America's River II

Bee Branch Creek Restoration

City of Dubuque, Iowa

Eric Vieth, P.E. Strand Associates

THE CITY OF DUBUQUE
Masterpiece on the Mississippi

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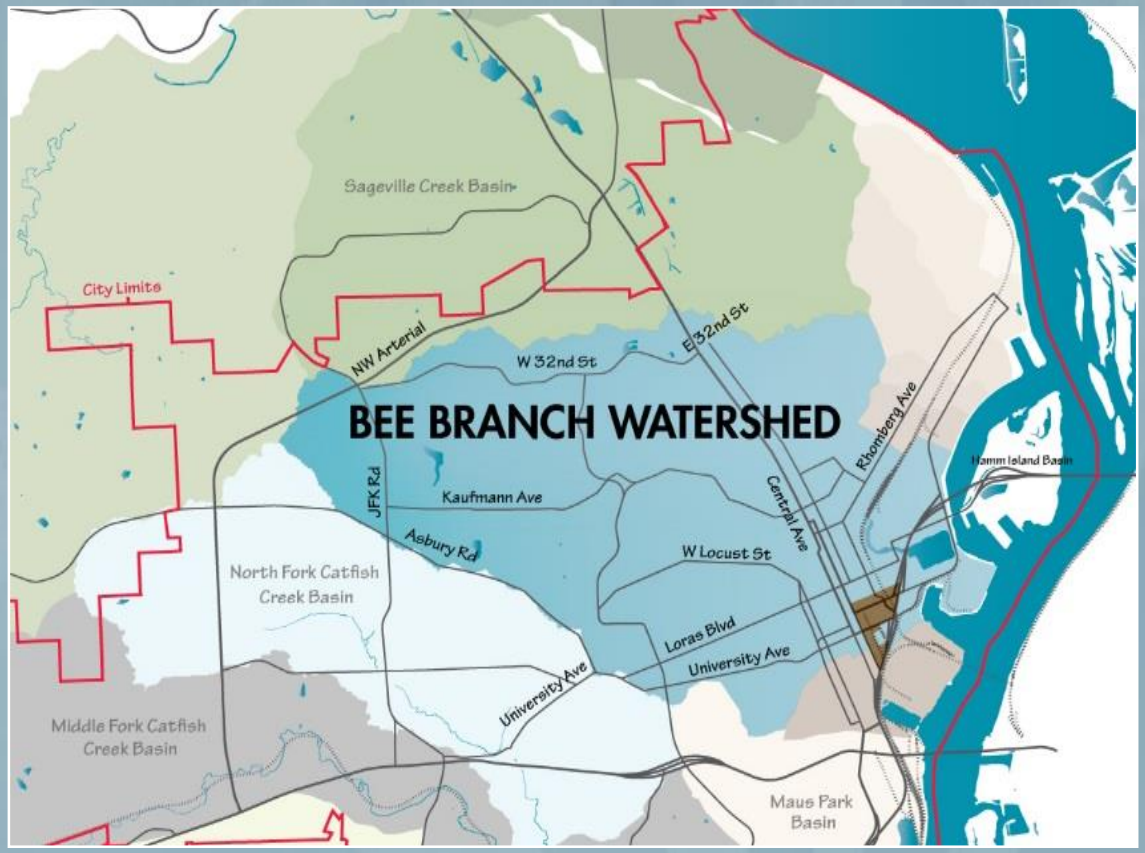
Bee Branch Watershed

- Drains to the Bee Branch Creek/Culvert, tributary to the Mississippi
- Approximately 6.5 sq. miles
- Over 50% of Dubuque residents either work or live in the watershed.



Bee Branch Creek Restoration

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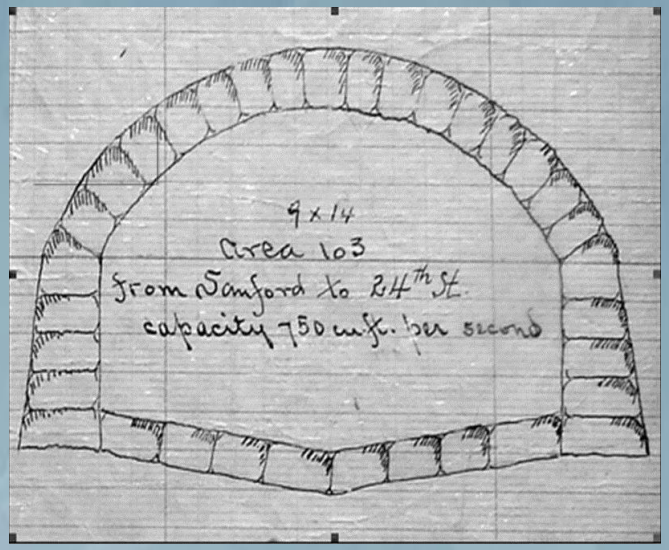
Existing Limestone Arch Culvert



Limestone Arch Culvert
Constructed in early 1900s

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Presidential Disaster Declarations in:

1999

2002

2004

2006

2010

2011

$70 M in damages

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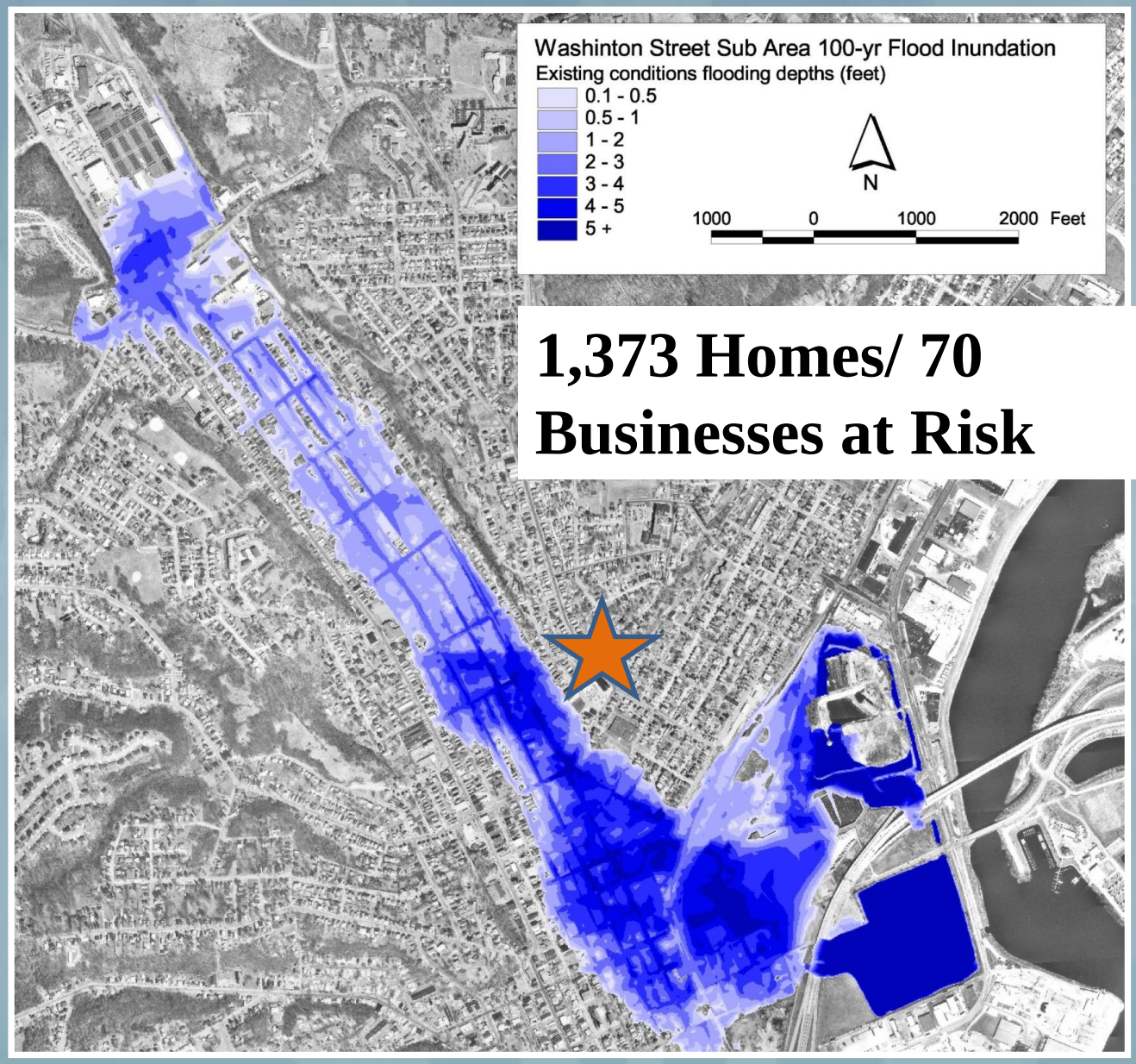
Bee Branch Watershed



1,373 Homes/ 70 Businesses at Risk

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Drainage Basin Master Plan

December 1998-2001

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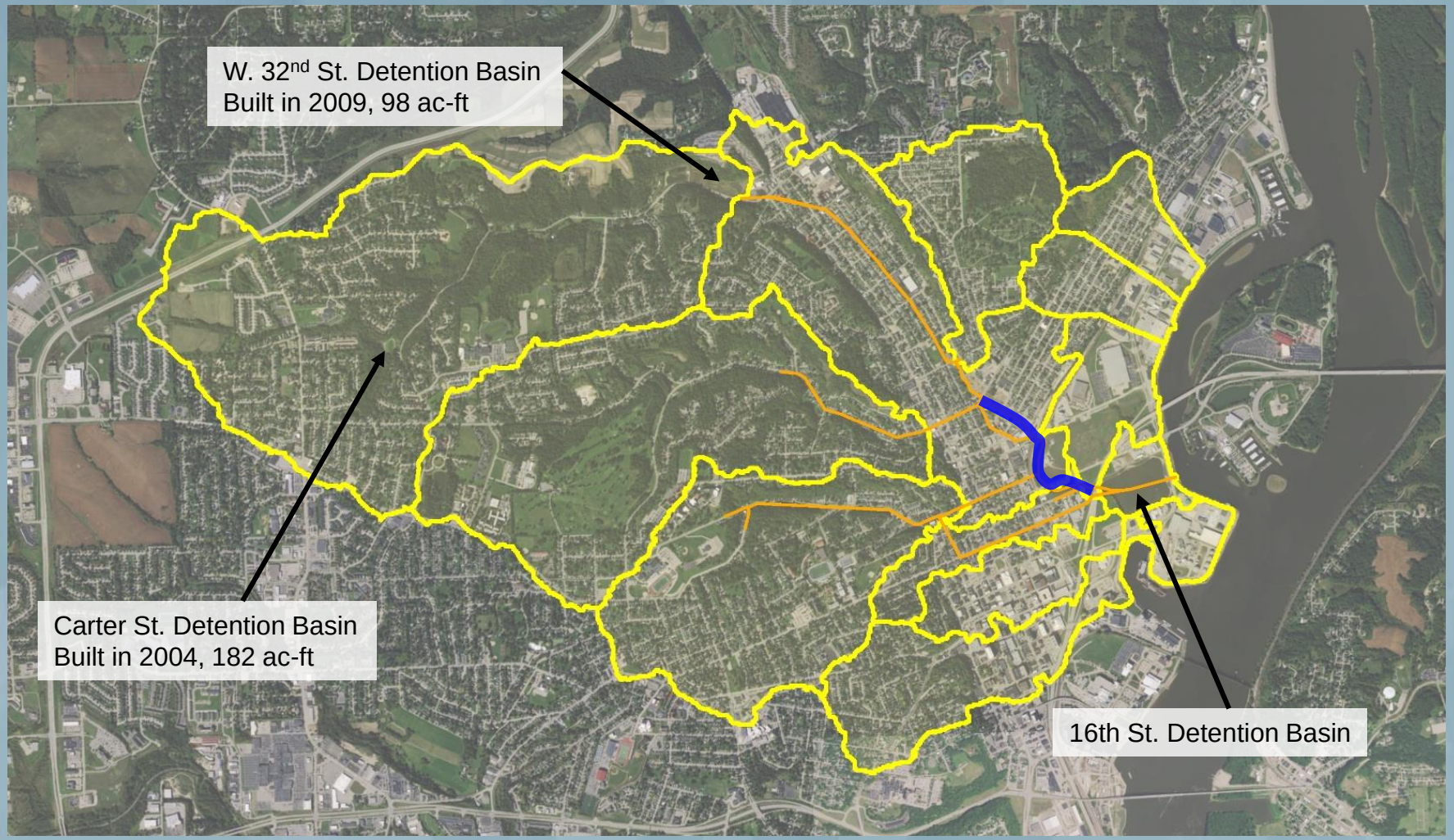
Bee Branch Watershed



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Bee Branch Creek Alignment Study

Fall 2004

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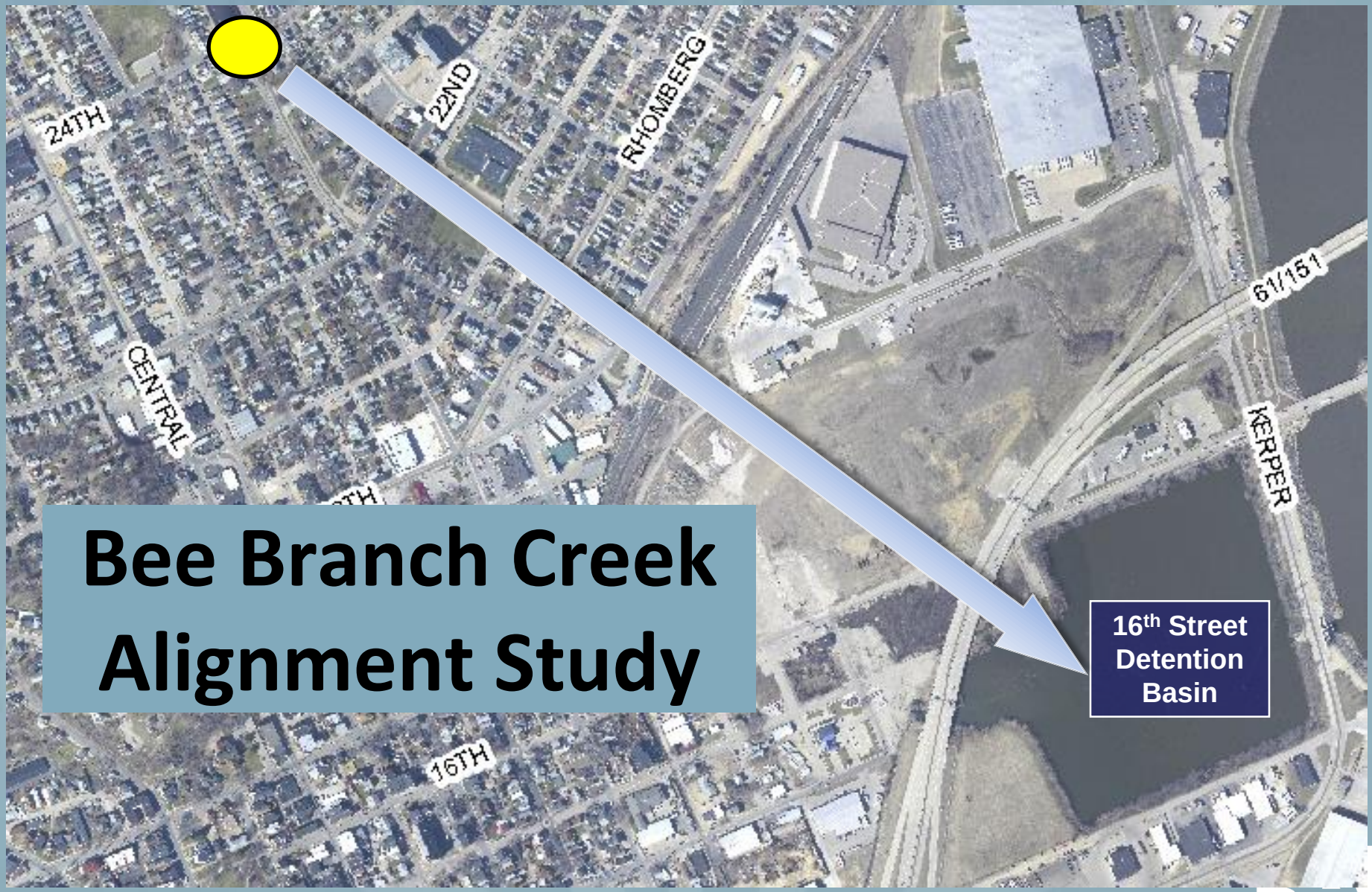
Bee Branch Watershed



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Project Goals

- **Primary - Flood Protection**

- **Secondary – Community Asset**
  - Aesthetics
  - Recreation
  - Water Quality

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The Bee Branch Creek Daylighting Solution is a.....

"Multiphased, fiscally responsible investment to:

1) **Mitigate flooding**
2) **Improve water quality**
3) **Stimulate investment**
4) **Enhance quality of life"**

- From 2004 to 2009, commercial property values increased by 39% citywide in Dubuque, but they fell by 6% in the flood prone areas.

- Daylighting Project will prevent an estimated $582 million in damages over the 100-year design life of the project.

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Watershed Project Timeline and Costs

Infrastructure Improvement	Status	Cost
Carter Road Detention Basin	Completed in 2003	$1,076,315
West 32nd Street Detention Basin	Completed in 2009	$4,158,589
Lower Bee Branch Creek Restoration	Completed in 2011	$21,274,685
Historic Millwork District Complete Streets	Completed in 2012	$7,977,311
Flood Mitigation Gate Replacement	Est. Completion - 2017	$2,099,000
Upper Bee Branch Creek Restoration	Est. Completion - 2017	$60,203,636
22nd St. Storm Sewer Capacity Improvements	Est. Completion - 2017	$3,906,000
North End Storm Sewer Capacity Improvements	Est. Completion - 2018	$1,341,000
Bee Branch Creek Railroad Culverts	Est. Completion - 2019	$18,249,000
Kaufmann Ave. Storm Sewer Capacity Improvements	Est. Completion - 2019	$11,500,000
Flood Mitigation Maintenance Facility	Est. Completion - 2020	$5,431,000
Bee Branch Healthy Homes Resiliency Program *(Assistance to over 300 homes in the Bee Branch Watershed)*	Est. Completion - 2021	$8,427,665
W. Locust St. Storm Sewer Capacity Improvements	Est. Completion - 2021	$2,600,000
17th St. Storm Sewer Capacity Improvements	Est. Completion - 2022	$8,681,000
Water Plant Flood Protection	Est. Completion - 2023	$4,397,000
Impervious Surface Reduction (240 Green Alleys)	Est. Completion - 2038	$57,420,000
	Total cost, excluding interest on debt:	**$218,742,201**
	Total grants to date:	**$160,000,000**

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Public engagement Process

- Landscape Design Advisory Committee — Oct 15, 2008
- Neighborhood Workshop #1 — Oct 22/23, 2008
  - Hopes, Desires & Fears of Project
  - Visual Preference Survey
- Landscape Design Advisory Committee — Oct 29, 2008
- Neighborhood Workshop #2 — Nov 5/6, 2008
  - Three creek cross section alternatives
- Landscape Design Advisory Committee — Nov 25, 2008
- Landowner Meeting Opportunity — Dec 9, 2008
  - Three creek cross section alternatives

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BEE BRANCH CREEK – 1 MILE CORRIDOR

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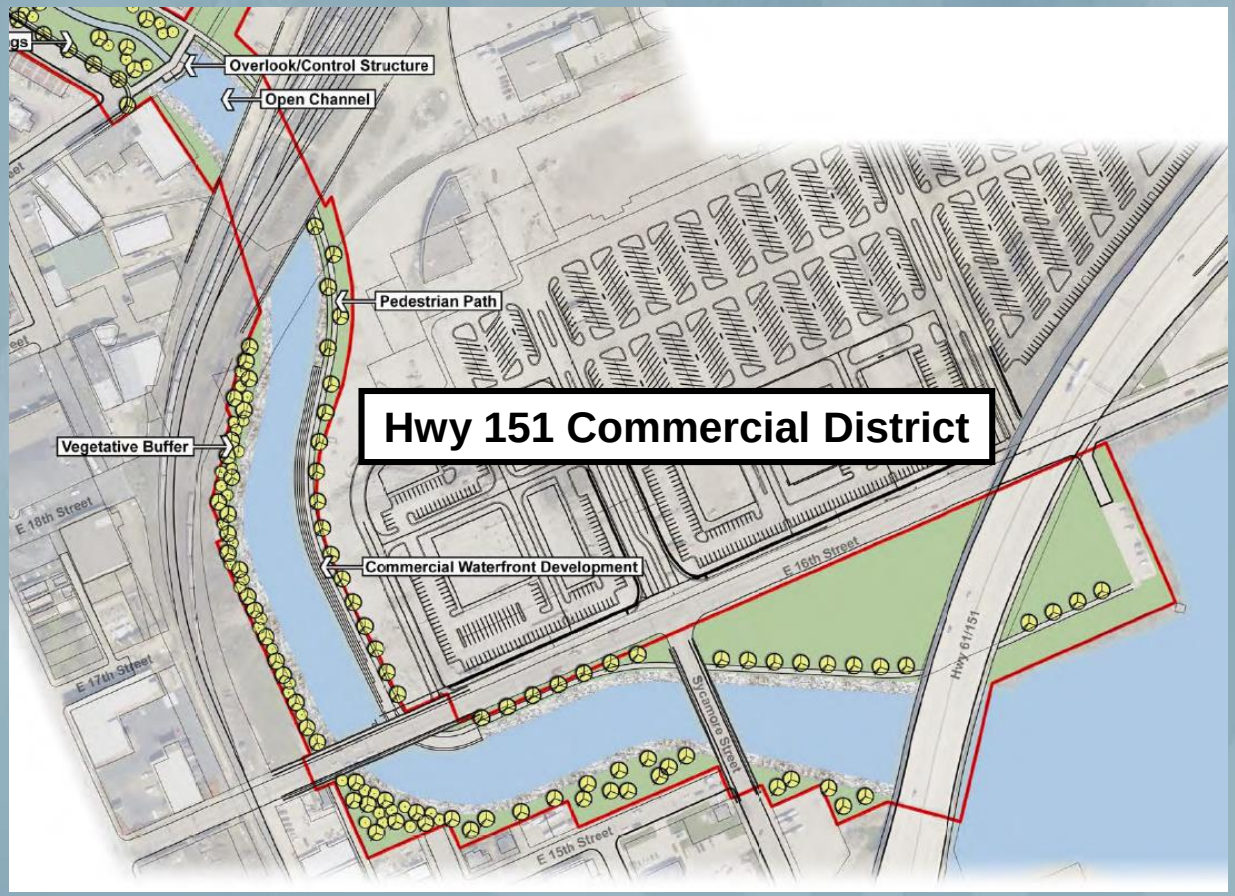
Design Process

In 2009 the focus shifts to complete the final design plans for the . . .

Lower Bee Branch Creek Restoration Project



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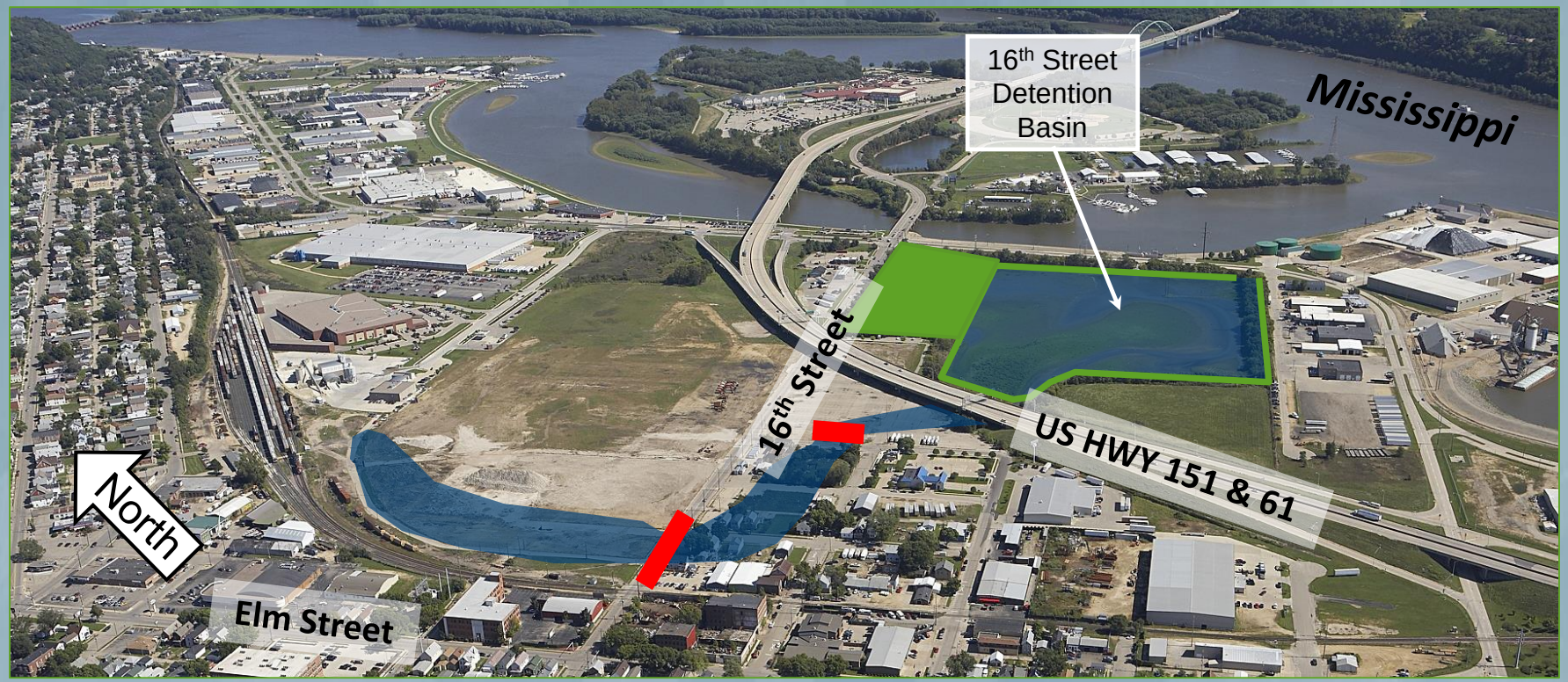
PHASE I: LOWER BEE BRANCH



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Construction

Spring 2010, construction starts on the

Lower Bee Branch Creek Restoration Project

……with construction completed in Fall 2011.

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PHASE I: LOWER BEE BRANCH

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Lower Bee Branch Channel

Downstream of 16th Street Bridge

Downstream of Sycamore Street Bridge

Upstream of 16th Street Bridge

16th Street Detention Pond

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Lower Bee Branch Creek Restoration

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Lower Bee Branch Creek Restoration

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Lower Bee Branch – Enhanced Wildlife Habitat

2014 IOWA DNR FISH ASSESSMENT

- 14 Species of Native Fish
- High Blue Gill Population
- Moderate Bass, Pike, and Perch Population

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Design Process

In 2011 the focus shifts to complete the final design plans for the . . .

Upper Bee Branch Creek Restoration Project

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BEE BRANCH CREEK – 1 MILE CORRIDOR

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Upper Bee Branch Creek - Overall Site

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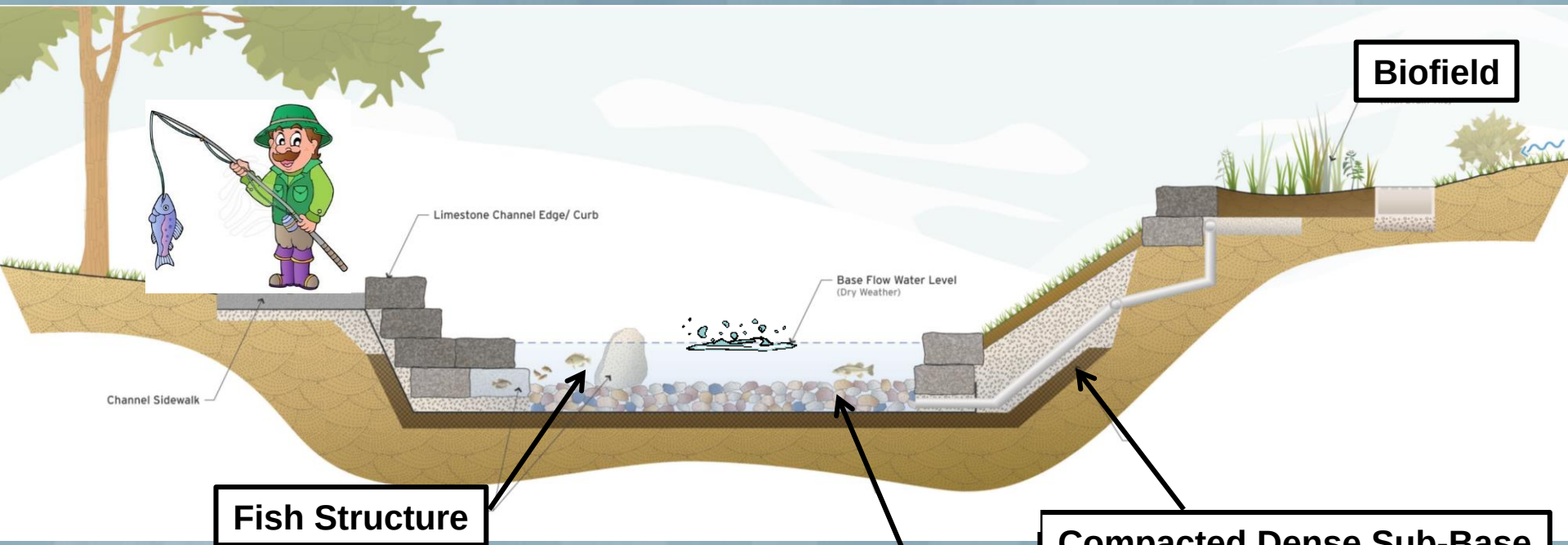
Upper Bee Branch Creek
Typical Channel Section



Biofield

Fish Structure

Compacted Dense Sub-Base

Cobble Channel Bottom

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Upper Bee Branch Flyover Rendering

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Stormwater Quality Elements

- Permeable Pavers
- 3 Bio infiltration Basins
- 5 nutrient separating baffle boxes
- 14 floating treatment islands

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Stormwater Quality – Biofields (Infiltration Basins)

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Stormwater Quality – Permeable Pavers

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Stormwater Quality - Green Alleys

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Stormwater Quality – Permeable Pavers

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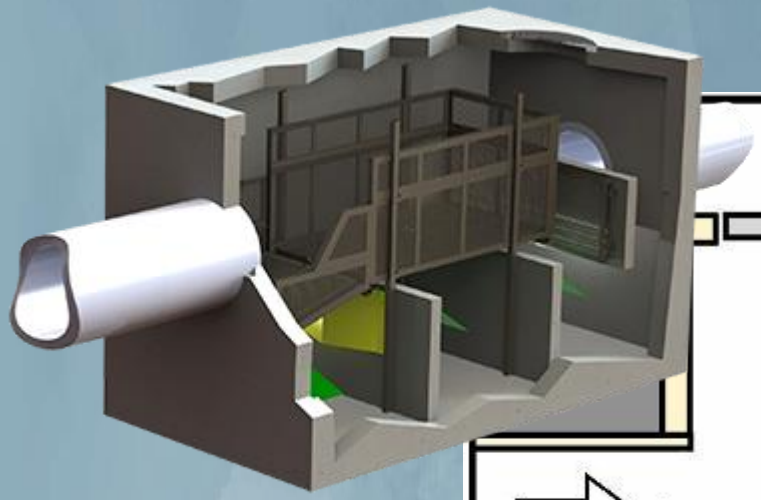
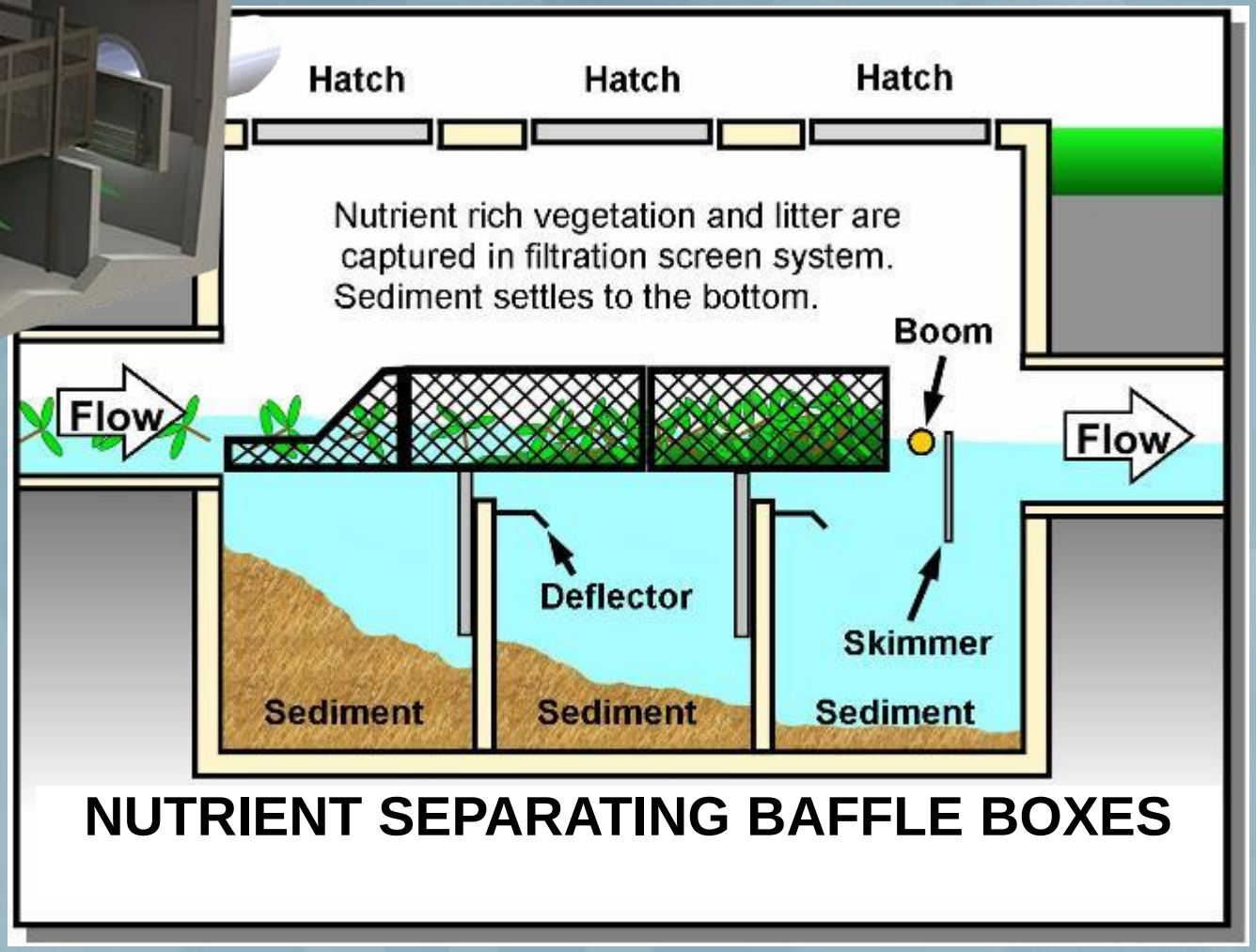
STORMWATER QUALITY – TREATMENT DEVICES





NUTRIENT SEPARATING BAFFLE BOXES

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Stormwater Quality – NSBB's

- High volume storage
- High flow rates
- Dry state storage

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STORMWATER QUALITY - FLOATING ISLANDS

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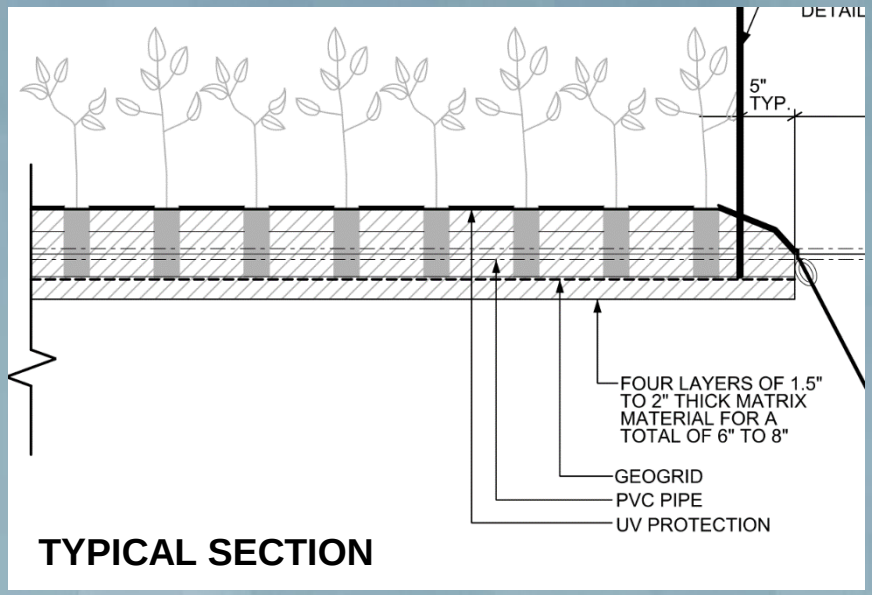
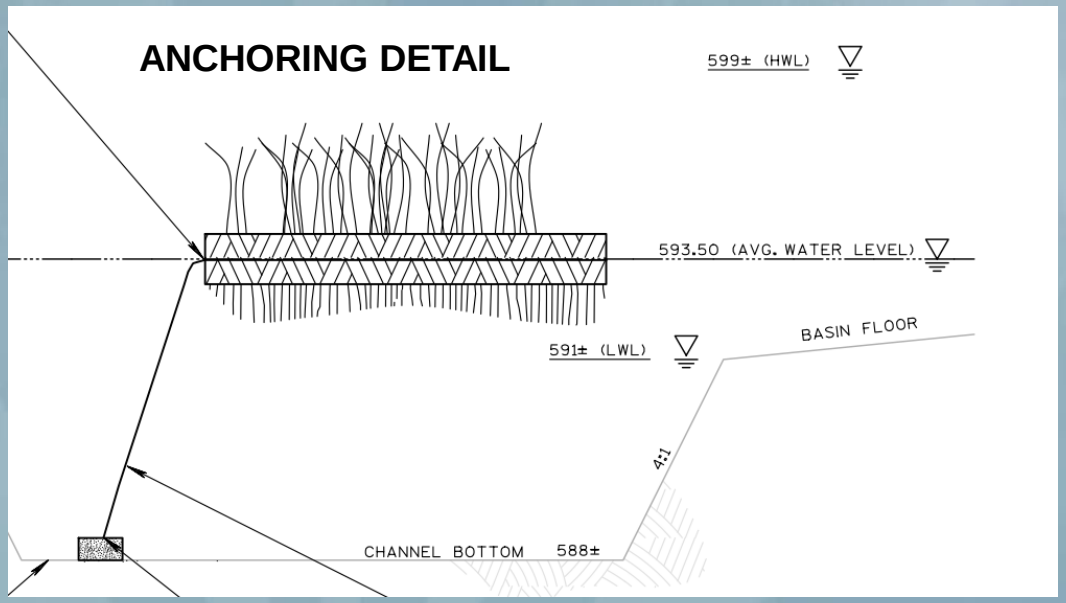
Stormwater Quality - Floating Islands



TYPICAL SECTION



Stormwater Quality - Floating Islands

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Stormwater Quality - Floating Islands

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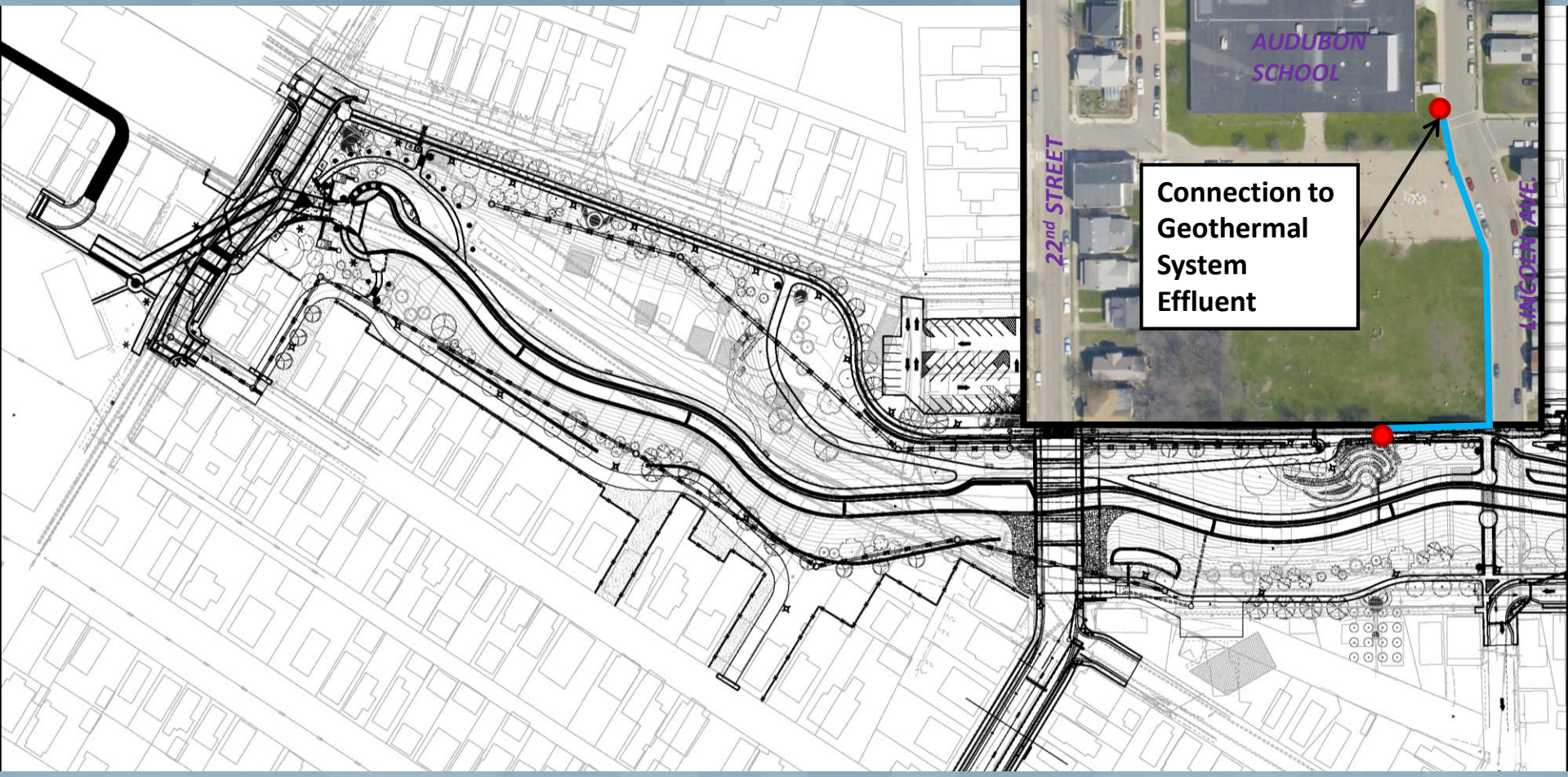
Creek Aeration Features



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CREEK AERATION FEATURES

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CREEK AERATION – OUTFALL DAYLIGHTING (CONNECTION TO EXISTING BEE BRANCH CULVERT)

- 2.5 CFS Dry Weather Base Flow
- 4 Foot Elevation Drop from Existing Culvert to New Channel Bottom

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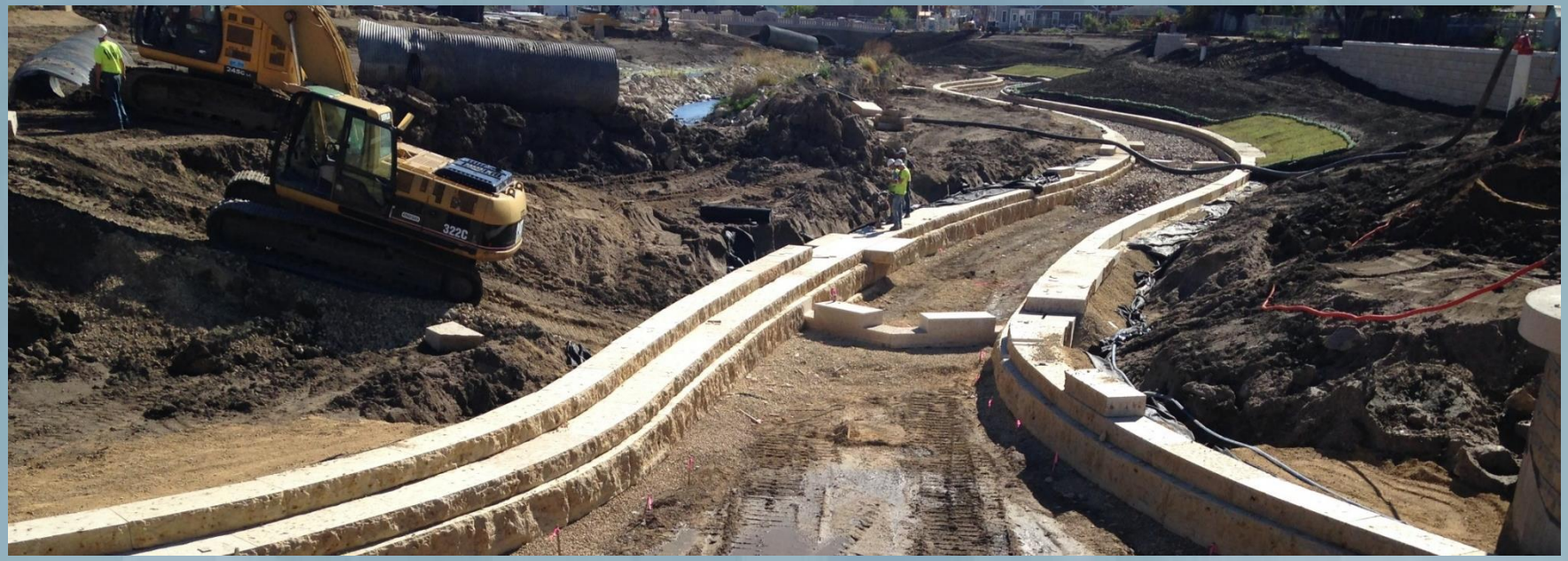
Channel Construction - Fish Habitat



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RAILROAD CROSSING– NEXT PHASE

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RR CROSSING – TRENCHLESS CULVERTS

- 25 M Estimated Construction Cost
- 6- 96” I.D. Steel Culvert Pipes
- Microtunneling or EPB TBM (Earth Pressure Balance Tunnel Boring Machine

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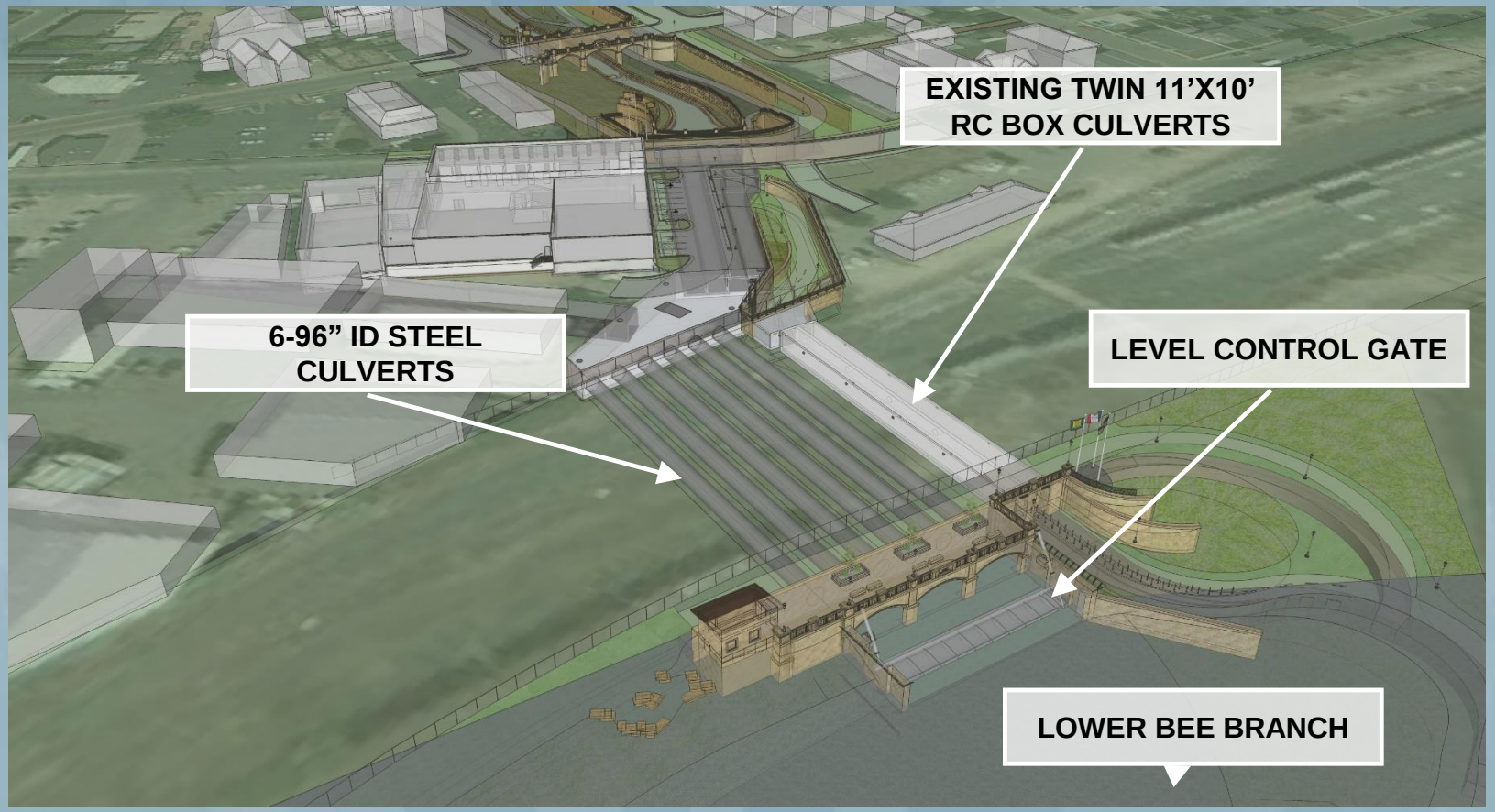
RR CROSSING – TRENCHLESS CULVERTS



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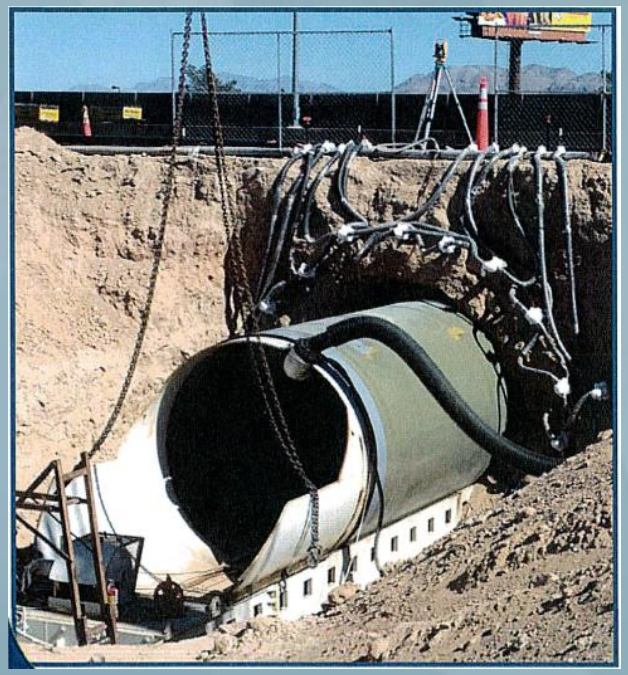
RR CROSSING – TRENCHLESS CULVERTS



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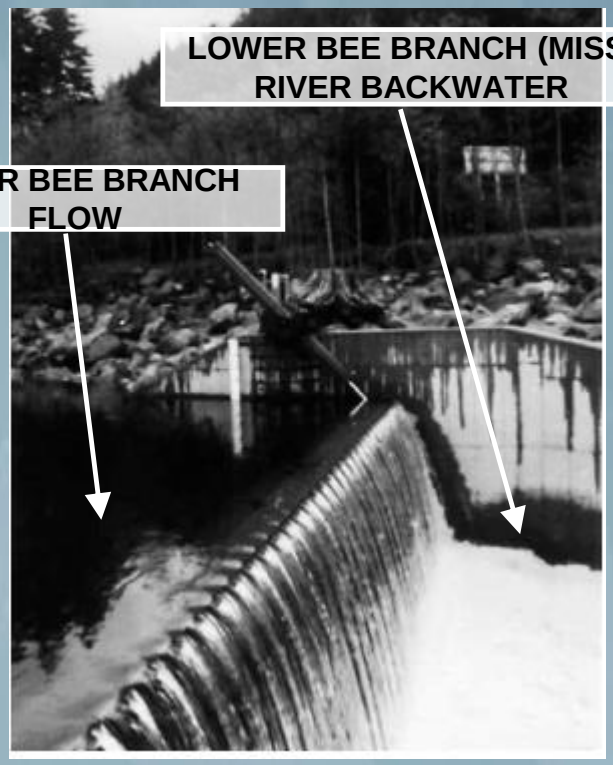
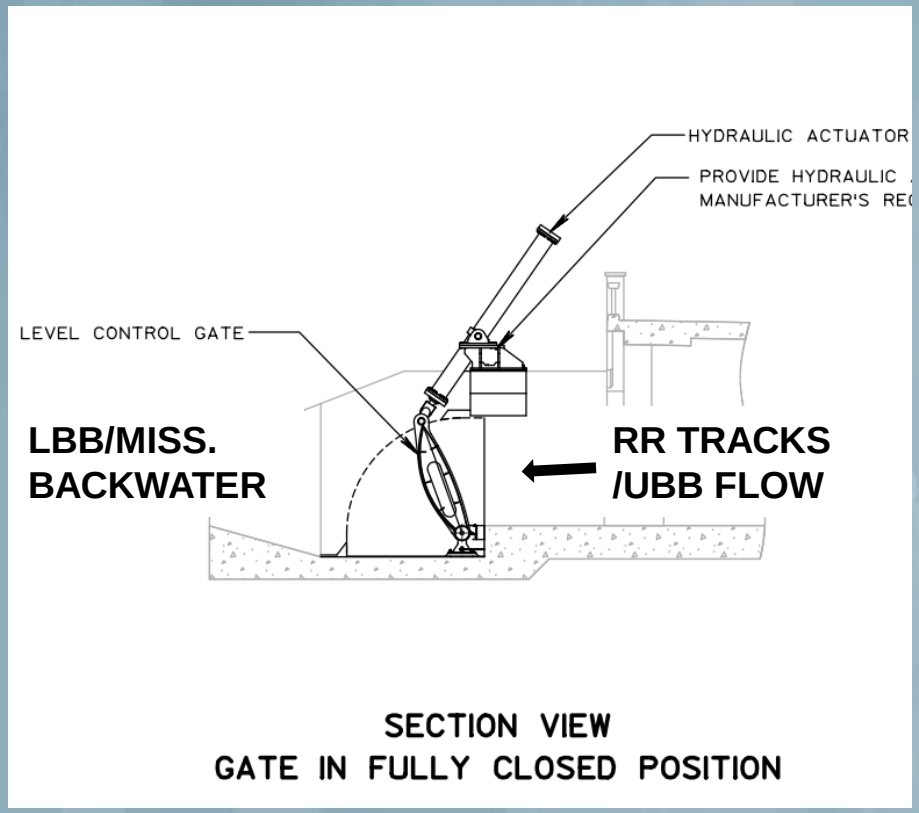
RR CROSSING – LEVEL CONTROL GATE



HINGE CRESTED GATE



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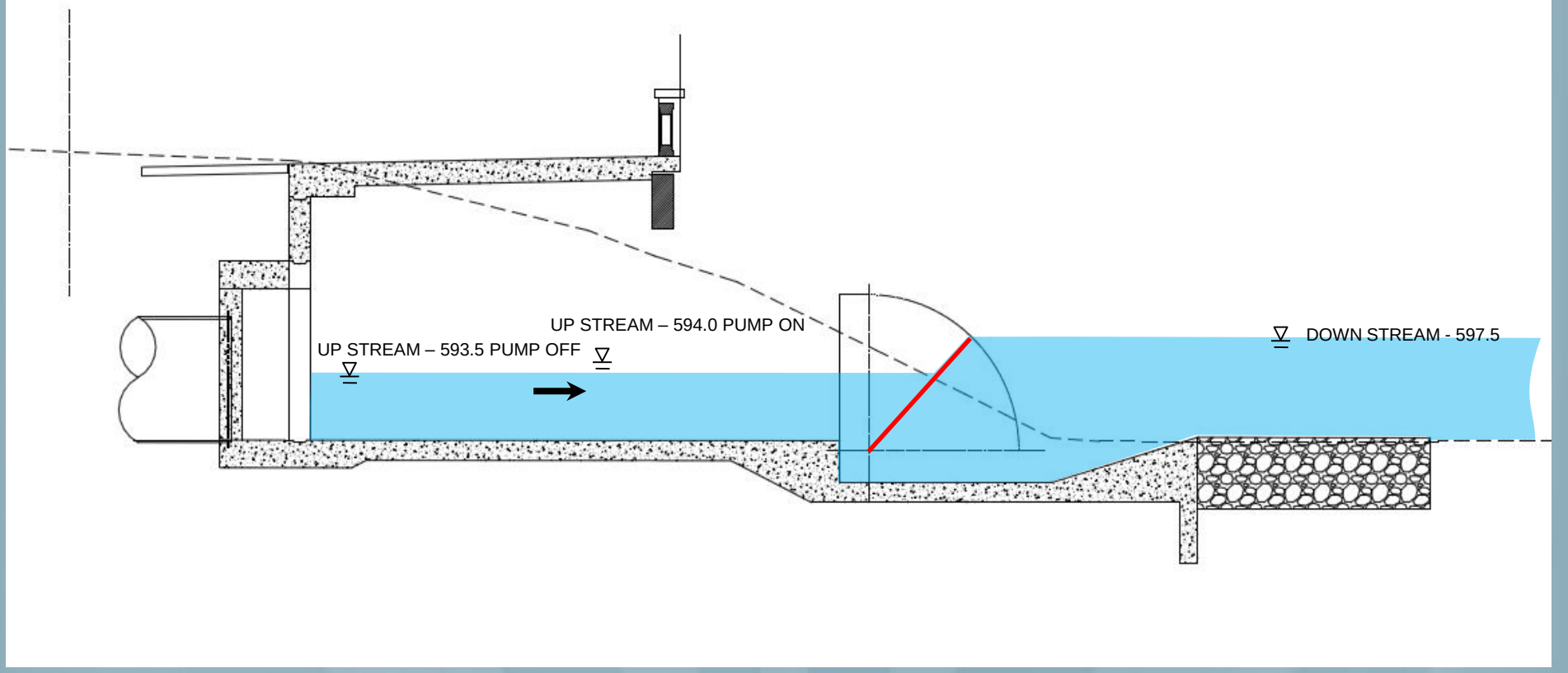
LEVEL CONTROL OPERATIONS

NORMAL RIVER ~ NORMAL CHANNEL
during Dry Weather

MODE 1-C



DS HIGH WATER LEVEL – DRY CONDITIONS

PUMPS ON – PUMPED DISCHARGE OF BASE FLOW

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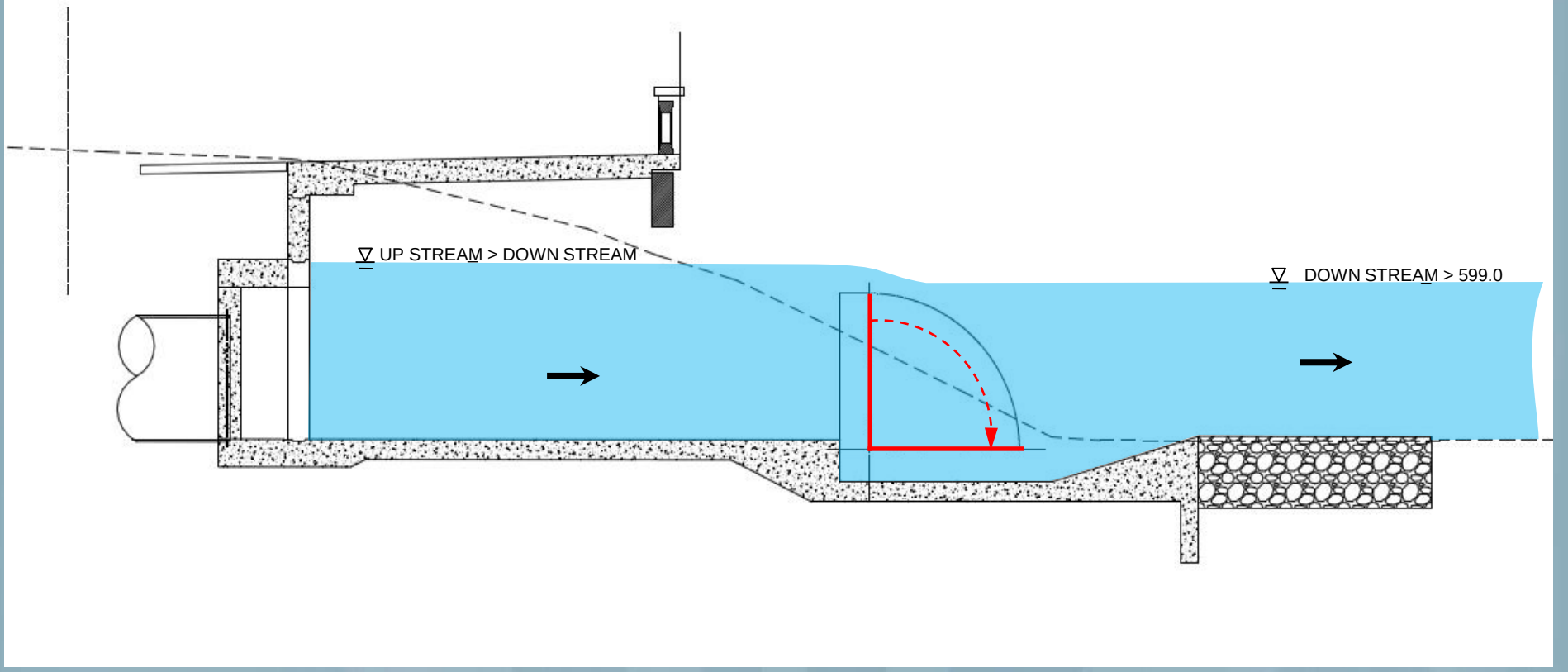
LEVEL CONTROL OPERATIONS

NORMAL RIVER ~ NORMAL CHANNEL

during Wet Weather

OPERATION
MODE 2



DS FLOOD CONDITIONS (KERPER CLOSED) - EXTREME WET WEATHER

4 PUMPS ON WITH OVERFLOW GATE LOWERS AUTOMATICALLY

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RR CROSSING - PEDESTRIAN TUNNEL

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RR CROSSING - PEDESTRIAN TUNNEL

TWIN BOX INVESTIGATION

- **VISUAL INSPECTION**
- **GROUND PENETRATING RADAR**
- **LASER SCANNING**

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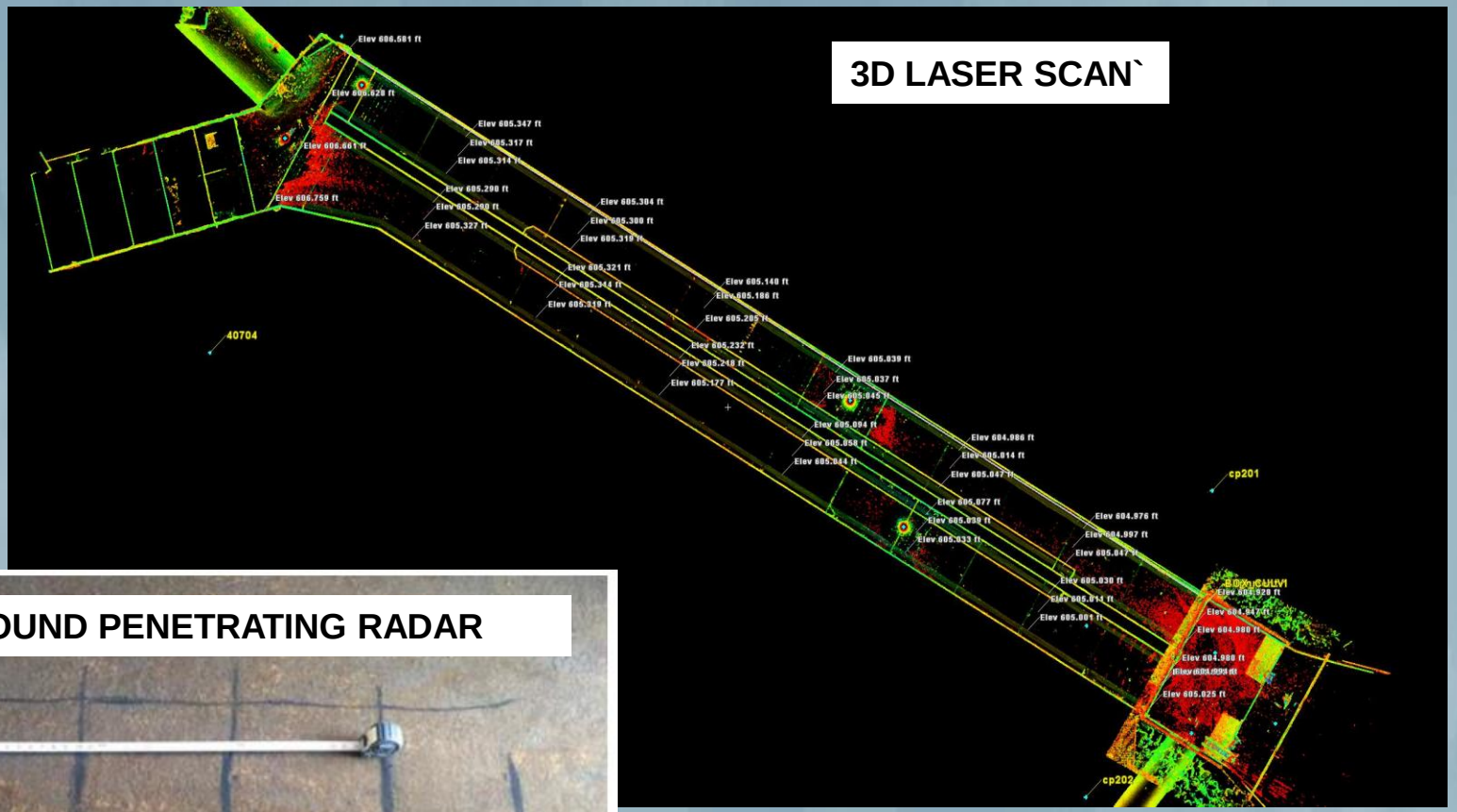
RR CROSSING - PEDESTRIAN TUNNEL



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Upper Bee Branch – Before and After

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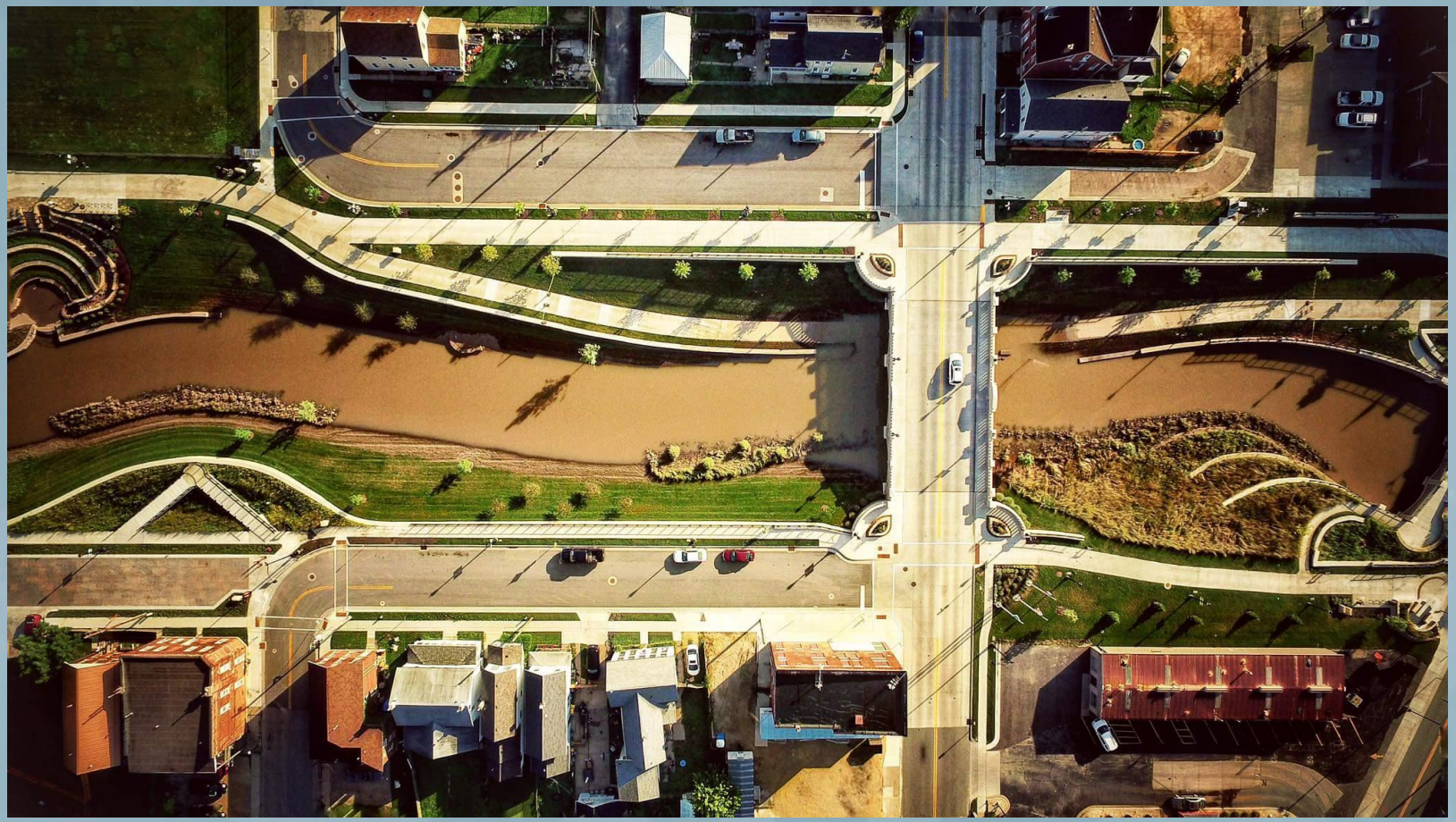
QUESTIONS?



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