

Michigan Department of Transportation

# **Infrastructure Protection and Rehabilitation Response to High Lake Levels**

MDOT OR21-013

## **Appendix C: Whitehall/Montague 2019/2020 Temporary Mitigation Measures Reference**

March 2022 (Final)

**Infrastructure Protection and Rehabilitation Response to High Lake Levels**

**MDOT OR21-031**

**Appendix C: Whitehall/Montague 2019/2020  
Temporary Mitigation Measures Reference**

March 2022 (Final)

**Primary Author:**

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**Prepared For:**

**Michigan Department of Transportation**  
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Research Administration Section  
Research Project Administration Manager  
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30080765

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The statements, analysis or calculations in this report are based on information provided to Arcadis by third parties and shall be used as general information only. The terms “engineer” and “engineering” used in this report are general terms that do not refer to final engineering design but are only used in terms of high level or conceptual engineering. The plans included in this report are not intended for construction purposes and should be checked and verified for changing field conditions prior to further development.

As Arcadis does not have a complete control over the accuracy of the data used in the conceptual engineering and design completed in this report, it is recommended that the results shown not be used without first obtaining additional information and confirming all results. This includes, but is not limited to, the roadway survey data, the recommended bridge structures, the soils and geotechnical data, the erosion control calculations, the wave calculations, future high water and wave forecasts, and all other engineering design. The statements provided herein shall not be relied upon for any specific application without independent verification and assessment of suitability by the project’s engineer of record, architect, or another party acting in similar capacity, as stipulated by the authority having jurisdiction or other applicable contractual regulations.

Therefore, while preliminary recommendations, calculations, and engineering design are based on sound and established principles, they shall not be deemed as instruction for any specific application or project without subsequent independent analysis, evaluation, verification and assessment of appropriateness for such an application by the engineer and/or architect of the project.

Based on the preceding, Arcadis hereby denies any liability whatsoever for losses and/or damages of whatever kind (and sustained by whomever) that might result from the above.

# **Engineering Drawings for Whitehall/Montague 2019/2020 Temporary Mitigation Measures**

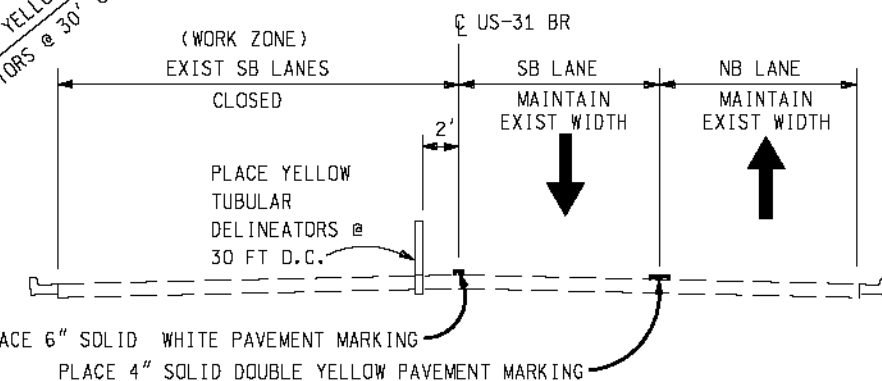
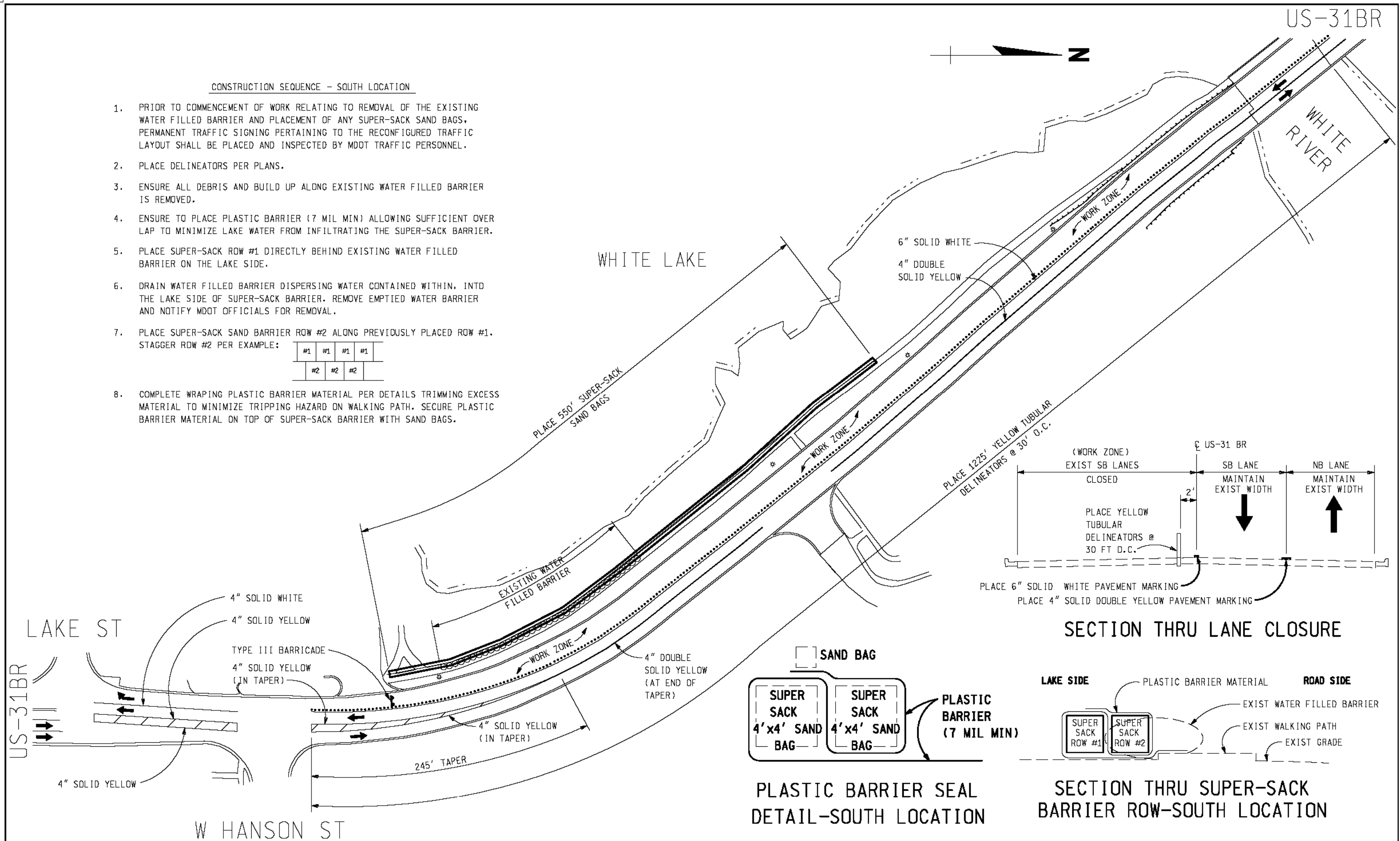
**Provided by Grand Region**



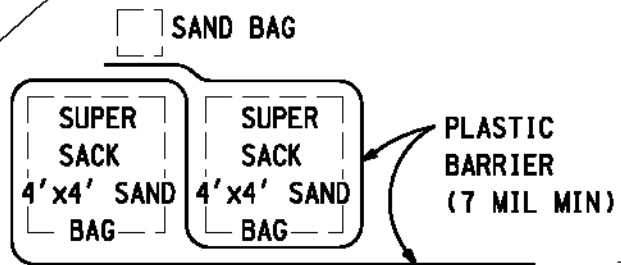
**CONSTRUCTION SEQUENCE - SOUTH LOCATION**

1. PRIOR TO COMMENCEMENT OF WORK RELATING TO REMOVAL OF THE EXISTING WATER FILLED BARRIER AND PLACEMENT OF ANY SUPER-SACK SAND BAGS, PERMANENT TRAFFIC SIGNING PERTAINING TO THE RECONFIGURED TRAFFIC LAYOUT SHALL BE PLACED AND INSPECTED BY MDTT TRAFFIC PERSONNEL.
2. PLACE DELINEATORS PER PLANS.
3. ENSURE ALL DEBRIS AND BUILD UP ALONG EXISTING WATER FILLED BARRIER IS REMOVED.
4. ENSURE TO PLACE PLASTIC BARRIER (7 MIL MIN) ALLOWING SUFFICIENT OVER LAP TO MINIMIZE LAKE WATER FROM INFILTRATING THE SUPER-SACK BARRIER.
5. PLACE SUPER-SACK ROW #1 DIRECTLY BEHIND EXISTING WATER FILLED BARRIER ON THE LAKE SIDE.
6. DRAIN WATER FILLED BARRIER DISPERSING WATER CONTAINED WITHIN, INTO THE LAKE SIDE OF SUPER-SACK BARRIER. REMOVE EMPTIED WATER BARRIER AND NOTIFY MDTT OFFICIALS FOR REMOVAL.
7. PLACE SUPER-SACK SAND BARRIER ROW #2 ALONG PREVIOUSLY PLACED ROW #1. STAGGER ROW #2 PER EXAMPLE:
 

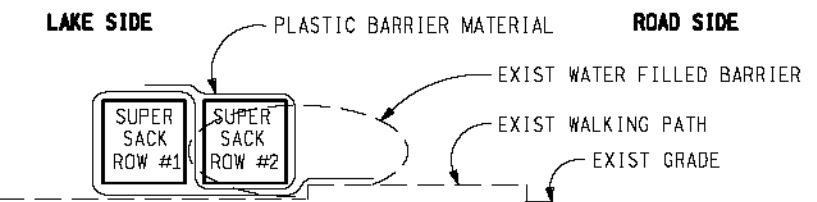
#1	#1	#1	#1
#2	#2	#2	
8. COMPLETE WRAPING PLASTIC BARRIER MATERIAL PER DETAILS TRIMMING EXCESS MATERIAL TO MINIMIZE TRIPPING HAZARD ON WALKING PATH. SECURE PLASTIC BARRIER MATERIAL ON TOP OF SUPER-SACK BARRIER WITH SAND BAGS.



**SECTION THRU LANE CLOSURE**

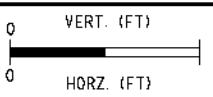


**PLASTIC BARRIER SEAL DETAIL-SOUTH LOCATION**



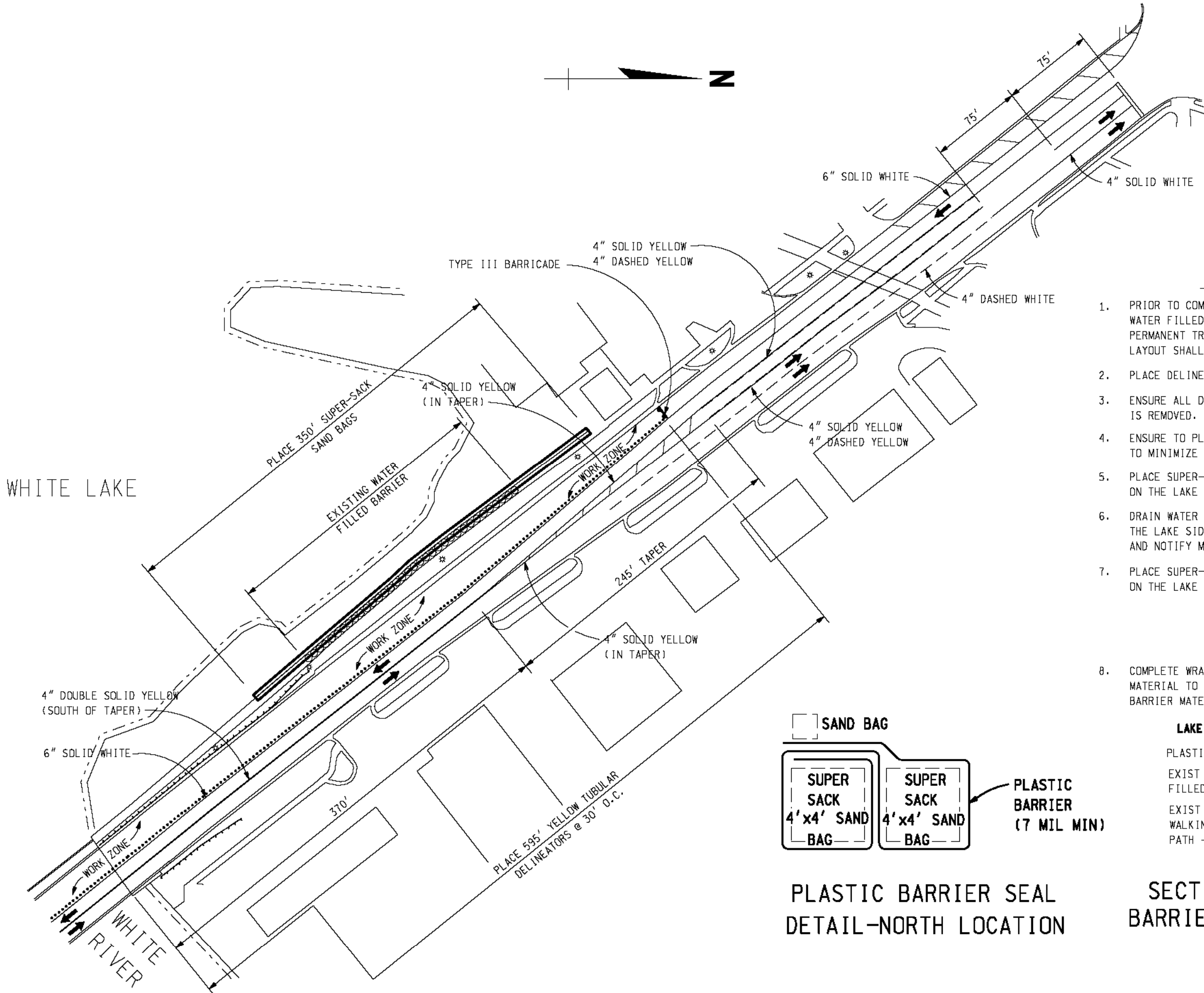
**SECTION THRU SUPER-SACK BARRIER ROW-SOUTH LOCATION**

FINAL ROW PLAN REVISIONS (SUBMITTAL DATE: )							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION



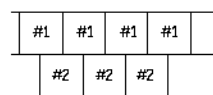
DATE: 10/14/19  
 DESIGN UNIT: FREDRICKSON  
 TSC: MUSKEGON

CS: 61073  
 JUN:

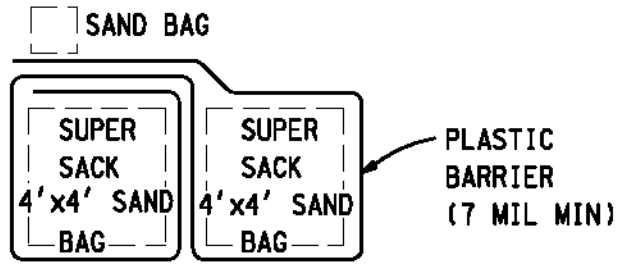


**CONSTRUCTION SEQUENCE - NORTH LOCATION**

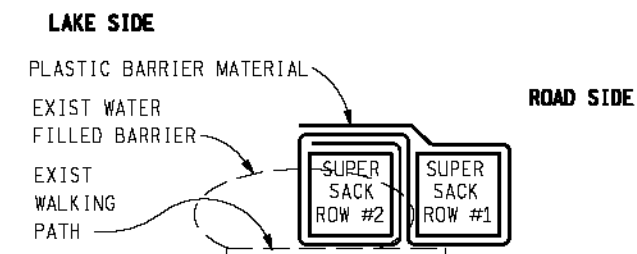
1. PRIOR TO COMMENCEMENT OF WORK RELATING TO REMOVAL OF THE EXISTING WATER FILLED BARRIER AND PLACEMENT OF ANY SUPER-SACK SAND BAGS, PERMANENT TRAFFIC SIGNING PERTAINING TO THE RECONFIGURED TRAFFIC LAYOUT SHALL BE PLACED AND INSPECTED BY MDT TRAFFIC PERSONNEL.
2. PLACE DELINEATORS PER PLANS.
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5. PLACE SUPER-SACK ROW #1 DIRECTLY IN FRONT OF EXISTING WATER FILLED BARRIER ON THE LAKE SIDE.
6. DRAIN WATER FILLED BARRIER DISPERSING WATER CONTAINED WITHIN, INTO THE LAKE SIDE OF SUPER-SACK BARRIER. REMOVE EMPTIED WATER BARRIER AND NOTIFY MDT OFFICIALS FOR REMOVAL.
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8. COMPLETE WRAPING PLASTIC BARRIER MATERIAL PER DETAILS TRIMMING EXCESS MATERIAL TO MINIMIZE TRIPPING HAZARD ON WALKING PATH. SECURE PLASTIC BARRIER MATERIAL ON TOP OF SUPER-SACK BARRIER WITH SAND BAGS.

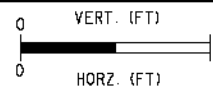


**PLASTIC BARRIER SEAL  
DETAIL-NORTH LOCATION**



**SECTION THRU SUPER-SACK  
BARRIER ROW-NORTH LOCATION**

FINAL ROW PLAN REVISIONS				(SUBMITTAL DATE: )			
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION



DATE: 10/14/19	CS: 61073
DESIGN UNIT: FREDRICKSON	JN:
TSC: MUSKEGON	FILE:

FLOODING ABATEMENT - NORTH LOCATION	DRAWING	SHEET
US-31BR		SECTION 2
WHITEHALL-MONTAGUE, MICHIGAN		

# **Cost Data for Whitehall/Montague 2019/2020 Temporary Mitigation Measures**

**Provided by Grand Region**

## Kirkpatrick, Emily

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**From:** Fredrickson, Marc (MDOT) <FredricksonM@michigan.gov>  
**Sent:** Friday, June 4, 2021 9:42 AM  
**To:** Kirkpatrick, Emily  
**Cc:** Zweng, Harold (MDOT); Reddick, Kelli; Trimble, Jonathan; Guikema, Jason (MDOT); Berdis, Philip; Gerdeman, David; Wildman, Charlie; Hebebrand, Craig  
**Subject:** RE: MDOT OR21-013: Grand Region Connect (pre site visit) - RFI and Scheduling

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

**Categories:** MDOT

Emily, sorry again for the delay in getting this information to you. Here are some costs and breakdowns for our Whitehall Site.

**Spring 2019** – Deployment of water filled barrier system. Approximately 2 days of road closure because of existing flooding while mitigation measures were procured and installed. Actual installation of the water filled barrier system was approximately half a day. After installation we left a permanent lane closure on one bound of the roadway to protect the pumping operations in the storm sewer. Our local partners provided generators and pump that were activated by local staff as needed (rain events). We “rented” this service for the summer of 2019 and then in the Fall with the sand bags placed we installed permanent measures. So we didn’t have a fixed cost for the pumping during this summer operation.

**Material Costs:**

Water filled barrier system - \$19,000 for 2 – 225’ sections of “3’ Single Closed End” plastic barrier system. This cost included on-site training by the manufacturer. (<https://damitdams.com/>)

**Additional Costs:**

Labor, Equipment, Traffic Control and Maintenance/Operation of pumps and generators from May 2019 to October 2019 by Muskegon County Road Commission - \$16,000

Total Costs: ~ \$35,000

**Fall 2019** – Deployment of sand bag barrier system to replace water filled barrier system. Existing 4 lane section of highway was permanently reduced to 2 lanes with new pavement markings and tubular markers. Road was closed for approximately 4 hours to setup the new traffic configuration. No closures needed to deploy the new mitigation, as all work was performed from the closed lanes. Approximately 10 days to complete installation of new sand bag barrier system; 5 days on the Montague side and 5 days on the Whitehall side. Some of the existing mitigation measures from Spring 2019 were left in place (ballooning of the storm sewer) while others were replaced (new submersible pumps that were powered by temporary power drops instead of a generator).

**Material Costs:**

630 Each – Bulk Bags (FIBC’s or Super Sacks) - \$15 each (<https://www.sandbagstore.com/bulkbag3000lb.html>)

10 Each – 6mil thicknes plastic sheeting at 32’ x 100’ rolls - \$270 each (<https://www.bfgsupply.com/order-now/122/greenhouse-coverings>)

3 Each - Submersible Pumps - \$2,000 each

3 Each – Heating Elements ~ \$1,000 total



Sand we had nearby from our County partners, so we did not have a direct cost for that. Each bag takes approximately 1 CYD to fill, so we had about 630 CYD's of material used.

Breakdown of charges from Fall 2019 to Fall 2020 (1 year of operation and maintenance)

Material Total: \$28,500

Labor/Equipment: \$48,000

Temporary Traffic Control: 3,000

Semi-Permanent Traffic Control Modifications: \$16,000

Operations/Maintenance for 1 year: \$58,000

Total Cost as of Fall 2020: \$153,500

Let me know if you have any questions.

Thanks,  
Marc

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**From:** Fredrickson, Marc (MDOT)  
**Sent:** Friday, May 7, 2021 2:36 PM  
**To:** Kirkpatrick, Emily <Emily.Kirkpatrick@arcadis.com>  
**Cc:** Zweng, Harold (MDOT) <ZwengH@michigan.gov>; Reddick, Kelli <Kelli.Reddick@arcadis.com>; Trimble, Jonathan <Jonathan.Trimble@arcadis.com>; Guikema, Jason (MDOT) <GuikemaJ@michigan.gov>; Berdis, Philip <philip.berdis@arcadis.com>; Gerdeman, David <David.Gerdeman@arcadis.com>; Wildman, Charlie <Charlie.Wildman@arcadis.com>; Hebebrand, Craig <craig.hebebrand@arcadis.com>  
**Subject:** RE: MDOT OR21-013: Grand Region Connect (pre site visit) - RFI and Scheduling

Emily,

Just wanted to provide an update that we're still gathering our Whitehall reference data that you requested below. As soon as I have it together I'll pass it along. Let me know if there's any immediate timeframe this is needed by and I'll work to get it to you in a timely fashion.

Thanks,  
Marc

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**From:** Kirkpatrick, Emily <[Emily.Kirkpatrick@arcadis.com](mailto:Emily.Kirkpatrick@arcadis.com)>  
**Sent:** Friday, April 30, 2021 5:33 PM  
**To:** Fredrickson, Marc (MDOT) <[FredricksonM@michigan.gov](mailto:FredricksonM@michigan.gov)>  
**Cc:** Zweng, Harold (MDOT) <[ZwengH@michigan.gov](mailto:ZwengH@michigan.gov)>; Reddick, Kelli <[Kelli.Reddick@arcadis.com](mailto:Kelli.Reddick@arcadis.com)>; Trimble, Jonathan <[Jonathan.Trimble@arcadis.com](mailto:Jonathan.Trimble@arcadis.com)>; Guikema, Jason (MDOT) <[GuikemaJ@michigan.gov](mailto:GuikemaJ@michigan.gov)>; Berdis, Philip <[philip.berdis@arcadis.com](mailto:philip.berdis@arcadis.com)>; Gerdeman, David <[David.Gerdeman@arcadis.com](mailto:David.Gerdeman@arcadis.com)>; Wildman, Charlie <[Charlie.Wildman@arcadis.com](mailto:Charlie.Wildman@arcadis.com)>; Hebebrand, Craig <[craig.hebebrand@arcadis.com](mailto:craig.hebebrand@arcadis.com)>  
**Subject:** RE: MDOT OR21-013: Grand Region Connect (pre site visit) - RFI and Scheduling

**CAUTION: This is an External email. Please send suspicious emails to [abuse@michigan.gov](mailto:abuse@michigan.gov)**

Hi Marc,

I wanted to follow up on both scheduling and our site-specific RFIs before we connect next week.

In terms of scheduling, what is your region's availability for site visits the week of May 10<sup>th</sup>? In terms of a time commitment, David, our drone pilot, is thinking he will likely be 2-3 hours at each site. We were hoping to get your staff's availability generally (morning / afternoon) from Monday May 10 through Friday May 14<sup>th</sup> so we can finalize the route. We can then share our target date, as well as a "rain" date once we coordinate with all the regions.

Also, below you will find our list of requested information, based on our understanding of what is available for the sites of interest based on our last call and our call with Chris. We don't need all the information at once, but we were hoping to get any plans prior to the site visits. Sending via email is fine – let me know if we need to coordinate on transferring any larger files.

Thank you!  
Emily + team

### **Grand Region RFI**

#### **Ludington**

- Existing roadway plans
- Plans of historically installed mitigation measures
- Any local maintenance logs
- Any photos during the past high-water events (photos during historic lows would also be useful for comparison)
- Seasonal AADT, if available

*Our understanding is that no geotechnical reports (other than what is included in the historic implemented mitigation measures) is available for this site.*

#### **Reference Site – Whitehall**

- Cost data for implemented temporary measures (water barriers, sand filled "supersack," pump & generators)
- Any drawing/sketches/cut sheets for water barrier mitigation measure
- Downtimes/road closures during installation of implemented measures
- *Received to date:*
  - *Ppt summary overview*
  - *Drawings of super-sac barrier implementation*
  - *Existing Bridge and roadway plans*

-----Original Appointment-----

**From:** Kirkpatrick, Emily

**Sent:** Wednesday, April 28, 2021 9:41 AM

**To:** Kirkpatrick, Emily; Fredrickson, Marc (MDOT); Hebebrand, Craig; Wildman, Charlie; Berdis, Philip; Gerdeman, David

**Cc:** Zweng, Harold (MDOT); Johnecheck, Christopher (MDOT); Reddick, Kelli; Trimble, Jonathan; Guikema, Jason (MDOT)

**Subject:** MDOT OR21-013: Grand Region Connect (pre site visit)

**When:** Tuesday, May 4, 2021 4:00 PM-5:00 PM (UTC-05:00) Eastern Time (US & Canada).

**Where:** Microsoft Teams Meeting

Grabbing an hour, but may use less.

### **Ludington State Park**

*Call Purpose:*

- Review the specific site of interest in more detail, identify key elements that should be captured, talk through any site-specific logistics (access, key start/stop points for capture, etc.).

**Tentative Site Visit Schedule – Weather and Regional Schedule dependent**

5/10 Benton Harbor (afternoon)  
**5/11 Ludington State Park** and Elbert/Frankfort (about 1.5hr drive between sites)  
5/12 Petoskey  
5/13 Algonac & St. Johns Marsh

Schedule Notes:

- Friday - overflow day for weather or if we aren't able to do both sites on Tuesday.
- Week of 5/17-5/21 as fall back dates.
- If the weather the week of 5/10 is not optimal, either Benton Harbor or Algonac may be done as a "one-off" visit.

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## Microsoft Teams meeting

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