Boyd Intercounty Drain

Allegan and Ottawa Counties, Michigan

Engineer's Report – Concept Review Meeting

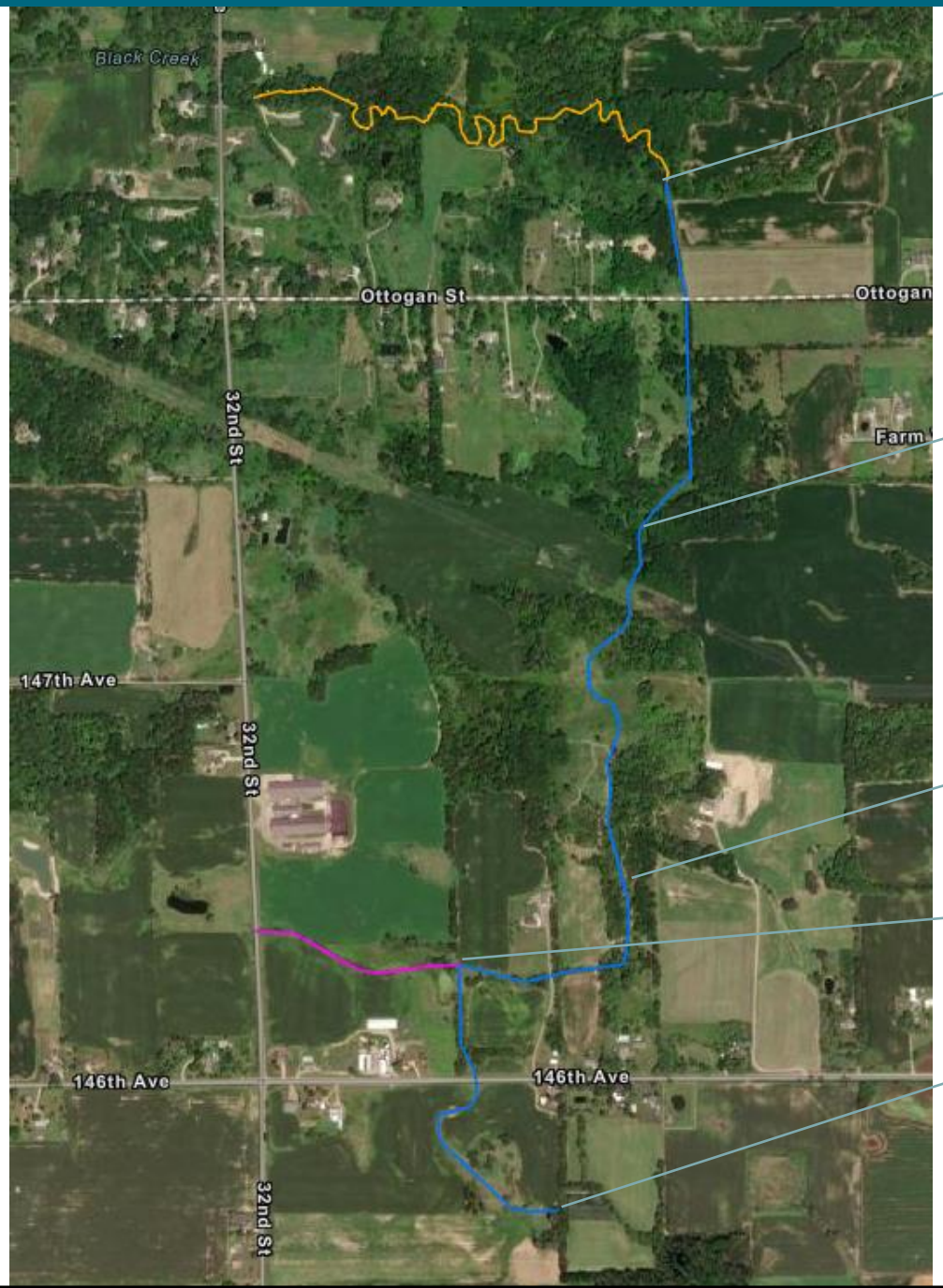
September 21, 2022

fishbeck

Engineers | Architects | Scientists | Constructors

Engineer's Report Outline

- Drain Overview
- Drainage District Review
- Drain Condition
- Recommendations
- Project Cost Estimate



Confluence w/ Black Creek, Sta 0+00

Begin Major Wetland Complex, Sta 25+00

End Major Wetland Complex, Sta 50+00

Confluence w/ Branch Drain, Sta 67+50

End Boyd ICD, Sta 90+61

Boyd Intercounty Drain Overview

Boyd Intercounty Drain
Allegan and Ottawa Counties, MI

Drain Overview

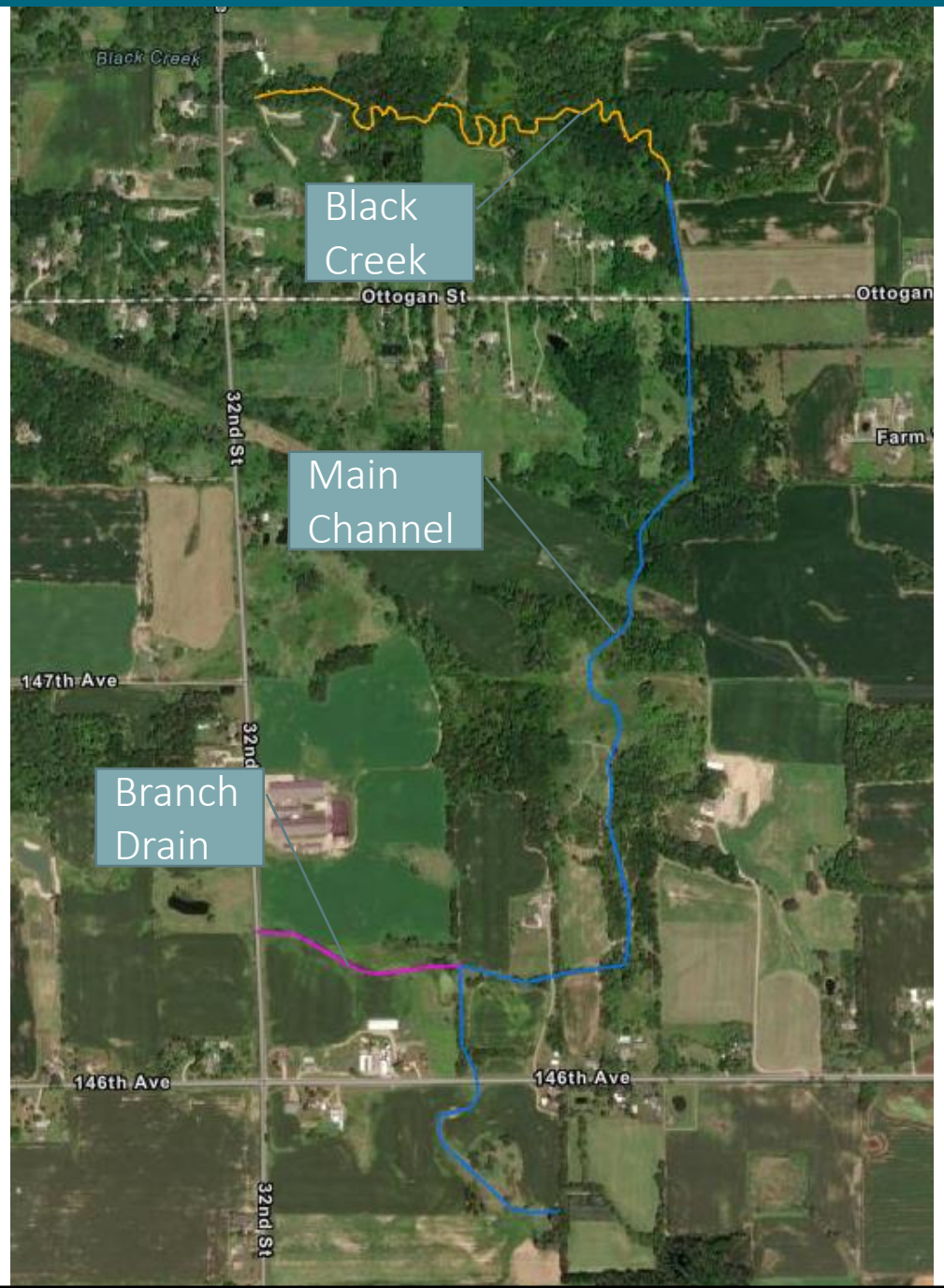
History

- Drain established – June 20, 2000
- Last major petitioned improvement project – 2002
  - Drain lowering and realignment
    - Work extended 1,300 feet downstream into Black Creek
    - No work in large wetland (Sta 25+00 to 50+00)
  - Two in-line sediment basins in Boyd, One in Black Creek
  - Five new culvert crossings

Drain Overview
Channel Slope

- Main Channel Avg. Slope = 0.4%
  - 38 ft of fall over 9,000 linear feet
- Branch Avg. Slope = 0.6%
  - 8 ft of fall over 1,400 linear feet
- Steeper at upper end, flatter at lower end

Based on Driesenga & Assoc. Plans, dated 7/30/2002

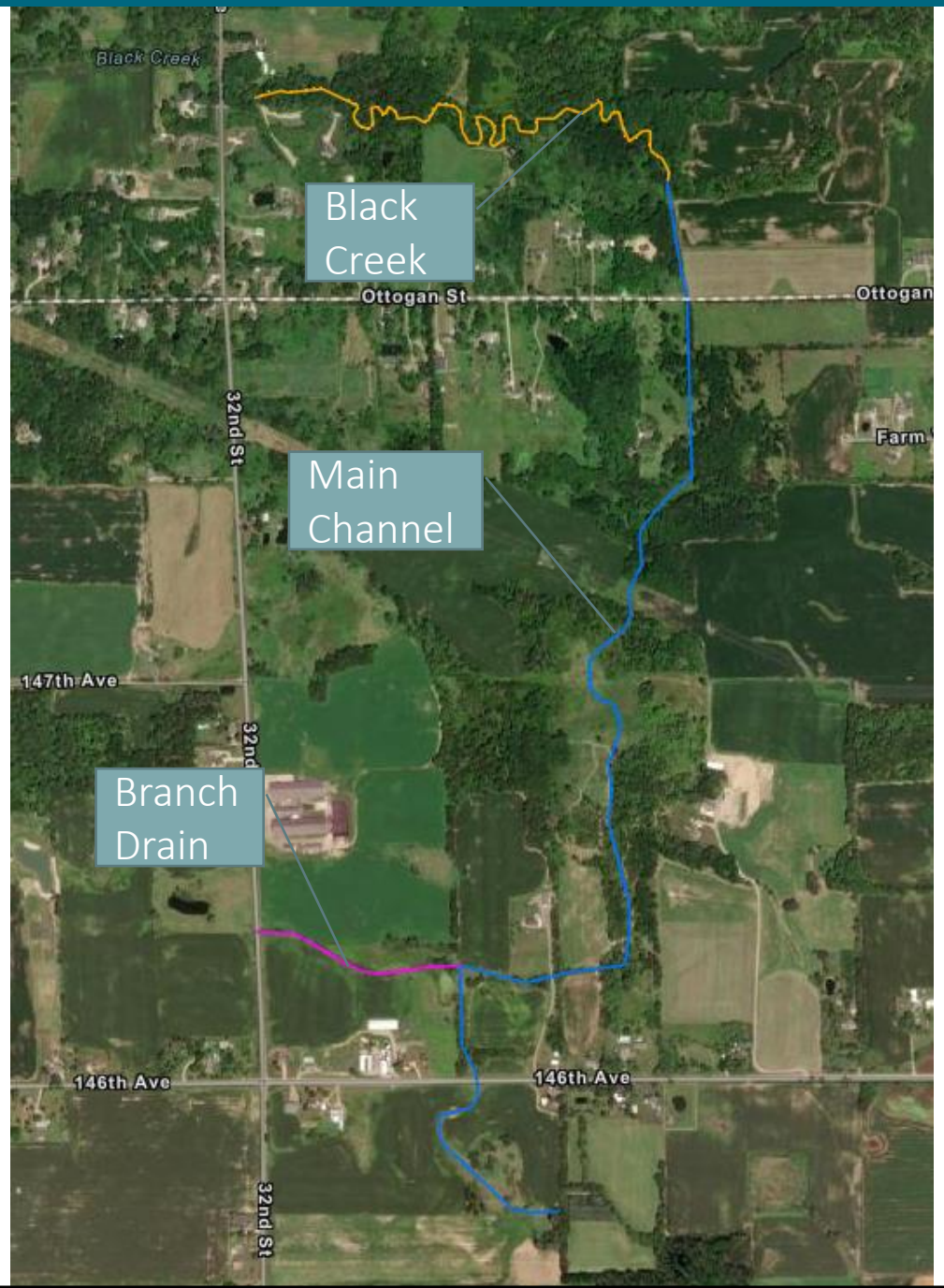


Drain Overview

Fall Between Crossings

- Black Creek to Ottogan Street
  - 0.75 ft fall over 759 linear feet (0.1%)
- Ottogan St to Confluence w/ Branch Drain
  - 23.4 ft fall over 5,919 linear feet (0.4%)
- Confluence w/ Branch Drain to 146th Street
  - 3.5 ft fall over 721 linear feet (0.5%)
- 146th Street to POE
  - 9.75 ft fall over 1,388 linear feet (0.7%)

Based on Driesenga & Assoc. Plans, dated 7/30/2002

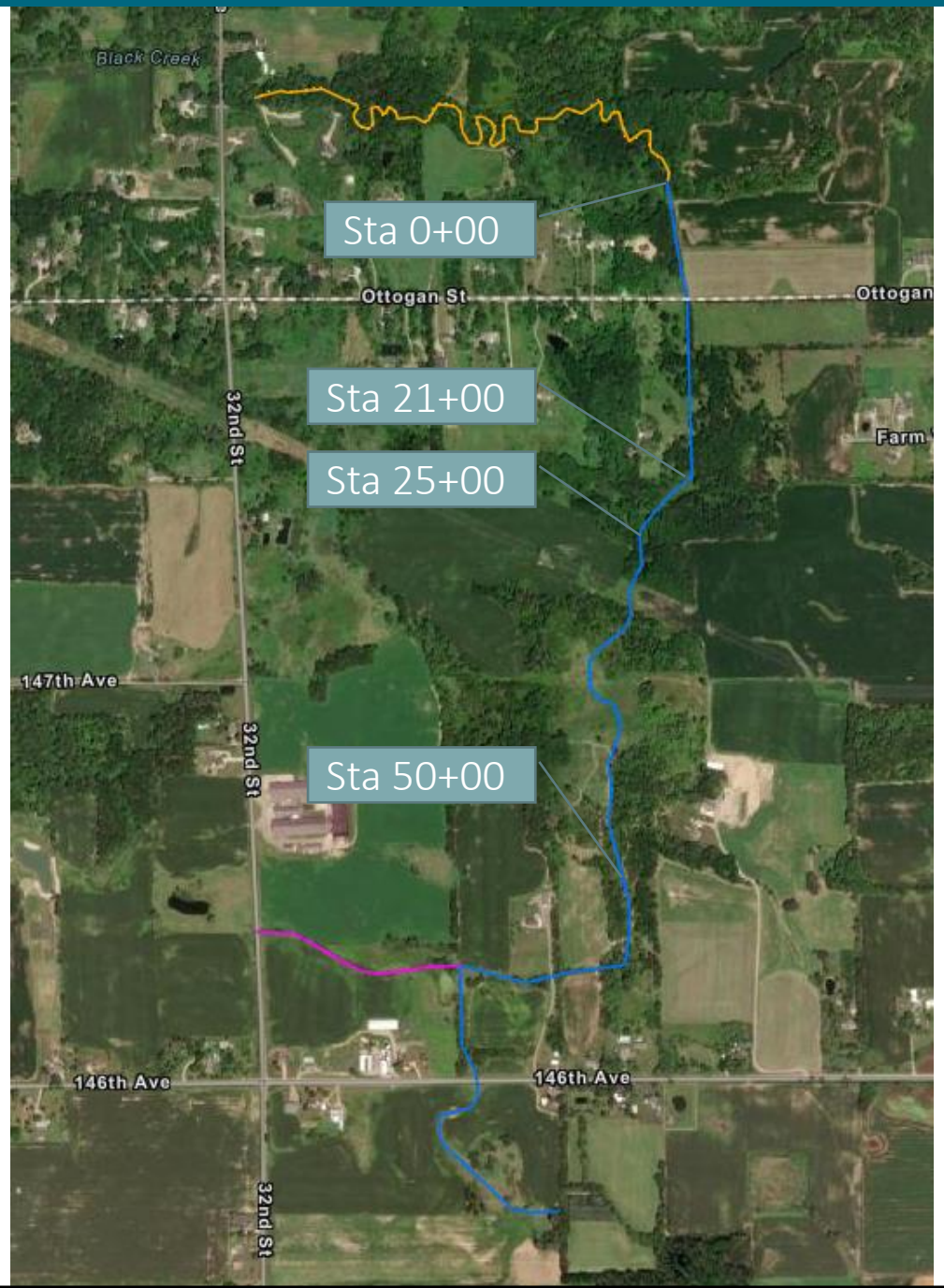


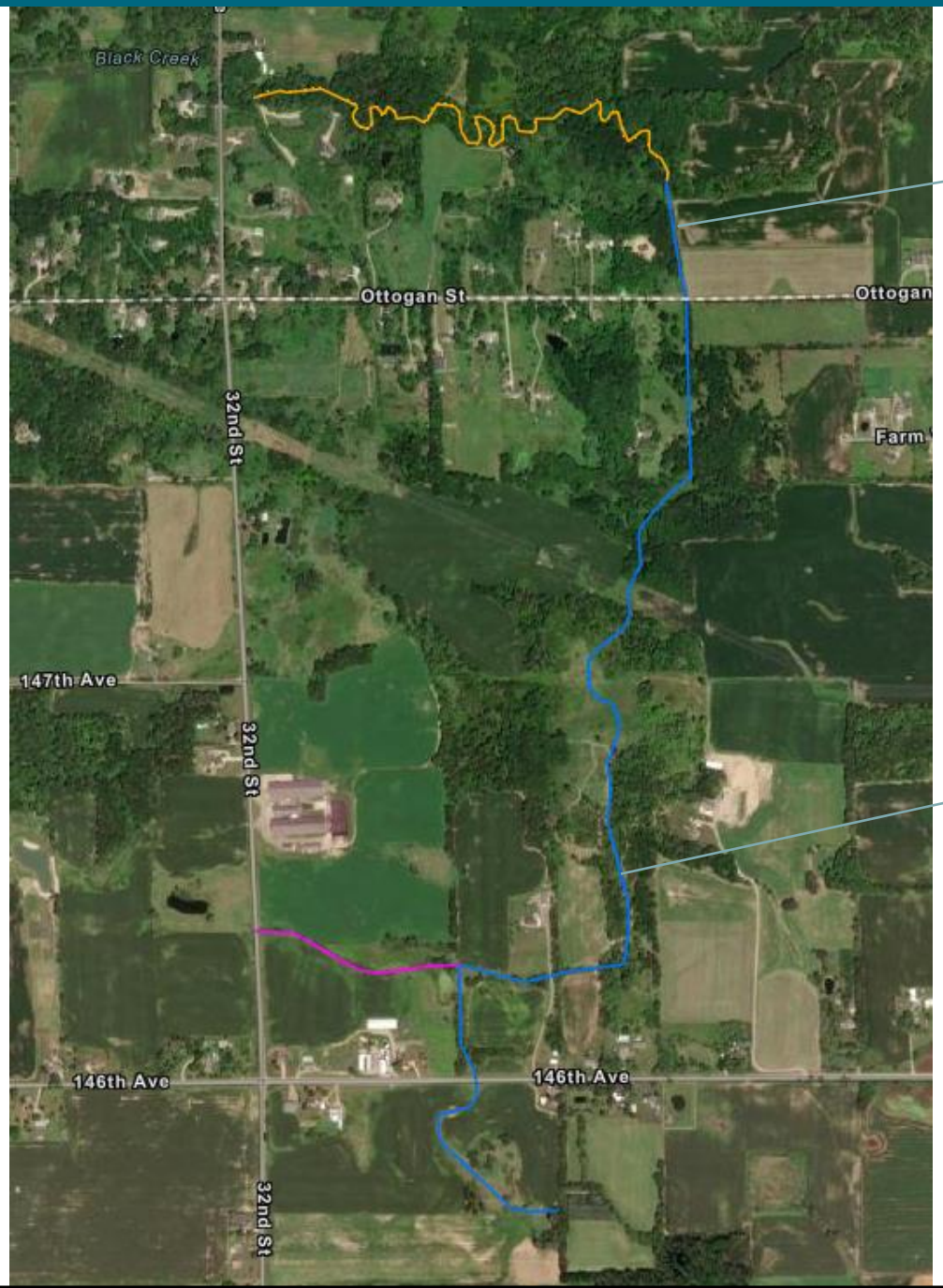
Drain Overview

Cross Sections

- Trapezoidal Channel
- Sta 0+00 to 21+00
  - 5’ Bottom Width, 3:1 Side Slopes
- Sta 21+00 to 25+00
  - 4’ Bottom Width, 3:1 Side Slopes
- Sta 25+00 to 50+00
  - No work, wetlands
- Above Sta 50+00
  - 3’ Bottom Width, 2.5:1 Side Slopes
- Branch Drain
  - 3’ Bottom Width, 3:1 Side Slopes

Based on Driesenga & Assoc. Plans, dated 7/30/2002

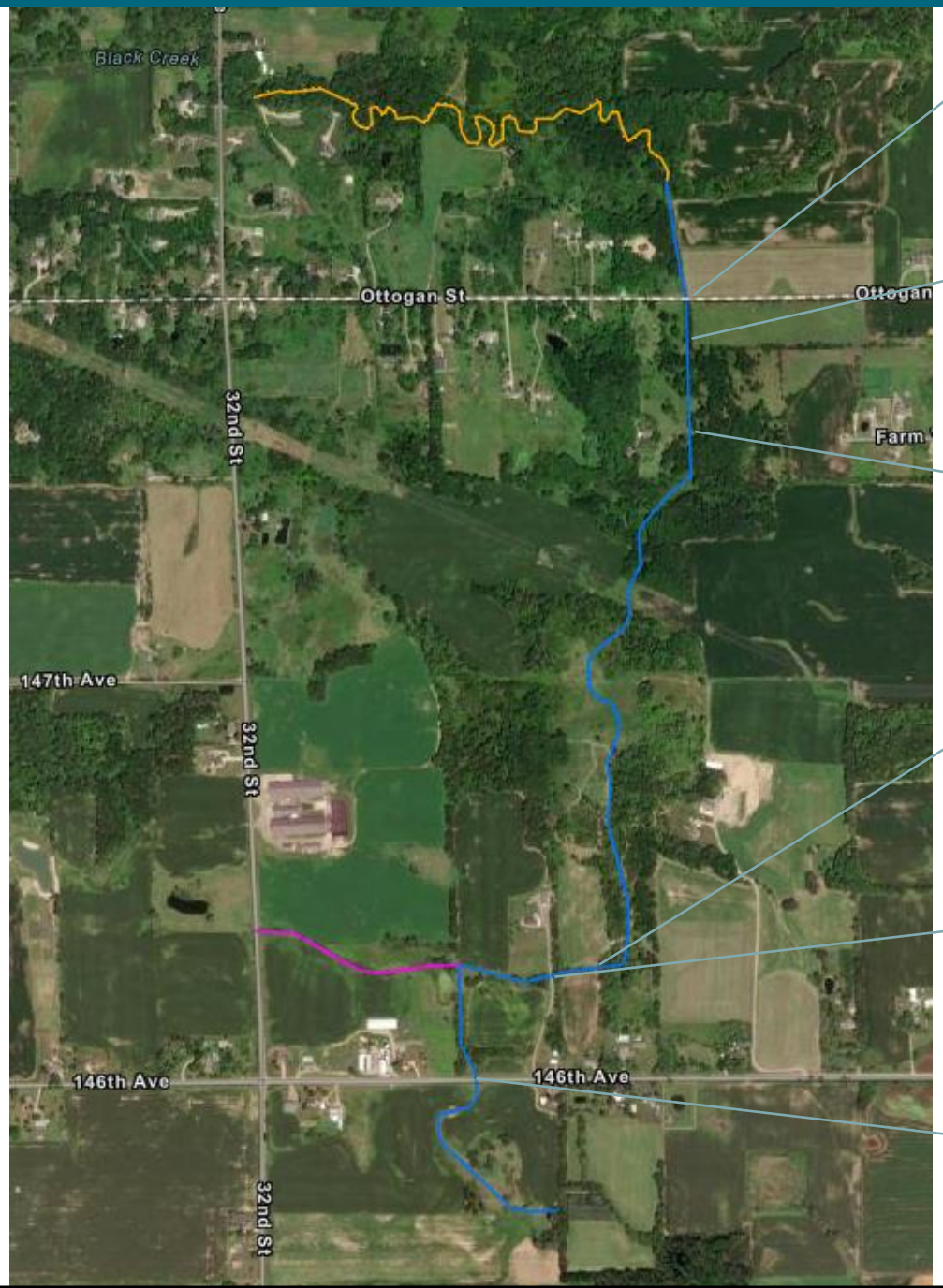




Sediment Basin
Sta 3+00

Sediment Basin
Sta 50+00

Sediment Basins



Ottogan Street, Sta 7+59
64 LF, 38”x60” Horizontal
Elliptical Concrete Pipe

Farm Crossing, Sta 10+60
44 LF, 29”x45” Horizontal
Elliptical Concrete Pipe

Farm Crossing, Sta 16+62
24 LF, 29”x45” Horizontal
Elliptical Concrete Pipe

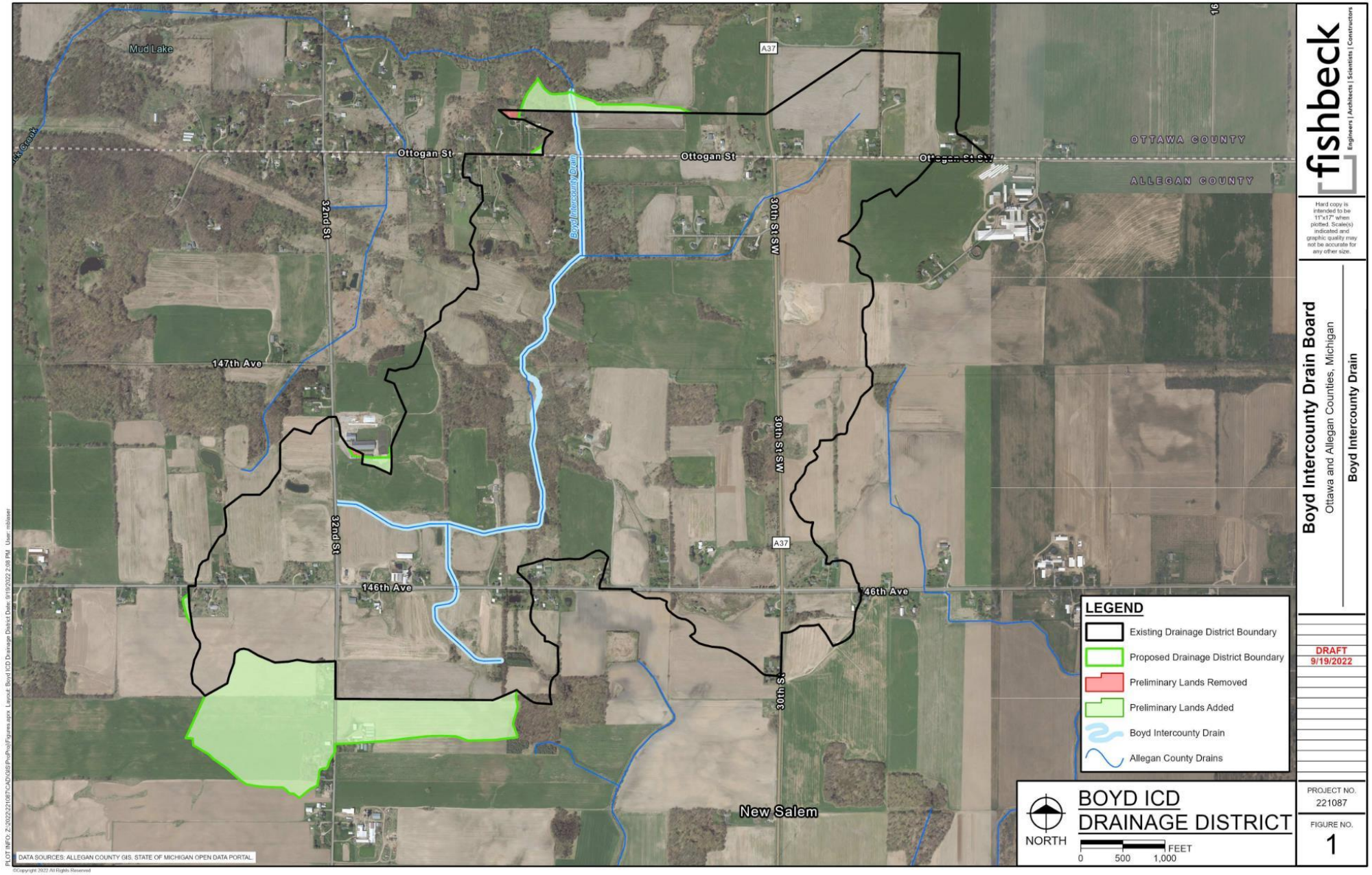
Farm Crossing, Sta 58+25
30” CPP, Length Unknown
(Not on 2002 plans)

Farm Crossing, Sta 61+50
32 LF 36” CPP
(42” RCP per 2002 plans)

146th Ave, Sta 74+66
95 LF 36” RCP
(24” RCP per 2002 plans)

Culvert Crossings

Drainage District Review



Drain Condition
Site Inspection

- Flow and Capacity
- Channel Stability
- Debris and Obstructions
- Gullies and Tile Outlets
- Crossings
- Black Creek
- Summary

Sept. 2022 - Looking upstream toward confluence w/ Branch

Drain Condition
Flow and Capacity

- Very little base flow in Main and Branch
- Overgrown vegetation along banks and filling in channel
- Mucky bottom w/ 12” to 24” sediment
- Channel width 3’ to 5’
- Linear wetland

Station 53+00

Flow and Capacity

Knee-deep muck in upper reaches

Branch Drain Station 1+50

Flow and Capacity

No flow at Ottogan St Culvert

Still water at Sta 2+00

Drain Condition
Channel stability

- Well to over-vegetated
- No downcutting
- No significant signs of erosion
- Intermittent mid-channel bars in lower reach above Ottogan Street – livestock access

Mid-channel bars Sta 16+50 in dredged stretch

Channel Stability

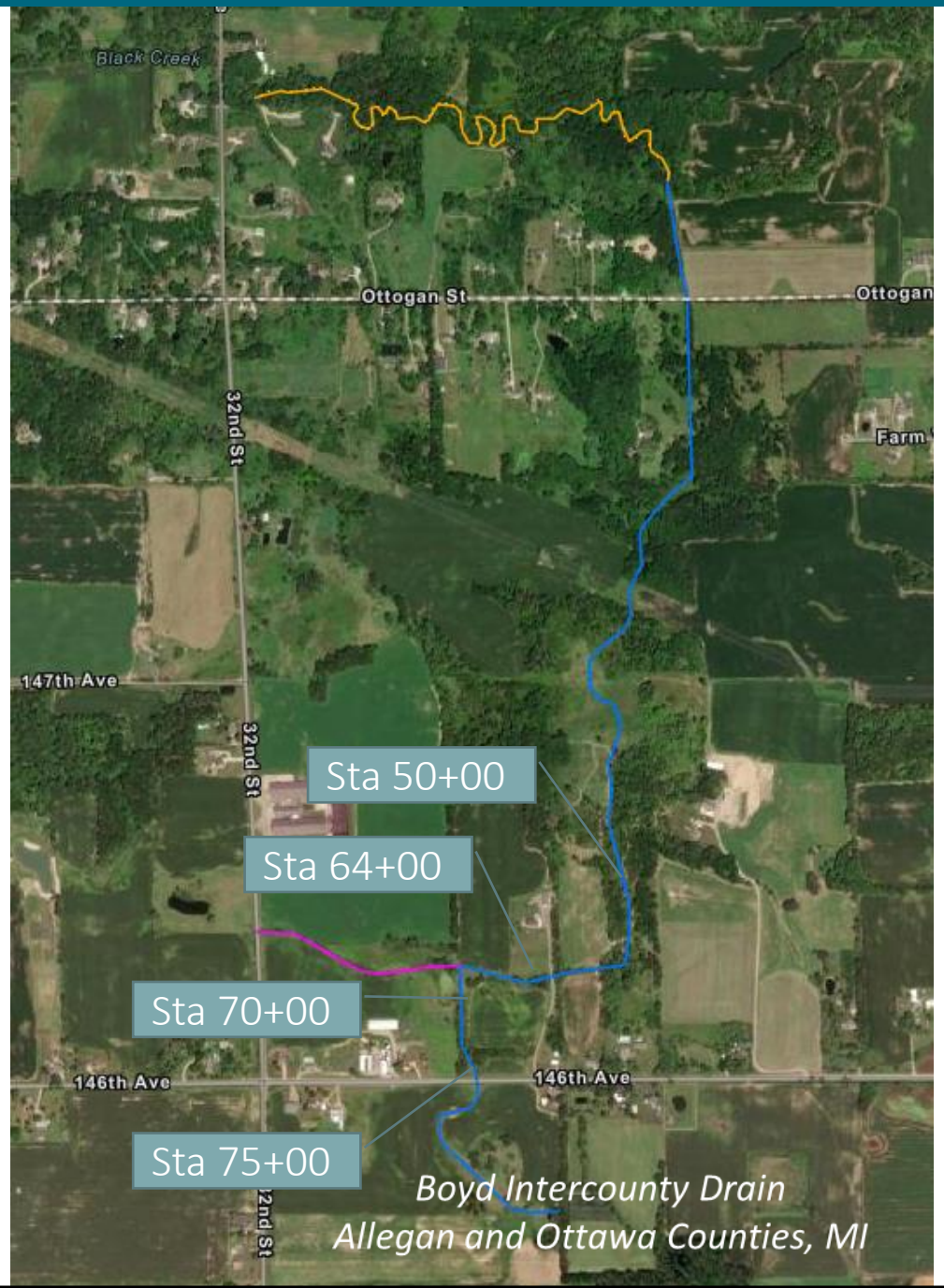
- Property Owner excavated pond at Sta 55+00
- Placed unstabilized spoils pile along drain
  - Encroachment of channel
  - Erosion and sedimentation

Spoils Pile as viewed from Drain

Boyd Intercounty Drain
Allegan and Ottawa Counties, MI

Drain Condition
Debris and Obstructions

- Minimal woody debris work
  - Sta 50+00 to 64+00
  - Sta 70+00 to 75+00
- Channel choked by overgrown vegetation throughout



Debris and Obstructions

Vegetation Choked Channel at Sta 78+00

Woody Obstructions at Branch Sta 8+10

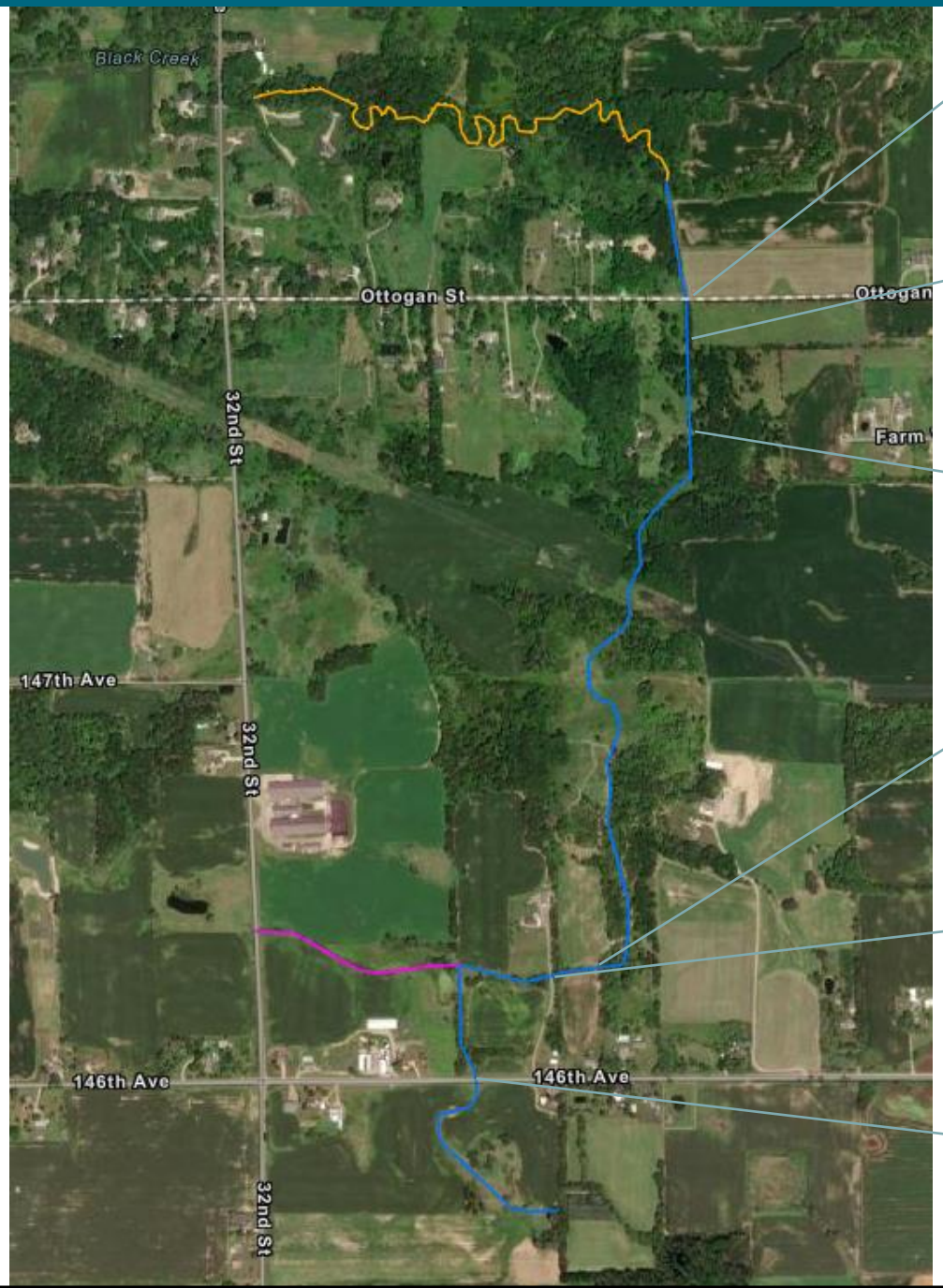
Drain Condition
Gullies and Tile Outlets

- Two tile outlets verified
- Additional tile outlets and gullies likely when vegetation dies/cut back

Gullies and Tile Outlets

Possible Tile Outlet, Branch Sta 3+60

Tile Outlet, Station 12+40



Ottogan Street, Sta 7+59
64 LF, 38”x60” Horizontal
Elliptical Concrete Pipe

Farm Crossing, Sta 10+60
44 LF, 29”x45” Horizontal
Elliptical Concrete Pipe

Farm Crossing, Sta 16+62
24 LF, 29”x45” Horizontal
Elliptical Concrete Pipe

Farm Crossing, Sta 58+25
30” CPP, Length Unknown

Farm Crossing, Sta 61+50
32 LF 36” CPP
(42” RCP per 2002 plans)

146th Ave, Sta 74+66
95 LF 36” RCP
(24” RCP per 2002 plans)

Drain Condition
Crossings

Drain Condition

Crossings

- Two county road crossings
- Four private crossings
- Crossings in generally fair to good condition
- Ottogan St crossing submerged under base flow conditions
  - Residents noted flooding during rain events
  - No evidence of settling

Ottogan St crossing. Submerged no flow base conditions.

County Road Crossings

Ottogan St Culvert, partially submerged

146th St Culvert, partially submerged, 21” sediment depth

Private Crossings

Private Crossing at Sta 21+25

Private Crossing at Sta 16+50

Private Crossings

Private Crossing at Sta 58+25, Looking Upstream

Black Creek

Black Creek – no obstructions; good flow

Black Creek – minor woody material; good flow

Drain Condition

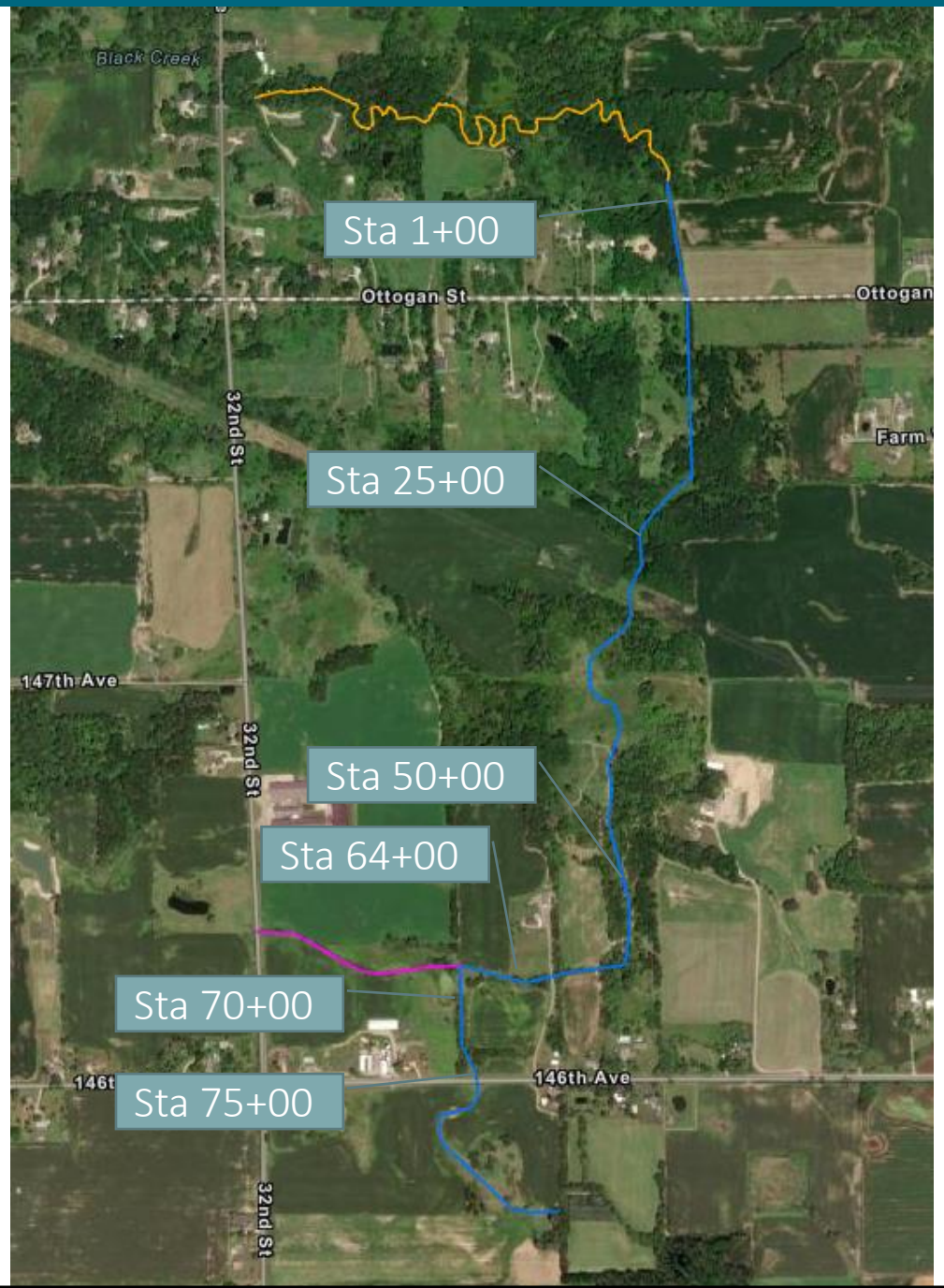
Summary

- Sediment depths of 12 in to 24 in throughout
- Isolated areas of woody debris
- Overgrown vegetation on banks and channel
- Tailwater effect at Black Creek prevents flow in Boyd

Mucky bottom and minimal baseflow DS of Ottogan St

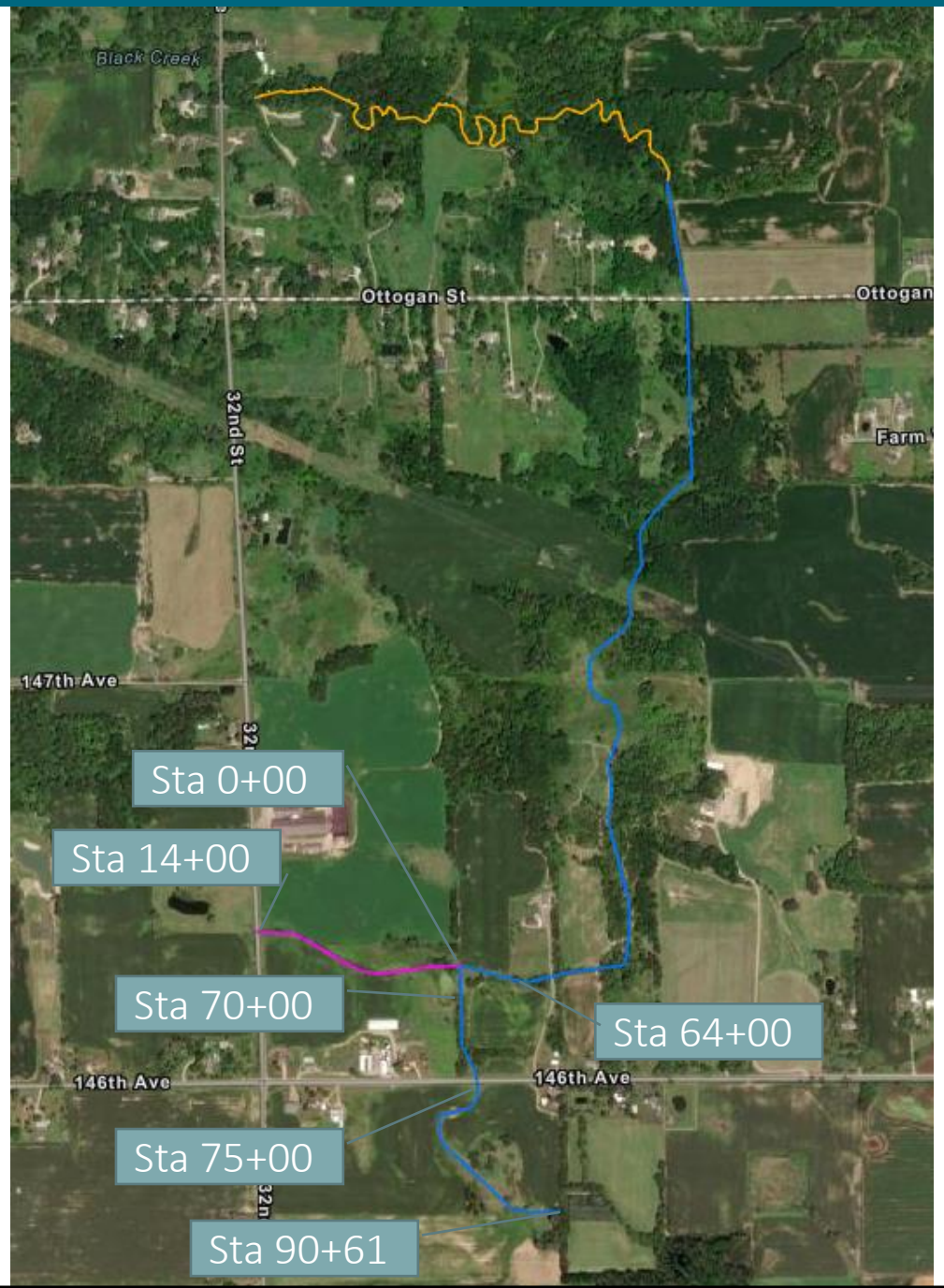
Recommendations

- Channel Dip Out Only
  - Sta 1+00 to 25+00
  - Sta 50+00 to 64+00
  - Sta 70+00 to 75+00



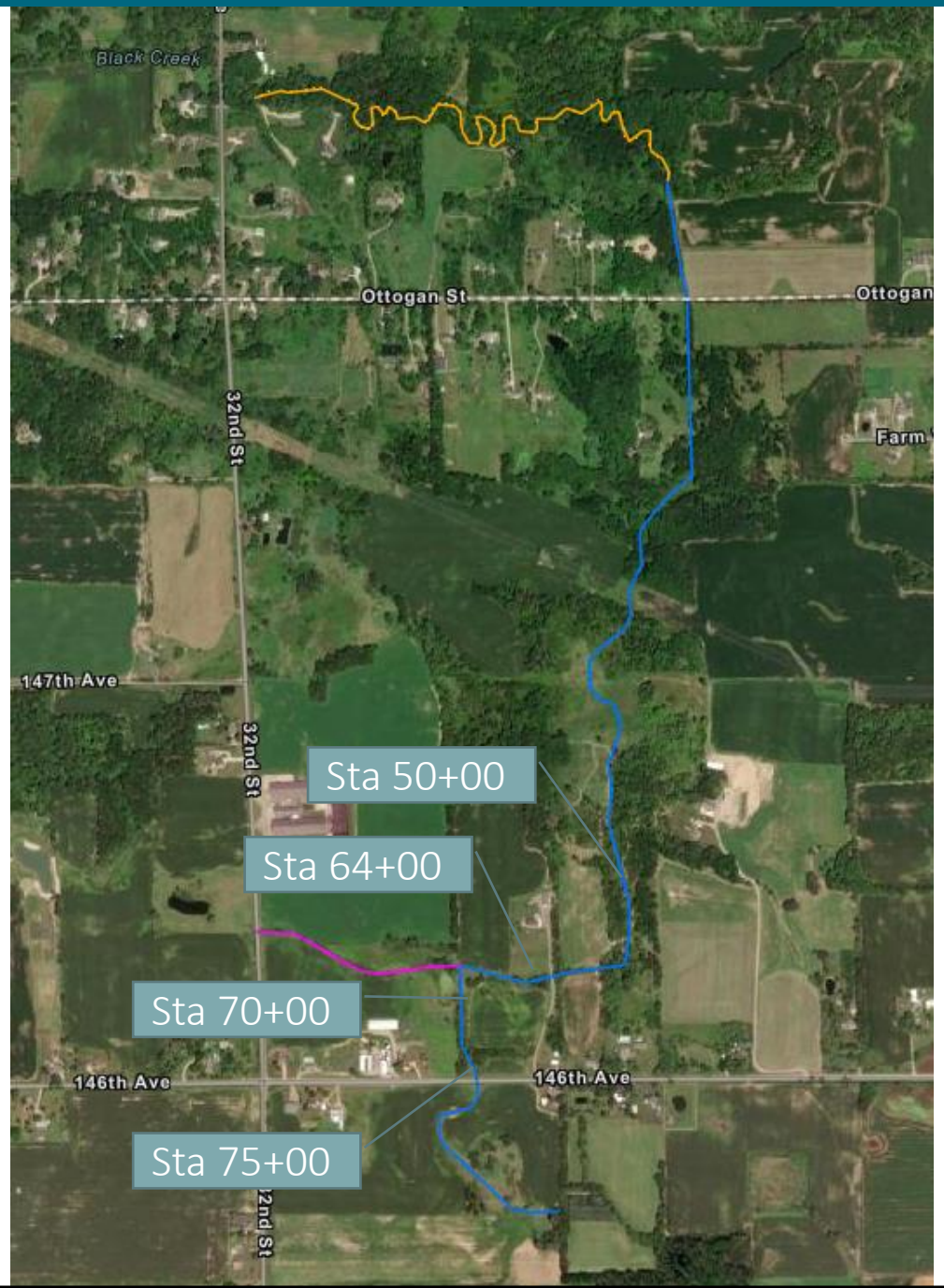
Recommendations

- Dip Out and Mow Banks
  - Sta 64+00 to 70+00
  - Sta 76+00 to 90+61
  - Branch Sta 0+00 to 14+00



Recommendations

- Woody Debris Management
  - Sta 50+00 to 64+00
  - Sta 70+00 to 75+00



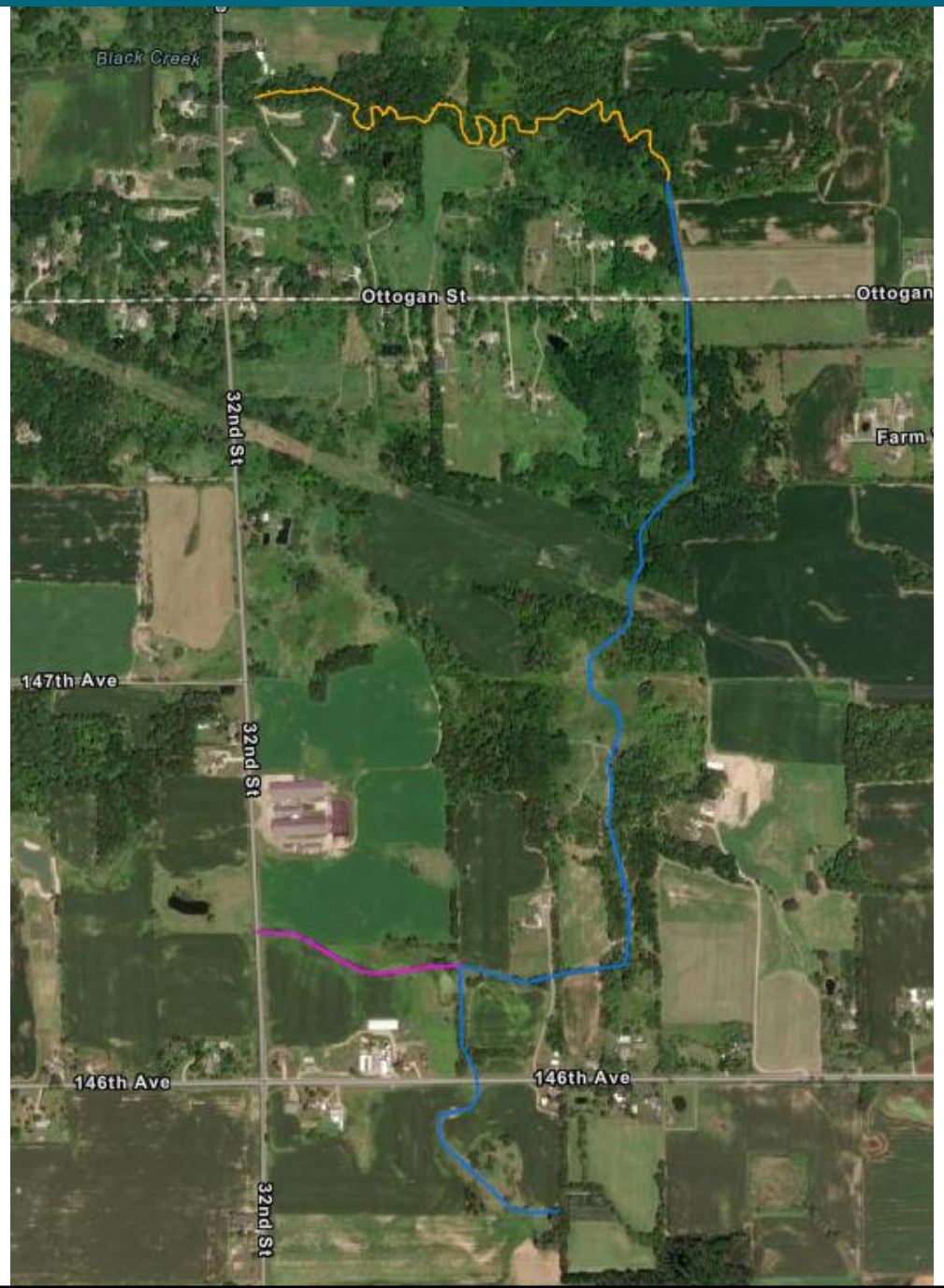
Recommendations

- Ottogan St Culvert and Black Creek Confluence
  - Tributary flow dominant causing re-circulating eddy
  - Possible use of in-stream structure to reduce confluence angle
  - Requires Hydraulic Analysis

Tributary Flow from Black Creek

Recommendations

- Armored Spillways for gullies and tile drains
- Riprap at culvert inverts
- Native seeding w/ Mulch Blanket – Wetland Areas
- Open Channel Seeding – Non-Wetland Areas



Regulatory

Part 301 and 303 permits NOT required

Project Cost Estimate

- Construction cost estimates from 2022 Buskirk as-bid
- Highest unit prices for conservative estimate
- Adjusted for 2023 Dollars (14% CCI)
- Engineering Estimate includes Survey, Design, Apportionment/Day of Review, and Construction Management

Project Cost Estimate

- Construction Cost Estimate: $ 250,000
- Engineering Cost Estimate: $ 75,000
  - Survey: $ 15,000
  - Design: $ 25,000
  - Bidding & Award: $ 3,000
  - Apportionment and Day of Review: $ 6,000
  - Construction Staking & Management: $ 13,000
  - Board Meetings, Coordination, & PM: $ $13,000

QUESTIONS?

fishbeck

Engineers | Architects | Scientists | Constructors