

# BUILDING ENCLOSURE DISCLOSURES:

## Insights from a Survey of Recent Architecture Graduates

By Elizabeth J. Grant, RA, PhD

Photo by Marc-Olivier Jodoin on Unsplash

**B**uilding enclosure consultants need to understand the capacities, and lack thereof, of the emerging professionals they hire. With my colleague Peter Ozolins, I conducted a survey of alumni of the Bachelor of Architecture program graduating in 2015-2017 from Virginia Tech to find out how prepared these students were for the profession. Our survey was inspired by, and in large part based on, the influential work by Earnest Boyer and Lee Mitgang, colloquially known as “The Boyer Report”<sup>1</sup> in architectural education circles. The broader findings of our survey and their implications for architectural education were published in the Association of Collegiate Schools of Architecture’s ACSA108 *Virtual Conference Proceedings*,<sup>2</sup> and findings specifically related to sustainability education and preservation of historic buildings were published in the open-access journal *Buildings & Cities*.<sup>3</sup>

For this paper, I took a deeper dive into the data, searching through answers to the free-response questions in our survey of alumni

as listed in **Table 1** for observations about the building enclosure that would be of interest to consultants and related professionals. My goal was to look for emerging themes related to IIBEC’s mission statement and relay what these revealed about recent alumni’s attitudes and competence in the building enclosure field. Further, my intention was to make these findings, and the conclusions drawn from them, easily accessible to IIBEC members.

### METHODOLOGY

The methodology used in this study is explained in further detail in the papers referenced in the introduction; but in summary, Peter Ozolins and I used a grounded-theory approach to answer the broad research question, “How does architectural education support the preparation of students for the profession?” Grounded theory is a qualitative methodology originating in sociological research and is defined by its developers Glaser and Strauss as “a general methodology for developing theory that is grounded in data systematically gathered and analyzed.”<sup>4</sup> In this approach, researchers enter a situation with an open-ended question, collect data, code it, look for themes, form conclusions, and then develop theories from these themes in an inductive process. This qualitative methodology was buttressed by a more post-positivist approach in the form of direct questions allowing recent graduates to rate and rank various aspects of their educational experiences; these outcomes are shared in the aforementioned papers.

The survey of recent graduates was approved by the Virginia Tech Institutional Review Board and consisted of 42 questions grouped into three categories. There were 20 questions on “personal

background,” eight on “academic preparation for architecture,” nine on “connections to the profession and society,” and five free-response questions. Of 224 alumni earning bachelor of architecture degrees from Virginia Tech from 2015 to 2017 who received the survey, 53 responded. Demographically, the respondents were evenly divided by gender, and a great majority of those answering (92%) were working within the field of architecture. More than half (59%) were currently “unlicensed entry-level interns.” These respondents’ views may not reflect that of their full cohort of graduating students, as it might be assumed that those pursuing architectural careers might have been more inclined to complete the survey. However, given this outcome, the results are useful since so many of the respondents were working in the profession at the time of the survey.

For the specific aims of this paper, I selected keywords from the IIBEC mission statement, as found on the “About IIBEC” webpage,<sup>5</sup> along with the description of IIBEC given in the first paragraph of that website. I also chose five additional keywords commonly used in building enclosure consulting work. These keywords are shown in **Table 2**. I searched for these keywords in the survey answers to see if alumni mentioned any of these ideas in their free responses to the open-ended questions and statements (hereinafter called “questions” for simplicity) shown in **Table 1**.

The IIBEC mission statement is as follows, with the bolded and italicized (by me) type indicating the keywords I sought:

“The mission of IIBEC is to advance the *profession of building enclosure (roofing, waterproofing, and exterior wall) consultants*.<sup>6</sup>”

### IIBEC Mission Statement

The mission of IIBEC is to advance the profession of building enclosure (roofing, waterproofing, and exterior wall) consultants.

I also used the first paragraph of the “About IIBEC” webpage to glean three search terms in addition to those identified above, again bolded and italicized by me. That text is as follows:

“The International Institute of Building Enclosure Consultants (IIBEC) is an international association of professionals who *specialize* in roofing, waterproofing, and exterior wall *specification* and *design*. From sprayed polyurethane foam to cedar shakes, from parking garages to air barriers, IIBEC has a member expert for every type of roof, exterior wall, or waterproofing issue in the world today.”

## RESULTS

### Searched keywords and what they yielded

Enclosure, roofing, exterior, wall, and waterproofing are search terms that were not mentioned by any architecture school alumni in response to any question in a way that relates to the work typically done by IIBEC members.

Of the remaining search terms pulled from the mission statement, “consulting” and “consultant(s)” were mentioned five times, “envelope(s),” used as a rough synonym for “enclo-

## OPEN-ENDED QUESTIONS

<b>Q43:</b> For what aspects of practice did your education best prepare you?
<b>Q44:</b> For what aspects of practice did your education least prepare you?
<b>Q45:</b> What additional areas of study might you have found most useful in preparing you for practice?
<b>Q46:</b> We would like you to reflect briefly on the purposes and priorities of architecture itself. Some have stressed, for example, the need to serve clients, or lift the human spirit, or preserve the environment, address social issues, or expand the aesthetic frontiers of built structures. Looking ahead to the next ten or twenty years, please summarize how you perceive the larger purpose of architects and architecture.
<b>Q47:</b> What are some of the most important changes you feel are necessary if schools of architecture are to respond to, and keep up with, the emerging realities of the profession and society? Are the assumptions and methods that have governed architecture education for decades still valid?

Table 1. Five open-ended questions (and statements) from the alumni questionnaire.


sure,” were mentioned three times, “profession(al)” appeared 49 times, and the root word “build” appeared 74 times. These last two terms referred to many topics outside of the purview of this paper, so they were not included in the analysis to follow.

Regarding the three additional terms that were not included in the mission statement but

were included in IIBEC’s “about” statement on the website, namely “specific/special(ized),” “specification,” and “design,” the following was found. There were three answers that related to specialization, two that referred to specifications, and 92 that related to design, which is unsurprising in an architecture school that focuses overwhelmingly on this aspect of


Save the Dates


# IIBEC Region Meetings



**Region II Virtual Meeting**

**July 20-22, 2021**





**Region V Virtual Meeting**

**June 22 & 24, 2021**

**Attendee Registration Fees:**

**Member - \$175**

**Nonmember - \$225**

**Exceptional Content | Virtual Format**

In Mission Statement	Open Coding (categories)	Q43	Q44	Q45	Q46	Q47	Total
X	enclos*	-	-	-	-	-	0
X	roof*	-	-	-	-	-	0
X	exterior	-	-	-	-	-	0
X	wall	-	-	-	-	-	0
X	waterproof*	-	-	-	-	-	0
X	consult*	-	3	-	-	2	5
X**	envelope*	-	2	1	-	-	3
X	profession*	1	13	5	8	22	49
X	build*	12	17	17	17	11	74
	specific/special*	2	-	-	1	-	3
	specification	-	1	1	-	-	2
	design*	27	15	12	17	21	92
	assembl*	2	-	1	-	-	3
	detail*	1	2	2	-	-	6
	foundation	-	-	-	-	-	0
	section	-	-	-	-	-	0
	plan	-	-	-	-	-	0
	<b>Total</b>	<b>46</b>	<b>53</b>	<b>39</b>	<b>44</b>	<b>56</b>	<b>238</b>

\*An asterisk was used here as a wildcard character when coding the data, to include alternative forms of words and plurals. For example, "enclos\*" refers to "enclose" and "enclosure."

\*\*The word "envelope" was included as nearly interchangeable with "enclosure," which had no matches.

**Table 2. Search terms used in open coding process for five open-ended questions.**

architecture. Again, because the term was so broadly used, results associated with the search term "design" are not discussed in the paper.

I included five additional terms shown in **Table 2**. Because of my familiarity with the curriculum, I suspected alumni quotes including these terms might contain thoughts related to the building enclosure. Of these, "assembl\*" yielded three results, and "detail\*" yielded six. "Foundation," "section," and "plan" did not appear at all.

The following sections contain direct quotes from responses to the five open-ended questions. In some cases, these quotes cover several of the search terms; in those cases, they are listed where they first appear in **Table 2**.

### Consultants/Consulting

**Q44:** Students did not adequately learn about:

"Consulting with other engineers and considering their constraints...I am also aware that there is so much information that it would be impossible to make room to cover all of it. The most critical and important years are spent developing into a designer and I put tremendous value in that."

"Coordination with **consultants**, understanding architectural contracts/AIA documents; the breadth of experience required for the ARE."

"The overall responsibilities of an architect as they pertain to client and **consultant** relationships, as well as the project team environment. I had a few collaborative projects in school, but they were short and were not very often enjoyable. I very much valued being given all the time I was to study and practice from an individual perspective, but wish that I had better experiences in collaborative design practice."

**Q47:** Alumni thought that schools of architecture should change to accommodate the following:

"While the attention given to each student at Virginia Tech seems to be valued higher than at other universities, cooperation among students should be emphasized more to simulate how architects must work together with each other in the real world, as well as working collaboratively with **consultants** and clients."

Students often bemoaned engaging in group projects, but I think the faculty also needs to better facilitate these types of exercises based on their experience (or knowledge) of how project coordination and execution work in an office environment."

"Design education is a strong aspect at Virginia Tech. It is an important part of architecture but still a part of the whole process. In some ways, it was not evident until I entered the profession the importance of being committed to the entire process, from getting a project to checking boxes at the finished job site. Architecture school at VT could tell us a bit more about what the profession is like, which would lead to fascinating conversations that many of us in the profession feel to be important (role of an architect in specific contractual situations, importance of managing and coordinating **consultants**, Gantt charts, etc.)."

### Envelopes

**Q44:** As related in the *Buildings & Cities* paper mentioned in the introduction, respondents felt that in school they had not been taught:

"How to put a building together when you have to accommodate climate with readily available building systems. A lot of the designs I remember didn't even pretend to have building **envelopes**. I don't think we needed to get into the nitty gritty, but it's where a lot of our attention is in the real world."

and

"My education did not provide me a sufficient understanding of how buildings and building **envelopes** come together beyond a very basic residential construction type."<sup>8</sup>

**Q45:** One alumnus, when asked what additional area of study might have been useful simply answered:

"Building **envelopes**."<sup>9</sup>

### Specific/Special(ized)

**Q43:** Alumni felt their educations contributed the following:

"My Tech education best prepared me to be a critical thinker, solve problems, and have a design-minded approach and attitude, and it instilled within me a greater passion to learn and continually improve. My education also provided me with exposure to different concepts in practice, building systems, environmental

design, basic structures, etc., so that when I entered practice I was able to be professionally literate, even if I lacked **specific** knowledge.

“My experience at Tech taught me the value of thinking abstractly in a very detailed field. My education taught me to question everything, which I believe would have set me up to succeed in any environment. Where other graduates came into my office with highly **specialized** architectural degrees—they typically have had less success participating in the overall practice of architecture.”

**Q46:** An alumnus thought the larger purpose and priority of architects should be:

“To regain the trust of clients and users so that architecture does not get relegated to being a sub-contracted service for a larger team usually led by a developer or construction company. To develop the skills and respect for ourselves and our contribution to the process of building so that our autonomy is preserved and even better architecture can be created. To resist becoming **specialty**-focused and esoteric.”

**Specification**

**Q44:** An alumnus cited the following deficiency:

“From a practice standpoint, we never really learned about things like **specifications**/project manuals, or how to coordinate between multiple disciplines (which entails understanding mechanical, electrical, plumbing drawings, etc.). We only ever saw architectural drawings, and even then we probably did not delve into them to the degree we needed to in order to understand what goes into creating a full set of construction documents.”

**Q45:** An alumnus wished they had learned more about:

“Construction documents, coordination between disciplines, requests for information, **specifications**/project manuals, and industry standard software.”

**Assemblies**

**Q43:** Students found that they were given:

“problem solving, creative thinking, critical thinking, design, general principles of building **assemblies**.”

“My education best prepared me for design work. Building **Assemblies** and Environmental

Building Systems [names of courses] were the most applicable for construction document detailing.”

**Q45:** Students wished they had been given:

“Hands-on and continuous learning of building **assemblies** (as opposed to an isolated lecture-style class, the concepts of which are not reinforced or tested in the studio or elsewhere outside the lecture hall). Curriculum focus on client input, responsibilities of the designer/architect, running a firm.”


**Detail(ing)**

**Q43:** Quoted above in “Assemblies.”

**Q44:** Students felt ill-prepared for the following:

“After graduating, I felt least prepared with proper **detailing** of a building and its interior parts, dealing with a client and governing bodies, its legal contracts and all building codes.

“My education did not prepare me for many of the technical aspects of the profession: codes, technical **detailing**, and the contemporary



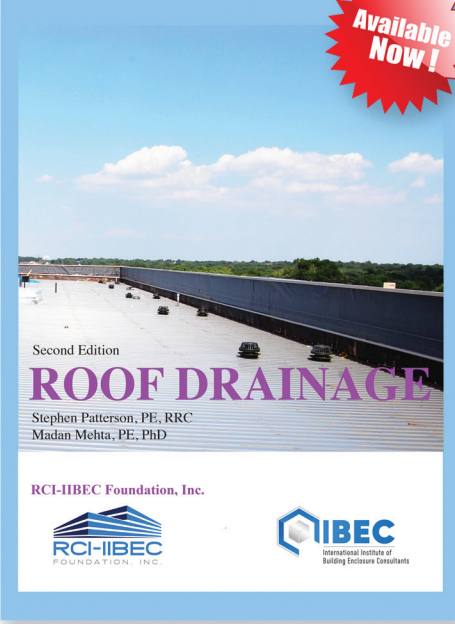
## **Roof Drainage — Second Edition**

*Funding provided by RCI-IIBEC Foundation, Inc.*

**Authors:**  
**Stephen Patterson, RRC, PE**  
**Madan Mehta, PE, PhD**

**Available As:**  
**Secure Smart PDF Format or Printed Edition**

**“This monograph has been written as a textbook to serve all three disciplines—architecture, plumbing engineering, and structural engineering,”** said Dr. Mehta. **“We have learned a great deal since the 2003 publication and have incorporated it into this book.”**



**Available Now!**

	<b>Digital</b>	<b>Print</b>
<b>IIBEC Member</b>	<b>\$59.00 USD</b>	<b>\$75.00 USD</b>
<b>IIBEC Nonmember</b>	<b>\$79.00 USD</b>	<b>\$95.00 USD</b>

**Order your copy today at [iibec.org](http://iibec.org)!**

practice models. I think that one of the biggest shortcomings was that at Tech, I was instilled with a passion to design and create better buildings, a better built environment, and constantly question how to improve, but I was not prepared for the monotony of a professional world in which precedents can be blindly followed, critical thinking can sometimes be cast aside, and continual learning is not facilitated by firms. I think that I would have liked a better understanding of how I could apply my talents, abilities, passion, and drive after graduation, beyond traditional entry into private practice. I still think that my private practice experience is valuable, but aforementioned, I lacked some of the technical skills. However, I don't not [sic] necessarily regret this lack of knowledge, as many of the staff in my office who possess technical skills lack the ability to think critically and approach challenges in new and different ways. But I do feel that as an undergraduate, my understanding of the professional world was somewhat naïve and I was disappointed with some of my work after graduation."

**Q45: Students would have appreciated greater exposure to:**

"Building materials, structures for architects rather than structures for engineers (i.e., how structure relates to a building environment and space), building **details**, computer courses, and additional writing courses could've been helpful."

"This is a complex question, as usefulness as a new graduate in a practice depends on your perspective. I think that some of my hiring managers . . . would also like better technical **detailing** skills so that I could plug in more quickly and more readily become a center for production. However, I am of the opinion that some of the greatest value that I have brought to my firm to date has been my knowledge of recent trends and practices in environmental building design and project development. I have been able to integrate 3-D printing into project workflows in order to examine design possibilities, and I possess a more updated knowledge of environmental building technologies."

## DISCUSSION

### Consultants/Consulting

Respondents noted that they were infrequently exposed to architects' interactions with consultants. The group work in which they did participate, and which forced them to collaborate with other designers, was both brief and unpleasant. They seemed to expect and even accept this situation as necessary given the pri-

mary focus of architecture school on individual design work.

### Enclosure

It was abundantly clear from the relevant comments that many students graduated from architecture school with a limited understanding of building enclosures. One alumnus noted that building envelopes were scarcely addressed in many design projects, and the absence of knowledge about them left graduates unprepared for practice.

### Specific/Special(ized)

In the comments shared here, and in numerous others throughout the data set, alumni feel that their architectural degrees have prepared them to be well-rounded individuals able to apply design thinking to a wide range of problems. The quotes in this section illustrated that alumni of this program don't tend to value specialization in architecture; on the contrary they are proud of their identity as generalists. Some are not overly concerned by their lack of specific knowledge about buildings as they feel sufficiently literate to function well in an architecture office.

### Specification

Alumni who earned professional degrees in architecture noted that they received very little exposure to the preparation of specifications and project manuals, RFIs, and industry-standard software. In accord with other comments related to interactions with consultants, they stated that they knew little about how to coordinate with other disciplines on project teams. One respondent (along with their peers) had never studied project drawings outside the architectural set, and they had given even architectural construction documents only a cursory review.

### Assemblies

Alumni felt that they were exposed to building assemblies, but predominantly in lecture courses with less application to design and real-world scenarios than they would have liked. One respondent appeared to distinguish "design work" from "construction document detailing."

### Detailing

Responses referring to detailing echo a few of the themes already introduced. Alumni tended to view those with technical detailing expertise with some disdain, seeing those individuals as productive and therefore valuable to their firms, but, owing to their narrow focus, rather limited in their artistic vision. Survey respondents tend-

ed to value critical thinking skills over technical competence. One respondent even questioned whether the passion and creativity inculcated in architecture school truly prepared graduates for what was viewed as the limiting and pedantic role of an intern architect.


## CONCLUSIONS AND FUTURE WORK

Several overarching conclusions can be drawn from the themes identified above. First, alumni cited a paucity of exposure to certain critical elements of architectural practice, including collaboration with designers in one's own and in other disciplines, preparation of contract documents comprised of detailed drawings and specifications, and working with clients, contractors, and code officials. Second, they observed a lack of emphasis on building enclosures and detailing. In architecture school, building elements are often indicated only with *poché*, and sometimes neglected altogether, as one alumnus observed. Third, and perhaps most surprising, there was an absence of concern on the part of some respondents about their lack of exposure to the practice of architecture in general and the designing of building enclosures in particular. While not explicitly stated, responses from some alumni insinuated that they expected to learn the specifics of architectural practice while on the job rather than in school. Others seemed to imply that detailing is a distinct activity separate from design.

It is important to note here that there are educators and even practicing architects who believe that architecture school is not the appropriate place to prepare students for the profession.<sup>10</sup> Many contend that professional preparation should more appropriately occur during the internship phase. I claim that a key, while not the sole, aim of professors of architecture is to introduce students to the rudiments of practice and to prime them to be able to make meaningful contributions to the profession— even during their early careers. This can only be accomplished by exposing them to the full range of design parameters that are necessary to achieve and sustain the beautiful spaces that are so highly valued in architecture.

The findings of this paper may be eye-opening to some building enclosure consultants, who might expect that graduates of accredited professional degrees in architecture would as a whole be prepared to work on project teams and eager to create documents that show how buildings go together. The trends emerging from the questionnaire employed in this study point to a different reality—one where new architecture graduates value engagement with sweeping societal questions, care deeply about

the built environment, and aspire to generate creative schematic designs, but feel unprepared for and even unsuited to a profession that expects them to understand the more quotidian aspects of their jobs. These new architects may also find it difficult to discover the satisfaction inherent in designing a building section and details to support the intent of a project; and worse still, may not even consider these to be truly “architectural” activities worthy of their attention.

My concerns here are twofold: first, that architects will relinquish responsibility for, or even interest in, the building enclosure to others; and second, that even as architects increasingly rely on consultants to handle the details, both architectural projects and the consultants who work on them will suffer because so-called “design architects” feel that these concerns are not worth their attention. I have written a book for architecture students addressing these trends in architectural education and practice.<sup>11</sup> I am now in the process of writing another to further explore the attitudes unearthed by the alumni questionnaire by interviewing a wider range of participants from multiple schools and firms. I invite readers who are in the position to hire, mentor, or interact in other ways with architecture students or recent graduates to educate them about the realities of the practice of architecture and the importance of a focus on the building enclosure in achieving design excellence. 

## REFERENCES

1. Earnest Boyer and Lee Mitgang. *Building Community: A New Future for Architecture Education and Practice: A Special Report*. Princeton, NJ. Carnegie Foundation for the Advancement of Teaching, 1996.
2. Elizabeth Grant and Peter Ozolins. “From School to Office: Recent Graduates’ Perceptions of Architectural Education and Practice.” *Proceedings of OPEN: 108th ACSA Annual Meeting*. Association of Collegiate Schools of Architecture (ACSA). 2020. pp. 1–6.
3. Elizabeth Grant. “Mainstreaming Environmental Education for Architects: The Need for Basic Literacies.” *Buildings and Cities*. 1(1). Ubiquity Press. 2020. pp. 538–549.
4. Anselm Strauss and Juliet Corbin. “Grounded Theory Methodology: An Overview.” In Norman Denzin and Yvonna Lincoln, eds., *Handbook of Quantitative Research*. First Ed. Thousand Oaks, CA: Sage Publications, 1994. p. 273.
5. International Institute of Building Enclosure Consultants. “About IIBEC.” [iibec.org](http://iibec.org). IIBEC. Accessed December 27, 2020. <https://iibec.org/about/>.
6. “About IIBEC.” para. 2.
7. “About IIBEC.” para. 1.
8. Grant, p. 543.
9. *Ibid.*
10. Sean Griffiths. “It Is Emphatically Not the Job of Architecture Education to Mimic Practice.” *Dezeen*. Dezeen Limited. August 2, 2019. Accessed December 27, 2020. <https://www.dezeen.com/2019/08/02/architecture-education-opinion/>.
11. Elizabeth Grant. *Integrating Building Performance with Design: An Architecture Student’s Guidebook*. New York: Routledge, 2017.



Elizabeth J. Grant, RA, PhD

*Elizabeth Grant, RA, PhD, is an associate professor at the School of Architecture + Design and the Associate Director of the Center for High-Performance Environments at Virginia Tech. She has written Integrating Building Performance with Design: An Architecture Student’s Guidebook, and papers in Buildings & Cities, Architectural Science Review, the Journal of Green Building, the Journal of Architectural Engineering, Interface, and Professional Roofing. She co-holds two patents for a roof vent and is active in roofing research.*

## OSHA Says: Vaccinated Employees Should Still Mask Up

As more and more essential workers receive their second dose of a COVID-19 vaccine, many are starting to question whether it is still necessary for them to continue to comply with COVID-19 safety protocols such as wearing a mask, washing hands, and staying six feet apart. According to the Occupational Safety and Health Administration (OSHA), the answer is yes, it is necessary.

The key issue is that at this time there is no definitive answer as to whether those who have been vaccinated can still carry and transmit the disease to others. Therefore, the workplace protocols that apply to unvaccinated employees apply equally to those who have had their vaccinations.

There’s no sure way to know whether you are a COVID-19 carrier. According to the OSHA website:

*You should wear a face covering even if you do not feel sick. This is because people with COVID-19 who never develop symptoms (asymptomatic) and those who are not yet showing symptoms (pre-symptomatic) can still spread the virus to other people.*

Photo Credit: © Can Stock Photo / lacustrine

— OSHA.gov, JDSupra

