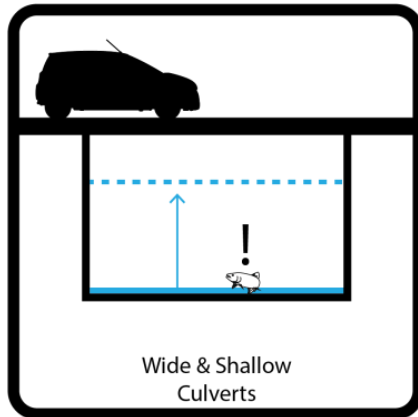
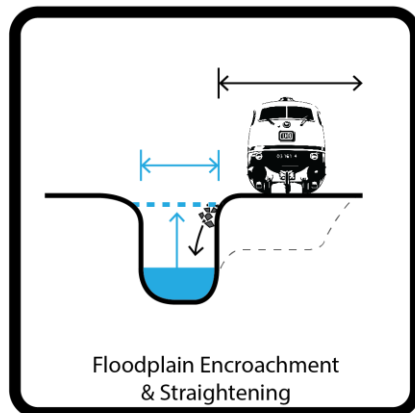


Wide & Shallow  
Streams



Wide & Shallow  
Culverts



Floodplain Encroachment  
& Straightening

Upper Midwest Stream Restoration Symposium  
La Crosse, WI

## **Golf, highways & trains** - Addressing Three Unique Impairments to Brown's Creek



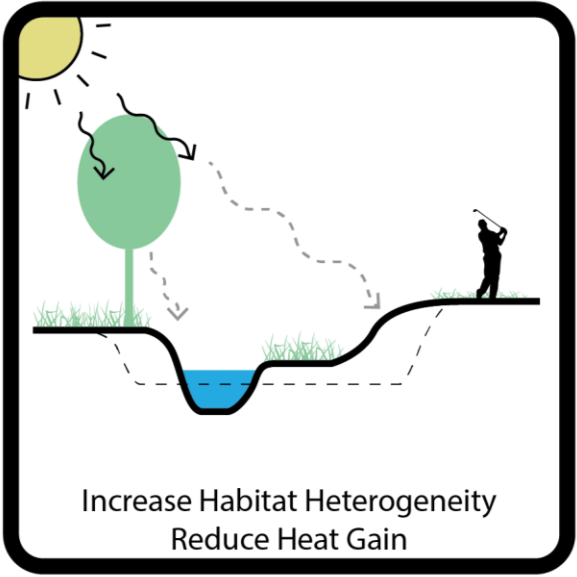
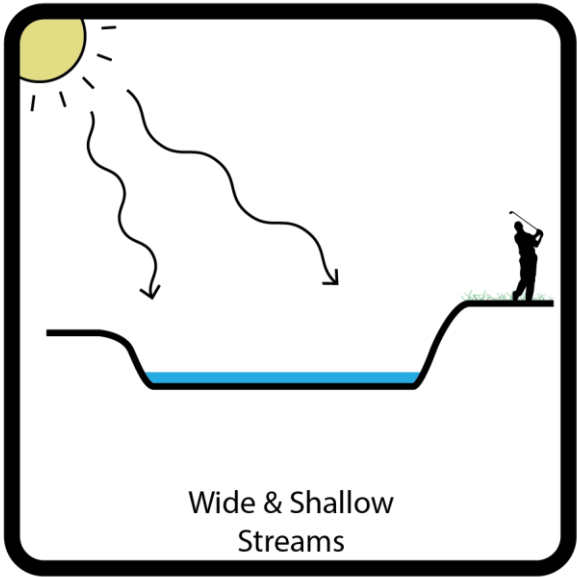
Kevin Biehn, RLA, CPESC, LEED AP BD+C  
Landscape Architect & Stream Specialist  
kbiehn@eorinc.com





## Quick Facts:

- Brown's Creek Watershed District – Est. 1997
- 30 square mile watershed
- Designated trout stream
- Headwaters – Impaired for biota
- Lower half – Impaired for lack of coldwater assemblage



**Golf**, highways & trains













## **Compounding Causes for Rise in Temperature**

- Vegetation
- Width to Depth Ratio
- Embeddedness

**SSTEMP Version 2.0.8**

File View Help

**Hydrology**

Segment Inflow (cfs)

Inflow Temperature (°F)

Segment Outflow (cfs)

Accretion Temp. (°F)

**Geometry**

Latitude (degrees)

Dam at Head of Segment

Segment Length (mi)

Upstream Elevation (ft)

Downstream Elevation (ft)

Width's A Term (s/ft<sup>2</sup>)

B Term where  $W = A \cdot Q^{**}B$

Manning's n

**Meteorology**

Air Temperature (°F)

Maximum Air Temp (°F)

Relative Humidity (%)

Wind Speed (mph)

Ground Temperature (°F)

Thermal gradient (j/m<sup>2</sup>/s/C)

Possible Sun (%)

Dust Coefficient

Ground Reflectivity (%)

Solar Radiation (Langley's/d)

**Shade**

Total Shade (%)

**Optional Shading Variables**

Segment Azimuth (degrees)

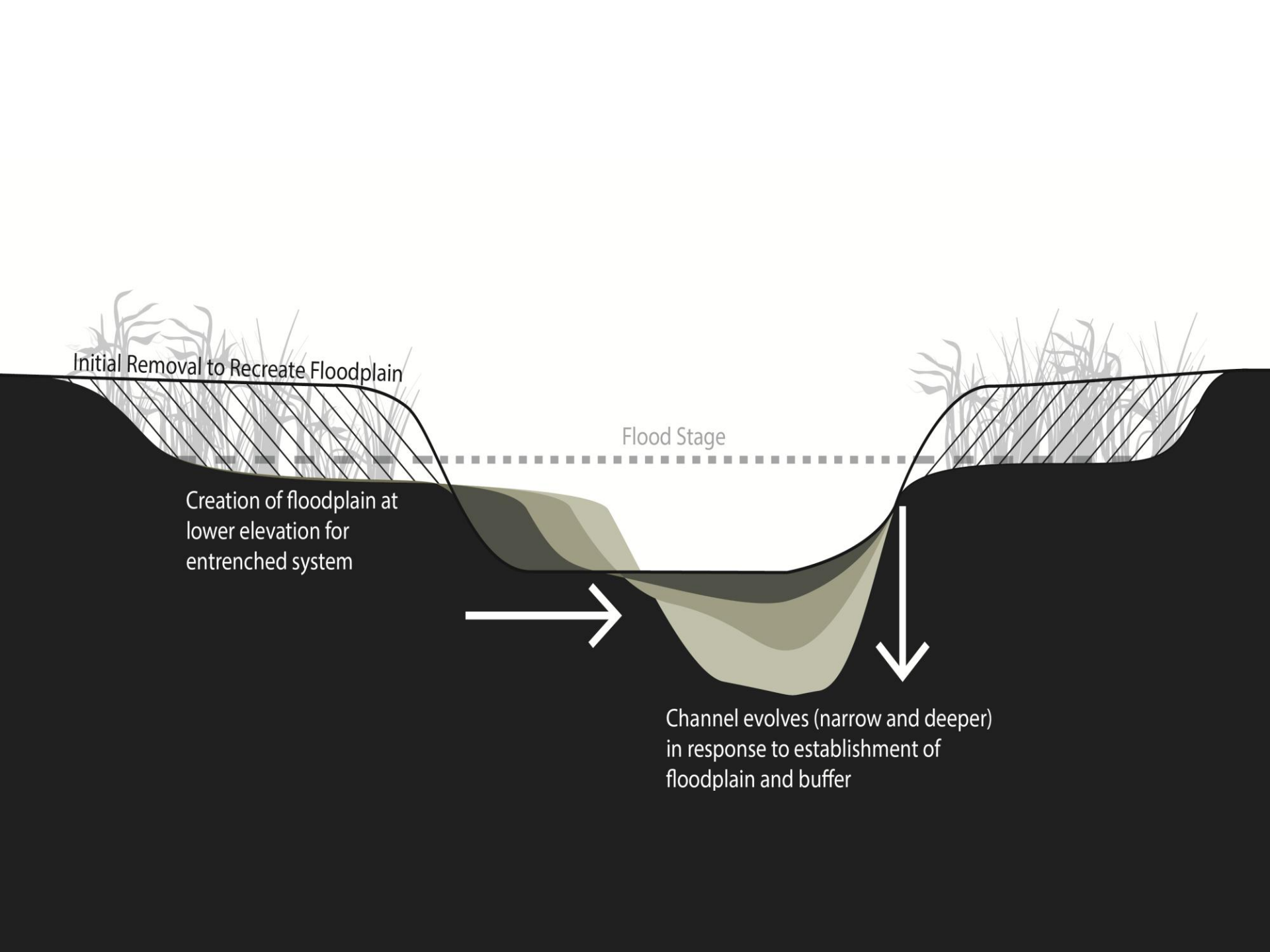
	West Side	East Side
Topographic Altitude (degrees)	<input type="text" value="5.200"/>	<input type="text" value="3.000"/>
Vegetation Height (ft)	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>
Vegetation Crown (ft)	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>
Vegetation Offset (ft)	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>
Vegetation Density (%)	<input type="text" value="0.000"/>	<input type="text" value="100.000"/>

Double click to add title

## Temperature Monitoring & Modeling

- Reduce mean by 0.5°F
- Reduce max by 6°F





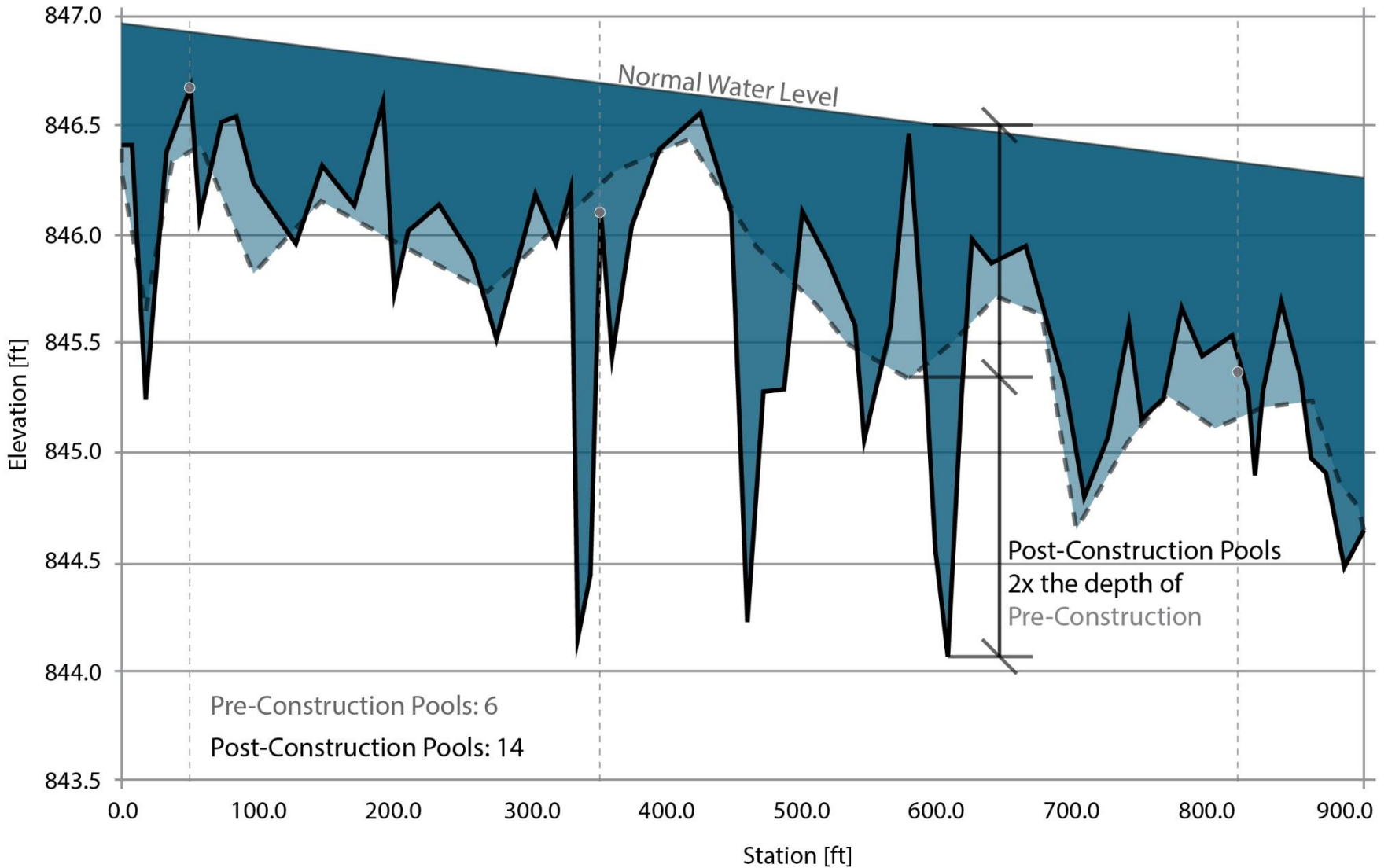








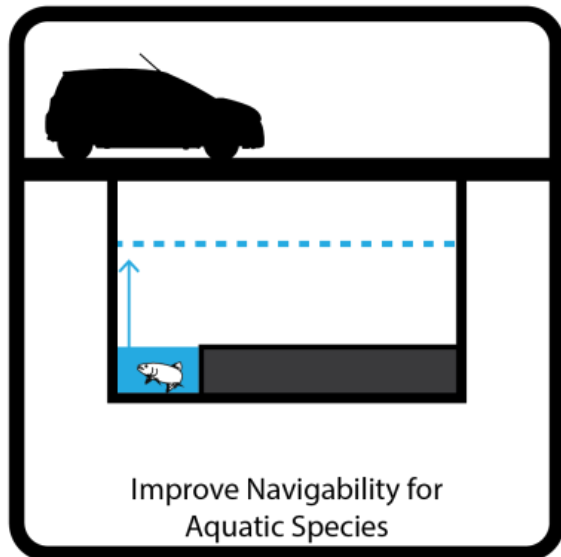
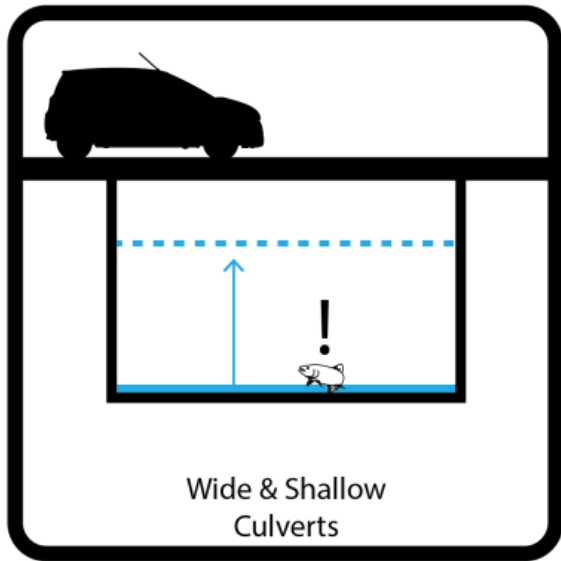
# Brown's Creek Profile - Oak Glen





## Project Particulars

- Completion – *Spring 2012*
- Course was not closed for a single day
- Construction Cost - *\$240,000*
- Buffer Area – *2.5 acres*
- Length of Stream – *1500'*



Golf, **highways** & trains



Orwell Ct  
2200  
Orwell Ct

96  
Dellwood Rd

County Highway 11

96  
Dellwood Rd

St Croix Trail N

95

Boom Rd  
Main St N

95

Lennhartson Realty

Boom Rd

St Croix Trail N

Boom Rd

Wolf Marine

Martronics

Alder St E

Alder St E

2126

Schuenberg Alley

Lake St

Ole Sawmill Marina

Alder St E

Hazel St E

200

Hazel St E

St Croix Trail N

400

Hazel St E

Dr

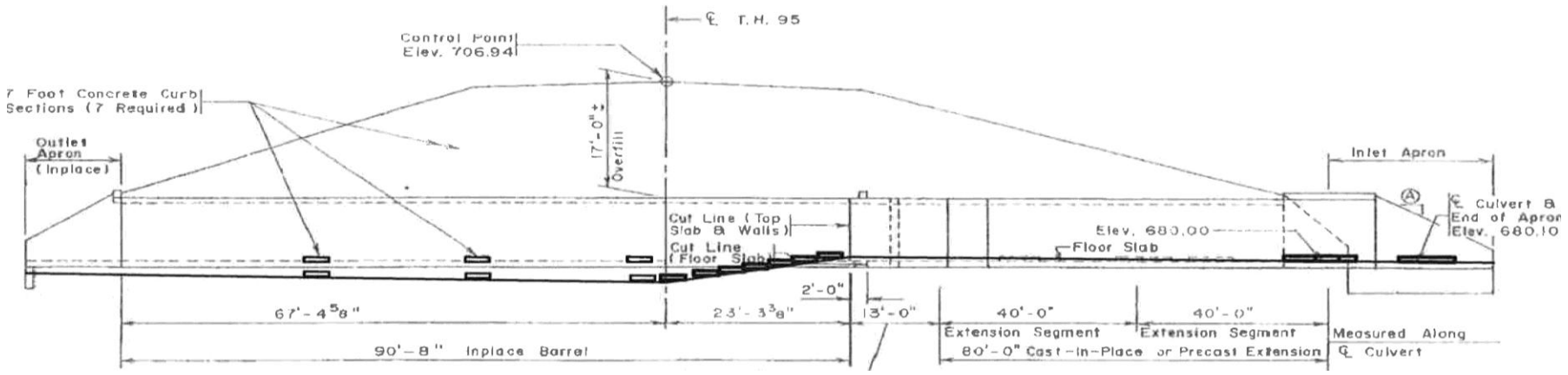
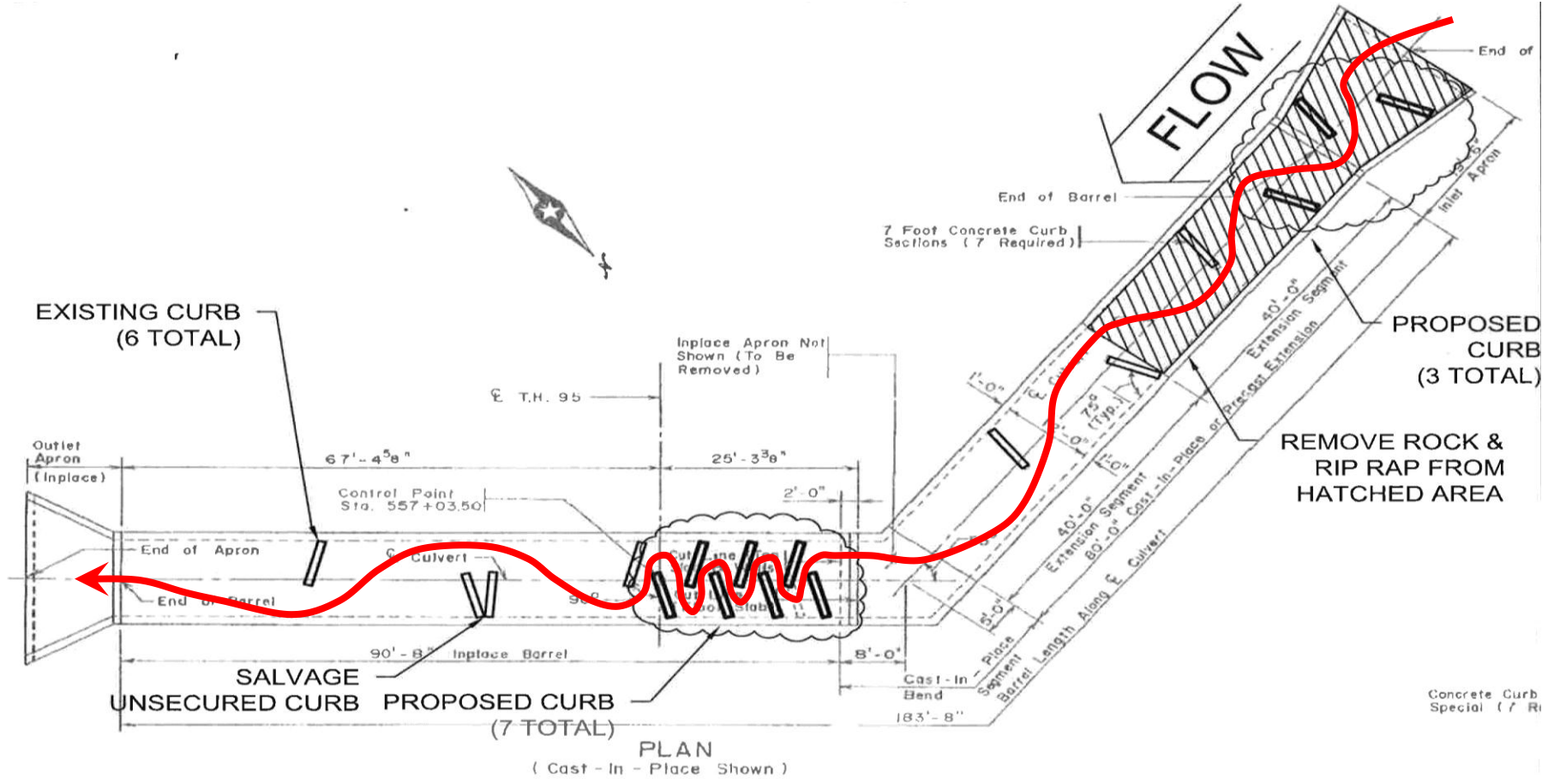
3rd St N  
1900



## **Compounding Problems:**

- Barrier
- Sterile habitat
- Reduce the fishes' ability to gather oxygen
- Behavior Barriers (length, darkness)



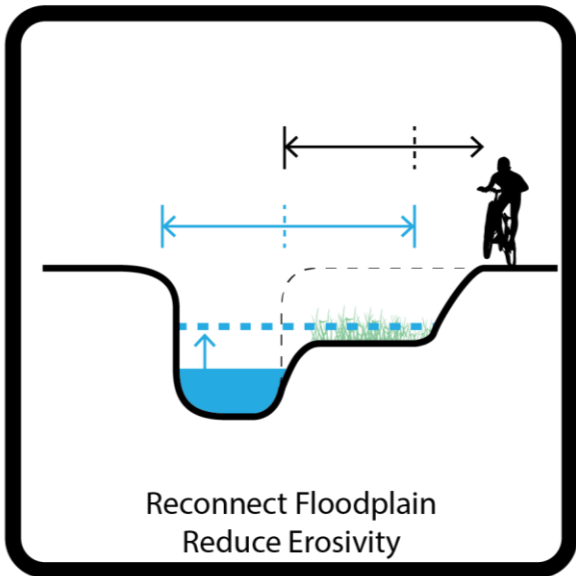
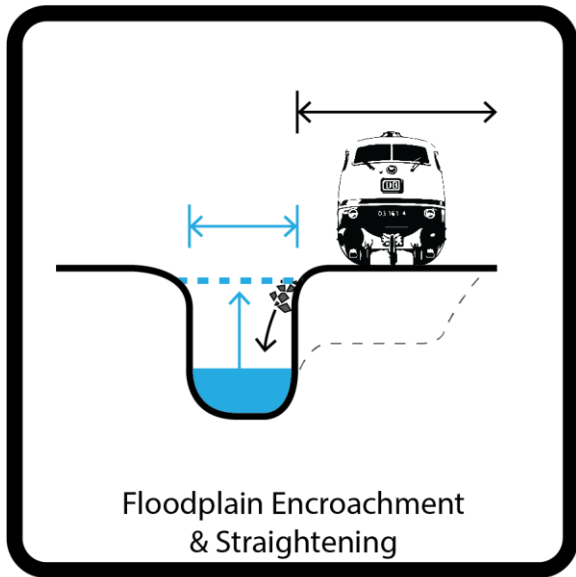






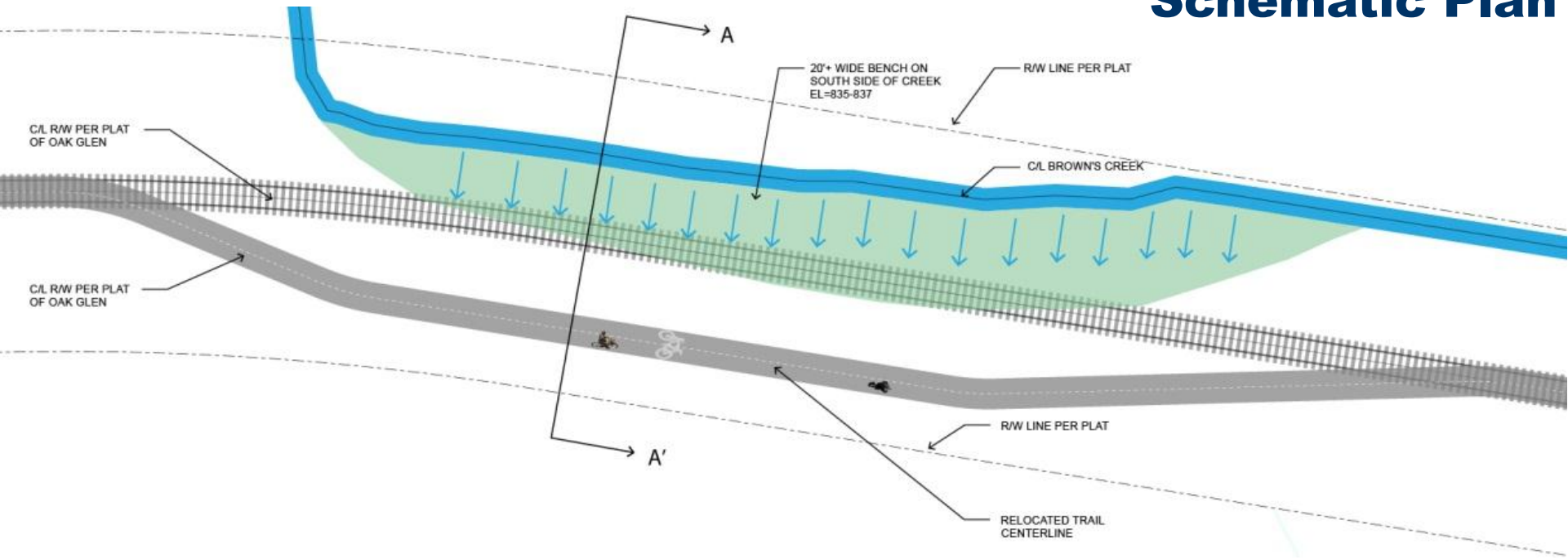
## Project Particulars

- Completion – *Fall 2011*
- Construction Cost - *\$8,000*

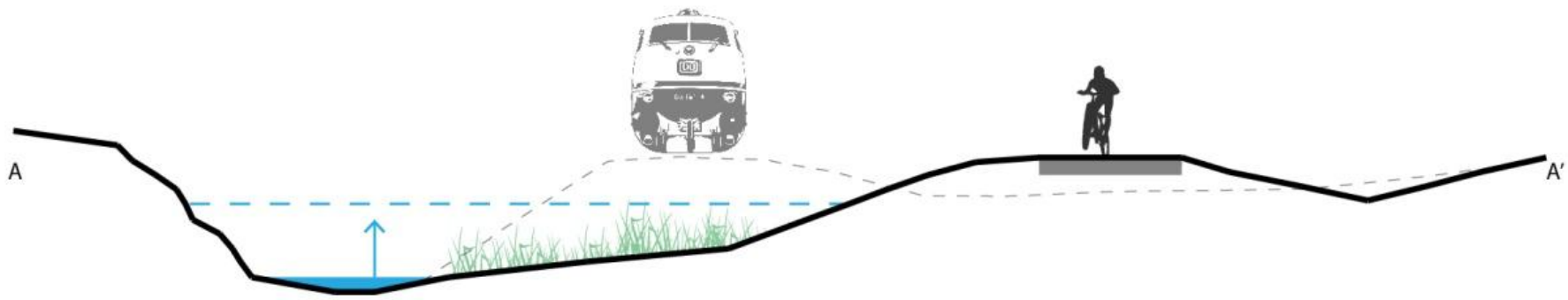


Golf, highways & **trains**

# Schematic Plan



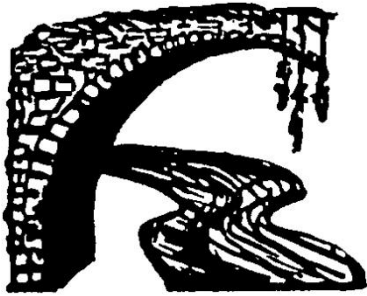
# Schematic Cross-Section





## Construction Particulars

- Estimated Completion – *Fall 2013*
- Estimated Construction Cost -  $\$105,000\pm$



### **BCWD Board of Managers**

Craig Leiser, President

Rick Vanzwol, Vice-President

Gail Pundsack, Vice-President

Gerald Johnson, Secretary

Connie Taillon, Treasurer

## **Upper Midwest Stream Restoration Symposium**

La Crosse, WI

### **Golf, highways & trains**

*- Addressing Three Unique  
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