An Educational

and

Transitional Landscape

North Dakota State University
Department of Architecture and Landscape Architecture
2005 - 2006 Undergraduate Design Thesis
Joe Nigg

AN EDUCATIONAL AND TRANSITIONAL LANDSCAPE

A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota State University

By

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In Partial Fulfillment of the Requirements
for the Degree of
(Bachelor of Landscape Architecture)

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Thesis Abstract

This project is centered on an idea for an outdoor educational facility that is directed for use by elementary age students. An interpretive, hands on approach to learning is used to highlight a variety of topics involving biology, ecology, and entomology. The project is implemented into an area of Minot, North Dakota that is strictly an industrial zoned area. The thesis essentially examines the ability of industrial processes to co-exist with a more natural environment.

Project Typology:

An outdoor educational facility directed at elementary aged students. An interpretive, hands on approach to learning is used to highlight a variety of science based topics. It will be implemented into an industrial zoned area in an underdeveloped district of Minot.

Theoretical Premise:

The thesis will examine the ability of industrial processes to co-exist with a more natural environment. Design metaphors, analogies, and or tectonics will be developed from the examination.

Project Justification:

Industrial processes must be adapted to the limitations of the environment or abandoned. The City of Minot has limited diversity in recreational opportunities and the proposed project will offer local and regional communities an educational and recreational attraction.

1. Narrative

Enbridge Oil LLC of Minot North Dakota owns a 40 acre, unimproved parcel of property that lies parallel to their distribution headquarters. The land has a small creek dividing the center, rolling topography, and vegetation that extends along the creeks relatively steep banks. The property is completely surrounded by industrial zoning and is anchored to the south by multiple railroad tracks.

Identified transitions between human impacted environments and natural landscapes will serve as a forum to explain different human and biological concerns including ground water contamination, habitat destruction/fragmentation and invasive species.

This site will allow elementary students the opportunity to explore various principles that relate to biology, and ecology with an emphasis on entomology. Concepts such as conservation, preservation, and species identification will be introduced and promoted in a hands on, educational approach.

In many regards, elementary education is taught through the use of text books and indoor routine. Providing a site that promotes field study will help expand and excite developing minds in the outdoor environment. Site design and on-site interpretation will help guide the science based learning, as many elementary aged students learn most effectively when they are presented with the freedom to explore the unknown.

2. User/Client Description

The client for this project is Enbridge Oil, but the space would experience a transition into the public sector. This project would be focused on, but not limited to, a specific user group: elementary students. Unique niche environments and characteristics designed into the site will draw additional user groups. These groups might include bird/animal watchers, naturalists, environmentalists, secondary education and/or any discipline relating to science. Diversifying the palette of potential users is important to a project of this scale.

Use of this site and the associated seasons will vary according to which user group is present. The central concepts of the design project will highlight various activities during different seasons to attract different user groups. Ideally the site will function year around.

Requirements for on-site parking will be minimal. Site design will allow parking for six visitor vehicles, one bus (70 people), and a maintenance vehicle. Space will be provided for the possibility of overflow parking. ADA accessibility would also have to be addressed, and the project designed in a manner consistent with the capabilities of disadvantages students. Depending on the location of the pipeline, parking lot restrictions may exist. Excavating subgrade and pouring an asphalt or concrete lot may have limitations.

3. Major Project Elements

a. A majority of the major project elements are described below. Expansion and further development of these elements will occur during the research and data analysis phase.
    i. Environmental educational areas
        1. Biology
        2. Ecology
        3. Entomology
    ii. Minimum maintenance trail system
    iii. Establish raptor habitat
    iv. Connection to Enbridge Oil Headquarters
    v. Exhibit a transition between industrial and recreational zoning
    vi. Present the importance of diversified zoning

4. Site Information: Macro to Micro Scale

a. Regional
    i. Ward County, North Dakota
b. City
    i. City of Minot, North Dakota
c. Site Specific
    i. Enbridge Oil & Pipelines of North Dakota
        1. 40 acre site north of Burdick Expressway
d. Site Statement of Importance
    i. Enbridge Oil of North Dakota is a 950 mile underground pipeline system that transports thousands of barrels of crude oil per day through the Midwest. The pipeline travels below the proposed site and limits the type of development directly above. This 40 acre parcel of property offers the unique opportunity to develop an educational environment that is contrasted with; and implemented into an area of industrial zoning.
e. Inventory
    i. Economics
        1. Agricultural based community
    ii. Demographics
        1. City population of approximately 36,000
        2. Schools sited in Minot and additional surrounding small towns
            i. Ward County 2000 Census - approx. 5,500 elementary students enrolled.
    iii. History
    iv. Geographic:
        1. Transportation
            i. Three main transportation routes including Highway 83, Highway 2, and Highway 52 move traffic into Minot
        2. Site Area
    v. Major Landmarks
        1. Minot Municipal Airport (Northwest of site)

vi. Site Topography
1. Mix of rolling hills and flat open grassland
2. Steep ravine leading down to creek

vii. Views
1. Heavy industrial
a. Above ground storage tanks
b. Railroad tracks and related activity
c. Rolling Hills running along western edge of property line

f. Physical
i. Environmental Issues
1. Annual precipitation
2. Wind analysis
3. Ground water contamination
4. Habitat fragmentation

ii. Vegetation
iii. Geology
iv. Soils/Hydrology

5. Project Emphasis

1. Emphasis in the examination of the theoretical premise:
a. The thesis will examine the ability of industrial processes to co-exist with a more natural environment. In addition, the thesis will focus on a transition back into the urban setting of Minot. This will be done by defining the movement of individuals by establishing visual and structural connections with existing infrastructure (exp. trails, paths, landmarks, nodes)

6. Plan for Proceeding

1. Definition of a Research Direction:
a. Research and analysis will be a Mixed Method, Quantitative/Qualitative Approach:
i. A Concurrent Transformative Strategy will be employed:
1. The strategy will be guided by the theoretical premise which examines the ability of industrial processes to co-exist with a more natural environment.
2. Implementation - both quantitative and qualitative data will be gathered concurrently.
3. Priority will be assigned by the requirements of the theoretical premise.
4. Integration of the data will occur at several stages in the process of the research through idea sketching, and will depend on the requirements of the examination of the theoretical premise.
5. Analyzing, interpreting, and documenting results will occur throughout the research process.

b. Quantitative Data, including but not limited to:
    i. Statistical Data:
        1. Gathered and analyzed locally or obtained through an archival search.
    ii. Scientific Data:
        1. Measurements obtained through instrumentation and or experiment - gathered directly or through archival search.

c. Qualitative Data:
    1. Gathered from direct observation
    2. Gathered from a local survey
    3. Gathered through an archival search
    4. Gathered from direct interviews

2. Design Methodology
    a. Language based:
        i. Philosophical Logic
            1. Adduction - To bring forward as an argument or as evidence.
            2. Deduction - Concluding from a set of premises.

3. Documentation of the Design Process
    a. Digital Reproduction
        i. Photography
    b. Hard Drawing
        ii. Sketches - sketchbook
        iii. Plans, Sections, and Details

4. Work Schedule

Oct. 13	Final Thesis Proposal Due
Oct. 17-21	Organize collected data (base information)
Oct. 24-28	Meet with primary critic to discuss program
Oct. 31-Nov.25	Complete inventory and analysis
Nov. 28-Dec. 2	Meet with primary critic to discuss inventory/analysis
Dec. 5-8	Complete research, finalization of program
Dec. 12-Jan.13	Schematics and concepts developed
Jan. 16-Mar.6	Begin drawings and presentation
Jan. 16-Mar.6	Begin drawings and presentation
Mar. 6-10	Mid-semester thesis review
Mar. 10-31	Drawings and presentation completed
Apr. 3-14	Board Layout
Apr. 28	Draft thesis document due to primary critic
Apr. 27-May.4	Final thesis reviews
May. 11	Final thesis documents due to the department office

7. Previous Design Experience

a. Second Year
    i. Fall Semester - Professor Matt Chambers
        1. Ideal Landscape
        2. World Trade Center - Peace Garden Memorial
    ii. Spring Semester - Professor Dennis Colliton
        1. NDSU Downtown Plaza Design
        2. NDSU Campus Arbor Walk
        3. Red River Waterfront Development

b. Third Year
    i. Fall Semester - Professor Matt Chambers
        1. Oriska Arboretum, Oriska, North Dakota
        2. Chicago Waterfront Competition, Chicago, Illinois
        3. Fargo Corridor Enhancement
    ii. Spring Semester - Professor Tim Kennedy
        1. Rocking Horse Community Development
        2. Annual Masonry and Stone Competition

c. Fourth Year
    i. Fall Semester - Professor Frank Kratky
        1. Urban Renewal, St. Paul, Minnesota
    ii. Spring Semester - Professor Catherine Wiley
        1. Trucker's Inn Brownfield Reclamation
        2. Sand and Gravel Quarry Reclamation

d. Fifth Year
    i. Fall Semester - Professor Joshua Walter
        1. Conservation Corridor - Restoring an Urban Waterway

8. APA Standard Reference List

1. McHarg, Ian L. Design with Nature. Garden City, New York: The Natural History Press, 1969.

2. Lynch, Kevin. Site Planning. Cambridge, Massachusetts: The M.I.T. Press, 1971.

Ecological & Cultural Landscape Restoration and the Cultural Evolution Towards a Post-Industrial Symbiosis between Human Society and Nature:

Z. Naveh

Implementing strategies that explore ecological and cultural restoration into the landscape was the focus of this journal article. Naveh attempted to explain the relationship between the landscape, society, and industrialization through ecological and cultural land restoration. Since the industrial revolution in the 1800's humans as a society have lived under the illusion that they can control nature if a link is created between science, technology, and the human. It is pointed out that a relationship between humans and nature must exist in order to create a holistic ecosphere. Conservation and restoration techniques are the foundation for this practice and can manufacture cultural diversity, natural landscapes, ecological integrity, and health. However, to accomplish this task Naveh says there must be a merger between science, humanities, and art.

Industrial processes as stated in the theoretical premise must co-exist with the natural environment. To unify the disciplines, historical and cultural values of ancient and traditional landscapes should be acknowledged. This will identify transitional lapses between humanity and nature. Ecological and cultural landscape restoration will be integrated into site design to mitigate and blend humanity and nature.

The Poetry of Landscape Ecology: an historic perspective:

Daniel Joseph Nadenicek

An article from the journal Landscape and Urban Planning focused on identifying an important common ground aspect between the disciplines of art and science. This was essentially completed by utilizing a historical perspective relating to transcendentalism. Ralph Waldo Emerson initially developed these transcendentalist principles from a philosophical understanding of nature. The principles are described as an aesthetic theory, which were also influenced by Henry David Thoreau. These ideas attempted to bring synergy between function and appearance, something often missing from contemporary landscapes. Emerson stated nature was like a book, you must read, observe, and study it. Only then would the book bring benefit. The principles continued to place responsibility on the artistic expression because the artist had greater insight into nature. The concept of integrity and essential rightness called for the artist to avoid unnecessary landscape decoration because nature is not perceived in that way. "Nature must be depicted as dynamic and flowing" (124). Horace William Cleveland designed many historical landscapes that acknowledged these principles. Sleepy Hollow Cemetery in Concord, MA was developed to change over time allowing natural systems to continue uninterrupted. Another example included the Minneapolis Park System that was designed to preserve certain prominent landscape elements.

To integrate industrial processes with the natural environment this historical perspective involving transcendentalism will assist in outlining and defining the importance of function and appearance. Additionally, it will maintain a focus on the web of interrelationships that comprise nature, while ideally extending nature as a component that is alive, moving, and reproductive.

The ecological and amenity functions of woodland edges in the agricultural landscape; a basis for design and management:

G. Frey

Examining woodland edges and their relationship with agricultural landscapes is the primary objective in this article. Written by G. Frey, he describes the transitional zone between woodland edges and agricultural fields as an important factor in maintaining biological and amenity functions. Frey states there are three elements that are essential in multi-use management and design of these edge environments. These include width, physical structure, and composition of woody species. Throughout the recent decade, developing communities have experienced habitat sharpening which is an increasing contrast between woodland, agricultural, and urban environments. European countries have attempted to reverse this trend by integrating planting schemes on small blocks which are distributed on the urban and farmland fringe. In theory, this will help create and develop stronger ecotone regions along the transitional lines. Woodland edges have numerous ecological functions that increase exponentially when the structural complexity of the edge is higher. Species richness, abundance, and diversity are a few of the benefits.

The development of woodland edges also establishes refuge zones for plants and animals that are sensitive to mechanical disturbances, fertilizers, and pesticides. Woodland edges can also enhance movement between corridors and stabilize species populations. The current project site has the potential to incorporate edge environments. Designed edges would be limited in size, and by alternating them between open and closed edges would achieve experiential variation along the property borders and shelterbelts.

Vegetation of the Northern Great Plains:

W. T. Barker and W. C. Whitman

This article analyzes the vegetation of the Northern Great Plains with a focus on its historical significance. The Northern Great Plains include North Dakota, Minnesota, South Dakota, Nebraska, and Iowa. Barker and Whitman describe three geological events that had a significant influence on the vegetation and physical features of this region (2). The first event is the presence of the Cretaceous Sea (100 million years ago), followed by the uplift of the Rocky Mountains (60 million years ago), and last the glaicial ice sheets that covered the landscape up until 10,000 years ago. These three events helped shape soil structure, determine hydrologic flow, and vegetation. Soils developed under grassland cover while trees advanced and retreated in relation to the ice sheets. The three major genera of grasses in this region include Agropyron, Stipa, and Bouteloua (7). Common wheatgrasses include: Western Wheatgrass (Agropyron smithii), and Thickspike Wheatgrass (Agropyron dasystachyum). Needlegrasses common to the region are Needle-and-Thread (Stipa comata), Porcupine grass (Stipa spartea), and Needlegrass (Stipa curtiseta). Although a large portion of the Tallgrass Prairie has been converted into cropland, remanants can be found which have species such as Big Bluestem (Andropogon gerardii), and Indian grass (Sorghastrum nutans) as dominant grasses. The most common short grass species can be identified as Buffalo grass (Buchloe dactyloides) which is often found in bottomlands or drainage ways. Riparian woodland common to the region of study is typically mixed with Cottonwoods (Populus deltoides), Boxelder

(Acer negundo), Green Ash (Fraxinus pennsylvanica), Common Hackberry (Celtis occidentalis), Bur Oak (Quercus macrocarpa), and a variety of willow species. Typical understory grasses include Canada Wildrye (Elymus canadensis), Slender Wheatgrass (Elymus trachycaulus) and Prairie Cordgrass (Spartina pectinata).

The site currently has limited plant diversity and the implementation of a plant palette will be a necessary component of the design. The common historical Northern Plains plants defined establish a strong foundation for a planting plan. Incorporating a mix of tallgrass prairie, riparian woodland, and native forbs is the primary goal.

Teaching Multiple Perspectives on Environmental Issues in Elementary Classrooms: A Story of Teacher Inquiry:

Mary A. Christenson

A year long qualitative study focusing on implementing multiple environmental perspectives into the elementary and middle school educational curriculm was written by Mary A. Christenson. This provided students with the opportunity to explore various controversial environmental topics in a open and supportive classroom environment. In the study, five teachers and one researcher developed lesson plans based on childrens literature that approached subjects in environmental education. In developing the lesson plans they looked carefully at curriculm guidelines to determine what environmental issues should be implemented. The group also considered popular media sources which allowed them to consider diverse adult perspectives on environmental issues. Throughout the school year the lesson plans were implemented into each grade level from kindergarten to fifth grade. One lesson plan used in the study involved students creating a T chart discussing the reasons to save a wooded area, and the reasons to cut down a wooded area. The lesson promoted critical thinking and idea discussion. It was noted that kids are very interested in environmental education and have no problem accepting others view points on the subjects.

Implementing discussion on environmental education that covers multiple perspectives is an important aspect of student development. Teachers were encouraged to consider this approach because “by failing to address why people make different environmental choices, children approach what they learn about environmental topics in the same way in which they sometimes approach learning facts for history, math, or health tests” (14). The educational components implemented into this site design would help support this environmental educational approach. Educators would have the opportunity to further enhance knowledge and interest in students with access to an outdoor educational facility that provided additional learning and support to various subjects covered in literature and classroom discussion.

Removing Metals from Soils - Cleaning Up Contaminants with Plants :

Jennifer Cutraro

Phytoremediation is described as plants and the process they use to clean up hazardous compounds. Currently, physiologists, molecular biologists, and soil scientists are developing plants that can be used in remediating a variety of contaminants. They are also working to develop plants that detect soil and water contamination. Traditional

remediation techniques usually fit into one of two methods. The first method is basically removing the contaminated soil. The second method involves applying chemicals to the soil which leaves the soil virtually useless. These two methods are costly and very destructive. If the contamination is an organic compound such as polycyclicaromatic hydrocarbons (PAH's) plants do not extract but are simply the means of delivering the microorganisms to the contaminated area. The microbes degrade the organic contaminants utillizing carbon as its energy source and breaking the organics into small and less volatile toxic compounds (34). Additional applications of plants can include the use of plants as indicator plants. These plants would be genetically engineered to change appearance when they detect the presence of metal in the soil.

Phytoremediation can be a useful tool that takes advantage of plants natural ability to extract contaminants from the soil. The pipeline that transports crude oil through the site could offer an opportunity to implement some of these techniques into the design. A remediation plant and indicator plant could be introduced as both functional and an education component. These plants could present the importance of plant diversity to students and also display a few important qualities in plants.

Transitional Uses and Reclamation of Urban Land

Dr. Manfred Fuhrich, Dr. Bernd Hunger
Federal Office for Building and Regional Planning, Berlin, Germany

This article was written to address future planning and land use issues in Europe. Many cities in Germany are currently experiencing an influx of vacant urban land. The authors Dr. Manfred Fuhrich and Dr. Bernd Hunger suggest two concepts to help reclaim and increase the quality of the landscape.

Transitional land is the first concept and does not require change of owner or additional permits. The general idea is for transitional land to allow and preserve long term development options for the site. Transitional land uses provide opportunities for the improvement of public areas while also increasing the quality and safety of neighborhoods. Renaturation is the second concept that involves urban renewal projects focused on a permanent conversion into open space or green space. Fuhrich and Hunger offer examples such as ecological successional zones, forested areas, and the expansion of existing parks (3).

The design development of the vacant project site in Minot can be linked to these two concepts. Implementing transitional and renaturation processes into this parcel of property will ultimately provide this area with a new identity. The residential housing that is proposed just west of the site will experience an increase in quality and neighborhood safety. The article expressed one question that was relevant to the design intent of this site. The question asks, "what substantive and conceptual approaches were followed, and what procedures were used to implement the project". In the initial design stages the basic conceptual ideas were based around identifying and creating a working transition between land uses - residential, industrial, and public space. Designing a site that focuses on education, but also meets the recreational needs of the public was important in establishing an argument to implement the project.

Regional Summary:

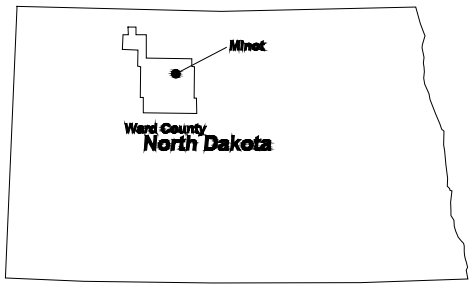
Ward County lies in the western part of North Dakota and has a population of approximately 53,000 people. The county is primarily an agricultural based community. Early settlement of this area occurred around 1870, driven by railroad construction and its quest to reach the coast. Small towns and villages appeared along the tracks, and land was settled. Bismarck is the closest large city which lies 60 miles south of Minot.

Local Summary:

The City of Minot rests in the north western part of North Dakota and the central portion of Ward County. Minot currently acts as the county seat with a population of 36,000. The Minot Air Force Base which is 15 miles north of city limits has an additional population of 8,000 people. Thus, localized population could be estimated at 42,000 individuals.

Site Specific Summary:

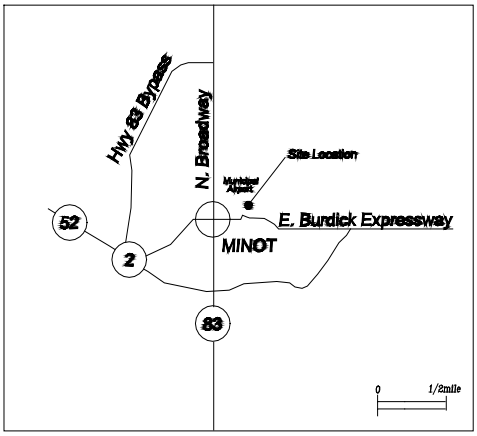
Enbridge Oil LLC of Minot, North Dakota owns a 40 acre, unimproved parcel of property that lies parallel to their distribution headquarters. The land has a small creek dividing the center, rolling topography, and vegetation that extends along the creeks relatively steep banks. The property is almost completely surrounded by industrial zoning and is bordered to the south by a series of railroad tracks.



Ward County Context Map - Fall 2005

Project Vision:

In many regards, elementary education is taught through the use of text books and indoor routine. Providing a site that promotes field study will help expand and excite developing minds in the outdoor environment. Site design and on-site interpretation will help guide the science based learning, as many elementary aged students learn most effectively when they are presented with the freedom to explore the unknown. This site will allow elementary students the opportunity to explore various principles that relate to biology, and ecology with an emphasis on entomology. Concepts such as conservation, preservation, and species identification will be introduced and promoted in a hands on, educational approach.

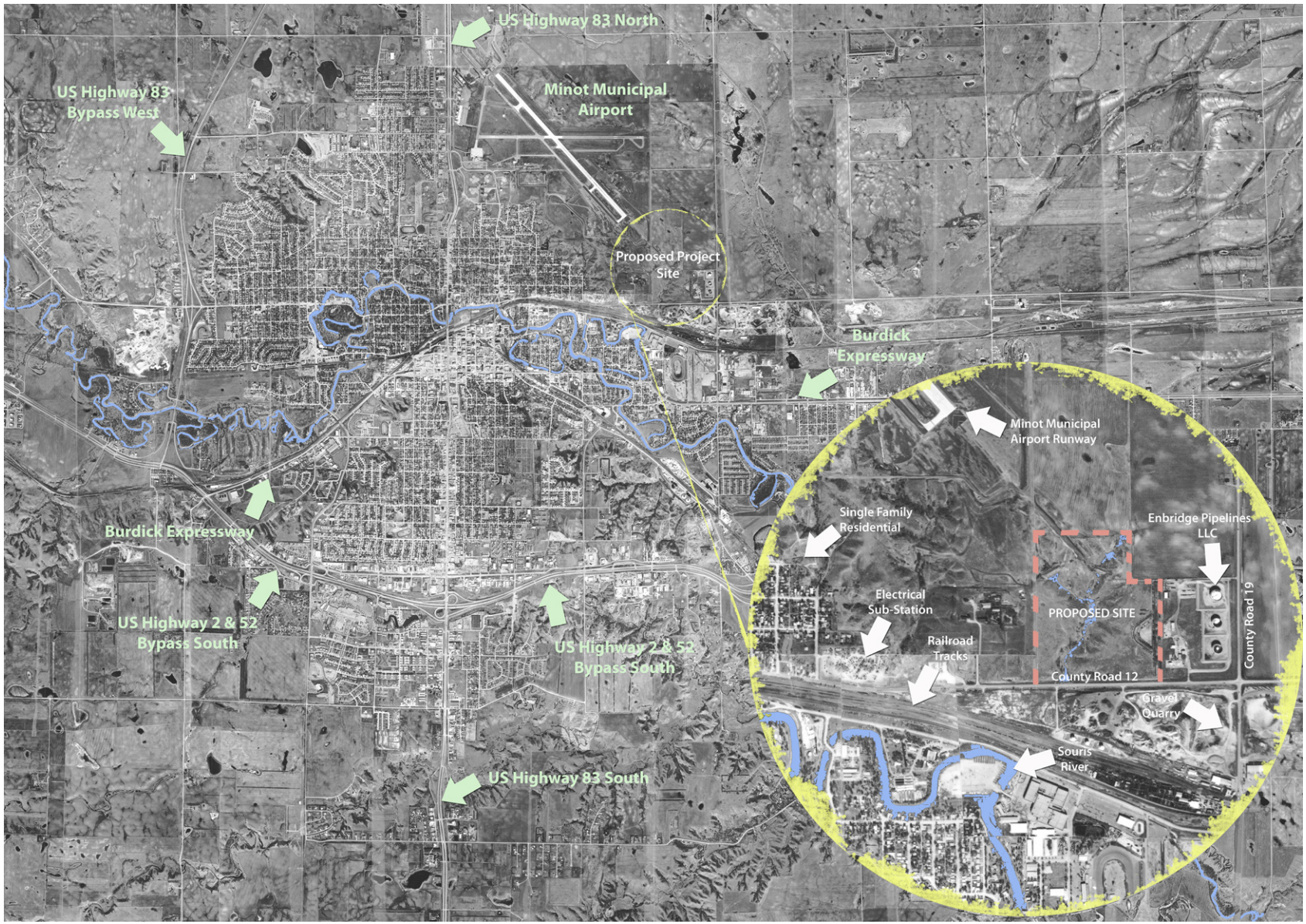


Ward County Context Map - Fall 2005

Historical Context:

Educational and interpretive parks have flourished with the recent nation wide push to establish new open space and public parks. However, they are often placed on upscale residential property which strangles the opportunity to enhance the environmental value of the land. This project will provide a public example and demonstrate that multiple land uses can be incorporated into a functional design. To establish a precedent that states the physical context of the land does not necessarily have to dictate future land use.

Site Orientation:



Project Goals & Objectives:

The major elements that will be represented in this project have been considered based on their compatibility as potential learning opportunities. A majority of the learning will be focused directly on the environment and fields of scientific research. Additionally, further expansion on these elements will occur throughout the design process.

- Environmental Educational Areas
    1. Biological Processes
        These concepts will be predominantly broad in their overall focus. Identifying and illustrating the significance of food chains, water cycles, decomposition, and erosion.

    2. Ecological Processes
        Narrowing in scope, the ecological concepts implemented will explain issues that include habitat fragmentation, habitat destruction, ground water contamination, and invasive plants/animals.

    3. Entomology & Nature
        The concepts initiated into this area will be small in scale and in-depth. Ideally the focus will rest on insects and the processes they endure. Included in this category would be metamorphosis, over-wintering, and anatomy.

- Minimal maintenance trail system
    The main objective behind this element is incorporating a paved system that would be limited in upkeep, but also allow for physically challenged individuals to have equal access and opportunity. The trail will also serve multiple functions which may include: access to various locations, possibility for vehicle movement, and other various user needs.

- Establish Raptor Habitat
    A species that lies at the top of the food chain and would diversify the species present on the site.

- Connection to Enbridge Oil LLC Headquarters
    Provide an open space accessible to employees on a daily basis.

- Exhibit a transition between industrial and recreational zoning
    Develop a smooth link between two classifications of zones that rarely co-exist in a working environment.

- Present the importance of diversified zoning
    The site needs to allow the exhibited contrast to show between the different zone classifications.

Project Emphasis:

In the examination of the theoretical premise there will be an emphasis upon the ability of industrial processes to co-exist with a natural environment. In addition, an emphasis will be placed upon the transition back into the urban setting of Minot. This will be done by defining the movement of individuals by establishing visual and structural connections with existing infrastructure (example: trails, paths, landmarks, nodes).

Hydrological & Ecological Considerations:

Displayed in the National Wetlands Inventory the proposed site has a 1/4 acre zone that is delegated as a wetland (Land Use Plan, 5-5). Also displayed are the locations of possible Environmental Concerns. These areas represent groundwater contamination and are in the general area of the proposed site (Land Use Plan, 5-6). Concurrent with the information provided by the City of Minot about the site, mitigation measures to eliminate or minimize the impact of the contamination will be addressed in project development and design.

Industrial Land & Community

Industrial land often has a negative impact and appearance on a city. Creating an awareness and providing possible solutions for land use integration can limit the amount of abandoned industrial land. Two objectives follow for reclaiming vacant industrial land:

a. To encourage positive land management and improve wildlife quality/quantity
b. To develop community integrity with regards to the environment

Case Studies:

Regenerating the Landscape, Reconnecting the Community - Milwaukee, Wisconsin, United States

The Menomonee River Valley runs two and a half miles long and covers over 750 acres of old industrial soil. After WWII, industrial companies began leaving Milwaukee and leaving a legacy of contamination. Realizing the significance of the land and the important connection between community health, environmental contamination, and economic sustainability; a plan was developed to revive the river and return it to a community amenity.

To achieve this goal a series of sustainability keys were conceptualized. These planning elements included: transportation, circulation, access, linkage, mixed use zoning, green building, and open space that ultimately would restore habitat. With a strong foundation the project will essentially link neighborhoods, produce a stormwater park, establish multi-transportation overall reclaim contaminated land throughout.

The type of planning that was incorporated into this project was focused around the well-being of the community. A minimal amount of importance was placed on the economic purposes of the project, but in the end the economy and the environment will experience the benefits.

Crosswinds Marsh - Wayne County, Michigan, United States
Integrating economics, recreation and ecology was the unifying idea of this wetland mitigation project. Conceptualized in 1989, this 467 acre multidisciplinary project focused on a form of restoration that reduces the impact of projects that degrade wetlands.

The land selected was previously agricultural soybean and corn monoculture cropland. Once the bottom of Lake Maumee (ancestor of Lake Erie) the soils were poorly drained and offered the opportunity for wetland restoration. Establishing public support was an integral factor in project development. It eventually became one of the ground breaking environmental projects in Michigan that offered passive recreation and environmental learning opportunities to the public.

Crosswinds Marsh is composed of a series of diverse wetland and terrestrial landscapes. The five major categories include: forested, wet meadow, emergent, shallow water, and deep water ecosystems. These small, yet defined environments create a sequential variation of outdoor rooms that can be explored through the trail and canoe systems. This design diversity has helped create habitat for a broad range of creatures including: birds, mammals, amphibians, and also plant types.

This project site was essentially transformed from an agrarian use into an environmental amenity to be utilized by the public. As a case study, the project provides insight into land use and land transformation. It identifies the fact that land can be manipulated into a completely different form, and if designed properly, has the potential to serve the interests of the public domain.

Fishtrap Creek - Abbotsford, British Columbia, Canada
Multi-use land planning was the underlying goal of this project. It is a classic example of suburban development encroaching on prime agricultural land. Establishing a synergism between the two land uses and creating public open space created a solution.

Limited in quantity, Canada is protective of its productive land. Suburban sprawl was forced to climb up the coastal mountains which in turn flooded the low lying valley farmlands. To accommodate the flooding the municipality purchased 57 acres of unused and overgrown farmland to create a pubic open space and mitigate the flooding. Fishtrap creek flowed through this area and was an integral component in the project design.

Designed to handle 5 feet of floodwater rise the creek would eventually overflow into a series of wetland zones. The ponds were given side slopes of 1:5 to limit their environmental footprint and also offered the opportunity to plant various native riparian species. Water quality was also an issue. Sediment traps were installed on all urban storm inlets, and the detention ponds were designed to capture 60% of suspended solids for a one hour duration. Approximately 35,000 native trees and shrubs were planted within the park and minimal maintenance allowed for plant succession.

As a result, a variety of habitats were created. These included meadow, mixed woodlands, riparian, and wetland habitats. A trail system was incorporated that enhances

interior views. The views feature the on-site housing buildings that were designed to be reminiscent of the historic agricultural buildings of the region.

Planning of this project was completed in five years. It attempted to find a way to fit the built environment into the natural environment with minimal impact. Fishtrap Creek is an example of land stewardship and designing with an environmentally friendly attitude.

Shalom Hill Farm Foundation - Southwestern Minnesota, United States
Originally settled in the 1800's as a 'tree claim' these 26.5 acres of rolling hillside and wooded groves provides experiential learning through interaction. Designed as a spiritual retreat and rural ministry Shalom Hill Farm demonstrates sustainable rural living.

Shalom Hill Farm is described as a planned agrarian use that meets natural prairie land. It is ideally an educational laboratory that enhances connections between the natural and human world. All resources used for energy and material needs are produced on-site. The design of this site offers opportunities for recycling, reuse of water, and use of organic materials. Buildings were designed to minimize land impact, while taking advantage of natural daylighting, wind energy, and views. A sub-surface wetland system treats water and provides irrigation for the farm. Concepts that include biodiversity and wildlife enhancement shows a sense of community and stewardship towards the land.

Shalom Hill Farm is a dialogue between past and present agricultural techniques. It shows an appreciation for the natural environment and also shows how natural systems can be connected through design.

Duisburg Nord Landscape Park - Emscher, Germany
Over 500,000 individuals visit this park per year. It was developed to be ecologically sensitive, innovative, and appeal to a wide range of users. The park integrates industrial heritage with an existing pattern of open spaces.

Constructed in 1991-2000 as part of the International Building Exhibition, Duisburg Nord Landscape Park was conceptualized of the idea of refurbishing an old 20 hectare steel plant. The goals were to re-introduce open space and clean up contaminated land.

The main design elements included integrating vegetation with industry, and creating an archeological window into the coal and steel industries that were typical in the early 1900's. A majority of the materials that existed on-site were recycled and integrated into the park. The park establishes connections to adjacent communities by using promenades that were designed to encourage a renaissance in moderate income communities.

Duisburg Nord Landscape Park is an interesting design in its attempts to link neighborhoods, communities, and recreational spaces. The idea of preserving industrial heritage while creating public open space and educational opportunities are rare concepts behind contemporary park design.

Genius Loci In Transition - Shenandoah Valley, Virginia, United States
As urban life and suburban sprawl move towards Blandy Farm the arboretums mission must transition into more of a public domain. A master plan was put together in order to help this transition. The farm will now offer a public education and recreation as well as its previous use by the University of Virginia for research purposes.

A majority of the research that takes place on this farm includes: forest fragmentation, old field succession, and meadow development. Allowing visitor access into these areas was defined in the master plan as three separate zones. In the first zone are publicly accessible research plots that highlighted the historic significance of the Shennandoah Valley landscape. Materials consist of wood, brick, stone, fencing that portrayed the rich regional history. Zone two included the arboretum, gardens, and meadow grass study area. The final zone was strictly research and was not accessible to visitors. To direct visitor flow through the farm the master plan worked to establish defined roads and trails.

Progression of the farm through the master plan and its concepts has helped this site display three elements: forest, field, and orchard. The bold representation of these elements has guided the farm towards a distinguished character that demonstrates the history and importance of this land.

Fundidora Park - Monterrey, Mexico
Constructed on the ground of an old iron and steel plant, Fundidora Park offers visitors a glimpse back into history and industrialization of Mexico. The park is 114 hectares and is an attraction for visitors of all ages.

An important concept incorporated with this park is access on multiple levels. People can reach the site by subway, bus, vehicle, bicycle, or by foot. Fundidora Park is diverse in the activities it provides and offers space for training in different disciplines.

Large green open spaces are contrasted with the historic red brick industrial buildings that once dominated this Mexican landscape. These buildings were built in the early 1900's and represent a important historical period.

Case Study Summary:

A common theme within the case studies focuses on establishing community amenities that attract the interest of the public domain. Extracting the characteristics that support the individual designs included a variety inter-related topics. Transitions between land use types were examined as they pertained to a majority of the case studies. The studies also promoted community health, environmental awareness, and economic sustainability resulting from design diversity. There was an emphasis on multiple access opportunities, land stewardship, and land patterns. The integration of certain transitional elements established micro environments in the designs. These included: terrestrial to wetland habitat, industrial heritage linked with community development, and vegetative connections in numerous creative methods.

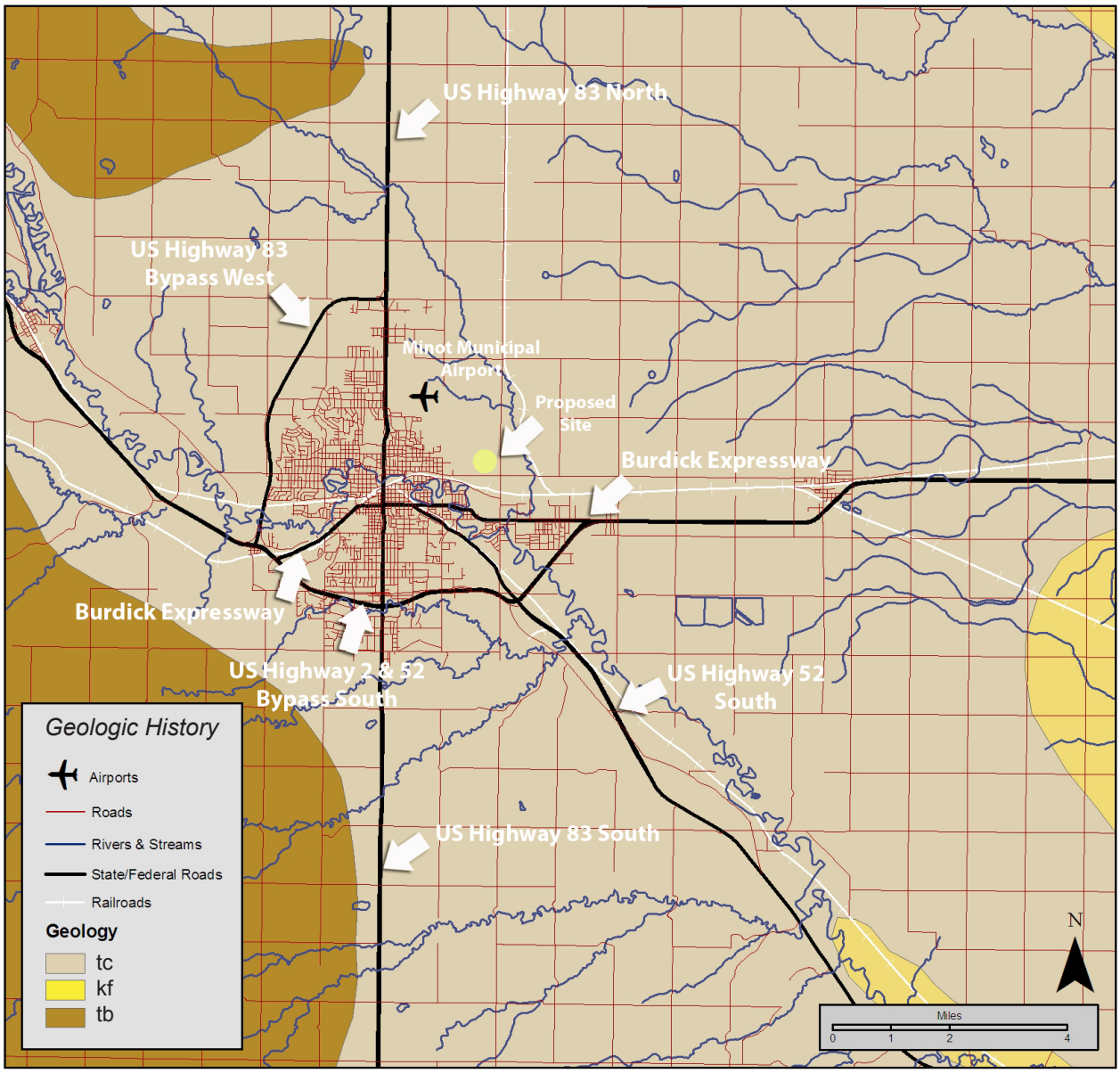
Geologic History:

Glacial deposits of sand and silt comprise a majority of the geological history for Minot ND. Two geologic periods are present in this area. The Paleocene (Tc, Tb) was 60-66 million years ago and is associated with the uplift of the Rocky Mountains and hoofed mammals. The Cretaceous period (Kf) started at the end of the Jurassic period and continued until the Paleocene. From 66-146 million years ago this time was linked to extensive submergence of continents, change in the earth surface, and it's flora and fauna.

Tc - *Cannonball Formation*: Connected to the last seaway of N. America (Cannonball Sea) with swamps and lowlands as defining features

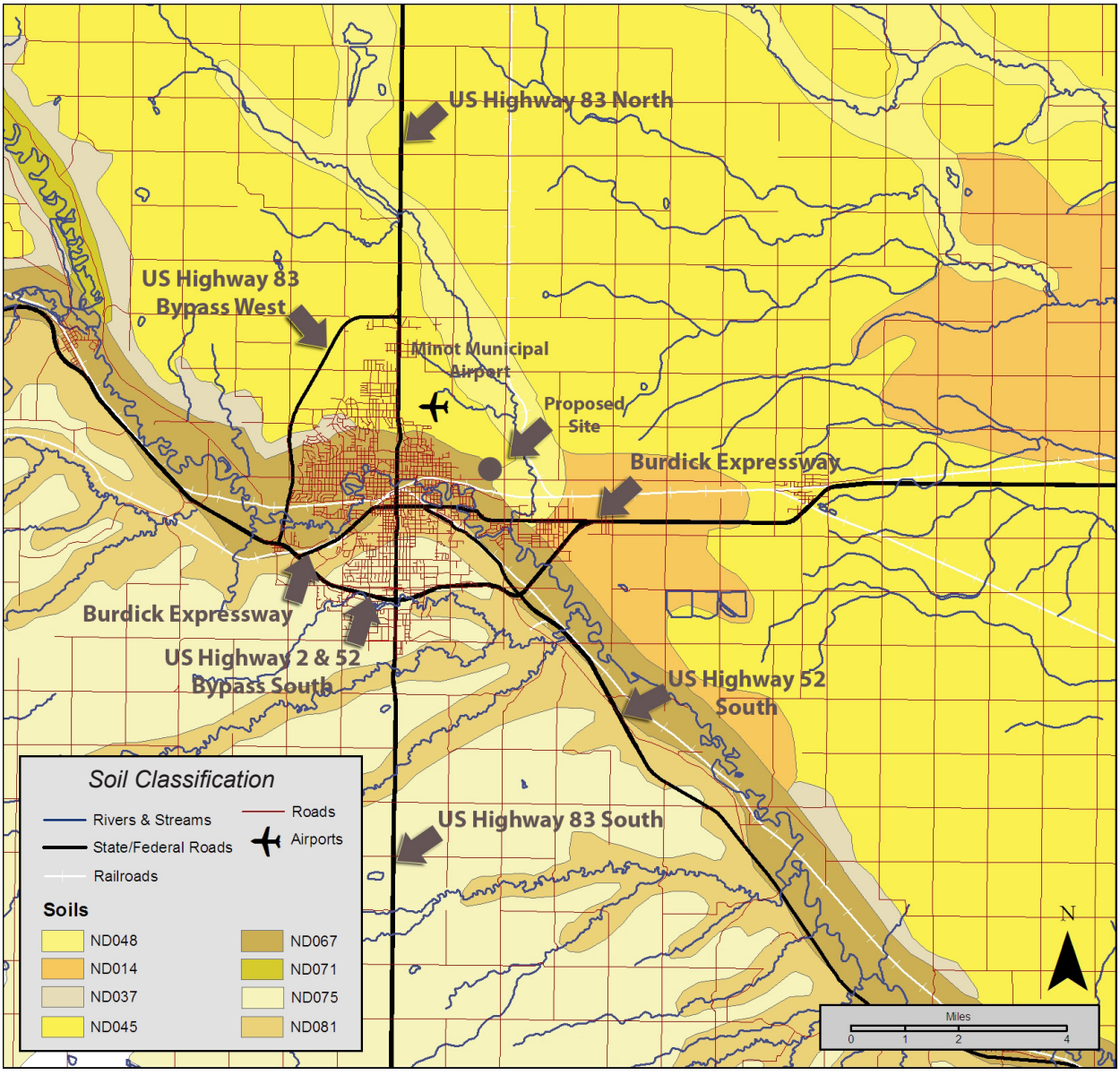
Kf - *Fox Hills Formation***:** Part of the Western Interior Seaway and holds deposits of interverte brate fossils. This formation is linked to terrestrial, estuarine, and marine ecosystems.

Tb - *Bullion Creek Formation*: Contains abundant coal beds (approximately 40 feet deep)



General Physiography:

Ward County and Minot more specifically are labeled glaciated plains. The elevations range from 1,520 feet in the Souris Valley to approximately 2,500 feet where the morainic hills are present. There are several dry coulees and numerous intermittent creeks that cut the valley and depend on spring runoff for recharge. Noticing from the aerial photo, the land is also dotted with shallow drainage depressions. These characteristics are important factors when analyzing soils and their location.



Soil Classification:

The Souris River and its intermittent streams act as the major soil feature in the Minot area. This soil classification map is based off a general soil map and North Dakota GIS information. Data delineates eight different soil associations which include: Barnes - Svea, Barnes-England-Emrick, Barnes, Zahl-Max-Williams-Velva, and Williams-Bowbells.

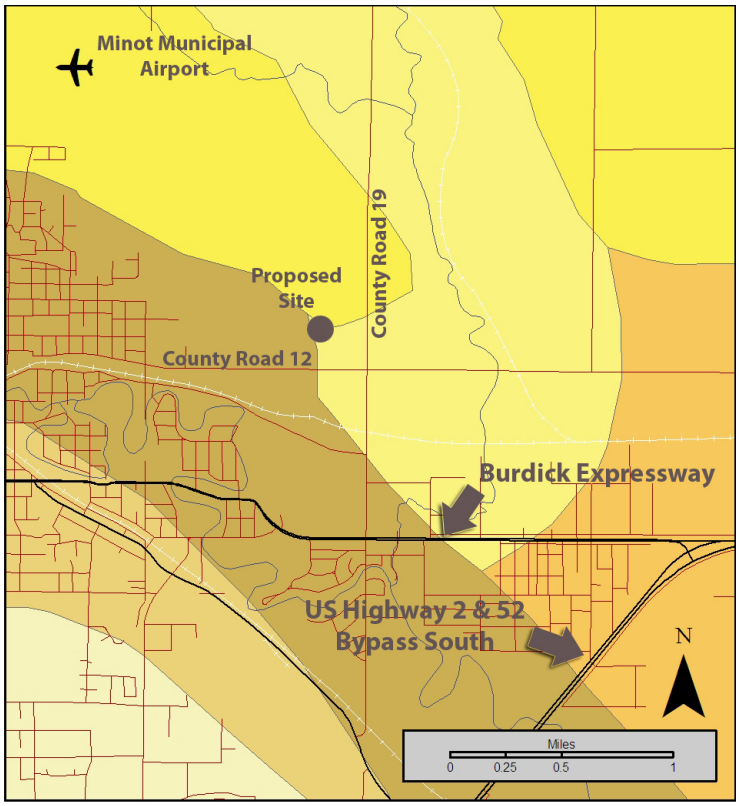
Soils Site Specific:

The proposed project site is located at the vertex of three different soil types.

(ND045) Barnes-Svea Associations:
Well drained and moderately well drained, nearly level, black loamy soils formed in glacial till. Typically this soil is cultivated and planted with wheat, barley, flax, and oats.

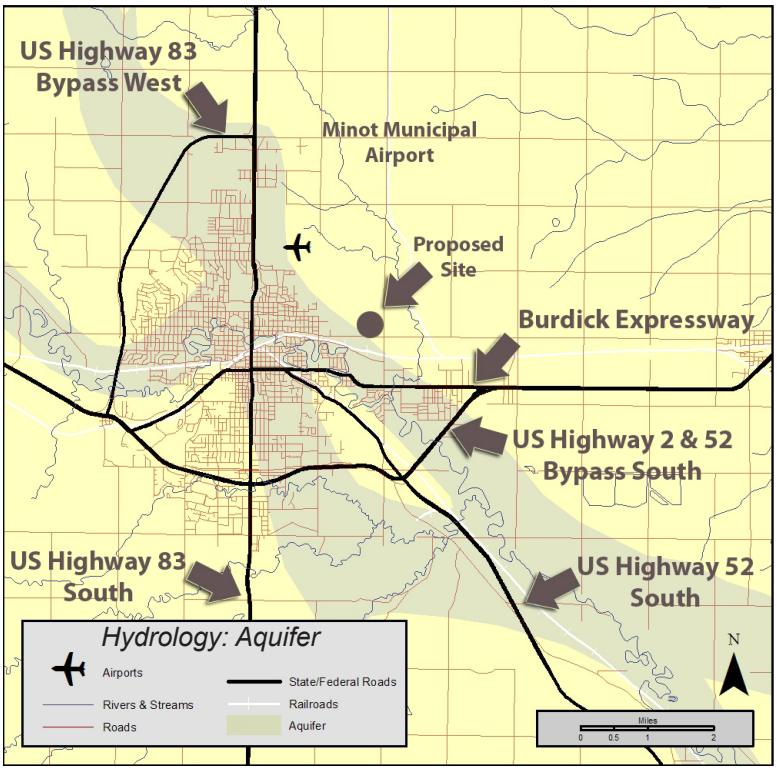
(ND048) Barnes Association:
Well drained, gently sloping, loamy soils formed in glacial till. Drainageways are low-gradient intermittent streams.

(ND067) Zahl-Max-Williams-Velva Association:
Well drained, level to steep, loamy soils formed in glacial till and well-drained, level, loamy soils formed in alluvium. A majority of this land is utilized for pasture land and have limited erosion potential.



Soil Analysis:

Soils specific to this site have characteristics that will allow variety and diversity in design decisions. Additional characteristics of Barnes Associations include: moderate shrink swell, rolling topography, and fair quality in topsoil. Zahl Associations: moderate shrink swell, steep and uneven topography, and poor quality in topsoil. **Shrink-Swell:** The change that is expected when moisture content changes (important for construction purposes).



Hydrology: Aquifer

A majority of Minot's water supply is pumped from the Souris Valley Aquifer. Recent city expansion has been met with diminishing reserves. The Garrison Resevoir on the Missouri River does offer an alternative source. However, its abundant supply of water is 45 miles south of Minot and has to cross over an intervening moraine which is approximately 400 feet in height. The Garrison Diversion Irrigation Project has currently alleviated some of the water supply concerns.

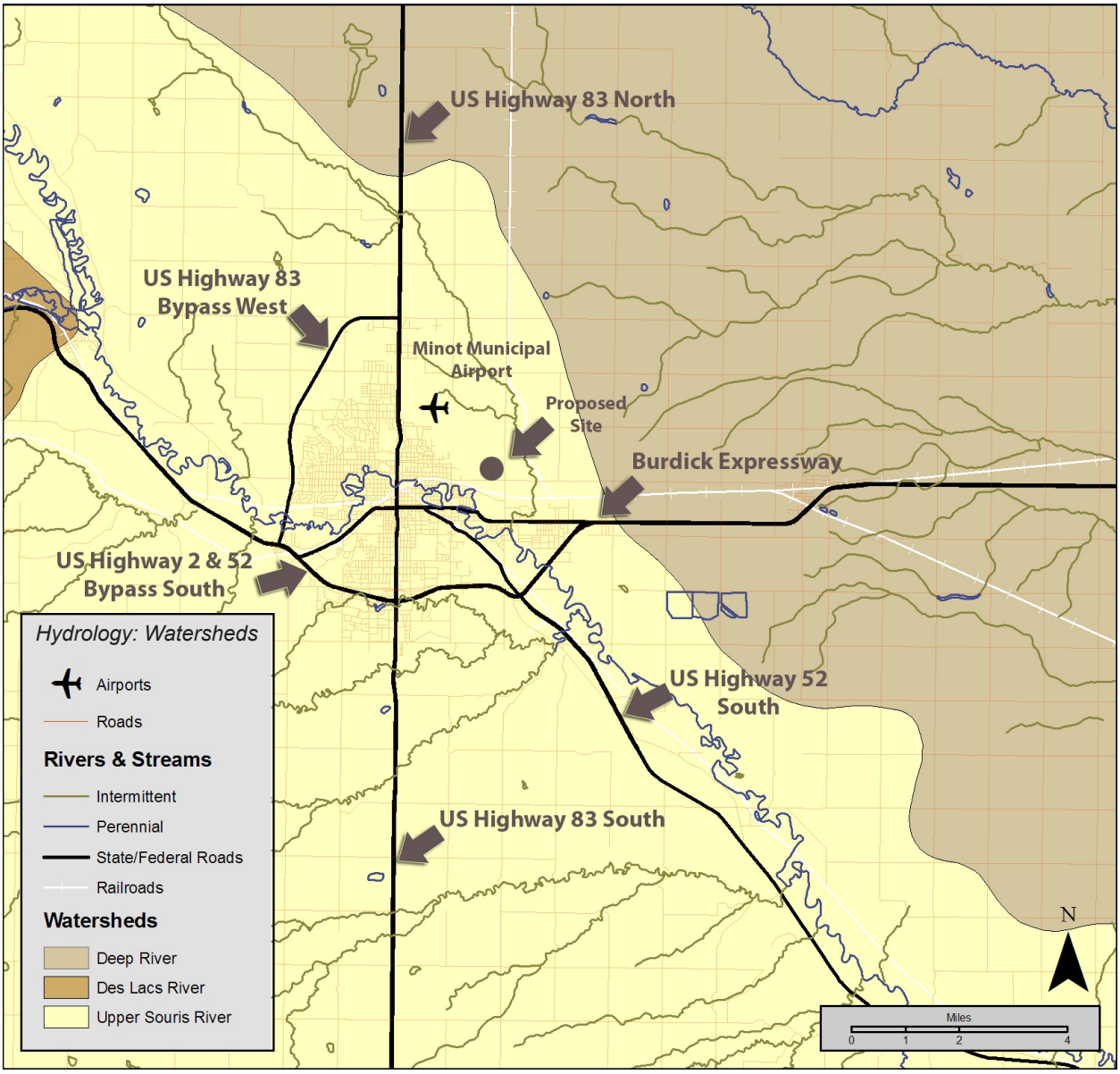
The project site rests on the edge of the Souris Valley Aquifer. Enbridge Oil LLC headquarters subsequently lies directly adjacent to this aquifer. Referring to previously discussed Minot's Land Use Plan, possible environmental concerns such as groundwater contamination are pinned in this area.

Watersheds:

The map below depicts the three different watersheds that are located around Minot's city limits. These watersheds include: Deep River, Des Lacs River, and the Upper Souris River which serve a large portion of this region. A Watershed is explained as a geographical area that is bounded by topography and the height of the land which determines the course and action water will take. This is usually to a larger element such as a river, stream, or lake.

The project site is located within the Souris River Watershed. The small creek that runs through this site (graphic on site orientation map Pg. 15) eventually drains into the Souris River. Small amounts of runoff will also end up percolating through the soil and entering the underlying Souris Valley Aquifer.

On site surface reseviors offer a secondary source of water. These small pockets rest along the creek's edges and are utilized by farmers for grazing ponds.



Regional Conditions:

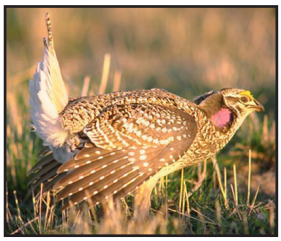
Ward County is classified as a region with continental climate. Typically, continental climates are middle-latitude interiors of the Northern Hemisphere. This region produces a wide seasonal variation in climatic conditions and also a zone of westerly winds. Normal annual temperature is estimated at 37 degrees fahrenheit in the northern portions of the state. During the winter months the Turtle Mountains which stand 400-800 feet higher in elevation in the central part of the state helps establish irregularities in the temperature conditions. The mountains also funnel cold air drainage into the Souris River Valley.

The climatic conditions also play an important factor in other areas. The limited seasonal rainfall combined with cooler temperatures have allowed forest and tallgrass prairie the opportunity to establish and survive. Furthermore, the conditions have contributed to the high amounts of rich organic soil of North Dakota. As a result, the soil has been productive farmland for numerous years.

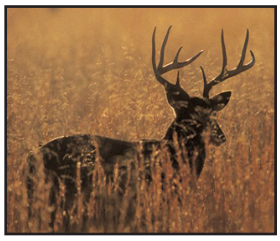
Average frost penetration in the winter months can be a maximum of 6.5 feet and as low as 4 feet. The depth of frost is usually useful when determining the depth of footings or foundations for structures within the landscape.

North Dakota Wildlife:

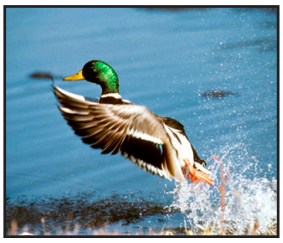
Wildlife resources are a vital recreational and natural component to an outdoor activities. Important species to central North Dakota and Ward County are displayed below.



Sharp-tailed Grouse
Tympanuchus phasianellus



White-tailed Deer
Odocoileus virginianus



Mallard Duck
Anas platyrhyachos

Gray Partridge
Perdix perdix

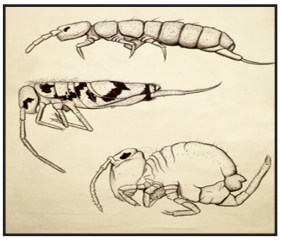
Management:

Few animals of North Dakota burrow or den into the soil. Most species are dependant on plants to provide cover; therefore, land use and managment of the land directly affects the local wildlife populations. The proposed project will work to increase habitat diversity and manage populations through environmental and land use planning.

North Dakota Entomology:

To further create educational opportunities, anthropod study will be an on-site focus as outlined in the project proposal. This will identify insect fauna and the associations that they have with tallgrass prairie habitat. Land use and management of the land will ultimately determine the extent of study and overall importance of these species.

Hymenoptera



Collembola

Adjacent Land & Built Features:

Southwest - *Fall 2005*
Electrical utility easement

South - *Fall 2005*
Multiple railroad tracks

Northeast - *Fall 2005*
Enbridge above ground storage tanks

The northwest corner of the proposed site connects to agricultural farmland; the remaining adjacent land is zoned industrial. Analyzing the built features associated with these land types leaves a structural impression. The vertical electrical poles in the southeast draw the eye from ground level to the building skyline, and then upward. The railroad tracks directly to the south move the eye from right to left in a linear motion. Above ground storage tanks to the northeast provide a backdrop to the shelterbelt. Storage tanks to the southeast protrude from the earths surface resembling a misplaced item. A grain elevator resting to the east reminds the area of its deep agricultural roots.

Northeast - *Fall 2005*
Enbridge above ground storage tanks

Northeast - *Fall 2005*
Enbridge above ground storage tanks

The built features that surround the proposed site have history and significance. These elements create definition for the proposed site in many ways. Identifying and integrating them into the project solution will create an identity

Existing On-site Built Features:

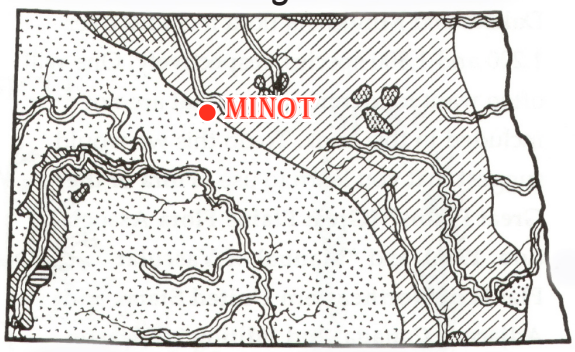
Within the site there are a limited amount of maintained built features. A fence follows the property lines and shows relationships of ownership. A dismantled rock dam can be found scattered across the landscape. There is also a culvert that controls water level and flow through this creek. When water is allowed to flow it is deposited on the other side of County Road 12 and into a drainage hole. Natural flow patterns have been re-routed and poorly managed.

Site Boundary - *Fall 2005*
Barbwire fence encloses site

Human Disturbance - *Fall 2005*
Old rock dam that once existed

Control of the Land - *Fall 2005*
Control culvert - south end of the site

North Dakota Vegetation:



ND/MN Selected Range Plants - Sedivec, Barker

- Tallgrass Prairie
- Sandhills Prairie
- Transition Prairie
- Rough Fescue Prairie
- Mixed-grass prairie
- Badlands
- Riparian Woodlands

A combination of prairie ecosystems make up the greater portion of North Dakota vegetation. Interconnected with the ecosystems is a moisture gradient that runs from west to east across North Dakota. This has left the western two thirds of the state dry prairie. The City of Minot and the project site are located within a region of transition prairie. Transition prairie ecosystems are found between the xeric/mixed grass of western North Dakota and the tallgrass prairie of eastern North Dakota. Flowing in from Canada, the Souris River institutes an area of Riparian Woodlands. These two systems create interesting transitions and ecotypes within a limited geographic range. Transition Prairie vegetation is associated with western wheatgrass (Andropyron smithii), big bluestem (Andropogon gerardii), and needle grass (Stipa viridula). Riparian Woodland vegetation is commonly associated with cottonwood (Populus deltoides), green ash (Fraxinus pennsylvanica), boxelder (Acer negundo), american elm (Ulmus americana), common hackberry (Celtis occidentalis), and the occasional oak species. Riparian zones along the river are often covered in sandbar willows (Salix interior) and dogwood species.

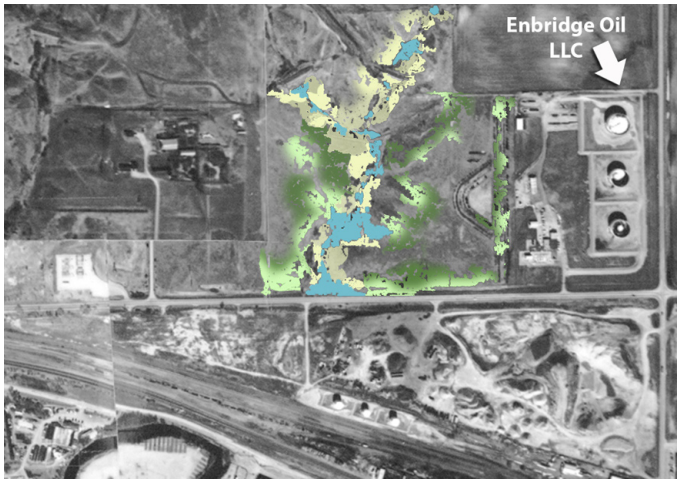
Site Specific Vegetation:

This color identifies areas of woodland species. The site has a vegetative patchwork feel consisting of oak, birch, ash, russian-olive, and boxelder. Few cottonwoods exist on-site.

Gray - and its lighter shade define areas of vegetative riparian species. Plant diversity is extremely limited in these zones. Dogwoods are the primary habitant of the creeks banks, and some small un-established willows are present.

Creek boundaries and wet areas noted within the proposed site property.

- The creek is defined in the hydrologic analysis as being an intermittent water body. Runoff is the main water source, and in periods of drought or limited precipitation the creek may be dry.



Vegetation Analysis Map - Fall 2005

Described in the analysis, the site has patchy areas where woodland species exist and riparian zones that lack plant diversity. The physiography that is linked to the site provides an opportunity to enhance and expand the diversity and overall functional aspects related to on-site vegetation. The aerial photograph depicts the scarce amount of vegetation that exists adjacent to the site. This may provide an opportunity to establish one type of connection with adjacent land uses and to the City of Minot as outlined in the 'Major Project Elements' section of the proposal. The south site boundary is lined with birch and oak species limiting visual access. The east boundary is defined by a relatively thick (50 feet) shelterbelt. The vegetation that is present buffers out most of the Enbridge Oil LLC headquarters and the three above ground storage tanks.

North - *Fall 2005*
Creek & rolling hills; patchy vegetation

East- *Fall 2005*
Facing Enbridge Oil LLC Headquarters

West- *Fall 2005*
Southwest boundary of site

Topography:

One dominant aspect that immediately stands out upon arrival is the differentiation in levels of topography. Identified above are three of the experiences. The North picture shows gently sloping hillsides that formulate landscape depth. Standing on the west boundary looking east the land appears to be common North Dakota flatland. Sharply contrasted to the flat is the steep slope shown in the West picture.

One Wildflower - *Fall 2005*
Lack of plant diversity

Impact - *Fall 2005*
Human domination of land

History - *Fall 2005*
Modern v.s. Old

Abandoned - *Fall 2005*
Misuse & no use land

General On-Site Observations:

As noted in the vegetative analysis and the wildflower picture above, it is evident there is a lack in plant diversity. Humans have displayed domination over the land throughout time. Pictured above is an example of how humans impact the environment. Labeled history, this picture caught my attention after it was taken. Notice in the foreground the old fence constructed of oak branches and authentic barbwire. A few feet further the fence has been replaced with modern industrial steel posts and factory manufactured barbwire. The final picture tells the story of the land, lost and forgotten and without use.

Path - *Fall 2005*
Located on southern boundary

Glacial Deposit - *Fall 2005*
Evidence of glacial deposits

Details:

The first photograph shows what resembles an old cattle path. About 3 feet deep and littered with vegetation. The rocks in the following picture are the only surface boulders found on site. It seems unlikely they were manually deposited in this location.

Overview:

The proposed project site has the potential to explore design in number of different ways. Although the site is relatively bare in structure, the site is rich in underlying phenomena. Some opportunities and constraints have been developed and recognized to date, however, throughout the project design additional entries may be added. Preliminary opportunities and constraints are listed below.

Opportunities:

- Community
    1. Reclaim vacant industrial land
        - Creating an educational awareness while promoting environmental stewardship and community health.
    2. Connections to city infrastructure
    3. Establish a transition between industrial and recreational zoning

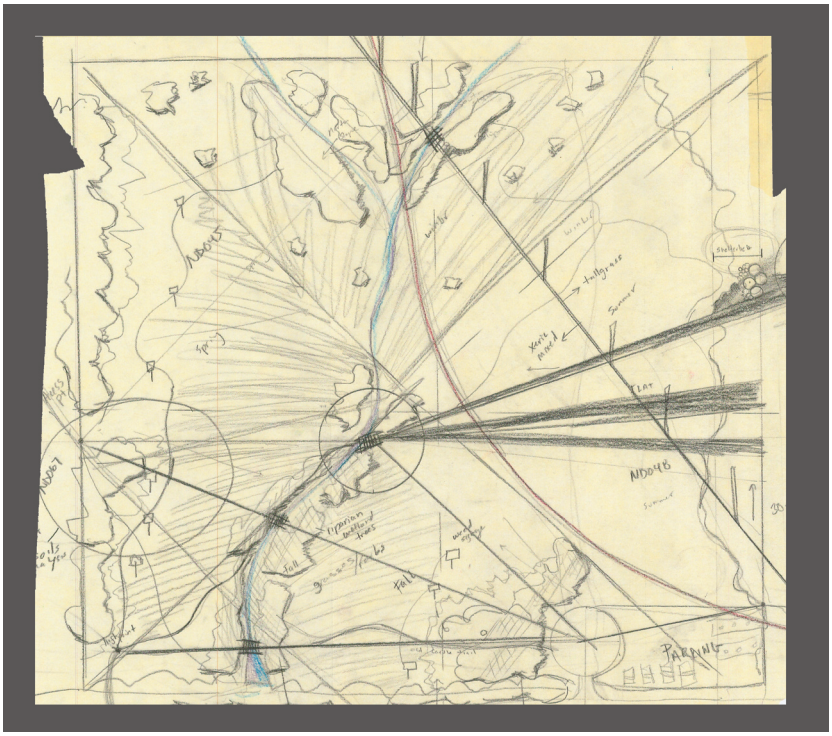
- Environmental
    1. Increase plant diversity throughout riparian, woodland, and grassland areas
        - Vegetation could act as a linking element between adjacent land use types
    2. Re-establishing natural flow of the creek
        - Incorporating the creek into site design and land use connections
    3. Mitigation measures to minimize the impact of ground water contamination
    4. Habitat diversity
        - The site has the necessary elements to provide habitat to a variety of species. These would include: ecotones (transitions between landscape types) grassland, riparian, and woodland. Located in the outer portion of the city limits habitat fragmentation is limited. Soils, geology, and hydrologic analysis shows the site is suitable for design development.

Constraints:

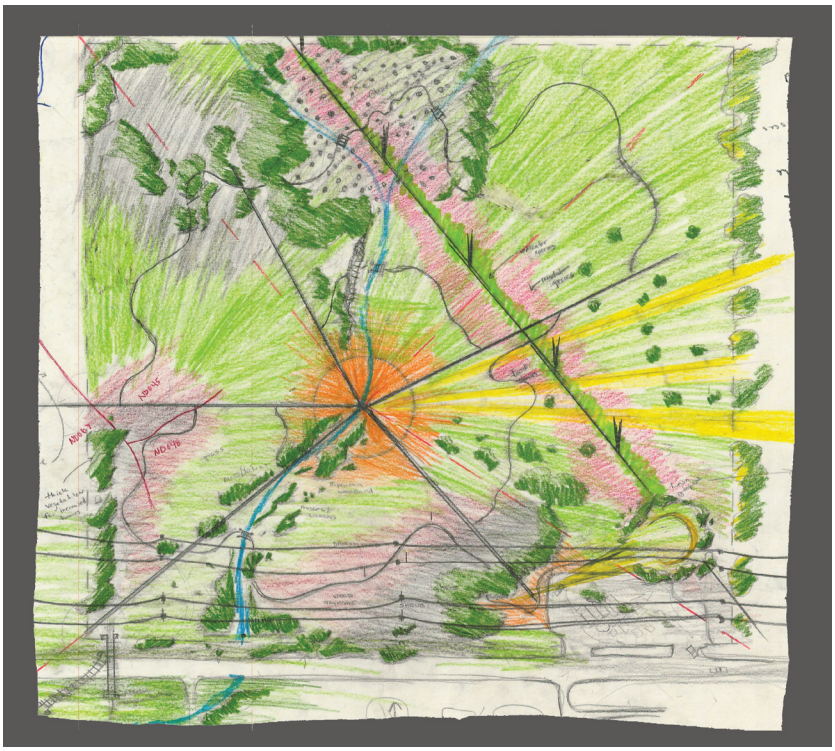
- Community
    1. Location and accessibility
        - Developing a public amenity that is aimed towards elementary students could fuel opposition being placed in an industrial area. Current access to the site is not pedestrian friendly.
    2. Security and Ownership
        - Enbridge Oil LLC is very cautious about access onto this parcel of property. Since 9/11 attacks security around resources including oil supplies are extremely tight. Ownership and property rights could be a concern if the site is not developed in accordance with these limitations.

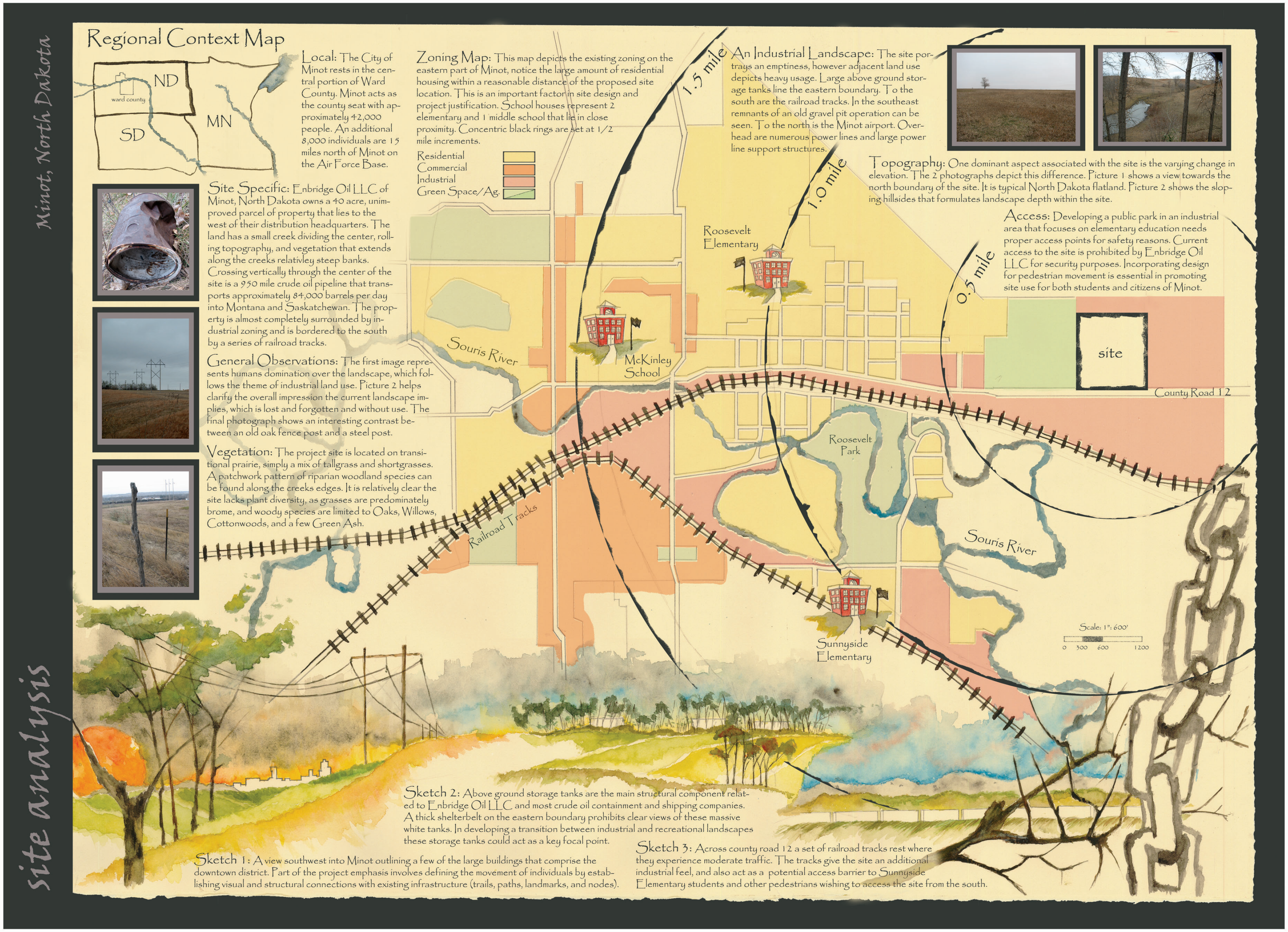
- Environmental
    1. Delineated Wetland Areas
        - Design work around environmentally sensitive wetland areas

Conceptual Development:
The sketch to the right is an early example identifying site opportunities and constraints. The approximate location of the pipeline, the views towards the storage tanks, dense shelterbelts, and existing vegetation formed a base of information. Three access points were considered for a number of reasons. County road 12 to the south of the site provided the easiest access for vehicular traffic. The western access point could bring individuals from the proposed multi-family subdivision into the site. Additionally, this access could work for the two schools that were within 1.5 miles west. The final access point was developed later in the design process to address the individuals wishing to enter the site from the south. This would include the elementary school students, Roosevelt Park visitors, and is also the strongest link into the downtown urban environment.



The second sketch below slowly becomes more defined in regards to design intent. With education and transitional ideas as the focus for this site, a general layout of the master plan is derived. Existing vegetation starts to shape patterns, movement, and views throughout the site. A few educational components can be seen implemented into areas that both biologically and ecologically portray the design intent. The five main trails are worked into the design to respond to certain site elements such as vegetation, views, topography, hydrology, and function aspects. The paths also respond to the four environmental education regions that were created. The center of the site has been designed to act as the focal point. Entering the site from the three access points will deliberately point a visitor towards the center area. Vegetation established in this area will be deliberately brighter, this will become a contrast to the gray and brown tones used in the grasses and forbs throughout the rest of the site. An entry space near the southern access has been implemented to allow teachers a location where they can group, inform, and educate students about site usage and its features. The space is located next to the bus and vehicle drop off and also visually directs visitors to a starting path. Further design development can be analyzed from the final solution.




site analysis
Minot, North Dakota
Regional Context Map
ND
MN
SD
ward county
Local: The City of Minot rests in the central portion of Ward County. Minot acts as the county seat with approximately 42,000 people. An additional 8,000 individuals are 15 miles north of Minot on the Air Force Base.
Site Specific: Enbridge Oil LLC of Minot, North Dakota owns a 40 acre, unimproved parcel of property that lies to the west of their distribution headquarters. The land has a small creek dividing the center, rolling topography, and vegetation that extends along the creeks relativley steep banks. Crossing vertically through the center of the site is a 950 mile crude oil pipeline that transports approximately 84,000 barrels per day into Montana and Saskatchewan. The property is almost completely surrounded by industrial zoning and is bordered to the south by a series of railroad tracks.
General Observations: The first image represents humans domination over the landscape, which follows the theme of industrial land use. Picture 2 helps clarify the overall impression the current landscape implies, which is lost and forgotten and without use. The final photograph shows an interesting contrast between an old oak fence post and a steel post.
Vegetation: The project site is located on transitional prairie, simply a mix of tallgrass and shortgrasses. A patchwork pattern of riparian woodland species can be found along the creeks edges. It is relatively clear the site lacks plant diversity, as grasses are predominately brome, and woody species are limited to Oaks, Willows, Cottonwoods, and a few Green Ash.
Zoning Map: This map depicts the existing zoning on the eastern part of Minot, notice the large amount of residential housing within a reasonable distance of the proposed site location. This is an important factor in site design and project justification. School houses represent 2 elementary and 1 middle school that lie in close proximity. Concentric black rings are set at 1/2 mile increments.
Residential
Commercial
Industrial
Green Space/Ag.
An Industrial Landscape: The site portrays an emptiness, however adjacent land use depicts heavy usage. Large above ground storage tanks line the eastern boundary. To the south are the railroad tracks. In the southeast remnants of an old gravel pit operation can be seen. To the north is the Minot airport. Overhead are numerous power lines and large power line support structures.
Topography: One dominant aspect associated with the site is the varying change in elevation. The 2 photographs depict this difference. Picture 1 shows a view towards the north boundary of the site. It is typical North Dakota flatland. Picture 2 shows the sloping hillsides that formulates landscape depth within the site.
Access: Developing a public park in an industrial area that focuses on elementary education needs proper access points for safety reasons. Current access to the site is prohibited by Enbridge Oil LLC for security purposes. Incorporating design for pedestrian movement is essential in promoting site use for both students and citizens of Minot.
1.5 mile
1.0 mile
0.5 mile
Roosevelt Elementary
McKinley School
Roosevelt Park
Sunnyside Elementary
Souris River
Souris River
Railroad Tracks
site
County Road 12
Scale: 1": 600'
0 300 600 1200
Sketch 1: A view southwest into Minot outlining a few of the large buildings that comprise the downtown district. Part of the project emphasis involves defining the movement of individuals by establishing visual and structural connections with existing infrastructure (trails, paths, landmarks, and nodes).
Sketch 2: Above ground storage tanks are the main structural component related to Enbridge Oil LLC and most crude oil containment and shipping companies. A thick shelterbelt on the eastern boundary prohibits clear views of these massive white tanks. In developing a transition between industrial and recreational landscapes these storage tanks could act as a key focal point.
Sketch 3: Across county road 12 a set of railroad tracks rest where they experience moderate traffic. The tracks give the site an additional industrial feel, and also act as a potential access barrier to Sunnyside Elementary students and other pedestrians wishing to access the site from the south.

intent, concepts, plants

Minot, North Dakota

Project Vision: This project is centered on an idea for an outdoor educational facility that is directed for use by elementary age students. An interpretive, hands on approach to learning is used to highlight a variety of topics involving biology, ecology, and entomology. This project essentially examines the ability of industrial processes to co-exist with a more natural environment.

Bubble Diagram: The initial design idea of developing a recreational amenity for the City of Minot into an industrial zoned area. The design needed to take advantage of residential housing and limited educational opportunites for students in the immediate area.

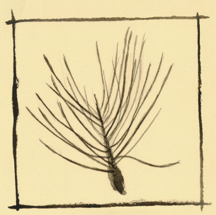
Project Objectives: The major elements that will be represented in this project have been considered based on their compatability as potential learning opportunities.

- Environmental Educational Areas
- Establish Raptor Habitat
- Connection to Enbridge Oil LLC
- Exhibit transition between industrial and recreational zoning
- Present the importance of diversified zoning

Environmental Education:

Biological Processes: These concepts will be predominantly broad in their overall focus. Identifying and illustrating the significance of food chains, water cycles, decomposition and erosion.

Water Cycle

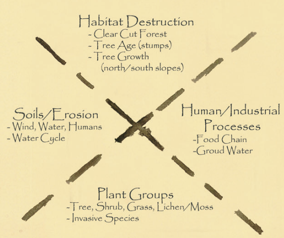


Invasive Plant - Salt Cedar

Ecological Processes: Narrowing in scope, the ecological concepts implemented will explain issues that include habitat fragmentation, habitat destruction, ground water contamination, and invasive plants/animal species.

Milkweed Beetle

Entomology & Nature: The concepts in this category will be small in scale and more in-depth. Ideally the focus will rest on insects and the processes they endure throughout the seasonal change. This would include metamorphasis, over-wintering, and anatomy.



Where to find these areas?: The site has been split into four equal sized areas based upon crieteria that included vegetation, topography, views, drainage, microclimates, overall landscape function, and design intent. The diagram to the left helps point out locations of the major study areas. Imagine this diagram is transparent over top of the masterplan drawing.

Plant Palette: The plant palette has been designed to work with the four seasons of the year and also coordinates with the previously diagramed planning of the major environmental study areas. Each quarter of the site is represented by a certain season of the year (diagram to the right). This will include a general palette of woody tree species that display unique characteristics in the designated season. Additionally, one grass or forb will be utilized in the center/focal area of the site to draw attention to this location from the three main access points. The four quarters of the site are labeled to the right along with the grass or forb that will be used as a highlight. The proposed plants are intended to help diversify the existing site vegetation which lacks diversity.

Woody Plant Species: Winter plants were chosen based on shape, bark, and branch characteristics. Spring plants were introduced for their early leaf appearance. The fall plant species are characterized by color and landscape value. Summer plants are larger specimens and offer shade potential.

Winter:
- Ohio Buckeye .... Aesculus glabra
- Paper Birch .... Betula papyrifera
- Pekin Lilac .... Syringa pekinensis
- Siberian Larch .... Larix sibirica

Spring:
- White Oak .... Quercus alba
- Laurel Willow .... Salix pentandra
- White Willow .... Salix alba
- Amur Maple .... Acer ginnala

Fall:
- Sugar Maple .... Acer saccharum
- Red Oak .... Quercus rubra
- Quaking Aspen .... Populus tremuloides

Summer:
- Common Hackberry .... Celtis occidentalis
- Green Ash .... Fraxinus pennsylvanica
- Cottonwood .... Populus deltoides

Grasses/Forbs: The basic idea for these introductions is the color and a focus towards the center as described in the diagram on the right. The grasses and forbs that are listed below are typical transition prairie grasses and have a dull color in full bloom. The mix will help promote plant diversity and also create a contrast between the center and outer areas of the site. The seeding of forbs would be isolated and minimal so attention is left on the center area.

- Western Wheatgrass .... Pascopyrum smithii
- Junegrass .... Koeleria macrantha
- Indiangrass .... Sorghastrum nutans
- Switch Grass .... Panicum virgatum
- Buffalo Grass .... Buchloe dactyloides
- Prairie Cordgrass .... Spartina pectinata

- Prairie Wild Rose .... Rosa arkansana
- Black-eyed Susan .... Rudbeckia hirta
- Maximilian Sunflower .... Helianthus maximilianii
- Tall Blazing Star .... Liatris pycnostachya
- Prairie Smoke .... Geum triflorum
- Indian Paintbrush .... Castilleja coccinea
- Common Milkweed .... Asclepias syriaca
- Purple Prairie Clover .... Petalostemum purpureum

Fall (red) - Little Bluestem .... Schizachyrium scoparium

Spring (blue) - Big Bluestem .... Andropogon gerardii

Summer (yellow) - Inland Saltgrass .... Distichlis stricta

Winter (gray) - Buckbrush .... Ceanothus cuneatus

Plants for an Educational & Practical Purpose: Enbridge Oil LLC transports large amounts of crude oil through a pipeline beneath the site. A large aquifer can be found just south and west of the pipeline which supplies a majority of the fresh water used by Minot residents. These facts have been utilized to help inform site design and to help students realize the importance of industrial and human processes and how the impacts can be reduced by natural processes.

Although there is virtually no chance for a oil leak, the concept provided an interesting educational component that would be displayed to students.

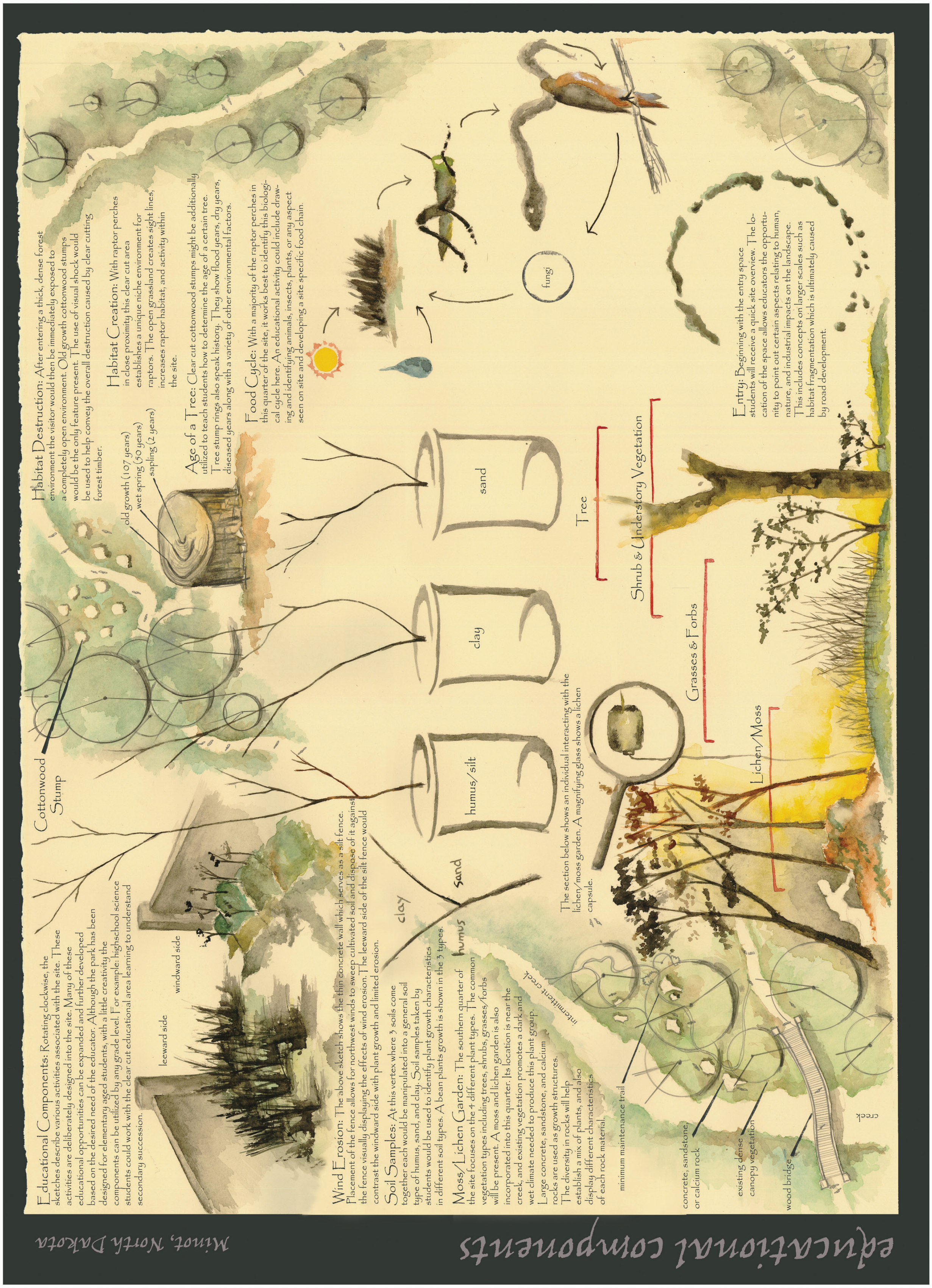
Phytoremediation is a strategy used today that takes advantage of plants and their root structure to extract contaminants from the soil. When petroleum leaks into soil it is not very mobile. It adheres tightly to the components in the soil which gives the plant root time to extract a percentage of the contaminants. Alfalfa (Medicago sativa) is a forage plant that would be used as a visual buffer from the pipeline. Its roots grow and spread quickly which is an important quality for a remediation plant. Students would be informed about Alfalfa and other plants that can serve this function.

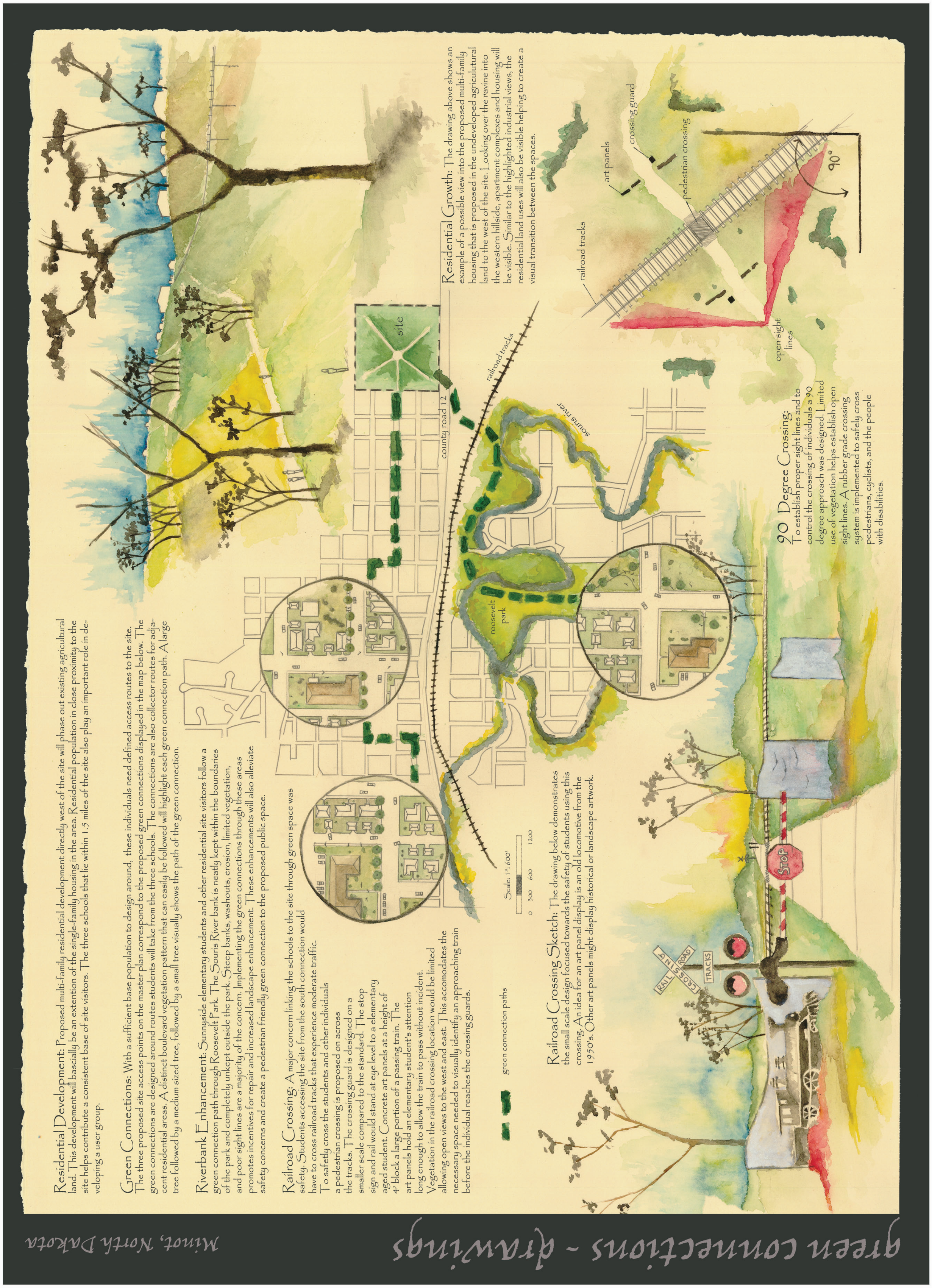
Bioindication is a second educational aspect that would be demonstrated in this location. These plants are chosen because they will react with a particular chemical in petroleum by either changing colors abruptly or causing immediate death. Rye grass (Leymus triticoides) will serve as the chosen grass for this site. Suppose a leak did occur, Rye grass would quickly show humans there were possible leaks in the pipeline and proper measures could quickly and effectively taken by the oil company.

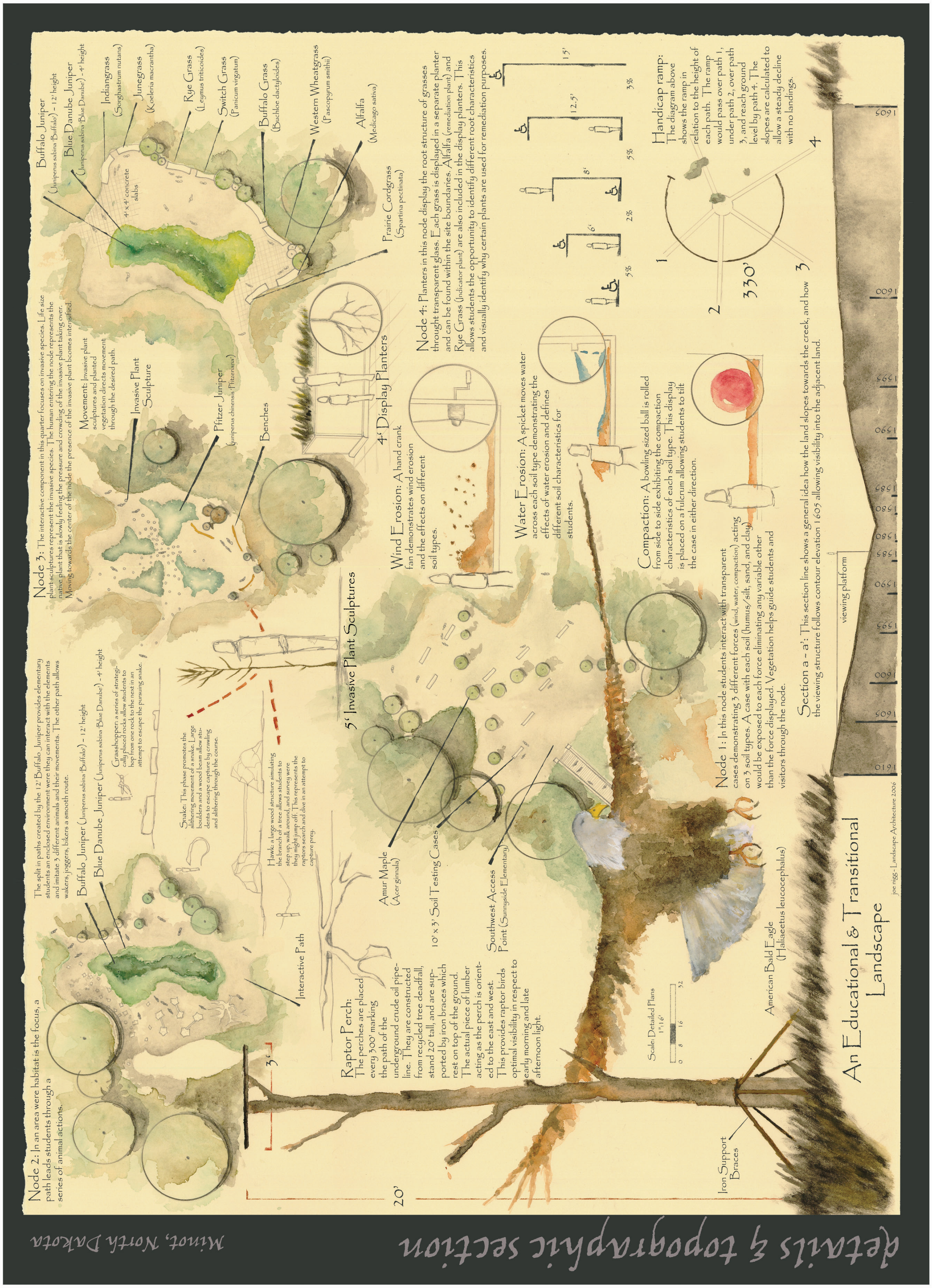
Raptor Habitat: Planting a remediation and indicator species would serve two additional purposes. First the plants would identify the path of the pipeline and its approximate location. The plants also work together with raptor perches that follow the same path. The vertical object allows site visitors to further identify the pipeline path in seasons where alfalfa is not present.

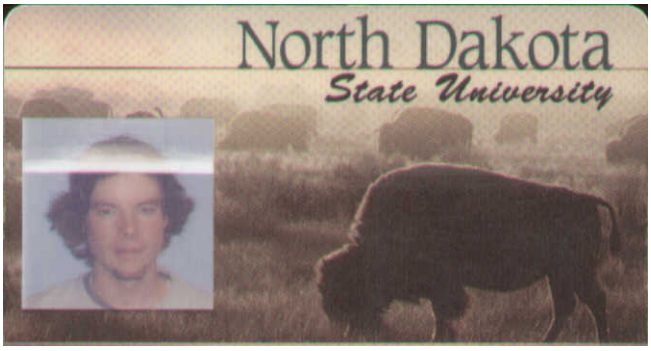
Where?: These plants are shown on the downward slope to the creek. This implies that the petroleum leak will follow the shortest possible path which is towards the creek.


master plan
Minot, North Dakota
Master plan: In many regards, elementary education is taught through the use of textbooks and indoor routine. Providing a site that promotes field study will help expand and excite developing minds in the outdoor environment. Site design and on-site interpretation will help guide the science based learning, as many students learn most effectively when they are presented with the freedom to explore the unknown.
Industrial Views: The master plan was developed to create a transition between land uses. Views into adjacent properties were utilized as visual connections.
views directed at above ground storage tanks.
Access Points: There are 3 main access points included on the master plan. Each access point corresponds visually to the center viewing structure, drawing visitors to this location. Access from the west will draw students and visitors from 1 elementary, 1 middle school, and the residential housing in the area. An access point in the southwest corner will attract site visitors from 1 elementary school and surrounding residential housing. The southeast access point will be intended for vehicular and school bus activity.
Nodes & Paths: Excluding the west access path, the 4 main 8' paths lead to 4 nodes. These establish points of interest that can be seen from the center viewing structure. Interactive activities in the nodes will correlate to the general concept in each study area (quarters shown on research board). They also help transition the secondary 5' paths into the larger 8' paths.
Vegetation: Existing site vegetation can be described as a patchwork pattern that follows the contours and the hydrologic path. The master plan is drawn to show both existing and proposed vegetation. The existing and proposed vegetation has also been used to frame the necessary views into the adjacent industrial processes.
existing vegetation (Oak, Birch, Ash, Kentucky Bluegrass)
proposed vegetation (see research board for plants)
Center Structure: The west access path will continue at an elevation of 1610 feet through the end of the viewing platform. Upon reaching the platform they will be directed either north or south. This will allow them visual contact with the nodes while continuing on their quest for the closest view of the industrial area.
boundary line
5' secondary path
clear cut forest
silt fence
8' main path
node 2
cultivated ground
Proposed Multi-Family Residential Housing
access point
a
a'
node 4
shelterbelt
remediation plant
indicator plant
raptor perch
picnic area
restrooms/ maintenance
entry space
Access to Enbridge Oil LLC
access point
node 3
power lines
moss/lichen garden
ramp
view structure
clay
sand
humus
5' secondary path
8' main path
node 1
Proposed Multi-Family Residential Housing
access point


educational components
Minot, North Dakota
Educational Components: Rotating clockwise, the sketches describe various activities associated with the site. These activities are deliberately designed into the site. Many of these educational opportunities can be expanded and further developed based on the desired need of the educator. Although the park has been designed for elementary aged students, with a little creativity the components can be utilized by any grade level. For example: highschool science students could work with the clear cut educational area learning to understand secondary succession.
leeward side
windward side
Wind Erosion: The above sketch shows the thin concrete wall which serves as a silt fence. Placement of the fence allows for northwest winds to sweep cultivated soil and dispose of it against the fence visually displaying the effects of wind erosion. The leeward side of the silt fence would contrast the windward side with plant growth and limited erosion.
Soil Samples: At this vertex where 3 soils come together each would be manipulated into a general soil type of humus, sand, and clay. Soil samples taken by students would be used to identify plant growth characteristics in different soil types. A bean plants growth is shown in the 3 types.
clay
humus
sand
humus/silt
clay
sand
Moss/Lichen Garden: The southern quarter of the site focuses on the 4 different plant types. The common vegetation types including trees, shrubs, grasses/forbs will be present. A moss and lichen garden is also incorporated into this quarter. Its location is near the creek, and existing vegetation promotes a dark and wet climate needed to produce this plant group. Large concrete, sandstone, and calcium rocks are used as growth structures. The diversity in rocks will help establish a mix of plants, and also display different characteristics of each rock material.
intermittent creek
minimum maintenance trail
concrete, sandstone, or calcium rock
existing dense canopy vegetation
wood bridge
creek
The section below shows an individual interacting with the lichen/moss garden. A magnifying glass shows a lichen capsule.
Tree
Shrub & Understory Vegetation
Grasses & Forbs
Lichen/Moss
Cottonwood Stump
Habitat Destruction: After entering a thick, dense forest environment the visitor would then be immediately exposed to a completely open environment. Old growth cottonwood stumps would be the only feature present. The use of visual shock would be used to help convey the overall destruction caused by clear cutting forest timber.
old growth (107 years)
wet spring (50 years)
sapling (2 years)
Habitat Creation: With raptor perches in close proximity this clear cut area establishes a unique niche environment for raptors. The open grassland creates sight lines, increases raptor habitat, and activity within the site.
Age of a Tree: Clear cut cottonwood stumps might be additionally utilized to teach students how to determine the age of a certain tree. Tree stump rings also speak history. They show flood years, dry years, diseased years along with a variety of other environmental factors.
Food Cycle: With a majority of the raptor perches in this quarter of the site, it works best to identify this biological cycle here. An educational activity could include drawing and identifying animals, insects, plants, or any aspect seen on site and developing a site specific food chain.
fungi
Entry: Beginning with the entry space students will receive a quick site overview. The location of the space allows educators the opportunity to point out certain aspects relating to human, nature, and industrial impacts on the landscape. This includes concepts on larger scales such as habitat fragmentation which is ultimately caused by road development.


green connections - drawings
Minot, North Dakota
Residential Development: Proposed multi-family residential development directly west of the site will phase out existing agricultural land. This development will bascially be an extention of the single-family housing in the area. Residential population in close proximity to the site helps contribute a consistent base of site visitors. The three schools that lie within 1.5 miles of the site also play an important role in developing a user group.
Green Connections: With a sufficient base population to design around, these individuals need defined access routes to the site. The three proposed site access points on the master plan correspond to the proposed green connections displayed in the map below. The green connections are designed around routes students will take from the three schools. The connections are also collector routes for adjacent residential areas. A distinct boulevard vegetation pattern that can easily be followed will highlight each green connection path. A large tree followed by a medium sized tree, followed by a small tree visually shows the path of the green connection.
Riverbank Enhancement: Sunnyside elementary students and other residential site visitors follow a green connection path through Roosevelt Park. The Souris River bank is neatly kept within the boundaries of the park and completely unkept outside the park. Steep banks, washouts, erosion, limited vegetation, and poor sight lines are a majority of the concern. Implementing the green connections through these areas promotes incentives for repair and increased landscape enhancement. These enhancements will also alleviate safety concerns and create a pedestrian friendly green connection to the proposed public space.
Railroad Crossing: A major concern linking the schools to the site through green space was safety. Students accessing the site from the south connection would have to cross railroad tracks that experience moderate traffic. To safetly cross the students and other individuals a pedestrian crossing is proposed on across the tracks. The crossing guard is designed on a smaller scale compared to the standard. The stop sign and rail would stand at eye level to a elementary aged student. Concrete art panels at a height of 4' block a large portion of a passing train. The art panels hold an elementary student's attention long enough to allow the train to pass without incident. Vegetation in the railroad crossing location would be limited allowing open views to the west and east. This accomodates the necessary space needed to visually identify an approaching train before the individual reaches the crossing guards.
green connection paths
Scale: 1": 600'
0 300 600 1200
site
county road 12
railroad tracks
roosevelt park
souris river
Residential Growth: The drawing above shows an example of a possible view into the proposed multi-family housing that is proposed in the undeveloped agriculutural land to the west of the site. Looking over the ravine into the western hillside, apartment complexes and housing will be visible. Similar to the highlighted industrial views, the residential land uses will also be visible helping to create a visual transition between the spaces.
Railroad Crossing Sketch: The drawing below demonstrates the small scale design focused towards the safety of students using this crossing. An idea for an art panel display is an old locomotive from the 1950's. Other art panels might display historical or landscape artwork.
RAILROAD CROSSING
TRACKS
STOP
railroad tracks
art panels
crossing guard
pedestrian crossing
open sight lines
90°
90 Degree Crossing: To establish proper sight lines and to control the crossing of individuals a 90 degree approach was designed. Limited use of vegetation helps establish open sight lines. A rubber grade crossing system is implemented to safely cross pedestrians, cyclists, and the people with disabilities.


details & topographic section
Minot, North Dakota
Node 2: In an area were habitat is the focus, a path leads students through a series of animal actions.
The split in paths created by the 12' Buffalo Juniper provides elementary students an enclosed environment were they can interact with the elements and imitate 3 different animals and their movements. The other path allows wakers, joggers, bikers a smooth route.
Buffalo Juniper (Juniperus sabina 'Buffalo') - 12' height
Blue Danube Juniper (Juniperus sabina 'Blue Danube') - 4' height
Grasshopper: a series of strategically placed rocks allow students to hop from one rock to the next in an attempt to escape the pursuing snake.
Snake: This phase promotes the slithering movement of a snake. Large boulders and a wood beam allow students to escape capture by crawling and slithering through the course.
Hawk: a large wood structure simulating the branch of a tree allows students to step up, walk around, and survey were they might jump off. This represents the raptors search and dive in an attempt to capture prey.
Interactive Path
3'
20'
Raptor Perch:
The perches are placed every 300' marking the path of the underground crude oil pipe-line. They are constructed from recycled tree deadfall, stand 20' tall, and are supported by iron braces which rest on top of the ground. The actual piece of lumber acting as the perch is oriented to the east and west. This provides raptor birds optimal visibility in respect to early morning and late afternoon light.
5' Invasive Plant Sculptures
Amur Maple (Acer ginnala)
10' x 3' Soil Testing Cases
Southwest Access Point (Sunnyside Elementary)
Scale: Detailed Plans 1"=16'
0 8 16 32
Iron Support Braces
American Bald Eagle (Haliaeetus leucocephalus)
An Educational & Transitional Landscape
joe nigg - Landscape Architecture 2006
Node 3: The interactive component in this quarter focuses on invasive species. Life size plant sculptures represent the invasive species. The human entering the node represents the native plant that is slowly feeling the pressure and crowding of the invasive plant taking over. Moving towards the center of the node the presence of the invasive plant bcomes intensified.
Movement: Invasive plant sculptures and planted vegetation directs movement through the desired path.
Invasive Plant Sculpture
Pfitzer Juniper (Juniperus chinensis 'Pfitzeriana')
Benches
4' Display Planters
Buffalo Juniper (Juniperus sabina 'Buffalo') - 12' height
Blue Danube Juniper (Juniperus sabina 'Blue Danube') - 4' height
4' x 4' concrete slabs
Indiangrass (Sorghastrum nutans)
Junegrass (Koeleria macrantha)
Rye Grass (Leymus triticoides)
Switch Grass (Panicum virgatum)
Buffalo Grass (Buchloe dactyloides)
Western Wheatgrass (Pascopyrum smithii)
Alfalfa (Medicago sativa)
Prairie Cordgrass (Spartina pectinata)
Wind Erosion: A hand crank fan demonstrates wind erosion and the effects on different soil types.
Node 4: Planters in this node display the root structure of grasses throught transparent glass. Each grass is displayed in a separate planter and can be found within the site boundaries. Alfalfa (remediation plant) and Rye Grass (Indicator plant) are also included in the display planters. This allows students the opportunity to identify different root characteristics and visually identify why certain plants are used for remediation purposes.
Water Erosion: A spicket moves water across each soil type demonstrating the effects of water erosion and defines different soil characteristics for students.
6' 8' 12.5' 15'
5% 2% 5% 3%
Compaction: A bowling sized ball is rolled from side to side exhibiting the compaction characteristics of each soil type. This display is placed on a fulcrum allowing students to tilt the case in either direction.
Handicap ramp:
The diagram above shows the ramp in relation to the height of each path. The ramp would pass over path 1, under path 2, over path 3, and reach ground level by path 4. The slopes are calculated to allow a steady decline with no landings.
1 2 3 4
330'
Node 1: In this node students interact with transparent cases demonstrating 3 different forces (wind, water, compaction) acting on 3 soil types. A case with each soil (humus/silt, sand, and clay) would be exposed to each force eliminating any variable other than the force displayed. Vegetation helps guide students and visitors through the node.
Section a - a': This section line shows a general idea how the land slopes towards the creek, and how the viewing structure follows contour elevation 1605 allowing visibility into the adjacent land.
viewing platform
1610 1605 1600 1595 1590 1585 1580 1580 1585 1590 1595 1600 1605



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