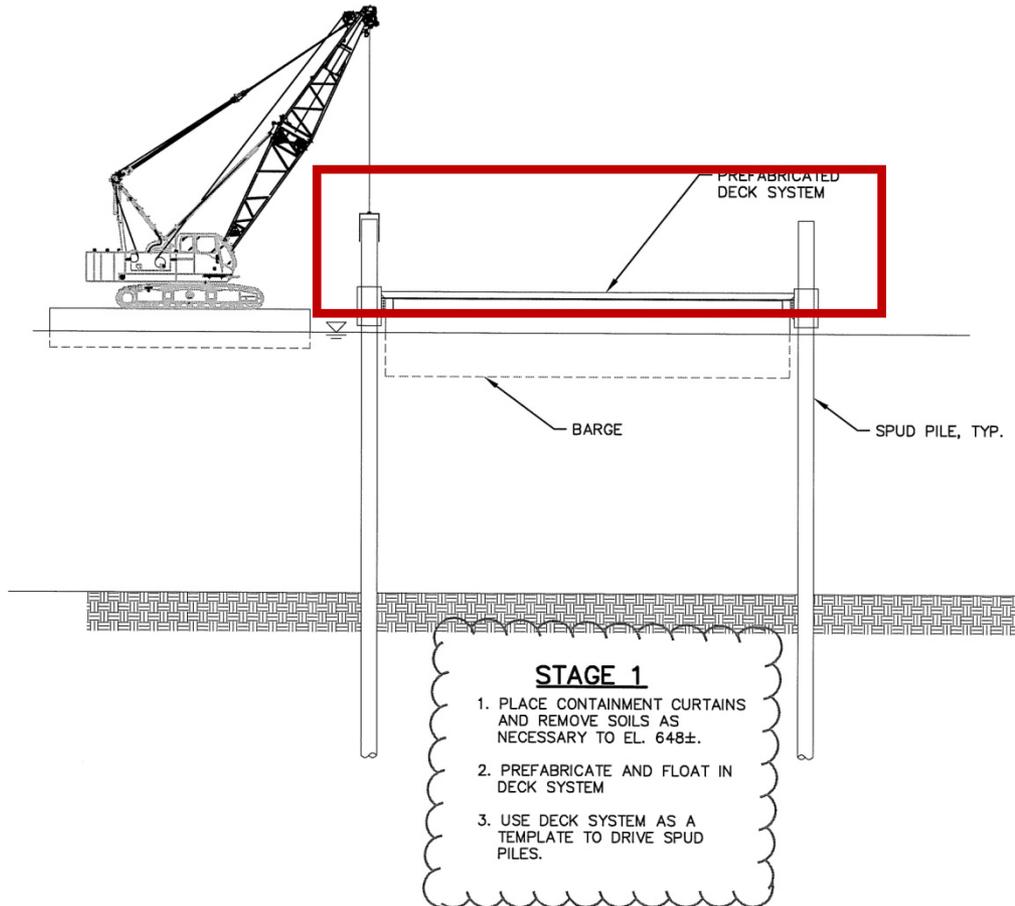




## Constructing the St. Croix Crossing Bridge Foundations: Seven “Easy” Steps

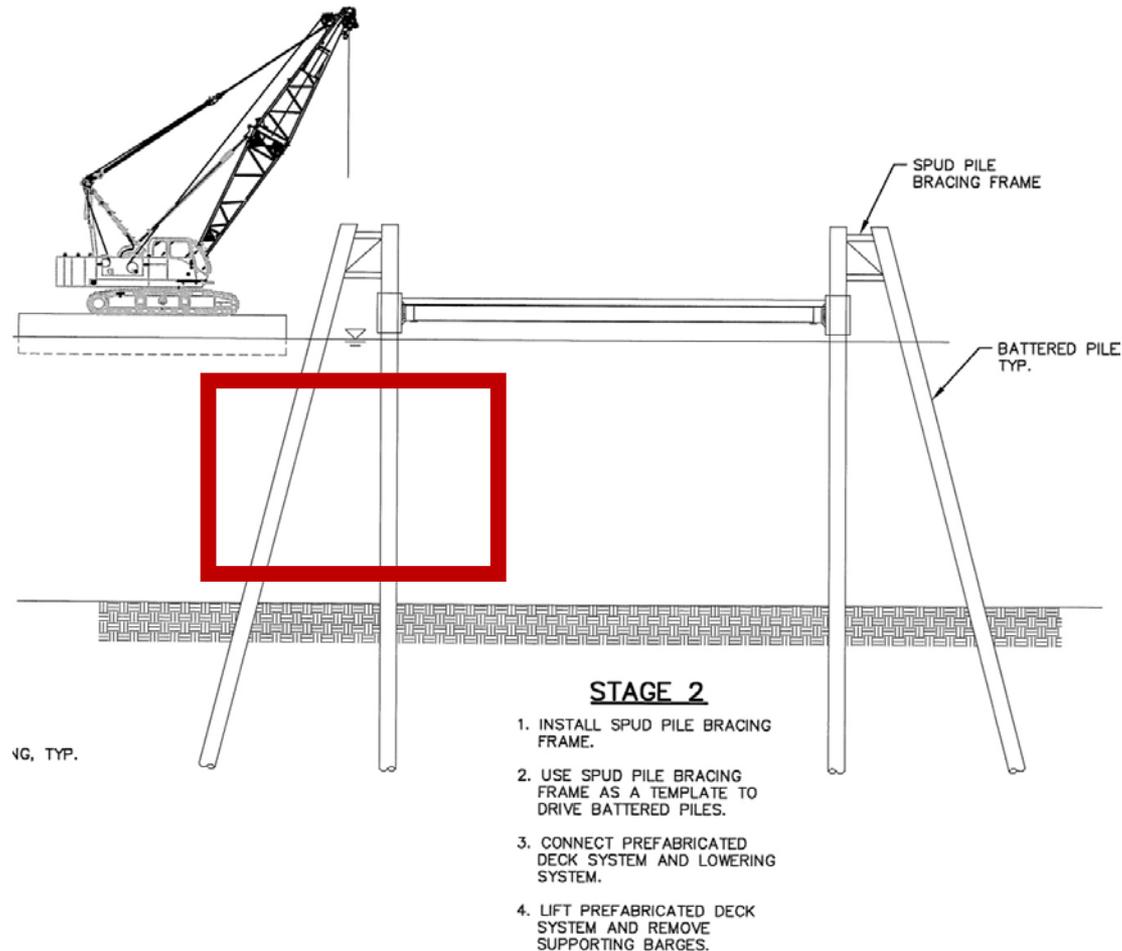
# Precast Deck System



The **pre-fabricated deck system** is a platform for workers, acts as a guide for placing the casings, and eventually gets sunk to the river bottom as part of the footing.



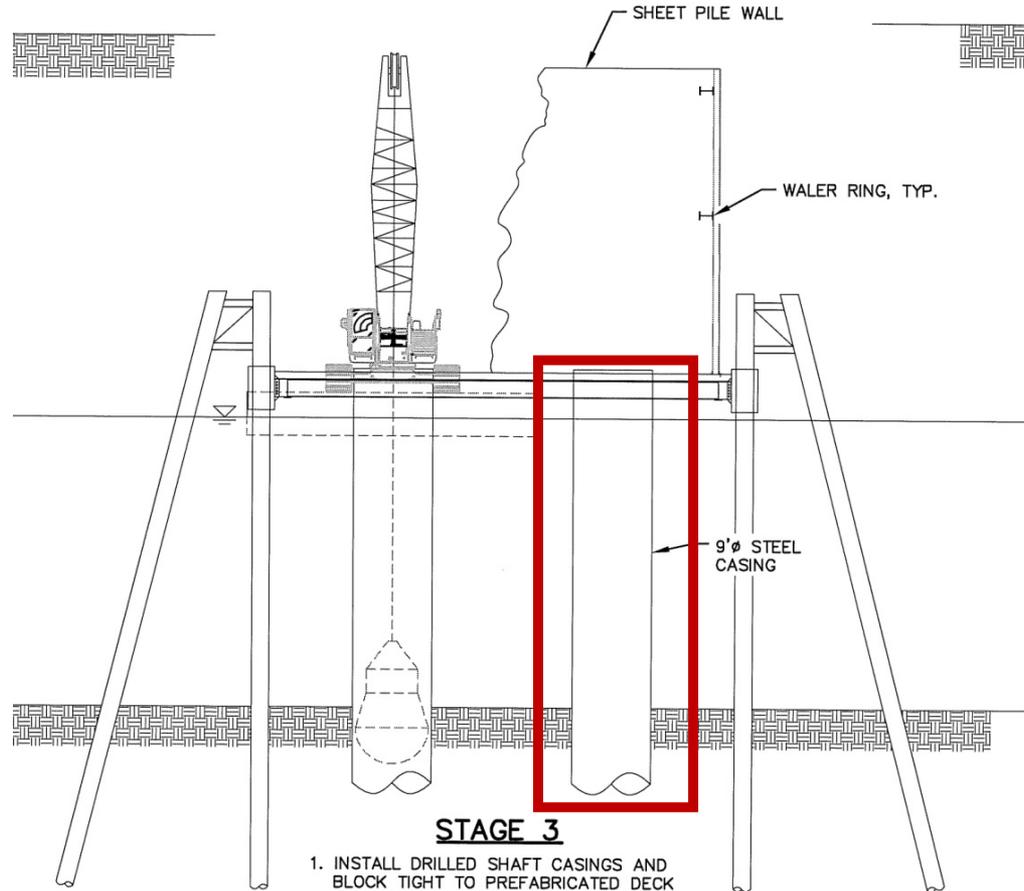
# Spud Piling and Brace Framing



To ensure the deck is able to support itself, the workers and the equipment, we reinforce it with **additional braces**, known as spud piles.



We place **9 ft. diameter hollow casings** into the muck and bedrock beneath the river bottom. Casings can range from 90-120 ft. long.



### STAGE 3

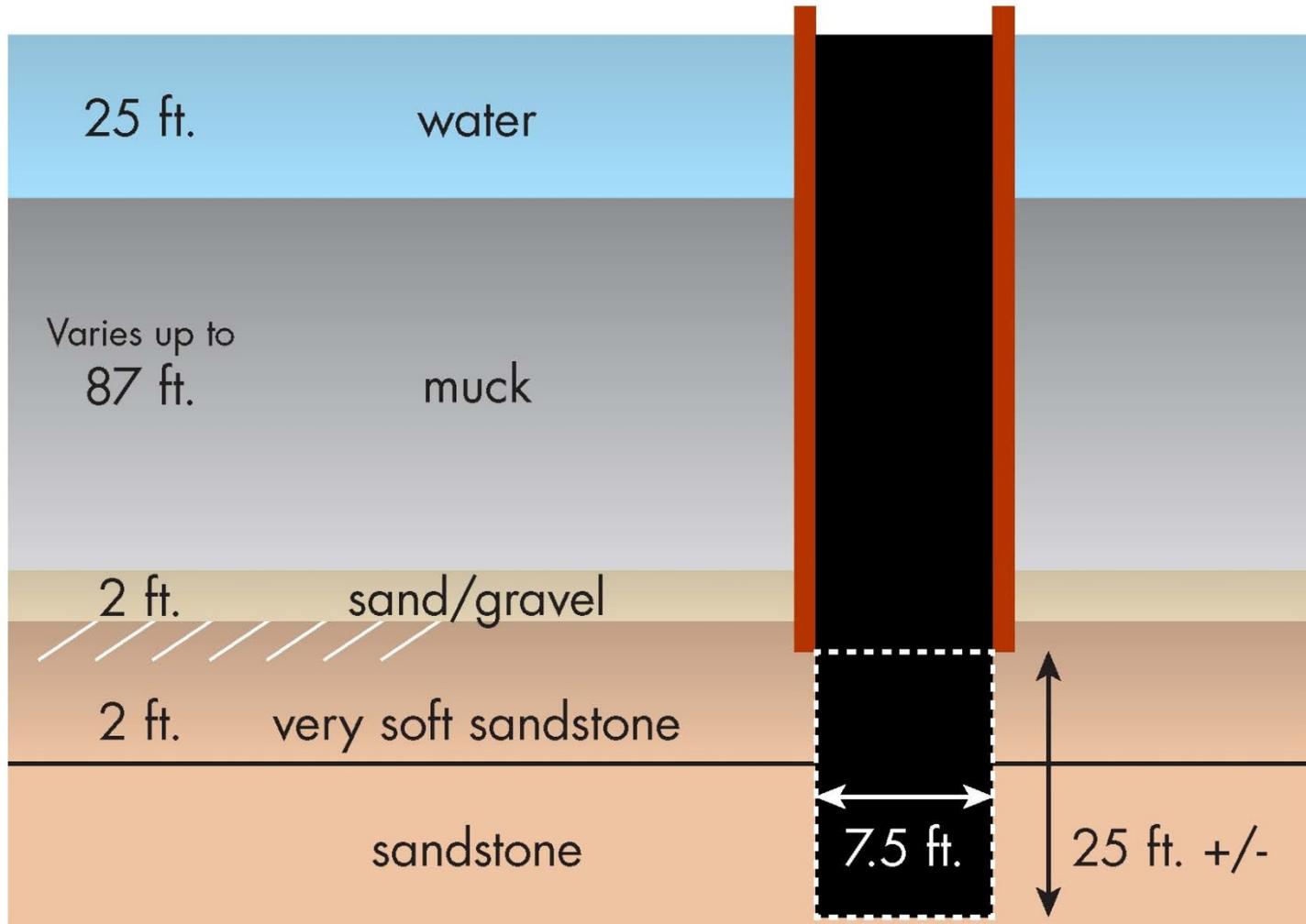
1. INSTALL DRILLED SHAFT CASINGS AND BLOCK TIGHT TO PREFABRICATED DECK SYSTEM
2. CLEAN OUT THE CASINGS, AND DRILL ROCK SOCKETS TO SPECIFIED DEPTH.
3. PLACE REINFORCING STEEL CAGES AND TREMIE CONCRETE INSIDE DRILLED SHAFT CASINGS.
4. ATTACH SHEET PILE WALLS AND WALER RINGS TO PREFABRICATED DECK SYSTEM.

**We twist and vibrate the casings down through thick layers of muck and mud until we reach the bedrock below. Before reaching the bedrock, the casings go through up to:**

- **25 ft. of water**
- **87 ft. of muck**
- **2 ft. of sand and gravel**
- **2 ft. of soft stone**

**Then crews drill about 25 ft. further into the bedrock.**





Then we drill out the muck, mud and rock with several different tools.





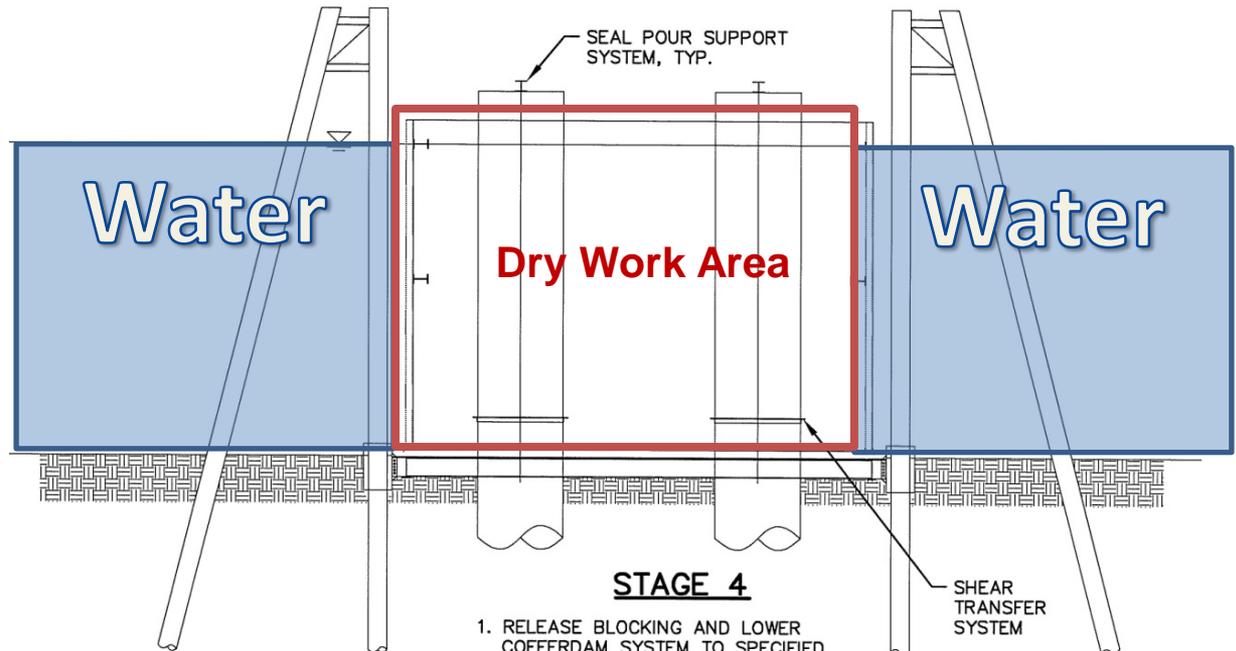
After the muck and mud are removed, we fill the casing with a **rebar cage** for support, and begin to pour the concrete.



## Step 4: Lower Cofferdam

We still need to add concrete on top of the sunken platform, but the area must be dry.

To remove the water, we install a box-like structure, called a **cofferdam**, and then pump water out until the area is dry.



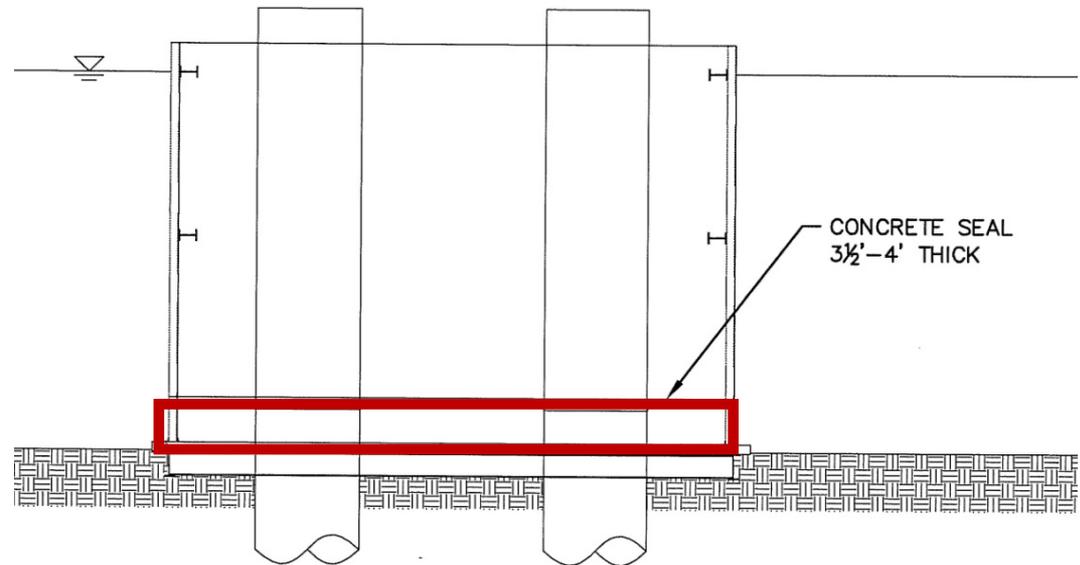
### STAGE 4

1. RELEASE BLOCKING AND LOWER COFFERDAM SYSTEM TO SPECIFIED ELEVATION. \*
2. CLOSE ANNULAR SPACE BETWEEN PREFABRICATED DECK AND DRILLED SHAFT CASINGS.
3. INSTALL SHEAR TRANSFER SYSTEM, AND ATTACH SEAL POUR SUPPORT SYSTEM.

\* RESTRICTED TO WIND SPEEDS LESS THAN 20 MPH.

At this point we build the concrete seal to ensure that the structure is stabilized. The **concrete seal** is between 3 ½ - 4 ft. thick.

That's a lot of concrete! We have a long way to get to the water line!



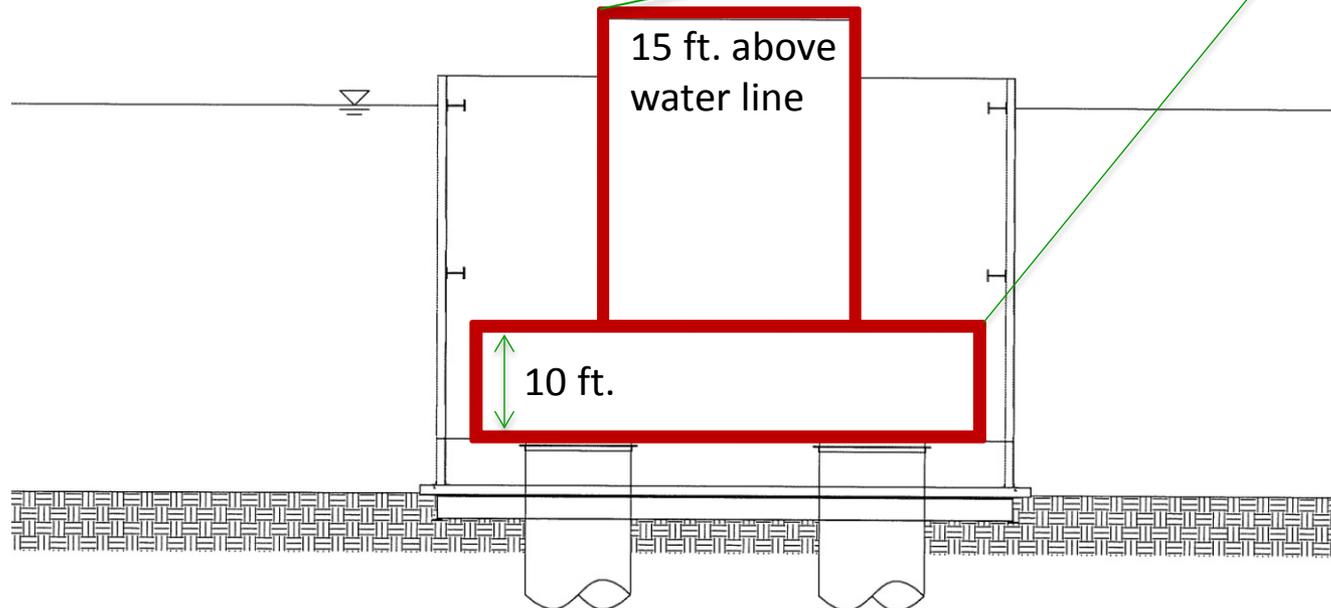
## STAGE 5

1. TREMIE POUR CONCRETE SEAL (3½'-4' THICK)
2. INSPECT SEAL POUR AND SHEAR TRANSFER SYSTEM FOR PROPER EMBEDMENT.
3. DISCONNECT LOWERING SYSTEM, REMOVE SPUD PILES, PILE BRACING FRAME, AND BATTERED PILES.
4. DEWATER COFFERDAM.
5. REMOVE SEAL POUR SUPPORT SYSTEM.

# Step: 6

## Construct Footing

Still within the dry cofferdam, we keep reinforcing the bridge foundation. On top of the concrete seal from step 5, we construct a reinforced **concrete footing** for added strength and stability. Then, we add the **tower** to the foundation.

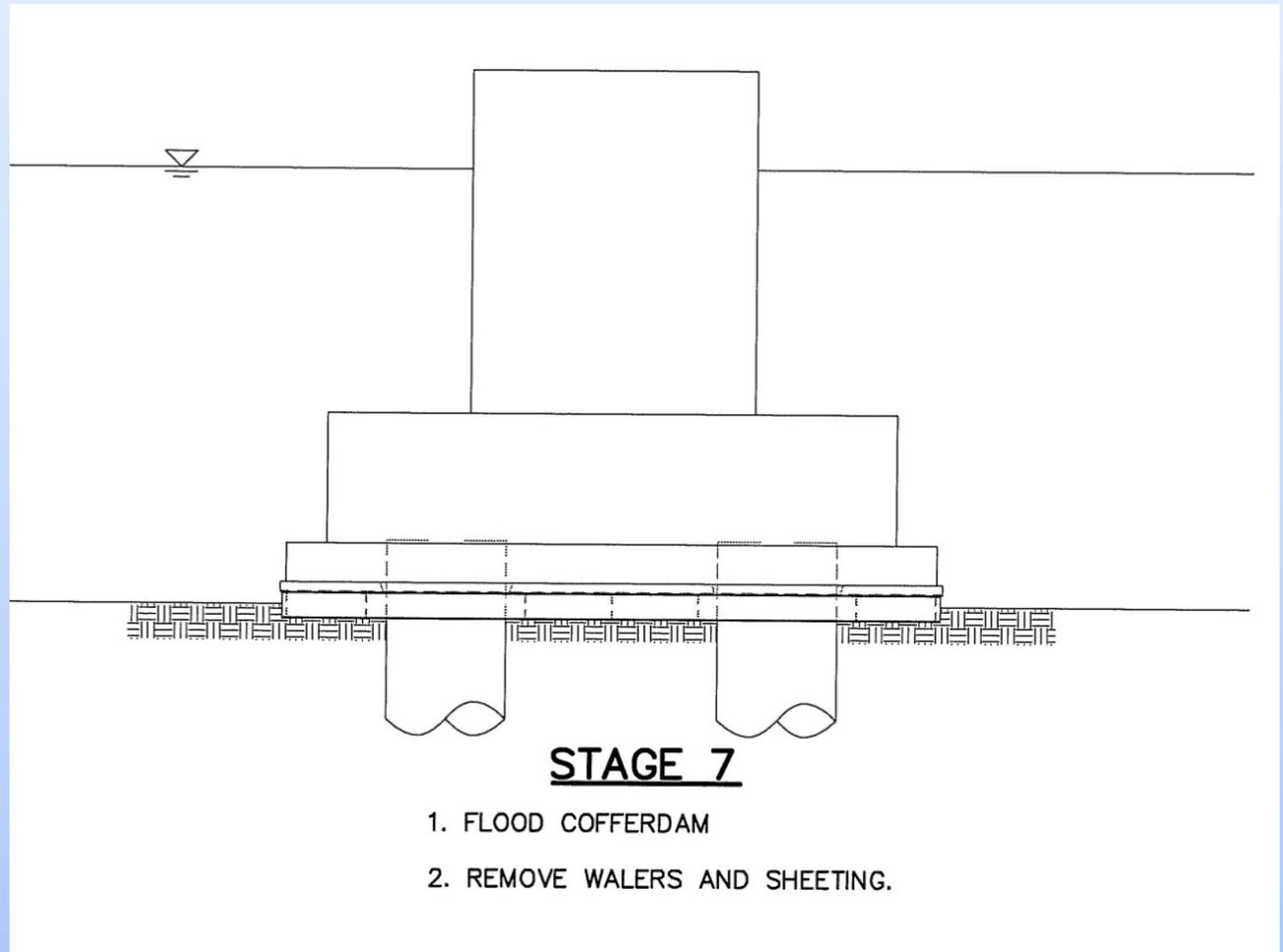


### STAGE 6

1. CUT-OFF STEEL CASINGS.
2. CONSTRUCT THE REINFORCED CONCRETE PILE CAP.
3. CONSTRUCT TOWER.

# Step 7: Remove Cofferdam

**We remove the cofferdam, letting water surround the new foundation. That's the last fresh air this concrete is going to see for a long, long time.**





**St. Croix**  
**CROSSING**

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**And that's how it's done!**

**Thank You!**