BEAUTIFUL INFRASTRUCTURE

By the Design Center

for American Urban Landscape

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Several years ago, Minnesota citizens voted to establish the Legislative Commission on Minnesota Resources (LCMR), a trust which reserves a portion of state lottery revenues to fund environmental projects. The Commission recommended a proposal submitted by the University of Minnesota's Design Center for American Urban Landscape to appropriate lottery funds to develop urban design principles. The principals help infrastructure projects respond to the typical concerns now facing many local communities. As communities mature, the cultural character and ecologies of place seem to disappear. Instead, regional nuances give way to a cluttered and confusing landscape of homogenized commercial and residential developments and the growing anonymity of the metropolitan environment.

The urban design ideas for "Beautiful Infrastructure" are illustrated with sites located around the Minneapolis St. Paul Metropolitan region. Many of the examples are from urban areas. Two of the more rural sites are in high-growth areas that are slated for infrastructural development: a highway upgrade in rural Chanhassen; and new development at the edge of rural lands in the agricultural town of Farmington.

Beautiful infrastructure, which responds to the physical and topographical features of the locale, is primary to creating community identity and a personal sense of orientation. Unfortunately, infrastructure is often regarded as a neutral grey utility devoid of cultural expression or celebration. While vital and costly capital infrastructure projects increasingly dominate the budget agendas and physical environments of local communities, too often their potential as multifunctional systems has been overlooked. Infrastructure shows its full complexity only when viewed with both the lens of an ecologist, who sees the interrelationships within natural systems, the lens of the urban designer, who sees and the features and patterns that enrich people's experience within the landscape.

About Terminology

Until now, we've associated infrastructure with industry and national defense. As a result, the terms for its planning and design are technical and standardized. We need a more precise language which integrates both ecological function and urban design. To enlarge functional engineering terms to include infrastructure's ecological, cultural and social layers, we draw upon the terminology of landscape ecology and environmental design. Landscape ecology includes human activities as part of the environment and focuses on spatial forms in ecological systems, such as corridors, networks, edges and patches. Environmental designers such as Kevin Lynch also created a vocabulary
for the landscape that included terms such as rooms, neighborhoods, districts, land- marks and paths. In naming a place, we can use language to transform our understanding of systems and places. For example the words prairie waterway instead of stormwater drainage ditch describe a series of proposed community stream corridors.

Enriching Sense of Place: Outdoor "Rooms" in the Landscape

Natural features, as well as infrastructure such as highways, bridges and storm sewers, can create or restore community identity. These systems define the public realm, accentuating its unique spatial organization and delineating outdoor "rooms" in the landscape.

In rural Chanhassen, there are a variety of rooms, formed by its rolling hills, sky lines, built structures and infrastructure Systems The resulting composition is a mixture of urban and rural rooms. A proposed upgrade to the highway through Chanhassen offers opportunities to create new rooms and enhance existing ones. In addition,

pedestrian and vehicle links that have sim- ilar design elements on both sides of the highway create rooms that bridge the high- way corridor. Different types of rooms experienced in a sequence along the high- way give the sense that the road is passing through specific places, rather than along an anonymous strip development. Diagram I shows different types of landscape rooms, including transit rooms, landmark intersections, civic spaces, and commercial nodes, along the highway corridor.

Bridging the Community with Corridors, Networks and Landmarks

Many connections amongst the Mississippi River and areas in the Twin Cities region offer a wide variety of recreational and environmental opportunities. The terms .recreational' and 'environmental' are used in the broadest, most inclusive sense. The daily commuter, migrating wildlife and leisure bicyclists are all potential users of different kinds of river connections. In ad- dition, these connections also serve an array of commercial services, work sites, and residential areas.

Corridors: Sharing the Community Life Lines

"Corridors' are linear spaces that accommodate movement or visual access, like a hallway in a house that provides access to a series of rooms along its length. Corridors may work as a permeable boundary between places or as a conduit to local landmarks. Diagram 2 shows a range of corridor types for a hypothetical River Community. Roadways as corridors, for example, are more than just single-use, functional rights-of-way defined by curbs. Roadways can be great, linear hallways with permeable walls shaped by the natural and built features along the road. Often passersby assess a place by the character of its roadway; people use roadway features to orient themselves. Corridors become richly layered cultural and environmental spaces which help define and connect sectors of the community. The proposed highway upgrade in Chanhassen offers an opportunity to create rooms off its hallway as shown in Diagram 3.

Networks:

Creating a **Hierarchical Web of Movement**

Networks are webs of alternative routes that offer tertiary systems of movement apart from major roadways. Networks con- nect the destinations of home, work and marketplaces to the community's environ- mental and cultural resources. Hubs along a network are places where trails, roads, paths and natural systems intersect, often made distinctive by landmarks or other cultural or natural features. Diagram 4 shows network types for a hypothetical river community.

Enhancing **Ecological Function**

New development has added more impervious surfaces to the landscape, such as roads, roofs, parking lots and turf (whose storm-water absorbency rate equals that of concrete). These hard surfaces repel, rather than absorb, rain, increasing the amount of storm water pouring into piped drainage ways, such as storm sewers. These efficient conduits quickly funnel valuable topsoil and pollutants, such as roadway runoff and lawn fertilizers, into lakes and streams. As underground aquifers are depleted, causing some lakes and streams to dry up, major rivers ironically swell beyond capacity. Land that is left undeveloped is often a fragment- ed scattering of natural habitat resource islands. Knowing where water originates and where it flows is essential to making deci- sions about land uses that will reconnect the community's natural resources and protect property values. The unique identity of the community watershed dictates environmentally sound patterns of development that vary from one site to another. A variety of watershed types in a hypothetical river community is shown in Diagram 5.

Instead of piping storm water as quickly as possible into rivers and lakes, we should explore alternatives that introduce more complexity to these systems. Exposed drainage ways, for example, provide space for plants that filter and recharge water. Strategies that rely on ecological features and functions of the landscape do require more land and therefore additional property costs. These costs may be minor compared to the initial and long-term municipal maintenance costs of concrete-and-steel systems. In addition, neighborhoods bordering a protected green corridor command higher property values. Even if drainage ways aren't exposed, the piped rights-of-way can be wide enough to accommodate pathways planted with native species, thus enhancing the value of adjoining properties.

Watersheds and Habitat: Making a Home for All

Complex systems may also be more economical in the long term. They're multi- use, providing twice the benefit for a single investment. Farmington's prairie waterway system was designed not only to provide recreational and wildlife connections to the Vermillion River, but also to purify storm water and surface water runoff. Cleaning these waters at the source is important because improving the quality of the water flowing into major rivers and lakes may eliminate the need for building costly treat- ment facilities later. The Prairie Waterway design complexity is shown in Diagram 6.

Most parks are typically planted with turf and randomly spaced trees. This rnono- culture of grass, in addition to sparse tree canopies, cannot sustain the diverse plant communities that support many species of wildlife. Groves of native trees, however, create patches of woodland habitat. Large tracts not only provide habitat for forest

species but also may frame views and form outdoor rooms. Obsolete land uses or derelict lands also offer opportunities to restore natural systems. Planted with native vegetation, linear waterways also serve as habitat corridors in the metropolitan area. These wet environments provide nesting, resting and foraging sites for a variety of wildlife. Cross-sections of the plantings for the prairie water way are shown in Diagrams 7a and 7b.

Conclusion

To build infrastructure that participates deeply in the imaginative life of its community requires a fundamental shift in our attitude toward landscape. In his book *Discovering the Vernacular Landscape, John* Brinckerhoff Jackson, the noted scholar on American landscape, says that 'the most magnificent of city complexes" recognized the need to integrate infrastructure, or civil engineering, with landscape, or architecture. Beautiful and brilliant schemes are created when 'they both reorganize space for human needs, both produce works of art in the truest sense.'

For Jackson, Infrastructure not only provides the backdrop for culture but the very ingredients that make it possible: *In the contemporary world it is by recognizing this similarity of purpose that we will eventu- ally formulate a new definition of landscape; a composition of man-made or man-modified spaces to serve as infrastructure or background for our collective existence; and if background seems inappropriately modest we should remember that in our modem use of the word it means that which underscores not only our identity and presence, but also our history.*

J.B. Jackson's definition of landscape sets forth a challenge to the standard infrastructure mission statement to supply goods, services and people to their proper destinations. His definition of landscape relies on the necessity for elements of infrastructure to fulfil broader cultural, social and ecological functions to become part of the supportive infrastructure or background for our "collective existence, identity and presence, and history." We believe that this composite 'man-made or man-modified' landscape is created by infrastructure that enriches our sense of place, bridges our commonwealth and enhances ecological function.

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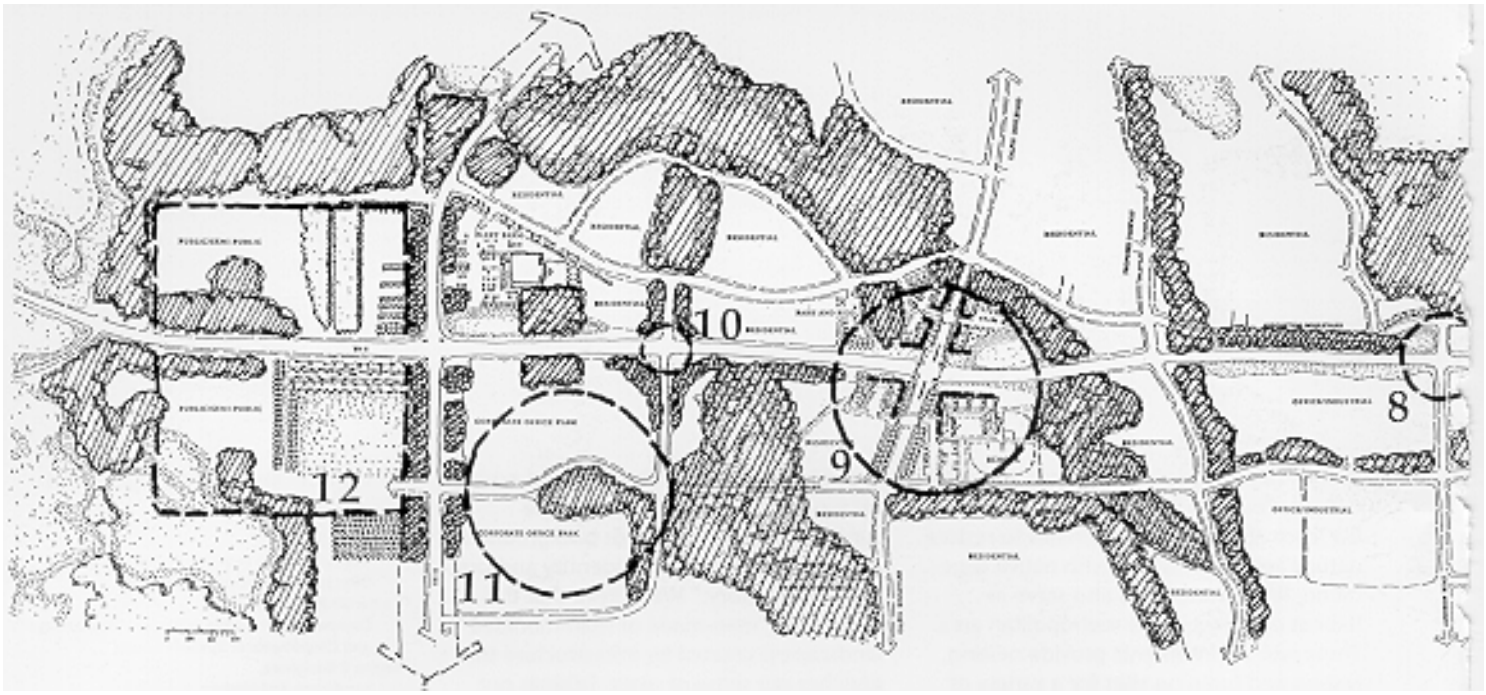


Above:

DIAGRAM I

LANDSCAPE ROOMS

I

Transit entrance: introduces landscape qualities that will be carried through the corridor, including park and ride lots with shaded and wind-protected environments.

2

Landmark intersections: sculpted to mark gateway to main street.

3

Service room: convenience facilities edged by windbreak vegetation and street trees.

4

Downtown: boulevard continued, fronted by commercial retail, service and civic spaces.

5

Wetiand Circle: ponds with edges defined with wetiand and aquatic plant materials.

6

Long view room: vantage point to preview the landscape ahead; signals the edge of downtown.

7

Lake Ann room: a civic park space enclosed by drainage ways, forests and windbreak vegetation, extending to include the business park south of Highway 5

8

Western entrance to Lake Ann: a park entrance room for future residents and employees.

9

Community commercial center: uses the stream corridor wind- break vegetation and buildings to build a service node "neigh- borhood niche" convenient to home, school and work.

10

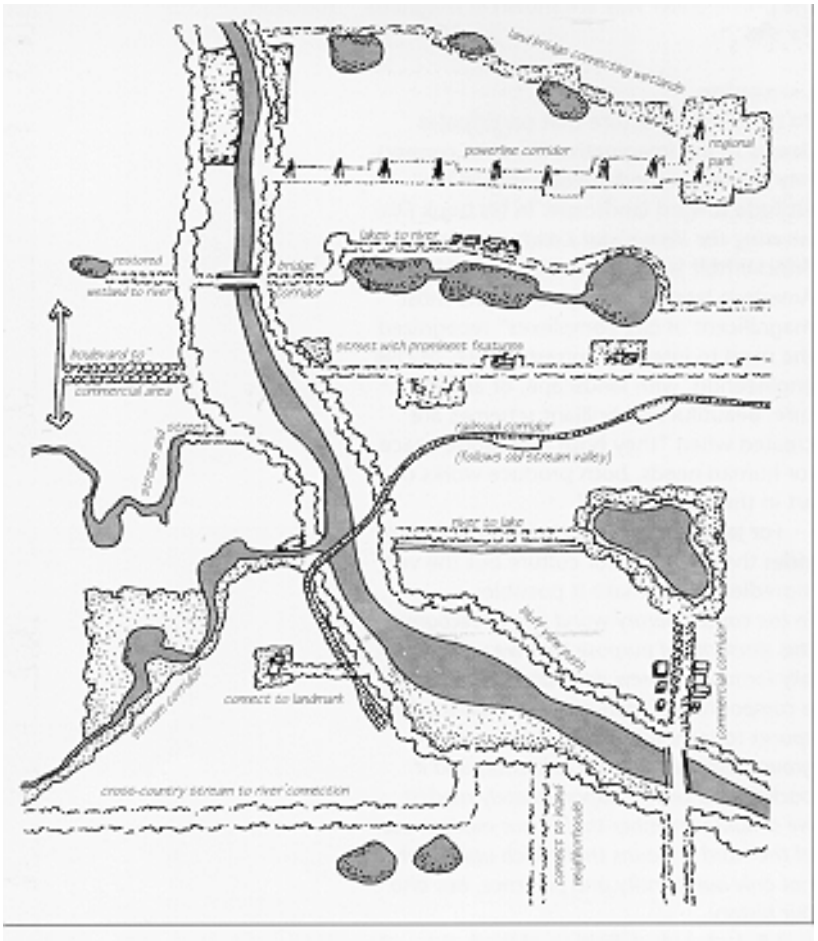
LIpper Bluff Creek intersection: a formally planted entry way with all corners relating to each other.

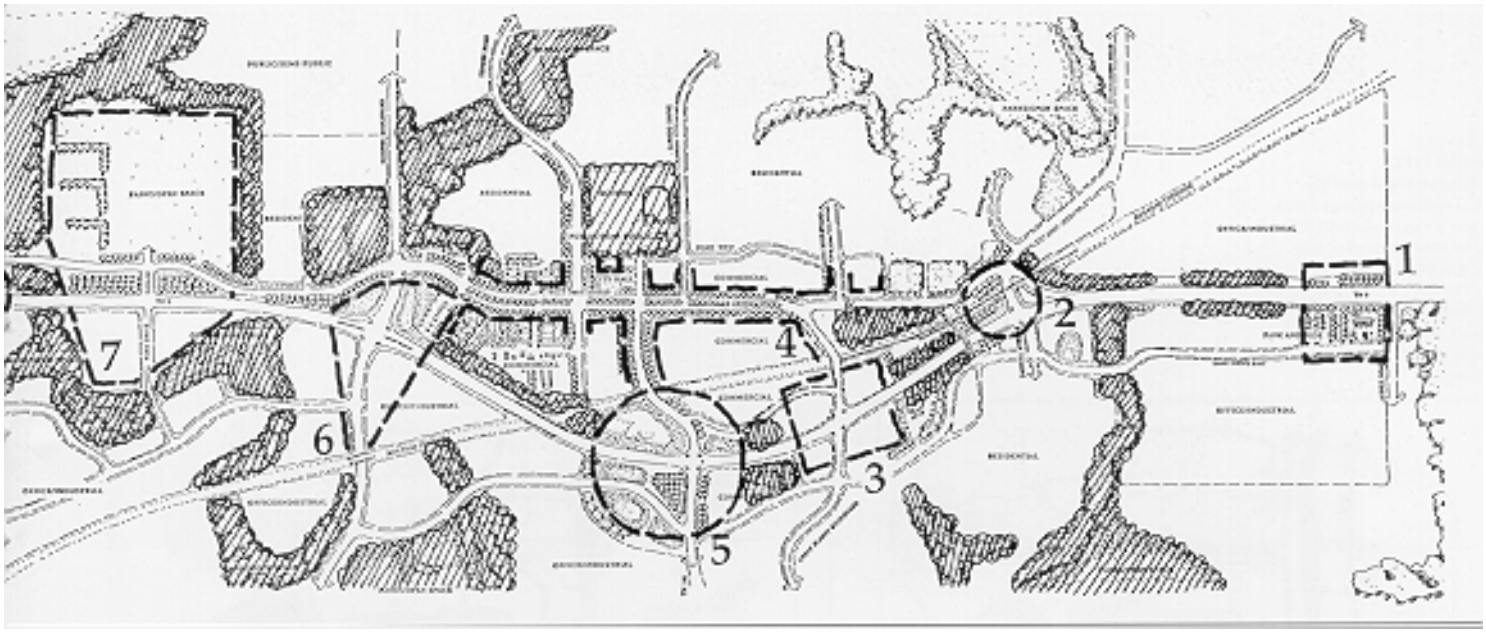
11.

Arboretum Gateway Office Park: centered around a formal wetiand planting.

12

Arboretum Gateway: formal, agricultural planted entrance, to include Highway 41 as an edge, complimenting the plantings of the office park. Together the planted edges make the lake to river gateway.





Left

DIAGRAM 2

CORRIDOR TYPES

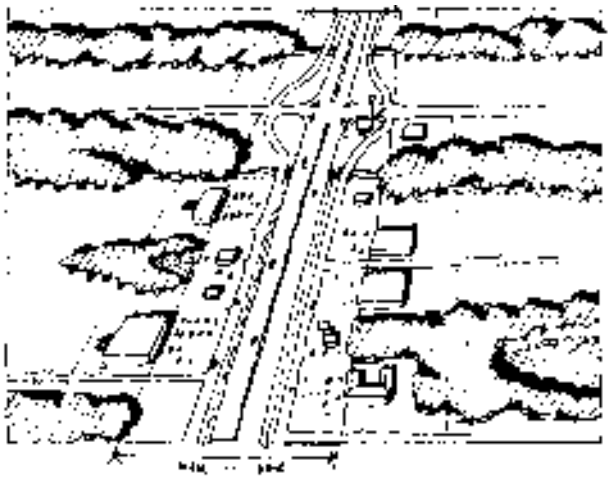
This diagram catalogues some of the many types of corridors that can connect an urban river landscape. Corridors can vary in character and serve multiple functions. Existing linear features may signal corridors that can be targeted for environmental and recreational enhancements,

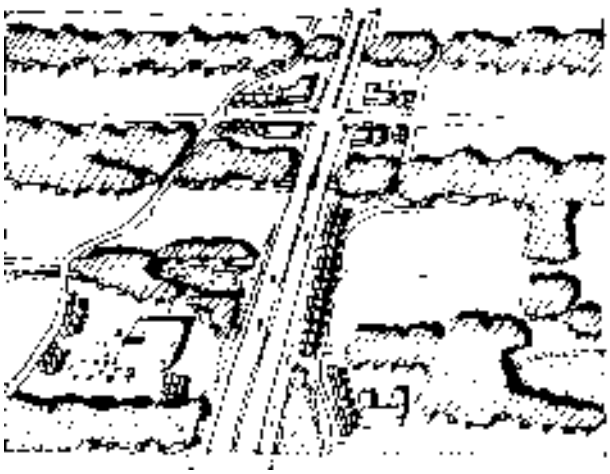
Right:

DIAGRAM 3

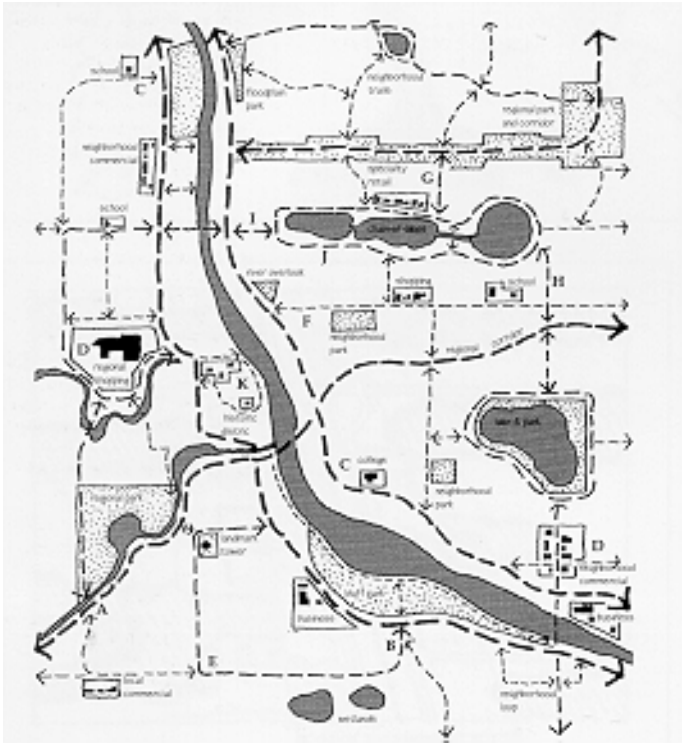
HIGHWAY CORRIDORS

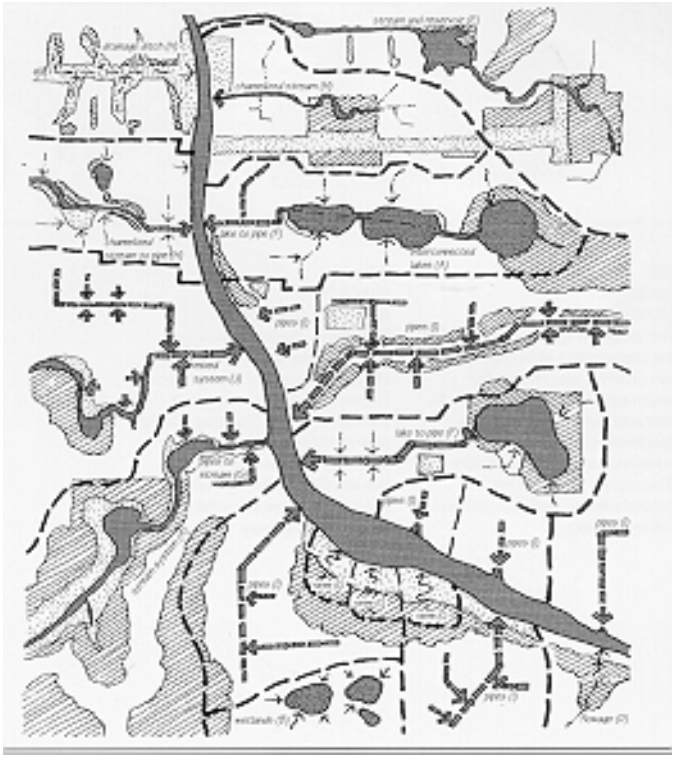
The upper diagram shows a typical highway corridor with strip development along the highway; the lower diagram shows proposed highway rooms and corridor using local landscape features along with the environmental systems to enhance a sense of community across the highway.



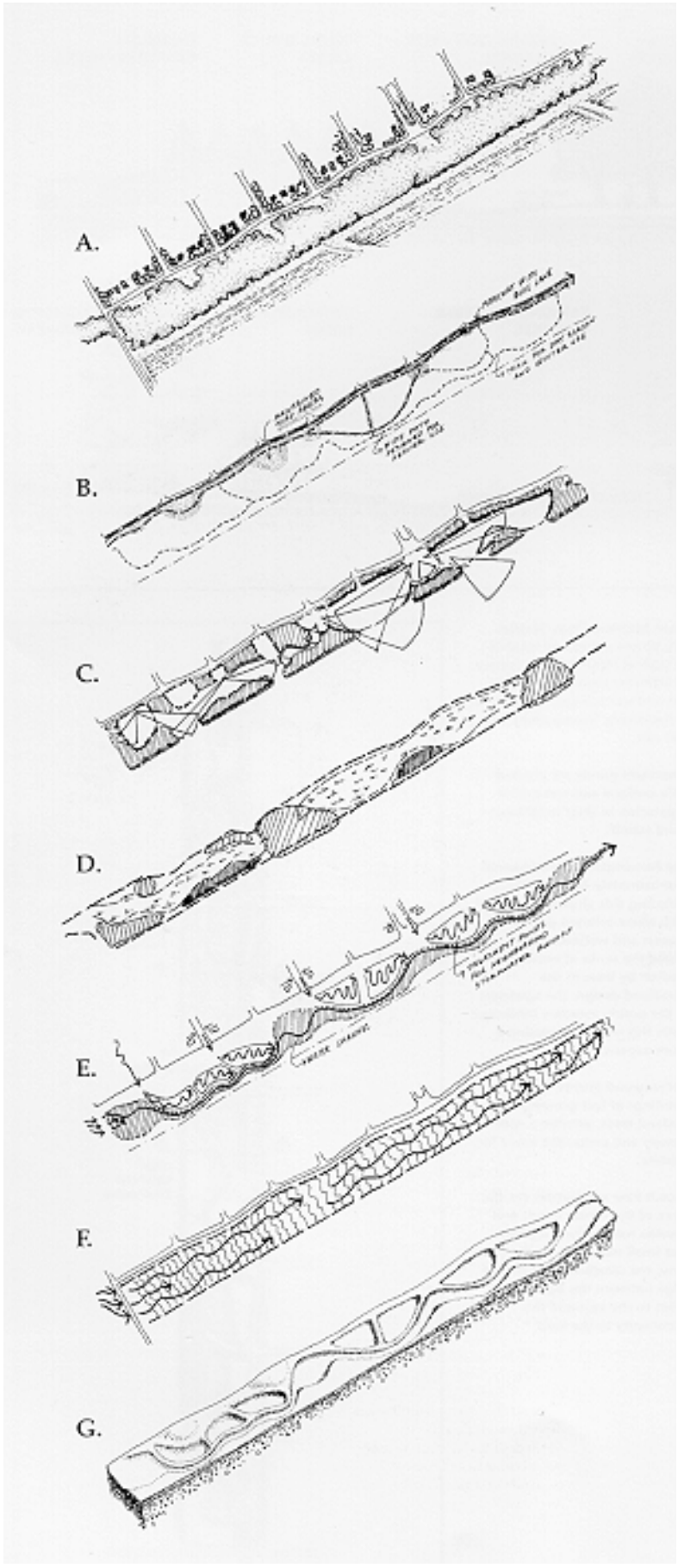


Below:
DIAGRAM 4
NETWORK TYPES
This diagram highlights the types of existing resources that can form a river network of hubs, landmarks, spokes and loops, symbolized in dashed lines. The scale and character of these movement systems can be as varied as the communities tha tmake up the river landscape.





Above:
DIAGRAM 5
WATERSHED TYPES Traditionally engineered drainage systems are shown above as dashed lines with arrows. These networks have typically superseded natural channels and basins, with a reduction of wildlife habitat. High environmental and municipal costs for traditional structural systems have spurred the search for new approaches to flood control and water- quality protection, including limiting development on flood plains and creating new wetiand areas where additional capacity and filtration is needed. Cross hatched sections represent wooded habitat; wetlands and grasslands are shaded.
ed in dashed lines. The scale and character of these movement systems can be as varied as the communities that make up the river landscape.



Left:
DIAGRAM 6
ELEMENTS OF THE PRAIRIE WATERWAY
A
City's Edge: The prairie waterway creates a transition between city and country, a permeable edge between the two land uses. Sheltering trees provide a vantage point from which to view the open croplands to the east. Views from the open country to town are defined by a horizon of vegetation.

B
Community Recreation: Seasonal changes of vegetation and wildlife can be observed from the parkway drive and community streets, which link pedestrians to the creek channel. The parkway drive and bicycle lanes gently meander to provide changing views of the waterway and the countryside. A broad path is paved to accommodate all-weather use. A low-rnaintenance trail, usable for winter and dry season walks, weaves through the prairie and lowland forest landscape. Turf areas, maintained for active play and picnic areas, are located at the ends of city streets.

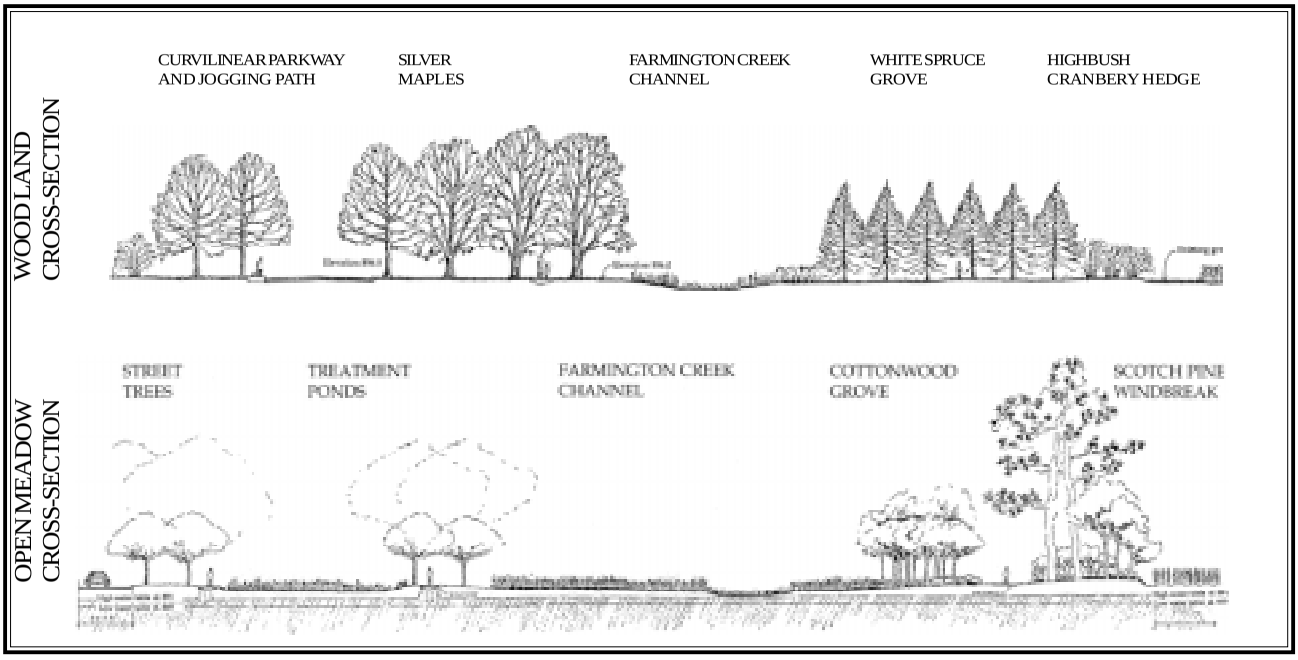
c
Rooms and Views: Tree masses, water-cleaning ponds and low embankments define outdoor rooms and views. A variety of experiences unfold as park users move along the water corridor. Small rooms and intricate views give way to longer, wider rooms and more expansive views of the waterway and adjoining farm fields.

D
Wildlife Habitat Corridor: The linear waterway and its vegetation also serves as a habitat corridor. Planted primarily with areas of prairie grass and lowland forest, this wet environment affords movement, nesting and foraging opportunities for a variety of wildlife. The patches of deciduous and evergreen woodlands that punctuate the corridor provide shelter and food for overwintering species, such as chickadees, nuthatches and cardinals. Because this corridor links to the Vermillion River, it forms a vital connection to the region's wildlife habitat network, especially as the watershed becomes more urbanized.

E
Surface Water: The prairie waterway incorporates a water-filtration system to help clean water flowing into the Vermillion River. Chemicals, fertilizers, and salt carried by runoff from neighborhood lawns and streets first flows into ponding areas for sediment and chemical filtration. The cleaner water then joins a channel carrying water from the south end of Farmington to the Vermillion River.

F
Flood Plain: The waterway serves as storage for excess water during major rainfalls, providing holding areas for surface water as well as groundwater pushed to the surface.

G
Topography: Low embankments separate channel and ponding areas. These earthworms are relatively shallow and do not penetrate a groundwater-filled layer of gravel just below the topsoil



Above and right:
DIAGRAM 7A
PRAIRE WATERWAY CROSS SECTIONS
DIAGRAM 7B
PRAIRIE WATERWAY PLAN

Woodland Cross-Section, shown above and located on plan at right. The curvilinear parkway and jogging path is planted with hardwoods, such as swamp white oak, a relatively fast- growing lowland oak with a generous canopy for shade.

Silver Maples, fast-growing lowland trees with a very wide canopy, enclose lawn openings for active play and picnics.

The Farmington Creek Channel, approximately 40 feet wide including side slopes, is planted with water-tolerant prairie grasses and wetiand plants. Red twig dogwoods help stabilize the bank and provide low shrub cover for wildlife.

White Spruce groves, lowland forest conifers, are large enough to provide winter cover and habitat for small mammals and songbirds such as cardinals. An all-season pedestran trail winds through the evergreen trees.

Highbush Cranberry is a source of food and shelter for wildlife. The hedge adds a middle habitat layer to the lowland forest vegetation.

Estimates of the high water table and low water table, illustrated in the shaded layer shown below the soil surface, are based on data from the City of Farmington and the Dakota County Soil Survey.

Open Meadow Cross-Section, also shown above and located on plan at right. Street trees are selected for their tolerance for salt and wet soil conditions, such as hackberry, swamp white oak and ash.

Treatment ponds are planted with wetiand and wet prairie vegetation to filter neighbour-hood runoff.

The Farmington Creek Channel, approximately 40 feet wide including side slopes, is planted with water-tolerant prairie grasses and wetiand plants. Unlike the sense of enclosure created by trees in the woodland design, the openness of the prairie meadow landscape gives this waterway section a more expansive feel.

Cottonwood groves, mass plantings of fast-growing lowland trees, provide a wide canopy and protective cover for wildlife.

Scotch Pine windbreaks cut the force of the winter winds and provide habitat for songbirds and small mammals. At the same time, the windbreak defines an edge between the agricultural fields to the east and the community to the west