

**Houston Extension
of the
Root River State Trail
Master Plan**

**Minnesota Department of Natural Resources
Trails and Waterways Unit**

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Visit the DNR Web site at <http://www.dnr.state.mn.us> for trail information, river level reports, or to download trail maps.

Executive Summary

The 6.7 mile extension of the Root River State Trail will link the current eastern end of the trail to the city of Houston. It will continue the opportunity for trail users to enjoy the character of the Blufflands landscape while traveling from community to community.

The City of Houston, the Root River Trail Towns Association, and other communities east and south of the end of the trail promoted the eastward extension of the trail, to link more communities to the popular Root River State Trail. This extension makes Houston the easternmost trailhead destination, instead of the current terminus in the forestry unit, six miles from the nearest services or access.

Trail uses on the Houston Extension will be similar to those on the Root River State Trail and Harmony-Preston Valley State Trail of the Blufflands Trail System. Bicycling, walking, in-line skating, running, dog-walking, and cross-country skis will be the primary recreational uses of the trail. Trail management guidelines for the Houston Extension will also be similar to the trails it links to.

Description of the alignment

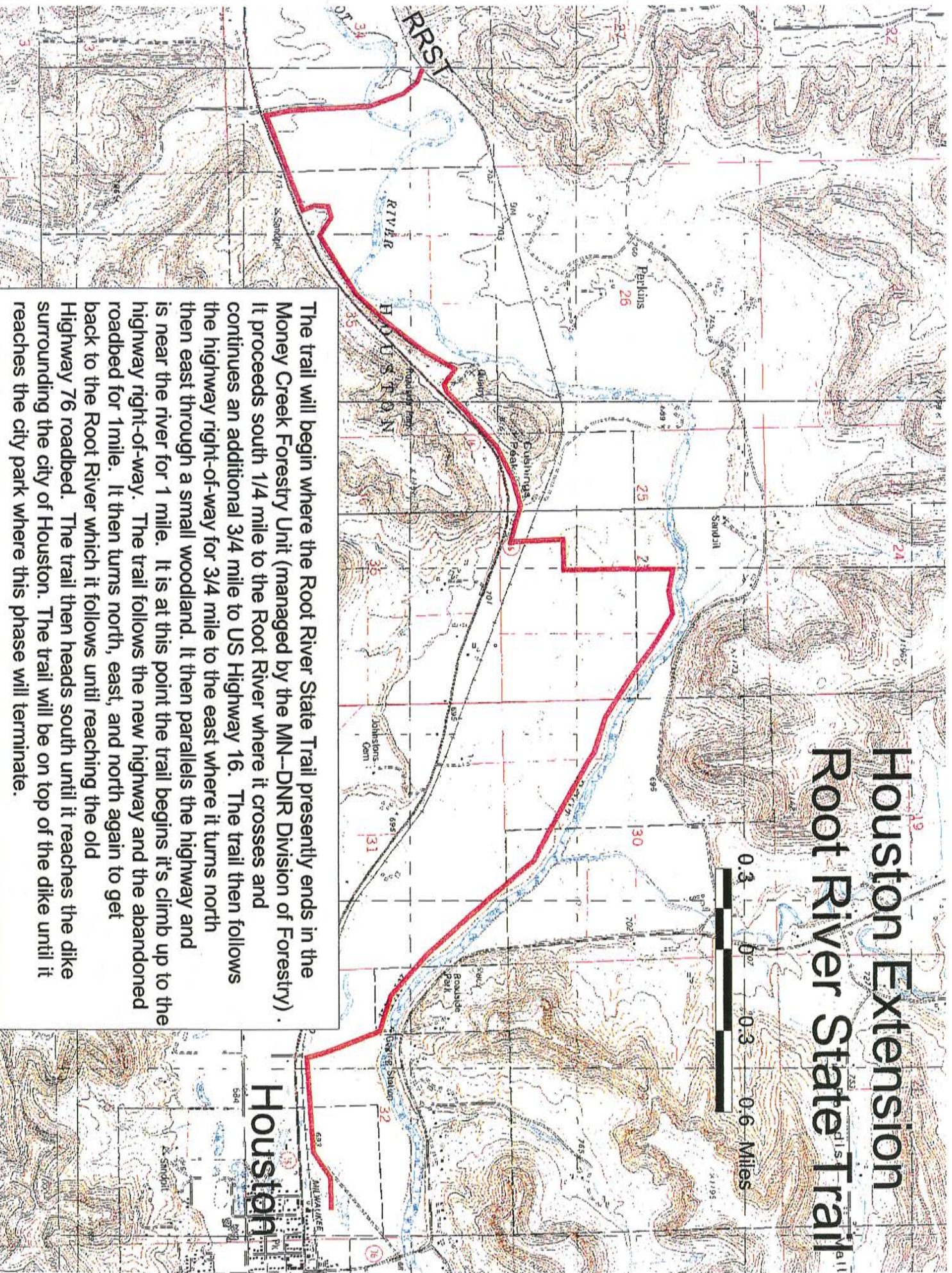
The trail will start on the north side of the Root River in Vinegar Ridge Recreation Area, a part of the Money Creek Woods Unit of the Richard J. Dorer Memorial Hardwood Forest (managed by the DNR Division of Forestry). *(See the color map of the trail alignment on the facing page.)* It will cross the Root River via a new 500' bridge. It then will run south 3/4 mile to the opposite side of the valley, to the right-of-way of State Hwy. 16. The trail will circle behind a residence, and then begin to work its way up the hillside to the right-of-way of State Highway 16. The trail is again close to the river at this point, as the river loops southward.

As it passes on the south side of the prominent Cushing's Peak, it still parallels Highway 16. At mile 2.1 of the new extension, it runs north along field edges, then to get back to the bank of the Root River. It follows the course of the Root River until it reaches the old roadbed of former Highway 76. It runs south till it reaches the new dike surrounding the city of Houston. The trail will be on top of the dike, to Houston Trailhead Park, where a parking lot/access is being built.

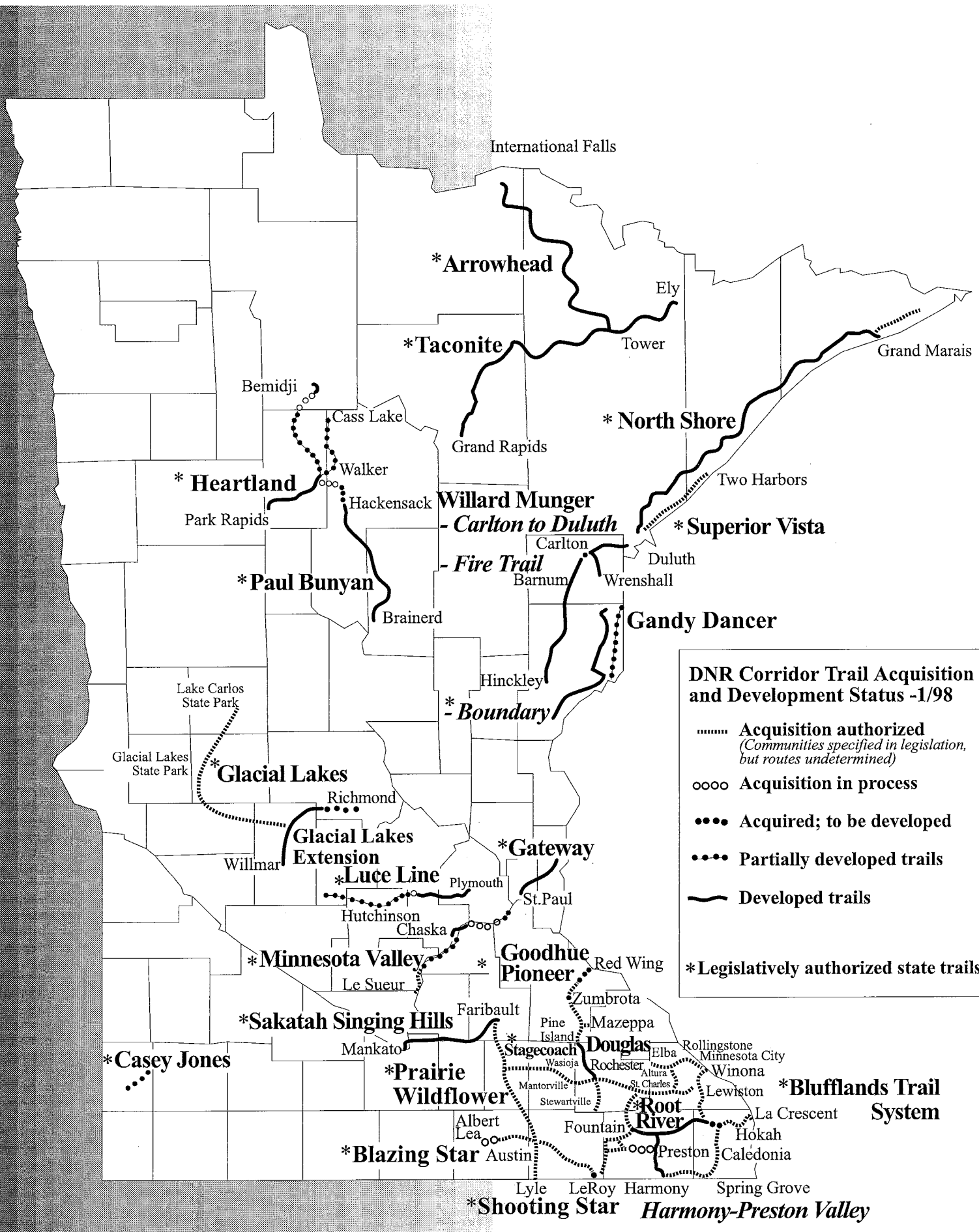
Project Status

Engineering design plans are underway. Construction will be completed by summer of 1999.

Houston Extension Root River State Trail



The trail will begin where the Root River State Trail presently ends in the Money Creek Forestry Unit (managed by the MN-DNR Division of Forestry). It proceeds south 1/4 mile to the Root River where it crosses and continues an additional 3/4 mile to US Highway 16. The trail then follows the highway right-of-way for 3/4 mile to the east where it turns north then east through a small woodland. It then parallels the highway and is near the river for 1 mile. It is at this point the trail begins its climb up to the highway right-of-way. The trail follows the new highway and the abandoned roadbed for 1 mile. It then turns north, east, and north again to get back to the Root River which it follows until reaching the old Highway 76 roadbed. The trail then heads south until it reaches the dike surrounding the city of Houston. The trail will be on top of the dike until it reaches the city park where this phase will terminate.



Legislative Authorization

Legislation authorizing the Root River State Trail system was first passed in 1971. The Legislature has subsequently amended the legislation to include more communities to read as follows:

Minnesota Statutes, 1996, Section 85.015, Subdivision 7, BLUFFLANDS TRAIL SYSTEM, FILLMORE, OLMSTED, WINONA, AND HOUSTON COUNTIES.

(a) the Root River trail shall originate at Chatfield in Fillmore county, and thence extend easterly in the Root River valley to the intersection of the river with Minnesota trunk highway No. 26 in Houston County, and extend to the Mississippi River.

(b) Additional trails shall be established that extend the Blufflands Trail System to include La Crescent, Hokah, Caledonia, and Spring Grove in Houston county, Preston, Harmony, Fountain, Wykoff, Spring Valley, Mabel, Canton, and Ostrander in Fillmore county, Dover, Eyota, Stewartville, Byron and Chester Woods county park in Olmsted county, and Winona, Minnesota City, Rollingstone, Altura, Lewiston, Utica, St. Charles, and Elba in Winona county.

(c) The trails shall be developed primarily for non-motorized riding and hiking.

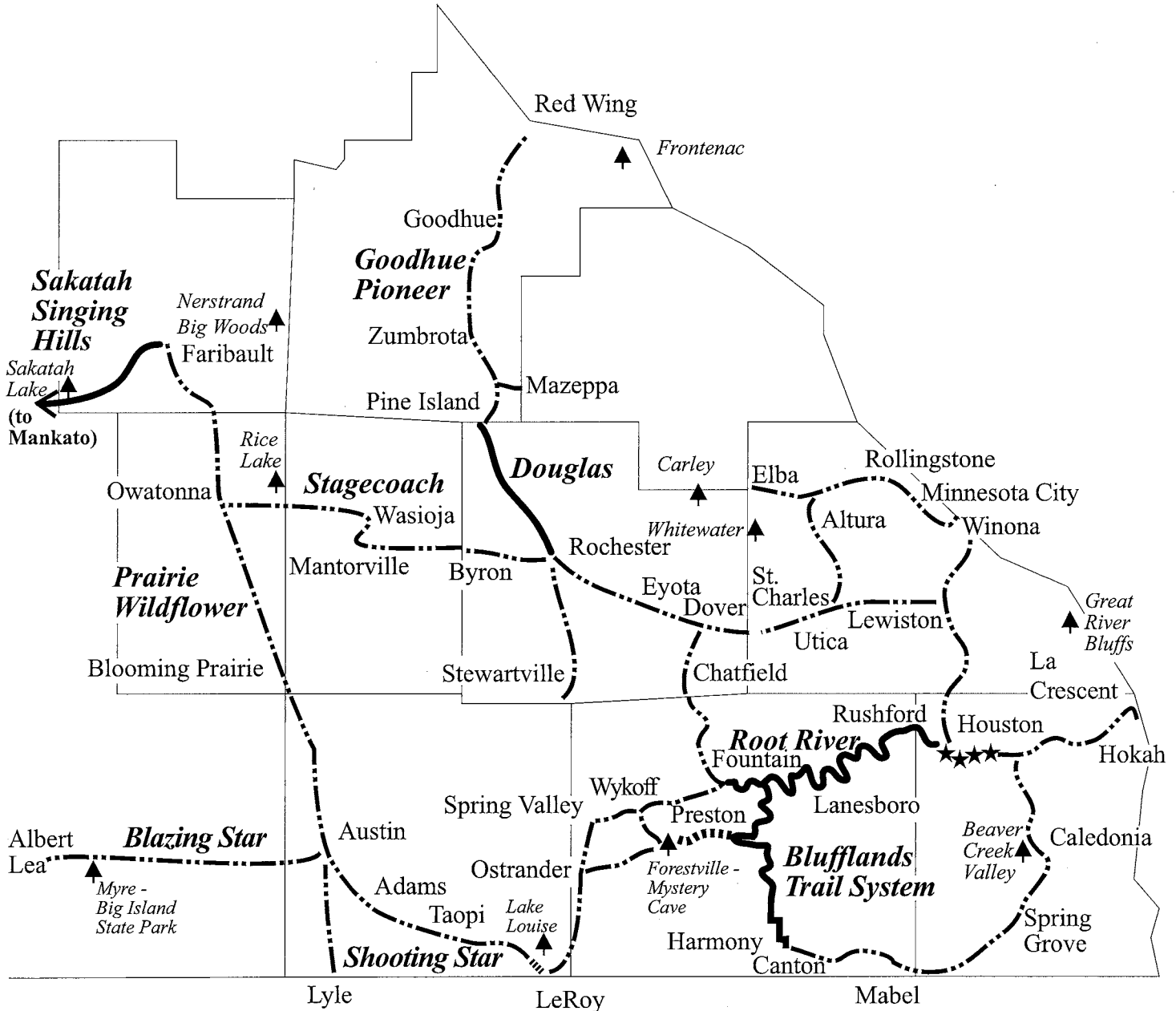
The Root River State Trail is one of the legislatively authorized state trails in the State Trail System. (See the map of existing and proposed trails on facing page.) State trails are one unit of the state's outdoor recreation system established by the Legislature. In 1975, the Minnesota Legislature enacted the Outdoor Recreation Act (ORA) (Minnesota Statutes Section 86A.05, Subdivision 4 and Section 85.015). This act established an outdoor recreation system consisting of eleven components or "units" classifying all types of state-managed recreation lands. The ORA requires that the managing agency prepare a master plan for the establishment and development of each unit. This plan fulfills this mandate. The Houston Extension of the Root River State Trail meets the following criteria established for state trails in the ORA.

Minnesota Statutes 86A.05, Subdivision 4, State Trail; purpose; resource and site qualifications; administration; designation.

a. "A state trail shall be established to provide a recreational travel route which connects units of the outdoor recreation system or the national trail system; provides access or passage through other areas which have significant scenic, historic, scientific, or recreational qualities; or establishes or permits travel along a historically prominent travel route or which provides commuter transportation."

The Houston Extension of the Root River State Trail will eventually link state trails, forestry units and state parks to communities along the trail. It continues the scenic route along the Root River valley floor, paralleling the river for about half the distance. It provides access to and passage through the scenic Vinegar Ridge Recreation Area, and provides access to the Root River itself, a designated Canoe and Boating Route.

Trails in Southeast Minnesota



Existing and Proposed Trails in Southeast Minnesota - 3/98

- ★★★★ Houston Extension of the Root River State Trail
- Acquisition authorized by Legislature for state trail - (Communities specified in legislation, but route undetermined)
- - - Acquisition in progress for state trail
- ▨▨▨▨ Development in progress for state trail
- ▬ Developed state trails
- ▲ State Parks

b. "No unit shall be authorized as a state trail unless its proposed location substantially satisfies the following criteria:

1. Permits travel in an appropriate manner along a route which provides at least one of the following recreational opportunities:

(i) Travel along a route which connects areas or points of natural, scientific, cultural and historic interest."

This extension of the Root River State Trail lengthens the backbone of the expanding Blufflands Trail System to the city of Houston. This trail ties to the Harmony-Preston Valley Trail, and proposed extensions to Forestville State Park, as well as many historic communities in southeastern Minnesota.

(ii) "Travel through an area which possesses outstanding scenic beauty."

The Houston Extension travels along the base of wooded bluffs on the north bank of the Root River, crosses the river, and provides views of the wide valley floor, bluff faces and Cushing's Peak. The Southeastern Blufflands landscape is beautiful in all seasons. Winter snows outline the bluff faces and ravines. Ephemeral spring wildflowers carpet the woodlands, and the lush greens of summer change to flaming fall colors. Views from the 500' bridge over the Root River, 170' wide at this point, will be dramatic.

(iii) "Travel over a route designed to enhance and utilize the unique qualities of a particular manner of travel in harmony with the natural environment."

Walking, bicycling, jogging, in-line skating, and cross-country skiing on this trail allow trail users to recreate in a natural setting and enjoy the details of the natural communities along the trail.

(iv) "Travel along a route which is historically significant as a route of migration commerce or communication."

The Root River and its banks provided a historically significant route of travel, first for the prehistoric people and American Indians of the area. Later, settlers journeyed up the river from the Mississippi River. Towns such as Houston were established along the banks of the river, to take advantage of the water power.

(v) "Travel between units of the outdoor recreation system or national trails system."

This extension connects the city of Houston to the Vinegar Ridge Recreation Area. Proposed trails that extend beyond Houston could allow travel between units of the outdoor recreation system. A connection to Caledonia could allow a link to Beaver Creek Valley State Park.

2. *"Utilizes to the greatest extent possible, consistent with the purposes of this subdivision, public lands, rights-of-way and the like."*

About 1 mile of the Houston Extension is within the Vinegar Ridge Recreation Area. Part of the trail shares a right-of-way with US Highway 16. The city of Houston has granted an easement for trail construction on top of a dike within city limits. The trail terminates in Houston's Trailhead Park.

3. *"Provides maximum potential for the appreciation, conservation, and enjoyment of significant scenic, historical, natural, or cultural qualities of the areas through which the trail may pass."*

Overlooks and interpretive facilities are proposed to increase trail users' appreciation and understanding of the natural and cultural resources of the area. Plant community restoration projects, wildlife habitat improvement projects, and development of environmental education information are all projects that would provide an educational opportunity for trail users. Archeological information from the summer 1996 survey of the route would be of interest to trail users.

The trail corridor can be a corridor for both habitat and recreation, across landscapes developed for agricultural, commercial, and residential use. The ecological value of the corridor could be enhanced by working to restore healthy native plant communities.

4. *"Takes into consideration predicted public demand and future use."*

The plan takes into consideration the current research and trends on existing use of trails, demand for trail opportunities, and demographic data. Information from the 1997 summer survey of Root River and Harmony-Preston Valley State Trail users is used to predict use of the trail.

Goals for the Houston Extension of the Root River State Trail

Provide a high quality, multi-use, non-motorized trail extending the Root River State Trail from Vinegar Ridge Recreation Area to the city of Houston that is managed in harmony with the Blufflands Landscape and meets the needs of trail users and surrounding communities.

Environmental Goals:

- Manage and enhance the natural and cultural features of the trail corridor.
- Interpret the natural and cultural features of the trail and the Blufflands Landscape.
- Design, construct, and maintain the trail in a way that protects and enhances the natural environment and minimizes trail users' impact.
- Restore and manage plant communities, wildlife, soil and water resources in a way that is appropriate to the Blufflands Landscape.

Goals for Meeting Trail User Needs:

- Provide access for a wide range of people with varying degrees of capabilities, including those with disabilities.
- Promote the safety of trail users.

Adjacent Landowner Relationship Goals:

- Develop and maintain the trail so that impacts on adjacent landowners are avoided or minimized.

Trail Integrity/Connectivity Goals:

- Provide a continuous, off-road multi-use trail which serves as a component of the Root River State Trail and Blufflands Trail System.
- Connect regional tourist travel destinations and population centers.
- Connect state and local outdoor recreation lands and facilities.

Goals for Partnerships and Cooperative Efforts:

- Work with local communities in developing, managing and maintaining the trail right-of-way to mutually benefit both trail users and the community.
- Complement the character and economic vitality of the communities through which the trail passes.
- Involve local units of government, user groups, adjacent landowners, and other concerned citizens in the planning, design, and operation of the trail so that their needs are identified and addressed.
- Work cooperatively with other units of the DNR and public agencies to fulfill mutual objectives.

Trail Uses

Trail uses will be the same as on the rest of the Root River State Trail:

- bicycling
- walking
- dog-walking
- in-line skating
- hiking
- running
- use by persons in wheelchairs
- picnicking
- birdwatching
- nature photography
- fishing
- cross-country skiing.
- By state law, state trails are open for lawful hunting or trapping during regular seasons.

Non-permitted uses on the Houston Extension include motorized vehicle use (except for emergency or maintenance vehicles, or motorized wheel chairs), snowmobiling, and horseback riding.

Trail user etiquette will be emphasized in trail brochures and in displays on the trail. The responsibility of parents to teach children to stay right was something that several trail users commented on in the 1997 survey of Root River and Harmony-Preston Valley trail users.

The Vinegar Ridge Recreation Area of the Money Creek Woods Management Unit provides camping and hunting opportunities on the north side of the Root River. Trails used for hiking, horseback riding and snowmobiling (3.8 miles) connect to the Root River State Trail.

With the opportunities for camping at Vinegar Ridge Recreation area as well as at several private and city campgrounds close to the trail, DNR has no plans at this time to provide camping within the trail right-of-way.

Projected Trail Use Levels

The 5.6 mile-long existing segment between Rushford-Vinegar Ridge had the lowest intensity of use of all of the segments surveyed in the summer of 1997 (4% of the total). However, this is the *only* segment that was not anchored by a community on each end. It was also one of the shorter segments surveyed.

Some trail users commented in the survey that the Vinegar Ridge endpoint was an unsatisfactory dead end, or that they didn't find the way from the Rushford depot trail center east to the existing Vinegar Ridge segment. Many of the trail users said that they would like to see the trail extended to Houston, or even further east. Many of the visitors surveyed were repeat out-of-town visitors, who enjoyed having new segments to explore on their return trips. Local residents are also a significant portion of Root River Trail use, with many using the trail on a regular basis for exercise.

Use on the Rushford-Vinegar Ridge segment, when combined with the Houston Extension, is expected to rise significantly. With parking areas/trail access sites at both ends, local and out-of-town trail users will be able to get on the trail from both directions. Current trail users enjoy traveling from town to town, stopping for services in towns along the way. Also, when a more direct connection from the trail center at the old Rushford depot through the city is complete, more trail users are likely to continue eastward. This new section of trail will allow trail users to go east by trail (instead of a detour on city streets) through Rushford.

Total hours of use on the Root River and Harmony-Preston Valley State Trail between Memorial Day and Labor Day 1997 were estimated at 178,761. (*Complete results of this survey, including total number of visitors, will be available from DNR Trails and Waterways in summer 1998.*) The most user hours were recorded on the Isinours to Lanesboro and Whalan segment (47%). Fountain to Preston had 21% of the hours of use, Whalan to Peterson had 18%, and Peterson to Rushford had 10% of the total trail use hours.

Many of the trail visitors from Rochester and the Twin Cities metro area start on the west end of the trail. However, visitors coming from the east will be able to start their trail journey in Houston.

Bicyclists accounted for 90% of the use hours on the Root River trail, with walkers 6%, in-line skaters 3%, and others, including people using wheelchairs, 1%. This predominance of bicyclists differs from other state trails surveyed in 1997. The Gateway segment of the Willard Munger State Trail in St. Paul, and the Douglas State Trail near Rochester had higher percentages of hours of use by walkers and skaters than the Root River State Trail. Previous surveys have shown that bicyclists travel further for trail recreation than other summer user groups.

Trail Development

The trail will be developed and managed to provide a recreational opportunity that allows trail users to enjoy the Blufflands landscape. The trail will be developed with a 10' wide bituminous surface. It will be designed to support maintenance and emergency vehicles. (See the color map, page 2).

Milepost	
Mile 0.0	Intersection with Vinegar Ridge Recreation Area loop trails. Develop small rest area with bike rack, picnic tables and information board.
Mile 0.27	500' bridge over the Root River and beach rest area with picnic tables, and interpretive signs on the north bank of the river.
Mile 2.7	Small rest area (Small rest areas have picnic table or benches, information kiosk or maps, but no water or bathroom facilities.)
Mile 4.5	Small rest area opposite the junction of Money Creek and the Root River
Mile 5.5	Small rest area at the site of the former highway bridge crossing
Mile 6.7	Parking area in the City of Houston Trailhead Park, with picnic tables, and information kiosk. The City of Houston is building a trailhead rest area building, with bathrooms, water, and bicycle rental and repair services.
Houston	

Future Trail Connections

The addition of this trail will bring the total Root River State Trail mileage to 41.4 miles. In combination with the existing 17.8 mile Harmony-Preston Valley Trail, total off-road trail mileage in Houston and Fillmore counties will be 59.2. Houston is now the eastern terminus of the trail system but it could become a hub city for trails as additional legislatively authorized trails in the Blufflands trail system become a reality. Eastward extension to Hokah and La Crescent would allow connections to Wisconsin's trails in LaCrosse. Connections to the south and west to Caledonia, Spring Grove, Mabel, Canton and Harmony would create a large loop across Houston and Fillmore counties. This loop could also have an interstate connection, with interest in the local community to tie the Harmony-Preston Valley Trail to Cresco, Iowa via Niagara Cave. *(See the map of Southeastern Minnesota Trails on the next page.)*

Extension westward from Preston toward Forestville-Mystery Cave State Park is the next trail in the planning stage, and has received initial funding in the 1998 legislative bonding package. At this time, the other Blufflands trail system projects have been authorized (but not funded) by the Minnesota Legislature. Local trail committees are discussing possibilities with landowners and DNR Trails and Waterways staff, but no alignments have been secured for any of these trails at this time.

Ecological Function of Trails in the Landscape

It is important to address the ecological function of the trail so that potential ecological benefits can be identified and maximized, and ecological impacts minimized. In developed areas, connected networks of natural land, open space and water resources can help to maintain ecological integrity in human-dominated landscapes, especially with regard to managing biological diversity and quality water resources. Such networks can provide habitats for some species, and increase the long term health of plant and animal populations. They help to maintain water quality by buffering and filtering excessive nutrients and contaminants. These networks can also provide opportunities for recreational pursuits in a natural setting.

Trail corridors can provide connections to these networks as they traverse developed landscapes. Corridors provide conduits for species movement across the landscape, refuges, habitats, or cover. However, these corridors may also provide an opportunity for increased predation of some species. Corridors can link isolated patches of natural areas, or link uplands to water resources. Corridors can act as barriers or filters, slowing wind speed and trapping sediments.

Trail corridors can alter future land uses. For example, the perpetual trail easement along the Root River precludes future use of the river bank for grazing or row crop production, and will allow a permanent vegetated buffer strip along the river's edge.

The Role of the Houston Extension

The quality of a corridor, and the range of benefits it could provide, increases with the width and ecological health of the organisms within the corridor. The quality of the Houston Extension corridor can be enhanced. DNR will work to replant with native species areas that are disturbed during construction, and will stabilize and plant the river bank where erosion is occurring.

Sustainable management of this artificial, narrow corridor can best be accomplished by focusing efforts to improve the resource base, and working with interested adjoining landowners. An example of this on the Gateway State Trail in St. Paul is joint management of a prairie patch that is partly on the right-of-way, partly on private land. DNR staff has worked with the adjoining landowner on a management plan for control of exotic species and controlled, prescribed burns to maintain the health of the prairie.

Some additional habitat will be created, as portions of the right-of-way that once were used for agricultural row crops are planted with native vegetation. Grasses, forbs, shrubs and trees native to this area and appropriate for the site will be chosen.

Some stream bank areas will be revegetated, creating a buffer strip where none existed recently. The trail right-of-way can serve as a filter against non-point source pollution in some areas. In fields adjacent to streams, the trail right-of-way will permanently exclude the stream bank from

grazing or row crop production and provide a vegetated buffer strip generally ranging from 40' - 90' wide. (Some areas were previously planted in row crops up to the edge of the river.)

All but the 10' wide treadway will be in permanent vegetative cover. All areas disturbed during construction will be seeded or planted with native vegetation. Erosion control techniques to be used during construction (such as silt bales and slope blankets) are specified in the construction documents.

The bridge will be designed to ensure that the hydrological function of flood plains and riparian zones are minimally impacted.

Some of the land acquired for trail construction is wooded field edge or flood plain forest. At the time of construction, the trail will be routed to avoid significant trees wherever possible. However, approximately 10 acres of small trees and brush will be removed for trail construction. Agreements with adjoining landowners restrict the height of newly planted vegetation on the field side of the trail to a mature height of 20 feet. Fifteen acres will be seeded with native grasses and forbs. Different seed mixes for will be used for wooded and open areas.

Seed mix A		
Floodplain woodland forbs and grasses - 8 lbs. per acre		
Forbs: 50%		oz/acre
Wild leek	Allium tricoccum	3
Columbine	Aquilegia canadensis	3
Spikenard	Aralia racemosa	3
Heart-leaved aster	Aster cordifolius	2
Short's aster	Aster shortii	3
Hairy woodmint	Blephilia hirsuta	2
Sweet joe-pye weed	Eupatorium purpureum	3
Tall bellflower	Campanula americana	3
Wild geranium	Geranium maculatum	2
Sweet cicely	Osmorhiza claytoni	16
Jacob's ladder	Polemonium reptans	3
Lions foot	Prenanthes alba	2
Tall coneflower	Rudbeckia laciniata	1
Brown-eyed susan	Rudbeckia triloba	6
Elm-leaved goldenrod	Solidago ulmifolia	2
Yellow pimpernel	Taenidia integerrima	4
Early medowrue	Thalictrum dioicum	6
	Total	64
Grasses: 50%		PLS lbs/acre

Hairy woodchess	Bromus purgans	1
Virginia wild rye	Elymus virginicus	1
Silky wild rye	Elymus villosus	1
Bottlebrush grass	Hystrix patula	1
	Total	4

Substitutes:

Common oxeye	Heliopsis helianthoides	2
Foxglove beardtongue	Penstemon digitalis	3
Wood betony	Pedicularis canadensis	2
Golden alexander	Zizia aurea	3

Seed mix B

Floodplain prairie, mesic 10 lbs per acre

Forbs: 60%

oz/acre

Canada anemone	Anemone canadensis	1
Thimbleweed	Anemone cylindrica	3
Smooth blue aster	Aster laevis	3
New England aster	Aster novae-angliae	2
Canada milk vetch	Astragalus canadensis	1
Prairie coreopsis	Coreopsis palmata	2
White wild indigo	Baptisia alba	6
Showy tick trefoil	Desmodium canadense	4
Rattlesnake master	Eryngium yuccifolium	16
Cream gentian	Gentiana flavida	2
Sneezeweed	Helenium autumnale	2
Roundheaded bushclover	Lespedeza capitata	8
Prairie blazing star	Liatris pycnostachya	8
Meadow blazing star	Liatris ligulistylis	4
Great blue lobelia	Lobelia siphilitica	3
Wild bergamot	Monarda fistulosa	2
Wild Quinine	Parthenium integrifolium	10
Mountain mint	Pycnanthemum virginianum	1
Yellow coneflower	Ratibida pinnata	2
Black-eyed susan	Rudbeckia hirta	2
Brown-eyed susan	Rudbeckia triloba	4
Cup plant	Silphium perfoliatum	1
Ridell's goldenrod	Solidago ridellii	3
Culver's root	Veronicastrum virginicum	3

Golden alexanders	Zizia aurea	3
	Total	96

Grasses: 40%		PLS lbs/acre
Canada wild rye	Elymus canadensis	1
Little bluestem	Schizachyrium scoparium	1
Prairie dropseed	Sporobolus heterolepis	0.5
Indian grass	Sorghastrum nutans	1.5
	Total	4

Substitutes:		
Azure aster	Aster oolentangiensis	2
Cream wild indigo	Baptisia leucophaea	2
Northern bedstraw	Galium boreale	2
Foxglove beardtongue	Penstemon digitalis	3
Blue vervain	Verbena hastata	1

Seed mix C
Top of Corps flood dam 10 lbs per acre

Forbs: 40%		oz/acre
Leadplant	Amorpha canescens	5
Thimbleweed	Anemone cylindrica	5
Prairie sage	Artemisia ludoviciana	4
Butterfly weed	Asclepias tuberosa	6
Aromatic Aster	Aster oblongifolius	5
Hairy golden aster	Chrysopsis villosa	4
Dwarf blazing star	Liatris cylindrica	8
Black-eyed susan	Rudbeckia hirta	10
White upland Aster	Solidago ptarmicoides	6
Old field goldenrod	Solidago nemoralis	5
Western spiderwort	Tradescantia occidentalis	6
	Total	64

Grasses: 60%		PLS lbs/acre
Side-oats grama	Bouteloua curtipendula	2

Prairie dropseed	Sporobolus heterolepis	2
Little bluestem	Schizachyrium scoparium	2
	Total	6

Natural Resource Considerations and Guidelines for Trail Development

Natural Community Management Recommendations

1. A more detailed inventory of the plant communities within the right-of-way should be conducted.
2. Minimize disturbance to soils and native plant communities during construction. Management of natural communities is a key component of efforts to protect Minnesota's natural biodiversity. Management of natural biodiversity is important because natural systems are responsible for sustaining ecological processes such as purification of the air and water, balance of predators and prey, cycling of nutrients and generation and maintenance of soils.
3. Native plant species, consistent with the native plant communities of the Blufflands region should be used to vegetate areas disturbed by erosion, overuse, and construction, and in the landscaping of parking areas and waysides.
4. Avoid planting and try to eradicate any aggressive introduced species which will crowd out native species.
5. Plants should be used to screen unsightly areas, to deter trespassing by trail users, and to assist in retaining snow cover along the trail treadway, where appropriate. Planting plans will adhere to the conditions in the easements.
6. Restore, or if necessary, recreate native grassland, woodland, or wetland communities along the trail to minimize maintenance, to minimize the use of pesticides, to control noxious weeds, and to enhance natural species abundance and biodiversity for enhanced user experience. Currently exposed riverbank will be planted with red osier dogwood, willow or cottonwood species to help stabilize the banks.
7. Develop a vegetation management plan for the trail corridor.
8. Mowing will be the minimum required to keep vegetation back from the trail. Low-maintenance native species will be planted within the trail corridor.
9. DNR staff can offer technical assistance to adjoining landowners who would like information on managing their land for multiple benefits.

Water Resources

1. Minimize trail development and maintenance impacts to water resources through the use of mulching, geo-textiles, silt screens, embankment plantings, and seeding to establish native vegetation.
2. Vegetation between the trail and river's edge should be maintained to serve as filter strips or buffer zones to control runoff. Vegetation can slow down surface runoff and trap excess nutrients that might otherwise run into adjacent water resources.
3. Appropriate erosion control measures should be taken to minimize potential impacts to adjacent water resources.
4. A wetland mitigation plan will be carried out to address the identified, impacted wetlands.
5. Access to the river's edge for trail users or anglers will be managed to prevent erosion.

Fish and Wildlife

1. Wildlife habitat will be enhanced through natural community management and through such projects as installation of bluebird houses or wood duck houses at appropriate locations.
2. The occurrence of endangered species was noted within a 1/4 mile radius of the trail. (See Wildlife Inventory Section.) No adverse impacts are anticipated by trail development and use. Trails and Waterways will work with DNR Natural Heritage Program to resolve any issues which may occur over time. Interpretation of these species will create an awareness, appreciation and understanding of their importance.

Trail Management

Information and Education

Identification of Services

Trail users benefit from knowing where they can obtain services (medical assistance, telephones, gasoline, food, lodging, rest rooms, campgrounds, repair facilities, other retail) and local businesses benefit from an increase in customers.

A listing of the services available in each community developed and maintained by the community could be developed and displayed on information boards in Houston. Currently, state trail rules and regulations prohibit commercial advertisements and concessions in the right-of-way.

Trail User Orientation

Trail users must have good information about the trail system so they can make choices about destinations appropriate for their time frame, skill level, need for services such as food and lodging, and the type of scenery and other recreational opportunities available along the route. This type of information should be displayed on information boards at parking areas, in communities, and trail junctions and include distances between communities, options for other trail connections, and locations of services.

Points of orientation should be located along the trail so the trail users can locate themselves and also so that emergency vehicles could find a particular point along the trail. Mile markers and maps are examples of helpful tools that could be installed.

Trail Rules and Regulations Education

The Visitor Services program has developed trail courtesy and safety display boards aimed at educating trail users about appropriate behavior, promoting safe trail use, and protecting the quality of the trail environment. These user-friendly versions of the rules applying to state trails should be posted at information kiosks along the trail.

Interpretation of Natural and Historical Resources

There are many natural resources of significance and interest along the trail. Topics could include the geological forces that shaped the Root River Valley, the natural communities and wildlife found in the Blufflands, or information from the archeological survey of the trail route. Providing information about these resources can add enjoyment to the trail experience. Interpretive signs will be developed in consultation with other DNR divisions, and the Minnesota Historical Society (MHS), especially near sensitive resources.

Enforcement

Effective enforcement plays a very important role in successful management of the trail. It is

important in creating and maintaining a safe trail environment and good working relationships with the trail's neighbors.

Additional efforts by the Division of Enforcement are needed in order to enforce trail rules and regulations on the trail as well as dealing with enforcement issues more pro-actively through education. Education efforts includes working with groups such as trail user groups, school groups, and civic groups.

Other actions which contribute to compliance with trail rules and regulations and appropriate trail behaviors are the posting of signs along the trail, repeating the rules on handouts and maps, the presence of DNR staff working on the trail.

Trail Maintenance and Operations

The trail will be managed and maintained by DNR Trails and Waterways staff that currently manages the Root River and Harmony-Preston trails.

Fencing will be built and maintained by the DNR for those adjoining landowners who requested it when an easement or land for the trail access was purchased. Other landowners declined fencing between their property and the trail in lieu of additional payments.

This 6.7 mile trail extension will add to the maintenance responsibilities which already exist, requiring more equipment, labor time, personnel and facilities. Some maintenance needs could be met by forming partnerships with the communities.

The boundaries, land ownership, and trail alignment will be entered into a geographic information system (GIS) database, to help facilitate management of the trail corridor.

Natural Resources Inventory

The Houston Extension is located within the Paleozoic Plateau Subsection of Minnesota, one of 21 subsections of the state. A subsection is a portion of the state defined by the results of interactions among the climate, geology, geomorphology, parent material, soil, vegetation, hydrology, wildlife and land history. The Paleozoic Plateau is an old plateau covered by loess (windblown silt), and then extensively eroded along rivers and streams. The eastern portion has bluffs and deep stream valleys 500 - 600' deep. The western portion is a gently rolling glacial till that is covered by loess in places. Oak forests dominated here, but oak barrens and tallgrass prairies were also present. River bottom forests grew along major streams and rivers.

Climate

This corner of the state has higher average temperatures and precipitation than almost all of the rest of Minnesota. The number of frost-free days is 154, and annual precipitation averages 30 inches at Houston. Longer growing season, warmer temperatures, and higher rainfall contribute to more lush vegetation, giving this area its nickname 'the Banana Belt' of Minnesota. This milder climate also allows some species of plants and animals that are at the limits of their northern or western range to live here.

Houston has an average of 42 inches of snowfall, but the average number of days that snow cover is 6" or greater is only 50-55 days (compared to 130 days on the North Shore.) Duration of snow cover of 12" or more averages 20-25 days (again, compared to more than 100 days in northern Minnesota.) Site conditions and microclimate (shade, shelter, tree cover) affect snow depth and winter recreation along the trail.

Geology, Landforms, and Soils

The striking features of the Blufflands landscape near Houston are the deep ravines, steep bluff faces, and flat-bottomed river valley that tell the geological history of the area. This area was barely touched by the massive glaciers that covered most of Minnesota during the last glacial period 10,000 years ago. However, torrents of glacial melt water carved the deep valleys through the layers of limestone and sandstone. Narrow gorges formed where the water cut through harder limestone layers. Where the glacial melt water cut through softer, more erodible sandstone layers, the valley is 1-2 miles wide. Terraces along the side slopes of the valley walls are remnants of the former glacial river bed.

The soils underlying the trail corridor are typically in Plainfield-Rawles-Minneiska association. Plainfield soils are sandy soils found on the river terraces and side slopes of the river terraces, near Cushing's Peak. Minneiska soils are level fine sandy loam soils on flood plains. Rawles soils underlie the Houston Extension at its junction with the existing trail; these silty loams are typically found on river terraces.

Water Resources

The Houston extension lies within the 1683 square mile Root River watershed.

Three wetland areas (0.5, 0.23, 0.58 acres) that will be impacted by trail construction have been delineated. Bridging these wetlands is cost-prohibitive, and alternative routes are not available. The trail design has been lowered to minimize the amount of fill area. DNR Trails and Waterways will undertake the wetland mitigation plans that have been prepared. Wetland impacts from this project will be rectified with purchase of 2:1 wetland credits purchased from the Minnesota Board of Water and Soil Resources (BWSR) Transportation Wetland Bank.

Natural Communities Along the Trail

Flood plain forests characterize the valleys of the Mississippi, Root, and other local streams. These lowland sites are subject to periodic flooding and drought. Frequent spring flooding enriches the soil by depositing silt over the forest floor. Dominant trees include silver maple, American elm, green ash, black willow, and cottonwood. Sedges, climbers such as grape vine and wild cucumber and stinging nettle are among the most common understory plants. Observed on the trail right-of-way were wild gooseberry, elderberry, and serviceberry. Despite the sometimes heavily disturbed ground, native groundcover species such as woodland phlox, sweet cicely, and false rue anemone can be seen along the trail. Downy blephilia, cup plant, and greenbrier were also noted.

The trail also crosses or runs alongside river beach communities. These sandy beaches are maintained by fluctuating water levels and scouring floods. Commonly seen species include swamp smartweed, dark green bulrush, brook nut-sedge, red-footed spikerush, catchfly grass, Walter's barnyard grass, creeping love grass, purple sandgrass, sandbar willow, and seedlings or saplings of flood plain forest species.

The trail allows stunning views of mixed hardwood forests of oak, hickory, basswood, cherry, maple, and black walnut on the hillsides of the river valley. So-called 'goat prairies' or dry prairies of the bedrock bluff subtype can be seen from the trail on the rocky, dry, steep southwest facing slopes on the upper bluffs. Prairie grasses such as big and little bluestem, Indian grass, side-oats gramma and forbs such as birdfoot violet and gray goldenrod can be found on these exposed, dry sites.

The DNR Natural Heritage Database lists 22 occurrences of plants listed as endangered, threatened or of special concern within ½ mile of the trail.

Two occurrences of *Talinum rugospermum* (rough seeded fameflower) are listed. This plant occurs on fluvial sand dunes, of the Mississippi River and its tributaries. Rock outcrops and rock ledges are a secondary habitat.

Eupatorium sessilifolium (upland boneset) and two occurrences of *Paronychia canadensis* (Canadian forked chickweed) are two threatened species that have been documented within ½ mile of either side of the trail. Limited knowledge of *Eupatorium sessilifolium*, its rare occurrences in Minnesota, and its decline in adjacent states has led to its classification as threatened. *Paronychia canadensis* is rare in Minnesota, and is found in dry, sandy woodlands.

Eight species of special concern are documented. *Asclepias amplexicaulus* (clasping milkweed) is rare in Minnesota, but common in the eastern United States. It is found on sand dunes, sand barrens, or sandstone outcrops. *Pellaea atropurpurea* (purple cliff brake) is a small evergreen fern found in dry ledges of sandstone or dolomite bluffs. As its name suggests, the habitat of *Solidago sciaphila* (cliff goldenrod) is crevices of sandstone or dolomite cliffs and bluffs. *Baptisia bracteata* var. *Leucophaea* (plains wild indigo) is not common in Minnesota. Its distribution is scattered, and is found in sandy habitats in prairie and upland woods.

The habitat of *Oenothera rhombipetala* (rhombic-petaled evening primrose) is dry sandy areas. Although common in the eastern U.S., *Tephrosia virginiana* (goat's rue) is limited in Minnesota, and populations have declined since settlement. This species requires sandy habitats, does not do well in degraded habitats, and has difficulty recolonizing.

Hamamelis virginiana (witch hazel) reaches the western limits of its distribution in southeastern Minnesota. The rare natural occurrences in Minnesota are found in wooded ravines and shaded streambanks.

There are also a number of species that are not officially listed as endangered or threatened, but are of importance because the population is declining or there is limited knowledge about its distribution. The species listed in the search area within ½ mile of the trail alignment are: *Dodecatheon amethystinum* (jeweled shooting star), *Helianthemum canadense* (Canada frostweed), and *Liparis lilifolia* (Lilia-leaved twayblade).

Fisheries

The main stem of the lower Root River is 52.1 miles long, from the mouth of its South Branch at Peterson to its confluence with the Mississippi east of Hokah. This drains an area of 1638 square miles, with much of the valley floor in row crops or pasture. For survey purposes, it has been divided into Sector 1 (Mississippi River to Peterson) and Sector 2 (Peterson to the South Branch). There are 28 tributary streams entering this reach of the main river and 23 sub-tributaries.

Water temperatures in this part of the main stem average about 75 degrees in hot weather, and is a limiting factor for fish diversity. While Sector 2 provides some quality habitat for warm water game fish, Sector 1 (which includes the Rushford to Houston area) provides poor habitat. Sector 2 is normally fast-flowing, with deep pools, riffles, and a stable bed of gravel and rubble. By contrast, Sector 1 has sluggish, shallow waters, a shifting sand bottom, and few riffles. Water suitable for game fish in Sector 1 is limited to areas where rip-rap and deflectors have been installed. Good current, deeper water, and some exposed gravel were observed at these locations.

No aquatic vegetation was observed during a DNR 1983-84 survey of the two sectors. Water turbidity remained high in Sector 1 during the course of the survey and there was a scarcity of aquatic invertebrates. Instream habitat diversity is low, and riparian cover is sparse or nonexistent in many areas.

More than 40 species of fish were collected during the 1984 DNR survey. Rough fish accounted

Wildlife

Trail users will be able to appreciate many species of wildlife along the trail. The woods, fields, and water's edge provide habitat for many species of birds, reptiles and amphibians, and mammals. In addition to the many species that are commonly seen throughout Minnesota, there are some uncommon or even unique creatures in this part of the state. Observant visitors may catch sight of wild turkeys, turkey vultures, or even a rare peregrine falcon. Occasionally, timber rattlesnakes, a species of special concern, are seen on rock outcrops and in the river bottoms. Blanding's turtles, a threatened species, and bullfrogs, a species of special concern, are sometimes seen near calm waters or wetlands.

Mammals

There are 77 native species in Minnesota, 51 of which may be found in southeastern Minnesota. Abundant or common mammals likely to be seen by trail users include woodchucks, thirteen-lined ground squirrels, and eastern chipmunks. Mounds of the plains pocket gopher, and striped skunk scent may be noted by trail users, even if the animals are not in view.

Of the 20 species for which the DNR has set hunting or trapping seasons, most are found in southeastern Minnesota. White-tailed deer, red and gray fox, coyote, raccoon, muskrat, beaver, fox and gray squirrels, mink, and eastern cottontail rabbits are common.

Birds

Several species reach their highest relative abundance or are only found in southeastern Minnesota. Commonly seen birds include sparrows, grackles, starlings, crows, robins, meadowlarks, red-winged blackbirds, mourning doves, house wrens, bobolinks, cardinals, and swallows. Such waterfowl as mallards, blue-winged teal, and wood ducks are common during the summer months and seasons of migration.

The Mississippi flyway is heavily used by migrating waterfowl, including such species as tundra swans, great blue herons, and great egrets. The ring-necked pheasant will occasionally be seen by trail users, especially along the field edges. Frequently observed raptors include the great horned owl, American kestrel, and the red-tailed hawk. Red-shouldered hawks, ospreys, and northern harriers have been spotted on occasion. As noted earlier, wild turkeys are a special feature of this area of the state.

Turkey vultures, belted kingfishers, red-bellied woodpeckers, rough-winged swallows, white-breasted nuthatches, house wrens, cardinals, indigo buntings, and field sparrows can also be seen. The northern bobwhite, blue-winged warbler, Bell's vireo, and blue-gray gnatcatcher can also be observed in Houston County. The loggerhead shrike, a threatened species once common and widely distributed across the United States, has recently seen drastic declines in its range. Breeding populations have been noted in the past in Houston County. It inhabits dry grasslands, nesting in shelterbelts, hedgerows or farmstead trees. It is a predatory bird with the unusual behavior of impaling prey such as mice or frogs on thorns or barbed wire. An occurrence of the Arcadian flycatcher has been recorded within ½ mile of the trail.

Reptiles and Amphibians

The diversity of reptiles and amphibians increases in the state's southeastern region. Warmer temperatures, higher annual precipitation, and unique habitat requirements found in this region of the state contribute to this increase.

Turtles include the common snapping turtle, western painted turtle, and spiny softshell turtle. The Blanding's turtle, a threatened species, is present in Houston County, and an occurrence of the species within ½ mile of the trail has been recorded in the Natural Heritage Database.

Snakes and lizards are especially compatible with the habitats of southeastern Minnesota. A common lizard is the six-lined racerunner. The five-lined skink, an endangered species of lizard, lives on exposed limestone or sandstone outcrops in wooded ravines and bluff prairies. The region boasts the greatest number of snake species in Minnesota. The Eastern garter snake and Eastern hognose snake are present. Of 13 other species of snakes found in this region, three are not found in any other part of the state. These three species include the timber rattlesnake and the rarely seen Eastern massasauga, Minnesota's only venomous snakes, and the black rat snake.

Timber rattlesnakes are classified as a species of special concern in Minnesota. This species has unique or highly specific habitat requirements and deserves careful monitoring of its status. Habitat is limited to the woods and river bluffs within six southeastern counties. Dens are found in rock fissures of bluffs or in openings under the rock formations. The occurrence of this species has been recorded on the Natural Heritage Database.

Currently, there are no known den sites along the trail. Trail users should be made aware of their presence in the area and what to do if they encounter one. Such a sign has been developed and used on the Root River State Trail. Trail managers will report any sightings to the DNR non-game wildlife manager at DNR's regional office.

Another snake species of interest that occurs in Houston County is the eastern milk snake.

Amphibians include the Eastern tiger salamander, American toad, and nine species of frogs. The northern leopard frog is the most common near the region's wetlands and water bodies. Other frogs include the northern spring peeper, gray treefrog, western chorus frog, green frog, and wood frog. The spring peeper, treefrog, and the pickerel frog may be found within forested areas. In addition, the bullfrog and the pickerel frog can only be found in southeastern Minnesota. Although rare, the Blanchard's cricket frog has been recorded in the region.

Cultural Resources

Partnerships

Involvement of the communities along the trail has been a key to the successes of the Root River State Trail and Harmony-Preston Valley Trail. Many of the trail users surveyed in the summer of 1997 added comments about how much visiting towns along the trail added to the trail experience, or that what they liked best about the trail was visiting the friendly, historic towns.

Efforts over the last several years by the City of Houston and its Trail Extension committee in cooperation with the DNR were instrumental in securing the alignment of the trail. Perpetual easements for parcels of land were acquired at appraised market value from 12 landowners. The City of Houston acquired one parcel at appraised value through eminent domain proceedings, and will resell this parcel to the MN DNR.

The terminus of the trail will be in the new trailhead park in Houston. An innovative project led by the school and Houston County Recycling (called ClassCycle) will offer high school business students experience in bicycle repair and running a rental/repair service on land within the park, while at the same time saving repairable bicycles from a landfill. This bicycle rental and repair service will be a great benefit to trail users.

Special events sponsored by local communities, such as the annual candle-lit cross country ski event, or trail dedication ceremonies, are held on the trail (by prior arrangement with the trail manager). These events draw more visitors to experience the trail.

Volunteers from the communities along the Root River and Harmony-Preston Valley Trails were an integral part of the survey of trail users in 1997. The survey will provide information for both the DNR and the communities about meeting the needs and expectations of the trail users.

The Root River Trail Towns Association was formed to support and promote the trail. It provides information and brochures about the area and local services to trail users.

Donations by local businesses and community groups enrich the trail. Communities have entered into cooperative agreements with the DNR regarding maintenance of trail parking areas, etc. Community groups have pitched in to help with restoring natural vegetation. For example, the garden club of Preston assisted with planting of native species at the Preston trailhead/parking area

These partnerships with local communities and volunteers are vital to the continued success of the trail system.

City of Houston

The city of Houston, Houston Township, and Houston County were all named for Sam Houston, candidate for president in 1856. The town was platted in 1854, and the first post office established in 1857. However, a change was ahead for the town. The Southern Minnesota Railroad was

given a tract of 70 acres of land for its depot west of the original townsite. The depot was built in 1866 when the railroad reached Houston, and soon most of the community moved to the new location. The original location became known as “Old Houston.” The present city was incorporated in 1874.

The Root River supplied water power for sawmills, flour mills, and sorghum manufacturing. By 1880, the 500 residents of the community contained 39 businesses, including boot and harness makers, dry goods and merchandise, three hotels, a restaurant and seven saloons.

Today, the city has a population of 1013. Many services for trail users (gas, food, lodging, telephones, banks, medical services, and camping in the city park) are available. The city’s location in the broad expanse of the valley, with views of steep wooded bluffs rising from the river, will appeal to visiting trail users.

The City of Houston is building a new park at the trailhead, and will be providing bathrooms and water at the new trailhead building that will also house the bicycle repair/rental operation.

Houston Township

Houston Township, population 423, surrounds the city of Houston. The trail crosses sections 30, 31, and 32 in the southwest corner of the township.

Money Creek Township

The name ‘Money Creek’ is used for the township, the forestry management unit, and the creek that runs through both. One legend of the origin of the name is that an early settler dropped his pocketbook in the creek, and spread his bank notes on the bank of the creek to dry. Wind blew the notes into the creek; some were never recovered, and others were found floating down the creek to the Root River.

The Houston Extension runs across sections 35, 36, 26 and 25 in the southeast corner of this township. The broad, level Root River valley cuts across the deeply dissected Blufflands landscape of this township from east to west. Population of the township is 429.

Vinegar Ridge Recreation Area takes its name from the local name for the high ridge north of the river. Its name is said to have come from the only legal liquid distilled in this area during the prohibition era.

Houston County

Houston County, which anchors the southeastern corner of the state, The county seat is Caledonia, about 12 miles south of Houston. Houston County is one of the most topographically rugged counties in Minnesota, with ridges deeply dissected by valleys.

Houston County has a population of more than 18,000. The largest cities are La Crescent, Caledonia, Spring Grove, and Houston. Population projections show continued growth, especially in the urban areas of La Crescent and Caledonia. Forty-one percent of the population is classed as urban, 44% rural non-farm, and 15% as rural farm residents. The farm population has declined 67% since 1960. Overall, the population is aging, with the percent of the population

under 19 decreasing, and the percent of those over 80 increasing.

Employment in Houston County is 24% farming, 22% services, 22% retail trade, 12% government, and 9% manufacturing. Farm income is primarily from dairy (37%), cattle (32%) and hog (14%) operations. Corn accounts for 10% of income, with other crops making up the remaining 7% of farm income.

Houston County's zoning ordinance has a Scenic Trail District overlay that includes lands within 5 feet outside the right-of-way lines of any publicly owned recreational trail. This district allows no new commercial uses except those already permitted and established before the effective date of the ordinance. No new buildings or additions are allowed within the Scenic Trail District overlay. Signs and advertising within the scenic trail district are allowed if they conform to the natural appearance of the surroundings. Limits are placed on size, colors, and spacing of signs within the Scenic Trail District.

Archaeological Survey

In the summer of 1997, archeologists identified six cultural resource sites along the trail corridor. All six sites are PreContact American Indian Heritage sites of the middle and late prehistoric periods (500 B.C. to 1650 A.D.). Five of the six sites were possibly eligible for nomination to the National Register of Historic Places due to their potential for further research and the location of the artifacts within undisturbed soil or sediment layers. DNR will modify construction in these five locations to reduce or avoid potential adverse effects to the sites, by limiting the depth of subgrade excavations, limiting grubbing of tree roots, or restricting the movement of construction equipment to the defined trail corridor.

The sixth site, a thin scatter of materials that has been significantly altered in the last 100 years by agricultural cultivation, was not intact enough to meet the criteria for nomination as a National Register site. Trail construction will proceed as planned in this area.

Lithic (stone) flakes, charcoal, non-human bones, and sherds, spalls or crumbs of prehistoric ceramic pots were recovered during field reconnaissance, shovel tests, and excavations to a depth of up to 2.5 meters. Locally available chert was the primary stone material. One site yielded tools, cores, flakes and shatter fragments from tool-making, with one large fragment that appeared to have broken during manufacturing. General dates for the habitation are based on the materials used to temper the clay (shell or sand/grit) and the style and techniques used in the ceramic pot fragments found. The ceramic fragments of vessels had decorations of cords, cord-wrapped sticks, textiles or net impressed into the clay surface. One site exhibited a possible pre-ceramic component (circa 5000 B.C.-500 B.C.).

This archeological information should be interpreted for trail users. Sharing what is known of the first residents of these beautiful valleys and bluffslands can add another layer of knowledge and appreciation of the Bluffslands landscape by trail users on the Houston Extension of the Root River State Trail.

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