

The Center for Humans and Nature Asks:

*To build or not to build a road...
how do we honor the landscape?*

By Way of Thoughtful Decision-Making

By Reconciling Mobility:
Redesigning the Road, Reweaving Landscape

By Keeping Values In Mind

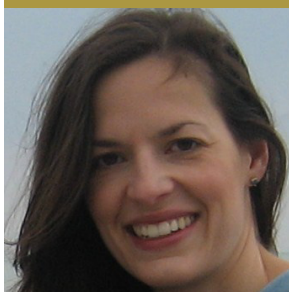
By Planning Roads at an Ecosystem Scale and
Integrating Sustainable Features

By Knowing When *Not* to Build a Road

By Creating a Meaningful Sense of Place

By Enhancing Green Infrastructure

FROM THE PRESIDENT



BROOKE HECHT, PH.D.

CENTER FOR
HUMANS AND NATURE

The Center for Humans and Nature asks fundamental questions.

In the spring of 2012, the Center for Humans and Nature will launch a web portal that offers a range of resources, relevant and accessible to the general public and rich for the expert. Drawing on the models of TED and Edge.org, the Center will engage big thinkers and ask questions that strike at the heart of the socio-ecological crises we are facing. This site will spotlight diverse responses from individuals and organizations committed to addressing these crises. The portal will allow users to transcend the divides—between biodiversity and human well-being, conservation and economic plenitude, and theory and action—that so often frustrate the discovery of thoughtful solutions. Importantly, this platform will not be offering answers, but a space that allows its users to come to their own informed conclusions. This portal will complement the Center's more traditional publications and public forums, providing access to video, blogs, and other resources in a clear and compelling format. The questions and challenges associated with the proposed Route 53 extension northwest of Chicago are an excellent fit for the Center's web portal.

Sustainable infrastructure?

Infrastructure and jobs. These are two terms currently receiving a lot of airtime, across branches of government and across our nation's kitchen tables. Renewing our nation's infrastructure has been touted as an important source of jobs, and road work is undoubtedly real work for people who need jobs. However, even if the economics of road building make sense, we often do not look at the other immediate consequences of where roads are built and how roads are designed. Moreover, the long view is seldom taken. We need to give weight to issues—beyond economic factors—that are critical to our sense of self, to our collective culture, and to nature. Truly sustainable infrastructure honors place, community identity, biodiversity, and ecological resilience. Actually achieving this—if and when we build a road—challenges us to recognize that we are part of an interdependent community that thrives when we focus on the character and health of our places.

The Center has engaged a series of experts to address the following question: To build or not to build a road.....How do we honor the landscape?

While Route 53 is the impetus—and provides context—for the question the Center is asking, we are offering a series of essays relevant to a broad audience, with communities in mind far beyond the Chicago region. The responses we have gathered cover fundamental ethical, ecological, and social issues that can offer a foundation for community discussion and decision-making. Check back with the Center's website (www.humansandnature.org) in the spring of 2012, when we will post additional essays on the question, as well as article-length pieces from our Senior Scholars. Video talks on the question by our Senior Scholars will be added to the Center's website in the fall following our first Senior Scholar Conference, done in collaboration with the American Museum of Natural History in New York City.

Why the Center for Humans and Nature?

The Center for Humans and Nature was founded in 2003 by Strachan Donnelley after decades of work in the bioethics field revealed that serious bioethics work was largely reserved for human and social issues. He saw an urgent need for an organization exploring the ethical dimensions of the relationship between humans and the rest of the natural world. He believed that creative interdisciplinary dialogue would provide a basis for an expansive vision of ethical responsibility that included—and integrated—humans and nature. For this reason, the Center is well positioned to take on issues that cross the human/nature divide; that connect ideas with action; and that break down barriers between experts and the general public.

We invite you.

We invite you to join the conversation. Visit our website at www.humansandnature.org and respond to the essays. We welcome your thoughts on roads, community, and honoring the landscape.

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Ingrid Leman Stefanovic, Ph.D.

Dr. Ingrid Leman Stefanovic is a Professor of Philosophy and former Founding Director of the Centre for Environment at the University of Toronto. Her research and publications explore the meaning of sense of place, as well as how values affect environmental policy development and decision-making. She teaches courses in environmental philosophy, environmental decision-making, and applied ethics (including climate ethics and water ethics.) She is a former Executive Co-Director of the International Association for Environmental Philosophy and currently co-chairs the Environmental and Architectural Phenomenology Network at the Environmental Design Research Association. Recent books include *Safeguarding Our Common Future: Rethinking Sustainable Development* (SUNY, 2000) and the co-edited volume, *The Natural City: Re-Envisioning the Built Environment* (University of Toronto Press, 2012).

By Way of Thoughtful Decision-Making

According to the National Research Council, “practical decision making begins by identifying the elements of a responsible and competent decision-making process.”¹ What might such a process consist of when it comes to the question of whether to build a new road?

Following a brief overview of what constitutes a rational decision-making process, I propose that it is hardly value-neutral. I then offer some virtues of a good road, recognizing that rational decisions not only reflect narrowly logical, technical matters but also incorporate essential elements of moral virtue, wisdom, and ultimately a respect for sense of place.

Values and Rational Decision-Making

Experts often utilize technical models to ensure that complex problems are addressed in a comprehensive manner. Decision trees, cost-benefit analysis, decision-making matrices, and calculations of expected monetary value are examples of such tools.²

This is not the place to delve into the specifics of such models. However, in my experience, typical approaches to rational decision-making follow generic steps, from defining the problem and opportunities to identifying constraints, alternatives, evaluation criteria, and a preferred option, all while monitoring and adjusting the strategy, if necessary.

While this process appears logical and perhaps even blatantly obvious, let me highlight a few issues. Defining the problem and the opportunities is sometimes no simple matter. For instance, in this case, the problem is not, strictly speaking, whether to build a road. Rather, the problem may be that travel times are currently too long, or perhaps—as in the case of some First Nations communities in Northern Canada—there may be a lack of easy access. Carefully identifying the problem and also the objective in addressing it (which, in this case, may consist of reducing travel times or improving access) will also identify opportunities and options that may or may not include the construction of a road and may consist, for instance, of improvements to various modes of public transport.

Other challenges present themselves within this apparently lucid and logical decision-making process. Often, constraints—notably, the impact of certain stakeholders—are ignored or under-valued. Broad consultation is essential—a point to which I will return shortly.

When it comes to identifying constraints, alternatives, and evaluation criteria, it is also important to take a *broadly interdisciplinary approach*, to ensure

that social, cultural, regulatory, economic, technological, and ecological functions are considered in a comprehensive and ethically responsible manner.³

Moreover, taken-for-granted values and attitudes affect decision-making in significant ways. For instance, most decisions present *risks*: risk-takers will respond to such challenges differently from those who are risk-averse. Motivational and other biases often inadvertently structure the way in which a problem is posed.⁴

Distinct *value systems* also may color conflicting judgment calls. For instance, some people may implicitly favor a utilitarian system of values, evaluating the viability of a new road by assessing the trade-offs between its costs and benefits. Others may argue that it is wrong “in principle” to build a road that dissects a vibrant and coherent community, even if that community consists only of a single, small town amongst many others. This community’s *rights* may be seen as inviolable, no matter what broader utilitarian trade-offs are considered.

Finally, distinct paradigms may frame problems and solutions very differently. For instance, the Government of Canada acknowledges that First Nations’ ways of knowing (described as “Traditional Ecological Knowledge” or TEK) provide a unique worldview that *complements* standard scientific knowledge.⁵

Identifying and resolving these sorts of different, sometimes conflicting risk perceptions, personal biases, societal value systems, and worldviews is a necessary requirement of any decision-making process if that process is to be comprehensive, transparent, relevant, and judicious.

Virtues of a Good Road

So what constitutes a “good” road, if that becomes a preferred option?

Presumably, it is one that genuinely reflects the outcome of a *broadly consultative process*. Through a “rational weighing of all considerations,” the aim is to make transparent the kinds of values described earlier, so that deeper, taken-for-granted roots of conflicting positions are addressed.⁶ Ideally, meaningful communication moves beyond token newsletters or public forums, ensuring a genuine collaboration and respectful, personal, engaged *listening* amongst stakeholders.⁷

Moreover, no matter how “rational” the process, it is essential that decision-makers step back to *look at the problem holistically*. Does the proposed road enhance a *sense of place*?⁸ Place is not simply a container of our activities. It reveals our culture and our explicit value systems, but, equally important, it uncovers and preserves our implicit, pre-linguistic understanding of *who we are*.

In that regard, I would suggest that building a road is much less a matter of *imposing* a rational and efficient solution with *universal technical criteria* than of *discovering* a way forward through a careful listening, seeing, and *revealing* of what is appropriate in each particular instance.

Each road invites diverse criteria that should reflect local conditions. There may be instances where, rather than razing the landscape, the road will more appropriately follow the existing topography—tracing the natural riverbed or mounting the hillside, providing unique vistas that would otherwise be lost by preserving a linear order to the motorway and simply cutting through geological obstructions.

Rather than viewing the proposed road rationally “from above” in an abstract planning exercise, questions should be asked about the actual *experience of being* on this road once it is built. A road connects spatial locations, but also “every stretch of road has meaning in itself.”⁹ A road that meanders through a diverse landscape will *preserve the mystery* of what lies ahead. Perhaps such a road will properly waver from its direct, linear route to acknowledge and *pay heed* to a unique village or town.

A more modest planning process ensures that the natural landscape, both flora and fauna, are respectfully incorporated into the road design. A road should find its way within the *genius loci* of the local forest or mountain range. It should respect and preserve animal migratory patterns by incorporating habitat corridors.

New road technologies must be developed that allow for natural drainage and are less intrusive than traditional asphalt or concrete paving.

Altogether, a “good” road reflects the positive values of the local communities. It enhances experience of place and preserves an appropriate “fit” with the landscape. And it is never easy to accomplish.

¹. National Research Council, *Decision Making for the Environment: Social and Behavioral Science Research Priorities*, (Washington, DC: The National Academies Press, 2005), p. 27.

². See Michael Stefanovic and Ingrid Leman Stefanovic, “Decisions, Decisions,” 2005 Proceedings of the Project Management Institute Global Congress.

³. See C.A. Doxiadis, “Ekistics: The Science of Human Settlements,” *Science*, 170 (1970): 393-404.

⁴. Stefanovic and Stefanovic, “Decisions, Decisions.”

⁵. See Environment Canada, “Aboriginal Traditional Knowledge and Environmental Management,” in *Science and the Environment Bulletin*, no. 32 (September/October 2002).

⁶. Jurgen Habermas, *The Theory of Communicative Action* (Boston, MA: Beacon Press, 1970.)

⁷. A. Poetz, “What’s Your ‘Position’ on Nuclear Power? An Exploration of Conflict in Stakeholder Participation for Decision-Making about Risky Technologies,” *Risk, Hazards and Crisis in Public Policy* 2, no. 2 (2011): article 2.

⁸. See I.L. Stefanovic, *Safeguarding Our Common Future* (Albany, NY: SUNY, 2000.)

⁹. M. Kundera, *Immortality*, trans. P. Kussi (New York: Harper and Row, 1990), p. 223.



Nina-Marie Lister, M.Sc. PI.

Professor Nina-Marie Lister is tenured Associate Professor of Urban and Regional Planning at Ryerson University in Toronto and Visiting Associate Professor of Landscape Architecture at Harvard University Graduate School of Design. A Registered Professional Planner (MCIP, RPP) with a background in ecology and environmental planning, she is the founding principal of *plandform*, a creative studio practice exploring the relationship between landscape, ecology, and urbanism. Professor Lister's research, teaching, and practice focus on the confluence of landscape infrastructure and ecological processes within contemporary metropolitan regions. She is co-editor of *The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability* (Columbia University Press, 2008) and author of more than thirty professional practice and scholarly publications, including recent contributions to *Ecological Urbanism* (Lars Müller Publishers with Harvard University, 2010) and *Large Parks* (Princeton Architectural Press, 2008, and winner of the J.B. Jackson Book Prize). Her work has been featured in several planning and design exhibitions, including the Canadian Centre for Architecture in Montreal, the Chicago Architecture Foundation, the Toronto Design Exchange, and the Van Alen Institute in New York. Professor Lister also served as the Professional Advisor for the 2010 ARC International Wildlife Crossing Infrastructure Design Competition, which developed the concept designs for a wildlife bridge at the Vail Pass in Colorado. She is currently Senior Scholar with the Center for Humans and Nature.

By Reconciling Mobility: Redesigning the Road, Reweaving Landscape

A road is a thoroughfare designed to connect two places—a route to link communities. Virtually every definition of “road” implies connectivity. Yet the unintended consequence of centuries of road building has been to divide as much as to connect. Perhaps we ought to revisit the road.

There are many strategies we should pursue, not least the fundamental question of whether or not to build a road. But my aim here is to pursue one approach that focuses on connectivity: to reconcile the notion of mobility such that we (re)imagine the road as a device for (re)connection between humans and wildlife, culture and nature.

In the last sixty years, the number of cars in the United States has increased more than threefold¹ and settlements have sprawled out from urban centers in unprecedented growth: roads have fragmented our landscapes, divided habitats, and grown ever more congested. Today, new roads are often built for the primary—but misguided—intention to alleviate congestion. Yet it’s clear that more routes lead to more traffic, and inevitably to further fragmentation.² Divided habitat and severed landscapes degrade both nature and culture: not least, the wildlife among us.

Today, there are more than 4.8 million miles (7.8 million km) of roads on the continent.³ Americans have one of the highest rates of private automobile ownership on the planet, with more than a quarter billion vehicles using these roads.⁴ Given the dominance of the road in North America and the fact that we now spend on average 1.5 hours per day in the car,⁵ it has become disturbingly commonplace—even acceptable—for wildlife to be killed on our roads. Collisions between wildlife and vehicles have increased by 50 percent in the past fifteen years. These accidents now cost Americans a staggering \$8 billion every year.⁶

The prevalence of roadkill is both an obvious and disturbing result of the conflict between the needs of humans and animals. The human need to get to where we are going safely and quickly is a basic expectation of modern society. Yet wild animals need connected landscapes: they must cross our roads in search of food, mates, and shelter. Our expanding network of roads, highways, and interchanges criss-crosses the continent, interrupting and disconnecting our landscapes—and with it, the territories of wild animals. Many in the most basic quest for survival are routinely struck and killed by vehicles.

But this is not merely a wilderness or rural issue—it is a problem that affects everyone; those of us living and driving in busy suburban and urbanizing landscapes are more likely to witness or experience the conflicts firsthand. In fact, growing numbers of wildlife-vehicle collisions are leading to higher levels of personal injury and property damage, and with this, rising insurance premiums. While human deaths are not high compared with other accidents, wildlife-vehicle collisions have increased significantly. A recent U.S. Federal Highway Administration study reports that there are approximately one to two million collisions between cars and large mammals every year in the United States. This represents a significant danger to human safety and to wildlife populations. Wildlife-vehicle collisions are also increasing as a proportion of the total accidents on the continent's roads. Even if not physically hurt or economically affected by a collision, many people report feeling traumatized after hitting an animal.

Alongside these obvious concerns for motorist safety are serious implications for wildlife. Road mortality is documented as one of the major threats to the survival of twenty-one federally listed threatened or endangered species in North America. On a much larger scale, conventional road building results in significant losses of habitat for wild animals. Road networks carve up our landscapes into small, isolated patches in which wildlife must live and move, faced with declining genetic fitness as populations become separated. Worse yet, basic wildlife mobility often conflicts with major transportation routes. Most of North America's major highways cross the continent in an east-west orientation, but wildlife movement patterns tend to flow north-south following mountain topography, such as the Rockies, the Appalachians, and the coastal ranges. These landforms have always been important habitat and migration corridors, and they may become still more significant. Research on climate change suggests many wildlife species may be forced to migrate in changing patterns across our landscapes in search of new habitats as resources become scarce in their current home ranges.

But roadkill is not simply “bad luck” or an unfortunate consequence of driving; it's an avoidable cost and a preventable loss. If we rethink our mobility to understand that both humans and wildlife share a common need to move, we can redesign the road to provide safe passage for all.

Indeed, an emerging priority for transportation and natural resource agencies is to make highways safer for both drivers and wildlife. One of the proven solutions is to build wildlife crossing structures. When designed and implemented strategically, wildlife crossing structures

can radically reduce the number of collisions to save costs and, most significantly, human and animal lives. Better still would be to redesign our transportation infrastructure to include a network of wildlife-crossing overpasses and underpasses along all key migration corridors.

This is not a new idea. Providing crossing infrastructure at key points along transportation corridors is known to improve safety, reconnect habitats, and restore wildlife movement. Throughout Europe, Asia, Australia, and North America, hundreds of crossing structures have already been implemented with demonstrable success. These include underpasses and overpasses that have been constructed in a variety of sizes and designs. Although wildlife underpasses are less costly to build and more commonly used by a diversity of species, wildlife overpasses are preferred by certain wide-roaming and iconic species at risk, such as grizzly bears. Overpass structures are also more visible and noteworthy to motorists.

In 2010, the ARC International Wildlife Crossing Infrastructure Design Competition engaged the world's leading engineers, landscape architects, and ecologists to create the next generation of wildlife crossing infrastructure for North America's roadways. Designers were challenged to develop new solutions for animal road-crossing structures that would be cost-efficient, ecologically responsive, safe, and flexible; they developed concept solutions that could be readily adapted for widespread use in various locations and under many conditions, including climate change. The resulting schemes made considerable progress toward the (re)design of highways to maintain the integrity and connectivity of our ecosystems, reduce the carbon footprint, minimize the consumption of non-renewable materials, recycle resources, and extend the life cycle of transportation infrastructure—all while providing safe and efficient mobility for humans and wildlife.

By redesigning the road for two “clients”—animal and human—wildlife crossing infrastructure presents a timely opportunity to communicate both the problem and the solution to the public. In building crossing structures that are visible and legible, we may empower motorists to experience engineered landscape designs that create safer roads, while simultaneously demonstrating the importance of (re)connected landscapes. Widespread deployment of this relatively simple redesign tactic may change the way we move and live.

We have proven solutions to reweave our landscapes, protect our wildlife populations and their habitats, and ultimately restore the essential functions of North America's wild ecosystems. In rethinking mobility and redesigning the road for safe passage for all, we honor the landscapes that sustain us and the places we call home. It's time to redesign the road.

- ¹. U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics 2011, *National Transportation Statistics*, Table 1-11. http://www.bts.gov/publications/national_transportation_statistics/html/table_01_11.html
- ². The problem of habitat fragmentation by roads is well documented in both the scholarly literature and popular media. See, for example, J.P. Beckmann, A.P. Clevenger, M.P. Huijser, and J.A. Hilty, *Safe Passages: Highways, Wildlife and Habitat Connectivity*, (Washington, D.C.: Island Press, 2010). See also Eric Bendick's documentary film, *Division Street*, 2009, at <http://www.videoproject.com/divisionstreet.html> and an interactive online documentary, *Bear71*, 2012, by Leanne Allison and Jason Mendes, at <http://bear71.nfb.ca/#/bear71>
- ³. Central Intelligence Agency, *The World Factbook*, 2012. <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2085rank.html>
- ⁴. S.C. Davis, S.W. Diegel, and R.G. Boundy, *Transportation Energy Data Book: Edition 30*, U.S. Department of Energy Office of Energy Efficiency and Renewable Energy, June 2011, Table 3.5, pp. 3-9. http://cta.ornl.gov/data/teb30/Edition30_Full_Doc.pdf
- ⁵. <http://www.theurbancountry.com/2011/05/americans-work-2-hours-each-day-to-pay.html>. See also R. Buehler, "Transport Policies, Automobile Use, and Sustainable Transportation: A Comparison of Germany and the USA," *Journal of Planning Education and Research* 30 (2010): 76-93, DOI: 10.1177/0739456X10366302. <http://jpe.sagepub.com/content/early/2010/04/06/0739456X10366302.abstract>
- ⁶. M.P. Huijser, J.W. Duffield, A.P. Clevenger, et al., "Cost-Benefit Analyses of Mitigation Measures Aimed at Reducing Collisions with Large Ungulates in the United States and Canada: A Decision Support Tool," *Ecology and Society* 14, no. 2 (2011): 15. <http://www.ecologyandsociety.org/vol14/iss2/art15/>
- ⁷. Residents of the northeastern states, particularly West Virginia (1:53) and Pennsylvania (1:86), have the highest risk of collision with deer, according to 2011 data collected by State Farm Insurance. http://www.statefarm.com/aboutus/_pressreleases/2011/october/3/us-deer-collisions-fall-map.pdf
- ⁸. M.P. Huijser, P. McGowen, J. Fuller, et al., *Wildlife-Vehicle Collision Reduction Study*, Report to Congress, 2007, by the U.S. Department of Transportation Federal Highway Administration, Washington D.C.
- ⁹. Beckmann, Clevenger, Huijser, and Hilty, *Safe Passages*.
- ¹⁰. See, for example, <http://www.highwaywilding.org/> and <http://www.arc-solutions.org>
- ¹¹. R. Van der Ree, J.A.G. Jaeger, E. van der Grift, and A.P. Clevenger, "Effects of Roads and Traffic on Wildlife Populations and Landscape Function: Road Ecology is Moving toward Larger Scales," *Ecology and Society* 16, no. 1 (2011): 48. <http://www.ecologyandsociety.org/vol16/iss1/art48/>
- ¹². N.E. Heller and E.A. Zavaleta, "Biodiversity Management in the Face of Climate Change: A Review of 22 Years of Recommendations," *Biological Conservation* 142 (2009): 14-32.
- ¹³. A.P. Clevenger and M.P. Huijser, *Wildlife Crossing Structure Handbook: Design and Evaluation in North America* (Lakewood, CO: U.S. Federal Highway Administration, 2011), pub. no. FHWA-CFL/TD-11-003. http://www.fhwa.gov/programs/techDevelopment/wildlife/documents/01_Wildlife_Crossing_Structures_Handbook.pdf
- ¹⁴. See, for example, L. Tepper, "Road Ecology: Wildlife Habitat and Highway Design," *The Design Observer Group*, posted September 22, 2011. <http://places.designobserver.com/feature/road-ecology-wildlife-crossings-and-highway-design/29498/>
- ¹⁵. ARC International Wildlife Crossing Infrastructure Design Competition 2010, *Competition Brief*, at http://www.arc-competition.com/files/ARC_Brief.pdf. See also <http://www.arc-solutions.org/>.

RESPONDENT



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Dr. Christopher J. Preston teaches and writes in environmental philosophy at the University of Montana, Missoula. He is author of *Saving Creation: Nature and Faith in the Life of Holmes Rolston, III* (2009) and *Grounding Knowledge: Environmental Philosophy, Epistemology, and Place* (2003), as well as co-editor of an anthology titled *Nature, Value, and Duty* (2007) and editor of a special journal issue of *Ethics and the Environment* on “Epistemology and Environmental Philosophy” (2005). His published articles include work on value theory, ecofeminist ethics, public health and environmentalism, environmental epistemology, and the embodied mind. He also writes on the ethics of emerging technologies such as nanotechnology, synthetic biology, and geoengineering. Raised in England and now living in Montana, he has particular interest in the idea of “sense of place.”

By Keeping Values in Mind

Big public infrastructure decisions are often couched in terms of comparing costs and benefits. Highway projects pitch commute times against the destruction of wetlands or potential economic development against the integrity of small communities. Though there are differences of opinion about how to quantify the pluses and minuses (especially as these measures stretch far into the future), the decision-making frame is essentially thought to be mathematical. It is what we believe big public decisions are about.

The mathematical framing, however, leaves out a central issue. Large-scale infrastructure forms the material within which we live our lives. For those of us who don't live in the backwoods (and for some who do), roads, homes, city parks, and shopping centers all form our immediate environment, the place within which we forge our lifestyles. We interact with this material structure continuously and inevitably. Philosophers have said that there is "a strange but necessary connection between place and mind." Part of what this means is that the physical setting with which we surround ourselves is not a neutral and passive background for human life, but an active and determining influence on us. It gets into our minds and shapes our conception of the world. This is part of what makes up a person's "sense of place," an embracing of what is embodied in a particular geography.

People like to say that nature "speaks to" them. In fact, all environments—natural and built—constantly speak to us. Part of the language they speak is the language of values. Infrastructure embodies values and reflects them back at us, immersing us in what they say. Values are "made material" in infrastructure, carrying messages about how to live. The way we build, then, even when we build something as instrumental as a road, needs to be "value-sensitive." Choices made about road building are not just choices about costs and benefits, they are long-range statements about the values in which we choose to immerse ourselves and our children. They will dictate where to focus our attention and what to dwell upon. The material structure of the highway system will instruct us in what to take as significant in our lives.

In order to make a design project value-sensitive, a number of deep questions about goals and metrics of success need to be asked. These questions include: What outcomes would constitute success for this project? How does the technical success of this project differ from social or ecological success? Which aspects of design could be altered in order to increase success, broadly defined? Rather than evaluate the road in terms of surface costs and benefits, it is necessary to probe the values the road might speak back to its users over the generations.

The probing might look like this:

Is the purpose of the road to increase quality of life? Do we have agreement about what quality of life means? Does it mean allowing people to live as far away from their work as possible, with the desired outcome being to make this one regrettable part of the day—the commute—as short as possible? What is at stake when people separate where they live from where they work? What does it mean to “relieve congestion”? Will the road solve or postpone this problem? When something is relieved, what is depressed? Are the values that are gained similar to the values that are lost? Is the public informed about how to meaningfully compare them? Will this road make us better or worse people? Will it build community or fragment it? Whose interests are being represented in the desire to spur economic growth?

If a road is built, which values will the infrastructure speak back to its users over the next several generations? Will it speak of efficiency, dreariness, community, or joy? Will the road increase options, or will it reduce them? Will the road be given a chance to ask each driver “might you be better off in a train?” Will the road be designed to showcase or erase the landscape? Occasionally, a road can be aesthetically positive (e.g., the Going-to-the-Sun Highway in Montana and the Southern Appalachians’ Blue Ridge Parkway). Is there a way to make the outcome of “road work” beautiful? How might a road be designed to enhance a sense of place? Will the road speak to the importance, the history, and the interest of its various destinations with unusual signs and local information, or will it serve only as an artery with a smooth, fast flow and little else? Will the road be designed to maximize speed or to maximize interest? Will the road impose itself on the landscape, or will it respond to the shape of landscape? Will the road respect diversity (of people and of place) or eliminate it? Will it be a source of pride to anyone but the engineer?

“Rather than evaluate the road in terms of surface costs and benefits, it is necessary to probe the values the road might speak back to its users over the generations.

A framing that probes the deeper values at work is the way decisions concerning public infrastructure should be made. These values need to be solicited from the public through as much community involvement as possible. The idea that a certain percentage of the population “support” the road and others “do not” is only minimally useful information. Designers need to know what the public support and *what they want built*. Im-

portantly, these wishes need to be informed by the highest aspirations of what is possible. Artists, visionaries, and philosophers need to inspire the public with images of the rich potential of this important piece of public infrastructure. The most enthusiastic vision of what is possible needs to be promulgated so that people are not making choices between yes and no, but between value sets that enhance both community and nature.

The built environment matters profoundly for the constraints it imposes and the opportunities it provides. It plays a role in creating or destroying a sense of place. A two-billion-dollar construction project shaping the landscape for the next hundred years that says only “here is a way to surround you in concrete as you speed between point A and B” would be a moral failure, even at the same time as it might be an engineering success.

CO-RESPONDENT



Carson Poe, M.A.

Carson Poe is a Transportation Industry Analyst with Volpe, The National Transportation Systems Center. His current research areas include climate change adaptation and mitigation, land-use and property management, and the National Environmental Policy Act process. Poe has conducted studies to estimate the country's unregulated oil and natural gas pipeline mileage and to quantify the revenue that could be generated from selling carbon credits generated on highway rights-of-way. He is currently leading a team that is investigating the implications of accommodating renewable energy technologies and alternative fuel facilities along highways. Poe holds an M.A. in Energy and Environmental Analysis from Boston University's Center for Energy and Environmental Studies and a B.A. in Interdisciplinary Studies/Environmental Policy and Planning from Appalachian State University.

CO-RESPONDENT



Julianne Schwarzer, M.C.P.

Julianne Schwarzer is an Environmental Protection Specialist with Volpe, The National Transportation Systems Center. Her current work focuses on environmental and ecosystem-scale planning, environmental policy, and programmatic outreach and facilitation. Schwarzer has worked with sponsors at the Federal Aviation Administration, Federal Highway Administration, the National Park Service, the United States Fish and Wildlife Service, and the United States Coast Guard. Schwarzer's current research concentrates on developing a better understanding of the effectiveness of and methods to operationalize the approach described in the 2006 document, *Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects*. She holds an M.C.P. in City Planning with a certificate in Environmental Planning and Policy from the Massachusetts Institute of Technology and a B.F.A. in Film, Television, and Radio from New York University's Tisch School of the Arts. For her graduate thesis, Schwarzer researched conflict surrounding urban wildlife management.

By Planning Roads at an Ecosystem Scale and Integrating Sustainable Features

Today, only a limited number of infrastructure projects in the United States are new roads. In fact, more than nine out of ten highway projects that require evaluation under the National Environmental Policy Act (NEPA) are classified as categorical exclusions, and thus are actions considered to involve no significant environmental impacts, based on a precedent that the environmental review of similar actions has set.¹

The only way to ensure that critical environmental and cultural resources are protected when a new road is built is to select an alignment that avoids them. Certain circumstances require roads to be constructed in or near sensitive resources; for example, a region may need a new road to respond to changes in population and land use, to replace obsolete facilities, to provide equitable access to transportation, or to facilitate economic development. A new road may also be necessary to enhance safety and emergency preparedness. For purposes such as these, the public's need for safe and efficient transportation solutions must be taken into account.

When a region determines that building a new road is in the best public interest, the transportation delivery process presents at least two broad types of opportunities to honor the landscape: those possible through the transportation-planning and environmental-permitting processes, and those possible through the application of certain technological, operational, and design features. Regarding the first opportunity, the transportation-planning and environmental review processes historically existed in separate spheres, but the state of the practice has changed and the use of an "integrated planning" approach is helping transportation and environmental practitioners to examine natural resource concerns prior to formal transportation-planning activities. By exploring environmental, economic, and other societal goals during the planning process and then carrying them through project development, design, and construction, resulting road projects can better reflect the priorities of the community and relevant agencies.

“The only way to ensure that critical environmental and cultural resources are protected when a new road is built is to select an alignment that avoids them.

When assessing infrastructure projects within a given region, integrated planning allows agencies with different missions and areas of expertise at local, state, and federal levels to collaborate. Together, they can identify critical ecological resources and mitigation opportunities and then select the most ecologically appropriate alignment. In cases where key resources cannot be avoided, the agencies can develop a list of mitigation options within the same ecosystem or watershed, while also creating a plan for infrastructure features that may lessen any negative environmental impacts of the road. Some of these features are new techniques that transportation agencies have demonstrated through recent research, while others have been available for many years but not regularly applied.

It is those features that can help roads of the present and future “look” and perform better than some roads may have in the past. For example, transportation agencies can install erosion, sediment, and runoff control measures to ensure that stormwater impacts resulting from new roads are alleviated. Transportation agencies might also implement policies or pricing strategies that reduce idling times in order to address air quality issues or to attempt to manage congestion. In other scenarios, transportation agencies can use unpaved portions of roads that are beyond the “clear zone,” or area necessary to ensure traveler safety, to sequester carbon or grow biocrops via alternative management practices

“...some transportation agencies are piloting ways to put new roads to work generating power through incorporating renewable energy technologies—including solar panels, wind turbines, and geothermal devices—into roadway design.

es for the native vegetation already present at the site of the road. When the proposed new road is located in a landscape where the new infrastructure might cause habitat fragmentation, disrupt migration patterns, or split species populations, measures such

as well-designed box culverts, wildlife overpasses/underpasses, and wildlife fencing can be installed to support habitat connectivity and to help offset other negative impacts of the road. Additionally, some transportation agencies are piloting ways to put new roads to work generating power through incorporating renewable energy technologies—including solar panels, wind turbines, and geothermal devices—into roadway design. The rapidly maturing state of the practice suggests renewable energy applications within highway right-of-way can promote energy security, reduce emissions, and foster the creation of local green job markets.

All of these considerations create a series of trade-offs that a region will need to balance with its stated values when building a road is the best approach to meeting the need for a proposed project within a region. If a region decides that a road should be built, an evaluation approach should be put in place to assess the relative success of that road in honoring the landscape and achieving other goals. This mechanism should be articulated during the project planning stage to ensure that goals are not selectively met; it will serve as a reminder of the intent of the project to be environmentally sensitive, while requiring the agencies involved to measure whether decisions have ultimately accomplished what the public need warrants and the community has affirmed.

¹. U.S. Department of Transportation, Federal Highway Administration, "FHWA Projects by Class of Action" and "FHWA Projects by Funding Program Amounts."
<http://environment.fhwa.dot.gov/strmlng/projectgraphs.asp>

RESPONDENT



Dana Beach, M.B.A.

Dana Beach serves as the Executive Director and Founder of the South Carolina Coastal Conservation League, an organization that works with citizens and government to develop policies that promote sustainable patterns of development for people and the environment. Under Beach's leadership, the Conservation League has grown into one of the most successful state-level conservation groups in the country and is particularly well known for its work in the field of land-use reform. His published work includes articles on wetlands, land-use planning, beachfront management, and other environmental topics. Beach also wrote *Coastal Sprawl: The Effects of Urban Design on Aquatic Ecosystems in the United States* (2002). Born and raised in Columbia, South Carolina, Beach lives in Charleston with his wife, Virginia.

By Knowing When *Not* to Build a Road

“All dash to and fro in motor cars,
Familiar with roads, but settled nowhere.”
-from “*The Rock*,” by T. S. Elliot

Spurred by important questions presented by a very real proposal for a new road, the Center for Humans and Nature asked me for my opinion about roads and the building of new roads. I live 954 miles away from the specific road that prompted this question and have spent much of my professional career opposing new highways in the South Carolina Lowcountry, so my qualifications for commenting on that proposal are therefore dubious.

I thought initially that the responsible approach would be to gather all of the information I could find and deliver a thorough, balanced response, with the qualification that there are wide gaps in my understanding of the issue. I studied three route maps, read the project description, found the area on Google Earth, and concluded that further research was unnecessary. The answer is that the project is a bad idea.

My reason has nothing to do with wetlands or air pollution; I don't know enough about the specific area to weigh in on these, although they are important issues, and ones we've cited consistently in our road battles. The issue with any road project has to do with whether we use public dollars to concentrate and enhance strong communities, or to decant and diffuse them.

I've observed that the area northwest of Chicago that spurred this series of essays is a mix of traditional town centers, a few farms (too few, for my taste), roads, highways, strip malls, and sprawling subdivisions—in other words, a snapshot of a typical American exurban landscape at this particular moment in history that is unique but structurally similar to other places around the country.

That area, like any, is not what it was fifty years ago, and it's not what it will be fifty or one hundred years from now. Over time, more houses will be built, stores will be abandoned, offices will arise, businesses will come and go. A lot will change, except for the roads.

Of all of the components of a human landscape, roads last the longest. Researchers at the University of Chicago, examining satellite images of Iraq and Syria, discovered remnants of five-thousand-year-old roads leading to the ancient city of Ur. Roads shape regions more substantially and for a longer time than any other single human construct.

For the past decade in South Carolina, we've warned that a proposed interstate extension to a rural sea island south of Charleston will change forever the island's character and landscape. The people who want the road argue that land uses can and should be determined by planning and zoning, and that even a large road should have no impact of the future layout of our communities.

This view is either very naïve or intentionally misleading. Zoning is the most ephemeral of all the forces that shape a region. It is easily manipulated politically, and when it goes against a strong economic force, it never prevails. Ur may have had zoning of a sort, but no sign of it remains today. If you want to shape a region, you do it with roads. That's why powerful people care more about serving on transportation commissions than on zoning boards.

So the question we should ask when we contemplate building a new road—especially a large one that connects distant places—is this: What will the road cause to happen in the area over the next two, three, or four centuries? What will people decide to do with land, and with themselves, because the road is there that they would not have done without it? Are those things consistent with what we believe, to the best of our limited vision, should be the future of the place in question?

Most people believe that small towns are worth saving, that people should be able to work closer to their homes, that local food and nearby farms can benefit communities in many ways, and that places should have an identity and a physical completeness about them. In short, it shouldn't be too easy to hop on a high-speed road, or even a train, and head to the other side of Chicago or Charleston to go to work or to shop. Instead, we should push harder in the direction of helping people stay put—building community, rather than tearing it apart. There should be some built-in friction that holds communities together.

“Over time, more houses will be built, stores will be abandoned, offices will arise, businesses will come and go. A lot will change, except for the roads.”

Wallace Stegner, who was born in Iowa and grew up in Montana and Utah, divided people into two categories: stickers and boomers. Boomers were constantly on the move, looking for the next get-rich-quick scheme (enabled by the next new road, no doubt). The stickers stayed in one

place and built communities. On a small scale, places like Libertyville need more stickers and fewer boomers in their future.

Building more arterial roads that connect suburbs and cities, however, would tip the balance in favor of the boomers. While some might

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say that the transformation of the American landscape over the past fifty years is simply a manifestation of our system of capitalism at work, that is not really the case. New roads represent an enormous public subsidy, one that favors a particular future—a

very different one than what would emerge in the absence of such a massive public expenditure.

So rather than putting public dollars into new roads, our communities should invest instead in parks and playgrounds, bike lanes, sidewalks, local food kitchens—whatever will produce better, stronger, more complete communities for future generations of stickers.

RESPONDENT



Meg Walker, M.Arch.

A registered architect, licensed planner, and elected official, Meg Walker is Senior Director of Urban Design at Project for Public Spaces, Inc., a unique, non-profit planning and design firm located in New York City that is dedicated to helping people create public spaces that build strong communities. She has engaged communities all over the country in planning their public spaces, downtowns, and waterfronts. Recent projects she has directed include a comprehensive plan for the Town of Hillsdale, New York, and a public space plan for the Cleveland, Ohio, waterfront. She is also working with Groundwork Hudson Valley and the City of Yonkers on an Interpretative Plan for Larkin Plaza that features the daylighting of the Saw Mill River. Walker has lived in the village of Hastings-on-Hudson for eighteen years. She served as the village's Planning Director from 1998 to 2003, and in March 2011 was re-elected to a second term on the Board of Trustees. Her challenges as Trustee are to revitalize Hastings' downtown and to help plan the revitalization of its fifty-acre derelict waterfront. Walker is also an Adjunct Professor of Urban Planning at Pratt Institute. She has a B.A. in government from Wesleyan University and a Master of Architecture from Columbia University.

By Creating a Meaningful Sense of Place

Project for Public Spaces, Inc., a non-profit planning firm that specializes in place-making, has a saying that can apply just as well to highways as to streets: “If you plan for cars and traffic, you get cars and traffic, but if you plan for people and places, you get people and places.” A new road should be about building stronger and healthier communities for the people who live there, not about building a way out of congestion. For decades, transportation planners have been trying to reduce congestion by building and expanding the highway system, and it has only led to more traffic and sprawl, along with their accompanying environmental, social, and public health woes.

Extensions to arterial highways between suburban communities and urban centers will not reduce the travel time by more than a few minutes in the long run, and this may not warrant billion-dollar investments, especially at a time when construction costs are skyrocketing, older infrastructure requires attention, and state highway budgets are being slashed. If arterial roads are built as conventional freeways without careful regional land-use planning, case studies from around the United States clearly show that within ten years such roads will likely become just as congested as existing roads in the area are today. But if roads are built to meet other objectives—to create healthier, more livable communities; to preserve open space and wildlife habitat; to create real, long-lasting economic value in neighboring towns; and to create places, rather than more faceless suburban sprawl—the enormous investments required to build such roads will bring benefits that could last for decades and enhance the entire region, rather than just providing temporary fixes.

Here is a vision for a road built to be a *place* and a link between strong, healthy communities:

Go Slow. A sustainable road will be a slow and gentle road, instead of a straight, high-speed freeway. Its maximum design speed should be 35–40 miles per hour (not the typical 60–70 mph) to allow it to bend around wetlands, farmlands, existing communities, and other sensitive features, rather than cleaving them in two. It will be an attractive parkway with a maximum of four lanes separated by a median, or alternatively, a two-lane boulevard with left-turn lanes; neither option will have grade separation at intersections. Eliminating overpasses will reduce the cost considerably, leaving extra money for place-making and open space preservation. Roundabouts will be utilized to create efficient intersections and provide attractive gateways into neighboring towns and parks. Contrary to popular belief, roundabouts pass traffic through an intersection far more effectively than conventional intersections.

Enhance Connectivity at the Local Level. The roadway will be designed to tie into a new grid of local streets, built over time to link to neighboring communities. Thus, the road will knit the region together as a local and regional connector instead of slicing through communities and fragile habitat. Isolated subdivisions, existing commercial districts, parks, and new compact development will be linked to the new road and to each other through the new road network.

Integrate Land Use and Transportation Planning. A sustainable road must be viewed as a transportation and land-use *system* to avoid the runaway sprawl and commercial strip development that has accompanied most new freeways. A new regional land-use plan will require compact mixed-use development and will protect open space, farmland, and other natural and cultural resources. New site development standards will reduce the impact of parking lots, multiple curb cuts, and stand-alone big-box development, as well as enhance the street environment for pedestrians and transit-users. This will do more in the long run to reduce congestion than massive infrastructure.

Incorporate Multi-Modal Transportation Opportunities. As a transportation *system*, the new road will be planned to offer a variety of transportation options: Bus Rapid Transit (BRT) or eventually light rail, bike paths, and walking trails. Bus connections, sidewalks, and bike lanes will feed into the adjacent communities using the new street grid, expanding transportation options throughout the region.

Engage the Community. All community stakeholders will be invited to help plan the road, as well as to envision the future of their own communities—their neighborhoods, businesses, commercial districts, and open spaces. The principles of “context-sensitive solutions” (CSS) will be utilized throughout the process. In Illinois, for example, various agency documents have recognized the importance of CSS by stating that “[t]hrough early, frequent and meaningful communication with stakeholders, and a flexible and creative approach to design, the resulting projects should improve safety and mobility for the traveling public, while seeking to preserve and enhance the scenic, economic, historic, and natural qualities of the settings through which they pass.” A state agency contemplating constructing a new road will put these principles into action.

Create Places and Destinations. Through place-making, an array of destinations will emerge, both along the roadway and in neighboring towns, that will give the road and the region an identity and a sense of place all its own. A place-making approach will challenge citizens to transform their public spaces into vibrant places that highlight local assets, revitalize local economies, and serve common needs. Such places help to forge healthier and more livable communities. For example, the citizens of Littleton, New Hampshire, a traditional New England village, used a state highway repaving project and a

grant from the Federal Highway Administration to transform their downtown by widening sidewalks, improving pedestrian crossings, slowing traffic, and adding landscape elements and pedestrian amenities. The result is a more walkable Main Street with welcoming public spaces that encourage tourists to stop and local residents to gather downtown.

Project for Public Spaces uses a tool called the “Power of Ten” to help communities plan and program vibrant places. The “Power of Ten” is simply the idea that any great place should have at least ten things to do, but the concept can be extended to a city-wide or regional scale. For example, a sustainable road should offer at least ten great destinations, such as a park or revived downtown, and each of these destinations should have ten places each offering at least ten things to do. This would create a lively network of connected places throughout the region. Places and activities will complement and enrich each other. For example, a restaurant with outdoor dining on a lovely lake that offers boating and swimming, a playground for young children, and a path for strolling provides a wealth of activities in a park, transforming it into a destination.

Build a Parkway in Every Sense. A sustainable road will not look at all like the straight, wide, and fast highways we have come to know over the last sixty years. It will evoke a bucolic parkway from the early twentieth century, celebrating the area’s natural resources and scenic views and offering recreational opportunities that allow people to enjoy its pastoral beauty—a true link between humans and nature. It will be programmed, like a park, to accommodate many different uses and even closed regularly to cars to allow for a variety of recreational uses that bring the surrounding communities together.

It could resemble the nation’s first parkway, the Bronx River Parkway, which runs for 12.5 miles from the Bronx in New York City to the city of White Plains in Westchester County, New York. The parkway is a scenic, narrow highway completed in 1926 that winds through a park built along the Bronx River. It shares the park with walking trails, wildlife habitat, trees well over one hundred years old, and beautiful stone bridges and retaining walls. The maximum speed along most of its length is 40 mph. The parkway is closed on Sundays in the summer for biking and roller-blading, bringing communities along its length into contact with one another.

If it achieves the vision described above, a sustainable road will not become the high-speed shortcut that commuters in the area are looking for to get them to work in half the time. But it could never possibly be that. Rather, it will be the catalyst for change, transforming a suburban environment into a cluster of compact, livable communities adjacent to preserved green space, highlighted by wonderful places to walk, bike, and enjoy nature and vibrant places for communities to gather.

RESPONDENT



Dennis Dreher, M.S.

Dennis Dreher is a Senior Consultant with Geosyntec Consultants. He specializes in green infrastructure and watershed planning and in working with clients, staff engineers, and ecologists to identify and incorporate conservation design practices into new residential, commercial, and institutional development projects. He was formerly the Director of Natural Resources for the Northeastern Illinois Planning Commission, where he managed a variety of water and natural resource projects for over twenty-five years. He was the principal author of the Chicago Wilderness Green Infrastructure Vision and serves on the regional Green Infrastructure Vision Task Force. His areas of expertise include conservation design, sustainable development, stormwater and floodplain management, stream and wetland protection, water quality planning, watershed management, and biodiversity protection. Dreher has written or assisted in the development of numerous water and natural resources publications, including model ordinances, guidebooks, and watershed plans. He holds a B.S. and M.S. in Environmental Engineering from Purdue University and the University of Illinois, respectively. Dreher also serves as the Vice-Chair of the Corporate Council of the Chicago Wilderness consortium.

By Enhancing Green Infrastructure

Highway design traditionally has been regimented to focus on “hard” engineering approaches to efficiently convey traffic and deal with incidental concerns like the movement of stormwater. Evolving national environmental regulations and regional concerns over flooding and groundwater have begun to push designers of roadways and other “gray infrastructure” systems to consider alternative approaches. This has led to a consideration of more holistic “green infrastructure” designs that not only provide environmental benefits, but may save money in the process.

Green infrastructure has been championed by Chicago Wilderness, a regional consortium of more than 250 public and private organizations that work together to restore local nature and improve the quality of life. Green infrastructure also has been embraced by the Chicago Metropolitan Agency for Planning as a core theme of the recently adopted GO TO 2040 Plan.

So, what does green infrastructure mean in the context of roadway planning and design? Green infrastructure is used to describe products, technologies, and practices that use natural systems—or engineered systems that mimic natural processes—to enhance overall environmental quality and provide more sustainable utility services. More specifically, it includes techniques such as porous pavement, rain gardens, and vegetated swales that use soils and vegetation to infiltrate and/or recycle stormwater runoff. On a larger scale, green infrastructure refers to strategically planned and managed networks of natural lands, working landscapes, and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations.

Following are several brief examples of recommended green infrastructure approaches in the context of proposed roadway projects.

Preserving Ecosystems: The northeastern Illinois landscape contains an abundance of sensitive natural communities, including lakes, stream corridors, wetlands, prairies, and woodlands. Some of these systems have been identified as regionally significant “resource protection areas” in the Chicago Wilderness Green Infrastructure Vision. Highway projects have the potential to damage such systems directly, as well as fragment wildlife habitats and adversely affect critical water flows. The siting of the road rights of way should attempt to minimize direct ecosystem impacts and fragmentation. It also is recommended that highway planners work with local and regional conservation agencies to design plans for habitat

damage mitigation, enhancement of ecosystem connectivity, and wild-life movement that take into account regional biodiversity considerations and opportunities. This task should include the development of refined inventories and maps of existing and potential green infrastructure in the project vicinity.

Protecting Water: Roadway construction can dramatically increase stormwater runoff, resulting in increased flooding, water pollution, and reduced groundwater recharge. In response to such concerns, most counties in northeastern Illinois have developed comprehensive ordinance requirements that address both runoff quantity and quality. These provisions should be used as a starting point for roadway and stormwater design. However, it is suggested that local watershed plans also be utilized so that specific pollutants of local concern and local hydrologic considerations are used as the basis for optimizing the design of best management practices (BMPs). Further, it is recommended that state-of-the-art national guidelines and research be utilized in selecting and designing the most effective BMPs to address the locally identified water quality and hydrologic concerns. Finally, it is recommended that a green infrastructure theme be used for the design of roadway and water management systems. Simply put, such designs would minimize impervious surfaces and treat water at the source using soils and cleansing vegetation. This approach would value water as a resource, not a waste product to be disposed.

Enhancing Landscapes: Traditional roadway designs contain rights-of-way that feature turf grass and ornamental shrubs and trees that often bear no resemblance to local native landscapes. Such landscapes can be expensive to maintain and offer little in the way of ecosystem services or visual appeal. As a consequence, suburban roadways in Illinois look much like roadways in Atlanta, New York, or almost anywhere in the country. A recommended alternative is natural landscaping that utilizes appropriate native grasses, forbs, trees, and shrubs to create an ecologically functional and aesthetically appealing corridor that reflects a local sense of place. The extensive use of deep-rooted native vegetation also can help to mitigate the impacts of climate change by acting as a carbon sink. Natural landscaping was recently incorporated into a “green roadway” system for a four thousand-acre intermodal project in Joliet. Other midwestern states such as Iowa have provided leadership in the natural landscaping movement through a Department of Transportation Living Roadway Trust Fund. One important proviso is that mechanisms must be adopted for the ecologically sustainable, long-term maintenance of natural landscapes so that installed landscapes thrive and corridors do not become routes for the spread of invasive species.

Green Infrastructure in Surrounding Communities: While much of the focus of new regional roadways is on mitigating the direct effects of the road corridor, far greater impacts may potentially be caused by the spin-off development spurred by the roadway. That is why it is critical that neighboring communities also consider green infrastructure principles in their plans and ordinances. At a minimum, these communities should consider green approaches to stormwater management, landscaping, and infrastructure designs as mentioned above. They should promote green infrastructure in neighborhoods, school grounds, and back yards. They should consider integrated approaches to open space and natural area protection, greenway connections, and trail and bikeway planning. These initiatives should be done not just to counteract potential adverse effects of the roadway, but to build communities that are more walkable, livable, and ultimately more healthy. Chicago Wilderness, through its Sustainable Watershed Action Team (SWAT) has supported the development of green infrastructure plans in several counties and communities that could serve as models for other communities in the region. These include the Mettawa/Lincolnshire/Riverwoods planning area, McHenry County, and the cities of Crystal Lake and Woodstock.

In conclusion, the design of a potential new roadway provides an exciting opportunity to embrace green infrastructure as a core theme. Green infrastructure reflects a fundamental paradigm shift that minimizes environmental impacts, enhances community livability and sense of place, and also has the potential to reduce construction and maintenance costs. While there are numerous green infrastructure references, a good starting point on northeastern Illinois principles and practices is the Ecological Planning and Design Directory: http://www.chicagowilderness.org/sustainable/directory_documents.php

Additional Resources

Geosyntec Consultants is a national leader in the design and assessment of best management practices to mitigate the effects of stormwater runoff. It has worked for federal and state transportation agencies on the following research projects and documents.

Evaluation of Best Management Practices for Highway Runoff Control, National Cooperative Highway Research Program Report 565, research sponsored by the American Association of State Highway and Transportation Officials in cooperation with the Federal Highway Administration, Transportation Research Board, Washington, D.C., 2006.
http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_565.pdf

Guidelines for Evaluating and Selecting Modifications to Existing Roadway Drainage Infrastructure to Improve Water Quality in Ultra-Urban Areas, NCHRP 25-31 [Active] Transportation Research Board, Washington, D.C., 2006.
<http://apps.trb.org/cmsfeed/trbnetprojectdisplay.asp?projectId=1642>

BMP Effectiveness Assessment for Highway Runoff in Western Washington, prepared for Washington State Department of Transportation, March 2008.
http://www.wsdot.wa.gov/NR/rdonlyres/195AF37F-1AA3-43AE-B776-B4A616CC5C7B0/BMP_EffectivHwyRunoffWestWA.pdf



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