I. Program Goals

The Construction Technology/Architecture program goals are to:

1. Provide a broad-spectrum introduction to the field of construction technology and architecture.

2. Produce:
   a) Career-oriented students who have hands-on experience with state-of-the-art equipment currently used in the construction industry.
   b) Graduates who have a level of academic preparation sufficient to transfer into a baccalaureate degree program.

3. Provide coop/intern experience in the construction-architectural industry.

The Construction Technology-Architecture (334) program goals have been modified to reflect the changes in the student population and its needs. Shortly after the last program review, the CT/A curriculum (334) expanded to include architecture, which reflected a growing percentage of the student population in the program. Recently, government projections indicate an increase in construction technology jobs, and the current goals reflect that change. The CT/A program goals are attainable and chosen to reflect both transfer and career opportunities for students.

In the Construction Technology/Architecture program, the emphasis is now equally on a broad-spectrum introduction to the field of construction and architecture. Based on the results of the Current Student Survey (see Appendix A), Graduate/Former Student Survey (see Appendix B) and transfer information (see Curriculum Section), student population enrolled in the program is equally split between construction technology and architecture.

The program goals have been compatible with the overall needs of the marketplace, but industry and government projections (see Appendix D) indicate an increase in jobs in construction technology related areas in the next five years. Respondents from industry (Monadnock Construction, Brooklyn, NY) and academia (Pratt Institute - Mary Matthews, Chair of Construction Management) have indicated that there is a critical shortage of individuals with Construction Management skills and an excess of Architecture graduates, and that this trend is expected to continue. With an emphasis on both fields, the Construction Technology/Architecture
curriculum (334) will continue to meet the current student needs and prepare future students.

Student needs are also reflected in the goal to produce both career-oriented and transfer graduates. Approximately half of all graduates from this program transfer into a baccalaureate degree program (see curriculum). The program needs to provide equal emphasis to those students who will enter the job market immediately after graduation and those who will transfer into a baccalaureate degree program. Proposed changes in the math curriculum (see Appendix C) will provide the same course content with better transferability.

The goal to provide cooperative and intern experience in the construction and architectural industry reflects the needs of the students to be exposed to techniques used in industry and to make contacts for future employment both at the end of two years and after completing a baccalaureate degree program. As indicated in the current student survey (see attached), the majority of students in curriculum 334 are working while attending school, but the majority of current students (83.9%) and graduate and former students (73.7%) did not use SCCC's Coop/Internship or Job Placement service.

Providing cooperative and intern experience will meet the financial needs of the students while providing an invaluable experience within the industry (see Appendix D). The faculty members involved in the program are in the process of forming an Industrial Advisory Board that would aid in providing intern experience and continue to provide up-to-date information on career opportunities. In conjunction with SCCC's Coop/Internship and Job Placement services, the department will meet the goal to provide cooperative and intern experience for their students.

The program goals are appropriate and attainable for both career oriented and transfer students. The program goals are consistent with general education demands as they satisfy the New York State requirements for technology degrees (see catalogue description Appendix C). Although challenging, approximately 17% of the entering students graduate within two years. A higher graduation rate is reported after three or more years of study (Analysis of the Statistics for Years to Graduate, Appendix G, indicates that the mean is 3.35 years to graduate from the Construction Technology/Architecture program.). Although the graduate rate after two years is below the desired level, it has been relatively constant for over ten years. The cause and possible remedies to the low graduation rate are areas that need to be explored by the faculty. Of those who graduate from the program about half continue their education at four-year colleges. The
majority of the other graduates are working in construction related industries.

Recommendations

Continue to serve both populations within the curriculum. Those interested in immediately entering the job market in the field of Construction Technology and those transferring to a baccalaureate degree program in Architecture or Construction Management.

Develop an Industrial Advisory Board to ensure that goals are compatible with the needs of the marketplace, and continue to review the Bureau of Labor Statistics as they pertain to the Construction Management, Construction Technology and Architecture options.

Review program entrance requirements and track students to determine their needs as related to improving graduation rates.
II. Curriculum

The Construction Technology curriculum (334) has been successful as a career program as well as a transfer program. Due to the dual goals of the program, an annual evaluation of the relevancy of the curriculum is essential. The changing demands of industry and academia are apparent when considering the history of this program.

In 1970, in response to information provided by the New York State Department of Labor the Civil Technology Curriculum was proposed and flourished from 1971 until 1976 when enrollment dropped reflecting a change in the industry. In 1979, a proposal was developed to replace the Civil Technology Program with the Construction Technology /Architectural Emphasis Program. The original Construction Technology Program was developed in partnership with local construction companies, which provided job description information that was utilized in selecting course content. The only significant change in the curriculum as originally designed occurred in 1984 with the replacement of CT45 (Construction Management) with MT63-64 (Fluid Mechanics). A description of the Construction Technology Curriculum as it appears in the 1999 catalogue can be found in Appendix C.

Enrollment in the present program declined from 1988 to 1993 and has currently remained stable (see Appendix G). In hopes of increasing enrollment, and in anticipation of labor changes, modifications to the Computer Assisted Drafting (CAD) certificate program (402) and Construction Technology/Architecture (CT/A) program have been proposed (see Appendix C).

The intent of the curriculum change proposal is to update CAD and CT/A course requirements to facilitate transfer to baccalaureate degree programs and to enable CAD graduates to continue into the CT/A degree program. In an effort to keep current, two courses (DR15 and CT34) will be replaced with two existing courses (DR18 and DR23) that better match students' needs. To enhance transferability, the more widely accepted courses, MA61 and MA68 will replace the unique and difficulty to transfer MA41 and MA42 without changing the course material required by the CT/A program. In addition, changes in the course requirements will mean that CAD graduates will have already taken eight courses required in the CT/A program, which gives them advanced standing.

Updating course requirements make both programs more attractive to new students. Three-D CAD and Building Construction are both rapidly growing segments of the economy (see Appendix D). With more courses in common between the two curricula, space utilization will improve, more
sections will run and students will find it less difficult to complete the program in a timely manner (see attached Current Student Survey response).

The Construction Technology/Architecture program has historically tried to meet the needs of two distinct student populations. Approximately half of the students immediately enter the work force in construction-related jobs upon graduation and the remainder transfer to a baccalaureate degree program. Some of the colleges to which our students have successfully transferred are: Cooper Union, Drexel University, New York Institute of Technology (NYIT), Purdue University, Rochester Institute of Technology (RIT), SUNY Binghamton, and SUNY Utica/Rome.

The active recruiting of our graduates by these colleges indicates that the transfer portion of the program has been successful. When asked about the Construction Technology/Architecture program's strength, an administrator from NYIT indicated, “the Suffolk students have the strongest technical preparation of all the transferring students.”

Because of the close similarity between our programs, it has been reported to faculty that students who transfer to NYIT and RIT lose very few credits in transfer. Our graduates are placed immediately into the third year of RIT’s five-year Civil Engineering Technology program. Tracking SCCC graduate and transfer students would provide the program with more concrete evidence of student success and allow the program to better meet student needs.

In addition to the active recruitment of our graduates by various Colleges, local industry continues to actively recruit our graduates for employment. Among the employers who have stated that our graduates are well trained for their needs are: Brookhaven National Laboratory, New York State Department of Transportation, Suffolk County Water Authority, H2M Corporation and Dunn Engineering Associates.

The New York State Department of Transportation was so impressed with two CT/A students who worked there last year that the NYSDOT has offered to hire as many students as the CT/A department can send them in the future. This ongoing recruitment by industry, as well as the four-year colleges, is evidence that the course selection and content are meeting the goals of the Construction Technology Program.

The inclusion of state-of-the-art equipment such as the recently installed CAD equipment and the AutoCAD 2000 software in the drafting labs together with the Total Station and laser equipment utilized in the surveying courses complements the academic quality of the CT/A program.
Academic Quality of the Curriculum

In order to keep the students current with the latest techniques in the construction industry and maintain a high level of academic quality, courses and topics are reviewed as an ongoing process by the department. As part of the program review, both current students and graduate/former students were surveyed concerning the academic quality of the curriculum.

The current student survey (see Appendix A) was handed out in all Construction Technology/Architecture classes (CT14, CT22, CT33, CT34, CT44, C46, DR11, DR14, DR17, DR19) during the spring 1999 semester. Of the 136 students enrolled in the Construction Technology/Architecture courses that semester, 56 completed the surveys for 41.2% response rate. Students were instructed to fill out only one survey to eliminate duplications.

In addition, 275 surveys were mailed to graduates and former matriculated students of the Construction Technology/Architecture program at SCCC from 1993 through 1998 (see Appendix B). The committee sent surveys to both graduates and former matriculated students to gather information on the large number of former matriculated students who did not graduate. Although the overall return rate was low (8.0% of the surveys that were delivered), a higher return rate (23.4%) was received from program graduates vs. non-graduates, and provides information about this sub-set.

Students were asked to rate the Construction Technology/Architecture courses that they took in order to meet the degree requirements. The courses were evaluated with a rating of 0-4 with four being the highest. Most courses received high ratings from both current and former students. In the survey of current students, 70% or more of the respondents who took the course and gave an opinion providing ratings of "good" or "excellent" for all courses except CT10: Surveying I (52.8%), CT34: Strength of Materials Lab (50.0%), and CT44: Soils and Foundations (64.7%). The highest ratings (close to excellent) were given for DR18: Architectural Drafting II, DR19: Architectural Drafting III and CT36: Energy Efficient Architecture.

Graduates and former students were also surveyed concerning their rating of program courses. Of those responding (over 80% for most courses) all courses received high ratings, with 75% or more of the respondents who took the course providing rating of "good" or "excellent" for all courses except CT43: Construction Contracting (73.3%) and MT66: Statics (64.7%).

Analysis of the Graduate/Former Student Survey and the Current Student Survey results indicates that the Construction Technology Curriculum is well designed and meets the needs of the students.
students overwhelmingly approve of the classroom/laboratory instruction they received in the program (78.5% providing ratings of "good" or "excellent"). Graduates and former students also approved of the classroom/laboratory instruction they received in the Construction Technology/Architecture program (75.0% rated it as "good" or "excellent"), and the involvement and support received from the department in reaching their career goals (73.3% rated it as "good" or "excellent").

Very few (10.7%) of the students who took Construction Technology/Architecture courses during the spring 1999 semester planned to change their curriculum emphasis. In addition, about one fifth of the current students reported that they changed curriculum emphasis from another program to Construction Technology/Architecture (21.4%). At this time there is no need to expand the program beyond the Ammerman Campus. Of the current students, 89.3% are taking most of their credits at the Ammerman Campus.

In response to the Graduate/Former Student Survey (see Appendix B), those students who did not opt for transfer entered construction-related industries in various job-related capacities. Approximately half (52.9%) of these respondents indicated that their current job was "moderately" or "very" well related to their study in the Construction Technology/Architecture program and feel that the program prepared them "moderately" or "very" well for their current position (47.1%).

Although a significant percentage of the graduate/former students reported favorably on the program, the curriculum does not seem to meet the needs of all graduates/former students. The Graduate/Former Student Survey indicates that 47.1% of the respondents did not find the Construction Technology/Architecture degree at all important in getting their job. Approximately one-quarter did not feel that the program prepared them well for their current position (23.5%) or think that their current occupation was related to their study in the Construction Technology/Architecture program (23.5%). The dissatisfaction expressed by graduate/former students reaffirms the need to develop an Advisory Board and explore the development of Construction Management and/or an A.S. option in the CT/A program.

In addition to the student survey, respondents in construction-based industry and Construction Management transfer programs indicated that the Construction Technology/Architecture program is not meeting their current needs. To meet the changing environment, the CT/A department has proposed changes to the curriculum (see Appendix C) while maintaining the components that are meeting student needs.
To meet the projected increase in jobs in Construction Technology related areas (see Appendix D), respondents from industry (Monadnock Construction, Brooklyn, NY) and academia (Pratt Institute – Mary Matthews, Chair of Construction Management) have recommended the following:

In general, CT/A curriculum should retain Surveying I, II, and III because references within standard project plans and specifications rely on a complete understanding of surveying terminology and techniques. These skills are also critical on the construction site.

The second most pressing recommendation is that at least one comprehensive Construction Specifications course be maintained within CT/A curriculum because again, students of architecture, construction technology, and construction management need to be completely conversant with project plans and specifications in division format. The project documentation covers all aspects of the entire construction process and students need to understand how to use it.

Finally, at least one course on construction management should be mandatory for all students of the CT/A curriculum so that they develop an understanding of the planning and scheduling process, and the financial workings of a large construction project. This also helps students pursuing the various careers within the Construction Industry to see how their chosen path fits in the scheme of things and enables them to select a curriculum that allows diversity within their careers.

The general feeling from the respondents was that our emphasis is heavily slanted in the Architectural area and scant in Construction Management, and this is inconsistent with the current needs of industry, and is also not in tune with government projections. At this time, there is a critical shortage of individuals with Construction Management skills and an excess of architectural graduates; this trend is expected to continue.

Both Pratt and Monadnock see this first hand within the inner city area. Construction managers are difficult to find and retain due to the high demand for their skills. Pratt is closely tied with the New York City Construction Industry and they echo the same sentiments. They would work with SCCC to help us develop a two-year Construction Management curriculum to encourage SCCC graduates to transfer to Pratt. If there are not enough day students initially considering Construction Management as their primary career emphasis, perhaps it would be worth while to investigate the feasibility of opening an evening program to focus on adult population already in the industry.
Pertinent information to support the respondents positions can be found in Appendix (D) and was extracted from the 1998-99 Occupational Outlook Handbook provided on-line at the Bureau of Labor Statistics (http://stats.bls.gov). This information includes employment, earnings, job outlook, training, other qualifications, and advancement for both architects and construction managers.

It is recommended that the CT/A program development of an Advisory Board and undertake an annual review of labor statistics to monitor trends in the industry to keep the curriculum current. The department is in the process of forming an Industrial Advisory Board. Nine individuals from various areas of the Construction/Architecture field have been contacted, but no meetings have taken place.

Because of the dual transfer/career oriented nature of the program, and the historical shifts in popularity of architecture vs. construction technology, the policy of assigning to each student an academic advisor who is familiar with the Construction Technology/Architecture program is important. This assures that the student will follow a sequence of coursework that provides the necessary prerequisites. In order to extend this help to the evening students, advisement is frequently conducted in the classroom.

Construction Technology/Architecture faculty advising was used and rated by 84.2% of graduate and former students and indicated a high level of satisfaction (87.5% "satisfied" or "very satisfied"). The current student survey indicates that the pattern remains the same. Current students indicated a high use of Construction Technology/Architecture faculty advising (58.9%), and satisfaction with the service. While the college academic counselor advising was used by the same percentage of current students (58.9%), it received significantly higher ratings of "dissatisfied" or "very dissatisfied" (41.6%).

The above data indicate the importance of continued counseling within the program, which is done by full-time faculty. Full-time faculty are also important for recruitment. Current and Graduate/Former Student Surveys indicated that most students found out about the program from the catalogue. Increased recruitment is needed to maintain and expand the program.
III. Students

The data provided on students has been extracted from the college's enrollment report and the persistence reports generated by the Office of Institutional Services (see Appendix G), and indicate little change in the student profile in the last ten years. Over half (62.5%) of the current Construction Technology/Architecture students are between 18 and 21 years of age, and relatively few (10.7%) are 31 years of age or older. The age of the students in the program has remained constant over the ten-year period.

Analysis of fall enrollment by ethnic group for the last ten years (1988-1997) indicates that overwhelming majority of students enrolled in the Construction Technology/Architecture (334) program are white non-Hispanic (91.1% average over 10 years). A slight increase in the Hispanic group is noted from 1987 (4.1%) to 1997 (11.8%). On average, less than 1% in any other ethnic group is represented in the program.

The fall enrollment by gender for the last ten years (1988-1997) indicates an overwhelming majority is male (average 90.3%). The relative small proportion of females to males has remained constant over the ten-year period. It is recommended that the program explore methods to increase recruitment of females and minorities to increase overall program enrollment.

It is suggested that the program renew contact with local high schools, including those high schools with large minority enrollments, to promote the CT/A program. Develop new brochures to increase the visibility of the program and contact organizations such as "Women in Civil/Architecture" to recruit female participants into the construction field. Since this is an area that has had low minority and female enrollment in the past, these actions would certainly help in attracting students to SCCC and the Construction Technology/Architecture program. It is recognized that the program needs full-time faculty able to do this.

Analysis of fall enrollment over the last ten years shows that a decline in enrollment occurred between 1990 and 1993 (112 to 68) with a relative constant enrollment since. There has not been a significant change in the relative percentage of full-time to part-time students. Statistics from 1988 to 1997 shows a relatively constant rate of full-time students (average 67.1%). The overall enrollment in the last 5 years remains stable.

Of those responding to the Current Student Survey (see Appendix A), the majority of CT/A students work at least part time (89.3%), more than half (64.2%) work over 20 hours a week, and 14.2% work more than 35 hours a week. On average the current students are enrolled full-time (12.91
credits during the semester in which they completed the surveys (spring 1999). 78.6% of the respondents consisted of full-time students, and more than half (60.7%) attend classes primarily during the day. A significant portion attends both day and night classes (32.1%).

To attract individuals currently in workforce wanting to upgrade skills, the department has proposed changes in the CAD certificate program and CT/A program to increase enrollment. The number of students enrolling in the Technology Curriculum as in the College is a function of economics. When there is a high availability of jobs relates to enrollment decreases; in periods of higher unemployment, enrollment increases. Enlarging the evening program, CAD certificate transfer to CT/A program, expanding the coop/internship program and developing a Construction Manager option are ways to meet students needs and expand the program enrollment.

Over a ten-year period the profile of the students in the program has not significantly changed in regard to their average ages, standardized test scores, high school averages and GPA's. No decline in enrollment as related to student preparedness. The majority of the incoming students (85.3%) are not in the developmental reading classes, start in the non-developmental math (89%) and in non-developmental English (86.8%). There is inadequate information to judge how students who are taking developmental courses fared in the program. Analysis of instructional methods and if they have been able to respond to the learning needs of students in the program enrolled in developmental courses has been difficult due to lack of full-time faculty in the area.

High School averages and cumulative averages have remained relatively constant for the last ten years. There has been no change in the quality of incoming students. Percentages do not seem high enough in any of the developmental areas to affect program entrance requirements.

Concerning entrance requirements, two years of high school math is adequate, but three years and perhaps a physics course would undoubtedly improve their success in the more challenging courses. Experience has shown, however, that students with this more complete preparation are more attracted to engineering than to technology.

Time to graduate and persistence trends over the ten-year period (1987-1998) have remained the same (see Appendix G). Of first time, full-time fall entrants the graduate rate from 1988 to 1994 has a relatively consistent mean (3.35 years). The data indicate that a significant number are continuing to attend SCCC and that graduation from the program takes longer than 2 years. Analysis of the Statistics for Years to Graduate indicates that the greatest percentage (51.6%) take three years to graduate, and 26.1%
take between 4 to 6 years to graduate from the Construction Technology/Architecture program. Taking into consideration the number of hours students work (Appendix A) and the rate of completion for SCCC students during the same period, the mean of 3.35 years to graduate is consistent.

An important aspect of student retention is the role of the Construction Technology Club that has been in existence since 1990. A student established organization that provides an opportunity for students to meet professionals in the construction industry and to visit construction sites in the community. The enthusiasm exhibited by these club members is an important part of the student community at SCCC, and provides the students enrolled in this program an important identify.
Graduates and former students of the Construction Technology/Architecture program at SCCC from 1993 through 1998 received surveys created by the Construction Technology/Architecture Program Review Committee and the SCCC Office of Institutional Research. Of the 275 graduates and former students mailed the surveys in January of 1999, 19 completed them and returned them to the college. 37 surveys were returned as undeliverable, resulting in 8.0% return rate. This number, while low, definitely provides some information about the sub-group of mostly graduates willing to return the surveys. In fact, of the 64 program graduates sent the surveys, 15 returned them for a 23.4% return rate. The majority of the respondents were white (89.5%) and male (89.5%) with a fairly even distribution in terms of age (from 22 to over 40).

Slightly over half of the respondents (52.6%) had attended SCCC full-time, while an additional one-third (31.6%) attended a mix of full-time and part-time. Slightly more than half of these graduates/former students (57.9%) attended classes primarily during the day with a significant portion attending evening classes (21.1% just evening; 21.1% mixture of day and evening).

The survey indicated that of all the respondents, 36.8% continued on to study construction technology or architecture. Of those respondents who had graduated from the Construction Technology/Architecture program at SCCC, 40.0% continued to study construction technology or architecture, and 26.3% have already earned a bachelor's degree.

It is recommended that faculty in the program survey graduates annually in order to seek information about their employment, salaries and education and continue to monitor reports from the Bureau of Labor Statistics.

The outlook for the next five years for the two major occupations served by the Construction Technology/Architecture program is promising, but with a brighter outlook for construction related jobs over architecture.

Architects held about 94,000 jobs in 1996 (see Appendix D). The majority of jobs were in architecture firms. Nearly 3 in 10 architects are self-employed, practicing as partners in architecture firms or on their own.

According to The American Institute of Architects, the median compensation for intern-architects in architecture firms was $27,000 in 1996. Licensed architects with 3 to 5 years experience had median
earnings of $33,000; licensed architects with 8 to 10 years of experience earned $45,000; and principals or partners of firms earned $75-100,000 in 1996.

Employment of architects is strongly tied to the level of local construction, and employment of architects is expected to grow about as fast as the average for all occupations during the next five years. Despite projected employment growth, prospective architects may face competition, especially if the number of architecture degrees awarded remain at, or above, current levels. Many individuals are attracted to this occupation, and the number of applicants often exceeds the number of available jobs. Prospective architects who complete at least one summer internship—either paid or unpaid—while in school and know CADD technology, may have a distinct advantage in getting an intern-architect position after graduation.

Another position with predicted growth for graduates of the Construction Technology/Architecture program is Construction manager. Construction managers plan and direct construction projects. They may hold a variety of job titles, such as construction superintendent, general superintendent, project engineer, project manager, general construction manager, or executive construction manager. Similar job titles were reported on the Graduate and Former Student Survey.

Good employment opportunities are expected because the increasing complexity of construction projects should increase demand for management level personnel. Construction managers held about 249,000 jobs in 1996. Around 40,000 were self-employed, and over 85 percent were employed in the construction industry, primarily by specialty trade contractors and general building contractors as well as local governments, educational institutions, and real estate developers.

Earnings of salaried construction managers and incomes of self-employed independent construction contractors vary depending upon the size and nature of the construction project, its geographic location, and economic conditions. According to a 1997 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates with degrees in the field of construction management received offers averaging $28,060 to $31,949 a year. Based on the limited information available, the average salary for experienced construction managers in 1996 ranged from around $40,000 to $100,000 annually.
Employment of construction managers is expected to increase as fast as the average for all occupations through the year 2006, as the level of construction activity and complexity of construction projects continues to grow. Prospects in construction management, engineering and architectural services, and construction contracting firms should be particularly favorable for persons with a bachelor's degree or higher in construction science, construction management, or construction engineering that have worked in construction. Employers prefer applicants with previous construction work experience who can combine a strong background in building technology with proven supervisory or managerial skills. More and more employers, particularly, large construction firms, seek to hire individuals who combine industry work experience with a bachelor's degree in construction or building science or construction management.

The department's proposed curriculum changes in CAD certificate and CT/A courses to enhance transferability and goal to provide coop/intern experience address these projected needs.
IV. Resources

The Ammerman Campus is the only campus that offers the Construction Technology/Architecture Curriculum; therefore all comments which follow will refer to that campus. In general, there are positive aspects to the state of the resources available, but there are also serious needs.

An important part of the success of the CTA program is the physical environment and equipment. There are four types of rooms used by the program: Lecture, Fabrication and Testing Laboratory, Computer Drafting/Design (lecture and laboratory), and Manual Drafting (lecture and laboratory)

At present there is barely adequate space for lecture courses. As enrollment increases more space will be required. At present the desks are too small to accommodate the note pad, textbook, calculator and instruments Construction Technology students typically have to use during class. There is no dedicated study and practice space available for student use outside of class.

It is recommended that the College plan for more classroom space, equip the rooms with larger desks or laboratory table to meet program demands, and create a group study laboratory and practice area for student use equipped with tables, computers and study materials.

Fabrication and Testing Laboratories

CT34 Strength of Materials Laboratory requires a dedicated room equipped with specialized testing equipment. The room currently is use (R15) is entirely inadequate. Located directly overhead and completely exposed is a very large piece of the building’s HVAC system that runs constantly and makes normal conversation impossible. In addition the room is too small and has no laboratory tables, work benches, desks or black board.

The testing equipment is also inadequate. It is obsolete analogue equipment rather than computer based digital. The lab was recently relocated and in the process all the equipment was damaged to some extent and a whole machine and several vital parts disappeared. Although old and obsolete it was operational before the move.

Appendix E contains a list of what is required to run a section of CT34 and what is now operational. It is recommended that the College provide a new room for this course, and purchase new and/or updated testing
equipment, and materials testing simulation software, computer and projection system.

Computer Drafting/Design (lecture and laboratory)

Because of the specialized computers, plotters and software, CAD requires dedicated labs. Presently there are two CAD laboratory rooms, R124 and R126. The computers, plotters and software now in use are obsolete and in dire need of replacement both operationally and academically. The point has been reach where the skills students are presently learning are also on the verge of obsolescence.

Room 126 is adequate in terms of space and lighting, but room 124 is a former staff lounge and is unsuitable for classroom use. Both rooms lack computer laboratory furniture, proper ventilation, heating and cooling (HVAC), operable window shades and security via limited access locks. R126 has an exterior door that opens onto a terrace and enclosed stairs providing unobserved access. The door is not alarmed and has a faulty locking mechanism.

It is recommended that the College purchase new and up-to-date industry standard computers, plotters and software. Also, replace R124 as a CAD room, purchase computer furniture for both rooms, improve lighting and correct HVAC inadequacies. Limit access to rooms when not in use and provide supervision when open to prevent pilferage and damage. Repair and alarm exterior door in R126 and create a CAD student laboratory for supervised use outside class.

Manual Drafting Room (lecture and laboratory)

One room (R100) is equipped and used for manual drafting. CT10, CT22 and CT36 also use it as a lecture and project laboratory because of the large drafting tables.

With only one manual drafting room, which is not sufficiently equipped to handle a maximum class size, an increase in enrollment would require an additional room. There are 20 sets of drawing tables and stools in R100 with a class limit of 25. The tables and stools are worn to the point that they are a potential safety hazard. Lighting is inadequate for drafting. Sides and rear tables are very poorly lit, and there are no operable window shades making use of a projector impossible.

It is recommended that the College equip R100 with new drafting tables and stools in a quantity equal to the maximum class size, install
adequate lighting and operable window shades, and provide a drafting project laboratory for student use outside class.

**Surveying Instruments:**

The laboratory portion of CT10 is carried out in the field. There is sufficient equipment and instrumentation (see Appendix E) to divided the class into four survey parties of between four and six members each. This presents serious logistics problems in terms of moving and setting up equipment. It is also difficult for the instructor to move quickly between surveying parties to both instruct and adjust equipment. The electronic instruments lack the hardware and software to transport and download digital field data directly into a computer database. PC based surveying software is also needed to use the field data for design and to create the required engineering drawings.

It is recommended that a Professional Assistant accompany field survey lab sections to help setup and maintain equipment. Electronic field instruments should be updated and surveying software installed in a computer lab to allow field data to be applied directly to design and drafting as is the case in professional practice.

**Reference and Research: (Technical Library)**

All CT/A courses require the use of reference materials for laboratory reports, design presentations and research projects. Most materials are specific to construction technology and supplied by the department and individual instructors. The College library is used only occasionally for general information. There is no technical library per se maintained for student use. For the most part, materials are supplied as required by instructors for use in class.

It is recommend that the College establishes a technical library accessible to CT/A students outside class. The best source of up-to-date technical information is the Internet and manufactures product specification CD’s. Students should be provided with supervised access to these resources.

**Projects Laboratory**

Several CT/A courses require students to complete individual and team manual drafting, CAD drafting/design, model building and multimedia presentation projects outside class. At present they scrounge for limited space and equipment and have no central facility to work and store their materials.
The program review committee recommends that the College create a large multipurpose study and projects laboratory with work and storage space, computers, drafting tables and equipment and provide open supervised access.

**College Academic Computing Center**

Because of the specialized nature of CT/A software and computers (as described above), the College Academic Computing Center is of limited use to our students. This is supported by responses in both the Current Student and Graduate/Former Student Surveys, which indicated that only a small percentage of the students used this Center.

It is recommended that the College Academic Computing Center acquires and maintains CT/A and CAD software for student use.

**Academic Skill Centers**

In response to the question asked on the Current Student Survey and Graduate/Former Student Survey, most students (67.9% Current and 52.6% Graduate/Former) indicated that they did not use the Academic Skill Centers (Math, Writing and Reading Centers). In addition, most did not use Construction Technology/Architecture Department tutoring (66.1% Current students and 63.2% Graduate/Former). The Math, Writing and Reading Centers all offer “walk in” help to students with immediate and specific problems. It is recommended that faculty encourage non-developmental students to use the Academic Skill Centers.

**Library**

The Construction Technology collection in the Ammerman Campus library was reviewed (see Appendix F) and consists of 181 books representing 0.15% of the total collection (122,711 books). The median copyright date is 1971. There has been some updating, twelve books added to the campus collection in the last five years, but no significant expansion of the collection in the last ten years, and the average date is still 29 years old. The number of books circulated (25) represents .22% of the total number of books that support the program.

The Ammerman Campus Library subscribes to 1,026 periodicals. Six periodical titles support the program representing 0.59% of the total campus periodical collection. The following titles support the program: Architectural Digest, Architectural Record, Better Homes and Gardens, ENR, Issues in Science and Technology, and Technology Review. This percentage is a
reduction (0.78%) from the last program review, and as continues to be true, the titles do not deal with all phases of construction.

Due to the average age, limited scope and paucity of books and periodicals to support this program, faculty should make recommendations to the library to build the collection within the budgetary constraints. This is important because in the Current Student Survey and Graduate/Former Student Survey one of the services used by most of the respondents was the campus library (73.2% Current Students and 78.9% Graduate/Former students).

Of the 2850 media titles in the Ammerman Campus Library Media collection, only 11 media titles support this program (0.39%) with a median age of 1989 with only three media titles added in the last 5 years. The Campus Media Resource Center and Campus Classroom Services indicate that there is no record of use of these facilities by this curriculum. CT/A faculty needs to work with the Media Resource Center to expand the collection.

The need for Internship/Co-Op experience in the program has been indicated by industry, academia and government projections. Most students do not use SCCC's Internship/Co-Op placement service. In the Current Student Survey 82.1% of the respondents indicated that they did not use this service. In addition, 83.9% indicated that they did not use the Job Placement service. This is also true for graduate/former students, with 73.7% indicating that they did not use either Internship/Co-op Placement or Job Placement.
V. Staffing

For the last three years, no full-time faculty has been solely designated to the Construction Technology Program. During that time, staffing consisted of part-time faculty and two full-time faculty members who must divide their time between the Construction Technology and Drafting programs.

In fall 1999, a full-time faculty member was hired for the Construction Technology/Architecture program. With the addition of this faculty member, it is anticipated that he will be able to direct the progress of the curriculum and the recommendation of the program review committee. Specifically, the need to establish an Advisory Board, conduct annual review of the Department of Labor projections, advise the CT/A Club and develop the outcomes assessment plan.

Those faculty involved in the program are constantly attempting to upgrade their teaching techniques. The Current Student Survey and Graduate/Former Student Survey indicate that the courses and the faculty that taught the courses were highly regarded by the students who responded. Graduates and former students rated the classroom/laboratory instruction (75.0%), and the involvement and support received from the department in reaching their goals (73.3%) as "good" or "excellent". Current students overwhelmingly approve of the classroom/laboratory instruction they received (78.5% providing ratings of "good" or "excellent"), and the involvement/support they received from the department in reaching their career goals (70.5% providing ratings of "good" or "excellent").

Graduate and former students were given the opportunity to respond to the question: What do you think are the strengths of the CT/A program at SCCC? The most frequent response of those who responded (55%) indicated that the quality and knowledge of the teachers and involvement of department personnel was the greatest strength of the CT/A program. In the same survey, graduate and former students indicated that the best way to improve the Construction Technology/Architecture program would be to hire additional, full time teachers in the program.

In addition to instruction and curriculum development, full-time faculty is important for student advisement. CT/A faculty advising was listed as most used of all SCCC services by both current and graduate/former students. But, the greatest levels of satisfaction was reported by graduate and former students (87.5% "satisfied" or "very satisfied" vs. 46.4% for current students) which correlates with a higher percentage of full-time faculty associated with the program.
As part of the program review process the full-time faculty involved in the program have met to discuss expanding the traditional student evaluation methods with portfolios and questions on exams throughout the curriculum. The following are desired outcomes for students who have completed the CT/A curriculum: sufficient understanding of CT/A course work; Organizational skills; Problem Solving skills; Communications skills; and Professional Inter-personal skills.

The following are methods of measurement: Student Portfolio; Grades from individual CT/A courses; Average CT/A grades; Transfer and or professional success; and Advisory Board input.

Implementation: Student Portfolio

In the second, third and fourth semesters there are certain courses requiring individual and group design and communications projects. The results would be good indicators of a student’s progress (and the program’s success) in reaching our desired outcomes. The portfolio would contain an objective record of progress. A standardized form will be used to rate progress in each category at the end of each semester in the selected courses.

In the second semester the courses would be CT22 Site Planning, individual design project; and DR17 Architectural Drafting I, individual design project. During the third semester, CT36 Energy-efficient Architecture, individual design project and DR18 Architectural Drafting II, individual and group design projects would be used. In the fourth semester, CT14 Construction Methods, individual design project, and DR19 Architectural Drafting III, group communication project would be selected.
VI. Major Findings

Statistics on the Construction Technology/Architecture Curriculum (334) indicate a relatively stable enrollment with little change in the student profile in the last ten years. To be better able to improve graduate rates there is a need to review admission standards and to develop methods to track graduates and former students. The emphasis to provide a broad-spectrum introduction to construction technology and architecture and to produce both career-oriented and transfer graduates provides the greatest flexibility for students.

Although student interest and transfer options in the Architecture option remain strong, industrial, academic and governmental projections indicate greater opportunities in the next five years in Construction Management. Proposed modifications of the CAD certificate and CT/A curriculum will meet both current and future students needs. In addition, there is a need to explore the development of a Construction Management and/or A.S. option to the CT/A program to better meet the needs of the students. A more active involvement in coop/intern placement will better prepare our graduates.

Quality of instruction as indicated on student surveys is an important aspect of the success of the program. Although the program has been without a full-time faculty member for a number of years, curriculum standards have been maintained. The recent hiring of a full-time faculty member for the program should aid in the development of an Industrial Advisory Board and annual review of information provided by the Department of Labor, which is necessary to ensure that the program remains current. Recruitment of female and minority students and changes in the evening program are additional ways to expand enrollment.

The greatest need for improvement is in the area of resources. The physical environment and equipment is inadequate for the success of the CT/A program. There is barely adequate space for lecture courses, and the desks are too small to accommodate the instruments used by CT/A students. Laboratory rooms are insufficient and inadequately secured. Equipment is in many cases obsolete and/or inoperative. Access to computers and CT/A software outside of class, and expansion of the library and media collection are needed for the curriculum to remain competitive.
VII. Recommendations

1. It is recommended that the College plan for more classroom space for CT/A courses, equip the current rooms with larger desks or laboratory tables to meet program demands, and create a group study laboratory and practice area for student use equipped with tables, computers and study materials. Provide for a Professional Assistant to accompany field survey lab sections to help setup and maintain equipment. (see Resource section for specific room needs)

2. Improve lighting and correct physical inadequacies in the CT/A rooms, limit access to rooms when not in use and provide supervision when open to prevent pilferage and damage. (see Resource section for specific needs)

3. Continue to review CAD technology and CT/A courses to enhance transferability and work with SCCC's Coop/Internship and Job Placement services to provide cooperative and intern experience.

4. Develop methods to assess program outcomes including Student Portfolios; grades from individual CT/A courses; average CT/A grades; transfer and/or professional success and Advisory Board input.

5. Develop an Industrial Advisory Board and a system to survey and track graduates and former matriculated students annually concerning their employment, salaries and education.

6. Continue to monitor reports from the Bureau of Labor Statistics concerning construction management and architecture, and within a year, explore the development of a Management Option and/or an A.S. option into the existing curriculum.

7. Renew contact with local high schools and organizations to increase enrollment, with emphasis on minority and female enrollment.

8. Work with the College Academic Computing Center to acquire and maintain CT/A and CAD software for student use.

9. Faculty should make recommendations to the library to build the CT/A collection within the budgetary constraints.
10. CT/A faculty should review admissions standards and encourage students to use the Academic Skill Centers.

11. The Construction Technology Club should continue to provide an opportunity for students to meet professionals in the construction industry and to visit construction sites in the community.