Roadside Vegetation Presentation
Department of Geographical and Sustainability Sciences

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Prairie by Pavement:

A proposal for native roadside vegetation in Iowa City
You’ve probably noticed prairie plants along rural roadways already

- Iowa Department of Transportation Integrated Roadside Vegetation Management (IRVM) project
- Initiated in the 1970s
- More than 50,000 acres have been planted with native grasses and wildflowers along our Interstates, highways, and county roads

Research question: Could this work in a city?

IowaDOT has documented many benefits of using prairie plants, including:

• Low-maintenance weed control
• Reduced surface runoff and improved water infiltration
• Filtering and capture of herbicides, pesticides, and sediment
• Increased biodiversity
• Roadside beautification

With the right preparation, yes it can!
Project scope:
A segment of Highway 6 in the center of Iowa City

Investigation area:

What we found:

• Most of the areas we visited had a combination of turf grass, weeds, shrubby plants, and some trees
• Many were subject to regular maintenance such as mowing and chemical applications
• Indicators of erosion and salt damage were evident throughout the investigation area

Prairie could help
The average root depth was found to be 8 cm. In comparison, prairie plant roots can be 60-450 cm long!

Data collection:
The study area was subdivided and visual inspections documented for each site.

Notes were made about:
- Vegetative cover
- Turf maintenance
- Slope
- Indicators of erosion
- Litter
- Physical infrastructure on site
- Soil quality

Elementary root depth was also measured along a diagonal transect for each site.
Data collection also involved evaluating each site using GIS information.
Following the initial assessments, three potential sites were selected:
Each site has unique opportunities and challenges for prairie plantings

**Strengths**

- Level sections near the road or at the top of the hill are good places to start
- Least amount of salt damage observed along the road
- **Prairie can slow water runoff from the hill, increase infiltration, and mitigate erosion observed on the hillside**
- Easy accessibility for maintenance
- **Reduced maintenance frequency, expense, and risk after establishing prairie**
- High project visibility for pedestrians and traffic – good site for signage and other education elements

**Challenges**

- Slope will require more seed to establish a prairie, increasing expense
- May be difficult to burn due to proximity to roads and homes
- A number of trees exist on the hill that may eventually require removal
- Lots of creeping Charlie on site might infiltrate prairie during planting
- Initial complaints may arise about the aesthetics due to high visibility of the site

Myrtle Hill
Strengths

- Good sun exposure
- Easy access for maintenance
- Level ground
- **Prairie can help address erosion and improve water filtration**
- **Proximity to river increases benefits to the waterway**
- Native plants can be integrated into current landscaping, increasing aesthetic value
- Good opportunity for public education
- **Prairie can replace the 13 ash trees that will likely need removal**

Challenges

- High pedestrian traffic
- Visibility concerns for automotive traffic
- Exposed on either side to vehicular traffic and road maintenance regimes
- Degraded soil quality
- Narrow plot
Strengths

- Currently under construction – will need to be replanted
- No trees to remove
- Relatively level
- Subject to no pedestrian traffic
- Low risk to visibility for drivers
- Sizable area with good sun
- Good maintenance access from behind Carver Arena
- Can function as a buffer between the road and the oak savannah

Challenges

- Heavily compacted soil
- Artifacts from the construction work likely buried in the ground
- Exposure to traffic along a busy road
- Invasive species including garlic mustard, peppergrass, and yellow rocket present at site
- High amounts of litter
- Institutional neglect
Because of the unique characteristics of each site, we make different recommendations for each:

For example:

- The Hawkins Drive location is near other prairie areas and, as such, is the best candidate for a fire-based maintenance regime.
- Visibility concerns for the Riverside parking area suggest a short-grass prairie mix would be more ideally suited to the site.
- Myrtle Hill is large enough that it could be planted in stages, perhaps starting at the top to allow the prairie to “walk” down the hill.
Prairie Restoration Planning

- Site Preparation
- Seeding
- First-Season Management
- Long-Term Maintenance

Image source: usbg.gov
Goal

A well-planned seed mix to construct a diverse, weed-resistant prairie community

Methods

- Identifying characteristics of tallgrass prairie species
- Assessing site conditions
- Studying criteria of seed mixes from prairie restoration handbooks

Outcome

- Comprehensive guidelines of designing seed mixes for recommended sites
Seed Mixes Guidelines

Characteristics of Tallgrass Prairie:

- Grass, Forbs, and Sedges
- Cool-season & Warm-season Plants
- Annuals, Biennials, Perennials

Site Conditions:

- Soil Moisture Type: Mesic
- Slope: 0-25 Percent
- Light Conditions: full, partial

Guidelines

- Select species native to the region
- Seed mixes should contain:
  - grass, sedge and forb
  - Annual, biennial and perennial
- Species-diverse seed mixes:
  - 6 grasses, 3 sedges, 25 forbs species
  - At least a 50:50 ratio of grass seed to forb seed
- Plant seeds with a minimum of 40 seeds per square foot
- Estimate cost of seed with seed calculator programs
Reputable Sources for Seed Mixes

- USDA NRCS PLANTS Website
  - Information of Tallgrass Species
  - Plant Guideline

- Iowa Natural Resources Conservation Service
  - Seed Mixes Calculator
  - A List of Native Tallgrass Seeds of Iowa
Benefits and Costs

- The University of Iowa maintains 493 acres, of which 74% is turf grass
- The average maintenance costs are $3049 per acre
- Prairie seed mixes that meet our criteria cost between $400 and $1959 per acre, compared to turf grass seed mixes, which average $830 per acre
- Initial costs for prairie are higher, though maintenance costs are lower in the long term
Costs depend on what seeds are in the mix...

<table>
<thead>
<tr>
<th>Location</th>
<th>Acreage</th>
<th>Cost of Re-seeding Turf</th>
<th>Cost of Seeding New Turf</th>
<th>Estimated Annual Maintenance Costs</th>
<th>Estimated Cost of Prairie Seeding</th>
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<tbody>
<tr>
<td>Site 1 Myrtle Hill</td>
<td>3.6</td>
<td>$1,764</td>
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</tbody>
</table>

Site 2: based on our own estimates of cost of UI short grass mix from United Seeds
Site 3: based on quoted estimate from United Seed representative for DOT IA mix
Site 1: Basic Prairie Mix from Shooting Star Native Seeds

... as well as the availability of seeds based on demand and the prior prairie harvest.
Keys to Success: Site Preparation

Different methods have different outcomes:

• Combination method
• Mechanical cultivation without herbicides
• No-till method
• Cover crop

Image source: Travis Audubon Society http://www.travisaudubon.org
Keys to Success: Maintenance During the First Three Years

**1st year:**
- Use flail mower to mow the weeds to 6 inches tall
- Prevent pulling of weeds
- Disperse the vegetation and prevent clustering

**2nd year:**
- Limit mowing to 1-2 times
- Keep weeds to 12 inches tall
- Avoid disturbing the soil

**3rd year:**
- Apply fire for burning
- Fertilize the prairie
Keys to Success:
Long-term Maintenance

- Prescribed burns
- Mowing and raking
  - Done where burning may be restricted
- Weed control
  - Must be vigilant, especially if not doing prescribed burning
- Interseeding
  - To maintain or increase species biodiversity
Controlled Burns

- Currently used around Mormon Handcart Trail and six other locations
- Equipment: Drip torches, 100 gallon spray backpacks, 500 gallon tow-behind, hand tools
- Entire area not burned
- Integral to prairie ecosystems
- Strict permitting - weather conditions, fire control plans, specific vegetation, topography

Source: windowontheprairie.com
Establishing prairie plants at these sites will require coordination between several stakeholders

- All three sites are owned and maintained by the University of Iowa
- The Iowa Department of Transportation has a 10 foot right-of-way along both sides of the road
- Some sites are located in areas targeted for streetscape improvement by Iowa City
It helps to bring the public on board, too

A few well-placed signs can help:

• Reduce foot traffic through planting areas

• Reduce complaints about areas looking “weedy” or unmaintained

• Help generate interest and enthusiasm for future prairie plantings
Prairie restoration and reconciliation projects are an investment with many ecosystem services as benefits.

Image source: iowaeenvironmentalfocus.org
Data Sources:

- Iowa Department of Transportation
- USDA Natural Resources Conservation Service
- Iowa Natural Resources Conservation Service
- United Seeds
- Shooting Star Native Seeds
- *The Tallgrass Prairie Center Guide to Prairie Restoration in the Upper Midwest* by Daryl Smith, Dave Williams, Greg Houseal and Kirk Henderson
- The USDA NRCS web soil survey
- *Going Native: A Prairie Restoration Handbook for Minnesota Landowners* by the Minnesota Department of Natural Resources
- *Urban Ecology: An Introduction* by Ian Douglas and Philip James
- “Five Steps to Successful Prairie Meadow Establishment” by Neil Diboll

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