City of Springfield - Greene County, Missouri

Stormwater Management Task Force Meeting

Date: Thursday, January 17, 2013
5:00 to 7:00 p.m.

Location: Public Safety Center
330 West Scott Street
Springfield, Missouri 65802

Map to meeting site on page 2

Meeting purposes:

- Select guiding principles to assist the Task Force members in their role, process, and issues to be addressed.
- Provide background on Infrastructure Repair & Replacement Efforts:
  - What is the City and County doing to repair & replace the existing systems?
  - What still remains to be accomplished?
  - Where should the community focus its efforts to reinvest in the existing infrastructure so that it functions properly?

AGENDA

5:00 p.m.	Welcome	Co-Chair Fred Palmerton Co-Chair Dan Hoy
5:10 p.m.	Repair & Replacement Infrastructure	Todd Wagner, City of Springfield Kevin Barnes, Greene County
5:30 p.m.	Survey Results & Task Force Discussion	Sheila Shockey
6:45 p.m.	Next steps - Information needed for upcoming meetings	Sheila Shockey
6:55 p.m.	Closing Remarks	Co-Chair Fred Palmerton Co-Chair Dan Hoy
7:00 p.m.	Adjourn	

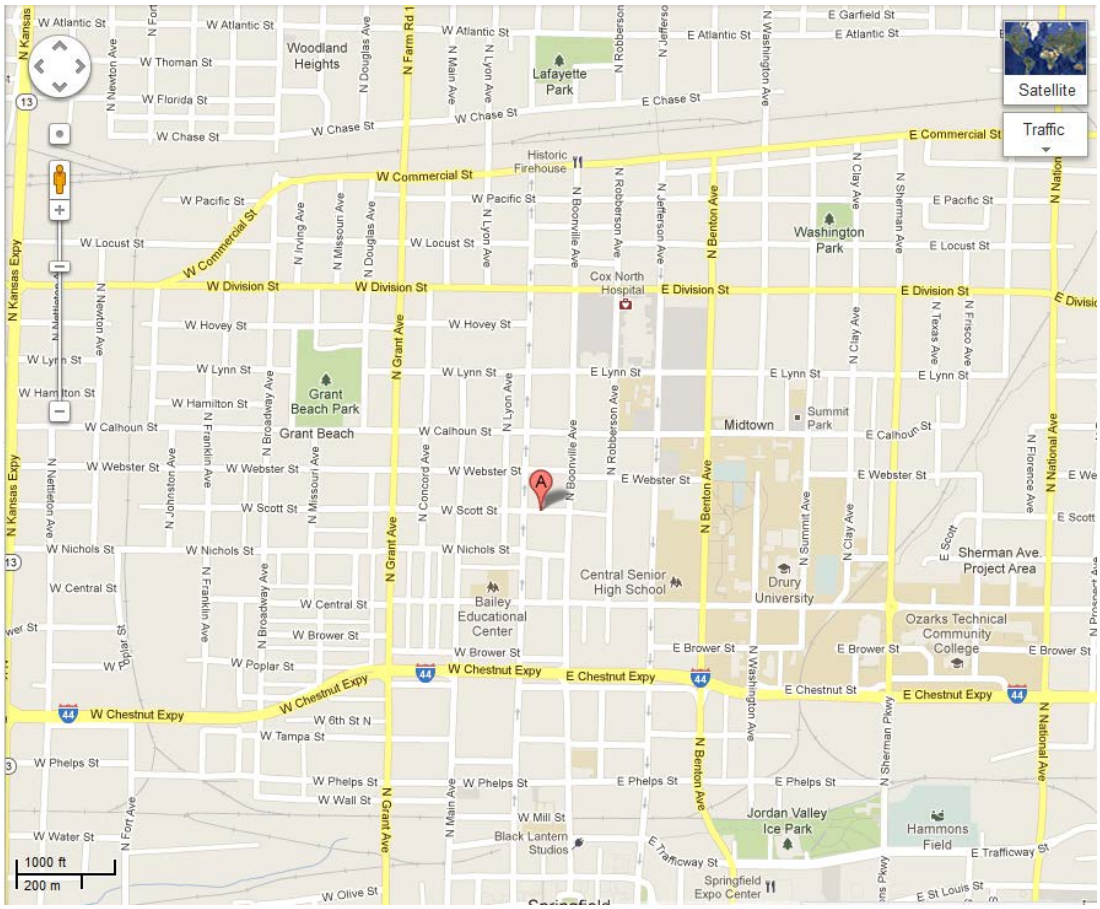
In accordance with ADA guidelines, if you need special accommodations when attending any City meeting, please notify the City Clerk's office at 864-1443 at least three days prior to the scheduled meeting.

Handouts:

1. Task Force Meeting #3 Notes pages 3-5
2. Repair & Replace Infrastructure pages 5-14

Meeting Site:

Public Safety Center
330 West Scott Street
Springfield, MO 65803
For assistance call (417) 864-1901 or (417) 818-6091



Directions:

From the North: Travel south on N. Kansas Expressway to Chestnut Expressway. Turn left or east and travel to North Booneville Avenue. Turn left and proceed 3 blocks to Scott Street. The Public Safety Center is on your left.

From Highway 65: Take the Division Street exit. Turn west (right if coming from the north, left if coming from the south) and travel to Booneville Avenue. Turn left and travel about 5 blocks to Scott Street. The Public Safety Center is on your right.

From the west and I-44: Take the Chestnut Expressway east to Booneville Avenue. Turn left onto Booneville Avenue and travel 3 blocks to Scott Street. The Public Safety Center is on your left.

City of Springfield/Green County, Missouri
Stormwater Management Task Force Meeting #3
Meeting Summary
12/13/2012

DRAFT

The Springfield/Green County, Missouri Stormwater Management Task Force met on Thursday, December 13, 2012 at 5:00 p.m. Task Force members present were: Brian Perdue, Matthew Pierson, Eric Dove, Karen Spence, Geoffrey Butler, Dana Elwell, Dave Murray, Patrick Harrington, Stacy Armstrong, Fred Schlegel, Andy Hosmer, Ronda Headland, Casey Haynes, Dan Hoy, Tom Kissee, Bill Bretall, Chris Macioce, and Tom DeWitt. Greene County staff present included: Kevin Barnes, Tim Davis, Vanessa Brandon, Tim Smith, and Karen Elmer. City of Springfield staff present included: Todd Wagner, Carrie Lamb, Sarah Davis, Barbara Lucks, Fred Marty, Kimberly White, Jan Millington, Steve Meyers, Phil Broyles, Cora Scott, and Greg Burris. Others present were: Jes Wilson, AM Hydro; Milton Dickensheet, City of Nixa; Mike Pessina, HDR; Dave Fraley, City Utilities; and Sheila Shockey, Shockey Consulting Services, LLC.

Dan Hoy, Co-Chairperson, welcomed the group and asked them to introduce themselves. He asked the task force to approve the meeting minutes from the last meeting. The minutes were unanimously approved without changes.

Water Quality and Regulations Presentation:
Carrie Lamb, City of Springfield and Kevin Barnes, Greene County, made a presentation regarding the City and County water quality programs. Carrie described the waterways the City and County are trying to protect. They are important recreational features to the region. They also are the community's source of drinking water. She described the regulations to comply with in regards to the Clean Water Act and the MS4 Permit. She also described the process of establishing and complying with the Total Maximum Daily Loads (TMDLs). Carrie described what the City and County do to protect water quality that is not necessarily required by the regulations. She described the partnerships that the City, County and nonprofits in the region have to deliver educational programs about water quality. Kevin described the unique features and geology of the region and how that impacts stormwater management. He said that because of the karst geology, pollution in sinkholes flows to other water bodies including the community's drinking water supply.

Task Force Discussion:
The task force had the following conversation about the presentation.

Comment: Karst topography may be a reason to go above and beyond what the regulations say. It is important to protect our drinking water supply.

Comment: Could we have the Missouri Department of Natural Resources (MDNR) administer the Land Disturbance Permit for the City and the County? They already are involved with this process.

Response: MDNR doesn't have adequate staffing to administer the Land Disturbance Permit locally. It is also a requirement of the City's and County's MS4 permits.

Comment: Are we planning locally for the impact of climate change on stormwater?

Response: Standards are based upon average rainfall events. If climate change results in changes to annual average rainfall events, the design storms will need to be adjusted.

Response: Drury is planning for increasing drought conditions on their campus by looking at ways to better capture and utilize rainwater.

Guiding Principles Discussion:
Sheila Shockey facilitated a session with the task force discussing the guiding principles survey results. She reviewed the guiding principles that were developed at the last meeting.
The task force discussed the guiding principles. The following comments were made:

- "Fair" should be based on objective science.
- How are the people treated that were good stewards on their property from the beginning. Do they pay less?
- Public perception should include how cost-efficient and effective the stormwater practices are in reality.
- Sometimes a best practice such as native landscaping is perceived negatively by the public because of the way it looks.
- Our community has successful projects to point to so it is not so important to do quick win projects. We should develop good master plans.
- Improvement in water quality is hard for the public to see unless the pollution is visible like sediment. Macroinvertebrates are not easily seen.
- We don't want to spend all the money on planning and never get to implementation.
- We need a master plan so we can build projects that are a priority. What percentage of cost does planning usually take in stormwater. The response was about 10%. Master planning is usually a per square mile cost.
- It is important to do story-telling as part of planning to be able to see what the next steps are and convey it to the public.
- Small projects that show immediate benefits at the top of the watershed should be built early on and then we move downstream and have larger, more complex projects. We need to identify and prioritize what investments are needed.
- Projects should be built that help meet environmental mandates. The public will understand why those types of projects are needed. It is not that important to spread the projects around to all parts of the city/county.
- This isn't a park program, projects should be based on priorities and not politically based.
- Regulations are unclear and sometimes we can't meet them such as the TMDLs. Exceeding water quality regulations only if feasible. We should not aim for the minimum but we should aim for the best water quality we can afford. But if the wishlist is bigger than the resources we have then we can't exceed requirements.
- Drinking water and recreation shouldn't be in the same sentence as drinking water is so much more important. We need to understand the consequences of not meeting water quality regulations.
- The task force agreed that the principles should promote the use of best practices as it recognizes evolving state of the practice. The task force also agreed to the terms "balanced" and "evidence-based." Remove the phrase "heavy burden."

The task force came to agreement on the following guiding principles. They are:

Understandability/Public Education: Citizens should be made aware of how they can protect water quality through their actions.

Understandability/Public Education: Citizens should understand how improvements can help protect water quality and how improvement programs are funded.

Conservation: The efficient use of resources should be encouraged.

Public Benefit: The public should benefit from the investments made in stormwater management.

Innovation/Planning: The long-term stormwater management program should be flexible to adapt to new technologies and innovations.

The task force made modifications to the following guiding principles:

Environmental Stewardship: It is important to protect & improve drinking water sources and quality of water in streams in Southwest Missouri. Good stormwater management is in everyone's best interest.

Public Acceptance: The public perception should be that the stormwater management programs are balanced; decision-making is open and is influenced by public input.

Effectiveness: Stormwater management programs utilize best practices & sound science; investments that are cost-effective.

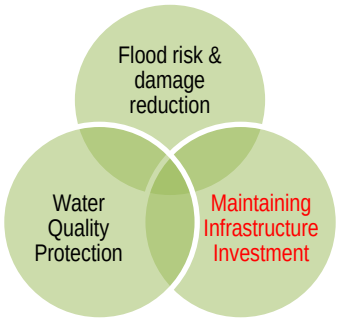
Next Steps & Closing Comments:

Sheila Shockey said the next meeting will be held on January 17 and will cover the topic of maintaining infrastructure investments.

Dan Hoy invited the task force to look at the Jordan Creek: Story of an Urban Stream book that was distributed at the beginning of the meeting. They should also look on the city's website to learn more about the water quality programs.

Adjourn at 7:00 p.m.

Maintaining Infrastructure Investment



Stormwater System Summary

The drainage system of Springfield and the surrounding Urban Service Area is an extensive network of natural and manmade channels, box culverts, pipes, inlets, junction boxes, and detention basins, both surface and underground. Example photos of these infrastructure components are shown on page 7. This system drains into several relatively small streams that originate in or near the City due to its location on a ridge. These small streams drain north into the Sac River or south into the James River. Over the last several years, the City and County have mapped their stormwater drainage systems in geographic information system (GIS) mapping databases. The map of the drainage system and streams resembles trees with branches (Figure 1). Modifications and additions to the systems occur through capital improvement projects and by private property owners through new developments. There is a process to ensure that modifications and additions to the system are added to the City and County maps once construction is complete. Other mapping corrections or additions are made in a timely manner based on ongoing field investigations and findings. The City's mapped drainage system is approximately 675 miles in length with the breakdown shown in Table 1.

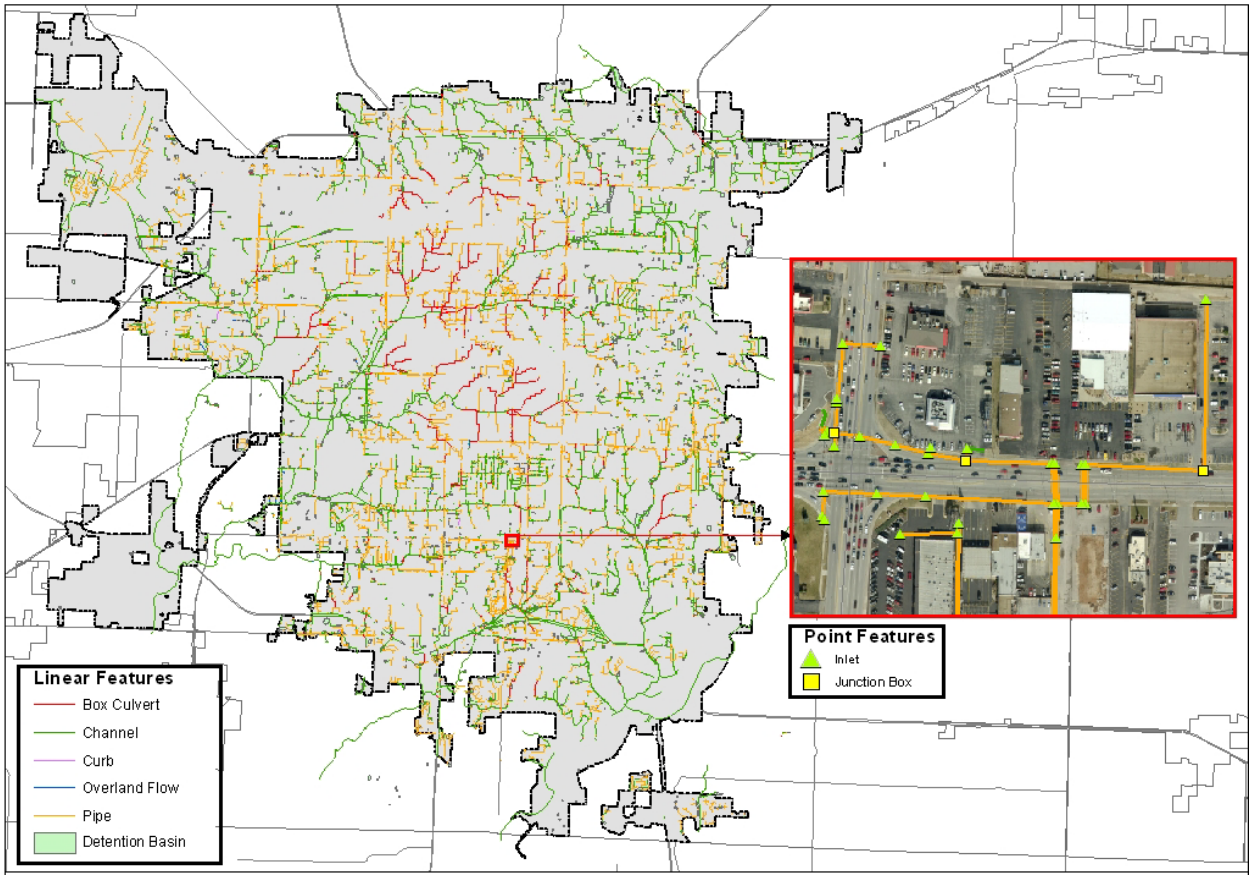


Figure 1: Springfield Stormwater Infrastructure Map

Table 1: Breakdown of the City's Stormwater System

Pipes	294 miles
Box Culverts	59 miles
Grass and Concrete Open Channels	321 miles
Inlet Structures	13,324
Junction Box Structures	1,947
Flood Control/Water Quality Basins	1,050
Best Management Practices	250

Box Culvert

Pipe

Open Channel

Inlet Structure

Junction Box Structure

Flood Control and Water Quality Detention Basins

What is the age of the City and County stormwater systems?

Much of the original stormwater infrastructure in Springfield is still in place, with structures ranging in age up to 100 years or more. Significant investment was made in the 1930's when waterways were improved in parks and Jordan Creek was enclosed in a tunnel through downtown. Beginning in the 1950's, Springfield began to see accelerated growth and expansion. But much of the infrastructure constructed from the 1950's through the 1970's had deficiencies. Many facilities were not sized adequately for existing and future development, and in many cases there were not enough inlets constructed to collect runoff adequately. In the 1980's and 1990's, the stormwater design standards for new development began to require more inlets and associated piping to ensure there was enough collection capacity to control localized flooding. These standards resulted in the large increase in pipe length and number of inlets that has occurred in the last 20 years. Figure 2 shows the mapped drainage system, color coded by age. It shows that much of the drainage system in the central part of Springfield is more than 50 years old (red in color). Note the older structures are similar in location to the box culverts shown in Figure 1. This is due to the fact that smaller, cast-in-place box culverts were much more common during that time period, prior to the development of precast production methods of reinforced concrete pipe.

Most of the stormwater infrastructure in the County is in developments that were constructed after about 1990. Most developments prior to 1990 were designed and constructed with little or no attention given to stormwater conveyance. Consequently, developments prior to 1990 have either inadequate or non-existent storm drainage which results in flooding and safety issues.

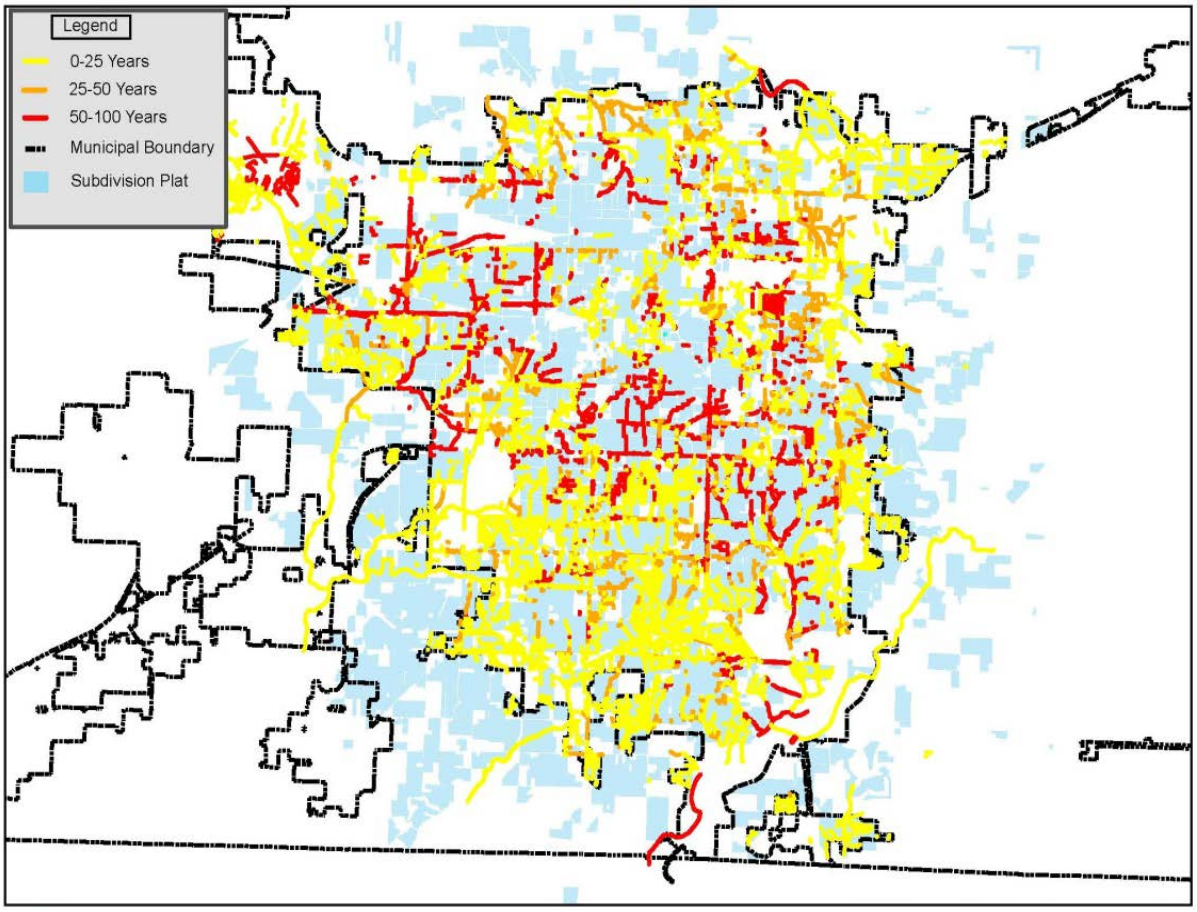


Figure 2: Map of Springfield Drainage System by Age

What is the value of the City and County stormwater systems?

The cost to replace the constructed portion of the City's stormwater system is estimated to be approximately $500 million. This averages to between $200 and $250 per linear foot. Included in this estimate is replacement of inlets and junction boxes at $3,000 each as well as replacement of large culvert structures that can cost several thousand dollars a foot. In addition, pavement replacement, utility conflicts and traffic control are some of the factors that make the cost of this work higher.

Figure 3 shows the age distribution of the drainage system in terms of length of structures. Note that nearly half, or 46 percent, of the system is less than 20 years old. This is due to the changes in design standards mentioned above, causing an increase in smaller pipes associated with more inlets. This, coupled with the construction of numerous street/drainage projects and rapid development in the last 20 years, has lead to an increase in the rate of expansion of the system. It is important to note that 27 percent, or about 100 miles, of the structural system is over 50 years old. The oldest part of the system is more likely based on a sub-standard design and is more likely to be in poorer condition with more associated repair/replacement needs. It is likely that a prioritized system condition evaluation would begin with this part of the system.

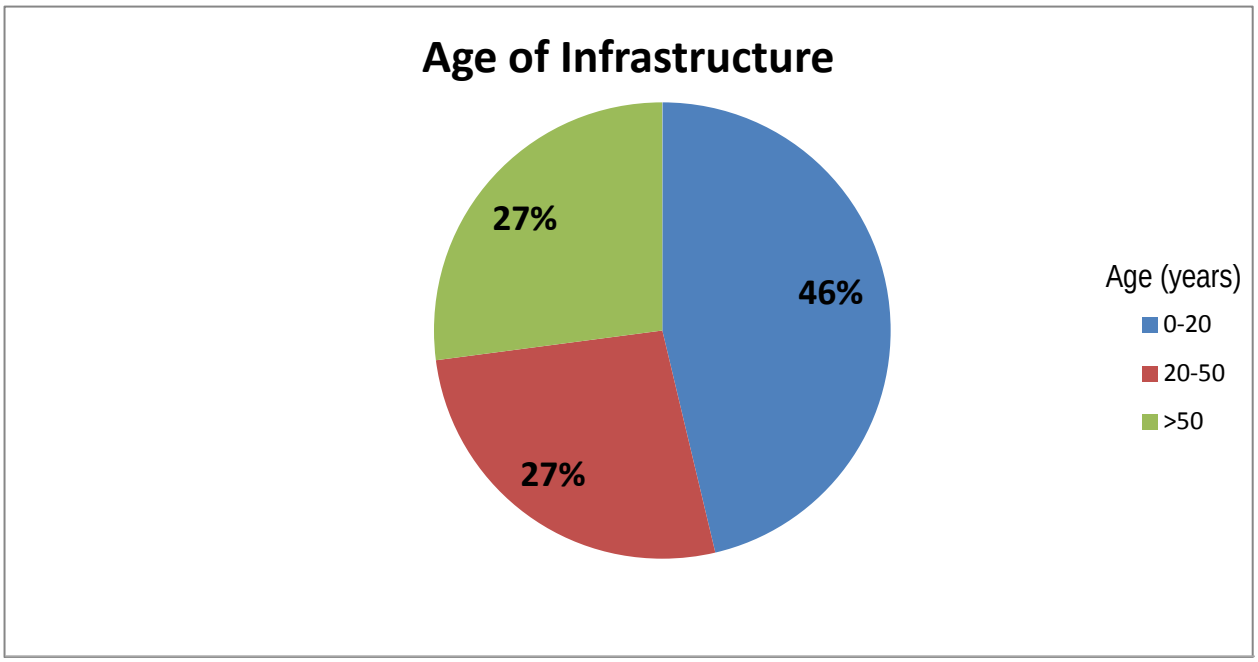


Figure 3: Age of City's Stormwater Infrastructure

Figure 4 shows a distribution of the replacement cost of the system by age. Note that the proportion of replacement cost is higher for the >50 years old category. This is due to a higher percentage of the older structures being larger and, therefore, having a higher unit replacement cost. This figure shows that 32 percent, or about $160 million, of the total value of the system is greater than 50 years old. A rough approximation of the cost to replace this part of the system over the next 50 years is $3-4 million annually, in 2013 dollars.

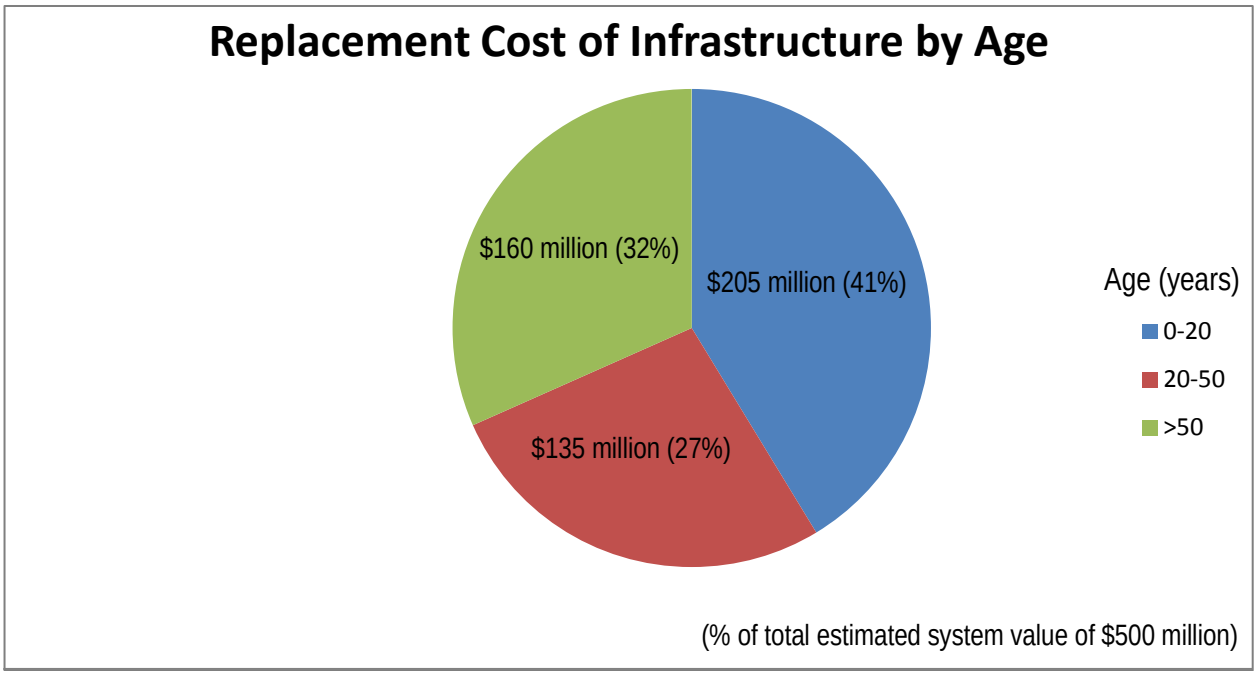


Figure 4: Replacement Cost of City's Stormwater Infrastructure by Age

The value of Greene County's total existing stormwater conveyance system within the Urban Services Area (Figure 5) is estimated to be approximately $107 million. The County's GIS inventory of the system was used to estimate the maintenance and replacement costs of the drainage system (Table 2). When estimating the unfunded maintenance needs of the existing stormwater infrastructure, the value of box culverts, curb inlets, and bridges was not included. Although these items are an integral and pivotal component of the storm water conveyance system, they are located within the right of way and maintained by the Greene County Highway Department using dedicated highway funds. In the calculation of system value it was also estimated that 50% of the pipes in the GIS inventory were also within the right of way and therefore maintained by the Greene County Highway Department. When these items with an approximate replacement value of $60.5 million are subtracted from the total there remains an estimated $47 million of existing stormwater system in Greene County's Urban Services Area for which there is no mechanism to ensure adequate maintenance, repair, or replacement.

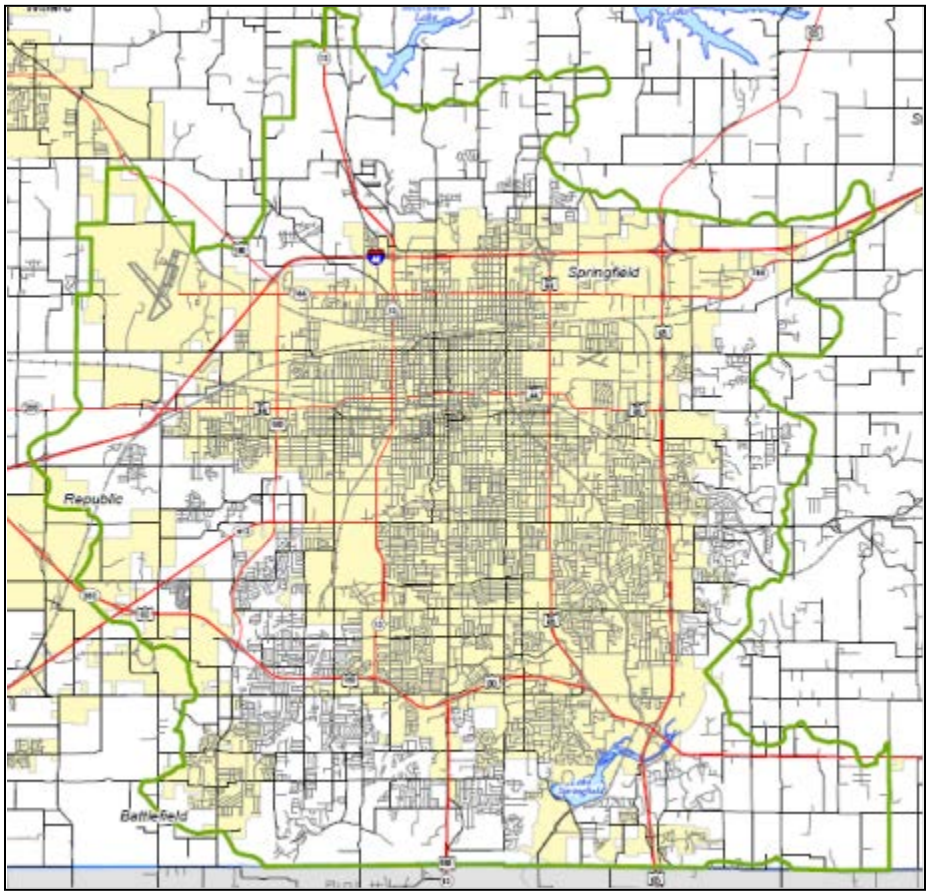


Figure 5: Urban Services Area Boundary (Green Line)

Table 2: Greene County Stormwater Conveyance System Replacement Costs

Total Estimated System Value Based on Detailed System Inventory					
	Number	Miles	feet	cost ($/ft) or (ea.)	Total
Box Culverts *	126			$23,000	$2,898,000
Pipe**		85	448800	$100	$44,880,000
Constructed Channels		22	116160	$100	$11,616,000
Inlets*	4527			$3,000	$13,581,000
Junction Boxes	282			$3,000	$846,000
Detention Basins	400			$30,000	$12,000,000
Bridges*	36			$600,000	$21,600,000
					$107,421,000

* These items on right-of-way are maintained by the Greene County Highway Department.
**50% of the pipe in the existing system was assumed to be on right of way and therefore maintained by the Greene County Highway Department

What is being done currently to maintain the City and County infrastructure investments?

Historically, there has been no long-term dedicated source to fund repair and replacement of the City's stormwater system. For that reason, repair/replacement of the system is primarily reactive in nature. This work is performed by the City's Street Maintenance crews and takes place primarily in the right-of-way. City crews also perform repair and replacement work on stormwater facilities outside the right-of-way as necessary when easements are present and maintenance has not been assigned to a property owners association or individual property owner. In addition to structural repairs/replacement, reactive maintenance includes cleaning out of debris and sediment from inlets, channels and larger accessible box culverts.

There is a crew of approximately 15 in this work group and they have numerous other duties such as snow removal, minor capital improvement projects, bridge inspections, and various other improvements not related to drainage such as streets, curbs, sidewalks and retaining walls. While this workgroup has maintenance of the stormwater system as one of its assignments, it is not dedicated solely to this function. Funding for this group is from the Motor Fuel Tax and the Use Tax with annual revenue of about $1.6 million annually. It is estimated that, on average, about 50 percent of the work done by these crews is dedicated to stormwater. It is preferred that a dedicated funding source be developed for maintenance of the stormwater system, particularly outside of the street right-of-way. A funding source to provide for a prioritized long-term proactive maintenance plan is recommended.

City-owned properties that were acquired as flood buyouts, riparian corridors, or for the construction of stormwater improvements represent another type of investment that must be maintained. The work performed in this category is primarily mowing, brush/weed control, and planting/maintenance of trees and other vegetation. Funding is about $300,000 annually and comes from the General Fund, Level Property Tax and Parks/Stormwater Tax reserves. Funding from the Level Property Tax and the Parks/Stormwater Tax are reserves from expired funding sources and will no longer be available within 2 years.

The Greene County Highway Department is tasked with maintaining all stormwater infrastructure that is within the public right-of-way in unincorporated Greene County. This includes bridge structures, most box culverts, curb inlets, roadside drainage ditches as well as about half of the stormwater pipe that is in the drainage network. The maintenance is funded by the portion of County sales tax and real property tax that is dedicated to Road and Bridge funds. The Greene County Highway Department does not maintain any stormwater infrastructure that is outside County right-of-way.

Responsibility for maintenance of storm system components such as inlets, pipes, and detention basins that are outside the public right-of-way falls to the individual property owners. In the case of most subdivisions there is a homeowner's association (HOA) that is supposed to assume maintenance responsibility. There is currently no effective mechanism to ensure that individual property owners or HOA's are performing adequate maintenance on the privately owned portions of the stormwater drainage system. Unfortunately, the result is little to no maintenance of pipes, inlets, and detention basins outside the right of way. In practice most maintenance is limited to minimal mowing of detention basins and the occasional cleaning out of trash.

What are the future needs?

There is a concern that structures over 50 years of age are nearing the end of usefulness and reliability, posing a risk to the City and the public through structural collapses or other failures (Figures 6-7). Over the next 50 years, much of the older system will require repair, replacement or a completely new plan for the drainage corridor. As mentioned above, the portion of the stormwater infrastructure system that is >50 years old has a replacement cost of about $160 million in 2013 dollars. It is recommended that the condition of the drainage system be evaluated and a prioritized long-term repair/replacement program be developed and funded to ensure the integrity of the system. Phase 1 of

this program would likely focus on evaluating the condition of the system that is known to be greater than 50 years old and funding critical repair/replacement needs found in these areas.

Figures 6-7: Examples of box culvert collapses

As previously stated, most of the stormwater infrastructure in the County is in developments that were constructed after about 1990. Most developments prior to 1990 were designed and constructed with little or no attention given to stormwater conveyance. Consequently developments prior to 1990 have either inadequate or non-existent storm drainage which results in flooding and safety issues. An estimate of the cost to bring this inadequate infrastructure up to current standards was made by multiplying the number of platted parcels (11,168) by the average per lot cost of installing stormwater conveyance in new development ($5,500). The result is an estimated $61 million needed to retrofit these developments to bring these inadequately served areas up to current standards. Figure 8 shows the extent of developments prior to 1990. The existing infrastructure replacement cost of $47 million combined with $61 million in retrofit needs gives a total unfunded value of approximately $108 million for Greene County's stormwater conveyance system. When divided over 100 years this gives an estimated annual replacement and retrofit cost of $1,080,000.

The maintenance of stormwater infrastructure on private properties in the County presents many challenges going into the future. Requiring maintenance by individual property owners places the full financial burden of system maintenance and replacement on just a few individuals even though the system benefits everyone whether in the development, or downstream of the property owner. Likewise, unless all individual owners perform adequate maintenance and replacement as needed, then as the system ages and begins to fail it can no longer provide the flooding protection and water quality functions it was designed for. Without a mechanism for adequate maintenance for the privately-owned portions of the stormwater system, flood protection and water quality will deteriorate.

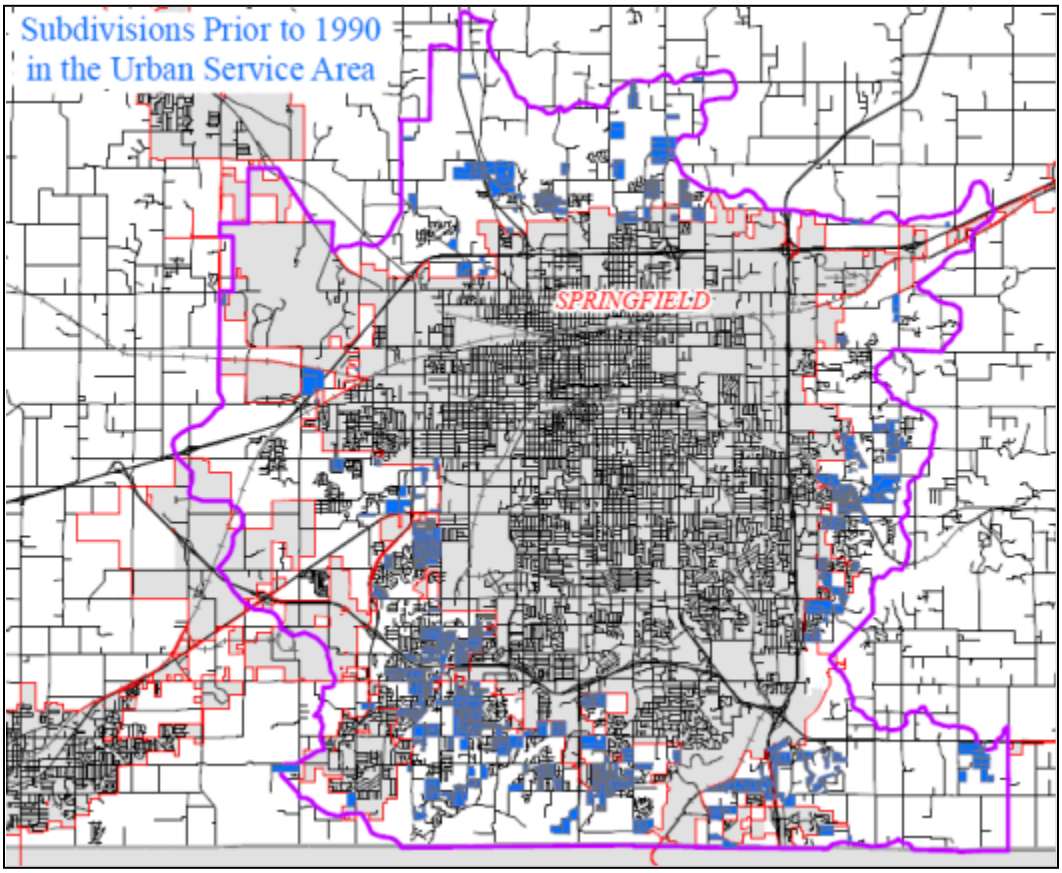


Figure 8: Greene County developments in the Urban Services Area built before 1990