

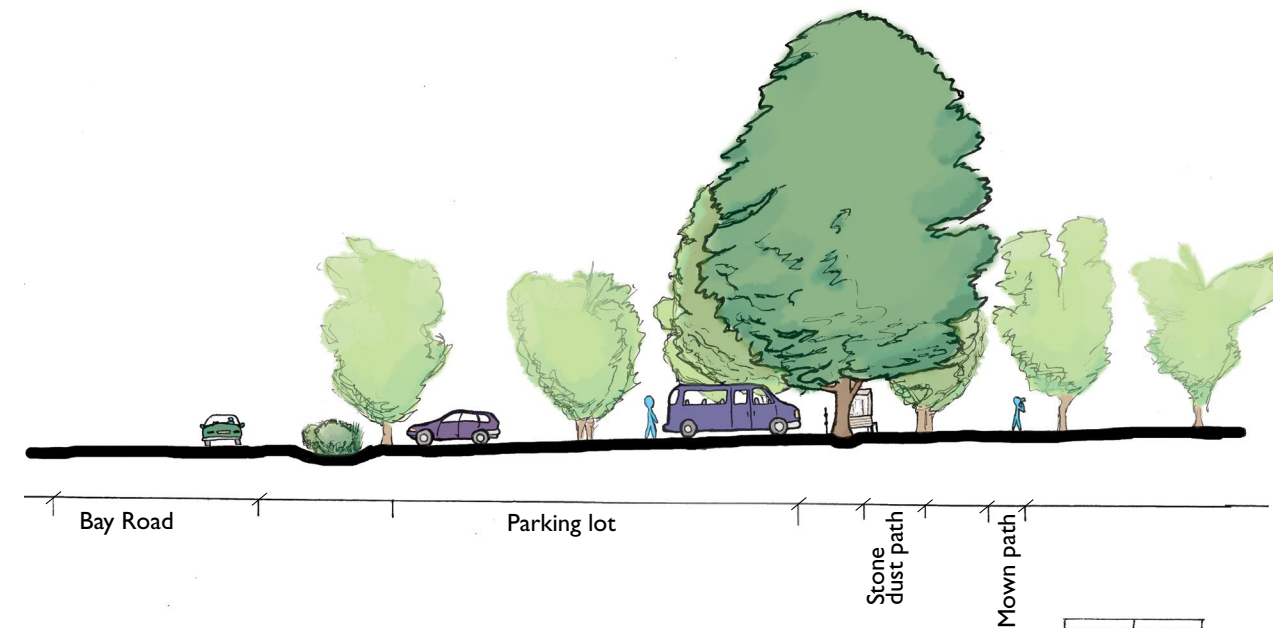
# Tamsin Flanders

Master of Science in Ecological Design '18

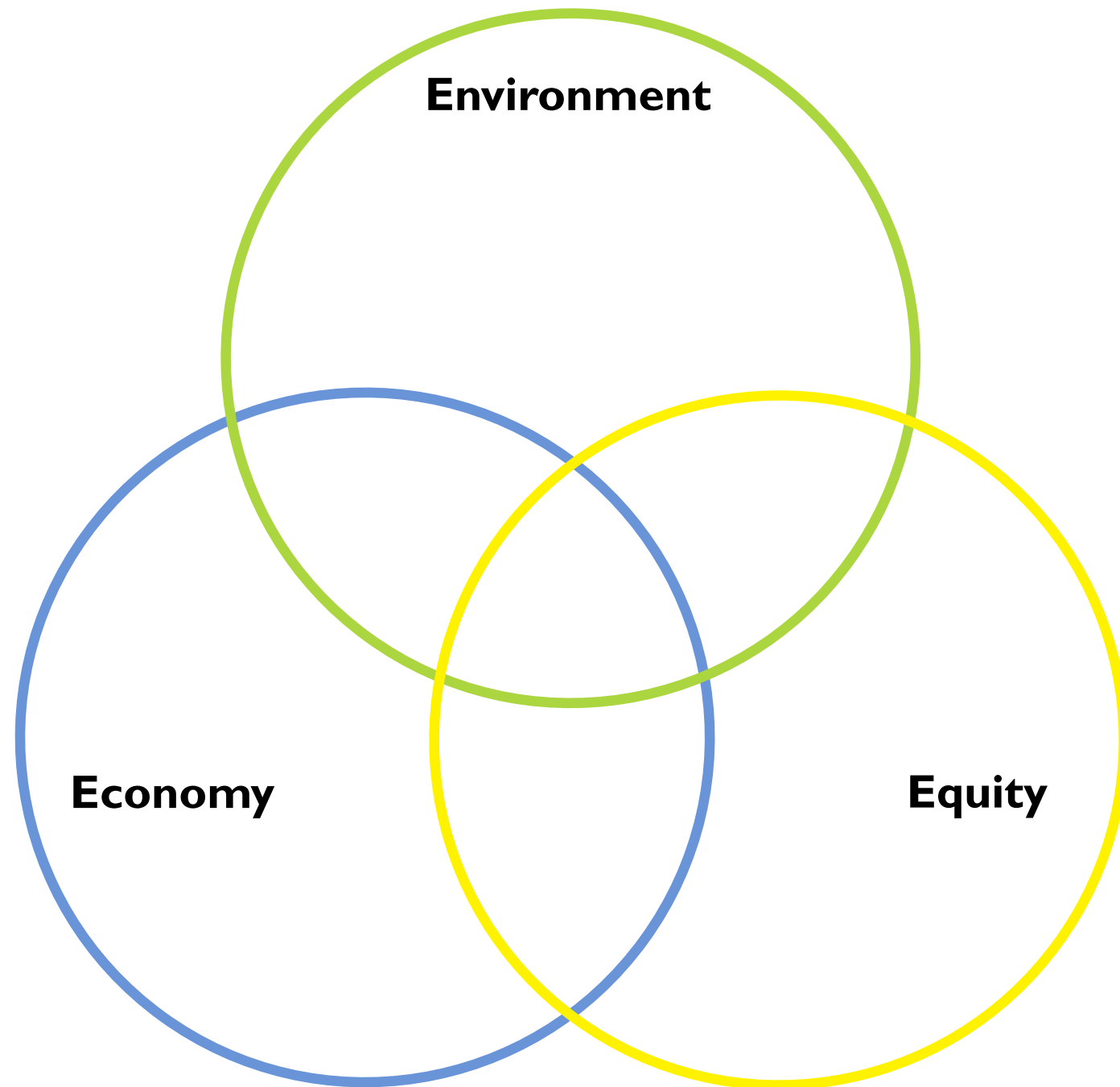
the Graduate Program in Sustainable  
Landscape Planning + Design  
**Conway**School

Master of Regional Planning '20

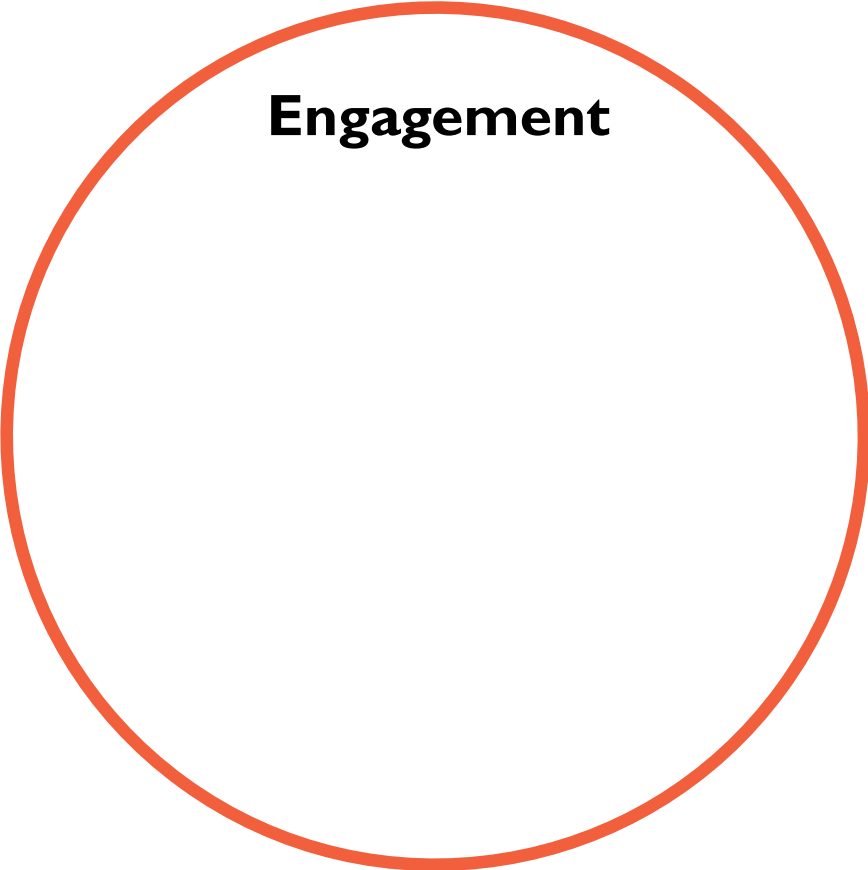
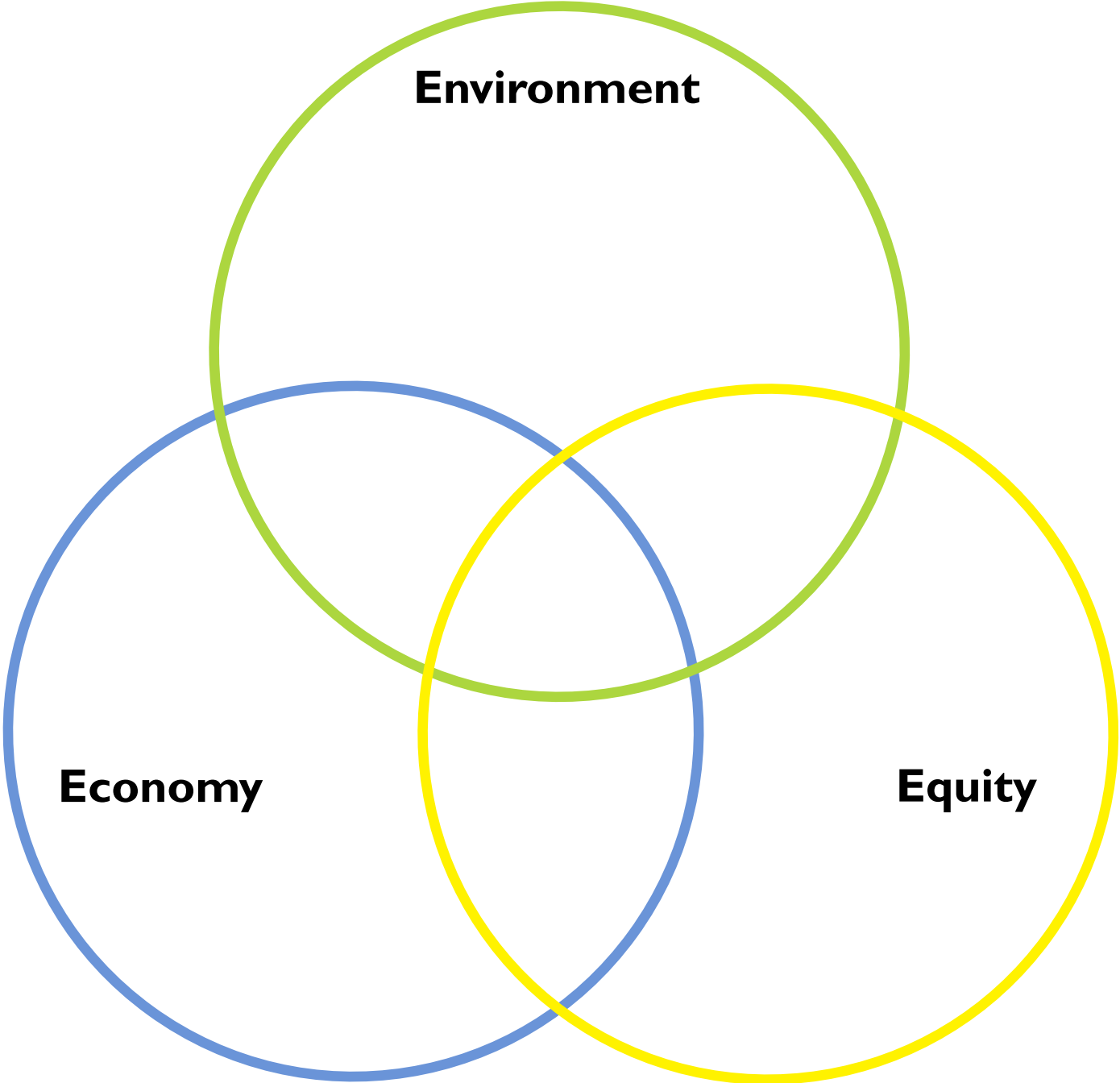
UMass **Amherst**



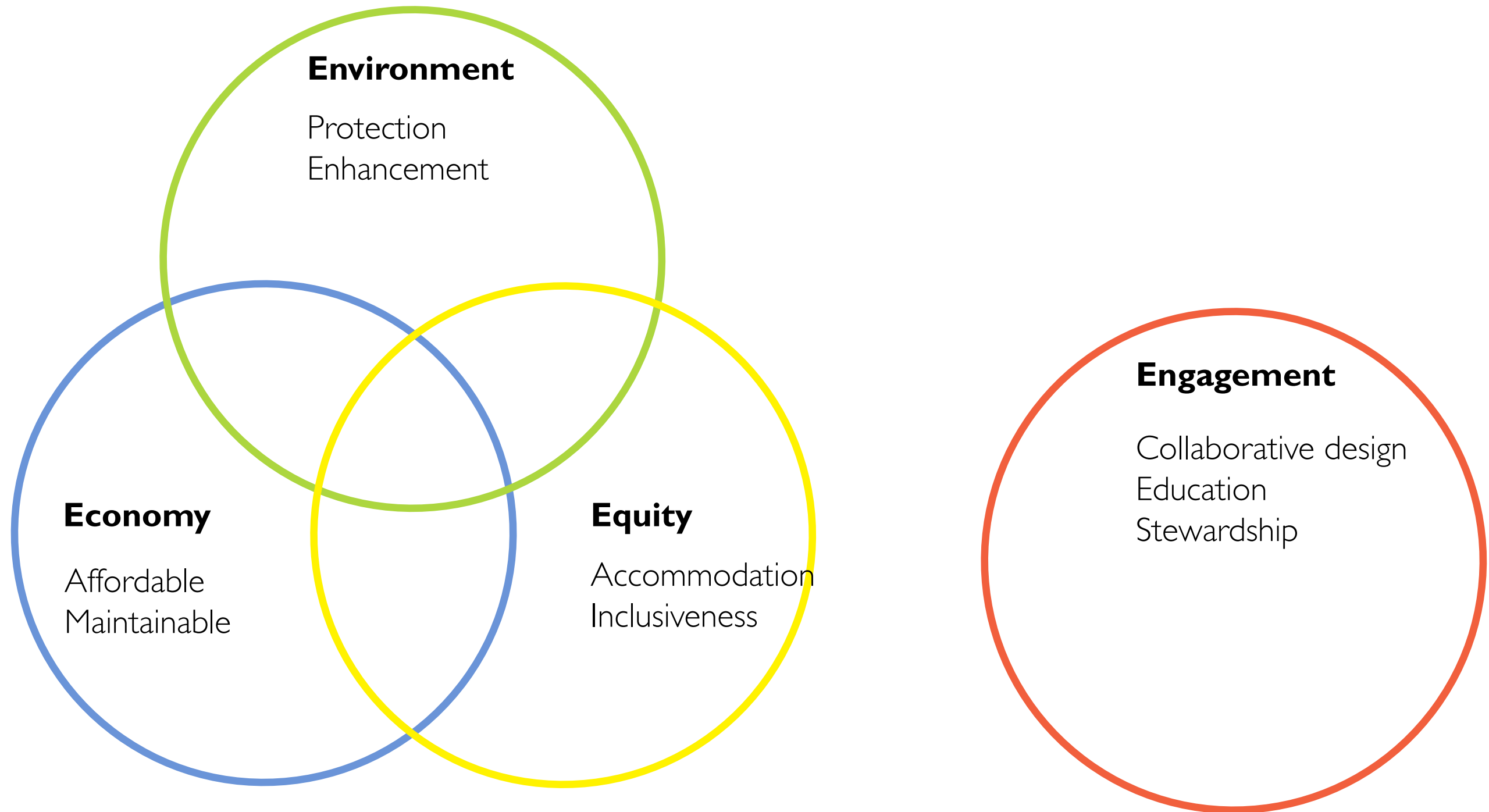
What do we mean by sustainable trails?



What do we mean by sustainable trails?



What do we mean by sustainable trails?





# THE DESIGN PROCESS

GOAL IDENTIFICATION

ANALYSIS  
(ECOLOGICAL!)

RECOGNITION OF  
CONSTRAINTS  
& OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA IDENTIFICATION

DESIGN

DESIGN DETAIL

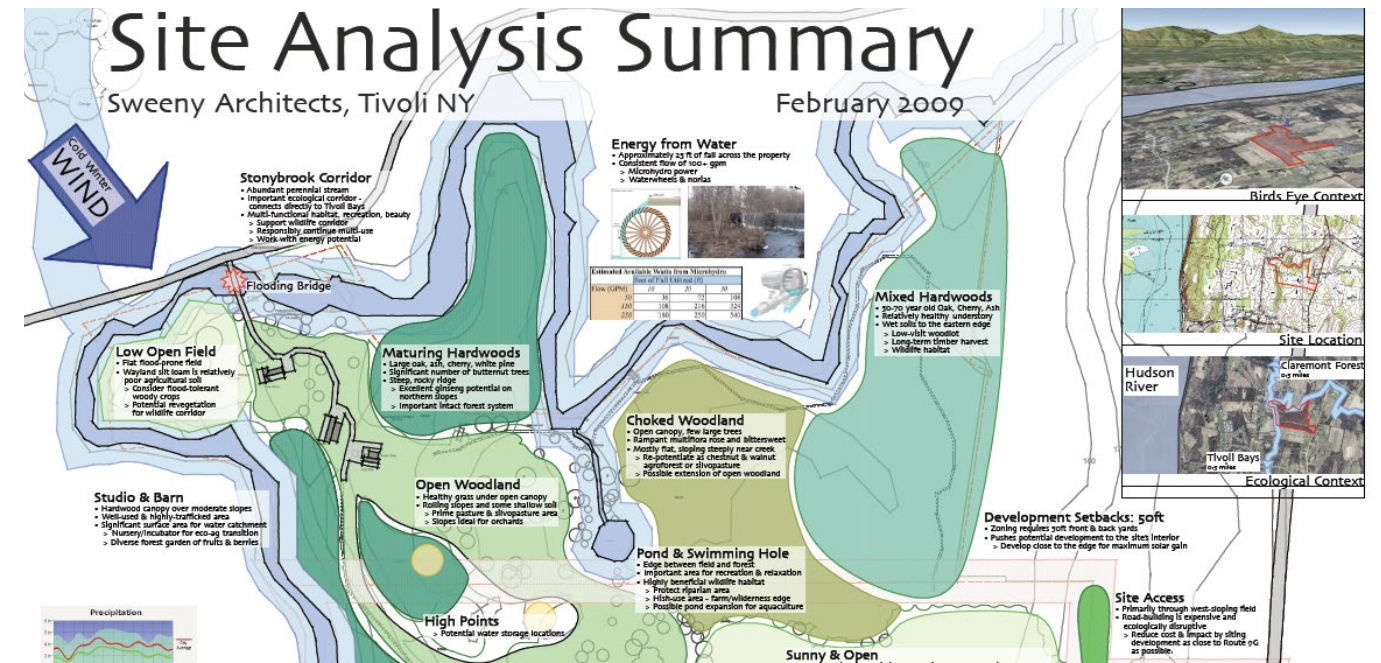


Image credit: AppleSeed Permaculture

What experiences and elements are important?

What are your priority goals?

## GOAL IDENTIFICATION

ANALYSIS

RECOGNITION OF  
CONSTRAINTS  
& OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

DESIGN

DESIGN DETAIL

At this segment of trail...

- A diversity of users have access to trailheads
- Natural resources and ecological functions are protected and improved where possible
- Visitation is decreased on overused trailheads
- Trail showcases ecological, geological, cultural, or historic features
- Trails are aligned, designed, and built to shed water and limit erosion
- A variety of trail types, trail experiences, and levels of difficulty available
- **Parking lot demonstrates ecological landscaping practices**

# GOAL IDENTIFICATION

ANALYSIS

RECOGNITION OF  
CONSTRAINTS  
& OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

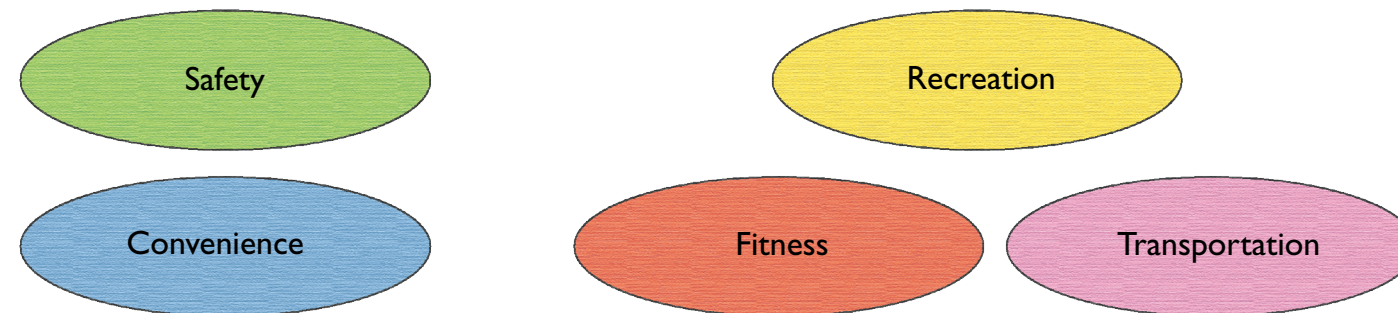
DESIGN

DESIGN DETAIL

Who are the current users?

Who are the hoped for users?

What are your goals for their experience?



**Baseline Values:** Determines if a person will even use a trail no matter what personal values it might offer.

**Personal Values:** What an individual may look for in a trail once the baseline values are satisfied.



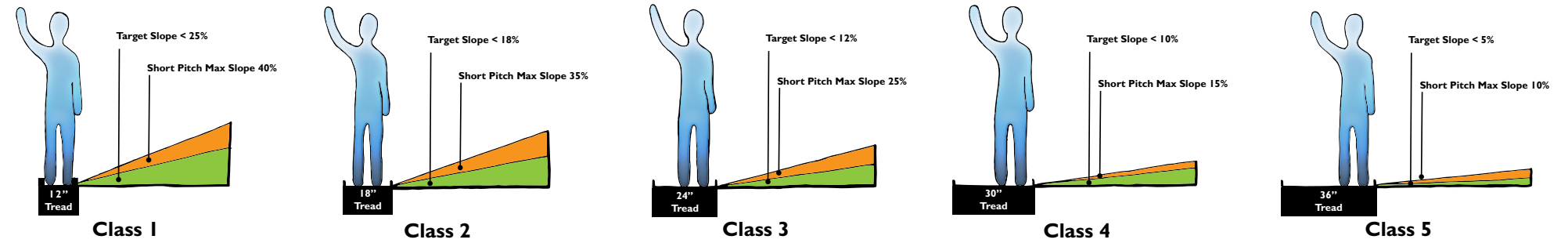
*Adapted from: State of Minnesota DNR. Trail Planning, Design, and Development Guidelines*

# GOAL IDENTIFICATION

# ANALYSIS

## RECOGNITION OF CONSTRAINTS & OPPORTUNITIES

Current trail class?  
Intended use types?  
Current trail use?



**Class 1**  
Wilderness trail experience for highly skilled users. Maintained every five or more years.

**Class 2**  
Semi-primitive trail for mid-to-highly skilled users. Maintained every 3-5 years.

**Class 3**  
Semi-developed natural trail experience for users with an intermediate skill level. Maintained every 1-3 years.

**Class 4**  
Developed natural trail experience for users with minimal skills. Maintained at least annually.

**Class 5**  
Urban trail experience for users with very limited experience. Maintained weekly or as needed.

*From the MA DCR trails best practices manual*

# GOAL RE-ARTICULATION



# CRITERIA

# DESIGN

# DESIGN DETAIL

Posting trail class information such as average grade and surface condition at trailheads can help users make informed decisions about their ability to complete a hike.





GOAL IDENTIFICATION

## environment

Slope  
Soil  
Drainage  
Vegetation  
Species of concern and sensitive habitat

## ANALYSIS

RECOGNITION OF  
CONSTRAINTS  
& OPPORTUNITIES

## access & circulation

Road type  
Vehicular and pedestrian circulation in  
neighborhood (including walkability)  
Distances to  
>public transportation  
>major road intersections  
>Environmental Justice populations  
Vehicular and pedestrian circulation on site  
Available parking

GOAL RE-ARTICULATION

CRITERIA

## legal restrictions

Zoning setbacks  
Wetland buffers  
Easements

DESIGN

DESIGN DETAIL

## visual cues

Legibility of trailhead as a trailhead  
Views from trailhead  
Visible landscape pattern

# RECOGNITION OF CONSTRAINTS, OPPORTUNITIES, AND CONFLICTING GOALS

GOAL IDENTIFICATION

ANALYSIS

## RECOGNITION OF CONSTRAINTS & OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

DESIGN

DESIGN DETAIL

**Example 1:** Trailhead has potential for a universally accessible trail and parking lot, however a sensitive wetland at the trailhead needs to be protected.

**Example 2:** Trailhead is located in close proximity to an Environmental Justice community, but there is no public transportation and the road is not walkable. However, a property with much smaller acreage does exist near the EJ community.

**Example 3:**

■ ■ ■ AND GOAL RE-ARTICULATION

GOAL IDENTIFICATION

## Goal

## Criteria

ANALYSIS

Parking for peak use of class 3 trail in suburban town of 15,000



25 cars

RECOGNITION OF CONSTRAINTS & OPPORTUNITIES

Retain 70% of stormwater on-site



120 s.f. of space downslope of parking lot for bioswale

GOAL RE-ARTICULATION

A diversity of users have access to trails



1,000' accessible trail  
+2 accessible parking spaces minimum 8' wide with 1 5' access aisle  
+trail surface to accommodate wheelchairs and strollers  
+map that can be interpreted without reading words  
good lines of site  
+1 bench every 500'

## CRITERIA

DESIGN

DESIGN DETAIL

TRAILHEAD = **space of arrival and transition**



GOAL IDENTIFICATION

ANALYSIS

RECOGNITION OF  
CONSTRAINTS  
& OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

**DESIGN** AMENITIES

DESIGN DETAIL



GOAL IDENTIFICATION

ANALYSIS

RECOGNITION OF  
CONSTRAINTS  
& OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

**DESIGN** AMENITIES

DESIGN DETAIL



GOAL IDENTIFICATION

ANALYSIS

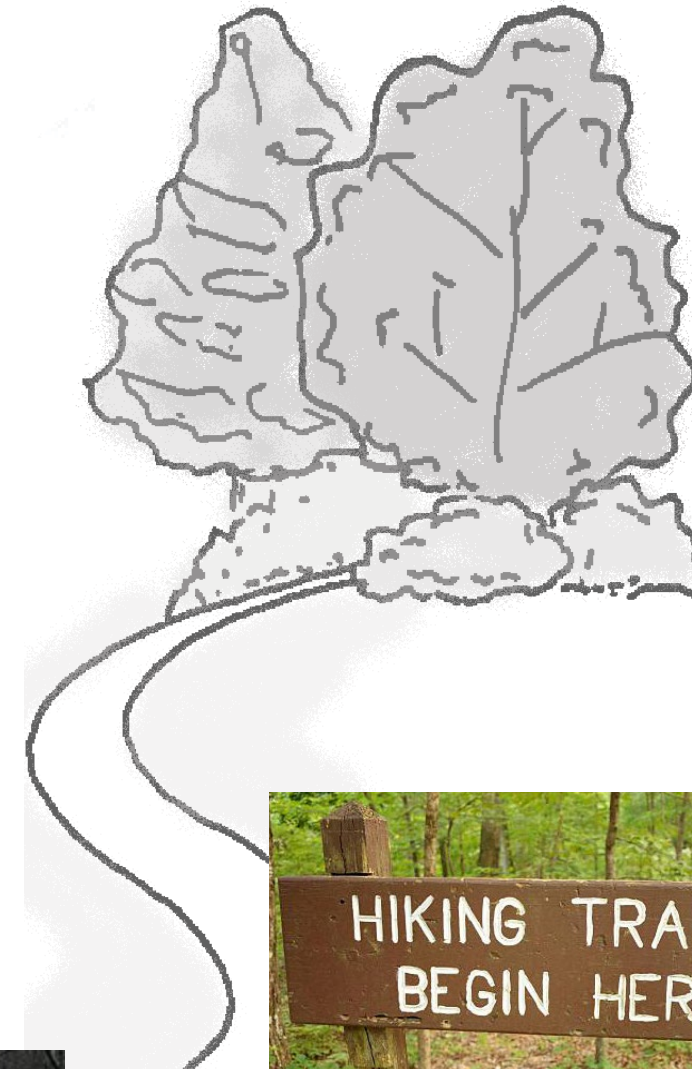
RECOGNITION OF  
CONSTRAINTS  
& OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

**DESIGN** AMENITIES

DESIGN DETAIL



GOAL IDENTIFICATION

ANALYSIS

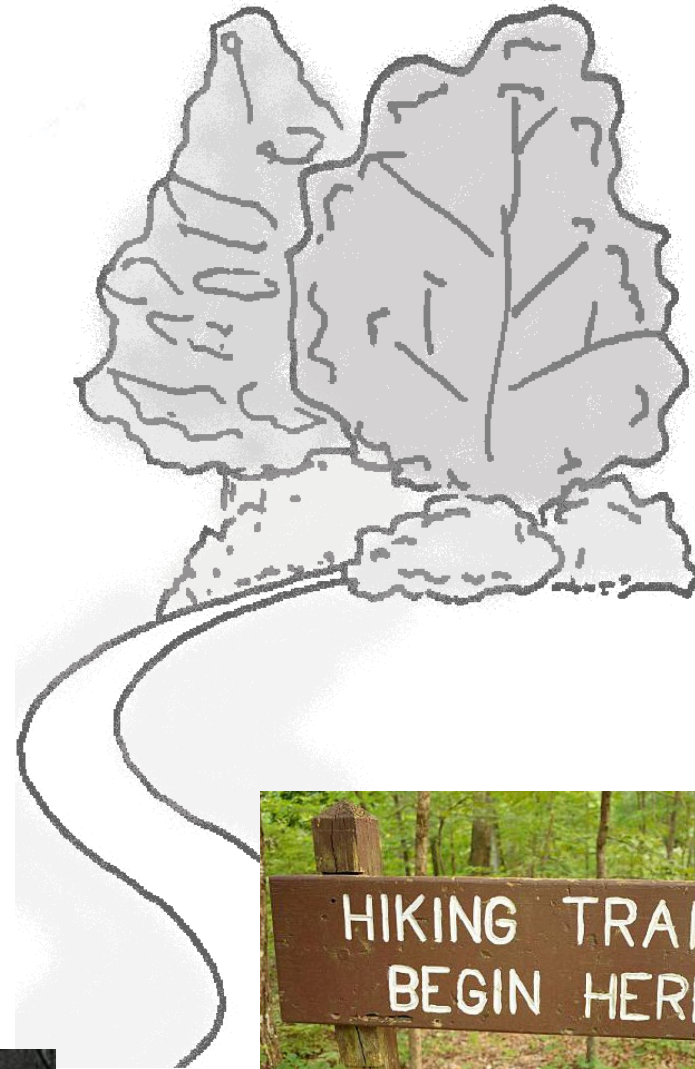
RECOGNITION OF  
CONSTRAINTS  
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GOAL RE-ARTICULATION

CRITERIA

**DESIGN** AMENITIES

DESIGN DETAIL





GOAL IDENTIFICATION

ANALYSIS

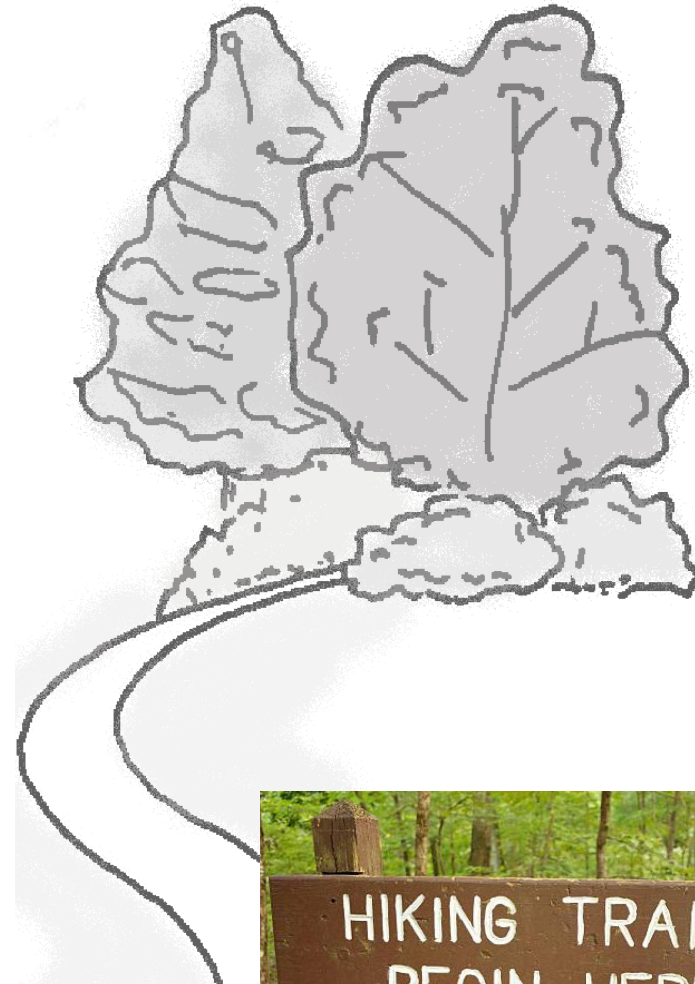
RECOGNITION OF  
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GOAL RE-ARTICULATION

CRITERIA

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DESIGN DETAIL



GOAL IDENTIFICATION

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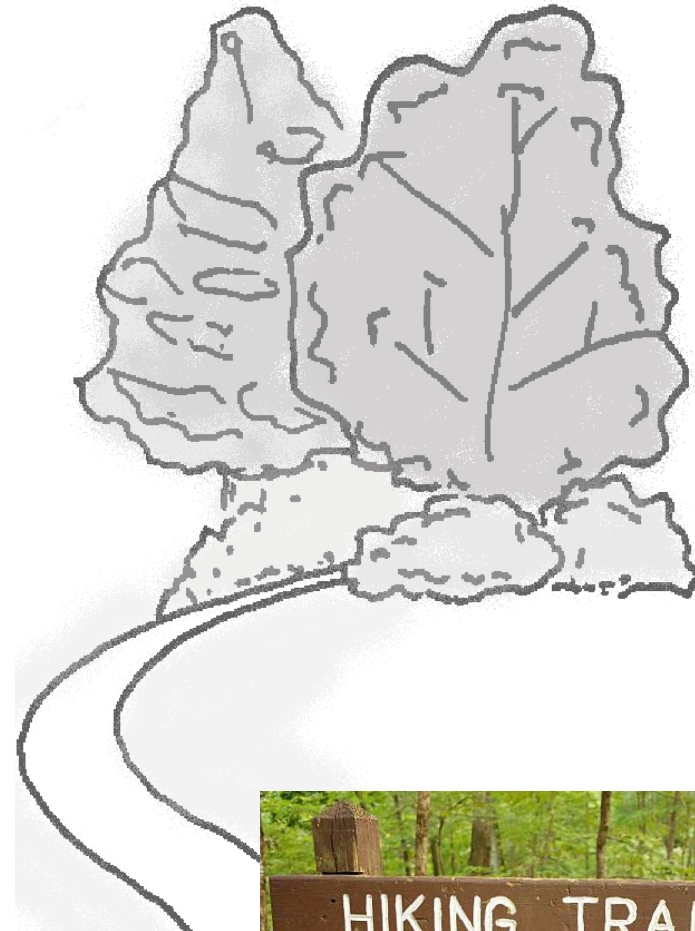
RECOGNITION OF  
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CRITERIA

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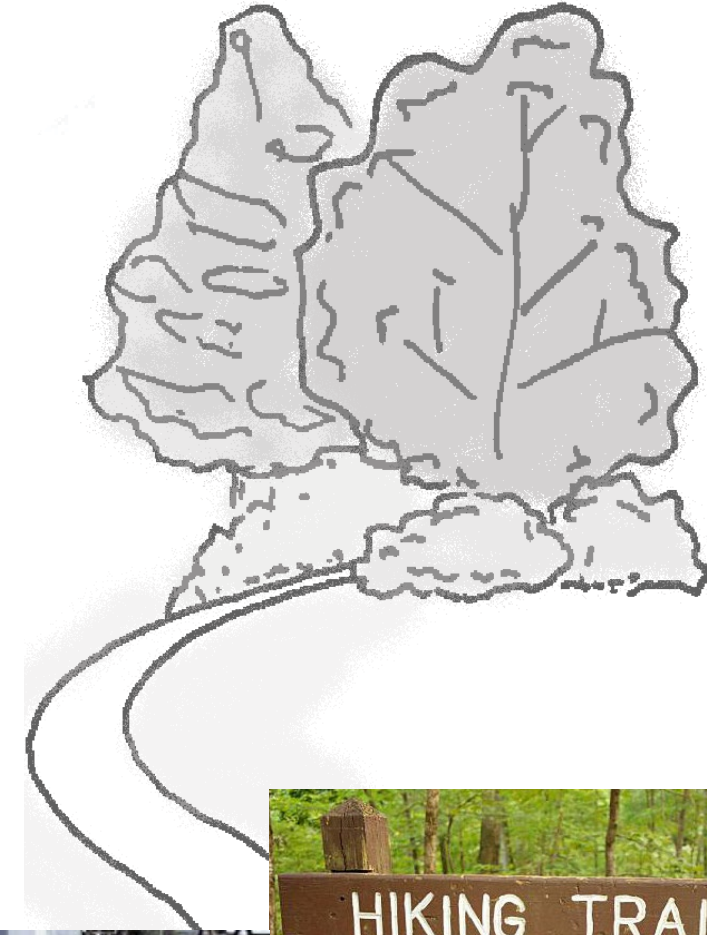
RECOGNITION OF  
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GOAL RE-ARTICULATION

CRITERIA

**DESIGN** AMENITIES

DESIGN DETAIL



GOAL IDENTIFICATION

ANALYSIS

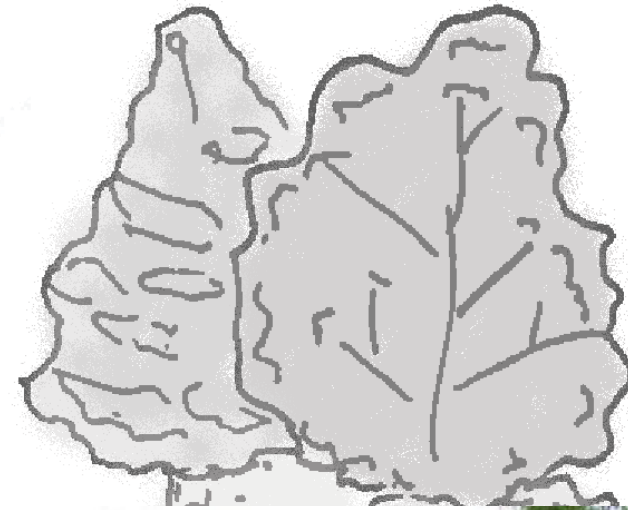
RECOGNITION OF  
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GOAL RE-ARTICULATION

CRITERIA

**DESIGN** AMENITIES

DESIGN DETAIL



GOAL IDENTIFICATION

ANALYSIS

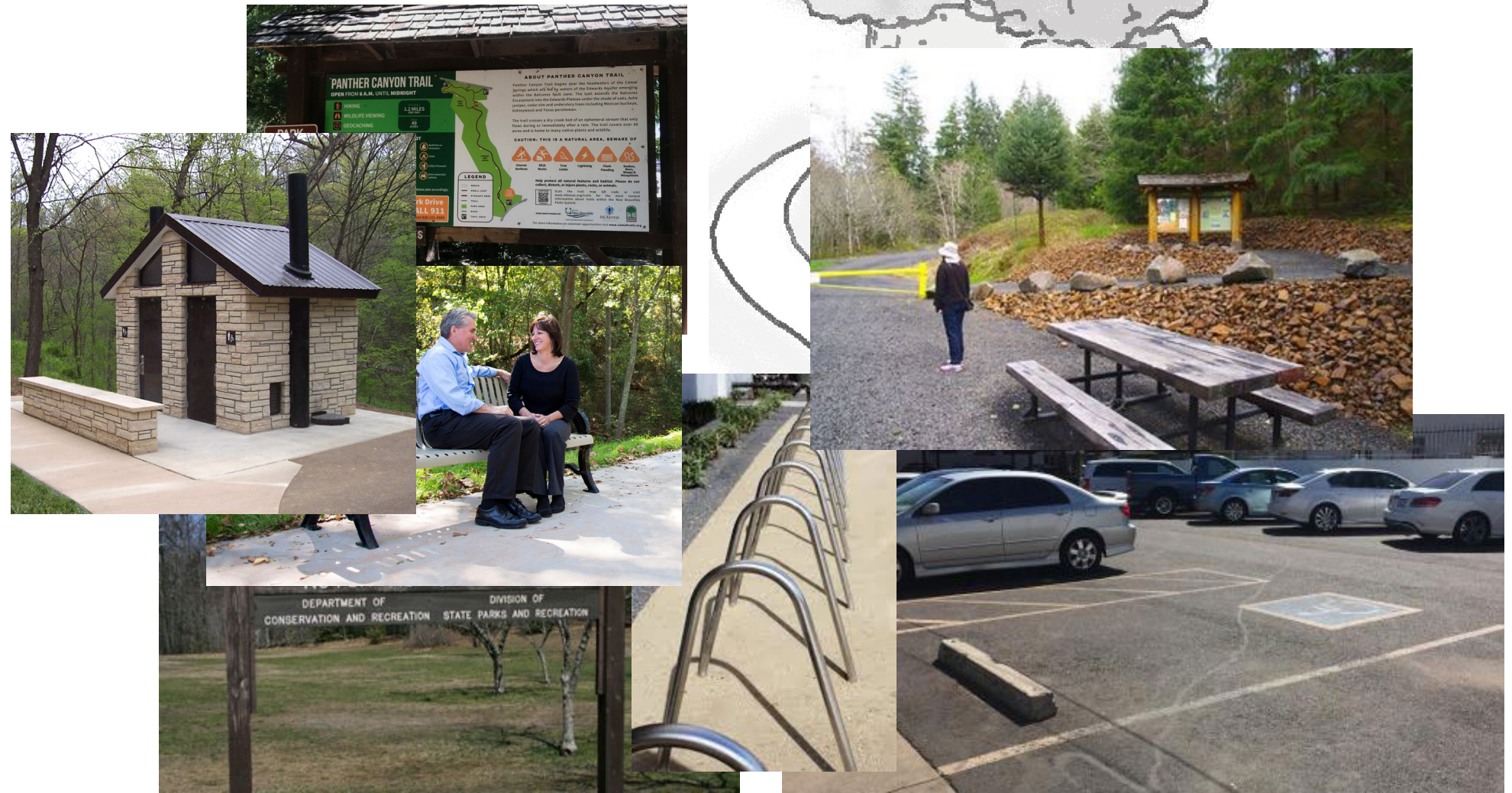
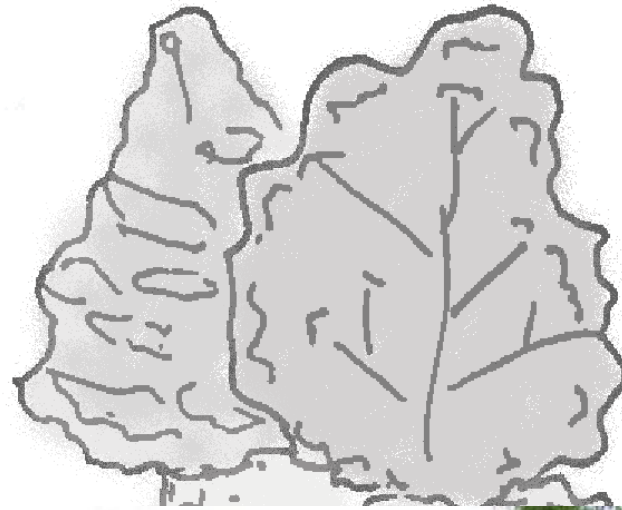
RECOGNITION OF  
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GOAL RE-ARTICULATION

CRITERIA

**DESIGN** AMENITIES

DESIGN DETAIL



GOAL IDENTIFICATION

ANALYSIS

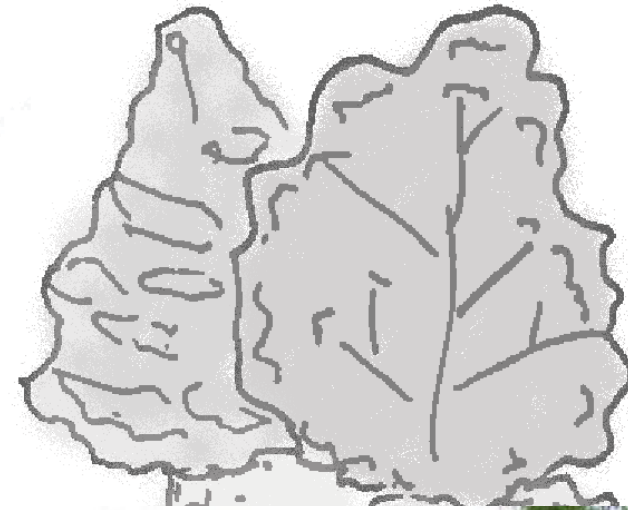
RECOGNITION OF  
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GOAL RE-ARTICULATION

CRITERIA

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DESIGN DETAIL



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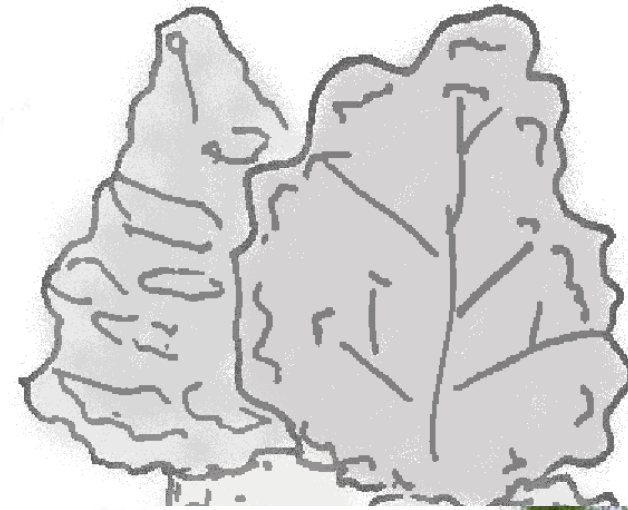
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GOAL RE-ARTICULATION

CRITERIA

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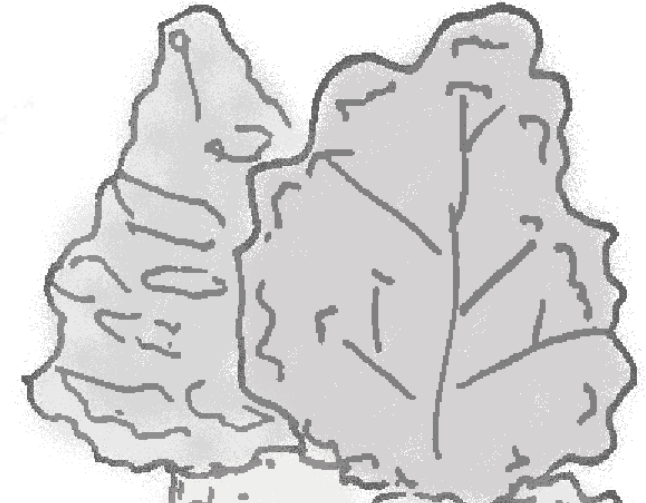
RECOGNITION OF  
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GOAL RE-ARTICULATION

CRITERIA

**DESIGN** AMENITIES

DESIGN DETAIL



GOAL IDENTIFICATION

ANALYSIS

RECOGNITION OF CONSTRAINTS & OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

DESIGN AMENITIES

DESIGN DETAIL



GOAL IDENTIFICATION

ANALYSIS

RECOGNITION OF  
CONSTRAINTS  
& OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

**DESIGN** AMENITIES

DESIGN DETAIL



## GOAL IDENTIFICATION

## ANALYSIS

## RECOGNITION OF CONSTRAINTS & OPPORTUNITIES

## GOAL RE-ARTICULATION

## CRITERIA

## DESIGN AMENITIES

## DESIGN DETAIL

	Class 1	Class 2	Class 3	Class 4	Class 5
DCR Use Level	Low use	Low to moderate use	Moderate to high use	Very heavy use	Intensive use
DCR User Skill Level	Highly skilled	Medium to highly skilled	Intermediate skill	Minimal skill	Limited skill
DCR Maintenance interval	5 or more years	3-5 years	1-3 years	Annually	Weekly or as needed
<b>Adequate off-street parking</b>	Space for 0-3 cars. Informal road shoulder parking on low-use roads. Little to no parking surface improvement. No van access.	Space for 1-5 cars. Informal road shoulder parking on low - to - medium - use roads. May not have turn-around space. Little to no parking surface improvement. No van access.	Space for 5-10 cars. Off-street parking with turn-around space on medium - to - high - use roads. 2% - 5% slopes for parking area, 10% or less sloped driveway. Driveway wide enough for at least one car. Improved aggregate parking surface may be necessary to maintain site under heavy traffic. Van parking may be marked. Parking delineation	Space for 10-20 cars. Off-street parking with turn-around space on medium-to-high-use roads. 2% to 5% slopes for parking area, 10% or less sloped driveway. Driveway wide enough for two cars. Improved aggregate parking surface to handle heavy traffic. Van parking may be marked. Parking lot delineated with fencing, hardscape, or	Space for 20+ cars. Off-street parking with turn-around space. 2% - 5% slopes for parking area, 10% or less sloped driveway. Driveway wide enough for two cars. Parking area should be paved to accommodate intense traffic. Van accessible parking should be provided. Parking lot delineated with fencing, hardscape, or vegetation.
<b>Clear sight lines at parking entry and exit points</b>	No	No	Yes; entrance visible from 50 feet away on road suggested.	Yes; entrance visible from 100 feet away on road suggested.	Yes; entrance visible from 200 feet away on road suggested.
<b>Landscape Management</b>	No	No	Vegetation around parking lot entry and exit should be managed 25 feet on each roadway from the intersection to maintain clear sight lines for vehicles.	Vegetation around parking lot entry and exit should be managed 25 feet on each roadway from the intersection to maintain clear sight lines for vehicles.	Vegetation around parking entry and exit should be managed 25 feet on each roadway from the intersection to maintain clear sight lines for vehicles. More comprehensive landscaping around parking lot and trailhead may be appropriate.
<b>Clearly visible and defined trailhead entrance</b>	Optional	Optional: 3 feet wide	Yes: 3 - 5 feet wide	Yes: 5 - 8 feet wide	Yes: 8 -15 feet wide. Bollards, gates, or other barriers may be considered to deter vehicular passage.
<b>Signs</b>	Possible blazes	Blazes. Local trail or property name should be considered.	Blazes and local trail or property name. NET sign and kiosk should be considered.	Kiosk. Blazes, local trail name, NET sign. Property name should be considered.	Kiosk. Blazes, local trail name, NET sign. Property or location name should be strongly considered.
<b>Bike racks</b>	No	No	May be appropriate depending on user-groups and on proximity to neighborhoods and regional rail-tra	Should be considered. May be appropriate depending on user-groups and on proximity	Should be strongly considered. May be appropriate depending on user-groups and on
<b>Pedestrian road crossings</b>	No	No	Should be considered when necessary.	Should be strongly considered when necessary.	Yes, when necessary
<b>Seating/Picnic Area</b>	No	No	Optional, should be shaded.	Optional, should be shaded.	Yes, should be shaded.
<b>Trash Receptacles</b>	No	No	No	No	Yes
<b>Restrooms</b>	No	No	No	No	Yes
<b>Art Space</b>	No	No	Possible	Possible	Possible
<b>Maintenance</b>	Same as trail maintenance level: 5 or more years.	Same as trail maintenance level: 3-5 years.	Same as trail maintenance level: 1-3 years.	Same as trail maintenance level: annually.	Same as trail maintenance level: weekly or as needed.

## GOAL IDENTIFICATION

## ANALYSIS

## RECOGNITION OF CONSTRAINTS & OPPORTUNITIES

	Class 1	Class 2	Class 3	Class 4	Class 5
DCR Use Level	Low use	Low to moderate use	Moderate to high use	Very heavy use	Intensive use
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## GOAL RE-ARTICULATION

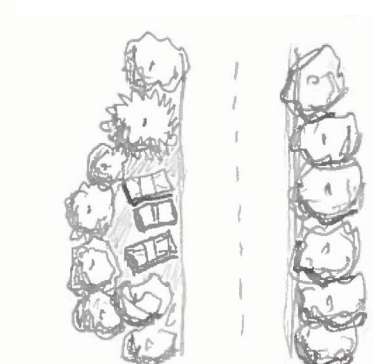
## CRITERIA

## DESIGN AMENITIES

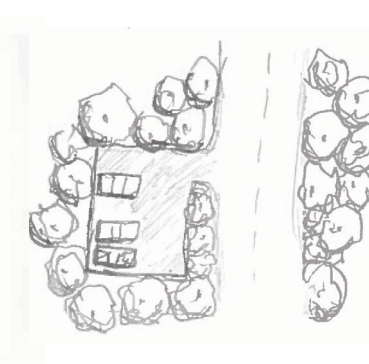
## DESIGN DETAIL



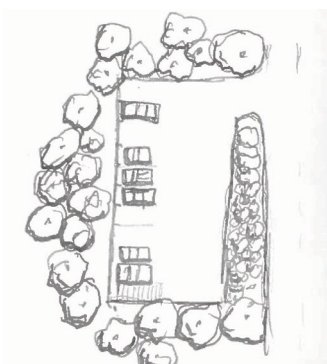
Class 1 trailhead. Informal pull-off parking for 0-1 cars.



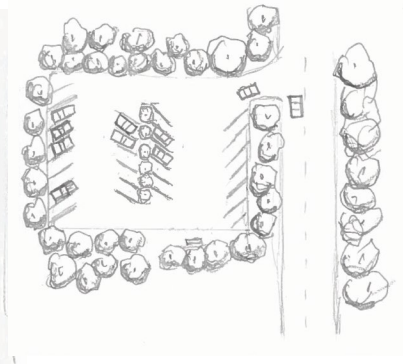
Class 2 trailhead. Informal pull-off parking for 1-5 cars.



Class 3 trailhead. Off-street parking for 5-10 cars.



Class 4 trailhead. Off-street parking for 10-20 cars.



Class 5 trailhead. Off-street parking for 20 or more cars.

## GOAL IDENTIFICATION

- Clear line of sight to trailhead upon entry
- Safe passage from parking space to trail

## ANALYSIS

## RECOGNITION OF CONSTRAINTS & OPPORTUNITIES



## GOAL RE-ARTICULATION

## CRITERIA

## **DESIGN** ACCESS & CIRCULATION

## DESIGN DETAIL



- Safe street crossing

GOAL IDENTIFICATION

ANALYSIS

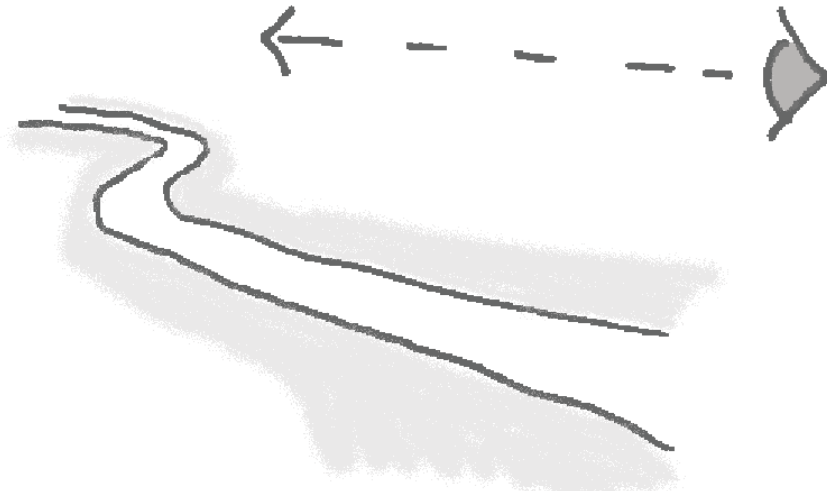
RECOGNITION OF  
CONSTRAINTS  
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GOAL RE-ARTICULATION

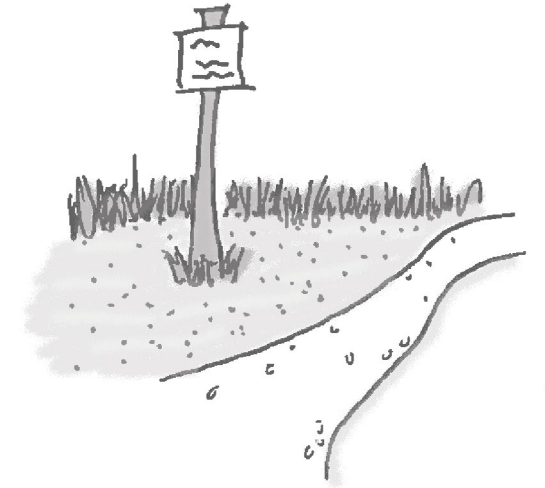
CRITERIA

**DESIGN** VISUALS

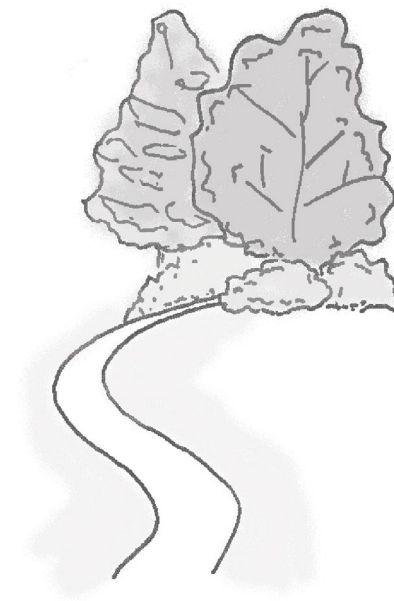
DESIGN DETAIL



Visual access creates familiarity and confidence



Human sign such as mowing and signposts communicates care



Mystery encourages exploration

## GOAL IDENTIFICATION

## ANALYSIS

## RECOGNITION OF CONSTRAINTS| & OPPORTUNITIES

## GOAL RE-ARTICULATION

## CRITERIA

# DESIGN EXPERIENCE

## DESIGN DETAIL

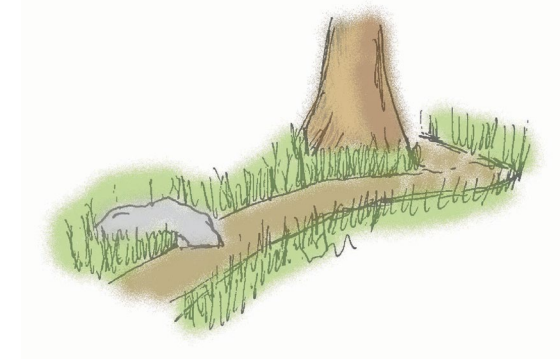
"SUCCESSFUL TRAILS ARE A SEQUENCE OF EVENTS: Trails offering a rich and continuous experience do not just happen. They are the result of thoughtful consideration of the site's physical and scenic qualities and conscientiously using them to create a sequence of events that add interest, offer challenges, and exhibit scenic values that contribute to the trail experience.

"Successful trails are designed at a detailed, intimate scale offering moment-to-moment experiences that bring visitors back again and again. The more a trail responds to the nuances of the site, the higher its value to the user. [...] creating a sense of place and trail context are essential design objectives."

State of Minnesota DNR, *Trail Planning, Design, and Development Guidelines*



Edges



Anchors



Gateways



Destinations



GOAL IDENTIFICATION

ANALYSIS

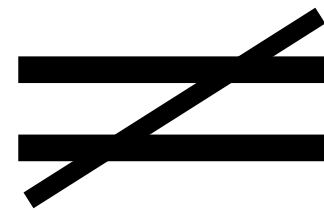
RECOGNITION OF  
CONSTRAINTS|  
& OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

**DESIGN** ENVIRONMENT

DESIGN DETAIL



GOAL IDENTIFICATION

ANALYSIS

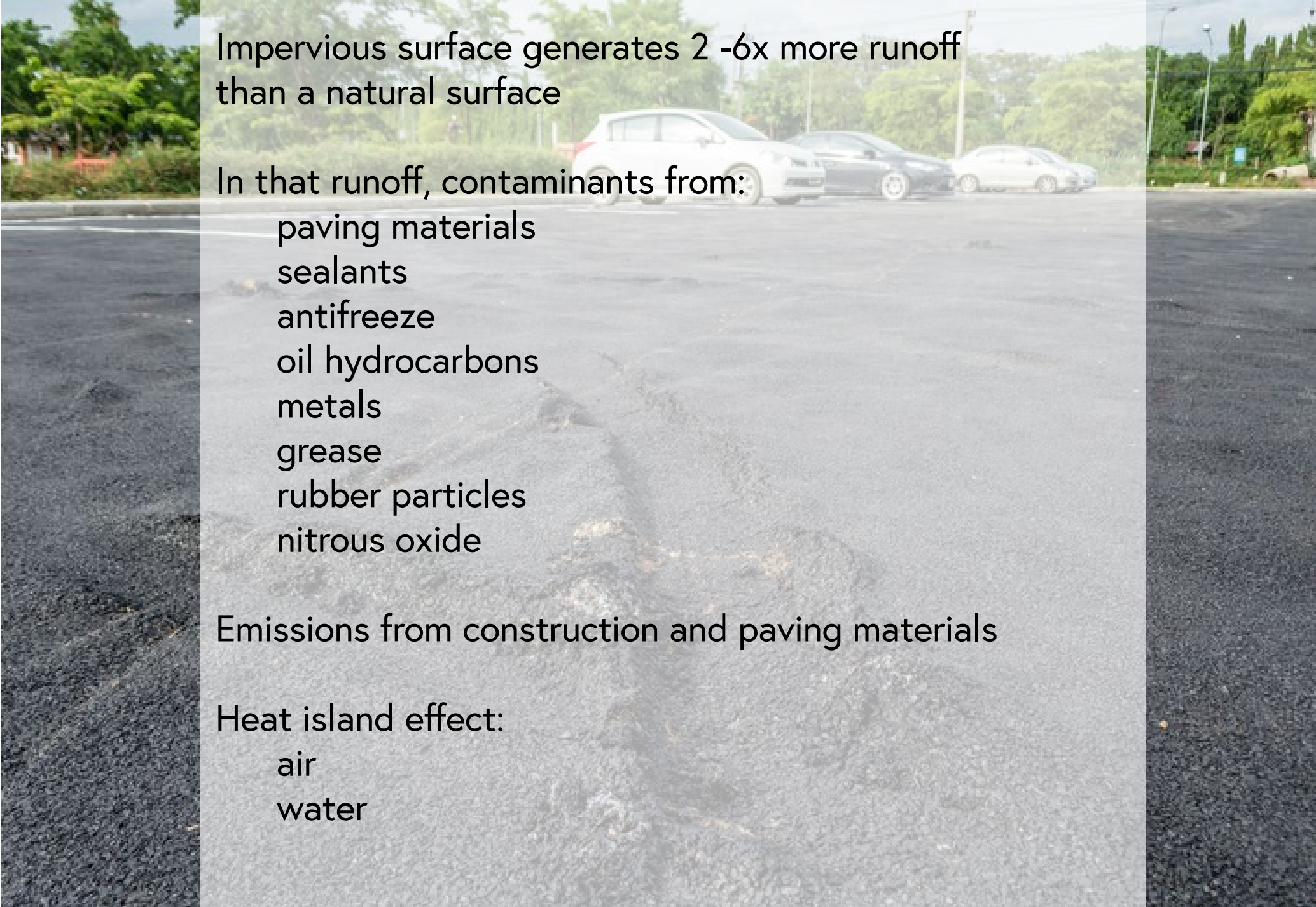
RECOGNITION OF  
CONSTRAINTS|  
& OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

**DESIGN** ENVIRONMENT

DESIGN DETAIL



Impervious surface generates 2 -6x more runoff  
than a natural surface

In that runoff, contaminants from:

- paving materials
- sealants
- antifreeze
- oil hydrocarbons
- metals
- grease
- rubber particles
- nitrous oxide

Emissions from construction and paving materials

Heat island effect:

- air
- water

GOAL IDENTIFICATION

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**DESIGN** ENVIRONMENT

DESIGN DETAIL

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In that runoff, contaminants from:

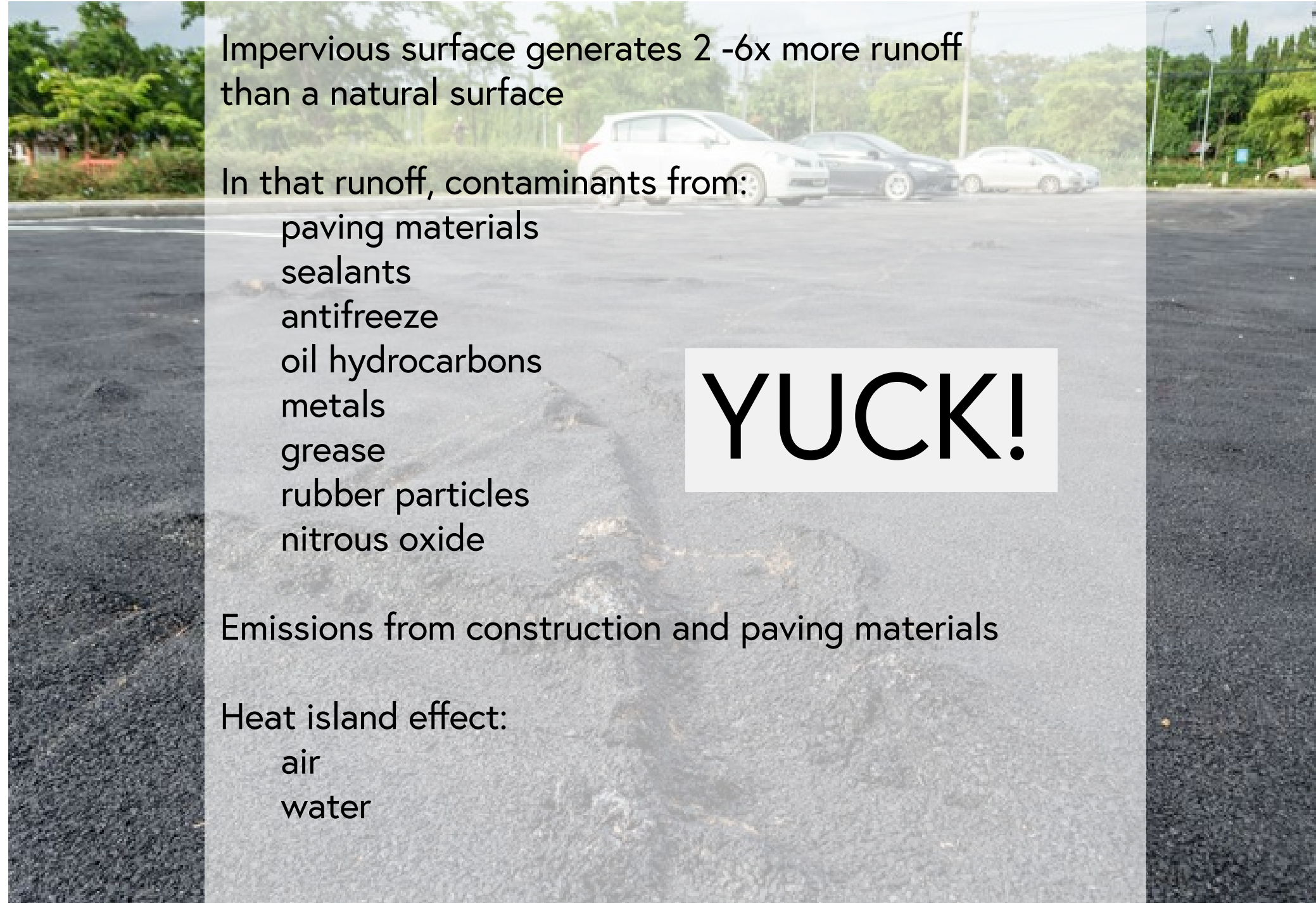
- paving materials
- sealants
- antifreeze
- oil hydrocarbons
- metals
- grease
- rubber particles
- nitrous oxide

**YUCK!**

Emissions from construction and paving materials

Heat island effect:

- air
- water



GOAL IDENTIFICATION

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& OPPORTUNITIES

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CRITERIA

**DESIGN** ENVIRONMENT

DESIGN DETAIL



## REDUCE FOOTPRINT OF ASPHALT

- Reduce stall dimensions
- Plan for overflow parking on grass

## INCREASE PERMEABILITY OF PARKING AND PATHWAY MATERIALS

- INSTEAD OF ASPHALT OR IMPERVIOUS GRAVEL, USE:
  - pervious gravel (1/4" - 2-1/2" diameter)
  - cobble
  - wood mulch
  - grass pavers
  - stone dust



## SPREAD AND SINK SURFACE RUNOFF

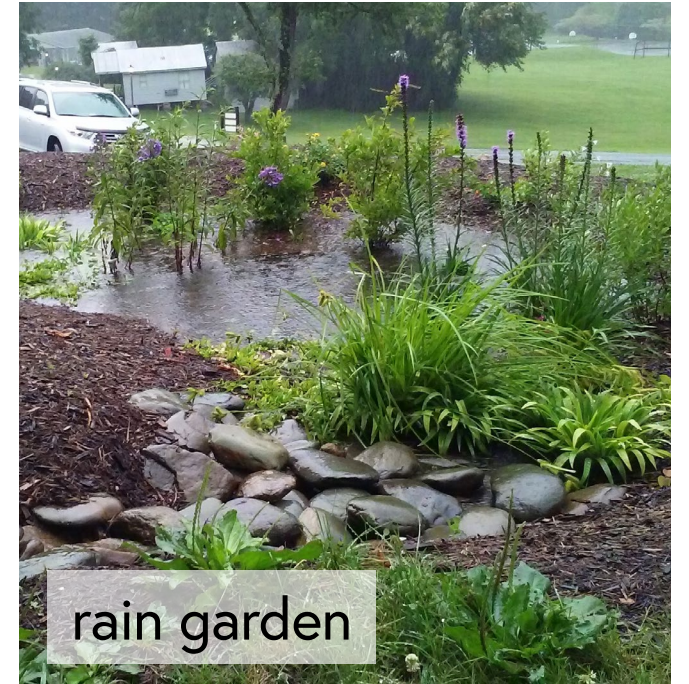
- INSTALL GREEN INFRASTRUCTURE
  - I.e. Water catchment systems with structural controls and bioengineering techniques designed to facilitate natural water cycling process by capturing, filtering, infiltrating, or storing stormwater.

*USING LOW IMPACT DESIGN BEST MANAGEMENT PRACTICES (Mass Audubon)*

GOAL IDENTIFICATION

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RECOGNITION OF  
CONSTRAINTS & OPPORTUNITIES



GOAL RE-ARTICULATION

CRITERIA

DESIGN

**DESIGN DETAIL**



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**DESIGN DETAIL**



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& OPPORTUNITIES

GOAL RE-ARTICULATION

CRITERIA

**DESIGN**

DESIGN DETAIL



# Open Space, Recreation & Multi-Use Trail Plan (2018-2025)

## 9. Develop Multi-Use Trails for Easy Public Access.

Northampton is increasingly becoming the mecca for multi-use trail users. With the doubling of the length of rail trails in Northampton in 2009-2010 and the slow but steady growth since then, the city has become the hub for a rail trail system that will eventually extend from Northampton north to Turners Falls, east to Boston, and south to New Haven.

The trails having been serving recreation uses for many years, but with the growth in the network they are now increasingly being used for all uses, including journey to work, play, and shopping. This decreases, even if only marginally, vehicular traffic, improves healthy lifestyles, and creates a transportation route far less expensive to tax payers than roads and highways.

The City's objective is to make 75% of the city easily accessible to trail systems. This would be done through additional trails, improved access to neighborhoods as multi-use spurs, standalone

“short-cuts,” and bicycle lanes for that last mile.

Resources to fund: LAND, Land and Water Conservation Fund, and other federal, state, and foundation grants, Community Preservation funds, city funds, Northampton Bikes Endowment Fund, n grants, community fund-raising, and limited development dividends.

Timing: On-going over entire plan period

**1. Develop bike infrastructure to connect to multiuse trails, including ValleyBike Share, connecting bike lanes and tracks, bike repair and storage, and repaving State and Bridge Streets.** None of these are multi-use trails, but they are the feeders and the infrastructure needed to build bike culture and make the trails a success.

**2. Major trail expansions, Rocky Hill Greenway (the top priority), MassCentral connection to Williamsburg, Damon Road Multiuse Trail, and the Connecticut River Greenway.**

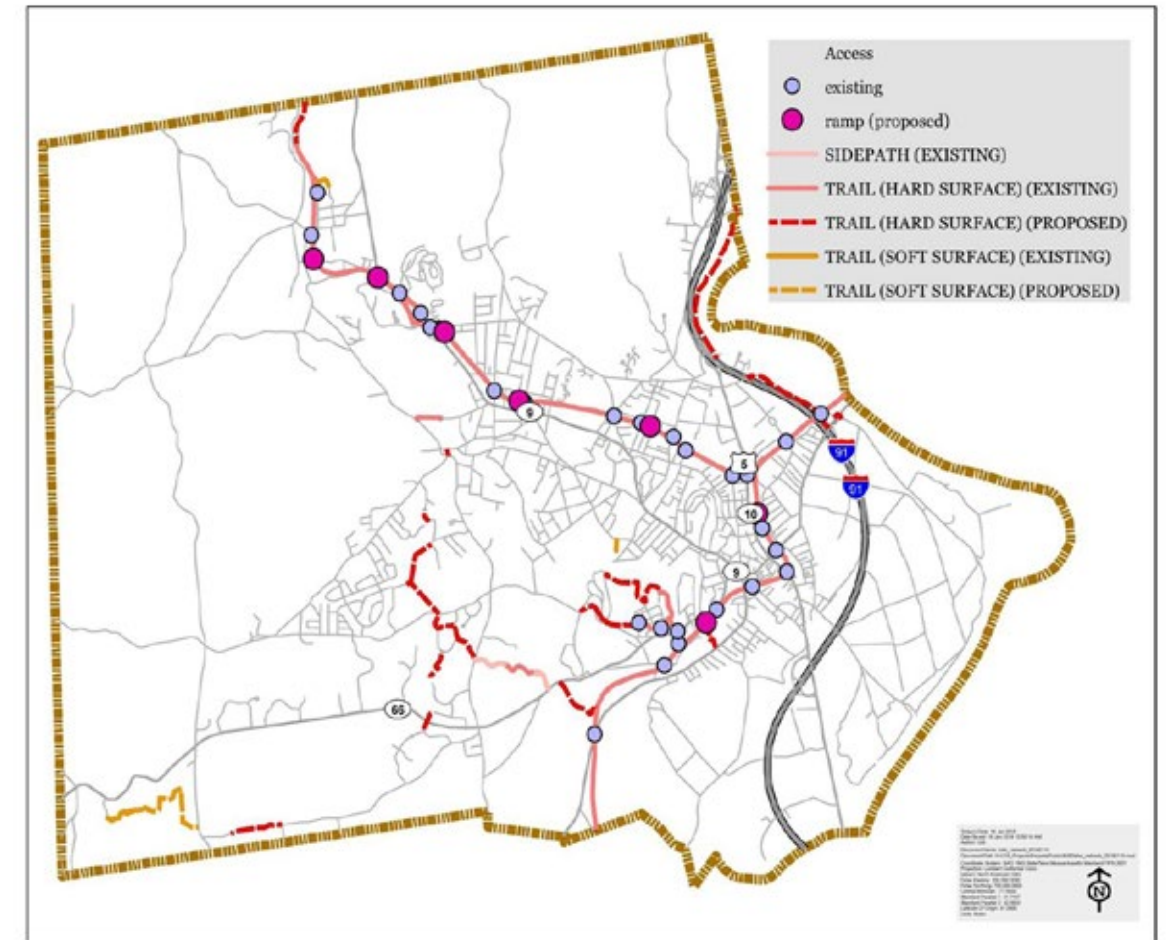
The **Rocky Hill Greenway** is the City's top multiuse trail priority, connecting the existing multiuse trail network with the largest neighborhood in the City currently unserved by multiuse trails. In order of priority: 1) Rocky Hill Greenway through Burts Bog is critical to connect the neighborhood and provide access to the conservation area, 2) Rocky Hill Greenway from the New Haven and Northampton Canal Greenway, which is currently under design and an approved MassDOT project, and 3) the remaining gap between these projects and the already completed section of the Rocky Hill Greenway.

The next priority is the **Connecticut River Greenway trail to Hatfield**, from Damon Road or 1.3 miles from River Run Access Road to Elm Court in Hatfield would dramatically open up multi-use trail opportunities. It would connect a new town to the growing rail trail network and provide easy access to Hatfield's safe back roads for Northampton bicyclists. It would also be a spectacular trail with great Connecticut River vistas and it would be anchored by the south by the new greenway community boathouse park and on the north by the Connecticut River Greenway parcel with frontage on the river.

## 12. Improved Public Awareness

It is important to improve public awareness of open space, recreation, and multi-use trail opportunities. We have a responsibility to ensure that the public is aware of resources in the community.

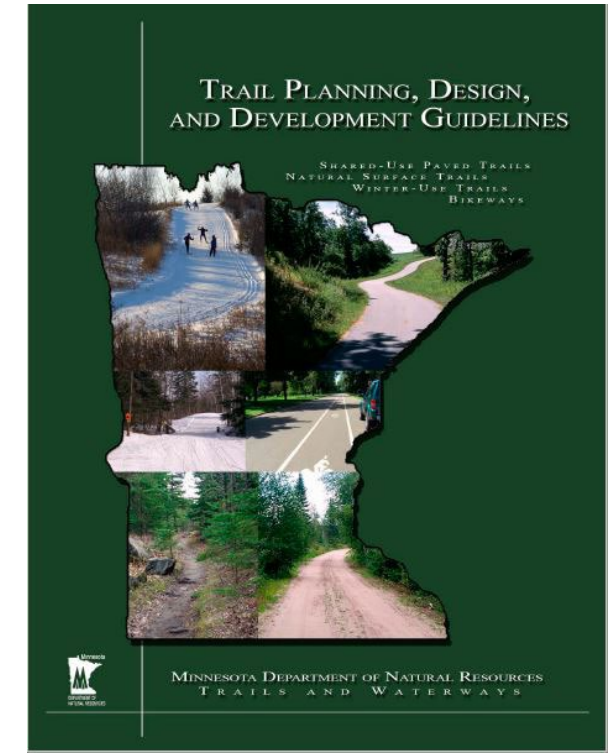
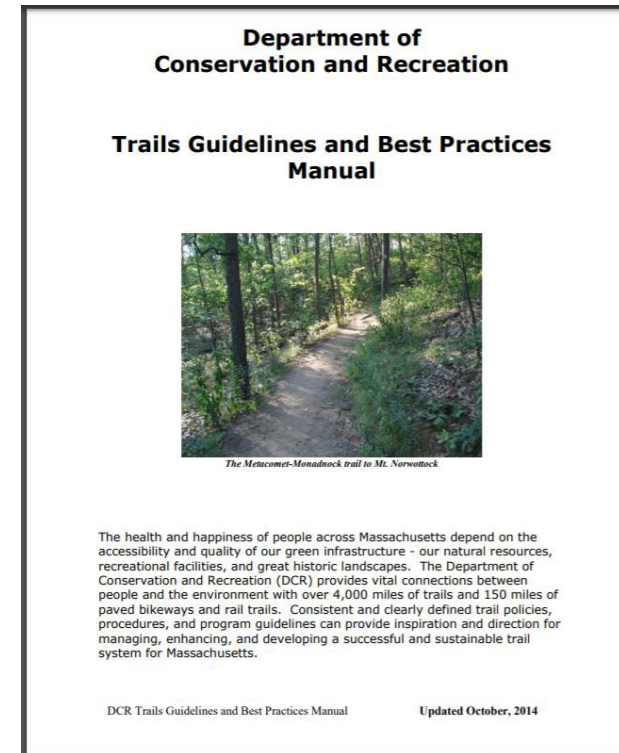
1. Expand bicycle rack and infrastructure program to raise public awareness.
2. Improve web information resources
3. Mark all open space property boundaries.



**Multi-Use Trail Expansion**



## RESOURCES



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