



HIGHWAYS DEPARTMENT

GUIDANCE NOTES
ON
DESIGN OF COVERS FOR
WALKWAYS AND PASSENGER SHELTERS

CONTENT

1. INTRODUCTION
2. GENERAL DESIGN CONSIDERATIONS OF COVERS FOR WALKWAYS AND PASSENGER SHELTERS
3. SUN SHADING AND RAIN SHELTERING
4. MAINTENANCE
5. AESTHETICS
6. CHOICE OF MATERIALS
7. ENQUIRIES
8. REFERENCES

APPENDIX A - EXAMPLES OF COVERS FOR WALKWAYS

APPENDIX B – EXAMPLES OF COVERS FOR PASSENGER SHELTERS

APPENDIX C – WALKWAY COVER WITH FASCIA

1. INTRODUCTION

- 1.1 Highways Department (HyD) maintains over a thousand covers for walkways and passenger shelters over the territory. These covers for walkways and passenger shelters have been designed and constructed in different structural forms and materials to meet the project specific requirements. To cope with the development of the society, it is expected that the number of these highway structures will further increase in the near future. From time to time, suggestions and complaints from members of the public about the functionality of some of the existing covers for walkways and passenger shelters have been received. There are concerns about their effectiveness for sun shading and rain sheltering. This document is therefore prepared aiming to address these issues, and provide general guidelines on the design of the layout and choice of materials for covers for walkways and passenger shelters with a view to enhancing the effectiveness of sun shading and rain sheltering.
- 1.2 For the purpose of this document, covers are categorized into two types:
 - (a) covers for walkways, such as footbridges, subways, at-grade walkways and the like; and
 - (b) covers for passenger shelters, such as bus shelters, taxi stands, bus-bus interchanges, public transport interchanges and the like.
- 1.3 Since the design of the layout and choice of materials for covers for walkways and passenger shelters are project specific, the information provided in this document is meant for guidance and reference only with a view to enabling designers to achieve a reasonable design from the functional, maintenance and aesthetic points of view. The information is not meant to be exhaustive. Designers should carry out their design to suit site conditions while meeting project requirements.
- 1.4 This document is applicable to covers for walkways and passenger shelters maintained by HyD.

2. GENERAL DESIGN CONSIDERATIONS OF COVERS FOR WALKWAYS AND PASSENGER SHELTERS

- 2.1 Covers for walkways and passenger shelters are primarily intended for providing sun shading and rain sheltering. Therefore, covers should be so designed to achieve these functional purposes.
- 2.2 Other considerations on the design of covers include maintenance, aesthetics and the choice of materials. As far as maintenance of covers is concerned, due consideration should be given to the use of durable materials and ease of replacement of damaged components. Advice from the respective Regional Offices of HyD should be sought on maintenance aspects. In regard to aesthetics, covers should be designed to blend in harmony with the overall aesthetics of walkways and passenger shelters as well as the surrounding streetscape. The alignment and layout should also be designed to minimize detriment to the existing landscape and retain as many trees as possible. The design should be accepted by the Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS). Advice from the Landscape Division of HyD could be sought on aesthetic aspects prior to the submission to the ACABAS.
- 2.3 The structural design of covers should comply with the Structures Design Manual for Highways and Railways (SDM) (Ref. 1). Advice from the Bridges and Structures Division of HyD should be sought on structural design aspects.
- 2.4 Covers should be designed so as not to cause impediment to pedestrian circulation and adjacent facilities including any potential future developments. Reference should be made to the Transport Planning and Design Manual in respect of clearance and width requirements (Ref. 2). Advice from the respective Traffic Engineering Divisions of Transport Department should be sought on the alignment, layout, headroom and width of covers as well as other traffic aspects.

- 2.5 A modular design approach should be adopted as far as practicable in designing covers. Components should be standardized, fabricated off-site and assembled on-site by bolted connections. This approach would facilitate faster construction, and reuse of modules for new locations of covers if required.
- 2.6 The following aspects should also be considered in the design of covers:
- (a) Renewable energy technologies: depending on the site conditions and scale of covers, the adoption of renewable energy technologies (e.g. photovoltaic panels) should be considered.
 - (b) Security: covers should be designed such that people should not be screened from view to deter crime. People should be prevented from trespassing on the top of covers.
 - (c) Seats: depending on the availability of space, the provision of seats should be considered for passenger shelters, long walkways or walkways leading to premises such as hospitals, elderly centres and the like.
 - (d) Sun-shadow analysis: analysis including existing available nearby shade (e.g. trees and structures) for assessing different scenarios of daily and seasonal changes of different sun angles should be considered.

3. SUN SHADING AND RAIN SHELTERING

- 3.1 Covers made of transparent or translucent materials would allow penetration of natural light and thus evoke a sense of openness and reduce lighting costs. However, there is a need to balance the extent of sun shading and natural lighting through the covers. For walkways, although pedestrians are moving and do not normally stay long on walkways, sufficient sun shading should be provided for covers in order to create a comfortable walking environment for pedestrians, particularly during the hot summer days in Hong Kong. Therefore, covers for walkways should preferably be made of opaque materials, with the total extent of

transparent or translucent panels being limited to about one-third of the walkway width. The transparent or translucent panels should preferably be located on the sides rather than on the middle portion of the covers. Transparent/translucent panels arranged in a scattered pattern or skylights may also be considered. Suitable sun shading should also be provided for covers where pedestrians may stay long, for instance, long walkways where it takes time for pedestrians to go from one end to the other end, at locations of walkways where pedestrians are likely to congregate (e.g. lift waiting areas) or take rest (e.g. areas with benches), and walkways leading to premises such as hospitals, elderly centres and the like. Examples of covers for walkways are shown in Appendix A.

- 3.2 For passenger shelters, passengers may need to stay long under the covers for rest or waiting for the arrival of transport. If transparent or translucent materials are used, passengers would be subject to prolonged sunlight and undesirable heat. Therefore, the use of transparent or translucent materials should be avoided as far as practicable and covers should be made of opaque materials. Examples of passenger shelters are shown in Appendix B.
- 3.3 The design of covers for walkways and passenger shelters should be site specific taking into account the site context, sun effects, surrounding environment and landscape, sun shading provided by existing buildings, structures and facilities in the vicinity, width of covers, etc. The extent of transparent/translucent and opaque materials, and their locations on the covers described in paragraphs 3.1 and 3.2 above serve as general guidelines only which may be varied to meet the specific project design requirements.
- 3.4 The effectiveness of sun shading and rain sheltering would be affected by the headroom of the covers. Given the same design of covers, higher headroom would reduce the effectiveness of sun shading and rain sheltering. Thus, minimum headroom should be adopted as far as practicable. To this end, consideration should be given to increase the width for covers with high headroom, if site conditions permit. To enhance the effectiveness of sun shading and rain sheltering, fascia along the perimeters of covers may be considered as shown in Appendix C.

- 3.5 Walkways and passenger shelters with flat covers (with adequate fall for drainage) are generally more effective for sun shading and rain sheltering when compared to those with upward inclined covers.

4. MAINTENANCE

- 4.1 Consideration should be given to the ease of maintenance of covers and replacement of damaged components. Fixing details for covers should be made simple (e.g. use of bolted connections). Standard flat panels should be adopted and curved panels should be avoided as far as practicable unless site conditions or design considerations predominate. For those panels not readily available in the market, sufficient amount of spare components should be provided.
- 4.2 Adequate drainage should be provided on covers to divert rainwater to drainage facilities in the vicinity. Drainage systems should be so designed to avoid accumulation of debris such as falling leaves that could clog the drainage outlets. Sags on covers should be avoided as far as practicable as they are prone to water leakage when drainage outlets are blocked by rubbish or falling leaves. For passenger shelters, covers should be designed to fall towards the side away from carriageways.
- 4.3 The maintenance requirements stated in Clause 16.1 of the SDM are also applicable.

5. AESTHETICS

- 5.1 Reference should be made to Chapter 15 of the SDM in respect of the aesthetic design of covers for walkways and passenger shelters.
- 5.2 For greening on covers, the Development Bureau Technical Circular (Works) No. 1/2018 – “Soft Landscape Provisions for Highway Structures” should be observed and followed to soften the hard elements, screen the visual mass of structures and provide greening/amenity to relieve the harsh road environment.

- 5.3 The design of covers should be aesthetically compatible with the surrounding streetscape, buildings and environment in terms of structural forms and finishing materials. If the proposed covers would be connected to existing footbridges, subways or buildings, the design of covers should be aesthetically compatible with them.
- 5.4 Thematic design/featured graphics could be considered to manifest the uniqueness of the surroundings of individual walkways and passenger shelters. However, permission to use graphics/artworks with copyrights should be sought prior to implementation.
- 5.5 Colours of covers should match with the surrounding environment. Neutral colours should be adopted to reduce the visual clutter of the congested urban environment.
- 5.6 Walkways and passenger shelters could be considered to well integrate with lamp posts/lighting, street plates, traffic signs, at-grade railings, bus stop signs and any other street furniture to minimize the visually intrusive elements for tidy streetscape appearance and effective use of the footpaths.
- 5.7 Consideration should also be given to well integrate covers with adjacent trees so as to provide broad and natural sun shading to road users with minimum visual obstruction to the connected view of open sky.

6. CHOICE OF MATERIALS

- 6.1 In terms of light transmission, materials for covers could be broadly classified as transparent, translucent and opaque materials.
- 6.2 Designers should consider the degree of light transmittance, solar reflectivity, glare, UV and fade resistance, aesthetic impact, ease of construction and maintenance, as well as the location and surrounding environment of covers in the selection of cover materials.
- 6.3 Glaring of sunlight reflecting from cover materials may attract complaints from members of the public. Designers should select suitable materials and specify necessary glare resistance requirements.

- 6.4 If covers are provided in areas closely surrounded by tall buildings and the chance of damage by falling objects is high, materials which may be easily damaged by falling objects should be avoided.

Transparent and Translucent Materials

- 6.5 Transparent materials include glass, polycarbonate and polymethyl methacrylate (PMMA) panels while translucent materials include frosted glass, frosted polycarbonate and frosted PMMA panels. Both allow light penetration but at a different degree. The latter allow partial light penetration and diffuse the transmitted light. Both would create a more “open” environment, reducing the need for lighting and energy consumption. However, because of their high light and solar heat transmission properties, covers made of transparent or translucent materials are not effective for sun shading. The guidelines on the use of transparent or translucent materials given in paragraphs 3.1 to 3.3 above should be followed.
- 6.6 For glass panels, considering the risks of breakage, laminated tempered glass should be used for covers. The interlayer within laminated tempered glass helps hold the glass fragments together when broken and reduce the risks to the public. Tempered glass should be heat soak tested to minimize spontaneous breakage induced by nickel sulphide inclusions, and such requirement should be specified in the contract. Moreover, tinted glass or low emissivity glass should be considered in order to reduce solar heat.
- 6.7 Polycarbonate and PMMA panels are lightweight and available in different colours to suit the design requirements. Depending on the thickness and colours, they have high light and solar heat transmission properties. Generally, polycarbonate panels are susceptible to scratching, discoloration and yellowing, and require special treatments to the materials to enhance their resistance in these aspects.
- 6.8 Transparent and translucent materials should possess UV blocking properties, and should not reflect light in such a way as to prejudice road safety or produce undesirable glaring effects.

Opaque Materials

- 6.9 Opaque materials include concrete, steel (e.g. corrugated sheets) and aluminum (e.g. honeycomb panels). They do not allow light to pass through, and thus provide effective sun shading. Concrete covers outweigh metal covers as far as sun shading is concerned. However, concrete structures may somehow appear bulky and monotonous, and the associated foundation costs may be higher. Metal covers usually appear slender in outlook and allow faster erection when compared with concrete covers.
- 6.10 Glass panels with surfaces imprinted with patterns of ceramic based paints (e.g. fritted glass), whether in translucent or opaque finishes, should not be regarded as opaque materials.

Retrofitting Existing Covers

- 6.11 For existing covers, perforated sheets or solar reduction films may be added underneath the transparent or translucent panels to reduce the transmittance of sunlight and solar heat.

7. ENQUIRIES

For enquiries on this document, please contact Chief Highway Engineer/Bridges and Structures of HyD.

8. REFERENCES

Ref. 1 - Highways Department, the Government of Hong Kong SAR, 2013, "Structures Design Manual for Highways and Railways".

Ref. 2 - Transport Department, the Government of Hong Kong SAR, "Transport Planning and Design Manual".

APPENDIX A - EXAMPLES OF COVERS FOR WALKWAYS



Walkway cover with transparent panels spanning over full walkway width and high headroom :

- Transparent panels are ineffective in providing sun shading.
- Covers with high headroom are ineffective in providing sun shading and rain sheltering.



Footbridge with hybrid cover (about one-third of width with transparent panels and two-third of width with opaque panels):

- Transparent panels located on the sides rather than on the middle portion of the cover are preferable.



Footbridge with metal cover:

- Effective in providing sun shading to pedestrians.

APPENDIX B – EXAMPLES OF COVERS FOR PASSENGER SHELTERS



Bus shelter with reinforced concrete cover:

- Effective in providing sun shading to passengers.



Bus shelter with metal cover:

- Effective in providing sun shading to passengers.



Minibus shelter with glass cover:

- Ineffective in providing sun shading to passengers.

APPENDIX C – WALKWAY COVER WITH FASCIA

