

A Brief History of a Concrete Pipe

Douglas Holdener, P.E.

Estero, Florida. When Strickler Brothers began constructing the new storm pipe installation for US Highway 41 in Lee County, little did they know that they would uncover a chapter of Florida's concrete pipe history that illustrates the rugged durability of concrete pipe. Strickler Brothers is the underground utility subcontractor to Russell Engineering for US 41 from Corkscrew Road to San Carlos Boulevard. The \$14.2M Florida Department of Transportation project in District One began in January 2011 and is projected to be complete by Summer 2013.

During the excavation to install concrete pipe, Strickler was tasked with removing old storm sewer utilities within the new project limits. The old reinforced concrete pipe (RCP) that was removed was observed to be in excellent condition after approximately 32 years. The old concrete pipe was stenciled with the name "ARC Kyle." A review of the old concrete pipe condition and the history of the ARC Kyle name illustrates the durability of not only concrete pipe, but also the durability of the concrete pipe industry.



Figure 1. 32-year old RCP unearthed during US 41 highway construction in Lee County, Florida.

The Kyle family owned concrete pipe plants in Florida, including Tampa, Apopka (now Rinker's Apopka plant), Jacksonville, and Tallahassee in the 1960s and 1970s. The British company ARC (Amey Roadstone Construction) purchased Kyle, including its 19 concrete pipe plants in the southeastern United States, and became known as ARC Kyle. In 1976, ARC Kyle purchased a family-owned concrete pipe plant in Miami. A Fort Myers plant was purchased in 1995, and the Tampa plant was shut down.

In the late 1970s, ARC Kyle acquired Hydro Conduit Corp. and its 32 RCP plants, which were predominantly west of the Mississippi River. During the 1970s and 1980s, ARC America was a subsidiary to Consolidated Gold Fields. Incidentally, it is reported that Consolidated Gold Fields played a key role in ending apartheid in South Africa. Consolidated Gold Fields' Public Affairs Manager Michael Young facilitated secret meetings between the South African government and the African National Congress that led to the collapse of the apartheid regime.

In 1989, Hanson acquired ARC for a brief period before ARC went into private ownership. CSR America, which owned Rinker Materials Corp., eventually acquired ARC America in 1990. In 2003, CSR America demerged and spun off Rinker Group. In 2007, CEMEX acquired Rinker Group, including its Rinker Materials Concrete Pipe Division product line, which currently operates Florida-based RCP plants in Miami, Fort Myers, and Apopka in addition to other US locations.

According to Clay Warner, of the IWI Group and former Vice President of Engineering for ARC Kyle, Inc./Amey Roadstone, concrete pipe stenciled ARC Kyle and installed in the Lee County area would have been produced at its Miami plant between 1977 and 1980. Furthermore, the concrete pipe has the “outer surface appearance” of “Packerhead Pipe.” A faintly visible 1980 date stamp was observed inside one of the pipes. According to Dave Crocket, the former Operations Manager of ARC Kyle plants in Florida, the Miami plant had two Packerhead pipe production machines that could produce up to a 36-inch diameter concrete pipe and a 72-inch diameter concrete pipe, respectively.



Figure 2. Lifting holes in 32-year old 18-inch RCP plugged with mortar have remained intact. The adjacent concrete pipe walls are in excellent condition.

The 15- and 18-inch diameter ARC Kyle concrete pipe unearthed along US 41 is approximately 32 years old. Despite a few damaged sections as a result of removing the old pipe with hydraulic excavators, the old RCP is in excellent condition. Neither the concrete nor the steel shows signs of corrosion, spalling, or deterioration. This pipe was installed at a time when lifting holes were plugged on the job site with objects such as Styrofoam cups, rags, or even oranges and then filled the exterior side of the hole with a mortar plug. These plugs, and the pipe wall, have withstood the test of time. The cups and oranges have since deteriorated.



Interestingly, the longitudinal reinforcing tips are visible on the face of the bell of some of the pipe. During production, longitudinal steel was allowed to rest on the pallet, and the end tip of the longitudinal reinforcement was, therefore, visible. The visible tips are not grounds for rejection, per ASTM C 76. Even though the longitudinal end tips were directly exposed to the environment for over thirty years, there is no deterioration in these areas.

Figure 3. Exposed Longitudinal Reinforcing Tips Has Not Resulted in Corrosion or Spalling.

Concrete pipe installed 30 years ago or earlier was not subject to today's standards of post-installation inspections (PIIs). Prior to internal video inspections, contractors did not feel compelled to install concrete pipe with "kid gloves." Hairline cracks, exposed steel from manufacturing, and minor damage left unrepaired was almost certainly more commonplace that it is today. Concrete pipe has proven to be highly durable and resilient to hairline cracks and minor damages.



Figure 4. An exposed circumferential wire has rusted but there is no deterioration to the concrete pipe wall. This localized issue did not impact the concrete pipe's performance during its 32 years in service.

In today's construction engineering and inspection environment, every newly installed storm pipe is thoroughly inspected. There is widespread agreement amongst contractors, manufacturers, and engineers that final inspection is beneficial. However, there is often excessive scrutiny of hairline cracks and cosmetic issues. Unfounded fears and speculation of concrete pipe failure often impede the process to approve repairs or to accept installed pipe condition. There comes a time when we should simply consider the actual historical performance of RCP, and not rely solely on university research, models, and speculation. The story of 32-year old ARC Kyle concrete pipe unearthed on US 41 shows that concrete pipe's history of durable performance should not be overlooked.