LAKE COUNTY RETAINING WALL REPORT

SAI

Length: **250'** Structure ID Code: **RW 0227 0300** Temp: **42F**

Inspected By: **ALE/JEG** Date: **12/6/2017** Reviewed By: **ALE** Date: **12/8/2017**

Township: **Perry** Road: **Vrooman** Location: **on hill S of SR 84**

TYPE:	RATING:	COMMENTS/DEFICIENCIES
LEVEL OF INSPECTION: 3		Most h-piles rusted with loss of section, failed webs, #2, 5, 10, 11, 14, 15 failed. Significant seperation between H-pile and sheeting at top #7 to #10. Minor separation at top along wall. **Possible tie rod failure at #20.** See H-pile notes. **2 point drop in condition rating in 18 Months.**
☐ Steel Sheet Pile		
☐ Concrete Cassion		
☒ **Steel Soldier Pile**	**2**	
☐ Concrete Gravity		Additional Comments and Findings: Piles numbered East to West. Additional pile locations with moderate to severe section loss at toe. See H-pile notes. #2 Pile sheared 5", (4 3/4" in 2016), 4" in 2014. Cap seperated 6 1/2", (6" in 2016).
☐ Other _____		
LAT/LONG: 41°43'36"N 81°11'10"W		
LAGGING:		
☐ Concrete Panel		bulged areas (See Photo 6) seems to be advancing Piles#2 to #11 and Piles #18 to #21. **Bulging area was not significant during 2016 inspection.** Rusted, loss of section especially at the toe. Holes at the splash zone. Horiz. Alignment is fair other than bulging areas.
☒ **Steel Sheeting**	4	
☐ Timber		
☐ Other _____		
WALER:		
☐ Steel Beam		Rusted loss of section, some are failed at H-Pile connection. All connections with minor to major section loss. See photo 7.
☒ **Steel Channel**	4	
☐ Double Channel		Rusted loss of section, plate washers cupped, stiffners in poor condition, some failed, heavy loss of section. Possible tie rod failure at #20. **2 point drop in condition rating in 18 Months**
☒ **Tie Rod and Connections**	**3**	
DRAINAGE:		
Roadside	7	good drainage off road
Structure	5	minor moisture at toe, **steel sheeting joints are rusted together not allowing moisture to pass through easily.**
COMPONENTS:		
Guardrail	4	Some collision damage, some lateral movement at broken cap location, See Photo 2 and 11.
Protective Coating	3	Poor, some paint at exposed sheeting at road elevation
Pavement	4	Settlement at SB lane adjacent to potential tie rod failure. Horiz. And map cracking, some sealed, see photo 2.
OVERALL RATING:	**2**	

H-pile condition, numbered East to West

#1: Good condition
#2: Failed, complete seperation below tie rod at grade. See Photo 4.
#4: Minor deformation at grade, rusted, section loss.
#5: Deformation at grade, 100% section loss of web.
#6: Significant deformation below tie rod*.
#7: Significant deformation at tie rod, partial failure at toe, separation at top of wall*.
#8: Major deformation below tie rod, H-pile separated at top*. See Photo 5.
#9: Deformation at tie rod and grade, H-pile separated at top*.
#10: Failed below tie rod, major separation at top. See Photo 9 and 10.
#11: Failed, No flange, no web at tie rod location. See Photo 6.
#12: Deformation at tie rod, section loss at grade*.
#13: Minor deformation at tie rod*.
#14: Failed at toe.
#15: Failed at toe. See Photo 8.
#16: Section loss
#17: Minor bending, section loss.
#18: Minor benging below tie rod.
#19: Major section loss at toe, broken weld at cap. See Photo 11.
#20: Bending, possible tie rod failure
#21: Section loss at grade.
#22: Section loss at grade.
#23: Section loss at grade.
#24: Section loss at grade.
#25: Section loss at grade.
#26: good condition
#27: Section loss at grade.
#28: good condition

All H-piles have varying degrees of rust with section loss.

*See Photos 5 & 7 for typical deformation at the tie rod view.

STRUCTURE ID CODE: ***RW-0227-0300*** *ROUTE:* ***Vrooman Road***

LOCALE: ***Perry Township, Lake County*** *LOCATION:* ***On hill S. of SR 84***

1: 2016-Vrooman Road looking West

2: 2016-Vrooman Road looking East

3: 2016-Wall looking East, note only minor separation at top.

4: 2016-Pile #2 at toe, gap increase of 1" in 3 years

5: 2016-Pile #8 deflection mid height of wall

6: 2016-Pile #11 not functioning

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7: Failed waler with deformation at tie rod, 12-6-2017

8: 2016-Typical H-pile 100% section loss at toe, Pile #15

9: Major separation at top Pile#10, 12-6-2017

10: Major separation at top of wall, 12-6-2017, see Photo 3.

11: Cap displacement (2), with wall misalignment, 12-6-2017

12: Overall view of wall at critical location. 12-6-2017

OVERALL RATING	
Code	**Description**
9	**No noticeable or noteworthy deficiencies** which affect the condition of the structure.
8	**No corrective action required.** No scour or erosion present at toe, minor shrinkage cracking with little spalling, scaling, delamination and no water saturation, discoloration, and no exposed reinforcing steel. Insignificant damage with no misalignment, no apperant corrosive action and no visible rust, minor cracking or splitting of timber components at insignificant locations.
7	**No corrective action required.** Minor scour or erosion present at toe with no undermining, small sealable cracks without desintegration, minor water saturation and spalling of concrete with no affect to reinforcing steel exposure. Minor rusting of steel components with little or no section loss and some cracked welds and /or broken girds. Insignificant decay, cracking splitting, and crushing of timber components.
6	**Preventative Maintenance Suggested.** Scour present with minor undermining but not affecting wall and any supported structures. Discolored apperance and signs of rust stains to painted components. Minor collision damage to guardrail with all components functioning. Minor water saturation at base, minor to moderate deterioration, cracking, and spalling of concrete with leaching and staining, minor to no section loss of steel components. Initial (minor) loss of section and pitting in non-critical stress areas, tie rods and connections may have corrosion issues. Minor decay cracking, splitting or crushing of timber components with some in need of replacement or retrofit. Minor indicators of poor structure drainage apperant.
5	**Preventative Maintenance Strongly Suggested.** Scour and/or erosion present with substantial undermining taking place, minor mis-alignment with possible movement or settlement of wall and any supported structures. Major discoloration, flaking, and rusted areas of painted components. Major collision and exposure damage to guardrail components but functioning as designed. Many concrete components show water saturation with substantial cracking and/or spalling with exposed rebar. Significant corrosive problems with section loss of steel components which may affect stability. Significant corrosion on exposed tie rods and connections, washers and plates showing minor stress deformation. Moderate decay, cracking, splitting and/or crushing of timber components requiring some replacement. Poor structure drainage indicators present.

4	**Investigation Suggested.** Severe scour and/or erosion present, excessive undermining with apperant mis-alignment of wall and movement of material behind wall causing visible settlement of supported structures. Major scaling and flaking of painted components with heavy rusted exposed steel. Extensive collision damage and major deterioration of guardrail components, some replacement required. Desintegration and advanced spalling with structural cracking of concrete components with full surface exposure to reinforcing steel and section loss. Advanced section loss of critical steel components, tie rods and connections severly corroded with washers and plates showing major stress deformation. Substantial number of timber components in need of replacement due to excessive decay, cracking, splitting and or crushing. Poor structure drainage, corrective action required.
3	**Investigation Strongly Suggested.** Excessive scour/erosion present. Corrective action considered necessary to maintain safety and other controlling factors influencing alignment, sliding, overturning and to protect supported structures. Paint not functioning as designed. Replacement of guardrail components nessesary to function as designed. Severe deterioration of structural concrete elements, extensive loss of section on structural steel components, severe decay, cracking, splitting, crushing of timber components; rehabilitation necessary to keep structure functioning as designed
2	**Corrective Action Required.** Critical condition present, complete deterioration of one or all structural components, non-reversible deformation apperant. Structure is not functioning as designed and should be monitored closely until corrective action is taken.
1	**Replacement Required**. Imminent failure condition, corrective action may temporarily place structure to function as designed.
0	**Replacement Required**. Failed condition, beyond corrective action, supported structure should be closed to sercice.

The overall, condition only, rating will code the general overall condition of the retaining wall. The darker boxes on the report form are components that likely control the overall rating however, take into account physical indicators such as misalignment, bowing, scour or undermining, soil migration, etc. that suggest overall stability issues.

EQUIPMENT REQUIRED

CHIPPING HAMMER, TAPE MEASURE, CLIPBOARD, CAMERA, AND PHONE, CHEST OR HIP WAITERS (WILLIAMS ONLY).

CURRENT LEVEL OF INSPECTION

1 LEVEL 1 INSPECTIONS ARE DONE WHEN FULL ACCESS TO THE TOP AND TOE OF THE WALL CAN BE ACHIEVED ON FOOT. NO OBSTRUCTED VIEW OF THE WALL IS PRESENT. ALL INSPECTED COMPONENTS ARE WITHIN ARM'S LENGTH.

2 LEVEL 2 INSPECTIONS ARE DONE WHEN FULL ACCESS TO THE TOP OF THE WALL CAN BE ACHIEVED ON FOOT WITH LIMITED ACCESS TO THE TOE OF THE WALL ON FOOT, LESS THAN 50% LIMITED. THE PORTIONS OF THE TOE THAT IS NOT ACCESSIBLE IS INSPECTED VISUALLY FROM THE TOP.

COMPONENTS ARE WITHIN ARM'S LENGTH AT THE TOP AND TOE OF THE WALL, PORTIONS OF THE COMPONENTS (MID WALL HEIGHT) ARE NOT WITHIN ARM'S LENGTH, LESS THAN 50% OF WALL.

3 LEVEL 3 INSPECTIONS ARE DONE WHEN FULL ACCESS TO THE TOP OF THE WALL CAN BE ACHIEVED ON FOOT WITH LIMITED ACCESS TO THE TOE OF THE WALL ON FOOT, GREATER THAN 50% LIMITED. THE PORTIONS OF THE TOE THAT IS NOT ACCESSIBLE IS INSPECTED VISUALLY FROM THE TOP.

COMPONENTS ARE WITHIN ARM'S LENGTH AT THE TOP OF THE WALL, PORTIONS OF THE COMPONENTS (MID WALL HEIGHT) ARE NOT WITHIN ARM'S LENGTH, GREATER THAN 50% OF THE WALL.

4 LEVEL 4 INSPECTIONS ARE DONE WHEN FULL ACCESS TO THE TOP OF THE WALL CAN BE ACHIEVED ON FOOT WITH NO SAFE ACCESS TO THE TOE OF THE WALL. THESE ARE INSPECTED VISUALLY FROM THE TOP OF THE WALL. NO ARM'S LENGTH INSPECTION OF WALL COMPONENTS OTHER THAN AT TOP OF WALL.