Chapter 11 Space & Sustainability

Goals
Campus space must support the academic and research missions of the University. To accomplish this requires appropriate space policies, capital planning, and usage monitoring to ensure that space is managed strategically, thoughtfully, and with broader institutional needs in mind. The U-M has also established sustainability goals, such as reducing greenhouse gas emissions, carbon output of university vehicles, and shrinking the amount of waste sent to landfills.

Overview
The physical plant of the University of Michigan Ann Arbor campus is extensive. The campus includes some 600 buildings with more than 2,000 classrooms and instructional laboratories. The U-M is responsible for nearly 30 miles of roads and 5 million square feet to sidewalks, steps and plazas. More than 16,000 trees and countless gardens populate the campus, as well as 13 million square feet of turf. 200 miles of fiber optic cable weave through the campus, supporting 6 enterprise-level data centers, some 2,300 servers, and countless individual computers.

Space utilization guidelines have been established for classrooms, food service, research activities, and offices. In particular, effective class and classroom scheduling is critical to the academic mission of the University. It enables students to take the classes they need in a timely manner and contributes to on-going cost containment efforts through efficient space utilization and good stewardship of our valuable institutional resources.

The condition of buildings requires regular monitoring to ensure that renovations and/or new construction occur in a cost-efficient manner while meeting the needs of the academic and research community.

The campus sustainability initiative brings together education, research, and operations into a single campus-wide sustainability brand, known as Planet Blue. Recently, the University became a signatory to the American Campuses Act on Climate Pledge, joining more than 200 universities and colleges committing to take “significant action to reduce greenhouse gas emissions, increase campus sustainability and incorporate environmental sustainability in academic curricula.”

In summer 2016, the U-M was one of eight institutions to receive the Sustainability Award in Facilities Management by a national organization of physical plant administrators.

For More Information
Space Planning and Utilization (provost.umich.edu/space/)
Planet Blue (sustainability.umich.edu/)
U-M sustainability education, research, and campus operations

Charts in Chapter 11
11.1 Total Facilities Space on the Ann Arbor Campus, by General Fund and All Other Funds, FY 2005-2015.
11.2.1 Ann Arbor Campus Space, by Room Type, FY2006-16.
11.2.2 Ann Arbor Campus Space, by Function, FY2006-16.
11.3 Age of Ann Arbor Campus General Fund Space, by 10-year Increments.
11.5 Ratio of General Fund Infrastructure Renovation Costs to Total Replacement Costs, FY2006-16.
11.6.1 Building Energy Use, Total and Per Square Foot Per Person, FY2006-16.
11.6.3 Waste, Total and Percent Recycled, FY2006-16.
11.6.4 Paper Purchased by Percent Recycled Content, FY2008-16.

1 “University takes the American Campuses Act on Climate Pledge,” University Record, Nov. 20, 2015.
Ann Arbor campus space (excluding the Health System) is about equally divided between General Fund and Other Funds. Since 2005, the General Fund-supported space grew by 1.13 million net assignable square feet.

11.1 Total Facilities Space on the Ann Arbor Campus (excluding the U-M Health System and North Campus Research Complex), by General Fund and All Other Funds, FY 2005-2015.

SOURCE: U-M Annual Space Management Survey Reports

Space supported by the General Fund is mainly used for teaching, research, student services, support of the campus physical plant, and administration. All Other Funds space is primarily comprised of residence halls, parking structures and varsity athletic facilities. Both categories exclude common areas, such as hallways, staircases and lobbies.
Ann Arbor campus space (excluding the U-M Health System and the acquisition of the North Campus Research Complex) has increased by about 1.7 million net assignable square feet over the last decade.

11.2.1 Ann Arbor Campus Space, by Room Type, FY2006-16.


Neither this chart nor 11.2.2 includes the space assigned to the U-M Health System or the North Campus Research Complex.

Space that is either not in use or being remodeled is in the unclassified category; campus facilities and buildings move into and out of this category from year-to-year. General use space covers rooms used for performances, exhibitions, food service, recreation, lounges, and meeting rooms. Plant, Parking and Other encompasses central computing and telecommunications rooms, parking structures and garages (but not surface lots), health care space that is not part of the U-M Health System, housing for research animals, media production facilities, and storage.

Net assignable space excludes hallways, restrooms, elevators, and custodial areas.
All types of space are needed to support the University’s mission.

**11.2.2 Ann Arbor Campus Space, by Function, FY2006-16.**

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Unclassified</th>
<th>Student Housing</th>
<th>Plant &amp; Operations</th>
<th>Other Inst. Activities</th>
<th>Administration</th>
<th>Library</th>
<th>Teaching &amp; Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** U-M Office of Space Analysis.

Neither this chart nor 11.2.1 includes the space assigned to the U-M Health System or the North Campus Research Complex.

Space in the unclassified category is either not in use or being remodeled. Plant and Operations includes space used in the operation and maintenance of the University’s physical plant, its heating/cooling and other utilities services, central information technology services, and some special service operations, such as printing services. Space assigned to the Other Institutional Activities category includes a long list of functions, such as development, government and community relations, student clubs and organizations, as well as University space leased to private entities or operated under a management agreement with an outside entity (i.e. food service in the student unions).

Net assignable space excludes hallways, restrooms, elevators, and custodial areas.
About 58 percent of the General Fund building space on campus was put into service within the last 50 years.

11.3 Age of Ann Arbor Campus General Fund Space, by 10-year Increments.

SOURCE: U-M Data Warehouse.

The General Fund building space for the Ann Arbor campus and nearby areas totals 15.3 million gross square feet. Buildings on campus that are more than 100 years old include the President’s House, Newberry Hall, Tappan Hall, the Detroit Observatory, Burnham House, and two barns at Matthaei Botanical Gardens; the 100-year-old structures contribute about 850,000 gross square feet to the campus total.

The last ten years saw a large increase in new construction on campus. During this period, the U-M built the Biomedical Sciences Research Building, Undergraduate Science Building, Palmer Commons, Computer Science Building, and the Ross School of Business building.

Buildings associated with auxiliary activities (e.g., U-M Health System, student residence halls and athletic facilities) are not included in this chart because these facilities are not supported by the General Fund. Also, this chart does not include buildings in the North Campus Research Complex, which was acquired by the University in 2009.
The University tries to maintain a balance between adding new space and renovating existing space on campus.


![Graph showing new construction and renovations expenditures from 2005 to 2015.](image)


The FY2009 new construction/renovation expenditure total does not include the purchase of North Campus Research Complex (NCRC) for $108M. However, expenditures for subsequent renovation to NCRC space is included.


Chapter 11 – Space & Sustainability (9th Edition)
The overall condition of General Fund buildings on campus has improved over the last decade as measured by the ratio of infrastructure renovation costs to total replacement costs.

### 11.5 Ratio of General Fund Infrastructure Renovation Costs to Total Replacement Costs, FY2006-16.

![Graph showing the ratio of General Fund infrastructure renovation costs to total replacement costs from FY2006 to FY2016.](image1)

**Source:** U-M Office of Financial Analysis.

The facilities condition ratio is an indicator of building condition that divides the cost of needed building renovations by the cost to replace those structures. The ratio maximum of 1.0 indicates that the cost of renovating the existing facilities equals their total replacement. A ratio of 0 would mean no renovations are necessary; that is, the facilities are all new or newly renovated.

Two ratios are presented: in blue, the ratio considers all campus buildings – new, renovated and existing; in red, new buildings have been removed from the data before the ratio is calculated.
The growth in total energy use by buildings on campus has grown along with the increase in campus buildings. At the same time, energy use per squarefoot per person has been largely flat over the last eight years.

11.6.1 Building Energy Use, Total and Per Square Foot Per Person, FY2006-16.

Total greenhouse gas emissions from campus buildings and vehicles have leveled off in the past several years.


The level of greenhouse gas emissions is influenced by two factors: total energy usage and the energy provider. University-generated energy is highly optimized for efficient production and to limit greenhouse gas production. However, much of the purchased electricity consumed on campus is generated by coal-fired plants, which produces relatively high levels of greenhouse gases. Even so, natural gas is becoming more competitive with coal as a fuel source, and as the U-M’s external energy providers shift toward natural gas, greenhouse gas emissions have leveled off.

Total waste created on campus remains below the 2009 peak, with 29 percent of waste being recycled in the most recent fiscal year.

11.6.3 Waste, Total and Percent Recycled, FY2006-16.

Even as the total amount of paper purchased by the University is declining, the fraction of the total with recycled content has, in general, increased.

11.6.4 Paper Purchased by Percent Recycled Content, FY2008-16.