

Specification for

Railway turnouts for private users —

**Part 3: Medium grade turnouts over
which British Railways locomotives do
not operate, for axle loads not
exceeding 25 tons —**

**Section 3.2: Turnouts using flat bottom
rails**

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Foreword

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee. It is one of a series of specifications of which the full list is as follows:

BS 4521, *Railway turnouts for private users.*

BS 4521-1, *Turnouts over which British Railways locomotives operate.*

BS 4521-1.1, *Turnouts using bull head rails.*

BS 4521-1.2, *Turnouts using flat bottom rails.*

BS 4521-2, *Light grade turnouts over which British Railways locomotives do not operate, for axle loads not exceeding 10 tons, using flat bottom rails.*

BS 4521-3, *Medium grade turnouts over which British Railways locomotives do not operate, for axle loads not exceeding 25 tons.*

BS 4521-3.1, *Turnouts using bull head rails.*

BS 4521-3.2, *Turnouts using flat bottom rails.*

BS 4521-4, *Heavy grade turnouts over which British Railways locomotives do not operate, for axle loads which may exceed 25 tons, using flat bottom rails.*

This Section of this standard relates exclusively to turnouts constructed from new rails complying with the requirements of Section 110A or Section 113A of BS 11 “*Flat bottom railway rails*”. It is recognized that second quality and partly worn rails are used for the manufacture of turnouts, but their use is subject to agreement between the purchaser and the supplier. The recommended minimum acceptance requirements for partly worn rails are given in Appendix A.

Turnouts from curved track have been omitted from this standard as they would complicate the tables and diagrams, but when they are used the minimum radius should be maintained, although the crossing angles obtained may be outside the range shown.

Special requirements such as insulation for track-circuiting have not been included.

Nomenclature is given in Table 1 with cross references to layout and component diagrams for identification of parts for standard turnouts.

Materials and dimensions are specified.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 36, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Section 3.2 of this British Standard specifies requirements for medium grade turnouts over which British Railways locomotives do not operate, for axle loads not exceeding 25 tons, from straight track 4 ft 8½ in gauge manufactured from new flat bottom rails as specified in BS 11, Section 110A or Section 113A.

The angles of crossing are 1 in 4½, 1 in 5, 1 in 5½, 1 in 6, 1 in 6½, 1 in 7, 1 in 7½ and 1 in 8.

NOTE The titles of the British Standards referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Section of this British Standard, the following definitions apply.

railway turnout

a complete unit consisting of curved track diverging from straight track as illustrated in the layout diagrams of this standard

hand of turnout

the direction in which the curved track leaves the straight track

3 Inspection

The purchaser or his representative shall have access at all reasonable times to those parts of the works engaged on the contract or order. He shall be at liberty to witness the manufacture at any stage.

4 Identification marking

Each complete turnout shall be marked by stamping with 1 in high letters and figures on the web of the wing rails at the check ends with the number of this British Standard followed by a stroke and a number indicating the Section of this standard, i.e. BS 4521-3.2.

When rail components are supplied separately they shall be stamped on the end of the rail with the number of this Section of this British Standard and the item number as shown in the nomenclature tables.

All castings shall be marked with identification letters and rail section and, where possible, the manufacturer's initials and the month and year of manufacture.

Baseplates shall be marked with identification numbers.

5 General requirements

The design of medium grade turnouts is based on the centre line radius. The minimum radius shall be 190 ft 8¼ in measured to the centre line of track.

The switches shall be straight cut with joggled stock rails and operated by a spring type lever box. They shall be either heel or spring type as specified by the purchaser.

The shaping of the rails shall be carried out by machining, sawing and pressing. The holes shall be drilled.

The turnouts shall be supported on timbers of cross section 12 in and 6 in. As an acceptable alternative to timbers rolled steel supports may be used, subject to agreement between the purchaser and the manufacturer. Layout drawings of turnouts on rolled steel supports are shown in Figure 2 and Figure 4.

Bolts shall be threaded B.S.F. (complying with BS 84) free class, with nut threads normal class, except where otherwise stated.

Alternative rail fastenings to those specified in this Section of this standard may be used subject to agreement between the purchaser and the supplier.

6 Nomenclature

The nomenclature and numerical reference numbers for components are given in Table 1 which refers to item numbers shown in Figure 1 to Figure 28.

Component details are given in Figure 10 to Figure 28 as a further aid to identification.

7 Materials

Materials shall be in accordance with the requirements given in Table 2.

8 Dimensions

The leading dimensions shall be in accordance with Figure 1, Figure 2 and Figure 5 for heel switch turnouts, Figure 3, Figure 4, Figure 6 and Figure 7 for spring switch turnouts, and with the tables associated with these figures.

The rail shall comply with the requirements of BS 11, Section 110A or Section 113A. The fishplates shall comply with BS 47 and the fishbolts and nuts shall comply with BS 64.

NOTE All the figures are based on BS 11, Section 110A, rail. If the purchaser specifies Section 113A rail, the figures are valid except that the blocks of Figure 20 will have to be modified.

Appendix A Partly worn rail

Partly worn flat bottom rail used for the construction of turnouts should have a minimum depth, measured on the vertical axis, of $5\frac{15}{16}$ in, and should have a minimum mass as follows:

Section 110A rail: 100 lb/yd

Section 113A rail: 103 lb/yd

It should be free from excessive side wear, chair gall and corrosion.

As a guide to the purchaser, it is recommended that flat bottom rail should be renewed when the depth reaches $5\frac{5}{8}$ in. The precise figure will depend upon the following conditions:

condition of sleepers and timbers

spacing of sleepers and timbers

condition of ballast

presence of side cutting.

Table 1 — Nomenclature for components

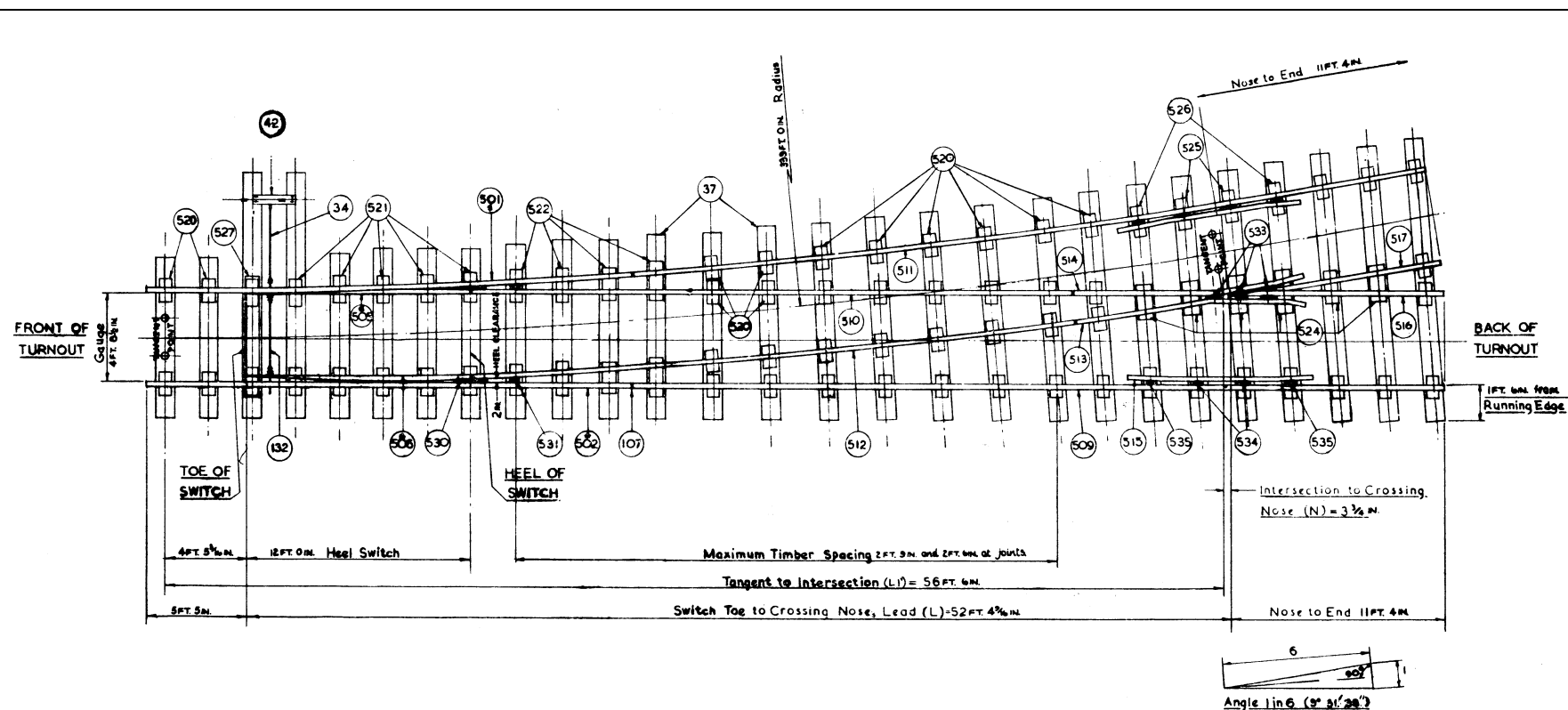
Item no.	Description	Figure no.	
		Heel switch turnouts	Spring switch turnouts
501	Stock rail, L.H. for L.H. turnout	1, 2, 8	3, 4, 9
502	Stock rail, R.H. for L.H. turnout	1, 2, 8	3, 4, 9
503	Stock rail, L.H. for R.H. turnout	1, 2, 8	3, 4, 9
504	Stock rail, R.H. for R.H. turnout	1, 2, 8	3, 4, 9
505	Switch tongue rail, L.H. for L.H. turnout	1, 2, 8	3, 4, 9
506	Switch tongue rail, R.H. for L.H. turnout	1, 2, 8	3, 4, 9
507	Switch tongue rail, L.H. for R.H. turnout	1, 2, 8	3, 4, 9
508	Switch tongue rail, R.H. for R.H. turnout	1, 2, 8	3, 4, 9
509	Straight running rail	1, 2, 14	3, 4, 14
510	Straight closure rail	1, 2, 8	3, 4, 9
511	Curved running rail	1, 2	3, 4
512	Curved closure rail	1, 2, 8	3, 4, 9
513	Wing rail, R.H.	1, 2, 14	3, 4, 14
514	Wing rail, L.H.	1, 2, 14	3, 4, 14
515	Check rail	1, 2, 14, 15, 17, 18	3, 4, 14, 15, 16, 18
516	Point rail	1, 2, 14	3, 4, 14
517	Splice rail	1, 2, 14	3, 4, 14
519	Ferrule	8, 20	—
520	Common baseplate	1, 8, 14, 23	3, 9, 14, 23
521	Switch baseplate	1, 8, 22	3, 9, 22
522	Back heel baseplate	1, 8, 23	23
523	Double bracket switch baseplate	—	3, 9, 22
524	Crossing baseplate	1, 14	3, 14
525	Check baseplate	1, 14, 23	3, 14, 23
526	End check baseplate	1, 14, 23	3, 14, 23
527	Switch soleplate	1, 8, 13	3, 9, 13
530	Switch heel block	1, 2, 8, 20	—
531	Back heel block	1, 2, 8, 20	—
532	Switch distance blocks	—	3, 4, 9
533	Crossing blocks	1, 2, 14, 20	3, 4, 14, 20
534	Check blocks	1.2.14.20	3, 4, 14, 20
535	End check block	1, 2, 14, 20	3, 4, 14, 20
107	Joint (fishplated)	1, 2, 21	3, 4, 21
116	Fishplate	21	21
182	Fishbolt, nut and washer	21	21
132	First stretcher bar	1, 2, 8, 13	3, 4, 9, 13
133	Second stretcher bar	1, 13	3, 4, 9, 13

Table 1 — Nomenclature for components

Item no.	Description	Figure no.	
		Heel switch turnouts	Spring switch turnouts
34	Connecting rod	1, 2, 8	3, 4, 9
42	Lever box (spring operated)	1, 2, 8	3, 4, 9
37	Timbers	1, 8, 14	3, 9, 14
38	Coach screw or fang bolt	8, 14, 24	9, 14, 24
540	Rail spike	8, 14, 24	9, 14, 24
541	M.O.W. clip	8, 14, 24	9, 14, 24
545	Rolled steel supports	2,	4
547	Switch and crossing bolts	8, 14, 19	
172	Universal washers	25	9, 14, 19
73	Spring washers	25	25
174	Stock rail washer	25	25
550	9 ft heel switches	10	25
551	Crossing 1 in 4½ for heel switch turnouts	15	—
552	Crossing 1 in 5 for heel switch turnouts	15	—
553	Crossing 1 in 5½ for heel and spring switch turnouts	15	—
554	12 ft heel switches	11	15
555	Crossing 1 in 6 for heel and spring switch turnouts	15	—
556	Crossing 1 in 6½ for heel and spring switch turnouts	17	17
557	Crossing 1 in 7 for heel and spring switch turnouts	18	18
558	Crossing 1 in 7½ for heels and spring switch turnouts	18	18
559	Crossing 1 in 8 for heel and spring switch turnouts	18	18
560	22 ft 6 in spring switches	—	12
561	Crossing 1 in 4½ for spring switch turnouts	—	16
562	Crossing 1 in 5 for spring switch turnouts	—	16
563	Steel sleeper	2	4
564	Switch baseplate for turnout on steel supports	2	4
565	Switch double bracket baseplate for turnout on steel supports	2	4

Table 2 — Materials for components

Part	Material
Rails	BS 11
Stretcher bars	BS 24-3A, Grade 8
Stretcher bar brackets	BS 24-6, Grade 621
Connecting rod (adjustable)	BS 24-6, Grade 621
Baseplate	BS 24-6, Grade 621
Rolled Steel Supports	BS 500
Coach screws	BS 970-1, steel 080M40, galvanized to BS 729-1
Ferrules	Low carbon steel
Fang bolts and shoes	BS 64
Fishbolts and nuts	BS 64
Switch, crossing and check bolts and nuts	BS 64
Spring washers	BS 1802
Fishplates	BS 47, Class B
Auxiliary and stock rail washers	BS 24-6, Grade 621
Crossing switch and check blocks and main washers	BS 1452, Grade 12
M.O.W. clip	Low carbon steel
Rail spike	Low carbon steel
Resilient rail spike	BS 970-5, steel 250A61
Timbers	Douglas fir or of similar quality, pressure creosoted to BS 913 where possible
Steel sleeper	BS 500

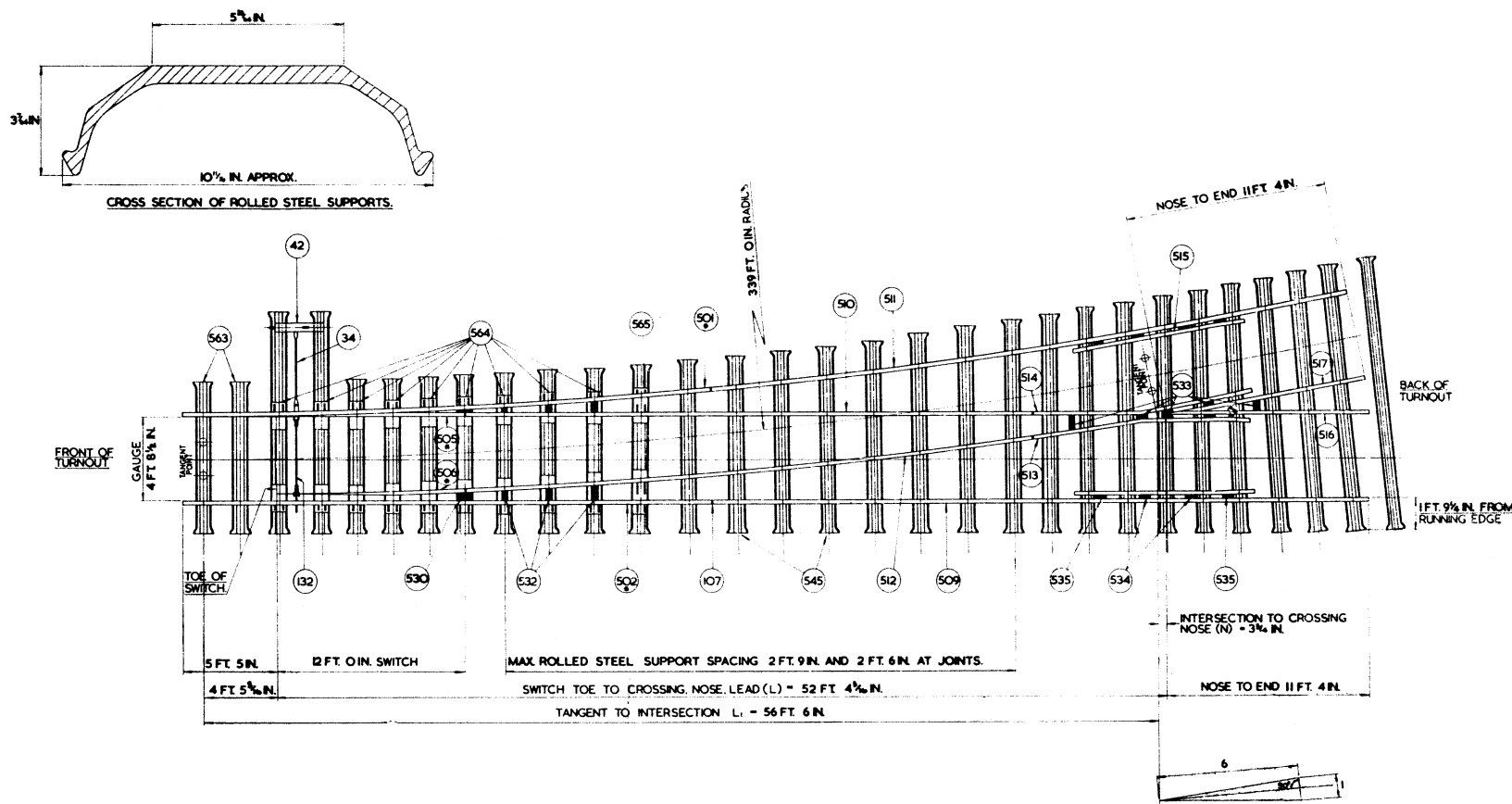


NOTE For Leading Dimensions, see Figure 5 and Table 3
For description of numbered Items, see Table 1

BS 11 Section 110A flat bottom rail
(1 in 6 left-hand turnout shown)

* For right-hand turnouts, Items no.
501 to read 503
502 to read 504
505 to read 507
506 to read 508

Figure 1 — Layout diagram for heel switch turnouts on timber supports

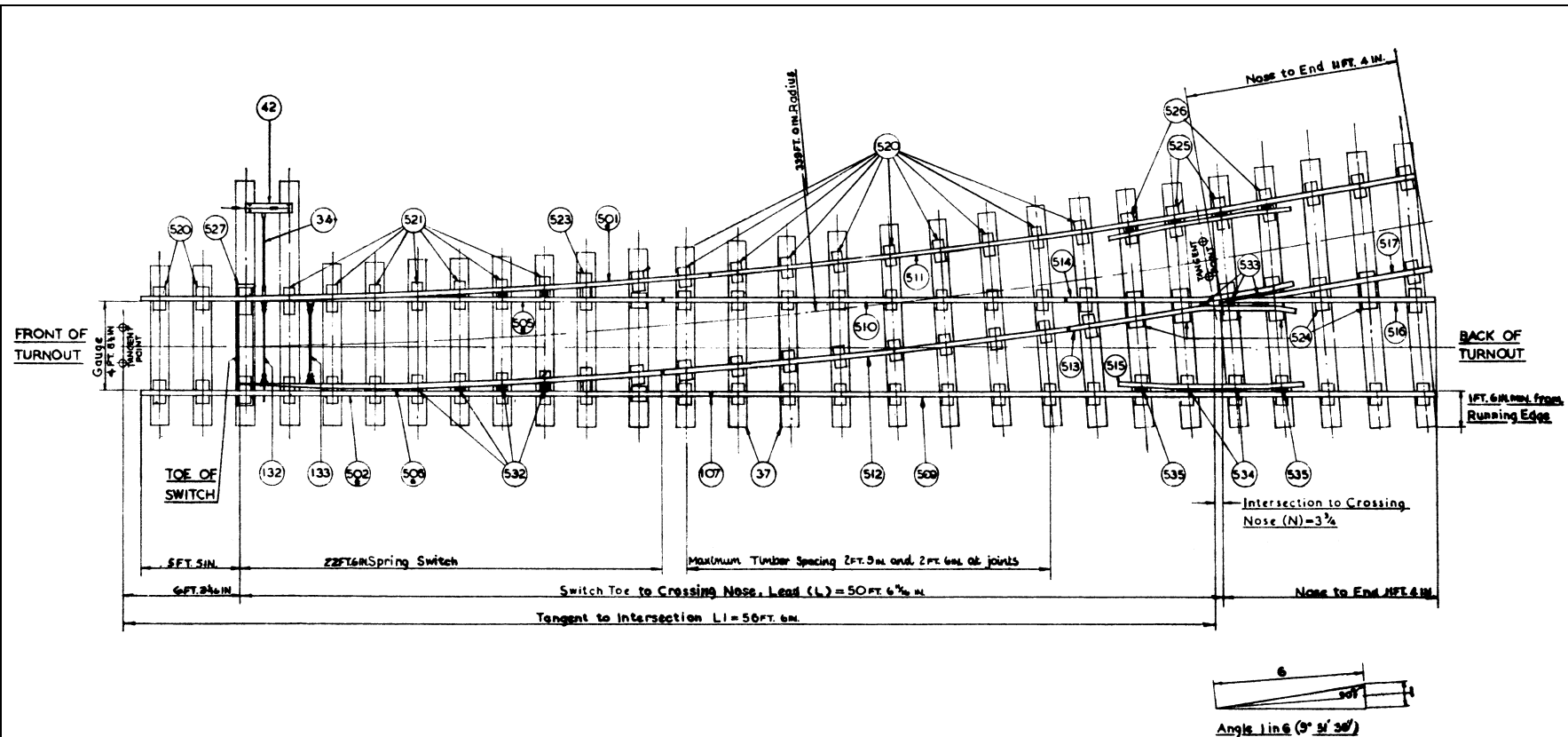


NOTE For leading dimensions, see Figure 5 and Table 3.
For description of numbered Items see Table 1.

BS 11 Section 110A flat bottom rail
(1 in 6 left-hand turnout shown)

* For right-hand turnouts, Items no. 501 to read 503
502 to read 504
505 to read 507
506 to read 508

Figure 2 — Layout diagram for heel switch turnouts on rolled steel supports

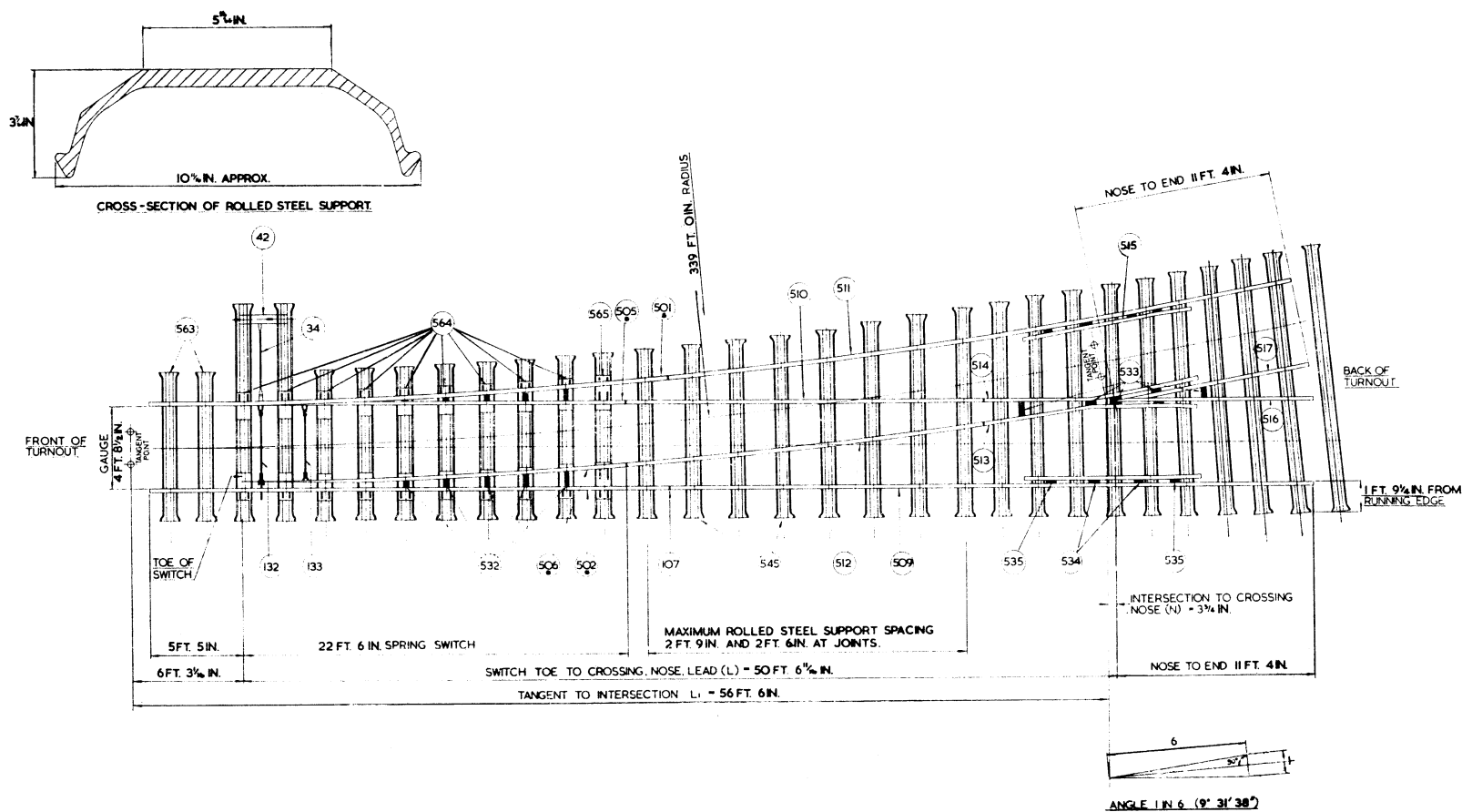


NOTE For Leading Dimensions, see Figure 6, Figure 7 and Table 4
For description of Numbered Items, see Table 1

BS 11 Section 110A flat bottom rail
(1 in 6 left-hand turnout shown)

* For right-hand turnouts, Items no. 501 to read 503
502 to read 504
505 to read 507
506 to read 508

Figure 3 — Layout diagram for spring switch turnouts on timber supports



NOTE For leading dimensions see Figure 6, Figure 7 and Table 4.
For description of numbered items see Table 1.

BS 11 Section 110A flat bottom rail
(1 in 6 left-hand turnout shown)

* For right-hand turnouts, Items no. 501 to read 503
502 to read 504
505 to read 507
506 to read 508

Figure 4 — Layout diagram for spring switch turnouts on rolled steel supports