

Guidance Document

G1113

Track Survey Brief

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1 Purpose

The purpose of this Guidance is to conduct a Track Survey Brief. To survey and provide adequate information with specific accuracy of existing vertical and horizontal track alignment together with all track features such as blockjoints, signals, trainstop mechanisms, adjustment/expansion switches, relay boxes, train detectors, bridges, cable gantries, cable runs, platforms and conductor rails including ramps, anchors sites and out of gauge conductor rails. Surveyor also to provide other information which is not listed in this brief, which could be relevant to track design. It is strongly advised to follow F0223 Checklists for Running Rail Survey & Design and F0226 for Track Survey work (general) respectively.

2 Scope

This Guidance applies to London Underground (excluding Tube Lines). However, the brief does NOT include Running Rail or Conductor Rail Survey.

3 TRACK ON OPEN SECTION

3.1 SURVEY OF PLAIN TRACK

Levels should be taken on both running rails. Levels should also to be taken on top of platform, where exists, at every survey station and at TOR (or end of platform, where no ramp exists) at both ends of platform. Platform offset (RE to nosing face) to be measured at every survey station and at TORs. Surveys to conform to the requirements listed below and should meet any special requirements set by Clients. No survey should finish in the middle of a transition curve.

Note: Total Station survey method can also be adopted to pick up all track features.

3.1.1 BTR SITE (WHERE NO PLATFORM EXISTS)

Survey should be by Total Station and running edge of the rail nearest to the cess to be picked up throughout the site along with all relevant track features listed under 'General Requirements'.

3.1.2 RESLEEPER / REBALLAST & BTR SITE (WHERE PLATFORM EXISTS)

(When Total Station survey method is not considered)

Note: Total Station survey method can be used when conventional survey is not adopted.

3.1.2.1 Curved Track and Straight (length $\leq$ 50m)

Should be surveyed by measuring versines on equal chords using survey stations as described below. Versine survey information must be submitted in appropriate field book/sheet, labelled and numbered correctly and survey to be identified by the following:

Line, location, road, kilometreage. Survey details must be recorded in survey book/sheet(s) as stated below and exemplified in **Attachment 1.1** and book/sheet(s) to be submitted to designer.

Survey stations are to be numbered in direction of running (any direction where traffic runs both ways) and listed in the middle column of survey book/sheet(s). All site information is to be recorded in relation to survey stations.

Versines to be measured on the high rail on curved track and recorded on the appropriate side (LH or RH in direction of numbering) of the middle column of survey book/sheet(s).

Actual readings must be recorded if versines are measured on backs of "Littleboys" (where versines are too small to read accurately) and also thickness of Littleboy to be noted in survey book/sheet(s).

When adjustment switches interfere with measurement, versines are to be taken on the opposite rail away from switch planing and stock rail bend or on full rail section on the same rail within 500mm of the survey station.

A symbol such as should be drawn in the middle column of survey book/sheet(s) (where station numbers are recorded) to indicate LH or RH curve.

3.1.2.2 Straight Track (length > 50m)

Survey to be carried out by theodolite (if Total Station survey method is not adopted) and dimension from theo line to RE at each survey station to be recorded. Theo line dimensions to be taken on the same rail where survey stations are marked (as stated below) and recorded in survey book/sheet(s) with a sketch to show where theo line readings are taken (**shown in Attachment 1.2**).

If a site consists of straight and curved track, theo line must be extended from straight into curve by minimum three survey stations overlapping by measuring versines

If a site consists of reverse curves with straight at the middle, theo line must be extended by min. three survey stations into each curve.

If a site is too long to cover by one theo line, combination of theo lines can be set up and each line must overlap the other by minimum 30m.

3.1.3 LONGITUDINAL TIMBERS

Survey shall be by the same method as on BTR sites and to be extended by minimum 30m on both ends of the site. All relevant track features are required as listed under "General Requirements". Additionally track gauge, timber sizes, packing retainers & retaining brackets, con. rail pots & stools, tie rods, transoms and cross girders shall be surveyed and detail to be submitted. Widths of cross girders are also required.

Width of wedges between timbers and retaining brackets, if exist, shall be recorded. If any timber is cut to fit on retaining brackets, the amount of cut also to be noted.

Outline view in sketch form (**shown in Attachment 1.3**) showing existing timbers, cross girders, cleats, tie rods, transoms, walkway board, conductor rail pots & stools

and also main girders, plinths and other relevant surrounding features with their dimensions in relation to survey stations shall be submitted.

Levels shall be taken on both rails, on top of timbers and also on the plates on cross girders where timbers are rested over packings.

Rail depths shall be measured for area over longitudinal timbers at 10m intervals and existing chair/baseplate positions to be noted. Rail depths to be measured at 15m intervals outside timbers.

All survey information shall be related to survey stations, ballast retaining wall and bridge girders. Position of minimum 3 sleepers and conductor rail pots outside timbers on both ends together with detail of ballast retainers shall be surveyed.

3.1.4 RENEWAL OF PIT ROAD / WASH ROAD

Survey should be by Total Station or by theodolite (if on straight track). Survey station intervals shall be as per "General Requirements". All other relevant features also to be recorded as listed under General Requirements. Additionally track gauge to be measured at each survey station if running edges of both rails are not surveyed.

Rail depths and packings (if any) under chairs /baseplates also to be noted. Rail type and location of rail joints should be recorded up to 36m outside the site.

Cross section of existing pit / wash road to be drawn in sketch with all relevant dimensions to show in detail of formation and fixings.

Conductor rail information including ramps, anchors etc. to be surveyed outside the site up to the next conductor rail gap.

3.2 SURVEY OF JUNCTION WORK

- 3.2.1** Survey shall be by Total Station and readings to be taken on all running rails at each survey stations and also at the following locations such as all running rail joints, (including blockjoints), toes, nose etc. Bonded out blockjoints also should be identified.
- 3.2.2** Survey stations should be at 2.5m intervals through main and also through turnout road within the junction work and 5m intervals outside the junction work (beginning of front of toes and up to the first joint after the last through timber). If checked curve exists outside junction work the 2.5m intervals to be continued throughout the site.
- 3.2.3** Survey shall be extended for a minimum of 40m past toes and point and splice rails at nose. If any blockjoint exists at the last joint, the survey should be extended to cover the rail length past this blockjoint.
- 3.2.4** Readings at RE must be taken accurately, especially at toes and switch rails. If correct RE at nose position could not be established, reading at the centre line of nose shall be taken and half the width of nose to be added to establish RE.
- 3.2.5** Rail distance between toes and nose along the main route (lead length), point and splice rails (distance from nose), fronts dimension of toes and crossing nose, position and lengths of through timbers measured along the outside running rails should be noted.
- 3.2.6** **Rail depths** are to be measured at every 15m and also at locations immediately outside rail joints of the fronts of toes and point and splice rails and immediately

outside rail joint of last closure rail at each end of renewal site. (Reconfirmed on item 3.3.19 in "General Requirements").

- 3.2.7** The position of the following track features must be surveyed by Total Station and their lengths also to be identified: timbers, slipper runs, locked wheel ramps, point insulation, signals, trainstop mechanism. Type of rails also should be noted.
- 3.2.8** All other relevant items for junction work listed under "General Requirements" must be recorded.
- 3.2.9** Conductor rail information including splays is required as stated in section 3.3.21 under "General Requirements". Dimensions to ramp ends to toes and nose also to be recorded.
- 3.2.10** Extent of check rails with their joints to be identified if it continues past the junction work.

3.3 GENERAL REQUIREMENTS

- 3.3.1** Location of site in relation to site kilometreage or platform TOR (or end of platform, where no ramp exists) must be correctly identified as per Design Brief / Workslope. If no Budget Plate or other identification exists on site extent of work site must be identified by measuring distance from the nearest Kilometre Post or TOR (or end of platform, where no ramp exists). If Kilometre Post or TOR (or end of platform, where no ramp exists) cannot be accessed site should be related to nearest BRS Distance Plate fixed on ground identifying distance from platform TOR (or end of platform, where no ramp exists) in direction of running.

- 3.3.2** Survey stations should be numbered from one (not from zero) and must be numbered in direction of running at equal distance accurately as follows:

Open & Sub-surface:

radius = or > 500m @ 10m intervals

radius < 500m > 200m @ 5m intervals (except where check rails)

radius = or < 200m @ 2.5m intervals (i.e. track with check rails)

Tube Section:

radius > 200m @ 5m intervals

radius < 200m @ 2.5m intervals

Station Grounds

If site runs through station ground survey stations to be as follows:

radius > 200m @ 5m intervals

radius = or < 200m @ 2.5m intervals

(the extent of platform to be identified)

If any site has compound curves or mixture of straight and curves, survey stations intervals to be as per smallest intervals. Survey stations to be numbered in sequence, using numbers only.