

**Municipality of Skagway**

# **West Creek Dike Inspection Report**

**Skagway, Alaska**

December 2022

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## 1. Introduction

The Municipality of Skagway (MOS) contracted PND Engineers, Inc. (PND) to inspect and provide maintenance and repair recommendations for the two segments of the West Creek Flood Control Dike system upstream of the West Creek Road crossing. The dike system appears to have been in place for many years or decades, as it is overgrown with alders and covered in moss in some areas. Since construction, the river appears to have experienced several moderate flood events but nothing approaching the extreme events for which the dike system was designed to withstand.

MOS is currently exploring development of a new housing subdivision in the area south of this dike system. The intent of this inspection is to assess the suitability of the existing dike system to provide adequate protection for the subdivision, and recommend repair, maintenance, and improvement measures to ensure that it is adequate to perform this function.

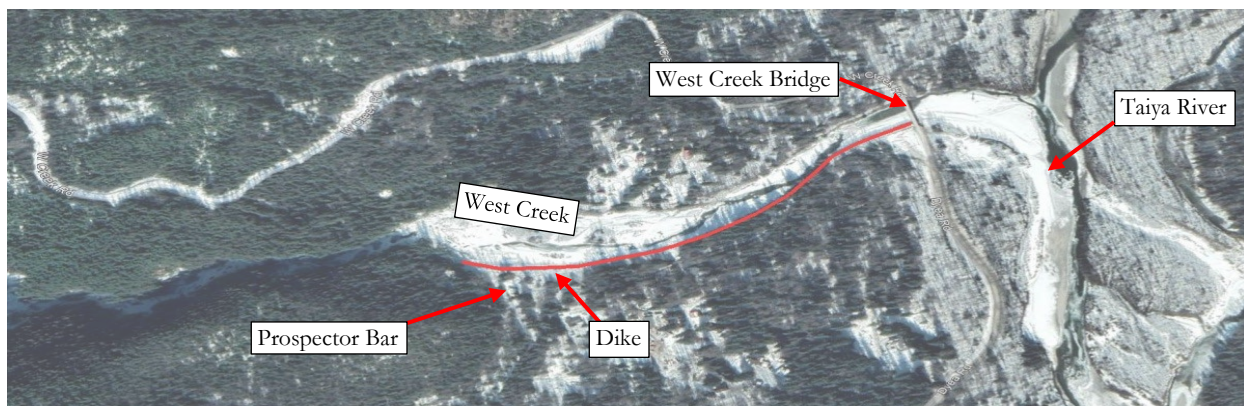
PND performed inspection work on October 25, 2022. The inspection checklists that PND developed for this task were designed to provide inspection results and maintenance recommendations that closely follow those generated by the United States Army Corps of Engineers (USACE). USACE provides similar service for the USACE-sponsored dike downstream of the Klondike Highway Bridge, on the east bank of the Skagway River parallel to the city airport runway. PND executed the inspection of the dike system to follow the same format and check set of conditions as the USACE inspection, in order to provide MOS with consistent inspection criteria and inspection and recommendations language for all dike infrastructure within the boundaries and control of MOS.

### 1.2 Inspection Targets

The dike system inspected by PND was along West Creek's southern bank, comprising approximately 2,000 linear feet. The West Creek Flood Control Dike system begins north of the "Prospector Bar" and ends at the West Creek bridge, where it ties into the bridge abutment protection before West Creek flows into the Taiya River.

The location of the dike system included in this inspection is shown in Figure 1.

**Figure 1. West Creek Southern Bank Dike Layout**





## 2. Inspection Results Matrices

This section provides details of the observations made in the field for the dike system. The deficiency categories rated for the dike were selected to match those evaluated by the USACE for the lower Skagway River Levee, and include the following:

- Unwanted Vegetation Growth
- Sod Cover
- Encroachments
- Closure Structures (stop log, earthen closures, gates, or sandbags)
- Slope Stability
- Erosion/Bank Caving
- Settlement
- Depressions/Rutting
- Cracking
- Animal Control
- Culverts/Discharge Pipes
- Riprap Revetments & Bank Protection
- Revetments other than Riprap
- Underseepage Relief Wells/Toe Drainage Systems
- Seepage

Of these, it was found during the inspection that Sod Cover, Closure Structures, Animal Control, Revetments other than Riprap, and Underseepage Relief Wells/Toe Drainage Systems were not applicable anywhere.

For the dike system, each of the evaluation elements was given a rating of acceptable, minimal acceptable (maintenance needed) and unacceptable. An acceptable element is in satisfactory condition, with no deficiencies noted; a minimally acceptable element has one or more minor deficiencies requiring maintenance, however are not likely to seriously impair the function of the element/system during the next flood event; and an unacceptable element has one or more serious deficiencies that will likely seriously impair the function of the element/system during the next flood event. Ratings for each deficiency category are “A” for acceptable, “M” for minimally acceptable, “U” for unacceptable, and “N/A” for not applicable. Results of the inspection findings are provided in Table 1. Definitions for each of these ratings for each deficiency category, provided from the USACE Skagway River Levee report, can be found in Appendix B.

The dike was found to be in fairly good condition, with the predominant deficiency found along almost the entire length being Unwanted Vegetation Growth. A gap in levee coverage of approximately 20-30 feet was observed about midway along the levee (59° 31' 35.6" N, 135° 21' 13.1" W). The gap in coverage does not currently pose a risk to the structure, however should be monitored, and MOS should consider installing this portion of levee to tie the two segments together into a continuous system. Some gradual Erosion/Bank Caving was noted at this gap, with one large tree being undermined and close to falling into the river. Adding riprap protection here to tie the two segments into one will protect against potential future erosion, outflanking of the downstream revetment segment, and flooding onto the road.



Table 1. West Creek Flood Control Dike Deficiencies Summary

Rated Deficiency Category	Rating	Location/Remarks/Photos/Recommendations
Unwanted Vegetation Growth	U	There is generally pervasive vegetation growth over everything, including between stones, generally consisting of alders, with some spruce growth seen on slopes. Vegetation growth is along both the toe of the dike and the top of the embankment. Vegetation is located along the entire length of the dike. <b>Recommendations: Remove small vegetation and brush. Cut all large vegetation as close to the base of the trunks as possible and remove from site.</b>
Sod Cover	N/A	N/A
Encroachments	A	No deficiencies noted
Closure Structures	N/A	N/A
Slope Stability	M	No sign of undercutting visible, although recent flooding may have eroded natural material along hidden toe. Undermining may be a risk if there is no riprap where it cannot be seen continuing below the water in the main channel where it abuts the slope. Large (~5') toe rocks keep the slope in place, however not all rocks are fully keyed into the rock mass, with some rocking/shifting seen mid slope. <b>Recommendations: Regrade portions that are steeper than 1.5:1, re-using existing riprap and supplementing with new materials as required. Install new sections at 2:1.</b>
Erosion/Bank Caving	A, M	Where the levee exists, there is minimal to no erosion or bank caving and the condition is Acceptable. There is a short break in slope coverage between two segments. Some toe erosion is apparent between the downstream end of one levee and upstream end of the next. This is an approximately twenty to thirty-foot-long break. (59° 31' 35.6" N, 135° 21' 13.1" W). In this section, erosion and bank caving is evident but constrained by the levees on either side, so the condition is Minimally Acceptable. <b>Recommendations: Close gap in levee coverage and re-grade adjacent existing sections to tie all in together, creating a consistent, continuous mass.</b>
Settlement	A	No deficiencies noted; settlement was not observed.
Depressions/Rutting	A	No deficiencies noted; depression/rutting was not observed. No scattered, shallow ruts, pot holes, or other depressions were observed on the dike.
Cracking	A	No deficiencies noted; cracking was not observed. No longitudinal, transverse or desiccation cracks were observed on the dike.
Animal Control	A	No deficiencies noted; no animal burrows were observed.
Culverts/Discharge Pipes	N/A	N/A



**Table 1. West Creek Flood Control Dike Deficiencies Summary** (Continued)

Riprap Revetment & Bank Protection	A	<p>Overall good condition. Toe rocks are large; two were measured to be approximately 5'x5'x2' and 7'x8'x3'. The rest of the slope is comprised of smaller rocks in the one-to-three-foot diameter range. A few of the smaller stones, though not recently, may have fallen from the face of the middle portion of the embankment over time. From the lower middle of the embankment to the bridge, the rock mass was found to be stable with no sign of dislodged stones, any slides, or other failure mechanisms.</p> <p>At the upstream end of the lower levee section, the slope appears to be close to 1:1 but stable under current conditions. It transitions quickly to a slope closer to 2:1. It is possible that this 1:1 section was initially constructed at close to a 2:1 slope but has steepened over time due to the erosion/bank caving in the levee gap upstream combined with potential toe scour, as the main channel currently abuts the levee at this location. Due to elevated flow at the time of inspection, it was not possible to evaluate the toe in this area for stability.</p> <p><b>Recommendation: If missing, add more rock at upstream end of lower levee section (downstream of gap) and re-grade to ensure this section remains stable during flood events.</b></p>
Non-Riprap Revetments	N/A	N/A
Underseepage Relief Wells/Toe Drain Systems	N/A	N/A
Seepage	A	No deficiencies noted; seepage was not observed. No evidence of unrepaired seepage, saturated areas or boils were observed.



### 3. Conclusion and Additional Recommendations

Overall, the dike system was found to be in good, stable condition and does not appear to have suffered any critical damage, scour, or loss of material since installation. Some portions of the dike system, either through previous toe scour and loss of material, or improper design or installation methods, are steeper than they should be, with a minimum slope of 1.5:1 desired. The dike system is overgrown with alders and other vegetation, and there is also a short break between two segments of dike that appears to be completely devoid of any armor which has resulted in minor bank erosion and caving.

PND recommends four initial actions be taken for the West Creek Flood Control Dike to repair identified deficiencies. These actions are:

1. Implement a brush-clearing program to provide initial and periodic maintenance clearing. Trees and brush should not be allowed to grow back to the same level that was observed during this inspection. A 15-foot vegetation-free zone, measured in either direction from the riverside toes and landside shoulders, should be maintained where practical in order to preserve a 3-foot root-free zone, or at least prevent the further growth of root systems already established.
2. Regrade slopes steeper than 1.5:1, recycling and adding material as necessary. Slopes should ideally be graded to 2:1, but if constrained by budget, space, or availability of materials, a maximum slope of 1.5:1 is acceptable.
3. Install a new section of levee along the 20-30-foot-long location where there currently isn't any erosion protection, keying this new segment into the segments upstream and downstream. The existing conditions leave this area exposed to additional erosion, as well as expose the upstream end of the lower dike segment to potential outflanking which could quickly undermine and destroy large segments of the levee wall under extreme flood conditions.
4. Finally, if development of a housing subdivision or other facilities or infrastructure occurs on the south bank, regular inspections should be performed of this dike system every 2-5 years and after any significant flood event to ensure it continues to provide adequate protection.



#### 4. References

USACE (2019). Flood Damage Reduction Segment/System Inspection Report – Skagway River Levee (SK01).



## Appendix A — Inspection Photographs

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A.1 West Creek Flood Control Dike



**Photograph No. 1**

**Description:**

View showing where the West Creek Flood Control Dike ties into the bank on the upstream end. (59° 31' 34.3" N, 135° 21' 27.9" W).



**Photograph No. 2**

**Description:**

View looking south towards the Flood Control Dike showing typical Unwanted Vegetation Growth on the water's side of the dike and along slope.



**Photograph No. 3**

**Description**

View showing toe Erosion, at the upstream end of the 20-30 foot break between levees located at approx.  $59^{\circ} 31' 35.6''$  N,  $135^{\circ} 21' 13.1''$  W



**Photograph No. 4**

**Description:**

View showing a tree that was observed which looks close to falling due to Bank Caving at ( $59^{\circ} 31' 39.1''$  N,  $135^{\circ} 21' 3.0''$  W).



**Photograph No. 5**

**Description:**

View showing the first of two large toe berm rocks that were measured, measuring approximately  $7' \times 8' \times 3'$ . ( $59^{\circ} 31' 33.6''$  N,  $135^{\circ} 21' 24.1''$  W).



**Photograph No. 6**

**Description:**

View showing the second of two large toe berm rocks measured, measuring approximately 5' x 5' x 2'. (59° 31' 34.1" N, 135° 21' 23.2" W).



**Photograph No. 7**

**Description:**

View showing where the embankment ties back into the bank for approximately 650 ft, upstream side (59° 31' 35.9" N, 135° 21' 10.9" W).



**Photograph No. 8**

**Description:**

View showing where the embankment ties back into the bank for approximately 650 ft, downstream side (59° 31' 40.5" N, 135° 21' 1.5" W).



**Photograph No. 9**

**Description:**

View looking south towards the Flood Control Dike showing where the embankment ends at West Creek bridge. (59° 31' 42.9" N, 135° 20'55.8" W).

## Appendix B — USACE Rating Criteria

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# Levee Embankments

For use during Initial and Continuing Eligibility Inspections of levee segments / systems

Rated Item	Rating	Rating Guidelines	Location/Remarks/Recommendations
1. Unwanted Vegetation Growth <sup>1</sup>	<b>M</b>	<b>A</b> The levee has little or no unwanted vegetation (trees, bush, or undesirable weeds), except for vegetation that is properly contained and/or situated on overbuilt sections, such that the mandatory 3-foot root-free zone is preserved around the levee profile. The levee has been recently mowed. The vegetation-free zone extends 15 feet from both the landside and riverside toes of the levee to the centerline of the tree. If the levee access easement doesn't extend to the described limits, then the vegetation-free zone must be maintained to the easement limits. Reference EM 1110-2-301 or Corps policy for regional vegetation variance.	SK01_2019_a_0007: Large established brush on toe of levee.: Brush periodically (M) SK01_2019_a_0025: Small trees and brushy vegetation along crest and slope of levee.: Remove small vegetation and brush large vegetation. (M)
		<b>M</b> Minimal vegetation growth (brush, weeds, or trees 2 inches in diameter or smaller) is present within the zones described above. This vegetation must be removed but does not currently threaten the operation or integrity of the levee.	
		<b>U</b> Significant vegetation growth (brush, weeds, or any trees greater than 2 inches in diameter) is present within the zones described above and must be removed to reestablish or ascertain levee integrity.	
2. Sod Cover	<b>NA</b>	<b>A</b> There is good coverage of sod over the levee.	Not Applicable.
		<b>M</b> Approximately 25% of the sod cover is missing or damaged over a significant portion or over significant portions of the levee embankment. This may be the result of over-grazing or feeding on the levee, unauthorized vehicular traffic, chemical or insect problems, or burning during inappropriate seasons.	
		<b>U</b> Over 50% of the sod cover is missing or damaged over a significant portion or portions of the levee embankment.	
		<b>N/A</b> Surface protection is provided by other means.	
3. Encroachments	<b>A</b>	<b>A</b> No trash, debris, unauthorized farming activity, structures, excavations, or other obstructions present within the easement area. Encroachments have been previously reviewed by the Corps, and it was determined that they do not diminish proper functioning of the levee.	SK01_2019_a_0011: Looking northeast; access ramp from the runway safety area to the Skagway River channel. The ramp is built above the levee prism and is not a deficiency.: NA (A) SK01_2019_a_0021: Looking southwest; access ramp from the runway safety area to the Skagway River channel. The ramp is built above the levee prism and is not a deficiency.: NA (A)
		<b>M</b> Trash, debris, unauthorized farming activity, structures, excavations, or other obstructions present, or inappropriate activities noted that should be corrected but will not inhibit operations and maintenance or emergency operations. Encroachments have not been reviewed by the Corps.	
		<b>U</b> Unauthorized encroachments or inappropriate activities noted are likely to inhibit operations and maintenance, emergency operations, or negatively impact the integrity of the levee.	
4. Closure Structures (Stop Log, Earthen Closures, Gates, or Sandbag)	<b>NA</b>	<b>A</b> Closure structure in good repair. Placing equipment, stoplogs, and other materials are readily available at all times. Components are clearly marked and installation instructions/ procedures readily available. Trial erections have been accomplished in accordance with the O&M Manual.	Not Applicable.

Key: A = Acceptable. M = Minimally Acceptable; Maintenance is required. U = Unacceptable. N/A = Not Applicable. FDR = Flood Damage Reduction



# Levee Embankments

For use during Initial and Continuing Eligibility Inspections of levee segments / systems

Rated Item	Rating	Rating Guidelines	Location/Remarks/Recommendations
Closures) (A or U only)		U	Any of the following issues is cause for this rating: Closure structure in poor condition. Parts missing or corroded. Placing equipment may not be available within the anticipated warning time. The storage vaults cannot be opened during the time of inspection. Components of closure are not clearly marked and installation instructions/ procedures are not readily available. Trial erections have not been accomplished in accordance with the O&M Manual.
		N/A	There are no closure structures along this component of the FDR segment / system.
5. Slope Stability	A	A	No slides, sloughs, tension cracking, slope depressions, or bulges are present.
		M	Minor slope stability problems that do not pose an immediate threat to the levee embankment.
		U	Major slope stability problems (ex. deep seated sliding) identified that must be repaired to reestablish the integrity of the levee embankment.
6. Erosion/ Bank Caving	A	A	No erosion or bank caving is observed on the landward or riverward sides of the levee that might endanger its stability.
		M	There are areas where minor erosion is occurring or has occurred on or near the levee embankment, but levee integrity is not threatened.
		U	Erosion or caving is occurring or has occurred that threatens the stability and integrity of the levee. The erosion or caving has progressed into the levee section or into the extended footprint of the levee foundation and has compromised the levee foundation stability.
7. Settlement <sup>2</sup>	A	A	No observed depressions in crown. Records exist and indicate no unexplained historical changes.
		M	Minor irregularities that do not threaten integrity of levee. Records are incomplete or inclusive.
		U	Obvious variations in elevation over significant reaches. No records exist or records indicate that design elevation is compromised.
8. Depressions/ Rutting	A	A	There are scattered, shallow ruts, pot holes, or other depressions on the levee that are unrelated to levee settlement. The levee crown, embankments, and access road crowns are well established and drain properly without any ponded water.
		M	There are some infrequent minor depressions less than 6 inches deep in the levee crown, embankment, or access roads that will pond water.
		U	There are depressions greater than 6 inches deep that will pond water.
9. Cracking	A	A	Minor longitudinal, transverse, or desiccation cracks with no vertical movement along the crack. No cracks extend continuously through the levee crest.

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# Levee Embankments

For use during Initial and Continuing Eligibility Inspections of levee segments / systems

Rated Item	Rating	Rating Guidelines	Location/Remarks/Recommendations
		<p><b>M</b> Longitudinal and/or transverse cracks up to 6 inches in depth with no vertical movement along the crack. No cracks extend continuously through the levee crest. Longitudinal cracks are no longer than the height of the levee.</p> <p><b>U</b> Cracks exceed 6 inches in depth. Longitudinal cracks are longer than the height of the levee and/or exhibit vertical movement along the crack. Transverse cracks extend through the entire levee width.</p>	
10. Animal Control	<b>A</b>	<p><b>A</b> Continuous animal burrow control program in place that includes the elimination of active burrowing and the filling in of existing burrows.</p> <p><b>M</b> The existing animal burrow control program needs to be improved. Several burrows are present which may lead to seepage or slope stability problems, and they require immediate attention.</p> <p><b>U</b> Animal burrow control program is not effective or is nonexistent. Significant maintenance is required to fill existing burrows, and the levee will not provide reliable flood protection until this maintenance is complete.</p>	No animal control issues noted.
11. Culverts/ Discharge Pipes <sup>3</sup> (This item includes both concrete and corrugated metal pipes.)	<b>A</b>	<p><b>A</b> There are no breaks, holes, cracks in the discharge pipes/ culverts that would result in significant water leakage. The pipe shape is still essentially circular. All joints appear to be closed and the soil tight. Corrugated metal pipes, if present, are in good condition with 100% of the original coating still in place (either asphalt or galvanizing) or have been relined with appropriate material, which is still in good condition. Condition of pipes has been verified using television camera video taping or visual inspection methods within the past five years, and the report for every pipe is available for review by the inspector.</p> <p><b>M</b> There are a small number of corrosion pinholes or cracks that could leak water and need to be repaired, but the entire length of pipe is still structurally sound and is not in danger of collapsing. Pipe shape may be ovalized in some locations but does not appear to be approaching a curvature reversal. A limited number of joints may have opened and soil loss may be beginning. Any open joints should be repaired prior to the next inspection. Corrugated metal pipes, if present, may be showing corrosion and pinholes but there are no areas with total section loss. Condition of pipes has been verified using television camera video taping or visual inspection methods within the past five years, and the report for every pipe is available for review by the inspector.</p> <p><b>U</b> Culvert has deterioration and/or has significant leakage; it is in danger of collapsing or as already begun to collapse. Corrugated metal pipes have suffered 100% section loss in the invert. <b>HOWEVER:</b> Even if pipes appear to be in good condition, as judged by an external visual inspection, an Unacceptable Rating will be assigned if the condition of pipes has not been verified using television camera video taping or visual inspection methods within the past five years, and reports for all pipes are not available for review by the inspector.</p> <p><b>N/A</b> There are no discharge pipes/ culverts.</p>	<p>SK01_2019_a_0022: The culvert outlet has multiple pin size holes caused from corrosion. Minor corrosion was noted inside the culvert. The video inspection file of this culvert was reviewed in 2017.: Perform video inspection of culvert by 2022. (A)</p> <p>SK01_2019_a_0023: Culvert in good condition. Inspectors were able to visually inspect the culvert inlet, outlet, and observe the entire length of the inside of the culvert from the culvert outlet. The culvert is free of debris.: The entire length of the culvert needs to be inspected by video camera. (A)</p> <p>SK01_2019_a_0024: Some movement of riprap noted at the culvert outlet. The outlet is above the elevation of the adjacent levee. The culvert is clear of debris.: The entire length of the culvert needs to be inspected by video camera. (A)</p>

Key: A = Acceptable. M = Minimally Acceptable; Maintenance is required. U = Unacceptable. N/A = Not Applicable. FDR = Flood Damage Reduction



US Army Corps  
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Flood Damage Reduction Segment / System  
Inspection Report  
Skagway River Levee (SK01)

Levee Embankments  
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# Levee Embankments

For use during Initial and Continuing Eligibility Inspections of levee segments / systems

Rated Item	Rating	Rating Guidelines		Location/Remarks/Recommendations
12. Riprap Revetments & Bank Protection	<b>M</b>	<b>A</b>	No riprap displacement or stone degradation that could pose an immediate threat to the integrity of channel bank. Riprap intact with no woody vegetation present.	SK01_2019_a_0009: No changes noted from previous inspection. The revetment was constructed with Class III riprap with a buried toe in 1999 which has been exposed and undercut by the Skagway River. Toe width has been reduced from 15 feet to approximately 5 feet.: Monitor (M) SK01_2019_a_0012: Class III riprap airport revetment toe has launched. Original toe width was 15 feet. Existing width varies between 0 to 5 feet.: Maintain revetment toe by adding rock. (M) SK01_2019_a_0013: The toe of this Class III riprap airport revetment appears to have completely launched and was not visible during this inspection, The revetment slope appears to have steepened.: Maintain revetment by adding rock to slope and toe. (M) SK01_2019_a_0014: Class III riprap airport revetment toe has launched.: Maintain revetment toe by adding rock. (M) SK01_2019_a_0015: The main channel of the Skagway River flows along the Class III riprap revetment toe at this location. Toe material has launched. Further erosion will cause displacement of stones on the slope of the revetment. Revetment slope has steepened at the toe.: Add riprap to the toe of the embankment and monitor for further erosion. (M) SK01_2019_a_0018: Class IV riprap revetment toe appears to have completely launched. The revetment slope appears to be steeper in this section than in adjacent areas.: Add riprap to the toe of the embankment and monitor for future erosion. (M) SK01_2019_a_0020: AKDOT&PF Class III riprap revetment typical conditions constructed as shown in 2001 As-built drawings.: NA (A)
		<b>M</b>	Minor riprap displacement or stone degradation that could pose an immediate threat to the integrity of the channel bank. Unwanted vegetation must be cleared or sprayed with an appropriate herbicide.	
		<b>U</b>	Significant riprap displacement, exposure of bedding, or stone degradation observed. Scour activity is undercutting banks, eroding embankments, or impairing channel flows by causing turbulence or shoaling. Rock protection is hidden by dense brush, trees, or grasses.	
		<b>N/A</b>	There is no riprap protecting this feature of the segment / system, or riprap is discussed in another section.	
13. Revetments other than Riprap	<b>NA</b>	<b>A</b>	Existing revetment protection is properly maintained, undamaged, and clearly visible.	Not Applicable.
		<b>M</b>	Minor revetment displacement or deterioration that does not pose an immediate threat to the integrity of the levee. Unwanted vegetation must be cleared or sprayed with an appropriate herbicide.	
		<b>U</b>	Significant revetment displacement, deterioration, or exposure of bedding observed. Scour activity is undercutting banks, eroding embankments, or impairing channel flows by causing turbulence or shoaling. Revetment protection is hidden by dense brush and trees.	
		<b>N/A</b>	There are no such revetments protecting this feature of the segment / system.	

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# Levee Embankments

For use during Initial and Continuing Eligibility Inspections of levee segments / systems

Rated Item	Rating	Rating Guidelines		Location/Remarks/Recommendations
14. Underseepage Relief Wells/ Toe Drainage Systems	<b>A</b>	<b>A</b>	Toe drainage systems and pressure relief wells necessary for maintaining FDR segment / system stability during high water functioned properly during the last flood event and no sediment is observed in horizontal system (if applicable). Nothing is observed which would indicate that the drainage systems won't function properly during the next flood, and maintenance records indicate regular cleaning. Wells have been pumped tested within the past 5 years and documentation is provided.	SK01_2019_a_0016: Trench on the river side of the revetment toe. The trench appears to have no impact on levee performance.: Monitor (A)
		<b>M</b>	Toe drainage systems or pressure relief wells are damaged and may become clogged if they are not repaired. Maintenance records are incomplete or indicate irregular cleaning and pump testing.	
		<b>U</b>	Toe drainage systems or pressure relief wells necessary for maintaining FDR segment / system stability during flood events have fallen into disrepair or have become clogged. No maintenance records. No documentation of the required pump testing.	
		<b>N/A</b>	There are no relief wells/ toe drainage systems along this component of the FDR segment / system.	
15. Seepage	<b>A</b>	<b>A</b>	No evidence or history of unrepaired seepage, saturated areas, or boils.	No seepage issues noted.
		<b>M</b>	Evidence or history of minor unrepaired seepage or small saturated areas at or beyond the landside toe but not on the landward slope of levee. No evidence of soil transport.	
		<b>U</b>	Evidence or history of active seepage, extensive saturated areas, or boils.	

<sup>1</sup> If there is significant growth on the levee that inhibits the inspection of animal burrows or other items, the inspection should be ended until this item is corrected.

<sup>2</sup> Detailed survey elevations are normally required during Periodic Inspections, and whenever there are obvious visual settlements.

<sup>3</sup> The decision on whether or not USACE inspectors should enter a pipe to perform a detailed inspection must be made at the USACE District level. This decision should be made in conjunction with the District Safety Office, as pipes may be considered confined spaces. This decision should consider the age of the pipe, the diameter of the pipe, the apparent condition of the pipe, and the length of the pipe. If a pipe is entered for the purposes of inspection, the inspector should record observations with a video camera in order that the condition of the entire pipe, including all joints, can later be assessed. Additionally, the video record provides a baseline to which future inspections can be compared.

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