

**Stormwater 101**  
**Planning Commission**  
**November 2<sup>nd</sup>, 2016**



**City of Lawrence**  
**PUBLIC WORKS**

**Matt Bond, P.E., CFM**  
**Stormwater Engineer**  
**Department of Public Works**

# CARRY – pipes, open channel





# CROSS - bridges



# CONVEY - levee



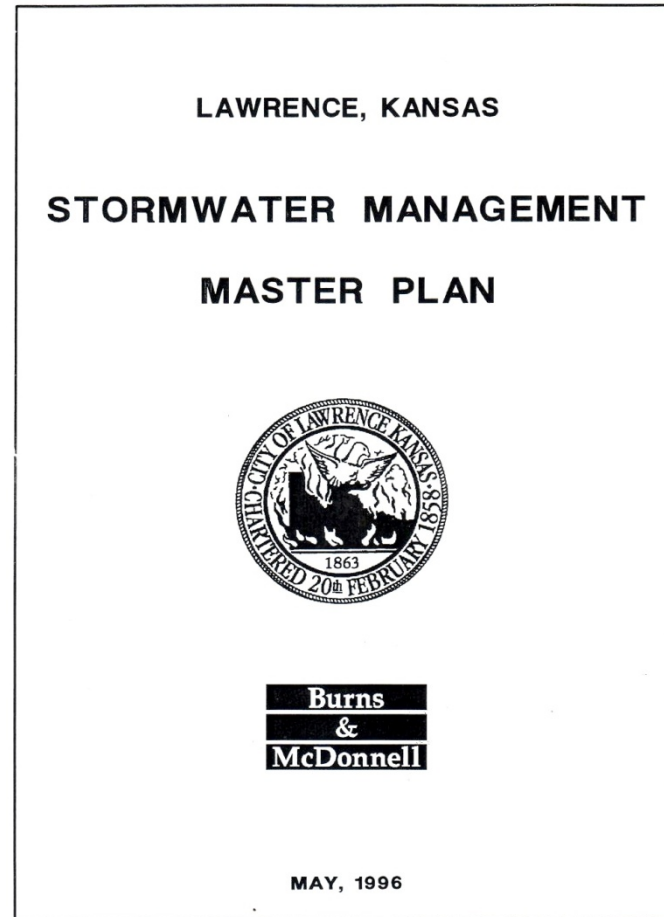


# CONTROL - Bowersock Dam



# **STORMWATER UTILITY**

**(created in 1996 to implement the Stormwater Management Master Plan)**







# **Stormwater Utility**

**Capital Improvements**

**Storm Sewer Maintenance**

**Review of Development**

**Pollution Prevention**



## **City of Lawrence Infrastructure Data:**

**Land area: 34.28 square miles  
138 miles of pipe  
110 miles of open channel & streams  
4574 curb & area inlets, jct. boxes**

**NPDES Phase II city  
(includes the University of Kansas)**

**Population: 90,000**

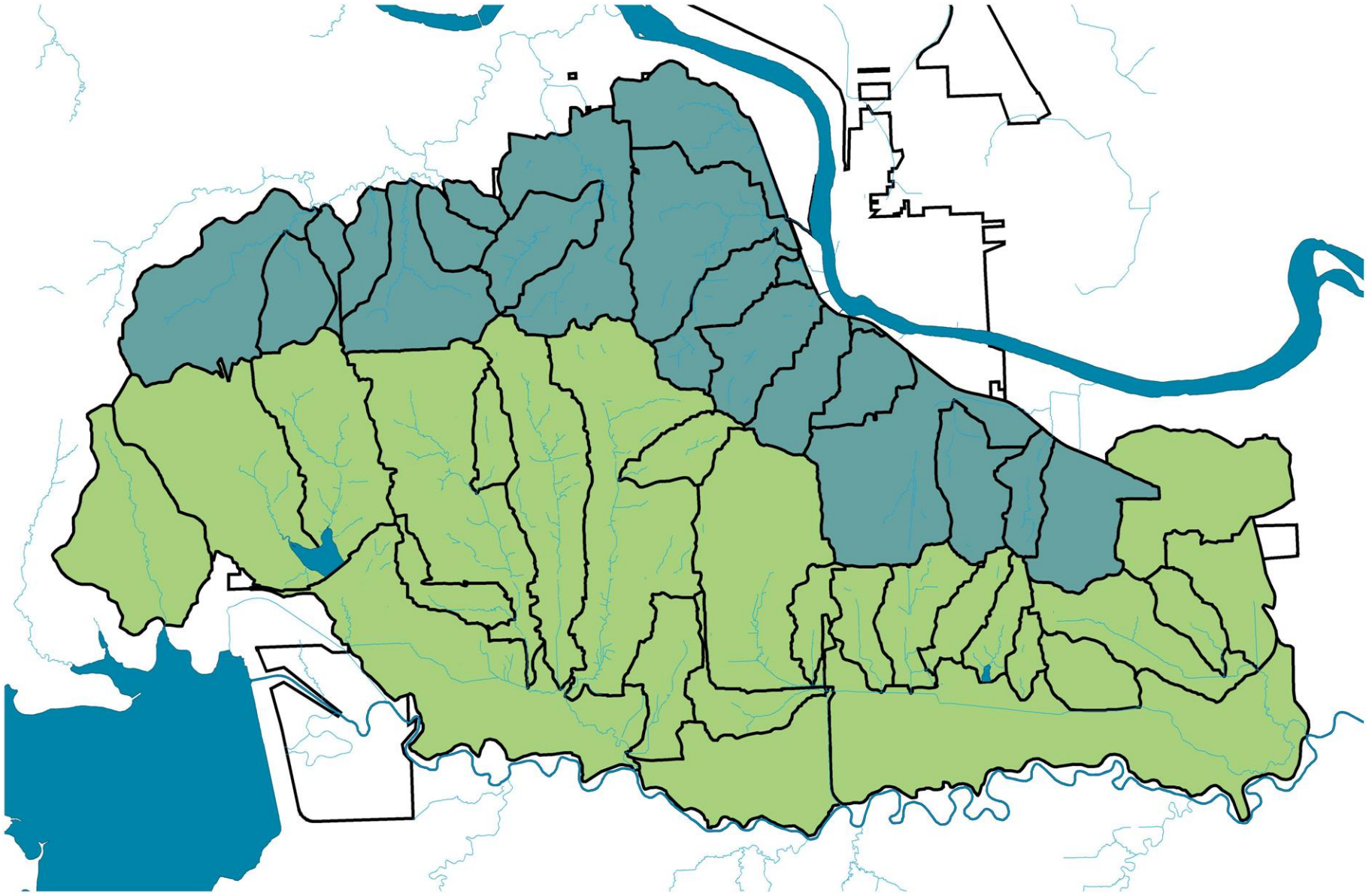


# Kansas River



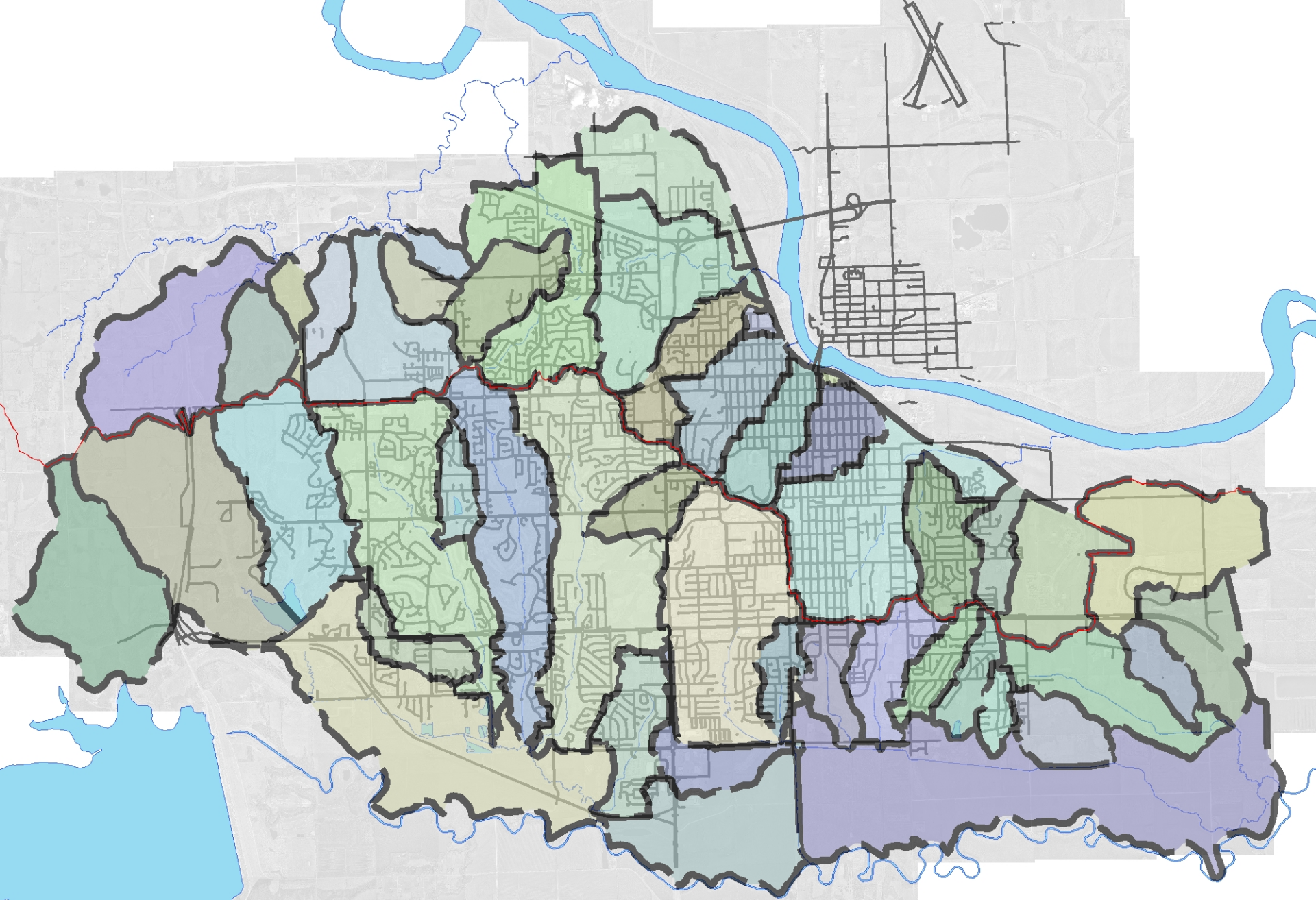
# Wakarusa River





21 Kansas River + 25 Wakarusa River = 46 total sub basins in City Limits





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Stormwater Utility Employees:

Stormwater Engineer

Environmental Technician

Administrative Assistant

Field Crew Supervisor

Field Crew (8)



# CAPITOL IMPROVEMENTS

LAWRENCE, KANSAS

**STORMWATER MANAGEMENT  
MASTER PLAN**

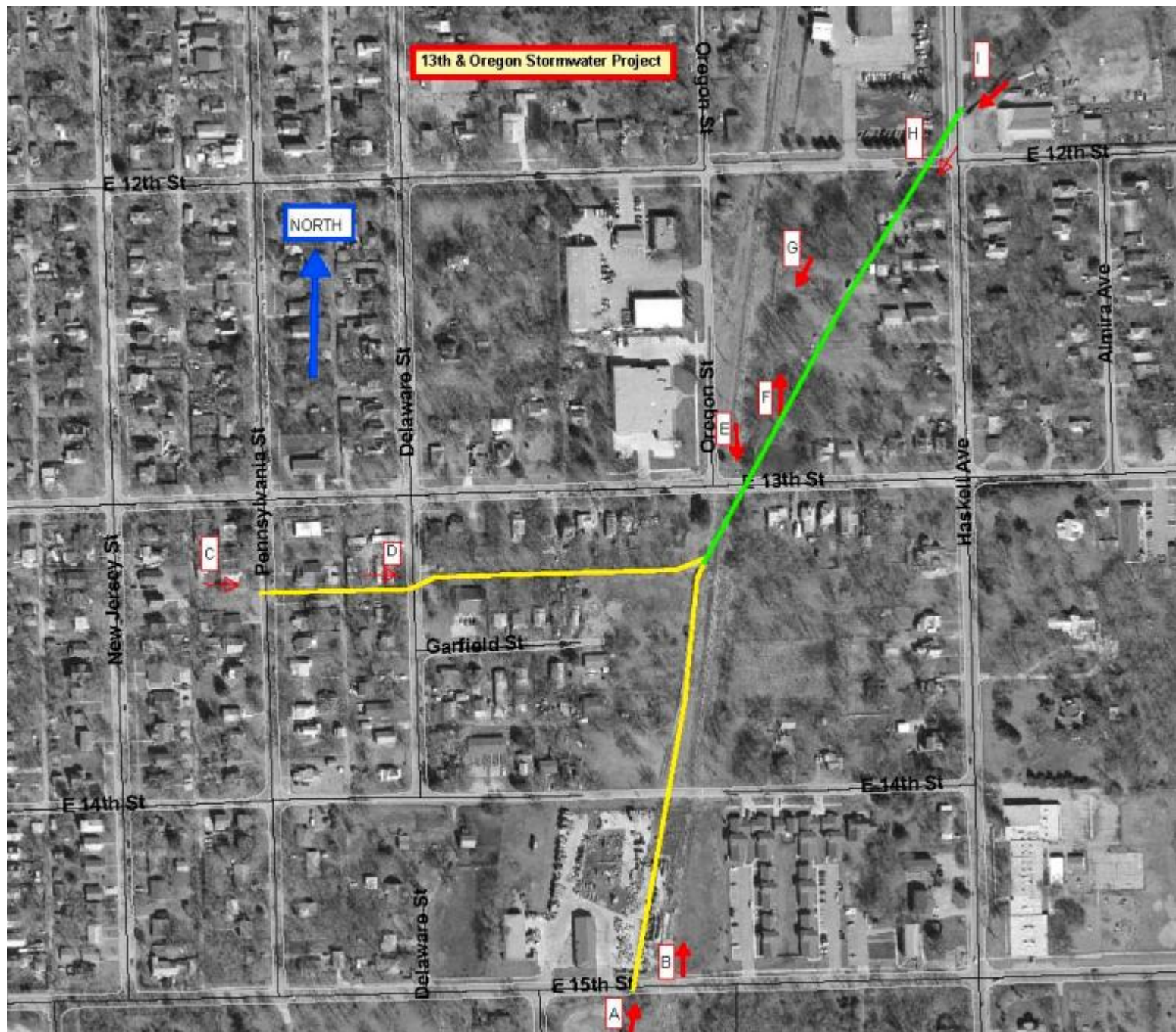


**Burns  
&  
McDonnell**

MAY, 1996









# CONSTRUCTION

## 13<sup>th</sup> Street (looking north)





# CONSTRUCTION

## 13<sup>th</sup> Street (looking north)











# STORM SEWER MAINTENANCE

LAWRENCE, KANSAS

**STORMWATER MANAGEMENT  
MASTER PLAN**



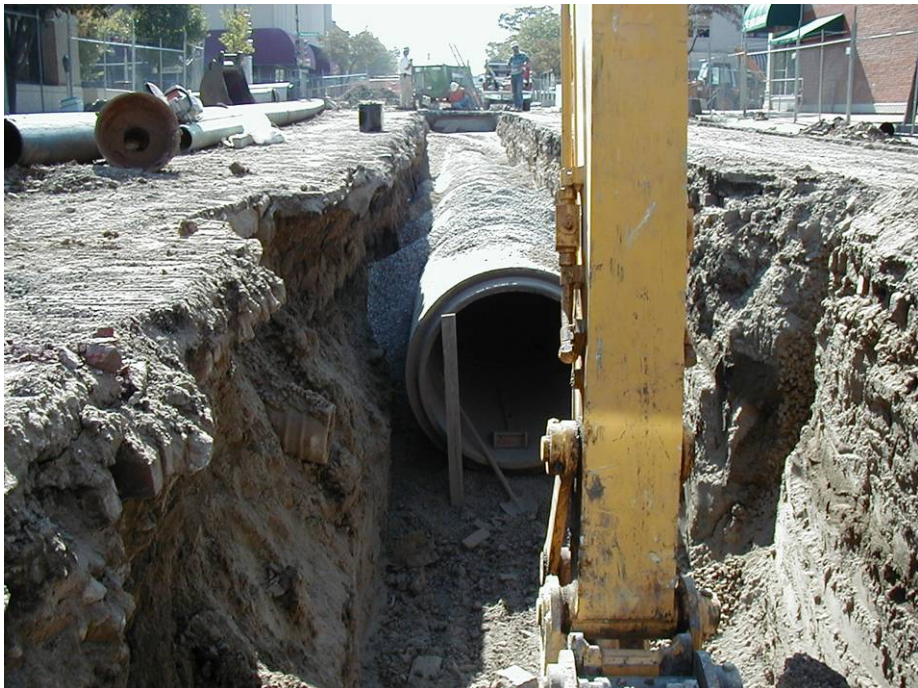
**Burns  
&  
McDonnell**

**MAY, 1996**



















































# REVIEW OF DEVELOPMENT

LAWRENCE, KANSAS

## STORMWATER MANAGEMENT CRITERIA



FEBRUARY 1996





Capacity > Runoff





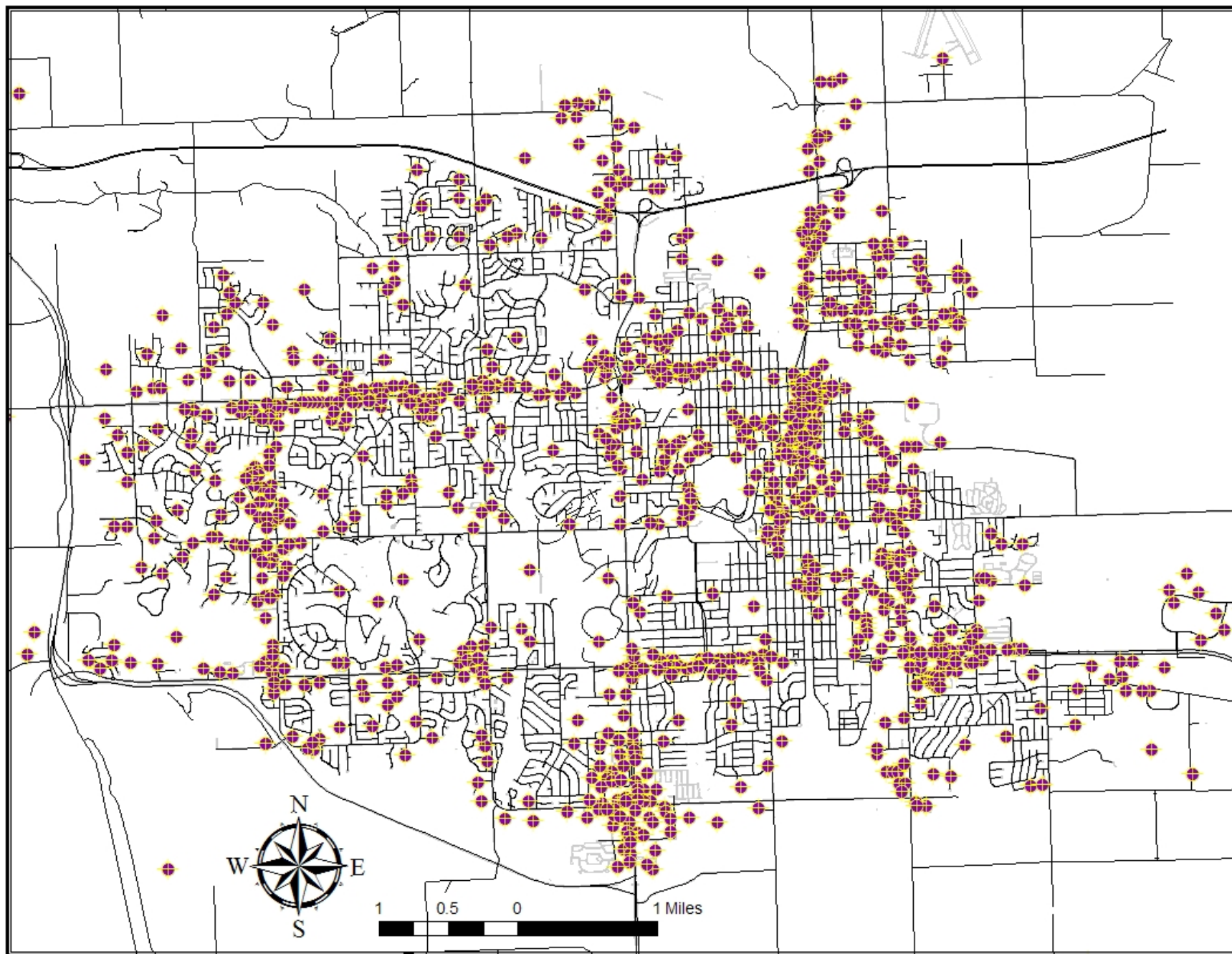
Runoff > Capacity



# **REVIEW OF DEVELOPMENT**

- **Site Plan Review**
- **Stormwater Management Criteria**
- **Drainage Study (Hydrologic and Hydraulic Study)**
- **Detention / Retention Basins**
- **1.8 cfs/acre release rate**







# 27<sup>th</sup> St. & Crossgate Dr. in 1995





# 27<sup>th</sup> St. & Crossgate Dr in 2000



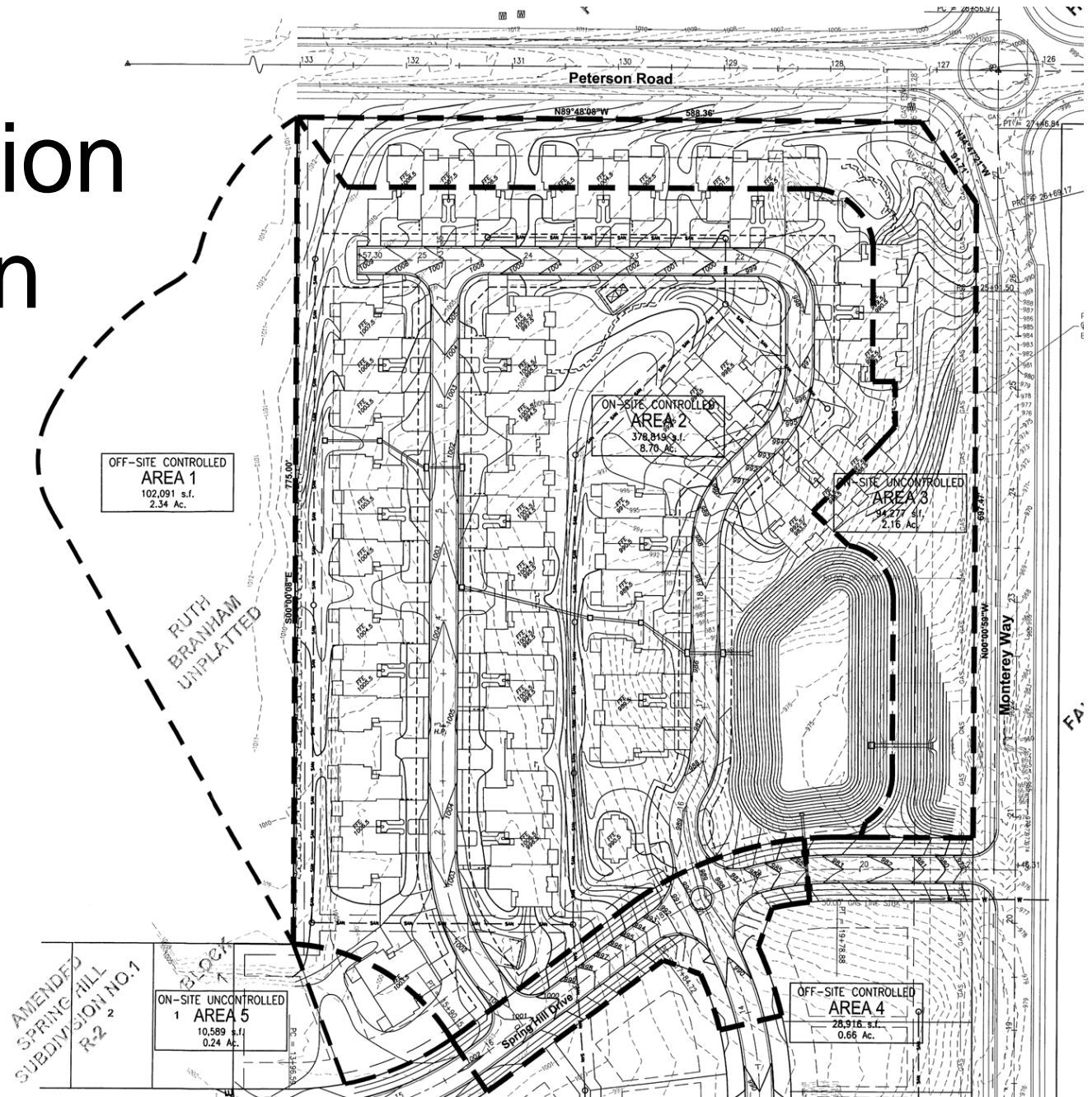


# 27<sup>th</sup> St. & Crossgate Dr. in 2006



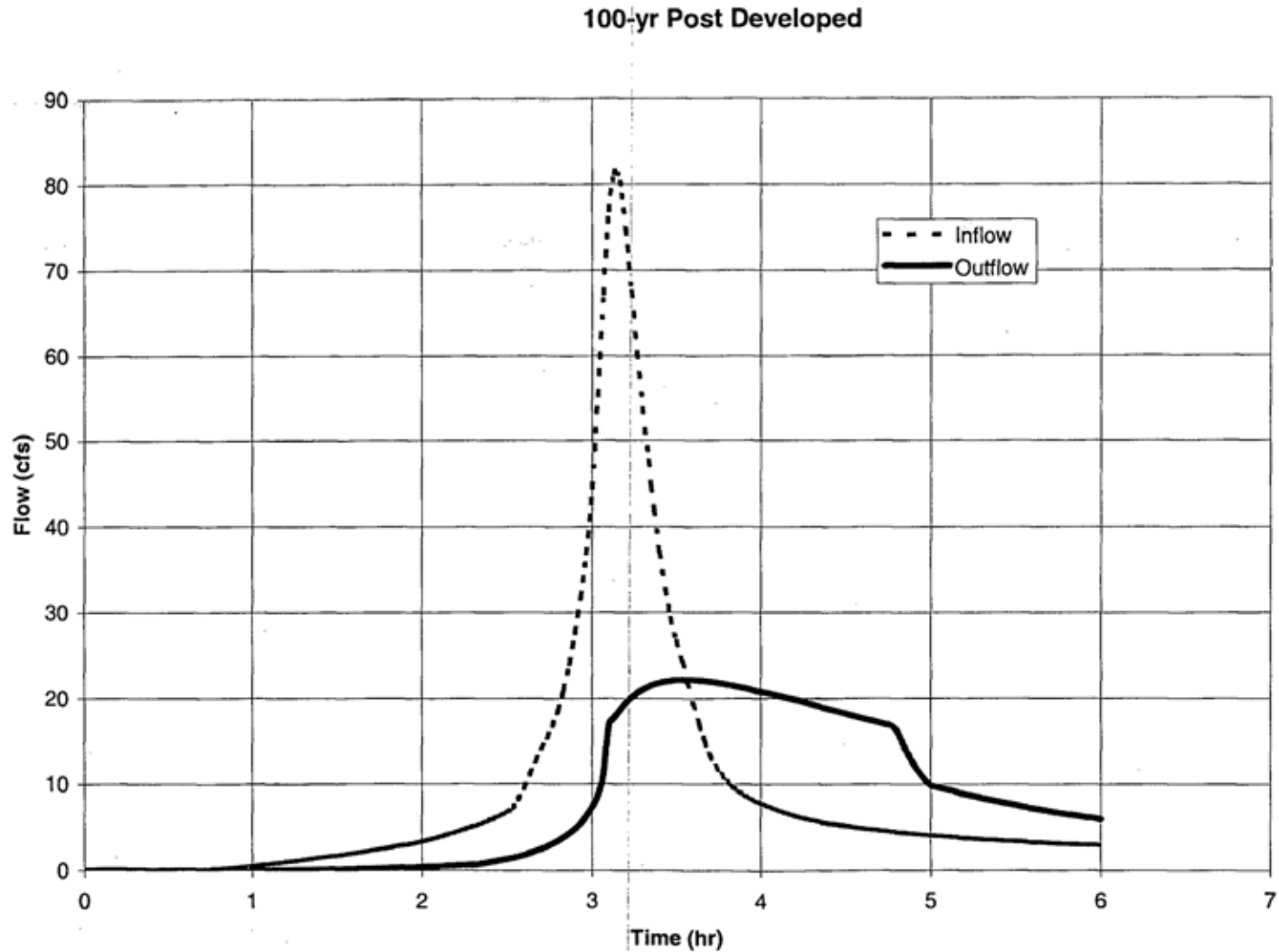


# Detention Basin





# Detention - Reshapes the hydrograph





# POLLUTION PREVENTION

LAWRENCE, KANSAS

**STORMWATER MANAGEMENT  
MASTER PLAN**



**Burns  
&  
McDonnell**

MAY, 1996



# Water Quantity



# Water Quality





# Stormwater Quality



rain



runoff



river



# **R E G U L A T I O N S**

1972 - Clean Water Act

National Pollution Discharge Elimination System (NPDES) permit to discharge from a point source.

1987

Amendment requiring NPDES permit discharge from a non-point source.

1990 - Phase I of NPDES Stormwater Program

Discharge permits for Municipal Separate Storm Sewer Systems (MS4s) serving populations >100,000.

1998

Phase II established for small municipalities including land disturbance activities of 1 acre or more.

2003

City of Lawrence applied for and received MS4 permit from the Kansas Dept of Health and Environment.



# NPDES Phase II

## Six Minimum Control Measures

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1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge and Elimination
4. Construction Site Stormwater Runoff Control
5. Post-Construction Storm Water Management
6. Pollution Prevention / Good Housekeeping



# Pollutants In Our Stormwater

Pet Waste

Sediment

Fertilizers and Lawn Chemicals

Detergents and Paint

Yard Waste

Motor Oil and Antifreeze



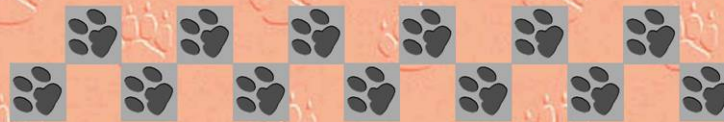




Please be a responsible pet owner and  
remember to clean up and properly  
dispose of your pet's waste.

*Pet waste left in yards, parks, and other outdoor  
areas washes away with rain or snow melt into storm  
sewers or ditches that flow directly into our streams,  
lakes and rivers. Pet waste contains bacteria and  
excess nutrients that have been identified as primary  
pollutants in the Kansas River and local streams and  
ponds. These pollutants destroy our natural  
resources and threaten public health. With 68 million  
dogs and 73 million cats in the United States,  
it all adds up!*

To properly dispose of pet waste,  
flush it down the toilet or place it in  
a bag and throw it in the trash.

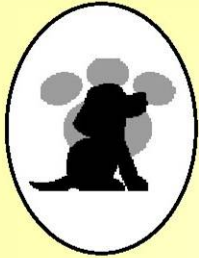


*For more information contact*  
Patty Ogle, Stormwater Quality Technician  
at 832-3136

*or visit us online at*  
[www.lawrenceks.org/stormwater](http://www.lawrenceks.org/stormwater)

*City of Lawrence, Kansas*





## ***Congratulations on your new pet!***



Please be a responsible pet owner and remember to clean up and properly dispose of your pet's waste. Pet waste left in yards, parks and other outdoor areas washes away with rain or snowmelt into storm sewers or ditches that flow directly into our streams, lakes and rivers. Pet waste contains bacteria and excess nutrients that have been identified as primary pollutants in the Kansas River and local streams and ponds. These pollutants destroy our natural resources and threaten public health. With 68 million dogs and 73 million cats in the United States, it all adds up.

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*For more information contact* Patty Ogle, Stormwater Quality Technician at **832-3136**  
*or visit us online at* **[www.lawrenceks.org/stormwater](http://www.lawrenceks.org/stormwater)**  
*City of Lawrence, Kansas*



## Stormwater Pollution



Stormwater pollution is caused by the daily activities of people everywhere. Rainwater and snowmelt run off streets, lawns, construction and industrial sites and pick up fertilizers, dirt, pet waste, pesticides, leaves oil and grease and many other pollutants on the way to our streams, rivers and lakes.



### **For more information, contact:**

Patty Ogle, Stormwater Quality Technician  
**785-832-3136**

or visit us online at:

[www.lawrenceks.org/stormwater](http://www.lawrenceks.org/stormwater)  
[www.lawrencerecycles.org](http://www.lawrencerecycles.org)

City of Lawrence, Kansas



## Storm Sewer vs. Sanitary Sewer

Our **storm sewer system** consists of street curbs, curb inlets, surface drains and ditches. Runoff from rainfall and snow melt enters this system and is then discharged directly into our streams and rivers without prior treatment.

Our **sanitary sewer system** is what our home plumbing and inside drains are connected to. This system goes to the sewer treatment plant before discharge into the river.



"No person shall release into the storm drainage system any discharge that is not composed entirely of uncontaminated stormwater . . ."

City of Lawrence  
Stormwater Pollution Prevention Ordinance  
Adopted September, 2001



# Yard Waste

Yard waste entering storm drains or streams increases the risk of *flooding* and adds *pollutants* to the environment.

Leaves, grass clippings and other yard waste should be composted or placed in acceptable containers for curbside pick-up.



Leaves and grass clippings should not be left along the street.



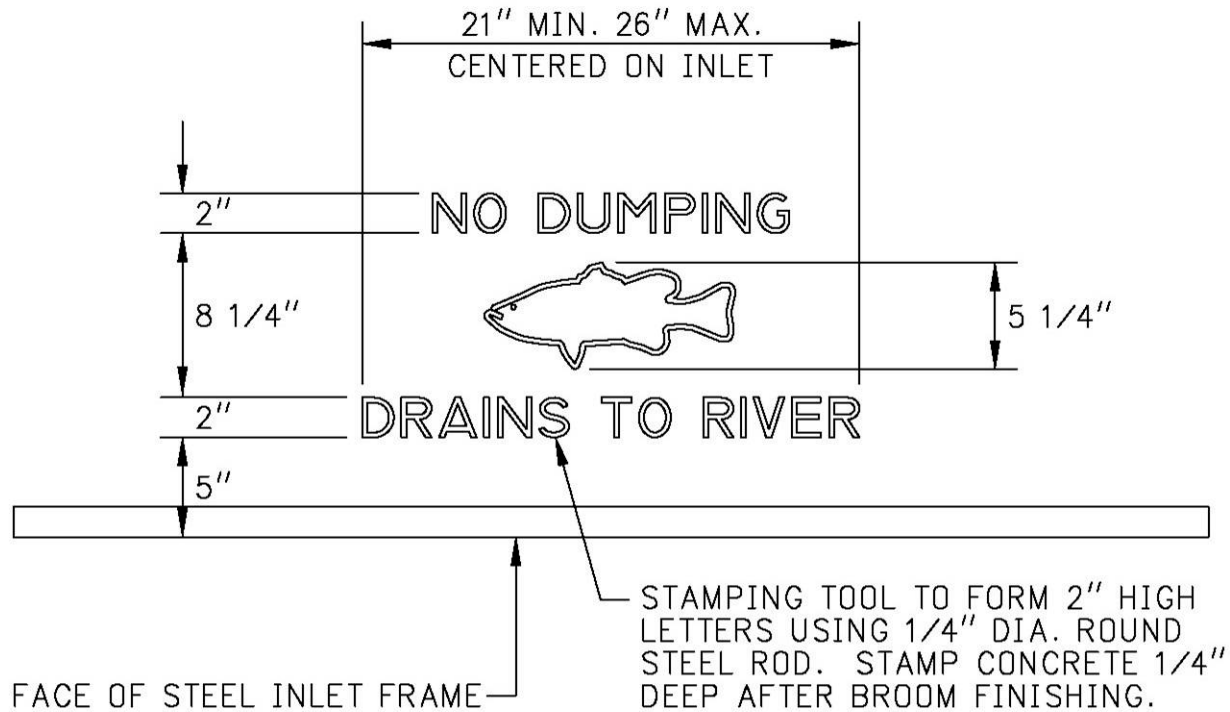
Yard waste should not be placed in or near streams and creeks.



Yard waste clogs the stormwater system and must be removed by city crews to prevent flooding.

City of Lawrence, KS  
Stormwater Division  
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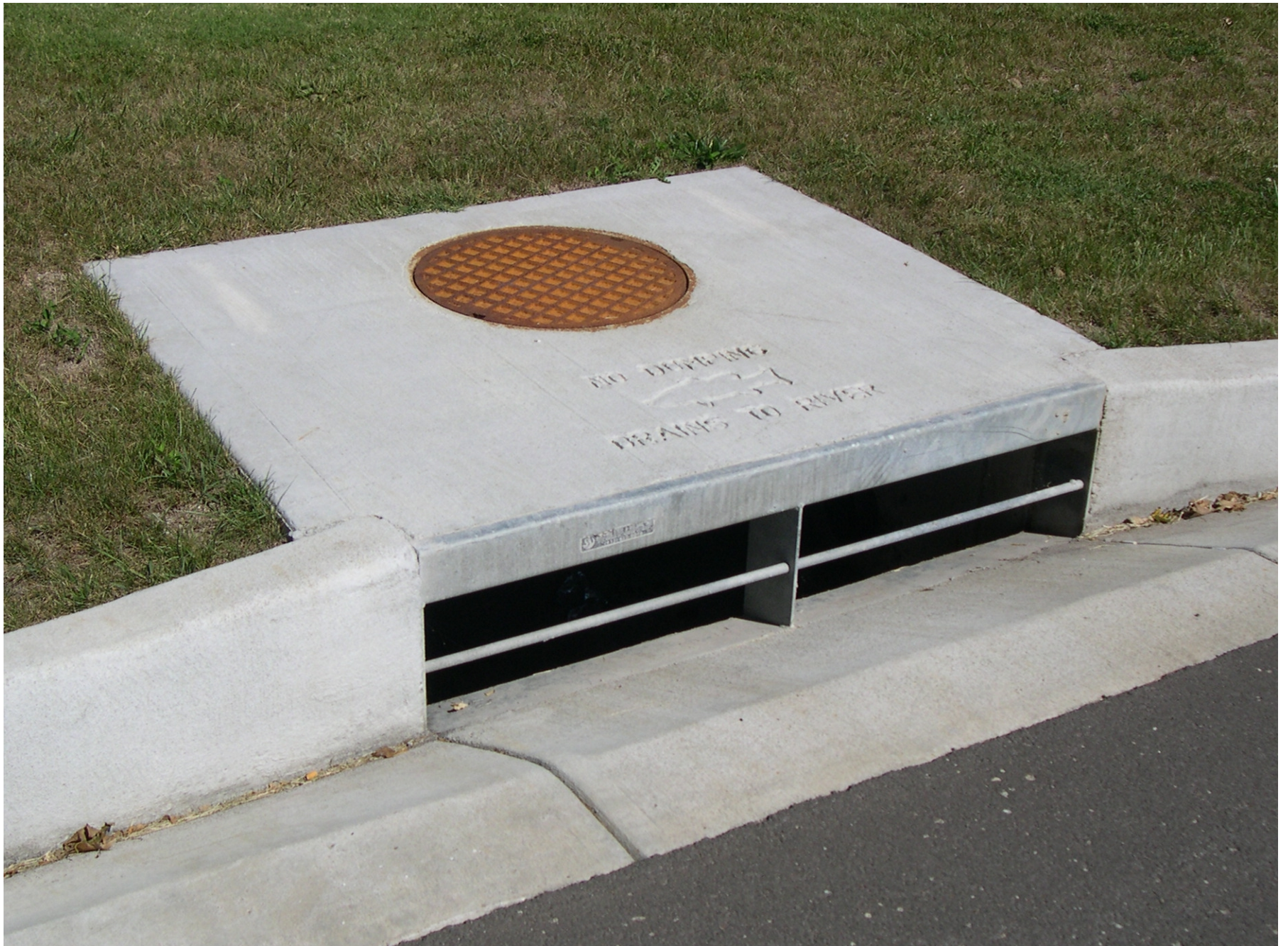


PLAN

SCALE 1" = 1'-0"

CURB INLET STAMP







NO DUMPING



DRAINS TO RIVER



# Construction Site Violations





# Gravel Construction Entrance



Sediment  
Barrier  
(Silt Fence)