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PROPOSED

LAFAYETTE COLLEGE

CEERC

Civil & Environmental Engineering Research Center

-

Report 2

Permitting and Construction Management

Site
Former Hummel Lumber Supply at 900 Bushkill Drive

City of Easton, Northampton County, Pennsylvania

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Permitting and Construction Management Table of Contents

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SECTION I: SCOPE OF WORK

Over the course of the semester, we looked into different pre-construction activities that include identifying and filling out necessary permits, calculating costs for different aspects of the project, and creating a Gantt Chart for the construction sequence. In total, we identified seven different permits that would need to be submitted for a project of this nature. Each of the activities in the Gantt Chart were added as the site design evolved. We determined a feasible construction sequence from previous experience and by also discussing it with Professor Dooley. For the cost estimation, we utilized the 2012 RSMeans Building Construction Cost Data book. Based on known square footages of the structures or pavement, we were able to calculate costs with the data provided by the book.

SECTION II: PERMIT APPLICATIONS

II.1 SALDO Applications

II.1.1 City of Easton Planning Review

As part of the permitting process, we would need to submit a SALDO application to the Bureau of Planning for the City of Easton. The Planning Bureau is responsible for continuing the development of Easton which includes regulating zoning and codes for the city. The following plans must be submitted as part of the permit according to Chapter 520 of the Subdivision and Development- Subdivision Regulations:

- Brief description of proposed project
- Land suitability report (§520-36(E))
- Impact analysis report (§520-36(D))
- Soil erosion and sedimentation control plan (§520-40(E))
- Approved copies of all required Commonwealth permits including completed sets of documents, plans, and forms submitted in application (§520-40(F))

See *Attachment II.1*

II.1.2 LVPC Review

The Lehigh Valley Planning Commission serves both the Lehigh and Northampton counties. Their role is similar to that of the City of Easton, but on a higher scale since they operate over a significantly larger area. They deal with aspects of planning for the Lehigh Valley that include transportation, stormwater management, open space, and sewage. The stormwater management review by the LVPC adheres to the Act 167 model ordinance. The following must be submitted as part of the SALDO application to the Lehigh Valley Planning Commission:

- Proposed subdivision and land development plans
- Stormwater management narrative and calculations
- Soil erosion and sedimentation control plan
- Traffic study report

See *Attachment II.1*

II.2 NCCD E&S Application

The Northampton County Conservation District deals with the protection of soil and water resources for the county. They have developed extensive Conservation Plans for any earth disturbing activity such as our project which will require extensive excavation and stormwater management practices. The District will review the plan once it has been approved by the Easton Planning Commission and Lehigh Valley Planning Commission. A permit is necessary if the proposed disturbance activity will affect 5,000 square feet.

See *Attachment II.2*

II.3 PA-DEP NPDES Permit (Post-Construction Stormwater Management)

The Commonwealth of Pennsylvania Department of Environmental Protection (PA-DEP) is the agency in the U.S. State of Pennsylvania responsible for protecting and preserving the land, air, water, and energy resources through enforcement of the State's environmental laws. For the Lafayette College CEERC project, the General Information Form (GIF) – Authorization Application was completed in order to provide information about the client, site, facility, project, land use, and coordination to the PA-DEP. To account for stormwater management for our site, the Permit Application Notice of Intent (NOI) for Coverage under the General (PAG-02) NPDES Permit was reviewed. The permit type chosen was the individual one because the water at the site drains to a high quality stream or river, the Bushkill Creek.

The information required for this permit application is project information, site analysis in relation to water discharge and earth disturbance, Best Management Practice (BMP) checklists for the Erosion and Sedimentation (E&S) plans and the Post Construction Stormwater Management (PCSM) plans, and antidegradation analysis module.

The additional information required to submit this application involves reviewing the E&S and PCSM checklists and completing the required appendices at the end of the form. The teams necessary to complete the work are the Construction Management, E&S, Stormwater Management, and Land Development teams.

II.3.1 GIF Form

See *Attachment II.3*

II.3.2 NOI Form

See *Attachment II.3*

II.4 PHMC Application

The Pennsylvania Historical and Museum Commission (PHMC) is the official history agency of the Commonwealth of Pennsylvania. They are responsible for the collection, conservation, and interpretation of Pennsylvania's historic heritage, which they accomplish through the Pennsylvania State Archives, the State Museum of Pennsylvania, the Bureau of Historic Sites and Museums, the Pennsylvania Trails of History, the Bureau for Historic Preservation, and the Bureau of Management Services. The reason why it was necessary to complete the Cultural Resource Notice form for the Lafayette College CEERC project was because the Hummel Lumber building is more than 50 years old and is therefore considered a historical landmark.

The information required for this permit application is project information and attachments founds in the Cultural Resource Notice Checklist (0120-PM-PY0003).

The additional information required to submit this application can be found in the Cultural Resource Notice Checklist (0120-PM-PY0003) and it mainly involves compiling data and plans that have already been completed by our project team members. The final for this permit would be submitting the permit application with all the required attachments such as, photographs of buildings over 50 years old, site maps of the proposed activity, 7.5’ USGS map, total acres of earth disturbance for the proposed activity, etc.

See *Attachment II.4*

SECTION III: PROJECT SCHEDULING

III.1 Gantt Chart

Table III.1: Gantt Chart

Task #	Task			
1	**Preliminary Site Work**			
1.1	Remove existing sheds			
1.2	Site grading			
1.3	Underground utilities modification			
1.4	Addition of temporary sedimentation basins			
1.5	Stormwater BMPs			
2	**Improve Site Access**			
2.1	Stair/elevator tower construction			
2.2	Maintain ADA compliance			
2.3	Pedestrian bridge and approach			
3	**Building Renovation**			
3.1	Changes to building structure			
3.2	Roof modifications			
3.3	Building connector			
3.4	Green roof and solar panels			
4	**Parking Garage Construction**			
4.1	Excavation/fill			
4.2	Retaining wall			
4.3	Parking garage construction			
5	**Facility Storage Construction**			
5.1	Buildings and storage			
6	**Improve Site Circulation**			
6.1	Changes to entry driveway			
6.2	Addition of entry plaza			
6.3	Site roads and parking			
6.4	On-site traffic modifications			
7	**Site Landscaping and Hardscaping**			
7.1	Pedestrian bridge approach			
7.2	On-site landscaping			
7.3	Drainage basin			
7.4	Improve site drainage			

III.2 Construction Sequence

In determining the construction sequence for this project, it was necessary to take into consideration factors such as required staging area, length of each activity, and the logical procession of each of the activities. To provide for the required space for vehicle and equipment storage, removal of the on-site sheds and other miscellaneous structures should be the first activity. Aside from providing additional storage, this would make preliminary site grading easier, especially at the area where the proposed parking deck is located. This could also help to improve on-site stormwater management during the construction phase of the project by channeling runoff away from the construction. Going along with that, any erosion and sedimentation control measure would be instituted at this point. This would include the addition of any sedimentation basin(s) or other methods that would improve on-site drainage while construction is ongoing. Any changes needed to connect to underground utilities can also be made at this time before the addition of buildings or asphalt which would limit access.

Figure III.1: Preliminary Site Work

Improving access to the site should be the next order of business and in particular, the pedestrian pathway connecting the school to the site. The stairway and elevator system would be the first task while ensuring the design meets ADA specifications. In addtion, the connector building will be constructed at this point. Depending on the timing of the project, the site development could

serve as a useful learning tool for students, especially with the construction aspect since the design portion would have been mostly completed by this time.

Figure III.2: Improve Site Access

Since they are not related, building retrofit can occur simultaneously with construction of the pedestrian pathway. This also applies to changing the current roof system to the flat membrane. However, the retrofit should occur before the roof modifications to ensure the structural system can support additional loads. At this time, there is still uncertainty as to whether the connected structure between the existing building and parking garage should be constructed before or after the parking garage has been constructed. The building retrofit is the most time sensitive of the project since it will needed to be ready before classes start for the semester. This consideration would influence the time at which the project starts to provide adequate time in the case of a delay.

Figure III.3: Building Renovation

Before construction of the parking garage can occur, it will be necessary to excavate and possibly fill the underlying soil profile beneath the proposed location of the garage. It is expected that a retaining wall will need to be added to backside of the garage to limit the horizontal forces from the inclined slope. Design of the facility storage does not fall within the scope of this project, but construction of those buildings would most likely occur after the parking garage. The machinery and crew needed to construct these buildings would already be on-site doing work on the building and garage so there would be more continuity doing it now rather than waiting until after road improvements have been made.

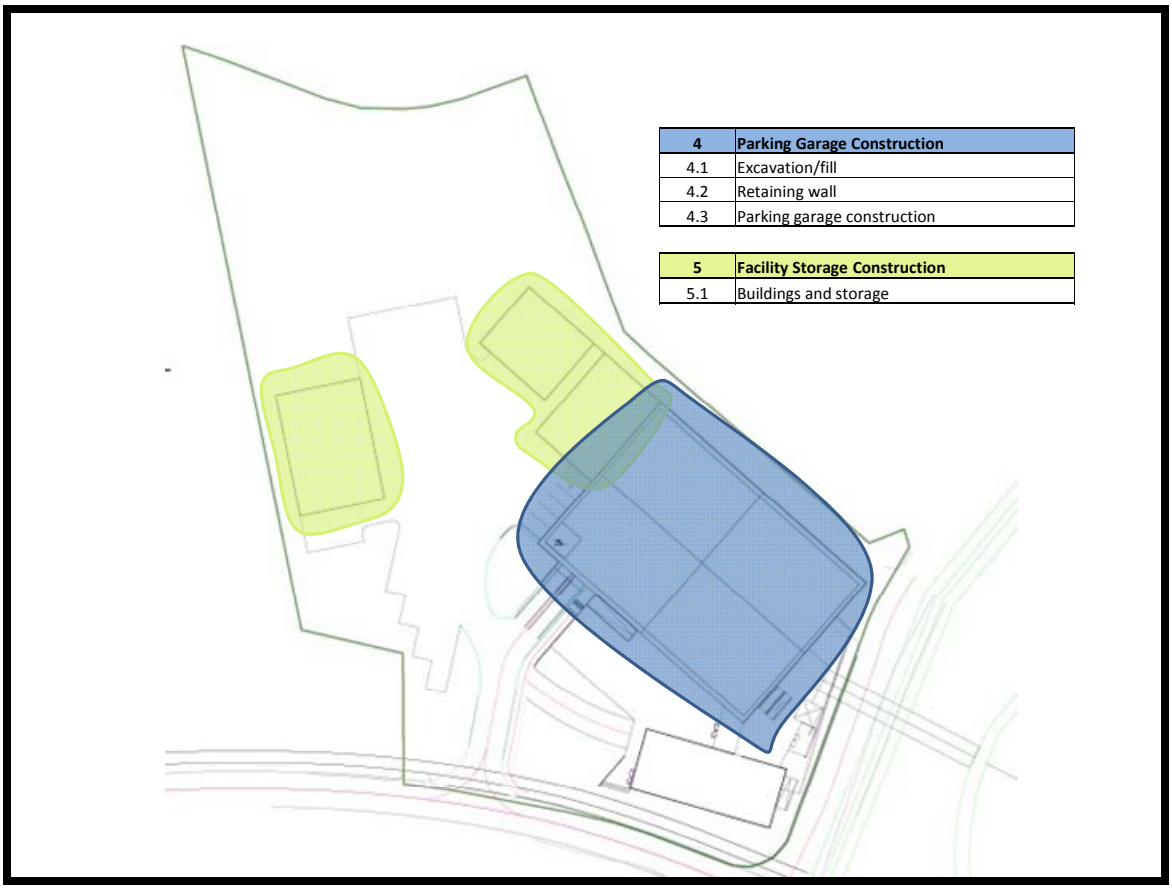

Figure III.4: Parking Garage and Facility Storage Construction

With the main structures in place, improvements to on-site circulation can now be made. This includes the plaza adjacent to the existing building, changes to the entry driveway, along with site roads and parking. These roads will be utilized to connect each of the structures and to provide adequate space for material deliveries. Traffic signals such as stop signs and pedestrian walkways should now be added. Also, landscaping and hardscaping should be performed on the site and pedestrian pathways now that construction is minimal. Although it has not yet been determined, a drainage basin might have to be added to the site. Going along with that, drainage systems would have to be connected to the basin or the underground storm drains. Design of the facility storage does not fall within the scope of this project, but construction of those buildings would most likely occur after the parking garage and before improvements to site circulation.

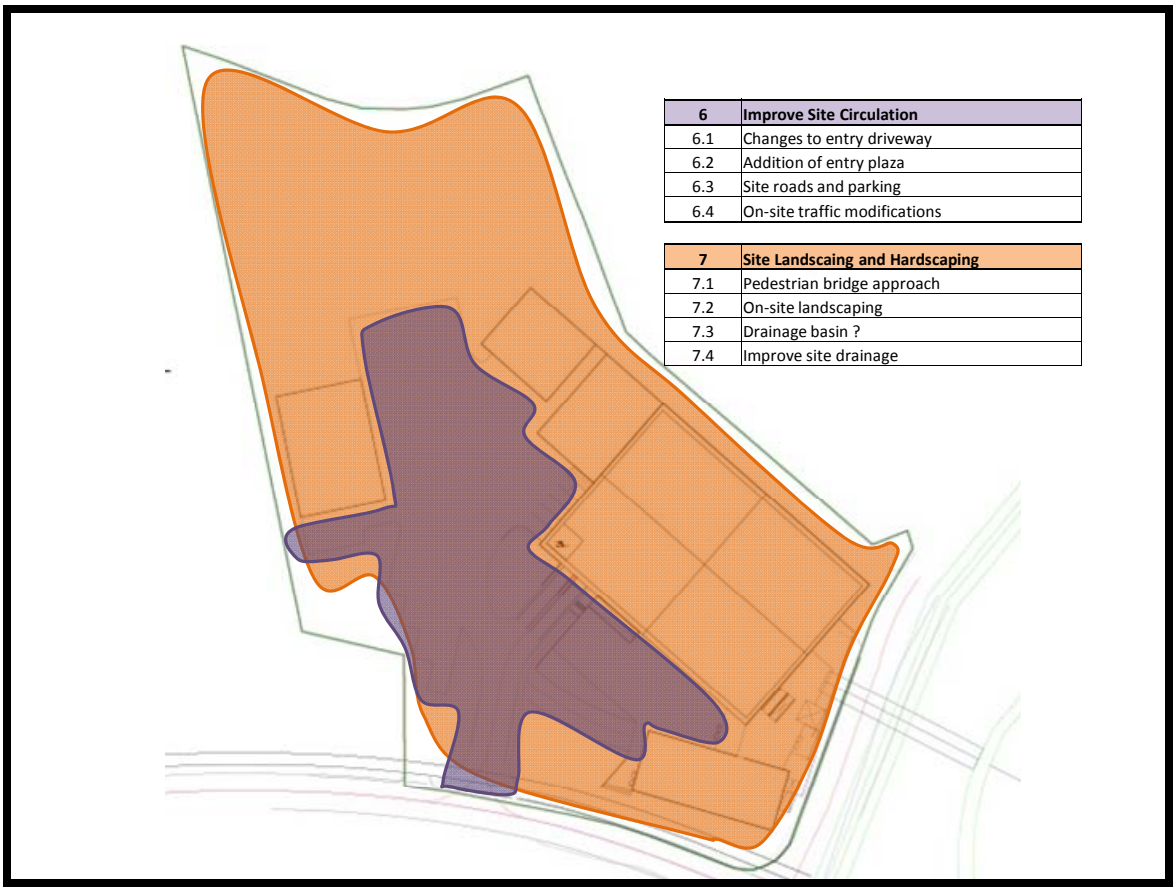

Figure III.5: Improve Site Circulation and Landscaping

III.3 Construction Staging Area

Since the site is considerably larger than the existing building, there should be ample space on site to serve as a construction staging area. In particular, the area to the west (left) on the site from the Bushkill Drive entrance is a sufficient distance away from the existing building and proposed location of the parking garage. For the figure below, the proposed area is enclosed by the white lines. Also, this is area is basically flat which would alleviate some of the concerns with erosion due to the heavy vehicles and equipment. This proposed area is located at the lowest elevation on site so there may be some drainage issues that would need to be addressed. A potential solution would be to create a temporary sedimentation basin. There is currently an existing shed and pits used by Plant Ops in this area, but they will be removed. This is the first construction sequence since providing the necessary area for the staging area is imperative given the amount of activity in and around the site. Before the parking garage is constructed, this site will have the benefit of having two access points which will provide ease of circulation around the site. This would also help to alleviate any increase in traffic at the intersection of Bushkill and Dietrich since vehicles can exit the site at a different point.

Figure III.6: Proposed Construction Staging Area

Due to rough terrain and the lack of space on the other side of Dietrich Road, this proposed staging area will have to serve as the staging area for the pedestrian bridge and potential stairwell/elevator as well. The amount of area needed for each of these activities will have to be considered so that there is enough space for all. The preliminary GANTT chart will not reflect the possibility of delaying an activity due to a lack of space for parking or storing equipment, but it is certainly a possibility.

A potential issue with the configuration of buildings is the limited access heavy machinery might have to the parking garage. Specifically, during construction the existing building and steep slope on the opposing side could restrict cranes or other machinery from gaining access to certain parts of the garage.

SECTION IV: COST ESTIMATING

IV.1 Findings

Using the 2012 RSMeans Building Construction Cost Data book, we identified several key phases of the project where we can perform cost estimation. In all the cases, we just identified the cost per area (or car) for each of the structures. We will determine their areas with the applicable person in class and calculate a definitive cost by the next assignment date. Several of the costs below have costs in terms of both square and cubic feet so we used our judgment in determining which is the most applicable.

Table IV.1 Parking Garage Costs

Parking Garage	Area (sf)	Unit Cost	Total Cost
Level 1	20479	$ 52.50	$ 1,075,147.50
Level 2	18400	$ 52.50	$ 966,000.00
Level 3	18400	$ 52.50	$ 966,000.00
Level 4	18400	$ 52.50	$ 966,000.00
Level 5	18400	$ 52.50	$ 966,000.00
Total	94079		$ 4,939,147.50

Table IV.2 Pedestrian Bridge Costs

Dimensions	Peace Bridge	Pedestrian Bridge
Span (ft)	428	120
Width (ft)	26	12
Height (ft)	19.2	16
Total Cost	$ 17,995,000	$ 1,940,510

Since our pedestrian bridge was modeled after the Peace Bridge located in Calgary, we used proportions to estimate our cost. The cost provided for the Peace Bridge was the cost of construction and materials which is the cost that applies to our own bridge.

Table IV.3 Green Roof Cost

Green Roof		
Area (sf)	Unit Cost	**Total Cost**
4800	$ 9.19	$ 44,100

This particular cost estimation was calculated by looking at the capital cost for the installation of a non-modular custom green roof. Initially we looked at data provided by RSMeans, however the cost was predicted to be too low so we looked into costs of other similar projects. Like the bridge estimation, we scaled the price down using proportions since the other green roof had a total area

of 10,000 ft². The calculated cost ignores other factors such as irrigation and constructing the surrounding walking surface.

Table IV.4 Pavement Costs

	Cost ($/ft²)	Area (ft²)	Total Cost ($)
Hot Mix Asphalt	**4.77**	**15278**	**$72,808**
2" Wearing	0.95		
2" Binder	0.85		
5" Base	2.16		
8" Subbase	0.80		
Roller Compacted Concrete	**3.77**	**27124**	**$102,378**
6" RCC	3.32		
4" Stone	0.45		

Table IV.5 Sidewalk Costs

	Cost ($/ft²)	Area (ft²)	Total Cost ($)
Concrete Sidewalk	**4.61**	**2279**	**$10,501**
5" Class A Concrete	4.05		
6" AASHTO 57	0.56		
Brick Sidewalk	**10.23**	**5060**	**$51,758**
Brick	9.43		
1" Sand			
6" 2A Stone	0.80		