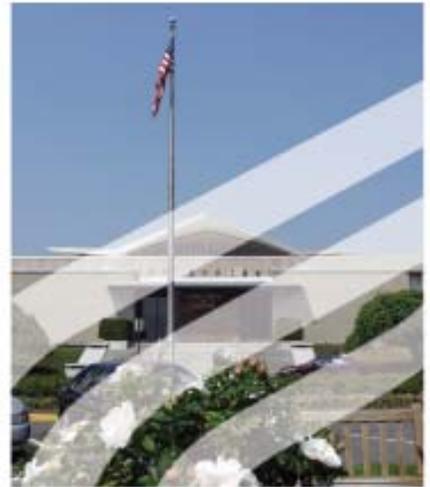


Chapter Four
Existing Conditions on the
NIH Bethesda Campus



4.1 Site Overview

4.1.1 Site Size and Condition

The NIH Bethesda site is a 310-acre parcel adjacent to the Bethesda Central Business District, with buildings and uses arranged in a campus-like setting. The principal boundaries of the site are Rockville Pike (Wisconsin Avenue) on the east, West Cedar Lane on the north, Old Georgetown Road on the west, and the Edgewood/Glenwood neighborhood as well as the Battery Lane residential district on the south. Also part of the NIH Bethesda Campus, but not included as part of this Master Plan Update, is Building 82, the Bloch Center, which is located on the southwest corner of Oakmont Avenue and Old Georgetown Road.

The principal impression from the edge of the campus is of clusters of buildings placed in a rolling, wooded landscape. This character is created by major topography changes (a drop of over 150 feet across the site), and by the existence of mature trees and tree groupings around the perimeter of the site. There is a strong landscaped buffer at the perimeter of the campus, which is mostly undisturbed or being restored, and a more intensely developed core at the center of the site. Although most buildings are laid out on an orthogonal grid, there is little sense of coherence among building groups, open spaces, or circulation patterns.

4.1.2 Existing Land and Building Use

The largest land use on the site is undeveloped open space. Landscaped, wooded, and open areas account for approximately 181 acres or 58% of the campus. The largest undeveloped open areas occur at the perimeter of the site in four primary locations: the northwest corner of the campus; along Rockville Pike between Wilson and Center Drives; the southeast corner of the campus near the Library of Medicine (Building 38); and the area southwest of the Animal Facility Building (14/28 complex). Of the total 181 acres, approximately 66 acres (21% of the site) lie within the current perimeter landscape/open space buffer. The buffer zone is shown in drawings as a light dashed line running at a constant width of 250 feet along the campus perimeter.

The second largest category of land use on the site is circulation and parking, with approximately 85 acres (28%) being used for roads and surface or structured parking areas. Although this is a significant land area allocation, the development of multi-level parking structures has reduced the amount of surface parking which would otherwise have been required. Also significant is the amount of space dedicated to circulation alone, with 54 acres (18%) of the site used for roadways, walks, and service areas.

A variety of other land uses contained within built areas on the site make up the final 44 acres (14%) of the campus. For a breakdown of the primary land uses on the Bethesda site, see Table 4.1.2a.



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Figure 4.0

Aerial Photograph

Table 4.1.2a - Existing Land Use

Land Use	Acres *	Site
Under Developed Open Space	181	58%
Buffer Zone**	66	21%
Other Open Space	115	37%
Circulation	85	28%
Parking	32	10%
Roadways / Walks / Service	54	18%
Buildings	44	14%
Total Land Area	310	100%

* All areas are approximate

** The entire buffer zone area encompasses 82.1 acres
The 66 acres denote green or impervious area

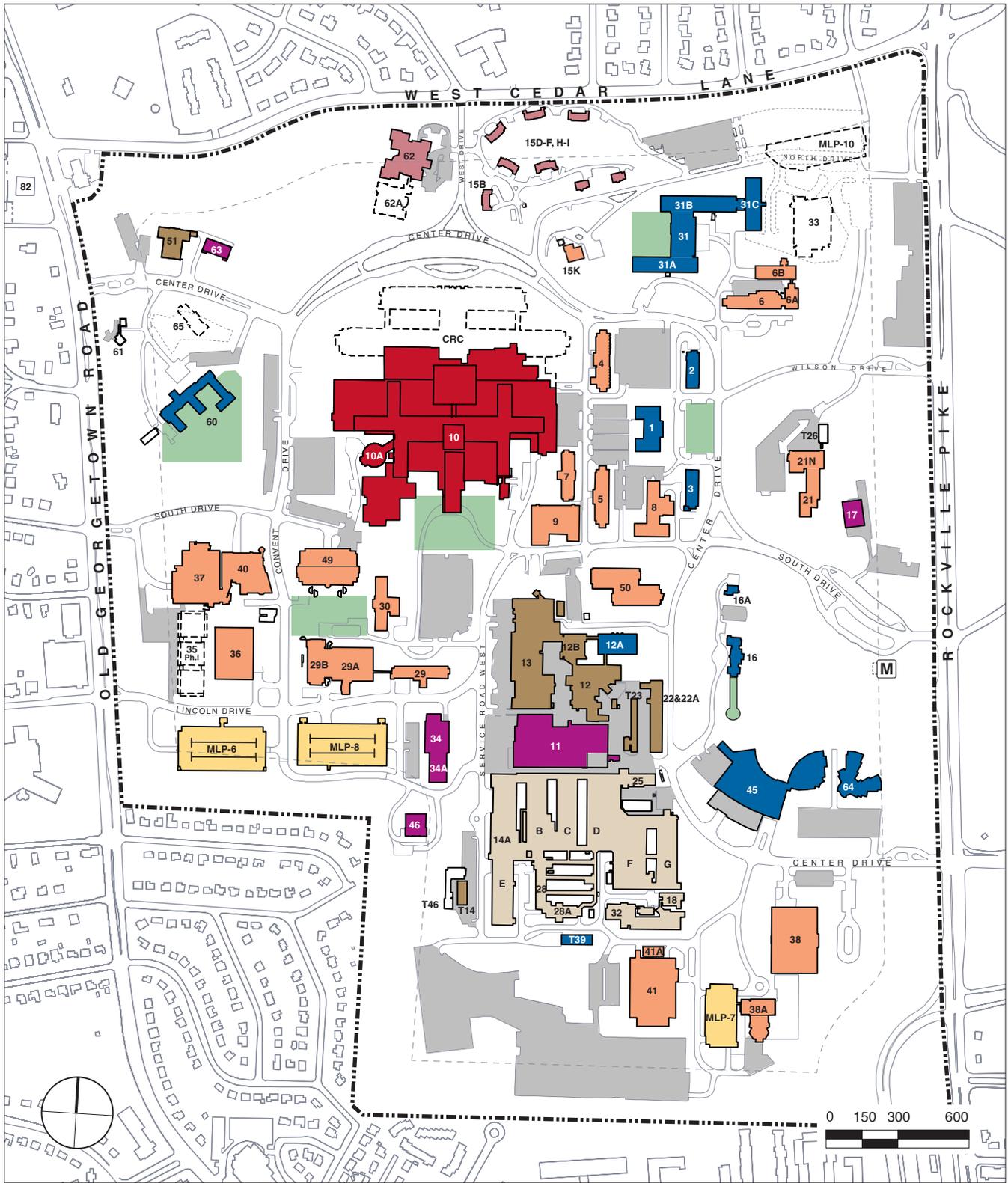
There are seven major functional building uses on the NIH Bethesda Campus: Clinical Center Complex/Patient Care; Research; Administrative/Special Function; Service/Support Utilities; Animal Services; and Residential.

Clinical Center Complex/Patient Care includes uses that relate to clinical/basic research and patient care. Research includes research laboratory, laboratory office, laboratory support, shared support and ancillary service space; Administrative/Special Function are activities which pertain to NIH administration or which primarily take place in an office setting. Service/Support include design and engineering offices, shops, loading areas, grounds maintenance, fire station, and other general campus support activities. Utilities include campus central boilers and chillers, and related infrastructure or equipment. Animal Services include areas for animal care, holding, and research procedures. Residential include residential structures used for NIH employee housing. Figure 4.1.2 shows the campus buildings by major use. Table 4.1.2b is the associated building key and directory.

Figure 4.1.2b Key - Existing Building Directory

Building Number	Primary Use
1	Central Administration
2	Administration
3	Administration
4	Research
5	Research
6, 6A & 6B	Research
7	Research
8	Research
9	Research
10	Clinical Research Complex
10 / CRC*	Mark O. Hatfield Clinical Research Center
11	Central Power Plant
12	Support Services
12A & 12B	Offices
13	Support Services
14A - H	Animal Facilities
15B	Offices
15C - I	Residences
15K	Research
16 & 16A	Office (Stone House)
17	Substation
18	Research
21 & 21N	Research / Radiation Safety
22 & 22A	Grounds Maintenance
25	Waste Management
28 & 28A	Animal Facility
29	FDA Research
29A	FDA Research
29B	FDA Research
30	Research
31A - C	Offices
32	Research
33*	Research
34 & 34A	Refridgeration Plant
35*	Porter Neuroscience Center (NRC) - Phase 1
36	Research
37	Research
38	National Library of Medicine
38A	Lister Hill National Center
40	Vaccine Research Center
41 & 41A	Research
45	Offices / Conference Center (Natcher Building)
46	PEPCO Substation
49	Research
50	Louis Stokes Research Building
51	Fire Station
53	Electrical Power Vault
54	Electrical Power Vault
60	Mary Woodard Lasker Center (Convent Building)
61 & 61A	Offices / Storage
62	Children's Inn
62A*	Children's Inn Expansion
63	Substation
64	East Child Care
65*	Family Lodge
T2	Storage
T14	Storage
T23	Storage
T39	Fitness Center
T46	Daycare Center
T26	Storage / Service
MLP 6	Southwest Multi-Level Parking
MLP 7	Southeast Multi-Level Parking
MLP 8	Southwest Multi-Level Parking
MLP 10*	Northeast Multi-Level Parking

* Buildings currently under construction



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- | | |
|---|---|
| CLINICAL RESEARCH CENTER | RESIDENTIAL |
| RESEARCH | MULTI-LEVEL PARKING |
| ADMIN/SPECIAL FUNCTION | SURFACE PARKING |
| SERVICE/SUPPORT | DEFINED OPEN SPACE |
| UTILITIES | BUILDINGS CURRENTLY UNDER CONSTRUCTION |
| ANIMAL FACILITY | M METRO STATION |

Figure 4.1.3

**Existing
Building Uses**

4.1.3 Functional Districts

The seven major functional land uses on the NIH Bethesda Campus are clustered on site and can be grouped for analysis purposes into functional districts. See Figure 4.1.4.

Clinical Center Complex/Patient Care

The Clinical Center Complex is centrally located and is the functional heart of the campus, housing a variety of uses that relate to clinical/basic research and patient care. Because of its wide range of activities and overwhelming size (32% of total campus occupiable gross square feet), the Building 10 complex can be considered as a functional district unto itself.

Research

Research facilities are primarily located in two clusters on either side of the Clinical Center Complex. To the east, small research spaces are located in buildings, which include the original NIH campus quad. To the west where the most recent growth has occurred are large, more modern laboratory buildings. Since most institutes have some form of clinical research occurring in Building 10, there is both a functional and “psychological” relationship between the research districts and the Clinical Research Center. Other significant research facilities include the National Library of Medicine (Building 38).

Administrative/Special Function

Within this functional category are activities which pertain to NIH administration (Buildings 1 and 31), or which primarily take place in an office setting (Building 45 (the William H. Natcher Building), and Building 60 (the Convent Building)). Most of these uses occur north and east on the campus, with a strong functional relationship between activities in Buildings 1, 31, and the Clinical Center.

Often associated with buildings within this functional use category are special function areas. These areas include conference and auditorium facilities, reception areas (Building 16), and the Mary Woodard Lasker Center in the Convent Building (Building 60).

Service/Support

Campus support services include a central mainframe computer, design and engineering offices, shops, loading areas, grounds maintenance, fire station, and other support activities. This group of buildings is currently located near the geographic center of the campus in the Building 12/13 Complex.

Utilities

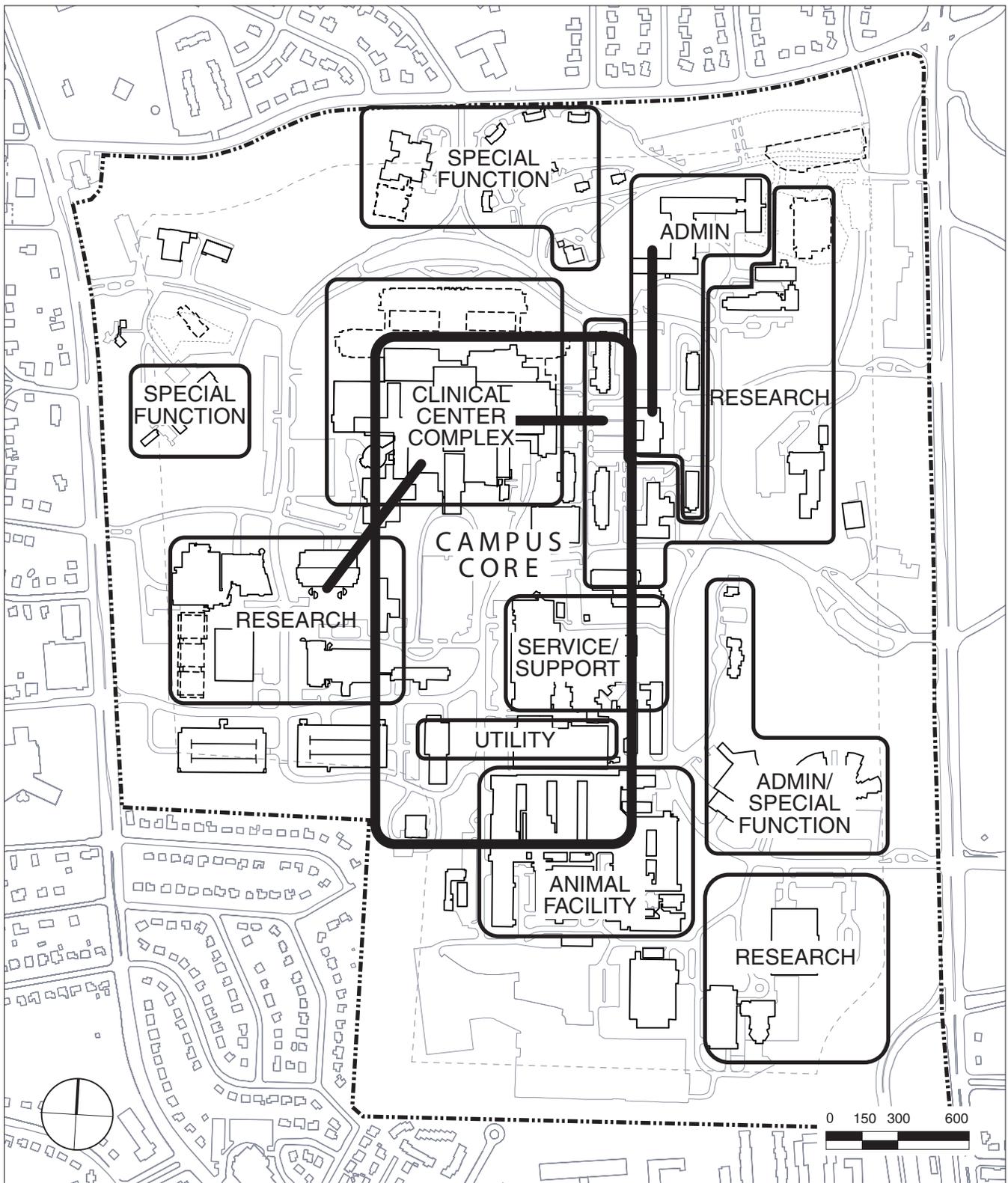
Located in proximity to the support service functions is the central utility district of the campus. Within this district are the campus central boilers and chillers, and related infrastructure or equipment, generally in Building 11.

Animal Services

This district is a large footprint composed of a series of interconnected small buildings (the Building 14/28 complex). Within this complex are areas for animal care, holding, and research procedures. This district has a functional relationship to all research areas of the campus that use animals in research.

Residential

On the north side of the campus is a less densely developed residential district. This area includes the residential structures of the Wilson Estate, the Children’s Inn (Building 62), and several other residential structures used for senior NIH employee housing (Buildings 15C - 15I). Some of these structures have been renovated for use as NIH offices or research facilities.



Campus Core

Though not formally defined, the campus has a strong functional core. This core is defined by the relationships, which exist between the Clinical Center Complex, and Central Administration uses on the north, and the utility/support functions on the south. The Campus Core overlaps several of the other districts, which generally cluster around the perimeter of this central core.

4.1.4 FAR/Population Density

The floor area to site area ratio (FAR) for the NIH Bethesda Campus is currently approximately 0.55 excluding parking garage and utility spaces. The allowable FAR in the Bethesda Central Business District is 1.5 - 4.0, and in the residential areas surrounding NIH 0.20 - 0.30. The NIH campus is a transition in development density between the Central Business District and the surrounding neighborhoods.

With 17,500 permanent employees currently on campus, NIH has an employee population of 56 persons/acre. This is less than the potential full-occupancy staff and resident population of 125 persons/acre for the Central Business District¹ and more than the resident population of 8-12 persons/acre² in the surrounding neighborhoods.

4.1.5 1995 Master Plan Observations

As a result of the 1995 Master Plan review by the National Capital and Planning Commission (NCPC), it was required that NIH update its Master Plan approximately every five years. The NIH Master Plan 2003 Update is the first of the series, and it follows the principles and goals established in the 1995 Master Plan. The updated Master Plan design is essentially the same as that in the Amendment to the 1995 Master Plan (Figure 4.1.6-b), published and approved by NCPC in June 1999. The 2003 Update takes into account both implemented and planned projects from the 1995 Master Plan, while also responding to changing NIH requirements and development, and integrating federal mandates into the plan.

General Observations

The 1995 Master Plan is shown in Figure 4.1.6-a. One major observation of the 1995 Master Plan is that the capacity was set at 18,026 employees for the year 2015. The current (year 2003) population is at 17,511, and the Update provides an ultimate capacity of 22,000 employees.

Specific Implementation

Specific major developments, which have occurred on-campus since the 1995 Master Plan, including Master Plan modifications, are listed below and are shown in Figure 4.1.6-c.

Proposed Construction — Implemented

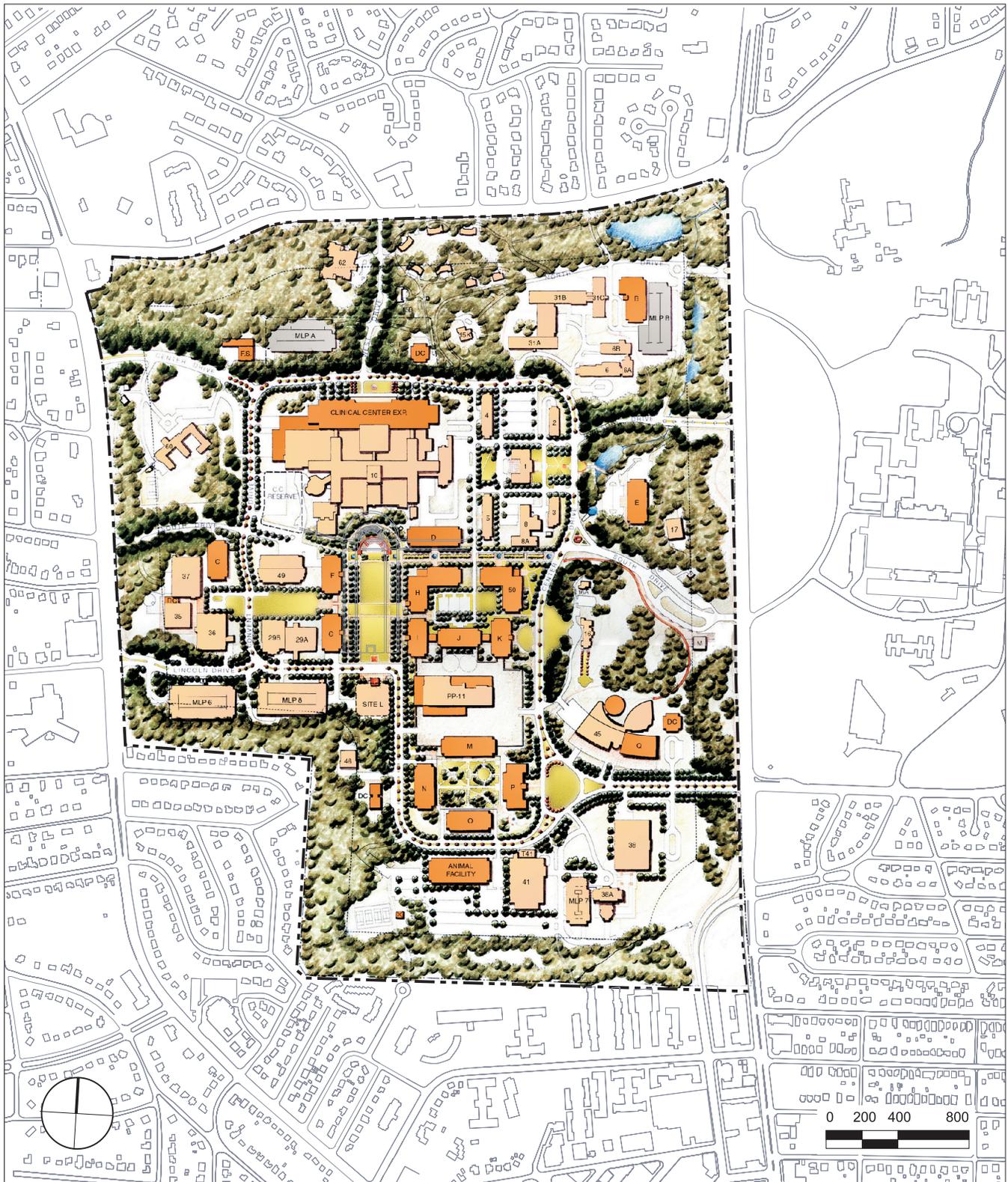
- Construction of Building 40, Vaccine Research Center Phase I (VRC)
- Construction of Building 50, Louis Stokes Research Building
- Building 63, North Electric Power Substation (PEPCO Facility)
- Building 64, East Child Care
- Building 11, Power Plant – Chiller Plant Expansion < Phase II
- Building 11, Cogeneration (COGEN) Facility
- Building 51, Fire Station

¹ Bethesda Central Business District - Approved sector Plan, July 1994. Montgomery County Planning Department. 38,500 - employment capacity. 5,600 housing units x 2.21 - 12,376. CBD area = acres.

² Assumes an average household size of 2.21 persons as of 1990. Based on 1988 Trends & Conditions Report - M-NCPPC.

Proposed Construction — Under Development

- Addition to Building 10, Mark O. Hatfield Clinical Research Center (CRC)
- Building 62A, Children's Inn Expansion
- Building 35, Neuroscience Research Center (NRC) - Phase 1
- Building 65, Family Lodge
- Research Building 33
- MLP-10



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- EXISTING BUILDING
- PROPOSED BUILDING
- PROPOSED MULTI-LEVEL PARKING
- CENTRAL MALL/PRIMARY OPEN SPACE
- PLAZA/PEDESTRIAN CIRCULATION
- OPEN SPACE/RECREATION

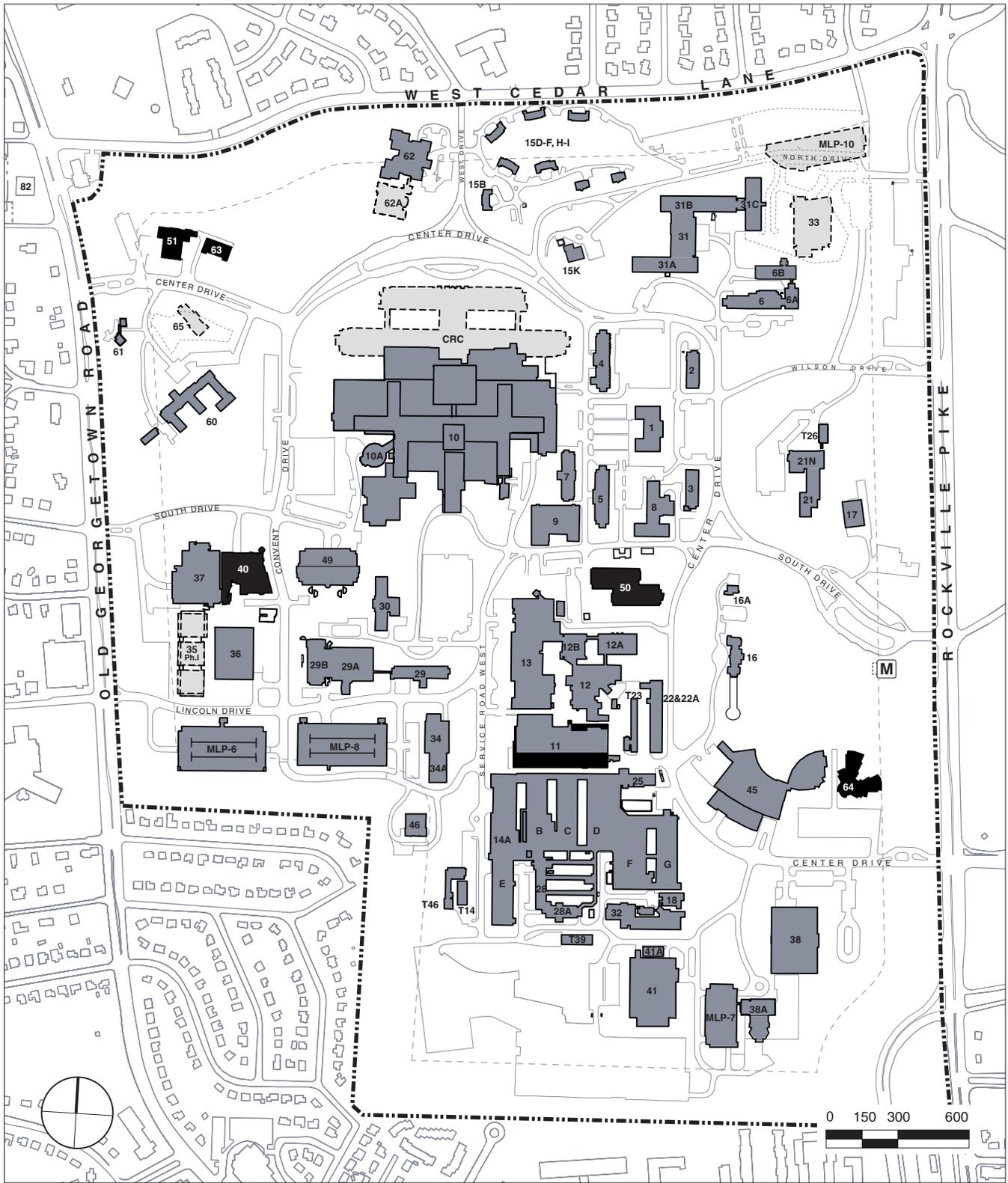
Figure 4.1.6-a

**1995
Master Plan**



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1999 Amendment
to Northwest Sector

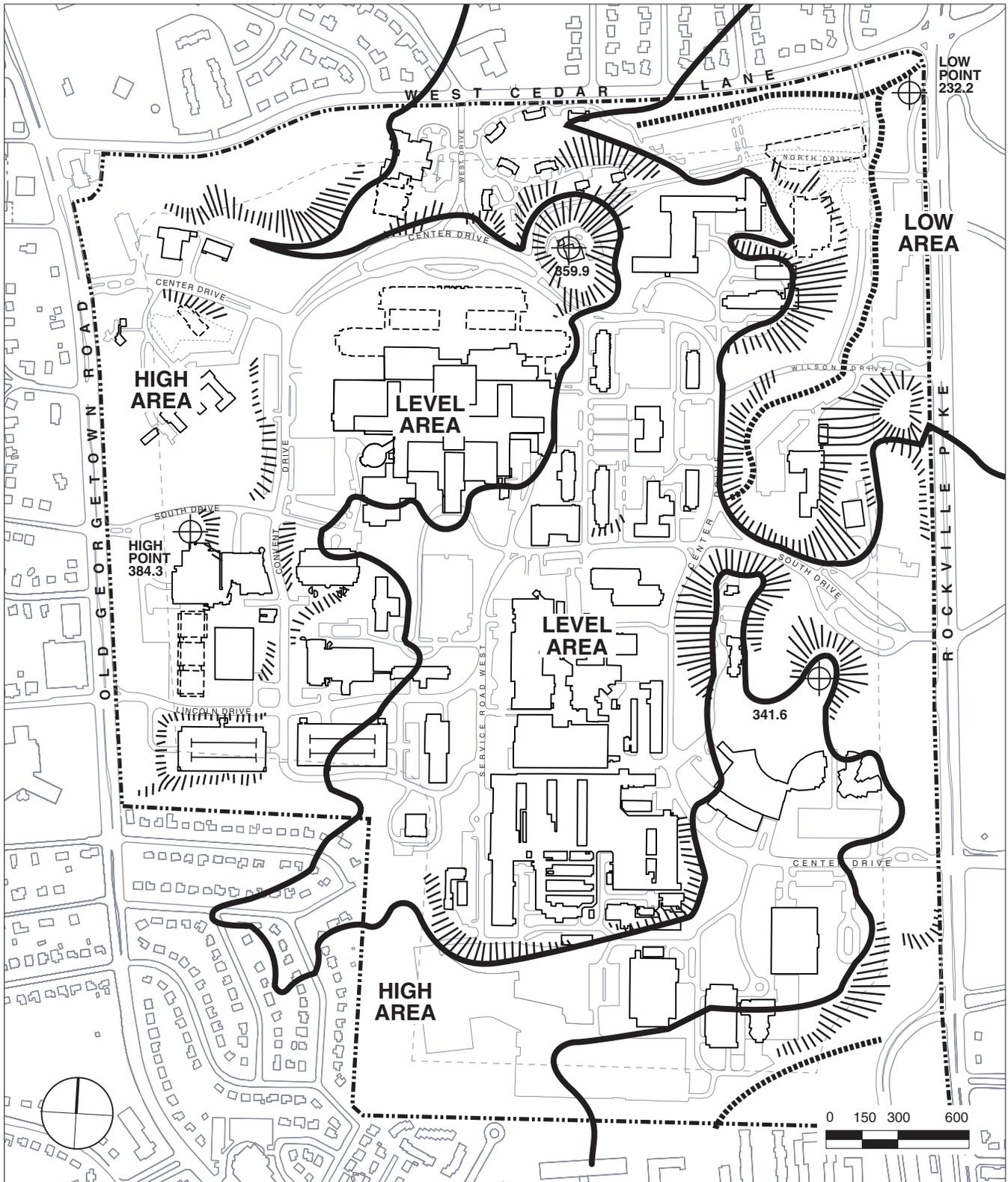


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- EXISTING BUILDINGS
- CURRENTLY UNDER CONSTRUCTION
- IMPLEMENTED

Figure 4.1.6-c

1995 Master Plan
Implementation



NIH
Master Plan
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 Bethesda Campus

-  STEEP SLOPES (OVER 15%)
-  HIGH POINT/LOW POINT
-  STREAM

Figure 4.2.1

Existing
Site Topography
Characteristics

4.2 Natural Features

4.2.1 Topography Characteristics

Elevations on the NIH campus range from a low of 232 feet above sea level at the northeast corner (Rockville Pike and West Cedar Lane) to a high of 384 feet above sea level north of Building 37 near Old Georgetown Road.

The site is divided into three zones with the highest area being along the west and south sides, the lowest area surrounding the NIH Stream in the northeast quadrant, and generally level areas in the center of the campus. Within this overall pattern there are several prominent hilltops, which are usually the locations of significant campus buildings. Site topography is more likely to be near its natural condition at the perimeter of the site than near the center.

Steep slopes (over 15%) primarily exist along the north and east perimeters of the NIH site and must be considered prior to construction and expansion. Steep slopes cover large portions of land along the margins of the NIH Stream and the NIH tributary stream, and a large area to the north of Stony Creek is very steeply sloped. Convent Drive is flanked by steep slopes along both its east and west margins. See Figure 4.2.1.

4.2.2 Hydrology and Floodplains

Subsurface Hydrology

The decomposed crystalline rock that underlies NIH is a type 1 aquifer as classified by Maryland standards. This type of aquifer normally produces less than 10,000 gallons per day and is considered a poor source of water. NIH presently has two wells for emergency supply, which have both been capped. These wells extend to 250 and 300 feet depths, respectively.

Surface Hydrology

The NIH Stream and Stony Creek, both tributaries of Rock Creek, convey surface runoff. The site drains from west to east, with the NIH Stream and its northern tributary receiving most of the campus watershed. The NIH Stream enters the site in a storm sewer from the Edgewood/Glenwood community and flows northeasterly until it emerges in an open channel near Building 21. Its tributary originates in the northwest corner of the site and flows toward the east in concrete drainage ditches or in storm sewers until its confluence with the main NIH Stream in the northeast corner of the site. Stony Creek, whose watershed covers about 32 acres (10%) of the NIH campus, enters and exits the site at the southeast corner. The ridge that separates these two watersheds crosses Rockville Pike just north of Jones Bridge Road. See Figure 4.2.2.

The fall of the main NIH Stream is 75 feet on site, and the total fall from entry onto the site to confluence with Rock Creek is 112 feet. The average stream gradient across the site is about 1.5%. The north tributary to the NIH Stream falls about 106 feet from the high point on the watershed to the confluence with the main NIH Stream with a gradient of about 5%. Stony Creek traverses the site for a short distance at its southeastern corner before crossing under Woodmont and Wisconsin Avenues and entering the National Naval Medical Center (NNMC). On the NIH site this stream receives storm waters from the National Library of Medicine (Building 38) and from the area around lab Building 41. The stream drops only 9 feet as it passes through the site over a distance of 1,040 feet for an average gradient of about 0.3%.

Floodplains

Floodplains of the two principal streams on the NIH site reflect the differences in the geomorphology of these streams. Stony Creek, with its gentle gradient, has a wider floodplain

than that of the NIH Stream with its steep gradient and slopes through the site. Studies of site obstructions or impediments to flow indicate that the existing storm sewer system is adequate to accommodate storms up to the 10-year recurrence level, with the only possible impediment being in the Rockville Pike culvert on the NIH Stream. This culvert reaches capacity somewhere above the 25-year storm recurrence. Flooding that occurs on-site for 50-year and 100-year frequency storms is generally contained within the low areas adjacent to the streams and does not reach the Rockville Pike elevation. See Figure 4.2.2 for floodplain delineations.

4.2.3 Geology

Montgomery County geology reflects the differential erosion rates in a series of crystalline and sedimentary rocks. The NIH site is in the Piedmont Physiographic Province. To the southeast of the campus, much younger rocks occur; pre-Cambrian rocks outcrop northwest of the Fall Line, which marks the general boundary of the Piedmont Province.

NIH is underlain by the Lower Pelitic Schist of the Wissahickon Formation. This schist is relatively soft mica overlain by 10 to 30 feet of weathered rock materials (Saprolites) and residual soils. The major structural feature in the rocks is a set of northeast trending joints. The strikes of these joints appear to be the major factor in the alignment of the on-site streams.

An old fault zone in Howard County is associated with the orogeny of the Baltimore Gneiss dome 12.5 miles to the north-east of Bethesda. The region has been seismically quiet since Triassic time with only minor earthquake activity reported in Montgomery County. The age of the bedrock materials together with the stability of the structural features provides a local setting of geologic integrity.

4.2.4 Soils

Surface Soils

The two major surface soil series at the NIH site are Glenelg and Manor. Both are derived from residual rock with the Glenelg Series more deeply weathered. Soils of limited distribution include the Worsham, Glenville and Neshaminy Series. The soils found on the NIH site are well-drained upland soils, moderately eroded. Because of the relatively good fertility, gently sloping nature, and deep character of these soils, they are well suited to suburban development.

Sub-Surface Soils

The term "Saprolite" is used for the in-place mantle of residual silty clay and weathered bedrock overlying all types of crystalline rocks in the Maryland piedmont. Based on the parent rock and the derived soil, the Saprolite group is generated from six different parent rocks. Three of these are found on the NIH site and are categorized as follows:

- Saprolite 5B - on schist, micaceous, well drained;
- Saprolite 5D - on gneiss, silty, bouldery, well drained;
- Saprolite 5F - on mafic rock, clay rich, poorly drained.

The bedrock underlying the Bethesda campus is igneous, metamorphic and consolidated rock, fresh, hard, unaltered, and locally overlain by Saprolite and organic surface soils. Due to erosion in the NIH Stream valley, this bedrock is only lightly overlain in the northeast corner of the site. Additional areas of known bedrock include the southwest corner of site, specifically between Buildings 41 and MLP 7. See Figure 4.2.4.

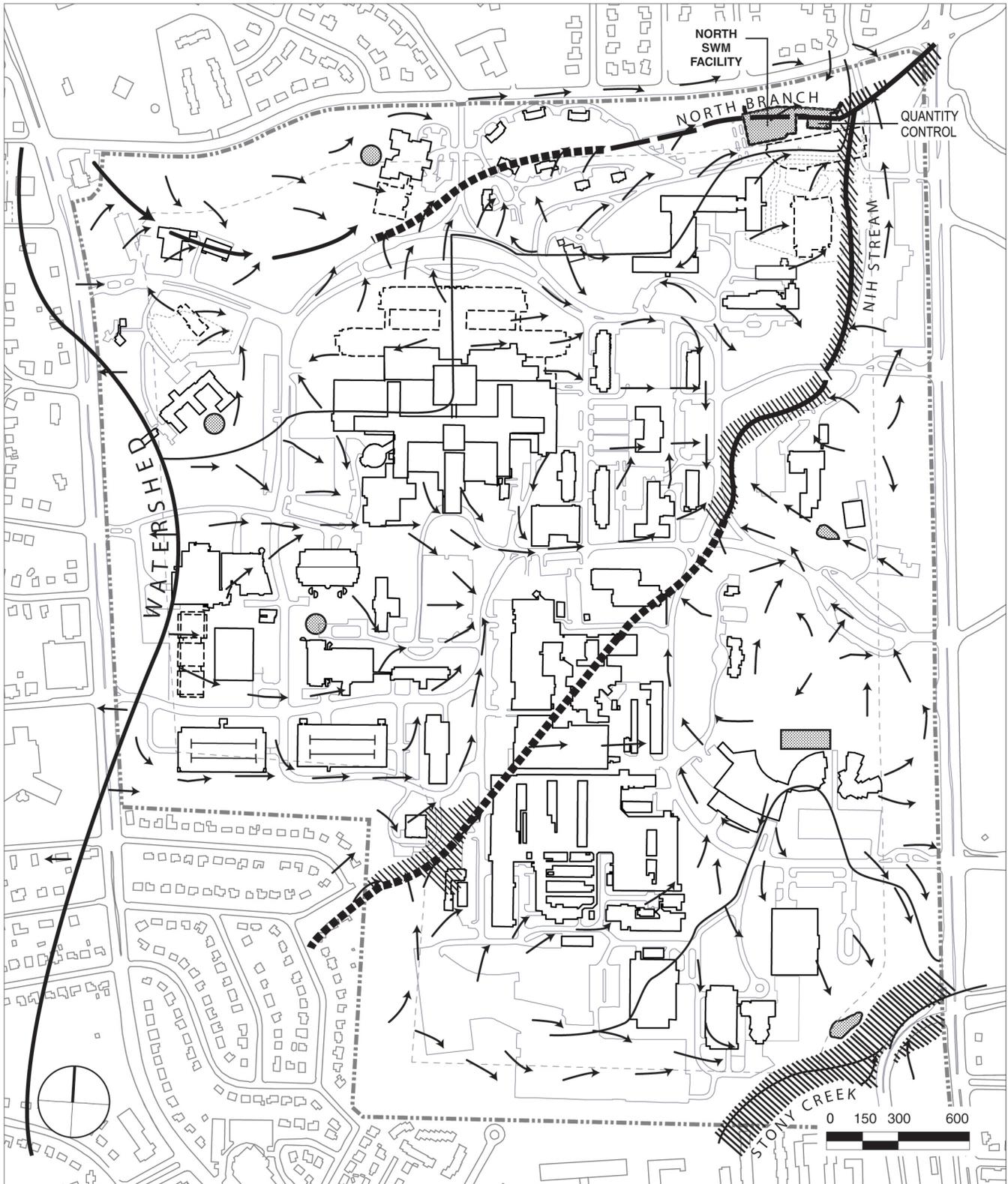
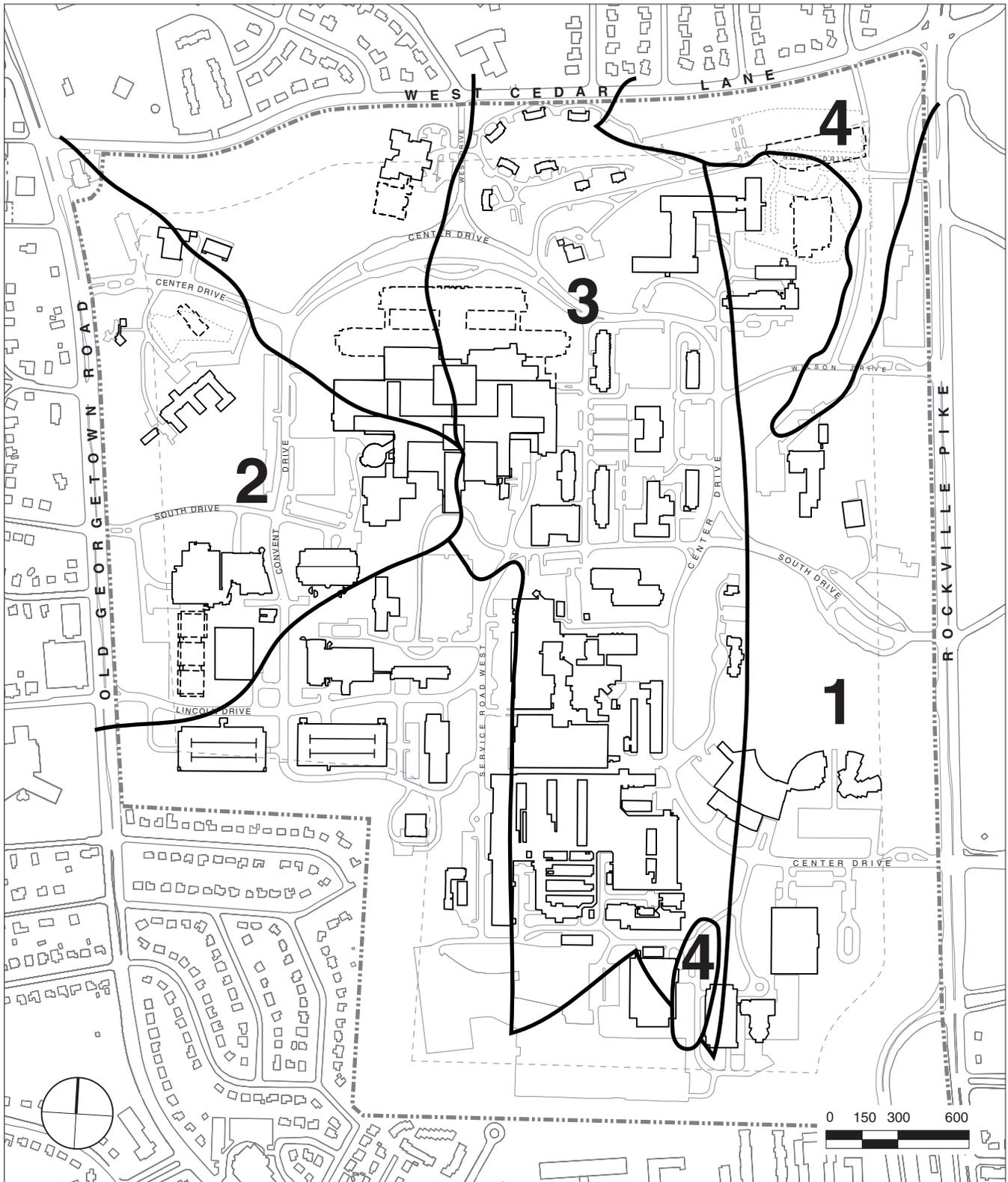


Figure 4.2.2

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-  100-YEAR FLOODPLAIN
-  PIPED DRAINAGE
-  OPEN STREAM
-  STORMWATER RETENTION

**Existing
Hydrology**



**NIH
Master Plan
2003 Update**
Bethesda Campus

- 1** SAPROLITE ON SCHIST, WELL DRAINED
- 2** SAPROLITE ON MAFIC ROCK, POORLY DRAINED
- 3** SAPROLITE ON GNEISS, WELL DRAINED
- 4** BEDROCK

Figure 4.2.4

**Existing
Subsurface Soils**

Structural Stability

The physical character of the Saprolite soils, such as those found at NIH, is that they are composed of sand, silt, clay, angular rock fragments, and a residual deposit of soft red-brown to gray earthy porous material derived from decomposed crystalline rock.

With light power equipment, the material is easy to work near the surface. With heavy power equipment, the material becomes moderately difficult to work below 20 feet. Achievable compaction is 90 to 95 percent of maximum density.

This soil is fair to good for support of heavy structures. With bearing strengths ranging from 3 to 4 tons per square foot near the surface, increasing to 5 tons per square foot at greater depths. Soil is stable in near-vertical cuts to as much as a 15 feet depth.

In the Saprolite mantle, disintegrated rock occurs between 20 and 60 feet below the surface, with hard rock usually at 40 to 50 feet below the surface or deeper. Boring data indicates that the water table is approximately 15 to 30 feet below the surface throughout the site.

4.2.5 Vegetation and Ground Cover

Tree cover on the Bethesda Campus is of two distinct types: woodland stands found around the perimeter of the site, and formal plantings associated with development of the interior portions of the property.

Predominant species in the woodland stands are Oak, Tulip Poplar, Sycamore, and Maple. Tulip Poplars and Maples occupy the lower portions of the site with Oaks and Sycamore dominating the upland areas. Trees are of mature or maturing stature and range in size from 18" to 36" diameter at breast height (DBH) with some specimens up to 48" DBH. Species generally occur in near pure stands of similarly aged trees of even density, with little or no understory planting. Most woodlands are maintained as tree lawns.

Tree cover on the interior of the site is predominantly street tree and parking lot plantings. Trees are young by comparison to the woodlands and often in a stressed condition.

Evergreen species are found throughout the property, generally in small stands of similar species, most often White Pine, Austrian Pine, or Scotch Pine concentrated around the perimeter of the property.

4.2.6 Plant and Animal Communities

Plant Community

The regional woodlands in the vicinity of the Bethesda campus have been largely modified by the increasing urbanization of the area. Small remnants of the original local woodland communities still exist on the grounds of the National Naval Medical Center and further to the east in Rock Creek Park. In these communities, as at NIH, the Tulip tree and the White Oak are the two most important native woodland tree species on the grounds, followed by the Northern Red Oak.

Aquatic vascular plants are absent along the NIH Stream courses because of general incompatibility with current landscape practices. There are no designated wetlands on the Bethesda campus. The only threatened species in Montgomery County, the Small Whorled Pogonia, has not been identified on the NIH campus.

Animal Community

Wild mammals at NIH are limited to those species that can tolerate the urban park setting and concentrated vehicular and pedestrian activity. Those, which may be found on-site,

include the Raccoon, Cottontail, Fox Squirrel and/or Gray or Black Squirrel. The habitat in the area is appropriate for a variety of small mammals including the House Mouse, White-footed Mouse, Deer Mouse, Least Shrew, Short-tailed Shrew and the Norway Rat.

With the elimination of the majority of understory habitat, nesting sites for bird species such as the Meadowlark, Kill-deer, Sparrow, Thrasher, Wren and many Warblers are currently absent. The few remaining groupings of tall trees on the site may provide some nesting habitat for Woodpeckers, Vireos, Tanagers, Thrushes, Chickadees and Titmice. Large areas of open space or buildings isolating the nesting sites from feeding areas limit the flight paths to and from these trees for these latter species. NIH provides artificial bird houses for cavity nesters throughout the campus to supplement the loss of habitat due to hazardous trees that are removed. There are presently fifty-one artificial bird houses on the campus and others are added as necessary. Migratory or seasonally abundant birds include such common varieties as the Tree Sparrow, House Sparrow, Starling, Robin, Common Crow and Blue Jay. The one endangered species listed in Montgomery County is the Bald Eagle, which has not been identified on the NIH campus.

A habitat survey conducted in preparation for planning of the William H. Natcher Building noted an absence of aquatic wildlife in the waters of NIH.

4.3 Built Environments

4.3.1 Landscape Patterns

The existing site landscape patterns are shown in Figure 4.3.1. At the macro scale the campus landscape falls into two distinct categories: the Landscape Dominant Zone of the perimeter of the campus and the Building Dominant Zone of the interior.

Natural rolling topography of fairly fine grain, and mature woodland cover of even age and density in certain areas characterize the Landscape Dominant Zone. Buildings are set within and are generally absorbed by the landscape. Four corners, which distinguish themselves from each other and from the landscape, anchor this zone. In the northeast area of the site, the NIH Stream, specimen trees and small footbridges create a quiet, internalized, and picturesque setting. In the southeast corner open landscape, rolling turf, and groupings of mature trees allow open vistas into the campus. The southwest corner, the only corner without a public edge, is a commanding site on high ground with long views to the north. Its aged, gnarled Sycamores and continuous sweep of lawn create a classic park setting. The northwest corner is an impressive woodland of mature, large Tulip Poplars.

Collectively, the corners of the Landscape Dominant Zone provide a rich, memorable, and valuable structure for the campus as a whole, while the Zone in its entirety provides an important buffer and edge to surrounding uses. Other prominent landscape features of this zone include the tree and lawn edges along Rockville Pike and Old Georgetown Road.

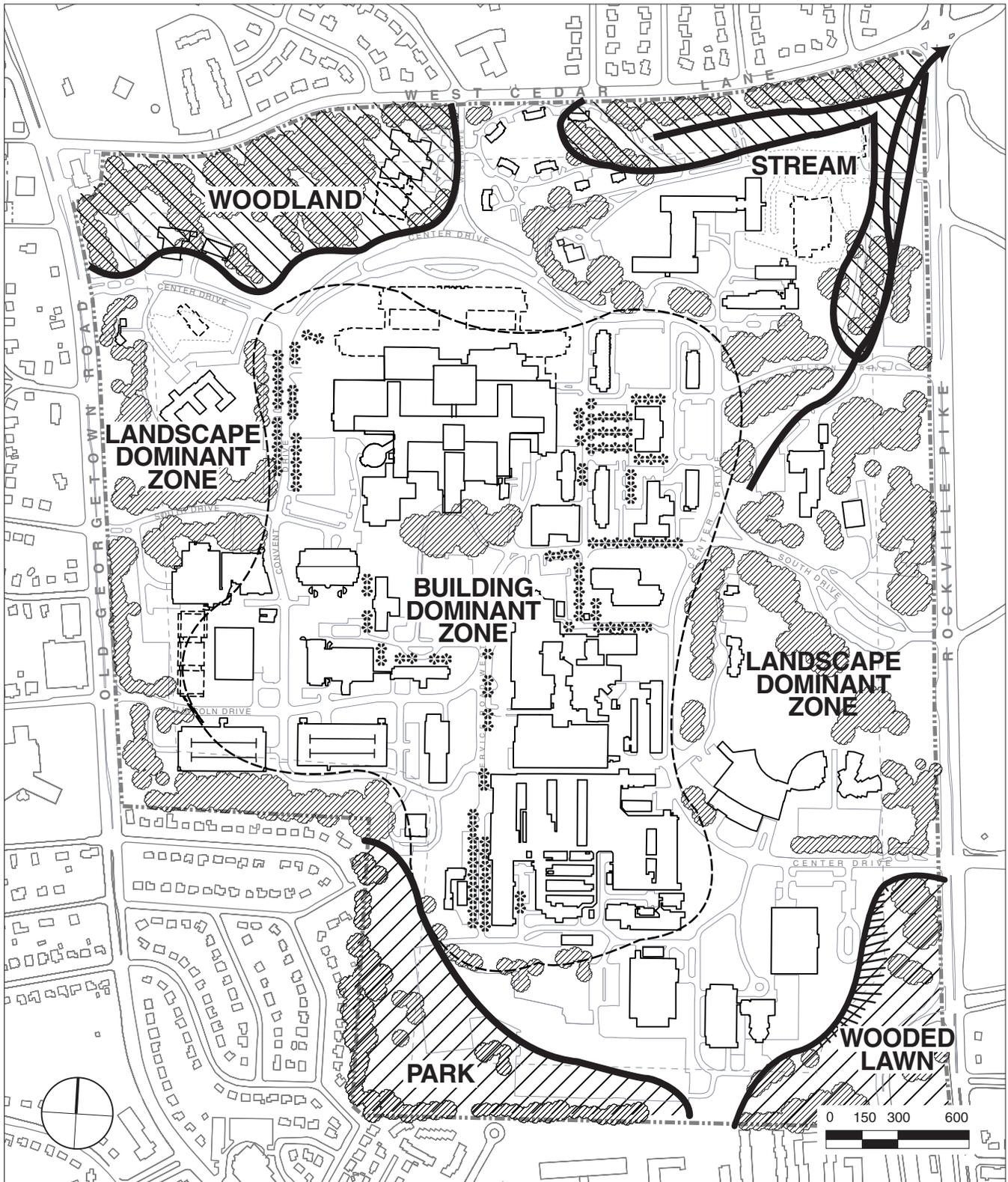
The Building Dominant Zone on the interior of the campus is characterized by terraced topography and planted landscapes typified by street trees, parking lot plantings, and defined ornamental plantings without apparent campus-wide patterns.

4.3.2 Building Patterns

Buildings on the NIH Bethesda Campus are laid out predominantly on an orthogonal grid, which is derived from the formal quad created by the original buildings of the campus (Buildings 1-5). A few structures do not conform to the grid, including the Convent Building (Building 60, whose construction predates the NIH Bethesda Campus), the William H. Natcher Building (Building 45, which responds to the curve of Center Drive), the residential buildings at the north end of the campus and now the East Child Care facility along Rockville Pike (Building 64) and the Fire Station (Building 63 in the northwest corner campus). Building patterns on the NIH site do not relate directly to building patterns of the surrounding area. See Figure 4.3.2.

While there is no formal structuring which relates all campus buildings to each other (such as a central lawn or mall), buildings on campus tend to be organized in clusters. These groups of buildings are related by formal structure, shared open space, or common uses. While most building groups open outward toward the rest of the campus, some groups, such as the Support Services cluster and the Animal Facilities, have a more inward focus and have less prominent building frontages. Due to its very large scale, the Clinical Center Complex should be considered a building group unto itself.

Within the overall structure of the grid there are important axes, which relate to significant buildings. These include the axial relationship between the central administration building (Building 1) and the tower of the National Naval Medical Center across Rockville Pike; the orthogonal relationship of the buildings within the historic core (Buildings 1-5); the axis created by the symmetrical composition of the original Clinical Center (Building 10), particularly toward the southern part of the campus; and the panoramic view from the Stone House (Building 16) over the entire campus.



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- *** FORMAL LANDSCAPE
- ▨ INFORMAL LANDSCAPE
- ▩ SPECIAL CORNER

Figure 4.3.1

Existing
Landscape Character

4.3.3 Places and Open Spaces

There are relatively few identifiable “places” on campus, and most outdoor open spaces are not well defined by enclosure, landscape, or character. Most open space on the site is treated as residual, with an emphasis on buildings as objects. Where identifiable places exist on campus, there is usually a relationship to a significant building or building entry. As with building patterns, there does not appear to be an organizing concept or system relating the individual places and open spaces to each other.

Three specific places deserve mention for their individual, collective, and contrasting qualities: the NIH Stream Valley with its connection to nature; the Stone House hilltop (Building 16) with its connection to history; and the Metro Station area with its regional connections. See Figure 4.3.3.

4.3.4 Building Heights

Building heights (above grade) on campus range from ± 15 feet, one-story structures such as the Animal Facility Building 14, to a high of ± 200 feet of the Clinical Center Complex (Building 10). As a general pattern, lower buildings (0-35 feet in height) are located at the perimeter of the campus, while medium height buildings (35-100 feet) occupy the center of the site. The taller of these medium height buildings include research Buildings 37 and 49, Building 11 (the power plant), and the William H. Natcher Building (45). These zones are punctuated by tall buildings (>100 feet), including the Clinical Center Complex, general office Building 31 (± 190 feet), and the Lister Hill National Center (Building 38A, $\pm 150'$). See Figure 4.3.4.

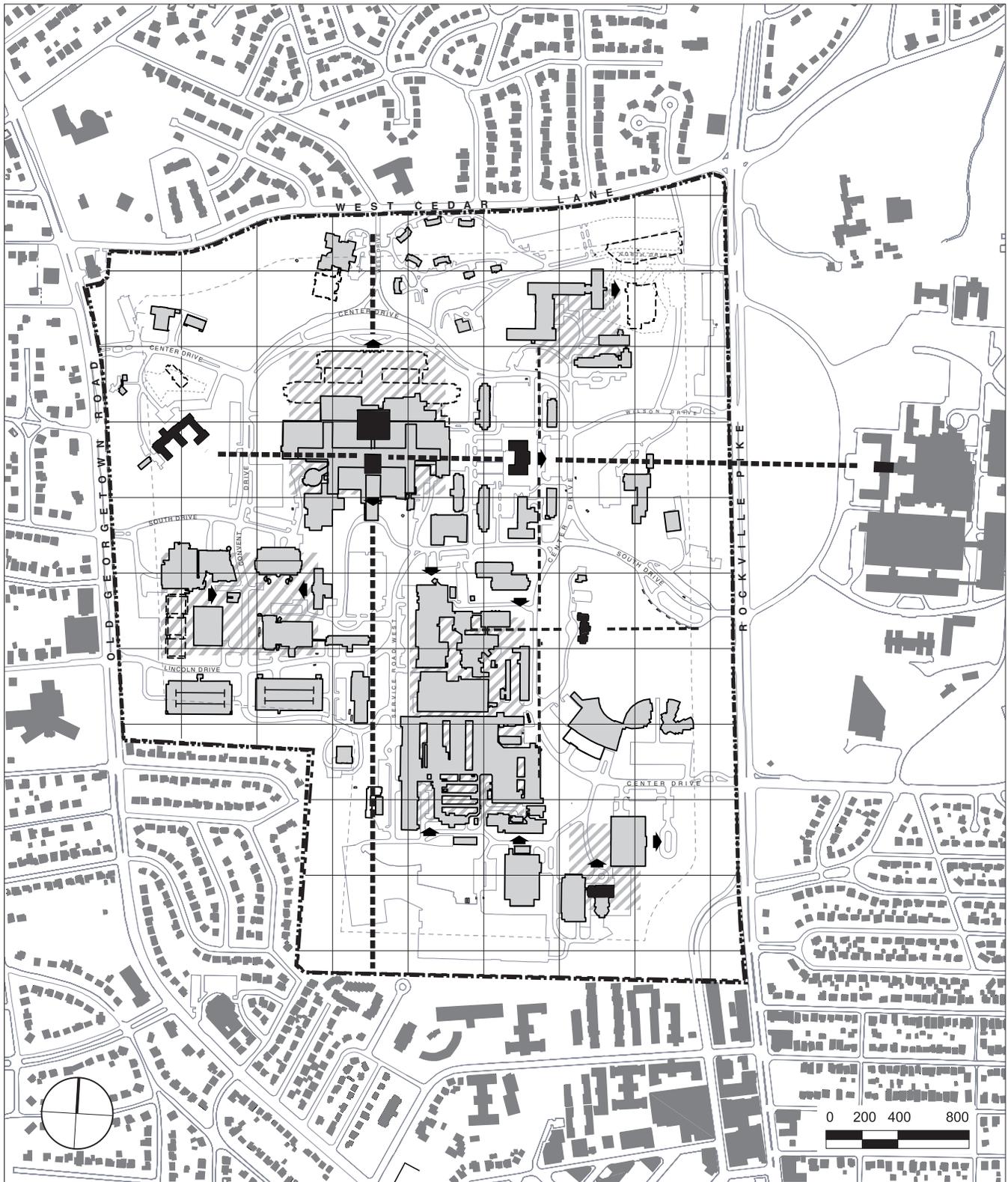
Because the site has such varied topography, building heights in relation to site elevation can be an important factor in the perception of building masses. Low buildings, except for the Lister Hill building and Building 31 Complex whose prominence is enhanced by its hilltop setting, occupy most hilltop sites on campus. Many buildings in the center of the campus are not highly visible from outside areas because they are at lower elevations than the perimeter landscaping, while structures on the western edge of the site (research Buildings 35 (NRC), 36, 37, and 49) appear to be taller from inside the campus because of their higher topographical elevations.

4.3.5 Views and Prominent Features

Natural prominent features of the site include significant hilltops around the campus, the NIH Stream Valley, and the numerous stands of mature trees around the perimeter. Man-made prominent features are structures which act as landmarks because of their height, size, age, or location.

The most prominent structure on site is the Clinical Center Complex, which is the major landmark for the campus. Other significant buildings on the site occur in conjunction with prominent natural features, such as the Building 60 (Convent Building), Building 16 (Stone House), and Building 38A (Lister Hill National Center). Other prominent buildings on site include Building 31 (general office), Building 1 (central administration), Building 45 (William H. Natcher Building), and Building 38 (National Library of Medicine), which is the most prominent campus building from outside the site.

An analysis of views around the site shows that visibility into the center of campus from surrounding streets and neighborhoods is mostly blocked by topography and landscape. Major views into the site tend to occur at the corners of the campus, at new research Building 35 (NRC - Neuroscience Research Center) on the Old Georgetown Road side, and along the south edge of the site. Axial views are created between the central administration Building 1 and the tower of the National Naval Medical Center, and to the

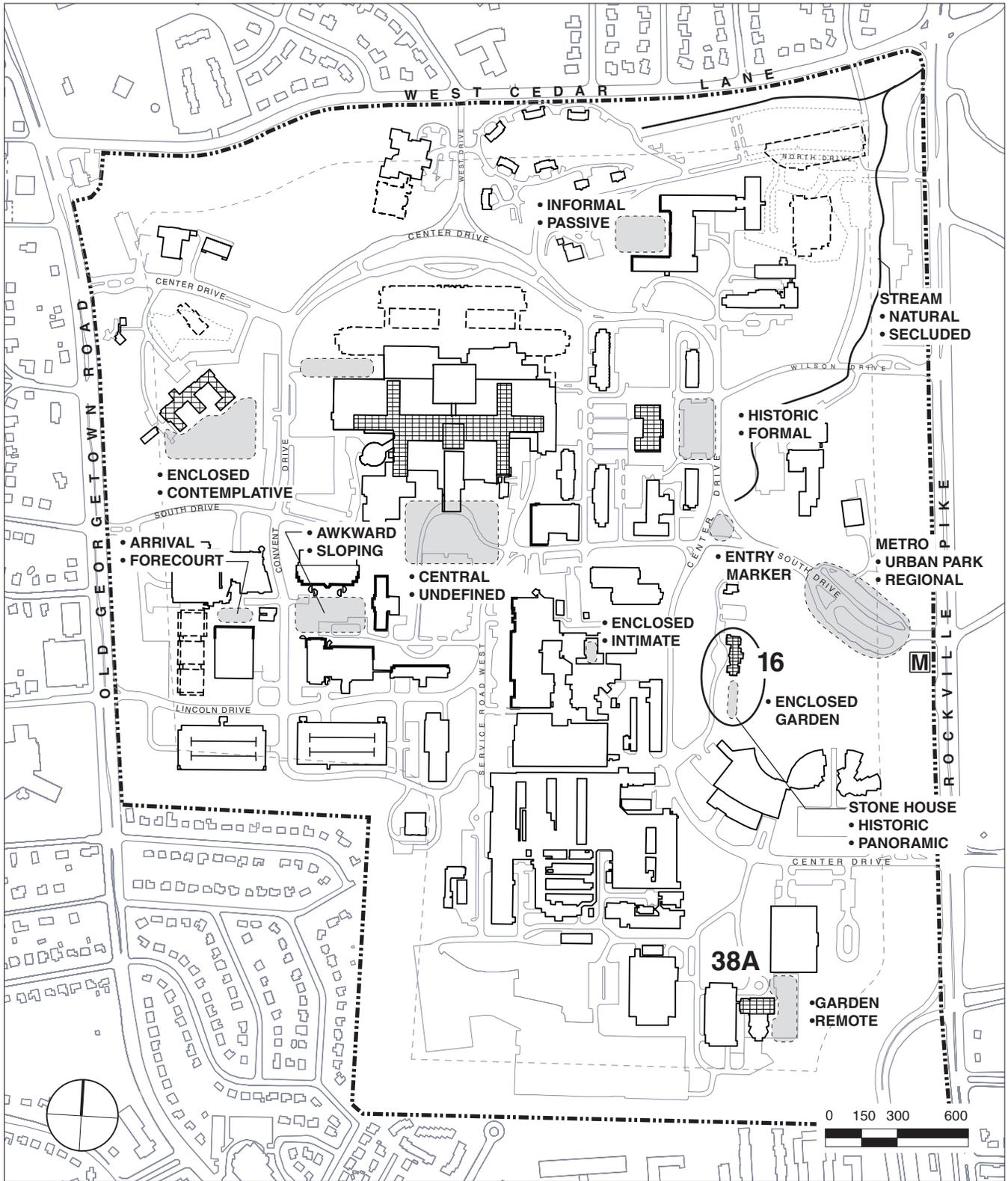


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- FOCAL ELEMENTS
- BUILDING GROUPS
- MAJOR AXES
- BUILDING ORIENTATION

Figure 4.3.2

Existing
Building Patterns

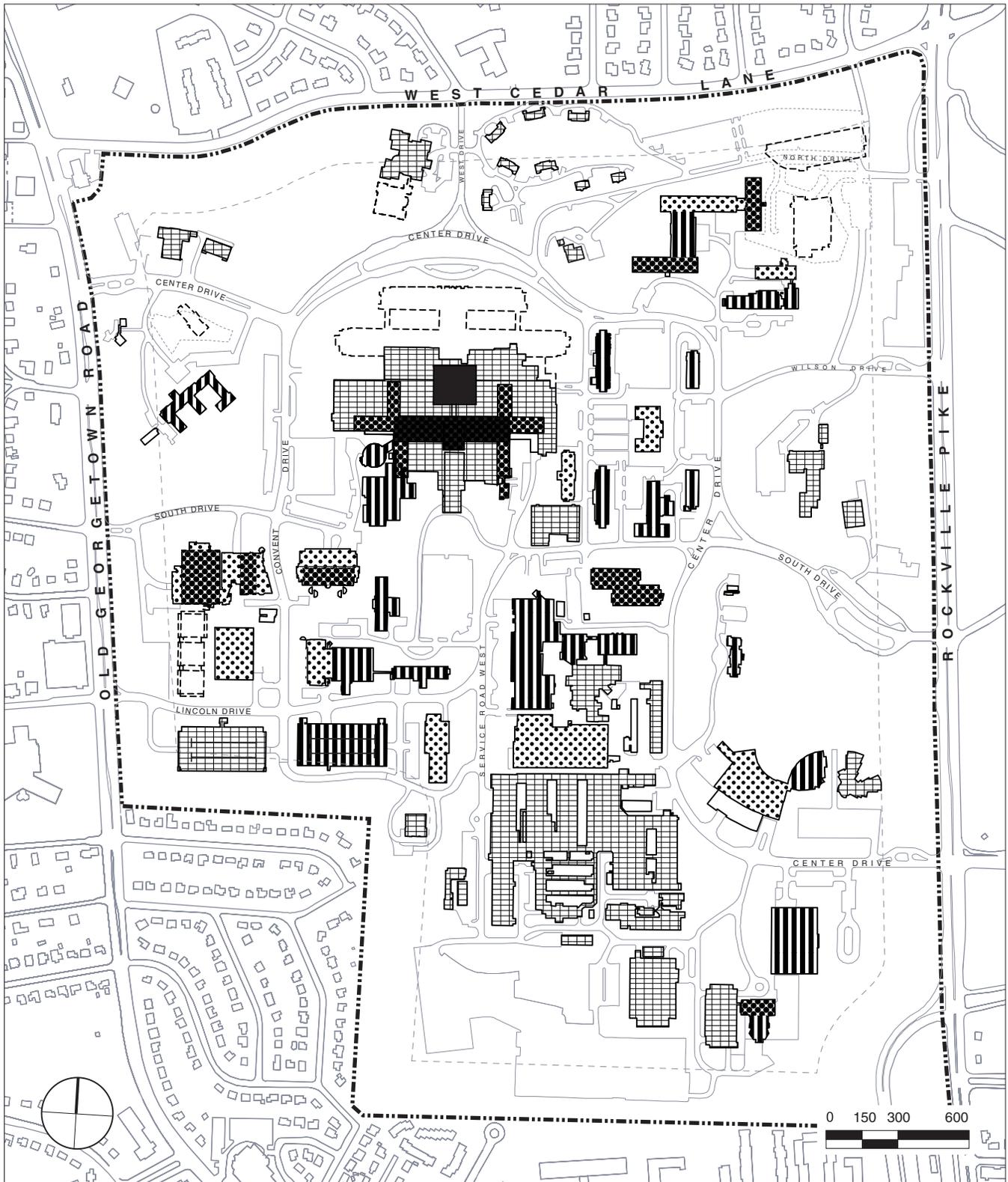


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-  KEY SPACES
-  KEY BUILDINGS
-  IMPORTANT EDGE

Figure 4.3.3

Existing Places
& Open Spaces

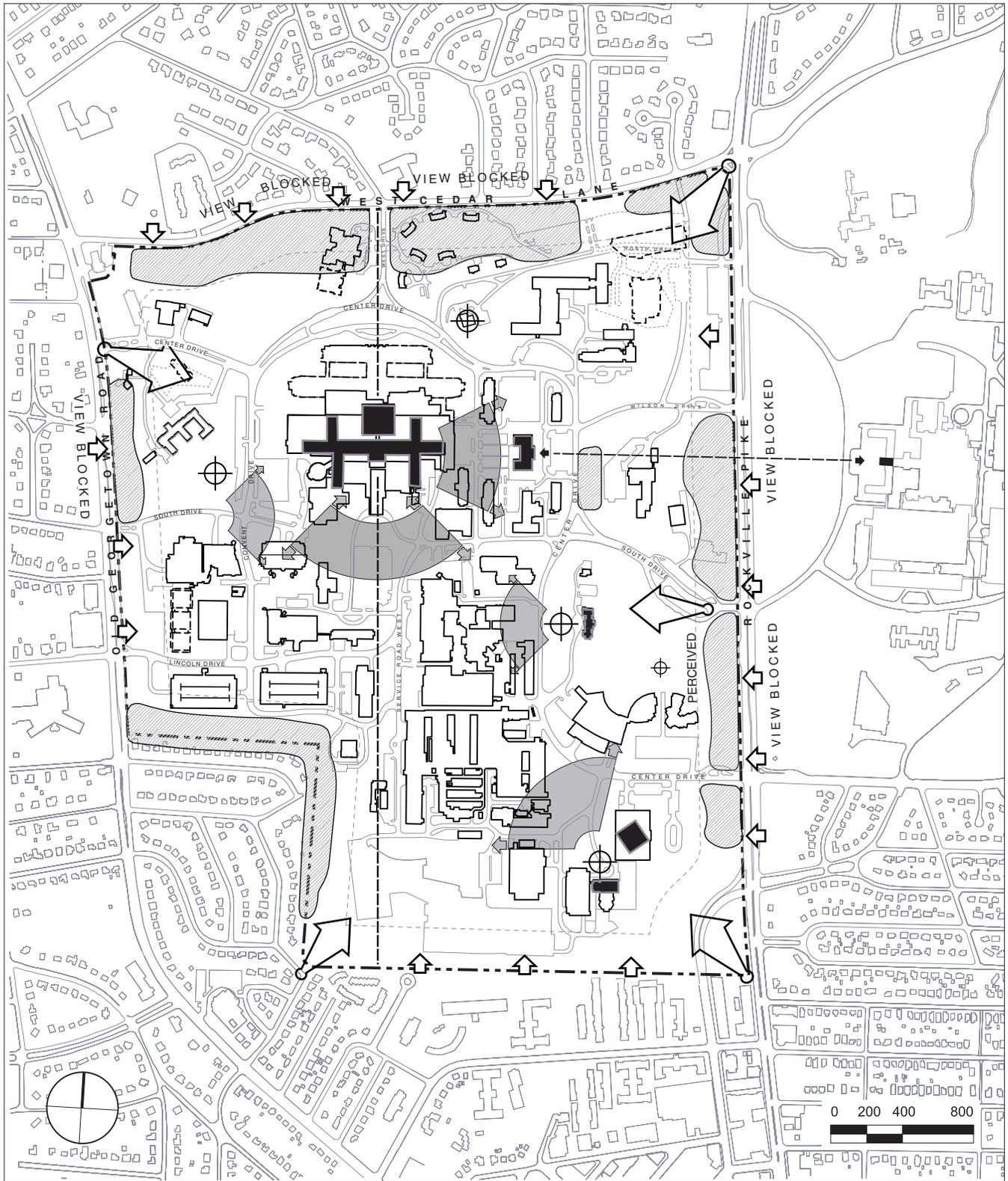


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-  0 - 35'
-  35' - 65'
-  65' - 100'
-  100' - 200'
-  200' +

Figure 4.3.4

**Existing
Building Heights**



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-  TREE BUFFER
-  HIGH POINTS
-  VIEWS
-  PROMINENT FEATURES

Figure 4.3.5

**Existing Views &
Prominent Features**

Clinical Research Center primarily from the south end of the campus. There are also panoramic vistas over the entire campus from the elevated areas in front of Building 16, Building 38A/41 and behind the Building 60. See Figure 4.3.5.

4.3.6 Building Areas Summary

The current gross square footage of occupiable structures on the NIH Bethesda Campus is 7.36 million gross square feet (gsf). The total built area including structured parking facilities is approximately 8.26 million gsf. See Table 4.3.6.

Excluding parking structures, there are sixteen buildings on campus, which have over 100,000 gsf of space, the largest of which is the Clinical Center Complex (Building 10). With approximately 2,260,000 gsf (excluding parking), this building complex contains 30% of all campus occupiable built space. The second largest building on campus is the general office Building 31A, B and C complex with over 580,000 gsf. Table 4.3.6 shows all existing building areas with their primary use identified.

Outside the Clinical Center/Patient Care category, the largest primary use category on campus is Research functions with approximately 2.8 million gsf of space, followed by Administrative/Special Function areas with approximately 1.2 million gsf of space.

4.3.7 Building Population Summary

The 2003 total campus employee population at Bethesda is 17,511. The largest population center is the Clinical Center Complex, which houses over 7,000 employees or 40% of the entire campus employee population. The second largest staff concentration (31%) is in the Research complex with approximately 5,500 employees housed in various research buildings in close proximity to the Clinical Center Complex (CCC) and 4,200 research employees in the CCC itself. The Administrative/Special Function category, which include the general office Building 31 complex houses approximately 1,800 employees or (28%) of the entire campus population.

4.3.8 Building Conditions

The building conditions analysis is based on physical factors such as structural soundness, condition of finishes, operation of mechanical systems, etc. All campus buildings have been rated from excellent to poor as an indication of the immediacy of need for their renovation or replacement. A summary of building conditions is graphically presented in Figure 4.3.8.

Buildings assigned an "excellent" rating are those that were either recently constructed or renovated, and represent approximately 48% of the built space on campus. A significant number of buildings, accounting for more than 18% of campus space, are in "good" condition. Approximately 9% of the campus has been assigned a "fair" rating, with buildings in this category expected to have only 5 to 10 years of useful life. The remaining 26% of campus space is rated in "poor" condition, with an expectation of 0 to 5 years of useful life. A significant portion of the Clinical Center Complex (Building 10) and the entire Animal Facility (Buildings 14/28) are rated in "poor" condition and will require early renovation or replacement.

Buildings in "fair" or "poor" condition are primarily located in the central and south-central portion of the campus, leaving these areas more readily available for renovation or redevelopment.

Table 4.3.6 Existing Areas Summary (areas do not include structured parking)

Building Number	Building Gross Area	Primary Use
1	95,948	Central Administration
2	46,860	Administration
3	48,860	Administration (currently vacant)
4	91,292	Research
5	91,292	Research
6, 6A & 6B	145,043	Research
7	48,860	Research
8	99,296	Research
9	32,500	Research
10	2,261,545	Clinical Center Complex
10 / NMR's	11,135	Clinical Center
11	232,400	Central Power Plant
12	52,140	Support Services
12A & 12B	104,196	Offices
13	212,690	Support Services
14A - H	245,252	Animal Facility
15B	8,065	Office
15C-I	52,345	Residences
15K	11,670	Research
16	17,480	Offices (Stone House)
16A	2,880	Offices
17	7,651	Substation
18	6,550	Research
21 & 21N	36,216	Research / Radiation Safety
22 & 22A	15,810	Grounds Maintenance
25	4,445	Waste Management
28 & 28 A	26,501	Animal Facility
29	89,949	FDA Research
29A	106,694	FDA Research
19B	102,700	FDA Research
30	93,940	Research
31A - C	582,037	Administrative Offices
32	9,768	Research
34 & 34A	72,547	Refridgeration Plant
36	236,285	Research
37	248,469	Research
38	230,347	National Library of Medicine
38A	222,120	Lister Hill National Center
40	84,600	Vaccine Research Center
41	138,268	Research
41A	3,526	Research
45	372,535	Offices / Conference Center (Natcher Building)
46	11,526	Substation
49	270,311	Research
50	290,000	Louis Stokes Research Building
51	22,000	Fire Station
53	3,968	Electrical Power Vault
60	67,500	Mary Woodard Lasker Center (Convent Building)
61 & 61A	3,296	Office / Storage
62	37,565	Children's Inn
63	10,030	Substation
64	21,000	East Child Care
T2, T14, Y23, T39	15,031	Storage / Service
T26	2,900	Storage / Service
T46	3,000	Child Care Center

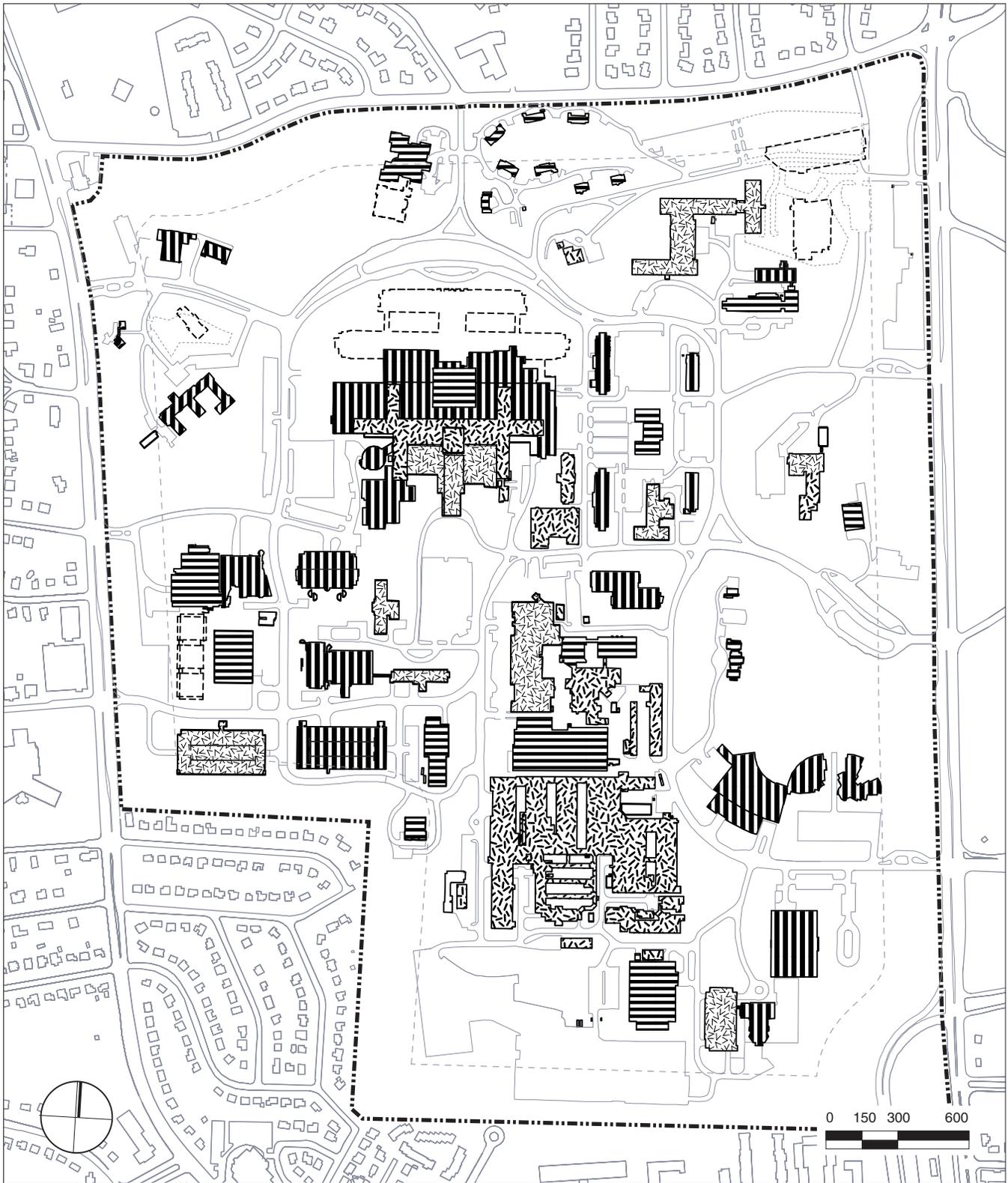
4.3.9 Building Functional Suitability

Functional suitability is based on the ability of a particular structure to continue to be used effectively for the activity assigned to it. In some cases, buildings which are judged to be in fairly good structural condition may no longer meet the functional requirements of the uses they house, or may not have a high reuse potential for other uses. Buildings deemed to be obsolete couldn't practically be reused because of inadequate mechanical systems, inflexible structural systems, building configuration, or cost factors.

Most buildings on campus are considered to be functional for the uses they currently house. Marginal buildings mostly include older research buildings whose structural systems and configurations cannot readily be updated to accommodate current research layout and mechanical systems requirements. The larger structures deemed to be obsolete are Building 14/28 (the Animal Facility), and service buildings 12/22. A summary of building functional suitability is graphically presented in Figure 4.3.9.

4.3.10 Campus Entries

The quality and character of entries onto the Bethesda campus create an important arrival image for employees as well as visitors. Campus entries also act as key orientation points for the organization of the entire campus. Most campus entries are not well defined by signage, landscaping, or other special features, except gates and guardhouses. There are five major vehicular points into the site, and two secondary entrance roadways. In addition to these multi-use campus entry points, there are several specific bicycle/pedestrian entry locations that should be accommodated in future planning. Following are descriptions of the qualities of the predominant entries, both for vehicular and bike/pedestrian traffic, as shown in Figure 4.3.10.

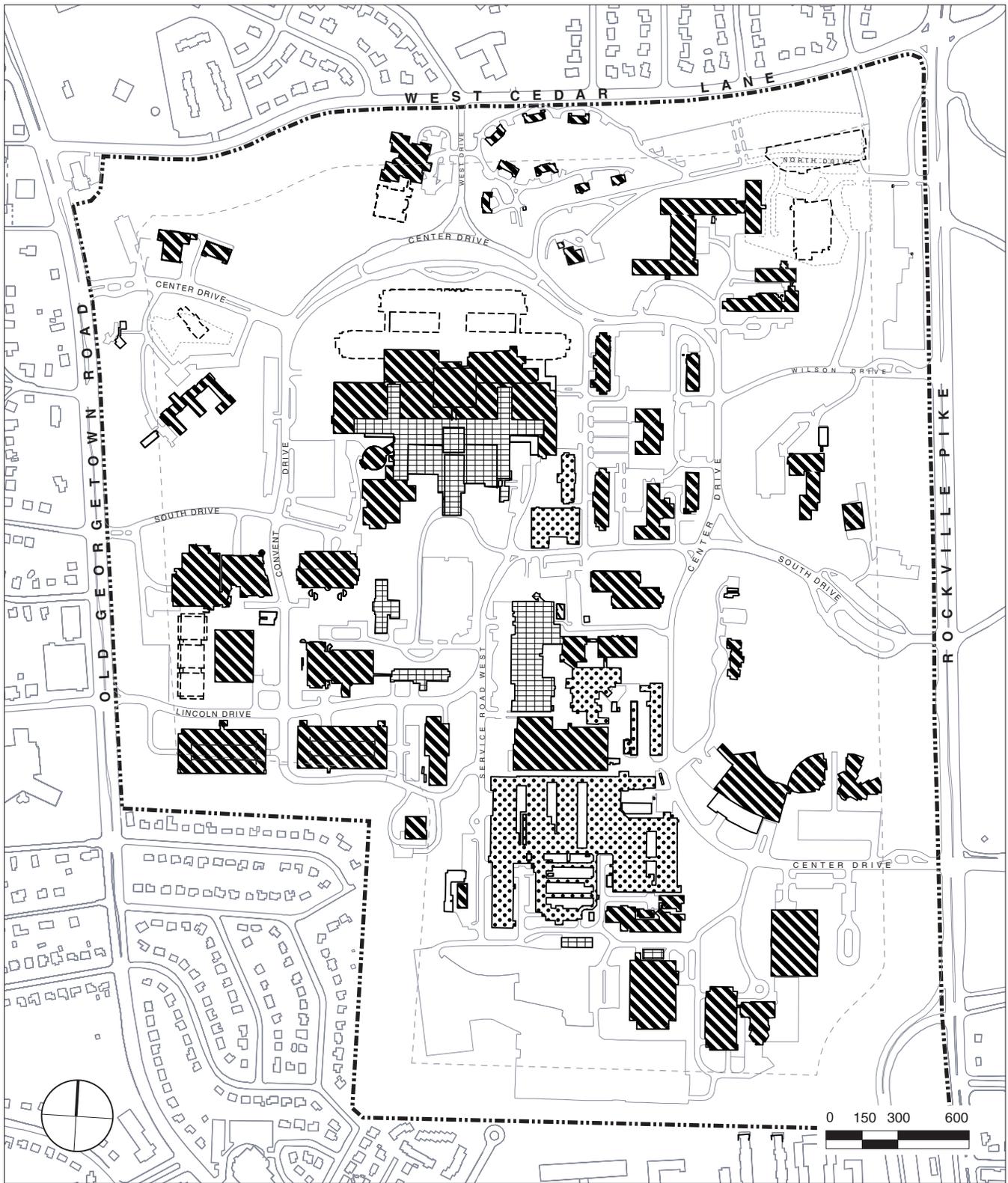


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-  EXCELLENT
-  GOOD
-  FAIR
-  POOR

Figure 4.3.8

Existing
Building Conditions

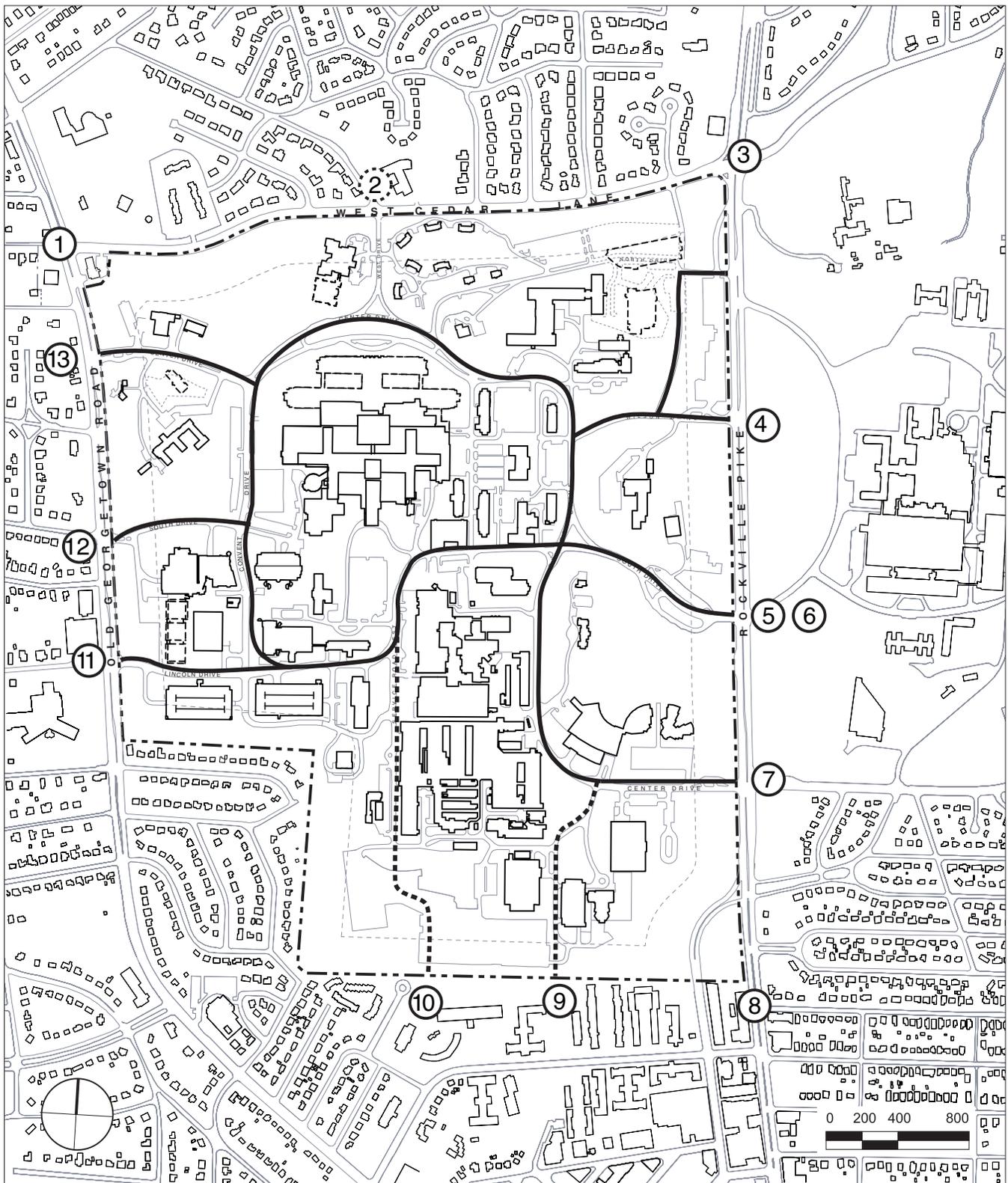


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-  FUNCTIONAL
-  MARGINAL
-  OBSOLETE

Figure 4.3.9

Existing Building Functional Suitability



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NOTE: SEE SECTION 4.3.10 FOR NUMBER LEGEND

Figure 4.3.10

Major Campus Entries

Vehicular Access Roadways

2. *West Drive at West Cedar Lane*

This entrance is currently closed to vehicular traffic and used for emergency evacuation only due to post-9/11 security improvements. This entrance will be converted into an entrance that would allow exclusive access for Clinical Center patients and patient visitors.

4. *Wilson Drive at Rockville Pike*

There is a positive entry experience through woods with views of the naturalistic setting of the NIH Stream. Entry experience terminates positively with a direct view into the formal quad at the central administration Building 1. Wilson Drive is currently used as an employee-only entrance and is open between 5:00–9:00 PM each weekday. Wilson Drive is closed during the weekends from Friday at 9:00 PM to Monday at 5:00 AM.

5. *South Drive at Rockville Pike*

This entry is highly landscaped and projects a positive gateway image at the bus terminal/Metro station entry. Due to special landscaping and visibility from Rockville Pike, this entry has the visual effect of being the main entry onto campus. However, the arrival sequence ends ambiguously at the memorial anchor/traffic island. South Drive is used by employees and visitors to enter onto the campus and is open 24 hours a day, 7 days a week.

7. *Center Drive (Jones Bridge Road) at Rockville Pike*

This primary campus entry has no special character or designation, other than signage. The entry drive passes by front entries and service areas for Building 45 (Natcher) and Building 38 (National Library of Medicine). The arrival sequence is negatively terminated by views into the Building 14/28 complex (Animal Facility). There will be bicycle access from the future east portion of the Capital Crescent Trail. Crossing of Rockville Pike is difficult due to high traffic volumes. Center Drive at Rockville Pike is an employee-only entrance onto campus and is closed between the hours of 7:00 PM and 6:00 AM. Center Drive at Rockville Pike is closed during the weekends from Friday at 7:00 PM to Monday at 6:00 AM.

11. *Lincoln Drive at Old Georgetown Road*

The lawn area in front of lab Building 36 creates a positive, “corporate campus” image. East of Convent Drive, the character of the entry drive becomes service oriented, and the entry sequence terminates with a negative view of the loading docks of Support/Services Building 13. Lincoln Drive is an employee-only entrance onto campus and is open between 6:00 AM–7:00 PM, with exiting traffic only between 10:00 AM and 7:00 PM. Lincoln Drive is closed during the weekends from Friday at 7:00 PM to Monday at 6:00 AM.

12. *South Drive (Greentree Road) at Old Georgetown Road*

This road is wooded with steeply sloping sides. It terminates with views toward central green space (positive) and service area of lab Building 49 (negative). Direct bicycle/pedestrian access is provided from neighborhoods to the west of NIH to South Drive. South Drive is an employee-only entrance onto campus and is closed between the hours of 9:00 PM and 5:00 AM. South Drive is closed during the weekends from Friday at 9:00 PM to Monday at 5:00 AM.

13. *Center Drive at Old Georgetown Road*

This is one of the most formalized entries to the campus with signage and a landscaped median. There is a positive entry view across the lawn toward Building 60, terminating with the view of Building 10/future CRC addition. Center Drive at Old Georgetown Road may be used by employees, visitors, and commercial vehicles to enter onto the campus and is open Monday to Friday from 5:00AM to 9:00PM, with entering traffic only between 5:00 AM to 2:00 PM.

Bicycle and Pedestrian Access Points

Employees by foot can enter all vehicular entry points in addition to all pedestrian and bicycle entrances. As of July 2004 only the two visitor entrances will remain accessible for public bicycle and pedestrian access.

1. Old Georgetown Road at Cedar Lane

Attractive wooded setting. Pedestrian path angles toward center of campus. Bicycle access from the Tenleytown Trolley Trail.

3. Rockville Pike at Cedar Lane

Attractive wooded stream setting. Bicycle access from Rock Creek Park.

6. South Drive - Metro Station

Highly landscaped transit plaza provides connections from the Medical Center Metrorail Station/Metrobus terminal to the central campus area.

8. Woodmont Avenue at south campus boundary

Access to retail areas of the Bethesda Central Business District. Path crosses a gracious lawn in front of the National Library of Medicine.

9. South Boundary at the Spring House building

This access point is reportedly the major bicycle/pedestrian connection between the campus and the Bethesda CBD. The fence opening and pathway to campus both are inadequate.

10. North Brook Lane at the south campus boundary

Access to the park-like lawn area at the southwest corner of the campus.

4.4 Circulation

4.4.1 Vehicular Circulation

Figure 4.4.1 shows current vehicular traffic patterns at the NIH Bethesda campus. Vehicular access is currently served by 7 entrances; 3 on the west, none on the north, and 4 on the east sides of the campus. There is no vehicular access from the south side of the campus and the driveway (Garden Lane) on the north side of campus only provides access to Lots 31B and 31C. Of the total vehicle trips entering the campus during the AM peak hour in January 2002, 53% occur on Rockville Pike, 38% on Old Georgetown Road, and 9% on West Cedar Lane. In January 2004, due to alterations in driveway operations these percentages had changed to 56% on Rockville Pike, 44% on Old Georgetown Road, and 0% on West Cedar Lane. Peak hour traffic flows for NIH occur from 7:45 to 8:45 a.m., and from 5:00 to 6:00 p.m.

There are seven vehicular entrances to the campus: Center Drive, South Drive and Lincoln Drive on the west side, with Center Drive, South Drive, North Drive, and Wilson Drive on the east side, and Garden Lane on the north side. Garden Lane currently services only the remaining surface parking lot near Building 31 and will be closed to vehicular access with the completion of Building 33 and MLP 10. The primary internal vehicular path is Center Drive, running from the northwest corner to the southeast corner of the site. The secondary vehicular paths are Lincoln Drive on the west and South Drive on the east, with a connection through the center of the campus; Wilson Drive on the east; and Convent Drive on the west. This internal circulation system creates an unbalanced loop-road within the campus which is inconvenient to use for internal campus circulation and can be confusing to people who are not familiar with the physical campus layout. As a result, campus traffic likely uses Rockville Pike, Old Georgetown Road, and West Cedar Lane as an informal "loop" road to circulate to the side of the campus where a destination is located, before entering onto campus.

There are numerous tertiary and service roads creating a web throughout the campus, allowing vehicular access to most areas of the site. Most roadways are curvilinear, lending to the informal character of the site. However, since roadways and building patterns are not closely related, roadways do not create a coherent system of building sites.

Traffic control on campus is currently implemented by a series of warning signs, stop signs, and police direction at major intersections during peak periods only. There are no signalized intersections on campus. However, a traffic signal is planned at the intersection of Center Drive and South Drive to help facilitate significant pedestrian crossing activity at this intersection.

4.4.2 Parking Resources/Distribution

The NIH campus has numerous surface parking lots, five multi-level parking structures and limited on-street parking to serve the needs of approximately 18,000 employees, 3,500 visitors, and 280 visits a day from the more than 7,500 off-campus employees. Due to displacement and relocation of parking to accommodate construction, exact parking counts vary continuously. Parking surveys were conducted in May 2002 and have been updated to reflect existing construction projects that have taken place or are currently taking place. The following parking space breakdown reflects the existing 2003 parking supply:

2003		
<i>On-street</i>	<i>87 spaces</i>	<i>(1 %)</i>
<i>Surface Lot</i>	<i>4,801 spaces</i>	<i>(51 %)</i>
<i>Multi-Level</i>	<i>4,468 spaces</i>	<i>(48%)</i>
Total	9,356 spaces	

Approximately half of the NIH campus parking supply is comprised of surface lots. Several of these lots are partially or entirely located in the perimeter buffer zone of the campus.

The supply of parking is designated for use by different categories of parkers. The most recent parking allocation data is shown below:

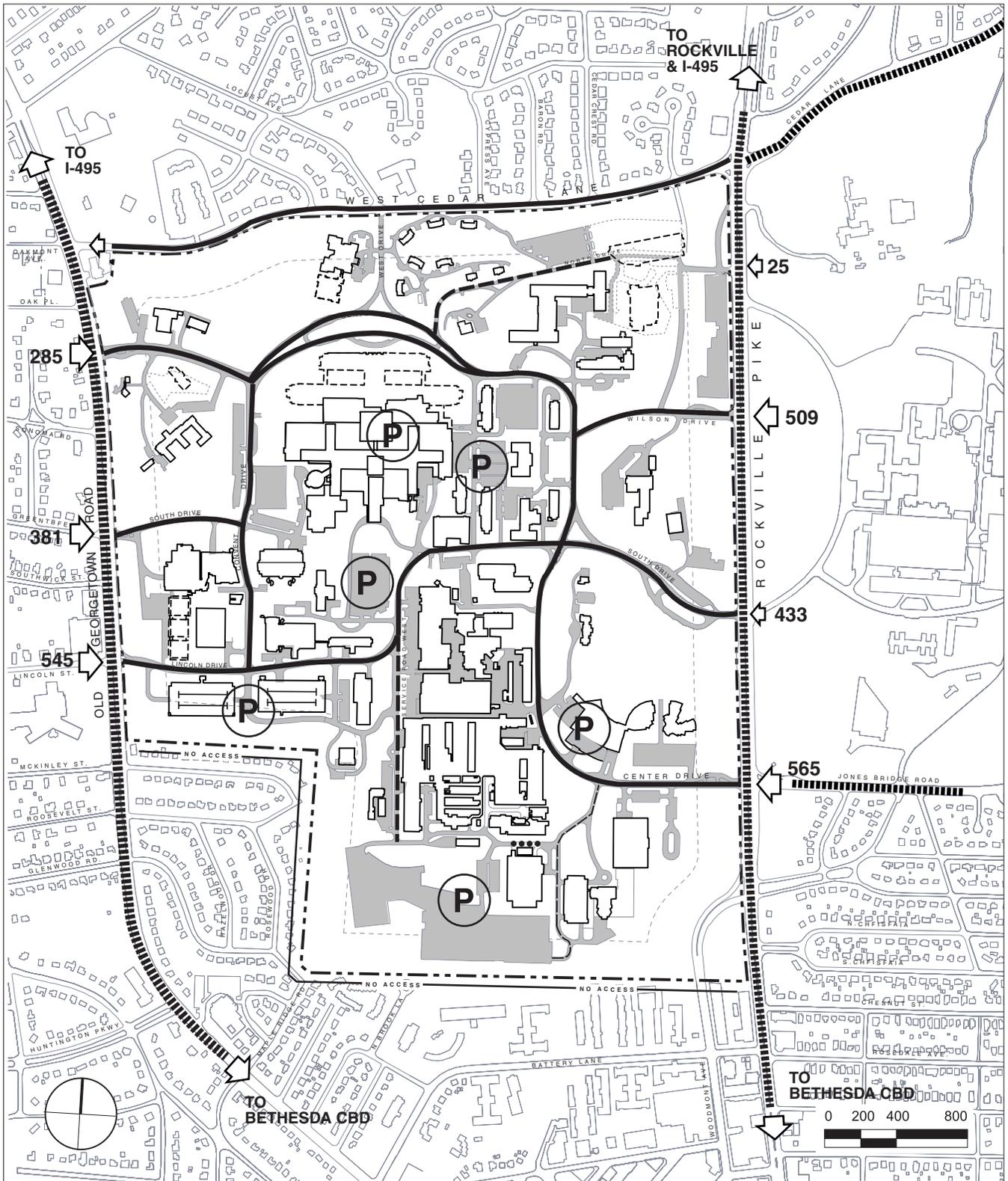
2003

Employee	8,149 spaces	87%
Motorcycle	43 spaces	0.50%
Residential	45 spaces	0.50%
Motor Pool	170 spaces	2%
Visitor	711 spaces	7%
Other	100 spaces	1%
Loading	138 spaces	2%
Total	9,356 spaces	100%

Community concern about parking generally focuses on whether there is consistently an adequate parking supply of employee parking located on the NIH Bethesda campus, especially with almost continual on-campus construction. The concern is that if there is not an adequate amount of on-campus employee parking, then employees could try to park in neighborhoods located adjacent to the NIH campus. Some neighborhoods adjacent to the campus are protected from long-term parking encroachment with a residential parking restriction program enforced by Montgomery County.

NIH employees park on-campus with a valid parking permit. The current ratio of employee-designated spaces per employee is significantly lower than at the time of the writing of the last NIH Master Plan in 1995. Based on the existing parking supply identified above, the ratio of employee-designated, spaces per employee, is currently 0.465, compared to a ratio of 0.54 in 1995. Thus, NIH has succeeded in its goal to maintain the employee-to-parking ratio at the same 1995 level or lower. In addition, the parking ratio is currently lower than the 0.50 ratio established by the National Capital Planning Commission, and it is anticipated that the NIH campus will continue to strive to maintain the employee-parking ratio to a level at below the 0.50 parking ration in the future through the implementation of a vigorous Transportation Management Program.

Parking areas are distributed throughout the site, with the largest parking areas located at the perimeter of the campus. The major concentrations of parking are: at the Clinical Center Complex; the northeast corner of the site near general office Building 31 (surface parking to be removed with the completion of MLP 10); the southwest corner of the site at parking structures MLP 6 and MLP 8; and the south side of the site at surface Lot 41, parking structure MLP 7A and the William H. Natcher Building 45. Figure 4.4.2 shows the relationship of parking distribution to major employee population centers on campus. In general, parking is distributed proportionately to population around the campus, with a higher proportion of parking per employee distribution in the northern and southern part of campus. In addition, 623 parking spaces are currently provided at five off-site satellite locations. Parking numbers and exact locations on campus are fluid due to the constant displacement of parking by numerous ongoing construction projects.



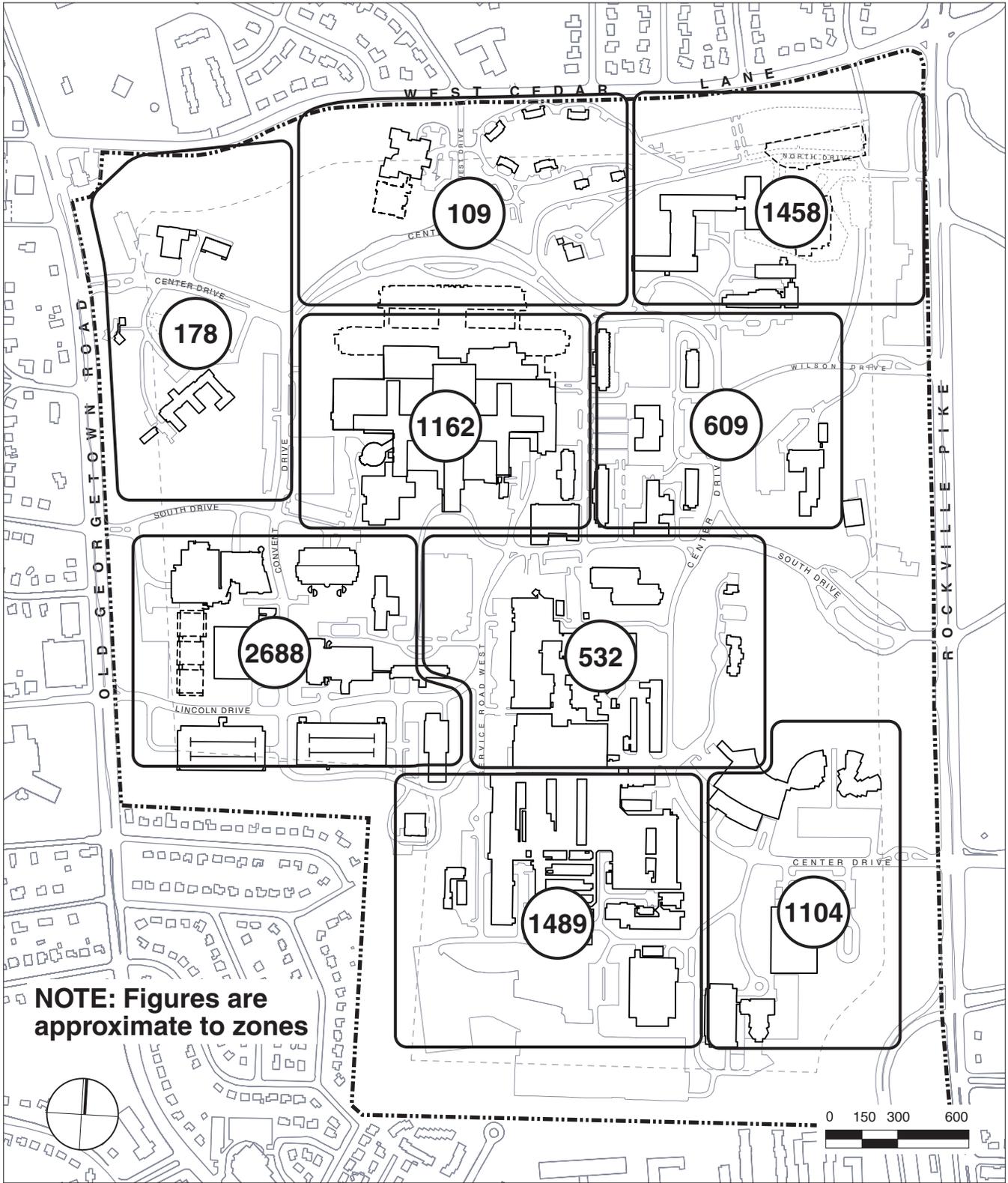
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- ▬ MAJOR ARTERIAL
- ▬ PRIMARY CIRCULATION
- ▬ SECONDARY CIRCULATION
- ▬ TERTIARY CIRCULATION
- BLOCKED CIRCULATION

- 232↗ SITE ACCESS/A.M. PEAK
- (P) PARKING RECEPTORS

Figure 4.4.1

**Existing
Vehicular Circulation**



4.4.3 Access for Persons with Disabilities

Existing buildings on the NIH campus are required to meet the criteria of the Uniform Federal Accessibility Standards (UFAS). As a federal entity, NIH does not fall under the jurisdiction of the Americans with Disabilities Act (ADA). However, the National Institutes of Health has adopted the Americans with Disabilities Act Accessibility Guidelines (ADAAG) as its standard for accessibility planning for new construction. NIH completed a building accessibility survey in 1991 and approved a Management Plan in 1992, which establishes priorities along with a 5-year capital plan for building improvements.

4.4.4 Transit Systems

The NIH Bethesda Campus is served by a variety of public and private transit services. Direct Metrorail service to the campus is provided via the Red Line at the Medical Center station located at Rockville Pike and South Drive. Both Metrobus and Montgomery County Ride-On buses operate along the perimeter of the campus and connect with Metrorail at the Metro station entry. There are also numerous on-campus shuttle routes, which circulate through the campus or connect to satellite office and parking locations. Campus shuttles that travel on the "NIH Campus Route" run on approximately 10-minute headways, while shuttles that are used on the other NIH routes have different headways, which vary by route. See Figure 4.4.4 for a diagram of existing transit systems.

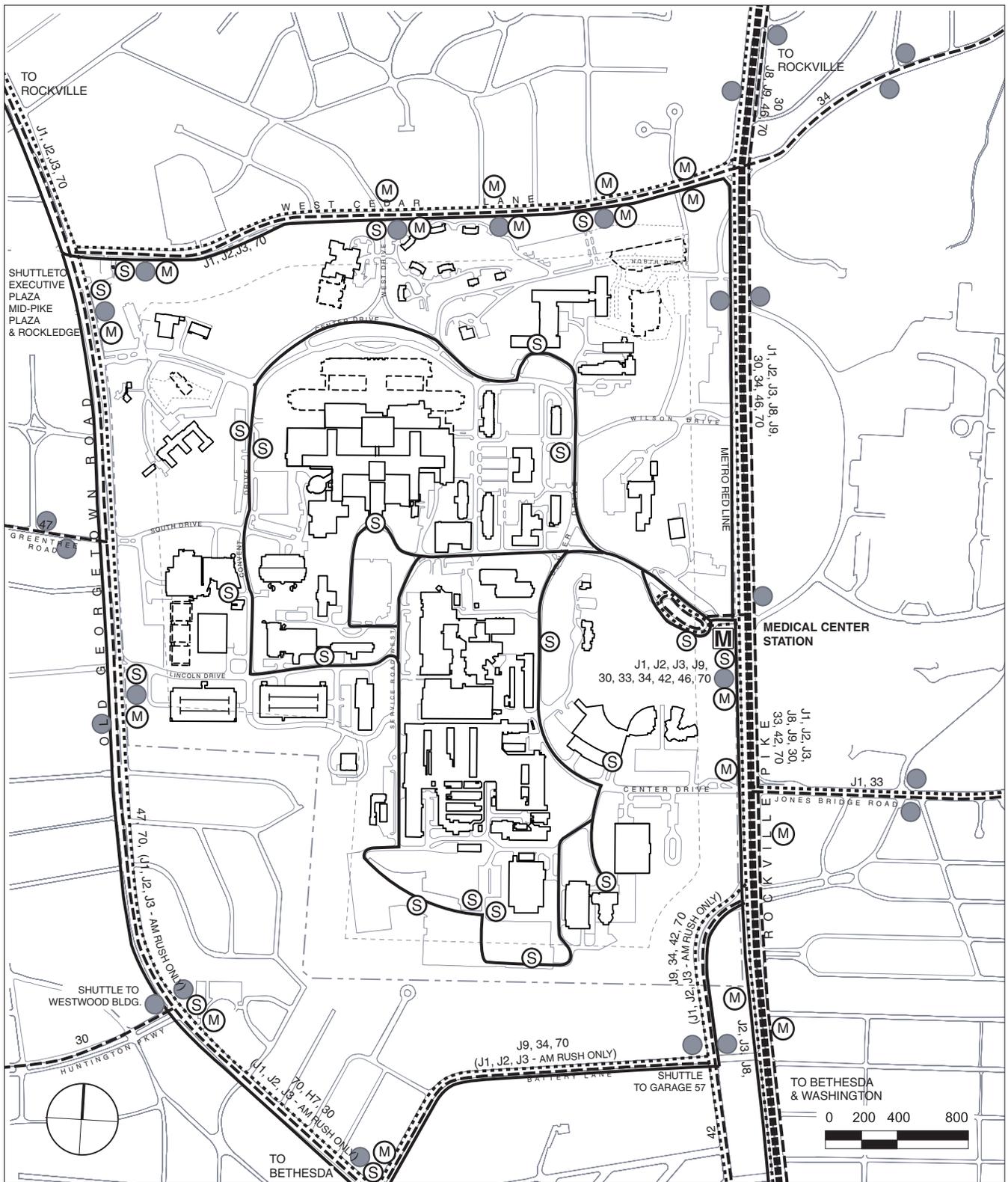
The large proportion of NIH employees using public transit is primarily due to the fact that NIH has actively worked with Montgomery County and WMATA officials to add several Ride-On and Metro bus routes to provide better access to campus, since the last master plan. There are currently seven Metrobus routes and seven Ride-On bus routes with stops at the NIH Campus. In addition, there are several express bus lines, which run during the morning and evening rush periods which provide service from areas that do not have as direct Metrobus or Metrorail links to the NIH campus. With the Metro station entrance on the east side of campus at Rockville Pike, however, the major transit node on the NIH campus is still somewhat remote from many major facilities at NIH. Also, the northern half of the site is better served by public transit than the southern half because of additional bus routes and a more continuous street system.

4.4.5 Pedestrian/Bicycle Systems

Pedestrian paths parallel most roadways on campus and make connections between buildings. See Figure 4.4.5. Almost all pathways have been upgraded to be a minimum of five feet wide and are paved with concrete, macadam, or in some cases special pavers.

Major pedestrian movements occur between pedestrian generators such as transit nodes, parking areas, and significant buildings. On the NIH Bethesda Campus, major pedestrian movements occur: from the Metro station north to administrative Buildings 1 and 31, west to the campus core and the Clinical Center (Building 10), and south to Building 38A; from general office Building 31 to the central administration Building 1 and the Clinical Center Building 10; from the campus core south to Building 38A along Center Drive, and to parking Lot 41; from the Clinical Center Building 10 to parking Lot 10K; from the campus core and Clinical Center Building 10 along Center Drive and Wilson Drive to parking Lot 31 (area currently under construction with research Building 33 and MLP 10); and from parking structures MLP 6 and MLP 8 to research Buildings 36, 37, 49, and the Clinical Center.

From north to south, the campus is approximately a 15- to 20-minute walk (nearly two-thirds of a mile), and most major facilities are within a 5- to 10-minute walk (one-quarter to one-half mile) of the Metro station. Primary campus pedestrian and bicycle access points currently include Old Georgetown Road at Cedar Lane; Rockville Pike at Cedar Lane; Jones Bridge Road at Rockville Pike; along the south campus boundary at

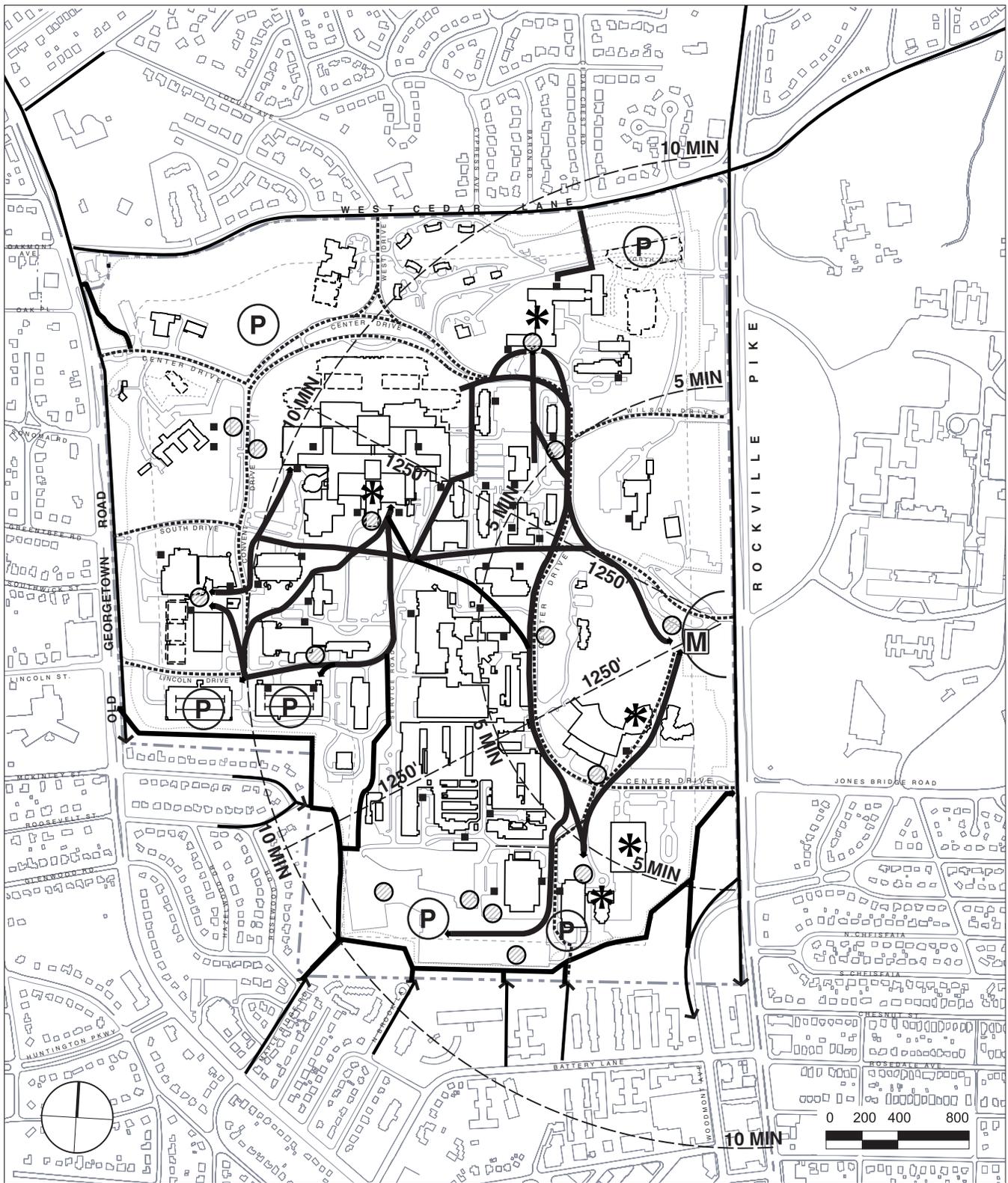


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- METRO RAIL
- NIH SHUTTLES
- RIDE ON BUS ROUTE
(30, 33, 34, 35, 42, 46, 70)
- METROBUS ROUTE
(J1, J2, J3, J8, J9)
- RIDE ON STOP
- METROBUS STOP
- NIH SHUTTLE STOP

Figure 4.4.4

**Existing
Transit Systems**



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- M METRO
- P VEHICULAR PARKING
- NIH PEDESTRIAN PATHS
- PUBLIC PEDESTRIAN PATHS
- CAMPUS BIKE ROUTES
- FENCELINE

- SHUTTLE/BUS STOPS
- * PEDESTRIAN GENERATORS
- BICYCLE PARKING

Figure 4.4.5

**Existing Pedestrian
& Bike Paths**

Woodmont Avenue, the Spring House building, N. Brook Lane, Maple Ridge Road, and Roosevelt Street; and Greentree Road at Old Georgetown Road (pedestrian and bicycle access will change for visitors in July 2004). There are few clear paths traversing the entire campus north-to-south or east-to-west, with the exception of the east-west path along the south fence. Inadequate lighting and signage also hinder nighttime pedestrian movement, although plans are currently underway to improve lighting in several key areas.

Bicycle circulation occurs on existing roadways and sidewalks on the campus. There is an NIH Bikeway System Master Plan; however, there is no signage on campus indicating areas as specifically designated or prohibited for bicycle use. There are three sections of roadway on campus, which have striped, 3-foot wide bike lanes, but they do not form a continuous path. Bicycle parking is dispersed throughout the campus.

There is an existing County bike path along the east side of the campus, which parallels Rockville Pike. Additionally, the M-NCPPC *Master Plan of Bikeways* proposes continuous bicycle paths on the NIH site along West Cedar Lane, Old Georgetown Road, and across the southern end of the campus, with connections to surrounding areas at key locations. All of the above mentioned paths are designated in the bike plan as Class I, 8-foot wide, paved bikeways.

4.4.6 Roadway Sections

Most roadways on campus are 22 to 35 feet wide with one travel lane in each direction. Notable exceptions are: Center Drive which varies from a 60-foot wide boulevard at its northwest entry to the site, to a 40-foot wide - 4 lane cartway at its southeast entry, and; the eastern segment of South Drive which has a 40-foot wide, 4-lane section flanked by well landscaped bus staging and parking areas.

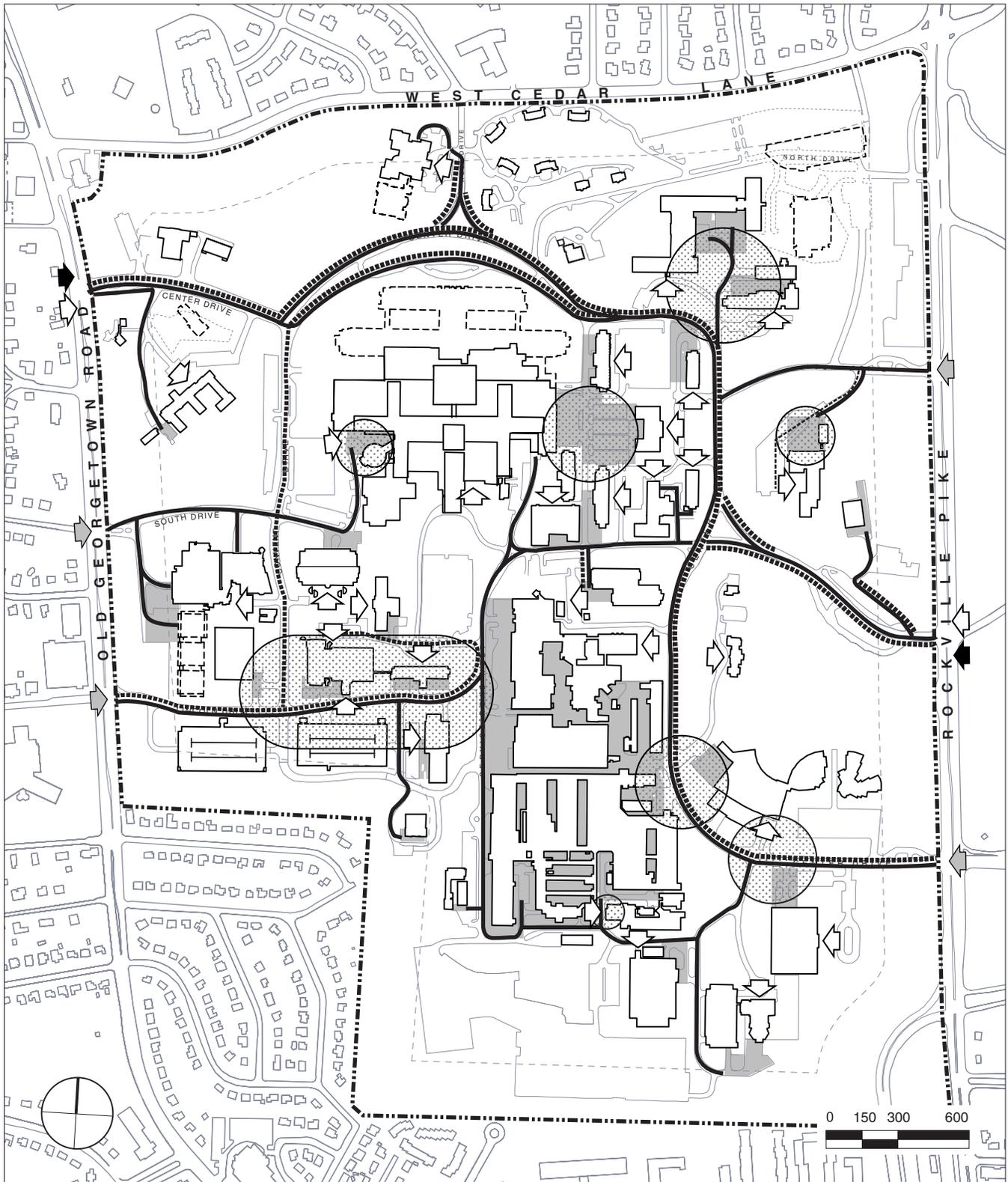
Toward the center of the campus roadways are generally bounded by sidewalks and formalized planting, whereas, at the periphery, roadways run through more natural landscape. Major buildings are generally set back from roadways 150-200 feet with 250 feet at the perimeter of campus, and, where buildings are closer than ± 60 feet to roadways, there is a loss of the "campus" impression of the site as a sense of spaciousness and foreground landscape is precluded (e.g. Lincoln Drive at Buildings 29A & B, and Center Drive at Building 22).

4.4.7 Public Entries and Service Areas

The majority of primary public entries or "front doors" to buildings on campus face directly onto or can be accessed from Center Drive. This pattern is clear for prominent campus buildings such as Buildings 38 and 38A (the National Library of Medicine and the Lister Hill National Center), Building 45 (the William H. Natcher Building), central administration Building 1, the Building 31 office complex, Building 50, and Building 10 (the Clinical Center Complex). Buildings on the west side of campus have public access from Convent Drive or off of Service Road West, including Building 35, the Neuroscience Research Center (NRC) which will open off Lincoln Drive. Many of the major building entries have unclear relationships to adjacent streets or other buildings.

Service areas are interspersed among buildings throughout the campus. The largest concentration of service areas occurs in the south-central area of the campus near Buildings 13 and 14, the north-central area of campus between the Clinical Center Complex and Building 1, and the southwest area of campus along Service Roads West and South, and the central portion of South Drive.

Since there is little separation between service and public routes on the NIH campus, there are inevitable traffic and visual conflicts. Along Center Drive, which is the primary public



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NIH / ORF / DFP

-  PUBLIC ACCESS
-  SERVICE ZONE
-  PUBLIC ENTRY
-  EMPLOYEE ONLY ENTRY
-  SERVICE ENTRY
-  SERVICE ACCESS
-  CONFLICT AREAS

Oudens & Knoop, Architects, P.C.

Figure 4.4.7

**Existing
Public Entries &
Service Areas**

SmithGroup

drive on campus, visitors and employees co-mingle with service vehicles and have views directly into service areas. Likewise on Lincoln Drive, those accessing parking at the multi-level parking structures, or continuing to the campus core, must pass numerous service areas. Access to research Buildings 29A, 29B, and 30 passes by the truck docks of support services Building 13. West of Building 1 there are conflicts where public entries to buildings (Building 7) and service areas are mixed together. See Figure 4.4.7.

4.5 Site Amenities

4.5.1 Natural Amenities

Much of the NIH campus was part of an estate setting prior to development and the southern third of the site was a golf course at one time. In the process of development, much of the natural rolling topography of the site has been retained. This topography contributes to the variety of excellent views and vistas of the campus and its structures.

There are about 28 acres of medium-density woodlands on campus, primarily located in the northwest corner of the site, and along the course of the NIH Stream. These natural woodlands, in conjunction with the large extent of open space and landscaping, help contribute to and establish the “campus” character of NIH. Stream areas on site offer a naturalistic and quiet respite from the development of surrounding areas.

4.5.2 Architectural Character

The NIH campus is comprised of over 75 buildings of different ages, architectural styles, and conditions. There are, however, certain groupings of buildings that give distinct character to specific areas of the campus. See Figure 4.5.2.

Brick-Traditional

These buildings are of neo-Georgian or other traditional style, usually of red brick with white trim. This character defines the original campus core (Buildings 1-6), the residential units in the northern part of the campus, and Building 60. Building 15K and its adjacent estate are also traditional brick structures designed in a revival style.

Brick - Modern

The central area of the campus is dominated by red brick buildings with white cast-stone trim, which relate to the original campus core, but are designed in a modernist vocabulary. This category includes older buildings such as Building 10, and newer structures such as research Building 49, and Building 50 and or renovated structures such as the Building 11 (Power Plant).

Brick - Utilitarian

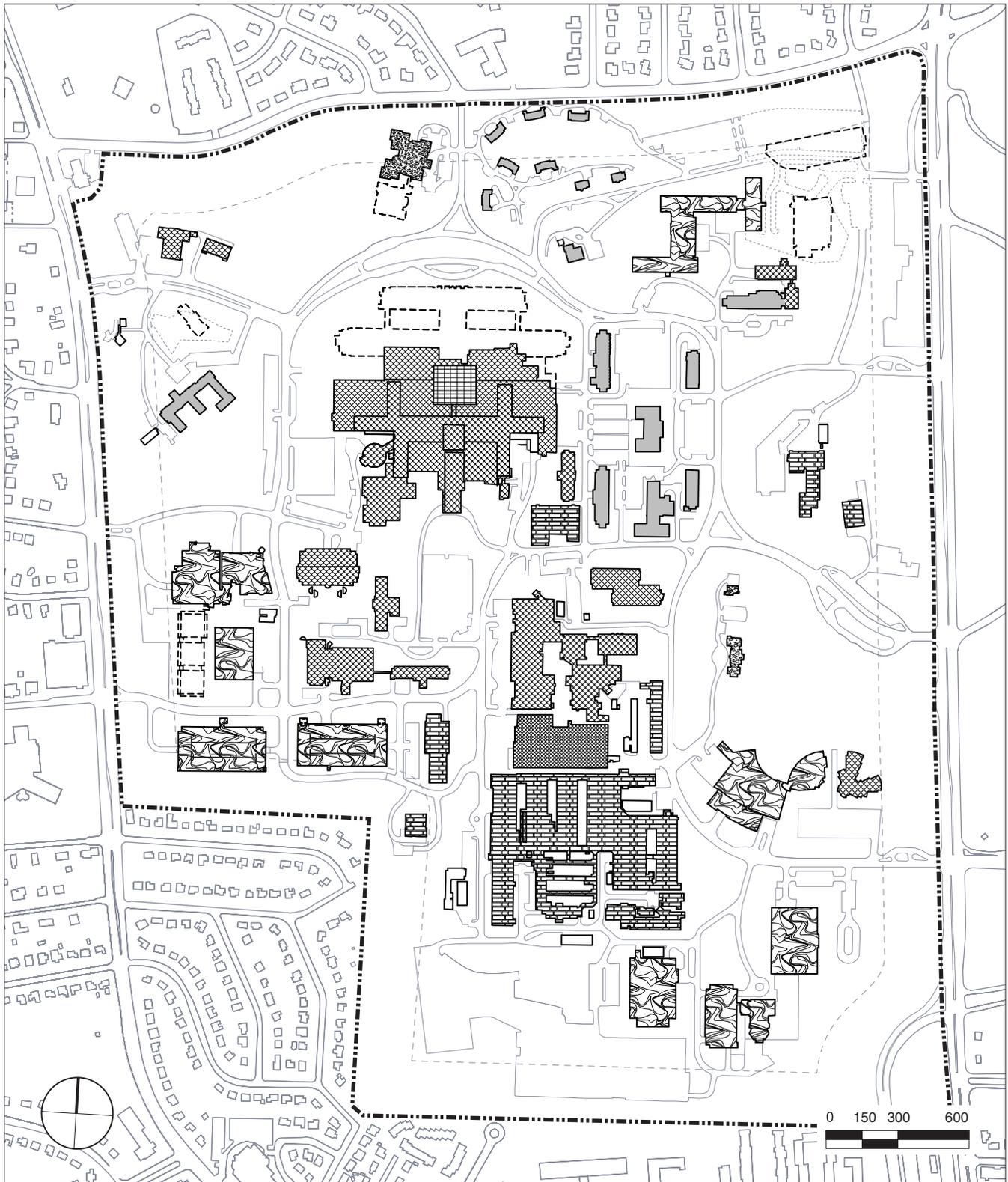
This category the Building 14/28 complex (Animal Facility). These structures are generally of red brick and are utilitarian in their design.

Stone-Residential

The Building 16 (Stone House) and Building 62 (Children's Inn) are the only examples of this character on campus. Materials are primarily wood and rusticated fieldstone, with a residential scale.

Stone/Concrete - Modern

Buildings at the periphery of the campus tend to be light in color and of modern design (Buildings 31A-C, 35 through 37, 38, 38A, 40, and 45). Materials include stone veneers, cast stone, structural concrete, and precast concrete, often in conjunction with large expanses of glass.



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- BRICK - TRADITIONAL
- BRICK - MODERN
- BRICK - UTILITARIAN
- STONE - RESIDENTIAL
- STONE/CONCRETE - MODERN
- GLASS - MODERN

Figure 4.5.2

**Existing
Architectural Character**

Glass - Modern

The ACRF (Ambulatory Care Research Facility - Building 10B) and the Building 10A-wing addition are the examples of this all glass curtainwall architectural character.

Specific buildings which are distinctive or architecturally significant include: the original campus quad - Buildings 1, 2, and 3; Building 60; Building 16; the original section of Building 10; Building 15K; and Buildings 38 and 38A (National Library of Medicine/Lister Hill complex).

4.5.3 Signage

The current campus exterior signage system was developed in 1976 as a hierarchical system with several categories of sign types as follows: A—major entry; B—limited access entry; C—general vehicular directional; D—specific directional; E—building identification; F—regulatory; G—directory. Signs are color-coded to correspond to specific areas of the campus.

In general, signs on the Bethesda campus are poorly located and in bad condition. Many of the original campus signs are faded, deteriorating, or out-of-date as a result of recent construction and other physical changes on campus. Moreover, campus signage tends to be oriented to vehicular traffic rather than to pedestrian movement. Traffic control signs are typical street and highway signs that follow the guidelines contained in the Federal Highway Administration's Manual on Uniform Traffic Control Devices for Streets and Highways. In addition, there are a limited number of current campus directories on-site.

The absence of a comprehensive signage system that promotes the desired image of the Bethesda campus is a concern. Signs at major entrances to the campus fail to convey a sense of arrival. Furthermore, because of the array of architectural styles on campus, which range from historic Georgian Revival buildings to modern office structures, a coordinated signage system is a challenge.

To address these issues NIH is considering a comprehensive wayfinding and signage study that will make it easier for those who live on, work within, or visit the Bethesda campus to access and move around the site. The NIH Streetscape Study will identify those signs that add to visual clutter, and therefore should be removed, and provide new signage guidelines that will result in enhanced design standards and recommended locations for future campus signs. The signage program will ensure that signage is easily maintainable and will remain consistent as the various phases of the master plan are implemented.

4.5.4 Site Furnishings

Site furnishings include items such as lighting, seating, waste receptacles, paving, and other freestanding objects. In general, there is not a coordinated site furnishings plan for the Bethesda campus.

Lighting types vary throughout campus. Standard "cobra" type street lamps generally light roadways, while pathway and building fixture types vary across campus with each architectural project.

Seating areas on campus range from built-in stone ledges to wooden and metal benches. Heavy, public park type steel picnic benches are scattered throughout the campus, sometimes without an obvious rationale.

Waste receptacles vary throughout campus, with an emphasis on the utilitarian. Freestanding bus stops are of standard metal frame and glass construction. There are no outdoor information kiosks or other organizational elements. Flagpoles at key locations

on campus tend to act as significant markers. Artwork and monuments on campus are limited to the memorial anchor at the intersection of South Drive and Center Drive, a small memorial behind the Children's Inn (Building 62), the sculpture in front of the Lister Hill National Center (Building 38A), and the artwork in the "Pool of Bethesda" within the ACRF.

Most walkways on campus are concrete and most roadways are paved with asphalt. There are few areas of special paving on campus.

4.5.5 Recreation Areas

Recreation areas on campus are both indoor and outdoor. Indoor recreation includes the fitness center in Building 31, an exercise facility in Building 10, and an aerobics/dance facility in temporary Building T-39 on the south side of campus. See Figure 4.5.6 for recreation area locations.

Outdoor recreation areas can be classified as active, passive, or ceremonial. Active recreation areas include playgrounds, tennis courts, exercise areas, and places where people play informal games such as Frisbee or ball. Passive recreation areas are places where people go to sit and relax, read, or eat lunch. Passive areas are generally more secluded, and tend to have natural landscape or garden qualities. Ceremonial areas tend to have a more formal character, with the quad in front of Building 1 serving this function on special occasions.

4.5.6 Employee/User Services

Employee and campus visitor services are dispersed throughout the site and include:

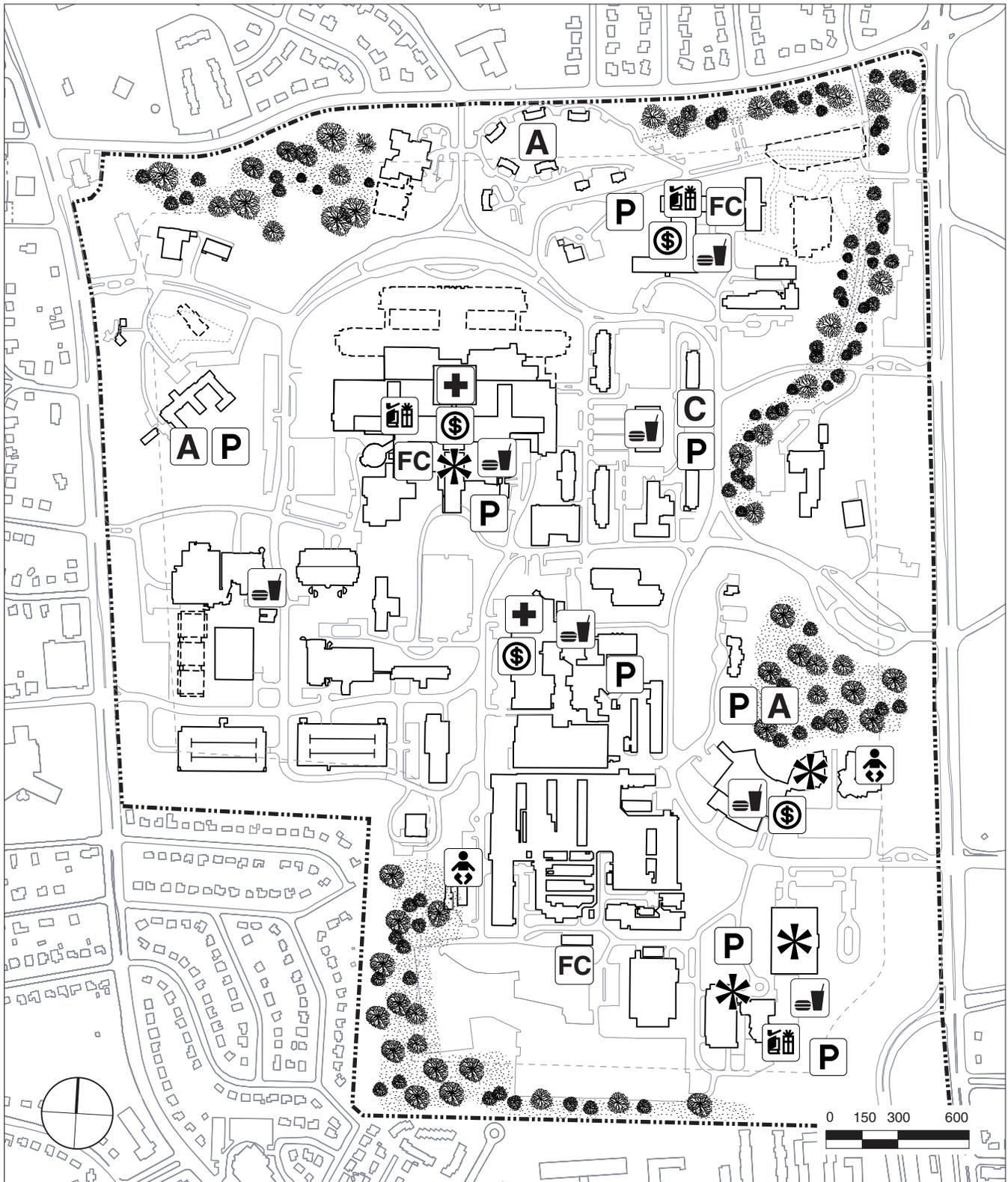
- Financial Services in Buildings 10, 13, 32 and 45.
- Health clinics in Buildings 10 and 13.
- Convenience retail in Buildings 10, 31, and 38A.
- Concession stands, dining centers and coffee bars in Buildings 1, 10, 12B, 31, 38A, 40 and 45.
- Fitness centers in Buildings 10, 31, and T-39.

Other services include personal services associated with the hospital function of the Clinical Center. There is also an automated postal facility located in Building 10. See Figure 4.5.6 for locations of campus services and amenities.

Many employee services are provided by businesses in the Central Business District (CBD) of Bethesda. Although walking distances between campus and the CBD are lengthy, bicycle access is reasonable and public transportation is available to transport employees to the area.

Although some services are available on campus, a desire has been expressed in campus interviews for a greater variety and higher quality of services, especially for those who are patients at the Clinical Research Center or users of other facilities. Employee/user services are not given a high priority on campus, and are often located in areas that are difficult to find. NIH is conducting a study of employee amenities and developing guidelines for future facilities. There is no central services/activity center on campus analogous to a university center, and NIH is currently conducting a study of amenities for employees both on the campus and in locally leased properties to identify potential areas of improvements and developing guidelines for future facilities.

Refer to Chapter 3 for more information on Bethesda campus and community context.



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- | | | | |
|--|-------------------------|--|----------------------------|
| | CREDIT UNION / ATM | | CONVENIENCE RETAIL |
| | CLINIC | | CHILD CARE |
| | RECREATION (ACTIVE) | | OPEN SPACE AMENITY |
| | RECREATION (PASSIVE) | | DINING CENTER / COFFEE BAR |
| | RECREATION (CEREMONIAL) | | SPECIAL FUNCTION |
| | FITNESS CENTER | | |

Figure 4.5.6

**Existing
Campus Amenities**

4.6 Historical and Archeological Features

4.6.1 Historic Properties

NIH acknowledges its responsibilities under Section 110 of the National Historic Preservation Act to identify and evaluate buildings that are over 50 years of age. NIH has been working and will continue to work in conjunction with the Maryland Historical Trust (MHT—the Maryland State Historic Preservation Office) to determine which resources on the NIH campus are eligible for listing in the National Register of Historic Places as either individual resources or as contributing elements to a larger historic district.

In 1997, NIH sponsored a cultural resource study of all buildings located on the campus that are over 50 years of age or that exhibited the likelihood of possessing exceptional historic and/or architectural significance regardless of age.

To date, NIH and MHT have reached a consensus determination that the following buildings are eligible for listing in the National Register of Historic Places:

Buildings 1, 2, 3, 4, 5, and 6—The Administrative Complex, or Historic Core

Collectively, Buildings 1, 2, 3, 4, 5, and 6 have been determined eligible for listing in the National Register of Historic Places

Buildings 1, 2, and 3

Completed in 1938, Buildings 1, 2, and 3 are the earliest buildings to be Congressionally authorized and constructed at NIH's Bethesda campus. (Buildings predating NIH's establishment on the site include Building 15K, "Tree Tops"; and Buildings 16 and 16A, the George Freeland Peter Estate; and Building 60, the Convent of the Visitation/Mary Woodard Lasker Center.) Collectively with Buildings 4, 5, and 6, these three buildings form the visual and symbolic core of the NIH site, and are typical examples of the academic Georgian Colonial Revival style used for many contemporary institutional buildings. In addition to their architectural merits, these buildings helped to establish NIH as one of the world's foremost biomedical research centers and are directly associated with major accomplishments in the field. Louis A. Simon designed the buildings, with J. Winthrop Wolcott, Jr., serving as the consulting architect. The George A. Fuller Company of Bethesda was responsible for construction.

Buildings 4 and 5—Research Buildings

Buildings 4 and 5 were constructed in 1941 as identical buildings. Constructed in the same Georgian Revival style previously used for Buildings 1, 2, and 3, Buildings 4 and 5 continue to represent the trend toward using this academic style. Building 4 was initially used as laboratory and research space, and in 1948 became the primary location for the Institute of Experimental Biology and Medicine. Other institutes housed in Building 4 have included the National Institute of Dental Research, the National Institute of Arthritis and Metabolic Diseases, which later became the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases. Building 5 initially housed researchers in infectious diseases and was home to the Microbiological Institute later renamed the National Institute of Allergy and Infectious Diseases. Because of the nature of this work, Building 5 was constructed with a sophisticated exhaust system that prevented the spread of infectious diseases from room to room within the building. The Charles H. Tompkins Company constructed Buildings 4 and 5.

Building 6

Constructed in 1939, just one year after Buildings 1, 2, and 3, Building 6 displays similar Georgian Revival characteristics as the earliest NIH buildings. Built to house the National Cancer Institute, Building 6 was believed to be one of few structures designed solely for research in a specialized field. Two additions have been made to Building 6: 6A was added

to the east portion of the building in 1976, and 6B was added to the north side of the building in 1988.

Building 7—Memorial Laboratory

Completed in 1946, Building 7 was originally known as Memorial Laboratory to honor scientists who had died while researching dangerous diseases. Building 7 represents a break in the traditional use of the Georgian Revival style of architecture at NIH, although it retains elements of the style, such as massing and materials. However, the distinguishing characteristics of Building 7 are its architectural planning and engineering details relating to its use as a state-of-the-art laboratory with the mission of providing a safe working environment for scientists engaged in highly dangerous research. Among its sophisticated features are an advanced air-flow system that insures the decontamination of exhaust to the outside of the building, the installation of rooms of various levels of germ decontamination, and triple-sealed windows with exterior shades to avoid the collection of dust on the interior of the building. All of these features were in use to insure the proper handling of potentially infectious diseases.

Buildings 15B1-15G2 and 15H and 15I—The Officers' Quarters

Collectively, the Officers' Quarters have been determined eligible for listing in the National Register of Historic Places. The Quarters are a collection of eight red-brick Georgian Revival duplexes and detached houses constructed in 1940 to serve as housing for junior officers so that they would be on the NIH site at all times. The quarters are an excellent example of the Radburn principle of planning, with residences sited around a common green in a wooded area with gently sloping topography and a series of paths linking the buildings. Louis Simon served as the architect for the buildings, and the Charles H. Tompkins Company was awarded the construction contract.

Building 15K—The Wilson House (Tree Tops)

Building 15K, Tree Tops, is the last remaining building and principal residence of the Wilson Estate. Predating NIH's occupation of the site, the Wilson Estate was constructed in 1926 to be the principal residence of Luke and Helen Woodward Wilson. Tree Tops is attributed to architect Edward Clarence Dean, and is a skillful blend of Tudor Revival and Craftsman elements. (Various other buildings originally present on the site were removed in 1997 as part of an 850,000-square-foot addition to the Clinical Center.)

The Wilson's, both members of prominent merchandising families, were responsible for the major donations of land in Bethesda to NIH. These donations of land were responsible for locating NIH on the site and changing the character of Bethesda from an area with large estates to a densely built area with a prominent medical community.

Building 16 and 16A—The George Freeland Peter Estate and Caretaker's Residence (The Stone House; currently used as the Fogarty International Center)

The Peter House (Building 16), an excellent example of the Colonial Revival style, was constructed in 1930. Designed by architect Walter G. Peter, brother of the original owner, the building exemplifies many of the qualities found in the large early twentieth-century estates that were constructed along Rockville Pike during that era. George Peter sold the estate to the federal government in 1949. The Caretaker's Residence (Building 16A), designed in the style of the main house, is also present on the site. The Montgomery County Master Plan for Historic Preservation includes the property in its list of county landmarks.

Building 38—The National Library of Medicine

The National Library of Medicine, which houses one of the world's largest collections of medical literature, has been determined individually eligible for listing in the National Register of Historic Places. Although the Library was constructed in 1962 and has not yet reached 50 years of age, a period of time that is generally necessary for a building to be evaluated in the greater historic context of its time, the Library displays several areas of

exceptional significance. Concerns relating to the threat of nuclear war influenced the choice of a location outside of downtown Washington for the National Library of Medicine, as well as design features thought to protect the building from an atomic bomb blast. Three of its five stories are below grade and its distinctive hyperbolic paraboloid roof shape was thought to dissipate the effects of a bomb blast. Additionally, many progressive features of library design were incorporated into the interior planning of the building in an attempt to manage the extensive holding of the Library. The New York firm of Robert B. O'Connor and Walter H. Kilham were the architects for the building, with Dr. Keyes Metcalf serving as the library consultant for the project. The structural engineering firm of Severud, Elstad and Krueger, one of the preeminent authorities on bomb-blast-proof construction, served as engineers for the structural design of the Library.

Building 60—The Convent of the Visitation (currently the Mary Woodard Lasker Center for Health, Research, and Education)

Constructed in 1922-23 as a self-sufficient, cloistered convent for the Roman Catholic Order of the Sisters of the Visitation, Building 60 remained in use for its original purpose until 1982. Designed by A.B. Mullet and Company, with Marsh and Peter as associated architects, the building reflects Georgian Revival characteristics popular during its era of construction. Romanesque elements, strongly associated with ecclesiastical architecture, were used to articulate the chapel wing.

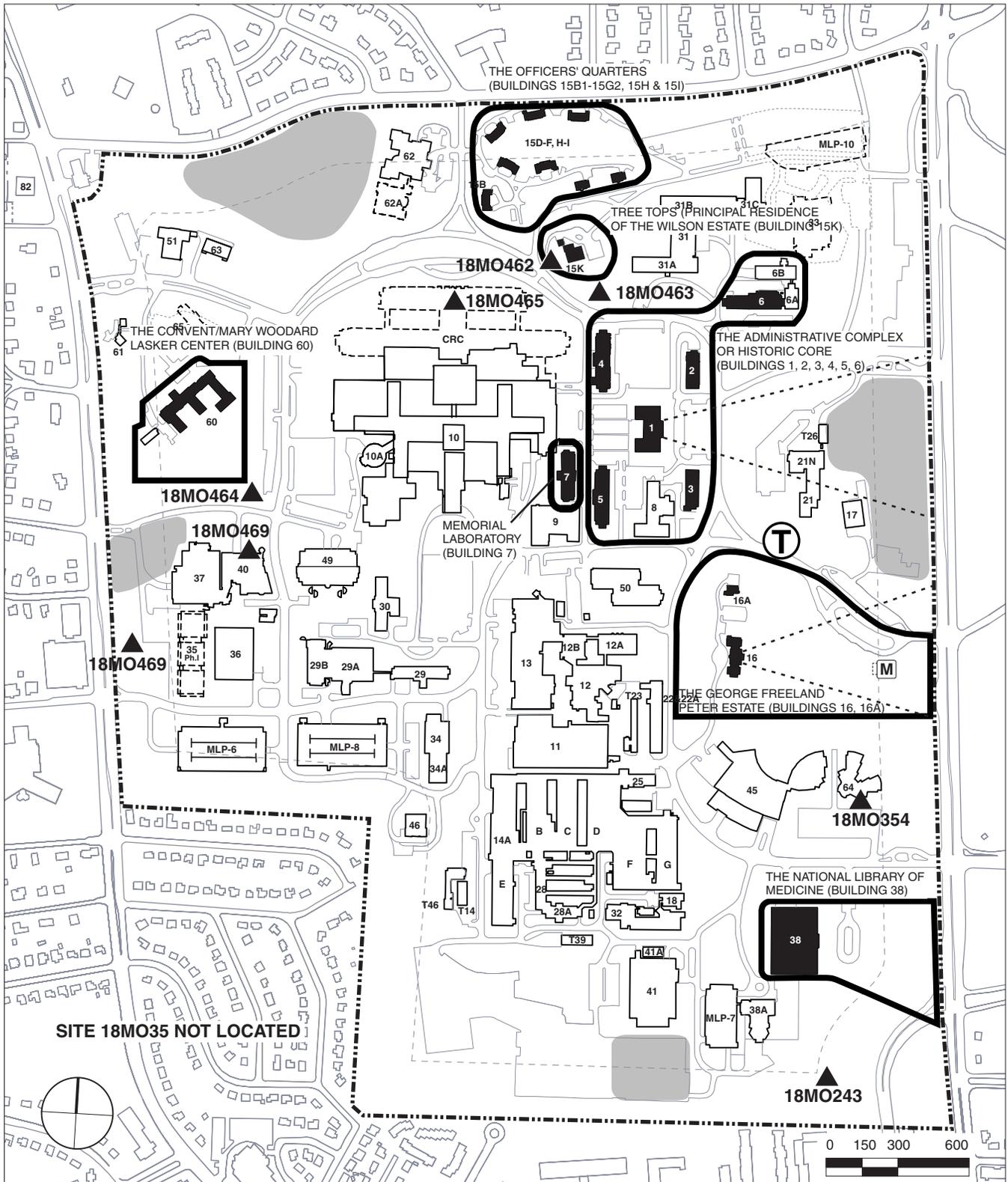
During the 1980s, the building was renovated for use as the Mary Woodard Lasker Center for Health, Research, and Education. At that time, a residential addition was constructed and linked to the original portion of the building by a modern glass entrance area.

4.6.2 Archeological Sites

The NIH campus is located in Maryland Archeological Research Unit 12 of the Piedmont Province. No Phase I cultural survey of the entire NIH campus has been completed. An inventory of known prehistoric and historic sites and identification of areas of potential sites was completed in 1985 (NIH Cultural Asset Inventory, D. R. Bush, 1985). The inventory included a review of Maryland Historic Trust records and files, research literature, and prior investigations in the immediate area, and a visual inspection of the campus

Nearly the entire campus surface has been disturbed by NIH and prior occupants. Prior site use includes crop farming, residential estates, a convent, and a golf course. Much of the central portion of the campus is located on the filled-in valley of the NIH Stream with the stream running as much as 30 to 35 feet below the surface. Archeological field investigations, which at least include Phase I surveys, have been conducted at eight sites on the Bethesda campus. None of the sites are eligible for listing on the National Register of Historic Places.

Four areas of the campus have been designated as “archeologically sensitive” areas, in that they have not been investigated or assessed. The largest of these occur in undisturbed areas at the periphery of the campus. If development is proposed for these areas, appropriate survey measures will need to be taken. The eight recorded archeological sites and four archeological sensitive areas are illustrated and identified on figure 4.6



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- HISTORIC PROPERTY
- RECORDED ARCHEOLOGICAL SITE
- HISTORIC PROPERTY PROTECTION BOUNDARY
- ARCHEOLOGICALLY SENSITIVE AREA
- T TAYLOR COLLECTION SUITE
- SIGNIFICANT VIEWS AND VISTAS

Note: All categories as defined by NIH

Figure 4.6

**Existing Historical &
Archeological Areas**

4.7 Environmental Features

4.7.1 Climate

The NIH campus is located in west-central Maryland at 39°00' N latitude and 77°22' W longitude, within the temperate continental climate of the United States.

Summers are long, warm and humid due to the dominance of maritime tropical air. Temperatures are almost sub-tropical in character, showing little change from day to day. Winters are relatively cold, however. Frequent air-mass changes occur because of the influence of either maritime tropical or continental polar air.

Temperature

The mean annual temperature is 57° F. Monthly mean temperatures vary little throughout the summer and winter seasons, but they are quite variable through the transition seasons of fall and spring. The January normal high is 43° F and the normal low is 27° F. The June normal high is 88° F and the normal low is 70° F. The number of normal heating degree-days for the Washington, D.C. area, as reported by the National Weather Service, is 3,988; the number of cooling degree-days is 1,432.

Humidity

The highest average relative humidity occurs in the early morning hours. The higher temperatures in the afternoon increase the amount of moisture the atmosphere can hold and thereby lower the relative humidity. Thus, the relative humidity decreases from a maximum in the early morning to a minimum around mid-day.

Precipitation

The maximum seasonal precipitation occurs in the summer, coinciding with the seasonal location of the jet stream. In winter, the location of the jet stream results in large-scale cyclonic storms that originate in the Texas area and Gulf of Mexico and move northeastward toward the Mid-Atlantic States. The storms' position in relation to the Appalachian range is the controlling factor on the quantity of snow the area receives. The 30-year mean annual precipitation is 39.0 inches for Ronald Reagan Washington National Airport. Snowfall averages 17.3 inches annually.

Sunshine/Winds

Total sunshine ranges from 40 to 50% of possible sunshine in January and from 60 to 70% from June through September.

Predominant breezes are from the southwest in the summer followed by north-northwesterly winds in the winter.

4.7.2 Noise

The NIH campus is subject to noise generated by sources within or internal, and outside or external to the campus. Most internal campus noise originates from stationary sources associated with cooling facilities in Buildings 11 and 34, individual building exhaust fans, and emergency diesel generators, which have sporadic or seasonal noise outputs. In addition, internal campus noise is generated from employee and visitor traffic and from construction activities and construction related traffic. External noise sources are primarily traffic on surrounding roads and from bus traffic associated with the Metro station. Aircraft overflights were judged to be only a minor noise source.

A noise survey of the entire campus was conducted in early 1995. The purpose of this survey was to establish noise generation design criteria for all local areas on the campus. The results indicate that nighttime noise levels are typically in the order of 50 to 55 dBA.

Daytime levels are in the range of 55 to 65 dBA, except within 200 feet of Rockville Pike and Old Georgetown Road, where noise levels generally range from 69 to 71 dBA between 7 AM and 9 PM daily. Maryland and Montgomery County have established 55 dBA as a goal for residential areas. The impact of traffic on NIH is quite evident with 60 dBA levels reaching about 300 to 400 feet into the campus from Old Georgetown Road and Rockville Pike. For further information on impacts associated with on-campus noise sources, see the NIH Master Plan Environmental Impact Statement Supplement.

4.7.3 Air Quality

Regional, local, and on-campus sources influence air quality at the NIH campus. The Washington metropolitan area is in non-conformity with the National Ambient Air Quality Standards (NAAQS) in that the criteria for ozone are exceeded. To meet the requirements of the 1990 Clean Air Act Amendments, the region must reduce ozone forming pollutant concentrations by 2005.

Within the immediate vicinity of the campus, there are two primary sources of emissions: the power plant in Building 11, and vehicular traffic.

Previously, combustion of fuel oil in the boilers in the central heating plant was a source of sulfur oxides, nitrogen dioxides, and suspended particulate matter. In 1994, NIH initiated a program to convert its fuel supply for its boilers from fuel oil to natural gas, with a consequent significant reduction in stack emission concentrations. NIH has also increased the boiler stack heights to improve emission dispersion.

Traffic around the campus is the primary contributor to local carbon monoxide (CO) concentrations. Micro-scale concentrations are generally proportional to traffic volumes and the highest concentrations are found along Rockville Pike.

All criteria pollutant concentrations in the vicinity of the campus meet the NAAQS.

4.7.4 Waste Disposal

Waste generated at NIH is classified according to federal and state regulations, which define procedures for storage, transport, and disposal. Classifications of waste generated at NIH include solid or general waste, medical/pathological waste, radioactive waste, chemical waste, and multi-hazard/mixed waste.

NIH rigidly controls waste generated by biomedical research. The Division of Environmental Protection (DEP) is responsible for all aspects regarding the safe use of materials and the management of waste, including the training of personnel in these areas. NIH manages waste from generation to ultimate disposal. Non-radioactive general, medical/pathological, chemical, and mixed waste is managed by the Waste and Resource Recovery Branch. The NIH DEP manages radioactive materials and waste. Specially trained and qualified private contractors carry out chemical, radioactive, and multi-hazard/mixed waste management operations on a "turnkey" basis.

Emphasis is placed on minimization of waste generation at NIH. Advisory services in the DEP are available to researchers in developing experiments and waste minimization protocols. Waste is strictly segregated in hospital, clinical, and research spaces to avoid creating unnecessary amounts of multi-hazard/mixed waste. A wide assortment of appropriate waste containers, many defined and specified by federal and state regulations, are provided to researchers. The researcher labels the container for date, source, constituents, and potential hazard. Accumulated waste is temporarily stored in cabinets or secure areas in research spaces away from the general public and easy employee access.

For chemical, radioactive, and multi-hazard/mixed waste, contractor personnel inspect and remove the wastes, and transport them to the waste marshalling facility located in Building 21. At Building 21 these wastes are segregated by different regulatory categories. If necessary, waste is treated to render them non-hazardous, reduce hazard, reduce volume, or convert multi-hazard/mixed waste to a single classification. Waste may be bulked for subsequent shipment and disposal by consolidation of multiple small containers of compatible waste materials generated in research spaces to fewer containers. This controlled waste is shipped weekly to off-site waste management facilities. When waste is disposed of, NIH keeps a permanent disposal record.

Solid or General Waste

General waste includes waste that is not contaminated with chemical, infectious, or radioactive materials and is not suitable for recycling. Examples of general waste include office waste, disposable products, animal bedding which is not contaminated, dining center waste, campus maintenance waste, and building renovation waste.

General waste is collected and placed in dumpsters located throughout the campus. A private contractor transports general waste to the Montgomery County Transfer Station away from the campus. NIH generated 9,600 metric tons of general waste in 2003. Records indicate that about 55 percent of this total was classified as office/institutional waste.

Medical/Pathological Waste (MPW)

Medical/pathological waste (MPW) is defined as waste that because of actual or perceived presence of pathogenic agents requires containment or treatment to prevent occupational or environmental exposure. To ensure compliance with all State and Federal regulations, NIH has merged the applicable definitions into the single category of MPW. Examples of MPW include microbiological cultures, clinical specimens, tissue cultures, waste from surgical suites, contaminated animal bedding, "sharps", and contaminated disposable clothing or absorbent materials.

MPW is packaged at the point of generation into opaque bags placed in cardboard containers. MPW boxes are labeled for source and content and then stored under refrigeration in designated pickup locations inside buildings around the campus. It is then marshaled at Building 25 and transported from the site by contractor for approved treatment and disposal.

NIH has reduced MPW generation by 45 percent since 1990 even though the number of researchers on the campus has increased significantly in the interim.

Radioactive Waste

Radioactive waste is any waste that contains or is contaminated with radioactive materials, such as contaminated paper, glass and plastic containers, liquids and fluids, experimental or cleanup materials, and contaminated medical pathological wastes including patient care wastes. Nearly all radioactive material used at NIH involves very low levels of radioactivity. Most of these materials have a half-life of less than 100 days.

NIH is licensed by the U.S. Nuclear Regulatory Commission (NRC) to use, store, and dispose of radioactive materials. The NRC inspects all NIH facilities for compliance with applicable regulations on a regular basis. All NIH personnel involved in handling, transporting, and/or use of radioactive materials are trained in accordance with NRC requirements. Training emphasizes minimization of low-level radioactive waste.

Radioactive wastes are marshaled for disposal or treatment in Building 21. Some radioactive wastes, which have a short half-life, may be stored until they are no longer classifiable as radioactive, and only then disposed of as non-radioactive waste. Over the last five years, annual radioactive waste generation has ranged from 78 to 154 metric tons.

Building 21 also contains laboratories designed for the use of radioactive materials with quantities of radioactivity higher than typically used in a standard laboratory. NIH also operates three cyclotrons in the Magnusen Clinical Center, which produce isotopes that have half-lives measured in terms of minutes or hours, and thus effectively do not produce long-term radioactive waste.

Chemical Waste

Chemical wastes are discarded non-radioactive chemicals, including hazardous and non-hazardous chemicals, as defined by Federal regulations. Chemical wastes that are not regulated under Federal or State regulations as hazardous, but which have toxic or hazardous waste characteristics are considered to be hazardous waste by NIH.

Chemical wastes are collected, sorted, and packaged for shipment and disposal from Building 21. NIH generated 193 metric tons of chemical waste in 2003.

Multi-hazard/Mixed Waste

Multi-hazard waste is an NIH definition for waste that meets the definition and properties of more than one of the restricted wastes, which are MPW, radioactive waste, and chemical waste. Mixed waste is combined chemical and radioactive waste, and is therefore a subset of multi-hazard waste. Volumes of multi-hazard and mixed wastes generated are included within the chemical and radioactive waste totals. When possible, multi-hazard and mixed wastes are converted to a single classification before treatment or disposal.

Animal Waste

Animal waste is classified as solid waste, MPW, or sanitary waste as determined by waste characteristics. It consists of animal bedding with animal droppings, and wash-down from daily cleaning of animal holding areas and cages. Bedding material and animal droppings from diseased animals are managed as MPW or processed by heating to sufficient temperatures in a steam autoclave and disposed of as general solid waste. Bedding from healthy animals is disposed of as general solid waste. Wash-down from areas housing healthy animals is routed to the sanitary sewer. Animal waste is generated primarily in the animal services Building 14/28 complex, and also at other laboratory buildings around the campus.

Recyclable Materials

Recycling consists of recovering materials before they enter the waste stream and diverting them for reuse as raw materials for the manufacture of new products. Examples of recycled materials include white office paper, mixed paper, scrap metal, wood pallets, and yard waste consisting of lawn/leaf materials. For many years NIH has participated in GSA surplus property programs to recycle paper, scrap metal, and used furniture and equipment. Since 1999, an even more concentrated effort to incorporate recycling within waste management services contracts has been instrumental in increasing recycling and recovering activities. As a result, recycling of general waste has increased from 2080 tons in 1999 to 2,657 tons in 2003. This does not include additional recycling of yard and construction waste materials. NIH has a recycling center at the William H. Natcher Building 45; however, there is no central recycling center covering the remainder of the buildings on campus. Materials are picked up from individual buildings by outside contractors, and many locations lack sufficient dock/storage areas.

Construction/Demolition Materials

Construction/demolition materials include any waste generated through the construction/demolition process that is directly attributable to a valid construction contract, controlled by specifications. Construction debris is removed from the site as part of the general conditions of the specification and is part of the construction cost. NIH buildings to be demolished or renovated undergo extensive inspection and testing of building infrastructure for the presence of hazardous materials such as asbestos and lead. These hazardous

materials are removed and disposed of according to applicable federal and state regulations prior to general demolition. Non-hazardous building materials are evaluated for recycling potential.

4.8 Existing Utilities

The NIH Bethesda Campus Master Plan is developed separately from, but in coordination with the campus Master Utilities Plan (MUP) Year 1 and Year 2, and the Master Utility Plan 2000 Update (UMUP). For more specific information on campus utilities, see the Utility System Analysis and Planning, MUP Task 3.0 Report and the UMUP. The Major Utility Corridors diagram, Figure 4.8, shows the general locations of the existing major utility distribution tunnels and trunk lines on campus.

Although utilities are concentrated under campus roadways, buried utility lines crisscross the entire campus. NIH is in the process of consolidating many utilities in utility corridors as recommended in the MUP. There are two existing utility tunnels on site, one running north-south from the Power Plant (Building 11) to the Clinical Center Complex (Building 10) and the Animal Facility (Building 14), the other running east-west between the Convent and Center Drives along the axis of South Drive. Future third and fourth sections are proposed for completing the loop around Building 10 (Clinical Center) and around the Building 14/28 complex (Animal Facility). Proposed utility trenches carrying steam and chilled water lines would be extended in the northeast sector of the campus toward Building 33 on the north, and around Building 14 on the south. The purpose of these proposed tunnel and trench expansions is to provide utility service redundancy to all parts of the campus in case of disruptions in service.

Construction of future campus development must take into consideration these existing tunnels and utility lines, as well as proposed corridors, tunnels, and utility improvements.

4.8.1 Water

The Washington Suburban Sanitary Commission (WSSC) supplies water to NIH through water mains under Rockville Pike, West Cedar Lane, and Old Georgetown Road. Service pressure, 495 feet, is established at the Alta Vista standpipe and storage tank located across West Cedar Lane near the northwest corner of the campus.

Supply to the campus is split among seven metered entry points to spread fire flow demand and provide service redundancy. There are three WSSC service lines on West Cedar Lane, two on Rockville Pike, and one each on Old Georgetown Road and Roosevelt Street. The average daily campus water demand in 2003 was 2.141 million gallons. The largest single demand source on the campus is the cooling towers in the chilled water plant in Building 11. The towers are submetered. They use water evaporation to release heat collected by the system from campus buildings. The towers can account for more than 70% of the total campus demand when outdoor temperatures exceed 95°F. For this reason, average campus daily water use ranges from approximately 1.5 million gallons per day during the winter months to more than 2.4 million gallons per day during July.

4.8.2 Gas

The Washington Gas Co. supplies natural gas to NIH from gas mains on Old Georgetown Road and West Cedar Lane. Total natural gas consumption on the NIH campus for 2003 was 1.748 billion cubic feet. Natural gas is the primary fuel used by the campus central plant boilers in Building 11. This use accounts for more than 98%, of campus demand with the remainder consumed in laboratories or cafeterias. The NNMC and residential areas

to the east of the campus are fed by Washington Gas lines that are routed across the campus in easements near the southern periphery.

4.8.3 Chilled Water

The chilled water distribution system at NIH is used for air conditioning most of the buildings on the site. Chilled water is generated in two refrigeration plants in Buildings 11 & 34. These two plants serve a single underground chilled-water distribution system consisting of major East, West, and Central Campus Headers. It is a closed loop system. Pipe is located in utility tunnels, utility trenches, or is directly buried.

The estimated current campus peak chilled water demand is 51,100 tons. The total and firm chilled water plant capacities are 68,000 and 63,000 tons. However, due to equipment age and conditions, the reliable chilled water plant capacity is 63,000 tons. The total capacity will be increased to 72,000 tons with the addition of chillers 26 and 27, and retirement of Chillers 10 and 14 by the end of 2004. Additional chiller units will be installed, as needed in future chilled water plant expansion projects, and distribution lines will continue to be upgraded.

The UMUP notes that numerous sections of the distribution systems have hydraulic deficiencies and cannot adequately meet projected building cooling loads. Major replacements, improvements, and expansions are needed throughout the campus distribution system to meet near future operational needs.

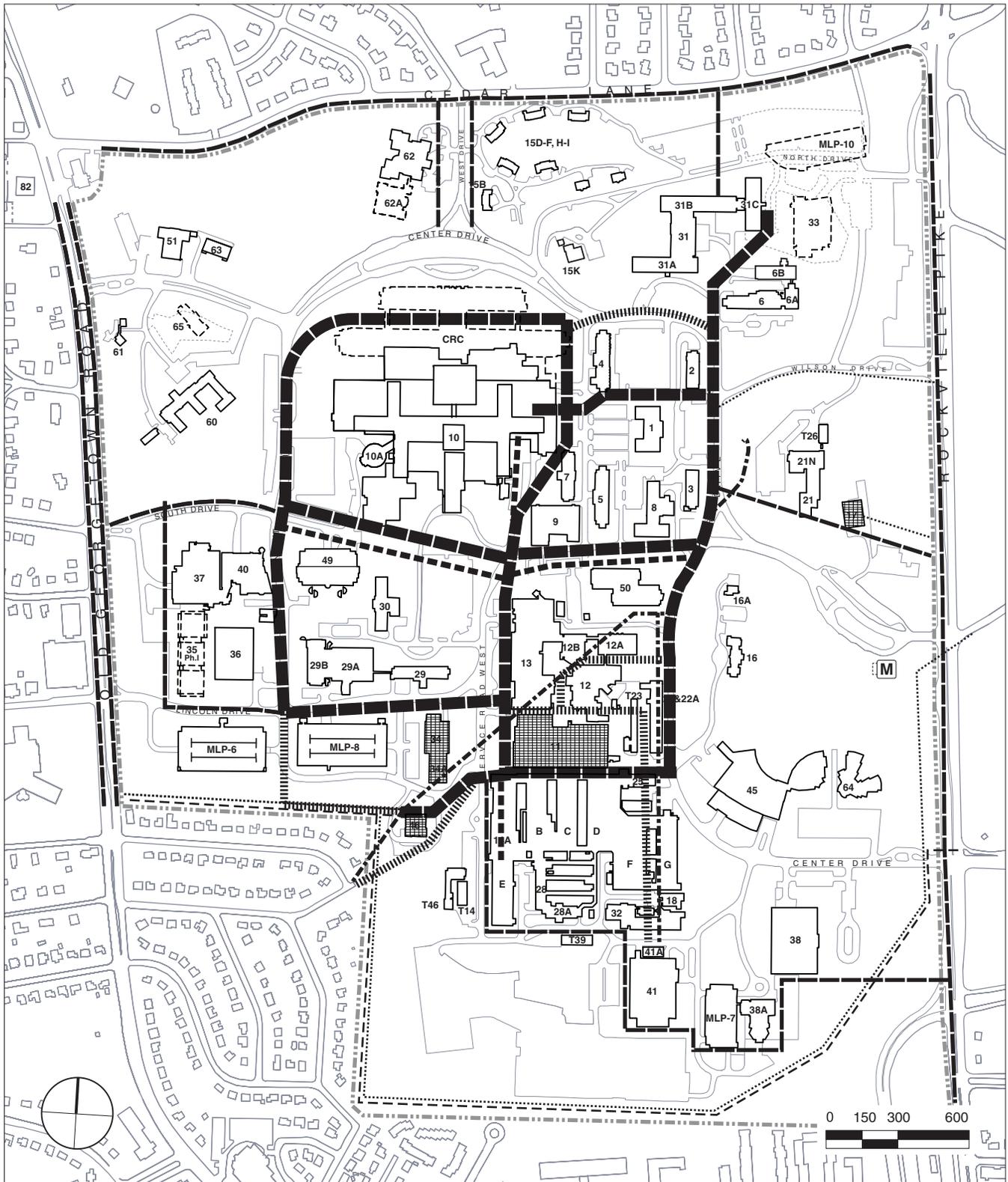
4.8.4 Steam

With a few exceptions, the central heating plant in Building 11 heats buildings on the NIH campus. Steam is produced in five boilers in the plant and distributed at 165 psi by lines that are located within tunnels or are directly buried. Pressures are reduced at each building for internal distribution and use. The generating plant in Building 11 also provides steam for "process" uses such as building humidity control, sterilization of equipment, cleaning of animal care areas, and at the laboratory bench.

The existing boiler plant can produce a total of 800,000 pounds per hour of steam for use on the NIH campus. The PEPCO co-generating unit, which is scheduled to come on line by 2004, will be capable of generating an additional 180,000 lb/hr when its heat recovery boiler is used. The peak recorded steam demand in 2003 was 532,000 lb/hr. The average winter demand (Jan-Feb-Dec) was 340,000 lb/hr.

4.8.5 Sanitary Sewer

The flow of the sanitary sewer system at NIH is in a general southwest to northeast direction across the campus. A sanitary sewer line crosses the site diagonally from southwest to northeast, and is connected to WSSC sewer mains as it enters and exits the site. Most of the campus sanitary system drain to this line which connects to Washington Suburban Sanitary Commission (WSSC) sanitary sewer mains near the intersection of Rockville Pike and West Cedar Lane. Buildings 38 and 38A in the southeast corner of the discharge sanitary sewer waste into the WSSC system at Rockville Pike and Glenbrook Parkway. Building 60 (the Convent Building) has a separate small WSSC sanitary line dating to pre-NIH occupancy which discharges to a WSSC system that drains westward from Old Georgetown Road. Except for Building 60, all the sewage generated on the NIH campus is discharged to the WSSC sewer network within the Rock Creek Basin and flows to the Blue Plains Waste Water Treatment Plant.



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- EXISTING MAJOR CORRIDORS
- EXISTING UTILITY TUNNEL
- WATER
- GAS
- ELECTRICAL
- SANITARY
- STORM DRAIN
- POWER PLANT/UTILITY BLDG.

Oudens & Knoop, Architects, P.C.

Figure 4.8

Existing Major
Utility Corridors

SmithGroup

4.8.6 Stormwater Systems

The NIH campus encompasses four drainage areas: the NIH Stream, the North Branch, Stony Creek, and a small area on the west side of the campus (See Figure 4.2.2.). Each area has a separate campus storm drain system. All, but the last, drain to Rock Creek.

All of the campus storm drains are owned and maintained by NIH. The main storm drain on the campus, which ranges from 84 to 96 inches in diameter, carries the NIH Stream across the campus between the southwest corner its outfall to daylight near Building 21. Two other systems join it in the vicinity of Building 50. One of these systems drains the area within the NIH Stream basin to the south of Building 11, the other drains the area within the basin that is north of Lincoln Drive. The area to the east of Building 10 is served by several individual short stormdrains that flow directly into the NIH Stream. Drainage in the northern and southernmost sections is handled either by either surface flow or short pipe systems carrying roof top runoff. In general, the existing drainpipe systems have adequate capacity and are in good condition.

Criteria for stormwater runoff quality and quantity control has been established in the Draft NIH Bethesda Institutional Stormwater Management Plan (ISMP) now under review. The plan proposes campuswide management. Quantity control will be achieved through a North SWM Facility on the North Branch; quality control through the South Pond, which will also serve as a Montgomery County quantity control facility.

4.8.7 Electric Power

Power to three campus substations is provided by the Potomac Electric Power Co. through underground ducts. Electric power is distributed to campus buildings from these three main substations via an NIH owned and operated network. One substation is on the east side of the site at Building 17, the second is on the west side at Building 46, and the third is the recently built substation, Building 63, located at the northwest corner of the campus.

Typical daily electrical usage ranges from about 1.0 to 1.3 million kilowatthours (KWHR). Total PEPCO billed electricity consumption for the year 2003 at the NIH campus was 409,000,000 KWHR. The maximum-recorded daily demand of 74,486 Kilowatts occurred in June 2003.

Operation of the NIH/PEPCO Cogeneration facility is scheduled to begin in 2004. The steam turbine electric power generation nominal capacity is about 23 megawatts (MW), and the unit will provide about 19.6 MW at 85 percent efficiency. The kilowatthours of power produced will be included in PEPCO billings. Billed kilowatt peak use, however, will decline by the amount supplied by the COGEN facility.

4.8.8 Compressed Air

The compressed air system at the NIH campus is an underground system that is generated in Building 11 at 125 psi and is distributed to other specific buildings at approximately 110 psi. Most campus buildings have their own exclusive air systems. Compressed air is used primarily as laboratory air and, occasionally, as backup for the control air in the HVAC system.

4.8.9 Oxygen/Compressed Gases

The oxygen system is not an interconnected system. It consists of a large tank adjacent to the north elevation of support services Building 13 to supply the Clinical Center (Building 10). Small portable tanks in place within the individual buildings supply any other oxygen used on the site.

4.8.10 Signal System

The signal system at NIH accommodates the telephone, fire alarm, security and door supervision, and local signal services. Concrete-encased fiber, asbestos-cement, and plastic 4-inch duct liners connect the underground manhole and handhole system.

4.8.11 Fuel Storage

There are two large underground fuel oil storage tanks east of Building 34, which supply fuel for the boilers in Building 11. Each tank holds 500,000 gallons. Currently, all five boilers use natural gas as the primary fuel. However, fuel oil storage will be required as an emergency supply. The Master Plan will replace the existing tanks with new ones on the south side of Building 11 in the service area. The new tanks would have the same or similar combined capacity as the existing ones.

4.9 Opportunities and Constraints

The following Opportunities and Constraints diagrams are a synthesis and summary of the program and analysis information presented in Chapters 2, 3, and 4. The Opportunities diagram (Figure 4.9.1) shows the physical site features which the Master Plan can take advantage of and identifies potential buildable sites to meet the program requirements. The Issues and Constraints diagram (Figure 4.9.2) shows a composite of issues to be addressed by the Master Plan as determined from program requirements, as well as potential constraints to development due to existing natural or built features of the site. In general, the Bethesda Campus has a high number of constraints to be considered due to the extensive level of existing development on the site.

The following numbered items correspond to areas noted on the accompanying figures:

4.9.1 Opportunities (Figure 4.9.1)

1. *Natural Features/Topography*

- The site has many positive natural features (streams, woodlands, topographical variation, etc.), which can be retained and incorporated in the Master Plan.
- New development can be shielded by topography in appropriate locations.

2. *NIH Stream*

- Upgrading of the NIH Stream is currently underway and will be a site amenity enhancing the campus character.
- Appropriate new development may be located along the stream provided a buffer (100 feet / 30m) between the development and stream is maintained.

3. *Campus Organization*

- The Master Plan can create a campus structure, which connects and unifies the various components of the site.
- A system of hierarchy can be established among campus buildings and spaces.

4. *Redefine Campus Core*

- Many existing buildings within the campus core need to be renovated or replaced (Building 10 -Clinical Center Complex, Building 12/13 Support and Computer Services complex, Building 14/28 Animal Facility complex). New construction can redefine the character and increase the density of the center of campus.

5. Site Landscape (not located on diagram)

- Site landscaping may be improved in coordination with redefinition of the campus core and reduction of surface parking.

6. Circulation

- Clarifying and enhancing vehicular and pedestrian circulation systems can improve orientation on campus.
- Visitor and service traffic conflicts may be minimized by separation where possible.

7. Campus Entries

- Key campus entry points are currently being reconfigured and improved with landscaping to create a better sense of arrival and orientation.
- A “front door” address to the campus in general and to individual buildings can be created.

8. Historic Core

- The Historic Core, one of ten sectors defined by the Master Plan, represents the original building group on the NIH Bethesda campus and contains a number of individually eligible historic buildings. The setting of these buildings may be enhanced through use change, parking removal, and landscaping.

9. Power Plant

- The continued expansion of the Power Plant (Building 11) in support of NIH activities may be designed to compliment adjacent development

10. Periphery Development Sites

- In addition to redevelopment of sites within the campus core, there are limited sites around the periphery of the campus, which can be more intensely developed. These sites are currently occupied mostly by surface parking or buildings, which may potentially be replaced. Such a redevelopment is already taking place at the northeast corner of the site with the construction of research Building 33 and MLP10.

11. Utilities Distribution (not located on diagram)

- Coordination of major utility corridors with proposed new development and roadways can create a more efficient distribution system and avoid future disruptions to campus functions.

12. Enhance Perimeter Buffers

- Relationship of campus development to surrounding residential areas and major thoroughfares can be improved through the expansion or enhanced landscaping of the perimeter site buffers.

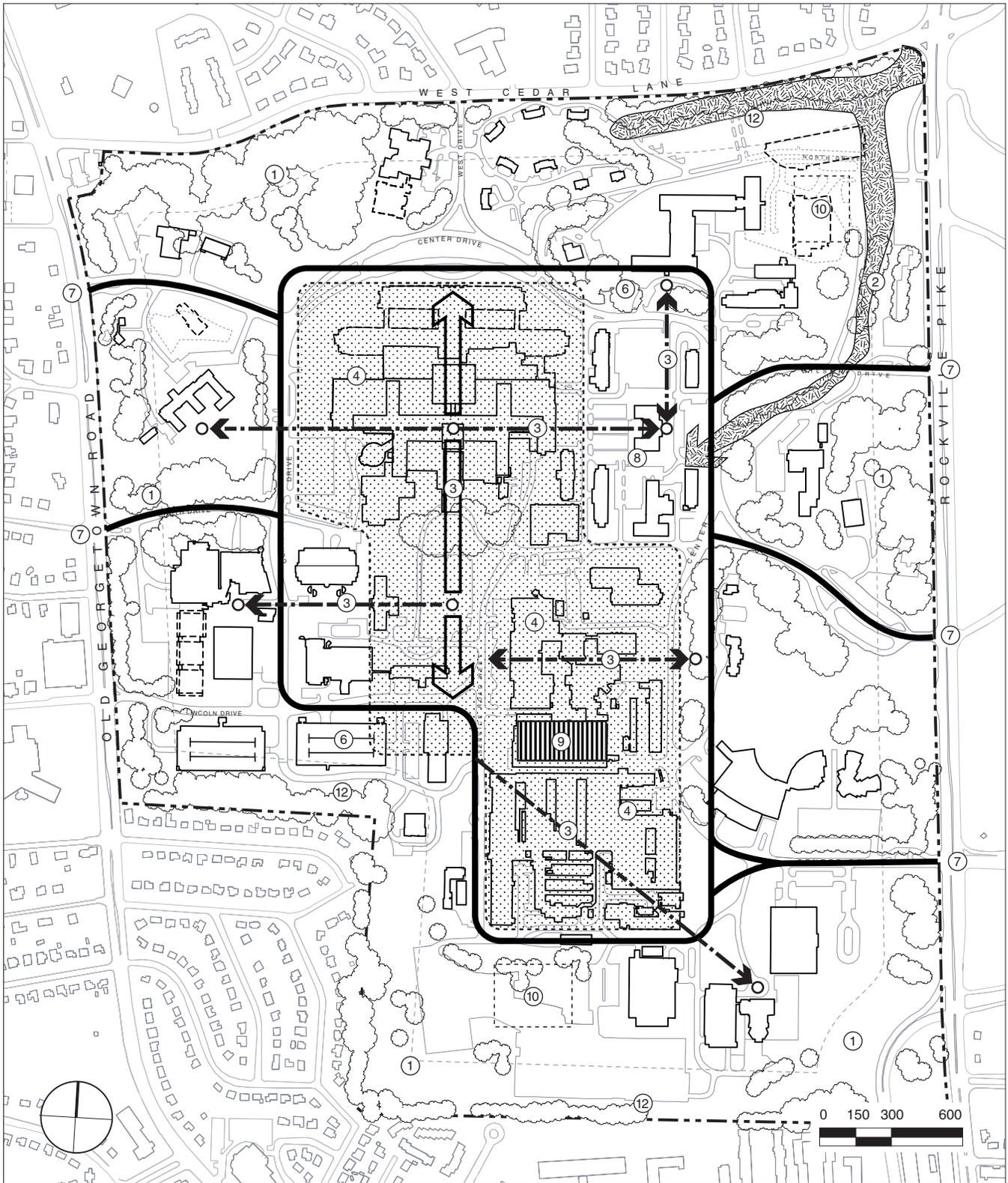
4.9.2 Issues and Constraints (Figure 4.9.2)

1. Neighborhood Compatibility

- The campus is bounded on the north, west, and south by residential neighborhoods, requiring sensitivity in building location, heights, and uses near these areas.

2. Natural Features/Topography

- Steep slopes occur around the periphery of the campus, particularly on the north and east sides, and should be avoided for new development.
- There are several significant areas of mature specimen trees and woodlands around the periphery of the campus, that should be retained as natural areas.



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- | | | | |
|---|-----------------------------|---|-------------------|
| ① | NATURAL FEATURES/TOPOGRAPHY | ⑧ | HISTORIC CORE |
| ② | NIH STREAM | ⑨ | POWER PLANT |
| ③ | CAMPUS ORGANIZATION | ⑩ | DEVELOPMENT SITES |
| ④ | CAMPUS CORE | ⑫ | ENHANCE BUFFERS |
| ⑥ | CIRCULATION | | |
| ⑦ | CAMPUS ENTRIES | | |

Figure 4.9.1

Opportunities

3. Buffer Zones

- Buffer zones of varying dimensions exist around the perimeter of the site within which buildings and parking are restricted.

5. Streams and Floodplains

- There are two streams with associated floodplains on campus, the NIH Stream with its North Branch in the northeast sector and Stony Creek in the southwest corner. New development should be placed outside of these floodplains.
- To meet Maryland State storm water management criteria, storm water drainage and retention should be addressed by an Institutional Stormwater Management Plan.

6. Existing Campus Anchors

- There are five major groups of buildings which will remain on campus through the period of the Master Plan: the general office Building 31 complex on the northeast, the Historic Core near the center, the Clinical Center - Building 10 Complex, the West Quad research group near Buildings 36 and 37, and the Lister Hill/National Library of Medicine/Natcher group to the south. Most of these buildings are in good to excellent physical condition and should be integrated into the campus Master Plan.

7. Important Views and Axes

- There are strong visual axes created by the relationship of central administration Building 1 to the tower of the National Naval Medical Center, and the symmetrical nature of the existing Clinical Center (Building 10). Additionally, there are important views into the campus, primarily at the corners of the site. These views and axes should be considered in the development of the Master Plan.

8. Clinical Center Complex

- The existing Building 10 complex will undergo a phased renovation program to create a modern clinical research facility.

9. Support Services Complex

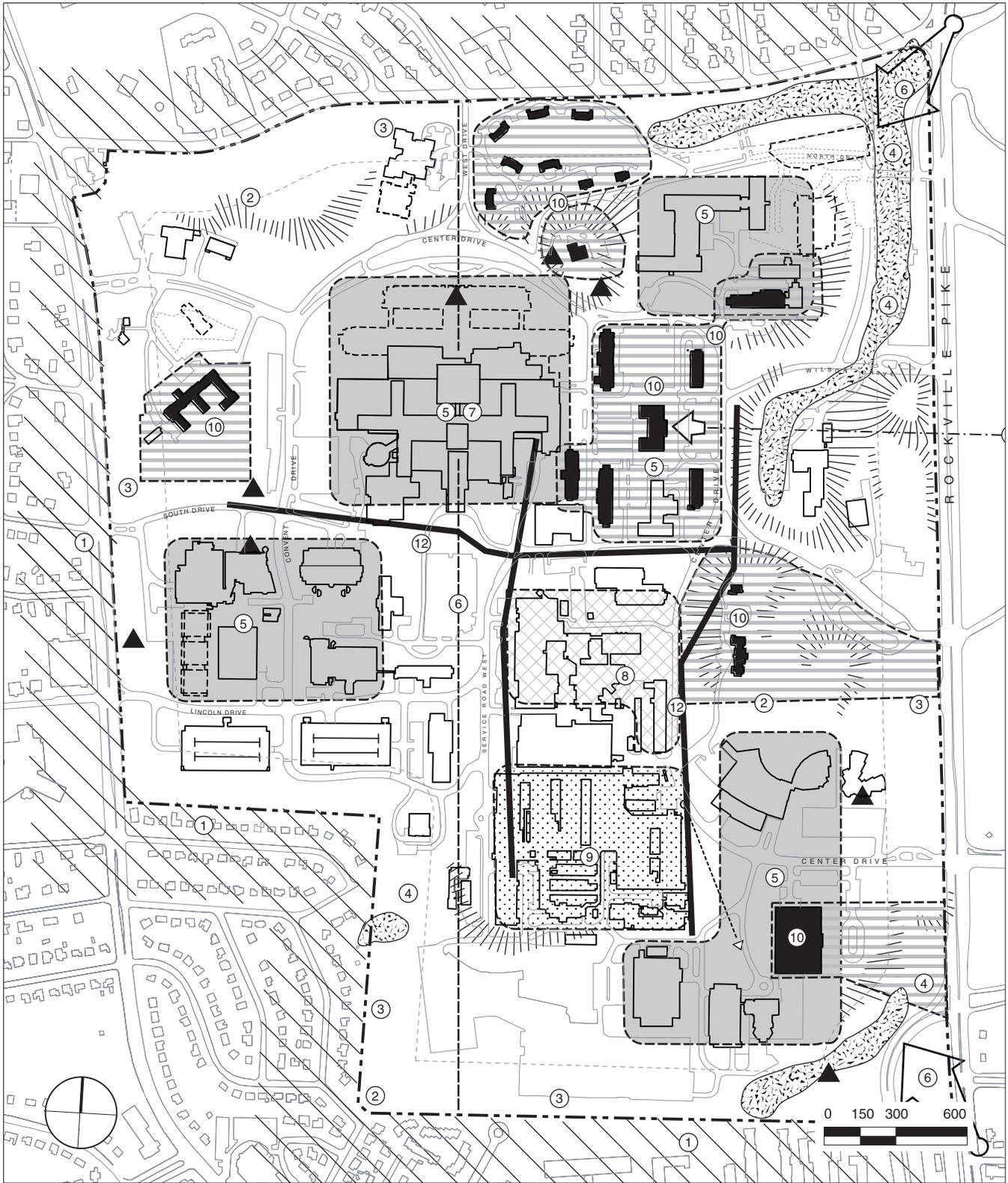
- The Building 12/13 complex (support services) is a low-density use which occupies a central site within the campus. Alternative development potential for this site should be explored.

10. Animal Services

- The Animal Facility (Building 14/28 complex) is a large footprint, one-story structure that occupies a strategic location for future development.
- The complex is in poor physical condition and will exceed its useful lifespan during the Master Plan period. Replacement phasing and an appropriate relocation site should be addressed by the Master Plan.

11. Historic Resources

- Several buildings on the NIH campus are currently identified by MHT and NIH as historic resources, including Buildings 1, 2, 3, 4, 5, and 6 (The Administrative Complex, or Historic Core) the Peter Estate (Buildings 16 and 16A), the Convent (Building 60), and Building 15K (Wilson House or Tree Tops) (see Section 4.6.1 for complete list of buildings determined eligible for listing in the National Register of Historic Places). These buildings should be retained and their settings respected by new development.



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- | | | | |
|---|-----------------------------|---|------------------------------|
| ① | NEIGHBORHOOD COMPATIBILITY | ⑦ | CLINICAL CENTER COMPLEX |
| ② | NATURAL FEATURES/TOPOGRAPHY | ⑧ | SUPPORT SERVICES |
| ③ | BUFFER ZONES | ⑨ | ANIMAL SERVICES |
| ④ | STREAMS AND FLOODPLAINS | ⑩ | HISTORIC RESOURCES |
| ⑤ | CAMPUS ANCHORS | ⑪ | RECORDED ARCHEOLOGICAL SITES |
| ⑥ | IMPORTANT VIEWS AND VISTAS | ⑫ | UTILITIES |

Figure 4.9.2

**Issues &
Constraints**

12. Archeological Areas

- Four areas of the campus have been designated as “archeologically sensitive” areas, in that they have not been investigated or assessed. The largest of these occur in undisturbed areas at the periphery of the campus. If development is proposed for these areas, appropriate survey measures will need to be taken.

14. Utilities

- There are many existing utility distribution lines on campus, and new lines are planned to accommodate future growth. The location of new buildings should be coordinated with these utility tunnels.
- Utility tunnels and improvements will require specific phasing strategies to avoid disruptions to campus activities.
- While projects are underway, utility services must be maintained to all parts of campus.

15. Proposed Projects (not located on diagram)

There currently are several projects under development that have been integrated into the Master Plan, which include:

- Building 10 - Clinical Research Center (CRC) expansion
- Building 35 Replacement - Neuroscience Research Center (NRC) Phase

16. Traffic and Parking (not located on diagram)

- Traffic congestion in the Bethesda/NIH area is a serious issue, requiring a careful analysis of traffic impacts associated with employment growth at the NIH campus.
- A high percentage of the campus site area is currently dedicated to vehicular circulation and surface parking, impairing the quality of the campus and limiting development sites.
- The amount and location of parking should be studied to assure an appropriate ratio and distribution for the site, and in relation to measures, that reduce reliance on single occupancy vehicle trips.