



Infrastructure News

2019 Winter Track Replacement

This winter's track renewal consisted of two separate sections, 13 sixty foot panels north of Caseford Bridge and 44½ panels, or half a mile between Sloop Bridge and Monteswood Lane Bridge. The latter links two sections of line already renewed. Now that it has been completed, there is 1½ miles of continuous new rail from the distant signal half way up Freshfield Bank through to the nine-mile post north of Tremains crossing. After that there is still a quarter mile or so gap to the next renewed section starting at "river slip". It could be another two years or more before this is replaced as it is less urgent than some other parts of the railway.

From river slip there is now almost ¾ mile of new rail up to half way between Caseford Bridge and Three Arch Bridge. Added to the small amount replaced when Poleay was repaired that makes a total of 2½ miles of track renewed between Sheffield Park and Horsted Keynes.

The main part of the relay started Thursday afternoon, 3rd January, at the top of Freshfield Bank and connected onto the track relayed in 2011. It passed over Sloop Bridge and finished where it connected onto where last year's winter relay started at the recently repaired Monteswood Lane Bridge.



The first panel to be changed, 50 yards before Sloop Bridge.



The last panel at Monteswood Lane Bridge connected to last year's replacement.

All the old rail panels were bullhead 60' long 95 pound rails and a few 45' 96 pound Brighton rails at the top of Freshfield bank. These were too long to be lifted in one go without hiring in bigger machinery and more operators. Therefore these were all cut in half, not with the rail-saw cutting disk as has been used before, but with a gas torch instead. This was much quicker and probably cheaper considering the number of cutting disks that would have been used. In addition, all the rail was being scrapped as it was badly worn, so neatly cut ends were not required.



Gas cutting the rails



Lifting out the half panels

These half panels were lifted and put to one side or loaded six at a time onto the road railer trailer ready to be brought back to Horsted Keynes so that they could be broken down later on in spare moments or possibly by the Sunday or Thursday gangs.

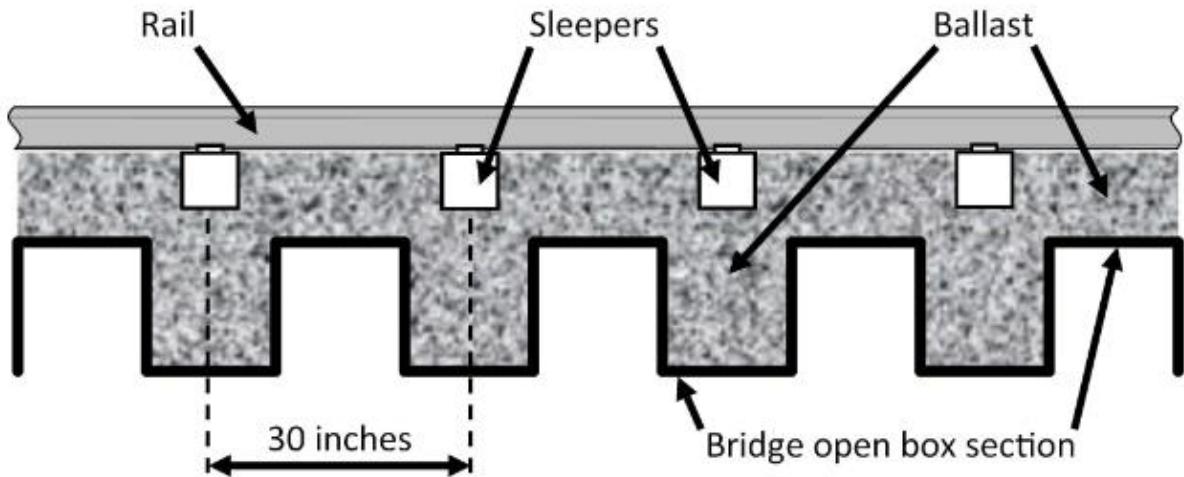
The laser was then setup firstly level for the few panels over the bridge and then tilted to match the gradient of the line from one bridge to the other. A few adjustments were made to match the required height over the bridge or to correct the ballast depth.

The laser controlled bulldozer then dozed the ballast to the correct gradient but with no cant. The cant, or tilt, through this section was set for a 45 mph line speed before Bluebell owned the line and is too much for our line speed. One of the several reasons for the relay is to get rid of the cant and only put back a small one with the tamper later on.

The first two panels to go back required a plastic and terram membrane under them as clay had pumped up between the sleepers which destabilises the track. The track bed was bulldozed slightly deeper for this to be put in and the cleanest ballast put back on top and then re-dozed to the correct laser controlled depth and level. The section was then whacked down and smoothed out with a three ton vibrating triple Wacker (trade name) to leave a very good even surface on which to lay the sleepers.

The old bullhead track had 24 wooden sleepers slightly irregularly spaced per 60' panel. The replacement flat bottom track has 28 evenly spaced good condition second hand concrete sleepers which provide a much more stable track and more even pressure on the track bed. The section over Sloop Bridge however had to match the spacing of the bridge metalwork sections and so stayed at the old 2'6" (762mm) spacing with a bit of adjusting at the ends to match up with the rest of the track at 653mm spacing.

Note: - Waterworks Bridge is the same construction but Monteswood Lane Bridge is a brick arch design and so does not have the same sleeper spacing restriction.



Part section through Sloop Bridge

The first three panels were laid by the end of the Friday of the first week which was very pleasing considering that the first rail removal was only started the previous afternoon. These were clipped up by the 9F club on the Saturday with the Sunday gang taking out three of the four bolts from each fish plate ready for the next few panels to be removed.



End of Thursday afternoon. Rails out and terram down after only half a day.



Progress at the end of the following Tuesday with Sloop bridge in the distance.

Before any sleepers could be laid, their correct position had to be defined. White posts were hammered into the ground with a nail in them exactly 2, 2.5 or 3 metres from the running face of the old track before the replacement started. This gave a reference point every 5 metres. After the track bed had been whacked down smooth, a piece of painted ballast was then placed on the track bed adjacent to each post but measured to where the sleeper end would be. A long string line then laid down by eye using the painted ballast markers as reference points. This gave us the opportunity to allow for any posts that has been knocked when bulldozing and smooth out any irregularities in the previous track layout and even modify curvature radii a little for a better overall line. This included providing a slightly greater clearance to the long-demolished Town House Farm occupation

bridge (wrongly called the blow-up bridge by some). With the ends of the string held down under tension by either a heavy weight or someone's foot the line is then over sprayed with surveyor's line marker. This procedure was carried out in sections over the whole length of the relay.

Before the relay started, sleepers were placed in piles of 8 or 16 at precise intervals so that they would be in easy reach of the digger jib when lifting them into their final position. This saved a lot of time tracking up and down the track bed by the digger, as has happened on previous relays, and also reduces the chance of breaking up the smooth surface. The sleepers were lifted into place, with one end on the marked line, in groups of four with a lifting bar on the track laying digger and using a pair of accurately cut wooden guides placed over their ends to set the correct spacing between them (653.27mm!). We have two pairs of these, painted red and yellow, for the two different types of sleeper we had.



Marking the line slightly further from the bridge wall blending back onto the original course.



Bruce Healey's photo from the 2018 winter relay showing sleeper placement.

The line and these wooden formers place the sleepers so well that the rails could be dropped in straight away without spending a lot of time and effort with iron bars heaving the sleepers around to get the rail to fit which is what used to be done. As can be seen in Bruce Healey's photo, all the "eyes" of the fixing points on the sleepers are exactly in line - with the exception of the group nearest the camera, enabling a very quick placement of the rails. Prior to the job starting all the rails on the outside of the curve were marked up with the exact sleeper positions to within a millimetre or two so that after the rails were lifted in by the road railer the sleeper positions could be checked instantly with only the occasional adjustment required. The precise position to the millimetre is not critical but the even spacing evens out the pressure of the track bed, makes the tamping much easier at a later stage and ensures that the rail joints sit in the middle of two sleepers so that the clips do not interfere with the fish plates.

The pair of rails were then lowered into position by the road railer and pressed down if necessary by the jib. They were then slid back against the previous rails with a spacer between them to provide the correct gap, typically 5mm or a little more on very cold days. The spacer can be any piece of metal of suitable thickness such as a small gemmy bar, a shovel or a tool we found which no one has worked out what it was really meant for but looks like a short roofing slate ripper!

The rail ends were predrilled where possible, both rails at the south end as we were laying south to north and the north end of the rail on the outside of the curve. The inside rail was not drilled as every second or third rail on the inside of a curve has to be cut slightly shorter. Typically one to two inches per rail to keep the rail joints exactly in line but by cutting an extra inch off when one has to be shortened then the next rail avoids having to be cut.



Sleepers aligned ready for the rail.
Photo: Bruce Healey.



Less than 30 feet to go. Sleeper position marks can be seen on the rail head.

After the rails were lowered into place, they were trimmed to length if required, any remaining holes drilled and the fishplates were fitted and tightened. Initially, to speed up the relay process, only every 6th sleeper was clipped so as to allow the road railer over to get to the next panel. These were fully clipped later on up by small group of Network Rail workers on two of their annual volunteer days and by the main team when time and manpower allowed.

By the Friday 18th all 44 panels were laid. There was less than 30 feet to go to connect the newly relayed track to the track that was re-laid a year ago at Monteswood Bridge. The sun was getting too low in the sky to get the last pair of rails in before the weekend. This last pair of rails always takes a little extra time and fiddle to get right as precise measurements and cutting of these closure rails is required. In addition, there is always a bit of extra fiddling with the ballast as the last few feet can't be bulldozed and whacked like the rest due to space restrictions. However at this point the clear up of the main relay had started with some of the plant already transported back to Horsted or to the site of the second, smaller relay.

With the closure rails in place and a visual check along the whole length of the job, a total of approximately 900 tons of ballast was dropped from the ballast wagons, and ploughed with a plough bucket on the road railer jib, ready for tamping. This plough is a very wide digger bucket with a pair of small wheels set into its edge that run along the rails.

The ballast, which was stored at West Hoathly, was loaded into the hopper wagons by our own "Bob the Builder" and was pulled by the diesel. With one or two people on each wagon to operate the doors via hand wheels at the end, Matt Crawford walked along the side shouting up instructions as to how much to drop and when. It is not possible to see from the wagons just how much and what rate the ballast is falling out of the hoppers so it has to be directed from beside the wagons while on the move.

Ballast can be dropped from either the centre door on the hopper or from one of the side doors. The majority is dropped between the rails as the plough will push the excess over to the sides. The side doors are normally only used to build up the ballast on the shoulders after tamping has taken place. Great care has to be taken not to let too much out at once. The side shoots will throw the ballast out too far from the track if the door is opened too wide.

The side doors can be closed, if they don't jam, to regulate the flow to a trickle which will drop onto the ends of the sleepers. The centre door however cannot. Once opened, it cannot be closed, even slightly. If opened too wide, it will put a big load between the rails which will flow over them and potentially derail the following wagons. This can also happen if the engine driver slows down too much and so the driver has to be one who is aware of how the ballast drop works.

If the train stops for any reason with the centre door open, then the whole of the hopper contents, up to 20 tones, will end up in one heap under the wagon and it has to be dug out by hand before the train can be moved. This has happened once in the past but not on any of the relays in recent years.

The plough can follow the hopper wagons immediately. Any overloaded or sparse areas can be corrected by the plough at this point by picking up the excess in the plough bucket and lifting it to where it is required.



Matt Crawford walking alongside the moving ballast wagons immediately followed by the plough driven by L&W expert driver, Darren. Photos from 2018 relay.

Following the completion of the track replacement and 660 of the 900 tons of ballast dropped in place, we were fortunate to have the use of a big main line tamper. Balfour Beatty occasionally carries out operator training at the Bluebell, and in return we get some tamping done for free; a good arrangement for both parties.

The tamper has on board computers which calculates the best position for the rails, both vertically and laterally at every point. It passes through the whole stretch to be tamped a couple of times to measure the existing positions of the rails in order to make those calculations. It then lifts, pushes sideways, cants and tamps them accordingly.



Balfour Beatty main line tamper with trainees on board on its way to Sloop Bridge.



Part 2 ready to start at Caseford Bridge adding 13 panels to last year's snow covered relay.

The second smaller relay north of Caseford Bridge started immediately, before the tamping of the first section was complete. It had also been pegged out and had materials positioned before the first relay was complete and so was effectively treated as a continuation.

Exactly the same procedure was used of lifting, dozing, marking out and placement of sleepers and rails as in the first part of the relay. This procedure is likely to be followed closely on all future relay projects as it produces very good results in very quick time.

The job started on the Monday morning and was reconnected by Wednesday which must be some sort of record for Bluebell seeing that there were some other distractions on the Tuesday. By Wednesday evening the team were so focused that "going home time" was forgotten as everyone wanted to get the line closed before we went home. Bruce Healey's picture shows the laser bulldozer and the Wackers on the smooth track bed early on the Wednesday morning with sleepers and rail stacked at the side ready. By the evening this was fully tracked and clipped up and the link-up complete. The picture of Andy Palmer cutting the final rail to length appears more dramatic than usual due to the sparks appearing brighter in the failing light.



8:38 Wednesday morning.



Wednesday evening. Final cutting in of the closure rails as it gets dark.

This section was ballasted ploughed and tamped by the end of the following day. A few snags were left to do on both parts of the relay such as quite a lot of clips had been knocked out by the ballast plough or sleepers moved out of position by the tamper but these were all completed and the possession handed back to the operating department on the following Friday.

Total amount of new track laid between Sheffield Park and Horsted Keynes: -

Year	No of panels	Where	Yards
2011	13	Top of Freshfield Bank	260
2014	22	Freshfield Bank	440
2015	11	River slip	220
2015	3	Freshfield Bank	60
2017	29	Holywell / Waterworks	580
2017	10	Overnight on Freshfield Bank	200
2017	6	Poley Bridge /points at north end of SP	120
2018	11	Keysford Lane / Caseford Bridge	220
2018	55	Rock Cutting / Tremains	1100
2019	44.5	Monteswood Lane to Sloop Bridge	890
2019	13	North of Caseford Bridge	260
Total	217.5		4350
		Total Miles Re-laid	2.47

For this winter's relays so far, to lay this amount of track, the following was required: -

116	FB rail lengths
1612	Concrete sleepers
12	Wooden sleepers on bridge
24	FB rail chairs for wood sleepers
3224	Rubber pads
6448	Insulators
6496	Clips
118	Pairs of fishplates
472	Bolt/washer/nut sets.
1000	Tons Ballast

Additional trackwork in the last three years include replacing Leamland points and the track from Leamland Bridge almost up to the Horsted up second advanced starter, and lowering and replacing roads 2 and 3 in Horsted station. Also replacing the deck on Poley Bridge together with 3 new flat bottom panels and one re-laid bullhead panel. This is apart from building a large portion of all the points and trackwork for OP4.

This winter's relay takes us well past the half way mark for renewing all the track between Sheffield Park and Horsted Keynes. There is approximately two miles left to do in total. If there is enough money available, which is always a big issue, the whole stretch could be finished within the next three years. This relay was done inside budget. The half mile was laid in approximately 80 hours with an average of 8-9 people each day with two diggers and a bulldozer. Take note Network rail!