Fundamentally, streets are public space. They do more than move cars.
Great Streets

- Are Great places
- Integrate land & transportation planning
- Accommodate all users and modes
- Are economically vibrant
- Are environmentally responsible
- Rely on current thinking
- Are measurable
- Develop collaboratively
Program conceived

as a reaction to construction of roadways that ill serve their communities

and the narrowly defined process that ensured that end result

as a carrot, not a stick
Planning with the environment:

- Accepted science (predictable outcomes)
- Address a range of measurable elements
  - water, light, sound, solar gain, energy consumption, biodiversity, education, etc.
- Makes practical sense
- Reduce ongoing demand on resources (storm sewers, electricity, irrigation, maintenance)
- Secondary benefits (ie: measures to improve air quality may also improve safety, etc.)
- Extend the life cycle of what gets built
- Spaces that reflect local identity
Green design should be well integrated into any plan.

“Silo’d” green design is unsustainable.

Only build what will be maintained.
People spend 5% - 8% more when shopping / dining in high quality environments.

Property next to parks/trails has 6% premium.
12.) The most important environmental issues to address on South Grand are... (Rank your top 3)
**Urban Heat Island**
Reduce peak temperature in streetscape environment by average of 5-7 degrees through low albedo materials, increasing planted areas and increasing tree canopy coverage.

**Pervious Surfaces**
Increase opportunity for pervious surfaces from 2% to 50% of ROW by utilizing porous pavement, increasing planting areas and constructing rain gardens.

**Planting Areas**
Increase opportunity for streetscape planting areas from 2% to 15% of ROW by narrowing South Grand Boulevard and creating bulbouts for rain gardens.

**Air Quality**
Reduce vehicle emissions by 50% by calming traffic by 15 mph, reducing stopping times and reducing traffic lanes.
### Environment Principles

- Responsible stormwater management can reduce runoff and erosion and can maintain water quality.
- Reducing heat island effects and noise levels creates a more comfortable pedestrian environment.
- Mixed-use districts and the availability of alternative transportation and local employment opportunities reduce traffic and air pollution.
- Utilizing efficient and/or alternative energy sources, reducing waste and promoting alternative transportation reduces the area's energy and carbon "footprint."

<table>
<thead>
<tr>
<th>Environment Metrics</th>
<th>Preliminary Goal</th>
<th>Baseline</th>
<th>Benchmark</th>
<th>SMART GOAL</th>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Canopy</td>
<td>Increase tree canopy to provide savings with regard to energy, to improve air quality, to intercept stormwater interception and to increase property value and aesthetics. Existing 6% canopy cover in Ward 15 is 7.7%, existing % canopy cover in Ward 15 is 8.9%. Darvey Resource Group: American Forests (2003) suggests canopy cover in a business district should be 15% of total land area.</td>
<td>Increase tree canopy to 15%</td>
<td></td>
<td>1) Replace existing street trees with healthy species, 2) Increase the quantity of trees and the size of the canopy</td>
<td></td>
</tr>
<tr>
<td>Planting Design</td>
<td>Use native plant materials to reduce water usage.</td>
<td></td>
<td></td>
<td></td>
<td>1) Specify native plant materials for street trees, rain gardens and street planting areas.</td>
</tr>
<tr>
<td>Improve the health of street trees</td>
<td>Existing tree pits of 4'x4' x 82% of trees in Ward 5 are in good condition, 88% of trees in Ward 15 are in good condition. Darvey Resource Group.</td>
<td></td>
<td>Increase soil volume to 1,000 c.f. to provide healthier street trees</td>
<td></td>
<td>1) Provide tree pits of 5.5x5x15 to increase soil area 2) Salvage and reuse good existing substrates 3) Choose tree species with a Relative Performance Index of 1.0 or higher (Darvey Resource Group: City of St. Louis Street Tree Resource Analysis).</td>
</tr>
<tr>
<td>Heat Island Effect</td>
<td>Protect against and reduce urban heat island. Existing temps. Grass 74.9-90 degree F, Bldg. 77.5-112.6, Grey Concrete 82.7-112.6, Aggregate Concrete 84.2-110.4, Painted/Colored Concrete 85.7-116, Asphalt 85.2-122.</td>
<td></td>
<td></td>
<td></td>
<td>1) Plant trees to shade hardscapes, 2) Replace paved areas with either planted areas or pervious materials, 3) Use hardscaping paving materials that are light in weight and have low light from light sources such as the sun.</td>
</tr>
<tr>
<td>Noise Pollution Reduction</td>
<td>Reduce noise levels. Existing noise levels: Bus Traffic-75-81dB, General Traffic-64-74dB, Stopped Traffic-57dB</td>
<td>60dB+ noise level at posted speed limit of 25 mph</td>
<td>Reduce impacts to 60dB or less</td>
<td></td>
<td>1) Reduce vehicular speed through lane reduction, traffic-calming techniques and increased walkability of sidewalks.</td>
</tr>
<tr>
<td>Light Pollution Reduction</td>
<td>Improve night-sky visibility. Fluctuating light levels from very dark to extremely bright with all non-cut-off fixtures/luminaries.</td>
<td></td>
<td></td>
<td></td>
<td>1) Provide even distribution of light along the corridor and meet City standards of 1% on sidewalks and 2% at intersections. 2) Provide cut-off fixtures/luminaries to reduce light pollution. 3) In the future, consider alternative power sources such as solar.</td>
</tr>
<tr>
<td>Non-motorized Alternatives</td>
<td>Maintain the percentage of residents within walking distance to alternative transportation. Metro ridership on South Grand - average of 334 daily boardings.</td>
<td></td>
<td></td>
<td></td>
<td>1) Increase the number of bike racks, 2) Provide shared bike lanes on South Grand to encourage more bicycle riding, 3) Provide shelters at transit stops.</td>
</tr>
<tr>
<td>Stormwater Management</td>
<td>Contain and collect stormwater on-site and increase the quality of any runoff. Currently 69 percent impervious.</td>
<td>Target: 56% porous pavement within the ROW.</td>
<td></td>
<td></td>
<td>1) Direct stormwater to rain gardens, 2) Utilize porous pavement on 25% of the street cross section, 3) Maximize incorporation of planting areas and rain gardens.</td>
</tr>
<tr>
<td>Landscape Materials</td>
<td>Incorporate locally extracted and manufactured materials. Limestone quarried locally along Mississippi River</td>
<td>LEED®</td>
<td>Average distance of materials not to exceed 500 miles</td>
<td></td>
<td>1) Incorporate locally quarried limestone, 2) Recycle materials (see waste management) for wall caps, pavers or specialty architectural features.</td>
</tr>
<tr>
<td>Waste Management</td>
<td>Reduce the amount of waste generated by construction.</td>
<td>LEED®</td>
<td>Recycle 100% of materials removed during construction</td>
<td></td>
<td>1) Recycle existing concrete, brick and asphalt, 2) Re-use existing site furnishings, granite curbing and brick, 3) Reuse good existing sub soils, 4) Utilize recycled materials for sub bases and trenching fill.</td>
</tr>
<tr>
<td>Support recycling programs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1) In the future, the district should provide recycling inserts for at least 50% of trash cans.</td>
</tr>
<tr>
<td>Wildlife</td>
<td>Provide habitat for urban wildlife. Existing % canopy cover in Ward 15 is 8.7%, existing % canopy cover in Ward 15 is 8.9%. Bldg. Blitz Data. Darvey Resource Group: American Forests (2003) suggests canopy cover in a business district should be 15% of total land area.</td>
<td>Increase tree canopy to 15%</td>
<td></td>
<td></td>
<td>1) Provide healthy and adequately spaced street trees with ample (1,000 SF minimum planting pits, 2) Encourage green roofs in new development, 3) Provide plantings and rain gardens with plants that provide for the needs of birds, insects, etc. 3) Increase the amount of tree canopy on the street.</td>
</tr>
<tr>
<td>Energy and Carbon</td>
<td>Minimize energy use. Total annual benefit of existing honey locust trees = $3,920. Darvey Resource Group.</td>
<td>Increase the total annual benefit of street trees by at least 30% ($7,034 annually)</td>
<td></td>
<td></td>
<td>1) Provide efficient street lighting, 2) Utilize materials with a long life cycle, 3) Promote solar as an energy source, 4) Promote alternative transportation options, 5) Ensure proper synchronization of traffic lights.</td>
</tr>
</tbody>
</table>
Air Quality

Air quality along the street can be improved. Current and future (based on the proposed 3-lane design) emission rates were calculated. Due to poor signalization timing at traffic signals in the 4-lane configuration, which causes cars to idle at signals, more emissions are produced from vehicles than are produced with the 3-lane configuration and improved signalization timing. The emission rate calculations multiply fuel consumption by carbon monoxide, nitrogen oxides and volatile oxygen compounds and were determined in the SimTraffic program.

Emission Rates

<table>
<thead>
<tr>
<th>Total Network Performance - 4 Lane</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg Speed (mph)</td>
<td>17</td>
</tr>
<tr>
<td>HC Emissions (g)</td>
<td>112</td>
</tr>
<tr>
<td>CO Emissions (g)</td>
<td>3,050</td>
</tr>
<tr>
<td>NOx Emissions (g)</td>
<td>364</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Network Performance - 3 Lane</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg Speed (mph)</td>
<td>13</td>
</tr>
<tr>
<td>HC Emissions (g)</td>
<td>35</td>
</tr>
<tr>
<td>CO Emissions (g)</td>
<td>1,369</td>
</tr>
<tr>
<td>NOx Emissions (g)</td>
<td>169</td>
</tr>
</tbody>
</table>
Surface materials play a large role in surface temperatures and thus the surrounding air temperature. An urban heat island is an urban area that is significantly warmer than its surrounding rural areas. Measurements taken on South Grand in early September show in the graphs to the right demonstrate that the maximum asphalt temperature (122 degrees) was 47 degrees higher than that of the lowest grass temperature (75 degrees).

The graph to the right displays the average temperatures from highest to lowest, showing that colored concrete had the highest average temperature (102 degrees), while grass had the lowest average temperature (82 degrees).

Increased vegetative cover and the use of high-albedo (reflective) surface materials can reduce the impacts of the heat island effect and improve air quality.

Measurements were taken using a hand-held infrared thermometer at 12" above the surface. All measurements were taken in the sun on the same day with the same ambient temperature.
**Benefits of Public Trees (Tree Canopy Volume)**

The City of St. Louis, MO Street Tree Resource Analysis completed in March 2000 by Davey Resource Group outlines the benefits of public trees including energy savings (reduces radiant energy absorbed by built surfaces, reduces air temperature), reduces carbon dioxide in the atmosphere, improves overall air quality (absorbs gaseous pollutants, intercepts particulate matter; reduces emissions, releases oxygen), creates wildlife habitat, reduces stormwater runoff and erosion, improves the aesthetics of the street, and increases property values.

The charts to the right illustrate the increased tree canopy of the proposed streetscape design.

**Energy Use**

The City of St. Louis, MO Street Tree Resource Analysis completed in March 2000 by Davey Resource Group assigns an annual benefit per tree based on tree species with respect to the electricity reduction, air quality improvement, stormwater interception and property value benefit provided by street trees. Based on their research for the entire City, the annual benefits of the existing Honey Locust trees were estimated at about $65, while the proposed Pin Oak and Sycamore trees provide an annual benefit to the City of about $911 and $111 per tree respectively. Therefore the proposed design would increase the total annual benefit to the City as about $7,000 compared to the current benefit of about $4,000.

When looking at the energy savings potential for street trees, the report assigned an average annual energy savings per tree species. The proposed design provides a total of about $809 in annual savings (Pin Oak - $111/tree, Sycamore $12/tree) compared to the current energy savings of only $328 annually.

**Annual Energy Savings from Public Trees**

<table>
<thead>
<tr>
<th></th>
<th>Existing Honey Locust</th>
<th>Proposed Pin Oak &amp; Sycamore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Energy Savings</td>
<td>$328.73</td>
<td>$809.46</td>
</tr>
</tbody>
</table>

**Annual Benefits from Public Trees**

<table>
<thead>
<tr>
<th></th>
<th>Existing Honey Locust</th>
<th>Proposed Pin Oak &amp; Sycamore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Benefit per Tree</td>
<td>$55.22</td>
<td>$111.00</td>
</tr>
</tbody>
</table>

**Average Annual Energy Savings per Tree**

<table>
<thead>
<tr>
<th>Tree Type</th>
<th>Average Energy Savings per Tree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed Pin Oak</td>
<td>$10.96</td>
</tr>
<tr>
<td>Proposed Sycamore</td>
<td>$11.58</td>
</tr>
<tr>
<td>Existing Honey Locust</td>
<td>$4.63</td>
</tr>
</tbody>
</table>
Let the plants do their work:

- Rain Gardens
- Pervious Pavement
- Pre & Post Construction Storm Water Analysis
- Education
- Planting Schedule
- Maintenance Routine
- Tree Wells - - -
50% Remaining After Flood 60% Festivals

27% Retail Tax

13% Gas Tax

*Cities Revenue: The annual budget varies yearly. Flood defense can deplete it 50 percent or more.

Existing Market Demographic Focus

Potential Market Demographic Growth

Market Growth Opportunity: Women over 55 make up the majority of Kimmswick's current market. There is great opportunity to expand commerce connecting with other age demographics.
• Embrace the River as a key asset
  • Reengage the water’s edge
  • Affordable resilience

• Fortify the brand
  • Event management
  • Diversify the economy
  • Place Making
  • Enhance existing ethos – don’t reinvent

• Facets to the Kimmswick gem
  • Governance / fiscal model
  • Business community
  • Environment
  • Flood management
  • Transportation network
FLOOD DEFENSE: It's the little things that count. Diverting runoff, slowing and retaining stormwater in swales, designing soils and pavement for infiltration and creating pockets to store water result in big help against flooding.

**LEGEND**
- Permeable Paving
- Improved Bioswale
- Permanent Levee
- Existing Waterway
- Roadway Renovation
- Stormwater Flow
- Ridge Line
- Improved Swale Lines
- Inlet & Underground Pipe
- Deployable Flood Barrier
- Floodwall
- Permanent Pump Station
- New Outlet Gate
- Catch Basin
A1. PERMANENT FLOOD BARRIER

Above: Flood Barrier Solution

Above: Deployable Barrier in Action

$1M to $5.5M
LOWER THAN COST OF INVESTMENT

3.4M GALLON RUNOFF STORAGE

8 to 27 DAYS ACCESS GAINED

INCREASE COMMERCE

MAINTAINED HISTORIC AESTHETIC

INCREASED FINANCIAL RESILIENCE

Accomplishes KIMMISWICK GOALS
- Community Supported
- Flood Protection
- Maintain/Enhance Quality of Life
- Enhance Historic Character
Clear communication is essential