Preface

People with a visual impairment are more or less completely dependent on clear and unambiguous tactile paving. Because there lacked guidelines for clear and unambiguous tactile paving, the CG-Raad (Dutch Council of the Chronically ill and the Disabled), at the request of Viziris (the umbrella organisation for people with a visual impairment), have given the PBT (Knowledge and Consultancy Office of the CG-Raad) the assignment to develop guidelines for Tactile Paving in the area of Public Transport and the rest of the Public Area.

With this guidelines municipalities, urban planners, architects and others that deal with the planning of public spaces and the design of buildings have a handle to design good and useful tactile paving. This standardisation has as its primary goal that the group of people with a visual impairment, regardless of being in the Netherlands or elsewhere, can find their way based on uniform solutions. We realise that these guidelines are not a static document, but that it will, we expect, evolve in due course.

Not before have design guidelines for tactile paving been published in this way and for a wide scope. That it has happened is mainly because of the very intensive and constructive cooperation that the PBT had with Viziris.

Introduction

Tactile paving is mainly intended for people with a visual impairment who, without these lines, cannot find their way independently. Tactile paving is not a goal in itself but a clear tool. Therefore the line needs to be well maintained by the administrator(s) to maintain its function.

This guidelines only describes tactile paving. Visual markings and information signs (e.g. tactile signing) are not described in this guidelines. These descriptions can be found in the ITS-criteria (The de facto accessibility standard in The Netherlands) among others.

This means that this guidelines should mainly be used in combination with the ITS-criteria to construct a complete provision for people with a visual impairment.

This guidelines does not contain references to suppliers of (parts of) tactile paving but only describes to which requirements the lines and parts of the line should comply with. This document also describes in which way a meeting of lines and connections to other elements like natural guidelines, stairs etc. should be solved.

It can occur that in certain situations creative solutions must be found. But consider that the basic principles in this guidelines should always be leading.

People with a visual impairment should be confident regarding the consistency of tactile paving. Devising one’s own solutions that disregard the examples given in this guidelines are per definition at fault and can translate into dangerous situations for the target group.

Basic principles

1. Guidance paths can always be used in 2 directions (no one way traffic!)
2. Guidance paths coincide with provisions for other disabilities;
3. Differences in height In accessible objects are primarily reconciled with a lift or a ramp;
4. The guidance path that goes through the entrance gates for the public transport smart card (always the widest gate) should always be used in both directions;
5. Guidance paths are always on safe and in for pedestrians appointed areas;
6. Basic principles for an accessible route (differences in height):
   a. When there are only stairs:
      Only at objects which have limited access (objects without lift and ramp) there runs a guidance path via the stairs. (object does not comply with ISA-criteria.);
   b. When there are only stairs and a ramp:
      The main pedestrian route (at public transport hubs) runs via the stairs to the platform;
   c. When there are only stairs and a lift:
      The main pedestrian route (at public transport hubs) runs via the stairs and a lift to the platform;
   d. When there is only a ramp:
      Guidance path runs via the ramp;
7. Location of tactile paving:
   a. Public spaces in general:
      There should only be tactile paving to make public areas (e.g. city centers, shopping centers) and public buildings (e.g. town halls, museums) accessible from public transport stops. These buildings and areas, could, if desired, be made mutually accessible by way of (a combination of natural guidelines and) tactile paving;
   b. Public transport hubs:
      i. The main pedestrian route in and around a public transport hub should always have tactile paving, unless...
      ii. All transport related destinations at a public transport hub will be connected via guidance paths (also when there is for example a wall that can serve as a natural guideline)
      1. Bus stop / station
      2. Tram stop / station
      3. Metro station
      4. Light rail station/stop
      5. Taxi stops
      6. “Kiss and Ride”
      7. Ferries
      8. Routes to city centers
      9. Public transport smart card machines / ticket machines (providing that it is ITS-approved)
     10. Manned ticket desks
     11. Public transport information machines
     12. SOS pillars
     13. Branches to shops, kiosks, toilets etc. are not made. These should be seen as an extra service in or in the vicinity of a public transport hub and are not necessary for travel

**NB:** Tactile paving on all the above mentioned public transport hubs should be connected to the guidance paths and/or natural guidelines that are connected to the public road at the public transport hub.

Some examples of the guidelines content
At the next pages you find some examples from the content of the guidelines
<table>
<thead>
<tr>
<th>Name:</th>
<th>NATURAL GUIDELINE</th>
</tr>
</thead>
</table>
| Shape: | A difference in surface structure that can be felt with the feet and with the cane. (e.g. pavement – grass)  
Height difference ≥ 50mm (e.g. kerb or wall) |
| Purpose: | Already existing (natural) structure that can serve as way to determine place and direction. |
| Details: | |
Name: GUIDANCE PATH

Shape:
Rounded bars
See 2.01 for a detailed description

Purpose:
Specifies place and direction

Guidance paths are installed on both horizontal surfaces and ramps.
Meaning for users: on the path and a strip of 0.6m on both sides is safe.
This means that no tactile paving can be laid on a traffic lane.
The strips on both sides cannot be laid in all situations.
Narrowing at a maximum length of 300mm is allowed (e.g. stands of bus shelters)

Details:
- Width of guidance path: 600mm;
- 10 to 12 bars divided over the width;
- Width of a bar: ca. 10mm;
- If intervals are needed because of draining then:
  - Length of a bar: 200 – 600mm;
  - Interval in bars for draining: ca. 50mm per 600mm;
- Height of a bar: 2 – 5mm (depending on underlying pavement);
- The direction of the bars follow the direction of travel.
<table>
<thead>
<tr>
<th>Name: WARNING SURFACE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shape:</strong> Blisters</td>
</tr>
<tr>
<td>Material that can differ in color, tangibility and/or sound from the existing pavement, this depends on the situation, see 3.2.</td>
</tr>
<tr>
<td><strong>Purpose:</strong> Danger / watch out</td>
</tr>
<tr>
<td><strong>Details:</strong></td>
</tr>
<tr>
<td>• Square of blisters: 600 x 600mm;</td>
</tr>
<tr>
<td>• A strip of blisters 600mm wide and as much length perpendicular to the direction of walking as needed;</td>
</tr>
<tr>
<td>• Blisters lie in raised relief in an orthogonal pattern;</td>
</tr>
<tr>
<td>• Blisters lie 60mm apart from centre to centre (5 x 5 blisters per 300 x 300mm);</td>
</tr>
<tr>
<td>• Diameter of a blister: 25 mm;</td>
</tr>
<tr>
<td>• Height of a blister: 3 - 5 mm;</td>
</tr>
<tr>
<td>• If possible with a “point” for better tangibility and non-slip purposes</td>
</tr>
<tr>
<td>Name: INFORMATION SURFACE</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>Shape: Material that can differ in color, tangibility and/or sound from the existing pavement. The used material should be sufficiently non-slip.</td>
</tr>
<tr>
<td>Purpose: Here is an information point.</td>
</tr>
<tr>
<td>Details: For example:</td>
</tr>
<tr>
<td>- A smooth ‘sound tile’;</td>
</tr>
<tr>
<td>- A smooth rubber tile;</td>
</tr>
<tr>
<td>- Dimensions: 600 x 600mm;</td>
</tr>
<tr>
<td>- “Points” on the surface for better tangibility and non-slip purposes.</td>
</tr>
<tr>
<td><strong>Name:</strong></td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td><strong>Shape:</strong></td>
</tr>
<tr>
<td><strong>Purpose:</strong></td>
</tr>
</tbody>
</table>
| **Details:** | For example:  
- A smooth ‘sound tile’;  
- A smooth rubber tile;  
- Dimensions: 600 x 900mm;  
- “Points” on the surface for better tangibility and non-slip purposes. |
<table>
<thead>
<tr>
<th>Name: ATTENTION SURFACE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shape:</strong> Unworked surface, bordered on 2, 3 or 4 sides by the elements 01, 02, 03, 04 and/or 05.</td>
</tr>
<tr>
<td><strong>Purpose:</strong></td>
</tr>
<tr>
<td>- A change of direction via a bend and/or T-junction and/or a crossing of paths;</td>
</tr>
<tr>
<td>- Point out an information tile;</td>
</tr>
<tr>
<td>- Preliminary warning for a warning tile</td>
</tr>
<tr>
<td>- Point out a ramp</td>
</tr>
<tr>
<td><strong>Details:</strong> Maximum 600 x 600mm unworked surface in the existing pavement.</td>
</tr>
</tbody>
</table>
Guidance path designed as a tile, where the whole guidance path, over the full width of 600mm, contrasts in colour compared to the pavement. Contrast difference between the whole path and the pavement is a minimum of 0.3, where the path is lighter in colour than the surrounding pavement (a positive contrast difference).

Guidance path designed as lines that are applied to the pavement (e.g. epoxy) or milled into the pavement (e.g. stainless steel), where the lines are contrasting in colour compared to the pavement. Contrast difference between the lines and the pavement is a minimum of 0.3, where the bars are lighter in colour than the surrounding pavement (a positive contrast difference).
2-3

**Warning surface** designed as tiles where the whole tile is contrasting in colour compared to the pavement. Contrast difference between the tiles and the pavement is a minimum of 0.3, where the tiles are lighter in colour than the surrounding pavement (a positive contrast difference)

2-4

**Warning surface** designed as blisters and applied to the pavement (e.g. epoxy) or milled into the pavement (e.g. stainless steel) where the whole tile is contrasting in colour compared to the pavement. Contrast difference between the blisters and the pavement is a minimum of 0.3, where the blisters are lighter in colour than the surrounding pavement (a positive contrast difference)
Possible cross-sections of bars
From top to bottom:
• Flat-topped bars, only with smooth floors (e.g. dimension stone)
• Rounded bar, suitable for rough floors;
• Truncated bar, suitable for rough floors.

Possible cross-sections of blisters
A guidance path consists of the path itself (width of 600mm) and on both sides of the path strips of 600mm that are free of obstacles.

Guidance paths can be applied in a curve. The minimum radius of the curve 10m.

A bend in a guidance path, smaller or equal to 15 degrees can be executed uninterrupted. With angles larger than 15 degrees an attention surface should be used. (see subjects 4.4 to 4.7).
An attention surface is placed at a corner or at the connection between two or more guidance paths. An attention surface is part of the guidance path, but is executed in the pavement surrounding the guidance path. The figures on this page show the attention surfaces at corners, crossings and bends.

A bend in the guidance path larger than 15 degrees should be executed with an attention surface.

Decision points in guidance paths are executed with attention surfaces.
When there is no natural guideline at the end of a guidance path (e.g. at the end of a platform) then the end should be marked with a warning surface of 600 x 600mm.
There should be the smallest amount of jumps in the guidance path for obstacles as is possible. When this is not possible (e.g. to avoid dangerous situations) then jumps can be applied. The maximum size of a jump is 900mm, this means that the maximum gap between both guidance paths 300mm is.

A jump in the guidance path where the difference between the paths is smaller than the width of 600mm of the path.

A jump in the guidance path where the difference between the paths is equal to the width of 600mm of the path.
A jump in the guidance path where the difference between the paths is at the maximum of 900mm.

When there is enough space then the adjoining example is preferred over the solution in figure 3-11. The minimum radius for a curve in the guidance path is 10m. See figure 3-2.
At those places where natural guidelines can be used, guidance paths should not be installed. This does not apply to public transport hubs. Here, guidance paths are always installed unless this is not possible. This should be judged on a case by case basis.

For the transition from a guidance path to a natural guideline and vice versa there should be an overlap of 600mm between the natural guideline and the guidance path.

When a guidance path runs parallel to the natural guideline at a larger distance than 600mm then there should first be a corner at a right angle to the direction of the natural guideline. This part of the guidance path should be at least 600mm long and should stop 300mm before it meets the natural guideline.
The route of the guidance path should guide through the door.

When the route of the guidance path runs via a revolving door, the path should arrive there where the doorway opens up. In practice this is usually at the left side of the revolving door because the direction of turning is usually counter clockwise.
A guidance path to a lift always runs until the lift door(s).
Size of a: (minimum of 1800mm)
1 traffic lane (or a segregated bike path) 1800mm
2 traffic lanes 2400mm
3 traffic lanes 3000mm
4 traffic lanes 3600mm

The direction of the guidance path before the warning surface gives the direction for crossing the road.

The attention surface of 300mm between the end of the guidance path and the warning surfaces can be omitted when the length of the guidance path that gives the direction of crossing is smaller or equal to 900mm.
Size of a: (minimum of 1800mm)
1 traffic lane 1800mm
2 traffic lanes 2400mm
3 traffic lanes 3000mm
4 traffic lanes 3600mm

The direction of the guidance path before the warning surface gives the direction for crossing the road.

When a road crossing is fitted with a traffic light then there should also be an audible traffic signal. The guidance path always arrives at the middle of the warning surface.

The traffic light stands at the intersecting lines of the centre of the guidance path and the centre of the warning surface.

The attention surface of 300mm between the end of the guidance path and the warning surface can be omitted when the length of the guidance path that gives the direction of crossing is smaller or equal to 900mm.
An oblique pedestrian/zebra crossing is only allowed when it is supported by an audible traffic signal. The direction of the guidance path before the warning surface gives the direction for crossing the road.
At road crossings where multiple lanes have to be crossed there should be a warning surface at every traffic lane (slow and fast traffic). The warning surface at a slow traffic lane (a bike path) should be laid up against the edge of the bike path.

At those places where the length of the guidance path before the warning surface is more than 1200mm there should be an attention surface of 300mm. Because of this there arises a guidance path of at least 900mm.
NB: The hereunder mentioned requirements are only applicable to those stairs at public transport hubs that are in the main pedestrian route and can be judged as accessible.

There should always be a warning surface at the top of the stairs.

A guidance path always ends at the right side at the top of the stairs.

The position of the guidance path with respect to the handrail is 300 – 600mm.

Between the guidance path at the bottom of the stairs and the front of the first step there should always be an attention surface of 300mm.

There should never be a warning surface at the bottom of the stairs.

A guidance path always ends at the left side at the bottom of the stairs.
When the handrail at the side of the guidance path continues across the intermediate landings then there is not a need to continue the guidance path on the intermediate landing. If the handrail at the side of the guidance path does not, then there should be a guidance path installed on the intermediate landing including the warning surface (for details see figure 3-26).

The handrail at the side of the guidance path continues across the intermediate landing.

The handrail at the side of the guidance path does not continue across the intermediate landing.
The handrail at the side of the guidance path continues across the intermediate landing.

The handrail at the side of the guidance path does not continue across the intermediate landing.
Passageways and tunnels are not considered as intermediate landings of stairs. This means that guidance paths should always be installed in passageways and tunnels. The guidance path in the figures on the left has been drawn in the middle, but the guidance path can also be installed 600mm from either the left or the right wall.
Variations on the guidance paths at passageways and tunnels shown in figures 3-33 and 3-34.
Variations on the guidance paths at passageways and tunnels shown in figures 3-33 and 3-34.
The course of guidance paths in tunnels when they connect to stairs that lead to the platforms.

The course of guidance paths in passageways when they connect to stairs that lead to the platforms.
At very wide stairs where the handrail has not been placed at the sides but elsewhere (e.g. the middle of the stairs) then the guidance path can be lead to the handrail. The details of the beginning and the end of the guidance path is the same as with standard sized stairs that are described in figure 3-26.
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Ramps steeper than 1:20

Ramps that are a maximum of 1:20 are considered “false flat” (gentle uphill) and are therefore not marked.

At ramps equal to or steeper than 1:20 (maximum height difference of 1m) the guidance path stops 300mm before the ramp, both at the top and at the bottom (attention surface).

There should be a continuous handrail on one side along the whole length of the ramp at 600mm from the guidance path.
At ramps slighter than 1:20 (and ramps at public transport hubs where the total maximum rise of 0,9m)

Supplementary provisions are not to be made regarding guidance paths at these ramps
When entrance gates for the public transport smart card are installed at a station, the guidance path always goes through the widest (accessible) gate. In the immediate vicinity of the gate should also be an information and SOS pillar.

When not entrance gates but smart card readers for the public transport smart card are installed at a station, these should be placed directly beside the guidance path (see figure 4-02). Guidance paths follow the main pedestrian route, but it is possible that it is not the same as the prevailed main route at the station. Because smart card readers cannot be placed in this main route the guidance path should run as close as possible past the smart card readers. In those situations where de solution in figure 4-02 is not possible, the solution given in figure 4-03 can also be applied.

When entrance gates for the public transport smart card are installed at a station, the guidance path always goes through the widest (accessible) gate. In the immediate vicinity of the gate should also be an information and SOS pillar.

When not entrance gates but smart card readers for the public transport smart card are installed at a station, these should be placed directly beside the guidance path (see figure 4-02). Guidance paths follow the main pedestrian route, but it is possible that it is not the same as the prevailed main route at the station. Because smart card readers cannot be placed in this main route the guidance path should run as close as possible past the smart card readers. In those situations where de solution in figure 4-02 is not possible, the solution given in figure 4-03 can also be applied.
Information points should, if possible, be placed directly beside a guidance path.

An information point should be placed directly beside an information surface. The maximum distance between an information surface and an information point is 300mm.

When it is not possible to place an information point directly beside a guidance path, a separate path (information guidance path) should be laid to the information point. This path always begins with an information surface (600 x 600mm).

On centre platforms it should be possible to reach information points from both tracks. In this case the information point is placed directly beside the guidance path at an attention surface.

The corners of the information guidance path is similar to the standard connection with multiple paths (see 3: solutions for cornering).
Size a:  
Tram: 700mm  
Light rail: 700mm
<table>
<thead>
<tr>
<th>Glossary</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG-Raad</td>
<td>The Dutch Council of the Chronically ill and the Disabled. It is an umbrella organization, consisting of associations of people with a chronic illness or a disability. The activities are focussed on the realisation of a society which enables people with a disability or a chronic illness to participate as valuable citizens, based on equal rights, equality of chances and equality of obligations.</td>
</tr>
<tr>
<td>Contrast</td>
<td>In this guideline contrast is given with the Weber fraction. It is calculated using the following formula: $2 \times \frac{(L_1 \times L_2)}{(L_1+L_2)}$, where $L_1$ is the luminance (or the reflectance) of the facility and $L_2$ is the luminance of the surroundings.</td>
</tr>
<tr>
<td>(Information and) SOS pillars</td>
<td>These pillars are located at a large part of the train and metro stations and before and after every entrance gate for the public transport smart card in the Netherlands. These pillars provide two services: a top button, labelled in blue, that one can press for information (e.g. arrival time of a train) and a button, labelled in red, for emergencies. These pillars are accessible for the visually impaired by using Braille on the buttons and there is also a telecoil in the pillar for people with a hearing impairment.</td>
</tr>
<tr>
<td>ITS-criteria</td>
<td>The International Symbol of Access (Dutch short text: ITS) is represented by a blue square overlaid in white with a stylized image of a person using a wheelchair. It shows that an object is accessible for the disabled. In the Netherlands the ITS-criteria are made by the CG-Raad and laid down in a Manual of Accessibility. The inspections are carried out by PBT.</td>
</tr>
<tr>
<td>Projectbureau Toegankelijkheid (PBT)</td>
<td>This is the (technical) consultancy to the CG-Raad regarding accessibility. It advises by order of e.g. architectural firms, property developers, public transport companies, local and national authorities.</td>
</tr>
<tr>
<td>Viziris</td>
<td>It is the network organization of visual impaired people in the Netherlands. It has 6 member organizations that represent more than 600,000 blind and partially sighted people in the Netherlands. The mission of Viziris is to achieve full participation of visually impaired people in everyday life and to foster fully independent living.</td>
</tr>
</tbody>
</table>
Under the authority of:

CG-Raad
Chronisch zieken en Gehandicapten Raad Nederland