2 PLATFORM, CREST AND RECLAMATION LEVELS

- NIL -

2.1 Compliance with Minimum Platform Levels

(a) All new development proposals including reconstruction proposals shall comply with the requirements for minimum platform levels except those listed in item (b) below.

(b) The following proposals need not comply with the required minimum platform levels:

(i) addition & alteration works to an existing building;
(ii) partial reconstruction works to an existing building involving only the building of additional floors without reconstruction of the first storey;
(iii) conservation projects;
(iv) temporary development works intended for use for a temporary period; and
(v) any other works as may be specified by the Board.

For these development proposals, the Qualified Person shall advise the developer/owner that the minimum platform levels are still recommended as a protection measure to reduce flood risks. If lower platform levels are adopted, the developer/owner shall be advised that the development site may be subjected to flood risks.
## 2.1 Minimum Platform Level

The minimum platform level of a development site as specified by the Public Utilities Board is the required minimum ground level of that proposed development. The platform levels as determined shall be indicated on the layout plans.

### 2.1.1 General

The minimum platform level required for a proposed development depends on its locality and the type of development, as categorised below:

- **(a) General Development Proposal**
  - The minimum platform level shall not be lower than:
    - (i) 750 mm above the highest tide level in the vicinity. For this purpose, the highest tide level shall, unless otherwise specified, be taken as follows:
      - along the southern coast of Singapore Island from Tuas to Changi: RL 101.75m
      - along the north-eastern coast of Singapore Island from Changi to Causeway: RL 102.05m
      - along the north-western coast of Singapore Island from Tuas to Causeway: RL 102.35m
    - (ii) the adjacent road/ground level;
    - (iii) 300 mm above the highest recorded flood level, if any, as advised by the Public Utilities Board;
    - (iv) other level as may be specified by the Public Utilities Board;
  - whichever is the highest.

## 2.2 Minimum Platform Level

The minimum platform level of a development site as specified by the Board is the required minimum ground level of that proposed development. The platform levels as determined shall be indicated on the layout plans.

The minimum platform level required for a proposed development depends on its locality and the type of development, as categorised below:

### 2.2.1 Type of Development

- **(a) General Developments**
  - The minimum platform level shall not be lower than:
    - (i) 104.0mRL for developments along the southern coast, and 104.5mRL for developments along the northern coast; or
    - (ii) 300mm above the adjacent road/ground level; or
    - (iii) 600mm above the highest recorded flood level, if any, as advised by the Board; or
    - (iv) Any other level as may be specified by the Board;
  - whichever is the highest.
### (b) Special Facilities

For special facilities, including Rapid Transit stations, airport runways, wafer fabrication plants, the minimum platform level shall not be lower than:

(i) 1 m above the adjacent road/ground level;

(ii) 1 m above the highest recorded flood level, if any, as advised by the Public Utilities Board; or

(iii) other level as may be specified by the Public Utilities Board;

whichever is the highest.

### (b) Commercial/Multi-Unit Residential Developments With Basements (e.g. shopping malls, large office buildings and condominiums)

The minimum platform level shall not be lower than:

(i) 104.0mRL for developments along the southern coast, and 104.5mRL for developments along the northern coast; or

(ii) 600mm above the adjacent road/ground level; or

(iii) 600mm above the highest recorded flood level, if any, as advised by the Board; or

(iv) Any other level as may be specified by the Board;

whichever is the highest.

### (c) Special Facilities

For special facilities, including Mass Rapid Transit stations, airport runways and wafer fabrication plants, the minimum platform level shall not be lower than:

(i) 104.0mRL for developments along the southern coast, and 104.5mRL for developments along the northern coast; or

(ii) 1 m above the adjacent road/ground level; or

(iii) 1 m above the highest recorded flood level, if any, as advised by the Board; or

(iv) Any other level as may be specified by the Board;

whichever is the highest.
### 2.2 Crest Level
Minimum crest level is required for an entrance, exit or opening to a basement or underground structure (basement, tunnel, underground facility, etc) as follows:

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) <strong>Basements</strong></td>
<td>For basements, underpasses and sunken/underground facilities, the minimum crest level shall be at least 150 mm above the minimum platform level as specified in clause 2.1.1(a).</td>
</tr>
<tr>
<td>(b) <strong>Special Underground Facilities</strong></td>
<td>For Rapid Transit underground stations/tunnels, underground road networks, depressed roads, and other special underground facilities, the minimum crest level shall be at least 150 mm above the minimum platform level as specified in clause 2.1.1(b).</td>
</tr>
<tr>
<td>(c) <strong>Linkage to Special Underground Facilities</strong></td>
<td>All developments with direct or indirect links to these special underground facilities shall comply with the same minimum crest level requirements as specified in clause 2.2(b).</td>
</tr>
</tbody>
</table>

### 2.2.2 If, subject to approval of the Board, the minimum platform levels as specified in Clause 2.2.1 cannot be met, the following conditions must be met:

(a) The platform level of the building structure must be at least:

(i) 103.5mRL for developments along the southern coast, and 104.0mRL for developments along the northern coast; or
(ii) 300mm above the adjacent road/ ground level; or
(iii) 300mm above the highest recorded flood level, if any, as advised by the Board;

whichever is highest

and:

(b) Flood protection measures must be included in the design to provide at least the same level of flood protection that the minimum platform and/or crest levels would provide for the building. Details of proposed flood protection measures should be submitted to the Board for approval.

### 2.3 Crest Level
Minimum crest level is required for an entrance, exit or opening to a basement or underground structure (basement, tunnel, underground facility, etc) as follows:

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) <strong>Basements of General Developments</strong></td>
<td>For basements, underpasses and sunken/underground facilities, the minimum crest level shall be at least 150mm above the minimum platform level as specified in clause 2.1.1(a).</td>
</tr>
<tr>
<td>(b) <strong>Special Underground Facilities and Basements of Commercial / Multi-Unit Residential Developments</strong></td>
<td>For Mass Rapid Transit underground stations/tunnels, underground road networks, depressed roads, basements of Commercial / Multi-Unit Residential Developments and other special underground facilities, the minimum crest level shall be at least 300 mm above the minimum platform level as specified in clause 2.1.1(b).</td>
</tr>
<tr>
<td>(c) <strong>Linkage to Special Underground Facilities and Basements of Commercial / Multi-Unit Residential Developments</strong></td>
<td>All developments with direct or indirect links to these special underground facilities and basements of Commercial / Multi-Unit Residential Developments shall comply with the same minimum crest level requirements as specified in clause 2.2(b).</td>
</tr>
</tbody>
</table>
2.4 Land Reclamation Level
For land reclamation works, the minimum reclamation level shall not be lower than:
(i) RL 104.0m along the southern coast; and
(ii) RL 104.5m along the northern coast; or
(iii) Any other level as may be specified by the Board.

The platform levels required for any development subsequently carried out on the reclaimed land shall be higher than the reclamation level and shall be separately determined by the developer’s Qualified Person to ensure effective internal drainage of the development site.

### PART II - DESIGN REQUIREMENTS

#### 7 DRAINAGE DESIGN AND CONSIDERATIONS

##### 7.1.3 Rainfall Intensity

For a storm of return period (T) years, the rainfall intensity (I) is the average rate of rainfall from such a storm having a duration equal to the time of concentration (tc). The rainfall intensity (I) can be obtained from the Intensity-Duration-Frequency (IDF) curves by estimating the duration of rainfall (equals to the time of concentration, tc) and selecting the required return period of (T) years. The Intensity-Duration-Frequency (IDF) curves for Singapore Island are shown in Appendix 2.

The return periods (T) adopted for the design of drainage systems in Singapore are as follows:

<table>
<thead>
<tr>
<th>Drainage System</th>
<th>Return Period (T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major rivers</td>
<td>50 to 100 years</td>
</tr>
<tr>
<td>Important installations/ developments such as airports and tunnels</td>
<td>50 years</td>
</tr>
<tr>
<td>Outlet drains and secondary drainage facilities</td>
<td>5 years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area Served by Drainage System</th>
<th>Design Return Period (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment of less than 100 ha</td>
<td>10</td>
</tr>
<tr>
<td>Catchment of 100 to 1000 ha</td>
<td>25</td>
</tr>
<tr>
<td>Catchments of more than 1000 ha or special facilities</td>
<td>50 to 100</td>
</tr>
<tr>
<td>ORIGINAL</td>
<td>AMENDMENTS</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>PART III - COMPLETION OF DRAINAGE WORKS</strong></td>
<td><strong>PART III - ENSURING THE INTEGRITY OF STORMWATER DRAINAGE SYSTEMS</strong></td>
</tr>
<tr>
<td>11 - Certificate of Statutory Completion (CSC)</td>
<td>11 - Certificate of Statutory Completion (CSC)</td>
</tr>
<tr>
<td></td>
<td>12 – Maintaining the Integrity of Storm Water Drainage Systems</td>
</tr>
<tr>
<td><strong>PART III - COMPLETION OF DRAINAGE WORKS</strong></td>
<td><strong>PART III - ENSURING THE INTEGRITY OF STORM WATER DRAINAGE SYSTEMS</strong></td>
</tr>
<tr>
<td></td>
<td>12 MAINTAINING THE INTEGRITY OF STORM WATER DRAINAGE SYSTEMS</td>
</tr>
<tr>
<td></td>
<td>12.1 Responsibility of Developer/Owner</td>
</tr>
<tr>
<td></td>
<td>The Developer/Owner shall be responsible for the maintenance, operation and monitoring of the storm water drainage systems within their premises. These include, but are not limited to, regular adequacy checks on the flood prevention measures such as minimum crest levels, detention/retention pond systems and pumped drainage system.</td>
</tr>
<tr>
<td></td>
<td>12.2 Flood Protection Measures (i.e. Crest/Flood barriers/Pumped drainage system)</td>
</tr>
<tr>
<td></td>
<td>The Developer/Owner shall submit the certificate of inspection and survey plan endorsed by a Qualified person to confirm that the approved flood protection measures, including crest protection measures, flood barriers and pumped drainage systems are in place. This shall be submitted annually upon obtaining the Temporary Occupation Permit (TOP), for all developments.</td>
</tr>
</tbody>
</table>