BETWEEN CAMPUS AND COMMUNITY,
A PROGRAM AND DESIGN FOR
A NEW STUDENT HEALTH FACILITY

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(ABSTRACT)

The Student Health Services is located in Henderson Hall, a complex consisting of several buildings constructed at various times. Three other departments share this complex. Because of inadequate space and a building layout which does not easily accommodate the Health Services' function, a study was completed to determine needs of the facility, and a final design solution was produced to supply the needs of the University, the Health Services and the community.

Advantages of the existing location as well as the university master plan indicated keeping the facility in the same area. But problems created by the layout and shape of the present facility necessitate a new facility designed to increase both efficient handling of patient and staff flow as well as creating a positive image. The facility should communicate that it is a place for healing rather than a place for the sick.

The new building ties into the existing complex creating a boundary between the University and the community, and creates a front facing the new student activities building. The original residence of the first College president will be restored to its original scale and identity by the removal of its present two additions.
ACKNOWLEDGEMENTS

I would like to greatly thank my committee, Dennis Jones, John Wade, Robert Chiang and Dr. Desjardins, for their contribution to this project. Their insight, experience and encouragement has stretched me in my understanding of an Architectural project and developing a workable solution. There were many issues to deal with which my committee helped bring out. The instruction and advice of Professor Schueller has also been significant in this project. Most importantly, I would like to thank my wife for her patience and support during such a long process.
INTRODUCTION

The purpose of this thesis is to consider and explore the needs of the Student Health Services facility at the Virginia Polytechnic Institute and State University and to propose an architectural approach to improving the services offered.

First of all, a look at the site in relation to both the University and the community was necessary in order to provide a context in which to design. Historical considerations were also an important factor. The original President's house at the university is now a part of the Henderson Hall complex, which consists of several additions of different periods. Objectives and images concerning both the university and the local community are vital to create a cooperative atmosphere.

The change in title from "infirmary" to "Student Health Services" represents a shift in emphasis in the objectives of the service and is an important aspect for consideration of future needs. The former represents a place where the sick are cared for while the latter connotes an attitude of health maintenance. In a Health Service facility, space for education will become more important.

To further understand the situation and work being done at the Health Services, a survey was made of the staff concerning patient and staff movements. Interviews were conducted with some of the staff along with direct observations of activities.

Outside research involved comparing the Health Services with other health facilities, including an analysis of a similar student health service, to determine various approaches to organization.

As a thesis is a proposal of a solution to a set of conditions, a final design is presented as a possible solution to the set of conditions revealed.
CAMPUS AND COMMUNITY ORGANIZATION

The existing Henderson Hall complex is located in an area defined by the campus master plan as a student service area. This description includes those facilities which meet indirect student needs in their education process, such as the library, the bookstore, the student activities center and the Health Services facility.

The community commercial district is directly across from this area and focuses on a student clientele. There is, therefore, a great deal of student activity in this area.

Planning a new Health Service facility close to the existing building would allow it to remain within the campus master plan and keep it near major public transportation routes.

Much of the central campus is of stone construction while buildings on the periphery are generally brick, especially those nearest the site of the Health Services. Concrete structures using brick or stone infill are frequently used throughout campus. The closest building to Henderson Hall, the student activities facility, uses exposed concrete column and beam with brick infill.
Although the main campus entrance would appear to be the main student pedestrian route, with two wide drives around a grassed median and wide walkways, it is actually used more for vehicular traffic. Heavier student traffic occurs more often perpendicular to the mall, but the majority of students follow College Avenue and have practically defined this as a student traffic zone. This route is directly in front of the site of the Health Services facility thus providing high visibility and easy access. Since a primary concern of the Health Services is attracting students to education classes which promote a healthy lifestyle and thus reduce illness, this would be an advantage. This area is frequented by students after normal hours as much as during the course of the day. Service vehicles would be able to use the main campus entrance for their work. Rescue squad vehicles would also be able to use this route to avoid pedestrian traffic.
Although the site is close to the center of the community, it is a relatively green area, supporting many large deciduous and conifer trees. It is a valuable site in terms of its natural beauty. The gentle southeast slope provides some protection from winter winds and also traffic noise from Main Street. The main protection from the westerly winter winds will come from the existing Henderson Hall, although it is too far from College Avenue to act as a buffer.

The College Avenue side of the site will receive morning and early afternoon solar radiation. This will cause a continuous change of shadow across the face of the structure, adding to its character as well as its physical warmth. Water runoff down the hill towards the site should not produce great difficulties due to the shortness of the hill and the drainage system along the street above.
This site is unique and has great potential and liability. Several views are commanded, each with their own responsibilities and assets. On this site images are presented to the community, to the student body and to those using the formal entrance to the University.

The College Avenue side of the site forms a boundary between the campus and the community. The boundary is symbolized by an old iron fence with brick pilasters creating separate zones. This is an area where an important image is communicated to the surrounding commercial district of the community. In some measure this image conveys what the University thinks of the community. What is now there is primarily the back side of the complex.

The side facing Main Street is surrounded with a view of trees, grass and a hill hiding Main Street itself. This view affords a peaceful view because of the heavy foliage and natural setting. This view would be suited to inpatients requiring overnight stays. It would face the least heavily traveled pedestrian route.

The major addition to the student activities building would focus more attention on the side of Henderson Hall directly across from it. This is an area that needs to be addressed in the new facilities.

The fourth side faces the official main campus entrance. This view gives no indication of being significant, although part of it is an historic building, designed as the original residence of the college president and later its first infirmary. The additions have altered it's appearance yet the building has the potential of being renovated to a prominent position.
An entrance to a facility presents an image that begins to affect the users perception of the facility and the life within. The Student Health Services has two entrances, neither of which leave a positive impression on its users. The primary entrance used both during the day and at night (photos 'A' and 'D') brings the students through the parking area, beside a trash dumpster, onto a loading dock and to a metal door. The user is neither welcomed or cheered. The interior corridor of the Health Services facility (photo 'F') does not convey warmth to the patients. Privacy, especially when one is ailing, is important but is almost impossible to find in this type of situation.

The second door used only during the day hours (photo 'C') is in a more secluded area, not along a major student pedestrian route. This door is not recognizable as a public entrance by most students. What was once clearly a residence has been altered in character by additions to the side (photos 'B' and 'E') and to the back. The original college president's house has become a small part of a somewhat related complex. The similarities tend to destroy its individual identity.
In order to establish a hierarchy of department locations, interviews were conducted with some of the staff and a survey was taken. The method chosen for the survey was a simple and easily answered questionnaire in which the staff would indicate how many times they traveled from their department to another and how many patients they would send from their department to another. Separate figures were to be given for an average day and for a busy day in order to evaluate how the process changed with a larger group of people. Due to the campus lifestyles, communicable diseases travel quickly throughout the student body, and a heavy influx of patients is not uncommon.

Making the questionnaire short and simple is key to having a busy staff take the time to fill it out. One problem is cutting the instructions down to help it to look simple, and risking unclear unclarified instructions or questions. Directing questionnaires to specific personnel would also be advantageous to getting responses.

The results were tabulated to determine which departments had continual traffic between them. Shortening staff travel was critical to the efficiency of the Health Services. From the tabulations, priorities were set as to which departments were most critical in their location relative to another department. The results included both patient and staff travel.
A similar institution was chosen for comparison of organizations with the Student Health Service in Virginia. The health facility at the North Carolina State University treats approximately the same number of patients and has similar departments as in Virginia. A patient at North Carolina first approaches the receptionists who determine what the particular need is. The patient's file is pulled and given to the first aid room and the patient waits his turn in a common waiting room for an examination. In turn, each patient goes to the first aid room to have vital signs taken by the staff. After this brief initial exam, the patient is sent to a department (gynecology, doctors' offices, nurse practitioners' offices, health counselors). To prevent wasted time by the staff, the patient is given their own records to carry to the next department. This saves steps for the staff but presents problems in having the records out of staff hands.

North Carolina also faces problems with an inadequate facility. Although an addition has been provided to alleviate some of the problems, there are still problems with organization caused by the physical layout of the facility. The work flow of a health service almost requires a horizontal flow of traffic, but the design of their building is a four floor building with a small amount of area per floor. Departments which should be closely connected because of traffic are separated because of lack of space.

Students at Virginia Tech also first approach the reception and records department. But after the student's records are located the student is sent directly to the office or department to wait with a group there. Vital signs are taken by the physician who will continue the rest of the analysis. There is no separate waiting area for the physicians' offices and patients are usually lined up along a corridor. Because each doctor does the entire analysis and because patient consultation and education are an important part of the doctor's responsibility, more time is required per patient slowing down the process and increasing the number of patients waiting.
Small clinic operations typically have a minimum of physicians and a maximum of patient rooms. The patient is taken to an exam room and given a preliminary analysis and interview by a nurse. This information is then provided to the doctor. This arrangement allows the doctor to see more students in a shorter period of time.

To a certain extent, this is the procedure followed at the North Carolina State University Student Health Services. Students are first taken to the first aid room where vital signs are taken and the initial paperwork is begun. But from there they are sent directly to the physician's office where further interviews, examination and counseling are done. Not having a separate exam room, the physician may need to leave his office if the patient needs to dress or undress. This is an inefficient use of time that could be avoided by having an exam room.

At the Virginia Tech Student Health Services, each physician handles their patient's vital signs, records and the entire process of interview, examinations and counseling. This all takes place in their office which functions also as an examining room. As with the previous situation, when the patient needs to dress or undress the physician may need to leave their office. In an effort to teach and train students in proper health procedures to avoid further or future problems, the physician will spend more time instructing the student than in a faster paced clinic.

The proposed organization would provide breaking the patient traffic into smaller groups by sending them to departments where nurses would take over the initial assessment in examining rooms and the doctors would take over as in a clinic situation. But each physician would have two examining rooms with his office, providing space for separate examinations and for consultation. Patients could be dressing or undressing while the doctor was seeing another patient.
In a survey of hospital and clinic facilities presented in current Architectural magazines, various types of design solutions began to emerge. Comparisons of floor plans showed four general types of plans to deal with patients and staff traffic.

The linear type of plan, which the current Health Services predominantly is, provides one central waiting area and one corridor. The patient is taken directly from the waiting area to the exam room. All personnel travel this same corridor. At the Health Services facility, the corridor is also used for a waiting area at some of the departments. For smaller facilities, this design seems to conserve space and consolidate resources, but long distances and congestion occur for larger facilities with longer corridors.

Providing circulation in a loop allows more corridor length than the linear type without having to transverse the entire corridor to get to the farthest point. It gives two possible directions for travel although the circulation tends to become more complicated. For fire egress, this is a preferred means of design. The waiting areas are typically in the front.

A zonal type of circulation groups related functions together allowing more contact between functions. This method usually accommodates more complicated procedures which require several related steps in patient analysis or treatment. This type creates a better organization although the disadvantage would be the tendency to create a redundancy in support services. This may decrease patient and staff movement but will require more staff and a greater stock inventory.

The cluster type of organization involves breaking down the process of patient handling into successive smaller units. This is the general plan of the new Student Health facility, to provide a common reception area for its diverse departments with smaller reception and waiting areas at each of the departments. This would reduce the backup at the main reception area and process the responsibility of a specific problem to that department for setting up its own priority schedule, based on knowing problem and not just a patient count.
The new organization for the Health Services will require more structure but will emphasize stronger department functions. There will be six steps or levels in the process of going through the Health Services, although not all steps are necessary for every patient.

The first step involves bringing students in, finding out needs, finding records, and sending both to the appropriate department. Arriving at the department begins the second step of the analysis. The student is greeted at the nursing station and is placed in a waiting area until time for examination. After examination, he may either enter the physician’s office for further consultation or proceed to another level.

Step three of the process serves to assist the physician in analysis by giving more information to determine a diagnosis or at least a verisimilitude. The next step is to supplement the diagnosis in treating the problem. At this level, the pharmacy provides for self-administered treatment under a doctor’s recommendations while the inpatient ward is generally for supervised treatment. At the fifth level, provisions are made for less than immediate health care concerns, ranging from further education to business matters.
The evening/night shift requires a different organization than the day staff in terms of personnel and responsibilities. Only the treatment room, records department and inpatient ward is open, and only one nurse (during the night) or two nurses (during the evening) plus attendants handle the load.

A patient generally approaches the entrance, looking for light or some signs of life. He is then met by an attendant who decides whether immediate attention is necessary, or whether the patient should wait. Verification of the eligibility of the patient is required for insurance purposes, and ineligible patients sent to the hospital or turned away. The students records are given to the nurse in charge of outpatients for review before seeing the patient. As the patient enters the treatment room, he is seated beside a desk which is occupied by the nurse. Vital signs are taken and an interview conducted to determine symptoms and treatment.

Occasionally a physician may need to be called concerning a patient, either for consultation over the phone or to come in for examination or treatment. A patient who is ill cannot return to the waiting room until the doctor arrives, yet also needs to step aside for the next patient to be seen. A separate place was created with a bed until treatment.

If a patient is already in the treatment room, and another is brought in requiring immediate attention, the latter may be taken to the suture area in the rear and isolated by a folding partition.

If a patient requires overnight admission, he may be taken directly to the elevator without having to pass through the waiting areas. Once off the elevator the patient arrives at the nurses’ station where information must be passed from the outpatient nurse or physician responsible for the examination to the inpatient nurse who will be responsible for observation or treatment.
The entrance should be clearly seen (1) (12) and have a specific character. The natural environment is an important symbol of the natural healing process, and should be a part of the entrance. Upon entry there should be a reception area close by (2), neatly organized and efficient. A patient’s senses will be close to being overloaded due to their affliction; anything else which may add to their confusion should be eliminated. The waiting areas (3) (6), conversely, are where patients and friends don’t have to think and need positive stimulation from the environment. Medical offices (4) should be organized, well lit with a prominent control point (nursing, receptionist station). In the physician’s office (5), the objective is to interview the patient for facts to determine a proper diagnosis. A warm atmosphere is important, but excitement would deter from its purpose. Waiting areas (3) (6) should be flexible and interesting while inpatient wards (7) should be secure and devoid of obstacles. Where long lines may form, waiting areas (8) should provide open space with perimeter seating. The emergency entrance should be private, protected from the elements and efficient. Exterior paths (10) (11) should be exciting, harmonizing with the environment.
To provide a new Health Services facility in the same area without interfering with the current process would require phasing the construction. A new structure would provide facilities for gynecology, a nurses' clinic, the lab, radiology, the pharmacy, the treatment room, records and business offices and an inpatient ward for the first phase. A new façade facing the student activities building would also be created by constructing additions to the ends of the existing building.

This would allow the second floor of the existing building to be renovated for offices. Those facilities presently located in parts of the complex to be removed could be transferred into the renovated office section.

The second phase would provide new offices for the physicians and the administrative staff, along with renovated facilities for the rescue squad. There would be new connecting corridors to tie the parts of the complex together.
Two additions were added to the side of the existing facility (photo 'A') opposite the student activities building to create a 'face' for the former and a defined space between the two facilities. This brings more attention to this area for use as an extension of both facilities. Instead of being just a side yard it would become a front yard. Opening sections of fence between the site and College Avenue would help to create better student access to and through the property.

The new addition for the Health Services (photo 'B') facing College Avenue and the commercial district will give a stronger image to the university, and a more professional atmosphere to the Health Services. There would be essentially three entrances. The largest being for cars, with the drive passing through the building and revealing parking beyond. The least noticeable from close distances would be the entrance to the office spaces on the left side, which would not be connected directly with the Health Services. The lack of glass and typical doors would help to diminish the impression of this being a front door, although the tower around it would draw more attention to this. To clarify the main front entrance to the Health Services, a cantilevered section on the second floor would project over the entrance. The entrance itself, protected above and surrounded with glass would reveal more of its inner life to those outside. It is more comfortable walking into a new place having had some introduction to the activity.

The Main Street side will project part of the third floor over a pedestrian path (photo 'C') connecting dorms and dining hall on south campus with the downtown area. The natural character of the site will be retained by keeping existing slopes and tree locations.
In removing the rear and right additions to the former president's house, a separate identity would be again given to the building. It would stand on its own as a separate entity more closely connected to its historical origins. To help maintain this separation in spite of the new additions surrounding it, an arched brick wall would serve to help isolate zones of old and new. The wall would be to the rear of the house (all photos) and on the right hand side (photo 'B') wrapping around the building. There would be an enclosed connection between the facilities which would allow freedom of movement, passing through the wall.

The first view seen from the main campus entrance would probably be the residence, and creating a formal garden around the formal historical structure would make this a special area to see. The heavy tree population in addition to the masonry wall would help keep the new Student Health Facilities from visually detracting from the residence.

A drive for the Rescue Squad would 'disappear' below street level allowing access to an underground garage for rescue vehicle parking. This would be designed in conjunction with the new rescue squad facilities to be located on the first floor of the existing building. A ramp would extend from the main drive, over the rescue squad garage and to a new entrance on the second level. A bridge between the old president's house and the second floor of the Health Services building would cover the rescue vehicle passage. This passage would lead to the new parking area between the new and existing facilities and to the ambulance loading area at the new facility.
FIRST FLOOR: The records/reception area is the first area encountered and is a prerequisite for using the Health Services. The treatment room and waiting area are concerned with the most critical or immediate health problems. Frequently an x-ray is required during this evaluation, and the X-ray room is immediately adjacent to the Treatment room. The pharmacy is usually the last step in a patient's visit and has been kept out of other heavily traveled areas.

SECOND FLOOR: Primary student contact is made at the Reception/Business area, which is responsible for sending student records to the separate departments. Because of a high volume of traffic the Clinic is located nearest the reception area. The Doctor's offices are located further back for more privacy, and with longer visits per patient there will be less traffic. A central location is given to the Lab which will be used by all departments but most frequently by Gynecology. For gynecology, therefore, a sample pass through door has been provided into the lab.

THIRD: The inpatient ward is furthest away from the traffic below to provide privacy and security. The Occupational Health department is for staff and not for students so this area needs to be separate. Administration would be in a private area though it would have immediate access to the inpatient areas.
Due to the heavy traffic in the Health facility and the need for privacy and security of areas, two separate circulation routes have been created. Free circulation areas allow unrestricted movements between departments and floors. Controlled circulation routes require pedestrians to pass a control point such as a nurses' station before entering the individual departments. The second floor has a main reception desk at the top of the stairs, the route most frequently traveled. Each department has a control point and a waiting area for collection of patients and privacy as well as for supervision.

Vertical circulation routes are kept generally in the free circulation areas to facilitate movement throughout the entire complex.
HVAC SYSTEM

FLOOR AREA: 5854 - 10544 - 11540
AIR QUANTITY: 6140 - 11060 - 12105 CFM
ROUND DUCT: 24" - 32" - 34"
CONCLUSIONS

The project seems to make efficient use of the space available and addresses key issues concerning the site and the facility requirements. One of the areas of weakness would be the lack of space for growth and expansion for the Health Services. Although there does not seem to be a need for a large expansion of the proposed facilities, additional physician's offices would be extremely difficult to provide for. Space could be made available in the eastern wing facing the student activities building, but the organization would be interrupted. By having provided for a better patient flow incorporating features such as exam rooms for the doctors, a greater number of patients could be seen with the combined use of the nursing staff and physicians.

Another area of concern is the night and evening shift staff. Because only the records/reception area and the inpatient ward is open and staffed, this will require personnel on the first and third floors. It would be more efficient to have the two areas closer together during this time, although the arrangement works well during the day to keep the patient department away from the rest of the high activity areas.

Keeping the main entrance for the Health Services on College Avenue visibly the 'main' entrance will be an important design consideration. Since there is an entrance to the former facility, which is marked from a distance by a tower, this entrance will have to be reduced in visual importance. The entrance should be seen as a secondary entrance. Bringing the Health Services entrance plaza out to the side walk will give a stronger connection between the two.

The location of the pharmacy has an advantage in being near the main entrance and reception area. Although the pharmacy is closed at night it is still located near an area of the building in which staff will be operating. This would provide security for an area which will require closer surveillance. During the day, when the pharmacy is open, there is a heavy flow of student traffic from this department out of the building, and being near major exits is important. A concern is that the some student traffic would interfere with the more private corridor area around the treatment center. Having an exit between these two areas will help, but students would generally take the shortest exit towards College Avenue which would be through this corridor.

After my presentation to the Health Services staff, some good questions arose about issues of day to day operations. The presentation gave the staff some degree of information on experiencing work in the proposed facility in order for them to make comments on potential problems, conflicts or advantages. It was revealed that even after information has been obtained from the staff, my interpretation of that information into a concrete design may not fulfill the expressed needs. Also, some actual needs were expressed only when the staff was given an example to view. My concept of obtaining all the basic information in order to develop a program as an absolute design formula to produce a final design was erroneous. There needs to be research, conclusions made and presented in the form of design ideas that can be comprehended by actual users and then obtain feedback and evaluation by the users. Afterwards redesign should begin based on additional information arose about issues of day to day operations. The presentation gave the staff some degree of information on experiencing work in the proposed facility in order to make comments on potential problems, conflicts or advantages. It was revealed that even after information has been obtained from the staff, my interpretation of that information into a concrete design may not fulfill the expressed needs. Also, some actual needs were expressed only when the staff was given an example. The idea of obtaining all the basic information in order to develop a program as an absolute design formula to produce a final design was erroneous. There needs to be research, conclusions made and presented in the form of design ideas that can be comprehended by actual users, feedback and evaluation by the users, and then redesign based on additional information.
BIBLIOGRAPHY

Buchanan, Peter. "Medical Facility, Technical University of Aachen, West Germany." 1076 (October 1986)


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