

Bexar Sports Complex

By: Modern Construction Development Corporations

Walelegn Admasu, Sarah-Ruth O'James, John Kight, Christopher Byrd, Tung Tran, Yonpiseth Lik, Carlos Sepulveda

Summary

Our goal is to construct a mixed-use development consisting of multi-purpose fields, a baseball field, and two story gym.

Reasons:

- Sense of community
- Promote healthy lifestyles
- Functional throughout the year
- Versatile, numerous facilities
- Sport growth in San Antonio

Drainage

Our site had 4 drainage areas with a total of 61.25 acres. Listed below are the drainage area's time of concentration (seconds) and flow rate for a 100 year storm (inches/hour).

Drainage Area 1: $T_c = 9.6$; $Q = 8.62$

Drainage Area 2: $T_c = 23.2$ $Q = 17.32$

Drainage Area 3: $T_c = 21.0$ $Q = 86.83$

Drainage Area 4: $T_c = 4.6$ $Q = 84.79$



Utilities

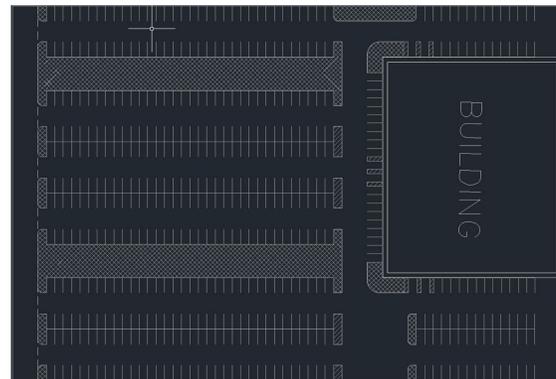
Using the SAWS Guide to Development, we calculated the amount of EDU for our site. Our project will use 50 EDU of water and 32.8 EDU of sewer. Our team propose to use a 4" by 4" meter size with a 4" service line to tap into an existing 12" water main.

We used the International Fire Code and a code from the National Fire Protection Association in order to calculate the fire flow. Our building is considered a A3 Type and we will have a fire flow of 3,250 gpm for a flow duration of 3 hours. Our team will design a 10" fire line with 4 fire hydrants.

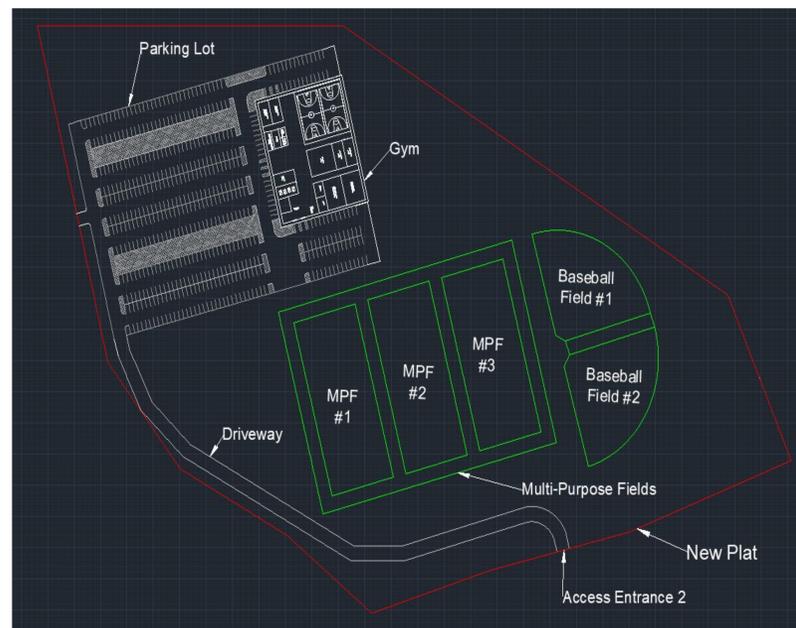
Our team plan to extend a sewer line from a 10" line by boring underneath I-10.

Transportation

Our parking lot is 224,804 sq. ft. consisting of 503 stalls with 10 ADA stalls. The lot will also include 2 areas where we will put vegetation for environmental purposes. The geotechnical recommendation for the pavement design will allow us to consider both flexible and rigid pavement as options. We will have 2 access points to our site, one along 1604 and the other along I-10 WB frontage road. The access point along 1604 will have 90% of our calculated trips and that is the access point that will have direct access to the parking lot, as well as a deceleration lane that will allow vehicles to enter without disrupting adjacent traffic. The access point on I-10 frontage does not need one because the traffic is only 10% of our calculated trips and will consist of a road in the property that leads to the parking lot.

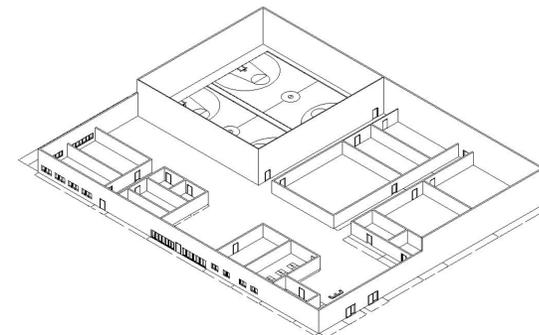


Site Plan



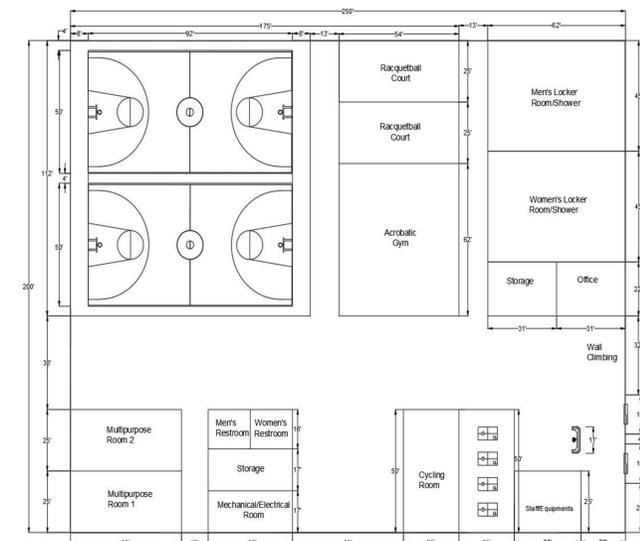
Structural

- Our building is 250 ft by 200 ft and steel will be used for the framework of the building and concrete for the walls.
- A 3" N type metal decking is used to cover the roof. Steel joists spaced at 5 ft support the roof. We decided to use 18LH03 for the steel joists.
- The reactions from the joists acting on the girder were used to calculate the shear and moment diagrams for the girder and determine the type of steel used for the interior and exterior girders. W12x35 is used for the interior girder while W12x22 is for the exterior girder.
- Using the reactions from the girders we were able to get a point load and cross-check the steel manual to find recommended steel shapes for the interior, exterior and corner columns. Local buckling was checked. Because we have two different lengths for the columns (28 ft and 18 ft) and it was determined that for the 28 ft long columns W12x40 will be used for the interior column, W10x33 will be used for both exterior and corner columns; and for all the 18 ft long columns W8x31 will be used.



Geotechnical/Foundation

Our site is sitting on Fat Clay so we have high strength but also have high PVR. In order to reduce that we are moisture conditioning the soil under the building and putting in a layer of select fill on top with a moisture barrier around the exterior beams. We are using a slab on grade foundation with 14 inch wide beams and a 5 inch slab. The depth is 3 feet. Running in the long direction we have 2#7's on bottom and 2#6's on top for moment reinforcement. Running in the short direction we have 2#8's on bottom and 2#6's on top for moment reinforcement. For temperature and shrinkage we have #3's @ 18" O.C. in the slab.



Codes used

- American Institute of Steel Construction; Steel Manual 15th edition
- American Society of Civil Engineers; ASCE 7-16 ACI 318-19
- San Antonio Water Utility Service Regulations (2016)
- San Antonio Water Guide to Development (2020)
- San Antonio Water System Construction Specifications SARA Technical Specification for Utilities Construction (2014)
- International Fire Code (2018)
- International Plumbing Code (2018)
- Unified Development Code (2021)
- International Building Code (2021)
- NFPA Chapter 24