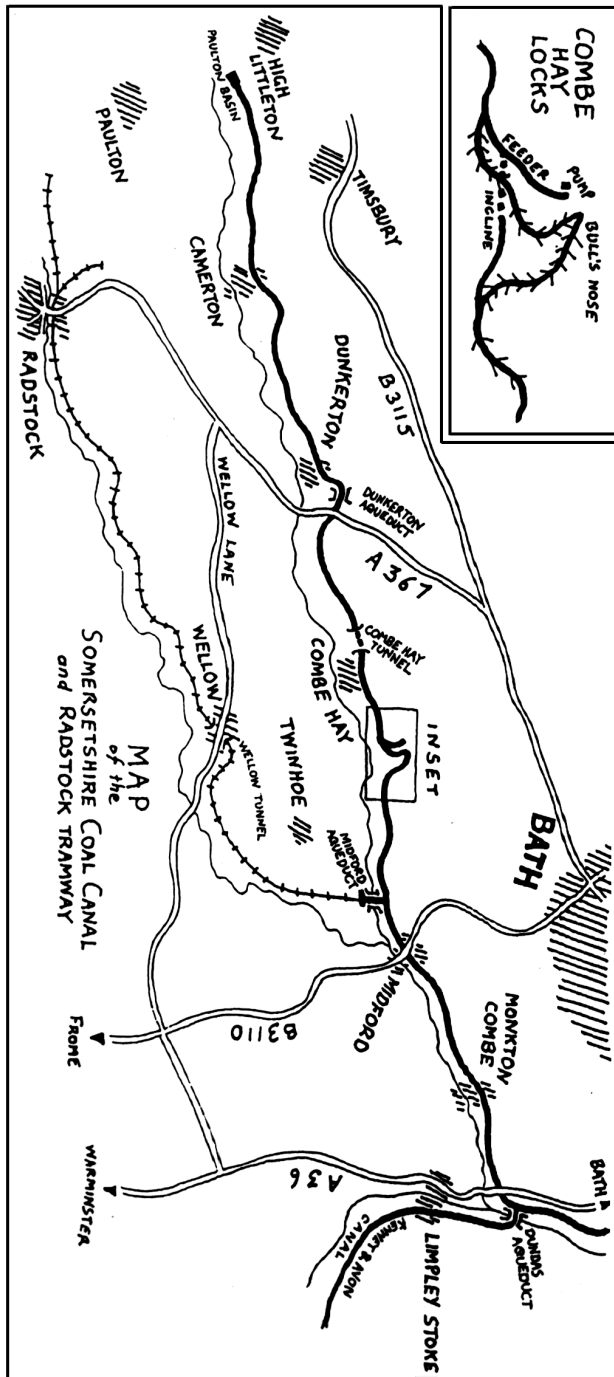


WEIGH-HOUSE

THE MAGAZINE OF THE
SOMERSETSHIRE COAL CANAL SOCIETY



Website: <http://www.coalcanal.org>



EXECUTIVE COMMITTEE

CHAIRMAN – PATRICK MOSS

☎ 07736 859882 *E-mail:* chairman@coalcanal.org.uk

SECRETARY – VACANT

TREASURER – DAVID CHALMERS

'Shalom' 40, Greenleaze, Knowle Park, Bristol BS4 2TL

☎ 0117 972 0423 *E-mail:* treasurer@coalcanal.org.uk

MEMBERSHIP SECRETARY – STEVE PAGE

36, Lower Whitelands, Radstock, Bath BA3 3JW

☎ (01761) 433418 *E-mail:* membership@coalcanal.org.uk

SECRETARY TO THE COMMITTEE – JOHN DITCHAM

☎ 01225 8308711 *E-mail:* secretary@coalcanal.org.uk

HISTORICAL ADVISOR – MIKE CHAPMAN

51, Newton Road, Twerton, Bath BA2 1RW

☎ 01225 426948 *E-mail:* history@coalcanal.org.uk

ENGINEERING ADVISOR – RICHARD HIGNETT

☎ 01793 855631 *E-mail:* engineering@coalcanal.org.uk

MAGAZINE EDITOR – ADRIAN TUDDENHAM

88, Mount Road, Southdown, Bath BA2 1LH

☎ 01225 335974 *E-mail:* editor@coalcanal.org.uk

ARCHIVIST – ROGER HALSE

4, Westminster Gardens, Chippenham, Wiltshire SN14 0DF

☎ 01249 652846 *E-mail:* archive@coalcanal.org.uk

COMMITTEE MEMBER – DERRICK HUNT

43, Greenland Mills, Bradford on Avon, Wiltshire BA15 1BL

☎ 01225 863066 / 07986 972984 *E-mail:* workparty@coalcanal.org.uk

VACANCIES: SECRETARY, EVENTS ORGANISER, WORK PARTY ORGANISER.

Website: <http://www.coalcanal.org>

The Somersetshire Coal Canal Society was founded in 1992 to:

'FOCUS AN INTEREST ON THE PAST, PRESENT AND
FUTURE OF THE OLD SOMERSETSHIRE COAL CANAL'

The Society became a registered charity in 1995 and now has the
Objects:

- 1) To advance the education of the general public in the history of the Somersetshire Coal Canal
- 2) The preservation and restoration of the Somersetshire Coal Canal and its structures for the benefit of the public

Registered Charity N^o 1047303
Registered under the Data Protection Act 1984 N^o A2697068
Affiliated to the Inland Waterways Association N^o 0005276
Inland Revenue reference code for tax purposes: CAD72QG

MEMBERSHIP

Membership Application Forms are available from
the Membership Secretary, Steve Page,
36, Lower Whitelands, Radstock, Bath BA3 3JW
☎ (01761) 433418 *E-mail:* membership@coalcanal.org.uk
and on the Society Website: <http://www.coalcanal.org>

The Editor welcomes letters, articles, photographs *etc* for inclusion in
WEIGH-HOUSE and will try to include them in full, but reserves the right to shorten
them if necessary. Author's guidelines are available at:

<http://www.coalcanal.org/wh/guidelines.htm>.

Please send articles and correspondence to:

Adrian Tuddenham 88, Mount Road, Southdown, Bath BA2 1LH

☎ 01225 335974 *E-mail (not HTML):* adrian@poppyrecords.co.uk

THE VIEWS AND OPINIONS EXPRESSED IN THIS MAGAZINE DO NOT
NECESSARILY REPRESENT OR CONVEY THOSE OF THE SOCIETY

Sunday 10th January —10:00

WORK PARTY — Location to be advised

For further details please contact: *Derrick Hunt* ☎ 01225 863066

Sunday 17th January —10:00

WALK — THE TYNING & WOODBOROUGH BASIN

Meet: Radstock Museum

For further details please see website or contact: *Mike Chapman* ☎ 01225 426948

Thursday 21st January — 19:30

SOCIAL EVENING — ADITS

by Mike Chapman

Meet: The Radstock Working Men's Club.

For further details please see website or contact: *Steve Page* ☎ 01761 433418

Sunday 7th February —10:00

WORK PARTY — Location to be advised

For further details please contact: *Adrian Tuddenham* ☎ 01225 335974

Thursday 18th February — 19:30

SOCIAL EVENING — THE HISTORY OF CLAY PIPES

by Marek Lewcun

Meet: The Radstock Working Men's Club.

For further details please see website or contact: *Steve Page* ☎ 01761 433418

Sunday 21st February —10:00

WALK — SOUTHSTOKE & TWINHOE

Meet: Twinhoe Lane, Midford

For further details please see website or contact: *Mike Chapman* ☎ 01225 426948

Sunday 6th March —10:00

WORK PARTY — Location to be advised

For further details please contact: *Derrick Hunt* ☎ 01225 863066

Thursday 17th March — 19:30

SOCIAL EVENING — TBA

Meet: The Radstock Working Men's Club.

For further details please see website or contact: *Steve Page* ☎ 01761 433418

Check the website:

<http://www.coalcanal.org>

for last-minute changes

WEIGH - HOUSE N^o 70

EDITOR'S NOTES	3
CHAIRMAN'S NOTES	4
NOTICE OF MEMBERS' UPDATE MEETING	4
DONATIONS & SPONSORSHIP	5
NEW MEMBERS	5
PAYMENT MYSTERY — SOLVED	5
RESTORATION PROGRESS Part 2 — Withy Mills to Terminus Bridge	6
THE S.C.C. AND THE INCLINED PLANE — Part 2 <i>by</i> Mike Chapman	17
BOOKS — Inclined Planes in the South West Discovering Britain's First Railways Death and Mr. Pickwick	20
DATES FOR YOUR DIARY	21

EDITOR'S NOTES

The majority of this issue of Weigh-House is devoted to an account of the restoration of the S.C.C. between Withy Mills Stop Point and Paulton Basin, which has been taking place in the past year. It is far more detailed than our usual Navvies Notes coverage of repairs and renovation, because it chronicles not just what was done, but how it was achieved and why it was done that way. For future restoration projects, looking back at how this project was planned could save a lot of unnecessary guesswork and warn of some of the pitfalls. The second part of the article, which will appear in *Weigh-House 71*, will deal with how we are trying to solve the problems of water supply.

The other main article in this issue is the second part of Mike Chapman's account of the inclined plane on the S.C.C.. In *Weigh-House 69*, he chronicled the events leading up to the decision to install a temporary inclined plane at Combe Hay, to carry coal from the upper to the lower canal reaches; the article in this issue describes the plane itself, its eventual replacement and the evidence for it which still remains.

Once again, I can only apologise that this issue of *Weigh_House* has been very much delayed, but an explanation of the reasons behind this will have to wait until the Members' Update Meeting in November.

ADRIAN TUDDENHAM

I love deadlines. I love the whooshing noise they make as they go by. — Douglas Adams

CHAIRMAN'S NOTES

The last six months have been turbulent ones for the Society and the Committee, with the result that we have had little time to communicate properly with our members. We have found ourselves in difficult situations which were changing daily and sometimes hourly, so it would have been counter-productive to make statements which would have rapidly been overtaken by events. This lack of communication has left some members feeling abandoned and has also allowed the spread of many rumours, some true and some false, which we have not had opportunity to confirm or deny.

Now that some of the dust has settled, we have finally found the time to look back over recent events and work out how to fulfil our obligation to our members by giving an explanation of what has been going on. The Members' Update Meeting, announced below, will be the opportunity for members who live locally to come and hear exactly what has been happening - both good and bad - and to ask questions of the Chairman and the Committee.

For members who are not able to travel to Radstock, we will publish an account of the meeting in the next edition of *Weigh-House* and I will be glad to put questions to the meeting on your behalf if you send them to me in advance [Contact details inside the front cover and on the website].

The second purpose of the meeting is to look to the future in the light of the lessons we have learned. Restoration is now becoming one of the Society's major activities and the present structure has proved inadequate to cope with it, so we shall have to consider carefully how to adapt the Society to its new rôle, so that we are properly prepared to move towards the future.

PATRICK MOSS

MEMBERS' UPDATE MEETING

A Members' Update Meeting of the Somersetshire Coal Canal Society will be held on
Thursday 26th November 2015
at the Radstock Working Men's Club, The Street, Radstock, BA3 3PR
commencing 7.30 pm.

The purpose of the meeting is to explain recent events and answer questions from the membership. There will be a review of the Society's current position and a discussion about organisation and restoration in the future.

A report on the meeting will be published in the next edition of *Weigh-House* for the benefit of members who are unable to attend.

PAYMENT MYSTERY — SOLVED

The mystery of the unidentified payment notified by our treasurer in *Weigh-House* 69 has now been solved; it was a bank transfer from the *Inch Fund*. Thanks to Tim Richardson for tracking it down.

DATES FOR YOUR DIARY — 2015

Thursday 15th October— 19:30

SOCIAL EVENING — MORE FROM THE ARCHIVES

by Roger Halse

Meet: The Radstock Working Men's Club.

For further details please see website or contact: *Steve Page* ☎ 01761 433418

Sunday 18th October —10:00

WALK — TIMSBURY PITS

Meet: Goosard Bridge, Paulton. (Please park— clear of the entrance to the Sewage Works)

For further details please see website or contact: *Mike Chapman* ☎ 01225 426948

Sunday 1st November —10:00

WORK PARTY — Location to be advised

For further details please contact: *Derrick Hunt* ☎ 01225 863066

Sunday 15th November —10:00

WALK — DUNKERTON AQUEDUCTS

Meet: Dunkerton layby on A367

For further details please see website or contact: *Mike Chapman* ☎ 01225 426948

Thursday 19th November— 19:30

SOCIAL EVENING — WORKING THE S.C.C.

by Patrick Moss

Meet: The Radstock Working Men's Club.

For further details please see website or contact: *Patrick Moss* ☎ 0773 685 9882

Thursday 19th November— 19:30

MEMBERS' UPDATE MEETING

Meet: The Radstock Working Men's Club.

For further details see p.4 or contact: *Patrick Moss* ☎ 0773 685 9882

Sunday 6th December —10:00

WORK PARTY — Location to be advised

For further details please contact: *Derrick Hunt* ☎ 01225 863066

Thursday 17th December— 19:30

SOCIAL EVENING — RESTORATION UPDATE

by Adrian Tuddenham

Meet: The Radstock Working Men's Club.

For further details please see website or contact: *Steve Page* ☎ 01761 433418

Sunday 20th December —10:00

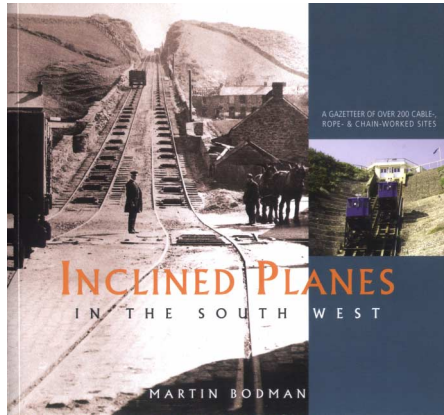
WALK — CLANDOWN

Meet: Radstock Museum

For further details please see website or contact: *Mike Chapman* ☎ 01225 426948

BOOKS

Some recent publications which may be of interest to our members



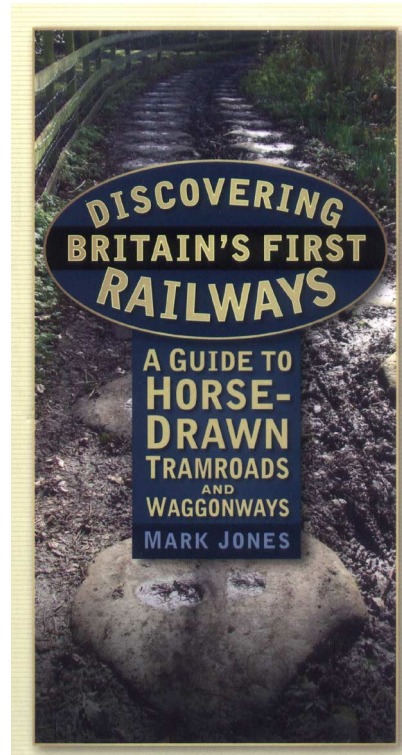
INCLINED PLANES IN THE SOUTH WEST

A Gazetteer of over 200
Cable, Rope and Chain-worked Sites

by

Martin Bodman

ISBN-13 978-0906294758



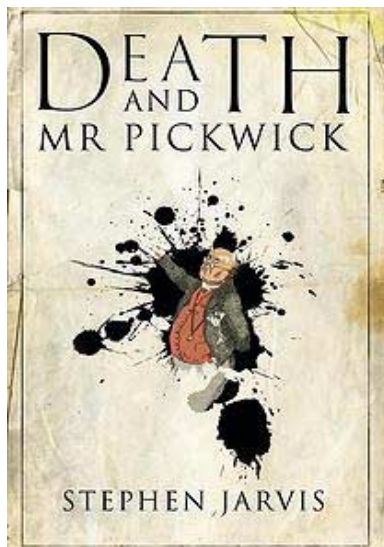
DISCOVERING BRITAIN'S FIRST RAILWAYS

A Guide to Horse Drawn
Tramroads and Waggonways

by

Mark Jones

ISBN-13 978-0752462738



DEATH AND MR PICKWICK

A Novel based around the Origins and History of

The Pickwick Papers

by

Stephen Jarvis

ISBN-13 978-0224099660

DONATIONS & SPONSORSHIP

The Society wishes to thank Joe Hitchins for his generous sponsorship of the canal restoration at Paulton

The Society wishes to express its thanks to the following for their generous donations:

Lady J. Maitland

The Hapsford Hydroelectric Power Company

Mr A. Payne

Mr J. Smith

Mr C. Axon

NEW MEMBERS

The Society welcomes the following new members:

Mr M Dunk

Mr D. Reynolds

Mr R. Moses

Mr J. Harris

Mrs J. Davies

Mr J. Dyer

Mr & Mrs Carroll

Mr & Mrs Jenkins

Ms G. Nash

Mr & Mrs Spurling

Mr A. Holland

Mr S. Witwicki

Ms R. Eversley

Mr A. Jones

Mr A. White

Mr S. Varley

Mr D. Peck

Mr G. Lang

Mr M. Brookbank

Mr R. Brice

Mr H. Thomas

Frome

Paulton

Keynsham

Christchurch

Helston

Bradford-on-Avon

Timsbury

Aylesbury

Midsomer Norton

Camerton

Timsbury

Yate

Paulton

Camerton

Clandown

Paulton

Odd Down

Holcombe

Doulting

Wilmslow

Carlingcott

Mr W. Norris

Mr J. Fishlock

Ms S. Crosse

Mr R. Wilkes

Mr S. Martin

Mrs D. Higgs

Mr D. Vosper

Mr P. Lander

Mr J. Brown

Mr A. Payne

Mr J. Leyton

Mrs T. Shellard

Mr D. Mann

Mr & Mrs MacLeay

Mr D. Vbranch,

Mr D. Woodland,

Mr T. Woodland,

Mr R. Hogan,

Mr P. Buckland,

Ms G. Ruddle,

High Littleton

Southdown

Midsomer Norton

Keynsham

Timsbury

Paulton

Farrington Gurney

Meare

Paulton

Wedmore

Chewton Mendip

Wellow

Paignton

Trudoxhill

Radstock

Midsomer Norton

Foxhill

Oldfield Park

Bruton

Glastonbury

MEMBERSHIP RENEWALS

Thank you to all those members who have already renewed their membership for this year – your continued support is appreciated. Those who pay by cheque and have not already paid for this year, please post your cheque to the Membership Secretary (address inside front cover) as soon as possible. Your annual subscription remains at the rate at which you joined, as a reward for your loyalty, but you may, of course add something more as a donation if you wish!

RESTORATION PROGRESS

Part 2 — Withy Mills to Terminus Bridge

In the first part of this article (Weigh-House 69) we covered the restoration of the S.C.C. East of Wither Mills, this part covers the section West of Wither Mills, including the stretch from Wither Mills to Terminus Bridge.

The land adjacent to the S.C.C. from Timsbury Basin to Terminus Bridge is used for agriculture; West of Terminus bridge it is only suitable for pasture and is mainly grazed by cattle; from about 50 metres East of Terminus Bridge it is used to grow a forage maize crop, which is a major constituent of the cattle's Winter feed. Forage maize is usually harvested in September or October and the next crop does not need to be planted until April of the following year. This meant that the field from Terminus Bridge to Wither Mills was not needed for agricultural activities from November 2014 to March 2015 and the landowner very trustingly offered the use of it to the S.C.C.S. for canal restoration on the condition that we reinstated it in time for him to plant his crop in April. We were somewhat 'caught on the hop' by this offer, but rapidly drew up a plan and engaged the services of Joe Hitchins, a local contractor and specialist in groundwork.

There were two vital things to be done before any work could commence: one was to find out what sort of canal we already had — and the other was to find out what sort of canal we were supposed to finish up with.

What we had

As far as 'the canal we already had' was concerned, the line of the original ditch was still obvious, but the shape of it had been altered by slumping of the soil and general deposition of new topsoil over the years. We had done some work during the preceding year to try to trace the leaks that caused that section to drain out so rapidly in dry weather. Unfortunately the results were inconclusive, but it looked as though whole areas of the canal bed had become porous. In the course of that work, markers had been posted along the towpath fence showing the distance eastwards from a datum point at Terminus Bridge in metres; these were later to prove very useful for keeping track of the work and identifying the location of various features.

The work was divided into three sections: a) from Wither Mills stop point to the boundary fence between the crop field and the pasture field, b) from the boundary fence to Terminus Bridge, c) from Terminus Bridge to the temporary bund which retained Paulton Basin. The plan was to do the work in that order, because the crop field would have to be returned to the landowner for planting earlier in the year than the other two sections, which were only needed for grazing. In the event, although the plan was generally followed, some work was undertaken on each of the sections whenever the need arose.

Having already marked out the length of the canal West of Terminus Bridge, the next task was to borrow a professional level and mark out some heights. This was rather more difficult because the only height we could be certain about was the spillweir at Lock 1 of the Combe Hay flight. This originally set the water level for the whole summit pound of the canal from Paulton to Combe Hay, but it was several miles from where we were going to work and we had no easily available way of transferring the measurement along many miles of dry canal. Richard Hignett, our civil engineer, very logically suggested using the slabs which had once carried the towpath under Terminus Bridge as our local datum. The canal level could not have been higher than the top of the slabs and several of them were still in place with no sign of disturbance or subsidence. If we aimed to keep the top of the towpath about 6" above that datum, we could be certain that it would never be 'over-topped' and washed away by a rise in the canal level. (We later obtained the services of a very accurate satellite measuring

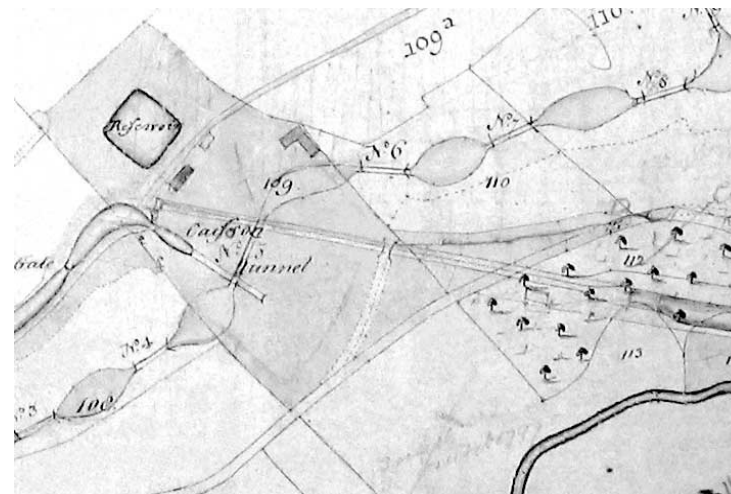


Fig.5 Detail taken from the draft map of the canal showing the state of affairs towards the completion of the lock flight at Combe Hay in 1805. The Caisson Lock has not yet been filled in, and the Inclined Plane is still in operation. Lower down, the road diversion and bridge over the incline is clearly shown, but the site of the Wharfinger's cottage at the lower basin is only sketched in.

over the approach to the lower gates of Lock 5, in the deep cutting between the lock and the present arched bridge (built after 1839). This section is supported by substantial walls on each side which would have been sufficient to carry a flat wooden bridge for the tramway.

Shortly below this point the incline is clearly defined by a shallow cutting for about 25 yards until obstructed by the track formation of the Camerton and Limpley Stoke branch railway, built in the early 20th century and now also abandoned. During the construction of the new railway the engineers were surprised to find remains of an earlier railway as they cut through the route of the incline, an indication that further evidence may lie below the surface elsewhere along the cutting.

Running down the field below the track formation the course of the incline can be faintly identified as a ridge for a further 25 yards before crossing the Combe Hay to Midford Road to the lower wharf on the opposite side. While the Inclined Plane was in use, road traffic was diverted up a trackway to a bridge at the top of the field. Although no longer needed after the lifting of the track, part of this alignment was adopted as a service access from the road to Caisson House and, when the new railway was built, provided with a level crossing and wooden gate, the latter still standing amongst the shrubbery.

The course of the incline on the lower side of the road passes through the entrance to Inner Meadow Cottage (formerly 'Platform Cottage', originally the Wharfinger's house), although obscured by extensions to the building, but the level platform at the base of the incline where the lower drum and crane were situated now provides a large lawn to the house. The basin itself has also survived in remarkably good condition, and although modified with a new terminal wall at some later stage, it is not impossible that remnants of the wharfside equipment still survive below the turf.

Since then, all signs of the upper part of the Inclined Plane from Caisson House down to Lock 5 have completely disappeared from the surface owing to the development of the garden in front of the house, already completed by 1839. A limited archaeological inspection of the terminal walls of the upper basin, site of the 'whimsey' and crane, was inconclusive, although part of a crane base was found in the basin itself. During the construction of the lock flight the tramway was provided with a bridge

MIKE CHAPMAN

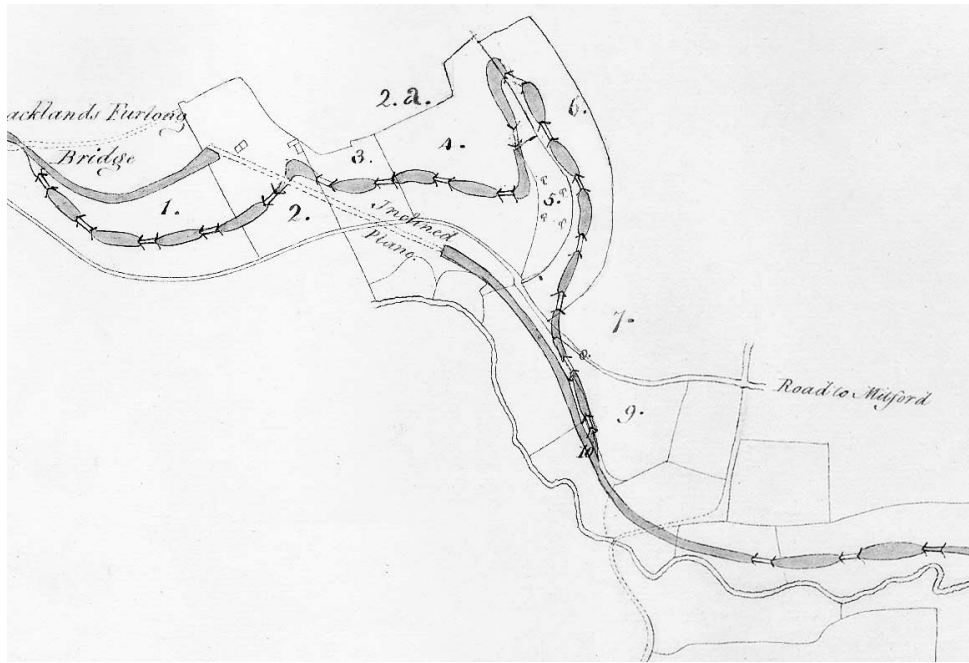
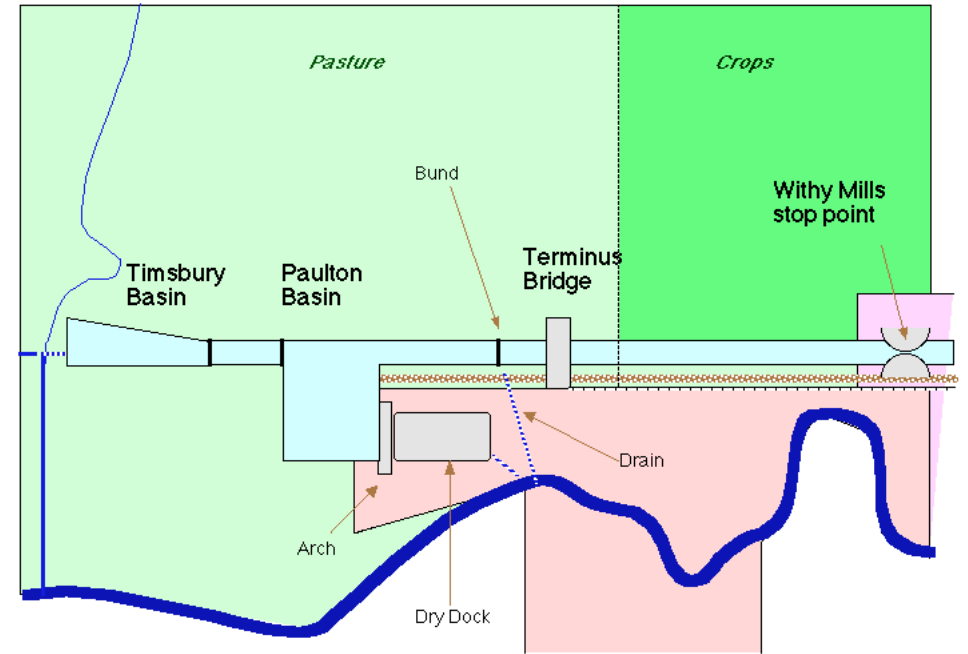


Fig.4 Detail taken from the Variation Plan of September 1801, showing the Inclined Plane, then still under construction, and the proposed flight of 17 conventional locks (19 were eventually needed) which would join up with the three already built (to the right) for the Inclined Plane.

Also, it was already apparent by early 1802 that the Inclined Plane was 'extremely inconvenient and difficult to pass', and on 11 March it was announced that the lock flights proposed in the Variations Plan would have to be built, financed by a 'Lock Fund'. The third act of Parliament, which approved the abandonment of the Inclined Plane and the substitution of locks, was passed on 30 April and in August tenders were put out to begin construction of the locks on both lines. On the Radstock line, Midford Aqueduct and the bottom lock were completed in 1803, but further financial constraints stopped work there and a temporary gravity railway (rather than an inclined plane) was constructed to connect the upper and lower levels instead. Completed in 1804, this tramway was subsequently incorporated with Hodgkinson's tramway which replaced the waterway some 10 years later. Finally, on 5 April 1805 the Combe Hay lock flight was completed, and from here onwards, the canal was fully open to traffic on both branches.

The Inclined Plane, though redundant, was retained for a further six years, presumably for maintenance purposes around the site of the Caisson Lock, and the track was not lifted until 1811. However, useful lessons had evidently been learned during these operations. Richard Bowsher, Clerk to the S.C.C Company, having acquired an interest in the stone mines on Bathampton Down, in 1808 employed William Bennet to construct a self-acting inclined plane there to a wharf on the Kennet and Avon Canal, and by 1811 the *Bath Guide* was able to report on 'the immense quantities of stone conveyed by the inclined plane from the quarries of Messrs. Bowsher & Co to the canal'. Less successful was William Smith's stone quarrying business with its tramway from Combe Down to the S.C.C. at Tucking Mill which ran from 1813 until 1818, but this too almost certainly included an inclined plane.









- | | | | | | |
|---|-----------|---|---------|---|----------------|
|  | Canal |  | Stream |  | Towpath |
|  | Cam Brook |  | Culvert |  | Retaining Wall |

DIAGRAM OF THE RESTORATION AREA

system which confirmed that the Terminus Bridge datum was exactly 3" above the Lock 1 spillweir.) The local datum height plus 6" was marked accurately by hammering nails into the fence posts along the towpath and the position of each nail was further emphasised by spraying a patch of dayglow red paint around it.

What we wanted

As a guide to the cross-section of canal that we wanted to create, we used measurements made in three different locations. At Wither Mills we had dug a trial trench, which gave us a rough idea of the canal shape at that point. Another set of measurements was made on a relatively unspoilt length of canal ditch which still exists at Sellar's Stile and these were confirmed by a third set of measurements made on a surviving length of canal ditch just East of Monkton Combe School. From these measurements, it was deduced that the canal was trapezoidal in cross section, the banks sloped at approximately 1:2, each with a width of 12ft and a depth of 6ft, and were separated at their bases by a flat bottom about 14ft wide [See diagram on p.8]. This made sense because, at minimum water depth, it would just allow two fully-laden 7ft-wide boats to pass each other. The minimum depth would be around 4ft, but the banks were made up to a height of 6ft, to allow the summit level to be over-filled during the Winter so as to act as a reservoir supplying the lock flight during the Summer.

→

THE SOMERSETSHIRE COAL CANAL AND THE INCLINED PLANE — Part 2

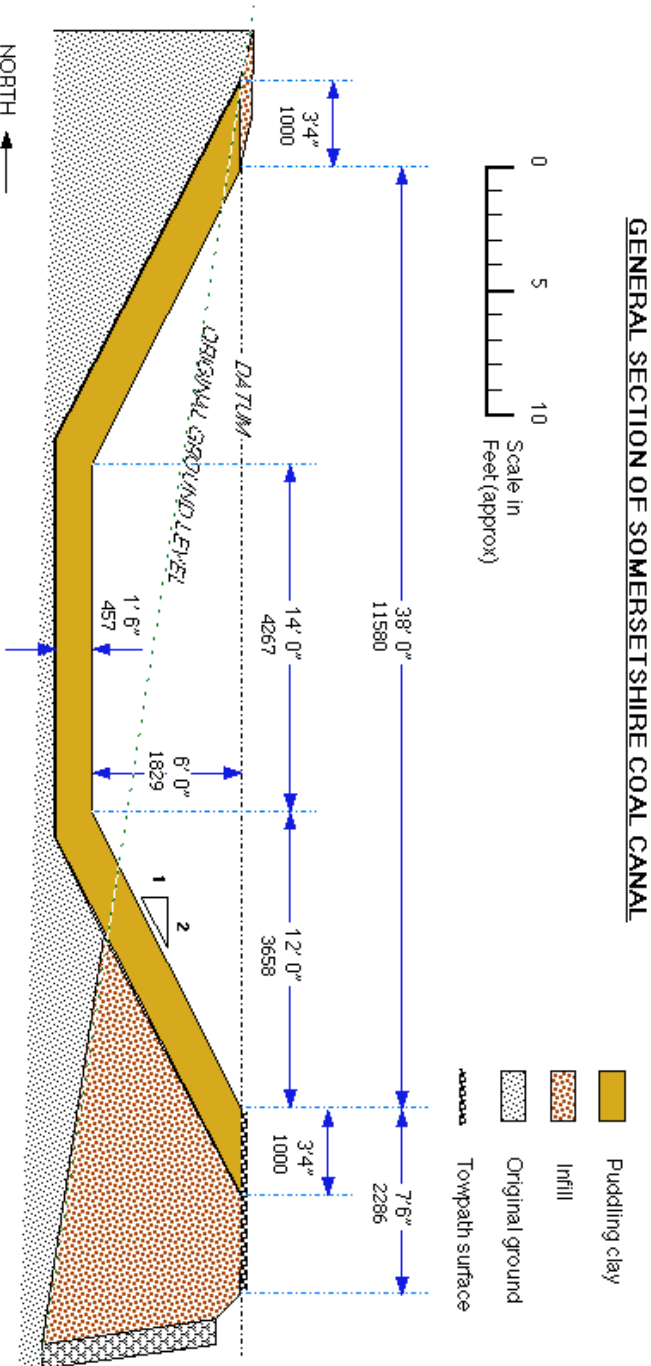
(Continued from *Weigh-House 69*)

Before reaching its final form the S.C.C. went through a lengthy 'evolutionary' process in which many variations in design were considered in the twelve years that elapsed between its inception in 1793 and formal opening in 1805. The sequence of steps in this process described by Kenneth Clew shows that the use of an inclined plane railway played an important part in this development, though not initially intended - nor finally adopted - as part of the permanent structure.

Despite a series of successful trials of the Caisson Lock in April 1799, the decision was taken in May (after the departure of William Smith) to suspend further work due to leaks and further costs, and it was at this point that the Inclined Plane was brought back into the picture as a temporary measure. However, the committee also decided that it should be 'ascertained whether the railroad inclined plane unanimously voted as a temporary expedient ... be likely to answer the end of a permanent and useful mode of conveyance'. To answer this question, advice was sought from Benjamin Outram whose report in February 1800 proposed an elaborate 'roll-on-roll off' system of waggon trains worked by an inclined plane which would avoid any transhipment between the collieries and the purchaser. His advice to abandon the Caisson Lock on the grounds of expense was accepted, but the rest of his scheme came under much criticism from other engineers such as Messrs. Norton & Whitmore and William Bennet who favoured their own boat lifts or Fussell's balance lock. John Sutcliffe, however, was sceptical of all these schemes, stating that the use of 'common Locks' ... 'will far exceed any other plan ... notwithstanding the first expense may far exceed that of the balance Lock or even that of inclined Planes'. Nevertheless, at a general meeting on 4 June it was eventually decided to go ahead with building the Inclined Plane, but employing a more modest version of Outram's idea using a system of containerised boxes.

However, by June 1801 the financial situation was becoming increasingly difficult, and in September it was decided that a new act of Parliament would enable the canal company to raise more money as well as providing the opportunity to make further deviations 'in case the said Company should hereafter erect [conventional] Locks'. On 30 September a Variation Plan showing conventional lock flights on both branches of the canal was deposited with the Clerk of the Peace, approved by the shareholders in October.

In November the Inclined Plane was complete, allowing through-traffic along the main line of the canal. A contemporary description of the Inclined Plane shows that it was self-acting, controlled on an endless chain by a 'Whimsey' or drum at the top. The coal arrived in one-ton boxes which were lifted from the boats by a crane onto a carriage carrying three boxes at a time. Also mentioned are the three locks needed to bring the lower level up to the base of the incline where there would presumably be another crane to lift the boxes into the boats waiting there. It was estimated that the carriage would descend 300 yards in five minutes, bringing a quarter of the weight up at the same time, and allowing a transfer of 200 to 300 tons per day. For goods passing down the Inclined Plane, an additional toll was claimed by the S.C.C. Company 'in remuneration for the additional expense of erecting cranes and other machinery required when the Caisson failed'. This was disputed by the Bath coal carriers, and eventually the High Court decided in favour of the traders, considering that the machinery formed part of the canal and was paid for in the regular tonnage.



Because of the urgency to return the landowner's fields, the bed of the canal had been completely neglected. This now had to be made waterproof by puddling. Back in the Autumn, the digger driver had been somewhat sceptical when we asked him to chop up a short section of the canal bed clay, mix it with water and then roll it back in again with the digger's tracks - but he obliged us and made a good job of it. During the changes in weather which followed, that section of canal appeared to keep out the groundwater but retain rainfall, both good indicators that the clay had become properly waterproof. This technique was now used to waterproof the rest of the canal bed; it proving surprisingly quick and economical, with a skilled driver completing the remaining 250-metre length in a single day.



THE DIGGER PUDDLING THE CANAL BED

The final major job on the Withy Mills to Terminus Bridge section was tidying up the top of the embankment puddling and reinstating the towpath. The towpath was too narrow for the 5-tonne digger, so a mini-digger had to be used. Ideally, the towpath should have been surfaced with compacted stone or a good hard-wearing grass, but our funds were insufficient to cover such luxuries at this stage, so it was decided to simply return it to its previous condition. At some future date, when funds permit, it can be properly surfaced.

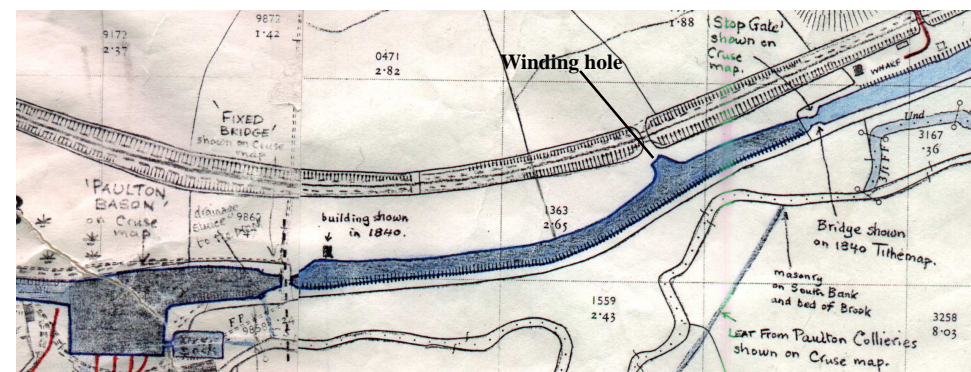
To be continued in Weigh-House 71

The plan

Next we had to work out how to get from what we had to what we wanted – and this was where our plans became somewhat vague. It was obvious that not all soils were equal and a lot of what was visible on the surface was porous and incapable of retaining water. We guessed that somewhere underneath the topsoil was a different kind of soil, probably clay, that was either impermeable or capable of being turned into something impermeable — if only we knew how. The general idea was to remove the topsoil so as to get down to a clean surface on the potentially impermeable clay, build up and shape the canal profile in clay and make it waterproof, then replace the topsoil on top of the clay to form the towpath surface on one side and the crop field on the other.

By the end of November, when the digger arrived on site, we had a slightly more refined version of our plans in place, but with no previous experience of this sort of work, we were totally at the mercy of the digger drivers for practical advice on how to actually set about doing the job. Far from being a disadvantage, this proved to be a tremendous advantage because the drivers, freed from the usual dead hand of authority, tackled the task with enthusiasm and incredible skill, often working long and unsociable hours to get the job finished. They freely shared their considerable knowledge and experience, which saved a lot of time and helped to avoid hidden pitfalls. Because the funding for this section of the restoration was tightly constrained, we could not afford to hire a driver for the dumper truck; but one of the digger drivers was a qualified instructor and offered to train the S.C.C.S. volunteers in the skills of dumper truck driving.

It appeared that there had been a degree of subsidence in the towpath embankment, so the first task was to cut the topsoil away from half the width of the towpath and pile it on top of the remaining half, so as to raise its level to the height marked out by the nails. This exposed the top of the puddling clay, which we could then see was well below the required level. We had hoped to find sufficient natural clay in the offside bank to build the towpath-side puddle back up to the required level, but we soon realised that there was a mysterious lack of clay along some sections of the offside bank. Mike Chapman pointed out that his maps, from about 1825 onwards, showed that a winding hole had been dug in the offside bank to allow boats from Withy Mills colliery to turn without having to go all the way to Paulton Basin and back. The winding hole had later been filled in, but the infill, which now formed the offside bank, was permeable soil and quite unsuitable for making puddling. We presumed that the banks at the back of the winding hole had originally been made watertight, so there was no need for the infill itself to be impermeable.



MAP OF S.C.C. FROM PAULTON BASIN TO WITHY MILLS COLLIERY WHARF (c.1880) SHOWING REMAINS OF WINDING HOLE

(Additional notes by Mike Chapman)

Work on the towpath embankment

Moving clay or other materials along the length of the canal is an expensive and time-consuming process, so even if we had found sufficient suitable clay elsewhere, we would have been reluctant to transport it to where it was needed. The only clay deposits adjacent to the slumped towpath were in the canal bed itself, so we reluctantly decided that the canal would have to be 'mined' in order to build up the towpath embankment. This ran the risk of breaking through the puddling clay at the bed of the canal, so we first had to find out how deep the puddling was by digging a number of trial pits. Our trial pits showed that the clay went down several feet below the bottom of the canal bed and possibly much further - as it was highly likely that it was nothing more than the original subsoil of the area. They also showed that much of the clay was now dry and crumbly, rather than well-puddled, which would account for why we had found such large areas of leakage.



THE DIGGER BEGINS WORK ON THE TOWPATH WEST OF WITHY MILLS

As the clay was mined from the canal bed, it had to be mixed with water to a Plasticene consistency, then piled on top of the existing embankment top and smeared into the final profile. This smearing action bonded it into the existing puddle and removed any possible lines of leakage through the boundary between the old and new puddle. It also worked up a new surface on the old puddle, to cover any cracks or fissures caused by previous dry conditions and to fill in any holes left by the roots of plants which we had removed during earlier work parties. This was slow and highly skilled work, the digger drivers having to follow the slope of the original profile and use the back of the bucket as a trowel to smear the puddle into place. After completing a short section of canal immediately adjacent to Withy Mills stop point we had gained a much clearer idea of the work involved and the likely speed of progress; we had also created a demonstration profile which would act as a guide for the digger drivers as they worked on the rest of the section. It was decided to leave completion of the towpath embankment until later and dig out the canal to its correct profile.

Work resumes

No progress could be made at all during the Winter because there were never enough consecutive rain-free days to allow the land to begin to dry out. The regular S.C.C.S. work parties confined themselves to hedge-laying and made a big improvement to the condition of the towpath hedge. With the crop-planting deadline fixed at the end of April, we watched with increasing anxiety through February and March as the rain continued to pour down and the ground squelched underfoot. Just as it seemed as though disaster was inevitable, in the first week of April the rain stopped and the land began to dry out. The digger resumed work with a sense of urgency, tidying up the site, removing the deep chasms its tracks had cut in the soft mud embankment the previous Autumn and reinstating and levelling the topsoil of the crop field.



Above: DIGGING EARLY IN THE MORNING...

Right: ...AND LATE INTO THE EVENING



Just before the deadline, we handed the crop field back to the landowner with a sigh of relief; within a few days, he was able to manure it and prepare it for sowing. The new crop of forage maize was planted on time and we cautiously monitored its progress throughout the Summer, to check that the plants on 'our' bit of the field were growing as vigorously as the rest — they were!

The remaining section and puddling

Work then began on the remaining section from the crop field boundary to Terminus Bridge. The eastern end of this section was boggy, and work was constantly interrupted by missions to rescue frogs from a colony that had taken advantage of this exceptionally wet patch. As the cut neared Terminus Bridge, the infilled material changed in both quantity and quality. Blocks of stone, chunks of coal and various iron items came to light, along with the ubiquitous oyster shells that occur along the entire length of the canal. This raises an interesting question of food hygiene: having bought oysters from vendors in Bath or Bristol, did the boatmen keep them alive in a bucket of salt water until needed, or had they been dead for many hours, or even days, when they were eventually eaten at the canal terminus?

The cut had been heavily infilled near Terminus Bridge and the volume of material that needed moving was far more than we had estimated. Also, a huge spoil heap on the West side of Terminus Bridge had to be moved eastwards and spread across the field to raise its level. The digger drivers worked on late into the night by the light of headlamps to get the job finished so that the landowner could fence the field in time to use it for Summer grazing.

→

The digger had to cut grooves for the dumper to run in, to prevent it from sliding sideways into the canal. Eventually the conditions deteriorated so badly that it wasn't safe to use the dumper at all, so it was returned to the hirers. Perversely, the newly-dug section of canal began to fill with water, which hampered the digger movement; so a channel had to be dug from the crop field section to the drain at Terminus Bridge in order to prevent the cut from filling up prematurely.



A DRAINAGE CHANNEL CUT BY THE DIGGER

abandon the work altogether. The landowner was very understanding and said that he would prefer us to give up the struggle, as we would probably do more harm than good to the soil by churning it up.

The digger soldiered on and managed to dig out the entire length of the crop field embankment and reinstate about half the topsoil. We were very much aware that we had to complete the reinstatement in order to fulfil our part of the bargain with the landowner; but our rate of progress slowed right down as the digger was constantly hampered by the depth of mud, often getting bogged down to the top of its tracks, so we were eventually forced to



TIME TO GIVE UP — THE DIGGER COMPLETELY BOGGED DOWN IN MUD

Surprise discoveries

It was whilst clearing the towpath embankment that the skill of our digger driver first began to pay dividends. Rather than just digging to a given profile, the driver was able to 'feel' his way along the boundary between the puddle and later accumulations of soil, thus revealing the original profile of the canal. This meant that we wasted no puddling clay by accidentally digging it out, but removed all the unwanted material without leaving any behind. In addition, we began to make interesting discoveries. After hitting a few stones, it became apparent that there was a very crude stone wall running along the length of the embankment, backed by very soft yellow and grey puddling clay, quite unlike the reddish clay of the canal bed. Gordon Taylor, one of our members who volunteered as a dumper truck driver, did some research on this. He discovered a publication in 1885 which showed a vertical clay 'membrane' supported by stone walling as the current form of construction for canal embankments, but previous to that date it only appeared to be used for reservoir dams. This suggested that either the S.C.C. was well ahead of its time when that section was built, or that this section had needed rebuilding some time after the clay membrane principle became common practice.

In several places, the towpath embankment appeared to have a double slope, shallower at the top and steeper at the bottom. No explanation for this has been found in the literature, but it is possible that the shallower slope was tipped material which was not as compact as the untouched ground beneath it and had a greater tendency to slip if piled too steeply. The cross-section on p. 8 shows that the boundary between the original and the tipped material would be part way down the towpath embankment. →



THE TOWPATH EMBANKMENT

Showing (left to right) the double slope, the rough stone wall and the newly-raised towpath.

In the course of the digging, a wooden structure came to light at the foot of the embankment. It appeared to comprise two baulks of timber about 18” apart, they were about 2” wide and 18” deep and set at right angles to the embankment, with a short length projecting into the canal bed and an unknown length buried under the embankment. The tops of these two timbers had been joined by smaller planks nailed onto them. The space between them was plugged with a different type of clay from the surrounding pudding. We speculated that these could have formed a temporary drainage channel for use during repairs on that section, which was later blocked with clay when it was no longer needed. However, there is no sign of any sort of channel or culvert in the outer embankment wall, or in the meadow below.



Above: MIKE CHAPMAN INVESTIGATING THE ROUGH STONE WALL WITH THE UNIDENTIFIED WOODEN OBJECT PROTRUDING FROM IT IN THE FOREGROUND
(Some of the stones have been removed from the wall to investigate how far the object extends back under the embankment.)



Left: A CLOSER VIEW OF THE OBJECT WITH AN ARCHÆOLOGIST'S TROWEL FOR SCALE
(Note the darker colour of the filling material.)

Heavy work on the crop field embankment

With the towpath embankment cleared, we turned our attention to the canal bed and the offside bank. A lot of topsoil and new growth had accumulated in the canal over the years, which meant that we had to find somewhere to put many hundreds of tonnes of unwanted ‘arisings’ (the technical term for any material dug out). The edge of the crop field nearest the canal formed a gradually-increasing



A VIEW OF THE DIGGER FROM THE SEAT OF THE DUMPER — The digger is lifting spoil up the embankment and the topsoil is piled to the left of the picture

slope due to slippage and erosion over the years; to make it more suitable for modern farm machinery, the landowner would have preferred a higher, flatter profile, with a distinct edge where the field met the canal. That shape also suited us, as our arisings could be disposed of with minimum effort (and no transport or environmental costs) by using them to build up the edge of the field. Before that could be done, however, the topsoil of the field had to be pulled back and stockpiled for later; we weren't sure of the agricultural qualities of the arisings, so at the end of the job we needed to cover them back over with the good-quality topsoil, rather than risk leaving a barren strip between the field and the canal.

By the time this work began in the second week of December, the weather had turned distinctly cold. The digger had a heated cab, but the driver of the dumper truck was exposed, at a height of 6ft above ground level, to the steady icy wind which



Above: THE DIGGER UNLEASHES A WATERFALL AFTER HEAVY OVERNIGHT RAIN



Left: EARLY MORNING ICE ON THE SEAT OF THE DUMPER

seemed to constantly blow along the valley. Rain then began to fall, making the clayey soil muddy and slippery. The work to clear the offside bank gradually became slower and more laborious as the ground conditions deteriorated. On one occasion there was so much overnight rain that a lake appeared behind the line of stockpiled arisings, so the following morning the digger had to cut a gap through the pile, in order to drain it.

