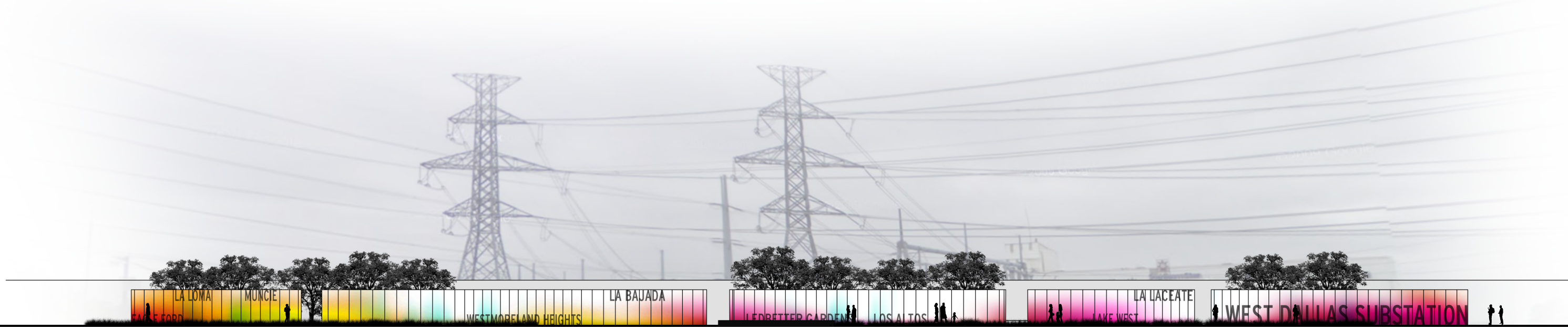
F



G







**COLOR REPRESENTATION**

- 1 The Magenta band moves the slowest, recording long-term, seasonal changes in energy use. The length of the wall represents one year of energy use.
- 2 The yellow band records daily energy use. The length of the wall represents 24 hours of energy use. The yellow band moves 365 times faster than the magenta band.
- 3 The cyan band moves the fastest. The length of the wall represents one hour of energy use. This band moves 24 times faster than the yellow band, and over 8000 times faster than the magenta band.



*Evening Perspective*

## WALL CONSTRUCTION

The wall is composed of a steel frame embedded in a reinforced concrete footing. Translucent fiberglass cladding allows for the passage of light and is extremely resistant to vandalism. The structural members are spaced every 30 inches and when viewed from the park, provide a sense of rhythm and scale.

The LED light fixtures are located in the bottom of the wall in a steel channel set within the footing for protection.

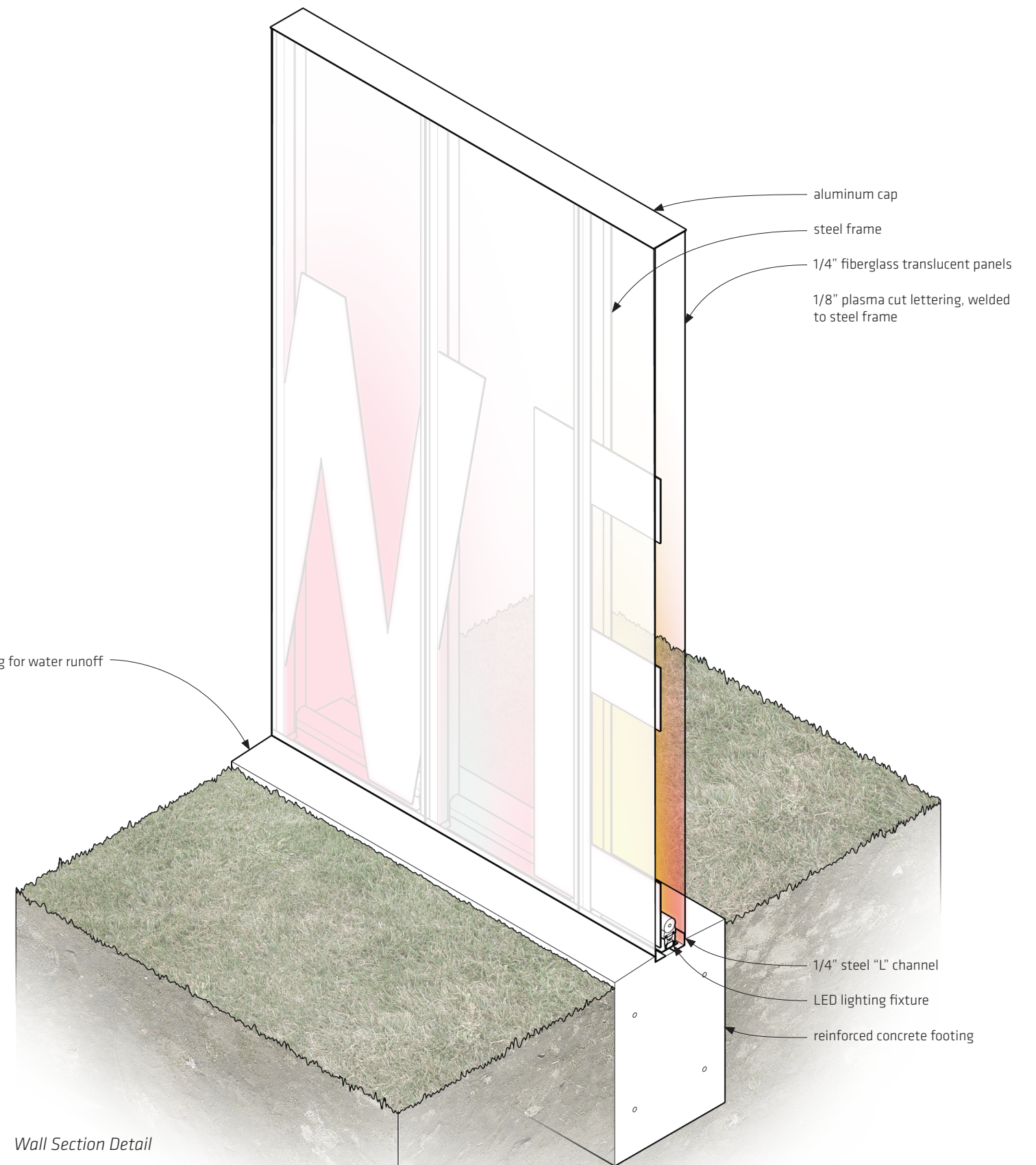
Plasma-cut steel lettering is welded to the steel frame and while faintly visible during the day, becomes readily apparent at night when silhouetted by the light fixtures below.

The strength of the steel coupled with the multiple breaks in the wall allow it to resist the wind load while the durability of the cladding keep the wall free of graffiti.



*Philips iColor Accent MX Powercore LED Lighting 2' module*

sloped footing for water runoff



**CONSTRUCTION COST: \$685,459**

CONSTRUCTION DURATION: 6 Months

SITE AREA (SQ. FT): 27,058 SF

COST PER SQ. FT: \$25.33 / SF

COST SUMMARY

General/Overhead	\$156,895	\$5.80 /SF	23.31%
Site Work	\$69,934	\$3.12 /SF	12.53%
Concrete	\$41,487	\$1.53 /SF	6.16%
Metals	\$68,000	\$2.51 /SF	10.10%
Thermal/Moisture Prot.	\$156,050	\$5.77 /SF	23.18%
Electrical	\$166,323	\$6.15 /SF	24.71%
	<b>\$658,689</b>		<b>100.00%</b>

BURDEN RATE 22.00%

**MAINTENANCE COST: \$30,000 / Year \*\***

\* includes all materials, contractor/subcontractor fees and overhead, site survey, and

\*\* includes landscape maintenance, cleaning, and replacement of light fixtures every 13 years based on ten hours of use per day.

## THE FUTURE

By elucidating the abstract nature of the substation and the power grid as a whole, MyEnergy and Urban Power Gauge increases awareness to power usage behavior in a time where energy conservation is of utmost importance.

Texas is unique in that it's power grid is virtually disconnected from the rest of the continent. This independence makes Texas uniquely situated to serve as an example of how energy infrastructure and urban life can be symbiotically intertwined.

## CREDIT

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