

City of Omaha Stormwater

Stormwater System & Capital Programs

Sediment & Erosion Control Seminar

February 6, 2020

City of Omaha Stormwater Presentation Agenda

- ▶ Overview of Stormwater System
- ▶ Capital Improvement Programs
- ▶ Stream & Stormwater Assessment & Prioritization



Omaha's Stormwater System

- Collection System: Storm Sewers and related “gray” infrastructure:

- ▶ Inlets
- ▶ Manholes
- ▶ Outfalls
- ▶ Storage Structures
- ▶ Pump Stations
- ▶ Flap gates & Bulkheads

- ## ► Levee & Floodwall

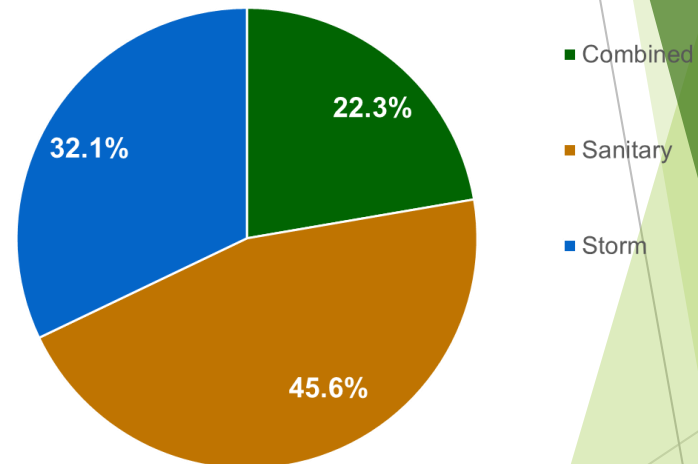
- ▶ Open Channels and other nonstructural elements
 - ▶ Natural Channels
 - ▶ Constructed/Engineered/Modified open conveyance
 - ▶ Green Infrastructure



Omaha's Stormwater System: Collection System Assets

- ▶ Regional Sewers (sanitary, combined & storm)
 - ▶ >3,400 miles, >137k manholes & structures in GIS
 - ▶ Force mains (~33 miles)
- ▶ Est. replacement value (2019 dollars)
 - ▶ Sanitary/Combined: \$8.6 billion
 - ▶ Storm: \$6.2 billion
- ▶ ~2,000 mi sewers owned & maintained by City of Omaha
- ▶ Lift Stations & related facilities
 - ▶ 82 Sanitary/Combined
 - ▶ 30 Stormwater

% of Sewer Types by Length



Population Growth in Papillion Creek watershed

2015: 562,833

2040: 747,437

2050: 821,278

Parcels

Year Building Built

No Data

<1900

1900s & 1910s

1920s & 1930s

1940s & 1950s

1960s & 1970s

1980s & 1990s

2000s to Present

MAPA Population Data

2040 Medium Growth Proj.

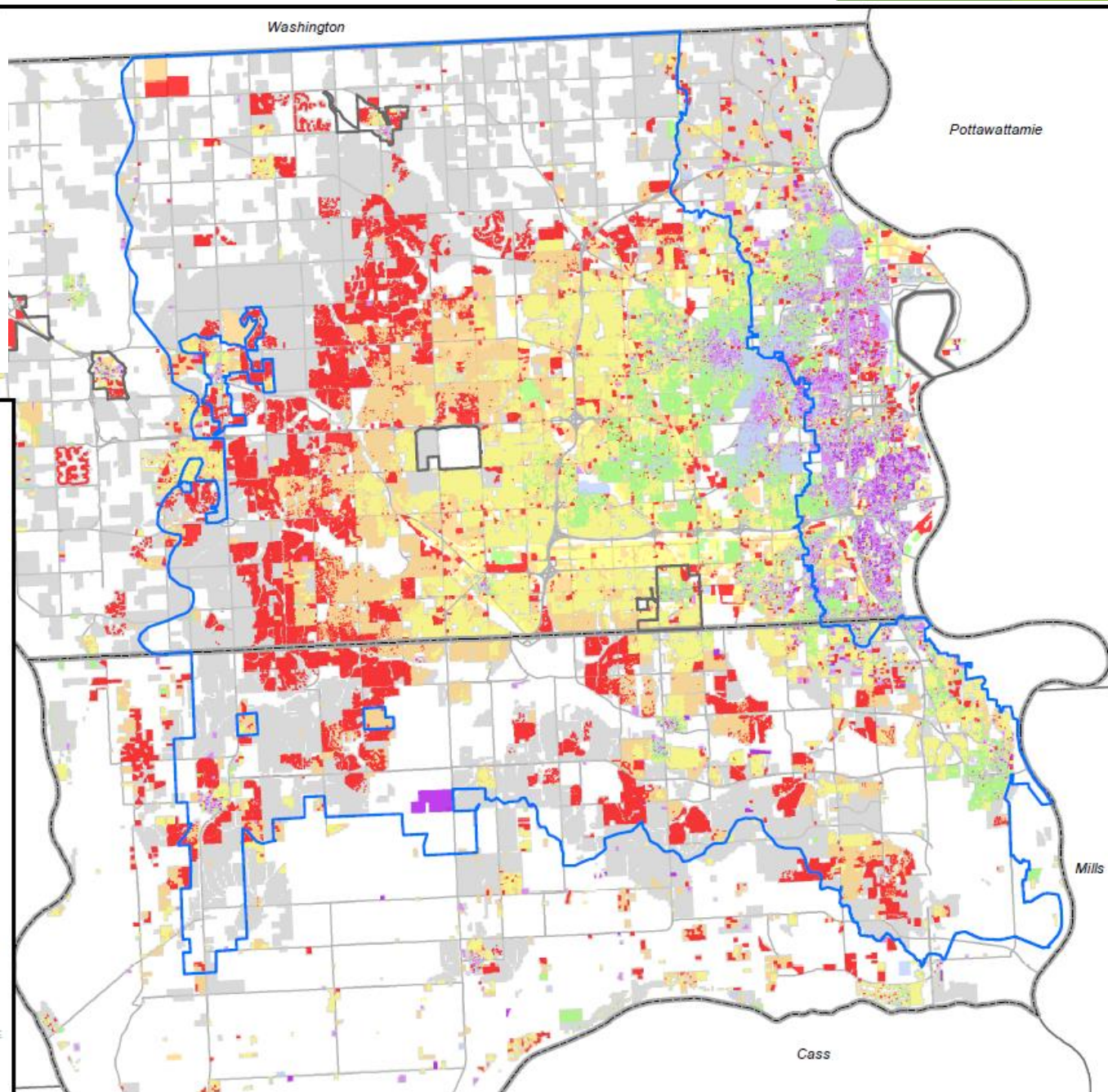
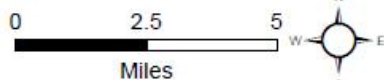
Streets

Papillion Creek SMA

City Limits (Not Omaha)

Douglas and Sarpy Counties

Area Counties



Omaha's Stormwater System: Levee/Floodwall

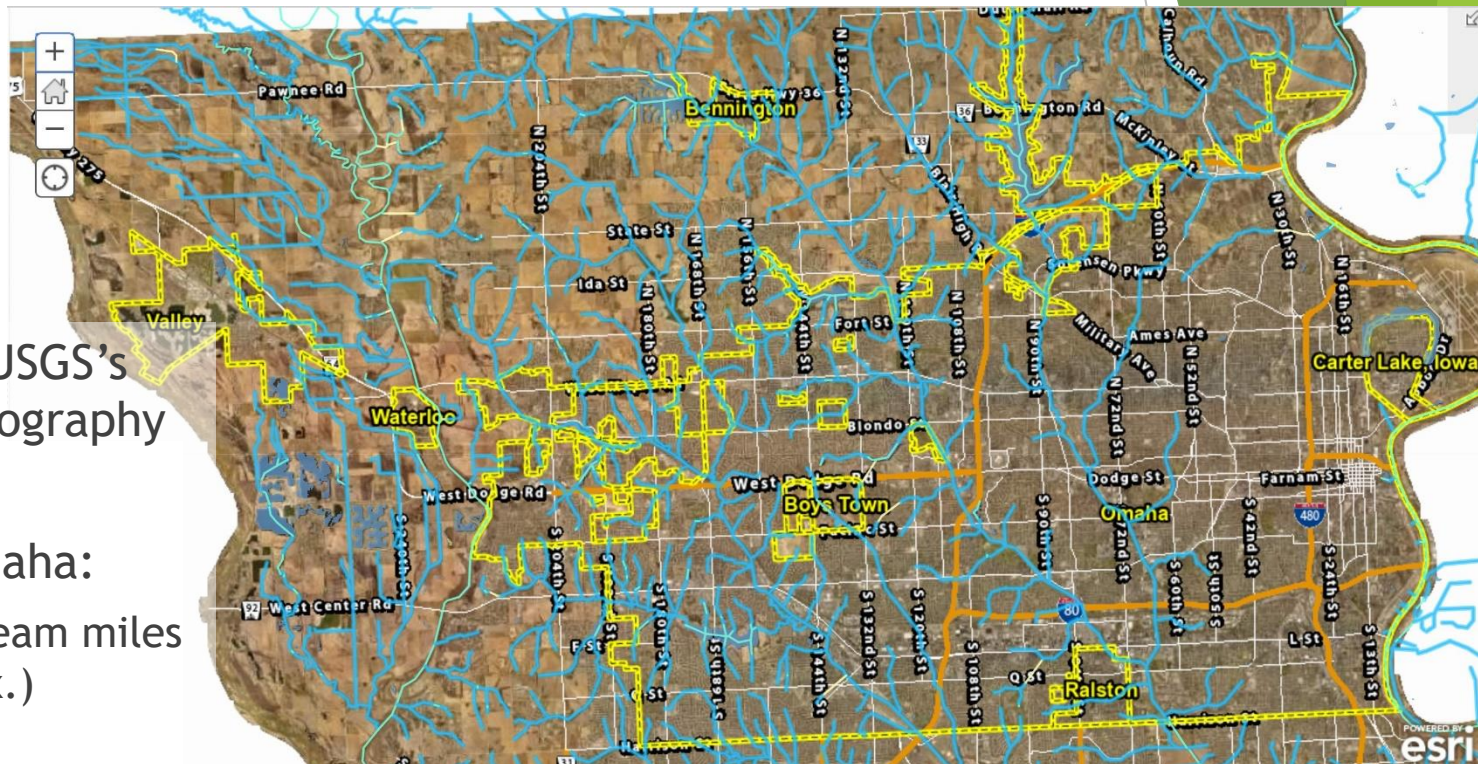
- ▶ Flood Protection Project
 - ▶ Constructed 1946 - 1951
 - ▶ 13.2 Miles:
 - ▶ North: 9.3 miles earthen levee
 - ▶ 1.1 miles flood wall
 - ▶ South: 3.5 Miles earthen levee
 - ▶ Outfalls, gates, pumping stations, toe drains, relief wells, seepage blankets
 - ▶ Protects 9 square miles of property
- ▶ Notable Events
 - ▶ 1952: 396,000 CFS; crest 40.2
 - ▶ 2011: crest 36.29
 - ▶ 2019: crest 34.4 / 31.96 / 30.58



Omaha's Stormwater System: Channels and Open Conveyance

According to USGS's
National Hydrography
Dataset:

- ▶ City of Omaha:
 - 180 stream miles (approx.)
- ▶ Douglas County:
 - Over 500 stream miles



Omaha's Stormwater System: Challenges

- Materials reaching design life



Omaha's Stormwater System: Challenges

- ▶ Materials reaching design life
- ▶ Difficult to manage systemic effects of channel erosion/degradation
- ▶ Access is challenging
- ▶ Not always clear if runoff or a particular drainageway is “private” or “public”
- ▶ Certifications & Regulatory responsibilities



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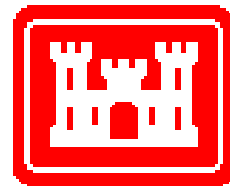


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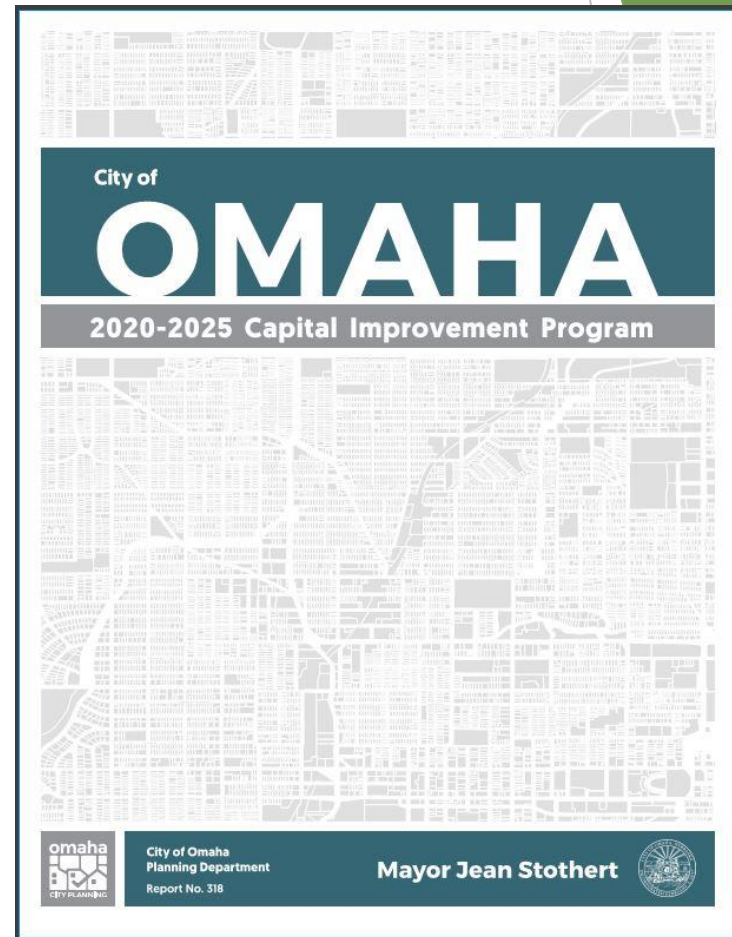
FEMA



**US Army Corps
of Engineers®**

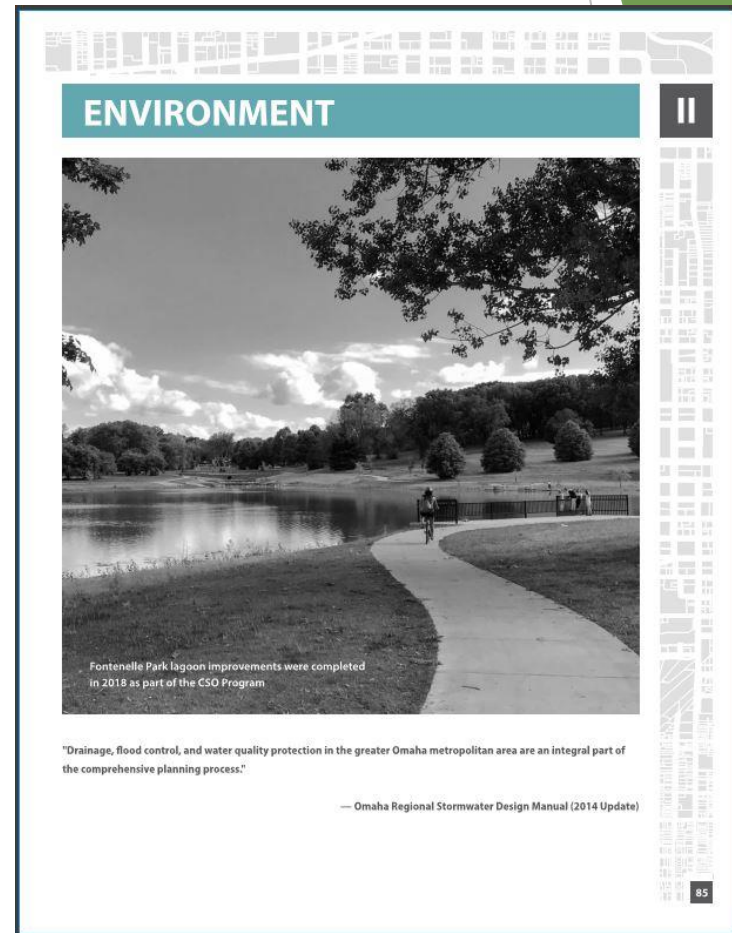
Omaha Stormwater: Capital Improvement Programs

- ▶ Funding Sources:
 - ▶ Environmental Bonds (also called “sewer bonds”)
 - ▶ Grants
 - ▶ Nebraska Environmental Trust
 - ▶ EPA Section 319
 - ▶ Other
 - ▶ Other Local Agency Cost Share/Partnership
 - ▶ Papio Missouri River NRD
 - ▶ Public/Private Partnerships



Omaha Stormwater: Capital Improvement Programs

- ▶ Missouri River Flood Levee Maintenance & Repairs
- ▶ Cole Creek Flood Mitigation
- ▶ Channel Rehabilitation Program
- ▶ Local Neighborhood Storm Sewer Improvements
- ▶ Erosion/Storm Sewer Repair
- ▶ Stormwater Facilities Capital Asset Replacement



Missouri River Flood Levee Maintenance & Repairs

Program Purpose:

- ▶ Maintain integrity of Omaha's Missouri River Levee
- ▶ Retain certifications of levee
 - ▶ FEMA
 - ▶ USACE
- ▶ Flood protection



Missouri River Flood Levee Maintenance & Repairs

Current and Upcoming Work:

- ▶ PL 84-99 work to repair 2019 Flood Damages
 - ▶ 15 structures planned for repair/replace
 - ▶ 25 outfall ditches to be cleaned
 - ▶ Many smaller point repairs
 - ▶ Still assessing damages
- ▶ FEMA Certification: 4-phase project
 - ▶ Recently bid Phase 2
 - ▶ More work 2020-2021
 - ▶ Approx. \$4M spent 2012-present
 - ▶ Approx. \$5M budgeted for completion of FEMA Cert



Missouri River Flood Levee Maintenance & Repairs

Current and Upcoming Work:

- ▶ USACE PL 84-99 Rehabilitation and Inspection Program
 - ▶ Maintenance and other improvements
 - ▶ Projects not yet programmed or budgeted
 - ▶ Timeline TBD
- ▶ USACE Section 408 Reviews
 - ▶ Early & frequent input from levee sponsor
 - ▶ Corps review process
 - ▶ ANY project within 500' of levee - route through sponsor early



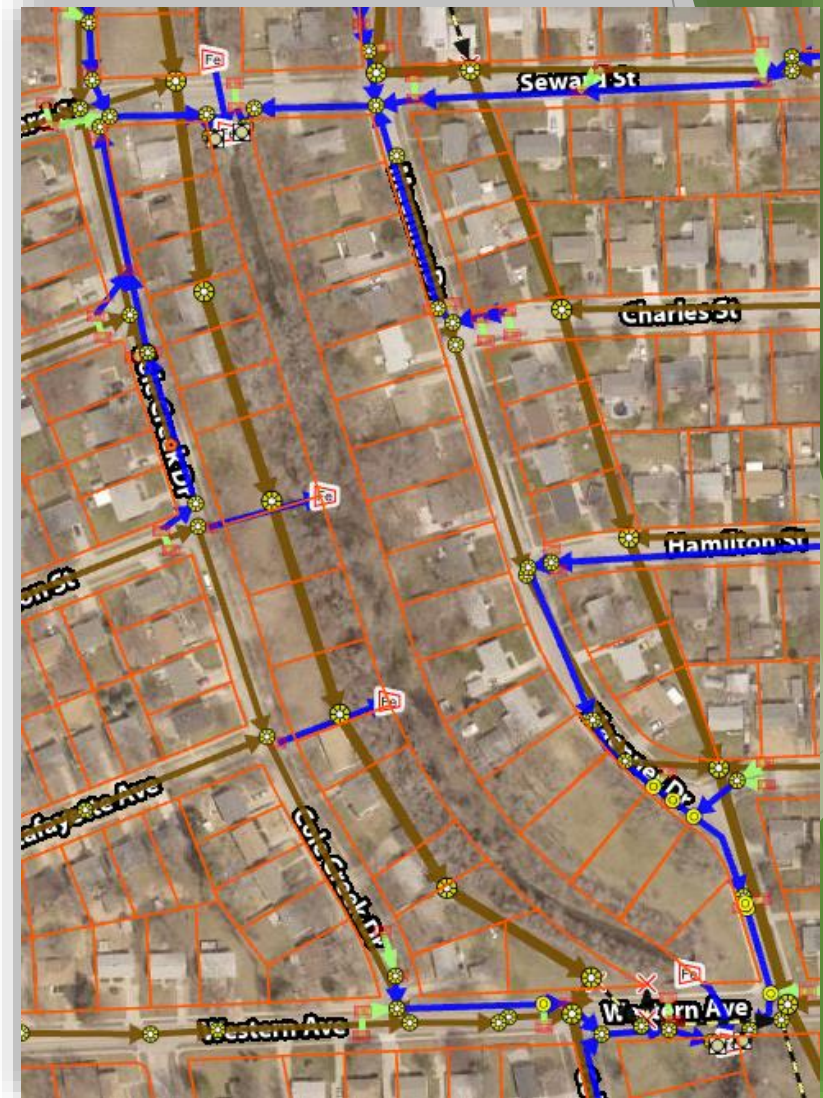
Cole Creek Flood Mitigation

Program Purpose:

- Evaluation of Flood Risk and Flood Mitigation

Recent Work Completed:

- New culverts at Western Ave and Seward Street
- Home buyouts in floodplain
 - FEMA
 - P-MRNRD/City of Omaha



Cole Creek Flood Mitigation

Current and Upcoming Work:

- ▶ Culvert at Hillside Drive
- ▶ Targeted Bank Stabilization
- ▶ Reviewing updated flood maps
- ▶ Access & Maintenance review



Channel Rehabilitation Program

Program Purpose:

- ▶ Protect public and private property
- ▶ Protect infrastructure
- ▶ Safety
- ▶ Water Quality
- ▶ Habitat Restoration

Recent Work Completed:

- ▶ Hell Creek: Westwood Lane to C Street
- ▶ Oakbrook Channel
- ▶ Mill Creek (2 locations)



Mill Creek Stream Stabilization - Before



Mill Creek Stream Stabilization - Before



Channel Rehabilitation Program

Current and Upcoming Work:

- ▶ Thomas Creek
 - ▶ 7 potential phases - Phase 1 funded and in design
 - ▶ Preliminary Design moving toward Final
 - ▶ Prelim. OPC : \$2.8 million
 - ▶ P-MRNRD Cost-share through Urban Drainageway Program
 - ▶ EPA 319 and NET grants
- ▶ Blood Creek
- ▶ Oakbrook Phase 2



Local Neighborhood Storm Sewer Improvements

Program Purpose:

- ▶ Storm sewer relief as needs arise

Recent Work Completed:

- ▶ North Main Street/Circle in Elkhorn

Current and Upcoming Work:

- ▶ As needed
- ▶ Budget small \$50k/year



Erosion/Storm Sewer Repair

Program Purpose:

- ▶ Repair Failures in storm system & erosion that results
- ▶ Proactive repairs best
- ▶ Often reactive due to limited resources

Recent Work Completed:

- ▶ Raven Oaks
- ▶ West Papio storm outlet
- ▶ 126th & Sky Park Dr
- ▶ 75th & Jackson outfall



Raven Oaks Erosion Repair - Before



Raven Oaks Erosion Repair - After



Erosion/Storm Sewer Repair

Current and Upcoming Work:

- ▶ 99th & Fort: Storm sewer failure w/sinkhole
- ▶ 99th & Ida: storm sewer failure at outfall
- ▶ West Papio @ 132nd: storm sewer outfall rebuild
- ▶ Harry Andersen @ West Papio: exposed sanitary sewer in drainageway



Stormwater Facilities Capital Asset Replacement

Program Purpose:

- ▶ Repair/Upgrade/Replace stormwater facilities - Pump Stations & Forcemains

Recent Work Completed:

- ▶ Minor repairs at several pump stations



Stormwater Facilities Capital Asset Replacement

Current and Upcoming Work:

- ▶ Storz East pump station
 - ▶ Fuel tank and lines
 - ▶ Pump replacement
- ▶ Omaha Riverfront Industrial Park pump station: pump replacement



Omaha Stormwater: Capital Improvement Programs

- ▶ Missouri River Flood Levee Maintenance & Repairs
- ▶ Cole Creek Flood Mitigation
- ▶ Channel Rehabilitation Program
- ▶ Local Neighborhood Storm Sewer Improvements
- ▶ Erosion/Storm Sewer Repair
- ▶ Stormwater Facilities Capital Asset Replacement

Stream and Stormwater Assessment & Prioritization

► Scoring System

► Two Categories

► Issues

► Infrastructure Risk

► Severity and Risk Ratings

► Scores

- Data can be analyzed and prioritized by category scores or total scores

ISSUE
Channel Downcutting
Bank / Widening
Incised Side Channel
Upland Swale / Gully Erosion
Little or No Buffer
Failed Grade Stabilization
Failed Bank Stabilization
Channel Sedimentation
In-Stream Obstruction
Scour at Pipe
Roadway Flooding
Other

SEVERITY
LOW
MEDIUM
HIGH

Issue Score

INFRASTRUCTURE RISK
Sanitary Sewer / Siphon
Storm Sewer
Utility
Culvert / Bridge
Building
Fence
Wall
Trail
Sidewalk
Parking Lot
Private Drives
Private Land Loss
Safety Concerns
Roadway
Other

RISK
LOW
MEDIUM
HIGH
IMMEDIATE THREAT

Infrastructure Score

Total Score = Issue Score + Infrastructure Score

Stream and Stormwater Database

- ▶ Data Collection and Sharing

- ▶ ESRI's Collector App

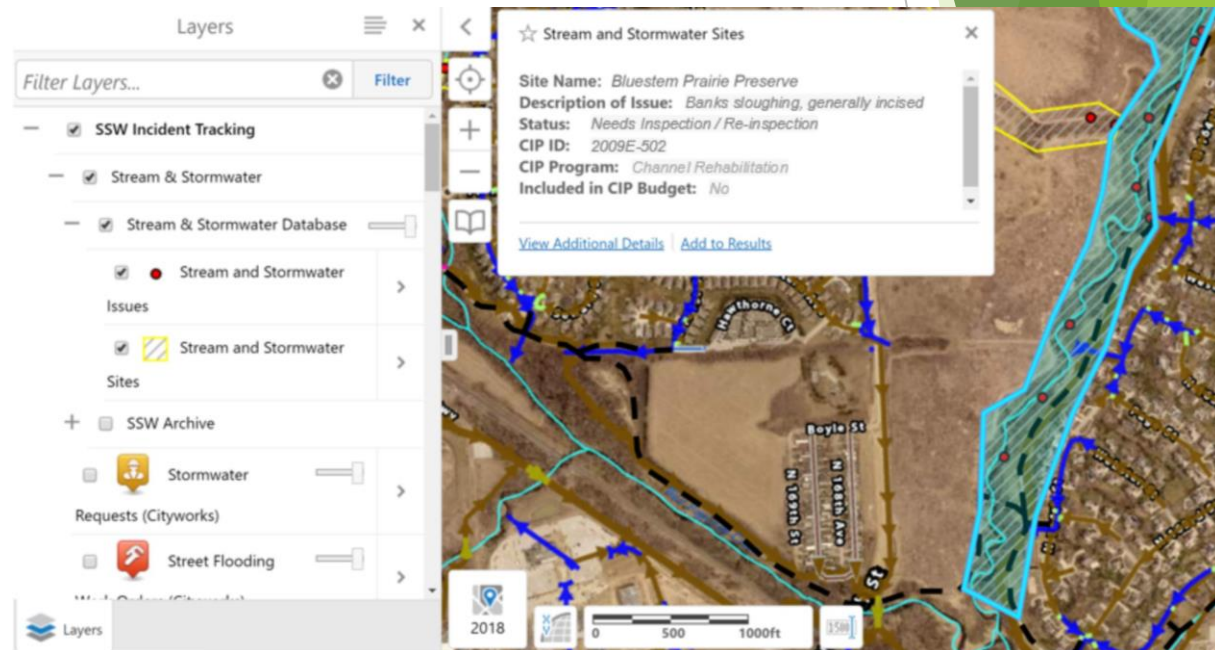
- ▶ Create site and point features



Collector

- ▶ Geocortex (ESRI-based GIS Platform)

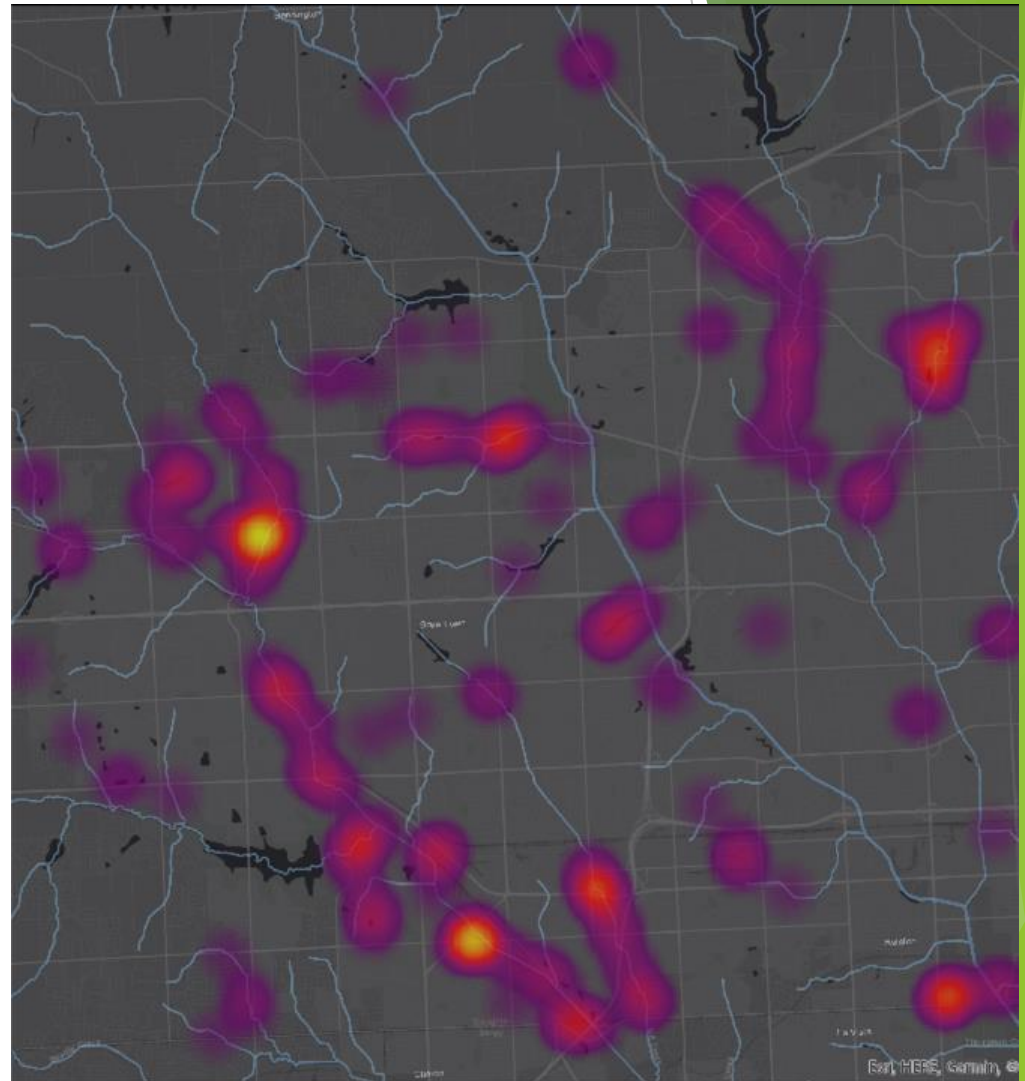
- ▶ Display information to end-users in Public Works



Geocortex

Where We Are Today

- ▶ Stream & Stormwater Issues Database
 - ▶ 148 Sites
 - ▶ 363 Issues
- ▶ How is this data being used?
 - ▶ Select projects for CIP
 - ▶ Inform decisions for grant applications
 - ▶ Data gathering for other projects



Better Designs Now = Fewer Problems in Future

- ▶ Preventing future problems through sustainable design approach
 - ▶ Urbanization effects are cumulative
 - ▶ Expect changes to drainageways, and **allow space!**
 - ▶ Sheet pile in channel today is flanked tomorrow
 - ▶ ***Below channel*** today is ***In Channel*** in 10 years



Effective Stormwater Management

- ▶ Post Construction Stormwater Management
 - ▶ Integral to site planning
 - ▶ Consider requirements from **project inception**
 - ▶ Set budgets and schedules appropriately
 - ▶ Look beyond immediate site - upstream and downstream
 - ▶ **Consider MAINTENANCE and ACCESS**



Thank You!

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Questions?