# SUSTAINABILITY STUDY

*Submitted to*
CITY OF PERRY, IA

Iowa Economic Development Authority (IEDA)
Sustainability Grant:

- *Water Treatment Plant*
- *Wastewater Treatment Plant*
- *Alternative Energy*
- *Cultural District Lighting*
- *Multi-Modal Transportation*
- *Education & Outreach*

PERRY
*Make Yourself At Home!*

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August 2012

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# Executive Summary

Perry was awarded an American Reinvestment and Recovery Act (ARRA) Sustainability Grant through the Iowa Economic Development Authority (IEDA) in March of 2012. The City retained Bolton & Menk to conduct inventory and analysis in the four areas of the community identified as part of the grant application: the Wastewater Treatment Facility, the Water Treatment Facility, Lighting in the Cultural District, and Multi-Modal transportation. The purpose of the study was to establish a baseline for energy use in these areas of the community and to recommend improvements that would lower the overall energy consumption in the same areas.

## Water Treatment Plant Recommendation

The water treatment facility has two separate treatment trains; an older train that was constructed in 1954 and renovated in 1988, and a newer train that was constructed in 1966. The facility uses a lime softening process to treat the water to supply potable water to residents and businesses within the community. The treatment facility draws water from well fields containing 13 wells located around the community and further east along Highway 169. The groundwater in many of these wells contain a significant ammonia concentration that must be addressed during the treatment process.

During a walk through of the water treatment facility in early July, the project team was able to observe the treatment process firsthand. They were also provided an opportunity to review past plant billings and records to get a more complete picture of current operations. With the information gathered from this tour, as well as supplemental inventory efforts, the project team provided recommendations for the City to consider in refining processes, upgrading equipment, or considering changes to treatment systems that would enable Perry to realize long-term energy savings.

The recommendations provided in this study are summarized in a chart at the end of Chapter 1. Additional descriptions for each entry can be found in the text from that chapter.

## Waste Water Treatment Facility & Recycling Center Recommendations

The waste water treatment facility has been converted from a sequencing batch reactor (SBR) process design to a conventional activated sludge with clarifiers. Only two of the four aeration basins are in active use due to reduced organic loading. The plant has been in consistent compliance with the National Pollutant Discharge Elimination System (NPDES) discharge permit limits. The plant will likely require modifications in the next five to ten years to meet projected future permit requirements for nitrogen and phosphorus removal.

During a walk through of the water treatment facility in early July, the project team was able to observe the treatment process firsthand. They were also provided an opportunity to review past plant billings and records to get a more complete picture of current operations. With the information gathered from this tour, as well as supplemental inventory efforts, the project team provided recommendations for the City to consider in refining processes,

upgrading equipment, or considering changes to treatment systems that would enable Perry to realize long-term energy savings.

The recommendations provided in this study are summarized in a chart at the end of Chapter 2. Additional descriptions for each entry can be found in the text from that chapter.

## Alternative Energy Discussion

The City has two existing wind turbines at the Waste Water Treatment Facility & Recycling Center. The costs associated with implementing additional renewable wind energy for the Wastewater Treatment Plant & Recycling Center and Water Treatment Plant are cost prohibitive based on simple equipment and implementation payback over its service life largely because of utility sellback requirements in place through Iowa legislation.

The turn key cost of a 50 kW wind turbine is $352,000. This assumes that the 30% investment tax credit that is due to expire at the end of the year will not be in place at the time of implementation.

Because both plants use on-demand metering, you cannot utilize net metering as part of the system. Instead of selling energy back to the utility supplier at the purchase cost, the City must instead sell it back at less than wholesale rates. In Perry the cost for electricity at the plants are approximately 8.5 cents per kW/h. The sellback rate to the utility is only 4-5 cents per kW/h. This equates to a payback on electricity of 3.5-4.5 cents per kW/h, or an average of 4 cents per kW/h.

With a 50 kW turbine running in Perry at an average wind speed of 13 mph , the annual energy production is 160,000 kWh. At 4 cents per kW/h sell back to the electrical grid, this equates to an annual sell back of $6,400. The turbine has an advertised life expectancy of 20 years, which equals $128,000 in sell back electricity over the life of the equipment; well below the costs associated with implementation.

Additional information on this discussion can be found in Chapter 3.

## Cultural District Lighting Recommendations

As an initial step toward preparing recommendations for energy reduction to Perry's Cultural District lighting, the project team inventoried the existing 147 light fixtures in the study area. This included determining the light source type and wattage for each fixture. The 36 non-metered Alliant Energy lights were included in the inventory even though the City is not currently paying electrical rates on these but rather a fixed tariff rate for each fixture.

The information from the inventory was used to calculate a Cultural District lighting energy baseline of 142,854 kWh/yr. The study then explored alternate lighting types and luminaire options that would meet the new

illumination standards as adopted by the Illuminating Engineers Society RP-8 Standards for Roadway lighting. The criteria for fixture selection also included energy savings, illumination capabilities, quality of light, dimming capabilities, maintenance demands, and life cycle costs.

Using the energy consumption baseline of 142,854 kWh/yr. with an assumed 20 year lifespan for each fixture results in a total energy savings of roughly 1,078,520 kWh using the proposed fixtures. This equals a savings of $111,424.00 in pure energy costs over the life of the fixtures in the Cultural District (assuming a simple inflation of 3% per year and an electrical rate of 8.4 cents/kWh).

A further energy savings component that could be implemented as part of the project is the ability to dim street lights during off-peak hours. If dimming is used with the proposed LED lights, it could represent an additional energy savings of 15-25% over the life of the fixture, and would represent a savings of $157,360.00 over the life of all fixtures in the study area.

In addition to pure energy savings, there is a significant savings in terms of maintenance costs with new LED fixtures. LED light sources are a 'life of fixture' source. The LEDs are expected to last a minimum of 20 years and perform at or above the designed lighting levels, resulting in greatly reduced maintenance costs. The existing lighting will require a minimum of 3 bulb and ballast replacements at a cost of $300 in equipment, labor, and materials per change in 2012 dollars. This equates to $261,900.00 savings over 20 years for lighting in the Cultural District that would not be required with LED lights.

### Multi-Modal Transportation Recommendations

As part of the Multi-Modal Transportation study the project team analyzed the existing corridors to determine obstacles and support needs for future multi-modal networks. The information from this evaluation was compiled in a spreadsheet along with a set of graphics to reference in determining potential future projects. This study also provides a discussion on project phasing as well as potential funding sources that may align with potential multi-modal development opportunities.

Also included in this study is a set of planning level cost estimates for different types of trails being recommended as part of this study, along with corresponding information for each of the identified trail segments in 2012 planning costs. This information can be used to get a feel for potential project costs, but should not be used as a basis for construction bids or acquiring funding. Prior to continuing to develop any of these segments (or partial segments) the City will need to reevaluate the costs associated with each project to come to a more accurate figure at the time of development.

1.1

# Water Treatment Plant

## Discussion & Recommendations

1.2

# Water Treatment Facility Study

## Section 1: Introduction

The City of Perry water supply and treatment system includes the following significant components:

- Wells (13) with two water supply mains from wells to plant
- Water treatment facility (1)
- Ground storage reservoirs (2)
- High service pumps
- Elevated storage tank (1)

The water treatment facility has two separate treatment trains. The older treatment train was constructed in 1954 and renovated in 1988. The newer treatment train was constructed in 1966 and is used as the primary treatment train. The older train is periodically used during peak demand periods.

The water treatment facility is a lime softening process and includes the following significant components:

- Lime storage silo
- Lime slakers (2)
- Solids contact clarifiers (2)
- Recarbonation basins (2)
- Filters (9 filters, mono sand media)
- Chlorination
- Fluoridation
- Lime sludge lagoons (2)

The raw water hardness varies significantly (250 – 500 mg/L) between the wells. Nearly all the hardness is carbonate (temporary) hardness. The lime softening process is operated with a 55 mg/L hardness goal. The City has a water supply agreement with Tyson Foods that specifies the maximum allowable hardness.

Many of the wells have significant ammonia concentration (1.0 – 4.5 mg/L). At times, the ammonia is biologically converted to nitrite in the distribution system. At times, this biological nitrification leads to excessive nitrite concentrations that violate the drinking water standard of 1.0 mg/L nitrite-nitrogen. The City installed a mixing system in the water tower in an attempt to reduce the thermal stratification in the tower that can lead to biological nitrification and subsequent elevated nitrite concentrations. The plant also uses chlorine (breakpoint chlorination) to remove the ammonia during periods of nitrite formation.

The plant is operated during the night and early morning due to the electric utility rate structure that provides for lower cost electricity during nighttime hours. See the Electric Utility section on page 13 of this study.

## Section 2: Energy Audit

The project team was able to walk through the water treatment facility in early July. At this time, the team inspected the treatment processes and equipment, as well as a description of how they were typically used during a given day. While

in Perry they were also afforded an opportunity to review past plant billings and records to get a more complete picture of the current operation and facilities.

## Section 3: Treatment Process Considerations

During the tour of the Water Treatment Plant, the project team was able to witness use of equipment for many of the treatment processes. Additionally, the project team was able to discuss daily and annual operations with plant staff to get a better understanding of the facility's systems. A number of the treatment processes at the Perry Water Treatment Plant may lend themselves to energy savings.

### pH Control

Carbon dioxide is fed to the solids contact clarifier effluent at the recarbonation basins. The carbon dioxide reduces the pH and stops the calcium carbonate precipitation process prior to filters. The pH monitoring point was located at the filter influent, or recarbonation basin effluent. This monitoring point was found to be ineffective and is not being used. There has been a significant problem with calcium carbonate precipitation in the filters. This results in excessive filter headloss and "media growth" due to scale formation. The media is being replaced and filter underdrains must be cleaned of scale.

*Recommendation:*

Install pH monitoring at the recarbonation basin and use the Programmable Logic Controller (PLC) for automatic carbonation feed rate control and pH control. Evaluate the optimum pH setpoint for production of a stable (nonscaling and noncorrosive) finished water. This will be a more sustainable water supply system as it will reduce plant maintenance costs for filter media replacement. In addition, a stable finished water will reduce user costs for water heater maintenance due to excessive scale formation and costs for plumbing system maintenance due to both scaling at excessive high pH and corrosion as low pH.

### Nitrite Control with Biological Nitrification

Currently, the nitrite formation potential is controlled with a mixer in the water tower (to prevent thermal stratification and warm water conditions that promote nitrification) and breakpoint chlorination to remove ammonia. Breakpoint chlorination requires very high chlorine dosages that result in significant increases in operating cost. Chlorination can also produce chlorinated organic byproducts that are water quality concerns.

*Recommendation:*

Evaluate the use of complete biological nitrification to convert the ammonia to nitrate prior to the lime softening process. This would eliminate the risk of partial nitrification of ammonia to nitrite in the distribution system. It would reduce the cost for breakpoint chlorination and reduce the formation of chlorinated organic compounds. Consider the use of an attached growth biological nitrification process. Pilot studies would be required to demonstrate feasibility and to develop design concepts.

### Lime Softening Sludge Processing

Currently, the lime softening sludge from the solids contact clarifiers is discharged to two sludge storage lagoons. The lagoons are periodically cleaned and the solids are land applied. This is a deferred operation cost.

*Recommendation:*

Evaluate the feasibility of lime softening sludge dewatering using plate and frame filter press or centrifuge for recovery of a value added ag lime product. The City has already performed a pilot test of lime sludge dewatering.

### Chlorination System Capacity

When using breakpoint chlorination for ammonia removal as required for addressing the nitrite issue, the plant is operated at reduced hydraulic loading due to inadequate chlorination system capacity. The treatment plant flow rate must be reduced as the chlorination system cannot provide the required chlorine feed rate required for breakpoint chlorination at the rated plant flow rate. This results in the inability to treat the entire daily demand volume during the off-peak power demand period and the plant must be operated during the peak power demand period.

*Recommendation:*

If breakpoint chlorination is used as the nitrite control method, install a larger capacity chlorination system. This would provide the capacity to treat the daily demand volume during the off-peak electrical demand period and thereby reduce power costs.

## Section 4: Distribution System & High Service Pump Operation Considerations

Distribution is a major operation element in the water treatment process. Pumps are required to collect water from the well systems and deliver it to the plant. Pumps are also in use during the treatment process as the raw water is softened and treated, and again as the water is prepared for distribution to the community or storage tower. Being a major part of the water treatment process, the project team evaluated potential procedural and equipment alternatives that may provide the City with a means of realizing energy and cost savings.

### High Service Pump Operation

The high service pumps are the most significant power users at the water treatment plant.

The discharge valve on the small high service pump is throttled to reduce risk of pump motor overload at pump runout on the pump curve. Power monitoring during plant evaluation indicated that the impact of the throttling valve is insignificant on power consumption.

There are two large capacity and two small capacity high service pumps that transfer water from the ground storage reservoir to the distribution system. Currently, the small capacity pump is operated as the lead pump. Normally, the small capacity pump is operated and the larger capacity pumps are not required. The power consumption by one large pump (Pump No. 3) and one small capacity pump (Pump No. 4) were monitored. The monitoring data are summarized below:

- Pump No. 3 1,760 gpm 89 psi 92.0 KW power consumption
- Pump No. 4 875 gpm 82 psi 60.2 KW power consumption

The higher discharge pressure on the large pump is due to higher friction losses in the distribution system between the plant and tower at the higher flow rate.

The following are the calculated pumping system efficiencies (from ground storage to the distribution system pressure):

- Pump No. 3 75% efficiency
- Pump No. 4 49% efficiency

*Recommendation:*

Evaluate the cause for the significant difference in efficiency between the small and large high service pumps. The difference could be due to differences in discharge check valve headloss or pump impeller wear.

The following is a summary of required daily pump operation times and power use at the 913,000 gallons per day June 2012 average water use:

- Pump No. 3 (large pump) 8.6 hours 791 KWH/day
- Pump No. 4 (small pump) 17.4 hours 1,065 KWH/day

Based on this evaluation, the operation of the large pump as the lead high service pump would reduce the high service pump power use by about 26% (274 KWH/day).

*Recommendation:*

Operate the high service pumps with the large high service pump as the lead pump when operating with the pump system efficiencies observed during the July 13 plant evaluation. This will reduce the high service pump power consumption by about 26%. If 75% of the high service pumping occurs during the peak power demand period, the cost reduction is about $185 per month when operating at the 913,000 gallons per day June 2012 average water demand.

## Water Tower Operation

Currently, the 500,000 gallon water tower is operated over a narrow range of levels (33 ft. high service pump start tower level to 36.25 ft. high service pump stop tower level). The high service pumps are operated during a significant period of time during the on-peak power demand period.

*Recommendation:*

Evaluate feasibility of operating the water tower over a larger level differential to reduce the time of on-peak power demand period high service pump operation. This would reduce power cost for high service pumping.

*Recommendation:*

Evaluate the benefits of an additional water tower in reducing high service pumping power costs. Another elevated tank would reduce the time of high service pump operation during the on-peak power demand period. An additional water tower would reduce power cost in addition to other distribution system benefits.

# Section 5: Building Design Considerations

The building is another element in evaluating energy consumption at the Water Treatment Facility. Heating, cooling, and lighting are all significant factors in providing the base environmental circumstances for operations staff. By providing

these amenities at key locations within the structure the City may be able to recognize energy and cost savings by better managing these factors. While touring the facilities, the project team took note of staff use of the facility, base building materials, and process needs to garner a better understanding of the needs of staff and the equipment.

## Lighting

Many of the plant areas are illuminated with original fluorescent fixtures which use traditional "F40T12" lamps and magnetic ballasts. US Department of Energy regulations have mandated an end of production of these lamps and ballasts, and supplies will begin to decrease. Newer energy-efficient lighting using "T8" or "T5" lamps and electronic ballasts can be installed, and will provide lighting energy savings of 30 to 45%. Alliant Energy (the electric utility) provides rebates for replacement of "T12" lighting, which will accelerate payback.

The Water Treatment Plant, Chlorine Building and Pumping Station have a total of approximately 90 two-lamp, four-foot, "T12" fixtures that can be replaced.

*Recommendation:*

Replace approximately 90 two-lamp, four-foot "T12" light fixtures with "T8" high-efficiency fixtures. New lighting in the filter areas should be located above walkways and on perimeter walls where the lights can be accessed without having to place scaffolding over open tanks.

## Insulation and General Construction

The original Water Treatment Plant building was constructed with little or no insulation. It is believed that the majority of the building construction includes a small insulation layer above the metal roof deck. The building walls are primarily brick-block masonry construction without an insulating cavity.

The City has recently replaced several single-pane metal-framed windows throughout the plant with double-pane, vinyl-framed windows.

The City has begun to take steps to reduce fuel consumption by reducing operating temperatures in the plant areas, and by constructing a smaller insulated "Operations Room" in the upper level filter area. The small Operations Room can be heated and air conditioned economically, providing a good working atmosphere for plant staff while allowing the rest of the building to operate at lower temperatures during the heating season. A similar installation should be employed at the existing first-floor Break Room and Locker/Restroom area.

*Recommendation:*

Modify the existing first-floor Break Room and Locker/Restroom area to include an insulated shell (walls, ceiling, doors and windows). Install a dedicated high-efficiency heating/cooling system to serve these spaces. Operate other areas of the plant at lower temperatures during the heating season.

The City has indicated that the Water Plant Building will receive a new roofing system in the near future. The roofing work should include installation of additional insulation material (4" minimum) which will have a significant impact on fuel consumption. The addition of an insulation layer may require modifications to existing parapets, roof openings, curbs and related items.

*Recommendation:*

Install new 4" minimum thickness rigid insulation system on the existing roof deck as part of the upcoming roof replacement.

## Humidity Control

Areas of the plant experience very high humidity during several months each year. The humid conditions shorten the life of process equipment, mechanical equipment, building materials and coatings, electrical systems, instrumentation, and controls. Although not an energy-savings measure, the installation of several high-quality portable dehumidification units will increase sustainability by extending the life of the building and equipment.

*Recommendation:*

Install several high-quality portable dehumidification units to extend the life of the building and equipment.

## Heating and Cooling Systems

The majority of the plant areas are heated with gas-fired equipment; primarily unit heaters. Although replacement of the equipment with new higher-efficiency units can result in marginal energy reduction (generally 2-5%), the capital costs for replacement solely to reduce energy consumption will result in extremely long payback periods. It is, however, recommended that when equipment replacement is necessary for other reasons (i.e. worn out or failed equipment) that high-efficiency replacement units be selected.

# Section 6: Electrical Utility Considerations

Electric utility customers are charged differently depending on how they use electricity and their electrical service. The City of Perry purchases power from Alliant Energy through their "Electrical Large General Service Usage" tariff. This rate includes a time-of-day feature whereby electricity is more expensive during "peak" hours and less expensive during "off-peak" hours. Along with a basic charge, the City is also charged a demand charge figured by measuring the average electrical usage for every 15-minute interval, then billing the highest average 15-minute interval during the billing period.

The project team looked at Alliant Energy's rate structure by compiling data from previous billing statements. It also gathered information on some of the equipment in use at the plant to get a better grasp on the energy draw required to perform some of the treatment processes. This information was used to check equipment sizing and use with plant and treatment process need to make sure that motor sizes and processes were providing the most efficient use.

## Rate Structure and Demand Charge

The Water Treatment Plant purchases power under Alliant Energy's "Electric Large General Service Usage" tariff. This rate includes a time-of-day feature whereby electricity is more expensive during the hours of 7AM to 8PM Central Standard Time (8AM to 9PM during daylight savings time). A general review of Alliant Energy's rate structures does not indicate whether other Alliant Energy rates are more attractive.

As a general goal, the plant will benefit when power consumption can be shifted to "off-peak" hours, either by operational or process changes. Some of the process recommendations made in this study are based on this goal. The City already takes advantage of this benefit by operating the plant during the nighttime hours as much as possible.

The "demand" charge is a significant portion of the energy bills, and is based on the maximum power used during any 15-minute period during the billing month. Cost savings can be realized when operational and process changes result in the reduction of this 15-minute demand. Other process recommendations made in this study are based on this goal.

## Generator Operation During On-Peak Demand Periods

Alliant Energy offers an optional rider called "INTSERV – Interruptible Service Option". This rider provides for reduced power costs when the customer (City) is willing to interrupt the connected load. The frequency, timing and duration of the interruptions are determined by Alliant Energy, although the rider provides a framework and limits on the interruptions. To qualify, the rider requires a minimum interruptible load of 200 kW, whereas the Water Treatment Plant load has generally been in the range of 80-190 kW. Even if the plant were to qualify for this rider, it does not appear to be economically-advantageous to the City, when the increased costs of fuel, labor hours and maintenance are considered.

The Water Treatment Plant has an existing 310 kW Caterpillar engine-generator set that provides standby power in case utility power is lost. Operation of the City's existing engine-generator beyond "standby" duty may also trigger issues with engine emissions and air permitting under current Environmental Protection Agency (EPA) regulations. The plant is also surrounded by residential neighbors, requiring the addition of sound abatement systems if the engine-generator were to operate more.

## Motor Replacement

The majority of existing larger motors at the Water Treatment Plant are a National Electrical Manufacturers Association (NEMA) "High–Efficiency" or "Premium-Efficiency" type that meet (or nearly meet) current "Premium-Efficiency" requirements. Although it may be possible to gain a marginal increase in efficiency by replacing some units with new Premium-Efficiency units, the costs of replacement will result in extremely-long payback periods, and are not economical. It is, however, recommended that when motor replacement is necessary for other reasons (i.e. process changes, replacing failed equipment, etc.) that Premium-Efficiency motors be selected.

1.10

## Water Treatment Plant Discussion

| Item | Existing Condition | Recommendation | Benefits | Cost Benefit * |
|---|---|---|---|---|
| **Treatment Process Considerations** | | | | |
| pH Control | There has been a significant problem with calcium carbonate precipitation in the filters, causing excessive filter headloss and "media growth" due to scale formation. | For a more sustainable water supply system that will reduce plant maintenance install pH monitoring at the recarbonation basin. Evaluate the optimum pH setpoint for production. | Equipment will operate more efficiently and can have longer intervals between maintenance. | $$ |
| Nitrite Control with Biological Nitrification | Currently the nitrite formation potential is controlled with a mixer in the water tower and breakpoint chlorination to remove ammonia. | Evaluate the use of complete biological nitrification to convert the ammonia to nitrate prior to the lime softening process. Pilot studies would be required to demonstrate feasibility and to develop design concepts. | Would allow control of nitrite formation early in the treatment process, reducing the cost for on-peak energy required for breakpoint chlorination. | $$$$ |
| Lime Softening Sludge Processessing | Lime softening sludge from the solids contact clarifiers is discharged to two storage lagoons. Lagoons are periodically cleaned and solids are land applied. | Evaluate the feasibility of lime softening sludge dewatering for recovery of a value-added ag lime product. | Opportunity to capitilize on current storage and shipping of lime sludge, changing this deferred cost by-product into a value-added resource and reducing energy use across the board. | $$$ |
| Chlorination System Capacity | The plant is operated at reduced hydraulic loading when using breakpoint chlorination for ammonia removal, plant has inadequate chlorination system capacity. | Install a larger capacity chlorination system if breakpoint chlorination is used as the nitrite control method. | Will require less peak energy use/cost during breakpoint chlorination. | $$$ |
| **Distribution System & High Service Pump Operation Considerations** | | | | |
| High Service Pump Operation | There are 2 large capacity and 2 small capacity high service pumps that transfer water from the ground storage reservoir to the distribution system. | Evaluate efficiency of the small and large high service pumps. The difference could be due to differences in discharge. Also check valve headloss or pump impeller wear. | Properly running equipment will run more efficiently and require less energy use. | $$ |
| High Service Pump Operation | There are 2 large capacity and 2 small capacity high service pumps that transfer water from the ground storage reservoir to the distribution system. | Operate high service pumps with large high service pump as the lead pump when operating with the pump system efficiencies observed during July 13 plant visit. | Changing procedure may allow greater efficiency in high service pump operation and may lead to reduced energy use. | $ |
| Water Tower Operation | Currently, the 500,000 gallon water tower is operated over a narrow range of levels. High service pumps are operated during a significant period of time during on-peak power demand. | Evaluate feasibility of operating the water tower over a larger level differential to reduce the time of on-peak power demand. | A reduction of on-peak power will result in energy savings to the City. Change in procedure for high service pump use may allow for overall energy use reduction. | $ |
| Water Tower Operation | Currently, the 500,000 gallon water tower is operated over a narrow range of levels. High service pumps are operated during a significant period of time during on-peak power demand. | Evaluate benefits of an additional water tower to reduce high service pumping power costs. | Will allow for greater storage against coverage area demand and would require less energy for operation of high service pumps. Would result in a long-term payback. | $$$$ |
| **Building Design Considerations** | | | | |
| Lighting | F40T12 lamps and magnetic ballasts are typical of most plant areas. The Water Treatment Plant, Chlorine Building, and Pumping Station have approximately 90 two-lamp, four foot "T12" fixtures. | Replace "T12" light fixtures with "T8" high-efficiency fixtures . New lighting in the filter areas should be located above walkways and on perimeter walls where the lights can be accessed without scaffolding over open tanks. | More energy efficient bulbs/fixtures will result in less energy use | $$ |
| Insulation and General Construction | Original WTP building constructed with little insulation. Walls are primarily brick-block without insulating cavity. A smaller insulated "Operations Room" was constructed in upper level filter area. | Install a dedicated high-efficiency heating/cooling system for existing first floor Break Room and Locker/Restroom. This area will have shell insulated walls, ceiling, doors and windows. | The room can be heated and air conditioned for staff, leaving the rest of the plant operation at lower temperatures. | $$ |
| Insulation and General Construction | City plans to install new roofing system at the Water Plant Building. The insulation material (4-inch min.) will have significant impact on fuel consumption. | Install 4-inch min. thickness rigid insulation system on existing roof deck as part of upcoming roof replacement. | Better insulation will require less energy use for heating/cooling of facility. | $$$ |

** $ = low investment and short payback to realize energy reduction | $$$$ = high investment and long payback to realize energy reduction*

## Water Treatment Plant Discussion

1.12

| Item | Existing Condition | Recommendation | Benefits | Cost Benefit * |
|---|---|---|---|---|
| **Distribution System & High Service Pump Operation Considerations** | | | | |
| Humidity Control | Several months of the year the plant has problems with high humidity. Humid conditions shorten life of equipment, building materials and coatings, electrical systems, instrumentation and controls. | Install several high-quality portable dehumidification units. | Will require more than current energy use but will extend longevity of equipment and materials; resulting in a net energy reduction. | $$ |
| Heating and Cooling Systems | The majority of the Water Plant Building areas are heated with gas-fired equipment. | Replace equipment with newer, more energy-efficient units when worn out or failure occurs. | Monitor and plan to replace for more energy savings in future | $$ |
| **Electrical Utility Considerations** | | | | |
| Generator Operation During On-Peak Demand Periods | The WTP has an 310 kW Caterpillar engine generator that provides standby power when utility power is lost. Sound could be problem for residential neighbors so sound abatement system may be needed if engine-generator is operated more. | Evaluate additional needs like sound abatment and engine emissions and air permitting under current EPA regulations should generator be used more. | May require additional systems for operation. | $$$ |
| Motor Replacement | Most of the larger motors at WTP are a NEMA "High-Efficiency" or "Premium-Efficiency" that meet, or nearly meet, current "Premium-Efficiency" requirements. | Replace equipment with newer, more energy-efficient units when worn out or failure occurs. | Monitor and plan to replace for more energy savings in future | $$$ |

** $ = low investment and short payback to realize energy reduction | $$$$ = high investment and long payback to realize energy reduction*

2.1

# Wastewater Treatment Facility & Recyling Center

Discussion & Recommendations

2.2

# Waste Water Treatment Facility & Recycling Center Study

## Section 1: Introduction

The City of Perry wastewater treatment facility is located in the southwest part of the city. The recycling center is located at the wastewater treatment facility site.

The City of Perry wastewater treatment facility includes the following significant components:

- Lift stations (2 small lift stations)
- Peak flow storage lagoons (2)
- Wastewater treatment facility

The wastewater treatment facility uses an extended aeration activated sludge process (no primary clarification) and includes the following significant components:

- Preliminary treatment
    - Bar screen
    - Grit removal
- Aeration basins (4)
- Final clarifiers (2)
- Ultraviolet light disinfection
- Aerobic digesters (2)
- Sludge storage tanks (2)
- Blower building
    - Aeration basin blowers, centrifugal blowers (4)
    - Aerobic digester blowers, positive displacement blowers (3)
    - Digested sludge pumps, air operated diaphragm pumps (2)
- Clarifier sludge pumping building
    - Return activated sludge (RAS) pumps (3)
    - Waste activated sludge (WAS) pumps (2)
- Operations building

The plant has been converted from a sequencing batch reactor (SBR) process design to conventional activated sludge with clarifiers. The organic loading is currently only approximately 40% of design treatment capacity. The current hydraulic loading is approximately 50% of dry weather design flow and 60% of maximum wet weather design flow. Only two of the four aeration basins are in use due to the reduced organic loading.

No chemicals are used in the wastewater treatment process.

The plant has been in consistent compliance with the National Pollutant Discharge Elimination System (NPDES) discharge permit limits. There are periodic issues with bulking sludge during the winter season.

The plant is currently operating under an expired permit. The plant will probably require modifications in the next five to ten years to meet projected future permit requirements for nitrogen and phosphorus removal.

The recycling center is a structure used for receiving and storing paper, plastic, and cardboard wastes. These waste materials are baled and stored in the recycling center building.

## Section 2: Energy Audit

The project team was able to walk through the Wastewater Treatment Facility in early July. At this time, the team was given a tour of the treatment processes and equipment, as well as how they were typically used during a given day. While in Perry they were also afforded an opportunity to review past plant billings and records to get a more complete picture of the current operation and facilities.

## Section 3: Treatment Process Considerations

During the tour of the Wastewater Treatment Facility, the project team was able to witness use of equipment for many of the treatment processes. Additionally, the project team was able to discuss daily and annual operations with facility staff to get a better understanding of the building's systems. A number of the treatment processes at the Perry Wastewater Treatment Facility may lend themselves to energy savings.

### Grit Pump Operation

Currently, the grit pump that transfers grit from the Pista Grit grit removal system to the grit classifier is operated continuously. The plant has experienced problems with grit piping pluggage during peak grit loading periods when operating the grit pump intermittently. The grit pump motor is 5 horsepower and the power consumption measured during the plant visit was 2.0 kW.

*Recommendation:*

Modify grit pump operation from continuous operation to intermittent operation. Modify the PLC programming from a simple reset timer algorithm to an automatic operation that provides operator selectable frequency of grit pump operation based on influent flow rate. For example, the grit pump may start and operate for ten minutes after 100,000 gallons of influent flow. At 1.3 million gallons per day (MGD) average annual flow rate, this would reduce the grit pump run time by 91% and reduce the daily power consumption by 43.7 kWh.

*Recommendation:*

If the grit pump has plugging problems when operated intermittently, replace the Gorman Rupp T-Series self priming pump with a recessed impeller grit pump. This may be more effective at moving heavy grit than the existing pump.

### Aeration Basin Blower Control

The 60 hp aeration blower motors are the largest power consumers at this plant. The measured power consumption for Blower No. 4 with the inlet valves fully open as measured during the plant visit are summarized below. The power could not be monitored on the other blowers due to an inability to attach monitoring equipment in the Motor Control Center (MCC). Blower No. 2 is a newer, larger capacity blower than the other three blowers.

Normally, one blower operates during the evening. The dissolved oxygen concentration is usually about 5 mg/L in the early morning when operating with one blower at minimum blower inlet valve position.

*Blower No. 4 Operation:*

- Blower No. 4 1,200 scfm 7.1 psig 42.7 kW
  66 amps indicated on surge panel
  59 amps measured at motor starter

*Blower No. 1 and No. 4 Operation:*

- Blower No. 4 1,100 scfm 7.8 psig 40.4 kW
  64 amps indicated on surge panel
  57 amps measured at motor starter

- Blower No. 1 1,300 scfm 8.1 psig
  56 amps indicated on surge panel

*Blower No. 1, No. 2, and No. 3 Operation:*

- Blower No. 1 700 scfm 8.7 psig
  50 amps indicated on surge panel

- Blower No. 2 1,350 scfm 8.7 psig
  62 amps indicated on surge panel

- Blower No. 3 900 scfm 8.2 psig
  56 amps indicated on surge panel

The aeration basin blowers are Hoffman multistage centrifugal blowers operated at constant speed. The blower air delivery rate is controlled by throttling the blower inlet valves to maintain the aeration basin dissolved oxygen setpoint. Normally, one blower operates during the evening. The dissolved oxygen concentration is usually about 5 mg/L in the early morning when operating with one blower at minimum blower inlet valve position. A second blower is called for during mid day. A third blower is called for at peak organic load conditions and operates about 0.5 to 1.0 hours per day.

The blowers have surge control panels with mechanical switches on the panel mounted amp meter indicators that shut down the blowers at surge (low air flow). There are no amp meter switches for overload protection , although the motors are protected by thermal overload units within the starter compartments. Blowers are started automatically if one or two blowers cannot maintain the dissolved oxygen setpoint with the inlet valve at the maximum opening. It appears that the existing blower control system does not fully utilize the blower operation range and may result in excessive power consumption as additional blowers may be started before the on-line blower reaches its maximum operation capacity. In addition, at low oxygen demand periods, the blower may not be throttled back to near its minimum (surge) capacity.

*Recommendation:*

Install aeration basin blower amp meter output signals to the PLC. Revise PLC programming to include limitations on the inlet throttling valve for minimum (surge) amp setting and maximum (motor overload) amp setting. This

will provide for utilization of the entire blower operation range and reduce power consumption by operating the blowers at lower output during periods of low organic loading and reducing the period of multiple blower operation during periods of higher organic loading. This control system modification would also reduce blower overload, surge shutdowns, and alarms during periods of widely varying ambient air temperature.

*Recommendation:*

Evaluate feasibility of letting dissolved oxygen concentration fall below the setpoint for a short period each day to eliminate the need to start the third blower. This could reduce the demand charge component of the power bill. This could possibly be achieved by operating at 2.0 mg/L dissolved oxygen concentration setpoint.

## Aeration Basin Diffuser Maintenance

The aeration air diffusers are Sanitaire ceramic diffusers. This type of diffuser typically requires periodic acid gas cleaning to maintain oxygen transfer efficiency. The pressure loss through the diffusers could not be determined due to lack of pressure gages at the aeration basin air piping.

*Recommendation:*

Install pressure gages at the aeration air drop pipe at each basin and monitor air pressure and air flow. Acid gas clean the aeration diffusers on a routine maintenance schedule or when excessive air pressure is observed. This will maintain high oxygen transfer efficiency and reduce aeration blower power consumption.

## Aeration Basin Dissolved Oxygen Setpoint

Currently, the aeration basins are being operated with a 3.0 mg/L dissolved oxygen setpoint. The rate of oxygen transfer is proportional to the difference between the dissolved oxygen concentration at saturation (8.9 mg/L at 70 degrees water temperature) and the actual dissolved oxygen concentration during operation. Therefore, operation at a lower dissolved oxygen setpoint would reduce the aeration air demand.

*Recommendation:*

Modify the dissolved oxygen setpoint from 3.0 mg/L to 2.0 mg/L. Common design practice for extended aeration activated sludge processes with nitrification is 2.0 mg/L dissolved oxygen concentration. This would reduce the theoretical aeration air demand and blower power consumption by about 15%.

## Aeration Basin Air Control Valves

There is a manually controlled butterfly valve on the air drop pipe to each aeration basin. The raw wastewater and return activated sludge (RAS) flow is split between the aeration basins with downward acting slide gates. The flow and organic loading cannot be split precisely equal between the basins. Therefore, the oxygen demand may not be the same in all basins. In addition, the air flow is not equally split between the basins due to variations in basin piping system and diffuser pressure losses. These conditions lead to the inability to precisely maintain the same dissolved oxygen setpoint at all basins. The air valve to one basin is throttled to force more air to the other basin.

*Recommendation:*

Install motor actuated aeration air valves on the two aeration basins that are continuously in service. Modify the PLC programming to maintain the valve on the basin with the highest oxygen demand at full open. Throttle the other valve to maintain the 2.0 mg/L dissolved oxygen setpoint in the basin with the lowest oxygen demand.

Modulate blower inlet valves and control blower operation based on maintaining the 2.0 mg/L dissolved oxygen setpoint on the basin with the highest oxygen demand. This will reduce aeration air blower power consumption by operating both basins at the 2.0 mg/L dissolved oxygen setpoint.

## Sludge Storage Tank Decant Schedule

The decant water from the sludge storage tank has high ammonia concentration. The decant water is returned to the aeration basins and exerts a significant oxygen demand for ammonia oxidation. The management of the sludge storage tank decant schedule can reduce aeration power consumption. The aerobic digester decant has a very low (less than 1.0) ammonia concentration. Therefore, the aerobic digester decant schedule should have no impact on aeration basin blower power consumption.

*Recommendation:*

Decant the sludge storage tanks during periods of low organic loading (late nights). During these periods of low organic load, the aeration air blower may be operating at its minimum capacity and the dissolved oxygen concentration in the aeration basins may be quite high. This strategy could reduce the cost of supplying oxygen for decant water treatment by flattening the plant electric demand curve, especially since the electric rate includes lower power costs during nighttime "off-peak" hours.

## Aerobic Digester Dissolved Oxygen and Blower Control

The aerobic digester is operated with continuous aeration blower operation between weekly decant events. The aerobic digester supernatant had less than 1.0 mg/L ammonia concentration during the plant visit. The PLC program has the capability for on/off blower operation, but the blower is operated continuously to reduce the risk of odor emissions. The aerobic digester air blowers are constant speed, positive displacement blowers and are a significant power consumer.

## Long-Term Process Modifications - Sustainability Considerations

The current wastewater and biosolids treatment processes are all aerobic. These processes generate significant carbon dioxide and require power input for aeration air. Long-term the City could consider modifying the treatment process design concept with sustainability considerations for lower green house gas emission and lower power requirement. The following treatment processes could be considered as more sustainable alternatives to the current processes:

- Anaerobic biosolids digestion with beneficial use of biogas for electric power generation or supplement to natural gas supply for heating buildings and recycle center. This would reduce the power consumption for the aerobic digester blowers. Anaerobic digestion with beneficial use of biogas reduces greenhouse gas emissions by replacing fossil fuels with biogas, reducing carbon dioxide emissions from aerobic processes, and reducing greenhouse gas emissions associated with power generation required for aeration blower operations.

- Primary clarification for capture of organic suspended solids. Solids would be treated in an anaerobic digester along with the waste activated sludge. This would reduce biosolids volume, reduce aeration power consumption for aeration basin blowers, and generate biogas for beneficial use.

- If anaerobic biosolids digestion is installed, the facility could be designed for treating high organic strength industrial wastes for additional biogas production for beneficial use.

## Section 4: Process Equipment Considerations

Wastewater treatment is a process requiring a combination of many different elements; invariably involving equipment and time. With the current rate structure through Alliant Energy, operation of this equipment, and the time during which this equipment is operated, becomes a major factor in the study of energy consumption and cost savings. Much like with the discussion of operation at the Water Treatment Plant, equipment operation and processes at the Wastewater Treatment Facility are integral towards reducing energy use and providing cost savings to the City. Reducing the use of equipment during "on-peak" hours was one of the items evaluated by the project team. Consideration was also given to determining whether equipment was being used in the most efficient manner or whether a change in equipment or process could lead to greater energy and cost savings to the City.

### Aeration Blowers

Normally, one blower operates during the late night and early morning. The dissolved oxygen concentration is usually about 5 mg/L in the early morning when operating with one blower at minimum blower inlet valve position.

*Recommendation:*

Evaluate the potential power savings by installing a smaller capacity blower for operation during the late night low organic load condition. (The plant is currently operated with the 60 hp blower at minimum blower inlet valve position during late night/early morning periods and dissolved oxygen concentration is about 5 mg/L.)

### Equalization Lagoon Return Pumps

The peak flow equalization lagoon pumps have variable frequency drives(VFD) Variable Frequency Drives that are not functional. The pumps are operated as on/off based on level in a wet well on the gravity lagoon return piping. There is no method for monitoring the lagoon return flow rate. The flow rate is set by a manual actuated valve on the lagoon effluent, gravity flow pipe to the lagoon return pump wet well.

*Recommendation:*

Install new VFDs on the lagoon return pumps. This could reduce power demand charge and improve process control. Consider installing a magnetic flow meter on the lagoon return pump discharge piping for more convenient and precise monitoring and control of lagoon return rate.

### Digested Sludge Transfer Pumps

Two air operated, single diaphragm Gorman Rupp pumps are used for transferring thickened aerobic digester biosolids to the sludge storage tanks. These pumps have had maintenance issues and have low energy efficiency.

*Recommendation:*

Replace the air operated diaphragm pumps with centrifugal or positive displacement (rotary lobe or progressing cavity) sludge pumps. This would reduce power consumption and reduce maintenance cost.

## Section 5: Building Design Considerations

The building is another element in evaluating energy consumption at the Wastewater Treatment Facility. Heating, cooling, and lighting are all significant factors in providing the base environmental circumstances for security and daily staff operations. By evaluating the existing infrastructure and evaluating these systems needs and performance, the City can begin to make decisions that will reduce energy consumption within the building infrastructure. While touring the

facilities, the project team took note of staff use of the facility, interior staffing processes, and exterior lighting to garner a better understanding of the needs of staff and the equipment.

## Interior Lighting

Many of the plant areas are illuminated with original fluorescent fixtures using traditional "F40T12" lamps and magnetic ballasts. US Department of Energy regulations have mandated an end to production of these lamps and ballasts, and supplies will begin to decrease. Newer energy-efficient lighting using "T8" or "T5" lamps and electronic ballasts can be installed, and will provide lighting energy savings of 30 to 45%. Alliant Energy (the electric utility) provides rebates for replacement of "T12" lighting, which will accelerate payback.

The Operations Building and Blower Building have a total of approximately 70 two-lamp, four-foot, "T12" fixtures, and 6 three-lamp, four-foot, "T12" fixtures that can be replaced.

High-pressure sodium fixtures are used in the Headworks Building screenings area, and in the lower level of the Blower Building. The lighting is rarely used in these areas (an average of only a few minutes per day), so replacement does not appear to provide a significant energy or cost savings. As these lighting systems reach the end of the equipment life and replacement is necessary, higher efficiency options can be explored.

Interior lighting in the Recycling Center consists of approximately 17 "low-bay" fixtures. The lamps are believed to be a 400W (HID) High Intensity Discharge type. The Recycling Center lights are generally on from 6 a.m. to 3 p.m., Monday through Friday, although the lights are sometimes turned off during the afternoon on bright warm days when the overhead doors are open. The "low-bay" fixtures can be replaced with new "warehouse" style fixtures using "T5 High Output" fluorescent lamps with solid-state ballasts, providing lighting energy savings of 40 to 60%. Alliant Energy provides rebates for this replacement method, which will accelerate payback.

*Recommendation:*

Replace approximately 70 two-lamp, four-foot "T12" light fixtures with "T8" high-efficiency fixtures. Replace approximately 6 three-lamp, four-foot "T12" lay-in ceiling light fixtures with "T8" high-efficiency fixtures.

Replace approximately 17 "low-bay" light HID light fixtures with "T5HO" warehouse-style light fixtures.

## Exterior Lighting

The site for the Wastewater Facility and Recycling Center is illuminated by approximately 24 high-pressure sodium "wall-pack" fixtures, mounted on building exteriors and on various poles. The lamps are believed to be 150 Watt. The quantity of fixtures is quite high for the size of the plant site. A short-term approach to reducing energy consumption would be to evaluate site lighting needs and determine if some units can be removed from service. Remaining units could be re-aimed for better illumination, and should be cleaned and re-lamped to increase lighting output. As the exterior lights reach the end of the equipment life, and as the cost of newer technology (such as LED lighting) continues to decrease, higher efficiency options can be explored.

*Recommendation:*

Review site lighting needs to determine wall-pack fixtures that can be removed from service. Re-aim, clean and re-lamp fixtures that will remain in service.

## Heating and Cooling Systems

The Wastewater plant buildings are heated using gas-fired equipment. Although replacement of the equipment with new higher-efficiency units can result in marginal energy reduction (generally 2-5%), the capital costs for replacement solely to reduce energy consumption will result in extremely long payback periods. It is, however, recommended that when equipment replacement is necessary for other reasons (i.e. worn out or failed equipment) that high-efficiency replacement units be selected.

The plant effluent water stream represents a possible thermal source for a heat pump heating/cooling system. The heat pump equipment would be most cost-effective where it can replace an existing forced-air system, such as the Operations Building. The concept will require pumps at the UV Structure and a piping loop to deliver treated effluent to and from the Operations Building. This concept would need to be reviewed for acceptability with the Iowa Department of Natural Resources (IDNR).

The Recycling Center process area heating system consists of a gas-fired radiant system located at the baler machine and over a portion of the operating floor where vehicles are unloaded. This system is intended to provide snow/ice melting and a marginal amount of heat for operator comfort on cold days. Since the system is designed for "point-of-use" and is an efficient method for the intended purpose, there are no recommendations for change in this area.

*Recommendation:*

Evaluate the installation of a heat pump system for using treated plant effluent water for heating and cooling of the existing Operations Building.

## Section 6: Electrical Utility Considerations

Electric utility customers are charged differently depending on how they use electricity and their electrical service. The City of Perry purchases power from Alliant Energy through their "Electrical Large General Service Usage" tariff. This rate includes a time-of-day feature whereby electricity is more expensive during "peak" hours and less expensive during "off-peak" hours. Along with a basic charge, the City is also charged a demand charge figured by measuring the average electrical usage for every 15-minute interval, then billing the highest average 15-minute interval during the billing period.

The project team looked at Alliant Energy's rate structure by compiling data from previous billing statements. It also gathered information on some of the equipment in use at the plant to get a better grasp on the energy draw to perform some of the treatment processes. This information was used to check equipment sizing and use with plant and treatment process needs to make sure that motor sizes and processes were providing the most efficient use.

## Rate Structure and Demand Charge

The Wastewater Treatment Plant purchases power under Alliant Energy's "Electric Large General Service Usage" tariff. This rate includes a time-of-day feature whereby electricity is more expensive during the hours of 7AM to 8PM Central Standard Time (8AM to 9PM during daylight savings time). A general review of Alliant Energy's rate structures does not indicate whether other Alliant Energy rates are more attractive.

As a general goal, the plant will benefit when power consumption can be shifted to "off-peak" hours, either by operational or process changes. Other process recommendations made in this study are based on this goal.

The "demand" charge is a significant portion of the energy bills, and is based on the maximum power used during any 15-minute period during the billing month. Cost savings can be realized when operational and process changes result in the reduction of this 15-minute demand. Process recommendations made in this study are based on this goal.

## Generator Operation During On-Peak Demand Periods

The Wastewater Treatment Plant has an existing 350kW Kohler engine-generator set that provides standby power in case utility power is lost. Alliant Energy offers an optional rider called "INTSERV – Interruptible Service Option". This rider provides for reduced power costs when the customer (City) is willing to interrupt the connected load. The frequency, timing and duration of the interruptions are determined by Alliant Energy, although the rider provides a framework and limits on the interruptions. To qualify, the rider requires a minimum interruptible load of 200kW, whereas the Wastewater Treatment Plant load has generally been in the range of 140-180kW. Even if the plant were to qualify for this rider, it does not appear to be economically advantageous to the City, when the increased costs of fuel, labor hours and maintenance are considered. Operation of the City's existing engine-generator beyond "standby" duty may also trigger issues with engine emissions and air permitting under current EPA regulations.

## Motor Replacement

The majority of existing larger motors at the Wastewater Treatment Plant are a NEMA "High–Efficiency" or "Premium-Efficiency" type that meet (or nearly meet) current "Premium-Efficiency" requirements. Although it may be possible to gain a marginal increase in efficiency by replacing some units with new Premium-Efficiency units, the costs of replacement will result in extremely-long payback periods, and are not economical. It is, however, recommended that when motor replacement is necessary for other reasons (i.e. process changes, replacing failed equipment, etc.) that Premium-Efficiency motors be selected.

2.12

| Item | Existing Condition | Recommendation | Benefits | Cost Benefit * |
|---|---|---|---|---|
| Treatment Process Considerations | | | | |
| Grit Pump Operation | The grit pump motor is 5 hp and constantly works to transfer grit to the classifier. Grit gets plugged during peak loading periods when operating the grit pump intermittently. | Modify grit pump operation to intermittent. Modify programmable logic controller (PLC) to automatic operation, allowing operator selectable frequency of grit pump operation based on influent flowrate. | Reduction of overall energy consumption by switching to intermittent pumping. | $ |
| Grit Pump Operation | The grit pump motor is 5 hp and constantly works to transfer grit to the classifier. Grit gets plugged during peak loading periods when operating the grit pump intermittently. | To more effectively move heavy grit and reduce pluggage replace existing Gorman Rupp T-Series self-priming grit pump with a recessed impeller grit pump. | Allow plant to more effectively handle grit during peak loading periods. | $$$ |
| Aeration Basin Blower Control | The aeration blowers are 60 hp Hoffman multistage centrifugal blowers operated at constant speed and are the largest power consumers at this plant. One blower operates during the evening, a second mid-morning, a third at peak organic load. | Install aeration basin blower amp meter output signals to the PLC. Revise PLC programming to include limitations on inlet throttling valve for surge amp setting and motor overload amp setting. | Control system modification would reduce blower overload and surge shutdowns and alarms. | $$ |
| Aeration Basin Blower Control | The aeration blowers are 60 hp Hoffman multistage centrifugal blowers operated at constant speed and are the largest power consumers at this plant. One blower operates during the evening, a second mid-morning, a third at peak organic load. | Evaluate feasibility of letting dissolved oxygen concentration fall below the setpoint for a short period each day to eliminate the need to start the third blower. | Evaluation may eliminate need to start thrid blower each day and would result in less energy use. | $ |
| Aeration Basin Diffuser Maintenance | This plant's air diffusers are Sanitaire ceramic diffusers. This diffuser typically requires periodic acid gas cleaning to maintain oxygen transfer efficiency. | Install pressure gages at the aeration air drop pipe at each basin and monitor air pressure and air flow. Keep good routine maintenance schedule. | Allow plant to maintain high oxygen transer efficiency and reduce aeration blower power consumption. | $$ |
| Aeration Basin Dissolved Oxygen Setpoint | Aeration basins are being operated with a 3.0 mg/L dissolved oxygen setpoint. | Modify the dissolved oxygen setpoint from 3.0 mg/L to 2.0 mg/L. | All for reduction in theoretical aeration air demand and blower power consumption by ~15%. | $ |
| Aeration Basin Air Control Valves | The drop pipe to each aeration basin has a manually controlled butterfly valve. Raw wastewater and return activated sludge (RAS) flow is split between aeration basins with downward acting slide gates. Flow and organic loading cannot be split between basins; therefore, oxygen demand may not be the same in all basins. | Install motor actuated aeration air valves on the two aeration basins that are continuously in service. Modify the PLC programming to maintain valve on basin with the highest oxygen demand at full open. Throttle other valve to maintain 2.0 mg/L dissolved oxygen (DO) setpoint in basin with lowest oxygen demand. Operate both basins at the 2.0 mg/L DO setpoint. | Will allow the plant to maintain the same dissolved oxygen setpoint to all basins. | $$ |
| Sludge Storage Tank decant Schedule | Decant water sludge storage tank has high ammonia concentration. The aerobic digester decant has a very low ammonia concentration. Therefore, the aerobic digester decant schedule should have no impact on aeration basin blower power consumption. | Decant sludge storage tanks late nights. | Will reduce the cost of supplying oxygen for decant water and lower power costs during off-peak hours. | $ |
| Aerobic Digester Dissolved Oxygen and Blower Control | The PLC program has the capability for on/off blower operation, but is operated with continuous aeration blower operation between weekly decant events to reduce the risk of odor emission. | Evaluate aerobic digester supernatant levels and consider revising PLC program for on/off operation where possible | Using the aerobic digester blowers less will result in less overall energy use. | $ |
| Long-Term Process Modifications - Sustainability Considerations | Current WW and biosolids treatment processes are aerobic and require power input for aeration air as treatment generates carbon dioxide. | Consider modifying treatment process design concept for lower greenhouse gas emissions and lower power requirement. | Alternative processes could be more sustainable, reduce energy use, and yield biogas production for beneficial use. | $$$$ |

** $ = low investment and short payback to realize energy reduction | $$$$ = high investment and long payback to realize energy reduction*

## Wastewater Treatment Plant & Recycling Center

| Item | Existing Condition | Recommendation | Benefits | Cost Benefit * |
|---|---|---|---|---|
| **Process Equipment Considerations** | | | | |
| Aeration Blowers | Typically one blower, 60 hp, is operated late night and early morning. During early morning while operating minimum blower inlet valve position the DO concentration level is ~5 mg/L. | Evaluate potential power savings of installing smaller capacity blower for late night and low organic load conditions. | May result in overall energy reduction and more consistent energy use. | $$ |
| Equalization Lagoon Return Pumps | The peak flow equalization lagoon pumps VHDs are not functional. | Install new VFDs on lagoon return pumps. Consider a magnetic flowmeter for precise monitoring lagoon return rate. | Will allow for more consistant return rate monitoring and flows and less overall energy use | $$ |
| Digester Sludge Transfer Pumps | Two (single operated) Gorman Rupp diaphragm pumps are used to transfer thickened sludge to storage. These pumps have had maintenance issues and low energy efficiency. | Replace diaphragm pumps with centrifugal or positive displacement sludge pumps. | More energy efficient pumps will lead to less overall energy use. | $$ |
| **Building Design Considerations** | | | | |
| Interior Lighting | F40T12 lamps and magnetic ballasts are typical of most plant areas, Recycling Center has 17 "low-bay" light HID fixtures. | Replace "T12" bulbs with "T8" bulbs and replace "low-bay" HID fixtures with "T5HO" light fixtures. | More energy efficient bulbs/fixtures will result in less energy use | $$ |
| Exterior Lighting | Wastewater Plant and Recycling Center site is illuminated by 24, 150 W, high-pressure sodium "wall pack" fixtures mounted on building exteriors and poles. | Evaluate wall-pack fixtures that can be removed and replaced with newer lighting technology. Re-aim, clean and re-lamp fixtures that will remain in service. | More energy efficient bulbs/fixtures will result in less energy use | $$ |
| Heating and Cooling Systems | The Wastewater Treatment Plant buildings are heated with gas-fired equipment. | Replace equipment with newer, more energy-efficient units when worn out or failure occurs. | Monitor and plan to replace for more energy savings in future | $$$ |
| Heating and Cooling Systems | The Recycling Center is heated with a "point-to-point", gas-fired radiant system. | The "point-to-point" system if effective. No recommendation for change. | N/A | N/A |
| Heating and Cooling Systems | The plant effluent water system represents a possible thermal source for a heat pump heating/cooling system where it can replace an existing forced-air system like the Operations Building. | Evaluate installing heat pump system for using treated plant effluent water to heat and cool existing Operations Building. | Possible energy savings through use of existing on-site resource. Will need to be reviewed for acceptability with the Iowa DNR. | $$$$ |

** $ = low investment and short payback to realize energy reduction | $$$$ = high investment and long payback to realize energy reduction*

3.1

# Alternative Energy

Discussion & Recommendations

3.2

# Alternative Energy Study

## Section 1: Introduction

Iowa Economic Development Authority (IEDA) expressed interest in having the City research alternative energy opportunities as part of the Community Development Block Grant (CDBG) awarded to the City of Perry in March of 2012. The project team researched potential alternative energy options focusing on the Waste Water Treatment Facility & Recycling Center and the Water Treatment Plant. All of the identified projects must have a net benefit targeting low and moderate income families.

## Section 2: Net Metering v. Demand Metering

Net metering is a billing method offered to eligible renewable distributed generation facilities. In Iowa, an eligible facility is rated up to 500 kW for power produced through alternate energy sources such as solar, wind, dedicated crops grown for electricity generation, anaerobic digestions of livestock or food processing waste, or hydroelectric energy.

With net metering, energy delivered to the utility at the metering location is subtracted from the energy consumed (kWh consumed minus kWh delivered). If a customer consumed more energy than it delivered, the resulting net kWh hour is billed to the customer at the same electric rate at which the customer normally purchases its energy. If the customer delivers excess energy to the utility during the billing period, net metering provides the customer energy credits that can be stored in the customer's account for future use in subsequent billing periods.

The magnitude of net excess generation depends on the size of the load, the capacity of the generating equipment, and the availability of renewable energy resources. While photovoltaic systems seldom generate more electricity than a residential or commercial building can use during a month, a wind system in a good wind resource region can produce more energy than is consumed during a utility's monthly billing cycle. Thus the treatment of the customer's net excess generation can significantly affect the economics of a small wind system.

Net metering is not generally available for customers on demand charge rates. Besides the need for a second meter, applying net metering to customers on demand charge rates raises the issue of which time period (on peak or off peak) generated energy should be credited to.

For customers using a large amount of electricity, utilities will charge a demand (measured in kW) in addition to being billed for energy consumption. Demand meters register the highest rate of electrical flow during a 15-minute flow of a billing period. The customer is billed for the highest average 15 minute flow during each billing period. The demand charge can be a large part of a customer's electric bill if the customer uses a lot of power over a short period of time, and a smaller part of the bill if the customer can spread this power use out throughout the billing period.

## Section 3: Recommendations

The City has two existing wind turbines at the Waste Water Treatment Facility & Recycling Center. The wind turbine at the Waste Water Treatment Facility is a 50 kW E-120 and should be producing between 120,000 – 160,000 kWh/year. The wind turbine at the recycling center is a 5kW model and should be producing roughly 10,000 kWh/year. The Waste Water Treatment Facility is on a demand charge and cannot use net metering. Neither can the City use the power generated from the turbines without first selling it to the grid at a less than wholesale rate; which is much lower than the

rate which its paying for electricity. With the cost of infrastructure and maintenance on equipment, this makes it nearly impossible to realize a payback during the life of the alternative energy infrastructure.

Some of the options reviewed to supplement the existing alternate energy production at the Waste Water Treatment Facility & Recycling Center Complex include consideration of installing a second 50 kW E-120 wind turbine to cover the remaining power demand. An alternative may be to consider installing a NP100 Northern Power 100 kW wind turbine that would produce more power than the E-120.

The City also wanted to look at options for alternative energy for a future campground development within Pattee Park. With future plans for building expanded recreational opportunities like soccer fields and trails along with camping facilities, an alternative energy source would be able to provide power for some of these power needs. For this, the City would likely want to consider a 5 kW wind turbine which should produce around 10,000 kWh/year. However, they will also want to look into projected use and need for power consumption, as many of the facilities that would benefit from this power production would be used between the months of April and September.

Payback considerations are another factor to consider in researching alternative energy. Implementation must consider not only maintenance and power production but also initial implementation costs. The City will not be eligible for the 30% tax credit, where a private company/individual would be. Additional consideration must be given to the electrical utility rate, both in terms of net metering and selling rate of surplus power to the utility.

## Section 4: Implementation & Payback Discussion

The costs associated with implementing renewable wind energy for the Wastewater Treatment Plant and Water Treatment plant are cost prohibitive based on simple equipment payback over its service life.

The turn key cost of a 50 kW wind turbine is $352,000. This assumes that the 30% investment tax credit that is due to expire at the end of the year will not be in place at the time of implementation.

Because both plants use on-demand metering, you cannot utilize net metering as part of the system. Instead of selling energy back to the utility supplier at the purchase cost, the City must instead sell it back at less than wholesale rates. In Perry the cost for electricity at the plants are approximately 8.5 cents per kW/h. The sellback rate to the utility is only 4-5 cents per kW/h. This equates to a payback on electricity of 3.5-4.5 cents per kW/h, or an average of 4 cents per kW/h.

With a 50 kW turbine running in Perry at an average wind speed of 13 mph , the annual energy production is 160,000 kWh. At 4 cents per kW/h sell back to the electrical grid, this equates to an annual sell back of $6,400. The turbine has an advertised life expectancy of 20 years, which equals $128,000 in sell back electricity over the life of the equipment; well below the costs associated with implementation.

See Appendix D for additional information.

4.1

# Cultural District Lighting

## Discussion & Recommendations

4.2

# Cultural District Lighting Study

## Executive Summary

After being awarded a sustainability grant through the Iowa Economic Development Authority (IEDA), the City of Perry retained Bolton & Menk, Inc. to conduct a lighting study for the Cultural District. This study established a baseline for energy consumption, and compared it to potential energy savings through more energy-efficient lighting solutions.

The first step was to inventory the existing 147 light fixtures in the Cultural District. This included determining the light source type and wattage for each fixture. The 36 non-metered Alliant Energy lights were included in the inventory even though the City is not currently paying electrical rates on these but rather a fixed tariff rate for each fixture. The luminaires owned by Alliant Energy are mainly located along First Avenue/Highway 144 and in City-owned parking lots and alleys.

Using the lighting inventory, the energy consumption baseline was calculated to be 145,377 kWh/yr. The study then explored alternate lighting types and luminaire options. Since this study focused on energy savings the project team did not focus on matching existing illumination levels, but rather what options would be available to the City to save energy while at the same time verifying that proposed lighting levels would meet the new illumination standards as adopted by the Illuminating Engineers Society RP-8 Standards for Roadway lighting. This provided greater options to the project team in determining potential retrofit. Selection criteria included energy savings, illumination capabilities, light quality, dimming capabilities, maintenance demands, and life cycle cost.

For the purposes of this study, it was determined that the alternate fixtures explored would need to have the option of replacing the existing lamp source or replacing the entire existing fixture head while using existing poles. By selecting appropriate luminaire wattages and lighting distributions, the alternate luminaires would also need to provide adequate illumination while allowing the City to recognize energy and maintenance savings.

From the lighting inventory, the energy consumption baseline was calculated to be 145,377 kWh/yr. The energy consumption for proposed fixtures on this same baseline was calculated to be 67,802 kWh/yr. With an assumed 20 year fixture life, this equates to a total energy savings throughout the study area of 77,575 kWh when using proposed fixtures. This equals a savings of $160,285.55* in pure energy costs over the life of the fixtures in the Cultural District.

A further energy savings component that could be implemented as part of the project is the ability to dim street lights during off peak hours. LED lighting can be controlled individually and dimmed through a central controller. When dimmed, the system shall still be above the minimum lighting levels as prescribed by IES RP-8 guidelines. If dimming is used, it could represent an additional energy savings of 15-25% over the life of the fixture which represents a cost savings of $195,309.27 over the assumed 20 year life of the fixture.

In addition to pure energy savings, there is a significant maintenance cost savings with new LED fixtures. LED lights are a 'life of fixture' source. The LED's are expected to last a minimum of 20 years and perform at or above designed lighting levels. This greatly reduces maintenance costs. The existing lighting will require a minimum of three bulb and ballast replacements at a cost of $300 in equipment, labor, and materials per change in 2012 dollars. This equates to $484,121.66 over 20 years (with an assumed 2% interest) for the existing system that would not be required with LED lights.

*Assumes simple inflation of 3% per year and an electrical rate of 8.4 cents/kWh.

## Section 1: Existing Lighting Inventory

An inventory of the existing 147 public right-of-way fixtures was conducted as an initial step in this process. Determining the type and wattages for each fixture were necessary for developing an energy consumption baseline. Alliant Energy fixtures (36 of the total in the study area) were removed from the study because they are on a fixed fee and not metered. Since these are not metered, the City is not currently eligible to realize energy savings from an energy-efficient lighting retrofit project (see pages 2-3 for details). If these lights were included in the study, there would be an additional energy and maintenance savings as part of the project. The following is a tabulation of current energy usage by area within the Cultural District:

*Estimated Current Annual Energy Use*

- First Ave. = 3,710 Watts x 12 hours/day x 365 days = 16,249 kWh
- Second Ave. = 8,861 Watts x 12 hours/day x 365 days = 38,811 kWh
- Third St. = 3,044 Watts x 12 hours/day x 365 days = 13,315 kWh
- Library Access & Railroad St. = 3,140 Watts x 12 hours/day x 365 days = 13,753 kWh
- Otley Ave. = 288 Watts x 12 hours/day x 365 days = 1,261 kWh
- Willis Ave . = 3,845 Watts x 12 hours/day x 365 days = 16,841 kWh
- Warford = 288 Watts x 12 hours/day x 365 days = 1,261 kWh
- Courtyard = 925 Watts x 12 hours/day x 365 days = 4,051 kWh
- Lucinda St. = 2,796 Watts x 12 hours/day x 365 days = 12,246 kWh
- Pattee St. = 288 Watts x 12 hours/day x 365 days = 1,261 kWh
- City Parking lots = 1,578 Watts x 12 hours/day x 365 days = 6,911 kWh
- Alleyways = 4,032 Watts x 12 hours/day x 365 days = 17,660 kWh

**Total annual :142,854 kWh**

## Section 3: Process

Baseline energy consumption of existing fixtures was determined with the existing lighting inventory. Following the baseline energy consumption calculation, energy efficient lighting source options were researched as part of this project including high pressure sodium (HPS), metal halide (MH), and light-emitting diode (LED). It was determined that:

- HPS and MH lamps provide good conversion of energy to light; however waste a lot of light due to fixture inefficiency. LED lamps are almost as efficient at converting energy to light, but the fixture efficiency is superior to HPS or MH.
- The quality of HPS light renders objects with an orange-yellow color. The quality of light from MH fixtures tends to be from the cooler portion of the spectrum, providing a more realistic rendering of objects. LED fixtures produce a more neutral white light that also provides realistic object rendering. This is important in terms of color rendition which lends to a more 'comfortable' feel as well as increased security with the ability to recognize colors true to form.
- LED has significant dimming control options available to the user. Dimming options for HPS and MH are very limited in exterior applications.
- LED excels as a lighting source in that it is an array of lights where each individual LED can be directed to a different area. This results in much less wasted light/energy and more uniform illumination that HPS or MH, giving it a clear advantage.

Fixture.....Compact Fluorescent
Lamp Wattage.....23 Watt
Number of Globes.....5

Fixture.....Compact Fluorescent
Lamp Wattage.....23 Watt
Number of Globes.....3

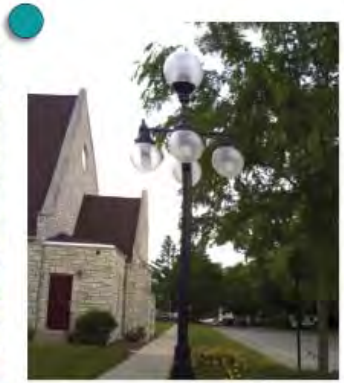
Fixture.....Metal Halide
Lamp Wattage.....150 Watt
Number of Globes.....1

Fixture.....High Pressure Sodium
Lamp Wattage.....250 Watt
Number of Globes.....1

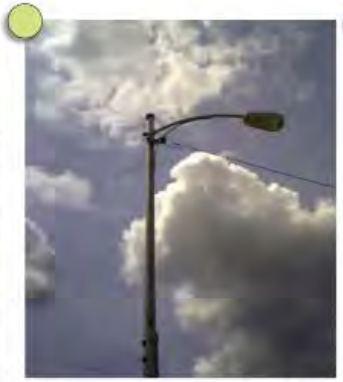
Fixture.....Compact Fluorescent
Lamp Wattage.....35 Watt
Number of Globes.....2

Fixture.....Compact Fluorescent
Lamp Wattage.....23 Watt
Number of Globes.....1

Fixture.....Metal Halide
Lamp Wattage.....100 Watt
Number of Globes.....1



Fixture.....Metal Halide
Lamp Wattage.....Top 1: 150 Watt, Bottom 4: 50 Watt
Number of Globes.....5



Fixture.....High Pressure Sodium
Lamp Wattage.....N/A
Number of Globes.....1

Fixture.....High Pressure Sodium
Lamp Wattage.....N/A
Number of Globes.....2


5 Globe Manufacturer (32)
1 Fixture Manufacturer (35)
3 Globe Manufacturer (10)
1 Globe Manufacturer (1)
1 Globe Lumec (29)
5 Globe Lumec (12)
1 Globe Manufacturer (20)
1 Globe Manufacturer (1)
2 Globe Manufacturer (4)
2 Fixture Manufacturer (4)
FIRST AVENUE
SECOND STREET
THIRD STREET
OTLEY AVENUE
WILLIS AVENUE
WARFORD STREET
LUCINDA STREET
PATTEE STREET
BATEMAN STREET

## Existing Energy Usage

### First Avenue

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| 5 Globe Sternberg | 4 | 23 | 23 | 5 | 460 |
| 5 Globe Lumec | 2 | 150 | 185 | 5 | 946 |
| Cobrahead | 10 | 250 | 288 | 1 | 2880 |
| | **40** | | | **Subtotal:** | **4286** |

### Second Street

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| 5 Globe Sternberg | 5 | 23 | 23 | 5 | 575 |
| 5 Globe Lumec | 4 | 150 | 185 | 1 | 740 |
| | | 50 | 72 | 4 | 1152 |
| 1 Globe Lumec | 5 | 150 | 185 | 1 | 925 |
| Cobrahead | 3 | 250 | 288 | 1 | 864 |
| Column Canister | 15 | 250 | 295 | 1 | 4425 |
| | **68** | | | Subtotal: | **8681** |

### Third Street

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| 5 Globe Lumec | 4 | 150 | 185 | 1 | 740 |
| | | 50 | 72 | 4 | 1152 |
| Cobrahead | 4 | 250 | 288 | 1 | 1152 |
| | **24** | | | Subtotal: | **3044** |

### Library & Railroad Street

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| 1 Globe Lumec | 9 | 150 | 185 | 1 | 1665 |
| Column Canister | 5 | 250 | 295 | 1 | 1475 |
| | **14** | | | Subtotal: | **3140** |

### Otley Avenue

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Cobra Head | 1 | 250 | 288 | 1 | 288 |
| | **1** | | | Subtotal: | **288** |

### Willis Avenue

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| 5 Sternberg | 25 | 23 | 23 | 5 | 2875 |
| 3 Sternberg | 10 | 23 | 23 | 3 | 690 |
| Shepard's Hook | 4 | 35 | 35 | 2 | 280 |
| | **163** | | | Subtotal: | **3,845** |

## Existing Energy Usage

### Warford Avenue

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Cobrahead | 1 | 250 | 288 | 1 | 288 |
| | **1** | | | Subtotal: | **288** |

### Courtyard

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| 1 Lumec | 5 | 150 | 185 | 1 | 925 |
| | **5** | | | Subtotal: | **925** |

### Lucinda Street

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| 5 Lumec | 2 | 150 | 185 | 1 | 370 |
| | | 50 | 72 | 4 | 576 |
| 1 Lumec | 10 | 150 | 185 | 1 | 1850 |
| | **20** | | | Subtotal: | **2,796** |

### Pattee Street

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Cobrahead | 1 | 250 | 288 | 1 | 288 |
| | **1** | | | Subtotal: | **288** |

### City Parking Lot

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| 5 Globe Sternberg | 1 | 23 | 23 | 5 | 115 |
| Cobrahead | 5 | 250 | 288 | 1 | 1440 |
| Caboose Lamp | 1 | 23 | 23 | 1 | 23 |
| | **11** | | | Subtotal: | **1,578** |

### Alley Ways

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Cobra Head | 14 | 250 | 288 | 1 | 4032 |
| | **14** | | | Subtotal: | **4,032** |

| | | | |
|---|---|---|---|
| Total Lights: | **362** | Total Wattage: | **33,191** |

| | |
|---|---|
| Total Annual Energy Consumption, kWh: | 145,377 |
| Total Annual Energy Cost at 8.4 cents per kWh: | $ 12,066.26 |
| Total 20 Year Energy Cost at 8.4 cents per kWh*: | **$ 300,380.43** |

**Present value of annualized costs over 16 years assuming 5% inflation and 3% interest rates*

- The expected operating life of LED lighting (70,000+ hrs) is considerably longer than either HPS or MH (20,000 to 24,000 hrs) thus reducing maintenance costs over the life of LED. The life expectancy of the LED array are for the anticipated life of the fixture.

Therefore, the design team concentrated on LED lighting in determining fixture recommendations.

Once LED style fixtures were chosen as the primary light fixture type, an analysis of existing poles and fixtures was developed to determine if LED fixtures could be retrofitted utilizing the existing poles, fixtures, or a combination of the two. Because of the many existing fixture types within the cultural district, there was not one solution across the area, but rather a variety of solutions based on the existing lighting types. Three different LED lighting solutions were then chosen for the district for each existing light type. They are as follows:

- Lumec Metroscape decorative LED fixture (or equivalent)
- Lumec RotoLED LED retrofit lamp for existing 'globe' style fixtures (or equivalent)
- Philips RoadView LED fixture for replacement of 'cobra head' style fixtures (or equivalent)

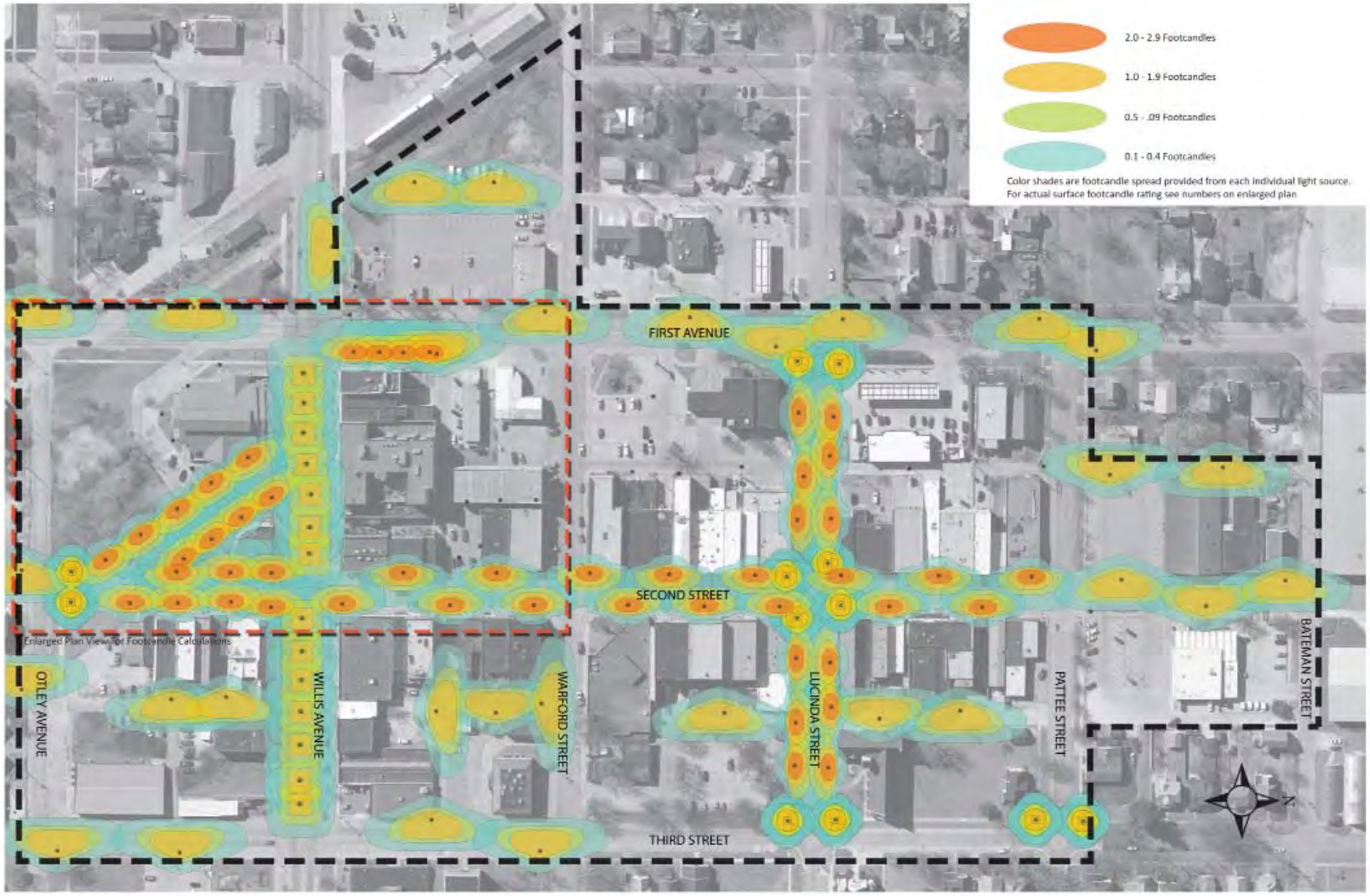
Once proposed lighting types were selected, a photometric analysis was performed for the district so that the maximum amount of energy efficiency could be obtained while still meeting the IES RP-8 lighting guidelines for roadways. Within the different proposed fixtures, different wattages and distribution patterns were further selected to lower energy costs.

Because this is a downtown commercial district, the goal for the lighting set forth is to light the district in lighting levels above the minimum RP-8 guidelines during business hours and then dim the lighting down to minimum levels during off-peak hours. This provides for an opportunity to have a well lit, inviting downtown, while at the same time having a substantial energy savings through more efficient lighting fixtures and dimming during off-peak times.

## Section 4: Findings

In switching to the proposed fixtures the following is noted:

1. Switching to the proposed LED fixtures saves a significant amount of energy. With dimming options, this saving represents a total energy saving of over 65% across the district.
2. Even with a relatively low energy cost of 8.4 cents/kWh, the energy cost savings is substantial, with a project 20 year energy savings of $160,285.55.
3. The quality of light for the district is greatly increased, with much better uniformity of light and a higher Color Rendition Index for a safer, more pleasing Cultural District.
4. With the proposed lighting, maintenance is greatly reduced with an estimated savings of $484,121.66 in maintenance costs saved over 20 years.
5. Light pollution is greatly reduced with the use of cutoff fixtures. This also has an added benefit or reducing light pollution in the upper floor apartments in the Cultural District.

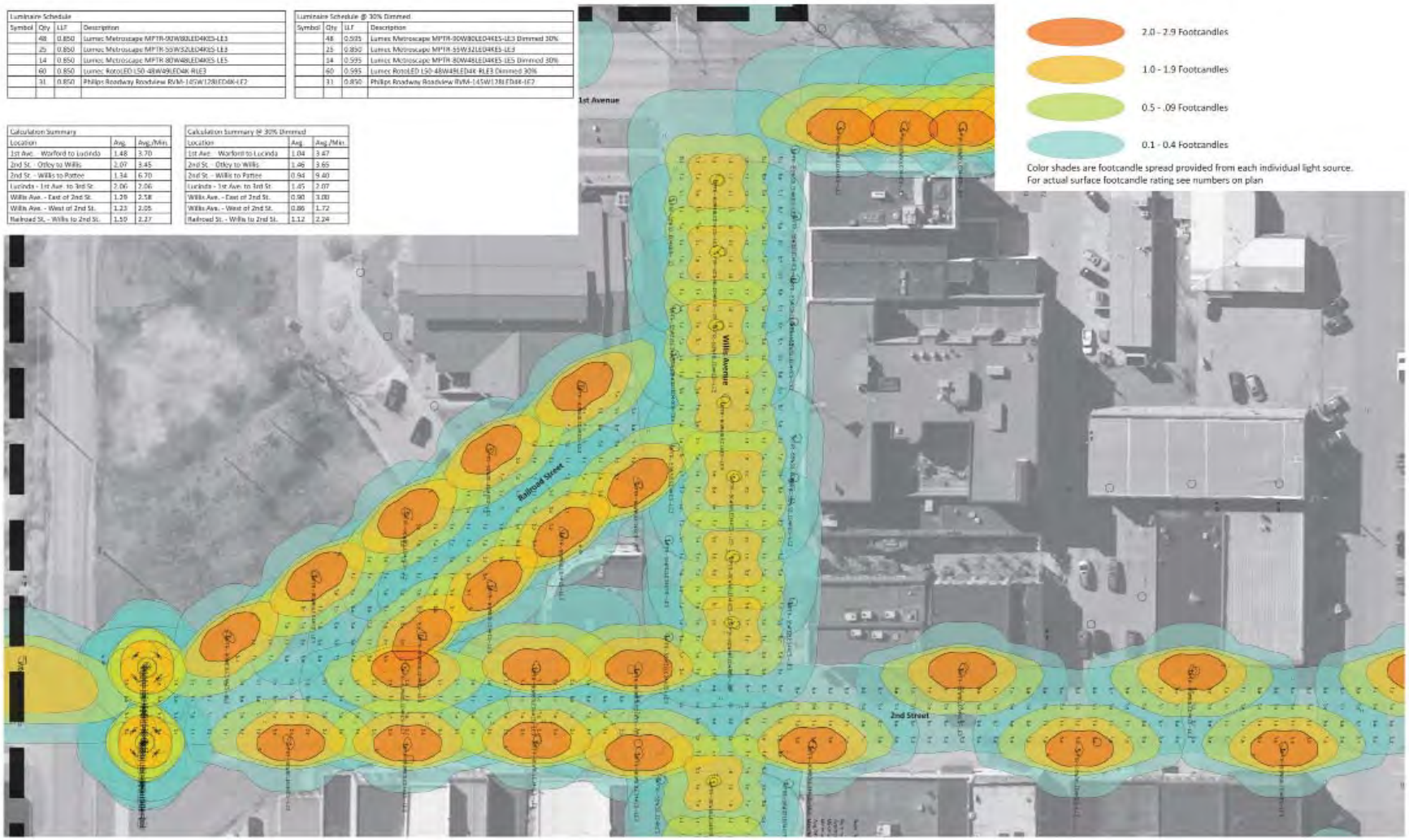

2.0 - 2.9 Footcandles
1.0 - 1.9 Footcandles
0.5 - .09 Footcandles
0.1 - 0.4 Footcandles
Color shades are footcandle spread provided from each individual light source.
For actual surface footcandle rating see numbers on enlarged plan
FIRST AVENUE
SECOND STREET
THIRD STREET
OTLEY AVENUE
WILLIS AVENUE
WARFORD STREET
LUCINDA STREET
PATTEE STREET
BATEMAN STREET
Enlarged Plan View for Footcandle Calculations
N

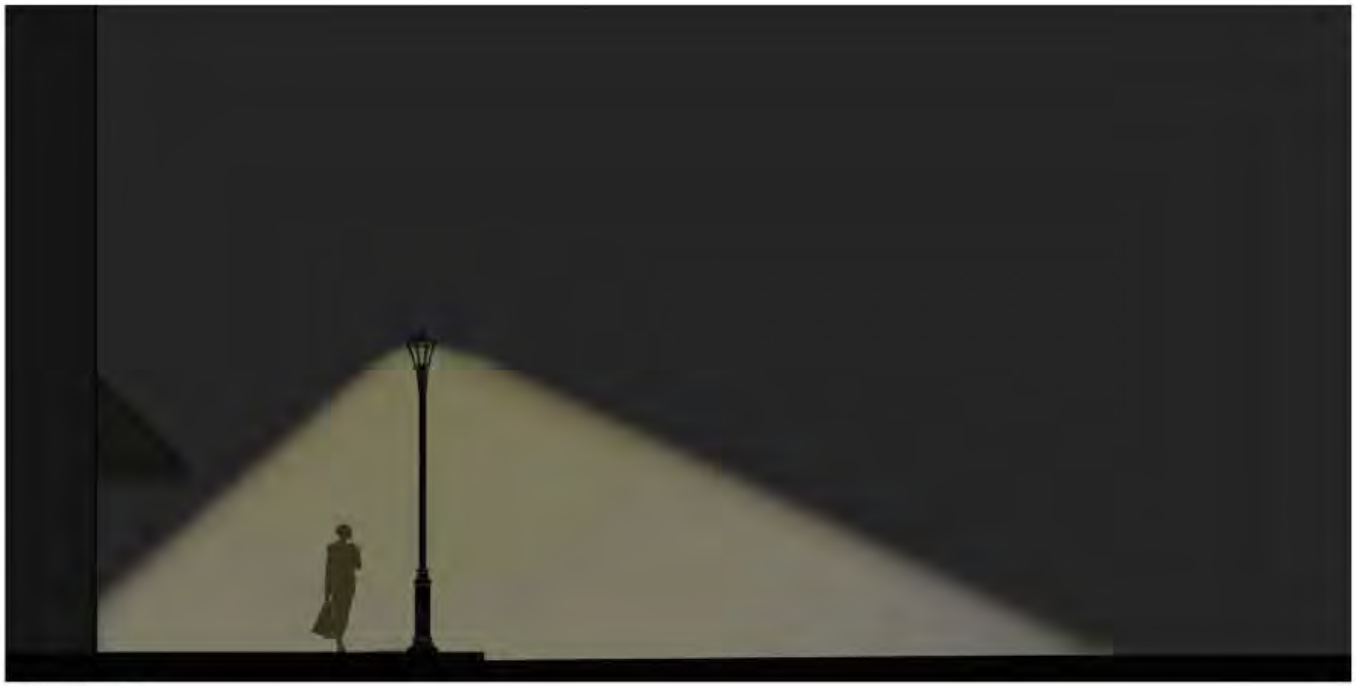
| Luminaire Schedule | | | |
|---|---|---|---|
| Symbol | Qty | LLF | Description |
| | 48 | 0.850 | Lumec Metroscape MPTR-90W80LED40KES-LE3 |
| | 25 | 0.850 | Lumec Metroscape MPTR-55W32LED40KES-LE3 |
| | 14 | 0.850 | Lumec Metroscape MPTR-80W48LED40KES-LE5 |
| | 60 | 0.850 | Lumec RotoLED L50-48W49LED4K-RLE3 |
| | 31 | 0.850 | Philips Roadway Roadview RVM-145W128LED4K-LE2 |
| | | | |

| Luminaire Schedule @ 30% Dimmed | | | |
|---|---|---|---|
| Symbol | Qty | LLF | Description |
| | 48 | 0.595 | Lumec Metroscape MPTR-90W80LED40KES-LE3 Dimmed 30% |
| | 25 | 0.850 | Lumec Metroscape MPTR-55W32LED40KES-LE3 |
| | 14 | 0.595 | Lumec Metroscape MPTR-80W48LED40KES-LE5 Dimmed 30% |
| | 60 | 0.595 | Lumec RotoLED L50-48W48LED4K-RLE3 Dimmed 30% |
| | 31 | 0.850 | Philips Roadway Roadview RVM-145W138LED4K-LE2 |
| | | | |

| Calculation Summary | | |
|---|---|---|
| Location | Avg. | Avg./Min. |
| 1st Ave. - Warford to Lucinda | 1.48 | 3.70 |
| 2nd St. - Otley to Willis | 2.07 | 3.45 |
| 2nd St. - Willis to Partee | 1.34 | 6.70 |
| Lucinda - 1st Ave. to 3rd St. | 2.06 | 2.06 |
| Willis Ave. - East of 2nd St. | 1.29 | 2.58 |
| Willis Ave. - West of 2nd St. | 1.23 | 2.05 |
| Railroad St. - Willis to 2nd St. | 1.50 | 2.27 |

| Calculation Summary @ 30% Dimmed | | |
|---|---|---|
| Location | Avg. | Avg./Min. |
| 1st Ave. - Warford to Lucinda | 1.04 | 3.47 |
| 2nd St. - Otley to Willis | 1.46 | 3.65 |
| 2nd St. - Willis to Partee | 0.94 | 9.40 |
| Lucinda - 1st Ave. to 3rd St. | 1.45 | 2.07 |
| Willis Ave. - East of 2nd St. | 0.90 | 3.00 |
| Willis Ave. - West of 2nd St. | 0.86 | 1.72 |
| Railroad St. - Willis to 2nd St. | 1.12 | 2.24 |





Typical LED Light Distribution

Philips Roadway Roadview - RVM

Lumec RotoLED - Globe light insert

Lumec Metroscape - MPTR

## Proposed Energy Usage

### First Avenue

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| 5 Globe Sternberg w | 3 | 65 | 70 | 5 | 1050 |
| 5 Globe Lumec w/ R | 2 | 65 | 70 | 5 | 700 |
| Roadview | 8 | 110 | 110 | 1 | 880 |
| | **33** | | | Subtotal: | **2630** |

### Second Street

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Roadview | 2 | 110 | 110 | 1 | 220 |
| Metroscape 90W | 22 | 90 | 90 | 1 | 1980 |
| 5 Globe Lumec w/ R | 6 | 65 | 70 | 5 | 2100 |
| | **54** | | | Subtotal: | **4300** |

### Third Street

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Roadview | 4 | 110 | 110 | 1 | 440 |
| 5 Globe Lumec w/ R | 4 | 65 | 70 | 5 | 1400 |
| | **24** | | | Subtotal: | **1840** |

### Library & Railroad Street

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Metroscape 90W | 9 | 90 | 90 | 1 | 810 |
| Metroscape 55W | 5 | 55 | 55 | 1 | 275 |
| | **14** | | | Subtotal: | **1085** |

### Otley Avenue

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Roadview | 1 | 110 | 110 | 1 | 110 |
| | **1** | | | Subtotal: | **110** |

### Willis Avenue

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Metroscape 55W | 22 | 55 | 55 | 1 | 1210 |
| | **22** | | | Subtotal: | **1210** |

### Warford Avenue

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Roadview | 1 | 110 | 110 | 1 | 110 |
| | **1** | | | Subtotal: | **110** |

## Proposed Energy Usage

### Courtyard

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Metroscape 55W | 5 | 55 | 55 | 1 | 275 |
| | **5** | | | Subtotal: | **275** |

### Lucinda Street

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| 5 Globe Lumec w/ R | 2 | 65 | 70 | 5 | 700 |
| Metro 90W | 10 | 90 | 90 | 1 | 900 |
| | **20** | | | Subtotal: | **1600** |

### Pattee Street

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Roadview | 1 | 110 | 110 | 1 | 110 |
| | **1** | | | Subtotal: | **110** |

### City Parking Lot

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Roadview | 5 | 110 | 110 | 1 | 550 |
| Metroscape 55W | 1 | 55 | 55 | 1 | 55 |
| Caboose Lamp w/ R | 1 | 65 | 65 | 1 | 65 |
| | **7** | | | Subtotal: | **670** |

### Alley Ways

| Type | Quanitity | Lamp Watts | Fixture Watts | No. of Lamps | Total Watts |
|---|---|---|---|---|---|
| Roadview | 14 | 110 | 110 | 1 | 1540 |
| | **14** | | | Subtotal: | **1540** |

| | | | |
|---|---|---|---|
| Total Lights: | **196** | Total Wattage: | **15,480** |

| | | |
|---|---|---|
| Total Annual Energy Consumption, kWh: | | 67,802 |
| Total Annual Energy Cost at 8.4 cents per kWh: | $ | 5,627.60 |
| Total 20 Year Energy Cost at 8.4 cents per kWh*: | **$** | **140,094.88** |

**Present value of annualized costs over 16 years assuming 5% inflation and 3% interest rates*

## Section 5: Recommendation

1. Replace existing globe 'lamps' with RotoLED lamp sources at key intersections to reduce total energy usage and maintain the historic aesthetic of the area. This would primarily be the 5-globe style fixtures currently in place the utilize high pressure sodium or metal halide lamp sources
2. Eliminate 50% of the light poles/fixture along Willis and provide Metroscape LED or similar fixtures in place of the remaining light units. This will provide lighting in line with commercial district standards with much better uniformity and substantially less energy consumption.
3. Replace existing single post top decorative fixtures throughout the district with Metroscape LED or similar fixtures. Utilize the existing poles, footings, and wiring.
4. Replace existing cobrahead lighting with RoadView style LED fixture or similar. Utilize the existing poles, footings, and wiring.
5. Using the photometric analysis performed on the district, develop wattage guidelines and distribution patterns for each fixture for maximum efficiency (See photometric study herein report).
6. Accommodate the possibility for dimming at each new fixture that can be centrally controlled through a master control unit. Lighting shall have the ability to be controlled independently of each other, with full range of dimming capabilities. Control units and receivers shall be a wireless, mesh network type such as Owlet controls or similar
7. Utilize existing wiring, conduit, poles, footings, and circuits wherever possible.
8. Salvage existing luminaires for reuse in other parts of the community.

## Section 6: Phasing Options

Phasing of this project must take into account the following:

- Available funding for the project – Because of the magnitude of the project, available funding may not be available for the whole district at once, and the project may have to be phased in several steps
- The necessity to replace the fixtures that are closest to their 'end of life' – The oldest fixtures or the fixtures that are the most troublesome regarding maintenance or energy consumption should be targeted for replacement first and foremost.
- How replacing fixtures may integrate into future streetscape revitalization plans – The City of Perry has a streetscape master plan developed with multiple steps of implementation. If possible, the lighting should be in line with the proposed steps or at least able to be integrated in the revitalization efforts in the future
- The usage of existing circuitry – The existing circuitry may not closely align with particular streets or blocks. Proposed lighting should be replaced according to the existing circuitry, with all lights on a particular circuit replaced if possible. The circuitry location should be taken into account when phasing the project.

## Electrical Costs - Without Dimming

| Existing Lighting | Total Wattage: | 33,191.00 |
|---|---|---|
| Total Annual Energy Consumption, kWh: | | 145,376.58 |
| Total Annual Energy Cost at 8.4 cents per kWh: | | $ 12,066.26 |
| Total 20 Year Energy Cost at 8.4 cents per kWh*: | | $ 300,380.43 |

| Proposed Lighting | Total Wattage: | 15,480.00 |
|---|---|---|
| Total Annual Energy Consumption, kWh: | | 67,802.40 |
| Total Annual Energy Cost at 8.4 cents per kWh: | | $ 5,627.60 |
| Total 20 Year Energy Cost at 8.4 cents per kWh*: | | $ 140,094.88 |
| | | |
| **Total Electrical Savings over 20 years:** | | **$ 160,285.55** |

## Electrical Costs - With Dimming

| Existing Lighting | Total Wattage: | 33,191.00 |
|---|---|---|
| Total Annual Energy Consumption, kWh: | | 145,376.58 |
| Total Annual Energy Cost at 8.4 cents per kWh: | | $ 12,066.26 |
| Total 20 Year Energy Cost at 8.4 cents per kWh*: | | $ 300,380.43 |
| | | |
| **Total Wattage with Dimming (25% energy reduction):** | | **11,610.00** |

| Proposed Lighting | | |
|---|---|---|
| Total Annual Energy Consumption, kWh: | | 50,851.80 |
| Total Annual Energy Cost at 8.4 cents per kWh: | | $ 4,220.70 |
| Total 20 Year Energy Cost at 8.4 cents per kWh*: | | $ 105,071.16 |
| | | |
| **Total Electrical Savings over 20 years with Dimming Option:** | | **$ 195,309.27** |

## Maintenance Costs

| Existing Lighting | |
|---|---|
| Number of existing fixtures | 362 |
| Lamp and ballast replacement over 20 yrs. ($300 x 3) | $ 1,337.35 |
| Total Maintenance Cost | $ 484,121.66 |

** with 2% interest*

| Proposed Lighting | 196 |
|---|---|
| Number of Proposed Fixtures | $ - |
| Lamp and Ballast replacement over life of fixture | $ - |
| | |
| **Total Maintenance Savings over 20 years:** | **$ 484,121.66** |

| | |
|---|---|
| **Combined Maintenance + Electrical Savings over 20 years** | **$ 644,407.21** |

| | |
|---|---|
| **Combined Maintenance and Electrical Savings over 20 years with Dimming Option** | **$ 679,430.93** |

## Section 7: Funding Opportunities

This section of the report begins the process of establishing a funding strategy and highlights several competitive grant sources. Ultimately this discussion should help community leaders evaluate and determine which funding opportunities have the greatest potential based on "fit" with project and community needs.

### *Summary of Funding Sources*

The initial step in developing a successful funding strategy is to carefully define improvements and identify alternative funding sources based on the specific characteristics of each project element, project phase, and the overall comprehensive plan. This process helps define the overall funding need and strategy that the community will use with prospective funding opportunities. The narrative below illustrates how each of these funding sources may be used to implement Cultural District lighting upgrades.

### Local Funding Opportunities

The City of Perry has several mechanisms that allow the City to participate in implementation efforts. A more detailed description of each is provided below.

### *Special Assessments*

The purpose is to offset public improvements through the assessment of costs. Special assessments are levied against property taxes and retired within ten years. Assessments are limited to 25% of the assessed value of the property.

### *Extension of the Local Option Sales Tax*

The City of Perry has used a 1% local option sales tax to successfully finance a wide array of capital improvement projects in the community. Since the sunset of the regional local option tax in 2003, Dallas County renewed the tax in partnership with the Perry Community School District. The local option tax extension began on January 2004 and will sunset on June 30, 2014.

### *City General Fund*

Implementing large-scale projects can be funded through the issuance of general obligation debt. Both the City and Dallas County can issue bonds to help finance project improvements, subject to what the Iowa Code allows. In general, municipalities are given some discretion in determining how the debt service obligations on bonds are addressed.

### State and Federal Funding Opportunities

Several sources available through the state and Federal government could be used to assist the City with implementation of segments of its multi-modal plan. A more detailed description of each is provided below.

### *Energy Efficiency and Conservation Block Grants (EECBG)*

The U.S. Department of Energy administers the Energy Efficiency and Conservation Block Grant program. This program funds energy efficiency and conservation projects nationwide across numerous categories, specifically including the installation of energy efficient street lighting. The program was funded through the American Recovery and Reinvestment Act (Recovery Act) of 2009 with an investment of $3.2 billion.

- Eligibility: Cities, counties, and states may apply

- Eligible uses: Grants can be used for energy efficiency and conservation programs and projects community wide, as well as renewable energy installations on government buildings. Activities eligible for use of funds include:

    - Development of an energy efficiency and conservation strategy
    - Building energy audits and retrofits, including weatherization
    - Financial incentive programs for energy efficiency such as energy savings performance contracting, on-bill financing, and revolving loan funds
    - Transportation programs to conserve energy and support renewable fuel infrastructure
    - Building code development, implementation, and inspections
    - Installation of distributed energy technologies including combined heat and power and district heating and cooling systems
    - Material conservation programs including source reduction, recycling, and recycled content procurement programs
    - Reduction and capture of greenhouse gas emissions generated by landfills, or similar waste-related sources
    - Installation of energy efficient traffic signals and street lighting
    - Installation of renewable energy technologies on government buildings
    - Any other appropriate activity that meets the purposes of the program and is approved by DOE

- Form of Funding: Through formula and competitive grants, the program empowers local communities to make strategic investments to meet the nation's long-term goals for energy independence and leadership on climate change.

*Community Attraction and Tourism (CAT)*

This aim of this program is to assist communities in development and creation of multiple purpose attraction or tourism facilities.

- Eligibility: Eligible applicants include a city, county, or public organization (or combination of these entities forming a 28E agreement pursuant to Iowa Code), or a school district in cooperation with a city or county. A "public organization" is a nonprofit economic development group or other nonprofit organization that sponsors or supports community or tourism attractions and activities. One-third of the funds available through the CAT program shall be allocated to projects in cities with populations of 10,000 or less, and/or counties that are among the 33 least populated counties in Iowa. If any portion of these funds has not been awarded by April 1, the funds shall be available for any community or county in the state.

- Eligible uses: Community attraction projects may include, but are not limited to: museums, theme parks, cultural and recreational centers, recreational trails, heritage attractions, sports arena, and other attractions.

- Form of Funding: Evidence of broad-based community support for a project, both philosophical and financial, is needed to fulfill this requirement. CAT funding may not constitute more than 50% of the total project costs. Up to 25% of local match may be in the form of in-kind or non-financial contributions, which may include but are not limited to the value of labor and services. A need for CAT funding must be shown after other financial resources have been committed for the proposed project.

### *Iowa Energy Bank*

This program assists public facilities, schools, and non-profit organization develop, implement, and manage energy management plans more easily and affordably.

- Eligibility: Public facilities, schools, non-profit organizations
- Eligible uses: Energy bank loans can be used to assist in the development, implementation, and management of Energy Management Plans.
- Form of Funding: Low interest loans with low origination fees

### *Community Development Block Grant (CDBG) Downtown Revitalization*

Projects funded through this program must have long-lasting benefits for the downtown area that contribute toward a comprehensive downtown revitalization effort. The projects must take place in the downtown or historic commercial center of the and are meant to support and demonstrate the following:

- Eligibility: Iowa cities with populations under 50,000 and all counties within the state. Eligible applicants may apply on behalf of nonprofit organizations. CDBG entitlement communities are not eligible to apply for these funds.
    - Project must be owned by a local government or nonprofit, if the local government is applying on its behalf.
    - Projects only making improvements to public buildings serving common community-wide services will not be competitive.
    - Projects for buildings for the general conduct of government operations are not eligible.
    - All funded projects must meet one of the following CDBG national objectives:
        - Prevent or eliminate slum or blight
        - Primarily benefit low and moderate income persons
    - Applicants must determine, prior to submitting a pre-application, that they can meet at least one of the national objectives above
    - Projects shall follow applicable HUD requirements such as environmental reviews, historical property review, Davis-Bacon wage requirements, and public participation requirements
    - All projects invited to submit a full application shall follow the Iowa Green Streets Criteria: http://www.iowalifechanging.com/community/downloads/green/Iowa-Green-Streets-Crieteria.pdf
    - Projects funded from the downtown revitalization fund must be part of a comprehensive downtown revitalization effort; and
    - Eligible applicants may apply for one of the two funding opportunities
        - Communities with populations less than 300 are limited to 1,000 per capita, those with populations between 300 and 999 may receive up to $300,000, and those with populations 1,000 or greater may

receive up to $500,000. If a comprehensive project far exceeds the funding cap, applicants are encouraged to:

- Fill out a pre-applications that describes the individual components under consideration for funding, and how they tie into a broader comprehensive project, and/or
- Inquire to IEDA about other possible funding programs that may be a better or complimentary fit for the complete scope and components of the project.

- Eligible uses: Projects funded through this program must have long-lasting benefits for the downtown area that contribute toward a comprehensive downtown revitalization effort. The projects must take place in the downtown or historic commercial center of the and are meant to support and demonstrate the following:

  - Innovation
  - Compatibility with and Supportive of a Local Downtown Revitalization Plan
  - Broad Downtown District Impact
  - Significant Impact on a Significant Structure(s)
  - Sustainable Community Principles (see www.smartgrowth.org)
  - Green, Sustainable building practices
  - Historic Preservation
  - Walk-ability, Bike-ability, Transportation Choices, Complete Streets
  - Broad Community Support and Impact
  - Innovative Policy and Funding Approaches
  - Promote Energy Conservation, Efficiency, and Clean Renewable energy
  - Green Infrastructure (www.epa.gov/greeninfrastructure)
  - Projects addressing only a single building must involve a prominent, publicly accessible building and demonstrate significant and comprehensive green building features (water reuse, net zero energy, Architecture 2030, renewable energy, rehabilitation, Living Building Challenge, etc...)

- Form of Funding: This program is a competitive grant process. Prior to submitting a proposal, please contact Derek Lord at 515-725-3081 or derek.lord@iowa.gov to confirm applicant eligibility and project's ability to meet the CDBG required national objectives described above.

  Community Development Block Grants are time and paperwork intensive and follow comprehensive reporting requirements of the federal government; therefore, projects seeking a small financial award may find the costs of administering the grant outweigh the benefits of any funding that may be awarded. IEDA requires recipients to procure an experienced CDBG administrator prior to issuing a final award commitment.

4.22

5.1

# Multi-Modal Transportation

Discussion & Recommendations

5.2

# Multi-Modal Transportation

## Section 1: Introduction

Transportation costs are becoming increasingly important for homeowners. In bedroom communities like Perry that have many commuting families, the cost of transportation can comprise the second highest expense after housing. Therefore, establishing a network of Multi-Modal infrastructure is a necessity for providing the base amenities to these families. Iowa communities like Perry are also in a unique situation in that a number of their residents are aging and in need of improvements to their community's infrastructure allowing better access within their neighborhoods.

Multi-Modal Transportation was one of the four target areas for the Community Development Block Grant (CDBG), administered through the Iowa Economic Development Authority (IEDA). The entire community of Perry was considered as part of the project study area. Within the study area, the project focused on traffic calming techniques along trails and streets, identification of deficiencies and needs in the existing network, and identification of routes for potential Multi-Modal Transportation development. Additionally, regional trail connections (both existing and planned) were noted as part of the overall concept illustrations.

As part of the Multi-Modal Transportation study the project team analyzed the existing transportation corridors to determine obstacles and support needs for future multi-modal networks. The information from this evaluation was compiled in a spreadsheet along with a set of graphics for the City to reference as potential future projects arise. This data will also be useful as the City develops a funding strategy for implementation of these mulit-modal systems. A list of potential funding sources has been provided in this report, along with stipulations and typical use descriptions for each funding source. This report also provides a discussion on phasing for projects by highlighting projects with a high, medium, and low priority need. The City should evaluate these priorities on an annual basis to better align with funding sources and to better align with development trends within the community.

Also included in this report is a set of planning level cost estimates for different types of trails being recommended as part of this study, along with corresponding information for each of the identified trail segments in 2012 planning costs. This information can be used to get a feel for potential project costs, but should not be used as a basis for construction bids or acquiring funding. Prior to continuing to develop any of these segments (or partial segments) the City will need to reevaluate the costs associated with each project to come to a more accurate figure at the time of development.

## Section 2: Process

This study examined the existing transportation network supporting multi-modal functions within the community. It then compared the existing infrastructure using related studies targeting multi-modal routes like trail and connection needs. This comparison supplemented information gathered from these outside studies by collecting information from public meetings; including residents, public law enforcement, Public Works personnel, City Administration staff, and the general public, to compile a map of deficiencies in the current network. The project team used this information to develop a map of proposed connections within the community while looking at links to regional resources.

The list of recommendations was then used to analyze the existing infrastructure along proposed routes to highlight potential opportunities and constraints that the City may want to address during future development or street improvement projects. Additionally, the project team prepared a list of potential funding sources which may be useful in developing a funding strategy for implementation of these recommendations. Finally, the project team devised a prioritization

of multi-modal routes based on the needs of the community, constraints along desired routes, and potential funding available for implementation.

A list of the steps undertaken during this process are listed below:

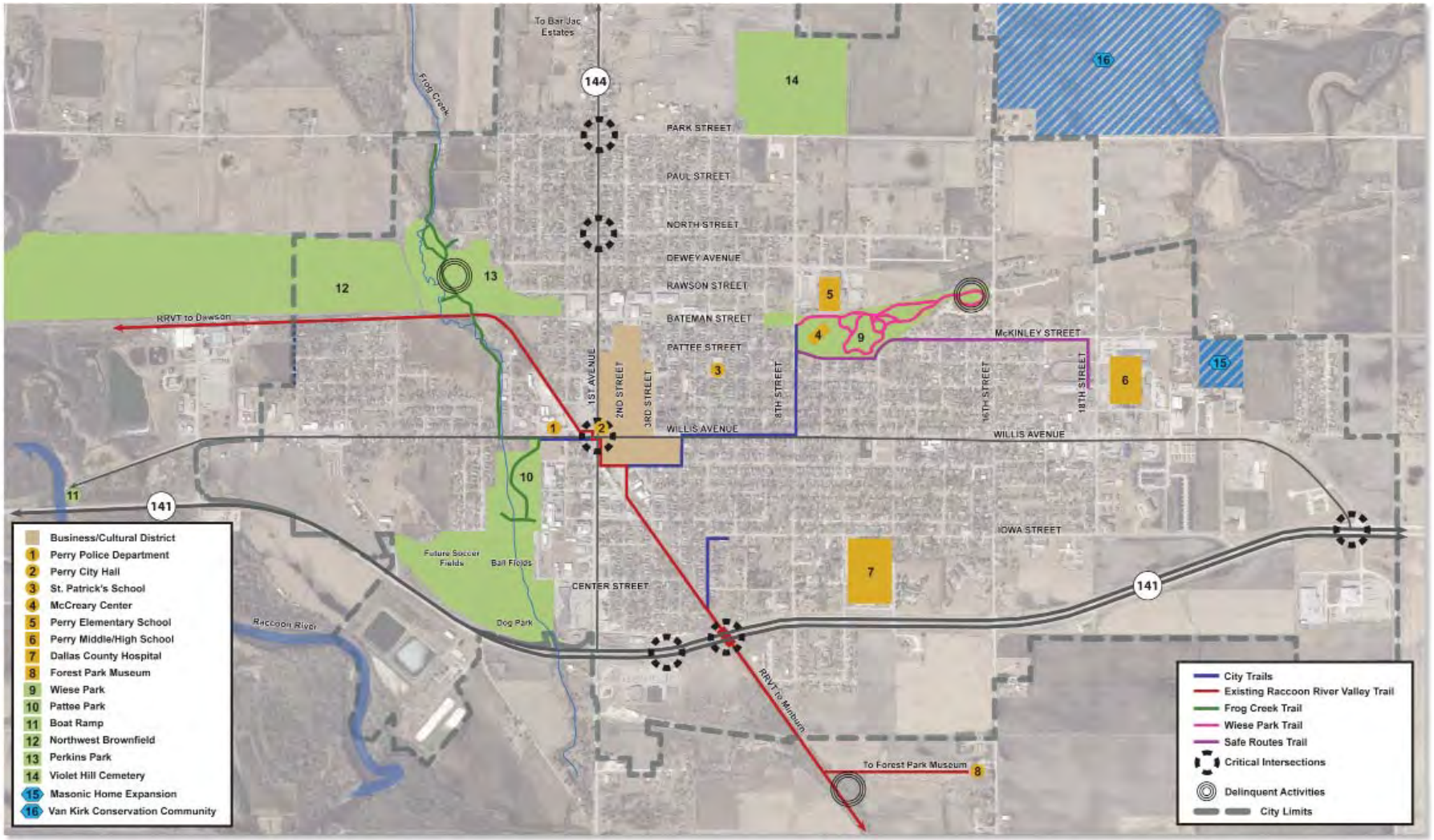
- Inventory Existing System
- Identify Deficiencies to Existing System
- Develop Concepts for Multi-Modal Connections
- Analyze Existing Corridors for Implementation Feasibility
- Develop Priorities Plan
- Produce Planning-Level Cost Estimates
- Identify Funding Sources

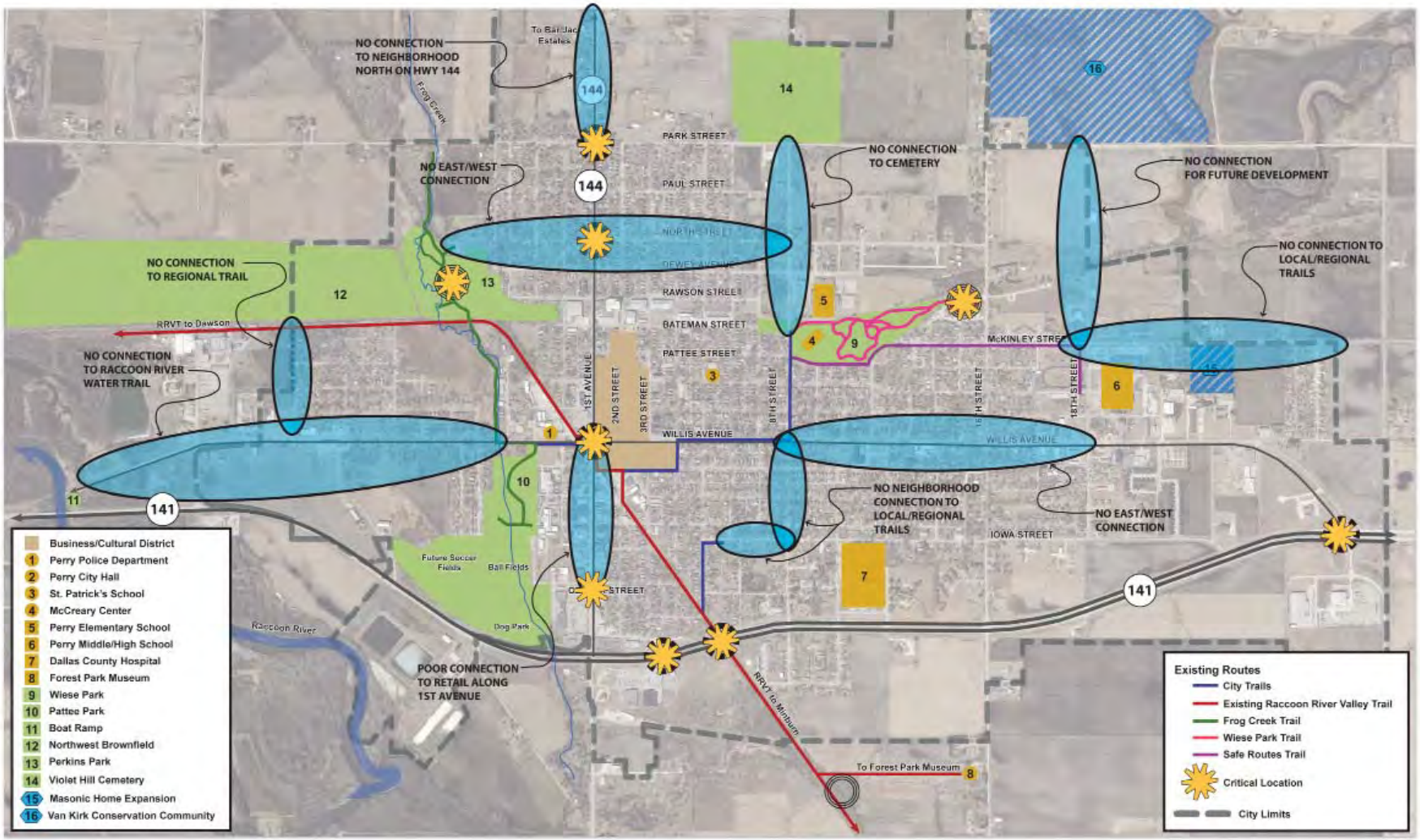
## Section 3: Inventory of Existing System

An inventory of Perry's existing trail system was completed as an initial step of this study. This inventory process included gathering information from local law enforcement and Public Works personnel pertaining to resident use of the community's parks, trails, and roadway systems. Locations prone to a greater number of accidents were mapped, as were areas where delinquent activities are frequently reported. Community destinations were discussed during the inventory phase to provide a better understanding of popular areas within the community.

Once construction is completed, Perry will serve as one of the largest communities along the North Loop of the Raccoon River Valley Trail; a 33 mile extension to a popular 56 mile trail in Central Iowa connecting more than 9 communities and spanning 3 counties. The City constructed the in-town trail along abandoned railroad right-of-way prior to Dallas County completing larger segments in 2010 and 2011. Additionally, a number of community trail segments provide access to Perry's parks through the Hiawatha Trail and Frog Creek Trail systems. However, connectivity to many of the neighborhoods, and some of the notable community destinations, is lacking. Creating links between these destinations and neighborhoods will provide greater opportunities for Multi-Modal Transportation. They will also serve as a stimulus for mobilizing residents to live healthier lifestyles.

One of the primary goals for developing a multi-modal system is to provide connectivity within the community by linking parks, schools, and civic institutions with Perry's neighborhoods. An additional outcome of this sustainability study is to realize the infrastructure that will enable residents of Perry to limit their dependence on vehicular transportation for short trips and access to parks, commercial districts, and civic amenities. Promoting alternative modes of transportation while reducing dependence on vehicular traffic can allow for better overall air quality, a reduction in energy needs in the form of gas consumption, reduce wear on the street and roadway systems, and provide a healthier environment for the overall community.


To Bar Jac Estates
Frog Creek
144
14
16
PARK STREET
PAUL STREET
NORTH STREET
DEWEY AVENUE
RAWSON STREET
BATEMAN STREET
PATTEE STREET
12
13
RRVT to Dawson
5
4
9
McKINLEY STREET
3
1ST AVENUE
2ND STREET
3RD STREET
8TH STREET
16TH STREET
18TH STREET
6
15
1
2
WILLIS AVENUE
10
11
141
IOWA STREET
Future Soccer Fields
Ball Fields
CENTER STREET
7
Raccoon River
Dog Park
RRVT to Midtown
To Forest Park Museum
8
Business/Cultural District
1 Perry Police Department
2 Perry City Hall
3 St. Patrick's School
4 McCreary Center
5 Perry Elementary School
6 Perry Middle/High School
7 Dallas County Hospital
8 Forest Park Museum
9 Wiese Park
10 Pattee Park
11 Boat Ramp
12 Northwest Brownfield
13 Perkins Park
14 Violet Hill Cemetery
15 Masonic Home Expansion
16 Van Kirk Conservation Community
City Trails
Existing Raccoon River Valley Trail
Frog Creek Trail
Wiese Park Trail
Safe Routes Trail
Critical Intersections
Delinquent Activities
City Limits


NO CONNECTION TO NEIGHBORHOOD NORTH ON HWY 144
To Bar Jac Estates
Frog Creek
144
14
16
PARK STREET
NO EAST/WEST CONNECTION
PAUL STREET
NO CONNECTION TO CEMETERY
NO CONNECTION FOR FUTURE DEVELOPMENT
NO CONNECTION TO REGIONAL TRAIL
12
13
RAWSON STREET
5
NO CONNECTION TO LOCAL/REGIONAL TRAILS
RRVT to Dawson
BATEMAN STREET
4
9
McKINLEY STREET
NO CONNECTION TO RACCOON RIVER WATER TRAIL
PATTEE STREET
3
6
15
1ST AVENUE
2ND STREET
3RD STREET
8TH STREET
16TH STREET
18TH STREET
1
WILLIS AVENUE
10
11
141
NO NEIGHBORHOOD CONNECTION TO LOCAL/REGIONAL TRAILS
NO EAST/WEST CONNECTION
IOWA STREET
Future Soccer Fields
Ball Fields
7
STREET
Raccoon River
Dog Park
141
POOR CONNECTION TO RETAIL ALONG 1ST AVENUE
RRVT to Minburn
To Forest Park Museum
8
Business/Cultural District
1 Perry Police Department
2 Perry City Hall
3 St. Patrick's School
4 McCreary Center
5 Perry Elementary School
6 Perry Middle/High School
7 Dallas County Hospital
8 Forest Park Museum
9 Wiese Park
10 Pattee Park
11 Boat Ramp
12 Northwest Brownfield
13 Perkins Park
14 Violet Hill Cemetery
15 Masonic Home Expansion
16 Van Kirk Conservation Community
Existing Routes
City Trails
Existing Raccoon River Valley Trail
Frog Creek Trail
Wiese Park Trail
Safe Routes Trail
Critical Location
City Limits

## Section 4: Identify Deficiencies to Existing System

Using the inventory created as a map of the community's existing trail and multi-modal infrastructure, the project team worked with local stakeholders and City staff to identify deficiencies in the existing network. These deficiencies fell into the following categories:

- Lack of trail system in existing neighborhoods
- No connectivity from local roads and neighborhoods to the regional trail system
- Lack of connections to City services, commercial districts, churches, and schools
- Dangerous crossings and corridors for pedestrians and cyclists
- Deficiencies in different types of multi-modal use; including recreational and commuter cycling and opportunities for pedestrian trail systems
- Fragmented recreational opportunities and lack of connectivity between City parks
- Lack of connectivity to existing large-scale employers or areas of concentrated job opportunities

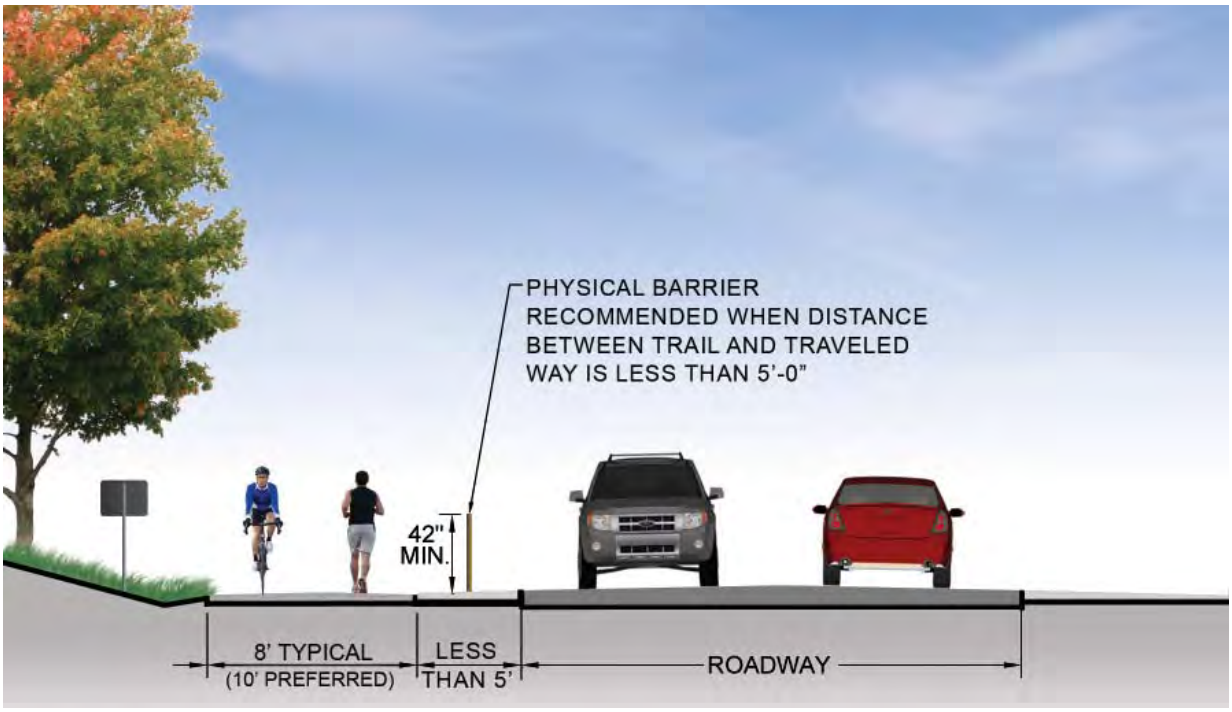
Through a series of meetings with stakeholders these deficiencies were identified, categorized, and prioritized in order to better meet the needs of the community; especially Perry's low to moderate income residents. The project team also worked with the City to determine a list of deficiencies that may occur if the City would continue to develop along its projected growth pattern. Though not easy to identify, incorporating links aimed at catering to these potential developments will provide the City with a set of well-rounded options as City leaders look toward implementing future improvement projects. The findings mapped during this exercise are located in the graphic on the opposite page.

## Section 5: Develop Concepts for Multi-modal Systems

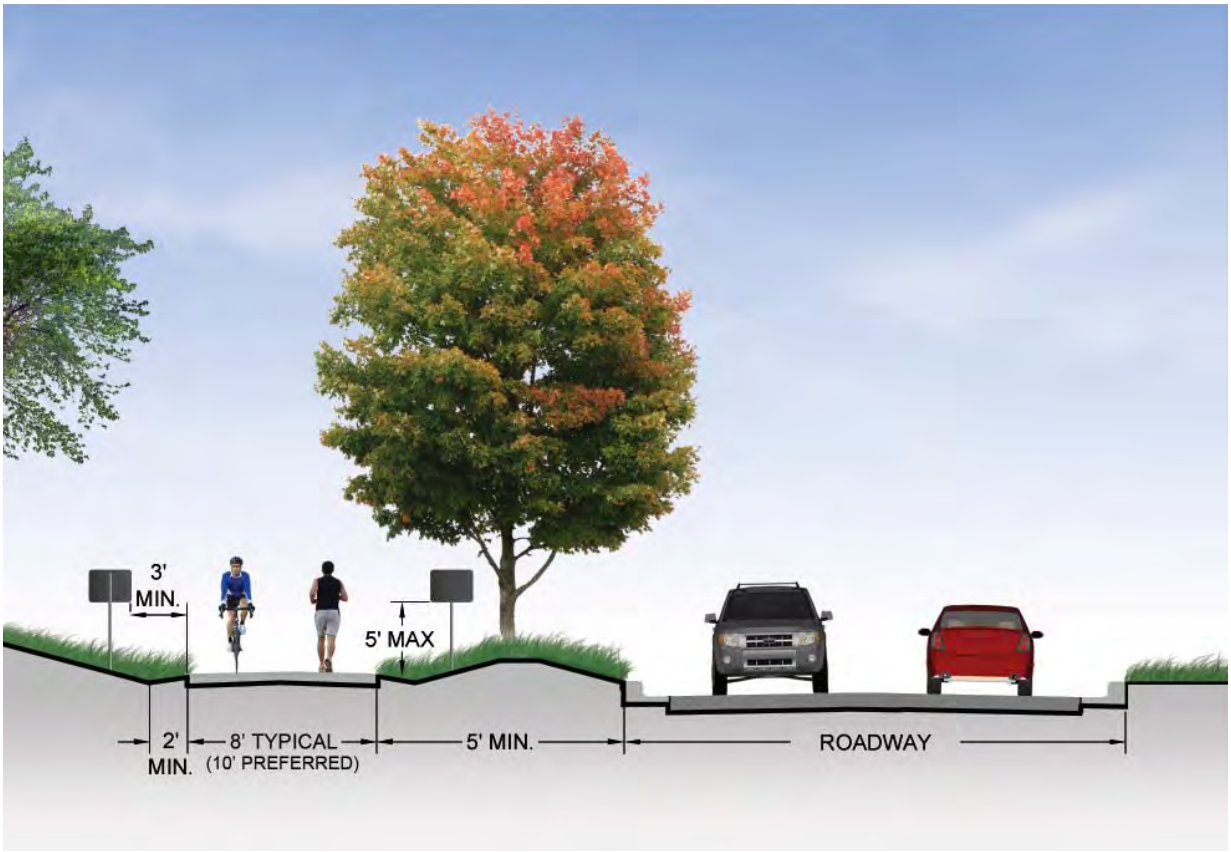
In order to establish a viable concept for Multi-Modal Transportation, the project team worked with local stakeholders and City staff; analyzing the data provided through identification of system needs and deficiencies. The multi-modal recommendations provide connections between city services and neighborhoods, create connections to existing and future regional trails, and provide better access to recreational opportunities across the community.

In developing recommendations for a Multi-Modal Transportation network, the design team sought to establish corridors for targeted complete streets efforts. Complete streets are corridors which promote multiple forms of transportation (pedestrians, bicyclists, motorists, etc…) and provide safety amenities for users of all ages and abilities. The benefits of complete streets include improved safety for pedestrians, cyclists, and motorists and improved health by providing infrastructure that encourages walking and biking. Encouraging residents to use these safer complete streets (or multi-modal) routes can also foster stronger neighborhoods. By exploring their community on foot, on bikes, or with mobility aids, residents will increase their likelihood of meeting new people.

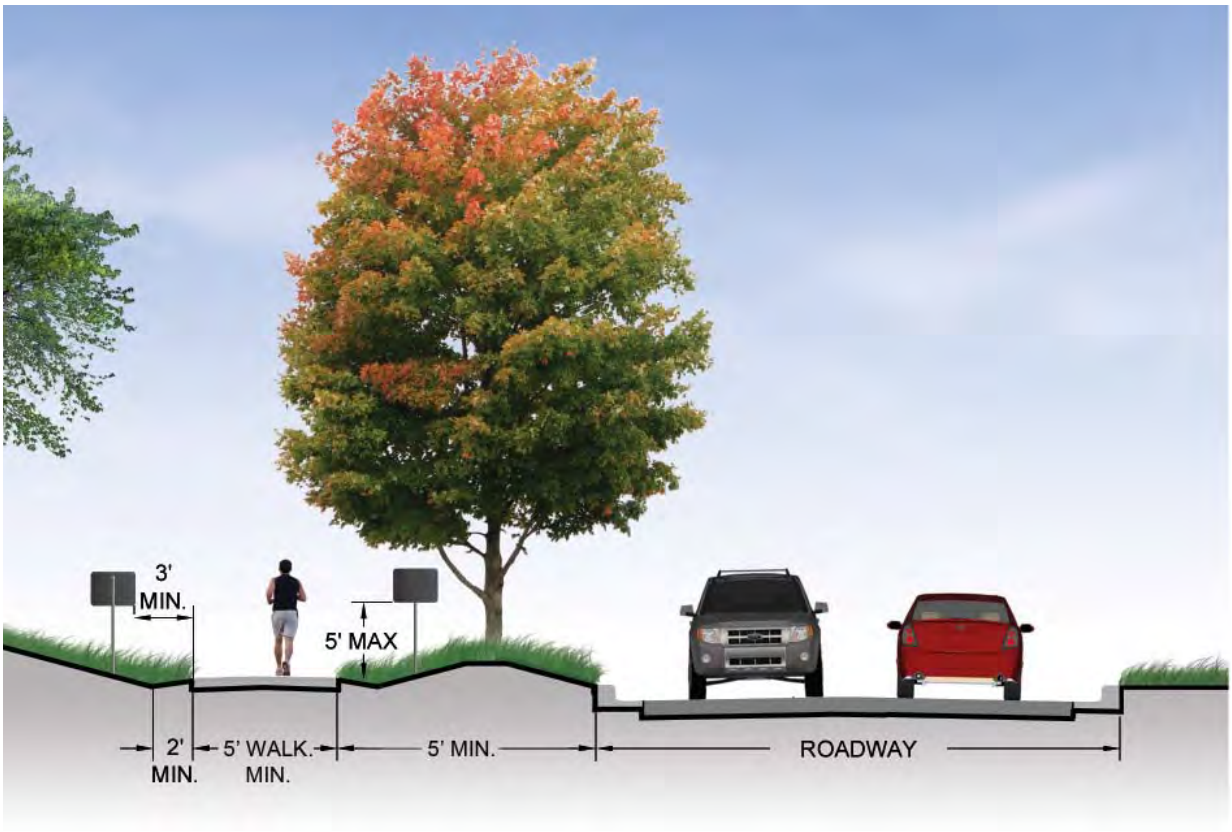
One of the most compelling elements of complete streets is that each route is unique and should be developed to meet the parameters of its specific situation. Instead of providing a standard design to use for each of the routes listed as part of the recommendation plan, the project team has noted some typical guidelines to use as these plans are further developed. Typical features include widened sidewalks, designated bike lanes on roadway surfaces, and accessible and safe crossing opportunities for pedestrians, cyclists, and motorists. Additional elements which may be associated with complete streets include median islands, curb extensions, bump-outs, raised intersections, landscaping, and pedestrian amenities such as benches, trash receptacles, and bike racks.




**Typical Multi-use Trail Layout** *(with less than 5' separation from traveled way)*




**Typical Multi-use Trail Layout** *(with at least 5' separation from traveled way)*



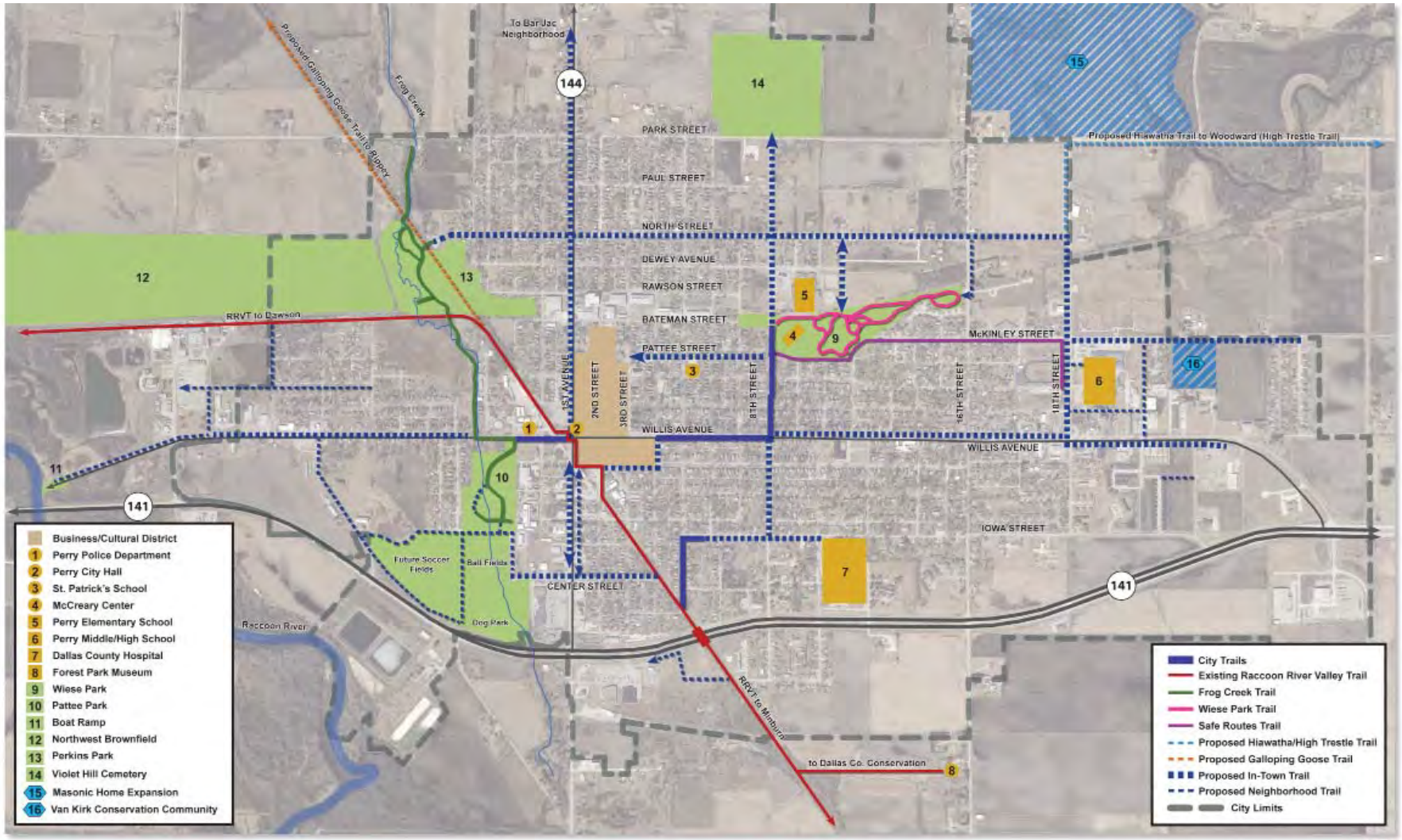

**Typical Improved Sidewalk Layout** *(with at least 5' separation from travled way)*

The three sections above and to the left depict typical layouts and dimensions for multi-modal routes most likely to be encountered in Perry. Where possible, the City should try to construct multi-use trails at least 8' wide (with a 10' wide preferred width). However, some of the routes under consideration as part of the overall multi-modal plan will not easily accommodate widened trail sections. In these areas, it may only be feasible to include an improved sidewalk. Any improvement will encourage greater use by residents and will begin to connect the various neighborhoods to community amenities.

At a minimum, major trail connections like the High Trestle Trail and Raccoon River Valley Trail through town should be an 8'-10' trail section. Important connection trails like those along North Street from Weise Park to Perkins Park or from Pattee Park to the Perry Boat Ramp should be at least 8' if possible. Neighborhood trails providing connections to larger trails could be improved sidewalk if space does not allow greater width, but would better serve the community if a minimum of 8' could be provided. Additionally, any trail or sidewalk improvements must meet the current stipulations for accessibility outlined in the (ADAAG) American Disabilities Act Accessibility Guidelines and (PROWAG) Public Right of Way Accessibility Guidelines. Other resources which will assist in design and implementation of the community's plan include AASHTO's "Guide for Development of Bicycle Facilities" and the current edition of SUDAS.

A common way for cities to incorporate complete streets as part of their community's infrastructure is through adoption of a *Complete Streets Policy*. A discussion of complete streets and a number of sample policies have been included in Appendix A of this report to provide further discussion in Perry. The project team worked with staff from the Dallas County Board of Health to prepare this policy document.

A map of the recommended multi-modal system elements can be found on the following page.




PERRY
Make Yourself At Home!

# City of Perry, IA - Sustainability Study

## Overall Multi-Modal Plan

BOLTON & MENK

## Section 6: Analyze existing corridors for Implementation Feasibility

After rough concepts for a Multi-Modal Transportation network had been developed, the project team worked with City staff to evaluate these recommended routes. Existing sidewalk and trail infrastructure along each corridor was recorded, as was the overall condition of roadway and walking surfaces. Current right-of-way information along each route was also recorded to indicate space available for construction of multi-modal facilities. Constraints to future development of the multi-modal elements were noted and, where possible, photographed for use by the City. This information also establishes a baseline which the City can use to evaluate success after these facilities have been implemented.

In order to more clearly depict the intended routes for the proposed multi-modal infrastructure, a set of enlarged graphics was created dividing the City, and overall proposed plan, into quadrants. These maps provide the City with a tool for use in analyzing the needs of individual neighborhoods, as well as a mechanism for evaluating their overall connectivity into the community network. They also provided a great resource for conducting analysis of the current City infrastructure, by allowing the project team to see each corridor in a neighborhood context as opposed to the entire city-wide network.

One example would be the need for improvements to the Highway 144/First Avenue corridor. Both residents and city staff identified the lack of pedestrian ammenities along the First Avenue corridor between Park Street and BAR JAC Estates as a 'need' area. The current configuration of this roadway makes it cost prohibitive to provide a separated trail section. However, a widened shoulder would provide an alternate solution that can provide safety for pedestrians while also allowing ease of seasonal maintenance. A change from rural section to an urban section near Park Street will allow for a separation of pedestrian facilities into a widneed sidewalk or multi-use trail.

Along with providing a widened shoulder along the stretch of First Avenue from Park Street to 123rd Place, the proposed pedestrian enhancements also call for restriping First Avenue from four lanes to three from Highway 141 to Park Street and providing turn lanes between Park Street to 123rd Place to facilitate turning traffic at BAR JAC Estates. This restriping will promote slower traffic along this roadway while providing for much needed pedestrian amenitities.

The information gathered during corridor evaluation visits was compiled into a spreadsheet based on a division of each enlarged City quadrant enlarged display. A graphic was also prepared for each of the initial major routes in the recommended multi-modal study. This graphic included the proposed route, locations of photos taken during the evaluation process, enlargements of key photos along the proposed route, and a list of potential constraints in future multi-modal infrastructure development. This information provided the project team with a clearer picture for discussions of needs for alternate routes and potential obstacles for the City to consider when developing cost estimates for implementation of these routes. A copy of each of the evaluation graphics prepared as part of this analysis phase can be found in Appendix C of this report.

Existing Corridor Condition Inventory

| Street Name: | Block Number: | ROW Width: | Street Width: | Constraints: | Road Condition (1 worst - 5 best): | Existing Walk (y/n): | Existing Walk Condition (1 worst - 5 best): | Rural or Urban Section: |
|---|---|---|---|---|---|---|---|---|
| SW Quadrant | | | | | | | | |
| Center Street | 900 | 80 | 26 | | 5 | y (North) | 1 | U |
| | 1000-1200 | 60 | 26 | Trees N., Garage S. | 4 | | | U |
| | 1200 | 60 | 26 | | 4 | | | R |
| 1st Avenue | 600-900 | 100 | 52 | Retaining Wall 600 Boock W., Motor Kars 700 Block W., Trees 100 Block E. | 4 | y (East/West) | 3-4 | U |
| Willis Avenue | 100 | 80 | 31 | | 3 | | | R |

**Truncation of Existing Corridor Condition Inventory Evaluation Spreadsheet**
(Complete spreadsheet can be found in Appendix C of this report)

## Section 7: Develop Priorities Plan

Realizing that the improvements recommended as part of this sustainability study will take years to construct, the project team prepared a phasing plan for the City to use in overseeing implementation of this multi-modal network. This phasing plan takes into account planned construction projects already in works at the City, as well as known development which could allow for key routes to see implementation sooner than others. Additionally, the project team considered the likely planning required for each segment through phased implementation would be spread over a number of fiscal years. The likelihood of outside funding during design and construction was also weighed in determining a priority for some of these multi-modal features. It is the recommendation of this plan that segment priorities be re-evaluated annually to identify current segment priorities for each year.

The graphic at the end of this section shows a recommended phasing plan with multi-modal segments noted as having high, medium, or low priority for implementation. Depending on development, funding opportunities, availability of resources, and support of local businesses and property owners, many of these projects may be combined into one construction project. Alternately, some of the larger segments may be broken into a number of smaller segments. Associated with each of the recommended segments is a brief description of the existing conditions along this route, a discussion for proposed improvements, and how they may be associated with adjacent developments.

### High priorities

*Highway 144 Connection (between North Street and 123rd Place [Bar Jac Estates])*

- **Existing:** Currently, residents walk on the highway edge or in the ditch alongside Highway 144. With speeds posted between 35 to 55 mph, it creates a safety hazard for the community. Sidewalk is limited from Park Street to North Street and the condition varies.

- **Proposed:** Coordinate with Iowa Department of Transportation (IDOT) to re-stripe Highway 144 from 4 lanes to 3 between Highway 141 and 123rd Place, and widnening from 2 lanes to 3 in key areas going north to 123rd Place. Provide a widened shoulder (10 feet) along both sides of roadway for pedestrian access and merge into a separated shoulder closer to Park Street and an urban roadway section.

*First Avenue Connection (between Willis Avenue and Center Street)*

- **Existing:** There is currently limited sidewalk to provide access to businesses in this area.

- **Proposed:** Provide a new minimum 8 foot trail along the west side of 1st Avenue to connect businesses with Cultural District and Trailhead Depot. Also coordinate with Iowa Department of Transportation (IDOT) to realize road diet along entire length of Highway 144/First Avenue from Highway 141 to 123rd Place by re-striping roadway from 4 lanes to 3.

*North Street Connection (from 18th Street to Perkins Park)*

- **Existing:** This is a much needed segment to connect neighborhoods in the northwest part of Perry to facilities at Wiese Park, the Elementary, Middle, and High School complexes. Also would provide a major east/west connection across town and would link the parks system.

- **Proposed:** Provide a new 8 foot trail along the north side of North Street. This may require retaining walls in certain areas west of 1st Avenue.

*8th Street Connection (between Willis Avenue and Iowa Street)*

- **Existing:** There is no current connection between the Raccoon River Valley Trail main route, the Dallas County Hospital Facilities, and the Hiawatha Trail near Wiese Park.

- **Proposed:** Provide a new 8 foot trail along the west side of 8th Street to connect into trails along Iowa Street.

*Iowa Street Connection (between 5th Street and Dallas County Hospital)*

- **Existing:** There is currently intermittent sidewalk along this roadway. The first phase of a trail connecting the Raccoon River Valley Trail and the Dallas County Hospital Facilities is being constructed this summer, but will not extend along Iowa Street.

- **Proposed:** Provide a new 8 foot trail along the south side of Iowa Street. Determine an optimal route where existing trees are present in the right-of-way.

*8th Street Connection (between Bateman Street and Violet Hill Cemetery)*

- **Existing:** Residents enjoy walking, running, and biking on the roadways in Violet Hill Cemetery. However, there are no paths connecting this amenity to the community.

- **Proposed:** Provide a new 8 foot trail along the east side of 8th Street to provide a connection between Wiese Park and Violet Hill Cemetery. This trail will also bisect the proposed North Street Connection.

*Willis Avenue East (between 8th Street and 18th Street)*

- **Existing:** There is sidewalk extending part of the way along the south side of this corridor. The sidewalk extends nearly the entire way on the north side of the road and has a wide parking separation from Willis Avenue. This route would provide additional neighborhood connections to the Middle and High School Complex.

- **Proposed:** Provide a new 8 foot trail along the north side of Willis Avenue.

*Otley Connection (along 3rd Street between Willis Avenue and Otley Avenue) & (along Otley Avenue between 2nd Street and 3rd Street)*

- **Existing:** The Hiawatha Trail currently extends along Willis Avenue to 3rd Street then becomes part of the sidewalk through the Cultural District. Sidewalk is in poor condition along this potential alternate route.

- **Proposed:** Provide a new 8 foot trail along the west side of 3rd Street to Otley Avenue then along the north side of Otley to make a connection with the Raccoon River Valley Trail which extends west from the intersection of 2nd Street and Otley Avenue.

*Center Street Connection (from Raccoon River Valley Trail to Pattee Park)*

- **Existing:** There is intermittent sidewalk along much of this route and no connection between the neighborhood in this area to the businesses along the south portion of 1st Avenue and to Pattee Park and the ballfields located there.

- **Proposed:** Provide a new 8 foot trail along the north side of Center Street to provide a safe crossing over 1st Avenue and provide a connection between the Raccoon River Valley Trail and Pattee Park via businesses along 1st Avenue.

*Pattee Street Connection (from 8th Street to 3rd Street)*

- **Existing:** There is generally sidewalk along this route, but the condition varies greatly from block to block. A majority of the street crossings do not have accessible ramps.

- **Proposed:** Consider providing a new 8 foot trail on the south side of Pattee Street to provide a pedestrian connection between Wiese Park and the Cultural District. This route will also provide a connection to St. Patrick's School, providing a safe route for neighborhood children to walk to and from school.

## Medium priorities

*Willis Avenue West (from Pattee Park to Perry Boat Ramp)*

- **Existing:** There is no infrastructure allowing the community to access the North Raccoon River Water Trail or Perry Boat Ramp.

- **Proposed:** Provide a new 8 foot trail along the south side of Willis Avenue. May also need to consider painted bike lanes or a widened shared shoulder along a portion of Willis to facilitate this connection.

*West 10th Street Connection (from Willis Avenue to Raccoon River Valley Trail)*

- **Existing:** There is no official connection to the Raccoon River Valley Trail for residents west of Frog Creek and north of Willis. There is also no connection for residents who may want to use the trail to commute to and from Tyson Foods and other businesses in this area.

- **Proposed:** Provide a new 8 foot trail along the west side of West 10th Street.

*Pattee Park (additional trail connections within the park and including future soccer complex)*

- **Existing:** The existing park trail dead ends on the west side of Frog Creek. There is no trail along the newly acquired parcel which is slated to be developed as soccer fields.

- **Proposed:** Provide new 8-10 foot trail connections within the park and ballfields to facilitate pedestrian use and access.

*Southgate Drive Connection (from Raccoon River Trail to Hy-Vee Facilities)*

- **Existing:** There is currently no connection from the neighborhood on the south side of Highway 141 to groceries and other business along 1st Avenue.

- **Proposed:** Provide a new 8-10 foot trail connection near the crossing of the Raccoon River Valley Trail (RRVT) at Southgate Drive as part of new development between the RRVT and facilities near Hy-Vee.

*16th Street Connection (from Wiese Park to North Street)*

- **Existing:** There is no pedestrian infrastructure along this section of roadway.

- **Proposed:** Provide a new 10 foot trail connection to tie in with existing trails at Wiese Park. This segment is slated to be part of the in-town trail link between the Raccoon River Valley Trail and the High Trestle Trail.

*18th Street Connection (from Willis Avenue to Park Street)*

- **Existing:** There are currently limited pedestrian facilities along this stretch of roadway. 18th Street is currently unpaved north of the intersection with McKinley Street.

- **Proposed:** Provide a new 10 foot trail connection from Park Street to the future intersection with North Street. This segment is slated to be part of the in-town trail link between the Raccoon River Valley Trail and the High Trestle Trail. Provide an 8-10 foot trail along the west side of 18th Street to Willis Avenue.

*High Trestle Trail Connection (from 18th Street to Woodward)*

- **Existing:** This is currently an unpaved section of road without any pedestrian facilities

- **Proposed:** Look at providing either a separated 10 foot trail or a shared shoulder as part of a roadway paving project.

*Winter Street (from Wiese Park to North Street)*

- **Existing:** There is no roadway or pedestrian connection currently in this location.

- **Proposed:** Provide an 8 foot trail to connect residents to the facilities at Wiese Park. This connection will also provide more connectivity to the Elementary School and McCreary Center as the land between North Street and Park Street is developed.

*First Avenue North Connection (from Willis Avenue to North Street)*

- **Existing:** There is generally sidewalk along this section but the condition varies greatly from block to block.

- **Proposed:** Consider providing a minimum 8 foot trail to facilitate pedestrian use along the west side of First Avenue. This will create a continuous trail section from Center Street to Bar-Jac Estates north of town. Also coordinate with Iowa Department of Transportation (IDOT) to realize road diet along entire length of Highway 144/First Avenue from Highway 141 to 123rd Place by re-striping roadway from 4 lanes to 3.

## Low priorities

*135th Street Connection (from 18th Street to 31st Street)*

- **Existing:** There are currently no pedestrian amenities linking trails near the Middle & High School Complex and along McKinley Street with the neighborhood east on 135th Street.

- **Proposed:** Provide a new 8 foot trail connection along the south side of McKinley Street/135th Street. An alternative would be to evaluate the use of shared shoulder or bike lanes to facilitate greater use of this stretch of road.

*Warford Street Connection (from 18th Street to east side of Middle/High School)*

- **Existing:** There are no pedestrian facilities in this area.

- **Proposed:** Provide a new 8 foot trail to facilitate pedestrian movement along the south side of the school property. This connection may become of more significance as areas to the east develop.

*22nd Street Connection (from Willis Avenue to 135th Street)*

- **Existing:** There are no roads or pedestrian facilities in this area.

- **Proposed:** Consider providing a new 8 foot trail to facilitate traffic between neighborhoods to the east and the Middle & High School Complex. This connection may become more significant as areas to the east develop.

*Willis Street East Connection (from 18th Street to Bowling Alley)*

- **Existing:** This roadway is a rural section with no sidewalk infrastructure on either side.

- **Proposed:** Consider providing a new 8 foot trail along the south side of Willis to provide access to the Bowling Alley and adjacent businesses in this area.

*Kading Development Connection (from William Street to Bowling Alley)*

- **Existing:** There are trails within the Kading Development but no existing sidewalk or trail that provides access to businesses east of this neighborhood.

- **Proposed:** Consider providing an 8 foot trail extension alongside William Street to provide access to the Bowling Alley and businesses located east of the neighborhood development.

*First Avenue Connection (from Center Street to Otley Avenue)*

- **Existing:** There is sidewalk along most of this route, but condition varies greatly.

- **Proposed:** Consider providing a new 5' sidewalk or 8' trail to connect residents of adjacent neighborhoods to businesses along First Avenue and amenities in the Cultural District.

*Diagonal Road Connection (from future soccer complex to Willis Avenue)*

- **Existing:** There are currently no pedestrian facilities in this area.

- **Proposed:** Consider providing a new 8 - 10 foot trail along the east side of Diagonal Road to provide a connection to the Perry Boat Ramp/North Raccoon River Water Trail and a potential west connection to the Raccoon River Valley Trail. This route will also provide a pedestrian connection for the neighborhood north of Willis Avenue and west of Frog Creek to access the future soccer fields and Pattee Park.

*Lucinda Street Connection (from West 8th Street to Tyson Foods)*

- **Existing:** There is limited sidewalk infrastructure in this neighborhood.

- **Proposed:** Consider providing a new 5' sidewalk or 8' trail along the north side of Lucinda Street to provide neighborhood access to Tyson Foods, the Raccoon River Valley Trail, and the Perry Boat Ramp/ North Raccoon River Water Trail.

*Tyson Foods Connection (from Willis Avenue to Tyson Foods along Idaho Ct.)*

- **Existing:** There is no pedestrian infrastructure in this area. This is the main approach for workers to access Tyson Foods.

- **Proposed:** Consider providing a new 8 foot trail to facilitate traffic between neighborhoods to the east and Tyson Foods. May also provide a connection between the Raccoon River Valley Trail and the Perry Boat Ramp/North Raccoon River Water Trail.

*Galloping Goose Trail (from Perkins Park to Rippey)*

- **Existing:** The abandoned railway bed is still intact but no pedestrian improvements have been constructed on this.

- **Proposed:** Consider providing a 10 foot trail to provide a pedestrian and cycling connection to nearby town of Rippey; thereby increasing the recreational potential of residents as well as cyclists, joggers, and naturalists along the Raccoon River Valley Trail.

## Section 8: Produce Planning-level Cost Estimates

A listing of capital improvements and associated budgets will need to be prepared in order to guide future capital needs for implementation of the recommended projects. Planning level cost estimates have been prepared to indicate a range of construction costs in 2012 dollars. These estimated costs are for budgetary purposes only.

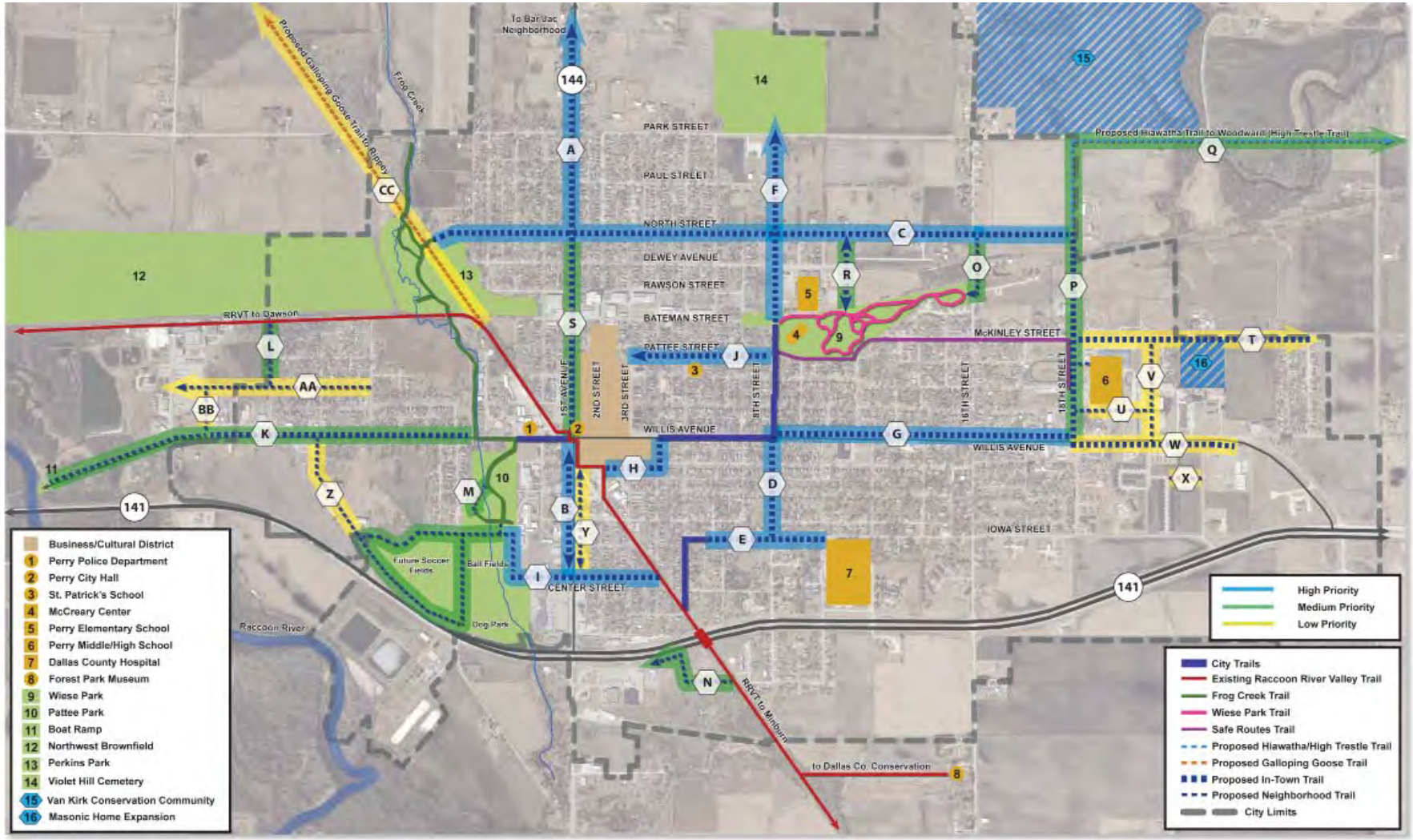
The following assumptions should be understood when using this information:

- Cost ranges will depend on project size and are rough estimates only
- Cost ranges could vary based on various project sizes (where a lower cost may indicate a larger quantity and a higher cost may indicate a smaller quantity)
- Costs do not include engineering, land acquisition, testing, or environmental fees, etc...

### Typical Trail Construction Costs

| Trail Type: | Description: | Cost: |
|---|---|---|
| Improved Sidewalk | 5' wide PCC sidewalk | $30.00 per lineal foot |
| Paved Trail (PCC) | 8' wide PCC trail | $50.00 per lineal foot |
| Paved Trail (PCC) | 10' wide PCC trail | $60.00 per lineal foot |
| Shared Shoulder | 10' wide shared HMA shoulder at 8" depth | $45.00 per lineal foot |
| On-Road Painted | 4' bike lane painted on both sides of road | $40.00 per lineal foot |

Trail construction costs can vary due to a variety of factors; including local conditions, trail type, and support service needs. These planning level cost estimates are general guidelines for the purpose of preliminary estimation of trail costs. More details cost estimation should be performed, particularly prior to submitting an application for funding, during preliminary design, and prior to bidding for construction.




PERRY
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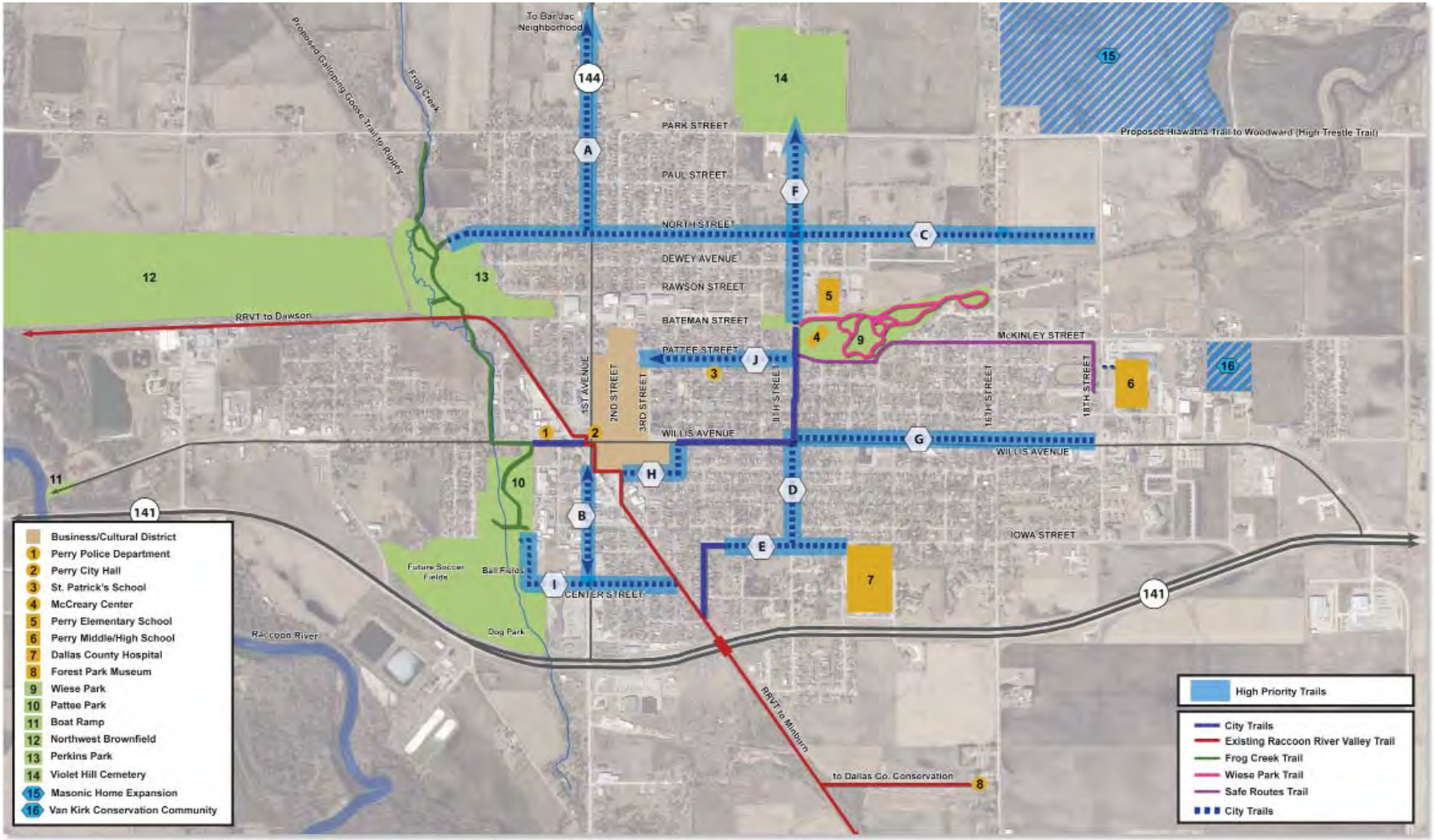
City of Perry, IA - Sustainability Study

Multi-Modal Priorities

BOLTON & MENK

## High Priority Trails - Opinion of Probable Cost

| Segment: | Segment Name: | Length: | Cost: |
|---|---|---|---|
| A | Highway 144 Connection (North Street - 123rd Place) | 5,300 feet | $238,500.00 |
| B | First Avenue Connection (Willis Avenue - Center Street) | 1900 feet | $95,000.00 |
| C | North Street Connection (18th Street - Perkins Park) | 8,772 feet | $438,600.00 |
| D | 8th Street Connection (Willis Avenue - Iowa Street) | 1,320 feet | $66,000.00 |
| E | Iowa Street Connection (5th Street - Dallas County Hospital) | 1,800 feet | $90,000.00 |
| F | 8th Street Connection (Bateman Street - Violet Hill Cemetery) | 2,430 feet | $121,500.00 |
| G | Willis Avenue East (8th Street - 18th Street) | 4,015 feet | $200,750.00 |
| H | Otley Avenue Connection (3rd Street to 2nd Street) | 800 feet | $40,000.00 |
| I | Center Street Connection (RRVT - Pattee Park | 1,960 feet | $98,000.00 |
| J | Pattee Street Connection (8th Street - 3rd Street) | 2,100 feet | $105,000.00 |
| | | | |
| | | Total: | $1,493,350.00 |

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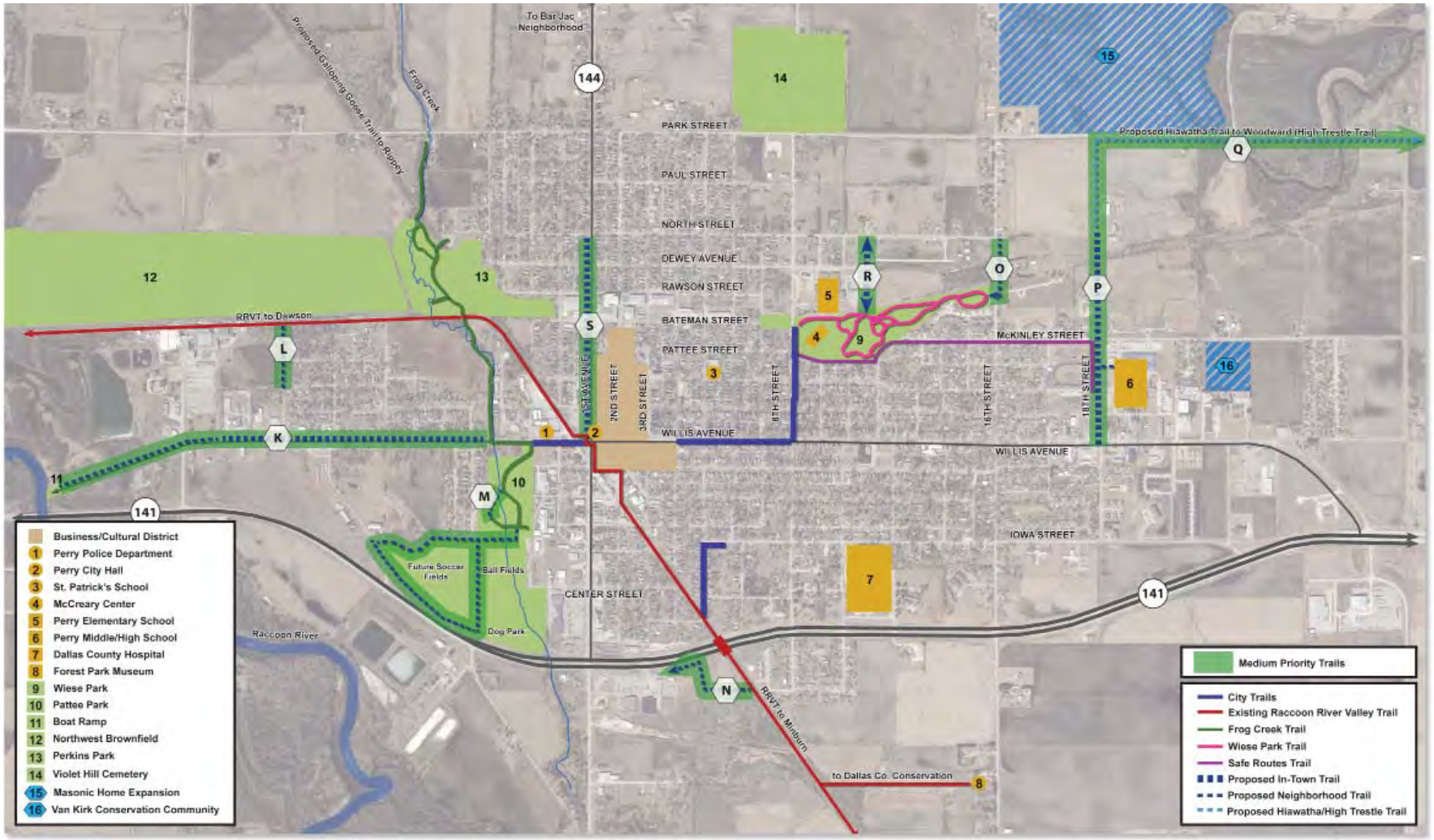
City of Perry, IA - Sustainability Study

High Priority Multi-Modal Segments

BOLTON & MENK

## Medium Priority Trails - Opinion of Probable Cost

| Segment: | Segment Name: | Length: | Cost: |
|---|---|---|---|
| K | Willis Avenue West (Pattee Park - Perry Boat Ramp) | 5,810 feet | $290,500.00 |
| L | West 10th Street Connection (Willis Avenue - RRVT) | 1,585 feet | $79,250.00 |
| M | Pattee Park (trail connections) | 5,000 feet | $250,000.00 |
| N | Southgate Drive Connection (RRVT to Hy-Vee) | 1,550 feet | $77,500.00 |
| O | 16th Street Connection (Wiese Park - North Street) | 690 feet | $34,500.00 |
| P | 18th Street Connection (Willis Avenue - Park Street) | 3,960 feet | $198,000.00 |
| Q | High Trestle Trail (18th Street - Woodward) | 48,050 feet | $2,402,500.00 |
| R | Winter Street (Wiese Park to North Street) | 2,230 feet | $111,500.00 |
| S | First Avenue North (Willis Avenue - North Street) | 2,650 feet | $132,500.00 |
| | | | |
| | | Total: | $3,576,250.00 |

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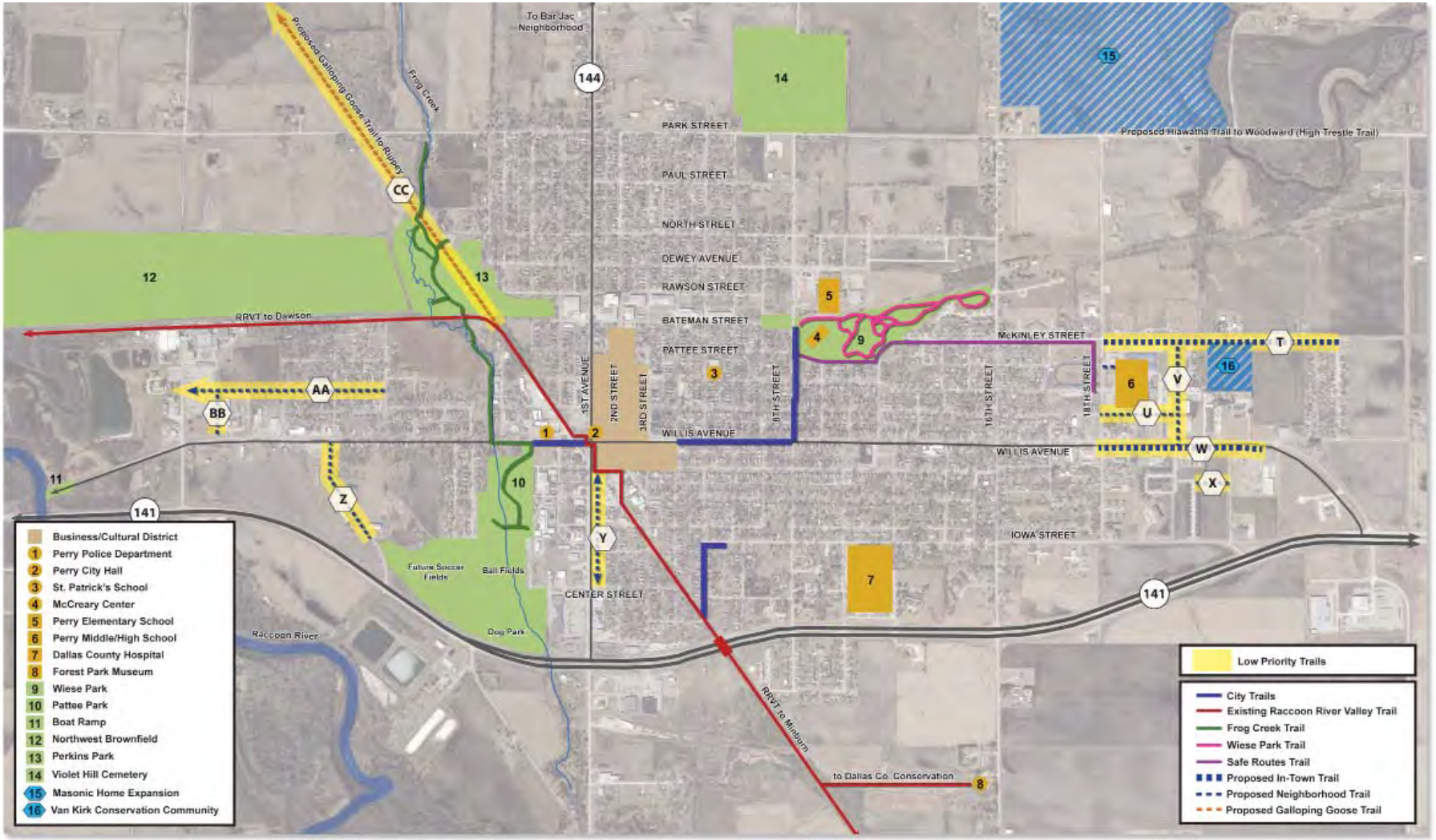
City of Perry, IA - Sustainability Study

Medium Priority Multi-Modal Segments

BOLTON & MENK
Engineers & Surveyors

## Low Priority Trails - Opinion of Probable Cost

| Segment: | Segment Name: | Length: | Cost: |
|---|---|---|---|
| T | 135th Street Connection (18th Street - 31st Street) | 3,065 feet | $153,250.00 |
| U | Warford Street Connection (18th Street - Middle/High School) | 950 feet | $47,500.00 |
| V | 22nd Street Connection (Willis Avenue - 135th Street) | 1,320 feet | $66,000.00 |
| W | Willis Avenue East Connection (18th Street - Bowling Alley) | 2,060 feet | $103,000.00 |
| X | Kading Development Connection (William Street - Bowling Alley) | 740 feet | $37,000.00 |
| Y | First Avenue Connection (Center Street - Otley Avenue) | 2,330 feet | $116,500.00 |
| Z | Diagonal Road Connection (future soccer fields - Willis Avenue) | 1,590 feet | $79,500.00 |
| AA | Lucinda Street Connection (West 8th Street - Tyson Foods) | 2,170 feet | $108,500.00 |
| BB | Tyson Foods Connection (Willis Avenue - Idaho Court) | 1,005 feet | $50,250.00 |
| CC | Galloping Goose Trail (Perkins Park - Rippey) | 41,200 feet | $2,060,000.00 |
| | | | |
| | | Total: | $2,821,500.00 |

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# City of Perry, IA - Sustainability Study

## Low Priority Multi-Modal Segments

BOLTON & MENK
Engineers & Surveyors

## Section 9: Identify Funding Sources

This section of the report begins the process of establishing a funding strategy and highlights several competitive grant sources. Ultimately this discussion should help community leaders evaluate and determine which funding opportunities have the greatest potential based on "fit" with project and community needs.

### *Summary of Funding Sources*

The initial step in developing a successful funding strategy is to carefully define improvements and identify alternative funding sources based on the specific characteristics of each project element, project phase, and the overall comprehensive plan. This process helps define the overall funding need and strategy that the community will use with prospective funding opportunities. The narrative below illustrates how each of these funding sources may be used to implement phases of the multi-modal system recommendations.

### Local Funding Opportunities

The City of Perry has several mechanisms that allow the City to participate in implementation efforts. A more detailed description of each is provided below.

#### *Special Assessments*

The purpose is to offset public improvements through the assessment of costs. Special assessments are levied against property taxes and retired within ten years. Assessments are limited to 25% of the assessed value of the property.

#### *Extension of the Local Option Sales Tax*

The City of Perry has used a 1% local option sales tax to successfully finance a wide array of capital improvement projects in the community. Since the sunset of the regional local option tax in 2003, Dallas County renewed the tax in partnership with the Perry Community School District. The local option tax extension began on January 2004 and will sunset on June 30, 2014.

#### *City General Fund*

Implementing large-scale projects can be funded through the issuance of general obligation debt. Both the City and Dallas County can issue bonds to help finance project improvements, subject to what the Iowa Code allows. In general, municipalities are given some discretion in determining how the debt service obligations on bonds are addressed.

### Regional Funding Opportunities

Dallas County, the Region XII Council of Governments, and the Central Iowa Regional Transportation Planning Alliance have several mechanisms that may assist Perry in implementation of multi-modal infrastructure. A more detailed description of each is provided below.

#### *Federal Surface Transportation Program (STP)*

The Central Iowa Regional Transportation Planning Alliance (CIRTPA) serves as the regional planning agency for Perry. As such, the agency receives STP funding for roadway projects that are on the federal aid system, transit systems, bicycle and pedestrian systems and/or transportation planning activities. The region receives a pool of money annually in Surface Transportation Program funding. Perry receives a portion of this amount. These funds are sub allocated

to member communities and not subject to competitive applications. Alternately, regional enhancement funding also receives a pool of money each year. These funds are made available on a competitive basis for which Perry can apply for these funds through CIRTPA.

Additionally, the City has the option of applying for Statewide Enhancement funding through the Iowa Department of Transportation. Programmed funds target projects that address *scenic and natural resources projects* (e.g. acquisition of scenic easements, scenic easements, scenic highway programs, landscaping and other scenic beautification, etc…) *and trails and bikeways projects* (e.g. facilities for pedestrians and bicycles, preservation of abandoned railway corridors, etc…).

- Eligibility: Member of the RPA/MPO or applying through the statewide program. The statewide program generally accepts applications every October.

- Eligible uses: Road, trail, transportation-related study

- Funding: A minimum 30 percent non-federal match is required for state program funds and 20 percent for regional funding. Also, several federal requirements must be satisfied in using these funds.

### State and Federal Funding Opportunities

Several sources available through the state and Federal Government could be used to assist the City with implementation of segments of its multi-modal plan. A more detailed description of each is provided below.

#### *Community Development Block Grants (CDBG)*

This funding source provides grants to local units of government for a wide array of community development activities, including public facilities and economic development. Projects are required to benefit low-to-moderate income populations, aid in the prevention of slums and blight, or address other community development needs and present a threat to the health or welfare of a community.

- Eligibility: Cities with populations under 50,000 can apply for funding through the Iowa Economic Development Authority (IEDA). IEDA generally accepts pre-applications in August. Invited full applications are generally due in December and award decisions are normally announced in February.

  Projects must also meet one or more of the U.S. Department of Housing and Urban Development's (HUD) national objectives.

  - Primarily benefit low and moderate income persons
  - Aid in the prevention of slums or blight; or
  - Address other community development needs that present a serious or immediate threat to the health or welfare of the community.

- Eligible uses: Acquisition, construction, reconstruction, rehabilitation, or installation of public facilities and improvements. Unless specifically precluded, the program can also serve as funding match to other funding sources. Non-entitlement community applications typically require matching funds from other sources.

- Form of Funding: Grants and matching grants. Grant ceilings are based on population; consequently, Perry could be eligible for up to $600,000 through this program. Additionally, Section 108 of the Housing and Community Development Act of 1974 was amended to allow CDBG funds to be pledged as security for loans guaranteed by HUD. Recognizing that Perry is not an entitlement community, the City has the ability to request funding assistance through IEDA. However, program administrators indicate that a significant emphasis is place on the quality of financing pledged to the project.

### *Iowa Clean Air Attainment Program (ICAAP)*

This program funds highway/street, transit, pedestrian/bicycle or freight projects that help maintain clean air by reducing transportation related emissions.

- Eligibility: Applications must be submitted by a city or county government

- Eligible uses: Eligible categories include reduction of emissions based on traffic flow improvements, reductions in vehicle miles traveled, reduction in single-occupant vehicle trips, or other transportation improvements that improve air quality or reduce congestion.

- Forms of Funding: The program is structured as a grant. Applicants are required to provide a match or at least 20 percent. Applications must be submitted with emission reduction calculations and will be evaluated by a committee on the following criteria:

  - Congestion Relief/Traffic Flow Improvements
  - VMT and SOV Reduction
  - Emission Reduction Estimate
  - Assistance to an Area that is Experiencing some Degree of Air Quality Problem
  - Cost-effectiveness in relation to Air Quality Benefits

  Additionally, project sponsor must provide certification of the local match requirements and future maintenance of the project. MPO or RPA certification of project conformity with the transportation planning process and regional transportation plan is also required. All grants must be received by Iowa Department of Transportation (IDOT) on or before October 1.

### *Iowa Traffic Safety Improvement Program*

This program can be used for traffic safety improvements or studies on public roads under county, city, or state jurisdiction.

- Eligibility: Local units of government or the State of Iowa

- Eligible uses: Eligible projects must fall into one of the three categories listed below.

  - Construction improvement of traffic safety and operations at a specific site with an accident history
  - Purchase of materials for installation of new traffic control devices such as signs or signals or replacement of obsolete signs or signals

  - Transportation safety research, studies or public information initiatives such as sign inventories, work zone safety, or collecting accident data

- Form of Funding: The program is structured as a grant. Applications must be submitted to the Department of Transportation by August 15 and awards for research or site specific improvements cannot exceed $500,000 per project.

### *Urban-State Traffic Engineering Program (U-STEP)*

This program is used to solve traffic operation and safety problems on primary roads in Iowa cities.

- Eligibility: Any Iowa city

- Eligible uses: In general eligible projects fall into two categories: spot improvements and linear improvements. Spot improvements are limited to single locations, while linear improvements can span two or more intersections.

- Form of Funding: The program is structured as a grant with a maximum of $200,000 for spot improvements and $400,000 for linear improvements. The city is obligated to provide a minimum match of 45% of the construction cost. Applications are accepted all year with an average of 90 days to receive a decision. Additionally, applications must include an engineering analysis of the problem.

### *Resource Enhancement and Protection (REAP)*

This program invests in the enhancement and protection of the state's natural and cultural resources. REAP provides money for projects through state agency budgets or in the form of grants. Several aspects of REAP also encourage private contributions that help accomplish program objectives. This program is funded from the state's Environment First Fund (Iowa gaming receipts) and from the sale of natural license plates. The program is authorized to receive $20 million per year until 2021, but the state legislature sets the amount of REAP funding every year. $12 million was allocated for the program in 2012.

- Eligibility: The City Parks and Open Space portion of REAP funding grants are available to cities in three categories: those with populations less than 2,000; those with populations between 2,000 to 25,000, and those with populations greater than 25,000

- Eligible uses: Parkland expansion and multi-purpose recreation developments are typical projects funded under this program.

- Form of Funding: Funded through the Iowa Department of Natural Resources (DNR), the program is structured for award of grant ceilings based on population to assure that funds are distributed across the state. These grants do not require a local match. Applications are due on August 15 annually.

### *Federal Recreational Trails Program*

The purpose of this program is to provide and maintain motorized and non-motorized recreational trails and trail-related projects.

- Eligibility: Federal and state agencies; local governments; and private individuals and organizations (if co-sponsored by a government agency)

- Eligible uses: Proposed projects must be identified in, or further a goal of, the Statewide Comprehensive Outdoor Recreation Plan (SCORP); the Iowa Trails 2000 document; or a regional, county, or local plan.

- Form of Funding: A match of 20% is required and may consist of cash, in-kind costs, and labor for which a value can be documented. Funds available under other Federal funding programs are also allowable as part of the funding match. Applications are due to the Iowa Department of Transportation (IDOT) by October 1.

### *State Recreational Trails Program*

The goal of this program is to fund public recreational trails.

- Eligibility: State or local government agencies, cities, counties, or non-profit organizations

- Eligible uses: Proposed projects must be part of a local, area-wide, regional, or statewide trail plan.

- Form of Funding: A local match of 25% is required. In-kind services and other state grants are NOT eligible as matching funds. Trails resulting from successful applications must be maintained as a public facility for a minimum of 20 years.

### *Statewide & Regional Transportation Enhancement Funding Program*

This program is in place to fund enhancement or preservation activities of transportation-related projects. Activities fall into the following categories: *trails and bicycle facilities, historic and archaeological, and scenic and environmental projects.*

- Eligibility: Public agencies and private non-profit organizations (and/or individuals) are eligible to sponsor.

- Eligible uses: Projects or areas served by enhancement activities must fit one of the following categories:

    - Facilities for pedestrians and bicycles
    - Acquisitions of scenic easements and scenic or historic sites
    - Scenic or historic highway programs, including tourist and welcome centers
    - Landscaping and other scenic beautification, including graffiti and litter removal
    - Historic preservation
    - Rehabilitation and operation of historic transportation buildings, structures, or facilities (including historic railroad facilities)
    - Preservation of abandoned railway corridors; including conversion and use of those corridors for pedestrian and bicycle trails
    - Control and removal of outdoor advertising
    - Archaeological planning and research

- Mitigation of water pollution due to highway runoff, including projects that reduce vehicle-caused wildlife mortality while maintaining habitat connectivity
- Safety and educational activities for pedestrians and bicyclists
- Establishment of transportation museums

- Form of Funding: Statewide projects are those that go beyond regional or metropolitan boundaries, enhance the state transportation system, benefit state tourism, or are consistent with statewide planning. An application form is provided by the Iowa Department of Transportation (IDOT) and is required for filing. Contact the appropriate RPA/MPO for application requirements of regional (non-statewide) projects.

  A minimum 30% local match is required for statewide projects and 20% match for regional projects which may consist of cash and/or in-kind costs and labor. As a cost reimbursement program, bills must be paid by the project sponsor prior to filing a request for reimbursement. In order to offset administrative costs, minimum total project size for statewide enhancements will generally be over $100,000. Statewide project applications are due on October 1 annually.

### *Community Attraction and Tourism (CAT)*

The aim of this program is to assist communities in the development and creation of multiple purpose attraction or tourism facilities.

- Eligibility: Eligible applicants include a city, county, or public organization (or combination of these entities forming a 28E agreement pursuant to Iowa Code), or a school district in cooperation with a city or county. A "public organization" is a nonprofit economic development group or other nonprofit organization that sponsors or supports community or tourism attractions and activities. One-third of the funds available through the CAT program shall be allocated to projects in cities with populations of 10,000 or less, and/or counties that are among the 33 least populated counties in Iowa. If any portion of these funds has not been awarded by April 1, the funds shall be available for any community or county in the state.

- Eligible uses: Community attraction projects may include, but are not limited to: museums, theme parks, cultural and recreational centers, recreational trails, heritage attractions, sports arenas, and other attractions.

- Form of Funding: Evidence of broad-based community support for a project, both philosophical and financial, is needed to fulfill this requirement. CAT funding may not constitute more than 50% of the total project costs. Up to 25% of local match may be in the form of in-kind or non-financial contributions, which may include but are not limited to the value of labor and services. A need for CAT funding must be shown after other financial resources have been committed for the proposed project.

5.32

6.1

# Education & Outreach

Presentation and Deliverables

6.2

# Education & Outreach

## Section 1: Introduction

Education and Outreach was one common element to each of the four study areas considered during the Community Development Block Grant (CDBG), administered through the Iowa Economic Development Authority (IEDA). The educational component to this study was put in place to provide the member communities of **Common** THREAD with the information prepared during study efforts. In particular, the processes by which the project team inventoried, evaluated and prepared recommendations were presented in a discussion for each of the four study areas:

- Water Treatment Plant
- Wastewater Treatment Facility & Recycling Center
- Cultural District Lighting
- Multi-Modal Transportation Infrastructure

In a partnership effort between Bolton & Menk, Iowa State University Extension and Outreach, and Greater Dallas County Development Alliance, the study material was packaged into an educational presentation and delivered to community leaders, staff, and residents of **Common** THREAD in public forums held in the following communities:

- Perry
- Coon Rapids
- Ogden
- Huxley
- Dallas Center

In addition to providing these educational forums to the **Common** THREAD communities, the project team also prepared flash drives containing the educational forum presentation materials, literature on local, regional, state, and federal programs available to homeowners, businesses, and communities regarding energy reduction and efficiency, and related studies for future reference. These flash drives were made available to participants in attendance at each of the education forums, with remaining drives being turned over to the City of Perry and **Common** THREAD for further distribution to community leaders.

The following pages contain information prepared as part of the educational forum process. This includes presentation slides, forum announcements, and sign-in sheets for each of the sessions.

6.4

common thread

# PLEASE JOIN US!

Learn how the results of Perry's Sustainability Planning Grant through the Iowa Economic Development Authority (IEDA) could be beneficial to your community. The Planning Grant targeted four areas:

- Water Treatment Facility
- Wastewater Treatment Facility/Alternative Energy
- Cultural District Lighting
- Multi-modal Transportation

Also learn how residents can take advantage of these concepts to reduce their home energy use.

## COMMON THREAD COMMUNITIES

# SUSTAINABILITY FORUM

**August 14 – 1PM** @ Perry Towncraft [1124 Willis Ave.]
* **August 14 – 6PM** @ Perry Towncraft [1124 Willis Ave.]
*Presentation in ENGLISH and SPANISH
**August 27 – 6PM** @ Coon Rapids City Hall [123 3rd Ave. S]
**August 28 – 6PM** @ Ogden City Hall [513 W. Walnut]
**August 29 – 6PM** @ Huxley Community Rm. [515 N. Main]
**August 30 – 6PM** @ Dallas Center Memorial Hall [1502 Walnut]

Bolton & Menk, Inc., in association with Iowa State University Extension and Outreach & Greater Dallas County Development Alliance

common thread

# Sign In Sheet

**Attending Meeting August 14 @ 1 p.m.**

| Name | City | Phone | Email |
|---|---|---|---|
| Josh Shields | Ames | (515) 460-1399 | joshsh@bolton-menk.com |
| Paul Thompson | Woodward | (515) 360-7548 | pctmjt@netins.net |
| Sven Peterson | Perry | (515) 418-8239 | svenp@iastate.edu |
| Steve Tibbles | Perry | (515) 314-9621 | Steve.tibbles@perryia.org |
| Laura Pieper | Perry | (515) 465-4666 | lpieper@theperrychief.com<br>news@theperrychief.com |
| Peggy Stecklein | County | (515) 993-3750 | peggy.stecklein@co.dallas.ia.us |
| Bob Wilson | Perry | (515) 465-4601 | bwilson@perryia.org |
| Jack Butler | Perry | 515-360-7271 | Jack.butler@perryia.org |
| Matt Ferrier | Ames | (515)306-7026 | mattfe@bolton-menk.com |
| Butch Neibuhr | Perry | 515-465-2481 | Butch.neibuhr@perryia.org |
| Jeff Hicks | Perry (WTP) | | |
| Lou Hoger | Perry | (515) 570-2975 | prlhoger@gmail.com |
| Jim Harbaugh | Urbandale | 515-664-5333 | jimha@bolton-menk.com |
| Alan Vandehaar | Granger | 515-231-6513 | alanv@iastate.edu |
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6.6

# Sign In Sheet

**Attending Meeting August 14 @ 6 p.m.**

| Name | City | Phone | Email |
|---|---|---|---|
| Josh Shields | Ames | (515) 460-1399 | joshsh@bolton-menk.com |
| Carina Burgos | Perry | (515) 465-4860 | |
| Rosa M. Gonzales | Perry | (515) 490-2298 | rdegonza@iastate.edu |
| Marlen Juarez | Perry | (515) 423-4147 | spanishacademyiowa@hotmail.com |
| Barb Wolling | Perry | (515) 465-2017 | Barb.wolling@gmail.com |
| Daniel Rivera | Perry | (515) 465-3521 | drivera@racoonvalleybank.com |
| Judy Jaimes | Perry | (816) 596-2536 | |
| Maria Jaoma | Perry | | |
| Fidel Enriquez | Perry | (515) 465-2487 | |
| Cesilia Gonzalas | Perry | (515) 465-20125 | |
| Derenise Rosas | Perry | (515) 465-20125 | |
| Ignacio Calderon | Perry | (515) 210-4805 | |
| Butch Neibuhr | Perry | 515-465-2481 | Butch.neibuhr@perryia.org |
| Jim Harbaugh | Urbandale | 515-664-5333 | jimha@bolton-menk.com |
| Alan Vandehaar | Granger | 515-231-6513 | alanv@iastate.edu |

common thread

# Sign In Sheet

**Attending Meeting August 27 @ 6 p.m.**

| Name | City | Phone | Email |
|---|---|---|---|
| Jeff Anthofer | Coon Rapids | (712) 999-6505 | |
| Doug Carpenter | Coon Rapids | (712) 999-9478 | dpcarp@crmu.net |
| Charles Nixon | Coon Rapids | (712) 830-3646 | |
| Butch Neibuhr | Perry | 515-465-2481 | Butch.neibuhr@perryia.org |
| Jim Harbaugh | Urbandale | 515-664-5333 | jimha@bolton-menk.com |
| Alan Vandehaar | Granger | 515-231-6513 | alanv@iastate.edu |

6.8

common thread

# Sign In Sheet

**Attending Meeting August 28 @ 6 p.m.**

| Name | City | Phone | Email |
|---|---|---|---|
| Josh Shields | Ames | (515) 460-1399 | joshsh@bolton-menk.com |
| Keith Berg | Ogden | (515) 275-2917 | ogdenmayor@netins.net |
| Donovan Olson | Ogden | (515) 275-2917 | donovanolson@netins.net |
| Butch Neibuhr | Perry | 515-465-2481 | Butch.neibuhr@perryia.org |
| Alan Vandehaar | Granger | 515-231-6513 | alanv@iastate.edu |

common thread

# Sign In Sheet

**Attending Meeting August 29 @ 6 p.m.**

| Name | City | Phone | Email |
|---|---|---|---|
| Josh Shields | Ames | (515) 460-1399 | joshsh@bolton-menk.com |
| John Haldeman | Huxley | (515) 597-2561 | jhaldeman@huxleyiowa.org |
| Travis Bakken | Huxley | (515) 597-2515 | tbakken@huxleyiowa.org |
| Jeff Peterson | Huxley | (515) 597-2256 | publicworks@huxleyiowa.org |
| Butch Neibuhr | Perry | 515-465-2481 | Butch.neibuhr@perryia.org |
| Jim Harbaugh | Urbandale | 515-664-5333 | jimha@bolton-menk.com |
| Alan Vandehaar | Granger | 515-231-6513 | alanv@iastate.edu |

6.10

# Sign In Sheet

**Attending Meeting August 30 @ 6 p.m.**

| Name | City | Phone | Email |
|---|---|---|---|
| Daniel Willrich | Dallas Center | 515-992-3891 | dwillrich@gmail.com |
| Gary Lee Stevens | Dallas Center | 515-992-3680 | glstimber@gmail.com |
| Brian Slaughter | Dallas Center | 515-992-3527 | dslaughter@dallascenter.com |
| Abbey Gilroy | Dallas Center | 515-992-3257 | a-gilroy@hotmail.com |
| Mike Kidd | Dallas Center | 515-992-3648 | manddkidd@mchsi.com |
| Mitch Hambleton | Dallas Center | 515-992-3159 | mhambleton@q.com |
| Butch Neibuhr | Perry | 515-465-2481 | Butch.neibuhr@perryia.org |
| Jim Harbaugh | Urbandale | 515-664-5333 | jimha@bolton-menk.com |
| Alan Vandehaar | Granger | 515-231-6513 | alanv@iastate.edu |

## Common Thread Utility Providers

| Community | Gas | Electric | Communications |
|---|---|---|---|
| Adel | MidAmerican | MidAmerican | CenturyLink/McLeodUSA |
| Bouton | | Alliant/Interstate Power | Webter-Calhoun Coop. Tel. Assn. |
| Clive | MidAmerican | MidAmerican | CenturyLink/McLeodUSA |
| Coon Rapids | Coon Rapids Municpal Utilities | Coon Rapids Municpal Utilities | Windstream Communications/<br>Conn Rapids Municipal |
| Cooper | | Alliant/Interstate Power | Jefferson Tel. Co. |
| Dallas Center | MidAmerican | MidAmerican | CenturyLink/McLeodUSA |
| Granger | Black Hills Energy | MidAmerican | CenturyLink/McLeodUSA |
| Guthrie Center | Guthrie Center Municipal | Alliant/Interstate Power/<br>Guthrie County REC | Windstream Communcations |
| Huxley | Alliant/Interstate Power | Alliant/Interstate Power | Huxley Coop. Tel. Co. |
| Jamaica | Alliant/Interstate Power | | CenturyLink |
| Jefferson | Alliant/Interstate Power | Alliant/Interstate Power | Jefferson Tel. Co. |
| Madrid | Black Hills Energy | Alliant/Interstate Power | Windstream Communcations |
| Minburn | MidAmerican | MidAmerican | Minburn Tel. Co. |
| Ogden | Black Hills Energy | Odgen Municipal | Odgen Tel. Co. |
| Panora | MidAmerican | Oanora Municipal/Guthrie Co REC | Panora Coop Tel. Assn. |
| Perry | MidAmerican | Alliant/Interstate Power | CenturyLink/McLeodUSA |
| Redfield | MidAmerican | Alliant/Interstate Power | Windstream Communcations |
| Rippey | Black Hills Energy | Alliant/Interstate Power | Windstream Communcations |
| Slater | Alliant/Interstate Power | Alliant/Interstate Power | Windstream Communcations |
| Woodward | Black Hills Energy | Alliant/Interstate Power/<br>Midland Power Coop | Schuyler Tel. Co. |
| Yale | MidAmerican | Alliant/Interstate Power | Prairie Tel. Co., Inc. |

# General Overview of Sustainability

**Linda Wunsch, CEcD, EDFP, LEED®AP**

Greater Dallas County
Development Alliance

# What is Sustainability?


"development that meets the needs of the present without compromising the ability of future generations to meet their own need" --World Commission on Environment and Development, 1987

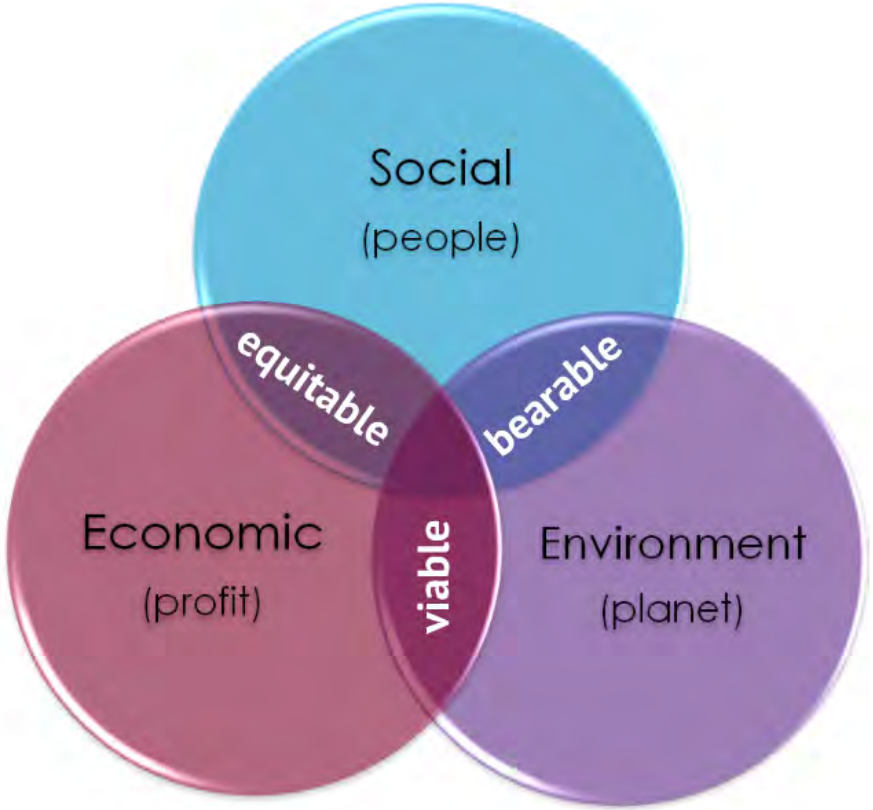
# What is Sustainability?

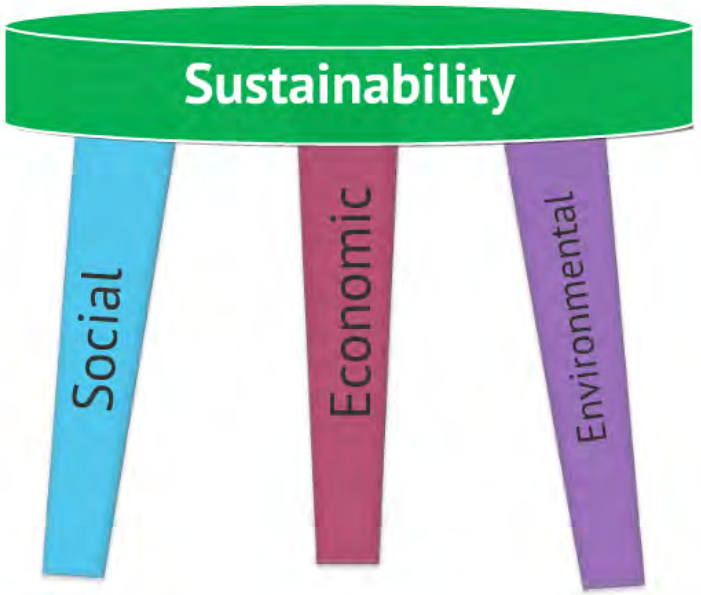
"improving the quality of human life while living within the carrying capacity of supporting eco-systems" --Caring for the Earth: A Strategy for Sustainable Living, 1991

# What is Sustainability?


Plain & Simple……"Don't take more than your share"

# Key Concepts



# sustainable vs. “green”


Green = environmental responsibility

# Sustainable Community

# Sustainable Community

## Governance

# Sustainable Community

## Transport and Mobility



# Sustainable Community
## Environment


Shops on Selborne


Farmer Paige & Chef Hilary



The Hil Restaurant


Gloriosa Event

# Sustainable Community

## Economy

# Sustainable Community Services

Parks Make Life Better!™

# Sustainable Community

## Equity & Balance

# Sustainable Community

## Diversity

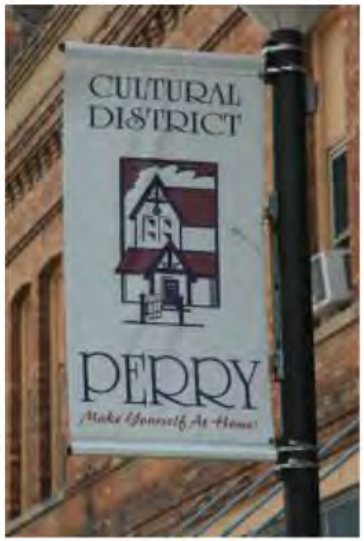

# Sustainable Community

## Mixed used

# Sustainable Community

## Identity






# Sustainable Community

## Citizens and residents participation, cooperation and involvement

# Moving Towards Sustainability

Perry Sustainability Grant Project
Funded by a Community Development Block Grant (CDBG)
Awarded by the Iowa Economic Development Authority (IEDA)
To the City of Perry, Iowa

August, 2012

# Purpose of Grant

Look at possible community upgrades aimed at reducing energy use:

- Water Treatment Plant
- Waste Water Treatment Plant
- Lighting within the Cultural District
- Multi-modal transportation

# Purpose of Grant

Share the findings (and processes) with interested member cities/residents of Common THREAD

Information will also be available for residents to reduce their energy use through assistance programs and new technologies

# Perry Sustainability Grant

Presented by Iowa State University Extension and Outreach, Greater Dallas County Community Alliance, and Bolton & Menk, Inc.

Public presentations of this material are being made during August, 2012 in these Common THREAD communities:

*Coon Rapids – Aug 27  *Ogden – Aug 28
*Huxley – Aug 29  *Dallas Center – Aug 30

# Sustainability:

The Capacity to Endure

Four areas of focus for this grant study:

- Multi-modal transportation
- Cultural District Lighting
- Wastewater Treatment Plant
- Water Treatment Plant

# Multi-modal Transportation

Multi-modal:  A connected transportation system that supports cars, bicycles, pedestrians

Comprehensive community-wide system plan will yield better results than a piece-meal approach

Why focus on multi-modal transportation?

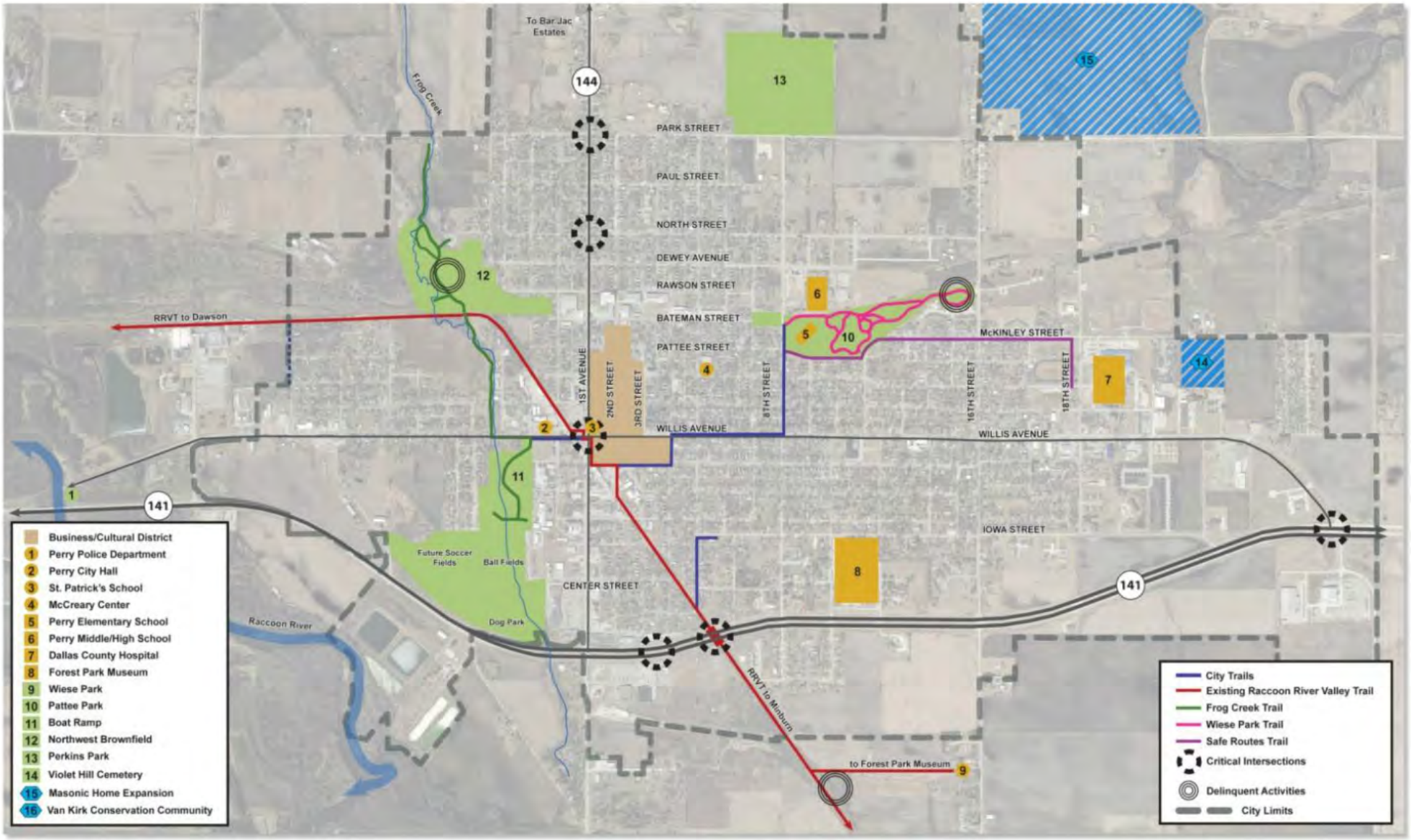
- Transportation costs are a major household expense
- Creating multi-modal infrastructure can provide alternatives to cars

# Multi-modal Process

- Inventory existing system; location and quality of trails, sidewalks
- Identify deficiencies in existing system
- Develop concepts for m-m connections
- Analyze existing corridors for feasibility
- Develop priorities plan
- Calculate planning-level cost estimates
- Identify possible funding sources

# Multi-modal Inventory

- Inventory
  - Identified locations prone to accidents
  - Identified existing trail segments, but many not connected into a larger trail system
  - Greater connectivity can encourage more walking and biking throughout the community and link to schools, downtown, parks. More walking and biking saves money, reduces wear on streets, reduces air pollution, and promotes a healthier community




PERRY
Make Yourself At Home!

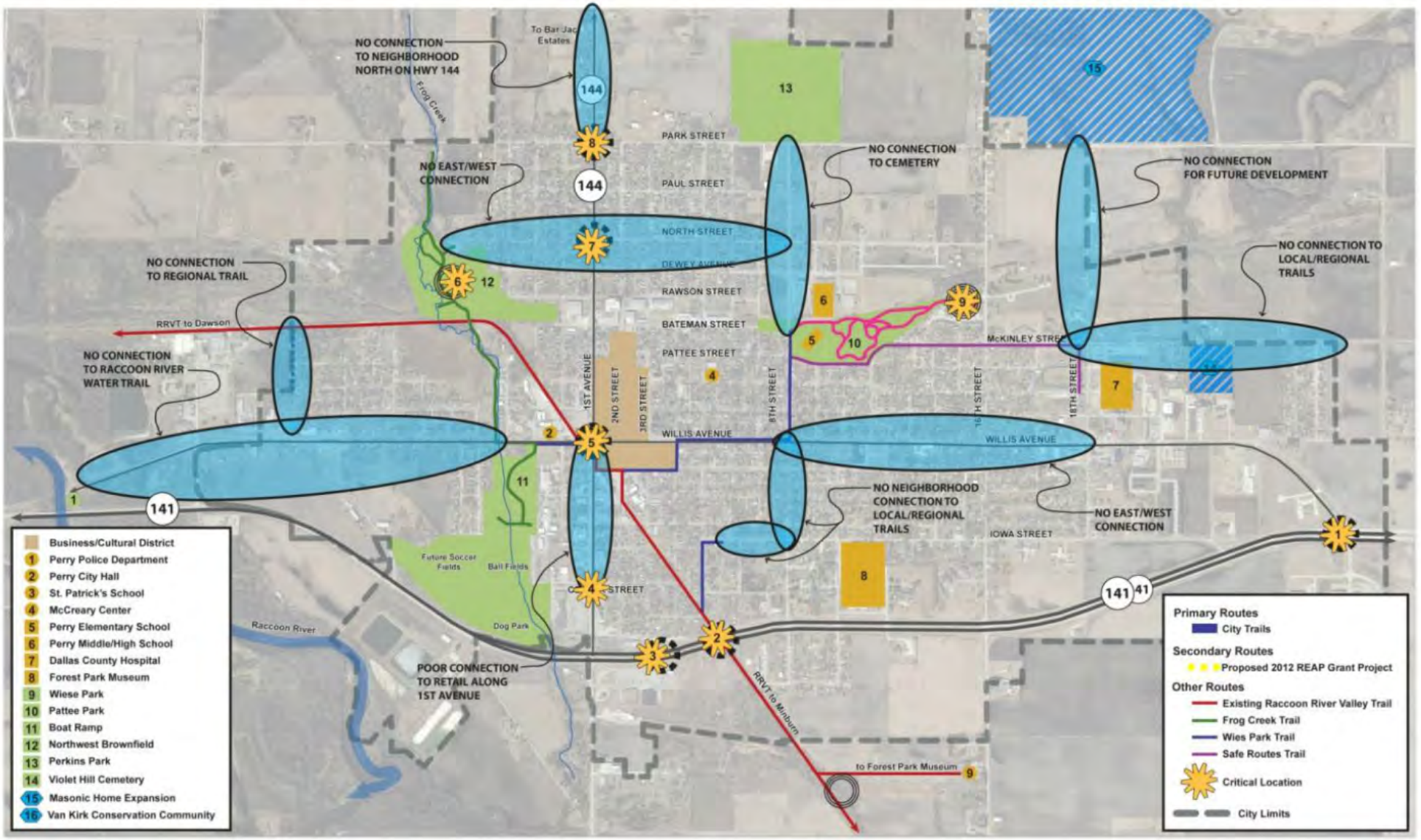
# City of Perry, IA - Sustainability Grant

Existing Conditions

BOLTON & MENK
Engineers & Surveyors

# Multi-modal Deficiencies

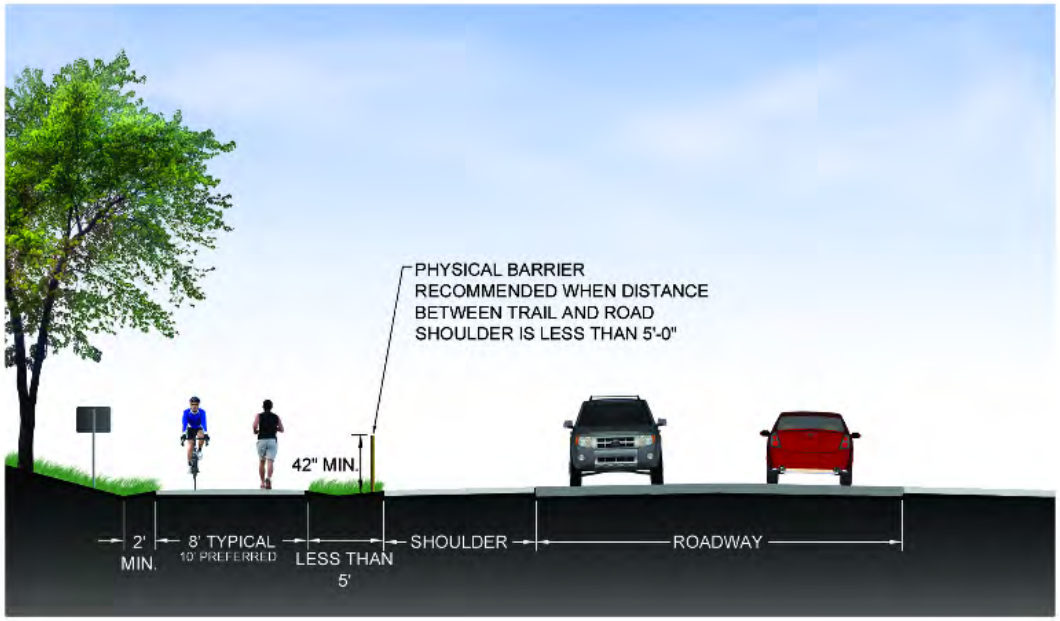
- Deficiencies  to existing system  include--
- Lack of trail system in neighborhoods
- No connections from local roads and neighborhoods to regional trail system
- Dangerous crossings and corridors for walkers, bikers
- Lack of connection to city parks
- Lack of connections to larger employers

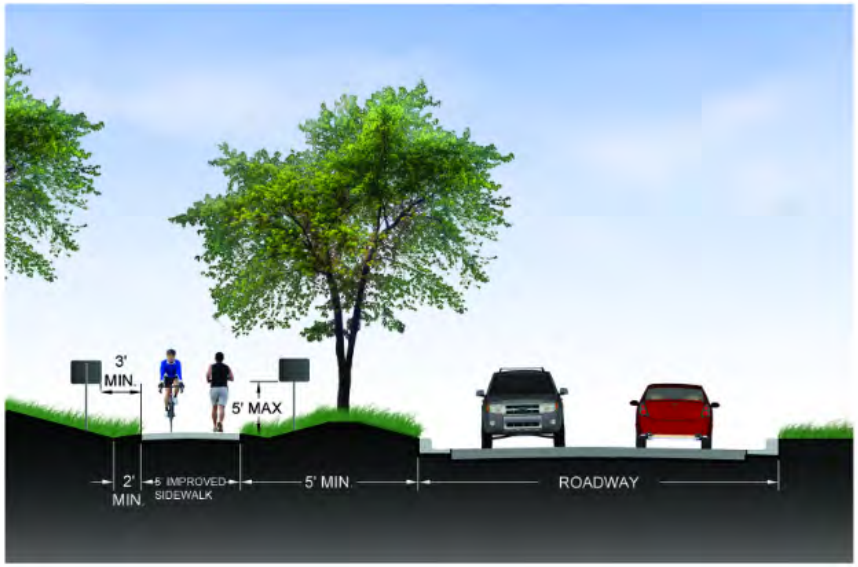

NO CONNECTION TO NEIGHBORHOOD NORTH ON HWY 144
To Bar Jac Estates
Frog Creek
NO EAST/WEST CONNECTION
NO CONNECTION TO REGIONAL TRAIL
RRVT to Dawson
NO CONNECTION TO RACCOON RIVER WATER TRAIL
PARK STREET
PAUL STREET
NORTH STREET
DEWEY AVENUE
RAWSON STREET
BATEMAN STREET
PATTEE STREET
WILLIS AVENUE
1ST AVENUE
2ND STREET
3RD STREET
8TH STREET
16TH STREET
18TH STREET
McKINLEY STREET
IOWA STREET
NO CONNECTION TO CEMETERY
NO CONNECTION FOR FUTURE DEVELOPMENT
NO CONNECTION TO LOCAL/REGIONAL TRAILS
NO NEIGHBORHOOD CONNECTION TO LOCAL/REGIONAL TRAILS
NO EAST/WEST CONNECTION
POOR CONNECTION TO RETAIL ALONG 1ST AVENUE
RRVT to Minburn
to Forest Park Museum
Future Soccer Fields
Ball Fields
Dog Park
Raccoon River
144
141
41
Business/Cultural District
1 Perry Police Department
2 Perry City Hall
3 St. Patrick's School
4 McCreary Center
5 Perry Elementary School
6 Perry Middle/High School
7 Dallas County Hospital
8 Forest Park Museum
9 Wiese Park
10 Pattee Park
11 Boat Ramp
12 Northwest Brownfield
13 Perkins Park
14 Violet Hill Cemetery
15 Masonic Home Expansion
16 Van Kirk Conservation Community
Primary Routes
City Trails
Secondary Routes
Proposed 2012 REAP Grant Project
Other Routes
Existing Raccoon River Valley Trail
Frog Creek Trail
Wies Park Trail
Safe Routes Trail
Critical Location
City Limits

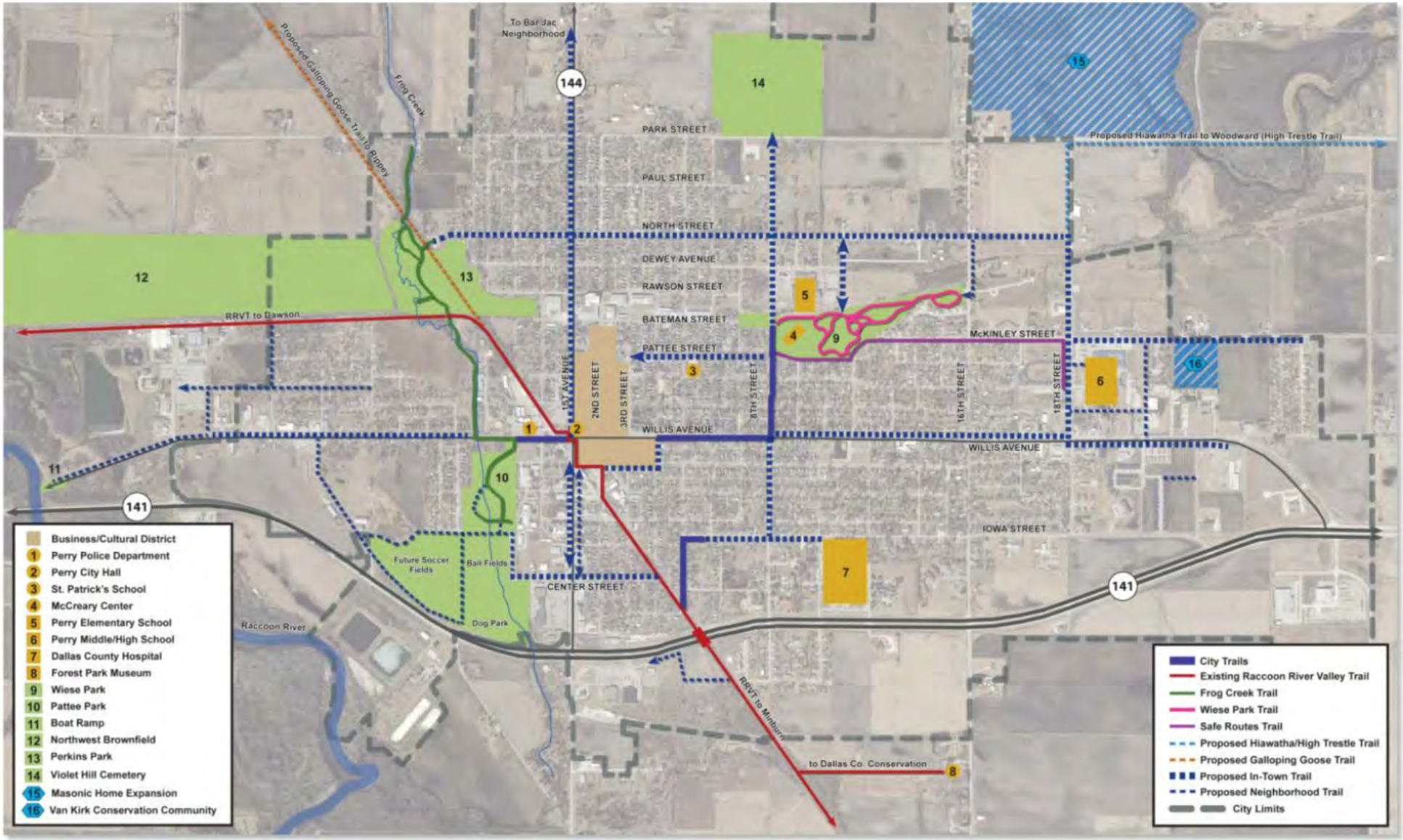
## Concepts for Multi-modal Systems

- Identified areas to establish corridors targeted for Complete Streets efforts – corridors which provide multiple forms of transportation designed to provide safety for all users

- Build travel loops in the system, creating connections throughout the community so it encourages widespread use and is safe and easy to get around the entire community, from any point in the community


PHYSICAL BARRIER
RECOMMENDED WHEN DISTANCE
BETWEEN TRAIL AND ROAD
SHOULDER IS LESS THAN 5'-0"
42" MIN.
2'
MIN.
8' TYPICAL
10' PREFERRED
LESS THAN
5'
SHOULDER
ROADWAY


3'
MIN.
5' MAX
2'
MIN.
5' IMPROVED
SIDEWALK
5' MIN.
ROADWAY




PERRY
Make Yourself At Home!

# City of Perry, IA - Sustainability Grant

## Overall Trail Master Plan

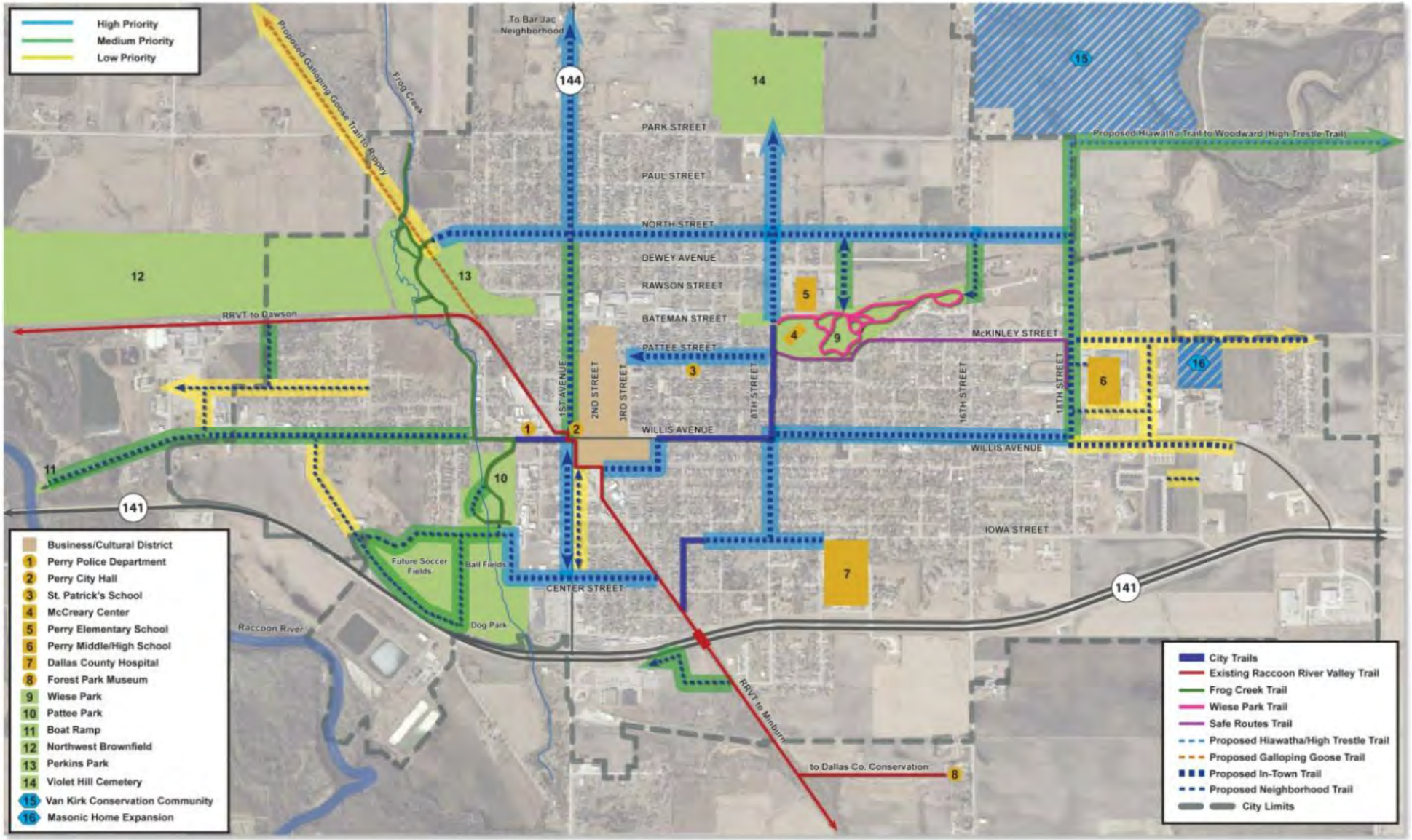
BOLTON & MENK
Engineers & Surveyors

# Develop Plan Priorities

- Phasing plan; may take years to construct
- Shows how pieces fit throughout the city
- Overall plan – big picture - valuable guide to developing of multi-modal system into the future
- Priories established based on safety, usage, connections to existing trails, and providing connections to schools, parks
- High, Medium, and Lower priorities

# High Priority Example

- Hwy 144 Connection – between North Street and 123rd Place
  - Existing – currently residents walk along Hwy 144, with speeds posted between 35 and 55mph, this is safety hazard
  - Proposed – Work with Iowa DOT, restripe road from 4 to 3 lanes, increase from 2 to 3 lanes in key areas north. Provide a 10’ shoulder, and merge into a separated sidewalk closer to Park St.




PERRY
*Make Yourself At Home!*

# City of Perry, IA - Sustainability Grant

## Multi-Modal Priorities

BOLTON & MENK
Engineers & Surveyors

# Multi-modal cost estimates

- Plan includes planning-level preliminary cost estimates for various types, lengths of trails
- Trails divided up into High, Medium, and Low priority categories for planning purposes
- Potential funding sources were identified from local, regional, state and federal sources

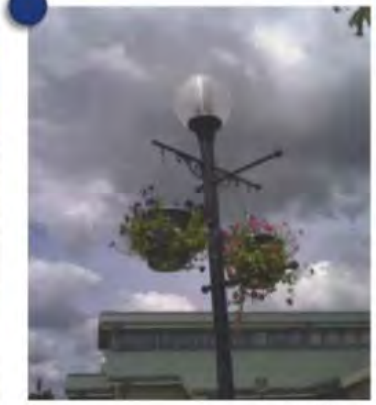
# Cultural District Lighting (Downtown Area)

- Conducted a lighting study to establish a baseline for energy consumption, used to compare potential energy savings with more energy-efficient lighting
- Inventory existing light fixtures, by street, by type of light, and wattage
- Focused on public right of way & city buildings
- Calculated kWh use/ year, with 20 year life energy costs


THIRD STREET
BATEMAN STREET
PATTEE STREET
LUCINDA STREET
WARFORD STREET
WILLIS AVENUE
OTLEY AVENUE
SECOND STREET
FIRST AVENUE
5 Globe Manufacturer (32)
1 Fixture Manufacturer (35)
3 Globe Manufacturer (10)
1 Globe Manufacturer (1)
1 Globe Lumec (29)
5 Globe Lumec (12)
1 Globe Manufacturer (20)
1 Globe Manufacturer (1)
2 Globe Manufacturer (4)
2 Fixture Manufacturer (4)

Fixture.....Compact Fluorescent
Lamp Wattage.....23 watt
Number of Globes.....5

Fixture.....Compact Fluorescent
Lamp Wattage.....23 watt
Number of Globes.....3



Fixture.....Metal Halide
Lamp Wattage.....150 watt
Number of Globes.....1

Fixture.....High Pressure Sodium
Lamp Wattage.....250 watt
Number of Globes.....1

Fixture.....Compact Fluorescent
Lamp Wattage.....35 watt
Number of Globes.....2

Fixture.....Compact Fluorescent
Lamp Wattage.....23 watt
Number of Globes.....1

Fixture.....Metal Halide
Lamp Wattage.....100 watt
Number of Globes.....1

Fixture.....Metal Halide
Lamp Wattage.....Top 1: 150 watt, Bottom 4: 50 watt
Number of Globes.....5

Fixture.....High Pressure Sodium
Lamp Wattage.....N/A
Number of Globes.....1

Fixture.....High Pressure Sodium
Lamp Wattage.....N/A
Number of Globes.....2

# Cultural District Lighting (Downtown Area)

Topics to address

- How much electricity is used?
- How much can be saved on maintenance and materials over time?
- What is the maximum usable light, and does the light illuminate what it is intended to light?
- Are lights dark sky compliant, yielding less light pollution for more natural evening environment

Example of a classic ‘traditional’ street light with LED

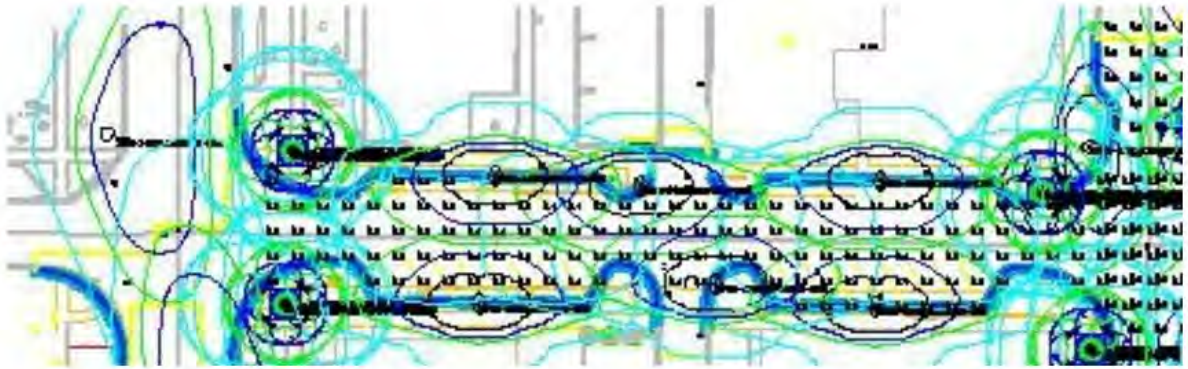
Example of an LED street light

# Cultural District Lighting (Downtown Area)

- Study focused on energy savings
- Explored alternative lighting type and luminaire options
- Examined energy savings, illumination capacity, quality of light, dimming capabilities, and life cycle cost

# Cultural District Lighting (Downtown Area)

Lucinda St



2nd Street

# Cultural District Lighting (Downtown Area)

- Energy efficient lighting source options considered in this project included

-high pressure sodium (HPS)
-metal halide (MH)
-light-emitting diode (LED)

- The study recommended concentrating on LED lights because of energy-efficiency, long-term cost savings, and color, quality and focus of light.

# Cultural District Lighting (Downtown Area)

- Some options for more energy-efficient lights, look at new fixtures, may retrofit with new bulb, or new fixture, or new fixture and pole
- May reduce the number of lights
- May select small area to experiment with new bulbs, w/ option to dim lights late at night
- New lights have both lower energy and lower maintenance costs

# Wastewater Treatment Facility (and Recycling Center)

Energy Audit

- Reviewed treatment process
- Reviewed equipment energy consumption

Equipment Considerations

- Consider variable frequency drive pumps to meet demand
  - Lagoon pumps and Sludge transfer pumps

# Wastewater Treatment Facility (and Recycling Center)

Treatment Process

- Largest power user at facility are aeration basin blowers
  - Equipment that take care of the treatment process
  - At highest need all 4 are in use
  - Is there a need for this operation use?
- Program blowers to operate more efficiently based on need
  - Lower organic periods during overnight and early morning
  - Stage dissolving oxygen concentration to a lower level will require less use of blowers

# Water Treatment Plant

Energy Audit

- Reviewed treatment process
- Reviewed equipment energy consumption as it relates to the typical day

Treatment Processes

- pH and Nitrite control
  - Control of these two elements creates a more sustainable water supply (more consistent process/energy use)
  - Reduces maintenance and operation costs

# Water Treatment Plant

Distribution and Pump Operations

- High Service pumps traditionally most significant power users at the plant
- Current configuration has 4 pumps: 2 small, 2 large
- Small pumps are being used predominantly
- Use of large pumps proved to be more efficient
    - Switching to larger pumps to fill tower can result in nearly $6,000 annual savings
    - Energy consumption reduction by this change is roughly 26%

# Water Treatment Plant

Lighting/Heating/Cooling

- Upgrade lighting in facilities to more energy efficient fixtures
- Recent operation room upgrades are  currently being put in place
  - Why heat and cool the entire plant when most of the time is spent in one location?
  - Look at needs for heating/cooling based on personnel and processes

# Value of this study

- There is money available for energy-efficiency studies and implementation
- This type of study can leverage energy grants for construction
- Could be adopted by city as public policy
- Could be adopted as part of local building code for greater energy-efficiency

# Funding Sources

- Local funding
  - Special assessments
  - Extend local option sales tax
  - City general fund
- State and Federal funding
  - Energy efficiency grant programs
  - Communication Attraction and Tourism (CAT)

# Sustainability Understanding

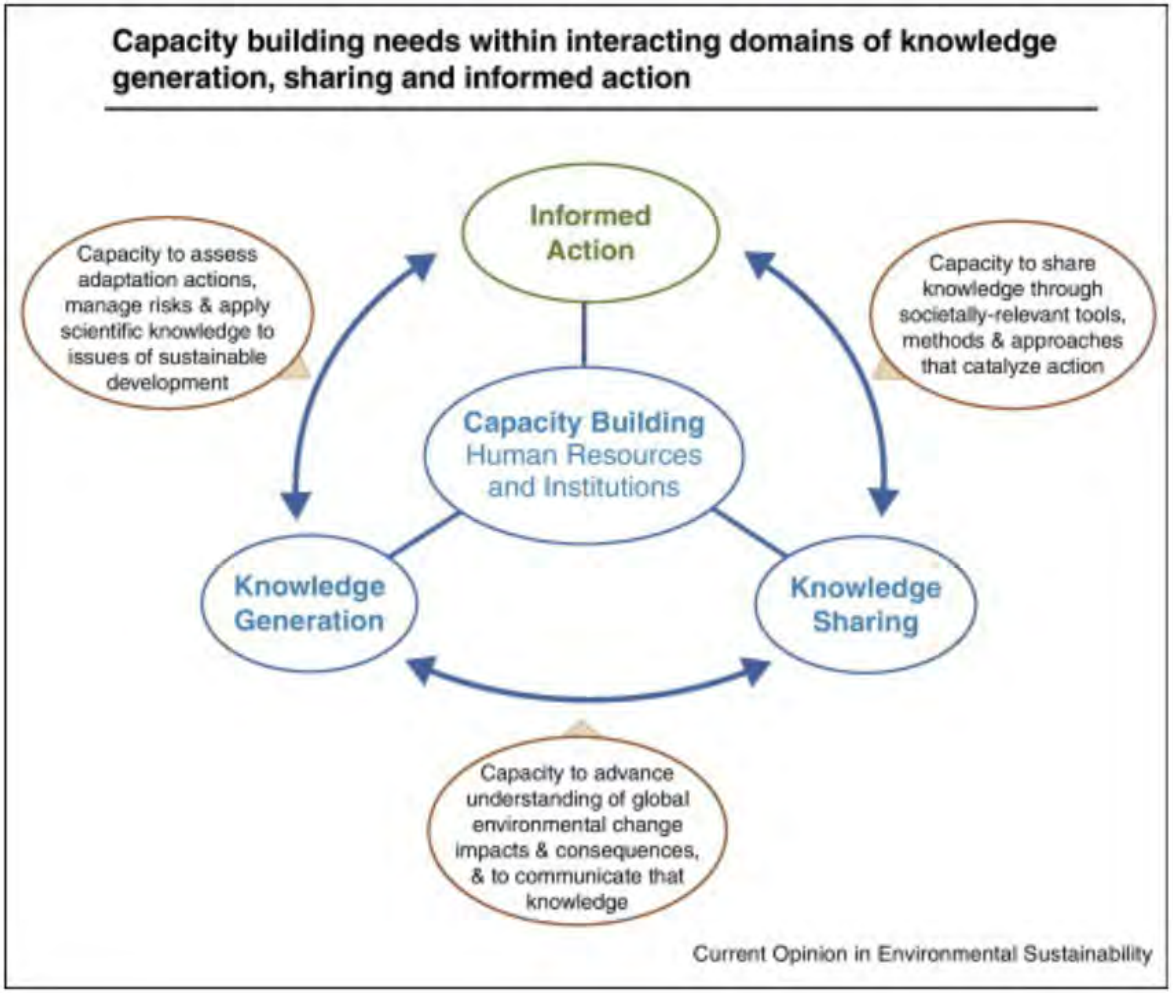
Questions to ask

- What is our current inventory
- Consider how you're using the infrastructure
- Look for ways to change operations/equipment
- Develop a plan
- Begin implementation

# Moving Towards Sustainability

# Moving Towards Sustainability: Assessment

# Moving Towards Sustainability: Capacity

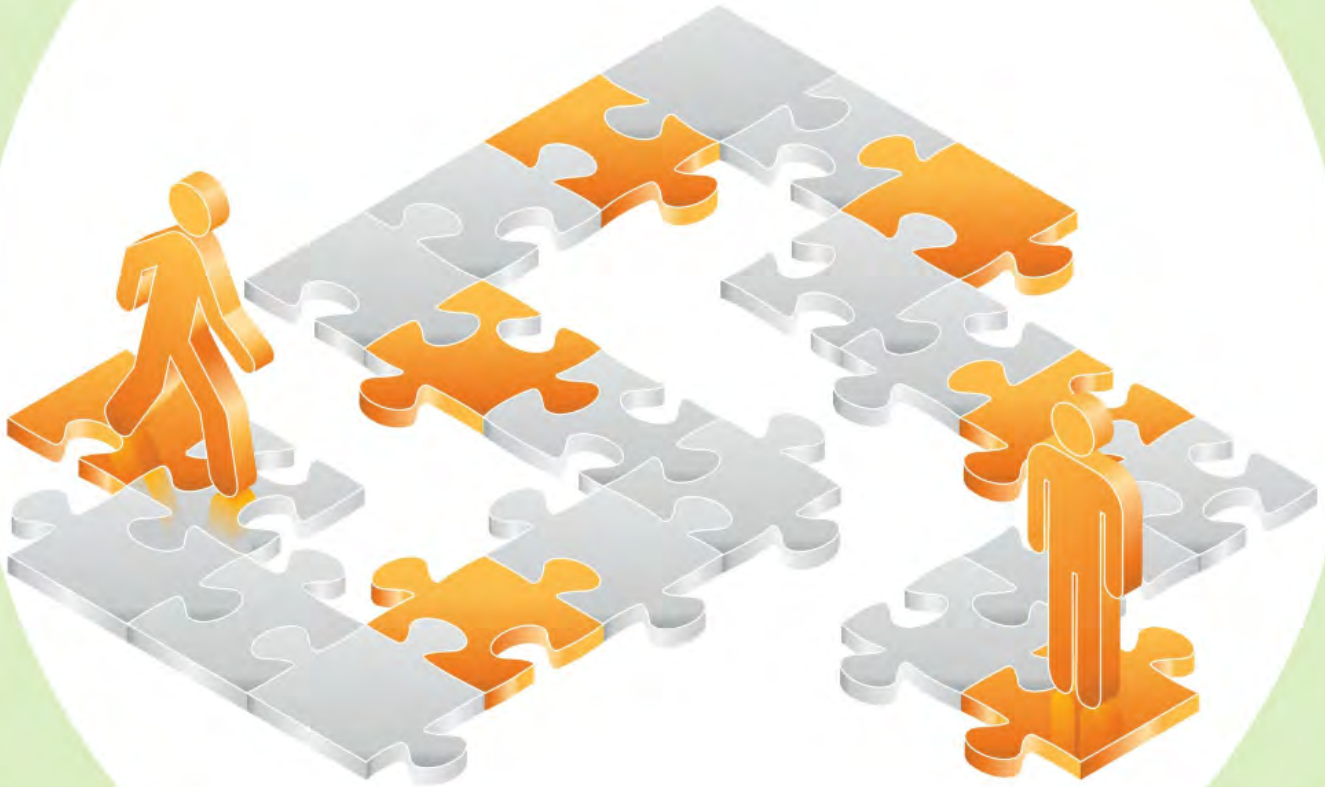


# Moving Towards Sustainability: Planning

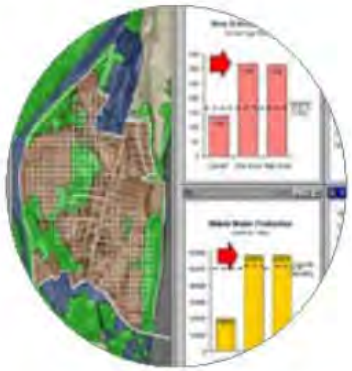
# Moving Towards Sustainability: Implementation

# Moving Towards Sustainability: Evaluation

# Resources:




Sustainable
Resources



# Placemaking

## tools for community action

Tools that engage the community
to create a future that works for everyone

CONCERN, Inc.
Environmental Simulation Center
Denver Regional Office of the U.S. Department of Energy
U.S. Department of Housing and Urban Development

# Sustainable City Plan

November
2010


## City of Middleton

THIS REPORT IS FORMATTED FOR DOUBLE SIDED PRINTING

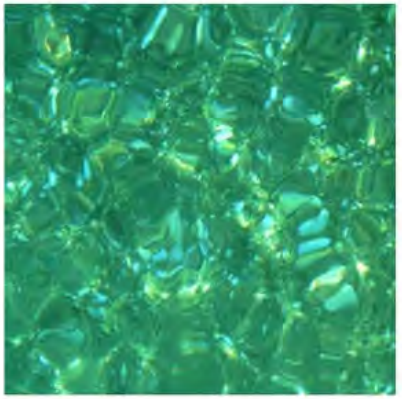
PREPARED BY MSA PROFESSIONAL SERVICES, INC.
SEVENTH GENERATION ENERGY SYSTEMS, AND GDS ASSOCIATES

SMART GROWTH
NETWORK

# Putting Smart Growth to Work in Rural Communities



ICMA *Leaders at the Core of Better Communities*



An Overview of the 2012

# International Green Construction Code

IgCC

SAFE & SUSTAINABLE BY THE BOOK

INTERNATIONAL CODE COUNCIL



# Sustainable Community Development Code

A Code for the 21st Century

**Beta Version 1.2** ***Revised: 1-30-09***

RMLUI
ROCKY MOUNTAIN LAND-USE INSTITUTE



# Essential Smart Growth Fixes for Rural Planning, Zoning, and Development Codes

EPA United States Environmental Protection Agency

Adopted October 19, 2009

Published November 20, 2009

THE CITY OF DUBUQUE
*Masterpiece on the Mississippi*

# UNIFIED DEVELOPMENT CODE
# CITY OF DUBUQUE, IOWA

Planning Services Department
City Hall
50 West 13th Street
Dubuque, IA 52001-4864
(563) 589-4210 phone
(563) 589-4221 fax
(563) 690-6678 TDD

# Environmental Sustainability Policy

Sustainability Victoria supports, encourages and assists Victorians to use our resources more efficiently and reduce our everyday environmental impacts. This is in accordance with the vision and objectives contained in Victoria's Environmental Sustainability Framework (Our Environment Our Future).

Sustainability Victoria will deliver environmentally sustainable outcomes for energy, materials and water, across all sectors of the Victorian economy and community. In support of this we are committed to leading by example, in particular through environmentally sustainable practices in our work place and activities.

This commitment will be met by:

- Understanding the environmental aspects and impacts of our activities.
- Where appropriate changing the way that we operate.
- Ensuring that all staff and our contractors are aware of the expectations placed on them.
- Measuring our performance against agreed objectives and targets.

Our objectives and targets are developed by the EMS Management Team and approved by the SV Executive Team.

To ensure these outcomes are achieved, Sustainability Victoria will develop and implement an Environmental Management System (EMS), certified to ISO 14001. We will ensure that all legal and other government commitments are met and exceeded where possible, and that we continually strive to improve against our benchmarks.

Sustainability Victoria will endeavour to continually reduce its ecological footprint by:

- Committing to principles of pollution prevention and continual improvement.
- Purchasing with waste avoidance and reduction of environmental impacts in mind.
- Striving towards zero waste to landfill through waste reduction, reuse and recycling.
- Minimising the use of water.
- Minimising the production of greenhouse gases through efficient practices of energy usage in the office environment, commuting and use of vehicles.
- Offsetting Scope 1 and 2 greenhouse gas emissions to achieve a carbon accountable organisation.

We will achieve this by:

- Engaging with suppliers and stakeholders to reduce the lifecycle impacts of our operations and products.
- Influencing events we support through our sponsorships to be carbon neutral and low waste.
- Training and supporting staff to work within the EMS framework to reduce their work and personal lifestyle impacts.
- Managing, monitoring and measuring resource use through implementation of best practice procedures.

Our achievements in terms of the agreed whole-of-government commitments will be monitored regularly, audited regularly and published in our annual report.

**Anita Roper**
**Chief Executive Officer**
**Sustainability Victoria**
**Apr 2010**

**Mike Waller**
**Chair of Sustainability Victoria**
**Apr 2010**

**Review Date: Mar 2012**

EPA
United States
Environmental Protection
Agency

# Sustainable Design and Green Building Toolkit

## FOR LOCAL GOVERNMENTS

EPA 904B10001 | June 2010

# Supporting Sustainable Rural Communities

## Partnership for Sustainable Communities

In collaboration with the U.S. Department of Agriculture

USDA

Fall 2011

PARTNERSHIP FOR

**Sustainable Communities**

*In collaboration with the U.S. Department of Agriculture*

# Federal Resources for Sustainable Rural Communities


# Iowa
# Green Streets
# Criteria


**Version 3.0**

**For Projects Awarded in 2012**

**www.iowaeconomicdevelopment.com/community**

IOWA

# Resources: Utility Energy Efficiency Programs

RESIDENTIAL PROGRAMS

- Home Energy Audit & Insulation
- Heating, Cooling & Water Heating
- New Home Construction

# Resources: Utility Energy Efficiency Programs

BUSINESS PROGRAMS

- Business Energy Audit Program
- Heating & Cooling Equipment
- Commercial New Construction
- Business Efficiency Cash-Back Rewards Program

| Community | Gas | Electric | Communications |
|---|---|---|---|
| Adel | MidAmerican | MidAmerican | CenturyLink/McLeodUSA |
| Bouton | | Alliant/Interstate Power | Webter-Calhoun Coop. Tel. Assn. |
| Clive | MidAmerican | MidAmerican | CenturyLink/McLeodUSA |
| Coon Rapids | Coon Rapids Municipal Utilities | Coon Rapids Municipal Utilities | Windstream Communications/Coon Rapids Munic. |
| Cooper | | Alliant/Interstate Power | Jefferson Tel. Co. |
| Dallas Center | MidAmerican | MidAmerican | CenturyLink/McLeodUSA |
| Granger | Black Hills Energy | MidAmerican | CenturyLink/McLeodUSA |
| Guthrie Center | Guthrie Center Municipal | Alliant/Interstate Power, Guthrie County REC | Windstream Communcations |
| Huxley | Alliant/Interstate Power | Alliant/Interstate Power | Huxley Coop. Tel. Co. |
| Jamaica | Alliant/Interstate Power | | CenturyLink |
| Jefferson | Alliant/Interstate Power | Alliant/Interstate Power | Jefferson Tel. Co. |
| Madrid | Black Hills Energy | Alliant/Interstate Power | Windstream Communcations |
| Minburn | MidAmerican | MidAmerican | Minburn Tel. Co. |
| Ogden | Black Hills Energy | Odgen Municipal | Odgen Tel. Co. |
| Panora | MidAmerican | Panora Municipal/Guthrie Co REC | Panora Coop Tel. Assn. |
| Perry | MidAmerican | Alliant/Interstate Power | CenturyLink/McLeodUSA |
| Redfield | MidAmerican | Alliant/Interstate Power | Windstream Communcations |
| Rippey | Black Hills Energy | Alliant/Interstate Power | Windstream Communcations |
| Slater | Alliant/Interstate Power | Alliant/Interstate Power | Windstream Communcations |
| Woodward | Black Hills Energy | Alliant/Interstate Power, Midland Power Co-op | Schuyler Tel. Co. |
| Yale | MidAmerican | Alliant/Interstate Power | Prairie Tel. Co., Inc. |

# Resources: Funding Assistance

**What kind of assistance is available for initiatives?**

Grants
Private Resources
Economies of Scale

# Resources: What does your jump drive contain?

# Thank You!