Promotion of Sustainable Redevelopment Practices

- Why is Sustainable Development important?
- Designing to Reduce Water Pollution
- Designing to Reduce Air Pollution
- Green Buildings
- Outreach on Sustainable Development Practices
- Removing Barriers to Sustainable Development Practices
Discussion Points Throughout Session

- How do these examples relate to your work?
- Do you have some similar stories?
- What are the barriers to implementing these approaches?
  - Fed
  - State
  - Local
Why is Sustainable Development Important?

From an Environmental Perspective
Environmental Strategy of the last 30 years
< 10 ug/m3 PM2.5, 8/16/00

15 ug/m3 PM2.5, 8/7/00

20 ug/m3 PM2.5, 8/24/00

25 ug/m3 PM2.5, 8/25/00

30 ug/m3 PM2.5, 8/15/00

35 ug/m3 PM2.5, 8/26/00

http://www.mwhazecam.net/index.html
1996 Chicago Area VOC Emissions

TOTAL = 769 TPD

OFFROAD 145 TPD
ONROAD 268 TPD
POINT 136 TPD
AREA 220 TPD
U.S. Emissions—2002
Volatile Organic Compounds
Total: 16.7 million tons/year

Canadian Emissions—2002
Volatile Organic Compounds
Total: 2.9 million tons/year
Area Sources

- Non-industrial paints and coatings
  - 60 tons per day of Volatile Organic Carbon

- Lawn and Garden Equipment
  - 60 tons per day of Volatile Organic Carbon
Native Landscaping

- Converting 1000 acres of corporate land from turf grass to prairie
  - Prevents air pollution –
    - 50 tons per year of VOC emissions
    - This is equivalent to 1 1/4 cars per acre
  - Saves Energy (gasoline for mowers)
  - Saves Water (irrigation)
  - Saves $$ - lowers operating cost
Water Pollution

- Similar Pattern
  - 25% Point Sources
  - 25% Urban Runoff
  - 50% Agricultural
Who is Responsible for More Pollution?
Current Development Patterns Have Significant Impacts

- Increased Runoff
- Poor Quality Runoff
- Decrease in Recharge to Groundwater
- Increase in Vehicle Miles Traveled (VMT)
- Increase in Air Emissions from Other Sources
- Abandonment of Brownfields, Construction on Farm Fields
- Isolation of low income communities, with limited resources to address problems
Figure 8. U.S. carbon dioxide emissions by sector and fuel, 1990-2030 (million metric tons)
Designing to Reduce Water Pollution
“Nature and I are two!”

Woody Allen
Street Design

Not so good

Street Width

Good
SEA Street monitoring results for two years:

98% reduction in total runoff volume
Parking Lots

Good – Run-off from the parking lot can be absorbed by the plants and soil

Not so good
H.B. Fuller Company Parking Lot

- Reduced storm water discharges by 73%
- Reduced sediment discharge by 94%
- Reduced phosphorus loading by 70%
Water - Menomonee Valley
Menomonee Valley under construction last summer
Green Roof on Public Housing, Milwaukee
Do Rain Gardens Really Work?
Native Landscaping – Independence Park, former NPL site in Libertyville, IL
Designing to reduce air pollution
Five Characteristics of Urban Form that Influence Travel and Air Quality

- Density
- Land Use Mix
- Transit Accessibility
- Improved Pedestrian Environment
- Regional Patterns of Development
Traditional Neighborhood Design
Traditional Neighborhood Design

- Mixed Use
- Narrower, pedestrian friendly streets
- Alleys for garages
Transit Oriented Development

“The Effect of CTA & Metra Stations on Residential Property Values”
RTA Study by Gruen, Gruen & Assoc

% increase in value

distance from CTA/Metra stop
Community Design and Income Inequality
Community Design and Income Inequality
Americans are getting Heavier...

Obesity Trends in the United States
A nice redevelopment can boost the surrounding community - Kenosha Harborpark
Planned Redevelopment
Northwest Meadow after retrofit

Motorola - After
Detention Ponds

Harbor Springs Property Owners’ Association (IL) - Before
Green Buildings
Environmental Impact of Buildings*

- 65.2% of total U.S. electricity consumption \(^1\)
- > 36% of total U.S. primary energy use \(^2\)
- 30% of total U.S. greenhouse gas emissions \(^3\)
- 136 million tons of construction and demolition waste in the U.S. (approx. 2.8 lbs/person/day) \(^4\)
- 12% of potable water in the U.S. \(^5\)
- 40% (3 billion tons annually) of raw materials use globally \(^6\)

* Commercial and residential
Water - Villa Park Police Station

Prisco Serena Sturm
Conservation Design Forum
Landscape and Storm Water Plan

- Permeable Paving
- Bioretention Swale
- Green Roof
- Bioswale
Sketch of an Urban Heat-Island Profile

Late Afternoon Temperature

- Rural
- Commercial
- Urban Residential
- Suburban Residential
- Downtown
- Park
- Rural Farmland
Green Roofs

`Chicago City Hall`

- 20,300 sf intensive green roof with 20,000 plants of more than 100 native species
- Installed in 2000
- Decreases air and roof surface temperatures
- Retains 75% of a one-inch rainfall event
- Provides habitat

*Before (Summer 2000)*
Back to the Future - Linoleum
Outreach on Sustainable Development Practices
Or:

‘If this all makes so much sense, why isn’t everyone doing it?’
Past Approaches – Sustainable Development

- Outreach to communities and practitioners
- Strategic analysis of key barriers
- Formation of partnerships
Midwest Summit on Sustainable Redevelopment of Brownfields

The Midwest Summit on the Sustainable Redevelopment of Brownfield Sites

June 25 and 26 - Chicago, Illinois

USEPA Regions V and VII
US Department of Housing and Urban Development
Partnership with IEPA: Aurora, IL
Charrette

- One-day Charrette
- Junkyard site in middle of redevelopment area
- Now incorporated into master sustainable development plan
Aurora charrette
East St. Louis, IL Charrette

- Lefton Iron and Metal Removal Site
- Charrette at BF2004
- Partners:
  - IEPA
  - St. Louis Chapter USGBC
  - BF HQ
East St. Louis Charrette
Nuts and Bolts of Brownfield Redevelopment for Local Governments

- Each year for last nine years
- 4 1/2 day course
- Many graduates have completed strong projects
- Has been franchised to R7
- Indianapolis this year
- Possible franchise to R4
Green Makeover Conference

Milwaukee

October 19-20, 2005
Green Makeover Charrettes
701 East Vienna

- Vacant 4-acre, abandoned industrial site
- Within a small cluster of industrial uses near the Milwaukee River, north of Downtown
- City seeks to create family-supporting jobs
701 East Vienna
20th & Walnut

- On Milwaukee’s near north side, surrounded by residential.
- Formally a grocery store and parking lot.
- City’s vision is to redevelop site into market-rate single-family housing.
Looking northwest across the site, Walnut St. and facing houses beyond.
The Grand Trunk is a vacant 31-acre, abandoned industrial site that lies in the southern most part of the Port of Milwaukee, and the northern most part of the Bayview Neighborhood.
Harbor cut (northwest area) looking northwest to KK River and beyond
Responding to the disconnect between the site and its neighboring communities, our group first implemented a new network of streets that would remedy this problem.

Our primary street (red) serves as the main connection between Milwaukee’s downtown and southside areas to the north and the ferry to Michigan and the Bayview community to the south. This street would support the heaviest traffic on the site and would serve new bus and light rail routes.

The streets shown in other colors are representative of secondary and tertiary street routes.
Specific areas of the site were denoted as urban open spaces.

The western “arm” of the site would serve as a “natural” area for picnicking, walks, and natural retreats. The central park of the site would serve as a stormwater management park to assist the site with drainage issues it currently faces. The eastern edge of the site would serve as a linear buffer between our primary street and the Kinnickinnic River Basin.

Arrow shown in blue demonstrate how the site would shed and retain water.
Brittany designed a storm-water management park as a poetic replacement of the marshy wetlands that once were located in the same area as the new park. The main function of the park is to channel water from built forms on the site and to cleanse and purify the water as it channels out to a natural release into the Kinnickinnic River Basin.
Water in my stormwater management park will be cleaned through rapid course filtration and slow biological filtration.

Rapid course filtration will be achieved through the use of clay filters installed under walkways crossing the water channel. Areas of rapid filtration will be lined with course gravel and stones. Rapid course filtration will remove all large to midsize particles of contamination.

Slow Biological Filtration will be achieved through the use of settling tubes. Small pollutants will settle through layers of sand, gravel, and mid-sized rock and will settle into precast tubes in the concrete until they are removed when cleansed.

The extent of the filtration will depend on the following: the filtration rate, the filter medium, the depth of the filter bed, and the quality of the raw water.
Open Space

A series of green urban spaces have been created relating directly to the site hierarchy laid out in the master planning of the site. The north end of the park accommodates a higher volume of people and allows for great variety in the types and sizes of public spaces offered. The southern end of the park provides a quieter setting near the more calm areas of the site.

The 4 water cycle elements have been incorporated at strategic locations in the park so that a seamless, cohesive sentiment is experienced.

The park remains highly walkable and directly relates to the built form surrounding the site.
Lessons Learned From Green Makeover Conference

- **We will always partner with Universities for projects like this in the future**
- **Linking to real sites was a plus; the students’ drawings are being used by the Port Authority**
- **We need quantified performance and environmental results data on Green Retrofit BMPs.**
CONFERENCE ANNOUNCEMENT

Green Engineering and Brownfields Redevelopment Conference
Chicago Center for Green Technology
October 24-25, 2006

Engineering of Sustainable Development
Practice incorporating green design into actual brownfield project. Focus on:
- Renewable sources of energy and energy efficiency
- Water Conservation and graywater re-use
- Sustainable Management of Stormwater

This 1 1/2 day workshop is planned for engineers who want to learn more about engineering and design issues important to the sustainable or “green” redevelopment of a Brownfield site. On the first day (afternoon only) there will be a tour of redevelopment sites in Chicago, including the site that will be used for the design exercise during day 2. The second day will feature expert presentations and interactive team break-out sessions. Practicing engineers who register for the workshop will join engineering students from the University of Illinois. Each group will be asked to develop sustainable alternatives to routine engineering practices at the chosen site, focusing on energy, water, stormwater, landscaping, roadway and infrastructure.

REGISTER NOW!
Registration is now open and space is limited!
Logon to:  http://128.248.232.70/glakes/ce/courseDetail.asp?GID=383
The cost for the conference is $75/person.
Continuing education credit for practicing engineers from the University of Illinois.

For more information call Marilyn Bingham at UIC 312-996-6904

Committee
City of Chicago, Dept of Transportation
Chicago Center for Green Technology
City of Chicago, Department of Environment
U.S. EPA
Campaign for Sensible Growth
Great Lakes Environmental Planning
Chicago Wilderness
University of Illinois at Urbana-Champaign
Removing Barriers to Sustainable Development Practices
Barriers to Sustainable Development Practices

- Quantification Needs
  - Air
  - Water
  - Ecologic
  - Economic
- Market Barriers
- Engineering Barriers
- Public Health Opportunities

Market Adoption of Sustainable Development Practices
Barriers to Sustainable Development Practices

• What are we trying to achieve?
  – Green redevelopment of cleanup sites can have lasting, measurable environmental and societal benefits
  – Most examples are led by an inspired few
  – Knowledge and process changes are needed in order to achieve widespread market acceptance
  – Quantification is needed so that we can count the results
In order to adopt sustainable practices, the market needs solid data on performance and benefits:

- Air
- Water
- Ecological
- Economic

Practicing Engineers need solid performance data for planning and design work.
Quantification of Performance and Benefits

- Quantification of the Benefits of Native Landscaping
- Conference held Dec. 2004
- Research Agenda
- Plain English Version
- Web site: www.epa.gov/greenacres
Quantifying the Benefits of NL

- **Air**
  - Absorption and filtration
  - Reduced maintenance emissions
  - Controlled burns
- **Water**
  - Less runoff
  - Better runoff quality
  - Water conservation during dry-weather periods
- **Carbon Sequestration**
  - Root mass
- **Phytoremediation**
  - Cleanup
  - Water Control
- **Economics**
  - Reduced O & M
  - Downstream benefits
- **Public Perception**
  - Design for acceptance
- **Pesticides and fertilizers**
  - Reduced usage
- **Biodiversity**
  - Fragmentation
Approach - Air
Supporting HQ BF work assignment

• Determining and testing methodologies for modeling the air quality benefits from reduced vehicle miles traveled due to brownfield vs. greenfield redevelopment

• Interested in investigating emission offsets from infill redevelopment in SIPs

• Other potential air issues:
  – Urban heat island, evaporative losses, emissions from coatings, landscape maintenance, indoor air quality, asthma

Partners

• USEPA, OSWER, Brownfields Office

• Others TBD
Kenosha Harborpark
Approach - Water

- Assemble and develop complete, precise, and quality-assured data on the performance of green design features and management practices.
- Provide the information in commonly used runoff prediction models, so that engineers and planners will have the same level of confidence in green storm water management features as they have in conventional systems.

Partners

- Region 5 Water Division, Superfund Division
- OWOW
- USEPA, Region 1
- NRCS
- University of Illinois at Urbana-Champaign
- Purdue University
- University of Vermont
- U.S. Forest Service
- Others TBD
Roles

- University of Illinois – Literature Review and Development of Preliminary Dataset, Runoff Curves
- NRCS - Incorporate Runoff Curves (reflecting BMP performance) into TR-55
- Purdue – Incorporate Runoff Curves into L-THIA
Measuring the Performance of BMPs

- BMP Database, existing research studies
- University of New Hampshire
- University of Vermont
- Center of Neighborhood Technology - 104(b)(3) grant to quantify BMP performance at neighborhood scale
- BMP parks, with performance measurement
  - Detroit, MI
  - Aurora, IL
  - Elgin, IL
1 ½” setting bed of CA-17
The pervious pavement was installed mechanically which helped reduce installation cost.
Villa Park Police Station

Prisco Serena Sturm
Conservation Design Forum
Landscape and Storm Water Plan

- Permeable Paving
- Bioretention Swale
- Green Roof
- Bioswale
COMMERCIAL DEVELOPMENT EXAMPLE

- Commercial site vacant since 2002
- All building pad and parking
- 6.4 acres
- Identified for a new Target

City of Chicago
- Green roof = 50% of the net roof area
- 2-story structure built on property line (Street frontage); incorporates parking below 160,000 sq. ft. retail areas
- LEED certified construction

**Financing Tool:** Tax increment financing assistance
Approach - Ecosystem Function
• Existing ITRC product

Partners
– The Interstate Technology and Regulatory Council
– USFS – Evanston
– Others TBD
Independence Grove, Former NPL Site
Libertyville, IL
Approach-Economic

- Identify high-priority economic research needs to support the implementation of green design practices
- Currently in the process of preparing a research plan on 1-2 high priority challenges
- Potentially targeting holes in public and land use policy that create valuation failures for lenders and investors

Partners

- Univ. of Illinois
- Univ. of North Carolina
- Univ. of Wisconsin-Milwaukee
- Others TBD
Our Development Practices Have Economic Consequences
Public Health Opportunities

- New, proactive role for Public Health
- Partnership with ATSDR
  - Developing with a public health endpoint – Milwaukee
- Charrette at BF2006 w/ Public Health endpoint
- Ohio River Valley Conference
Connections Between Development Choices and Public Health

- Physical Activity
  - Walkability and Transit

- Respiratory Health
  - Indoor and Outdoor Air

- Emotional/Mental
  - Link to reduced violence

- Access to Services
  - Food
  - Health Care

- Development Approaches
  - Smart Growth
  - New Urbanism
  - Green Buildings
  - Community Greening
  - Focus on Community Services

- Potential Economic Valuation
Market Gaps

- Your average developer is not in to this
- Benefits to Society are often costs to developers
  - Quantification of performance and benefits of green techniques can help fill this gap
  - The structure of the market may need a bit of help to recognize these benefits
  - Projects need to be profitable for the developer
What can we do?

- Create solid demonstration projects
- Quantification of:
  - Performance
  - Costs
- Recognize full range of benefits
  - Attach monetary value to benefits
- Look at cleanup phase
Market Adoption of Sustainable Development Practices
SAVE THE DATE – OCT 1-3, 2007

Sustainable Redevelopment

IN THE OHIO RIVER VALLEY

Louisville, KY

Sustainable Redevelopment can lead to long-term benefits to the environment, public health, and the quality of life of the surrounding community.
Miller Brewing Rain Garden
and Bioretention Swale

This project absorbs and treats stormwater and
reduces combined sewer overflows!

A stormwater best management demonstration partnership of:

Miller Brewing Company, Owner
Milwaukee Metropolitan Sewerage District, Partner
TEI Corporation, Designer-Builder

Information at the Miller Brewing Visitor’s
Center and at MMSD.COM

05.20.2006
Thank you!

Jim Van der Kloot
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