

RESEARCH REPORT DOCUMENTATION PAGE

1. Report No. ND 94-07	2. Report Date December 2001	3. Contract No. N/A	4. Project No. IM-8-094(005)331
5. Title and Subtitle Optical Camera In Edge Drains		6. Report Type Click on link to open report Work Plan <input type="checkbox"/> Construction <input type="checkbox"/> Evaluation <input type="checkbox"/> Final <input checked="" type="checkbox"/>	7. Project No. 8. Project No. 9. Project No. 10. Project No.
11. Author(s)/Principle Investigator(s) Curt Dunn, Tom Bold, Mike Marquart			
12. Performing Organization Name and Address NDDOT M+R <input checked="" type="checkbox"/> North Dakota DOT NDDOT OTHER* <input type="checkbox"/> Materials and Research Division NDSU <input type="checkbox"/> 300 Airport Road UND <input type="checkbox"/> Bismarck ND 58504-6005 UGPTI <input type="checkbox"/> OTHER* <input type="checkbox"/> *see supplementary notes		13. Sponsoring Agency Name and Address North Dakota DOT Materials and Research Division 300 Airport Road Bismarck ND 58504-6005	
14. Supplementary Notes			
15. Abstract Purpose and Need Along with proper surface drainage practices, provisions are needed to provide proper subsurface drainage for the removal of water from underneath the road surface. The North Dakota Department of Transportation (NDDOT), along with many other states, have utilized longitudinal underdrains (edge drains) to collect and dispose of water from the underlying pavement structure directly beneath the roadbed to eliminate moisture related pavement distress. Objective In order to evaluate the effectiveness and long-term operation of these edge drains, an optical camera was obtained to observe the interior of the edge drain piping. In performing the annual inspection of the edge drain systems, an evaluation of the optical camera system was also conducted to determine its performance and usefulness as a diagnostic tool for other applications. Scope The NDDOT has set aside a select group of edge drains along a portion of interstate in North Dakota as an experimental study. The experimental project is located on I-94 (eastbound) in Cass County. This study will monitor the performance and effectiveness of the edge drain system by use of the optical camera annually with a final report in the fifth year. Items evaluated are: -Amount of fines being carried into the edge drains -Flushing capability of the fines -Condition of the drain pipes Summary In general the edge drains appear to be functioning properly with little internal restriction from collected sediment or other foreign material. The edge drain systems evaluated show that 26 of the 38 (68.4%) had no change or a decrease in the amount of sediment observed. The evaluation history indicates that most increases in observed sediment occurred in the first two years of service and continues to decrease in amount. Of those systems indicating an increase in sediment, it should be noted that the increase is generally small and is not presenting any performance problems. Other items such as the intrusion of rodents into the drain system, punctures and/or protrusions in the pipes, plant roots, and sags in the pipes; although degrading the overall condition of the edge drain system, do not appear to be presenting any problems. The clogging of concrete headwall outlets with hay and other matter may create performance problems. Grass clippings should be removed for optimum operation of the edge drain systems. The source of the damage to the rodent screens appears to be NDDOT mowers. Edge drain concrete headwalls used on current projects utilize a different rodent screen design. This new design is less susceptible to the type of damage observed on this project. The condition of the rodent screens should be monitored and repairs performed as required. The optical camera system used to inspect the edge drains continues to work well with little or no difficulty in operation. Since acquired by the NDDOT, the camera system has been utilized by Materials and Research Division personnel for the evaluation of experimental projects. District personnel from around the state have used it to evaluate newly constructed pavement edge drain systems, slide area drainage systems, roadway culverts, and storm drainage systems. Materials and Research personnel have performed general maintenance on the camera system. Maintenance operations consist of general cleaning and lubrication of camera head contacts and fittings. Miniature light bulbs, which act as the light source for the camera in the absence of natural light, are replaced when they have been damaged or fail. Replacement bulbs, (approximately \$1.70 per bulb), are somewhat difficult to replace; however, using proper tools, this operation also is performed by Materials and Research personnel. Color-coded tape was applied to the 300' cable to indicate the position of the camera when "snaking" the camera through a pipe. Due to the adverse conditions (water, grit, etc.) in which the camera operates, this tape must occasionally be replaced. Recommendations: The condition of the headwall area is critical to the performance of the edge drain systems. The headwall should be kept clear of grass clippings and other debris. Damaged rodent screens should be repaired to prevent rodents from entering the edge drain system. The optical camera system has been very reliable, and easy to operate. District personnel continue to use it regularly to inspect new construction of drainage systems. The camera has proven to be a valuable inspection and diagnostic tool.			
16. Key Words Drainage Pipes Plastic	17. Distribution Statement No restrictions. This document is available to the public from: North Dakota Department of Transportation Materials and Research Division: 300 Airport Road Bismarck ND 58504-6005 Office: (701) 328-6900 Fax: (701) 328-03100		18. No. of Pages 31 19. File type/Size Pdf / 0.8 mb