The Intersection of Nature and Knowledge

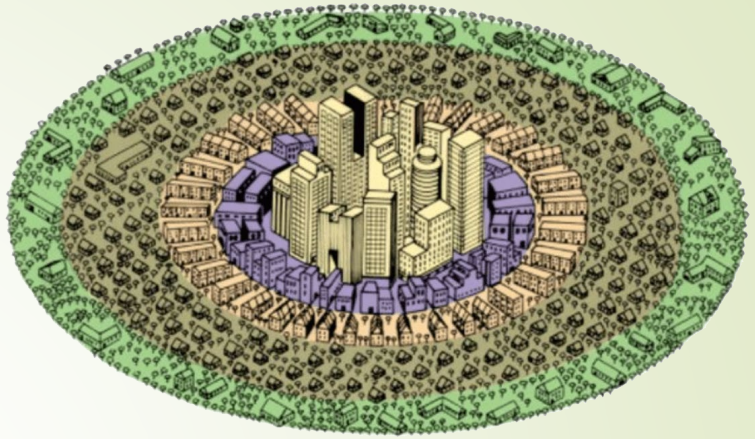
The Red River Valley Science Center

Research Questions

How can architecture be used to rejuvenate areas by redeveloping brownfield sites

How can architecture be used to bring nature into the built environment and create immersive spaces

Urban Expansion



- Loss of Natural Connection
  - Often results in the loss of green spaces, distancing communities from nature
- Creation of Brownfields
  - Abandonment of industrial areas, creates brownfield sites as economic activities shift outward
- Informal Learning Opportunities
  - Offer unique opportunities for informal learning through increased cultural interactions and technological integrations

Proposed Solution

Through the revitalization of once-neglected brownfield sites, we can transform them into hubs of education, culture, and community engagement. This thesis explores the development of an Urban Science Center designed with biophilic principles to enhance connection with the natural world. This project examines the potential benefits of such a space in fostering urban revitalization, economic growth, and community involvement, proposing a new model for sustainable urban development.

Why a Natural Science Center?

- Reconnecting with Nature
  - Interactive exhibits and programs about nature bridge the gap between urban populations and the natural world
- Community Catalysts
  - They foster community development, enhancing social cohesion and stimulating local economies
- Urban Integration
  - Actively reflecting and responding to community needs, influencing how cities evolve and improve community well-being

Biophilia

- Biophilic Design
  - Architectural practice that incorporates natural elements to enhance human-nature connections
- Benefits
  - Improves well-being, reduces stress, and boosts productivity
- Application
  - Used in building design to promote environmental sustainability and enhance personal health

Background

Fargo, ND

City of Fargo Overview

Location

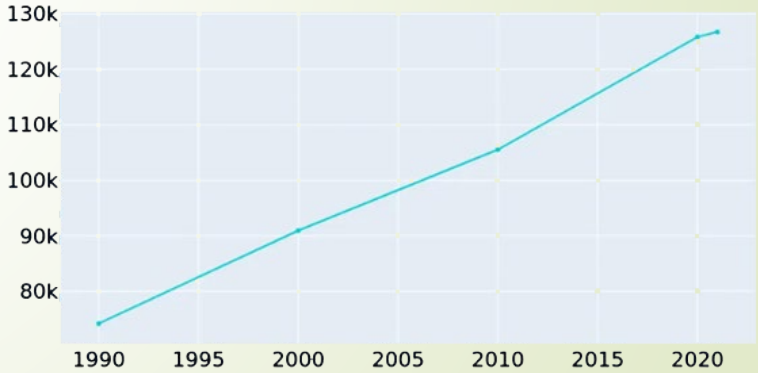
- Western ND
- Sits on western bank of the Red river

Demographics

- 50.8 square miles
- Population
  - Fargo: 126,000
  - Metro area: 229,000
- Primarily White Population: 81.5%

Challenges

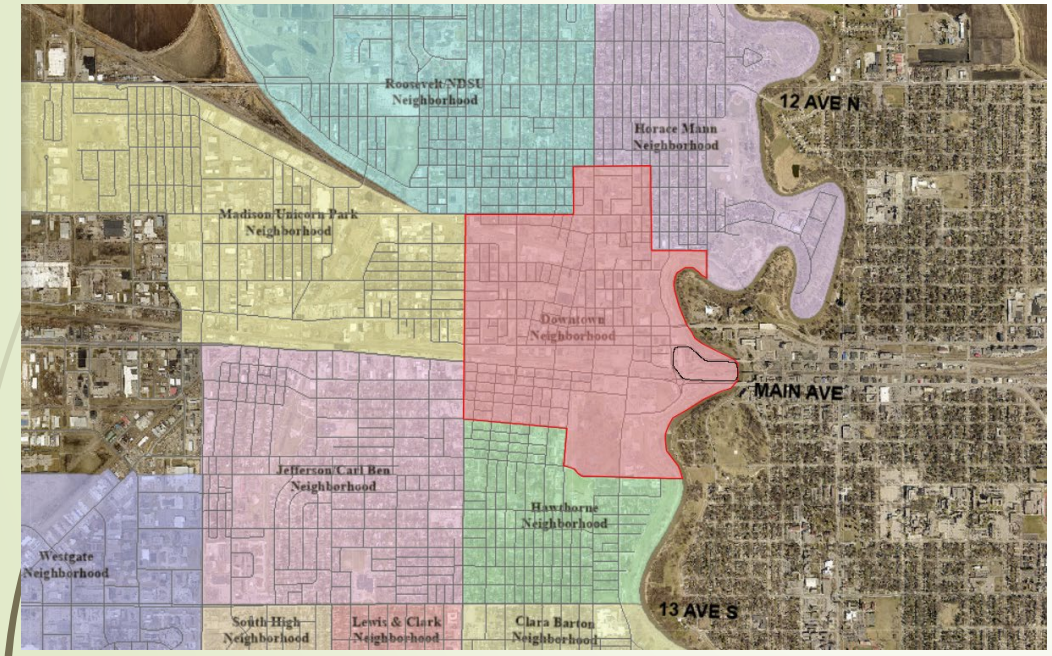
- Grown 39.7 % since 2000
- Previous downtown industrial zones have left behind brownfield sites

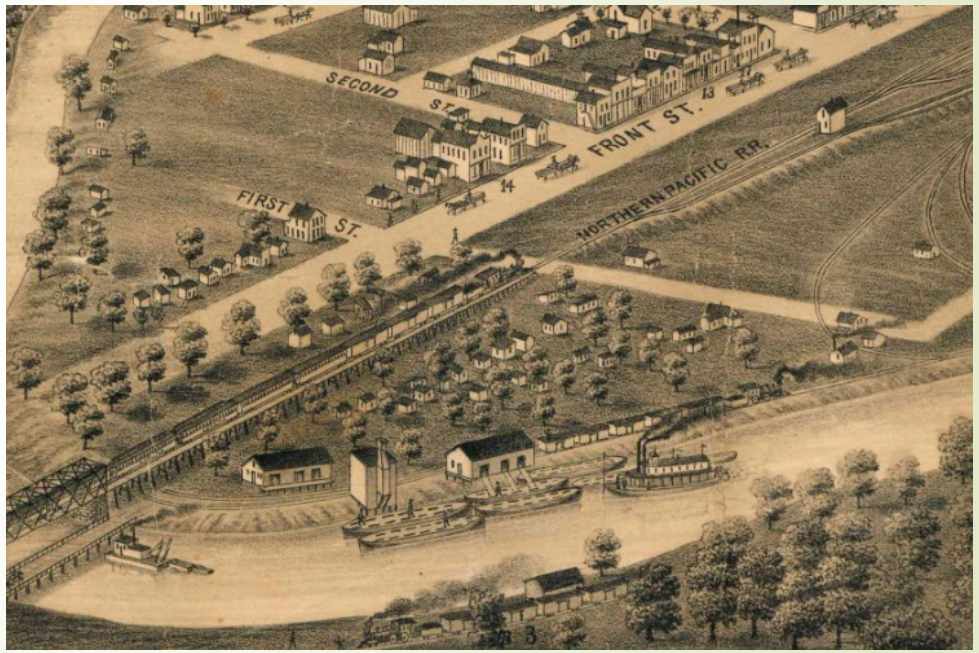


Fargo's Population growth

Obtained from: (World Population Review, Fargo ND, N.D.)

Site Context



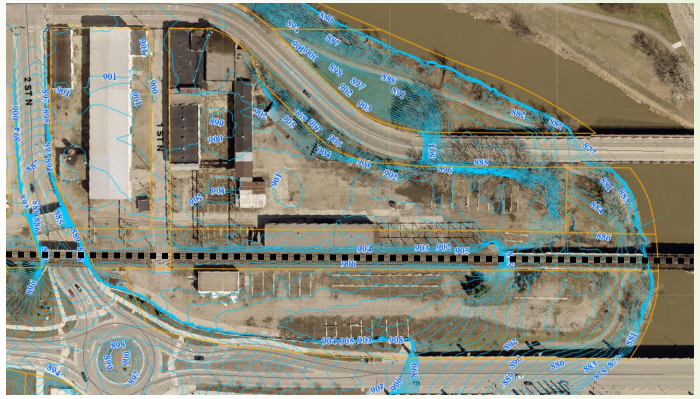


Site

Base Map

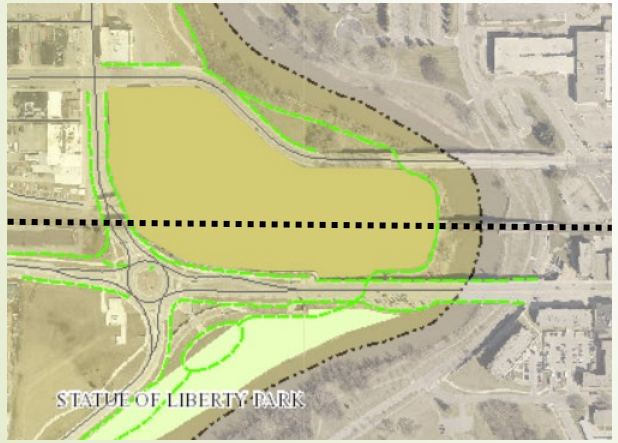
Train Tracks

Topography Map



Train Tracks

Paths + Parks

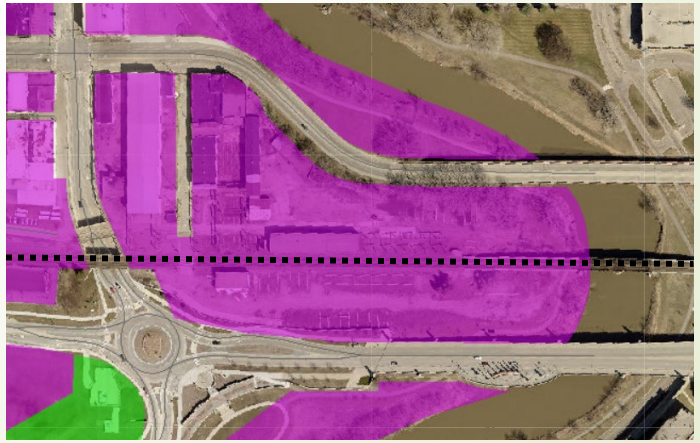


Paths

Park

Train Tracks

Zoning



Downtown Mixed use

Train Tracks

Existing Site Conditions 1

Location A

Location B

Location C

Location D

Existing Site Conditions 2

Location A

Location B

Location C

Location D

Location E

Location F

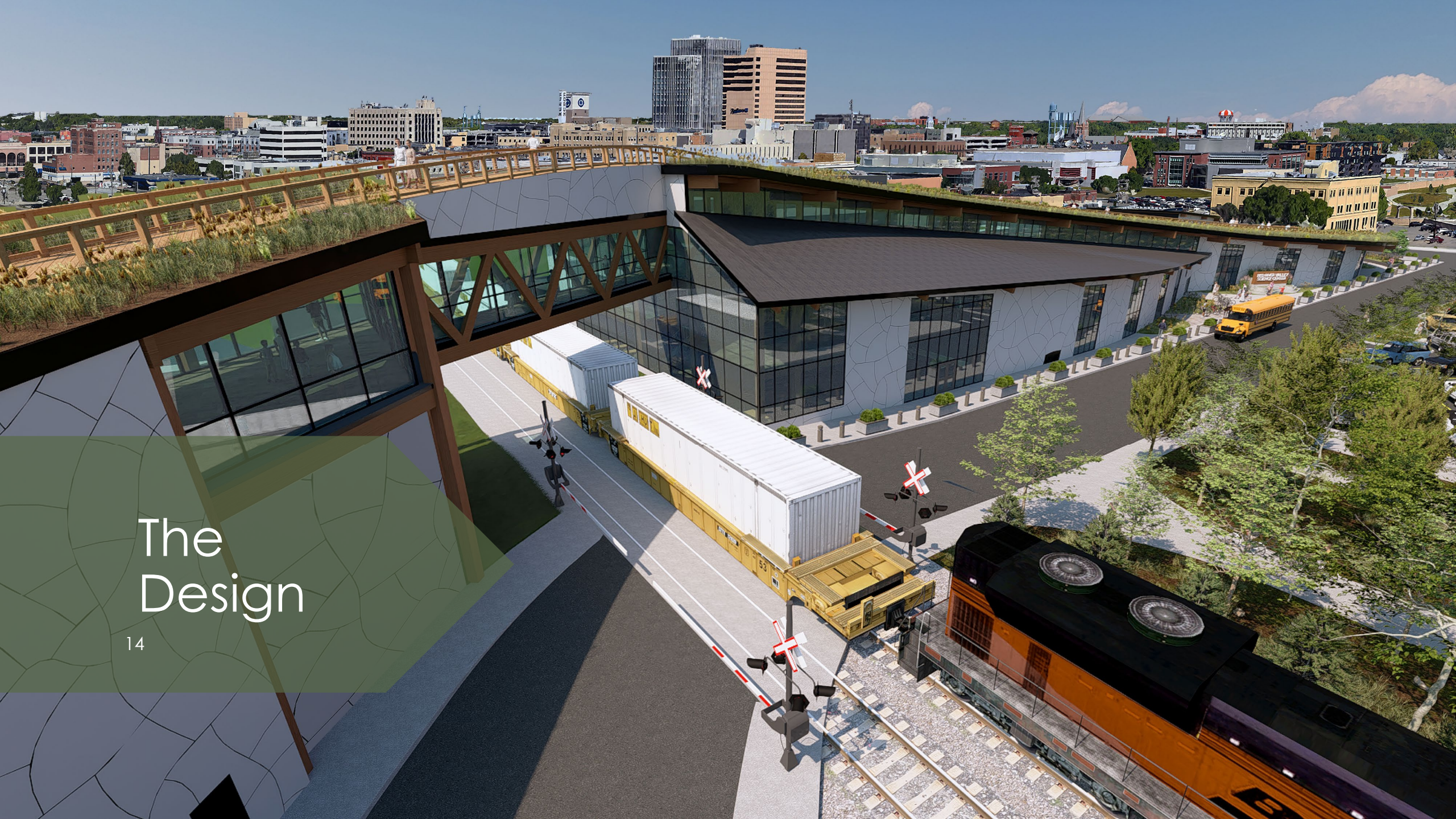
Location G

Location H

Project Objectives

Create an immersive space that incorporates biophilic design principles to enhance the visitor experience

Regenerate an abandoned brownfield site while connecting to the surrounding environment



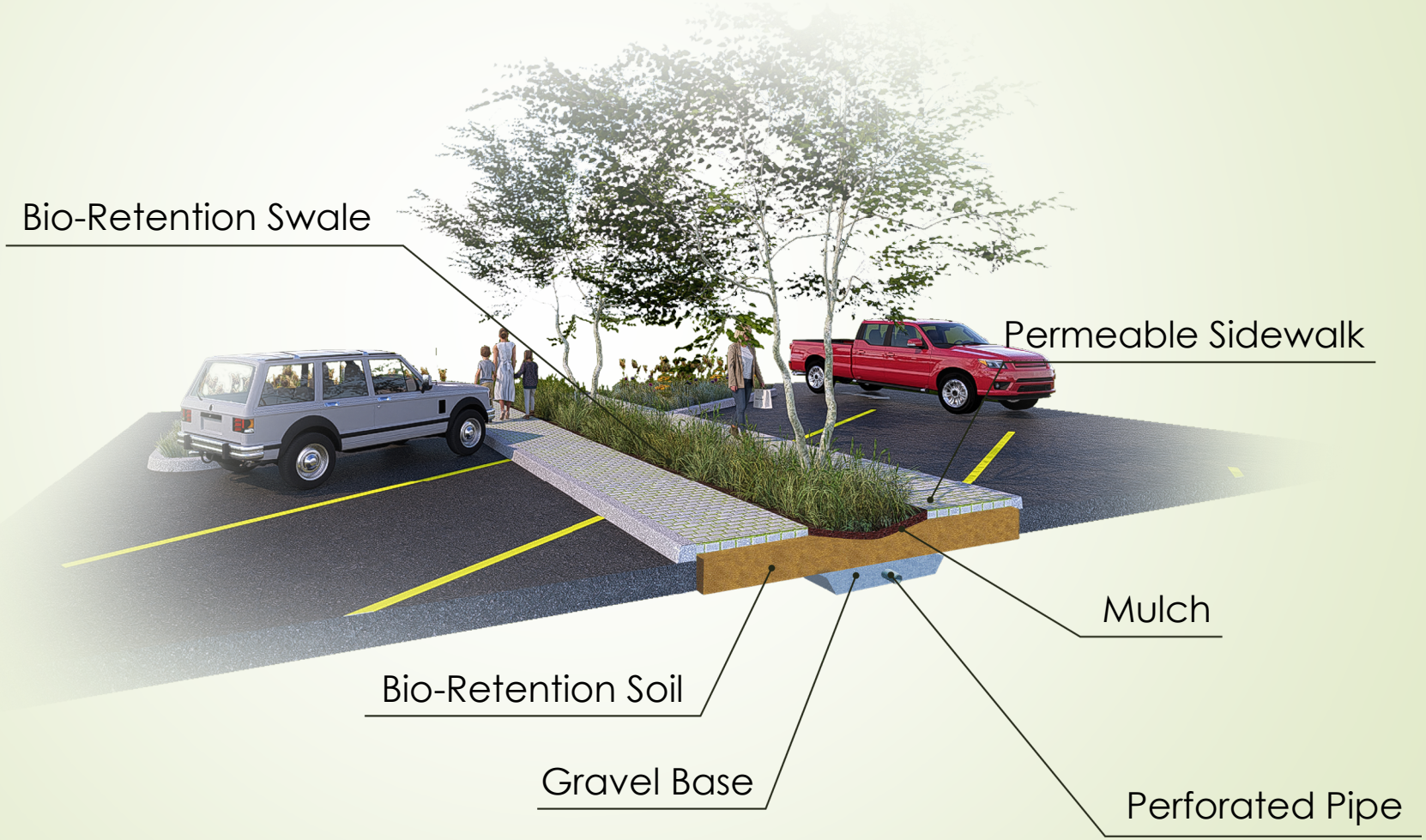
The Design

Site Plan

Nature Park Prairie

Site Orthographic

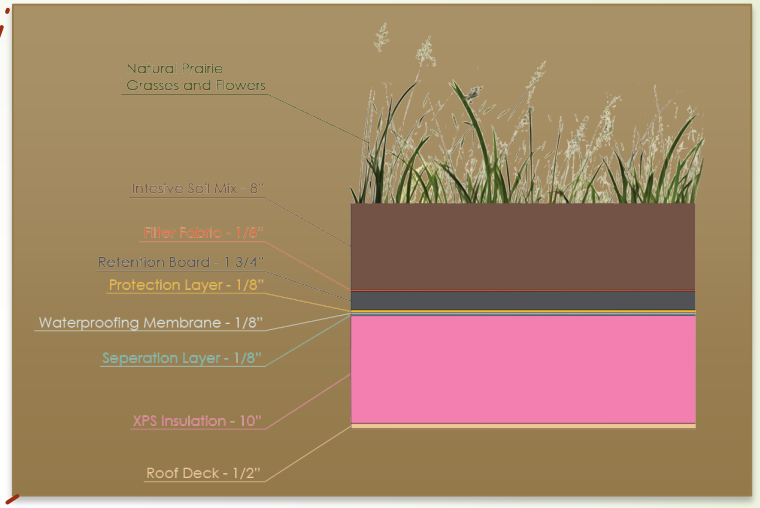
Bio-Retention Swale Section



Green Roof Walk

Green Roof Lookout

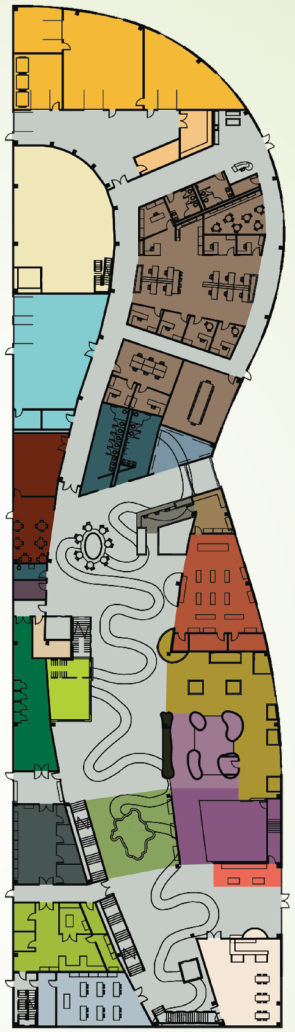
3D Section + Green Roof

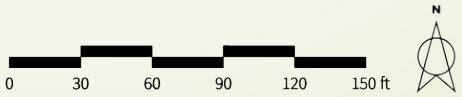


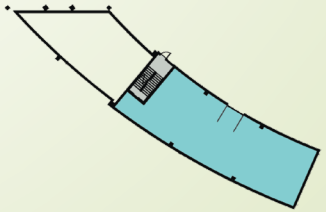
Façade Inspiration

First Floor

- Workshops
- Mechanical
- Janitorial
- Storage
- Offices
- Restrooms
- Nursing Room
- Coat Room
- Cafe
- Front Desk
- Work Room
- Gift Shop
- Animal Food Prep
- Duck Pond
- Exhibit Storage
- Veterinarian
- Classroom
- Regional Geography Exhibit
- Regional Animals
- Channel Fish
- Flooded Forest
- Information Desk
- Conservation Lab
- Circulation Space







Train Tracks

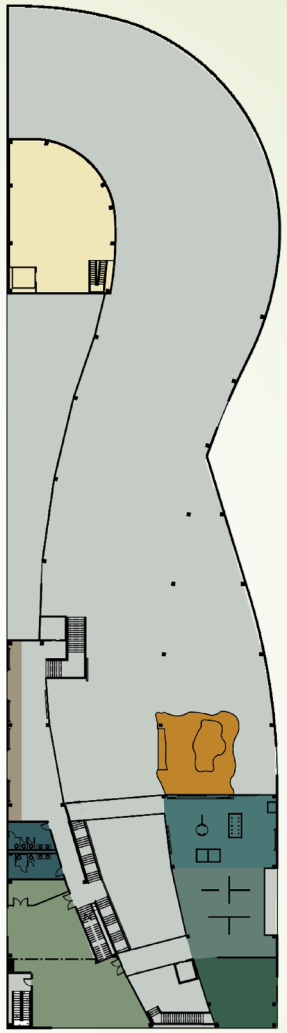
Main Entrance

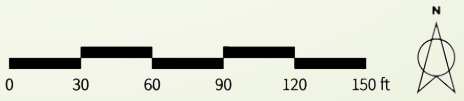
Main Hallway

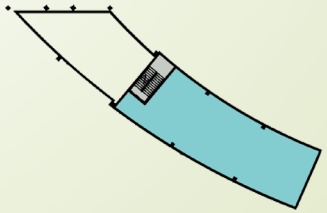
Flooded Forest

Second Floor

- Mechanical
- Interactive Wall
- Restrooms
- Indoor Prairie
- Makers Space/Multi-Purpose Room
- Regional Forces Exhibit
- Historical Exhibit
- Special Exhibit
- Storage
- Circulation Space



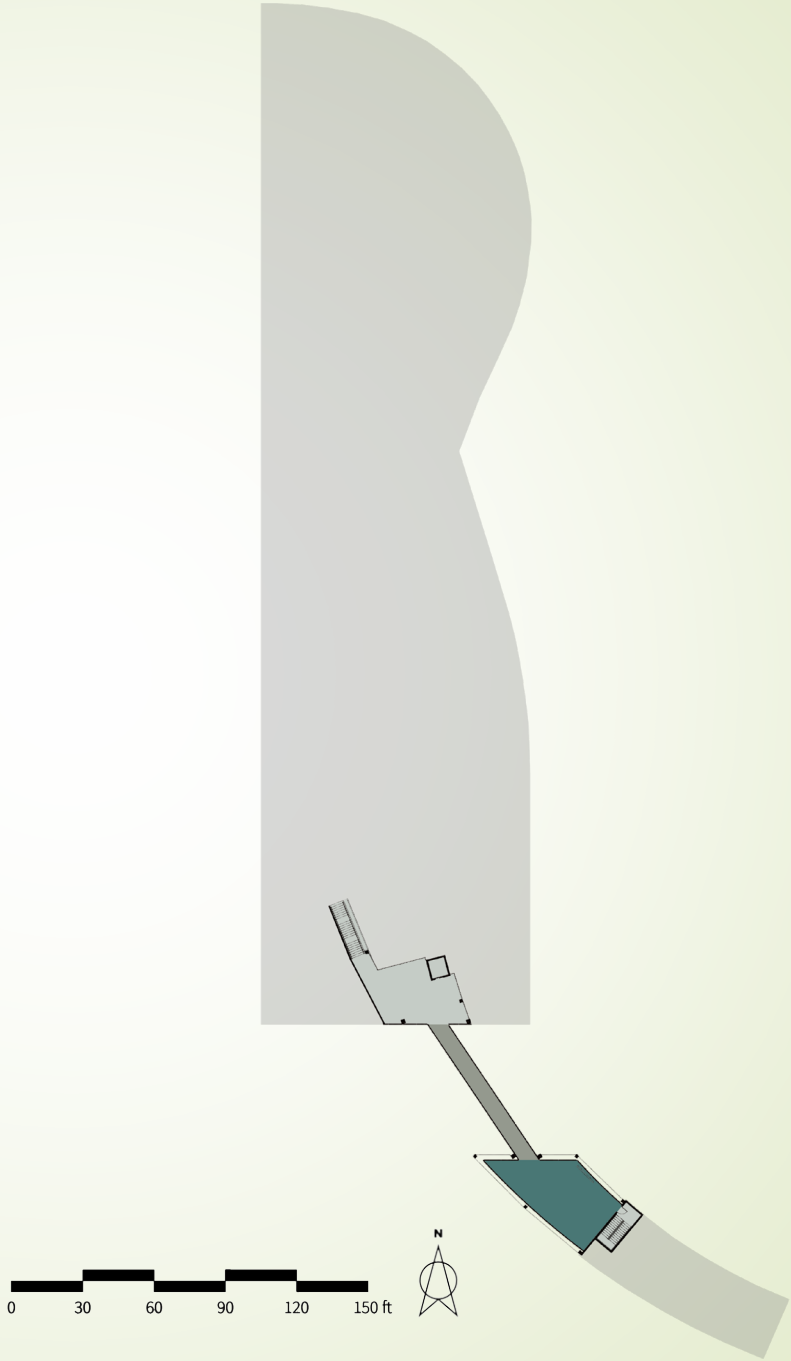




Second Level Walkway

Third Floor

- Circulation Space
- Observation Room
- Skyway



Third Level Balcony

Thank You

Questions & Comments?

Boards


THE INTERSECTION OF
NATURE AND KNOWLEDGE:
RED RIVER VALLEY
SCIENCE CENTER
Site Plan
1/64" = 1'-0"
Site Selection
Concept Process
3D Section
Heavy Timber Structure
Level 1
1/32" = 1'-0"
Level 2
1/32" = 1'-0"
Level 3
1/32" = 1'-0"
Bio-Retention Swale Section
Orthographic View
East Elevation

References

American Planning Association. (2009). *Downtown Fargo: Fargo, North Dakota*. Retrieved from American Planning Association: https://www.planning.org/greatplaces/neighborhoods/2009/downtownfargo.htm

Browning, W., Ryan, J., & Clancy, J. (2014). 14 Patterns of Biophilic Design. New York: Terrapin Bright Green llc.

Buckler, C. S. (2015, September/December). The Role of Science Centers in Increasing the Public Understanding of Science. *Dimensions*. Association of Science and Technology Centers.

Costanzo, G. D. (2022). *The Value of Science Centres – especially in low- and middle-income countries.* InterAcademy Partnership.

EPA. (2019, September). *Cleaning Up Brownfield Sites.* Retrieved from United States Environmental Protection Agency: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epa.gov/sites/default/files/2019-10/documents/cleaning_up_brownfield_sites.pdf

EPA. (2022). *R1 Success Story: Children's Museum & Theatre of Maine, Portland, Maine*. Retrieved from United States Environmental Protection Agency: https://www.epa.gov/brownfields/r1-success-story-childrens-museum-theatre-maine-portland-maine

Falk, J. H., & Dierking, L. D. (2000). *Learning from Museums: Visitor Experiences and the Making of Meaning.* Rowman & Littlefield.

Falk, J., & Needham, M. (2011). Measuring the Impact of a Science Center on its Community. *Journal of Research in Science Teaching*, 1-12.

Goodwin, K. (2022, December 29). *How do cities grow?* Retrieved from Property Metrics: https://propertymetrics.com/blog/how-do-cities-grow/

NDSU Archives. (n.d.). *Fargo Before Settlement*. Retrieved from Fargo North Dakota: Its History and Images: https://library.ndsu.edu/fargo-history/indexda1d.html?q=content/fargo-settlement

NWF. (2023). *Red River of the North*. Retrieved from TheNationalWildlifeFederation.org: https://www.nwf.org/Home/Educational-Resources/Wildlife-Guide/Wild-Places/Red-River-of-the-North#top

The City of Fargo. (n.d.). *City History*. Retrieved from The City of Fargo: https://fargond.gov/explore/about-fargo/city-history

The Mind Museum. (2023). *The Mind Museum - Science Comes Alive!* Retrieved from The Mind Museum: https://www.themindmuseum.org/

U.S. Census Bureau. (n.d.). *Fargo City, Cass County, North Dakota*. Retrieved from U.S. Census Bureau: https://data.census.gov/profile/Fargo_city,_Cass_County,_North_Dakota?g=060XX00US3801725700

United States Census Bureau. (2020). *Decennial Census of Population and Housing*. Retrieved from Census.gov: https://www.census.gov/programs-surveys/decennial-census.html

USDA. (n.d.). *USDA Plant Hardiness Zone Map*. Retrieved from USDA Agricultural Research Service: https://web.archive.org/web/20140227032333/http://planthardiness.ars.usda.gov/PHZMWeb/