

Careers in STEAM

Grade Levels: 9th - 12th

Standards Alignment

Career Technical Education (CTE) - Common Career Technical Core (CCTC)

- CRP 1: Act as a responsible and contributing citizen and employee.
- CRP 2: Apply appropriate academic and technical skills
- CRP 4: Communicate clearly, effectively and with reason.
- CRP 6: Demonstrate creativity and innovation.
- CRP 10: Plan education and career path aligned to personal goals.
- CRP 11: Use technology to enhance productivity.

Michigan Science Standards (NGSS Aligned)

- HS-ETS1-1 - Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions.
- HS-ETS1-2 - Design a solution to a complex real-world problem by breaking it down into manageable problems.
- HS-ETS1-3 - Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs.
- HS-ESS3-1 - Construct an explanation based on evidence for how natural resources, hazards, and climate affect human activity.
- HS-ESS3-2 - Evaluate competing design solutions for managing human impacts on natural systems.
- HS-ESS3-3 – Create a computational simulation to illustrate relationships among natural resource management and sustainability
- HS-ESS3-4 - Evaluate or refine technological solutions that reduce human impacts on natural systems

Materials

- Lesson Activity Guide

Careers in STEAM

Ralph C. Wilson, Jr. Centennial Park

9th - 12th

- Clipboards
- Pencils
- [Ralph Wilson Park map](#)
- "Before" picture of Ralph Wilson Park

Lesson Vocabulary

- **Infrastructure** - built systems that support a community, like roads, drainage, lighting, utilities, parks, etc.
- **Green infrastructure** – Natural and engineered systems designed to manage stormwater, reduce pollution, and improve the overall environmental quality of an area
- **Sustainability** – managing resources to meet current needs without harming compromising the needs of future generations
- **Systems thinking** - understanding how parts of a system interact and affect one another
- **Bioswale** – a landscaped area designed to collect and filter stormwater runoff
- **Stormwater runoff** – rainwater that flows over surfaces instead of soaking into the ground
- **Permeable pavement** – surface materials that allows water to pass through
- **Watershed** – an area of land where water drains to a common body of water
- **Erosion** – the movement of soil by wind or water
- **Habitat restoration** – repairing damaged ecosystems
- **Shoreline stabilization** – preventing erosion along rivers or lakes
- **Landscape architecture** – designing outdoor spaces to be functional, safe, and environmentally sustainable
- **Data collection** – gathering information through measurement or observation

Pre-Visit Activities

Prepare your group for the field trip with these in-classroom pre-visit activities.

- **Detroit River Story Lab Career Profiles** – The Detroit River Story Lab’s programming exposes young adults to a wide range of water-linked education, career, and community leadership pathways. These are interviews from professionals all around Detroit who are working to educate, conserve and connect their community to the river and city.
 - Consider putting students into pairs and having them pick a few to focus on. They can present their chosen profile to the class.
 - [Detroit River Pathways Career Profiles](#)
- **Research STEAM careers on different park websites** – Consider having students research careers on different park websites; this will show them how many careers are considered to be “green careers.”
 - Split students into pairs and have them look at the following sites. Direct them to navigate to either the “Who We Are” or “Careers” section of the website.
 - The Detroit Riverfront Conservancy - <https://www.detroitriverfront.org/inside-the-conservancy/leadership-and-team>
 - The Huron-Clinton Metroparks - <https://www.metroparks.com/job-opportunities/#JOBBOARD>
 - Metroparks Toledo - <https://www.metroparks.com/job-opportunities/#JOBBOARD>
 - Sleeping Bear Dunes National Lakeshore - <https://www.nps.gov/slbe/getinvolved/workwithus.htm>
 - The Gathering Place of Tulsa - <https://www.gatheringplace.org/join-our-team>
 - The Bentway Toronto - <https://thebentway.ca/work-with-us/>
 - Yellowstone National Park - <https://www.nps.gov/yell/getinvolved/explore-careers.htm>
 - Isle Royale National Park - <https://www.nps.gov/isro/getinvolved/workwithus.htm>
 - Once students have had time to explore the websites, have them discuss or respond in writing to the following prompts:

- What park-related careers are interesting to you?
- What STEAM careers did you identify on each website?
- What careers incorporated conservation and/or sustainability?
- Some parks listed are in rural, remote areas, and some parks listed are in a city. What is different about the career opportunities in those places?
- **GIS – Geographic Information System**
 - Have students learn and explore how many jobs use GIS to create maps that help us respond to important environmental concerns.
 - Have students checkout this website:
<https://storymaps.arcgis.com/stories/f674704b9b2341e99c2a2493fd906824>
 - Have students split into four groups: air, land, waste, and water
 - Each group should read through the website section describing how scientists and engineers are using GIS data to inform how they monitor and protect these natural resources.
 - Have each group produce a written summary noting the section they were assigned, how GIS informs the monitoring and protection of natural resources, and which careers use GIS as a tool.
 - Lastly, have students predict how GIS may have been used to build Ralph Wilson Park.
- **Book Recommendations** – Both fiction and nonfiction books can be powerful tools to expose, engage, and connect students to a subject area. Consider showcasing the following books in your classroom to allow students to read and check out. Some of the following recommendations are available through the Detroit Public Library.
 - *What If?: Serious Scientific Answers to Absurd Hypothetical Questions* by Randall Munroe – This book contains hilarious and informative answers to all the questions you never thought to ask. (Available at the Detroit Public Library)

- *Headstrong: 52 Women who Changed Science – and the World* by Rachel Swaby – This book showcases 52 courageous and intelligent scientists who impacted the world throughout history to today. It will inspire a new generation of scientists.
 - *The Boy Who Harnessed the Wind* by Bryan Mealer and William Kamkwamba – This is an inspiring memoir of a Malawian teenager who built a windmill from scrap parts to bring electricity to his village. This book showcases the use of STEAM to bring about social and ecological change to your community. (Available at the Detroit Public Library)
 - *What Color Is My World? The Lost History of African American Inventors* by Kareem Abdul-Jabbar and Raymond Obstfeld – This is a non-fiction book that highlights lesser-known African American inventors and their contributions to society's advancement. (Available at the Detroit Public Library)
 - *Green Careers: Choosing Work for a Sustainable Future* by Jim Cassio and Alice Rush – This book looks at almost every different career field and shows young people how you can choose a green career that fits within many different interests. It inspires young people to consider the future of the planet as they make plans for their own future.
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Lesson Sequence and Instruction

Arrival and Introduction (10 minutes)

- Begin your time at the park by encouraging students to take a moment to notice their surroundings, be present, and grow in mindfulness.
- Walk to the dock of the **Huron-Clinton Metroparks Water Garden** and gather in a circle.
- Encourage students to find a spot along the railing to look outward towards the **Water Garden**.
- Begin with this guided mindfulness activity to help students connect to nature:

- Tell students you will count from 10 to 0. When you get to 0, quiet your voices and find something in or around the **Water Garden** to focus on.
- As you find something to focus on with your eyes, take note of your body.
- How does the “outside feel”? Can you feel the sun touching your skin? Is there wind or rain? How does it feel on you?
- Now focus on your hearing. What sounds stick out to you? Can you hear any birds or animal sounds? What about the sounds of a city? Can you hear cars or humans? Is the water making a sound?
- Now, finally focus back on the spot you picked. What color is it? Is it living or not living? Do you think it will look the same in all seasons?
- Have students turn back to the center of the circle to face the instructor.
- Reflect and Share: Direct students to turn towards a partner next to them to share something in nature they felt, heard, and saw.
 - Call on a few partners to share their observations aloud.
- Key point to emphasize: Nature is all around us even in the middle of the city. Ralph Wilson Park is full of plants, animals, and a complex river ecosystem. Many different people with different roles worked together to build this park. Let’s learn about the ways the professionals come together to build something like this and how your interests may fit into a future green career.

Career Tour Talk and Station Setup (40-45 mins)

Setup

- Gather students in a circle and show them the picture of the park before it looked like this.
- As students look around, ask what kinds of jobs were needed to create a space like this? What kinds of jobs are needed to keep this park open?
 - Example responses:
 - Engineer
 - Environmental scientist
 - Landscape architect

- Architect designer
 - Construction worker
 - Gardner
 - Maintenance worker
 - Park ranger
 - Electrician
 - Urban planner
- Have students share out responses.
 - Divide students into four separate groups and assign them a section on the activity guide to begin their career tour and talk. Each group should travel with a chaperone throughout the park. The chaperone will read the background information available in this lesson plan for each section as students begin that section.
 - Give students clipboards, maps, student activity guides, and a writing utensil.
 - Direct them to spend 10 minutes on each section of their activity guide. They can walk around the park or find somewhere to sit.

Career Tour & Talk

- **Section 1: Park Design and Architecture**
 - Background information on park design: From the beginning, Ralph C. Wilson, Jr. Centennial Park was designed with community in mind. A diverse group of community advisors from around Detroit traveled to three different cities to tour world renowned parks. They came back to Detroit and, alongside the broader community, provided input for what would make Ralph Wilson Park a one-of-a-kind destination. Four architect teams submitted proposals and presented them to the public. Michael Vanburgh and Associates was the winning architect design team. In the **Delta Dental Play Garden**, the play structures were built and designed in Denmark and shipped to the United States. They are based on animals you would find in Michigan here, and some of them were designed by students in Detroit with clay.
- As you focus on park design and architecture, take note of the following things:

- Walk over to the **Delta Dental Play Garden**
 - What is special about the play structures here? Notice their shape, color, and structure.
 - How are they different than other playgrounds you have been to?
 - What kinds of materials are used as flooring throughout?
 - Why are there separate playgrounds?
 - Notice the fencing. What is the purpose of the fencing?
- Walk over to the **William Davidson Sport House**
 - What is unique about the design?
 - What is the ceiling like?
 - Do you notice anything different about the structural poles?
 - How was the seating designed? Why do you think that is?
- Walk around the different paths in the park
 - Notice the different seating options.
 - Pay attention to accessibility; are all areas wheelchair accessible?
 - What other features do you notice in the park? Food? Water? Restrooms?
- **Section 2: Construction and Materials Engineering**
 - Background information on construction materials and engineering:
Before this park was built, the land you are standing on looked very different. Most recently, Ralph Wilson Park was called West Riverfront Park; it was a large flat space with grass and only about 40 trees. Before that, it was a printing plant for the Detroit Free Press. Imagine a large industrial building here that ran the whole length of the park. Before the printing plant, the land was used as a railway shipping yard. It was full of trucks, trains, and a large shipping building. So much had to be done to make this park look like what it looks like today. Consider what materials and engineering needed to happen to make the park you are standing in today.
 - As you focus on construction and materials engineering, take note of the following things:
 - Walk up and down the different hills in the park.

- What materials and construction are necessary to build hills?
 - What is the benefit of adding elevation to a space?
- Walk the different pathways throughout the park
 - Are the surfaces made of asphalt or concrete?
 - Are there other walkable surfaces like wood chips or stones?
 - Why are there different surfaces and not one continuous surface throughout the park? Why build a park this way?
- Walk along the shoreline in the park
 - How does the shoreline differ in different parts of the park?
 - Notice where there is railing and where there isn't railing? Why do you think it was engineered in that way?
 - Notice the bridge and dock over the **Huron-Clinton Metroparks Water Garden**. What materials were used to build these?
- Think about weather and the impact that it has on the materials in the park.
 - How was weather considered when building this park?
- **Section 3: Green Infrastructure and Sustainability**
 - Background information on green infrastructure and sustainability: Ralph Wilson Park did not always look this way. With the factories on this site, the park needed to be cleaned up and restored for the public to use. Before Ralph Wilson Park was built, this site also struggled with different environmental concerns, like shoreline erosion, lack of shade, and stormwater management. The "soft" shoreline in Wilson Park, which refers to the section of shoreline that has rocks and no seawall or railing, was engineered with green infrastructure in mind. It helped to create cleaner water, more fish habitat by adding a "riparian zone," and trap sediment and pollution. The **Huron-Clinton Metroparks Water Garden** added wetland habitat to the park which can support hundreds of species. Through green infrastructure, Ralph Wilson Park helps to create a cleaner river, a more diverse ecosystem, and allows people to interact with nature more fully.

- As you focus on green infrastructure and sustainability, take note of the following things:
 - Walk along the shoreline, across from the **Delta Dental Play Garden** and **Huron-Clinton Metroparks Water Garden**:
 - Notice the rocks along the shore in comparison to the seawall and railing. Why might the rocky shoreline be better for the fish habitats and the health of the river?
 - Notice the logs poking out of the water. These are fish habitats for fish that live in the Great Lakes ecosystem. Why should a park intentionally try to add fish habitat?
 - Walk around the **Huron-Clinton Metroparks Water Garden**.
 - Notice the water being pumped in through the river and flowing out under the bridge, or weir. Why might someone design the **Water Garden** in this way?
 - Notice the various plants. How do diverse plantings impact the ecosystem?
 - Notice the island. Why would the designers add an island to the **Water Garden**?
 - Walk around the different paths throughout the park
 - Are there enough trees planted?
 - Where is there shade in the park? Where isn't there shade?
 - How are the park features protecting you from inclement weather events?
- **Section 4: Technology and Data in Parks**
 - Background information on technology and data in parks: The Detroit Riverfront Conservancy utilizes a variety of technology and data services to enhance the visitor experience in our parks. As you walk around Ralph Wilson Park, you will see emergency poles. The emergency poles provide direct contact to our 24-hour security camera stations and guards. The Conservancy uses foot traffic data software to inform the team on how many visitors are coming to the parks and where they are visiting from.

Even outdoor spaces, like Ralph Wilson Park, use technology to enhance the visitor's experience.

- As you focus on technology and data in parks, take note of the following things:
 - Walk the different paths throughout the park:
 - Notice the lighting and power access in the park. Is there enough lighting to create safety for visitors?
 - Notice the mapping signage. Is there enough?
 - Notice the security cameras and emergency poles. How are they located throughout the park?
 - Pay attention to the **William Davidson Sport House**. What kind of technology is necessary to keep all elements of the sport house functional?
 - Who or what might the park need to collect data on? (tree health, water quality, fish habitat, number of visitors, etc.)

Career Reflection and Closing (5-10 mins)

- Gather students back together in a circle and have them look through their notes
 - Have students share with a few people next to them:
 - One career that is necessary to build and manage a park that they didn't know about and/or are interested in.
 - One new skill needed for that career.
 - One course or internship you could take to prepare for that career.
 - One career you know you would not be interested in and why.
 - Have groups share out responses.
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Post Visit Activities

Optional classroom activities to extend their learning from their field trip experience.

- **Engineering Redesign Proposal PowerPoint Presentation** – Students can practice using the engineering design cycle by picking an issue they saw in the park and designing a solution to the problem.
 - In pairs or independently, students start by picking an issue they saw at the park.
 - Examples: lack of shade, flooding in certain areas, poor accessibility, erosion, aging infrastructure
 - Student research that issue and common solutions to the issue; include references to the research in their presentation.
 - Then, students define criteria (what specific requirements, goals, and desirable features the solution needs to have to be successful) and the constraints (the limitations that will restrict the ideal design solution).
 - Students develop a model to show the redesigned solution
 - They should consider certain trade-offs, like cost vs. sustainability
 - Students present their PowerPoints to the class as a design pitch
 - Consider sharing the presentations with the Detroit Riverfront Conservancy or the community at large.
- **STEAM Careers Vision Board** – Following the field trip experience, students can pick a STEAM career they are most interested in and create a vision board focused on their career aspirations
 - Define a vision board for students
 - A collage of images and words that represents their goals and dreams.
 - The purpose is to help people envision a positive future for themselves and serves as a visual reminder of that future once completed.
 - Vision boards use cut out images from the internet, magazines, or drawn images, as well.
 - Provide students with a large piece of cardstock and some additional art materials (scissors, glue, markers, tape, magazines, etc.)
 - When complete, consider hanging the vision boards up in the hallway for everyone to see and be inspired by.

- **STEAM Career Portfolio Project** – Similar to the [Detroit River Pathways Career Profiles](#) students looked at before the field trip, students can create a career profile for a role they learned about while on their field trip.
 - Students can use Canva or Word to create the career profile.
 - They should include the following in the career profile:
 - Specific career description
 - Required education pathway
 - Required high school courses
 - Michigan salary data
 - Local employers of this career
 - Reflection or personal interest in this career
 - An optional add-in: have students create a mock resume for this career or a Linked-In style profile.

Careers in STEAM

Ralph C. Wilson, Jr. Centennial Park

9th - 12th

Career Tour and Talk

Directions: With your chaperone or teacher, walk throughout Ralph Wilson Park. For each section, go to the specific areas listed. Spend about 10 minutes on each section, observing and thinking about the STEAM careers necessary to build the park.

Section 1: Park Design and Architecture

Areas to check out

Delta Dental Play
Garden

William Davidson
Sport House

Walkways and
Restrooms

Example Careers - Circle what you are interested in!

Landscape Architect

Playground Designer

Accessibility Specialist

Urban Planner

Project Manager

Postives/Negatives: _____

Notes: _____

Section 2: Construction and Materials Engineering

Areas to check out

Hills and Slopes

Walkways

Shoreline along the River

Example Careers - Circle what you are interested in!

Civil Engineer

Project Manager

Construction Worker

Cost Estimator

Structural Engineer

Postives/Negatives: _____

Notes: _____

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Section 3: Green Infrastructure and Sustainability

Areas to check out

- Rocky Shoreline Along the River Huron-Clinton Metroparks Water Garden Walkways

Example Careers - Circle what you are interested in!

- Environmental Engineer Hydrologist Sustainability Specialist
Urban Forester Solar Photovoltaic Installers

Postives/Negatives: _____

Notes: _____

Section 4: Technology and Data in Parks

Areas to check out

- Emergency Poles Walkways Lighting

Example Careers - Circle what you are interested in!

- Electrician GIS Analyst Drone Operator
Biological Science Technician Environmental Data Technician

Postives/Negatives: _____

Notes: _____

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Before Ralph Wilson Park

