The Powder Horn. Redevelopment Master Plan.

An Honors Thesis (HONRS 499)

by

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Abstract

This study reveals the potential for an abandoned, underutilized industrial site in the small town of Charlestown, Indiana to be redeveloped as a sustainable mixed-use development. In recent years, the redevelopment of brownfield sites, such as the Indiana Army Ammunition Plant (INAAP) in Charlestown, has become an important and popular topic in the field of landscape architecture and land development. The presence of numerous abandoned post-industrial sites throughout the United States has pushed redevelopment of these underutilized sites to the forefront of concern. In addition, the environmental movement has helped thrust sustainable and dense mixed-use developments into a position of importance. To this point in history, it has been rare that these three concepts have been successfully married in one design. Too often, projects claim the "sustainable" title while failing to consider the true impacts on the environment. The proposed redevelopment plan for the INAAP will bring the three concepts (redevelopment, sustainability, and mixed-use development) into harmony.
REDEVELOPMENT MASTER PLAN
Indiana Army Ammunition Plant
Charlestown, Indiana

Landscape Architecture Comprehensive Project
Naomi Lewis
Ball State University
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This study reveals the potential for an abandoned, under-utilized industrial site in the small town of Charlestown, Indiana to be redeveloped as a sustainable mixed-use development. In recent years, the redevelopment of brownfield sites, such as the Indiana Army Ammunition Plant (INAAP) in Charlestown, has become an important and popular topic in the field of landscape architecture and land development. The presence of numerous abandoned post-industrial sites throughout the United States has pushed redevelopment of these underutilized sites to the forefront of concern. In addition, the environmental movement has helped thrust sustainable and dense mixed-use developments into a position of importance. To this point in history, it has been rare that these three concepts have been successfully married in one design. Too often, projects claim the "sustainable" title while failing to consider the true impacts on the environment. The proposed redevelopment plan for the INAAP will bring the three concepts (redevelopment, sustainability, and mixed-use development) into harmony.

The architecture of the World War II era plant is iconic in the city of Charlestown and will be saved as a testament to the character and history of the place. The design focuses on preservation of these invaluable historic aspects of the site. If the final redevelopment master plan were implemented, Charlestown would see an increase in economic development just as the original development spurred growth during WWII. The creation of new housing — both affordable and market-rate — would provide opportunities for new residents to come to the area to enjoy a small town lifestyle without being too far from the amenities of the big city of nearby Louisville, Kentucky. The development plan also includes restaurants and small businesses to serve residents and tourists alike. By following the proposed plan as a guide for future development, developers will be armed with the tools necessary to improve the communities they work in. In turn, the negative attitude towards developers can be shifted into a positive mind-set.
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The redevelopment of the INAAP site will create a sustainable, mixed-use neighborhood on this brownfield site, to be known as the **POWDER RCM**
Throughout its history, the Indiana Army Ammunition Plant (INAAP) located in the small city of Charlestown, Indiana, has had a significant impact on the southern region of the state. Constructed during World War II, it was one of the largest plants ever built. At its peak, the plant employed over 20,000 people, transforming Charlestown from a sleepy village with a population of merely 900 into a thriving city of several thousand. Without the economic development spurred by the plant, Charlestown would not exist as it does today. When the plant closed about 15 years ago, it was earmarked for redevelopment; part became a state park and the other portion is to become an industrial park. The current plans for the site suggest demolition of a majority of the original structures. Rather than taking a flattening approach, the designer recommends that these buildings be saved for their historical value. The architecture of INAAP, the smokestacks and warehouses that brought so many people to this place, has become iconic to the city of Charlestown and therefore valuable enough to save.

The redevelopment of the INAAP site will create a sustainable, mixed-use neighborhood on this brownfield site, to be known as the Powder Horn District. The name for the neighborhood harks back to the magazine, the Powder Horn, published for plant workers during the Second World War. The design of the Powder Horn District will focus on preservation of the irreplaceable historical aspects of the site. The redevelopment master plan will spur economic development in Charlestown just as the original development brought people to the area during WWII.

The creation of new housing -- both affordable and market rate -- will provide opportunities for new residents to come to the area to enjoy a small town lifestyle without being too far from the amenities of the big city, nearby Louisville, Kentucky. The development will also include restaurants and small businesses to serve the new residents. The close proximity to the Charlestown State Park will entice people who enjoy the recreational opportunities of the park and nearby Ohio River.

Another goal of the redevelopment plan is to demonstrate ways in which a developer can give back to the community by sharing the profits of the development. The practice, presently uncommon in this area of the country, will revolutionize the way developers think and, in turn, the way they are perceived by the community at large. Currently, developers in this area tend to build sprawling development on greenfield sites -- most commonly land that was previously agricultural land. This practice, although profitable for the developer, does not benefit the community in any quantifiable way. Rather than following the sprawling land use pattern, the proposed redevelopment plan will employ dense residential and mixed-use zoning in order to preserve more land for public use.
The Indiana Army Ammunition Plant was built during the Second World War; construction started in 1940 and was completed by 1945. At the time, it was the world’s largest smokeless powder plant. At its height, the plant employed over 27,500 people. The thousands of jobs INAAP introduced to the small town of Charlestown had an enormous impact on the community. According to one account, it was "the first large scale defense project to be built in small town America, and it was viewed by both government agencies and the national press as a kind of laboratory experiment" (Hackel 82).

INAAP published a biweekly bulletin featuring news and events of the plant. This publication, known as the Powder Horn, is a great resource for understanding daily life at the plant. Safety was a major concern at the plant, as is easily seen in the articles and illustrations in the magazine. Patriotism is another theme frequently visited in the magazine.

The plant was in operation until the early 1990s, when it was closed to business. At that time, the 9,790 acres were divided between two entities. Approximately 2,300 acres were transferred to the River Ridge Development Authority (RRDA) to be used for industrial purposes and to be known as the River Ridge Commerce Center (RRCC). Another 2,100 acres were given to the Indiana Department of Natural Resources to become the Charlestown State Park. The site is still currently owned by the United States Army. In the near future, the property will be turned over to the RRDA.

The site is located on the former 1500-acre Propellant and Explosives area. From 1941 to 1970, this facility manufactured single-based propellant. The major process areas included two nitric acid manufacturing areas, two nitrocellulose manufacturing and purification areas, and two propellant manufacturing and finishing areas. Major support areas included an aniline manufacturing area, two coal burning power plants, approximately 450 above-ground storage tanks, and an extensive railroad system.

ABOVE: Ceremony to mark the opening of plant in 1941. LEFT: Aerial photos of the plant taken in late 1940s.
BRWNFIELD
MIXED-USE

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In recent years, the redevelopment of brownfield sites has become an important and popular topic in the field of landscape architecture and land development. The presence of numerous abandoned post-industrial sites throughout the United States has pushed redevelopment of these underutilized sites to the forefront of concern. The environmental movement has helped push sustainable and dense mixed-use developments into a position of importance as well. Up to this point, it has been rare that these three concepts have been successfully married in one design. Too often, projects claim to be sustainable while failing to consider the true impacts on the environment. The redevelopment of the Charlestown Army Ammunition Plant will bring the three concepts into harmony.

The site, formerly an Army-operated plant that produced gun powder during WWII, has been abandoned for a number of years. In its current deteriorating state, it is an eyesore on the community as well as waste of valuable developable land. The setting, just outside a small suburban town, is essential to understanding the subsequent review. A majority of the research on brownfield and sustainable development to this point has been focused on urban sites. The purpose of this project is to specifically address the value of Brownfield redevelopment in suburban and rural areas as a potential for economic development. This literature review will explore the concepts of Brownfield, sustainable, and mixed-use development.
BROWNFIELD REDEVELOPMENT

Two of the most important agencies dealing with brownfield redevelopment in the United States are the National Brownfields Association (NBA) and the Environmental Protection Agency's (EPA) Brownfield Economic Redevelopment Initiative (BERT). The NBA’s website, www.brownfieldassociation.org, provides resources about brownfields across the United States. In the bi-monthly magazine published by the association, case studies and best practices are highlighted. The EPA’s website, www.epa.gov/brownfields, is another chief resource on brownfield redevelopment. The EPA has set up several programs to encourage remediation of and provide financial support for brownfield redevelopments. Charles Bartsch outlines the programs provided by the EPA in regards to brownfields in his book Brownfields: Cleaning and Reusing Contaminated Properties. The grants awarded by the EPA are focused on the environmental remediation of the site – some of these programs could be used to remediate the site in Charlestown. The State of Indiana also has a Brownfields Initiative that could be a source of funding for the project.

One interesting approach to remediation efforts is presented by Mark Dennison in his 1998 book entitled Brownfields Redevelopment. He presents the view that environmental remediation may not have to be complete if the developer takes the future uses of the site into consideration. He states:

“Some may be opposed to brownfield redevelopment, believing that remediation to less stringent levels is not protective of human health and the environment. However, the fact remains that a good deal of common sense, current technical/scientific knowledge, and effective land use planning support the belief that former industrial facilities can be safely redeveloped in property that does not meet the overly stringent and often unnecessary criteria previously held as cleanup goals.” (1298)

A similar view is taken by Robert Simons in his book Turning Brownfields into Greenbacks, published in 1998 by the Urban Land Institute. He suggests that a designer could “avoid delay by placing remediated soil under parking lots, keeping land under buildings relatively clean, and avoiding basements and other underground digging in some cases” (75). This approach to remediation suggests that phasing the development of the INAAP site will be essential.

The relatively high economic costs of brownfield redevelopment are addressed by both Bartsch and Dennison, who focus heavily on economic strategies to overcome the comparatively high costs of brownfield to greenfield development. Simons makes several recommendations regarding cutting costs of brownfield redevelopment through design techniques, including the use of high density and the avoidance of single-family detached housing.

SUSTAINABLE DEVELOPMENT

A discussion of sustainable development cannot be complete without mentioning Ian McHarg's Design with Nature, the book that marks the beginning of the environmental design movement. Published in 1967, McHarg introduced the overlay system of design that gives consideration to all the environmental aspects of a particular site. By following his overlay method, a designer can determine the sensitivities of the site and, in turn, establish the best location for each use. In the decades since publication, this method has become widely accepted and used in the field of landscape architecture, mainly through Geographic Information Systems (GIS) applications. Another set of guidelines commonly used by landscape architects are those set out by the United States Green Building Council (USGBC) in their Leadership in Energy and Environmental Design (LEED) program. The Neighborhood Development rating system compiled by LEED includes checklists focused on "smart location and linkage, neighborhood pattern and design, green construction and technology, and innovation" (www.usgbc.org). Specifically applicable to my project is the information related to building reuse and adaptation, brownfields redevelopment, and compact development.

The Urban Land Institute, a non-profit organization dedicated to providing responsible leadership in the use of land, published The Practice of Sustainable Development in 2000. The book, edited by Douglas Porter, provides an overview of principles that drive the various pieces of sustainable development. The approach is "comprehensive and holistic in considering ways in which communities and real estate developments can respond to environmental, social, and economic needs" (Porter 11). The approach is driven by the interrelatedness of three entities: social equity, economic prosperity, and ecological integrity. This three-pronged concept provides a basis to begin thinking about the chosen site in Charlestown. A variation on McHarg’s overlay system is proposed; the landscape is considered through three separate lenses: legal/political, human/cultural, and physical (Porter 46). Considering the site through these lenses should provide a holistic approach to organizing the project. Another particularly applicable section is the landscape conservation considerations for green infrastructure (Porter 81).
Another comprehensive guide to sustainable development was published by the Rocky Mountain Institute in 1998, entitled *Green Development: Integrating Ecology and Real Estate*. In comparison with the ULI's publication, this book is more focused on the development process from a real estate professional's point of view. It emphasizes financial considerations more than design components. In one section site planning and design are covered in a similar guideline fashion to that in *The Practice of Sustainable Development*. A new observation in this book is the conscious forward-thinking attitude of sustaining the green development. The authors propose that restoration of the physical and natural environment should be the role of the developer (415). This provides a unique perspective that can be applied to my site. Preservation should be considered a main goal for the extensive acreage of the site.

**MIXED-USE DEVELOPMENT**

Throughout history, a majority of human settlements have included several uses. With the advent of the automobile, development patterns have leaned toward the devotion of land to a single use. Within the last century, people have begun to realize the value and convenience of multiple uses in one location. Beginning in the 1960s until the present, mixed-use development has become a popular trend in development (Schwanke 8-9). The ULI's *Mixed-Use Development Handbook*, written by Dean Schwanke, is one of the most comprehensive guides to determining where and how to design mixed-use developments. The handbook provides suggestions for evaluating sites for possible mixed-use developments. The location and proximity of the site are among the most important features that determine success. Military and industrial sites are specifically identified as appropriate sites for mixed-use developments (Schwanke 40). The author proposes that many developments require a long time frame for completion, often requiring phasing of elements of the design. Designing and building in phases allows projects to be completed effectively and economically.

A majority of the literature on mixed-use developments takes a similar approach to Schwanke's book by attempting to provide a comprehensive list of the essential elements that make a successful development. The lists presented are similar, but each has their distinct approach. For example, the Project for Public Spaces' (PPS) website gives a list of ten goals that includes but not limited to: an emphasis on public space, a strong sense of community and place, a wide variety of uses and activities, and a design that is well-integrated into the existing community (www.pps.org). The non-profit organization is "dedicated to helping people create and sustain public spaces that build community" (www.pps.org). An article found on the website written by a member of PPS presents the "Power of Ten" rule that states the importance of a place to have a variety of uses and activities for all different types of people. Fred Kant, the author of this section, states: "It's really a matter of offering a variety of things to do in one spot – whose quality as a place then becomes more than a sum of its parts" (www.pps.org/linfo/linewsletter/november2004/november2004_ten). He argues that this type of rule gives people a tangible goal to work towards; ten is not some magical number that makes a place great, rather it is representative of a necessary variety.

Cy Paumier echoes the necessity of variety in his 2004 book *Creating a Vibrant City Center*. Although the concepts presented in this book were developed for large scale development, the principles can be applied to a smaller site. His list of guidelines includes: "promoting diversity of uses, encouraging compactness, fostering intensity of development, ensuring a balance of activities, providing for accessibility, creating functional linkages, and promoting a positive identity" (Paumier 17). The most inspiring and applicable ideas gleaned from Paumier's book is the importance of fostering a distinct and positive identity (49) by building on existing assets (42). The Ammunition Plant in Charlestown provides a wealth of historical architecture that is iconic in the community and preservation will lend the project a sense of identity.
The neighborhood of Stapleton was created on the former site of the Denver International Airport. After the airport closed in 1995, the city saw this site as a great opportunity for new housing and development. Stapleton is just 15 minutes from downtown Denver and is one of the nation's largest infill projects. It offers a unique New-Urban lifestyle that balances the convenience of urban places with the open space of suburban development. Currently, over 7,000 residents call Stapleton home. The mixed-use center of the development houses a variety of shops, restaurants, gas stations, grocery stores, and school. Over 30% of the site is devoted to open space and parks.

DEVELOPER
Forest City Enterprises, Inc.

CONSTRUCTION DATE
2001 to present

LANDSCAPE ARCHITECT
Calthorpe Associates

SITE AREA
Over 4,700 acres

COLLABORATORS
+ Denver Urban Renewal Authority (DURA)
+ Stapleton Development Corporation (SDC)

AWARDS
+ “Best Sustainable Neighborhood” as named by Pacific Coast Builders
+ Urban Land Institute 2006 Award of Excellence
+ Recognized by UN as a model of sustainable development
AMEN MELILLA
Austin, TX

The Mueller development is located just three miles north of downtown Austin, on the former site of the Robert Mueller Municipal Airport. When the airport relocated in 1999, the City of Austin began planning the redevelopment of the site into a mixed-use, sustainable community. Upon completion, the site will be home to over 10,000 residents and 10,000 jobs, more than 1,000 affordable housing units, and over 100 acres of public open space. In the summer of 2007, the Dell Children's Hospital opened, certified as LEED Platinum. When complete, Mueller will be a showcase of transit-oriented and pedestrian-friendly design.

DEVELOPER
Catellus Austin LLC

CONSTRUCTION DATE
2005 to present

SITE AREA
709 acres

LANDSCAPE ARCHITECT
ROMA Design Group

COLLABORATORS
City of Austin

AWARDS
+ Charter Award, Congress for the New Urbanism, 2001
+ James C. Howland Award for Municipal Enrichment, National League of Cities, 2005
+ One of nation's "Top 10 -- America's Best Green-Built Neighborhoods" by Natural Home Magazine in 2008
North Charlestown, SC

John Knott and the Noisette Company began redevelopment efforts on the former Charlestown Naval Base in the late 1990s. The final build-out of the project, comprising over 3,000 acres, is projected to take more than twenty years to complete. After the redevelopment plan was approved by the city of North Charleston, the project broke ground in 2004. The developer's vision for Noisette is a long-term community that embodies all aspects of sustainable development.

DEVELOPER
The Noisette Company, LLC

CONSTRUCTION DATE
1996 to present

SITE AREA
3,000 acres

LANDSCAPE ARCHITECT
Burt Hill Kosar Rittelmann Associates

COLLABORATORS
+ Noisette Urban Alliance
+ EQA Landmark Communities
+ Integrated Building and Construction Solutions (IBACS)
+ Applied Ecological Services, Inc.
+ Rolf Sauer & Partners
+ Newkirk Environmental, Inc.

AWARDS
+ 2005 ASLAAward of Excellent in Urban Planning
+ One of nation's "Top 10 -- America's Best Green-Built Neighborhoods" by Natural Home Magazine in 2008
An industrial wasteland in Germany was transformed into a multifunctional and successful park in the 1990s. The former factory buildings have been converted to accommodate various recreational and cultural functions; an old gasholder has become the biggest artificial diving center in Europe, alpine climbing gardens have been created in the former storage bunkers, and an extinct blast furnace has been developed into a panoramic tower.

**DEVELOPER**
Development Company of Nordrhein-Westfalen and the city of Duisburg

**CONSTRUCTION DATE**
1991-2000

**SITE AREA**
200 hectares

**LANDSCAPE ARCHITECT**
Latz and Partners

**COLLABORATORS**
+ IBA (Internationale Bauausstellung)
+ IG Nordpark
+ Society for industrial Culture and the Parks Department of Duisburg City Council
+ Thyssen Entsorgungstechnik (waste treatment technology company)

**AWARDS**
Winner of the 1990 international competition
Low impact development refers to a "comprehensive, landscape-based approach to sustainable development" and includes a set of strategies to maintain existing natural systems, hydrology, and ecology (Massachusetts LID Toolkit). LID design is that which decentralizes stormwater management with the intent of reducing the ecological footprint of development. The following review of LID principles and strategies is borrowed from the Massachusetts LID Toolkit found at their website, http://www.mapc.org/lid.html.

LID PRINCIPLES
1. Use existing natural systems as the integrating framework for site planning.
   - Land use & watershed planning
   - Identification of environmentally sensitive areas
   - Assessment of existing hydrology
   - Definition of a development envelope
2. Focus on preservation.
   - Clusters of buildings & reduction of footprint
   - Reduction of road widths & parking area
   - Green rooftops
   - Permeable pavement
3. Treat stormwater close to the source.
   - Subwatersheds to micromanage runoff
   - Open drainage
   - Manage frequent, low-intensity storms
4. Emphasize simple, nonstructural, low-tech, low-cost methods.
   - Open drainage systems & filter strips
   - Rain barrels
   - Minimize lawn area
5. Create a multifunctional landscape.
   - Provide open space & wildlife habitat
   - Store water for landscape use
6. Maintain and sustain.
   - Reduction in pesticides & fertilizers
   - Native plants
   - Rain gardens & bioretention areas
LID STRATEGIES

Roadways & Parking
+ Narrow roadways (18-24 feet)
+ Alternative curb designs
+ Allow shared parking
+ Create multiple small parking lots
+ Reduce parking requirements near transit

Permeable Paving
+ Grass pavers, paving stones, porous asphalt, pervious concrete
+ Parking stalls, overflow parking, driveways, walkways & plazas

Biotrention
+ Excavation filled with engineered soil mix
+ Herbaceous perennials, shrubs, trees
+ Overflow outlet and optional underdrain

Vegetated Swales
+ Roadside swales
+ Low-angle slopes only
+ Opportunity for snow storage

Rain Barrels & Cisterns
+ Downspouts directed to tanks or barrels
+ Excess diverted to drywell or rain garden
+ Landscaping, car washing, other nonpotable uses

Green Roof Systems
+ Rainwater stored in a lightweight engineered soil medium
+ Hardy, drought-resistant vegetation
+ Reduce runoff by 50%

Skirmwater Planters
+ Vegetation uptake of stormwater pollutants
+ Pretreatment for suspended solids
+ Reduction of peak discharge rate

SUSTAINABLE SITE DESIGN
How can the abandoned industrial site of the former Indiana Army Ammunition Plant be redesigned as a sustainable mixed-use development that creates business in Charlestown, Indiana, and how can the history of this site be incorporated into a design that is tailored to the contemporary population?

1) Identify the elements that constitute a successful mixed-use development.

2) Identify the elements of successful sustainable development.

3) Identify how abandoned industrial sites have been developed to support business in small towns.

4) Determine how history and historical elements (from industrial spaces) are utilized in the process of redevelopment of downtowns.

5) Identify ways that a developer can share profits with the community as a way to change the negative reputation of developers.

6) What does an analysis of the above reveal for the design of the abandoned INAAP?
A proposal exists for the extension of I-265, including a bridge across the Ohio River. The intent is to connect the existing sections of I-265 to create a complete loop around the Louisville Metro Area. The project is currently under review. If the bridge is constructed, the location of the site will be greatly improved, as it will see significantly increased levels of traffic and will be more accessible to the downtown region.

**LOCATIONS**
- 15 miles north of Louisville, KY
- Adjacent to Charlestown State Park
- Adjacent to River Ridge Commerce Center
- Access to Ohio River
- 4 miles to Clark County Airport
- 16 miles to Louisville International Airport
- 1.5 miles to I-265
- 3 miles to I-65
- 10 miles to I-64 and I-71
- 100 miles to Indianapolis
- 106 miles to Cincinnati
- 186 miles to Nashville
- 289 miles to Chicago
- 254 miles to St. Louis

**SITE CONTEXT**
DESCRIPTION
In total, the site is 997 acres. There are approximately 2 million square feet of WWII era buildings existing on site, approximately 50 miles of existing roadways in fairly good condition and capable of handling light traffic, and approximately 20 miles of existing railroads in good condition in need of minor repairs.

PHASING PLAN
The Powder Horn development will be completed in three phases over the course of fifteen years. This research project will focus only on Phase One, the first and most dense stage of construction. Phase One is 314 acres total. The diagrams to the right illustrate how the site will be divided into the three phases.
A majority of the vegetation found on site is a mixture of native grasses and ground cover. Some portions of the site were reforested during the 1940s to reduce the damage area if an explosion were to occur. In 1994, an inventory of rare plant species on the INAAP site was conducted. The species identified include Adder's Tongue, Carolina Buckthorn, Crested Coral Root Orchid, Ebony Sage, Hairy Alumroot, and Wild Chervil.

There are over 200 miles of existing paved roads at INAAP. These roads have bituminous pavement and are typically 20 or 24 feet in width. INAAP has over 55 miles of railroad track. During production days, the extensive raillines were used to transport freight from one building to the next. Two major terminals exist on the site. The existing railroad and terminals could be reused for passenger light-rail lines.

A majority of the soil on site is categorized as UnsB - Urban land-Udarents. This soil is complex with a clayey substratum. It is characterized by hills with 2 to 10 percent slopes. Two other soil types are found at the southern end of the site: HuhD2 - Haggatt-Caneyville (silt loams, karst, hilly, eroded) and CxmC2 - Crider-Haggatt (silt loams, karst, rolling, eroded).

The most important view onto the site is from SR-62. The main entrance to the Powder Horn District will be from this four-lane highway. Views from passing motorists will be carefully considered in the planning and design. Views into the Charlestown State Park will also be analysed in the design process.

The site is generally flat with some rolling hills and gentle slopes. It is also considered to be a karst landscape, created by the dissolution of limestone and other soluble rocks. This causes sinkholes and caves to form underground. The elevation near the river is approximately 430 feet above mean sea level (MSL), while the site is at approximately 650 feet above MSL.
A  HISTORIC POWER PLANT
Preserve buildings as iconic architecture to give the Powder Horn a distinct character.

B  EXISTING RAILROAD
Convert existing railroad into passenger light rail system to run throughout site.

C  EXISTING RAILROAD TERMINAL
As the railroad extends to the south, it could connect with Jeffersonville and eventually with Louisville, KY.

D  EXISTING RAILROAD TERMINAL
This existing terminal could be used as an entry point to the Charlestown State Park. The light rail system might extend into the park.

E  MAIN ENTRANCE
The ideal location is from SR-62 because it offers the highest visibility and easiest access to the site.

F  CHARLESTOWN STATE PARK
The expansion of the adjacent state park offers opportunities for connecting walking and biking trails.

G  RIVER RIDGE COMMERCE CENTER
The economic development promoted by the RRCC bring people and business to the area.

H  DOWNTOWN CHARLESTOWN
The Powder Horn is not meant to compete with the existing downtown; rather it should complement it. This balance should be achieved through careful design consideration.

I  EXISTING ROADS
The existing network of roads and buildings limits the potential development patterns. The existing road pattern should be preserved in following the sustainable guidelines.

J  IN L'IT
Create connections between the site development and the park. Include trail connections and planting buffers.

Possible industrial uses or buffer to connect with RRCC.

Most dense locations should be located at the northernmost end to connect with downtown Charlestown.

Legend:
- Most dense land use
- Less dense land use

SITE ANALYSIS
The Powder Horn District's proximity to the Ohio River, the Charlestown State Park, and downtown Charlestown affords it many opportunities. The mixed-use business district created within the existing buildings of INAAP will have a unique urban industrial character.

RESIDENTIAL
The Powder Horn District will create new housing for many residents. The historic buildings will be converted into loft apartments and condominiums. This type of living environment will be unique to the area, as most of the existing housing is found in subdivisions of single family homes. Some of the housing will be live-work units, following the traditional model of work space on the ground level with living space above. At least 15% of the housing will be affordable housing to accommodate the needs of the current residents of Charlestown. Single family homes will not be emphasized in this design, although there might be a need for that type of housing in the future stages of the project.

COMMERCIAL
Residents of the Powder Horn District will enjoy all the amenities of downtown living in this neighborhood. There will be a small grocery, laundry mat, daycare, several restaurants, boutique shops, and an organic brewery. When determining what businesses occupy the commercial space, the developer will favor tenants who have sustainable products or who strive to be environmentally friendly in practice.

OFFICE
The Powder Horn District will be the home to several offices. This is a prime location for offices because of its proximity to the newly developed River Ridge Commerce Center. The large old buildings allow sufficient space to be redeveloped into large office buildings. The River Ridge Redevelopment Authority will relocate their office to the site.

PERFORMANCE VENUE
A building will be renovated or built to house a theater to be used by the local acting group -- the Charlestown Players. Currently, the group has no permanent performance space.

MUSEUM
A museum dedicated to the history of the Ammunition Plant will be located on site. The museum will house photographs and artifacts saved from the WWII era of the plant. It is important to tell the story of the site so future generations understand the impact the plant had on the community.

HOTEL
Currently, Charlestown does not have a nice hotel to accommodate visitors. The Powder Horn District is the perfect location for a hotel that takes advantage of the historic architecture as well as the proximity to the park. Since the district will draw people from the surrounding regions, a hotel will be essential.

COMMUNITY CENTER
A community center with large gathering space and a community pool will be included on site.

ELEMENTARY SCHOOL
A small elementary school will be included in Phase 2 to accommodate the children of the new residents.
GHT-RAIL TRANSIT

Existing railroads will be converted into a light-rail passenger transit system. The system connects to downtown Arlestown, Jeffersonville, and the Charlestown State.

ORMWATER MANAGEMENT

Ponds and rain gardens will be used throughout the site to manage stormwater naturally before it reenters the Ohio River. Several small stormwater ponds will be included on site. Bioswales will be used extensively to reduce runoff from parking lots and impervious surfaces. As much as possible, permeable pavers and pavement will be used. Low-impact development techniques, as described in the research section of this booklet, will be employed.

IMMUNITY GARDENS

Gardens throughout the site serve two functions: first, they remind people of the history of the site and importance during WWII; and second, they allow the neighborhood to work together and thus build relationships.

TRAILS

Hiking and biking trails will be the prevalent means of transportation throughout the development. This infrastructure encourages healthy living and a minimal impact on the environment. Bike and hike trails will connect frequently with the State Park to allow residents maximum access to the park. Trails will also lead to downtown Charlestown to allow people to bike there without using their cars. Part of the acquired land will be restored and donated to the state park to increase preserved acreage. Since the site is adjacent to the park, it will be very important to blend the developed areas into the natural areas. Essentially, the mixed-use community should have the feel of being nestled within the park.

PUBLIC PARKS

Public parks for large gatherings and festivals will be prominent in the heart of the district. These parks will be simple in design in order to accommodate the many uses and people.

NOTE: Numbers indicate in which phase of development each element of the design is constructed.
<table>
<thead>
<tr>
<th>SUSTAINABLE SITES</th>
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<tbody>
<tr>
<td>SS Prerequisite 1: Construction Activity Pollution Prevention</td>
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<tr>
<td>SS Credit 1: Site Selection?</td>
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<td>SS Credit 3: Brownfield Redevelopment</td>
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<tr>
<td>SS Credit 4.1: Alternative Transportation (Public Transportation Access)</td>
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<tr>
<td>SS Credit 4.2: Alternative Transportation (Bicycle Storage &amp; Changing Rooms)</td>
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<td>SS Credit 4.3: Alternative Transportation (Low Emitting &amp; Fuel Efficient Vehicles)</td>
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<td>SS Credit 4.4: Alternative Transportation (Parking Capacity)</td>
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<td>SS Credit 5.2: Site Development (Maximize Open Space)</td>
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<tr>
<td>SS Credit 6.1: Stormwater Design (Quantity Control)</td>
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<td>SS Credit 6.2: Stormwater Design (Quality Control)</td>
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<tr>
<td>SS Credit 7.1: Heat Island Effect (Non-Roof)</td>
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<tr>
<td>SS Credit 7.2: Heat Island Effect (Roof)</td>
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<td>SS Credit 8: Light Pollution Reduction</td>
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<th>WATER EFFICIENCY</th>
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<tr>
<td>WE Credit 1.1: Water Efficient Landscaping (Reduce by 50%)</td>
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<tr>
<td>WE Credit 2: Innovative Wastewater Technologies</td>
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<tr>
<td>WE Credit 3.1: Water Use Reduction (20% Reduction)</td>
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<tr>
<td>WE Credit 3.2: Water Use Reduction (30% Reduction)</td>
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<tr>
<th>ENERGY &amp; ATMOSPHERE</th>
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<tbody>
<tr>
<td>All buildings constructed or renovated will be required to achieve at least 6 points in this section. To be designed by the architect later in the design process.</td>
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<thead>
<tr>
<th>MATERIALS &amp; RESOURCES</th>
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<tr>
<td>MR Prerequisite 1: Storage &amp; Collection of Recyclables</td>
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<tr>
<td>MR Credit 1.1: Building Reuse (Maintain 75% of Existing Walls, Floors &amp; Roofs)</td>
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<tr>
<td>MR Credit 2.1: Construction Waste Management (Divert 50% from Disposal)</td>
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<tr>
<td>MR Credit 3.1: Materials Reuse (5%)</td>
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<tr>
<td>MR Credit 3.2: Materials Reuse (10%)</td>
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<tr>
<td>MR Credit 4.1: Recycled Content (10% post-consumer +h pre-consumer)</td>
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<tr>
<td>MR Credit 5.1: Regional Materials (10%)</td>
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<th>INDOOR ENVIRONMENTAL AIR QUALITY</th>
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<th>INNOVATION &amp; DESIGN PROCESS</th>
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<td>ID Credit 1.1: Innovation in Design</td>
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</tr>
<tr>
<td>ID Credit 2: LEED Accredited Professional</td>
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</tbody>
</table>

TOTAL POINTS = 43
LEED Gold Certified
Integral to the site planning, design, and development of the Powder Horn District is the concept of sustainability. The Master Plan is centered on the guidelines set out by the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) for Neighborhood Development (ND) certification, which integrates the principles of smart growth, urbanism, and green building into the first national standard for neighborhood design. A list of specific sustainability goals for the Powder Horn District is provided below.

**WATER**
+ Use low impact development methods to reduce stormwater runoff.
+ Use natural systems to treat stormwater where feasible.
+ Meet non-potable demand from non-potable sources.

**ENERGY**
+ Orient streets and buildings to seasonal sun and wind patterns to maximize energy efficiencies.
+ Evaluate potential for energy on-site and off-site renewable sources.
+ Reduce residents’ dependence on cars for access to daily needs.
+ Minimize building heat gain and reduce heat island effects with abundant street trees.

**TRANSPORTATION**
+ Minimize use of single occupant vehicles.
+ Promote public transit.
+ Promote pedestrian and bicycle transportation.

**LANDSCAPE & ECOLOGY**
+ Heal the environment through brownfield redevelopment.
+ Maximize recycling of material generated during demolition (diversion from landfill).
+ Employ low-impact construction techniques
+ Increase publicly accessible open spaces.
+ Enhance and conserve the surrounding marsh.
+ Utilize low-impact lighting.

**SOCIAL & ECONOMIC**
+ Involve the public in the planning process of the Powder Horn District.
+ Add significantly to annual property sales taxes.
CONCEPT 01
ARCHITECTURAL PRESERVATION

STRENGTHS
+ Focus on the preservation of the architectural features of the site by maintaining, to a certain degree, the existing road pattern.
+ Existing railroads are converted into a light-rail transit system around the northwestern portion of the site. Two existing railroad terminals are redeveloped into nodes for light-rail system.
+ Mixed-use core runs through the middle of the site to create a strong central axis.
+ Large hotel and large area of surrounding open space located at southeastern end of site.
+ Pedestrian mall links the two iconic power plants.

WEAKNESSES
- At southern border of property, no buffer is created between residential areas and potential industrial development of RRCC.
- Green pedestrian malls are not aligned or linked; greater connection between hotel and power house could be developed.

CONCEPT 02
WATER CONSERVATION

STRENGTHS
+ Focus on several stormwater retention ponds and rain gardens is a sustainable solution to dealing with runoff.
+ Industrial/manufacturing uses on site creates jobs for residents.
+ Hotel located in more central and dense part of site.

WEAKNESSES
- No green pedestrian malls.
- Weak connection between the power houses.
- Roads do not respect the existing conditions, which leads to the destruction of more buildings and is therefore less sustainable.
**DESIGN ELEMENTS**

Preservation of the architectural features of the site by maintaining, to a certain degree, the existing road pattern.

Existing railroads are converted into a light-rail transit system around the northwestern portion of the site. Two existing railroad terminals are redeveloped into nodes for fight-rail system.

Mixed-use core runs through the middle of the site to create a strong central axis.

Large hotel and large area of surrounding open space located at southeastern end of site.

Two pedestrian malls link the two iconic power plants and the proposed hotel. Green spaces are aligned and linked creating a strong connection between the hotel and power houses.

Focus on several stormwater retention ponds and rain gardens is a sustainable solution to dealing with runoff.

At southern border of property, a park spaces buffers the residential areas and potential industrial development of RRCC.
Circulation

The master plan follows the existing roads as much as possible. The circulation follows a fairly strict grid pattern for two reasons: one, to preserve as many buildings as possible; two, to make navigation of the site as easy as possible. The average block size is 450 by 600 feet. Two roundabouts are features of the circulation design.

The existing railroad, shown here in red, will be converted into a light rail transit system. In addition to several stops throughout the site, the rail line will connect north to downtown Charlestown and south to the regional hub, Clarksville. Eventually, connections could be made across the river to downtown Louisville.

Land Use

- Residential
  Activity 1000
  265 acres
- Mixed-Use
  Activity 1000 & 2000
  171 acres
- Commercial
  Activity 2000
  57 acres
- Office
  Activity 2000
  28 acres
- Institutional
  Activity 4000
  21 acres
- Transportation
  Activity 5000
  412 acres
- Open Space
  Activity 8000
  79 acres

Phase I

314 acres
The central features of the first phase are the historic smokestacks, which are to be converted into a museum and performance venue. They connected by a pedestrian promenade surrounded by mixed-use. The Entertainment District will also be completed, as well as two transit stops and a residential neighborhood.

Phase 2

243 acres
The second phase will extend the central axis of mixed-use development. More residential areas will be built, including a large section of townhomes. The office park, centered on the second pedestrian promenade, will be built. A grocery store will be located in the heart of the neighborhood.

Phase 3

440 acres
The final phase of the project will complete the residential areas and will create significant park space for the State Park and to serve as a buffer to future development at River Ridge.
PHASE ONE ELEMENTS

Powder Horn Performance Venue
One of the historic power plants is to be gutted and retrofitted to house a performance venue. The venue hosts the local theater group as well as nationally known bands and groups. The surrounding park has a large plaza for outdoor concerts and events.

Wet Ponds
The wet ponds located throughout the site are not only aesthetic additions, they also treat stormwater runoff by settling and biological uptake.

INAAP Museum
The southern power plant is converted into a museum to share the history of the plant during the WWII era. Historic artifacts and photographs are housed here.

Light-rail Stops
The light-rail system runs along the existing railroad tracts, originally used to transport materials and ammunition from one processing plant to the next. The two stops located in the parks include restaurants that overlook the respective parks.

Parking Structures
To encourage residents and visitors to use the mass transit system, a large long-term parking facility is located near the transit stop.

Organic Brewery
An organic brewery is situated between the Powder Horn Venue and the Entertainment District. The developer wishes to promote and encourage sustainable and green-minded businesses.

Entertainment District
A series of old warehouses are converted into a lively nightlife spot. Proximity to the Powder Horn Venue and the hotel make it the ideal location for bars and restaurants to draw a younger crowd.

Hotel
Until the large hotel is built in Phase 3, this smaller hotel serves visitors to the site. After the main hotel is built, this small hotel will be converted into apartments and condominiums.

Artist Commune
These existing warehouses are converted into live-work studios to house local artists and craftsmen.

Residential Lots
The residential lots of Phase 1 are the first stage of a large neighborhood. Each lot has alley access and faces either a small park or a residential street.
BUILDING FOOTPRINT & CIRCULATION

The diagram to the right shows the building footprint and the road pattern. The roads follow the existing grid pattern as much as possible. The buildings are designed to create blocks that are comfortable for the pedestrian.
DENSITY
The most intense density on site occurs at the entrance and by the light rail stop. The most intense uses are concentrated near State Road 62 for easy access and visibility.

WALKABILITY
Pedestrian accessibility is an important component of the master plan design. The rings on the plan above show the distance of five, ten, and fifteen minute walks.

PHASE ONE
The Powder Horn Performance Venue has both indoor and outdoor performance spaces. The large plaza shown above can accommodate large crowds for concerts and events. The circular plaza is surrounded with trees to give the space definition and the feeling of enclosure. The stage can be set up against the Power Plant. Imagine what an incredible setting this is at night!
Eighth Street, the main boulevard through the site, is a tree-lined boulevard. The center median is designed to collect stormwater runoff. The divided travel lanes slow traffic and allow for a more pedestrian friendly environment. The twenty-foot sidewalk is divided into two distinct zones: one for pedestrians and the other for cafes. The buildings lining Eighth Street are retail on the first level and residential above.
The pedestrian way through the middle of the most densely developed portion of the site will capture stormwater. The ponds on site will be similar to the wet pond shown above. The edges of the ponds will be heavily vegetated with water tolerant plants to give a soft, natural look. The plants filter stormwater before it returns to the water source, in this case the groundwater or the Ohio River.
CLOSE-KNIT NEIGHBORHOOD

The residential areas of the Powder Horn are designed to foster community interaction. Wide sidewalks and shared green space allow people ample opportunity to interact with their neighbors. Each house has access from a back alley, to de-emphasize the automobile. The architecture is inspired by the farmhouses of Indiana.

PHASE ONE
Performance Park

Mixed-use
(Commercial / Residential)

Parking

Maintenance Entrance

Hotel
The Entertainment District is located in the northeast portion of Phase One of the project. The existing buildings, once used for manufacturing and production of ammunition, will be converted into restaurants, bars, and galleries to create a lively pedestrian area that is active both day and night. A hotel anchors the Entertainment District at the southern edge. Across the street to the west, commercial and residential areas feed the District with daily pedestrians. In Phase Two, townhomes will be built on the block just east of the site. These townhomes will generate even more foot traffic to feed the area. The Entertainment District features a wide pedestrian way that can accommodate market. A large fountain in the middle of the pedestrian mall features a sculpture made of remnants of the industrial era of the plant. The maintenance road that serves the restaurants and bars as well as the hotel is tucked in the back, the east side. Parking is hidden behind the development to enhance the pedestrian environment.

Total Acreage  25 acres
Commercial       82,700 sq.ft.
Hotel           300,000 sq.ft.
Parking Spaces  251
LIVELY ENTERTAINMENT

Walking south through the Entertainment District towards the hotel, one can choose from an array of restaurants and bars. The middle of the pedestrian way is shaded by lush river birch trees. The wide pedestrian zone allows ample space for outdoor cafes. During the weekends, farmers will set up tents for the farmer's market. Adjacent to the buildings, one sees cisterns to capture rainwater. This captured water is used to irrigate plantings throughout the site. Between some of the restaurants, there are kitchen gardens to allow the restauranteers to grow fresh vegetables to serve.
ECO-PAVERS RIVER BIRCH SEAT WALL

Eco-Optiloc pavers
Betula nigra, Native Unilock Brussels provided by Unilock, Indiana tree, likes Block Seatwall permeable pavement, handles high traffic conditions, well to rain garden conditions

PHLOX
Groundcover for summer color, part-sun/part-shade, native to Indiana

CISTERN
Rain barrel by Alpine Water Tanks of Alpine, TX, 12-ft diameter, 8600 gallon capacity

ECO-PAVERS
Eco-Optiloc pavers provided by Unilock, permeable pavement, handles high traffic

RIVER BIRCH
Betula nigra, Native Indiana tree, likes wet soils to adapt well to rain garden conditions

SEAT WALL
Unilock Brussels Block Seatwall

ENTERTAINMENT DISTRICT
The small existing buildings that face the road will be converted into small restaurants and gallery space. One will house a local coffee shop, another a small deli, and another an artist's studio space. The wide medians along the street collect stormwater runoff. Rather than piping this overflow into an underground system, the water will percolate through the native, water-tolerant plants. The streets are curbless, so the water flows directly into the bioswale.
BIOSWALE
Native plants that will thrive in wet soils, but will also tolerate mild drought, including grasses and flowering perennials

SOLAR LAMP
Completely solar powered, monocrystalline silicon photovoltaic panel

POROUS ASPHALT
Underlying, open-graded stone bed allows water to slowly infiltrate

ENTERTAINMENT DISTRICT


Environmental Protection Agency's Brownfield Website. <http:llwww.epa.gov/brownfieldsindex.html>.


Project for Public Spaces Website. <www2.pps.org>.


