Design Futures for Industrial Saginaw

Metropolitan Landscape Architecture Studio, 2012
Professor Joan Iverson Nassauer
Contents

Project Overview
   Design in the Dynamics of Urban Landscape Recovery .................................................. 5

Site Context and Conditions
   Locations and boundaries ................................................................................................. 6
   Investigative Units ............................................................................................................ 8
   Ecological connectivity and habitat .................................................................................. 10
   Hydrology ........................................................................................................................ 11
   Urban context .................................................................................................................... 12

Alternative Future Scenarios ............................................................................................... 14

Scenario 1: Industrial Heritage Park
   Observing the Past, Present, and Future-Fan Huang ...................................................... 17
   Longevity through Ephemerality-Nick Lavelle ............................................................... 18
   Flow-Ariel Shaw ............................................................................................................... 20

Scenario 2: Low Density Business Park Condominiums .................................................. 25
   Outlook Business Park-Helen Graham ............................................................................ 26
   Prairie Office-Mary Hejna .............................................................................................. 28
   Mainstream-Lindsay Nelson ............................................................................................ 30
   A Fork in the Road-Danny Power .................................................................................. 32

Scenario 3: Industrial Growth
   The Industrial Heart of Saginaw- Caroline Bergelin ..................................................... 35
   Big Systems- Ayehlet Cooper ......................................................................................... 36
   Reinvest and Rebound- Olivia Garnett ............................................................................ 38
   Pennycress Park-Trinity Pierce ....................................................................................... 40

References ............................................................................................................................ 45
This project envisions possible futures for the 700 acre former General Motors facility that lies adjacent to the Saginaw River on the northwestern edge of the city of Saginaw, Michigan. Instructed by Professor Joan Nassauer, eleven graduate Landscape Architecture students in the University of Michigan School of Natural Resources and Environment created designs for the site proposing landscape interventions for recovery within the site’s shifting economic and environmental contexts. These designs are proposals that seek to open possibilities for future landscapes that can be acted upon by inhabitants of the present. They address the ecological and property management dynamics of a landscape that is in transition from a past industrial use to an uncertain future.

To help show the possibilities even if the future is uncertain, the scenario approach is used to provide a ‘provocative but plausible basis for imagining future directions’ for the site. While ‘no scenario is a prescription,’ each draws out some of the implications of different development choices, and is intended to provoke consideration of some consequences of such choices (Nassauer and Corry, 2004).

The studio gave students three very different hypothetical scenarios for the regional economy in the year 2027. Students were asked to design the site under one of these scenarios and also to show what immediate design and management strategies could be implemented in 2015. The 2027 Scenarios cover a spectrum of development possibilities and industrial densities. With the least industrial presence, the Industrial Heritage Park future scenario (Scenario 1) focuses on ecosystem services provided by new cultural and recreational open spaces. The Low Density Business Park Condominium scenario (Scenario 2) proposes economic development through creation of a business park. Finally, Scenario 3, the Industrial Growth: 21st Century Vehicle Manufacturing in a River Park scenario imagines that industry expands on the site.

After summarizing the site’s context and conditions, this document describes these possible future scenarios and presents student designs for each. Especially pertinent and useful aspects of these designs for Saginaw community members and leaders are highlighted. This document is intended to make the student work available to citizens and leaders of Saginaw as they work toward a productive and vibrant landscape on the site and in the city as a whole.
This site is located at 1629 North Washington Avenue (at Veterans Memorial Parkway), primarily in the City of Saginaw, and partially in Buena Vista Township (the eastern portion of the site), Saginaw County, Michigan. The site is an approximately 700 acre industrial manufacturing facility. The property is zoned “industrial” by the City of Saginaw and Charter Township of Buena Vista. Current land use on properties surrounding the site is primarily commercial and industrial with a small residential area to the south and agricultural areas to the east.

Important transport connections and adjacencies include:

- the Saginaw River to the west/northwest, which is a navigable waterway;
- I-75 to the north and east
- transection by the Chesapeake and Ohio RR easement (southwest-northeast) with connections to the CSX interstate rail system
- transection by Veterans Memorial Parkway or M-13 (north-south)

Important land-use adjacencies include:

- the City of Saginaw Wastewater Treatment Plant (WWTP) (1998 EPA National First Place CSO Control Award Winner), and the former City of Saginaw Landfill (SCA or Crow Island Landfill) to the north;
- the Buena Vista WWTP to the north and east (between the Facility and I-75);
- agricultural areas to the east along Outer Drive;
- general businesses including a recycling facility and a former bulk petroleum transfer facility to the south and east;
- residential areas to the south and southeast (along Diekmann Street and Washington Avenue); and
- small business areas to the south along Washington Avenue and the west along Sixth Street.

Maps sources:
Phase 1A RCRA RFI report and Phase 1B RFI workplan, Saginaw Metal Casting Operations, Naperville, Illinois, Vol. 1, 2000
Site Context and Conditions: Location and Boundaries

The map on this page shows the site boundaries (most of which currently have perimeter fencing), as well as the locations of the three primary manufacturing plants that have historically been located at the site: the Saginaw Metal Casting Operations (SMCO) plant (formerly the Grey Iron Plant) which is a currently operating aluminum metal casting plant, the Former Chevrolet Parts Plant which has been demolished, and the Former Nodular Iron Plant which has been demolished.

The Former Nodular Iron Plant property has been subdivided for redevelopment. Tri Cap currently owns and operates a halfway house on a 3.7 acre parcel located at the north end of this property, which was formerly a parking lot for the Nodular Iron Plant. Corvus currently owns and operates a manufacturing operation (supplier park) supporting GM’s activities on a 35 acre parcel that is adjacent to and south and east of the halfway house.
**Site Context and Conditions** : Investigative Units

Shown in this map, the 700 acre site is divided into 10 Investigative Units, or IUs. IUs vary in present and former usage and ownership, and therefore in their present level of contamination and ecosystem services quality. Table 1 summarizes the IUs.
## Site Context and Conditions: Investigative Units

<table>
<thead>
<tr>
<th>IU</th>
<th>Acreage</th>
<th>Name</th>
<th>Status</th>
<th>Contamination</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>38</td>
<td>Miscellaneous Sluice Sand and Bulk Storage Area</td>
<td>Discontinued use 1983; currently vacant</td>
<td>Low level contamination: no excavation, building, groundwater use</td>
<td>Disturbed area, no habitat</td>
</tr>
<tr>
<td>B</td>
<td>14</td>
<td>Former Parts Plant</td>
<td>Demolished; currently vacant</td>
<td>Contamination in soil and groundwater selectively exceeds criteria</td>
<td>Disturbed area, no habitat</td>
</tr>
<tr>
<td>C</td>
<td>7</td>
<td>Inlet Water Reservoir</td>
<td>Stages water that is not recirculated from the water recycle system for re-use in the Grey Iron Plant; part of a closed-loop system.</td>
<td>Levels below EPA levels of concern for human health according to industrial standards</td>
<td>No further action in RFI, poor habitat</td>
</tr>
<tr>
<td>D</td>
<td>66</td>
<td>SMCO Plant</td>
<td>Now Saginaw Metal Casting Operations; casts aluminum for automotive engines and cylinder heads.</td>
<td>Problematic levels of contamination with some remediation activities underway</td>
<td>Operational plant site; no habitat</td>
</tr>
<tr>
<td>E</td>
<td>86</td>
<td>Riverdock area</td>
<td>Discontinued use in 1985; currently used to store recycled core butts, quench slag, and casting sand</td>
<td>Low level contamination: no excavation, building, groundwater use</td>
<td>Disturbed area, no habitat</td>
</tr>
<tr>
<td>F</td>
<td>43</td>
<td>Advanced Materials Development Center</td>
<td>Previously used for production of unique automotive components and experimental materials. Currently used for storage/additional workspace</td>
<td>Involved in limited to no hazardous waste handling</td>
<td>Disturbed area, no habitat</td>
</tr>
<tr>
<td>G</td>
<td>79</td>
<td>Former Nodular Iron Plant</td>
<td>Demolished and covered with clean fill; currently successional field</td>
<td>Low level or remediated contamination</td>
<td>Clean Fill, revegetated; no exposure pathways</td>
</tr>
<tr>
<td>H</td>
<td>78</td>
<td>Wastewater Treatment System and North Ditch</td>
<td>Contains classifiers, mixing tanks, flocculators, treatment tanks, and primary and secondary settling basins; water is recirculated to the inlet water reservoir and a small percentage is discharged to the Saginaw Wastewater Treatment Plant after pretreatment by GM.</td>
<td>Low to high levels of contamination which however do not leach above regulated levels</td>
<td>Potential wildlife exposure at Secondary Settling Pond, Water Reservoir (Lagoon #5), and the North Ditch</td>
</tr>
<tr>
<td>I</td>
<td>92</td>
<td>Classified Sand Staging Area</td>
<td>Includes historic quench slag and casting sand staging areas and the former Dones School Building. Demolished in 1988; area currently being used for bulk sand and recyclable materials staging.</td>
<td>Contamination present in soil and groundwater which may not leach above regulated levels</td>
<td>Disturbed area, no habitat</td>
</tr>
<tr>
<td>J</td>
<td>73</td>
<td>Onsite Landfill</td>
<td>Type III landfill used for disposal of wastewater treatment sediment, filter cake and construction/demolition debris from the facility; also receives waste core sand, slag, and core butts from the GM Saginaw Malleable Iron Plant.</td>
<td>Levels below EPA levels of concern for human health according to industrial standards</td>
<td>Clean capped, revegetated, no exposure pathways</td>
</tr>
</tbody>
</table>

Descriptive table of Investigative Units; partially from RFI phase 1C report
The site lies in an important location for habitat connectivity, which will become of increasing importance with climate change. To the south of the site along the Saginaw River is the Shiawassee National Wildlife Refuge, which acts as a high quality habitat patch. To the north of the site along the river is the Crow Island State Game Reserve, which acts as another high quality habitat patch. Waterfowl currently rest and forage within the settling ponds on site. The site also lies along two major flyways: the Atlantic and the Mississippi.

Water bodies on site do not contain game fish but do contain limited benthic communities and some habitat potential for birds and mammals. Limited exposure pathways for contaminants do occur in these water bodies.
Groundwater on the site is divided into two aquifers by an impervious confining layer of fine-grained soils. Except in parts of Areas H and I, groundwater within the upper aquifer is generally less than fifteen feet below the ground surface. In parts of Areas H and I, stockpiled clay material up to approximately 40 feet thick overlies the upper water-bearing zone. Except for in a few specific locations, the upper aquifer is unconfined throughout the site. The lower, or bedrock, aquifer, lies approximately 80-100 feet below ground surface, and is likely confined throughout the site. Both aquifers discharge to the Saginaw River, which then flows to the Saginaw Bay, a sensitive ecosystem, and Lake Huron.

Soils within the two aquifer zones are as follows:

• The upper aquifer zone generally consist of three soil types: black, foundry sand fill, fluvially-deposited sand and gravel, and silt associated with a lower energy, marsh environment. Thin, discontinuous lenses of clay, sandy clay, silty clay, and clayey sand are interbedded within all soil types comprising the upper aquifer zone.

• The lower aquifer consists of subglacial deposits (sands and silts), weathered bedrock and competent bedrock.

Ground-water recharge to the upper water-bearing zone occurs in the unpaved areas of the site via the infiltration of precipitation. However, groundwater recharge from the surface is not expected to occur through the overlying clay materials that are present in portions of Areas H and I, where locally confined conditions are encountered.

The ‘cleanest’ water on the site is likely rainwater, and perhaps runoff coming from surrounding neighborhoods through the county drain running through Unit E. Rainwater likely gains contaminants as it infiltrates through contaminated soils to the groundwater in the upper aquifer.

Upstream of Saginaw the 100 year floodplain covers most of four townships, but the floodplain has been artificially narrowed by Corp of Engineers projects in the city itself since the late 19th century. The river regains its floodplain expanding north of the city. The only portions of the site that are outside the 100-year floodplain are IU's B, D, and F. Massive flooding in 1986 as well as spring floods in 2004, 6, and 7 distributed river sediment across the floodplain. With climate change, flooding patterns may become less predictable, with the possibility of more frequent, more extreme, and ‘flashier’ floods.

The water and sediment of the Saginaw River and its floodplain are highly contaminated with dioxins and PCB’s, and this raises issues of public health and environmental justice, as well as habitat quality. Birds that forage in the area of the river have poor reproductive success. The state of MI strongly suggests limiting or avoiding fish consumption from the river – with carp, bass, catfish, and lake trout being most contaminated. However, local people often fish the river and regularly eat what they catch, including these most contaminated species. According to a 2008 study by the US Dept. of Health and Human Services, “four times as many minority fish consumers fishing and eating fish from the Saginaw Waters (about 37%) were not aware that Michigan advises people to either restrict consumption or not eat the fish from these rivers.” Even without consumption, contaminated dust ingested or picked up on the bodies of people or their pets in floodplain landscapes are likely to become part of household dust.

Floodplain, from City of Saginaw mapping
Site Context and Conditions: Urban Context

In 2010, the City of Saginaw had a population of about 50,000, down from about 100,000 in 1960; Saginaw County as a population of about 210,000. The city is about 55% African American or Latino, while the County is about 27% African American or Latino. The former GM facility is located in a primarily African American neighborhood that was cut off from the rest of the city by the construction of I-675 in the 1960’s. This neighborhood has the city’s highest rate of residential tax foreclosures (about 60-70%). East of the Veteran’s Memorial Highway, the entire neighborhood lies within the 100 year floodplain of the Saginaw River. The city has a tax-foreclosed properties landbank and is the midst of planning for “right-sizing” neighborhoods with high vacancy rates.

According to the 2011 Saginaw Master Plan, the sharp decline in population can be attributed to several factors, including migration to newer residential developments in surrounding suburbs, migration caused by the downscaling in the automotive manufacturing industry, and the demolition of substandard housing without replacement. The land use plan suggests that the potential for new residential development at or in the immediate vicinity of the site is low.
Alternative Future Scenarios

Three alternative future scenarios for 2027, each assuming a different regional economic development context, were given to the students as the basis for their designs. Each scenario is a hypothetical but plausible description of the economic development context for the site in 2027.

Each student worked with the Nodular Site, IU “E” shown in the map on page 8 of this report, and selected at least two adjacent investigative units as the focus for their design of sites ranging from approximately 150-700 acres.

2027 Phase 2 Design

1. Industrial Heritage Park
GM moves its engine block manufacturing out of the city and the nearby supplier park closes as a result. However, GM’s global financial success allows it to endow the design and maintenance the entire 700 acre facility as a regional park celebrating the industrial heritage of vehicle manufacturing. The park controls to flood control be providing off-channel storage of Saginaw River floodwaters. While the Racer Trust and GM have extensively remediated site contaminants by grading and capping and cut and haul, ground and surface water contamination remains high and contaminated sediment is mobilized when the river floods. The engine block manufacturing plant was disassembled by its structural frame has been left in place as a landmark in the regional park. On the 164 acre site, locate a 45,000 sq. ft. visitors’ center and parking for 10 buses and 150 cars.

2. Low Density Business Park Condominiums
The RACER Trust works with an industrial land developer to establish a business park condominium. It focuses on lower cost remediation of contamination, flood control for occupied parcels and building habitat and recreational value in the common areas of the site. It parcelizes the site to identify 3 20-30 acre parcels that can be occupied by a separate business parks for service and information-based industries. The development aims to attract employees for whom the site and its context could serve as a healthful, restorative complement to the work place. The remainder of the site is divided between public access recreation and a privately-held land held and managed by the business parks condominium.

GM invests in massive expansion of its engine block plant in Unit D, building a new assembly plant in Unit G (roughly the same footprint as the current engine block plant), and employing F for vehicle storage and employee parking. While some raw materials come into the facility by barge and are stored in the southern 50% of Unit E, GM wishes to dedicate Unit A and much of Unit E to a public recreational, habitat and flood control park that celebrates the industrial heritage and new clean manufacturing future of GM. The rest of the former facility is redeveloped at a high density with services for plant workers and big box stores to draw on easy rail and freeway access.
2015 Phase 1 Design

Each student developed a design under one of the alternative hypotheticals. Short-term ‘mothballing’ designs were produced for Phase 1, intended for implementation by 2015. Phase 1 designs assume that the site contamination is remediated to industrial environmental standards:
1. Flow of water-borne contaminants to adjacent surface waters or properties is contained on site.
2. Contaminated sediment or soil is contained on site.

Phase 1 designs aimed to ensure that:
1. The site is secured and surfaces are introduced to discourage harm to adults on the site for up to 60 hours/week.
2. The site looks well maintained as viewed from nearby roads.
3. Existing infrastructure that may have some future industrial use is left intact.
Scenario 1: Industrial Heritage Park

In this scenario, all industry on site ceases, and the entire facility is converted to a regional park celebrating the area's industrial heritage of vehicle manufacturing. In addition, the park:

- controls flooding and provides off-channel storage of Saginaw River floodwaters.

- remains highly contaminated despite extensive remediation through capping, cut and haul

- retains the disassembled remains of the engine block plant as a regional landmark

- contains a 45,000 sf visitors' center and parking for 10 buses and 150 cars.

The Landschaftspark in Duisburg Nord, Germany, shown at right, is a useful precedent for envisioning the Industrial Heritage Park. Once a steel mill in a struggling industrial city, it is now an internationally renowned park and source of local pride.
This design uses changing water levels from the river’s flooding and as a result of stormwater runoff to create a constantly metamorphosing landscape which simultaneously provides the important ecosystem service of off-channel flood storage.

A highlight of the design are the egg-shaped viewing mounds found at the north and south ends. Views to the SMCO plant, the river, and the landfill are also carefully considered.

Pictured are precedent images which convey the look and feel of the design.
1. Industrial Heritage Park  Observing the Past, Present, and Future  Fan Huang

Pictured are precedent images which convey the look and feel of the design.
This design offers a series of highly constructed spaces which tell the story of the site’s history and material flows as the visitor moves through. With this design, the site draws visitors from across the nation and world because of the novelty and beauty of the experiences it provides.

Phase 1 uses decorative fabric, recycled materials, light, and shifting landscapes to reframe the industrial ruins and convey a sense of hope and impending change for the better.
1. Industrial Heritage Park  Longevity through Ephemerality  Nicholas Lavelle
This design carefully considers cost effectiveness to offer a way to improve perceptions of care and stewardship on the site. Large-scale prairie plantings are used to provide potential habitat and low-cost, beautiful cover. The design also especially considers floodwater flows on the site, providing a series of settling ponds to slow and filter the floodwaters of contaminated sediments, which could then be removed.

Phase I considers views from the road and neat landcovers that would increase perceptions of the property’s marketability.
1. Industrial Heritage Park Flow Ariel Shaw

Phase 2 master plan
Scenario 2: Low Density Business Park Condominiums

This imagines that the RACER Trust works with an industrial land developer to establish a business park condominium. Additionally:

- It focuses on lower cost contaminant remediation
- It calls for flood control for occupied parcels
- It seeks to build habitat and recreational value in common areas
- It creates 3 20-30 acre parcels for service and information-based industries
- It divides the remainder of the site between public access recreation and land privately held by the business park
- It attracts employees seeking a healthful and restorative work environment

Arlington Business Park near Theale, England, establishes a precedent for the Low Density Business Park scenario by siting office and light industrial buildings adjacent to outdoor amenities that manage stormwater.
Outlook Business Park provides nine flexible buildings that are oriented for river views and sunlight. An important feature of this design is that it provides green spaces near buildings in order to provide pleasant common spaces for gathering and resting. In front of each grouping of buildings is a pond, an amenity for people who work in the business park that suggests the qualities of the river beyond.

Phase 1 employs plants of native wetlands and prairies beyond the edge of parcels designated for business park development..
Callout of section of business park showing orientation of buildings towards river views as well as proximity of pleasant outdoor landscapes to workspaces.
Two main ideas are proposed in this design. The first is the creation of real estate value through the elevated siting of buildings within a pastoral prairie landscape. The design places each building on a hill above the floodplain, and uses native plantings to blend ecosystem services with workplace health. Three possible building and parking configurations are proposed.

The second main design proposal is an ecological design experiment, termed the ‘Washboard.’ This feature harnesses the power of natural flooding to contribute to cleaning of sediment from the Saginaw riverbed. Sediment collected during flooding in this large sculptural piece could then be transported away for proper disposal.
Phase 2 master plan
This design presents an integrated approach to ecosystem services, public recreation, and commercial revitalization. It proposes a phased approach starting with parcelization of the property (each parcel with 25 acres), then the installation of a riparian buffer and constructed wetlands to provide habitat. Parks follow, including golf courses, ball fields, and a pub, allowing the site to become a destination along the river and to attract a diverse range of users.

Finally, business park buildings are constructed. Buildings are small and numerous to allow for a phased construction approach and maximum flexibility of usage. Parcel A has 367,000sf of building and 761 parking stalls. Parcel B has 227,000 sf of building and 506 parking stalls. Parcel C has 297,000 sf of building and 654 parking stalls. All parcels of a parking ratio of approximately 2.2:1,000. Runoff from the business park hardscape is collected in adjacent constructed wetlands.

Section showing topography between river and business park buildings, including the riparian buffer and constructed wetland which receives runoff from the business park.
Master plan detail showing northern constructed wetland, golf course, and brewery pub. This recreational facility serves the community while simultaneously providing ecosystem services.
This design proposes the rerouting of M-13 to the east of the Corvus plant in order to create a larger, more unified, and more pleasant space for the office park. Sun direction and views are considered for building positioning; green spaces around the buildings provide active and passive recreational opportunities for workers.

Along the river, a riparian zone and trail system is maintained, as well as a number of landscape features intended to slow and treat stormwater and also capture floodwater sediment.
2. Low Density Business Park   A Fork in the Road   Daniel Power

In this scenario, GM expands its operations, building a new vehicle assembly plant with the footprint size of the current plant, as well as associated parking and vehicle storage. The remainder of the area is devoted to ecosystem services and an industrial heritage park. Additionally:

- Materials continue to arrive by barge and are stored in Unit E

- The park serves for public recreation, habitat, and flood control

- The park celebrates a new, clean manufacturing future of GM

- The rest of the former facility is redeveloped at a high density with services for plant workers and big box stores.

The Ford Motor Plant in Dearborn, MI, pictured at right, establishes a good precedent for the Industrial Growth scenario. It is a functioning automobile manufacturing plant which simultaneously incorporates ecosystem services and projects a green image with its 454,000 sf green roof. The factory and associated museum also draw tourists from around the nation.

http://www.landinform.net/2010/08/31/metroplex-industry-and-sustainable-design/
Two main innovations are introduced in this project. The first is the rerouting of M-13, which would consolodate traffic flow and create high value commercial zones along existing and new commercial corridors. A new commercial district could be formed, taking advantage of proximity to the highway and rail lines.

The second innovation is the construction the ‘Saginaw Speedway,’ an amateur racetrack intended to celebrate the industrial heritage of the site and to serve as a local and regional attraction. The highly active nature of this land use invites visitors to enjoy recreation that directly relates to the historic and current use of the surrounding industrial zone.
3. Industrial Growth

The Industrial Heart of Saginaw

Caroline Bergelin

Phase 2 master plan
This design layers ecosystem services onto industrial and recreational functions. It separates clean water from dirty water on site, capturing rainwater from the new factory roof for recreational use in the remediated settling basins. The industrial area remains in the floodplain, and the factory is raised on pylons to maximize the flood plain area and to allow for car storage beneath the building, freeing up the relatively clean Investigative Unit F for habitat usage. The berms and walls of the flood plain boundary separate the dirty industrial area from the new, relatively clean recreational area to the northeast.

After appropriate engineered remediative actions take place, Phase 1 of the design calls for a phytoremediation approach to take advantage of the time that the property sits idle. A matrix of poplar trees underplanted with a phytoremediative meadow mix could clean soil and groundwater over time. It could also potentially be part of a larger urban forestry effort extending into the vacant neighborhoods to the south of the site or selectively serve as a catalyst for habitat succession.
3. Industrial Growth **Big Systems** Ayehlet Cooper

- Flood line: berms and walls
- Stormwater flows
- Clean water pools
- Pub
- Parking and car storage
- New factory raised on pylons
- Berm protecting railroad; recreational area access road

Detail of Phase 2 master plan
The highlight of this design is the large constructed wetland which flows through the site and filters stormwater runoff from the site and adjacent areas, such as the large new car storage lot, before it reaches the river. The wetland also supports a recreational trail network. This trail network offers views of both the newly rehabilitated landscape as well as of adjacent industrial activities in the new plant and along the river edge at the barge dock.

Berms protect visitors from contaminated water in IU C and raise recreational areas above the flood plain.
3. Industrial Growth  Reinvest and Rebound  Olivia Garnett

Sun/shade study highlighting site topography

Phase 2 master plan
This design provides a vision of a theme park of sorts which explores the city’s industrial heritage. The project’s wonderful innovation is to imagine the park as culturally tied to other flourishing institutions in town, such as local museums. Through these institutions, citizen groups could design and build the park’s installations. Museum tours could be run to see the park’s sculptural and experiential landscape exhibits; the functioning industrial plant also provides an opportunity for visitor education and cultural experiences.
3. Industrial Growth  Pennycress Park  Trinity Pierce
References

City of Saginaw, **City of Saginaw Master Plan**, August 23, 2011


**Websites:**


http://maps.sagagis.org/SAGAIMS/viewer.htm

http://www.saginawmasterplan.com/
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