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Paper 61**DESIGNING FOR DISABILITY – A DANISH CASE STUDY ON DR BYEN**

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Abstract

Considerations for the disabled have become increasingly important in most countries. The building codes set a number of requirements with a minimum standard, but these have been supplemented by various recommendations and guidelines. The requirements and recommendations vary from country to country. In Denmark a Danish Standard (DS 3028) with detailed recommendations on accessibility was issued in 2001. This paper gives a description of the way these recommendations were put into action in a current Danish building project. DR Byen is the new headquarters for DR (Danish Broadcasting Corporation) in Copenhagen, which is under construction at the moment. The project includes 130.000 sq. m divided into 4 parts, which have been designed by 4 different design teams. The complex has several areas with public access; including a concert hall and various studios. The paper provides an evaluation of the activities and measures in relation to disability considerations and draws conclusions in relation to the need of increased awareness and competencies on accessibility in the design process.

Keywords: *Inclusive design, disability, accessibility, standards, media building*

INTRODUCTION

The concept of accessibility has over the last decade become increasingly important in relation to disability and the built environment. The concept has changed the focus from dealing mainly with physical access for wheelchair users towards enabling people, including persons with disability, to participate in the social and economic activities for which the built environment is intended. Accessibility is a basic feature of the built environment concerning the way in which houses, public buildings, places of work etc. can be reached and used.

The purpose of this paper is to present a case study from a huge building project in Denmark, where comprehensive requirements for accessibility was integrated in the design process by involving a specialist architect experienced with accessibility aspects as a client consultant. The paper makes an evaluation of this process and makes conclusions in relation to the need for increased awareness among both clients and designers, as well as specialist competencies among designers.

The author of the paper was until spring 2005 actively involved in the case study project as deputy project director with responsibility for, among other things, the client coordination of design in relation to disability. The paper has been developed in collaboration with the specialist architect consultant for the client in relation to disability considerations.

CODES, STANDARDS AND GUIDELINES

The Danish building codes from 1995 (Boligministeriet, 1995) introduced for the first time in Denmark accessibility as an essential consideration in building planning. Earlier safety and health were the main consideration in the planning of building layout according to the building codes. The building codes from 1977 had, as a first step, introduced requirements for direct level access.

The development of increasing the focus on accessibility was international brought forward by the United Nations, who in 1993 agreed on Standard Rules on the Equalization of Opportunities for Persons with Disabilities (United Nations, 1994). A few years earlier the American government had passed ADA - The Americans with Disabilities Act (U.S. Department of Labor, 1991). The United Nations' Standard Rules have been officially adopted by, among others, all member states of the European Union. However, it is the general impression that there is a long way to go before the Standard Rules are fully implemented in most countries. This is at least the case in Denmark, although an increased political awareness is recognized.

The current building codes from 1995 contain a number of specific requirements in relation to accessibility, but also several requirements of intentional character. The Danish Standard organization issued a handbook (not a formally agreed standard) on accessibility with guidelines in 1995, but this only focused on outdoor areas, which was later supplemented by a collection of examples on design of recreational areas (Dansk Standard, 1995 and 1999). To supplement the building codes a number of Danish handicap organizations issued guidelines in 1996 on implementing the requirements in the building codes (Center for Ligebehandling af Handicappede, 1996).

More recently an official Danish Standard on accessibility was issued in 2001 (Dansk Standard, 2001). It is a comprehensive document with detailed requirements on all aspects of accessibility in relation to disability and the built environment. The Danish handicap organizations want the standard to become compulsory as part of the building codes, but the Danish government has decided that it should be voluntary for building clients to implement the rules. Thus the standard has the status of a guideline with recommendations. A number of guidelines on specific types of buildings have been published in recent years in Denmark, for instance for housing, museums, sports facilities and for special groups of people, for instance giving guidance to building clients and recommendations on accessibility for the blind and the elderly (Boplan, 2003).

There seems to be a lack of international standards on accessibility. There are a number ISO- and EN- standards on technical aids for handicapped, for instance walking aids, wheelchairs and beds. There are also national standards on accessibility and the built environment in various countries, but no comprehensive international standards on accessibility has yet been adopted. The only European standards concern accessibility to lifts in relation to safety rules for the construction and installation of lifts (Dansk Standard, 2003) and tactile identifiers (ETSI, 1998).

A general introduction to Danish disability policy written in English was issued in 2002. (Danish Disability Council, 2002). The Danish government issued a new action plan in relation to disability in February 2003 (Regeringen, 2003). Among the most important

initiatives in relation to accessibility and the built environment was a test project with training consultants in accessibility, introducing an accessibility label for tourism facilities – recently broadened to all buildings with public access – together with a web portal (see <http://www.godadgang.dk> for further information in Danish and English) and changing the law and codes on building to cover some rebuilding project that must comply with certain accessibility requirements.

These actions have all been implemented. The amendments to the building law and codes came into force on 1. January 2005. They cover buildings with public access and buildings for service and administration. Rebuilding projects should implement direct level access, parking and toilets for disabled – and lifts only for buildings with public access - if the cost hereof does not exceed a certain percentage of the total rebuilding project cost.

DR BYEN

The building project in this case study is a new headquarters for DR which is the main public service company in Denmark broadcasting radio and television. The project was initiated in 1999 and started with an international master plan competition in 2000 won by the Danish architect company Vilhelm Lauritzen A/S. The master plan is divided into four building segments dissected by an artificial canal crossing the site from north to south and a 12 meter wide connecting building – the internal street – from east to west, including an enclosed bridge over the canal on the second floor level.

Vilhelm Lauritzen A/S has been responsible for the design of segment 1, which is the largest segment, including several large television and drama studios, the internal street and the landscaping. The other segments have had separate architectural competitions. Segment 4 with the concert hall was won by the French architect Jean Nouvel, segment 2 by the Danish architect company Dissing + Weitling and segment 3 by a joint venture of two small Danish architect companies Gottlieb & Paludan + Nobel.

The total project covers 130.000 sq. m including full basement. Except for the concert hall the complex is in general six stories high over terrain. Construction started early 2002 and building work on the first segment was finish in spring 2005, but installation of technology will not be finished before early 2006, when staff will start to move in. The other segments are under construction and will be finished in 2006 except for the concert hall. By the end of 2006 all DR's staff in the Copenhagen area is expected to be relocated to the new multimedia building.

DR has established a big internal client organization headed by a project director and with a combination of specialists from consulting companies, project employed and DR staff. The client organization is responsible for the overall project management in all stages of the project, including site management.

DR has insisted on the implementation of environmental management, in accordance with ISO 14001, in the building project. The construction brief contains a large number of requirements in relation to environmental sustainability, including requirements to avoid hazardous products. Where possible, building materials with an indoor climate label should be used. In relation to disability this is of particular importance for people with allergic diseases.

Requirements on accessibility

In the first versions of the construction brief, from 2001, the requirements in relation to accessibility only referred to the building codes except for the external areas, where the earlier mentioned guidelines (Dansk Standard, 1995 and 1999) were made compulsory. These versions were used as a basis for the design of segment 1. Later on the comprehensive Danish standard from 2001 (Dansk Standard, 2001) were included in the construction brief and has been a basis for the design of the other segments, the internal street and the landscaping.

The text in the latest version of DR's general construction brief is as follows (in a non-authoritative English translation, including titles of the Danish publications; see references for original titles):

"It shall be possible for disabled people, even without help, to enter and leave the buildings by normal access routes, terraces and personnel entrances and to move around the areas surrounding the complex. It shall also be possible for disabled persons to move around and orient themselves in the buildings without special measures. Refer also to "Danish Building Regulations 1995 – About access requirements" (Center for Ligebehandling af Handicappede, 1996) and "Accessibility for all" (Dansk Standard, 2001) which applies to the whole building.

Recreational areas should be laid out such that disabled persons can access and use these areas. Outdoor areas shall be laid out in accordance with Danish Standard's "Outdoor areas for all - planning and design guidelines for providing access for disabled persons" (Dansk Standard, 1995), "Recreational areas for all – collection of examples" (Dansk Standard, 1999) and " Accessibility for all" (Dansk Standard, 2001)."

The responsibility to fulfil the requirements in the construction brief was designated to the architects of each segment in their contracts with DR.

THE IMPLEMENTATION PROCESS

DR's focus on accessibility was increased in spring 2003 following a letter from the chairman of DSI (De Samvirkende Invalideorganisationer – an umbrella organization for 31 different organizations in relation to disability in Denmark) to the chairman of DR's board. DSI had been contacted by one of the architects on DR BYEN, who wanted advice on disability considerations in the design. DSI informed DR in the letter that they did not have the necessary competencies to act as a consultant and recommended DR to involve a specialist handicap consultant in relation to the design of DR BYEN. Particularly, as the division of the project between different design teams causes a need for coordination between the different segments.

To clarify the situation DR arranged a meeting in June 2003 with representatives from DSI, handicap specialists, the architect teams and the client organization on DR BYEN. At the meeting DR outlined the requirements on accessibility in the construction brief, and the architects teams explained how they were working to comply with these requirements. The meeting revealed some problems in the design, for instance doors to handicap toilets opening inadequately, but the general conclusion was that DR was taking consid-

erations for accessibility serious and had come a long way to implement the requirements in the Danish standard.

However, the need for involving a specialist consultant to coordinate the accessibility aspects on the different segments was not clarified at the meeting. DR's viewpoint was that the responsibility for the design should stay with the design teams. Following the meeting DR questioned each of the design teams, how they would make sure that their design complies with the requirements and what were their competencies to do so. The responses were very different. One team immediately reviewed their project on accessibility. Another team would involve a specialist consultant in the design work. Yet another team stated that they had the necessary competencies in their team without documenting it. The last team did not come up with a clear answer except that they would comply with the requirements.

DR decided on this basis that there was a need for involving a specialist consultant on the client side to review the design from the different teams to make sure, that the requirements were fulfilled. In the autumn of 2003 DR therefore contracted Erik Bahn and his architect company. He was one of the specialists participating in the meeting in June 2003 and he has extensive experience with designing for disability as well as good working relationships with Danish handicap organizations.

Immediately afterwards a review was made of the design projects of all the segments, independent of their stage of development. Later on, review of accessibility has been part of the general client review at the end of each stage of the design development, i.e. conceptual design, schematic design and detailed design. During spring 2005 the reviews of the detailed design of the four segments was almost finished, but reviews of the concert hall, the internal street and landscaping is still ongoing.

The reviews have mainly taken place as a check of project drawings from each design team providing written comments, which the design team replies on and the result is checked in the review at the next stage. On certain issues there have been meetings with a design team and the specialist consultant. In special cases the specialist consultant has produced sketches with possible solutions and improvements. The specialist consultant has also provided references to specialized information to the design teams.

Below the main focus areas for the reviews on accessibility are described together with some examples of the most difficult problems in the process.

Parking

The supply of handicap parking spaces is a requirement in the building permit for the project. The main problem has been to get handicap parking placed near the main entrances. The specialist consultant has provided information of the necessary sizes and number of parking spaces for different types of handicap vehicles. The landscaping project is still under design development.

External access

The external access is particular difficult because the master plan holds an idea of placing the different buildings on a platform raised 30 cm above the surrounding terrain. This has

made it necessary to integrate ramps for wheelchairs around the buildings. Direct level access has been made possible to the main entrance by raising the road and walkway locally in front of the entrance. Entrances to the building with the concert hall will also have direct level access.

Another aspect of external access is accommodating for people with reduced vision. The dialogue between the landscaping architects and the specialist consultant is ongoing in this respect.

Internal circulation

The concerns for internal circulation areas have mainly been to make sure that all corridors are 1,50 m wide, which is required in the Danish standard, while the requirements in the building codes are only 1,30 m for escape routes. Besides, the possibility to manoeuvre wheelchairs in other parts of the buildings has been checked.

Doors

The width of doors has also been an issue. Particularly because doors to production facilities for radio and television need to be soundproof, which reduces the effective opening space. This has been a problem in relation to access for wheelchair users.

Lifts and stairs

This has been one of the most difficult areas with considerable dialogue between the specialist consultant and the design teams. In relation to stairs there are specific requirements for the dimensions of steps, distance between steps, contrasting fronts of steps and shape of handrails, but often these requirements are unknown or neglected by the design teams. In relation to lifts there are similarly specific requirements on the dimensions of the car and the placing and design of control panels. Particularly the requirements of the control panels are generally unknown or neglected – even by producers of lifts. The new European standard in relation to lifts (Dansk Standard, 2003) has not yet been generally recognized. The requirements on control panels have also shown to be conflicting with some architects design ideas.

Due to this it has been hard work to get the requirements on stairs and lifts fulfilled. However, the specialist consultant also has an important role in interpreting the requirements and deciding what is needed and what is necessary to fulfil the intentions in the requirements on accessibility. Not all lifts or stairs need to comply with the accessibility requirements for disabled as long as all parts of the building is satisfactorily accessible.

Toilets

Although the requirements for layout of toilets are very specifically described in the Danish standard on accessibility, there has still been a need for a thorough review of the layout in the project design. Besides, the necessary number of toilets for disabled in special areas, for instance the staff restaurant, has been an issue of debate – also between the client and the specialist consultant.

Seating in concert hall

An area of strong concern among the representatives from organizations of disabled is the seating possibilities for wheelchair users in the concert hall. This became clear at the

meeting in June 2003. The design team had planned areas for wheelchairs in the concert hall, but the representatives of the disabled found it very important, that wheelchair users could be seated next to their not disabled family members or friends. DR decided, that this request should be followed, and the design team plan that ordinary seats can be replaced with wheelchairs in specific rows in the concert hall.

Hearing aid in assembly rooms

In assembly rooms installation of a building integrated hearing aid system is required. This is usually designed as a loop wire system with one wire circuit around the perimeter of the room in question. However, such a system will create interference with micro-phones in radio and television studios as well as music facilities. It has therefore been a technical challenge to find systems suitable for DR's building.

The result has been a combination of conventional systems and so-called super-loop systems. These consist of a number of loops each covering a specific part of the room and each loop can be activated according to the actual need. In the concert hall both systems are used while super-loop systems are used in other music facilities and big studios with audience. A large meeting room has a conventional system.

It has been discussed whether building integrated hearing aid should be installed in foyer areas and the staff restaurant. The result is, that such systems are installed in two designated areas of 50 sq. m each in the concert hall foyer to be used for audience seating during foyer concerts. In other cases temporary systems will be put in place as needed.

Glass doors and walls

In modern buildings glass has become a very popular building material and that creates problems particular for people with reduced vision. Therefore, marking of glass doors and glass walls nearby has to be implemented. The main problem in the review has been to get the design teams aware of this and specify the areas where marking is needed.

Signage

The signage system in the buildings is being designed by DR BYEN's client organization with involvement of DR's internal design department. The specialist accessibility consultant collaborates with the person responsible for the signage project and has given advice; for instance on size of typography and color contrasts. Use of tactile maps for external overview signage is under consideration.

CONCLUSIONS

Accessibility is an essential concept in relation to inclusive design and it has become increasingly important over the last 10 years – both politically and in practical building design. The requirements for accessibility have at the same time become much more comprehensive and increasingly complex. It has become a challenge for designers to find, understand and implement the huge amount of recommendations and guidelines.

However, there seems in general to be a lack of awareness among designers in relation to the need to take all necessary considerations for accessibility into account. Most architects and engineers have not been educated in this field and the complexity calls for involvement of specialists with specific competencies in relation to accessibility.

It is very important that considerations on accessibility are taken during the concept design development. If the requirements are implemented at an early stage, it becomes much easier to comply with them. The cost of the necessary measures will also be less if they are an integrated part of the building design. Many measures for accessibility for the disabled give general qualities to the building with benefits for all users over the building's lifetime. For instance wider corridors and stairs make transport of furniture and equipment much easier. In contrast, if measures for disabled have to be implemented after the building is finished, it becomes very expensive. The case study shows that the cost of fees for involving a specialist consultant on accessibility is very small, approx. 0,1% of all consulting fees and 0,01% of the total budget.

Besides DR BYEN, a new opera house opened this year and a new theater building is under construction in Copenhagen, both have involved a specialist consultant on accessibility (Rødsgaard, 2005). This follows a public criticism of a recent extension of the Danish National Art Museum, where accessibility has not been considered adequately.

The involvement of a specialist consultant makes sure that the essential knowledge is integrated in the project team to comply with the requirements on accessibility. It also gives the possibility to optimize the design by interpreting the requirements and deciding what is needed and what is necessary to fulfil the intentions in the requirements on accessibility. This requires professional experience, but education of designers in accessibility is a very important starting point to get an appropriate number of specialists. Furthermore, an increased awareness among clients on accessibility is important to make building design companies and individual designers give this due consideration.

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