A Food Service System Facility for the Citadel

Jackson M. Zorn

Clemson University

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A FOOD SERVICE SYSTEM FACILITY FOR THE CITADEL

JACKSON M. ZORN
TERMINAL PROJECT
COLLEGE OF ARCHITECTURE
CLEMSON UNIVERSITY
DECEMBER 1978
A FOOD SERVICE SYSTEM FACILITY FOR THE CITADEL

A FOOD SERVICE SYSTEM FACILITY TO MEET THE NEEDS OF A PROGRESSIVE MILITARY COLLEGE.

THE CITADEL
CHARLESTON, SOUTH CAROLINA

Jackson M. Zorn
December 1978

A terminal project submitted to the Faculty of the College of Architecture, Clemson University in partial fulfillment of the requirements of the degree of

MASTER OF ARCHITECTURE

APPROVED:

[Signatures]

Committee Chairman

Head, Department of Architectural Studies

Dean, College of Architecture
Traditionally, the food service system at The Citadel has been subservient to the fourth class or plebe system. Dining has been used as one of the primary vehicles for enforcement of a class system whose hierarchy is determined first by the length of time an individual has been a member of the system, and second by individual merit within an established class.

The broad spectrum of economic aspects associated with the present system of family-style dining have created problems which indicate the need for a future plan of change which can be accommodated within Citadel tradition.

Through meetings with members of the food service staff, faculty, administration, alumni, and cadets, the basis for evaluating the existing system and for proposing a revised system cognizant of established traditions was developed.
The proposed architectural response allows the food service facility to function as such, not as a subordinate extension of a military system, while positively effecting the class system, through making dining a social event among classmates and friends, rather than a training experience for fourth classmates.
I wish to acknowledge the invaluable assistance and support of the following:


Health Care Facilities Planning and Design Studio.

The Citadel
Col. Jim Baker, Campus Engineer
Mr. Elton Coleman, ARA Food Services Manager
Col. Lionel Himmelright, Head, Dept. of Civil Engineering

Andy Hall, Ben McKay, and Paul Pushkar.

Jeane, Katherine, Jack, Billie, Mabel, and Rebecca.
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introduction
The Citadel was created by an act of the South Carolina State Legislature in 1842 as an educational institution with the secondary function of serving as a military post in Charleston, South Carolina. Since that time it has continued as a military institution with a sound tradition founded in its past in a city with a similar philosophy. In 1918 The Citadel moved to its present site bounded on the northeast by Hampton Park and on the southwest by the Ashley River.

Presently The Citadel enrolls approximately two thousand cadets in an undergraduate liberal arts and sciences program. Due to the cadet housing capacity on campus the size of the Corps of Cadets has been limited to two thousand during the foreseeable future. However, the incorporation of graduate programs and evening classes in which approximately thirteen hundred off campus students participate creates the potential need for expansion of facilities outside of cadet housing.

In 1977 a master plan for campus development was incorporated establishing project priorities, the first
of which was renovation of the air conditioning system in Coward Mess Hall. Prior to this time, and at the beginning of this project, a totally new dining hall had been a priority based on an earlier master plan.

With the new master plan, and proposed renovations to Coward Hall, the reality of a new food service system facility moves farther into the future, requiring a greater amount of foresight in determining a feasible solution to existing and projected problems.
method
The method of arriving at a workable program for the new food service system facility was broken down into six related phases.

The initial phase consisted of determining the major elements which had to be addressed during the course of the project. This was termed perception of the problem.

Second, parameters were defined in which the problem would be solved.

Third, the major issues as they effected the problem were defined.

Fourth, systems were developed to satisfy the major issues.

Fifth, the effects of the systems developed were predicted in order to evaluate their benefits and liabilities.

And sixth, a program of physical spaces was developed as a final step prior to beginning the design.
PERCEPTION OF PROBLEM

ESTABLISH PARAMETERS

CHOOSE MOST IMPORTANT ISSUES

DEVELOP SYSTEMS TO SATISFY ISSUES

PREDICT EFFECTS OF SYSTEM

DEVELOP SPACE PROGRAM
The major elements were conceived to be the food service system and The Citadel, which generated the design decisions for the ultimate architecture of the facility. The food service system consisted of the means by which food was received, stored, processed, served, and disposed of within the macro-environment. The Citadel was the macro-environment surrounding the food service system. Physically this presented no unusual implications. Socially, however, the traditions relating to the food service facility were very important.

The design process consisted of translating the most important needs of the social and physical character of The Citadel and of the food service system into a respondent environment. Once this was done, the resulting facility became a micro-environment or architectural system within The Citadel.

In establishing the conceptual parameters for a food service system facility within a military environment, case studies of similar projects were limited in number.
but broad in their range of possible solutions.

At one extreme, the facility at the Air Force Academy was evaluated. In his book, Modern Movements in Architecture, Charles Jenks states

the Air Force Academy so over-asserts regimentation and impersonality... the mechanical system has become greater than the desire to change it.... How pretty those 2600 cadets look sitting down to dinner and saying the Lord's Prayer in unison. I want to be a machine.

Jenks goes so far as to blame the frequent cheating scandals on the architectural environment. The cheating scandals are due more likely to the fact that cheating is not tolerated at the service academies as it is at most civilian colleges and universities. Still, Jenks' criticisms are valid concerning other aspects of the academy's architecture. The food service facility takes on the character of the surrounding architecture. The interior space consists of a open square large enough to seat 2600 cadets who lose their individual identity and are identifiable only as The Corps.
At the other extreme the cafeteria at the U. S. Atomic Energy Commission's Brookhaven National Laboratories was designed in the belief that the scientist-specialists were leading intensely disciplined workaday lives and needed some form of relief from this regimentation during the course of the day.  

The resultant plan of the structure is in two uneven sections around an entrance court; not one of the walls is parallel to another. Sloping cast in place columns support slanting roofs.

Obviously, there was a very broad range in which the design solution might lie. Rather than begin with the whole, and force the functioning parts into some predetermined concept, the more logical approach of developing functioning parts into a resultant conceptual scheme was chosen.

Through meetings, interviews, and discussions with faculty, administration, food service staff, and cadets, primary issues were determined which had to be addressed in the course of arriving at a workable solution.
The most important issue was whether The Citadel would remain a military college in the foreseeable future. If not, the design of the food service facility lost its uniqueness. Evaluation of recent decisions and events indicated that The Citadel would remain a military college during the foreseeable future for the following reasons. The conversion of the College of Charleston to a state-supported institution, relieving pressure from minority groups for less restricted college education opportunities locally; the establishment of two thousand as the optimum number of cadets, strong alumni support, both political and financial, for continuing traditions; strong recruiting efforts under the present administration, increased emphasis on academics and the graduate program; and location in, and support from, a city that preserves strong tie to its heritage.

The second issue had to do with determining what was of optimum importance in the military system at The Citadel. Generally, those things which perpetuated the idea of The Citadel being unique. Most important
was maintenance of the status of The Citadel graduate as a citizen soldier. To accomplish this retention of the class system and in turn its generation of esprit de corps had to be incorporated in the solution.

The third issue had to do with determining what was of optimum importance in a food service system. The primary purpose of the facility would be to furnish proper nutrition through meal variety not presently offered through family-style dining with one main course. Next, flexible scheduling of meals was desirable to accomodate a broader range of cadet activities during free periods. An atmosphere conducive to good digestion was desirable along with fast service, and economical operation within an established budget.

The last issue, will, and to what degree should the traditional military system be maintained relative to the proposed food service system, was generated by the first three issues already addressed. The following activities are listed sequentially as they occur in the existing, or traditional system, and as they might occur in the proposed system with the overriding concern
being maintenance of tradition as long as it does not minimize the effectiveness of the food service system.

**EXISTING**

<table>
<thead>
<tr>
<th>EXISTING</th>
<th>PROPOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>formation prior to meals</td>
<td>retained</td>
</tr>
<tr>
<td>march to dining hall</td>
<td>retained for those who have eaten earlier or will eat later</td>
</tr>
<tr>
<td>dining in company groups</td>
<td>dining by choice with classmates</td>
</tr>
<tr>
<td>family style service</td>
<td>cafeteria-style service</td>
</tr>
<tr>
<td>fourth class service</td>
<td>fourth class service during cadre training period</td>
</tr>
<tr>
<td>one seating meal service</td>
<td>broad range of dining hours</td>
</tr>
</tbody>
</table>

Since some aspects of the existing system are changing, it is necessary to address the reasons for those changes.

Primarily those changes are seen as changes that would develop a stronger sense of camaraderie within a class, remove the tensions present between classes in the existing system of assigned seating, and allow cadets a choice of what they would eat and to some degree, when they would eat it. From the vantage point of the food service staff, the changes mean a more economical operation in that less food would be wasted, less employees
required and a more even work load for those staffing the facility. For the administration of the college, more pleasing dining conditions for cadets means increased figures for cadet retention, particularly fourth classmen, and more economical operation means either reduced tuition, or putting the money saved into other areas on campus needing improvement.

There were two major systems to be developed from the issues. The first had to do with servant spaces containing facilities related to the preparation and serving of the food. The second, and more critical systems had to do with the process of receiving and consuming the food.

The first system is process oriented and not that different from other conventional food preparation systems. These elements were determined in the early stages of development by criteria established by the food service staff based on the proposed cafeteria style menu and service they envisioned providing.
The second system, that of receiving and consuming the food, is socially and psychologically oriented, in that the dining spaces provided must satisfy criteria that had been developed throughout the entire process of this project.

The most obvious question concerning the dining spaces is how large or small do they need to be. Ideally, large enough to seat the entire Corps of Cadets for those special occasions when they might all dine together. However, since these special occasions are not typical, it is uneconomical to design a system in which a large portion is out of use most of the time. Conversely a system designed to accommodate typical dining loads would have problems handling those special occasions when it was necessary for two thousand cadets to dine at once.

It was determined that the most satisfactory system would seat the two thousand cadets either banquet or family-style in a space of twenty-thousand square feet allowing ten square feet per cadet. For typical dining situations when seating would be changed to
cafeteria or restaurant-style seating, at sixteen square feet per cadet, the resulting load would be 1250 cadets. Next, the noon meal was determined the design meal since it was the most critical in that it occurs within a limited time frame. Theoretically a cadet could have an eleven and a one o'clock class which would limit the time available to carry out the traditional functions of formation on the quadrangle, company and battalion announcements, inspection, marching to the dining hall, eating, and returning to the barracks prior to afternoon classes.

Research indicates that approximately seventy-six percent of the population would choose the hour between 1200 and 1300 hours as the preferable dining period. This means that 1520, or 270 cadets over the typical design load normally would choose to dine during the noon hour.

These 270 cadets could be moved into pre-1200 or post 1300 hours dining periods with the remaining 480 cadets who would prefer dining then by two methods;
First, class schedules could limit the number of cadets available during the noon hour with the incorporation of a noon class period. This in turn would alleviate class scheduling problems and make better use of existing academic facilities by cadets and graduate students. Second, through incentives, such as allowing cadets to fall-out of formation prior to marching to the dining facility if they have a free period before or after the noon meal during which they might choose to eat, would move the remainder out of the noon dining hour.

By establishing the time period 1200 to 1220 hours as the time period for formation on the quadrangle to arrival at the dining hall, and 1250 to 1300 as the time period for leaving the dining hall in order to leave the barracks for afternoon classes, the time period 1220 to 1250 becomes the period in which 1250 cadets must be served and eat. Twenty minutes has been established as the average amount of time necessary to eat a full course meal, leaving ten minutes as the time frame in which a cadet must be served. Full
course meal serving lines can process from three hundred to over eight hundred patrons per hour, depending upon variety of food, staff experience, and clientele. The food service staff at The Citadel estimates that 720 cadets per hour is a reasonable figure establishing serving facilities.

Therefore, to serve 1250 cadets in ten minutes requires eleven serving stations serving approximately 115 cadets each.

Having determined the systems required to satisfy the issues, an effort was made to evaluate the effects the proposed systems might have upon the existing systems, and to determine if the issues had been resolved by the proposed system. Areas of prediction were categorized as either economical, individual, or conceptual.

Economically, the smaller facility required to serve a portion of the Cadet Corps would result in direct savings in initial construction costs, maintenance costs, and operating costs. The wider range of dining
hours would mean broader utilization of existing academic facilities, reduced food service staff, and reduced waste of food.

From the individual cadet standpoint, nutritional benefits along with a higher degree of satisfaction on the part of cadets and food service staff might be realized. Also important are an improvement in cadet retention and reduced tuition.

Conceptually, the transition from mess hall to dining room could be realized, increasing moral among both the individuals who eat there, and those who work there.

The program for areas within the servant spaces was developed with guidelines from reference materials related to food handling and preparation. Based on twice-a-week deliveries of supplies, conventional food preparation in the kitchen area, and cafeteria service serving an average of six thousand meals per day the following requirements were determined;
Total Facility (heated space) 57,960

Servant Areas 23,080
Receiving and Storage 4,780
unloading and loading dock,
weighing and checking 480
dry storage 1,800
paper and linen storage 1,000
cold storage 1,500

Processing 3,850
vegetable preparation, butchery, bakery 600
cooking, potting, panning, dishing 2,400
washing, cleaning, garbage holding 850

Servery 6,040
service staff and tables 1,540
queing for 375 4,500

Administrative Staff 800
secretarial pool and records storage 400
managers offices 400
<table>
<thead>
<tr>
<th>Section</th>
<th>Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kitchen and Service Staff</strong></td>
<td>1,600</td>
</tr>
<tr>
<td>lockers facilities for 25 male staff</td>
<td>400</td>
</tr>
<tr>
<td>locker facilities for 50 female staff</td>
<td>800</td>
</tr>
<tr>
<td>lounge facilities</td>
<td>400</td>
</tr>
<tr>
<td><strong>Mechanical Equipment Space</strong></td>
<td>3,000</td>
</tr>
<tr>
<td>heating, ventilating, air conditioning</td>
<td>3,000</td>
</tr>
<tr>
<td><strong>Served Areas</strong></td>
<td>34,880</td>
</tr>
<tr>
<td><strong>Dining Rooms</strong></td>
<td>21,600</td>
</tr>
<tr>
<td>350 first classmen @ 16 S.F.</td>
<td>5,600</td>
</tr>
<tr>
<td>600 second and third classmen @ 14 S.F.</td>
<td>8,400</td>
</tr>
<tr>
<td>300 fourth classmen @ 12 S.F.</td>
<td>3,600</td>
</tr>
<tr>
<td>250 faculty, staff, administration @16 S.F.</td>
<td>4,000</td>
</tr>
<tr>
<td><strong>Exterior Dining Terraces</strong></td>
<td>(7,200)</td>
</tr>
<tr>
<td>350 first classmen, 250</td>
<td></td>
</tr>
<tr>
<td>faculty, staff, administration @ 6 S.F.</td>
<td>(3,600)</td>
</tr>
<tr>
<td>600 second and third classmen @ 6 S.F.</td>
<td>(3,600)</td>
</tr>
<tr>
<td><strong>Lounge Areas</strong></td>
<td>5,250</td>
</tr>
<tr>
<td>toilet facilities for 1500</td>
<td>750</td>
</tr>
<tr>
<td>lounge and waiting for first classmen, faculty, staff, administration</td>
<td>1,800</td>
</tr>
<tr>
<td>Description</td>
<td>Area (sq ft)</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>lounge and waiting for underclassmen</td>
<td>2,700</td>
</tr>
<tr>
<td>Circulation</td>
<td>8,030</td>
</tr>
<tr>
<td>stairwells, elevators, halls, walls estimated at fifteen percent of clear space</td>
<td>4,030</td>
</tr>
<tr>
<td>entry elements large enough to enclose one battalion</td>
<td>4,000</td>
</tr>
</tbody>
</table>
relationships
Having established a program of physical spaces, they must be synthesized into a pleasing and workable arrangement. These spaces were organized in a continuous linkage from the macro-environment, or campus, to the micro-environment, or individual spaces.

The campus is organized around a parade ground which is the internal focus of the college. On the southwest side of the parade ground are located four barracks housing two thousand cadets. Immediately behind the living quarters are located the infirmary, cadet store, laundry, athletic practice fields and parking. It is within this area that the proposed food service system facility will be located. The latest master plan call for developing this area with a perimeter vehicular link passing through on the Ashley River side. An additional plus factor in developing this area would be to remove the existing parking to the northwest side of campus where athletic practice fields and more parking are presently
located. This would locate all cadet parking on the northwest side of campus, and all athletic fields to the southwest side, along the Ashley River.

The other three sides of the parade ground are bordered by academic buildings in which expansion is limited.
site

The site chosen for the proposed food service facility is located at the center of the living-recreation area. Immediately to the northwest lies Indian Hill, a natural ridge twenty-six feet above mean sea level. This is the highest natural elevation on the peninsula, and its prominence is reinforced by a cover of mature live oaks, draped with Spanish moss, rising an additional sixty feet with an eighty to one hundred foot spread.

To the south, the site is bordered by recreation areas and then by the Ashley River. Across the river is Charles Town Landing, the site of the original English settlement. Through the center of the site passes the perimeter road.

Rather than allow the road to force the facility to one side or the other, it was used as an element to separate the entry area from the dining areas with a bridge between the two. The entry areas were located on the hill side, with the dining areas on the river side, allowing a panoramic view of the athletic
practice fields, yacht club, Ashley River and Charles Town Landing.

The juxtaposition of the building axis to the hill axis allowed both entities to co-exist, with neither compromising the importance of the other. Also positive solar relationships were obtained.
The external building relationships were considered in two areas. The first, and more important, being an outward expression of interior function. The second, also very important, the relationship to existing or traditional architectural style on campus.

An addressing function, the entry areas adjacent to Indian Hill were open and inviting, incorporating the pleasantness of the hill with outdoor terraces and patio. Entry occurred at the hill level for those arriving from across campus, while entry for cadets marching from their barracks occurred at the foot of the hill. The dining areas were more enclosed presenting a more protected facade, but with generous glazing to allow visual contact for cadet with the amenities surrounding the dining rooms. Again, outdoor terraces and patio were provided for a spatial transition to the outside with the added functional option of outdoor dining.

In addressing the existing Spanish Moorish architectural style, it was noted that the latest addition,
Deas Hall, removed from the context of The Citadel, little resembles the existing style, yet it is in context. This relationship was developed through the compatability of finish materials, bold and organized architectural lines, and the eclectic application of familiar elements of existing campus architecture. Economically, the articulated towers, crenalations, and castle architecture adhered to in the past have become more and more illogical. Surely future facilities can be tastefully handled to create a contemporary architecture contexturally acceptable.

Internal building relationships were developed on three levels. The first level contained food receiving, storing, and preparation along with the major cadet entry area. Food items arrived by delivery vehicle on the perimeter road and passed through receiving, checking, and weighing down a central corridor to storage areas. From storage they moved through intermediate preparation areas such as bakery, butchery, and vegetable preparation.
prior to being cooked. From this point food was pan­ned, potted, or plated and moved into a holding area near the main food service elevators for vertical distribution to the two floors above. On the above floors, service elevators opened into satellite kitchen and intermediate holding areas for distribution to service stations where food would ultimately be distributed. Beverages and utensils stations were located outside of the servery area to facilitate speedy service and rapid movement through servery areas. Empty trays were returned to the beverage and utensil stations for gathering and return to the lower level areas for cleaning. From cleaning, trays returned to serveries while waste was shredded and retained in a garbage holding area until it was moved down the central corridor and into the service bay for scheduled vehicular pickup from the perimeter road.

The initial contact between food service staff and cadets occurs on the lower level with the location
of administrative offices directly across from, and visually related to the main cadet entry and VIP entry from the perimeter road.
The second level of internal relationships occurred in the entry and primary circulation areas adjacent to Indian Hill. The three levels are a series of balconies opening the adjacent space above and/or below. The emphasis was on the observation of continuing movement through the interlocking spaces with the distance traveled by each class establishing a hierarchy of circulation. Also of importance was the location on lounge areas adjacent to circulation corridors. This allowed cadets to move easily out of the flow into a static area to observe later arrivals with whom they might have made earlier plans to dine.
The third level of internal relationships were established in the dining areas. Once the heirarchy of dining spaces had been established with primary space determined, a secondary breakdown of space became necessary to avoid the loss of individual identity associated with a large dining area. Spaces were organized with a maximum dimension of eighty feet for dining groupings, the distance at which a face is recognized. This was supportive of individual recognition and identity on a personal basis with classmates or peers.

Primary dining space

Secondary breakdown supportive of individual identity and recognition
Another important consideration in the dining areas was prime seating as it related to volumetric space. Typically, the most desirable seating would be at the exterior perimeter of the dining spaces affording a panoramic view of the surrounding area. In these areas the focus expanded horizontally to the outside. However late arrivals were relegated to more internal dining areas where they had no direct view to the exterior. To make these spaces attractive to dine in, their focus was expanded vertically above and/or below to other dining areas and to the outside through skylights. The desired result was a dining facility seating fifteen hundred with no bad seats.
The final level of relationships were those on an individual basis between cadets. The method for control in this area was determined to be variation in seating pattern.

The existing family style arrangement consists of two "messes" of seven cadets each. A mess is typically made up of first and second classmen at the head of the table, fourthclassmen located at the center seats in order to serve the upperclassmen, and second and thirdclassmen at the foot.
This arrangement can be divided into five zones of interaction. The two at the ends of the mess are strong, based upon proximity and peer relationship. The center zone has weak interaction due to the break in the tables with the focus away from the center and toward the far ends.

In setting up the proposed dining arrangement, square, rather than rectangular tables were used. This allows expansion in grouping tables to seat from four to six at a time. Seventy three percent of the population prefers a table seating four. This creates one zone of interaction for all diners.
The majority of the remaining twenty three percent prefer a dining arrangement for six. This creates a position of importance at the head of the table creating strong zones of interaction at each end, with a secondary zone in the center through which limited interaction occurs.
The majority of the remaining twenty three percent prefer a dining arrangement for six. This creates a position of importance at the head of the table creating strong zones of interaction at each end, with a secondary zone in the center through which limited interaction occurs.
Arrangements using square tables were proposed for the dining rooms for fourth, third, and second classmen along with those for faculty, administration, and staff.

In the senior dining area, the incorporation of round tables was proposed for the seventy-six percent preferring that arrangement. An added advantage is that by simply adding a chair to each table, the capacity of the first classmen dining area is increased from seventy-six percent of the senior class, to one-hundred percent seating, with no damage to the one strong zone of interaction already existing.
architectural response
The design of a food service system facility for The Citadel must incorporate the positive aspects of food service technology with the traditional aspects of The Citadel, while acknowledging the dining experience of the individual cadet as its reason for being.

The following drawings were presented as an architectural response for the food service system evaluated in this manuscript.

- Campus Plan
- Site Plan
- Lower Level Plan
- Main Level Plan
- Upper Level Plan
- Elevations
- Building Sections
- Building Details and Systems
references
footnotes


3 Skidmore, Owings and Merrill, Architect.


bibliography


"Dining Halls at Human Scale," Architectural Record, February 1969, pp. 120, 121.


Himmelright, L. K., Col., Head, Department of Civil Engineering, The Citadel, Charleston, South Carolina, Personal Interview, March 1, 1977.


