

REGIONAL STORMWATER PLANNING

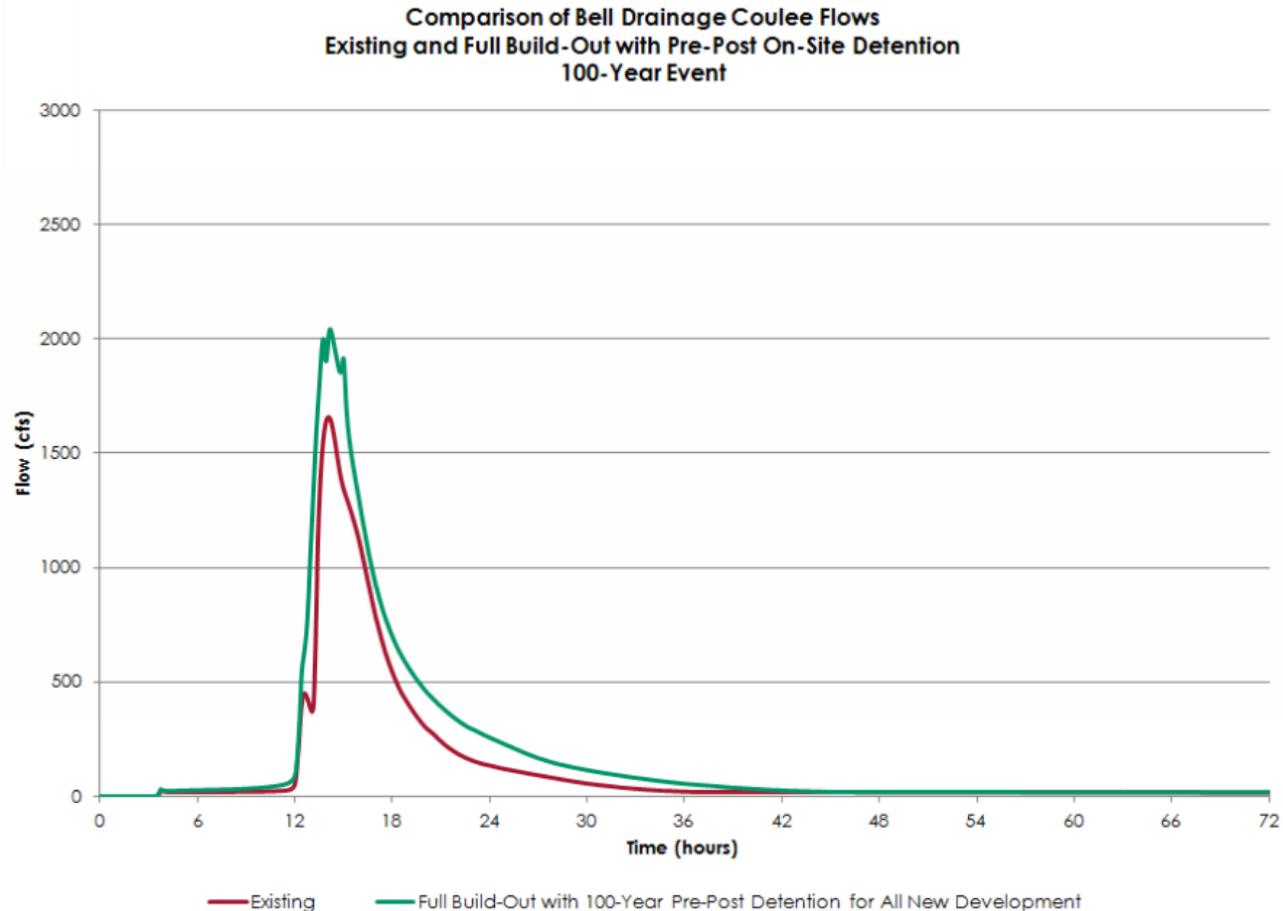
Presented by Jeff Hruby, PE
Water Resources Practice Leader

NDWPCC Spring Stormwater Conference
March 12, 2015

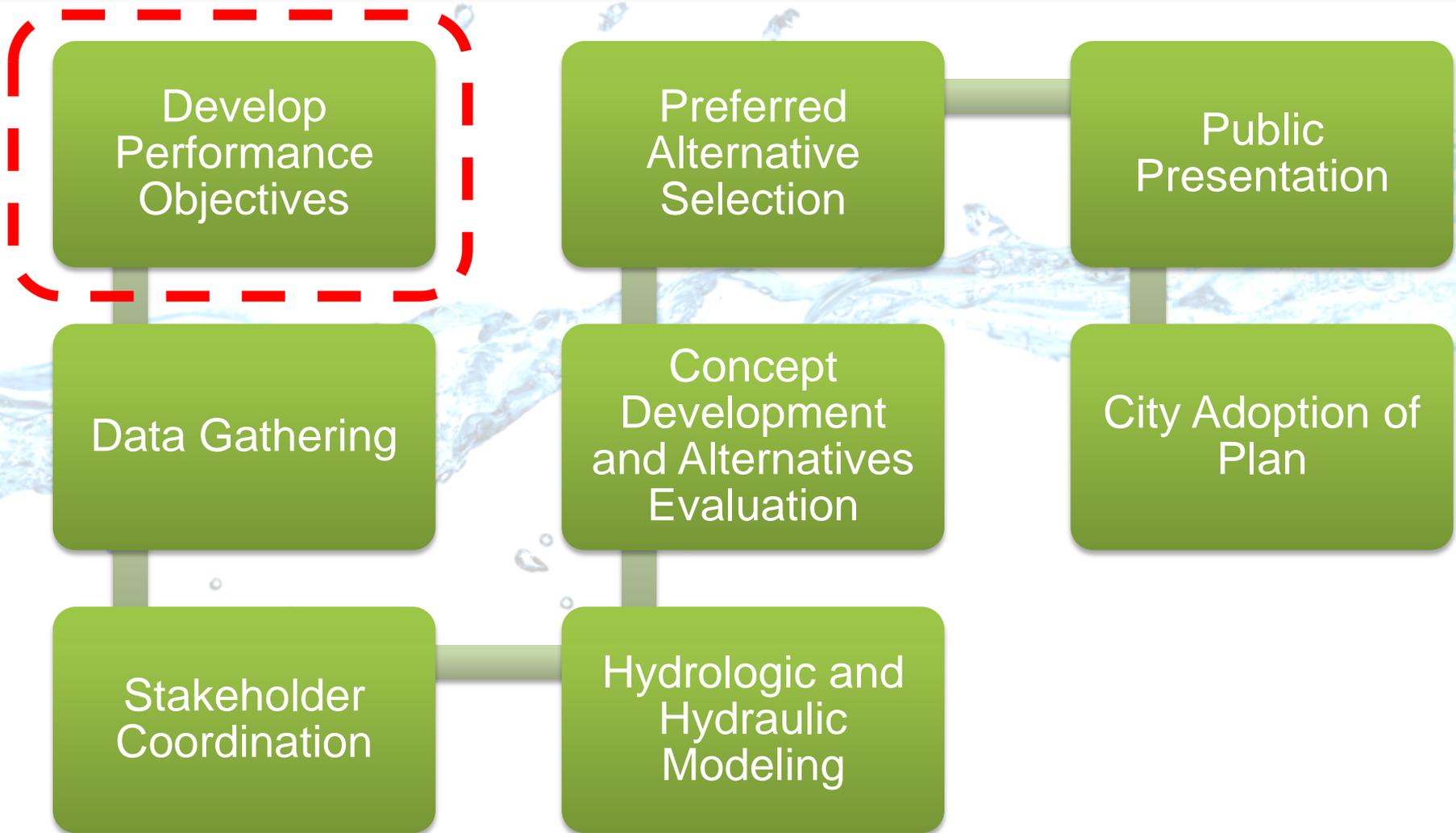


WHY?

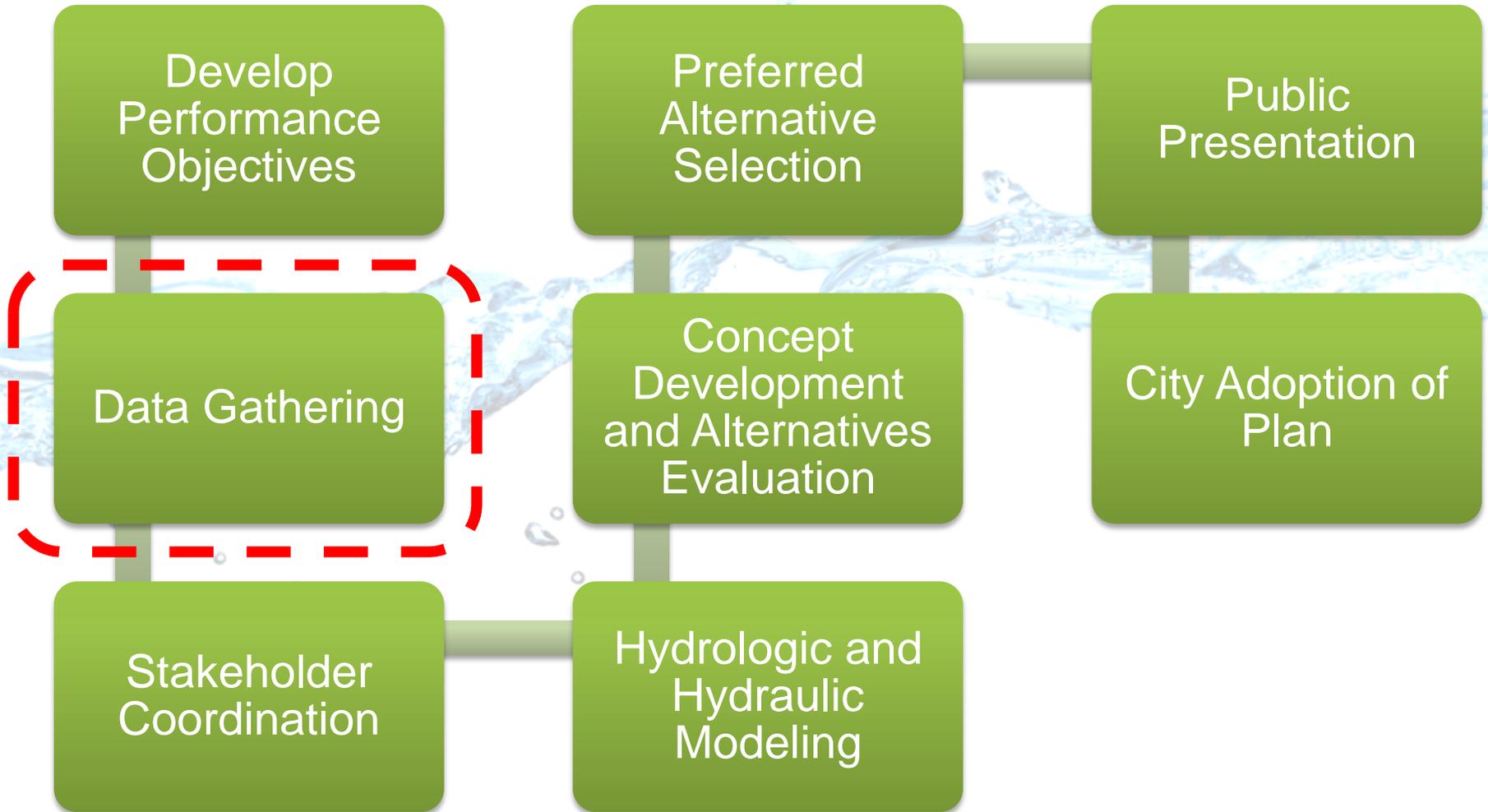
- Manage by Watershed Rather than Property Boundary
- Address “Big Picture” Rather than Site by Site



PROCESS

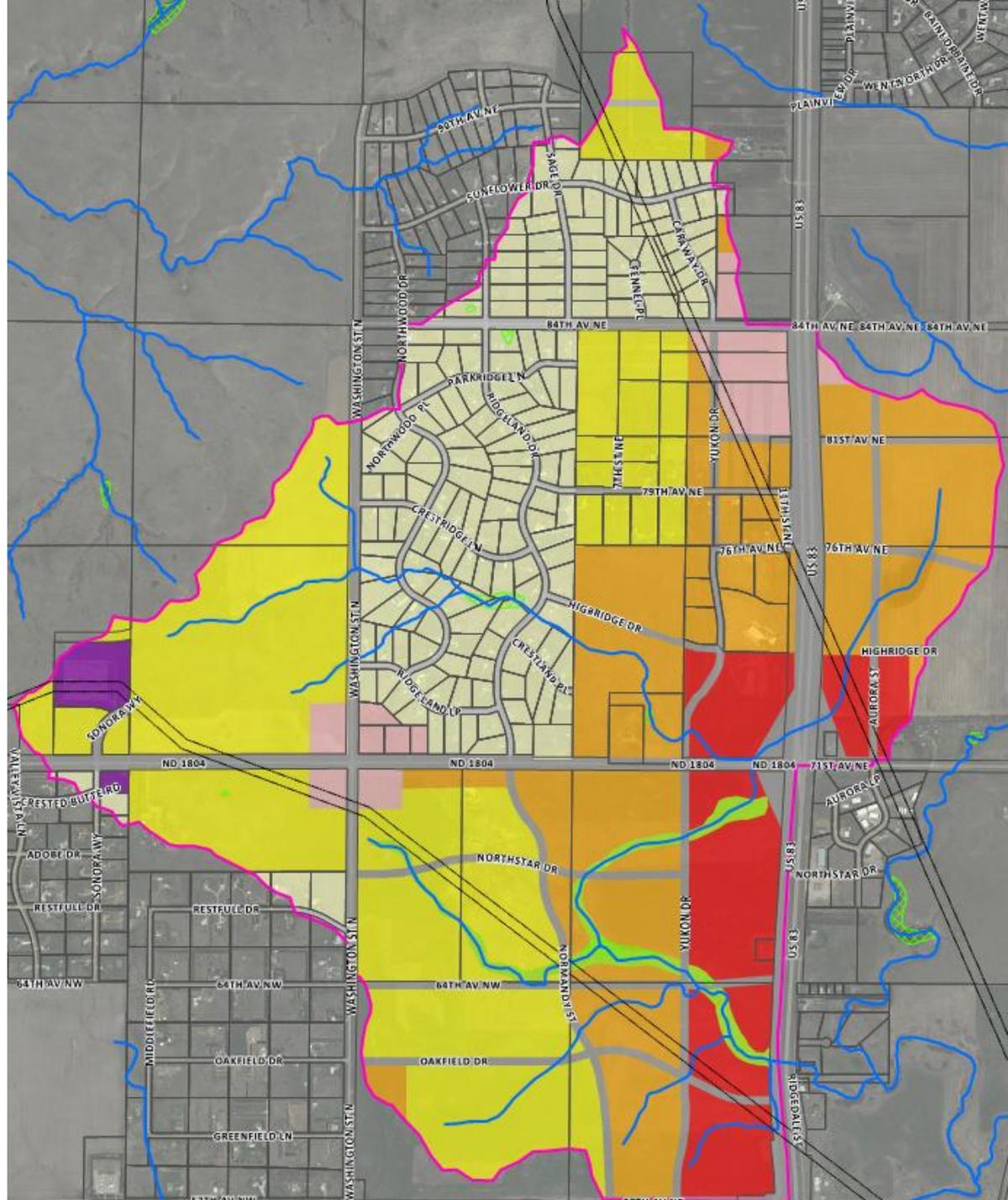


PROCESS



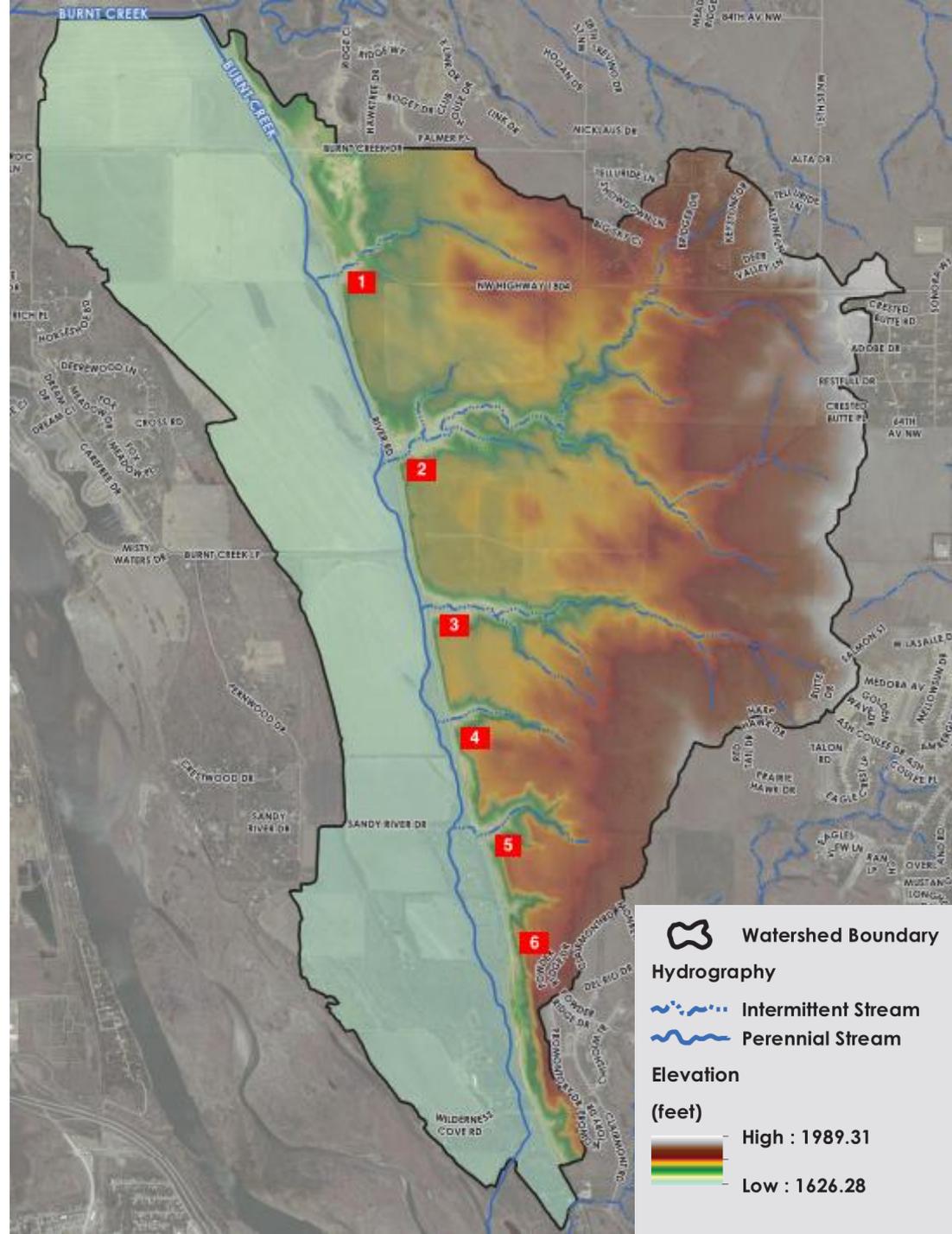
DATA NEEDED

- Existing and Future Land Use
- Future Major Road Corridors
- Existing Natural Features



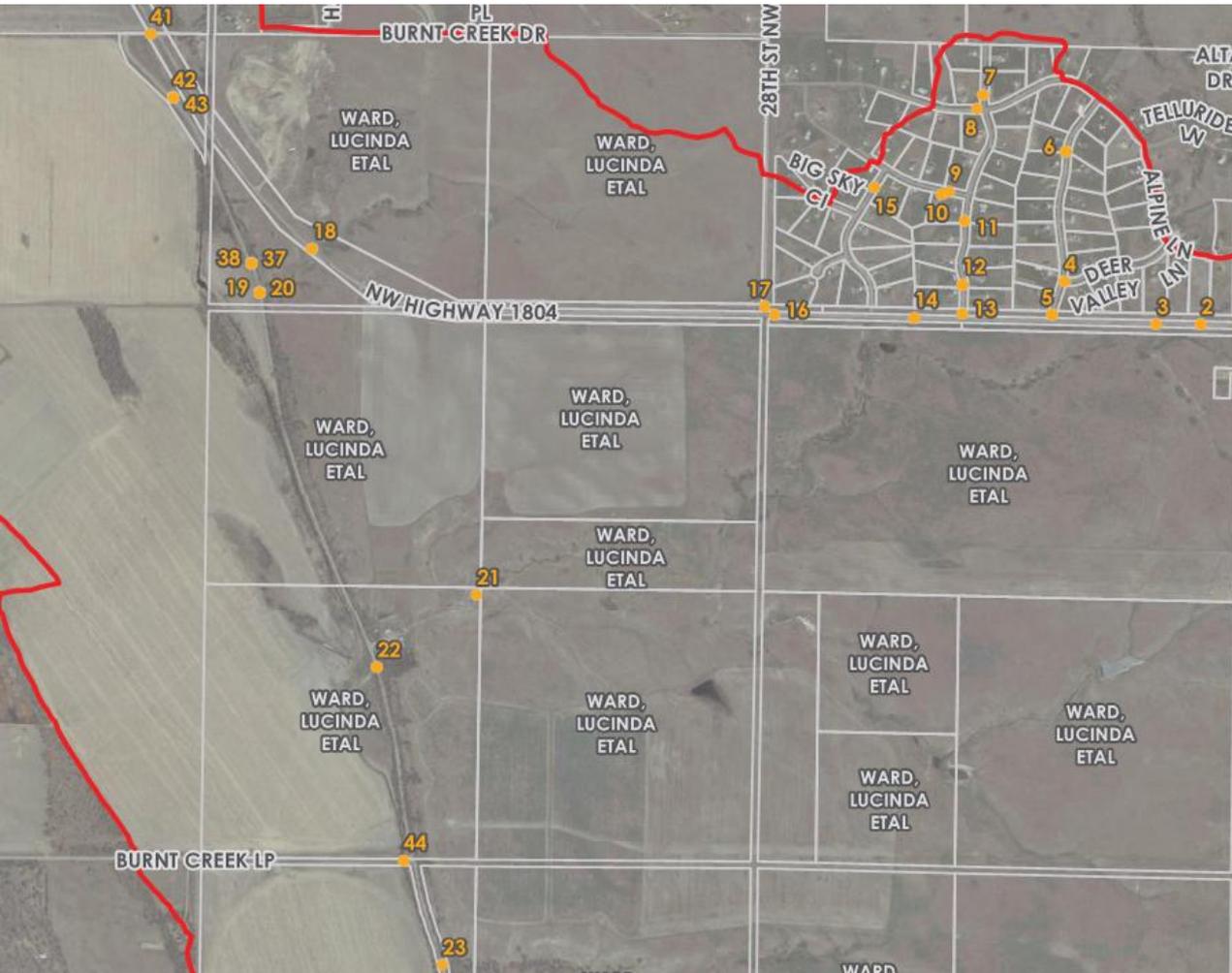
DATA NEEDED

- Topography



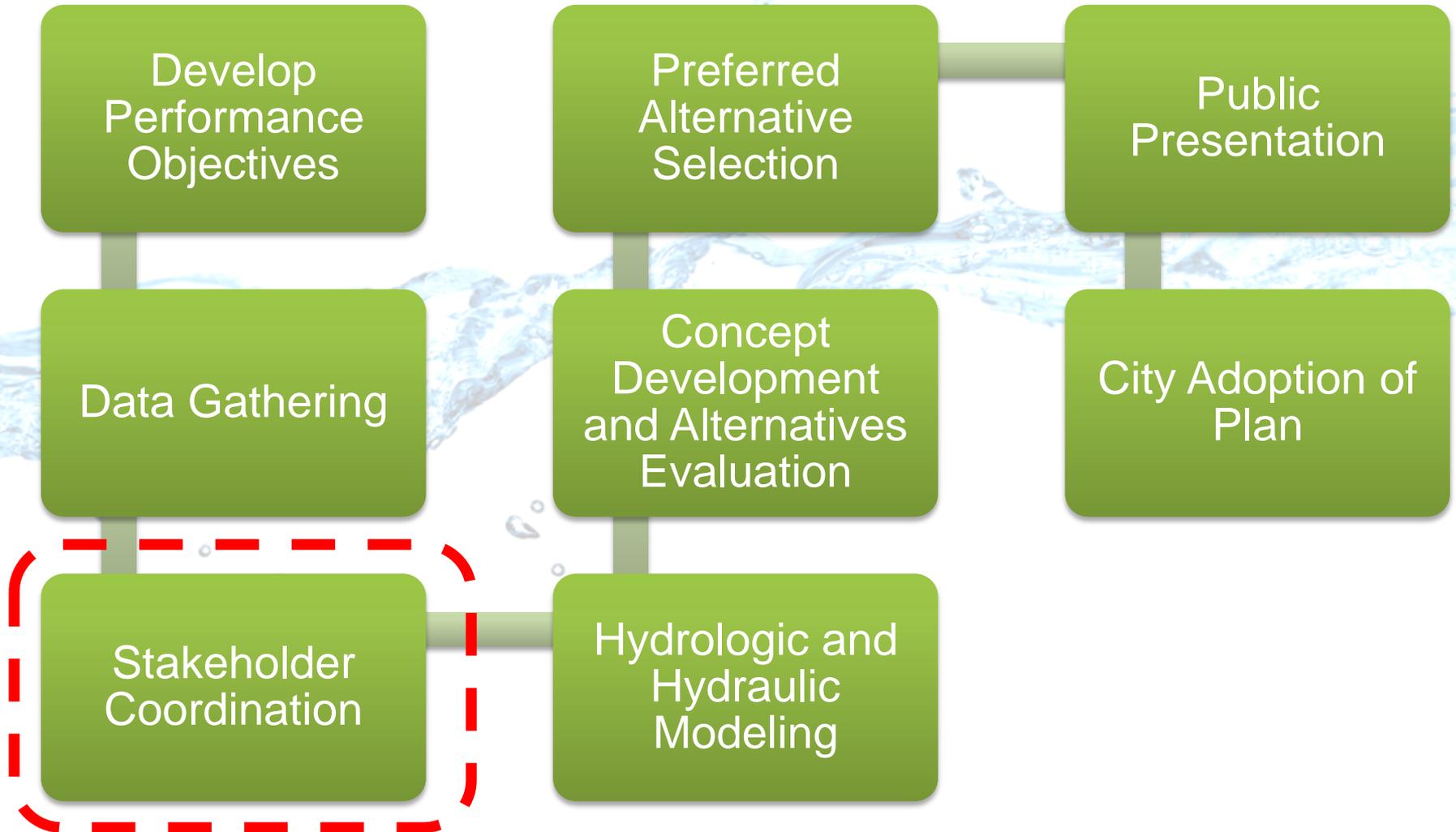
DATA NEEDED

- Existing Infrastructure



ID	Upstream Elevation (feet)	Downstream Elevation (feet)	Size (inches)	Material
1	1898.000	1897.712	84 X 60 ARCH	RCPF
2	1861.158	1859.844	30	RCPF
3	1857.837	1843.172	30	RCPF
4	1849.207	1848.723	24	CMP
5	1841.927	1839.136	24	CMPF
6	1858.401	1857.523	24	CMP
7	1846.647	1845.808	18	CMPF
8	1842.524	1839.727	18	CMPF
9	1811.171	1810.430	24	CMPF
10	1808.834	1808.399	24	CMPF
11	1809.393	1808.970	24	CMP
12	1799.346	1794.233	24	CMPF
13	1802.142	1797.845	24	CMPF
14	1769.221	1766.698	36	RCPF
15	1818.732	1818.136	18	CMP
16	1785.747	1783.063	30	RCPF
17	1786.934	1786.648	18	CMPF
18	1667.617	1666.331	54	RCPF
19	1641.353	1640.649	18	RCP
20	1641.392	1640.443	18	RCP
21	1660.276	1659.615	24	CMP
22	1638.664	1637.210	2 X 60W X 48H	RCP BOX
23	1636.141	1635.794	48	RCPF
24	1639.302	1639.154	48W X 72H	RCP BOX
25	1654.267	1653.291	30	RCP
26	1637.721	1637.479	30	RCP

PROCESS



Stakeholder Coordination



International Association
for Public Participation

EMPOWER
COLLABORATE
INVOLVE
CONSULT
INFORM

IAP2 Public Participation Spectrum

Courtesy of The Perspectives Group

Increasing Level of Public Impact

Inform

P2 Goal:

To provide the public with balanced and objective information to assist them in understanding the problems, alternatives, opportunities and/or solutions.

Promise to the Public:

We will keep you informed.

Example Tools:

- Fact sheets
- Web sites
- Open houses

Consult

P2 Goal:

To obtain public feedback on analysis, alternatives and/or decisions.

Promise to the Public:

We will keep you informed, listen to and acknowledge concerns and aspirations and provide feedback on how public input influenced the decision.

Example Tools:

- Public comment
- Focus groups
- Surveys
- Public meetings

Involve

P2 Goal:

To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.

Promise to the Public:

We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.

Example Tools:

- Workshops
- Deliberative polling

Collaborate

P2 Goal:

To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.

Promise to the Public:

We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.

Example Tools:

- Citizen Advisory Committees
- Consensus-building
- Participatory decision-making

Empower

P2 Goal:

To place final decision-making in the hands of the public.

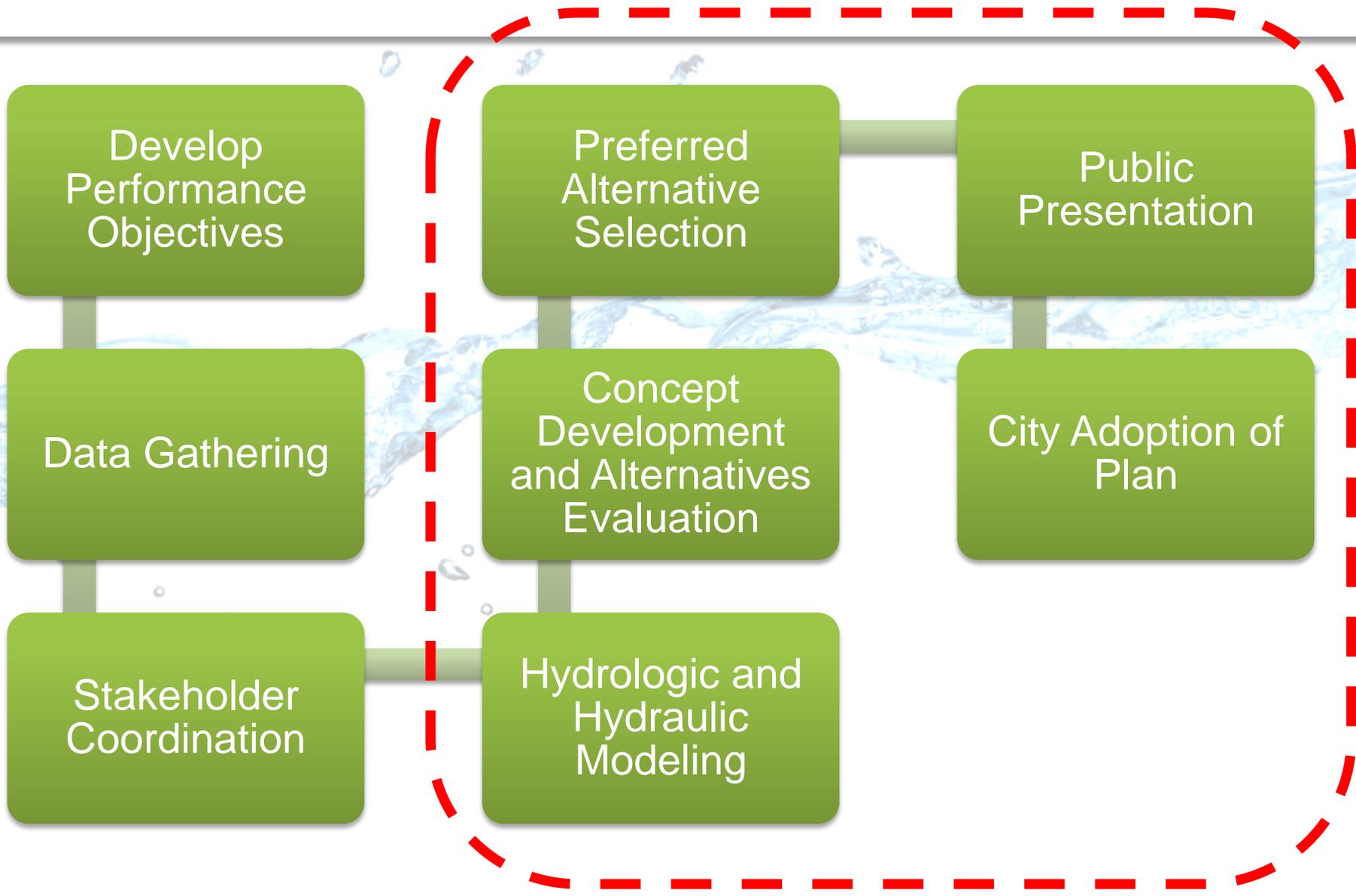
Promise to the Public:

We will implement what you decide.

Example Tools:

- Citizen Juries
- Ballots
- Delegated decisions

PROCESS



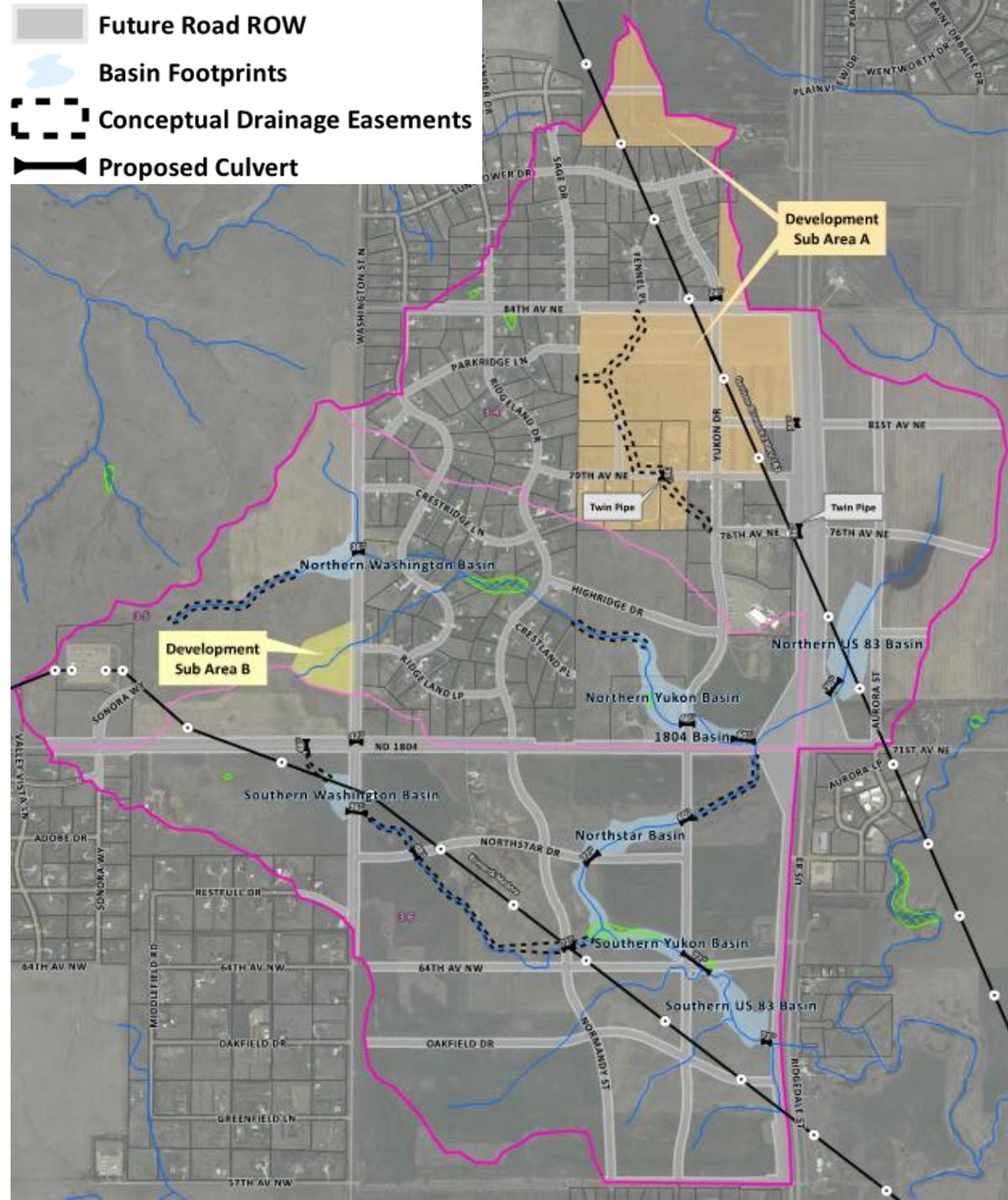
BENEFITS

- Evaluate Existing Infrastructure Capacity



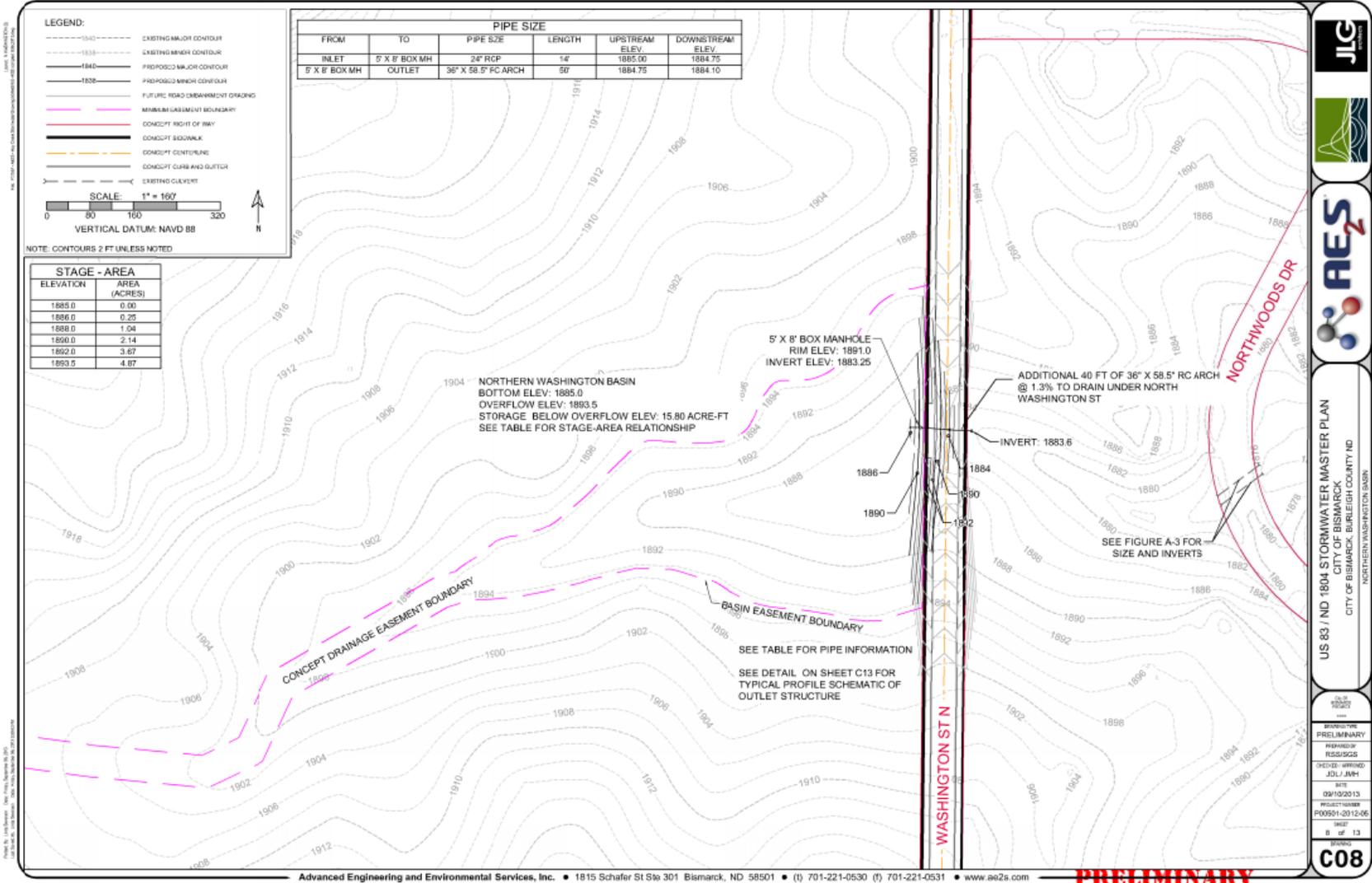
BENEFITS

- Regional Detention, Water Quality, and Conveyance
- Consolidate Infrastructure
- City Control and Quality Assurance



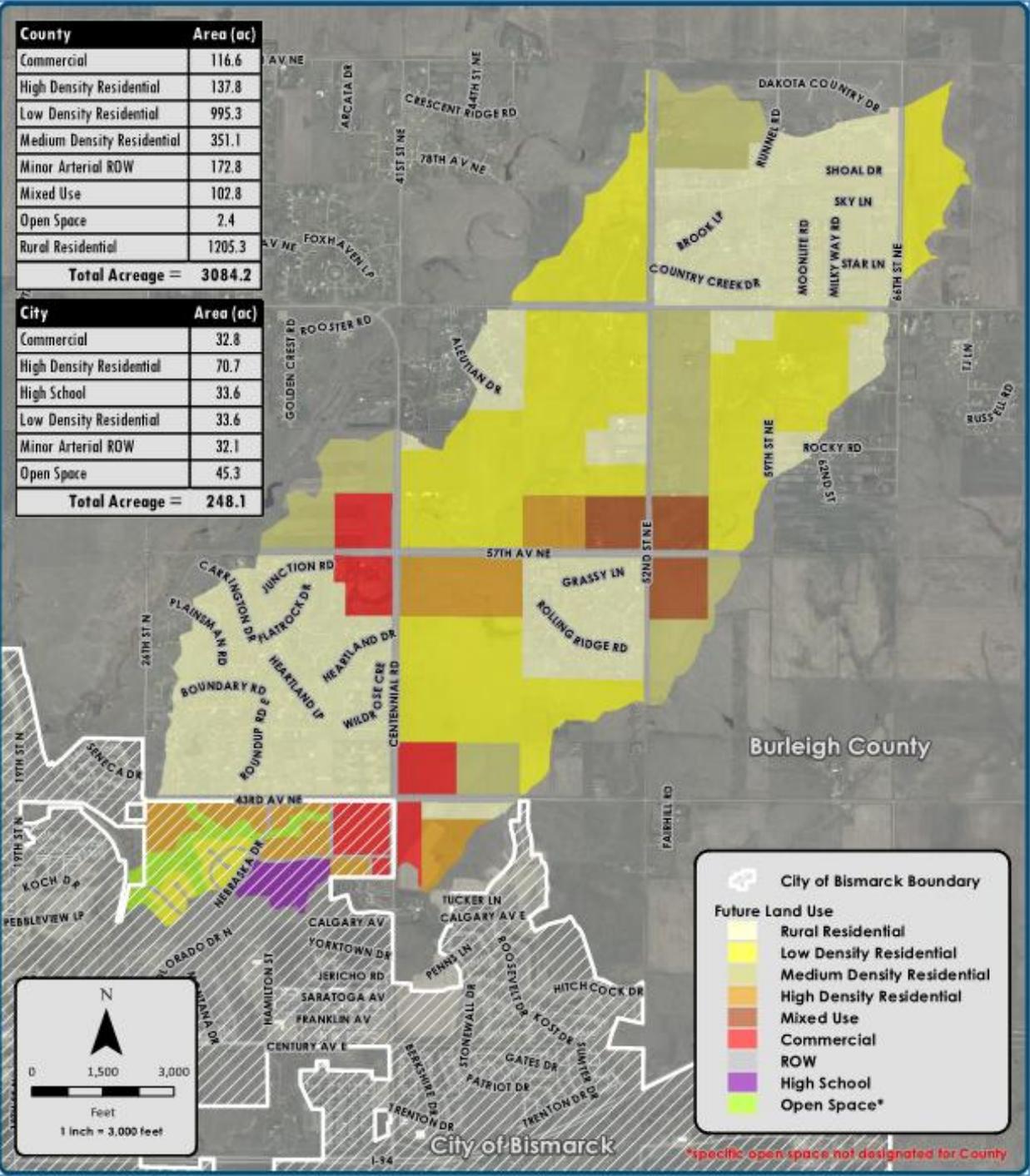
BENEFITS

- Establish Preliminary Development Limits



CHALLENGES

- Funding & Land Acquisition
 - Studies
 - Assessment of Areas Outside the City



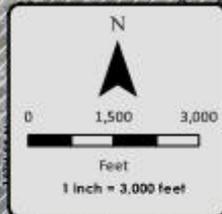
County	Area (ac)
Commercial	116.6
High Density Residential	137.8
Low Density Residential	995.3
Medium Density Residential	351.1
Minor Arterial ROW	172.8
Mixed Use	102.8
Open Space	2.4
Rural Residential	1205.3
Total Acreage =	3084.2

City	Area (ac)
Commercial	32.8
High Density Residential	70.7
High School	33.6
Low Density Residential	33.6
Minor Arterial ROW	32.1
Open Space	45.3
Total Acreage =	248.1

City of Bismarck Boundary

Future Land Use

- Rural Residential
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Mixed Use
- Commercial
- ROW
- High School
- Open Space*

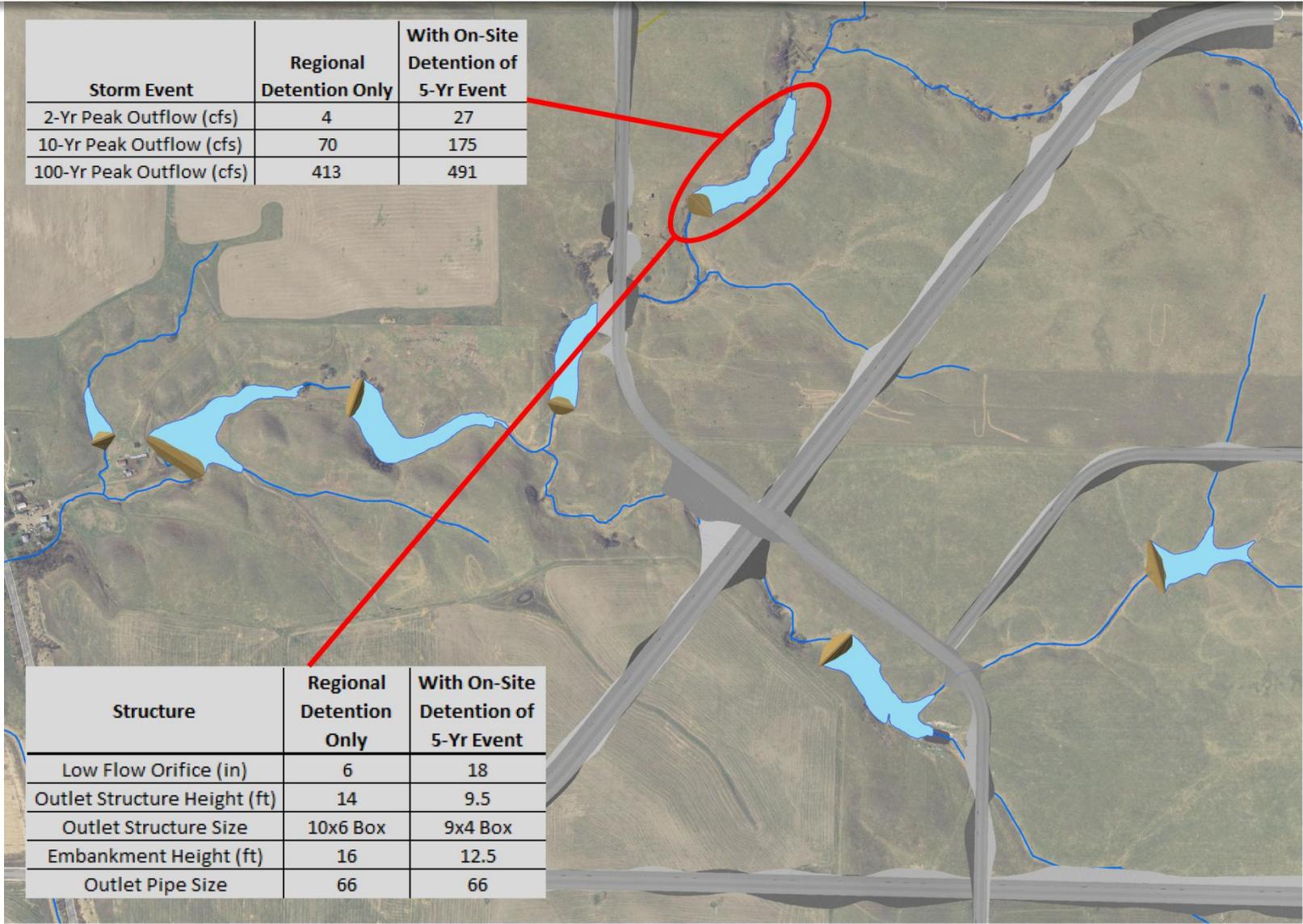


*specific open space not designated for County

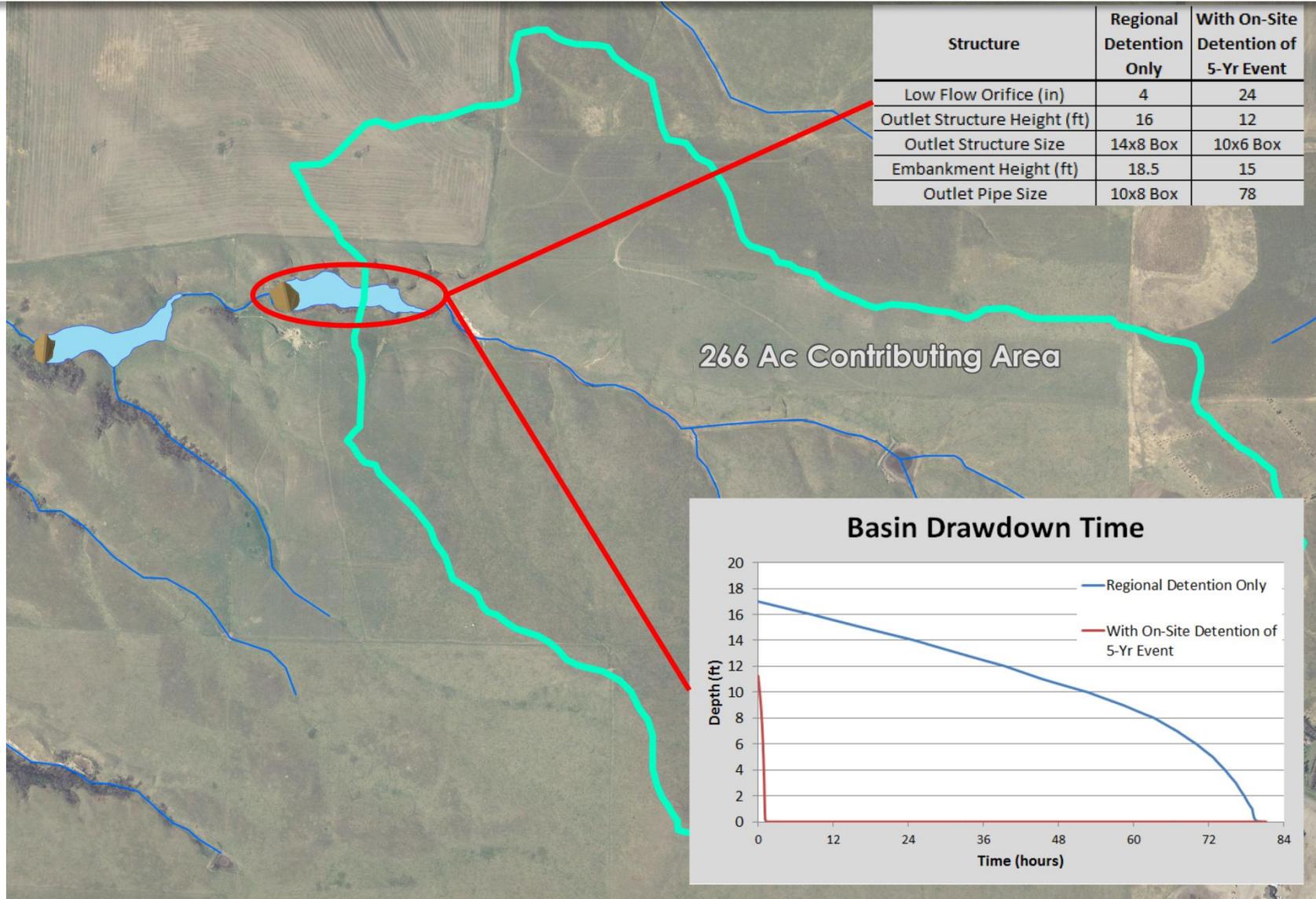
CHALLENGES

Storm Event	Regional Detention Only	With On-Site Detention of 5-Yr Event
2-Yr Peak Outflow (cfs)	4	27
10-Yr Peak Outflow (cfs)	70	175
100-Yr Peak Outflow (cfs)	413	491

Structure	Regional Detention Only	With On-Site Detention of 5-Yr Event
Low Flow Orifice (in)	6	18
Outlet Structure Height (ft)	14	9.5
Outlet Structure Size	10x6 Box	9x4 Box
Embankment Height (ft)	16	12.5
Outlet Pipe Size	66	66



CHALLENGES

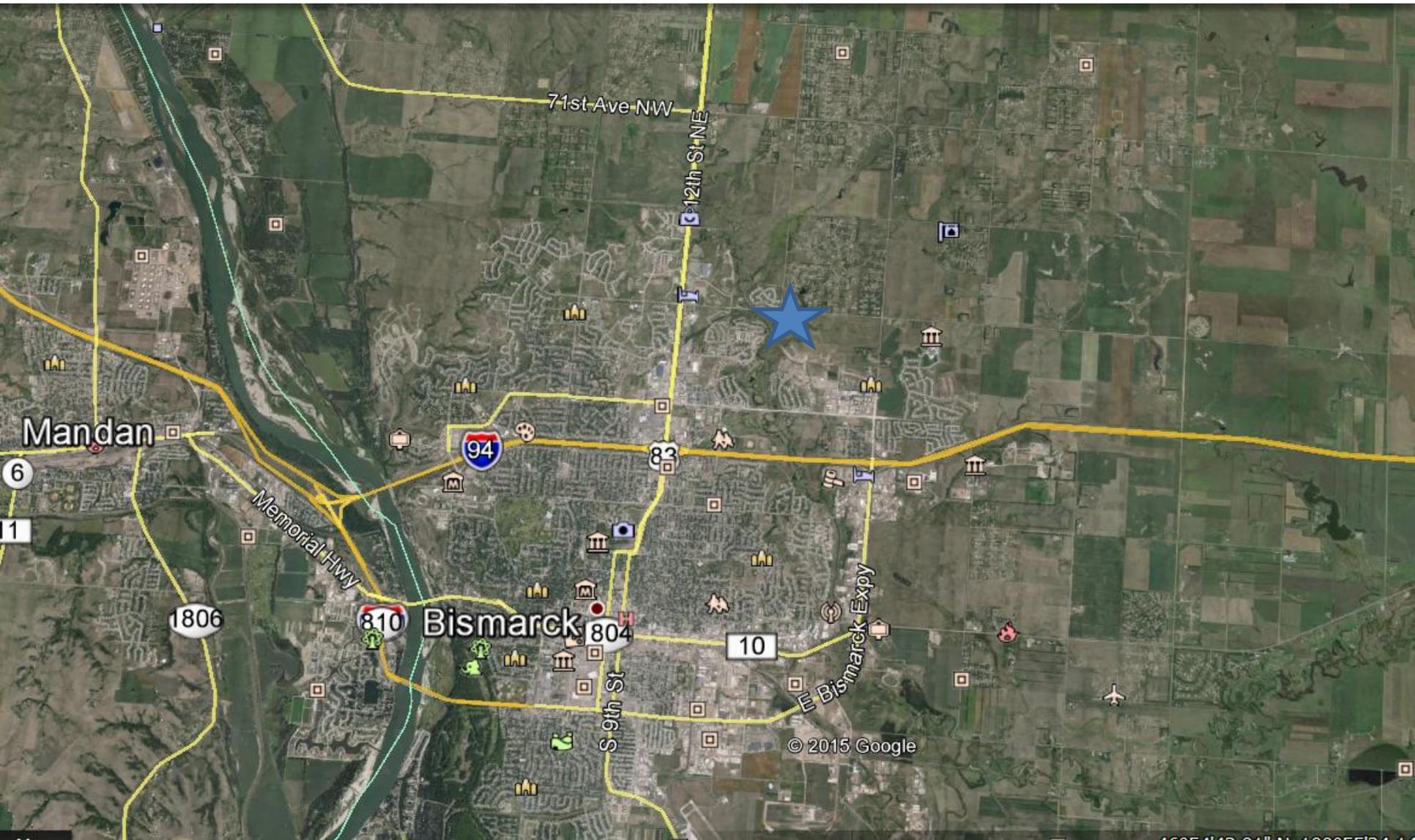


CHALLENGES

- Maintenance
 - City vs. private
 - Large Structures
 - Access

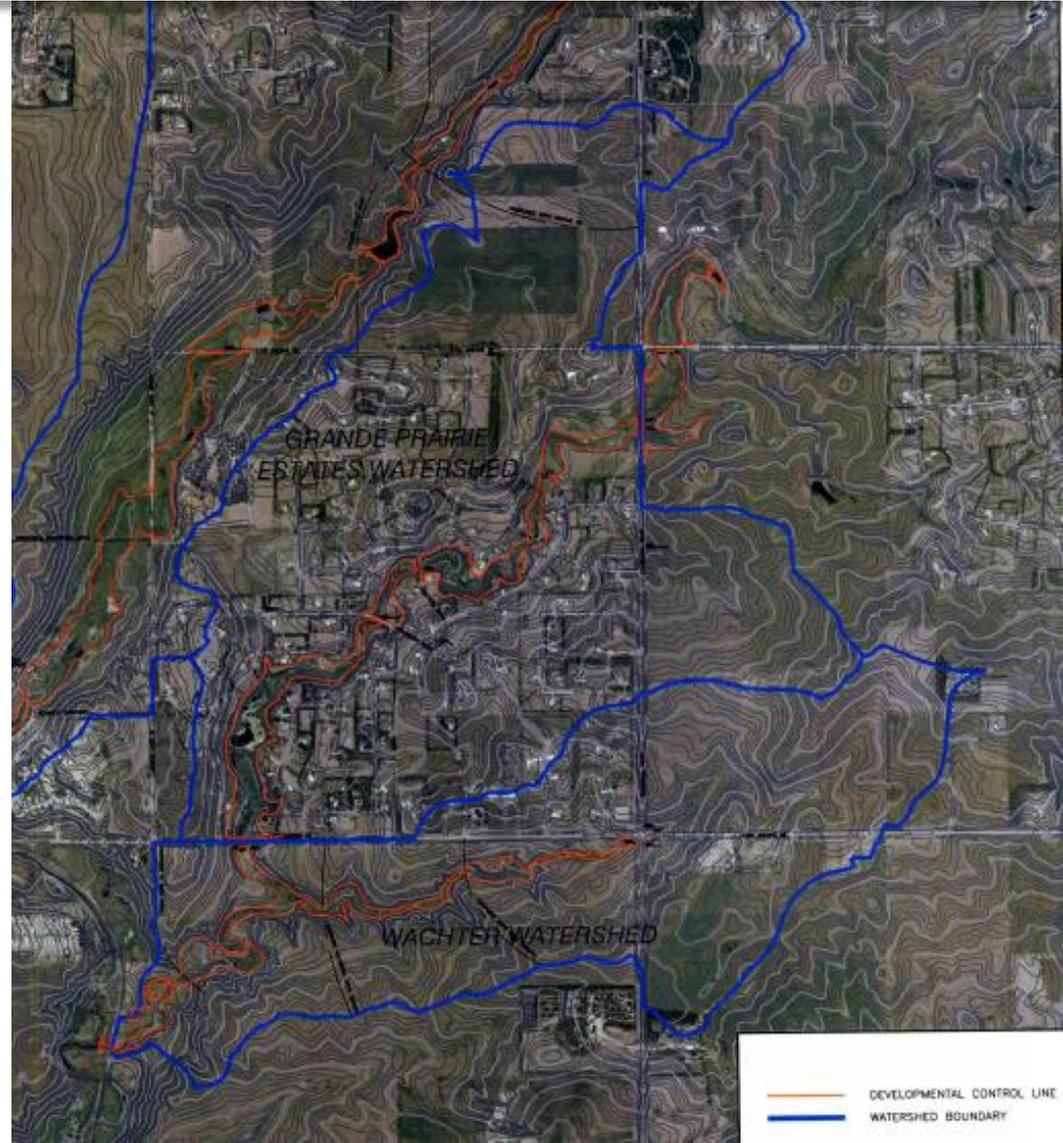


CASE STUDY - Edgewood Regional Stormwater Management Improvements



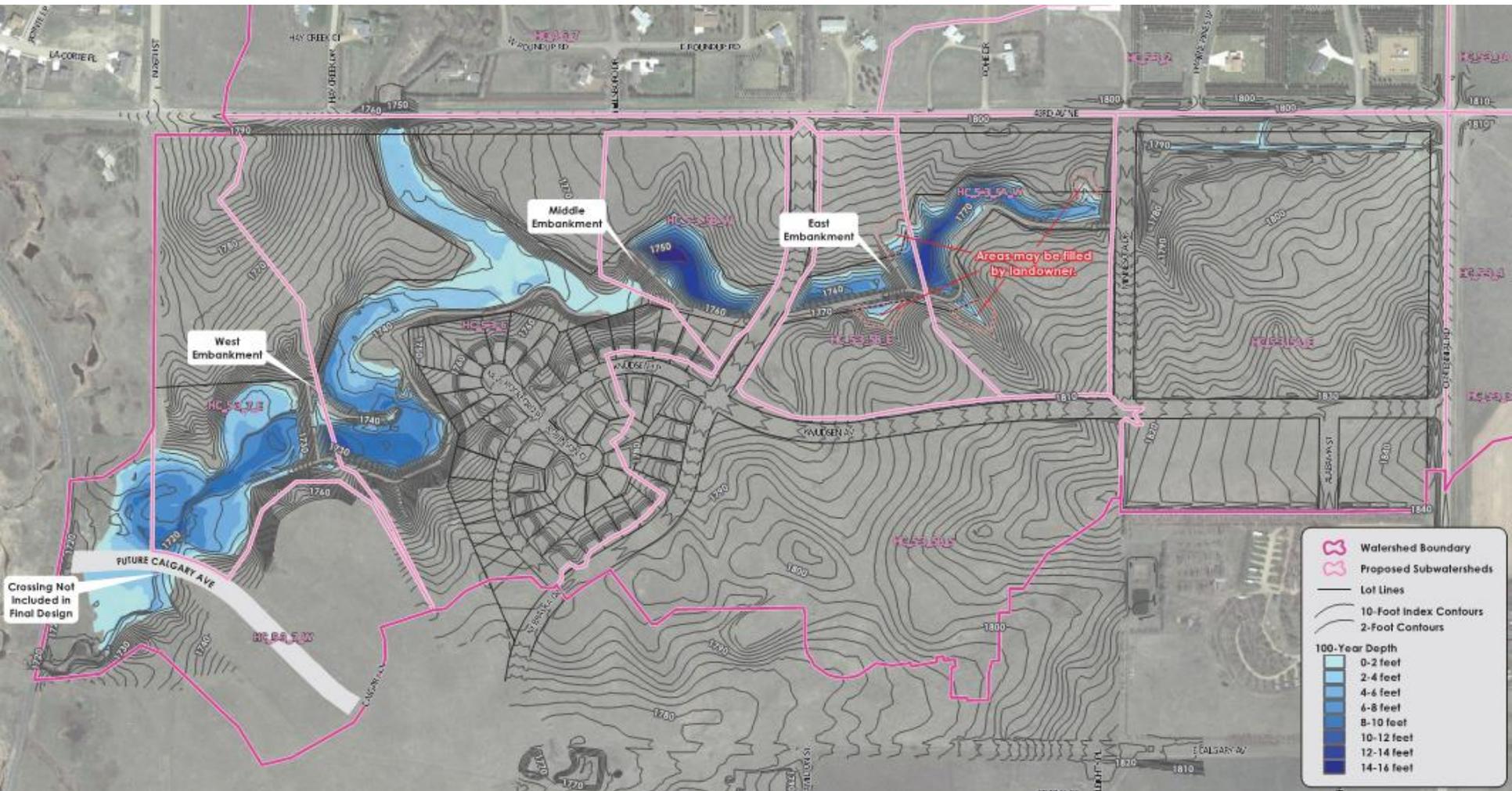
CASE STUDY

- Existing Master Planned Area (2006)
- Updated to Reflect Better Information
 - Atlas 14
 - Land Use
 - HSG
 - Regional Development



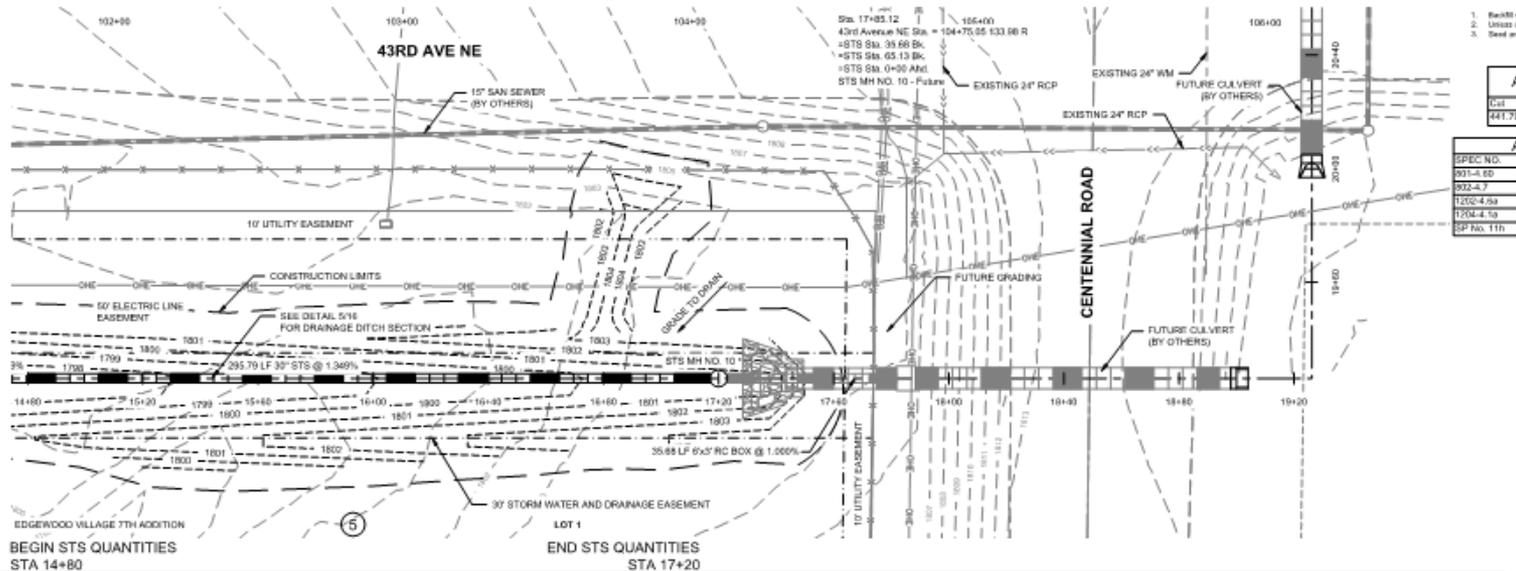
CASE STUDY

- Evaluated Regional Conveyance and Detention



CASE STUDY

- Evaluated Regional Conveyance

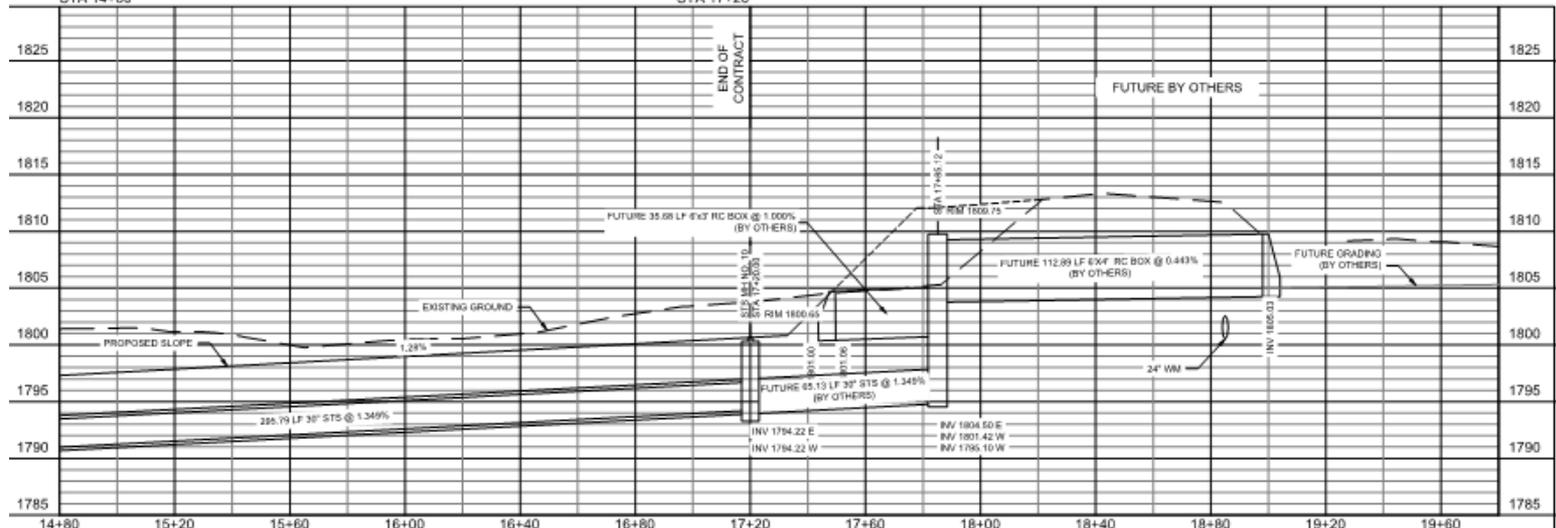


1. Rev'd
2. Utilized
3. Deleted

SPEC. NO.
011-4.60
032-4.7
1202-4.5a
1203-4.5a
SP No. 11b

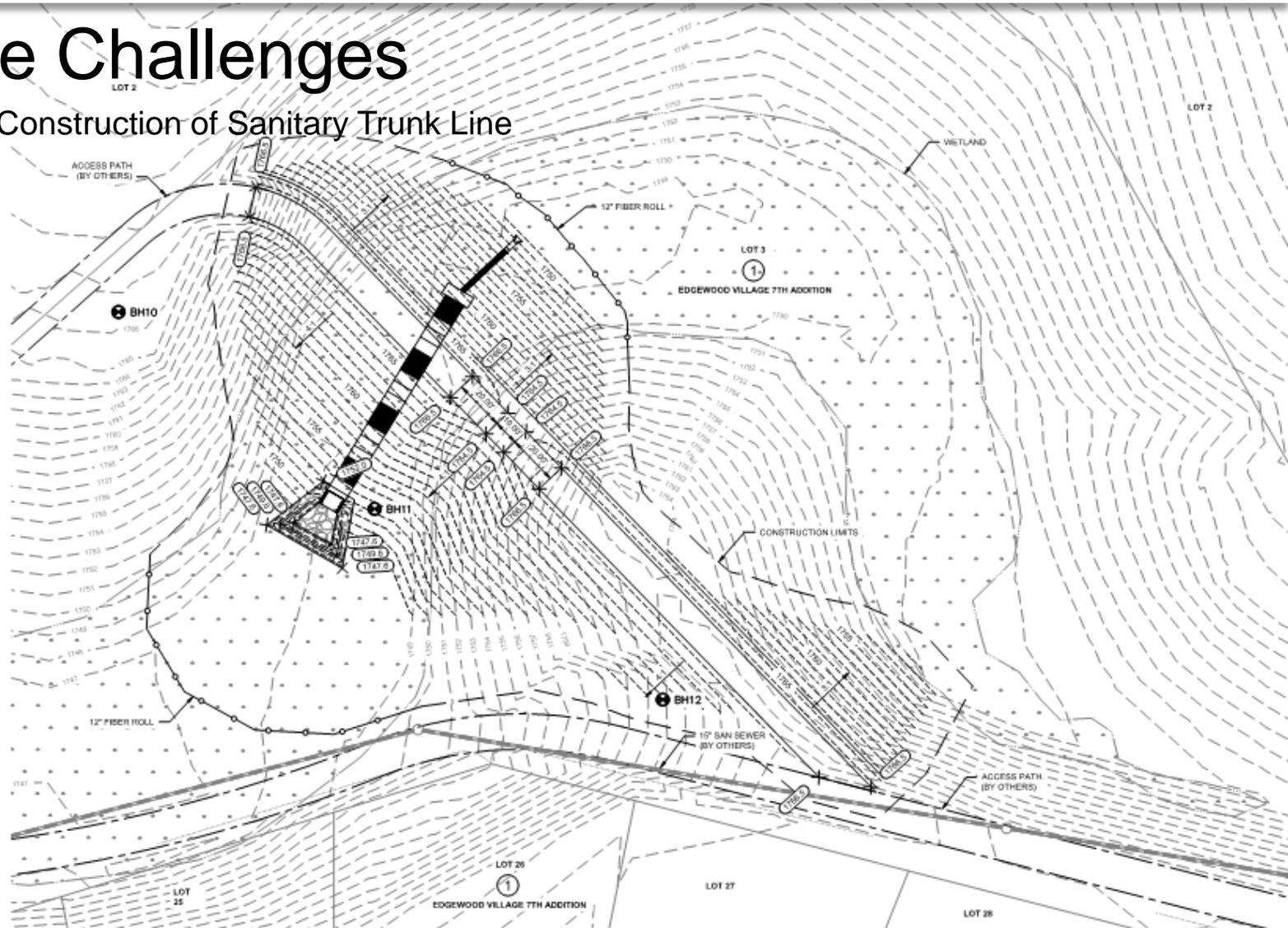
BEGIN STS QUANTITIES
STA 14+80

END STS QUANTITIES
STA 17+20



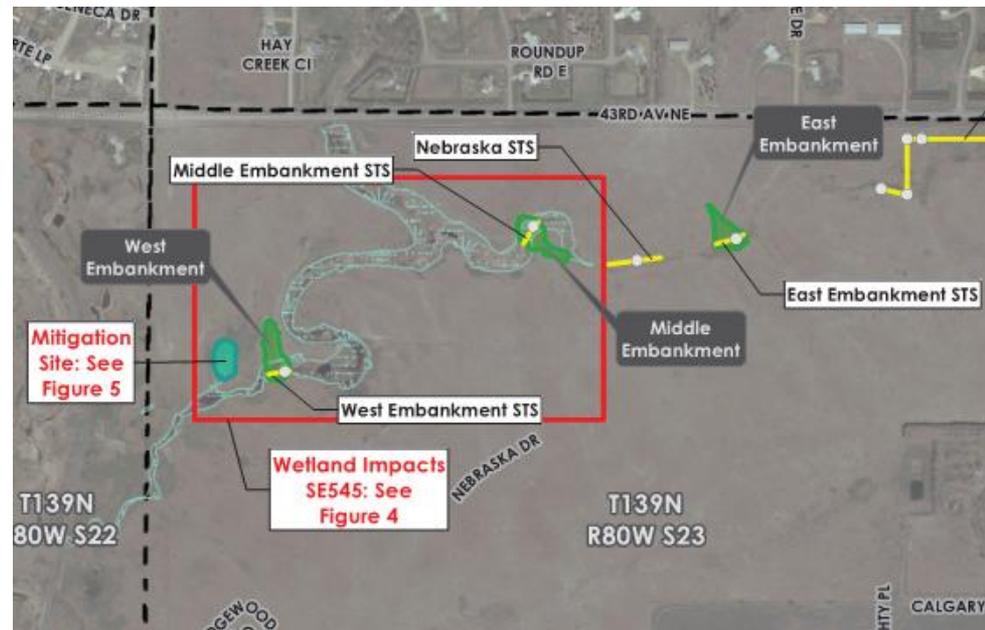
CASE STUDY

- Unique Challenges
 - Design/Construction of Sanitary Trunk Line



CASE STUDY - Edgewood Regional Stormwater Management Improvements

- Unique Challenges
 - USACE Permitting



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CASE STUDY - Edgewood Regional Stormwater Management Improvements



West Embankment

43rd Ave NE

N Colorado Dr

Nebraska

Jordan

Jericho

West Embankment

CASE STUDY - Edgewood Regional Stormwater Management Improvements



CASE STUDY - Edgewood Regional Stormwater Management Improvements



CASE STUDY - Edgewood Regional Stormwater Management Improvements



CASE STUDY - Edgewood Regional Stormwater Management Improvements



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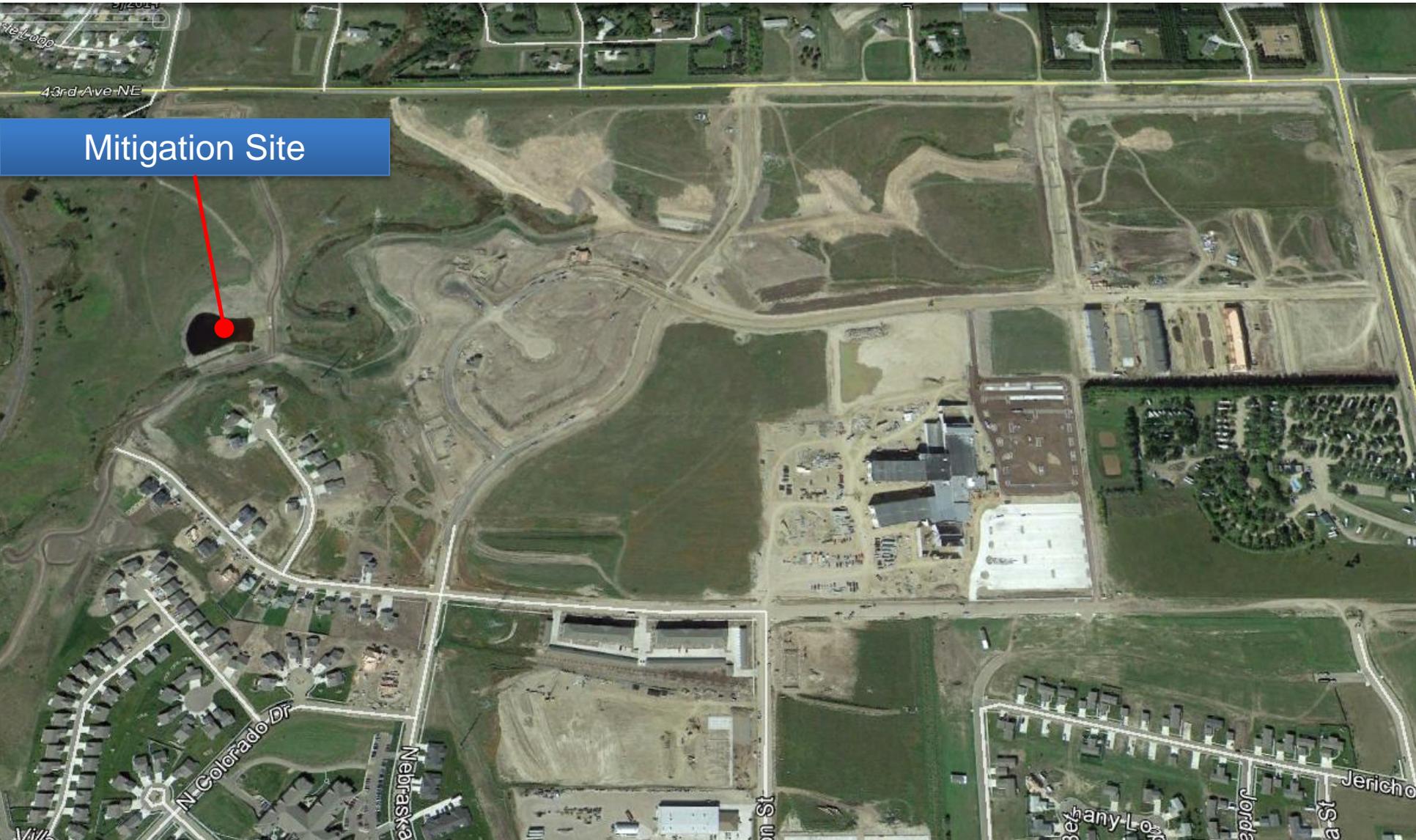
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Mitigation Site

CASE STUDY - Edgewood Regional Stormwater Management Improvements



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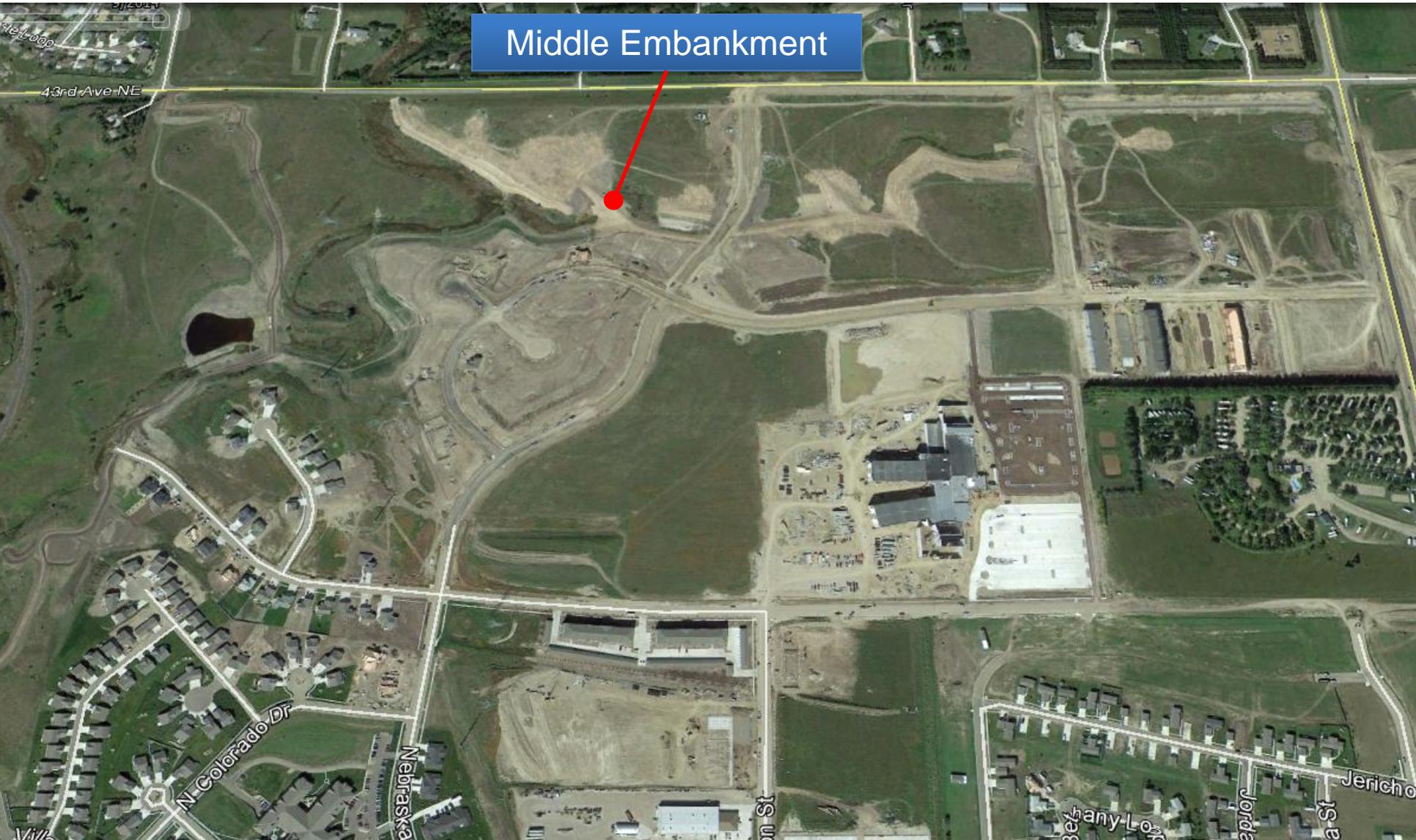
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CASE STUDY - Edgewood Regional Stormwater Management Improvements



Middle Embankment

43rd Ave NE

N Colorado Dr

Nebraska

Jericho

Bethany Ln

Jordan

East St

Village

CASE STUDY - Edgewood Regional Stormwater Management Improvements



CASE STUDY - Edgewood Regional Stormwater Management Improvements



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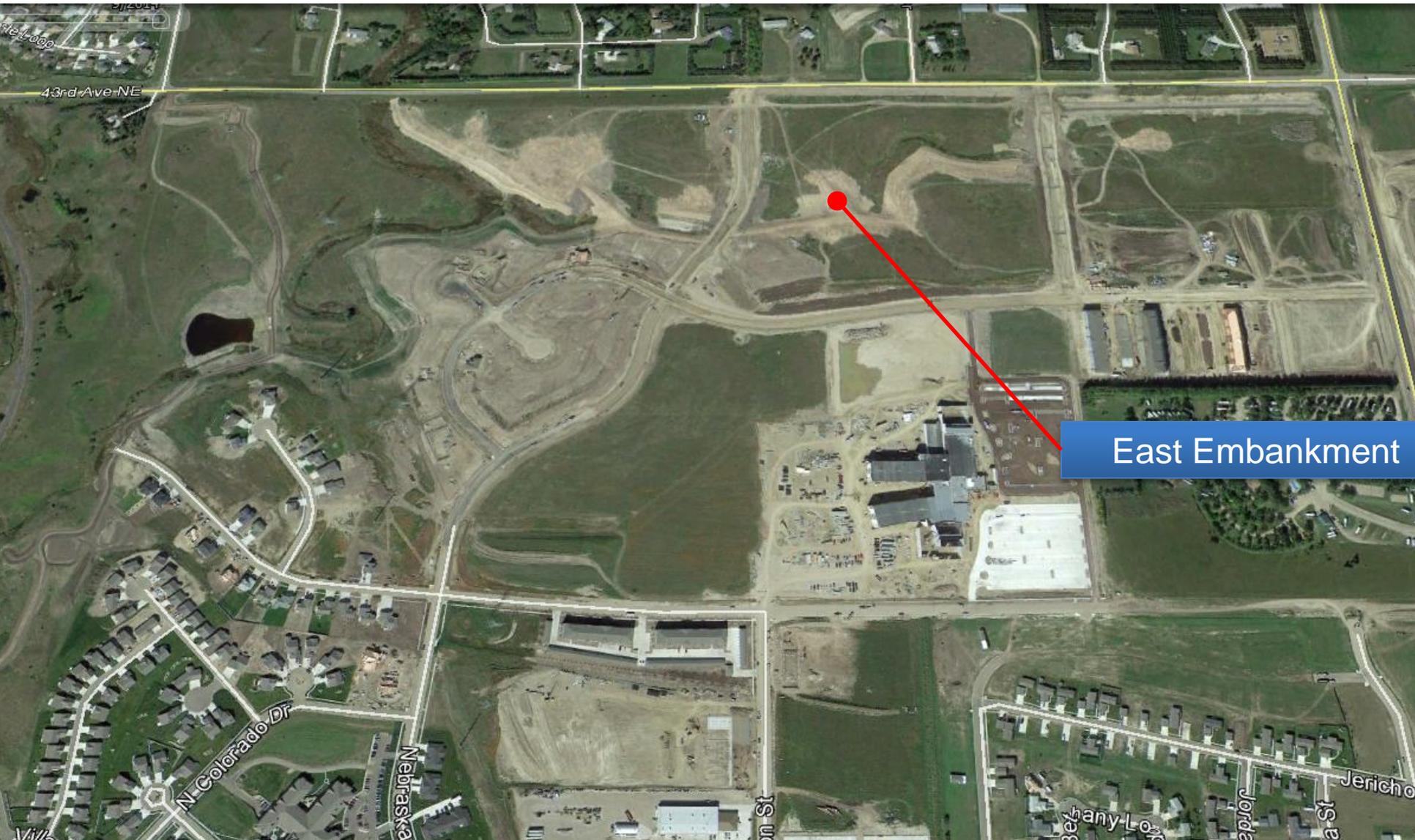
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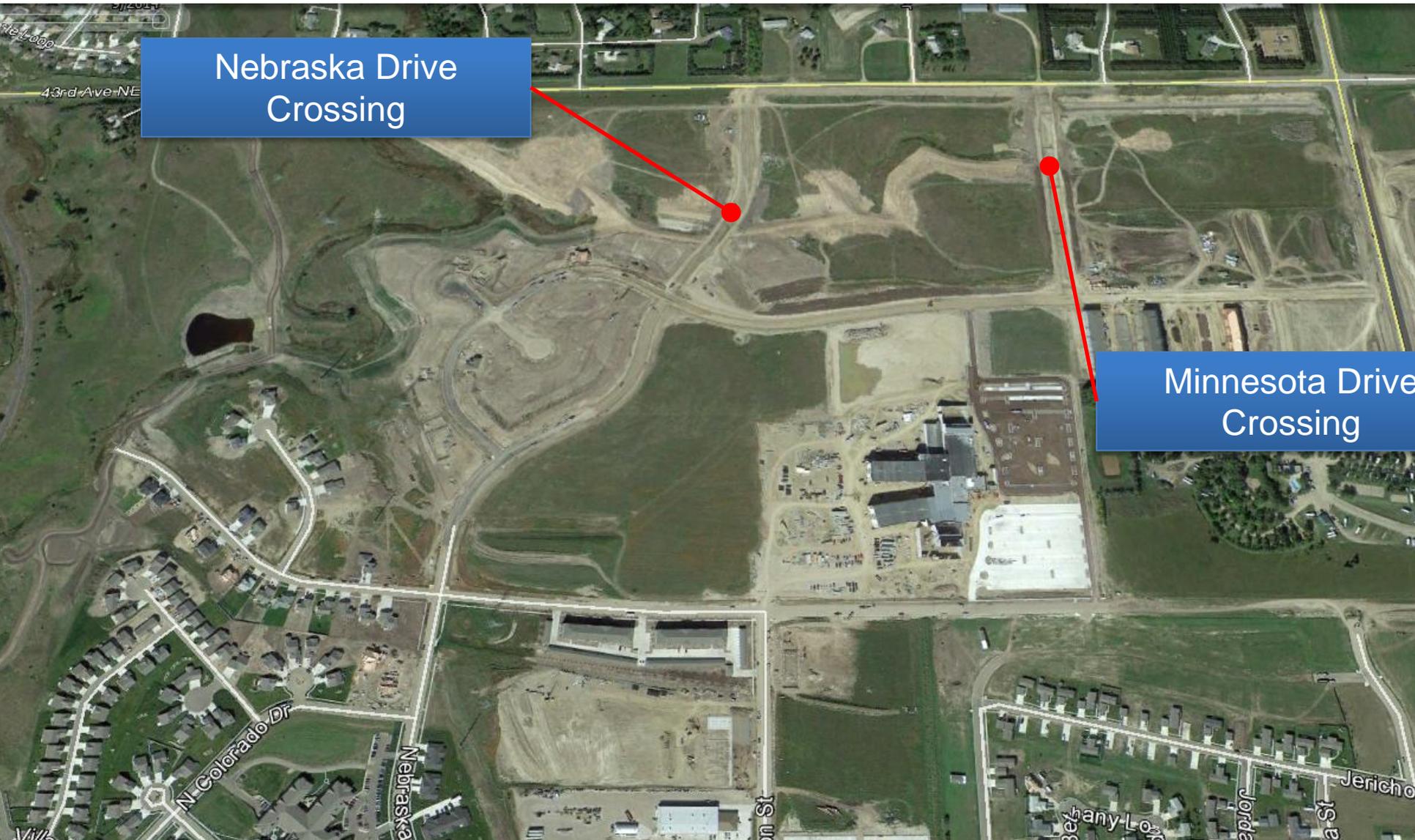
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Nebraska Drive
Crossing

Minnesota Drive
Crossing

CASE STUDY - Edgewood Regional Stormwater Management Improvements



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Swale/Storm Sewer

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THANK YOU! QUESTIONS?

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