MSW Association Site Plan

PeAC Designs
Site Planning Consultants

Fall Report

BAE 4012 – Senior Design
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December 8, 2005
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Introduction

The Muscogee-Seminole-Wichita (MSW) Baptist Association is a fellowship of Native American Baptist Churches from 11 Oklahoma counties. Founded in 1851, it was the first Association organized in Indian Territory. In October of 1956, the Association purchased 40 acres adjacent to the Yardeka Baptist Church grounds nine miles southeast of Henryetta, Oklahoma. They bought the land in McIntosh County for twenty dollars per acre and began constructing the Assembly Grounds in 1961. The Association holds several meetings at the Assembly Grounds throughout the year with the majority of activity during the summer months due to the week-long youth camp, adult church leadership camp, and Baptist Assembly.

Ralph Hight, the Chief of Engineering and Construction at the Tulsa District of the United States Army Corps of Engineers (USACE), hired PeAC Designs on behalf of the MSW Association in September 2005. The task presented to PeAC Designs is to create an improved site plan for the MSW Tribal Association Assembly Grounds. The site plan needs to improve safety, provide for potential growth, and maintain functionality while keeping within economic constraints of the Association. All plans must include water and power distribution as well as wastewater collection and treatment.
Statement of Work

Site Description

The legal land description of the MSW Assembly Grounds is SW ¼ SE ¼ Sec. 3 R13E T10N I.M. The property is bordered on all sides by private property owners. As shown in figure 1 there is a county road along the north edge of the property and a private road borders the eastern boundary.

The grade of the site is fairly level on the north half with a relatively steep, rocky downhill slope on the south half. The property elevation drops roughly 60 feet on the eastern edge and 30 feet on the western boundary, yielding an average downhill slope of 6 percent. This slope change roughly bisects the property with a vegetation change from grasses to trees occurring here, as well.

Information about the soils on the property was obtained from Soil Survey of McIntosh County Oklahoma (USDA-SCS, 1981). Soils on the site vary from the north to the south boundaries. The soil on most of the north half is a Linker fine sandy loam. In the middle portion of the property, the soils change to a Linker-Hector complex. Soil on the steep, south half of the property is made up mostly of an Enders-Hector association.

Figure 1. Topographic map with MSW property identified in red circle.
**Structural Layout**

PeAC Designs generated a layout of current structures on the MSW property using ArcView 3.2 (fig. 2). The layout was created referencing differential surveys provided by Marjorie Courtright of the USACE Tulsa District, and aerial photography downloaded from the United States Geological Survey (USGS) Seamless Data Distribution System.

![Figure 2. Current structural layout with all facilities highlighted.](image)
Common Use Facilities

All common use buildings are located on the north half of the property. These buildings are identified in red in the general structural layout (fig. 2). As shown in figure 3, the common use buildings include:

1. Women’s ministries building
2. Two-story Dormitory
3. Concession Stand
4. Cafeteria
5. Shower and Restroom Facilities
6. Nursery Buildings
7. Chapel

Figure 3. Common use facilities layout.
Private Use Facilities

The blue buildings in the general structural layout (fig. 2) represent small private church cabins and storage buildings. As shown in figure 4, numerous private church cabins skirt the eastern boundary of the north half of the property and bisect the Assembly Grounds from east to west along the slope change. A cluster of private cabins and storage buildings are also located on the northwest quarter of the property.

Figure 4. Private use facilities layout.
Open Air Facilities

The green objects in the general structural layout (fig. 2) represent open air facilities. All of these facilities are situated on the north half of the property and most are located where there is very little slope. As shown in figure 5, the open air facilities include:

1. Prayer Garden
2. Nursery Playground
3. Double-sided Carport
4. Open Pavilions
5. Basketball Court

![Figure 5. Open air facilities layout.](image-url)
**Existing Utilities**

PeAC designs gathered the information necessary to create current utility layouts from three sources: the differential survey provided by Marjorie Courtright, a water distribution and sewer collection layout provided by the MSW Association Planning Committee, and two site visits.

**Electrical Distribution**

PSO provides electrical power to the MSW Assembly Grounds at single phase. The nearest two-phase line is at the cross section of 1138 and Salem County Roads. A general illustration of the current power distribution on the property is shown in figure 6. The power lines are shown in red and the twelve power transformers located throughout the site are identified as pink dots. All other power poles on the property are marked as light blue dots. Many of the small cabins obtain power by splicing into the power lines and stringing wires around poles and trees. Several of these wires hang dangerously low to the ground.

![Figure 6. Electrical distribution with power poles, transformers, and power lines.](image-url)
**Water Distribution**

McIntosh County Rural Water District #13 serves the facility. Two water meters are located on the north boundary of the property and are identified in figure 7 as red stars. A 3 inch line feeds the meter on the northwest corner and from there a 2 inch line runs east along the north edge of the site, connecting to the second meter. This 2 inch line is identified in black in figure 7. The remaining water distribution on the property is through 1 ½ inch lines and are identified in figure 7 as dashed red lines.

*Figure 7. Water distribution layout.*
Sewer Collection

A layout of the sewer collection system can be seen in figure 8. Two 6 inch pipes serve as the main wastewater collection lines on the Assembly Grounds and are shown as green lines in figure 8. One of these lines runs southwest from the eastern edge of the property beginning at the slope change. This pipeline is fed by 4 inch collection lines from the private cabins on the eastern half of the property. The 4 inch lines are shown in orange in figure 8. The second 6 inch sewer line collects from 4 inch lines that serve all of the large buildings, as well as the cabins on the western side. This 6 inch line begins just south of the western cabins and runs due south to the wastewater lagoon on the southwest corner of the property.
**Site Expectations**

PeAC Designs met twice with members of the MSW Association in order to determine their expectations for future growth on the Assembly Grounds. Both Linda Minter, current Director of the MSW Association and A.J. Tiger, member of the MSW Association Planning Committee, have played critical roles in providing PeAC Designs with insight to the wants and needs of their organization.

The MSW Association would like to see utilities improvements on their property as well as modifications to allow for growth. Currently, the dormitory houses between 100 and 150 youth in a single two-story building during the annual summer camp. The Association would like to accommodate upwards of 300 people in two gender specific dormitory facilities in the future.

Due to an insufficient water distribution system, there is unequal water pressure across the site. One cause of this problem may be a leaking water line which serves the cabins along the eastern edge of the Assembly Grounds. This issue will need to be addressed before the site can sustain a population increase. A study must be performed to ensure the current size of the wastewater lagoon is large enough to handle a population increase. For safety purposes, an underground power distribution network would be ideal. However, if underground power is cost prohibitive, a safely designed above ground network will be acceptable. More outdoor lighting is also needed within the distribution system.

Other modifications the MSW Association would like on the property include the addition of a small motel-style building to provide office space and sleeping quarters for traveling ministers and the creation of a designated camping area with RV pad sites. Other potential improvements to the site are a larger centralized prayer garden and a hiking trail.
Literature Review

In order to provide the MSW Association with an appropriate and complete site plan, PeAC Designs first performed a comprehensive literature review. The literature review included general layout planning and design, as well as specific recreational design considerations. This research served as a basis for PeAC Designs’ education in planning theory.

Layout Planning

When considering the general idea of “site planning” it is necessary to think about the plan in its most basic terms. What type of layout will work best on this site? What shape or pattern is most convenient? According to Lynch and Hack (1984), there are several commonly used design methods, including modular division and division by aspect.

Modular division refers to dividing a site into distinct areas. This type of site development is seen throughout suburban America; a tract of land is separated into discrete regions that, if necessary, can be divided multiple times. This kind of division led to a popular Western U.S. layout, the grid. According to Campbell and Fainstain (1996), the grid has been used in modern times as a plan that neutralizes the environment.

Modular design can be a convenient planning method if the program, or site needs, are inclined to this sort of repetitive function. It is possible to integrate this style of spatial division with a little creativity to generate a plan that is not completely modular. The units can be created in different sizes and for different functions, leading to a less monotonous pattern.

Division by aspect is a method whereby the planner may regard the basic elements of site design separately (Lynch and Hack, 1984). First, the activities of the site must be considered. The needs of the site may be met by a formal pattern, such as ring, peak, star, etc. noted in figure 9 (Lynch and Hack, 1984).
If the designer chooses this route, they must determine whether the pattern is applicable to the piece of land in terms of topography and hydrography.

The next piece considered in layout planning is circulation of the site. Circulation refers to roads as well as foot paths, and is often determined by the presence of passes, ridge and valley systems, or existing routes through the property. Various road arrangements may be tested, including general patterns such as “grid, linear, or concentric schemes” (Lynch and Hack, 1984).

**Recreational Design Considerations**

Hultsman et al., (1998) counsels recreational designers to consider the many problems they must address during projects. The authors start with their most fundamental point: water flows downhill. Water caused erosion can have significant impacts on the environment. The text warns that rapid erosion frequently occurs under rooftops due to rainfall drainage and that the best way to protect these areas is with crushed stone.

Hultsman et al. (1998) also identified the importance of knowing the types of soil present at the site. This information can be found through the NRCS. According to the authors, vegetation is another vital aspect in crafting outdoor use areas. Cover planting is essential in the prevention of soil erosion and while shading is crucial for outside environments, the planner should not be afraid of cutting down trees.

The next major portion of this publication concentrated on campsite development. The book discusses how universal type campsites are best because they align the tent pad, garbage can, and fire pit all on the passenger side of the site. The campsites are considered universal because there are no limits to wheel chair-bound or disabled campers since the entire site is level. This type of site also reduces maintenance costs by decreasing site deterioration.

**The Design Process**

When designing changes to any type of park or recreational area, it is important to follow a detailed plan. Kelsey and Gray (1985) provide useful information for the detailed steps necessary to create functional, attractive recreational facilities. This reference details how to set forth objectives identified by the sponsoring agency. There should be resource goals to ensure effective and conservative use of land and water sites, as well as participant goals to ensure safety, equal opportunity, and limited costs to those utilizing the facilities.
Kelsey and Gray (1985) go on to discuss the necessity of preparing a supply analysis of the site to identify existing assets of the sponsoring agency, which range from buildings and scheduled events to natural resources. Next, the authors demonstrate the need to make population and demand analyses. They state that the planning of recreational areas “does not occur in a vacuum and the population served is most critical”. The demand analysis consists of polling the community to determine its desires.

Once the data collection process is completed, Kelsey and Gray (1985) suggest performing an expenditure analysis to achieve a financial cost estimate of each component of the plan, as well as creating a priority criterion ranking system to determine the specific importance of each recommendation.
Structural Layout Designs

After studying existing literature and considering the requests of the MSW Association, PeAC Designs is presenting two basic structural layouts for consideration.

**Plan A**

The first design employs the “star” planning pattern while still minding the rocky, sloping terrain of the south half of the property. Figure 10 shows the general structural layout for this design. To start, the main entrance of the Assembly Grounds is moved from the western edge of the property to the middle. The west entrance is designated for campers only and leads to an RV circle and a smaller loop with tent pad sites. The eastern most road is used to access the private church cabins. This road also loops through the center of the property.

Changing the structural arrangement of the Assembly Grounds positions the cafeteria, chapel, dormitory, and women’s ministry building to the center of the property. The small motel-style building requested by the MSW Association is added to the center structures for office space and traveling ministers’ sleeping quarters. In order to accommodate more youths for the summer camps, the dormitory structure is modified to two buildings with a breezeway in between. All private church cabins, depicted in blue in figure 10, are arranged in an L-shaped pattern along the east side of the property.

All open air facilities, except the basketball court, are relocated in this new design. The nursery buildings and their associated playground are moved to just west of the centralized women’s ministry building. The prayer garden is shifted to a more private location, southwest of its current position. A second, smaller prayer garden is added in the southeast corner of the property. In addition, a hiking trail is created on the southern half of the site. The trail consists of two separate loops that weave throughout the rocky, shaded terrain. One of the loops passes around the smaller prayer garden. The overall configuration of this design maintains the open fields on the north half of the property for youth sports activities. The facilities, as shown in figure 10, include:

1. Dormitories
2. Cafeteria
3. Office Building
4. Women’s Ministry Building
5. Chapel
6. Restroom/Shower Facilities
7. Basketball Court
8. Nursery Buildings and Playground
9. Open Pavilions
10. Main Prayer Garden
11. Small Prayer Garden

Figure 10. Plan A: Star pattern site plan.
**Plan B**

A second site plan created by PeAC Designs utilizes many aspects of the current structural layout on the Assembly Grounds. This plan makes use of all large permanent structures and a majority of the private church cabins currently on the site. As in Plan A, an additional dormitory building is included as well as the motel-style building for offices and sleeping quarters. The new dormitory is located adjacent to the existing one, with a breezeway in between and the new office building is situated just north of the cafeteria. Two restroom/shower facilities are added; one on each edge of the property.

As requested, designated RV and tent camping areas are created on the western edge of the property. The main prayer garden and hiking trail are developed in the same locations as Plan A. As shown in figure 11, the additional buildings include:

1. Dormitory
2. Office Building
3. Restroom/Shower Facilities
Figure 11. Plan B: Utilize current structural layout.
Feasibility of Designs

**Plan A**

This plan’s purpose is to centralize common use facilities and employ the topography for outdoor recreation. The feasible developments of this plan include using the shaded area on the western edge of the property for RV and tent camping facilities. The gentle grade on this portion of the property is conducive to the minor leveling needed for RV and tent pad sites. The addition of hiking trails and prayer gardens make use of the undeveloped south half. These amenities can be implemented with minimal construction efforts.

Many of the structural changes necessary for this design make it difficult to implement. In order to execute the “star” planning pattern, the cafeteria, dormitory, women’s ministry building, nursery, and both sets of restrooms must be demolished and reconstructed in the center of the property. To adjust for the relocation of these buildings, new trenches must be excavated for water and sewer line connections. Although the Linker-Hector soil complex in this area is adequate for constructing buildings, the shallow soil depth to bedrock makes excavation extremely difficult and cost prohibitive. PeAC Designs believes utilizing as many existing utility trenches as possible will be the most cost effective solution.

Due to the Enders-Hector soil association on the south half of the property, PeAC Designs does not believe it is feasible to develop this area for anything other than recreational purposes. The shallow depth to bedrock, moderate to steep slope, and shrink-swell tendencies of the soil make excavation and construction impractical.

**Plan B**

The purpose of this plan is to maintain as much of the current structural layout as possible in order to limit the construction and excavation costs. This plan utilizes all feasible additions discussed in Plan A, which include designated camping areas, hiking trails, a larger prayer garden, and two new restroom facilities.

The main difference between the suggested site plans is that Plan B takes advantage of the current structural layout on the property. All large permanent structures are retained as well as most of the private church cabins. Maintaining the current structural layout allows utilization of the existing utility trenches which makes this plan more cost effective than Plan A.
Final Design Recommendation

After researching layout planning and theory and considering the physical properties of the MSW Association Assembly Grounds, PeAC Designs recommends the implementation of Plan B. Although this plan does not centralize the common use buildings, it is the most cost effective of the two options because it does not entail the extreme excavation and construction associated with Plan A. Plan B does allow for construction of the requested dormitory expansion, the office building with sleeping quarters, and the supplemental restroom facilities but it locates them near existing utility trenches, therefore requiring minimal excavation.

PeAC Designs suggests a realistic location for the requested camping facilities and hiking trails. This plan also moves the redesigned prayer garden to a more appropriate secluded location. Developing the southern and western portions of the property for outdoor activities makes best use of the soil and topographic limitations of the area.

Project Schedule

A Gantt chart for the fall and spring semesters can be found in Appendix A. This schedule details the remaining tasks associated with creating the completed final design.
References


Appendix A