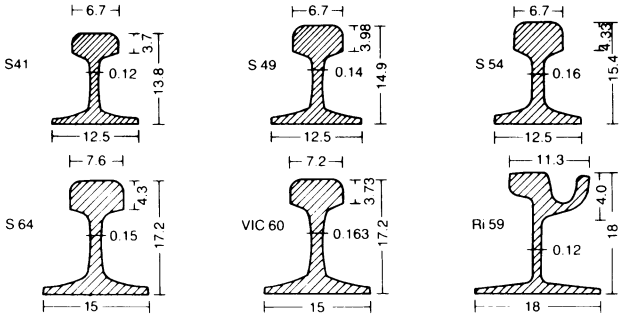
Track Installations

For further information on British railways contact Safety and Standards Directorate, Railtrack PLC, London.
For further information on European railways, contact the Union of European Railway Industries, Brussels.

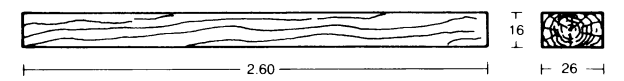


① **The common rail sections**

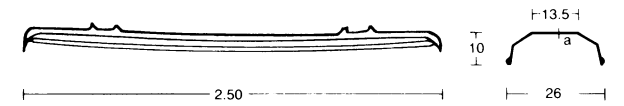
rail section	G (kg/m run)	A (cm^2)	$W_{x\,head}$ (cm^3)	$W_{x\,base}$ (cm^3)	W_y (cm^3)	I_x (cm^4)	I_y (cm^4)
S 41	40.95	52.2	196.0	200.5	41.7	1368	260
S 9	49.43	63.0	240.2	248.2	51.0	1819	320
S 54	54.54	69.4	262.4	276.4	57.0	2073	359
S64	64.92	82.4	355.9	403.5	80.5	3253	604
UIC 60	60.34	76.9	335.5	377.4	68.4	3055	513
Ri 59	58.96	75.1	372.6	351.8	81.0*)	3257	781

*) W_{y1} = 118cm^3 because of asymmetry

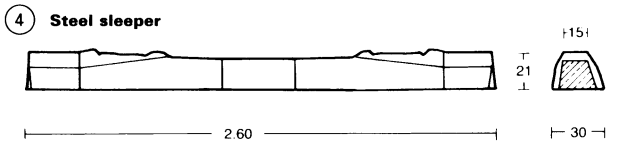
② **Rail dimensions** → ①



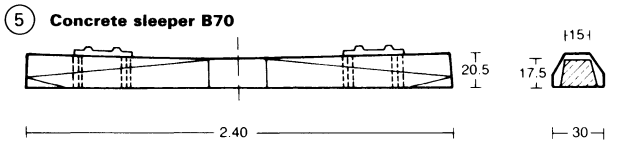
③ **Wooden sleeper**



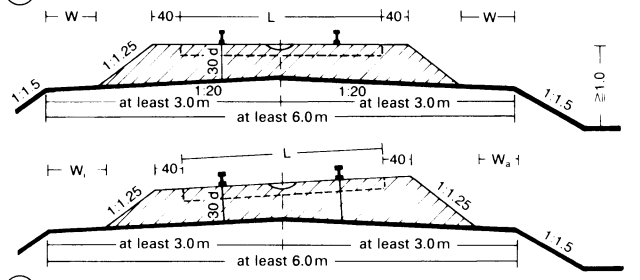
④ **Steel sleeper**



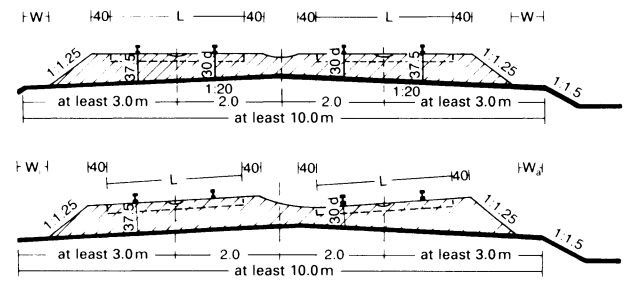
⑤ **Concrete sleeper B70**



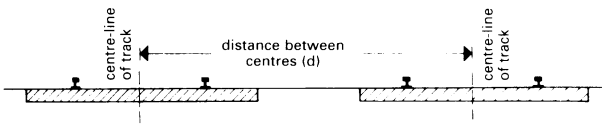
⑥ **Concrete sleeper B58**



⑦ **Standard cross-section for a single track bed**



⑧ **Standard cross-section for a twin track bed**



⑨ **Distance between centre-lines of tracks**

The key standard distances (d) between track centre-lines are as listed below:

- On open stretches of track — 4.00 m (3.5 m on older stretches)
  - where signals are installed — 4.50 m
  - as safety space after every second track — 5.40 m
  - on newly built stretches (V > 200 km/h) — 4.70 m
- In stations — 4.50 m (4.75 m)
  - main lines, straight through — 4.00 m
  - in sets of 5–6 lines — 6.00 m
  - for brake inspection/test tracks — 5.00 m
  - in sidings for carriage cleaning — 5.00 m

The standard gauge for the UK (and for 71% of all the railways in the world) is 1.435 m. Tolerances on the gauge width are, as follows:

–3/+30 mm on main lines
–3/+35 mm on branch lines

Gauges in other countries are: Russia 1.520 m, Spain and Portugal 1.668 m, South and Central Africa 1.067 m, Chile, Argentina and India 1.673 m.

Typically, the expected life of sleepers can be taken to be as follows:

- timber sleepers, impregnated with creosote — 25–40 years
- timber sleepers, unimpregnated — 3–15 years
- steel sleepers — about 45 years
- concrete sleepers (estimated) — at least 60 years

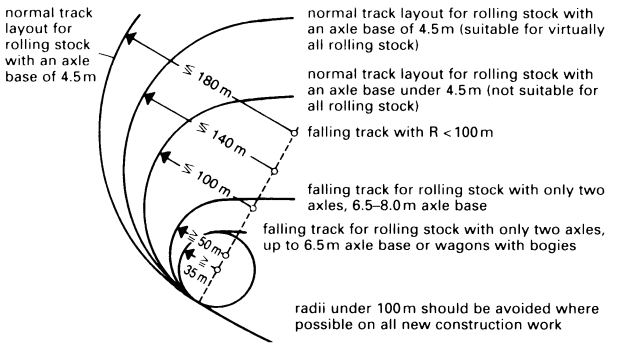
The depth of trench in a cutting should be ≥0.4–0.6 m below grade and the slope of the trench 3–10%, depending on the type of consolidation of the trench floor.

Ground water in the case of retaining walls must be conducted away by pipes or drainage holes.

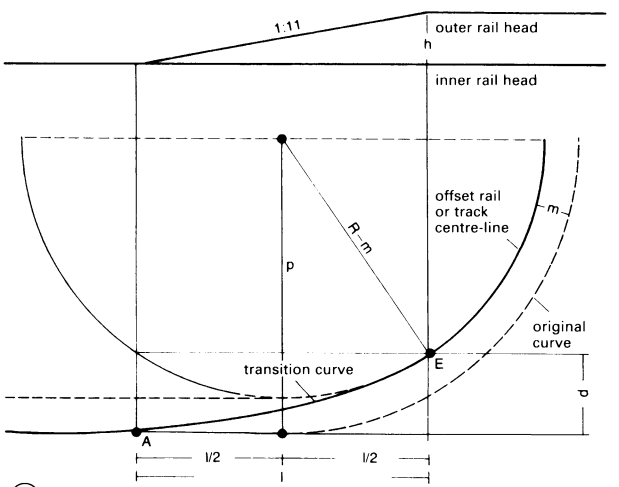
The longitudinal gradient for open stretches of main line should be ≤12.5‰, and ≤40‰ for branch lines. For lines in stations it should be ≤2.5‰. In exceptional circumstances, where special permission is granted, gradients up to 25‰ can be used on main lines.

When stationary, the permissible wheel load is 9 tonnes. On stretches with sufficiently strong track and supporting structures, a greater wheel loading is possible (up to 12.5 tonnes).

Track Installations



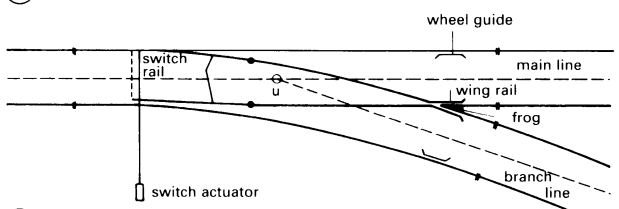
① **Track radius (for turning round) in sidings**



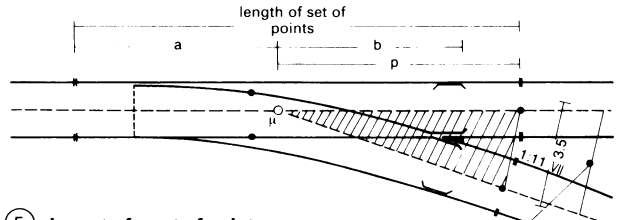
② **Canted curve and transition curve**

R	l	m	ramp gradient
180–200	40	0.370	1: 320
		0.333	1: 320
250–350	30	0.150	1: 300
		0.107	1: 400
400–2000	20	0.012	1: 310
		0.008	1:1300

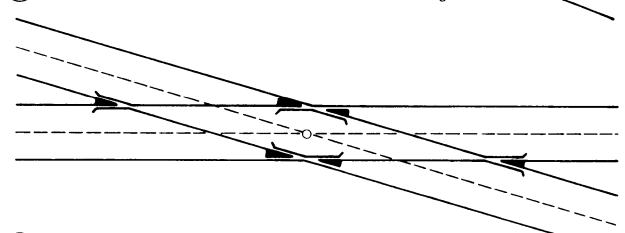
③ **Table for branch lines and normal sidings (m)**



④ **Simple set of points**



⑤ **Layout of a set of points**



⑥ **Oblique angled crossing (wheel guide as in ④ + ⑤)**

Curved radii (to the centre-line of the track), R:

for direct main line fast track	≥300m
for sidings in stations	≥180m
for branch lines with main line rolling stock	≥180m
without main line rolling stock	≥100m
for sidings, used by main line engines	≥140m
for sidings, not used by mainline engines possibly	≥100m
minimum	≥35m

Note that if 100m > R ≥ 35m carriages should only be pulled. In addition, R >130m might not be suitable for all rolling stock so the types involved should be checked at an early stage.

Radii for narrow gauge railways

for 1.00m gauge track	≥50m
for 0.75m gauge track	≥40m
for 0.60m gauge track	≥25m

For track that will be used at speeds greater than shunting speed, a transitional section of curve must be laid between the straight section and the circular arc itself, giving a continuous curvature change from 1:∞ to 1:R → ②. Under certain circumstances the curves must be canted in order to keep the centrifugal force that arises during travel through the curve within reasonable limits. Canted curves and transition curves should be blended together. All details should satisfy the Service Regulations of the relevant Railway Authority.

Sets of points are designated in accordance with the rail shape, the branch line's radius and the pitch of the frog (e.g. 49–190–1:9). Below are example lengths of sets of points/switch rails:

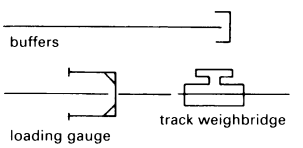
49–190–1:7.5 = 25.222m/12.611m
49–190–1:9 = 27.138m/10.523m
49–300–1:9 = 33.230m/16.615m

Carriages must not stand beyond the marker sign, to prevent obstructing the set of points → ⑤. The distance between the track centre-lines at the marker sign should be ≥3.5m.

The diameters, D, of normal turntables are: for axles, 2–3m; for wagons, 3–10m; and for engines, 12.5–23.0m.

The sizes of transfer tables should be calculated as minimum axle base of the carriage to be transferred + 0.5m.

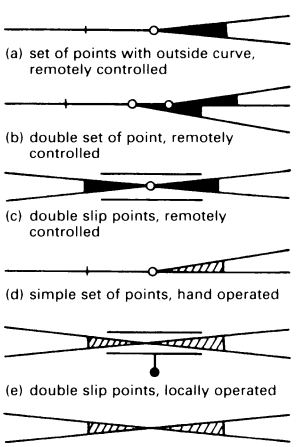
Details for level crossings can be obtained from the Service Regulations of the relevant Authority.



⑦ **Display symbols**

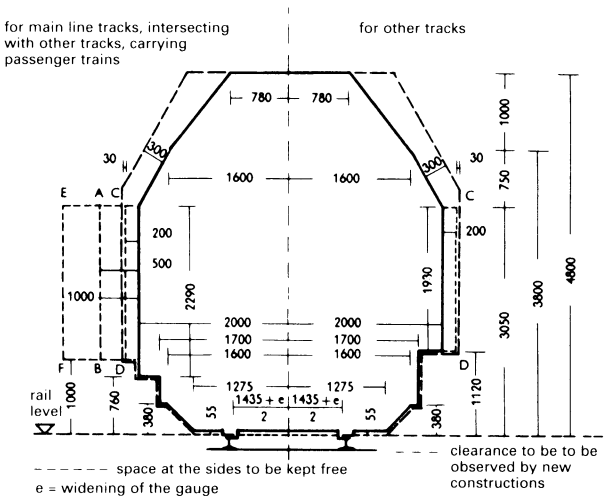
set of points	radius (m)	pitch ratio	overall length (m)
(a) 49	215	1:4.8	22.100
(d) 49	190	1:7.5	30.039
(d) 49	190	1:9	27.138
(c) 49	190	1:9	33.230
(b) 49	190	1:9r/ 1:9l	37.661

⑧ **Dimensions for sets of points → ⑨**



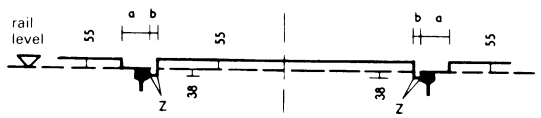
⑨ **Display symbols**

standard gauge railways



A–B for main lines on open stretches for all objects with the exception of fabricated structures
C–D for station sidings and for open stretches of main lines with special structures and signals between the tracks
E–F for fixed objects on passenger platforms

① **Standard clearance profiles (straight track plus curves with radii ≥250 m)**



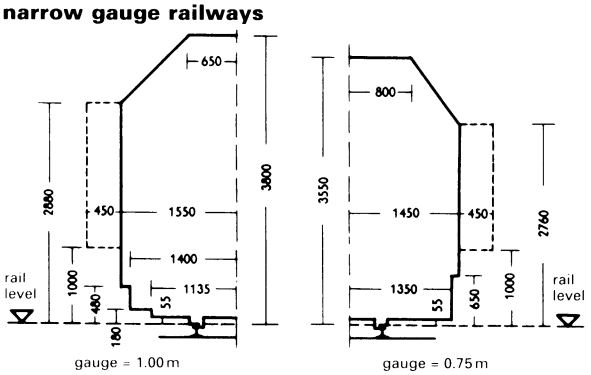
a = 150 mm for immovable objects which are not firmly connected to the rail
a = 135 mm for immovable objects which are firmly connected to the rail
b = 41 mm for devices guiding the wheel on the inside of the front surface
b = 45 mm for level crossings
b = 70 mm for all other cases
Z = corners which have to be radiused

② **Standard structure gauging and clearances at low level**

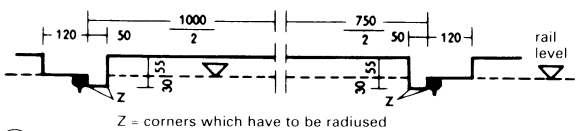
curve radius (m)	necessary increase in standard clearance on the inside of the curve (mm)	outside of the curve (mm)
250	0	0
225	25	30
200	50	65
190	65	80
180	80	100
150	135	170
120	335	365
100	530	570

③ **Necessary increase in the standard clearance for curves with radii < 250 m**

narrow gauge railways



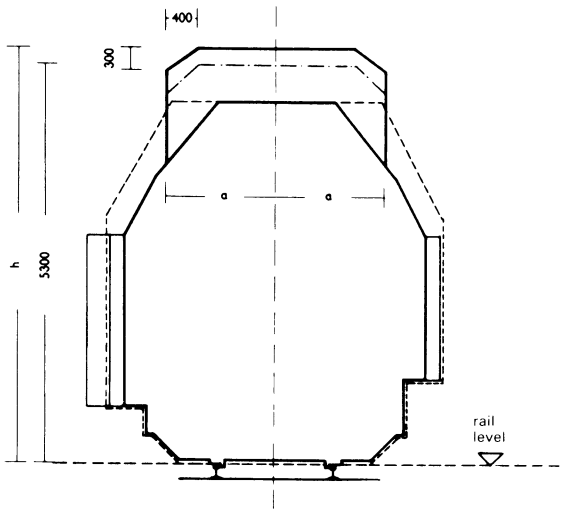
⑦ **Standard clearance profiles, straight line track**



Z = corners which have to be radiused

⑧ **Standard structure gauging and clearances at low level**

Typical Continental European Structure Gauging and Clearances



for existing superstructures, tunnels and engine shed doors when electrification takes place

④ **Top limit of clearance for stretches with overhead conductor wire (15 kV)**

half the radius of the curve (m)	dimensions of half the width a (mm)
up to 250	1445
225	1455
200	1465
180	1475
150	1495
120	1525
100	1555

⑤ **Dimensions for half the width of the upper limit of the clearance**

	h
heavy superstructures up to 15 m wide and in tunnels	5500 mm
heavy superstructures over 15 m wide	6000 mm
light superstructures, such as footbridges, sheds including doors	6000 mm
signal gantries and brackets	6300 mm

⑥ **Minimum clearance under structures**

Other dimensions: European standards (Germany)

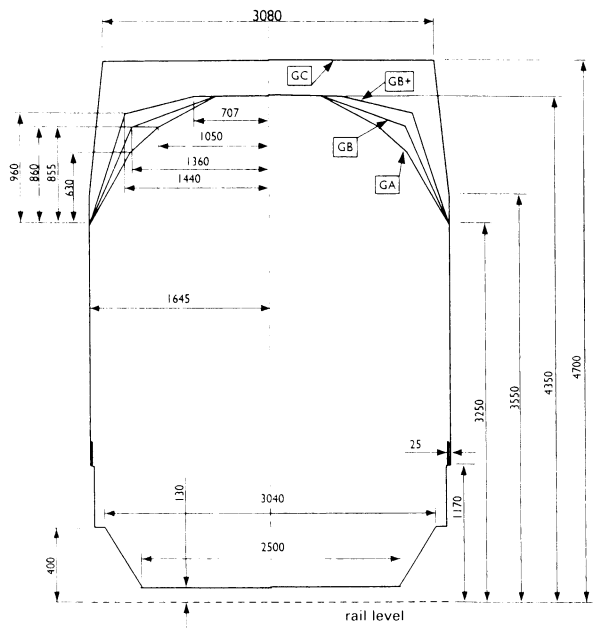
For entrance doorways the clear width should be ≥3.35 m and for new structures ≥4.00 m.

For tunnels, the extra clearance needed beyond the trains' kinematic envelope clearance to the wall for a single-track stretch of line is 0.40 m; for a double-track stretch of line it is 30 cm.

There are minimum distances required between buildings and railway tracks for new structures. These vary according to location. Typical examples are: a fire resistant structure with suitable cladding must be separated by ≥7.50 m from railway land; the corresponding distance for soft covered structures that are not fire resistant is ≥15 m. The latter also applies to structures in which combustible materials are stored.

Platform heights vary from country to country, and can be as small as 0.38 m. However, access to platforms must not involve passengers having to cross the track. This requires tunnels or bridges, which should have a width of 2.5–4.0 m. If there is circulation in both directions, 4.00–8.00 m is desirable. Steps on bridges or in tunnels should be the same width as the bridge or tunnel.

UK Structure Gauges and Clearances



1 All dimensions are in mm.
2 The kinematic envelope is the cross-sectional profile of a vehicle at any position along its length, enlarged to include the effects of dynamic sway and vertical movement caused by speed, (dynamic effects of) track curvature and cant, track positional tolerances, rail wear, rail head/wheel flange clearances, vehicle wear and suspension performance for the particular track location under consideration. The determination of the kinematic envelope is the responsibility of the operator of the proposed vehicle and shall be in accordance with the Railway Group Standard.

(1) **UIC (International Union of Railways) reference profiles for kinematic gauges (GA,GB, GB+, GC)**

Further information: Safety and Standards Directorate, Railtrack PLC, London

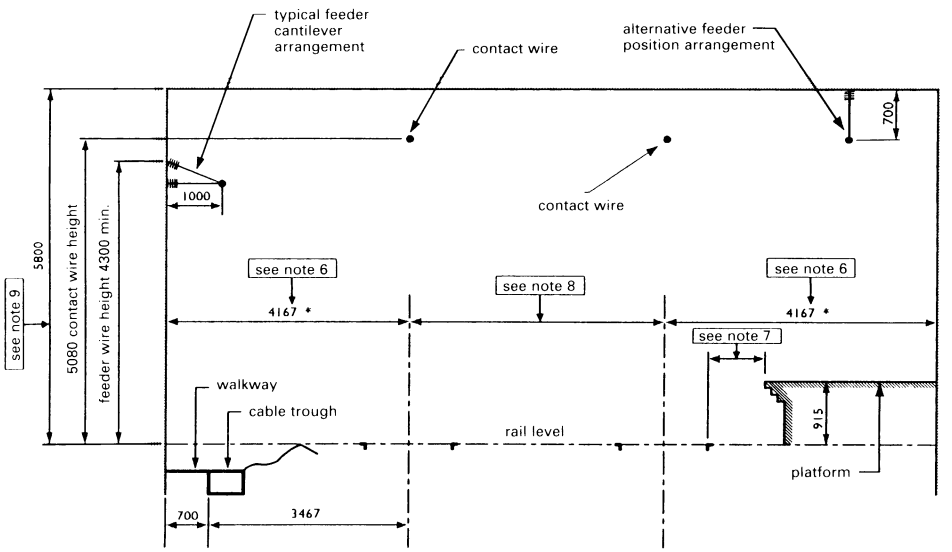
This information is based on the Railway Group Standard which applied to all new design and new route clearances for railway vehicles and loads from 3 February 1996.

The purpose of this Railway Group Standard is to set down the engineering requirements for the safe passage of rail vehicles and their loads by reconciling their physical size and dynamic behaviour with the opportunities offered by the railway infrastructure.

This standard applies to infrastructure owned by Railtrack PLC and any other infrastructure interfacing with it and affecting its physical clearances (e.g. private sidings or works into which, or out of which, trains will work onto Railtrack lines).

It shall be complied with in the design, maintenance and alteration of the railway infrastructure, in the design and modification of traction and rolling stock and in the conveyance of out of gauge loads.

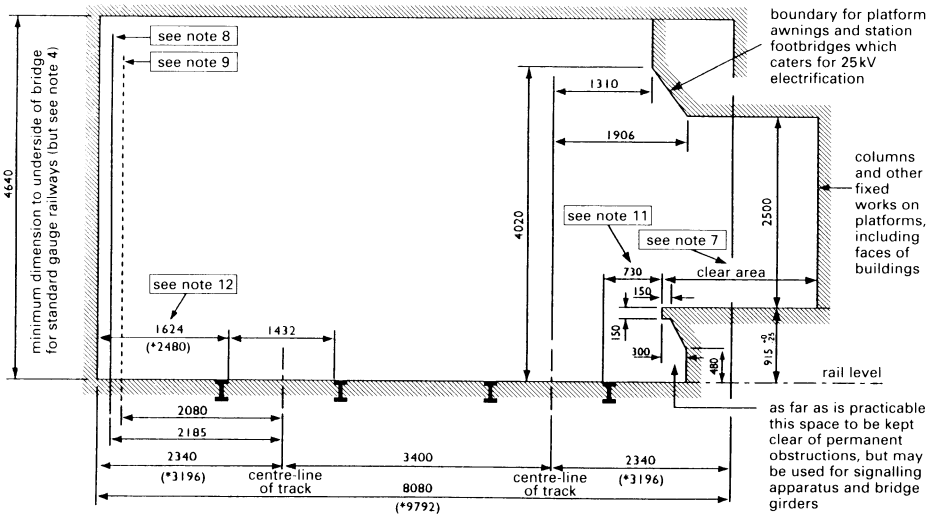
Standards are constantly evolving as faster trains are developed and heavier loads are transported. The national rail administration should, therefore, always be contacted for the latest standards and details.



1 This drawing is not applicable to viaducts and tunnels.
2 All dimensions are in mm.
3 Track centres for a mixed traffic railway.
4 Applicable only to straight and level track.
5 Refer to GC/TW496 *Requirements for Constructional Work on or near Railway Operational Land for Non-Railtrack Contracts* for the design of supports for structures built over or close to railway lines.
6 It may be possible in tight situations to reduce the dimension marked with an asterisk, but only where alternative access is available, via a route in a petition of safety, connecting with the walkways each side of the structure or where the railway operates on a 'no person' basis, whereby staff are only allowed on the track when special protection measures are in place.
7 Platform clearances are subject to maintenance of HMRI stepping distances and specific requirement shall be calculated from the chosen kinematic envelope with an allowance made for structural clearance.
8 This dimension shall be calculated from the dimensions associated with the chosen kinematic envelope with an allowance made for passing clearance. At the time of calculating the required dimension an assessment shall be made of traffic proposed for the route such that aerodynamic effects can be taken into account.
9 This dimension accommodates full UIC GC reference profile and assumes train speeds up to 300 km/h. Commercial considerations will dictate whether it is necessary to amend this dimension and contact wire height for the actual type and speed of vehicles proposed for the route.

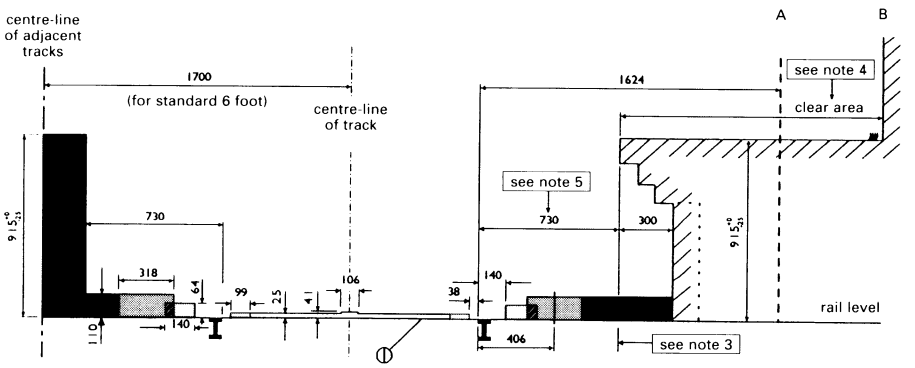
(2) **New construction gauge (derived from the UIC GC reference profile)**

UK Structure Gauges and Clearances



1 This diagram illustrates minimum lateral and overhead clearances to be adopted in construction or reconstruction and for alterations or additions to existing track and structures for line speeds up to 165km/h (100mph).
2 All dimensions are in mm.
3 * The dimension to be used when line speed exceeds 165 km/h (100 mph).
4 The clearance dimensions given are valid for straight and level track only and due allowance must be made for the effects of horizontal and vertical curvature, including super-elevation (cant).
5 The standard structure gauge allows for overhead electrification with voltages up to 25kV. However, to permit some flexibility in the design of overhead equipment, the minimum dimension between rail level and the underside of the structures should be increased, preferably to 4780mm or more if this can be achieved with reasonable economy. The proximity of track features such as level crossings or OHE sectioning may require greater than 4780mm.
6 Permissible infringements in respect of conductor rail equipment, guard and check rails, train stops and structures in the space between adjacent tracks are not shown.
7 The minimum dimensions of a single face platform measured from the edge of the platform to the face of the nearest building structure or platform furniture shall be 2500mm for speeds up to 165km/h and for speeds greater than 165km/h the minimum dimension shall be 3000mm. The minimum distance to the face of any column shall be 2000mm.
8 Nearest face of all other structures including masts carrying overhead line equipment of electrified railways.
9 Nearest face of signal posts and other isolated structures less than 2m in length but excluding masts carrying overhead line equipment on electrified railways.
10 Vertical clearances to the canopy above the platform shall be 2500mm up to 2000mm minimum from the platform edge or up to 3000mm where the line speed exceeds 165km/h. At distances beyond 2000mm or 3000mm from the platform edge, as applicable, the minimum headroom shall be 2300mm.
11 Platform clearances are subject to the maintenance of HMRI stepping distances and specific requirements shall be calculated from the particular kinematic envelope with an allowance made for structural clearance. The minimum lateral dimension is 730mm and is shown for guidance.
12 Where reasonably practicable these dimensions shall be increased by 300mm to facilitate the provision of an access walkway in accordance with CC/RT5203 *Infrastructure Requirements for Personal Safety in Respect of Clearance and Access.*

(3) **Standard structure gauge**



1 All dimensions are in mm.
2 The dimensions shown are for straight alignment and appropriate adjustments must be made for curvature. Except for dispensation which allows station platforms on curves with a radius greater than 360m to be placed at standard dimensions (as shown), the amount of platform set-back for curves with a radius less than 360m shall be determined by Railtrack.
3 Bridge girders, dwarf signals and other lineside equipment up to a height of 915mm ARL may be positioned in the space available for platforms.
4 The minimum dimension of a single face platform shall be 2500mm for speeds up to 165km/h and for speeds greater than 165km/h the minimum distance shall be increased to 3000mm. The minimum distance to the face of any column shall be 2000mm.
5 Platform clearances are subject to the maintenance of HMRI stepping distances and specific requirements shall be calculated from the particular kinematic envelope with an allowance made for structural clearance. The minimum lateral dimension is 730mm and is shown for guidance.

key
A abutments, piers, stanchions etc. (clear of platform)
B columns and other works on platforms
areas for conductor rails and guard boards
areas for guard and check rails only
areas available for dwarf signals, bridge girders and other lineside equipment
unhatched areas so marked are for permanent way, signal fittings and fourth rail electrification

(4) **Standard structure gauge applicable at and below 1089 mm above rail level (ARL)**

Railtrack shall give consideration to passenger safety by limiting the maximum stepping distance from the top edge of the platform to the top edge of the step board or floor of passenger rolling stock.

The following maximum dimensions for stepping distances, calculated from the centre of the bottom of the door opening, shall apply unless dispensation has been sought from HSVHMRI for site specific cases relating to identified rolling stock. All such cases must be recorded in writing and maintained for future reference.

horizontal	275mm
vertical	250mm
diagonal	350mm

RAILWAY FREIGHT YARDS

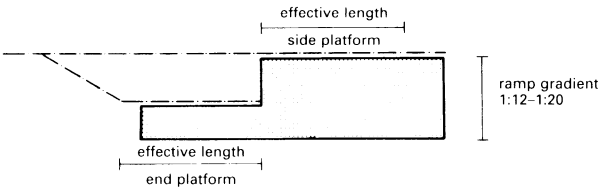
The freight yard is the traditional transfer point for goods being moved using a combination of rail and road transport.

Typical functional buildings and installations are: goods sheds, the freight office building and perhaps a customs hall. The loading yard will usually have end or side platforms and ramps. In addition, loading gauges, sidings for bulk offloading (e.g. coal and oil) and transfer terminals may also have to be installed. And, with the increasing use of standard containers, additional plant such as portal cranes will also be needed.

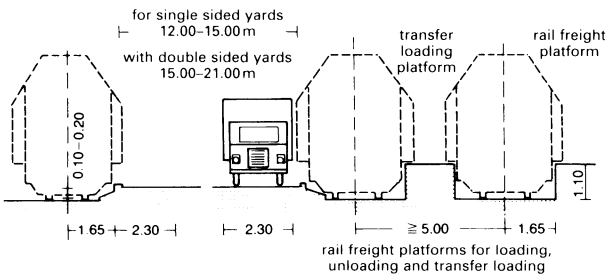
The effective depths for goods sheds are 10–18 m or even 16–24 m, depending on the freight to be handled, and they are usually 3.50–5.00 m high. They can consist of any number of bays between structural frames, at 5 m centres, up to a maximum of 400 m.

The width of the platform on the track side of the shed should be at least 3.50 m and for the loading dock on the service road side of the shed it is 2.50 m. The height in both cases should be 1.20 m above the rail level or, alternatively, the road surface of the freight yard. Both platform and loading dock should be covered by a canopy.

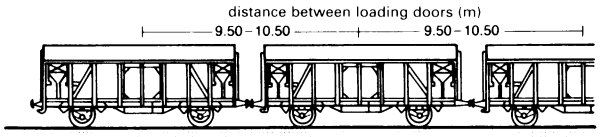
The area required for goods sheds → ① - ⑦ depends on the type and size of the goods and also the quantity of goods to be held in the store. To be able to determine the surface area required, the specific area needed for the types of goods involved (i.e. containers, pallets and goods which are not palletised) has to be known. A rule of thumb for values to be used in the calculation of the area requirement is as follows: for small containers with an area of 2 m^2, allow approximately 6.9 m^2/t; for pallets, each needing 1.2–1.4 m^2, allow 5.6–6.5 m^2/t; and for goods not on pallets and occupying 0.13–0.2 m^2 each, allow 6.5–10.0 m^2/t. The exact storage area requirement should only be calculated when planning a particular project. This is done by carrying out a physical count of the quantity of goods to be stored. Peak periods of traffic movements during the week (for instance Saturdays or Mondays) should be taken into account because they can be 25–30% higher than the daily average. Surface area requirements for traffic movements, and also adequate space between the goods in the store, must be determined at the very outset. For small containers this can be 80–100% of the actual space for storage, for pallets 180–210% and for goods not on pallets 100–160% of the storage area.



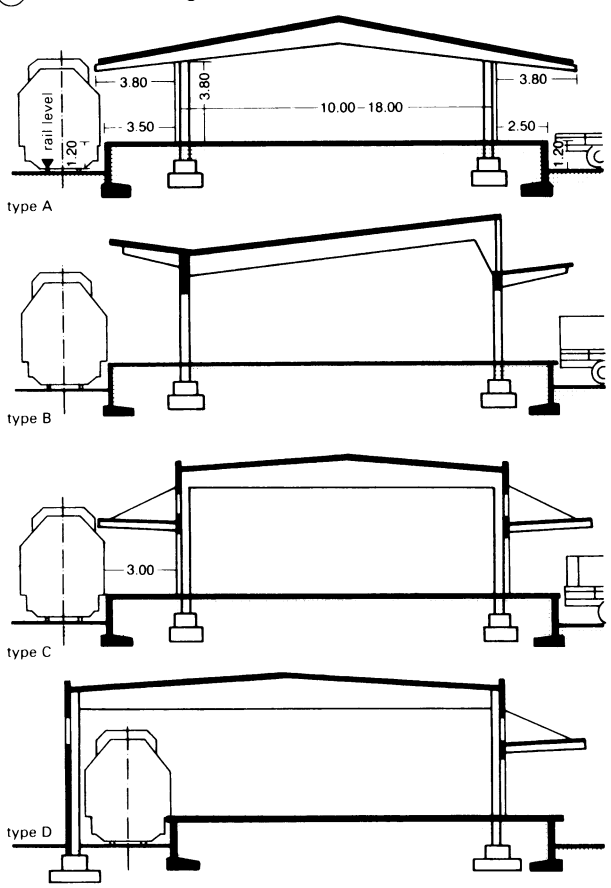
① **End and side platforms**



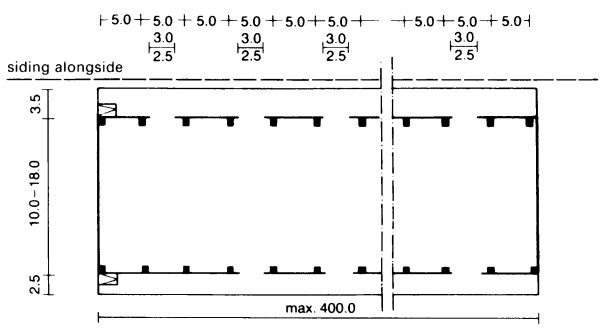
② **Lay-out of yard for loading and unloading**



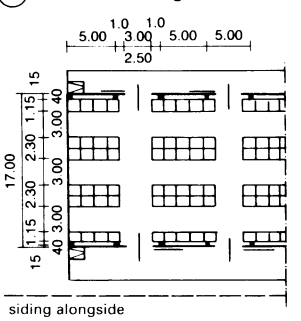
③ **Common roofed goods truck**



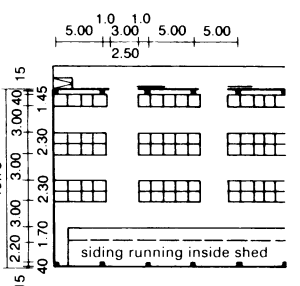
④ **Examples of goods sheds: A, B, and C with siding outside, D with siding inside**



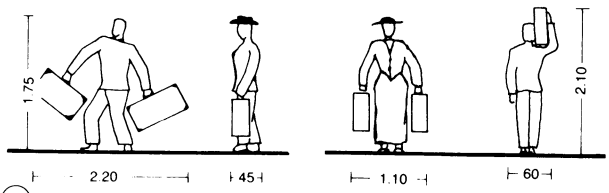
⑤ **Plan view of a goods shed → ④ type A**



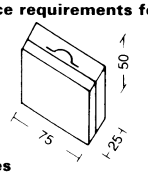
⑥ **Plan view, cross-section → ④ type C**



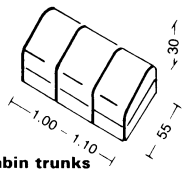
⑦ **Plan view, cross-section → ④ type D**



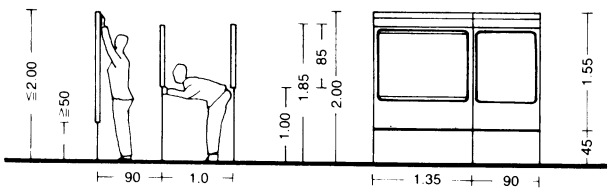
① **Space requirements for people**



② **Cases**

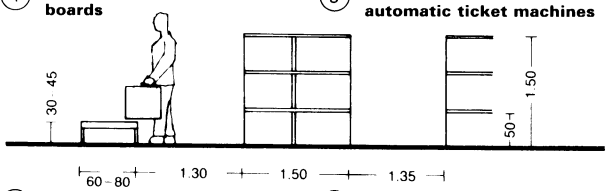


③ **Cabin trunks**



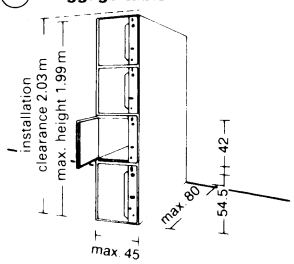
④ **Reading timetable display boards**

⑤ **Display cabinets and automatic ticket machines**

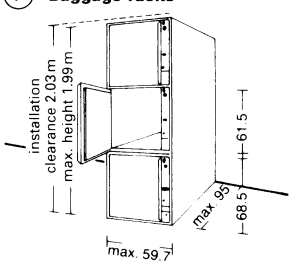


⑥ **Baggage table**

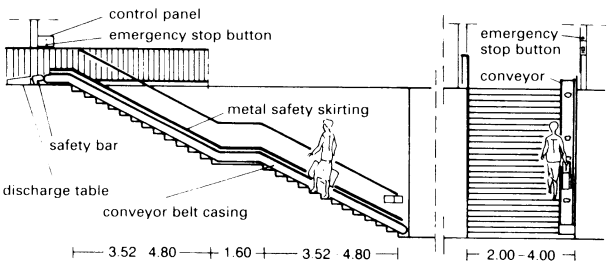
⑦ **Baggage racks**



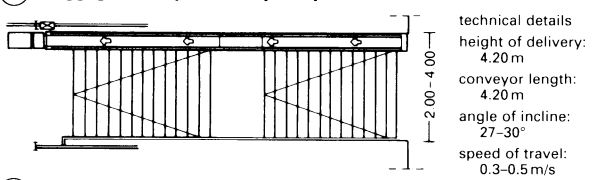
⑧ **Luggage lockers: four standard compartments**



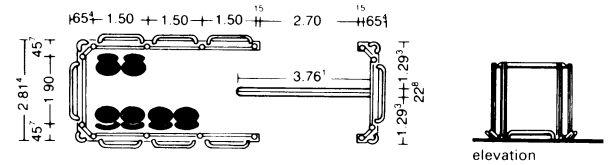
⑨ **Luggage lockers: three large compartments**



⑩ **Luggage conveyor for steps to platform**



⑪ **Plan view → ⑩**



⑫ **Waiting shelter on main line platforms, plan view**

The layout of the rooms for push button signal controls should follow the schematic drawings set out below ⑬ - ⑰. The control rooms do not have to have windows but all rooms should have a clear room height of ≥2.80 m, with the exception of those for the battery and electrical power. The clear widths for the doors should be ≥1.00 m.

The signal control manager's room should be near to the relay and telecommunications rooms and a full view out over the track layout must be ensured. The bottom edge of the lintel or window soffit should be 1.60–1.80 m above floor level, with the top of the window sill at a height of 0.40–0.50 m above the floor.

The relay room should have a minimum width calculated using the following formula: 0.23 m wall clearance + 0.66 m per rack + 1.25 m gangway.

SCMR	signal control manager's room
TR	telecommunications room
WC	rest room and toilets
ATCR	automatic train control room
RR	relay room
SCFR	signal control foreman's room
EPSR	emergency power system room
CR	control room
BR	battery room
SPS	spare parts store
WS	workshop
FS	fuel store

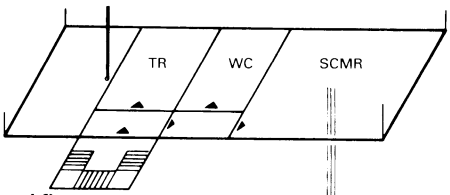
H	heating
EPR	electrical power room
CTR	cable terminal room
FA	first aid room
DP	data processing room

space allocated for signalling equipment

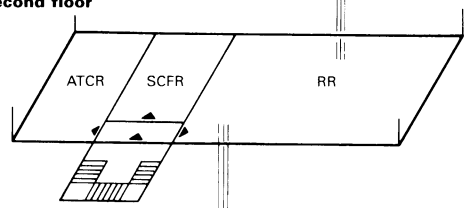
protection for people and objects

entries and exits

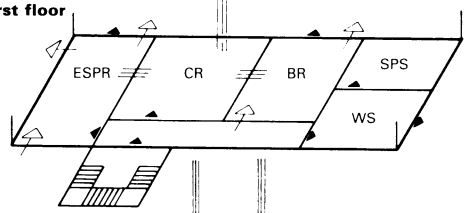
ventilation and extraction



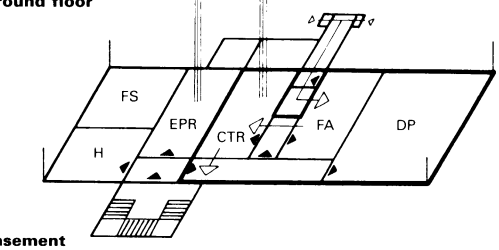
⑬ **Second floor**



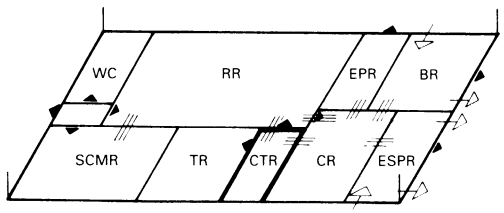
⑭ **First floor**



⑮ **Ground floor**



⑯ **Basement**



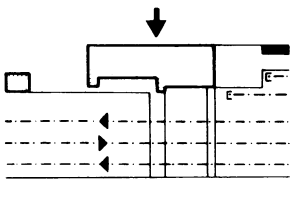
⑰ **Single storey ground floor**

RAILWAY STATIONS

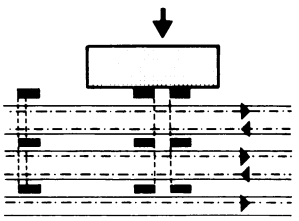
Further information: Railtrack PLC

Railway lines frequently pass through small and medium-size towns at street level, in which case the station buildings are on the same level as the tracks. At some small stations in continental Europe (e.g. Rüdesheim), access to the platforms for passengers and luggage → ① is achieved by crossing the tracks. Pedestrian tunnels are generally used for medium-size installations, such as Bonn → ②. In large terminals there are gently inclined tunnels for both pedestrians and luggage.

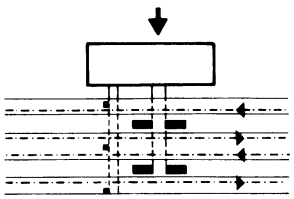
An improvement in layout can be achieved by raising the level of the track installation, as at Cologne and Hanover, or by lowering the level as in Darmstadt, Copenhagen and London → ③ – ⑦. This problem of access to the platforms does not arise in terminal stations → ⑧.



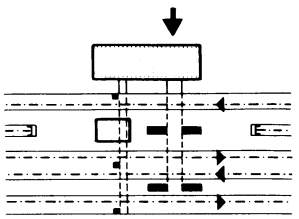
① **Station concourse on one side, at track level; passengers and luggage must cross the tracks (Only for small branch-line installations; not permitted in Britain)**



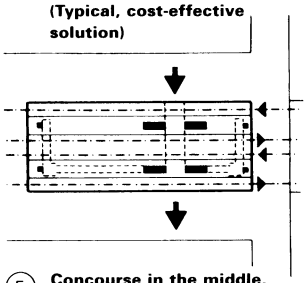
② **As ① but with tunnel for passengers, staircase access; luggage transported across the tracks (Only for medium-size installations)**



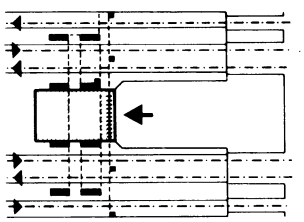
③ **Concourse on one side, below track level; tunnel for passengers and luggage; staircase and lift access to platforms (Typical, cost-effective solution)**



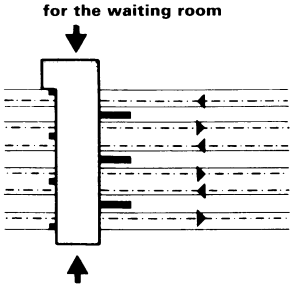
④ **Station concourse on one side, below track height; waiting room between the tracks (Suitable for interchange stations)**



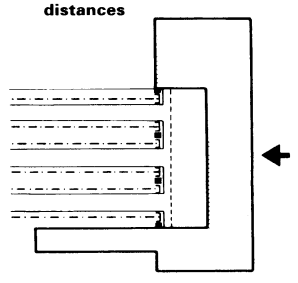
⑤ **Concourse in the middle, underneath the tracks: short walking distances and good natural lighting for the waiting room**



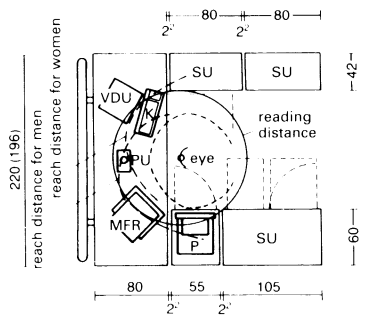
⑥ **Concourse in the middle, underneath the tracks: spacious access via forecourt and short walking distances**



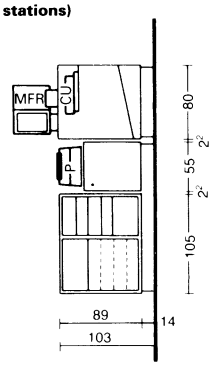
⑦ **Concourse over the tracks: acts as a bridge for passengers and baggage**



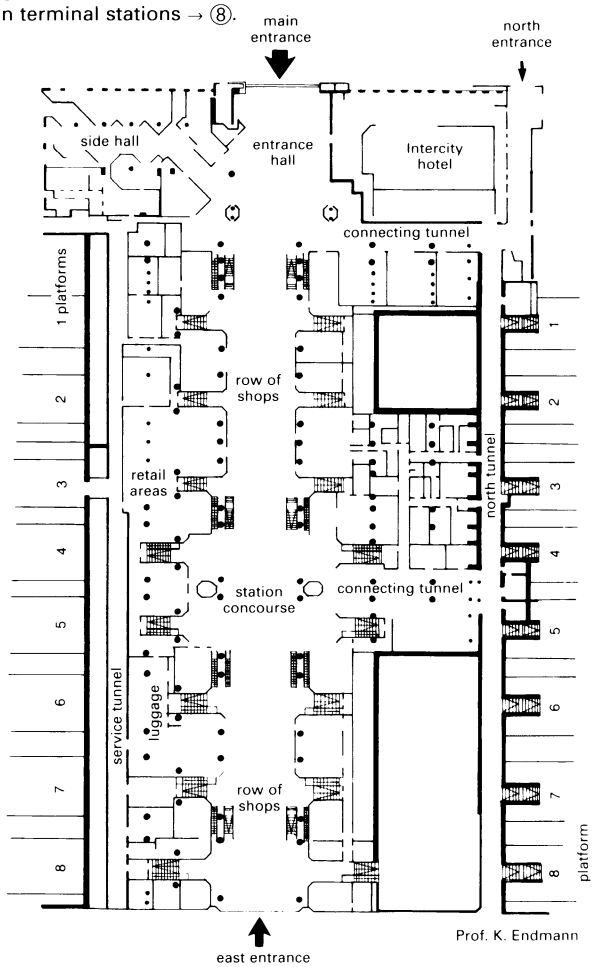
⑧ **Concourse at end of track, where possible at track height (Only suitable for terminal stations)**



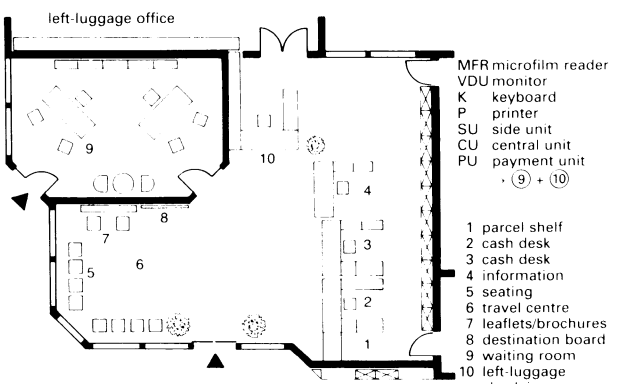
⑨ **Plan view: workstation layout for open counters → ⑩ – ⑪**



⑩ **Side view: unit and printer → ⑨ – ⑪**



⑫ **Pedestrian arcade, Düsseldorf Main Station**



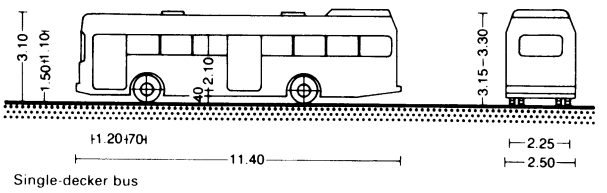
⑪ **Plan view of a travel centre**

BUS STATIONS

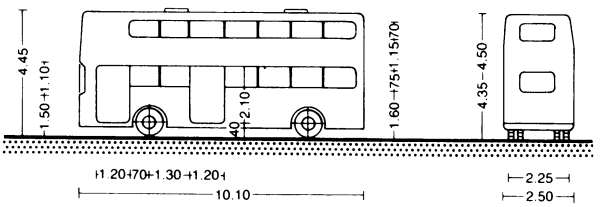
Special provision has to be made for the widening of curves to match the turning circles of buses → ② - ⑮. Bus stops require shelters and special layouts (see also figures ① - ⑧ on the next page).

Ramps should be provided at the front to allow easy access up to a 30–40cm high step → ⑪ - ⑫.

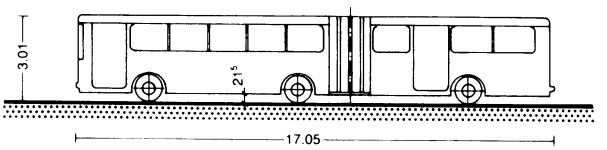
Short-stay car-parking space should be incorporated for passengers on the edge of towns (i.e. park and ride).



Single-decker bus

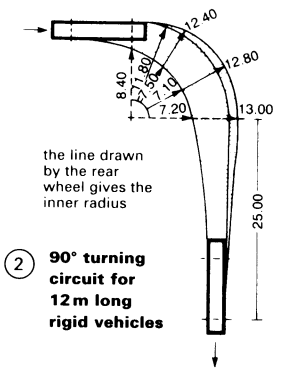


Double-decker bus

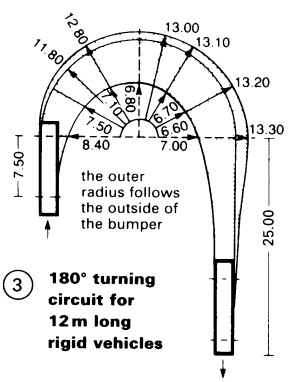


Articulated bus, common in Europe

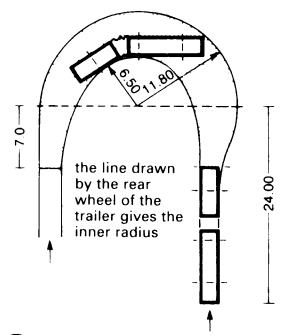
① **Bus dimensions**



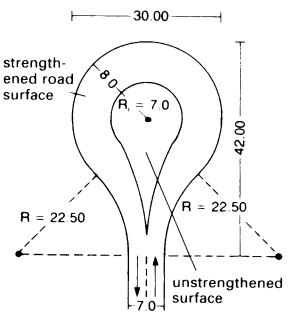
② **90° turning circuit for 12m long rigid vehicles**



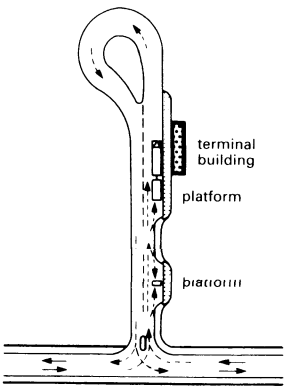
③ **180° turning circuit for 12m long rigid vehicles**



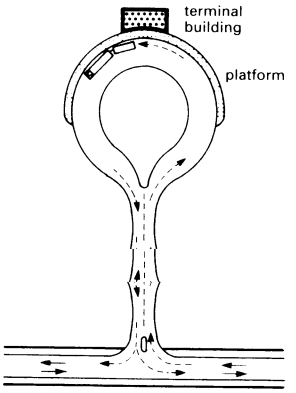
④ **180° turning circuit for 17m long articulated vehicles**



⑤ **Turning circuit**



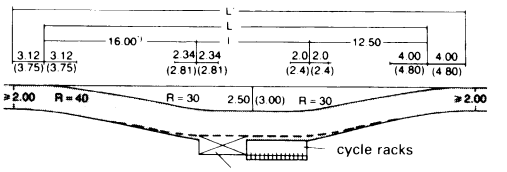
⑥ **Small turn-around station**



⑦ **Platform on the outside of the turning loop**

bus	l	L	L'
two buses	12.00	40.50	47.62 (49.05)
articulated bus	25.00	53.50	60.62 (62.05)
	18.00	46.50	53.62 (55.05)

for 3m wide bus stop bays
*) 25m for bus stop bays for articulated buses



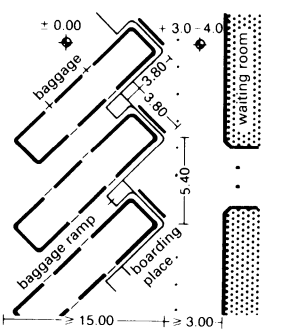
⑧ **Bus stop**

platform shape	without passing lane			with passing lane		
	Aa	Ab	Ac	Ba	Bb	Bc
layout of arrival line	parallel	at 45°	at 90°	parallel	at 45°	at 90°
platform length (m)	24	24	24	36–60	36–60	36–69
platform width (m)	3	3	3	3.5–4	3.5–4	3.5–4
number of loading points a) for buses	2	2	2	2–3	2–3	2–3
b) artic. buses	1	1	1	1–2	1–2	1–2
area of platform, roadway and arrival spur in m² a) for buses	138	176	189	293	296	313
b) artic. buses	276	340	378	439	444	470

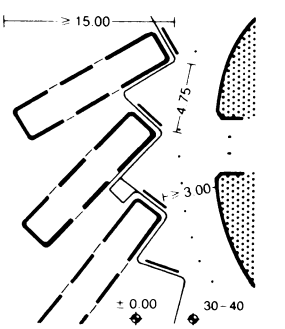
⑨ **Space requirement for platforms**

relation to line of arrival	parallel	at 45°		at 90°	
length of parking space (m)	32	12	24	12	24
parking options	1 artic. bus or 2 buses	1 bus	1 artic. bus or 2 buses	1 bus	1 artic. bus or 2 buses
width of parking space (m)	3.5	3.5	3.5	3.5	3.5
width of arrival lane (m)	4.0	8.0	8.0	14	14
parking area incl. roadway area in m² a) per bus	88	135	89	140	91
b) artic. bus	176		178		182

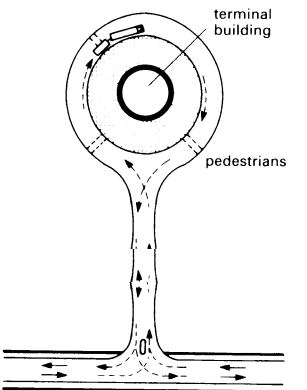
⑩ **Space for parking spaces**



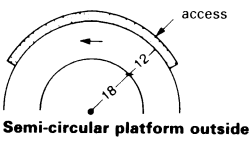
⑪ **Standard interlocking layout**



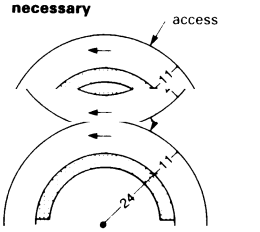
⑫ **Radial layout providing more room at the front**



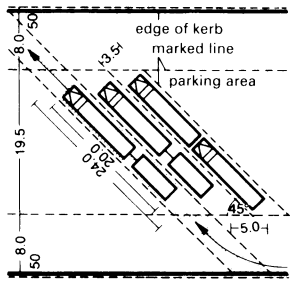
⑬ **Platform inside the turning loop**



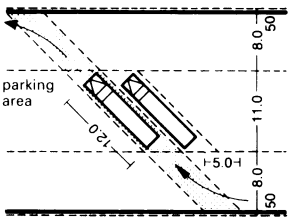
⑭ **Semi-circular platform outside loop; no pedestrian crossing necessary**



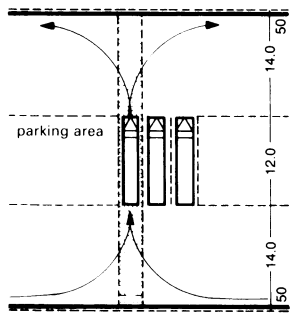
⑮ **Semi-circular platform inside loop; accessible only by crossing the road**



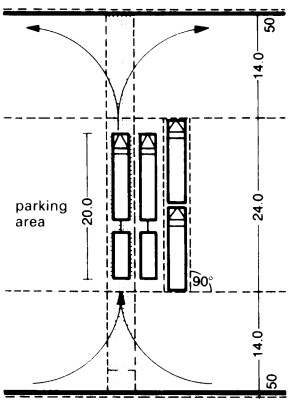
(1) **Parking places for buses and articulated buses**



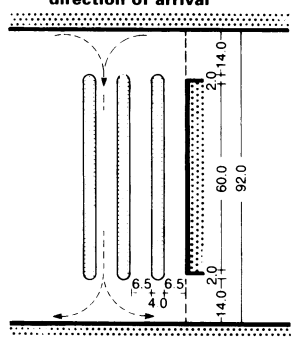
(2) **Oblique layout, 45° to direction of arrival**



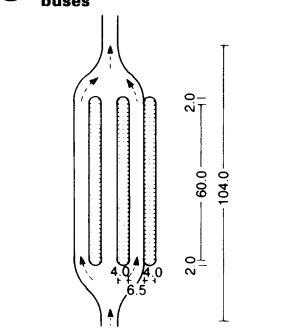
(3) **Parking at right-angles to direction of arrival**



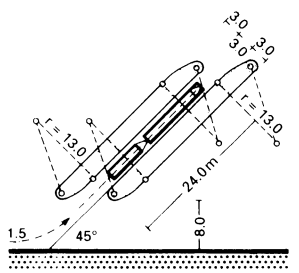
(4) **For buses and articulated buses**



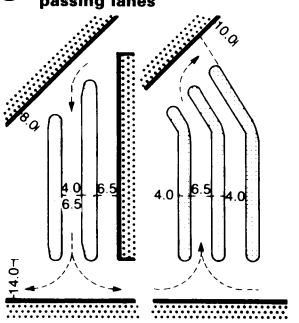
(5) **Platforms at right-angles to direction of arrival**



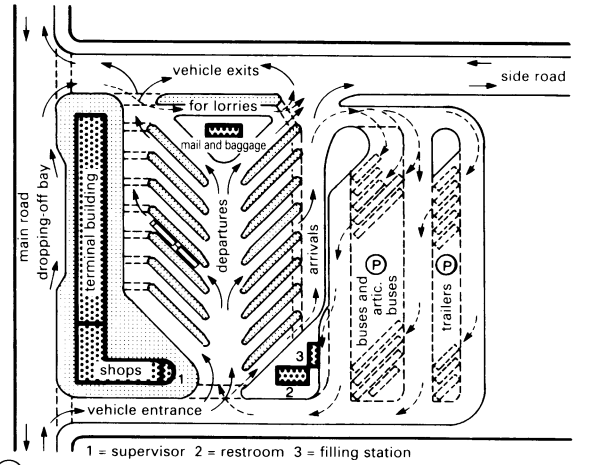
(6) **Long platforms with passing lanes**



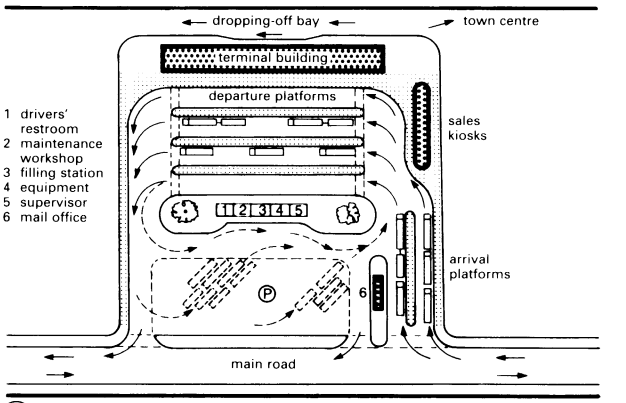
(7) **Oblique alignment of platforms**



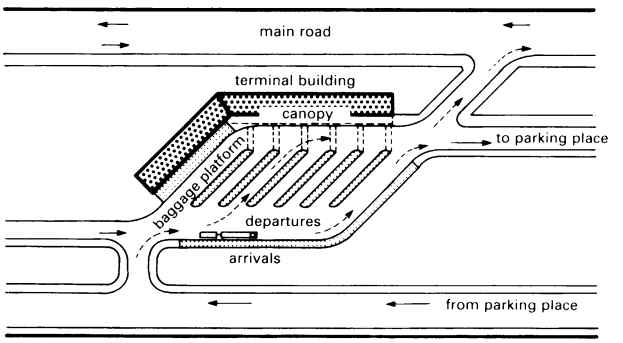
(8) **Departure at 90°, arrival and departure at oblique angles**



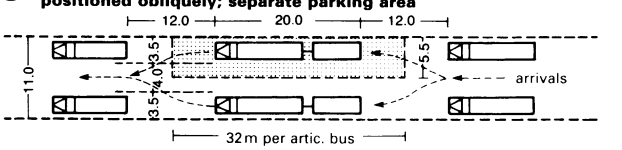
(10) **Large transit station with attached parking area**



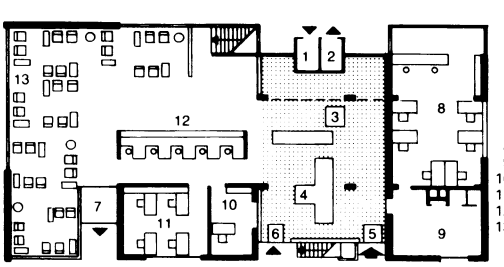
(11) **Large transit station with separate arrival and departure platforms**



(12) **Transit station with separate arrival and departure platforms positioned obliquely; separate parking area**

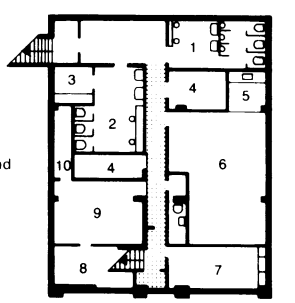


(13) **Layout of parking places, parallel to direction of arrival**



1 entrance for departing passengers
2 exit for arriving passengers
3 concourse
4 baggage despatch
5 entrance for arriving passengers
6 entrance for arriving baggage
7 exit for departing passengers
8 baggage office
9 baggage deposit
10 office manager
11 office
12 information and air tickets
13 waiting room

(9) **Ground floor, KLM bus station**



1 WC men
2 WC women
3 nursery
4 cloakroom
5 kitchen
6 canteen staff
7 drivers' restroom
8 meter cupboard and storeroom
9 filing room
10 pump room

(14) **Basement → (9)**