



Flood Damage Reduction Segment / System Inspection Report

**US Army Corps
of Engineers®**

Name of Segment / System: NPS - Cady Marsh RR Tieback

Public Sponsor(s): Canadian National Railroad

Public Sponsor Representative: _____

Sponsor Phone: _____

Sponsor Email: _____

Corps of Engineers Inspector: USACE Chicago District Inspection Start Date: 2/13/2019

Inspection End Date: 2/13/2019

Inspection Report Prepared By: Yuki Galisanao, PE, PG Date Report Prepared: 2/15/2019

Internal Technical Review (for Periodic Inspections) By: Yuki Galisanao, PE, PG, LSPM *Yuki Galisanao* Date of ITR: 3/5/2019

Final Approved By: John A. Groboski, PE, CCE, LSO *John A Groboski* Date Approved: 3/18/2019

Type of Inspection:	<input type="checkbox"/> Initial Eligibility Inspection <input checked="" type="checkbox"/> Continuing Eligibility Inspection (Routine) <input type="checkbox"/> Continuing Eligibility Inspection (Periodic)	Overall Segment / System Rating:	<input type="checkbox"/> Acceptable <input checked="" type="checkbox"/> Minimally Acceptable <input type="checkbox"/> Unacceptable
Contents of Report:	<input type="checkbox"/> Instructions <input type="checkbox"/> Initial Eligibility Inspection <input type="checkbox"/> General Items for All Flood Control Works <input checked="" type="checkbox"/> Levee Embankment <input type="checkbox"/> Concrete Floodwalls <input type="checkbox"/> Sheet Pile and Concrete I-walls <input type="checkbox"/> Interior Drainage System <input type="checkbox"/> Pump Stations <input type="checkbox"/> FDR System Channels	<p>Note: In addition to the report contents indicated here, a plan view drawing of the system, with stationing, should be included with this report to reference locations of items rated less than acceptable. Photos of general system condition and any noted deficiencies should also be attached.</p> <p>Note: This inspection rating represents the Corps evaluation of operations and maintenance of the flood damage reduction system and may be used in conjunction with other information for a levee certification determination for National Flood Insurance Program (NFIP) purposes if applicable. An Acceptable Corps inspection rating, alone, does not equate to a certifiable levee for the NFIP. It is recommended for levee systems currently accredited by the Federal Emergency Management Agency (FEMA) for NFIP purposes receiving a Corps Minimally Acceptable or Unacceptable rating, be evaluated by the levee owner to determine the potential impacts to the certification for FEMA.</p>	

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 ¹	M	A 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.	CMRR_2019_a_0001: Station_1 NA: Station_2 NA: Trees along the landside toe of the railroad embankment.: Remove trees within the vegetation free zone (15 ft from the toe). (M) CMRR_2019_a_0002: Station_1 NA: Station_2 NA: Trees along the riverside toe of the railroad embankment.: Remove trees within the vegetation free zone (15 ft from the toe). (M)
		M 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.	
		U Significant vegetation growth (brush, weeds, or any trees greater than 2 inches in diameter) is present within the zones described above and must to be removed to reestablish or ascertain levee integrity.	
2. Sod Cover	NA	A There is good coverage of sod over the levee.	
		M 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.	
		U Over 50% of the sod cover is missing or damaged over a significant portion or portions of the levee embankment.	
		N/A Surface protection is provided by other means.	
3. Encroachments	A	A 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.	
		M 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.	
		U 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	NA	A 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.	

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



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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 ²	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.	
		M	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.	

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Rated Item	Rating	Rating Guidelines		Location/Remarks/Recommendations
		U	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.	
10. Animal Control	A	A	Continuous animal burrow control program in place that includes the elimination of active burrowing and the filling in of existing burrows.	
		M	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.	
		U	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.	
11. Culverts/ Discharge Pipes ³ (This item includes both concrete and corrugated metal pipes.)	NA	A	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.	
		M	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.	
		U	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. HOWEVER: 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.	
		N/A	There are no discharge pipes/ culverts.	
12. Riprap Revetments &	A	A	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.	

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Rated Item	Rating	Rating Guidelines		Location/Remarks/Recommendations
Bank Protection		M	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.	
		U	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.	
		N/A	There is no riprap protecting this feature of the segment / system, or riprap is discussed in another section.	
13. Revetments other than Riprap	NA	A	Existing revetment protection is properly maintained, undamaged, and clearly visible.	
		M	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.	
		U	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.	
		N/A	There are no such revetments protecting this feature of the segment / system.	
14. Underseepage Relief Wells/ Toe Drainage Systems	NA	A	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.	
		M	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.	
		U	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.	
		N/A	There are no relief wells/ toe drainage systems along this component of the FDR segment / system.	
15. Seepage	A	A	No evidence or history of unrepaired seepage, saturated areas, or boils.	
		M	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.	
		U	Evidence or history of active seepage, extensive saturated areas, or boils.	

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¹ 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.

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

³ 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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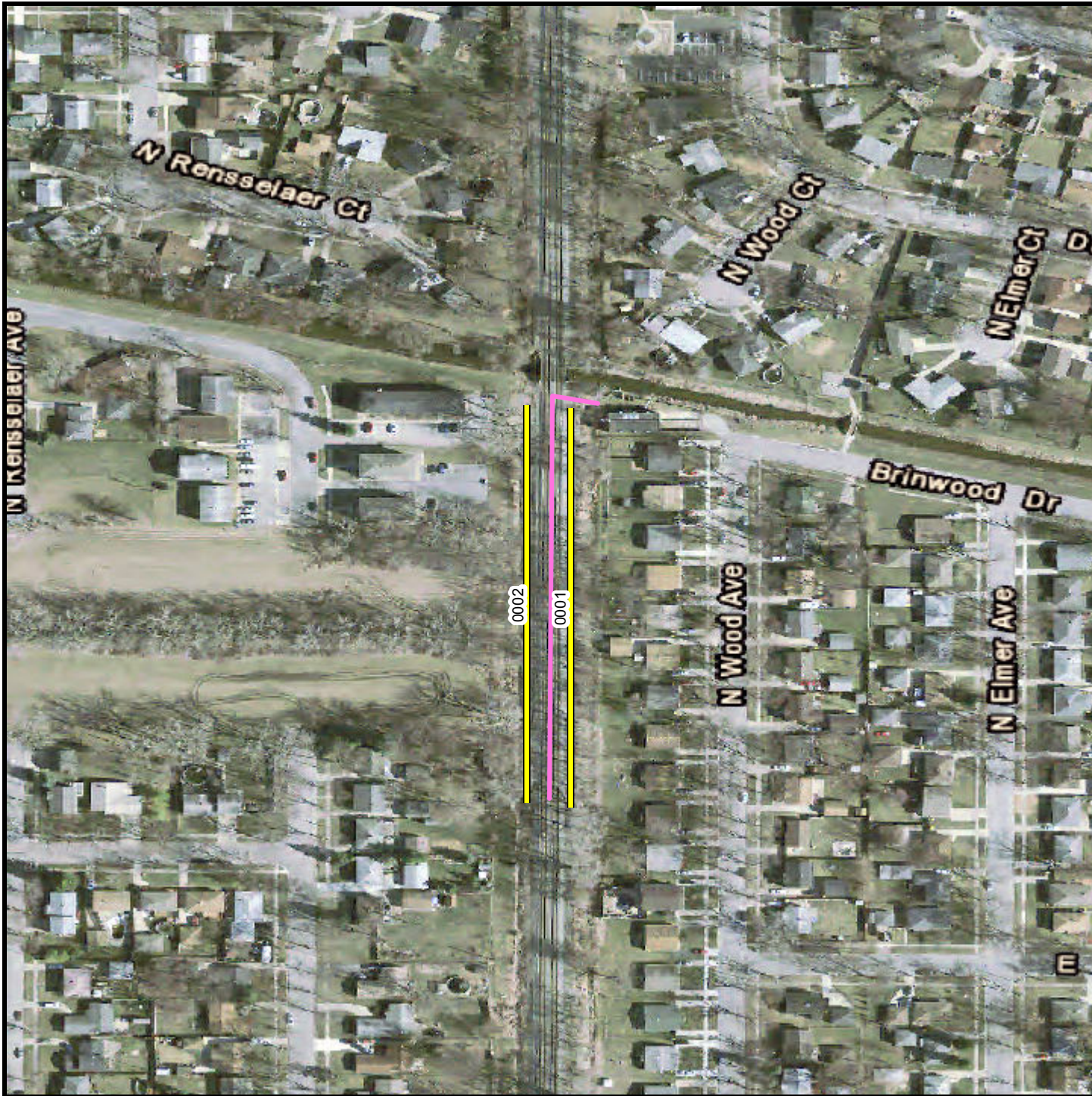


Inspect ID: CMRR_2019_a_0001 **Title:** USACE_CELRC_CMRR_2019_a_0001_1.jpg
Rated Item: 1. Unwanted Vegetation Growth **Caption:** Rating: Minimally Acceptable;
Remarks: Trees along the landside toe of the railroad embankment.; **Action:** Remove trees within the vegetation free zone (15 ft from the toe).



Inspect ID: CMRR_2019_a_0002 **Title:** USACE_CELRC_CMRR_2019_a_0002_1.jpg
Rated Item: 1. Unwanted Vegetation Growth **Caption:** Rating: Minimally Acceptable;
Remarks: Trees along the riverside toe of the railroad embankment.; **Action:** Remove trees within the vegetation free zone (15 ft from the toe).





Levee Inspection Map

NPS - Cady Marsh RR Tieback

Location: Griffith, IN
 Year/cycle: 2019 a
 Inspection type: Routine
 Inspected by: USACE Chicago District
 Inspection date(s): February 13, 2019
 Observation ID prefix: USACE_CELRC_CMRR_2019_a
 Map created: 04 March 2019

- Observation Points**
- Acceptable
 - Minimally Acceptable
 - Unacceptable
 - Not Applicable
- Observation Lines**
- Acceptable
 - Minimally Acceptable
 - Unacceptable
 - Not Applicable

