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SUMMARY REPORT

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955 Park Street
P.O. Box 191
Columbia, SC 29202

Specifications for Culvert Pipe Used in SCDOT Highway Applications

This report presents the findings from a study undertaken to improve the field performance of culvert pipe used in SCDOT roadway applications. Reinforced concrete, corrugated aluminum alloy and high density polyethylene pipe are the primary pipe materials used on SCDOT projects. Appropriate use of these pipe materials in terms of design, installation, maintenance, service life, and quality control/quality assurance was the focus of the study. The research involved reviewing research manuscripts, AASHTO and ASTM specifications, construction standards and specifications of state transportation departments, and manufacturer's literature. The work resulted in the development of a "SCDOT Culvert Pipe Selection Guide" which provides a step by step procedure for selecting pipe materials for specific applications. The criteria for pipe selection include durability, hydraulic capacity, structural capacity, service life, compatibility of pipe material to the environmental site conditions and life cycle costs. Guidance was provided for the recommended practices for materials, materials management, installation (backfill materials, trenching, bedding, laying pipe, backfilling, and cover heights), design, maintenance, quality control/quality assurance for product approval and field inspection of delivered pipe and installation procedures. Recommendations made to improve the installation of all culvert pipe include improving the quality and density of backfill materials placed around pipe, improving the compaction inspection standards by performing density checks on compacted backfill at the spring line of the pipe to ensure that compaction is adequate in the haunches; requiring a minimum compaction level of 95% Standard Proctor density, and requiring all pipes to meet minimum cover requirements. Recommendations made to improve the inspection standards for all installed pipes include visually inspecting all installed pipe to ensure proper joining, line and grade of pipe using video camera equipment with a laser deflection measuring device

attached. Random inspections of pipe should be made throughout the construction process to prevent poor construction methods from propagating through entire projects. The study also recommends utilizing third party certification and testing programs for quality control and quality assurance. These include the PPI and NTPEP third party certification programs and the ACPA "Q-Cast" program for concrete pipe. The final product of this work was the development of a training course to educate SCDOT personnel on the proper design, installation, maintenance, and quality control/quality assurance of culvert pipe used in roadway applications. Seven modules were developed and will be presented to SCDOT personnel via one pilot training course.

This research project was conducted at the University of South Carolina by Sarah L. Gassman, Ph.D.

For further information, contact Terry Swygert at SCDOT: (803) 737-6652; swygerttl@dot.state.sc.us