









CASE STUDY

PILOT TUBE METHOD | GUIDED PIPE ROOFING



-  **Project Name:**
Castle Hill Pedestrian Underpass
-  **Prime Contractor:**
Tunnelling Solutions
-  **Location:**
Sydney, Australia
-  **Owner:**
Northwest Rapid Transit Infrastructure Joint Venture (NRTIJV)

-  **Ground Conditions:**
Up to 50mPa Rock and Sticky Clay
-  **Akkerman Equipment:**
GBM 240A Jacking Frame & Guidance System, Lead Integral Swivel Cutter Head, Rock Drill Adapter for TriHawk® Drill Bit
-  **Pipe:**
12.75-in. OD Steel Casing
-  **Total Length/Longest:**
1,690-lf./130-lf.

PROJECT OVERVIEW

Tunnelling Solutions (TS) combined guided boring pilot tube technology with an adjustable support and tension frame for consistent and repetitive success to install canopy tubes on several projects.

The method of guided pipe canopy installations, also called guided pipe roofing, is used for short tunnels, culverts, or crossings for extra reinforcement in heavily traversed regions for stress distribution and to mitigate ground settlement.

TS provided this trenchless solution on the Castle Hill Pedestrian Underpass project for the NRTIJV.

THE CHALLENGES

- Pipe roof/arch required 13, 130-lf. canopy tubes to form the pipe arch
- All points of entry and tooling pull-back had to occur from the launch shaft
- Installation in up to 50 mPa rock and sticky clay ground conditions
- Required repositionable platform and backstop for line and grade accurate points of entry

THE SOLUTION

TS used their GBM 240A jacking frame and collaborated with Akkerman to manufacture a custom Lead Integral Swivel Cutter Head with retractable dirt wings that could be pulled back. They also sought a locally manufactured adjustable support frame. The process went as follows:

- Step 1:** Install pilot tubes on line and grade.
- Step 2:** Retract pilot tubes and steering head from the pilot tube borehole and remove them from the launch shaft.

Step 3: Launch canopy tubes with lead integral cutter head and augers. The cutter head excavates the ground with a slight overcut for reduced jacking forces. When the lead auger reaches the final point of installation, the integral cutter head dirt wings are retracted, the GBM jacking frame operator engages pull-back mode, and the augers and cutter head travel back to the launch shaft for removal, and the canopy tube remains in place.

OUTCOME

- Approach allowed the contractor to provide all-inclusive project solution for the new underpass
- Production savings from fewer individual set-ups
- Opportunity for further geotechnical information before installing the main tunnel and reveals a complete set of soil samples for the length of the tunnel for reduced risk
- Pilot tubes proved the alignment and ensured an accurate installation of the canopy tubes for a precisely installed pipe canopy

