Capital Needs in Higher Education

by Dr. Harvey H. Kaiser

Several signs illustrate the dramatically increasing demands for funding higher education physical plant needs. More and more institutions are announcing major capital campaigns with significant components for plant, in addition to endowments and unrestricted gifts to augment annual operating budgets. The number of institutions routinely announcing campaigns in the hundreds of millions of dollars fails anymore to raise the eyebrows of fundraising colleagues. The challenge has become one of who can be the more audacious in reaching the twenty-first century with the largest campaign goal.

In addition to campus-based initiatives, capital needs for funding from the state houses are entering the scene. The deterioration of higher education's physical plants has awakened elected representatives to the perilous conditions on campuses in both the public and private sectors. Deferral of maintenance, relatively unnoticed until a decade ago, has now begun to prompt action. Individual campuses have surveyed needs and acquired funds through either internal sources or gifts and grants to reduce deferred maintenance. The number of enlightened state legislatures that have either responded to well-presented cases of needs or demanded specific data to justify special budget appropriation is also heartening. But much more funding is required to reduce accumulated plant deterioration funding requirements.

In the past twenty years federal investment in university research plant has declined in real terms by 95 percent,

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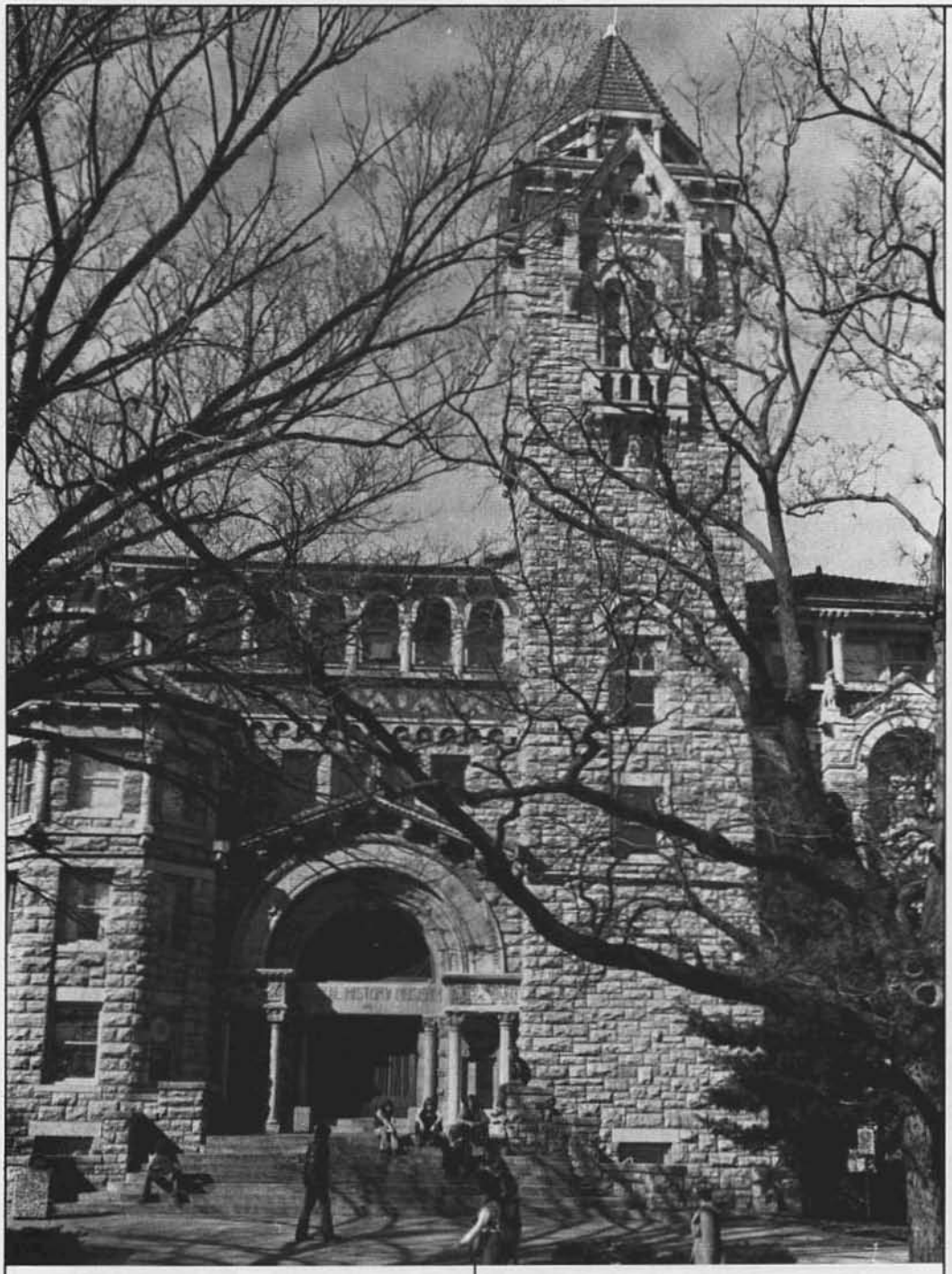
according to Erich Bloch, director of the National Science Foundation (NSF). A 1980 study of scientific instrumentation needs of research universities, prepared by the Association of American Universities for NSF, highlighted the dire conditions of campus facilities. Comparisons of university instrumentation laboratories to commercial laboratories revealed that the median age of university equipment in 1980 was twice that of the commercial laboratories in the computer and physical sciences. Engineering reported that 24 percent was obsolete and only 16 percent was "state-of-the-art." The decline in federal funding and lack of increased institutional support led to NSF's conclusion that many research facilities were in need of renovation or replacement.

Decay in physical plant and obsolescence in research facilities and equipment are also drawing the attention of the White House and Congress. In 1985 Representative Don Fuqua (then-Chairman of the House Committee on Science and Technology) introduced the University Research Facilities Revitalization Act of 1985 (H.R. 2823). The bill proposed a $10 billion expenditure over ten years on a 50/50 federal and nonfederal matching basis. Although unsuccessful, similar bills before Congress have developed more promising prospects of passage. Limited to repair, renovation, and replacement of laboratories and other research facilities, H.R. 1905 proposes $250 million

for the next ten years. The potential contribution to meeting part of higher education's needs will offset overall capital requirements. These are the first major legislative proposals to address capital needs in many years. A similar response came when the White House Science Council on the Health of U.S. Colleges and Universities Report, A Renewed Partnership (1986), called for increased federal support to the higher education scientific enterprise. The Council concluded independently of the Fuqua initiative the same level of $10 billion required in expenditures for research facilities and equipment over the next ten years, along with encouraging greater industrial cooperation in university research activities.

Through intensive lobbying with state legislatures, public and private institutions have gained access to public funding under the rubric of economic development. The theory at work is that investing in the strengths of academic programs, particularly in science and technology, can foster synergy through academic, industry, and government cooperation. Recently announced long-term, no-interest loans to Columbia, Cornell, and Syracuse universities of approximately $100 million for science and technology centers are examples of state support furthering economic development and meeting campus capital needs.

A corollary of assessing renewal and replacement needs is the portrayal of the big picture: a comprehensive overview of campus plant needs folding



together deferred maintenance with programmatic requirements and enhancement of faculty and student support services. Thus, we have the emergence of strategic facilities planning tying academic planning and student life facility requirements into plans to eliminate plant deterioration. The comprehensive approach now being undertaken by many campuses is producing capital campaigns and more vigorous lobbying for public policy to provide funding for campus capital needs.

Physical Plant Expenditures and Assets

The annual expenditures for operating, maintaining, and adding to plant summarizes the levels of resources dedicated by higher education to its plant assets. How much is expended on operations and maintenance has a direct effect on the conditions of campus facilities; the amounts spent on plant additions represent capitalized investments to replace obsolete facilities, meet new program requirements, and enhance the quality of campus life. An analysis of the past decisions allocating current and plant funds offers some insights into future capital needs.

Current fund education and general expenditures for operation and maintenance of plant include all expenditures for services and maintenance related to grounds and facilities. The National Association of College and University Business Officers (NACUBO) defines this as costs for physical plant administration, building maintenance, custodial services, utilities, landscape and grounds maintenance, and major repairs and renovations. The last category often creates confusion by including work more appropriately classified as that for capitalized renewal and replacement. A difficulty arises from inconsistent accounting practices in differentiating between current and plant fund expenditures for deferred maintenance.

In reviewing plant operations and maintenance expenditures for the past decade, one might expect increased proportions of total expenditures to compensate for several factors: increasing enrollments causing additional wear and tear on facilities; higher required levels of maintenance for more technologically sophisticated buildings; drastically increased utility costs; and inflationary effects on maintenance costs for personnel, materials, and services exceeding rises in the Consumer Price Index. The accumulation of plant improvement costs for the older campus buildings—as well as the large amount of plant added to meet increasing enrollments more than fifteen years ago and now reaching an age of increasing maintenance costs—contributes to demands for additional plant operations and maintenance.

Despite these demands, the portion of operations and maintenance funding has remained almost near-level from fiscal year 1975 to 1984 *(see Table 1).* Fluctuations have been less than one percent, ranging from ten to eleven percent of total education and general expenditures for operations and maintenance. The tentative conclusion is that unless additional funding is made under categories of renewals and replacement or plant additions, the unfunded needs of deferred maintenance will continue to grow.

By examining book value of plant additions for buildings and equipment, we can obtain an indication of levels of plant fund expenditures for renewals and replacements and new construction. In the period from 1970 to 1983, book value for buildings more than doubled. Converting the annual additions to 1983-84 constant dollars using the Boeckh Construction Index presents

a more accurate picture of trends in annual plant additions. From $7.8 billion in 1970-71, plant additions declined to $3.7 billion in 1983-84, a decrease of 57 percent *(see Table 2)*. In constant dollars per student, expenditures for new construction dropped from a peak of $577 in 1967 to $120 per student in 1983.

An over-building of higher education in the 1960s is now being counteracted by a more cautious position due to stable or declining enrollments. However, the drastic decline in plant additions for building, combined with near-level operations and maintenance expenditures, suggests an increase in deferred maintenance and a pent-up demand for upgradings, renovations, and new construction. Demands for adding facilities for specific needs, such as in research or improving outdated housing built in the 1950s and 1960s, will place heavy resource burdens on some campuses.

Book value increases from 1970 to 1983 also show a steady increase for new equipment and replacements, rising from $800 million to $2.7 billion. In constant dollars, additions for equipment were relatively level until 1980. As a result of increased federal aid for higher education equipment purchases, additions to equipment value have risen dramatically *(see Table 3)*. With trends in all prices up sharply, future equipment purchases will buy less than in the past. And the continued purchase of more costly equipment compounds the problem.

Determining Capital Needs

Now to the heart of the issue: how much is needed to meet the capital requirements for higher education's physical plant? Seeking the answer is an elusive quest. The frustrating response is that in the national aggregate there is no reliable measure. By assessing historic data and anecdotal information, some general estimates of the funding required to correct existing campus conditions can be prepared. However, the aspirations of programmatic requests or enhancements to the quality of campus life nationally remain unquantified.

Ideally, the summary of individual campus resource needs for buildings, grounds, utilities, and equipment would provide aggregates for system, state, or national comparisons. Assembled

Table 1

Plant Operation and Maintenance 1975-1984

Fiscal Year	Total Educat'l & Gen Expenditures (000's)	Plant Oper & Maint Expenditures (000's)	% E&G
1975	$27,547,620	$2,786,768	10.12%
1976	30,598,685	3,082,959	10.07%
1977	33,151,681	3,436,705	10.4%
1978	36,256,604	3,795,043	10.5%
1979	39,833,116	4,178,574	10.5%
1980	44,542,843	4,700,070	10.55%
1981	50,073,805	5,350,310	10.68%
1982	54,848,752	5,979,281	10.9%
1983	60,785,097	6,391,596	10.515%
1984	65,860,992	6,729,825	10.2%

Table 2
Trends in Additions to Plant Value-Buildings Fiscal Years 1970-1983 (000's)

Academic Year	Building Value	Boeckh Constr. Index 1983-84 = 100	Annual Increase Bldg. Value	Constant Dollar Increase
1969-70	$31,865,179			
1970-71	35,042,590	36.58	$3,177,411	$8,686,197
1971-72	38,131,339	39.58	3,088,749	7,803,936
1972-73	40,808,481	42.07	2,677,142	6,363,107
1973-74	43,701,491	44.93	2,983,010	6,438,378
1974-75	46,453,642	50.15	2,752,151	5,488,259
1975-76	49,349,224	54.01	2,895,582	5,361,453
1976-77	52,384,393	58.60	3,035,169	5,179,643
1977-78	55,188,603	62.82	2,804,210	4,464,087
1978-79	57,563,005	67.15	2,374,402	3,535,890
1979-80	60,847,097	72.73	3,284,092	4,515,765
1980-81	64,158,017	79.78	3,310,920	4,150,095
1981-82	67,794,877	87.68	3,636,860	4,147,995
1982-83	71,519,718	94.43	3,724,841	3,944,607
1983-84	75,220,765	100.00	3,701,047	3,701,047

Source: National Center for Education Statistics

Table 3
Trends in Additions to Plant Value-Equipment Fiscal Years 1970-1983

Academic Year	Equipment Value	Equipment Price Index 1983-84 = 100	Annual Increase Bldg. Value	Constant Dollar Increase
1969-70	$7,151,649			
1970-71	7,893,100	73.27	$ 731,451	$1,690,434
1971-72	8,734,866	44.10	841,486	1,908,305
1972-73	9,513,503	45.46	778,917	1,713,300
1973-74	10,412,914	49.01	899,411	1,835,193
1974-75	11,518,536	58.52	1,105,622	1,889,409
1975-76	12,653,847	61.38	1,135,311	1,849,518
1976-77	13,910,107	64.39	1,256,260	1,950,957
1977-78	14,961,131	68.84	1,051,024	1,526,874
1978-79	16,250,737	74.41	1,289,606	1,733,093
1979-80	17,849,119	80.51	1,598,382	1,985,264
1980-81	19,390,097	87.60	1,540,978	1,759,159
1981-82	21,319,297	93.99	1,929,200	2,052,514
1982-83	23,584,042	97.75	2,264,745	2,316,834
1983-84	26,309,602	100.00	2,725,560	2,725,560

Sources: National Center for Education Statistics. Inflation Measures for Schools and Colleges, D. Kent Halstead. U.S. Department of Education 1983.

through uniformly administered instruments for data collection, campus-based surveys of needs would provide clear conclusions for policy guidance. Unfortunately, the lack of universally prepared and collected surveys of needs prevents the compilations necessary for presenting a convincing public policy picture.

The information gap existing at the campus level also prevents reliable inter-campus comparisons of need. Many campuses continue to make capital budget decisions in the traditional manner: high priority programmatic requirements struggle to the surface along with the most pressing renewal or deferred maintenance priorities. Missing is any systematic audit of facility conditions or evaluation process for determining long range priorities for functional replacements or future program needs.

A promising source of capital needs information results from demands of governing boards and state legislators. Unlike a traditional compilation of line item requests for renovations or plant additions presented in annual or biennial budgets, campuses are now engaging in detailed surveys of plant conditions and justifications of facilities before introducing fundraising campaigns or presentations of requests to governing boards or legislators. The results of these mandates have proved gratifying with thoroughness of preparation producing new streams of funding for deferred maintenance and new facilities. Sometimes only funding needs on a partial basis, the initial responses have proven encouraging.

A coherent picture of campus capital needs is aided by defining main categories of need. Major repairs are costs associated with deteriorated conditions due to deferred maintenance, such as roof replacements, interior building finishes, or mechanical, plumbing, or electrical system replacements. Upgrading and renovations are costs associated with modification for functional inadequacies or obsolence due to changing space needs for program use of a facility. New construction includes plant additions for expansion, new programmatic requirements, or enhancement of quality of campus life.

The category of plant additions has the tendency to become a "wish list." Such requests are the hardest to sort out as absolutely necessary capital needs. Unless strong personal presentations are made to move them from the suspect category of frills and amenities into essential requirements, plant addition requests remain suspect. The handicap of guiding national policy on higher education capital needs through the lack of comprehensive data in existing conditions and anticipated needs prevents a clear set of conclusions of resource requirements. This frustration can be overcome partially by reviewing available data and anecdotal information on existing conditions. Relationships between plant replacement values and estimated costs for correcting existing conditions provide ranges of need for overall capital requirements.

The last national survey of the condition of all higher education facilities was prepared by the National Center for Education Statistics (now named the Center for Education Statistics) in fall 1974. It was then reported that approximately 20 percent of campus facilities was in an unsatisfactory condition. Recent statewide and campus surveys of facility conditions show that ratio to be consistent. The following examples support that conclusion; a selection of available information and the projected renewal and replacement estimates are enlightening.

North Carolina. A 1982 facilities and inventory study of public and private institutions with 72 million gross square feet reported 17.4 percent of space in an unsatisfactory condition. The estimated cost of restoring space to a satisfactory condition was $301.6 million.

University of California System. A detailed survey in 1983 of 60 million gross square feet had a capital maintenance backlog of approximately $2 billion at $33.60 per square foot.

Texas. A 1982 survey of twenty-five institutions of the College and University System Coordinating Board, excluding the University of Texas and Texas A&M, evaluated conditions of educational and general facilities ten years and older. Total costs of renewals and replacements for 21.3 million gross

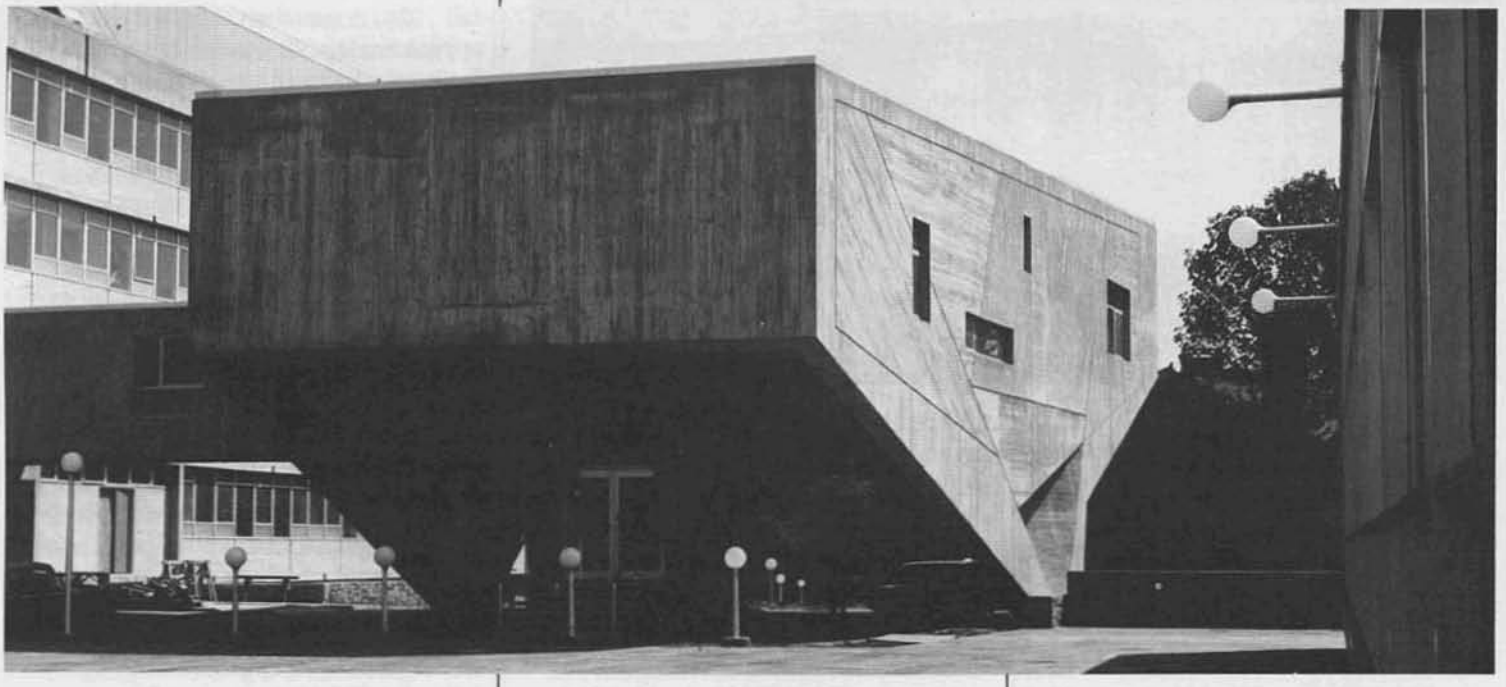
square feet of space was estimated at $301 million.

Indiana. A 1983 survey of the Indiana Commission for Higher Education's seventy-eight campuses totaling 33.6 million gross square feet reported 24 percent of the space in unsatisfactory condition. Total replacement value was $3.34 billion.

University of Maryland. In 1985 a report was presented to the Maryland Board of Regents for the eight campuses of the University of Maryland. Critical capital needs were defined for a five year period totaling $555.5 million: $224.1 million to correct deteriorated facility conditions and $331.4 million for new facilities. The 1986 allocation for deferred maintenance was $2.5 million with an estimated annual renewal need of $22.5 million per year.

New York. A 1982 survey of 196 million gross square feet of space reported 20 percent of the space in unsatisfactory condition.

Similar surveys in Kansas, Iowa, and Arkansas reported approximately 10 to 15 percent of replacement values required renewal or replacment. Two private institutions provide supportive



data on the magnitude of costs for renewal and replacement. Columbia University prepared a detailed survey of conditions in 1984 for 7.11 million gross square feet of space. The estimated capital maintenance backlog was $247 million at $34 per gross square foot. Syracuse University conducted an intensive campaign to eliminate deferred maintenance beginning in 1972 for 7.1 million gross square feet that eventually cost over $170 million. Escalating those costs to 1984 would produce a total similar to Columbia University's projections.

There are two approaches to determining the major repairs and upgrading and renovation components of capital needs. The most thorough approach is the campus-based audit of existing conditions of buildings, grounds, utilities, and equipment. An alternate method is to use life-cycle analyses in lieu of actual amounts comprising the backlog of deferred maintenance. By factoring the age and replacement cost of building components, a renewal and

Table 4
Building Replacement and Book Values
Fiscal Years 1970-1983 (000's)

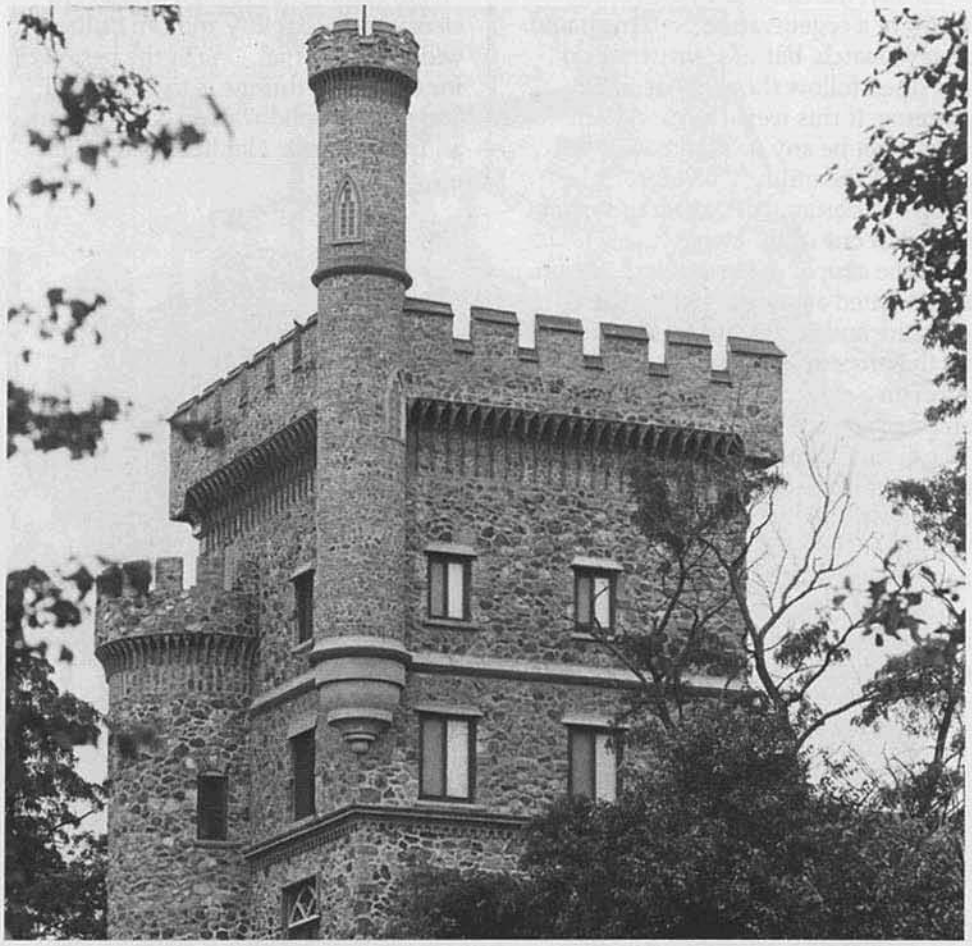
Academic Year	Book Value				Boeckh Constr. Index 1983-84 = 100	Building Replacement Value	Annual Increase Repl. Value	Constant Dollar Increase
	Land	Building	Equipment	Total				
1974-75	$4,210,901	$46,453,642	11,518,536	$62,183,079	50.15	$79,340,614		
1975-76	4,345,232	49,349,224	12,653,847	66,348,303	54.01	89,381,799	$10,381,799	$19,222,917
1976-77	4,444,927	52,384,393	13,910,107	70,739,427	58.60	95,969,973	6,247,560	10,661,722
1977-78	4,621,071	55,189,603	14,961,131	74,770,805	62.82	105,159,012	9,189,039	14,628,245
1978-79	4,824,250	57,563,005	16,250,737	78,637,992	67.15	115,038,214	9,879,202	14,711,817
1979-80	5,037,172	60,847,097	17,849,119	83,733,388	72.73	130,417,556	15,379,342	21,147,242
1980-81	5,212,453	64,158,017	19,390,097	88,760,567	79.78	142,979,847	12,562,291	15,746,289
1981-82	5,402,339	67,794,877	21,319,297	94,516,513	87.68	156,991,860	14,012,013	15,981,303
1982-83	5,889,080	71,519,718	23,584,042	100,992,042	94.43	165,038,516	8,038,516	8,521,409
1983-84	6,109,746	75,220,765	26,309,602	107,640,113	100.00	181,550,765	16,512,249	16,512,249

Source: National Center for Education Statistics

replacement allowance can be budgeted to offset facility aging each year. Empirical studies have produced ranges of 1.5 to 3 percent of plant replacement value as appropriate levels of annual funding for renewal and replacement.

Added to annual funding are costs to correct existing deferred maintenance. The 20 percent level of "unsatisfactory conditions" is a reasonable assumption based on the historical data and selected examples. Using this assumption, the 1983-84 total building replacement value of $181 billion *(see Table 4)* would require $36.3 billion to correct deferred maintenance. Adding equipment replacement value brings the total over $200 billion and a deferred $40 billion to $50 billion.

At a modest inflation rate of 3 percent, an annual commitment of between $4 billion and $5 billion is required nationally to eliminate deferred maintenance. In addition, a minimum of 1.5 percent of total replacement value of buildings and equipment requires almost $3 billion a year for facility renewal.



For a campus with $300 million in replacement value for buildings and equipment, this translates into $60 million for deferred maintenance and $4.5 million a year for facility renewal. Again, omitted are the projections of capital additions still fermenting in the campus community. New academic programs or outstanding space needs, innovative research activities, and faculty and student support facilities will wend their way into the capital budget process by the subtleties of campus politics and other pressures.

How much of the $3.7 billion spent on campus plant additions in 1983-84 reported by the NCES was for major repairs, upgrading, renovations, or new construction is unclear. However, the reports of deterioration, aging facilities, and obsolete equipment suggest that unmet capital needs are much higher than the amount spent that year.

An important principle for campus decision makers and higher education policymakers to remember is that a one-time elimination of current renewal and replacement priorities does not solve the problem. As campus facilities continue to deteriorate and become obsolete, an annual allocation for renewal and replacement is necessary to prevent further accumulation of deferred maintenance. Establishing an appropriate level of annual funding in the beginning of a facility program may have to include "catch-up" costs. As needs are reduced to manageable proportions, the operating budget can accommodate priorities as they are identified. The end result is a program that maintains campus facilities in good repair so they are functionally adequate for instruction, research, campus life, and community service. ■