FIRESTATION 37
HOUSTON FIRE DEPT

70% space daylighting

30% less water use

nearly **100%** construction debris recycled

City Projects Case Study

"This project exemplifies a true collaboration of art, architecture, sustainability, functionality and aesthetics….."

_ *FireChiefMagazine.*pg96.Nov09.

Photo by Gilbane Portfolio

Square Feet: 10,800 , 1 story

Site: Braeswood Subdivision

Location: 7026 Stella Link

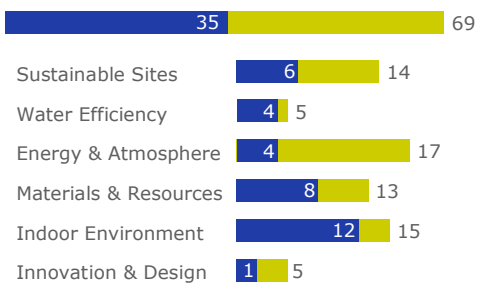
Construction Cost: $472/SF

Total Cost: $5.1 million

Completed: September 2009

LEED rating system	New construction V2.2
Achieved rating	Silver 35 pts
Energy use intensity	100 kBtu/sf/yr
Greenhouse gas emissions	** lbs CO2 e/sf/yr
Water usage	** gal/sf/yr

LEED Facts– CI Silver



Sustainable Initiatives

- **30% reduced water consumption.**
- **70% daylight of spaces.**
- **Over 30% product value used has recycled content.**
- **Over 30% materials used are produced within 500 miles.**
- **Nearly 100% of construction debris recycled.**

Project Overview

The City of Houston is always challenged with providing strong and durable, yet economical buildings. This is particularly true when the building being designed represents fire safety for the community. Fire stations operate 24/7 year-round, and serve as homes to fire fighters working extended shifts. The city encourages design strategies that generate a more pleasant work environment, and comfortable living quarters while saving energy.

The current Fire Station 37 on Stella Link replaces the old station that was located in the residential area at Aberdeen. The former station was in service since 1955, and has been retired for a new larger station wired for the 21st century. The City of Houston has taken the lead along with the architects of Natex Corp. to deliver the Houston Fire Department's new FireStation 37. This development involves the construction of a 10,800 square foot fire station which consists of 3 apparatus bays, a dormitory, locker room, study area, TV areas, an exercise room, offices, a full kitchen, a covered outdoor grill area and clean/maintenance rooms. This facility houses 48 firemen as well as a fire captain and chief. The building features glass artwork and has a brick facade and metal roof. This facility has achieved LEED Silver Certification in September 2009.

Houston's first LEED-silver fire-station.

Photo by Houston Arts Alliance

Art at Fire Station 37

A unique aspect of the station is its integrated glass art display. The City of Houston dedicated 1.75% of construction costs for the artistic window structures. Jeff Smith designed two beautiful abstract pieces — the front main-entry design abstracts a glass art collage of a fire hose, fire helmet, water droplets and other iconic fire elements into a symbolic vibrant piece. The rear private window is a tree with a squirrel that gives firefighters nostalgic remembrance of the old fire -station and its unofficial squirrel mascot. The sheets of stained glass give a 3-dimensional quality with a textured water-like appearance. A dichroic white opal glass accent is visible when viewed from the outside. Color-shifting vibrant colors are vivid when viewed from the inside.

Learn more at:
www.archstglassinc.com

Photo by Natex Portfolio

Sustainable Sites (6/14)

The new Fire Station 37 replaced an unsightly site and polluted structure with this sustainable station situated in the subdivision of Braeswood. The station retired the 1950's, 4,400 square foot, two-bay, outdated station blocks away. The new station was designed and built to provide the necessary resources to serve the increasing population in the area. Confronted with site challenges such as constricted space, polluted structures, and recent change in flood plain, the team worked early in the process to maximize site usage while creating sustainable features outside and in.

The location is sited within 1/4 mile of the METRO Bus(SS4.1), and other alternative transportation has been improved since the old fire station. With bicycle storage and changing rooms(SS4.2), firefighters have the opportunity to bike to work. Back parking area offers bike storage, and 5% parking capacity for preferred parking for fuel efficient vehicles(SS4.3).

The facilities' high albedo paving(SS7.1) and new white roofing system(SS7.2) are methods in the reduction of the heat island effect. The white port concrete reduces temperature in the paved areas as well as increasing night-time visibility. Site lighting(SS 8.0) is modeled with full cut off fixtures to reduce interference with nearby neighborhood lighting.

Water Efficiency (4/5)

Fire fighters employ water not only to combat flames, but for washing fire fighting apparatus and hosing down equipment bays. The 3-Bay fire station will use millions of gallons of water each year, so water conservation is a huge value.

Rain tanks are installed under the parking to filter storm water(WE2.0). The storm water, in turn, is used for sewage conveyance. Storm water filtration and collection thru the use of rain tanks underneath the parking allowed for on-site detention while providing maximum fire truck access and operations.

Water efficient landscaping(WE1.2) features a micro-drip irrigation system, rain sensors, and native plants.

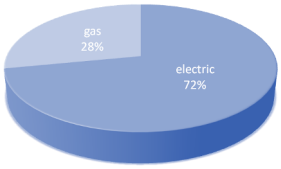
Without the possibility of on-site storm water reuse, conservation is the main objective for water cycle design. This project uses water conserving fixtures(WE2.1) to reduce water consumption. High-efficiency restroom fixtures include low-flow shower heads, dual flush toilets, and no water urinals. The combination of all of these fixtures results in a 30% reduction in indoor potable water use over standard fixtures.

- **LEED**
  Energy & Atmosphere 10 of 17

EA credit 1 (* pts)	Optimize Energy Performance
EA credit 4	Enhanced Refrigerant Mgmt
EA credit 6	Green Power

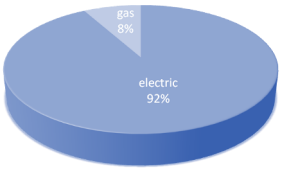
- **Purchased Energy Costs** 2010

	Total	Electricity	Gas
Annual energy use	1,085,648 kBtu	21.18 kWh/sf	.28 therms/ sf
Annual energy cost	$2.22 sf/yr	$2.04 sf/yr	$.18 sf/yr



Annual Energy Use
1,085,648 kBtu

Electricity 72%
Gas 28%



Annual Energy Cost
$2.22 sf/yr

Electricity 92%
Gas 08%

Actual Gas and Electric Comparison

- **Measured Energy Usage**

100* EUI

KBtu/sf/year

- **Energy Model Comparison**

	Baseline	Design
Project Modeled EUI (kBtu/sf/yr)	144	129
Actual EUI* Comparison	30% lower	22% lower

PRM Summary provide by DBR Engineering

- **Renewable Energy**

Renewable Energy: Wind energy
Green Power Purchased: 70% for two years

*EUI refers to Energy Use Intensity as a standard metric to compare buildings. EUI is calculated by converting all fuel sources to kBtu and dividing this value by the square footage of the project space.

Photo by Natex Portfolio

Energy & Atmosphere (4/17)

Energy optimization measures include high-reflectance roof, high efficiency equipment, enhanced refrigerant management(EA4.0),green power, and ventilation systems including both natural and mechanical strategies. Cool metal roofing is a viable solution that offers enormous economic and environmental benefits. The metal roof in this project has high reflectance to improve micro-climate. It conserves utility use by helping to cool the facility naturally in the warm climate of Texas. This saves on building operating costs and reduces peak demand for utilities. The cool metal roofing also mitigates the urban heat island effect and have high recycled content.

Thru the optimization of HVAC systems, this project has achieved 14.7% efficiency and features ceiling fans for improved airflow. Adequate ventilation of the apparatus bay prevents the build-up of exhaust fumes and decrease energy usage. The recycling area is served with a separate exhaust to ventilate its area to prevent emissions from migrating into crew quarters and to ensure a rapid clearing of the apparatus room air.

Green Power(EA6.0) from renewable sources is environmentally preferable to electricity generated from conventional energy sources. The City of Houston has purchased 50 Megawatts of wind energy through Reliant Energy with ERCOT Tradable Renewable Energy Credits (July 1, 2009—June 30 2013). The City has applied 70% green power to the estimated annual energy consumption of Fire Station 37 for two years.

New buildings must be designed to meet local energy codes, but should also be expected to meet aggressive energy use targets. Energy Star appliances save money, save energy, and prevent carbon emissions. The kitchen in this facility exclusively uses Energy Star Appliances which generally use 20%-30% less energy than required by federal standards.

Materials & Resources (8/13)

Materials for the Fire Station were carefully selected to minimize their environmental impact. Sustainable efforts during the project's construction included the recycling of nearly 100% of construction debris(MR2.1). Efficient recycling management(MR2.2) was attained by hiring a third-party recycling company to sort all debris offsite instead of using multiple waste receptacles on the jobsite.

The fire station is outfitted with sustainable and local materials. Over 30% of materials used in this station are produced and harvested within 500 miles. The regional materials(MR5.1) include concrete, aggregate, brick, steel, etc. The front entry concrete block and the structural steel of the

Rating and Awards

2009 Best of Houston Award
"...for Institutional Publicly Funded Project Under $30 Million."
Texas Construction Magazine
Best of 2009 Awards Competition
"Best Small Project"
Associated Builders and Contractors
2009 Excellence in Construction Awards Competition
"ICE Award"
Associated Masonry Contractors
2010 Govt / Institutional category
Golden Trowel Award

Project Team

Owner
City of Houston
General Services Dept. Fire Dept
www.houstonTX.gov

General contractor
Gilbane Building Co.
www.gilbaneco.com

Architect
NATEX Architects
www.natexarchitects.com

Structural engineer
Henderson and Rogers Inc.

Civil engineer
REKHA Engineering Inc.
www.rekhaeng.com

MEP engineer
DBR Engineering Consultants

Landscape architect
Lauren Griffith Associates
www.laurengriffithassociates.com

Electrical contractor
Kenmor Electric Co.

Plumbing contractor
Walton Mechanical Services

Earthwork and concrete contractor
Keystone Concrete

LEED® Facts

Fire Station 37
Houston, TX

LEED for Building Design & Construction
Certification Awarded Sept 2009

Silver **35***

Sustainable Sites	6/14
Water Efficiency	4/5
Energy & Atmosphere	4/17
Materials & Resources	8/13
Indoor Environmental Quality	12/15
Innovation & Design	1/5

**Out of possible 69 points*

apparatus bay is made of recycled content. Recycled building materials include rebar, cmu, steel, and fly ash in concrete.(MR4.2) The carpeting, rubber flooring, lockers, ceiling, and ceramic tiles, are other components made of recycled content.(MR4.1) 2.5% of total value of the building incorporate rapidly renewable materials(MR6.0) . Wood materials used in the facility are FSC certified(MR6.1) . FSC products ensures that the forest products used are from responsibly harvested and verified sources.

In addition, there is a recycling area in place for the building occupants. The recycling center offers the storage and collection of recyclables to help divert waste from landfills.

Indoor Environment (12/15)

Indoor air quality is an important environmental consideration, especially since we spend approximately 90 percent of our time indoors. Several design features and strategies in this facility promote indoor air quality. This building meets and exceeds the fresh air ventilation requirements by more than 30%(EQ2.0). Incorporating operable windows into the project contributed to the credits for increased outdoor air ventilation.

Materials are selected with interior air quality in mind, including adhesives, sealants(EQ4.1), paints, coatings(EQ4.2) that are low in Volatile Organic Compounds (VOC) and other toxics. Green Label Plus program is used in identifying carpeting with the lowest emmitting VOC(EQ4.3).

Air quality is also enhanced with natural daylight and views to most spaces. The exercise room has 100% daylight and views(EQ8.1). Clerestory windows were placed to provide maximum daylight. They supply natural light to 75% of spaces.

Budget & Cost

The City of Houston and building contractor, Gilbane, was able to keep the complex project on budget and in full compliance with all City minority and women hiring goals during an unstable phase in the construction industry. There was an extremely high volume of work across all industries that was either in design or under construction at the time the project was being developed. Both locally and in the world commodity markets, costs were escalating, and staffing and material were at a premium. Throughout the design process, the City and contractor were able to provide accurate budget, forecast estimates, note scope changes, and other inflationary pressures during the volatile period.

1 Restrooms:
- Low flow shower head
- Dual flush toilets

2 Recycling Center:
- Stg and collection of recyclables
- Regional materials
- Separate exhaust

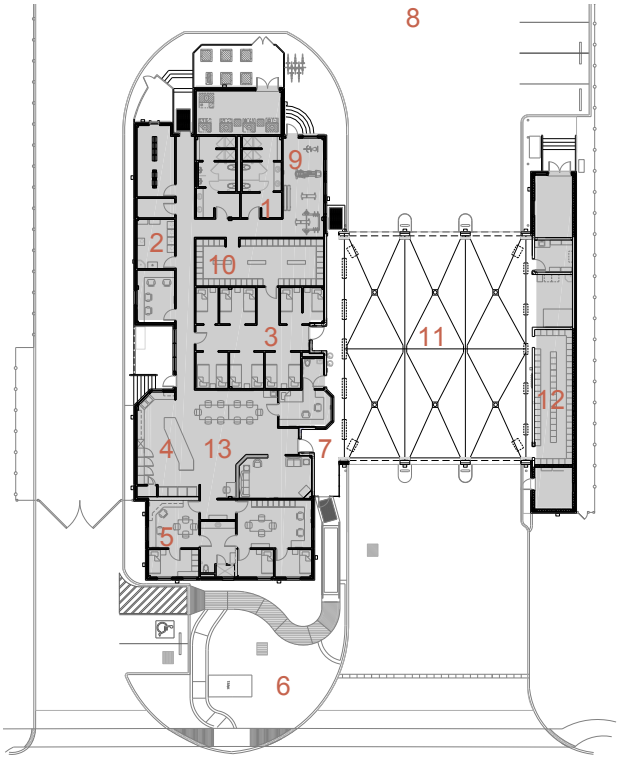
3 Dormitory:
- Exceed fresh air req.
- Efficient HVAC
- Ceiling fans for improved airflow.

4 Kitchen:
- Energy Star Appliances
- Recycled content materials

5 Captain/Chief's:
- GreenLabel Plus carpet
- Low VOC paint/ adhesives
- Natural daylight

6 Landscape:
- Drip irrigation
- Rain sensors
- Native plants

7 Front Entry:
- Concrete Block-Recycled Content
- Natural daylight to most spaces



8 Back Parking:
- Rain tanks under pavement
- High albedo paving
- Bike storage
- Parking for fuel efficient vehicles

9 Exercise Room:
- Recycled rubber flooring
- 100% daylight and views

10 Locker Room:
- No VOC adhesives
- FSC Certified wood

11 Apparatus Bay:
- Structural Steel—recycled content
- Regional materials: concrete, block, brick, steel, etc.
- Natural ventilation

12 Gear Lockers:
- Grid made of recycled content
- Low VOC paints
- Natural ventilated spaces

13 Lounge:
- Low VOC carpet
- Regional materials
- Efficient HVAC
- Views to outside

FireStation-37 Floor Plan & Green Initiatives