This document was produced by the Facilities Management Planning Group at the University of Arkansas.
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The growth of the Chemistry Department

In 2001, Dr. Wesley Stites, Associate Professor of Chemistry, prepared a proposal to improve the existing chemistry facilities and purchase much-needed instrumentation for the University’s growing biomedical research program. Funding was granted for the equipment purchase, but the department did not receive money for a building renovation to house the new instruments. The equipment purchase could not be delayed, and is currently housed in substandard temporary facilities.

It is clear that the 1934 Chemistry building, in its current state, is inadequate for departmental needs. In fact, building conditions have proven a detriment to attracting leading research faculty whose work depends on state-of-the-art equipment and laboratories. Prospective faculty have already declined offers because other institutions have better facilities. Without an increase in the size and quality of laboratories, the teaching and research mission will continue to be compromised.

For the building to properly house the department, a major renovation is needed. Dr. Stites and the chemistry faculty were successful in obtaining $2 million for this purpose, which will be matched by the University, and another $10 million has been appropriated. This $14 million will be used for additional labs, an improved library, faculty offices, upgraded lecture halls, new MEP systems, and making the building fire and safety code compliant.

Furthermore, the department has identified need for an additional 20,000 - 30,000 sf of space, and is completing a proposal for a potential donor. FM Planning Group is assisting the department by developing plans for this expansion. This document identifies items of concern to the donors, to the chemistry department, and to the campus master plan.
1st floor plan
actual state
1934 to present

1st floor plan
grant application scheme
2001
In 1925, in response to the University’s 50th anniversary, a master plan was created which would guide new construction on the campus for the next 30 years. The plan, designed by the architectural firm Jamieson and Spearl of St. Louis, was firmly rooted in the collegiate tradition of academic quadrangles which grouped the buildings of each college or department around their own open space. The style of the buildings, known as Collegiate Gothic, depended not only on the decorative elements of the buildings to connect the University with the long tradition of English colleges, but also on the arrangement of the buildings themselves, encircling the courts to create ideal academic precincts.

The Chemistry building is one of the first on the campus to be built according to this plan. Others include the old Library (Vol Walker Hall), the Engineering building, the Agriculture building, and Ozark Hall. The image below shows how the Chemistry building (in orange) was conceived as simply the first in a series of buildings which would ultimately create a quadrangle for the Chemistry department. Unfortunately, later buildings have ignored the pattern which was set in the 1920’s and have consequently diminished the size and quality of the court behind the original structure, lessening the possibility of making a coherent exterior space to be enjoyed by the students and faculty.

This aerial view from the 1925 plan shows how the Chemistry building (in orange) was envisioned as the first part of a larger structure which would form two quadrangles. Note the old library (Vol Walker Hall) and the Greek Theater, both results of this master plan.
The Chemistry building is constructed of Arkansas limestone. Its design was carried out by Wittenberg & Delony of Little Rock under the supervision of Jamieson & Spearl, consulting architects, who ensured that the work would follow the recently completed masterplan. The style of the building, as called for in the plan, is **Collegiate Gothic**, referencing the long traditions of Oxford and Cambridge in England. Like the early-Renaissance buildings there, it is a marriage of both medieval and classical elements, containing Gothic moldings, crenellations, battlements, and pointed arches, as well as pilasters, pediments, and ædicules. Major collegiate Gothic commissions were being carried out in the 20’s and 30’s at universities like Princeton and Yale. The style of the Chemistry building reflects the aspirations of this university to being a first-class educational institution.
CURRENT NEEDS

why is a major renovation needed?

The Chemistry building was constructed in 1934 and has never had a major refurbishment. Vital services such as fire alarms, HVAC (air-conditioning), and new wiring have been haphazardly inserted into the building. Laboratory layouts are not flexible, and the benches are outdated. Windows leak air and the roof is in poor condition. The combined effects of the building’s shortcomings make it inefficient and inadequate for contemporary research. Delicate instrumentation cannot be housed, so it must be temporarily placed in the newer research building in rooms not designed for that use. Most pressing, however, is the fact that the building does not meet any of today’s building, fire, safety, or accessibility standards. Below is a summary of the needed changes.

code compliance
- addition of a new fire stair in the east wing
- enclosing / reconfiguration of western stair as fire stair
- 20-min. fire-rated doors and transoms in hallways
- ADA-compliant elevator
- ADA-compliant entryway with automatic operator
- ADA-compliant restrooms

building systems
- complete replacement of HVAC system
- complete replacement of electrical system
- complete replacement of plumbing system
- new fire alarms integrated with the campus network

exterior repairs
- masonry repointing
- roof membrane replacement
- door refurbishment
- window refurbishment / replacement

interior reconfiguration
- completely new room layout to accommodate lab spaces (particularly for biomedical research) and delicate instrumentation
- most / all interior partitions gutted
- new partitions - drywall or Max/Wall™ system
- new furnishings / casework
- etc.
. . . we were awaiting a reply on an offer extended to a potential new faculty member, Dr. Wright. Dr. Wright has research interests in anti-malarial drug development and has current NIH funding. Dr. Wright declined our offer and accepted another, in large part because we could only guarantee him one small lab of 660 square feet. The institution he went to offered him over four times that amount of space.

-Dr. W. Stites

**benefits of the interior renovation**

research labs
- various labs needed by research teams will be grouped on the same floor for the first time
- more wet labs will meet the current demand

instrument labs
- new labs purposely built to house sensitive instrumentation will be located on the ground floor
- adequate hood space for all researchers will be included in the labs:
  - protein x-ray crystallography
  - NMR
  - mass spectrometers

fume hoods
- more hoods will be installed to meet projected demand throughout the building
- the hoods will meet the specific needs of the various research teams:
  - plumbed for air, gas, nitrogen, vacuum, and cold water
  - wash-down system

new casework
- lab layouts (benches, hoods, sinks) will be fitted to the needs of the faculty
- faculty, the architect, and the supplier will collaborate to provide an ideal research environment
- some casework will be flexible to allow for changing uses through time
In many places on the facade, major work is necessary to repoint the stonework. The image at right shows how in some places, the mortar has cracked loose and fallen away—the joints are completely exposed. Care must be taken to determine the type of mortar that was used. If a harder portland cement based product is substituted for what was originally used (probably a soft lime mix), the stones could be significantly damaged.

A conflict exists between the sill height of the windows and the height of the new interior casework. When the work benches are replaced in the renovation and the labs are reconfigured, the Chemistry department would like to place permanent casework against the exterior walls. The result is that part of window will be covered. This conflict can be resolved in one of three ways: 1. configure the labs so that the casework does not abut the windows; 2. use a casework detail which pulls the counter slightly away from the windows; 3. change the window configuration itself (i.e. block out a part of the window openings).

At right is a view showing option 3. This changes the proportions of the windows, and undermines the character of the facade. It is not recommended.
These original steel windows, which were used on all of the buildings on the campus during the 1930’s, are essential to the character of the Chemistry building. The thin profile of the muntins and the numerous small panes of glass evoke the leaded glass of the medieval buildings on which the collegiate Gothic style is modeled. To replace the windows with blank-looking replacements would destroy the effect the designers consciously chose. Because of their poor state of repair, these windows must be refurbished or replaced. Any replacements, however, must replicate the character of the originals.

This photo shows the effect of blank, unsympathetic replacement windows. Unfortunately, other similar Gothic buildings on the campus, such as the Agriculture and Home Economics buildings, have already had their steel windows replaced with cheap, extruded-aluminum windows that have significantly altered the character of their facades, a danger that the Chemistry building now faces.
The chemistry building has never had a loading dock of its own. Now, when deliveries of large equipment are made, student volunteers have to muscle the equipment down a ramp from the Science building and cross the service court to enter the building. This is obviously not ideal, especially when considering the cost and precise nature of the instruments which the Chemistry department uses. A possible solution to this problem would be to expand the current Mullins Library loading dock and tunnel. By attaching a new underground room to the tunnel, and making a connection to the basement of the Chemistry building, deliveries could be made directly into the building. Atop the room a new terrace would be created, providing a place for students to sit, shaded by the large trees which surround the area. This terrace would mask the mound which presently covers the library tunnel, as well as creating a level area in front of the entry to the building, thereby making it ADA-compliant—an important code issue).
Because fire codes have changed since the Chemistry building was completed, a major renovation must address current life-safety issues. Major violations that require changes include the excessive length of several dead-end corridors as well as the open stairways. Open stairways are no longer allowed as fire egress under the Standard Building Code. Because of that, the western stair must be reconfigured or enclosed (see plans next page). The eastern stair can remain in its current state due to the fact that a new fire stair will be added to service the east wing of the building. This new fire stair provides both a required fire exit from each floor and eliminates the dead-end corridors which violate the fire code. The way these changes are carried out will have major implications for the character of the Chemistry building, the legibility of the circulation system, and the renovation budget.
**stair reconfiguration options**

A
the stair is moved out beyond the exterior walls and the existing opening to the hall is enclosed

pro: - minimal use of space  
- no changes to hallway

con: - exterior wall must be rebuilt

B
the stair is rotated to stay within the existing building envelope and opens onto the existing hall

pro: - no exterior changes  
- no changes to hallway

con: - some space sacrificed

C (grant application scheme)
the stair itself remains as it is, while the entire hall and circulation system is moved to accommodate the enclosure

pro: - stairwell remains in place  
- no exterior changes

con: - to save one stair, a complete modification of the entire circulation system is required
The structure of the Chemistry building is composed of reinforced concrete columns and slabs (columns run on either side of the hall). The exterior walls are bonded masonry—stone bonded to brick in soft lime mortar—and are self-supporting. **None of the interior partitions are structural.** This allows complete freedom in changing the arrangement of the rooms to meet current needs. Because of the numerous system upgrades that are required to bring the building up to code, and because of various programming needs, the best solution is to **gut the interior of the building.** However, because of several considerations, it is recommended that the **hallways be restored.** First, the unique character of the building is largely found in the halls, with their plasterwork, arches, terrazzo floors, high wainscots, and art-deco light fixtures—all features which would be too costly to reconstruct. Second, by leaving the halls intact, money will be freed for other parts of the building. All of the area shown in orange below should be saved.

### Diagram

The pendant light fixtures, the plasterwork on the ceiling, and the Tudor arches are several reasons for saving the halls from the general interior demolition.
fire code issues

The hallways have many elements which are worth saving, but care must be taken to ensure that they meet current code standards. The walls already meet the 1-hour fire rating. Questions remain, however, about the transoms and doors. They should be examined and either modified or replaced if they do not meet the necessary 20-minute rating. The preferred step would be to replace the glass found in many of the doors with a fire-resistant type, thereby preserving the building’s character and eliminating the need to purchase new doors.

code requirements for exit access corridors:

- walls must be
- 1 hr if unsprinklered
- 1 hr if sprinklered

- openings must be
- 20 min

note: the chemistry building contains occupancy groups A and B
This scheme was previously prepared for a grant application which required the Chemistry department to show very specific arrangement of lab spaces and general interior layouts. It is divided into two phases, A and B (see opposite). Phase A was included when determining the interior layouts. Phase B remained merely a suggestion for a building footprint. This presents some problems. For example: while the arrangement of halls and stairs may work initially, no possibility exists to later integrate them with Phase B—the placement of the new fire stair is in the way. Similarly, if Phase B is built, the fire stair in the east wing will be blocked from exiting to the outside—a violation of code. Another problem is the size of the court. Because both Phase A and B shrink the size of the court, what is left is nothing more than a light well which is too small to be really usable and where no vegetation is likely to grow. In addition, phase B blocks a major campus pathway which is used by many students each day. However, this scheme can be seen as a starting point for understanding the general space requirements of the Chemistry department and its needs for future expansion.
square feet (gross)

phase A - 950 sf / floor  
phase B - 6625 sf / floor  

total - 30,300 sf / 4 floors

pro

meets immediate needs  
maximum square feet

con

courtyard is dark and unusable  
phases A and B cannot work together  
interior circulation is a labyrinth  
disrupts major campus path  
does not work with neighboring buildings
This scheme addresses the fire code requirements (addition of appropriate means of egress) and adds much-needed space to the library wing, while also creating a usable and light-filled courtyard between the Chemistry and Science buildings. The existing path is accommodated by making arched passageways through the new additions. These passageways set up the conditions for future expansion to the south, allowing connections to be made to the science building, or to its replacement.

This flexibility for future decisions is important, since the past has shown how needs can change quickly on campus and how other buildings have not been accommodating to these changes. While this scheme has less area than the others, it is the most flexible and has the largest courtyard space. This court will be an important amenity for the students and faculty of the Chemistry department—it will allow a place for informal meetings, lunches, or relaxing, and will be a central focus for the buildings around it.
square feet (gross)

east side - 1300 sf / floor
west side - 2530 sf / floor

total - 15,300 sf / 4 floors

pro

most flexible scheme
meets immediate needs
pleasant, light-filled courtyard
interior circulation is clarified
passageways prepare for later connection
to renovated / rebuilt science building
retains and enhances major path

con

less square footage than other schemes
This is similar to scheme 1, but adds a significant amount of area by enclosing the courtyard with another wing, placed next to the virtually windowless wall of the science building. On the ground floor, a passageway allows the existing path to continue through, covered with an arcade as it passes along one side of the court. This allows the path to remain outdoors on the lowest level, while above it a single-loaded corridor serves a series of rooms. Although the courtyard is smaller than in scheme 1, it is still a comfortable size (although it receives less light throughout the day). The addition has been arranged in such a way that it can attach to the neighboring science building, or expand to become part of a larger complex of buildings if the science building is demolished. Either way, it allows several choices for future building programs, though not as many as the previous scheme.
square feet (gross)

6450 sf / floor

total - 25,800 sf / 4 floors

pro

high square footage
meets immediate needs
courtyard is usable
interior circulation is clarified
passageways prepare for later connection
to renovated / rebuilt science building
retains and enhances major path

con

not as flexible as scheme 1
Both expansion schemes have been configured to allow for connections to the existing Science building. They also allow for the Science building’s replacement by a larger one in the future. This set of illustrations show how a future building could be integrated seamlessly with the Chemistry expansion to create a coherent complex of buildings.
scheme 2 with a new science building

view from southeast
The quadrangles and intimate courts of Cambridge and Oxford in England have long provided inspiration for universities in the United States, including our own. These two images give a small picture of the quality of the physical environment in Cambridge. All buildings are grouped around courts, while pedestrian movement between them is allowed through open passageways like the one at right.

above
Old Court
Pembroke College, Cambridge

right
Gate of Virtue
Gonville and Caius College, Cambridge
These examples show several American interpretations of Cambridge-inspired architecture. Yale’s building program in the 1920’s and 1930’s (which coincides with the date of Arkansas’s masterplan) resulted in a completely rebuilt campus. New examples such as the Humanities Building at Rice and Torgersen Hall at Virginia Tech show how this long tradition of collegiate architecture continues.