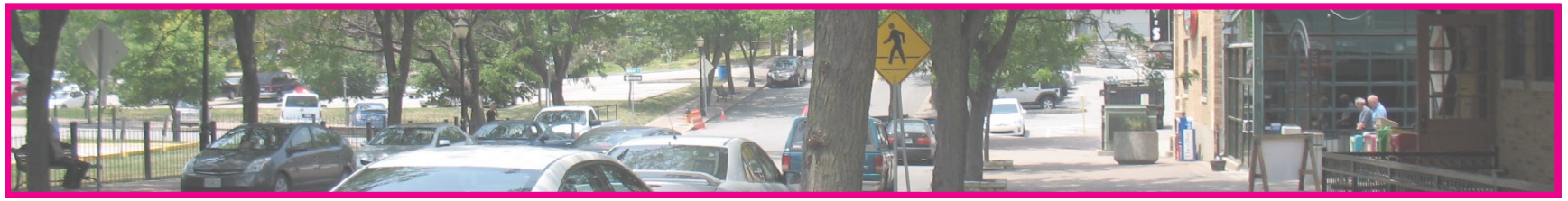
LENEXA GUIDEBOOK OF QUALITY COMMUNITY DEVELOPMENT STRATEGIES

CITY OF LENEXA, KANSAS



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Introduction:

The City of Lenexa was awarded an Energy Efficiency and Conservation Block Grant (EECBG) funded by the American Recovery and Reinvestment Act (Recovery Act) of 2009. A portion of this grant was dedicated to the production of this guidebook, as well as an assessment of the current Unified Development Code in regard to the topics in this guidebook.

One element of the grant requirements included community involvement. Due to the community engagement process related to creating Lenexa Vision 2020 and Vision 2030, the goals and strategies outlined in these documents provided the foundation for this project. A steering project committee, made up of four citizen participants (Cindy Green, Mandy Stuke, Craig Denny and Blake Schrek) who had been involved in the 2020 and 2030 effort, was then asked to assist city staff and the team of consultants (Patti Banks Associates, Davison Architecture + Urban Design LLC, and Gould Evans) in reviewing and assessing the various goals and strategies related to community sustainability. From that discussion two objectives for this project arose.

- A desire to work towards greater education of citizens and developers in Lenexa regarding the application of a variety of sustainable practices for future building and development.

- A need to identify and address areas of conflict or silence in the Unified Development Code regarding these practices in order to allow such methods to be utilized, if chosen, by the citizen or developer.

To meet these two objectives this document – Lenexa Guidebook of Quality Community Development Strategies – and a supplemental document – Unified Development Code: Sustainability and Energy Efficiency Audit – were created. These two documents are intended to serve as education and resource tools for city staff, the development community, and citizens as Lenexa works to balance aesthetic values and financial impacts with sustainability desires in the community.

In this guidebook, some of the most important sustainability related items in Vision 2030, as well as several related topics have been divided into three chapters: alternative energy and energy efficiency, development pattern and site development, and transportation. It was felt that the topics in these chapters would have the most impact on the fast growing, City of Lenexa community, if widely distributed and made available proactively to both citizens and developers that come to the City with building and development plans.

Prior to investing in planning/design/implementation, this guidebook can serve as an educational and informational resource to inform the citizen and/or developer of opportunities to “green” their projects. These methods may save money by encouraging reduced energy loads, creating lower maintenance buildings, improving site planning and design, or increasing connections within the Lenexa community.

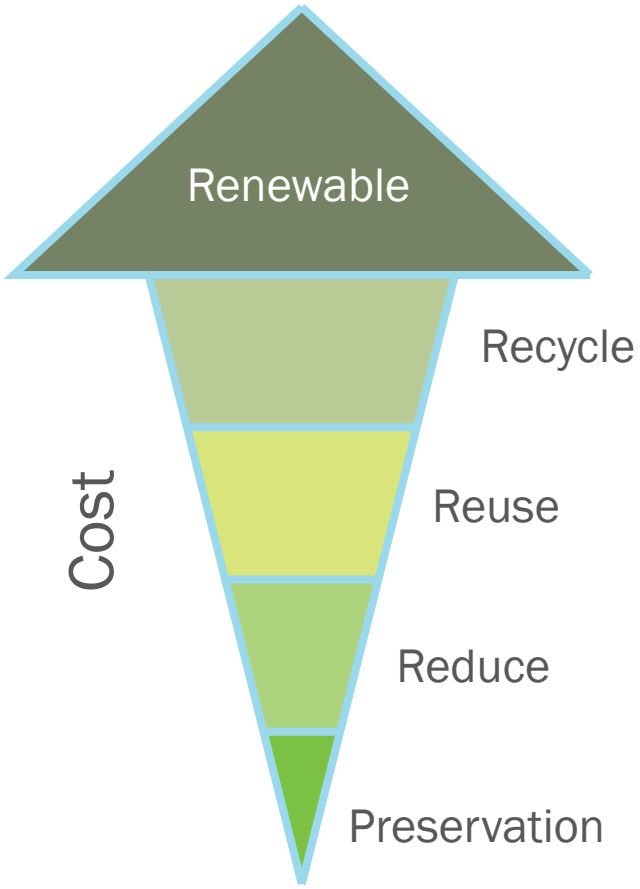
With potentially small up-front investments, it is possible to have 1-7 year pay backs for “green” improvements to a building. In a challenging economy it can be a smart approach to your project. Efficient buildings use less water and energy and thereby translate to lower utility costs. A sustainable home not only reduces energy use, it also creates a healthier and more comfortable home to live in. Allergens and mold are reduced and their envelopes are “tighter” offering better control of indoor air quality if designed correctly. Green developments can also create strong, unique, long lasting desirable places in which to work, shop, play, and live.

Ultimately, every building and development in Lenexa should help create lasting, positive growth for our community. This guidebook aims to identify examples of strategies related to creating long lasting positive growth through a realistic look at estimated implementation costs, as well as the potential benefits and challenges for each strategy.

Sustainability and Cost

It is a common belief that sustainable projects cost more to realize than more conventional projects. Many sustainable methods can have large up front costs, especially renewable systems, but these systems often have proven payback periods based on life-cycle costs. Payback amounts and timeframes can be estimated by your installer or a green rating specialist.

As the graphic to the right demonstrates, there are many methods to create a project that is sustainable but lower in cost - a sustainable project is one that first starts with good design. This document outlines a number of low cost methods, as well as provides a scale ($-$$$$) of what different methods may cost (based on 2011 costs). Additionally, the document outlines estimated pay-backs and cost/benefits of implementing these methods.



Life Cycle Cost Indicator (Key)

Throughout this document ($) symbols are used to represent the estimated expense of each strategy or method.

$ - little to no expense above normal building practices
$$ - some upfront cost, clear payback
$$$ - premium, up front cost, clear payback
$$$$ - larger up front investment, longer payback

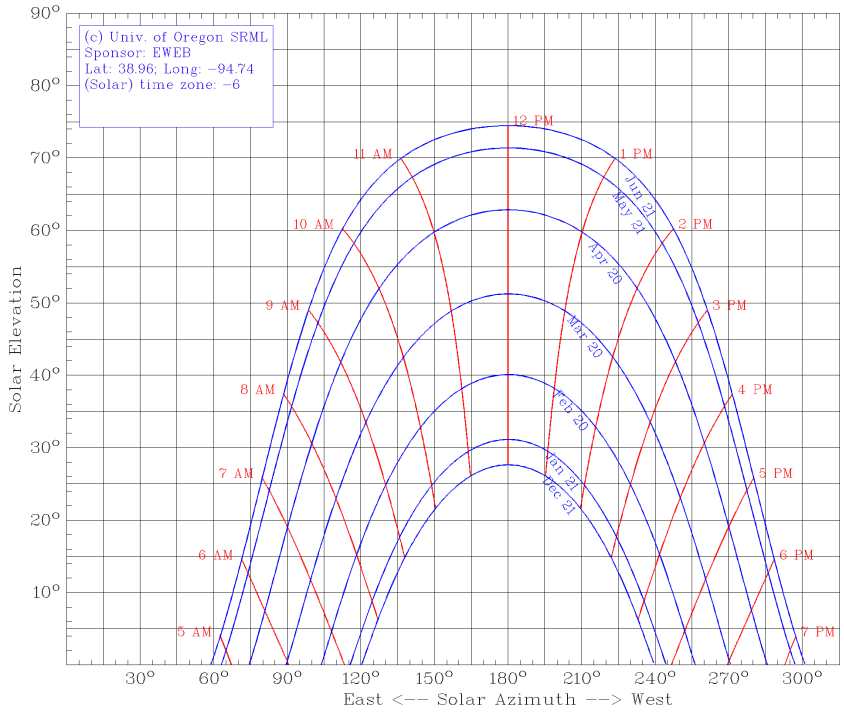
$-$$$$

Preservation - Consider the Site + Passive Strategies

A major component of the "preservation" portion of the cost arrow graphic involves understanding the local climate and weather patterns. Leveraging the existing site's solar orientation and wind patterns can save dollars in its development. The way your building is oriented in respect to the sun can help control the desired amount of solar heat gain in buildings, therefore reducing energy loads to heat/cool the facility. In addition, knowing the direction and magnitude of prevailing winds can help determine the site orientation / materials needed for your buildings to maximize airflow in warmer weather and minimize in cooler weather.

It is also important to assess the existing site's topography and natural resources. Walking a site prior to design can help identify easily implemented cost saving strategies. Maintain existing topography as much as possible to save significantly on site grading and development costs. Maintaining trees adds value and retains the character of the site.

Data collected from Solar Radiation Monitoring Laboratory, Department of Physics, University of Oregon showing the solar angles in Lenexa, Kansas



Certified Programs

Beyond this document, it is also recommended that developers research the different sustainable certification programs that are available, as these provide in-depth analyses and guides to green development. Some of these programs are listed below:

- National Green Building Program (NAHB)-
http://www.nahb.com/
- Leadership in Energy & Environmental Design (LEED) NeighborhoodDevelopment-
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148
- All other LEED Programs -
http://www.usgbc.org/DisplayPage aspx?CMSPageID=222
- Sustainable Sites Initiative -
http://www.sustainablesites.org/

NAHB NATIONAL GREEN BUILDING PROGRAM™

LEED-ND

THE SUSTAINABLE SITES INITIATIVE™

Energy Efficiency and Alternative Energy:

Promote the design and construction of energy efficient buildings; reduce air, water, and land pollution from energy consumption; reduce heat island effect; and encourage on-site renewable energy production.

Energy Efficiency

STRATEGIES:

- Review alternative energy standards for ways to conserve (Energy Star, International Green Construction Code). Use daylight to reduce electrical loads.
- Explore options for rebates, tax deductions and other financial incentives available through federal, state and local governments. While incentives may change, they can be beneficial to the financial feasibility of a project.
- Smaller building footprints reduce utility costs.
- Apartments/town homes with shared/party walls reduce the numbers of exterior surfaces, reducing heating and cooling loads.

BENEFITS:

- Cost avoidance and reduction through energy efficiency.
- Energy efficient homes are seen as quality homes to buyers.
- Monetary return on investment.

POTENTIAL CHALLENGES:

- Reference the most recent legislation, building codes, and policies as they may change frequently.
- Potential increase in initial investment.

RESOURCES:

- Database of State Incentives for Renewable Energy (DSIRE) - State and Federal and Listing of Incentives for renewable energy per state. *http://www.dsireusa.org/*
- Tax Incentives for Geothermal Residential and Commercial Projects - GeoExchange recommended source for understanding incentives for Geothermal Installations. *http://www.climatemaster.com/downloads/LC028.pdf http://www.climatemaster.com/downloads/RP215.pdf*
- Department of Energy, Energy Efficiency - DOE's guide to financing commercial projects. *http://www1.eere.energy.gov/financing/*
- Environmental Protection Agency, Energy Efficiency - EPA's links to energy efficiency guides and programs. *http://www.epa.gov/energy/energy.html*
- Project Living Proof, Kansas City, Missouri - a local green project example; tours are available. *http://www.kcenergy.org/projectlivingproof.aspx*
- Daylighting Collaborative - How to use the sun to daylight interiors. *http://www.daylighting.org/*
- International Green Construction Code (IGCC) - a commercial green codes guide, promoting safety and sustainability. *http://www.iccsafe.org/cs/IGCC/Pages/default.aspx*

ENERGY STAR

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Heat Island Reduction

STRATEGIES:

- Reduce un-shaded, impervious, heat-sink areas.
- Use solar reflective/low albedo paving materials, like slag/ fly ash concrete or porous concrete.
- Use paver alternatives for parking and accessways.
- Break-up large impervious areas with green space and increase shade.

BENEFITS:

- Heat island reduction results in reduced air temperatures, noise, and energy usage.
- Air quality is improved through the reduction of greenhouse gas emissions.
- Reducing pavement surface temperatures can also increase the life span of some materials. Evening illumination is improved as less lighting is needed to illuminate and reflect off a surface.

POTENTIAL CHALLENGES:

- Maintenance requirements differ from typical asphalt surface parking lots. Research how to care for these paving methods and budget/plan accordingly.
- Maintain design continuity.
- Load bearing limitations.
- Additional area required to accommodate trees and landscaping.

RESOURCES:

- Environmental Protection Agency: Reducing Urban Heat Islands: Compendium of Strategies - Methods to implement cooling strategies in urban areas. Data from existing examples included. *http://www.epa.gov/heatisld/resources/pdf/CoolPavesCompendium.pdf*
- City of Chicago Green Alley Handbook - *http://www.cityofchicago.org/content/dam/city/depts/cdot/Green_Alley_Handbook_2010.pdf*

Street Trees

Pervious parking lot

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Cool Roofs

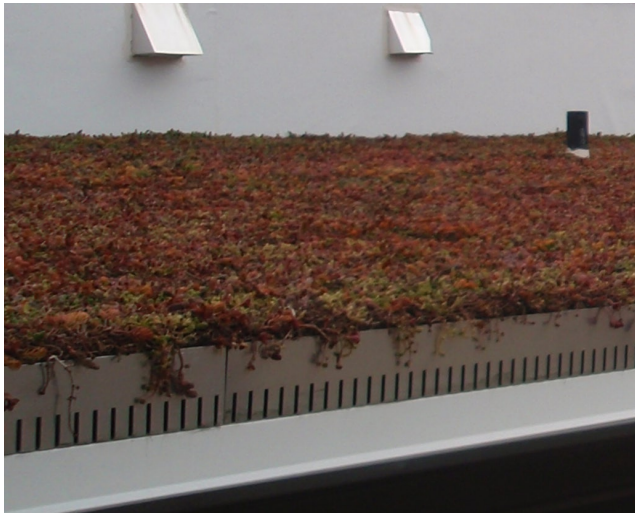
STRATEGIES:
Design structures with:
- Reflective and light colored roofs.
- Green roof on all or part of structures (minimum of 50% to realize noticeable energy savings). Plant green roofs with drought tolerant and low maintenance plants so additional irrigation is not needed.

BENEFITS:
- Reflective roofs lower heat gain, which is especially important for commercial buildings due to the size of roof area.
- Green roofs help to retain stormwater, increase the life of roofing material, add more insulative value, and may provide additional green space for building tenants.

POTENTIAL CHALLENGES:
- It is important for green roofs to be accessible for maintenance.
- A supplemental watering source may be necessary.
- This will be accounted for during design of new structures but may require additional load bearing features on retrofits. Costs associated with structural components will depend on the type of green roof proposed.
- City or home owners' association regulations may restrict certain materials and orientations.

RESOURCES:
- Cool Roof Rating Council - a non profit organization that rates roof cooling products. *http://www.coolroofs.org/*
- Energy Star Roof Products - products that meet Energy Star's qualifications for lowering the temperature of roofs. *http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=RO*
- EPA's Reducing Urban Heat Islands: Compendium of Strategies - Methods to implement cooling strategies in urban areas. Data from existing examples included. *http://www.epa.gov/heatisland/resources/pdf/GreenRoofsCompendium.pdf*
- Chicago Guide to Building Green Roofs - Green roof manufacturers and installation methods. *http://www.artic.*

Lenexa Fire Station #5 Green Roof



Lenexa Conference Center

Green Roofs

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Cool Roofs

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Shade

STRATEGIES:

- Provide shade structures over public spaces and walkways, windows/doors to minimize glare and unwanted solar heat gain. Structures include awnings, screens, louvers or other architectural features.
- Maintain existing trees on site. Strategically plant deciduous and coniferous trees.

BENEFITS:

- A passive strategy to reduce unwanted heat loads, which will reduce energy costs.
- Creates a more inviting space for pedestrians.
- Adding trees for shade also addresses screening requirements.

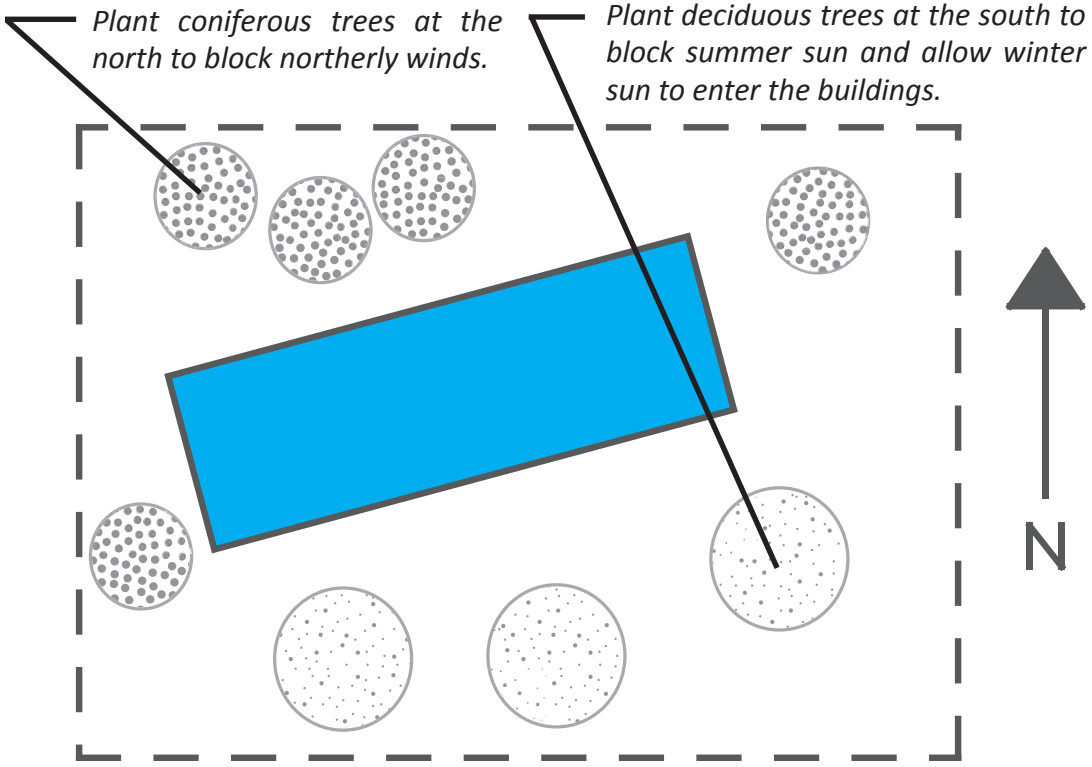
POTENTIAL CHALLENGES:

- Awnings should be designed for snow load. Plan for additional structural support.
- Planting trees close to buildings can offset foundation performance.

RESOURCES:

- Landscape Shading, Department of Energy - DOE's guide to using plants and trees to lower the tempertaure of buildings. *http://www.energysavers.gov/your_home/landscaping/index.cfm/mytopic=11940*
- Passive Solar Home Design - DOE's guide for using the sun to passively heat/cool a building. *http://www.energysavers.gov/your_home/designing_remodeling/index.cfm/mytopic=10250*

photo by Ryan Warman



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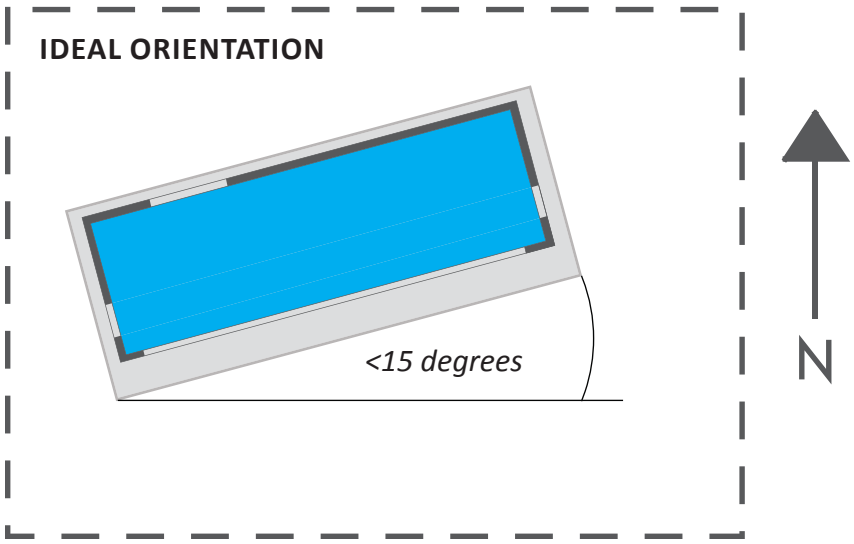
Solar Orientation

STRATEGIES:

- Design key features of a development to have access to solar energy - In Lenexa, we want solar heat gain in the winter and to block summer sun. Consider variation in width of lots to maintain solar access.
- Orient the project so that over half (50%) of the project total building square footage has maximum solar orientation (longer axis is within 15 degrees of geographical east/west axis).
- Utilize trombe walls and clerestories on sites with less than optimal orientation.

BENEFITS:

- Reduces solar heat gain in the summer and increases solar heat gain in the winter, which in turn reduces utility costs.
- Provides increased natural light to interior of buildings which reduces costs for artificial lighting and elevates user satisfaction.
- Utilizes a free, locally available, non-polluting, energy source.



POTENTIAL CHALLENGES:

- It is challenging to create development plans where all housing has the ideal solar orientation. A site's topography and access issues can also prevent ideal orientation. A design professional that specializes in sustainable design could help think of creative ways to improve site access and achieve ideal orientation.
- Interior finish materials may require additional consideration to address potential glare.

RESOURCES:

- Solar Radiation Monitoring Laboratory, Department of Physics, University of Oregon - a sun path tool that can calculate solar angles in the winter and summer at any global location. *http://solardat.uoregon.edu/SunChartProgram.php*
- Passive Solar Window Design - Department of Energy's guide of using windows to heat / cool a building. *http://www.energysavers.gov/your_home/windows_doors_skylights/index.cfm/mytopic=13360*
- Daylighting and Human Performance, ASHRAE Journal, vol. 44, no. 6, p. 65-67 - *http://bookstore.ashrae.biz/journal/journal_s_article.php?articleID=395*
- Daylighting, Whole Building Design Guide - *http://www.wbdg.org/resources/daylighting.php?r=provide_comfort*

Solarium and windows strategically located at south elevation with overhangs

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Purchasing Renewable Energy

STRATEGIES:

- Provide a significant percentage of the project's total energy consumption through renewable energy sources.
- Contact local utilities to learn how to purchase green power, or research the Green E database of green power providers.

BENEFITS:

- Reduce your development's carbon footprint.
- Foster green market development in Kansas.

POTENTIAL CHALLENGES:

- Use the Green E program as a resource for finding green renewable energy you can purchase - they provide an actual chain of custody so you can be certain the energy you purchase was created with a truly renewable project.

RESOURCES:

- Can I Buy Green Power in My State? - Summarizes green power products available in Kansas. *http://apps3.eere.energy.gov/greenpower/buying/buying_power.shtml?state=KS*
- Green E Energy Program - Green-E is a consumer protection program for the sale of renewable energy and greenhouse gas reductions in the retail market. *http://www.green-e.org/*

Green-e

Verified, **Certified**
Renewable Energy
and Greenhouse Gas
Emission Reductions

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Lenexa/PBA:
Green E GIS Sources for possible map -
http://www.green-e.org/base/re_products

Renewable Energy Resources

STRATEGIES:

- Incorporate on-site renewable energy generation technologies such as solar, wind, geothermal and biomass.
- Set a specific goal of energy generation (ex. 5% of the project's annual electrical energy demand). Please check with the Database of State Incentives for Renewable Energy (DSIRE) for the most recent incentive information.

http://www.dsireusa.org/incentives/index.cfm?re=1&ee=1&spv=0&st=0&srp=1&state=KS

BENEFITS:

- Most systems do have tax incentives available in Kansas.
  - -Commercial: 10% of total cost, or depreciation may offer better value (as of 2011)
  - -Residential: 30% tax credit (as of 2011)
- DA+UD has worked on projects that have shown only a 10% increase in pricing for using ground source heat/cooling systems.
- Low maintenance systems
- Research the estimated pay back to fully comprehend the potential cost savings.
- Reduction in life cycle costs.

POTENTIAL CHALLENGES:

- Fully research all legislation to determine estimated paybacks, as this may change frequently.
- Site constraints may restrict choices and feasibility.

RESOURCES:

- Southwest Energy Efficiency Project Beyond Code Programs: December 2008- SWEEP has published a new resource designed to help state and local governments design and implement successful efficiency programs for new commercial and residential buildings in the Southwest. The guide provides detailed descriptions and analysis of previously implemented programs, including lessons learned and best practices. *http://www.swenergy.org/programs/buildings/codes/beyond code/SWEEP_Beyond_Code_Guide_2008.pdf*
- Southwest Energy Efficiency Project Beyond Code Programs Quick Reference Matrix: December 2008- Provides an expanded quick reference to the energy efficiency elements included in the programs in this guide, as well as several other programs in the region. *http://www.swenergy.org/programs/buildings/codes/beyondcode/SWEEP_Beyond_Code_Guide_2008.pdf, pg. 5-9, Table 2*
- Closed Loop/Geothermal Heat Pump Systems: Design and Installation Standards 2010 Edition- Provided by the International Ground Source Heat Pump Association, this is a source of precise standards and guidelines for the design and installation of Closed Loop/Geothermal Heat Pump Systems. *http://www.igshpa.okstate.edu/pdf_files/publications/Standards2010s.pdf*
- Department of Energy, Energy Savers, Your Home- Basic geothermal definitions including the types of geothermal heat pump systems, how to select and install a geothermal heat pump, and the benefits associated. *http://www.energysavers.gov/your_home/space_heating_cooling/*

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index.cfm/mytopic=12640

- Geothermal Cost Estimator, GeoSun NRG *http://www.geosunnrg.com/geothermal-cost-estimator/?uid=5cd11d27-068c-4672-997f-f081489c4ec2*
- GEOSUN NRG has developed its exclusive cost estimator to allow homeowners an opportunity to better understand the financial reward of installing a geothermal system. The cost estimator will lay out, in dollars and cents figures, the long-term savings of owning a geothermal system, based on several key economic points. *http://www1.eere.energy.gov/femp/pdfs/groundsource_heatpumps.pdf*
- How to buy an energy efficient ground source heat pump, Energy Efficiency and Renewable Energy, Federal Energy Management Program, Dept. of Energy.- Includes efficiency recommendations for the different geothermal systems, cost effectiveness and financing.
- Tax Incentives for Geothermal Residential and Commercial Projects *http://www.climatemaster.com/downloads/LC028.pdf AND http://www.climatemaster.com/downloads/RP215.pdf=*
- Chicago's Guide to Completing an Energy Efficiency & Conservation Strategy (pdf from Center for Neighborhood Technology) *http://www.cnt.org/repository/CHICAGOEECGUIDE4POST.pdf*

Solar Panels Integrated into a tile roof, Leawood, Kansas

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Solar-Ready Design

STRATEGY:

- Design the project so that buildings will readily accommodate installation of the most appropriate solar technology, if not with initial development, design structures to easily accommodate such improvement including structural capacity, roof types, pitch, orientation, electrical planning, hot water system options and material choices.

BENEFITS:

- A solar ready design is a solution for home buyers who plan to implement solar, but cannot fit the system into their initial construction budget.
- "Solar ready" is becoming a popular catch phrase in green development for home buyers and can raise property value.

POTENTIAL CHALLENGES:

- Solar technology is constantly changing and improving.
- It can be more difficult to implement solar panels as a retrofit and have them look integrated with existing structure and finishes.

RESOURCES:

- Solar Radiation Monitoring Laboratory, Department of Physics, University of Oregon - a sun path tool that can calculate solar angles in the winter and summer at any global location. *http://solardat.uoregon.edu/SunChartProgram.php*
- Passive Solar Design, Department of Energy - Department of Energy's guide of using windows to heat / cool a building. *http://www.eere.energy.gov/basics/buildings/passive_solar_design.html*
- Southwest Energy Efficiency Project - list of links to publications to SWEEP created relating to Energy Efficiency
- Rock Mountain Institute - a non profit that works to increase use of renewables - visit their online library. *http://www.swenergy.org/publications/category.aspx?CategoryID=2*
- Solar Ready Building Design Guidelines Report, The Minneapolis Saint Paul Solar Cities Program - Explains methods to create a solar ready building, including electrical, structural, and space programming. *http://www.state.mn.us/mn/externalDocs/Commerce/Solar_Ready_Building_Design_Guidelines_020211042659_SolarBuildingDesignGuidelines.pdf*

General Rules for Solar Panel Use in Kansas

RESIDENTIAL BUILDINGS → HIGHER HEATING LOADS → MORE WINTER SUN
COMMERCIAL BUILDINGS → HIGHER COOLING LOADS → LESS WINTER SUN

Latitude, multiply by 0.89, and add 24 degrees = Optimum Angle of Solar Panel

- http://www.macslab.com/optsolar.html

Latitude = Optimum Angle of Solar Panel

- Free Sun Power, http://www.freesunpower.com/solarpanels.php
- Department of Energy, http://www.energysavers.gov/your_home/electricity/index.cfm/mytopic=10830

35-40° latitude, add 15° to local latitude = Optimum Angle of Solar Panel

- OkSolar, http://www.oksolar.com/technical/angle_orientation.html

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Wind Energy

STRATEGIES:

- Consider the use of wind turbines in development projects for areas with optimal wind speeds.
- Consult a local distributor / installer to estimate if your site would benefit from wind energy.

BENEFITS:

- Energy savings.
- Research the estimated pay-back to fully comprehend the potential cost savings using the Wind Energy Savings Calculator.
- Provides sense-of-place to the built environment through the use of a historic, landscape element.
- Potential to sell energy back to the grid.

POTENTIAL CHALLENGES:

- Larger scale of turbines must be based on location and context.
- Consider impact on view-sheds when determining placement.

RESOURCES

- Kansas 50-Meter Wind Resource Map - this link provides the map shown in the appendices. *http://www.windpoweringamerica.gov/maps_template.asp?stateab=ks*
- Chicago's Guide to Completing an Energy Efficiency & Conservation Strategy, Center for Neighborhood Technology - Chicago's response to the EECBG grant. *http://www.cnt.org/repository/CHICAGOEECGUIDE4POST.pdf*
- Solar and Wind Energy Savings Calculator - tool to estimate the size and cost of turbine needed to power a building. http://www.solar-estimate.org/index.php?verifycookie=1&page=wind-calculator&subpage=&external_estimator=
- Brightergy - a local supplier/installer of wind and solar products. *http://www.brightergy.com/*
- Please see the Kansas Wind Resource Map in the appendix of this document.

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Ecoworks Wind Turbines, Lenexa, Kansas

Development Pattern and Site Development:

Encourage balanced land uses, new development near existing community centers or public transportation infrastructure, support alternative transportation choices. Provide a variety of open spaces close to work and home. Encourage site development that furthers the goals of walkability, mixed use, a variety of housing styles and types, and commercial centers as opposed to strip development.

Development Site Selection

STRATEGIES:

- Select infill sites that are closer to existing business centers and community amenities.
- Redevelop existing, under-utilized or obsolete sites before green field sites.
- Select new development sites that are contiguous with existing development, infrastructure, utilities, and services.
- Develop sites adjacent to nodes or corridors currently served by transit or identified as future transit corridors.
- Consider proximity to public and alternative transportation options.

BENEFITS:

- Reduce infrastructure costs through the utilization of existing services and reducing new construction.
- Creates increased density needed to attract and support public transit.
- Attracts varied development and housing types.

POTENTIAL CHALLENGES:

- Site acquisition.
- If the site is brownfield, cleanup and remediation costs.
- Restrictions defined by existing conditions and surrounding development.
- Limits of existing transit/transportation options.

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RESOURCES:

- Creating Great Neighborhoods: Density in Your Community - sponsored by the National Association of Realtors guide to community development. *http://www.epa.gov/smartgrowth/pdf/density.pdf*
- Penny Wise, Pound Fuelish, Center for Neighborhood Technology - discusses how excessive metropolitan sprawling growth can have negative effects on community. *http://www.cnt.org/repository/pwpf.pdf*
- Performance-BasedTransit-Oriented Development Typology Guidebook, Center for Transit-Oriented Development - user-friendly tool to evaluate the performance of transit zones and the benefits of development near transit corridors and nodes. *http://ctod.org/portal/node/2162*
- Stapleton Sustainable Development Plan - Stapleton Denver Colorado Community Development Plan *http://www.stapletondenver.com/sites/default/files/resources/Stapleton_Sustainability_Plan.pdf*
- LEED for Neighborhood Development - United States Green Building Council, Leadership in Energy ad Envionmental Design neighborhood development guide that can be followed without enrolling in the program (but will not earn a certification). *http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148*
- Sustainable Sites Initiative - benchmarking system to develop green site, ie. this considers a building's surrounding green development. *http://www.sustainablesites.org/report/Guidelines%20and%20Performance%20Benchmarks_2009.pdf*

See Lenexa Activity Node map in Appendices.

Site Inventory and Analysis

STRATEGIES:

- Complete a detailed site inventory and analysis prior to initiating the development program and undertaking site design.
- Understand the carrying capacity of the land (*the amount of development that can be sustained on a specific site without causing environmental harm*).
- Investigate soil conditions and previous uses of the site and sub-surface conditions.
- Maintain existing soil conditions by limiting the area of disturbance required by development.
- Create inventory of existing trees on site, as well as other natural resources such as streams, natural habitats, etc.
- Preserve desirable trees and shrubs on site.

Lenexa Central Green Existing Site Analysis

BENEFITS:

- As noted in the Sustainable Sites Initiative, "A site assessment evaluates resources and opportunities that can be incorporated into site design. For instance, social gathering spaces can be sited near existing large trees to take advantage of their shade, or existing materials can be reused, saving money and resources."

POTENTIAL CHALLENGES:

- None

RESOURCES:

- I-TREE - a free online tool that can assess the monetary value of city trees. *http://www.itreetools.org/*
- Sustainable Sites Initiative, Pre-requisite 2.1 - this prerequisite details how to conduct a site inventory. *http://www.sustainablesites.org/report/Guidelines%20and%20Performance%20Benchmarks_2009.pdf*
- Mid America Regional Council Natural Resource Inventory - several digital maps detailing the natural resources of Kansas City region. *http://www.marc.org/environment/Smart_Growth/NRI/index.htm*

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Mixed Use

STRATEGIES:

- Design development projects with a variety of uses including residential, retail, office and public uses within the same project.
- Infill or new developments which result in a variety of uses in close proximity create a positive patchwork of diverse uses within an existing framework.

BENEFITS:

- Reducing or shortening the number of trips equates to fewer car trips, thus saving fuel.
- Provide the potential for alternative modes of transportation, such as walking or bicycling, to be used because the distance traveled is not as great.
- Higher densities and varied uses create the type of community that, studies show, are preferred by growing age and demographic groups.

POTENTIAL CHALLENGES:

- Ensure hazardous uses are separate from people's everyday activities.
- Resolving or avoiding conflicts between different uses and the associated activities and noise levels.
- Increased density may result in increased challenges addressing water quality requirement.
- New development patterns may not meet the expectations of suburban dwellers, developers, and other community members.

RESOURCES:

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- Penny Wise, Pound Fuelish, Center for Neighborhood Technology - discusses how excessive metropolitan sprawling growth can have negative effects on community. *http://www.cnt.org/repository/pwpf.pdf (pdf from Center for Neighborhood Technology)*
- Performance-BasedTransit-Oriented Development Typology Guidebook, Center for Transit-Oriented Development - user-friendly tool to evaluate the performance of transit zones and the benefits of development near transit corridors and nodes. *http://ctod.org/portal/sites/default/files/FINAL_PerformanceBasedTODTypologyGuidebook_FINAL.pdf*
- Creating Great Neighborhoods: Density in Your Community - sponsored by the National Association of Realtors guide to community development. *http://www.epa.gov/smartgrowth/pdf/density.pdf*
- Stapleton Sustainable Development Plan - Stapleton Denver Colorado Community Development Plan *http://www.stapletondenver.com/sites/default/files/resources/Stapleton_Sustainability_Plan.pdf*
- Congress of New Urbanism - organization that promotes walkable, mixed-use neighborhood development, sustainable communities and healthier living conditions. *http://www.cnu.org/*
- Dockside Green - an example of a mixed use community. Dockside has seen great increases in commerce and jobs with the implementation of mixed uses. *http://docksidegreen.com/index.php?option=com_frontpage&Itemid=1*

Old Town, Lenexa

Compact Development Promoting Walkability

STRATEGIES:

- Design development with residential land use within 1/4 mile of a neighborhood or similar of commercial use, school or civic use.
- Increase development densities near existing nodes.

BENEFITS:

- Reduce infrastructure costs by reducing infrastructure installations and subsequent maintenance.
- Reduce overall energy costs in individual units when there are fewer exposed exterior walls.
- Creating a relationship between land use and transportation is important. Increased density in residential areas tends to support other modes of transportation besides the car.
- Compact, walkable developments have higher home sale prices, enhanced marketability, and faster sales or leases than conventional developments.
- Keeps retail and leisure purchases in Lenexa.

POTENTIAL CHALLENGES:

- Existing conditions - topography, street grid, and development.
- Funding for retrofits.

- Consider location and proximity of public open space.

RESOURCES:

- Penny Wise, Pound Fuelish, Center for Neighborhood Technology - discusses how excessive metropolitan sprawling growth can have negative effects on community. *http://www.cnt.org/repository/pwpf.pdf (pdf from Center for Neighborhood Technology)*
- Performance-BasedTransit-Oriented Development Typology Guidebook, Center for Transit-Oriented Development - user-friendly tool to evaluate the performance of transit zones and the benefits of development near transit corridors and nodes. *http://ctod.org/portal/sites/default/files/FINAL_P*erformanceBasedTODTypologyGuidebook_FINAL.pdf
- Creating Great Neighborhoods: Density in Your Community - sponsored by the National Association of Realtors guide to community development. *http://www.epa.gov/smartgrowth/pdf/density.pdf*
- Stapleton Sustainable Development Plan - Stapleton Denver Colorado Community Development Plan *http://www.stapletondenver.com/sites/default/files/resources/Stapleton_Sustainability_Plan.pdf*
- The Economic Benefits of Open Space, Recreation Facilities and Walkable Community Design - information about preventing childhood obesity through walkability. *http://www.activelivingresearch.org/files/Synthesis_Soup-Ewing_March2010.pdf*
- Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, An ITE Recommended Practice - Institute of Transportation Engineers resource for creating context driven streets. *http://www.ite.org/emodules/scriptcontent/Orders/ProductDetail.cfm?pc=RP-036A-E*

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Reduce Parking Footprint

STRATEGIES:

- Consider constructing fewer parking spaces and surface parking lots and utilize on-street parking to meet parking requirements.
- Use pervious pavement for as large a portion of parking requirement as possible.
- Promote shared parking.
- Look for duel use opportunities. I.E. tennis courts, basketball courts and other paved recreational surfaces, used as overflow parking.

BENEFITS:

- On street parking helps to maintain the character of the street. Surface parking pushes the front facade of a storefront / home too far from the street so the front door is not easily accessed from the sidewalk.
- Provides better access by reducing remote parking locations.

Surface parking lot with abundant trees to reduce heat gain

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- Pervious paving reduces heat island effect. Parking lots can raise surface and air temperatures when they are hit with direct sunlight throughout the day. These overheated surfaces are not comfortable to walk or play upon.
- Retail and services are supported as people explore the area by walking.
- Less paved area to maintain will reduce cost for repairs, snowplowing, etc.
- Less impervious surface to address for water quality and stormwater requirements.

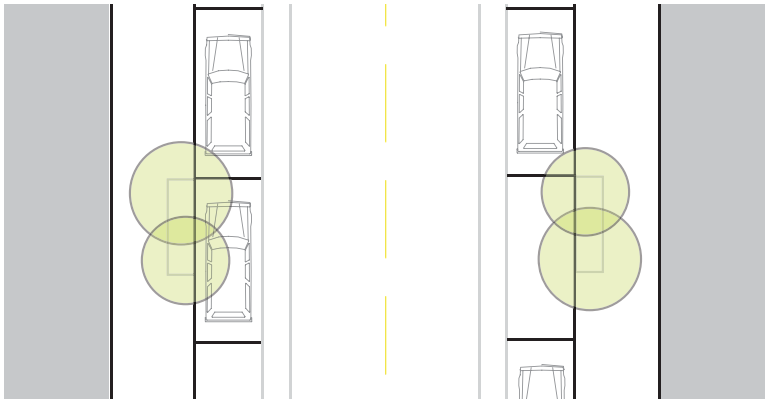
POTENTIAL CHALLENGES:

- Many citizens may need to adjust their perception of convenience and general walking distance from a building to their car.
- Different pavement types require different maintenance strategies.

RESOURCES:

- Contested Streets: Breaking New York City Gridlock - DVD clips available online of this documentary that discusses the change in street designs and cities that are supporting progressive street design.

On street Parking rather than surface parking lots.



Parking Location

STRATEGIES:

- Locate parking lots at the side or rear of buildings, leaving building frontages and streetscapes free of surface parking lots.
- Integrate parking structures into the building so that storefronts are maintained along pedestrian walkways.
- Reduce parking lot area wherever possible.

BENEFITS:

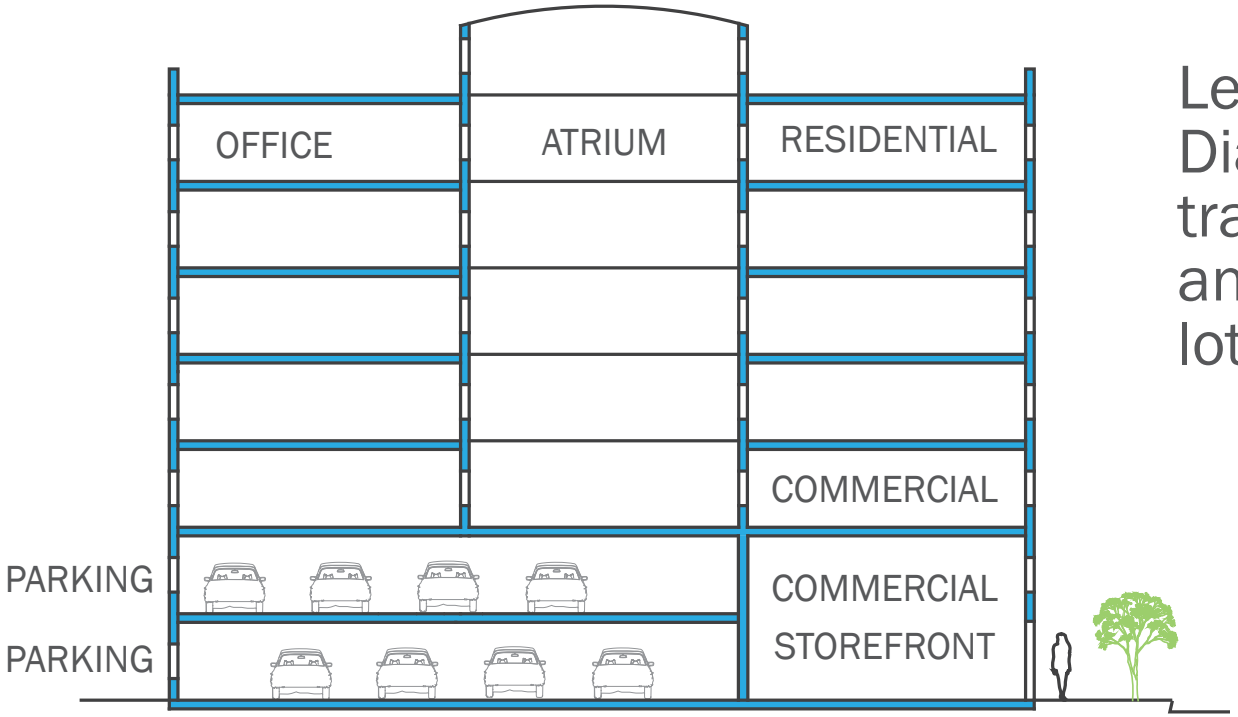
- Maintains character of street.
- More commercial storefront, increasing revenue.
- Structured parking reduces the impervious footprint and weather related maintenance.

POTENTIAL CHALLENGES:

- Planning for proper safety measures.
- Integrating parking within a new structure requires a larger initial investment than planning for surface lots, but may provide shorter walking distances and protection from inclement weather.

RESOURCES:

- Contested Streets: Breaking New York City Gridlock - DVD clips available online of this documentary that discusses the change in street designs and cities that are supporting progressive street design.
- Center for Neighborhood Technology, Paved Over document - *http://www.cnt.org/repository/PavedOver-Final.pdf*
- Victoria Transport Policy Institute - *http://www.vtpi.org/*



Lenexa/PBA: Diagram showing traffic, building, and rear parking lot.

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Landscape Considerations

STRATEGIES:

Consider:

- Providing more water efficient landscapes by limiting turf grass and using native plants.
- Limit water consumption for irrigation through the use on drip irrigation and supplement water supply through rainwater harvesting or gray water reuse systems.
- Request native plants be used in landscape applications.
- If not native, drought resistant plants are preferred.
- Develop a resilient design which is responsive to site conditions.

BENEFITS:

- Native plants increase landscape plant diversity, minimize pesticide usage, have lower energy and water maintenance and costs.
- Local insects and birds benefit from local plants.
- Creates year-round visual interest.
- Creates a sense-of-place, unique to Kansas.

POTENTIAL CHALLENGES:

- Adjustment in perception for a less suburban aesthetic.
- Different vegetation types require different maintenance techniques.
- Education of citizens, maintenance providers, and community leaders.

RESOURCES:

- American Society of Landscape Architects - national landscape architect association. Find local certified landscape architects. *http://www.asla.org/*
- Plants of Merit - Plants of outstanding quality and dependable performance for the lower Midwest provided by Missouri Botanical Gardens, Powell Gardens, and others. *http://www.plantsofmerit.org/*
- Grow Native - Missouri Department of Conservation (MDC) and the Missouri Department of Agriculture (MDA) list of native plants. *http://www.grownative.org/*
- Powell Gardens, Plant Catalog - listing of a local garden's plantings. *http://www.powellgardens.org/default.asp?page=PlantCatalog*
- Great Trees for the Kansas City Region - Robert Whitmann, a landscape architect from Gould Evans, has compiled a list of plants and trees that grow well in the Kansas City region. *http://extra.gouldevans.com/greattreesforkc.pdf*
- 10,000 Rain Gardens , http://www.rainkc.com/
- MO Botanical and Kemper Center http://www.mobot.org/gardeninghelp/plantfinder/Alpha.asp
- Kansas Native Plant Society http://www.kansasnativeplantsociety.org/
- Best Management Practices (BMP) Manual for Stormwater Management - *http://kcmetro.apwa.net/chapters/kcmetro/specs/APWA_BMP_Manual_Mar08.pdf*
- Please see the appendix for a list of recommended plants in Lenexa.

Bio-retention Firestation #3, Lenexa

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Lot Configurations

STRATEGIES:

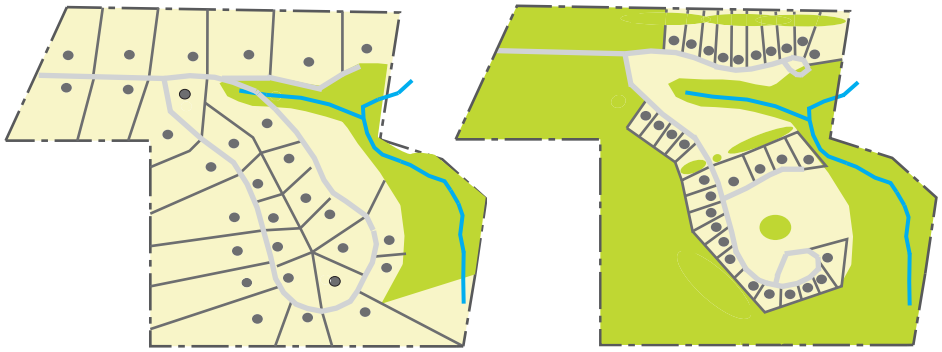
- Offer alternative residential layouts in addition to mixed use.
- Use a variety of lot sizes within residential projects.
- Base site, lot and building setbacks on building type.
- Provide multiple housing types within the same block.
- Encourage cluster housing to preserve open space and resource areas.
- Plan lots for optimal solar orientation

BENEFITS:

- Cluster developments preserve open space, reduce the length of lines to utilities and shorten road networks, reducing energy costs during development as well as future maintenance costs.
- Energy is preserved by working with the topography and aspect of the land, rather than mass grading.
- Areas that have steep slopes or streamways can be preserved while development occurs where it fits best within the landscape.
- Best use of natural topography on the site.
- Preserving floodplains reduces other stormwater costs.
- Preserved open space allows trail and park connectivity.

Typical Development

Cluster Development



POTENTIAL CHALLENGES:

- Perceptions related to density.
- Necessitates mechanism to insure open space is permanent.
- Cost and responsibility for maintenance of open space must be considered.
- Desire for large, private lots.

RESOURCES:

- The Cluster Subdivision: A Cost-Effective Approach. APA PAS Report.
- Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks. American Planning Association Planners Book Service, Chicago, IL. Arendt, R. 1996. - How a development can protect open space and produce an interconnected network of green space.
- An Examination of Market Appreciation for Clustered Housing with Permanently Protected Open Space - Center for Rural Massachusetts, Amherst, MA. *http://www.capeelizabeth.com/council_packets/2011/03%2021%202011%20Ordinance%20Committee/article-1.pdf*
- Serenbe Community - a 900 acre development in Georgia showing minimal impact on natural surroundings. *http://www.serenbecommunity.com/home.html*
- Thornton Creek Water Quality Channel - *http://www.seattle.gov/util/groups/public/documents/webcontent/spu01_006146.pdf*
- SMARTRAQ - *http://www.act-trans.ubc.ca /smartraq/pages/reports.htm*

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Community Gardens

STRATEGIES:

- Dedicate permanent, viable growing space if a convenient water source is available, consider dedicating permanent viable growing space within projects for community gardening.
- Passively collect water from roofs or stormwater for irrigation.
- Utilize passive, open space or neglected areas to a greater degree.
- Provides fresh, local food for citizens.
- Builds a sense of community.

BENEFITS:

- Stormwater can be diverted away from stormwater systems, lowering the need for facilities and maintenance.
- Stormwater can be strategically directed from a roof or hard surface to irrigate a yard or community garden, reducing water usage, reducing irrigation system installation costs and water bills.
- Community gardens offer opportunities for communities to plant organic produce.
- Provides a source of income for gardeners.
- Is an educational opportunity for residents, students, and gardeners.

POTENTIAL CHALLENGES:

- Having a committed community to maintain the garden.
- Creating and maintaining a context sensitive and aesthetically pleasing design.
- No venue for growers to sell produce in Lenexa.
- Impacted soil quality.
- Urban wildlife.

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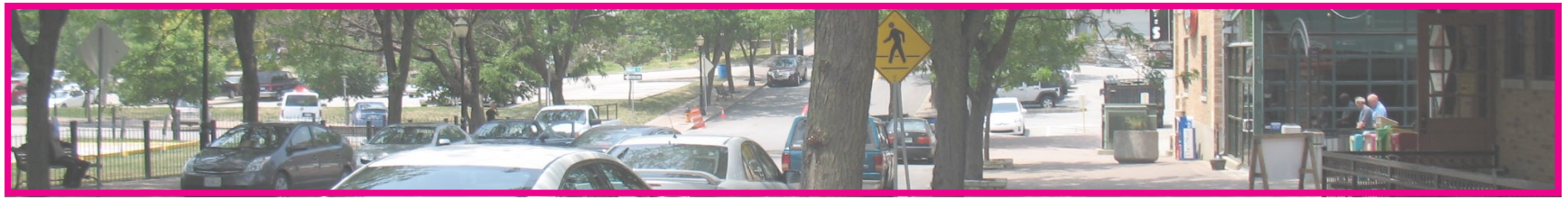
RESOURCES:

- American Society of Landscape Architects- national landscape architect association. Find local certified landscape architects. *http://www.asla.org/*
- Kansas City Center for Urban Agriculture - local organization that promotes edible community gardens. *http://www.cultivatekc.org/*
- Kansas City Community Gardens- local organization that promotes community gardens. *http://www.kccg.org/*
- Urbavore Compost Program *http://www.badseedkc.com/farm/services/*

Image Courtesy of Patti Banks Associates



Transportation:

Promote the use of alternative modes of travel such as walking, bicycling and the use of public transit. Design streets to balance the needs of all users and to compliment adjacent land uses and building types.

Interconnected Street Network

STRATEGY:

- Provide multiple vehicular route options.
- Increase connectivity through local neighborhoods using sidewalks and trails.
- Reduce the use of the cul-de-sac streets.

BENEFITS:

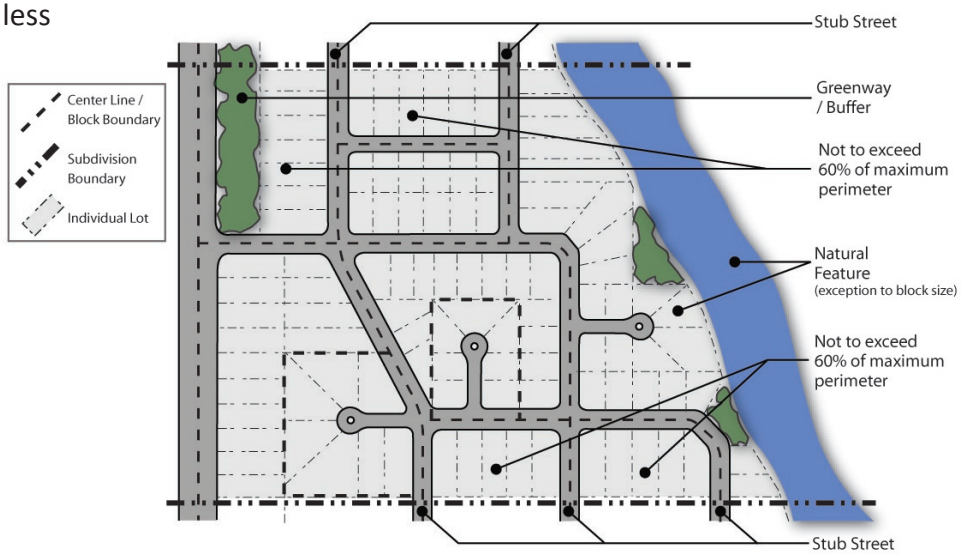
- Connectivity using decreases the need for a car, and encourages efficient walking and biking routes
- Shortens distances to daily needs.
- Easier to connect your development to public transportation.
- Cul-de-sacs create confusing neighborhoods that are often difficult for an aging population or young children to navigate.
- Provides versatility in trip planning and alternative routes.
- Decreased emergency response time.

POTENTIAL CHALLENGES:

- It is difficult to retroactively increase interconnectivity between cul-de-sacs.
- The use of pavement to land area in a grid system is less efficient with a cul-de-sac design.
- Cut- through automobile traffic may increase.
- Increased need for pedestrian facilities such as crossing signals and crosswalks.
- Using a strict grid layout is not responsive to topographical changes and natural features of the landscape.

RESOURCES:

- *Sprawl Repair Manual*, Galina Tachieva, 228, 252-254 - Center for Applied Transect Studies, methods to "repair" broken or deadend street networks.
- Cul-de-sacs: Suburban Dream or Dead End? - National Public Radio article on the negative impact of cul-de-sacs neighborhood safety. *http://www.npr.org/templates/story/story.php?storyId=5455743*
- The Ninth Annual Year in Ideas, The Cul-de-sac Ban. - New York Times Magazine article that discusses Viginia's ban on cul-de-sacs. *http://www.nytimes.com/projects/magazine/ideas/2009/#design*
- SMARTRAQ-*http://www.act-trans.ubc.ca/smartraq/pages/reports.htm*



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Street Design

STRATEGY:

- Develop projects with context sensitive street designs.
- Use a variety of street sections that carry expected traffic but compliment adjacent land uses.
- Accomodate all transportation modes.

BENEFITS:

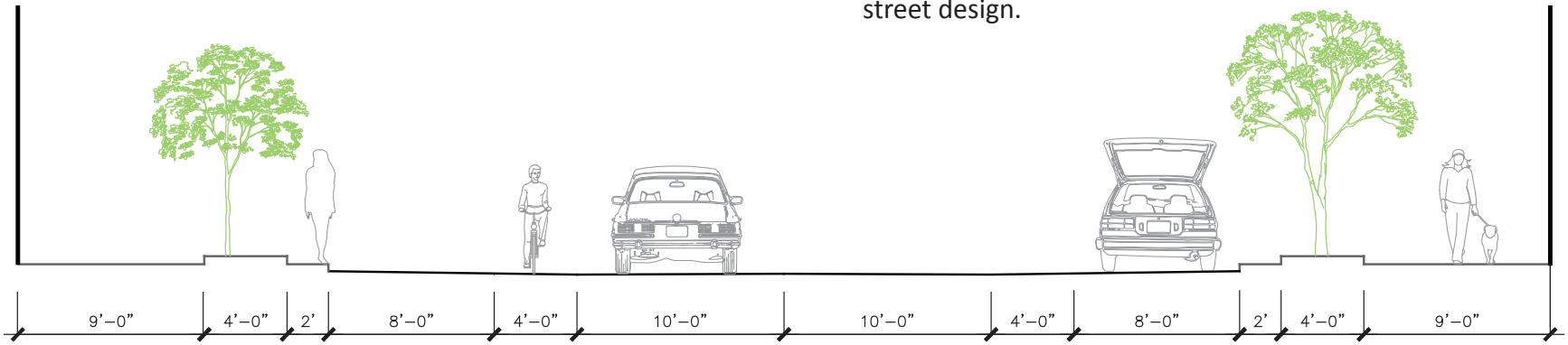
- Streets are places, they are not only a route from one location to another. Create streets that include opportunities for social interaction and commerce.
- Safe and complete streets accommodate all users.
- Create streetscapes which provide a comfortable experience for the pedestrian by including shade and buffering from traffic.

POTENTIAL CHALLENGES:

- Redesign and implementation costs.
- Increased maintenance costs (increased landscaped area, street sweeping, of bike lanes, etc.)
- Public education for navigation of new lane configurations and change in expectations.

RESOURCES:

- Complete Streets List of Resources - links to complete streets guides. *http://www.sacog.org/complete-streets/toolkit/files/categories/liveable-communities.html*
- *Getting Back to Place: Using Streets to Rebuild Communities.* New York: Project for Public Spaces - how to enhance streets in existing communities and decrease the appearance and dependence on cars.
- Ellen Dunham-Jones: Retrofitting suburbia - lecture on how to make existing suburbs green and liveable. *http://www.ted.com/talks/ellen_dunham_jones_retrofitting_suburbia.html*
- Contested Streets: Breaking New York City Gridlock - by Transportation Alternatives, DVD clips available online of this documentary that discusses the change in street designs and cities that are supporting progressive street design.



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Pedestrian System

STRATEGY:

- Design development projects with shorter block lengths to create interconnected pedestrian network.

BENEFITS:

- Walking keeps everyone healthy and active. Elderly and children gain independence and mobility with pedestrian systems.
- Walking builds a sense of community because there is more opportunity to talk to neighbors and form social connections.
- Walking creates a safer neighborhood because there is more activity and eyes on the street.
- Walkable communities build the adjacent economy. Residents can walk to buy groceries, run errands, etc. without the use of a car.
- Walking and bike riding are energy efficient, and reduce dependence on cars.
- Creates distinctive, unique feel to development.

POTENTIAL CHALLENGES:

- Retrofits in build-out areas.
- Limited right of way and right of way acquisition.
- Adapting pedestrian plan to existing traffic planning speeds and volumes.
- Perceived and real costs for construction and maintenance.

RESOURCES:

- City of Boulder, Pedestrian System Plan - the City of Boulder, Colorado's plan to increase pedestrian traffic and build a network of connected trails. *http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=453&Itemid=1655*
- Walkability Checklist - from the Partnership for a Walkable America, a checklist to analyze the walkability of a community. *http://www.walkableamerica.org/checklist-walkability.pdf*
- Benefits of Walkable Communities, Walk San Diego - San Diego Prevention Research Center's guide to creating walkable communities to reduce health risks. *http://www.sdprc.org/conferencefiles09/benefits-english.pdf*

Prado, Madrid, Spain

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Bicycle Circulation System

STRATEGIES:

- Provide safe design developments to provide safe, continuous bicycle access to all land uses adjacent to and within the site.
- Where appropriate provide access to routes connecting major destinations.

BENEFITS:

- Proximity and connectivity to regional facilities such as trails, increases tourism.
- An increase in the demand for bicycles can stimulate a local economy if the demand for bike equipment increases.
- The value of homes increase with the implementation of bicycle routes, trails and open space.
- Riding a bike is an excellent form of exercise that can be incorporated into daily activities.
- Riding a bike serves as a transportation mode for members of the population who are non-drivers, by choice or circumstance.
- Encourages increased use of non-polluting, low cost, transportation.
- Provides a higher level of safety for all users of the roadways.

Paths at Craig's Crossing, Lenexa, KS

POTENTIAL CHALLENGES:

- Retrofit situtations present challenges with limited right of way area and physical constraints.
- Perception of need.
- Driver education regarding on-road facilities and pertinent laws
- Changes in maintenance practices and costs.

RESOURCES:

- Overland Park – Bike, Hike Trails and side paths available in Overland Park Kansas. *http://www.opkansas.org/Place-Finder , http://www.opkansas.org/Doing-Business/Vision-Metcalf-Plan*
- Olathe Trails and Greenways - Olathe, KS comprehensive plan to implement trails in their community. *http://www.olatheks.org/files/rec/Trails_and_Greenways_Plan_1993.pdf*
- MARC, MetroGreen - Mid America Regional Council's Kansas City network of bike trails. *http://www.marc.org/metrogreen/*
- Economic Impact of Investments in Bicycle Facilities - National Trails Training Partnership's hosts articles regarding the economic impacts of bike trails. *http://www.americantrails.org/resources/economics/NCouterbanks.html*
- Fietsberaad, and international cycling expertise center to promote cycling policy. *http://www.fietsberaad.nl/index.cfm?lang=en&section=Nieuws&mode=newsArticle&newsYear=2011&repository=Cyclists+spend+as+much+in+supermarket+as+motorists*

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Bicycle Parking

STRATEGY:

- Provide bicycle racks at destinations within developments, parks and transit hubs.

BENEFITS:

- The long term costs of bicycle accommodations is lower than the cost of automobile infrastructure.
- Encourages bike use and accommodates potential bike share programs.
- Facilitates use of trail networks.
- Provides safe parking for bicycles, allowing riders to conduct their business.

POTENTIAL CHALLENGES:

- Retrofit situation require identification of location and adequate space.
  Additional costs for facilities and installation.
- Perceived implications of liability.
- Perceived need for facilities.

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RESOURCES:

- The New York City, Bicycle Survey - City of New York Department of City Planning Transportation Division identifies what cyclists need to have a safe and frequent riding experience
- Economic Impact of Investments in Bicycle Facilities - National Trails Training Partnership's hosts articles regarding the economic impacts of bike trails. *http://www.americantrails.org/resources/economics/NCouterbanks.html*
- The Economic Impact of Bicycling in Wisconsin- Bicycle Federation of Wisconsin, economic impact analysis. *http://www.dot.wisconsin.gov/business/econdev/docs/impact-bicycling.pdf*
- The Economic Benefits of Bicycle Infrastructure Investments - League of American Bicyclists. *http://www.bikeleague.org/resources/reports/report_economics.php http://www.bikeleague.org/resources/reports/pdfs/economic_benefits_bicycle_infrastructure_report.pdf*

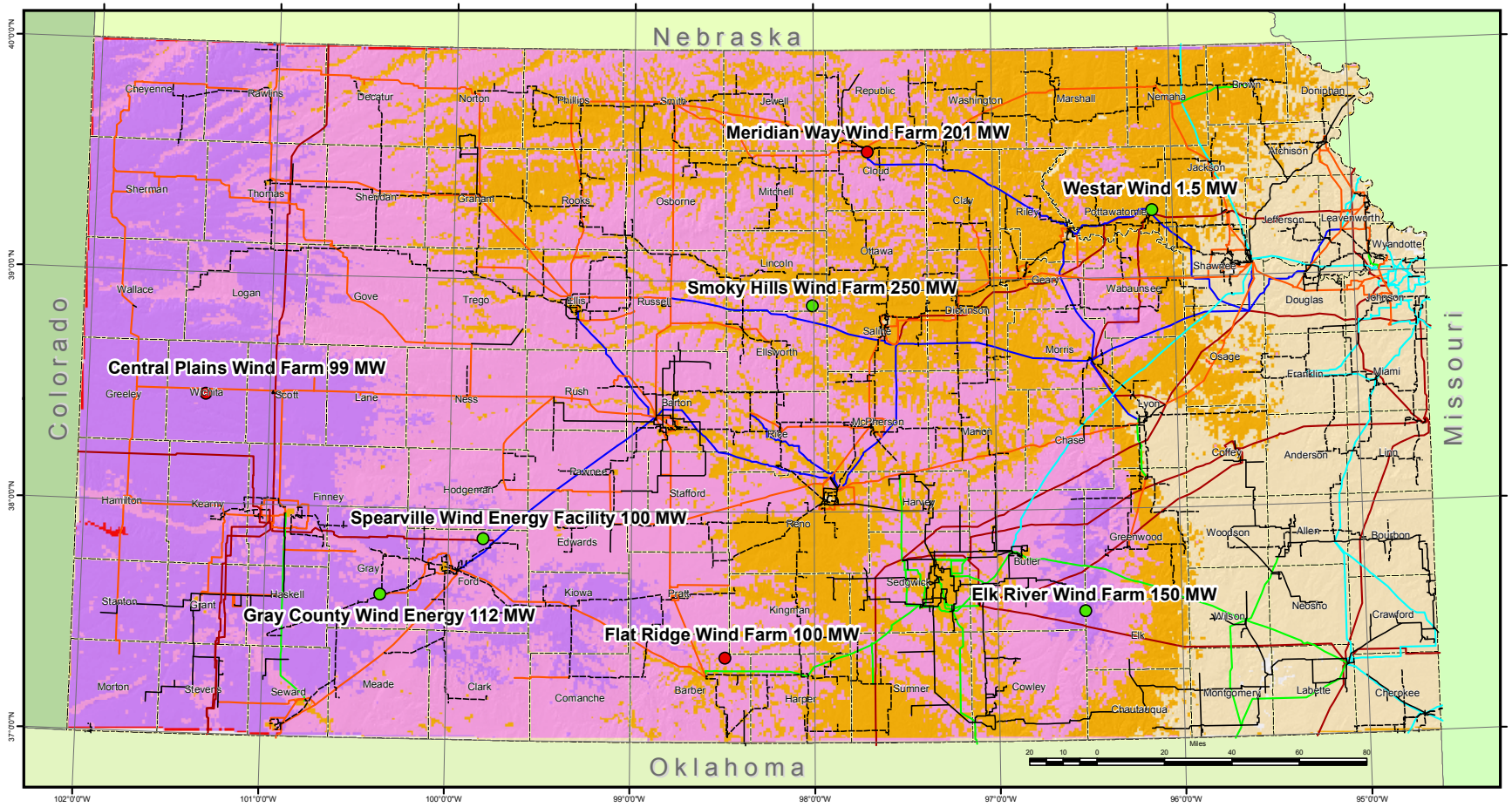
Summary:

The citizens of Lenexa are proud of their community and strive to create and maintain high quality places. As the community continues to evolve through new investment in new development, as well as reinvestment in existing development, the focus will remain on creating high quality, lasting places and buildings.

Geographically it is not possible to annex more land into the city, so the proper design and development of existing sites and areas to continue the tradition of quality placemaking as is critical for both economic and environmental reasons. Using this guide, future development within Lenexa may be accomplished in a manner that is responsive to the goals and objectives of *Vision 2030* and the continued success of Lenexa as a desirable place to live.

Whether adding to existing residential or commercial structures, redeveloping an existing site, building a new shopping or employment area, or creating a new subdivision or apartment complex, this guide can be used as a resource to investigate and implement site appropriate and cost effective solutions. Not all the strategies are appropriate for every site or every project. Working in partnership with one another, the City, developers, design professionals and, most importantly, citizens can determine which strategies have the greatest impact for each particular project and the community.

Kansas Wind Map, image courtesy of DOE



Electric Transmission Lines	Wind Speed at 50 meters (m/s)	(mph)	Wind Power Density at 50m W/m²	Wind Farms
345 - KV	Class 1: 0.00 - 5.60	0.00 - 12.5	0 - 200	Announced
230 - KV	Class 2: 5.60 - 6.40	12.5 - 14.3	200 - 300	Existing
161 - KV	Class 3: 6.40 - 7.00	14.3 - 15.7	300 - 400	
138 - KV	Class 4: 7.00 - 7.50	15.7 - 16.8	400 - 500	
115 - KV	Class 5: 7.50 - 8.00	16.8 - 17.9	500 - 600	
69 - KV	Class 6: 8.00 - 8.80	17.9 - 19.7	600 - 700	
34.5 - KV	Class 7: > 8.80	> 19.7	> 700	

Kansas Wind Resource Map

Coriolis

Kansas Corporation Commission Energy Programs

The wind resource estimates presented on this map were developed by Coriolis-AE using WindMap TM, a program developed by BrowerCo. WindMap TM is a mass conserving model based on NOABL, a program developed in the 1970s by the U. S. Department of Energy. The spatial grid resolution is of 1000 (app) meters.

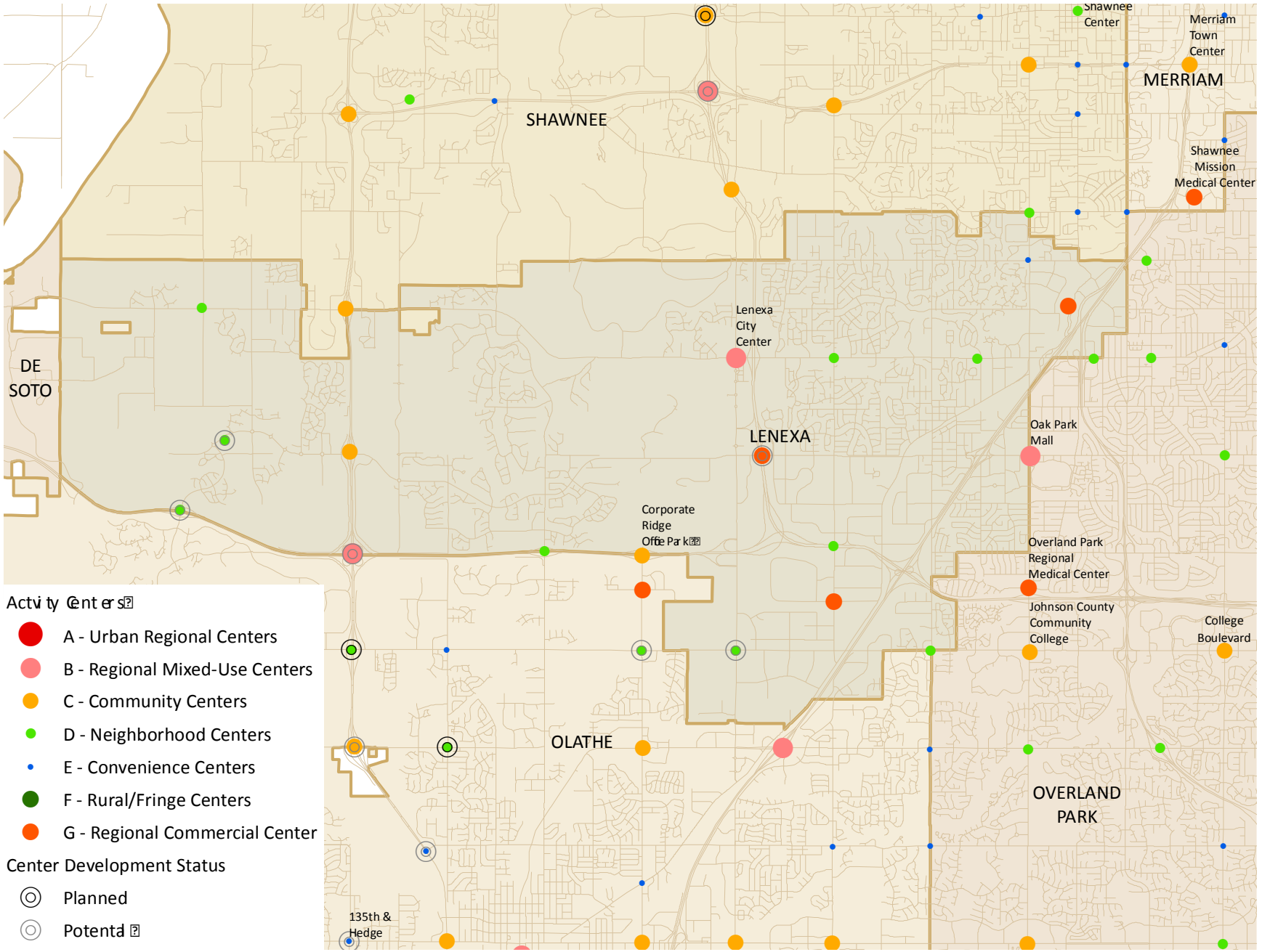
The resource estimates have NOT been validated by the National Renewable Energy Laboratory (NREL) or independent meteorologist. All wind energy development projects should confirm wind resources by direct measurements in accordance with wind energy industry standards.

Development of this map was performed under contract with the Kansas Corporation Commission Energy Program with funding from the U. S. Department of Energy's Wind Power America Program.

This map may be viewed on the web at:
http://wwg.kansas.gov/kansas_wind_map.pdf

Kansas Corporation Commission
23 January 2008

Lenexa Activity Nodes, image courtesy of MARC



City of Lenexa
Recommended Native plants for Landscape Applications

Foxglove	Indian grass
Coneflower	Little bluestem
Black-eyed Susan	Switchgrass
Blue-eyed Grass	Sideoats grama
Rose Verbena	Prairie Dropseed
Butterfly Milkweed	Blue grama
Golden Alexander	St. John's Wort
Cardinal Flower	Ninebark
Blue lobelia	Gro-low sumac
Coreopsis	Viburnum
Columbine	Eastern redbud
Prickly pear cactus	Sugar maple
Bergamot	Oak species
Wild ginger	Linden

Resources

1. ENERGY EFFICIENCY AND ALTERNATIVE ENERGY

- Database of State Incentives for Renewable Energy (DSIRE)

http://www.dsireusa.org/

- Tax Incentives for Geothermal Residential and Commercial Projects

http://www.climatemaster.com/downloads/LC028.pdf AND *http://www.climatemaster.com/downloads/RP215.pdf*

- Department of Energy, Energy Efficiency

http://www1.eere.energy.gov/financing/

- Environmental Protection Agency, Energy Efficiency

http://www.epa.gov/energy/energy.html

- Project Living Proof, Kansas City, Missouri,

http://www.kcenergy.org/projectlivingproof.aspx

- Daylighting Collaborative,

http://www.daylighting.org/

- Internation Green Construction Code,

http://www.iccsafe.org/cs/IGCC/Pages/default.aspx

- Environmental Protection Agency: Reducing Urban Heat Islands: Compendium of Strategies

http://www.epa.gov/heatisld/resources/pdf/CoolPavesCompendium.pdf

- PaveStone

http://www.pavestone.com/

- City of Chicago Green Alley Handbook

http://www.cityofchicago.org/content/dam/city/depts/cdot/Green_Alley_Handbook_2010.pdf

- Cool Roof Rating Council

http://www.coolroofs.org/

- Energy Star Roof Products

http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=RO

- EPA's Reducing Urban Heat Islands: Compendium of Strategies

http://www.epa.gov/heatisland/resources/pdf/GreenRoofsCompendium.pdf

- Chicago Guide to Building Green Roofs

http://www.artic.edu/webspaces/greeninitiatives/greenroofs/main.htm

- Landscape Shading, Environmental Protection Agency

http://www.energysavers.gov/your_home/landscaping/index.cfm/mytopic=11940

- Passive Solar Home Design

http://www.energysavers.gov/your_home/designing_remodeling/index.cfm/mytopic=10250

- Solar Radiation Monitoring Laboratory, Department of Physics, University of Oregon

http://solardat.uoregon.edu/SunChartProgram.php

- Passive Solar Window Design

http://www.energysavers.gov/your_home/windows_doors_skylights/index.cfm/mytopic=13360

- Daylighting and Human Performance, ASHRAE Journal, vol. 44, no. 6, p. 65-67,

http://bookstore.ashrae.biz/journal/journal_s_article.php?articleID=395

- Daylighting, Whole Building Design Guide -

http://www.wbdg.org/resources/daylighting.php?r=provide_comfort

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