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Connecting Classroom and Industry through Project-Based Learning in Construction Management Education

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Abstract

Project-based learning (PBL) is widely recognized as an effective approach for engaging students in authentic industry practice. This paper presents an industry-informed PBL framework implemented in an upper-division heavy civil construction management course that intentionally connects classroom instruction with contemporary construction project pursuit processes. The framework centers on a term-long, team-based project modeled after RFQ/RFP pursuits common to Construction Manager / General Contractor (CM/GC) and Construction-Manager-At-Risk (CMAR) delivery methods.

Student teams complete a coordinated sequence of deliverables, including a statement of qualifications, a detailed cost estimate, and a critical path method schedule, supported by lectures, guest speakers, and applied in-class exercises. Technical content is introduced incrementally and applied immediately, allowing students to experience estimating, scheduling, and means-and-methods planning as interdependent components of a single project. The framework is flexible and scalable, allowing instructors to adapt project scope, delivery method, and optional safety, quality, and risk deliverables to meet specific course outcomes. The paper focuses on curriculum design and instructional implementation rather than reporting formal educational research methods or empirical assessment results.

Introduction

As the construction industry transitions from traditional hard-bid procurement toward qualification-based and best-value selection [1], exposing students to the full project development process is of ever-increasing value. Understanding how Requests for Qualifications (RFQs) and Proposals (RFPs) are structured, evaluated, and pursued is as important as knowing how to estimate or schedule a project.

This paper presents a curriculum design framework and classroom implementation example for integrating project-based learning (PBL) into a heavy civil construction management course through a term-long project that mirrors professional practice. The purpose of this paper is to describe the instructional design, structure, and implementation approach. While this paper does not report empirical educational research findings or formal assessment data, future work will examine student learning outcomes and instructional impact through systematic evaluation. The project framework aligns with ABET and ACCE outcomes for communication and teamwork, as well as additional ACCE outcomes related to safety planning, estimating and scheduling, project delivery methods, and quality assurance/quality control [2, 3]. The project is supported by lectures, guest speakers, and applied assignments. The framework creates a realistic, sequential learning experience that ties together technical, managerial, and communication skills. Rather than treating estimating, scheduling, safety, and quality control as separate lessons, students experience them as interdependent components of a single project pursuit, similar to how they would function within an integrated CM/GC (Construction Manager / General Contractor) or CMAR (Construction-Manager-At-Risk) team.

PBL is well documented as an effective student-centered approach that enhances learning and better prepares students for life after graduation. The same is true for industry collaborations whether in the form of field trips, guest speakers, case studies, or industry informed projects. Combining PBL with industry collaboration provides students with both enhanced educational experience and relevant professional development. Through the selection of a meaningful and manageable project with the course instructor serving as a learning facilitator, PBL provides opportunities to reflect and conceptualize classroom experiences, encourages curiosity, and generates motivation for students to learn and to solve problems on their own. [4, 5, 6].

The benefits from PBL are enhanced through a sequence of industry-authentic activities that scaffold knowledge and build towards a coordinated, long-term proposal package. Early in the quarter, student teams complete an RFQ "kickoff" to review the project scope. The accompanying lecture exposes students to different selection criteria, utilizing real-world examples from solicitations utilizing Qualifications Based Selection (QBS) approaches, and students are tasked with reviewing the prequalification requirements for contractors bidding public work. Afterwards, students draft a brief cover letter expressing interest in prequalification and defining team roles and responsibilities.

As technical content is introduced, students complete in-class, applied assignments such as determining the proper equipment spread, followed by productivity calculations and preparation of an earthwork estimate. Throughout this process, students learn that this process is often included in the technical narrative submitted within the proposal for many QBS solicitations.

From the perspective of students, PBL is a well-received approach to education as they find value in the experience and see its potential to help them develop academically and personally. To help facilitate successful implementation, particularly around teamwork and collaboration, and avoid students feeling left to their own devices or unsupported in these experiences, reflective exercises focused on group dynamics and interpersonal conflict are recommended [7]. To support students in this way, team dynamics are discussed at the start of the project, including activities in which student teams develop team norms, consistent with research showing that effective teams are shaped more by collective interaction patterns and behavioral expectations than individual member traits [8]. In addition, the concept of a Dispute Resolution Board (DRB) is introduced as an industry-informed framework for addressing conflict, providing students with a formal yet constructive process for resolving disputes that may arise.

To further support students through this project, the class uses timely content lectures, guest speakers, and applied assignments including a similar sized case study. These lectures and activities mirror the larger project requirements and allow students opportunities to practice in a low-stakes environment, and then apply what they learn on their larger project. As students progress through the term, they gain understanding and confidence in implementing new concepts on a real project. In addition to these exercises, “gate reviews” are simulated after each activity where the faculty member acts as an internal company executive, providing feedback on proposal compliance, estimate assumptions, and schedule logic before final submission at the end of the term.

The following section describes the course project used to implement this framework, illustrating how PBL and industry-informed practices were integrated to mirror professional project pursuit.

Project Overview

Tracking student progress and learning outcome achievement has been identified as one of the challenges to effective PBL implementation [4]. This was addressed by structuring the project with multiple deliverables, each connected to specific learning objectives which are described in the following paragraphs. It is important to note that the framework is highly flexible and can be adapted to utilize a variety of contract types and project scopes. We identify three “must-have” deliverables and provide optional exercises that can be incorporated into the project as desired. The project was first delivered into the classroom as an alternative procurement contract, incorporating the three must-have deliverables: a statement of qualifications (SOQ), a cost estimate, and a critical path method (CPM) schedule. This was delivered as a group project with teams of four to five students.

Statement of Qualifications (SOQ)

Learning objective(s): Explain the stages in the bid and proposal processes used in heavy civil construction; Differentiate among common heavy civil contract types and delivery methods

An instructor developed Request for Qualifications (RFQ) was provided to students for review. The first assignment was for them to respond with their SOQ. The RFQ utilized was a condensed version of the actual RFQ published for the project. The number of elements in the assigned RFQ is up to the discretion of the instructor depending on time available for students to develop their SOQ. The RFQ includes an overview of the project, lists key dates and milestones, outlines the deliverables and provides a scoring mechanism for best value selection. An example RFQ is provided in Appendix A.

Student's SOQ was prepared from the perspective of a fictitious company and contained the following sections:

1. Cover Letter: Demonstrates the team's understanding of the project requirements and ability to perform the work.
2. Project Personnel: Resumes of each of the students, including, as an option, the assignment of their specific role on the team. For example, Project Manager, Lead Estimator, Scheduler, QC Manager, Safety Manager, etc. Note: we assigned students to update and use their own resumes, not fictious ones, scheduled prior to the career fairs for that academic term, with enough time to afford review by the faculty member.
3. Optional – Project Team's Experience: Students can expand upon any internship or industry experience they may have and how that will assist the project team with completing the work. Alternatively, at the faculty member's discretion, students can imagine where they would like to be mid-career and utilize that fictionalized experience.
4. Optional – Project Delivery and Approach: Students discuss the project team's overall approach to scheduling and sequencing the project to meet the contract duration and completion date. Students list ways to promote efficiency and minimize negative impacts to project stakeholders.

This deliverable was required within the first two weeks of the term to allow sufficient time for work on the remaining components. An important part of industry experience is the emphasis on submitting proposals on time. In industry, a proposal that is even one minute late will not be accepted. The deadline for submitting the SOQ was set firmly at 7:00pm and points were deducted when groups submitted a late proposal.

Instructors may also choose to deliver this project using a conventional design-bid-build framework. In this case, while contractor selection is ultimately based on lowest responsive bid, students are still exposed to common public-works prequalification requirements, which typically involve submitting standardized company information rather than a full qualifications-based SOQ [9].

Options for this delivery method may include:

1. Maintain the cover letter and project personnel submittals as above.
2. Incorporate specification and plan reading exercises (scavenger hunt, fill in the blank, or other method) to provide students with opportunities to spend time reviewing project requirements and practice reading plans.

Cost Estimate

Learning objective(s): Apply heavy civil means and methods to support a project cost estimate; Differentiate between self-performed and subcontracted work and incorporate this distinction into a project cost estimate; Coordinate cost estimating with project scheduling requirements

The bid list from the real project was provided to the students, and a subset is given in Appendix B. Some of the items were pre-populated to keep the scope of the estimate manageable. These can be adjusted depending on the length of the term and the complexity of the project selected. Students are required to determine a cost for each of the line items left blank, which include work self-performed by the general contractor and subcontracted work. Self-performed work items require students to determine the labor, equipment, and materials needed to perform the work. Students apply knowledge gained throughout the term to determine the means and methods for each scope of work, identify specific crew and resources needed, apply durations, and include purchased materials for the work items.

The total cost estimate was broken into segments corresponding to unique scopes of work, each containing numerous bid items. For example, Earthwork, Drainage, Concrete, Structures, etc. These segments were paired with learning through the quarter, so that students were working on a particular segment of the project at the same time they were learning about that scope of work during class lectures and guest presentations. In this way, students were provided the opportunity to immediately apply their knowledge in a tangible way. In a 10-week quarter term, we created five segments that were due at the end of the week, beginning in week four.

Instructor provided materials for students to complete the cost estimate:

1. A list of equipment and labor rates containing at a minimum all the equipment and personnel required to complete the project. It is recommended that additional equipment is given for students to perform their own cost evaluation and consider various means and methods. An example equipment and labor rate sheet is provided in Appendix B
2. Fictitious quotes for all subcontracted items of work. The instructor can give one quote per scope of work, or provide multiple quotes for students to evaluate and compare pricing and inclusions/exclusions. A sample subcontractor quote is provided in Appendix B.

The instructor provided comments and feedback for student consideration with each estimate scope. A final cost estimate was due at the end of the term that incorporates all the segments, feedback from the instructor, and any remaining subcontractor items. The actual project pricing can be shared at this time so that students can compare their own pricing to the winning bid and consider where differences arose and improvements might be made.

Critical Path Method (CPM) Schedule

Learning objective(s): Develop a comprehensive, logically sequenced, project schedule for a heavy civil project; Differentiate between the different levels in CPM scheduling

The final requirement is the CPM schedule which was due with the final cost estimate at the end of the term. The CPM schedule was required to have at least 80 activities with no more than 50% on the critical path. It included both pre-construction activities (such as submittals) and construction activities. Students created milestones such as 'Contract Award', 'Notice to Proceed' and 'Contract Completion' to simulate industry processes. The CPM schedule also had to fit within the number of working days allotted by the project specifications. The durations for each activity on their CPM schedule were checked for consistency with the durations they calculated in the cost estimate.

Optional Deliverables

Additional deliverables may be added to the project as time permits to meet additional learning objectives around safety, risk, environmental impacts, and quality control. These assignments can be independent of the cost estimate segments or paired with them. A list of exercises with a brief description of each is provided below for consideration.

1. *Maintenance of Traffic:* Provide plans and a narrative of how traffic control devices will be installed for worker safety. Be sure to accommodate any staging required on the project.
2. *Storm Water Pollution Prevention Plan:* Detail the efforts made to prevent sediment and other pollutants from entering the storm drain system and/or natural waterways. Include a plan view of what BMPs will be used and where they will be installed.
3. *Trenching and Excavation Plan:* Provide a narrative and a cross-section view of how workers will be protected in any trench or excavation exceeding five feet in depth. This may include sloping, benching or other excavation protection systems.
4. *Quality Control Plan:* Review the quality metrics in the specifications for Aggregate Base, Hot Mix Asphalt and Concrete and explain how the contractor will ensure quality is maintained through the duration of the construction. This should include supplier and contractor responsibilities.
5. *Lift Plan:* For work requiring cranes, provide a plan view of a successful lift. Review crane capacity charts to ensure the proper crane is selected and operating within the maximum radius and boom length configuration.

6. *Workplace Injury Plan:* Students develop a one page flyer to be posted on the jobsite, containing project information and outlining emergency response procedures for workplace injuries.
7. *Risk Matrix:* After review of real-world examples, identify key project risks, assign probability and impact ratings, and propose mitigation/contingency actions with an assigned "risk owner". A one-page "heat map", accompanied by a short narrative explaining the top 3-5 risks and how they influence means and methods, schedule logic, and cost assumptions is included.
8. *Technical Approach Narrative (Proposal Section):* A concise, reader-friendly narrative describing how the contractor will execute the work to meet scope, schedule quality, and safety requirements. This deliverable scaffolds on previous work identifying equipment spreads, preparing cost and schedule estimates, and work plans for specific work scopes including QC/testing requirements, ensuring safety for high-risk activities, and key temporary works.
9. *Partnering Plan:* A brief outline on how the contractor team will establish trust and communication with the client/owner and manage disagreements. Define kickoff workshop agenda, communication cadence (daily/weekly/monthly), decision-making hierarchy and escalation ladder, incorporation of partnering techniques (such as a Dispute Resolution Board) and how the team would resolve issues without formal claims.
10. *Stakeholder Engagement Plan:* Identify project stakeholders beyond the contractor team and client/owner. Develop an outreach plan for communicating project impacts and benefits to these additional, affected stakeholders. The deliverable includes a list of outreach methods, as well as a sample one-page public notice describing upcoming work, expected impacts, and contact information.

Conclusions

The applied and industry-aligned framework for integrating PBL into a heavy civil construction management course anchors the term around an authentic RFQ/RFP project pursuit.

Implementation requires minimal resources and can be adapted to other courses. Structuring the course as a sequential proposal development effort and supporting learning objectives with lectures, guest speakers, and scoped deliverables allows students to experience the estimating, scheduling, and quality control processes as interdependent components of a complete project pursuit rather than as isolated topics.

The primary value of this approach is student exposure to how work is executed in an integrated CM/GC and CMAR environment. By incorporating realistic assignments with continuity, students interpret drawings and specifications throughout the life cycle of the project, build a team identity, and produce coordinated submittals that are refined through experienced instructor feedback. This naturally creates an environment that fosters communication and application of professional judgement. Students must work within their group to ensure that estimate assumptions account for scheduling decisions; that work plans, quality control, and task hazard analysis account for proposed sequence and means and methods; and that this work is documented and managed across the proposal deliverable. As a result, students practice the same integration that they will be expected to demonstrate in their careers.

This framework is easily replicable. It can be implemented with a local agency or contractor partner. Even without such a partner, it can be adapted from public bid documents and awarded contract notices. It can be scaled up or down depending on course length and student experience level. And, because deliverables are modular, instructors can select the components that are best suited to their program and course learning outcomes while recognizing regional industry needs. Implementation requires adequate class time (e.g. a lecture/lab) for iterative feedback and works best when students have foundational knowledge in project estimating and scheduling.

Future work will involve implementing a structured, repeatable assessment plan to systematically evaluate the impact of this framework on student learning, technical performance, and professional confidence. Potential measures include rubric-based evaluation of project deliverables, analysis of student performance artifacts, structured industry partner feedback, and student self-efficacy or reflective survey instruments. This approach enables longitudinal analysis of how specific scaffolding components (e.g. interim gate reviews, structured industry engagement, and reflective teamwork exercises) most strongly influence student outcomes. These findings will guide refinement of the instructional model and provide evidence to support broader adoption within construction management programs.

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Appendix A – Project RFQ

REQUEST FOR QUALIFICATIONS

The (insert fictitious agency name) is requesting statement of qualifications ("SOQ") from qualified contractors ("Proposer") to provide construction services for the Highway 46 and Vineyard Drive Roundabout ("Project"). The purpose of the SOQ is to demonstrate the qualifications, experience, competence, and capacity of the Proposer to construct the Project described in this RFQ.

After selection of the successful Proposer the Owner will require from the Proposer a Construction Cost Estimate and Critical Path Method Schedule.

1. GENERAL DESCRIPTION OF THE PROJECT

1.1 Project Summary

This Project is for the construction of the Roundabout at the intersection of Highway 46 and Vineyard Drive in San Luis Obispo County, California. The Engineer's Estimate for construction of the Project is $4,750,000. The project includes the following scopes of work:

- Excavation
- Drainage
- Retaining Walls, including Soil Nail Installation
- Structural Concrete
- HMA Paving
- Landscaping

1.2 Project Schedule

The following are key milestone dates for the project:

- Submission of SOQ – (insert date)
- Selection of Contractor – (insert date)
- Notice to Proceed – (insert date)
- Substantial Completion – (insert date)

2. SCOPE OF SERVICES

2.1 Summary of Services

The project includes multiple phases of construction to facilitate traffic throughout the entire construction duration. At no time will the road be completely closed to the traveling public. Phasing is detailed in the project plans, and changes to the phasing must be approved in writing by the Owner. Proposer's scope of work includes furnishing all labor, equipment and materials to complete the entire project as shown in the plans and specifications, consistent with the bid item price sheet.

2.2 General Qualifications

The Proposer shall hold a California Class A (General Engineering) License and be registered with the Department of Industrial Relations. The team shall demonstrate past experience with similar projects in size and scope, including projects that include phasing and traffic control.

3. PROPOSAL REQUIREMENTS

3.1 General Format

Proposer shall prepare and submit a SOQ for construction services for the Project. The SOQ must not exceed 3 pages, excluding the cover letter, table of contents and appendices. The SOQ shall be prepared on 8-1/2 x11 paper using Airal 11 pt. font, single spaced and margins not to be less than ¾" inch. Each SOQ shall be clear, accurate, and comprehensive. Excessive or irrelevant materials will not be favorably received. SOQs shall include the following items and organized in the order specified below:

- Cover Letter
- Table of Contents
- Statement of Qualifications
- Understanding of Project
- Project Team and Key Personnel
- Appendices
    - Appendix A – Project Team Resumes

3.2 Components of SOQ

(a) Cover Letter

The cover letter must include the Project title, Proposer's firm name, and the name and signature of Proposer's team lead.

(b) Table of Contents

Provide a table of contents with major headings and subheadings identified with corresponding page numbers. The table of contents shall conform to the sections presented herein , be presented in the same sequence, and labeled using the same titles. Identify all attachments, exhibits, tables, and figures.

(c) Statement of Qualifications

Provide an affirmative statement that members of Proposer's team have completed, or have demonstrated the experience, competency, capability, and capacity to complete projects of similar size, scope, or complexity as this Project. Proposer must demonstrate that they have the financial capacity to complete the Project. Proposer shall confirm that they are licensed in the State of California and are registered with the Department of Industrial Relations for Public

Works Contracts. Proposer must have an exceptional safety record, and provide details on its safety culture, including training topics, frequency, and certifications.

(d) Understanding of Project

Proposer must demonstrate their understanding of the Project after having thoroughly reviewed the plans and specifications. Include the Proposer's thoughts and understanding of the project phasing, unique challenges, schedule duration and sequencing and opportunities for value engineering. Provide a narrative description of how the Proposer intends to complete the work within the contract duration.

(e) Project Team and Key Personnel

Proposer must demonstrate that the Project team has the experience to support successful completion of this Project. Describe the structure and management of the Project team, including an organizational chart. The Project organizational chart shall consider staffi to address, at a minimum, the following Project activities: project health and safety, project management, cost estimating, quality control, and environmental/stormwater management. Proposer shall include in Appendix A the resume of each of its team members assigned to this Project.

4. EVALUATION PROCESS

4.1 General

Each SOQ will be evaluated to determine its relative strengths, weaknesses, merits, and benefits. This evaluation will include the degree to which each SOQ achieves the goals and objectives established in the RFQ, conformance to established mandatory criteria, and the degree to which minimum performance criteria are exceed by the SOQ.

4.2 Evaluation Criteria

SOQs that meet the submittal requirements will be evaluated based on the following criteria:

Section	Description	Points
1	Statement of Qualifications	40
2	Understanding of Project	30
3	Project Team and Key Personnel	30
Total Proposal Maximum Score		**100**

At the conclusion of the SOQ solicitation period, the Owner will review each SOQ, and then rank the SOQ according to the evaluation criteria.

After selection of the Proposer to be recommended for award of the Contract, the successful Proposer will meet with the City to review its SOQ and outline deliverables required after Contract Award.

Appendix B – Materials for Students to Develop Cost Estimate

BID ITEM PRICE LIST (EXAMPLE)

Bid Item	Description	Quantity	Unit	Unit Price	Total Price
58	HOT MIX ASPHALT (TYPE A)		Ton		
59	PLACE HOT MIX ASPHALT DIKE (TYPE E)	410.00	LF	$23.00	$9,430.00
60	PLACE HOT MIX ASPHALT (MISCELLANEOUS AREA)	12.00	SQYD	$87.00	$1,044.00
61	TACK COAT		Ton		
62	COLD PLANE ASPHALT CONCRETE PAVEMENT		SQYD		
63	REMOVE BASE AND SURFACING		CY		
64	JOINTED PLAIN CONCRETE PAVEMENT	160.00	CY	$580.00	$92,800.00
65	SOIL NAIL		LF		
66(F)	STRUCTURAL CONCRETE, RETAINING WALL	185.00	CY	$1,092.00	$202,020.00
67(F)	STRUCTURAL CONCRETE, WALL FACING		CY		
68(F)	STRUCTURAL CONCRETE, HEADWALL		CY		
69(F)	STRUCTURAL CONCRETE, DRAINAGE INLET		CY		
70(F)	CONCRETE SURFACE TEXTURE		SQFT		
71(F)	BAR REINFORCING STEEL (RETAINING WALL)		LB		
72(F)	BAR REINFORCING STEEL (EPOXY COATED) (SOIL NAIL WALL)		LB		
73(F)	STRUCTURAL SHOTCRETE		CY		
74	24" REINFORCED CONCRETE PIPE		LF		
75	36" CORRUGATED STEEL PIPE (.064" THICK)		LF		
76	DRAINAGE INLET MARKER	12.00	EA	$55.00	$660.00
77	24" CONCRETE FLARED END SECTION		EA		
78	ROCK SLOPE PROTECTION (60 LB, CLASS II, METHOD B)		CY		
79	ROCK SLOPE PROTECTION FABRIC (CLASS 8)		SQYD		
80	MINOR CONCRETE (CURB) (CY)		CY		
81	MINOR CONCRETE (GUTTER) (LF)		LF		
82	DETECTABLE WARNING SURFACE	390.00	SF	$39.00	$15,210.00
83	MINOR CONCRETE (CONCRETE MOW STRIP)		CY		
84	MINOR CONCRETE (SIDEWALK)		CY		
85	MINOR CONCRETE (CURB RAMP)		CY		
86(F)	MISCELLANEOUS IRON AND STEEL		LB		
87	PREPARE AND PAINT CONCRETE		SF		

Legend:

Leave bid item pricing as entered
Develop price, self-performed
Develop price, choose from subcontractor quotes

LABOR AND EQUIPMENT RATES

Equipment	Hourly Rate
Asphalt Paver - AP1000	$ 215.00
Asphalt Paver - AP1055	$ 220.00
Backhoe - 430	$ 80.00
Cold Planer - PM620	$ 250.00
Compactor - 815	$ 120.00
Compactor - CP13	$ 80.00
Compactor - CS13	$ 80.00
Compactor - CB2.9	$ 40.00
Compactor - CB15	$ 120.00
Compactor - CW16	$ 90.00
Drill Rig (Soil Nail)	$ 250.00
Dozer - D5	$ 80.00
Dozer - D6	$ 120.00
Dozer - D8	$ 230.00
Excavator - 308	$ 62.00
Excavator - 323	$ 140.00
Excavator - 336	$ 180.00
Excavator - 350	$ 250.00
Grader - 140	$ 130.00
Loader - Skip 'n Drag	$ 60.00
Loader - 926	$ 100.00
Loader - 950	$ 140.00
Loader - 966	$ 165.00
Scraper - 623	$ 280.00
Scraper - 631	$ 300.00
Scraper - 637	$ 340.00
Truck - 10-Wheel Dump	$ 95.00
Truck - Transfer / Bottom	$ 110.00
Truck - Low Bed / Mob	$ 110.00
Truck - Small/Pick-up	$ 25.00
Truck - 1 Ton / Service	$ 40.00
Water Truck - 2,000 Gal	$ 60.00
Water Truck - 4,000 Gal	$ 100.00

Labor	Base Rate	Fringes	Total Rate
Laborer - Traffic	$44.00	$27.00	$71.00
Laborer - Shovel/Rake	$46.00	$27.00	$73.00
Operator - Roller	$60.00	$30.00	$90.00
Operator - All Others	$62.00	$30.00	$92.00
Foreman	$65.00	$30.00	$95.00
Cement Mason	$48.00	$28.00	$76.00
Carpenter	$52.00	$28.00	$80.00
Teamster	$44.00	$32.00	$76.00

EXAMPLE SUBCONTRACTOR QUOTE

Happy Trees Landscape Services

BID / PROPOSAL

(Insert Project Name, Contract Info, Location)

Bid Item	Description	Qty	Unit	Unit Price	Total Price
19	Move-In/Move-Out (Temp Erosion Control)	6	EA	$ 540.00	$ 3,240.00
20	Temporary Hydraulic Mulch (Bonded Fiber Matrix)	45,000	SY	$ 0.78	$ 35,100.00
38	Rock Blanket	10,100	SF	$ 15.00	$ 151,500.00
39	Soil Amendment	2.10	CY	$ 252.00	$ 529.20
40	Organic Fertilizer	11	LB	$ 49.00	$ 539.00
41	Plant (Group A)	55	EA	$ 47.40	$ 2,607.00
42	Plant Establishment Work	1	LS	$ 30,000.00	$ 30,000.00
43	Wood Mulch	90	CY	$ 93.00	$ 8,370.00
44	1” Wye Strainer Assembly	2	EA	$ 740.00	$ 1,480.00
45	3/4” Drip Irrigation Tubing	960	LF	$ 2.56	$ 2,457.60
46	Cam Coupler Assembly	2	EA	$ 740.95	$ 1,481.90
47	1” Plastic Pipe (Sch 40)(Supply Line)	400	LF	$ 5.54	$ 2,216.00
48	Pressure Regulating Valve	2	EA	$ 740.95	$ 1,481.90
49	Check Valve	2	EA	$ 676.15	$ 1,352.30
50	Move-In/Move-Out (Erosion Control)	1	EA	$ 540.00	$ 540.00
51	Rolled Erosion Control Product (Netting)	17,500	SF	$ 0.80	$ 14,000.00
52	Compost Sock	1,680	LF	$ 7.50	$ 12,600.00
53	Hydroseed	114,000	SF	$ 0.08	$ 9,120.00
54	Compost (CY)	360	CY	$ 40.00	$ 14,400.00
				GRAND TOTAL	**$ 293,014.90**

Optional Work Items

21	Temporary Check Dam	300	LF	$ 7.70	$ 2,310.00
22	Temporary Drainage Inlet Protection	12	EA	$ 190.00	$ 2,280.00
23	Temporary Fiber Roll	16,000	LF	$ 3.75	$ 60,000.00
24	Temporary Gravel Bag Berm	300	LF	$ 9.00	$ 2,700.00
25	Temporary Large Sediment Barrier	2,500	LF	$ 19.00	$ 47,500.00

Inclusions, Exclusions & Requirements

- Excludes maintenance, repairs and removals
- Excludes traffic control
- Excludes water for temporary bonded fiber matrix (bid item #20) and hydroseed (bid item #53)
- Requires water source to be a high-pressure fire hydrant or a water tower with 12’ clearance within a 1/2 mile of schedule work area; or an operated and maintained 3,000-gallon minimum water truck dedicated to delivering water to our crew
- Requires areas of implementation for all items to be cleared and grubbed and to be clearly marked and measured by the contractor or owner’s representative prior to each scheduled mobilization
- Requires finish grade complete, weed and debris free