

B & W GO ROCK BORING AT INDIAN QUEENS



Photograph above. B&W Tunnelling have the expertise to bore through rock at quite a large diameter.

Scheme Title: Maudlin to Indian Queens Pipeline

Client: Transco

Main Contractor: Lawrence

Specialist Contractor: B&W Tunnelling Ltd

Contract Value: undisclosed

Form of Contract: NEC Option A

Contract Duration: 12 weeks

Introduction

On the face of it, the huge debate on Hand Arm Vibration Syndrome was the making or breaking of many specialist sub contractors, and in all honesty it has been the making of B&W Tunnelling. The specialist has been the ultimate success story over the past 24 months and have proved themselves worthy to be up there with the best when it comes to achieving both performance, and a giving their client a good end product.

During the dark months the specialists concentrate all their efforts within the UK water and sewerage industry, however in the spring and summer months they focus their attention heavily towards the construction of specialist elements on gas pipelines. On average they complete two of these specialist pipeline contracts per year.

Transco to their credit, are the unsung heroes of trenchless technology. Through the fields they open-cut, but cross beneath roads,

railways, water-courses and woodland most always, using trenchless techniques such as microtunnelling, pipejacking or auger boring. It is here where most main contractors look to the likes of B&W to provide the works for their pipeline to tie into.



Photograph Above. The rock head was developed to handle rock up to 200MPA

B&W appear to have broke off the shackles from being tared as just another "subbie", and have a growing fleet on tunnelling and



Photograph Above. Setting up for the 1st Rock Bore which turned out to be an unprecedented success.

auger boring machinery which would make most “alleged specialist contractor” green with envy.

Location

The location of this contract is just outside Bodmin and comprises a 20km long by 36” dia. 900mm welded steel pipeline and takes in an abundance of trenchless crossings.

Relationship

From an independent viewpoint Lawrence appear to be doing very well in respect of securing gas pipeline contracts, and have done exceptionally well in building up their order book and their ever growing relationship with the client.

B&W have a good productive five year working relationship with the main contractor and it is here where the two have

crossing	length	ground	method	shaft type	pipe
RDX1	15m	hard rock	rock bore	box and battered	900mm steel
RDX2	12m	hard rock	rock bore	box and battered	900mm steel
RDX3	36m	hard rock	rock bore	box and battered	900mm steel
RDX4	20m	mudstone	auger bore	battered	900mm steel
RDX6	35m	mudstone	pipejack	sheeted	1500mm concrete
RDX7	70m	mudstone	pipejack	sheeted	1500mm concrete
RDX9	36m	hard rock	rock bore	battered	900mm steel
RDX12	70m	mudstone	auger bore	battered	900mm steel
RDX13	35m	mudstone	auger bore	battered	900mm steel
RDX14	65m	clays	pipejack	box and battered	1500mm concrete
RDX16	60m	mudstone	pipejack	box and battered	1500mm concrete
RDX17	40m	mudstone	auger bore	battered	900mm steel
RDX17a	70m	mudstone	pipejack	battered	1500mm concrete
RDX18	70m	mudstone	pipejack	sheeted	1500mm concrete

RDX 10, 11 and 15 all undertaken via open-cut and all pipejacking undertaken by the WM Akkerman

joined forces in a bid to execute this contract both within budget and on programme.

B&W Tunnelling are no novices when it comes to the organisation of specialist sub-contracts such as these.

However, looking at their sub-contract it appears no easy

task in juggling men and kit between individual crossings some miles apart, especially when you look at the location of the job, as Cornwall has an array of small single track roads.

The specialist undertake a few contracts

like this each year and are currently executing one for a Nacap/Lawrence joint venture in South Wales.

The crossings

In the past, these types of contracts used to be executed mainly by hand excavated pipejacks however these were gradually replaced by the quick, cheap and cheerful if not totally Neanderthal method of auger boring. In fairness, these were the way the go, although the ultimate tolerances, especially on the longer bores left a hell of a lot to be desired.

Since then, auger boring companies such as Barbo, American Augers and in particularly Perforator have helped the cause by introducing both more capable, but more importantly steerable, machinery into the market.

Now, looking what is available, auger boring appears to be quite a prudent way forward to get that desired crossing.

However, and we stress however, this contract is not quite that straightforward to just chuck a couple of auger boring units at it.

Cornwall is the home to some of the best hard rock drillers on the globe and there is a good reason why this is so.

And there you have it. The reason why is that there is a huge abundance of the said geology which consists mainly of hard rock which is one of the reasons Lawrence opted to go with B&W, as they have that mechanised technology to deal with it.

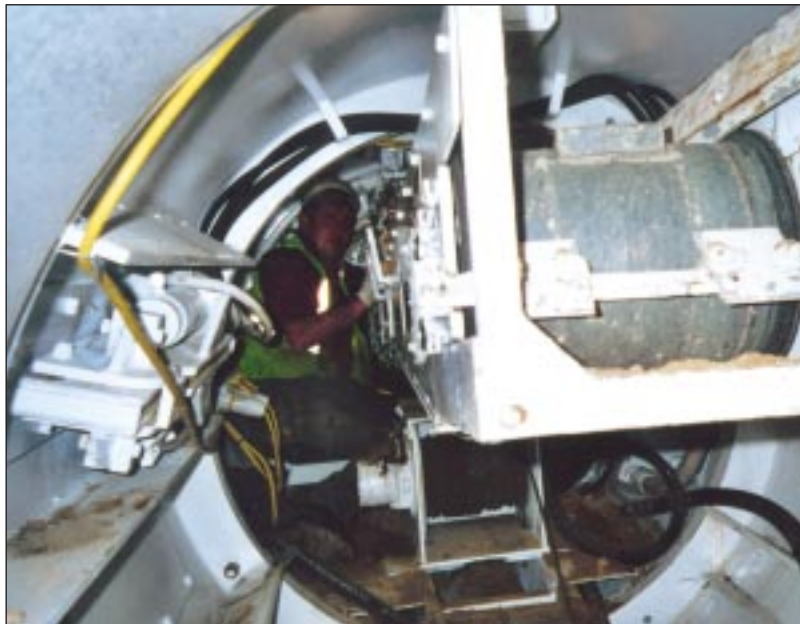
Ground Conditions

The ground conditions comprise predominantly granite and hard mudstone and just to be awkward, believe it or not, there is a crossing which does comprise clay.

Therefore and bearing these in mind, an AVN slurry system would appear the way to go would it not?

"However," B&W Director Steve Williams explained. "Apart from the fact that we like to stick to the systems we are familiar with, the crossings are relatively short and there

fore the most economic way forward was always going to be to fabricate a hard rock head for the American Augers' auger boring unit which we hoped would cope with the granite, and to dress the head of our Akkerman WM1200 for driving through the mudstones."



Photograph Above. The set up of the 70m drive which was executed by the Akkerman TBM

It sounds relatively straightforward, but then again- where would you get a hard rock head to suit an American Augers auger boring unit?



Photograph Above. The site compound set up.

Hybrid system

B&W have an exceptional relationship with Tunnel Engineering Services (UK) and between them they have recently developed and manufac

tured two sizes of auger boring machine cutting heads. The models RC900 and RC610 (36" and 24") both utilise heavy duty roller cutters mounted onto a cutter head and supported by a bearing housing, which is designed to transmit all the cutter head forces through to the casing and not via the auger shafts and main drive gearbox. The RC900 is also equipped with four adjustable stabiliser shoes.

The rock cutting head has made an impressive difference over previous conventional carbide bits, not only increasing production rates but also in the smoothness of cut and removal of vibration on the boring machine.

Akkerman WM1200

The reputation of this machine is growing by the minute. Barhale initially set the ball rolling by procuring a machine for work on their successful West Oxford contract. The machine had a much revered success and was followed by more successful works in London and Gloucester. The forward thinking nature of B&W then began to look one step forward and moving from conventional backhoe tunnelling they looked to purchase a WM1500 for their St. Brides contract, and in fairness

never looked back. Since then B&W have taken delivery of a WM1200.

Just prior to this machine being delivered, Bolton based specialist A E Yates purchased a machine for works on their high profile Kelvin Valley contract. Now you could say, with the exception of one or two- most notably Byzak- All the UK's top pipejacking contractors own an Akkerman.

However the question remained- there is no doubt the machine is good in clay, but what is its pedigree in the hard stuff?

Mr. Williams is a man who seldom uses two or three words where one will do, and on asking the question of 'will it be able to handle it?' appeared both totally unruffled if not quietly bullish replying, "of course it will".

Rock Bores

At present two of the rock bores (RX1 & RD3) have been completed, and have gone exceptionally well with the auger boring wading through the granite at 2m per hour which is no mean achievement considering the rock strength is in excess of 150mpa.

"Looking back at the way we used to undertake the work- in this kind of ground and



Photograph Above. The awesome Rock Boring machine supplied by TES

using a hand pipejack, we would have been “purely for economical reasons”. lucky to pull 500mm per shift.”

Line and level has been exceptional and the bores executed problem free with push forces being less than 75T.

An auger bore through clay at RDX12 has also been completed .

The Tunnel Drive

The tunnelling operation is being served by a 55T hydraulic track mounted Sennibogen crane and back up equipment has been provided as always by PL Manufacturing.

The Akkerman TBM has just completed a 70m crossing of RDX7 in 2-shifts generating jacking forces in the region of 100T, coming out well within line and level.

B&W Tunnelling opted to jack pipes which were supplied by CV Buchan and which according to Mr. Williams were procured



Photograph Above. Rock Boring

Shafts

The configuration of the construction on each of the shafts is dictated purely by the depth.

“Generally speaking if the shafts are less than 4m in depth we batter them, anything deeper we have a 7m long x 4m wide pit.

All shafts have been constructed in front of the tunnelling and trenchless operation by main contractor Lawrence.

Summary

Mr. Williams concluded: “Work is proceeding very well.

“The access points for mobilisation have been very good and the most rewarding feature on the contract so far has been the success of the rock boring machine.

“The way forward for us is to go for more specialist contracts and utilise the abundance of specialist tunnelling and auger boring plant and equipment we have.”