MONDAY Lesson Plan: Hydraulics: The Power of Water

SUBJECT	TEACHER	GRADE	DATE
Waterways & Hydraulics			2/22/2021

OVERVIEW

Introduce students to engineered waterways, hydraulics and how engineering is used to prevent flooding disasters when nature strikes.

PHASES	TEACHER GUIDE	STUDENT GUIDE
OBJECTIVES	• Introduce students to MDOT (Michigan Department of Transportation) • Show how catastrophic uncontrolled water can be • Show what the engineering solution is	• Pay Attention to key events in Videos • Ask Questions about flooding and how to prevent it. • Ask about any question about how to direct water flow.
INFORMATION	• **Video 1**: Midland Flooding & Dam Failure • **Video 2**: Smallwood Lake Dam Overflows • **Audio 3:** MDOT's Eric Carlson on Midland Dam Failure • **Video 4**: M-30 Reopens	• Pay attention to how fast the dam fails • Pay attention to the amount and speed of water flowing • Look at the Map Printout and follow along with Eric on what failed where. • Notice how much rock needed to be put around the structure
VERIFICATION	Please ask students to pay attention to the sense of scale and how little time it takes for water to demolish a bridge.	Be able to answer what part of the bridge collapsed first and how long it took for total collapse. Answer what happened to the lake after the dam failure.
ACTIVITY	Go on a engineering adventure with videos. Work through what caused the collapse and how it was fixed	Engage in discussion of what they think went wrong and might also fix a failed dam.

PHASES	TEACHER GUIDE	STUDENT GUIDE
SUMMARY	Show your students the awesome power of water and how MDOT tries to manage it. Show how MDOT repairs damaged waterways when disaster occurs.	See how powerful a force water can be and the sheer size and scale of engineering put into trying to channel it.

REQUIREMENTS	RESOURCES	NOTES
• **Requirement 1** Learn about how and why water can destroy a dam	• **Resource 1** Video 1: "M-30 Dam" Michigan dam failure caught on video - YouTube	**Estimate Time:** 10-15 minutes
• **Requirement 2** Learn about indirect impacts on waterways after a collapse	• **Resource 2** Video 2: "Smallwood Lake Overflows" Smallwood Lake Dam Overflows After Edenville Dam Failure - YouTube	**Estimate Time:** 10-15 minutes
• **Requirement 3** Match the Hydraulics Engineer's problem breakdown and solution to provided map.	• **Resource 3** Audio 3 : "MDOT's Eric Carlson on M30 Dam Failure" https://youtu.be/uns5M7oo3mk Map Printout Link: Live updates: Flooding in Michigan as dams fail (cnn.com)	**Estimate Time:** 10 minutes
• **Requirement 4** The Built Solution	• **Resource 4** Video 4: "M-30 reopens over the Tittabawassee River" M-30 reopens over the Tittabawassee River to local traffic in Edenville - YouTube	**Estimate Time:** 5-10 minutes

Total Time Frame: 45-60 Minutes