

PCI Big Beam Contest



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Overview

- Purpose
- Precast/Prestressed Concrete Institute
- Prestressed Background
- Prestressed/Precast
- Key Stakeholders
- Contest Parameters/Existing Conditions
- Technical Objectives/Challenges
- Scope of Service
- Task 1 – Project Management/Review of Current Practice
- Task 2 – Preliminary Analysis and Design
- Task 3 – Final Analysis and Design
- Task 4 – Beam Fabrication
- Task 5 – Beam Testing
- Task 6 – Capstone and Competition Deliverables
- Project Schedule
- Cost Proposal
- Closing Statement



Key Staff

Chad Dietrich – Project Manager



Wael Alqattan – Capstone Manager



Mengxi Du – Analysis and Design Manager



Purpose

- Effectively design a prestressed/reinforced concrete beam
- Meet parameters set by PCI Contest Committee
- Coordinate with PCI Producer Member
- Beam will be tested, analyzed and judged



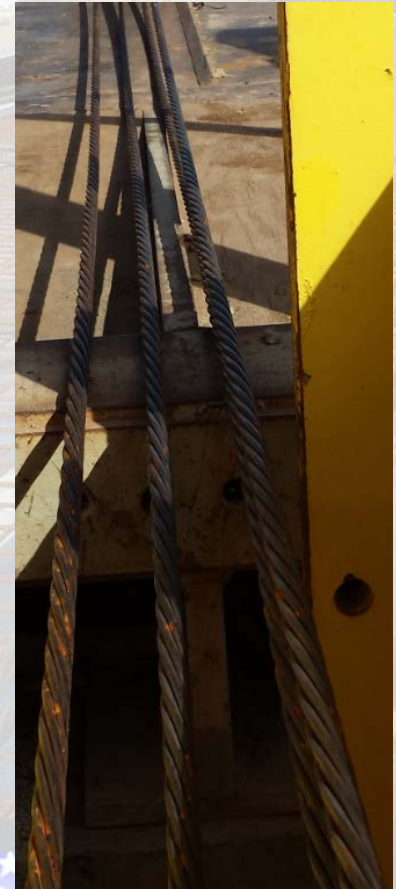
Precast/Prestressed Concrete Institute

- Established in 1954
- Committee of over 2,000 members
 - Consult and ensure proper prestressed production and procedures
- Big Beam Contest began in 2005



Prestressed Background

- Precast has innovated the structural industry
- Prestressed concrete is the process of prestressing concrete with strands
 - Allows for a higher ultimate capacity as well as a higher deflection



Key Stakeholders

- Academic Advisor – Prof. Tuchscherer
- PCI Student Education Committee
- Abdullah Kassab of TPAC
 - Professional Perspective
 - Production
 - Transportation



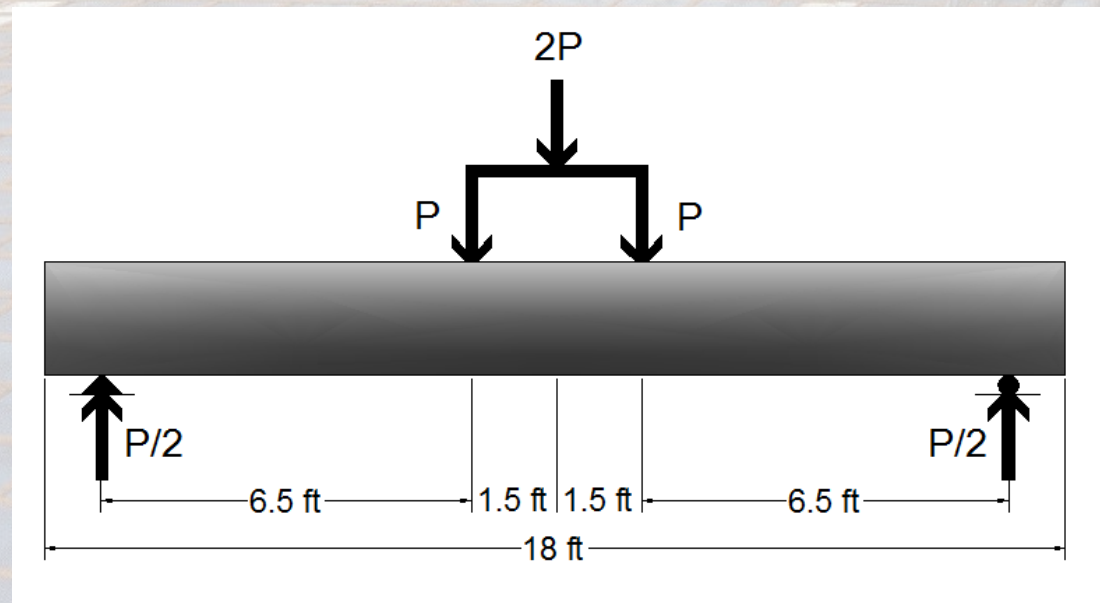
A Division of Kiewit Western Co.

<http://www.merchantcircle.com/business/Tpac.A.Division.of.Kiewit.Western.Co.602-262-1360/picture/view/621290>



Contest Parameters/Existing Conditions

- 18 ft long, prestressed, precast beam simply supported over 16 ft
- Design for
 - Cracking above service load (22 kips)
 - Fail above factored load (35.2 kips) and below peak load (42 kips)
- Judging Criteria
- Few Constraints



Technical Objectives/Challenges

- Design of Prestressed Beam
 - Design, analysis, testing, results and report
- Research Existing Projects
- Acquire additional knowledge outside of the undergraduate curriculum
- Rules and Parameters given by PCI
- Communication with Client
- Testing accuracy and safety
- Deadlines set forth by Pre-Capstone Class and PCI Big Beam Competition

Scope of Service

- Task 1 – Project Management/Review Existing Projects
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1.0 Project Management/Review Existing Projects

1.1 Precast/Prestress Seminar Lectures

1.2 Weekly Team Meetings

1.3 Technical Advisor Meetings

1.4 Review Existing Projects



2.0 Preliminary Analysis and Design

2.1 Concrete Mix Analysis

2.2 Beam Design Analysis

2.3 Design Decision Matrix



3.0 Final Analysis and Design

3.1 Choose One Alternative

3.2 Shop Drawing Using AutoCAD

3.3 Final Predictions Using Response 2000



Response 2000

(<http://www.ecf.utoronto.ca/~bentz/r2k.htm>)



4.0 Beam Fabrication

4.1 Sending of Shop Drawings to TPAC

4.2 Beam Manufacturing

4.3 Beam Transportation



5.0 Beam Testing

5.1 Predicted Calculations in Response 2000

5.2 Preparation of Testing Apparatus

5.3 Testing and Gathering Data

5.4 Analysis of Results



6.0 Capstone and Competition Deliverables

6.1 Project Website

6.2 Proposal Report & Presentation

6.3 50% Design Report & Presentation

6.4 Final Project Report & Presentation

6.5 Final Submittal to PCI



Project Schedule

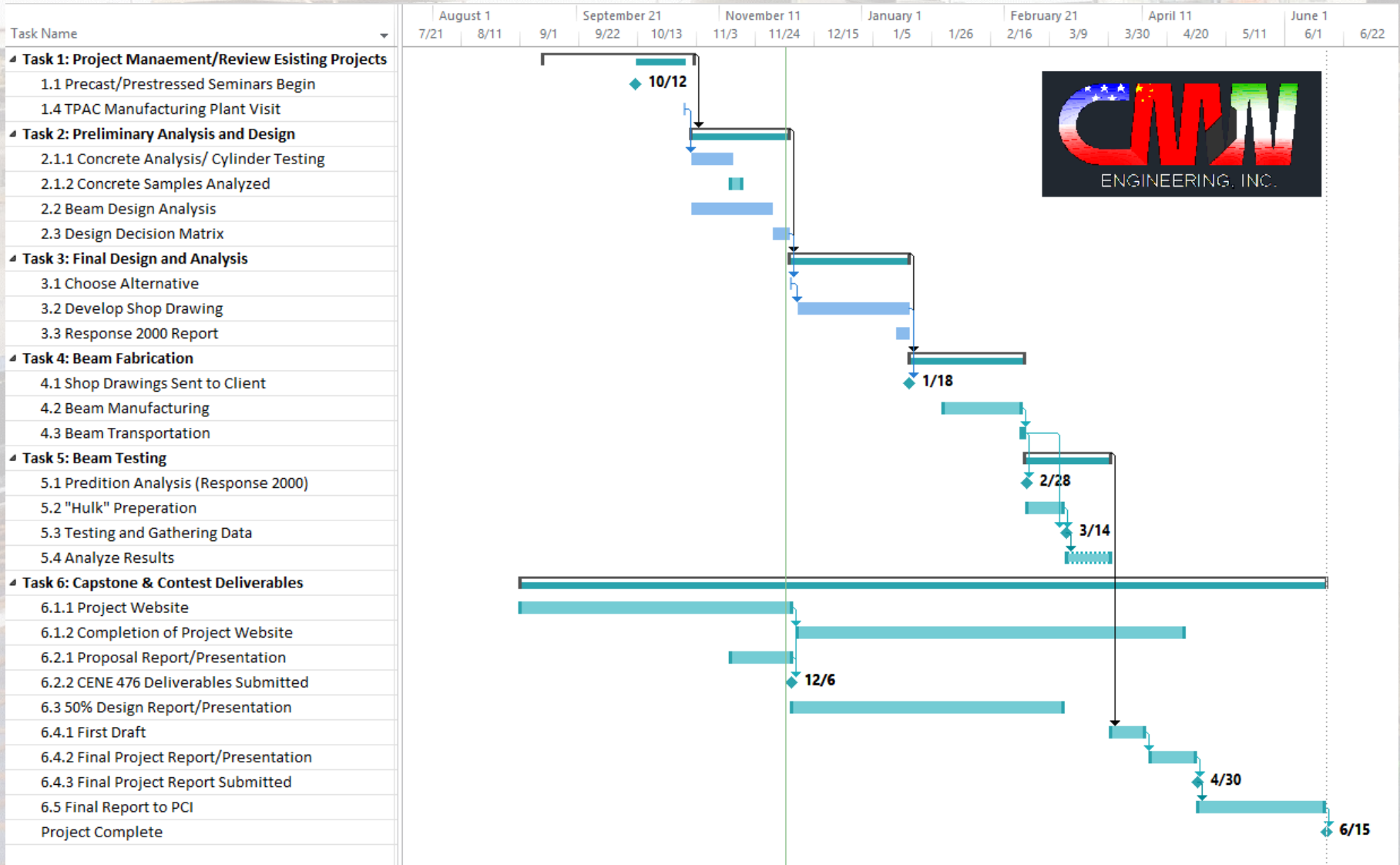
Milestone	Date
Precast/Prestressed Seminars Begin	October 10 th , 2013
CENE 476 Deliverables Submitted	December, 6 th , 2013
Shop Drawings to Client	January 1 st , 2014
Prediction Analysis - Response 2000	February 28 th , 2014
Testing	March 14 th , 2014
Final Project Report Submitted to CENE 486 Instructors	May 1 st , 2014
Final Report Submitted to PCI	June 15 th , 2014

Task	Date Completed
Task 1 - Project Management/Review Existing Projects	November 1 st , 2013
Task 2 - Preliminary Analysis and Design	December 5 th , 2013
Task 3 - Final Design and Analysis	January 17 th 2014
Task 4 Beam Fabrication	February 27 th , 2014
Task 5 - Beam Testing	March 30 th , 2014
Task 6 - Capstone and Competition Deliverables	June 15 th , 2014

*Total Duration of 205 Days

**TPAC's tentative schedule and other delays may warrant a schedule adjustment

Project Schedule



Cost Proposal

Maximum cost of project is
\$57,105.40

Design and Production Cost Estimation

Task Name	Overhead (\$15.0/hr)	Project Engineer (\$218/hr)	Engineer 1 (\$135/hr)	Data/Analysis Technician (\$86/hr)	Cost Per Task
Task 1: Project Management/SOTA					
Precast/Prestressed Seminars	2	4	4	1	\$1,786.00
Decision Matrix Spreadsheet	2	4	4	1	\$1,786.00
TPAC Manufacturing Plant Visit	1	1	1	1	\$586.00
Select mix/Design Own Mix	1	2	2	4	\$1,194.00
ACI 318-11 Code Regulation	1			2	\$322.00
Task 2: Preliminary Analysis and Design					
Concrete Analysis/ Cylinder Testing		2	2	4	\$1,044.00
Concrete Samples Analyzed		1	1	6	\$866.00
Beam Design Analysis		2	2	8	\$1,388.00
Design Decision Matrix	1	4	5	12	\$2,717.00
Task 3: Final Design and Analysis					
Choose Alternative		1	1	2	\$522.00
Develop Shop Drawing	1	4	6	10	\$2,680.00
Response 2000 Report				12	\$1,032.00
Task 4: Beam Fabrication					
Shop Drawings Sent to Client		1			\$215.00
Beam Manufacturing					\$0.00
Beam Transportation					\$0.00
Task 5: Beam Testing					
Predition Analysis (Response 2000)	1	4	6	10	\$2,680.00
"Hulk" Preperation		2	4	12	\$2,002.00
Testing		1	2	4	\$829.00
Analyze Results	1	4	2	12	\$2,312.00
Task 6: Capstone & Contest Deliverables					
Project Website	2	1	15		\$2,543.00
Completion of Project Website	2	1	15		\$2,543.00
Proposal Report/Presentation	1	10	6	2	\$3,312.00
50% Design Report/Presentation	1	10	6	2	\$3,312.00
Final Project Presentation	1	4	4	4	\$1,906.00
First Draft	1	8	5	3	\$2,827.00
Final Project Report	1	12	6	2	\$3,748.00
Final Report to PCI	2	12	8	6	\$4,512.00
Total Estimated Labor Hours	22	95	107	120	\$48,775.00
Total Labor Cost					\$48,664.00

Cost Proposal

Staff Position	Base Pay (\$/hr)	Benefits (%)	Actual Pay (\$/hr)	Profit (%)	Billable Rate (\$/hr)
Project Engineer	150	30	195	10	215
Engineer 1	90	36	122.4	10	135
Data/Analyzation Technician	65	20	78	10	86

Labor & Materials Costs	
Tasks 1 - 3 Design Phase	
Project Management/Sota	\$5,674.00
Preliminary Analysis and Desiq	\$6,015.00
Final Design and Analysis	\$4,234.00
Computer Costs	\$250.00
Design Phase Subtotal	\$16,173.00
Tasks 4-6 Testing/Analysis Phase	
Beam Fabrication	\$215.00
Beam Testing	\$7,823.00
Capstone & Contest Deliverabl	\$24,703.00
Beam Materials	\$3,000.00
Testing/Analysis Phase Subtotal	\$35,741.00
Project Total Cost	
	\$51,914.00
Total + Profit	
Profit of 10%	\$5,710.54
Total Cost	\$57,105.40



Closing Statement

This presentation outlined the project understanding, scope of service, project schedule and the cost proposal. Our team is dedicated to quality, timeliness and professionalism. We will strive to provide you with excellent results and leave you completely satisfied with your whole experience.

Thank you for your consideration of our team.



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Questions?

