



HIGHWAYS DEPARTMENT

GUIDANCE NOTES ON INSTALLATION OF BARRIERS

AT EMERGENCY CROSSING

AND

CONTINGENCY CROSSING

IN CENTRAL DIVIDER OF DUAL CARRIAGEWAY

**Guidance Notes on Installation of Barriers at
Emergency Crossing
and
Contingency Crossing
in Central Divider of Dual Carriageway**

Introduction

1. Emergency crossing (EC) and contingency crossing (CC)¹ are openings provided in the central reserves of dual carriageways as stipulated in the Transport Planning and Design Manual. EC is to facilitate manoeuvre of emergency vehicles across central reserves in emergencies, whereas CC is for diversion of traffic in major traffic incidents. Some crossings serve dual purposes as both EC and CC.
2. Most ECs and CCs are currently closed by tubular crash gates according to the HyD standard drawing, which are designed in such a manner that they could be knocked down easily for quick passageway of vehicles. They are therefore not strong enough to prevent errant vehicles from straying onto the opposite carriageway in case of accident. Broken gates may also be projected to opposite traffic lanes upon collision and endanger road users.
3. With a view to alleviating the above hazards, studies have been conducted to identify alternative installations to replace the crash gates. It is identified that movable steel barrier (MSB) and removable concrete barrier (RCB) are in general feasible alternatives for use at EC and CC respectively. MSBs and RCBs shall be used on all new carriageways unless otherwise requested by the traffic authorities. For the existing openings of central dividers, TD, FSD, HKPF and HyD are reviewing the closure of surplus openings by permanent barriers or RCBs, and the replacement of crash gates for ECs with MSBs. When the EC is not suitable to be retrofitted with MSB (e.g. The ends of adjacent central divider are railings.), Emergency Access Gate (EAG) as shown in HRDMISCEL-SK0149 in Appendix B can be considered. This EAG allows the gate to bend about the ground before breakage and thus no detachment would become dangerous projectiles upon impact by an errant vehicle.

¹ In the latest updating for the Transport Planning and Design Manual (TPDM), the term 'emergency opening' is deleted, and 'emergency crossing' and 'contingency crossing' are added. The definitions of these crossings are given in Volume 2 Chapter 3 Section 3.4.8 of the TPDM.

4. Installation of movable steel barrier or removable concrete barrier on highway structures should be avoided as far as practicable. In case they cannot be avoided, the concrete end anchor blocks of the barriers should be specially designed in order not to jeopardize the structural integrity of the supporting highway structure.

Barrier for EC

5. To facilitate manoeuvre of emergency vehicles, the barrier at an EC should be able to be opened and closed in a few minutes. Yet it should have containment capacity comparable to normal barrier when it is closed. MSB has been identified to be the suitable facility satisfying such functional requirements.
6. To serve the designed purpose, a MSB should meet the specifications in *Appendix A*. The typical layout of a MSB is given in the drawings in *Appendix B*. As shown in the drawings, red/white retroreflective strips shall be provided on the MSB and instruction labels shall be fixed for the emergency personnel's quick reference. The type of MSB to be adopted should be agreed by HyD, TD, FSD and HKPF.
7. Currently, both ArmorGuard Gate System (AGS)² and Vulcan Gate System (VGS) have been installed on trial in Hong Kong. TD, FSD and HKPF have no objection in principle to their installation at ECs subject to the following:
 - a) Each proposed installation shall be forwarded to FSD, HKPF and the relevant regional office of TD in advance for formal agreement.
 - b) Regional staff of FSD and HKPF shall be given the chance to practise the operation of the MSB on site before commissioning of the facility. The practice session shall be arranged by the respective regional office or project office of HyD. When several MSBs are installed in the same district, the number of practice sessions may be reduced if agreed by FSD and HKPF.
8. If the longitudinal gradient and/or crossfall of the EC exceeds the designed operating limit of the MSB to be installed, the manufacturer shall be consulted to ascertain whether it is suitable to install the MSB at that EC or to relocate the EC to a suitable position agreeable to TD, FSD and HKPF.
9. Other types of MSB satisfying the functional requirements could also be considered subject to the agreement of TD, FSD and HKPF.

² Previously called SafeGuard Gate System (SGS)

Barrier for CC

10. Unlike EC, opening of a CC in one to two hours in contingencies is acceptable in general. According to the TPDM, RCBs are to be provided at CCs as a standard provision under normal circumstances. When an EC is no longer required but it is desirable to retain the crossing to cater for future temporary traffic diversion, TD may instruct installation of RCB to close up the crossing. Details of RCB are given in HyD Standard Drawing Nos. H2254 to H2256.

11. For CCs at strategic locations where speedy traffic diversion arrangement will be required in major traffic incidents (e.g. single traffic route to the airport, etc.), use of other suitable devices may be requested by the traffic authorities. For existing CCs, TD will consider whether the use of RCB or other devices are more suitable. For new CCs, the works office should consult TD (Strategic Roads Division, Regional Office and Transport Incident Management Section), HKPF, the regional office of HyD, and other relevant parties. Technical advice could be sought from the Research and Development Division of HyD on the use of other suitable devices.

Barrier for crossings which serve as both EC and CC

12. In general, 16m MSB should be considered at such dual-purpose crossings located at strategic locations of major roads with:
 - dual 3-lane configuration or above; and
 - legal speed limit of 70km/h or above

Maintenance of MSB and RCB

13. To ensure that MSBs and RCBs can perform satisfactorily during emergencies / contingencies, proper maintenance of these facilities are of paramount importance. Section 11 of the Maintenance Administration Handbook (MAH) shall be strictly complied with for maintenance of MSBs and RCBs.

Enquiries

14. Enquiries on these guidance notes should be directed to the Research and Development Division of HyD.

Appendices

- Appendix A – Specification of MSB
- Appendix B – Typical Drawings of MSB and EAG

Appendix A

Specification of Movable Steel Barrier

Specification of Movable Steel Barrier

1. Movable steel barrier (MSB) shall comply with the evaluation criteria for Tests 3-10, 3-11 and 3-21 stipulated in Table 3.1 of the National Cooperative Highway Research Program Report 350 (NCHRP Report 350). The maximum permanent deflection of the barrier system in the tests shall not exceed a value that renders the barrier to encroach upon the opposite traffic lane after impact.

The Contractor shall provide details of the proposed MSB and a copy of the relevant crash test certificates for approval of the Engineer before delivery of the barrier system or commencement of site work, whichever is the earlier.

2. The MSB shall be able to be opened by swinging about end anchors towards either sides of a road smoothly up to 45 degrees on site (taking into account the longitudinal and transverse gradients of the carriageway and the central reserve), and then closed properly without affecting its containment capability. After the MSB is swung opened, the passageway created along the central reserve should be 8m or 16m long depending on the type of MSB installed.
3. Opening together with closing of the MSB shall be able to be completed within 2 minutes by 2 (for 8m MSB) to 4 (for 16m MSB) local adults of normal built on site by hands with a non-powered mechanical system (use of compressed air or any other powered means is not allowed) built-in with the MSB (e.g. a hand operated jacking system) without the need of any other tool. The system shall also have a built-in mechanism to prevent it from sliding when being opened or closed on site.
4. If the proposed MSB is not a type which has been agreed by TD, FSD and HKPF for installation at EC previously, the Contractor shall solicit agreement of these traffic and rescue authorities for the use of the barrier system in advance.
5. The Contractor shall arrange training session for the regional staff of FSD and HKPF to practise operation of the MSB on site before commissioning of each new MSB. Training session shall be arranged no matter the proposed MSB has been agreed for use at other ECs before or not, unless otherwise agreed by FSD and HKPF.

Appendix A

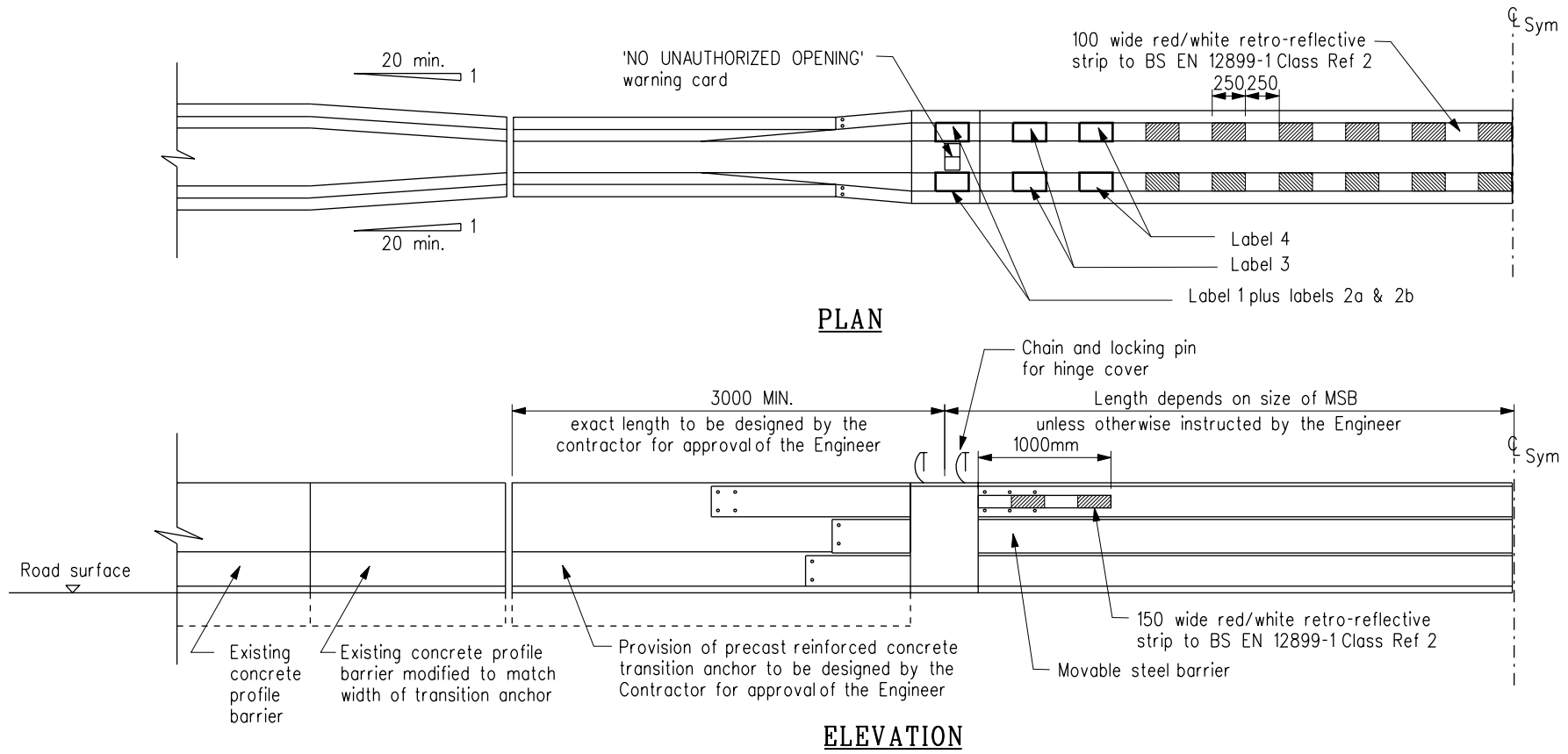
6. The Contractor shall provide detailed design of the reinforced concrete end anchors for the MSB in consultation with its manufacturer taking into account the actual site conditions. The Contractor shall inspect the proposed site before carrying out detailed design for the end anchor blocks. The Contractor shall identify necessary modification to existing features and installations on site. The Contractor shall demonstrate that their design is agreed by the manufacturer of the MSB, and submit the design to the Engineer for approval.
7. The protruding ends of any bolts on a MSB or its anchors which are exposed to traffic shall be capped by dome shape headed nuts.
8. The Contractor shall submit the installation manual and the maintenance manual of the MSB at least 7 calendar days before commencement of the installation of the MSB.
9. The Contractor shall provide detailed mechanical drawings of the MSB and as-built drawings for the works together with a detailed schedule of accessories and components for the MSB.

Appendix B

Typical Drawings of Movable Steel Barrier

and

Emergency Access Gate




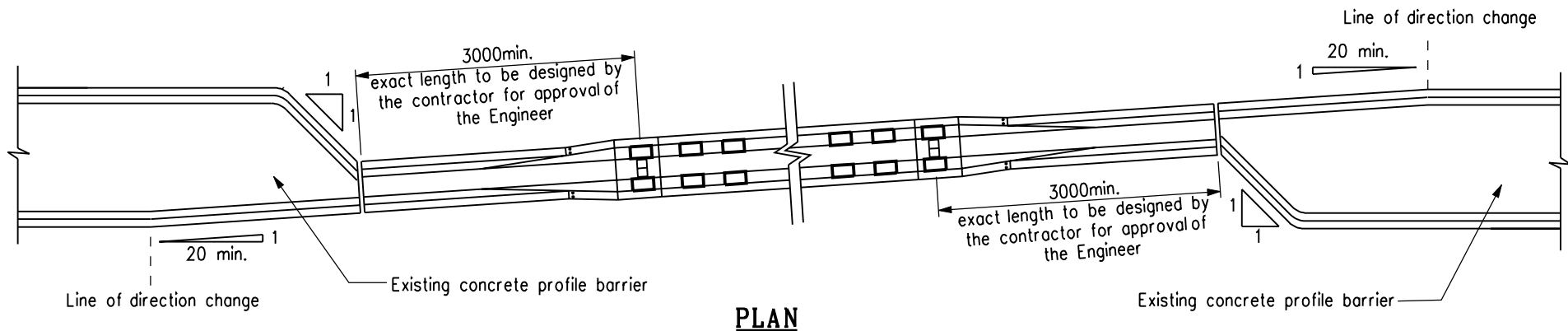
Notes:

1. Refer to the product specification of the movable steel barrier system for details.
2. Precast reinforced concrete transition anchors to be designed by the Contractor.
3. * Exact length of transition anchor to be proposed by the Contractor for approval of the Engineer.
4. Instruction labels shall be affixed at appropriate positions approved by the Engineer.
5. The surface of the movable steel barrier shall be painted in light gray colour except for the joints of the movable parts.
6. For central divider wider than 1 m, the alternative layout in drawing No. HRDMISCEL-SK0112 may be adopted.
7. Refer to drawing No. HRDMISCEL-SK0113 for details of Instruction Labels. The labels shall be UV and weather resistant.

**MOVABLE STEEL BARRIER
- TYPICAL LAYOUT**

drawn	Leo Chan	Sep 08
checked		
approved		
office	RESEARCH & DEVELOPMENT DIVISION	

rev	date	description	initial
drawing no.		HRDMISCEL-SK0111	scale
			N.T.S.
		HIGHWAYS DEPARTMENT HONG KONG	路 政 署 香 港





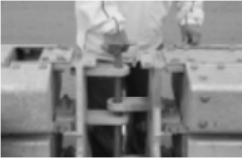
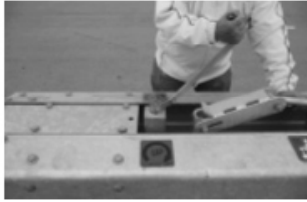

Note:

1. Please refer to drawing No. HRDMISCEL-SK0111 for positions of the red / white retro-reflective strips and instruction labels.

**MOVABLE STEEL BARRIER
- ALTERNATIVE LAYOUT FOR
INSTALLATION AT WIDE CENTRAL DIVIDER**

drawn	Leo Chan	Sep 08
checked		
approved		
office	RESEARCH & DEVELOPMENT DIVISION	


rev	date	description	initial
drawing no.		HRDMISCEL-SK0112	scale
			N.T.S.
		HIGHWAYS DEPARTMENT HONG KONG	路政署 香港

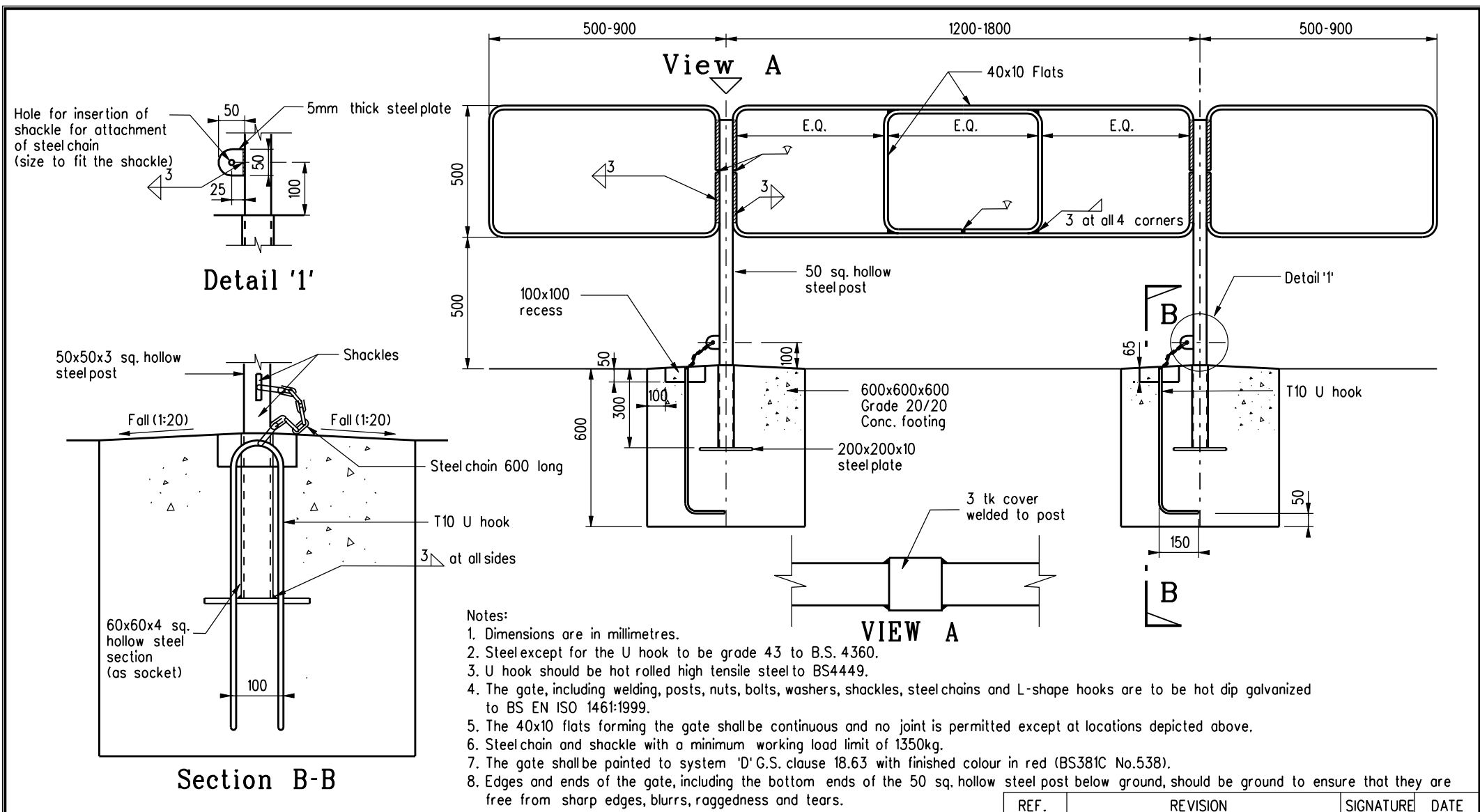
	Label 1 (on hinge cover)	Labels 2a & 2b (inside hinge cover)		Label 3 (near hand jack)	Label 4 (near tiller handle)	"NO UNAUTHORIZED OPENING" Warning Card (tied onto handles of hinge covers)
		2a	2b			
Label (The photos shall be prepared by the Contractor for approval by the Engineer. If instructed by the Engineer on the contrary, softcopy of the photos may be obtained from the Engineer)	1. 拔栓開蓋 	2. 拔起鐵杆 	3. 唧起鐵閘 	4. 扳杆定向 	NO UNAUTHORIZED OPENING 未經許可 請勿開啟 REQUEST FOR INSPECTION OF HyD via 1823 HOTLINE AFTER OPENING 開啟後·致電 1823 要求路政署檢查	
Size	130mm (w) x 140mm (H)		2a - 90mm (w) x 25mm (H) 2b - 130mm (w) x 100mm (H)	130mm (w) x 140mm (H)	130mm (w) x 140mm (H)	130mm (w) x 140mm (H)
Font	中黑體 (point 72)	中黑體 (point 48)	中黑體 (point 72)	中黑體 (point 72)	ARIAL+中黑體 (point 32)	

- Note.
- The "NO UNAUTHORIZED OPENING" warning card should be laminated with plastic on both sides and fastened onto the hinge covers using a 5mm wide plastic strap. The loop formed by the plastic strap should be sufficiently large for inserting a 30mm diameter rod.
 - A unique serial number should also be printed at a prominent location on top of the barrier. The serial numbers for movable steel barriers in Hong Kong Island, Kowloon, New Territories East, New Territories West and Tsing Ma Control Area should start with the prefixes "HKI -", "KLN -", "NTE -", "NTW -" and "TMCA -" respectively.
 - Exact positions of instruction labels shall be proposed by the Contractor for approval of the Engineer.

**MOVABLE STEEL BARRIER
- INSTRUCTION LABELS**

drawn	Leo Chan	Sep 08
checked		
approved		
office	RESEARCH & DEVELOPMENT DIVISION	

rev	date	description	initial
		drawing no. HRDMISCEL-SK0113	scale N.T.S.
		 HIGHWAYS DEPARTMENT HONG KONG	



EMERGENCY ACCESS GATE
- FOR USE AT EMERGENCY OPENINGS AT CENTRAL DIVIDERS
OF DUAL CARRIAGEWAYS WHICH HAVE NO VEHICULAR BARRIER
AT EITHER OR BOTH ENDS

REF.	REVISION	SIGNATURE	DATE
HIGHWAYS DEPARTMENT			
REFERENCE		DRAWING No.	CAD
SCALE Not to scale		HRDMISCEL-SK0149	