Boston 2024
Olympic Stadium Renewable Energy Project

Prepared By:
Team Olympians
Greg Keohane - Keohane.g@husky.neu.edu
John Merriman - Merriman.j@husky.neu.edu
Hashim Hafiz - Hafiz.h@husky.neu.edu
Priyabrata Purohit - Purohit.p@husky.neu.edu

Deliverable 6 & 7: Project Plan Final
April 30th 2015

Table of Contents

Letter of Transmittal

April 30, 2015

To: General Stadium Contactor
2018 Olympic Site Construction
RE: Renewable Energy Project

Dear General Contractor,

Attached please find the proposal entitled "Olympic Stadium Renewable Energy Project". This proposal explains in detail the work to be completed at the 2018 stadium construction site by us as Northeastern University students during the period leading up to the scheduled event, for the project requested by your company.

We would much appreciate if you read our proposal carefully, complete the section below and fax it back to the Engineering Project Management Department at Olympians Corp., or to the Project Manager, Greg Keohane, so he can take it back to our project instructors.

Should you have any questions or comments about this proposal, do not hesitate to contact us.

Sincerely,

Gregory Keohane
John Merriman
Hashim Hafiz
Priyabrata Purohit

I have read the enclosed proposal and have the following comments:

- ☐ We accept the proposal.
- ☐ We decline the proposal.
- ☐ We accept the proposal with the changes/comments shown below (feel free to include any comments in separate page as necessary).

Company Rep Name/Title _____ Signature / Date _____

Good idea here - need some polish before it goes out to the client.

Executive Summary

Our current reliance on unreliable sources of energy such as oil, natural gas, coal and nuclear power has caused a severe damage in our environment which has affected human beings with diseases like asthma, natural disasters, climate changes and many things that have harmed not only human beings but also animals and agriculture. Besides that, those energy sources are expected to deplete soon (WC) which make all nations that rely on those sources paralyzed since they are the main sources of energy. Fortunately, renewable energy sources have increased in the last few decades, yet, it is still 2% of the energy generated around the world.

I thought it was to implement a renewable solu to generate electricity?

The main purpose of this project is to spread awareness among people to use renewable energy more. To deliver our message to the largest group of people, we ~~thought that we would choose~~ propose to use one of the biggest events in the modern world and make (WC) people participate in generating energy themselves so they know more about renewable energy and its importance. We chose The 2024 Olympic Games in Boston, MA to do our project because it has always been one of the biggest globally televised events around the world, with about 205 nations participating in it. The approach for this project will be unique because it will allow the spectators to generate the power themselves ~~and then use the generated electricity~~ to be used to power the stadium's facilities. A simple yet extremely (WC) innovative tile that generates energy by stepping on it will be installed under the spectators' seats and throughout the Olympic Stadium so every time they walk, stand up, cheer, or even jump on them (the tiles) an electrical charge will be generated. Spectators can actually see what they generated by taking advantage of the cell phone charging stations. There are two key things this project will produce:

reword - venue or focus or ??

Boston or the olympics?

I would use 'olympics' not pronoun.

why not 'electricity'?

- Electricity that will help with operating costs of the stadiums utilities
- Awareness about renewable energy and other PR revenues

each person or the group as a whole?

Project will produce - will be technology integrated & implementation in the olympics.

As mentioned, ~~there will be~~ (it) special tiles, manufactured by the PaveGen Company, installed in specific spots that have the most foot traffic in the stadium and under the first three rows of seats in the stadium. These tiles generate energy when someone steps on them. Then, the generated power will be used in powering some of the facilities in the stadium. Spectators will be informed about the tiles and their function, and will be encouraged to produce more energy by stepping or jumping on the tiles.

why energy vs. electricity?

I am thinking that it might be helpful to mention - % or W output. Specific.

Although we know this project will not solve the world's energy problem, it is believed that this project will succeed in delivering a positive message to the world because of the number of people that will participate and learn and foster the future growth of renewable energy. Also, the idea of renewable energy will reach countries around the world because of the idea of using it in such a huge event such as the Olympic Games. And where other projects have also succeeded in conveying such a noble message, ~~for a short time~~, we believe our project will continue to succeed. Our project is simple in concept and offers lots of marketability. It is easy to install yet very durability and most importantly a financially viable option. If more people knew about Pavegen tiles, the extent of this campaign is ~~unmeasurable~~.

single handedly (we)

I would say now

could have for energy production to a large-scale effect.

I like how you are seeing the bigger picture. Your project is focused but the impact has much broader perspective.

Purpose

The purpose of this project is to use PaveGen floor tiles to take advantage of the increased foot traffic/tourism to provide excess power for the Olympic Stadium. This power would be used to cut the electric costs for lighting the field, the concessions/concourse, and the parking lot, as well as provide stations for charging of portable electronics. Rather than a full scale stadium renovation, this technology could be incorporated into the design of the soon to be constructed Olympic Park for the 2024 Boston Olympics.

Key Objectives

The key objectives that we as a team want to accomplish during this project are as follows:

- Perform a feasibility study to confirm energy savings
- Provide a stadium specific prototype of the Pavegen tile and an effective layout model
- Finish construction and installation of the system

Technical Overview

good write-up.

PaveGen tiles convert the kinetic energy of a footstep into useable electricity, which can either be stored in a battery or fed directly into devices. A typical tile is made of recycled polymers, and when compressed by an average foot-step generate between 3-7 Watts. While the exact science behind the technology is a secret, PaveGen has alluded to a "hybrid solution of mechanisms that include the piezoelectric effect (an electric charge produced when pressure is exerted on crystals such as quartz) and induction, which uses copper coils and magnets."*

With an expected stadium capacity of 60,000 people, the plan is to strategically place approximately 10,000 2'x6' tiles in the locations with the highest expected foot-traffic. Over the course of the stadium construction, our team will work closely with the general, electric, and design contractors to ensure successful system integration. Once integrated, our tiles will be able to feed the generated electricity into the stadium's electricity grid, where this power will either be used on the spot or stored for future use.

*http://www.scientificamerican.com/article/pavement-pounders-at-paris-marathon-generate-power/

Implementation Plan

The Implementation Plan consists of a work breakdown structure (WBS), as well as the project schedule, the responsibility chart, and the resource allocation chart which stem from the WBS. The details of this section are contained herein and in the appendices.

Work Breakdown Structure:

The WBS contains a detailed catalog of the project's major milestones, tasks and subtasks needed to complete the scope of work. The WBS is not written in chronological order but does give a rough representation of the project plan and can be used to accurately estimate the completion time of the project and resources needed for each task. The Olympians propose to provide a more detailed WBS and schedule once the Olympic bid has been awarded and the general contractor is available for consultation.

The WBS can be found in Appendix A

Schedule:

The project schedule was first created in Microsoft Excel Scheduler. A Gantt chart of this rough draft can be found in Appendix B

Soon after, we acquired Microsoft Project and we were able to reconstruct the schedule to include milestones for each subproject and a more detailed Gantt chart. The current project schedule can be found in Appendix C.

Responsibility Chart:

The responsibility chart translates the WBS and allows each team member and all stakeholders to understand who is doing what. It also indicates what type of responsibility they have and whether they are sharing responsibility. See Appendix D.

To view the subtasks of this chart, refer to the WBS.

Resource Allocation:

A resource allocation chart is provided below for reference. An in depth description of the project team and other project personnel's responsibility is included herein.

The project engineering team consists of a Project Manager, an energy systems engineer, a traffic engineer and a electrical/software engineer. The PM will oversee the project monitoring and control, making sure the project stays within scope, schedule, and budget. In addition, the PM has the responsibility to host the pre and post feasibility meetings, present findings to the stakeholders and prepare the project schedule. The energy systems engineer is primarily

responsible for reviewing the feasibility study findings and estimating the projects viability. In the event that the project continues forward, he will work with the finance team on buying the tiles and will also consult with the electricians during the final installment. Our traffic engineer will be responsible for performing the feasibility study and for mapping a high efficiency tile layout. He will work closely with our energy systems engineer during the project. The electrical/software engineer is responsible for designing the tile schematics and will be managing the consultants during the installation phase. All three team engineers will share responsibility for the feasibility study and for risk analysis throughout the project.

The marketing team will be responsible for creating a major marketing platform for the tiles. They will consult with the project team when necessary and work closely with the finance team.

The finance team's primary responsibility is to negotiate the terms and conditions of a procurement contract with Pavegen. Finance will handle the procurement of the tiles, charging stations and any electrical material needed for installation. They are responsible for the project budget both pre and post feasibility study.

The general contractor, stakeholders and Pavegen will be kept informed of the project's progression and will be consulted during various steps of the projects.

The electricians will be responsible for the final installation of the Pavegen tiles. Their expertise will be utilized during the study and they will be consulted throughout the project. They will work closely with the project team and PM.

Execution Plan Previously Approved

Monitoring Plan

Project monitoring will be performed throughout the life of the project in order to collect, record, and report information concerning the project's performance to the project manager. Monitoring the project is important for keeping track of project implementation and keeping an eye on any updates that may require a change in the project's schedule, budget, or resources. A monthly meeting will be held to update everyone of what is being monitored and recorded, and the overall performance of the project. The meeting will have one person from each department reporting the progress of their tasks. Also, if a team member has an issue with one of the tasks, an issue-report can be sent anytime to the project manager explaining the situation. The report may request a decision regarding scope change or task due dates, as well as inform the PM about any important updates.

Control Plan

In order to keep the project under control, the project manager will be maintaining a monthly report. The report will compare the actual performance with the planned performance. Based on the report the project manager will be taking action and allocating tasks to other team members,

so that the project stays under control and will yield the desired outcome in project when significant differences exist.

Project reports have to be maintained, which will determine whether the project is under control and it has to be delivered by certain due dates. The project manager and the project team members will be responsible for this deliverable.
These project reports have to be continuously delivered every month by a certain due date so that the project manager will be able to determine if the project is under control or not

Auditing

The purpose of the project audit is to identify the "Lessons Learned" that can help improve the performance of the project as well as the performance of future projects that may stem from the success or failure of this project. This project will have two audits, a mid-term audit performed after the feasibility study, and a project end audit after project completion. During each audit, the core project team, project manager, and stakeholders will be interviewed about the projects progress and management. The interviews will provide insight and help identify major project successes, issues, challenges, concerns, as well as how the team works/worked together, how reporting and meetings are/were handled, and how risk and change is/was controlled. All of this information is collected and findings are compiled into a report of recommendations for current and future project improvement.

Project Termination

Subsequent to the approval of the stadium contractor to undertake this project, there are potential events that could take place that may alter the attractiveness of the project and thus cause it to be terminated. These events include a potential cost disadvantage and a potential failure to effectively install and integrate an effective system into the design of the stadium.

The first potential cost disadvantage will arise if the expected funding for the project exceeds the actual funding that is generated. The second potential cost disadvantage has to do with the economic feasibility of the project, specifically the cost to implement the tile system as a means of power generation relative to the cost of the alternative fossil fuel system. This potential cause of termination will be known after performing the feasibility study of the tile system, specifically, the ratio of the total cost of the system to the feasible power output of the system. It is understood and expected that the direct cost comparison between using either the tiles or fossil fuels as an energy source will favor fossil fuels. However, if the magnitude of this cost discrepancy exceeds the perceived value that advertising sponsors place on being associated with clean sustainable energy, then the project may need to be terminated. The decision to terminate due to these cost disadvantages will be made prior to the purchase orders of the system components in order to minimize monetary losses.

The other possible cause of project termination is the potential inability to successfully implement a reliable working system. Ultimately, the electric circuit design for the stadium will

include a grid connection with a reliable external power source in place to remediate potential system failures. Thus the impacts of a potential failure to implement a working system will be limited to the associated monetary and brand perception losses of our project stakeholders with little risk of jeopardizing the entire stadium construction process. Ideally, the recognition of such a failure will be early enough in the project timeline to allow identification of the cause and the exploration of possible remediation options. After exploring these options and their associated time and cost viability, a decision will be made as to whether the project will continue through an alternative path or terminated completely. The Olympians are available by phone for construction support (if needed). We have budgeted for several one-hour phone calls during construction for the General Contractor and GC's Lead Technician.

Content for table is good Layout could be tightened up by

Add Table title.

Risk Assessment

Risk Factor	Relevant Risk Components for each Risk Factor		
	Low	Medium	High
Financing	- procurement of funds	- revenue generation from advertising	- economic feasibility of system
Design and Planning	- change in strategy - skill deficiency	- resource procurement - insufficient information	- poor communication with subcontractor groups
Technical and Implementation		- reliability of relevant subcontractors - technology reliability -safety on-site	- integration of process into stadium power system
External	- weather - natural hazards - economic market swings	- political/legal	

Each make Initial cap a first word

Put text first then follow up table

The above table highlights the main risk factors, and breaks these risk factors down into individual components. The riskiest factor associated with the success of our project has to do with successfully communicating our project design with the various stadium subcontractor groups, and implementing this integrated design into a working power system for the stadium. Considering that there are various subcontractor groups involved in this construction process, it is essential that we work with all of these relevant groups- the general contractor, the electricians, design engineers, etc. - in order to successfully integrate all of the various components.

The other noticeable element of risk has to do with the economic feasibility of our project. The energy from the PaveGen tiles is generated by a very new and untested technology. Considering our implementation of this technology on a scale as large as an Olympic Stadium, there is a lot of inherent risk associated with implementing this innovate technology into a functional working unit on such a large scale. This risk factor encompasses various components, including the reliability of the technology and the aforementioned communication and integration, and these risks ultimately have a large impact on the economic feasibility of this system in comparison to a fossil fuel alternative. It is important to note that this economic risk is apparent to all the stakeholders of the project- whom have recognized that brand alignment with sustainable energy adds an additional value that offsets the extra cost of sustainable energy.

Of the other medium and low risk components shown, most are those associated with the implementation of any project. Thus the economic market, the legal environment, the quality of information- all of these are risks inherent in any undertaking. The legal environment includes any required permits and associated compliance paths. Furthermore, on-site job safety warrants notice- a construction project on this large of a scale is bound to have various on-site job hazards that could pose potential problems. Finally, it is important to mention that the risk associated with each component was evaluated using the Qualitative Risk Ranking Guidelines criteria provided by the United States Department of Energy, included in the appendix of this project plan.*

* http://energy.gov/sites/prod/files/2013/05/f0/PM_PLAN_EXAMPLES_54-56.pdf

Financial Plan with Budget

Need a transition ¶ before the following data.

Rates - Hourly

Project Manager - $52.00 per hour

Project Team - (Transportation Engineer, Energy Systems Engineer, Electrical Engineer) - $145.00 per hour

Consultants - $73.00 per hour

Marketing Team - Salary based

Finance Team - Salary based

Project A Budget – give brief description

Project A's budget is known and is broken down in detail below.

Travel $80.00 per hour (to stadium and back)

Vehicle is at $0.67/mi travelled

Expenses at cost

Duration 4 weeks plus 3 days:

Cost per visit 6.5hr@ $145.00 = $942.50

1.4hr@ $80.00= $120.00

5mi@ $0.67= $3.35

Room and meals $140.00

Sub total $1,205.85 X 31 Days = $37,381.35

Three men round trips to Sault @ $3,185 X 3 men = $9,555.00

Plus Tax

Project B Budget

Project B is more unpredictable and, therefore, the exact budget will be established once the feasibility study is complete.

Cost per day - 6.5hr day

Project manager - $338.00 per day

Project team - (Transportation Engineer, Energy Systems Engineer, Electrical/Software Engineer) - $942.50 per day

Consultants - $474.50 per day

Estimated totals

Project manager - $270,400.00

Project team - $1,243,016.00

Consultants - $204,522.50

The actual number of days that the project team works is unknown and may vary over the four year project. It is known that they will be required to work at least 20 hours a week but no more than 40 hours as we will not offer overtime unless there are time constraints. Due to the length of this project, we do not intent on having many, if any, time constraints unless it is unforeseen and high risk to the project in which crashing tasks will be handled as they would in any project.

Overhead Costs

The electrical equipment cost and the Pavegen tile cost for the whole stadium is below. Total amount spend on it depends on the number of electrical equipment and number of tiles purchased.

Tile Cost - $76 per tile (according to Pavegen)

Estimated 10,000 tiles @ $76 per tile = $76,000.00 plus S&H

Wiring - $11.03 per foot

Estimated 10,000 feet @ $11.03 per foot = $11,030.00

Other

Material blanket order - $100,000.00

Marketing budget - $100,000.

It would be very good to have a summary table. Also please include the total proposed cost.

Appendices

Appendix A

Work Breakdown Structure

Before any funding can be obtained, our company needs to prove that its goals are attainable, both technically and economically. Therefore, the project will be broken into two parts, a feasibility study and the construction phase. The former, Project A, will take place before any major funding is acquired. The latter, Project B, hinges entirely on the results of Project A, and may be terminated prior to beginning any potentially costly activities. The two project's tasks are broken down further in the WBS below.

Project A: The project team will determine if the project is worth investing time and resources on.

Project Plan

1. Preliminary action plan
    - 1.1. Procure preliminary funds for feasibility study
        - 1.1.1. Present objectives to stakeholders
    - 1.2. Sign agreement with Pavegen

Feasibility study

2. Investigate permissibility of project
    - 2.1. Review previous Olympic Stadiums
    - 2.2. Acquire permits for study
    - 2.3. Acquire permits from Boston Public Authority
3. Begin feasibility study
    - 3.1. Determine desired layout efficiency
    - 3.2. Research economic viability
    - 3.3. Research commercial viability
    - 3.4. Travel to Rio
4. Record the stadium's utility cost (This will help us decide the best way to use the generated electricity)
    - 4.1. Measure stadium electricity usage:
        - 4.1.1. Parking lots
        - 4.1.2. Concession/concourse
        - 4.1.3. Playing field
        - 4.1.4. Entrances
5. Develop model
    - 5.1. Visit the Rio Olympic stadium
        - 5.1.1. Make a visual observation
        - 5.1.2. Locate three spots with high foot traffic based on the visual observation

5.2. Install footsteps detectors in the locations to count footsteps
  5.2.1. Keep the detectors in each location for 5 days
    5.2.1.1. Collect daily readings
    5.2.1.2. Uninstall the strips
5.3. Report results
5.4. Create traffic model
  5.4.1. Find the average footsteps per game
  5.4.2. Estimate how much energy will be produced per game
5.5. Create final tile layout
  5.5.1. List the high footsteps spots in the stadium (from high to low footsteps)
  5.5.2. Choose the highest footsteps spots
  5.5.3. Decide where tiles will be installed
  5.5.4. Decide how many tiles will be installed

Project B: The project team will finalize project plan and budget, hire consulting team and initiate the final installation.

Viability Decision

1. Hold post feasibility study meeting
  1.1. Present report to consultants
2. Review general findings
  2.1. Compare results to original scope
    2.1.1. Identify areas of risk
    2.1.2. Assess the need for scope change
    2.1.3. Assess the importance of the changes
  2.2. Compare results to original cost
    2.2.1. Identify cost savings
    2.2.2. Identify new costs
    2.2.3. Assess the need for additional capital
  2.3. Decide the final scope of work and capital cost
3. Prepare project schedule
  3.1. Identify major milestones and tasks
  3.2. Construct an AON Network
    3.2.1. Establish a critical path
    3.2.2. List the activities
    3.2.3. Research the expected time, optimistic time and pessimistic time
      3.2.3.1. Calculate activity LS, ES, and Slack
  3.3. Generate Gantt Chart in MSP
  3.4. Allocate resources
  3.5. Level resources
4. Acquire funds from stakeholders
  4.1. Project Manager presents final project plan to stakeholders and general contractor

Procurement

5. Purchase tiles and other resources
    - 5.1. Request for quotation (RFQ) sent to Pavegen
    - 5.2. Buy tiles and tile casing
        - 5.2.1. Contact PaveGen for ordering a shipment of the required numbers of tiles
    - 5.3. Find suitable cabling to purchase
        - 5.3.1. Determine the amount of cabling required
        - 5.3.2. Determine the quality of cable needed
6. Purchase charging stations

Installation and Evaluation

7. Produce 2 final assembly drawings for general contractor
    - 7.1. Design specifications for casing installation
        - 7.1.1. Include instruction on tile installation into tile casing
    - 7.2. Design the cabling schematics for the electricians
8. Installation
    - 8.1. Work with general contractor
        - 8.1.1. Install tiles in previously determined locations
    - 8.2. Hire electrician/technician
        - 8.2.1. Connect tiles to main electricity grid
        - 8.2.2. Make sure the system is operating properly
            - 8.2.2.1. Detect/resolve any errors in the power grid

Marketing

9. Formulate a marketing platform
    - 9.1. Engage public about the benefits of tiles
        - 9.1.1. Inform public
            - 9.1.1.1. Design game-day pamphlets informing public about the benefits of tiles innovative technology
        - 9.1.2. Investigate possibility of a stadium mechanism that visualizes the ability of the crowd to generate useable energy through cheering
    - 9.2. Generate revenue from sustainability perception
    - 9.3. Generate revenue from advertising decals on tiles
        - 9.3.1. Investigate the value that companies place on being able to directly associate their brand with sustainability
    - 9.4. Generate revenue from sponsors
        - 9.4.1. Investigate the value that companies place on advertising indirectly i.e. banners etc.
10. Risk Analysis
    - 10.1. Financing
        - 10.1.1. Procurement of funds
        - 10.1.2. Revenue generation from advertising
    - 10.2. Design/planning
        - 10.2.1. Resource procurement
        - 10.2.2. Poor communication

- 10.2.3. Incorrect/insufficient information
- 10.2.4. Change in strategy
- 10.2.5. Skill deficiency

10.3. Technical

- 10.3.1. Integration of all processes into a working system
- 10.3.2. Economic feasibility of system
- 10.3.3. Risks in section 10 are also associated with each subcontractor
  - 10.3.3.1. PaveGen
  - 10.3.3.2. General Contractor
  - 10.3.3.3. Electrician

10.4. External

- 10.4.1. Economic/Financial
- 10.4.2. Political/Legal
- 10.4.3. Weather
- 10.4.4. Natural hazards

Appendix B

Critical Path Method

HELP

Start Date: 10/1/2015

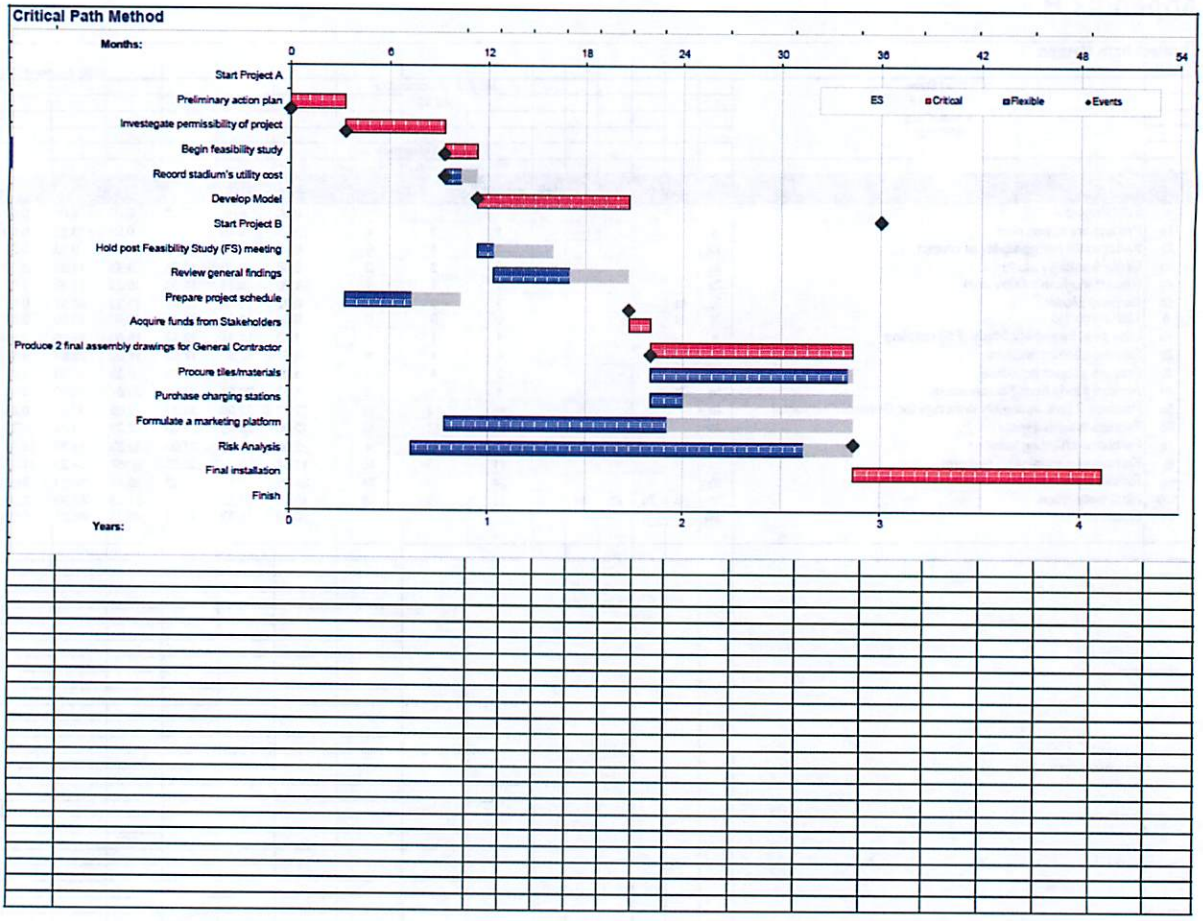
Finish Date: 6/3/2021

Months to Completion: 49.33

Times (in Months)

Time Distribution: Triangular

ID	Task Name	Predecessors (Enter one ID per cell)						O (min)	M (most likely)	P (max)	Duration (exp. time)	ES	EF	LS	LF	Slack
a	Start Project A										0.00	0.00	0.00	0.00	0.00	0.00
1a	Preliminary action plan	a						1	3	6	3.33	0.00	3.33	0.00	3.33	0.00
2a	Investegate permissibility of project	1a						3	6	9	6.00	3.33	9.33	3.33	9.33	0.00
3a	Begin feasibility study	2a						2	2	2	2.00	9.33	11.33	9.33	11.33	0.00
4a	Record stadium's utility cost	2a						1	1	1	1.00	9.33	10.33	10.33	11.33	1.00
5a	Develop Model	3a	4a					9	9	10	9.33	11.33	20.67	11.33	20.67	0.00
b	Start Project B	3a	4a					0	0	0	0.00	11.33	11.33	15.00	15.00	3.67
1b	Hold post Feasibility Study (FS) meeting	b						1	1	1	1.00	11.33	12.33	15.00	16.00	3.67
2b	Review general findings	1b						4	4	6	4.67	12.33	17.00	16.00	20.67	3.67
3b	Prepare project schedule	1a						3	4	5	4.00	3.33	7.33	6.33	10.33	3.00
4b	Acquire funds from Stakeholders	5a	2b					1	1	2	1.33	20.67	22.00	20.67	22.00	0.00
5b	Produce 2 final assembly drawings for General Contractor	4b						10	12	15	12.33	22.00	34.33	22.00	34.33	0.00
6b	Procure tiles/materials	4b						12	12	12	12.00	22.00	34.00	22.33	34.33	0.33
7b	Purchase charging stations	4b						1	1	4	2.00	22.00	24.00	32.33	34.33	10.33
8b	Formulate a marketing platform	2a						11	15	15	13.67	9.33	23.00	20.67	34.33	11.33
9b	Risk Analysis	3b						24	24	24	24.00	7.33	31.33	10.33	34.33	3.00
10b	Final installation	5b	6b	7b	8b	9b		12	15	18	15.00	34.33	49.33	34.33	49.33	0.00
11	Finish	10b									0.00	49.33	49.33	49.33	49.33	0.00


Critical Path Method
Months:
0
6
12
18
24
30
36
42
48
54
ES
Critical
Flexible
Events
Start Project A
Preliminary action plan
Investegate permissibility of project
Begin feasibility study
Record stadium's utility cost
Develop Model
Start Project B
Hold post Feasibility Study (FS) meeting
Review general findings
Prepare project schedule
Acquire funds from Stakeholders
Produce 2 final assembly drawings for General Contractor
Procure tiles/materials
Purchase charging stations
Formulate a marketing platform
Risk Analysis
Final installation
Finish
Years:
0
1
2
3
4

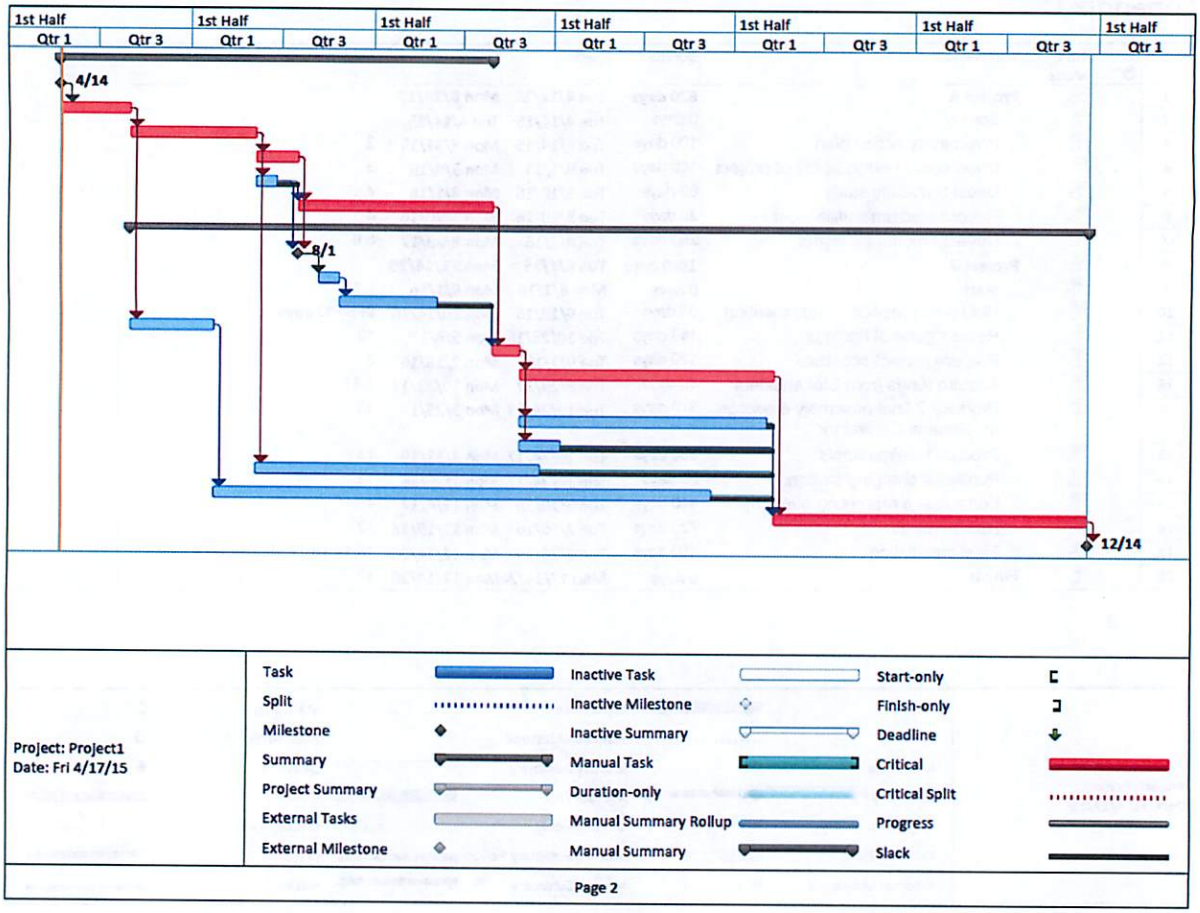
Appendix C

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Qtr 3
1		**Project A**	**620 days**	**Tue 4/14/15**	**Mon 8/28/17**			
2		**Start**	0 days	Tue 4/14/15	Tue 4/14/15			
3		Preliminary action plan	100 days	Tue 4/14/15	Mon 8/31/15	2		
4		Investegate permissibility of project	180 days	Tue 9/1/15	Mon 5/9/16	3		
5		Begin feasibility study	60 days	Tue 5/10/16	Mon 8/1/16	4		
6		Record stadium's utility cost	30 days	Tue 5/10/16	Mon 6/20/16	4		
7		Develop model for layout	280 days	Tue 8/2/16	Mon 8/28/17	5,6		
8		**Project B**	**1380 days**	**Tue 9/1/15**	**Mon 12/14/20**			
9		**Start**	0 days	Mon 8/1/16	Mon 8/1/16	6,5		
10		Hold post feasibility study meeting	30 days	Tue 9/13/16	Mon 10/24/16	9FS+30 days		
11		Review general findings	140 days	Tue 10/25/16	Mon 5/8/17	10		
12		Prepare project schedule	120 days	Tue 9/1/15	Mon 2/15/16	3		
13		Acquire funds from Stakeholders	40 days	Tue 8/29/17	Mon 10/23/17	7,11		
14		Produce 2 final assembly drawings for General Contractor	370 days	Tue 10/24/17	Mon 3/25/19	13		
15		Procure tiles/materials	360 days	Tue 10/24/17	Mon 3/11/19	13		
16		Purchase charging stations	60 days	Tue 10/24/17	Mon 1/15/18	13		
17		Formulate a marketing platform	410 days	Tue 5/10/16	Mon 12/4/17	4		
18		Risk Analysis	720 days	Tue 2/16/16	Mon 11/19/18	12		
19		Final installation	450 days	Tue 3/26/19	Mon 12/14/20	15,14,16,17,18		
20		**Finish**	0 days	Mon 12/14/2(	Mon 12/14/20	19		

Project: Project1
Date: Fri 4/17/15

Task	Inactive Task	Start-only
Split	Inactive Milestone	Finish-only
Milestone	Inactive Summary	Deadline
Summary	Manual Task	Critical
Project Summary	Duration-only	Critical Split
External Tasks	Manual Summary Rollup	Progress
External Milestone	Manual Summary	Slack

Page 1


1st Half
Qtr 1
Qtr 3
4/14
8/1
12/14
Project: Project1
Date: Fri 4/17/15
Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Deadline
Critical
Critical Split
Progress
Slack
Page 2

Appendix D

Responsibility Chart	Project Team (Project Manager, Traffic Engineer, Energy Engineer, Electrical Engineer)									
			Project Office				Field Operations			
Activity	Task	Time (months)	Project Manager	Project Team	Marketing Team	Finance	General Contractor	Stakeholders	Electricians	Foreman
Preliminary action plan	1.1a	1.83	R					C		
	1.2a	1.83	I			R				C
Investigate permissibility of project	2.1a	1.83	I	R						
	2.2a	2.83	A	R						
	2.3a	2.83	A	R			I			
Begin feasibility study	3.1a	0.25	A	R					C	
	3.2a	0.75	I	A		R				
	3.3a	0.75	I	A	R					
	3.4a	0.25		R						
Record stadiums utility cost	4.1a	1.03	I	R					C	
Develop model	5.1a	1.03		R						
	5.2a	0.03		R						
	5.3a	0.03	I	R						
	5.4a	3.03		R						
	5.5a	5.03	A	R			I		C	
Hold post feasibility study meeting	1.1b	1.03	R	C	I		I		I	
Review general findings	2.1b	2.03	R	R						
	2.2b	2.03	A	I		R				
	2.3b	2.83	A	R	I	R	I	I	I	
Prepare project schedule	3.1b	0.13	R	I	I	C	C	I	I	
	3.2b	0.75	A	R						
	3.3b	1.03	A	R						
	3.4b	1.03	R	I		C	C	C		
	3.5b	1.03	R							
Acquire funds from Stakeholders	4.1b	1.33	R		I		I	I		
Produce 2 first assembly drawings for General Contractor	7.1b	4.03	A	R			I		C	I
	7.2b	8.33	A	R			I		C	
Procure Electricals	5.1b	0.83	I			R				I
	5.2b	10.03	I		I	R				I
	5.3b	1.83	I	C		R			C	I
Purchase charging stations	5b	2.03	I	I	I	R				
Formulate a marketing platform	9.1b	3.03	I		R					
	9.2b	3.83	I		R	C				
	9.3b	3.83	I		R	C				
	9.4b	3.43	I		R	C				
Risk Analysis	12.1b	10.03	A	S	C	R				
	12.2b	6.03	A	R		S			S	
	12.3b	6.03	A	R		S				
	12.4b	2.03	R			S	S	S		
Final installation	8.1b	7.03	A	S			C		R	
	8.2b	8.03	R							

Olympic Stadium Project Resource Allocation Chart

ID	Resource Name	Task	Work (months)	2015 Oct	Jan	Apr	Jul	2016 Oct	Jan	Apr	Jul	2017 Oct	Jan	Apr	Jul	2018 Oct	Jan	Apr	Jul	2019 Oct	Jan	Apr	Jul	2020 Oct
1	Project Manager		7.90	46.5	0	0	96.1	62	0	0	40.3	0	0	0	0	0	0	0	0	0	0	0	0	0
		1.1a	1.50	46.5 DAYS																				
		1.1b	1.00					31																
		2.1b	2.00					62																
		3.1b	0.10					3.1																
		3.4b	1.00						31															
		3.5b	1.00						31															
		4.1b	1.30								40.3													
2	Project Team			0	84	93	147.3	93	93	55.3	93	93	93	93	9.3	93	93	93	93	0	0	0	0	0
		2.1a	1.00		31																			
		2.2a	2.50		53	24.5																		
		2.3a	2.50			68.5	6.8																	
		3.1a	0.25				7.75																	
		3.4a	0.25				7.75																	
		4.1a	1.00				31																	
		5.1a	1.00				31																	
		5.2a	0.00				0																	
		5.3a	0.00				0																	
		5.4a	3.00				6.7	86.3																
		5.5a	6.00					6.7	93	55.3														
		3.2b	0.75				23.25																	
		3.3b	1.00				31																	
		7.1b	4.00								93	31												
		7.2b	8.30									62	93	93	9.3									
		10.2b	6.00													93	93							
		10.3b	5.00															93	93					
3	Marketing Team			0	0	0	93	93	93	93	72.65	0	0	0	0	0	0	0	0	0	0	0	0	0
		3.3a	0.75				23.25																	
		9.1b	3.00				69.75	23.25																
		9.2b	3.60					69.75	41.85															
		9.3b	3.60						51.15	60.45														
		9.4b	3.40							32.55	72.65													
4	Finance			46.5	9.3	0	93	93	93	93	41.85	155	93	93	93	0	0	0	0	0	0	0	0	0
		1.2a	1.80	46.5	9.3																			
		3.2a	0.75				23.25																	
		2.2b	2.00					62																
		2.3b	0.60					18.6																
		5.1b	0.50									15.5												
		5.2b	10.00									77.5	93	93	46.5									
		8.3b	1.50												46.5									
		6b	2.00									62												
		10.1b	10.00				69.75	12.4	93	93	41.85													
5	Electricians	8.1b	7.00													93	93	31						

Points of Contact

Name/Title/Organization	Email
Greg Keohane, Project Manager, NEU	Keohane.g@husky.neu.edu
Hashim Hafiz, Project Team Member, NEU	Hafiz.h@husky.neu.edu
John Merriman, Project Team Member, NEU	Merriman.j@husky.neu.edu
Priyabrata Purohit, Project Team Member, NEU	Purohit.p@husky.neu.edu
Dr. Tristan Johnson, Project Supervisor, NEU	tri.johnson@neu.edu
Mr. Ayush Tayal, Supervisor Assistant, NEU	tayal.a@husky.neu.edu

Asthetics 9.0
Logic - 9.0
Rethon - 8.5
Content - Well done 9.2

Overall Grade 8.5

90%

180 pts