Langford Building A

Case Study
ARCH 631 Applied Structures
Anne Nichols
Jorge Casique Araujo, Maria F. Chacon Portillo, Oscar Garza Reza, Heather Lorenzo
Overview

- Fun Facts
- Brief History
- Design Concept
- Building Layout
- Structural Features
- Building Components & Systems
- Loading Summary
  - Gravity Loads
  - Lateral Load Resistance
  - Visual Analysis
  - Foundation and Soil
- Bibliography
The Ernest Langford Architecture Center

Designed by: Jack R. Yardley ‘58
Architect/Engineering Firm: HKS, Dallas
Location: Texas A&M University, College Station, Texas.

Price: <$7 million
Dedication Year: 1976
Construction: 1975-1978
Brief History

- Dedicated and named after Ernest Langford
  - Head of Architecture department for 27 years (1929-1956)
- Building was designed to accommodate 1,500 students.
- The Langford Architecture Center was built in two phases.
  - Phase 1: renovation of "Building C" from 1961 to 1963.
  - Phase 2: Addition of "Building A"

https://one.arch.tamu.edu/news/2011/9/7/trc-archive/
Design Concept

- **Style: Brutalism**
  - Characterized by its massive, monolithic, rigid geometry
- **From “HKS: Selected and Current Works”:**
  - Designed to:
    - express primary building systems
    - Utilize climatic elements for energy conservation
    - Precast reinforced concrete structure used to highlight design concept.
- **Special features:**
  - Bridge connection to all buildings (A, B and C)
  - Deep recesses on east and west side of the building
Building Layout

- Floors: 4
  - Penthouse + Roof Garden
- Total square footage: 116,000 sqft.
- Orthogonal grid system
  - 40 ft. bays
  - 10 ft. service modules
- Area tabulations

Program:

- Building A currently houses
  - Offices
    - departments (Architecture, Landscape Architecture and Urban Planning, Visualization)
  - Staff + faculty
  - Education
    - Studio spaces, study rooms
  - Design/print labs (Makerspace, ITS, Photoroom)
  - Mixed-use open areas
  - Gallery space
  - Cafe

Table: Texas A&M University College of Architecture TRC Archives
Building Layout - Building A

Green: Educational (Studios, study rooms/classrooms)
Orange: Mixed-use
Yellow: Offices
Blue: Design/Print labs
Purple: Services
Red: Cafe
Pink: Gallery/Lecture space

Plans: Texas A&M University College of Architecture TRC Archives
Structural Features

- Skylights at 45 degrees due North
- Columns = shafts that encase the mechanical systems that service the building
- Double Tee Joists
- Precast beams
- Handrail beams

Original Drawings: Texas A&M University College of Architecture TRC Archives
Building Systems

- Hybrid
  - Pre-tensioned and post-tensioned precast reinforced concrete components.

- Reinforced Concrete Shear Walls

- One-way Precast Reinforced Concrete Double Tee Beams

- Reinforced Concrete Rigid Moment Frames

3D model reference courtesy of Prof. Marcel Erminy
Building Components Overview

- Precast reinforced concrete components
  - Columns
  - Shear Walls
  - Post-tensioned Beams
  - Double Tee Beams
  - Spandrel beams
  - Handrail girders

- Cast-in-place reinforced concrete components
  - Belled Piers
  - Pier Caps
  - Retaining Walls
  - Topping Slabs
  - Grade Beams
Building Components

- Precast reinforced concrete components
  - Columns
  - Shear Walls
  - Post-tensioned Beams
  - Double Tee Beams
  - Spandrel beams
  - Handrail girders

Original Drawings: Texas A&M University College of Architecture TRC Archives
Building Components

- Cast-in-place reinforced concrete components
  - Belled Piers
  - Pier Caps
  - Retaining Walls
  - Topping Slabs
  - Grade Beams

Original Drawings: Texas A&M University College of Architecture TRC Archives
Loading and Materials

- Live loads

- Lateral Loads

- Material Properties
Loading Summary

Gravity Loads

3D model reference courtesy of Prof. Marcel Erminy
Loading Summary

Lateral Load Resistance

3D model reference courtesy of Prof. Marcel Erminy
Axial Analysis
Shear Analysis
Moment Analysis
Loading Summary

Foundation

- Plan
- Allowable end bearing values
- Soil: Blackland Prairie, Post Oak/Claypan Area
- “Thin, light-colored, acid sandy loam surface layer over dense, mottled red, yellow, and gray claypan subsoils. Some deep, sandy soils with less clayey subsoils exist. Bottomlands are deep, highly fertile, reddish-brown to dark-gray loamy to clayey soils.” (texasalmanac.com)
Loading Summary

- Belled piers
- Pier caps
- Grade beams
- Retaining walls

Original Drawings: Texas A&M University College of Architecture TRC Archives
Bibliography


Historical photographs courtesy of the Texas A&M University College of Architecture TRC Archives. Used with permission from Ian Muise.

3D model references courtesy of Prof. Marcel Erminy

Interviews with faculty: Prof. Gerald Maffei