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Implementation Plan for the Highlands Center at Cape Cod National Seashore

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In cooperation with the
National Park Service

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1 Purpose of this Plan

1.1 Refine the Vision

The Highlands Center at Cape Cod National Seashore is a 110-acre site on a high bluff overlooking the Atlantic Ocean on the site of the former North Truro Air Force Station. The site, owned by the federal government and administered by the National Park Service (NPS), contains over 50 buildings originally used for common space, housing, administrative functions, storage space, and maintenance facilities. These buildings are organized around a central quadrangle and a residence area.

In 1999, NPS, as part of its overall internal and public planning process, developed a *Site Plan and Environmental Assessment* for the Highlands Center that defined, as a preferred alternative, creation of a unique center for the arts and environment, developed in cooperation with program partners. The vision statement from that document has guided the agency's efforts.

The 1999 site plan showed a basic approach to the site and its buildings and has served as a general framework for efforts that have taken place since. In 2003, the NPS issued a Request for Proposals for Program Partners as well as a Request for Qualifications for a Management Partner, resulting in selection of three Program Partners – the Fine Arts Work Center, AmeriCorps Cape Cod, and the Payomet Performing Arts Center in Truro – as well as selection of Highlands Center, Inc. (HCI), a non-profit entity formed by local citizens with a commitment to the project and its implementation, as the Management Partner. In 2005, HCI signed a Cooperative Agreement with NPS, setting forth the scope of its authority and a short-term agenda of tasks related to the project.

As part of HCI's activities, a staff has been assembled, a fund-raising effort has been launched, and HCI has sponsored the study documented in this report with funding assistance from the Commonwealth of Massachusetts, the Cape Cod Economic Development Council and HCI donors. The report adapts the broad vision statement and site plan into a more specific implementation plan that is current and captures the enormous potential of the original vision.

NPS Vision Statement

The center for the arts and environment is a community for the development of the arts, sciences, and environmental understanding. Activities at the center foster creative investigation of the interdependence of human and natural systems and the linking of arts and sciences. The work at the center is inspired by and in harmony with the surrounding community, native history and culture, and the landscape setting of the North Truro Highlands.

The center is a collaborative of organizations, forming a unique community where creative people can work, communicate, and learn. It is also a place to demonstrate the use of sustainable technologies, as well as the location of the NPS Atlantic Research Center and the NPS North Atlantic Coastal Laboratory. The center is patterned after similar public/private program initiatives in other national park system units.

A

A: View of Highlands Center Site from Northeast

Highlands Center Mission Statement

The Highlands Center fosters the unique cultural and natural heritage of Cape Cod by facilitating scientific research, the arts tradition, and educational programs atop the dramatic sea cliffs of Cape Cod National Seashore.

1.2 Expand Expectations

The long-range vision for activities and the environment of Highlands Center needs to be as unique as its dramatic setting. One of the purposes of this implementation plan is to crystallize this vision, while understanding that the long-term realization of the project will engage new entities and activities that cannot be forecast with certainty today whose involvement may cause adaptations to the overall plan. HCI expects to be a catalyst and facilitator of the redevelopment and operations of the Highlands Center to enable a vision that can achieve the project's goals:

- **Create a multi-disciplinary and collaborative community of artists, scientists, and educators amidst the natural and cultural resources of the Outer Cape.** The operational concept is that most buildings will be leased to Program Partner organizations, of which there are currently five, whose programs and activities will facilitate this collaboration and whose participants will pursue their work in a national park setting and be a broad, multi-disciplinary resource for the public. After substantial rehabilitation and building upgrades, many of the structures will be suitable for studios and workshops for artists and artisans, indoor and outdoor theater and music performances, classrooms for environmental, marine, and arts instruction, laboratories for science research and education, and residences to support permanent and temporary participants at the Highlands Center.

- **Improve the site and setting to facilitate the redevelopment and growth of this community and to be supportive of its contributions to a wide range of local, national, and international issues.** Characteristics of such an approach to design will be to encourage face-to-face interaction by incorporating many places where formal and informal programs, activities, and personal encounters can take place, to design site circulation layouts that maximize pedestrian spaces and reduce intrusion and distractions from vehicular circulation, and to incorporate on-site housing of various types in order to encourage a sense of site stewardship in the resident population and to activate the site beyond normal working hours. Additionally, the overall plan should re-introduce vegetation native to the Cape Cod landscape in the large expanses of areas that were clear cut as part of the construction of the Air Force base.

- **Facilitate green redevelopment that is a demonstration for new ways of addressing sustainability for buildings and the site within this national park setting.** The entire rehabilitation project will be approached keeping the principles of environmental protection and sustainability paramount. Building rehabilitation and redesign will reflect current codes, "green" building technology and an integrated approach towards rehabilitation. The redevelopment concept will break new ground in "living lightly" upon the land on the Cape's increasingly threatened ecosystem. In addition, the Center can become a showcase for the National Park Service in terms of integrating high environmental building standards and principles of sustainability and serve as a model for others to follow.

1.3 Enable Outreach to Program Partners and Supporters of HCI and Highlands Center

The National Park Service, as owner of the property and steward for the Cape Cod National Seashore has demonstrated an ongoing commitment to the idea of Highlands Center that has been backed up with funding and project commitments. NPS funds are increasingly in high demand and there are practical and statutory limits to the cost and type of improvements that NPS is authorized to undertake and finance. Critical to the project is that HCI be successful in its fund-raising mission; and a clear object of this plan is to establish clear purposes and a well-thought through target of funds required to complete the Highlands Center redevelopment and to sustain its operations. Such a plan will be an important tool to seek such external philanthropic, grant, and local sources of support, as well as to attract the next round of program partners who will support the overall mission of Highlands Center.

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A: Meeting at Fine Arts Work Center Common Room in Provincetwown

B: Highlands Fest 2006, with presentation of initial planning concepts

2 The Site

2.1 Location

The Highlands Center at Cape Cod National Seashore is located in Truro approximately 12 miles southeast of the center of Provincetown and two hours from Boston, MA and Providence, RI. The Center is located on the 110-acre site of the former North Truro Air Force Station, overlooking the Atlantic Ocean. There are many buildings available for reuse, comprising up to 110,000 square feet of space. The buildings range from two story barracks to single-family homes, and include a dining hall and former library. The property is owned by the federal government, and administered by the National Park Service by staff of the Cape Cod National Seashore.[1] Figure 1 shows the general location of the site.

A: View of Highlands Center Site from south

Figure 1: Site Context Map

[1] The information referenced is from the Request for Proposals for Program Partners and Request for Qualifications for a Management Partner issued by the National Park Service in March of 2003.

B: The Quadrangle *(NPS)*

C: View towards the ocean *(NPS)*

D: Substantial reinforced concrete structures north of entry road *(NPS)*

2.2 Buildings

The total building inventory of the site is over 150,000 SF. The Environmental Assessment prepared by the NPS proposed demolition of approximately 24,000 SF of residential and other structures, leaving a total significant inventory of remaining available buildings; some of these were proposed for adaptive reuse and others might be either rehabilitated or demolished. The currently identified Program Partners, including the NPS, would require over 56,000 SF, of which HCI and currently identified program partners could occupy as much as 50%, leaving over 75,000 SF of building potentially available for future uses and users.

Detailed inventories of building condition have been conducted by the NPS to identify structural problems, hazardous materials, and other material and site issues. NPS national policies permit leasing of existing buildings on this site, which could enable designated Program Partners to rehabilitate structures in conformance with NPS guidelines that require a scale and character of rehabilitation that will be similar to the current building stock, as well as incorporation of features that will encourage green redevelopment and building sustainability. NPS policies do not allow new construction on the part of its Partners.

C

B

D

2.3 Utilities

Views to the ocean and across the landscape are dramatic and are important assets of the site that could be capitalized upon by creating view corridors within the site and also by taking advantage of opportunities to view the landscape from higher elevations from within buildings or from the top of landforms. Overhead utilities, as the only vertical elements on site, particularly detract from what is otherwise a horizontal landscape.

The site was dramatically altered by construction of the Air Force Radar Station, which cleared the native vegetation and leveled irregular landforms at the heart of the campus, leaving a landscape that is quite alien to Cape Cod. There is a significant amount of asphalt on site that detracts from the natural environment. This amount of paving is a residual effect of the former occupancy and presents a "hard-edged" geometry of building layouts, site roadways, and walkways that contrasts considerably with the organic forms typically associated with Cape Cod. The extensive road network appears excessive for the traffic likely at Highlands Center, in comparison to its past use for military purposes.

A

A: Aerial view from above the entry road

The US Air Force undertook some intensive environmental remediation work extending into the early 1990s documented in 1994 in the US Air Force and Army Corps Environmental Baseline Survey for North Truro Air Force Station. The report documents the processes used by DOD to identify and abate known friable asbestos, underground storage tanks, and PCB transformers; no known fuel or pesticide contamination was disclosed. Since then, the NPS has become aware of additional potential residual contamination. For instance, some areas were not studied and hazardous materials were discovered in the old sewer system pipes. In 1997, the sewer system was remediated by the Air Force, but some other issues have not been addressed by DOD. The NPS has clarified that it will not require that potential partners be responsible for site remediation activity. As for hazardous building materials, building investigations have been completed for the NPS in the 2000 and 2001. There are code requirement and structural repair needs identified, as well as sampling results of lead and asbestos-containing hazardous building materials. Partners will be responsible for remediation of hazardous building materials as part of applicable building rehabilitation projects if hazardous substances would be disturbed. The NPS is attempting to leverage federal funds for additional hazardous materials investigation and remediation through requests for assistance to the United States Air Force.

The soil on the site is very sandy, overlain by a very thin cover of organic material that supports minimal native vegetation. Building roofs do not have gutters or downspouts. Rainwater is generally directed to the ground around the roof overhang perimeter where it seeps into the ground. Rainwater runoff is directed by roadway and parking lot grading to low spots in the landscape, where the rainwater seems to easily seep into the sandy

soil. With the exception of the existing single-family housing, the site generally does not have closed-type drainage systems. Many of the parking lots show evidence of low-point ponding and puddling. Where drainage is properly directed, storm water generally flows off the pavement and can be easily absorbed into the sandy soil.

The site formerly served a population of approximately 500 military and civilian people (at the time of its maximum use) and has the remnants of a sewerage infrastructure, including a piping collection network and the remains of a de-commissioned sewage treatment and disposal system. Water supply for the Center is from two on-site public gravel-packed wells. The Town of Provincetown uses these wells as an alternate supply. The two wells are known as Wells No. 3 and No. 4. The site contains a water supply tank and water treatment/booster station located at the entrance of the site, southeast of Building T-5 and water distribution lines. The water treatment system has been replaced and the NPS has negotiated details with Provincetown with respect to the management and maintenance of the system. The water tank is covered with berms of earth and is quite conspicuous in the landscape.

Studies by consultants to NPS have assessed the feasibility of reactivating the sewerage and water supply systems. Reactivation of the sewage treatment system was determined not to be economically feasible but sewage collection components can be reused and upgraded. Reactivation of major portions of the water supply systems is complete. NPS is in the process of implementing a Title 5 sewage disposal system designed to accommodate the early stages of redevelopment a the Highlands Center. The system includes a pumping station and septic tank located east of Building T-5, and a new subsurface disposal field located at the east of the site near buildings 22 and 23.

B: Headlands at southwest edge of Highlands Center site

The capacity of the above planned system will be approximately 5,000 gallons per day, accomodating Phase I building reuse. Wastewater treatment adequate to serve the redevelopment of the entire site may require a central wastewater treatment plant that would cost in excess of the funding cap imposed by the U.S. Congress for infrastructure improvements by NPS. (According to NPS, funds within the cap could provide for water and electrical improvements and a second 5,000 gallon system only. This is sufficient to accommodate some but not all of Phase 2 building reuse.) Achievement of full site redevelopment potential as defined by early studies of Highlands Center will require either external funding for such a sitewide wastewater system or implementation of highly innovative means of wastewater treatment, such as solar aquatics systems, composting toilets, or other measures that can reduce the quantity of waste water treated. Such an innovative system would require the concurrence of state regulators and may pose an implementation challenge to realize the full potential of the site.

3 The Highlands Center Partnership

3.1 Highlands Center, Inc.

3.1.1 General History

In mid-2001, Highlands Center, Inc. was created. Highlands Center, Inc. is a local non-profit organization with a mission to work cooperatively with the National Park Service in the eventual redevelopment of the Highlands Center site by identifying additional Program Partners who will utilize the site and performing such physical and business analyses of the site as is agreed upon by HCI and NPS. HCI has adopted the NPS mission for the site and has drawn together a board that includes artists, scientists, business interests, and representatives of local communities to exercise leadership in developing a new institutional capacity that will be equal to this large task.

3.1.2 Activities to Date

HCI has developed an internal staff and Board of Directors. HCI's key activities completed and anticipated include:

- Facilitating and participating in numerous meetings to define and develop the mission and scope of Highlands Center, in cooperation with NPS, the community, and prospective Program Partners.
- In April 2002, HCI entered into an agreement with NPS to become the designated fundraising partner for the Highlands Center project.
- In 2003, Highlands Center, Inc. was selected as the Management Partner for the redevelopment of the site.
- In early 2005, key agreements with the NPS, including its first Cooperative Agreement and its first Task Agreement were signed. A new follow-on Fundraising Agreement with the NPS was negotiated between the parties that will significantly increase HCI's authority to raise funds for the project. HCI raised funds from public and private sources to support the preparation of this plan and has continued liaison with prospective Program Partners.
- In 2006,2007, and 2008, HCI has completed a fund-raising feasibility study, coordinated the planned installation of a donated kiln on-site. Working through the Highlands Center Partnership Committee (with AmeriCorps as the lead) convened annual Highlands Fests on-site to celebrate the concept and progress to date.
- In 2008, HCI rehabilitated Building 35 on-site to house Cape Cod's first and only wood-fired kiln. The facility will be operated by Castle Hill, and will be utilized by pottery organizations and individuals desiring access to the kiln.
- By 2010 HCI intends to achieve rehabilitation of Building 16 on-site as a provisional headquarters, a Welcome Center and shared space for Program Partners.

A: NPS Atlantic Learning Center

A

3.2 National Park Service

3.2.1 Overview

The federal government operating through the National Park Service (NPS) is the site owner. NPS is responsible and accountable for the activities and leases as the property owner. NPS conducts several activities on-site to support its obligations and programs associated with the Cape Cod National Seashore (CCNS). These include operation of the North Atlantic Coastal Laboratory, rehabilitation of two buildings adjoining the quadrangle for the ARC Laboratory and Multi-purpose Room, and the use of several other buildings for NPS storage and maintenance spaces. The NPS Atlantic Research Center occupies rehabilitated Buildings 14 and 17, operating earth science research and educational programs and activities for visiting and park researchers and contributing to an on-site park and scientist presence within the heart of the site.

NPS is responsible for access control to the site and has undertaken and supported many site planning and technical studies, including assessments of site and building historic and cultural resources, building and site systems inventories, studies of site infrastructure, and planning efforts to define the Highlands Center concept and to develop the initial site plan and Environmental Assessment. A landscape site plan resulting from one of these efforts, prepared in 2002, is shown in Figure 2 and indicates buildings suggested for reuse as well as demolition, as well as general site planning principles and concepts.

Following preparation of the site plan, NPS prepared the 2005 Building and Site Rehabilitation Handbook and detailed plans for initial infrastructure improvements. NPS has spent approximately one million dollars on water and wastewater improvements to enable some key building rehabilitation projects, including a rehabilitated water plant, and pumping station and a septic tank located east of Building T-5, and a new subsurface disposal field located at the east of the site near buildings 22 and 23. NPS is responsible for initial site maintenance and lease supervision with the anticipation that the Management Partner maintenance and administration role will grow, and that some Program Partners who undertake their own capital rehabilitation projects will be responsible for their individual leased buildings and operations.

Figure 2: Landscape Site Plan (Patricia Quintero Brouillette)

3.2.2 Regulatory and Procedural Issues

NPS is a land management agency with an extraordinary commitment to quality and service, making it one of the best substantive collaborators that a non-profit such as HCI could wish for. NPS has many regulatory and procedural requirements which will have to be taken account of by proposed uses, partnerships, donors and designs at Highlands Center. These include, but are not limited to, the following:

- CCNS legislative purpose, themes and mission, as further defined in the General Management Plan for the park;
- Commitments defined in public planning documents regarding the Highlands Center, including the Site Plan and Environmental Assessment;
- Responsibilities in law associated with federal ownership of property, including but not limited to: National Environmental Policy Act, National Historic Preservation Act (archeological clearance), Freedom of Information Act, applicable building codes and the Americans with Disabilities Act, McKinney Act, Anti-Deficiency Act;
- Responsibilities in policy associated with federal ownership of property, including but not limited to: NPS Management Policies, 36 Part 18 NPS Leasing Regulations, NPS Director's Order 21: Fundraising and Donations & OMB Circular A-110, NPS Director's Order 35A: Sale or Lease of Park Services, Resources, or Water in Support of Activities Outside the Boundaries of National Park Areas; NPS Concessions policy and cooperative agreement parameters and special park uses regulations;
- Specific requirements of NPS Leasing authority, as contained in 36 Part 18 NPS Leasing Regulations, including but not limited to limitations on additions and new construction limitations (some of this also discussed in EA and its Finding of No Significant Impact and the RFP/RFQ);
- Terms and conditions of RFP/RFQ, criteria and submission requirements, including such issues as leasing purposes, lessee requirements and use of housing for program partner activities at HCI, etc.;
- Letters of Intent with three initial Program Partners as well as the terms and conditions set forth in the Cooperative and Task Agreements as well as a Fundraising Agreement with HCI;
- $2.5 million Congressional funding cap language contained in FY02 Department of the Interior Appropriations bill;

Additional constraints that also affect site redevelopment include facility and security concerns regarding the adjacent FAA land and its operations, unfulfilled or incomplete USAF septic system and clean-up commitments, and interactions with and commitments made to adjoining communities.

Finally, however, the leasing authority does give broad authority to the NPS for the envisioned creative and educational ventures to locate at this remarkable oceanfront site. And, the NPS has made a strong commitment to achieve the Highlands Center mission.

3.3 Program Partners

NPS has selected, in addition to HCI, three existing successful Cape Cod organizations as Program Partners at Highlands Center, based upon response to a Request for Proposals issued in 2003. Two additional partners have come on board since then. The Program Partners will be the heart of the Highlands Center idea, providing programs compatible with the mission of the Highlands Center, and building local, regional, and national support. In accordance with the 2003 Request for Proposals, "Program Partners will be non-profit organizations, educational institutions, and public agencies that conduct some or all of their programs at the Highlands Center's campus, enriching each other's work through their distinctive activities and opportunities for interaction… These partner organizations will establish an interactive community of creative individuals and groups to serve as a catalyst for cultural and environmental understanding through creative inquiry, research, and learning," undertaking such activities as:

- Residential programs, such as fellowships and educational participant programs, providing office/studio workspace, field station laboratory space, and housing for a changing community of scientists, educators, and artists.
- Classroom facilities for science education and visual, writing and performing arts programs.
- Office, retreat and conferencing facilities for institutes, organizations and foundations dedicated to supporting the arts, earth sciences, sustainability, natural and cultural history, education, and collaborative ventures across disciplines.

A short summary of these entities and their plans is provided below.

3.3.1 Fine Arts Work Center

The Fine Arts Work Center (FAWC) is a highly respected Provincetown organization that works to assure Provincetown's continuation as the nation's oldest arts colony. The FAWC owns several buildings in Provincetown that support offices, live/work spaces, apartments, a gallery, auditorium, print shop, wood shop, and offices. Programs of the FAWC include a renowned Fellowship Program for Emerging Writers and Artists, a Summer Workshop Program, weekend classes, long-term Residency Programs, co-operative programs with higher educational institutions, a low residency MFA program in visual arts in collaboration with MassArt, and many events. The FAWC proposed program for Highlands Center is conversion of Building 10, in the quadrangle area, to a non-residential studio building that would be rented year-round to artists and writers who live on the Outer Cape at affordable rates. Such an activity and use would be entirely consistent with the objectives and mission of Highlands Center and would be similar to programs currently operated by FAWC in Provincetown. The tentative proposal would include twenty 200 square foot studios with common kitchen, restrooms, requiring substantial rehabilitation of the shell and interior of the structure.

A: Highlands Fest 2006

B: Fine Arts Work Center visual arts class

A

B

A

B

A: PPACT outdoor performance at Highlands Center *(NPS)*

B: PPACT Summer tent at Highlands Center for 2006 season *(Charles Fields)*

3.3.2 Payomet Performing Arts Center in Truro

The Payomet Performing Arts Center in Truro (PPACT) is an equity theater founded in 1998 to provide local residents and visitors with professional theater, art, and music programs at affordable prices. PPACT attracts a cumulative audience of over 3,000 to performances in the Outer Cape and also offers children's drama classes, professional training programs, and cooperative efforts with local institutions. PPACT has proposed to lease, rehabilitate, and occupy Building #33, which would have the potential to double the current performance seating capacity of the organization as well to expand educational programs and to improve theater systems and technologies to support its activities. As an initial early improvement, in cooperation with NPS and HCI, PPACT has relocated its performance tent from its former location along Route 6 to a location at the entry to the Highlands Center, where it serves to introduce the site to the Outer Cape and represents an early mutual commitment of the partnership envisioned at Highlands Center.

3.3.3 Barnstable County's AmeriCorps-Cape Cod

Barnstable County's AmeriCorps Cape Cod enlists highly educated and skilled college graduates in a year of fulltime service to address critical environmental and disaster preparedness and response needs throughout Barnstable County (Cape Cod). The program is administered by Barnstable County and is part of the national AmeriCorps network. AmeriCorps, often referred to as the "domestic Peace Corps", engages Americans of all ages and backgrounds in results driven service to address community needs throughout the United States. Since its inception in 1999, AmeriCorps Cape Cod's Corps members have served in collaboration with over 150 public, nonprofit and community based groups to provide the Cape Cod community more than 375,000 hours of service. The Corps members' service is focused in the areas of natural resource management, environmental education, disaster preparedness and response, and volunteer engagement. The service focus areas are highly supportive of the NPS, CCNS and the Highlands Center. Past and current Corps members have been assigned to support CCNS and Highlands Center planning and community outreach. AmeriCorps Cape Cod is one of a few select residential AmeriCorps programs in the nation.

The proposal of Barnstable County and AmeriCorps Cape Cod is to rehabilitate Building 11 on the Highlands Center quad to serve as a residential facility for approximately half of its Corps members and as satellite offices for Barnstable County. The Corps members housed at the Highlands Center would serve with municipalities, nonprofits and community groups based on the Outer Cape. This facility may also support other service agencies with related focus areas and could offer increased opportunities for service projects and collaborations that would benefit the Outer Cape as well as provide specific services in support of Highlands Center projects and programs.

3.3.4 Provincetown Center for Coastal Studies

Provincetown Center for Coastal Studies has been active at the Highlands Center since 2004 with the construction of its coastal observation station. Researchers investigate coastal processes and conditions of the bluff are collected daily to further our understanding of coastal erosion and sediment movement. The Center for Coastal Studies is dedicated to scientific research of coastal ecosystems and marine mammals, promoting stewardship, conservation, and education in related areas. For more information, visit their website at: www.coastalstudies.org

C: AmeriCorps volunteers have been assisting NPS and HCI *(Americorps Cape Cod)*

C

3.3.5 Truro Center for the Arts at Castle Hill

Truro Center for the Arts at Castle Hill has agreed to oversee the operational management and facilitation of a wood-burning kiln, performing such services as constructing the actual kiln, and operating open pottery programs at the site. The installation of a wood-burning kiln in partnership with HCI will advance the Highlands Center mission, constituting a joint effort that will foster benefits to local artists and craftspeople, attractiveness to visitors, and a unique form of artistic education in the community. For more information about Castle Hill, visit their website at: www.castlehill.org

3.3.6 Other Program Partners

As time goes on and the initial efforts at Highlands Center bear fruit, other Program Partners will be solicited. Ideally, these efforts would provide opportunities to attract an "anchor" Program Partner who might be a public or private non-profit organization or university whose mission reinforces that of Highlands Center and would benefit from this powerful site location as well as its association with other creative scientific, artistic, and educational participants at the site. An acceptable and desirable Program Partner might include a broad range of possible entities: a non-profit educational institution that would offer summer residencies in combination with year-round programs in the visual or performing arts or sciences; a non-profit entity engaged in environmental research that could benefit from location in the landscape of the Outer Cape; or a public institution seeking expansion space for educational and research programs.

A number of such organizations have toured the site and several are actively considering the Highlands Center site as a location option.

A: Highlands Center Kiln - pots (Truro Center for the Arts at Castle Hill)

B: Stoking the Highland Center Kiln (Truro Center for the Arts at Castle Hill)

A

B

4 Project Goals

The goals of HCI are consistent with the Highlands Center mission, as stated above, and address the unique potentials of the site, the CCNS setting, and the Outer Cape community. In order to achieve these goals, HCI will need to continue its close and continuing working relationship with NPS. HCI acknowledges the important contributions that NPS personnel and resources have made to birthing and sustaining the Highlands Center concept. Compliance with NPS policies is a requirement of HCI goals for the project.

1. Create a multi-disciplinary and collaborative community of artists, scientists, and educators amidst the natural and cultural resources of the Outer Cape.

a. Support the activities of currently designated Program Partners

b. Accomplish outreach, in coordination with NPS, to encourage future Program Partners, making sure that their activities and vision for site operations reinforce the special qualities sought after at Highlands Center.

c. Seek an "anchor" Program Partner (or two) that has the potential to be a major catalyst economically and functionally for the site and its activities, while contributing to the values and vision of Highlands Center.

2. Improve the site and setting to facilitate redevelopment of this unique community's contributions to a wide range of local, national, and international issues.

a. Design roads and access facilities to limit vehicular use within the site and encourage pedestrian activities and informal encounters, while enabling access for wheelchairs and disable users.

b. Rehabilitate the site grounds to restore native plant materials and textures of Cape Cod's unique landscape while adhering to NPS "Principles of Sustainability".[2]

c. Create and support outdoor and indoor spaces where artists, scientists, and educators can interact with one another and experience the cross-fertilization of ideas.

[2] NPS defined these principles in the Request For Proposals for Program partners and in a separate 2005 publication entitled Site and Building Rehabilitation Handbook.

3. Demonstrate highly sustainable and green redevelopment that includes new rehabilitation approaches to existing buildings and the site within this national park setting.

a. Achieve recognition for the commitments of HCI, the site Program Partners, and site occupants to conserve water, energy, and material resources.

b. Rehabilitate buildings using sustainable materials and achieve high effectiveness in non-renewable energy conservation through proper orientation, insulation, and use of sun and wind resources.

c. Recycle materials and resources, including rainfall, groundwater, wastewater, and construction waste.

d. Incorporate alternative methods for collection and storage of renewable energy for power and heat, through use of photovoltaic systems, wind turbines, thermal mass, and other systems.

4. Build partnerships among HCI, NPS, Program Partners, and local communities that take full advantage of the community building potential of the site and its activities, while contributing benefits to the Outer Cape.

a. Encourage joint programs, events, research, and educational initiatives that take advantage of the talents of the institutions and individuals on site.

b. Nurture and expand HCI's and NPS's linkages to communities of the Outer Cape to engage their citizens and officials in the activities of Highlands Center and enable them to benefit from the growth and success of this new initiative.

5. Expand the capacity of HCI to serve as the facilitator of people, programs, and site activities as the touchstone of the unique institution at Highlands Center.

a. Capture philanthropic and grant support to implement capital improvements and achieve "critical mass" and to insure sustainability of a core HCI operational capacity.

b. Develop reliable sources of re-occurring revenue-generating activities, such as, community support services, on site programs, and user fees that will be able to assist the management of the Center in maintaining a level of operations and staff that will be able to maximize the unique Highlands Center human, institutional, and environmental resources, provide required and acceptable levels of services for site tenants, and continue aggressive planning for future site redevelopment and programming. For a more complete discussion of this issue, refer to Chapter 6.

5 The Plan

5.1 Overview

Figure 3 is an illustrative site plan that builds upon the framework defined by the NPS 1999 Site Plan and Environmental Assessment, as informed by events over the last several years and by concepts and commitments that have emerged during the preparation of this document. The intent and approach of the plan is consistent with the previous NPS framework.

The site will encompass a highly diverse mix of artistic, scientific, service, and educational uses, centered on the site's Quadrangle at the heart of the campus. Several of the buildings in this space have been rehabilitated or have been committed to site Program Partners, already insuring the seeds of this new multi-disciplinary institution at Highlands Center.

The plan will change the emphasis and look of the Quadrangle and the remainder of the site to reintroduce native plant materials, softening the character of the setting from a pavement-dominated former military installation to a grouping of buildings of a scale and character that will exist in a rehabilitated Cape Cod landscape. This environment will nurture on-site activities and will be an attraction that will draw participants from many disciplines to the evolving programs at Highlands Center.

The site plan places major vehicular circulation and parking to the perimeter of the complex, emphasizing a pedestrian-friendly environment within the core areas and changing all paving to permeable materials that can diminish the need for drainage systems. A more attractive pedestrian environment will be conducive to the type of interaction that is at the core of the Highlands Center concept.

In all buildings, efforts will be made to incorporate sustainable technologies that can reduce energy consumption, conserve water, and demonstrate the effect of lightening the impacts of man's activities on the environment. Solar technologies, wind power, use of water-conserving devices, and sustainable materials will make the site a model for living lightly on the land in the fragile environment of Cape Cod. Especially in the residential area, rehabilitation will be accomplished to enable a real demonstration of green approaches to design.

Finally, several major sites overlooking the bluff and the Atlantic Ocean will be held in reserve to be potentially rehabilitated by anchor Program Partners who can take advantage of these settings and of the critical mass that they offer to strongly influence the evolution of activities and programs at Highlands Center.

Specific aspects of the plan are amplified in the following sections.

Figure 3: Illustrative Site Plan

5.1.1 Early Actions and Commitments

As noted in Chapter 3, significant progress is being made to launch the Highlands Center, with the combination of existing activities and pipeline projects by NPS and its Program and Management Partners, including:

- NPS

  Continuation of the operations of North Atlantic Coastal Laboratory.

  Completion of the Atlantic Research Center multi-purpose room and laboratory buildings.

  Public tours offered seasonally by park rangers since 1999 to interpret site history and potential.

  Implementation of overlook platform and recycled plastic lumber picnic tables through a grant received from the National Park Foundation/Unilever Recycling at Work in summer of 2000.

  Receipt of an initial $775,000 from Congress to begin utility system upgrades on the site in fall of 2001.

  Issuance of the Request for Proposals for Program Partners and Request for Qualifications for a Management Partner in 2003.

  Design and implementation of an initial Title 5 wastewater treatment system, enabling implementation of initial buildings in the quadrangle area.

  Design and implementation of new water treatment system and initial water distribution repairs for the site.

  In January, 2005, HCI and CCNS together funded a coastal observation station used by Center for Coastal Studies and NPS researchers in monitoring coastal processes for research and education at the Highlands Center.

  In summer 2005, a solar powered National Weather Service climate station was placed on the site in association with the North Atlantic Coastal Lab.

  In March of 2006, a Meteorological ("Met") tower was installed in cooperation with UMass Renewable Energy Research lab funded by the Massachusetts Technology Collaborative to test feasibility of wind power generation on-site.

  In 2008, the NPS received funds from Mass Technology Collaborative for a wind feasibility study to be conducted through 2009.

  Continued maintenance and security of the site.

  Collaboration on Highlands Fest activities in 2006.

- HCI

  Initiation of fund-raising strategy and funding outreach to grant sources and donors.

  Coordination of interim arts installations for Truro Treasures weekend and exhibits at Cape Cod Museum of Art.

  Design and construction of a facility and contracting with Castle Hill for the installation of a wood-fired kiln to support future pottery and sculpture studio.

  Planning and implementation of Highlands Fest, in collaboration with NPS and Program Partners, 2006, 2007, and 2008.

  Planning and preliminary drawings for rehabilitation of Building 16 for temporary HCI administrative offices, meeting room's and shared spaces.

  Preliminary drawings for building T-% as the Weclome Center with offices for HCI, small non-profit organizations, and gallery/meeting room.

  Installation of three wind -driven sculptures by artist Donald Gerola.

- NPS Atlantic Research Center

  The NPS Atlantic Research Center occupies Buildings 14 and 17, operating earth science research and educational programs and activities for visiting and park researchers and contributing to an on-site park and scientist presence within the heart of the site.

- Barnstable County's AmeriCorps-Cape Cod
  Since 1999, placement of Corps members at least two days per week to support the NPS and Highlands Center. Projects include assistance with site planning and assessment and assistance with Highlands Center community outreach projects (including Highlands Record newsletter).

  Assignment of AmeriCorps member teams to complete periodic site maintenance and beautification efforts at the Highlands Center.

  Coordination, planning, implementation and funding support of Highlands Fest, an event showcasing the vision of Highlands Center and its Program Partners to the Cape Cod Community; 2006, 2007 and 2008.

  Planning for rehabilitation of Highlands Center building to serve as program residence and office.

- Payomet Performing Arts Center in Truro (PPACT)
  Offered summer Storyteller series from 2000 to 2005 and Shakespeare by the Shore plays with Cape Cod Community College at the picnic grove that brought new audiences to the site.

  Raised funds for and installed new performance tent at entry to Center in the summer of 2006 for current season and an interim period thereafter.

  Operated summer programming in 2006-2008 including drama classes, theater, yoga, independent films, music, storytelling, and more.

- Fine Arts Work Center (FAWC)
  Advance planning for rehabilitation of studio building.

- Castle Hill
  Agreement to operate wood-fired kiln on-site

5.1.2 A Flexible Plan

The Highlands Center is a concept requiring a great deal of cooperative effort and investment, not only from the entities listed in the previous section, but also from future Program Partners that are yet to be identified. Accordingly, the overall plan described in this section must be seen as a strategic direction for the future that may adapt and change as future Program Partners are identified. However, the goals that motivate this direction should remain constant and changes that may be proposed in individual bricks and mortar elements should be assessed in the future in the context of these goals.

A: View of site from the south

A

5.2 Elements of the Plan

This section explains the key concepts of the Highlands Center plan, with accompanying diagrams. In addition, more detailed annotated versions of the diagrams in Figures 4, 6, 7, 8, and 10 are provided in Appendix B.

5.2.1 Create a Multi-Disciplinary Community

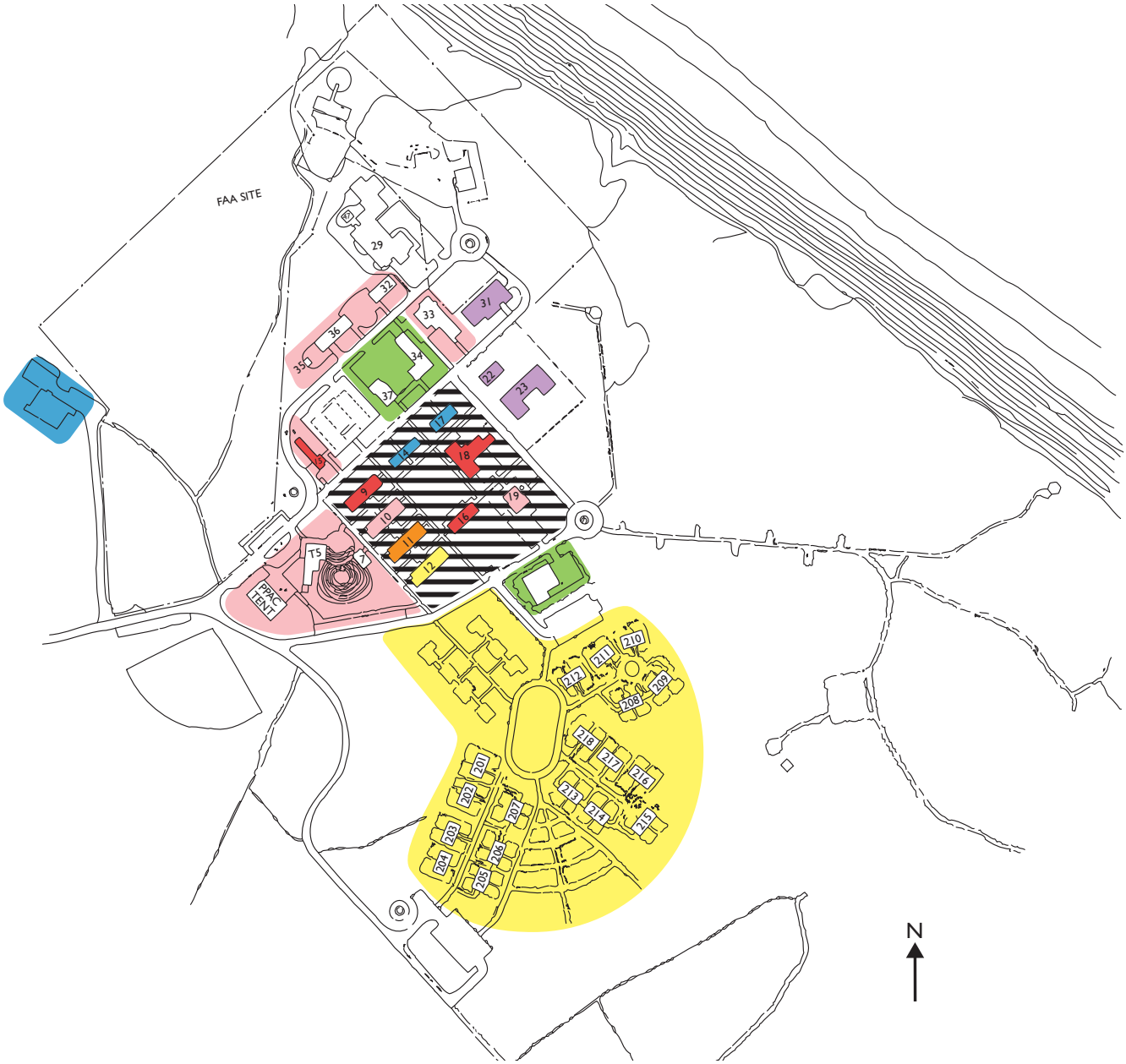
Figure 4 shows the overall proposed zoning of uses of the site indicating the creative mix of uses and users that are at the heart of the Highlands Center concept.

The Quadrangle – Core Area for Art and Science Collaboration

A key tenet of the vision for the Highlands Center project is to create a community of artists, scientists and educators working together in a creative environment. The fact that individuals with different skills, backgrounds, life experiences and perspective will be working, living and interacting in close proximity with one another presents an opportunity for "crossover" inspiration, multidisciplinary projects and unique and unusual insight.

As shown in Figure 4, at the "heart of the campus," the quadrangle will become a core area at the center of Highlands Center where a mix of uses that is well underway will foster the interaction among artists, scientists, and educators that is at the heart of the Highlands Center Concept. Within this area, the commitments already made by existing Program Partners are a giant step towards this concept, and further involvement of additional entities will enrich the mix of activities and programs. The open spaces within this center area, plus the future opportunity for common meal service and recreation space in Building 18, will encourage this interaction among the diverse participants on site. Additionally, the potential occupancy within this core area of residences for AmeriCorps-Cape Cod volunteers and NPS personnel will contribute to a more permanent and year-round sense of activity.

Figure 4: Plan Element – Multi-Disciplinary Community



- Art
- Science
- Residential
- HCI- Admin
- Service Organization/Environment
- NPS
- Open Programming and Education
- Core Campus

Native planting should be introduced throughout. Depending on occupancies of quadrangle buildings, boardwalks could be introduced to facilitate same level access between buildings. The proposed sketch shows an idea for free standing solar panels between buildings, which could be ideally oriented for maximum solar exposure.

Existing

Proposed

Other Art and Science Clusters

Figure 4 also shows other key groupings of uses combining potential art, science, and educational activities; each with a combination of current commitments and potential future users to be determined, including:

- **Gateway Entry Area** – this area is at the entry to the site and could encompass a mix of arts, events, performance, and related activities. The intent is to define, on immediate entry, a sense of excitement and activity. The Payomet summer performance tent was installed at this location and continues to offer summer programs since 2006. Additionally, the plan indicates the idea of adding to the activity within this highly visible area by creating a small outdoor gathering space that could be used for orientation, for small events, and for gatherings. This space could be linked to Building T-5 where there would be the potential for a welcome center, galleries, exhibit spaces, small conferences and related activities. Also related to these entry activities, Building 15, a narrow structure, could be rehabilitated and rented for very small studios and workspace. Building 15 could also ultimately house the administrative offices of HCI, thus freeing up Building 16 for a new tenant.

- **North Arts Area** – At the north edge of the site, a series of buildings encircle major parking and could evolve into a cluster incorporating arts, sculpture, and performance events. These include Building 33, designated for permanent performance and educational space for Payomet, the location of the wood-fired kiln is in Building 35 where a cantilevered roof will extend from the shed over the outdoor kiln, and relatively smaller spaces within Buildings 32 and 36, that could accommodate sculpture, iron working, artisan looms and additional pottery studios and related outdoor spaces that could take advantage of the proximity of the kiln and artisan buildings.

- **Science Area at North Atlantic Coastal Laboratory** – The North Atlantic Coastal Laboratory is an existing NPS laboratory providing office space, laboratory facilities, and a field staging base for NPS natural resource staff. Collaborating and visiting researchers, working under the auspices of the NPS Atlantic Research Center, also use these facilities. Adjacent to the NACL is an area previously used by the Town of Truro as a native plant nursery. This former nursery area might be revitalized in conjunction with the new landscaping activity proposed for the Center.

- **NPS Service and Support Areas** – these areas are to the north and south of the quadrangle and include buildings 34 and 37 to the north, identified to support NPS maintenance activities, and the former ATT Building, which is actively in use as an NPS warehouse facility.

- Potential Future "Anchor Partner" Area – this area, flanking the easterly edge of the site, includes some of the larger unclaimed buildings on the site – the former Bachelor Officers' Quarters (Buildings 22 and 23) and two large concrete structures (Buildings 29 and 31) that may have potential to be adaptively reused for a variety of uses. The plan suggests combining these areas into a larger parcel that could be offered to a future prospective "Anchor" user (or users) on-site, to take advantage of the powerful location of these facilities, overlooking the dramatic view over the bluffs of the Atlantic Ocean, as well as the possibility of a single user being able to combine these sites and spaces to meet its needs in support of the overall Highlands Center mission. HCI and NPS should maintain considerable flexibility in responding to potential users of these properties, as they represent the only large scale opportunity that could be offered to a prospective large user. The site offers the potential for extensive and creative rehabilitation, showcasing the type of innovative design and sustainability improvements that might be possible with participation of a major space user.

Existing reinforced concrete buildings can be rehabilitated for new uses, changing their appearance. Flat roofs would offer the opportunity for rooftop solar greenhouses or green roof treatments

Existing

Proposed

Existing one story housing buildings can be rehabilitated into duplex units. These buildings can be laboratories in sustainability, with solar roof panels, south facing glazing for passive solar gain, effective design for natural ventilation and use of sustainable technologies and materials. Landscapes in this area should be transformed to emphasise native materials and pervious surfaces.

Existing

Proposed

Creation of a Resident Community

As noted above, several opportunities exist to incorporate on-site residential uses within the core quadrangle, and these should be pursued aggressively in order to create a sense of activity within this crucial site and, of course, to meet the immediate short-term housing needs of tenants and their employees.

In addition, considerable effort has been given in this plan to investigate a range of options for adaptive reuse of structures in the Southern Residential Area shown in Figure 4. These residential structures represent a potential opportunity to generate revenue to support the Highlands Center by serving as on-site short- and longer-term residence for renters who are affiliated with the Highlands Center activities. Considerable precedent exists for attraction of arts associated individuals to the Outer Cape during the summer as well as during the off-season, as exhibited by the fellowship and educational programs provided in Provincetown by the Fine Arts Work Center.

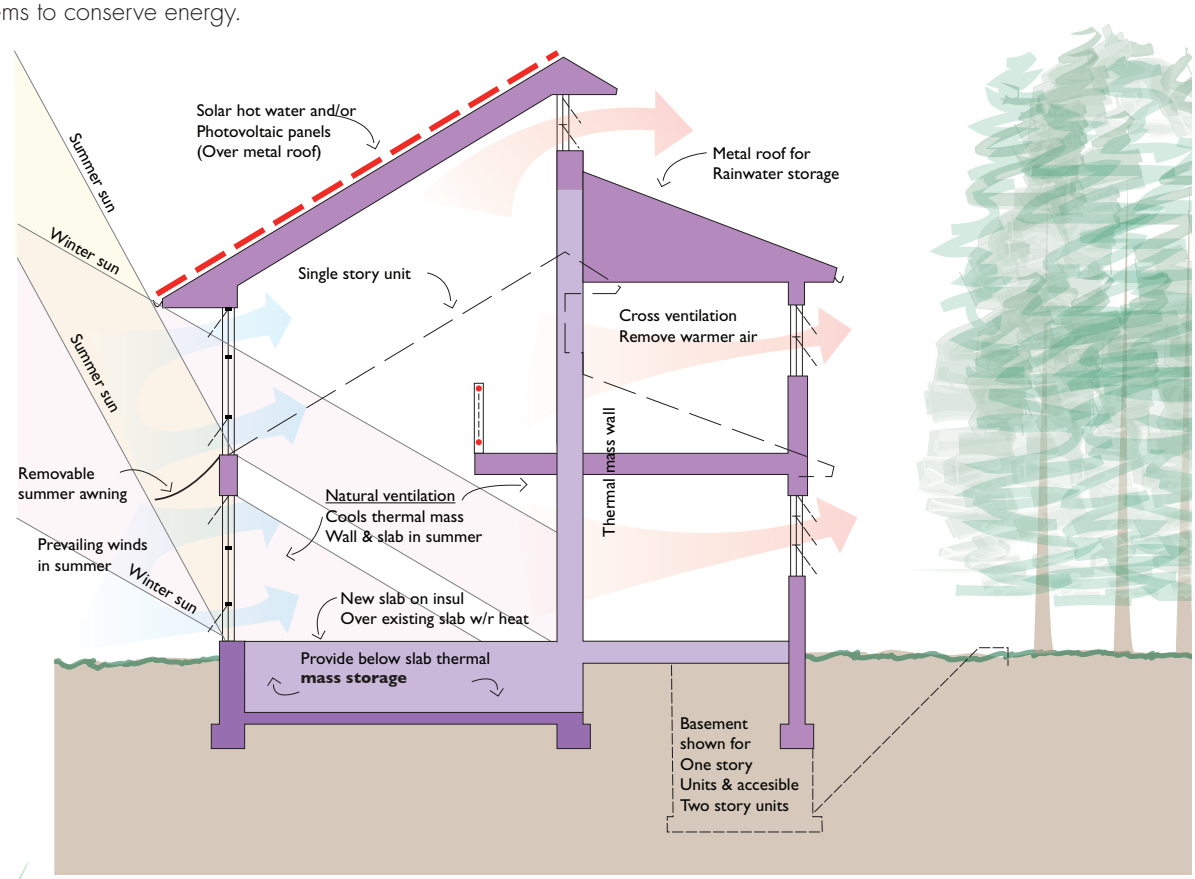
In this tradition, the plan envisions that housing will support the campus activities and that there will be affordable opportunities for use of residences via partner subsidies for fellowships or program participants, and possibly even other forms of staff workforce housing support. It is believed that a variety of market rates and terms could be implemented. It is envisioned that providing on-site staff, visitor, and program participant housing will be beneficial by enhancing the sense of community and reducing traffic.

This area includes 27 residential structures formerly serving as housing units for the Air Force base. In this area, the NPS Environmental Assessment identified 18 buildings for rehabilitation and recommended that 9 buildings (the "100" series to the north of this cluster) be demolished. All 27 structures are highly deteriorated modest, one-story homes that were originally developed as family housing, with from 2 to 3 bedrooms. The buildings have not been occupied for some time and were not exemplars of sustainable, energy-efficient design at the time they were built. All these structures will require significant rehabilitation. NPS policy does not allow for new construction under existing leasing regulations. Rehabilitation efforts will be limited to the existing building footprints. Accordingly, this plan responds to these constraints and incorporates a rehabilitation strategy.

The Plan recommends rehabilitating the "200" series of structures as one and two-story duplex units, where each structure would contain two rental units for a total of 36 units of varying size and configuration. These units would have the potential to generate modest income to defray some Highlands Center operating costs, and also could serve as a model demonstration of several different "green" approaches to rental residential redevelopment, taking advantage of building technologies, solar orientation, and site redevelopment approaches, as described in detail in Section 5.2.3. As shown in Figure 5, and amplified in Section 5.2.3, this would involve design for passive solar, natural ventilation, incorporation of photo-voltaic energy, where appropriate, composting toilets and gray water recycle systems to conserve water, and incorporation of high performance building envelope systems to conserve energy.

The overall plan shows demolition of the nine structures that comprise the "100" series of housing, in compliance with the recommendations of the Environmental Assessment and reuse of this area for small-scale recreation and other uses. While beyond the scope of this Implementation Plan, upon success of Phase 3 carbon neutral housing experiment, consideration could be given to reopening the environmental assessment to analyze possible housing reuse in this area.

Figure 5: Typical Housing Section Concepts



5.2.2 Supportive Environment

As noted in Chapter 3, the existing site retains the character and form of its former use as a military base, with a largely cleared and level site, many roads, and a geometric, repetitive and relatively un-distinctive set of buildings. In order to fulfill the mission and purpose of the project, gradual transformation of the site is required to create a site character that can support the diverse and creative activities and people that the Highlands Center wishes to attract. Figures 6, 7, and 8 show various aspects of the recommended site approach.

Vehicular Circulation

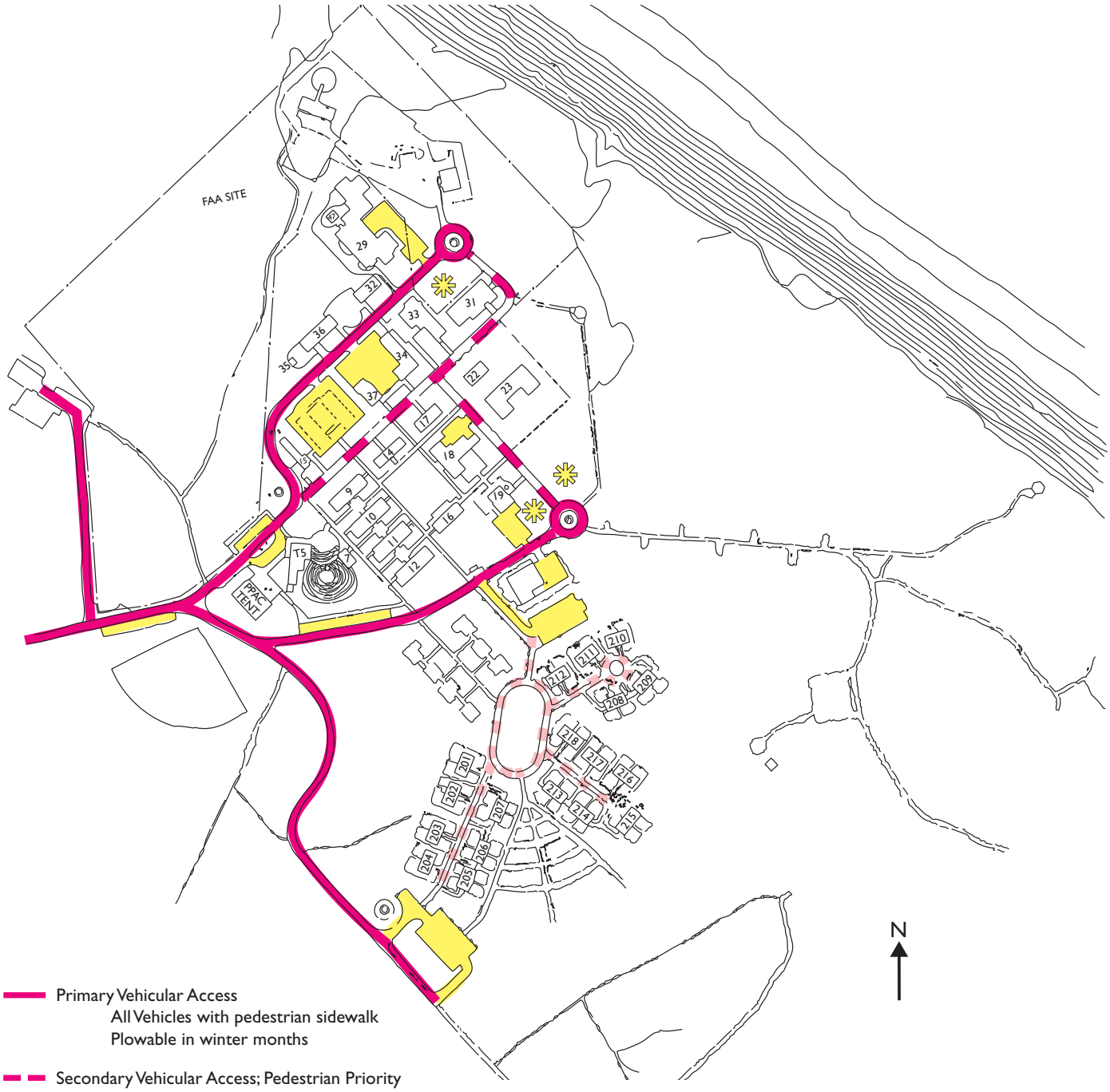
The approach to site vehicular circulation and parking is shown in Figure 6. The plan recommends creating, for the majority of the site, areas where pedestrians have priority, as further described below:

- Primary vehicular access facilities – would be conventional streets, serving vehicular traffic and leading to the principal parking areas. These facilities could, over time, be altered to use porous asphalt paving that would be semi-permeable, contributing to effective site drainage and water retention without need for storm sewer installation. The primary vehicular entry route to Highlands Center can be relocated to swing west of building 15 (requiring some demolition of the end of this structure, to end in a cul-de-sac at the terminus of the current entry road. Such a circulation change would enable elimination of most vehicular traffic along the location of the current principal east-west entry road, enabling narrowing of pavement here as well as along the road between Buildings 18 and 23. This new road location would require negotiation with FAA to use a portion of their property north of Building 31. Such a process may be facilitated by a recent decision of the FAA to relocate primary access to their facilities to the north of the Highlands Center site, so their access will not traverse the Highlands Center site. However, FAA's concurrence regarding the area north of Building 31 would be necessary and has not been secured at the time of this report. Other vehicular priority roads would remain the spur to the southwest, connecting to parking for the South Residential Area, s well as the existing road to the south of the quadrangle, which would also serve the South Residential Area, the NPS warehouse and the future site of a potential anchor Program Partner to the east of the quadrangle.

- Secondary vehicular access facilities – would be accessible to emergency and delivery vehicles, but would typically not be used by vehicles of site residents, workers, or visitors. These roads include the current principal east-west entry road and the road between Buildings 18 and 23, expanding the pedestrian emphasis within the complex. These facilities, when replaced, should be narrowed and paved with stabilized aggregate comprised of crushed stone and sand, creating a less "urban" feel and changing to a porous surface that would be permeable to rain water.

- Emergency vehicle and service access – would be retained within the South Residential Area where the idea would be to create a zone where pedestrian use would predominate. Within this district, parking would be located at two perimeter lots – to the southwest and northeast – and existing roads serving the residential complex would be narrowed and resurfaced with stabilized aggregate that would be permeable to rain water, excepting at handicapped spaces, where pavement markings required by code would require a material that could sustain a painted surface; in this case porous asphalt may be the most appropriate.

Figure 6: Plan Element – Plan Element – Vehicular Circulation Concept



Primary Vehicular Access
All Vehicles with pedestrian sidewalk
Plowable in winter months

Secondary Vehicular Access; Pedestrian Priority
Primarily pedestrian and emergency vehicles only
Limited plowable surface in heavy storms
Snow blower snow removal in light snow

Walkways With Emergency Vehicular Access
Emergency and light service vehicles
Snow blower maintained

Parking and Service areas

Potential Parking

Walkways and adjoining planted areas should be rehabilitated to emphasise permeable surfaces and native plant materials

Existing

Proposed

Major parking for the Highlands Center would be located at the north and south, as well as at smaller lots associated with individual sites. In the future, subject to the attraction of an anchor Program Partner for the buildings to the east edge of the campus, parking could be added in the locations shown. Additionally, parking on grass areas could be utilized for larger events, to avoid additional of large extents of new paved areas.

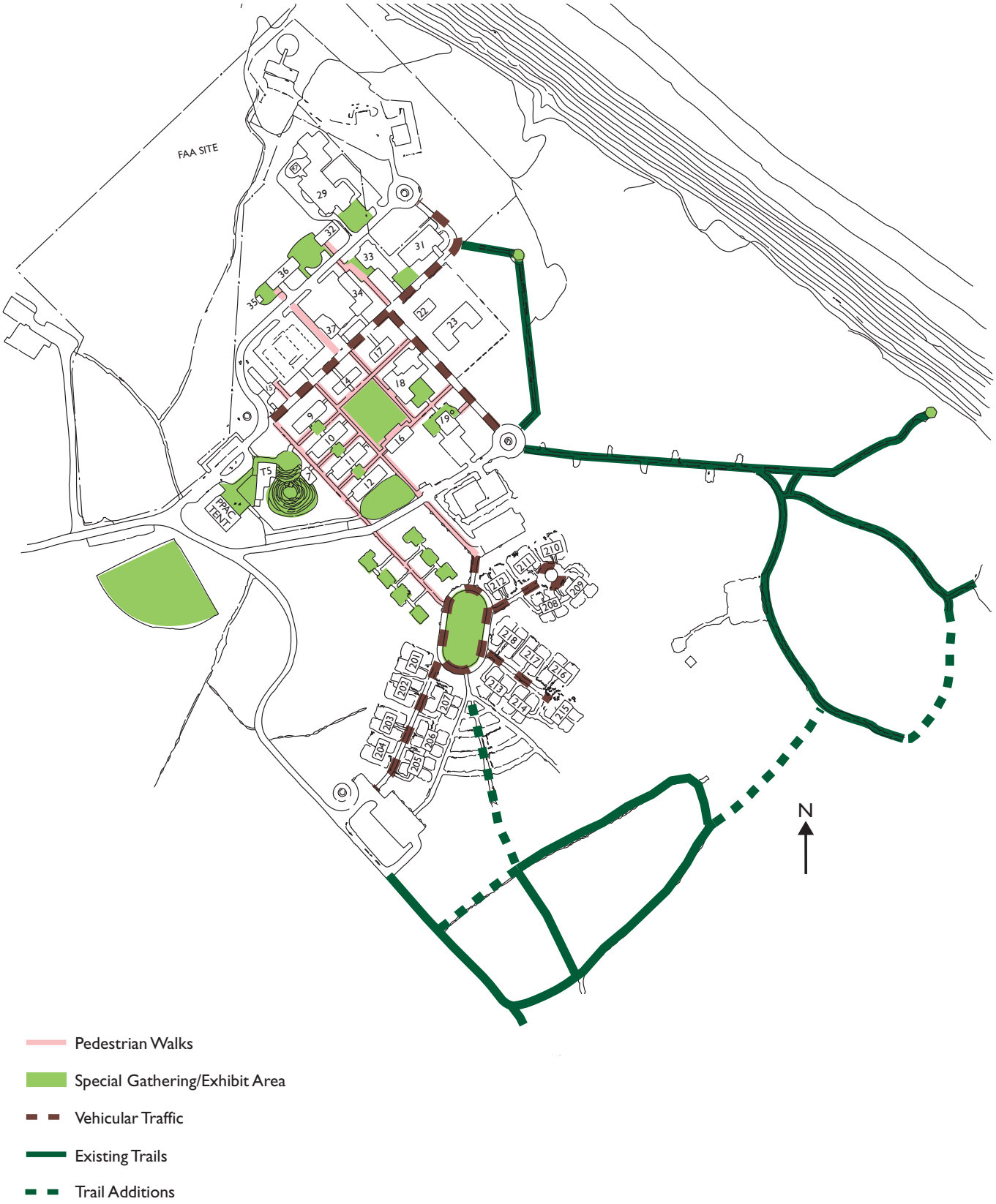
In design of parking areas and related circulation, lighting should be designed to minimize off site glare and to incorporated buffer planting areas to shield adjoining residential areas from spill over light and noise from site activities and circulation.

Pedestrian Emphasis

Figure 7 shows the recommended system of pedestrian walks and spaces in the Highlands Center Plan, with further detail provided in the comparable plan in Appendix B. Consistent with the description of vehicular circulation, above, the plan suggests creating an area that emphasizes not only a largely vehicle free core area but also articulates many specialized spaces that can be areas for formal and informal interaction among Highlands Center workers, residents, and visitors. Major types of facilities illustrated on Figure 7 include:

- **Pedestrian-only walks** – this system of walkways builds upon the current connections that exist; however, over time it is suggested that existing asphalt walks be replaced with stabilized aggregate, in order to replace impermeable materials with permeable surfaces. In some locations that require a particularly sensitive approach or require grade changes at buildings, wooden boardwalks could be constructed in lieu of the stabilized aggregate walkways. Extensions of these walkways are proposed from the quadrangle to the North Arts Area and to the South Residential Area. Additional walks will be appropriate in the areas suggested for future anchor Program Partners, but should be determined in coordination with entities selected to occupy these key sites. In the areas, in between buildings 9, 10, 11, and 12, it may be appropriate to replace walkways with boardwalks made of recycled lumber or other sustainable materials, in order to enable ease of entrance to first floors, to encourage through building connections to link these separate structures, and to enable appropriate ramps to meet ADA accessibility requirements.

Figure 7: Environment for Pedestrian and Supportive Activities



A: The plan will make good use of existing trails

A

- **Pedestrian emphasis areas with access for emergency and service vehicles** – these connections are, typically existing roadways that are proposed to be converted to pedestrian emphasis areas, through narrowing and long-term replacement of impervious pavement with stabilized aggregate. In the South Residential Area, a new residential green is proposed; this would be surrounded with pedestrian ways of this type.

- **Nature Trails** – these could encompass small loops that would link housing areas to the coastal walking trail and would serve as relatively informal connections to less developed portions of the property. Existing trails would be retained in their current condition other than restoring trails and providing for continued maintenance.

- **Special gathering, activity, and exhibit areas** – an important feature of the plan is the creation of a network of specialized spaces designed to support the sub-areas of the site and their occupants. These spaces include the existing picnic grove area, the small proposed event and gathering space near the site entrance and Building T-5, the main green at the center of the quadrangle, a residential green at the junction of the three housing clusters in the South Residential Area, the existing ball field near the site entry, the area of the "100 series" housing to be demolished, and multiple spaces associated with buildings where individual arts, science, educational, and other group activities will take place. The former helipad site could be reused as another activity area if not the location of a future wind facility. Suggestions for these sites are noted in the more detailed version of this plan including in Appendix B.

Rehabilitated Cape Cod Landscape

As shown in Figure 8, the plan recommends that the cleared and flattened landscape with the heart of the former base be rehabilitated to reintroduce native Cape Cod landscape elements into the core of the campus, building on the vocabulary of existing site vegetation. The intent of the plan is to extend the same types and mixes of native vegetation currently existing at the edges of currently cleared areas into the site, including the following types shown on Figure 8:

1. Sparse Vegetation: Sea Rocket, Seaside Sandmat
2. Herbaceous Vegetation: American Beachgrass, Beachpea
3. Shrub land: Bear Oak, Dwarf Chestnut Oak
4. Scarlet Oak, Black Oak , Sassafras, Blueberry Forest
5. Coastal Little Bluestem, Black Huckleberry, Lowbush Blueberry, and Bearberry
6. Beach Plum and Northern Bayberry Shrubland
7. Pitch Pine, Scarlet Oak, Blueberry, Northern Bayberry Forest

Scrub oak vegetation ("Type 4" vegetation) should be re-introduced into the "campus" and the plan should include replacement of totally flat surfaces with subtle undulating landforms and native grassland and heathland areas characteristic of this area where possible. Pitch Pine stands ("Type 7" vegetation) should be reintroduced to the north of building groups to act as a windscreen in winter. In the heart of the quadrangle, as well as at the green in the South Residential Area, lawns using native grasses mixed with native fescue would be used to accommodate gathering and recreational spaces.

Figure 8: Plan Element – Rehabilitated Cape Cod Landscape

Regenerative Infill of Natural Vegetation

1. Sparse Vegetation: Sea Rocket
2. Herbaceous Vegetation: Beach Grass, Beach Pea
3. Shrub land: Scrub Oak, Dwarf Chinquafin Oak
4. Scarlet & Back Oak–Sassafras–Blueberry: Sassafras Pallidum Forest
5. Little Blue Stem, Black Huckleberry, Low Bush Blueberry
6. Morella Pensylvanica, Beach Plum Shrub Land
7. Forest: Pitch Pine–Lowbush Blueberry (Morell Pensylvanica)
8. Turf

3–4–5 Native plants arranged architecturally

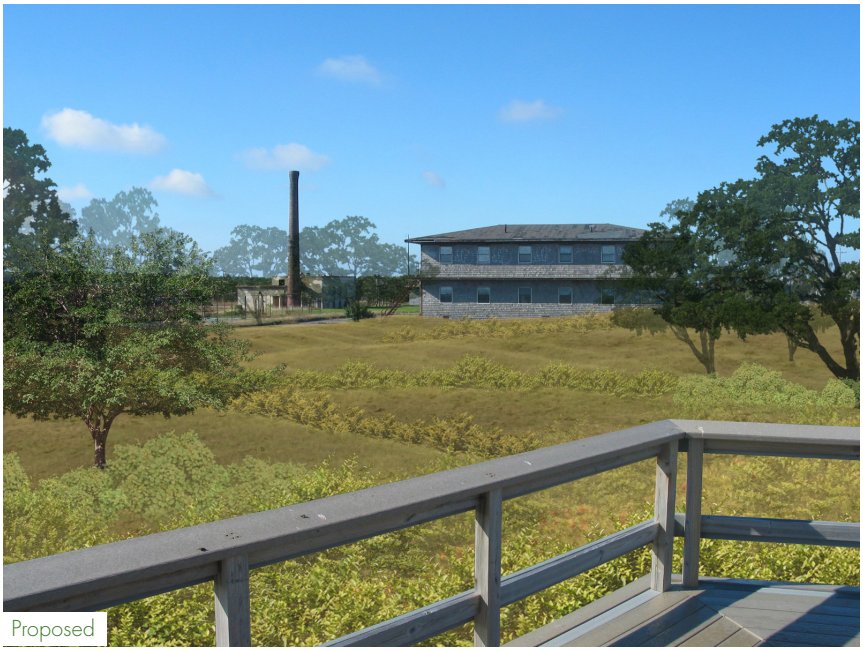


Figure 9: Landscape Rehabilitation, Before and After

Figure 9 shows before and after views of this approach to the landscape.

In detailed design, the grading of the site should be detailed to 'harvest" storm water for use in the landscape either for irrigation purposes or in creating storm water detention areas that can allow plant types that require additional water to grow. Also, to the degree that gray water recycling is implemented as buildings are rehabilitated, this byproduct should be diverted to irrigate areas of the site that will be modified to incorporate new vegetation.

As an integral part of the site redesign, views to the ocean and across the landscape will help orient Highlands Center users to the larger landscape. View corridors within the site should be created and maintained. A key view corridor is the current east-west entry road whose emphasis will be changed to pedestrian use. Additional potentials will be associated with the sites identified for potential anchor Program Partners, whose plans should be carefully reviewed prior to approval to insure that they maintain views from the site interior. Higher view points from buildings will offer opportunities for longer views that capture the overall sense of the setting and its relationship to the ocean. Ultimately, overhead utilities throughout the site should be either relocated to the site edges or placed underground.

A

B

The plan will take advantage of the existing Cape Cod landscape (A) and some attractive and shaded areas of the picnic grove near the quadrangle (B) but will reintroduce native plant materials within the disturbed area of the former air force base

5.2.3 Model Green Redevelopment

Highlands Center as a green redevelopment arrives at a point in time when global issues are surfacing that require our institutions and individuals to become more pro-active in reconnecting with the environment in which we live. The natural setting of Cape Cod and its recognized fragile ecosystem is one of these special regions under pressure, due to over-development, pressure on water resources, and threats to the very quality of life that drew people to this unique region. The Highlands Center concept not only represents a venue which can not only be an experiment in creating sustainable relationships between humans and their environment but also provide a truly unique opportunity to document a process of changing awareness about our relationship to nature. Little was understood in the 1950's with respect to the impact of development with respect to ecology, protecting natural systems or attempting to minimize damage to the environment. The Highlands Center project is an opportunity to reverse the negative consequences of the creation of the North Truro Air Force Radar Station and repair the damage. In addition, adoption and execution of the plan will enable the National Park Service fulfill the promise of its Principles of Sustainability[3] by achieving a showcase "green" redevelopment, accomplished through a creative partnership that can be used as a model and educational vehicle for other park managers.

[3] The principles of sustainability, as articulated for the Highlands Center, were presented in the following publication: National Park Service, Highlands Center at Cape Cod National Seashore, Site and Building Design and Rehabilitation Handbook, Final Draft, September 2005.

Green Principles

Conservation of resources was the beginning of the green movement, but it has grown more urgent and more acute as emerging global issues are understood to require "out of the box" creative responses to dealing with resources at every level of our culture, including:

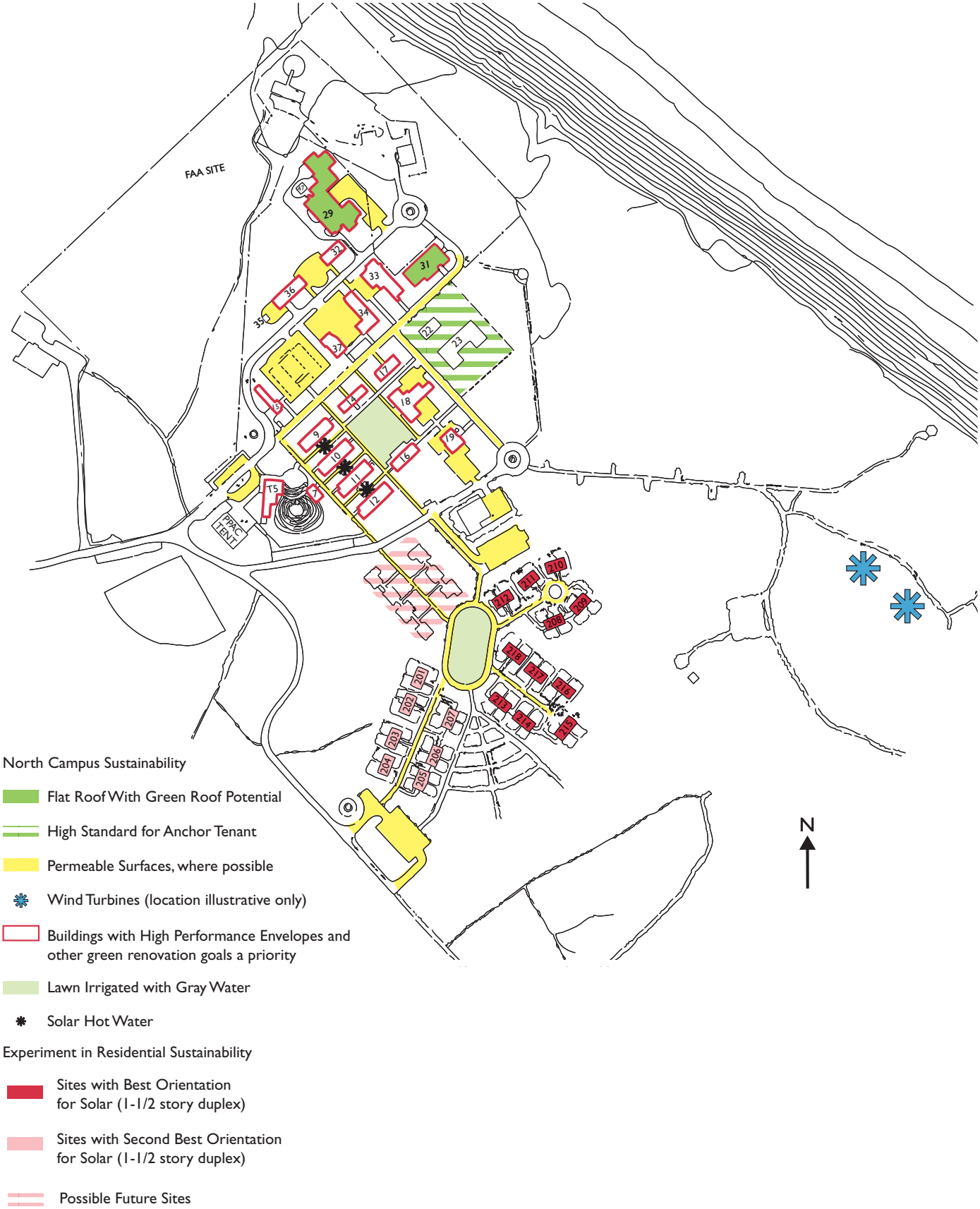
- Global warming: Energy and atmosphere are emerging as the most critical issues that we must address in the next 30 years or less. Global Warming is the result of over-reliance on carbon as an energy resource. It is the primary form of energy that has supported the consumer culture in which we live. The availability of seemingly abundant and inexpensive carbon based energy sources have turned us away from the energy abundance of the sun and wind that are potential sources that can contribute to reduction of greenhouse effects.

- Water Use and Pollution: Clean water conservation and restoration is the second and maybe the most volatile geopolitical issue that will challenge future generations. This issue has been critical to communities on the Cape. Clean, natural water provides a second fundamental green principle from which Highlands Center will evolve.

- Habitat Loss and Protection of the Natural Environment: The idea of living in harmony with nature requires a conscious conservation, restoration, and stewardship of natural flora and fauna that can become a third cornerstone of green principles from which Highlands Center will evolve.

Other issues that affect the built environment and can contribute to the "greening" of Highlands Center include maintenance of indoor air quality through use of natural materials that are produced locally, topsoil loss and erosion prevention, and waste management for operations and construction processes.

Figure 10: Plan Element – Model Green Redevelopment



An Experiment in Sustainability

Much of the technology that is needed to bring the existing site and buildings into a meaningful expression of sustainability is not experimental. What may prove to be the greatest experiment at Highlands Center is that age-old basic concept of living in balance with natural rhythms, combined with the highly evolved technological building and energy systems, can be used to create a living environment that can become a model for other actions at the local level. Just by setting this intention Highlands Center, Inc. and the NPS have the opportunity to shift consciousness by exposing basic and fundamental responses to how we might create a campus representing, in its operation and form, an expression of this larger green vision and fulfill the Highlands Center mission. That is the great experiment of sustainability at Highlands Center.

A limited number of wind turbines (A) could frame the site edge and could provide electric power.

Proposed Actions

Figure 10 shows the potential types of green interventions that can be pursued at Highlands Center. Although the precise details and locations of these initiatives cannot be guaranteed in the absence of selection of future Program Partners and prior to the approvals that will be required from the site's owner, the National Park Service, the initiatives shown represent a target to be pursued with passion and diligence.

Two primary directions include the maximum use of renewable energy resources available from the sun and the wind, diminishing reliance on carbon products, produced by ancient sunlight, as the source of energy at this institution. The minimization of carbon-based fuel will be an important goal for replacing much of the infrastructure at the existing site. At Highlands Center, there is potential for direct and indirect solar energy as well as wind energy. Fortunately this site, the Cape Cod National Seashore is unique in its abundant access to these two forms of renewable energy, which are diagrammed in Figure 10:

- **Wind generated electrical power from turbines,** subject to location approval by NPS and FAA, offer the potential to capture this source and to be iconographic symbols of a new environmental ethic at Highlands Center. The plan shows 1 or 2 wind turbines. However, the number and locations of such turbines would be subject to further feasibility analysis and would also require an Environmental Impact Assessment prior to final decisions on such an installation to comply with the requirements of the National Environmental Policy Act.

The NPS and FAA are interested in the possibility of analyzing feasibility of installing a wind power generating facility in two phases, pre-development and development. The first phase will include study of available wind resources (underway with met tower), cost estimating, engineering analyses, assessing and addressing environmental concerns, and soliciting public comments. Involvement in the project would likely include: the Department of Energy Federal Energy Management Program (FEMP), Massachusetts Technology Collaborative (MTC), Highlands Center, Inc., the Cape Cod Commission, Cape Light Compact and the Town of Truro. Based on preliminary discussions, there is optimism that the project will be viewed favorably by the surrounding communities. MTC has provided 2008 funding for a wind feasibility study to the NPS, who will lead and provide matching funds for the effort.

- **Solar generated electrical energy** is possible with the amount of yearly sunlight that this site enjoys. With some minor adjustments in lifestyle, photovoltaic systems can be used to power selected appliances without the need for costly and potentially hazardous battery storage devices.

- **Solar radiant heating** can be used for passive heating and heating of domestic hot water. Emerging high tech systems that use parabolic mirrors to convert the sun's radiant energy into superheated water or steam and can be used to generate electrical energy will be a possibility when these systems become more compact and cost-effective.

- **Building envelope and system design** can be adapted to achieve high performance standards. Many technologies exist that need to explored and used, including:

  Window and exterior door systems that contain insulated glass with low E coatings and argon gas.

  Wood or vinyl frames meeting performance requirements.

  High overall R values for the insulation of walls and roofing systems to R-30 for exterior walls and floors over crawl spaces and R-60 for roof structures.

  Domestic hot water for residential use that emphasize solar water heating systems without backup unless it can be provided by electrical power generated by one of the above renewable energy sources.

B

C

The photos above show how photovoltaic panels can be added to relatively traditional buildings.

A

B

Greenhouses (A) or green roofs (B) could be introduced on existing buildings with flat roofs

Space heating for existing buildings that can be adapted to systems that will rely on passive storage of solar energy. Electrical energy should be considered an option since it ultimately will be provided by the renewable energy systems listed above with wind being the most promising source.

Radiant floor heating deserves to be considered in combination with thermal mass storage of solar heat to enable electrical energy to be a supplement to space heating requirements instead of being the primary source of space heating.

Placing full height glass on southern walls to maximize finish floor exposure to the sun. Such a strategy must be established with early programmatic zoning consideration of the building use.

Water conservation issues will have an impact on the way we process water. Domestic water for human consumption is provided by wells located on the site. Retention of rainwater will allow aquifers to be recharged. Reduction of human consumption of the well water and safe treatment of the human process water offers an opportunity to address the high initial cost of conventional wastewater treatment systems. Additionally, Highlands Center can be an educational environment to increase awareness of water conservation and best practices. To that end the following conceptual considerations should be priorities in redevelopment of Highlands Center:

- Composting toilet systems can replace existing toilet system in existing buildings. This will remove domestic water use for processing black water and remove the black water from existing septic systems that serve the site. In order to meet accessibility requirements of the Massachusetts Building Code first floor toilet facilities will require partial basements to enable this type of installation.

- All other domestic water use such as showers, sinks, and clothes washing represent 80% of the domestic water that is processed through our residential buildings. This water spends very little time within the closed loop water systems before it is sent out to wastewater treatment, typically a sewage treatment plant or septic system. This gray water waste contains some nutrients useful to plants and soil microorganisms and requires far less treatment than black water from toilets. The technology for those systems is evolving at a rapid rate now promising a whole host of options in the future including support of aquaculture development. Initially, gray water systems should be isolated from black water systems, where possible.

- The capture of rainwater from roof surfaces is important as a means of reducing water consumption. While it may not appear practical to use captured rain water for domestic water uses due to regulatory restrictions that require complicated treatment before it can be reused, it is still prudent to provide the collection materials in place for a time when aquifer system is challenged and reduction of well water use is required. As treatment systems become more affordable and accepted by approving agencies, conversion to using rainwater in washing of dishes clothes and even at showers and lavatories can then be easily converted.

C

D

Examples of ecologically sensitive environments for living and working are available at highly successful eco-villages outside Ithaca, NY.

6 Implementation of the Plan

6.1 Phasing Concept

The redevelopment of Highlands Center consists of three distinct phases. Those phases are based upon two key elements: a logical evolution of the various parts of the Highlands Center campus and an assessment of revenue available to build out the Center. The first phase is largely complete, a portion of the second phase is underway and the third has not started. Additional redevelopment of the site is possible after Phase 3, but is beyond the scope of this analysis.

As part of this process, final plans should be reviewed with officials of the community of Truro to respond to local concerns and to actively solicit local support of the Highlands Center initiative

Phase 1 Existing Development: Initial Redevelopment

This phase is largely completed, but subject to modifications in later phases as priorities evolve. It establishes basic infrastructure facilities that allow the phase two redevelopment to proceed without the delays and the cost of building this infrastructure. Background engineering and architectural analyses were undertaken. Short-term outdoor special events were conducted, the Payomet Performing Arts Center tent was located at the entry of the site, and a temporary wind data collection meteorological tower was installed.

Much of the existing redevelopment involved the National Park Service's commitment to the concept of Highlands Center including the rehabilitation of five buildings to establish several key park operations at the site, serving resource management, utility, and maintenance functions. Additionally, NPS made a significant $1 million federal investment in capital improvements to the infrastructure to establish basic utility services for NPS and partner buildings located on the site.

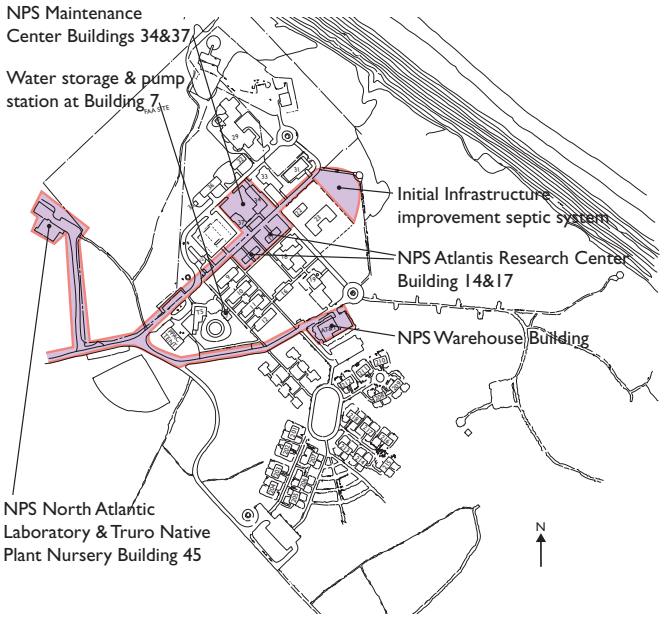
Phase 2 Develop Center Core & Provide Sustainable Improvements to Existing Structures FY Mid 2007 to FY2012

The core of the Highlands Center will be completed creating a vibrant active center. Partners will begin to occupy structures on the site. Current program participants, Highlands Center Inc., Fine Arts Work Center, AmeriCorps, Castle Hill, the Center for Coastal Studies, Payomet, and the National Park Service will be operating out their respective buildings. HCI will move in to the Buildings 9 & 15. Building 36 will be completed and, hopefully, building 18 (seen as the activity center with food service and meeting rooms) will be completed or under construction to complete the core redevelopment intent of Phase 2 with the central quadrangle as the center.

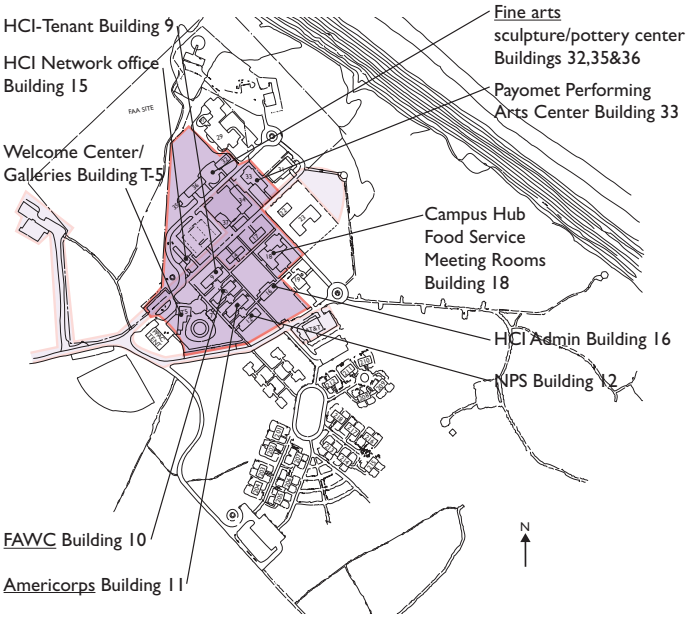
Building renovations in this phase will be designed with the intent of creating a sustainable redevelopment that will reduce Highlands Center's contribution to global warming, implement restoration, conservation, and stewardship of the natural habitat, and developed protocols to conserve water through reuse of storm and graywater systems. Investigations of wind generation and other renewable energy will continue.

Post-release of this Implementation Plan, Highlands Center, Inc. with NPS will also begin to execute a comprehensive marketing program to attract new Program Partners to the site, focusing a part of their efforts toward attracting one or two "core" tenants for the Center. In addition, Highlands Center, Inc. contracted with a professional fundraising firm to assist it in its ongoing search for funding to meet the capital and operating needs associated with Phases 2 and 3.

Figure 11: Phasing Diagram



Phase 1 Initial Redevelopment



Phase 2 Develop Center Core
Provide Sustainable Improvement
to Existing Structures

Phase 3 Develop Carbon Neutral Housing
& North Perimeter Site with
Wind Generator Installations

Phase 3 Develop Carbon Neutral Housing and North Perimeter Site with Wind Generators Installations FY2012 to FY2015

By FY2012 the final stages of the core redevelopment is completed and attention is turned to design and construction of the Carbon Neutral housing rising out of the rehabilitation of 18 of the 27 existing single family residential structures located on the site. This will be an aggressive green redevelopment that will carry over to the renovations of buildings 29, 33, 23, and 22 that are considered opportunities for anchor institutional tenants. In addition, a second phase of infrastructure work will be completed. At the end of Phase 3 the center is considered complete.

Possible Future Opportunities: FY2015 & Beyond

The Highlands Center site, when completed, should continue to be an attractive venue for artists, scientists and educators and both NPS and HCI will have the opportunity to continue additional amenities of this major venue on the Outer Cape.

6.2 Costs and Revenue Potentials

6.2.1 Basis of Estimates

Precise costs for the redevelopment of the Highlands Center project are difficult to estimate, as many aspects of the project will depend on the participation of program partners not now identified and the operations of programs whose scope cannot now be known. However, it is important to establish reasonable assumptions of expected capital and operating costs to serve as a "baseline" and we recommend that as additional facts are known, as key assumptions are confirmed or rejected, and as the scope of responsibility of Highlands Center, Inc. for project redevelopment matures, the estimates in this document should be updated and made more precise.

The key caveats in using the cost estimates are:

- NPS has commented on the numbers and assumptions contained in the pro-formas and discussions between HCI and NPS will continue.
- The cost analysis does not assume that HCI will manage or be responsible for expenses associated with (a) any site-based transportation service for tenants; (b) any extraordinary on-site energy delivery system; or (c) an ecology-oriented village. All are important and HCI, if asked, would consider assuming responsibility but all require additional detailed analysis.
- CCNS and HCI have reached a tentative agreement, requiring NPS final approval, with respect to the appropriate types of service to be offered to tenants locating to the Highlands Center site and who will be providing such services, as reflected by the summary of "Tenant Services and Site Administration" at the end of this section. In addition, the parties agree that as progress is made with respect to the redevelopment of the site and as tenants arrive, an ongoing process of assessing site service will be institutionalized among all of the site stakeholders. While the costs presume a reasonably full level of services for tenants, decisions to significantly increase or decrease service levels will alter estimates of operating expenses and revenue.
- It is important to remember that the project is to be accomplished in phases and that the project managers must be able to adjust these phases in order to bring expectations in line with funding reality.

Detailed estimates of redevelopment costs, revenues, and operating expenses are included in Appendix D.

Note: *Discussions about management responsibilities are ongoing between NPS and HCI. The results of such discussions may modify the proposals made in the remainder of Section 6.2 and the detailed data in appendix D.*

6.2.2 Capital Costs, FY96-FY15

The physical rehabilitation of the site is estimated to cost approximately $35 million, of which at least $2.6 has already been spent by NPS as of 2006. Of the remaining $32.4 million, $19.3 million is allocated to the Management Partner, $2.5 million to NPS and $10.6 million to the Program Partners. NPS and HCI have agreed to a $3.5 million HCI capital fundraising goal for an initial 4-5 buildings. It is further assumed that the full redevelopment of the site will take ten years. Again, it is important to point out that certain important elements of cost are not yet known and the total project cost will likely grow through investments by other entities and unforeseen conditions. However, such unanticipated costs may be partly offset by other savings or unforeseen revenue. For example, if it becomes possible to design and build the site using state-of-the art gray water treatment technology, and presuming regulatory agreement, the need to expend funds for a wastewater treatment plant could be eliminated or reduced, although some additional systems costs associated with gray water treatment would be added. The current estimate for Phase 2 capital costs stands at $18 million; Phase 3 capital costs are estimated to be $18.9 million.

In general, funding for the project is expected from three entities: the federal government (via the National Park Service), the Management Partner for the project and prospective tenants. It is presumed that the latter two entities will obtain capital funding from traditional public and private sources. It is further presumed that the housing component will primarily be funded by debt. This plan envisions that one entity would redevelop the housing, versus multiple lessees undertaking the rehabilitation. The federal government's contribution is, of course, subject to appropriation and no commitment can be made at this time to guarantee these funds. Appendix D includes a detailed analysis of the expected sources and uses associated with capital spending for the project, from its inception in FY96 through its probable completion in FY15.

6.2.3 Operating Costs, FY07-FY15

The purpose of the Operating Budget Pro-Forma, covering the period running from the current fiscal year until FY15, is to estimate the phased-in cost of managing the annual non-capital costs of operating Highlands Center. Somewhere between FY11 and FY12 the Management Partner will begin to experience the full cost impact associated with operating the Center and will need to raise and spend approximately $1.7 million per year.

The Operating Budget Pro-Forma, set forth in Appendix D, requires cost assumptions that are based on best estimates about the outcomes of presumed future policy and management decisions. Operating costs expectations have not been finalized, but this provides a potential framework for further consideration.

It is important to realize that the pro-forma assumes that the project will not realize sufficient recurring revenue so as to make it self-sustaining. According to the pro forma, the Management Partner will need to annually raise between $125,000 and $300,000 to supplement revenue needed for its operating budget; further, the analysis demonstrates that the Management Partner will need to also raise amounts to cover the annual operating deficit, ranging from $36,000 up to $144,000 in addition to its capital fundraising obligations. Although this number is large, it is not, by any means, out of line with comparable initiatives done in partnership with NPS at such locations as the Headlands of Golden Gate National Recreation Area and Cuyahoga National Park, where ambitious environmental and educational programs are being carried out by non-profit entities. While it is difficult to estimate the total amount of money needing to be raised by the Management Partner for the project, we estimate it is, at a minimum, over $19 million, inclusive of debt, for both capital and operating needs, to be raised over the next ten years. The first concrete step of that effort is reflected in the $3.5 million fundraising target set forth in a 2007 Fundraising Agreement between NPS and HCI.

6.2.4 Tenant Services and Site Administration

The Management Partner will eventually serve as the day-to-day management entity for the NPS of the Highlands Center village. There will be an expectation of certain services to be provided to tenants as well as an expectation as to the costs and revenue associated with the services. The following chart lays out the various current and enhanced service components for the tenants at Highlands Center that are expected to be provided by NPS or the Management Partner. The precise determination of service levels, in turn, translates into the common area service district charges and user fees in order to reimburse the organization and/or the government for its incurred expenses associated with delivering those services. There are some tenant services for which costs will be included in the common area service district charge, or annual cost recovery fee, associated with a lease. Other services will be paid by users on a voluntary basis. The standard lease services, activities related to site administration and user-fee services are set out below.

As noted previously, the menu of services should be viewed as an evolutionary process and should be reviewed by all of the stakeholders from time to time.

Tenant Services And Site Administration

Common area services to be provided to tenants:

- Landscape and road maintenance *
- Snow removal *
- Safety lighting for parking areas (beyond premises) *
- Ranger safety patrols for site security
- Fire suppression mutual aid
- Water and wastewater system maintenance
- Electric system maintenance
- Recyclable trash maintenance *

Site administration activities:

- Real estate leasing and management
- Housing leasing and maintenance repair and services
- Highlands Center marketing/PR
- Highlands Center programming
- Alternative energy system planning, installation and maintenance
- Administration and finance, procurement, contracts management, bookkeeping services, records management, legal services
- Long term planning and strategy

Fee-based user services: **

- Managing Food Services, catering and event planning
- Transportation systems
- Enhanced safety and site security

Services *not* provided to tenants:

- General (non-recyclable) trash removal
- Fuel
- Telephone/cable services or connections
- Electricity (separately metered)
- Water use (separately metered)

* Service provided by Management Partner

** Service paid by user fee

Appendices

Appendix A Bibliography

Appendix B Annotated Plans of Highlands Center Elements

Appendix C Technical Memorandum on Art/Science Collaboration Precedents

Appendix D Pro Forma Analysis*

Appendix E Mwmoanda on Wastewater Treatment Alternatives

Appendix A

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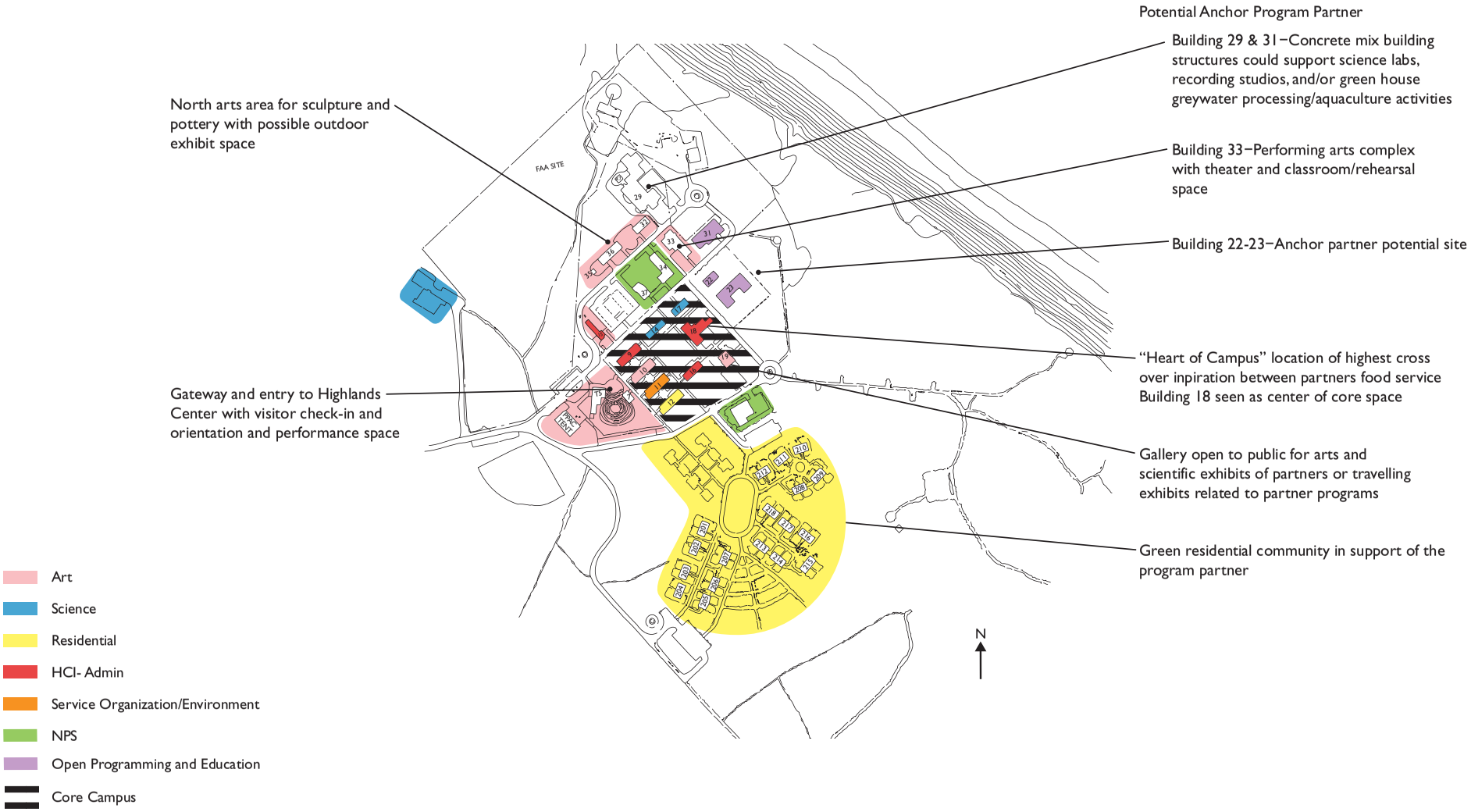
Appendix B

Annotated Plans of Highlands Center Elements

The attached drawings are larger, more heavily annotated versions of drawings of the key elements of the Implementation Plan that are presented in the body of the Plan

Multi-Disciplinary Community

A Creative Mix of Use and Users—The Heart of Highlands Center Concept



Environment for Pedestrian Supportive Activities

Create a walkable community with many spaces for events, activities and encounters among Highland center users

Pedestrian Walks

Special Gathering/Exhibit Area

Vehicular Traffic

Existing Trails

Trails Additions

Model Green Development

Facilitate an Environment Where a Consciousness of Sustainability Informs Development

Building connected for shared energy and circulation systems

Potential greenhouse for greywater treatment and/or aquaculture installation

Building renovations to maximize renewable energy use typical of all existing upper campus structures

Rebuild existing housing as one and one-half story duplex units that are carbon neutral without fossil fuel heating and cooling systems

Agricultural site as permaculture expression goals for site development

Wind generators as primary source of renewable energy in carbon neutral goals serves as icon of sustainability commitment

North Campus Sustainability

- Flat Roof With Green Roof Potential
- High Standard for Anchor Tenant
- Permeable Surfaces, where possible
- Wind Turbines (location illustrative only)
- Buildings with High Performance Envelopes and other green renovation goals a priority
- Lawn Irrigated with Gray Water
- Solar Hot Water

Experiment in Residential Sustainability

- Sites with Best Orientation for Solar (1-1/2 story duplex)
- Sites with Second Best Orientation for Solar (1-1/2 story duplex)
- Possible Future Sites

Appendix C

Technical Memorandum on Art/ Science Collaboration Precedents

The memorandum attached was developed as input to a facilitated discussion among various stakeholders about potential art and science collaboration at Highlands Center. It includes a summary of many comparable institutional efforts to create centers where artists and scientists work in collaboration.

I C O N
architecture

To: Bob Ciolek and attendees at brainstorming session on Highland Center Program

From: Jonathan Lane and Michael Singer

Subj: **Some examples of entities seeking to foster collaboration among artists and scientists**

Date: November 16, 2005

architecture

urban design

landscape

planning

Michael Singer, who was planning to facilitate this session, was unable to attend because of an unanticipated trip to deal with hurricane damage to his family's place in Florida. However, Michael did provide some interesting references to potential comparable institutions, to which I've added a few others that are operated by non-profits within National Park facilities. The institutions that are profiled below are organized into the following categories:

- **National Park Venues** – these examples are, clearly, of great relevance, as they have been developed in cooperation with the current site owner, NPS. The Headlands Institute, is notable as it takes advantage of existing buildings on the Marin Headlands of San Francisco Bay, although it is a spin-off of the Yosemite Institute, a pre-existing and successful institution. The Cuyahoga Valley Environmental Education Center is of interest because of the breadth of its programs and because it was developed by an active "Friends" group. Both are highly successful. The focus of both of these programs is environmental education of the public, although additional programs and resources are available.
- **Academic Centers for Interdisciplinary Collaboration between the Arts and Sciences** – there are many such examples within existing higher educational institutions. These are somewhat less comparable, inasmuch as they take advantage of an existing critical mass of research and teaching talent, as well as the renewable resource of a continuing influx of capable students. The MIT Media lab has been mentioned as a comparable; however, it is based on a model that solicits large corporate sponsorship expecting to benefit from the foregoing conditions as well as the output of the Media Lab's research.
- **International government sponsored centers –** two examples are given of major centers that receive considerable government assistance. Of the two, the National Endowment for Science, Technology and the Arts (NESTA) in the United Kingdom is particularly interesting as it explicitly seeks to encourage creative thinking from professional "at the top of their game," with an eye towards innovation. As opposed to the NPS models, which reach towards a broad user audience, these examples are focused more on the elite.
- **Non-profit special purpose entities –** two examples are noted. The Hambidge Center for Creative Arts and Sciences is oriented to selected artists in residency, although there is a focus on the particular environment of its setting, something that could be comparable to HC. The Sitka center for Art and Ecology is more centered on its fragile environment along the Oregon Coast, although it offers divers programs. Many other examples – such as Yaddo and the McDowell Colony are more single purpose, sited in historic properties, and endowed – thus probably not widely applicable to the HC case.
- **Museum – related Programs** – these examples are offered, not because HC is seeking to create a museum, but because some of their programs may be of interest.
- **Other International Examples** – these include several examples that do not fit neatly in the preceding categories, but have some elements of interest, nonetheless.

ICON architecture, inc.

a merger of
CityDesign Collaborative
Lane, Frenchman and Assoc.

38 Chauncy Street
Boston, Ma 02111
tel: 617.451.3333
fax: 617.451.1328
www.ICONarch.com

National Park Venues

Headlands Institute:

The Headlands Institute (HI) was founded in 1977 as a result of the success of the Yosemite Institute program. The new campus, just miles from San Francisco, provided students with a coastal experience. In addition, the park's rich history, including settlement by the Miwok people and later use as a former military site, prompted new ways to teach about humans and the environment. The Headlands Institute is a private non-profit organization dedicated to providing educational adventures in nature's classroom to inspire a personal connection to the natural world and responsible actions to sustain it. Located in Marin County within the Golden Gate National Recreational Area, HI is a part of the Yosemite Institute, operating in Yosemite NP, Olympic NP, and GG NRA providing Field Science School Programs, K-12 School Programs, Teacher Resources, Teen Leadership Programs, Teacher Training, Conference Facilities, and related programs.

http://www.yni.org/hi/

Cuyahoga Valley Environmental Education Center:

This center was created ten years ago and since that time, over 30,000 children have participated in the four-day, three-night environmental education resident program. Of those children, 7,500 from urban areas in Cleveland and Akron were able to participate as part of a scholarship program. The Cuyahoga Valley Environmental Education Center is a 500-acre handicap accessible campus with buildings ranging from a historic, 1850's farmhouse to a modern conference center with meeting rooms, classrooms, computer lab and a library. Cuyahoga Valley Environmental Education Center facilities include the Lipscomb Campus, November Lodge and White Pines Campus, and are available for day and overnight use by a variety of groups. The Cuyahoga Valley National Park Association, a nonprofit, membership based organization working in partnership with the National Park Service, provides innovative education and fosters community awareness, support and enjoyment of Cuyahoga Valley National Park. The organization both advocates and educates on behalf of the national park, reaching out to people of all ages and businesses to build membership, provide volunteer opportunities, coordinate efforts with other partner organizations, increase fundraising, and encourage enjoyment of and participation in the many wonderful opportunities available in Cuyahoga Valley National Park. The CVNPS has an operating budget of approximately $1.5 million, with nearly $1.3 million earned through environmental education and other program fees, with the remainder from a number of other sources.

http://www.cvnpa.org/meeting-facilities-at-cuyahoga-valley-national-park-association.php

Academic Centers for Interdisciplinary Collaboration between the Arts and Sciences

Center for the Arts in Society, Carnegie Mellon University:

This center bridges two Carnegie Mellon Colleges: the College of Fine Arts and the College of Humanities and the Social Sciences. The Center for the Arts in Society brings artists and humanists together to inquire into the role of the arts in societies. Through practice, publications, exhibitions, performances, and projects, artists and humanists examine the impact of arts on social change as well as the importance of historical events for the evolution of the arts. In courses, in programs for visiting scholars, and in sponsored research activities, the Center fosters interdisciplinary collaboration both within the University and between the University and arts and cultural organizations. Its three main agendas are: curricular innovation; events and visiting scholars to reflect new inquiries into the role of the arts in societies; support of interdisciplinary research among faculty, students, and the non-academic community. Website explains courses as well as the Center projects:

http://www.hss.cmu.edu/cas/index.htm

Center for Creative Inquiry, Carnegie Mellon University:

Founded in 1989, the STUDIO connects artistic enterprises to academic disciplines across the Carnegie Mellon campus, to the community of Pittsburgh and beyond. The STUDIO's mission is to support creation and exploration in the arts, especially interdisciplinary projects that bring together the arts, sciences, technology, and the humanities, and impact local and global communities. It has an excellent website with links to the more developed projects, including several that are based on arts and the environment:

http://www.cmu.edu/studio/

The CADRE Laboratory for New Media, School of Art and Design at San Jose State University:

The CADRE Laboratory for New Media is an interdisciplinary academic and research program dedicated to the experimental use of information technology and art. Enterprise by students and faculty includes but is not limited to issues of media and identity, political and social activism, experimental and interactive video, mapping and visualization of systems and databases as art, ubiquitous computing and communications, artificial life and genetics, social and computing networks, virtual environment and media installation, computer mediated performance and theatre, automated surveillance and telepresence.

http://cadre.sjsu.edu/

San Francisco State's Conceptual/Information Arts (CIA) Program:

CIA emphasizes systematic and structured processes of inquiry as an underlying support to the experimental searching at the fringes of the art world. The area has stressed the integration of the rational and the intuitive. Students are expected to learn and use processes of planning and problem solving typical of disciplines outside the arts when appropriate. CIA students are interested in art that could be categorized through a wide spectrum. The area supports students to pursue these types of inquiries. Some of the categories include: performance art, interactive events, public art, earthworks, art and architecture, installation, kinetics and robotics, video,

intermedia, computer imaging, computer generated conceptual work, telecommunications, sound art, art and science, integration with other disciplines, art and language, conceptual art, guerrilla art, and hopefully activities that defy these categories.

http://userwww.sfsu.edu/~infoarts/

MIT Media Lab:

This has already been distributed to participants in Highlands Center planning. The link below provides a 4 page overview of the institution:

http://www.media.mit.edu/about/index.html

Electronic Visualization Laboratory (EVL) at University of Illinois, Chicago:

The Electronic Visualization Laboratory (EVL), is an interdisciplinary graduate research laboratory that combines art and computer science, specializing in virtual reality, visualization and high-speed networking. The laboratory is a joint effort of UIC's College of Engineering and The School of Art & Design, and represents the oldest formal collaboration between engineering and art in the country offering graduate degrees in visualization (MFA, MS, PhD). Funded research projects include; tele-immersion, collaborative software, the development of viable, scalable, deployable stereo displays and management of next-generation advanced networking initiatives.

http://www.evl.uic.edu/core.php?mod=9&type=6&cat=28

International government sponsored centers

The Banff Center, Alberta, Canada:

The Banff Centre is a globally respected arts, cultural, and educational institution and conference facility. The Banff Centre enables both emerging and established individuals to interact within a multidisciplinary and multicultural environment, allowing them to push boundaries, to experiment, to share knowledge, to create and showcase new work, and to develop new ideas and solutions for the present and the future. The Banff Center has dramatic, relatively contemporary facilities in a beautiful setting, but it is unclear how much science / technology is involved at the center.

http://www.banffcentre.ca/

The National Endowment for Science, Technology and the Arts, UK:

NESTA was set up by Act of Parliament in 1998 to help maximize the UK's creative and innovative potential. They are funded by an endowment from the National Lottery and use the interest to back people of exceptional talent and imagination. They support people to explore new ideas, develop new products and services, or experiment with new ways of nurturing creativity in science, technology and the arts. NESTA is an interesting example of a place that brings real projects from outside communities to a place that supports the project participants in exploring creative and innovative solutions. A real feature of NESTA is that the center works as a place where highly creative people can examine projects away from their everyday stresses, and to provide the kind of expertise that could address, with the project participants, new solutions.

http://www.nesta.org.uk/ also see

http://www.nestafuturelab.org/about_us/index.htm

Non-profit special purpose entities

The Hambidge Center for Creative Arts and Sciences, Rabun Gap, Georgia:

Founded in 1934, the mission of the Hambidge Center is to provide opportunities for the expansion of creative vision. The Center maintains a national and international artists' working residency program serving artists from all fields in an unspoiled natural setting with a particular focus on: Providing artists with time and space in which to pursue their work, enabling artists to enhance their own communities' arts environment through works created at the Center, protecting and sustaining its pristine natural environment, land and endangered species. Hambridge provides artist residencies that are focused on specific themes; this could be a comparable function for Highland Center.

http://www.hambidge.org/

Sitka center for Art and Ecology, Otis Oregon:

In 1970, artist Frank Boyden and his wife Jane, a musician, founded Sitka as a Center dedicated to exploring—and celebrating—the intersection of art and ecology. The mission of the Sitka Center is: To expand the relationships between art, nature and humanity through workshops, presentations and individual research projects, and to maintain a facility appropriate to its needs that is in harmony with the inspirational coastal environment of Cascade Head.

http://www.sitkacenter.org/

Museum – related Programs

Art Institute of Chicago

The Art Institute offers a website that includes lesson plans. While this does not seem to be an actual center, institute, or program, this website offers some interesting ideas on the linkages between the arts and sciences:

http://www.artic.edu/aic/students/sciarttech/2a.html

Exploratorium, San Francisco, California

The Exploratorium is a museum of science, art, and human perception, with a mission to create a culture of learning through innovative environments, programs, and tools that help people nurture their curiosity about the world around them. They invite visitors, artists, scientists, educators, and exhibit developers to explore the natural world in new ways. From its beginning, the museum has used the observations made by scientists and artists as a means of expanding visitors' understanding of nature, culture, and natural phenomena. In the words of Exploratorium founder Dr. Frank Oppenheimer: "Art is included, not just to make things pretty, although it often does so, but primarily because artists make different kinds of discoveries about nature than do physicists or geologists. They also rely on a different basis for decision-making while creating their exhibits. But both artists and scientists help us notice and appreciate things in nature that we had learned to ignore or had never been taught to see. Both art and science are

needed to fully understand nature and its effects on people. The art in the Exploratorium is therefore blended with the science as part of the overall pedagogy." The Exploratorium has a mission statement that has some applicability to Highland Center. It also is an example of using art-science collaboration as a tool to enhance interpretive programs and exhibitions.

http://www.exploratorium.edu/arts/

Other International Examples

International Academy of Media Arts and Sciences (IAMAS), Japan:

IAMAS consists of two schools: the Institute of Advanced Media Arts and Sciences and the International Academy of Media Arts and Sciences. The Institute is solely a graduate school and has one faculty and one course, namely Media Creations. There are 20 students in each year of the course. The Academy was founded in 1996 and the Institute was opened in 2001. Gifu Prefecture established both schools as part of a strategy to promote advanced information technology and the culture that develops from this. The schools' activities are closely linked with Softpia Japan, the hub of the Prefecture's information industry.
http://www.iamas.ac.jp/SC/E/index-conc.html

The Alliance for Educational Innovation (also known as AEI), Hong Kong:

AWI is a collaborative partnership among several Hong Kong educational organizations that shares a vision and commitment to improve cultural education in a technology-rich environment. Based in the Hong Kong Institute of Education, the Alliance brings together teachers and teacher educators to collaborate on initiatives encouraging and supporting educational innovation. See the ‘projects’ section for information on projects relating to the arts:
http://aei.ied.edu.hk/

SANART Association of Aesthetics and Visual Culture, Turkey:

An interesting group of artists and architects with some symposiums on Art and Science (2000) and Art and Social Engagement (2002) see: http://www.sanart.org.tr/symposia.html

Appendix D

Pro Forma Analysis

HIGHLANDS CENTER PRO FORMA OPERATING BUDGET DETAIL (FY07-FY15)
PHASED CASE

General Assumptions: This Pro-Forma is created assuming a "phased in" scenario; i.e., that the operating and capital funding is available over time. It assumes that all parties have concurred with a plan to rehabilitate the site in its entirety, including 36 units of housing in 18 of the existing houses as expected to be contained in the final ICON Architecture analysis. It assumes phasing of construction/rehabilitation efforts, with the bulk of the redevelopment largely completed by mid-2012 with the remaining work by 2015.

Revised Nov 07 and Jan 08

OPERATING BUDGET DETAIL

REVENUE

	SF	$/SF	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	Notes
Common Area Fee												Charge for Common Area Exp & basic services provided by Management Partner
Building 23 [11,240 sf]	11,240	1.00	0	0	0	0	0	5,620	11,240	11,240	11,240	Program Partner
Building 22 [1,340 sf]	1,340	1.00	0	0	0	0	0	670	1,340	1,340	1,340	"
Building 31 [6,564 sf]	6,564	1.00	0	0	0	0	0	3,282	6,564	6,564	6,564	"
Building 32 [1,635 sf]	1,635	1.00	0	0	0	0	0	818	1,635	1,635	1,635	"
Building 29 [16,455 sf]	16,455	1.00	0	0	0	0	0	8,228	16,455	16,455	16,455	"
Building 10 [5,780 sf]	5,780	1.00	0	0	0	2,890	5,780	5,780	5,780	5,780	5,780	"
Building 11 [5,780 sf]	5,780	1.00	0	0	0	2,890	5,780	5,780	5,780	5,780	5,780	"
Building 33 [5,460 sf]	5,460	1.00	0	0	0	2,730	5,460	5,460	5,460	5,460	5,460	"
Building 16 [1,969 sf]	1,960	na	na	na	na	na	na	na	na	na	na	
Building 15 [1,987 sf]	1,987	6.00	0	0	0	5,961	11,922	11,922	11,922	11,922	11,922	operated by Management Partner
Building 9 [5,780 sf]	5,780	20.00	0	0	0	57,800	115,600	115,600	115,600	115,600	115,600	"
Building 35/36 [2,470 sf]	2,470	6.00	0	0	0	7,410	14,820	14,820	14,820	14,820	14,820	"
Subtotal			0	0	0	79,681	159,362	177,979	196,596	196,596	196,596	
Escalation		2.0%	0	0	0	4,781	12,749	17,798	23,592	27,523	31,455	
Total			0	0	0	84,462	172,111	195,777	220,188	224,119	228,051	
Service District Charge												Charge for Maint/Op svcs provided by NPS
Building 23 [11,240 sf]	11,240	2.00	0	0	0	0	0	11,240	22,480	22,480	22,480	
Building 22 [1,340 sf]	1,340	2.00	0	0	0	0	0	1,340	2,680	2,680	2,680	
Building 31 [6,564 sf]	6,564	2.00	0	0	0	0	0	6,564	13,128	13,128	13,128	
Building 32 [1,635 sf]	1,635	2.00	0	0	0	0	0	1,635	3,270	3,270	3,270	
Building 29 [16,455 sf]	16,455	2.00	0	0	0	0	0	16,455	32,910	32,910	32,910	
Building 10 [5,780 sf]	5,780	2.00	0	0	0	5,780	11,560	11,560	11,560	11,560	11,560	
Building 11 [5,780 sf]	5,780	2.00	0	0	0	5,780	11,560	11,560	11,560	11,560	11,560	
Building 33 [5,460 sf]	5,460	2.00	0	0	0	5,460	10,920	10,920	10,920	10,920	10,920	
Building 16 [1,969 sf]	1,960	2.00	0	0	0	1,960	3,920	3,920	3,920	3,920	3,920	
Building 15 [1,987 sf]	1,987	2.00	0	0	0	1,987	3,974	3,974	3,974	3,974	3,974	
Building 9 [5,780 sf]	5,780	2.00	0	0	0	5,780	11,560	11,560	11,560	11,560	11,560	
Building 35/36 [2,470 sf]	2,470	2.00	0	0	0	2,470	4,940	4,940	4,940	4,940	4,940	
Meeting Center (Building T5)	3,625	-	0	0	0	0	0	0	0	0	0	
Food Service (Building 18)	4,680	-	0	0	0	0	0	0	0	0	0	
Subtotal			0	0	0	29217	58434	95668	132902	132902	132902	
Escalation		2.0%	0	0	0	1,753	4,675	9,567	15,948	18,606	21,264	
Total			0	0	0	30,970	63,109	105,235	148,850	151,508	154,166	
Rent (to NPS)												Fair Market Rent for Ground Lease & bldg. shell
Building 23 [11,240 sf]	11,240	3.50 1d/	0	0	0	0	0	19,670	39,340	39,340	39,340	
Building 22 [1,340 sf]	1,340	3.50 1d/	0	0	0	0	0	2,345	4,690	4,690	4,690	
Building 31 [6,564 sf]	6,564	3.50 1d/	0	0	0	0	0	11,487	22,974	22,974	22,974	
Building 32 [1,635 sf]	1,635	3.50 1d/	0	0	0	0	0	2,861	5,723	5,723	5,723	
Building 29 [16,455 sf]	16,455	3.50 1d/	0	0	0	0	0	28,796	57,593	57,593	57,593	
Building 10 [5,780 sf]	5,780	3.50 1d/	0	0	0	10,115	20,230	20,230	20,230	20,230	20,230	
Building 11 [5,780 sf]	5,780	3.50 1d/	0	0	0	10,115	20,230	20,230	20,230	20,230	20,230	
Building 33 [5,460 sf]	5,460	3.50 1d/	0	0	0	9,555	19,110	19,110	19,110	19,110	19,110	
Building 16 [1,969 sf]	1,960	na 1d/	na	na	na	na	na	na	na	na	na	Management Partner use

Building 15 [1,987 sf]	1,987	2.00	1d/	0	0	0	1,987	3,974	3,974	3,974	3,974	3,974
Building 9 [5,780 sf]	5,780	2.00	1d/	0	0	0	5,780	11,560	11,560	11,560	11,560	11,560
Building 35/36 [2,470 sf]	2,470	2.00	1d/	0	0	0	2,470	4,940	4,940	4,940	4,940	4,940
Meeting Center (Building T5)	3,625	2.00	1d/	0	0	0	3,625	7,250	7,250	7,250	7,250	7,250
Food Service (Building 18)	4,680	2.00	1d/	0	0	0	4,680	9,360	9,360	9,360	9,360	9,360
Total				0	0	0	48,327	96,654	161,814	226,973	226,973	226,973
Fee for Service and Miscellaneous												User fees
Meeting Center (Building T5)	3,625			0	0	0	0	5,000	10,000	10,000	10,000	10,000
Food Service (Building 18)	4,680			0	0	0	0	21,175	42,350	42,350	42,350	42,350
Catering				0	0	0	0	4,935	9,870	9,870	9,870	9,870
Media Lab				0	0	0	1,925	3,850	3,850	3,850	3,850	3,850
Interest				0	0	250	500	500	750	750	1,000	1,000
Miscellaneous				0	0	2,000	2,500	2,500	3,500	3,500	5,000	5,000
Subtotal				0	0	2,250	4,925	37,960	70,320	70,320	72,070	72,070
Escalation Clause		2.0%		0	0	90	296	3,037	7,032	8,438	10,090	11,531
Total				0	0	2,340	5,221	40,997	77,352	78,758	82,160	83,601

Notes and Assumptions - Revenue The revenue assumptions are based upon a number of critical strategic assumptions concerning the project build-out and operation. The key assumptions are as follows:

1a. FY07 Revenue assumptions are based on the current HCI Board-approved budget modified by GLC based on discussions with NPS and HCI staff.

1b. Common Area Fee is anticipated revenue for common and other services offered bythe Management Partner to Porogram Partners. It is ianticipater that this would be negotiated between the entitiies; actual fees to be negoatitaed in the future when service are available.Examples include availability of meeting rooms in headquarters building, programs and events, visitor reception, Center promotion, general center management.

1c. Service District charge provides for overall property maintenance, including grounds, landscaping, snow removal, utility maintenance, security, lighting, etc.

1d. Rent to NPS is to be charged on a Fair Market Value as determined by appraisal. This is an estimate only for pro forma projections and is not based on an appraisal.

2. Donations include amounts received from individuals, businesses and foundations.

3. • No direct revenue from NPS to Management Partner of any kind is assumed. For space occupied by the National Park Service (other thanhousing occupied by NPS) no direct payments for Management Partner services rendered are assumed because NPS will share in Service District Charge operations. NPS has waived the rental value of Building 16 in exchange for management partner services, but not annual service costs.

• The pro-forma also assumes that Buildings 22, 23 and 29, may need extensive rehabilitation but will haveroughly the same amount of square footage available for lease.

4. Building T5 is assumed to be re-designated as a Conference Center for the primary use of Program Partner sponsored conferences. It is expected that it will be rehabilitated and leased by the management partner. The income estimates are based upon 40 annual events with a rental fee of $250 per event, commencing mid-2011

5. Catering revenue is based on several assumptions. First, management partner, or other lessee, would lease the facility and an outside caterer will be awarded a service contract for all food services (including catering). Second, the management partner will receive 7% of the gross revenue. Third, in terms of catered events, an average of 40 people will attend each of the 40 events in Building T5. 1,600 people will be charged an average of $10.00 in food costs x 7%. In addition, there will be 20 larger catered events on-site, averaging 125 people per event, spending $50.00 per person for food x 7%.

6. Dining Hall revenue is calculated at 275 meals per day at $10.00 per meal x 220 days x 7%. "Canteen" type revenue is also assumed to be included in this amount. The dining area will be completed mid-2011.

7. Revenue associated with Media Lab is assumed to involve an average of 50 people per day at an average of $5.00 per person per day, times 220 days and calculated at the same 7% formula for Managing Partner revenue.

8. Housing revenue assumptions are derived from the ICON Architecture estimates. Housing units will be leased on a year-round and short term basis.

EXPENSES and RESERVES

	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Staffing									
Executive Director	50,000	50,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Mrkt'g/Prog Mgr./Fundraiser	0	0	30,000	60,000	60,000	60,000	60,000	60,000	60,000
Administrative Assistant	0	0	0	8,750	35,000	35,000	35,000	35,000	35,000
Business/Facil. Mgr	0	0	0	30,000	60,000	60,000	60,000	60,000	60,000
Admin Assist't (Part time)	0	0	0	0	15,600	15,600	15,600	15,600	15,600
Total Salaries	50,000	50,000	105,000	173,750	245,600	245,600	245,600	245,600	245,600
Fringe/Taxes - 20%	10,000	10,000	21,000	34,750	49,120	49,120	49,120	49,120	49,120
Total Staff Expense	**60,000**	**60,000**	**126,000**	**208,500**	**294,720**	**294,720**	**294,720**	**294,720**	**294,720**
General & Administration									
Contract Services (land maint, snow)	1,800	1,800	9,000	12,000	12,000	12,000	12,000	12,000	12,000
Marketing & Events	29,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Advertising/Publications	300	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Printing	7,300	8,000	9,000	10,000	10,000	10,000	10,000	10,000	10,000
Office Supplies	800	1,000	3,000	4,000	4,000	4,000	4,000	4,000	4,000
Postage	1,500	4,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Professional Services	78,500	32,000	75,000	55,000	10,000	10,000	10,000	10,000	10,000
Insurance	6,500	10,000	12,000	14,000	14,000	14,000	14,000	14,000	14,000
New Equipment	4,000	4,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Equipment Rental	500	500	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Equipment Maint/Suppt	800	1,000	2,500	3,000	3,000	3,000	3,000	3,000	3,000
Capital Repairs/ Projects	5,000	5,000	5,000	10,000	10,000	10,000	10,000	10,000	10,000
Rent: Admin Office	1,200	1,200	4,000	4,000	0	0	0	0	0
Utilities	1,795	8,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000
Telephone	2,400	3,200	4,000	5,000	5,000	5,000	5,000	5,000	5,000
Licenses/Fees/Permits	300	500	1,000	1,500	1,500	1,500	1,500	1,500	1,500
Memberships	200	300	500	1,000	1,000	1,000	1,000	1,000	1,000
Travel	3,600	3,600	7,500	10,000	10,000	10,000	10,000	10,000	10,000
Training	200	1,000	2,500	3,000	3,000	3,000	3,000	3,000	3,000
Site Planning/Workshops	13,000	2,500	5,000	5,000	5,000	0	0	0	0
Total G&A	**158,695**	**105,100**	**177,500**	**177,000**	**128,000**	**123,000**	**123,000**	**123,000**	**123,000**
Operating Reserve - 5%	10,935	8,255	15,175	19,275	21,136	20,886	20,886	20,886	20,886
Capital Reserve - $.50/SF	0	0	0	0	9,262	9,262	9,262	9,262	9,262
Escalation - 2%/annum over 2007	0	3,302	12,140	23,130	33,818	41,772	50,126	58,481	66,835
Total Expenses	**229,630**	**176,657**	**330,815**	**427,905**	**486,936**	**489,640**	**497,994**	**506,349**	**514,703**

Notes and Assumptions – Expenses Some positions reflect first year cost based on half years or quarter year budget impact.

Staffing:

1. Fringe Benefits and tax payments for FY08-FY15 are assumed to be 20% of salaries. However, the numbers for FY07 reflect the current budget (and level) of fringe benefits and taxes. It is assumed that as Management Partner grows and acquires more staff it will need to improve the current level of health insurance contribution and will likely created a modest 401(k) program for staff.

General & Administration:

2. There is a "Clerk of the Works" position within the Professional Services line item, from mid-FY08 until mid-FY12. The position will be eliminated upon the completio of all major capital projects for which Management Partner is responsible. This item will also be contained in the Highlands Center Capital Budget Pro-Forma. Over the course of four years the cost of this service is expected to be $135,000.

3. Other professional services include the cost of the annual audit, legal and other professional services. It may include contracts for fundraising specialists. Contract services represents payroll and accounting services plus other miscellaneous contractual services.

4. The pro-forma does not include any administrative office rent once Management Partner is located on-site. It does not include any annual cost recovery/service district charges that NPS may be obliged to charge HCI under NPS leasing requirements.

5. There is an outstanding loan to HCI from MassDevelopment(MDFA) which will require repayment. The pro-forma assumes repayment in FY11.

6. Phase 1 consists of site planning and design, initial infrastructure work, repair of Buildings 7, 45 and 146, plus Buildings 14 and 17 which comprise the Atlantic Research Center. Phase 1 is esssentially complete. Phase 2 includes Buildings 9, 10, 11, 15, 16, 33 and 35/36. Building 16 will have Management Partner as a tenan Building 10 will be occupied by the Fine Arts Work Center; Building 11 will be occupied by Barnstable County AmeriCorps; and, Building 33 is earmarked for Payomet Theatre. Building 16 will be open in FY08; Buildings 10, 11, 12 and 33 by mid-FY10. All of the buildings to be rehabbed and operated by Management Partner will be opened by mid-10. Phase 3 assumes that Buildings T5, 18, 22, 23, 29, 31, and 32 are fully rehabbed and occupied by mid-FY012. This phase also assumes that 36 units of housing in 18 duplex units are renovated by that date. Three other buildings, 12, 34 and 37, are designated for the use of NPS. It is unclear when these structures will be rehabilitated.

7. In terms of reserves it is assumed that the Management Partner organization will, over time, approve the creation and gradual funding of certain reserves. They are (a). an Operating Reserve representing six months of operating expenses. It will be funded at 5% of staffing and G & A (not reserve funding), until the six months amount is attained. The money will be kept in an interest bearing account with interest accruing to the reserve; and, (b). a 3R Reserve, to be used for the repair, replacement and renewal of the capital assets of the Center, funded at 10% of staffing costs and G & A (not reserve funding) to an amount to be determined by the Board (likely a percentage of the value of all capital assets or some fixed amount. For the first year of the creation of each reserve, funding will be at 50% of the require amount (i.e., 2 1/2% for the Operating Reserve and 5% for the 3R Reserve). Interest accruing to reserves remain in the reserve. Reserves will be replenished as they are used. Any amounts in excess of the required reserve funding will be treated as miscellaneous revenue to Management Partner

8. Housing Costs reflect ICON Architecture's recommendation to create 36 units of "green" housing in the 18 existing houses. The housing maintenance costs reflect ICON's estimates of $2,500 per unit per year.

9. Other than housing related debt, the pro-forma assumes no other debt and thus, no other debt service. In terms of debt and debt service the assumptions contained in the ICON Architecture report are used, with one exception. The assumptions are debt in the amount of $8,151,082, at an interest rate of 6.5% over 30 years. There is "green" construction components totalling $1,729,475 and it is assumed that 75% of the green costs will be paid by a grant. Added to the ICON assumptions is an amount representing 3% of the par value of the bonds to cover costs of issuance, amortized over the life of the debt. The cost of issuance, $495,330 over 25 years, will be capitalized and represents direct costs associated with the bond issuing process, such as legal fees, investment bank takedown and other issuance fees. It should be noted that the pro-forma does not assume pre-construction financing or any likely required reserves associated with the issuance of bonds, such a debt service reserve. It also does not presume any costs associated with the possible need for credit enhancement. All represent probable and substantial increases in project-related expenses. Note: if the housing rehabilitation becomes the responsibility of an outside developer, as opposed to the Management Partner, no project debt should be assumed as well as a probable but unknowable reduction in the revenue potential associated with unit rentals. A housing debt item is carried in the pro-forma regardless of the developer and operator as it is probable.

Highland Center Implementation Plan
Phased Analysis--At Stabilized Year--GLC Recast
Management Partner Revenue and Expense Only

27-Jan-2008

Operating Pro Forma

FY	Phase 1 Thru 2006	2007	2008	2009	2010	Phase 2 Stabilized 2011	Phase 3 Stabilized 2013	Notes from Operating Pro-forma Detail
Income								
Revenue								
Common Area Fee								
Subtotal		-	-	-	79,681	159,362	196,596	
Escalation		-	-	-	4,781	12,749	23,592	2%/annum from 2007$
Total		**-**	**-**	**-**	**84,462**	**172,111**	**220,188**	
Service District Charge								
Collected From Program Partners		-	-	-	17,020	34,040	108,508	
Collected From Management Partner Tenants		-	-	-	10,237	20,474	20,474	
Subtotal		-	-	-	29,217	58,434	132,902	
Escalation		-	-	-	1,753	4,675	15,948	2%/annum from 2007$
Total		**-**	**-**	**-**	**30,970**	**63,109**	**148,850**	
Fee for Service and Miscellaneous								
Meeting Center (Building T5)		-	-	-	-	5,000	10,000	
Food Service (Building 18)		-	-	-	-	21,175	42,350	
Catering		-	-	-	-	4,935	9,870	
Media Lab		-	-	-	1,925	3,850	3,850	
Interest		-	-	250	500	500	750	
Miscellaneous		-	-	2,000	2,500	2,500	3,500	
Subtotal		-	-	2,250	4,925	37,960	70,320	
Escalation Clause		-	-	90	296	3,037	8,438	2%/annum from 2007$
Total		**-**	**-**	**2,340**	**5,221**	**40,997**	78,758	
Fundraising		**125,000**	**150,000**	**185,000**	**220,000**	**252,162**	**200,869**	
Total Revenue		**125,000**	**150,000**	**187,340**	**340,652**	**528,378**	**648,665**	

Expense							
NPS Operations							paym't of Srvc Dist. Chgs collected to NPS for maint. services
Collected From Program Partners	-	-	-	17,020	34,040	108,508	
Collected From Management Partner Tenants	-	-	-	10,237	20,474	20,474	
Subtotal	-	-	-	29,217	58,434	132,902	
Escalation	-	-	-	1,753	4,675	15,948	2%/annum from 2007$
Total	**-**	**-**	**-**	**30,970**	**63,109**	**148,850**	
Rent to NPS for Buildings Used by Management Partner	**-**	**-**	**-**	**18,542**	**37,084**	**37,084**	
HCI Operations							
Total Salaries	50,000	50,000	105,000	173,750	245,600	245,600	
Fringe/Taxes - 20%	10,000	10,000	21,000	34,750	49,120	49,120	
Total G&A	158,695	105,100	177,500	177,000	128,000	123,000	
Operating Reserve - 5%	10,935	8,255	15,175	19,275	21,136	20,886	
Capital Reserve - $.50/SF	-	-	-	-	9,262	9,262	
Escalation - 2%/annum over 2007	-	3,302	12,140	23,130	33,818	50,126	2%/annum from 2007$
Total	**229,630**	**176,657**	**330,815**	**427,905**	**486,936**	**497,994**	
Total NPS & HCI Operations	**229,630**	**176,657**	**330,815**	**477,417**	**587,128**	**683,929**	
Net Income before Housing	**(104,630)**	**(26,657)**	**(143,475)**	**(136,765)**	**(58,750)**	**(35,263)**	
Additional Uses					**80,000**	**80,000**	camps, larger conf. ctr., anchor tenant (college satellite)
Net Housing Income	-	-	-	-	**73,267**	**98,923**	net from Housing Pro Forma
Net Income	**(104,630)**	**(26,657)**	**(143,475)**	**(136,765)**	**94,518**	**143,660**	
Startup Deficit				**(411,526)**			added to Capital Plan requirement

Capital Plan

FY	Phase 1 Thru 2006	Phase 2 Stabilized 2011	Phase 3 Stabilized 2013	Total All Phases	Notes
Uses					
Total Development Costs--Exclusive of Buildings Developed by Partners					
Hard Costs					
Infrastructure Repair or Replacement					
Water	-	-	-	-	
Wastewater	-	1,104,154	-	1,104,154	over and above that provided by NPS
Electrical Systems	-	-	-	-	
Alternate Energy Systems	-	TBD	TBD	-	separate project-funded by grants or savings
Site Work & Cleanup					
Site Demolition	-	-	-	-	
Building Cleanup	-	100,000	30,000	130,000	
Site Cleanup	-	150,000	150,000	300,000	
Overlook 1	-	-	-	-	
Overlook 2	-	30,000	-	30,000	Per ICON study
Reshaping Landforms	-	-	243,000	243,000	Per ICON study
Pathways/Trails	-	75,000	-	75,000	Per ICON study
Pedestrian Walkways	-	30,000	31,200	61,200	Per ICON study
Streets and Parking	-	600,000	364,400	964,400	Per ICON study
Landscaping	-	395,650	200,000	595,650	Per ICON study
Lighting	-	-	-	-	
Signage	-	25,000	25,000	50,000	
Common Building Rehabilitation/Fitout					Management Partner controlled buildings only
Building T5	-	-	504,602	504,602	
Building 16	-	274,304	-	274,304	Management Partner use, 2002 Hannon report
Building 15 [1,987 sf]	-	326,619	-	326,619	
Building 9 [5,780 sf]	-	703,423	-	703,423	
Building 35/36 [2,470 sf]	-	458,265	-	458,265	
Building 18 [4,680 sf]	-	-	534,090	534,090	
Construction Contingency	-	550,109	208,229	758,338	10%
Housing	-	8,646,412	-	8,646,412	Includes soft cost, all-in
Common Facilities					
Data/Communications/Security Systems	-	37,000	50,000	87,000	
Capital Equipment	-	20,000	20,000	40,000	
Recreational Facilities/Gathering Spaces	-	200,000	200,000	400,000	
Music Amphitheater	-	TBD	TBD	-	
Total Hard Costs	**-**	**13,725,936**	**2,560,521**	**16,286,457**	

Soft Costs					
Planning and Design--early stage					
Preliminary Site Planning	-	-	-	-	
Preliminary Site Design	-	225,000	-	225,000	
Implementation Plan	118,000	-	-	118,000	
Add'l Architecture & Engineering	-	826,412	342,344	1,168,756	10% of Hard Costs
Project Management Fees	40,500	100,000	37,500	178,000	
Legal Expenses	-	150,000	100,000	250,000	GLC est
Soft Cost Contingency - 10%	-	148,016	47,984	196,001	
Total Soft Costs	**158,500**	**1,449,429**	**527,828**	**2,135,757**	
Other Uses					
Repayment of MDFA Loan	-	16,979	-	16,979	
Reserve for Inflation		300,000	347,386	647,386	5% per annum from 2009
Startup Deficit			411,526	411,526	over first 4 years
Total Uses	**158,500**	**15,492,344**	**3,847,262**	**19,498,105**	

Sources

Management Partner Sources				
Fundraising-Private	-	3,770,000	1,896,683	5,666,683
Foundation Grants	-	2,800,000	2,000,000	4,800,000
State	68,000	300,000	-	368,000
County	50,000	-	-	50,000
MDFA Loan	16,979		-	16,979
Housing Bond issue	-	8,646,412	-	8,646,412
Total Management Partner Sources	**134,979**	**15,516,412**	**3,896,683**	**19,548,074**
Sources Net of Uses	**(23,521)**	**24,068**	**49,421**	**49,969**
Cumulative Phase 1 & 2		**547**		
Cumulative Phase 1, 2 & 3			**49,969**	

Notes:

1. For purpose of analysis only, it has been assumed that Management Partner would develop housing; and NPS would reimburse developer/operator for housing units utilized by NPS
2. Does not include cost of energy facilities or any unique transportation costs.
3. "Stabilized Year" is the year when operations have become stabilized--the newly created space is on-line paying full rent and charges and ongoing performance should be consistent other than inflation.

Highland Center Implementation Plan
Phased Analysis--At Stabilized Year--GLC Recast
NPS Revenue and Expense Only

27-Jan-2008

Operating Pro Forma

	FY	Phase 1 Thru 2006	2007	2008	2009	2010	Phase 2 Stabilized 2011	Phase 3 Stabilized 2013	Notes
Income									
Revenue									
Service District Charge	$	2.00 per sf							
Building 23 [11,240 sf]			-	-	-	-	-	22,480	
Building 22 [1,340 sf]			-	-	-	-	-	2,680	
Building 31 [6,564 sf]			-	-	-	-	-	13,128	
Building 32 [1,635 sf]			-	-	-	-	-	3,270	
Building 29 [16,455 sf]			-	-	-	-	-	32,910	
Building 10 [5,780 sf]			-	-	-	5,780	11,560	11,560	
Building 11 [5,780 sf]			-	-	-	5,780	11,560	11,560	
Building 33 [5,460 sf]			-	-	-	5,460	10,920	10,920	
Building 16 [1,969 sf]			-	-	-	1,960	3,920	3,920	Management Partner use
Building 15 [1,987 sf]			-	-	-	1,987	3,974	3,974	
Building 9 [5,780 sf]			-	-	-	5,780	11,560	11,560	
Building 35/36 [2,470 sf]			-	-	-	2,470	4,940	4,940	
Meeting Center (Building T5)			-	-	-	-	-	-	
Food Service (Building 18)			-	-	-	-	-	-	
Subtotal			-	-	-	29,217	58,434	132,902	
Escalation			-	-	-	1,753	4,675	15,948	2%/annum from 2007$
Total			**-**	**-**	**-**	**30,970**	**63,109**	**148,850**	
Rent (to NPS)									Fair Market Rent for ground lease and building shell
Building 23 [11,240 sf]			-	-	-	-	-	39,340	
Building 22 [1,340 sf]			-	-	-	-	-	4,690	
Building 31 [6,564 sf]			-	-	-	-	-	22,974	
Building 32 [1,635 sf]			-	-	-	-	-	5,723	
Building 29 [16,455 sf]			-	-	-	-	-	57,593	
Building 10 [5,780 sf]			-	-	-	10,115	20,230	20,230	
Building 11 [5,780 sf]			-	-	-	10,115	20,230	20,230	
Building 33 [5,460 sf]			-	-	-	9,555	19,110	19,110	
Building 16 [1,969 sf]			na	na	na	na	na	na	Management Partner use
Building 15 [1,987 sf]			-	-	-	1,987	3,974	3,974	
Building 9 [5,780 sf]			-	-	-	5,780	11,560	11,560	
Building 35/36 [2,470 sf]			-	-	-	2,470	4,940	4,940	
Meeting Center (Building T5)			-	-	-	3,625	7,250	7,250	
Food Service (Building 18)			-	-	-	4,680	9,360	9,360	
Housing			-	-	-	-	18,317	24,731	
Total			**-**	**-**	**-**	**48,327**	**114,971**	**251,704**	
Total Revenue			**-**	**-**	**-**	**79,297**	**178,080**	**400,554**	

Expense							
NPS Operations / Service District Charges							
Landscape maintenance							
Snow removal							
Minimal exterior safety lighting for parking lots							
Ranger safety patrols - 1 FTE							
Fire suppression mutual aid							
Wastewater system maintenance (1 hr./wk. WG-9)							
Water system maintenance (5 hrs./wk. WG-9)							
Electric system maintenance (WG-10)							
Trash recycling WG-7							
Subtotal	-	-	-	19,212	39,149	79,827	NPS estimate
Escalation--2%	-	-	-	1,153	3,132	9,579	2%/annum from 2007$
Total	**-**	**-**	**-**	**20,365**	**42,281**	**89,406**	
Net Income	**-**	**-**	**-**	**58,932**	**135,799**	**311,148**	

Note: "Stabilized Year" is the year when operations have become stabilized--the newly created space is on-line paying full rent and charges and ongoing performance should be consistent other than inflation.

Capital Plan

FY	Phase 1 Thru 2006	2007	2008	2009	2010	Phase 2 Stabilized 2011	Phase 3 Stabilized 2013	Total All Phases	Notes
Uses									
Total Development Costs--Exclusive of Buildings Developed by Partners									
Hard Costs									
Infrastructure Repair or Replacement									
Water	463,901					204,137	-	668,038	
Wastewater	299,013					564,771	-	863,784	
Electrical Systems	40,000					422,770	-	462,770	
Site Work & Cleanup	-								
Site Demolition	47,500					1,027,000	-	1,074,500	
Building Cleanup	-					-	-	-	
Site Cleanup	-					-	-	-	
Overlook 1	30,000					-	-	30,000	
Overlook 2	-					-	-	-	
Reshaping Landforms	-					-	-	-	
Pathways/Trails	-					-	-	-	
Pedestrian Walkways	-					-	-	-	
Streets and Parking	-					-	-	-	
Landscaping	-					-	-	-	
Lighting	10,000					10,000	-	20,000	
Signage	2,000					-	-	2,000	
Building Rehabilitation/Fitout									
Building 14 & 17--Atlantic Res Ctr	920,000					-	-	920,000	
Construction Contingency	-					100,000	-	100,000	10%
Total Hard Costs	**1,812,414**					**2,328,678**	**-**	**4,141,092**	
Soft Costs									
Planning and Design--early stage									
Preliminary Site Planning	288,786					-	-	288,786	
Preliminary Site Design	-					-	-	-	
Implementation Plan	-					-	-	-	
Add'l Architecture & Engineering	240,000					178,752	-	418,752	
Project Management Fees	57,500					-	-	57,500	
Soft Cost Contingency - 10%	-					-	-	-	
Total Soft Costs	**586,286**					**178,752**	**-**	**765,038**	
Total Uses	**2,398,700**					**2,507,430**	**-**	**4,906,130**	
Sources									
NPS Sources									
Infrastructure	1,028,708					1,480,430	-	2,509,138	
Site Plan/Buildings	1,369,992					1,027,000	-	2,396,992	
								-	
Total Sources	**2,398,700**					**2,507,430**	**-**	**4,906,130**	
Sources Net of Uses	**-**					**-**	**-**	**-**	
Cumulative Phase 1 & 2						**-**			
Cumulative Phase 1, 2 & 3							**-**		

Highland Center Implementation Plan
Phased Analysis--At Stabilized Year--GLC Recast
Consolidated Sources and Uses--Management Partner & NPS

27-Jan-2008

Capital Plan

FY	Phase 1 Thru 2006	2007	2008	2009	2010	Phase 2 Stabilized 2011	Phase 3 Stabilized 2013	Total All Phases	Notes
Uses									
Total Development Costs--Exclusive of Buildings Developed by Partners									
Hard Costs									
Infrastructure Repair or Replacement									
Water	463,901					204,137	-	668,038	
Wastewater	299,013					1,668,925	-	1,967,938	
Electrical Systems	40,000					422,770	-	462,770	
Alternate Energy Systems	-					TBD	TBD	-	separate project-funded by grants or savings
Site Work & Cleanup									
Site Demolition	47,500					1,027,000	-	1,074,500	
Building Cleanup	-					100,000	30,000	130,000	
Site Cleanup	-					150,000	150,000	300,000	
Overlook 1	30,000					-	-	30,000	
Overlook 2	-					30,000	-	30,000	Per ICON study
Reshaping Landforms	-					-	243,000	243,000	Per ICON study
Pathways/Trails	-					75,000	-	75,000	Per ICON study
Pedestrian Walkways	-					30,000	31,200	61,200	Per ICON study
Streets and Parking	-					600,000	364,400	964,400	Per ICON study
Landscaping	-					395,650	200,000	595,650	Per ICON study
Lighting	10,000					10,000	-	20,000	
Signage	2,000					25,000	25,000	52,000	
Building Rehabilitation/Fitout									Management Partner controlled & NPS only
Building 14 & 17--Atlantic Res Ctr	920,000					-	-	920,000	
Building T5	-					-	504,602	504,602	
Building 16	-					274,304	-	274,304	Management Partner use, 2002 Hannon report
Building 15 [1,987 sf]	-					326,619	-	326,619	
Building 9 [5,780 sf]	-					703,423	-	703,423	
Building 35/36 [2,470 sf]	-					458,265	-	458,265	
Building 18 [4,680 sf]	-					-	534,090	534,090	
Construction Contingency	-					650,109	208,229	858,338	10%
Housing	-					8,646,412	-	8,646,412	Includes soft cost, all-in
Common Facilities									
Data/Communications/Security Systems	-					37,000	50,000	87,000	
Capital Equipment	-					20,000	20,000	40,000	
Recreational Facilities/Gathering Spaces	-					200,000	200,000	400,000	
Music Amphitheater	-					TBD	TBD	-	
Total Hard Costs	**1,812,414**					**16,054,614**	**2,560,521**	**20,427,549**	

Soft Costs					
Planning and Design--early stage					
Preliminary Site Planning	288,786	-	-	288,786	
Preliminary Site Design		225,000	-	225,000	
Implementation Plan	118,000	-	-	118,000	
Add'l Architecture & Engineering	240,000	1,005,164	342,344	1,587,508	15% of Hard Costs
Project Management Fees	98,000	100,000	37,500	235,500	
Legal Expenses	-	150,000	100,000	250,000	GLC est
Soft Cost Contingency - 10%	-	148,016	47,984	196,001	
Total Soft Costs	**744,786**	**1,628,180**	**527,828**	**2,900,795**	
Other Uses					
Repayment of MDFA Loan	-	16,979	-	16,979	
Reserve for Inflation		300,000	347,386	647,386	5% per annum from 2009
Startup Deficit	-	-	411,526	411,526	over first 4 years
Total Uses	**2,557,200**	**17,999,774**	**3,847,262**	**24,404,235**	

Sources

NPS Sources				
Infrastructure	1,028,708	1,480,430	-	2,509,138
Site Plan/Buildings	1,369,992	1,027,000	-	2,396,992
Total NPS Sources	**2,398,700**	**2,507,430**	**-**	**4,906,130**
Management Partner Sources				
Fundraising-Private	-	3,770,000	1,896,683	5,666,683
Private Grants	-	2,800,000	2,000,000	4,800,000
State	68,000	300,000	-	368,000
County	50,000	-	-	50,000
MDFA Loan	16,979		-	16,979
Housing Bond issue	-	8,646,412	-	8,646,412
Total Management Partner Sources	**134,979**	**15,516,412**	**3,896,683**	**19,548,074**
Total Sources	**2,533,679**	**18,023,842**	**3,896,683**	**24,454,204**
Sources Net of Uses	**(23,521)**	**24,068**	**49,421**	**49,969**
Cumulative Phase 1 & 2		**547**		
Cumulative Phase 1, 2 & 3			**49,969**	

Notes:

1. For purpose of analysis it has been assumed Management Partner to develop housing; to be reimbursed by NPS for housing units utilized by NPS
2. Does not include cost of energy facilities or any unique transportation costs.
3. "Stabilized Year" is the year when operations have become stabilized--the newly created space is on-line paying full rent and charges and ongoing performance should be consistent other than inflation.

Highland Center Implementation Plan
Phased Analysis--At Stabilized Year--GLC Recast
Program Partners Operating Payments to Management Partner, NPS and Capital Costs Only

27-Jan-2008

Operating Budget

	FY Phase 1 Thru 2006	2007	2008	2009	2010	Phase 2 Stabilized 2011	Phase 3 Stabilized 2013	Notes
Expense								
Common Area Fee								
Building 23 [11,240 sf]		-	-	-	-	-	11,240	
Building 22 [1,340 sf]		-	-	-	-	-	1,340	
Building 31 [6,564 sf]		-	-	-	-	-	6,564	
Building 32 [1,635 sf]		-	-	-	-	-	1,635	
Building 29 [16,455 sf]		-	-	-	-	-	16,455	
Building 10 [5,780 sf]		-	-	-	2,890	5,780	5,780	
Building 11 [5,780 sf]		-	-	-	2,890	5,780	5,780	
Building 33 [5,460 sf]		-	-	-	2,730	5,460	5,460	
Building 16 [1,969 sf]		na	na	na	na	na	na	Management Partner use
Building 15 [1,987 sf]		-	-	-	5,961	11,922	11,922	
Building 9 [5,780 sf]		-	-	-	57,800	115,600	115,600	
Building 35/36 [2,470 sf]		-	-	-	7,410	14,820	14,820	
Subtotal		-	-	-	79,681	159,362	196,596	
Escalation		-	-	-	4,781	12,749	23,592	2%/annum from 2007$
Total		**-**	**-**	**-**	**84,462**	**172,111**	**220,188**	
Service District Charge Collected to Cover NPS Expense								
Building 23 [11,240 sf]		-	-	-	-	-	22,480	
Building 22 [1,340 sf]		-	-	-	-	-	2,680	
Building 31 [6,564 sf]		-	-	-	-	-	13,128	
Building 32 [1,635 sf]		-	-	-	-	-	3,270	
Building 29 [16,455 sf]		-	-	-	-	-	32,910	
Building 10 [5,780 sf]		-	-	-	5,780	11,560	11,560	
Building 11 [5,780 sf]		-	-	-	5,780	11,560	11,560	
Building 33 [5,460 sf]		-	-	-	5,460	10,920	10,920	
Total Service District Charges		**-**	**-**	**-**	**17,020**	**34,040**	**108,508**	

Rent (to NPS)							
Building 23 [11,240 sf]	-	-	-	-	-	39,340	
Building 22 [1,340 sf]	-	-	-	-	-	4,690	
Building 31 [6,564 sf]	-	-	-	-	-	22,974	
Building 32 [1,635 sf]	-	-	-	-	-	5,723	
Building 29 [16,455 sf]	-	-	-	-	-	57,593	
Building 10 [5,780 sf]	-	-	-	10,115	20,230	20,230	
Building 11 [5,780 sf]	-	-	-	10,115	20,230	20,230	
Building 33 [5,460 sf]	-	-	-	9,555	19,110	19,110	
Total	**-**	**-**	**-**	**29,785**	**59,570**	**189,889**	
Fee for Service and Miscellaneous							
Meeting Center (Building T5)	-	-	-	-	5,000	10,000	
Food Service (Building 18)	-	-	-	-	21,175	42,350	
Catering	-	-	-	-	4,935	9,870	
Media Lab	-	-	-	1,925	3,850	3,850	
Subtotal	-	-	-	1,925	34,960	66,070	
Escalation Clause	-	-	-	116	2,797	7,928	2%/annum from 2007$
Total	**-**	**-**	**-**	**2,041**	**37,757**	**73,998**	
Total Expense	**-**	**-**	**-**	**116,287**	**269,438**	**484,075**	

Note: "Stabilized Year" is the year when operations have become stabilized--the newly created space is on-line paying full rent and charges and ongoing performance should be consistent other than inflation.

Capital Plan

FY	Phase 1 Thru 2006	2007	2008	2009	2010	Phase 2 Stabilized 2011	Phase 3 Stabilized 2013	Total All Phases	Notes
Uses									
Total Development Costs--Exclusive of Buildings Developed by Partners									
Hard Costs									
Building Rehabilitation/Fitout									
Building 23 [11,240 sf]							1,417,470		
Building 22 [1,340 sf]							190,370		
Building 31 [6,564 sf]							594,713		
Building 32 [1,635 sf]							222,714		
Building 29 [16,455 sf]							2,075,130		
Building 10 [5,780 sf]						600,000			
Building 11 [5,780 sf]						750,000			
Building 33 [5,460 sf]						1,500,000			
Construction Contingency	-					285,000	450,040	735,040	10%
Total Hard Costs	**-**					**3,135,000**	**4,950,437**	**8,085,437**	
Soft Costs									
Add'l Architecture & Engineering	-					250,800	396,035	646,835	8% of Hard Costs
Project Management Fees	-					156,750	247,522	404,272	
Legal Expenses	-					150,000	100,000	250,000	GLC est
Soft Cost Contingency - 10%	-					55,755	74,356	130,111	
Total Soft Costs	**-**					**613,305**	**817,912**	**1,431,217**	
Other Uses									
Reserve for Inflation						320,000	795,000	1,115,000	5% per annum from 2009
Total Uses	**-**					**4,068,305**	**6,563,349**	**10,631,654**	
Sources									
Program Partners	1,000,000					3,070,000	6,561,654	10,631,654	
Sources Net of Uses	**1,000,000**	**-**	**-**	**-**	**-**	**(998,305)**	**(1,695)**	**(0)**	
Cumulative Phase 1 & 2						**1,695**			
Cumulative Phase 1, 2 & 3							**(0)**		

Highland Center Implementation Plan
Phased Analysis--At Stabilized Year--GLC Recast

Housing Operating Pro Forma

27-Jan-2008

	Base		2011	2013
Assumptions				
Units	36			
Operating Expense	$ 3,500	per unit		
Escalation from 2007	2%			
Income				
Total income	$ 859,360		$ 930,199	$ 967,779
Expense				
Operating Cost	$ 126,000		$ 136,386	$ 141,896
Taxes	$ -		$ -	$ -
Total Expense	$ 126,000		$ 136,386	$ 141,896
Net Income	**$ 733,360**		**$ 793,812**	**$ 825,882**
Debt Service	($618,245)		($681,615)	($681,615)
Cost of Issuance (Bonds)	($19,813)		$ (20,613)	($20,613)
Net Cash Flow Before Ground Rent	**$ 95,302**		**$ 91,584**	**$ 123,654**
Ground Rent to NPS 20.0%			**$ (18,317)**	**$ (24,731)**
Net Cash Flow			**$ 73,267**	**$ 98,923**
Loan			5%	
Development Cost	**$ 8,151,082**		**$ 8,986,568**	
Rate	6.50%			
Term	30			

Notes:

1. Income and Expense figures from ICON implementation plan
2. Capital costs covered by bond issues proceeds
3. "Stabilized Year" is the year when operations have become stabilized--the newly created space is on-line paying full rent and charges and ongoing performance should be consistent other than inflation.

Appendix E

Memoranda on Wastewater Treatment Alternatives

Several memoranda as well as reference materials from the Massachusetts Department of Environmental Protection are attached. The memoranda suggest several ways that wastewater can be handled on site and recommend an approach that involves extensive use of composting toilets as well as gray water processing on site. Although consent of Mass DEP would be required for such an approach, the consulting team believes that it has sufficient promise to serve as a basis for soliciting such approvals.

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Civil Engineering
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MEMORANDUM

TO: Jonathan S. Lane, ICON architecture, inc.
William Grover, ICON architecture inc.

FROM: Stephen M. Benz, PE
Cheeta L. M. Soga, EIT

DATE: August 15, 2006

RE: Highlands Center

Wastewater Management

The existing Title V system currently being installed has a capacity of 5,000 gpd. According to the report titled "Value Analysis Wastewater Collection, Treatment and Disposal" prepared by EarthTech, Phase I wastewater flows connected to this system total 4,252 gpd, which is less than full capacity of the system. The ICON master plan supports a full build out wastewater flow projection of 22,000 gpd. With full build out, an additional Title V system to a maximum of 5,000 gpd can be installed before a wastewater treatment plant for wastewater flows greater than 10,000 gpd for the full development would need to be installed. With innovative wastewater management in the form of composting toilets and greywater treatment, the need for a wastewater treatment plant could possibly be eliminated. The following analysis evaluates various scenarios in an attempt to accommodate full build out wastewater generation without consideration for a wastewater treatment plant.

Base Scenario: Title V Flows

Existing system capacity	5,000 gpd
Demand – ICON master plan (incl. Phase I)	22,000 gpd
Capacity shortfall	-17,000 gpd

Scenario 1: Retrofit Phase I Buildings Only With Composting Toilets

Existing system capacity	5,000 gpd
Phase I demand (50% Title V)*	2,126 gpd
Additional demand	17,748 gpd
Capacity shortfall	-14,874 gpd

* Assuming maximum 50 percent reduction of Phase I flows per Mass DEP Title V regulations

It should be noted that the additional capacity gained in the existing Title V system by retrofitting Phase I buildings with composting toilets, translates to connecting 17 single family (3-bedroom) residences,

with composting toilets installed. For this scenario, the building program would have to be substantially cutback or the existing Title V system would have to be expanded (see subsequent scenarios).

Scenario 2: Convert to Composting Toilets Project-Wide

Existing system capacity	5,000 gpd
Total demand (50% Title V)*	11,000 gpd
Capacity shortfall	-6,000 gpd

* Assuming maximum 50 percent reduction of ICON master plan flows per Mass DEP Title V regulations

Scenario 3: Convert to Composting Toilets
Install Additional Title V System

Existing system capacity	5,000 gpd
Total demand (50% Title V)*	11,000 gpd
New Title V system**	5000 gpd (max)
Capacity shortfall	-1,000 gpd

* Assuming maximum 50 percent reduction of ICON master plan flows per Mass DEP Title V regulations
** Maximum Title V system capacity of 10,000 gpd allowed for the development

Scenario 4: Convert to Composting Toilets
Install Greywater Garden/Greenhouse Treatment

Existing system capacity	5,000 gpd
Total demand (50% Title V)*	11,000 gpd
New greywater garden/greenhouse system**	5000 gpd (max)
Capacity shortfall	-1,000 gpd

* Assuming maximum 50 percent reduction of ICON master plan flows per Mass DEP Title V regulations
** Maximum Title V system capacity of 10,000 gpd allowed for the development

Scenario 5: Convert to Composting Toilets
Negotiate with Mass DEP for greater flow reduction than 50%
Install Additional Title V System

Existing system capacity	5,000 gpd
Negotiated demand (less than 50% Title V)*	10,000 gpd
New Title V system**	5000 gpd (max)
Capacity shortfall	---

* Assuming greater flow reduction of ICON master plan flows negotiated with Mass DEP
** Maximum Title V system capacity of 10,000 gpd allowed for the development

Scenario 6: Convert to Composting Toilets
Negotiate with Mass DEP for greater flow reduction than 50%
Install Greywater Garden/Greenhouse Treatment

Existing system capacity	5,000 gpd
Negotiated demand (less than 50% Title V)*	10,000 gpd
New greywater garden/greenhouse system **	5000 gpd (max)
Capacity shortfall	---

* Assuming greater flow reduction of ICON master plan flows negotiated with Mass DEP **Maximum Title V system capacity of 10,000 gpd allowed for the development

Under the most optimistic assumptions, the above analysis shows that in order to accommodate full Highland Center build out, composting toilets would have to be used throughout the project, an additional Title V system or greywater treatment system such as a greywater garden or greenhouse would have to be installed, and the DEP would have to be consulted to negotiate greater flow reductions than those allowed in Title V. Alternatively, consideration could be made to reduce the building program for the development.

Composting Toilets

There is no reason that composting toilets could not be pursued at Highland Center as a means to dramatically reduce the need for (and cost devoted to) wastewater treatment as long as the conditions of the site are favorable for their installation. Caution; however, may need to be exercised when considering the use of composting toilets for rental housing depending on the type of system that is installed, its operation and maintenance requirements and the level of education and training that may be provided to new users. In addition to receiving approval from the Commonwealth of Massachusetts, Department of Environmental Protection (Mass DEP), approval from local authorities, typically the local Board of Health, is required. It should be noted that local regulations may be more stringent than state regulations.

Based on a discussion with Mass DEP, reductions in Title V design flows resulting from the use of composting toilets are acceptable, however, these flows have not yet been standardized. A previous application for the use of composting toilets provided for the following reductions in design flows to the subsurface disposal system:

Type of establishment	Title V Design Flow	Reduced System Design Flow
3-bedroom house	330 gpd	125 gpd

Another application reduced Title V flows by 40% to estimate the reduced system design flow for a resident camp. It is suggested that design flow values for projects proposing composting toilets be discussed with Mass DEP throughout design development. Recent revisions to Title V allows for up to 50 percent reduction in the soil absorption system for residential facilities when a composting toilet is used; therefore, reduced system design flow estimates should not be less than 50 percent of Title V flows.

Greywater Treatment

Greywater systems are typically comprised of a septic tank and a soil absorption system (SAS) or leachfield. Special treatment is not required for disposing of greywater compared to sanitary wastes. There are a number of accepted Innovative and Alternative (I/A) technologies that can be considered for use as an alternative to the typical SAS. Based on a discussion with Mass DEP, it may be difficult to permit graywater for reuse in spray irrigation. One emerging practice for reusing graywater to irrigate plants is by incorporating a greywater garden, in place of the leachfield system. In this arrangement, a septic tank would still be required.

Attached is a list of locations in Massachusetts that use composting toilets and greywater systems. In addition, a fairly comprehensive summary of using composting toilets and greywater systems in Massachusetts prepared by the Mass DEP is attached for reference.

Stormwater Runoff in Housing Area

It is recommended that the stormwater runoff in the housing area be disconnected from the existing system and recharged into the surrounding site. This practice is being proposed site-wide at the Highland Center, and is therefore, consistent with the overall water management strategy of the site.

COMMONWEALTH OF MASSACHUSETTS
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ELLEN ROY HERZFELDER
Secretary

ROBERT W. GOLLEDGE, Jr.
Commissioner

Revised April 2005

Using Composting Toilets and Greywater Systems in Massachusetts

COMPOSTING TOILETS

Required Approvals

Homes: Title 5 (310 CMR 15.000) allows composting toilets for Remedial Use and also certifies them for General Use in new residential construction where a system in full compliance with Title 5 could otherwise be installed. The local approving authority (typically the Board of Health) must also approve installation of a composting toilet through a Disposal System Construction Permit and Certificate of Compliance. Check with your local Board of Health for its approval procedures.

Commercial or Public Facilities: Massachusetts General Laws of 2002 (Chapter 176, §3) allow the use of composting toilets for remedial use or new construction of commercial and public facilities without meeting the full compliance requirement of Title 5. As with residential facilities, they must obtain approval from their local approving authority. DEP is the approving authority for state and federal facilities.

Plumbing Approvals: Since a composting toilet is a plumbing fixture, the Board of Registration of Plumbers and Gas Fitters must also approve the unit. For a list of approved units, see http://license.reg.state.ma.us/pubLic/pb_product.asp. In addition, the local plumbing inspector must approve any installation of indoor plumbing fixtures.

Composting Toilet Technology

Composting toilets use a biological process in which various types of organisms degrade human waste under controlled conditions to a humus-like end product. This process is influenced by environmental factors such as temperature, moisture, pH, aeration and the ratio of carbon to nitrogen:

- Compost temperature must be maintained above 55°C for three days for composting to proceed effectively and kill pathogenic organisms. At lower temperatures, bacterial activity is inhibited, the composting process slows, and pathogens may not be destroyed.

This information is available in alternate format. Call Donald M. Gomes, ADA Coordinator at 617-556-1057. TDD Service - 1-800-298-2207.

DEP on the World Wide Web: http://www.mass.gov/dep
Printed on Recycled Paper

- Moisture must be maintained between 40-60% for best results. All organisms require water, but too much moisture in the compost pile may create anaerobic conditions. On the other hand, very low water content will retard microbial activity.
- Normally, there is no need to influence the pH of a composting toilet. The ideal pH range for most bacteria is from 6 to 7.5. Fresh human excreta are slightly acid (below 6) but after a few days in compost pile the pH usually begins to rise to the optimum range.
- Proper mixing, porosity and maintenance of aerobic conditions are necessary for rapid decomposition and for the destruction of pathogenic organisms. Under anaerobic conditions, the decomposition is slower, heat given off is only a fraction of that from aerobic conditions, and foul-smelling gases are released.
- To achieve rapid decomposition, the optimum range for the carbon/nitrogen balance is 20:1 to 30:1. Human excreta and especially urine are rich in nitrogen. It may be necessary at times to add high carbon materials like sawdust, grass and kitchen wastes to keep the carbon/nitrogen ratio in the optimum range. Manufacturers of composting toilet systems often recommend such materials and provide instructions on how often to use them; they may even sell pre-packaged bulking agents.

Types of Composting Toilets

There are two types of composting toilets generally available:

Separate Composting Units: These are toilets connected to a separate, relatively large composting unit located near the toilet. Waterless composting toilets are typically installed in a bathroom directly above the composting unit with a straight chute directly connecting them. A foam flush toilet can be offset from the composting unit and connected to it via a standard pipe.

The composting unit consists of a receptacle and a storage chamber. A properly operating composting process will decompose the pile to less than 10% of the original volume by the time the compost is ready to be removed. Excess liquid is drained to the lowest part of the composting unit where it is either evaporated or collected. This is a slow process, and it may take a few years before the first time there is a need to remove humus from the storage unit. After that, annual removal is generally sufficient.

Self-contained Units: These are smaller units in which the toilet seat, receptacle and composting tank are a single self-contained unit. Some designs incorporate heaters and mechanical aeration to maintain a balance of moisture and aerobic conditions necessary for proper composting. Self-contained units are designed to evaporate all excess liquid so that there is no discharge other than the finished compost. Compost has to be removed from these units several times per year; disposal options for the finished compost are described below.

Liquid By-product

If the composting toilet produces a liquid by-product that is not recycled through the toilet, the liquid by-product must be disposed of in one of the following ways:

a) Discharged through a greywater system on the property that includes a septic tank and leaching system in compliance with Title 5 (310 CMR 15.100-15.293);

b) Stored properly and removed and disposed of by a licensed septage hauler;
c) Disposed of using an alternate method specifically approved by DEP.

Composted Solids

Title 5 (310 CMR 15.289(3)(a)(3)) requires that composting toilet systems be designed to store compostable and composted solids for at least two years, either inside the composting chamber (systems with large separate composting units) or in a separate compost container (smaller self-contained units), unless DEP has specifically approved an alternate system.

Compost from a system may be removed by the owner, a maintenance person, or a licensed septage hauler. Compost has the potential to contain pathogenic organisms, and caution and good hygiene are necessary when dealing with this material. The composted material must be disposed of in one of the following ways:

a) Burial on the site or in another manner and location approved by the local Board of Health, and covered with a minimum of six inches of clean compacted earth;
b) By a licensed septage hauler.

Places to try before you buy

Manufacturers should be able to give you a list of facilities you can visit. In addition, there are a number of public facilities in Massachusetts that use composting toilets:

- Halibut Point State Park, Rockport, MA
- Johnny Appleseed Tourist Information Center, Route 2, Lancaster, MA
- Mass. Audubon, Visitor's Center, Wellfleet, MA
- Nickerson State Park, Brewster, MA
- Salisbury Beach, Salisbury, MA
- Walden Pond State Reservation, Concord, MA
- Wallum Lake, Douglas, MA
- Waquoit Bay National Estuarine Research Reserve, Waquoit, MA.

GREYWATER SYSTEMS

If a facility using a composting toilet generates greywater (i.e. wastewater from sinks, showers, washing machines, etc.), a soil absorption system still is needed for its safe treatment and disposal. A 2002 study by University of Massachusetts in Amherst (Greywater Characterization And Treatment Efficiency) indicates that greywater, while containing less of many pollutants than combined domestic wastewater, is still contaminated. It may contain toxic chemicals, nutrients such as phosphorus and nitrogen, and pathogens, including bacteria and viruses.

There are three approval options for greywater systems: Remedial Use, General Use for New Construction, and Piloting Approvals. In addition to the information below, see DEP's Technology Approval Process for I/A Systems.

Remedial Use

Remedial Use Approvals (310 CMR 15.284) may be used for greywater systems in all types of existing facilities (residential, commercial, or public) that meet three criteria:

a) Design flow of less than 10,000 gallons per day;
b) Served by an existing system which has failed, is failing or does not conform to Title 5 standards;
c) There is no proposed increase in the design flow from the facility.

Under remedial use, an existing cesspool may be used as a leaching pit under the following conditions:

- The cesspool is pumped and cleaned when the other system components are installed;
- The bottom of the cesspool is located at least two feet above the high groundwater elevation;
- The cesspool meets the design criteria of Title 5 (310 CMR 15.253) for depth, separation between units, and inspection access, or the cesspool is replaced by a precast concrete leaching pit meeting these requirements;
- The requirements of 310 CMR 15.242 on effluent loading rates are satisfied.

When greywater is to be discharged to a facility's existing soil absorption system and that system has failed, a new soil absorption system is required. The soil absorption system may be reduced by 40% from the size required by its Title 5 design flow (310 CMR 15.242). A new septic tank also is required if a filter system approved by the DEP is not installed; note that to date DEP has not approved any greywater filter systems. Since filters are plumbing fixtures installed in a building, they would need to be on the list approved by the Board of Registration of Plumbers and Gas Fitters, and an inspection by the local plumbing inspector is required.

Approval Process for Remedial Use: A Disposal System Construction Permit and Certificate of Compliance must be obtained from the local Board of Health; no application to DEP is required unless variances from Title 5 are being requested. If DEP variances are needed, the applicant must apply for the variances first to the Board of Health and then to the appropriate Regional Office of DEP using form BRP WP 59b (DEP Approval of Variance). See http://www.mass.gov/dep/brp/wwm/t5forms.htm#ia for DEP Forms and Applications.

General Use for New Construction

Under Title 5, New Construction includes facilities built on an undeveloped lot and any situation in which a facility increases its design flow, e.g., adding a bedroom to a home or adding seats to a restaurant. In a facility with a composting toilet, if there is a greywater discharge or a discharge from a drain equipped with a garbage grinder, a septic tank and soil absorption system are required. A filter system specifically approved by DEP for this type of application can be used instead of the septic tank; note that to date DEP has not approved any such filters. Since filters are plumbing fixtures installed in a building, they would need to be on the list approved by the Board of Registration of Plumbers and Gas Fitters, and an inspection by the local plumbing inspector is required.

For greywater systems in New Construction, the size of the soil absorption system may be reduced by 40%. However, in residential construction the site must be capable of providing 100% leaching capacity. This ensures that there will be available land for waste disposal in case

the current or subsequent property owners remove the composting toilets. Installations at commercial and public facilities do not have to meet this requirement for a site with 100% leaching capacity (2002 MGL, chapter 176, §3).

There is currently no nitrogen removal credit established for the use of composting toilets; therefore, the loading on the lot cannot exceed 440 gallons per day per acre in a nitrogen sensitive area (310 CMR 15.214).

Approval Process for New Construction: A Disposal System Construction Permit and Certificate of Compliance must be obtained from the local Board of Health or approving authority. No application to DEP is required, unless DEP variances to Title 5 are needed, in which case the application also must be submitted to the appropriate Regional Office of DEP using application form BRP WP 59b (DEP Approval of Variance). See http://www.mass.gov/dep/brp/wwm/t5forms.htm#ia for DEP Forms and Applications.

Greywater Piloting Approvals

DEP issues Piloting Approvals for innovative greywater systems such as greywater gardens. Piloting Approvals for New Construction must meet the conditions in 310 CMR 15.285. The applicant must also show that a fully complying Title 5 system could be constructed on the site, should the piloting project fail and require replacement. In addition, greywater systems with Piloting Approval may be installed as Remedial Use systems to replace a failed, failing, or nonconforming system.

DEP has approved alternative greywater systems to serve homes and public facilities such as state parks and rest areas. Based on performance data from the Greywater Piloting Program and information from the University of Massachusetts study, DEP has proposed regulatory changes to Title 5 for greywater systems. In the meantime, DEP will continue to accept applications for Piloting Approvals of greywater disposal or reuse projects.

Approval Process for Piloting: Applicants for a Piloting Approval must show through available laboratory data, field-testing, previous use and other information that the system is likely to be capable of providing a level of protection at least equivalent to a conventional Title 5 system. For installations in homes, commercial facilities, and local public facilities, the applicant must first obtain Board of Health approval and then submit DEP application BRP WP64b (Installation of Alternative Systems) to the Boston DEP. For state and federal public facilities, applicants should submit BRP WP63 (Disposal System Construction Permit for State and Federal Facilities) to the Boston DEP. See http://www.mass.gov/dep/brp/wwm/t5forms.htm#ia For DEP Forms and Applications.

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