

REPORT OF THE CONSTRUCTION MANAGEMENT REVIEW COMMITTEE

INTRODUCTION

In mid-January, 2001 Dr. Marsha Landholt, Dean of the University of Washington Graduate School, initiated a review of the two academic programs in the Department of Construction Management, the Bachelor of Science in Construction Management (BSCM) and Master of Science in Construction Management (MSCM). Dean Landholt asked Bruce H. Faaland, Professor of Business Administration to chair the review committee and invited two University of Washington faculty members and two external reviewers to join him. The other committee members are Donald J. Janssen, Associate Professor of Civil and Environmental Engineering, Richard L. Ludwig, Professor of Urban Design and Planning, William W. Badger, Professor and Director, Del E. Webb School of Construction, College of Engineering and Applied Sciences, Arizona State University and James C. Smith, Professor and Head, Department of Construction Science, Texas A & M University.

While the Academic Programs Office in the Graduate School coordinated the review, it was conducted under the auspices of the Dean of the Graduate School, the Dean of the College of Architecture and Urban Planning, the Dean for Undergraduate Education and the Provost.

The Bachelor program review was a normal one held in accordance with the University's ten-year review process for all degree programs with continuing status. The Board of Regents mandated the Master program review at the time it granted authorization for the MSCM in April 1994. The program was to have been reviewed in the 1999-2000 academic year but was postponed to 2000-2001. The charge to the committee was "to assess the quality of the degree programs and provide the faculty with constructive suggestions for strengthening the programs."

At the time the review committee was constituted the members were provided with the following documents:

1. A Department of Construction Management Self-Study;
2. A set of guidelines for the review;
3. Summaries of the Graduate School Exit Questionnaire for the MS in Construction Management degree;
4. The 1993-94 program review documents for the MS in Construction Management degree.

The three internal members of the review committee met with representatives of the Graduate School, the College of Architecture and Urban Planning, and the Dean for Undergraduate Education on February 5 to review the committee charge and discuss specific issues to be addressed during the review. These internal members met later that

week and interviewed the Chairman of the Department of Construction Management. They also prepared an interview questionnaire and during the subsequent week (February 12 through 16) interviewed most of the members of the Construction Management regular faculty. One faculty member was out of town during that time. The external members of the committee arrived on February 25 and the committee devoted February 26 and February 27 to an intensive review. This involved interviewing each member of the faculty again, visiting undergraduate and graduate classes and discussing the program with students, interviewing the Chairman in two additional sessions, interviewing the Dean of the College of Architecture and Urban Planning, meeting with industry representatives and program advisory committee members, and presenting their initial findings to University representatives in an "exit interview." Dr. Badger was able to participate only on February 25 and 26 due to prior engagements.

Review Committee Report

In addition to the exit interview the committee was asked to provide written findings and recommendations within six weeks after the site visit. This report is the committee's response to that part of the charge.

Program History

In May 1963, the Board of Regents approved a program with the title "Building Technology and Administration" in the College of Architecture and Urban Planning (CAUP). The program made its first course offerings in the Winter Quarter of 1964 and the first graduates received their BS degrees in June 1965. Prior to this time, students interested in building construction created their own individual programs from existing university courses. This practice dated back to the mid-1950s and such students received a BA degree from the College of Arts and Sciences (CAS). At the beginning of the 1962-63 academic year this CAS BA degree was replaced by a similar program in the College of Architecture and Urban Planning and the new BS degree program was prepared for Regent approval. The program received "department status" within the CAUP in August 1968 and was given the title of the Department of Building Construction. It is one of four departments in the College of Architecture and Urban Planning. The other departments are Architecture, Landscape Architecture, and Urban Design and Planning. The program received its first accreditation in 1987.

In April 1994, the Board of Regents authorized a new degree and program, the Master of Science in Building Construction and two years later changed the name of the department to the Department of Construction Management. The first graduate courses were offered at the beginning of the 1994-95 academic year. During the same time period the University of Washington Extension program worked with the Building Construction Department to offer a Certificate Program in Construction Management. In 1996, at the time the name of the department was changed, the Board of Regents also authorized changes in the titles of the degrees to Bachelor of Science in Construction Management and Master of Science in Construction Management. The first Masters degree was granted in 1997. At the present time the program enrolls about 60 students per undergraduate class, and has about 50 students in the master's program.

Academic Programs

The Department of Construction Management strategic plan (circa 1999) identifies as the department's mission "(T)o prepare individuals for careers in the construction and related industries by providing a high quality education, to conduct research that will benefit the construction industry, and to provide service to the community." In keeping with this the plan further identifies the accredited Bachelor of Science in Construction Management program as "(t)he primary educational program within the Department."

The Bachelor degree curriculum is built around the 2 plus 2 concept. The first two years may be taken at the University of Washington, at another four-year institution, or at a community college. The "construction core" is concentrated in the upper division during the junior and senior years. As a rule, students who are admitted take all of their junior and senior courses with others that have been admitted at the same time. The curriculum is rigid and students who get out of sequence often have difficulty in getting into a specific course at a later time.

The focus of the Masters degree program is to prepare graduates for upper management positions in a construction activity. Program components include a required core curriculum, student-selected construction emphasis courses, electives, and either a thesis or a graduate research report. All graduate classes are offered during the evening to accommodate students who work during the day.

The 9-month Certificate Program in Construction Management (offered in cooperation with University of Washington Extension) provides educational opportunities for professionals in construction and related fields who wish to develop or expand their technical and managerial skills but do not have a degree objective.

The construction management program is the oldest and largest of four programs in the State of Washington that serve the construction industry. Two of these, at Central Washington University and Washington State University, are at four-year institutions and one, at Edmonds Community College, is a two-year program.

Program Objectives

The stated educational objectives of the Bachelor Degree program are to enable graduates to develop:

1. Technical skills necessary to define and solve practical construction problems;
2. Managerial skills necessary to make and implement sound and timely decisions in a prudent and professional manner;
3. Broad perspectives of the humanities and social and natural sciences;
4. The ability to communicate clearly and concisely both orally and in writing.

Program Faculty

At the time of the review the Department of Construction Management had 1 full-time full professor, 2 full-time associate professors, 2 half-time associate professors, 2 full-time assistant professors and 1 vacant full-time position. There were also eight faculty who taught one course (or in a couple instances, two) courses during the previous year who held titles of lecturer, instructor or assistant professor. Five of the seven regular tenure-track faculty hold Ph.D.s and the other two have a J.D. and a M.S., respectively. All part-time adjunct faculty have a B.S., M.S. or Ph.D. The department head is the only permanent full-time full professor. Three of the four associate professors are tenured and none of the assistant professors are tenured.

RECOMMENDATION ON PROGRAM STATUS

We recommend continuation of the Department of Construction Management's BS degree program and a change for the MS degree from provisional to continuing status. These programs should be reviewed in five years.

STRENGTHS OF THE PROGRAM

The department has done exceedingly well in establishing rapport with local industry. The faculty, the chair, and the graduate advisor should be commended for this. The department's Construction Industry Advisory Council believes the department consistently produces well-qualified graduates who are "road ready" for jobs in industry. It has a very high regard for the program, crediting it with being in the top ten percent of programs nationally. In particular, the Council compared it favorably to those on the East Coast, where engineering and architecture programs are the principal source of graduates for building construction. The Council also expressed appreciation for the effort the department has made in soliciting suggestions from industry through surveys.

The perceived quality of graduates is undoubtedly due in part to the students themselves who impressed us during our meetings with them. They are highly motivated, with a definite sense that the University was providing them with an education that was valuable. Industry demand for undergraduates is extremely strong, particularly for those in the dual-degree program. There was a suggestion however, from the Construction Industry Advisory Council that the Department of Architecture should provide more support for the dual-degree program.

It is remarkable how far the graduate program has come in a short period of time. Special kudos are due the graduate advisor, who has done an exemplary job in running a new operation.

OPPORTUNITIES

Additional Industry Support

Industry seems willing to provide additional enhanced support for the department. In particular, that could include additional endowment funds, scholarships for students and more frequent guest appearances in classes by people from industry. The members of the Council were intrigued with our suggestion of having funds donated directly to the department for scholarships. One potential advantage would be graduates who might be more likely to support the department if they felt the department had a hand in securing their financial support while they were students.

Differential Tuition

The Council might be a strong ally in offering political support with the Legislature for differential tuition for the program. Given the salaries graduates command (currently in the high 40's), there seems to be a real opportunity for justifying higher tuition, which differential could in turn be used to support the department.

Historically the Washington State Legislature has retained for itself the authority to set tuitions for all academic programs at public higher education institutions. While there have been some relatively minor exceptions in recent years (UW Law School tuition, for example) the prevailing philosophy has been to maintain a uniform tuition across programs within an institution so that a student's selection of a major field does not become driven by economic considerations. This may be ending. Because of the continuing difficulty in funding higher education many legislators are apparently now willing to consider providing greater tuition authority to the major 4-year institutions. This would include the ability to set different tuition rates for degree programs. Governor Locke's tuition bill introduced in February had such a differential tuition component and both the Senate and House bills currently under consideration do as well.

The Construction Management faculty, and particularly the Chairman, find the idea of being able to charge a higher tuition for their programs an attractive one, and there appears to be support for the idea from the Dean of the College as well. One of the major arguments in favor of differential tuition is based on the "marketplace" model that acknowledges that some professional and academic fields offer a likelihood, or at least opportunity, for much greater financial gain after graduation. Business degrees and computer science degrees are oft-cited examples. For this reason, students would be willing to pay more for their education in these fields, particularly if the increased costs are channeled back into the program in question and used to provide a better educational experience (through higher salaries for better instructors, for example). Opponents of differential tuition (typically organized student groups) argue that such programs become elitist, with only the wealthiest students being able to afford the increased costs. This argument is often countered with the one that there would be a greater amount of financial aid available to poorer students if higher tuition were permitted.

In any event, construction management is one of those fields in which graduates immediately receive high salaries and numerous job offers. It is therefore a reasonable candidate for high tuition if the marketplace model were to prevail.

One potential problem for such a strategy to increase resources is the prospect of undermining relationships with other units in the College of Architecture and Urban Planning. This College is a relatively small one and for more than 25 years a succession of deans has attempted to build a strong and competitive unit by reinforcing the relationships among the four major departments. College faculty welcomed the introduction of the MSCM in 1994 because it provided a form of status for the College -- now all four fields offered graduate level education. But the additional faculty resources that were necessary to launch that program were viewed with considerable concern by faculties that felt pinched in meeting the needs of their own student populations. When the construction management faculty subsequently received uniformly large salary increases more or less as a "unit", based on market conditions, and these increases were viewed as being made at the cost of increases in other departments, much of the earlier positive sentiment began to erode.

Most of the construction management faculty feels that the future success of the programs lies in a close association with the Department of Architecture, particularly through the dual degree program and joint "design-build" initiatives. If this is true then it would seem that the two departments would need to be on fairly equal footing; something that could be unbalanced if one unit were to charge significantly higher tuition than the other (even assuming that the logistical problems of two different tuitions in the "dual degree program" could be easily worked out).

Of course, there has been some discussion of increasing tuition in the Department of Architecture degree programs as well, should differential tuition become possible. However, the reasons are entirely different. Architecture is a "high-cost" field because its educational model is based on the studio in which a relatively few individual students get a great deal of attention from an instructor. It is expensive in terms of space and facilities and it is expensive in terms of instructor input. The same is true for the degree programs in Landscape Architecture. The argument here is that differential tuitions would allow these departments to recover the actual costs of their education without so much subsidy from other units in the College and the larger University.

WEAKNESSES OR CONCERNS

Curriculum

The undergraduate curriculum will receive a thorough analysis from the ACCE accreditation team. While a detailed look of the curriculum was not part of this effort, based on the success of graduates finding employment and based on the comments of the industry advisory group--the students were deemed to be "road ready" upon graduation--the curriculum appears to be thorough and sufficiently rigorous. There were some comments by students about redundancy in the curriculum, suggesting the need for a comprehensive curriculum review. The graduate curriculum is a flexible mix of construction management offerings and courses from other colleges and departments; it appears to be very appropriate.

Another area of concern for students who wish to take the Masters degree is the large number of undergraduate prerequisite courses required. The department may wish to

consider offering a smaller number of intensive classes for graduate students who do not have the entire range of undergraduate Construction Management preparation. We also felt that there should be a broader faculty involvement in supervising graduate student research. Currently that is borne entirely by the graduate advisor. This seems to us to be an unusually high burden for one person, and makes the graduate program advisor vulnerable to burnout.

RA and TA Support

The availability of RA/TA financial support is on the low side, a problem that might be remedied if the program is able to marshal more financial support from local industry. Having the graduate program offered entirely in the evening and primarily for part-time students who are otherwise employed makes recruiting RAs and TAs a problem.

Research

The University of Washington is positioned to move into the leadership of construction programs in the Associated Schools of Construction (ASC) category. In the area of Construction Engineering programs, where research has more emphasis, they will need to change focus and hire faculty with stronger research experiences. Although teaching is a strong point, at least on the part of certain individuals, research seems to have been neglected.

The amount of funded research is very modest. Only a few faculty have any research agenda. There was little evidence of research expectations being set by the leadership. The program leader characterized the current faculty workload as 80-20 with 80% teaching and 20% research, with the goal of reaching a 50-50 teaching-research mix. The modest research currently being undertaken is a function of several factors:

- Heavy teaching loads, exacerbated by growth in student population,
- Senior, tenured faculty who have no interest in pursuing research,
- New faculty who have not had time or motivation to establish their research agenda

The program placed great emphasis on creating a research facility—the Sand Point facility—as the vehicle to promote research among faculty. If funding could be found, either from the state, research agencies, private industry, or some combination of these sources, the Sand Point research center could become a catalyst for a solid research program. However, to make this facility a reality will require dedicated resources for an initial start-up period.

National Visibility and Stature of Program

The review team received interesting answers from the program leader, the faculty, the industry advisory group, and the students when they were asked how UW CM program would be ranked nationally. All sincerely believed that the UW program is one of the top ten programs in the country. Some could make the argument that this is a noteworthy attitude. But if the success metrics used to measure UW (profile or ranking) were expanded to include research funding from industry, research funding from the National Science Foundation (NSF), scholarships funding (from industry) collected and distributed

within the UW program, endowed scholarships in place, and endowed professorships and chaired positions it is doubtful that the UW program would rank anywhere near the top ten. The data used to measure the metrics listed above are not available for ASC schools nationally, but after the Engineering News Record profiles the program in an October 2001 issue, a more accurate ranking of the UW program may be possible. The UW leadership should start collecting their own data and begin a more realistic evaluation of their program.

Faculty Turnover

For a program of its size, there has been an unusually high degree of faculty turnover. However, there appears to be no single cause for this phenomenon. A troubling sign was that faculty members were unable to state clearly what was expected of them in research and teaching. There seem to be no well-understood measures among the faculty for evaluating their teaching and research other than the normal UW course evaluations. This weakness may well be resolved with more careful mentoring of faculty by the chair and guidance of junior faculty from senior professors.

Student Diversity

Construction management programs nationwide suffer from a relatively small population of female and minority students and the University of Washington undergraduate program is no exception. The department should do more to develop a more diverse student population; success in this effort would improve the profession as well as the department. Curiously, diversity does not appear to be as much of an issue in the graduate program.

OTHER RECOMMENDATIONS

National Constructor Certification

National Constructor Certification is fast becoming a necessary credential for construction professionals. The certification process starts with a Level I examination given to graduating seniors, who may then sit for the Level II Professional Constructor Certification examination after seven years of qualifying experience. It is recommended that the program consider requiring the Level I examination of its graduating seniors. In addition to the prestige of professional recognition, the Level I examination results, which are available in detail by curriculum category, are an excellent outcome assessment measure of the quality of the undergraduate program.

Scholarship Support

The level of student scholarships should be enhanced to attract the brightest and most promising students available, though we must admit the current group of students is very strong. Some students mentioned that while scholarship support for their senior year was available, most of them were unaware (in time) of support during their Junior years.

Perhaps scholarship funds could be directly available through the Department to use as "signing bonuses" for outstanding applicants to the Department.

Use of Lecturers

Currently the program makes limited use of lecturers to teach required courses. The lecturer we interviewed, Ben Emam, appeared to be a very fine resource for the program with superb, current credentials. Since the program enjoys strong industry support and since the program is located in a major metropolitan area, the department should consider expanding the use of lecturers. This will enable full time, tenured and tenure-track faculty to maintain modest teaching loads and expand their research agenda. A comfortable mix of lecturers and full time faculty (perhaps up to 35% lecturer FTE) should enhance the currency of the curriculum, promote expanded industry contacts, and permit more research opportunity.

Advising of Students

A regular full-time faculty member currently advises undergraduate students, a task that takes approximately ½ of his time. Yet the department appears to be moderately understaffed. We recommend that a professional staff person be hired to handle the advising needs of the undergraduate students.

Ph.D. Program

There is a demand nationally for Ph.D.'s in Construction Management. Most academic Construction Management departments are forced to hire faculty from disciplines other than Construction Management, such as Civil Engineering. The Self-Study that was prepared for this review mentioned an interest in creating a Ph.D. program in the Department of Construction Management. One of the reasons given for having a Ph.D. program was an improved research capability with Ph.D. students.

There doesn't seem to be much interest in Ph.D.'s among the students. When students in both undergraduate and graduate classes were asked if any of them considered getting a Ph.D. eventually, the response was almost universally no.

The overall interest of the faculty did not seem that high either. Most of the Construction Management faculty are heavily involved in teaching, and have minimal interest in research. Some faculty mentioned they're having difficulty in finding suitable students to serve as TA's. Such an environment does not seem ready to support a Ph.D. program. If the situation arises in the near future, in which a student in Construction Management wishes to pursue a Ph.D., the Interdisciplinary Ph.D. Program may be more appropriate. This is especially true in light of the small number of Construction Management faculty that are members of the Graduate Faculty. We are therefore apprehensive about any plans to begin a Ph.D. program with the current mix and number of faculty available.

Sharing Current Laboratory Facilities with the College of Engineering

Access to laboratory space is extremely important for laboratory-oriented faculty to be able to develop a successful research program. Currently, the most laboratory-oriented faculty are Professors Denali and Nemati. Both of these faculty have interests in construction materials – primarily portland cement-based materials. Facilities for the preparation of portland cement concrete specimens as well as facilities for conducting physical loading (structural testing) already exist on campus (Department of Civil Engineering in More Hall). An attempt at using Civil Engineering facilities was made a few years ago by a former Construction Management faculty member (D. Riley), but this cooperation was not considered successful enough to encourage repetition. Also, the current structural faculty in Civil Engineering are much more “laboratory active”. This often results in delays while one project waits for another to finish testing. Given the busy laboratory schedule, it is unlikely that Civil Engineering would welcome additional projects from Construction Management.

As mentioned above, facilities do exist for the preparation of concrete and other small specimens. A laboratory course for the Construction Management undergraduate students is currently being developed, and will probably initially use laboratory facilities in Civil Engineering. These specimen preparation facilities are in a teaching lab. Use of these facilities requires careful planning around scheduled classroom activities. (Concrete casting requires that the lab be available for at least portions of two consecutive days.) Once specimens have been cast, however, the testing facilities are rather limited. Neither equipment nor technicians are available for the preparation of thin sections (for microscopic examination of concrete specimens). A small environmentally controlled chamber is available, but this apparatus provides only for controlled temperature (not controlled humidity). Other facilities (freeze-thaw, small-scale controlled loading, etc.) are either not operational or not available. In summary, specimens could be prepared, but facilities for testing are quite limited.

Depending upon faculty specialty, cooperative work with Mechanical Engineering could be envisioned. Unfortunately, most of the facilities in Mechanical engineering are small, and/or heavily utilized as well.

Sand Point Facility

Local industry supports the proposal of a lab for testing materials and electrical and mechanical experimentation at Sand Point. The Sand Point installation would be a very attractive addition to the department’s research capability but not an essential element in its success, particularly given the level of funding required to maintain it on an ongoing basis. If, on the other hand, these funds were assured from private sources, proceeding with the facility would make sense.

Space exists at Sand Point, but as yet there are no facilities in place. Once basic amenities were in place (water, electrical, machine shop capability, etc.), it is very likely that some projects from Civil Engineering would seek to move to Sand Point. Sufficient space to permit staging of projects (storage of formwork, materials, etc) would allow some projects to proceed much more efficiently. The potential move to Sand Point of the Civil Engineering students’ concrete canoe construction has already been announced to

Civil Engineering faculty. And the availability of a larger space for construction-related projects would expand not only the research capability of faculty from both Construction Management and various Engineering departments, but also the teaching capability. Larger scale teaching laboratory projects are a definite possibility. Such projects would bring students in both Civil Engineering and Construction Management closer to real world applications.

Relationships with Other Departments in the College of Architecture and Urban Planning

It is unlikely that faculty members in the Departments of Architecture, Landscape Architecture and Urban Design and Planning have a very clear understanding of the goals and objectives of the Department of Construction Management. However, they do recognize that the Department educates a large contingent of students annually with a relatively small faculty, and does it very well. That is to say, they realize that construction management graduates are in high demand and are sought by the industry. On the other hand, there is very little awareness of the MSCM program at all, probably because it is an evening program and those students are not "visible" within the College.

The fortunes of Building Construction (Construction Management) in the College of Architecture and Urban Planning have improved over time. Eight deans have served the program. The first four of these had very little interest in the program and even felt that it belonged elsewhere, if in a university at all. Certainly there were few resources committed to Building Construction during its first 20 years. In the mid-1980s a dean was appointed who held a faculty appointment in "BECON" and, indeed, had served as the program chairman for a while. The resource situation improved and the program was able to achieve accreditation in 1987. From this point on the department has been seen as an equal player among the four departments of the College (with as much "equality" as can be expected in a College where one department has more than half the faculty resources).

The department has also demonstrated an ability to marshal external funds that seem out of proportion to its size when compared with other units in the College. This has gained the program greater awareness and appreciation among College faculty and helped bolster its position within the College. One department chairman characterized the Construction Management Chairman as being the most "entrepreneurial" of the four and other College faculty have confirmed this view. It is balanced, however, by the observation that he is unwilling to share resources even when it seems appropriate to do so.

In a very positive light the Chairman of Construction Management is applauded for his willingness to entertain a variety of suggestions for cooperative ventures within the College. For example, he now appears to view the proposed Sand Point Research and Education Center as a College facility; an idea that certainly was not evident in the original proposal for the Center that was appended to the Self Study document. He has been receptive to joint initiatives in such areas as natural hazards mitigation, "green building", and capital facilities construction (e.g., sewers, water systems, roads, etc.) that the Construction Management faculty has not previously been willing to consider.

It is probably unfortunate that space limitations dictate that three of the CAUP departments have offices in Gould Hall with the Office of the Dean while the Construction Management office is in Architecture Hall. This necessarily reduces the amount of interaction that can take place among faculty and in a small college such interaction can be very important, in fact critical, to the commonly expressed and long-standing overall goal of greater integration among College programs. This symbolic isolation of a program that for much of its existence was indeed isolated and which is still perceived by some people as marginal to the major purposes of the College should not be overlooked.

Awareness and Respect of Construction Management Program in Engineering

Students from Civil Engineering have been taking classes from the Department of Construction Management since before the change from Building Construction to Construction Management. Most of those students considered their Civil Engineering emphasis to be Construction Engineering (a sub-group in the Department of Civil Engineering). The decrease in the number of Construction Engineering courses offered in Civil Engineering (following the departure and non-replacement of one of the Construction faculty in Civil Engineering) has led to an increasing number of Civil Engineering students enrolling in courses taught by Construction Management. In the past, most of those students would have considered themselves to have a Construction emphasis. More recently, however, some of the Civil Engineering students with a Structures emphasis have also been taking Construction Management courses. Both the variety of courses offered by Construction Management and the awareness of those courses by Civil Engineering students have increased.

An area in which the visibility of the Department of Construction Management could be increased is among pre-engineering students. If pre-engineering students knew about the Department of Construction Management when they chose a major, more would apply to Construction Management. This is especially important since the Department of Construction Management resides in the College of Architecture. There is a tendency for students wanting to "build things" to look at Engineering, leaving them completely unaware of the Department of Construction Management.