Environmental Assessment for the Partial Funding of a Proposed Life Sciences Building at Brown University, Providence, Rhode Island

FINAL

July 2003

National Aeronautics and Space Administration
Washington, D.C. 20546-0001

U.S. Department of Energy, Chicago Operations Office
Argonne, Illinois 60439

National Aeronautic and Space Administration
U.S. Department of Energy
Finding of No Significant Impact
Life Sciences Building
Brown University, Providence, Rhode Island

NOTICE: NASA/03-GSFC-02 and DOE/EA-1473

AGENCIES: National Aeronautic and Space Administration
U.S. Department of Energy

ACTION: Finding of No Significant Impact

SUMMARY:

The National Aeronautic and Space Administration (NASA) and the U.S. Department of Energy (DOE) propose to partially fund a Life Sciences Building to be located on the Brown University campus in Providence, Rhode Island. Conference reports accompanying their congressional appropriations indicated that NASA and DOE were provided $5.25 million and $1.0 million, respectively, for this purpose. NASA and DOE determined that award of the partial funding would require compliance with the National Environmental Policy Act (NEPA), 42 U.S.C. 4321 et seq. Primarily, because of potential impacts to historic resources, the agencies determined that preparation of an environmental assessment (EA) was appropriate.

DESCRIPTION OF THE PROPOSED ACTION:

The proposed action consists of providing partial funding for a new Life Sciences Building on a site adjacent to the existing Grimshaw-Gudewicz Biomedical Building on the Brown University campus. The occupants of the proposed facility would be scientists from the Department of Molecular and Cell Biology and Biochemistry, the Department of Neuroscience, and a new Brain Science Program. The proposed facility would contain 51 laboratory modules, 69 faculty offices, two administrative suites, three large seminar or conference rooms, and 15 small conference rooms. There would be research suites for Magnetic Resonance Imaging units and electron microscopy. The building would consist of approximately 15,800 square meters (170,000 gross square feet), with five levels above grade and one level below grade. The building would be framed of structural steel with concrete floors on steel decking. The exterior envelope would consist of masonry and glass construction.

ALTERNATIVES:

In addition to the proposed action, alternative sites were considered for the proposed building. Seven potential sites were identified and then compared with screening criteria developed by Brown University to identify reasonable sites for analysis. Of the seven sites, only the proposed site met all the screening criteria. The other sites were eliminated from consideration because they were either too small to accommodate the proposed facility, were not within reasonable

proximity to existing life sciences facilities that would be shared by the new Life Sciences Building, were not currently owned by Brown University, or were not in the Institutional Zone approved by the City of Providence. Renovation of existing buildings was also considered, but was eliminated from consideration because no acceptable buildings were found and the cost would be prohibitive.

Under the no action alternative, neither NASA nor DOE would provide partial funding for the proposed Life Sciences Building. However, this funding represents less than 7 percent of the total funding for the project, and it is likely that Brown University could find other sources for these funds. Brown University is committed to implementing the project without the NASA or DOE funding if necessary; thus, the environmental impacts of the no action alternative would be consistent with those of the proposed action. Denial of funding is not a reasonable option because it does not meet the intent of Congress.

ENVIRONMENTAL IMPACTS:

Areas of potential environmental impact evaluated in the EA included those associated with both the construction and operation of the proposed facility. Construction impacts evaluated included the effects of demolishing existing buildings in an historic district, air emissions, noise, and construction traffic and parking. Impacts of operation included air emissions, noise, traffic and parking, and the effects of the use of hazardous, radiological, and biological materials and waste generation.

Impacts of Construction

The primary environmental impact of the proposed Life Sciences Building would be to historic resources. The proposed site for the building is located in the College Hill Historic District of Providence, Rhode Island. In addition, the proposed action would require that three contributing resources be removed and replaced with the proposed building. These impacts have been mitigated to the fullest extent possible (including photo-documentation and redesign of the proposed building to reduce overall scale and massing). NASA, DOE, the Rhode Island State Historic Preservation Officer, and Brown University have agreed to a Memorandum of Agreement that documents these commitments.

During construction, there would be a small volume of air pollutant emissions, temporary increases in noise, and temporary disruptions in traffic and parking. Brown University has committed to implementing several mitigation measures to minimize construction impacts, including establishing a special parking lot for construction workers and a designated construction truck route. The Construction Manager would ensure that all applicable equipment met current federal and state emission regulations (*e.g.*, valid inspection certificates, *etc.*). All site trade contractors would comply with the City of Providence Noise Control Ordinance and the limitations placed upon them in Project Specifications regarding various pieces of equipment.

Impacts of Operation

The operation of the facility is a reasonably foreseeable outcome of the proposed action and, therefore, NEPA requires consideration of the operational impacts. The operation of the facility would result in an increase in the use of hazardous materials and in the generation of hazardous, radioactive, and biological waste as a result of research conducted in the building. Brown University would comply with all applicable federal and state regulations regarding the handling, storage, and disposal of these materials and wastes. The operation of the proposed building would also result in air emissions; some of which would be added to the university's existing Title V Air Operating Permit issued by the Rhode Island Department of Environmental Management. The identified air emissions generated from the operation of the proposed building would be from boilers, an emergency generator, cooling towers, and exhaust from research fume hoods.

DETERMINATION: Based on the analysis in the EA, NASA and DOE have determined that the construction and operation of the proposed Life Sciences Building at Brown University in Providence, Rhode Island, would not individually or cumulatively have a significant affect on the quality of the human environment. Therefore, the proposed action does not constitute a major federal action within the meaning of NEPA, and an environmental impact statement is not required.

PUBLIC AVAILABILITY: Copies of the EA are available by contacting:

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Brown University
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A copy may be viewed online at: http://www.brown.edu/webmaster/special_rept.html

Copies of the EA are also available for review at the following locations:

Providence Public Library
Government Documents
225 Washington Street
Providence, RI 02903

For further information regarding the NASA NEPA process, contact:

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THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

_____ Date: 8.5.03

Dr. Malcolm V. Phelps

Title: Associate Director for Programs NASA Headquarters, Education Division Office of Human Resources and Education

UNITED STATES DEPARTMENT OF ENERGY

_____ Date: 8/7/03

Marvin E. Gunn, Jr.

Title: Manager, U.S. Department of Energy, Chicago Operations Office

MEMORANDUM OF AGREEMENT
AMONG

THE NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION,

AND

UNITED STATES DEPARTMENT OF ENERGY

AND

THE RHODE ISLAND HISTORICAL PRESERVATION
AND HERITAGE COMMISSION

AND

BROWN UNIVERSITY

REGARDING THE LIFE SCIENCES BUILDING PROJECT

PROVIDENCE, RHODE ISLAND

WHEREAS, the National Aeronautics and Space Administration (NASA), and the United States Department of Energy (DOE) are providing limited funding to Brown University, Providence Rhode Island, for a Life Science Building (LSB) within the College Hill Historic District; and

WHEREAS, the LSB will have an adverse effect on the College Hill Historic District, which is listed on The National Register of Historic Places, because three structures will be removed (60 Olive Street, 201 Meeting Street, and 185 Meeting Street) and replaced with a new state-of–the-art building; and

WHEREAS, the LSB Project will have the potential for adverse effects on traffic, parking, noise, visual, and emissions during construction; and

WHEREAS, NASA and DOE have consulted with the Rhode Island Historical Preservation and Heritage Commission ("Commission"), which is the Rhode Island State Historic Preservation Office (RISHPO), in accordance with Section 106 of the National Historic Preservation Act, as amended (16 U.S.C. 470f) and its implementing regulations (36 CFR Part 800); and

WHEREAS, Brown University has participated in the consultation and has been invited to concur in this Memorandum of Agreement (MOA); and

WHEREAS, to inform and involve the community, Brown University has met and communicated with city officials, community groups, preservation groups and the general public, as listed in Appendix A of this MOA; and

WHEREAS, in response to comments, Brown University has made changes and scaled back its original plans for the LSB; and

WHEREAS, the RISHPO has reviewed and approved schematic architectural plans for the LSB site, footprint, scale, massing and exterior façade through November 2002; and

NOW, THEREFORE, the signatories to this MOA agree that the implementation of the following stipulations will take into account and mitigate the effects of the LSB on the College Hill Historic District, including contributing properties located at 185 Meeting Street, 201 Meeting Streets and 60 Olive Street, Providence, Rhode Island (the "Historic Properties").

STIPULATIONS

The parties to this agreement agree to the following stipulations:

1. Brown University shall prepare documentation of the Historic Properties based on the standards established by the Commission prior to the demolition of the Historic Properties.

2. Brown University shall submit the documentation, including archival quality photographs of the Historic Properties to RISHPO for inclusion in the Rhode Island Historic Resources Archive.

3. Brown University shall salvage items of historic value, following consultation with the Commission.

4. Brown University shall submit architectural elevations for the exterior of the LSB to the RISHPO for review and approval of the LSB, including materials, color and façade treatment, through the design development phase.

5. Brown University shall develop a landscaping plan for the LSB and the adjoining sections of Meeting and Olive Streets and submit it to the RISHPO for review and approval. The emphasis of this plan shall be to establish a corridor of street trees.

6. Prior to the commencement of construction of the LSB, Brown University shall prepare and then implement construction phasing, logistics and mitigation plans to address traffic, parking, and other temporary effects associated with construction, such as dust, noise, and vibration.

7. If potential historic properties are discovered or unanticipated effects on historic properties found, NASA and DOE shall carry out the provisions in 36 CFR Part 800.13(b)(2).

8. Any party to this Agreement may request that it be amended, whereupon the parties shall consult in accordance with 36 CFR Part 800 to consider such an amendment. In the event of a dispute that cannot be resolved among the signatories, any one of the signatories may request the participation of the Advisory Council on Historic Preservation to assist in resolving the dispute.

9. This Agreement shall be null and void if the terms are not carried out within ten (10) years from the date of its execution unless the signatories agree in writing to an extension to carry out its terms.

10. NASA and DOE shall incorporate the above stipulations as conditions of their respective grants to Brown University.

Execution of this Agreement and implementation of its terms evidence that NASA and DOE have taken into account the effects of the LSB Project on the Historic Properties.

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

By: _____ Date: 8.5.03

Dr. Malcolm V. Phelps

Title: Associate Director for Programs NASA Headquarters. Education Division Office of Human Resources and Education

UNITED STATES DEPARTMENT OF ENERGY

By: Eric M. Simpson Date: 8/6/03

Eric M. Simpson

Title: Contracting Officer. U.S. Department of Energy, Chicago Operations Office

THE RHODE ISLAND HISTORICAL PRESERVATION AND HERITAGE COMMISSION

By: Frederick C Williamson Date: 1 Aug 2003

Frederick C. Williamson

Title: State Historic Preservation Officer

BROWN UNIVERSITY

By: _____ Date: 8-1-03

Walter Hunter

Title: Vice President of Administration

Appendix A: Timeline of Public Involvement

June 2000, Community Meeting
University hosts public meeting prior to presenting revised Master Plan to City Plan Commission in September 2000. Meeting advertised in *Providence Journal* and Brown's *Community Bulletin* sent to 14,000 East Side residents. Meeting covered in *Providence Journal.*

October 2000, City Plan Commission
Brown officials present revised Master Plan to City Plan Commission. Plan includes proposed Life Sciences Building and associated projects (relocating U.S. Post Office, demolishing current structures, relocating parking).

City Plan Commission approves Table of Projects, which includes proposed Life Sciences Building, but gives entire plan conditional approval while requiring the University to try to resolve parking issues that were raised and to return in 6 months.

Spring 2001, Zoning Board Meeting
University asks Zoning Board for height variance of 10 feet to proceed with project. University sends letters to abutters within 200-foot radius, sends copies to key stakeholders, and places calls to neighbors. Zoning sends notices to property holders within 200 feet. Zoning Board grants variance, which is appealed.

Spring 2001-present, Historic Review
Because project would require relocating or demolishing various structures, Brown hires consultant to assess historic value of various properties. University officials meet with representatives from Providence Preservation Society (PPS) in March, April, June, July, and September 2001. Representatives from Rhode Island's State Historic Preservation Office are included in some of these meetings. Brown omits from parking expansion plan the demolition of a Greek Revival Structure; agrees to offer 185 Meeting Street to third party.

June 2001, City Plan Commission
Brown presents update on efforts to address neighbor concerns regarding parking, seeks approval on an amendment that includes approval to demolish 185 Meeting Street. PPS defines the demolitions as "reconcilable losses." Lack of quorum; no vote taken.

July 2001, City Plan Commission
City Plan Commission approves plan.

October 2001, College Hill Neighborhood Association (CHNA)
Brown representatives attend CHNA to discuss the new building, the construction schedule, *etc.* Many neighbors vocally oppose.

November 2001, RISHPO hosts Public Meeting
University officials discuss rationale for the building, review site selection process, and present architectural renderings and models to community. Meeting advertised publicly.

Approximately 30 members of the CHNA and Fox Point Neighborhood Association attend. Many voice significant opposition to the building. Among the issues raised were:

- Scale and massing of the building;
- Overall design;
- Noise during and after construction;
- Possible emissions;
- Traffic and parking impacts during and after construction;
- Desire for the building to be located near the hospital.
- Loss of the building that houses Sarah Doyle Women's Center

PPS representatives attended, and restate their position of neither supporting nor opposing demolition of structures.

December 2001
SHPO sends letter to Brown University outlining issues raised during November 2001 meeting. (Note: By this time, the University has hired consultants to assess and address noise, emissions, *etc.* Plans developed to have construction workers park offsite.)

Ted Sanderson, Deputy State Historic Preservation Officer, recuses himself from project, citing conflict of interest because spouse works for Brown as a consultant. Fred Williamson, State Historic Preservation Officer, named Officer of Record with continued staff support from Richard Greenwood.

Funding from NASA and DOE confirmed.

January 2002
Upon urging from CHNA, PPS holds emergency board meeting and votes to oppose Life Sciences Project. (Only half of Board is present, and vote is 9 to 7.) PPS sends letter to President of Brown University.

February 2002
With NASA identified as lead agency, meeting scheduled with staff from NASA and Brown University to discuss project. As regulations suggest, SHPO remains agency of record to negotiate with Brown unless significant obstacles arise.

SHPO and University representatives meet to discuss efforts taken to address issues raised in December letter and to outline MOA elements. SHPO outlines specific concerns regarding size, scale, massing, and design of building that must be addressed to achieve MOA.

Brown hosts meeting with NASA and SHPO to negotiate compromise in hopes of proceeding with MOA.

March 2002
SHPO writes letter to NASA indicating that they are not prepared to enter into an MOA due to scale, size, massing, and design vocabulary.

With possibility that SHPO will terminate negotiations, University updates Advisory Council on Historic Preservation on efforts to reach agreement. Advisory Council communicates willingness to enter MOA; shares information with Brown and SHPO.

Brown decides to continue to work locally to reach agreement. Brown representatives, including architect, meet with SHPO and discuss possible modifications.

Note: Members of College Hill Neighbors create new group, "Concerned Citizens of College Hill," focusing on Life Sciences Building. Circulate petition expressing concerns noted above.

April 2002
Architects produce possible new designs to reflect SHPO concerns. SHPO indicates they are a step in the right direction.

May 2002
Facilities and Design Committee of Brown Corporation reviews designs.

July 1, 2002
Brown representatives meet with SHPO. SHPO indicates designs have improved and are close.

July 31, 2002
Brown hosts meeting with CHNA board to review revised designs. Design addresses scale, massing, and vocabulary—is reduced by one story, stepped back from Thayer Street.

August 27, 2002
Brown presents revised design to PPS architectural review committee.

September 30, 2002
Brown and architect meet with SHPO to review latest design. Vocabulary has changed significantly. Agree that next step is to proceed with MOA. MOA to include:

- Documentation of the structures to be demolished based on Rhode Island Historical Standards (because none are landmark quality, the Historic American Building Survey standard is not necessary)
- Salvage items from 185 Meeting Street with preference for keeping items in College Hill area
- Final review and approval of design
- Outline temporary effects of construction (*i.e.*, controlled detonations) and plan to address.

October 9, 2002
Brown hosts meeting of CHNA board to review revised designs and to discuss longer-range planning process being done by institutional master planner, Frances Halsband.

October 2002
Brown representatives have breakfast meeting with CHNA representatives. CHNA representatives remain opposed to building despite modifications.

December 9, 2002
RISHPO sends letter to Brown University indicating that given changes to scale, massing, and design, it would be possible to enter into an MOA.

January-April 2003
Draft EA prepared.

Draft MOA developed, shared with SHPO, NASA, ACHP, and DOE.

May 2003
Representatives from Brown University, Gilbane Construction, and Ballinger Associates host two meetings: one with residents with property immediately adjacent to project (within 300-foot radius), and one with the broader community.

Representatives from Brown University and Gilbane Construction meet with area merchants to discuss project and construction schedule and impacts.

Letter sent from University to Thayer Street property owners along with information about project and schedule, offering to meet.

Elected officials updated about project status and schedule.

June 2, 2003
Draft EA issued for 30-day public comment period.

Environmental Assessment for the Partial Funding of a Proposed Life Sciences Building at Brown University, Providence, Rhode Island

FINAL

Lead Agency: National Aeronautics and Space Administration

Cooperating Agency: U.S. Department of Energy

Proposed Action: Partial funding for a new Life Sciences Building at Brown University, Providence, Rhode Island

For Further Information Contact:

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Date: July 2003

Abstract: This Environmental Assessment (EA) examines the potential environmental impacts of a decision by the National Aeronautics and Space Administration (NASA) and the U.S. Department of Energy (DOE) to provide partial funding for a new Life Sciences Building at Brown University in Providence, Rhode Island. NASA and DOE were directed to provide this partial funding ($6.25 million dollars over two years) by Congress in conference reports accompanying the appropriations for those agencies. The total cost of the project is approximately $92 million. Areas of potential environmental impact evaluated in the EA include those associated with both the construction and operation of the proposed facility. Construction impacts evaluated included the effects of demolishing three existing buildings located in an historic district, air emissions, noise, and construction traffic and parking. Impacts of operation included the effects of the use of hazardous, radiological, and biological materials and waste generation.

Table of Contents

Page

List of Acronyms iii

Summary 1

Chapter 1 Introduction and Purpose and Need 3
1.1 Introduction 3
1.2 Purpose and Need for Agency Action 3

Chapter 2 Description of Proposed Action and Alternatives 6
2.1 Site Alternatives 6
2.2 Renovation Alternative 8
2.3 Proposed Action – Partial Funding of a Life Sciences Building (site bordered by Brown, Meeting, and Olive Streets, adjacent to the Grimshaw-Gudewicz Biomedical Building) 9
2.3.1 Construction 12
2.3.2 Operation 12
2.4 No Action Alternative 15

Chapter 3 Affected Environment 16
3.1 Natural and Physical Elements 16
3.1.1 Land Use 16
3.1.2 Geology 16
3.1.3 Soils 16
3.1.4 Biological Resources 17
3.1.5 Water Resources 17
3.1.6 Air Quality 18
3.1.7 Traffic and Parking 18
3.1.8 Noise 19
3.2 Cultural/Historic and Socioeconomic Elements 20
3.2.1 Cultural and Historic Resources 20
3.2.2 Socioeconomic Resources 25

Chapter 4 Environmental Consequences 26
4.1 Proposed Action 26
4.1.1 Natural and Physical Elements 26
4.1.1.1 Land Use 26
4.1.1.2 Geology 26
4.1.1.3 Soils 27
4.1.1.4 Biological Resources 27
4.1.1.5 Water Resources 28
4.1.1.6 Air Quality 28
4.1.1.7 Traffic and Parking 32
4.1.1.8 Noise 34
4.1.1.9 Human Health and Safety 34

Table of Contents, continued

Page

4.1.2 Cultural/Historic and Socioeconomic Elements 38
4.1.2.1 Cultural and Historic Resources 38
4.1.2.2 Socioeconomic Resources/Environmental Justice 41
4.1.3 Cumulative Impacts 41
4.2 No Action Alternative 42

Chapter 5 Public Involvement Process 43

Chapter 6 Agencies and Persons Consulted 44

Chapter 7 References 45

Chapter 8 List of Preparers 47

Appendix A: Final Memorandum of Agreement 48

Appendix B: Selected Letters from the Rhode Island State Historic Preservation Officer 52

Appendix C: Section 106 Process Correspondence 58

Appendix D: Timeline of Public Involvement 60

Appendix E: Responses to Comments on the Draft Environmental Assessment 64

List of Tables

Table 1 - Demographics of Providence, College Hill, and East Providence 25

List of Figures

Figure 1 – Map of Providence, Rhode Island 4
Figure 2 – Map of Sites Considered for Proposed Life Sciences Building 7
Figure 3 - Location Plan of the Proposed Life Sciences Building 9
Figure 4 - North Elevation of the Proposed Life Sciences Building 10
Figure 5 - East Elevation of the Proposed Life Sciences Building 10
Figure 6 - South Elevation of the Proposed Life Sciences Building 11
Figure 7 - West Elevation of the Proposed Life Sciences Building 11
Figure 8 - Construction Delivery Route Map 19
Figure 9 - South Elevation, 60 Olive Street 22
Figure 10 - North Elevation, 201 Meeting Street 23
Figure 11 - North Elevation, 185 Meeting Street 24

List of Acronyms

ACHP	Advisory Council on Historic Preservation
CHNA	College Hill Neighborhood Association
DNA	Deoxyribonucleic acid
DOE	U.S. Department of Energy
EA	Environmental Assessment
EHS	Office of Environmental Health and Safety, Brown University
MOA	Memorandum of Agreement
MTPSD	Metric tons per summer day
MTPY	Metric tons per year
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NOx	Nitrogen oxide
OAR	Office of Air Resources, Rhode Island Department of Environmental Management
PPS	Providence Preservation Society
RIDEM	Rhode Island Department of Environmental Management
RISHPO	Rhode Island State Historic Preservation Officer
TPSD	Tons per summer day
TPY	Tons per year
VOC	Volatile organic compound

Environmental Assessment for the Partial Funding of a Proposed Life Sciences Building at Brown University, Providence, Rhode Island

Summary

The National Aeronautics and Space Administration (NASA) and the U.S. Department of Energy (DOE) propose to provide partial funding for a Life Sciences Building to be located on the Brown University campus in Providence, Rhode Island. In conference reports accompanying their Congressional appropriations, NASA and DOE were directed to provide $5.25 million and $1.0 million, respectively, to Brown University for a Life Sciences Building. NASA and DOE determined that award of the partial funding would require compliance with the National Environmental Policy Act (NEPA), 42 U.S.C. 4321 *et seq.* Primarily because of potential impacts to historic resources, the agencies determined that preparation of an environmental assessment (EA) was appropriate.

Purpose and Need. The agencies' purpose in awarding the partial funding to Brown University for the proposed Life Sciences Building would be to carry out Congressional intent and to contribute to their own missions, by supporting highly technical research programs such as those that would be conducted at the new facility. The NASA and DOE funding would assist Brown University to design and construct a Life Sciences Building that would allow breakthrough scientific collaborations in the areas of microbiology, genetics, genomics, and biochemistry. This important research would help the United States overcome the challenges of scientific uncertainties that limit the ability to solve many health problems plaguing the nation.

Proposed Action. The proposed action consists of providing partial funding for a new Life Sciences Building on a site adjacent to the existing Grimshaw-Gudewicz Biomedical Building on the Brown University campus. This funding represents less than 7 percent of the total funding for the project. The occupants of the proposed facility would be scientists from the Department of Molecular and Cell Biology and Biochemistry, the Department of Neuroscience, and a new Brain Science Program. The proposed facility would contain 51 laboratory modules, 69 faculty offices, two administrative suites, three large seminar or conference rooms, and 15 small conference rooms. There would be research suites for magnetic resonance imaging units and electron microscopy. The building would consist of approximately 15,800 gross square meters (170,000 gross square feet), with five levels above grade and one level below grade. The building would be framed of structural steel with concrete floors on steel decking. The exterior envelope would consist of masonry and glass construction.

No Action Alternative. Under the no action alternative, neither NASA nor DOE would provide partial funding for the proposed Life Sciences Building. However, because this funding represents less than 7 percent of the project's total funding, it is likely that Brown University could find other sources for these funds.

Impacts of the Proposed Action. The primary environmental impact of the proposed Life Sciences Building would be to historic resources. The proposed site for the building is located in the College Hill Historic District of Providence, Rhode Island. In addition, the proposed action would require that three resources that contribute to the historic character of the district be removed and replaced with the proposed building. Because the project may be partially funded with federal resources, the project must comply with Section 106 of the National Historic Preservation Act, a regulatory process designed to ensure that any historic, natural, and cultural

resources are identified and that efforts are made to mitigate any effects that the project may have upon such resources. In accordance with Section 106, Brown University has been working with the Rhode Island State Historic Preservation Officer (RISHPO) to review the project, assess the effects, and make efforts to mitigate the impacts. The Section 106 process has included (1) public involvement to assess impacts that may not otherwise be identified, (2) ongoing interaction with the RISHPO to address the implications of impacts, and (3) the development of a final Memorandum of Agreement (MOA) that describes the mitigation measures Brown University would undertake to reduce impacts to the historic resources. With the implementation of the planned mitigation measures, impacts to historic resources would be minor.

In addition, during construction, there would be a small volume of air pollutant emissions, temporary increases in noise, and temporary disruptions in traffic and parking. Brown University has committed to implementing several mitigation measures to minimize construction impacts, including establishing a special parking lot for construction workers and a designated construction truck route. The Construction Manager would ensure that all applicable equipment met current federal and state emission regulations (*e.g.*, valid inspection certificates, *etc.*). All site trade contractors would comply with the City of Providence Noise Control Ordinance and the limitations placed upon them in project specifications regarding various pieces of equipment.

The operation of the facility would result in a small increase in the use of hazardous materials and in the generation of hazardous, radioactive, and biological waste as a result of research conducted in the building. Brown University would comply with all applicable federal and state regulations regarding the handling, storage, and disposal of these materials and wastes. The operation of the proposed building would also result in a small volume of air emissions, some of which would be added to the University's existing Title V Air Operating Permit issued by the Rhode Island Department of Environmental Management (RIDEM). The identified air emissions generated from the operation of the proposed building would be from boilers, an emergency generator, cooling towers, and exhaust from research fume hoods.

None of these impacts are expected to result in significant impacts, either individually or cumulatively when considered together with other past, present, and reasonably foreseeable future actions in the area of Brown University or Providence, Rhode Island.

Impacts of the No Action Alternative. Brown University is committed to implementing the project without the NASA or DOE funding if necessary; thus, the environmental impacts of the no action alternative would be the same as those of the proposed action.

Conclusion. NASA and DOE have concluded, on the basis of this EA, that partial funding for the proposed Life Sciences Building will not impose significant environmental impacts and that an environmental impact statement is therefore not required.

Environmental Assessment for the Partial Funding of a Proposed Life Sciences Building at Brown University, Providence, Rhode Island

Chapter 1 Introduction and Purpose and Need

1.1 Introduction

The National Aeronautics and Space Administration (NASA) and the U.S. Department of Energy (DOE) propose to partially fund a Life Sciences Building to be located on the Brown University campus in Providence, Rhode Island (Figure 1). In conference reports accompanying their Congressional appropriations, NASA and DOE were directed to provide $5.25 million and $1.0 million, respectively, to Brown University for a Life Sciences Building (NASA: Conference Report 107-272, November 6, 2001, and Conference Report 108-10, February 13, 2003; DOE: Conference Report 107-258, October 30, 2001). NASA and DOE determined that award of the partial funding[1] would require compliance with the National Environmental Policy Act (NEPA), 42 U.S.C. 4321 *et seq*. Primarily because of potential impacts to historic resources, the agencies determined that preparation of an environmental assessment (EA) was appropriate.

This EA was prepared by NASA and DOE as the lead federal agencies in accordance with NEPA, the Council on Environmental Quality regulations implementing NEPA, and NASA and DOE NEPA implementing regulations. NASA's NEPA regulations are codified at 14 CFR Part 1216; DOE's NEPA regulations are codified at 10 CFR Part 1021. This EA addresses the purpose and need for agency action, the proposed action and alternatives, the affected environment, and the environmental consequences of the proposed Life Sciences Building.

The EA was issued in draft, along with a draft Finding of No Significant Impact, on June 2, 2003, for a 30-day comment period, which ended on July 1, 2003. Comments were received from 35 individuals, organizations, and agencies (some comments were received after the July 1 deadline but were nevertheless considered by NASA and DOE). The NASA and DOE responses to these comments are appended to this EA. Changes to the text were made as appropriate.

1.2 Purpose and Need for Agency Action

Congress has provided funds to NASA and DOE to assist particular universities and other facilities. Specifically, House of Representatives Conference Reports 107-272 and 108-10 (NASA) and 107-258 (DOE) indicated that appropriations for these agencies included a total of $6.25 million for a Life Sciences Building at Brown University in fiscal years 2002 and 2003. Although Brown University has submitted grant applications for these earmarked funds, only DOE has made an award thus far. The use of award funds, however, is contingent upon the outcome of this process. The purpose of the agencies' actions – the partial funding to Brown University for a proposed Life Sciences Building – would carry out this Congressional intent and contribute to the University's own missions by supporting highly technical research programs such as those that would be conducted at the new facility.

[1] The total estimated cost of the proposed Life Sciences Building is approximately $92 million. Thus, the federal funding represents less than 7 percent of the total cost of the project.

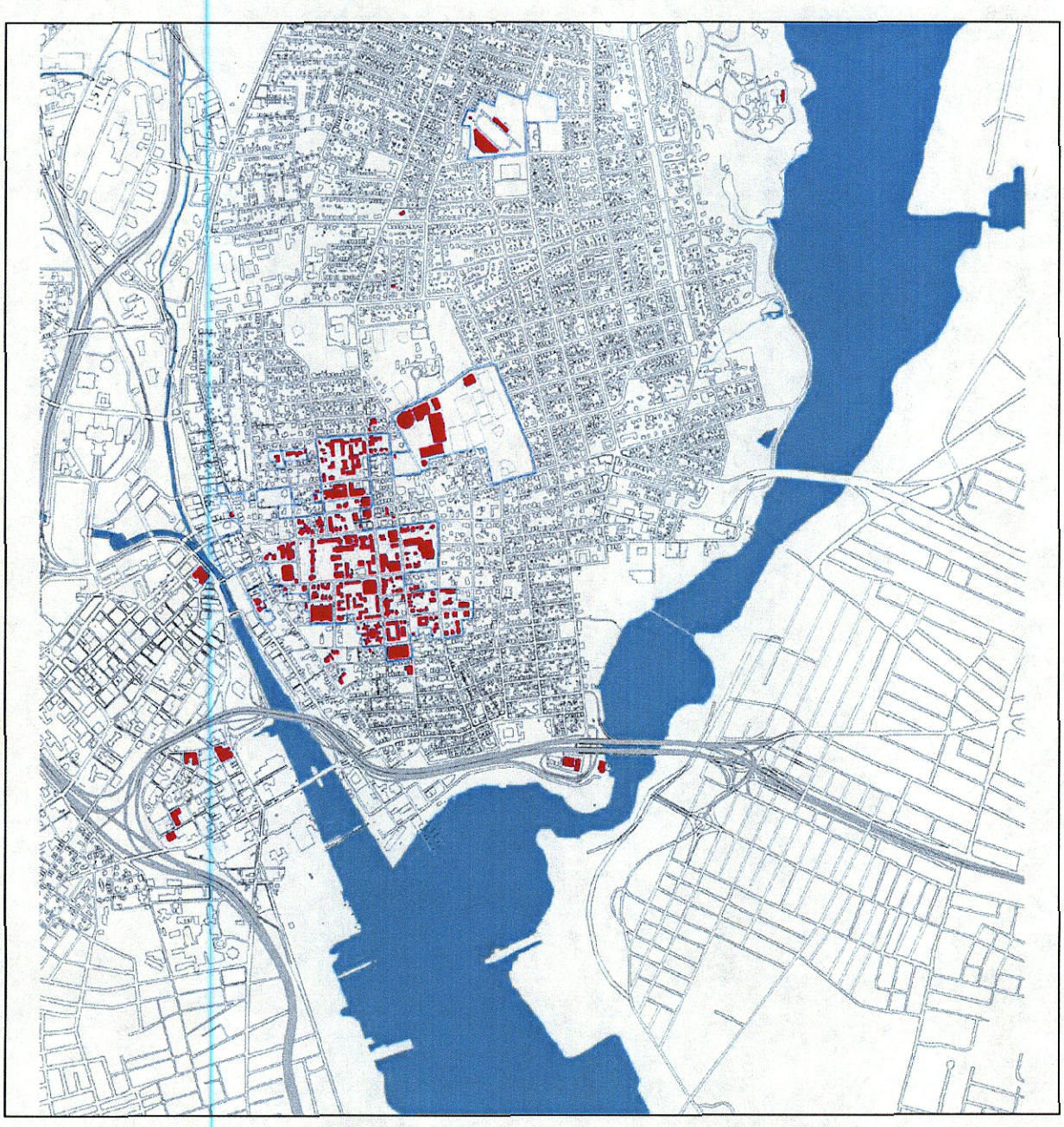


Figure 1 – Map of Providence, Rhode Island (red depicts Brown University facilities)

Founded in 1764, Brown University is the seventh oldest college in the nation and a member of the Ivy League. Brown's mission is to serve the community, the nation, and the world by discovering, communicating, and preserving knowledge and understanding in a spirit of free inquiry, and by educating and preparing students to discharge the offices of life with usefulness and reputation.

Critical to achieving this mission in the 21st century is the need to advance the excellence of the University's research enterprise. However, the University currently suffers from a lack of research capacity dedicated to the life sciences, with no new space added in the last 12 years. The NASA and DOE funding would assist Brown University to design, construct, and operate a Life Sciences Building that would allow breakthrough scientific collaborations in the areas of microbiology, genetics, genomics, and biochemistry. The proposed Life Sciences Building would house approximately 50 laboratories, representing a 50-percent increase in overall biomedical research space. The building would also house more than 50 research faculty (who would be relocated from other University locations) and allow for an increase of new life sciences research positions at the University over the next 5 years. This important research will help the United States overcome the challenges of scientific uncertainties that limit the ability to solve many health problems plaguing our country.

Chapter 2 Description of Proposed Action and Alternatives

Several alternatives were considered for use of federal funding to meet the needs of the University for a proposed Life Sciences Building. These included new construction on and off campus, renovation of existing facilities, and the no action alternative (as required by NEPA implementing regulations).

Brown University developed and implemented a screening process to determine reasonable alternatives for a new facility. Potential alternatives were screened against the following criteria:

- Consistent with the city-approved Brown University Master Plan.
- Within the Institutional Zone established by the City of Providence (the area in which the city has indicated that University growth is appropriate).
- In close proximity to an existing Biomedical Complex to enable graduate and undergraduate students, researchers, and professors to travel efficiently among and/or use facilities in both buildings, including (1) core research facilities (magnetic resonance imaging, electron microscopy, and animal care facilities), (2) common meeting space, and (3) seminar rooms.
- Within reasonable proximity to other existing Brown University student facilities to provide practical access to students (that is, students would need to be able to travel between a new Life Sciences Building and other campus facilities in a reasonable period of time).
- Able to accommodate a footprint of approximately 3,250 square meters (35,000 square feet) to allow construction of a 15,800-gross-square-meter (170,000-gross-square-foot) building, given height restrictions in the area and the proposed use of the facility by the Department of Molecular Biology, Cell Biology, and Biochemistry; the Department of Neuroscience; and a new interdisciplinary Brain Science Program.
- Located on land currently owned by Brown University (in order to minimize costs).
- Able to avoid, to the maximum extent possible, the disruption or fragmentation of existing residential areas.

2.1 Site Alternatives

The University identified seven potential sites for the proposed Life Sciences Building (Figure 2) and applied the screening criteria to identify reasonable sites for analysis. The sites are illustrated in relationship to existing University facilities, the Institutional Zone, and officially designated Historic Districts. Each potential site is described below and compared to the screening criteria.

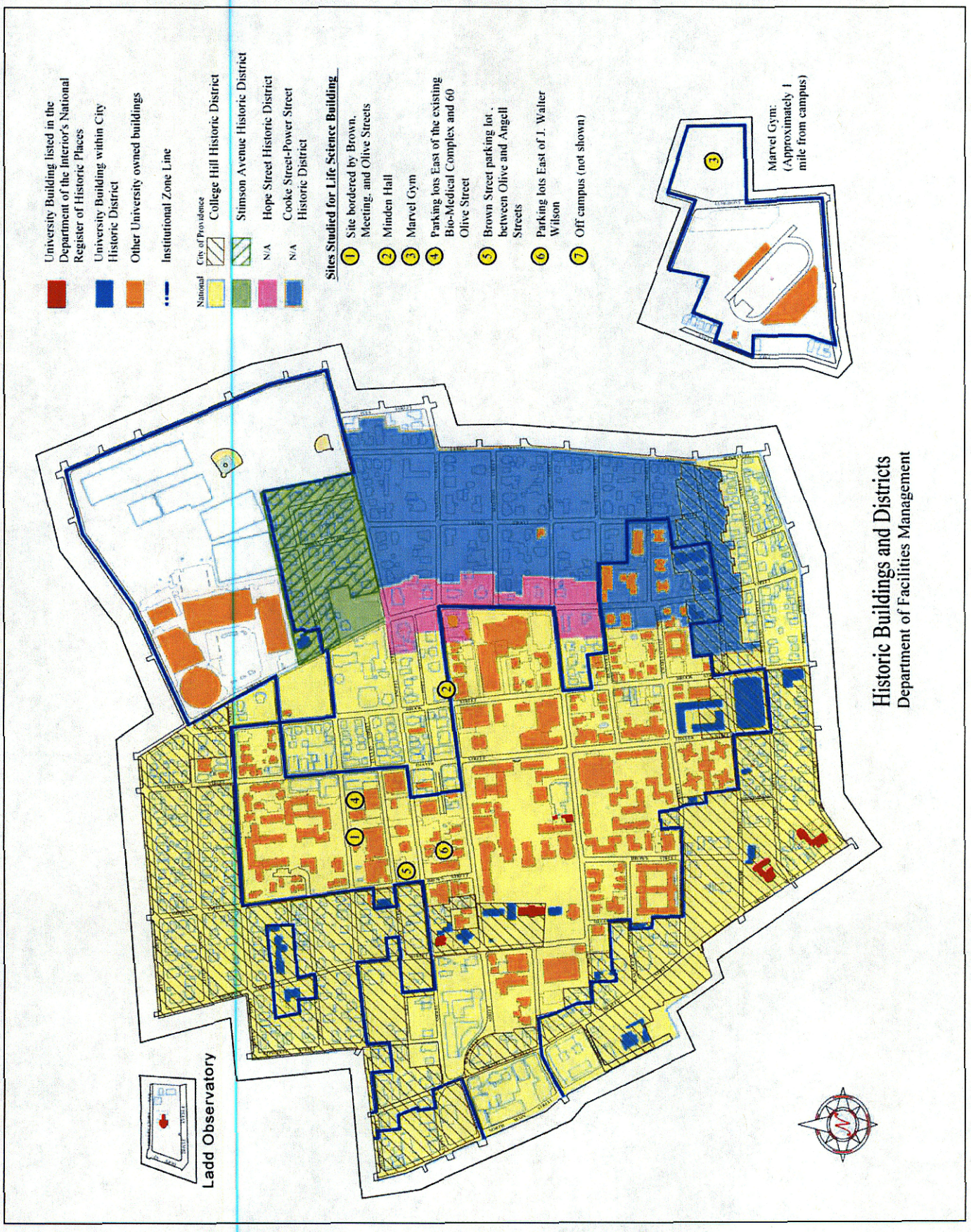
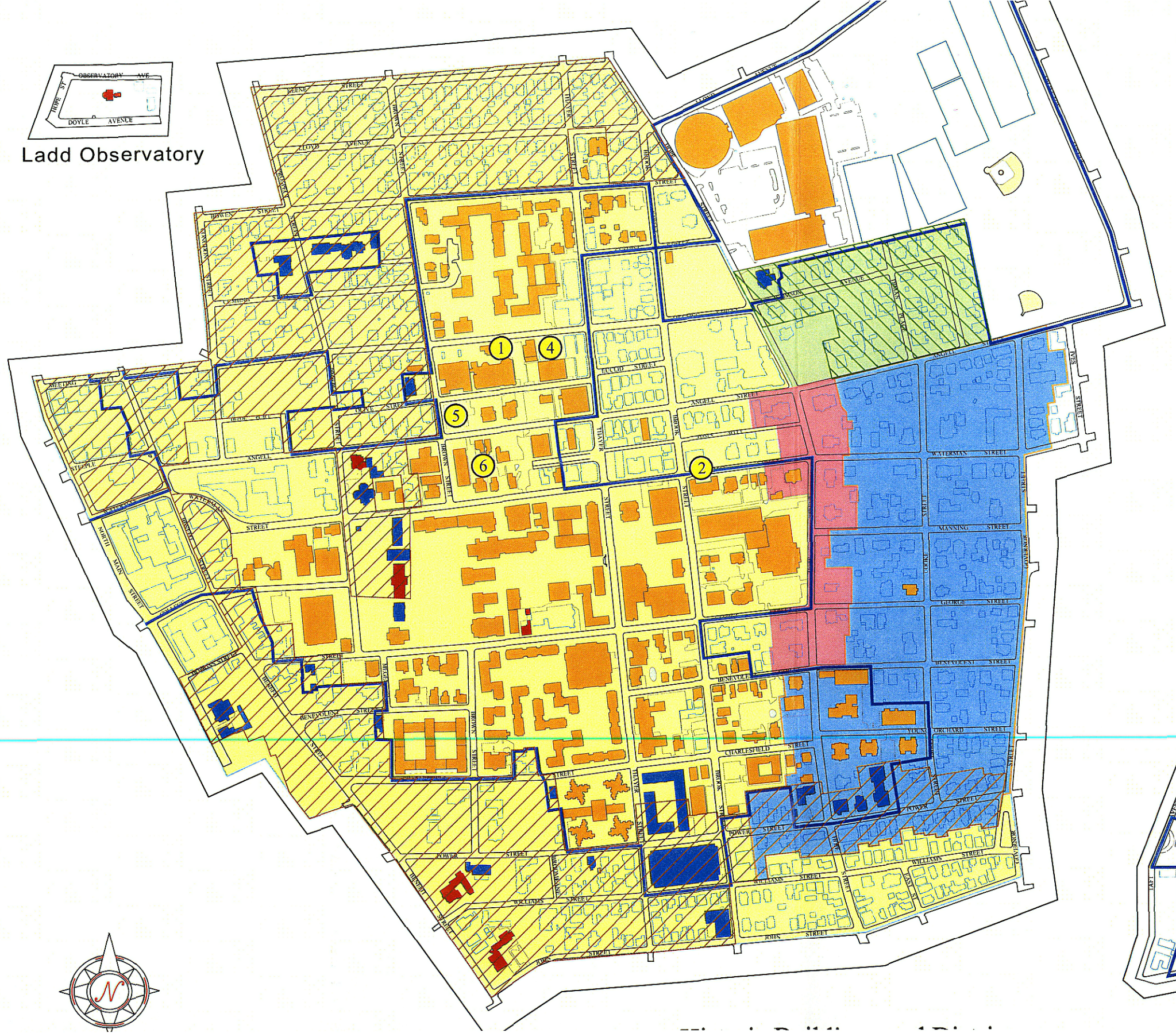


Figure 2 – Map of Sites Considered for Proposed Life Sciences Building



University Building within City Historic District

Other University owned buildings

Institutional Zone Line

National	City of Providence	
		College Hill Historic District
		Stimson Avenue Historic District
N/A		Hope Street Historic District
N/A		Cooke Street-Power Street Historic District

Sites Studied for Life Science Building

1. Site bordered by Brown, Meeting, and Olive Streets
2. Minden Hall
3. Marvel Gym
4. Parking lots East of the existing Bio-Medical Complex and 60 Olive Street
5. Brown Street parking lot , between Olive and Angell Streets
6. Parking lots East of J. Walter Wilson
7. Off campus (not shown)

1. ***Site bordered by Brown, Meeting, and Olive Streets, adjacent to the Grimshaw-Gudewicz Biomedical Building.*** This site is immediately south of Brown's Pembroke campus. Use of this site would allow the University to locate its largest buildings in a concentrated area, thus minimizing the impact on the surrounding residential and commercial areas. The site is sufficiently large to house the proposed facility and is adjacent to the existing Biomedical Complex.

2. ***Minden Hall.*** This site is at the corner of Waterman and Brook Streets. There is insufficient space available, however, and the location would not be sufficiently close to existing biomedical facilities.

3. ***Marvel Gym.*** This site is adjacent to the Brown University Stadium and is identified in the Master Plan as being available for additional athletic field space. Thus, this site is not consistent with the city-approved Master Plan. Moreover, it is over 1.6 kilometers (1 mile) from existing biomedical facilities.

4. ***Parking lots east of the existing Biomedical Complex and 60 Olive Street combined.*** According to a study commissioned by Brown University (and incorporated in this EA by reference), this site would not provide sufficient space for the required footprint of the proposed building (Shepley et al. 1999a).

5. ***Brown Street parking lot, between Olive and Angell Streets.*** According to a study commissioned by Brown University (and incorporated in this EA by reference), this site is only able to accommodate an approximately 7,340-gross-square-meter (79,000-gross-square-foot) building (Shepley et al. 1999b) and thus would not provide sufficient space for the proposed Life Sciences Building. The site could accommodate the proposed building only if the two existing buildings east of the site, the Sharpe House and the Peter Green House, were removed. However, these buildings were recently renovated at considerable expense and are currently occupied.

6. ***Parking lot east of J. Walter Wilson site and site of 127 and 129 Angell Street.*** The largest building this site would accommodate is 6,410 gross square meters (69,000 gross square feet), significantly less than the 15,800-gross-square-meter (170,000 gross-square-foot) minimum required for a Life Sciences Building (Ballinger 2002, incorporated by reference).

7. ***Off-campus locations.*** Sites adjacent to existing hospitals were considered but were not a reasonable distance from other University facilities to allow for student use and interaction. Further, these sites are not owned by the University and are located outside of the Institutional Zone.

2.2 Renovation Alternative

In addition to new construction, renovation of existing facilities was also initially considered. However, this small set of alternatives was found to be unreasonable due to the lack of suitable buildings for renovation and the extremely high cost involved. In particular, Brown University conducted an evaluation of the renovation of the Metcalf Chemistry Building as a possible alternative. This study, which is incorporated by reference, found that the building was inappropriate for modern laboratory equipment due to its configuration, size, and heating/ventilation/air conditioning requirements (GPR Planners Collaborative 1999).

2.3 Proposed Action – Partial Funding of a Life Sciences Building (site bordered by Brown, Meeting, and Olive Streets, adjacent to the Grimshaw-Gudewicz Biomedical Building)

As discussed above, only the site adjacent to the existing Grimshaw-Gudewicz Biomedical Building on the Brown University campus met all of the established screening criteria and, for that reason, is fully analyzed in this EA. The proposed action consists of providing partial funding for a new Life Sciences Building at that site.

The occupants of the proposed facility would be scientists from the Department of Molecular and Cell Biology and Biochemistry, the Department of Neuroscience, and a new Brain Science Program. The proposed facility would contain 51 laboratory modules, 69 faculty offices, two administrative suites, three large seminar or conference rooms, and 15 small conference rooms. There would be research suites for magnetic resonance imaging units and electron microscopy. The building would consist of approximately 15,800 square meters (170,000 gross square feet), with five levels above grade and one level below grade. The building would be framed of structural steel with concrete floors on steel decking. The exterior envelope would consist of masonry and glass construction. Section 4.1.2.1 contains additional information regarding the overall design, scale, and massing of the proposed building.

Figures 3 through 7 depict the design scheme being developed as of July 2003.

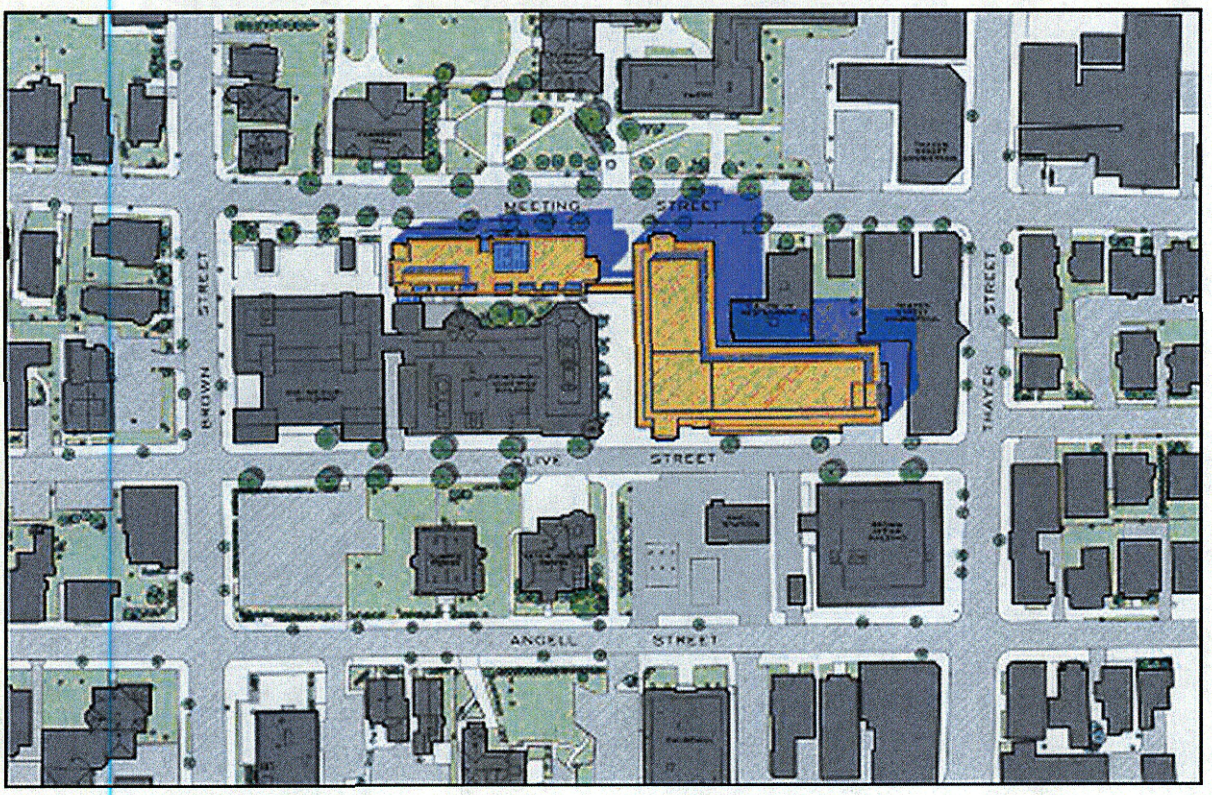


Figure 3 - Location Plan of the Proposed Life Sciences Building

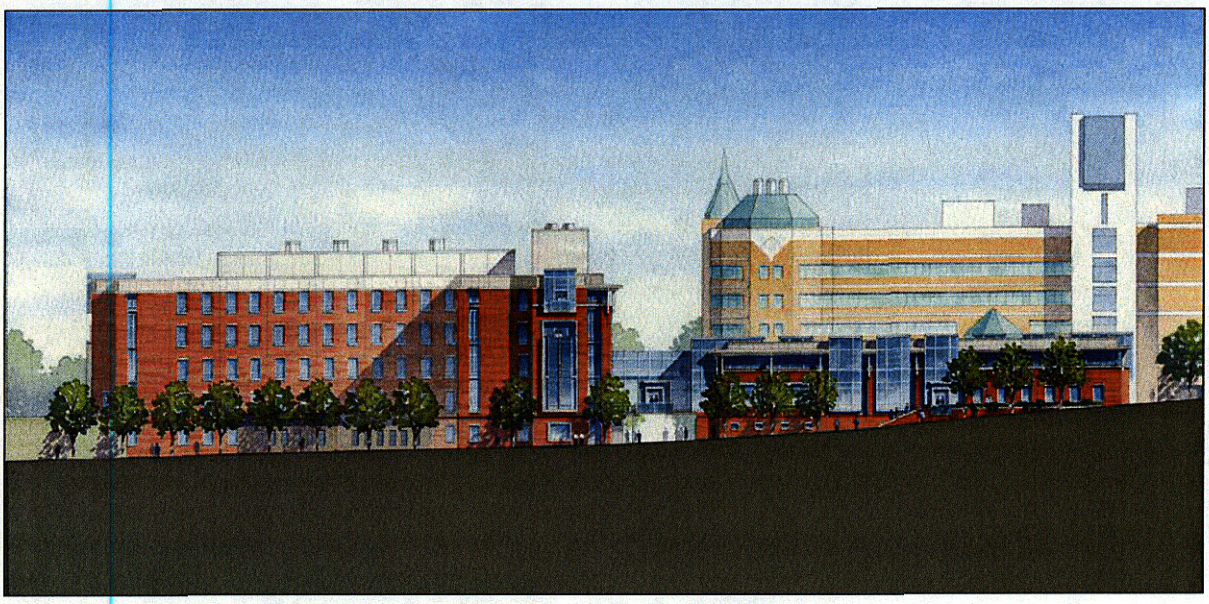


Figure 4 - North Elevation of the Proposed Life Sciences Building

Figure 5 - East Elevation of the Proposed Life Sciences Building

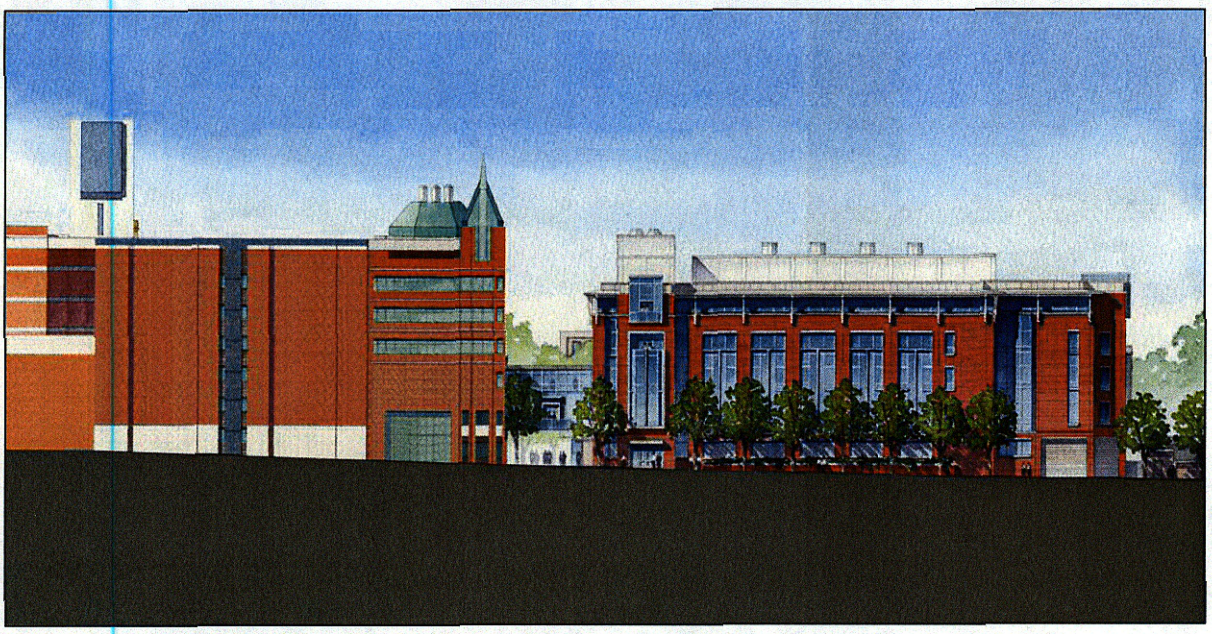


Figure 6 - South Elevation of the Proposed Life Sciences Building

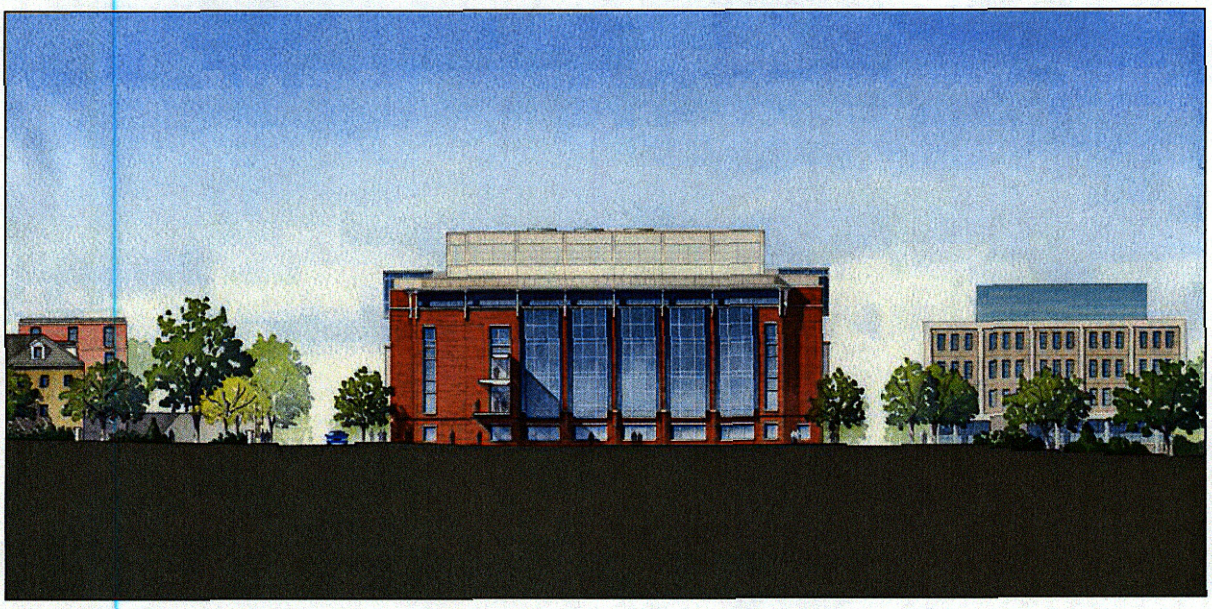


Figure 7 - West Elevation of the Proposed Life Sciences Building

2.3.1 Construction

The proposed action would require the demolition of three historic structures (discussed in Sections 3.2.1 and 4.1.2.1), relocation of utilities, excavation of rock and soil, and general construction activities such as steel erection. Construction would last approximately 30 months and require approximately 50,000 worker days (200 worker years) to complete. Specific construction activities are expected to include:

- Controlled detonations to remove existing rock (pre-detonation surveys would be conducted for structures within a 46-meter [150-foot] radius of the detonation operations, and detonation operations would be closely monitored by a geotechnical engineer).
- Disturbance of contaminated soil (urban fill) as a result of excavation (soil and groundwater management plans would be prepared and implemented)
- Dewatering to support construction activities, and possibly on a permanent basis following site development. Because of the depth of the basement, an underdrain system could be installed. During construction, groundwater and runoff from precipitation would be diverted away from excavations to avoid ponding. Sumping of water from excavations could be required.
- The use of trucks to transport building materials to the site and remove excavated soil and rock from the site. The maximum truck traffic expected would be approximately 24 arrivals per day during the project's 4-month demolition and building excavation phase, and substantially less during the remainder of construction.

During construction, Olive Street would be closed to through traffic but would remain open for local deliveries to existing businesses and University buildings. During two 2-week periods, Meeting Street would be closed between 7 a.m. and 3:30 p.m. for utility crossings.

Additional details on construction activities are provided in Chapter 4 where necessary to clarify construction impacts.

2.3.2 Operation

The Life Sciences Building would provide new space for the Department of Molecular and Cell Biology and Biochemistry; the Department of Neuroscience; and the Brain Science Program. Many of the research activities ongoing at other locations at Brown University would be consolidated in the proposed Life Sciences Building. These research activities would occur in a manner similar to the manner in which they are currently planned, initiated, and conducted at these other locations. Researchers using the laboratories and equipment in the new facility would:

- Study critical areas of genetics, with projects ranging from research into cancer and inflammation to an examination of the genetic basis of certain human dementias.
- Develop prosthetic devices to restore movement in paralyzed humans and testing other implantable devices to treat human movement and psychiatric disorders.
- Measure brain chemistry and find the site of action of new drugs to prevent and eliminate disturbances of brain function using the only magnetic resonance imaging machine in Rhode Island dedicated solely to research.
- Use advanced neurophysiological techniques to provide direct insight into human perception, thinking, and behavior.
- Understand the mechanics of the initiation of deoxyribonucleic acid (DNA) replication and chromosome structure

- Study the genetics of the aging process
- Determine the function and structure of the cells protein synthesis machinery
- Understand the fundamental signals by which cells of the body divide and differentiate into specific cell types
- Define basic mechanisms of DNA-protein interactions and mechanisms of site specific recombination

As under current University practices, specific future research programs would be defined as needs are determined and funding is obtained. For this reason, further detail at this time concerning future research would be speculative. However, all federally funded research programs would be subject to NEPA review by the sponsoring agency. NASA and DOE understand that both current and future research activities would involve the use of chemical, radiological, and biological materials that will have the potential to impact human health and the environment primarily in the following areas:

Air emissions. Very small amounts of air emissions would be generated in the proposed building's laboratories as a result of the use of chemicals during research. Containers would be kept closed when not in use to minimize air emissions. Volatile and toxic chemicals would be used under fume hoods to limit staff exposure. The fume hoods would be vented to the outside air using Strobic-type exhaust fans mounted on top of the roof to dilute and dissipate the air emissions (3,000-to-1 dilution). Based on information from the existing Biomedical Complex, Brown University estimates that no more than 680 kilograms (1,500 pounds) of fugitive emissions (primarily from the use of ethanol, a volatile organic compound [VOC] that is used widely in biological research) would be released annually.

Other identified air emissions generated from the operation of the proposed building would be from boilers, an emergency generator, and cooling towers. New air emissions sources, including boilers, would be added to the University's existing Air Operating Permit issued by the Rhode Island Department of Environmental Management (RIDEM). The proposed building would operate within the requirements of RIDEM.

Effluents. Liquid effluents from the building would include sanitary wastewater, water used in the research laboratories, and boiler and cooling tower blowdown. Waste chemicals would be collected; each sink would be posted with a sign describing the "no drain disposal" policy. A darkroom would generate spent fixers, developers, and rinsewaters from a photoprocessor. These effluents would be treated prior to discharge to remove silver and adjust pH. After pretreatment, the photoprocessor effluent would be discharged under a permit from the Publicly Owned Treatment Works (the Narragansett Bay Commission).

Hazardous materials. Research in the building laboratories would involve the storage and use of laboratory chemicals such as acids, bases, solvents, and various other chemicals. Chemicals would be segregated by compatibility (*e.g.*, flammable, corrosive, *etc.*) and stored in appropriate cabinets. Diesel fuel would be stored onsite in an underground storage tank to supply fuel for the emergency generator.

Biological materials. Operations at the proposed Life Sciences Building could include the initiation of Biosafety Level 2 research, which would involve the management of a broad spectrum of indigenous, moderate-risk biological materials. Examples include hepatitis B, salmonellae, and human-derived blood. Primary barriers such as splash shields, face protection, gowns, and gloves would be used as appropriate. Secondary barriers such as hand washing, sinks, and waste decontamination facilities would also be available. There are

currently no proposals for working with more dangerous select agents at the proposed Life Sciences Building. If a proposal were made in the future to work with such agents, procedures reflective of current laws, regulations, and best practices would be developed.

Radioactive materials. Research in the building would include the storage and use of radioactive materials. The State of Rhode Island Radiation Control Agency regulates the use of radioactive materials in research laboratories at Brown University under a broad scope license. A radiation safety committee would approve and authorize the possession and use of any radioactive materials. The laboratories would be equipped with all necessary safety features to keep radiation levels as low as reasonably achievable, and would be surveyed and inspected regularly. Research activities would not result in the release of any radioactive emissions to the public.

Wastes. Research activities in the laboratories and some building maintenance operations would generate liquid and solid hazardous wastes. All hazardous waste generated would be stored in clearly designated satellite accumulation areas and managed in accordance with applicable requirements (*e.g.*, using appropriate containers, labeled with hazardous waste labels, segregated by compatibility, and kept closed.) The building would include a room to store hazardous waste for less than 90 days in accordance with state and federal hazardous waste regulations.

Radioactive waste would be segregated according to whether it was solid or liquid. It would be further segregated by half-life (long-lived or short-lived). The building would include a room for the temporary storage of radioactive wastes prior to shipment offsite for disposal in a licensed facility. The radioactive waste storage rooms would be secured and the waste would be appropriately contained and shielded to minimize radiation exposure.

Mixed radioactive waste (radioactive and biohazardous or radioactive and hazardous) could also be generated in the proposed facility. Mixed radioactive/biohazard waste would be autoclaved or disinfected and then treated as radioactive waste. Mixed radioactive and hazardous waste would be shipped offsite for disposal in a licensed facility in compliance with applicable radioactive and hazardous waste regulations.

Regulated medical waste would be managed in accordance with RIDEM's *Rules and Regulations Governing the Generation, Transportation, Storage, Treatment, Management, and Disposal of Regulated Medical Waste in Rhode Island* (Regulation DEM-DOH-MW-01-921). It is not anticipated that any pathological or isolation medical wastes would be generated in the proposed Life Sciences Building. However, if such wastes were to be generated, Brown University would comply with all aspects of the regulations.

Based on current usage at the Biomedical Complex, the University expects that no more than 10 cubic meters (350 cubic feet) of biological waste, no more than 9,000 kilograms (20,000 pounds) of hazardous waste, and no more than 450 kilograms (1,000 pounds) of radiological waste (long-lived isotopes) would be generated at the proposed Life Sciences Building annually.

Electricity. The building would be designed to reduce the building electrical consumption. An energy consulting firm retained for the proposed project performed computer-based energy modeling studies of the proposed design at design development-level documentation in accordance with DOE-2 standards (Steven Winter Associates 2002). Certain energy conservation measures resulting from the studies have been incorporated into the design of the

building, while other measures remain under review by the University; decisions on these measures would be made in the construction-documents phase of design.

2.4 No Action Alternative

Under the no action alternative, neither NASA nor DOE would provide partial funding (amounting to less than 7 percent of the total funding for the project) to Brown University for a Life Sciences Building. However, it is likely that Brown University could find other sources for these funds and that the project would be constructed and operated as described in Section 2.3. Brown University is committed to implementing the project without the NASA or DOE funding if necessary.

Chapter 3 Affected Environment

This chapter describes the environmental conditions in the area that could be affected by the proposed action. It includes the natural and physical environment and the cultural/historic and socioeconomic environment.

3.1 Natural and Physical Elements

This section describes land use, geology, soils, biological resources, water resources, air quality, traffic and parking, and noise in the area that could be affected by construction and operation of the proposed Life Sciences Building.

3.1.1 Land Use

The land use for the site and general area surrounding the site has been characterized as urban in nature, featuring a combination of commercial, educational, and residential uses. It is located approximately 0.8 kilometer (0.5 mile) from the center of the City of Providence, Rhode Island, and located within the city's formally designated Institutional Zone for Brown University.

The Life Sciences Building would be located on Plat 10, lot 704 in Providence, Rhode Island, within the block bounded by Thayer, Olive, Brown, and Meeting Streets, on the same lot as the existing Brown University Biomedical Complex (see Figure 2). The area surrounding the site consists of commercial, educational, and residential buildings. The site's existing features include three buildings (all now vacant) formerly used as the Brown University Facilities Management building (60 Olive Street), a U.S. Post Office (201 Meeting Street), and the Brown University Sarah Doyle Women's Center (185 Meeting Street). The balance of the site consists of paved parking and landscaped areas.

3.1.2 Geology

Based on a review of topographic mapping, the northwest corner of the site rises to the site's maximum elevation of approximately 38 meters (125 feet). The grade drops gradually to a minimum elevation of approximately 35 meters (116 feet) at the southeast corner. Based on a review of the *Soil Survey of Rhode Island*, prepared by the U.S. Department of Agriculture, no significant geological formations are known to exist on the site (USDA 1981).

According to the U.S. Geological Survey Surficial and Bedrock Geology Map of the Rhode Island, Providence Quadrangle (USGS 1956, 1959), the surficial soils in the vicinity of the site consist of ground moraine glacial till. Glacial till is an unconsolidated, poorly sorted, unstratified mixture of boulders, cobbles, gravel, sand, silt, and clay forming a relatively thin, discontinuous mantle over bedrock. The Rhode Island Formation refers to a rock formation of sedimentary origin, which, in the northern areas of the Providence Quadrangle (including the project site) is typically unmetamorphosed. The bedrock is categorized as the Rhode Island Formation. Regional rock types include greenish, gray, dark gray to black greywacke, conglomerate, sandstone, shale, and meta-anthracite.

3.1.3 Soils

Test pit and exploratory borings completed at the site indicate that soils across the site generally consist of urban fill, mixed in some areas with construction debris, brick and coal cinders, and overlying bedrock.

Based on recent investigations (GZA 2000; GZA 2001a; and GZA, 2001b), near-surface and deeper unsaturated zone soils contain certain constituents at concentrations that exceed the Method 1 Direct Exposure Criteria as established in RIDEM's *Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases* (Remediation Regulations). The primary constituents of concern for soils are arsenic, certain polynuclear aromatic hydrocarbons, and, to a much lesser degree, total petroleum hydrocarbons. The polynuclear aromatic hydrocarbon and arsenic data provide no apparent spatial pattern to the distribution or concentration, and therefore likely reflect the character of the fill and represent conditions throughout the site as a result of its historical use. No contaminants were observed in surface soils at concentrations above the Method 1 Upper Concentration Limits. No visual evidence of gross petroleum contamination was noted in soils collected from borings.

3.1.4 Biological Resources

Plants. The following common trees and shrubs currently exist on the site: rhododendron bouledeneique, taxus mediahatfield, arborvitae (*Thuja occidentalis*), red maple columnar (*Acer rubrum*), Canadian hemlock (*Tsuga canadensis*), Chinese dogwood (*Cornus kousa*), honey locust (*Gleditsia triacanthos*), sycamore maple (*Acer pseudoplatanius*), willow (*Salix babylonica*), lilac (*Syringa patula*), privit (*Ligustrum ovalifolium*), green ash (*Fraxinus pennsyuanica*) and azalea hino crimson.

Based on a review of November 1996 Rhode Island Geographic Information System Habitat Resource Protection Area and Soil maps, no rare or endangered plant species or areas of critical environmental concern (*i.e.*, protected plants) were identified on the study site (RIGIS 1996).

Animals. Based on a review of November 1996 Rhode Island Geographic Information System Habitat Resource Protection Area and Soil maps, no rare or endangered animal species or areas of critical habitats, or other areas of environmental concern (*i.e.*, protected wildlife) were identified on the study site (RIGIS 1996).

3.1.5 Water Resources

Wetlands. Based on a review of topographic mapping, no wetlands are known to occur on or near the site.

Groundwater. Based on a review of the area's topography and a groundwater elevation survey, groundwater in the vicinity of the site is expected to flow in a southerly direction, toward the Seekonk River, located approximately 1.4 kilometers (0.9 mile) to the east and southeast. Groundwater beneath the site and surrounding area is classified "GB" by the RIDEM (groundwater classified as GB is presumed to be degraded and not suitable for use as drinking water without treatment). A GB groundwater designation is typical for urban locations in Rhode Island.

The depth to groundwater was determined to range from approximately 3 meters (9 feet) below ground surface to approximately 4 meters (12 feet) below ground surface. Correlation of readings results in groundwater elevations ranging between approximately 36 meters (117 feet) and 32 meters (104 feet). Seasonal lowest groundwater levels typically occur during the fall months, and groundwater levels in glacial till often vary seasonally by 3 meters (10 feet) or more. Because of the relatively shallow depth of groundwater relative to the elevation of the proposed structure, dewatering would be required to support construction activities, and possibly on a permanent basis following development.

Surface water. No surface water bodies are known to occur on the site. The closest water body is the Seekonk River, located approximately 1.4 kilometers (0.9 miles) to the east and southeast.

3.1.6 Air Quality

Rhode Island, and much of the northeast United States, does not meet the health-based standard for ozone. All of Rhode Island is considered a serious nonattainment area for ozone. Most of the work performed by the RIDEM Office of Air Resources (OAR) is related to ensuring that the state improve its air quality in order to attain the standard in accordance with the schedule required by the federal Clean Air Act. The OAR is working to implement several emission reduction programs. Brown University has an existing Title V Air Operating Permit issued by the RIDEM OAR (RI-2001-09). This permit addresses the emissions of ozone precursors (*e.g.*, nitrogen oxide [NOx]) from the University. Required activities in the permit such as emissions monitoring and annual equipment tuning and maintenance requirements ensure that the University is minimizing emissions that impact the local air quality. The University tracks air emissions from the entire University and submits annual reports to RIDEM.

3.1.7 Traffic and Parking

The proposed Life Sciences Building would be located on a parcel of land bordered by Meeting Street to the north and Olive Street to the south. Major streets serving and bordering the proposed building site are Thayer Street, Brown Street, Meeting Street, and Olive Street.

Thayer Street is the major north/south route in the area. It is a one-way southbound street with parking on both sides and one travel lane. The street consists of mostly retail stores and restaurants catering to the University communities (Brown and the Rhode Island School of Design) and to residents living in the area. Most buildings are multi-storied, with either additional retail services or residents on the upper floors. The commercial district on Thayer Street starts at approximately Bowen Street and extends south to Waterman Street. While Thayer Street is the predominant street for traffic moving from the north to the south, there is no predominant south-to-north street in the area. The streets that carry northbound traffic are mostly Brown Street, Brook Street, and Hope Street. These streets are all two-way streets.

Because of the traffic pattern described above, the side streets in this area are used to recirculate traffic and locate on-street parking. Most of the side street uses are retail, residential, and institutional. Parking varies by street, with most streets having on-street parking on both sides. Because the streets are narrow, the on-street parking makes it difficult at times for two vehicles on the two-way streets to move in opposite directions at the same time.

Meeting Street is a one-way westbound roadway with parking on both sides of the street. Olive Street is a two-way east/west roadway with limited parking on the north side of the street.

Traffic volumes are heaviest on Thayer Street, with peak periods occurring from mid-day through 6 p.m. on most weekdays and from 10 a.m. to 8 p.m. on weekends. The level of congestion varies and depends to a great extent on activities at the local colleges.

There is very little off-street parking in this area; the off-street parking that does exist is private parking by permit only. On-street parking is heavily utilized and regulated. Most spaces have either 1-hour or 2-hour parking limits.

Trucks traveling to the proposed building site would follow a delivery route that provides access from I-195 at the Broadway ramps in East Providence. Following this route, trucks would use the Henderson Bridge, Angell Street, Waterman Street, and Brown Street to get to and from the site. The delivery route (Figure 8) is approximately 5.6 kilometers (3.5 miles) from I-195 to the site.

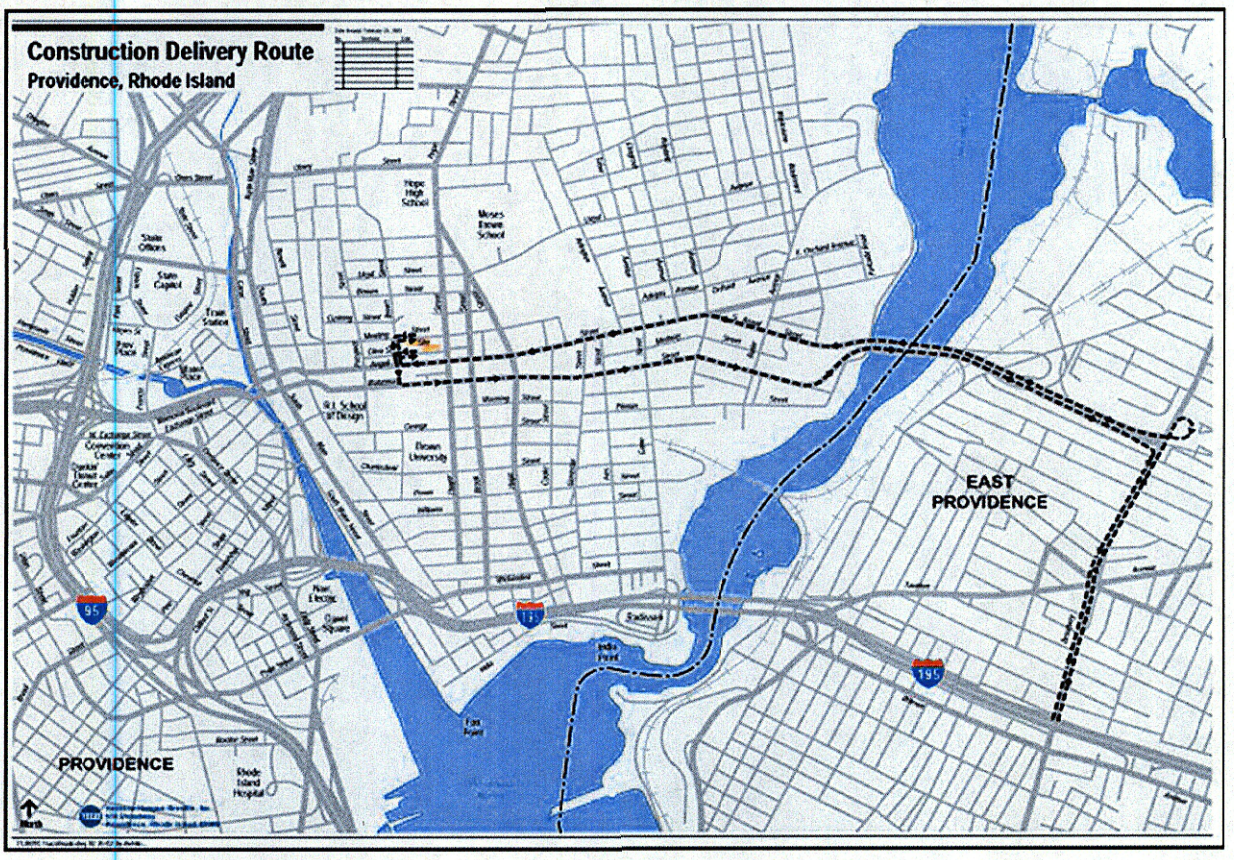


Figure 8 - Construction Delivery Route Map

Broadway, the Henderson Bridge, Angell Street, and Waterman Street are classified as urban arterials. They are major traffic corridors providing access between East Providence and Providence, with average daily traffic ranging from 8,000 to 17,000 vehicles per day. These roadways are also considered as an alternate route between I-195 and Providence (downtown and the East Side) and have been used as detour routes by the Rhode Island Department of Transportation. The land use along these corridors is primarily commercial and office use, with some residential properties.

3.1.8 Noise

The city noise ordinance allows noise levels no higher than 55 decibels between 7 a.m. and 8 p.m. and 50 decibels between 8 p.m. and 7 a.m. (City Code of Ordinances, Chapter 16, Article III, Sections 16-92, 16-97, and 16-98) (Municode 2002). As a baseline, Acentech (a Brown University consultant) measured existing noise levels generated by the existing

Biomedical Complex and other surrounding buildings in areas immediately surrounding the proposed site and in the adjacent residential neighborhood (Acentech 2002a). This report, which is incorporated in this EA by reference, stated the following:

> "Ambient sound level measurements at locations in the residential community surrounding the site of Brown University's proposed new Life Sciences Building show the influence of noise from HVAC [heating, ventilation, and air conditioning] and other building mechanical systems at some of Brown's existing biomedical research facilities in the project area, as well as the influence of noise from vehicular traffic on the many local streets throughout the neighborhood. Background sound levels were highest close to the site: at the corner of Brown and Meeting Streets, background sound levels were found to be nearly constant at around 56 – 58 dBA [decibels], day and night. Further back into the residential neighborhood, background sound levels dropped significantly: by roughly half a block away from the edge of the campus, levels dropped to the mid- to upper-40s dBA. At residential receptor locations roughly a block from the campus, daytime background levels in the low-40s dBA were measured, and nighttime levels fell into the upper 30s dBA." Report at Page 5.

3.2 Cultural/Historic and Socioeconomic Elements

This section describes the existing cultural and historic resources and the socioeconomic environment in the area that could be affected by construction and operation of the proposed Life Sciences Building.

3.2.1 Cultural and Historic Resources

According to Historic Sanborn Insurance Maps and records dating to the late 1800s, the site of the proposed Life Sciences Building formerly contained a garage with one gasoline underground storage tank, a post office, residential buildings, and a livery. No suspected archaeological resources are located in the area (Providence City Hall undated).

The site is located in the College Hill Historic District of Providence, Rhode Island (see Figure 2). The proposed action would require that three contributing resources be removed and replaced with the proposed building. Because the project may be partially funded with federal resources, the project must comply with Section 106 of the National Historic Preservation Act, a regulatory process designed to ensure that any historic, natural, and cultural resources are identified and that efforts are made to mitigate any effects that the project may have upon such resources.

In accordance with Section 106, Brown University has been working with the RISHPO to review the project, assess the effects, and make efforts to mitigate the impacts. The Section 106 process has included public involvement to assess impacts that may not otherwise be identified, ongoing interaction with the RISHPO to address the implications of impacts, the development of a final Memorandum of Agreement (MOA) (Appendix A), and correspondence among several interested parties (Appendices B [list of correspondence] and C [selected letters from the RISHPO]).

College Hill Historic District

The College Hill Historic District was placed on the National Register of Historic Places in 1976. The National Register is a list of cultural resources in the United States that are significant in American history, architecture, archeology, engineering, and culture. The College Hill National

Historic District designation grew out of a 1959 study entitled *College Hill*. As defined in the nomination, the boundaries extend to Olney Street to the north, Hope and Governor Streets to the east, India Street to the south, and South Water and Canal Streets to the west (see Figure 2).

The College Hill Historic District was listed for its association with events of local and national importance. As the site of the original settlement in Providence in 1636, College Hill reflects the evolution in the region from its inception to the time the nomination was submitted in 1976. It also reflects the transition of the area's economy from agriculture to commerce to industry. It has been the center of the political, governmental, scholarly, and artistic life in the city, and leaders of the community built grand residences on College Hill. In addition to housing the wealthy, immigrants settled portions of the district in the 19th century, and institutional development marked the 18th, 19th, and 20th centuries. The architecture of the area reflects the richness of its history; the buildings within the district reflect a variety of uses and date from 1700 to the present day, from the vernacular to the high style. The district is also important as an early landmark within the historic preservation movement.

Although not individually identified as historic structures, the following three structures that contribute to the historic nature of College Hill are located within the site of the proposed action.

60 Olive Street

Most recently, the building at 60 Olive Street (Figure 9) housed the University's Department of Facilities Management. When the National Register nomination for the College Hill Historic District was submitted, this building was considered "contributing." However, constructed as a garage in the 1920s, this building does not reflect the significant trend associated with the 20th century construction of University buildings in the district and does not relate to the documented significance of the district. Furthermore, the integrity of the building is low, as the design, materials, and setting have been significantly altered over time. Thus, although the building may have some marginal association with the history of transportation in Providence, the loss of integrity is such that the building fails to convey that association.

Figure 9 - South Elevation, 60 Olive Street

201 Meeting Street

The building located at 201 Meeting Street (Figure 10), constructed circa 1927-1937, dates from the period of significance of the College Hill Historic District (1636-1976). The resource was considered contributing at the time of the nomination. The building, which has served as a Post Office, was not part of the University's institutional growth, and therefore appears not to be associated with the general trend of development during this period. The Post Office was relocated in September 2001 and the building is now vacant. Although the setting has changed dramatically over time, the building maintains its integrity of location.

Figure 10 - North Elevation, 201 Meeting Street

185 Meeting Street

The historic house at 185 Meeting Street (Figure 11), constructed in 1926, dates from the period of significance of the district.[2] The building does not reflect the general development of the block of Meeting Street between Brown Street and Thayer Street. During the 19th century, the surrounding block developed largely as a residential neighborhood that featured a few institutional buildings like the Bethel AME Church. However, with the growth of Brown University and the introduction of Pembroke College at the turn of the 19th century, the institutional character of the neighborhood grew stronger. By 1920, the development in the immediate area was almost exclusively commercial and institutional. Thus, although the house appears a vestige of the residential development of this neighborhood, it in fact dates from a time when institutional development was the main thrust of building in this area. The integrity of the building itself is high, but its setting has been severely compromised. Late 20th century commercial and institutional buildings now surround the building.

Perhaps its greatest significance lies in the fact that a prominent local architect, Frederic Ellis Jackson, designed it. Although not stylistically significant, it is an example of Jackson's residential work.

Figure 11 - North Elevation, 185 Meeting Street

[2] The building is also known as the Sarah Doyle house because it formerly housed the Sarah Doyle Women's Center. This center has been moved to a larger, newly renovated, and more central location on the Brown University campus, and the building is now vacant. Sarah Doyle, a prominent Rhode Island educator, has no association with the house at 185 Meeting Street.

3.2.2 Socioeconomic Resources

The proposed action would take place in the College Hill area of Providence, Rhode Island. According to information reported by the Providence Plan (2001), College Hill is 2.0 square kilometers (0.77 square mile). According to the 2000 census, nearly 10,000 of Providence's 174,000 residents live in College Hill. Approximately 76 percent of College Hill residents are white, 13 percent are Asian or Pacific Islander, 4 percent are African American, and 5 percent are Hispanic. Citywide, Providence is approximately 54 percent white, 6.2 percent Asian or Pacific Islander, 14.5 percent African American, and 30 percent Hispanic (Table 1).

Table 1 - Demographics of Providence, College Hill, and East Providence

	Providence	College Hill (proposed building)	East Providence (transportation corridor)
Race			
White	54 percent	76 percent	86 percent
Asian or Pacific Islander	6.2 percent	13 percent	1 percent
African American	14.5 percent	4 percent	5 percent
Hispanic	30 percent	5 percent	2 percent
Income			
Families below poverty level	23.9 percent	5.1 percent	6.3 percent

The median family income for College Hill is $121,521, compared with $32,058 for Providence. There are 5.1 percent of families below poverty, compared with 23.9 percent citywide.

With approximately 3,300 regular employees, Brown University is the second largest private employer in Providence and the largest on College Hill. There is also a commercial area located on Thayer Street and at the east end of Meeting Street abutting the site of the proposed building, which includes a mix of retail stores (gifts, clothing), restaurants, convenience stores, bookstores, and a theater. A gas station, situated on property owned by Brown University and leased to the business owner, is located to south of the proposed site. Also to the south are several Brown facilities. Immediately to the north of the proposed site is Brown's Pembroke Campus and to the west is a mix of Brown facilities, the Brown-Rhode Island School of Design Hillel facility, and residences.

The route that would be used by construction trucks to and from the proposed site would also affect the City of East Providence (see Figure 8). According to information reported by the Rhode Island Economic Development Corporation (RIEDC 2003), the population of East Providence was 48,688 in 2000. Approximately 86 percent of the residents of East Providence are white, 1 percent are Asian or Pacific Islander, 5 percent are African American, and 2 percent are Hispanic (see Table 1). The median family income for East Providence is $48,463, compared with $32,058 for Providence. There are 6.3 percent of families below poverty, compared with 23.9 percent in Providence. The land use along the truck route is primarily commercial and office use with some residential properties.

Chapter 4 Environmental Consequences

This chapter describes the potential consequences of implementing the proposed action and the no action alternative.

4.1 Proposed Action

This section describes the potential impacts of the proposed action on the natural and physical environment (Section 4.1.1) and on the cultural/historic and socioeconomic environment (Section 4.1.2). Potential impacts to low-income or minority populations are also addressed in Section 4.1.2. Section 4.1.3 discusses cumulative impacts.

4.1.1 Natural and Physical Elements

This section describes the potential impacts of the proposed action on land use, geology, soils, biological resources, water resources, air quality, traffic and parking, noise, and health and safety.

4.1.1.1 Land Use

The proposed Life Sciences Building would conform to existing land use practices for the site and the general area surrounding the site. Specifically, the proposed location is consistent with the city-approved Brown University Master Plan and is within the Institutional Zone established by the City of Providence (the area in which the city has indicated it is appropriate for the University to grow). Thus, no impacts to land use would be expected as a result of implementation of the proposed action.

4.1.1.2 Geology

Excavation of the existing fill and controlled detonation of bedrock are expected to accommodate the basement, and to a lesser degree, underground utilities including sanitary, stormwater, municipal water, cable/telephone, electrical, and natural gas lines. Soil would be excavated and removed, resulting in creation of an approximately 3,530-square-meter (38,000-square-foot) by up to 12-meter (40-foot) deep braced excavation. In the western portion of the site, approximately 10 meters (32 feet) of bedrock would be removed by controlled detonations. Estimates indicate that this would involve the removal and offsite disposal of approximately 8,410 cubic meters (11,000 cubic yards) of soil fill, approximately 5,352 cubic meters (7,000 cubic yards) of glacial till, and approximately 9,557 cubic meters (12,500 cubic yards) of bedrock. These materials would be transported offsite for reuse, disposal, or recycling.

Existing bedrock would be removed by a combination of controlled detonations and mechanical methods. Controlled detonations would be used to facilitate the bulk rock removal, and mechanical methods would be used for clean-up to final elevations. The method of controlled detonations would be less disruptive than other alternatives, including ripping or pneumatic hammers. All detonations would be performed under the onsite supervision of a licensed professional certified by the State of Rhode Island. Because there is a potential for impact to humans and surrounding infrastructure, a geotechnical engineer would monitor the detonations to ensure that the activities produced acceptable results with regard to human safety, noise, over pressure, and peak particle velocity criteria.

To control surface water runoff and prevent flooding of excavations during construction of the proposed Life Sciences Building, a stormwater management plan would be implemented.

Provisions include sediment and erosion control measures to address disturbed areas, stockpile areas, and lay-down areas.

No impacts to geological resources would be expected as a result of the implementation of the proposed action. Minor, temporary impacts could be experienced as a result of vibrations from controlled detonations.

4.1.1.3 Soils

Construction of the basement level of the Life Sciences Building and the installation and/or maintenance of subsurface utilities would require the excavation and removal of the existing contaminated soil (urban fill). Direct contact with surficial soil has been identified as an exposure pathway of concern at the site (see Section 4.1.1.9). However, soil and groundwater management plans would be prepared and implemented to minimize potential impacts.

As noted in Section 3.1.3, contaminants are present at the site at concentrations that exceed the Method 1 criteria as established by RIDEM. Specifically, certain metals and polynuclear aromatic hydrocarbons were identified at concentrations above the Direct Exposure Criteria. These conditions, which likely exist site-wide, reflect the presence of fill materials used to create the site and/or are the result of the natural occurrence of metals. Notwithstanding, these conditions were considered a "release" and represented a notification obligation to the site owner in accordance with RIDEM regulations.

Following RIDEM's December 2001 Program Letter (RIDEM 2001), the regulatory process involved the preparation of a Remedial Action Work Plan to describe actions that would be completed to address the risks posed by these conditions during construction of the proposed Life Sciences Building. These included remedial components (*e.g.*, comprehensive asbestos survey and abatement plan, removal and closure of underground storage tanks, demolition technical specification), design considerations for final site grades, the development of a Soils Management Plan to establish procedures for the offsite disposal of site-derived soils, and the establishment of an Environmental Land Usage Restriction to help ensure the long-term permanency of the remedy.

The Environmental Land Usage Restriction would also provide reference to the *Soil Management Plan* to establish procedures should any future work at the site involve disturbing the surfaces and excavating underlying soils. As long as the remedial measures described in this plan were implemented and maintained, the site would be considered to be compliant with the remedial objectives.

After the completion of the Life Sciences Building, a *Remedial Action Summary Report* would be submitted to RIDEM describing the construction activities and documenting the site's compliance with the remedial objectives. It is anticipated that RIDEM would issue a *Letter of Compliance* for the site once these conditions were met.

No adverse impacts to soils would be expected as a result of the implementation of the proposed action.

4.1.1.4 Biological Resources

No federal- or state-listed threatened or endangered plant or animal species, critical habitats, or other areas of critical environmental concern were identified on the study site. For this reason,

no impacts to sensitive biological resources would be expected as a result of the implementation of the proposed action.

4.1.1.5 Water Resources

Groundwater would be encountered and removed during the construction of the Life Sciences Building foundation. VOCs and total petroleum hydrocarbons were detected in two of the three groundwater samples tested. Both total petroleum hydrocarbons and VOCs were present at concentrations considered low. None of the VOC concentrations exceeded the GB Groundwater Objectives or GB Upper Concentration Limits. The University has retained a geo-environmental consultant for testing and environmental compliance related to the groundwater that would be affected.

Minor alterations in the direction of localized groundwater are expected. Based on a groundwater elevation survey, groundwater in the vicinity of the site is expected to flow in a southerly direction, toward the Providence River (approximately 1.6 kilometers [1 mile] away). Groundwater flow direction may be affected to a limited degree by the building foundation, underground utilities (*e.g.*, storm drains, sewers, and utility conduits), and disturbance of subsurface soil conditions.

No change in the level or quantity of groundwater is expected; no underground injection control structures are proposed. The location of the proposed building is in a groundwater area deemed unsuitable for public or private drinking water use due to known or presumed degradation. The site and surrounding areas are served by municipal water. The site is not located near a drinking water source; there are no known private wells located nearby, and the site is not located within a wellhead protection zone, nor are any located within a 0.8-kilometer (0.5-mile) radius of the site.

Dewatering would be required to support construction activities, and possibly on a permanent basis following site development. Because of the depth of the basement, an underdrain system may be installed. During construction, groundwater and runoff from precipitation may be diverted away from excavations so as to avoid ponding. Sumping of water from excavations may be required. Groundwater is expected to meet water quality criteria in Water Quality Regulations for Class B groundwater. Approval associated with the discharge of groundwater generated during dewatering activities is required to be granted through the Rhode Island Pollution Discharge Elimination System and Narragansett Bay Commission Discharge Permit processes. Further analytical laboratory testing would be required as a condition of the permit.

No adverse impacts to water resources would be expected as a result of the implementation of the proposed action.

4.1.1.6 Air Quality

Proposed construction activities would use a variety of gasoline- and diesel-powered equipment. The construction manager would ensure that all applicable equipment met current federal and state emission regulations (*e.g.,* valid inspection certificates, *etc.*). In addition, no construction equipment (whether onsite or making deliveries) would be permitted to idle for more than 5 minutes, with the following exceptions:

- Initial start-up required to reach operating temperature
- Idling required in order to operate equipment efficiently

- Winter conditions

Air intakes for all occupied structures on adjoining properties would be identified, if applicable, and all feasible efforts would be made to ensure that construction equipment does not affect these intakes. If these measures are not effective and building occupant complaints are received, additional control measures would be enacted (*e.g.*, relocation of equipment, placement of filters on intakes, *etc.*)

The Life Sciences Building plan calls for the use of natural gas-fired boilers for hot water and steam generation. It is estimated that the Life Sciences Building would use approximately 124,954 cubic meters (4,412,700 cubic feet) of natural gas per year. It would also contain one 1,500-kilowatt/1,875-kilovolt-ampere diesel-fired emergency power generator. This generator would be used only for emergency power generation and not for peak shaving. The generator would be limited by the University's air-operating permit to running a maximum of 500 hours per year and thus would be exempt from the NOx Reasonably Available Control Technology standards. Existing emergency generators in the Biomedical Complex run 15 to 30 hours per year. It is anticipated that the Life Sciences Building generator would run a similar amount of time. Most of this run time would be for routine maintenance, as generators are run approximately 1 hour per month to ensure proper operation. Based on 30 hours of run time, it is estimated that the Life Sciences Building generator would use approximately 12,500 liters (3,300 gallons) of diesel fuel per year.

The ozone issue is by far the largest area of air quality concern, and its generation has the potential to exacerbate an existing area of environmental impact. As noted in Section 3.1.6, Rhode Island, and much of the northeast United States, does not meet the health-based standard for ozone. All of Rhode Island is considered a serious nonattainment area for ozone. Most of the work performed by RIDEM's OAR is related to ensuring that the state improve its air quality in order to attain the standard in accordance with the schedule required by the federal Clean Air Act. As part of that program, Brown University has an existing Title V Air Operating Permit issued by RIDEM (RI-2001-09). This permit addresses the emissions of ozone precursors (*e.g.*, NOx) from the University. Required activities under the permit, such as emissions monitoring and annual equipment tuning and maintenance requirements, ensure that the University is minimizing emissions that impact the local air quality. In the Life Sciences Building, all fuel-burning equipment with an input capacity greater than or equal to 1.0 million British thermal units (MBtu) per hour would be added to the University's Air Operating Permit and would be subject to the conditions noted above. The University would track and annually report to RIDEM air emissions from the new Life Sciences Building.

Very small amounts of air emissions would be generated in the laboratories of the proposed building as a result of the use of chemicals during research. Containers would be kept closed when not in use to minimize air emissions. Volatile and toxic chemicals would be used under fume hoods to limit exposure to staff. The fume hoods would be vented to the outside air using Strobic-type exhaust fans mounted on top of the roof to dilute and dissipate the air emissions (3,000-to-1 dilution). Emissions from fume hoods are not specifically regulated under Rhode Island state law. Air emissions from the University as a whole are regulated under an existing Air Operating Permit issued by RIDEM.

Based on information from the existing Biomedical Complex, Brown University estimates that no more than 680 kilograms (1,500 pounds) of fugitive emissions would be released annually from the proposed Life Sciences Building.[3] These emissions would be primarily from the use of ethanol, a VOC that is used widely in biological research. Other emissions could include very small volumes of hazardous air pollutants (also known as air toxics) commonly used in laboratories such as chloroform, methylene chloride, toluene, and xylene. None of these emissions would rise to a level requiring an air toxics permit from RIDEM under Rhode Island's Air Toxics Regulations because they would be far below the minimum quantities stated in the regulations (Air Pollution Control Regulation No. 22). Emissions would be diluted to such an extent that they would be unlikely to increase ground-level concentrations of a hazardous air pollutant at or beyond the property line.

It should be noted that the estimate of up to 680 kilograms (1,500 pounds) of air emissions is highly conservative. First, the volume of fugitive emissions from all University laboratories in 2001 was 2,410 kilograms (5,230 pounds), with approximately 25 percent, or 600 kilograms (1,330 pounds), estimated to be from the existing Biomedical Complex. In 2002, this fell to an estimated 2,201 kilograms (4,852 pounds) for the University as a whole and 550 kilograms (1,213 pounds) for the Biomedical Complex. Second, the emissions are estimated based on mass balances performed that do not account for materials that remain in the laboratories as part of experimental processes and research samples. Finally, it is anticipated that the Life Sciences Building will house 51 laboratory modules, whereas the existing Biomedical Complex houses approximately 80 laboratories.

The University also commissioned a study to mathematically model, physically model, and wind-tunnel-test the effect of the emissions at the immediately surrounding buildings, assuming dilution would increase beyond these buildings (Rowan et al. 2001). The study also modeled the effect of the existing emissions listed above, and other surrounding exhausts, at the proposed building's air intakes. The intent of this was to provide guidance in locating new air intakes, but this can also be used as a worst-case scenario, assuming that dilution increases as the emissions travel farther away from the building.

While highly unlikely given the research activities planned for the Life Sciences Building, in the event of a release of hazardous material with the potential to cause harm, Brown University would notify the National Response Center, the federal government's national communications center that is responsible for coordinating federal and state emergency response activities. The University would also work with local authorities to notify residents in the community regarding a need for protective action.

New air emission sources, including releases from the boilers and the emergency generator, would be added to the University's existing Air Operating Permit issued by RIDEM. The proposed building would operate within the requirements of RIDEM. Brown University is responsible for compliance with RIDEM's air permitting requirements, which RIDEM monitors and enforces.

Minor, temporary adverse impacts to air quality would be expected as a result of the implementation of the proposed action.

[3] In the Draft EA, this volume was incorrectly stated to be 6,000 pounds of emissions. That volume is the amount estimated for all laboratories at Brown University. Approximately 25 percent of the total laboratory emissions (or 1,500 pounds) are attributable to work in the Biomedical Complex. In 2001, the volume estimated to have been released from the Biomedical Complex was 1,330 pounds, or a total of 5,320 pounds for emissions from all University laboratories. This volume does not change substantially from year to year. Annual emissions from the proposed Life Sciences Building are expected to be about the same as, or less than, those from the Biomedical Complex.

Conformity Review

Section 176(c)(1) of the Clean Air Act requires that federal actions (including federal funding) conform to applicable state implementation plans for achieving and maintaining the National Ambient Air Quality Standards for six criteria air pollutants: sulfur dioxide, NOx, carbon monoxide, ozone, lead, and particulate matter. In 1993, the U.S. Environmental Protection Agency promulgated a rule titled "Determining Conformity of General Federal Actions to State or Federal Implementation Plans" (58 Fed. Reg. 63214 (1993)), codified at 40 CFR Parts 6, 51, and 93. The rule is intended to ensure that emissions of criteria pollutants or ozone precursors (*i.e.*, VOCs and NOx) are specifically identified and accounted for in the attainment or maintenance demonstration contained in state implementation plans. For there to be conformity, a federal action must not (1) contribute to new violations of air quality standards, (2) increase the frequency or severity of existing violations, or (3) delay timely attainment of standards in the area of concern.

The conformity rule applies to proposed federal actions that would cause emissions of criteria air pollutants, or ozone precursors, above allowed threshold levels to occur in locations designated as nonattainment or as maintenance areas for criteria pollutants. Under the rule, an agency must engage in a conformity review process and, if necessary depending on the outcome of that review, conduct a conformity determination.

In a conformity review, the federal agency must (1) determine whether the proposed action would cause emissions of criteria pollutants or ozone precursors, (2) determine whether the emissions would occur in a nonattainment or maintenance area, (3) determine whether the proposed action is exempt from the conformity requirements, and (4) estimate the total emissions of the criteria air pollutants from the proposed action and compare them to the allowed threshold emission rates and to the total emissions inventory for each criteria air pollutant in each area of concern (note that not all six criteria air pollutants would be emitted as a result of every proposed action).

If the proposed action would result in emissions of a criteria air pollutant above the threshold rate or above 10 percent of the total emissions inventory for the nonattainment or maintenance area, then the agency must conduct a conformity determination. If the proposed action would not result in emissions above the threshold rate or above 10 percent of the total emissions inventory for the nonattainment or maintenance area, then the proposed action is exempt from conducting a further conformity determination. Further, an action is subject to the General Conformity Rule if the emissions are deemed to be regionally significant, even if the total direct and indirect emissions are less than the specified rates (*de minimis* emissions) for any criteria pollutant in a nonattainment area.

Because Rhode Island is a serious nonattainment area for ozone, the *de minimis* emissions level is 45.4 metric tons per year (MTPY) (50 tons per year (TPY)) for NOx or VOCs. The Rhode Island State Implementation Plan levels are 89.6 metric tons per summer day (MTPSD) (98.8 tons per summer day (TPSD)) for NOx and 157.2 MTPSD (173.3 TPSD) for VOCs. Brown University has estimated the expected emissions from both the demolition/construction phase of the project as well as the operation of the Life Sciences Building.

The emissions expected during the construction phase would result from demolition of the existing constructions, excavation of the area, and construction of the new building. This estimate included both stationary sources and mobile sources. Using very conservative assumptions regarding the number and type of vehicles and equipment that would be present

onsite during the construction process, it is estimated that NOx emissions would be approximately 36.28 MTPY (40 TPY), and VOC emissions would be approximately 7.3 MTPY (8 TPY). Operation of the facility would result in 1.08 MTPY (1.2 TPY) of NOx emissions and 0.1 MTPY (0.11 TPY) of VOC emissions.[4]

Because the proposed construction and operation of the Life Sciences Building would not result in emissions of a pollutant of concern above the threshold rate or above 10 percent of the total emissions inventory for the nonattainment or maintenance area, a further conformity determination is not required. Further, air emissions from both construction and operation would be below the *de minimis* emissions level. These emissions levels would not be considered regionally significant, as they are less than 10 percent of the 1999 Rhode Island State Implementation Plan levels.

4.1.1.7 Traffic and Parking

The project would result in changes to existing traffic in the vicinity of the project during construction and permanent changes to University parking spaces. The highest number of trucks would be traveling to and from the site during excavation – approximately 24 trucks per day over the 4-month duration of excavation. Conservatively assuming that same number of trucks over the entire 30-month construction project would result in 14,400 trucks.

The construction of the proposed building would necessitate temporary street closures and rerouting of traffic. In order to create a safe construction site and minimize disruptions, the construction manager for the Life Sciences Building would fence an area that included all of the proposed site, most of Olive Street between Thayer Street and Brown Street, a small area just south of Olive Street, and the parking lot at the corner of Olive Street and Brown Street. Meeting Street would also be affected during the construction period, at times being restricted to one travel lane. Extensive efforts would be made to minimize the duration of any such restrictions.

During construction, Olive Street would be closed to through traffic but would remain open for local deliveries to existing businesses and University buildings. During two 2-week periods, Meeting Street would be closed between 7 a.m. and 3:30 p.m. for utility crossings. Street parking displaced during construction would be approximately 34 spaces (13 spaces along Olive Street for the 30-month construction period, and 21 spaces along Meeting Street for 24 months).

The majority of all construction activities would occur within these boundaries. The anticipated exceptions (utility street crossings, steel erection, delivery of materials, *etc.*) would require short-term closures of Meeting Street. Construction vehicles would access the site using Brown Street by way of Angell Street and Waterman Street. Gates would be placed at both Meeting Street and Olive Street. No traffic would be routed into the College Hill neighborhood north of Meeting Street.

In an effort to reduce the construction impacts on the surrounding area, all construction personnel for the proposed Life Sciences Building would park in a remote location and ride a

[4] These estimates were derived using a methodology outlined in the *U.S. Air Force Air Conformity Applicability Model (ACAM) Technical Documentation* (April 2002) to calculate the estimated emissions during construction. For building operations, emissions factors from the *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources* were used to calculate emissions from the boilers and emergency generator.

shuttle to the site. The University would use its property located at 10 Park Lane for parking for all construction workers. The shuttle service, coordinated by the construction manager, would be provided for workers through a leased service. Shuttle routes would access the site as previously defined. The construction manager would implement an enforcement method to ensure the use of Brown's offsite lot. A head count of all workers parking at the lot would be conducted each morning. This would be compared to the actual count of workers onsite each day. If consistent discrepancies were discovered, the method would be enforced by restricting workers entering the site to one gate, which would be supervised by the site superintendent each morning.

Impacts to traffic along the delivery route due to construction are anticipated to be minimal. Existing truck traffic along these roadways is moderate under existing conditions and is not expected to be affected by the projected construction deliveries. The demolition and building excavation phase of the project should last approximately 4 months and would involve the most truck traffic to and from the site (approximately 24 arrivals per day). However, this amount of truck traffic is not expected to have an impact because most of these trips are projected to occur during the off-peak hours.

The completed Life Sciences Building would have little, if any, impact on future traffic volumes in the area, because most students, staff, and faculty members would already be on campus or would already travel to the campus. Future traffic patterns and flow on surrounding streets would continue to operate similar to existing conditions.

Providence zoning ordinances specify the number of parking spaces the University must maintain. Spaces are considered collectively for the entire campus based on the total number of students and employees, rather than on a building-by-building basis. Currently, Brown University is in compliance with the zoning ordinances, but it recognizes the continuing pressure on the surrounding residential areas that even a slight increase in parking demand creates.

Although the proposed Life Sciences Building would cause the displacement of some parking spaces within its footprint, there would be no net loss of on-campus parking spaces. A new lot between Cushing Street and Bowen Street, east of Thayer Street, has been added to accommodate 36 new off-street parking spaces, replacing those spaces within the footprint of the proposed building.

Most of the employees who would work in the proposed Life Sciences Building would move from other facilities on Brown's campus. These employees would either maintain their current Brown parking lot assignments or be reassigned to more convenient lots. The additional employees in the proposed new building would easily be accommodated within Brown's increased parking supply. An increase in parking demand is not expected upon completion of the proposed Life Sciences Building. However, such an increase could occur after the buildings that are vacated by the Life Sciences faculty and staff are renovated and reoccupied. At that time, additional employees may be hired or relocated from offsite facilities. Parking demands for those employees would be determined at that time.

Brown has also committed to developing a comprehensive plan to alleviate parking concerns both on campus and on the city streets. This commitment was a condition of the City Planning Commission's approval of Brown's Master Plan.

On-street parking would not be affected by the operation of the completed Life Sciences Building. The construction of the proposed building is likely to result in an increase in on-street

parking on the north side of Olive Street due to the elimination of driveways and no parking zones.

Minor impacts to traffic and parking would be expected as a result of the construction of the proposed Life Sciences Building. No adverse impacts would be expected after completion of the building.

4.1.1.8 Noise

Transient increases in noise levels would occur during the construction phase of the Life Sciences Building project due to operation of machinery and equipment, controlled detonations, steel erection activities, and other construction activities. All site trade contractors would be required to comply with the City of Providence Noise Control Ordinance and the limitations placed upon them in project specifications (to be developed) regarding various pieces of equipment. The city noise ordinance allows noise levels no higher than 55 decibels between 7 a.m. and 8 p.m. and 50 decibels between 8 p.m. and 7 a.m. (City Code of Ordinances, Chapter 16, Article III, Sections 16-92, 16-97, and 16-98).

All site trade contractors would also endeavor to minimize negative impacts from construction noise by working with Brown University and being sensitive to the proximity of residential and commercial properties adjacent to the work limits. If a particular operation were obviously noisy or of long duration, or if a complaint were received, the applicable trade contractor would remedy the condition by establishing a buffer, approved by Brown University and the construction contractor, in order to reduce the noise level.

To ensure that the operation of the completed building would comply with the city noise ordinance, the University commissioned a mathematical analysis to assess the effect of noise generated by the proposed building. This report, which is incorporated in this EA by reference, estimated the noise levels that would be expected at several critical receptor locations near the proposed building (Acentech 2002b). The building has been designed to limit noise emissions to the low 40-decibel level at the critical neighbor locations. The proposed Life Sciences Building would not contribute additional noise to the existing ambient noise level and, when viewed as an individual building, would comply with the local noise ordinance.

Minor, temporary adverse noise impacts would be expected as a result of the construction of the proposed Life Sciences Building. No impacts would be expected after completion of the building.

4.1.1.9 Human Health and Safety

During construction, industrial accidents could occur that cause injuries to workers (*e.g.*, falling debris, tripping). The most recent U.S. Bureau of Labor Statistics data (BLS 1999) indicate that 7.6 incidences and 3 lost work days would occur per 200,000 hours worked in the construction industry in Rhode Island. Construction of the proposed Life Sciences Building would require approximately 400,000 work hours, which could result in up to 15 incidences and about 6 lost work days. No fatalities would be expected based on the incidence rate of 16 per 100,000 worker-years (200 million hours) (NSC 1996).

Accidents could also occur as a result of truck transportation. The highest number of trucks would be traveling to and from the site during excavation – approximately 24 trucks per day over the 4-month duration of excavation. Conservatively assuming that same number of trucks over the entire 30-month construction project would result in 14,400 trucks. Round-trip traffic on local

roads (S. Angel Street, Waterman Street, and Broadway) travels approximately 12 kilometers (7 miles) between I-195 and the site.[5] Multiplying the number of trucks (14,400) times the number of round-trip kilometers (12) results in an estimate of 172,800 kilometers. In Rhode Island, accident injury rates are approximately 2.6×10^{-7} per kilometer, and accident fatality rates are 1.49×10^{-8} per kilometer (DOE 2002). Based on these statistics, no accidents (0.05) and no fatalities (0.003) would be expected to occur.

A safety and health plan, soils management plan, and stormwater pollution prevention plan would be prepared to establish procedures that would be followed to manage excavated soils, groundwater, and stormwater. To address the Risk Management Criteria under RIDEM regulations, the remedial objective proposed for the soil eliminates exposures through removal, grading, and asphalt/concrete capping, building structures, and modifications to landscaping.

Because the groundwater resources of the site are not intended for use as drinking water resources, the pathway of concern is volatilization into site structures. Low concentrations of metals and individual polynuclear aromatic hydrocarbons are present in the soil. Due to the relatively low vapor pressure of these compounds, vapor hazards at ambient temperatures are not expected to occur. However, during construction, the generation of contaminated dusts may pose a potential inhalation hazard. The contractor would be required to use standard procedures for dust management, (*e.g.*, watering the site, covering stockpiles). Therefore, the potential for dust generation during construction activities, including movement of equipment across the site and site grading activities, is expected to be minimal.

To limit skin contact, ingestion, and inhalation of airborne concentrations, excavated soils would be staged and temporarily stored in a designated area of the property. The storage location would be selected to limit unauthorized access to the materials (*i.e.*, away from public roadways/walkways). Soils would be either stockpiled on an impervious surface (*e.g.*, polyethylene sheeting) or stored in roll-off type containers. In either case, the material in storage would be covered with secured polyethylene sheeting at the end of each workday. Stockpiled materials would be maintained with appropriate controls to limit the airborne loss of material and protect against stormwater erosion. Most work inside trenches would be conducted in water-resistant garments and boots. If any apparent contaminants were identified above background levels, such as floating fuel or increased odor, work would be discontinued and conditions would be assessed.

No risk of exposure to asbestos- or lead-containing materials is expected. A comprehensive asbestos survey has been conducted. Materials found to contain asbestos would be abated by a licensed asbestos contractor in accordance with an asbestos abatement plan approved by the Rhode Island Department of Health.

The research that would occur in the building laboratories would include the storage and use of laboratory chemicals such as acids, bases, solvents, and various other chemicals. Chemicals would be segregated by compatibility (*e.g.*, flammable, corrosive, *etc.*) and stored in appropriate cabinets. Laboratory safety inspections would occur in each laboratory at least once per year to ensure safe operations.

Research activities in the laboratories and some building maintenance operations would generate liquid and solid hazardous wastes. The building would house a room to store

[5] Because precise origins and destinations of truck traffic are various and unknown at this time, itineraries beyond the local roads or the Interstate Highway system are not estimated.

hazardous waste for less than 90 days in accordance with state and federal hazardous waste regulations.

Research in the Life Sciences Building would involve the storage and use of biological and radioactive materials as well as the storage of wastes from these research activities. The building would house a room for the temporary storage of biological wastes as well as for the decay of radioactive wastes prior to shipment offsite for disposal.

The operation of the proposed building would result in air emissions, some of which would be added to the University's existing Title V Air Operating Permit issued by RIDEM (RI-2001-09). The identified air emissions would be from boilers, an emergency generator, cooling towers, and exhaust from research fume hoods.

Diesel fuel would be stored onsite in an underground storage tank to supply fuel for the emergency generator. This tank would meet all federal and state requirements for oil spill prevention, including 110 percent secondary containment, secondary containment for fuel lines, spill bucket for the fill pipe and other measures to prevent spills. The tank would be registered with RIDEM and would be added to the University's existing Spill Prevention, Control, and Countermeasures Plan. This plan, among other things, requires monthly tank inspection, periodic tank integrity testing, and other measures to ensure that releases of oil do not occur. An underground storage tank would be required to store sufficient fuel to run the emergency generator for an extended period of time during a power outage to avoid adverse impacts to research and research materials; the site does not contain suitable space for an aboveground storage tank.

Liquid effluents from the building would include sanitary wastewater, water used in the research laboratories, and boiler and cooling tower blowdown. All wastewater discharges would be discharged under a permit granted by the Publicly Owned Treatment Works (Narragansett Bay Commission). Waste chemicals would be collected, not disposed of down drains. Each sink would be posted with a sign describing the policy prohibiting sink discharge of chemicals. Staff is also trained on the "no sink disposal" policy annually. A darkroom in the area would generate spent fixers, developers, and rinse waters from a photoprocessor. These effluents would be treated prior to discharge to remove silver and adjust pH. After pretreatment, the photoprocessor effluent would be discharged under a pretreatment permit granted by the Narragansett Bay Commission. The effluents would typically be sampled twice per year to ensure compliance with discharge limits.

Research activities and some building maintenance activities would generate wastes considered hazardous by federal and state regulations. All hazardous waste generated would initially be stored in clearly designated satellite accumulation areas and managed in accordance with the applicable requirements (*i.e.*, using appropriate containers, labeled with hazardous waste labels, segregated by compatibility, and kept closed). Wastes removed from the accumulation areas would be stored in a room designed to meet federal and state hazardous waste accumulation area requirements. All waste stored in this area would be packaged, shipped, and disposed of offsite within 90 days of generation in accordance with all federal and state hazardous waste requirements.

The University maintains a Hazardous Waste Contingency Plan that describes the actions to take should an emergency occur that involves hazardous waste. This plan describes the procedures and coordination that would take place between the University and the Providence Fire Department, Providence Police Department, and the Local Emergency Planning Commission in the event of an emergency involving hazardous waste. All laboratory staff are

trained annually on the Brown University hazardous waste management requirements and on the hazardous waste contingency plan.

Research in the building would involve the storage and use of radioactive materials as well as the storage of wastes from these research activities. The State of Rhode Island Radiation Control Agency regulates the use of radioactive materials in research laboratories at Brown University under a broad scope license. A radiation safety manual was prepared as part of the license application process. This manual establishes the procedures and policies to be adhered to while working with radioactive materials at the University. In accordance with these procedures, the radiation safety committee would approve and authorize the possession and use of all radioactive materials. Laboratory personnel would attend radiation safety training and would be monitored for radiation exposures, if required. The laboratories would be equipped with all the necessary safety features to keep radiation exposures as low as reasonable achievable. The laboratories would be surveyed for radioactive contamination and would be inspected for compliance on a regular basis. Research activities undertaken within the building would not result in the release of any radioactive emissions to the public.

The building would house a room for the temporary storage of radioactive wastes prior to shipment of waste offsite for disposal. Radioactive waste would be segregated according to whether it is solid or liquid. It would be further segregated by half-life (long-lived or short-lived). The waste would be picked up from the laboratories weekly and stored in waste storage rooms for decay or for disposal using a licensed radioactive waste disposal company. The waste storage rooms would be secured and the waste would be appropriately contained and shielded to minimize radiation exposure.

Medical research in the building would require the storage and use of biological agents, equipment, and waste. Faculty conducting research using biological agents and/or recombinant DNA would submit protocols, safety procedures, and a Biological Research Authorization application to the Office of Environmental Health and Safety (EHS). These uses would be reviewed by the Biological Safety Officer and then submitted to the University's Biological Safety Committee for final approval. EHS maintains the Brown University Biological Safety Manual and the Guidelines for Developing Biological Safety Procedures to assist researchers in the submission of their applications and to develop procedures that ensure safety for researchers, laboratories, and the community. EHS also conducts training in biosafety and bloodborne pathogens to minimize the risk of exposure and infection to laboratory staff. The Biological Safety Officer also conducts initial and spot inspections of laboratories to ensure compliance with the Centers for Disease Control, National Institutes of Health, and University guidelines and regulations.

RIDEM regulates disposal of regulated medical waste. Regulated medical waste would be managed in accordance with RIDEM's *Rules and Regulations Governing the Generation, Transportation, Storage, Treatment, Management, and Disposal of Regulated Medical Waste in Rhode Island* (Regulation DEM-DOH-MW-01-921). It is not anticipated that any pathological or isolation medical wastes would be generated in the proposed Life Sciences Building. However, if such wastes were to be generated, Brown University would comply with all aspects of the regulations.

Mixed waste could also be generated in some of the laboratories. These wastes could be either radioactive and biohazardous, or radioactive and chemical in nature. The mixed radioactive/biohazard waste would be autoclaved or disinfected, then treated as radioactive waste. The mixed radioactive/chemical waste would be shipped out as a mixed waste, following the hazardous waste regulations, if applicable.

The operation of the facility would result in a small increase in the use of hazardous materials and in the generation of hazardous, radioactive, and biological waste as a result of research conducted in the building. The impacts of the use of these materials and waste generation would be low.

4.1.2 Cultural/Historic and Socioeconomic Elements

This section describes the potential impacts of the proposed action on cultural and historic resources and the socioeconomic environment, including potentially disproportionately high and adverse impacts to low-income or minority communities.

4.1.2.1 Cultural and Historic Resources

Construction and operation of the proposed Life Sciences Building would require the demolition of three historic structures: 60 Olive Street, 185 Meeting Street, and 201 Meeting Street. In addition, the proposed building would be constructed within the College Hill Historic District, which was placed on the National Register of Historic Places in 1976. In accordance with 36 CFR 800.6(a)(1) of the National Historic Preservation Act Section 106 regulations, the National Advisory Council on Historic Preservation (ACHP) must be notified of any adverse effects that may result from an undertaking. A list of the correspondence documenting compliance with the regulations is in Appendix B.

With respect to the removal of the three historic buildings, the RISHPO stated that the buildings do not possess outstanding historical or architectural significance, but that they do contribute to the historic character of the district (Letter from Edward F. Sanderson, Deputy State Historic Preservation Officer, to Marisa Quinn, Community and Government Affairs, Brown University, dated December 13, 2001, contained in Appendix C). As a result, the RISHPO concluded that an appropriate mitigation for their loss would be Historic American Buildings Standard photo-documentation for the Rhode Island Historic Resources Archive (*ibid.*).

With respect to the exterior design of the proposed Life Sciences Building, extensive efforts were undertaken between Brown University, RISHPO, and others to assess the impacts that the proposed action would have upon historic and cultural resources and to agree on measures to mitigate the impacts. As a result of these efforts and the substantial redesign of the proposed building, in December 2002, the RISHPO concluded that the redesign "has sufficiently modified the building's form and character so that its potential to intrude upon the College Hill Historic District has been substantially reduced" (Letter from Frederick C. Williamson, State Historic Preservation Officer, to Marisa Quinn, Community and Government Affairs, Brown University, dated December 9, 2002, contained in Appendix C). Given this, the RISHPO indicated that it was possible to enter into an MOA that would "satisfactorily mitigate the project's effects on the historic district." The final MOA among Brown University, the RISHPO, NASA, and DOE outlining required mitigation efforts is contained in Appendix A.

The following sections discuss the mitigation efforts considered and those adopted with respect to the removal of the three historic buildings and the construction and operation of the proposed Life Sciences Building within the historic district. With the implementation of the planned mitigation measures, impacts to historic resources would be minor.

Mitigation Efforts Considered

Maintaining the house at 185 Meeting Street

The University first examined whether the proposed building could be constructed around the house at 185 Meeting Street. However, doing so would have severely limited the land available for the proposed project, resulting in a building that could not accommodate the programmatic needs. Furthermore, the setting of the house would have been severely compromised.

Incorporating the House at 185 Meeting Street into the Proposed Building

The University also examined whether the house at 185 Meeting Street could be incorporated into the design of the proposed Life Sciences Building. However, technical issues such as inadequate floor-to-floor height, structural floor loading, firewall separations, construction type, and accessibility would prevent the house from being used even as office space. Incorporating the existing house into the proposed building would have also created a net increase in the mass of the building, due to inefficiencies within the house itself and inefficiencies associated with working around it. The result would have been programmatic sacrifices, as no small discrete groups could be separated from the rest of the building.

Relocating 185 Meeting Street to another site on-campus

As an alternative to demolition, the University studied the possibility of relocating the house at 185 Meeting Street to several other on-campus sites. Although separating any resource from its original site irrevocably alters the understanding of the resource, in the case of 185 Meeting Street, the setting of the house has been so severely altered over time that much of the integrity of setting has already been compromised. Therefore, this was seen as an acceptable alternative.

Because the University is located in a densely developed historic district, a limited number of sites that could accommodate the relocated house are available. Three potential sites were identified on Brown Street: two mid-block locations between Cushing and Bowen Street and one at the southeast corner of Brown and Cushing Streets (see Figure 2). However, none of these sites provided the house with a setting similar to its historic setting, and none offered the same orientation or topography similar to the current site. Furthermore, two of the sites would require the removal of existing historic resources, both of which are more strongly associated with the period of significance than the house at 185 Meeting Street. The third site would have an adverse effect on the historic Pembroke campus, interrupting vistas into the main quadrangle.

Further, in order to move the house, it would have to be separated from its foundation and divided into at least two or, more likely, four pieces. Overhead utilities would have to be relocated and a significant number of street trees would have to be cut down. The materials of the house (slate, stucco, plaster) would likely suffer a great deal of damage during the move. The house would then be reassembled at the site. Structural repairs would be made, but the integrity of the structure and of the exterior of the building would be greatly reduced. Extensive asbestos abatement would be required (all interior plaster) and substantial interior code upgrades (fire protection, fire alarm, accessibility, floor loading, *etc.*) would be required to comply with current regulations for office use. The costs associated with this type of move and the required code upgrades would be prohibitively expensive.

The other option, which was explored in detail, would be dismantling the house and reconstructing it on another site. This would have eliminated the difficulties associated with moving a large structure over the roads (utilities, trees, *etc.*), but the integrity of the original house would have been severely compromised. Again, the costs associated with this option proved prohibitive.

Mitigation Efforts Adopted

Offering the house at 185 Meeting Street to a third party for relocation

Historic resources that are to be demolished are sometimes offered to interested third parties who are willing to assume and relocate the structure at their own cost. The University, recognizing the significant costs involved with relocating the house, is willing to contribute up to $250,000 to the relocation. To date, no qualified party has been identified (*i.e.*, criteria include ownership of property on which to locate the structure). Brown University has made this offer at public meetings and by advertising in local newspapers such as the *Providence Journal*.

Providing documentation for historic properties requiring demolition

Before demolishing the historic properties at 60 Olive Street, 201 Meeting Street, and potentially at 185 Meeting Street, the University would prepare documentation of the historic properties based on standards established by the Rhode Island Historical Preservation and Heritage Commission. The documentation, including archival quality photographs of the historic properties, would be transmitted for inclusion in the Rhode Island Historic Resource Archive.

Scale, Massing, and Vocabulary

Although the need for space is critical, rather than proposing a Life Sciences Building that would be five stories at every point as would be allowed by city zoning ordinance, Brown University proposed keeping the scale of the Meeting Street elevation relatively low, while concentrating most of the massing of the building in the portion of the building located on Olive Street, which abuts other large, institutional buildings. Achieving this while still meeting optimal programmatic needs called for a six-story, 26-meter (85-foot) tall portion of the building. The University sought and received a height variance from the City of Providence to build to this height, which was 3 meters (10 feet) above zoning ordinance. However, the neighboring community and the RISHPO requested that the scale, massing, and vocabulary (exterior building envelope) of the new building be modified.

As a result of feedback from the RISHPO, community leaders, the Providence Preservation Society (PPS), and others, the design of the proposed building has changed substantially since the original conceptual design. The Life Sciences Building would be three stories along Meeting Street, with the remainder of the building at five stories. The eastern portion of the building closest to Thayer Street would begin at two stories, step up to four stories, then step up to five stories. The design vocabulary of the building has been modified substantially.

During the comment period on the Draft EA, the RISHPO requested that a landscaping plan be developed as an additional mitigation measure. Brown University has committed to developing a landscaping plan for the proposed Life Sciences Building in response to this request (see final MOA in Appendix A).

4.1.2.2 Socioeconomic Resources/Environmental Justice

The proposed action would not be expected to increase burdens on local social resources. Brown University's ability to retain and attract highly technical professors and researchers by having a modern Life Sciences Building and associated facilities is likely to benefit the local community and the City of Providence. No adverse socioeconomic impacts would occur as a result of the implementation of the proposed action.

With respect to environmental justice impacts, Executive Order 12898 directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on low-income populations and minority populations in the United States. The proposed Life Sciences Building would be constructed and operated under the guidelines of the Executive Order.

A comparison was made between the population demographics within the areas of impact and the estimated levels of impact. The most significant impacts were identified as the footprint of the proposed Life Sciences Building and the associated impact to the historic district designation and transportation corridors to and from the site during demolition, excavation, and construction. Based on the level of impacts reported in the preceding sections of Chapter 4 and the demographics reported in Section 3.2.2, the likelihood of both adverse and disproportionate impacts is low.

4.1.3 Cumulative Impacts

Council on Environmental Quality regulations implementing the procedural provisions of NEPA require federal agencies to consider the cumulative impacts of a proposal (40 CFR 1508.25(c)). A cumulative impact on the environment is the impact that results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). This type of an assessment is important because significant cumulative impacts can result from several smaller actions that by themselves do not have significant impacts.

The proposed Life Sciences Building would result in the permanent loss of three historic structures. Mitigation measures would be taken to reduce this impact to historic resources to the fullest extent possible. This mitigation includes substantial modifications to the design, scale, and massing of the proposed building in order to reduce intrusion upon the historic district as much as possible. The impact to historic resources, when added to other past, present, and reasonably foreseeable future actions in the College Hill Historic District, would not be cumulatively significant.

During construction, there would be a small volume of air pollutant emissions, temporary increases in noise, and temporary disruptions in traffic and parking. Construction of the building would also result in the destruction of three historic buildings. The operation of the facility would result in a small increase in the use of hazardous materials and in the generation of hazardous, radioactive, and biological waste as a result of research conducted in the building. The operation of the proposed building would also result in a small volume of fugitive air emissions, some of which would be regulated under amendments to the University's existing Title V Air Operating Permit. The fugitive emissions from the laboratories in the proposed Life Sciences Building, together with the emissions from the laboratories in the existing Biomedical Complex and the other laboratories at Brown University, would not result in cumulative emissions exceeding the minimum quantities of air toxics regulated by RIDEM. The operation of the

building would not add to the ambient noise level in the surrounding area. Adverse impacts to the historic area were found by the RISHPO to be capable of being mitigated. Because of their small volume and/or short duration, none of these impacts, when added to other past, present, and reasonably foreseeable future activities in the area of Brown University or Providence, Rhode Island, would result in cumulatively significant environmental impacts.

4.2 No Action Alternative

Under the no action alternative, neither NASA nor DOE would provide partial funding (amounting to less than 7 percent of the project's total funding) for the proposed Life Sciences Building. However, it is likely that Brown University could find other sources for these funds. Brown University is committed to implementing the project without the NASA or DOE funding if necessary; thus, the environmental impacts of the no action alternative would be the same as those of the proposed action.

Chapter 5 Public Involvement Process

Brown presented its revised Master Plan for 2000, which included the proposed Life Sciences Building, to the City Planning Commission in October 2000. The Commission approved the project and granted conditional approval in November 2000, and granted its full approval in July 2001.

As part of this process, the University hosted a community meeting in June 2000 to outline the elements of the plan. This meeting was well attended and covered in the *Providence Journal*. In addition to this, when it became clear that the location site of the building would require relocating or demolishing historic resources, the University had several meetings with the PPS and one with the College Hill Neighborhood Association (CHNA) to discuss the project.

The University also sought and received a variance from the Providence Zoning Board allowing a portion of the building to exceed the maximum height by 3 meters (10 feet). Prior to the public hearing, the University notified all property owners within 60 meters (200 feet) of the proposed building and many of the key stakeholders and neighbors about the hearing.

In compliance with the Section 106 process, the RISHPO hosted a public meeting in November 2001. Since that time, University officials have interacted with the RISHPO, the national ACHP, and the federal funding agencies to assess and mitigate impacts. There have been meetings with leaders from the College Hill and Fox Point neighborhood associations to apprise them of changes made to the scale, massing, and design of the proposed project, and to get their feedback.

As of July 2003, in accordance with the MOA, the University is continuing to work with the RISHPO. University representatives will meet with affected residents and businesses to discuss the construction process and efforts to mitigate impacts.

Throughout the process, elected and appointed officials at the city, state, and federal levels have been invited to meetings and apprised of the proposed action and its evolution.

Appendix D contains a description and timeline of public involvement reflecting interactions that have occurred both prior to as well as during this federal EA process. Appendix E summarizes the comments received on the Draft EA and provides responses to the comments.

Chapter 6 Agencies and Persons Consulted

During the development of the proposal for a Life Sciences Building and this EA, NASA, DOE, and/or Brown University consulted with the following:

City of Providence, City Hall Archives Collection

City of Providence, Department of Inspections and Standards

City of Providence, Department of Public Works

City of Providence Engineering Department

City of Providence, Department of Fire Prevention

City of Providence Planning Department

City of Providence Tax Assessor's Office

College Hill Neighborhood Association

Narragansett Bay Commission

Narragansett Electric Company

National Advisory Council on Historic Preservation

Providence Water Supply Board

Providence Historic District Commission

Providence Preservation Society

Rhode Island Department of Environmental Management

Rhode Island Department of Health

Rhode Island Historic Preservation and Heritage Commission

Rhode Island Historical Society

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Chapter 8 List of Preparers

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Appendix A: Final Memorandum of Agreement

MEMORANDUM OF AGREEMENT AMONG

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,

AND

UNITED STATES DEPARTMENT OF ENERGY

AND

THE RHODE ISLAND HISTORICAL PRESERVATION AND HERITAGE COMMISSION

AND

BROWN UNIVERSITY

REGARDING THE LIFE SCIENCES BUILDING PROJECT

PROVIDENCE, RHODE ISLAND

WHEREAS, the National Aeronautics and Space Administration (NASA), and the United States Department of Energy (DOE) are providing limited funding to Brown University, Providence Rhode Island, for a Life Science Building (LSB) within the College Hill Historic District; and

WHEREAS, the LSB will have an adverse effect on the College Hill Historic District, which is listed on The National Register of Historic Places, because three structures will be removed (60 Olive Street, 201 Meeting Street, and 185 Meeting Street) and replaced with a new state-of–the-art building; and

WHEREAS, the LSB Project will have the potential for adverse effects on traffic, parking, noise, visual, and emissions during construction; and

WHEREAS, NASA and DOE have consulted with the Rhode Island Historical Preservation and Heritage Commission ("Commission"), which is the Rhode Island State Historic Preservation Office (RISHPO), in accordance with Section 106 of the National Historic Preservation Act, as amended (16 U.S.C. 470f) and its implementing regulations (36 CFR Part 800); and

WHEREAS, Brown University has participated in the consultation and has been invited to concur in this Memorandum of Agreement (MOA); and

WHEREAS, to inform and involve the community, Brown University has met and communicated with city officials, community groups, preservation groups and the general public, as listed in Appendix A of this MOA; and

WHEREAS, in response to comments, Brown University has made changes and scaled back its original plans for the LSB; and

WHEREAS, the RISHPO has reviewed and approved schematic architectural plans for the LSB site, footprint, scale, massing and exterior façade through November 2002; and

NOW, THEREFORE, the signatories to this MOA agree that the implementation of the following stipulations will take into account and mitigate the effects of the LSB on the College Hill Historic District, including contributing properties located at 185 Meeting Street, 201 Meeting Streets and 60 Olive Street, Providence, Rhode Island (the "Historic Properties").

STIPULATIONS

The parties to this agreement agree to the following stipulations:

1. Brown University shall prepare documentation of the Historic Properties based on the standards established by the Commission prior to the demolition of the Historic Properties.

2. Brown University shall submit the documentation, including archival quality photographs of the Historic Properties to RISHPO for inclusion in the Rhode Island Historic Resources Archive.

3. Brown University shall salvage items of historic value, following consultation with the Commission.

4. Brown University shall submit architectural elevations for the exterior of the LSB to the RISHPO for review and approval of the LSB, including materials, color and façade treatment, through the design development phase.

5. Brown University shall develop a landscaping plan for the LSB and the adjoining sections of Meeting and Olive Streets and submit it to the RISHPO for review and approval. The emphasis of this plan shall be to establish a corridor of street trees.

6. Prior to the commencement of construction of the LSB, Brown University shall prepare and then implement construction phasing, logistics and mitigation plans to address traffic, parking, and other temporary effects associated with construction, such as dust, noise, and vibration.

7. If potential historic properties are discovered or unanticipated effects on historic properties found, NASA and DOE shall carry out the provisions in 36 CFR Part 800.13(b)(2).

8. Any party to this Agreement may request that it be amended, whereupon the parties shall consult in accordance with 36 CFR Part 800 to consider such an amendment. In

the event of a dispute that cannot be resolved among the signatories, any one of the signatories may request the participation of the Advisory Council on Historic Preservation to assist in resolving the dispute.

9. This Agreement shall be null and void if the terms are not carried out within ten (10) years from the date of its execution unless the signatories agree in writing to an extension to carry out its terms.

10. NASA and DOE shall incorporate the above stipulations as conditions of their respective grants to Brown University.

Execution of this Agreement and implementation of its terms evidence that NASA and DOE have taken into account the effects of the LSB Project on the Historic Properties.

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BY: _____ DATE: _____
Dr. Malcolm V. Phelps

Title: Associate Director for Programs NASA Headquarters, Education Division Office of Human Resources and Education

UNITED STATES DEPARTMENT OF ENERGY

BY: _____ DATE: _____
Eric M. Simpson

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THE RHODE ISLAND HISTORICAL PRESERVATION AND HERITAGE COMMISSION

By: _____ **Date:** _____
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BROWN UNIVERSITY

By: _____ **Date:** _____
Walter Hunter

Title: Vice President of Administration

Appendix B: Selected Letters from the Rhode Island State Historic Preservation Officer

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
HISTORICAL PRESERVATION & HERITAGE COMMISSION
Old State House • 150 Benefit Street • Providence, R.I. 02903-1209
Preservation (401) 222-2678 FAX (401) 222-2968
Heritage (401) 222-2669 TDD (401) 222-3700

December 13, 2001

Ms. Marisa Quinn
Community and Government Affairs
Brown University
Box 1941
Providence, RI 02912

Re: Life Sciences Building, Brown University
Meeting and Olive Streets, Providence

Dear Ms. Quinn:

The Rhode Island Historical Preservation and Heritage Commission staff has been reviewing the project information on the proposed Life Sciences Building, including the draft mitigation report, the latest architectural plans you have provided, and the comments of the interested public who spoke at the public information meeting on November 28, 2001. We have the following comments.

The Draft Mitigation Report provides a discussion of the project need, the process used to evaluate alternatives and select the preferred site, the historic resources affected by the proposed action, and proposed measures to mitigate project effects. We find that the report adequately describes the project need. The section dealing with the consideration of alternative sites and the selection of the preferred site should address the questions raised at the public meeting about the suitability of an off-campus location next to Rhode Island Hospital or Miriam Hospital.

The report describes the project site within the College Hill National Register Historic District. It should be noted that this section of the College Hill National Register Historic District does not lie within the College Hill National Historic Landmark District. The discussion of affected historic resources focuses on the three buildings that would have to be removed for the project. We find that the surrounding portion of the historic district needs to be included as an affected resource as well, due to the scale and mass of the proposed building. It would also be appropriate to discuss the previous construction that has irretrievably altered the historic scale and character of this block.

The report concludes that the removal of the buildings at 60 Olive Street and 201 Meeting Street would have no adverse effect on the historic district. We do not agree. While they do not possess outstanding historical or architectural significance, they are representative of the development trends in the historic district in the early 20th century, and in siting, scale, form, and materials they contribute to the historic character of the district. An appropriate form of

mitigation for their loss would be HABS-standard photo-documentation for the Rhode Island Historic Resources Archive.

We agree that the removal of 185 Meeting Street would have an adverse effect on the historic district. At the public meeting, several questions and comments were made regarding the possibility of redesigning the project to preserve 185 Meeting Street on site (e.g. adding a seventh story to the eastern section). It would be appropriate to respond to this issue. If the building cannot be preserved in place, relocating it would be an appropriate means to mitigate this effect. We recognize that there are considerable logistical problems that have prevented Brown from moving the building, including the building's structural form, lack of appropriate sites and potential impacts to street trees. The results of Brown's efforts to offer the building to the public for relocation inside or outside the district should also be documented in this report. In the absence of a viable plan by Brown or others to move the building, it should be photo-documented to HABS standards for the Rhode Island Historic Resources Archive.

Before we can reach a conclusion on the project's effect on the adjoining portion of the historic district, we need to review additional information on the building design, atmospheric effects (noise and emissions), and parking impacts. The specifics of these issues are discussed below.

Building Design – The Life Sciences Building, as described in the Ballinger plans dated October 11, 2001, consists of an L-shaped six-story structure on the east end and a three-story rectangular block on the west end. In its form and design, the building would represent an eastward extension of the large, modern sciences complex that occupies the western half of this block. Built up over the past thirty years, these existing science buildings represent a significant break in scale and mass from the surrounding historic neighborhood and are generally considered to lack architectural merit.

Architecturally, the proposed project is a work of classic modernism clad in brick with a large amount of glazed surface. The building's height and breadth would make it a dominant part of the landscape on the block of Meeting Street between Brown and Thayer Streets and on the east end of the same block of Olive Street. It would be a notable visual presence on Thayer Street in the vicinity of the Dale Building and the Avon Theater and in views east from parts of the neighborhood at the intersections of Meeting and Olive Streets with Brown Street.

In weighing the relative magnitude of the building's impact on the historic setting, the most significant impact would be felt on Meeting Street. Currently the proposed elevation represents an interruption of the rhythm of the historic district's streetscape. The severe planar quality of the façade and the large amount of blank masonry at sidewalk level detract from the district's sense of place, as does the very long projecting horizontal mass of the third floor. This needs to be mitigated with architectural measures that integrate the building with the pedestrian level more effectively and provide a more compatible rhythm to the third floor elevation. Such measures would also mitigate the building's intrusive qualities in views up and down Meeting Street.

Landscaping, and street trees in particular, should be incorporated into the designs for both Meeting and Olive Streets, to maintain the continuity of the streetside environment along these streets.

The east elevation of the building would become a significant visual element rising above the commercial buildings on the west side of Thayer Street. We previously voiced concerns about the blankness of the façade and we note that the current design includes additional windows here. A broad expanse of masonry remains at the fire stairs that cannot be opened with windows. Patterned masonry or other treatments should be considered here, to provide this surface with a character that responds to the buildings below it on Thayer Street.

Atmospheric Effects - In addition to the preceding issues, members of the interested public voiced concerns about a number of other potential impacts at the meeting on November 28, 2001. The issues of noise and emissions were raised, both the impact of the atmospheric output to be generated by the new building and the cumulative effect that would result when the new building's noise and emissions were added to those generated by the adjacent laboratories and other buildings. We agree that the atmospheric effects of noise and emissions need to be evaluated at the individual and the cumulative levels.

Other Effects - We also find that the associated project impact of parking for the building's occupants needs to be evaluated, to insure that it does not have adverse effects on the quality of the adjacent portion of the historic district. Regarding public comments on the temporary impacts of construction activities (e.g. workers' parking, blasting impacts), Brown's plan for addressing these issues should be explained in the report as well.

We look forward to receiving further information from you on these various aspects of the project to complete our assessment of the project's effects and the available means to avoid or mitigate adverse effects. These comments are provided in accordance with Section 106 of the National Historic Preservation Act. If you have any questions, please contact Richard Greenwood, Project Review Coordinator of this office.

Very truly yours,

Edward F. Sanderson
Executive Director
Deputy State Historic Preservation Officer

Cc: Michael McCormick, Planning Department, Brown University
Catherine Horsey, PPS
Interested Members of the Public, per sign-up on 11/28/01

(011213.04)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
HISTORICAL PRESERVATION & HERITAGE COMMISSION
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December 9, 2002

Ms. Marisa Quinn
Community and Government Affairs
Brown University
Box 1941
Providence, RI 02912

Re: Life Sciences Building, Brown University
Meeting and Olive Streets, Providence

Dear Ms. Quinn:

In our previous comments on this project, we expressed our concern that the Life Science Building could become an intrusive presence in the historic district through a combination of massive scale and incompatible design. Avoiding this would require a basic re-examination of the building's scale and massing, as well as the overall architectural character. On November 22, 2002, we received from you elevation drawings of a revised design for the proposed Life Sciences Building. We understand this new design represents a response to our concerns about the previous proposal and these drawings are the same as those you showed us at a meeting on September 30, 2002. We further understand that the same drawings have been shown to the College Hill Neighborhood Association on October 9, 2002 and an earlier but essentially similar version was shown to the Architectural Review Committee of the Providence Preservation Society on August 27, 2002. We have the following comments.

The building as shown in the latest version differs significantly from its predecessor in the three areas of scale, massing, and architectural character. Most notable are the changes to the building's height. While the footprint is essentially the same, the L-shaped block on the eastern side of the complex has been lowered from six to five stories. In addition, on the east end of the block the building steps down to three stories where it meets the historic commercial buildings on Thayer Street. On the three-story wing on the west end of the complex, the unrelieved horizontality of the previous design has been eliminated by the increased articulation of the façade and the creation of a public entrance that responds well to Meeting Street and the axis of the Pembroke campus. On the complex as a whole, the patterns of fenestration are more appropriately scaled and the use of horizontal belt courses and cornices provide an appearance more compatible with the adjoining neighborhood. Brick is to be the primary exterior material with stone or composite stone trim.

We have concluded from our review that this redesign has sufficiently modified the building's form and character so that its potential to intrude upon the College Hill Historic District has been substantially reduced. Given these fundamental design changes, we believe it is possible now to enter into a memorandum of agreement that would satisfactorily mitigate the project's effects on the historic district. The key elements of such an agreement would be provisions for RIHP&HC review and approval of subsequent designs and plans through the final design phase, implementation of plans to address temporary construction impacts, and documentation of the three buildings that would be removed for the project. We also need to confirm with you that the atmospheric effects (noise and emissions) that will result from the completed project will not adversely affect the historic district.

These comments are provided in accordance with Section 106 of the National Historic Preservation Act. If you have any questions, please contact Richard Greenwood, Project Review Coordinator of this office.

Very truly yours,

Frederick C. Williamson

Frederick C. Williamson
Chairman
State Historic Preservation Officer

Cc: Ann Hooker Clarke, NASA
Lois M. Thompson, US Dept. of Energy
Peter Siebach, US Dept. of Energy
Walter Hunter, Vice President for Administration, Brown University
Thomas McCullough, Advisory Council on Historic Preservation
Catherine Horsey, PPS
Frederick C. Stachura
William Touret, Ronald Dwight and Other Interested Members of the Public, per sign-up on 11/28/01

(021209.03)

Appendix C: Section 106 Process Correspondence

Date	From	To	Subject
3/20/2003	Rick Greenwood, RI Historical Preservation & Heritage Comm.	Paul Dietel, Brown University Facilities Mgmt	Life Sciences Building draft historic documentation for 3 buildings proposed for demolition as part of the project
12/9/2002	Frederick Williamson, RI Historical Preservation & Heritage Comm.	Marisa Quinn, Brown University Community & Government Relations	Changes to Life Sciences Building design plans - the modifications to the plan have reduced the building's potential to intrude upon the College Hill Historic District
3/8/2002	Frederick Williamson, RI Historical Preservation & Heritage Comm.	Marisa Quinn, Brown University Community & Government Relations Ann Hooker, NASA	Concern about areas in the College Hill Historic District where the Life Sciences Building poses potential impacts
2/14/2002	Kenneth Kumor, NASA	Rick Greenwood, RI Historical Preservation & Heritage Comm.	NASA has delegated responsibility to Brown University to draft an MOA
2/14/2002	Kenneth Kumor, NASA	Thomas McCulloch, Advisory Council on Historic Preservation	NASA invites the participation of the ACHP in drafting the MOA for the Life Sciences Building project
1/31/2002	Jay Fluck and Luigi Bianco, Providence Preservation Society	Ruth Simmons, Brown University	The Board of Trustees of PPS voted to oppose the construction of the Life Sciences Building; concern for future buildings of this scale on the Brown campus
12/19/2001	Edward Sanderson, RI Historical Preservation & Heritage Comm.	Marisa Quinn, Brown University Community & Government Relations	Recusing himself from further review of Life Sciences Building project to avoid appearance of self-interest; Rick Greenwood will remain the principal contact
12/13/2001	Edward Sanderson, RI Historical Preservation & Heritage Comm.	Marisa Quinn, Brown University Community & Government Relations	Comments on Life Sciences Building project - the size and scale do not fit the character of the neighborhood, parking problems need to be addressed, the removal of buildings at Olive and Meeting Streets would have an adverse effect on the neighborhood

Date	From	To	Subject
10/25/2001	Edward Sanderson, RI Historical Preservation & Heritage Comm.	Marisa Quinn, Brown University Community & Government Relations	The Life Sciences Building project will have an adverse effect on the College Hill National Register Historic District; public meetings should be held to address concerns; the Advisory Council on Historic Preservation should be notified
6/1/2001	Edward Sanderson, RI Historical Preservation & Heritage Comm.	Marisa Quinn, Brown University Community & Government Relations	Follow up to 5/14/01 meeting - the Life Sciences Building will have an adverse effect on the neighborhood; requirements of Section 106 must be completed during planning process
5/21/2001	Edward Sanderson, RI Historical Preservation & Heritage Comm.	Kathleen Walker, US Postal Service	The proposed relocation of the Postal Service's East Side station will have no adverse effect on the historic district
5/16/2001	Luigi Bianco, Providence Preservation Society	Marisa Quinn, Brown University Community & Government Relations	Follow up to 3/15/01 presentation to Planning & Architectural Review Committee - PPS is concerned with impact of any plans for facilities expansion; recommendations from PPS for Life Sciences Building - the overall plan needs refinement
3/18/2001	Edward Sanderson, RI Historical Preservation & Heritage Comm.	Paul Dietel, Brown University Facilities Mgmt	Comments on Life Sciences Building materials: the demotion of three buildings will adversely affect the neighborhood; the new building as proposed will also have an adverse effect
2/6/2001	Edward Sanderson, RI Historical Preservation & Heritage Comm.	Kevin Nelson, RI Statewide Planning Program	The proposed demolition and new construction will have an effect on the College Hill National Register Historic District and more detailed information is needed to determine if this effect will be adverse

Appendix D: Timeline of Public Involvement

June 2000, Community Meeting
University hosts public meeting prior to presenting revised Master Plan to City Plan Commission in September 2000. Meeting advertised in *Providence Journal* and Brown's *Community Bulletin* sent to 14,000 East Side residents. Meeting covered in *Providence Journal*.

October 2000, City Plan Commission
Brown officials present revised Master Plan to City Plan Commission. Plan includes proposed Life Sciences Building and associated projects (relocating U.S. Post Office, demolishing current structures, relocating parking).

City Plan Commission approves Table of Projects, which includes proposed Life Sciences Building, but gives entire plan conditional approval while requiring the University to try to resolve parking issues that were raised and to return in 6 months.

Spring 2001, Zoning Board Meeting
University asks Zoning Board for height variance of 10 feet to proceed with project. University sends letters to abutters within 200-foot radius, sends copies to key stakeholders, and places calls to neighbors. Zoning sends notices to property holders within 200 feet. Zoning Board grants variance, which is appealed.

Spring 2001-present, Historic Review
Because project would require relocating or demolishing various structures, Brown hires consultant to assess historic value of various properties. University officials meet with representatives from Providence Preservation Society (PPS) in March, April, June, July, and September 2001. Representatives from Rhode Island's State Historic Preservation Office are included in some of these meetings. Brown omits from parking expansion plan the demolition of a Greek Revival Structure; agrees to offer 185 Meeting Street to third party.

June 2001, City Plan Commission
Brown presents update on efforts to address neighbor concerns regarding parking, seeks approval on an amendment that includes approval to demolish 185 Meeting Street. PPS defines the demolitions as "reconcilable losses." Lack of quorum; no vote taken.

July 2001, City Plan Commission
City Plan Commission approves plan.

October 2001, College Hill Neighborhood Association (CHNA)
Brown representatives attend CHNA to discuss the new building, the construction schedule, *etc.* Many neighbors vocally oppose.

November 2001, RISHPO hosts Public Meeting
University officials discuss rationale for the building, review site selection process, and present architectural renderings and models to community. Meeting advertised publicly.

Approximately 30 members of the CHNA and Fox Point Neighborhood Association attend. Many voice significant opposition to the building. Among the issues raised were:

- Scale and massing of the building;
- Overall design;
- Noise during and after construction;
- Possible emissions;
- Traffic and parking impacts during and after construction;
- Desire for the building to be located near the hospital.
- Loss of the building that houses Sarah Doyle Women's Center

PPS representatives attended, and restate their position of neither supporting nor opposing demolition of structures.

December 2001
SHPO sends letter to Brown University outlining issues raised during November 2001 meeting. (Note: By this time, the University has hired consultants to assess and address noise, emissions, *etc.* Plans developed to have construction workers park offsite.)

Ted Sanderson, Deputy State Historic Preservation Officer, recuses himself from project, citing conflict of interest because spouse works for Brown as a consultant. Fred Williamson, State Historic Preservation Officer, named Officer of Record with continued staff support from Richard Greenwood.

Funding from NASA and DOE confirmed.

January 2002
Upon urging from CHNA, PPS holds emergency board meeting and votes to oppose Life Sciences Project. (Only half of Board is present, and vote is 9 to 7.) PPS sends letter to President of Brown University.

February 2002
With NASA identified as lead agency, meeting scheduled with staff from NASA and Brown University to discuss project. As regulations suggest, SHPO remains agency of record to negotiate with Brown unless significant obstacles arise.

SHPO and University representatives meet to discuss efforts taken to address issues raised in December letter and to outline MOA elements. SHPO outlines specific concerns regarding size, scale, massing, and design of building that must be addressed to achieve MOA.

Brown hosts meeting with NASA and SHPO to negotiate compromise in hopes of proceeding with MOA.

March 2002
SHPO writes letter to NASA indicating that they are not prepared to enter into an MOA due to scale, size, massing, and design vocabulary.

With possibility that SHPO will terminate negotiations, University updates Advisory Council on Historic Preservation on efforts to reach agreement. Advisory Council communicates willingness to enter MOA; shares information with Brown and SHPO.

Brown decides to continue to work locally to reach agreement. Brown representatives, including architect, meet with SHPO and discuss possible modifications.

Note: Members of College Hill Neighbors create new group, "Concerned Citizens of College Hill," focusing on Life Sciences Building. Circulate petition expressing concerns noted above.

April 2002
Architects produce possible new designs to reflect SHPO concerns. SHPO indicates they are a step in the right direction.

May 2002
Facilities and Design Committee of Brown Corporation reviews designs.

July 1, 2002
Brown representatives meet with SHPO. SHPO indicates designs have improved and are close.

July 31, 2002
Brown hosts meeting with CHNA board to review revised designs. Design addresses scale, massing, and vocabulary—is reduced by one story, stepped back from Thayer Street.

August 27, 2002
Brown presents revised design to PPS architectural review committee.

September 30, 2002
Brown and architect meet with SHPO to review latest design. Vocabulary has changed significantly. Agree that next step is to proceed with MOA. MOA to include:

- Documentation of the structures to be demolished based on Rhode Island Historical Standards (because none are landmark quality, the Historic American Building Survey standard is not necessary)
- Salvage items from 185 Meeting Street with preference for keeping items in College Hill area
- Final review and approval of design
- Outline temporary effects of construction (*i.e.*, controlled detonations) and plan to address.

October 9, 2002
Brown hosts meeting of CHNA board to review revised designs and to discuss longer-range planning process being done by institutional master planner, Frances Halsband.

October 2002
Brown representatives have breakfast meeting with CHNA representatives. CHNA representatives remain opposed to building despite modifications.

December 9, 2002
RISHPO sends letter to Brown University indicating that given changes to scale, massing, and design, it would be possible to enter into an MOA.

January-April 2003
Draft EA prepared.

Draft MOA developed, shared with SHPO, NASA, ACHP, and DOE.

May 2003
Representatives from Brown University, Gilbane Construction, and Ballinger Associates host two meetings: one with residents with property immediately adjacent to project (within 300-foot radius), and one with the broader community.

Representatives from Brown University and Gilbane Construction meet with area merchants to discuss project and construction schedule and impacts.

Letter sent from University to Thayer Street property owners along with information about project and schedule, offering to meet.

Elected officials updated about project status and schedule.

June 2, 2003
Draft EA issued for 30-day public comment period.

Appendix E: Responses to Comments on the Draft Environmental Assessment

The EA was issued in draft, along with a draft Finding of No Significant Impact, on June 2, 2003, for a 30-day comment period, which ended on July 1, 2003. Comments were received from 39 individuals, organizations, and agencies (several comments were received after the July 1 deadline, but were considered by NASA and DOE). The commenters raised concerns regarding (1) air emissions from the proposed Life Sciences Building, (2) noise levels resulting from the operation of the proposed facility, (3) the effect of the building on the residential community, (4) the effect on historic resources in the community, (5) the expected use of the building, (6) the configuration of the proposed building, (7) the vulnerability of the proposed building to terrorist attack, (8) the length of the comment period and the need for a public hearing, and (9) the need for an environmental impact statement (EIS). Each of these issues is addressed below and/or in the Final EA, as appropriate.

Air Emissions

Comments: Commenters noted that the Draft EA stated that the proposed Life Sciences Building would release up to 6,000 pounds of air "toxins" per year. Commenters also stated that the proposed facility would "emit toxic chemicals, as well as radioactive and biological agents, into the atmosphere" and that incidences of cancer have occurred in the residential areas adjacent to the existing Biomedical Complex.

Response: In the Draft EA, the volume of air pollutant emissions expected to be emitted from the proposed Life Sciences Building was incorrectly stated to be 6,000 pounds annually. That volume is the amount estimated for fugitive emissions from all laboratories at Brown University. Approximately 25 percent of these emissions (or 1,500 pounds) are attributable to work in the existing Biomedical Complex (in 2001, the volume estimated to have been released from the Biomedical Complex was 1,330 pounds, or a total of 5,320 pounds for the University as a whole). This volume does not change substantially from year to year. Annual emissions from the proposed Life Sciences Building are expected to be about the same as, or less than, those from the Biomedical Complex. For purposes of analysis and to be conservative, NASA and DOE assumed that fugitive emissions from the proposed facility would be no more than 1,500 pounds annually.

As stated in the Final EA (Section 4.1.1.6), Brown University estimates that no more than 680 kilograms (1,500 pounds) of fugitive emissions would be released from the proposed Life Sciences Building, based on information from the existing Biomedical Complex. These emissions would be primarily from the use of ethanol, a volatile organic compound (VOC) that is used widely in biological research. Other emissions could include very small volumes of hazardous air pollutants (also known as air toxics) commonly used in laboratories, such as chloroform, methylene chloride, toluene, and xylene. None of these emissions, from the proposed building or in combination with releases from other laboratories at Brown University, would rise to a level requiring an air toxics permit from RIDEM under Rhode Island's Air Toxics Regulations because they would be far below the minimum quantities stated in the regulations (Air Pollution Control Regulation No. 22). Emissions from the building would be diluted to such an extent that they would be unlikely to increase ground-level concentrations of hazardous air pollutants at or beyond the property line.

It should be noted that the estimate of up to 680 kilograms (1,500 pounds) of air emissions is highly conservative. First, the volume of fugitive emissions from all University laboratories in 2001 was 2,410 kilograms (5,230 pounds), with approximately 25 percent, or 600 kilograms

(1,330 pounds), estimated to be from the existing Biomedical Complex. In 2002, this fell to an estimated 2,201 kilograms (4,852 pounds) for the University as a whole and 550 kilograms (1,213 pounds) for the Biomedical Complex. Second, the emissions are estimated based on mass balances performed that do not account for materials that remain in the laboratories as part of experimental processes and research samples. Finally, it is anticipated that the Life Sciences Building will house 51 laboratory modules, whereas the existing Biomedical Complex houses approximately 80 laboratories.

The EA also notes that operation of the boilers for the Life Sciences Building would result in NOx and VOC emissions of 1.08 MTPY (1.2 TPY) and 0.1 MTPY (0.11 TPY), respectively. These levels are well below the *de minimis* emissions level of 45.4 MTPY (50 TPY) for NOx or VOCs (criteria air pollutants) established by the State of Rhode Island under the Clean Air Act. These levels are also well below the Rhode Island State Implementation Plan levels for NOx and VOCs (89.6 MTPSD [98.8 TPSD] for NOx and 157.2 MTPSD [173.3 TPSD] for VOCs).

No incinerators are planned for the proposed Life Sciences Building; thus, there would be no releases from incinerators.

The new air emission sources, including releases from the boilers and the emergency generator, would be added to the University's existing Air Operating Permit issued by RIDEM. Although small amounts of criteria and hazardous air pollutants would be released, the proposed building would operate within the requirements of RIDEM. The fugitive emissions from the laboratories in the proposed Life Sciences Building, together with the emissions from the laboratories in the existing Biomedical Complex and the other laboratories at Brown University, would not result in cumulative emissions exceeding the minimum quantities of air toxics regulated by RIDEM. Brown University is responsible for compliance with RIDEM's air permitting requirements, which RIDEM monitors and enforces. Brown University annually reports its estimates of air emissions to RIDEM; these reports are publicly available.

The appropriate agency to address concerns regarding cancer incidences is the Cancer Registry of the Rhode Island Department of Health. Operation of the proposed Life Sciences Building will be in compliance with all applicable environmental permit requirements and be subject to oversight and enforcement by the various federal, state, and local environmental and public health agencies.

Noise Levels

Comments: Commenters stated that the existing Brown University buildings are "already in violation of" Providence's noise ordinances. They also stated that the Acentech noise studies commissioned by Brown University were incorrectly characterized in the Draft EA and that, in fact, those studies suggested that the proposed building would fail to comply with city noise requirements.

Response: As stated in the EA (Section 4.1.1.8), transient increases in noise levels would occur during the construction phase of the Life Sciences Building project due to operation of machinery and equipment, controlled detonations, steel erection activities, and other construction activities. However, all site trade contractors would be required to comply with the City of Providence Noise Control Ordinance. The city noise ordinance allows noise levels no higher than 55 decibels between 7 a.m. and 8 p.m. and 50 decibels between 8 p.m. and 7 p.m. (City Code of Ordinances, Chapter 16, Article III, Sections 16-92, 16-97, and 16-98).

Further, to ensure that the operation of the completed building would comply with the city noise ordinance, the University commissioned a mathematical analysis from Acentech to assess the effect of noise generated by the proposed building. This report estimated the noise levels that would be expected at several critical receptor locations near the proposed building (*Exterior Noise Emissions and Control Report*, Acentech, February 27, 2002). The building has been designed to limit noise emissions to the low 40-decibel level at the critical neighbor locations. This noise level would ensure that the total sound level from the proposed building is within the limit set by the local noise ordinance. Further, the building would not add to the ambient noise level in the surrounding area.

However, the Draft EA incorrectly stated that the noise level from the proposed Life Sciences Building, "together with noise emissions from other University buildings, would ensure that the total sound level is within the limit set by the local noise ordinance." In fact, ambient sound level measurements at locations in the residential community surrounding the site of Brown University's proposed Life Sciences Building show the influence of noise from heating, ventilation, and air conditioning and other building mechanical systems at some of Brown's existing biomedical research facilities in the area, as well as the influence of noise from vehicular traffic on local streets throughout the neighborhood. Background sound levels measured during a February 2002 noise study in the area were the highest at the corner of Brown and Meeting Streets, where background sound levels were found to be nearly constant at around 56 – 58 decibels, day and night. This information has been clarified in the Final EA (see Sections 3.1.8 and 4.1.1.8). The Final EA includes the following quote from the noise study:

> "Ambient sound level measurements at locations in the residential community surrounding the site of Brown University's proposed new Life Sciences Building show the influence of noise from HVAC [heating, ventilation, and air conditioning] and other building mechanical systems at some of Brown's existing biomedical research facilities in the project area, as well as the influence of noise from vehicular traffic on the many local streets throughout the neighborhood. Background sound levels were highest close to the site: at the corner of Brown and Meeting Streets, background sound levels were found to be nearly constant at around 56 – 58 dBA [decibels], day and night. Further back into the residential neighborhood, background sound levels dropped significantly: by roughly half a block away from the edge of the campus, levels dropped to the mid- to upper-40s dBA. At residential receptor locations roughly a block from the campus, daytime background levels in the low-40s dBA were measured, and nighttime levels fell into the upper 30s dBA." Report at Page 5.

Both of the Acentech studies are incorporated in the EA by reference (see Sections 3.1.8 and 4.1.1.8).

The Effect on the Residential Community

Comments: Commenters stated that the construction and operation of the proposed Life Sciences Building would be detrimental to the residential nature of the area and that such an "industrial" facility should be located in an industrial area. Commenters also stated that the value of their residential property in the area would be decreased by the construction and operation of the proposed Life Sciences Building.

Response: As noted in the EA (Chapter 2), several alternatives were considered for use of federal funding to meet the needs of the University for a proposed Life Sciences Building.

These included new construction on and off campus, renovation of existing facilities, and the no action alternative (as required by NEPA implementing regulations). After it was determined that renovation of existing facilities was not feasible, Brown University developed and implemented a screening process to determine reasonable alternative locations for a new facility. Reasonable locations were those that were (1) consistent with the city-approved Brown University Master Plan, (2) within the Institutional Zone established by the City of Providence (the area in which the city has indicated it is appropriate for the University to grow), and (3) in close proximity to existing biomedical facilities and within reasonable proximity to other existing University facilities. The location proposed by Brown University for the new Life Sciences Building meets these criteria. While the location is near a residential community, it is located on land owned by the University and is consistent with the University's and the city's master plans.

Further, as noted below (see the response to comments related to the use of the proposed building), the Life Sciences Building would be used for research in keeping with the mission of the University and is not intended for commercial or industrial purposes.

Construction impacts would be temporary and would be mitigated to the fullest extent possible (see Sections 4.1.1.7 and 4.1.1.8). The impact of the operation of the proposed Life Sciences Building in an area with other University laboratories and facilities on the value of residential properties in the future is speculative and would be based on the needs and desires of particular buyers and sellers at the time a house was put up for sale.

The Effect on Historic Resources in the Community

Comments: Commenters stated that the diminution of the district as a residential area will degrade the College Hill Historic District, which is a valuable asset to the historical record and the City of Providence's tourist economy. The Rhode Island State Historic Preservation Officer (RISHPO) requested that Brown University develop a landscaping plan to be reviewed and approved by the RISHPO.

Response: NASA and DOE recognize that the proposed Life Sciences Building will affect the College Hill Historic District. However, the RISHPO has, after lengthy discussions and negotiations with Brown University and after substantial modifications to the proposed building, determined that the adverse impacts can be mitigated satisfactorily. Brown University has committed to developing a landscaping plan for the proposed Life Sciences Building in response to the RISHPO's request.

Use of the Proposed Building

Comments: Commenters stated that the proposed Life Sciences Building was intended to be a "major commercial-governmental-industrial research complex" and that the building was no longer a facility for teaching students, but would be used for "unspecified research which could include military or the next pathogen epidemic." Commenters stated that the building would be "an industrial center for research involving large quantities of toxic chemicals, radioactive materials, and biological agents."

Response: The EA lists the types of research that would be conducted in the proposed Life Sciences Building (see Section 2.3.2). These activities, many of which are currently ongoing at other laboratory facilities on the Brown University campus, involve the routine use of toxic chemicals, radioactive materials, and biological agents, similar to activities undertaken in most

University and other research laboratories in the nation. Such chemicals, materials, and agents are used in small amounts, and any wastes generated are taken offsite for disposal in licensed disposal facilities. Section 4.1.1.9 of the EA describes the activities that would be undertaken to protect the health and safety of students and researchers who would use the laboratories in the proposed building and the members of the public, including other students, who live and work near the proposed building.

DOE and NASA do not believe that these proposed activities reflect an intention on the part of Brown University to establish a major commercial-governmental-industrial research complex. Although the type of work that would be conducted could benefit the missions of NASA and DOE, neither agency has been asked to or has any plans to grant additional monies for the construction or operation of the proposed building, including future research projects. Funding for research activities at the proposed Life Sciences Building would come from many sources, not just federal agencies. Any research funding provided by the National Institutes of Health (NIH) would be subject to the NEPA regulations promulgated by that agency (a description of the NIH NEPA review process can be found at: http://home.ncifcrf.gov/fme/pdfs/procedures/P355/Exhibit%20A.pdf). The mission of Brown University is to educate and prepare students to discharge the offices of life with usefulness and reputation. The addition of seminar rooms, meeting space, and modern laboratory facilities for life sciences research will enable the University to meet this mission.

Configuration of the Proposed Building

Comments: One commenter requested that the proposed three-story part of the building be eliminated so that the proposed building would be set farther back from Thayer Street. This would be accomplished by moving compactors and trash containers to the westerly side of the building and moving the conference room space as "penthouse rooms on top of either of the two buildings in question."

Response: The decision pending before NASA and DOE is whether to provide partial funding for the Life Sciences Building proposed by Brown University. Neither NASA nor DOE are in a position to suggest that Brown University modify its building plans as suggested by the commenter. NASA and DOE note that the University has gone through an extensive planning process and has modified its plans several times to accommodate community concerns. These modifications involved reducing the height of one building from six stories to five and moving the building back form the abutting property line. Adding conference rooms as "penthouse rooms" to this building would adversely affect other aesthetic interests that Brown University is endeavoring to protect.

Vulnerability of the Proposed Building to Terrorist Attack

Comments: A commenter stated that the EA fails to "consider the obvious vulnerability of the proposed Life Sciences facility and the existing Biomedical Building to potential terrorist attack."

Response: The proposed Life Sciences Building and existing Biomedical Complex do not appear to be any more vulnerable to a terrorist attack than any other multi-story building or any other routine laboratory facility in the nation. Brown University devotes considerable effort to overall campus security. Over the past two years, the University has further developed comprehensive emergency response and crisis management plans. These plans coordinate activities of the key departments on campus that are responsible for security and for responding

to emergencies that may arise. These efforts have included purposeful consideration of the security of existing and proposed buildings and laboratories.

Length of the Comment Period and the Need for a Public Hearing

Comments: Commenters stated that the comment period should be extended to 120 days because Brown University did not release the Draft EA until "the 11th hour" and because the 30-day comment period did not allow sufficient time to review the "highly technical matters" contained in the Draft EA. Commenters also asked for a "public hearing on these new issues."

Response: NASA and DOE prepared the EA to inform their decisionmaking and the public on whether to release the funds appropriated by Congress for the partial funding of the proposed Life Sciences Building at Brown University. The EA was released when it was completed. However, Brown University has provided information regarding its plans for the proposed Life Sciences Building, including the types of research that would be conducted in the building and the potential environmental impacts that could result from the construction and operation of the building, since June 2000 (see Appendix D, Timeline of Public Involvement). Many public meetings have already been held.

NASA's NEPA regulations do not require a public comment period on Draft EAs. DOE's NEPA regulations suggest that a Draft EA be made available to a host state or tribe for 14 to 30 days to allow for review and comment (10 CFR 1021.301(d)). Thus, NASA and DOE went beyond their regulatory requirements to provide the Draft EA to the public for review and comment for 30 days. NASA and DOE believe that the 30-day comment period was sufficient, particularly in light of the public involvement opportunities that have been provided by Brown University since this project was initially planned. In response to a specific request by the RISHPO, RIDEM and the Rhode Island Statewide Planning Program were allowed to submit comments two weeks after the close of the comment period.

Need for an EIS

Comments: Commenters stated that an EIS should be prepared. One commenter stated that such a document should be prepared by the U.S. Environmental Protection Agency.

Response: The purpose of an EA is to determine whether the impacts of a proposed action could be significant (40 CFR 1508.9). An EIS is prepared when the agency concludes that a proposal may have significant environmental impacts (40 CFR 1508.11). Compliance with NEPA is the responsibility of the agency or agencies putting forth a proposal, not the U.S. Environmental Protection Agency.

Based on the EA, and taking into account the public comments received on the Draft EA, NASA and DOE have concluded that the partial funding of the proposed Life Sciences Building at Brown University will not result in the imposition of significant environmental impacts, although some minor impacts will occur. For that reason, NASA and DOE do not believe the preparation of an EIS is warranted.

Further, NASA and DOE believe that the EA fully discusses the potential environmental impacts associated with the proposed building and note that the Draft EA was provided for public comment. Thus, preparing an EIS would not provide any additional information or provide any additional public involvement opportunities that were not already provided in this instance.