

**Summary:**

# Evaluating standards and practices for facilitating visually impaired people's mobility in the built environment

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*Making transport systems accessible and usable for visually impaired people is an important part of efforts to achieve an inclusive society. The clients wanted an evaluation of standards and practices for facilitating wayfinding and orientation in transport systems. The purpose was to: obtain an updated overview of existing standards, handbooks and guidelines; gather knowledge on how these work in practice, and; gain input to necessary changes that may improve the accessibility and usability of transport systems for visually impaired people. We found clear potential for improvements, regarding the recommendations given, as well as how they are presented. Regarding practice, there is a need for improving knowledge among involved actors, as well as changes in how the planning- and design-processes are conducted. Our most important finding is, however, that there is a lack of systematic and research-based knowledge on how visually impaired people use elements of the physical environment when they orient and find their way. This might also be the main explanation for weaknesses found in standards, handbooks and guidelines, as well as in practice.*

## Background

The National Public Roads Administration (NPRA) and The Norwegian Building Authority (NBA) wanted to evaluate standards and practices for facilitating wayfinding and orientation for visually impaired people in transport systems. The purpose of this work was to evaluate standards, handbooks and guidelines, as well as practice, in order to arrive at recommendations on what can be done to make the built environment more accessible and useable for the visually impaired.

The task of the project was twofold:

- a) To review current standards, recommendations, knowledge and practices concerning wayfinding in transport systems, with particular emphasis on inclusive design and use of tactile paving, where the entire travel chain is considered
- b) To generate recommendations for further work and/or to identify the need for changes to recommendations and requirements concerning inclusive design and use of tactile paving in transport systems, where the entire travel chain is considered

In Norwegian standards, handbooks and guidelines concerning facilitation of the built environments in ways making them accessible for visually impaired people, one distinguishes between natural and artificial leading elements or lead lines. A lead line is often defined as a chain of natural and built leading elements that is easy to follow for visually impaired people, where elements provide visual and tactile information

that are easy to recognise and understand. The lead line should be detectable from other surfaces by the foot or with the help of a cane. Elements naturally belonging in the environment, such as facades or kerbs can form a lead line. Where such natural leading or guiding elements are lacking, artificial or built lead lines can be used. In our work, artificial or built lead lines are defined in the same way as tactile walking surface indicators or tactile paving in the English language literature. They are constructed solely in order to guide or warn visually impaired people, and they have a standardised design. We distinguish between guiding path surfaces, warning surfaces and information surfaces.

## **Understanding of the problem**

In order for the built environment to be accessible and useable for visually impaired people, certain qualities are required. There are various ways of explaining why the built environment does not always meet these requirements. In this project, we first examined the quality of standards, handbooks and guidelines, focusing on the following properties:

- whether the standards, handbooks and guidelines present recommendations that actually point in the direction of ensuring usable and accessible environments for visually impaired people
- whether they are consistent with each other
- whether they are usable, clear and understandable to those who use them (designers, engineers, architects, etc.)

We have also examined whether attributes of practitioners and practices can contribute to explaining why environments are built in ways making them less accessible and useable for visually impaired people, and focused on:

- the knowledge and understanding being the basis for practice
- the use of standards, handbooks and guidelines (if and how they are used)
- perceptions of weaknesses in standards, handbooks and guidelines
- winter, snow and ice - what the problems are and how they can be solved
- other considerations that are given higher priority
- planning- and design-processes
- other factors affecting usability of the built environment
- disagreements and lack of knowledge

We have investigated and analysed how and to what extent these factors may explain why environments which form part of transport systems are built in ways which make them not accessible and useable for visually impaired people. On this basis, we have provided recommendations for necessary changes, as well as further work.

## **Methodology**

The clients asked seven specific questions to be answered by the project. In order to be able to answer these questions, we conducted documented studies (Norwegian, Scandinavian, British and international standards, handbooks and guidelines), literature reviews (relevant research literature, etc.), expert interviews, and interviews with actors responsible for planning, designing, building, and operating built environments. An important part of the work has been to present preliminary findings in two seminars, where relevant stakeholders have provided input to our

work. On this basis we have answered the questions from the clients, as summarized below.

## **How can we ensure inclusive design as the main solution?**

We have arrived at several recommendations for making the built environment more usable for the visually impaired, mainly through inclusive design and natural reference points. The main recommendations can be summarized as follows.

One is that standards, guidelines and handbooks should give more room for describing how visually impaired people orient themselves and find their way, which elements of the environment they can use as reference points, and thus how the environment should be designed to be usable for them.

Another is that standards, handbooks and guidelines need to be more detailed and concrete when it comes to recommendations and descriptions of inclusive design and use of natural reference points.

A third recommendation is that those who plan, design, build, operate and maintain the built environments are given better access to knowledge about how to design usable environments for the visually impaired, through inclusive design and use of natural reference points.

## **In which situations are tactile walking surface indicators necessary?**

The use of tactile walking surfaces should be restricted to situations where they actually are necessary and useful. Tactile and visual information should, nevertheless, be used to warn of danger, such as in front of stairs and pedestrian crossings. We have arrived at the following recommendations.

One is that standards, handbooks and guidelines need to be clearer in their recommendations about in which situations tactile paving should – and should not – be used. This mainly relates to specifying what *the motivation* should be to lay tactile paving (and especially guidance paths) – how they are intended to be used.

One should also consider how much attention and space to allot for descriptions and examples of tactile paving compared to how much attention and space is used for description and examples of inclusive design allowing easy orientation and wayfinding without using guidance paths. At present there is an imbalance in favour of tactile paving, which may give the impression that this should be the preferred solution.

Another approach is to seek to provide planners and others a better understanding of how visually impaired people orient themselves and find their way, as well as how and to what extent they use tactile paving (especially guidance paths). Evidence in this field is, however, thin.

A final, but important, recommendation is to investigate the mechanisms which cause planning and design processes to arrive at solutions that involve the laying of tactile paving more often than what would seem to be desirable and necessary. We have found that the ways in which user consultations currently work, in particular the various actors' understandings of the roles that users are supposed to play in planning and design processes, may be an important mechanism explaining this.

## **How should the tactile walking surface indicator systems be designed?**

There is a high degree of correlation in the recommendations given on tactile walking surfaces in various national standards, manuals and guides. Nevertheless, we still found discrepancies and shortcomings that call for improvements. We have arrived at several recommendations that, if followed, could contribute to crosswalks, intersections and systems of tactile walking surface indicators being designed to be more consistent, usable and safe.

Firstly, it is important to continue the ongoing work of standardising systems for tactile surfaces. This should also include correction and updating of certain standards, handbooks and guidelines, and to take outdated guidelines, etc. out of circulation.

We also noted that especially NPRA's Handbook 278 needs to be clearer in its recommendations regarding intersections and pedestrian crossings. There should also be a review of the illustrations in Handbook 278.

Moreover, there is a need for better descriptions and illustrations on connections between new and existing systems, and between tactile surface paving and natural reference points.

It has also been pointed out that standards, handbooks and guidelines should include recommendations and descriptions of how to solve more, and more complex situations, than the few and simple ideal situations illustrated and described at present.

It would also be an improvement if the handbooks, etc. justify the recommendations concurrently, and describe possible consequences of deviating from these recommendations. This would mainly involve describing how visually impaired people are supposed to use and benefit from the tactile information (also including kerb drops). However, the evidence related to how visually impaired people can and do use tactile paving systems, in which situations they are useful, etc. appears to be thin.

## **What materials should be selected to establish sufficient visual contrast?**

The national standards, handbooks and guidelines do not provide clear recommendations on what materials should be selected to ensure and maintain contrast. There is also a general agreement that there is a lack of accessible and systematic documentation of the contrast quality of various materials.

Hence, we cannot answer the question of which materials should be used to ensure good contrast. Instead, we point out that this is an area where there is a lack of documented and accessible knowledge, and we recommend establishment of greater knowledge-sharing and the conduct of further systematic research.

We also found that the standards, handbooks and guidelines give different recommendations with respect to contrast. Several experts and some practitioners find that contrast requirements should be harmonized and standardized. However, this requires more knowledge of the case matter.

## **What materials should be selected to ensure resistance related to operations and maintenance?**

We found that national standards, handbooks and guidelines do not give clear recommendations regarding which materials to choose. Further, they do not provide descriptions of various materials' strengths and weaknesses on which those planning and designing the built environment can base their own assessments. Further, we have not found accessible and systematic documentation on various materials' resistance in the literature. We found, however, that there is general agreement that natural materials such as granite, steel and linoleum (indoors) are more resistant than for instance concrete.

In order to contribute to changes towards use of more durable materials in future projects, we recommend that more systematic research is done on the durability of various materials (also with respect to winter maintenance), and how much wear and tear you can expect in various types of materials. This knowledge should be presented in guidelines etc. in ways that allow for calculations of the cost-effectiveness of choosing different materials, in the short as well as the long term perspective.

Standards, handbooks and guidelines should also request assessments of the materials' durability, not least for safety reasons.

## **Which supplements are necessary in winter?**

It is commonly understood that ensuring that the built environment is useable in winter is necessary but difficult. It would require a large increase in the intensity of winter maintenance (brushing, ploughing, salting, thawing) if the usability of the transport environment for everyone, everywhere and always is to be ensured. An interesting development project is currently being conducted under the auspices of the NPRA, which should provide useful input to the discussion.

It was also suggested that we should maybe think of the system of orientation and wayfinding in winter being a different one to the system used in summer, rather than attempting to make the summer solutions usable in winter. This is an interesting thought.

The Norwegian winter issue is not unique. It may therefore be fruitful if Norway cooperates with other relevant winter countries to compare solutions and experiences, and to jointly perform testing, development and research in this field<sup>1</sup>.

## **What costs are associated with current recommendations and any proposed new recommendations?**

This question can be answered in many different ways. We have not attempted to calculate the actual costs, but rather to say something about how our recommendations will contribute to higher and to lower costs.

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<sup>1</sup> See <http://www.wintercities.com>

The main finding is that most of our recommendations are likely to lead to reduced costs and increased benefits, especially if considering a longer time perspective, if including operating and maintenance costs, and if including benefits for groups other than visually impaired people. The costs associated with our recommendations revolve mainly around changes to standards, handbooks and guidelines, dissemination of knowledge, training and research.

## **Need for more knowledge and research**

Our most important finding, as we see it, is that there is a lack of systematic and research-based knowledge on how blind and visually impaired people use various elements of the physical environment when they orient and find their way. Our strongest recommendation is hence that more systematic research on these issues is conducted, and that this knowledge is made available to practitioners. This regards:

- how sight impaired people orient and find their way in complex built environments, in summer and winter
- how and to what degree sight impaired people use various natural and artificial leading elements when orienting and finding their way, summer and winter
- which types of discrepancies, errors and omissions serve to reduce the usability and increase the risks for the users

Institutions engaged in mobility training for the blind and visually impaired may be useful partners in such work.

As mentioned above, there is also a lack of documented and available knowledge about contrast quality and resistance to wear of various materials, as well as how to make transport systems more usable under winter conditions. Such knowledge should be developed and disseminated. Finally, we mention the need to study the planning and design processes to clarify the mechanisms contributing to the physical environment being designed in ways that are not optimal in terms of usability and safety for the visually impaired.

If professionals do not have scientific and research-based knowledge to draw on and refer to, they will not be able to know or to present arguments for what does and does not provide usable environments for the visually impaired. Aims to ensure usable environments for this group, or to restrict the use of artificial guidance systems, can hence more easily be down-played in the planning- and design-processes.

Improving the systematic and research-based knowledge provides a potential for improvements which - if exploited - can contribute to more usable built environments for visually impaired people in the future.