TEXAS STATE
INGRAM SCHOOL OF ENGINEERING

Group C2.01

Onion Creek Senior Center Expansion

Emily Parks, Jasmynne Brown, Nickolas Sprangers, and Edward Urias

JEEN ENGINEERING

DESIGN CONSIDERATIONS

The following criteria will be of primary consideration for the site:

LANDFILL	**DRAINAGE**
POWER LINES	**AESTHETICS**

However, due to their non-profit status **cost** will be the **main** design consideration.

CONSTRAINTS & STANDARDS USED

The site was designed in accordance with specific local, state, and federal codes/laws.

Standards Utilized
City of Buda Zoning Regulations
City of Buda Building Code
FEMA & TCEQ Environmental Regulations
City of Buda Unified Development Code
Geotechnical Constraints
ADA Accessibility Standards
City of Buda Traffic Engineering Standards

CAPITAL & LIFE-CYCLE COSTS

Capital Costs (USD)				
Item	**Unit**	**Quantity**	**Cost Estimate**	
Hot Mix Asphalt	CY	2894	$	53,359
Crushed Limestone Base	CY	579	$	25,761
ADA Sidewalks/ Walkways	SF	1007	$	9,003
Bioswales	SF	4207	$	63,106
Cut	CY	1174	$	10,272
Fill	CY	272	$	2,720
Parking lot striping	SF	26567	$	16,604
Building Expansion	SF	1110	$	316,350
Permit Expenses	EA	4	$	9,805
Live Oak Tree	EA	1	$	595
Total			**$**	**507,575**

The 25-year life cycle cost for the pavement is estimated to be **$45,656**.

PROJECT OVERVIEW

Onion Creek Senior Center – Buda, Texas

Site Location

In 2013 the Onion Creek Senior Center opened its doors and has served as a place of community for the senior residents in Buda, Texas.

With an increasing senior population, there is a demand for more accommodating space. This project aims to improve accessibility by expanding the existing facility through the addition of both a parking lot and building expansion.

SUSTAINABILITY FRAMEWORK

ENVISION

- Framework that provides the guidance needed to initiate systemic change in sustainable infrastructure which serves as a decision-making guide during design.

SCORE

53 %
Platinum

ENVISION™

LOW IMPACT DEVELOPMENT

- Focused on managing stormwater runoff and reducing the environmental impact of development on local ecosystems through a set of **eight principals**.

- Conservation Development
- Minimize Soil Compaction
- Minimize Total Disturbance
- Protect Natural Water Flows
- Protect Riparian Buffers
- Protect Sensitive Areas
- Reduce Impervious Surfaces
- Stormwater Disconnection

ENGINEERING SOLUTION: SYSTEM & ELEMENT DESIGN

REQUIRED PERMITS

Demolition
Tree Removal
Site/Construction Infrastructure Inspection
Site Plan/Development Review

***These permits are represented in the total Capital Costs.**

DRAINAGE CALCULATIONS

$$Q = \frac{(P-I_a)^2}{(P-I_a)+S} \quad (1) \qquad I_a = 0.2\,S \quad (2)$$

$$Q = \frac{(P-0.2\,S)^2}{(P+0.8\,S)} \quad (3)$$

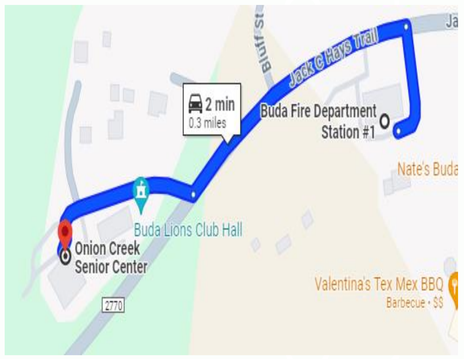
Q = runoff (in)
P = rainfall (in)
S = potential maximum retention after runoff begins
I_a = initial abstratctions

$$S = \frac{1000}{CN} - 10 \quad (4)$$

Flow Type	
Shallow Concentrated (min)	1.84
Sheet (min)	2.43
Channel (min)	9.6
Total (min)	**9.6**

Total runoff generated was calculated using the SCS method on Hydraflow. Rainfall intensity and type were found via NOAA ATLAS 14. The drainage plan was designed to accommodate a 100-year storm per TCEQ standards.

TRAFFIC ANALYSIS



- Bude Fire Station Route

DESIGN

- 53 total parking spaces (includes 11 ADA-compliant)

Type	Width	Length	Accessible Route Width	% Slope in All Directions
Car	8 feet	18 feet	5 feet	2.08%
Van	8 feet	18 feet	8 feet	
Van	11 feet	18 feet	5 feet	

Implementation of City of Buda Parking Action Plan
- LI Region (light industrial)
- Adhere to TDLR and ADA parking specifications
- Buda Fire Station will transport guests to and from site

SUBGRADE CONDITIONS

The foundation design consists of a stiff mat foundation supported by piers at each column point.

- **18-inch** shaft diameter
- **3-feet** pier embedment into shale
- Soil consists of dark brown and brown clay underlain by dark shale of the Eagle Ford Group of the Upper Cretaceous Age.

FOUNDATION CALCULATIONS

$$f_n = \alpha s_u \qquad q_n' = N_c^* s_u$$

$$P_a = \frac{q_n' A_t + \sum f_n A_s}{F}$$

- **Qn** = Toe Bearing Capacity (psf)
- **Fn** = Nominal Side Friction Capacity (psf)
- **Pa** = Downward Load Capacity (kips)

Qn (psf)	18,000
Fn (psf)	2,702
Pn (kips)	84.2