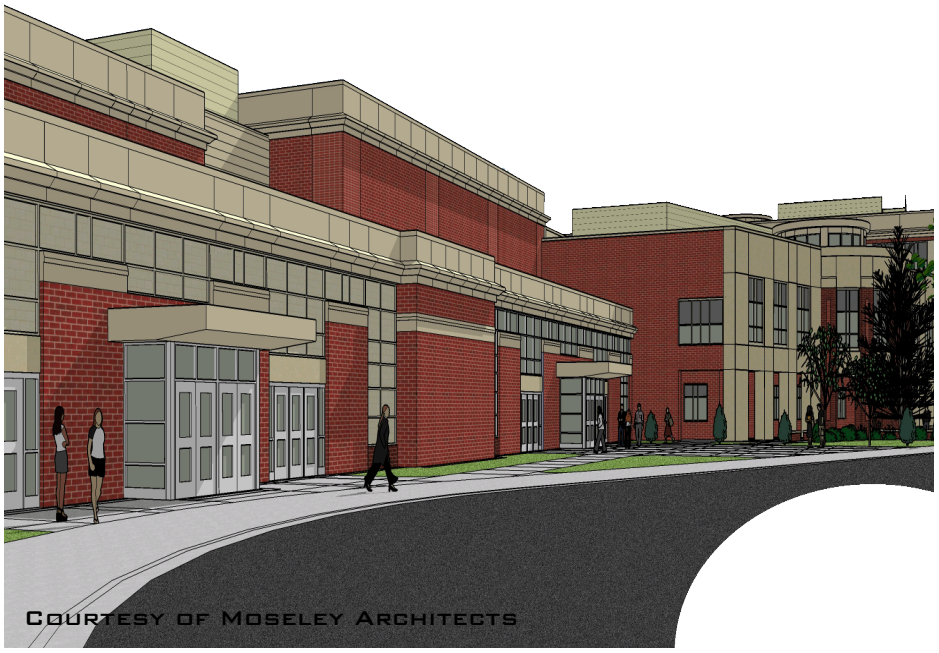
Proposal



Courtesy of Moseley Architects

Diab Shetayh

Construction Option

Paint Branch High School

Burtonsville, Maryland

Dr. Riley

12/10/10

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Executive Summary

This proposal is intended to discuss the four analyses that will be conducted for the final thesis report on the Paint Branch High School project. The four topics will include studies in Critical Issues Research, Constructability, Value Engineering, and Schedule Reduction. Along with the four analyses, two breadth analyses will be conducted in areas of structural and mechanical research.

Technical Analysis #1: Site Congestion

The proposed site is currently being shared by the existing outdated facility, the new facility and an existing parking lot. Currently, there are several trades such as steel erectors, masons, MEP subcontractors, and site workers. The sequencing and building systems used on the project have shown to cause a congested site between trades. This analysis will aim to minimize site congestion by an alternative sequence plan and building systems.

Technical Analysis #2: LEED Certification

The new Paint Branch High School is said to be the latest state of the art facility for Montgomery County Public Schools (MCPS). The facility is currently pursuing a LEED Gold Certification. However it is believed with further consideration and research, the new facility has the potential to attain a LEED Platinum Certification. This analysis will research alternative systems in order to attain a LEED Platinum Certification.

Technical Analysis #3: Brick Façade

The new facility will consume a mass amount of face brick for its façade. With a 350,000 square foot facility, there will be a lot of manpower and time required to manually lay the face brick. This analysis will look into an alternative system such as a prefabricated brick panel system in order to eliminate site congestion and reduce manpower and schedule. This analysis will also be the core of the two breadth analyses of mechanical and structural research.

Technical Analysis #4: BIM Coordination

Early in the design phase of the project, there was a lack of communication between the Architect and MEP designers. This caused a creation of the BIM model currently used on the project. This analysis will look into the cost benefits of a BIM model along with the time a BIM model can potentially save on the overall project.

Project Summary

Figure 1 – New Facility Render

Paint Branch High School was originally constructed in 1969 and added a classroom addition in 1986. Currently, the existing facility is approximately 260,680 square feet and has a capacity of 1,800 students. The existing outdated facility is to be demolished upon completion of the new 344,000 square foot facility. The new state of the art facility will house nearly 2,400 students on a 45 acre campus. The new $81,000,000 facility will be LEED Gold certified and will be the latest state of the art facility for Montgomery County Public Schools (MCPS).

The new Paint Branch Facility will be located southwest of the existing facility. The new facility will have a façade that will primarily consist of face brick and architectural pre-cast concrete panels. Included in the new facility will be a state of the art auditorium seating 900 occupants, 12 science labs, and a greenhouse. The classrooms will serve a learning environment for culinary arts, finance, pharmacy, and media. The facility will also include classroom spaces for high-tech simulation, technology, engineering research and design, food sciences and JROTC. Paint Branch will also include outdoor soccer fields, tennis courts, basketball courts, softball and baseball fields, and a new football stadium.

One of the largest challenges associated with this project is that the proposed site is shared between the new facility and the existing facility. Although, the new facility is located southwest of the existing facility, having active construction near an occupied facility raises safety concerns. The existing parking lot stands between the new facility and occupied existing facility as shown in *Figure 2*. A portion of the parking lot is being used by the construction team for parking and lay down areas. The remainder of the parking lot is being used by students and faculty for vehicular parking. Safety is a huge concern for both the owner and project team on site. To increase safety around the active

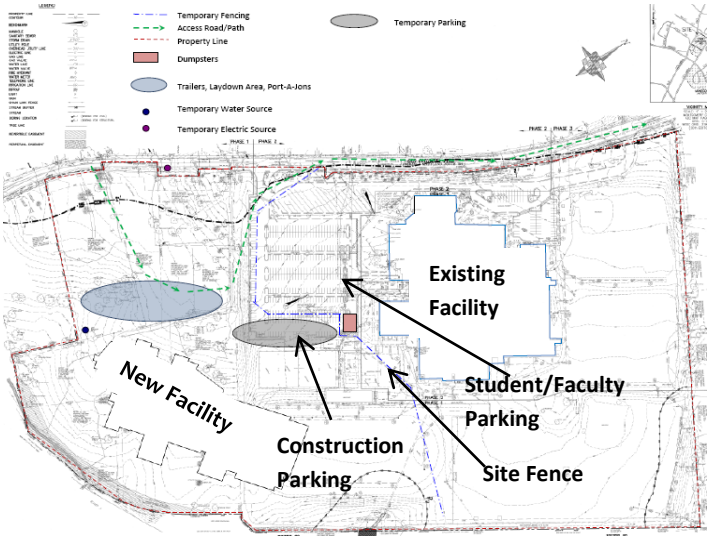


Figure 2 – Paint Branch Site Plan

construction sites, site fences and signs have been placed between the active site and parking lot to restrain students and faculty from crossing into the active construction site.

Construction of the new facility began on December 15, 2009 with initial site work and layouts for sediment and erosion control as part of phase one. The overall project has a total of three phases. Figure 3 shows the areas for their respected phases. The following dates have been set as turnover milestones by HESS Construction + Engineering Services .

Phase 1 completion Date: March 30, 2012

Phase 2 Completion Date: June 12, 2012

Phase 3 Completion Date: August 15, 2013

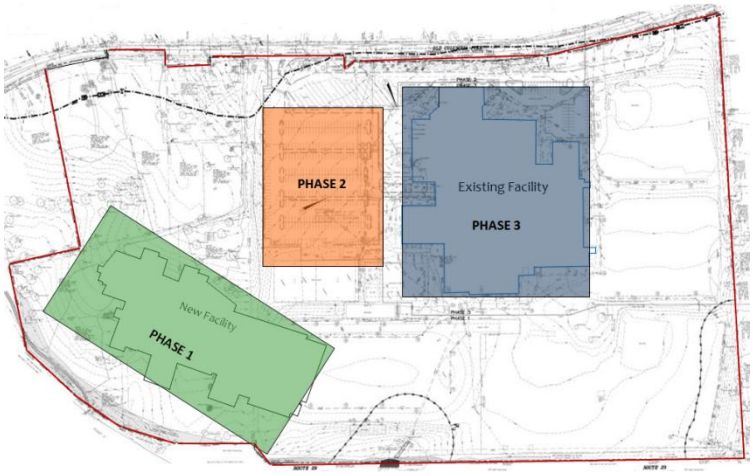


Figure 3 – Phase Diagram

Phase one will include preparing the existing site and construction of the new facility. Phase two will consist of reconfiguring the parking lot for the student/staff parking, and bus route. Finally, phase three will deal with the abatement and hazmat of the outdated facility and completion of the overall site.

Technical Analysis #1: Site Congestion

Problem Identification

Site congestion is a great concern to the project team. This has a potential to affect several trades on site including steel erectors, masons, and MEP contractors. A congested site has the potential to directly affect the steel erectors and masons. The masons require a substantial amount of room for material and scaffolding. Since steel erection is affected by the masonry shear walls, and steel erection is a critical path, the project has a potential to fall behind in schedule.

Research Goal

The goal of this analysis is to investigate different trade durations for their respected activities. Also, I will look for alternative methods of construction for certain activities that may reduce material storage on site, resulting in a decrease of site congestion.

Methodology

- Analyze the project schedule for each trade's duration of construction activity during a phase of the project.
- Consult with HESS project team about alternative sequence methods in order to reduce congestion.
- Consider prefabrication in areas of construction that may be applicable.
- Draw conclusions from collected data.
- Develop a conclusion with a proposed idea comparing the original schedule and sequencing with my findings.

Resources

- HESS Project Team
- Industry Professionals
- Similar project types

Expectations

Understanding the thought behind planning the sequence of a project will allow me to apply that knowledge in the work field. Also understanding alternative methods of construction such as prefabrication will me to understand how that may affect a schedule. Along with understanding an affect in schedule I will also understand the impact of cost to a project due to prefabrication.

Technical Analysis #2: LEED Certification

Problem Identification

Building sustainable buildings has been of great importance to MCPS. They have been constructing LEED certified educational facilities since 2004. Currently, Paint Branch High School is striving to achieve a LEED Gold Certification upon completion. However, it is believed that the building has not been designed to its full potential for LEED Certification.

Research Goal

The goal of this analysis is to investigate alternative systems within the building that may improve the overall efficiency of the building. It is also to analyze the impact of cost to the overall project. Finally, I will analyze the relationship between green buildings and a healthy learning environment.

Methodology

- Analyze the current systems being used on the project and reasons for being implemented.
- Compare similar educational facilities and their systems.
- Research alternative systems which may improve buildings efficiency.
- Determine how alternative systems impact overall cost of the building.
- Research relationship between green buildings and healthy learning environments.
- Draw conclusions on impact of schedule, cost, and learning environment.

Resources

- Industry Professionals
- AE Faculty
- HESS Project Team
- Applicable Literature

Expectations

After conducting extensive research on alternative systems throughout the building, it will be believed that the project will be able to attain a LEED Platinum Certification. Although, the upfront cost will increase, the projected savings throughout the life cycle of the building will be greater. It will also be believed to benefit the students learning environment through a more sustainable building.

Technical Analysis #3: Brick Façade

Problem Identification

The Paint Branch project utilizes a great deal of face brick for its façade. As noted in the previous section, this can cause a significant affect in the project schedule. The face bricks are to be laid by masons and will take a great deal of time to complete with a 350,000 square foot building. This also will require a great deal of man power as well as man hours to complete, and can potentially affect the overall quality. However, with the use of prefabricated masonry panels, a great deal of time, money, and productivity can be saved.

Research Goal

The goal of this analysis is to perform a design of a prefabricated brick panel system and investigate the impacts on schedule, cost, and site congestion.

Methodology

- Research prefabricated masonry panels and select an applicable manufacturer.
- Contact manufacturer for design consultation.
- Analyze the impact of the prefabricated brick panels to the existing structure.
- Assess impact on LEED Certification requirements.
- Determine means of transportation, erection, and installation requirements for prefabricated panels.
- Analyze impact on cost, schedule, and constructability due to prefabricated panels.

Resources

- Industry Professionals
- Prefabricated Brick Panel Manufacturer
- AE Faculty
- Moseley Architects
- HESS Construction Team
- Applicable Literature
- Structural System Software

Expectations

After completing this research it will be believed that the prefabricated brick panels will cause a reduction in project schedule while causing an increase in project coast. It is also believed the prefabricated panels will eliminate site congestion, and increase safety.

Technical Analysis #4: BIM Coordination

Problem identification

Originally, there was no use of a BIM model on the Paint Branch project. It was not until there was a lack of communication and coordination between the Architect and Engineers when designing the new educational facility. The lack of communication and coordination led to the use of a BIM model a few months prior to breaking ground. After the BIM model was in use, several issues arose and resulted in having to creatively reroute the MEP work to avoid changes in the structural design and ceiling heights.

Research Goals

The goal of this analysis is to assess the amount of time and money that could have been saved through the use of a BIM model at earlier stages of the project.

Methodology

- Investigate the reason for not using BIM at the beginning of the design phase.
- Investigate how much time and cost is required to construct a BIM model.
- Analyze the potential time a BIM model will save during construction and relate to cost of the project.
- Compare costs of similar projects that have used BIM to projects that have not and assess differences in construction and time.

Resources

- BIM Coordination Meeting Minutes
- MEP & Structural Models
- AE 473: Building Construction Management
- Autodesk Revit & Autodesk Navisworks

Expectations

Through the conduction of this research, it will be believed that a substantial amount of time and money would have been saved if a BIM model would have been utilized at an earlier phase of the project. This information will be beneficial to Owners and Project Teams in the future.

Analysis Weight Matrix

The following weight matrix shown below in Table 1 shows how each analysis accounts for the four main areas of investigation. The percentages represent the expected time and effort that will be needed to accomplish the required research.

Analysis Description	Research	Value Engineering	Constructability Review	Schedule Impact	Total
Site Congestion	10%	---	---	10%	20%
LEED Certification	10%	10%	---	10%	30%
Brick Façade	---	---	20%	10%	30%
BIM Coordination	10%	---	---	10%	20%
Total	30%	10%	20%	40%	100%

Table 1 – Analysis Weight Matrix

Timetable

A timetable has been constructed and can be located in Appendix B. This timetable was constructed to stay on track with set goals to complete research work throughout the semester.

APPENDIX A

Breadth Topics

Breadth Topics

Structural Breadth: Contributes to Technical Analysis #3

As discussed in the previous section, the façade for the Paint Branch project is primarily face brick with architectural pre-cast concrete. Since the facility is approximately 350,000 square feet, it would take an immense amount of time and manpower to manually lay face brick. The proposed idea is to substitute face brick with prefabricated brick panels as discussed in Technical Analysis #3. This analysis will include an in depth look at the effect on the existing structure and how the prefabricated panels may cause in increase in member sizes for the structural steel system.

Mechanical Breadth: Contributes to Technical Analysis #3

As discussed in the previous section, changing the masonry system form manually laid face brick to a prefabricated brick panel system will affect the heat transfer through the building. Prefabricated panels tend to be much more water tight systems, therefore this will cause a change in the R-value of the wall type. This analysis will compare the difference in R-values between the prefabricated brick panels and the manually laid brick system.

Appendix B

Timescale

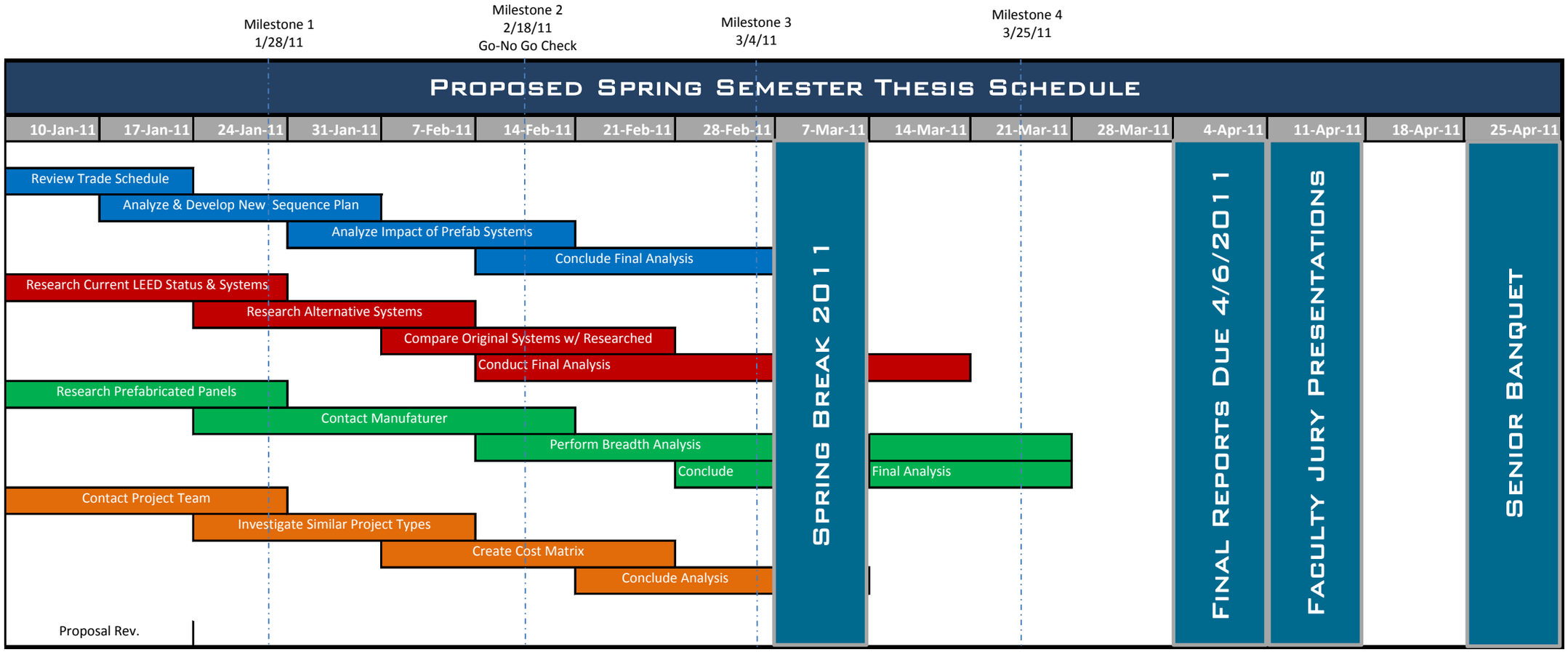
Paint Branch High School - Burtonsville, MD

Senior thesis Proposal 12/10/2010

Dr. David Riley

Diab Shetayh

Construction Management



Legend		
	Analysis 1	Site Congestion
	Analysis 2	LEED Certification
	Analysis 3	Brick Façade
	Analysis 4	BIM Coordination

Milestones	
1	All Analysis Search Complete
2	Analysis 1&2 begin final analysis
3	All Analysis in Evaluation Stages
4	All Analysis Complete