Herbert Hoover Dike
Major Rehabilitation Design

Your Questions Answered

August 2007

The U.S. Army Corps of Engineers, Jacksonville District, is expediting rehabilitation of the Herbert Hoover Dike (HHD). Current work includes prioritizing and initiating design and construction in areas that are in greatest need of repair and easily accessible within the Corps' right-of-way. The rehabilitation design concept, endorsed by a group of 40 national experts, includes filling in the existing toe ditch, constructing landside features to manage seepage and installing a cutoff wall. The toe ditch is the ditch located on the landside of the HHD for the purpose of collecting water that seeps through the dike's earthen material. Demucking and then filling the toe ditch and additional landside features will provide relief of pressures caused by rising lake waters and a filter to prevent seepage from removing foundation materials. The cutoff wall will be constructed vertically through the center of the existing dike and will reduce seepage and increase stability.

Because the Corps is committed to keeping lakeside residents fully informed as the project progresses, the following information is provided in response to questions received from you and your neighbors. This fact sheet is one in a series, each of which will address a specific aspect of the Corps' ongoing work on HHD.

Extent and Location of the Rehabilitation

Q. We've heard references to reaches and sub-reaches of the Herbert Hoover Dike. Where are these located?

A. The Corps has divided and prioritized the HHD into eight reaches, and is currently concentrating on reaches 1, 2 and 3. Reach 1 is 22.4 miles, and extends south of Lock S308 in Port Mayaca to S2 (near Hillsboro Canal, Belle Glade).

Sub-reaches of Reach 1 includes:

1A – Port Mayaca S308 lock (near Highway 76) south to S-76 (Sand Cut)

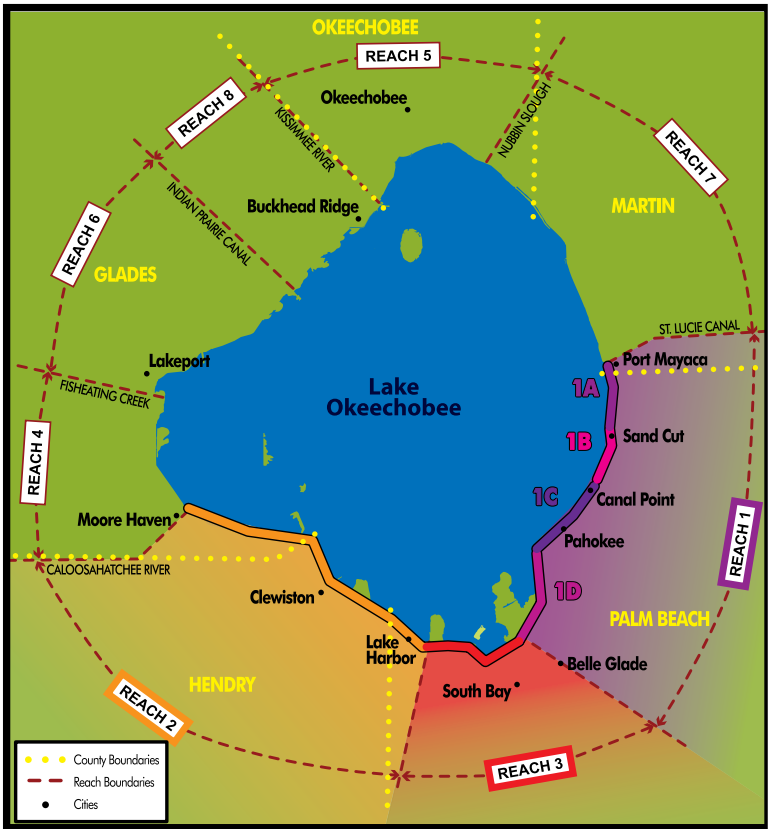
1B – S76 south to S352 (near Highway 98) in Canal Point

1C – South of S352 (near Highway 98) to CU-10 (Bacom Point) at Canal Point

1D – South of CU10 to S2 (near highway 827)

Reach 2 is 20.4 miles, and extends from S77 in Moore Haven, south to S3/S354 in West Lake Harbor.

Reach 3 is 6.7 miles, and extends from S3/S354 in West Lake Harbor east to S35/S2 near highways 27 and 827 (vicinity Hillsboro Canal).



Q. Will the entire HHD be rehabilitated or just key areas within the reaches?

A. The Corps plans to rehabilitate the entire dike, prioritizing work within all the reaches.

Q. Why is the Corps moving with construction now before the analysis is complete?

A. To expedite repairs to the dike, the Corps is targeting areas that are most in need of repair and that can be quickly improved. Simultaneously, we continue to analyze specific design features and potential impacts of future planned components of the project. The first feature under way is clearing and filling the toe ditch within the Corps' right-of-way, to provide additional protection from potential piping. The Corps is currently applying the National Environmental Policy Act (NEPA) Environmental Impact Statement process only to those areas in which we have the right-of-way to do this work. While clearing and filling the toe ditch, the Corps continues to collect geological and other data for the design of the cutoff wall. This information is also needed to determine how wide the landside rehabilitation should be. Once these design features are complete, we can begin further analysis to determine impacts to structures and groundwater.

Q. How could such a massive structure fail?

A. It would seem that because of its sheer size, the HHD's stability would be guaranteed. However, there are specific issues with the dike that could contribute to a failure. For example, substantial portions of the HHD were constructed out of materials dredged from the bottom of the lake, such as shell, soil, sand and gravel, all of which are highly porous. While seeping water is to be expected in earthen structures such as HHD, when the seeping water also carries along these materials, it creates cavities within the dike (known as pipes), weakening the dike wall and increasing the potential for failure.

Cutoff Wall

Q. How wide/thick will the cutoff wall be? Will it go all the way around the dike?

A. The wall will be a minimum of 24 inches thick and will be installed on most of the circumference of the dike. The final design will determine the depth of the cutoff wall.

Q. Can the Corps build a deeper cutoff wall near lakeside communities, and save the towns?

A. It's possible. The Corps' first priority is the health and safety of the public. Next, our goal is to avoid negative impact to homes and properties to the greatest extent possible. The Corps will not compromise on safety; consequently, we will use the highest level of engineering standards required to obtain the conceptual design goal. Making the cutoff wall deeper will not provide the factor of safety required per Corps regulations. The purpose of the cutoff wall is to cut off existing piping and help control seepage through the dike. Additionally, the deeper the wall penetrates, the greater the impacts on local groundwater.

Q. What is sheet piling, how is it typically used, and why is the Corps not using it for the HHD rehabilitation (cutoff wall)?

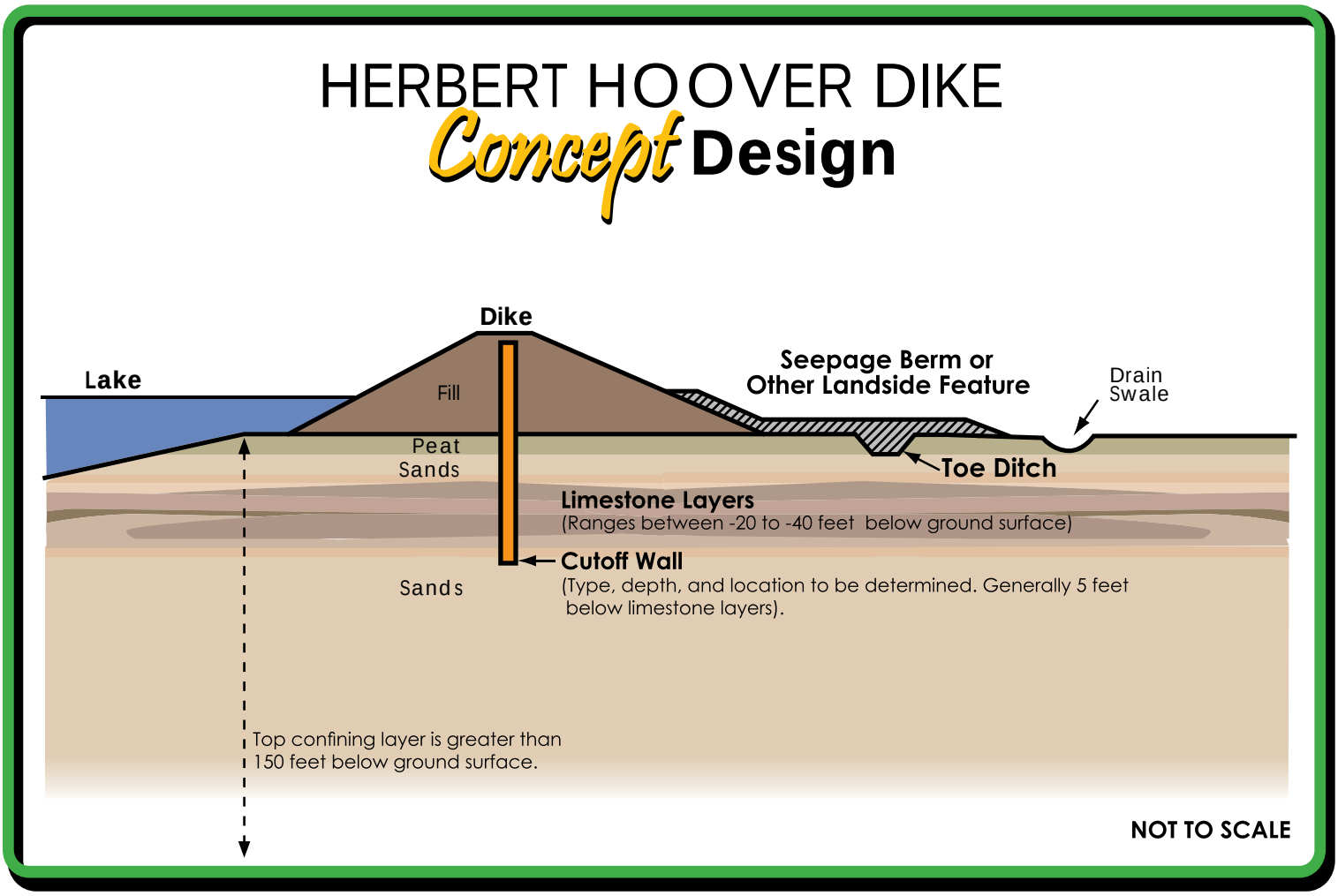
A. Sheet piling is a manufactured construction product with a mechanical connection "interlock" at both ends of each section. These mechanical connections interlock with one another to form a continuous wall of sheeting. Sheet pile is classified in two construction applications, permanent and temporary. A permanent application is "stay-in-place," where the sheet pile wall is driven and remains in the ground. A temporary application provides access and safety for construction in a confined area. Once the work is completed, the sheets are removed.

The Corps has considered using a stay-in-place sheet pile cutoff wall. However, using sheet pile presents several challenges. Sheet pile is more expensive than a bentonite cutoff wall. Installing sheet pile to the depths required (especially in the case of a deep cutoff wall) presented unique construction challenges. The intermittent rock layers below HHD are not conducive to the installation of sheet pile. Finally, it is difficult to state with certainty that the sheet pile interlocks will remain sealed after they are installed, possibly becoming potential seepage paths. These problems must be overcome before sheet pile can be used.

Toe Ditch

Q. Where will the water drain, once the toe ditch is filled?

A. The seepage berm design provides for surface drainage. In most cases, a swale, or small valley or depression, will replace the toe ditch to drain surface runoff.



Seepage Berm

Q. If the cutoff wall stops seepage, why is the berm needed?

A. The wall will not stop seepage. The seepage berm or other landside feature will relieve uplift pressures and provide a filter, allowing seepage to pass without carrying sediment (piping). The use of redundant features in the rehabilitation design further ensures reliability, strength and stability.

Q. Can the Corps build a seepage berm on the lakeside of the dike instead of on property outside the current Corps' right-of-way?

A. The seepage berm serves two functions: it strengthens the dike by providing additional mass to resist the water pressure of the lake, and serves as a filter to prevent piping of foundation material. If constructed on the lakeside of the dike, it would be unable to serve either of those functions.

Q. Is the seepage berm going to be a consistent width?

A. The Corps' first priority is the health and safety of the public. The seepage berm will be no wider than what is required, in conjunction with the cutoff wall, to provide protection. In addition, the Corps is considering other design features that will reduce the width of the berm or replace it altogether. Our rigorous engineering analysis and design process will aim to minimize the expansion of the Corps' right-of-way into current private property, while ensuring the required integrity, strength and safety of the structure.

Q. When will potentially affected property owners be notified?

A. The majority of private property concerns are centered in the Pahokee and Canal Point areas. Although full design completion for HHD rehabilitation in these areas will take longer, the Corps is striving to provide information concerning property impacts as soon as the designs are finalized and have gone through the review process.

Q. Have environmental impacts of berm construction been considered?

A. Yes, and this process is ongoing. Potential impacts are incorporated in the Environmental Impact Statement / Environmental Assessment documents, made available to the public and presented at public meetings for review and comment. The Corps will host public meetings and/or request public input for each new portion or phase of HHD rehabilitation.

Your Questions Answered

Design Standards

Q. What is the difference between the levee (dike) design standards and dam standards?

A. Dams are designed to contain greater flood events than levees. Design differences center primarily on the environmental conditions the structure is required to withstand. Dams impound permanent pools of water and are generally designed to higher standards than levees, which may impound water on an infrequent basis. These higher standards include higher factors of safety, superiority (height of the structure above the water's surface), inlet/outlet structures, emergency spillways and other features that allow water levels behind the dam to be controlled.

Q. Why can't HHD be brought up to dam safety standards?

A. Congress authorized the HHD as a levee to provide standard flood protection that is about equal to one flood event in a 935-year period. The HHD was built rapidly in the 1930s and was not designed to meet current levee or dam design standards. Our Corps headquarters is looking into these standards now and is collecting information on other dike/dam projects nationally. Changes to dam standards would require congressional authorization for a higher level of protection. Construction costs and the footprint for a dam are greater than for a levee. Our current HHD rehabilitation design allows for upgrade, if later authorized by Congress.

Other Issues and Alternatives

Q. How does the public know all options were considered?

A. The Corps and the rigorous independent review process identified the key HHD issues to be seepage (normal for earthen structures), and piping, which is seepage that carries foundation materials, resulting in cavities and threatening ultimate structural compromise and collapse. The review process considered all known options or variations. A broad expert community was engaged, and the best combination of techniques was chosen.

Q. Could barrier islands in Lake Okeechobee prevent damage or erosion to the dike?

A. Barrier islands would prevent erosion on the lakeside of the dike. They might also help prevent some of the wave run up or 'sloshing' effect caused by extreme winds. However, they would not prevent seepage and the associated piping through the dike, which is the primary threat to the integrity of the dike.

Q. Can the Corps build a wall on the lakeside of the dike?

A. Building a wall on the lakeside of the dike would not meet the necessary level of engineering safety standards. Essentially, the wall foundation could erode over time, causing it to buckle and collapse.

Q. What other issues are you considering?

A. We are considering the age of the structures, tying the cutoff wall into the structures (culverts, pump stations, etc) and municipal and agricultural pipe penetrations of the dike. We are addressing these concerns in the comprehensive design for the rehabilitation of the dike.

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