CITY OF EDINA

State of the Utilities
Water, Sanitary, Storm

City Council Work Session
March 3, 2015

Introduction

- Work Session Theme from Council's Strategic Goals
  - Innovation
  - Effective and Valued City Services
- Team Effort between Public Works and Engineering
- Continuous Improvement and Data Driven Decisions
  - Working Documents

Agenda

- System Overview
  - 10 minutes presentation / 10 minutes questions
- 2014 Accomplishments and 2015 Initiatives
  - 15 minutes presentation / 15 minutes questions
- Council Feedback Topics
  - 5 minutes presentation / 5 minutes questions

System Overview – Key Concepts and Trends

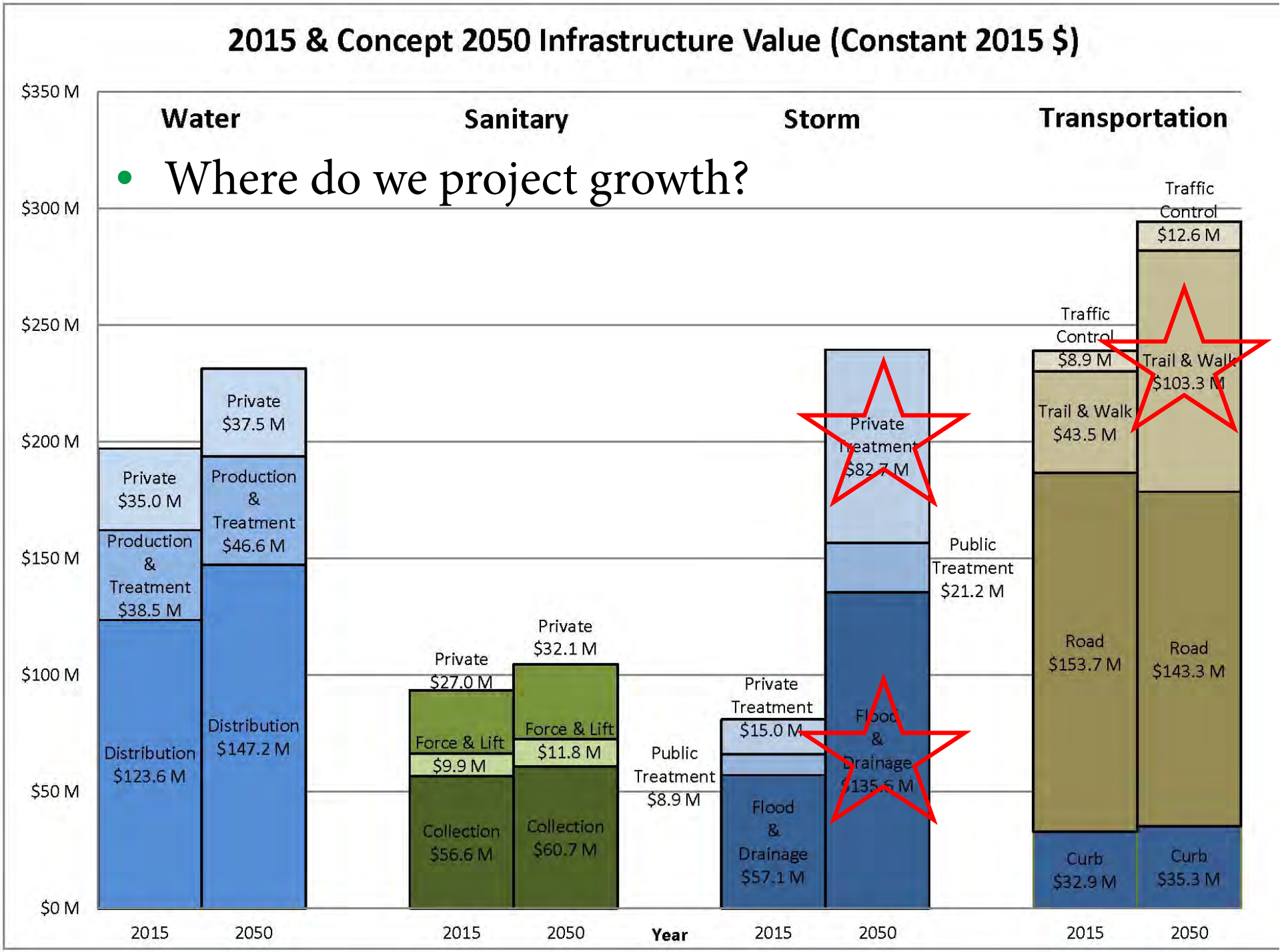
- Planning for Future Growth (2014 SotU Topic)
  - Southeast Edina
  - Pentagon Park
- Asset Management Approach
  - System Replacement Costs
  - Growth Trends / Policy Drivers
  - Programmatic vs. Infrastructure
- Aging Infrastructure Trend
  - First Cycle Replacement
  - Average System Age

2015 System Replacement Value

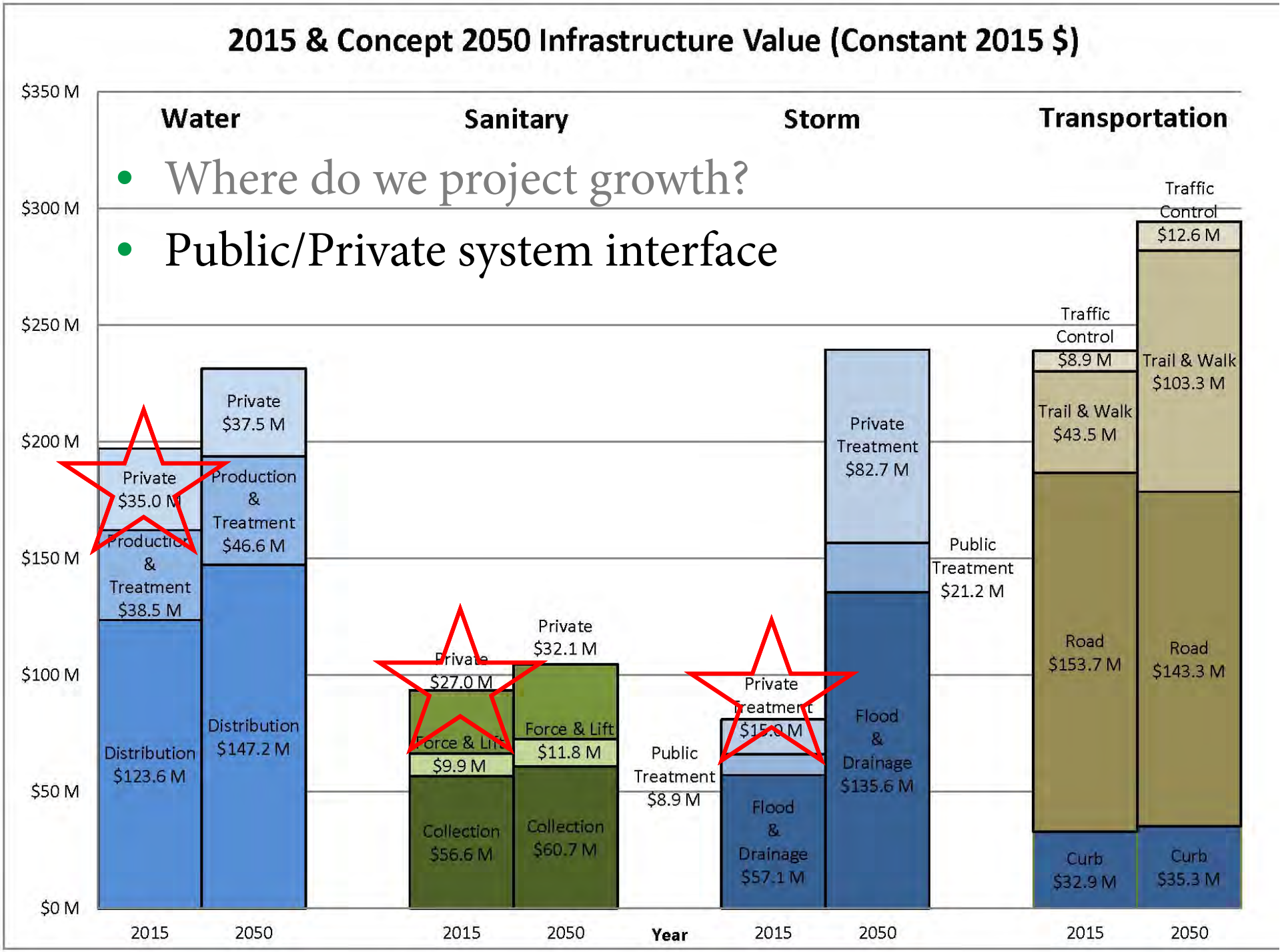
- If we had to replace the entire system today, what would it cost?
- Each year we replace a percentage of the system, are we investing enough?
- What percentage of the system do we replace each year at current level of funding?

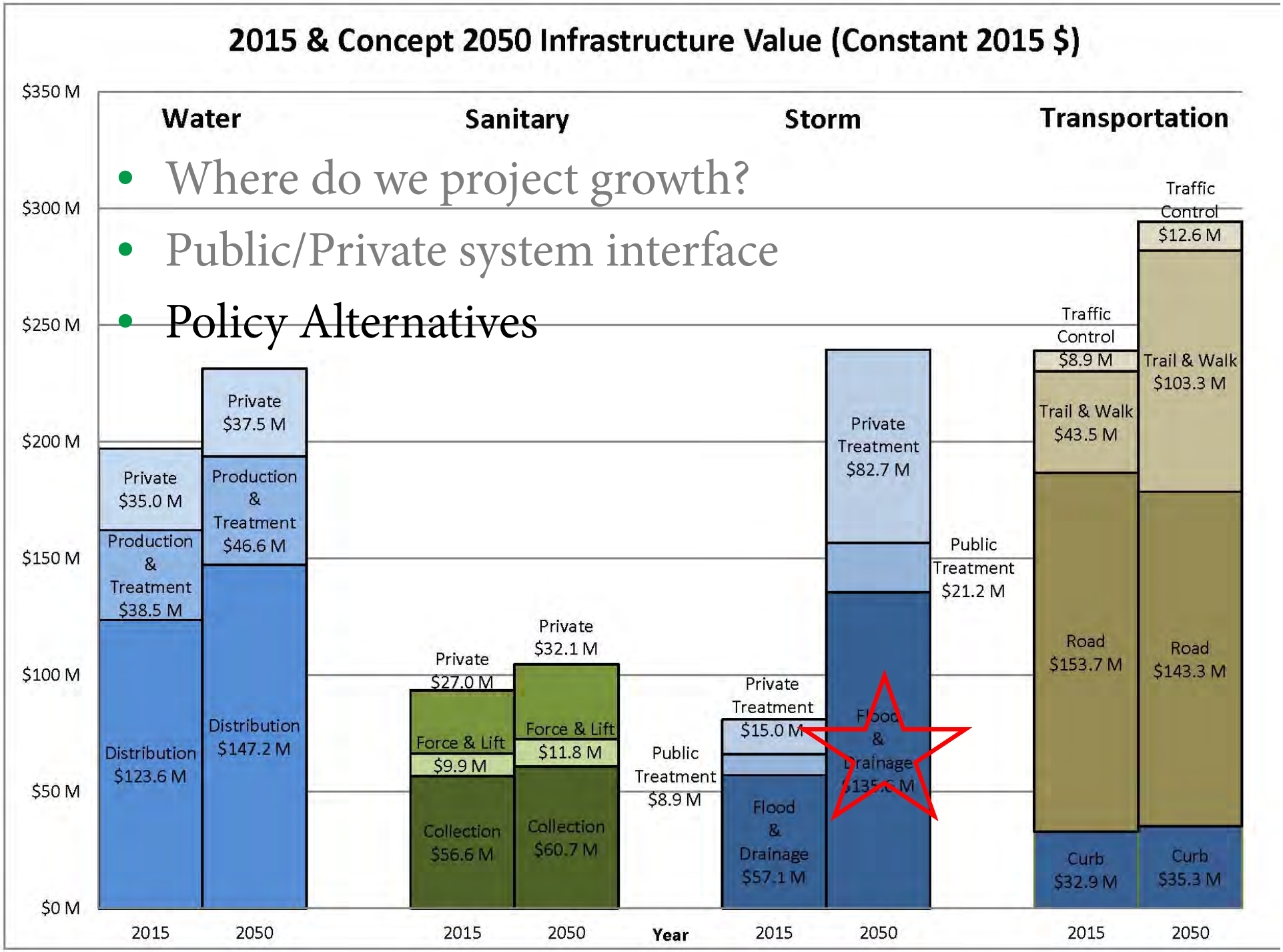
Total Replacement Value of Public Assets

SUMMARY	QUANTITY	UNIT	VALUE	+/-
Sanitary Sewer Gravity Main	194.2	miles	$42,856,591	
Sanitary Sewer Manholes	5014	ea	$13,788,500	
Sanitary Sewer Force Main	4.5	miles	$1,146,189	
Sanitary Sewer Lift	23	ea	$8,725,000	
TOTAL SANITARY			**$66,516,280**	0.1
Watermain	223.7	miles	$66,240,255	
Watermain Valves	4729	ea	$8,417,620	
Hydrants	2017	ea	$7,462,900	
Water Services	13873	ea	$41,520,745	
Wells	21	ea	$21,000,000	
Treatment plants	3	ea	$7,500,000	
Water towers	3	MG	$6,000,000	
Water reservoir	4	MG	$4,000,000	
TOTAL WATER			**$162,141,520**	0.15
Storm Sewer Lift	11	ea	$2,175,000	
Storm Force Main	0.5	miles	$158,400	
Sump drain	37.9	miles	$7,998,840	
Sump drain cleanout	878	ea	$175,600	
Outlets	888	ea	$1,554,000	
Storm Sewer Gravity Line	127.6	miles	$32,325,053	
Storm Sewer Manholes	6796	ea	$12,738,450	
Underground Treatment	204	ea	$2,191,710	
Ponds	150	ea	$6,750,000	
TOTAL STORM			**$66,067,053**	0.35
Street lights	1092	ea	$3,822,000	
Traffic signs	8820	ea	$1,543,500	
Traffic signals	14	ea	$3,500,000	
Road	207.9	miles	$153,679,680	
Curb	415.8	miles	$32,931,360	
Trail and walk	101.9	miles	$35,518,894	
County ROW Trail and walk	23.0	miles	$8,008,070	
TOTAL TRANSPORT			**$239,003,504**	0.1
Fiber optic	15.3	miles	$808,200	
TOTAL COMMUNICATIONS			**$808,200**	0.2
TOTAL PUBLIC WORKS			**$534,536,557**	$78,158,315



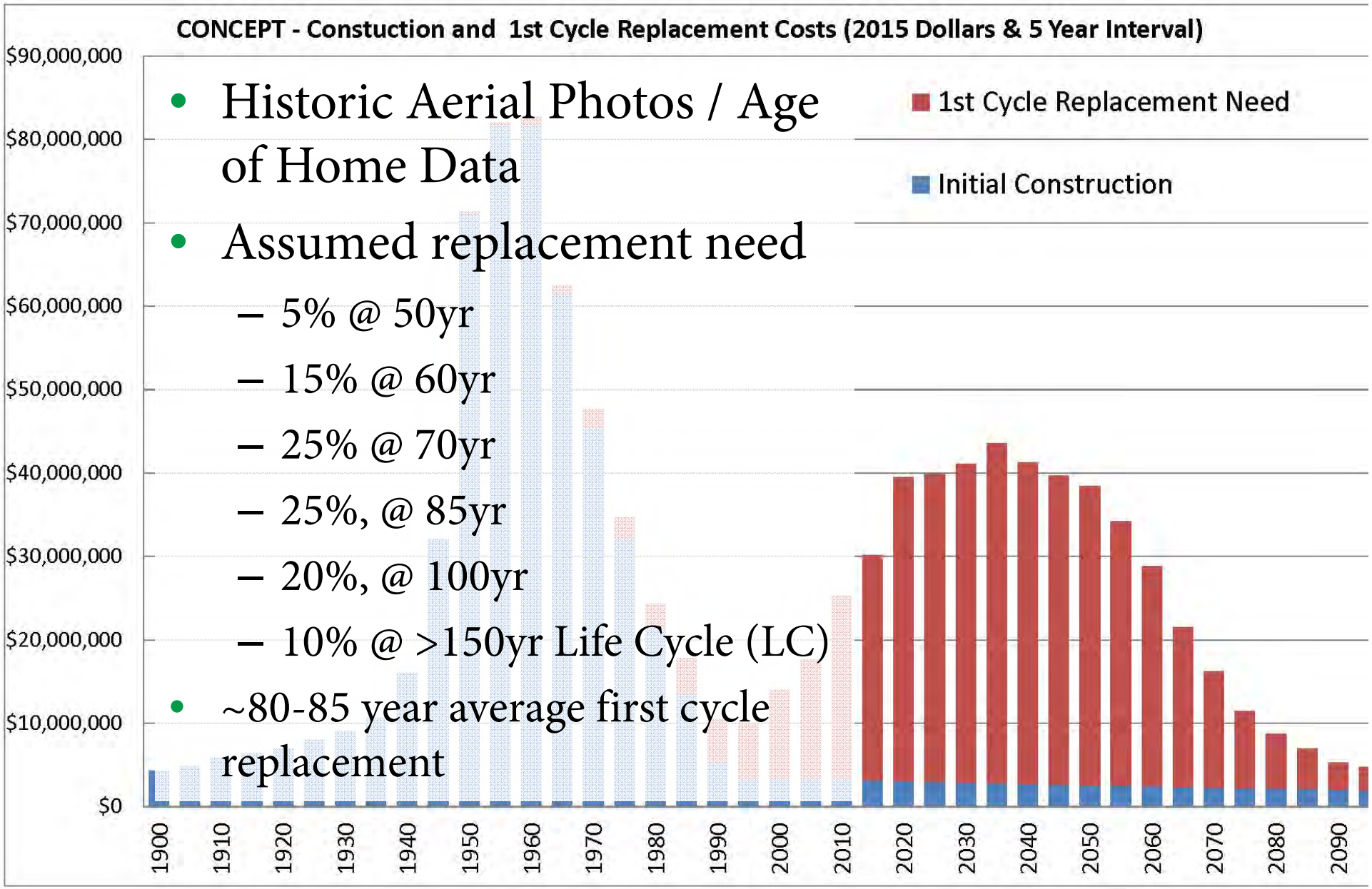
- Where do we project growth?


2015 & Concept 2050 Infrastructure Value (Constant 2015 $)
Water
Sanitary
Storm
Transportation
Where do we project growth?
Public/Private system interface
$350 M
$300 M
$250 M
$200 M
$150 M
$100 M
$50 M
$0 M
Private $35.0 M
Production & Treatment $38.5 M
Distribution $123.6 M
Private $37.5 M
Production & Treatment $46.6 M
Distribution $147.2 M
Private $27.0 M
Force & Lift $9.9 M
Collection $56.6 M
Private $32.1 M
Force & Lift $11.8 M
Collection $60.7 M
Public Treatment $8.9 M
Private Treatment $15.0 M
Flood & Drainage $57.1 M
Private Treatment $82.7 M
Flood & Drainage $135.6 M
Public Treatment $21.2 M
Traffic Control $8.9 M
Trail & Walk $43.5 M
Road $153.7 M
Curb $32.9 M
Traffic Control $12.6 M
Trail & Walk $103.3 M
Road $143.3 M
Curb $35.3 M
2015
2050
2015
2050
Year
2015
2050
2015
2050



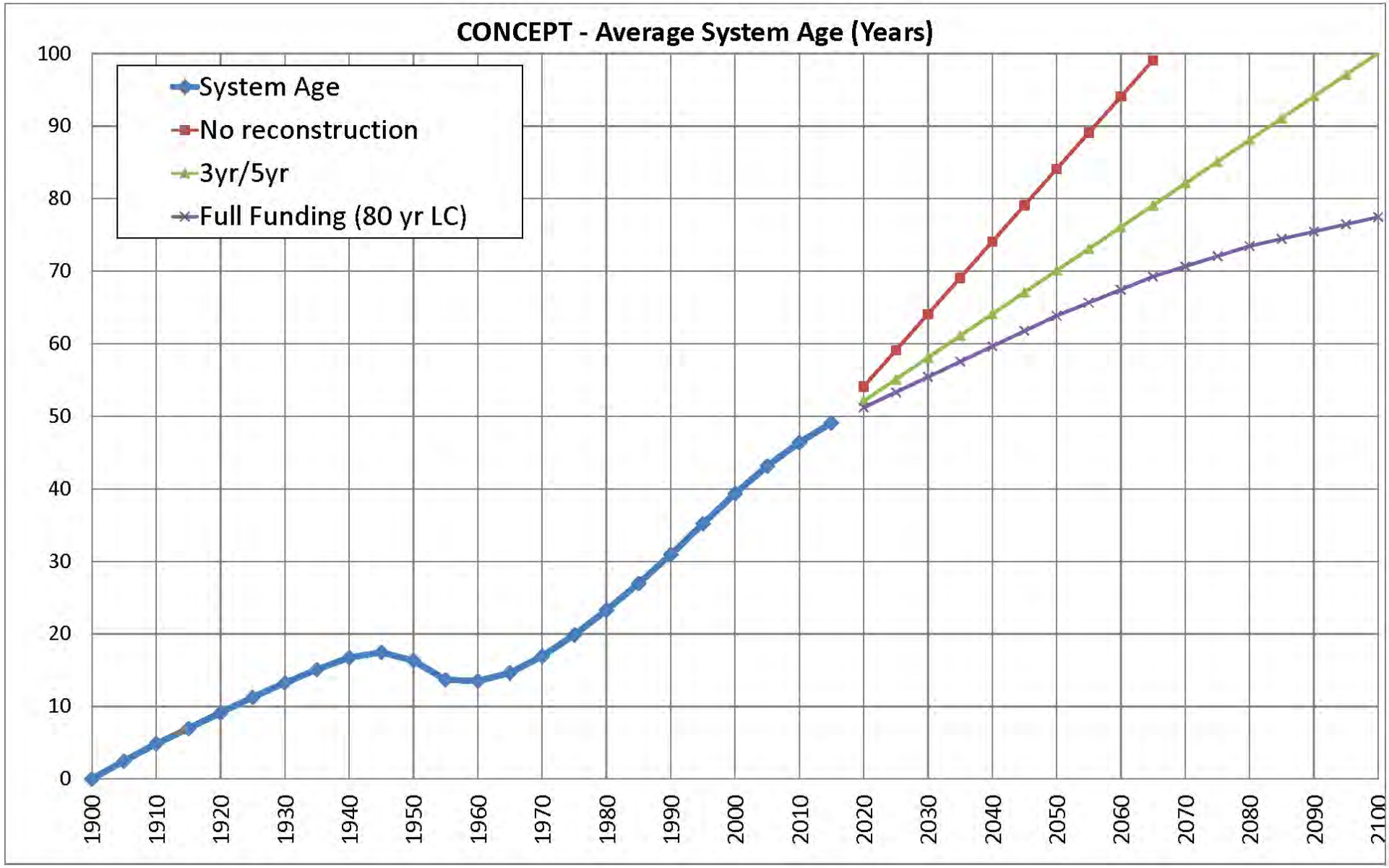
- Where do we project growth?
- Public/Private system interface
- Policy Alternatives

CITY OF EDINA

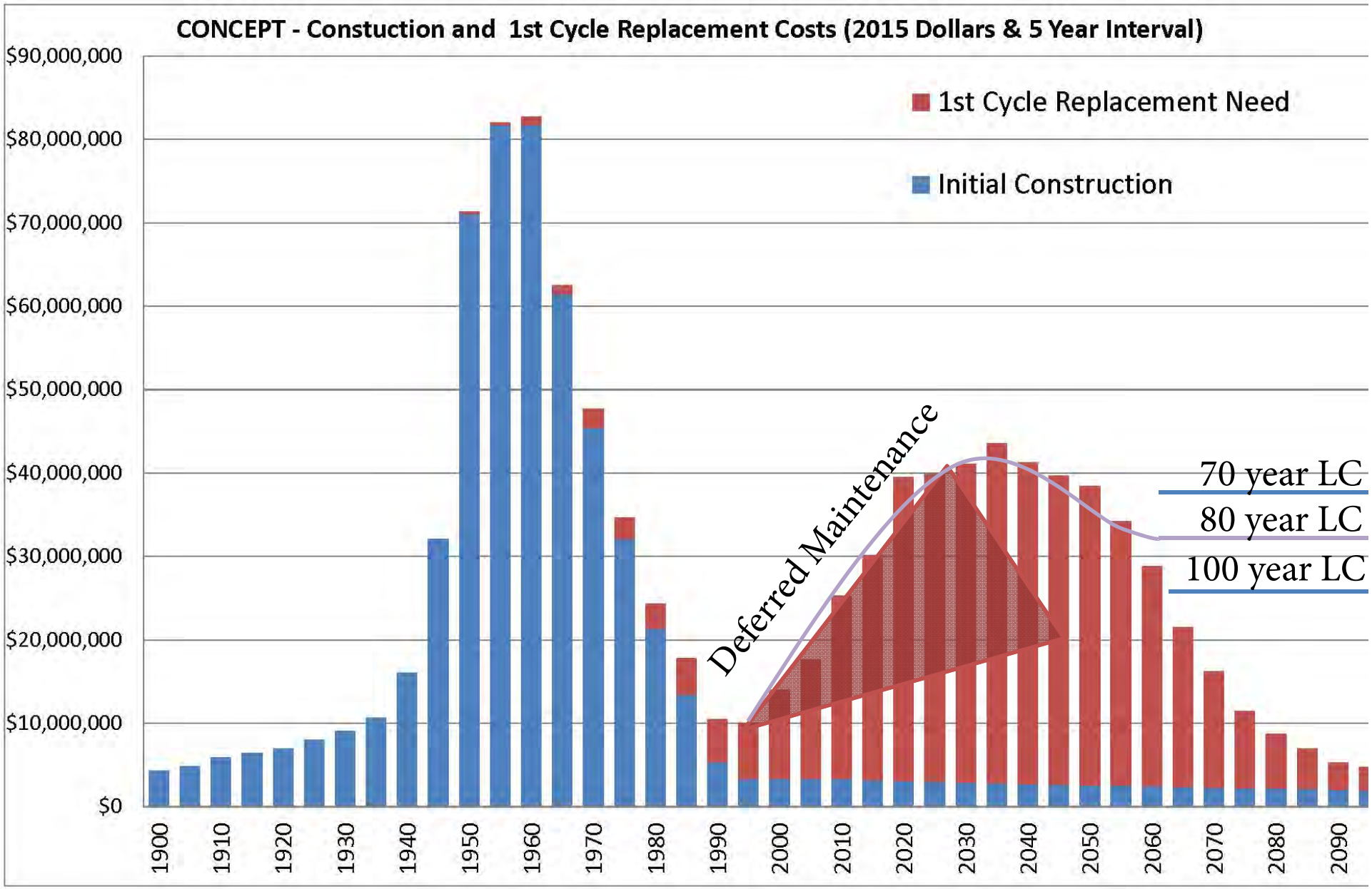


- Historic Aerial Photos / Age of Home Data
- Assumed replacement need
  - 5% @ 50yr
  - 15% @ 60yr
  - 25% @ 70yr
  - 25%, @ 85yr
  - 20%, @ 100yr
  - 10% @ >150yr Life Cycle (LC)
- ~80-85 year average first cycle replacement

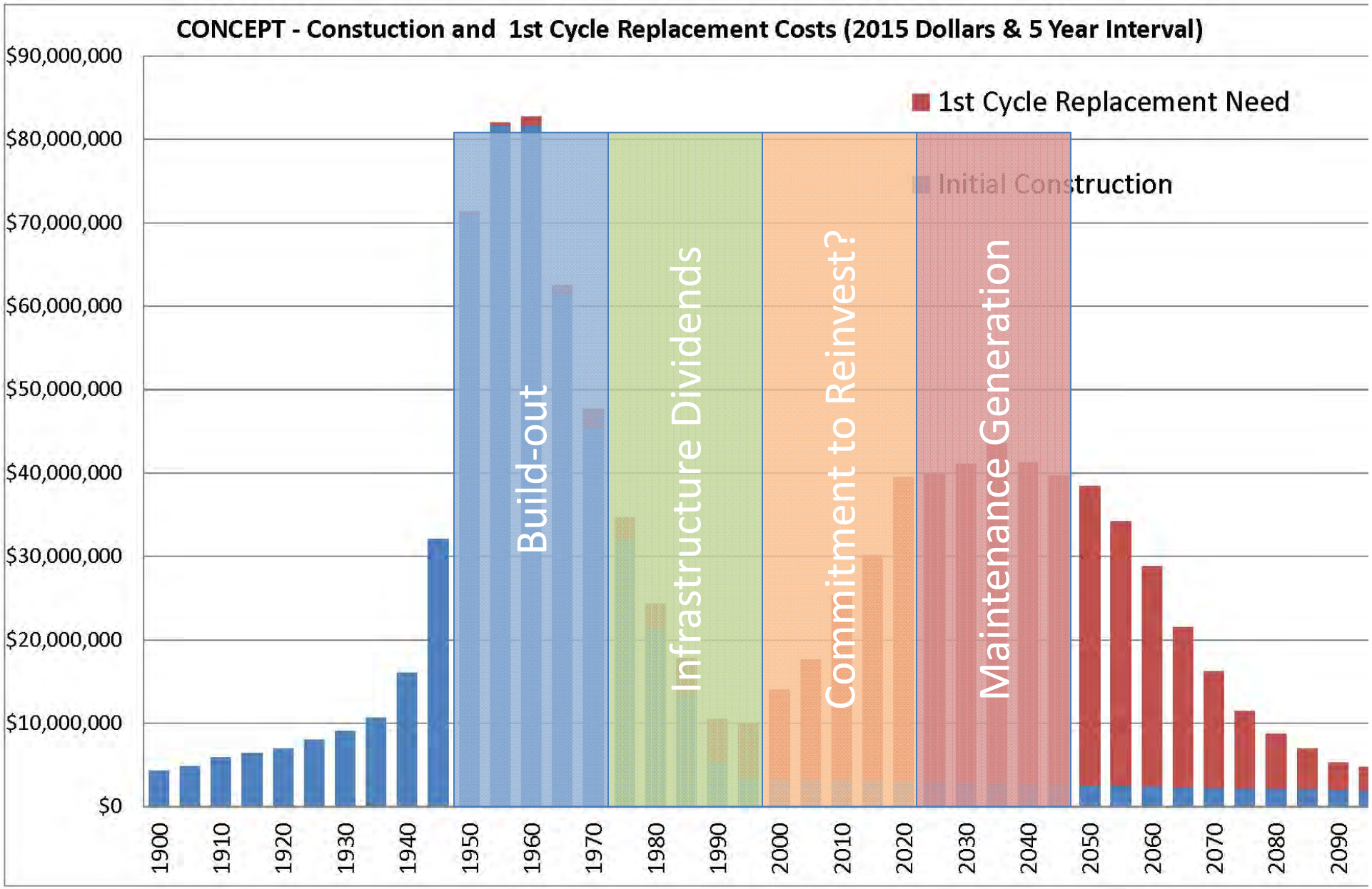
CITY OF EDINA



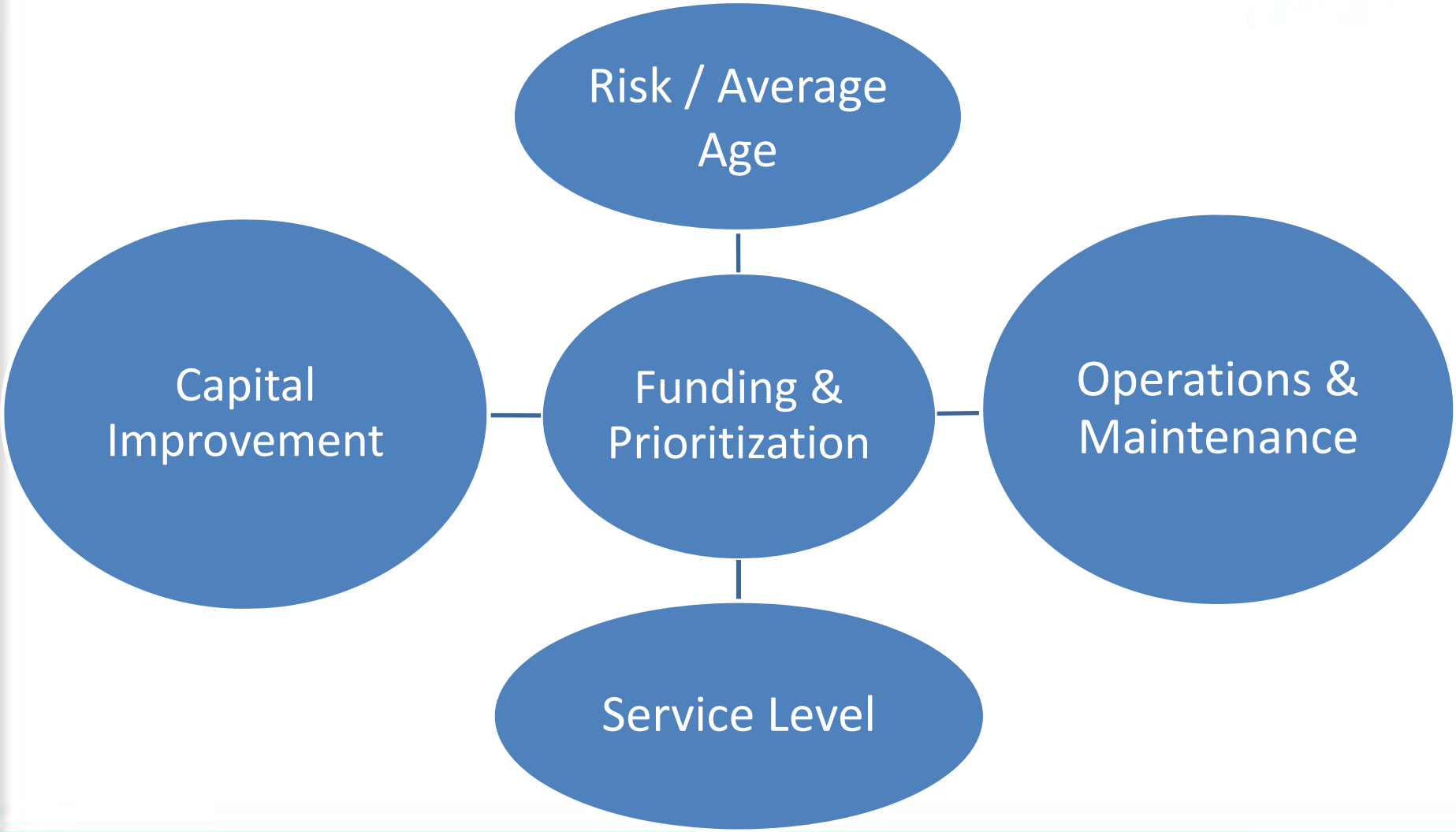
CITY OF EDINA



CITY OF EDINA



Public Works Balance



Public Works – 2014 Accomplishments

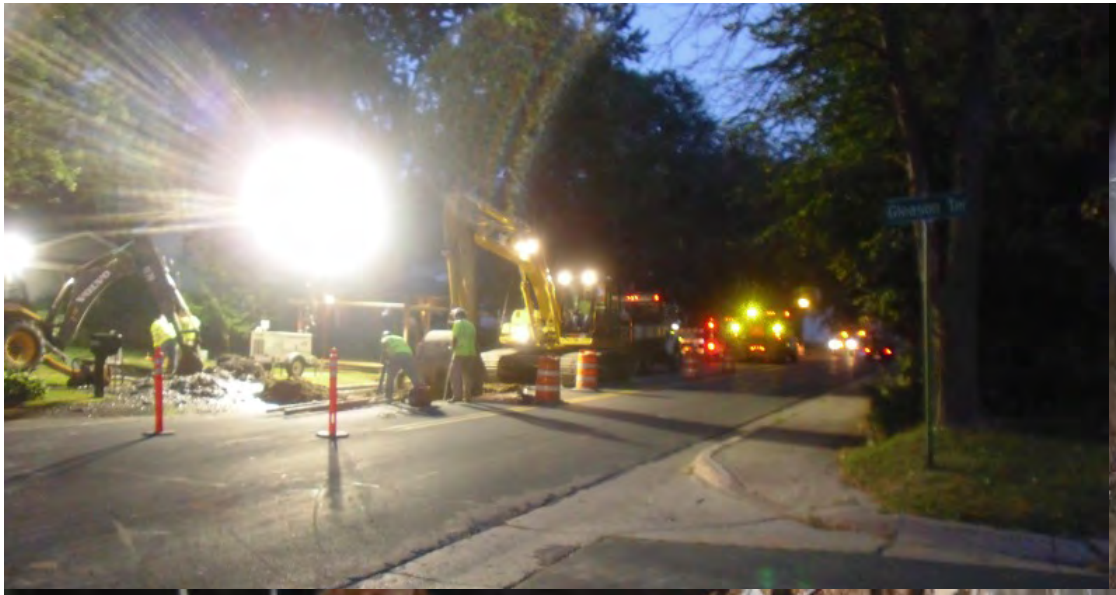
- Frozen Water Services 73 in 2013-2014 (Cold winter!)
- Well 13 failed on May 6 - 363 MGY
- 2014 Flood Response (MCWD reports wettest Spring on record)
  - Over 11,000 sandbags delivered
  - Hand made over 15,000 sandbags
  - Responded to over 42 reported sewer backups
  - 162 flooding related service requests
    - Road closures (under water)
    - Cave-ins, plugged CBs (really water levels so high)
    - Water in yards etc
    - Tracy Lift Station failure

Public Works – 2014 Accomplishments

- Held Public Works Open House
- 3.97 miles of asphalt roadway overlayed
- Resurfacing of Van Valkenburg Park (½ in 2014)
- 50th France Parking ramp improvements
- Implemented Public Stuff (Edina to Go)with the assistance of the Communication and IT Staff
- Replaced traffic signal cabinet and installed 1st art wrap at the corner of 66th and Valley View Road

CITY OF EDINA

CITY OF EDINA



Public Works – 2015 Initiatives

- 2015 Hydrant Refurbishment
  - 4th of the City hydrant maintenance program – City of Lakeville Fire Department responded to restauraunt in the summer of 2012
- 2015 Asphalt Overlay program
- 2015 Storm Catch Basin Repair
  - 4th of the City inspected annually. 80-90 outside of the road project areas are identified as a 4 in the scale of 4 (4 being the worst)

CITY OF EDINA

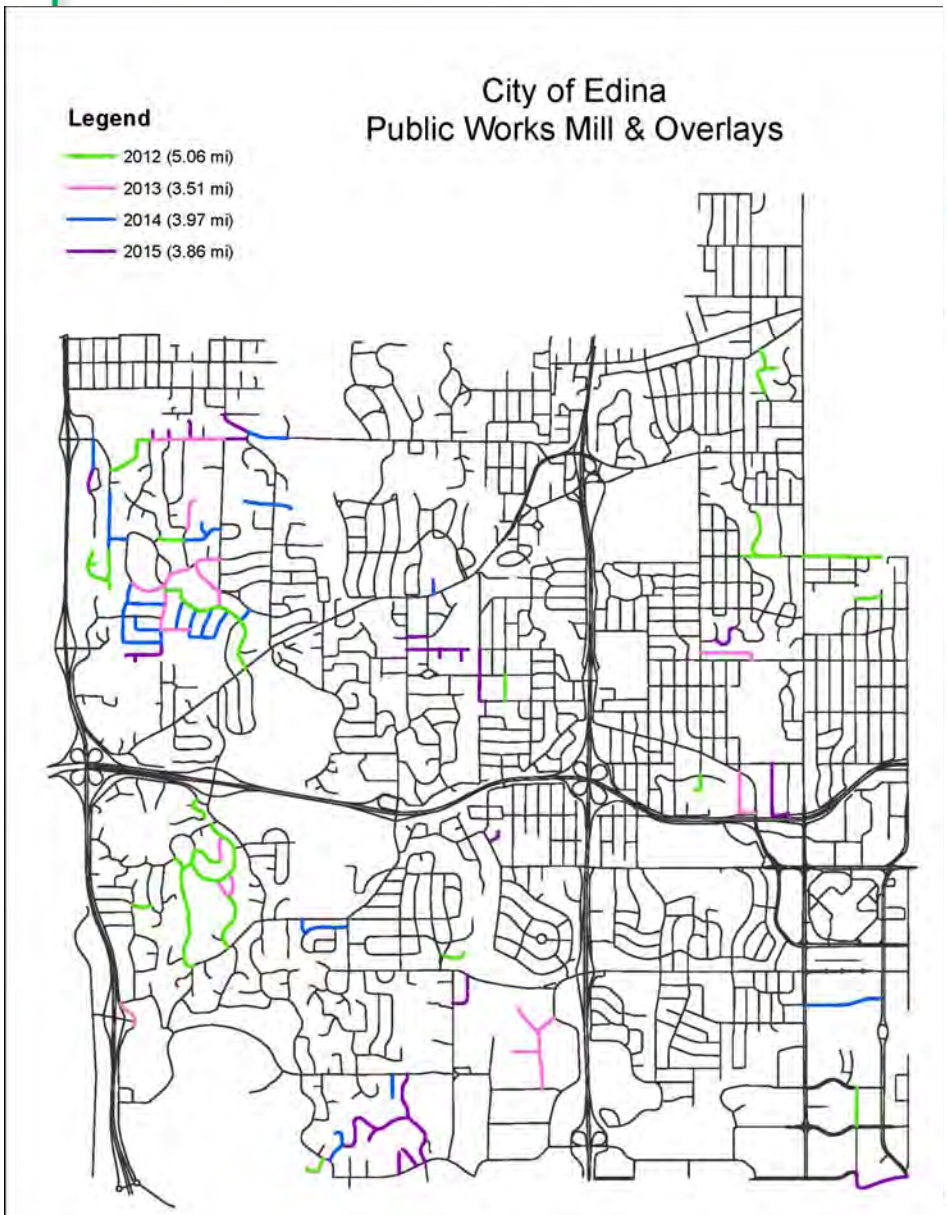
Public Works – 2015 Hydrant Refurbishment

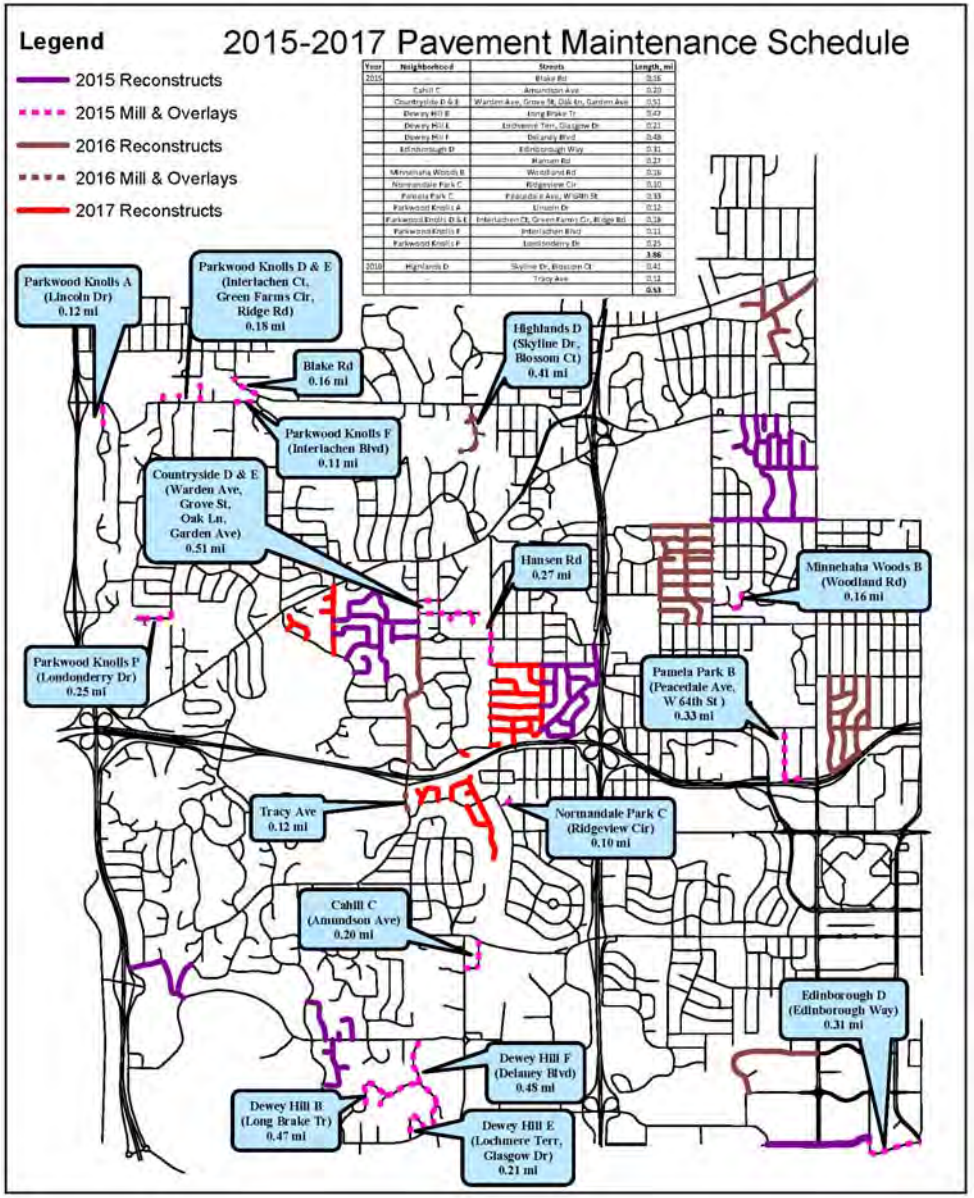
Public Works – 2015 Hydrant Refurbishment

CITY OF EDINA

Public Works – 2015 Storm Catch Basin Repair

CITY OF EDINA





Year	Neighborhood	Streets	Length, mi
2015		Blake Rd	0.16
	Cahill C	Amundson Ave	0.20
	Countryside D & E	Warden Ave, Grove St, Oak Ln, Garden Ave	0.51
	Dewey Hill B	Long Brake Tr	0.47
	Dewey Hill E	Lochmere Terr, Glasgow Dr	0.21
	Dewey Hill F	Delaney Blvd	0.48
	Edinborough D	Edinborough Way	0.31
		Hansen Rd	0.27
	Minnehaha Woods B	Woodland Rd	0.16
	Normandale Park C	Ridgeview Cir	0.10
	Pamela Park C	Peacedale Ave, W 64th St	0.33
	Parkwood Knolls A	Lincoln Dr	0.12
	Parkwood Knolls D & E	Interlachen Ct, Green Farms Cir, Ridge Rd	0.18
	Parkwood Knolls F	Interlachen Blvd	0.11
	Parkwood Knolls F	Londonderry Dr	0.25
			3.86
2016	Highlands D	Skyline Dr, Blossom Ct	0.41
		Tracy Ave	0.12
			0.53

Engineering – 2014 Accomplishments

- Goal: Cost Effective and Data Driven Decisions

- Project Synergies – Multiple Systems in One Project
  - Valley View Road and Flood Project (STS406)
  - Olinger Blvd Mill & Overlay and Bike Lanes
  - Local Neighborhood Projects

- Overall System Studies
  - Comprehensively assess needs in priority areas

Engineering – 2015 Initiatives

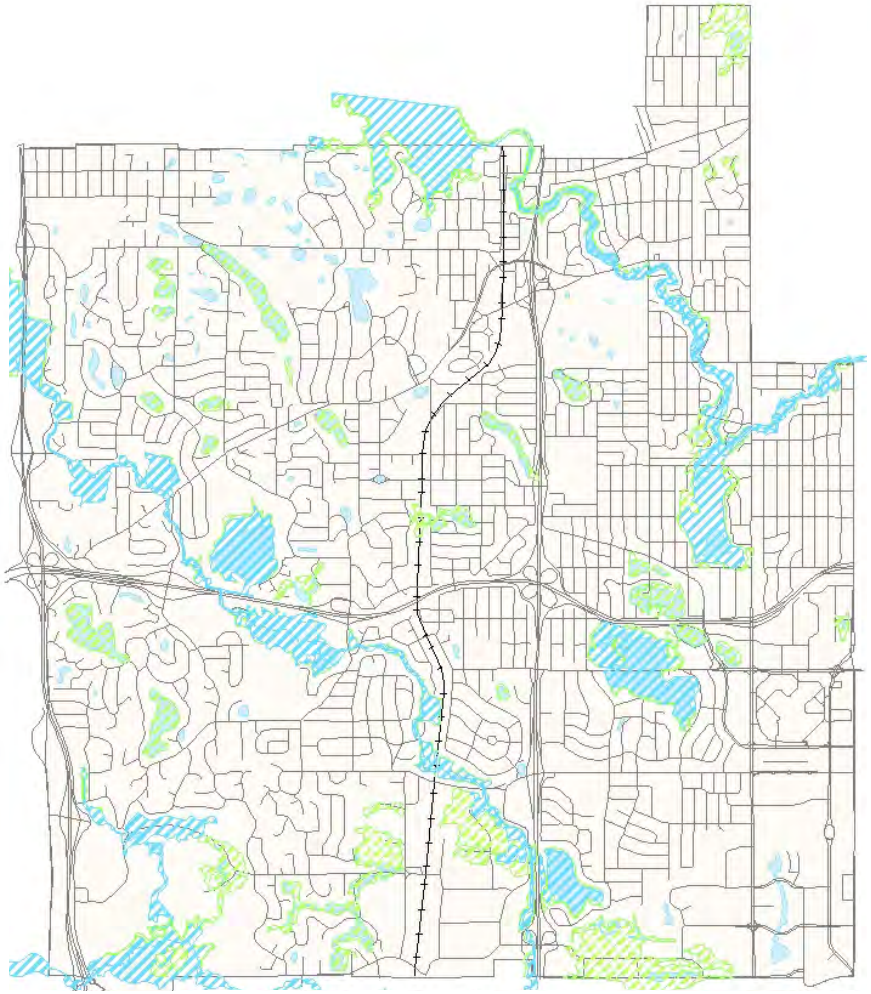
- Project Selection
  - Local vs MSA Streets
  - Wider net vs. Deeper net for utilities – PCI and Utility Condition. What is the right combination?
    - Non-Destructive Watermain Testing
    - Sanitary Televising
  - Available Data – Increase Quantity and Quality
    - GIS Centric maps and system data workflow in Cityworks tool
- Infrastructure Dashboard
  - GIS / Asset Management Based
  - Helpful to Council?

Flood Plain Updates

- Regional and local flooding

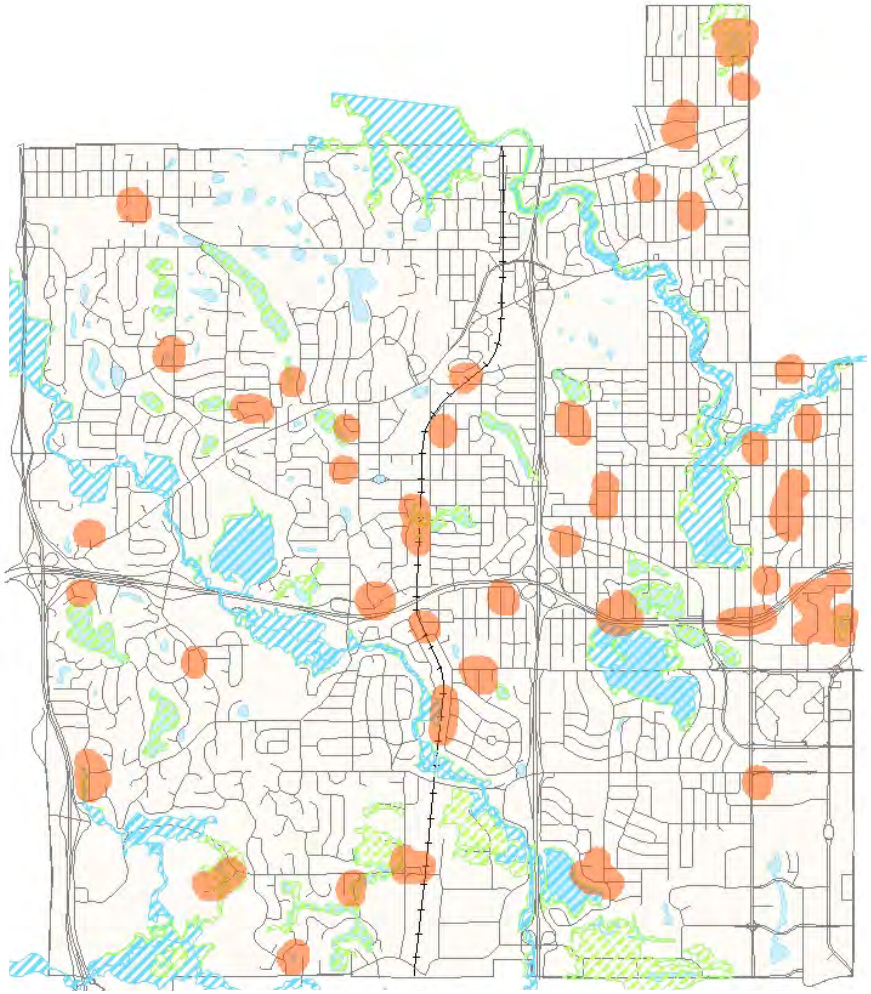
Flood Plain Updates

- Regional and local flooding
- FEMA flood plain



Flood Plain Updates

- Regional and local flooding
- FEMA flood plain
- Local flood areas (identified in 2011 CWRMP)



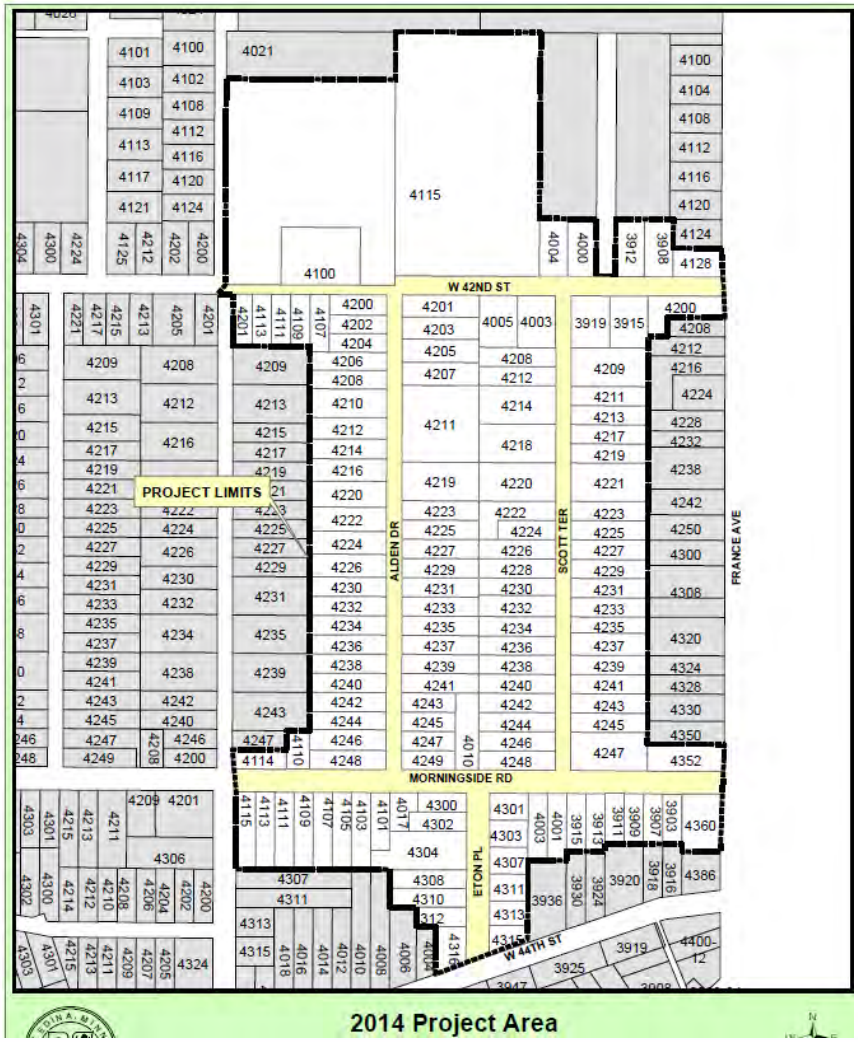
Flood Plain Updates

- Regulatory gaps
- Revised FEMA maps for Hennepin County
- Ordinance revisions
- 2016 update to Edina's model

- Community Rating System (CRS)
  - Communities complete additional flood plain management activities
  - Rewarded with flood insurance premium discounts for residents and businesses
  - 10-45% premium reductions possible

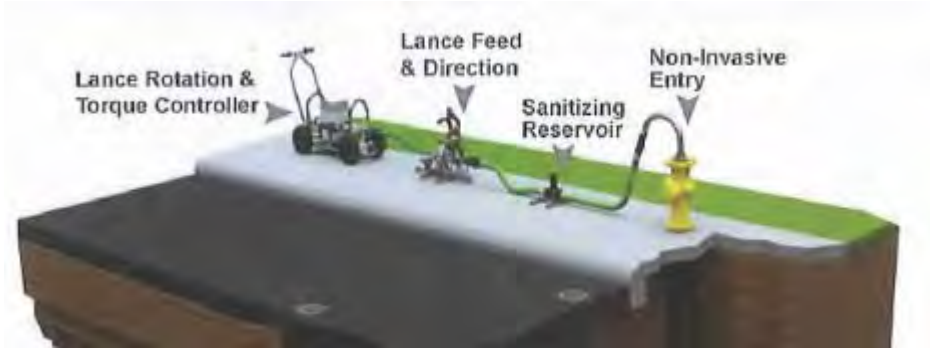
Council Feedback

- Issue: Morningside Watermain – Hard Water Deposits In Pipe
- 2014 Street Project Summary



Council Feedback

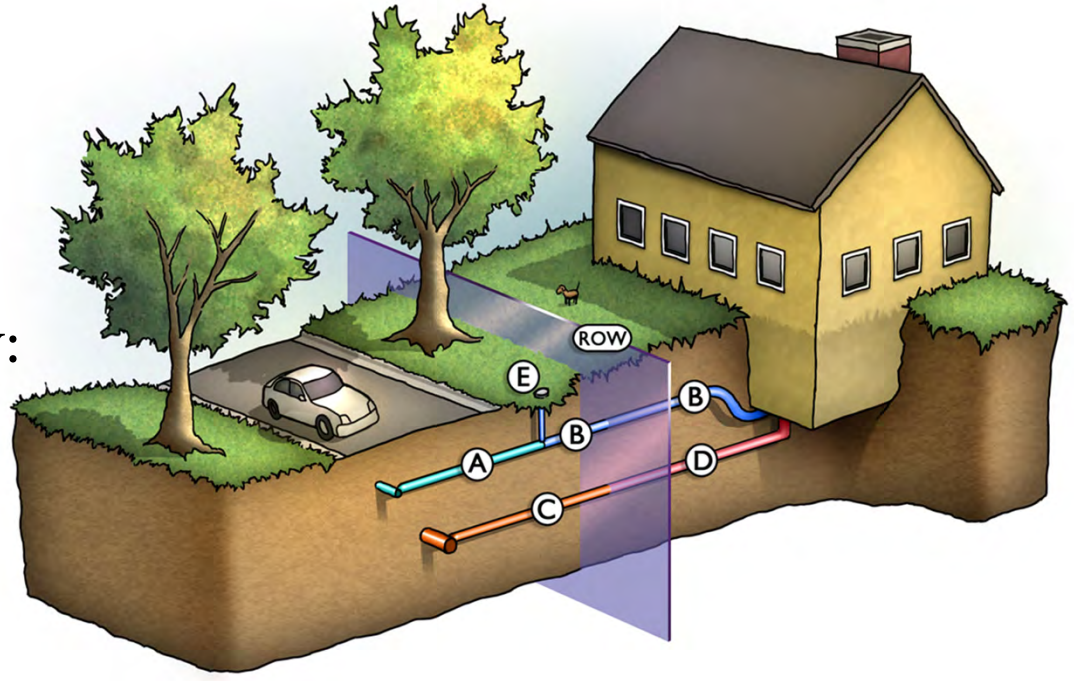
- Opportunity: Watermain Cleaning
- Demonstration Project
  - Boiling Notice
  - Bottled Water
  - Temporary Water System
    - $25,000



Council Feedback

Private Inflow and Infiltration Reduction

- Example 1 Golden Valley: Point of Sale Program
- Example 2 West St. Paul : Study and mandatory home inspections prioritized by zone with financial assistance to homeowner. CCTV video of entire private service.



- Example 3 Eagan : Smoke testing, study and mandatory home inspections prioritized by zone, completed citywide in 4 years. Street side CCTV video of service only.

Council Feedback

- Council Packets Items from Public Works and Engineering
  - Are you getting enough information?
  - Too much information?
  - Budget / CIP / Strategic Goals / Comp Plan ties?

Source:www.consumerinformation.ca

REPORT / RECOMMENDATION

To: MAYOR AND CITY COUNCIL

From: Chad Millner PE, Director of Engineering
Brian Olson PE, Public Works Director

Date: March 3, 2015

Subject: 2015 State of the Utilities Presentation

Agenda Item #: Work Session IV

Action ☐
Discussion ☒
Information ☐

Action Requested:
No action requested. Discussion only.

Information / Background:
Staff will provide a presentation of utility asset management concepts, 2014 accomplishments, 2015 initiatives, and future opportunities described in the attached memo and report.

Attachment:
2015 State of the Utilities Memo
2015 Water, Sanitary and Stormwater Utility Systems Report

DATE: March 3, 2015

TO: Mayor and City Council

CC: Scott Neal – City Manager,

FROM: Chad Millner PE – Director of Engineering, Brian Olson PE – Public Works Director

RE: **2015 State of the Utilities**

This memo reviews notable accomplishments for 2014, upcoming utility projects and initiatives for 2015 and future opportunities.

Executive Summary

The City of Edina water, sanitary and stormwater public utilities provide critical public health, sanitation and public safety services. These utilities operate over generations, continuously providing reliable service to every Edina resident and business. Given their high reliability public utilities are generally out of sight and out of mind, but these services rely on aging infrastructure components that occasionally fail. The 2015 "State of the Utilities" report is meant to continue to tell the story of the people, equipment and infrastructure that support these core public services.

Utility services are primarily provided by physical infrastructure including extensive pipe networks, pumps, reservoirs and electronic control systems, and are dependent on and constrained by energy and natural water resources systems and available financial and human resources. The fundamental challenge can be easily summed up - the infrastructure providing utility services are aging. While continual repair and renewal of this infrastructure is taking place, it is sometimes reactionary. This issue of aging infrastructure challenges utility operators and engineers to continually improve operations and maintenance, and, design and construction techniques to protect, extend the life and renew or replace utility infrastructure.

In addition to the information provided in this memo, the 2015 Water, Sanitary and Stormwater Utility System Report provides a more detailed summary of utility services and reflects the state of the practice in managing city utilities to sustain the existing service, and plan and react to short term risks and emergencies and long term trends in service demand.

Accomplishments

Last year saw the sanitary and storm sewers challenged as a significant June rainfall event compounded with an already wet spring resulted in an overwhelming volume of requests for service for flooding, wet basements, and surcharging sanitary sewers. Although Public works pre-staged 11000 sandbags flows in Minnehaha Creek hit all-time records resulting in over 150 calls for service over the course of several hours. Tracy lift station failed after four days of continuous maximum capacity pumping and the threat of flood continued to loom into August of 2014, necessitating Public Works monitor creek levels. The results of this flood event continue into 2015 with bridge repairs and FEMA reimbursement requests. In 2014 the public work department also saw over 70 frozen water services and the failure of one of the City's 18 wells.

In 2014 the Engineering Department lead projects that construct, reconstructed or rehabilitated 15,822 feet (3.00 Miles) of road, 15,729 feet (2.97 Miles) of water main 14,304 feet (2.71 Miles) of sanitary sewer and 1,894 feet (0.36 Miles) of storm sewer. In addition to the many reconstruction projects, the Engineering department's continuous improvement initiatives led to changes in:

- Public right of way management, stormwater and erosion control permitting, inspection and enforcement relating to residential redevelopment drainage issues
- Correction to errors in pending FEMA floodplain elevations areas
- Improvements in neighborhood street reconstruction program resident communications
- Use of innovative technology to extend water main life (detailed below)

Last year also saw the roll out of a mobile application "Edina To Go." This project was led by Communications and Technology Services Department and upon roll out was linked directly to Public Works service requests in the Cityworks asset management software. Now residents have access to an app to request: Damaged mailbox or sod, fire hydrant inspections, weed issues, street light out, traffic safety, water leaks and more.

2015 Initiatives and Future Opportunities

This section will highlight and describe utility issues, and the 2015 departmental work plan initiatives that staff intends to consider addressing each.

Neighborhood Street Reconstruction Program / Selection Criteria

The trend of aging infrastructure challenges the City to find efficient ways to renew and rehabilitate utility infrastructure. The method of project deliver in this case, matters greatly. The City's neighborhood street reconstruction program continues to provide a cost effective project delivery method that bundles a variety of system improvements. Street reconstruction projects allow the City the opportunity to rehabilitate streets and utilities at the same time for less capital compared to stand-alone projects. While stand-alone utility projects make sense in some cases. In 2014, the City spent a total $2,500,000, $1,500,000, and $1,100,000 in water, sanitary, and storm infrastructure, respectively, with a majority of the work timed to coincide with a street reconstruction. Note that these values were lower than expected due to the delay of the 54th Street and Birchcrest Neighborhood Projects.

The ability to rehabilitate multiple systems as part of a single project provides cost savings to the City and reduces impact on residents. This type of integrated project scope decision requires more work up front, and high quality data linking system needs and service and is well supported by the 'asset management approach' described in below. In 2015 Engineering will continue to refine our selection criteria for utility, neighborhood and Municipal State Aid projects, consider alternative pavement management funding sources, and schedule 2019 neighborhood reconstruction projects.

Asset Management Approach

Water, sanitary, and stormwater public utility services are provided using extensive physical infrastructure and modest programmatic efforts. Each utility is planned, operated, maintained, expanded, replaced, and managed by professional staff in the City's Public Works and Engineering departments. Engineers and system operators use a process called "asset management" to set service levels, assess the present condition of the infrastructure, judge system performance, plan for repair, replacement, or future upgrades, and assess risks.

The tools, methods and processes used to manage aging infrastructure are becoming increasingly data intensive. Engineering and Public Works share geographical information systems (GIS) records, and collaborate on the development of the Cityworks service request, work order and asset management software (AMS). Development and staff training supporting these software tools enable increasingly efficient records management, workflow tracking and process improvement, and trend and system analysis. The rate of adoption for these information systems is currently limited. In 2015 the City will be considering its options for organizing and staffing enterprise GIS solutions. As the City's earliest adopter and most advanced user of these software solutions, Engineering and Public Works will take an active role in planning and implementing GIS/AMS to enable increasingly complex street reconstruction decision making, track reliability trends, and increase service and response by providing annual reporting on outages, repair costs, and performance metrics. Additional information on this topic is available in the 2015 Water, Sanitary and Stormwater Utility Systems Report.

In addition to information management system improvements, the technology to assess utility condition continues to develop. In 2015 Engineering will continue to refine its water main selection criteria for replacement and rehabilitation.

Planning for sanitary demand growth

Growth in service demand in southeast Edina is expected to continue, and our initial review show need for additional trunk sanitary capacity in southeast Edina in the next decade. Capacity in the regional trunk sewer than serves southeast Edina is ample, and while there may be capacity limitation in the local trunk system, remedying these constraints are entirely within our control. The schedule for trunk sewer capacity additions in the Pentagon Park neighborhood is heavily dependent on Met Council action. In 2015 Engineering will work with a consultant to make recommendations to serve this demand growth and funding strategies to pay for the needed infrastructure and lay the groundwork for a sewer plan that will support the upcoming Comprehensive Plan update.

Innovative Technology to Extend Water Main Life

A testing technique implemented as part of the continuous improvement initiative provided major savings to the City was the use of non-destructive water main testing in the Arden Park D Neighborhood. This data provides a better understanding of the remaining life of those pipes and led to better replacement and repair decisions. This change resulted in estimated savings to our water utility fund of approximately $500,000. We are now using this data collection technique on most of the street reconstruction projects 2-years in advance to make better decisions about our water infrastructure. This effort will continue water main assessment in 2015 for upcoming neighborhood reconstruction projects.

Redevelopment

A near doubling of permit applications and residential redevelopment activity between 2009 and 2014, consistent staffing levels, and specific concerns for the impact of construction activities and associated drainage issues on nearby residents and property has led to an evolving community consensus that has raised the expectation of service for permitting redevelopment. Water quantity and erosion and sediment control are specific areas Engineering gets involved though the review of flooding risk, site hydrology, erosion and sediment control precautions.

Continuing on the last two years of work, the Engineering Department will continue to engage with Planning, and Building Departments to identify permit review gaps, proactively improve and streamline plan review, permitting and inspections, and assist in site-by-site inspection and enforcement response. In 2015, the Engineering department will promote related drainage policy and flood ordinance development to support redevelopment enforcement and this effort is described below.

Flood Risk Assessment / Unified Local and Regional Flood Planning

Flooding is assessed and regulated on both a regional and local level. The Federal Emergency Management Agency (FEMA) Flood Plain Maps define regional flooding areas surrounding larger water systems, such as Minnehaha and Nine Mile Creeks. These areas are subject to flooding from a large area, and floodwaters tend to stay high for a significant amount of time when there is a flood. The City regulates these regional flood plains through the Zoning Ordinance, limiting the types and amount of development allowed in the flood plain. Local flooding, however, affects smaller areas. The Comprehensive Water Resources Management Plan (CWRMP) includes a hydrologic model of the City's storm water system. It identifies local flooding areas throughout the city. The CWRMP also gives general guidelines for redevelopment within these areas.

Through road reconstruction projects and residential and commercial redevelopment, staff has found gaps in policy for regulating both regional and local flooding areas. There are gaps in the level of protection provided; many buildings are protected from flooding that occurs during a 100-year storm, while others are only protected to a 50-year storm or less. There are gaps in redevelopment standards, such as minimum low floor elevations, for both types of floods, but these often conflict with other requirements, such as portions of the zoning ordinance that requires the first floor elevation stay close to the existing elevation. In 2014, the City hired Barr to look at six local flooding areas that require study. The results from this study show that some of these areas can be fixed with upcoming road reconstruction, but some have no solution or potential solutions are prohibitively expensive. While the City is working towards solutions to existing local and regional flooding areas, there is opportunity to prevent new flooding issues or reduce flooding in existing areas through clear policy and redevelopment requirements.

It is necessary to have reliable data in order to regulate flooding areas. The CIP includes a 2016 project to update the entire model included in the CWRMP. Model updates will include changes to the storm water system since 2004, updated rainfall data, and flow information. Staff begins preparation for the model update in 2015.

FEMA is in the process of revising the Flood Plain Maps for Hennepin County. The City will need to update flood plain ordinance language in order to adopt the new maps. This is an opportunity to examine the regulations and make changes. FEMA has a voluntary program called the Community Rating System (CRS). By completing and documenting activities in four areas, cities can reduce the cost for flood plain insurance for residents and businesses by 10-45%. The flood plain ordinance revision is an opportunity to implement some of these activities. Staff will also look at policy for local flood areas at this time to ensure that requirements are cohesive and complete.

Stormwater Project Scope Example

A continuous improvement initiative Engineering is implementing in 2015 that will provide a savings to the storm water utility fund related to the sump drain pipe. As part of our street reconstruction projects, sump

drain pipe is installed wherever feasible. The sump drain pipe allows homeowners to connect drain tile and sump pumps. Past practice has been to provide a sump drain service pipe to every home. We have seen a low percentage of homes connecting to that system until they are redeveloped, and in most redevelopment cases, the location of the sump drain service pipe in not in the location they want. Therefore, in 2015 sump service pipes will be provided without a dedicated service connection. In the future property owners will be able to make the connect to that system with the flexibility to connect at any point along their property. This initiative will save our stormwater utility fund approximately $200,000 per year. Engineering will still work with the handful of residents that want to connect immediately as part of the project.

Alignment of Watershed District and City Clean Water Goals

The Minnesota Pollution Control Agency (MPCA) issued a new storm water permit for cities in 2014. The new permit requires additional storm water education, public involvement, illicit discharge detection and elimination, construction site erosion control, post-construction storm water management, and internal good housekeeping activities. The City's Storm Water Pollution Prevention Plan (SWPPP) guides and documents these activities. There are changes required for ordinances, policies, and procedures for storm water that will be implemented this year. Partnership agreements between the City and the watershed districts, currently under development, will address several of the requirements while increasing city and watershed district efficiency and ability to work together. Some of the activities in the SWPPP also align with the work on redevelopment and flood plain.

Private Sanitary Service I/I

Source control of infiltration and inflow (I/I) waters is an important, but historically neglected strategy to manage peak, storm related, events that can cause surcharge of the sanitary system and backups into low basements. The June 2014 rainfall, and subsequent surcharge notice from the Met Council, reminds us the importance of these long term programmatic efforts to reduce I/I. Engineering has reviewed three leading metro area communities and their different approaches to public and private I/I reduction.

Other Future Opportunities

Other future initiatives to address the challenges of aging infrastructure include the following: Consideration of sanitary and water service levels definitions and long term needs assessments as part of the upcoming update to the Edina Comprehensive Plan, additional risk based operation and maintenance procedures that rate key individual system components in terms of its likelihood and consequence of failure, additional standardization of system design and components, and consideration of non-infrastructure programmatic source and demand controls such as sanitary inflow and infiltration reduction, user education and assistance to prevent grease or flushing materials that clog sanitary pipes, street sweeping for clean water, and others.

Conclusions

Water, sanitary and stormwater public utilities provide critical public health, sanitation and public safety services. These services rely on aging infrastructure systems, the operations, maintenance, engineering and design of which support their continual function. Edina's commitment to its utility infrastructure is evident in its mission: "Our mission is to provide effective and valued public services, maintain a sound public infrastructure... ...in a manner that sustains and improves the uncommonly high quality of life enjoyed by our residents and businesses." This tradition of stewardship pays dividends for generations.

ENGINEERING DEPARTMENT
7450 Metro Boulevard • Edina, Minnesota 55439
www.EdinaMN.gov • 952-826-0371 • Fax 952-826-0392

DATE: March 3, 2015

TO: Mayor and City Council

CC: Brian Olson PE, Chad Millner PE., Patrick Wrase PE

FROM: Ross Bintner PE - Environmental Engineer

RE: **2015 Water, Sanitary and Stormwater Utility Systems Report**

This memo summarizes domestic water, sanitary sewer, and storm sewer systems, system risk and resilience and system understanding.

Background

Development that initially drove construction of Edina's infrastructure proceeded from the northeast to the southwest. This phased development is shown in Figure 1 – Residential Periods of Construction and Figure 2 – Age of Buildings. A portion of northeast Edina was constructed in the 1940s and earlier. The majority of infrastructure in the City of Edina was constructed in the 1950s and 1960s. Minor infill development occurred in the 1970s and 1980s.

With the bulk of its infrastructure in the 1950s and 1960s cohorts, the City has begun reconstructing significant portions of its streets and portions of its pipe infrastructure to maintain service reliability as the systems age. Figure 3 – Local Bituminous Street Reconstruction History shows areas of street reconstruction over the past 16 years. Figure 4 – Anticipated Local Bituminous Street Reconstruction shows potential areas of reconstruction over the next five years.

Services Delivered

The City of Edina operates a public utility providing water, sanitary and stormwater services. These utility services provide:

1) Clean and reliable drinking water to:
    a. promote public health, and
    b. waters to suppress fire for public safety.
2) The collection, treatment and disposal of sanitary sewer waste to:
    a. prevent disease, and
    b. promote public health.
3) Management of flood waters and floodplain to:
    a. promote public safety, and
    b. protect property.
4) Management of stormwater runoff to:
    a. prevent pollution,
    b. promote the public health, and
    c. improve the health of local water bodies and the environmental services they provide.

Decision-making for Maintenance and Reconstruction

The water, sanitary, and stormwater public utility services are provided using extensive physical infrastructure and modest programmatic efforts. Each utility is planned, operated, maintained, expanded, replaced, and managed by professional staff in the City's Public Works and Engineering departments. Engineers and system operators use a process called "asset management" to set service levels, assess the present condition of the infrastructure, judge system performance, plan for repair, replacement, or future upgrades, and assess risks.

The tools used to manage aging infrastructure are becoming increasingly data intensive, but lead to better decisions. Also increasing management complexities are the better scientific understanding of both the chemical, physical and biological processes acting on the systems and the infrastructure's interaction with the natural systems on which each utility service depend. Evolving methods of assessing system condition such as non-destructive water main sounding, and closed circuit television allow nuanced replacement decisions. Changing methods of inspection such as nondestructive water main sounding, and construction, including trenchless installation and robotic pipe rehabilitation technology also have changed project scope choices, and continue to lower overall cost of repair.

Understanding of Infrastructure

The following is a brief description of each of the utilities in the City of Edina including:

1) Description of service: An overview of the service(s) provided, system extents and critical design considerations.
2) Infrastructure summary: A description of major components of the system, scale of system and current estimated replacement value (not including potential restoration costs such as pavement or sod.)
3) System understanding: List of the most recent plans, review of the key design variables, reliability and risks.
4) Function and condition assessment: Review of methods to assess system and overview of issues with age and existing materials.

Water

1) Water production and distribution infrastructure is built to provide uninterrupted service of clean drinking water citywide, and is made available in abundance for firefighting. Water is supplied from groundwater aquifers through wells spread throughout the community and distributed via a network of pipe. Some wells are connected to water filtration plants and are used to provide water in normal use periods. The remaining wells are unfiltered and rotate into service during summer peak use periods. A small portion of the City is served by Eden Prairie, Bloomington, Saint Louis Park or Minneapolis water supply.

2) The domestic water system is made up of two parts. The first is a water distribution system that includes: 220 miles of pressure water main ranging from 4-16" in diameter, nearly 5000 main valves, 2000 hydrants, and 13800 service connections, valves and meters and equal numbers of private service pipes. The second is a water production, storage and treatment system that includes: 18 wells, 4 treatment plants, 4 water towers, and 1 reservoir. The estimated 2015 total replacement value of this infrastructure is over $160 million.

3) The current system understanding is based on the 2002 Water Distribution System Analysis by SEH and the 2013 Wellhead Protection Plan by Source Water Solutions. The City also has a current InfoWater model that describes the distribution system, and regional agencies maintain a variety of regional groundwater models used to understand and assess groundwater risk and supply. Modeling that enhanced the system understanding include a 2013 Water System Demand and Capacity Analysis for Water Treatment Plan 5 (WTP5). The water distribution system is sized based on geometric constraints, system wide supply and demand, design pressure, and fire flow capacity. Supply systems include pumps with reliable power backup, to keep the distribution system under constant pressure to meet demand and keep contaminants out. The production system is designed to meet peak day and peak week demands, assuming the largest well in the system is out of service.

4) The current method of condition assessment is through maintenance records, continuity comparison between pumped and metered flow, and visual inspection of the main during water main repair work. The water system is remotely controlled by a data collection and control (SCADA) system, and this system also provides insight into system function. System age affects service reliability as spot repairs are made due to water main and service breaks. Figure 5 – Watermain and Service Breaks shows recent repair density on water main currently in service across the city. Note sections in north east Edina with few breaks or service breaks were recently fully replaced. Figure 6 – Water Pipe Material Distribution shows material type distribution citywide. Some areas of northeast Edina have had full pipe replacement or pipe lining with new high-density polyethylene (HDPE). Additional looped connection pipes are considered to raise service levels in areas with low pressure or stagnant water complaints.

Sanitary

1) Sanitary collection system infrastructure is built to transmit peak flows without surcharge and reduce risk of human exposure. Wastewater is collected and routed via private service connections to lateral and trunk sanitary pipes and then on to the regionally operated Met Council system. There it is conveyed to either St. Paul Metro or Eagan Seneca treatment plants for treatment and disposal of waste. The system functions via gravity flow, with intermittent pump lift stations and sanitary force main when needed.

2) The sanitary system is made up of three parts. The first includes privately owned service pipes. The second is a City-owned collection system that includes: 194.2 miles of gravity main ranging from 4-33" in diameter, over 5000 maintenance access manholes, 4.5 miles of force main, and 23 lift stations. The third is a regional trunk conveyance and treatment system owned and operated by the Met Council, to which the City pays fees based on use. The estimated 2015 total replacement value of the City portion of infrastructure is just under $70 million. System costs for the Met Council systems are prorated metro area wide by metered flow volume.

3) The current system understanding is based on a 2006 XP-SWMM model by Barr and a 1997 Sanitary System Evaluation by TKDA. Inflow and Infiltration is document sin reports by CH2M Hill, 1992 and by Donohue, 1983. The collection system was designed based on expected total and daily peak flow, estimated based on land use, density, average population per household, average per capita water use, and an allowance for inflow and infiltration during storm events at the time of development. The system is metered continuously at three locations by the MCES, and modeling and calibrated flow metering are periodically conducted to predict and track flow trend, most recently in 2006 and 2012. Reducing inflow of floodwaters

through manholes, basement foundations, parking garages, and other structure flooding can increase reliability and reduce costs. Reducing infiltration of stormwater though pipe and service lining can reduce treatment costs.

4) The current method of condition assessment is through closed circuit televising of lines, maintenance records, and visual inspection of manholes. Sanitary lift stations are remotely controlled by a supervisory control and data acquisition (SCADA) system, and this system also provides insight into system function. Lining of clay pipe (VCP) is considered a high priority to increase reliability and reduce infiltration. Figure 7 – Sanitary Pipe Material Distribution shows the majority of the system as VCP, with three of the four major trunk lines primarily made of reinforced concrete (RCP). Locations of cast in place cast in place pipe (CIPP) liner, and PVC and HDPE show the extent of pipe rehabilitation work.

Stormwater

1) Storm sewer conveyance system infrastructure is built to carry the water from a storm with a 10% chance of occurring in a given year for neighborhood and lateral systems, and water from a storm with a 1% chance of occurring in a given year for trunk and regional systems. Floodplain is managed to minimize damage and maintain flood storage and conveyance capacity. Stormwater treatment infrastructure is built to meet regulation defined pollutant removal targets, and is complemented by programmatic pollution prevention techniques and system maintenance such as street sweeping, stormwater education, illicit discharge enforcement and sediment trap manhole cleaning.

2) The stormwater system includes over 127 miles of gravity main ranging from 12-84" in diameter, 6800 manholes, 900 outlets, 38 miles of sump drain, 11 stormwater lift stations, one-half mile of stormwater force main, 150 ponds and wetlands, and numerous sediment trap structures. The estimated 2015 total replacement value of this infrastructure is over $65 million.

3) The current system understanding is based on the 2011 Comprehensive Water Resources Management Plan by Barr. The collection system is designed to provide drainage and manage flood risk. Recent upward revisions to storm frequency probability (NOAA Atlas 14) mean portions of the system previously meeting design standards are now considered under sized, and flood storage areas now have higher peak flood elevations. Treatment systems are designed to meet pollutant removal standards set by the State and Watershed Districts. Clean water service demand due to water body specific Total Maximum Daily Load (TMDL) regulation is increasing. There is no reliable estimate for future liability.

4) The current method of condition assessment is through visual inspection of storm manholes and outlets and some closed circuit televising of lines where needed. System function is checked with a calibrated computer model and though visual inspection after large storm events. Pollution removal is estimated with an un-calibrated computer model.

Comprehensive Plan and Areas with Local Demand Growth

Areas of the City are subject to future redevelopment. This redevelopment is expected to result in significant demand growth primarily around Southeast Edina including Pentagon Park. Local commercial nodes such as 50th and France, Grandview, Cahill and Valleyview/Wooddale also expect modest demand growth. In anticipation of this redevelopment, staff completed various infrastructure system studies to verify capacity or

identify system needs to accommodate growth. In addition to those system studies referenced above, the conclusions in this memo and project recommendations are informed by the following studies.

Water

1. Hydraulic Modeling Results - Water Treatment Plant #6 and Southdale Development (July 3, July 13 2012 SEH Engineering)
2. Water System Demand and Capacity Analysis – Water Treatment Plan #5. (October 23, 2013 SEH Engineering)
3. Grandview Area Water Distribution System Analysis (February 21, 2014 SEH Engineering)
4. TH 62 and Concord Water Main Break Analysis (March 10, 2014 SEH Engineering)

Sanitary

1. FilmTec Flow Analysis (April 5, 2013 Barr Engineering)
2. Sanitary Sewer Model Recalibration (November 22, 2013 Barr Engineering)
3. Southeast Edina SAC Availability Analysis (July 23, 2013 Barr Engineering)
4. Edina SAC Availability Analysis – Fairview Southdale (July 23, 2013 Barr Engineering)
5. Trunk Sanitary Sewer Infiltration Study (December 5, 2013 Bolton and Menk)
6. Grandview Area Sanitary Sewer Analysis (February 21, 2014 Barr Engineering)
7. WTP #4 Sewer Analysis (2015 Barr Engineering)

The Edina Comprehensive Plan was updated in 2008. In acknowledgement of the continued pressure to redevelop to mixed uses around existing commercial and office districts and the increase in development density envisioned in Chapter 4, Chapter 8 describes broad trends in system capacity and the ability of the existing infrastructure to meet future service demand.

Two development scenarios were reviewed for sanitary and water capacity during the development of the plan; Scenario 1 included Met Council estimates for growth in population and employment and Scenario 2 describes an ultimate possible development density. The Met Council estimate in Scenario 1 assumed a change from 48,500 residents and 52,100 jobs in 2010 to 50,000 residents and 57,400 jobs in 2030. The ultimate development density assumed in Scenario 2 was 70,149 residents and 70,000 jobs. Both scenarios assume the bulk of growth will occur in the southeast quadrant of the City in existing commercial areas. The new 2030 population and job projections due out this year appear to be falling on the mid to low side of the range of these two scenarios. The following is a more detailed review of each utility, with a focus on growing areas in southeast Edina:

Water

Comprehensive Plan Chapter 8 describes trends and challenges to the public water supply. Generally, the City has a resilient water system that can produce clean, safe and plentiful water for public use. The increasing occurrence of groundwater quality issues and contamination (vinyl chloride and radium) has led to increased treatment needs. Providing water for the peak demand is also a concern. The demand for water increases in the evenings due to in-home use and in the summer due to irrigation systems. The average daily demand in Edina is between 7 and 8 million gallons per day (mgd). The peak demand is between 14.5 and 22 mgd, which is about three times higher than the average daily demand. This is known as the peaking factor, and Edina (with a peaking factor of 3.0) is in the high end of the range that is typical for similar suburban communities.

Under Scenario 1, two additional wells and no additional water storage would be needed assuming no decrease in the peaking factor, or one additional well with a reduction in the peaking factor resulting from conservation efforts. Under Scenario 2, even with aggressive conservation efforts and a corresponding reduction in the peaking factor from 3.0 to 2.75, an additional 7 wells or equivalent supplementary sources will be needed. No major upgrades to the distribution system are required for either scenario assuming aquifer capacity is available and water supply is sources by local wells. Upgrades to the distribution system may be required under Scenario 2 if water purchase agreements with nearby communities were pursued. Additional filtration capacity is desirable under both scenarios.

Sanitary

System flow in the water and sanitary systems are closely linked. In general, declining trends in system flow were noted in the sanitary sewer between 1980 and 2000, with a flat trend between 2000 and 2010. Reasons for decreased demand include changing demographics (fewer people per household) and increasing retrofit of buildings to include efficient modern fixtures and appliances. Reasons for increasing demand on system use include redevelopment and leaky aging pipes. The Met Council expects to see continued pressure for redevelopment along the 494 corridor, and has improved regional trunk sewer conveyance capacity as a result. This additional capacity is extended to the City boundary at Xerxes and 75th and can be extended into the southeast quadrant of the City with additional trunk infrastructure investment.

Both the 2006 XP-SWMM analysis and 2008 Comprehensive Plan concluded that Scenario 1 could be accommodated without major trunk line upgrades but Scenario 2 would require major system upgrades, dependent on redevelopment density and pattern. In 2013, the Engineering Department directed Barr Engineering to review the sanitary sewer model for flow capacity constraints in southeast Edina. In general Southeast Edina is well served in the near term with some excess capacity available for growth. The review shows most lateral lines have excess capacity, and trunk lines are running nearer to design capacity. The review also shows a trunk line serving western Edina and the Hwy 100 / Cahill industrial area running at capacity. The portion of southeast Edina that serves the hospital and flows to MCES meter RF-490 (65th/Xerxes trunk) has limited remaining capacity.

Stormwater

Storm system flows are linked to hydrologic, geologic and geometric attributes such as the connectivity in a drainage area, the percent of a site that is impervious, condition of the soil, and vegetation. In general, the service demands for clean water and flood protection are growing based on increased understanding of natural systems and regulation by state and local watersheds to remediate and protect local waters. While Nine Mile Creek capacity in southeast Edina show some flooding risk, infrastructure used to provide local flood protections is generally robust, and soil conditions in much of the area are favorable to reducing runoff. There is an increasing pressure on flow due to redevelopment at higher densities, but local controls require much of the flow and water quality treatments to happen on-site for large lot and commercial development. This trend will lead to less utilization of city infrastructure for small storm events, and a continued reliance for large storm events. Residential redevelopment runs counter to this trend because treatment and control is not required for lots less than one acre in size.

Additional demand analysis was conducted for the Grandview area, and aside from minor sanitary lift station and looped water recommendations, the area is well served to meet future demand. Demand analysis for the Gateway/Pentagon park area was studied in detail in the June 2013 Update to the September 26, 2007 Alternative Urban Areawide Review (AUAR) by WSB Engineering. Demand growth in this area will require the improvement of flow capacity at a Met Council lift station, and additional local sanitary capacity in Edina and Bloomington.

Conclusions

Water, sanitary and stormwater public utilities provide critical public health, sanitation and public safety services. These services rely on aging infrastructure systems, the operations, maintenance, engineering and design of which support their continual function. The City is well served by its aging utility infrastructure and the level of investment is favorable to support localized demand growth and its continued function.

Appendix

Figure 1: Residential Periods of Construction
Engineering Department, June 2006

Figure 2: Age of Buildings
Engineering Department, July 2013

Figure 3: Local Bituminous Street Reconstruction History
Engineering Department, November 2014

Figure 4: Anticipated Local Bituminous Street Reconstruction
Engineering Department, December 2014

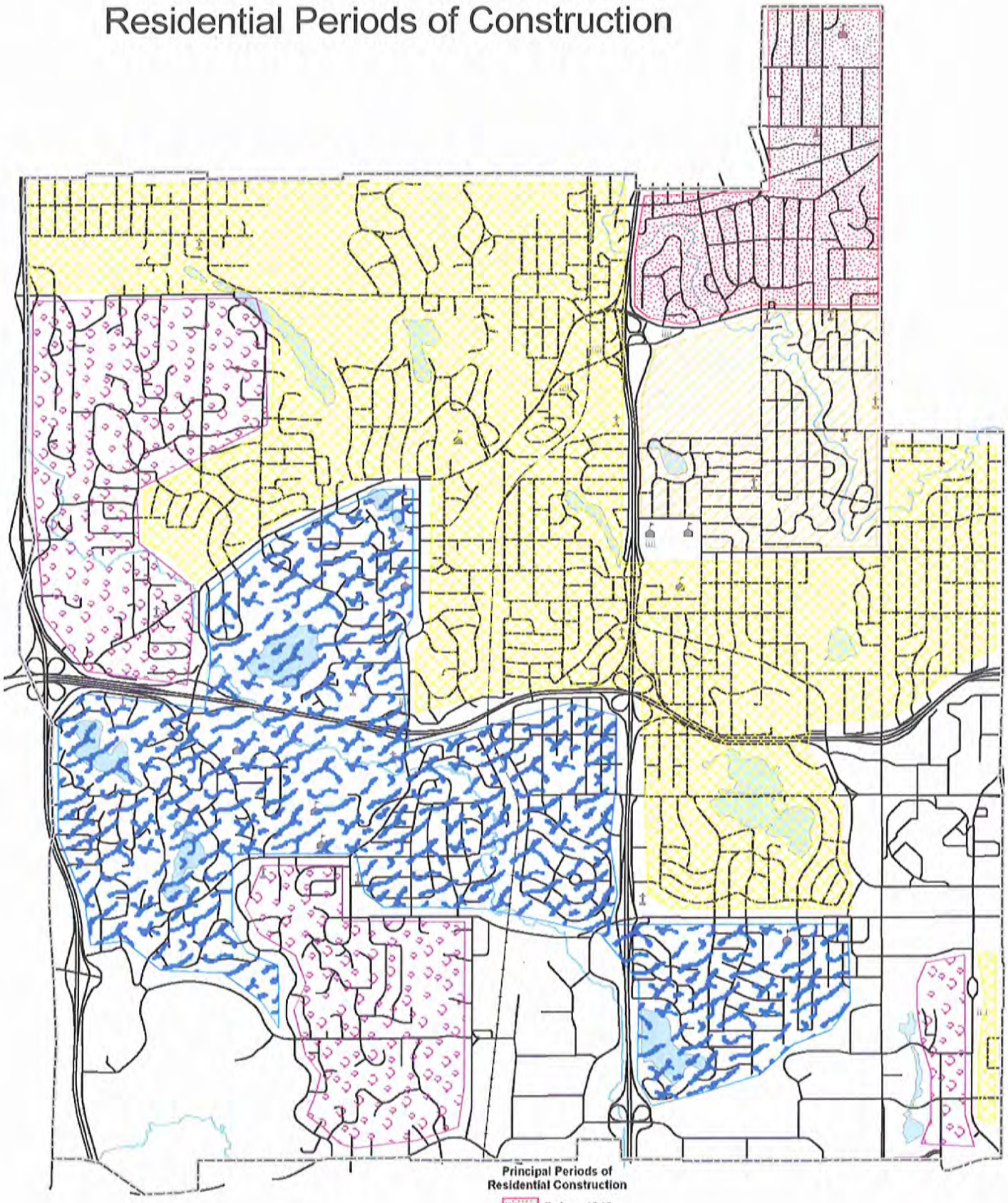
Figure 5: Watermain and Service Breaks
Engineering Department, February 2015

Figure 6: Water Pipe Material Distribution
Engineering Department, February 2015

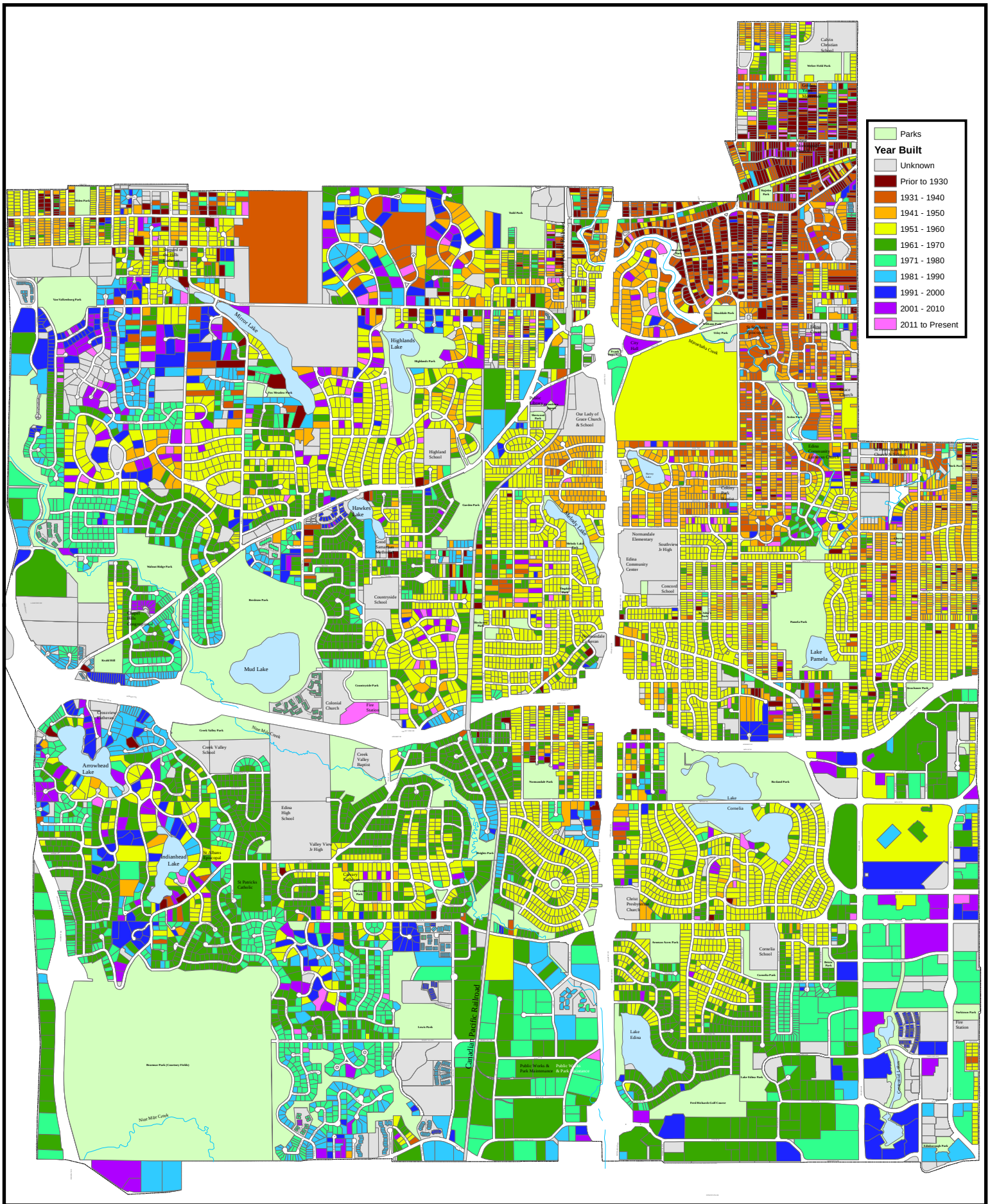
Figure 7: Sanitary Pipe Material Distribution
Engineering Department, February 2015

ENGINEERING DEPARTMENT
7450 Metro Boulevard • Edina, Minnesota 55439
www.EdinaMN.gov • 952-826-0371 • Fax 952-826-0392

Residential Periods of Construction



Engineering Dept
June, 2006

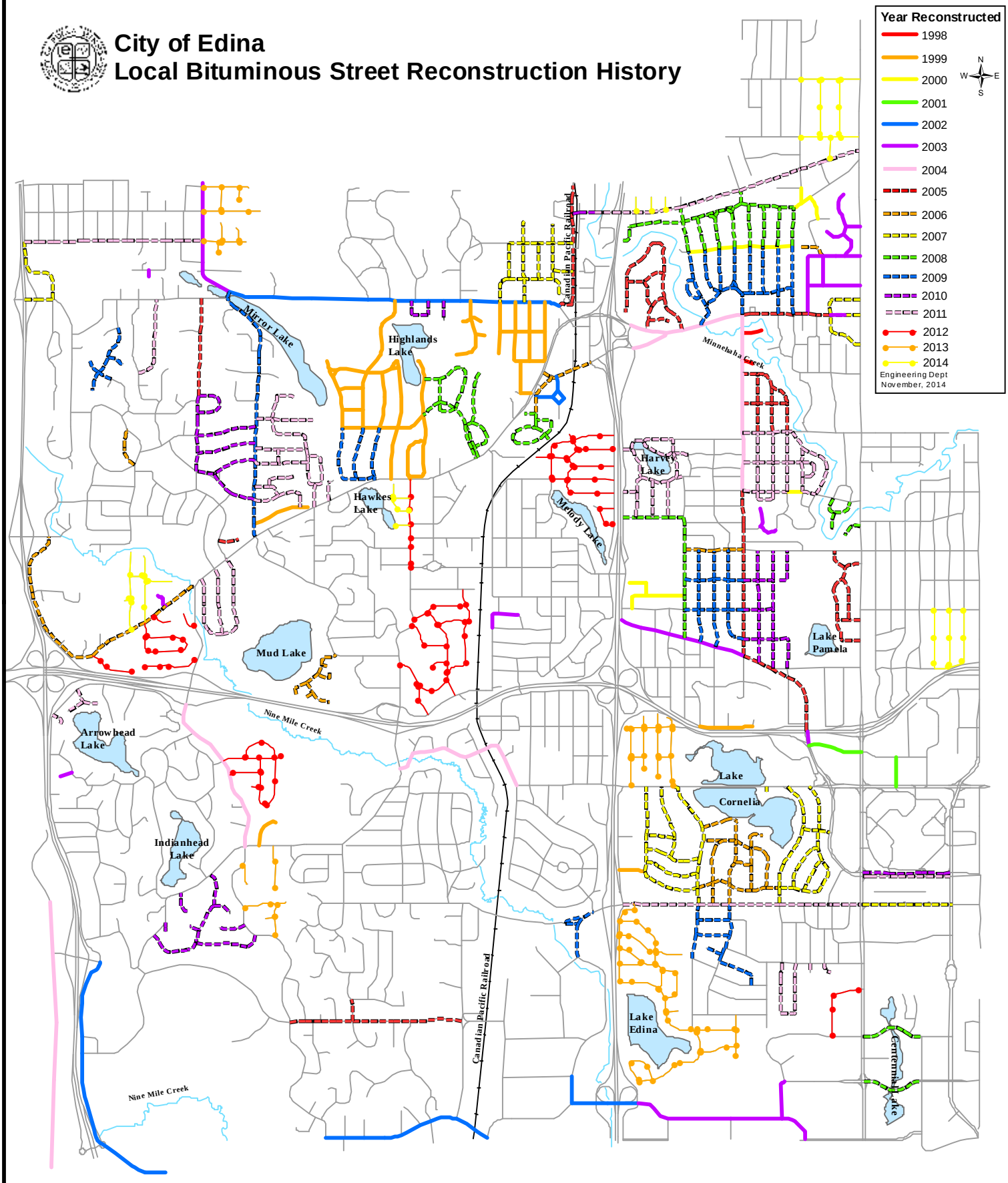


Year Built

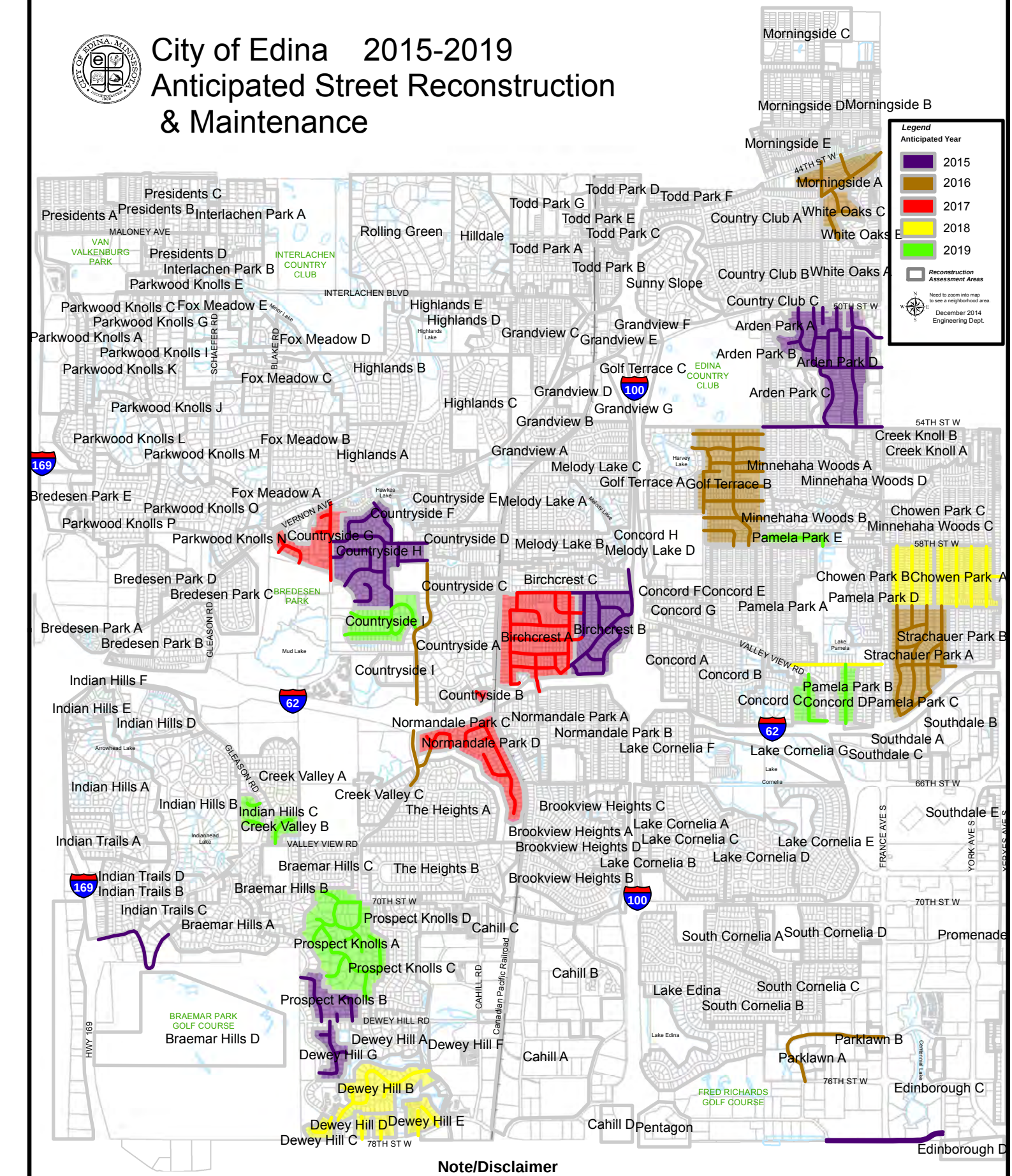
N
W E
S

Engineering Dept
July, 2013

City of Edina
Local Bituminous Street Reconstruction History



City of Edina 2015-2019 Anticipated Street Reconstruction & Maintenance

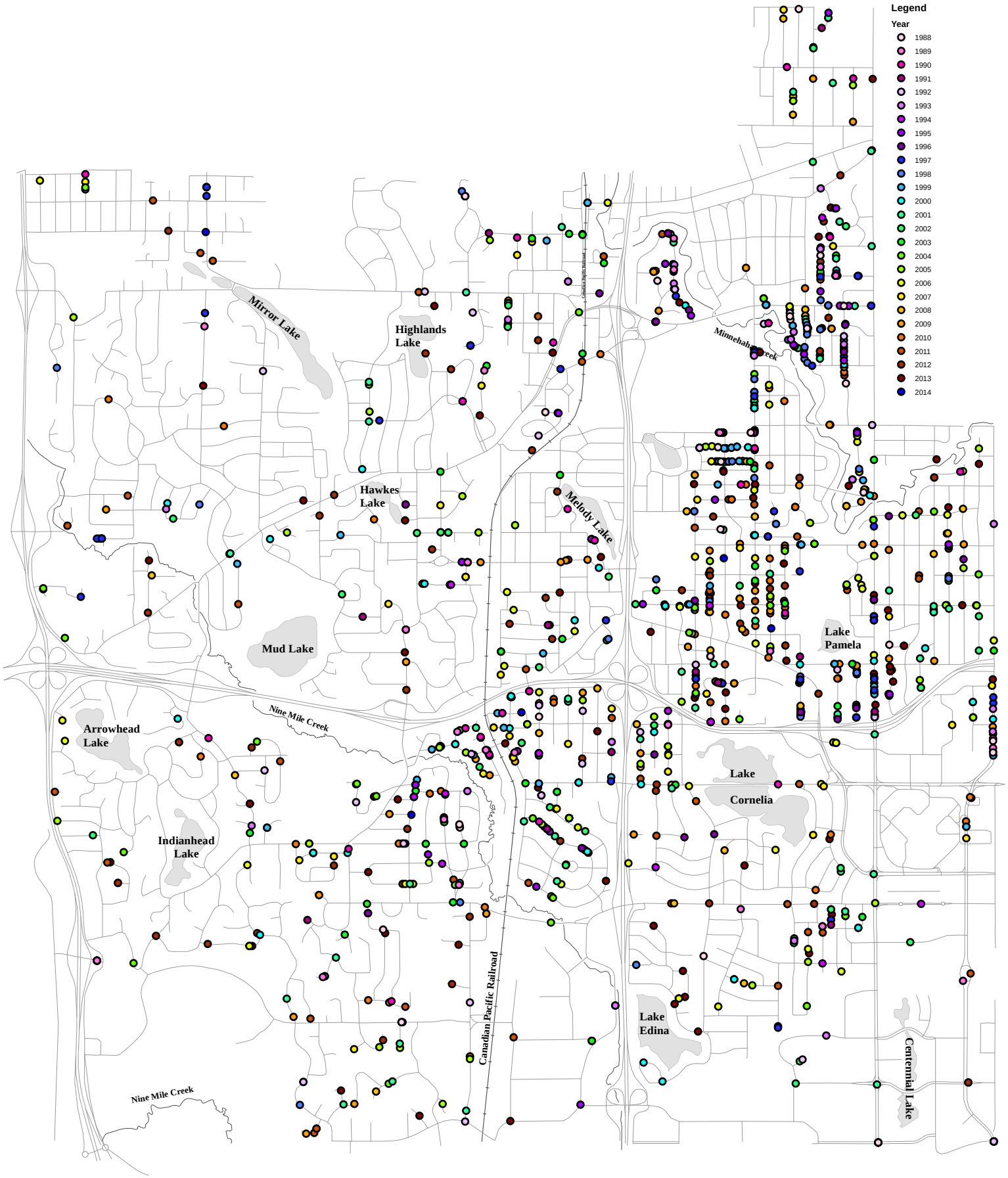


Note/Disclaimer

The dates shown on the map represent the anticipated years of construction and are subject to change based on budgetary issues, adjacent projects, resident input and other factors. Not all bituminous roadways within the City are shown. If a road is not highlighted then the potential reconstruction date is beyond the City's long term planning process.

The City of Edina's street improvement policy is to assess residents for a portion of the roadway reconstruction costs. Public utility improvements are paid for from the City's utility fund.

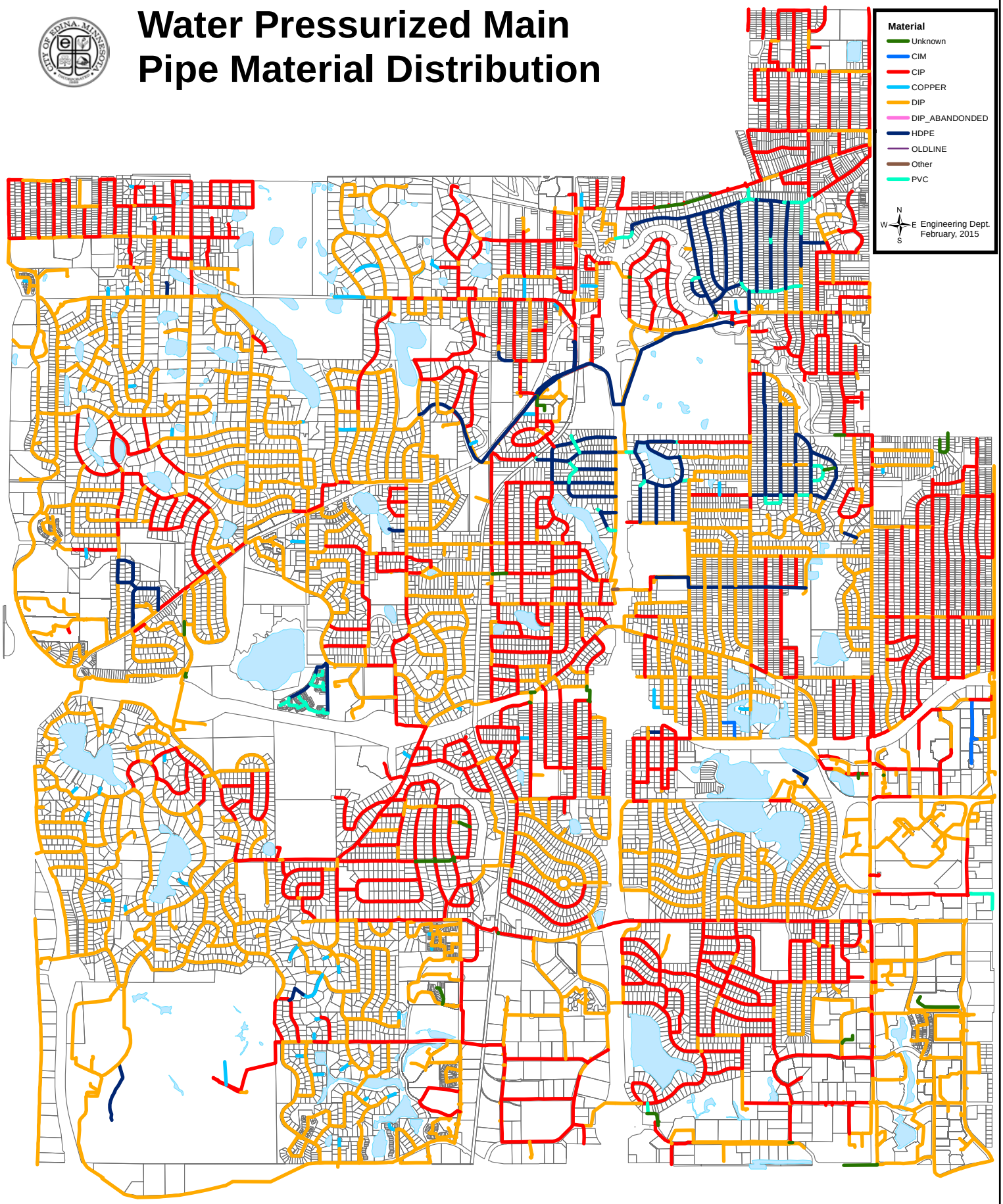
Extensive evaluation regarding the condition of the bituminous pavement, sanitary sewer, storm sewer and water main were used to set the priority of roadway improvements.



Watermain Breaks and Service Leaks

Engineering Dept
February 2015

Water Pressurized Main
Pipe Material Distribution



Sanitary Sewer Gravity Main Pipe Material Distribution