2017 RUCUS
Roadsoft User Conference of the United States

Building a Culvert Inventory Using Roadsoft

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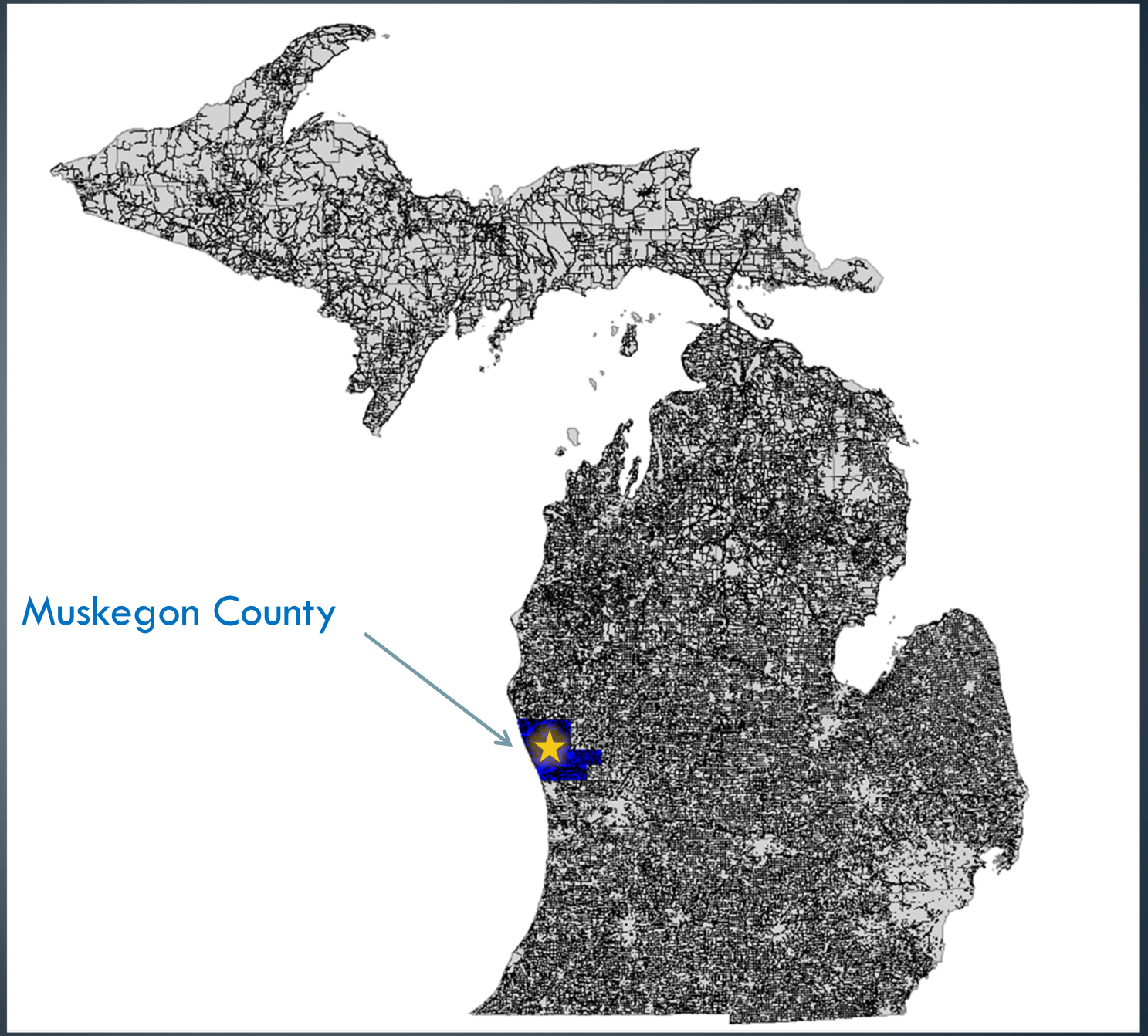
Muskegon County Road Commission


Muskegon County

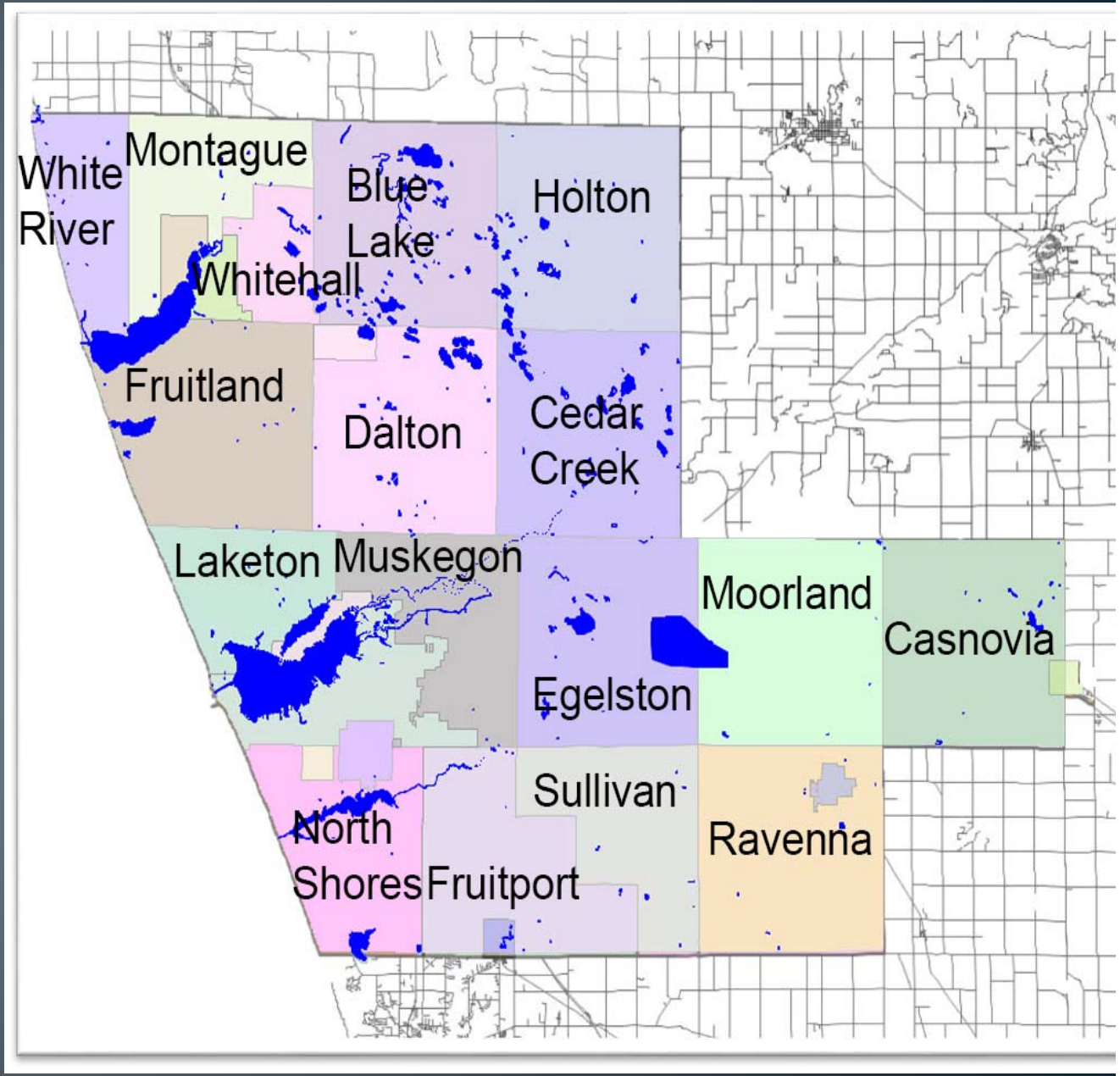
Muskegon County

Located in West Michigan along the coast of Lake Michigan

Local Government

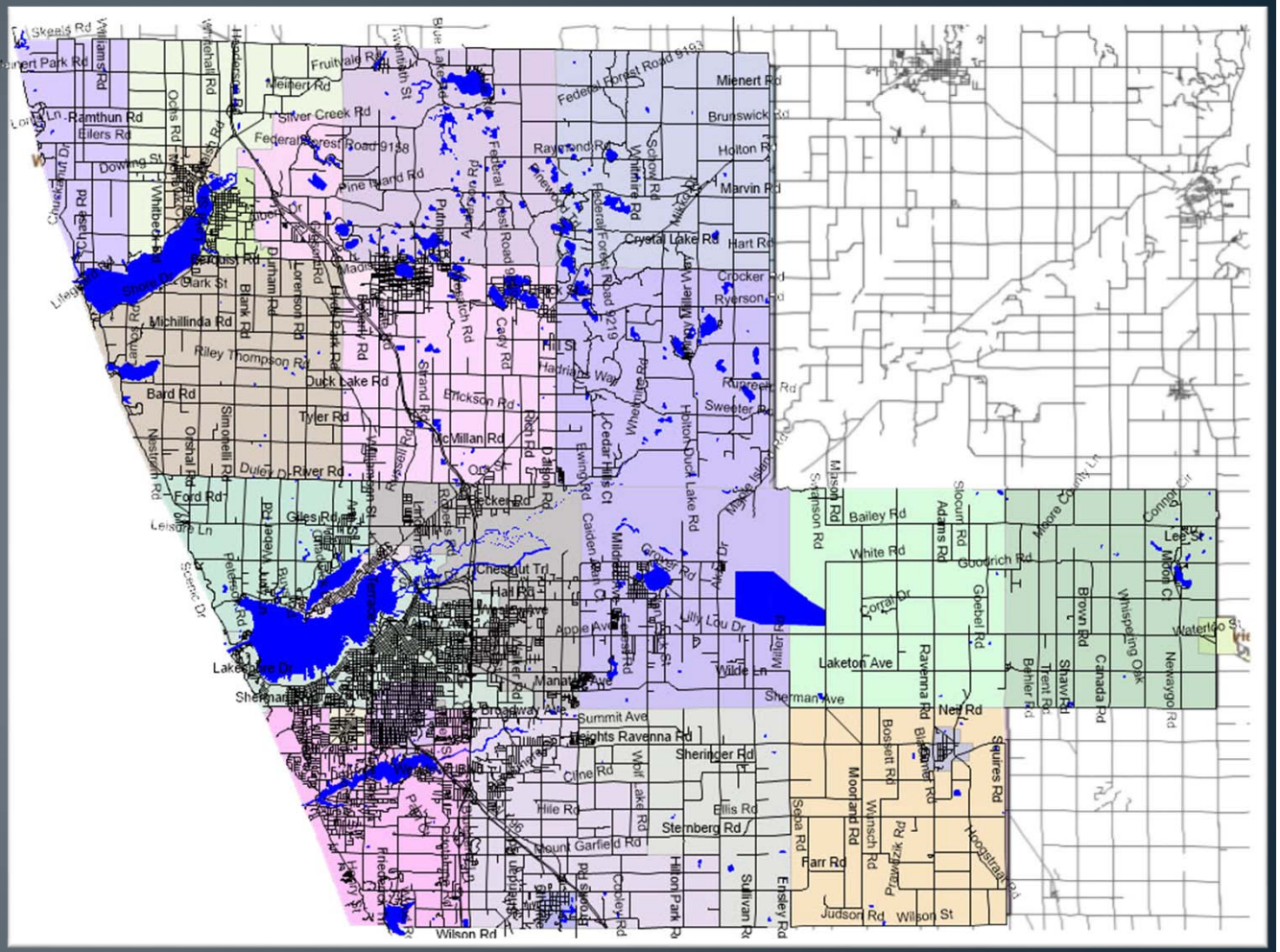
16 Townships

11 Cities & Villages

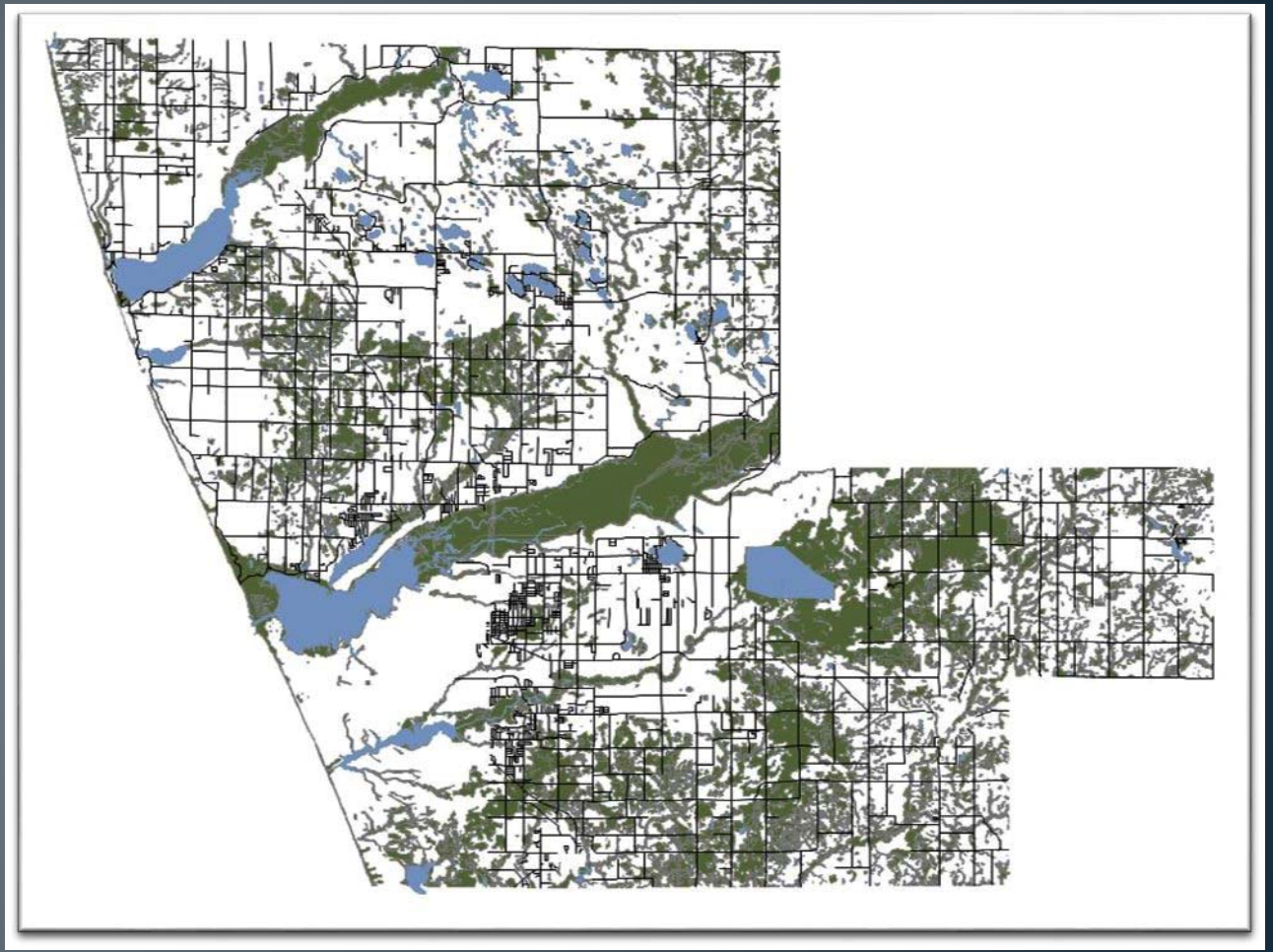


County Road System

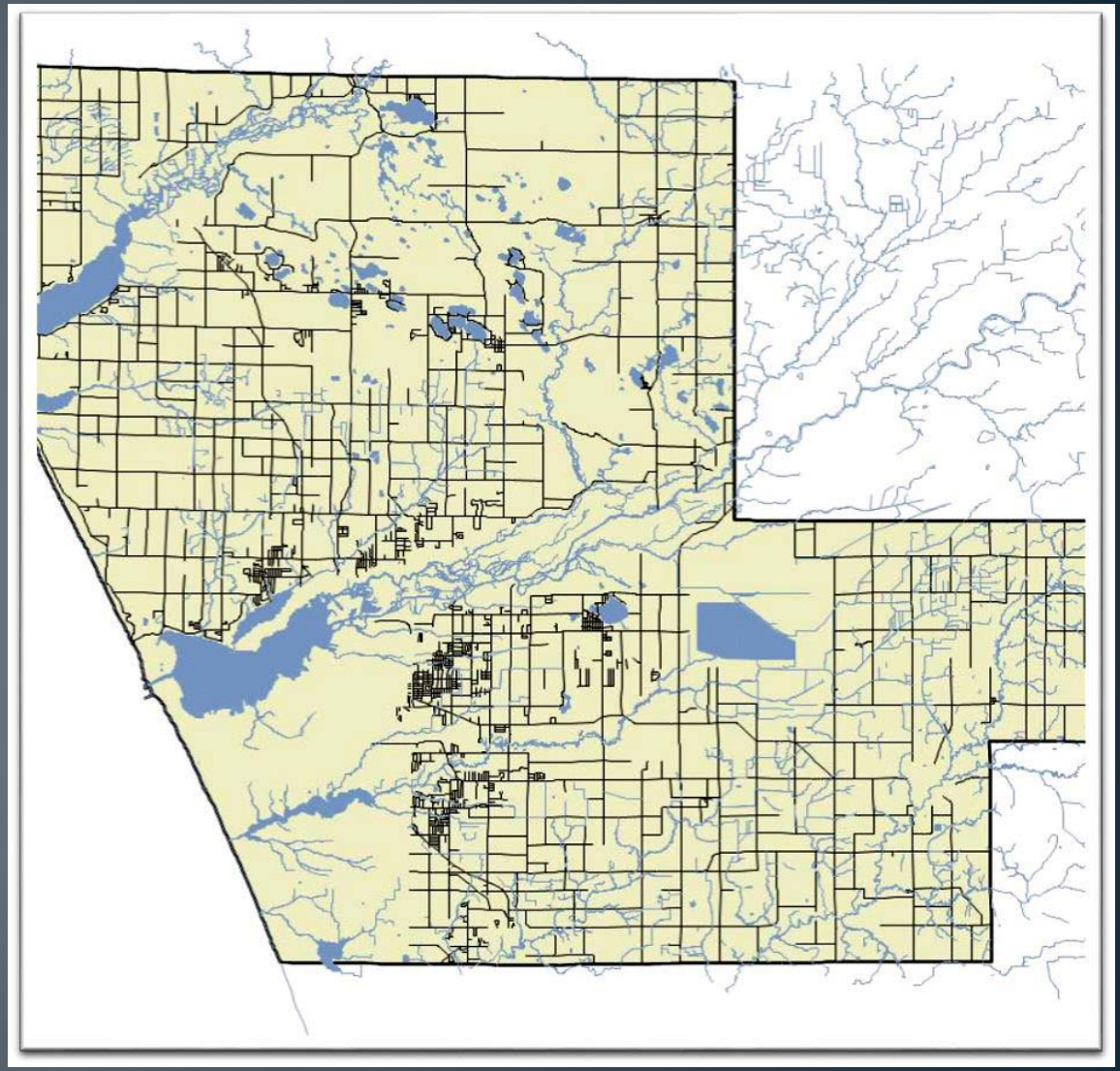
Approximately 1,100 miles of county roads.



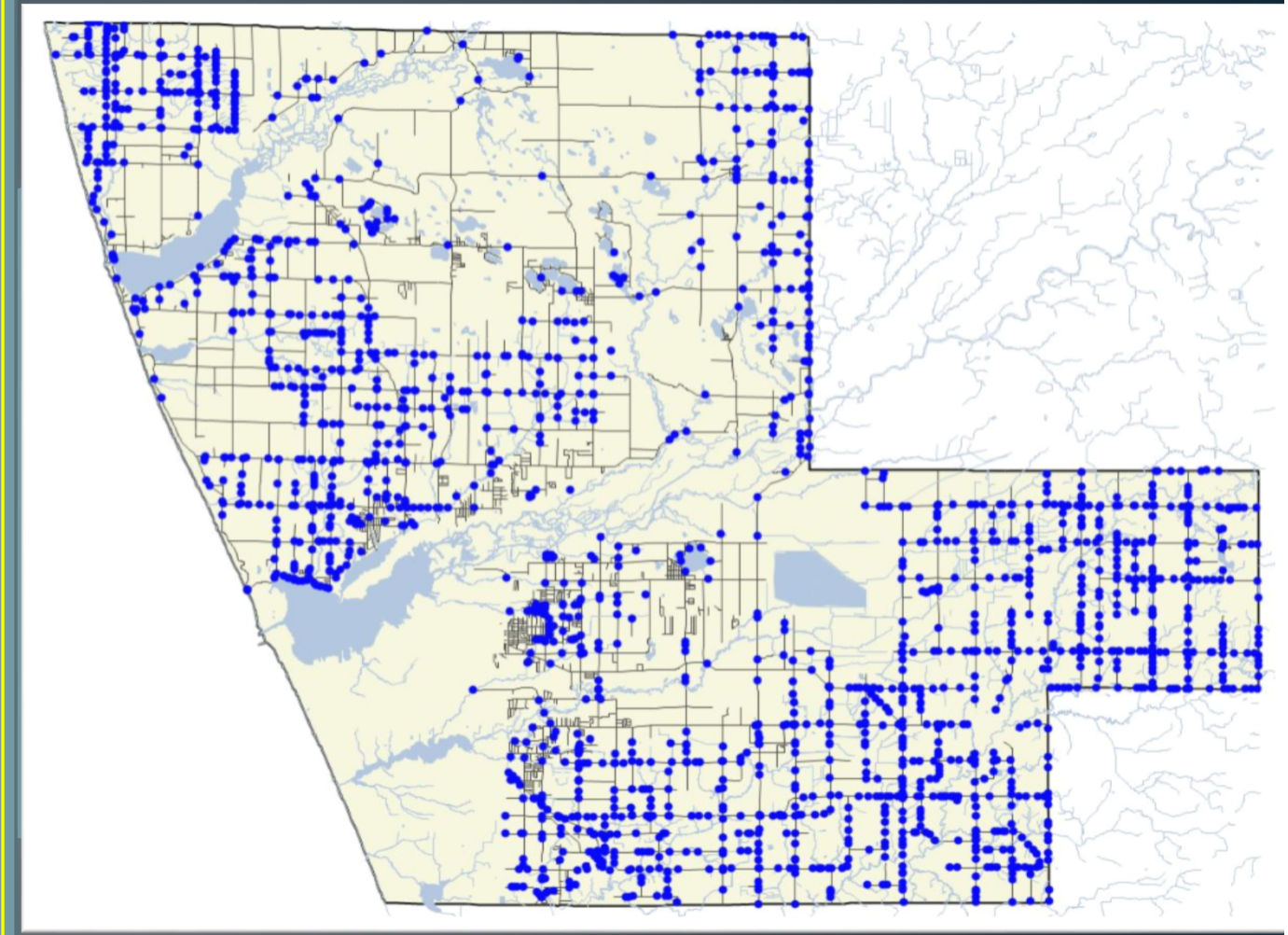
Many areas of wetlands due to flat terrain.



Two large river systems through county (White & Muskegon Rivers). Eastern areas flow to Grand River.



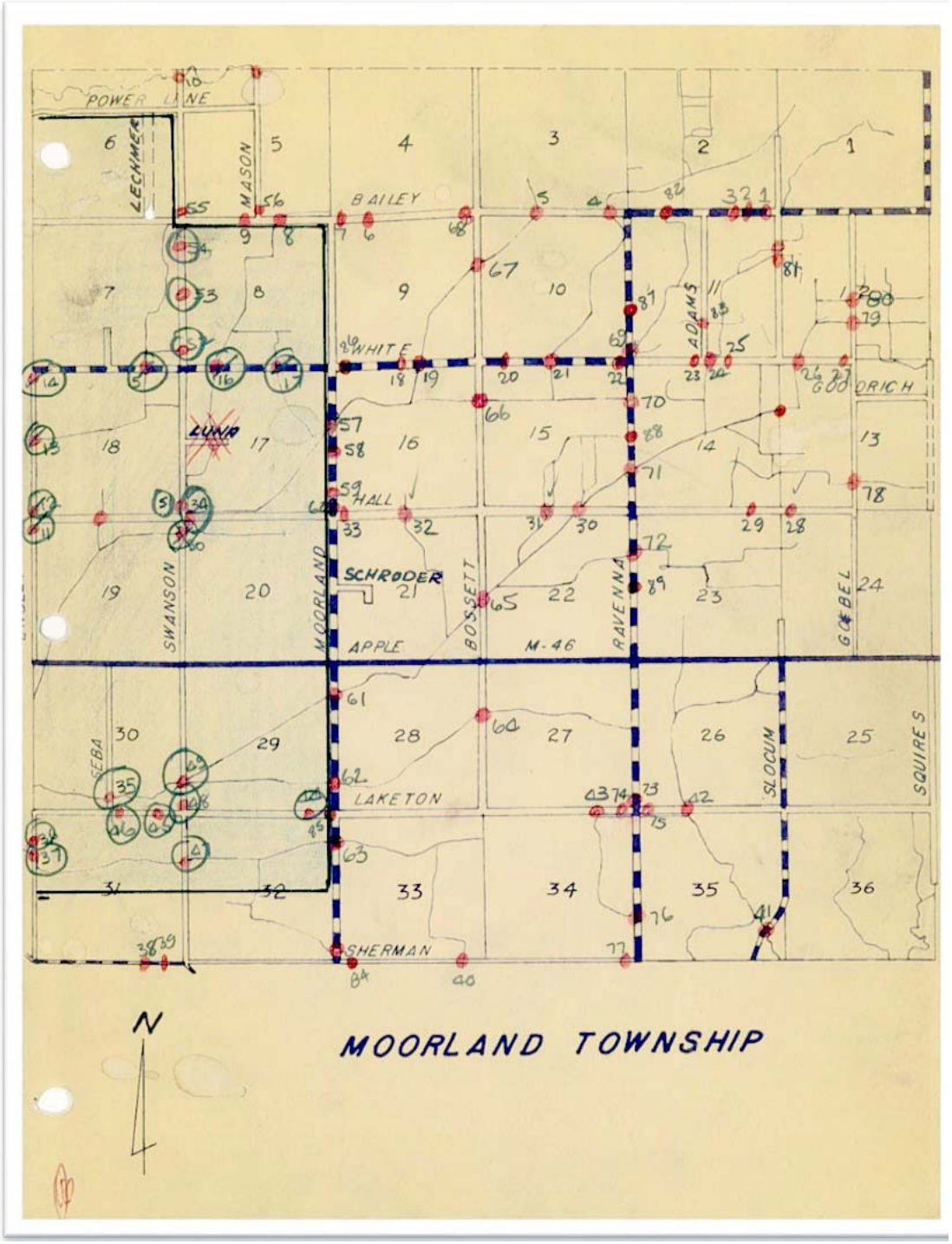
Relatively flat terrain through much of county = many manmade drains and small streams and many culverts (2,000).



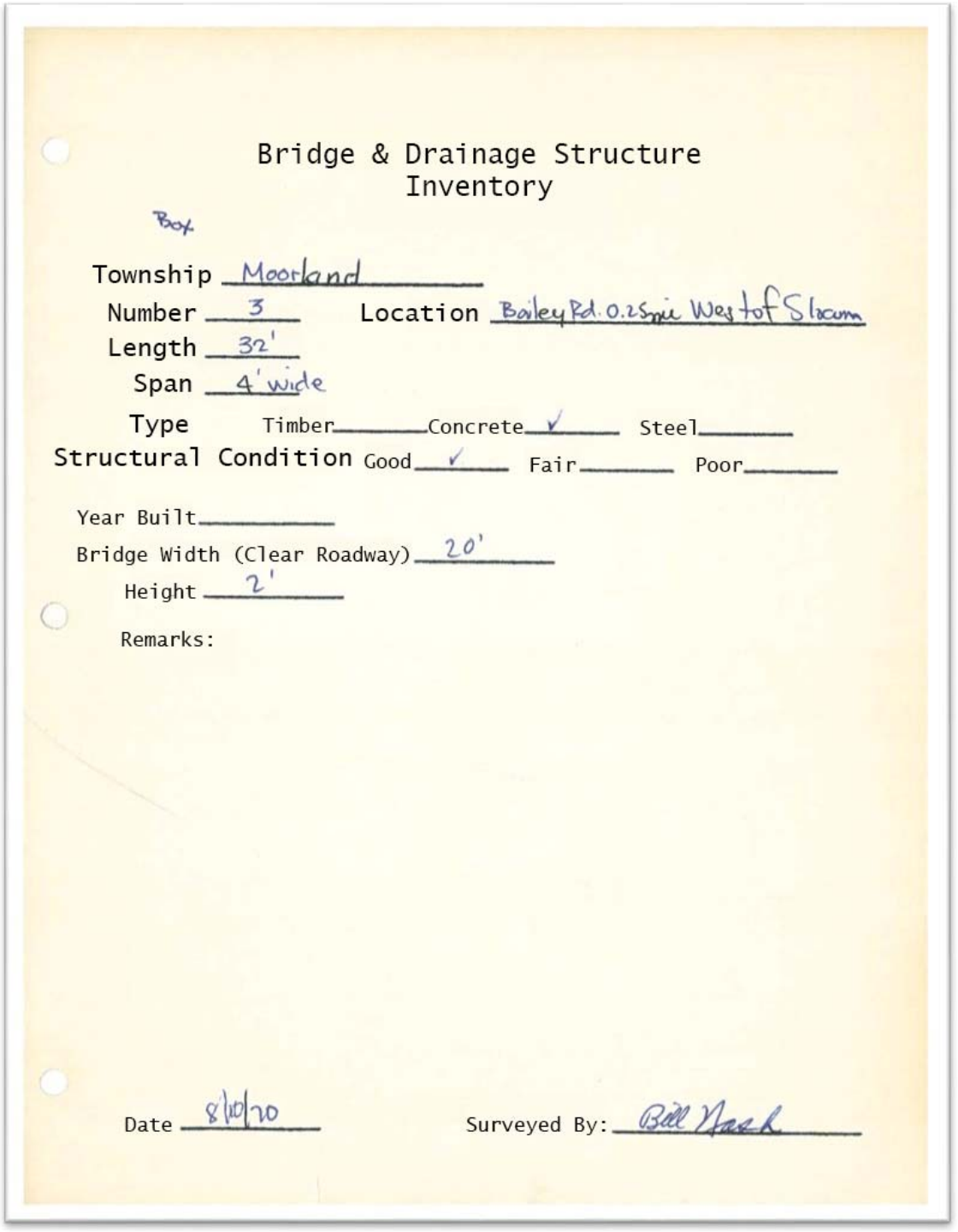
How we built our Roadsoft Culvert Inventory

We had older inventories performed in the 1970's and 80's.

These only included large culverts.



These inventories included a simple evaluation of the condition of the culvert.



Bridge & Drainage Structure
Inventory

Box

Township Moorland

Number 3 Location Bailey Rd. 0.2 Smi West of Slocum

Length 32'

Span 4' wide

Type Timber ____ Concrete ✓ Steel ____

Structural Condition Good ✓ Fair ____ Poor ____

Year Built ____

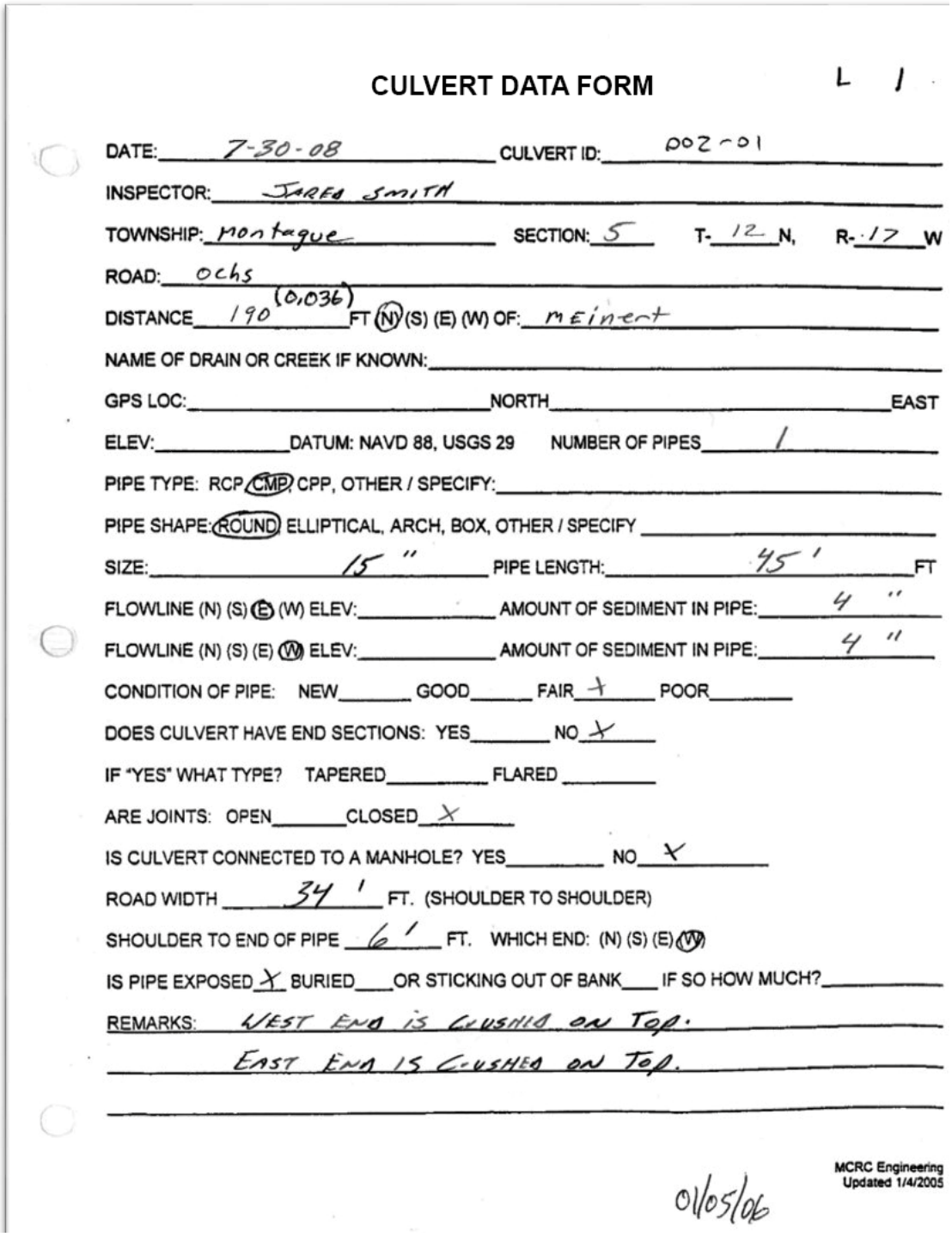
Bridge Width (Clear Roadway) 20'

Height 2'

Remarks:

Date 8/10/20 Surveyed By: Bill Nash

About 12 years ago, we determined the need to improve our culvert inventory and assess the condition of this part of our road system.



CULVERT DATA FORM

L 1

DATE: 7-30-08 CULVERT ID: 002-01

INSPECTOR: JARED SMITH

TOWNSHIP: Montague SECTION: 5 T- 12 N, R- 17 W

ROAD: Ochs

DISTANCE 190 (0.036) FT (N) (S) (E) (W) OF: Meinert

NAME OF DRAIN OR CREEK IF KNOWN:

GPS LOC: NORTH EAST

ELEV: DATUM: NAVD 88, USGS 29 NUMBER OF PIPES 1

PIPE TYPE: RCP (CMP) CPP, OTHER / SPECIFY:

PIPE SHAPE: (ROUND) ELLIPTICAL, ARCH, BOX, OTHER / SPECIFY

SIZE: 15 " PIPE LENGTH: 45 ' FT

FLOWLINE (N) (S) (E) (W) ELEV: AMOUNT OF SEDIMENT IN PIPE: 4 "

FLOWLINE (N) (S) (E) (W) ELEV: AMOUNT OF SEDIMENT IN PIPE: 4 "

CONDITION OF PIPE: NEW GOOD FAIR X POOR

DOES CULVERT HAVE END SECTIONS: YES NO X

IF "YES" WHAT TYPE? TAPERED FLARED

ARE JOINTS: OPEN CLOSED X

IS CULVERT CONNECTED TO A MANHOLE? YES NO X

ROAD WIDTH 34 ' FT. (SHOULDER TO SHOULDER)

SHOULDER TO END OF PIPE 6 ' FT. WHICH END: (N) (S) (E) (W)

IS PIPE EXPOSED X BURIED OR STICKING OUT OF BANK IF SO HOW MUCH?

REMARKS: WEST END IS CRUSHED ON TOP.

EAST END IS CRUSHED ON TOP.

01/05/06

MCRC Engineering
Updated 1/4/2005

How we built our Roadsoft Culvert Inventory

- Every Spring, culvert locations were logged, relative to a nearby intersection.
- Information that could be quickly gathered; diameter, length and observation of any issues was noted.
- Done as a side project during other activities.
- Later, we entered this data into Roadsoft.

Roadsoft Culvert Form

FYI, a blank evaluation form is built into Roadsoft for your use.

Muskegon (County)

Culvert Evaluation Form

Evaluation Date:_____/_____/_____

PR No.: _____ Road Name: _____ Referenced Intersection: _____ Reference Distance: _____

Culvert Inventory ID: _____ Waterway Name: _____

Culvert Inventory

Description: _____ Height / Diameter: _____

Type: _____ Width: _____

Shape: _____ Length: _____

Entrance Structure: _____ Span: _____

Exit Structure: _____ Rise: _____

No. of Culverts: _____ Depth of Cover: _____

Skew Angle: _____

Upstream Road Surface Elevation: _____ Upstream Culvert Invert Elevation: _____

Downstream Road Surface Elevation: _____ Downstream Culvert Invert Elevation: _____

GPS Coordinates

Longitude: _____ Latitude: _____ Elevation: _____

Culvert Ratings

Culvert Rating: _____ Channel Rating: _____ Waterway Adequacy: _____

MEMO: _____

How we built our Roadsoft Culvert Inventory

- In the office, culvert information was obtained from the old inventories, road plans, and from culvert work orders.
- This data was entered into Roadsoft over the Winter months and when time was available.
- Over time, we have added attribute data and found additional culverts that we had missed.

Roadsoft Laptop Collector

- The bulk of our inventory was built in the office. The construction of the culvert inventory was not a standalone project but just part of routine business.
- LDC was not used heavily by us due to our method of constructing our database.
- If an agency were constructing a culvert inventory from scratch, as a specific project, I would recommend using LDC.

Roadsoft Mobile

- Useful for adding work orders from the field during culvert inspections.
- We would like to be able to add a new culvert in the field from the mobile app.
- We would also like the database to be “live” in the sense that anyone could add an inspection, work order, or new culvert from their smart phone.

How we use our Roadsoft Culvert Inventory

- Reliable inventory allows us to more easily plan our projects. Preliminary cost estimates for projects can be done more completely.

- Our maintenance staff appreciates the easy availability of culvert location data when planning ditching projects.

How we use our Roadsoft Culvert Inventory

- Culvert location and other attribute data can be exported to other GIS databases for data sharing or other analysis purposes.

- Example: I use the culvert location data exported to Google Earth to help me breakdown watersheds for hydrologic analysis.

How we use our Roadsoft Culvert Inventory

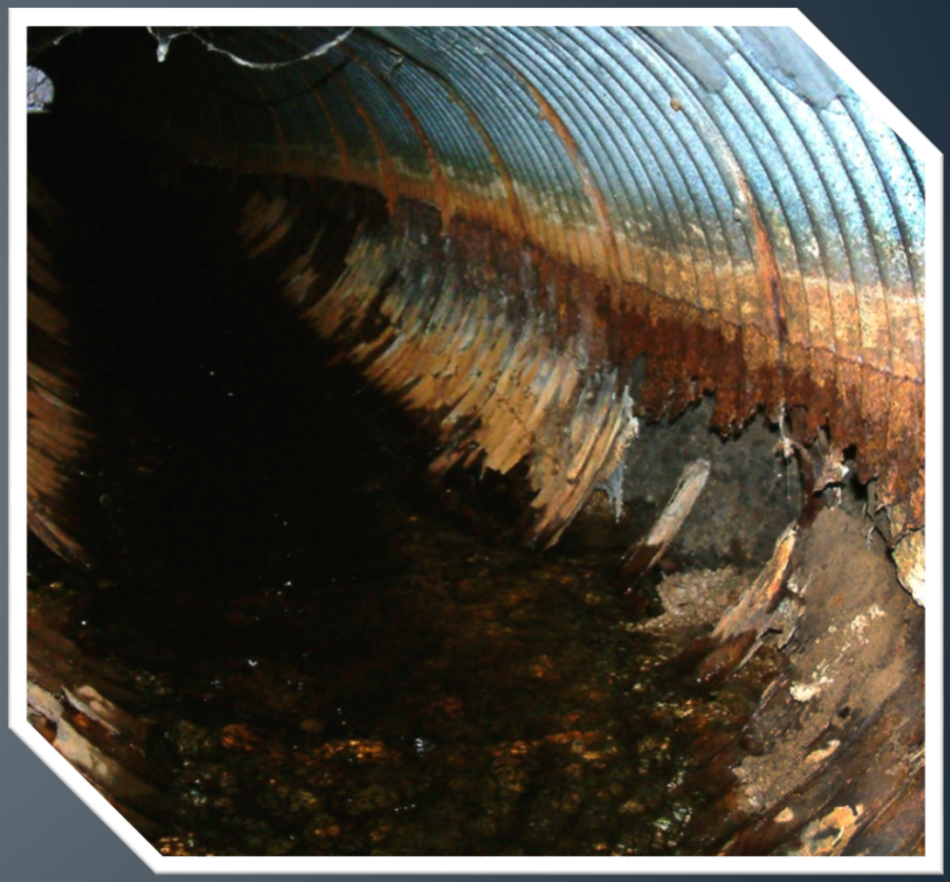
- Easily plan our inspection priorities. Coordinate culvert work on primary and local road systems to improve efficiency and economies of scale.

- With better culvert inspection data, preventive maintenance projects can be arranged around nearby locations & similar types of work: Re-lining, headwall repairs, joint sealing, etc.

We inspect our culverts to manage their replacement, rather than being faced with emergencies.

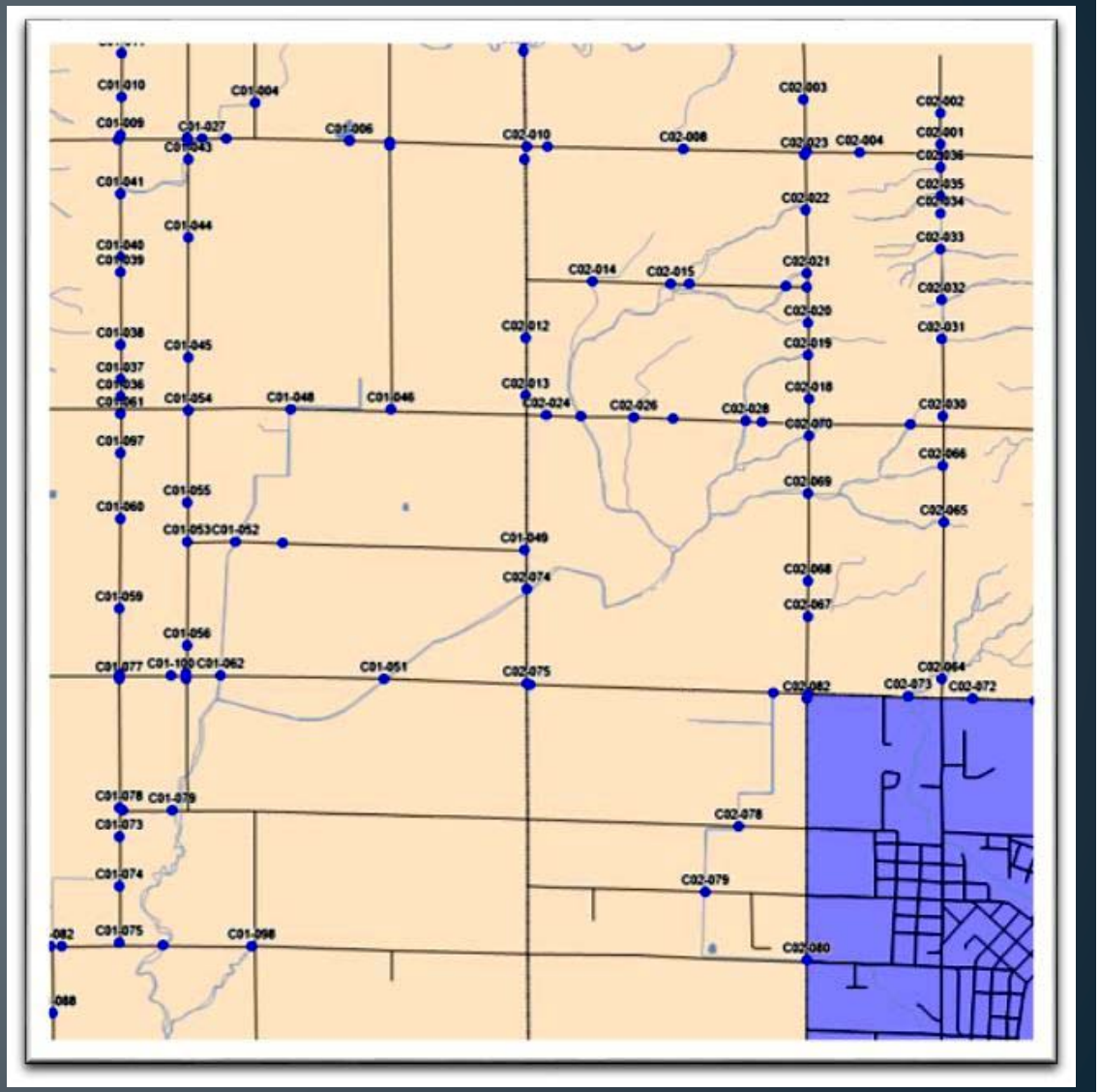
Repairs and replacements can be better planned. Joint failures on concrete pipes.

Being proactive and scheduling replacements or repairs allows us to budget better.



Sometimes, catching one at the right time can mean the difference between a repair and an emergency closure.

We have assigned an inventory number to each culvert. Work orders and finance work type codes flow from these numbers



Inventory reports can be generated for a location, road section, township, etc.

Muskegon County Road Commission

Culvert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size Ht/ Diam. Width	Length
R No: 860505	**Road Name:** Sherman Blvd								
Intersection: Peters Rd & Sherman Blvd									
C13-206	-0.402	01/01/1900	Pre-Cast Concrete Pipe	Circular	Highland County Drain (Ottawa)	None	None	36.0 in	70 ft

Road Elevation: **Up:** **Down:**

Invert Elevation: **Up:** **Down:**

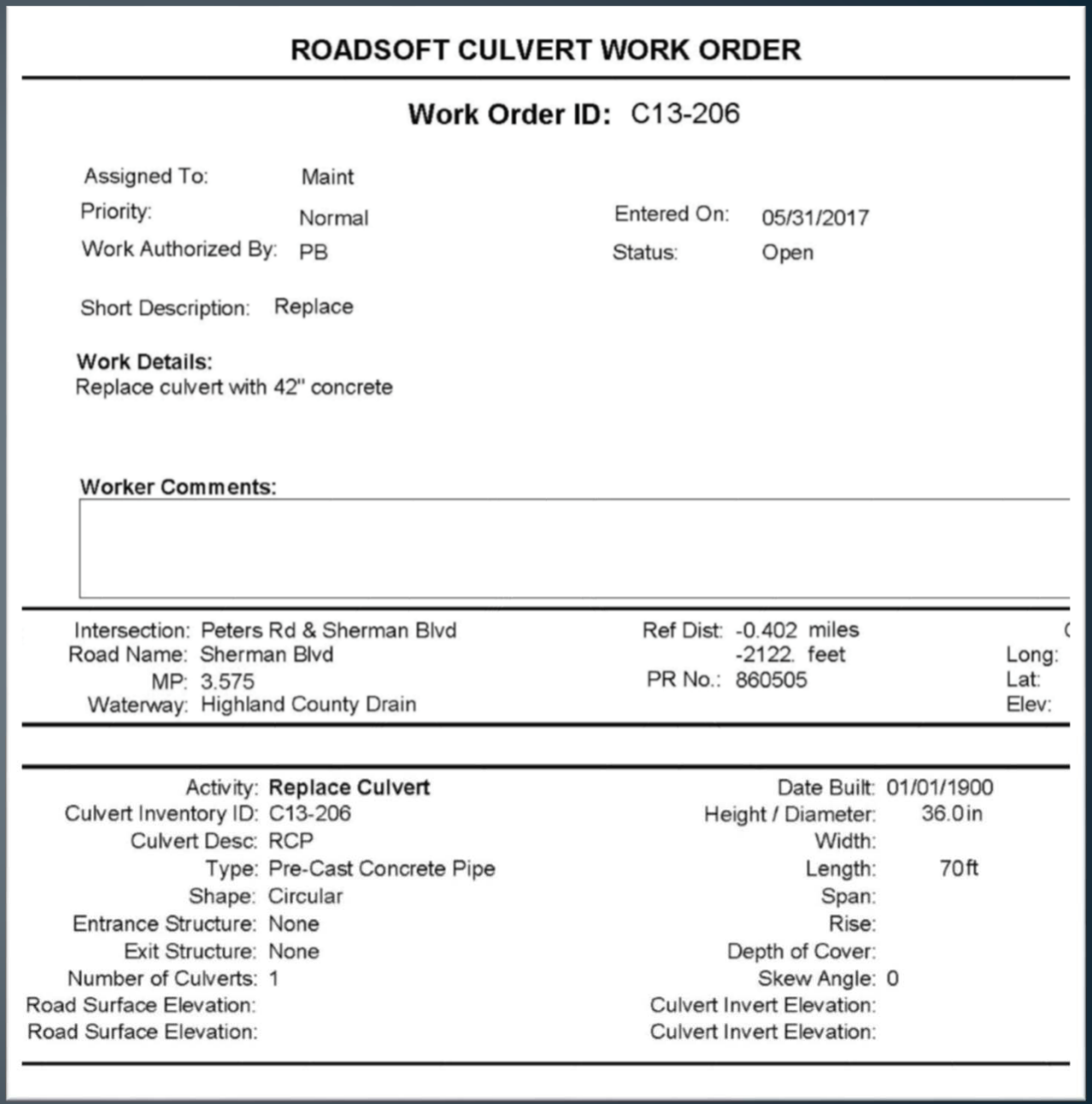
Description: RCP

Memo: 7399 feet west of the centerline of Newaygo Road on Sherman Blvd. Both end sections are disconnected.

Drainage contributing area = 65 acres.
Soil Drainage Class: 90% Class D, 10% Class C
40' of slope change in basin

Drainage calculation: 10% = 73 CFS, 4% = 100 CFS, 2% = 122 CFS, 1% = 147 CFS

Roadsoft generates work orders that can also be managed within the program.



ROADSOFT CULVERT WORK ORDER

Work Order ID: C13-206

Assigned To:	Maint		
Priority:	Normal	Entered On:	05/31/2017
Work Authorized By:	PB	Status:	Open

Short Description: Replace

Work Details:
Replace culvert with 42" concrete

Worker Comments:

Intersection:	Peters Rd & Sherman Blvd	Ref Dist:	-0.402 miles
Road Name:	Sherman Blvd		-2122. feet
MP:	3.575	PR No.:	860505
Waterway:	Highland County Drain		

Long:
Lat:
Elev:

Activity:	**Replace Culvert**	Date Built:	01/01/1900
Culvert Inventory ID:	C13-206	Height / Diameter:	36.0 in
Culvert Desc:	RCP	Width:	
Type:	Pre-Cast Concrete Pipe	Length:	70 ft
Shape:	Circular	Span:	
Entrance Structure:	None	Rise:	
Exit Structure:	None	Depth of Cover:	
Number of Culverts:	1	Skew Angle:	0
Road Surface Elevation:		Culvert Invert Elevation:	
Road Surface Elevation:		Culvert Invert Elevation:	

Being able to demonstrate the needs of the system, gets us further away from management by emergencies.

Getting towards proactive repairs and replacements is our goal.

Thank You!