CITY OF LEAVENWORTH
100 N. 5th Street
Leavenworth, Kansas 66048
www.lvks.org

CITY COMMISSION STUDY SESSION
COMMISSION CHAMBERS
TUESDAY, FEBRUARY 20, 2018 7:00 P.M.

Welcome - Please turn off or silence all cell phones during the Study Session.

Meetings are televised everyday on Channel 2 at 7 p.m. and midnight

Study Session:

POLICY REPORT
RV Parking Regulations

FEBRUARY 20, 2018

SUBJECT:

Review current RV parking regulations

Prepared By:
Julie Hurley
City Planner

Reviewed By:
Paul Kramer
City Manager

DISCUSSION:
The issue of RV parking regulations frequently comes up with normal code enforcement duties. Current regulations regarding RV parking were amended by the City Commission in January, 2017, and are as follows:

Recreational Vehicle Storage.

a. Storage:

(1) Between April 1 and October 31, the storage and parking of major recreational equipment such as boats, boat trailers, pick-up campers or coaches, camping buses or converted trucks and tent trailers shall be allowed in the front and side yard. A maximum of two (2) such recreational vehicles may be stored in the front or side yard of a property at any time. Any recreational vehicles stored in the front or side yard shall be located a minimum of 10' from the curb or edge of any street, and a minimum of 2' from any interior side lot line and shall not block any sidewalk. All recreational vehicles must be stored or parked on a paved or aggregate block surface.

(2) Between November 1 and March 31, the storage and parking of major recreational vehicles shall be prohibited in the front and side yard setbacks for a period in excess of 72 hours per month but may be stored or parked in a rear yard on a paved or aggregate block surface.

b. RV Occupation: No recreational equipment shall be utilized for living, sleeping, or housekeeping purposes when parked on a residential lot or in any location, not approved for such use, for a period in excess of 14 days per calendar year.

Generally, the side yard setback in residential districts is 6', and the front yard setback is 25'. This means that if there exists sufficient room in the front or side yard area outside of the required setback, a property owner may store an RV in that area. The time period allowed for expanded parking of RVs between April 1 and October 31 was selected to align with the open season of the City's campground, to allow for more flexibility during the months when such vehicles are typically most frequently used by owners.

The regulations regarding RV parking prior to being amended in January, 2017 were as follows:

Recreational Vehicle Storage.

a. *Storage: The storage and parking of major recreational equipment such as boats, boat trailers, pick-up campers or coaches, camping buses or converted trucks and tent trailers shall be prohibited in the front and side yard setbacks for a period in excess of 72 hours per month but may be stored or parked in a rear yard on a paved or aggregate block surface.*

b. *RV Occupation: No recreational equipment shall be utilized for living, sleeping, or housekeeping purposes when parked on a residential lot or in any location, not approved for such use, for a period in excess of 14 days per calendar year.*

The City Commission previously revised the RV parking regulations in September, 2012.

ACTION:

Provide direction to staff regarding potential revisions to regulations related to recreational vehicle storage.

STUDY SESSION POLICY REPORT
PRESENTATION BY
COMMISSIONER GRISWOLD

FEBRUARY 20, 2018

Prepared by:

Carla K. Williamson, CMC
City Clerk

Reviewed by:

Paul Kramer
City Manager

ISSUE:

Commissioner Griswold will provide a presentation to the City Commission.

POLICY REPORT PWD NO. 18-12

REVIEW DRAFT 2017 KDHE ANNUAL REPORT FOR STORMWATER

February 20, 2018

Prepared by:

Michael G. McDonald, P.E.,
Director of Public Works

Submitted by:

Paul Kramer,
City Manager

ISSUE:
Review draft annual KDHE report for 2017 stormwater activities.

BACKGROUND:
The City of Leavenworth is regulated by the Kansas Department of Health and Environment (KDHE) and US Environmental Protection Agency (EPA) as a Phase II City for stormwater purposes. The City has been required to submit an annual report on stormwater activities every year since 2003. The report is to summarize the actions the City has taken the previous year to protect and enhance stormwater quality. The guidelines for the activities to be reported on are set by the Stormwater Management Program (SMP) which was adopted by the City Commission in 2016.

The City has submitted reports in accordance with KDHE requirements in previous years. Interaction with KDHE and EPA suggest that the report be reviewed in a public forum rather than simply submitted by staff. The attached documents are a draft of the annual report for 2017. There is considerable additional information in the appendices that will be included when the report is submitted.

Staff is requesting comments and suggestions from the City Commission related to the content of the report. It is appropriate for the City Commission to seek input from the public on this matter as well.

Key narratives in the report are:

- Executive Summary
- Section C-E – (6 Minimum Control Measures)
- Section F – Recordkeeping and Reporting (Sections 1-5)
- Appendix A – Data
- Appendix C – Comments on Sampling and an Example Graph

RECOMMENDATION:
The report is due at KDHE on February 28th via digital delivery. It is recommended the City Commission adopt a resolution supporting the final draft of the report at the February 27th Commission meeting.

ATTACHMENT:
Draft Report (partial)

Section B
Executive Summary

SECTION 1: EXECUTIVE SUMMARY

To satisfy the requirements of NPDES permit, this annual report summarizes the City of Leavenworth's plans and actions to reduce the discharge of pollutants from the municipal separate storm sewer system (MS4) to the maximum extent practicable, to protect water quality, and to meet the appropriate water quality requirements of the Clean Water Act. The information contained within this report was obtained through interviews with City staff, review of permits and projects from 2017, and examining communications and publications made available to the citizens of Leavenworth.

City staff communicated the awareness of water quality with efforts in several areas during 2017. These activities continue efforts from previous years including review of the annual report, stormwater guidelines and the "Land Disturbance Permit" (LDP) process. A key addition to the work effort in 2017 was the City Commission discussion regarding implementation of a stormwater fee to fund stormwater construction projects.

There were 21 Commission meetings (study sessions and regular meetings) and two public information meetings during the course of the year. No conclusion on funding amount and collection methods was reached, and review of these matters will continue in 2018.

The importance of construction site runoff control was communicated to developers and contractors through enforcement of the "Land Disturbance Permit" requirement for nearly all construction activities. A schedule of fees was adopted in 2017 for LDPs to reinforce the program. A group meeting with contractors and others was held at City Hall to discuss the program.

The City saw overall reductions in Sanitary Sewer Overflow (SSO) events during 2017 and continued with improved clean-up of SSO situations on both public and private property. The aggressive commercial grease trap inspection program by the building inspectors continued with on-site inspections and review of maintenance records.

The City water quality sampling program for Three- and Five-Mile Creeks continued. Five storms were sampled in 2017. Improvements in staff sampling time were noted although the rapid response of local streams to rainfall creates some timing issues to meet KDHE guidelines. In a broad non-scientific overview of four years of testing data, it appears that water quality is usually diminished as it passes through Leavenworth. Three-Mile Creek generally shows a greater decrease in quality than Five-Mile Creek.

Stormwater quality and runoff control from construction projects continues to be addressed during the planning phase of projects. The Development Review Committee (DRC) provides an informal forum as well as advice and guidance to applicants prior to the detailed design process. Stormwater quantity and quality issues are discussed. The creation of the "Land Disturbance Permit" process includes standard drawings and acknowledgements by owners and/or contractors related to their responsibilities for managing water quality from their site. Requirements related to providing an "Operations and Maintenance Manual" to the owner of any water quality features have been added.

The EPA "Special Environmental Project" (SEP) was completed in 2017. This project near Ottawa Street between 7th Street and Broadway contains several water quality features in addition to the basic design to address neighborhood flooding issues. The project features are being evaluated for possible inclusion in future City and development projects.

One of the least effective parts of the stormwater management plan lies with managing existing BMPs on private developments. Lack of maintenance to detention ponds by Home Owner Associations (HOAs) continues to be a concern by both the HOAs and the City. City staff and City attorney have been working on an approach to improve responses from HOAs although no action has been taken.

City staff performed outreach to owners/operators of current detention ponds in the City during 2017. A mailing was sent out to properties with detention ponds BMPs that contained basic information on maintenance of ponds, and informed them of an upcoming meeting. This informational meeting reviewed owner responsibilities (especially keeping records of their maintenance activities) and City expectations. The meeting was well received with over ??? attendees and an additional ???? contacts via and email/telephone contact.

The inspection and enforcement of the LDP and grease trap regulations continues. As noted previously, while initial compliance is very good, the on-going maintenance and self-inspection of these facilities is lacking. Compliance with City expectations improved in 2017 as the programs became better understood by both staff and citizens.

Efforts to reach out and educate the citizens of Leavenworth through media such as the newspaper, City website and newsletter, the local cable television station (Channel 2), YouTube, Facebook, and Twitter have increased public awareness of environmental issues in general. The meetings regarding the implementation of a stormwater fee generated additional public interest. Staff had contemplated using several small surveys to increase public awareness of stormwater issues, ultimately choosing to rely upon the other media noted above.

Section C-E
Stormwater Management Program

C. Stormwater Management Program

Place a check mark in the appropriate box.

	Yes	No	Not Applicable
1. Has the Stormwater Management Program (SMP) been developed?	X		
2. Has the SMP been modified during this reporting period?		X	
3. If the answer to question 2 above was "yes", has the modified SMP been submitted to KDHE for approval?			X

If the answer to item 3 is "No" a copy of the modified SMP must be submitted with this annual report. If it is anticipated a measurable goal cannot be met in the next year the SMP should be modified and submitted to KDHE for approval. The modifications may include different BMPs and/or revised goals to avoid being in a position of non-compliance.

D. Total Maximum Daily Load (TMDL) Best Management Practices

Place a check mark in the appropriate box.

	Yes	No	Not Applicable
1. Were any best management practices (BMPs) intended to attenuate the discharge of TMDL regulated pollutants implemented? See your permit to determine if TMDL regulated pollutants are listed for the receiving stream affected by your stormwater system.			X

2. List all of the BMPs intended to attenuate the discharge of TMDL regulated pollutants as identified in the SMP and provide the requested information on the following table on the following pages.

D. Total Maximum Daily Load (TMDL) Best Management Practices (Table)

BMP ID Number	Brief BMP Description	Regulated TMDL Parameter	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)

E. Stormwater Management Program Requirements (Six Minimum Control Measures)

1. Public Education and Outreach (Table)

List all of the public education and outreach BMPs as identified in the SMP and provide the requested information in the following table (List presentations & media)

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
1.1	Webpage link to stormwater infrastructure information – Master Plan, Management Plan, Map	# Of visitors – Current software unable to isolate detailed information; however, entire site had 253,612 views in 2017	All items are available on-line. Current web page software does not provide detailed page views counts.
1.2	Place documents in public library stormwater infrastructure information – Master Plan, Management Plan, Map	# Check-out requests – Unknown	All items available at the public library. No check-out requests are known.
1.3	Include articles or stories related to stormwater in City newsletter in at least two issues per year	# Articles/Stories – at least three per issue in 2017 # Issues – three issues of City Connection delivered in 2017	Coordination between Public Information Office and Public Works has stories on leaf collection, wastewater issues, adopt a park, etc.
1.4	City-generated posts on social media related to stormwater issues at least ten occurrences per year	# Posts – unable to determine exact number, well in excess of fifty.	Public Information Office interacts with the public on social media on wide range of stormwater-related issues.
1.5	Provide Information to citizens regarding the City of Leavenworth Solid Waste Division.	Distribute trash bags to citizens with proper disposal handout	A paper insert with solid waste and other City information is provided to the doorstep on nearly all residences twice per year in roll of trash bags.
1.6	Show stormwater information on local cable TV station	Broadcast community forums, in which continued water quality discussions take place	Public Information Office broadcasts City Commission Meetings, Planning Commission Meetings and others on City channel cable TV – began live broadcast online in 2017.

2. Public Involvement and Participation (Table)

List all of the public involvement and participation BMPs as identified in the SMP and provide the requested information in the following table (List all associations & partnerships)

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
2.1	Hold public information meetings regarding stormwater issues	Annual review by City Commission of Stormwater Annual Report – YES Review of stormwater projects in annual Capital Improvement Plan - YES	City Commission reviewed KDHE annual stormwater report February 21st, 2017. City Commission reviewed stormwater projects for CIP in 2017 and approved design and construction of several projects.
2.2	Create an "Adopt a Stream Program"	# Streams adopted - None # Streams cleaned – At least two	City has not created an official "Adopt a Stream" program, but does encourage groups to clean streams. At least two streams were cleaned by groups participating as part of Citywide clean-up or as part of a group activity which included Havens Park, Cody Park and Three-Mile Creek Trail.
2.3	Improve lines of communication with the public through use of website and social media	Integrate contemporary methods of providing and receiving information to the public. - ONGOING	Public Information Office continues a robust social media program for all City issues. Posted Information on other efforts such as detention ponds and such improves as staff skills increase.
2.4	Annual Citywide clean-up program	# Groups – approximately 40 # Participants – 1,056	Citywide clean up continues to increase in number of participants.
2.5	Customer surveys – conduct at least one survey each year on stormwater related issues in an on-line environment	# of responses – N/A	No survey was conducted in 2017. This is primarily due to internal conflicts related to the purpose of the survey and lack of similar studies performed by others to learn from.
2.6	Encourage groups to participate in activities such as inlet stencil program and similar	# Groups – None # Programs – None	Group participation is encouraged for environmental issues.

3. Illicit Discharge Detection and Elimination

Place a check mark in the appropriate box

Explain each item below in following table.	Yes	No	Not Applicable
1. Has a program/plan been developed and is it presently implemented to detect and address illicit/prohibited discharges into the MS4?	X		
2. Has a map of the MS4 been developed, showing the location of all outfalls, either pipes or open channel drainage, showing names and location of all streams or lakes receiving discharges from the outfalls?	X		
3. The permit requires the permittee enact ordinances, resolutions, or regulations. Has an ordinance, resolution or regulation to prohibit non-stormwater discharges into the storm system been enacted? Effective Date: ____March 2016 Has the ordinance, resolution or regulation been modified? Effective Date: ____December 20, 2016__	X		
4. Has the ordinance, resolution or regulation and/or modification been submitted to KDHE for approval? ***(INCLUDED in Appendix E to this report)***		X	
5. Have public employees, business, and the general public been informed of the hazards associated with illegal discharges and improper disposal of waste?	X		
6. Are stormwater inlets & detention ponds inspected for illicit discharges and debris?	X		
7. Are restaurant waste grease areas inspected?	X		
8. Are septic systems inspected?	X		
9. Are debris, yard waste and dead animals removed from the streets when noticed by employees or reported?	X		
10. Is there a yard waste management program?	X		
11. Are snow removal activities inspected?	X		

12. List all of the illicit discharge detection and elimination BMPs as identified in the SMP and provide the requested information in the table on the following pages.

3. Illicit Discharge Detection and Elimination (Table)

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
3.1	Inspect complaints of illicit discharge	Inform public of methods to communicate concerns regarding illicit discharges - YES # Reports investigated – 34 after-hours calls on sewer/storm sewer issues and approximately 20 more from all other sources.	Public Information Officer has created social media space for complaints. 24/7 "real person" phone answering service can dispatch City forces for emergencies.
3.2	Update stormwater outfall maps	Continue efforts to accurately locate and measure existing and new stormwater infrastructure	City maps are updated constantly. The GIS staff and the stormwater crew assist in obtaining accurate measurements and locations. In 2016 the maps were made available online to the public.
3.3	Inspect outfalls	# Outfalls inspected –over 600 inlets and drains were inspected. No specific notation on "outfall"	On-going efforts by the stormwater crew has inspected infrastructure throughout the year as part of their routine work and for the GIS staff.
3.4	Collect yard waste at City composting facility	# Customers: for 2017, Grass – 580, Leaves - 622	City provides free drop off of yard waste for composting. There may be slight overlap with #3.5
3.5	Collect tree and brush debris at brush disposal site	# Customers – 3,974 for 2017. (1,168 on free Saturdays, 2,806 on other days).	City provides a KDHE approved site for drop off of tree and brush debris for disposal through a combination of mulching, composting and burning.
3.6	Collect household hazardous waste (HHW) as part of Citywide clean-up event	# Pounds of household hazardous waste recycled – more than 4,400 lbs.	City residents are directed to Leavenworth County facility during most of the year. Citywide clean up accepts HHW, but it is not weighed separately. In 2017 over 30 customers were serviced.
3.7	Conduct free disposal Saturdays (First Saturday)	# Events - 12 # Tons collected – 229.38	The free Saturdays are well attended; however, volume is not tracked separately for regular refuse and recycling material.
3.8	Staff training	# of staff trained – 10+	At least ten different staff members attended some level of training on stormwater related issues; many on multiple issues.

3.9	Storm sewer maintenance and inspection	Provide dry weather storm sewer inspection. - YES	Two-person crew inspects stormwater structures and works with GIS staff.
3.10	Inspection of sanitary sewer systems	Inspect residential and commercial sanitary systems for improper discharge into storm drains. - YES Inspect sanitary sewer system to reduce number and volume associated with SSO - YES Coordinate SSO events between wastewater staff, building officials and engineering. -YES	City operates CCTV of sewer and storm sewer systems throughout the year. Approximately 5.7 total miles were inspected in 2017. City completed $675,000 in work within the sanitary sewer system to reduce Inflow and Infiltration to and from the storm sewer system. Greatly improved coordination between wastewater staff and building inspection staff on review and resolution of SSO events.
3.11	Commercial grease trap inspection program	Review status of commercial grease traps through record review and physical inspection – YES.	An aggressive grease trap inspection program has improved participation and record keeping from the approximately 60 entities required to have a grease trap. At least three new installations were completed in 2017 as a result of this program.

4. Construction Site Stormwater Runoff Control

Place a check mark in the appropriate box

Explain each item below in following table.	Yes	No	Not Applicable
1. The permit requires the permittee to enact ordinances, resolutions or regulations. Has an ordinance, resolutions or regulation to address construction site runoff from new development and redevelopment projects been enacted? Effective Date: ___December 2017___	X		
2. Has a copy of the ordinance, resolution or regulation been submitted to KDHE as required by the permit? ***(submitted as appendix E of this report)***		X	
3. Has a procedure or program been developed requiring construction site owners and/or operators to implement appropriate erosion and sediment control best management practices?	X		
4. Has a procedure or program been developed requiring construction site owners and/or operators to control wastes such as discarded building materials, concrete truck washout, chemicals, paint, litter and sanitary waste at construction sites likely to cause adverse impacts to water quality?	X		
5. Has a procedure been developed and implemented requiring site plan review of erosion control and debris container locations incorporating consideration of potential water quality impacts?	X		
6. After review, is a construction site permit issued?	X		
7. Has a procedure been developed for the receipt and consideration of information submitted by the public?	X		
8. Has a procedure been developed and implemented for construction site inspection and enforcement of the control measures?	X		
9. Are construction site inspection and enforcement actions successful?	X		
10. Are site owners and/or operators provided instruction on proper construction site erosion and waste control?	X		

11. List all the construction site stormwater runoff control BMPs as identified in the SMP and provide the requested information in the table on the following pages.

4. Construction Site Stormwater Runoff Control (Table)

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
4.1	Construction drawing plan review and site runoff control	# Plans reviewed – 24 (construction= 17; development=7) # LDPs issued - 67	All development projects were reviewed related to installation of appropriate BMPs. All construction projects were reviewed to ensure adequate BMPs were included in the work to prevent erosion runoff. 2017 initiated less than 100 square feet LDPs not required. Local utility companies were issued a blanket LDP for the year – for small projects.
4.2	Publish updated standard details and design criteria for erosion control	Make available on-line - YES Review annually with staff – No formal meeting; however staff has met informally throughout the year.	Newly-encountered BMPs resulted in staff discussions and sharing of ideas for proper oversight.
4.3	Staff training on runoff inspection	# Inspectors trained – 10+, see section 3.8	City staff has attended a variety of courses in 2017. City staff shares new information as encountered.
4.4	Inform local contractors of LDP	Annual notification of LDP requirements - YES LDP documents available online - YES	Contractor's LDPs are regularly inspected and contractors are informed of any deficiencies. LDP documents are available online.
4.5	Pre-construction meetings with owner and contractor - require meetings with owner and contractor prior to commencement of grading operations.	# Meetings – 17	All City-funded projects have a pre-construction conference. Development projects typically meet at the Development Review Committee where BMP requirements are discussed, and then incorporated into the plans. City has no requirement that private development have a pre-con with the City.
4.6	Construction site inspection and enforcement - Increase the frequency of inspections and communications back to owner/contractor	Documentation of inspections - YES	Extensive documentation of site visits (both random and after rainfall) are included in each project file. This includes City and development projects, and individual LDP inspections (such as home construction).

5. Post-Construction Site Stormwater Management in New Development and Redevelopment

Place a check mark in the appropriate box.

Explain each item below in following table.	Yes	No
1. The permit requires the permittee to enact a program to address post-construction site stormwater runoff from new development and redevelopment. The program developed to manage stormwater in new development and redevelopment projects must include the following elements: a. Strategies which include a combination of structural and/or Non-structural BMPs, b. Measures to ensure adequate long-term operation and maintenance of BMPs, c. Site Owner or operator name and telephone number Responsible to ensure adequate long-term operation Maintenance of BMPs, d. BMPs to prevent or minimize adverse water impacts.		
2. Has a post-construction stormwater runoff program been Implemented?	X	
3. Has post-construction sites been inspected?	X	
4. Have there been post-construction violations? ***(All post construction issues identified were addressed by permit holders)***		X
5. List all the post-construction site stormwater management in new development and redevelopment BMPs as identified in the SMP and provide the requested information in the table on the following pages.		

5. Post-Construction Site Stormwater Management in New Development and Redevelopment Table

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
5.1	Construct sediment vane traps on new and reconstructed inlets	# Inlets - 20	Sediment traps were installed on new and replacement inlets on various projects.
5.2	Protect sensitive areas, such as wetlands and riparian areas through plan review and selected land acqusition from developers and at tax sales	# Tracts acquired from developers - 0 # Tracts from tax sale - 1 # Acres acquired/year – 0.26	City participated in the 2016 tax sale by Leavenworth county and purchased one property. Two requests for the City to sell/donate these types of properties occurred in 2016, one resulted in a donation for landscaping at a local restaurant, the other was rejected (in 2017) for lack of detail
5.3	Enforce post construction runoff control ordinance	#LDP releases – 27 Documentation of inspection and communication – YES	LDPs are closed out when the danger of off-site erosion has been eliminated though either vegetation or other means. This is documented in the various permits. Several LDPs from 2017 are still open into 2018.
5.4	Conduct long-term BMP maintenance inspections	Documentation of inspection and communication - YES	City continues outreach to detention basin owners. Meeting on February 27, 2017 was relatively well attended. This effort will continue and expand. City conducts inspections of selected sites on random, after rainfall, or with depth recording equipment. In 2017 the City requested detention basin owner's inspection reports and action plans for containing contamination spills.
5.6	Analyze existing structural BMP performances at selected sites (particularly detention basins)	# Sites evaluated – 6+	City installed depth recording devices in at least six locations in 2017. This is to facilitate evaluation of performance. Selected graphs and charts are shared informally with interested parties via email.
5.7	Measure rain gauge and creek depth to evaluate flow quantity and duration from at least March – October.	# Rain gauges - 4 # Stream gauges - 2	City continues to maintain rain and creek monitors. The City also collaborates with other local governments on an extended rain gauge network. Selected graphs and charts are shared informally with interested parties via email.

6. Municipal Pollution Prevention/Housekeeping

Place a check mark in the appropriate box.

Explain each item below in following table.	Yes	No
1. The permit requires the permittee to enact a program to address Pollution Prevention/Good Housekeeping for Municipal Operations.	X	
2. Has an operation & maintenance program to reduce Pollutant runoff and an audits /inspection program been adopted? ***(Audits and inspections occur, no formal program has been adopted)***		X
3. Has a municipal employee training program been established? ***(All involved employees have been directed to seek appropriate training throughout the year, City also sponsors training)***	X	
4. Are oil, hazardous wastes, chemicals and municipal debris properly deposed?	X	
5. Are snow and ice removal material and chemicals properly managed to prevent runoff?	X	
6. Are municipal streets swept on a regular basis?	X	
7. Are municipal stormwater inlets and drains inspected and cleaned?	X	
8. Are municipal snow piles controlled drainage to prevent runoff pollution?	X	

List all the Municipal Pollution Prevention/Housekeeping BMPs as identified in the SMP and provide the requested information on the table on the following pages.

7. *PHASE I OPERATORS ONLY* - Monitoring Industrial and High Risk Run-Off

Place a check mark in the appropriate box.

	Yes	No
1. Has the permittee developed and maintained a list of the municipal industrial facilities contributing to the pollutant loading to the municipal storm sewer system?		
2. Has at least two municipal industrial facilities on the list had inspection and sampling conducted?		

If the answer to items 1 an 2 is "No" provide a statement on the Phase I operator form Appendix B as to why monitoring and control has not occurred.

Complete Monitoring form in Appendix B.

6. Municipal Pollution Prevention/Housekeeping Table

BMP ID Number	Brief BMP Description	Measurable Goal(s)	Progress Achieving Goal(s) (Measured Result)
6.1	Review City facilities for water quality concerns and develop plans to address them, goal is at least three facilities per year	# Reports prepared: No reports prepared in 2017. City focused on water quality in parking lot projects.	City constructed a substation at the 200 block of Cherokee.
6.2	Street sweeping program – goal is residential areas three times per year and collector/arterial streets once per month (8 months)	# Times completed residential area sweeping – 79 # Times completed collector/arterial sweeping – 8 # Hours sweeping – 1,561 # Miles of streets swept – unknown (difficult to determine) # Pounds of debris removed – 338.99 tons	Aggressive street sweeping program operates all year, weather permitting. There are two sweepers.
6.3	Snow removal operations - use ground speed control and GPS equipment to keep salt use within guidelines	# Tons of salt used per year - 364 # Pounds per lane mile per storm – 370 lbs/lane-mile average for 2017	Use of ground speed control continues to result in relatively stable application rates of 300-350 lbs/lane-mile for several years.
6.4	Stormwater inlet cleaning	# Inlets – 1200+	Stormwater crew inspected and/or maintained in excess of 1200 inlets, areas drains and other stormwater facilities.
6.5	Continue Citywide leaf collection program (currently one-half of City each year)	# Loads – 50 loads (est. 1000cy)	City continues to offer free leaf vacuuming for one-half of the City each year (alternating halves).

Section F, Items 1-5
Record Keeping and Reporting

F. Recordkeeping and Reporting

Attach a report which addresses the following subjects:

1. A general assessment of the appropriateness of the various BMPs included for each of the major program elements as follows:
   a. TMDL regulated pollutants
   b. Public Education and Outreach
   c. Public Involvement and Participation
   d. Illicit Discharge Detection and Elimination
   e. Construction Site Stormwater Runoff Control
   f. Post-Construction Site Stormwater Management in New Development and Redevelopment
   g. Pollution Prevention/Good Housekeeping for Municipal Operations
   h. A map of surface water sampling locations with an information table is to be attached with this report (if surface water monitoring is required by the permit). An example map and table is included with this report to illustrate the preferred method of completion.

Issues which may be addressed include:

   a. Are the BMPs appropriate for the local population?
   b. Are the BMPs appropriate for the pollution sources?
   c. Are there specific concerns related to the local receiving waters that may justify a change in BMPs?

2. An assessment of the effectiveness of the BMPs towards achieving the statutory goal of reducing the discharge of pollutants to the Maximum Extent Practicable (MEP).

3. Provide a summary of results of information collected and analyzed, if any, during the reporting period, including any monitoring data used to assess the success of the SMP.

4. Provide a summary of the planned changes in stormwater activities which are scheduled to be undertaken during the next annual reporting cycle. This should address the implementation of new BMPs and/or the deletion of BMPs and include a projected schedule for the month or quarter when the BMP will be either implemented or discontinued. Please note a revised SMP should be submitted for KDHE review if BMPs are revised.

5. Provide a list of other municipalities/contractors, if any, which will be responsible for implementing any of the program areas of the SMP.

Section F: Recordkeeping and Reporting

1. *A general assessment of the appropriateness of the various BMPs included for each of the major program elements as follows:*

   a. **TMDL Regulated Pollutants.** Not Applicable. City of Leavenworth is a Phase II City and does not have any TMDL requirements.

   b. **Public Education and Outreach.** Stormwater information is disseminated to the public through numerous channels such as the City newsletter, press releases, posting documents on the City website, placing reference material at the public library and several social media platforms. Social media platforms used by the Public Information Officer (PIO) include Facebook, Twitter, and YouTube in the effort to reach a larger population in a timely manner. Considering all of these avenues to reach the public, the City's attempt to provide its citizens with updated material is very effective. An update of several projects with videos and information was completed in 2017. New promotional videos would increase the effectiveness of this means of communication. A review of materials placed at the library showed that there had been little to no use of them. The participation of the City at Leavenworth High School on Earth Day with sewer cleaning and TV equipment and information was well received.

   c. **Public Involvement and Participation.** The City engages the public by calling for volunteers to work on local initiatives through the several lines of communication discussed earlier. The Annual Spring Clean Up has been effective in reducing pollution as well increasing the public awareness of stormwater BMPs and other City programs.

      Free drop off of large items on Free Saturdays continues to be a popular program. Calls for civic organizations to clean and make improvements to City parks throughout the year are being made through an established Adopt-a-Park program with 19 parks currently adopted; to include an additional park that was added in 2017. Arbor Day is observed yearly and the City continues to be part of the Tree City USA program. Brochures and newsletters are published throughout the year that includes code enforcement information and more information about any discarded debris and the proper place to discard it.

      City receives occasional calls from groups such as Boy Scouts related to public service projects. There were no known inquiries in 2017.

      Related activities in 2017 included:

- *The Annual Spring Clean-up Program on May 6th which had an increased number of participants totaling 1,056 volunteers from 42 groups who picked up trash throughout the City.*
- *In 2017, the City of Leavenworth began a major information campaign with Recycle Coach to inform residents about proper dates of trash pickup, recycling center availability and brush site availability. Research shows that our low income residents often access the internet via smartphone, and the new (free) Recycle Coach app will give all residents the same information. The information in the app is what is already provided in the Solid Waste Printable Flyer, but more easily readable in a digital format. Residents can type in their address and see on a calendar when their trash pickup will be. They can also sign up for reminders for changes in the trash pickup schedule. Between its launch in October and the end of 2017, there were 196 subscribers, 939 total users and 1,915 total resident interactions.*
- *The Legacy Tree Program saw an additional nine trees planted in 2017, and the City participated in the County-wide clean-up effort during the month of April, 2017.*

d. **Illicit Discharge Detection and Elimination.** In order to control improper disposal of waste to the storm sewer system, the City of Leavenworth makes material available through flyers and online regarding household hazardous waste and its proper disposal. Parks Department reports that the "Pick up Your Dog Doo" plan continues to be a very effective at the parks where it has been implemented.

Storm sewers are examined with the City's camera truck which allows for sewer lines to be videotaped and searched for improper connections or line failures. The use of a "Pole Cam" continues to facilitate a much quicker inspection time. The City has completed the storm sewer map and it is available to staff and the public on the GIS system and as a paper map (upon request). Technical information on the map continues to be verified through use of physical inspection and hand-held GPS, particularly to correctly note diameters and locations of storm sewer structures. The final GIS database will include size, horizontal location as well as invert and top elevations for all storm structures and outfalls.

The City has an ongoing cleaning and CCTV program for the sanitary sewer lines. This work has identified several locations that that were repaired as part of the current effort to reduce Inflow and Infiltration.

Staff evaluated the number of creek crossings for periodic inspection. The number of crossings was increased from 26 to 33 for inspection at least three times each year. This includes regularly scheduled inspections as well as after heavy rainfall events. There are an additional 200 crossing locations that are inspected periodically.

The City requirement that all exterior clean-out caps on sanitary sewer lines be "screw caps" rather than "press-on caps" has contributed to the reduced number of Sanitary Sewer Overflow (SSO) events that that release sewer water to the environment.

The City inspection of commercial facilities with grease traps (or who might/should have grease traps) continued in 2017. This program is a combination of inspection and education to ensure that the grease traps are properly maintained which helps to prevent blocked sewer lines, which prevents sanitary sewer water from entering the environment.

City contacted grease trap owners in 2017 with multiple requests for inspection records. While some businesses are able to comply when notified, others have had to be contacted multiple times for results. Several businesses have been physically inspected by City inspectors to verify grease trap operations. In general – the education and awareness portion of the plan seems to be effective; however, routine maintenance of the grease traps varies considerably. On-site inspections were effective in meeting program goals of awareness and education. A summary of this program can be found in Appendix ___.

It is likely that additional ordinances specific to grease trap maintenance will be necessary for greater compliance. It will be necessary to coordinate this with other City departments before it can be implemented.

City employees are reminded at staff meetings and safety meetings to report any activity that is questionable to their supervisor and/or the City Engineer Office. An awareness and training session on IDDE issues was held in December 2017, and 16 employees attended.

e. **Construction Site Stormwater Runoff Control.** City implemented a "Land Disturbance Permit" (LDP) in early 2015 and strengthened it in 2016 with the adoption of a fee and fine structure for LDPs and erosion. No changes were made in 2017. The LDP has been very successful ensuring owners and contractors know their responsibilities. It has dramatically reduced erosion and sedimentation from construction sites.

Enforcing the LDP is time consuming during both office and field review requirements. City continues to evaluate several digital alternatives to better manage staff time to ensure the permits are being complied with.

Construction site runoff is generally inspected as follows:

- Work within the right-of-way and/or City-bid projects is inspected by Engineering Staff Technicians on a regular basis.
- Work on private property is inspected by Building Inspections Staff.

Plan review and construction site inspection are the City's first line of defense in protecting water quality in developing areas. The initial planning process for large and small developments includes a formal focus on stormwater quantity, quality and control measures as part of the Development Review Committee meeting with project sponsors and developers. Staff comments on plans reviewed are submitted in writing.

Weekly staff meetings are held in the Public Works office. Review of stormwater issues on current City and developer projects both in the design and construction phase is discussed.

The City guidelines related to stormwater quantity and quality were approved by the City Commission in early 2015. They rely upon the technical work completed in other documents – particularly the MARC BMP Manual, APWA Section 5600 and City of Leavenworth Stormwater Master Plan 1995. These documents are generally accepted by professional engineers and developers as part of the development process. There were no changes in 2017.

City staff has attended a variety of training and educational events to become more effective in addressing the construction site runoff situation. VERIFY This with certificates and such! It includes attendance at regional classes, vender demonstrations, and focused training on installation/inspection of erosion control systems.

f. **Post-Construction Site Stormwater Management in New Development and Redevelopment.** City has changed contracting requirements on City-funded projects so that contractors are responsible for landscaping for two years following construction rather than the previous period of one year. This practice ensures that an acceptable grass stand is established in the area to stabilize soils and increase infiltration by reducing runoff velocity.

On developer-funded projects the City requires that the approved plans be followed. This typically requires maintaining erosion control measures until a minimum of revegetation of the site is met,

and maintaining all other BMP activity. The associated LDP permit is completed with issuance of a certificate once the post construction measures are fully implemented. The City has increased periodic inspection of post-construction sites to ensure compliance with the regulations by reviewing the status of active projects at weekly staff meetings.

Also, the City continues a program to notify detention pond owners of proper maintenance procedures and requirements. This program needs to be more aggressively pursued to be effective. It is expected that notification of maintenance requirements will be expanded to address other project specific BMPs in the future. Example letters can be found at Appendix ___.

The increased visibility of inspection efforts and the requirement that BMP maintenance information be provided to the owner of projects has resulted in better compliance with the regulations.

g. **Pollution Prevention/Good Housekeeping for Municipal Operations.** The leaf collection program each fall (curbside pick-up is one-half of the City each year), more efficient application of salt and sand to the roadways through better equipment, street sweeping operations, and extended sweeping season are all effective in decreasing pollutants from entering the storm sewer system.

Beyond these steps the City has two full-time employees dedicated to the cleaning of storm inlet structures with a vacuum truck (and occasional augmentation from other workers). Over 600 inlets were inspected and openings cleaned in 2017, and an additional 300 visited by the GPS locating crew.

Water Pollution Control dye tests 33 creek crossing every quarter for an annual total of 132. WPC is working with our GIS department and have identified over 200 creek crossings. WPC will inspect each creek crossing as we clean quarter sections within the City of Leavenworth.

The addition of the ground speed control systems on the spreaders has improved consistency of application rates and they remain within the recommended rates of application. The street sweeping program has exceeded performance standards. City ensures chemicals (including salt) are stored in covered facilities, and that all personnel using herbicides/pesticides are trained appropriately. The City offers free disposal of grass and leaves, and free drop-off of recyclable goods is available.

City continues to evaluate the performance of Special Environmental Project (SEP) installed as part of the EPA settlement in 2016 (completed in 2017). The inlets are intended to collect pollutants from small rain events and allow them to degrade through exposure to sunlight and/or infiltration through buried media to improve water quality. The inlets will also collect roadside trash and debris requiring additional maintenance effort on the part of the City. The performance of these inlets will be monitored for possible inclusion on other projects.

City staff reviewed the general state of water quality management selected City facilities in late 2017. The following were identified and action taken:

- The berm surrounding the snow disposal area used when snow is trucked from the downtown area had been repaired.
- The salt/sand operational area at the Municipal Service Center area was evaluated for functionality of containment of run-off from storage and truck loading. In general the site functions well, but substantial degradation of creek banks from erosion was noticed. City forces cleared vegetation that obstructed the view of the creek and installed silt fence.
    - A project that will improve water quality for the salt/sand area and reduce erosion of the creek banks was not constructed in 2017.
    - Adjustments to operational issues and storage locations of materials resulted in the need for a better tarp system for stockpiles which was installed.
- Parking areas at the public library lend themselves to relatively simple modifications to improve water quality of the runoff. No improvements at this location were constructed in 2017.
- Substantial water quality improvements were included in a project for reconstruction of a parking lot in 200 Block of Cherokee including grass strips, eco-friendly bio-retention storm inlets, and appropriate vegetative plantings. This work was partially completed in 2017.

Inspection of selected City facilities indicated that a greater effort needs to be in place to evaluate ALL City facilities. Additional facilities will be evaluated in 2018.

Further Discussion of BMPs in general

City opinion is that the BMP approach to the current level of stormwater activity in Leavenworth is entirely appropriate. They address the main concerns of the city: water quantity, water quality and construction site run-off. The implementation of the LDP has improved erosion and runoff during and after construction on many projects. The aggressive street sweeping program catches much of the salt and sand from winter operations before the spring rains. Grease trap and detention basin inspection are important programs. Staff is aware of the significance of the stormwater issues reviewed by KDHE

and seeks to ensure compliance by having an empowered staff and opportunities for the public to comment or become involved.

The paragraph above notes that the BMPs are appropriate to the City. The current Stormwater Management Plan was not updated in 2017.

2. ***An assessment of the effectiveness of the BMPs towards achieving the statutory goal of reducing the discharge of pollutants to the Maximum Extent Practicable (MEP).***

The City of Leavenworth has evaluated the functionality of various types of BMPs in Leavenworth while preparing for the adoption of an updated stormwater design manual. BMP overall effectiveness, economy, and general upkeep needs will drive BMP selection on future developments in Leavenworth. For instance, most in-situ soils in Leavenworth have low permeability which has led the Public Works staff to favor BMPs focused more on pollutant removal rather than stormwater infiltration. Recently constructed detention basins and bank stabilization projects have proven stable in normal rains.

The storm of July 6th 2015 (3"-4" of rain in an hour) did damage to bank protection rip-rap on Five-Mile Creek at the treatment plant, and Three-Mile Creek between Esplanade and 2nd Street. The Five-Mile Creek erosion was repaired in 2016 and has not been disturbed by subsequent rainfall events. The bank erosion on Three-Mile Creek between Esplanade and 2nd Street is the subject of a joint OneGas and City project currently under construction expected to be completed in early 2018.

The successful operation of ground speed control on salt spreaders and performance of the street sweeping program has improved water quality of discharges to the creeks and rivers.

The increased focus on the construction site monitoring program has been generally effective. The City is seeking more effective methods to efficiently inspect these permits.

The increased numbers of programs and greater inspection efforts have improved water quality. It is clear that without additional enforcement options there is minimal effort on the part of owners and contractors on complying with record keeping. Efforts in 2018 will be to continue seeking better ordinances with fees and fines related to compliance in these areas.

3. ***Provide a summary of results of information collected and analyzed, if any, during the reporting period used to assess the success of the SMP.***

Stormwater from the MS4 has been tested during five events in 2017. Additional testing in selected detention basins and over the winter months has occurred as well.
Stream Testing dates in 2017 are shown below:

- March 29th
- April 5th
- July 27th
- August 5th
- October 22nd

A summary of the results is included in the Appendix A along with several graphs and charts in Appendix C. The City also monitored several detention basins to evaluate performance. This information is communicated back to the designer in most cases, and adjustments made if necessary to the outfall structure.

In general the City observed the following during this process:

1. **The stream stage is extremely sensitive to rainfall intensity and duration.** It was difficult to have all of the samples taken during a "rising stream" stage. A brief report summarizing these observations is included in Appendix C. Key concerns are:
    a. It will require substantial investment in equipment and staffing to operate a testing environment that can reliably take samples in rising stream stages.
    b. City has not performed a literature search to determine if water quality is known to vary between rising and falling stages

2. **Measuring stream volume is difficult**. City has used manual methods and "stage-discharge" charts to estimate volume while sampling. There are significant differences between the methods. A brief report summarizing these concerns is included with this Appendix C.

3. **Differences in water quality data are difficult to interpret**. A very simplistic analysis shows that in 2014 water quality was improved by flowing through the City of Leavenworth. This was NOT TRUE in 2015, 2016, nor 2017. Data show that water generally degraded as it passed through Leavenworth. The tables show generally greater degradation in Three-Mile Creek than Five-Mile Creek. The detailed information has been submitted to KDHE electronically prior to January 1, 2018.

Three Mile Creek - 4 event 2014		
	NC/Better	Worse
Total Phosphorus	1	3
Ortho Phosphate	0	2
Nitrate+Nitrite	2	2
Total Kjeldahl Nitrogen	2	2
Total Suspended Solids	3	1
Turbidity	4	0
E.Coli		
	12	10

Five-Mile Creek - 4 event 2014		
	NC/Better	Worse
Total Phosphorus	3	1
Ortho Phosphate	2	0
Nitrate+Nitrite	0	4
Total Kjeldahl Nitrogen	4	0
Total Suspended Solids	2	2
Turbidity	2	2
E.Coli		
	13	9

Three Mile Creek - 6 event 2015		
	NC/Better	Worse
Total Phosphorus	1	5
Ortho Phosphate	3	3
Nitrate+Nitrite	2	4
Total Kjeldahl Nitrogen	3	3
Total Suspended Solids	3	3
Turbidity	2	4
E.Coli	0	6
	14	28

Five-Mile Creek - 6 event 2015		
	NC/Better	Worse
Total Phosphorus	2	4
Ortho Phosphate	5	1
Nitrate+Nitrite	0	6
Total Kjeldahl Nitrogen	4	2
Total Suspended Solids	2	4
Turbidity	3	3
E.Coli	5	1
	21	21

Three Mile Creek - 6 event 2016		
	NC/Better	Worse
Total Phosphorus	0	6
Ortho Phosphate	2	4
Nitrate+Nitrite	3	3
Total Kjeldahl Nitrogen	0	6
Total Suspended Solids	0	6
Turbidity	2	4
E.Coli	0	6
	7	35

Five-Mile Creek - 6 event 2016		
	NC/Better	Worse
Total Phosphorus	2	4
Ortho Phosphate	3	3
Nitrate+Nitrite	3	3
Total Kjeldahl Nitrogen	1	5
Total Suspended Solids	2	4
Turbidity	3	3
E.Coli	3	3
	17	25

Three Mile Creek - 5 event 2017		
	NC/Better	Worse
Total Phosphorus	0	5
Ortho Phosphate	1	4
Nitrate+Nitrite	1	4
Total Kjeldahl Nitrogen	1	4
Total Suspended Solids	1	4
Turbidity	1	4
E.Coli	1	4
	6	29

Five-Mile Creek - 5 event 2017		
	NC/Better	Worse
Total Phosphorus	0	5
Ortho Phosphate	1	4
Nitrate+Nitrite	1	4
Total Kjeldahl Nitrogen	2	3
Total Suspended Solids	2	3
Turbidity	2	3
E.Coli	1	4
	9	26

4. ***Provide a summary of the planned minor changes in stormwater activities to accomplish the SMP designated goals that are scheduled to be undertaken during the next annual reporting cycle.***

   The City expects to perform the following changes in 2018:

   1. Consider modifications to the Stormwater Management Program.
   2. Consider revisions to the "Stormwater Guidelines" especially related to effective implementation, and consider revisions to the fee and fine schedule.
   3. City will continue to evaluate methods and equipment to improve sampling program and to provide relevant information.
   4. City will continue to observe performance of selected detention ponds and related facilities during the heavy rainfall season. City will evaluate hardware and software to create some level of automation related to stream stage and sampling.
   5. Expand awareness of BMP maintenance expectations and requirements.
   6. Increase staff training related to construction site inspection and post construction inspection activities throughout the year.
   7. Increase exposure of related staff members from building inspection and code enforcement to stormwater issues, especially with illicit discharge issues.
   8. Seek opportunities with community groups to improve awareness of stormwater issues.
   9. Evaluate at least two City facilities for stormwater quality and quantity concerns. Prepare a report with recommendations.

5. ***Provide a list of other municipalities/contractors, if any, which will be responsible for implementing any of the program areas of the SMP.***

   None

Appendix A
Summary of Sampling Data

- Basin Maps
  - Overall
  - 3-Mile Creek
  - 5-Mile Creek
- Location Detail Coordinates
- Weather Monthly Summary Sheets (City Hall)
- Data Collection Time Summary – Need sheet
- Data Collection Visual Summary
- Summary of Water Quality Data (five storms)
- Need the sheet submitted to KDHE

City of Leavenworth

2017 Stormwater Sampling Summary

		Upstream (West)	Downstream (East)	Upstream (West)	Downstream (East)	Upstream (West)	Downstream (East)	Upstream (West)	Downstream (East)	Upstream (West)	Downstream (East)
		March 29 2017		April 5 2017		July 27 2017		August 5 2017		October 22 2017	
	KDHE ID										
	Time	8:57 a.m.	8:37 a.m.	9:19 a.m.	8:57 a.m.	8:45 a.m.	8:18	4:16	3:53	11:02	10:37
Three Mile Creek	CFS	003B6	003A6	003B6	003A6	003B6	003A6	003B6	003A6	003B6	003A6
Total Phosphorus	mg/l	0.26	0.86	0.21	0.43	0.29	0.41	0.23	0.21	ND	0.27
Ortho Phosphate	mg/l	0.1	0.21	0.2	0.33	0.17	0.27	0.16	0.14	ND	0.3
Nitrate+Nitrite	mg/l	0.62	0.9	0.99	0.67	0.5	1.2	0.53	0.55	0.3	1
Total Kjeldahl Nitrogen	mg/l	0.76	2.5	0.84	1.4	1.2	2.2	0.56	ND	1	1.2
Total Suspended Solids	mg/l	185	488	116	132	56	159	62	33	41.3	47
Turbidity	NTU	155	434	107	134	50.9	67.2	58.6	30.5	38.3	56.6
E.Coli	col/100ml	4106	4352	1460	6130	8164	6867	4730	9870	2410	5810
potable TSS meter	*at time of sampling*	*420*	*960*	*290*	*1870*	*170*	*380*	*180*	*110*	*110*	*170*
	later few hours	*240*	*210*	*140*	*150*	*50*	*110*				

		Upstream (West)	Downstream (East)	Upstream (West)	Downstream (East)	Upstream (West)	Downstream (East)	Upstream (West)	Downstream (East)	Upstream (West)	Downstream (East)
		March 29 2017		April 5 2017		July 27 2017		August 5 2017		October 22 2017	
	KDHE ID										
	Time	9:15	9:38	9:36	9:55	9:11	9:34	4:40	5:04	11:26	11:49
Five Mile Creek	CFS	005B6	005A6	005B6	005A6	005B6	005A6	005B6	005A6	005B6	005A6
Total Phosphorus	mg/l	0.36	0.66	0.18	0.29	0.23	0.28	0.13	0.16	0.15	0.2
Ortho Phosphate	mg/l	0.19	0.14	0.24	0.3	0.1	0.15	ND	ND	0.17	0.22
Nitrate+Nitrite	mg/l	1	1	0.25	0.35	0.44	0.57	0.37	0.19	0.42	0.66
Total Kjeldahl Nitrogen	mg/l	1.9	2.6	0.98	0.89	1.1	1.1	ND	4.5	0.96	1.2
Total Suspended Solids	mg/l	270	994	162	336	92	81	68	35.5	30	83.2
Turbidity	NTU	252	855	296	222	63.2	77.3	47	33	4.4	7.5
E.Coli	col/100ml	31800	55600	6630	8200	4352	5475	6090	24810	8360	7980
potable TSS meter	*at time of sampling*	*630*	*2610*	*410*	*520*	*260*	*250*	*190*	*120*	*170*	*280*
	later few hours	*300*	*300*	*230*	*270*	*130*	*120*				

Appendix C
Selected Maps and Charts related to measurement of rainfall and stream stage with comments

- Overview map of drainage basins, water quality sampling points, rain gauges and detention basins (need map)
- Comments on
  - Sampling Rising Streams
  - Measuring Stream Volume
  - Detention Basin Effectiveness
- Selected graphs of Three-Mile and Five-Mile Creeks
- Selected graphs of detention basins

The following topics have been addressed in previous reports. There is some additional information from 2017 included in this report.

Difficulty in obtaining samples in the rising stream

The City has conducted a sampling program each year since 2014 as part of the MS4 permit. It is understood that KDHE and the City are interested in determining the impact of City activity on quality of water flowing through the City.

It has been difficult to have the sampling team obtain samples from a rising stream stage of both Three-Mile and Five-Mile Creeks. The graphs in this appendix from 2017 of Three-Mile and Five-Mile Creeks show the rapid rise and fall of the water surface elevation and sampling time. It is clear that it is nearly impossible to meet the requirements of sampling a rising stream.

The City has evaluated the costs of installation of permanent monitors in the past. The cost of between $20,000 and $40,000 continues to be a barrier to their installation. The staff time needed to oversee the operation of permanent monitors is also a concern.

Staff implemented some new practices to the sample collection routines 2017. In general – samples were collected once there was at least 0.5 inch of rainfall and the weather was considered safe for sample collection. The results are shown in the attached graphs. There was no identified improvement toward meeting the goal of sampling a rising stream. Time to gather all samples was decreased as operators become more familiar with the process.

Other focus items for 2017 included:

- Follow-up measurements on some anticipated detention basin modifications.
  This was interesting and the data was shared with peers. No direct action occurred due to the data.
- Measuring a weir installed in a creek to compare flow with previous events.
  Basic analysis showed that there was (as expected) a delay in peak flows with a reduction in volume of peak flows. The installation is working as anticipated.
- Use of a portable TSS meter to evaluate fluctuations in TSS by rerunning the sample route for TSS information only. Results of the handheld TSS meter fluctuated substantially from laboratory results and the use of the hand-held meter will be discontinued in future sampling events.
- Ongoing discussions between staff and also with manufacturers related to affordable equipment better suited the needs of the City and KDHE has occurred without any outcomes.

Difficulty in measuring streamflow (volume)

The City has conducted several years of sampling effort as part of the MS4 permit. Accuracy of the manual flow volume calculations was a concern. An engineering firm was contracted to provide Stage-Discharge Curves for all sampling locations. Tis provided a more repeatable calculation that requires only the depth of the flow. These charts were used in the 2014 and 2015 annual reports. A review of water volume calculations in 20169 indicate that the Stage-Discharge Curves will not work as the depth data and velocity

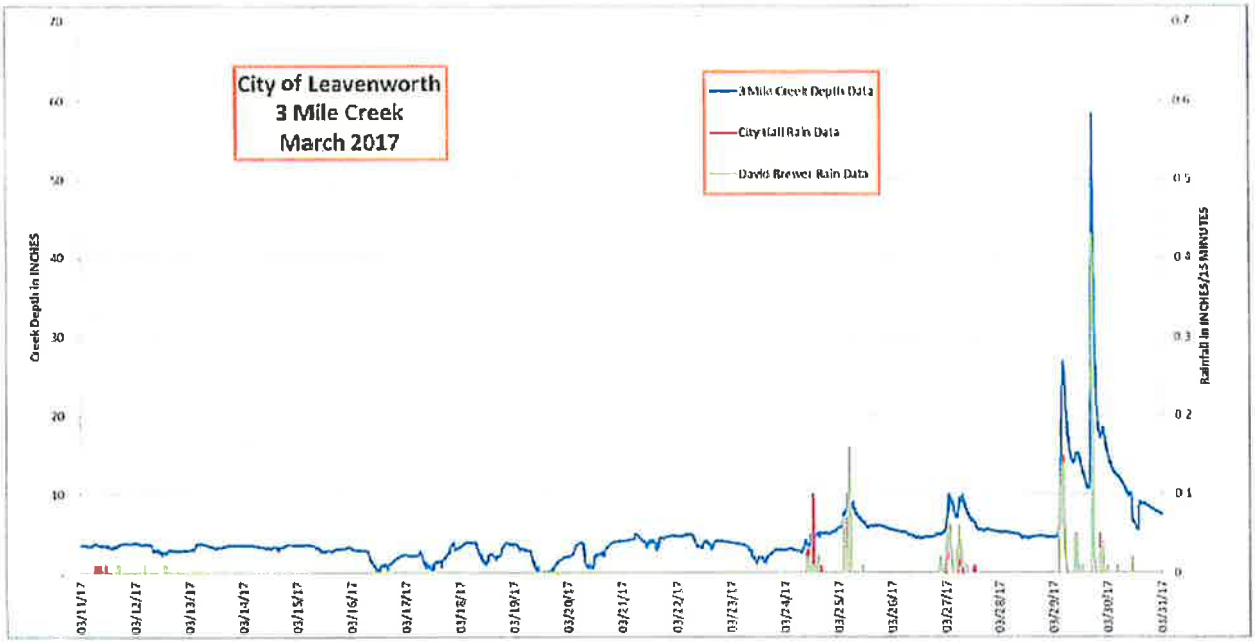
appear to not be represented accurately in the tables. Staff discussions indicate that the creek channel may have eroded during the year. Further measurements and evaluation are necessary. Flow data for 2016 was calculated from observed velocities and an assumed channel width. 2017 data will be calculated similarly.

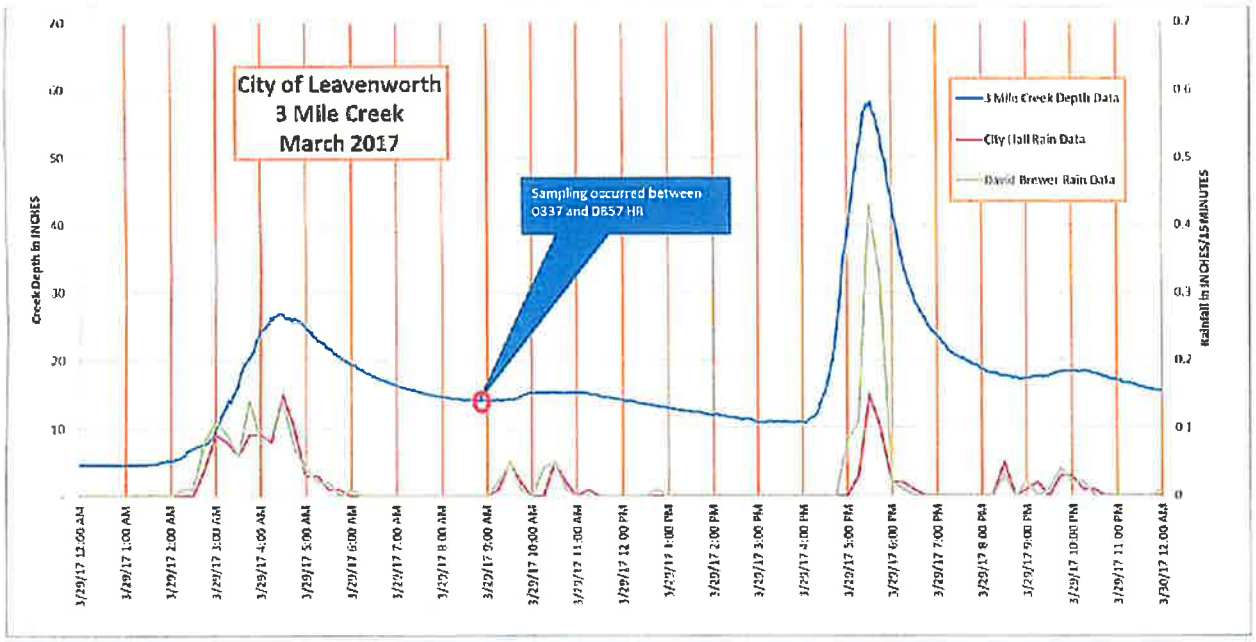
Detention Basin Concerns (new thoughts for 2017)

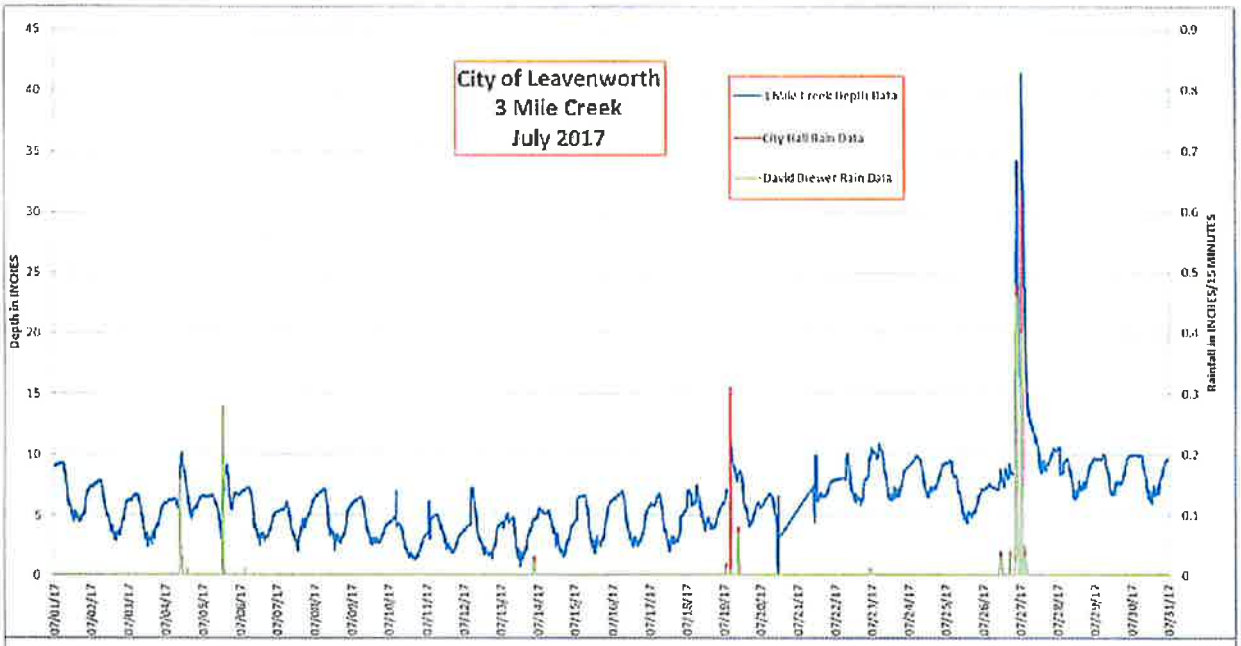
A brief review of several detention basin charts from earlier measurements show many of the early designed basins pass a lot of water through very quickly. Discussions with design professionals indicate that these were an early design that basically allowed for storage and release for of the design storm. They work fine to mitigate that, and are simple to construct. They do very little mitigation on smaller storms, and smaller storms are the most damaging to creek banks and other erosion potential areas.

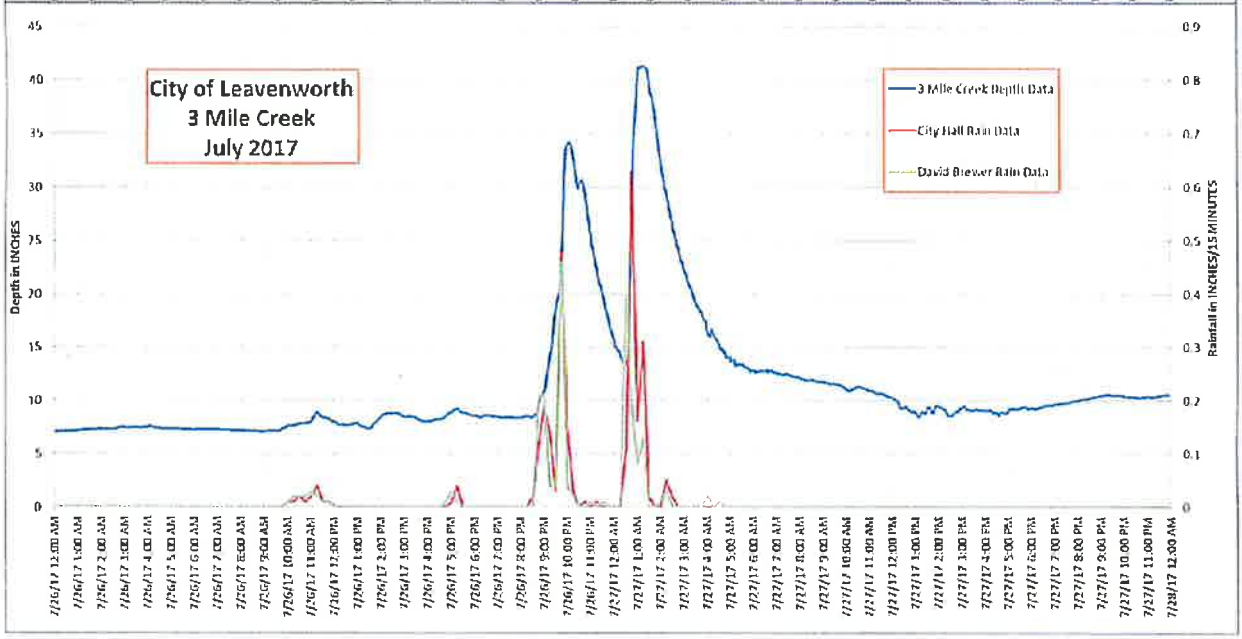
City efforts to work with basin owners on some modifications to make the responses more in keeping with modern design practices has been unsuccessful. This is generally due to lack of regulatory authority and a perception that if it was "OK" when it was approved, it should be "OK" now except for ongoing routine maintenance.

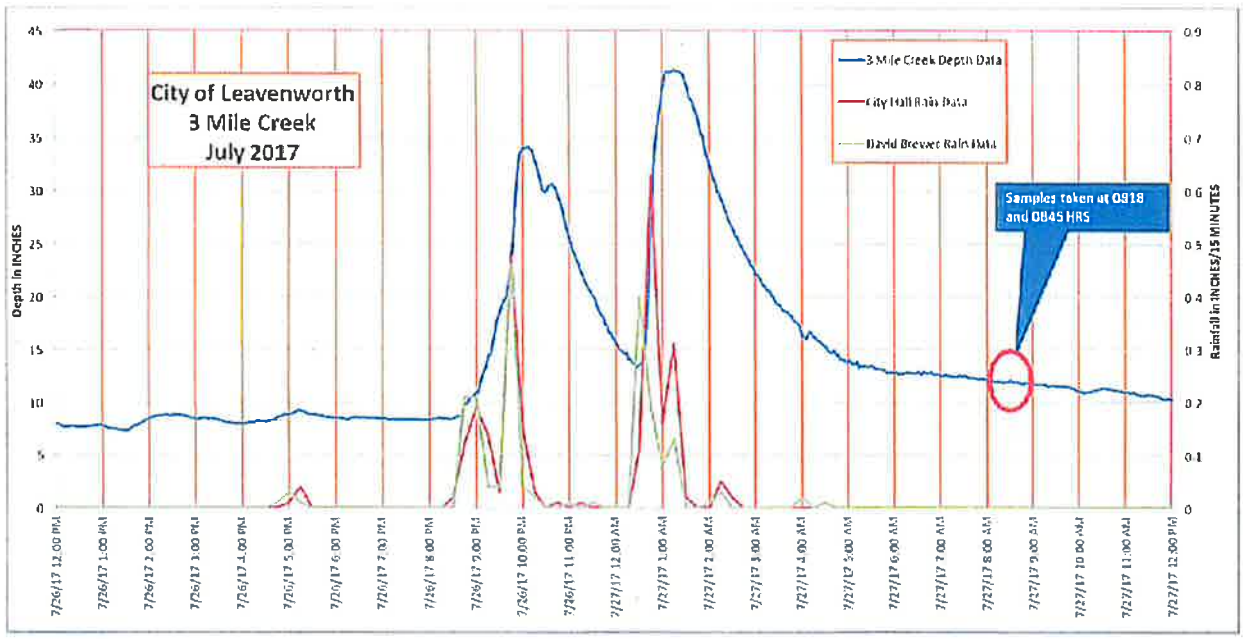
City staff has discussed the potential for requirements related to monitoring performance of basins in actual rainfall events with engineering and other municipal staff members. This type of work is generally regarded as a good idea.

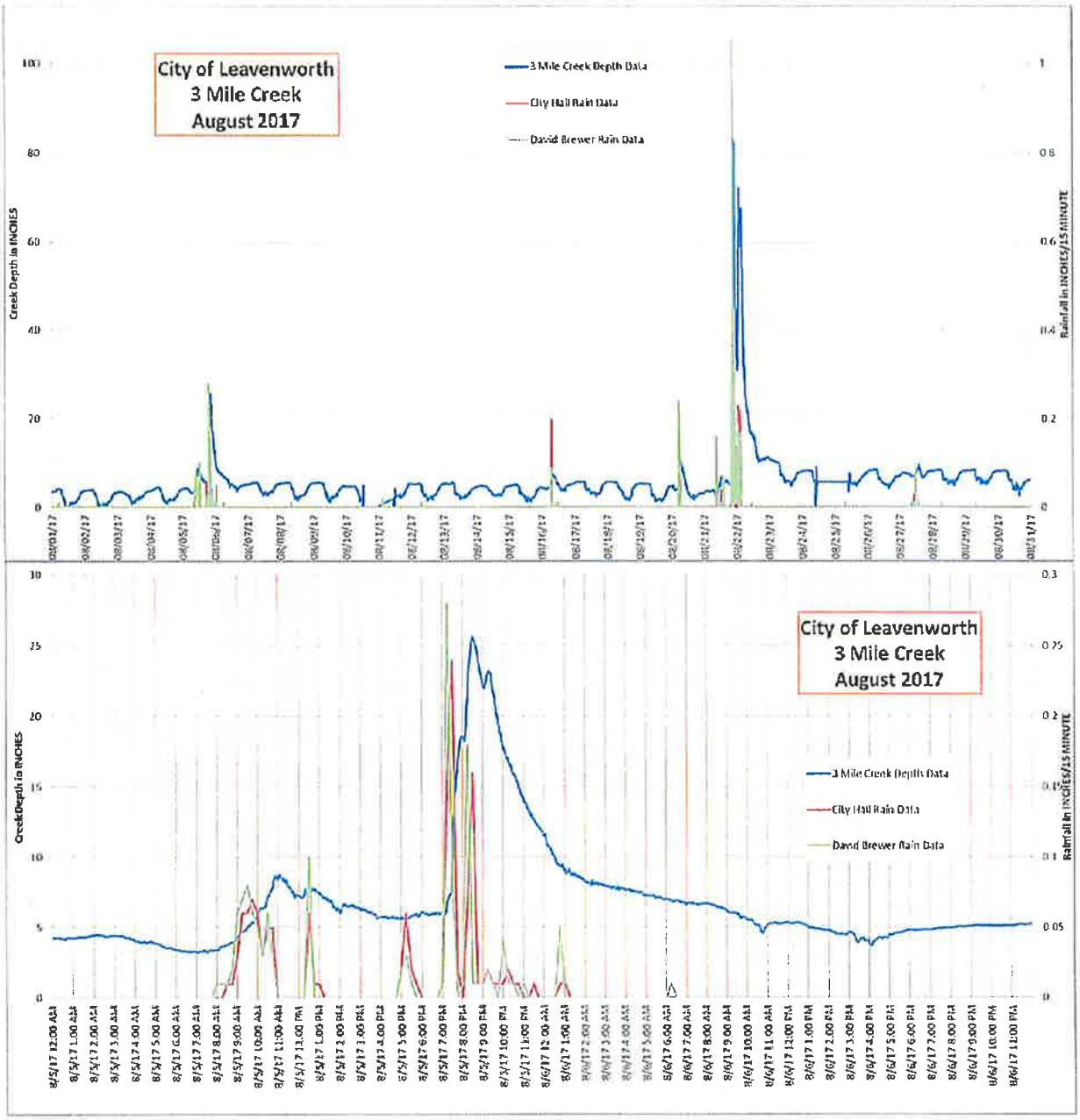

City of Leavenworth
3 Mile Creek
March 2017
3 Mile Creek Depth Data
City Hall Rain Data
David Brewer Rain Data
Creek Depth in INCHES
Rainfall in INCHES/15 MINUTES


City of Leavenworth
3 Mile Creek
March 2017
Sampling occurred between
0837 and 0857 HR
3 Mile Creek Depth Data
City Hall Rain Data
David Brewer Rain Data
Creek Depth in INCHES
Rainfall in INCHES/15 MINUTES

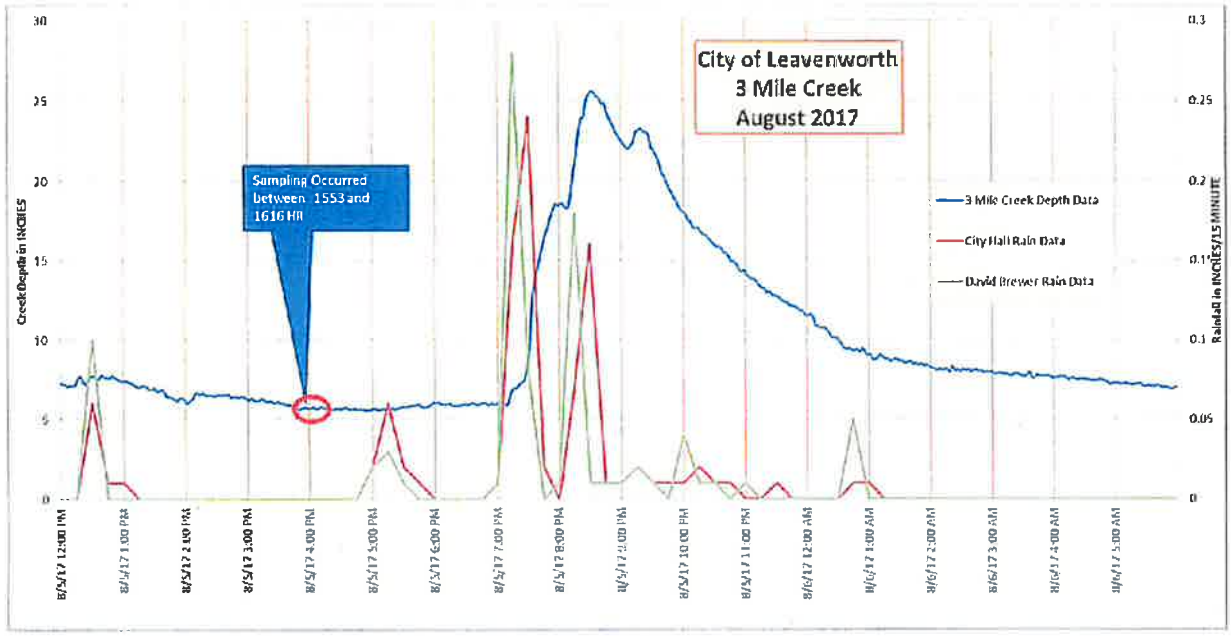

City of Leavenworth
3 Mile Creek
July 2017
3 Mile Creek Depth Data
City Hall Rain Data
David Brewer Rain Data
Depth in INCHES
Rainfall in INCHES/15 MINUTES


City of Leavenworth
3 Mile Creek
July 2017
3 Mile Creek Depth Data
City Hall Rain Data
David Brewer Rain Data
Depth in INCHES
Rainfall in INCHES/15 MINUTES


City of Leavenworth
3 Mile Creek
July 2017
3 Mile Creek Depth Data
City Hall Rain Data
David Brewer Rain Data
Samples taken at 0918 and 0845 HRS
Depth in INCHES
Rainfall in INCHES/15 MINUTES


City of Leavenworth
3 Mile Creek
August 2017
3 Mile Creek Depth Data
City Hall Rain Data
David Brewer Rain Data
Creek Depth in INCHES
Rainfall in INCHES/15 MINUTE

City of Leavenworth
3 Mile Creek
August 2017
3 Mile Creek Depth Data
City Hall Rain Data
David Brewer Rain Data
Creek Depth in INCHES
Rainfall in INCHES/15 MINUTE


City of Leavenworth
3 Mile Creek
August 2017
Sampling Occurred between 1553 and 1616 HR
3 Mile Creek Depth Data
City Hall Rain Data
David Brewer Rain Data
Creek Depth in INCHES
Rainfall in INCHES/15 MINUTE

POLICY REPORT PWD NO. 18-11
REVIEW STORMWATER MANAGEMENT PROGRAM

February 20, 2018

Prepared by:

Michael G. McDonald, P.E.,
Director of Public Works

Submitted by:

Paul Kramer,
City Manager

ISSUE:
Review Stormwater Management Program

BACKGROUND:
The City of Leavenworth is a Phase II City for stormwater matters and is regulated by KDHE. The current Stormwater Management Program (SMP) was adopted by the City Commission on February 23, 2016 is attached to this report. The report outlines how the City intends to implement programs to protect water quality in the creeks and streams within the City; ultimately contributing to improved water quality of the Missouri and Mississippi Rivers.

The goals of the program are to:

- Protect people and property from water quantity issues (flooding).
- Protect and improve water quality in the creeks and streams of Leavenworth.

The EPA and KDHE dictate the form of the SMP, particularly how the "Six Minimum Control Measures" should be addressed by the City (attached). These six measures are:

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Stormwater Runoff and Control
5. Post-Construction Stormwater Management in New Development and Redevelopment Projects
6. Pollution Prevention/Good Housekeeping for Municipal Operations

These control measures are addressed by "Best Management Practices" (BMP). This is a broad term that generally relates to an expectation by regulatory agencies that the City will be following good practices for a municipality of our size, such as design standards, permit requirements, record keeping, inspection staff and more.

A series of goals formulated as BMPs has been incorporated into the SMP. City staff has sought to meet the goals through a variety of programs over the last year. It is important to note that these activities will need to be tracked and are expected to be reported each year in the annual report submitted to KDHE.

This annual review of the Stormwater Management Program is an opportunity for the City Commission and the public to comment on the activities and direction the City is taking to meet the various goals of the program.

RECOMMENDATION: It is recommended that a resolution supporting the program be adopted at the Commission meeting February 27, 2018.

ATTACHMENTS:
2016 City Stormwater Management Program adopted February 23, 2016
Kansas Stormwater Phase II Final Rule Fact Sheet Series
KDHE Guidance for Completion of a Stormwater Management Program Document

RESOLUTION NO. B-2132

BE IT RESOLVED BY THE LEAVENWORTH CITY COMMISSION OF THE CITY OF LEAVENWORTH, KANSAS, AS FOLLOWS:

SECTION 1:

The 2016 Stormwater Management Program shall become the official guiding authority for actions by the Leavenworth City Commission and its staff until or unless changed by official action.

PASSED AND APPROVED THIS 23rd DAY OF FEBRUARY, 2016.

Larry Dedeke, Mayor

ATTEST:

Carla K. Williamson, CMC, City Clerk

SEAL OF THE CITY OF LEAVENWORTH KANSAS CORPORATE SEAL

City of Leavenworth
Stormwater Management Program

Adopted by the City Commission February 23, 2016

City of Leavenworth
Stormwater Management Program

February 2016

Program History

The City of Leavenworth was established in the 1850's along Three-Mile Creek and on the banks of the Missouri River. Since that time the City has grown to include most of the Three-Mile Creek and Five-Mile Creek watersheds.

There has been a history of flooding since the founding of the city, with notable examples in the attached Appendix. The most recent dramatic example was in October 2005 where an estimated eleven inches of rain fell in a four hour period, causing significant property damage throughout the community. On July 6, 2015 over three inches fell in a one hour period also causing significant damage.

It is understandable that the city focused efforts since at least the 1980's to improve stream capacity to reduce flooding. Key improvements include:

- Replaced Major Bridges (at least 8)
- Channel Improvements on Three-Mile Creek between Missouri River and Broadway
- Stormwater Master Plan (1997)
- FEMA Floodplain Revisions on Three-Mile Creek (2014 and 2015)
- Approved Sales Tax with dedicated stormwater funding (1995, 2005,2015)

During the late 1980's the Environmental Protection Agency (EPA) determined that stormwater discharges from urban areas were having a negative impact on the nation's waterways. In the 1990s Congress expanded Clean Water Act authority to regulate municipal stormwater discharges under the National Pollutant Discharge Elimination System (NPDES). Phase I regulations were implemented in 1990 for large municipalities and Phase II regulations were implemented in 1999 for smaller municipalities such as Leavenworth

The City of Leavenworth received its first NPDES stormwater permit from the Kansas Department of Health and Environment (KDHE) in 2004, along with 58 other regulated entities. All regulated Phase II entities have the same six minimum requirements:

1. Public outreach and education
2. Public involvement
3. Municipal pollution prevention
4. Construction site stormwater control
5. Illicit discharge detection and elimination
6. Post construction stormwater control.

A new NPDES permit was issued to City of Leavenworth in 2014 which includes the same six minimum control measures, along with additional requirements for water quality testing and an updating of the Stormwater Management Program

Stormwater Program Goals

The stormwater program of the city has two goals:

- Protect people and property from flood events
- Protect and enhance water quality

The city works to meet these goals by having a qualified staff and appropriate standards for design and construction of improvements.

Staff

The Public Works Department staff includes engineers, inspectors, technicians, GIS mappers and project managers that review plans for all projects. The Community Development Department reviews plans for compliance with zoning ordinances

The Street Division has significant staffing and equipment resources to assist in addressing stormwater matters that may occur, and there are two full-time stormwater employees who inspect, evaluate, clean and perform small repairs on existing stormwater infrastructure. The Community Development Department has two full-time inspectors to evaluate zoning matters within the city including stormwater concerns. Employees of Water Pollution Control (wastewater) perform the measuring and testing work required.

Program Tools

The City uses a variety of tools to assist in the evaluation and management of stormwater issues including:

1. Stormwater Master Plan (1997) by Black & Veatch)
2. Stormwater Design Guidelines (March 2015)
3. American Public Works Association Section 5600 as a guideline (2011)
4. MARC/APWA BMP Manual as a Guideline (2012)
5. Floodplain Management (20103CV000B, July 2015)
6. Requiring a "Land Disturbance Permit" for most construction activity (March 2015)
7. Various City Ordinances
8. Submit Annual Report to KDHE after review by City Commission

Stormwater Management Program Implementation
City Staff has created goals related to the six minimum control measures in an effort to meet the needs of the community and comply with the NPDES requirements. These are shown in the attached pages.

Please do not hesitate to contact the Office of the City Engineer should you have any questions regarding this program

Michael G. McDonald
City Engineer
Public Works Director
City Hall
100 N Fifth Street
Leavenworth, KS
mmcdonald@firstcity.org
913-684-0375

Attachments

- FEMA Narrative on Flood events from FIS 20103CV000B
- Stormwater Management Program Goals

Stormwater Management Program BMP List
February 23, 2016

Minimum Control Measure #1 - Public Education and Outreach

BMP	Measure	Responsibility	Schedule (Permit Year)
Web Page link to stormwater infrastructure information – Master Plan, Management Plan, Map	# of visitors	Leavenworth	1,2,3,4,5
Place documents in Public Library stormwater infrastructure information – Master Plan, Management Plan, Map	# Check-out requests	Leavenworth	1,2,3,4,5
Include articles or stories related to stormwater in city newsletter in at least two issues per year	# Articles/Stories # Issues	Leavenworth	1,2,3,4,5
City generated posts on social media related to stormwater issues at least ten occurrences per year	# Posts	Leavenworth	1,2,3,4,5
Provide Information to Citizens regarding the City of Leavenworth Solid Waste Division.	Distribute trash bags to citizens with proper disposal handout	Leavenworth	1,2,3,4,5
Show Stormwater Information on Local cable TV Station	Broadcast community forums, in which continued water quality discussions take place	Leavenworth	1,2,3,4,5

Stormwater Management Program BMP List
February 23, 2016

Minimum Control Measure #2 - Public Participation and Involvement

BMP	Measure	Responsibility	Schedule (Permit Year)
Hold Public Information Meetings Regarding Stormwater Issues	Annual review by City Commission of Stormwater Annual Report Review of Stormwater projects in annual Capital Improvement Plan	Leavenworth	1,2,3,4,5
Create an "Adopt a Stream Program"	# Streams Adopted # Streams Cleaned	Leavenworth	1,2,3,4,5
Improve Lines of Communication with the Public through use of website and social media	Integrate contemporary methods of providing and receiving information to the Public.	Leavenworth	1,2,3,4,5
Annual City-Wide Clean-up Program	# Groups # Participants	Leavenworth	1,2,3,4,5
Customer Surveys – conduct at least one survey each year on stormwater related issues in an on-line environment	# of responses	Leavenworth	1,2,3,4,5
Encourage groups to participate in activities such as inlet stencil program and similar	# groups # programs	Leavenworth	1,2,3,4,5

Stormwater Management Program BMP List
February 23, 2016

Minimum Control Measure #3 - Illicit Discharge Detection and Elimination (IDDE)

BMP	Measure	Responsibility	Schedule (Permit Year)
Inspect complaints of Illicit Discharge	Inform public of methods to communicate concerns regarding illicit discharges # reports investigated	Leavenworth	1, 2, 3,4, 5
Update Stormwater Outfall Maps	Continue efforts to accurately locate and measure existing and new stormwater infrastructure	Leavenworth	1,2,3,4,5
Inspect Outfalls	# outfalls inspected	Leavenworth	1,2,3,4,5
Collect Yard Waste at City Composting Facility	# customers	Leavenworth	1,2,3,4,5
Collect Tree and Brush Debris at Brush disposal site	# customers	Leavenworth	1,2,3,4,5
Collect Household Hazardous Waste as part of Citywide Clean-up Event	# pounds of household hazardous waste recycled	Leavenworth	1, 2, 3,4, 5
Conduct Free Disposal Saturdays (First Saturday)	# Events # Tons Collected	Leavenworth	1,2,3,4,5
Staff Training	# of staff trained	Leavenworth	1,2,3,4,5

Stormwater Management Program BMP List
February 23, 2016

Stormsewer Maintenance and Inspection	Provide dry weather storm sewer inspection.	Leavenworth	1,2,3,4,5
Inspection of Sanitary Sewer Systems	Inspect residential and commercial sanitary systems for improper discharge into storm drains. Inspect sanitary sewer system to reduce number and volume associated with SSO Coordinate SSO events between Wastewater Staff, Building Officials and Engineering.	Leavenworth	1,2,3,4,5
Commercial Grease Trap Inspection Program	Review status of commercial grease traps through record review and physical inspection	Leavenworth	1,2,3,4,5

Stormwater Management Program BMP List
February 23, 2016

Minimum Control Measure #4 - Construction Site Runoff Control

BMP	Measure	Responsibility	Schedule (Permit Year)
Construction Drawing plan review and Site Runoff Control	# plans reviewed # LDP Issued	Leavenworth	1, 2, 3,4,5
Publish Updated Standard Details and Design Criteria for Erosion Control*	Make available on-line Review annually with staff	Leavenworth	1,2,3,4,5
Staff Training on Runoff Inspection	# inspectors trained	Leavenworth	1,2,3,4,5
Inform Local Contractors of LDP	Annual notification of LDP requirements LDP documents available on-line	Leavenworth	1,2,3,4,5
Pre-Construction Meetings with Owner and Contractor - Require meetings with owner and contractor prior to commencement of grading operations.	# Meetings	Leavenworth	1,2,3,4,5
Construction Site Inspection and Enforcement - Increase the frequency of inspections and communications back to owner/contractor	Documentation of inspections	Leavenworth	1,2,3,4,5

Stormwater Management Program BMP List
February 23, 2016

Minimum Control Measure #5 - Post Construction Runoff Control

BMP	Measure	Responsibility	Schedule (Permit Year)
Construct Sediment vane traps on new and reconstructed inlets	# Inlets	Leavenworth	1,2,3,4,5
Protect sensitive areas, such as wetlands and riparian areas through plan review and selected land acqusition from developers and at tax sales	# tracts acquired from developers # tracts acquitted from Tax sale # Acres acquired/year	Leavenworth	1,2,3,4,5
Enforce Post Construction Runoff Control Ordinance	# LDP Releases Documentation of inspection and communication	Leavenworth	1,2,3,4,5
Conduct Long Term BMP Maintenance Inspections	Documentation of inspection and communication	Leavenworth	1,2,3,4,5
Analyze Existing Structural BMP Performances at selected sites (particularly detention basins)	# sites evaluated	Leavenworth	1,2,3,4,5
Measure rain gage and creek depth to evaluate flow quantity and duration from at least March – October.	# Rain gages # Stream gages	Leavenworth	1,2,3,4,5

Stormwater Management Program BMP List
February 23, 2016

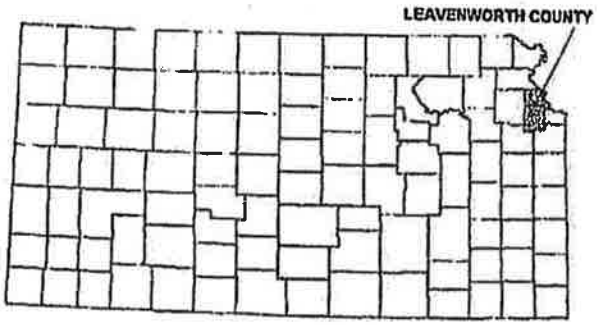
Minimum Control Measure #6 - Municipal Pollution Prevention

BMP	Measure	Responsibility	Schedule (Permit Year)
Review City Facilities for water quality concerns and develop plans to address them, goal is at least three facilities per year	# Reports Prepared	Leavenworth	1,2,3,4,5
Street Sweeping Program – goal is residential areas three times per year and collector/arterial streets once per month (8 months)	# Times completed Residential Area Sweeping # Times completed Collector/arterial Sweeping # hours sweeping	Leavenworth	1,2,3,4, 5
Snow Removal Operations - Use ground speed control and GPS equipment to keep salt use within guidelines	# tons of salt used per year # pounds per lane mile per storm	Leavenworth	1,2,3,4,5
Stormwater Inlet Cleaning	# Inlets	Leavenworth	1,2,3,4, 5
Continue Citywide Leaf Collection Program (currently one-half of city each year)	# loads	Leavenworth	1,2,3,4,5

FLOOD INSURANCE STUDY

LEAVENWORTH COUNTY, KANSAS
AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
BASEHOR, CITY OF	200187
EASTON, CITY OF	200188
LANSING, CITY OF	200189
LEAVENWORTH, CITY OF	200190
LEAVENWORTH COUNTY UNINCORPORATED AREAS	200186
LINWOOD, CITY OF	200191
TONGANOXIE, CITY OF	200192



REVISED: July 16, 2015

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

20103CV000B

September 1970. Unfortunately, precise data regarding flood levels reached by these events have not been documented. The following extracts from the Leavenworth Times described two of the events that were experienced. "On July 30, 1958, more than four and half inches of rain fell in the area." Hundreds of area residents were delayed in reaching their homes by streams that were overflowing their banks at many locations. On October 13, 1961, three to four inches of rainfall occurred in the area.

The City of Lansing is above the floodplain of the Missouri River except for the areas where Sevenmile Creek and other right bank tributaries enter the Missouri River. The only recorded damage to the City, caused by flooding from the Missouri River, occurred when an emergency levee failed during the April 1952 flood. The flood caused a total of $125,200 damage to the Leavenworth and Lansing areas. The damages were $112,000 to business property, $12,600 to homes, and $600 to public property (Reference 1). The main sewers are subject to silting and other damage by flooding from the Missouri River.

City of Leavenworth

The flood producing characteristics of Threemile, South Branch, and Fivemile Creeks are typical of small watersheds in the Midwest region. Past flood flows have usually been caused by short duration thunderstorms having high intensity rainfall. Conversely, flood problems associated with the Missouri River are usually caused by long protracted fronts occurring over large areas. There are no natural obstructions to flood flow in the Threemile Creek floodplain. Obstructions restricting floodwater flow have been created by man's continued encroachment on the Threemile Creek floodplain. Severe restrictions to flood flow have been created in the past by construction of many bridges located in the floodplain between Tenth Street and the mouth. In addition, a portion of the creek channel had been enclosed in a box culvert located under the railroad yards between Seventh Street and Broadway. Because of inadequate openings in these bridges and culvert, a cumulative aggravation of flood backwater occurred in the lower floodplain

The City of Leavenworth embarked on a substantial effort to improve flooding conditions downstream of Tenth Street in the early 1980's. The bridge on Tenth Street was replaced in 1983, the bridge on Cherokee (west of Broadway) in 1981, and the bridge on Shawnee west of Tenth in 1985. The rail yard trestles were removed by 1988. In addition, new bridges have been constructed at Third Street, Sixth Street, Seventh Street, Broadway and Shawnee Streets since 1988. Construction of a pedestrian trail at creek level between Esplanade Street and 7th Street contributed to larger channel cross sections between Fourth Street and Seventh Street and generally improved flow characteristics. A new bridge at Second Street is expected to be constructed in 2015. A significantly larger natural open channel was constructed between 6th Street and Cherokee Streets in the early 1990's.

The improvements since the last FIS have had a significant impact on the critical area near Cherokee and Broadway Streets. At this location flood flows were impeded by small bridge openings at Cherokee Street and at Broadway Street that forced excess water out of banks through the developed floodplain area along Cherokee Street. Flow from this area attempting to return to the channel was further impeded by the now removed railroad yard culvert. Flooding at Cherokee Street occurs less often with the construction of the noted improvements.

Channel restrictions between Cherokee Street and Shawnee Street west of Broadway remain. These restrictions continue to pose a threat to structures along Miami St. between 8th St. and 10th St.

Since there is no stream gaging stations on Threemile Creek or its South Branch, documentation of flood problems affecting Leavenworth in the past rely completely upon historical accounts. Detailed investigations have been made of flooding which occurred in July 1958 and October 1961. In addition, fragmentary records of 11 additional floods have been found through a search of newspaper files. It appears that the maximum known flood prior to 1972 occurred in 1904. This flood had an estimated peak discharge of 7,000 cubic feet per second (cfs) at the mouth (between the discharge of a 50-year and 100-year flood), and 6,500 cfs at Seventh Street. The following composite accounts describe the July 1958 and October 1961 events experienced on Threemile Creek.

On July 30, 1958, more than 4 1/2 inches of rain fell in the Leavenworth area. Damage estimated at $30,000 was reported from businessmen and homeowners from the resulting flood on Threemile Creek. The downtown area was hardest hit, especially on Cherokee from Broadway to Seventh Street where the discharge of the flood was estimated at 4,300 cfs.

On October 13, 1961, three to four inches of rainfall fell in the Leavenworth area. The resulting flood on Threemile Creek exceeded bank full capacity at 7:00 PM, crested at about 9:00 PM, and receded to within-bank stages at 11:30 PM. The flood caused $71,000 damage in Leavenworth, of which $58,700 was damage to 24 business places and 16 residences, and the remainder was damage to transportation facilities and municipal property. The discharge at Seventh Street was estimated at 4,000 cfs.

The City of Leavenworth Public Works Department has identified the following significant flood events since 1972 (Reference 12). In all cases – water overtopped the banks upstream of Cherokee Street and flowed east along Cherokee Street, returning to the banks of the creek at 6th Street. Flooding of the 800 and 900 blocks of Miami also occurred in the same years noted below causing damage to residences and businesses. Water has been as high as two feet deep in Miami Street. The city has purchased several homes using "buy-out" programs, and worked with businesses to ensure that they take appropriate measures to minimize risks from flooding. Some of the more notable events include:

- July 6-7, 1986- 10.4 inches of rain fell, causing water to flow down Cherokee Street and floating several automobiles and trailers.
- May 15, 1990 – 4.4 inches of rain fell causing minor flooding.
- October 4th 1998 – between six and eight inches of rain fell in a twelve hour period causing damage on Cherokee Street and areas upstream of Shawnee (west of Tenth Street). Damage was also noted in the 800 and 900 blocks of Miami Street.
- 1993 – Local heavy thunderstorms combined with an elevated water surface in Three-Mile Creek from record flooding on the Missouri River resulted in significant flooding along Cherokee Street.

- October 2nd 2005 – A NWS gage recorded 5.6 Inches of rain, but eyewitness accounts and anecdotal evidence supports between seven and eleven inches of rain falling in a four hour period in some locations. The resulting flood was identified as the worst in memory, and flooded structures between 11th Street and downstream to 6th Street. A new bridge was under construction at 6th Street, and the debris caused the complete collapse of the falsework. The floodwater and debris and falsework passed through the old railroad Bridge at Esplanade Street which acted as lens and focused the stream upon the mouth of the creek at the Missouri River. The jet of water undermined the sanitary sewer along the banks of the Missouri River. A hole that later measured as over forty feet deep appeared where the sewer had been buried twenty feet below the creek bottom. The sewers were repaired by late 2006 at a total cost of about $1,000,000. Estimates of flow were later determined by Black & Veatch Engineers as being in excess of 7500 cfs at Esplanade Street.

- There has been no further flooding of Cherokee Streets between 2005 and October 2014.

Flood damage along South Branch of Three-Mile Creek has typically been much less severe than that along the Main Branch of Threemile Creek. Damage to road crossings and property near Eleventh Street as well as scouring is likely to take place during floods.

Severe restrictions from bridges across Five-Mile Creek have been addressed with new structures at Fourth Street, Second Avenue/Limit Street and Shrine Park Road since 1972. Inadequate openings of the older bridges had caused a cumulative aggravation by flood backwater in the floodplain.

Newspaper accounts provide most of the history of flooding on Fivemile Creek prior to the 1970's. These accounts reveal that flooding has occurred several times in the past. Notable floods were reported in June 1942, July 1958, October 1961, April 1969, and September 1970. Unfortunately, precise data regarding flood levels reached by these floods have not been documented.

The flood of July 30, 1958, had Fivemile Creek flooding Shrine Park Road, Limit Street and U.S. 73 at Black Bridge (Reference 1).

The flood of October 12, 1961, swept away cut brush laying in the vicinity of the sewage treatment plant at Second and Fivemile Creek (Reference 1).

On April 26, 1969, Fivemile Creek ran 10-12 inches deep across Shrine Park Road, just south of the entrance to the golf club. Along south Fourth Street the stream spread out for a half mile or more and at Second Street, in the vicinity of the sewage disposal plant, the creek rose to the edge of the street (Reference 1).

Heavy rains since 1988 often result in water flowing across Shrine Park Road at low areas north of the new bridge and across Tenth Avenue at Wellington Drive. These events also result in significant erosion and scouring of the creek bank. Water has crossed the bridge at Second Avenue and Limit Street on several occasions at depths up to six inches since 1988. One notable event occurred on October 4, 1998, when 4.74 inches of rain fell in two hours (measured in south Leavenworth), and it resulted in ten

inches of water across Tenth Avenue at Wellington, 24 to 30 inches across Shrine Park Road north of the bridge, and six to eight inches across Limit Street (Reference 12). A new larger bridge at this site is completed (2014) and is expected to reduce and possibly eliminate roadway flooding at this location.

The City of Leavenworth is above the floodplain of the Missouri River except for the areas where Threemile and Fivemile Creeks and other smaller right bank tributaries enter the Missouri River. Recorded damage to the city, caused by flooding from the Missouri River, occurred when an emergency levee failed during the April 1952 flood. The flood caused a total of $125,200 damage in Leavenworth. The damages were $12,000 to business property, $12,600 to homes, and $600 to public property. The Wastewater Treatment Plant had never been threatened by flooding until it was inundated in the 1993 Missouri River Flooding, with repair costs in excess of $1 million required to restore service. The plant has been threatened to a level requiring sandbagging and other measures at least three additional times since 1993, most notably in 2011 due to releases from Corps of Engineers dams upstream when the levels were within six inches of the city closing the plant.

Second Street north of Five-Mile Creek is subject to standing water and flooding from high water in the Missouri River and is then closed to protect the public. This has happened at least five times since 1988.

The Riverfront Community Center (Union Railroad Depot) was protected from flooding in 1993 when nearly four feet of water from the Missouri River threatened the structure. Heroic efforts by the community created a sizable protective sandbag wall that prevented flooding, but the building suffered related damage requiring over $300,000 in repairs. It has been necessary to construct flood protective measures at least three times since 1993 with expenses typically in excess of $10,000 on each occasion. The City expects to construct a permanent floodwall with a FEMA grant in 2015 to reduce expenses and damage from future floods.

A combined effort of Leavenworth County, City of Leavenworth and City of Lansing resulted in a recording stream gage being installed at the Leavenworth Waterworks Intake structure on Dakota Street in September 2012. This is expected to improve flood evaluation and forecast activities.

2.4 Flood Protection Measures

There are several flood protection measures operable for the benefit of Leavenworth County. The Mud Creek Levee Unit meets the requirements and provisions of Section 65.10 of the NFIP regulations. The levee system provides flood protection for the 1-percent annual chance flood event on Mud Creek. The levee system is currently in the USACE PL 84-99 levee program and is periodically inspected by the Kansas City USACE District. There are some low frequency private agricultural levees along Stranger Creek that do not meet the FEMA 3-foot freeboard requirement and any other provisions of Section 65.10 of the NFIP regulations. There are no major structural flood protection measures planned for this study area. However, the adoption of State and local development regulations concerning floodplain management will help alleviate storm related losses.

United States Environmental Protection Agency
Office of Water (4203)
EPA 833-F-00-002
January 2000 (revised December 2005)
Fact Sheet 2.0

Stormwater Phase II Final Rule

Small MS4 Stormwater Program Overview

Stormwater Phase II Final Rule Fact Sheet Series

Overview

1.0 – Stormwater Phase II Final Rule: An Overview

Small MS4 Program

2.0 – Small MS4 Stormwater Program Overview

2.1 – Who's Covered? Designation and Waivers of Regulated Small MS4s

2.2 – Urbanized Areas: Definition and Description

Minimum Control Measures

2.3 – Public Education and Outreach

2.4 – Public Participation/ Involvement

2.5 – Illicit Discharge Detection and Elimination

2.6 – Construction Site Runoff Control

2.7 – Post-Construction Runoff Control

2.8 – Pollution Prevention/Good Housekeeping

2.9 – Permitting and Reporting: The Process and Requirements

2.10 – Federal and State-Operated MS4s: Program Implementation

Construction Program

3.0 – Construction Program Overview

3.1 – Construction Rainfall Erosivity Waiver

Industrial "No Exposure"

4.0 – Conditional No Exposure Exclusion for Industrial Activity

Polluted storm water runoff is often transported to municipal separate storm sewer systems (MS4s) and ultimately discharged into local rivers and streams without treatment. EPA's Stormwater Phase II Rule establishes an MS4 stormwater management program that is intended to improve the Nation's waterways by reducing the quantity of pollutants that stormwater picks up and carries into storm sewer systems during storm events. Common pollutants include oil and grease from roadways, pesticides from lawns, sediment from construction sites, and carelessly discarded trash, such as cigarette butts, paper wrappers, and plastic bottles. When deposited into nearby waterways through MS4 discharges, these pollutants can impair the waterways, thereby discouraging recreational use of the resource, contaminating drinking water supplies, and interfering with the habitat for fish, other aquatic organisms, and wildlife.

In 1990, EPA promulgated rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) stormwater program. The Phase I program for MS4s requires operators of "medium" and "large" MS4s, that is, those that generally serve populations of 100,000 or greater, to implement a stormwater management program as a means to control polluted discharges from these MS4s. The Stormwater Phase II Rule extends coverage of the NPDES stormwater program to certain "small" MS4s but takes a slightly different approach to how the stormwater management program is developed and implemented.

What Is a Phase II Small MS4?

A small MS4 is any MS4 not already covered by the Phase I program as a medium or large MS4. The Phase II Rule automatically covers on a nationwide basis all small MS4s located in "urbanized areas" (UAs) as defined by the Bureau of the Census (unless waived by the NPDES permitting authority), and on a case-by-case basis those small MS4s located outside of UAs that the NPDES permitting authority designates. For more information on Phase II small MS4 coverage, see Fact Sheets 2.1 and 2.2.

What Are the Phase II Small MS4 Program Requirements?

Operators of regulated small MS4s are required to design their programs to:

- ❑ Reduce the discharge of pollutants to the "maximum extent practicable" (MEP);
- ❑ Protect water quality; and
- ❑ Satisfy the appropriate water quality requirements of the Clean Water Act.

Implementation of the MEP standard will typically require the development and implementation of BMPs and the achievement of measurable goals to satisfy each of the six minimum control measures.

The Phase II Rule defines a small MS4 stormwater management program as a program comprising six elements that, when implemented in concert, are expected to result in significant reductions of pollutants discharged into receiving waterbodies.

The six MS4 program elements, termed "minimum control measures," are outlined below. For more information on each of these required control measures, see Fact Sheets 2.3 – 2.8.

❶ ***Public Education and Outreach***
Distributing educational materials and performing outreach to inform citizens about the impacts polluted stormwater runoff discharges can have on water quality.

❷ ***Public Participation/Involvement***
Providing opportunities for citizens to participate in program development and implementation, including effectively publicizing public hearings and/or encouraging citizen representatives on a stormwater management panel.

❸ ***Illicit Discharge Detection and Elimination***
Developing and implementing a plan to detect and eliminate illicit discharges to the storm sewer system (includes developing a system map and informing the community about hazards associated with illegal discharges and improper disposal of waste).

❹ ***Construction Site Runoff Control***
Developing, implementing, and enforcing an erosion and sediment control program for construction activities that disturb 1 or more acres of land (controls could include silt fences and temporary stormwater detention ponds).

❺ ***Post-Construction Runoff Control***
Developing, implementing, and enforcing a program to address discharges of post-construction stormwater runoff from new development and redevelopment areas. Applicable controls could include preventative actions such as protecting sensitive areas (e.g., wetlands) or the use of structural BMPs such as grassed swales or porous pavement.

❻ ***Pollution Prevention/Good Housekeeping***
Developing and implementing a program with the goal of preventing or reducing pollutant runoff from municipal operations. The program must include municipal staff training on pollution prevention measures and techniques (e.g., regular street sweeping, reduction in the use of pesticides or street salt, or frequent catch-basin cleaning).

What Information Must the NPDES Permit Application Include?

The Phase II program for MS4s is designed to accommodate a general permit approach using a Notice of Intent (NOI) as the permit application. The operator of a regulated small MS4 must include in its permit application, or NOI, its chosen BMPs and measurable goals for each minimum control measure. To help permittees identify the most appropriate BMPs for their programs, EPA issued a Menu of BMPs to serve as guidance. NPDES permitting authorities can modify the EPA menu or develop their own list. For more information on application requirements, see Fact Sheet 2.9.

What Are the Implementation Options?

The rule identifies a number of implementation options for regulated small MS4 operators. These include sharing responsibility for program development with a nearby regulated small MS4, taking advantage of existing local or State programs, or participating in the implementation of an existing Phase I MS4's stormwater program as a co-permittee. These options are intended to promote a regional approach to stormwater management coordinated on a watershed basis.

What Kind of Program Evaluation/Assessment Is Required?

Permittees need to evaluate the effectiveness of their chosen BMPs to determine whether the BMPs are reducing the discharge of pollutants from their systems to the "maximum extent practicable" and to determine if the BMP mix is satisfying the water quality requirements of the Clean Water Act. Permittees also are required to assess their progress in achieving their program's measurable goals. While monitoring is not required under the rule, the NPDES permitting authority has the discretion to require monitoring if deemed necessary. If there is an indication of a need for improved controls, permittees can revise their mix of BMPs to create a more effective program. For more information on program evaluation/assessment, see Fact Sheet 2.9.

For Additional Information

Contacts

☞ U.S. EPA Office of Wastewater Management
http://www.epa.gov/npdes/stormwater
Phone: 202-564-9545

☞ Your NPDES Permitting Authority. Most States and Territories are authorized to administer the NPDES Program, except the following, for which EPA is the permitting authority:

Alaska	Guam
District of Columbia	Johnston Atoll
Idaho	Midway and Wake Islands
Massachusetts	Northern Mariana Islands
New Hampshire	Puerto Rico
New Mexico	Trust Territories
American Samoa	

☞ A list of names and telephone numbers for each EPA Region and State is located at http://www.epa.gov/npdes/stormwater (click on "Contacts").

Reference Documents

☞ EPA's Stormwater Web Site
http://www.epa.gov/npdes/stormwater

- Stormwater Phase II Final Rule Fact Sheet Series
- Stormwater Phase II Final Rule (64 *FR* 68722)
- National Menu of Best Management Practices for Stormwater Phase II
- Measurable Goals Guidance for Phase II Small MS4s
- Stormwater Case Studies
- And many others

KDHE GUIDANCE FOR COMPLETION OF A STORMWATER MANAGEMENT PROGRAM DOCUMENT IN COMPLIANCE WITH THE REQUIREMENTS OF AN MS4 NPDES STORMWATER PERMIT

A. General Guidance and Background

The Municipal Separate Storm Sewer System (MS4) NPDES stormwater permits issued by KDHE require preparation of a Stormwater Management Program (SMP) document, also referred to as a stormwater management plan. The acronym SMP is used to help differentiate this plan from other plans required by NPDES stormwater permits in Kansas. Both industrial stormwater permits as well as construction stormwater general permits call for development of a Stormwater Pollution Prevention (SWP2) Plan.

The SMP documents which have been prepared by various NPDES permitted MS4 municipalities in Kansas range from documents of a few pages to documents contained in multiple three ring binders with several hundred pages. The purpose of this guidance document is to identify the requirements for an SMP document and help to avoid development of a document excessively long and detailed or too brief and unacceptable.

The SMP document should comply with the requirements of the permit and may also satisfy other needs of the permittee. As an example some SMP documents include multiyear capital improvement plans, this is not required by the MS4 permit but may be useful to the permittee. Additionally, some municipalities may have established a stormwater utility and imposed a stormwater fee for property owners. The present fee schedule and ordinance may be included in the SMP document, however, there is no requirement within the MS4 permit for the permittee to impose a stormwater utility fee nor include such documents in the SMP.

The MS4 permit should be fully read and understood prior to writing or updating the SMP document. Typically, the MS4 permits require the SMP document be drafted or updated with the intent of implementing a program designed to:

1) Reduce the discharge of pollutants from the MS4 to the Maximum Extent Practicable.
2) Fully implement the six minimum control measures as presented in the permit.
3) Satisfy the requirements of the permit, the Clean Water Act and Kansas surface water quality statutes and regulations.

The permit defines Maximum Extent Practicable as implementation of the Best Management Practices (BMPs) as specified in the SMP. However, failure to implement the BMP in a manner to achieve the measurable goal or failure to implement reasonable goals can constitute a failure to comply with the permit and may place the permittee in jeopardy of enforcement by KDHE. Please note, these MS4 NPDES permits are joint State of Kansas and Federal permits and the Federal Government, normally the Environmental Protection Agency, can also bring enforcement action for failure to comply with the permit. Federal regulations and the permit require implementation of BMPs to achieve improvements in stormwater quality and are expected to result in significant reductions of pollutants discharged into surface waterbodies.

There are six minimum control measures for which BMPs are to be implemented to attenuate the discharge of pollutants in stormwater. This document does not define specific BMPs and associated measurable goals which must be implemented for each permittee. Permittees have great discretion in the selection of BMPs and associated measurable goals. However, implemented BMPs should be reasonable, and effective.

The six minimum control measures (and their associated EPA Fact Sheet numbers) are listed as follows:

1) Public Education and Outreach (Fact Sheet 2.3)
2) Public Participation and Involvement (Fact Sheet 2.4)
3) Illicit Discharge Detection and Elimination (Fact Sheet 2.5)
4) Construction Site Stormwater Runoff Control (Fact Sheet 2.6)
5) Post-Construction Stormwater Management in New Development and Redevelopment Projects (Fact Sheet 2.7)
6) Pollution Prevention/Good Housekeeping for Municipal Operations (Fact Sheet 2.8)

The SMP document should at a minimum identify the associated BMPs, their goals, and the responsible party or entity tasked with implementation or maintenance of the BMP. Additional guidance and information regarding implementation of BMPs for the six minimum control measures can be obtained from EPA Fact Sheets addressing each of the measures. The Fact Sheets are available from EPA on-line, a search engine should be able to locate them by the fact sheet number, for example "Fact Sheet 2.5".

Additionally, many MS4 NPDES permits require implementation of BMPs to reduce the discharge of TMDL pollutants identified in the permit and also conduct surface water monitoring for various parameters associated with the specified TMDL pollutants. If there are no TMDL pollutants and associated impaired stream or lake identified in the TMDL table within the permit then the permit does not require either implementation of BMPs to reduce TMDL pollutants or surface water monitoring for associated parameters. In the event such BMPs and monitoring are required the SMP document should at a minimum identify the associated BMPs, their goals, the individuals or entity responsible for surface water monitoring, and a map should be included which identifies the surface water monitoring locations.

B. KDHE Recommended Format and Items Which Should be Included in the SMP Document.

The SMP document should address the program tasks and items necessary to comply with the requirements of the permit. It may address other issues and include additional information so as to provide for the needs of the municipality. KDHE has attempted to provide as much flexibility for the permittee to develop a stormwater program which best serves the needs of the municipality and achieves compliance with the NPDES MS4 permit.

The SMP document should outline stormwater program activities, monitoring requirements, BMPs, BMP goals, reporting requirements, and responsible parties for implementing this work. The document should be sufficiently comprehensive such that if the stormwater manager discontinues employment, some other municipal staff member could review the document and understand the commitments and obligations which must be met to ensure satisfactory operation of the program and continued compliance with the MS4 NPDES permit.

Suggested elements in the document include the following:

- Table of Contents, this may be included if the document is at least moderately long, perhaps 20 pages or more. A table of contents is not required by the MS4 permit.

- An Introductory Section may be helpful to provide an overview of the MS4 permit program and the specific aspects of the local program as it presently exists. A history of how the program developed may be useful. Any such introduction is not required by the MS4 permit.

- A general section which address municipal staff responsibilities should be included. Perhaps a chain of command listing or organizational chart may be helpful. The individual or entity responsible for ensuring the program is enacted in compliance with the MS4 permit should be identified. This need not name specific staff members but simply identify the staff positions who are responsible for various aspects of implementation. This section is required by the MS4 permit.

  KDHE recommends within this section a list of general permit requirements be included which may not be addressed subsequently in the document. This list may include such items, if included in the permit, as a requirement to update the SMP document (including any specific items or subjects specified by the permit), the duty to reapply for continued permit coverage prior to expiration of the present permit, update of maps, and an explanation of the management staff responsible for compliance with the stormwater management program. If a schedule of compliance is included in the permit, the schedule should be repeated here and an explanation of how compliance with the schedule will be accomplished should be provided. This entire section is not necessarily required by the permit, but some items addressed above may be required by the permit. This section is required by the MS4 permit.

- A section which addresses the six minimum control measures and specifies the BMPs which the municipality has committed to implement must be included. This section is required by the MS4 permit. Normally the BMPs are included in a table format, and the table should specify:

    1. the individual BMP,
    2. a general description of the BMP,
    3. the measurable goal the municipality commits to achieve,
    4. and the responsible staff positions and/or entities who are principally responsible for implementing and/ or maintaining the BMP.

Guidance for implementing BMPs for the six minimum control measures can be found within Fact Sheets prepared by the EPA. Six separate fact sheets, one for each control measure, are available on-line and are numbered as indicated in the list of control measures on page two. Additionally, a search for "Stormwater Phase II Final Rule Fact Sheet Series" will normally provide links to the Fact Sheets. The EPA Fact Sheets provide only guidance, they are not a portion of the enforceable NPDES MS4 permit. Review of the Fact Sheets is recommended when drafting or updating the SMP document.

This section should be organized in subsections, one for each of the six minimum control measures. Each subsection should address the BMPs which are to be implemented. In some cases individual BMPs may be repeated under multiple control measures. As an example, distribution of leaflets for public education by inserting them in the utility bills may serve to meet the obligation of implementing one of the BMPs for the Public Education minimum control measure. This same BMP may be repeated under the subsection listing BMPs for control of TMDL pollutants if a commitment to distribute a leaflet addressing proper fertilizer application to lawns is scheduled in late winter with one of the monthly utility bills. This section is required in the SMP document.

An example of a portion of a table listing a few of the BMPs for Illicit Discharge Detection and Elimination is provided on the next page as follows:

Illicit Discharge Detection and Elimination		
BMP Description	**Measurable Goal**	**Responsible Staff**
Update the Stormwater GIS map as required.	Updated Stormwater system map will be included with annual report.	Public Works GIS staff of City of Watertown.
Inspect a portion of the MS4 outfalls and their associated collection system for illicit discharges annually.	The number of MS4 stormwater outfalls at the start of the calendar year shall be documented and the number of outfalls with their associated collection system which are inspected shall be documented at the end of the calendar year. Number of MS4 stormwater outfalls inspected by the end of the year shall equal or exceed 5% of the number of outfalls documented at the start of the year.	Public Works staff of City of Watertown.
Any spill reports received by the Public Works Department shall be conveyed to the on-call Public Works staff member for his response or consultation with municipal staff on site.	All spill reports received by the on call Public Works staff member shall be logged in and each of the logged spills (100%) shall be physically attended by the on call staff member (or his designee) or verbal guidance by the staff member/designee shall be provided to municipal staff on site. All spill reports which are logged in shall include documentation of the response.	On call Public Works staff Member City of Watertown.
Review and update the Stormwater Pollution Ordinance No XXXX every other year (even years) with an update of enforcement procedures as needed.	Ordinance reviewed and updated (if required).	Stormwater Director City of Watertown

- If a TMDL table is included in the MS4 permit with TMDL regulated pollutants listed and a listing of targeted streams and/or lakes, the BMPs for which the municipality commits to implement for reduction of the discharge of TMDL pollutants must be identified. In addition to the BMPs the associated measurable goals must also be specified. Normally this is accomplished in a table format similar to the tables addressed above with the six minimum control measures. Any specific requirements specified in the permit for reduction of TMDL regulated pollutants should be repeated in this section and an explanation of how the permittee will achieve compliance with these requirements is to be included. This section must be included if a TMDL table with TMDL pollutants listed in the table is included in the permit.

- A section should be included which addresses required permit compliance activities and scheduled milestones. These requirements are often addressed in the permit in a section titled "Permit Compliance Activities and Schedules".

- A current map of the municipality which illustrates the permit area must be included in the SMP document. These maps may need to be updated each year in conjunction with the annual report. This item is required by the MS4 permit.

C. SUMMARY

The NPDES MS4 permits require SMP documents be drafted or updated periodically. The current version of the SMP document must be submitted with each annual report provided to KDHE. KDHE reviews the SMP documents, normally an approval letter is not provided as there is no requirement for approval. For documents which are found to be inadequate, notification to the permittee will be provided with a specific request for revision. When SMP documents are reviewed by KDHE, the items which will be checked include the following:

1) Review Table of Contents. A table is not required by the permit, it is only recommended at times.

2) Review the introductory section. This section is not required by the permit but may be included at the discretion of the permittee.

3) Review the general section which address managerial and operational responsibilities. Additionally, this section should address any permit requirements which are not addressed elsewhere in the SMP document. Inclusion of this section is required.

4) Review the section which addresses implementation of BMPs for the six minimum control measures. This section is required.

5) Review the section, if present, which includes a table for implementation of BMPs for reduction of TMDL pollutants. This section is to be included only if a TMDL table is included in the permit and TMDL pollutants are listed in the table along with the targeted stream(s) and/or lake(s). This section is required if the permit imposes the requirement for TMDL BMPs and surface water monitoring.

6) Review the section which addresses permit compliance activities and scheduled milestones. This section is required if a "Permit Compliance Activities and Schedules" section is included in the permit.

7) Review the current map of the permit area and confirm updates as needed. The permit area is the area for which the permittee is implementing the stormwater management program. The MS4 permit typically indicates this permit area is either the area within the municipality (normally area within corporate limits of a city) or for municipalities in an urbanized area, as defined by the U. S. Census Bureau, the

area within the permittee's jurisdiction which is also located in the urbanized area. This map is required by the permit and must be included in the SMP document. Urbanized area maps are associated with six municipalities, they are as follows:

1) Kansas City,
2) Lawrence,
3) Topeka,
4) St. Joseph, Missouri (small area in Kansas)
5) Wichita,
6) Manhattan.

Maps of urbanized areas in Kansas can be found on the KDHE Municipal Stormwater Program webpage at the following link - url:

"List of 2010 Urbanized Area Maps" http://www.kdheks.gov/muni/ms4.htm

Policy Report
Collector and arterial road discussion
February 20, 2018

Prepared by:

Paul Kramer
City Manager

Background:
The City of Leavenworth primarily finances road projects, including new construction, reconstruction, resurfacing and other rehabilitation services through an annual General Improvement Bond issue. This action allows about $1.3 million worth of work annually. The allocation of those resources is determined by direction of the City Commission, who is generally informed by recommendations from City staff.

Currently, those bond funds are being used in a granite seal program on the City's lowest rated streets (approximately $500k annually), as well as a 5-year project to mill and overlay 20th Street Trafficway from Spruce Street south to Eisenhower Road (approximately $500k annually). Additionally, based on Commission direction, the City is preparing to start the second year of an annual program to address issues in City-owned parking lots in the downtown (approximately ($100k annually). The need to mill and overlay 20th Street was unexpected and related to the deterioration of the concrete. It is staff's recommendation that the 20th street funding revert back to either overlay or granite seal projects on existing roads following the completion of the 5-year project in 2019.

The annual General Improvement Bond proceeds are not the only funding source available for roads within the City. However, other additional funds – local and countywide sales tax proceeds – are part of the budget pool that provides for buildings, bridges, parks and recreation items, information technology tools, public safety, vehicles, equipment, etc., in the overall Capital Improvement Program (CIP).

Based on current obligations, including a long-term fire truck lease, funding for the business and technology park, funding for the Animal Control Facility and many other items, there are no large-scale road projects scheduled in the 2018-2022 CIP outside of the bond projects.

Subject:
There have been many public discussions about the need to address additional single road projects in Leavenworth, with the Commission specifically expressing interest in the

reconstruction of Thornton Street from 10th Avenue west to 5th Street, and the continuation of Muncie Road west of 10th Street to New Lawrence Road.

Thornton Street would involve reconstructing an important east/west corridor that is heavily damaged and travelled. A new Muncie Road west of 10th would be a development tool designed to trigger residential and commercial development in that area. A project like Muncie could potentially be triggered by development that was able (through a Benefit District or other similar tool) to fund much of the work. However, City funding would be required until sufficient development had occurred to meet the debt obligations, and the burden of a Benefit District might hamper development. Funding of either of those projects would require a dramatic shift in the direction of the CIP or exploring other ways to make the revenue required available.

For the sake of discussion, staff has also included a list of about 15 other road projects that would not traditionally fit within the bond-funded program. These projects relate to staff interpretation of comments from Commissioners, as well as projects that have been talked about in the community or that would create some development opportunities. This list is not meant to be exhaustive, but to enrich the conversation.

It is imperative to start a dialogue with the Commission related to priorities and direction about specific road projects if the intent is to move forward in the near future, as each of the projects requires significant lead time.

Action Requested:

Staff is requesting a general discussion with the Commission regarding next steps. Some options might include:

- Reaching consensus on a single project, instructing staff to recommend funding options and continuing the dialogue on other future projects.
- Reaching a general consensus on a limited number of projects and asking staff to prepare funding options.
- Narrowing the list and directing staff to prepare more detailed summaries of the projects.
- Reviewing the projects listed, holding public meetings, seeking feedback, adding other options before moving forward.

COLLECTOR and ARTERIAL STREET IMPROVEMENT LOCATIONS

Road construction projects of the types listed below typically require 9 – 12 months for design. Once 75% plans are obtained, easement and right-of-way acquisition can start, with the process normally taking 3 – 9 months. Once final plans are complete and all necessary easements and right-of-way is obtained, utility relocations can start. This process can take as little as 3 months and with major relocation work, up to 18 months.

The projects are typically planned for bid letting late in the fall with construction starting in early spring to allow for as much construction during peak weather conditions. Staff anticipates all projects listed below would be built during one construction season or broken into phases to allow each phase to be built during one construction season. The peak construction period is from mid-April to mid-November.

The size and scope of the projects listed below will require a public information component. This usually includes resident meetings during design and at pre-construction. The pre-construction meeting takes place after the project has bid and a contractor has been awarded the contract. This allows the residents to meet the contractor, his office and field staff involved in the project, and City staff involved in the project. Notices of all projects are put on the City website, the City Facebook page, and covered in the newspaper.

STREETS

Thornton Street – 10th Ave to 5th St.	$4,255,000.00
Muncie Rd. – 10th Ave to New Lawrence Rd.	$6,050,000.00
Muncie Rd. – 4th St. to Hughes Rd.	$1,750,000.00
Ottawa St. – 18th to 20th	$877,500.00
Ottawa St. - 20th to 22nd St.	$840,000.00
Cherokee St. – 10th to 11th	$435,000.00
Cherokee St. - 12th to 13th	$600,000.00
Dakota St. – 18th to 20th	$840,500.00
Dakota St. - 20th to City Limits	$840,500.00
Vilas – 10th to 20th	$6,059,100.00
Eisenhower Rd. – 4th St. to Shrine Park	$850,000.00
10th Ave. – Pennsylvania to Limit	$4,900,000.00
10th Ave. – Limit to Eisenhower	$1,296.000.00
Michels Rd. – Tonganoxie Rd. to City Limits	$2,421,250.00
Ohio/Lecompton Rd. – 20th St. west to Highway 92	$3,700,000.00

***** construction costs only, add 30% for design, inspection, and right-of-way and easement acquisition costs *****

STREETSCAPE IMPROVEMENTS

Cherokee St. & Shawnee St. – Esplanade to 7th St.	$3,000,000.00
2nd, 3rd, 4th, 5th, 6th, & 7th – Shawnee to Choctaw	$3,750,000.00
4th St. – Miami to Bridge	$3,575,000.00

***** construction costs only, add 30% for design, inspection, and right-of-way and easement acquisition costs *****

Thornton Street – 10th Ave to 5th St.

$4,255,000.00

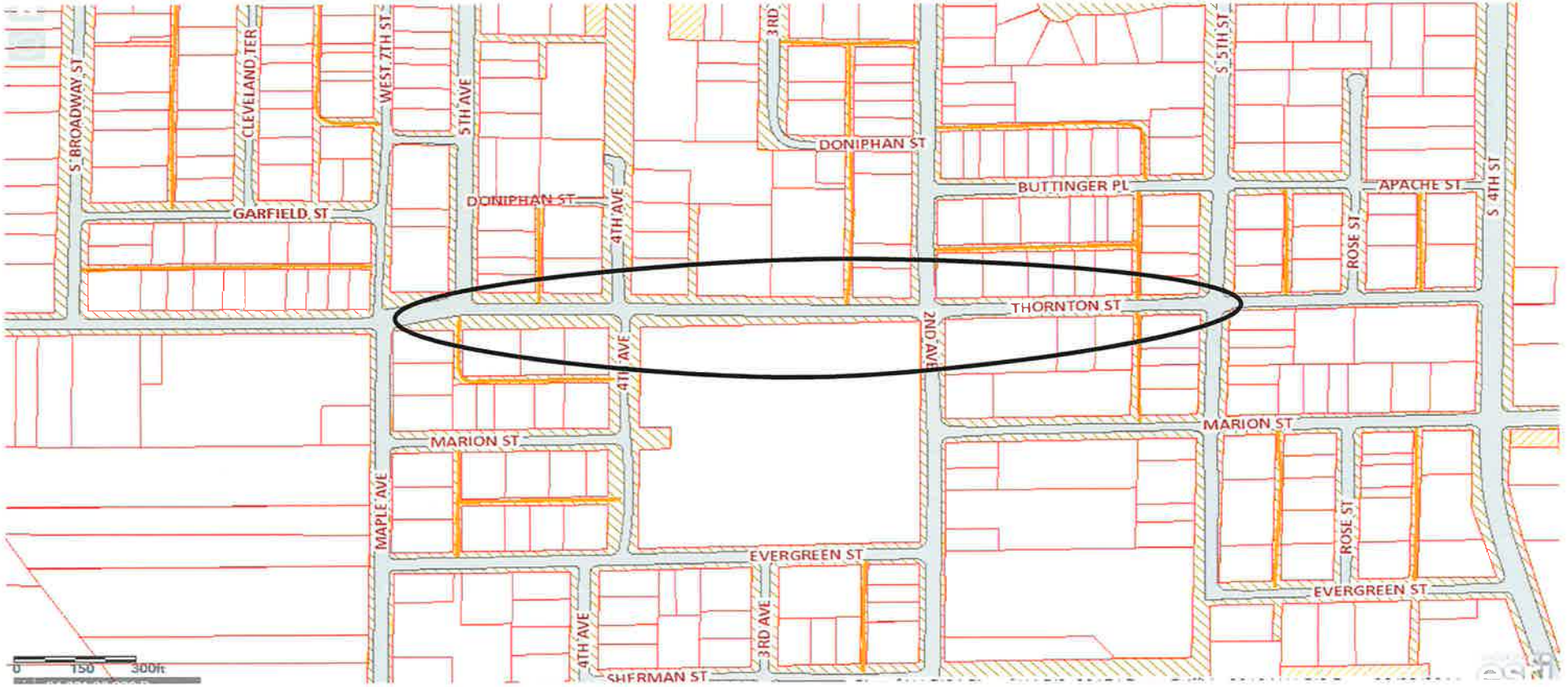
In early 2015, the City worked with KDOT and TranSystems to complete a TEAP Study of the intersection at 5th Ave., Thornton, & Maple Ave. Affinis completed a design concept study for Thornton from 10th Ave. to 2nd Ave. in 2016 incorporating the results of the TEAP Study in the concept. Project design would take approximately 1 year to complete with additional time necessary for easement and right-of-way acquisition.

The project construction would be completed as a 2 phase project over a 2 construction season timeframe. Phase 1, 10th Avenue to Maple Ave., construction estimated at $2,553,000.00 and Phase 2, Maple Ave. to 5th St., construction estimated at $1,702,000.00. The total estimate for design, inspection, right-of-way & easements, and construction is $4,255,000.00.

The total project is approximately 4,000 feet in length and includes new storm drainage, new curb & gutter, sidewalks, sub-grade stabilization, new pavement, and new traffic signals at 2nd Ave.

(see attached maps)


REES ST
HALDERMAN ST
LAWRENCE AVE
10TH AVE
GARLAND ST
MONTEZUMA AVE
S BROADWAY ST
CLEVELAND TER
WEST 7TH ST
5TH AVE
DONIPHAN ST
GARFIELD ST
4TH AVE
THORNTON ST
MARION ST
GIRARD AVE
SPRING GARDEN ST
MAPLE AVE
EVERGREEN ST
0
150
300ft


S BROADWAY ST
CLEVELAND TER
WEST 7TH ST
5TH AVE
DONIPHAN ST
4TH AVE
3RD
DONIPHAN ST
S 5TH ST
BUTTINGER PL
APACHE ST
S 4TH ST
GARFIELD ST
ROSE ST
THORNTON ST
2ND AVE
4TH AVE
MARION ST
MARION ST
MAPLE AVE
ROSE ST
EVERGREEN ST
EVERGREEN ST
4TH AVE
3RD AVE
SHERMAN ST
0
150
300ft

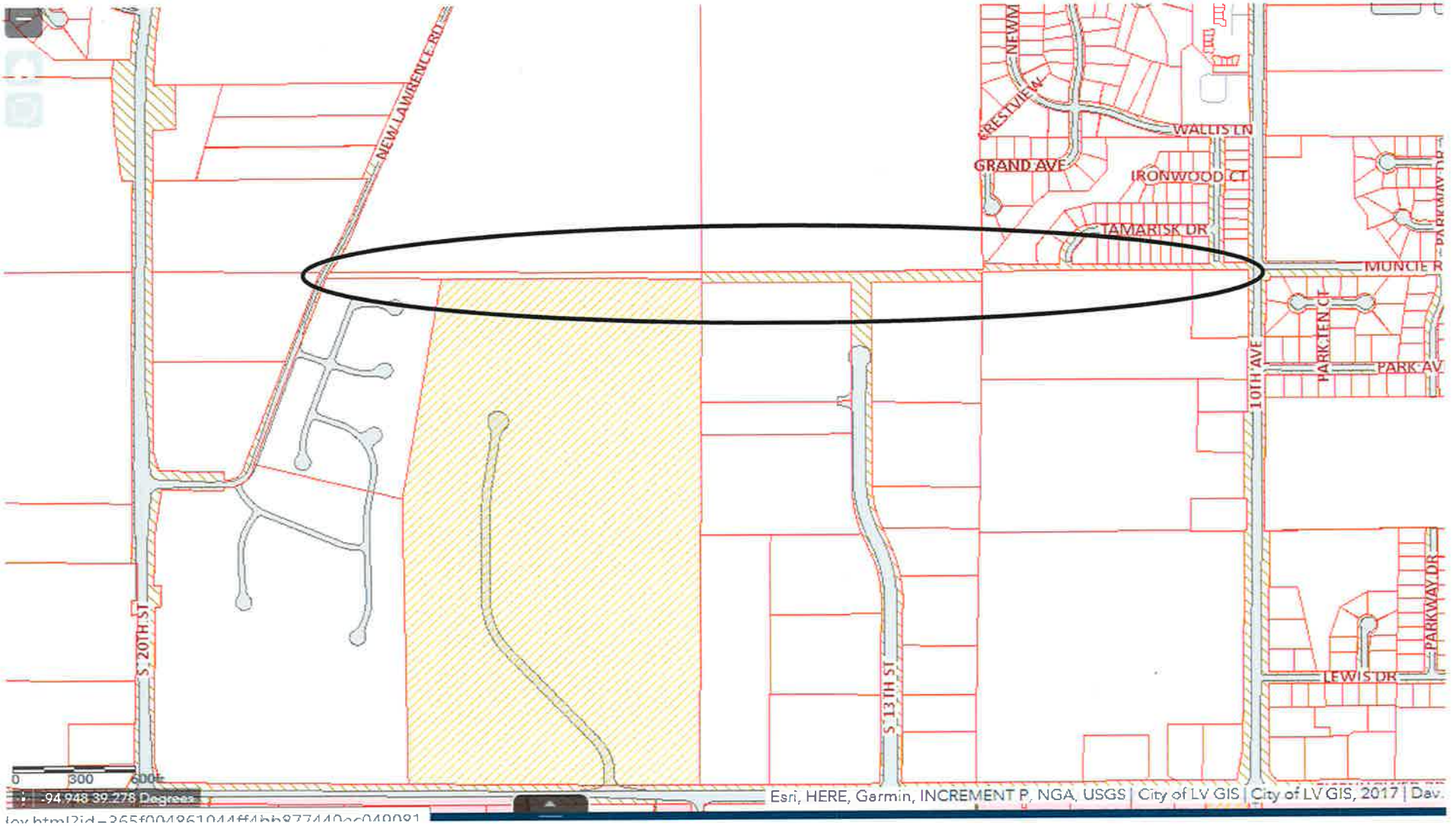
Muncie Rd. – 10th Ave to New Lawrence Rd.

$6,050,000.00

In 2009, a development plan was submitted for the property behind Wellington Subdivision. The developer was proposing a benefit district for the construction of Muncie Rd. back to his development. Staff initiated a drainage study in early 2010 for use in design of the creek crossing included in the roadway construction plans. Plans were complete in late 2010 for the street approximately 1,320 feet in length. Due to excessive development and right-of-way acquisition costs, the proposed development was stopped and roadway construction was never initiated.

In 2016, a concept alignment for extending the road to New Lawrence Rd. using the information and alignment identified in the work completed in 2010. The project from 10th Avenue to New Lawrence Rd.is approximately 5,000 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement 30' in width. Additional right-of-way and construction easements would be necessary to complete the project.

(see attached map and drawing)


NEW LAWRENCE RD
S 20TH ST
S 13TH ST
NEWM
CRESTVIEW LN
WALLIS LN
GRAND AVE
IRONWOOD CT
TAMARISK DR
MUNCIE R
HARKTEN CT
PARK AV
10TH AVE
PARKWAY DR
LEWIS DR
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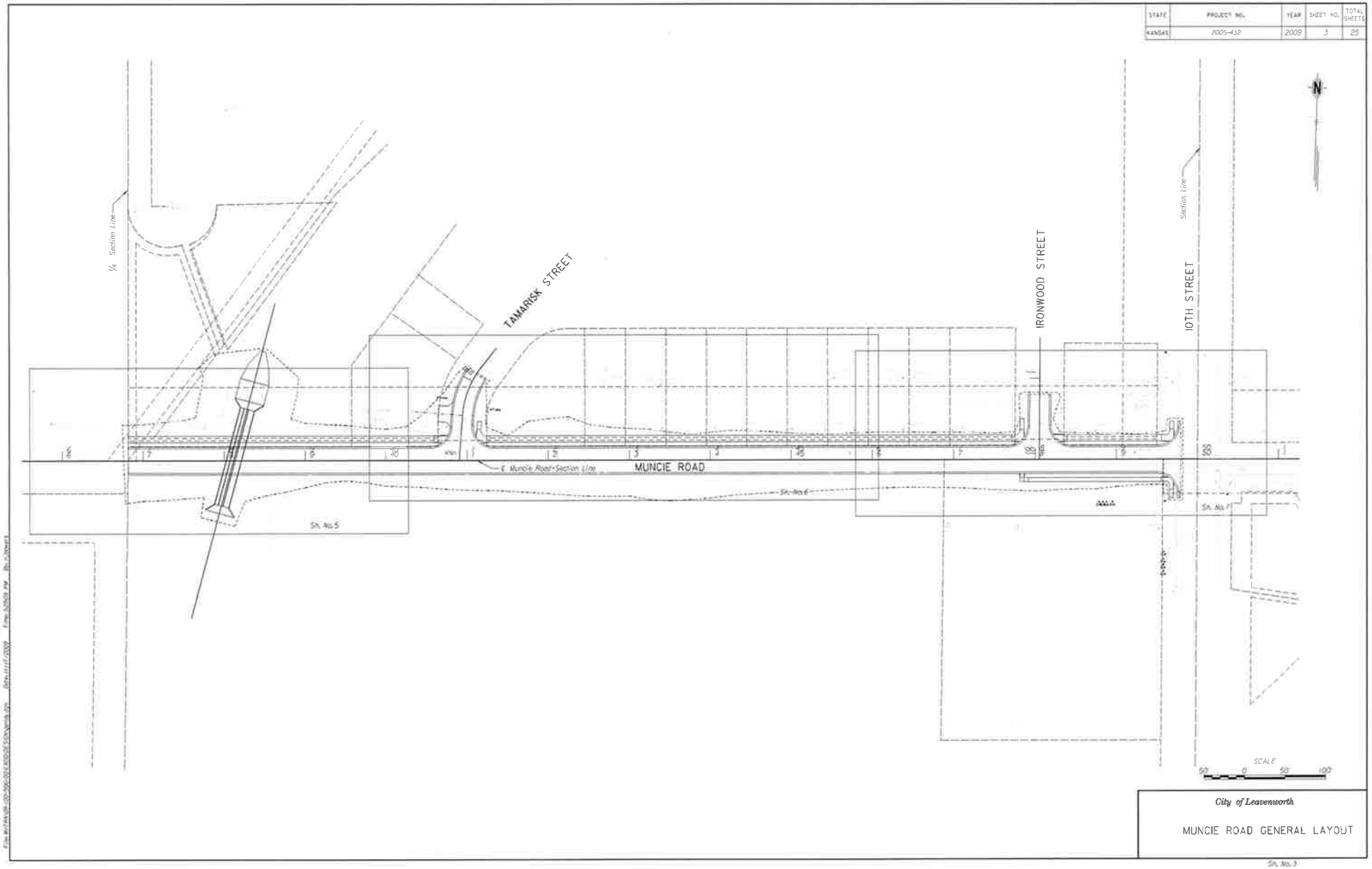
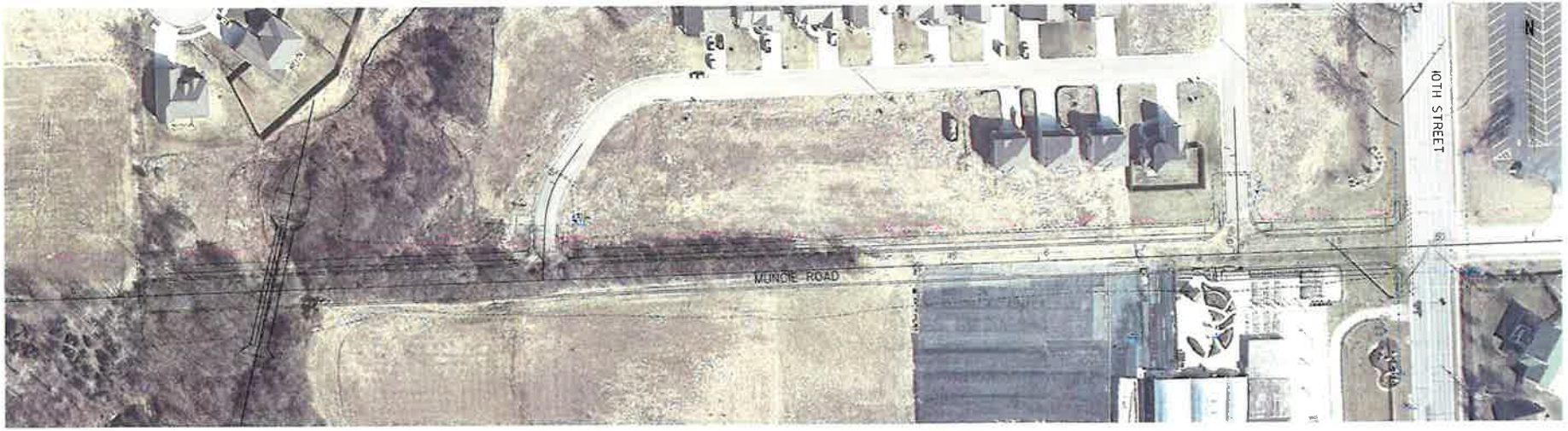
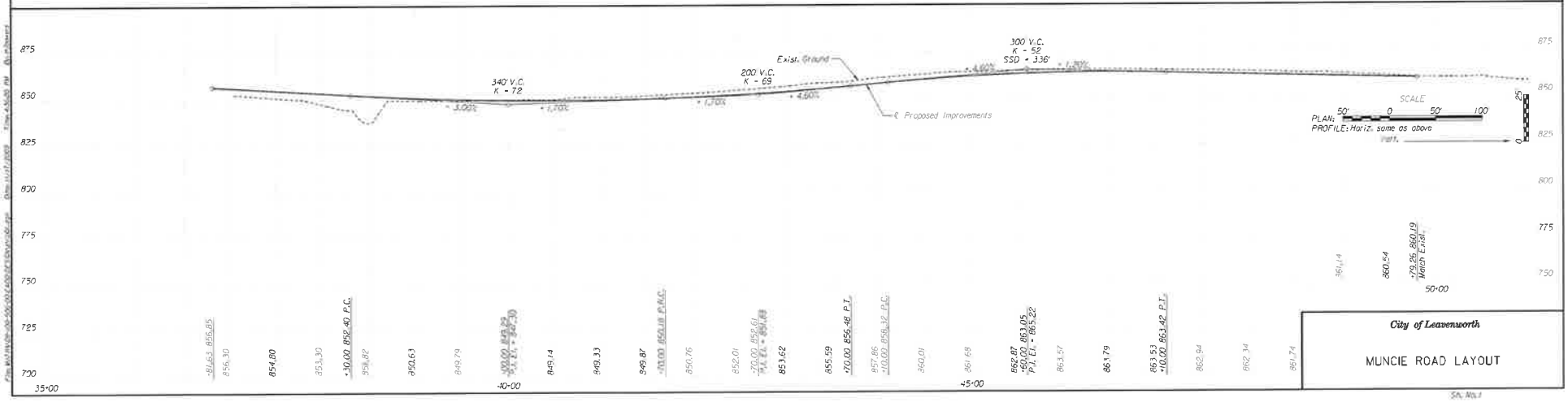
300
600ft
-94.948 39.278 Degrees
Esri, HERE, Garmin, INCREMENT P, NGA, USGS | City of LV GIS | City of LV GIS, 2017 | Dav.


STATE
PROJECT NO.
YEAR
SHEET NO.
TOTAL SHEETS
KANSAS
2005-432
2009
3
25
1/4 Section Line
TAMARISK STREET
IRONWOOD STREET
10TH STREET
Section Line
N
MUNCIE ROAD
E. Muncie Road-Section Line
SA. No. 5
SA. No. 6
SA. No. 7
SCALE
50' 0 50' 100'
City of Leavenworth
MUNCIE ROAD GENERAL LAYOUT
SA. No. 3

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	2005-432	2009	1	1

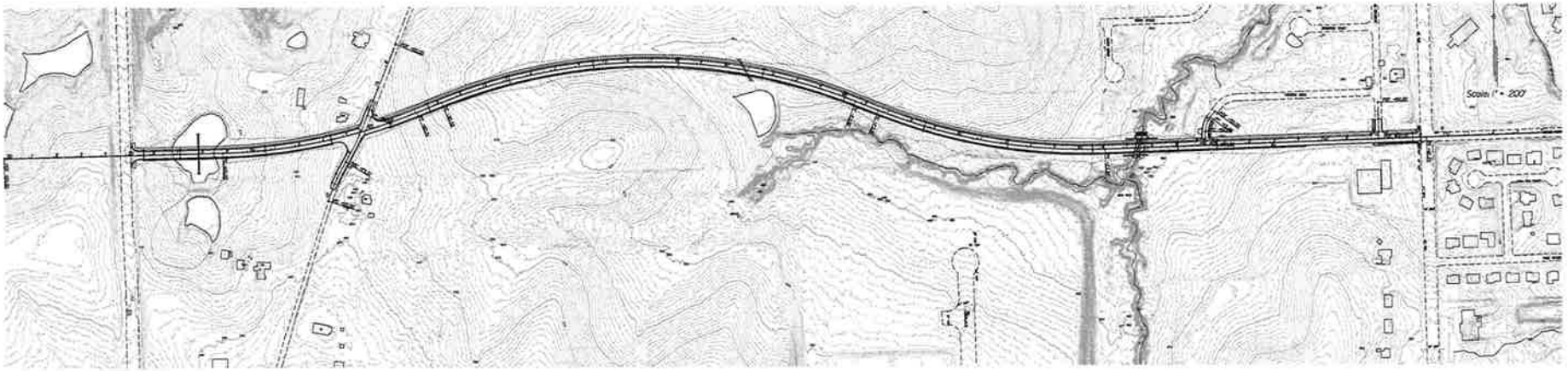




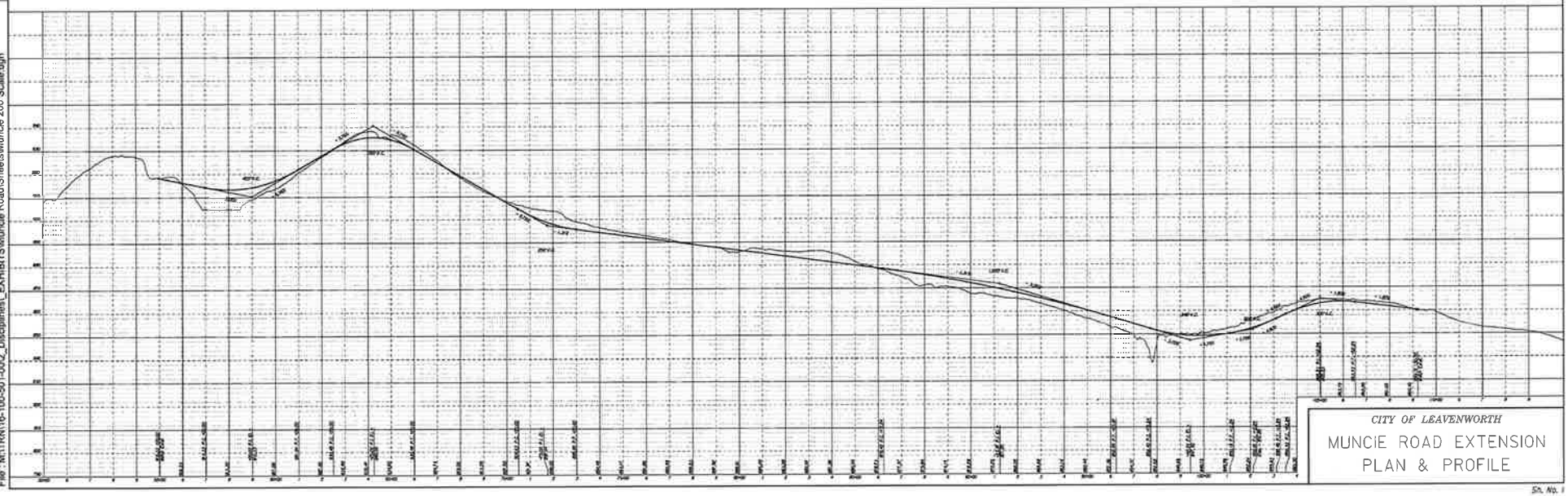
City of Leavenworth

MUNCIE ROAD LAYOUT

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	MUNCIE ROAD	2016	1	1



REFERENCES NOTED	BY	DATE
REFERENCES CHECKED		



Drawn By : waoneal Plotted : 4/22/2016
File : M:\TRN\16-100-501-0002_Disciplines_EXHIBITS\Muncie Road\Sheets\Muncie 200 Scale.dgn

CITY OF LEAVENWORTH

MUNCIE ROAD EXTENSION
PLAN & PROFILE

Sh. No. 1

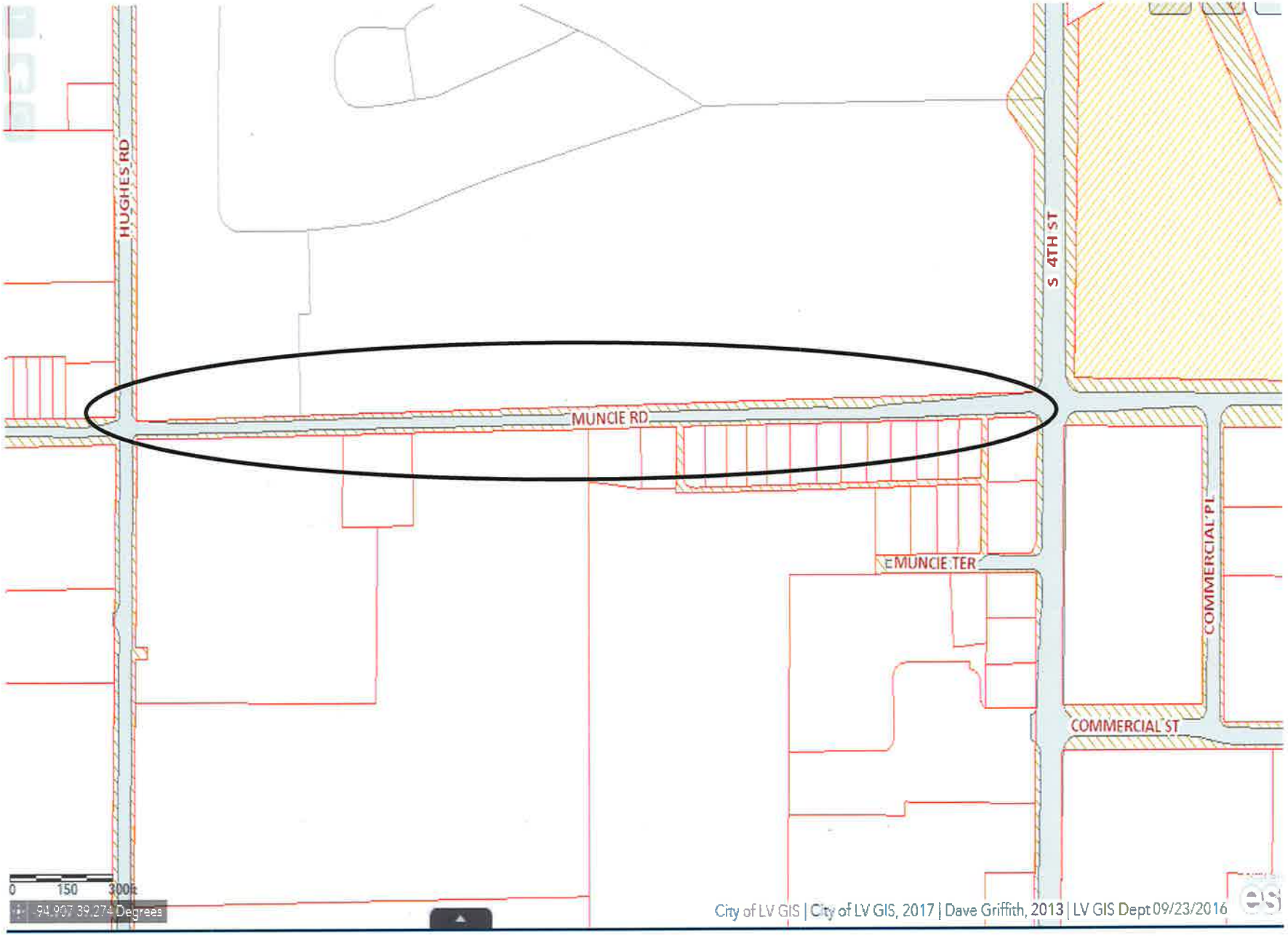
Muncie Rd. – 4th St. to Hughes Rd.

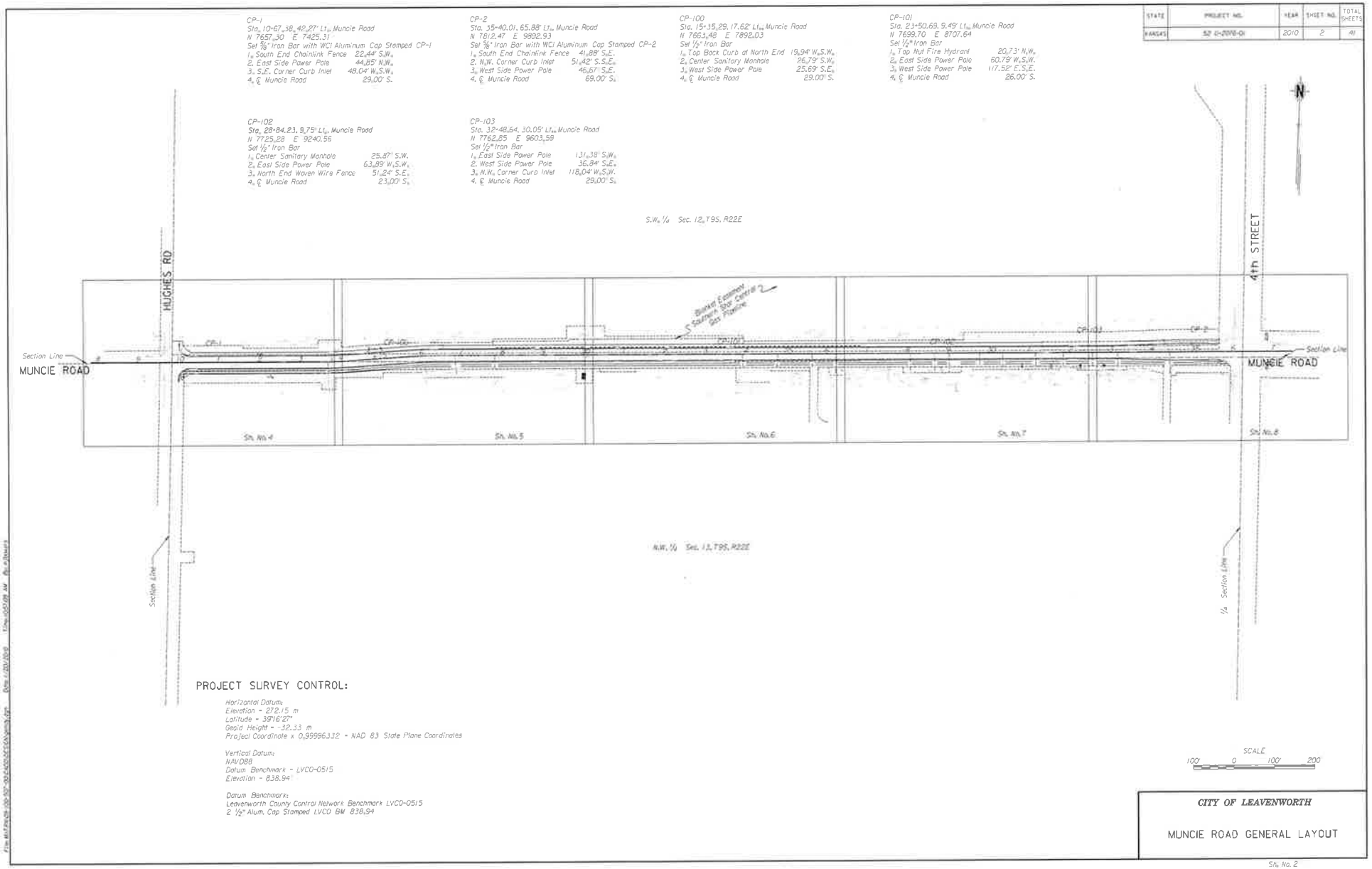
$1,750,000.00

The project is approximately 5,400 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement. Additional right-of-way and construction easements would be necessary to complete the project.

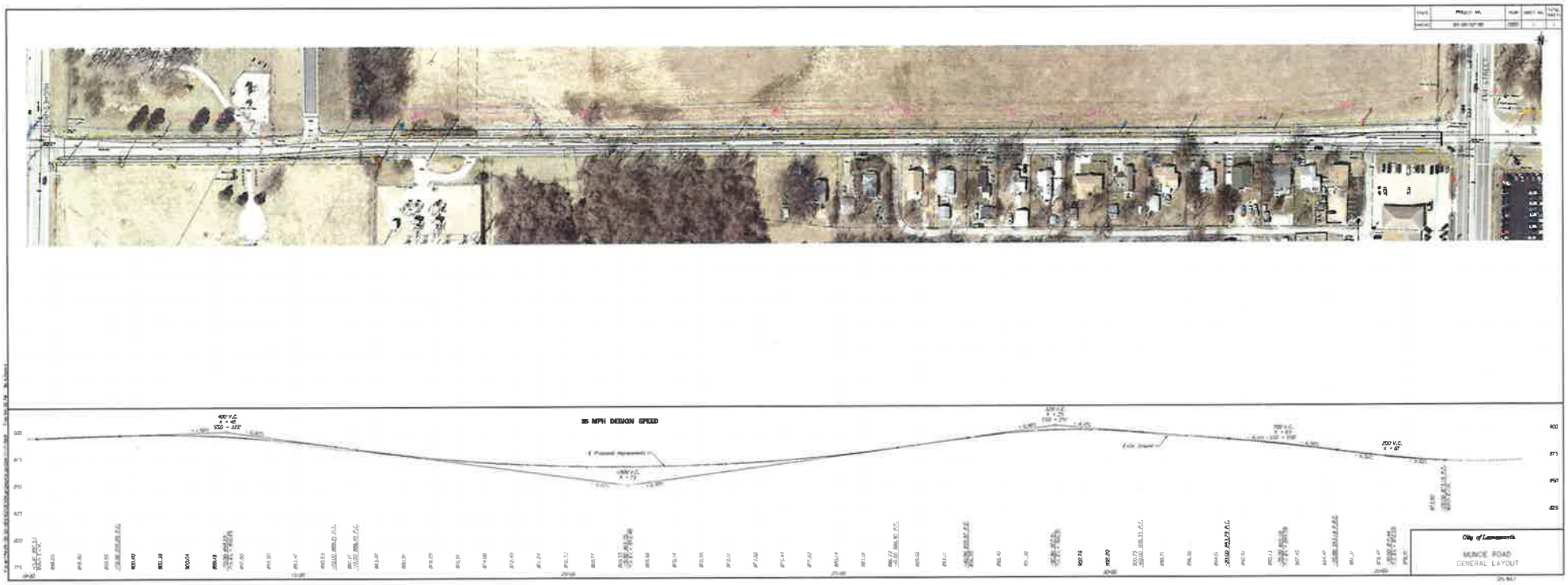
In 2009, the City contracted with Wilson & Co. to design the project as an economic development effort to spur growth in the commercially zoned property along and south of Muncie Rd. and west of 4th St. Upon completion of the design and the initiation of easement and right-of-way acquisition, it was determined that acquisition costs would be as much or more than estimated construction costs due to the proximity of numerous gas pipelines and overhead power lines, and the project was shelved.

(see attached map and drawing)


HUGHES RD
MUNCIE RD
S 4TH ST
E MUNCIE TER
COMMERCIAL PL
COMMERCIAL ST
0 150 300ft
-94.907 39.274 Degrees
City of LV GIS | City of LV GIS, 2017 | Dave Griffith, 2013 | LV GIS Dept 09/23/2016



STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	52 U-2078-01	2010	2	41


35 MPH DESIGN SPEED
City of Leavenworth
MUNCIE ROAD
GENERAL LAYOUT

Ottawa St. – 18th to 20th

$877,500.00

The project is approximately 1,400 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement. Additional construction easements would be necessary to complete the project.

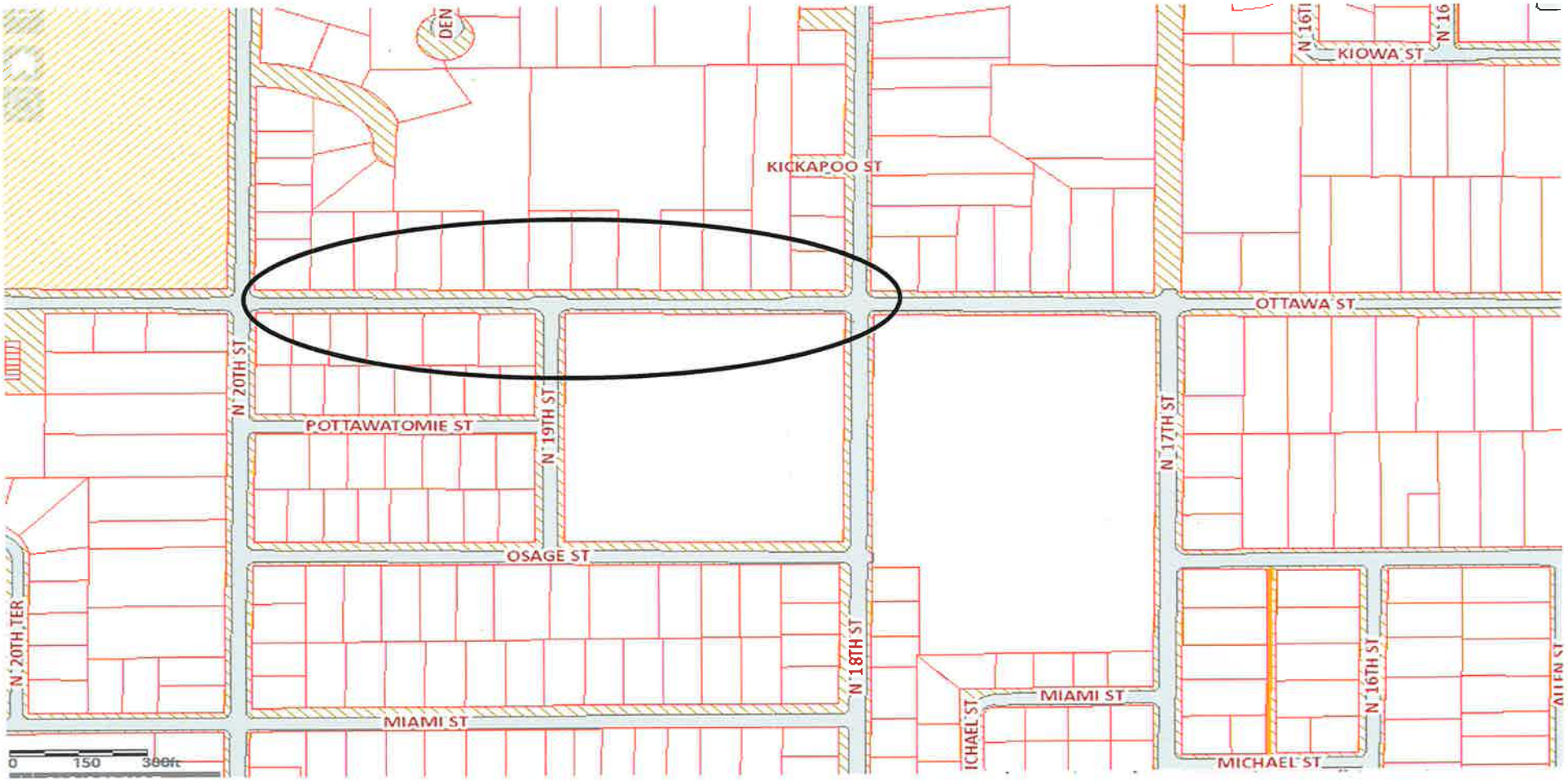
(see attached maps)

Ottawa St. - 20th to 22nd St.

$840,000.00

The project is approximately 1,450 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement. Additional construction easements would be necessary to complete the project.

(see attached maps)


KICKAPOO ST
KIOWA ST
OTTAWA ST
N 20TH ST
N 19TH ST
N 18TH ST
N 17TH ST
N 16TH ST
POTTAWATOMIE ST
OSAGE ST
MIAMI ST
MICHAEL ST
N 20TH TER
0
150
300ft


DAKOTA DR
Threemile Creek
OTTAWA ST
N 22ND ST
N 20TH TER
N 19TH ST
POTTAWATOMIE ST
OSAGE ST
DENNEY L
0 150 300ft
-94.960 39.319 Degrees
City of LV GIS | City of LV GIS, 2017 | Dave Griffith, 2013 | LV GIS Dept 09/23/2016 | Stante...

Cherokee St. – 10th to 11th

$435,000.00

The project is approximately 725 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement. Additional construction easements would be necessary to complete the project.

(see attached map)

Cherokee St. - 12th to 13th

$600,000.00

The project is approximately 1,000 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement. Additional construction easements would be necessary to complete the project.

(see attached map)


MIAMI ST
N 14TH ST
N 13TH ST
SENECA ST
SENECA ST
N 11TH ST
N 10TH ST
MIAMI ST
SHAWNEE ST
S 13TH ST
S 12TH ST
S 11TH ST
DELAWARE ST
DELAWARE ST
DELAWARE ST
CHEROKEE ST
RYAN ST
S 10TH ST
S 9TH ST
S 14TH ST
YOUNG ST
S 11TH ST
GRAND AVE
SHERMAN AVE
S 9TH ST
0 150 300ft
-94.936 39.319 Degrees
City of LV GIS | City of LV GIS, 2017 | Dave Griffith, 2013 | LV GIS Dept 09/23/2016

Dakota St. – 18th to 20th

$840,500.00

The project is approximately 1,400 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement. Additional construction easements would be necessary to complete the project.

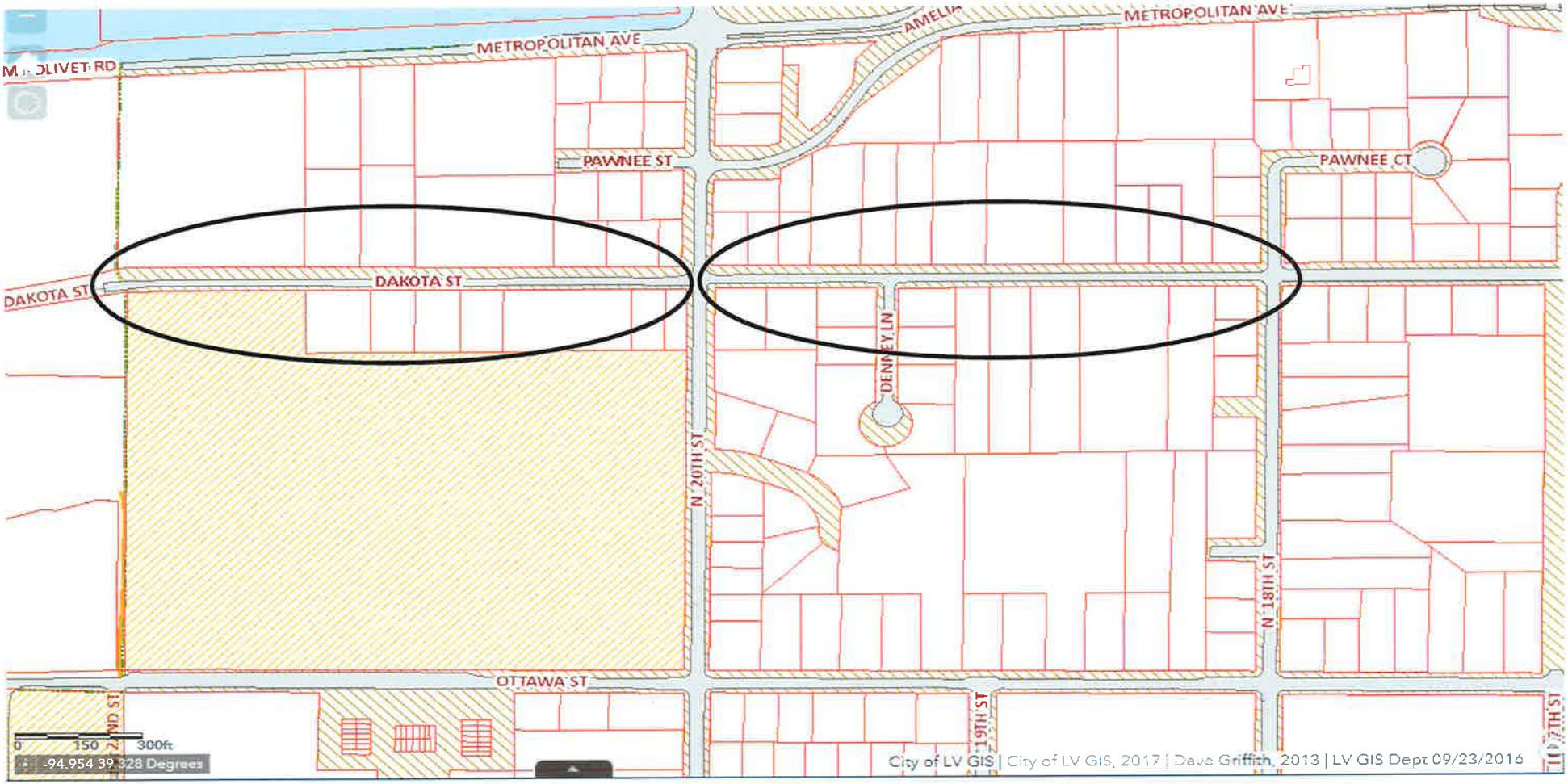
(see attached map)

Dakota St. - 20th to City Limits

$840,500.00

The project is approximately 1,400 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement. Additional construction easements would be necessary to complete the project.

(see attached map)

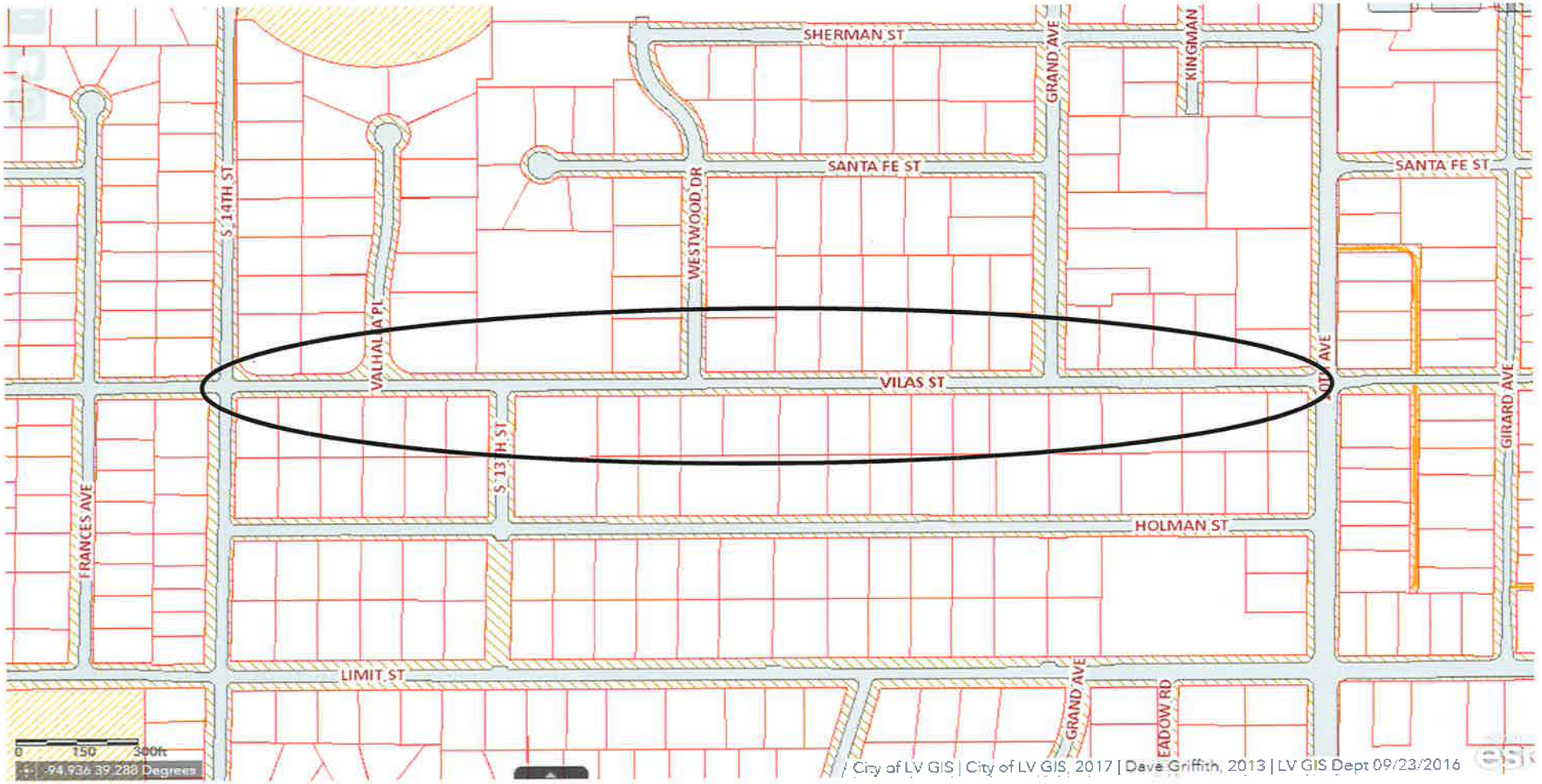

METROPOLITAN AVE
METROPOLITAN AVE
PAWNEE ST
PAWNEE CT
DAKOTA ST
DAKOTA ST
DENNEY LN
N 20TH ST
N 18TH ST
OTTAWA ST
19TH ST
0 150 300ft
-94.954 39.328 Degrees
City of LV GIS | City of LV GIS, 2017 | Dave Griffith, 2013 | LV GIS Dept 09/23/2016

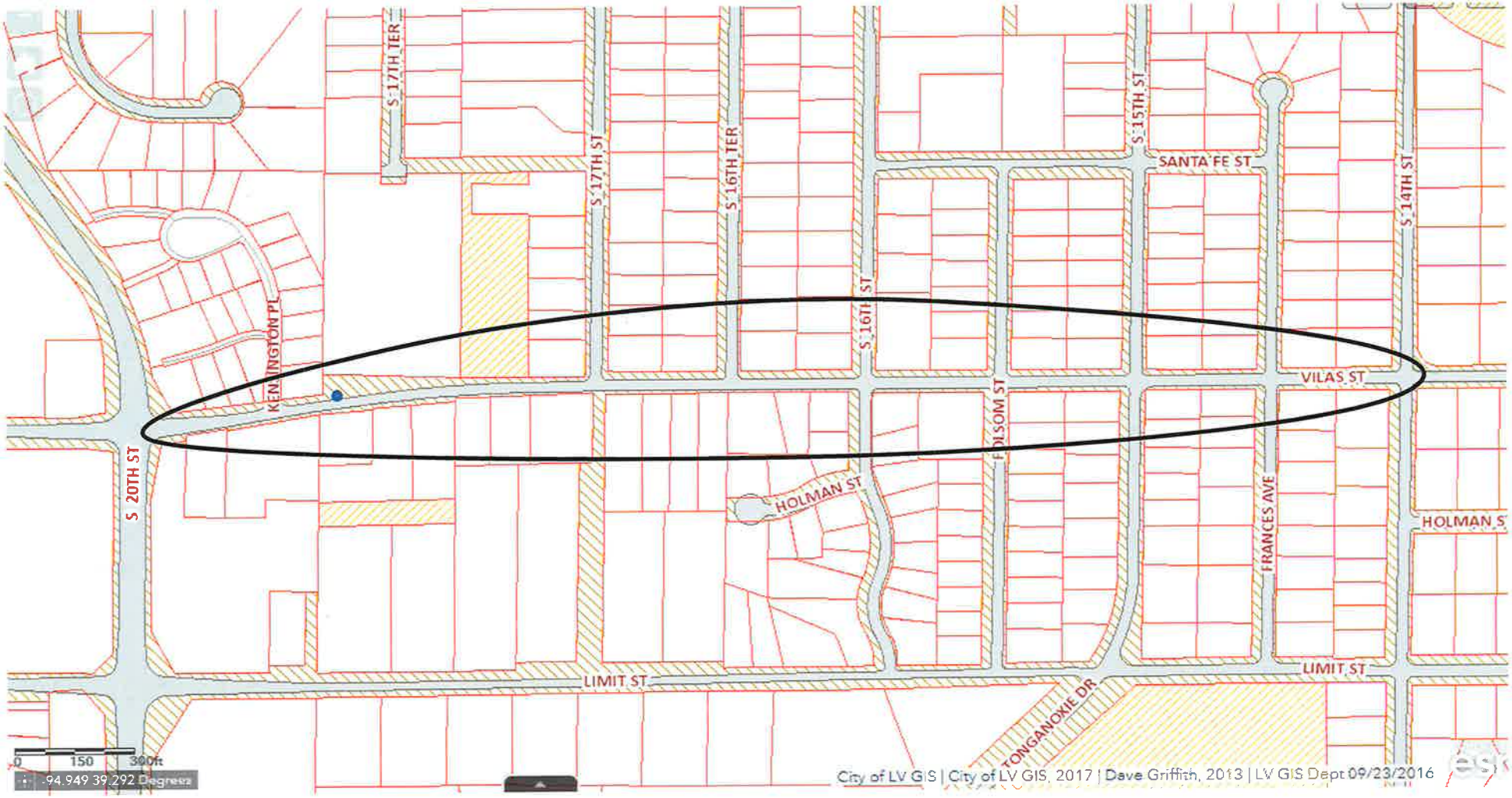
Vilas – 10th to 20th

$6,059,100.00

The project is approximately 5,700 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement. Additional construction easements would be necessary to complete the project.

(see attached maps)


SHERMAN ST
GRAND AVE
KINGMAN
SANTA FE ST
SANTA FE ST
S 14TH ST
WESTWOOD DR
VALHALLA PL
VILAS ST
OT AVE
GIRARD AVE
S 13TH ST
FRANCES AVE
HOLMAN ST
LIMIT ST
GRAND AVE
EADOW RD
0 150 300ft
94.936 39.288 Degrees
City of LV GIS | City of LV GIS, 2017 | Dave Griffith, 2013 | LV GIS Dept 09/23/2016

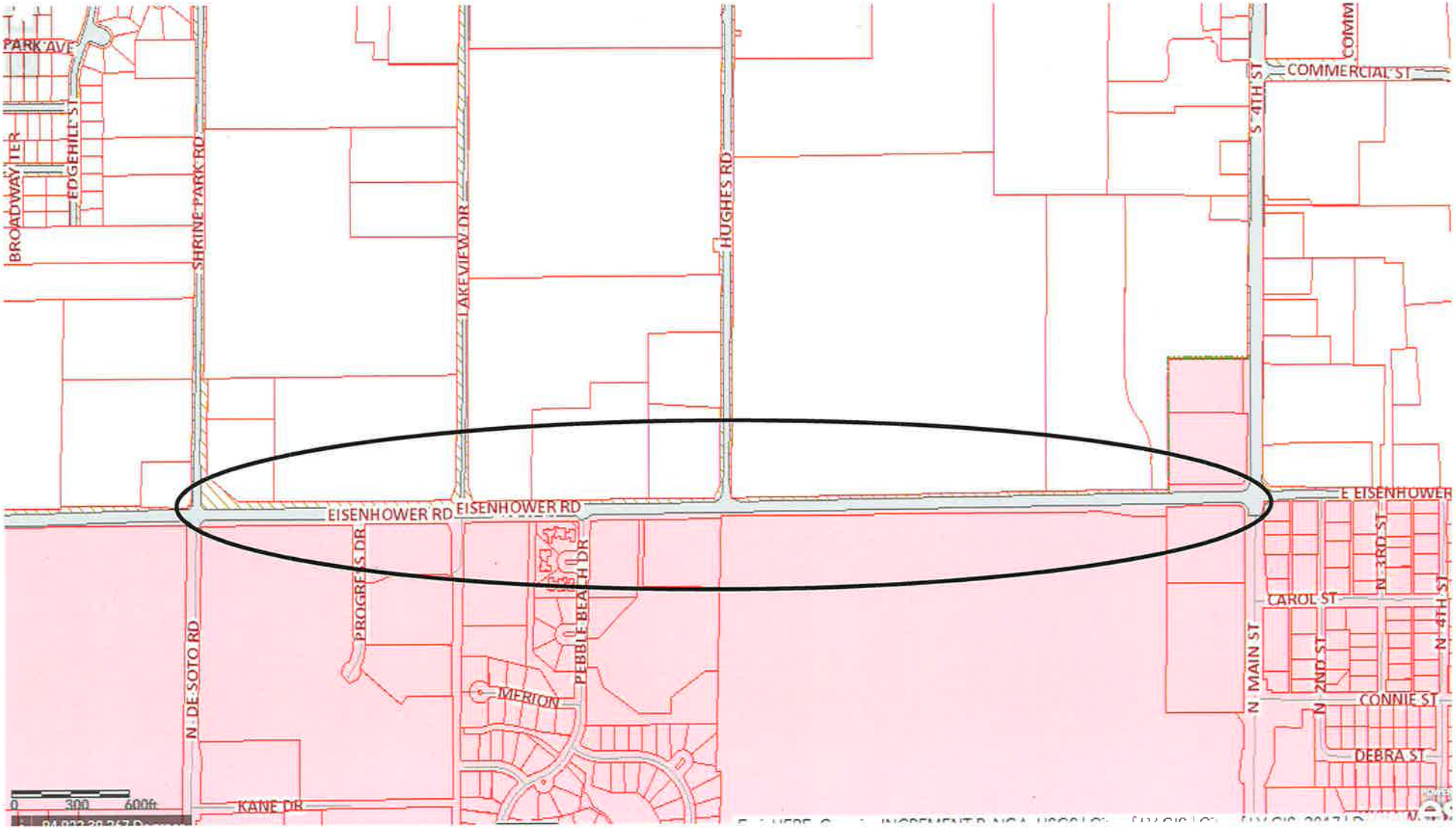

S 17TH TER
S 17TH ST
S 16TH TER
S 16TH ST
S 15TH ST
SANTA FE ST
S 14TH ST
KENSINGTON PL
VILAS ST
FOLSOM ST
S 20TH ST
HOLMAN ST
FRANCES AVE
HOLMAN ST
LIMIT ST
LIMIT ST
TONGANOXIE DR
0
150
300ft
-94.949 39.292 Degrees
City of LV GIS | City of LV GIS, 2017 | Dave Griffith, 2013 | LV GIS Dept 09/23/2016

Eisenhower Rd. – 4th St. to Shrine Park

$850,000.00

The project is approximately 5,100 feet in length and would include new curb, storm inlet tops, mill & overlay.

(see attached map)


PARK AVE
BROADWAY TER
EDGEHILL ST
SHRINE PARK RD
LAKEVIEW DR
HUGHES RD
S 4TH ST
COMMERCIAL ST
EISENHOWER RD
EISENHOWER RD
E EISENHOWER
PROGRESS DR
PEBBLE BEACH DR
N DE SOTO RD
MERION
N MAIN ST
CAROL ST
N 3RD ST
N 4TH ST
N 2ND ST
CONNIE ST
DEBRA ST
KANE DR
0 300 600ft

10th Ave. – Pennsylvania to Limit

$4,900,000.00

The project is approximately 4,600 feet in length and would include new curb, storm inlet tops, sub-grade repair and stabilization, and new pavement.

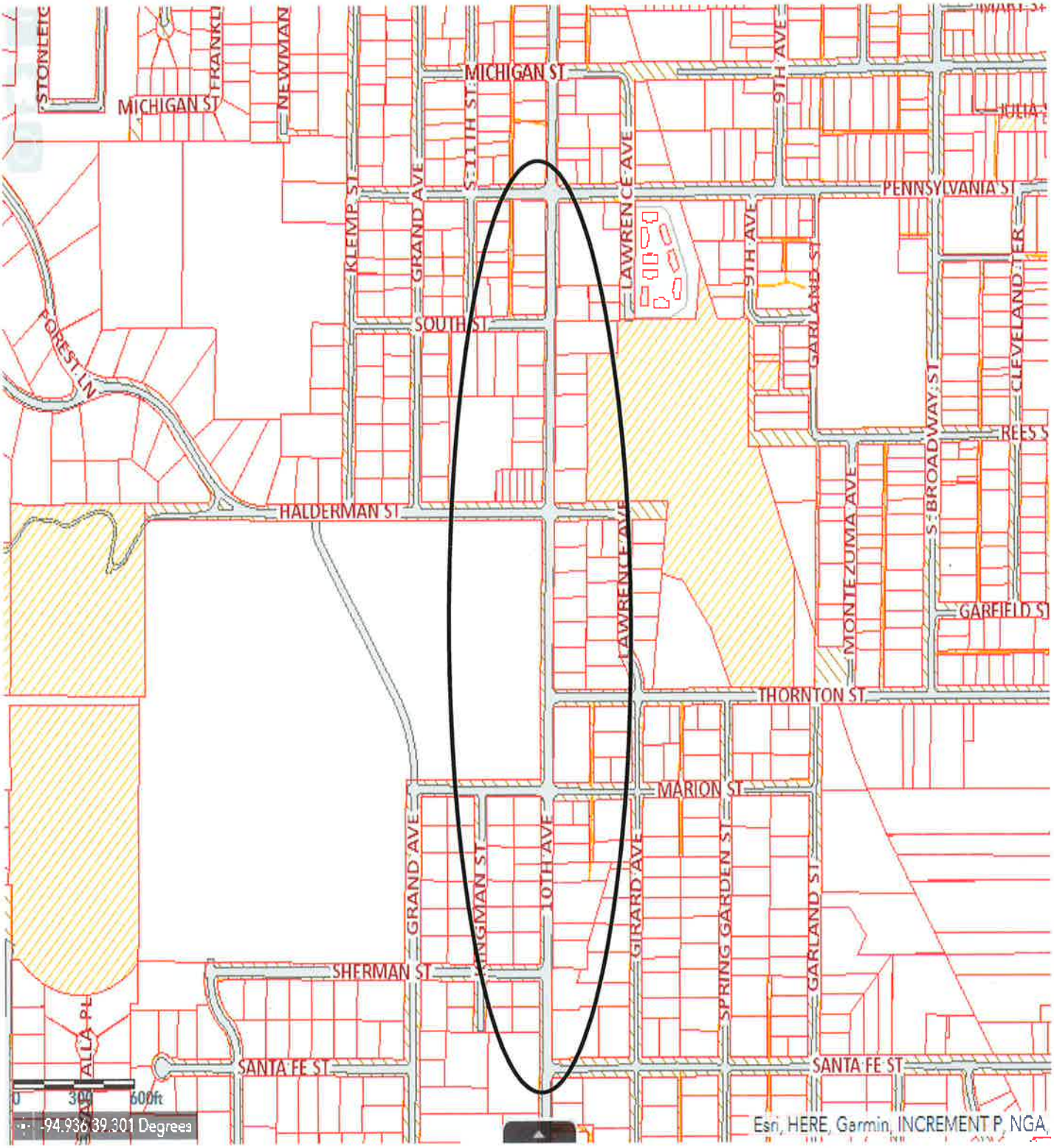
(see attached maps)

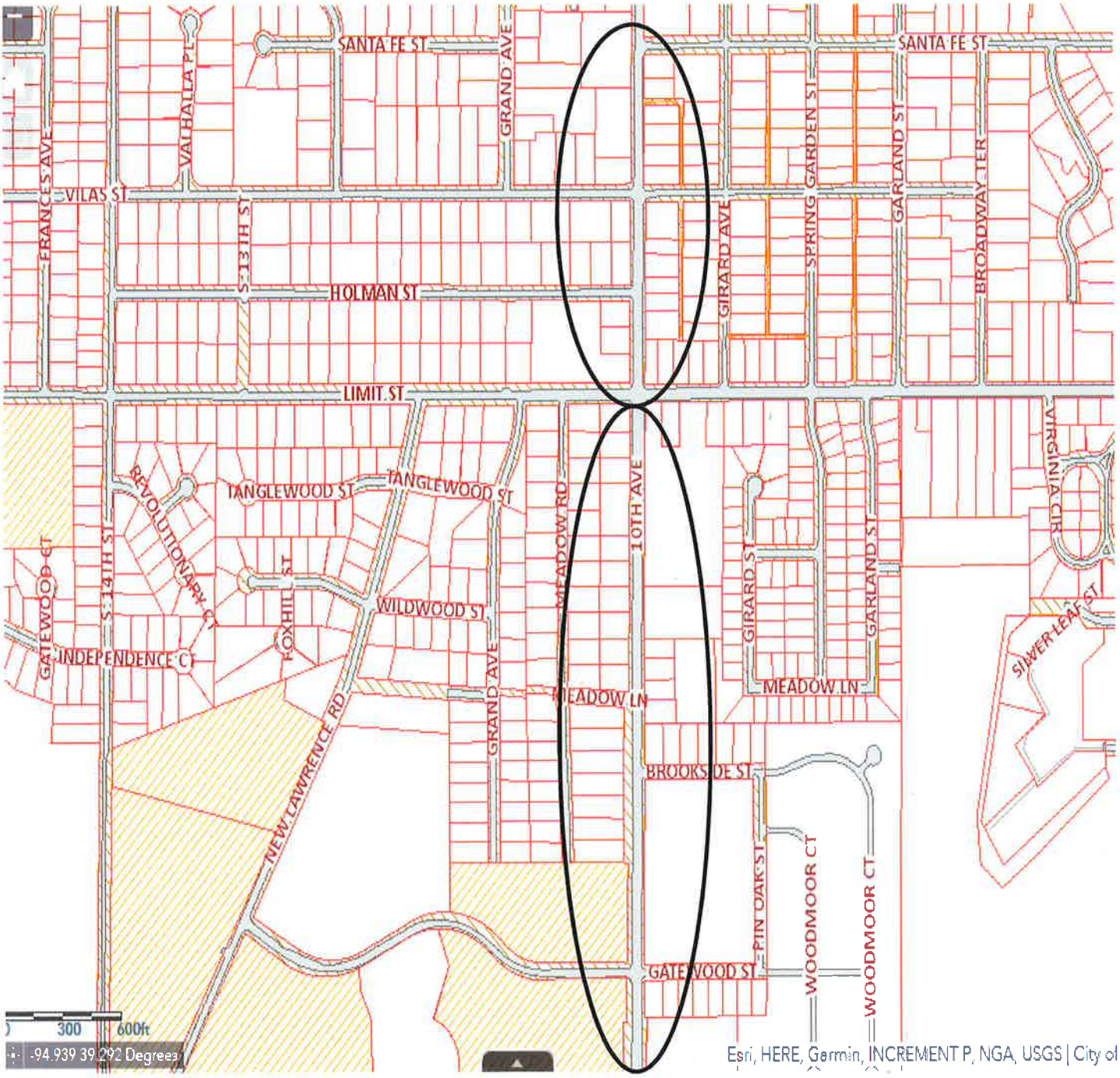
10th Ave. – Limit to Eisenhower

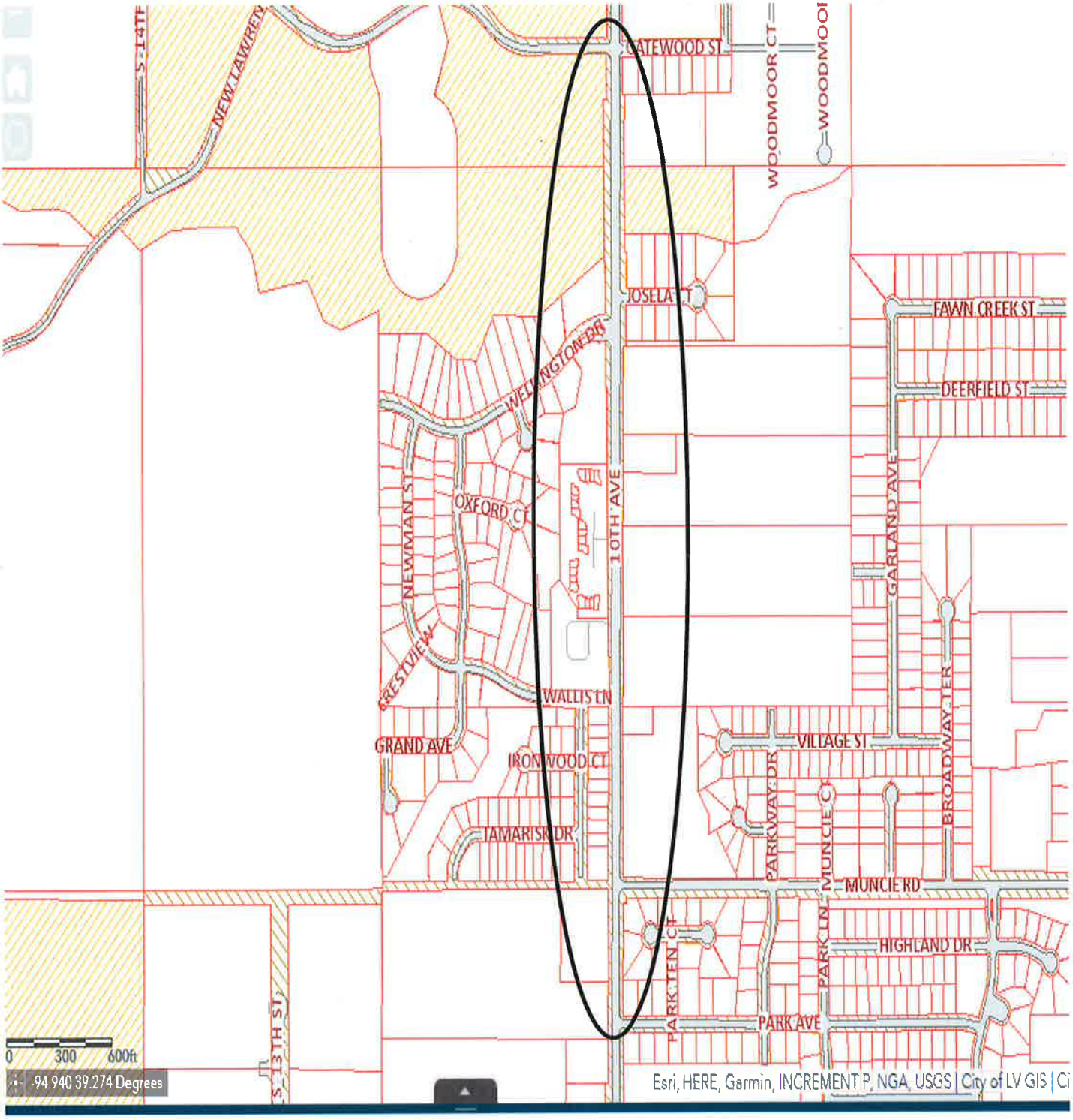
$1,296.000.00

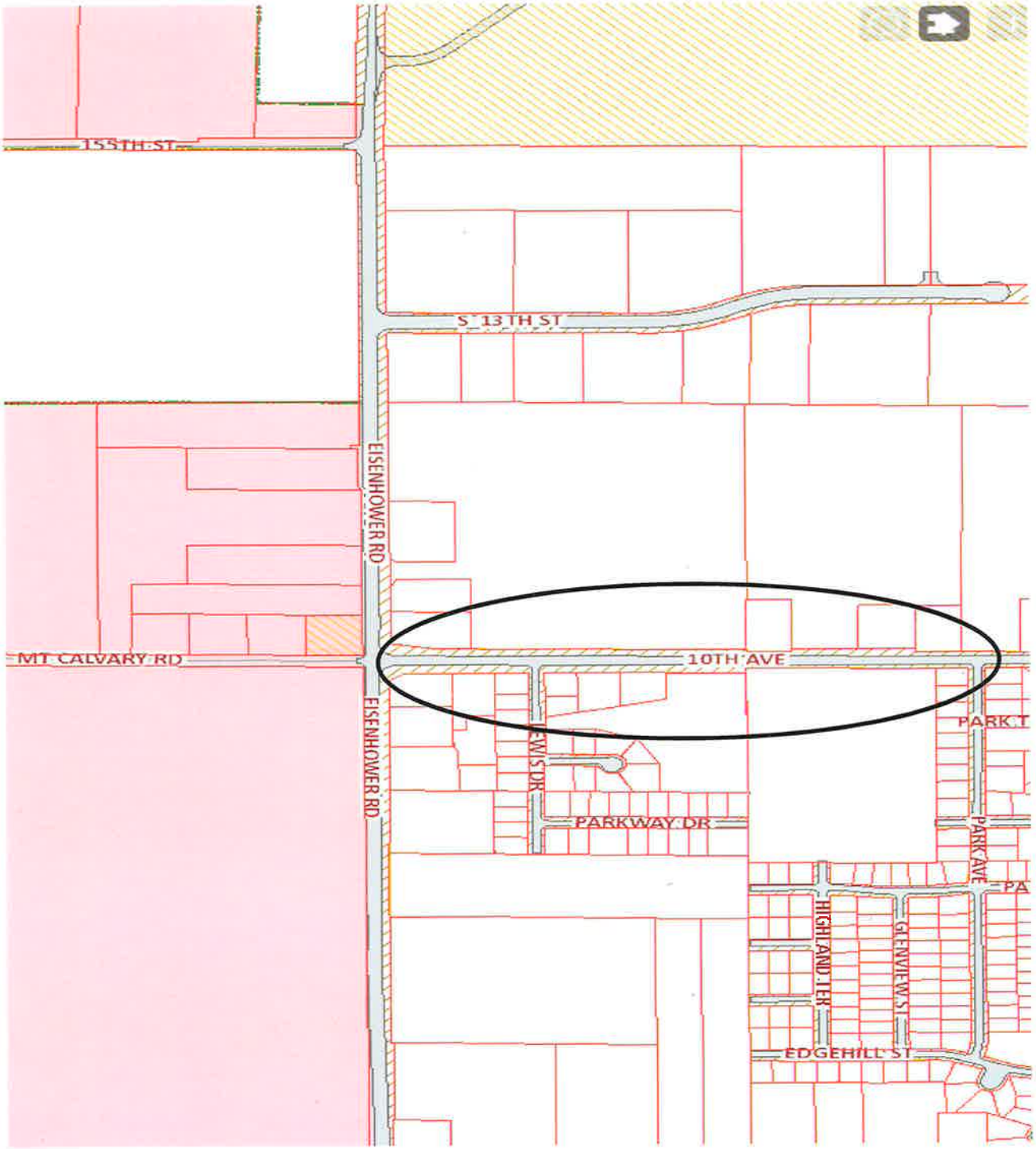
The project is approximately 8,100 feet in length and would include partial curb replacement, sidewalk repair, new storm inlet tops, mill & overlay.

(see attached maps)


MICHIGAN ST
NEWMAN
S 11TH ST
9TH AVE
PENNSYLVANIA ST
KLEMP ST
GRAND AVE
LAWRENCE AVE
SOUTH ST
FOREST LN
GARLAND ST
CLEVELAND TER
S BROADWAY ST
REES ST
HALDERMAN ST
MONTEZUMA AVE
GARFIELD ST
THORNTON ST
MARION ST
KINGMAN ST
10TH AVE
GIRARD AVE
SPRING GARDEN ST
GARLAND ST
SHERMAN ST
SANTA FE ST
ALLA PL
0
300
600ft
-94.936 39.301 Degrees
Esri, HERE, Garmin, INCREMENT P, NGA,


SANTA FE ST
GRAND AVE
SANTA FE ST
VALHALLA PL
FRANCES AVE
VILAS ST
S 13TH ST
GARDEN ST
GARLAND ST
BROADWAY TER
HOLMAN ST
GIRARD AVE
SPRING
LIMIT ST
VIRGINIA CIR
TANGLEWOOD ST
TANGLEWOOD ST
MEADOW RD
10TH AVE
REVOLUTIONARY CT
S 14TH ST
GATEWOOD CT
FOXHILL ST
WILDWOOD ST
GIRARD ST
GARLAND ST
SILVER LEAF ST
INDEPENDENCE CT
GRAND AVE
MEADOW LN
MEADOW LN
NEW LAWRENCE RD
BROOKSIDE ST
PIN OAK ST
WOODMOOR CT
WOODMOOR CT
GATEWOOD ST
300
600ft
-94.939 39.292 Degrees
Esri, HERE, Garmin, INCREMENT P, NGA, USGS | City of


GATEWOOD ST
WOODMOOR CT
WOODMOOR
JOSELA CT
FAWN CREEK ST
DEERFIELD ST
WELLINGTON DR
NEWMAN ST
OXFORD CT
10TH AVE
GARLAND AVE
CRESTVIEW
WALLIS LN
GRAND AVE
IRONWOOD CT
VILLAGE ST
BROADWAY TER
PARKWAY DR
MUNCIE CT
TAMARISK DR
MUNCIE RD
PARK LN
HIGHLAND DR
PARK TER CT
PARK AVE
S 13TH ST
0 300 600ft
-94.940 39.274 Degrees
Esri, HERE, Garmin, INCREMENT P, NGA, USGS | City of LV GIS | Ci

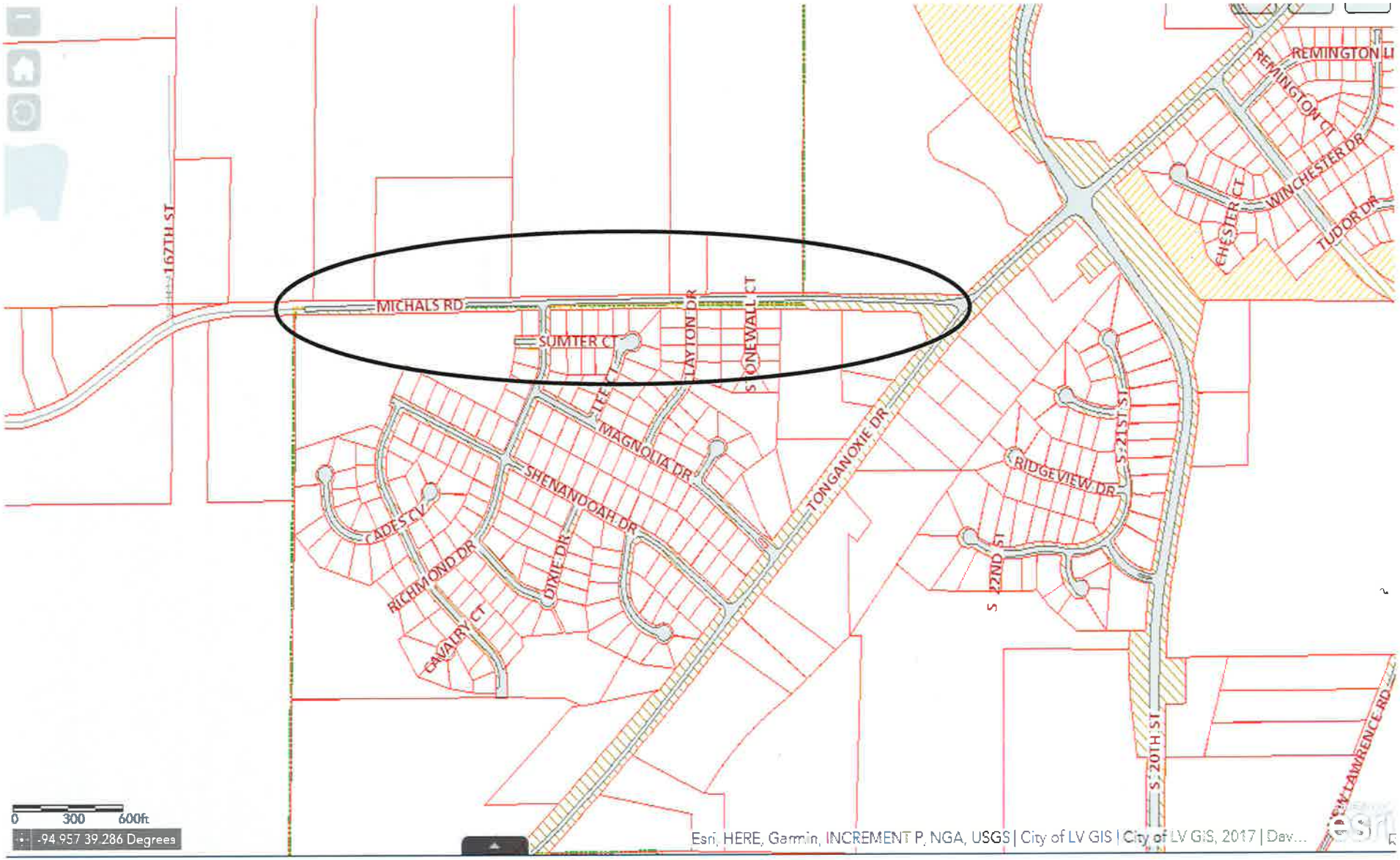

155TH ST
S 13TH ST
EISENHOWER RD
MT CALVARY RD
10TH AVE
EISENHOWER RD
LEWIS DR
PARKWAY DR
PARK T
PARK AVE
PA
HIGHLAND TER
GLENVIEW ST
EDGEHILL ST

Michels Rd. – Tonganoxie Rd. to City Limits

$2,421,250.00

The project is approximately 3,650 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement. Additional right-of-way and construction easements would be necessary to complete the project.

(see attached map)

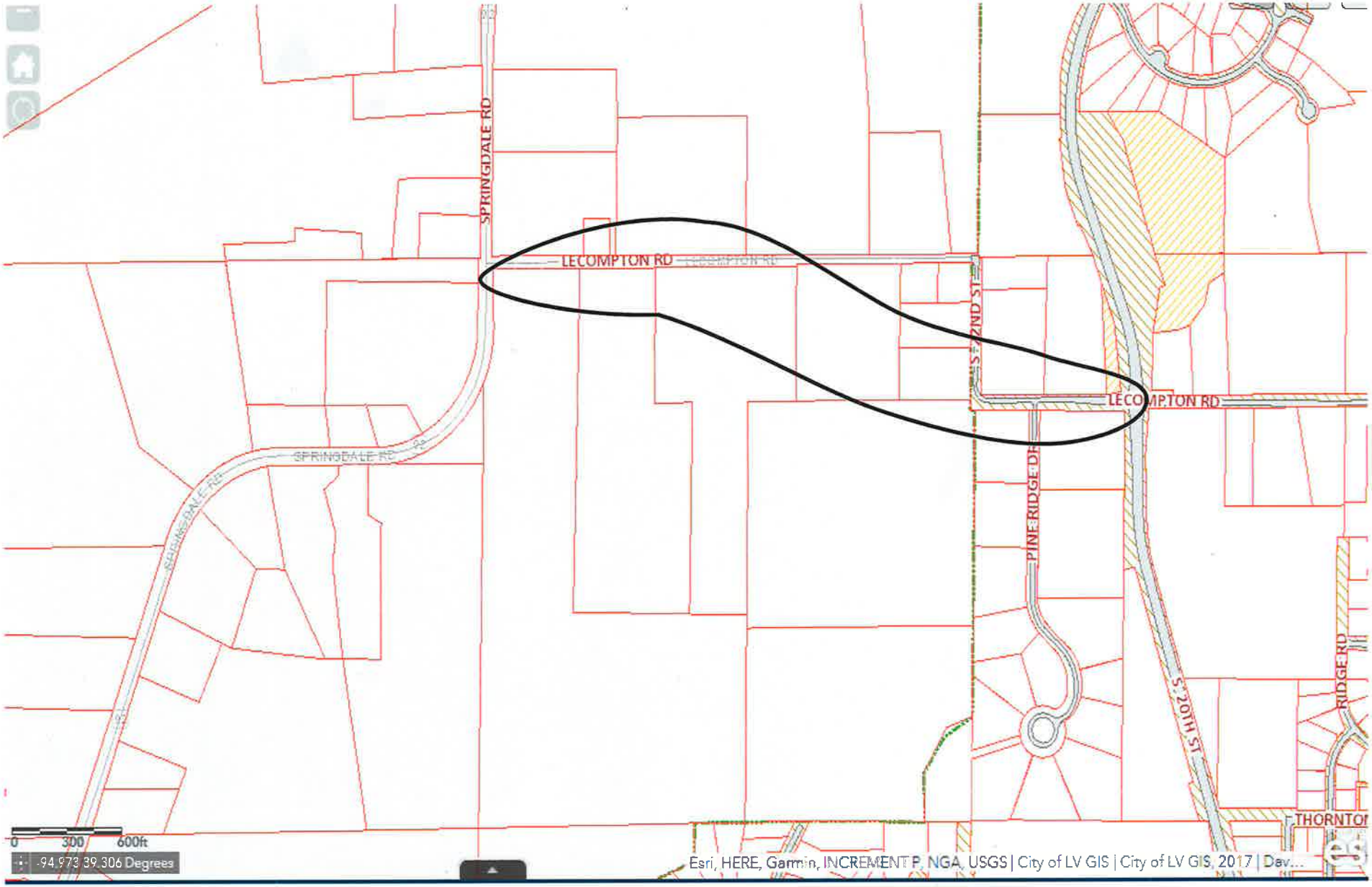

MICHALS RD
SUMTER CT
LAYTON DR
STONEWALL CT
MAGNOLIA DR
SHENANDOAH DR
CADES CV
RICHMOND DR
DIXIE DR
CAVALRY CT
TONGANOXIE DR
RIDGEVIEW DR
S 21ST ST
S 22ND ST
S 201H ST
167TH ST
REMINGTON LI
REMINGTON CT
WINCHESTER DR
CHESTER CT
TUDOR DR
0 300 600ft
-94.957 39.286 Degrees
Esri, HERE, Garmin, INCREMENT P, NGA, USGS | City of LV GIS | City of LV GIS, 2017 | Dav...

Ohio/Lecompton Rd. – 20th St. west to Highway 92

$3,700,000.00

The project is approximately 4,200 feet in length and would include sub-grade stabilization, new storm drainage, new curb & gutter, sidewalks, and new pavement. Additional construction easements would be necessary to complete the project.

(see attached map)


SPRINGDALE RD
LECOMPTON RD
S 22ND ST
LECOMPTON RD
SPRINGDALE RD
PINE RIDGE DR
S 20TH ST
RIDGE RD
0 300 600ft
-94.973 39.306 Degrees
Esri, HERE, Garmin, INCREMENT P, NGA, USGS | City of LV GIS | City of LV GIS, 2017 | Dev...

STREETSCAPE IMPROVEMENTS

Cherokee St. & Shawnee St. – Esplanade to 7th St.

Explore state funding to design and construct a streetscape project to match the work done on Delaware St.

(see attached maps)

2nd, 3rd, 5th, 6th, & 7th – Shawnee to Choctaw

Explore state funding to design and construct a streetscape project to match the work done on Delaware St.

(see attached map)

4th St. – Miami to Bridge

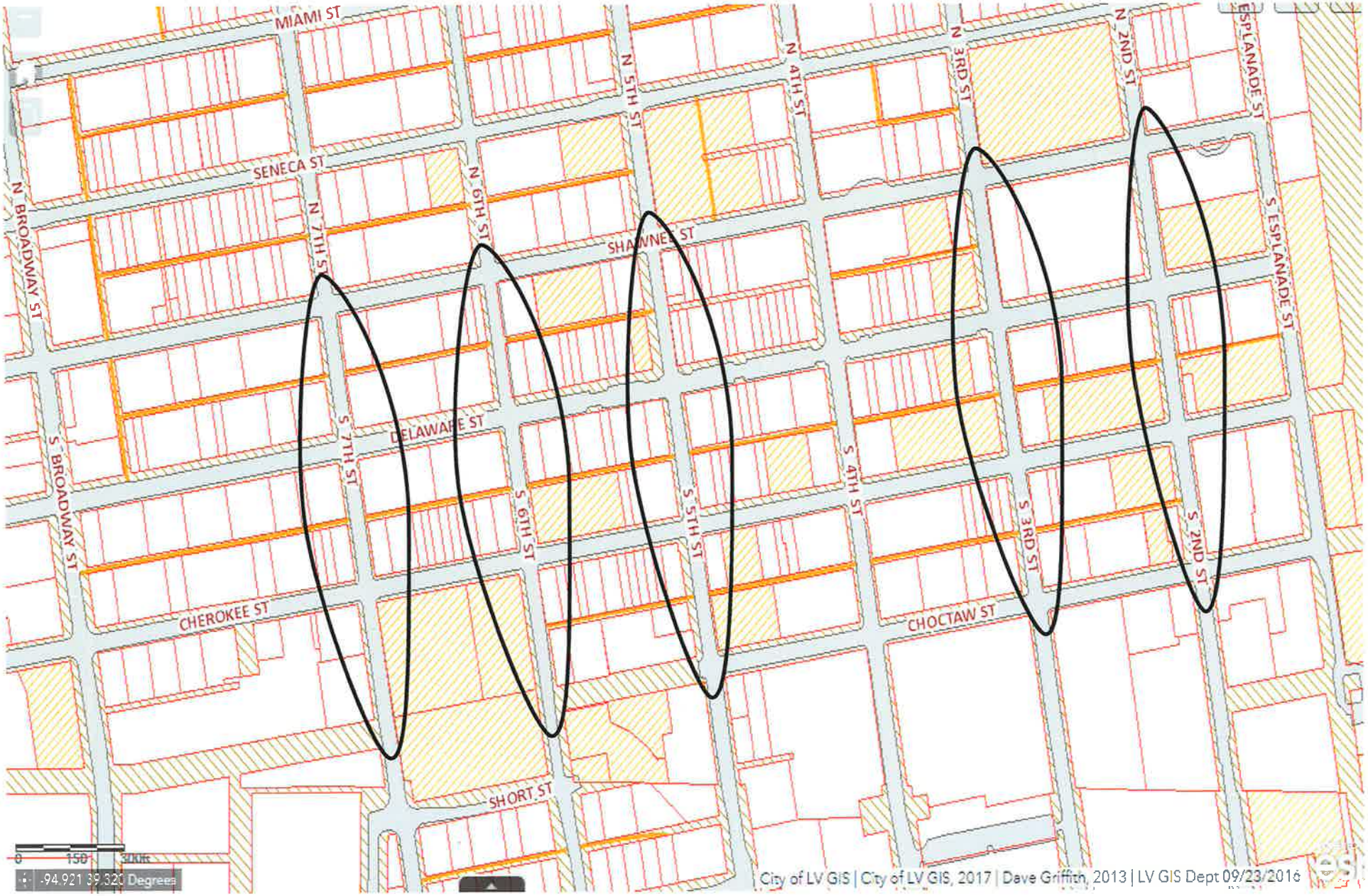
$3,575,000.00

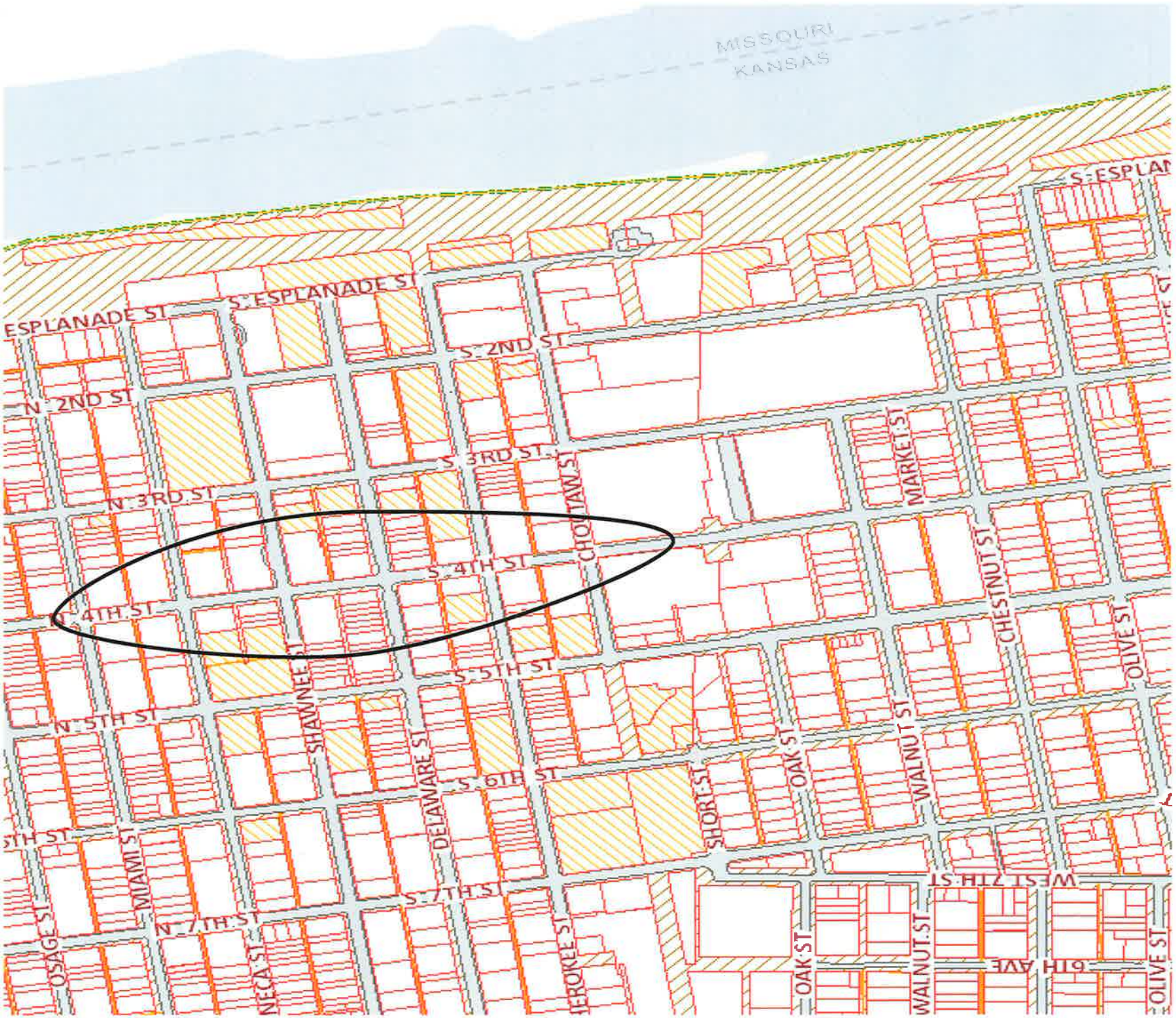
The project is approximately 2,050 feet in length and would include new curb, new sidewalks, up-grade storm sewer piping & storm inlets, sub-grade repair and stabilization, new intersection profiles, new pavement striped to a 3 lane roadway section, and new traffic signals.

(see attached map)


N 7TH ST
N 6TH ST
N 5TH ST
N 4TH ST
N 3RD ST
N 2ND ST
SENECA ST
SHAWNEE ST
DELAWARE ST
S ESPLANADE ST
S ESPLANADE ST


SHAWNEE ST
ESPLANADE ST
S 7TH ST
DELAWARE ST
S 4TH ST
S 3RD ST
S 5TH ST
CHEROKEE ST
CHOCTAW ST
SHORT ST
S 2ND


MIAMI ST
SENECA ST
SHAWNEE ST
DELAWARE ST
CHEROKEE ST
CHOCTAW ST
SHORT ST
N BROADWAY ST
S BROADWAY ST
N 7TH ST
N 6TH ST
N 5TH ST
N 4TH ST
N 3RD ST
N 2ND ST
S 7TH ST
S 6TH ST
S 5TH ST
S 4TH ST
S 3RD ST
S 2ND ST
ESPLANADE ST
S ESPLANADE ST
0 150 300ft
-94.921 39.320 Degrees
City of LV GIS | City of LV GIS, 2017 | Dave Griffith, 2013 | LV GIS Dept 09/23/2016


MISSOURI
KANSAS
S. ESPLANADE ST
ESPLANADE ST
S. 2ND ST
N. 2ND ST
S. 3RD ST
N. 3RD ST
S. 4TH ST
4TH ST
CHOCTAW ST
MARKET ST
CHESTNUT ST
OLIVE ST
S. 5TH ST
N. 5TH ST
SHAWNEE
DELAWARE ST
S. 6TH ST
SHORT ST
OAK ST
WALNUT ST
W. 7TH ST
S. 7TH ST
N. 7TH ST
MIAMI ST
OSAGE ST
NECA ST
CHEROKEE ST
OAK ST
WALNUT ST
6TH AVE
OLIVE ST