BSGM Inc.

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BSGM Inc.
5500 Wabash Ave.
Terre Haute, Indiana 47803
May 2021

Sugar Creek Baptist Church
1050 S Thorpe Pl,
West Terre Haute, IN 47885

Dear Dr. Tom Savage,

We would like to thank you for the opportunity to work with the church . We have gathered information from surveys along with our ideas and suggestions to come up with our design layouts. Our layout designs show effective ways to draw in many local residents to have a fun place to hang out and enjoy many new activities. This process should also draw enough local attention to persuade more people into attending Sugar Creek Baptist Church. Attached is a detailed report of the extensive research and design plans by BGSM.inc. We have included cost estimates along with the different design layout options. If you have any questions regarding anything within this report, feel free to contact us. Thank you for the experience!

Sincerely,

Braxton Gabbard

Sydney Hardesty

Grayson Lincoln

Mira Randolph

Sugar Creek Baptist Church

Community Development

Prepared for

Sugar Creek Baptist Church
1050 S Thorpe Pl,
West Terre Haute, IN 47885

BSGM.inc
May 2021

Disclaimer

This report was prepared by freshmen civil engineering students of the 2021 Introduction to Design class of Rose-Hulman Institute of Technology. BSGM is a fictitious company created by Braxton Gabbard, Sydney Hardesty, Grayson Lincoln, and Mira Randolph as part of this class project. We are not yet registered engineers thus, any material from this project should be reviewed by a professional engineer for consideration.

Executive Summary

Our client is the Sugar Creek Baptist Church and the main communicant for our project is Dr. Tom Savage. Dr. Savage is the pastor at the church. The problem that Dr. Savage came to us with is that the church owns a three-acre plot of land across from the church building that, as of now, has only a small children's play set on it. What the church wants is for BGSM Inc. to create a design for the plot that would fulfill one important goal: make the land a fun place where not only the congregation, but also the community surrounding it feel free to gather there and be a sort of community center.

This report details all aspects of the project from the initial site visit, to final design plans and cost estimates, and every step in between. Our final design has an open concept so that it can still be used for other purposes like picnics and other events. The main demographic is young teens and children, although there is something to benefit every age group. Outlining the perimeter is a walking path, with a tree-line bordering the side that lies next to a highway. The major elements of the design inside of the plot are the U10 size soccer field, a pickleball court, and a greenhouse.

Also included in this report is an analysis of the projected cost($7,000) with a few available variations.

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1.0 Project Description

1.1 Client

Our client, the Sugar Creek Baptist Church in West Terre Haute, Indiana sought out our assistance for an underdeveloped 3 acre plot of land across the road from the church (Figure 1) that they would like to see turned into a multi purpose space not solely for the congregation but for community use of all ages. Our main contact throughout this process was Dr. Tom Savage, the Pastor of Sugar Creek Baptist Church. On March 22, 2021 Dr. Savage gave us a short tour of the property line along with a detailed description of his vision for the project.

(Figure 1) Parcel bounds (ESRI, 2020)

Highlighted above is the area within the property lines of the plot.

1.2 Problem Description

We were tasked with creating a site that engages the local community around the church. With input from the community, we were to design a space that is usable by all ages and appeals to people outside of the Church congregation.

The plot itself is approximately 3 acres in area with a cut corner to the northwest. The plot slightly slopes downwards from the West to the East and tends to collect water in the center, not necessarily pooling, but creating a muddy area. It is located directly along the highway which creates noise issues and poses a danger to small children. There is already a small developed

parking lot which consists of a covered pavilion and a small playset. There are underground utilities that line the highway and can potentially cause issues when planting a tree line or adding any subsurface lining to the plot.

Many people of the congregation have offered us their ideas and what they would like to see done along with their goals for the site. A problem arises of making ends meet, because the goal is to please the masses. We kept the design on track by choosing what the masses wished to see. All while also maintaining the goal of having an open multifunctional space.

2.0 Design Requirements

2.1 Project Requirements

The main goal for our client, the Sugar Creek Baptist Church, was to create a space to cultivate community and to overall be a place where both those in the congregation of the Sugar Creek Baptist Church and the approximate 2,000 members of the community who live in West Terre Haute, Indiana could come and enjoy the space. This community center will be multipurpose, housing various activities for the public and space for events. Once built this site should be able to comfortably support the 90 to 100 member congregation. Additionally, our design must be fully functional under regular use and not require frequent maintenance.

2.2 Design Constraints

The Sugar Creek Baptist Church is located in West Terre Haute, Indiana. The land that was assigned to be developed has some pre existing infrastructure that had to be considered while creating the design. The site is bordered by two main roads on the Southern and Eastern site bounds also boardaring residencies on the Northern and Westen bounds of the site. Our size constraint is the approximate three acres of property which the church owns. There are also issues with noise pollution which is caused by the main roads which was another factor to be accounted for. The site has an existing gentle slope in land downwards from the west to east borders causing a minor issue with slight water collection creating mud formation. Taking into account the existing underground utilities on site along the Southern border, the treeline that we designed for would need to be recessed at least 5 feet. We were given a monetary constraint of approximately $10,000, and a deadline for our design plan and solution of May 9th, 2021.

2.3 Functional Requirements

There was a given functional requirement of creation of a community space that is multifunctional and appeals to any age group while being able to accommodate at least all the members of the congregation. It is vital that the design is durable and can withstand constant and frequent use for many years while also remaining low maintenance. All while staying within the property boundaries and $10,000 cost restraint, allowing drainage, and not disturbing pre-existing infrastructure or breaking site restrictions or agency regulations.

3.0 Project Approach

3.1 Overall Approach

Firstly to assess our task we scheduled an in person client meeting to get a better understanding of what our client wanted and what the site looked like. Our client, Dr. Tom Savage provided us with a base goal of making a community friendly and inclusive area with his own suggested ideas, otherwise our client was open to many possible options for the site. Post meeting, BSGM Incorporated was able to walk the site for a broader idea of the site parameters, space, and layout allowing for a clearer idea of the possibilities for the site. Without a pressing budget limit, our client was willing to hear our ideas for all possibilities regardless of cost. Our tasks following our initial site visit are shown in figure 6 which can be found in section 3.5.

The first major task for this project was to get input from the congregation on what ideas of ours they wanted to see and any ideas of their own that they had. From this feedback we decided on the elements that we wanted in the design. After that we created a design based off of the elevation changes and appropriate spacing in between the activities. Our last step was to estimate the cost

3.2 Site Investigation

During our first site visit we observed that the layout was not as flat as previously assumed from the aerial images and google earth. Therefore, there are some areas within the site more prone to water collection and light flooding. We were also able to observe the close proximity of the site to the busy highway raising concerns for safety and noise. As such, we suggested sound lining the East border of the parcel, something that our client had already been planning to do via a treeline. We were also informed that the neighbors bordering the site to the West and North East prefer that all members of the residences keep to their property.

(Figures 2 & 3) Site Pavilion (left) and Playset (right).


(Figures 4 & 5) Views from east to southwest (left) and northwest (right).

3.3 Research

Our initial research consisted of us finding the location of our project and seeing the area that we would be working on. While Google Maps gave us a basic idea, we found that our first site visit cleared up some extra questions that were unclear before. After hearing the starting ideas that Dr. Savage had laid out for us, we decided to look deeper into the main goal of bringing the community to a safe fun place to enjoy themselves and hangout. We accomplished this by doing a survey to find what individual people within the Sugar Creek Baptist Church and West Terre Haute community would actually like to see in this area. Although our group, along with Dr. Savage and his facilities team had come up with multiple ideas, we wanted to get feedback to make this the best overall place for the community's sake. Research included desired features, drainage, total cost, and regulations.

3.4 Analysis

To proceed with our design we initially planned to collect site data (property bounds, site elevation, soil data, border offsets, and underground utilities) for a better comprehension of the site possibilities and workability. To have a better idea of what amenities would be best to include in the site design, BSGM Incorporated constructed a survey for the community to better understand what the community themselves would like, and also for a better grasp of who we are designing for. We have since then compiled our design elements between the community survey to project feasibility, and also analyzed the cost. With a limited space and our client hoping for the parcel to be multi purpose we know that we could not make the site too cluttered which sets limitations on some previous ideas and suggestions. Following, we know of two priorities to be completed such as a tree line along the East side of the parcel where the highway is located for protection and noise cancellation with also the possibility of a tree line along the yard of the neighbor. We also needed to look into the possibility of leveling the land or a possible drainage system to keep the parcel (in particular the areas prone to water collection) as dry as possible. We have provided aerial pictures of the site with crafted AutoCAD drawings which have allowed us to create a layout to optimize the full potential of the site for optimum satisfaction.

3.5 Project Timeline

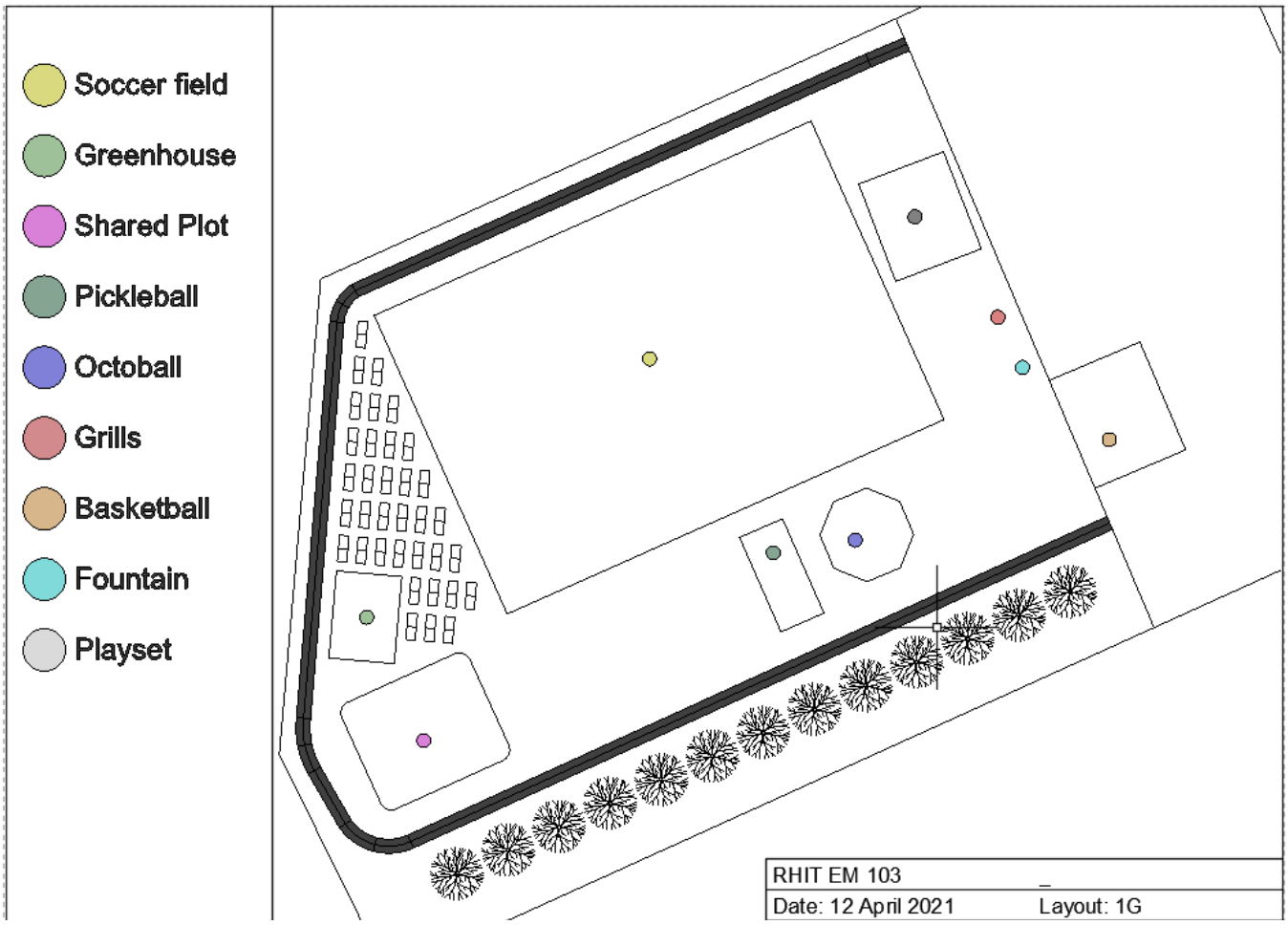
	Week 2 (3/24-3/31)	Week 3 (3/31-4/7)	Week 4 (4/7-4/14)	Week 5 (4/14-4/21)	Week 6 (4/21-4/28)	Week 7 (4/28-5/5)	Week 8 (5/5-5/12)	Week 9 (5/12-5/19)	Week 10 (5/19-5/26)
Bounds									
Elevation									
Soil data									
Underground Utilities									
Border offsets									
Survey									
Cost Analysis									
Assess Feasibility									
Tree line(s)									
Drainage									
Use aerial photo									
Broad outline of elements in plot									
Pathways									
Have multiple layout options									
Discuss options with client									
Write									
Edit									
Finalize									

(Figure 6) Project timeline chart

4.0 Design Options

4.1 Alternatives

Alongside our main design, we iterated multiple variations of the proposed site changes. Figure , captured below, is an original design which offers a variety of activities for members of the community.



(Figure 7) Alternative Layout with Green Space

This option focuses heavily on the Greenhouse and community garden plot aspect of local engagement. This leaves ample room for the sporting and event facilities, and utilizes what would be treated as the back of the site to allow people to grow flowers, food, or other plants, creating a connection to the location through repeated visitation.

(Figure 8) Alternative Simple Design

This design features a more simple design with a larger open area that can be utilized by the community for other activities. This design also includes a different method of placement for the structures.

(Figure 9) Alternative Design, Smaller Field

Our last alternative design also features an open concept apt for housing other events. One main difference with this design is that the soccer field is measured to be for a younger group, geared more towards elementary school kids.

4.2 Alternative Criteria

The design that we used the decision matrix to determine is the border to the highway. The criteria that was weighted most heavily is sound dampening because it is the main reason for the border. There are descriptions of the criteria in table 1, and we have chosen to divide up these criteria into three categories, one being the worst option and three being the best.

(Table 1) Criteria Levels

Category	Level 1	Level 2	Level 3
Cost	$3,000-$4,000	$2,000-$3,000	$1,000-$2,000
Maintenance	Once a year	Once every few years	Once a decade
Aesthetics	Clashes with rest of area	Fits in fairly well but not great	Adds to the appearance of the whole area
Sound Dampening	Has almost no noise impact	Lessens the noise	Highway barely audible

This table allows us to weigh our options by attributing values to qualitative measurements.

4.3 Decision Matrix and Process

The options we chose for the borders can be seen in table 2. There was a clear winner from these options, a tree line. From this decision we next had to decide what kind of tree would be best, what size, and how many.

(Table 2) Option Weights

Borders	Weighting	Hedges	Trees	Mixed wooden Fence & Trees	Wooden Fence	Chain Fence
Cost	0.2	3	2	2	1	3
Maintenance	0.25	1	2	2	2	3
Aesthetics	0.2	2	3	2	3	1
Sound Dampening	0.35	1	3	3	1	1
Total	1.0	1.6	2.55	2	1.65	1.9

Here, we added decimal weights to each category equivalent to their importance, which are then multiplied to the assigned values for each category. This allowed us to sum a value for the total suitability of a specific choice.

5.0 Design Summary

5.1 Problem Description

We were tasked with designing a community space for Sugar Creek Baptist Church. Our job was to design a plan to turn a three acre plot of land into a space that would draw in members of the community and serve as a gathering place for both the community and the congregation. With the goal of creating a fun, family friendly space, our design has to be accessible to everyone for individual activities, group events, and everything in between.

Legend:

1. Pickleball court
2. Octoball Court (x2)
3. Swing set
4. Drinking fountain
5. Grill (x3)
6. Basketball hoop
7. Soccer field
8. Tree line
9. Greenhouse

(Figure 10) Aerial image of proposed design layout (ESRI, 2020)

5.2 Boundaries

5.2.1 Sound Dampening

The nearby highway along the southern border causes a noise issue and poses a safety risk for small children. To separate the plot from the highway within regulation, we recommend a line of short, full-fill evergreens along the boundary. The nearly 360 foot long border would require approximately 40 saplings to be planted and allowed to grow over two years to become viable. There is also an underground utility line along the edge of the plot, so the trees would need to be recessed up the swail by a few feet.

5.2.2 Surrounding Infrastructure

To the North and West of the plot are two residences which would need to be fenced off for privacy on both sides.

5.3 Activities

5.3.1 Soccer Field

We planned to implement a quarter scale soccer field to the north of the plot that can also serve as a multipurpose space during events. To reduce the amount of soccer balls being kicked over the plot and boundaries, we recommend a set of small, flexible poles holding up light plastic netting around the field. These poles can be quickly set up or taken down by pushing them into the ground around the field.

5.3.2 Basketball Court

The south section of the parking lot can be set aside as a basketball court with a permanent net. If more parking space is required, the court will still contain parking spaces and can be the last place for cars to park.

5.3.3 Pickleball/Octoball

The North end of the 3 acre property will include a pickleball and octoball area. These are two main activities that the congregation would like to have implemented and will need to be done separately from the soccer field as they use more than just an open field of grass to be played.

5.3.4 Playground Expansion

The existing playground structure is acceptable as is, but we recommend the addition of a new swing set next to it. New mulch should also be added to the existing area.

5.3.5 Grills and Fountain

We plan to include 3 charcoal standing grills and an outdoor water fountain near the pavilion.

5.3.6 Walking Trail

The walking trail will be the number one advancement to the plot and will border the 3 acre property. People from the congregation, no matter the age, will be able to make use of this improvement by running, walking, skateboarding, biking, or many other activities.

5.3.7 Greenhouse

A greenhouse may be implemented at the north east side of the plot bordering the parking lot and start of the walking trail. While the congregation hosts people of various ages, this will be great for sightseeing and people who would rather not be doing physical activities on the rest of the plot.

6.0 Cost Analysis

6.1 Bordering

In order to create both the sound barrier along the southern border and the separating fence between the plot and the neighbors requires a set of tree emplacements and two solid wooden fence sections.

The fence can be estimated at approximately $2200. The trees depend on the type, how long they are allowed to grow, and how dense the cover must be. We would recommend 25 seven foot evergreens spaced 6 feet apart. Along with transport and installation costs, this would come to $2810 (Gordian, 2020).

6.2 Walking Trail and pickleball court paving

A local company is in contact for asphalt paving services. A quote from them is required to ascertain the cost of such paving. Both the track and the pickleball court baselayer can be paved in this manner. Afterwards, a $100 bucket of Surface Coat would seal the court.

6.3 Soccer Field and Basketball Court

Two $70 small soccer goals and two or three $20 cans of spray line paint can create a workable soccer field. We would recommend that light mesh netting be erected around the field with fiberglass polls hammered into the ground for support at a total additional cost of around $300. A static basketball hoop can be placed for another $300.

6.4 Further items.

The grills can be purchased for $130 each, a simple drinking fountain attachment can be made accessible for $120, but a full-standing concrete or steel fountain can range up to beyond $2000. A prefabricated octoball court, or a plywood frame would both come to about $700. Finally, the optional greenhouse can be purchased for $1500 for an 8x10'.

6.5 Total

The total estimated cost before the fountain or paving, and without a greenhouse comes to just shy of $7000. When including a very rough estimate for the paving, and a modest fountain, $9000 is within the ballpark. Should a greenhouse or garden plots be included, another 1500 to 3000 might be added. This project is variable on both the final product selections and on local labor cost. We believe that a $10000 budget can easily accomplish what is expected of the site and while most individual products are best purchased from large sources, fencing, paving, and trees (the largest parts of the budget) may be found at reduced cost from local businesses willing to help.

7.0 Appendices

7.1 References

Environmental Systems Research Institute (ESRI). (2020). ArcMap [Computer Software], Redlands, California.

Gordian, S. (2020). *RSMeans Data*. Gordian. https://www.rsmeansonline.com/ManageEstimate/LineItemSearch/1728299.