National Institutes of Health

Master Plan

Rocky Mountain Laboratories Campus -

Hamilton, Montana

March 2009

❖ U.S. Department of Health and Human Services ❖ National Institutes of Health ❖
❖ Office of Research Facilities Development and Operations & Division of Facilities Planning ❖

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1 Executive Summary

1.1 The RML Master Plan

The Rocky Mountain Laboratories (RML) is a 33-acre facility located in Hamilton, Montana. It is occupied by the National Institute of Allergy and Infectious Diseases (NIAID), one of the 27 Institutes or Centers of the National Institutes of Health (NIH).

The Master Plan is an integral part of broader, long term planning efforts at the U.S. Department of Health and Human Services (HHS). HHS requires Master Plans for all of its owned campuses as well as those sites and installations occupied by HHS employees that contain at least two independent buildings, or two different activities. One of the plan's primary purposes is to define the physical resources needed to maintain or advance the execution of NIH-wide programs. In addition, it assists in determining and coordinating site improvements and provides guidance for the orderly and comprehensive physical development of NIH campuses to improve their functioning and appearance.

The RML Master Plan seeks to create and maintain a campus environment conducive to accomplishing the NIH, NIAID and RML missions while providing a physical framework for the changing character, nature and urgency of RML's biomedical research programs. It provides a long-range planning envelope for the RML campus, and outlines a strategy for accommodating potential campus development subject to future NIH priorities and the availability of resources. It identifies the physical opportunities and limitations of the campus and projects future staff population and associated facilities for planning purposes. It recognizes, however, that actual program realization at any given time will depend on NIH and HHS priorities, congressional and presidential policy decisions and federal budgetary realities. Although the proposed projects may not be required or carried out to the extent shown in this plan, the Master Plan will help ensure orderly future development of the campus if and as it occurs.

Furthermore, while the Master Plan is a reasonable guideline for future development it does not represent the pre-approval of any individual facilities project nor the particular needs of specific programs to be accommodated on the campus since the financing of such projects and programs must be addressed within the annual HHS budget processes and the HHS Capital Investment Review Board mechanisms.

In accordance with the National Environmental Policy Act of 1969, as amended, (NEPA), federal agencies must use a systematic, interdisciplinary approach that will ensure the integrated use of the natural and social sciences in planning and decision-making activities that may have an impact on the human environment. An environmental document, in this case the Environmental Impact Statement (EIS) which has been prepared to accompany the Master Plan, satisfies this requirement.

NIH is housed on six primary campuses including RML. Although the NIH has prepared Master Plans for its main campus in Bethesda, Maryland and its Animal Center in Poolesville, Maryland, no formal Master Plan, with accompanying NEPA documentation, has been developed for the RML campus. A Site Utilization Study, conducted by Architects Design Group (ADG) of Kalispell, Montana, was completed in 2002 which summarized data collected about the program needs, the regional setting, existing natural resources, and infrastructure. The RML master planning process used this and other information to identify campus needs and develop recommendations and standards for future site development.

In addition, in June 2005, NIH, with the assistance of RTKL Associates, Inc., developed Campus Development Guidelines for RML. The Guidelines are general standards which, when applied to new RML development projects, produce an organized and unified campus environment. The fundamental elements of the campus are described in the report including its history, the overall campus layout, the distinct neighborhoods within the campus, and site landscaping patterns. These proposed design guidelines further specify provisions for setbacks, parking locations, and acceptable ranges of exterior building materials.

This Master Plan builds upon these previous studies. It updates the programmatic bases and integrates campus-wide planning with current physical security requirements. As noted, the Master Plan has been developed for a 20-year planning horizon, and personnel and space estimates are arranged in four incremental phases covering the 20-year period. At the same time, it is recognized that the Master Plan is a work in progress, for a "living campus", and the NIH intends to continue to update the plan periodically.

1.2 The Missions of the NIH, NIAID and RML

THE NATIONAL INSTITUTES OF HEALTH

The NIH is the federal government's focal point for health research and one of the world's foremost biomedical research institutions.

- The mission of the NIH is to uncover new knowledge that will lead to better health for everyone. NIH seeks to apply that knowledge to extend the health of human lives; and to reduce the burdens resulting from disease and disability. The NIH seeks to accomplish its mission by:
  - fostering fundamental discoveries, innovative research, and their applications in order to advance the nation's capacity to protect and improve health;
  - developing, maintaining, and renewing the human and physical resources that are vital to ensure the nation's capability to prevent disease, improve health, and enhance quality of life;
  - expanding the knowledge base in biomedical and associated sciences in order to enhance America's economic well-being and ensure a continued high return on the public investment in research; and
  - exemplifying and promoting the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science.

In addition to the RML campus in Hamilton, Montana, which is the subject of this Master Plan and associated EIS, the NIH maintains installations in Bethesda, Montgomery County, Maryland (the NIH Main Campus) as well as Poolesville, Baltimore and Frederick, Maryland; Research Triangle Park, North Carolina; and smaller facilities in other parts of the country. The NIH also leases space in over 30 locations in the Bethesda/Rockville area of Montgomery County, and in approximately 10 locations elsewhere.

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

The NIAID conducts and supports basic and applied research to better understand, treat, and ultimately prevent infectious, immunologic, and allergic diseases. For more than 50 years, NIAID research has led to new therapies, vaccines, diagnostic tests, and other technologies that have improved the health of millions of people in the United States and around the world. The Institute traces its origins to a small laboratory established in 1887 at the Marine Hospital on Staten Island, N.Y.

In the 1880s, boatloads of immigrants were heading towards America, some of them unknowingly bringing with them cholera and other infectious diseases. The causes of these diseases were not

known. Physicians relied on clinical signs alone to determine whether someone might be carrying an infectious agent.

During this time, Dr. Joseph J. Kinyoun, a young medical officer with the Marine Hospital Service, toured scientific research centers in Europe learning about the new science of bacteriology. Returning home, Dr. Kinyoun set up one of the first bacteriologic laboratories in the United States. Using his microscope and newly acquired medical research techniques, Dr. Kinyoun was able to isolate the cholera organism from arriving passengers in New York. For the first time, American physicians could actually see the organisms causing the disease.

Dr. Kinyoun's Laboratory of Hygiene was renamed the Hygienic Laboratory in 1891 and moved to Washington, D.C., where Congress authorized it to investigate "infectious and contagious diseases and matters pertaining to the public health." The Hygienic Laboratory became the National Institute of Health in 1930 (later renamed to the “National Institutes of Health”) and in 1938 relocated to Bethesda, Maryland.

Scientists in NIAID's Division of Intramural Research (DIR). of which RML is a part, conduct laboratory and clinical research covering a wide range of biomedical disciplines related to infectious diseases, immunology, and allergy. Much of the research in DIR involves investigation of the multitude of interacting cells, antibodies, receptors, proteins, and chemicals that compose the immune system.

ROCKY MOUNTAIN LABORATORIES

RML’s mission is to play a leading role in the nation’s effort to develop diagnostics, vaccines, and therapeutics to combat emerging and re-emerging infectious diseases. The strength of RML programs is in vector-borne transmission of infectious diseases and prion disease research. RML's most significant contributions to the NIAID intramural research program are its unique scientific programs, such as in Transmissible Spongiform Encephalopathy, Lyme Disease, Bubonic Plague, Q Fever and Chlamydia. RML’s mission also includes biomedical research regarding the diagnostics, vaccines, immunotherapies, drugs and biologics to prevent and cure diseases associated with the intentional release of agents into civilian populations. To support this mission the RML campus contains secure laboratory facilities and support services.

1.3 Planning Methodology

This Master Plan for the Rocky Mountain Laboratories is one of a set of long range development plans for NIH installations that NIH prepares, then updates on a regular basis, to guide future use and development of its campuses. Each plan outlines a physical framework to support the NIH strategic research plan, the unique needs and character of the site, and the locale in which the installation is located. One of the primary benefits of the NIH master planning process is that it provides a consistent structure for NIH master plans - similar content, methodology, and level of detail. At the same time, the process recognizes differences among NIH campuses - different histories, physical resources, and community contexts - which result in distinctive programmatic requirements and physical forms for each campus.

Development of the RML Master Plan began with the review of relevant information about the mission, organization, personnel, programs and facilities at the RML campus. The most important source of information was the interviews of RML leadership and the research and administrative staff on the campus. Key personnel were asked to base their projections on research needs without considerations of possible limitations on available funding or unanticipated changes in government policies and priorities. Within an interview questionnaire format, laboratory chiefs (1) attempted to predict biomedical research requirements for their respective research unit over the next 20 years, (2) set forth the mission and program development they anticipate would be necessary to meet these requirements, and (3) estimated

personnel needed to staff these programs over the next five-, ten-, fifteen-, and twenty-year periods.

These projections by RML staff were reviewed by senior RML leadership, NIAID management and the RML Master Plan Steering Committee, groups comprising broader NIH interests. All of these activities were conducted under the oversight and direction of the Division of Facilities Planning (DFP), the organization responsible for master planning within NIH's Office of Research Facilities Development and Operations (ORF).

At each stage of development of the Master Plan, the master planning team coordinated with, and made progress presentations to: NIH and NIAID Management; the RML Master Plan Steering Committee; the Community Liaison Group (CLG), a group representing neighborhood associations and organizations surrounding the RML campus; neighbors of the campus; elected officials; and representatives of Hamilton City and Ravalli County government offices. At the same time, the environmental impacts of growth and change on the campus were investigated, together with various options to mitigate unavoidable impacts. The EIS was developed as part of that process.

1.4 Program Basis

This Master Plan is based on data and conditions existing at the close of calendar year 2005, which corresponds closely with the issuance of the Notice of Intent to Prepare an EIS for the RML Master Plan EIS (issued on March 3, 2006). Changes in data and conditions since issuance of the Notice of Intent will be reflected in the next update of the Plan.

In order to develop a framework for this Master Plan, a projection of functional, personnel, and space needs was prepared by means of questionnaires and interviews of personnel at the RML and meetings with officials within NIAID's Office of the Director (OD) Division of Intramural Research (DIR).

Including the projected net increase of 96 staff in the new Integrated Research Facility (IRF), the 2005 total population on the RML campus is 336. Total estimated population at the end of the 20-year planning period is projected to be 427. The primary growth at the campus is anticipated to be through expanded initiatives in existing research programs and associated supporting services. Over the planning period, the number of RML personnel is projected to change as indicated in the following table:

Baseline (2005)	Phase 1	Phase 2	Phase 3	Phase 4
336	400	414	422	427

This Master Plan is based, as well, on a number of planning premises and principles, chief among them is accommodating the anticipated scientific needs of RML's biomedical research programs. The Master Plan identifies current and future impacts on building areas, parking and transportation systems, and utilities infrastructure. At the same time, the capacity of the campus for accommodating occupiable space was tempered based on broader community and campus planning goals and objectives. This allows the Master Plan to satisfy its many purposes without compromising the basic tenets on which it is based.

The Master Plan provides a strategy for accommodating the space needs related to these personnel projections, while at the same time satisfying other campus goals and objectives, including decompression of overcrowded office and laboratory space, utility upgrades, and the addition of needed amenities. It is estimated that the space on the RML campus will grow from approximately 309,000 to nearly 432,000 gross square feet, an increase of about 123,000 gross square feet of building area. Most of this growth will be in construction of new research and animal facilities.

RML in the NIH Organization

The most significant organizational feature of most NIH institutes, including NIAID - for purposes of the Master Plan - is their division into intramural and extramural research functions. The intramural basic and clinical research programs distinguish the NIH as an institution from all others in biomedical research. The NIH intramural research program, unlike grant-funded extramural research, enjoys unique interdisciplinary character, flexibility of the course of research and the freedom to pursue research without imposition of predetermined duration or, in some instances, scope, A key component of the NIAID DIR, RML is perhaps best known for its research into vector-borne diseases, such as Rocky Mountain Spotted Fever, Q Fever and Lyme Disease, three illnesses caused by microbes whose names pay tribute to the former RML scientists who discovered them.

Each of the 27 Institutes and Centers (ICs), including the NIAID, has an Office of the Director (OD) which requires convenient access to the corresponding offices of the other ICs and to the NIH Office of the Director. Accordingly, the NIAID OD and many intramural research facilities, especially those with clinical research needs, are located on the Bethesda, Maryland campus and in other locations in the Metropolitan Washington, D.C. area. Because of its unique history and evolution, RML is located on its own campus in Hamilton, Montana.

Since 1928, when the landmark facility was constructed – and two decades before that when its scientists worked out of makeshift cabins and tents – RML has played a key role in our nation's health and well-being by focusing its talent and resources on the infectious disease threats of the day. One hundred years ago that meant helping overcome the scourge of "black measles" which was striking down settlers in Western Montana's Bitterroot Valley at an alarming rate. Today, it means grappling with the more confounding health issues such as prion diseases and antibiotic-resistant bacteria. Moreover, its proven history in the study of exotic illnesses makes RML eminently positioned to play a central role in conducting research that could help safeguard the public against infectious disease threats, including a possible bioterror attack.

RML is not a clinical facility in which researchers study the effects of experimental drugs, vaccines, and diagnostics on patients and healthy volunteers. Rather, the basic research conducted at RML makes clinical research possible. By focusing on the molecular traits of a given microbe – namely, what the microbe is composed of and how it behaves in its environment – scientists are able to determine the most effective target for fighting that microbe and, from there, develop diagnostics and chemicals that could detect, treat, and generate an immune response against it for further study.

Animals in Research

The use of animals in research by the intramural programs is extensive at the NIH, which has one of the larger federal veterinary resource programs for research. Animals are accommodated in various ways. Many are currently scattered among buildings on the Bethesda and Poolesville campuses. Some are in leased space near Bethesda. Others are at NIH's Frederick, MD, Baltimore, MD, Hamilton, MT, Research Triangle Park, NC, and other satellite field locations. All NIH facilities are accredited by the American Association for Accreditation of Laboratory Animal Care (AAALAC). RML animals are held at the ABSL2 (Animal Bio-safety Level) and ABSL3 levels, and the ABSL4 level is planned for the IRF. Given the RML research mission, the need for BSL3 and BSL4 containment is greater than at other NIAID research locations. The IRF provides appropriate BSL4 animal provisions for the foreseeable future, but it is estimated the requirement for both BSL2 and BSL3 animal space will continue to increase.

Master Plan Interviews

Campus Amenities
Interviews of RML personnel revealed concerns about the character of the RML site, but not about the sufficiency of places offering opportunities for socialization and collegiality. In addition, there was a general lack of concern regarding the current availability of facilities for recreation, child care, dining and other services. The general character of the site was considered somewhat industrial by those that responded, noting that its condition detracts from the ambiance and recreational potential of the site.

Parking and Transportation
Of all the RML campus site issues, provision of adequate and convenient on-site parking for all employees and visitors was considered very important. No demand for alternative transit was identified, though it is known that some employees walk or bike to campus.

1.5 Planning Objectives

An academic campus model emerged as the appropriate tool to guide the modernization and modest growth of the NIH on its main campus in Bethesda. However, the application of this same model to the RML campus is less easily accomplished due to the more industrial character of the property as it has evolved. Nevertheless, the benefits of relying on a model in characterizing future campus growth and development are many. For example, it provides a flexible framework for phased construction of independent buildings allowing this to occur in a rational, cost-effective way while maintaining functional relationships and efficient infrastructure and circulation systems. It also provides a conceptual structure for addressing land use and development issues given the site conditions and mission considerations present at a particular location.

Although the NIH is organizationally different from a traditional American academic institution, its campuses share some of the same features of large academic institutions. It has several large self-contained installations spread over large geographic regions and even the country, and these installations are in many respects independent of each other and run their own programs. Nevertheless, they all are organized under the core unit which provides corporate guidance and key services to the individual campuses. Furthermore, programmatically, NIH's campuses are important venues for thoughtful research and study, an essential trait of places of higher learning. Finally, physically, the term "campus" implies an expression of density, scale and quality of environment which is consistent with goals NIH has generally expressed for all of its major installations. The campus model, therefore, has been adopted as the framework for the RML Master Plan. It evokes a clear image to guide future development decisions and is consistent with an overall visual identity that NIH has chosen to advance for its activities.

Due to the extensive level of existing development, the RML campus has certain constraints, but at the same time existing physical site features present opportunities that can be enhanced and incorporated successfully into the Master Plan.

The basic goals of the Master Plan are to provide the framework for:

- An attractive campus whose setting and composition promote collegial interaction and opportunities for informal collaboration and conversation. A flexible framework for development of the campus, one that can adapt to the potential needs of current and future RML and NIAID programs over time

- A campus that affords a secure, supportive, and convenient work environment for RML personnel, with amenities that enhance the quality of life for staff

- Enhanced appearance of the RML campus to complement the surrounding residential community
- Protected and enhanced natural, historic, and scenic resources at RML
- Enhanced communication about NIH goals and policies
- Environmental Sustainability/ Low Impact Development

1.6 Description of the Master Plan Concept

The Master Plan builds on the existing campus and buildings, defers in scale to the neighboring residential neighborhoods, and respects the historic areas within and adjacent to the campus.

Functional Relationships
The primary concept for relating functions on the campus is to cluster denser research laboratories in the central portion of the campus close to animal facilities. These are then flanked by support activities--administrative and supply support to the north and east and maintenance activities to the west.

Open Space
A 100' standoff/buffer zone would follow the site perimeter and would be enhanced as a landscaped open space. The Master Plan proposes surface parking at the north perimeter but no new structures within this buffer zone.

In the interior of the campus, the Master Plan proposes a Central Pedestrian Concourse with connections from the Quad and administrative support center to Buildings 13 and 25 and the IRF. This concept is well suited for creating a "campus" atmosphere with spaces and opportunities for random encounters and interaction.

Land Acquisition
The Master Plan includes the acquisition of adjacent properties to the north and northeast of the existing campus boundaries for the purposes of enhancing campus security and accommodating increased parking demand associated with planned growth. HHS approved funding for purchasing these properties in 2003.

Building Patterns
All new development is proposed to follow the orthogonal grid pattern established by the layout of existing buildings. This pattern is continued and built on with the placement of new buildings. Advantages of developing the campus on a grid system include ease of integration with existing orthogonal oriented structures, efficiency of land use, economical integration with, and extension of, the utility distribution system and the acknowledgment and further establishment of a clearly defined pattern to guide future growth.

Massing and Heights
The primary concept for building massing on the RML campus is to concentrate the two tallest structures at the center of the campus, with a transition in height to lower buildings toward the perimeter.

Circulation
The vehicular circulation concept for the campus is a loop road at the building perimeter, outside the central pedestrian area, with access to surface parking on the one side and primary building entrances on the other. There are two entries to campus, the existing staff and visitor entrance

from 4th Street near Grove Street and the service entrance from 5th and Baker Streets. A new vehicle exit is provided at 6th Street near the area planned as future expansion. This exit would only be used for campus evacuation during emergencies.

Best Management Practices/Low Impact Development

All new development would follow Best Management Practices (BMP) and Low Impact Development (LID) strategies. BMPs are defined as "physical, structural and managerial practices that, when used individually or in combination, prevent or reduce pollution of water and attenuate peak flows and volumes.

LID is an alternative, ecologically-sensitive design that mimics the way natural areas store and infiltrate rainwater. The LID approach protects local and regional water quality by decentralizing storm water management and absorbing rainfall throughout the landscape. LID minimizes the amount of impervious surfaces and mitigates the impact of necessary impervious surfaces. There are a variety of conservation practices that work together to mitigate these effects, such as pervious paving, rain gardens, bio-retention cells, bio-swales, native landscaping, and soil quality restoration.

Source Data: Oudens + Knoop Architects, PC

NIH-RML Master Plan

Hamilton, Montana

B Veterinary Branch
C Maintenance
D Long Term Storage Facility
E Short Term Storage Facility
F Generator Expansion/Centralization
G Research Laboratory
H Central Stock Room
J Seminar Room
K Interpretive Center

Property Line
Fence
Central Pedestrian Concourse

Figure 1.1

Illustrative 20 year Master Plan

NIH/ORF/DFP

LSY Architects

Oudens + Knoop Architects, PC

Chapter Two
Introduction and Program Requirements

2 Introduction and Program Requirements

2.1 Introduction

The National Institutes of Health (NIH) is the focal point of the federal government for health research and one of the world's foremost biomedical research institutions. Its mission is to discover new knowledge that will lead to better health for all. To achieve that mission, the NIH invests over $28 billion annually in medical research for the American people.

More than 80% of NIH's funding is spread across almost 50,000 competitive grants awarded to more than 300,000 researchers at over 3,100 universities, medical schools, and other research institutions in every state of the Union and around the world.

Of its remaining budget, about 10% of NIH's funds support projects conducted by nearly 6,000 scientists in laboratories on the Bethesda campus and at other NIH Intramural facilities including RML. In addition, approximately 1,500 studies are in progress at the NIH Clinical Center at Bethesda. Most of these are Phase I and Phase II clinical trials.

Research is conducted at both the basic and clinical levels, encompassing studies related to the prevention, diagnosis, treatment and cure of diseases that afflict men, women and children around the world. In addition, the basic research supported by NIH provides the foundation for the nation's pharmaceutical and biotechnology industries. As one measure of the agency's excellence in research, at last count, NIH-supported investigators had won over 113 Nobel Prizes (between 1939 and 2004).

2.2 Authorization & Applicability

The Rocky Mountain Laboratories (RML) Master Plan and accompanying Environmental Impact Statement (EIS) have been prepared in accordance with the requirements of the HHS Facilities Program Manual, Section 3-1, Facility Master Planning.

Oudens + Knoop Architects PC, a subcontractor to LSY Architects under a contract with the NIH, prepared the plan in collaboration with NIH's Division of Facilities Planning (DFP)/Office of Research Facilities Development and Operations (ORF)/NIH, and leadership at NIAID and RML.

2.3 Purpose and Scope of the RML Master Plan

There is no official master plan for RML. Nevertheless, the recent construction of the new Integrated Research Facility (IRF), current physical security requirements, growing concerns in the Hamilton area about growth and effects on natural resources, and increased interest within the local community about activities on the RML campus have made clear the need for a coordinated plan for future development of the site.

In order to accomplish the NIH mission, it is imperative that NIH establish and maintain long range facilities plans to address issues such as facility requirements, prudent land use and orderly future development. This need has become even more evident at RML in light of key projects and programs, planned, underway, soon-to-be-completed or recently completed on the RML campus. These include: the IRF, also designated as Building 28; physical security improvements along the campus perimeter, including perimeter site barriers; a Shipping and Receiving Building, also designated as Building 29; a new Visitors' Center, also designated as Building 30: and Building 31, a replacement building for activities now too close to the perimeter to provide adequate protection.

The objective of this Master Plan is to provide a guide for the reasoned and orderly development of the RML campus, one that values and builds on existing resources, corrects current deficiencies and meets changing needs through new construction or renovation. The plan sets forth implementation priorities and a logical sequencing of planned development.

The Master Plan is not intended to be a specific design and construction program, but rather a framework within which design and construction can occur for actual projects over the next 20 years as the programmatic needs upon which the plan is based arise.

Nor does it attempt to anticipate unpredictable budgets, or congressional and presidential priorities and mandates. The objective has been to base the Master Plan solely on the NIH's best estimate of where the science is going on the premise that the more inclusive the plan, the more receptive it will be to a variety of future development possibilities. The Master Plan does not represent the pre-approval of any individual facilities project nor the particular needs of specific programs to be accommodated on the campus since the financing of such programs must be addressed within the annual Department of Health and Human Services (HHS) budget processes and the HHS Capital Investment Review Board mechanisms.

A coordinated planning effort is underway to better integrate future NIH programs to optimize the use of the Bethesda main campus and to fully exploit the strengths of the other NIH installations such as the National Institute of Allergy and Infectious Disease's RML campus; the National Cancer Institute-Frederick facility at Fort Detrick, MD; and the National Institute of Environmental Health Sciences' facility at Research Triangle Park, North Carolina.

RML's Master Plan covers a 20-year planning period, with 2005 as the baseline condition. Personnel and space estimates are based on phases. The NIH intends to continue to update its master plans, as required, in approximately 5-year intervals.

2.4 Historic Overview and Background

2.4.1 Early Public Health Initiatives

The origins of the NIH, and federal government's involvement in public health issues, can be traced to the mid-nineteenth century in America. Today, NIH, with its main headquarters and Intramural Research facilities located on a 308-acre campus in Bethesda, MD, continues to serve the nation by providing state-of-the-art research and patient care facilities.

Because little was known about medicine or scientific methods in the eighteenth century, the Constitution includes no provisions for federal government involvement in public health. Although government provisions were made for Marines and U.S. Navy officers and seamen in 1798-99, the health issues of the general public were largely ignored. From the time the nation was founded through the early nineteenth century, illness was considered to be primarily an individual concern. When epidemics struck communities, local leaders would often form temporary committees to deal with the crises. By the mid-nineteenth century, as immigrants poured into America, slum conditions in major cities were thought to be the cause of many diseases and conditions. Squalid conditions encountered by troops and their effects on the soldiers' health during the Civil War also contributed to what was at the time termed "sanitary science."[1]

In 1872, various interested parties formed the American Public Health Association. Members hoped to assist the federal government in establishing a national bureau that would promote knowledge of the most recent advances in sanitary science. Other organizations, such as the

[1]Victoria A. Harden, *Inventing the NIH: Federal Biomedical Research Policy, 1887-1937*, Baltimore and London: The Johns Hopkins University Press, 1984, pp. 9-10.

American Medical Association, were also promoting a similar idea, citing the need for a central agency that could coordinate public health programs and provide funding and broad dissemination of knowledge.[2]

2.4.2 Establishment of the National Institutes of Health

Following the devastating yellow fever epidemic in the Mississippi Valley in 1878, Congress established a National Board of Health, which was the first government institution to award grants for medical research. However, the Board was short-lived, lasting only until 1883, when its appropriation expired. After a lapse of several years, the Marine Hospital Service (later renamed the Public Health and Marine Hospital Service) established the Hygienic Laboratory in 1887 in Staten Island, New York, with the express purpose of studying bacteriological disorders such as cholera. While the focus of the initial research was on disorders affecting seamen, the Laboratory assumed a large responsibility in 1890 for common ailments among the immigrant population.[3]

After four years, in 1891, the Hygienic Laboratory needed additional space for research and moved to Washington, D.C., in offices across from the U.S. Capitol. However, in 1895, once again more space was needed and the Laboratory moved to the Old Naval Observatory at 25th and E Streets, NW, a five-acre parcel near the National Mall that provided space to keep research animals. During this time, the Laboratory work focused on infectious diseases because of their powerful threat to public health.

In 1912, the governing agency of the Hygienic Laboratory, the Public Health and Marine Hospital Service, was renamed the Public Health Service, indicating that the primary concern of the agency was the public's health and well-being. Throughout World War I, research concentrated on the needs of military troops, but the public benefit of the research was also a goal.

Realizing the importance of the work of the Hygienic Laboratory, Congress passed the Ransdell Act in 1930 which designated the Laboratory as the National Institute of Health (NIH). Authorized to construct research facilities and create a system of research fellowships, the program at the NIH expanded rapidly, and space for conducting experiments as well as additional facilities to house experimental animals were needed.

2.4.3 NIH Moves to Bethesda

The philanthropy of Luke and Helen Woodward Wilson, who made a series of land donations to the federal government between 1935 and 1948, proved the catalyst for the NIH's move to Bethesda, MD, and its subsequent development into one of the world's leading biomedical research institutes.

During the Depression, in the mid-1930s, the Wilsons expressed an interest in donating a portion of their estate to the federal government, if a worthy use could be found. The Wilsons were directed to the National Institute of Health, which was then searching for a farm site on which to raise animals for research purposes. Initially, the new campus at Bethesda was meant to be simply one animal unit building, leaving the main research functions in Washington, D.C.[4]

2.4.4 Research and Growth at NIH

During World War II, research at the NIH focused on the war effort, much as it had during World War I. Much of the new medical research and information disseminated during this period was

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[2]Ibid., p. 11.

[3]Ibid., pp. 12-13.

[4]Dorothy Pugh, "The National Institutes of Health," excerpted from *The Montgomery County Story*, 1987, p. 3.

connected with NIH, which was given bureau status within the Public Health Service in 1943. Although NIH was still responsible for much of the research relating to infectious diseases, its scope was enlarged to include fundamental medical research into cancers, heart conditions, stroke, and mental illness.[9] To reflect the diversity of NIH research, it was renamed the National Institutes (plural) of Health in 1948.[10]

2.4.5 The National Institute of Allergy and Infectious Diseases (NIAID)

As described in Chapter 1, the National Institute of Allergy and Infectious Diseases (NIAID) traces its origins to a small laboratory established in 1887 at the Marine Hospital in Staten Island, N.Y. The laboratory was set up to address cholera and other infectious diseases carried by new U.S. immigrants who arrived during the 1880s.

Dr. Joseph Kinyoun's small Staten Island laboratory, which was known as the Laboratory of Hygiene at the time, was renamed the Hygienic Laboratory in 1891 and moved to Washington, D.C., where Congress authorized it to investigate "infectious and contagious diseases and matters pertaining to the public health." As previously noted, the Hygienic Laboratory became the National Institute of Health in 1930 and relocated to Bethesda, MD, in 1938.

The Rocky Mountain Laboratory was established in 1902. The Laboratory became part of NIH's Division of Infectious Diseases in 1937. In mid-1948, the Biologics Control Laboratory and the Division of Infectious Diseases, joined with NIH's Division of Tropical Diseases to create two of the four units of the new National Microbiological Institute.

Dr.Victor Haas was the Institute's first Director. In 1955, Congress changed the Institute's name to the National Institute of Allergy and Infectious Diseases to reflect the inclusion of allergy and immunologic research.

2.4.6 The Rocky Mountain Laboratories (RML)

About the time the Hygienic Laboratory was created, other doctors far from the mid-west were struggling against a little understood disease. As the population expanded westward, many early settlers in the Montana foothills of the rugged Bitterroot Range of the Rocky Mountains were plagued with a disease known as "black measles," or "spotted fever," now known as Rocky Mountain Spotted Fever. In 1902, the U.S. Public Health Service sent out a research team to find the cause. Tents, cabins, and an old schoolhouse were used for housing the nascent lab, the predecessor to RML, where researchers determined that the disease was transmitted by ticks, identified the cause as what is now called Rickettsia rickettsii, and formulated a vaccine against the agent. In gratitude, the State of Montana in 1928 built a new facility for RML in Hamilton, MT, which the Public Health Service then purchased in 1931.

In 1937, RML became part of the National Institute of Health. During World War II, the laboratory joined in the war effort by becoming a "national vaccine factory" producing vaccines to protect soldiers against spotted fever, typhus, and yellow fever. After the war, work at the lab returned to its primary mission of basic scientific research of infectious diseases. In 1948, the National Institute of Health was reorganized into the National Institutes of Health, and RML became part of National Microbiological Institute. In 1955, Congress changed the name of the Microbiological Institute to the National Institute of Allergy and Infectious Diseases (NIAID).

RML remains an active NIH/NIAID facility. It is one of the NIH facilities that conduct biodefense research.

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[9] J.E. Rall, "Epilogue," in *NIH: An Account of Research in Its Laboratories*, London: Academic Press, 1984, p. 537.

[10] *National Institutes of Health 1995 Master Plan*, Chapter 2, Page 6.

2.5 The NIH Organization

The NIH is one of eight health agencies in the U.S. Public Health Service (USPHS) which, in turn, is a component of the U.S. Department of Health and Human Services (HHS).

The Office of the Director

The NIH Director provides overall leadership of NIH activities in both scientific and administrative matters. Although each Institute within the NIH has a separate mission, the NIH Director plays an active role in shaping the agency's research agenda and outlook. With a unique and critical perspective on the mission of the entire NIH, the Director is responsible for providing leadership to the Institutes in determining needs and identifying opportunities, especially in areas concerning trans-NIH initiatives and those affecting multiple Institutes. Within the Office of the Director, scientific research generally falls into one of two categories: the Extramural Research Program which financially supports researchers and organizations outside the NIH through grants, contracts or cooperative agreements; and the Intramural Research Program which oversees research, training and technology transfer performed within NIH's own laboratories and clinics. The following is a list of the Office of the Director components with certain components of more relevance to the RML Master Plan shown in greater detail:

ADMINISTRATION AND SERVICES

Executive Office
Serves in both a staff and operational capacity for all administrative support activities for the Office of the Director, excluding the Office of Research Services.

The Office of Equal Opportunity and Diversity Management
Advises the NIH Director and staff on matters related to equal employment opportunity programs and policies of the NIH.

NIH Ethics Office
Deals with standards of ethical conduct for federal employees. The NIH Ethics Program includes the central NIH Ethics Office and the individual ethics programs in each of the ICs.

The Office of Management
Advises the NIH Director and staff on all phases of NIH-wide administration and management.

Office of Research Facilities Development and Operations (ORF)
Supports NIH priorities by providing safe, secure, sound, healthy, and attractive facilities and space

- **Division of Facilities Planning (DFP)**
  DFP coordinates and manages all site and facility planning activities related to NIH owned and leased locations. Some of DFP services are: setting the NIH definitions of space; assigning building space to ICs on the Bethesda and Poolesville campuses; preparing the NIH five-year strategic facilities plan; conducting the annual NIH census and maintaining the NIH real property inventory which serves as the official NIH data for HHS reporting purposes, rent collection, and IC space planning activities; master planning NIH's campuses; assembling information on and providing controlled access to NIH floor plans, room data, and related reports; and providing assistance to ICs in requesting space.

- **Division of Environmental Protection (DEP)**

  DEP works to protect and enhance the NIH environment. In addition to an Office of the Director, DEP includes three divisions: the Environmental Compliance Branch, which serves as the focal point for regulatory inspections and required environmental permits and plans; the Environmental Quality Branch, which is responsible for the supervision, management, and conduct of the environmental quality program at NIH, and the preparation of environmental documents such as environmental impact statements; and the Waste Resource and Recovery Branch, which is responsible for the supervision, management, and conduct of the waste management program at NIH.

Office of Research Services (ORS)
Provides laboratory safety, radiation safety and occupational medical services, police, fire protection, and emergency planning services, veterinary resources, library services, events management assistance, travel and transportation support, services for foreign scientists, and programs to enrich and enhance the NIH worksite.

PROGRAM COORDINATION

The 27 NIH ICs, all of which either conduct or support scientific research, are managed and coordinated by the Office of the Director, NIH. They are as follows:

INSTITUTES
National Cancer Institute
National Eye Institute
National Heart, Lung, and Blood Institute
National Human Genome Research Institute
National Institute on Aging
National Institute on Alcohol Abuse and Alcoholism
National Institute of Allergy and Infectious Diseases
National Institute of Arthritis and Musculoskeletal and Skin Diseases
National Institute of Biomedical Imaging and Bioengineering
National Institute of Child Health and Human Development
National Institute on Deafness and Other Communication Disorders
National Institute of Dental and Craniofacial Research
National Institute of Diabetes and Digestive and Kidney Diseases
National Institute on Drug Abuse
National Institute of Environmental Health Sciences
National Institute of General Medical Sciences
National Institute of Mental Health
National Institute of Neurological Disorders and Stroke
National Institute of Nursing Research
National Library of Medicine

CENTERS
Center for Information Technology
Center for Scientific Review
John E. Fogarty International Center
National Center for Complementary and Alternative Medicine
National Center for Minority Health and Health Disparities
National Center for Research Resources
Warren Grant Magnuson Clinical Center

2.6 The Master Plan Goals and Objectives

. The NIH, with the NIAID and RML, seeks to accomplish its mission by:

> Fostering fundamental discoveries, innovative research, and their applications in order to advance the Nation's capacity to protect and improve health;
>
> Developing, maintaining, and renewing the human and physical resources that are vital to ensure the Nation's capability to prevent disease, improve health, and enhance quality of life;
>
> Expanding the knowledge base in biomedical and associated sciences in order to enhance America's economic well-being and ensure a continued high return on the public investment in research; and
>
> Exemplifying and promoting the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science.

The Master Plan supports these mission implementation strategies by providing a framework for future development based on the following planning goals and objectives:

GOAL 1
An attractive campus whose setting and composition promote collegial interaction and opportunities for informal collaboration and conversation

> Develop a comprehensive program and Master Plan that supports the long term goals and missions of NIAID, RML, and the NIH as a whole.
>
> Stimulate interaction and communications among scientists and staff to enhance quality of research and opportunities for interdisciplinary collaboration through adjacency of uses and creation of formal and informal meeting and gathering spaces on campus.
>
> Create a flexible development plan that will allow for changing program needs in the future.

GOAL 2
A flexible framework for development of the campus, one that can adapt to the potential needs of current and future RML and NIAID programs over time

> Establish a comprehensive and coordinated approach to physical development and orderly growth of NIH facilities.
>
> Develop building sites, open space, and circulation systems that will ensure appropriate campus facility utilization, functional land use and efficient accommodation of future program requirements.
>
> Enhance campus function, efficiency and character through better definition of land use and functional relationships.
>
> Identify patterns of existing development and factors which potentially limit future development.

Define an achievable development strategy.

GOAL 3
A campus that affords a secure, supportive, and convenient work environment for RML personnel, with amenities that enhance the quality of life for staff

The majority of people on the RML campus fall into the following categories: scientists and professional/administrative staff, visitors and other non-RML users.

Facilitate the security, safety and well-being of those who work, or visit RML by constructing site perimeter barriers, effectively screening for contraband and mitigating vulnerabilities through campus and building design.

Enhance the quality of the research and work environment and overall campus quality.

- Preserve the integrity and build upon the desirable qualities of the RML campus.
- Provide guidelines for use of native landscapes and improving the quality of landscaping.
- Provide accessibility to campus facilities for persons with disabilities.
- Improve and enhance the pedestrian environment and linkages, and create a pedestrian scale within the larger site.
- Preserve and enhance structures with established historic and cultural value.
- Develop a recognizable landscape system that enhances the quality and character of the campus.
- Increase the ease of orientation and direction-finding around the campus.
- Improve pedestrian and bicycle movement on campus.
- Define and communicate building character and scale to achieve a perceivable and attractive identity.
- Provide for the convenience and safety of employees and the neighborhood through sensitively designed site lighting and security measures.

GOAL 4
Enhanced appearance of the RML campus to complement the surrounding residential community

Conserve and enhance the campus perimeter zones, especially bordering residential areas.

Coordinate with and respond to various regulatory and review agencies that have responsibility for or interest in activities on the campus.

Engage the RML, local agencies, and the community in an active dialogue concerning Master Plan premises and concepts.

Establish the scale and height of future RML facilities to limit adverse impact on adjoining neighborhoods or cultural resources.

Minimize future construction near adjacent residential neighborhoods.

Protect adjoining neighborhoods from excessive impacts of RML traffic, parking, noise, and lighting.

Endeavor to ensure that the RML and its activities do not contribute to security or safety issues in adjoining neighborhoods.

Incorporate native landscape techniques.

GOAL 5
Protected and enhanced natural, historic, and scenic resources at RML

Identify and build upon the unique environmental qualities of the campus and enhance existing and native landscaping and vegetation.

Enhance campus design to encourage greater RML employee use of bicycles and walking as alternate commuting modes.

Improve bicycle circulation on the campus.

Promote efficient use of all natural resources.

Improve management of storm water runoff and lessen water quantity impacts and water quality impacts with the objective of raising conditions above the minimal state requirements, where possible.

Reduce noise in adjacent off-site residential areas caused by campus sources including but not limited to mechanical equipment, vehicular traffic, and construction activities.

Improve facilities for storage and handling of hazardous materials.

Encourage sustainable and environmentally-sound development that is sensitive to surrounding neighborhoods and adjacent natural areas.

GOAL 6
Enhanced communication about NIH goals and policies.

Encourage active dialogue among NIH management, the scientific community and the NIH staff, to foster a better understanding of the ramifications of proposed development policies and plans.

Encourage continuing active dialogue among NIH and the surrounding community as well as local, state, and federal agencies to resolve campus land use and development issues that affect the community and region.

2.7 Planning Methodology/Format

The RML Master Plan consists of six chapters. Chapter 1 is the Executive Summary. Chapters 2, 3 and 4 provide background on NIH, NIAID, and RML, the goals for the Master Plan, staff population and space projections, and descriptions of regional and local campus conditions.

Chapter 5 describes the Master Development Plan and implementation phasing. Chapter 6 provides Master Plan Development Guidelines.

Chapter 1 - Executive Summary

Chapter 2 - Introduction and Program Requirements
This Chapter provides background and organizational information, defines the approach to the Master Plan, establishes the planning premises and identifies programmatic requirements in terms of personnel and physical facilities. It discusses the relationships between the RML Master Plan and other long range NIH planning activities. It also places the Master Plan in the context of the federal government-wide focus on enhancing physical security at its facilities.

Chapter 3 - The Community Context of the Hamilton Campus
This chapter provides an overview of the regional setting, places the RML campus in the context of existing and future land use patterns. It discusses the context of Hamilton, the Bitterroot Valley, and Ravalli County. The context reflects the latest NIH statistics and, where available, data from the 2000 Census and other official sources. Important aspects of the utility services, population and economy, cultural assets, and other research facilities are identified.

Chapter 4 - Baseline Conditions on the RML Campus
Field survey information from 2005 forms the baseline on which the campus has been evaluated. The baseline resource analysis determines the major development features on the RML campus. The chapter also identifies natural and man-made elements which affect potential uses, such as physical features of the site, climate, environmental features, existing land use, utilities, historic/archaeological features, amenities and visual quality, and site constraints and opportunities.

Chapter 5 - The Master Plan for the RML Site
The fifth chapter outlines the Master Development Plan, including the specific proposals planned for the campus over the next twenty years, concepts and standards for future development, the distribution of land uses, the location of new buildings, the relationships between utilities and new development, provisions for open space, new circulation and parking plans and implementation priorities and strategies.

While primary emphasis in the plan is placed on clarifying long-range development patterns, short- and mid-range opportunities are also identified. Sufficient refinement is provided to determine the character and significance of these projects.

Chapter 6 – Development Guidelines
This chapter provides long-range guidelines for the development of building and site projects set forth in the Master Plan.

2.8 Summary of Program Findings

2.8.1 Introduction
As part of this Master Plan, functional and personnel needs over the next 20 years were projected by RML staff during initial programming interviews and in subsequent discussions. Space needs for buildings not yet in the programming or planning stages were estimated, for master planning purposes, based on these personnel projections. Actual allocations of space to scientific staff will be made by NIAID as the needs of specific research programs and the facilities needed to accommodate them are determined.

While this Master Plan is based on relatively specific estimates for growth and change in campus population and facilities over the next 20 years, based on the scientific programs and missions of the NIAID/RML, potential campus development is subject to available funds and priorities set by

HHS and future congressional and presidential policy decisions, as well as federal budgetary constraints. Also, changes in national health policy are expected to occur over the next decade as they did over the previous one, and NIH's mission could be significantly affected as a result. The Master Plan provides guidance on how change and development would take place on the RML's campus, when and if it occurs over the next 20 years and beyond.

2.8.2 Mission

Institutes generally can be categorized by the orientation of their funding of biomedical research:

by disease; for example, the National Cancer Institute (NCI); NIAID; or the National Institute of Neurological Disorders and Stroke (NINDS). In recent years, NIH has developed "Centers" for research on a disease or disorder where multiple ICs participate, such as the Porter Neuroscience Research Center and the Dale and Betty Bumpers Vaccine Research Center, both of which are located on the Bethesda campus.

by body organ or system; for example, the National Heart, Lung and Blood Institute (NHLBI); the National Eye Institute (NEI); or the National Institute of Dental and Craniofacial Research (NIDCR).

by population group; for example, the National Institute on Aging (NIA); the National Institute of Child Health and Human Development (NICHD); or the National Institute on Drug Abuse (NIDA).

by research discipline; for example, the National Institute of General Medical Sciences (NIGMS); the National Human Genome Research Institute (NHGRI); or the National Institute of Nursing Research (NINR).

Centers provide services to the Institutes. Although there are no Centers on the RML campus, the researchers at RML may draw from the resources of one or more Centers in Bethesda. For example, the Warren Grant Magnuson Clinical Center (CC) and the Mark O. Hatfield Clinical Research Center (CRC) provide the environment for clinical researchers in the Intramural Research Programs of most Institutes to translate laboratory research into applications that benefit patients. The National Center for Research Resources (NCRR) has the responsibility to develop critical research technologies and provide cost-effective, multidisciplinary resources to biomedical investigators across the spectrum of research activities supported by the NIH.

The Office of the Director of the NIH, as noted previously, provides general management and policy direction for the NIH as well as specific services such as research support, personnel, physical security, fire and life safety, procurement, planning, design, construction, maintenance and operations.

2.8.3 Organization and Programs

The most significant organizational feature of most Institutes - for purposes of master planning - is their division into Intramural and Extramural Research functions. Centers may be similarly divided or may have organized their services to the Institutes to correspond to Extramural/Intramural functions.

2.8.4 Locations and Proximities

In addition to the NIH main campus and leased facilities in Bethesda, MD and NIAID's long standing presence in Hamilton, MT, other NIH facilities include:

The National Institute on Aging (NIA) at the Gerontology Research Center (GRC), and the National Institute on Drug Abuse (NIDA) and NIA in the recently completed Biomedical Research Center on Johns Hopkins Bayview campus in Baltimore, MD;

NCI-Frederick and NIAID, which occupies a portion of the Ft Detrick campus, both of which are in Frederick, MD;

Animal breeding and various Institute Intramural Research programs at the NIH Animal Center in Poolesville, MD; and
NIEHS' campus at Research Triangle Park, North Carolina.

2.8.5 Training

Training biomedical research personnel is a major part of the NIH mission, and training programs exist in most ICs within both Intramural and Extramural programs. On the Bethesda campus extensive seminars, lectures, and conference programs conducted within all ICs generate a need for conference space. RML also conducts on-site scientific and other training programs, generally in the large conference room in the Quad. RML is also able to participate in on-line conferences broadcast from Bethesda and other NIH locations, and RML personnel oftentimes travel to Bethesda, when appropriate, for training and conferences.

2.8.6 Animals in Research

Animal use in research by the Intramural programs is extensive at the NIH which has one of the largest veterinary resource programs for research anywhere. For Intramural Research, animals are scattered among buildings on the RML campus, but are primarily in Building 13, Building 25, adjacent to the new IRF, and in the IRF itself, once operational.

To one degree or another, most Institutes, including NIAID, procure, house, breed and manage some inventory of their own animals, while other animals are under the management of the ORS, Division of Veterinary Resources (DVR). Animals at RML are under the management of the Rocky Mountain Veterinary Branch (RMVB). All NIH animal facilities are accredited by the American Association for Accreditation of Laboratory Animal Care (AAALAC). In terms of trends, fewer large animals are being used in biomedical research in most programs, and scientists strongly prefer having the smaller research animals near the laboratory, whenever possible.

2.8.7 Growth

The primary growth at the RML campus is expected to be in Intramural Research personnel, beginning with the completion of the IRF. Total 2005 campus population is 336, inclusive of anticipated total IRF staffing. The total estimated population at the end of the 20-year planning period is projected to be 427.

Future areas of research are difficult to predict; research is either investigator-initiated or congressionally-mandated in response to public concerns. The IRF reflects the current emphasis on research in the area of biodefense. The NIAID conducts and supports much of the research aimed at developing new and improved medical tools against potential bioterrorism agents. Since 2001, NIAID has greatly accelerated its biodefense research program, launching several new initiatives to catalyze development of vaccines, therapies, and diagnostic tests.

In terms of growth, a certain amount is driven by the public, the Congress, and the White House. Since all Institutes receive their own appropriations, congressional priorities are, of course, reflected.

2.8.8 Long Range Plans

NIAID, like other ICs, has formal long range strategic plans in place or under development, and these can be viewed on the NIAID website at the following address: http://www3.niaid.nih.gov/

2.8.9 Technology

Biomedical research is technology intensive, and, in addition to complex scientific and medical technologies, all components of the NIH use computers extensively. The Center for Information Technology (CIT) not only provides one of the computer mainframes central to the NIH, it also assists many ICs, including NIAID and RML, in computer use, training, adaptation of off-the-shelf software and development of new applications. It also provides computer services to 30 other federal agencies. The degree to which information technology has become a central part of

research at the NIH is seen by the wide range of services provided by CIT to the research community:

Applications Support
Application Hosting
Computing Services
Desktop User Services
Networking and Telecommunications
Research and Scientific Support
Web Resources

Videoconferencing technology has evolved to a standards-based architecture whose potential is being exploited throughout NIH to improve processes, to save time and money, to attract higher level review participation, and to increase the exchange of information. Videoconferencing has removed some of the inconvenience for NIH employees in locations remote from the Bethesda campus, such as RML. Current applications include grants reviews, Executive Officer meetings, staff meetings, town meetings and special events originating from NIH auditoriums. In-progress and planned applications include Telemedicine videoconferencing between the Clinical Center and research institutions for NIH medical trials and Center for Scientific Review grant reviews that currently require 450 two-day meetings of 15 participants each, plus travel time.

2.8.10 Campus Quality

As part of the interview process for the Master Plan, RML personnel were asked to address quality of life issues on the campus, such as the size, adequacy and location of buildings; and facilities for recreation, fitness, child care, and dining. Responses to the survey showed mostly favorable responses to the quality and suitability of existing buildings. Responses regarding campus amenities were mixed, and are outlined in detail in Chapter 4, Section 4.5.4.

NIH has developed guidelines for providing employee amenities and services.

2.8.11 Parking and Transportation

Since there is no public transportation available in the city or county other than modest taxicab service, most RML employees drive to work, though some do walk from nearby neighborhoods, and others bicycle. Bicycle racks are provided in several locations on the campus. While there are a limited number of designated carpool or vanpool parking spaces, there is adequate space for additional spaces, if needed. Carpool spaces are provided in premium locations as an incentive to their use.

2.9 Summary of Site Data

The following information summarizes data gathered during the RML master planning effort. All areas and parking indicated as "proposed" represent what would be needed to accommodate the population based on the IC's projection of research demand.

TABLE 2.9: SUMMARY OF SITE DATA

Site Areas

	Baseline (2005)	Proposed
Site Size :	33+ acres	36+ acres
Developed Area :	± 9 acres (27.2%)	± 17.5 acres (48.6%)
Open Area :	± 24 acres (72.8%)	± 18.5 acres (51.4%)

Population

Baseline (2005) campus population :	336
Projected Phase 1 campus population:*	400
Projected Phase 2 campus population:*	414
Projected Phase 3 campus population*	422
Projected Phase 4 campus population:*	427

***** IC projections - See Section 2.8

Building Areas

Baseline (2005) Occupied Building Area:	309,223 gsf
Minus Proposed Demolition Building Area by the end of the Final Phase:	(42,938 gsf)
Plus Proposed New Construction Building Area by the end of the Final Phase:	179,428 gsf
Equals Proposed Total Occupied Building Area by the end of the Final Phase:	445,713 gsf

Parking Spaces

	Baseline (2005) Staff Parking	Baseline (2005) Visitor Parking	Proposed Staff Parking	Proposed Visitor Parking
Total	**174**	**24**	**427**	**34**

2.10 Planning Premises

2.10.1 Population Growth

As of the baseline year of 2005, the RML campus population was 336 including 96 staff in the new IRF. Total projected population is anticipated to be 427 in 20 years. The primary growth at the campus is expected to be in Intramural Research personnel.

2.10.2 Building and Land Use

Although not specifically identified in the program areas, employee service facilities, such as facilities for fitness and recreation, may be increased to meet NIH guidelines and distributed in convenient locations on the campus to provide for employee needs wherever it is possible to include amenities in new construction budgets. Amenities are listed in the program and are based on the approved *Guidelines for Amenities and Services within NIH Facilities, December 2004*.

In accordance with Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management", RML/NIH initiated a program to incorporate sustainable features in new campus development. HHS implemented this Executive Order and NIH is charged with compliance at its facilities.

2.10.3 Open Space

A continuous open space system would continue to be developed, as much as possible, to enhance the sense of unity, order and scale on the campus. A western river-oriented park area would be created for informal as well as organized outdoor activities, although some of the zone would be inside the perimeter fence.

Landscaped elements of special value would be preserved and additional landscaping, signage, and street furniture would be developed to enhance the working environment. New landscaping should be developed based on native species that do not require continual watering.

Historic properties and environmental resources would be respected.

2.10.4 Architectural Principles

Future development would reflect historic patterns and priorities. Architectural policies and criteria will be developed and used to ensure respect for the built environment in terms of materials, style, massing, scale and color.

Development would simplify and clearly reflect overall patterns; creating a sense of order, quality and unity throughout the campus.

2.10.5 Transportation / Circulation

A well-defined campus loop road with secondary drives for service accessibility would be established to increase efficiency and protect both open space and pedestrian corridors.

The primary campus visitors' entry point would continue to be on 4th Street near Grove Street, directly into the Visitors' Center.

Some existing employee parking adjacent to major campus buildings would remain. The balance of existing and new parking needs would be met in a single consolidated lot in the north portion of the campus

Visitors' parking would remain at the visitors' center on the east side of the campus. Additional visitor parking would be available at a proposed Interpretive Center within the expanded campus boundaries.

Traffic impacts of future campus development would be mitigated on the surrounding roadways serving the campus to the maximum extent possible.

The pedestrian character of the campus, which is already conducive for pedestrian and bicycle use, would be promoted and emphasized to employees.

With some exceptions, commercial and other service vehicles are and would continue to be restricted to the service entrance at the north end of the site, and all deliveries would continue to be made at Building 29 (the Shipping and Receiving Building) where screening of all deliveries is performed. On-site service vehicles would use the campus circulation system to access delivery and service areas.

2.10.6 Infrastructure

Certain deficiencies in RML infrastructure are being corrected to maintain the quality of research conducted at the campus. This includes utility generation and distribution systems, in addition to programmatic functional requirements. Impacts of utility upgrades, such as noise, will be mitigated.

Utility and services would be developed in accordance with the RML Master Utilities Plan, currently being developed.

Future office, laboratory, and animal buildings would be designed with maximum flexibility/adaptability to facilitate change as science dictates.

2.10.7 Animal Programs

The Master Plan program includes additional animal holding facilities which anticipate occupancy of the IRF as well as other research needs. It is anticipated that a study being made of campus-wide animal holding and research requirements will further refine these requirements.

2.10.8 Management

The NIH plans to ensure continued senior management awareness and involvement in the implementation of the Master Plan

The NIH Office of the Director has established the Office of Community Liaison to work with community members to address continuing or new community concerns related to NIH campus activities. The Office of Community Liaison supports the Community Liaison Group (CLG) at RML.

2.11 Program Premises

2.11.1 Personnel Growth Estimates

Current personnel reports and personnel projections for the next 20 years, provided by RML staff and NIAID management as described in Section 2.8, are summarized in Table 2.9. This format provides the personnel basis for computing building area requirements.

2.11.2 Space Programs

- Current net and gross areas and estimated net and gross area requirements are summarized in Table 2.9. Existing net building areas are from the NIAID ARCHIBUS Database adjusted to reflect "use" rather than "ownership". The NIAID ARCHIBUS Database does not include

building gross areas. Gross building areas are from the NIH Real Property Database, which NIH adjusts quarterly and reports to HHS.

- In accordance with the *NIH Design Policy and Guidelines* (DPG) for master planning, ***Laboratory and Laboratory Support*** spaces are allocated at 180 and 90 net square feet per researcher, respectively, with a grossing factor of 1.8 to determine gross area. Actual space allocations would be made by NIAID as the needs of specific research programs are determined.
- ***BSL3 Laboratory*** spaces are programmed based on needs described in the interviews with research staff. These are shared by researchers and considered to be shared support rather than assigned space.
- ***Office*** space per tenant is allocated, in accordance with direction given by the Steering Committee, at 100 net square feet for laboratory chiefs, principal investigators and administrative staff and 60 net square feet per person for post-doctoral fellows.
- ***Conference/Library, Storage and Staff Break and Locker*** spaces are programmed in accordance with *NIH Lab Administrative Space Recommendations, dated June 1991.*
- ***Director's Reserve*** is programmed as laboratory space assigned from time to time, at the discretion of the Director, DIR, NIAID for temporary research accommodation pending provision of permanently assigned space.
- ***RMVB and Administrative Services*** are programmed based on staff interviews and responses to program questionnaires.
- ***Amenities*** are programmed by type and square footage based on the approved *Guidelines for Amenities and Services within NIH Facilities, December 2004*.
- ***Support Space*** is programmed based on staff interviews and responses to program questionnaires. Also included in this category are security-related support facilities such as the Visitors' Center and the Shipping and Receiving Building which complete the perimeter security system. Associated guard houses at the various gates are not tabulated in the areas.

2.12 Security Considerations

2.12.1 Background

The RML campus is a federal installation, and potentially vulnerable to various kinds of threats. The campus, though it has long had a perimeter fence, has maintained an open, academic-like character in deference to the spirit of intellectual interaction, and access to the public with which the NIAID does business. Several buildings are frequented by visiting scientists, scholars, and an array of trades people, messengers, contractors and others throughout the business day. The campus is also the site for meetings of researchers, academicians and others. The addition of conference facilities would increase the number of visitors to the site.

Following the April 1995 bombing of the Alfred P. Murrah Federal Office Building in Oklahoma City, the Department of Justice was tasked with developing a "Vulnerability Assessment of Federal Facilities" which was released in June 1995. Immediately thereafter, former President Clinton in a Presidential Directive, ordered all agencies to begin a security upgrade process, and in October of the same year, by Executive Order 12977, established the Interagency Security Committee to develop and ensure compliance with government-wide physical security criteria.

NIH developed its Security Assessment in response to the Presidential Directive in August 1995, but the absence of significant new physical security funding delayed action by nearly all federal agencies. In summer 2001, the HHS Office of the Inspector General reviewed the RML campus physical security and made recommendations for physical and operational security improvements which have largely been implemented. These include:

Improved perimeter security by: installing a more secure perimeter fence with a limited number of controlled entry and exit points;

Constructing a visitors center and parking facility;

Installing additional surveillance and new barriers;
Improved staffing of security;
Constructing a centralized shipping, receiving and storage facility;
Improved interior building security; and
Improved security planning.

2.12.2 Specific Measures

A perimeter fence surrounding the entire campus with vehicular and pedestrian gates has been completed.

Gates provide access for employees and visitors on foot or bicycle at the east side of the campus entering from 4th Street. Employees and their vehicles are screened in various modes depending on the Alert Level issued by the Department of Homeland Security (DHS). Generally, visitors, including most vendors, arriving at this location park in the special visitors' lot, and proceed to the interior of the campus after screening in the Visitors Center, and walk or are driven to their destinations. Visitors' vehicles are proposed to remain in the parking lot outside the perimeter fence.

Protective barriers of various kinds against vehicle ramming have been provided at entrances and other areas of potential vulnerability.

A centralized shipping, receiving and storage facility with screening capabilities has been completed in the northeast corner of the property with a separate gate and sally-port arrangement to control access by commercial vehicles. Generally, commercial deliveries are off-loaded at the Shipping and Receiving Building, screened, and delivered by government-owned vehicles to the interior of the campus.

2.12.3 Security Management

Improved security planning, staffing and operations have been enhanced by the creation of a Division of Security and Emergency Response (SER) under the Office of Research Services (ORS) in the NIH Office of the Director.

All NIH physical security programs are addressed through and by organizational entities in the SER service cluster. The Associate Director for Research Services is the Security Officer for NIH, who is advised by a Security Operations Advisory Committee.

The SER combines emergency management, security planning and management, police, fire fighting and prevention, and crime prevention activities within a single, full-service organization which ensures that all emergency incidents are coordinated and controlled through and by a single entity, sharing available resources to provide optimal services to the NIH nationwide.

The NIH Division of Police is a highly trained full service federal police agency with exclusive jurisdiction on the RML enclave. The Division of Physical Security Management, composed of specially trained Security Specialists, performs security reviews of all NIH buildings and facilities nationwide on a continuing basis. All security measures, including locking hardware, electronic access systems, and other physical plant protection devices as well as operational procedures, are reviewed continuously to identify security vulnerabilities. Improvements are made as necessary to ensure that protective measures in place are consistent with any identifiable risks to persons or property.

The access to certain areas within buildings, such as those containing hazardous materials or processes, animals and sensitive research, and to building entrances after hours, is controlled by centrally-monitored systems.

Crimes of violence have been extremely rare on NIH campuses, and the probability of violent threats, when discussed, is typically from external causes.

NIH's SER regularly performs security surveys of its buildings, and maintains liaison with other law enforcement agencies in Hamilton, Ravalli County, the State of Montana and federal agencies within the state for mutual assistance, when needed.

The SER service cluster also provides: (1) coordination of all emergency response services for fires, rescues and medical emergencies, and hazardous materials incidents,

with local emergency response agencies, especially the City of Hamilton volunteer fire department, and adjacent communities as appropriate. (2) fire protection and prevention activities including fire protection engineering services and, (3) emergency preparedness direction and coordination for the NIH.
The NIH Division of the Fire Marshal acts as the "Authority Having Jurisdiction" in all matters affecting fire and life safety at the RML.

2.13 Relationship to the Environmental Impact Statement

The National Environmental Policy Act (NEPA) of 1969, as amended, 42 U.S.C. §§ 4321 et seq., commits federal agencies to "…utilize a systematic, interdisciplinary approach which will ensure the integrated use of natural and social sciences in planning and decision-making that may have an impact on the human environment." Prior to undertaking major actions, federal agencies must identify alternatives and significant environmental issues, include economic and social impacts in the environmental analysis, and involve the public in the review of the environmental document.

The Master Plan EIS has been prepared in accordance with these directives and is a companion document to the Master Plan. As part of the Master Plan NEPA process, a Scoping Meeting was held on March 23, 2006 with jurisdictional review agencies, the general public and RML employees. As required by NEPA, a public hearing is planned to present the Draft Master Plan and environmental document, and invite comments and questions on the impacts of the plan.

2.14 Relationship to the Site Utilization Study and Campus Development Guidelines

A Site Utilization Study conducted by Architects Design Group (ADG) of Kalispell, MT was completed in 2002. This Master Plan has updated programmatic and other background material included in the study as appropriate, and has developed alternative planning approaches. The site utility information in the Site Utilization Study supplements the information contained in Chapter 4 of this Master Plan.

In June, 1995, NIH prepared RML Campus Development Guidelines in conjunction with RTKL Associates, Inc., an architectural design and planning firm. The Guidelines are general standards, which when applied to new development projects, create an organized and unified RML campus environment. The fundamental elements of the campus are described including the overall campus layout, distinctive neighborhoods within the campus, and recommended landscape and architectural treatments. The Development Guidelines are intended to promote a general level of conformance to physical planning standards and recommendations.

This Master Plan has built upon these previous studies, updated the programmatic bases, and integrated planning with current physical security requirements.

Chapter Three
The Community Context of the RML Campus

3 The Community Context of the RML Campus

3.1 Location of The Rocky Mountain Laboratories (RML) in the Region

RML is located in Hamilton, a small community in southwestern Montana approximately 46 miles south of Missoula. It is the largest city in Ravalli County and serves as the county seat. In 1998, Hamilton approved a Comprehensive Master Plan for the city, which included a Zoning Map. The Zoning Map identifies RML as a Public Institutional use which is described in the Hamilton Municipal Code as follows:

- **Public and Institutional Facilities**
  The **Public and Institutional Facilities** district establishes zoning to accommodate those public and institutional uses that are related to the health, safety, educational, cultural and welfare needs of the City. Permitted uses include colleges and schools; convention and cultural centers; churches; government-owned facilities, including fire stations, parks and playgrounds; fairgrounds; and non-profit organization facilities.

RML is bounded to a large extent by single-family residential (R-S) zoning, although there are a few scattered parcels located north and east of the campus that are either unzoned or outside the city boundaries. The land to the west is zoned single-family residential also although much of it is within the River Park and the Bitterroot River floodplain. To the south is the city boundary with bordering single-family residential properties in Ravalli County. Refer to Figure 3.1.

As federal property, the RML campus is not subject to local zoning rules. The National Institutes of Health (NIH) has briefed local officials on actions discussed in the Draft Master Plan.

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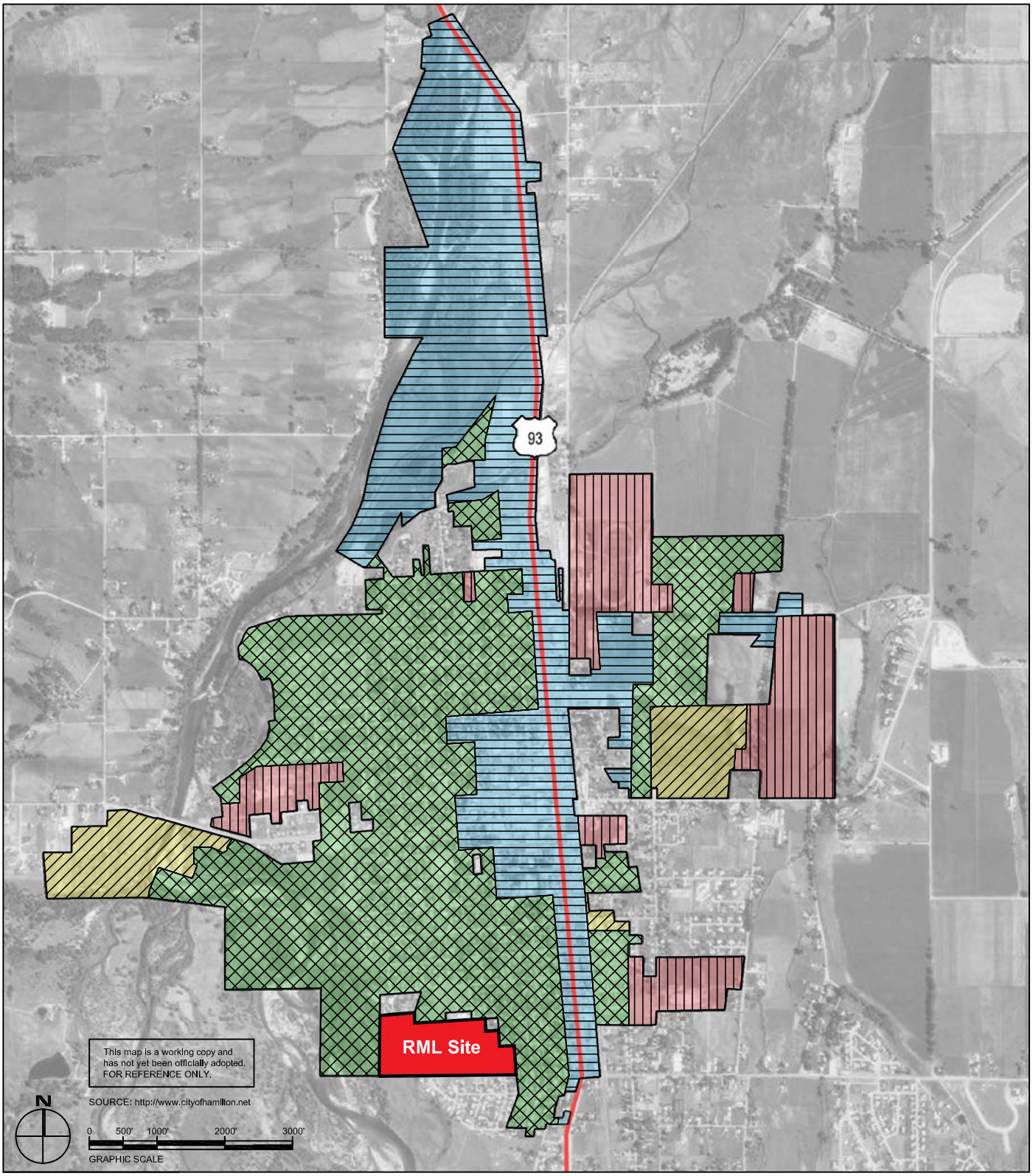
3.1.1 History – Hamilton and RML

Hamilton was founded by copper king Marcus Daly in the late-nineteenth century. As described on the City of Hamilton's web site, Daly's mines required a consistent supply of timber and a mill to support the timber operations. The town, in turn, was designed to support the mill. It is said that Daly wanted to begin business in the then county seat of Grantsdale, MT, but was denied the opportunity. He supposedly founded Hamilton out of his own pocket as a reaction to being rebuffed at Grantsdale. The town of Hamilton was incorporated in 1894 and was named after James Hamilton, a Daly employee, who platted the town along the route of the Northern Pacific Railway in 1890. When Daly died in 1900, Hamilton was the commercial center of the Bitterroot Valley and the seat of Ravalli County.

As the population expanded westward, many early settlers in the Montana foothills of the rugged Bitterroot Range of the Rocky Mountains contracted a disease known as "black measles," or "spotted fever," now known as Rocky Mountain Spotted Fever. In 1902, the U.S. Public Health Service sent out a research team to find the cause. Tents, cabins, and an old schoolhouse served as research facilities, where scientists determined that the disease was transmitted by ticks, identified the cause as what is now called *Rickettsia rickettsii*, and formulated a vaccine against the agent.

In gratitude, the State of Montana built a new facility in 1928, which the Public Health Service then purchased in 1931, resurrecting a local economy that had gone into decline.

In the summer of 2000, Hamilton made international headlines when forest fires throughout the Bitterroot Valley filled the area with smoke and prompted the evacuation of many residents. President Clinton declared a state of emergency in the area and dispatched National Guardsmen to assist with fighting the fires.



NIH-RML Master Plan
Hamilton, Montana

- Hamilton City Limits
- Commercial
- Residential
- Public Institution
- Unzoned

Figure 3.1

Existing Zoning Districts

Hamilton is home to two microbiological research and production facilities, RML and a branch of the Corixa Corporation (bought in the late 1990s from the Ribi Corporation). Glaxo Smith Kline purchased the Corixa Corporation in 2005.

3.1.2 Geography

Ravalli County is part of a north/south mountain valley bordered by the Sapphire Mountain Range on the east and the Bitterroot Mountains on the west. The Bitterroot Valley is named for the Bitterroot Flower, the Montana state flower. Hamilton, like much of the county, is adjacent to the Bitterroot River which drains the valley.

According to the U.S. Census Bureau, the county has a total area of 6,217 km² (2,400 mi²). 6,201 km² (2,394 mi²) of it is land, and 16 km² (6 mi²) is water. Only 0.25% of the total area is water.

Hamilton is located at 46°14'54" North, 114°9'35" West (46.248412, -114.159852)[GR1]. According to the U.S. Census Bureau, the city has a total area of 6.0 km² (2.3 mi²), none of which is considered water as defined by the Bureau. The Bureau's calculations exclude areas occupied by bodies of water such as the Bitterroot River. RML is immediately adjacent to the river with some floodplain and wetlands at the western end of the site. It has an altitude of approximately 3,500 feet above sea level.

Neighboring communities include Pinesdale (pop. 742) and Corvallis (pop. 443) to the north and Grantsdale (pop. Unknown) to the south. Other communities in the county are Darby, Florence, Stevensville and Victor.

3.1.3 Regional Context

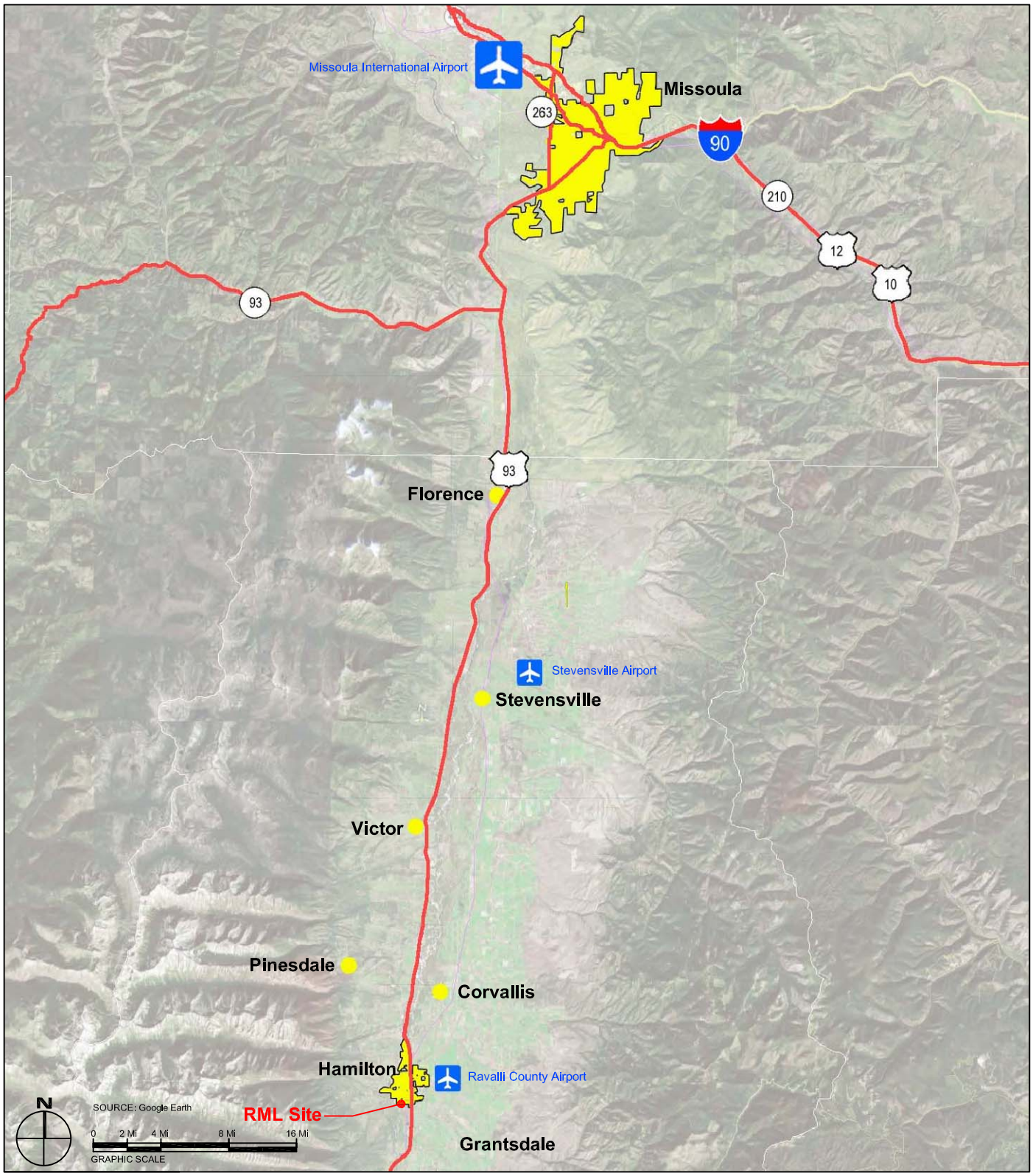
Hamilton is located in the Bitterroot Valley between the Bitterroot River and the Bitterroot Mountain Range to the west and the Sapphire Mountain Range to the east. Refer to Figure 3.1.3. The city is built along U.S. Route 93 (first street within the city), a popular route for travelers between Yellowstone and the Glacier National Park, and a seldom-used rail line operated by Montana Rail Link, Inc., both of which run north-south roughly paralleling the Bitterroot River which joins the Clark Fork River of the Columbia River Basin in Missoula, MT.

The highway is especially significant since it is the primary route to Missoula to the north and its population of over 57,000, the University of Montana main campus, the Northern Region headquarters for the U.S. Forest Service and other employment centers. Residents of Ravalli County and Hamilton regularly commute to Missoula for work.

Missoula has an international airport, though Ravalli County has a small air strip for private aircraft. In addition, Missoula contains the nearest major medical care centers with the 164-bed St. Patrick Hospital and Health Sciences Center and the 120-bed Community Medical Center which provide more facilities and care than currently available from the 25-bed Marcus Daly Memorial Hospital in Hamilton, the only hospital in Ravalli County.

Both the City of Hamilton and Ravalli County experienced rapid growth in the early part of the decade and have since adopted Growth Policies to control future expansion. Hamilton's policy was adopted in 2003 for FY 2004-2008, and Ravalli County's in 2002. The Ravalli County Growth Policy states, in part:

> Ravalli County will probably continue its rapid growth during the current decade. *"Population growth will almost certainly be governed by the rate of in-migration to the valley... The factor most affecting future growth is what will happen to perceptions of the valley's attractiveness as this fast growth continues and increasingly takes its toll on the very thing enticing more people to move to the valley- the area's scenic qualities and rural character."-* Dr. Larry Swanson.



NIH-RML Master Plan
Hamilton, Montana

Figure 3.1.3

Bitterroot Valley Area Map

And:

> If current trends continue, the county will experience more development, primarily residential, in a scattered pattern. Commercial and industrial development will likely locate near existing service centers and along major travel corridors.

According to the Hamilton Growth Policy:

> The City of Hamilton's jurisdictional area consists of 1.8 square miles of land area within the city limits. Its anticipated planning area extends several miles in all directions beyond the city limits. In general, the city is an urban community that has developed with a broad mix of land uses including housing, commercial, industrial, public, recreation and open space uses. Hamilton, to a large part, is built out within the existing city limits. The residentially zoned parcels located in the city limits are mostly infill projects. The existing commercial and industrial lands within the city limits are available for new development primarily along Route 93.

And:

> The constraints on potential land uses within the city are divided between those that are a part of the city's natural endowment, and those that result from man-made structures and activities.
>
> - **Constraints Resulting From Nature**
> Twenty-five percent (25%) of the city is within the flood hazard area. Flooding may be expected in extreme conditions in the event of a 100-year flood.
> - **Constraints Resulting From Human Activities**
> Route 93 divides the city on its north/south axis, presenting both opportunities and constraints. As a constraint, the highway literally divides Hamilton in two. However, the city has both visual and direct access from the highway as well as visual highway frontage for commercial and/or industrial users. Route 93 provides the primary source for regional access to and from the city. There are some industrial and commercial businesses located throughout the city that are involved in the processing, storage, and/or manufacture of a wide variety of goods and materials that benefit from the highway access.

Taken together, these observations suggest that the region will continue to grow along the north-south axis of the river and Route 93.

3.2 Transportation

3.2.1 Automotive

The overwhelming preponderance of travel in Ravalli County and Hamilton is made by private vehicles. However, since 1976, the Ravalli County Council on Aging (COA) has been providing a demand-response service to senior citizens five days a week using an ADA-accessible 14-passenger van. The service is headquartered in Hamilton. In addition, Valley Taxi and Mountain Taxi provide taxi service within Hamilton, and Yellow Cab, Inc. provides taxi service from Missoula. An airport shuttle is also available from the Missoula International Airport.

Ravalli County has approximately 1,450 miles of public roadways. Approximately 550 miles of these roads are maintained by the County Road Department. Of the 550 miles of roadway approximately 300 miles are paved and 250 miles are graveled.

Ravalli County Transportation Planning
The need for transportation planning and alternate modes of travel that reduce reliance on single-occupancy vehicles has been recognized by the county. According to the Ravalli County Growth Policy:

> The seven-member Ravalli County Transportation Advisory Committee (RCTAC) has completed a five-year long-range transportation plan. A major goal of the plan is to provide improved transit connections with Missoula due to the large number of local commuters who work in the Missoula job market. Mass transportation is provided by:
>
> - The Missoula Ravalli County Transportation Management Association (MRCTMA)
> - The Transportation Advisory Committee
> - The Council on Aging

Hamilton's Transportation Plan
The Hamilton Area Transportation Plan, contained in the city's Growth Policy, is the result of the city's desire to conduct an in-depth analysis of their transportation system and develop a short-term and long-term needs assessment.

The future roadway system in Hamilton is defined using a classification system that reflects a hierarchy of facility types. The desirable goal for every classified street section is that it carry the design volume of traffic at the desired level-of-service. The facility types are as follows:

- Principal Arterials: U.S. Route 93
  Function: Mobility
  A four-lane divided roadway with a typical right-of-way width of 120 feet and curb-to-curb pavement width of 100 feet.

- Major Collectors: SR 269 (East Side Highway) and SR 531 (Main Street)

- Minor Collectors: (All other local collector streets in Hamilton)
  Function: Land access/Mobility
  Collectors are intra-community highways connecting residential neighborhoods with community centers and facilities.

- Local/Residential Streets (all remaining residential and commercial streets)
  Function: Land access
  Primary function of local/residential streets is access to abutting properties. Local streets include a variety of designs and spacing depending on access needs. Local streets typically have low traffic volumes and provide internal circulation and undivided roadway access to residential development boundaries and small community facilities.

Streets surrounding and serving the RML campus are classified as Local/Residential Streets, and the city's Transportation Plan does not propose to change or widen these.

On the arterial system, primary north/south arterial travel is provided by Route 93, with two lanes in each direction. Secondary east/west travel is provided by Main Street, Fairgrounds Road and Golf Course Road. Each of these facilities currently operates with one lane in each direction.

RML's main entrance for employee and visitor vehicles is on South 4th Street which is connected to Route 93 approximately three blocks to the east by a number of east-west streets – the nearest being Grove and Baker Streets. Baker Street also provides access to the commercial vehicle entrance on the north side of the property at 5th Street, though for larger vehicles, the approach may best be from 5th Street by using Desta Street or another east-west street north of Baker Street. Properties to the south of the RML campus are generally accessible by Montana Avenue which connects with Route 93 via Hope Avenue.

3.2.2 Rail

A single-line Federal Railroad Administration Class 2 freight line runs from Missoula through Hamilton to Darby. The line carries fewer than two carloads per mile of freight and is restricted to a 25 mph speed limit. It has limited load capacity, many grade crossings and was deemed at risk of abandonment in a Montana Department of Transportation Study, *2000 Montana State Rail Plan Update*. There is no known consideration by the owner, Montana Rail Link (MRL) of upgrading or adapting this line for potential passenger use.

3.2.3 Air

Hamilton is served by the Ravalli County Airport which is publicly owned and operates typically during dawn to dusk hours, with 24 hour runway lights available at request. The airport is not federally certified but is State inspected. It has a paved, 4,200 ft. runway and accommodates small, private single and multiple engine and jet aircraft, commercial air taxi, and general aviation helicopter. Stevensville has a 3,800 ft "hard surface" runway for small aircraft.

Commercial air service is via the Missoula International Airport which is located about 46 miles north of Hamilton. Carriers currently serving the airport include:

- Alaska Airlines – Horizon Air
- Allegiant Air
- Big Sky Airlines
- Compass Airlines/Northwest Airlink
- Delta Connection
- Northwest Airlines/KLM
- United Express

There are no regularly scheduled international flights at this writing.

3.3 Utilities

3.3.1 Water - Hamilton Water Supply

The City of Hamilton completed a series of major improvements to their water system in 2003-2004, bringing on-line three new wells with disinfection facilities and replacing their 1934-era water storage reservoir. The city now pumps water from seven groundwater wells spread throughout the distribution system. The capacity of these wells ranges from 300 to 700 gallons per minute (gpm), with a theoretical combined capacity of 4,375 gpm. The water is chlorinated at each well. The City of Hamilton Department of Public Works (CHDPW) municipal water supply system is pressurized by a one million gallon in-ground concrete storage tank located in the SW ¼ of Section 32, Township 6 North, Range 20 West. This tank supplies water to nearly all of Hamilton via a gravity fed system. A limited number of homes located at a higher elevation than the tank are served by a pump station using five pumps.

The city water system includes a 12-inch diameter water main connecting the storage reservoir to the 10-inch diameter main located within 1st Street. RML installed a 12-inch water main from 1st Street down Grove Street to the RML Campus in 1995, connecting the city's 6-inch diameter cast iron water mains at 2nd, 3rd, and 4th Streets, improving the city's distribution system and pressure. The city water pressure is approximately 60 psi. The city can supply more than 2,000 gpm at the corner of 4th and Grove Streets - the RML connection point.

In 2000, the average daily use for the system was 1.6 million gallons per day (mgd). The peak was 2.5 mgd.

3.3.2 Storm Water

Storm water is currently drained locally on the RML campus by dry wells that discharge to groundwater. According to the Hamilton Growth Policy, this is a common form of storm water

management in the Hamilton area. Dry wells or sumps are frequently used on public right-of-ways, public lands, and commercial properties. There is no municipal storm water drainage system at this time, or any known plan to add one.

3.3.3 Sanitary - Wastewater Treatment
Currently, wastewater generated at RML is discharged to the sanitary sewer system operated by the CHDPW. Current sources of RML wastewater include sanitary waste, liquid waste from animal facilities, boiler water, and cooling water. Wastewater discharges from RML to the CHDPW sanitary sewer are via four sewer mains.

3.3.4 Electrical Utility Systems:
The City of Hamilton currently has two power substations owned by the Northwestern Energy Company (formerly The Montana Power Company). One is an older 4,160-volt substation that is being phased out. The second is a 12,470-volt, 20 MVA station that is loaded to approximately 12 MVA. Two of the four distribution lines that serve the community feed RML. The 'West Line' is the main utility primary feeder for RML and runs along the west side of town. This line is currently feeding both the West Distribution and East Distribution systems at RML via aerial lines that run along the northern border of the campus. If the West line is cut or damaged between the substation and RML, Northwestern's 'Central' primary feeder has manual switches that allow RML to be cut over to that feeder. Due to the limited capacity on the Central Feeder, it should only be considered for short term emergency use according to Northwestern. The Master Utility Plan (MUP), currently under development, is anticipated to include recommendations for additional dedicated power to the campus from a substation to the southeast.

The electrical distribution to the RML campus consists of two primary underground services from the local utility company, designated the West and East Distribution systems. An additional separate underground service has also been installed as part of the IRF. In addition to the primary electrical feeders there is one overhead 120/240 volt, single-phase secondary feeder to a utility pole in pasture.

All primary feeders are 12,470-volt primary services with utility owned, oil filled, pad mount transformers to step the voltage down to 480-volt 3-phase 4 wire wye secondary services. The MUP is anticipated to include recommendations for modifications to this system. The feeders are fed from the same overhead primary line running by the north and west sides of the property. The lines enter the property underground to the transformer locations. The East Distribution system is fed with a 2.5 MVA transformer that feeds a 4,000 amp, 480-volt main distribution board. Based on readings made for the MUP and projections for additional demand from projects currently under construction, the demand load for the East Distribution system is estimated to be between 1,800 and 2,000 KW. The West Distribution system is fed with a 2.5 MVA transformer that feeds a 4,000 amp, 480-volt main distribution board. The new service to Building 28 (IRF) is from a single 3 MVA transformer. Based on readings made for the MUP the average peak load for the West Distribution system has been estimated to be 1,000 KW, although demand as high as 1,200KW has been recently recorded. The 200 KW spike was attributed to a temporary rental chiller used on Building 13 during that time period.

3.3.5 Telephone and Data Network System:
The local service providers are upgrading systems and a recent upgrade providing fiber optics to RML has been completed. These systems are constantly being upgraded and do not present a limiting factor in the growth of RML. The RML campus currently has a 100 pair telephone line and a DS3 Line via fiber optic cable coming in from Qwest, the local telephone company. The 100 pair provides service for direct telephone lines and three T1 lines from MCI. One T1 line is for backup for the NIH WAN (Wide Area Network) connection, a second is for the switched voice circuits on the Definity telephone switch, and a third is for video teleconferencing. The DS3 line is the primary WAN Connection.

The current telephone switch is a Definity switch by Lucent. It is no longer being manufactured

but it is still being supported. The current campus licensing agreement is for 700 telephone lines, and presently, there are 390 ports available for use. If necessary, the license could be modified to add additional lines, but this could be limited by hardware availability in the future.

According to Qwest Federal Services, the Qwest Hamilton central office is currently unable to directly provide ISDN PRI or BRI circuits. These types of circuits must be pulled from the Missoula office, which result in Missoula numbers being assigned. If available, these services would allow caller ID information to pass to RML telephone equipment to digital display voice terminals. Features such as this may not be mandatory, but would provide more efficient communications.

Limited services from the local Qwest office may impact some future telecommunications functions at RML. However, the demand from a local federal government agency may prompt or force upgrades of the local Qwest facilities

3.3.6 Natural Gas Utility Service:
The RML campus is currently served by four natural gas utility service lines. Only one of these is a large industrial service. Three are smaller residential type services.

The existing three smaller service lines serve Buildings 8, 9 and 11. Each of these is a ¾" residential gas service These services extend individually to each building from the utility company's service main in the alley between 3rd and 4th Streets south of Grove Street. Each building serviced is fitted with its own meter and service regulator as is typical for residential gas service.

A large industrial gas service line was installed in 2000 specifically to serve the new heating plant in Building 26. It is now the source for the entire campus gas distribution system. A new gas distribution system was installed in 2003.

The main service line is sized to carry no less than 100,000 scfh (nearly twice the current campus load) of gas and could easily carry nearly twice this volume without undue pressure drop. However, the capacity of the utility company's distribution grid in the vicinity of RML will limit the amount of natural gas which can be delivered to campus. During the installation of the 6" service line, the utility company raised its distribution pressure in order to meet expected campus loads. The utility company has recently completed a distribution assessment of their grid capacities in Hamilton and believes with its other demands (other consumers) it can support a load at RML of only 60,000 scfh (the current projected demand). However, the utility company is currently planning to upgrade a major leg of its distribution in Hamilton. When complete, the planned upgrade will allow the utility to deliver up to 150,000 scfh to the RML campus, more than twice the current connected load. The utility company has assured RML that they will supply what gas volume is needed.

3.4 Fire Protection and Emergency Services

Fire protection and emergency response services throughout Ravalli County are supplied by 12 local volunteer fire departments. These include the Corvallis Fire Department, Darby Fire Department, Florence Fire Department and Quick Response Unit, Hamilton Fire Department, Painted Rocks Fire and Quick Response Unit, Pinesdale Fire Department, Stevensville Fire Department, Stevensville Rural Fire Department, Sula Fire and Quick Response Unit, Three Mile Fire and Quick Response Unit, Victor Fire Department, and West Fork Fire Department and Quick Response Unit. These units utilize a mutual aid agreement to provide assistance to each other as required. During major fire and emergency situations that exceed the capacity of local departments and/or response units, the Ravalli County Disaster and Emergency Services (DES) Coordinator offers assistance in the definition of combined plans and actions.

3.5 Law Enforcement

3.5.1 Ravalli County

The Ravalli County Sheriff's Office is primarily responsible for the investigation and enforcement of criminal and traffic laws throughout the county. However, these duties are concentrated outside the incorporated limits of towns and cities.

The Sheriff's Office serves as coroner and runs the county jail, which houses arrested persons for all law enforcement agencies in Ravalli County as well as for the U.S. Marshals, Federal Bureau of Investigations (FBI), Drug Enforcement Agency, law enforcement resources of the Immigration and Naturalization Service, and the Montana Highway Patrol.

3.5.2 City of Hamilton

The Hamilton Police Department has a total of 13 sworn officers, resulting in approximately one police officer for every 290 residents of the city. As the county seat and a center of commerce for the valley, Hamilton requires a larger police force than the suggested "one sworn officer for every 1,000 city residents" ratio typically used by other police departments. The rank structure includes the Chief of Police, one sergeant, two detectives (one who serves as the School Resource Officer), eight patrol officers and one animal control/parking enforcement officer. Service is provided 24 hours a day/seven days a week.

3.5.3 RML

The responsibility of the NIH Police is to protect people and property from the threat of terrorism, crime, or other hazards so the administration of the business and research of the NIH may progress as unimpeded as reasonable. The police accomplish this by conducting routine patrols, and by responding to and handling emergencies and other requests for service. The NIH Police enforce laws, investigate crimes, issue IDs and provide public services such as escorts and lock-out relief to those in need of assistance. The force utilizes crime prevention methods and techniques to reduce crime at the RML. They work to ensure the safe and efficient movement of traffic on the campus, investigate traffic accidents, and enforce traffic laws and parking regulations. The NIH Police conduct initial and follow-up investigations of all crimes committed against persons and property on the RML campus. The investigations include crime scene processing, interviewing victims and witnesses, arrests for prosecution and documentation of all activities. The NIH Police maintain a liaison with the FBI and all local law enforcement agencies. The NIH Police support the contract guard services by handling all incidents where law enforcement authority and expertise is needed. Contract guards at the RML provide patrols, escorts for visitors, and perimeter screening of persons and vehicles at the entrances.

3.6 Community Facilities and Cultural Assets

3.6.1 Museums, Theater and Historic Resources:

Hamilton currently boasts two museums. In 1887, the wife of Marcus Daly, a copper mining magnate who developed the local timber industry to supply framing timbers to his mines, completed the Daly Mansion. The mansion was closed following Mrs. Daly's death in 1941 until 1987 when it was reopened to the public as a museum. The second museum, the Ravalli County Museum, is housed in the former Ravalli County Courthouse. This museum was built in 1900 and has among other exhibits the Ricketts Museum which commemorates the development of RML.

There are other cultural assets in the area as well. The Hamilton Players, a theater company, perform plays on a regular basis in the building that once housed the predecessor of RML. Also, the High School has a large performing arts facility. St. Mary's Mission, in nearby Stevensville, was the first permanent white settlement in Montana, founded by Jesuit priests in 1841, and nearby Fort Owen provides a glimpse of early life in the valley.

A portion of the RML Campus is part of a Historic Preservation District. The buildings included in this district are Buildings 8, 9, 11 and the Quad. These buildings date back to the beginning of the RML campus and care has been taken to preserve and renovate them while maintaining their historical integrity.

The Hamilton Southside Residential District was added to the National Register of Historic Places in 1988. The district includes portions the residential community to the north and east of the RML campus, and includes examples Queen Anne, Craftsman, Colonial Revival and Spanish Revival buildings.

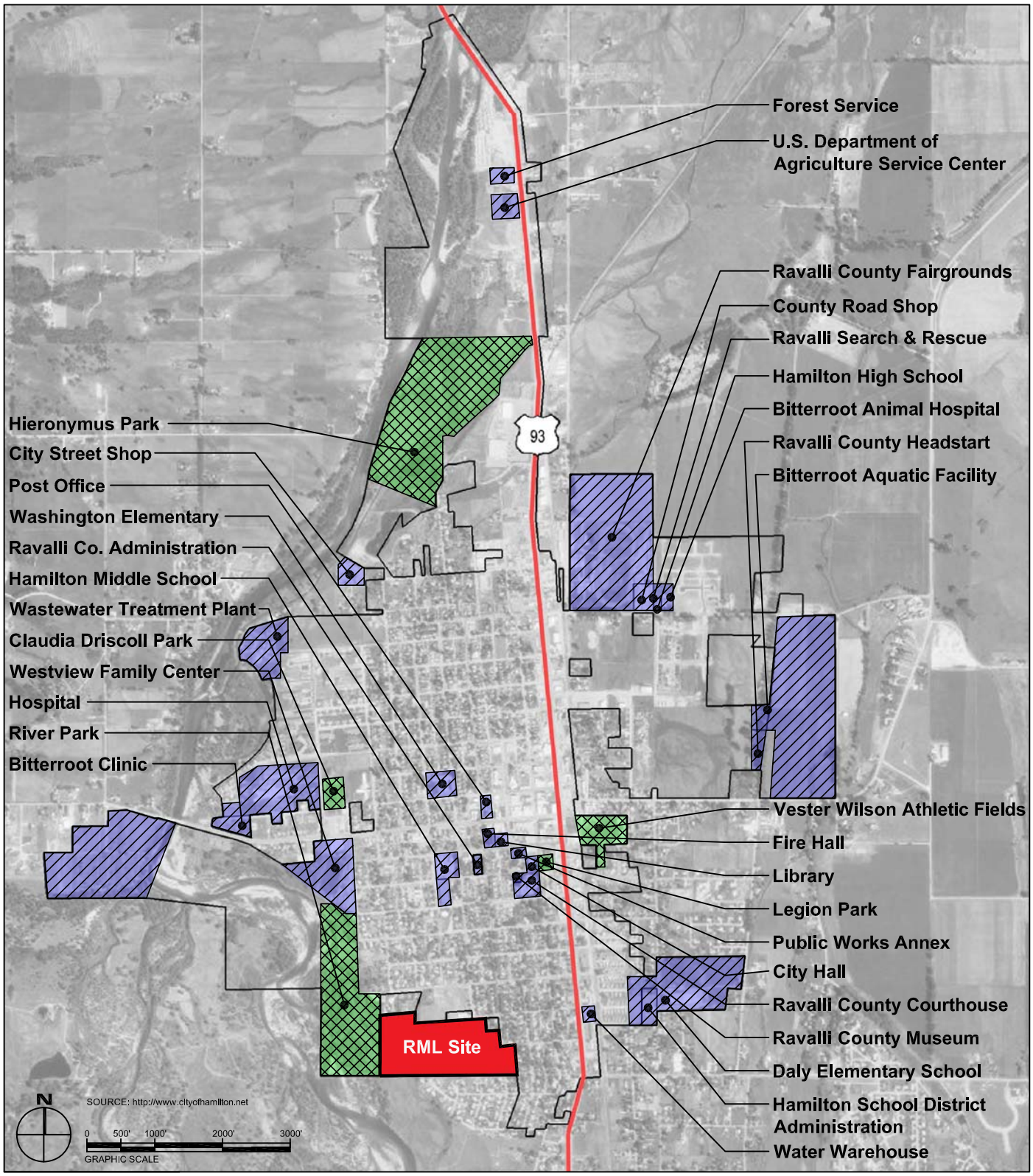
3.6.2 The Bitterroot Library District:
The Bitterroot Public Library in Hamilton was originally chartered under the authority of the Bitterroot Library District, and receives partial funding from both Ravalli County and the City of Hamilton through property tax mills. Public libraries are also located at Stevensville and Derby.

The Library Board is comprised of residents who live throughout the Library District. The Board consists of five members: two each appointed by the city and county, and one that is appointed jointly by the city and county. This Board governs total operation of the Library and has the authority to make loans and grants.

3.6.3 Parks and Recreation:
Recreational opportunities abound in Ravalli County. Hiking, horseback riding, mountain biking, downhill and cross-country skiing, snowmobiling, golf, hunting, fishing, wildlife photography, and soaking in a natural hot spring are among the many activities available. Community Theater, rodeos, county fair, and various bluegrass, arts, harvest and microbrew festivals occur throughout the year. The adjacent Selway-Bitterroot Wilderness Area to the west and the Anaconda-Pintler Wilderness Area to the southeast provide protected wilderness areas. Lewis and Clark expedition campsites and trails are scattered throughout the valley. The City of Hamilton website (www.cityofhamilton.net) shows five parks within the city, including Hieronymous Park, Claudia Driscoll Park, Legion Park, the Vester Wilson Athletic Fields, and River Park, a portion of which adjoins the RML property on its western boundary. These parks are shown on Figure 3.6.

3.6.4 Education:
Elementary and secondary education consists of three elementary schools, a middle school and a high school. The University of Montana (student population of 12,124) and Missoula Vocational Technical Center, both located in Missoula, 46 miles to the north, are the closest centers of higher education. Newspapers such as the local “Bitterroot Star”, the "Ravalli Republic" and the "Missoulian" provide a range of news from community updates to world events.

3.6.5 Public Facilities:
In addition to the assets listed above the City of Hamilton website includes a broad range of public facilities that contribute to the well-being of the community. These are included in Figure 3.6.



NIH-RML Master Plan
Hamilton, Montana

Hamilton City Limits
Public Facilities
Recreational Facilities

Figure 3.6

Community Facilities & Cultural Assets

3.7 Population and Housing

3.7.1 Ravalli County

Following is a summary of demographic statistics for Ravalli County and its principal communities according to the 2000 U.S. Census:

Community	Population	Households	Area - Miles^2	Persons Per Miles^2	Dwellings per Miles^2
Hamilton	3,705	1,722	2.3	1,603.6	828.8
Stevensville	1,553	652	0.5	3008.3	1,377.3
Florence	901	323	4.7	190.7	71.1
Victor	859	351	1.6	537.6	234.7
Pinesdale	742	132	1.3	567	113.9
Darby	710	279	0.5	517.2	594.8
Corvallis	443	185	0.5	363.9	417.7
Ravalli County	36,070	14,289	2,400	15	7

Table 3.7.1

As of the 2000 Census, there were 36,070 people, 14,289 households, and 10,188 families residing in the county. The population density was 6/km² (15/mi²). There were 15,946 housing units at an average density of 3/km² (7/mi²). The racial makeup of the county was 96.71% White, 1.88% Hispanic or Latino of any race, 0.88% Native American, 0.30% Asian, 0.14% Black or African American, 0.10% Pacific Islander, 0.44% from other races, and 1.44% from two or more races..

Ravalli County's population has been projected to reach over 60,000 by 2025 in the Ravalli County Growth Policy (derived from *2002 Ravalli County Needs Assessment* [Swanson] and the Montana Department of Commerce 2004).

Of the 14,289 households, 30.2% had children under the age of 18 living with them; 60.3% were married couples living together; 7.50% had a female householder with no husband present; and 28.7% were non-families. Twenty-four percent of all households were made up of individuals and 9.8% had someone living alone who was 65 years of age or older. The average household size was 2.48, and the average family size was 2.94.

In the county the population was spread out with 25.6% being under the age of 18; 6.2% were from 18 to 24 in age, 24.7% were from 25 to 44 old, 28.0% fell into the 45 to 64 age category; and 15.5% were 65 years of age or older. The median age was 41 years. For every 100 females there were 98.6 males. For every 100 females age 18 and over, there were 95.4 males.

The median income for a household in the county in the 2000 Census was $31,992, and the median income for a family was $38,397. Males had a median income of $30,994 versus $19,987 for females. The per capita income for the county was $17,935. Almost 14% of the population and 9.6% of families were below the poverty line; 20.1% of those under the age of 18 and 6.3% of those 65 and older were living below the poverty line.

3.7.2 Adjacent Counties

The following table compares Ravalli County with its adjacent counties, the most economically significant of which is Missoula to the north:

County	Population	Households	Area - Miles^2	Persons per Mile^2	Dwellings per Mile^2
Ravalli	36,070	14,289	2,400	15	7
Missoula	95,802	38,439	2,618	37	16
Granite	2,830	1,200	1,733	2	1
Beaverhead	9,202	3,684	5,572	2	1
Lemhi, ID	7,806	3,275	4,570	2	1
Idaho, ID	15,511	6,084	8,485	2	1
Montana	1,087,340	----	147,165	6.19	---

Table 3.7.2

3.7.3 City of Hamilton

As of the 2000census, there were 3,705 people, 1,772 households, and 855 families residing in the city. The population density was 619.3/km² (1,603.6/mi²). There were 1,915 housing units at an average density of 320.1/km² (828.8/mi²). The racial makeup of the city was 96.22% White, 0.89% Native American, 0.78% Asian, 0.11% African American, 0% Pacific Islander, 0.22% from other races, and 1.78% from two or more races. Approximately 1.65% of the population was Hispanic or Latino of any race.

There were 1,772 households out of which 22.3% had children under the age of 18 living with them, 36.3% were married couples living together, 9.5% had a female householder with no husband present, and 51.7% were non-families. 47.6% of all households were made up of individuals and 24.9% had someone living alone who was 65 years of age or older. The average household size was 1.95, and the average family size was 2.81.

In the city the population was spread out with 20.2% under the age of 18; 6.8% were from 18 to 24 in age; 24.0% ranged in age from 25 to 44; 20.6% reported ages from 45 to 64; and 28.3% were 65 years of age or older. The median age was 44 years. For every 100 females there were 82.2 males. For every 100 females age 18 and over, there were 74.9 males.

The median income for a household in the city was $22,013, and the median income for a family was $30,665. Males had a median income of $25,795 versus $22,138 for females. The per capita income for the city was $14,689. Almost 18% of the population and 14.3% of families were living below the poverty line while 28.4% of those under the age of 18 and 15.3% of those 65 and older were below the poverty line.

3.8 Economy

3.8.1 Regional Economic Conditions

The Hamilton Growth Policy makes the following points about the local economy:

- **Key Area Conditions & Trends**
  The single greatest force in the Ravalli County area's recent and on-going economic change is relatively high rates of people moving into the area and population growth. In fact, about 95% of the recent population growth is attributable to much higher rates of net in-migration to the county. Ravalli County's in-migration and population growth is spurring employment growth at a relatively high rate. Total personal income is rising fairly rapidly as well. However, these high levels of "quantitative" growth are not translating

directly into significant improvements in the "quality" of economic life for many Ravalli County citizens.

As the population grows, it is also aging. The principal areas of population growth are among teenagers and persons in their 40s and 50s. Generally these age shifts are consistent with what is happening in the U.S. population as a whole, but also are caused by the net in-migration and age of new residents.

The economy of the Bitterroot Valley has become increasingly "growth driven" and "growth dependent", with much of the employment and income growth associated with more people moving to the area and with heightened levels of construction activity. Historically, high levels of growth do not continue indefinitely. It is important for leaders and decision makers in the valley to enhance area qualities in ways that can assure future prosperity. The greatest deficiency in the area's economy is the relatively low level of per worker earnings, both for wage and salary employees and for proprietors.

- **Greatest Needs**
  Ravalli County and the City of Hamilton have two paramount needs in the area of economic development:
  Improve the quality of jobs in the valley;
  Find ways to condition economic growth and change in the valley so that it doesn't degrade the amenities that make the Bitterroot Valley so attractive to newcomers.

- **Key Area Assets**
  The following are considered to be current and potential key economic assets of Ravalli County and the City of Hamilton:
  Natural setting;
  Proximity to Missoula, a large and growing regional center;
  The presence of a highly adaptive wood products industry;
  The presence of RML, an NIH research lab and GlaxoSmithKline Corporation, a biomedical research facility;
  The long-standing presence and area relationship with the U.S. Forest Service;
  Matured and experienced work force;
  Proximity to the University of Montana and the College of Technology in Missoula;
  High level of area self-employment;
  Area farmers and ranchers;
  Scheduled improvement and capacity expansion of Route 93.

3.8.2 Rocky Mountain Laboratories Contribution to the Economy

An Economic Fact Sheet developed by RML makes the following points:

> For every 100 jobs at RML, approximately an additional 40 jobs in other parts of the Montana economy are affected, including fractional jobs. The total employment multiplier is therefore 1.4 or a total of 140 jobs including the original 100. [1]

Presently, RML staffing, exclusive of the new IRF, is approximately 250. This means RML affects another 100 Montana jobs. The following economic data from RML is approximate, but indicates the impact of RML on the economy:

> The largest segment affected is retail trade (spending by employees at RML plus employees in other affected sectors) at roughly 22.5 of the 100 jobs. Health services are another 10 jobs; finance, insurance, and real estate sectors combined are an additional 10 jobs, split between serving businesses and consumers. Another 37.5 jobs are

1 Phil Brooks, Ph.D., Chief Economist, Montana Dept. of Labor and Industry. November 2003

scattered primarily among other consumer services sectors.

For every $1 million in employee compensation at RML (payroll + fringe benefits), roughly an additional $600,000 of employee compensation is generated in other parts of the Montana economy. The total employee compensation multiplier is therefore about 1.6. [2]

At the present RML payroll of $10.4 million, RML impacts another $6.24 million in the Montana economy.

The same segments of the Montana economy that were prominent in the employment impact analysis above are also prominent for employee compensation. Of the $6.24 million generated by RML, about $1.25 million is in retail trade, $1.15 million in health services (health services wages and salaries are much higher than for retail trade), and $624,000 in finance, insurance, and real estate combined.

The present average annual salary at RML is $41,600, based on 250 workers and an annual payroll of $10.4 million for 2003. When the proposed IRF is built, the average annual salary at RML would be $48,571, based on 350 workers and an annual payroll of $17 million.[3]

RML is included in a list of seven Montana research facilities that are considered vital to establish a "life sciences" economic development cluster in Montana.[4]

- Analysis indicates that, "The research infrastructure is concentrated in the west (Missoula, Hamilton). … Establishment concentrations in the biotechnology core are above average in western Montana and almost twice the national average in the southwest. Employment concentrations are below average even in these regions, indicating that Montana's biotechnology cluster consists primarily of small companies. This suggests some promising entrepreneurial activity."
- The analysis further states, "Recruitment does not appear to be a problem. There are an adequate number of potential candidates for highly specialized or skilled positions who would like to move to Montana. . . . There is also an adequate supply of entry-level candidates, because large percentages of recent graduates with life science-related degrees seek to remain in Montana."

As a side note, a recent streptococcus (strep throat) research project was significant in two ways. The research uncovered new information about bacteria-immune system interactions, and the five-person research team all have deep Montana connections, both as natives to the state and graduates of Montana universities.

RML is cited in an economic research document as having an important role in the Bitterroot Valley's future.[5]

3.9 Other Relevant Federal Facilities in the Region

USDA U.S. Forest Service

- **Northern Region 1 – Missoula** Office of the Regional Forester
  The Northern Region National Forest lands encompass 25 million acres and are spread over five states. Included are 12 national forests located within the perimeter of northeastern Washington, northern Idaho, and Montana; and a national grassland in North Dakota and northwestern South Dakota.

2 Brooks.

3 RML Administrative and Facilities Management Section. November 2003

4 Montana Industry Cluster Analysis, pp. 37-43. Regional Technology Strategies, Inc. May 2003.

5 2002 Ravalli County Needs Assessment, p. c. Dr. Larry D. Swanson, University of Montana. November 2002

- **Bitterroot National Forest – Hamilton** Office of the Forest Ranger
  The Bitterroot National Forest consists of 1.6 million acres of forest in southwest Montana and Idaho. Half of the forest is dedicated to the largest expanse of continuous pristine wilderness in the lower 48 states -- the Selway Bitterroot, Frank Church River of No Return, and the Anaconda Pintler. Much of its beauty can be attributed to the heavily glaciated, rugged peaks of the Bitterroot Range. Drainages carved by glaciers form steep canyons that open into the valley floor.
- **Federal Bureau of Investigation – Missoula**
  The Missoula Office of the FBI is under the jurisdiction of the Salt Lake City, UT Field Office, and is responsible for Covering Deer Lodge, Granite, Lake, Mineral, Missoula, Ravalli and Sanders counties.

3.10 Coordination with Local Planning Agencies

The planning agency with jurisdiction over the Ravalli County area is the Ravalli County Planning Board. Representatives of the RML have been in frequent communication with the county staff and the Hamilton City Planning Board staff over the years.

Continuing the practice developed for the IRF, Informal meetings and interviews were held with government agencies, local jurisdictions, citizen associations, and individuals. NIH and RML representatives and the master planning team established initial contact with city and county staff members.

Chapter Four
Existing Conditions on the RML Campus

4 Baseline Conditions on the RML Campus

As noted in Chapter 1, the Master Plan is based on data and conditions existing at the close of calendar year 2005. This date is the baseline for the personnel and space projections in the plan, as well as for cataloging campus conditions. Unless otherwise noted, the information in this chapter is from baseline year 2005.

4.1 Site Overview

4.1.1 Site Size and Condition

The Rocky Mountain Laboratories (RML) is approximately 33 acres in size and located in the southern portion of the City of Hamilton. The principal borders of the property are as follows:

- North – Baker Street, residential streets and properties, and a parcel belonging to the school district of Hamilton which contains a senior citizens' recreation center.
- East – 4th Street with single-family residences opposite the RML property, and an alleyway serving the residential area.
- South – The boundary between the city and Ravalli County. The area is a single-family residential neighborhood with yards, driveways, alleyways and miscellaneous structures abutting the RML property line and fence.
- West – The Bitterroot River, its floodplain and wetlands. The area is also part of a contiguous River Park belonging to the city.

See Figure 4.1.1-a

The site is of diverse character with buildings that vary in size, style, and materials. Two Colonial Revival, two-story, wooden, residential clapboard sided buildings are located in a park-like setting in the southeast corner of the site separated from the rest of the campus by the 4th Street extension. Visible from the 4th and Grove Streets intersection is a cluster of laboratory buildings ranging in height from two to four stories and consisting of campus Buildings A, 1, 2, 3, 5, 6 and 7. This red brick Neo-classic academic-style complex is known as the Quad. New, one-story, modern western-style stone, timber and stucco structures that serve as Building 30 (the Visitors' Center) and Building 29 (the Shipping and Receiving Building) complete the perimeter buildings in the northeast corner of the site. At the center of the site is Building 28, a new, modern, three-story glass and masonry laboratory building that dominates the site. This building is also known as the Integrated Research Facility, or IRF. On the rest of the site are various one-story, split-faced masonry and metal utilitarian buildings with above-ground utilities and support structures. The site has very little vegetation except in the southeast area, and is largely comprised of graveled or barren ground outside the area immediately adjacent to the Quad. The appearance is somewhat industrial, and there is little or no sense of cohesion or order other than the comparatively tranquil southeast corner of the site. See Figure 4.1.1-b.

4.1.2 Land and Building Use

As will be seen from Figure 4.1.2, the site has five categories of building use:

- Research (primarily laboratories, researchers' offices and support space)
- Animal Holding
- Administration
- Service and Support
- Mechanical (including boiler and refrigeration plants, emergency power, switchgear, etc.)

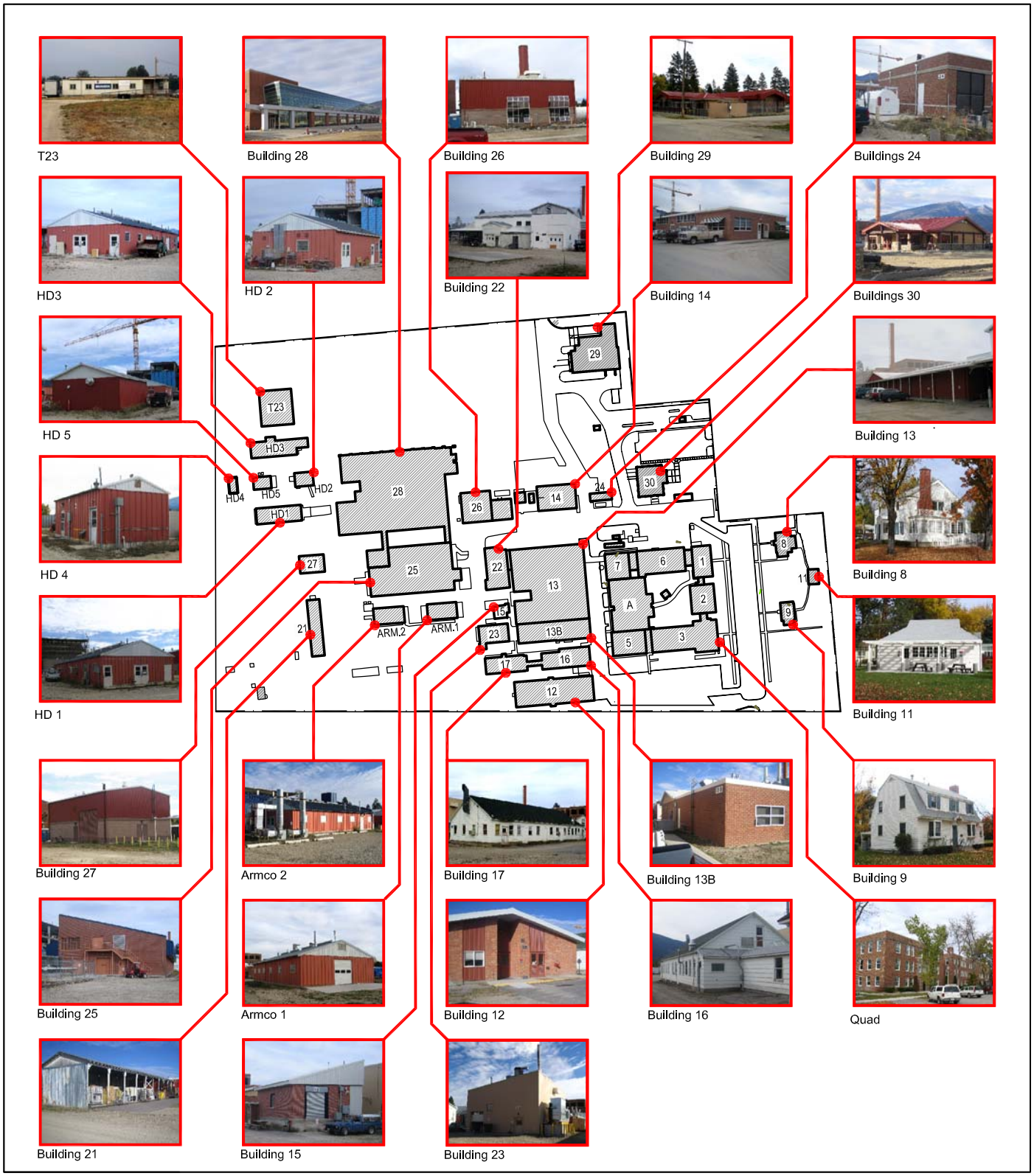
These functions are somewhat scattered, but the research is generally in the Quad, Building 28, and portions of the one-story utilitarian buildings adjacent to these main research buildings.

NIH-RML Master Plan

Hamilton, Montana

Figure 4.1.1-a

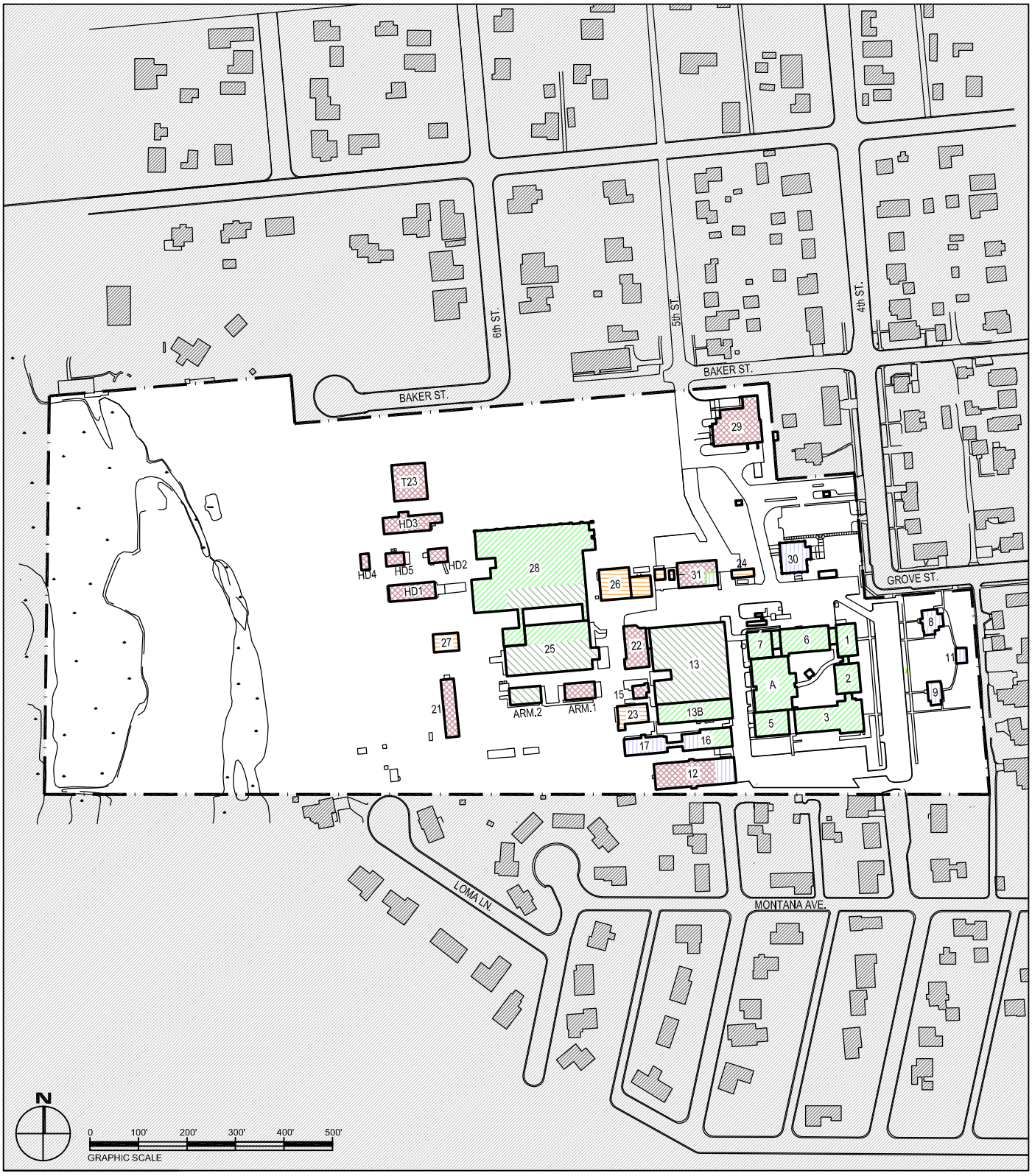
RMLSite



NIH-RML Master Plan
Hamilton, Montana

Figure 4.1.1-b

Building Photos



NIH-RML Master Plan

Hamilton, Montana

- Research
- Animal
- Service/Support
- Administration
- Mechanical

Figure 4.1.2

Building Use

Animals are housed primarily in Buildings 13 and 25 and portions of Building 28. Administration is located in portions of the Quad and in Buildings 8, 9, and 30.

The remaining activities scattered about the campus are support buildings of various kinds or mechanical/electrical equipment. The campus buildings and functions are summarized in Table 4.1.2a.

Table 4.1.2a Existing Campus Buildings

Building	Gross Area	Primary Use
1	8,246	Research
2	9,468	Research
3	24,814	Research
A	24,929	Support
5	7,224	Research
6	15,000	Research
7	3,975	Vacant
8	4,461	Administration
9	3,156	Administration
11	660	Administration
12	7,690	Visual Medical Arts and Freezer Storage
13	17,800	Animal Research
13B	5,880	Research
14	4,000	Storage
15	1,092	Radiological Waste Storage
16	3,520	Research Support
17	2,975	Storage
21	2,843	Equipment Storage
22	2,624	Central Stockroom
23	2,356	Incinerator
24	700	East Emergency Generator
25	15,332	Research
26	3,844	Central Boiler Plant
27	1,961	West Emergency Generator
28	105,000	Integrated Research Facility
29	7,525	Shipping and Receiving
30	3,562	Visitors' Center
HD1	3,072	Maintenance
HD2	1,120	Maintenance
HD3	3,482	Maintenance
HD4	512	Maintenance
HD5	864	Maintenance
SS1	384	Storage
SS2	216	Storage
SS3	216	Storage
ARMCO1	2,048	Storage
ARMCO2	2,048	Animal Research
T23	4,624	Maintenance
Total	**309,223**	

Most of the land area not dedicated to structures is devoted to paved and unpaved parking and circulation paths with patches of vegetation dispersed throughout the campus. Most of vegetation is concentrated in the southeast corner of the campus. Refer to Figure 4.1.2b for a summary of pervious and impervious areas. Also see Table 4.1.2b.

Table 4.1.2b Baseline Land Areas

Land Use	Acres	% of Site
Open Space		
Landscaped	2.7	8.2%
Other	21.3	64.6%
Circulation		
Parking, Roads, Walks, Service	4.4	13.3%
Buildings	4.6	13.9%
Totals	33	100%

4.1.3 Density

The density of the site with the completion of Building 28 will be approximately equivalent to a Floor Area Ratio (FAR) of 0.2, with a lot occupancy of 13.4%. The only comparable density in the Hamilton Zoning Ordinance allows 70% lot occupancy at three stories for Industrial and Commercial Manufacturing uses. This would yield an FAR of 2.1.

The tallest building on the RML campus is Building 28 at 52 feet, slightly higher than the highest portion of the historic Quad (Building A) at 50 feet. The Hamilton Zoning Ordinance restricts most zones to a maximum of 45 feet or three stories, though no height is specified for the Public Institutional zone (in which RML is located) or for the adjacent Single-Family Residential zone.

The campus population density is about 7.6 persons per acre when all employees are present, compared to a density of about 12 persons per acre permitted by the City of Hamilton's Zoning Ordinance for a Single-Family Residential zone (such as the neighborhood to the immediate north). In the Single-Family Residential zone, 7,000 square foot minimum lots would yield about six houses per acre and the average household size of 1.95 persons per dwelling unit for Hamilton in the 2000 Census would result in about 12 persons per acre.

4.2 Natural Features

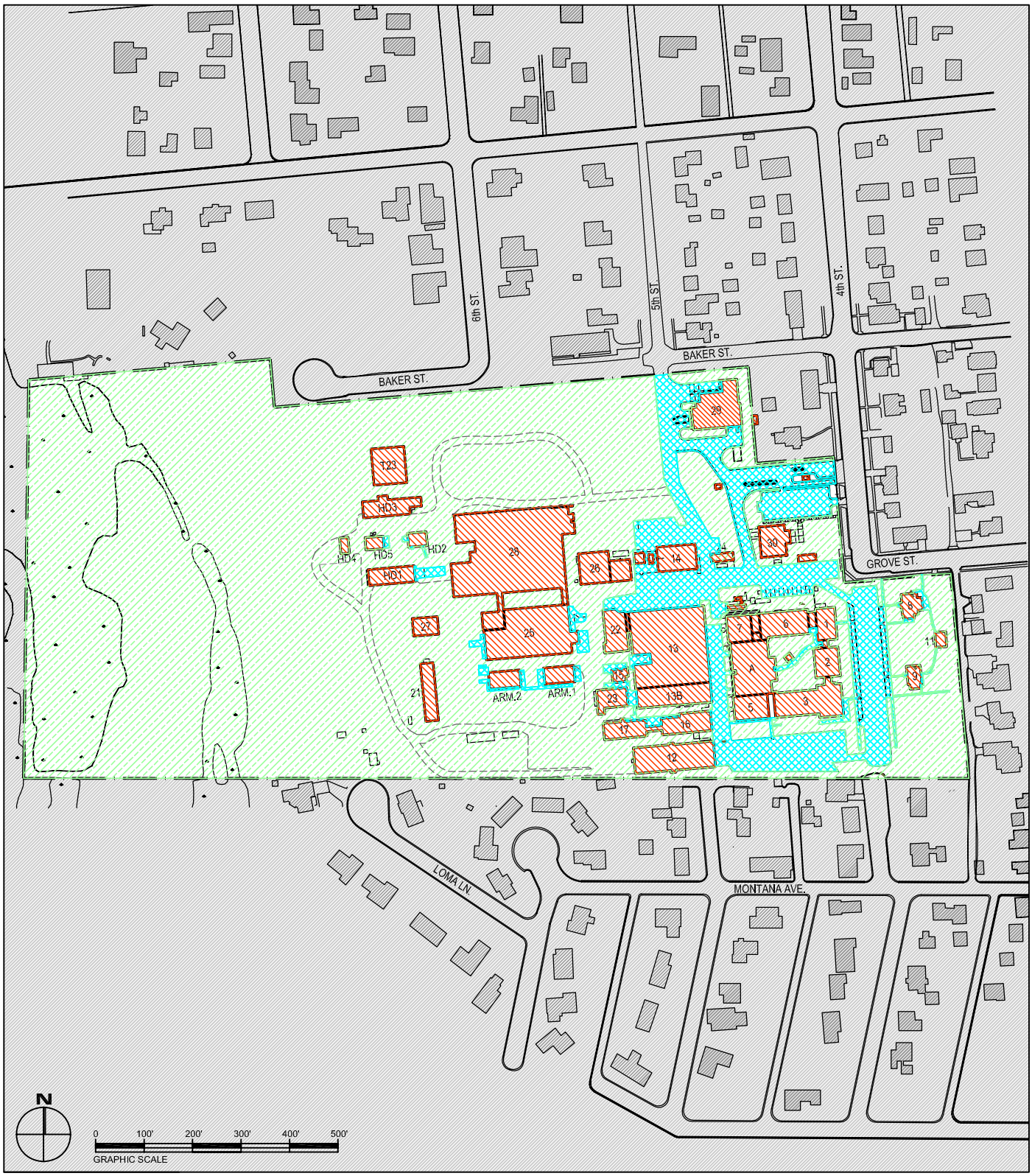
The RML property is mostly flat, with an elevation of 3,585 feet above sea level (asl) at its most eastern end at 4th Street, sloping to 3,580 feet asl at the western end before descending to the floodplain, wetlands and river which are at 3,557 feet.

4.2.1 Floodplain

Refer to Figure 4.2. The west end of the RML property is in the Bitterroot River floodplain, which lies approximately at 3,563 feet asl.

Floodplains, such as the far western end of the RML site, are areas of relatively flat land bordering a river that are inundated fully and partially when the river floods. Floodplains are formed by fluvial erosion and deposition of sediment during floods. The extent of floodplain inundation depends in part on the magnitude of the flood, defined by the return period. Federal policy governing construction within floodplains is as follows:

> Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains



NIH-RML Master Plan
Hamilton, Montana

Pervious Area
Impervious Area - Pavement
Impervious Area - Roof

Figure 4.1.2b

Pervious and Impervious Areas

NIH-RML Master Plan

Hamilton, Montana

- Wetlands
- Floodplain
- Site Contour- 5' interval
- Site Contour- 1' interval

Figure 4.2

Natural Features

and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. As applied to RML's west end of the property, the Order requires, in part, that RML, "… take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities" for the following actions:

> acquiring, managing, and disposing of federal lands and facilities;
> providing federally-undertaken, financed, or assisted construction and improvements; and
> conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

No RML facilities are located within the property's floodplain area.

4.2.2 Wetlands

Refer to Figure 4.2. The west end of the RML property is in the wetlands of the Bitterroot River, which correspond roughly, but not exactly, with the floodplain.

Generally, wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface (Cowardin, December 1979). Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. Indeed, wetlands are found from the tundra to the tropics and on every continent except Antarctica.

For regulatory purposes under the Clean Water Act, the term wetlands means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." [from the EPA Regulations listed at 40 CFR 230.3(t)]Protection of the nation's wetlands is provided under Section 404 of the Clean Water Act:

> The basic premise of the program is that no discharge of dredged or fill material may be permitted if: (1) a practicable alternative exists that is less damaging to the aquatic environment or (2) the nation's waters would be significantly degraded. In other words, when an applicant applies for a permit, he must show that he has, to the extent practicable:
>
> - Taken steps to avoid wetland impacts;
> - Minimized potential impacts on wetlands; and
> - Provided compensation for any remaining unavoidable impacts.

Minor road activities, utility line backfill, and bedding are activities that can be considered for a general permit. States also have a role in Section 404 decisions through State program general permits, water quality certification, or program assumption.

4.2.3 Geology

The Bitterroot Valley is a north-south trending intermontane basin about seven miles wide and 64 miles long, encompassing about 430 square miles. The Bitterroot Valley ranges from approximately 5,500 feet asl on its highest terraces to 3,250 feet at its termination at the Missoula Valley. It is bounded by the Bitterroot Mountains on the south and west, the Sapphire Mountains

on the east, the Anaconda-Pintler Mountain range on the southeast, and the Missoula/Clark Fork Valley on the north. The Bitterroot Valley is characterized by two topographic features: a broad one- to two-mile wide floodplain in the center of the basin; and high, broad alluvial/colluvial terraces on the east and west flanks that are on average two to three miles wide. The terraces slope from 4º to 5º on the basin edges to less than 1º near the Bitterroot floodplain. West side terraces slope gently and merge with the floodplain and are bisected by small drainages. East side terraces have generally smooth topography, are flat topped, and relatively steep escarpments ranging 50 to 150 feet above the floodplain (Kendy and Tresch 1996).

4.2.4 Geologic Structure and Seismicity

The Bitterroot Valley is a structural basin formed during the emplacement of the Idaho Batholith in the late Cretaceous or early Tertiary Period resulting from basin floor dropping along pre-existing faults (McMurtrey et al. 1972) or as a result of eastward block displacement of crustal material along low-angle thrust faults (Hyndman *et al.* 1975). Geophysical data indicate that the western valley margin is relatively straight, but the eastern side has an irregular margin (Noble *et al*. 1982). The structural depth of the basin is one mile (Lankston 1975). Lower Tertiary age sediments within the basin have been deformed into a faulted syncline, whereas Pliocene sediments are relatively undisturbed (McMurtrey *et al*. 1972), indicating that the major tectonic events that formed the Bitterroot basin have slowed considerably since the end of the Tertiary period. The basin is on the western edge of a broad region of basin and range tectonism. Extensional tectonism in the Bitterroot Valley, relatively dormant at present, occurs along existing fractures which are part of a regional northeast, northwest, and north-south trending fault system that exhibit long histories of recurrent activity (Barkman 1984).

At least six Class A faults or fault systems have been identified within 100 miles of the Hamilton area in western Montana (Haller et al. 2000). The closest Class A fault to Hamilton is the Bitterroot Fault, which runs along the east flank of the Bitterroot Mountains for a distance of approximately 60 miles and dips 45° to 90° east (Lindgren 1904, McMurtrey *et al*. 1972). The age of the faults extends from Cenozoic into late Quaternary time, with the most recent deformation occurring in pre-Bull Lake and Bull Lake glacial deposits, 300,000 to 130,000 years ago (Barkman 1984). The surface traces of the Bitterroot Fault system are shown by McMurtrey *et al*. (1972) as four traces that run along and into the Bitterroot Range from near Florence to south of Victor. Barkman (1984) identified several distinct fault scarps in the Bitterroot Valley that have been active in Quaternary time: the Bear Creek Scarp and the Curlew Fault located west of Victor, and the Tin Cup and Como Scarps located north of Tin Cup Creek.

The most recent faulting appears to have occurred around 7,700 years ago on the Mission Valley section of the Mission Fault. Class A faults have evidence that at least one large-magnitude earthquake occurred on that fault during the last two million years. Within the last 40 years, two recordable earthquakes greater than 2.5 Richter magnitude have occurred within 50 miles of Hamilton. In 1982, a 2.5 Richter magnitude tremor occurred approximately 20 miles southeast of Hamilton (Stickney et al. 2000), and on June 28, 2000, a 4.5 magnitude earthquake occurred approximately 40 miles northeast of Hamilton.

The Bitterroot Valley has one of the lowest seismic activity ratings in western Montana (Stickney *et al*. 2000). The International Conference of Building Officials (ICBO) rates Hamilton as a low seismic risk area (Zone 0). By comparison, Salt Lake City is in Zone 2, and part of San Francisco is in Zone 4.

4.2.5 Vegetation and Ground Cover

Vegetation within the RML campus consists of sparse lawn grasses and weeds competing with pavement, buildings and pebbly bare earth, except for the southeast corner of the property where some mature trees stand between the east side of the Quad (Buildings 1, 2 and 3) and the existing historic houses (Buildings 8 and 9) along the current parking lot which was formerly the

right-of-way of 4th Street. The trees are a mixture of deciduous, including elms, in various states of health, and various conifers.

.

4.2.6 Fish and Wildlife

In the vicinity of Hamilton, the Bitterroot River provides a variety of game fish, including: bull trout, brook trout, brown trout, rainbow trout, westslope cutthroat trout, and mountain whitefish. Brook, brown, and rainbow trout are not native to the Bitterroot River. The river is one of the regional recreational attractions because of the fishing.

The fauna of the valley near Hamilton is characteristic of the northern Rocky Mountains. Many species of mammals, amphibians, and reptiles may occur in the vicinity of Hamilton and RML. Also, a wide variety of birds may breed in the valley near Hamilton. Wildlife habitat has generally been altered by agriculture and other human developments. Highly altered urban environments meet the habitat needs of fewer species, most of which tend to be generalists, and several of which are non-native (e.g., European starling, house mouse, eastern fox squirrel). Species inhabiting urban environments tend to be tolerant of disturbance.

Common species of mammals that may occur in or adjacent to Hamilton include white-tailed deer, mule deer, coyote, red fox, striped skunk, raccoon, badger, long-tailed weasel, deer mouse, house mouse, meadow vole, Columbian ground squirrel, yellow-bellied marmot, eastern fox squirrel, several species of bats (e.g., big brown bat), and shrews (e.g., masked shrew). Terrestrial garter snakes, common garter snakes, and gopher snakes may live in Hamilton. Common bird species likely to breed in the urban habitats of Hamilton include rock dove, mourning dove, great horned owl, downy woodpecker, hairy woodpecker, northern flicker, western wood-pewee, eastern kingbird, tree swallow, barn swallow, black-billed magpie, black-capped chickadee, house wren, American robin, European starling, warbling vireo, yellow warbler, western tanager, American tree sparrow, chipping sparrow, dark-eyed junco, brown-headed cowbird, house finch, American goldfinch, and house sparrow.

4.3 Built Environment

4.3.1 Site Organization

The RML site is organized in an orthogonal grid pattern which parallels the surrounding Hamilton streets and is most apparent around the Quad. More recently, Building 28, located in the approximate center of the site, provides a new focus visually since it is the largest and tallest building on the campus.

These dominant buildings and the recently completed Building 30 and Building 29 are of an architectural character that conveys a sense of permanency that is less characteristic of many of the other buildings on site. While all buildings are related to the orthogonal grid, and many are of masonry construction, they are of a more utilitarian design and appear transitory and incidental to the other structures.

In the southeastern sector of the site, opposite the east face of the Quad, are two wooden houses that originally fronted on 4th Street when it continued past Grove Street (where it now terminates) to Montana Avenue south of the property. The former street right-of-way has been used for on-site parking for many years. Interspersed among the occupied buildings are a variety of smaller structures housing mechanical, electrical and storage functions.

4.3.2 Places and Open Spaces

Although the arrangement of buildings and landscape on the RML campus lacks a formal orthogonal geometry, the open space extending from the former main entrance to the site at 4th

and Grove Streets to the connection between Buildings 25 and 28, contain elements of the axial master planning philosophy that was prevalent in the early 20th Century. This portion of the campus is flanked on both north and south by a miscellany of buildings and structures that frame an irregular open service courtyard. Spaces leading north or south from this axial service yard are loosely defined spaces mostly occupied by circulation and service functions with little architectural definition or character.

Between Buildings 25 and 28 and within the Quad complex are the only formal exterior courtyards on the campus, and these spaces are accessible only from the buildings that surround them.

There remains a large amount of unoccupied open space, especially on the north and west portions of the site, which are undefined architecturally. The western portion of the site which extends to the Bitterroot River has the most compelling aspect which is the Bitterroot Mountains rising across the river from the site, and provides a backdrop of singular beauty.

4.3.3 Building Heights

Until completion of Building 28 at a height of 52 feet, the tallest building on site was a portion of the Quad at 50 feet. All other buildings except the residences (Buildings 8 and 9) are single-story and relatively low profile. Refer to Figure 4.3.3. The placement of the tallest building at the center of the site provides a focus that is visually apparent from nearly every vantage point surrounding the campus, although the Quad continues to retain a sense of prominence when seen from 4th Street or Grove Street from which most traffic approaches the site.

4.3.4 – Building Area Summary:

Table 5.2.1 in Chapter 5 lists existing buildings by gross area and existing use.

4.3.5 Building Conditions

Building conditions on the RML campus are rated using a performance metric established by the Department of Health and Human Services (DHHS). The Condition Index (CI) is a general measure of constructed asset condition which the Federal Real Property Council requires agencies to track for all their facilities. It is calculated as the ratio between the repair needs of the asset and its replacement value. NIH has committed to achieve a CI of 90 or more for all its buildings by 2017 (except for Building 10 on the Bethesda campus).

A summary of building conditions is graphically presented in Figure 4.3.5-a. Buildings with a CI score of 90-100 are shown as “Excellent”, those with a score of 80-89 are shown as “Fair”, and those below 80 are identified as being in “Poor” condition. Building 28, the IRF, has not yet been rated on its Condition Index. However, since this is a new facility it is shown in Figure 4.3.5 as “Excellent”. Building T23 is a leased trailer and has likewise not been rated; temporary leased trailers are not required to be rated.

The Condition Index Ratings are summarized in Table 4.3.5.

NIH-RML Master Plan
Hamilton, Montana

UP TO 20'

UP TO 40'

UP TO 52'

Figure 4.3.3

Building Heights

NIH-RML Master Plan
Hamilton, Montana

Excellent- Condition Index Rating of 90-100
Fair- Condition Index Rating of 80-89
Poor- Condition Index Rating below 80

Figure 4.3.5

Building Conditions

Table 4.3.5- Conditions Index Ratings

Building	Condition Index	Building	Condition Index	Building	Condition Index
RML-A	99	RML-13B	99	RML-29	100
RML-01	94	RML-14	90	RML-30	100
RML-02	99	RML-15	87	ARMCO-1	98
RML-03	99	RML-16	89	ARMCO-2	100
RML-05	99	RML-17	38	RML-HD 1	90
RML-06	99	RML-21	84	RML-HD 2	81
RML-07	76	RML-22	87	RML-HD 3	82
RML-08	95	RML-24	100	RML-HD 4	75
RML-09	92	RML-25	99	RML-HD 5	100
RML-11	100	RML-26	99	T-23	Not Rated
RML-12	100	RML-27	99		
RML-13	99	RML-28	Not Rated		

4.3.6 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 activities. Buildings deemed to be obsolete could not practically be reused because of inadequate mechanical systems, inflexible structural systems, building configuration, or cost factors.

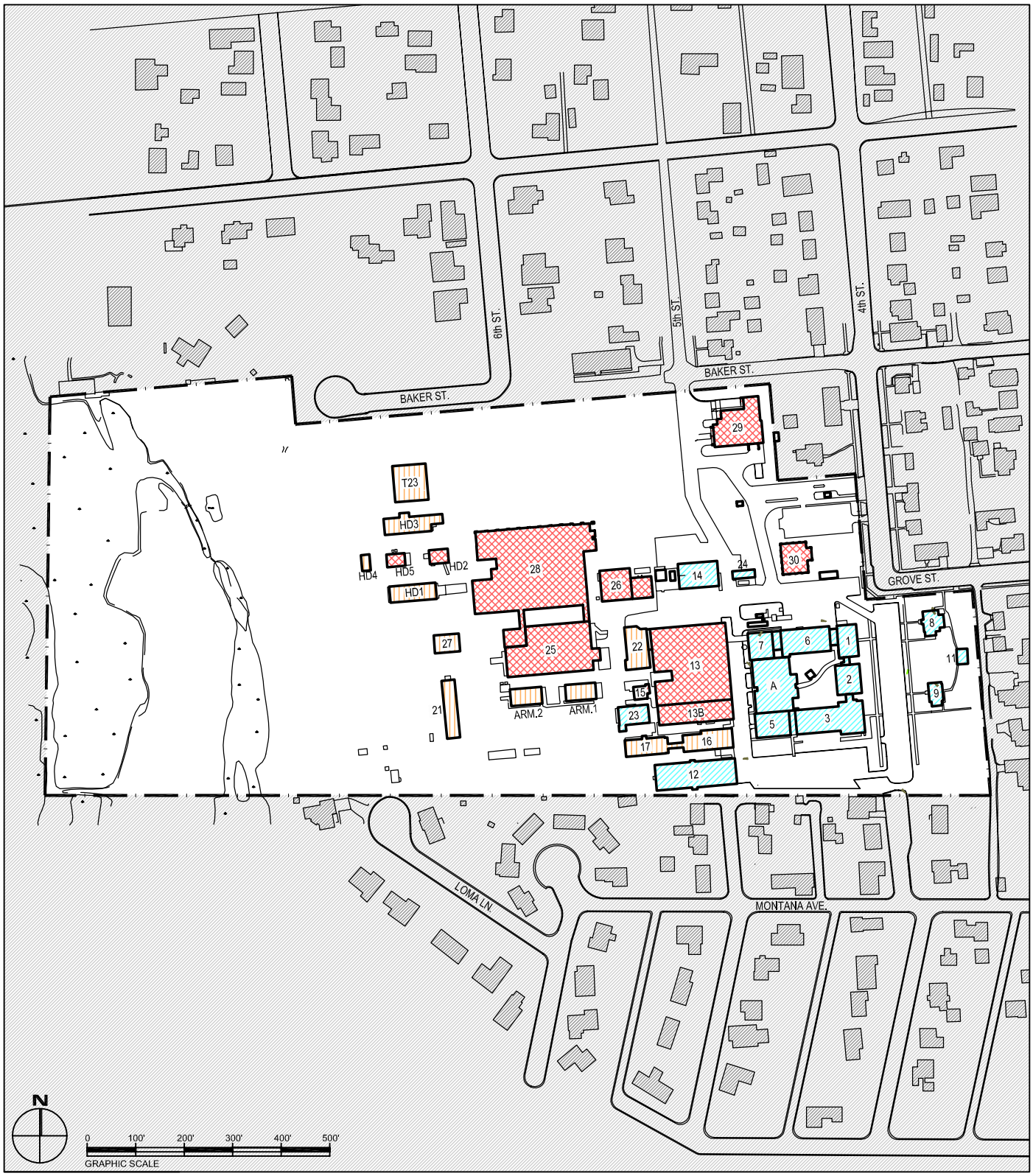
Most buildings on campus are considered to be functional for the uses they currently house. Marginal buildings include prefabricated buildings, industrial buildings and a barn that have been retrofitted for functions other than their original purpose. A summary of building functional suitability is graphically presented in Figure 4.3.6.

4.3.7 Campus Entries

The quality and character of entries onto the RML campus create an important arrival image for employees as well as visitors. Campus entries also act as key orientation points for understanding the organization of the entire site. The two existing campus entries, at 4th and Grove Streets and 5th and Baker Streets, have only limited landscaping or architectural features, but are obvious for the gates and guardhouses present at these locations. Visitors' and employees' vehicles, bicyclists, and pedestrians enter at 4th Street, and commercial delivery and service vehicles access the campus from Baker and 5th Streets, as shown in Figure 4.3.7. The 4th Street entrance has a sign identifying the installation, and its width, its gate arrangement, and the prominence of Building 30 set it apart as the main campus entry point. The second entrance has few distinguishing features. The remainder of the site perimeter is closed by a security fence. Previously, the main entrance was at 4th Street, between Baker and Grove Streets with a secondary entrance just east of 4th at Grove Streets. Both have been permanently closed.

4.4 Circulation

Although, as stated above in Section 4.3.7, the entrances to the RML campus are clear and few in number, the circulation onsite is less well defined beyond the entrance gates and control points. Because of the scattered buildings on the site and their multiple entrances, and informal parking and service areas, buildings are virtually surrounded by pavement or gravel drives which are shared by all forms and modes of circulation – vehicular, pedestrian and bicycle. Visitor vehicles are

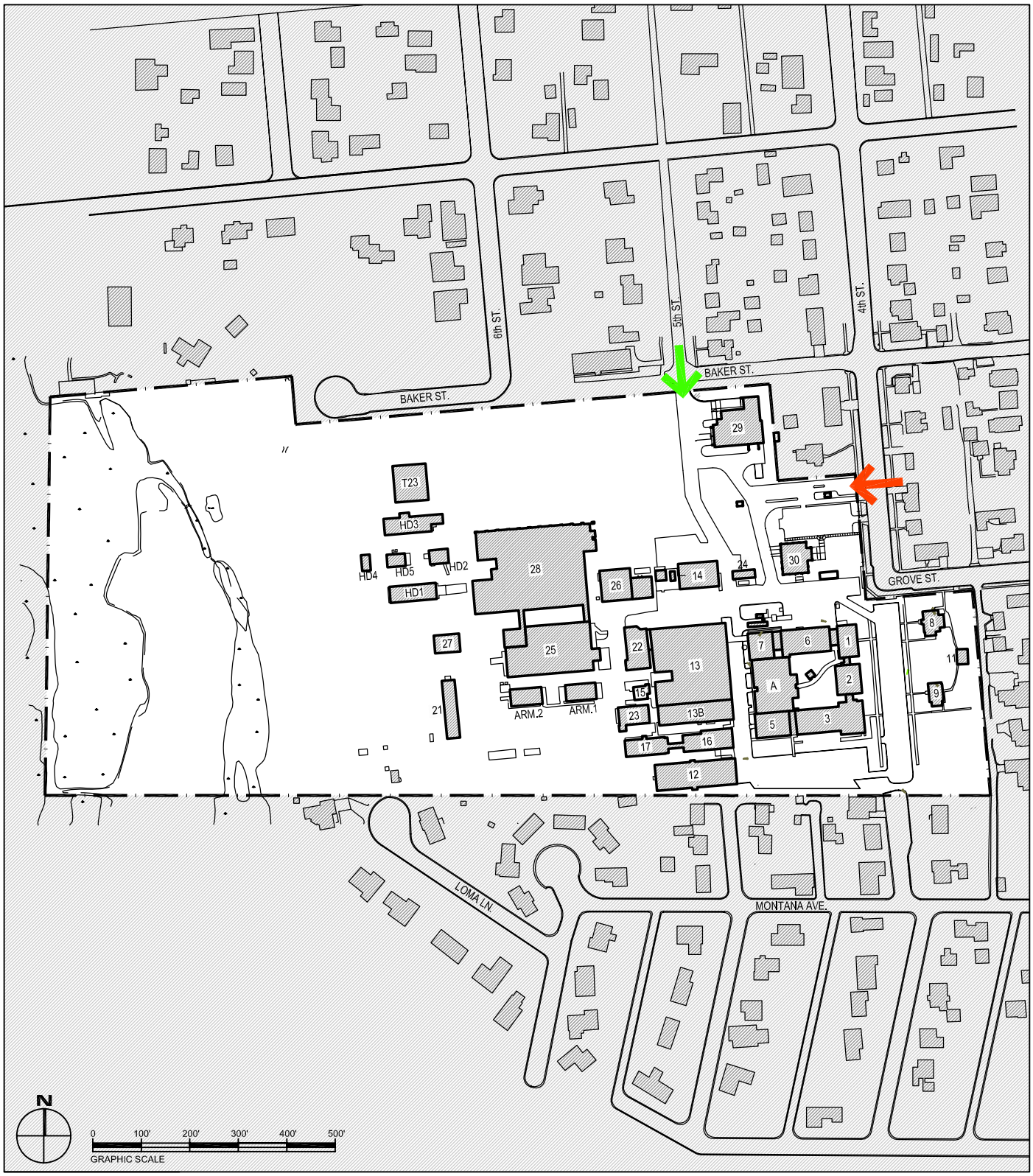


NIH-RML Master Plan
Hamilton, Montana

Excellent
Good
Poor

Figure 4.3.6

Functional Suitability



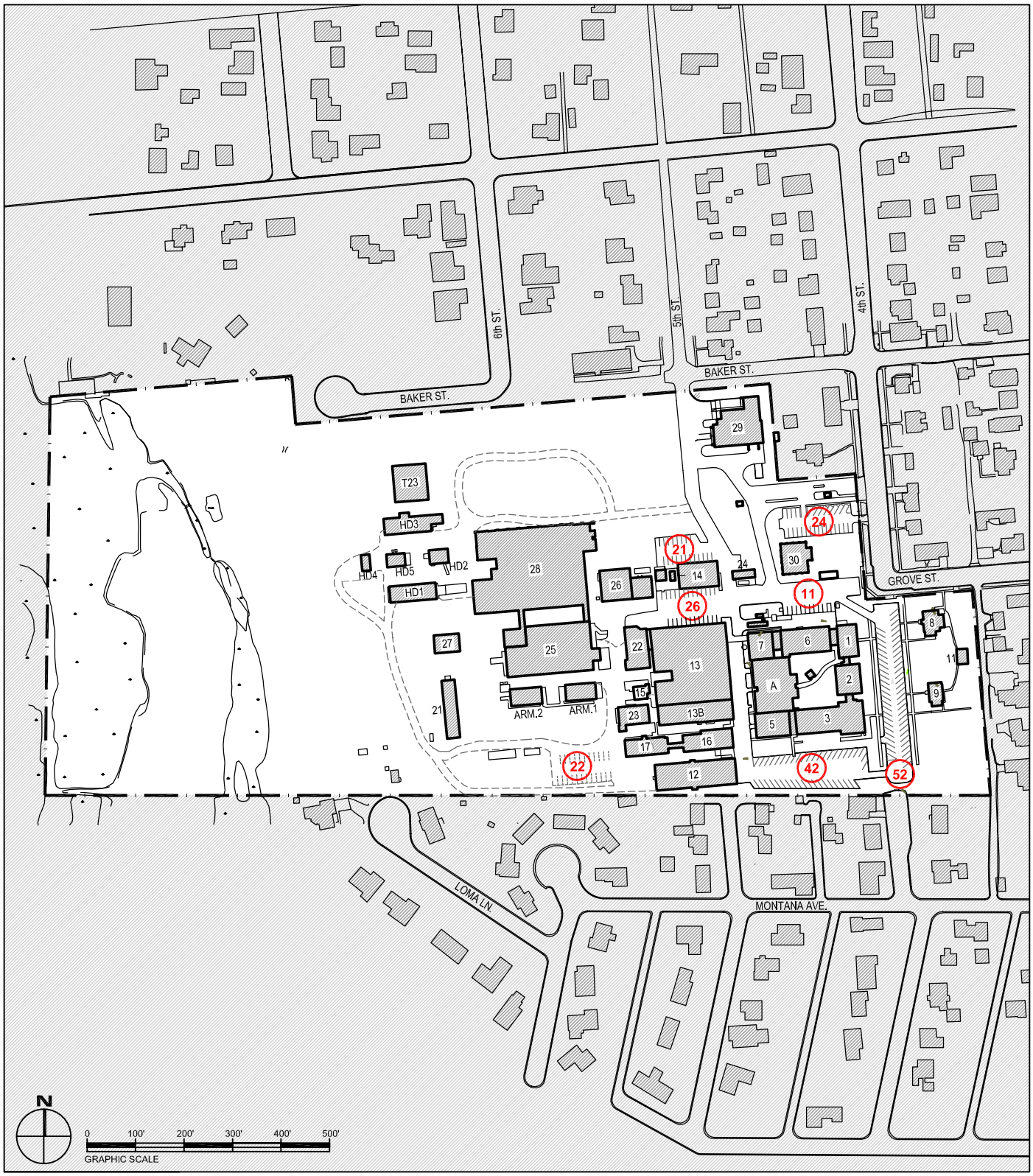
NIH-RML Master Plan
Hamilton, Montana

Passenger Vehicle, Pedestrian & Bicycle Entry

Service Entry

Figure 4.3.7

Campus Entries



NIH-RML Master Plan
Hamilton, Montana

24 Parking Area - Number of Spaces

Unpaved Drive

Figure 4.4.1

Parking Distribution

confined to a visitor parking lot clearly demarcated and located outside the secure perimeter near the Visitors' Center. Similarly, commercial delivery vehicles are generally restricted to the service yard immediately inside the gate at Baker and 5th Streets and the loading bays for the Shipping and Receiving Building. Some service vehicles belonging to contractors, suppliers, vendors, etc., are permitted to proceed directly to destinations on campus after security screening. The shared use of the paved areas is seldom a serious problem due to the very light vehicle volumes on the site.

4.4.1 Parking

With the exception of dedicated parking for 24 visitors' vehicles at the 4th Street entrance, all other parking is distributed around the buildings with the largest lots totaling 94 spaces to the east and south of the Quad. Eleven spaces are provided north of the Quad; 26 spaces have been located between Buildings 13 and 14; and 21 spaces are located north of Building 14. Another 22 are located west of Building 17. Additional parking occurs in undefined areas throughout the campus. See Figure 4.4.1.

4.4.2 Access for Persons with Disabilities

Existing buildings on the RML campus are required to meet the criteria of the Uniform Federal Accessibility Standards (UFAS). As a federal entity, the NIH does not fall under the jurisdiction of the Americans with Disabilities Act (ADA). However, the agency has adopted the Americans with Disabilities Act Accessibility Guidelines as its standard for accessibility planning for new construction.

4.5 Amenities

The proximity of commercial services in Hamilton has obviated the need for on-site amenities for the most part.

- Dining – Many employees bring their own lunches to work; others drive to their nearby homes; while still others frequent restaurants on U.S. Route 93. No on-site dining is offered other than scattered vending machines.
- Child Care – No on-site child care is offered, and it is presumed that all employees make their own arrangements within the community.
- Recreation and Fitness – Commercial fitness facilities are available in Hamilton, and there are many recreational opportunities throughout the Bitterroot Valley, including hunting, fishing, hiking, skiing and other sports. Although there are no formal recreational facilities on site, the adjacent River Park system is used by RML employees at times for walking, picnicking and other recreation.

In preparing the Master Plan, the RML staff was asked to respond to a questionnaire using a scale from 1 (Essential) to 5 (Unnecessary) to determine preferences for amenities such as conference rooms, food service, staff lounges, fitness centers, staff showers, bicycle racks and break rooms. The results of this survey are shown on Table 4.5. Fifty-five staff members participated in the survey. The results of the survey indicate clear preferences for bicycle racks, break rooms, showers and lockers, food concessions and conference rooms for 5-15 people. Full service dining and conference rooms for 3-5 were seen as less important.

Table 4.5-Amenities Questionnaire Results

	Rating-Number of responses					Total Responses	Average Rating
	Essential				Unnecessary		
Amenity	1	2	3	4	5		
Conference Rooms							
for 3-5 people	3	7	19	8	18	55	**3.56**
for 5-15 people	19	18	10	1	7	55	**2.25**
for 15-30 people	14	14	15	2	10	55	**2.64**
for 30-50 people	9	7	10	7	22	55	**3.47**
Food Service							
Full Service Dining	3	11	12	10	19	55	**3.56**
Concessions	20	11	14	6	4	55	**2.33**
Catering	3	12	17	7	16	55	**3.38**
Lounge Areas	8	18	10	11	8	55	**2.87**
Day Care	11	12	15	3	14	55	**2.95**
Fitness Center	17	16	10	7	5	55	**2.40**
Showers/Lockers	15	19	12	3	6	55	**2.38**
Bicycle Racks	38	12	3	0	2	55	**1.47**
Break Rooms	36	13	3	1	2	55	**1.55**

The types and scale of amenities appropriate for NIH facilities is based on staff population, and the ranges are set forth in NIH's *Guidelines for Amenities and Services Within NIH Facilities, December 2004*. Based on the Guidelines, the RML campus qualifies for several amenities including vending areas, wellness centers, unsupervised fitness rooms, bicycle racks, lockers/showers and lactation cubicles. Currently, only vending machines, bicycle racks and lockers/showers are provided. See Figure 4.5

4.6 Architectural Character

The architectural character of the buildings on the RML campus varies from the traditional brick academic style of the Quad, to the clapboard frame houses within the eastern portion of the historic district, to the various modern styles represented by the IRF, Visitors' Center, and Shipping and Receiving Building, and the assorted utilitarian buildings scattered about. In general, the site lacks a consistent architectural character that would prescribe future building designs. See Figure 4.6.

4.7 Historical and Archeological Features

The eastern portion of the campus contains structures that together comprise the Rocky Mountain Laboratories Historic District which was listed in the National Register of Historic Places in 1988. The boundary description of the district in the Register includes Lots 1-9 of Block 18 and Lots 1-7 of Block 19 of the Pine Grove Addition to the City of Hamilton, MT. This includes RML Buildings 1, 2, 3, A, 5, 6, 7, 8, 9 and 11, as well as site amenities such as mature trees, period lighting, and landscaping that contribute to the integrity of the District.

NIH-RML Master Plan

Hamilton, Montana

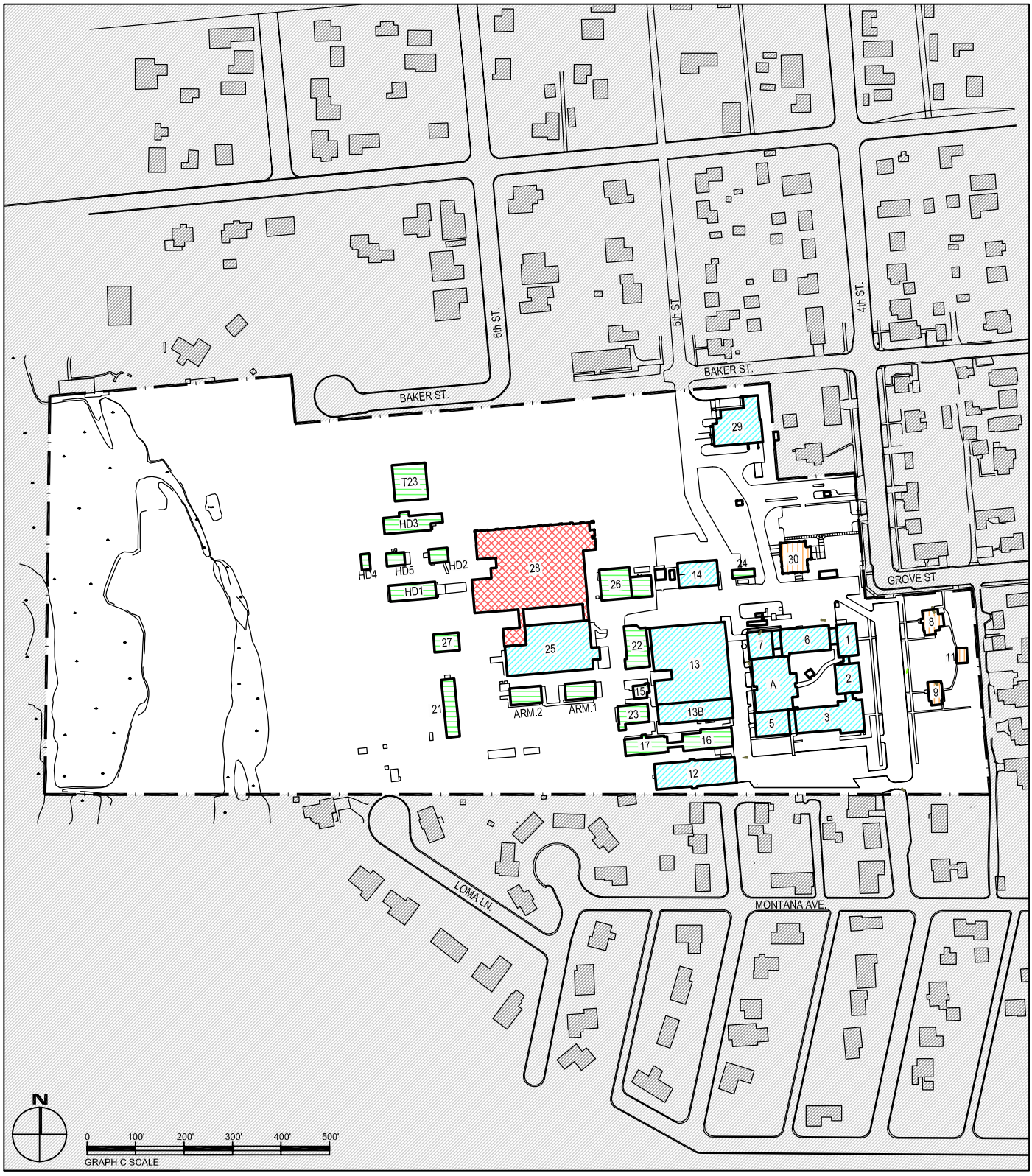
Figure 4.5

Bicycle Rack

Vending

Lockers/Showers

Amenities



NIH-RML Master Plan
Hamilton, Montana

- Institutional - Contemporary
- Institutional - Brick
- Industrial
- Residential - Wood

Figure 4.6

Architectural Character

4.8 Environmental Features

4.8.1 Climate and Outdoor Design Conditions:

The severity and variability of the climate in Hamilton warrants special design considerations for building envelopes and mechanical systems. These include special treatment of outside air and design and control strategies as they pertain to extreme outdoor conditions. The design parameters for outdoor conditions are as follows:

- Project Location

Location:	Hamilton, MT
Latitude:	46 degrees, 30 minutes
Elevation:	3,578 feet asl

- Outside Design Conditions

Summer*	96° F dB / 65° F wB, Daily Range = 36° F
Winter*	-30° F
Heating - Degree - Days	7,931 (65 F base)

* Note- These are normal summer/winter extremes and are based upon NOAA weather records. These exceed the ASHRAE design parameters of -9 degrees F (99.6%) winter and 91/62 degrees F (0.4%) summer.

Hamilton's prevailing weather conditions are actually quite mild by Montana standards. However, the area experiences virtually the same extremes as the rest of the state. Very warm temperatures can be expected for a period of at least several days in the summer and can be accompanied by relatively high humidity levels. Extreme cold can also be expected for some duration every winter. Use of the ASHRAE data tables for design temperatures should be considered very carefully as this data does not embrace, to any significant extent, the normal extremes. It is recommended that all buildings that utilize large amounts of outside air be designed to accommodate extreme temperatures, especially for winter conditions. As the data listed above indicates, the normal extreme temperatures for Hamilton are more than 20 F less than the recommended ASHRAE winter design temperature. No building system designed for -9 F will accommodate -30 F temperatures with ease, and if the fresh air (ventilation) load is at all significant, a massive undersizing of the mechanical systems may result by following ASHRAE criteria. The temperature extremes from summer 2003 to winter 2004 went from 106 F to -29 F.

Humidity levels in the region are typically quite low and rise to significant levels only on a sporadic basis. Consequently, humidification systems must be installed to maintain even minimal indoor relative humidity levels. Without humidification systems, the winter indoor conditions would be less than 15% relative humidity for the bulk of the winter, and would rise only slightly above this in the summer. The fact that high outdoor humidity in the summer is expected to be significant at times, but is commonly quite low, implies that dehumidification systems are not normally required. Finally, the prevailing low outdoor humidity levels make the Hamilton climate very well suited to the use of economizer cooling with outdoor air for a great amount of time each year. They further allow the use of evaporative cooling as an energy saving measure for utilitarian type buildings which require cooling only in the summer months.

Caution must be exercised in building envelope design to ensure that vapor barriers are employed in a very complete fashion. The extremely low outdoor humidity levels in winter, combined with elevated levels indoors for a humidified building, give rise to a significant vapor pressure gradient. This gradient will drive considerable amounts of moisture through any breaks in a vapor barrier and will condense and freeze within building structures where this is allowed to happen.

The above analysis is taken from the 2002 Site Utilization Study by Architects Design Group of Kalispell, Montana. Complete meteorological data is available for Hamilton from the National Oceanic and Atmospheric Administration (NOAA) for the designers use.

4.9 Existing Utilities

The Site Utilization Study (SUS) conducted by Architects Design Group (ADG) was completed in 2002. This Master Plan updates programmatic and other background material included in the SUS, as appropriate. The site utility information in the study describes in detail existing site utilities in *Part III: Existing RML Resources and Conditions*, and is repeated in part in this section without the analyses, judgments and recommendations contained in the SUS. A Master Utility Plan (MUP) is currently under development for RML. Where possible the information below has been coordinated with that effort and is therefore more current than the baseline year information.

4.9.1 Natural Gas Distribution System:

As the gas distribution in Figure 4.9.1 indicates, there are currently three small gas service lines and one large industrial service line feeding the campus. The three small lines serve Buildings 8, 9, and 11 located on the east side of the former 4th Street right-of-way.

The 6" industrial service line, which enters the north side of campus, was installed in 2000 and is constructed of polyethylene. This high capacity line originally served only the new steam plant in Building 26 but it later became the source for an entirely new campus distribution system installed in 2003. Although the current load on this line is only on the order of 60,000 standard cubic feet per hour (scfh), this service is sized to accommodate a future load of over 150,000 scfh without undue pressure drop. This is equivalent to twice the current boiler plant load plus all other current campus usages.

The new campus gas distribution system is constructed entirely of polyethylene. It is routed as indicated on the distribution plan and has a depth of bury which generally ranges from 18" to 24". The previous gas distribution system was abandoned in place and is largely constructed of steel. When abandoned, the system was cleared with compressed air in compliance with Fuel Gas Code requirements.

The gas distribution pressure on campus is 30 pounds per square inch (psi). This allows tremendous capacity in the distribution system, even in relatively small piping runs. Regulators are used at each building to reduce incoming gas to the appropriate pressure. For all but the incinerator building, Building 23, and the boiler plant, Building 26, the building service pressure is reduced to 7" water column (1/4 psi).

4.9.2 Steam System:

Refer to Figure 4.9.2. The majority of the buildings on campus are connected to the central steam system, and it is utilized for building heat and humidification, hot water production, sterilization, and cage and glassware washing. The steam plant operates continuously year-round.

- Distribution:
  The central steam distribution system on the RML campus is comprised of an underground direct-bury conduit piping system. Steam is produced and distributed to campus buildings at approximately 100 psig.

  The campus steam plant in Building 26 was constructed in 2000; the "old", now defunct, steam plant occupies Building 7 at the northwest corner of the Quad complex. The two plants are connected with a large (12") underground steam main and two (4") pumped

condensate lines. This arrangement previously allowed steam produced at either location to be distributed through the other. Likewise, condensate returned to either plant could be transferred to the other via the underground condensate lines. The plant in Building 7 is now abandoned and the fuel supplies to the boilers have been removed. However, all steam for the Quad complex and for Buildings 13, 13B, 16, 17, and 12 are routed through the old boiler header arrangement that still exists in Building 7. In the future, the header will be removed under the Building 7 renovation project but the distribution scheme will remain the same. The design for renovating Building 7 into laboratory space has been completed but funding is not available.

Building 25 is served by a dedicated 6" direct-bury steam line and a 2" direct-bury pumped condensate line. The underground piping between Building 26 and Buildings 25 and 7 was installed between 2000 and 2001. Both the steam and the condensate systems utilize Schedule 40 steel carrier piping with calcium silicate or rock wool insulation, a spiral welded steel outer casing, which is insulated on the exterior with foam insulation and an FRP (fiberglass reinforced plastic) outer jacket. The system is Ricwil model " Multi-therm 500". The underground piping mains which leave Building A to serve Buildings 12, 13, 13B, 16 and 17 are also this same type of piping (Ricwil Multi-therm 500) but were installed new between 1995 and 2000. The branch lines, which connect Buildings 12, 16 and 17 to the newer mains, are quite old and are largely run in shallow trenches. The condition of the line set serving Building 17 is reported to be in poor condition and of questionable integrity.

The steam plant, or Building 26, is served by its own dedicated emergency power generator in the plant and designated generator G5, which is discussed in more detail in Section 4.9.9 below. The fuel supply for the generator is No. 2 diesel fuel. The only fuel tank is a base tank beneath the generator. This tank is sized to support 40 hours of generator operation at full load.

The boilers burn natural gas as their primary fuel and utilize No. 2 diesel fuel as a back-up fuel source. A 20,000 gallon storage tank sits adjacent to the east side of Building 26 and stores enough fuel for approximately 45 hours of plant operation at full (design) load.

Building 26 was configured to allow expansion to the east for one or more additional boilers. The condensate and boiler feed assemblies were also sized to support additional boilers. With the construction of the IRF, the plant building shell was expanded to allow for two boilers. A new boiler stack was installed and it was sized for two boilers as well. However, only one new boiler was added with the IRF project, leaving space for a fourth boiler to be added in the future.

- System Capacity – Steam Plant:
  The new steam plant (Building 26) currently houses three boilers, each rated to produce 50,000 lbs/hr of 100 psi steam. The plant design is such that each boiler is sized to accommodate the entire connected campus load with the remaining boilers serving as a fully redundant stand-by to the active boiler.

  The actual available capacity from the plant will be the rated output of one boiler less the amount of steam consumed within the plant itself for the deaerator unit which pre-heats the feed water before admitting it to the boilers to make steam. The amount of heat required by the deaerator depends primarily on the makeup water load (the amount of fresh cold water admitted to the system). In turn, the makeup water consumption rate is driven primarily by the humidification loads on campus. It is estimated that the deaerator could consume as much as 3,500 lbs/hr of steam, leaving the available steam capacity from a single boiler to be 46,500 lbs/hr.

During cold weather experienced in January 2004, when low temperatures of 25 degrees Fahrenheit below zero were experienced, the maximum steam demand recorded was 24,300 lbs/hr, on an hourly demand basis. During summer heat in August 2003, with temperatures exceeding 102 degrees Fahrenheit, the highest demand was 11,110 lbs/hr on an hourly demand basis. Also, a surge in demand of 2,000-3,000 lbs/hr is experienced when the cagewash facilities fire up in Building 13 each morning. However, recent analysis of the available data indicates that the current peak campus design load should be considered to be in the range of 40,000 to 45,000 lbs per hour of steam. With the IRF project, the addition of one boiler equal in size to each of the two existing units, has essentially doubled the steam production capabilities of the plant.

During design of the steam plant, the campus steam demand was assessed in a coordinated effort between Gordon-Prill-Drapes, Inc. (GPD) and the NIH. It is difficult to assess the true, current peak steam demand for the RML campus due to the sporadic nature of equipment loads. This is not normally the case, as equipment loads do not typically comprise such a large percentage of a total campus load. However, in the case of RML, the large sterilization and cage wash equipment loads are very significant. As such, NIH and GPD explored and then agreed upon what was thought to be a reasonable diversity factor to accommodate the load associated with equipment, which does not operate continuously. The results of those calculations indicate a total connected load of approximately 66,000 lbs/hr and a diversified (adjusted, realized) load of approximately 48,000 Lbs/Hr. These figures were summarized in a joint spreadsheet (NIH/GPD), dated September 17, 1998, and assume a 0.9 diversity factor for connected heating loads and a 0.5 diversity factor for the equipment loads. It is interesting to note that the connected *equipment* loads (28,000 lbs/hr) in this study were very nearly as high as the connected *heating* loads (38,000 lbs/hr).

The load figures are considered to be very conservative in that they assume that all of the systems in all of the buildings operate at or near (90%) full capacity simultaneously. Further, and perhaps of equal or greater importance, no internal heat gains from lights, equipment and people are allowed in the calculations. It is highly likely that when all of the current buildings are fully occupied, the peak steam load for the campus could prove to be as much as 10% to 20% lower than these calculations indicate.

- Distribution System:

  There are only two steam pipelines leaving Building 26. The largest of these is a 12" service that extends to Building 7, and the other is a 6" line that feeds Building 25. The line that feeds Building 7 extends to Building A where it serves all of the Quad buildings, the large central cooling system absorption chillers, and then the underground distribution system which was originally connected to Building 7.

4.9.3 Chilled Water System:

There are two chilled water plants on campus. The original plant is located in Building A on the west side of the Quad Complex. The other is located in Building 28.

- Building 28 Chilled Water System:

  The Building 28 plant serves both Buildings 28 and 25. Chilled water lines will also be extended from this plant to serve Building 31, which has been approved for construction.

  The Building 28 chiller plant is a hybrid arrangement of three types of chillers. There is a 170-ton outdoor air-cooled screw chiller, and a 700-ton centrifugal water cooled chiller and nominal 700-ton water cooled steam fired absorption chiller located inside the plant. The centrifugal chiller and the absorption chiller are redundant to one another and are not

intended to operate together. There are two redundant cooling towers located on the roof of the chiller plant. The outdoor air-cooled chiller is located between Building 25 and Building 28 on the west side of the facility. The system uses a primary-secondary pumping arrangement. There are redundant primary chilled water pumps and redundant condenser water pumps located inside the chiller plant. The secondary chilled water pumps for this system are dispersed in the system and are located in each building served. Buildings 28 and 25 each have their own redundant secondary chilled water pumps. Building 31 will also have its own dedicated pumps when complete.

The plant utilizes the outdoor air cooled chiller as its first stage of cooling at low loads and during spring and fall weather. The chiller can operate to an outdoor air temperature of 40 degrees F. At temperatures lower than this, each building can provide cooling via dedicated equipment or outdoor air economizer cycle. As soon as the load is high enough, the centrifugal chiller starts and operates and is the most efficient of the three chillers. The absorption chiller is strictly intended as a backup to the centrifugal chiller. An absorption type unit was utilized in order to avoid the need for an emergency generator large enough to power the centrifugal chiller. In the case of a commercial power outage, the plant can operate both the air cooled chiller and the absorption chiller.

Should the cooling load at the west side of campus grow significantly, the Building 28 plant is designed to accommodate future expansion to the west and the roof of the plant is designed to accommodate one more cooling tower at the north end. Expansion of the Building 28 chilled water plant to the west would impact the underground electrical duct bank as shown in Figure 4.9.9. that feeds the RML site northwest quadrant; a campus distribution gas line as shown in Figure 4.9.1; and the portable generator location for Building 28.

- Building A - Chilled Water System:

  The Building A chiller plant serves the Quad buildings plus Buildings 13, 13B, and 12. The system utilizes two electrical centrifugal chillers located in the Building A ground floor mechanical room and an open (“wet”) outdoor cooling tower located just west of Building 14.

  The cold water produced by the two absorption chillers is piped to all of the air handlers that serve the Quad buildings. Additionally, a 6” piping loop (supply and return) extend underground from Building A to serve Building 13 (via a pipe entrance closet in Building 13B) and branch south to serve a new air handler in the east end of Building 12.

  The chiller system in Building A, and the accompanying underground distribution piping, were installed between 1995 and 2000. The underground piping for this system is identical to that used for the Building 25 system.

4.9.4 Compressed Air and Vacuum Distribution Systems:

- Underground Distribution Piping:

  These two piping systems extend from Building 7 into Building A. A branch line that serves the underground distribution leaves the west side of Building A then turns southward in the alley between Building A and Building 13 to serve Buildings 13, 13B, and 16. The two services (air and vacuum) parallel one another and serve the same buildings . Despite their similarities, the capacities of these two systems to accommodate additional loading vary quite significantly.

These services are routed just west of the Quad complex and extend to the south where they now terminate at the services for Building 12. The mains remain undiminished in size from Building A to their terminus.

4.9.5 Energy Monitoring and Controls Systems:

The building control systems on the RML campus are a mixture of new direct digital controls (DDC) and older, local pneumatic and local electric controls.

All of the DDC control systems on campus are less than 6 years old, are manufactured by Trane, and are networked to a common front end located in HD-3. The Trane PC based operators' terminal in Building HD-3 features color graphics for all of the connected systems. In addition to featuring graphics for each HVAC system, the main operators' terminal has separate graphics pages for monitoring and alarming the central chillers in Building A, the boilers in Building 26 and all of the (5) emergency power generators on campus.

Complete, new DDC systems by Trane serve Buildings A, 1, 2, 3, 5, 6, 12, 13, 24, 25, 26, and 27.

The Trane DDC system is the most dominant control system on campus and has been employed exclusively in every major renovation and new construction project in the last five years. The Trane system is LonWorks compatible and can be adapted to a LonWorks front end operating station should this be desired in the future in order to allow one common front end to communicate with DDC controls by other manufacturers.

Building 7 has an aging, but functional, all-pneumatic control system. It is the only all-pneumatic control system on campus and serves old antiquated steam radiators. Building 7 is slated for renovation in the future and will be fit with new DDC controls at that time.

A number of buildings have hybrid systems consisting of local pneumatic or electric controls and limited DDC monitoring and control capabilities. Trane DDC systems have been added to the pneumatic control systems in Buildings 16 and 17. The functions of the DDC controls are to monitor and alarm fan failures, automatically switch operation of redundant fans upon detection of a fan failure and to control new humidification systems in these buildings. The controls in Building 13B are similar in that the existing electric/electronic controllers packaged with the air handlers are augmented with Trane DDC controls for monitoring, alarm, fan switching and humidification control.

Local electric or combination electric/electronic packaged controls are used in Armco 1, HD-1, HD-2, HD-4 and HD-5 and Buildings 9, 10, 11, 14, 22 and 23.

Temperature Controls Compressed Air Supply Systems: Most of the buildings on campus receive air for temperature control actuation from dedicated air compressors resident in each building. Aside from the Quad buildings and Buildings 13 and 13B, which receive their temperature control air from the compressor in Building 7, all of the other campus buildings which require compressed air for controls have their own compressors.

4.9.6 Water Distribution:

Refer to Figure 4.9.6. The RML campus has a single connection to the city's water system at 4th and Grove Streets. The pipeline to the meter pit, located adjacent to the roadway, is 12" diameter PVC. A water meter assembly (two meters) is located in the pit and maintained by the city. The water service building, which houses two parallel 8" diameter reduced pressure back flow preventers and a booster pump system, is located approximately 50 feet downstream from the meter pit. The interior campus water distribution system is 10" diameter PVC. Fire hydrants (9 total) are located strategically throughout the system.

The entire water distribution system has been installed within the last eleven years and is in good condition. Almost all of the RML buildings have had new water service connections installed with recent improvement projects.

There is an active 6" water line running under 4th Street that is owned by the City of Hamilton. A new fire hydrant was installed on 4th Street south of the campus to replace the hydrant in that area that has become inaccessible with the construction of the perimeter fence. There is a fire hydrant off this 6" line at the northeast corner of Building 1.

4.9.7 Sanitary Sewer Collection System:

Refer to Figure 4.9.7. The RML has a conventional gravity collection system consisting of 8" diameter sewer mains and 4' diameter concrete manholes. The manholes are located at pipe junctions and changes in pipe direction. The manholes are all less than 400 feet apart.

The RML has four connections to the City of Hamilton's sanitary sewer system. The first connection is in the alley on Baker Street between 5th and 6th Streets. This sewer main is an 8" clay tile main which serves most of the RML buildings. The sewer main was probably installed shortly after the sanitary sewer system was installed in Hamilton, which was in the early 1950s. The second connection is at what would be the alley between 6th and 7th Streets. This 8" PVC main was installed in the mid-1980s and serves facilities at the western end of the campus and Building 25. There is a third connection at the intersection of 5th and Baker Streets, an 8" PVC pipe that was installed in 2005. The fourth connection is in the alley behind Building 11, and connects only to this building. Its size and composition are undetermined.

The sewer collection system has been modified within the last five years. The sewer lines from MH A-3 east to MH A-11 and south to MH A-13 are new 8" PVC mains. Also, the sewer line from MH A-8 to MH A-15 is an 8" PVC and was installed recently. Building 31, planned for construction, will connect into the existing sanitary sewer at man hole C3. As part of this project, the clay pipe and manholes running from MH-A1 to MH-A3 are being replaced with 8" PVC. Most of the sewer mains at the RML are at or near 0.4%, the minimum slope allowed for sanitary sewers. Since the existing mains are at minimum grade, it is difficult to make changes in the sewer main routing.

4.9.8 Storm Sewer:

The RML campus has two pipes which daylight at the west end of campus. The southerly pipe which runs just inside the RML's south boundary is an overflow pipe for the irrigation pipe system in the alley between 3rd and 4th Streets. No water from RML runs in this pipeline. It is currently still active in the summers. The northerly pipe carries limited water from area drains inside the RML campus. Other storm water on campus is managed through dry wells or sumps.

The State of Montana has issued a Montana Pollutant Discharge Elimination System (MPDES) permit to the RML for discharging boiler blow-down and cooling water to the Bitterroot River. The permit listed two discharge points. The permit expired on November 30, 2002 and has not been renewed since RML no longer disposes of boiler blow-downs and cooling water in the pipes on campus.

The Phase II storm water regulations under MPDES Permit System (Storm Water Discharges associated with Small Municipal Separate Storm Sewer Systems) apply primarily to areas with populations of at least 10,000. However, the rule also includes other areas such as military bases, large educational, hospital and prison complexes and highways and municipalities with less than 10,000 people depending on the receiving water designation. Currently, only construction activities that disturb more than 1 acre at RML are subject to MPDES Phase II rules

(primarily Best Management Practices for erosion and sediment controls)." [REF: MPDES Permit Number: MTR 040000]

Considering the likelihood that both Hamilton and RML will be included under additional Phase II requirements within the 20-year time frame of the Master Plan, NIH will adopt a proactive storm water management approach incorporating storm water Best Management Practices (BMP) and Low Impact Development (LID) strategies. These methods are described in more detail in Chapter 6.

- Drainage System:
  An 8" pipe from Building 7 used to flow boiler blow-down water under Building 13 into a 12" diameter drain beginning on the west side of Building 13. The original 12" diameter corrugated metal pipe (CMP) was replaced by PVC pipe to the section west of Building 25. The drain line terminates below the irrigation ditch west of the campus. This pipeline also has four storm water intakes, two each between Buildings 22 and 25, and two each south of Building 25 on the easterly section of pipe. The portion of drain line from the outfall to the first manhole is a 12" diameter corrugated metal pipe (CMP), 310 lineal feet. This pipe shows rust on the inside, but otherwise is in good condition. A service connection is located 256 lineal feet from the outfall. An existing connection from a drain from HD 5 has been removed. The remaining of this drain is 12" PVC installed recently under current construction projects. This pipe is in good condition. This pipe is one of the discharge points listed in the MPDES permit. The pipe capacity is 2.9 cfs.

- Storm Water Management:
  Most of the storm water on the RML site is disposed of in dry wells (sumps), which percolate the water into the ground. The Bitterroot Valley soils have good drainage characteristics so sumps are good methods of storm water disposal. Normally a 4' diameter x 8' deep sump is designed to drain a 10,000 square foot surface area. The State of Montana does <u>not</u> require permits for storm water discharged into the ground. Only storm water from parking lots, roadways, roofs, and grassy areas can be discharged without a permit. Remnants of an old system have been found south of Building 30, reportedly consisting of two area drainage sumps piped to a French drain. The extent and use of this system should be investigated in order to determine its potential impact on campus planning.

4.9.9 Electrical Building Systems:

- Power Distribution:
  The campus currently has two 480-volt distribution systems – an East Distribution system and a West Distribution system. Both have separate 2500 KVA utility pad-mount transformers. The campus also has one 120/240-volt single-phase service on the southwest end of the site that serves lighting in Building 21 and the watering systems for the sheep pens. A new 480-volt service has been installed for Building 28.

  - East Distribution System:
    The East Distribution system in Building 7 was originally a 120/208 volt 3-phase, 4-wire distribution system with two 120/208 volt generators, G1 and G2, providing backup power to the entire campus. As part of the facility renovation project, the East Distribution was converted to a 277/480-volt distribution system. The renovation project provided a new 480-volt distribution switchboard MSBA1, located in Building A, that is also connected to a new 480-volt emergency generator, designated G3 and located in Building 24. Generator G3 has a capacity of 1250 KW, but would typically be rated for 80% of this load, or 1000 KW. Recent readings taken for the MUP indicate a demand load of 900 KW on this generator. Ongoing construction projects which will be explored in more detail in the MUP may affect this demand load.

The East Distribution system is rated for 4000 amps (3,324 KVA) at the Main Distribution Board (MDB), but is limited by the utility provider's 2500 KVA transformer noted above. If necessary, utilizing the 4000 amp potential would require a new utility transformer.

- West Distribution System:
  The West Distribution system was installed to provide additional power to accommodate the increased load created during the renovation and future expansion. It is a 277/480-volt 3-phase, 4 wire, wye system. It consists of a dedicated building housing normal and emergency power distribution switchboards and a new 1500 KW emergency standby generator, designated G4, located in Building 27. Generator G4 has a capacity of 1500 KW, but would typically be rated for 80% of this load, or 1200 KW. Recent readings taken for the MUP indicate a demand load of 1000 KW on this generator. With the exception of the Building 26 feeder, all other loads being fed from the West Distribution are fully backed up by the emergency generator. Building 26 has its own dedicated generator, designated G5, located in Building 26. It has a capacity of 300 KW, but would typically be rated for 80% of this load, or 240 KW. It is connected to the Normal Power Distribution Board in Building 27. Recent readings taken for the MUP indicate a demand load of 150 KW on this generator, but this will likely change when construction of Building 31, which post dates the baseline, is complete. The West Distribution primarily serves all buildings west of the main Quad Complex and is intended to provide service to any additional buildings on the west end of the campus. As noted in Chapter 3, Section 3.3.4, the demand load for the West Distribution system has been estimated to be 1000 KW. In August 2007, there was a peak demand of 1200 KW but the 200 KW spike was attributed to a temporary rental chiller used on Building 13 during that time period.

- Emergency Backup Power System:
  The entire campus is fully backed up with emergency generators with the exception of Building 21. All are diesel engine generator sets. There are five fixed generators currently installed and two generator sets that have been installed for Building 28. For temporary power purposes, RML has a portable 750 KW generator set.

  A generator replacement project has replaced the generators previously designated as G1 and G2 with a single generator capacity of 1250 KW and designated as G1. Generator G1 would typically be rated for 80% of its capacity, or 1000 KW. Recent readings taken for the MUP indicate a demand load of 400 KW on this generator. Under the same project a second generator rated at 1250 KW and designated as G2 has been installed to support the campus cooling system. Generator G2 would typically be rated for 80% of its capacity, or 1000 KW. Recent readings taken for the MUP indicate a demand load of 900 KW on this generator. Both G1 and G2 are located on the exterior of Building 7.

  Generator G3 is a 1250 KW, 277/480 volt, 3-phase, diesel engine generator set that serves switchboard MSBA1, which is located in Building A. It has a separate 4,000-gallon fuel tank.

  Generator G4 is a 1500 KW, 277/480-volt, 3-phase diesel engine generator set installed in 2002 to provide backup Power to the West Distribution system. With the exception of Building 26 (Steam Plant), G4 provides backup power to all buildings tied to the West Distribution system. The set has an 8,000-gallon fuel tank providing over 80 hours of backup fuel, however, the tank was sized for the addition of a second 1500 KW generator which would decrease the fuel capacity to 40 hours each.

Generator G5 is a 300 KW, 277/480-volt, 3-phase diesel fired engine generator set located in the new steam plant built in 2001 and serves only that facility. The G5 has a sub base mounted 200-gallon fuel tank to provide a minimum of 40 hours of backup capability.

As part of the Building 28 (Integrated Research Facility), a generator set (G6) and generator set (G7) are provided. Generator G6, located in Building 25, has a capacity of 2000 KW, but would typically be rated for 80% of this load, or 1600 KW. Recent readings taken for the MUP indicate a demand load of 1600 KW on this generator. Generator G7, located in Building 27, has a capacity of 600 KW, but would typically be rated for 80% of this load, or 400 KW. Recent readings taken for the MUP indicate a demand load of 400 KW on this generator. The demand loads for both G6 and G7 are estimates, as at the time of the readings Building 28 was not fully operational. G6 serves the main building complex while the G7 provides a separate backup power source for the cooling systems within the building. G6 has a 10,000 gallon fuel storage tank for 72 hours backup capacity with a 300 gallon sub-base tank which acts as a day tank. G7 is a fully enclosed, exterior unit with a 3000 gallon sub-base tank for 72 hours also. G7 is provided with a radiator mounted resistive load bank rated at 75% load. G6 is provided with an exterior air cooled resistive load bank rated at 75% load, located between Buildings 25 and 28.

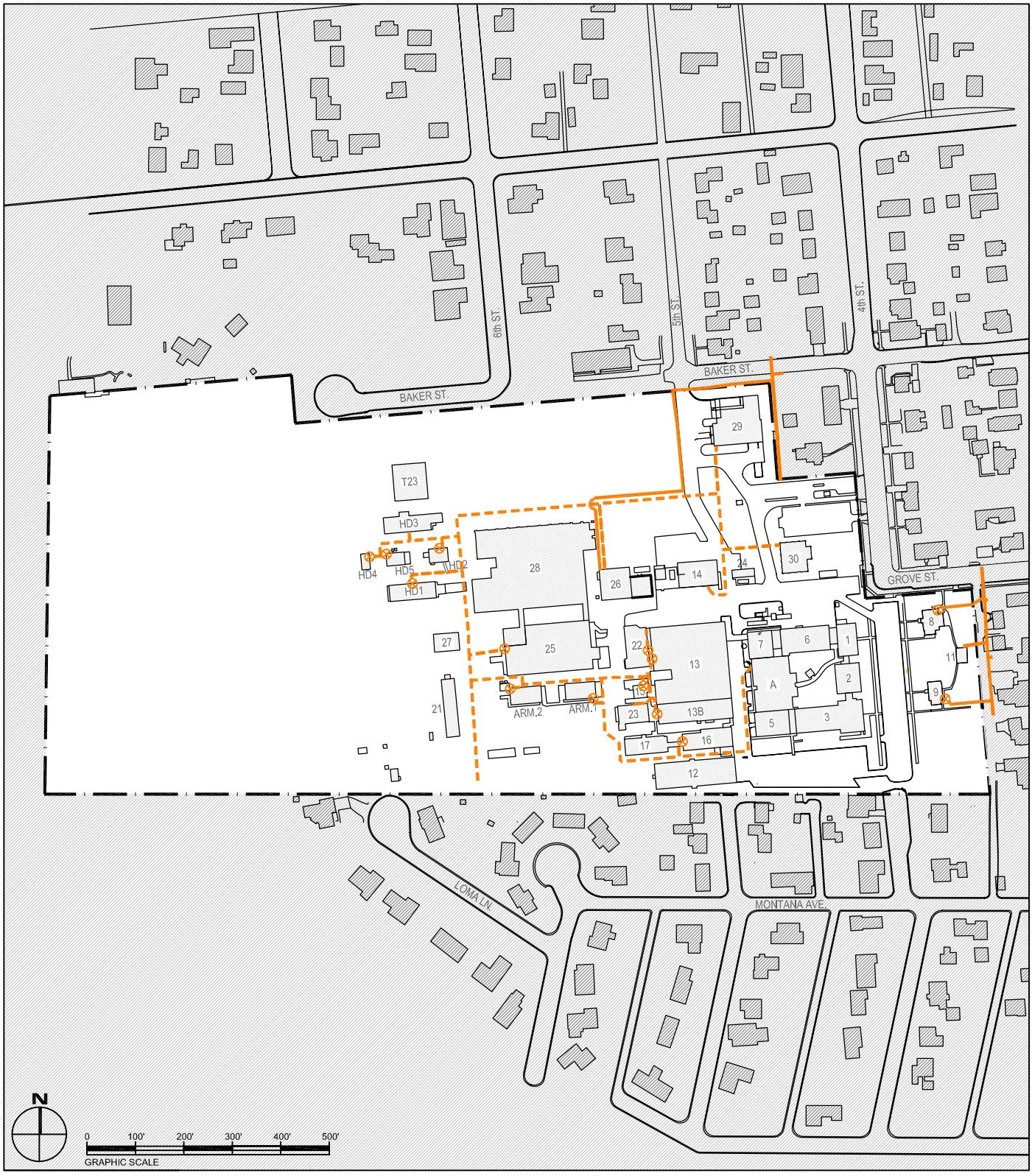
- Underground Power Distribution System:
  Refer to Figure 4.9.9. A system of power manholes and an underground duct bank system have been installed with conduits running from both the East and West Distribution systems and connecting to each building on campus. Spare conduits have been installed in each bank of conduits to allow addition of future facilities. The system was installed with the conduits approximately 6 feet below grade and bedded in sand. Spare conduits were installed in all duct banks with the main concentration out of Building 27. The manholes are large enough that additional conduits can be added to the existing system without significant difficulty or conflicts with existing conduits. The number of spare conduits starting out from the West Distribution System should be adequate for the capacity of the building. At each manhole the spare conduits divide to cover more area. This results in fewer spare conduits as the distance from Building 27 increases. The potential need for additional conduits for new projects therefore also increases as the distance from Building 27 increases. The requirements for new conduits will have to be evaluated on a case by case basis as new projects are developed.

- Telephone and Network Systems:
  The entire campus telephone and network system is fed from one Main Distribution Frame located on the first floor of Building 6. At this location is the main telephone PBX switch. All telephone service comes from this location and switch. From this room, telephone tie cables are provided to dedicated rooms for Intermediate Distribution Frames and Building Distribution Frames located in other buildings.

  The entire campus networking system is based in the same location in Building 6 as the telephone. From the Network, a fiber backbone distribution system is used to extend the campus network throughout the facility.

- Fire Alarm System:
  The electrical components of the Campus Fire Alarm system consists of a main panel located in Building A and a main panel in Building 28 with remote panels in individual buildings with communication back to the main panels. The system is monitored remotely at the guard's station in the Visitor's Center (Building 30).

- Signal Systems Underground Raceway Distribution System:
  A system of signal manholes and an underground duct bank system has been installed with conduits running between each manhole and connecting to each building on campus. Spare conduits have been installed in each bank of conduits to allow addition of future facilities. The system was installed with the conduits approximately 6' feet below grade and bedded in sand. The manholes are large enough that additional conduits can be added to the existing system without significant difficulty or conflicts with existing conduits. The spare capacity is adequate for most future additions at the campus. In general there are three 4" signal conduits to each building and four 4" signal conduits between each manhole.

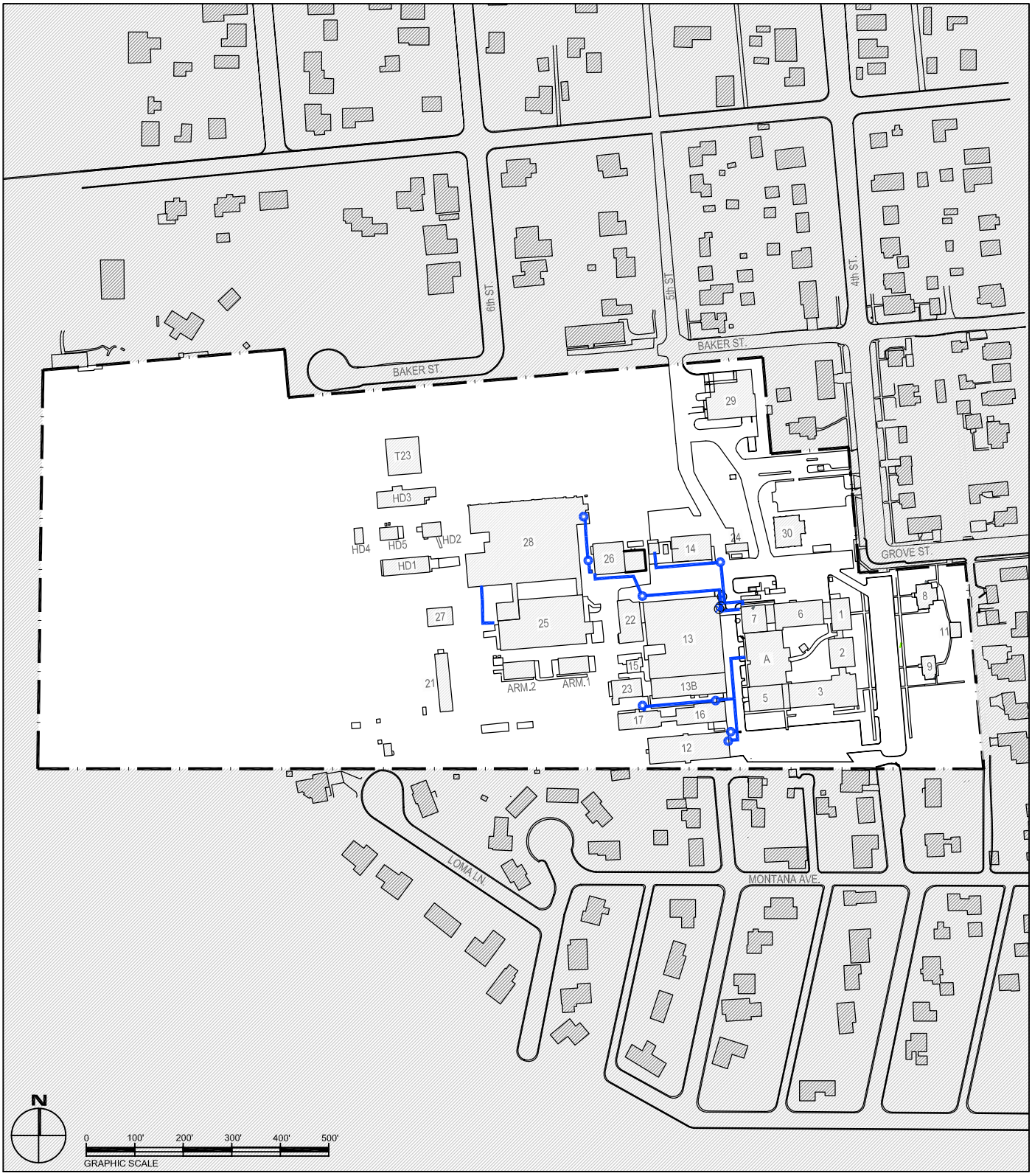


NIH-RML Master Plan
Hamilton, Montana

GAS LINE- SERVICE
GAS LINE- CAMPUS DISTRIBUTION
VALVE

Figure 4.9.1

Gas Lines

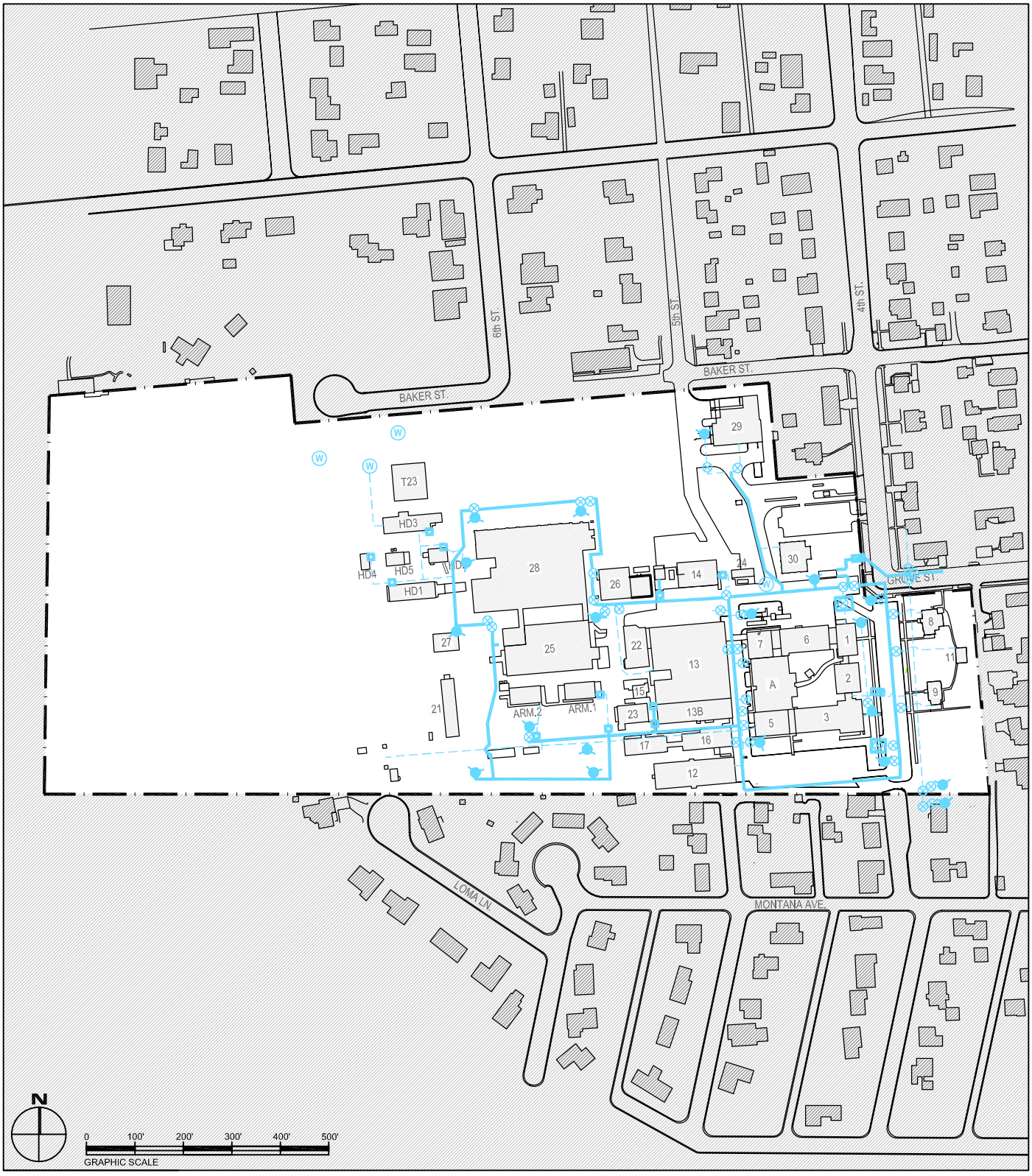


NIH-RML Master Plan
Hamilton, Montana

STEAM LINE
VALVE
STEAM MANHOLE

Figure 4.9.2

Steam Lines



NIH-RML Master Plan

Hamilton, Montana

WATER LINE- 10" OR GREATER

WATER LINE- LESS THAN 10"

VALVE

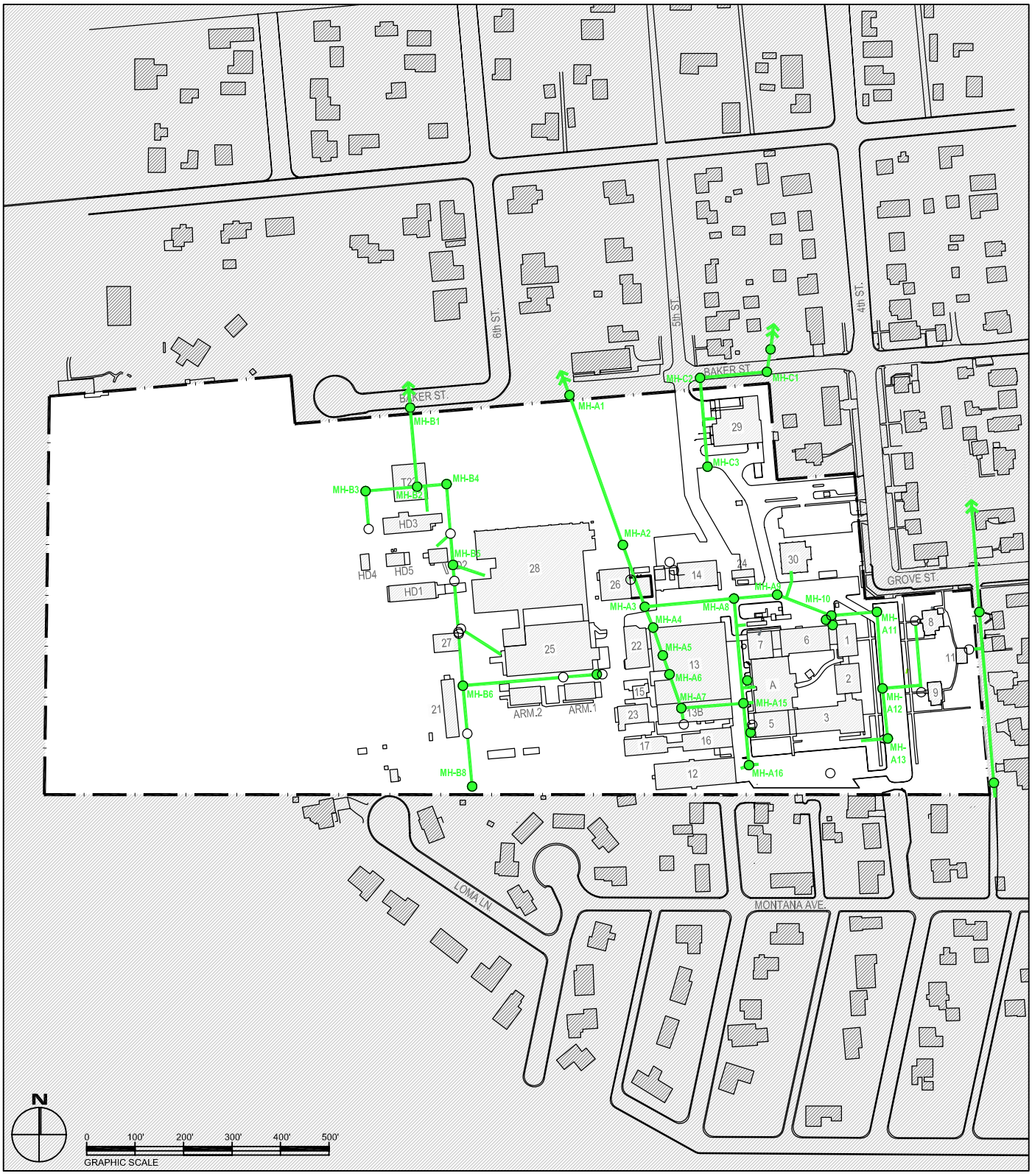
HYDRANT

CURB BOX

WELL

Figure 4.9.6

Water Lines

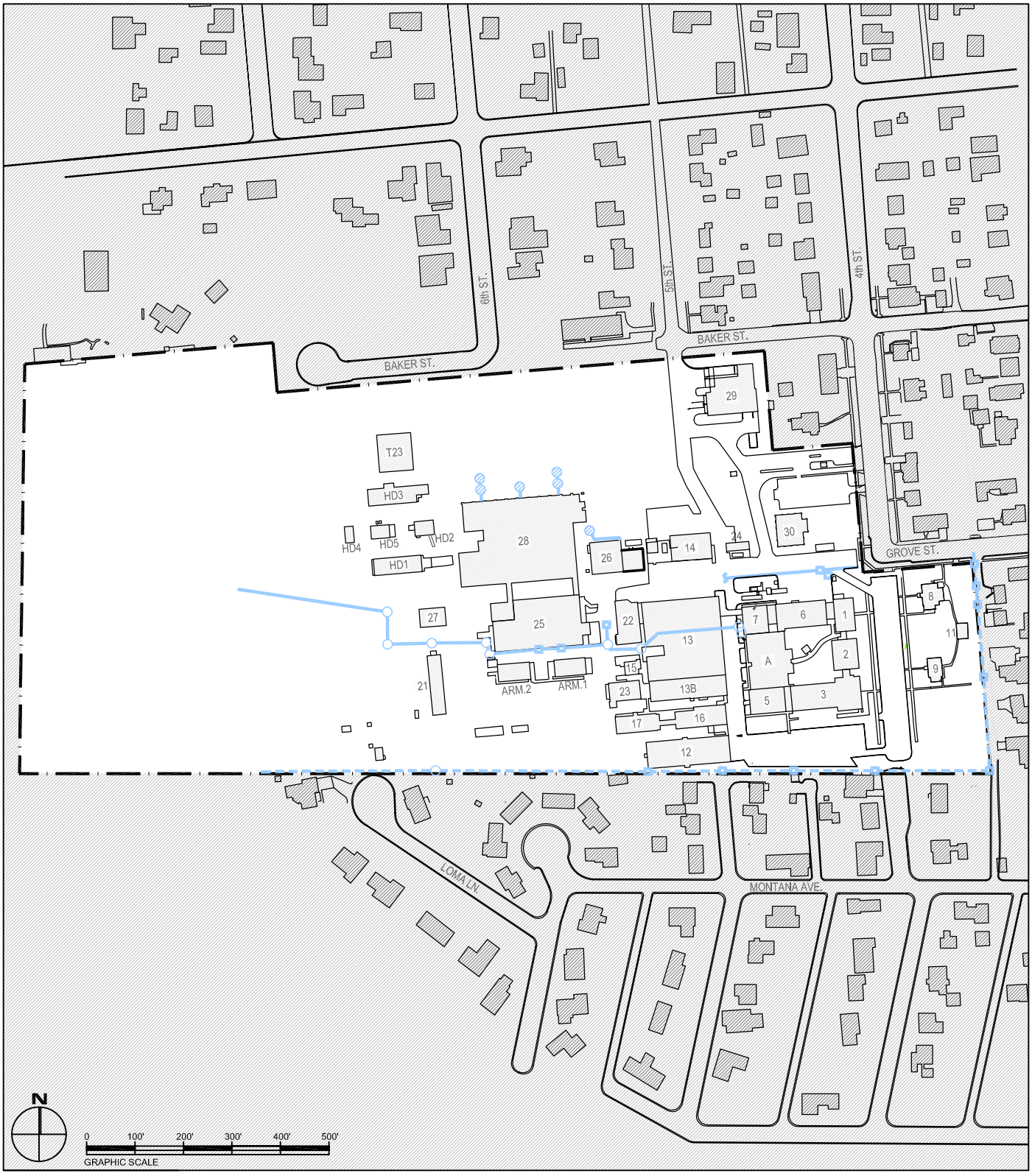


NIH-RML Master Plan
Hamilton, Montana

SANITARY SEWER LINE
CLEANOUT
MANHOLE MH-XX
CONNECTION TO CITY OF HAMILTON SANITARY SEWER

Figure 4.9.7

Sanitary Sewer Lines



NIH-RML Master Plan

Hamilton, Montana

RML STORM WATER LINE

OVERFLOW LINE (ON RML PROPERTY, NOT PART OF RML SYSTEM)

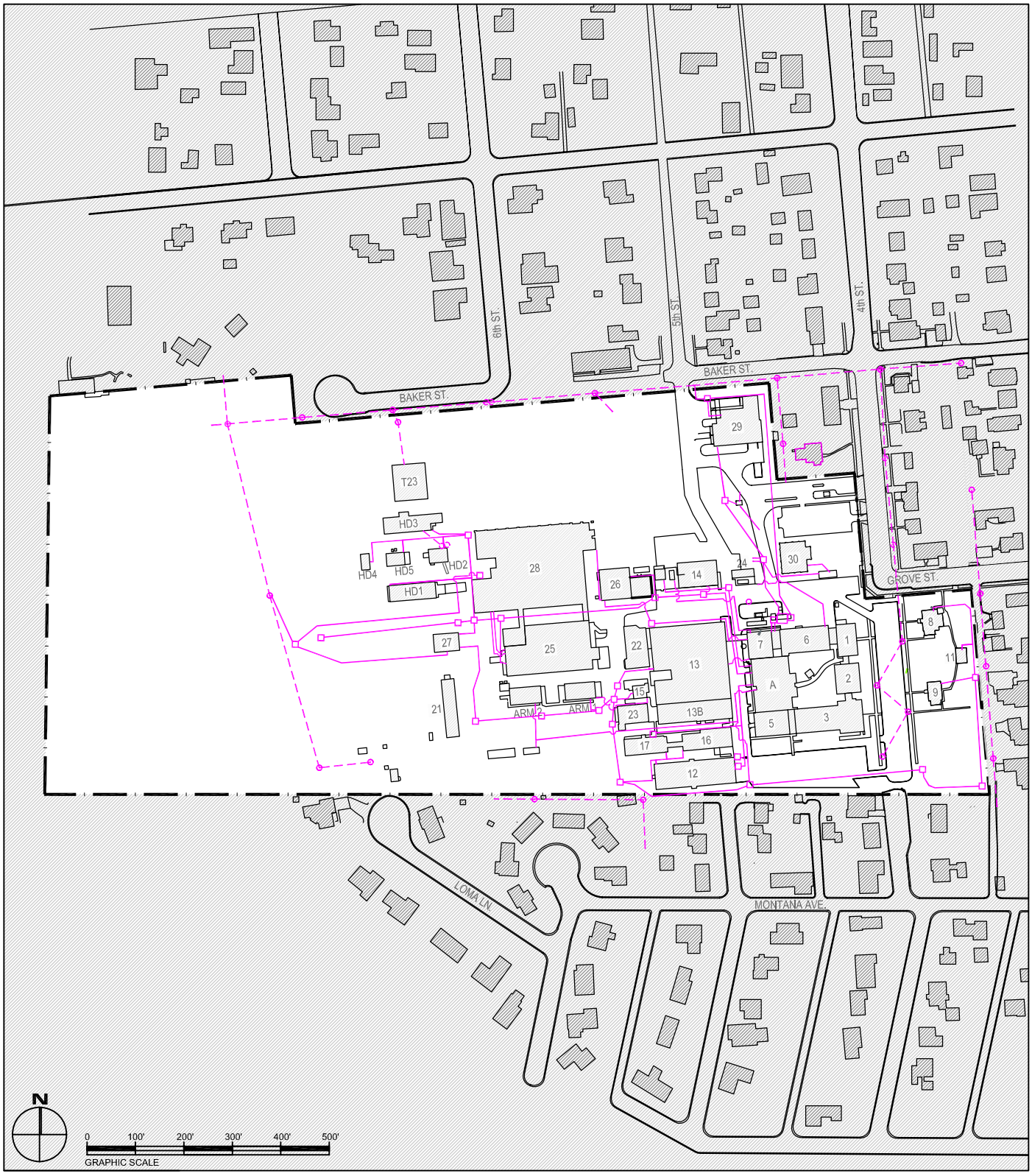
MANHOLE

CATCH BASIN

ROOF DRAIN SUMP

Figure 4.9.8

Storm Water Lines



NIH-RML Master Plan

Hamilton, Montana

UNDERGROUND DUCT BANK

OVERHEAD POWER LINE

POWER MANHOLE

POLE

Figure 4.9.9

Power Lines

Chapter Five
The Master Plan for the RML Site

5 The Master Plan for the RML Site

As of 2005, 240 persons worked at The Rocky Mountain Laboratories (RML) and total building space amounted to approximately 204,000 gross square feet in 37 buildings. Building 28 (IRF - the Integrated Research Facility) was under construction and, when completed and fully occupied, will add 105,000 gross square feet and an estimated 96 personnel to the campus.

Significant population and economic growth have occurred over the past decade in Ravalli County, Montana and the City of Hamilton. There are also several construction projects recently completed, underway or soon-to-be-completed on the RML campus that will add new staff or activities. Among these are the Integrated Research Facility (IRF, also designated Building 28), a Replacement Building (Building 31) for activities that are to be relocated from the campus perimeter, parking and road improvements and site security improvements including a Visitor Center (Building 30) and a Shipping and Receiving Building (Building 29).

A number of structures on the campus are aging and/or obsolescent and in need of repair or replacement. With increased population growth in Hamilton and Ravalli County and new requirements placed on RML for state-of-the-art research facilities and other activities, concerns within the communities near the campus have escalated. The RML Master Plan is designed to address the potential long-term land use planning and facility issues of concern to the local community and RML while improving the appearance and functionality of the campus.

5.1 Planning Process and Program Summary

5.1.1 Master Plan Process

Development of the RML Master Plan has followed a logical and comprehensive process. All direction and decisions have been coordinated with National Institutes of Health (NIH), National Institute of Allergy and Infectious Disease (NIAID), and RML staff, both individually and collectively, through the Master Plan Steering Committee.

The Master Plan Steering Committee includes the:

- Director of the Division of Intramural Research, NIAID
- Associate Director, Rocky Mountain Laboratories, NIAID
- Business and Program Manager, RML, NIAID
- Director, Office of Research Facilities
- Director, Division of Facilities Planning, ORF
- Director, Division of Environmental Protection, ORF
- Associate Director for Security and Emergency Response, ORS
- Science Resource Manager, ORS

NIH has informed the local community, neighbors of the lab, and public agencies about the progress of the plan as it proceeded as well.

The IRF, when it is fully operational, will add 96 staff to the current population of 240 increasing campus population to 336. This Master Plan responds to current operational and physical conditions on campus and would accommodate a potential growth to 427 employees within the next 20 years. As research initiatives evolve, personnel and facility requirements may change further. For that reason the Master Plan will be updated periodically. It recognizes, however, that actual program realization will depend on NIH and Department of Health and Human Services (HHS) priorities, congressional and presidential policy decisions, and federal budgetary realities and availability of resources.

Furthermore, while the Master Plan is a reasonable guideline for future development it does not represent the pre-approval of any individual facilities project nor the particular needs of specific programs to be accommodated on the campus since the financing of such projects and programs must be addressed within the annual HHS budget processes and the HHS Capital Investment Review Board mechanisms.

The following activities were part of the master planning process.

Establishing Planning Goals, Objectives, and Premises
This process established the basic objectives which need to be achieved by the Master Plan in support of the research mission of the RML, and defined the fundamental attitudes which supported and shaped the direction of subsequent studies.

Data Gathering and Analysis
This phase involved documenting physical site conditions and interviewing RML personnel to update the programmatic needs for the campus. During the analysis phase the interview data was compiled, augmented, and later adjusted to project campus population and space needs, in increments, over the next 20 years. The physical site data were analyzed to confirm general patterns of land use, building disposition, landscaping and other important features within the campus, and to understand the RML site in relationship to its surrounding context.

Development of Program and Planning Principles
During this phase, the campus space needs were further defined to determine appropriate allocations of space to various campus uses and identify other needs or activities which should be addressed by the Master Plan. Concurrently, general Planning Principles, derived from the analysis of existing conditions and Planning Premises were put forward and reviewed.

Alternative Concept Studies
Three concept studies showing alternative campus development strategies and potential building sizes and locations were prepared and reviewed for appropriateness. The Master Plan Steering Committee adjusted programmatic and planning objectives both to reflect the consensus reached among RML and NIAID leadership regarding estimated program and personnel growth and in anticipation of community concerns regarding such issues as traffic through the residential neighborhood and construction density on the site relative to the surrounding community. Further, direction was established with respect to the location and relationships of functional components.

Preliminary Master Plan/Draft Master Plan/Final Master Plan
The resulting Preferred Concept was further refined through development of the Preliminary Master Plan as additional program data for the Office of Research Facilities (ORF) management, maintenance, storage, waste management and fuel storage became available.

5.1.2 Summary of Master Plan Goals

In order to accomplish the RML mission in an efficient and effective manner, it is imperative that RML have an agreed upon long range facilities plan that addresses facility and campus requirements, prudent land use, and orderly future development.

The objective of the Master Plan is to provide a guide for the reasoned and orderly potential development of the campus that values and builds on existing resources, corrects existing deficiencies and meets changing needs through both new construction and renovation and sets forth implementation priorities and a logical sequencing of planned potential development.

The plan is based on phased personnel and space estimates. The document is not intended to be a specific design and construction program, but rather a framework within which the design

and construction of required facilities could occur over the next 20 years as the potential programmatic plans upon which this facilities plan is based arise and funding becomes available.

The NIH, with the NIAID and RML, seeks to accomplish its mission by:

> Fostering fundamental discoveries and innovative research, and their applications, in order to advance the Nation's capacity to protect and improve health;
>
> Developing, maintaining, and renewing the human and physical resources that are vital to ensure the Nation's capability to prevent disease, improve health, and enhance quality of life;
>
> Expanding the knowledge base in biomedical and associated sciences in order to enhance America's economic well-being and ensure a continued high return on the public investment in research; and
>
> Exemplifying and promoting the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science.

The Master Plan supports this mission with the following planning goals:

Goal 1: Provide a flexible framework for a “living campus”, one that can adapt to the potential needs of current and future RML and National Institute of Allergy and Infectious Diseases programs over time

Goal 2: Provide an attractive campus whose setting and composition promote collegial interaction and opportunities for informal and formal collaboration and exchange of ideas, expertise and data

Goal 3: Provide a secure, supportive, and convenient work environment for the people involved in RML activities, including scientists and professional administrative staff, visitors and other non-RML users, with amenities that enhance the quality of life for staff

Goal 4: Enhance the appearance of the RML campus so that it complements the surrounding residential community

Goal 5: Protect, conserve and enhance RML’s natural, historic, and scenic resources

Goal 6: Foster improved communication about, and better understanding of, NIH goals and policies through the planning process.

5.1.3 Summary of Planning and Programming Premises

General Growth

Under the proposed Master Plan, NIH would continue to develop RML to accommodate NIH’s and NIAID’s research needs and related programmatic adjacencies consistent with the commitment to maintain the “campus” character of the site. The Master Plan advances this objective by programming and locating potential future RML growth so that local services and utilities would be available to support growth, and establishing development guidelines for possible future changes to the site that ensure that, as the campus grows, new development would be responsive to the context of adjacent neighborhoods or developments.

The following sections of the plan contain personnel estimates provided by RML and NIAID leadership and researchers, in addition to RML staff, during interviews conducted by the planning team in 2006, and space estimates prepared by the planning team based on those personnel estimates as part of the programming phase of the Master Plan (see Tables 5.1.3.A and 5.1.3.B).

It is important to note, however, that the distributions of personnel and space by phase in the two tables are provided simply to illustrate the results of the programmatic discussions that occurred in 2006 and are not meant to suggest that campus growth in terms of personnel or space would occur as proposed in the interviews. Tables 5.4.1 and 5.4.2 in Section 5.4, on the other hand, outline the manner in which the Master Plan translates the overall personnel and space requirements shown in Tables 5.1.3.A and 5.1.3.B into an implementation plan for the 20-year Master Plan. Tables 5.4.1 and 5.4.2 take into account factors such as desired construction phasing, the timing of development projects, and other considerations that would affect the delivery of Master Plan proposals.

Personnel Growth Estimates

If the campus develops as planned, RML population could potentially grow by 27 percent over the current population of 336 (including 96 estimated personnel in the new IRF) to a total campus population of 427 by the end of the planning period. The primary growth at the campus would be in Intramural Research personnel and the staff to support them.

Space Programs

The Master Plan uses personnel growth estimates to determine potential net and gross area requirements. These are calculated as set forth in Section 2.11.2 and are shown in Table 5.1.3.A below.

TABLE 5.1.3.A
ESTIMATED POTENTIAL PERSONNEL GROWTH AND NET AND GROSS AREA REQUIREMENTS (NOTE: PHASES BEGIN AFTER THE DATE THE MASTER PLAN IS APPROVED)

Totals	Existing (2005)	Phase 1	Phase 2	Phase 3	Phase 4
Net Useable Area	187,349	243,068	252,704	255,294	259,474
Gross Area	309,223	408,368	421,674	426,336	431,690
Existing	309,223	266,285	408,368	421,674	426,336
Demolition	0	42,938	0	0	0
New Construction	0	142,083	13,306	4,662	5,354
Personnel	336	400	414	422	427
Researchers	202	221	231	238	241

Programmed Built Area

The largest programmed growth component would occur within the initial phase of the plan depending on program priorities and availability of resources. Total building area could increase from 309,223 existing gross square feet (gsf) to 408,368 gsf, largely to address potential new research needs and to correct existing deficiencies. During this period 42,938 gsf of existing space could be demolished and 142,083 gsf of new space could be constructed. Over the ensuing years, based on limited anticipated personnel growth, further increases in required building area would be in small increments and total only 23,322 gsf. Table 5.1.3.B sets forth net and gross area plans by major functional unit.

TABLE 5.1.3.B
POTENTIAL NET AND GROSS AREA REQUIREMENTS BY BASIC FUNCTIONAL UNIT

Basic Functional Unit	Existing (2005)		Phase 1		Phase 2		Phase 3		Phase 4	
	Net	Gross	Net	Gross	Net	Gross	Net	Gross	Net	Gross
Laboratory, Director's Reserve and Shared Laboratory Support	71,188	113,398	83,910	151,038	88,040	158,472	90,630	163,134	91,710	165,078
Integrated Research Facility	37,036	103,190	37,036	103,190	37,036	103,190	37,036	103,190	37,036	103,190
Veterinary Branch	30,818	37,157	43,650	63,158	43,650	63,158	43,650	63,158	43,650	63,158
Administrative Services	10,328	13,042	12,550	17,570	12,550	17,570	12,550	17,570	12,550	17,570
Maintenance Shops and Storage	11,475	12,798	21,560	23,716	21,560	23,716	21,560	23,716	21,560	23,716
Central Stockroom	2,879	3,129	10,700	11,770	10,700	11,770	10,700	11,770	10,700	11,770
Equipment Storage	3,476	3,659	5,600	6,160	6,000	6,600	6,000	6,600	6,000	6,600
Interpretive Center	0	0	0	0	0	0	0	0	3,100	3,410
Visitor Center	2,657	3,562	2,657	3,562	2,657	3,562	2,657	3,562	2,657	3,562
Shipping and Receiving	7,156	7,525	7,156	7,525	7,156	7,525	7,156	7,525	7,156	7,525
Waste Management	547	1,092	6,120	6,732	9,020	9,922	9,020	9,922	9,020	9,922
Incinerator	2,118	2,356	2,118	2,356	2,118	2,356	2,118	2,356	2,118	2,356
Central Plant	7,671	8,315	7,671	8,315	9,877	10,557	9,877	10,557	9,877	10,557
Amenities	0	0	2,340	3,276	2,340	3,276	2,340	3,276	2,340	3,276
Totals	187,349	309,223	243,068	408,368	252,704	421,674	255,294	426,336	259,474	431,690

In order to accommodate these expectations, the RML has planned for a combination of renovations of existing structures and construction of new facilities. The listed increases in area, however, represent only new construction to expand capacity, to replace obsolete facilities or permit a decompression or reassignment of space through renovation of existing buildings. They do not identify the areas of renovation that would be needed in buildings, such as the Quad and Building 13, to correct existing deficiencies. For example, although 20,522 net assignable square feet of research laboratory space (from 71,188 to 91,710 square feet) could be added to the campus over the next 20 years, significant renovation would be carried out in existing laboratory areas as well.

Planning Premises

Building and Land Use

Similar building uses should be grouped together geographically

Employee amenities and services should be increased and appropriately distributed on campus

Open Space

A perceivable and hierarchical system of open spaces should be developed

The buffer zone at the site perimeter should be enhanced and respected where possible

Landscaping elements should be improved and increased

Architectural Guidelines

Policies and criteria should be developed and used as guidelines for future development.

Development should respect historic patterns, and should convey a sense of order, quality, and unity throughout the campus.

Buildings should be designed with maximum flexibility to facilitate change as state-of-the-art needs dictate

Transportation/Circulation

A well-defined road system should be established to increase efficiency, orient visitors, and protect open space.

Parking should be located outside the loop road separated from the pedestrian core of the campus.

Parking should be on-grade rather than in parking structures consistent with the scale and character of the adjacent residential community.

Existing dispersed parking should be preserved, where possible and appropriate, in locations convenient to workplaces.

The character of the campus as one that encourages pedestrian use should be promoted.

Accessibility for persons with disabilities must be ensured.

Infrastructure

Major utility infrastructure and service uses should be geographically concentrated.

The development of the Master Utilities Plan should be coordinated with the Master Plan.

Laboratory Research Programs

Planning should group research laboratories around central animal facilities.

Functionally related laboratories should be grouped together.

The historic Quad should be retained for research laboratory use but renovated to permit decompression of current occupancies and reallocations to correct space deficiencies.

Animal Programs

Planning for animal programs should provide for current needs while anticipating the eventual need to replace Building 13.

Management

A “good neighbor” relationship should be maintained with the surrounding community.

RML should continue to provide means for citizen involvement in activities on campus.

Amenities and Site Program

The Master Plan should provide for amenities in accordance with the approved *Guidelines for Amenities and Services Within NIH Facilities, December 2004,* and the results of the RML staff questionnaire described in Section 4-5.

Amenities not specifically programmed, but that may be absorbed within the gross area allocated to space programs of major buildings should be distributed according to the Amenities Guidelines.

Outdoor spaces planned for recreation, including bicycle and hiking paths, should be provided.

5.1.4 Planning Principles

Planning principles were established as the first step toward conceptual designs, and represent broad physical design objectives which guided the concept plans prepared for the site.

The major Planning Principles have been grouped into four categories, which are described below.

Campus Structure and Landscaping (Figure 5.1.4-a)

Respect the existing campus orthogonal grid in developing a new campus structure.

Retain the historic core as a major campus organizational feature.

Create a better-defined sense of hierarchy among campus buildings and open spaces.

Create or enhance defined open spaces within the interior of the campus.

Locate and utilize interior campus open spaces to link buildings and create a pedestrian friendly environment.

Preserve the perimeter of the campus as open space with an informal landscaped screen buffer.

Preserve and enhance the relationship of the campus to its broader environment.

Development Height Zones (Figure 5.1.4-b)

Establish maximum building height (52') at the campus core surrounded by buildings of medium height (40') and with lowest construction density (0'-20', except for the two, existing, $2^{1/2}$ story houses in the historic core) at the campus perimeter.

Access and Parking (Figure 5.1.4-c)

Maintain and enhance the current 4^{th} Street main entrance and the 5^{th} and Baker Streets service entrance.

Reinforce campus organization and facilitate vehicular access to all areas of the campus through the creation of a loop road.

Provide all parking in surface lots.

Locate new parking along the north perimeter of the campus.

Retain and improve parking to the east and south of the Quad both to achieve required surface parking spaces and for staff convenience.

Create a walking path within the occupied portion of the site, and extend a hiking trail through the west side of the site.

Provide additional pedestrian/bicycle access gates in the perimeter fence to encourage employees to use alternative modes of travel and to allow access to the natural area on the western portion of the site.

Functional Relationships (Figure 5.1.4-d)

Relate existing and planned building groupings to an overall campus structure.

Reinforce the laboratory and animal buildings as the functional heart of the campus.

Cluster administrative and support functions central to areas supported.

5.1.5 Alternative Concept Studies

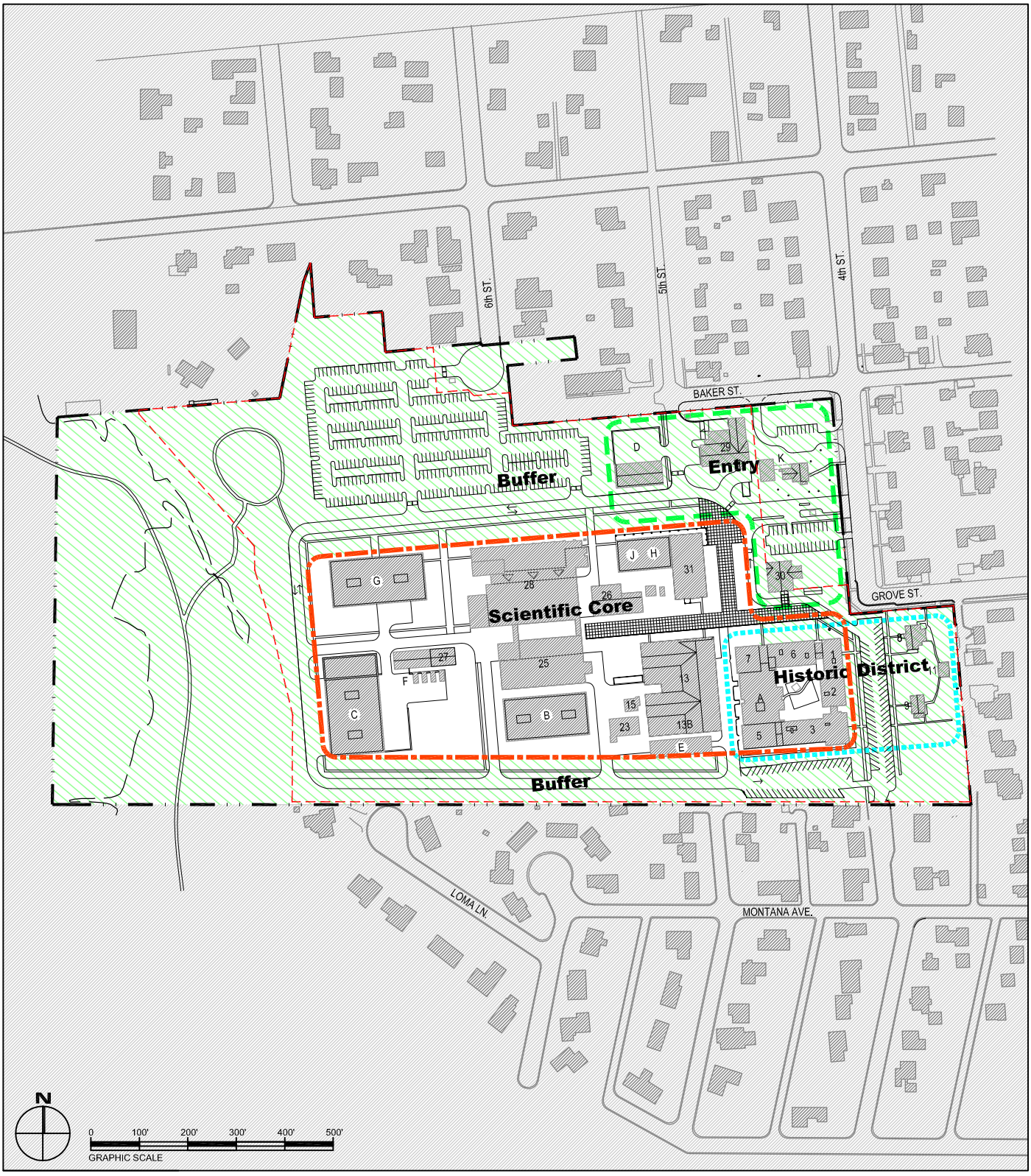
Initial concept plans were prepared based on interview data. The objective of this planning was to evaluate building size and lot coverage as well as to study alternative building placements, site circulation options and locations for a major conference center initially suggested for consideration in the Master Plan. The Master Plan Steering Committee reviewed the concept plans and their program basis. They found the growth in program staffing estimated by the RML laboratory personnel to be unrealistic for RML and the resulting concept plans to be excessive in terms of building size and scale of development given the campus' research requirements and its proximity to its residential neighbors. Instead, the Steering Committee directed the Planning Team to assume a Low Growth personnel expansion for the 20-year plan. Under this option, after a period of construction during the initial phase for space and staffing increases to correct existing deficiencies and provide needed shared laboratory, animal, administrative and ancillary support services for the IRF, the employment on campus would grow by approximately 1% per year, and site development would proceed at a density compatible with the scale of the adjacent residential community.

A continuing planning dialogue based on these objectives, as well as alternative building deployment, functional relationships and coordination with existing site utilities, resulted in a concept plan for the 20-year timeframe that would accomplish project objectives and be consistent with established Planning Premises and Principles. This concept was approved for Master Plan development.

5.2 Master Development Plan

5.2.1 Introduction to the Master Plan

The Master Plan, shown in Figure 5.2, accommodates a potential campus employee population growth, over the 20-year timeframe of the plan, from 336 currently to approximately 427. To support the growth in employees, and required utility upgrades, the campus gross built area could potentially increase during the Master Plan period from 309,223 gross square feet to 431,690 gross square feet which includes the replacement of approximately 43,000 square feet of obsolete buildings to be demolished. Much of the building area growth would be attributable to construction of a central administrative and storage building to replace obsolete buildings and those located within the site standoff area; expanded animal facilities south of Building 25; construction of a new research laboratory building west of Building 28 (the Integrated Research Facility); and consolidation of maintenance activities in the southwest corner of the buildable site area. Solid waste management facilities would be constructed just inside the service entrance opposite Building 29, the Shipping and Receiving Building, and at the incinerator building. Central plant expansion and improvements would include demolition of Building 24 with consolidated and expanded generator capacity at Building 27and boiler and chilled water plant expansion in the new research laboratory building. Existing parking at the south perimeter and within the historic core would be retained and improved, and new surface parking would be consolidated along the north perimeter within an expanded site created through private property acquisitions.



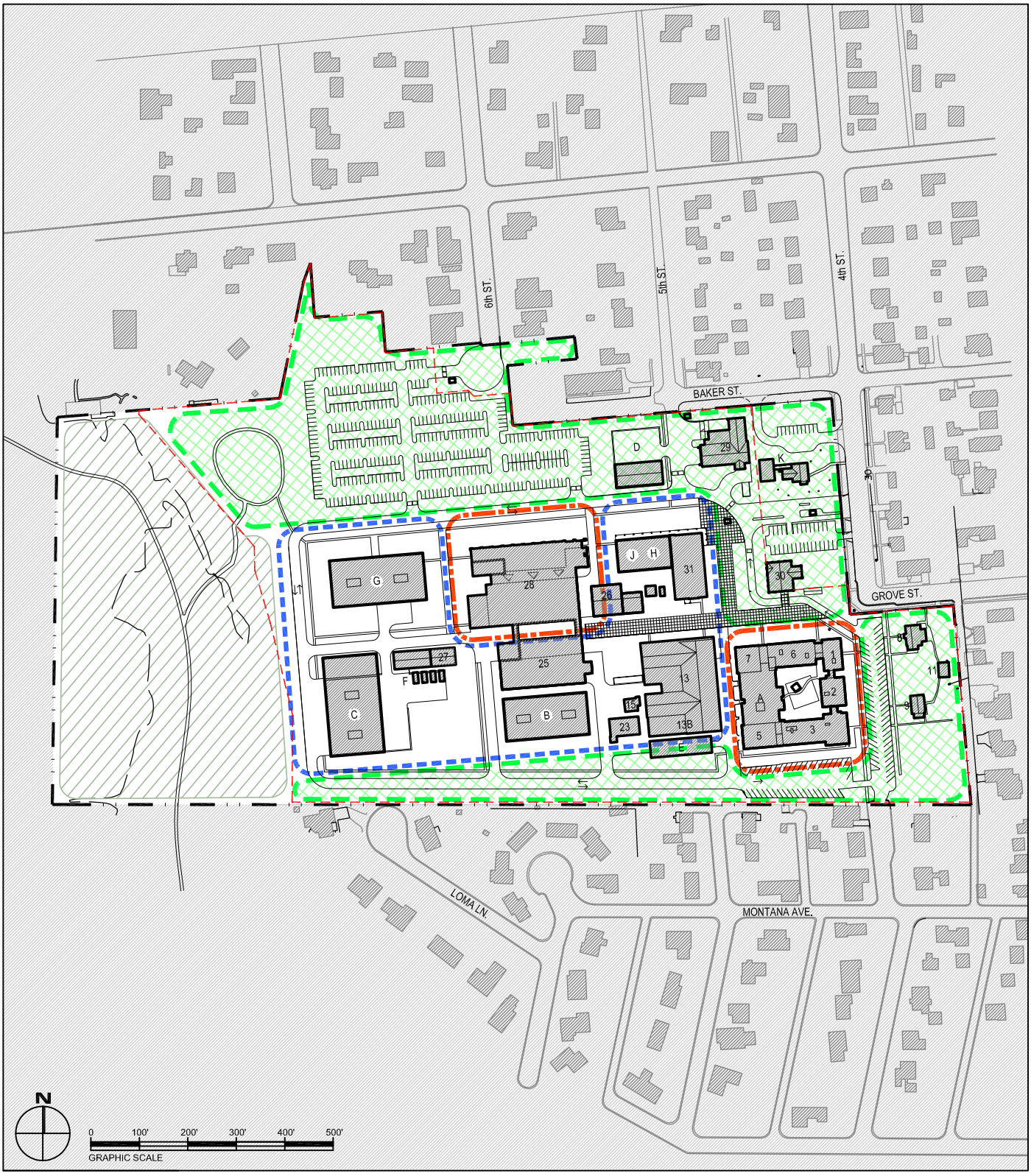
NIH-RML Master Plan
Hamilton, Montana

- Scientific Core
- Historic District
- Entry
- Buffer
- Perimeter fence

Figure 5.1.4-a

Planning Principle

Campus Structure



NIH-RML Master Plan
Hamilton, Montana

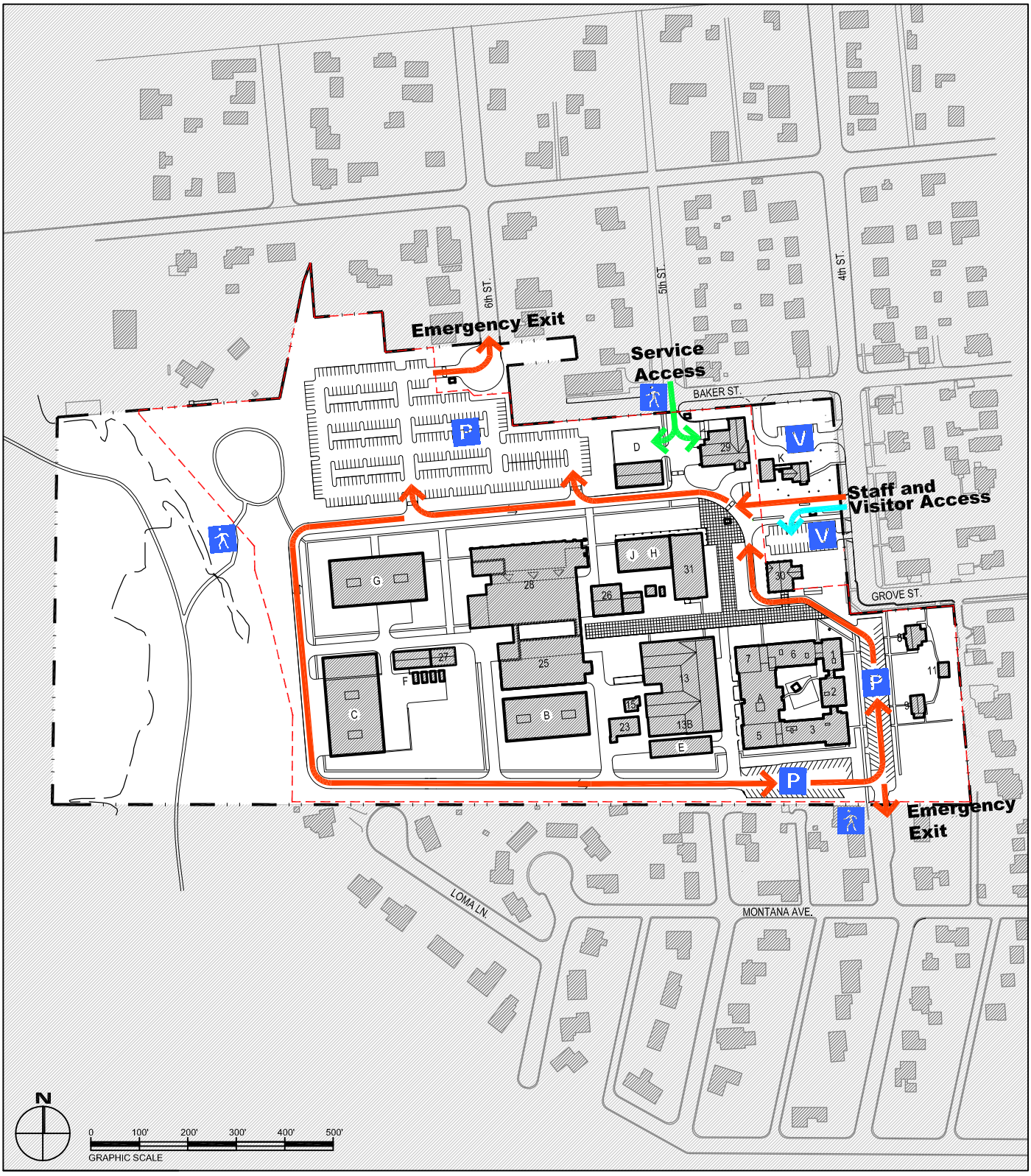
- Highest
- Medium
- Lowest
- Perimeter Buffer
- Open Space Buffer- No Development
- Perimeter fence

Figure 5.1.4-b

Planning Principle

Development Height Zones & Buffers

NIH/ORF/DFP | LSY Architects | Oudens + Knoop Architects, PC



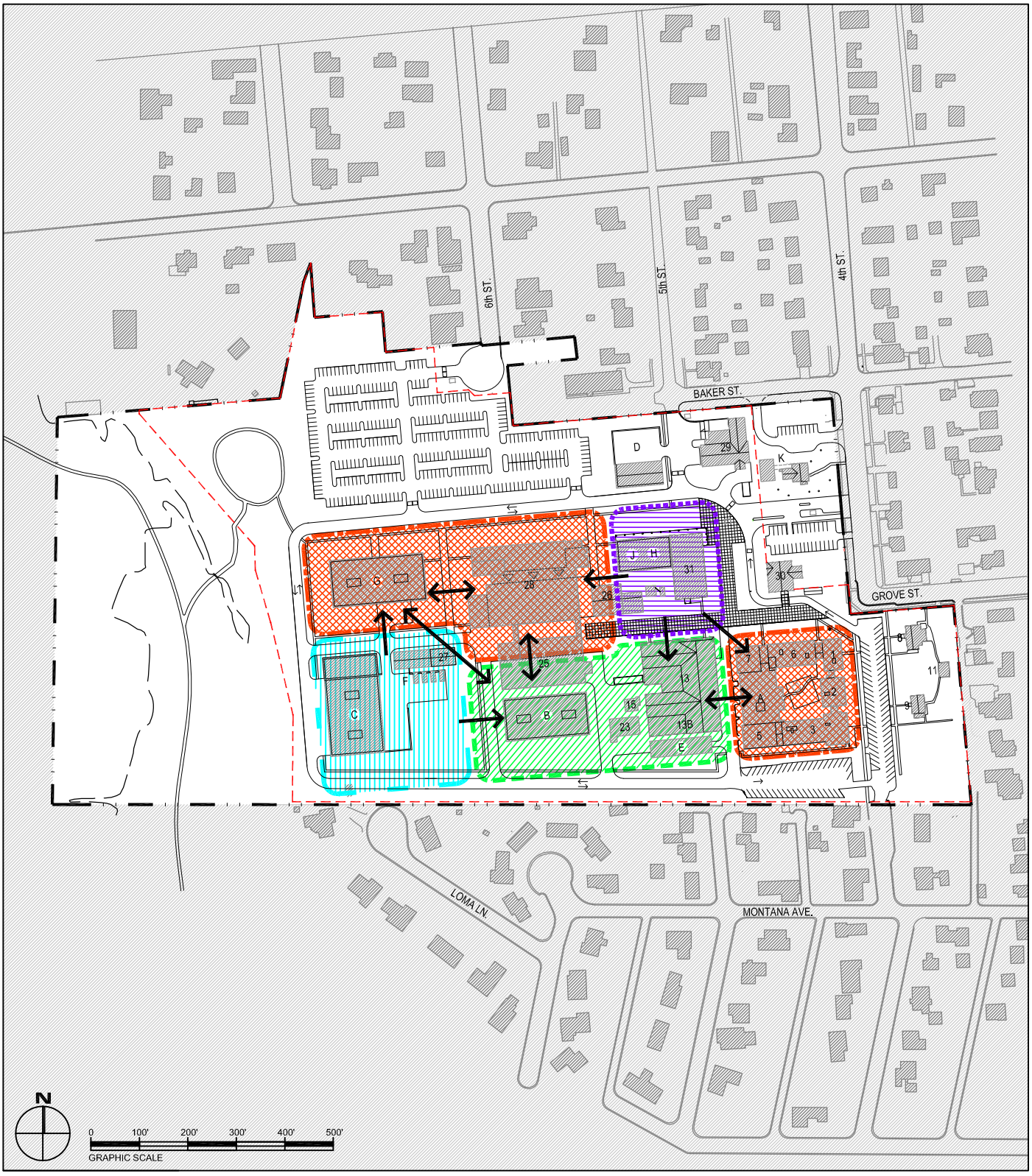
NIH-RML Master Plan
Hamilton, Montana

- P Staff parking
- V Visitor parking
- Pedestrian/Bicycle gate
- Perimeter fence
- Staff traffic
- Visitor traffic
- Service traffic

Figure 5.1.4-c

Planning Principle

Access & Parking



NIH-RML Master Plan
Hamilton, Montana

- Laboratory
- Animal
- Support
- Admnistration
- Perimeter fence

Figure 5.1.4-d

Planning Principle

Functional Relationships

NIH/ORF/DFP

LSY Architects

Oudens + Knoop Architects, PC

In addition, planned acquisition of property at the northeast corner of the site would permit new construction, along with renovation of an existing log home, to provide a public information facility, to be called the Interpretive Center, outside of the protected site perimeter and with its own access and parking.

The RML Master Plan is intended to be a strategic tool for the efficient allocation of campus resources, the orderly accommodation of future growth and the creation of an environment which is both functionally and aesthetically conducive to accomplishing the RML mission. The facilities plan accommodates the program plans set forth in Section 5.1.3, and the Goals and Objectives elaborated on in Section 5.1.2. The plan provides a rational framework to accommodate projected growth incrementally, and in a manner which consistently reinforces a desired character for the campus.

The Master Plan would establish the Quad and the IRF as the armature with buildings and open spaces built around them and all parts of the campus linked in an orthogonal grid. The core of the campus has a denser character; while buildings near the perimeter are set at more generous spacing within the landscape.

The pedestrian core of the campus would be enclosed within a loop road with campus entries for visitors and staff on the east side at the current 4th Street entrance and service traffic at the northeast corner near 5th and Baker Streets.

A standoff and buffer setback area, 100’ wide, would extend around the site perimeter interrupted only along the southeast boundary by existing surface parking; at the east side by existing Buildings 1, 6, 8, 9 and 11 in the Historic Core; and to the north by the Shipping and Receiving Building and new surface parking for staff.

A combination of renovation of existing structures and construction of new facilities would be used to accommodate functional needs. The area increases listed in Section 5.1.3 represent new construction only to expand capacity, to replace obsolete facilities or permit a decompression or reassignment of space through renovation of existing buildings. They do not identify the areas of renovation that would be carried out in existing buildings. The following Table 5.2.1.A lists existing buildings and notes the disposition of each within the 20-year Master Plan, including renovation to correct existing deficiencies.

Table 5.2.1. Existing Buildings and Potential Disposition in Master Plan

Building	Gross Area	Primary Use	Potential Disposition
1	8,246	Research	Reallocate and renovate area in Buildings 1-7 as required to correct deficiencies in equipment rooms, post-doctoral fellows offices and storage space
2	9,468	Research	
3	24,814	Research	
A	24,929	Support	
5	7,224	Research	
6	15,000	Research	
7	3,975	Vacant	Renovate for research laboratories
8	4,461	Administration	Current occupancies in Buildings 8, 9, and 11 are relocated to proposed Building 31 (Replacement Building); renovate for alternative uses
9	3,156	Administration	
11	660	Administration	
12	7,690	Visual Medical Arts and Freezer Storage	Demolish; current occupancies relocated to proposed Building 31
13	17,800	Animal Research	Renovate to correct equipment and supply storage deficiencies
13B	5,880	Research	Retain
14	4,000	Storage	Demolish; current occupancy relocated temporarily to the HD complex and ultimately to proposed Building 31
15	1,092	Radiological Storage	Retain for radiological waste storage
16	3,520	Research Support	Demolish; current occupancy relocated to proposed Building 31 and Building 13B
17	2,975	Storage	Demolish; current occupancies relocated to proposed Building 31 and new Long-Term Storage Facility
21	2,843	Equipment Storage	Demolish; current occupancies relocated to new maintenance building
22	2,624	Central Stockroom	Demolish; current occupancy relocated to new central supply stockroom
23	2,356	Incinerator	Retain
24	700	East Emergency Generator	Demolish; relocate occupancy to expanded Building 27
25	15,332	Research	Retain
26	3,844	Central Boiler Plant	Retain
27	1,961	West Emergency Generator	Expand
28	105,000	Integrated Research Facility	Retain
29	7,525	Shipping and Receiving	Retain
30	3,562	Visitors' Center	Retain
HD1	3,072	Maintenance	Demolish; current HD1-5 maintenance occupancy relocated to new maintenance complex and temporary occupants from Building 14 relocated to proposed Building 31
HD2	1,120	Maintenance	
HD3	3,482	Maintenance	
HD4	512	Maintenance	
HD5	864	Maintenance	
SS1	384	Storage	Demolish; current SS1-3 occupancies relocated to new maintenance complex
SS2	216	Storage	
SS3	216	Storage	
ARMCO1	2,048	Storage	Demolish; current occupancies relocated to new animal facility
ARMCO2	2,048	Animal Research	Demolish; current occupancy relocated to new animal facility
T23	4,624	Maintenance	Demolish; current occupancy relocated to new maintenance complex
Total	309,223		

5.2.2 Master Plan Component Concepts

The following paragraphs describe the fundamental Master Plan recommendations.

Functional Relationships

The primary concept underlying the functional relationships in the Master Plan is the idea of locating the research laboratories in close proximity to animal facilities and the animal facilities immediately adjacent to each other. In turn, these central laboratory/animal facilities would be flanked on the north by administrative and supply support and on the west by the maintenance complex. New animal facilities would be planned for expansion to eventually replace Building 13. Administrative and central supply functions would be consolidated central to the uses they serve. Utility functions would remain in their current locations for efficient utility distribution, and maintenance facilities would be consolidated in the southwest corner of the site away from staff and visitor traffic.

Open Space

A 100' open space buffer zone would be maintained along the site perimeter serving as a visual buffer and a standoff to mitigate effects of any possible blast originating on the border of the site. This space would be landscaped to provide an attractive park-like setting while preserving needed views for surveillance. The Master Plan proposes surface parking at the north perimeter but no new structures within this buffer zone.

In the interior of the campus, the Master Plan proposes a Central Pedestrian Concourse with connections from the Quad and administrative support center to Buildings 13 and 25 and the IRF. This concept is well suited for creating a "campus" atmosphere with spaces and opportunities for random encounters and interaction.

Building Patterns

All new development would follow the orthogonal grid established by existing buildings. This pattern would be continued and built on with the placement of new buildings. Advantages of developing the campus on a grid system include ease of integration with existing orthogonally oriented structures, efficiency of land use, economical integration with, and extension of, the utility distribution system and the acknowledgment and further establishment of a clearly defined pattern to guide future growth.

Massing and Heights

The primary concept for building massing on the RML campus is concentrating the tallest structures along the central axis of the campus, with a transition in height to lower buildings toward the perimeter.

Circulation

The vehicular circulation concept for the campus provides a loop road at the building perimeter, outside the central pedestrian area, with access to surface parking outside the loop and primary building entrances to the interior of the road. The Master Plan would retain the two existing entries to the campus, the staff and visitor entrance from 4th and Grove Streets and the service entrance from 5th and Baker Streets. Two new emergency exits would be provided; one from the north parking lot to 6th Street, and the other from the south parking lot to 4th street, south of campus.

5.2.3 Land Use

Construction would be planned for the entire buildable area of the site, approximately 25 acres. Floodplain and wetlands to the west would remain unbuilt. Refer to Figure 5.2.3 for a summary of pervious and impervious areas. Also see Table 5.2.3.

Table 5.2.3 Master Plan Land Areas

Land Use	Acres	Percent of Site
Open Space		
Landscaped	11.1	30.8%
Other	7.9	22.0%
Circulation		
Parking, Roads, Walks, Service	11.3	31.4%
Buildings	5.7	15.8%
Totals	36	100%

5.2.4 Perimeter Buffers

In order to achieve the Master Plan goal of ensuring that development on the RML campus respects and enhances the environment of the surrounding communities, open space buffers would be created around the perimeter of the site. The Master Plan proposes buffer zones extending a minimum of 100 feet inward from the RML property line. The guidelines below define the character and activities which should apply to all buffer areas:

Buffers would primarily be landscaped open space

Existing screen landscaping would remain and to be enhanced with additional plantings

Plantings would be designed to frame attractive views into the campus

Existing Buildings 1, 8, 9, 11 and 29 would remain

No new permanently occupied buildings would be allowed

Surface parking would be permitted along the north perimeter; existing surface parking east of the Quad and a portion of the parking now located south of Buildings 3 and 5 would remain

Bikeways and walkways would be encouraged

Utility easements and necessary infrastructure would remain

Signage and lighting would be allowed for entry identification and direction

5.2.5 Open Space and Landscape

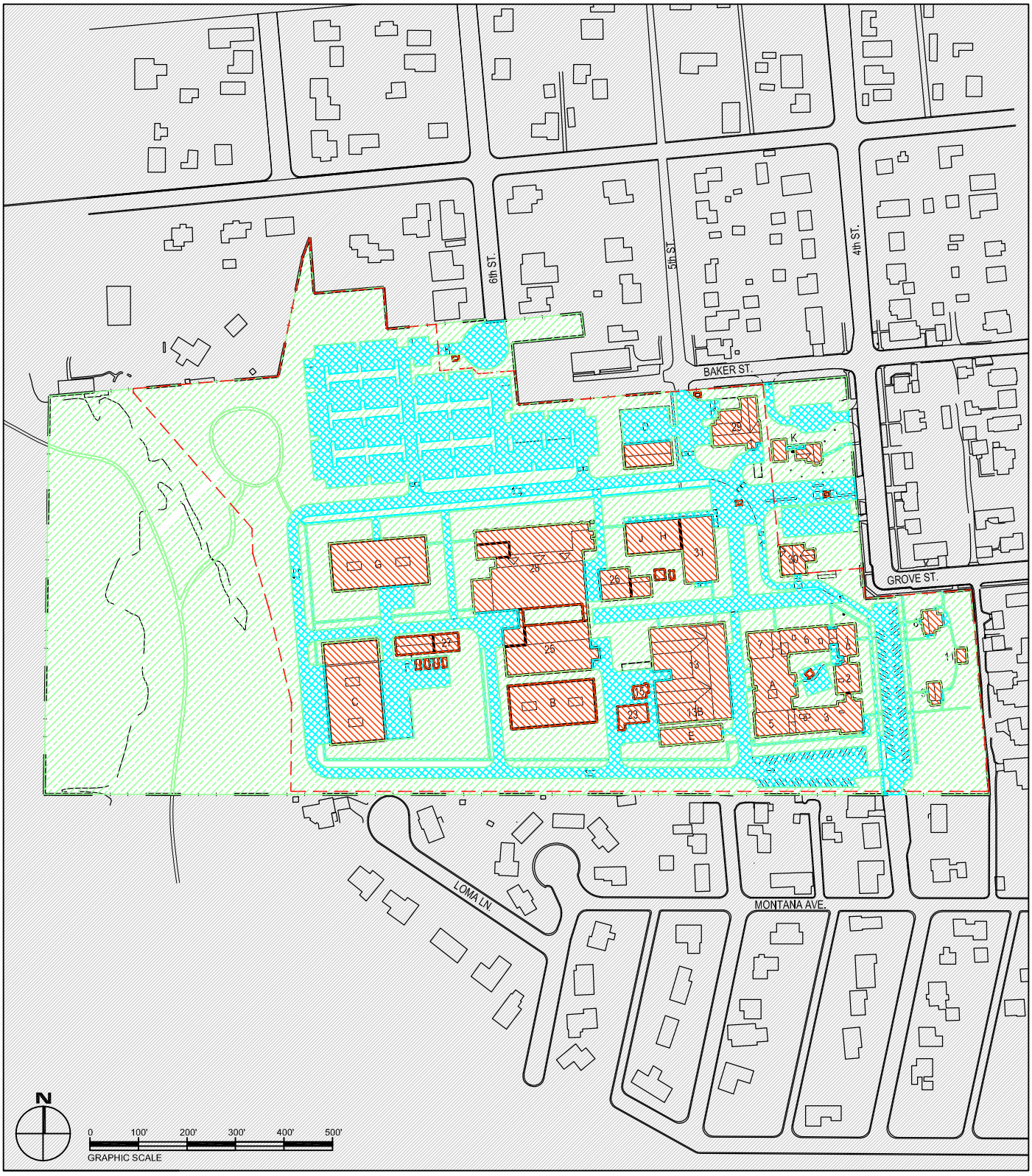
Indigenous plants integrate the man-made architectural elements into the natural landscape and reinforce the site's character. The guiding principles of the landscape plan serve to complement and reinforce the overall Master Plan by:

Improving and strengthening the buffers between adjacent land uses,

Using native plant materials,

Minimizing water use,

Preserving mature trees as the core of landscape planning,



NIH-RML Master Plan

Hamilton, Montana

Pervious Area

Impervious Area - Pavement

Impervious Area - Roof

Perimeter fence

Figure 5.2.3

Pervious and Impervious Areas

Giving the plan identity and structure,

Articulating the circulation system, and

Creating a hierarchy of open spaces which will encourage interaction among RML staff and visitors.

Landscape design details are discussed in Section 6.5.2

5.2.6 Campus Amenities

Campus amenities can generally be divided into two groups: employee/visitor services and positive site features which enhance the use or image of the campus. The Master Plan addresses the issue of campus amenities in an effort to provide for the practical needs of employees as well as to create a campus setting which is conducive to attracting and retaining the highly qualified employees who are needed to carry out the mission of RML.

Amenity services would be programmed in accordance with the approved *Guidelines for Amenities and Services Within NIH Facilities, December 2004*. These would be located for easy access from staff population centers.

New or enhanced open spaces on campus, such as the Central Pedestrian Concourse, would be major site amenities for visual and recreational purposes. These spaces could be utilized for outdoor eating, campus gatherings and collegial interaction.

The landscaped area at the Historic Core could be extended across the 4th Street entrance area and offer a positive image for the public side of the campus as well as passive recreation space, and, of course, the Bitterroot Mountains to the west will remain as a beautiful backdrop for the campus plan.

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5.2.7 Reuse and Demolition

Table 5.2.1, above, shows the extent of building reuse and demolition proposed by the Master Plan. Most new construction and currently identified historic buildings on campus would be retained; however, over the 20-year period of the Master Plan, virtually all of the small, older buildings would be replaced.

5.2.8 Fire and Life Safety

All buildings on the RML campus are planned to have a minimum clearance of 30 feet from other structures to provide for fire separation and emergency vehicle access. Primary access would be the loop road. Emergency north-south travel could be accommodated through the Central Pedestrian Concourse and between the Quad and Building 13.

All major campus pedestrian pathways (such as the Central Pedestrian Concourse) should be designed to accommodate emergency vehicles. Landscape and path design allow for a clear path of 16 feet minimum width and 14 feet minimum height. When constructed, walkways should be designed to withstand occasional emergency vehicle loads.

The existing water supply has sufficient capacity to meet existing and projected campus fire flow requirements. Additional booster pumps would be installed at individual buildings where needed.

5.2.9 Parking

It is important that the RML maintain adequate parking on site to meet employee and visitor needs and avoid parking shortages which would encourage employees to park in residential neighborhoods. As a consequence, parking is planned on the basis of one space per staff member. To encourage ridesharing, the Master Plan recommends offering incentives for employees that carpool or vanpool to work, such as reserving preferential parking spaces for multi-occupant vehicle use.

Estimated parking requirements for the 20-year plan are, accordingly, for 427 estimated personnel plus 24 spaces at the Visitor Center and 10 spaces at the Interpretive Center.

5.2.10 Service Access

All delivery truck traffic would continue to access the RML campus at the 5th and Baker Streets service entrance; commercial traffic is planned to be restricted from further entry into the site by vehicle barriers. All supplies would be broken out and inspected at the Shipping and Receiving Building and internally delivered by RML staff. A new Long-Term Storage Facility, with a storage building and screened dumpster yard, would be located within the restricted service access area across from the Shipping and Receiving Building.

The Master Plan would consolidate and simplify service access on the RML campus to avoid conflicts with pedestrians and passenger vehicles, minimize the negative visual impacts of multiple service areas, and enhance site security.

5.2.11 Physical Security

The Master Plan would enhance the current new perimeter fence with staffed and monitored entrance gates and/or turnstiles to control access into the campus. Additional openings in the perimeter beyond those planned in this Master Plan would potentially tax personnel resources and physical security. Therefore, the perimeter should not be altered. All new construction would comply with the *NIH Physical Security Design Guidelines* to ensure the safety of persons and research.

Visitors would be screened in the Visitor Center and, as noted above, deliveries are screened in the Shipping and Receiving Building.

5.2.12 Waste Management

Disposal methodology and space requirements for waste management were estimated by RML based on a study, *Medical Waste Disposal Alternatives at Rocky Mountain Laboratories*, *September 2007*, which addressed municipal solid wastes, medical/pathological/lab wastes, hazardous chemical waste, radioactive waste and recycled materials.

Based on available information and the maturity of current technologies the study determined that, at this time, incineration of all medical type wastes is the technology best suited for RML, and the Master Plan proposes to retain the current incinerator. The NIH and the RML will continue to consider alternative waste disposal technologies as these evolve and as campus operations and needs change in the future.

The study also identified waste streams from generation points to collection and disposal areas, and circulation provisions in the Master Plan incorporate these waste movement requirements.

5.3 Utilities

A Master Utility Plan (MUP) for RML is currently being prepared. Projects developed for the Master Plan will be coordinated with the MUP. In general, new projects should be planned to minimize the interruption of utility services to existing campus buildings. Additional attention should be given to potential utility conflicts as noted below.

5.3.1 Steam

Refer to Figure 5.3-a. Principal steam lines run beneath the service drive between the Quad and Buildings 13/13B, in the planned Central Pedestrian Concourse adjacent to Buildings 13, 26 and 31, and to the west of Building 25. Many of these lines are at their limit in terms of slope and should not be disturbed or relocated.

5.3.2 Chilled Water

Refer to Figure 5.3-a. A critical chilled water line runs under the service drive between the Quad and Buildings 13/13B and across the planned Pedestrian Concourse. While the Master Plan does not anticipate new projects that would adversely affect this utility, construction that would affect this line is discouraged.

5.3.3 Natural Gas

Refer to Figure 5.3-a. A 6” gas main enters the site and runs under the proposed loop road from the vicinity of the proposed Long Term Storage Facility to Building 26. This is a critical utility which future construction should avoid disturbing.

5.3.4 Power & Signal

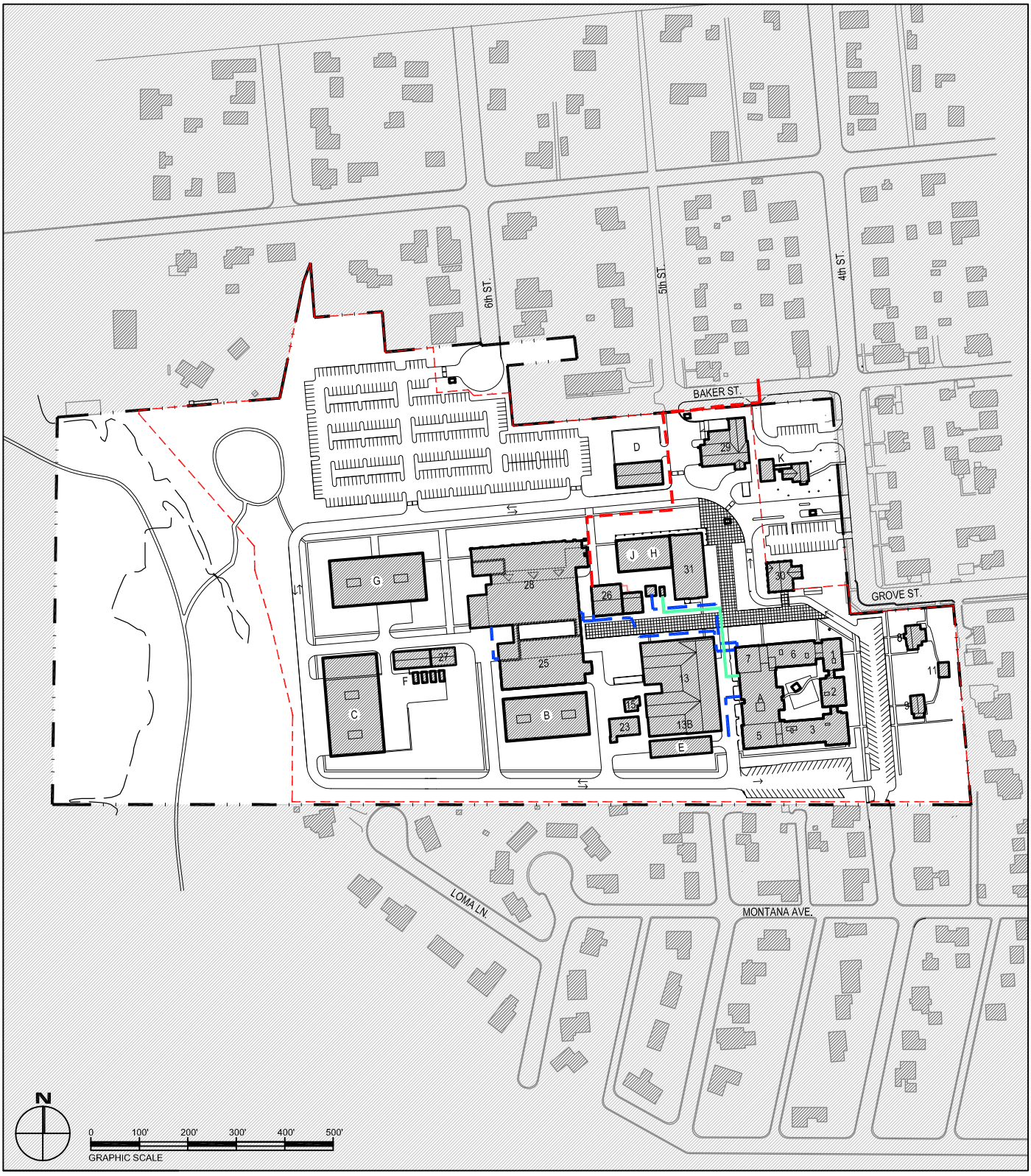
Refer to Figure 5.3-b. Critical underground power and signal lines run under the proposed Pedestrian Concourse, between Buildings 30 and 31, between the Quad and Buildings 13/13B, north of Building 28, between and west of Buildings 28 and 25, south of the ARMCO buildings, and in the western portion of the campus roughly on axis with the Central Pedestrian Concourse. Construction projects anticipated by the Master Plan that would affect these lines must retain service to existing buildings served by these lines throughout construction. Should the Building 28 plant expansion noted in Chapter 4, Section 4.9.3, become necessary, this project must also be planned so that service to existing buildings is retained. Existing aerial lines providing power to the West Distribution system may require modifications to accommodate the improvements associated with the acquisition of the north properties. If necessary, these modifications will be explored in greater detail in the MUP currently being developed.

5.3.5 Water

Refer to Figure 5.3-c. Critical water routing runs around the Quad, under the central Pedestrian Concourse and around the east, north and west sides of Building 29. The Master Plan does not propose any construction that would adversely affect these lines.

5.3.6 Sanitary Sewer

Refer to Figure 5.3-c. Critical sanitary sewer lines run under the parking area east of the Quad, between the Quad and Buildings 13/13B, beneath the proposed Pedestrian Concourse, south of Building 25, west of Buildings 25 and 28, west of Building 29, and from Building 13B to the middle of the campus’ current northern boundary. The Master Plan does not propose any construction that would adversely affect these lines.

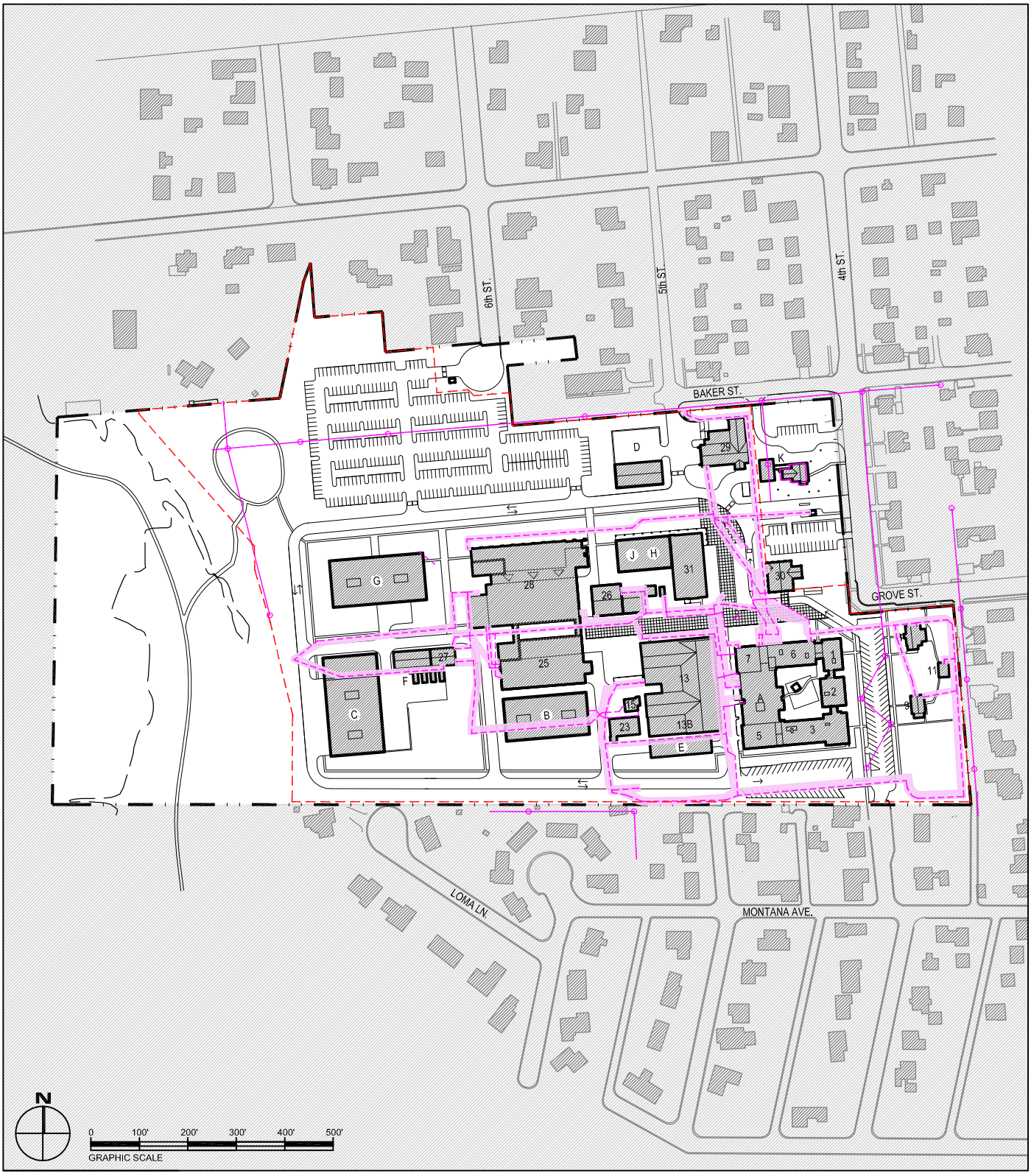


NIH-RML Master Plan
Hamilton, Montana

Steam line
Chilled water line
Natural gas line
Perimeter fence

Figure 5.3-a

Key Utility Lines- Steam, Chilled Water, and Natural Gas



NIH-RML Master Plan
Hamilton, Montana

- Underground duct bank
- Overhead power line
- Pole
- Perimeter fence

Figure 5.3-b

Key Utility Lines-Power and Signal

NIH-RML Master Plan
Hamilton, Montana

Water Line

Sanitary Sewer Line

Perimeter Fence

Figure 5.3-c

Key Utility Lines- Water and Sanitary Sewer

5.3.7 Storm Water

The NIH is implementing Best Management Practices (BMPs) at its facilities to control the quantity and quality of its storm water run off. As the Master Plan is implemented over the years, the NIH would strive to decrease storm water runoff as much as possible but with an overall goal of no net increase in storm water runoff from the site after full development of the site.

5.3.8 Campus Generator and Fuel Storage Expansion

A study is underway to increase and consolidate campus emergency generator capacity and fuel storage. The Master Plan would include expansion of the West Power Plant (Building 27), and increased fuel oil storage capacity in multiple, above-ground storage tanks. These elements must remain inside the campus perimeter security standoff. Additional security measures for these elements may also be required at the direction of the NIH Division of Physical Security Management.

5.4 Master Plan Implementation

Programming for growth under the Master Plan is phased over a 20-year period in accordance with time frames established during the interview and data collection processes and personnel needs during these time frames estimated by RML staff and the Steering Committee.. Based on these expressed needs the bulk of construction would need to be completed in the initial period largely to provide facilities to support the IRF as well as to correct current deficiencies. Over the ensuing years, required additional space would total only 23,322 gross square feet to support the anticipated slow rate of personnel growth. This statement of estimated space needs based on estimated population growth is set forth in Tables 5.1.3.A and 5.1.3.B.

Implementation planning, on the other hand, must consider funding availability and the logistics of construction phasing.

Additionally, implementation of any of the projects that make up the Master Plan is dependent upon various actions, some of which are within NIH's or RML's control; others are not and are under the control of groups such as HHS or the Congress or a consequence of presidential priorities and mandates. The timing of actual construction at RML would be related to the level of future staff growth, the program-driven demands for the facility in question, the availability of funding to construct the project, and considerations such as the need to provide ancillary facilities to support the construction of primary facilities. For example, the research activities anticipated for the Integrated Research Facility (IRF) could utilize expanded animal facilities, campus maintenance, general storage, waste management and parking.

During the initial construction phase only those projects that are already funded, and essential, smaller scale, works for which funding could be immediately obtained can realistically be undertaken. Functional priorities, for the most part, would be deferred to the subsequent time frame.

Planned construction phasing is presented in Table 5.4.1 along with required demolition and new construction areas by line item. Resulting gross area increases and demolition by function and phase are presented in Table 5.4.2. Based on implementation planning, total gross building area at the end of the 20-year planning period is estimated to be 445,713 square feet as opposed to the estimated programmatic need of 431,690 square feet set forth in Tables 5.1.3.A and 5.1.3.B, an increase of 14,023 square feet. This additional area derives from two sources. One of these is Buildings 8, 9 and 11 that are designated an historic resource and cannot be demolished. At the same time, they are located within the secure standoff area and cannot be occupied by functions that require fixed staffing. Within these guidelines, of the 8,277 square feet in these buildings the only portion of the estimated program need they can accommodate is 2,604 square feet for amenities including fitness facilities and changing rooms leaving a balance 5,673 square feet for

which there is no current programmed need. The other is Building 31 which was built to include surge space for occupancies relocated from buildings to be demolished in the standoff area. These occupancies are temporary pending new construction for their permanent accommodation. For example, laboratory space and central freezer storage are to be located in Building 31 pending construction of the new research building at which time they will move and the space in Building 31 will be vacated. The resultant vacant space in Building 31 is estimated to be 8,350 square feet. The unoccupied 14,023 square feet in these four buildings is designated Director's Reserve to be used for future surge space during renovation programs, for accommodation of new needs pending new construction and for temporary, short term needs that may arise.

Source Data: Oudens + Knoop Architects, PC

NIH-RML Master Plan

Hamilton, Montana

B Veterinary Branch
C Maintenance
D Long Term Storage Facility
E Short Term Storage Facility
F Generator Expansion/Centralization
G Research Laboratory
H Central Stock Room
J Seminar Room
K Interpretive Center

Property Line
Fence
Central Pedestrian Concourse

Figure 5.2

Illustrative 20 year Master Plan

NIH/ORF/DFP

LSY Architects

Oudens + Knoop Architects, PC

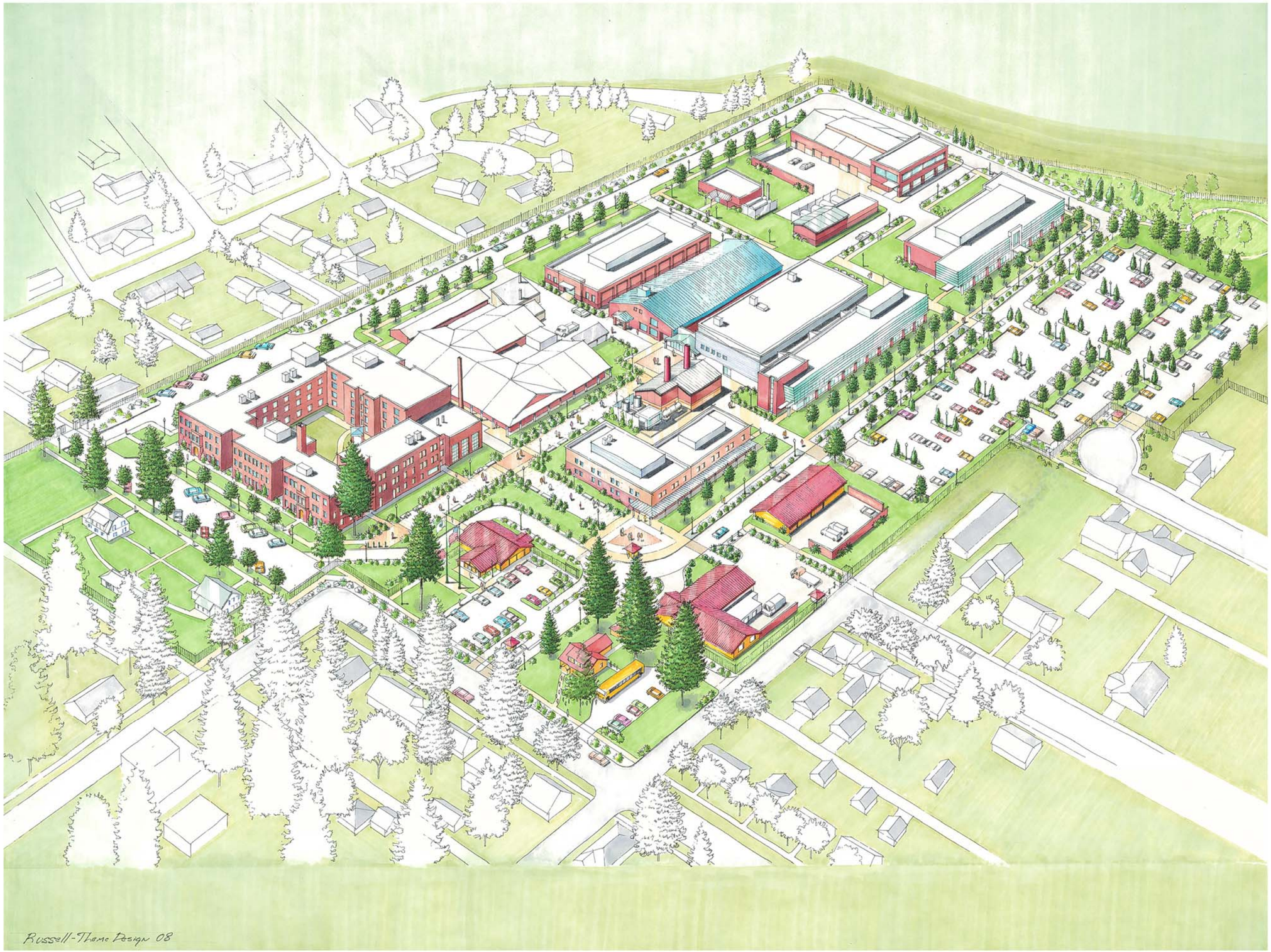


Figure 5.2a- Concept Rendering of Campus- Aerial View

Table 5.4.1
Implementation Phasing

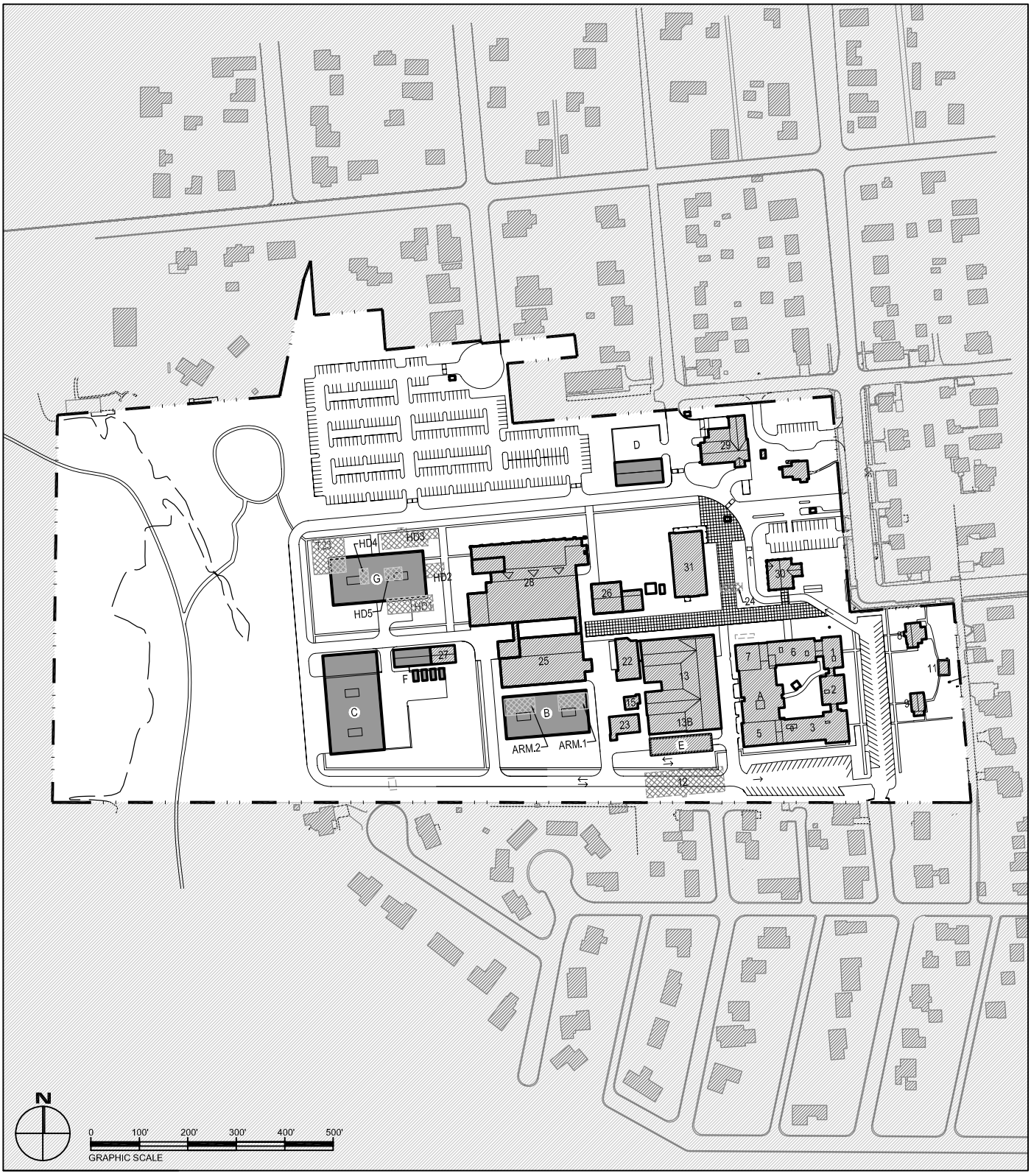
	Demolish (gsf)	Construct (gsf)
Phase 1 (Figure 5.1.4a)		
Demolish Building 14	4,000	
Construct Building 31		25,920
Demolish Buildings 16, 17, and 21	9,338	
Construct short term storage (Building E)		4,800
Purchase north and northeast properties		
Relocate Building T23		
Construct loop road, parking, landscape improvements and a security fence around the new north property		
Demolish duplex house on northeast property and construct parking		
Construct temporary animal facility as required (Building 32)		
Install tank farm at Building 22		
Construct central pedestrian concourse		
Phase 2 (Figure 5.1.4b)		
Construct central maintenance facility and general equipment storage (Building C)		30,316
Construct central generator plant addition (Building F)		2,000
Demolish HD and T23 building complex	14,490	
Construct research laboratory building and mechanical plan expansion (Building G)		58,721
Construct amenities in Building G		672
Demolish Building 12	7,690	
Revise loop road at demolished Building 12 and construct landscape improvements		
Relocate ARMCO 1 and 2 activities to temporary facilities		
Demolish ARMCO 1 and 2	4,096	
Construct animal facility (Building B)		34,315
Demolish temporary animal facility (Building 32)		
Construct long-term storage (Building D)		4,030
Demolish Building 24	700	
Construct parking and landscape improvements		
Complete central pedestrian concourse		
Phase 3 (Figure 5.1.4c)		
Construct central stock room and seminar room (Building H/J)		15,244
Demolish Building 22	2,624	
Reposition tank farm at Building 13 service entrance		
Phase 4 (Figure 5.1.4d)		
Construct interpretive center (remodel log house and build addition) (Building K)		3,410
Totals	42,938	179,428

NIH-RML Master Plan
Hamilton, Montana

31 Administration/Laboratory (Under construction)
E Incinerator Storage Facility

Figure 5.4.1a

Phase 1 Implementation Diagram

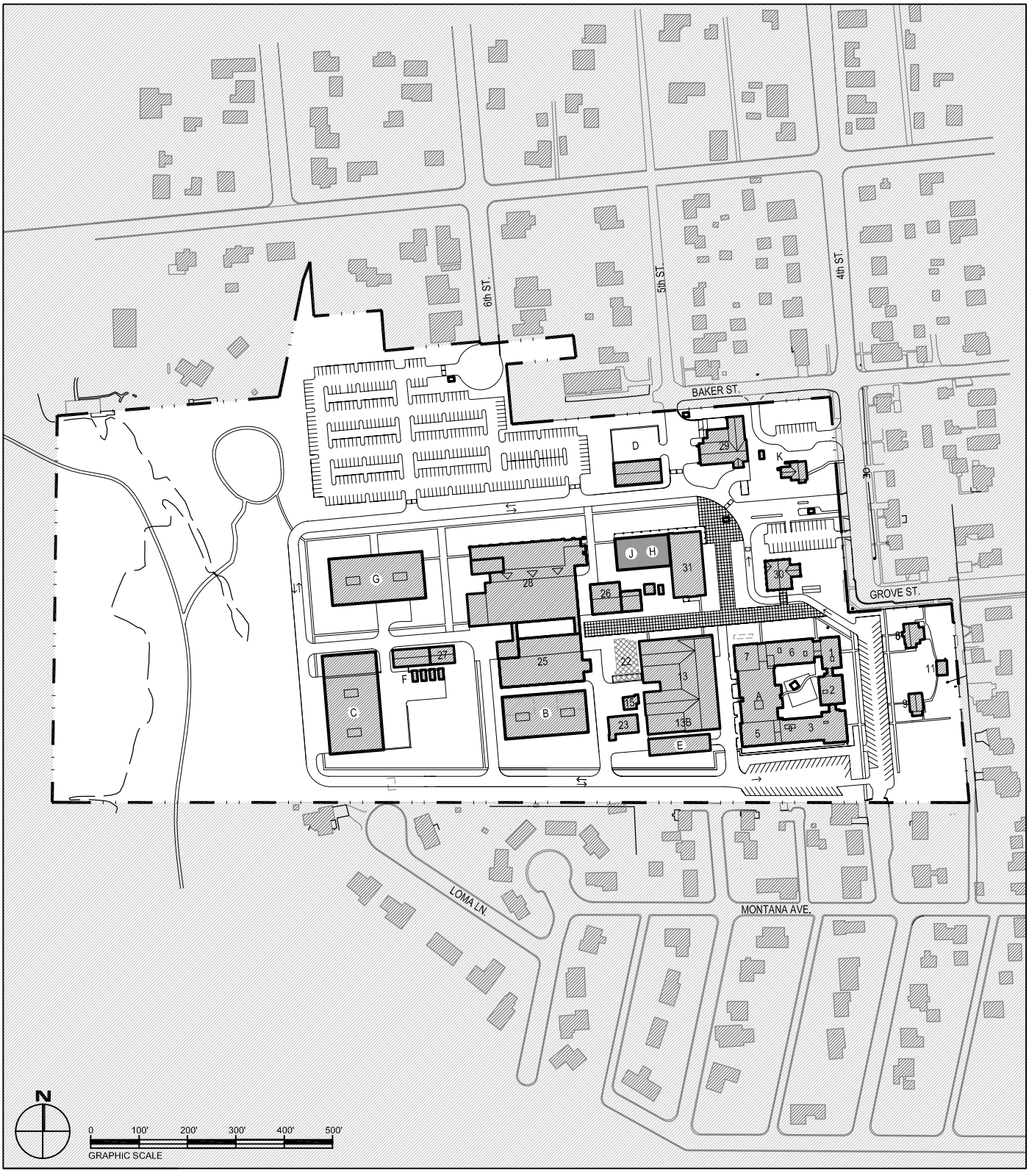


NIH-RML Master Plan
Hamilton, Montana

B Veterinary Branch
C Maintenance
D Long Term Storage Facility
F Generator Expansion/Centralization
G Research Labratory

Figure 5.4.1b

Phase 2 Implementation Diagram



NIH-RML Master Plan
Hamilton, Montana

H Central Stock Room
J Seminar Room

Figure 5.4.1c

Phase 3 Implementation Diagram

NIH-RML Master Plan
Hamilton, Montana

K Interpretive Center

Figure 5.4.1d

Phase 4 Implementation Diagram

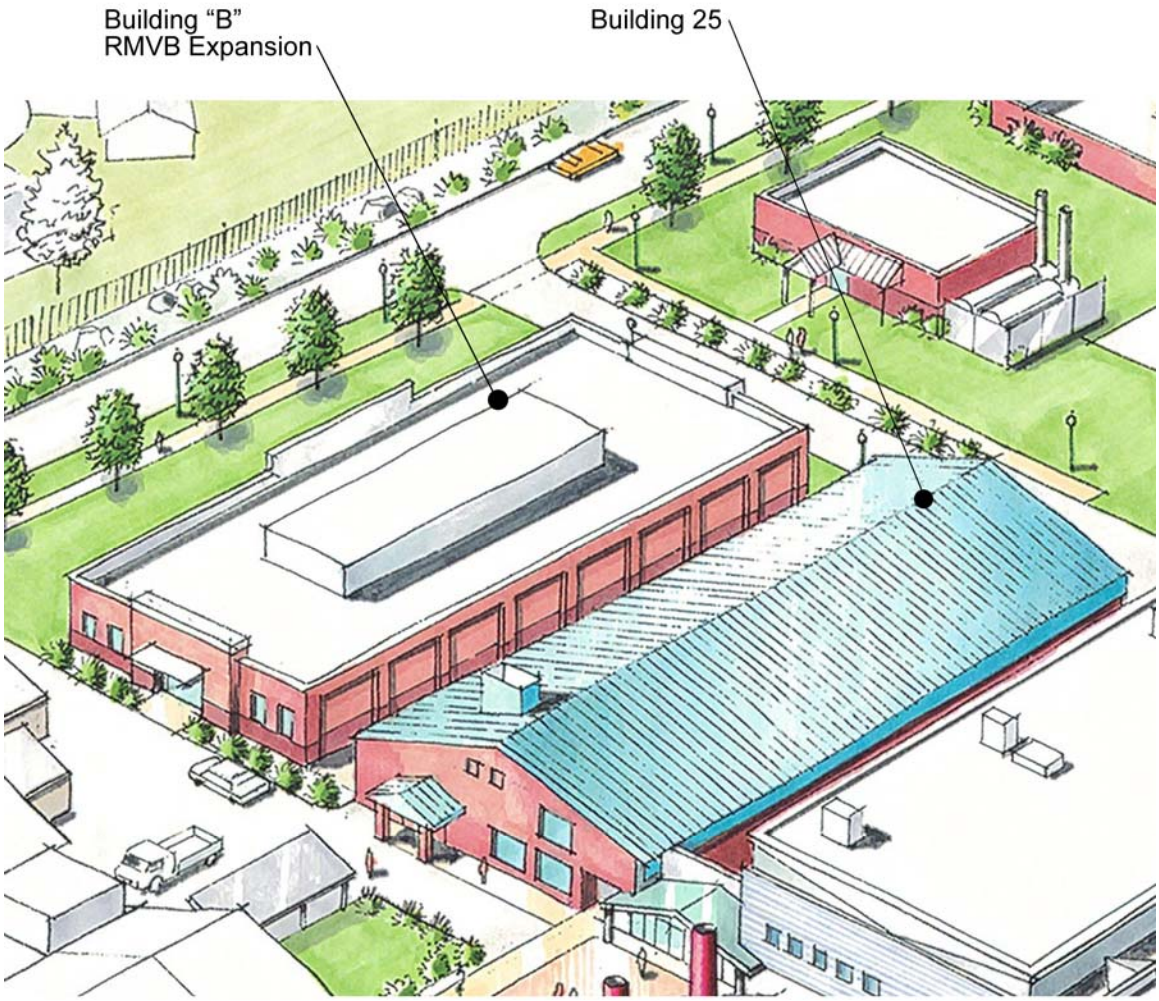
Table 5.4.2
Gross Area Increases and Demolition by Phase

	Program	Baseline	Phase 1	Phase 2	Phase 3	Phase 4	Totals
Laboratory, Director's Reserve and Shared Laboratory Support	161,604	113,398	113,398	161,604	161,604	161,604	161,604
Seminar Room B	3,474	0	0	0	3,474	3,474	3,474
Integrated Research Facility	103,190	103,190	103,190	103,190	103,190	103,190	103,190
Veterinary Branch	63,158	37,157	37,157	63,158	63,158	63,158	63,158
Administrative Services	17,570	13,042	17,570	17,570	17,570	17,570	17,570
Dir. Reserve – Bldg 31	8,350	0	0	7,845	8,350	8,350	8,350
Dir. Reserve – Bldgs 8, 9, 11	5,673	0	5,450	5,673	5,673	5,673	5,673
Maintenance Shops	23,716	12,798	12,798	23,716	23,716	23,716	23,716
Equipment Storage	6,600	3,659	3,659	6,600	6,600	6,600	6,600
Central Stockroom	11,770	3,129	3,129	3,129	11,770	11,770	11,770
Interpretive Center	3,410	0	0	0	0	3,410	3,410
Visitor Center	3,562	3,562	3,562	3,562	3,562	3,562	3,562
Shipping and Receiving	7,525	7,525	7,525	7,525	7,525	7,525	7,525
Long Term Storage	9,922	1,092	5,892	9,922	9,922	9,922	9,922
Incinerator	2,356	2,356	2,356	2,356	2,356	2,356	2,356
Central Plant	10,557	8,315	8,315	10,557	10,557	10,557	10,557
Amenities	3,276	0	2,604	3,276	3,276	3,276	3,276
Totals	445,713	309,223	326,605	429,683	442,303	445,713	445,713
Demolition			13,338	26,976	2,624	0	42,938
New Construction			30,720	130,054	15,244	3,410	179,428

A brief description of each of the proposed Master Plan projects follows.

RMVB Expansion—Building "B", and the ARMCO Buildings

The RMVB expansion would be planned as a new, 34,300 gsf, one-story plus basement, animal holding and research facility in the south-central area of the campus on land currently occupied by the ARMCO buildings south of Building 25. With Building "B" in place, animal space on the campus would increase by approximately 26,000 gsf, from 37,200 to 63,200 gsf. ARMCO 2 contains animal surgery, a critical support function that would need to be accommodated in temporary facilities during the construction of the RMVB expansion. The site immediately west of the planned RMVB expansion is recommended for consideration for this temporary facility.



Research Laboratory Building "G" and the HD Complex

Research Laboratory Building "G" would be a new, two-story plus basement, laboratory building located in the western portion of the campus in an area presently occupied by the HD Building complex which houses campus maintenance activities. The approximate 58,700 gsf building would provide needed laboratory and shared support space, break rooms, and small meeting rooms to support basic scientific research activities. Completion of the planned Maintenance Complex (Building "C") would be necessary to permit the removal of the HD Building complex in order to make its site available for the construction of Laboratory Building "G".

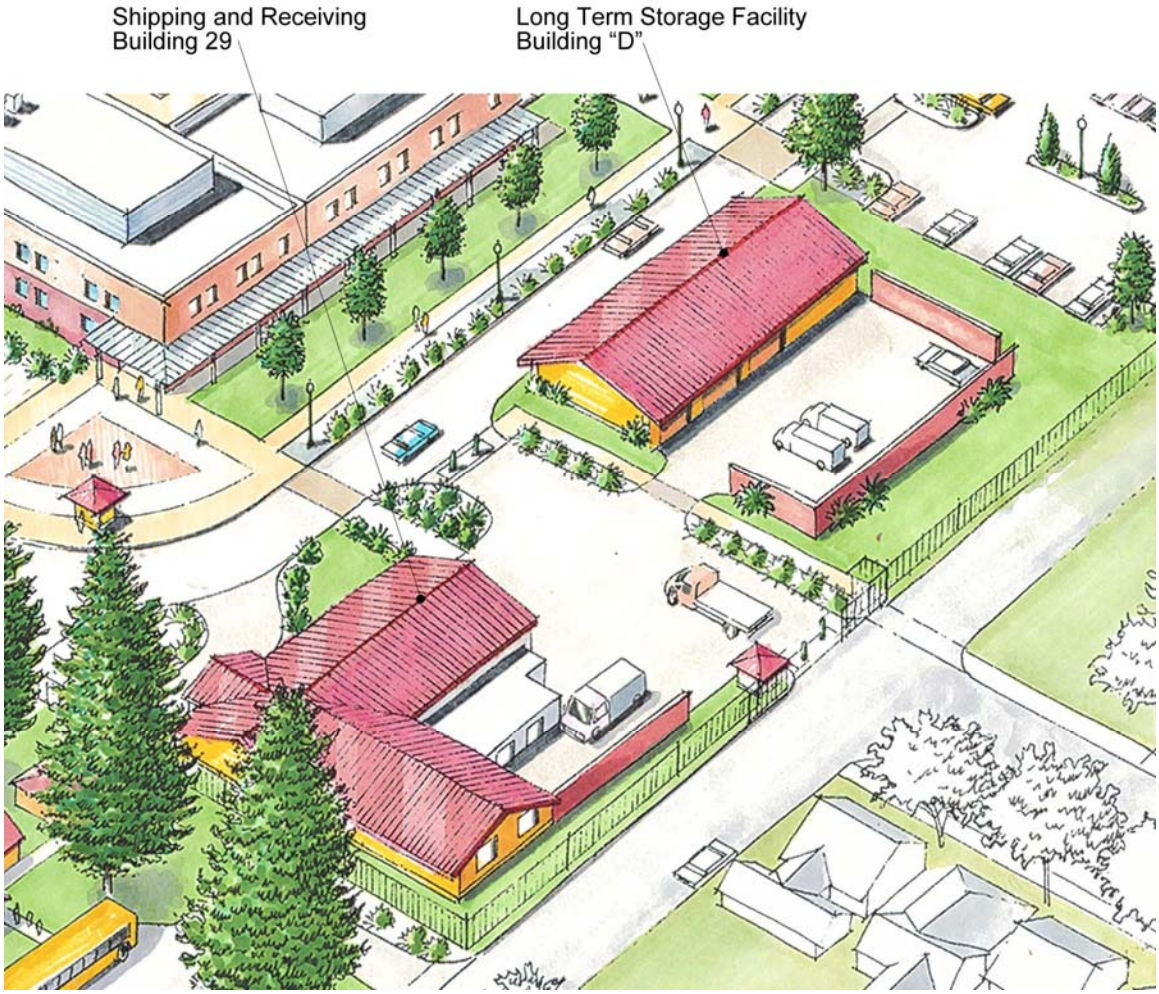
Figure 5.4.2a- Concept rendering of IRF and Laboratory Building "G", with Loop Road in the foreground

Maintenance Shops and Storage and Equipment Storage, Building "C"

Current maintenance staff at RML is located in temporary leased trailers in the northern portion of the site. With future expansion of the campus and the completion of the Integrated Research Facility, maintenance responsibilities would grow. The Master Plan calls for constructing a new, approximately 30,300 gsf Maintenance Complex (Building "C"), with offices, shops, support space, conference/break rooms, maintenance, storage areas, lockers, showers, and toilet facilities and general equipment storage in the far southwestern corner of the campus. The support facility would provide larger and more functional space for current and future maintenance personnel as well as the NIH Police. In addition, paved areas would be planned on the east and west sides of the main building to park maintenance and public safety vehicles and allow for outside storage of maintenance-related equipment. Screen walls and landscaping would be used to screen unsightly views of the yard from off-site areas.

Long Term Storage Facility, Building "D"

This new facility, located on the north edge of the campus west of the Shipping and Receiving Building, would be essentially a marshalling facility for items RML intends to hold for a short period of time before they would be removed from campus by individuals or private contractors. These items would include recycled waste, general waste, and surplus equipment awaiting donation or removal from campus. In addition to the 4,000 gsf building, an outside storage yard would contain closed compacting-type dumpsters for trash and recycled waste. The yard would be screened from off-site views via an attractively designed screen wall.

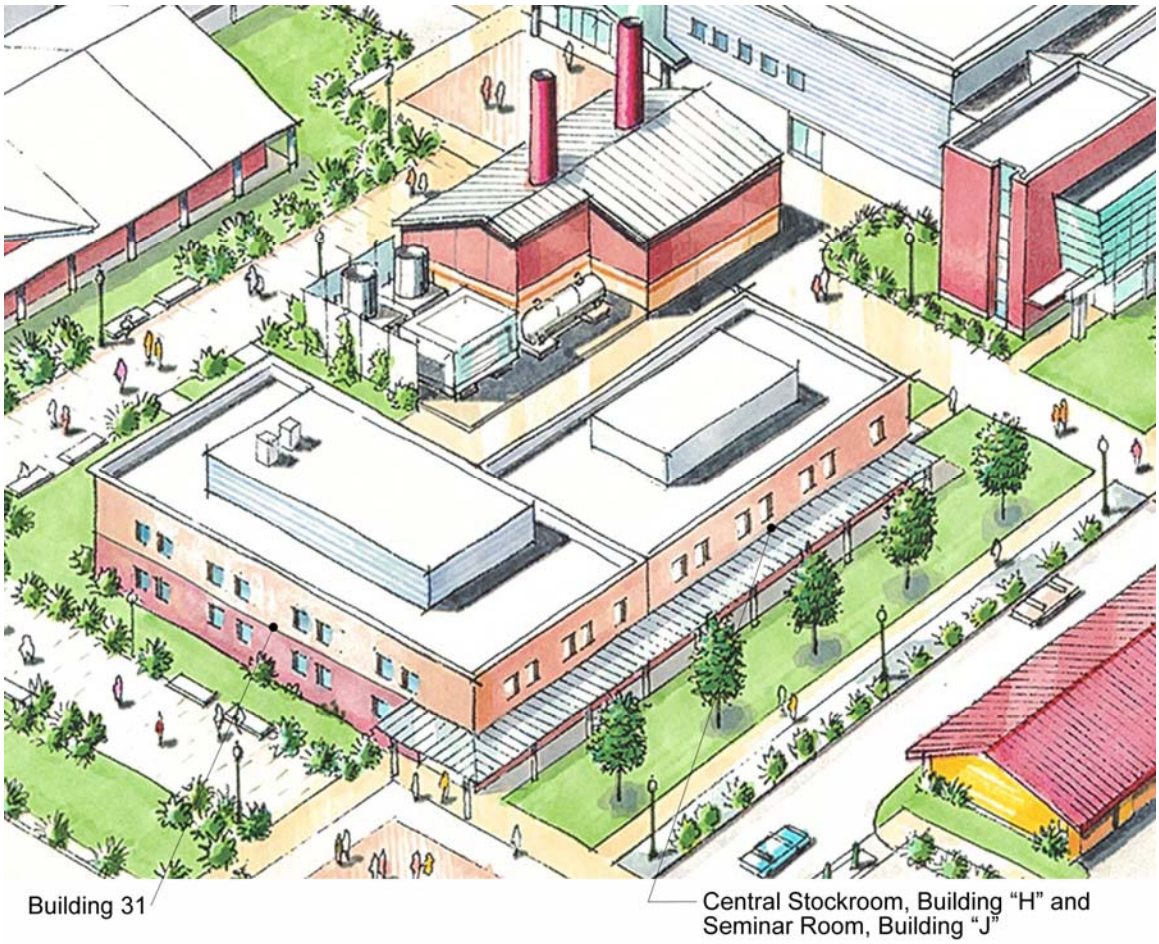


Short Term Storage Facility, Building "E"

Medical pathological waste (MPW) generated on the campus needs to be in a separate facility close to Building 23, the site of the campus incinerator. The Master Plan includes Building "E", a 4,800 gsf building where MPW would be stored in approved containers until treated, with any residue subsequently taken off-site to be landfilled. The new facility would be screened from off-site views.

Generator Expansion/Centralization, Building "F"

The campus Master Plan is based on changes to the site's electrical service so that the entire campus, except for the IRF, would be fed from a central facility, Building 27. Two generators are to be relocated to a location near the existing generator in Building 27 and a third generator would be added to accomplish this. In addition, switchgear would be installed to allow all generators to operate in a parallel fashion to meet overall campus demand and provide for "N+1" redundancy, allowing one unit to be down for maintenance at any given time. Under the plan, Building 27 would be expanded by 2,000 gsf. Also proposed in the area of the Generator Expansion project would be four, above ground fuel tanks with a storage capacity of 15,000 gallons each and a common fuel handling system.



Central Stockroom, Building "H"

The planned 11,800 gsf central stockroom, Building "H", would be centrally located near Buildings 28, 31, and the Quad to be convenient to the research and administrative staff who frequent the facility.

Seminar Room, Building "J"

Building "J", the Seminar Room, would expand RML's conferencing capability. The location of the Seminar Room would be based on its proximity to the Quad, Building 31, and the Visitor's Center. The facility would be approximately 3,500 gsf in size.

Interpretive Center, Building "K"

This remodeled log house and 3,400 gsf addition would be built on newly acquired property located just outside the current northeast boundary of the campus. The Center would be planned for school groups on field trips or others interested in the history of the campus. The Master Plan expects that visiting classes would consist of no more than thirty students. Parking for a small number of personal vehicles (and possibly a school bus) would be proposed as well.

Figure 5.4.2b- Concept rendering of Interpretive Center entry

Conversion and renovation of Building 7

Originally a central mechanical plant, Building 7 would be renovated as research laboratory space under the Master Plan.

Property Acquisition

Two planning alternatives were prepared to study the accommodation of estimated requirements with and without acquisition of available properties along the northern boundary of the site. It was determined that acquisition of property to the north would allow RML to meet expanded requirements for parking while diminishing the parking on the south side and interior portion of the campus. Also, acquisition of this land would enhance the security buffer between the community and the IRF, RML's high containment building.

In addition, during a master planning workshop with the Hamilton community on May 5, 2007, the participants suggested that NIH purchase the property at the northeast corner of the site to enhance the site's entrance and provide an opportunity for the RML to create an Interpretive Center that would be publicly accessible outside the secure boundary of the campus. The community recommended a Center with classrooms, a museum, displays and other facilities, as appropriate, to inform the community of the history of the campus and the scientific accomplishments of the RML. During the initial implementation phase, the log house would be remodeled as the first phase of the Interpretive Center, and the duplex house would be demolished to provide area to park visitor vehicles.

In 2003, HHS approved funding for the planned acquisition of the north and northeast properties. As funding is in place for the purchase, the Master Plan recommends making their acquisition a priority, and the plan recommends acquisition in the initial phase. In accordance with the National Environmental Policy Act process, NIH will complete an environmental document for the purchase prior to any acquisition.

General Site Improvements

Pedestrian Concourse

A pedestrian precinct would be established within the interior portion of the campus on the axis of Grove Street extended to provide a campus focal point and reduce potential pedestrian/vehicle conflicts. Vehicles would not be permitted within the precinct, except for emergency vehicles. The area would have special paving materials and attractive and well-maintained landscaping. Additional green space would be distributed throughout the site and along the perimeter of the campus to make it more visually appealing and pedestrian-friendly.

Landscaping (emphasizing native plant materials), durable site furnishings (benches, trash receptacles, bicycle racks, etc.) and site signage would be improved and coordinated.

Attractive pedestrian-scale light fixtures**,** matching the campus standard, would be provided along walkways and at building entrances. The use of banners would also be encouraged to add visual interest and color to the campus.

The plan also recommends placing overhead utilities underground as utility improvements are made in the future.

Figure 5.4.2c- Concept rendering of Pedestrian Concourse

Off-Street Parking Expansion

The Master Plan would provide for expanding employee parking on the campus to 427 spaces to accommodate planned growth and satisfy security requirements. This also involves consolidating parking that is now scattered throughout the site, removing it from the center of campus. This, in turn, would create a more favorable pedestrian environment in the center of campus. Parking to be expanded and relocated to the north in the vicinity of Baker Street would be phased, to the extent practical, to coincide with phased campus Master Plan development.

Chapter Six
Development Guidelines

6 Development Guidelines

6.1 Introduction

Development guidelines are included in this Master Plan to quantify or further define the general concepts and planning intentions set forth in Chapter 5. Although there is flexibility within the Master Plan, certain key relationships, patterns, and standards should be adhered to or considered when developing site or building projects to ensure that the desired functional characteristics and campus character are achieved. The Development Guidelines define these key elements and provide recommendations for their implementation.

Subjects addressed in this chapter include issues of building size and scale, definition of open spaces, site character and quality, as well as access and circulation. Considerations for implementation of the Master Plan are also included.

6.2 Building Siting and Open Space Guidelines

6.2.1 Standoff and Setback

This Master Plan includes separations, known as “standoffs”, between occupied buildings and potential threats from explosives and separations for aesthetic and other reasons called “setbacks”.

At the perimeter of the site, the standoff should be acknowledged by excluding new buildings within this area. Buildings located toward the perimeter of the site facing spaces where unscreened vehicles might be located with explosive devices could be parked must be designed to mitigate potential blast effects by a combination of distance and construction designed to resist the blast. The National Institutes of Health (NIH) will conduct a threat and risk assessment to establish design assumptions for blast charge weight for any new construction project. Standoff design criteria should adhere to NIH Security Guidelines. Owing to the relatively small size of the Rocky Mountain Laboratories (RML) campus, the typical standoff of 250 feet cited in the Guidelines is prohibitively restrictive for future development of the campus. The standoff for RML should therefore be maintained at 100 feet throughout the campus perimeter, and all new construction with this standoff should be designed with sufficient hardening to be in compliance with the Guidelines. The Interpretive Center anticipated for the property to the northeast of the existing campus is envisioned to be open to the public and is therefore considered outside the secure perimeter and not subject to the standoff requirements.

On a campus-wide basis, the Master Plan proposes general patterns of setbacks for buildings from the loop road to control density, ameliorate the scale of buildings, and ensure the development of a "campus" character to the site. Along the loop road, new buildings of two or more stories should generally not be any closer than 50 feet from roadway curb lines, and single-story buildings should generally not be any closer than 25 feet from roadway curb lines.

Within the campus there is a proposed open public space, or Central Pedestrian Concourse, which is described in greater detail in Chapter 5. The dimensions of this area, approximately 80 feet by 1000 feet, are defined by existing Buildings 1, 6, 7, 13 and 22 to the south and 30, 31 and 26 to the north. Buildings 28 and 25 mark the western boundary of the space while to the east it is open to the Grove Street approach to the campus in the east. Exterior modifications to or replacement of the buildings that define this space should strive to enhance the public nature of the plaza and enhance the character it provides for the campus. New buildings would not be sited inside the area, existing mechanical equipment within the plaza must be screened or

relocated, and the existing covered walk at Building 13 should be enhanced and extended along the southern border of the concourse.

A second open public space that links the site entry to the Pedestrian Concourse is proposed between Buildings 30 and 31. As with the Pedestrian Concourse, new building construction should not be considered inside this area, and future modifications to Buildings 30 and 31 should strive to enhance the public nature of the concourse.

6.2.2 Building Heights

General Campus Height Plan

Heights have been arranged to create a coherent pattern among all campus buildings and to give a sense of hierarchy or prominence to the most important structures. As noted in Chapter 4, Building 28 and the Quad are the tallest buildings on campus, at 52' and 50', respectively. New construction generally should be no higher than these buildings to maintain their prominence as centers of campus research.

Critical Areas

The Master Plan minimizes the effects of new construction on neighboring areas off campus.

Within the campus, special attention has been given to creating appropriately scaled open spaces and relationships between new and existing buildings. Areas of significant attention to scale issues include: The Central Pedestrian Concourse; development near the Historic Core; the Campus Entry; the Interpretive Center; the Floodplain Trail; and the areas within the campus setbacks or standoffs.

6.2.3 Ground Level Activity and Use

In all areas of the campus buildings should present an accessible appearance at ground level. Building entries should be oriented to address streets or major spaces.

In particular, ground level activities and uses are encouraged around the Central Pedestrian Concourse. This area should become the campus' central meeting place for large outdoor gatherings. Creating new or enhancing existing building entries and ground level activities which open to the Concourse will aid in creating this sense of vitality and centrality.

Pedestrian movement can also add to the vitality of public spaces on campus. Spaces should be designed to accommodate and encourage pedestrians comfortably. Walkways within the major open spaces should be of high quality materials, shaded where practical, and equipped with seating and furnishings where appropriate. Buildings around the major open spaces should also include arcades to shelter pedestrian movement in inclement weather.

6.2.4 Density and Bulk

Maintaining a "campus" character and image for the site is an important aspect of the Master Plan and the manner in which open space is arranged on the campus is critical in establishing the image. To ensure that an appropriate proportion of open space and landscape is maintained, it is important to control the density of buildings on campus. Infilling central open spaces shown in the Master Plan is discouraged as this may diminish the character and quality of prime open spaces, as well as impede views and light available to other buildings. An exception may be made for the site immediately west of the proposed Rocky Mountain Veterinary Branch expansion (Building B). In the event unforeseen programmatic needs arise this site could be considered for new construction.

6.2.5 Rooftop Elements

Rooftop elements such as parapets, penthouses, and antennas should be carefully designed to ensure architectural compatibility and minimize their visual impact on the skyline. Mechanical and elevator penthouses should create visually attractive rooflines for the campus. These elements should be integrated into the architectural expression of the building, and may be articulated as an attic story or hidden within the roof form of the structure. All rooftop equipment should be screened from view using materials consistent with the major building facades.

Installation of rooftop antennas, including satellite and microwave dishes, should be carefully considered for location and visual impact. Antennas should be installed at the lowest possible elevation above the roofline, and screened to the extent practicable from public view. Antennas should be set back as far as possible from all edges of the roof. Rooftop antennas which cannot be screened should be placed in association with penthouse structures so as to avoid the appearance of a freestanding object on the roof. Antenna and mounting materials should be unobtrusive and of a color that blends with surrounding buildings. Antennas should be protected against corrosion, securely mounted, and secured from unauthorized access.

Consideration should be given to developing on site solar capacity to accommodate portions of the campus power requirements. Rooftops provide an excellent location for the installation of solar collectors. As with other rooftop elements, the installation of solar collectors should be carefully considered for location and visual impact.

6.3 Historical and Archeological Guidelines

6.3.1 Historical Guidelines

The Quad, comprised of Buildings 1, 2, 3, 5, 6, 7 and A, dates back to 1928, when Building 1 was completed. As discussed in Section 4.7, Buildings 1, 2, 3, 5, 6, 7, A, 8, 9 and 11 and certain elements of these buildings' sites comprise the Rocky Mountain Laboratories Historic District which is listed in the National Register of Historic Places.

It is possible that other buildings, upon reaching 50 years of age, will be eligible for listing. (Under Section 110 of the National Historic Preservation Act, federal agencies are required to identify and evaluate historic resources and to ensure that the resources are managed and maintained in a manner that is sensitive to their historic, archaeological, architectural, and cultural values.) The NIH is committed to continuing to evaluate the potential historic significance of buildings that are approaching 50 years of age. Until these evaluations are complete, the NIH acknowledges that cultural resource investigations will be necessary for individual undertakings to be submitted for Section 106 review. (Under Section 106 of the National Historic Preservation Act, government agencies are required to take into account the effects of planned undertakings on historic resources prior to approving funding for the undertaking.)

The Secretary of the Interior's Standards for Rehabilitation provide basic principles to guide work undertaken on historic buildings. The Standards are as follows:

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its environment.

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.

4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.

6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of distinctive features, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

7. Chemical or physical treatments, such as sandblasting, that can cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

8. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

6.3.2 Archeological Guidelines

To date no archeological sites have been encountered on the RML campus.

If a sensitive area is encountered, the site must be evaluated and recommendations for appropriate sampling, recovery of artifacts, or protection in place must be prepared as necessary. It is possible, but not probable, that an alternative building site would have to be chosen or construction delayed if the archeological site were determined to be of great importance. In general, artifact recovery is preferable to avoidance since the historic and archeological value of most sites lies in the information obtainable from the artifacts.

The survey, evaluation and mitigation work (if required) should be completed during the planning of individual building projects and prior to the start of any construction. This releases the site for construction and avoids delays and additional costs once construction is underway.

6.4 Circulation Guidelines

6.4.1 Vehicular

Vehicular access to the RML Campus is currently achieved by means of two existing entrances; the staff and visitor entrance located along 4th Street near Grove Street and the service vehicle entrance adjacent to the intersection of 5th and Baker Streets. The Master Plan Proposed Action calls for two emergency vehicle exits, one where 6th Street terminates at the northern boundary of the site and the other at 4th Street extended where the roadway terminates in the southeast corner of the campus, to facilitate evacuating vehicles if necessary.

None of these entrances are anticipated to require traffic signals to control traffic flow to and from the campus.

The Master Plan proposes a new two-way campus loop road around the north, west and south portions of the campus, where it meets the existing parking area at the Quad. A one-way northbound exit lane connects this parking area to the staff and visitor entrance and the loop road. There are also several two- way service lanes to permit access from the loop road to existing building service entries.

The locations of these roadways are presented in Figure 6.4.1-a. The loop road and most service lanes are proposed to be 24 feet wide. The exit lane is proposed to be 15 feet wide. Cross sections through the loop road and exit lane are illustrated in Figure 6.4.1-b.

6.4.2 Parking

Under NIH Security Guidelines, the existing parking areas at the southeast side of the Quad and south of the ARMCO buildings are permitted to remain, but new parking areas should not be planned adjacent to campus buildings. In the future, additional parking will be accommodated in the setback area on the north side of the campus. The use of multi-story parking structures is discouraged; surface lots are preferred. Consequently, parking for the campus population anticipated by the Master Plan should be accommodated in the properties that are planned to be acquired to enhance security stand off to the north of the campus. Planting areas should be located between parking rows and interspersed between parking spaces to provide visual relief and create shade where possible. Premium parking spaces will be allocated for compact cars, low emission cars, hybrid electric cars and car pooling vehicles.

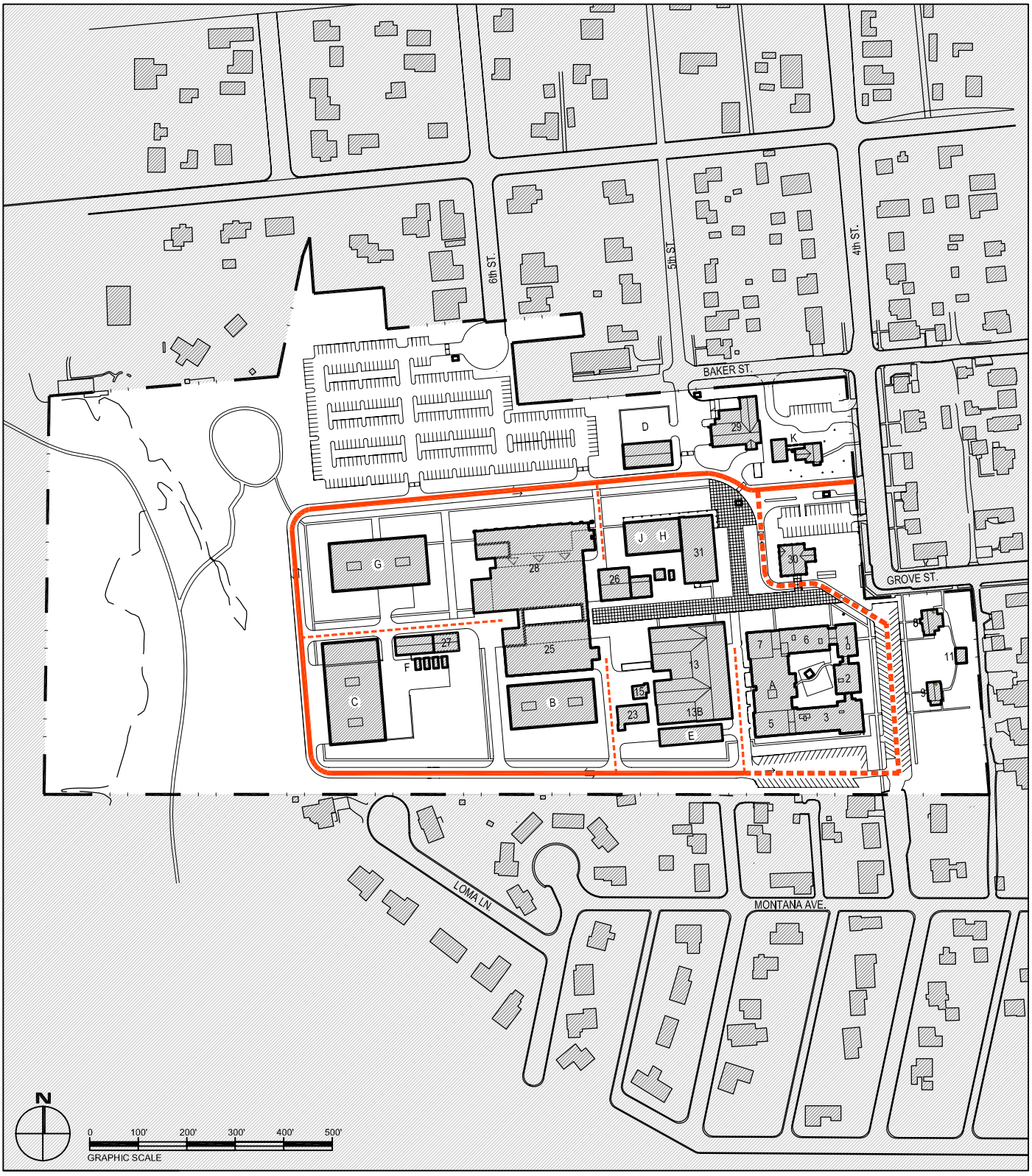
RML will incorporate Best Management Practices (BMP) and Low Impact Development (LID) in its approach to parking lot construction, including 'hybrid' paving such as hard surface access roads and permeable paving for parking spaces, natural vegetated separation strips and use of recycled materials. Other examples of LID practices that may be incorporated in parking areas include, but are not limited to, bioretention cells to filter storm water, infiltration trenches, sumps, and bioswales incorporating native vegetation.

6.4.3 Service

With few exceptions, all commercial trucks would continue to enter the site through the service entrance, where they would drop off deliveries and/or pick up materials from Building 29 or the Solid Waste Management Facility. On- campus service vehicles would distribute delivered materials from Building 29 to campus buildings and carry deliveries, recyclables, or waste from the campus to Building 29 or the Solid Waste Management Facility.

The number of access driveways on the internal loop road has been limited by providing shared service/delivery areas for groups of buildings. This consolidation of the service/delivery areas would minimize conflicts in the internal road system.

The design of the access driveways from the internal loop road system should be provided with adequate sight distances and proper turn-around areas for service vehicles within the access drive layout. In general, access driveways for service/delivery vehicles and employee or visitor passenger vehicles should be separated. Although these criteria may not be feasible in all cases, the objective should be to reduce the possibility of the access driveway being temporarily blocked by a service/delivery vehicle.



NIH-RML Master Plan

Hamilton, Montana

- Two Way Loop Road
- One Way Exit Drive
- Two Way Service Drive

Figure 6.4.1-a

Roadway Types

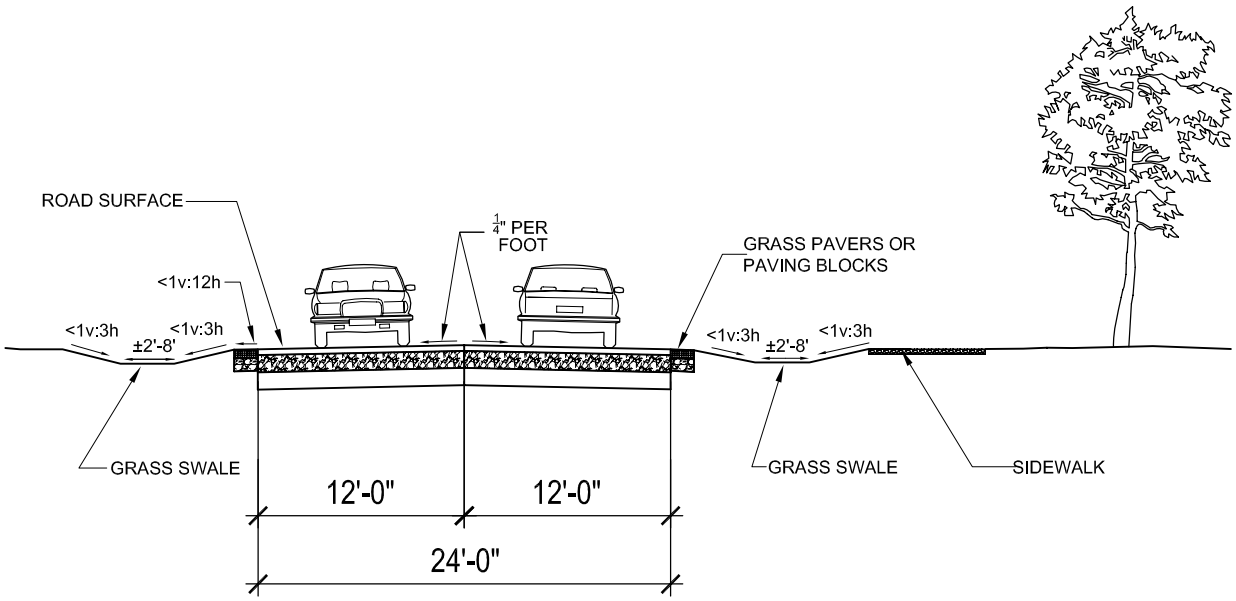


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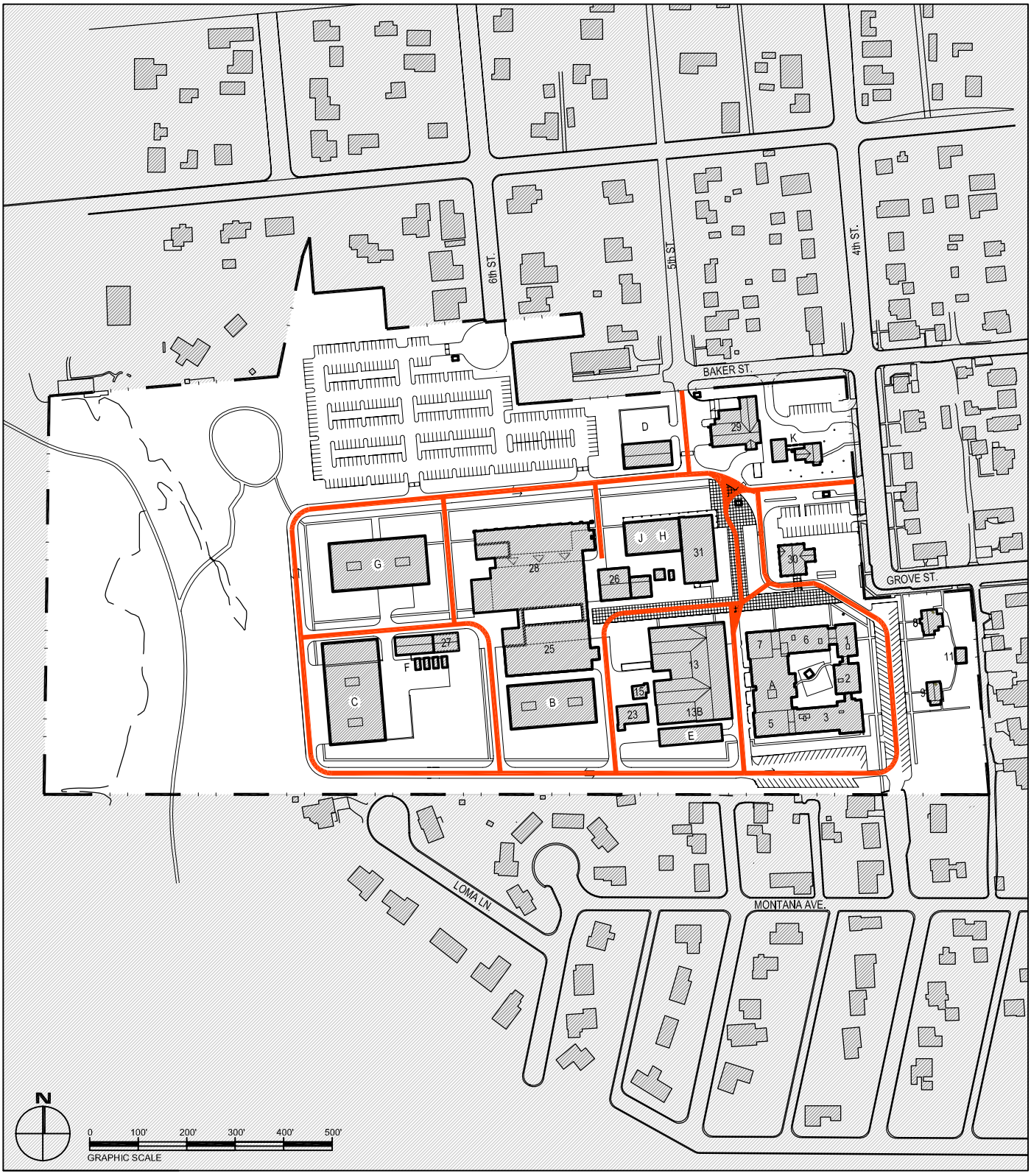
Figure 6.4.1b

Typical Roadway Section



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Access Route

Figure 6.4.4

Emergency Vehicle Access

6.4.4 Emergency Vehicle Access

Access to all campus buildings for emergency vehicles, especially fire department vehicles, must remain a priority in building, road and parking design. To facilitate this, the Pedestrian Concourse shall be designed to carry emergency vehicle traffic. Landscape elements or covered walks shall not impede emergency vehicle access. The proposed emergency vehicle access routes are shown on figure 6.4.4.

6.4.5 Pedestrian/Bicycle

Pedestrian Pathways

Pedestrian access to the site is currently limited to the staff entrance along 4th Street. Formal pedestrian pathways within the site are currently limited to the sidewalks within the Historic District. Pedestrian circulation outside of this area takes place without a planned system or formal pathways. The planned Central Pedestrian Concourse provides an internal focal point that links pedestrian access for most of the research and administrative campus buildings. Perimeter pedestrian paths are also planned to be adjacent to the loop road. It is anticipated that a system of public trails through the western portion of the site adjacent to the Bitterroot River is to be planned by the County. Access from the campus to these trails is planned from the perimeter pedestrian path.

Bikeways

Bicycle facilities are an important element in the promotion of alternative transportation modes for employees of the RML campus to encourage healthful exercise and reduce carbon emissions. A significant amount of bicycle use occurs on the campus today. Under the Master Plan, bicycle access would be provided for employees at all vehicular entrances and at pedestrian/bicycle employee-only gates in the perimeter fence. Bicycle access for visitors to the RML campus would be through the Visitor Center, Building 30. Access to the public trails noted above should allow for bicycle traffic as well.

Bicyclists should be encouraged by signage and policy to walk their bikes in congested areas. In general on the RML campus it is expected that bicyclists would utilize the campus roads to circulate around the campus. However, it is important that these roadways are regularly maintained and cleared of debris, snow and ice and that drainage grates are designed flush to the surface with narrow grid openings so that bicyclists do not get trapped as with conventional parallel, widely spaced grates.

6.4.6 Access for Persons With Disabilities

For implementation of access standards, see the ABAAS (42 U.S.C. §§ 4151 et seq**.** Architectural Barriers Act Accessibility Standard (ABAAS).

6.5 SITE PERFORMANCE GUIDELINES

6.5.1 Building Character/Materials

As noted in Section 4.6, consistent architectural character is currently lacking on the RML campus. Future development on the campus should strive to reinforce the academic institutional quality of the most prominent campus buildings, the Quad and Building 28. New construction near the perimeter should also remain compatible with the scale and character of the surrounding

residential neighborhood. Red brick masonry should be included as a prominent exterior feature in the design of new buildings.

An exception should be made for the development of the Interpretive Center in the northeast corner of the campus. The existing "log cabin" residence on this property shall be retained, along with its landscaping, to the extent practical for the development of the Center. New construction associated with the Interpretive Center should be consistent with the residential scale and character of the adjacent residential neighborhood.

Future development should exclude prefabricated buildings and exterior metal siding, as these promote an industrial impression that is contrary to the academic institutional setting noted above.

6.5.2 Landscape Design and Planting Criteria

Figure 6.5.2-a shows the proposed Landscape Concepts and Planting Patterns for the RML Campus. Landscaping for the campus should be developed to enhance the basic goals of the Master Plan described in Chapter 1.5.

Planting Patterns and Scale

The size of trees, shrubs, and plant beds should be considered with respect to their scale relationship to the RML campus buildings, roads, and spaces. In general, plantings should be simple and conceived in broad masses. In addition, there should be a hierarchy of plantings, ranging from tree and/or shrub massings along roads, entries and in parking areas, down to small garden scale plantings and floral display beds in courtyards and pedestrian gathering areas.

Plants can also serve to punctuate and reduce the scale of walls and building facades, through the use of hanging, twining, or climbing plants, which can help the buildings and spaces become part of the landscape. Similar techniques can be used for screening mechanical equipment. Flower beds should be used to soften the edges of buildings, paths, and outdoor areas. The selection of plant materials should keep security in mind as well. Plants should not provide potential intruders a means to scale perimeter barriers nor obscure security surveillance, including CCTV.

Plants selected for use on the RML campus should be of indigenous or native species, possess appropriately long-lived characteristics and have visual traits that offer refined intrinsic beauty to reflect the enduring quality of the institution. The overall design of the campus planting should be simple and seek to evoke a mood of tranquility to complement the existing natural and surrounding plantings. It is also recommended that the use of annuals and perennials be encouraged to create an uplifting campus environment for visitors and employees.

Minimizing water consumption should remain a primary concern in landscape planning for the RML Campus. Principles of xeriscaping, landscaping in ways that do not require supplemental irrigation, should be applied wherever possible. If supplemental irrigation systems are determined to be necessary for the establishment of any new planting, the installation of these systems should be temporary and, to the extent possible, utilize grey water from existing campus operations, so as not to require additional campus water consumption.

Care should be exercised in the use of ornamental plants. As a general rule, these should not be used in the more natural perimeter landscape. They should only be used in the central core areas, in enclosed courtyards and internal landscape spaces between buildings. Simple refined patterns would yield a campus that is unique, dignified, and practical to maintain.

The natural forms of plants should be retained through proper pruning techniques. This is most important when considering shrubs. Shrubs should be planted in arrangements that allow for their natural shape to be retained through periodic renewal pruning.

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- Street/Parking Planting
- Formal Planting
- Buffer Planting
- Pedestrian Concourse
- Undisturbed

Figure 6.5.2-a

Campus Planting Patterns

Adequate space must be allowed for plants to grow, particularly near paths and buildings, in order to avoid the heavy shearing of these plants which often renders them unnatural and unattractive. Planting should also be located so that they are protected from piled snow and from salt.

Tree pruning should start early in the life of campus trees to ensure that a proper form is established and that the canopy is promoted and trained to a sufficient height to provide clear visibility beneath trees for autos and pedestrians and adequate light to lawn areas.

Buffers and Perimeter Screening

The long term objective for improving the perimeter landscape areas should be to enhance the campus' relationship to the surrounding residential neighborhoods. Perimeter shrubs and grasses can help to mediate the uninviting qualities of perimeter fences and crash barriers required by current security standards. At the same time these plantings would provide environmental benefits including enhanced storm water management, erosion control and increased species diversity.

Any landscaping in the perimeter areas would require careful study to ensure that campus safety and security is maintained.

Special Landscape Areas and Features

Additional attention should be given to the landscape character in critical campus areas, based on the following recommendations.

Central Pedestrian Concourse: Utility lines run beneath the concourse area. Planting in this area should be limited to native species with shallow root structures that would not threaten existing utility lines and that could be readily replaced if removed for maintenance purposes. Paving should be patterned to emphasize the pedestrian character of the concourse. Paving should also be designed to allow service and emergency vehicle access. Where practical, paving should be designed to permit access to utility lines for maintenance.

Historic Core: Existing planting, particularly old growth trees, shall be retained and protected within the historic district. As these plants die they should be replaced in kind, unless disease is suspected, in which case similar, disease resistant species should be used in replacement. New landscaping in this area should reinforce existing landscape patterns, including the allee of trees lining the extension of 4th Street, the entry plantings at Buildings 1, 2 and 3 and the lawn area defined between Buildings 8, 9 and 11.

Interpretive Center: The existing landscaping, particularly old growth trees, of the "log cabin" property should be retained. Formal planting as well as paving should be added to present a welcoming appearance and guide visitors from the parking to the Interpretive Center entrance. Landscaped links should also be provided between the log cabin and accessory building. Landscape screening should be added between the parking area and 4th and Baker Streets.

Site Entry: The existing old growth trees in front of the Visitors Center (Building 30) shall be retained and protected. Formal plant beds should be developed for the area between the Visitors Center and 4th Street. Landscape screening should be added around the water pumping structure recently installed adjacent to the Center.

Floodplain Trail: The floodplain is generally defined by existing wetlands. Landscaping in the wetlands area is generally discouraged. The Master Plan recommends an RML trail link to a public trail system, should one be developed.

6.5.3 Streetscape/Pathscape

Street Tree Recommendations

The primary planting objective for the loop road system should be to create a uniform appearance, through the use of a uniform tree type and spacing, that assists in defining the road as a continuous corridor. As a general rule, the Master Plan recommends the use of large deciduous trees along the loop road in order to form a continuous canopy that will provide foliage at a height from 10 to 15 feet above the ground allowing open views below the branches. Trees along the loop road should be selected from those recommended by the City of Hamilton.

Detailed Streetscape Layout Recommendations

Roadways should be bounded by swales designed to capture and filter surface runoff in keeping with the Low Impact Development practices described in Section 6.4.2. There should be occasional paved areas for access to the street. Streetlight posts and roadway regulatory and directional signage should be accommodated outside of the swales.

Pedestrian walkways, located adjacent to the planting strips, should be at least six feet wide to accommodate service vehicles if needed. Paths and walkways should generally be constructed of concrete. Special paving patterns and materials should be used to highlight key areas such as the Pedestrian Concourse and major building entrances. These areas should also include seating areas, solid waste and recycling receptacles, pedestrian lighting, landscaping and above grade planters. The Master Plan recommends using a standardized paving material throughout the campus to facilitate maintenance and enhance campus coherence.

Currently site furnishings on campus are not well coordinated either by style or location. The Master Plan recommends adopting a standard palette of street furniture including seating, receptacles, bicycle rack, and kiosks, which are functional, easily maintained, and aesthetically compatible for use throughout the campus. The use of durable wood and natural materials for site furnishings is encouraged. These elements will not only provide pedestrian scale and comfort, but also visually unify the campus environment.

6.5.4 Exterior Signage

Most buildings on the RML campus are identified by a sign bearing their building number. Beyond this the campus lacks consistent signage for information and wayfinding. A comprehensive signage and wayfinding plan should be developed for the campus, including recommendations for the upgrade or replacement of the existing signage system according to sign type, location, graphic quality, physical condition and maintenance, accuracy of information and adequacy of the amount of signage. The categories of signage which should be addressed include the following:

Orientation - site maps near the campus entry and area maps in the core of the campus.

Direction - to major campus buildings and areas, both for vehicles and pedestrians. Notations of accessible routes for persons with disabilities.

Identification - campus entry signage and exterior building and place signage.

Regulatory/Safety - traffic and parking control, safety, and warning signage.

Information - public announcements, etc.

Interpretive - campus tour signage, plant species signage, etc.

Visitor and staff entries should be clearly and coherently signed to both identify the RML campus and create a positive first impression of the institution. Along the loop road, signage should be consistent and a clear orientation tool. Directional kiosks bearing a campus map should be included at key pedestrian locations.

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- Loop Road Lighting
- Pedestrian Path Lighting
- Parking Lighting
- Light Control Zone
- Fenceline

Figure 6.5.5

Lighting Concept Plan

Signage character should be clearly legible and should be of a quality appropriate to a world renowned institution. There should be design consistency between all campus sign types. Signage placement should also be carefully considered to avoid visual clutter. Regulatory and traffic signage should be reviewed to determine if more compatible signage designs can be implemented rather than the standard uniform roadway signs which are now used.

A Signage and Wayfinding Master Plan is currently under development for the Bethesda campus of the NIH. The standards developed by this document should be reviewed for applicability at RML.

6.5.5 Exterior Lighting

The campus lacks a coordinated lighting scheme with a family of lighting fixtures. Site lighting on the campus is mostly limited to the Historic District and site entry. Building lighting, where it exists, is generally limited to utility fixtures. A consistent, comprehensive lighting scheme should be developed for the campus, including recommendations for fixture type, location, and light quality. All general campus lighting (at the loop road, major pedestrian framework, primary entries, etc.) should be of a single fixture type. Individual building projects may continue to differentiate fixture types for buildings and surrounding area lighting, within a style complementary to other campus lighting. Consideration should be given to including solar powered fixtures where practical.

Categories of lighting which should be addressed include the following.

Street - *for vehicular safety and general campus illumination*- The NIH Design Policy and Guidelines specifies a level of 50 lux, or 2-5 footcandles for roadways

Pedestrian - *for pedestrian safety and path marking*- The NIH Design Policy and Guidelines specifies a level of 10 lux, or 1-2 foot candles for pedestrian areas.

Building - *to identify building entries and provide security*.

Safety/Security - *for areas of the campus that pose danger or require surveillance*.

Signage - *at major entry locations and for key directional and orientation signage*.

Special Features – *for building or landscape highlighting at special outdoor spaces or monuments*.

Figure 6.5.5 illustrates the primary Master Plan lighting concept recommendations. Loop road lighting should be of a distinct character to help define the road as a continuous vehicular corridor. Parking area lighting must conform to security requirements. Lighting for the Central Pedestrian Concourse should enhance the significance of this area as a principal circulation and gathering space. Lower intensity pedestrian lighting should be provided for secondary pedestrian routes. Parking areas must be lighted in accordance with security requirements.

At the campus perimeter special attention should be given to avoiding spillover lighting into adjacent neighborhoods. Full-cutoff light fixtures, which allow no light to be emitted above a designated horizontal plane, should be used for roadways, walkways, parking, and buildings. Increased landscape screening should also be considered where practical.

Fixture lamps should be selected for energy savings, light quality, and maintenance characteristics. Metal halide, high-pressure sodium, or compact fluorescent lamps are preferred, and mercury vapor lamps are discouraged. Additionally, it should be recognized that simply increasing or decreasing lamp wattage is not always the correct solution to a perceived lighting problem. Other factors such as light direction, light quality, surface reflectance, and contrast with surrounding areas can affect perceptions of security and character.

6.5.6 Storm water Management and Erosion and Sediment Control

Storm water Best Management Practices (BMPs) that can effectively slow the rate of runoff from the campus while removing pollutants from surface drainage should be incorporated into campus development. BMPs such as grassed swales, filter strips adjacent to new parking areas, porous pavement, and infiltration trenches in areas of concentrated runoff have been shown to be effective in improving water quality if properly maintained. RML should regularly inspect and maintain its future BMPs to ensure their long-term effectiveness. In addition, all new development projects on the campus should include erosion and sediment control plans designed to minimize erosion and release of unfiltered runoff from the site and into adjacent waterways. Low Impact Development (LID) principles should also be incorporated into campus development. LID is a design strategy that uses natural and engineered infiltration and storage techniques to control storm water. Examples of LID technologies include; engineered filtration systems such as bioretention cells, infiltration trenches, and sumps; low tech use of native vegetation for rain gardens and bioswales; reducing impervious surface areas recycled materials such as porous conrete or permeable pavers; and infrastructure improvement such as curbless and gutterless roadways.

6.5.7 Noise Control

Campus Noise Level Criteria Standards were developed for RML in 2003. Based on these standards the noise levels at the property line of the RML site are to be maintained at or below 55 decibels adjusted (dBA) during the day and at or below 50 dBA at night. RML is in the process of bringing existing campus activities into compliance with these standards. All new projects undertaken under the Master Plan are required to comply with these standards. Noise levels in the vicinity of new campus projects should be measured prior to the start of work to establish a baseline condition. Compliance should be demonstrated during the design phase through modeling and prediction of noise levels. Following completion of construction work, noise should be measured again to determine if noise levels are within the predicted range. If noise outside the campus exceeds pre-construction levels, mitigation measures should be implemented to lower noise to the pre-construction level. Where possible, the potential for new construction projects to reduce or contain existing campus noise should be explored. Mitigation of noise levels during construction should be managed through strict control of construction work hours and by continuing processes, already in place on the campus, to communicate with the community on those occasions when construction activities may generate excessive noise.

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