

Leachate Collection Pipe Construction

*Ai Khatami, Ph.D., P.E.,
Vice President, SCS
Engineers*

Consolidation of the landfill industry and complicated permitting processes have forced landfill operators to stay away from permitting new greenfield sites and stay within their currently permitted sites. Permitting lateral and/or vertical expansions is the way for landfill operators to remain in business, and that has resulted in permitted landfills becoming larger and taller. There are currently permitted landfills in the state of Florida or in other states with a maximum waste thickness exceeding 300 ft. Landfills with over 300 ft thicknesses may be rare, but there are many landfills with waste thicknesses over 200 ft in Florida. These landfills can apply significant compressive stresses on the leachate collection pipes placed below waste at the bottom of the landfill. Leachate collection pipes are considered the backbone for proper management of leachate in landfills. Without leachate collection pipes, leachate heads can quickly exceed the allowable maximum of 1.0 ft above the liner and the agency would have to take action at that stage, possibly shutting down the landfill if leachate collection pipes are compromised to the point of not allowing flow through them.

Leachate collection pipes are generally made of high-density polyethylene (HDPE) resin. There are certainly extensive standards to make sure that pipes used for leachate collection systems meet the minimum reported values by the pipe manufacturer; however, HDPE pipes by themselves

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Photo 1: Gravel placed below pipe



*Photo 2: Gravel formed around the pipe
Photos courtesy of SCS Engineers*

cannot resist the compressive stresses of 200 ft or more of waste above them. What makes it possible for HDPE pipes to survive under such high compressive stress conditions is the gravel placed around the pipe. Extensive research by academia and industry has shown that gravel can bridge compressive stresses over and around the pipe and reduce the amount of compressive stress actually applied to the pipe when correctly placed. Situating the pipe over the lining system geosynthetics and then placing gravel over the pipe will not do the job. That type of construction has very high risks of the pipe collapsing under the compressive stresses because gravel cannot bridge the stresses around the pipe. For proper bridging of the compressive stresses, gravel must encase the leachate collection

pipe, which means gravel must be placed below and above the pipe. A minimum of 3 inches of gravel below the leachate collection pipe (Photo 1), in addition to gravel covering the sides and the top of the pipe (Photo 2), is a proper manner of construction to ensure compressive loads are not directly applied to the pipe, but bridged around the pipe by the gravel encasing the pipe.

It is very important for landfill engineers to show gravel below the pipe in their plans, and it is very important for the construction quality assurance monitors to observe placement of gravel below the leachate collection pipe. Construction of the leachate collection pipe with gravel below the pipe may take a bit longer, but that little extra time drastically increases survivability of the pipe below high compressive stresses.

Contractors need to have laborers available to form gravel properly around the pipe before closing the gravel with geotextile. Contractors must also be very conscious about placement of the protective cover material over and around the pipe/gravel/geotextile burrito. Improper placement of soil material may disturb the gravel pack around the pipe to the point that gravel may not function as desired. Such conditions would be almost impossible to detect or assess as a cause of failure if and when the leachate collection pipe collapses below waste.

Ai Khatami, Ph.D., P.E., can be reached at (561) 441-1473 or via e-mail at akhatami@scsengineers.