

**University of Oklahoma
College of Architecture
The Haskell & Irene Lemon Construction Science Division**

**CNS 5622: Lean Construction Principles
Fall 2021**

Final Exam

CASE STUDY

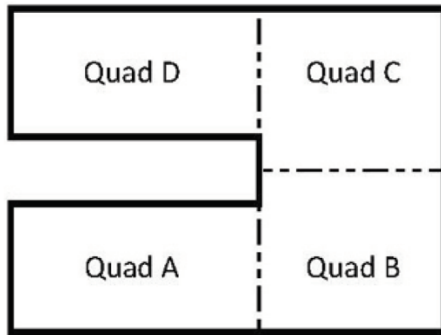
(The case study is adapted from “Lean Practices in Subcontractor Management” by AGC)

General Framework for Case Study

The project that is the focus of this case study is a \$60+ million, four-story, 200,000 square foot higher education facility on the campus of East Coast University (ECU), a major university in the Eastern US. The project, titled the University Energy Center (UEC), houses classrooms, lecture halls, conference rooms, a clean room, a high structural bay, a smart grid facility, offices, and laboratories for electrical, civil, environmental and computer research related to energy and energy delivery infrastructure.

Project Description

The main building for the project was a 4-story, 200,000sf teaching and research center. The footprint of the building is basically ‘U-Shaped’ as shown below. To meet the aggressive construction schedule, the Construction Manager (CM), Premier Construction Services, developed a phased approach for the construction once the building structure was completed. The CM divided the 4-story UEC building into four (4) quadrants and established a construction plan to sequentially complete each Quad of the facility. Once the structure was completed, the CM planned to sequence the enclosure activities (exterior framing, masonry, and windows), followed by the work inside the building, starting in Quad A and sequentially proceeding toward Quad D. This approach permitted the enclosure (shell) and dry-in activities to be completed sooner for the initial Quads which in turn facilitated an earlier start of the interior work. This sequenced approach was the basis of performance for all of the subcontractors/vendors involved with the project. Essential for this approach to be effective was material procurement, staging, and completion of the masonry, stone, windows, and roofing activities in each ‘quadrant’ in a timely manner.



Contractor Selection

Early in the planning phase for the University Energy Center, East Coast University (ECU) decided that they wanted to utilize a Construction Manager at Risk delivery method for the project. With the complexity and size of the project, the University felt it would be prudent to have a contractor on board early during the design period to help ensure that the University received best value in a timely and cost-effective manner. To achieve that objective, approximately one year prior to the start of construction; ECU issued a Request for Proposal soliciting qualifications from contractors interested in the project.

After two months of reviewing proposals and interviewing contractors, ECU selected Premier Construction Services (PCS) as the construction manager for the project. Premier is a North America-based, international construction services company with an annual volume greater than \$10 billion. Premier has a staff of over 5,000 employees involved in more than 1,500 projects each year. The company has approximately 40 offices located throughout the US which provide clients the accessibility and support of a local firm with the stability and resources of a multi-national organization. Additional factors with a positive influence on ECU's selection committee were that Premier Construction Services was the nation's largest builder of educational facilities, had a regional office close to the site, and the contractor had successfully completed a building for the University several years earlier.

Premier was brought onto the project team approximately ten months prior to the actual start of construction to provide preconstruction services during design. Preconstruction services included development of the project schedule and budget, constructability reviews, design management to support project phasing, value engineering, site logistics planning, and the preparation of bid packages and corresponding scopes to facilitate solicitation of competitive bids from qualified subcontractors and/or vendors for each portion of the work.

Approximately 10 months later, when design was nearing 75% completion, the contractor prepared an estimate for the project that established the Guaranteed Maximum Price of approximately \$60 million dollars for the Construction Manager at Risk contract between the Owner and Contractor (CM). The format for the Owner/CM agreement was AGC's Consensus Docs 500 - Agreement and General Conditions between Owner and Construction Manager (where the CM is at Risk). The agreement between Premier Construction Services and the Owner stipulated a construction start

in early January (Year 1) with substantial completion by December 1st (Year 2), twenty-three (23) months later. The Owner/CM agreement noted that ‘time was of the essence’ and the contract carried liquidated damages for late completion.

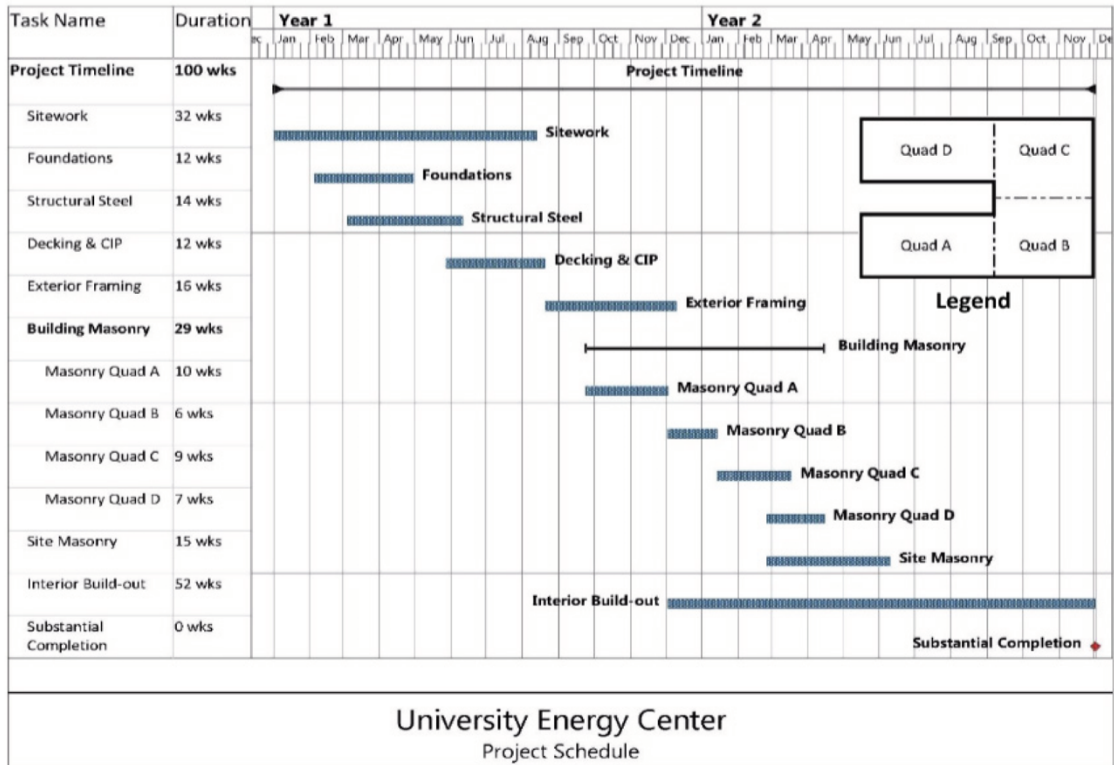
Subcontractor Selection

A primary responsibility of the CM was the identification and preparation of bid packages to serve the phasing requirements and construction approach adopted for the project. Throughout the design phase, Premier worked with the Owner and the Design Team to identify and ensure timely development of the scope and performance requirements for each bid package. Subsequent to preparation, these bid packages were then distributed for competitive pricing by interested subcontractors and vendors deemed capable of performing the work.

Prior to issuing a bid package for pricing, the CM developed a list of pre-qualified subcontractors/vendors for that portion of the work. Premier’s prequalification process collected information from each subcontractor/vendor to determine if they had the financial strength/stability, organizational capability, and operational capacity to perform the work. The format for Premier’s prequalification process was similar to that addressed in AGC’s Pre-qualification for Construction Services Using a Qualifying System in Publicly Bid Projects. Subcontractors and vendors interested in the project were required to submit information addressing company ownership and key employees, business license(s), insurance coverage and rates, current and past projects, financial statements, banking and credit information, bonding capacity and rates, references, and safety experience. Firms meeting Premier’s prequalification standards for the project were then added to a prequalified list of bidders for that portion of the work (bid package).

Since the building envelope for the UEC facility was clad in brick with stone accents, a key bid package for the project was masonry. By May, the 5th month of Year 1 of construction, the scope of the masonry package was developed and issued for subcontractor/vendor pricing. The scope of the masonry bid package was defined by the CM to include the furnishing and installation of the brick masonry, cast stone, CMU support walls, associated flashing, masonry reinforcement, lintels, staging, and final cleaning. When the bid package was issued, there were 28 alternates impacting the masonry work in addition to 6 allowances and 12 unit prices that each bidder was required to submit with their bid. At the time of bid, the proposed schedule for the masonry work was as shown below.

Four (4) interested masonry subcontractors were prequalified by the CM to bid the work. Two of the subcontractors (Bidders A and B) were local to the project, one was headquartered 100 miles from the jobsite (Bidder C), and the corporate office of the fourth bidder (Brick-it) was located approximately 500 miles from the project. Premier had previous, good experience(s) with each of the approved bidders.



In early June, bids were received from each of the prequalified bidders (as shown in Table below). All of the bids were below Premier's budget estimate of \$3,350,000 and the spread from the low to high bidder was approximately 30%. The CM developed a scope comparison spreadsheet to evaluate the bids and ensure adequate coverage of the project scope and the subcontractor's ability to meet the performance criteria for the project. At the time of bid evaluation, the CM was concerned with the subcontractor pricing spread and that the bid received from Brick-it (the apparent low bidder) was significantly below Premier's budgeted cost for the work. However, an investigation of Brick-it's estimate, scope, capability, and capacity convinced Premier that Brick-it should be able to perform the work.

Company	Bid
Premier Estimate	\$3,350,000
Bidder A (Local)	\$3,314,000
Bidder B (Local)	\$3,096,000
Bidder C (100m+)	\$2,896,000
Brick-it	\$2,475,000

In late June, subsequent to the CM's evaluation of the bids, the masonry work was awarded to the low bidder (Brick-it) for \$2,475,000. The form of contract was a Consensus Docs 750 - Standard Form of Agreement between Contractor and Subcontractor. Included with the subcontract were a detailed scope of the work and Premier's administrative and payment provisions for the project.

Following execution of the subcontract and receipt of payment and performance bonds from their surety, Brick-it was given a notice to proceed with the work.

At the time of award, the project schedule provided approximately 10 weeks for engineering, submittals, mock-up(s), and material procurement for the masonry package. Masonry construction for the main facility was scheduled to take 29 weeks. Installation was planned to start in late September of Year 1 in Quadrant A and sequence through to Quadrant D with completion by mid-April of Year 2. In addition, masonry around the site and in the building courtyards was scheduled to be completed from February to June in Year 2.

Originally, the brick masonry and stone on the UEC building were not on the critical path for the project for two primary reasons. First, the exterior backup wall for the masonry consisted of metal stud framing and gypsum sheathing with a waterproof membrane applied to the exterior face of the sheathing. The waterproof membrane facilitated building dry-in prior to completion of the exterior brick and stone veneer. Second, the critical path activities of mechanical, electrical, and plumbing (MEP) rough-in and partition framing could be installed prior to completion of the masonry skin. As a result, the masonry work had approximately four (4) weeks of float in the original project schedule.

Masonry Subcontractor Performance

Subsequent to award, Brick-it had approximately 10 weeks to prepare for the start of construction. However, from the start, Brick-it was slow to provide the submittals and mockup(s) that needed approval prior to releasing the masonry and stone for manufacture and/or fabrication. Concurrently, design changes and clarifications to the exterior windows were also occurring that would have adversely impacted the start of the masonry work.

As a result, the start of masonry construction was delayed approximately 4 weeks till mid-October which pushed the completion of Quad A to late December. However, even with the late start, Brick-it was still committed to meeting the original completion schedule for Quads B, C and D and the site masonry.

Premier was in agreement with Brick-it's late completion in Quad A but was concerned about the delay. While Brick-it's work was a key component for installation of the exterior windows and ultimately the completion of the project up until this point, the masonry work was not on the critical path of the project schedule. However, because of Brick-it's delayed completion of the work in Quad A, schedule float for the masonry was quickly being consumed. If this trend continued, the masonry work could rapidly become a critical path activity.

In November and December, Brick-it's performance began to falter. Brick-it had inadequate field supervision, an insufficient number of skilled workers, experienced late/erratic stone deliveries, and was faced with the start of wintry weather conditions that together contributed to further erosion of the masonry schedule. During this time period, Premier received repeated assurances from Brick-it's field supervision and company leadership that their performance problems would be addressed. In the meantime, Premier was resequencing the interior work and/or making arrangements to increase the resources of the interior contractors to minimize the impact of the masonry delays.

However, slippage continued and by the end of Year 1, completion on Quad A was now forecast to be delayed till early February. This was almost 8 weeks later than originally planned and 5 weeks longer than Brick-it's commitment in October. Additionally, because of the late completion of Quad A, start of the masonry in Quad B (the next area in the sequence) was forecast to be delayed 7 weeks till late January. Masonry was now hindering critical path activities and adversely impacting completion of the project. Premier demanded that Brick-it add additional masonry crews/resources and work overtime to stop the schedule slippage and recover the lost time. Premier also considered withholding payment and supplementing Brick-it's workforce but concerns regarding the risk and the effectiveness of these actions prevented them from implementation. Earlier design changes and clarifications from the owner/designer involving the masonry work had complicated the issue, and Brick-it's surety was supporting Brick-it and remaining largely unengaged. In addition, Premier was beginning to become concerned that there may be insufficient funds remaining in Brick-it's contract to complete the work should they declare Brick-it in default and take over all or a portion of their remaining work. However, Premier again notified Brick-it's surety and repeated their request that the surety take steps to rectify Brick-it's lack of performance.

During January of Year 2, Brick-it slowly built up their workforce, but refused to work overtime. They laid the blame for the bulk of their poor performance on Premier's lack of coordination, untimely and incomplete payment for the work performed, slow response to submittals and design clarifications, and designer/owner changes. Conversely, Premier deflected these accusations and continued to point out the shortcomings of Brick-it's performance – including the lack of adequate supervision, an insufficient work force, and sporadic/incomplete stone deliveries.

During this period (January), in spite of all the finger pointing (or maybe because of it), Brick-it added additional resources on the project to execute the work in Quad A. As a result, the schedule slippage on Quad A stabilized, and the forecast early February completion appeared likely. However, quality concerns began to surface. A number of deficiencies were identified including numerous chipped stones, poorly tooled masonry joints, improperly installed flashings, and extensive staining of the stonework. These quality issues were excessive and widespread throughout Brick-it's work. In addition, because of Brick-it's focus on Quad A, the start of the masonry work in Quad B was delayed till late January which was almost 8 weeks later than originally planned.

By mid-February, the masonry work on Quad A was completed (9 weeks late) except for some missing stone sills/headers and numerous punchlist items. The work on Quad B was progressing, and during February, the majority of the work on Quad B was completed. However, continuing delay in the delivery of stone prevented completion of one elevation in Quad B. Premier investigated this condition and found that Brick-it was in a dispute with Stonewall, their stone supplier for the project, over payment. As a result, Stonewall had stopped fabrication and shipment of a number of the units needed for completion of the work in Quad B. Premier again notified Brick-it, and their surety and demanded action to rectify the problem to permit fabrication to continue and stone shipments to resume. Brick-it responded that they were doing what they could to resolve the problem. They stated that the \$40,000 dispute with their supplier centered on the replacement cost for stone that Brick-it had released for fabrication prior to approval of the initial submittals. This was done to help mitigate delays caused by the design changes that occurred after

award (the designer/owner changed the detailing of the stone which necessitated re-fabrication). Brick-it pointed out that the only reason they released the stone for fabrication prior to approval was to help Premier recover the schedule slippage caused by the design changes in September that delayed the original start of the masonry work.

This situation continued for several weeks with the stone supplier refusing to ship until payment was received, and Brick-it denying that payment was due. Premier considered issuing joint checks, but upon further investigation determined that Brick-it had already been paid for the work and it was becoming increasingly clear that there could be insufficient funds remaining in Brick-it's contract to complete the work. Brick-it meanwhile refused to pay the supplier any additional funds and continued to redirect blame toward the supplier, Premier, the designer, and the Owner. As this impasse continued, the completion of Quad B was further extended.

By late February, the dispute was resolved, but the special stone shapes needed to complete Quad B had yet to be fabricated which took several additional weeks. Therefore, with work stopped on Quad B, Brick-it redirected their workforce toward the remaining quadrants. In an effort to minimize the adverse impact to the project, Brick-it split their workforce and started the masonry simultaneously in both Quads C and D. This approach facilitated a start of the masonry in Quad C six weeks behind the original schedule, and a start in Quad D that was actually in line with the original plan. When this decision was made Brick-it planned to add a few additional masons but anticipated a significant increase in productivity now that the workforce was 'spread out'. The hope was that Quad C and D could both be completed by late April. If accomplished, this would have resulted in a five weeks delay for Quad C and a completion of Quad D that closely aligned with the original schedule.

However, March resulted in more of the same. Shipments of stone remained erratic and payment disputes/issues between Stonewall and Brick-it persisted. Work on Quad B was resumed, but now Brick-it's workforce was spread over three quadrants. Additional masons and equipment were not brought in to supplement the work force (by either Brick-it or Premier) so now all three quadrants were falling further and further behind schedule. Quality problems continued to mount. Other suppliers and workers were now also beginning to experience slow payment(s) from Brick-it. With all this occurring, Premier was becoming increasingly concerned about Brick-it's performance and continued financial health. Project personnel were advocating that Premier declare Brick-it in default and begin supplementing the workforce to expedite completion. However, Premier's senior leadership advised against such action given: a) Brick-it's current forecast of a late April for completion of the masonry work on the UEC facility, and b) the difficulty and time required to secure a replacement subcontractor to perform the work.

In addition, senior management was very worried that there could be insufficient funds remaining in Brick-it's subcontract to complete the work. Their concerns centered on three issues:

Overpayment for the Work Performed: With Brick-it's latest progress billing for March, they had billed to-date for 81% of their subcontract amount (see below). Their remaining balance to finish the work was \$495,104 of which \$284,600 was for the site masonry. There was only \$210,504 unbilled for the masonry and stonework on the building. Premier's management was concerned that Brick-it had been overpaid for the work that they had completed to-date because:

a) based upon their assessment of the work remaining it did not appear that there were sufficient funds to complete the work, and b) Brick-it would likely incur considerable added expense for correction of the quality problems with the work that had already been installed.

Brick-it's ability to Pay its Workforce, Sub-subcontractors, and Vendors: Suppliers and workers were experiencing slow payment(s) from Brick-it and Premier's management was concerned that Brick-it may be experiencing a cash flow problem causing the firm to be unable to pay its bills. Brick-it had been submitting partial lien waivers for their firm to Premier with each progress payment but lien waivers had not been submitted for Brick-its 2nd tier subcontractors and vendors.

Brick-it's Continued Solvency: With Brick-it's escalating quality issues, slow payment, and apparent cash flow problems Premier management was becoming increasingly concerned about Brick-it's continued solvency to: a) complete the work, and b) honor any long-term warranty issues.

The one bright spot in March was that the missing stone for Quad A was delivered and installed and a majority of the punchlist items for that quadrant had been corrected. By the middle of April, Brick-it completed installation of the stone and brick in Quad B and was progressing toward completion of the masonry in Quad D by mid-May. However, work was still intermittent on Quad C because of erratic and incomplete deliveries from Stonewall.

Since December of Year 1, Premier's project staff had been repositioning, resequencing, and expediting the subcontractors performing work inside the UEC facility in an effort to compensate for, or adjust to, Brick-it's continued failure to perform. To further minimize the impact of the delayed completion of Brick-it's work, Premier undertook temporary measures to 'dry-in' the facility. The CM installed protective enclosures and/or barriers on the building envelope openings (windows) to permit temporary dry-in of portions, or all, of several building quadrants. As a result, Quadrants A and B were essentially 'dried-in' during February – approximately 6 weeks behind schedule. Taking similar measures, temporary dry-in of Quadrants C and D was achieved by late April – approximately 5 weeks later than originally planned.

CONTINUATION SHEET

AIA DOCUMENT G703

PAGE OF PAGES

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing

Contractor's signed certification is attached.

In tabulations below, amounts are stated to the nearest dollar.

Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO: 6

APPLICATION DATE: 3/25/XXXX

PERIOD TO: 3/31/ XXXX

ARCHITECT'S PROJECT NO: 0002682

A	B	C	D	E	F	G	H	I	J
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED		MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED & STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE 5%
	Masonry & Stone		FROM PREVIOUS APPLICATION (D+E)	THIS PERIOD					
1	P&P Bond	\$52,000	52,000			52,000	100%	0	2,600
2	Mobilization	\$60,000	60,000			60,000	100%	0	3,000
3	Brick Masonry Quad A	\$405,650	405,650			405,650	100%	0	20,283
4	Brick Masonry Quad B	\$334,900	275,000	43,155		318,155	95%	16,745	15,908
5	Brick Masonry Quad C	\$278,375	95,000	58,106	32,560	185,666	67%	92,709	9,283
6	Brick Masonry Quad D	\$376,230	86,000	167,500	42,825	296,325	79%	79,905	14,816
7	Stone Masonry Quad A	\$143,600	143,600			143,600	100%	0	7,180
8	Stone Masonry Quad B	\$111,350	85,600	25,750		111,350	100%	0	5,568
9	Stone Masonry Quad C	\$92,830	65,300	18,500		83,800	90%	9,030	4,190
10	Stone Masonry Quad D	\$116,065	92,600	11,350		103,950	90%	12,115	5,198
11	Site Masonry	\$355,000	36,500	33,900		70,400	20%	284,600	3,520
12	CMU Masonry (Interior)	\$237,000	222,650	14,350		237,000	100%	0	11,850
	GRAND TOTALS	\$2,563,000	1,619,900	372,611	75,385	2,067,896	81%	495,104	103,395

By early May, the impact of Brick-it's late completion of the UEC masonry on the overall project schedule had peaked. Despite all of the efforts taken to overcome the delayed completion of Brick-it's work, Premier was now forecasting a late December completion for the project. This was approximately 4 weeks later than originally planned and placed the planned opening of the facility for the spring semester of the following year in jeopardy.

In mid-May, the masonry was completed in Quad D, but Brick-it was still experiencing erratic stone deliveries because of payment issues which was extending the completion of Quad C. In addition, Brick-it's supplier for brick, mortar, and sand stopped deliveries due to lack of payment. When Premier became aware of the problem they notified Brick-it and their surety and demanded resolution. The surety stepped in and within a couple of weeks resolved the issue and deliveries resumed.

However, Premier remained concerned about Brick-it's financial condition and their ability to complete the work considering a) Brick-it's persistent payment problems, b) the amount of work yet to be completed, and c) the extensive amount of corrective work remaining to be addressed. Management had become very skeptical that the remaining unpaid balance of Brick-it's contract was sufficient to complete their work. Therefore, Premier notified Brick-it that it intended to withhold progress payments for all work completed since the first of May. This action placed additional stress on Brick-it's financial condition and strained an already tenuous working relationship with Premier.

With work on the building nearing completion, the focus now turned to a) correction of numerous improperly tooled joints, b) the repair or replacement of an extensive list of chipped and/or stained stone and brick masonry, and c) completion of the site masonry. Since most of Brick-it's resources

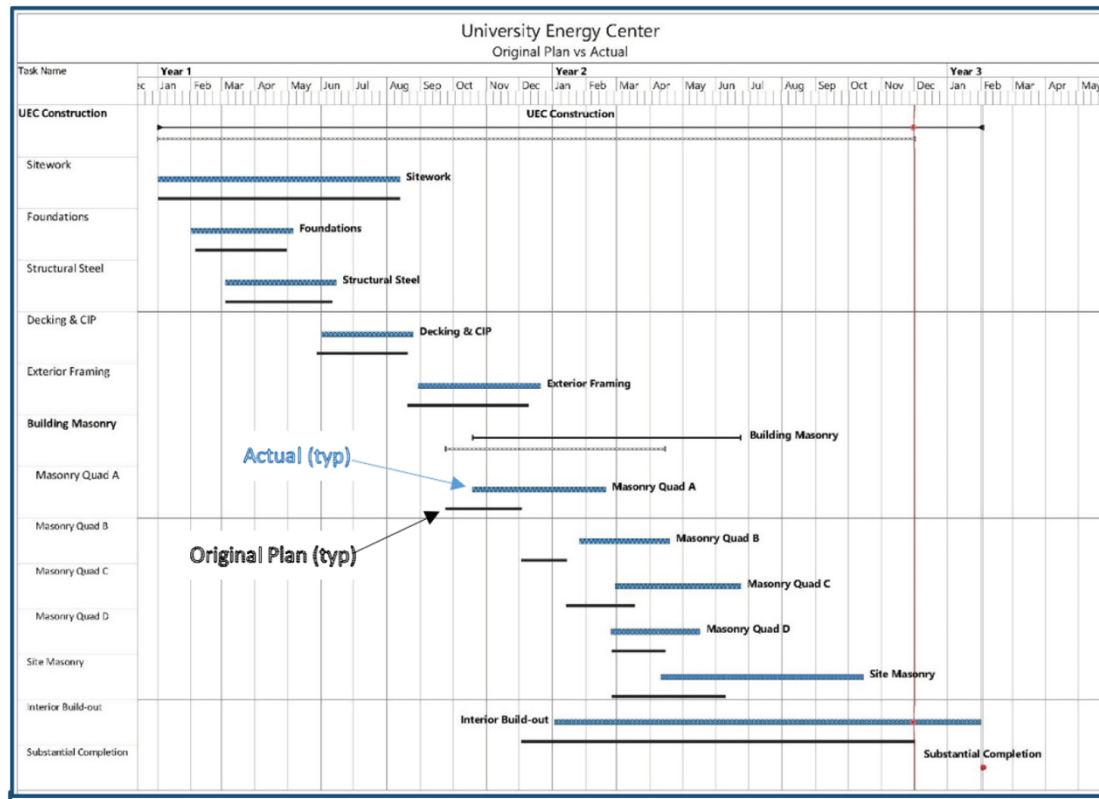
were focused on the UEC facility from December through mid-April, construction of the stone and brick site walls did not get started until late April. This work was originally scheduled to start by mid-January and be complete by early June. This delayed start was now beginning to impact completion of the other site work activities, and if not addressed, could also further jeopardize completion of the project.

Throughout May and June, stone deliveries were erratic, supervision continued to be inadequate, and the work force remained insufficient to effectively complete the remaining work. Finally, in mid-July Premier gave Brick-it and its surety formal notice of nonperformance. Brick-it and its surety were advised of Brick-it's failure to perform the work in a timely fashion and notified that if the situation was not corrected Premier would supplement Brick-it's workforce and expect payment from Brick-it for all costs associated with this action.

Within a few days of receiving Premier's notification, Brick-it in turn notified Premier that they were stopping operations and leaving the site due to Premier's non-payment for the work that Brick-it had performed since May. Shortly after receipt of Brick-it's notification, Premier responded to their threat to cease operations. Premier advised Brick-it and its surety that if Brick-it did not cure their lack of performance, Premier would terminate their subcontract with Brick-it. Shortly thereafter the parties met and worked out a plan to complete the work that was acceptable to all of the parties.

However, within 2 weeks (mid-August) Brick-it was out of brick due to failure (or inability) to pay their suppliers, and as a result, their operations on site ceased. Premier issued another notice to Brick-it and its surety, and the surety reluctantly stepped in to assist Brick-it with payment to their suppliers. Within a couple of weeks, Brick-it's operations resumed.

The actual performance vs. planned for the masonry work, and the project overall, is shown in the following figure.



Subcontractor Default

Over the next several weeks Brick-it's performance continued to be unacceptable and in mid-September, Premier again placed Brick-it on notice. Brick-it was advised that if they did not expedite completion, Premier would supplement their work. In response to Premier's notification, Brick-it claimed that they were behind schedule because, a) work areas were not available for them to commence their work when promised, b) Premier's poor coordination of the project, and c) delays caused by Premier and the owner regarding approval of the stone. Brick-it noted that combined, these issues delayed Brick-it approximately nine weeks which was the same amount of time that Premier claimed they were behind schedule.

Premier responded that Brick-it's delays were not caused by Premier, but rather as a result of Brick-it's poor performance. Premier advised that the delays incurred for approval of the stone at the start of the masonry work were, a) largely Brick-it's fault, and b) not a valid reason for Brick-it's current lack of performance. Premier again notified Brick-it that they intended to supplement their work if they did not take immediate action to expedite. Brick-it did not respond to Premier's demands, and in late September, Premier supplemented Brick-it's work. At that point, Premier established a cost-plus contract with another masonry subcontractor, Superior Masonry, to complete the remaining masonry site work and directed Brick-it to focus their workforce on repair of the chipped stonework and completion of the extensive masonry punchlist.

After Premier supplemented the work, their relationship with Brick-it continued to deteriorate. Brick-it's poor performance persisted, and shortly thereafter in early October, Premier gave Brick-

it and its surety notice of termination. Premier's termination notice advised Brick-it and its surety that the reasons for termination included, a) failure to pay subs/vendors, b) failure to provide an adequate completion plan, c) failure to provide verification of its financial ability to complete the work, and d) failure to confirm availability of material needed for completion.

After Brick-it's termination, Superior Masonry was directed to complete all of the remaining masonry work, including the repair work and the remaining punchlist items. Premier and Superior anticipated that completion of the work would extend till late-December.

In early December, when the masonry work was nearing completion, Premier submitted a listing of their projected costs for completion of the masonry work to Brick-it and its surety. Premier estimated that the cost to address Brick-it's default and complete the masonry work was \$1,575,498. Since the amount remaining unpaid in Brick-it's contract was only \$329,407, Brick-it was advised that the balance due from them was \$1,246,091 as detailed in Table 2. Brick-it and their surety denied responsibility and again redirected blame for their delay and any additional cost back toward Premier, the designer, and the owner.

In an attempt to resolve the dispute, Premier requested mediation. However, this step did not result in resolution of the dispute and subsequently, Premier submitted a 'demand for arbitration' to settle the dispute between the parties.

As the parties continued to direct blame toward each other, Superior completed the masonry 'repair and punch list' work by the end of December. However, the Architect and the Owner still had concerns with the cast stone color and the color variance. In addition, efflorescence had developed in numerous locations on the cast stone and brick masonry. Superior was tasked with cleaning the masonry to remove the efflorescence. However, Premier and the Architect were concerned about the possibility of its reappearance in the future. In addition, replacement of the 'discolored' stone was temporarily postponed as Brick-it and their surety continued to claim that the color range of the installed cast stone was within industry tolerance.

While the dispute continued, the overall project was completed in late January – approximately two (2) months later than originally scheduled.

Finally, six months later in July the parties reached settlement. The terms of the settlement included: a) a payment of approximately \$500,000 to Premier which along with the unpaid balance of Brick-it's contract essentially reimbursed Premier for payments made to Brick-it's vendors and Premier's direct cost to Superior and other subcontractors to complete the work, and b) the surety's commitment to honor Brick-it's warranty requirements.

Premier's Projected Cost to Complete Brick-it's Work

Superior Masonry Costs (Replacement Sub)	\$606,060
Direct Work & Back charges	\$51,438
Premier Management Time Dealing w/ Default	\$172,640
Miscellaneous Costs	\$76,589
Payments to Unpaid Pre-Termination Vendors	\$180,663
Total	\$1,087,390
General Conditions related to Default (15% O&P)	\$163,108
Total	\$1,250,498
Estimated Legal Costs	\$325,000
Total Project Cost to Complete	\$1,575,498
Amount Remaining Unpaid in Brick-its' Contract	\$329,407
Total Due Premier Construction	\$1,246,091

END OF CASE STUDY