ACSA/AIA Practice and Leadership Award

2015-2016 Winner Submission Materials

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AIA/ACSA Practice + Leadership Award

Voices from the Field: From Design Concept to Reality

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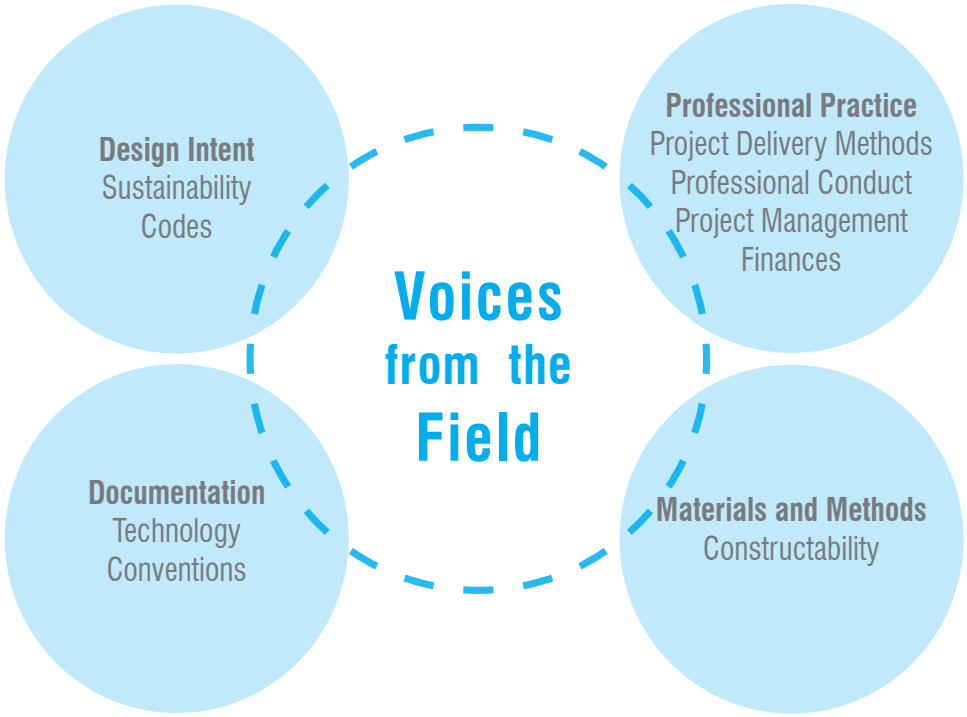
Course Offered: Spring 2014, Fall 2014, Fall 2015

Course Credits: 3.00

Degree Program Setting: M.Arch

Number of Students to whom it was offered:
Spring 2014: 15 Graduate Students
Fall 2014: 12 Graduate and Undergraduate Students

Course position within the curriculum:
Elective Graduate Course opened to advanced undergraduates when space permits
This course is intended to be taken during the final year of graduate study in an M.Arch curriculum.
Advanced undergraduates are pursing a 4+2 BFA curriculum.



Contents

Syllabus: Course Description

The Voices from the Field class is an hybrid classroom and field-based model for integrating issues central to practice in curricula. Supported by the 2013 NCARB Award, the course puts forth a method for examining the integrated relationship between concept design and technical execution by examining active building projects with practicing architects, owners, and construction managers to advance an understanding of the myriad factors that impact design decisions during construction. In doing so, the course takes topics that are sometimes difficult to understand in an academic environment and links them to real world examples, thus providing students with direct experiential knowledge of critical practice issues.

The 2012 NCARB Practice Analysis of Architecture: Education Report strongly recommends integrating field work into the academic curriculum to establish an early understanding of construction sequences. This course provides an opportunity for students to learn about the relationship between concept and technical design, to develop an understanding of construction processes, and to become familiar with the Architect's role from design to construction and maintenance.

Students examine five case studies per semester. Featured buildings are high performance projects, including those pursuing LEED certification and Living Building Challenge registration. Examining these projects demonstrates to students how project teams make decisions regarding issues of sustainability including design, materials and methods, construction processes, and maintenance concerns. Additionally, the seminar introduces students to a range of practitioners including those practicing at small firms, large firms, and university facilities departments. Engaging a diverse group of non-faculty practitioners demonstrates different practice models and offers insights into the professional conduct issues that arise in manifold practice situations.

Course Structure

The course was piloted in the Spring 2014 semester, was tested again in the Fall 2014 semester, and is now in its third iteration during the Fall 2015 semester. The course structure has evolved over the three semesters while maintaining consistency in its core activities and assignment types:

First, students are provided with construction document sets for review. Next, student facilitators present a critical context for each project in a seminar setting. In their presentations, facilitators review the project's financial and institutional details, and present background information on the project team and project delivery method. Then, supported by the faculty member, students lead a walk-through of the project's full construction document set, highlighting primary as well as unusual materials and construction methods, noting drawing conventions, and supplementing with product information. Finally, students generate a list of questions for meetings and site visits with practitioners.

Alternating weeks with the seminar sessions, students then visit the active construction sites accompanied by a corresponding non-faculty practitioner such as the architect, owner's project manager, and construction manager. Students compare the topics that were studied in the classroom with the reality of the construction progress at the site.

Syllabus: Course Objectives

In this course, students will:

Learn about the relationship between concept and technical design.
Develop an understanding of construction processes.
Become familiar with the Architect's role from design to construction and maintenance.

Upon completion of this course, students will be able to:

Deconstruct a construction document set into its constituent parts.
Identify documentation standards.
Compare the styles of construction documentation from different architecture firms.
Explain the relationship of codes and performance standards to design decisions.
Identify what they see on a construction site.
Compare construction documentation to field conditions.
Explain how design, sustainability, and construction issues are integrated on a project.
Explain the impact of contracts and project delivery methods on design and construction projects.
Articulate the relationship between technical issues and social issues on a construction project.
Compare Architects' and Construction Managers' roles during design and construction.
Recognize that the Architect's role is part of a larger series of contractual relationships.
Differentiate among the various roles that architects can adopt in practice.
Recognize a spectrum of leadership styles within the profession.
Differentiate among various practice models that architects may pursue.

Reading + References

Required Text:

Fundamentals of Building Construction: Materials and Methods by Edward Allen and Joseph Iano

Based on primary materials and methods for each project studied, review of construction documents is keyed to specific chapters.

Other Assigned Readings depending on projects studied:

Whole Building Design Guide: Net Zero, Residential Enclosure, and other sections (www.wbdg.org)

"Builders Challenge Guide to 40% Whole-House Energy Savings in the Cold and Very Cold Climates." Building America Best Practices Series. US Department of Energy, February 2011. www.buildingamerica.gov.

Living Futures Website General and Case Studies (www.living-future.org)

General Assigned Readings:

American Institute of Architects, ed. *The Architecture Student's Handbook of Professional Practice. 14th ed*. Hoboken, N.J: Wiley, 2009.

The Emerging Practitioner's Companion esp. Construction Phase Observation (www.epcompanion.org)

Deamer, Peggy. "Detail Deliberations" in Deamer, Peggy, and Bernstein, Phillip G., eds. *Building (in) the Future-Recasting Labor in Architecture*. New York: Princeton Architectural Press, 2010, *pp. 80 - 88.*

Ford, Edward R. "What is a Detail" in *The Architectural Detail*. New York: Princeton Architectural Press, 2011.

Holden, Kimberly J., Gregg Pasquarelli, Christopher Sharples, Coren Sharples, and William Sharples. "What Classifies Architectural Practice?" in *SHoP Out of Practice*. The Monacelli Press, 2012, pp. 91-99.

The American Institute of Architects*. AIA Foresight Report. Washington, DC, 2014.*

Course Assignments

The course evaluation is based on several individual and team efforts including the following:

General Participation: 15%
We are fortunate to engage a diverse group of non-faculty practitioners including architects, construction managers and owner's representatives. Student questions and contributions to the discourse are essential to the success of this course.

Field Reports (5): 60%
Following site visits, students will synthesize and reflect on their experiences by composing Field Reports. Each Field Report must include ten "Observations." Students are required to submit five reports per semester.

Seminar Facilitation (in teams): 15%
Students are each assigned to be seminar facilitators for one project that we visit. In teams, seminar leaders present a critical context for that project's documentation, give a visual presentation outlining key issues for each project, facilitate discussion with appropriate discussion questions, and gather a list of questions for practitioners.

Final Assignment: 10%
Students write a short culminating reflective paper or take an instructor administered survey synthesizing their experiences with respect to the course objectives.

Assignment 1: Field Reports

(see Appendix for examples of student work and evaluation rubric)

Following site visits, students will synthesize and reflect on their experiences by composing Field Reports. Each Field Report must include at least 10 Observations. Observations include:

- Activity on-site
- Photos juxtaposed with annotated excerpts from construction documents
- Observations connecting the transformations that occur from drawing to construction.
- Questions about what you are observing
- Changes since last visit when applicable

Observations also should illuminate aspects of the design and construction process that were not readily apparent from the documentation alone and that were gleaned from questioning practitioners. This should particularly include issues of:

- Leadership
- Project management
- Construction scheduling
- Collaboration
- The role of technology
- Ethics and professional conduct

Your submittal should not be exactly like a professional field observation report but rather a compilation of key issues that you noticed in the documentation and that then were observable in the field. Making connections to the documentation and providing images is essential.

- How does this compare to the documentation?
- What are some of the factors that are driving this project?
- Are typical or unusual for this project?

Assignment 2: Seminar Facilitation

Students are assigned to teams to be seminar facilitators for projects that we will visit.
Prior to the construction site visit, the team will give a presentation that does the following:

- Presents a context for that project's documentation including background information on the project – check client websites, newspaper articles, etc.
- Reviews the project team including architecture, consultant, and construction firm websites
  - Does this project fit in with their other work?
  - Are they experts in this project type?
  - What's the context for this work in their general portfolio?
- Identifies and explains the project delivery method.
  - Provides an organizational chart for the team.
  - Reviews project finances especially for publicly bid projects.
- Leads a walk-through of the Construction Document Set:
  - Reviews life safety, zoning, and code documentation.
  - Highlights primary materials and construction methods.
  - Explains drawing conventions, define terms.
  - Identifies unusual materials or methods.
  - Reviews appropriate consultant drawings, identifies differences between architects' and consultants' documentation focus
- Provides additional background information, such details about products.
- Gathers a list of student questions for site visits with practitioners.

Assignment 3

(see Appendix for examples of student work and reflective essay evaluation rubric)

Reflective Essay | Spring 2014

The culminating assignment for the first semester in which this course was offered, Spring 2014, was a 1000 word Reflective Essay in which students were asked to synthesized what they had learned from the documentation review, the construction field visits, outside assigned readings and the meetings with non-faculty practitioners. All of the students were graduate students and many were in their final semester. Many wrote about how their perspective on issues central to practice had changed over the course of the semester and how the course affected their thinking about their future plans.

Student Survey | Fall 2014

At the conclusion of the second iteration of this course, the Fall 2014 semester, the culminating assignment was a survey. Students were asked eleven questions in which they indicated on a 5-point scale to what degree the course increased their understanding of the following topics: Constructability, Project Management, Sustainability, Professional Conduct, Collaboration, and the Role of Technology.

Each topic employed questions with language adopted from the 2012 Practice Analysis. For each question, students were also asked to make connections between the Practice Analysis Recurring Themes, the Qualitative Findings and their experiences. Students were then evaluated on their ability to make these connections.

Self Assessment: Analysis of Course Content

These tables represent an attempt to internally evaluate the course with regard to content. The intention for the course is to develop a model that complements and integrates information amassed in comprehensive courses. However, it was unclear at the outset whether the course could provide exposure to a sufficiently broad spectrum of project types, project issues, and professional roles.

In considering this course's ability to be adapted to other academic scenarios, the instructor was particularly concerned with similar architecture programs located far from urban centers. Testing the course over one spring and one fall semester identified that it was possible to source construction projects from a mostly rural area with a robust diversity of project types and budgets, construction materials and methods, sustainability targets, and project delivery methods. See Tables 1 and 2 below for an analysis of the course content with respect to project distribution.

Project	Type	Size	Budget (millions)	Firm Size	Phases Visited	Structure	Rating System	Delivery Method
Integrative Learning Center (ILC)	Academic	150,000 sf	$93.25	14,000	Interior Finishes Millwork, MEP	Steel	LEED Gold	CM At Risk
Football Performance Center & Pressbox	Athletics	55,000 sf 5,800 sf	$34.50	1,600	Cladding, Interior Build-out, MEP	Steel	LEED Gold	CM At Risk
Bechtel Environmental Center	Classroom	2500 sf	$1.79	8	Complete,	Wood: glulam	Living Building	Design-Bid-Build
Powdermill Village	250 unit Affordable Housing Retrofit	240,000 sf / First Phase: 8,900 sf	$3.00, First Phase: $400,000	8	Testing retrofit strategies	Wood	30-40% energy savings	Design-Bid-Build / Design-Build
Champion Center	Athletics	56,500 sf	$19.00	90	1: Sitework, Foundations 2:Steel	Steel	LEED Silver Min.	CM At Risk

Table 1: Project Distribution Spring 2014 Semester

Project	Type	Size	Budget (millions)	Firm Size	Phases Visited	Structure	Rating System	Delivery Method
Champion Center	Athletics	56,500 sf	$19.00	90	1: Brick Cladding, Interiors 2:Curtain Wall, Interiors	Steel	LEED Silver Minimum	CM At Risk
Bechtel Environmental Center	Classroom	2500 sf	$1.79	8	Complete,	Wood: glulam	Living Building	Design-Bid-Build
Plains Elementary School	Pre-K-2	63,400 sf	$28.00	10	Sitework, Foundations, Steel Structure, CMU	Steel, CMU	LEED Silver Min.	Design-Bid-Build
Parson's Village	38 Unit Affordable Housing	32,430 sf	$12.00	21	Sitework, Utilities, Foundations, Structure, Windows	Wood Frame with Roof Trusses	Zero net energy with PV's	Design-Bid-Build
Baystate Hospital of the Future South Wing & Pharmacy Relocation	Healthcare Fit-Out	70,500 sf + Pharmacy: 14,000sf	$33.00 + $5.5	150+	Interior Build-out, MEP, Millwork Mockups	Steel, Curtain wall, CMU	MA Stretch Code, Green Guide for Health Care	Integrated Project Delivery (IPD)

Table 2: Project Distribution Fall 2014 Semester

Self Assessment: Analysis of Field Reports

The primary assignment for this course was to complete the Field Reports submitted following each site visit. Each Field Report comprised ten observations, with students required to submit five per semester. The first two semesters' Field Reports yield 1492 data points regarding how often "Issues that are Central to Practice" were explored and how these align with the "Recurring Themes" identified by the 2012 NCARB Practice Analysis. The total data points for each project varied as some students made multiple points per "Observation" while other students did not meet the requirements. See Table 3 for an analysis of the content of the Field Report Observations with respect to the Practice Analysis Recurring Themes.

Observations necessarily interrelate. For the purposes of this study, a data point was logged in Constructability if the student paper was primarily discussing the construction detail and implementation, whereas it was logged in Sustainability if the student observation discussed the detail's impact on the energy performance of the project.

This ongoing analysis enables the instructor to evaluate their own methods with respect to the course objectives. Moreover, this analysis provides an assessment of the emphasis of the course and an evaluation of the degree to which students are able to articulate their understanding of the course content.

Recurring Themes	Constructability - Structures, Systems, Materials, Methods	Constructability - Building Codes	Professional Conduct	Site Design	Project Management / Construction Administration	Role of Technology	Sustainability	Collaboration	Documentation	Design	Total
Integrative Learning Center (ILC)	71	12	0	3	6	0	7	10	11	0	120
Football Performance Center & Pressbox	102	27	0	3	16	0	0	0	0	0	148
Bechtel Environmental Center (2 visits)	165	7	6	35	3	0	92	0	10	0	318
Powdermill Village	84	0	41	0	17	0	6	4	25	0	177
Champion Center (2 visits)	164	3	0	6	70	5	20	2	3	0	273
Plains Elementary School	98	0	0	5	18	0	9	5	0	11	146
Parson's Village	90	9	2	13	20	0	8	0	1	0	143
Baystate Hospital of the Future	102	0	0	0	32	6	0	14	0	13	167
Total Observations	**876**	**58**	**49**	**65**	**182**	**11**	**142**	**35**	**50**	**24**	**1492**

Table 3: Distribution of 2012 NCARB Practice Analysis Recurring Themes Exhibited in Field Reports

Feedback from Participating Practitioners

The following comments are representative of practitioner letters at the course's conclusion:

I found the students to be attentive and asking questions that opened discussion on many topics that offer learning opportunities….I think that such discussion is sharpened by your having organized the course into a classroom meeting, in which the design program and documentation are reviewed (and some of the peculiarities revealed), and then a second meeting at the construction site.

Bruce Coldham FAIA, Coldham + Hartman Architects - Practitioner Letter, 1.6.2015

All too often, students graduating from an architecture program do not have this field experience and do not fully understand how all the pieces fit together and why. This NCARB program with UMass Amherst provides a great benefit to its students by teaching them the importance of proper documentation and communication throughout the entire project process.

....I hope the students gained as much of an appreciation for this course as I have. I truly believe this course is vital to students giving them an even greater depth of knowledge and the ability to create a well-rounded individual once they move on from student to employee, and hope this course will continue for future students and would also feel privileged to be a part of this great program.

Rich Halm RA, JCJ Architecture - Practitioner Letter, 12.24.2014

I really appreciated the broad scope of the conversation – as I think the students did as well. Instead of focusing solely on construction details (as I did in graduate school), it was far more interesting to relate some of those specific design decisions to the larger context - the role of the client, OPM, architect, and contractor; lessons learned from the project; and how much of the process is really dependent on human interactions in addition to what gets put on paper.

Touring the site with the OPM, as well as the architect, was also very interesting and helped both parties take a step back and examine their roles in the process.

Kristian Whitsett AIA, Associate Principal Jones Whitsett Architects - Practitioner Letter, 1.5.2015

The tours were very successful. At the time of the tours, the Training Facility and Press Box displayed different stages of progress,which allowed the students to have a broader exposure to the construction process. Students observed many details and asked a wide range of questions, more that I had expected. In several cases, students helped the project by observing conflicts which I had not, allowing me to raise the issues with the contractor.

...As an alumnus, I was proud to participate in the program, helping students gain exposure to construction, an experience that many students in other programs around the country do not get to have. If more opportunities like this become available in the future, I would gladly offer to participate again.

Alec Zebrowski, UMass M.Arch 2011, Perkins+Will - Practitioner Letter, 1.9.2015

From the quality of questions posed by your class and the discussions that followed it was clear to both my colleagues at Suffolk Construction, SBA, and me that prior exposure to other diverse design and construction projects throughout this fall semester had imparted a valued comprehension of design execution through construction upon your students.

...SBA recognizes both the inspirational and educational value of exposure to the tangible world of design, documentation and construction and was honored to participate in this partnership between NCARB and UMass, Amherst. What was unexpected however, was the reciprocal excitement and enthusiasm that we all received from your students as active participants in this program. The ensuing conversations between Suffolk and SBA with regards to this experience were marked by positive feedback and discussions of future teaming academic opportunities. Our participation in this program with you and your students not only strengthened the foundation of design and construction comprehension of your students, but also strengthened the teaming relationship between the SBA and Suffolk as a result.

Kris Kennedy, UMass M.Arch 2011, Steffian Bradley Architect - Practitioner Letter, 12.30.2014

Evaluation of Course by Students

This course has been well received, as demonstrated by my UMass Course Evaluation Summary numbers (rated on a 5 point scale).

SEMESTERS	**Sp '14**	**Fall '14**	**Average**
1. The instructor was well prepared for class:	4.70	4.90	4.80
2. The instructor explained course material clearly:	4.70	5.00	4.85
3. The instructor cleared up points of confusion:	4.40	5.00	4.70
4. The instructor used class time well:	4.50	5.00	4.75
5. The instructor inspired interest in the subject matter:	4.50	5.00	4.75
6. The instructor showed a personal interest in helping students learn:	4.50	5.00	4.75
7. I received useful feedback on my performance:	4.10	4.30	4.20
8. The methods of evaluating my work were fair:	4.50	4.90	4.70
9. The instructor stimulated student participation:	4.60	4.90	4.75
10. Overall, how much did you feel you learned in this course:	**4.40**	**4.90**	**4.65**
11. Overall rating of instructor's teaching:	**4.50**	**5.00**	**4.75**
12. Overall rating of the course:	**4.50**	**5.00**	**4.75**

The following comments are representative of anonymous student responses at the course's conclusion:

For me, this has been one of the most valuable courses I have taken as an undergrad, allowing me to learn more concepts and ideas then I ever would have in my Building Construction Technology courses. I generally felt like the exposure to both the documents and the physical sites themselves provided an important bridging component allowing for the connections between drawing and construction to be made.

Clearly, there is an incredible difference between the schematic design process typical in architecture studio courses compared to the actual depth and rigor that is required to execute design and construction of a real-world project. Nevertheless, before taking this course, I did not fully understand the relationship and transitions between design and construction. I now see that these relationships and transitions are vital parts of the process of creating a building, just as important as design.

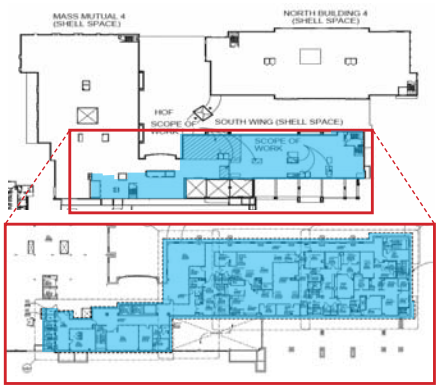
This class was excellent! I believe the structure was set up quite well. It was nice to all get together as a group, discuss and debate and then actually visit the specific projects. All the site visits were very informative and each architect who hosted us was extremely well-prepared and thoughtful. I do not have any suggestions as I believe this semester was a true success!

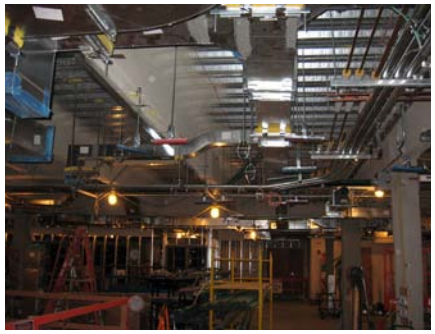
I learned more from this class in all of my classes combined. Mostly because there were pieces of all of my classes within this one. Design classes plus Building Construction Technology classes were exactly what this class was about and I truly hope it can continue to be available to future students.

This course was an extremely intriguing opportunity. It is the type of class I've been yearning to be in since my freshmen year of college. It was extremely useful and added to my excitement of Architecture and Design!

Appendix: Examples of Student Assignment 1: Excerpts from Field Reports

SHELL AND CORE CONSTRUCTION





The structure is a multi-stage construction. First the shell, or envelope, of the building and the main core components, elevator wells and primary mechanical shafts are built according to assumed future uses. These are then modified slightly, as needed to accommodate the interior walls and systems which are added later, once the interior rooms and program are fully designed and construction starts. The plans above show the shells for the north and Mass Mutual wings which are still shell space, alongside the south wing which they are currently fitting out. The section that was highlighted in blue is the section of the hospital's fourth floor which is currently under construction. The top right image shows the shell space with construction of the patient room walls beginning on the sixth floor. The bottom right image shows the mechanical systems which are also being fitted into the existing shell and core.

PROJECT DELIVERY METHOD

This project was extremely unique to the other sites that we have visited for several reasons. Not only was it the only fit-out project as opposed to new construction, it was also developed through an Integrated Project Delivery strategy. This approach demands the involvement of the construction team and general contractor from the very beginning of the process.

More commonly, projects are developed through Design-Bid-Build strategies in which the architects send out finalized drawings that construction teams then respond to with cost estimates. As a result, the architecture firm has a much greater responsibility to generate extremely accurate drawings so that changes aren't made later in the project after the budget has been set. In addition, the relationship between the architects and construction teams becomes tenuous as a result of discrepancies and misunderstandings between the two.

Integrated Project Delivery eliminates a majority of these issues because it integrates the two teams at the very beginning of the process. All stakeholders in the project share the risks and rewards as well, thus creating a mutually supportive relationship. Josh DiGloria, the general contractor, described to us the ways in which this strategy greatly maximizes efficiency. His role during schematic design was to give immediate feedback on costs and feasibility. This meant that there was a lot of time saved in the long run since value-engineering plays a much less significant role.

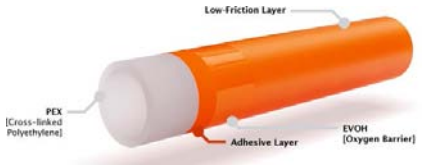
One place in which this relationship was visually communicated was in their main conference room. Lining each of the four walls were calendars that scheduled the coordination between the design and construction teams. The organization was extremely impressive and unlike any of the other site conference rooms we had seen prior. Josh described his intention with the variety of colors that each indicated a different sub-contractor. In this way, all the workers had a comprehensive and visual understanding of the work of other teams and the pace at which they should be accomplishing their tasks. It had proved to be an extremely efficient and successful strategy according to both Josh and Kris at the time.

Images of the white boards in the conference rooms.

RADIANT FLOOR HEATING

Radiant floor heating is the main source of heating in the classrooms and adjacent rooms. The thinking was that since kids spend a lot of time sitting on the floor, radiant heating made the most sense. The tubes were supposed to be hung from the slab rebar, a few inches from the top. But it was accidentally stapled to the bottom of the slab, through the vapor barrier and into the rigid insulation. This was a big nightmare for the architects, but the general contractor relocated the tubes to the rebar, removed all the staples, and put tape over every hole in the vapor barrier. The tubing used in this building is 5/8" radiant PEX +, manufactured by Pexheat.

Feature Overview from PEX Heat Website

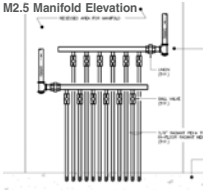


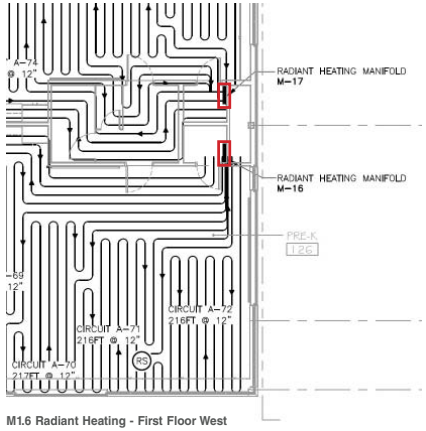
Radiant Floor Heating Manifold
A manifold is simply a device that channels the flow from a bunch of small pipes into one large pipe, or vice-versa.

In this case, the manifolds are supported several feet off the ground by rebar, and connects the radiant tubing to larger pipes going to a boiler in the mechanical room.

The radiant tubing is distributed to a total of 18 manifolds. Two of them are highlighted in red in the plan to the right.

M2.5 Manifold Elevation



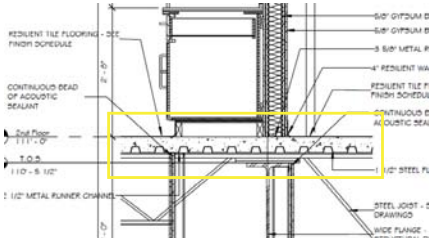


M1.6 Radiant Heating - First Floor West

ACOUSTIC PANELS

As an acoustic strategy in the neighborhoods of classrooms, 1 1/2" steel floor decking is filled with insulation as illustrated in the images below. The decking is planar and punctured with small holes on the side that will be exposed to the classrooms. Kristian described to us that the final installed product will be spray painted white but remain uncovered above the exposed truss systems.

The reverse side of the decking is grooved so that concrete can be poured to create the second floor's slab. These notches both absorb sound as well as provide a strong base for the concrete to adhere to.



5 A5.2 Classroom clerestory wall section with steel acoustic decking.

Acoustic decking laid in place and resting on the exposed trusses.

Punctured planar side of decking.

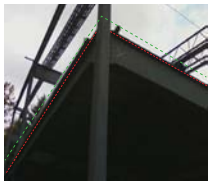
Grooved side that will secure the concrete floor slab.

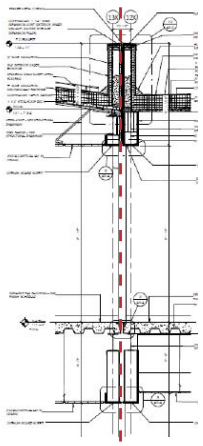
Appendix: Examples of Student Assignment 1: Excerpts from Field Reports

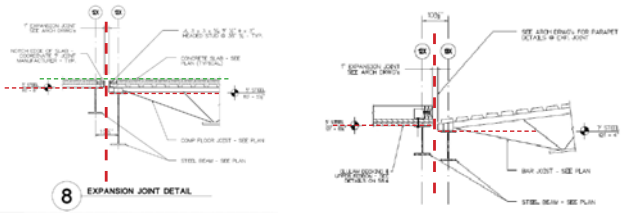
DESIGNING FOR THE REAL WORLD

Another interesting aspect of this project was how apparent the expansion joints were in the building, and how well we were able to observe these moments when we visited the site; whereas these joints were more concealed in the Champions Center because that project was farther along. The attention paid to these particular instances in the drawings was immense. The photo to the far right shows one instance where the structure is accommodating an expansion joint. The image beside it displays a similar instance, showing how the floor and ceilings interact along an expansion joint. The red dotted line highlights the continuous spacing created between the structural components along the expansion joint. The images at the bottom right are also details showing conditions along the expansion joint. Another interesting aspect of these drawings is that they show how structural systems in the same area may be offset in order to accommodate the different thicknesses of various materials. As in the photo below this condition is general more apparent at corners, but may also be observed in these instances. The dotted red lines show the difference in height of the beams, while the dotted green lines illustrate how the they align at the top surface.

The images to the right show decking details at the expansion joint(s). Note that the materials and height of the wide-flange beams differ to either side. This is not necessarily the case at all points along the expansion beam, but is rather a result of the different uses of spaces on either side. The height of the beams varies because of the thickness of the truss ends which are resting on one beam but not the other. Lowering one beam allows for the floor surfaces to be at the same level.







BRICK FACADE

While looking through the drawings, I understood that the majority of the facade of the building was brick, but I didn't look closely at how the bricks would be connected to the structure, and what was going on behind the brick veneer. It wasn't until the site visit when I saw the details in the brick facade and how it connects to the wall behind. One aspect of this wall system that I found very interesting was how metal brick ties protruded through the spray-on insulation, to fit between rows of bricks to anchor them to the wall.

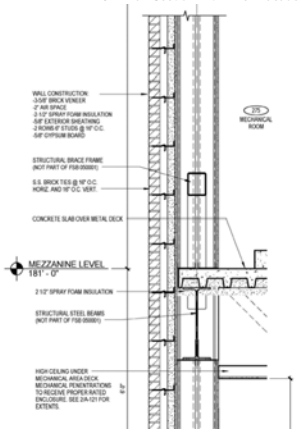
A201 Brick close-up on West Elevation

Left: Venting Screen Detail
At the base of the brick wall, there are small screen vents between every three bricks that allow more airflow behind the wall. The exposed metal trim is flashing that helps divert moisture out of the wall where the vents are. The project architect explained that in the past, they allow air behind the brick, but they didn't allow enough space, and proper venting. This system provides a 2" air space and vents on the bottom and top of the wall.

Left: Air Space Between Insulation and Bricks
Brick ties are placed every 16" on center horizontally, and vertically. This anchors the brick wall to the structure of the building. The ties can be seen in the section below, and poking through the yellow insulation in the photo to the left.

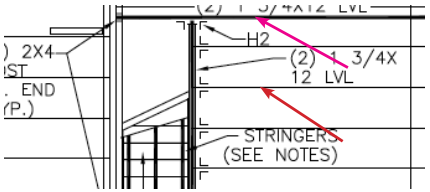
The green mesh is meant to break up the mortar that falls down the air space during construction, so that air can still pass through this area and exit or enter the vents at the bottom. *Dylan Brown*

A324 Wall Section with Brick Facade

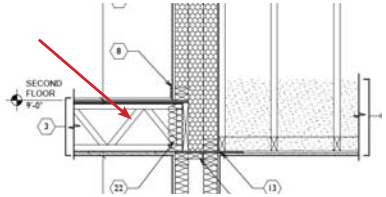


WOOD TRUSS FLOOR JOISTS

Throughout the entire residential complex, wood truss beams are used instead of dimensional lumber joists to create the floor spans. According to the architect, this is the first project where he has used this particular system. There are many advantages to these trusses such has lower weight during construction, less material, faster framing times and stronger spans. The reason these were used however was to provide for more flexible space to run utilities such as HVAC ducts, electrical and plumbing lines. I am curious as to why these are not more prevalent in residential construction, due to their numerous advantages. I found the use of LVLs interesting too, showing how the areas around openings in the floors needed to be reinforced in order to provide adequate structural strength. I wonder why trusses can't be used for the pieces highlighted in pink arrows.



S120D Framing Plan



A-402 WOOD TRUSS

LEED SITE CONDITIONS

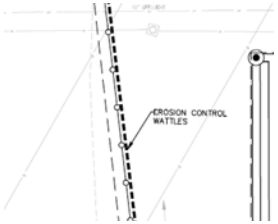
Prior to our site visit, a number of questions regarding the project stemmed from our curiosities about the LEED Silver qualifications. They were all in regards to the building's materials, form, and structure without consideration about the site and it's preparation however.

Upon our arrival, it was very interesting to learn about the additional steps taken by both the architects and Whiting Turner, the construction company, to assure that the site itself was considerate of the environment. Additional signage, recycling bins and fences were used to fulfil the LEED Silver requirements on site.

Perimeter drains surround the building because the site is a former marsh and is extremely wet. The drain directs water into the retention system that then manages its distribution.

This pile of dirt and debris was covered with grass so that it retains the materials in place and keeps them from blowing into the air and negatively affecting the site's air quality.

Silt screens line the base of the metal fencing that encloses the site. They protect the surrounding athletic fields from debris while containing the construction site's dirt and materials from entering into storm drainage systems.



On Page C-100 of the Civil Drawings an outline of the site preparation is illustrated. Here, a dashed line is used to represent the silt fencing.

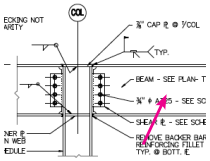
Additional signage on the site was used to indicate various recycling stations. This "Wash Out" area provides a space for cement trucks to dispose of their leftover residual waste by washing it out of their trucks. After it dries, the leftover cement creates chunks that are later recycled and re-used, rather than dumped in landfills. *Elisabeth Baird*

Appendix: Examples of Student Assignment 1: Excerpts from Field Reports

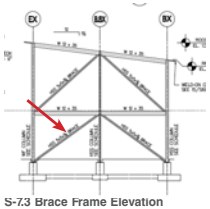
BRACED AND MOMENT FRAMES

These two terms were structural elements that I have heard about but wanted to do some more research to become familiarized with them. Basically, the pods are separated from the central spine of the building by the expansion joint, which divides the structural system. On one side of the joint is the braced frame, which acts in many ways like a truss in tension and compression to resist wind and seismic loads. A moment frame is a construction where the beams are connected rigidly to the columns, and resist lateral loads by bending. I wonder why these two different kinds of systems were used, since they both resist wind loads in different ways. Perhaps it was a design consideration, utilizing different systems to accomplish the architectural goal or if there is a significant amount of wind load to warrant these different systems. *Andrew Shea*

S-3.1 Braced Frame Plan



S-7.1 Moment Connection



S-7.3 Brace Frame Elevation

SLAB ISOLATION JOINTS

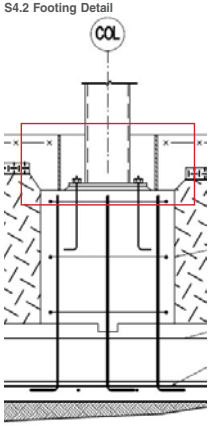
Every place where a column intersected the slab, an isolation joint ensured that the two elements didn't touch each other. In my wood properties class, we covered foundations last week, and we learned about the different types of joints. I had never seen this before, so it looked quite odd on the site.

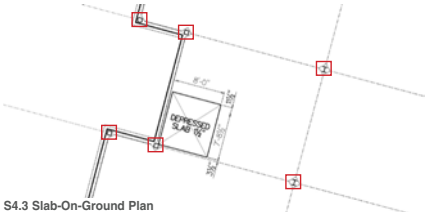
The purpose is to totally isolate the column from the slab, because the column is supported by the footing below, and the slab moves independent of the footing. Therefore the column should not be in contact with the slab so that any expansion or shrinkage does not have any effect on the column.

I couldn't find any specific close-up plan views of the joint, so I'm curious to know what type of material is being used to fill in the space between the slab and the column. *Dylan Brown*

Column Sitting on Footing Pier Through the Isolation Joint

S4.2 Footing Detail

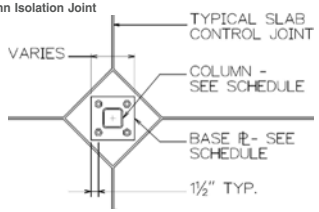




S4.3 Slab-On-Ground Plan

S4.3 Plan of Column Isolation Joint

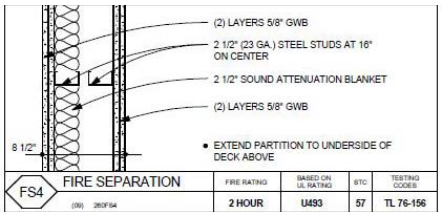
Not only are the columns separated from the slab, but the slab is separated into multiple pieces, so that any differential settling under the slab sections is dealt with in a controlled way.



FIRE PROTECTION

In addition to sound considerations, fire protection is incredibly important in a hospital. There will be almost 100 new patient rooms and patients in them in various states and conditions. As a result, if a fire were to start, ample time would be needed for evacuation and spread prevention is key to this.

In the drawings, details around fire protection show a double layer of gypsum board on each side of the walls as well as an air cavity inside the interior walls. Particular instructions on the drawings were given to ensure that the walls extend all the way up to the underside of the next slab and are sealed. In addition to fire protection in the walls, at the time of the site visit, the ceiling was exposed and I could see fireproofing on all of the structural members. There is also a sprinkler system in place which shows that there are three systems in place to aid in the prevention of fire. This is different from other projects I have looked at this semester as typically it has been an either/or scenario. *Nicholas Jeffway*

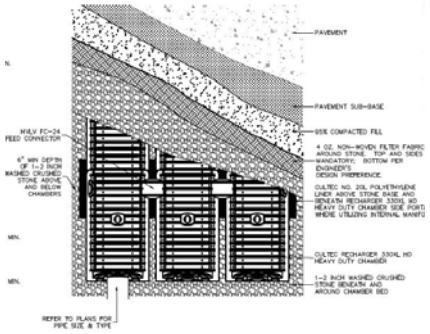


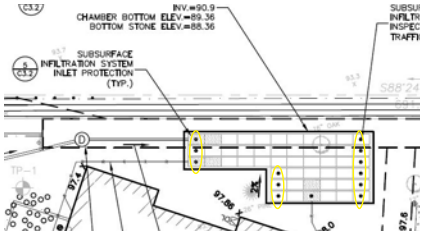
RUNOFF WATER MANAGEMENT

Aside from the extravagant landscape architecture that is present on the site, the civil and landscape engineering which happens underground to manage displaced water on site is quite exemplary.

The design differs from many other large construction jobs that I have seen. Most choose to use less elegant or efficient means of managing all the water that is ultimately displaced from the impermeable surfaces created by new construction. At the Plains Elementary School however, Kristian pointed out a series of pipes which extrude from the ground that are actually part of a subsurface stormwater infiltration system.

The system captures all water which percolates through the ground, and passes it through filtration mats which removes pollutants. It is then slowly released back into the ground. Ultimately, this system recreates the natural process of the ground and eliminates the building's otherwise disruptive presence on the site in regards to ground water displacement. *Nicholas Jeffway*





Appendix: Evaluation of Student Assignment 1: Field Report Rubric

Students were given this rubric with the assignment.

		Aspirational (4)	Acceptable (3)	Marginal (2)	Unacceptable (1)
Understanding of Issues Driving Project	Evidence and Examples from Drawing Sets, Class Discussion, Lectures, Readings, Research and meetings with practitioners	Response demonstrates an in-depth understanding of the issues driving and determining design and construction decisions on this project. Viewpoints and interpretations are insightful and well supported. Clear, detailed examples are provided, as applicable. Information is supported by conversations with non-faculty practitioners as well as documentation and research.	Response demonstrates a general understanding of the issues driving and determining design and construction decisions on this project. Viewpoints and interpretations are supported. Appropriate examples are provided, as applicable. Some information is supported by conversations with non-faculty practitioners.	Response demonstrates a minimal understanding of the issues driving and determining design and construction decisions on this project. Viewpoints and interpretations are unsupported or supported with flawed arguments. Examples, when applicable, are not provided or are irrelevant to the assignment. Minimal information is supported by conversations with non-faculty practitioners.	Response demonstrates a lack of understanding of the issues driving and determining design and construction decisions on this project. Viewpoints and interpretations are missing, inappropriate, and/or unsupported. Examples, when applicable, are not provided.
Connections between Documentation and Construction	Evidence and Examples from Drawing Sets, Class Discussion, Lectures, Readings, and meetings with practitioners	All of the evidence and examples are specific, and relevant to the project. At least 10 project issues are identified. Connections between documentation and construction are illustrated with images from the site and excerpts from the drawings. Unusual terms are defined. Outside research expands knowledge of key materials, assemblies, project delivery methods, and construction processes.	Most of the evidence and examples are specific, and relevant to the project. At least 8 project issues are identified. Connections between documentation and construction are mostly illustrated with images from the site and excerpts from the drawings. Some unusual terms are defined. Some research expands knowledge of materials, assemblies, project delivery methods, and construction processes. .	Some of the evidence and examples are specific, and relevant to the project. At least 5 project issues are identified. Connections between documentation and construction are mostly illustrated with images from the site and excerpts from the drawings. Some research expands knowledge of materials, assemblies, project delivery methods, and construction processes.	Evidence and examples are not relevant and/ or not explained. Sufficient connections are not made. Research is not included.
Mechanics	Sentences Diction Format	Writing is clear, concise, and coherent. Sentences are strong and expressive, with varied structure. All language is accurate and used correctly. No errors in punctuation, spelling, capitalization. Report has a clear title page, author's name on each page, all pages numbered, 10 point Helvetica, 1.2 spacing with easily legible print.	Writing is clear and coherent, but sometimes wordy. Sentences have varied structure. There are no more than two errors in punctuation, spelling, or capitalization.	Writing is clear, but sometimes lacks coherence or is often wordy. There are three to five errors in punctuation, spelling, or capitalization. Two format errors.	Writing is unclear, confusing, incoherent, or verbose. Contains fragments and/or run-on sentences. Six or more errors in punctuation, spelling, or capitalization. More than two format errors.

Appendix: Excerpts from Assignment 3 Reflective Essay | Spring 2014:

Honestly, during the first site visit I had no idea of what I was looking at. In my professional experience as an architect in several important projects, I have not had the chance to go to construction sites and talk with contractors. By asking lots of questions and collecting information about building science, I gradually accumulated more and more knowledge about construction. At the same time, continuing to visit sites enabled me to consolidate my learning with respect to structure, material, and building technology. Therefore, I really value this class experience even though it was difficult at the beginning. The comprehensive knowledge that I acquired towards building and constructing will definitely benefit my future study and professional life.

About our exposure to Bechtel Environmental Classroom, without exaggeration I would claim that it exerts great influence on my plan of my future career. Actually, it is my first contact with the concept of the Living Building Challenge. From the drawings we can see that Bruce and his team members devoted a lot of energy and care to this project, which causes us to think about the responsibility of architect. Bruce told us that they researched the construction materials that are frequently used in modern buildings to find out the red list items in them. To create a healthy interior environment, they have spent a lot of time looking for appropriate substitutes and taking them into account in this design. Undoubtedly, this time-consuming job is only a little part of all the work that Bruce and his coworkers have done for this building, but it contributes to demonstrate an attitude that architects should be with when they are responsible for a building....Personally, I really hope that I can take this living building challenge idea into China in the future and contribute to spread it in order to encourage more practices of environmentally high-performing building.
Yi Wang, Master of Architecture 2015

I was particularly interested in practice issues and the collaboration dynamic, especially how Coldham and Hartman advance their professional practices by a combination of novel high performance and paradigm advancing work such as the Living building challenge with renovation and 'uninteresting' performance enhancing work such as window replacement, insulation and sheathing addition in Powdermill village to keep a functioning architecture practice. This particularly was enlightening for me as a professional who aspires to work in a challenging environment where there is the absence of the market that actively supports elaborate architecture design projects and views sustainability as an expensive design endeavor.
Silva Olaoluwa, Master of Architecture 2015

As a student with little experience on construction job sites, I found the Spring 2014 Voices in the Field course to be very informative. It was particularly useful to examine projects of varying scale and scope; to meet with designers, project managers, and contractors; and to visit buildings in various stages of construction and occupancy. Throughout the semester, two majors themes emerged. First, we observed the different ways in which architects incorporate performance and quality into a project's design intent. Second, it became evident that experimentation in the field is inevitable and important.

At the Integrated Learning Classroom building, we observed an issue where the concrete had been poured, but was measured to have a moisture content that was too high. In order to pour the terrazzo floors, the contractors had to create a new plan: to seal the concrete such that the moisture would not be able to escape from the concrete. After the sealant was applied, the terrazzo flooring could be poured. At the McGuirk Press Box, we also observed an issue where the steel beam manufacturers had incorrectly manufactured part of the structure. As a result, the entire Press Box was not level, causing a major issue that the team had to solve during construction.
Samantha Greenberg, Master of Architecture 2015

Appendix: Evaluation of Student Assignment 3: Reflective Essay Rubric

Students were given this rubric with the assignment.

		Aspirational (4)	Acceptable (3)	Marginal (2)	Unacceptable (1)
Depth of Reflection		Response demonstrates an in-depth reflection on, and personalization of the concepts, material, and experiences presented in the course. Viewpoints and interpretations are insightful and well supported. Clear, detailed examples are provided, as applicable.	Response demonstrates a general reflection on, and personalization of the concepts, material, and experiences presented in the course. Viewpoints and interpretations are supported. Appropriate examples are provided, as applicable.	Response demonstrates a minimal reflection on, and personalization of the concepts, material, and experiences presented in the course. Viewpoints and interpretations are unsupported or supported with flawed arguments. Examples, when applicable, are not provided or are irrelevant to the assignment.	Response demonstrates a lack of reflection on, or personalization of, concepts, material, and experiences presented in the course. Viewpoints and interpretations are missing, inappropriate, and/or unsupported. Examples, when applicable, are not provided.
Connections to Reading and Themes discussed in class	Evidence and Examples from Drawing Sets, Class Discussion, Lectures, Readings, and meetings with practitioners	All of the evidence and examples are specific, relevant and explanations are given that show how each piece of evidence supports the author's position. All sources used for quotes, statistics and facts are credible and cited correctly. At least (2) assigned readings or lectures are cited. At least (3) projects are referenced.	Most of the evidence and examples are specific, relevant and explanations are given that show how each piece of evidence supports the author's position. All sources used for quotes, statistics and facts are credible and most are cited correctly. At least (1) assigned reading or lecture is cited. At least (2) projects are referenced.	At least one of the pieces of evidence and examples is relevant and has an explanation that shows how that piece of evidence supports the author's position. Most sources used for quotes, statistics and facts are credible and cited correctly. At least (1) assigned reading or lecture is cited. At least (1) projects is referenced.	Evidence and examples are NOT relevant AND/OR are not explained. Many sources are suspect (not credible) AND/OR are not cited correctly. No readings are cited. No projects are referenced.
Mechanics	Sentences Diction Format	Writing is clear, concise, and coherent. Sentences are strong and expressive, with varied structure. There are no questions. Diction is consistently appropriate to formal writing. All language is accurate and used correctly. No errors in punctuation, spelling, capitalization. Essay has a title, author's name on each page, all pages numbered, 12 point font, easily legible print.	Writing is clear and coherent, but sometimes wordy. Sentences have varied structure. There are no questions. Diction is usually appropriate to formal writing. There are no more than two errors in punctuation, spelling, or capitalization.	Writing is clear, but sometimes lacks coherence or is often wordy. Sentences lack variety. One question appears. Diction is often inappropriate.. There are three to five errors in punctuation, spelling, or capitalization. Two format errors.	Writing is unclear, confusing, incoherent, or verbose. Contains fragments and/or run-on sentences. Two or more questions are included. Inappropriate diction. Six or more errors in punctuation, spelling, or capitalization. More than two format errors.

Appendix: Excerpts from Assignment 3 Student Survey | Fall 2014:

On the relationship between concept design and technical design

I think a great example of a conceptual to technical design would be from our first visit to the Champions Center. While conceptually the cantilevering porch area is a cool concept, to technically design it means to create the steel support structure with the thermal breaks in order to prevent its movement from impacting the rest of the steel structure of the building.

On the role of documentation in communicating design detailing for construction

One of the most significant lessons I will take from this course is the importance of communicating design detailing for construction. At the start of the semester I was amazed by the number of architectural drawings and details in each of the sets and the specificity of all of them. There were many occasions when we learned about the relationships between architecture firms and construction teams and the conflict that arises between the two as a result of missing components in the drawings (from either party). One site in which this was relevant was at Plains Elementary School when the construction team did not realize that the metal decking on the ceilings was filled with acoustic insulation material. As a result, their bid was much lower because it didn't account for that material or labor cost. This disparity resulted from a miscommunication over the architectural drawings, which proves the importance of clear and accurate drawings.

On understanding of the construction process and the architect's role during construction

Prior to the course beginning I had an understanding on what the architects role was in the construction process. But it was interesting to see the five different projects that were at different levels of completion and how the relationship between the project manager and the architect worked together on all the different projects making adjustments or corrections when necessary.

On understanding professional conduct and ethical behavior

In many ways, all of the projects visited displayed these different traits needed by the architect. In Parsons Village, the architect advocated for moving towards a net zero design, convincing the client it was the right direction to go. At Bay State, we were exposed to how an IPD project functions, which is vastly different from a typical contractual approach, providing the platform for the architect and contractor to work hand in hand during both the design process and construction to ensure a superior product.

On understanding project management and project delivery methods

I certainly gained a strong understanding of project management and the different ways a project can be delivered. Each project provided a unique case. For instance Parson's Village was a state-funded, low income housing which required an open bidding process because it is a public building. The Plains School was a design-bid-build process which differed from the IPD approach that the Baystate project used. Overall, I learned that some processes work better than others and it seemed that the IPD process will be the best method moving forward. In speaking with Kris at the Plains School, he made it apparent that the design-bid-build process can be quite clunky. An architect simply cannot include every detail and also does not have the knowledge as a contractor would have to create the most efficient detail as to how certain parts of a building will actually be constructed. This can cause the project to go over budget and delay when change orders need to be made. Often times, value engineering, which is a necessary part, can completely decimate the power of an architectural design. With the IPD approach however, things seemed a lot more streamlined and integrated. Contractors are brought on to actually voice their opinion as to how things should be built which eliminates a lot of error on the architects part. In addition, a collaborative relationship between designer and builder is established from the get go which is much more effective than the typical process which often creates friction between the designer and builder.