

Traffic Safety Facilities

Selected Provisions of JTG/T 5410-2026

Specifications for Design of Highway Maintenance Engineering

UNOFFICIAL ENGLISH TRANSLATION OF SELECTED PROVISIONS

Complete translation of Section 5.7, including its three tables and source commentary, with selected related requirements and separately identified translator's notes.

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Scope and status

This document is not a translation of the entire 114-page Chinese PDF. It translates Section 5.7, Traffic Safety Facilities, in full, together with the specifically identified related provisions on page 2. Other chapters and the standards cited by the source are not reproduced in full.

This is not an official English version and has not been approved or certified by the Ministry of Transport. In case of ambiguity or inconsistency, refer to the Chinese original. Project-specific application requires verification by appropriately qualified engineers against the original text, applicable standards and approved design documents. This translation does not establish equivalence with foreign standards or certify any product.

Translation and contact

English translation and translator's notes prepared by China Guardrail.

Website: chinaguardrail.com

Business enquiries: sales@chinaguardrail.com

How to read this document

Source commentary translates the original explanatory text; it is not our own opinion. **Translator's note** identifies an addition by China Guardrail and does not add a technical requirement. Original clause and table numbers are retained. Page references are to the printed Chinese page numbers; PDF page numbers are four higher for the main text.

Contents: related provisions - page 2; Section 5.7 and commentary - page 3; Table 5.7.2 - pages 4-5; data collection and inspection - page 6; coordination and scheme selection - page 7; signs, markings and barriers - page 8; insufficient barrier height - page 9; terminology, notes and sources - page 10.

Related Provisions - Selected Extracts

Source: printed pages 1-3, 6, 7-9 (PDF pages 5-7, 10-13). The selections below are not the whole of Chapters 1 or 3.

1.0.2 This Standard applies to the design of preventive, corrective and emergency maintenance works on highways of all technical classes.

1.0.7 Traffic management design shall be undertaken concurrently with highway maintenance engineering design to safeguard the safe passage of highway traffic and the safety of construction work zones during implementation.

1.0.8 Highway maintenance engineering design shall give attention to the use of existing engineering facilities and the recycling of discarded materials.

1.0.10 In addition to complying with this Standard, highway maintenance engineering design shall comply with relevant national and industry mandatory standards currently in force.

3.0.5 - introductory requirement and item 6 only: Corrective maintenance engineering design shall not use standards lower than the original design standards and shall comply with the following provisions: [...]

6. Current design standards should be adopted for newly installed traffic safety facilities and for their concentrated replacement or modification.

Source commentary to 3.0.5, item 6: Corrective maintenance design for traffic safety facilities needs to meet at least the original design standards and, where conditions permit, improve safety performance towards current design standards. Local repairs or replacements may use the original design standards to maintain compatibility with existing facilities. For new installations, concentrated replacement or safety upgrading, current design standards are recommended. However, where civil works or other constraints make implementation to current standards genuinely difficult, the original standards may be retained.

3.0.9 Traffic management for maintenance works shall be specifically designed according to highway class, traffic conditions, maintenance type, distress treatment design schemes and construction operation schemes.

Source commentary to 3.0.9: Traffic management design in this Standard includes both traffic management and construction work zones.

3.0.10 Maintenance engineering design shall specify material technical requirements, construction processes and acceptance criteria according to the characteristics of the works.

3.0.12 No obstruction shall intrude into the highway clearance envelope. Highway signs, guardrails, lighting columns, utility poles, pipelines, landscaping, roadside trees and other added permanent structures, components or facilities shall not intrude into the existing highway clearance envelope.

Translator's note R-1: The ellipsis in 3.0.5 marks omitted items, not omitted words within item 6. Only the commentary specifically associated with item 6 is included. The commentary to 1.0.2, 1.0.7 and 3.0.10 is outside this selection. No omissions are made within Section 5.7 below.

Translator's note R-2: "Shall," "should" and "may" preserve different levels of requirement in the source. They must not be read as interchangeable. See page 10.

5.7 Traffic Safety Facilities

Source: printed page 76; commentary on printed pages 78-79 (PDF pages 80, 82-83).

5.7.1 Corrective maintenance design for traffic safety facilities shall address their type, scale, installation location, form, structure and materials, and specify technical requirements for materials, construction process requirements and acceptance criteria.

5.7.2 Corrective maintenance of traffic safety facilities shall consider service, safety, management, environment, cost and other factors comprehensively. Design shall address the distress and defects listed in Table 5.7.2. The following measures may be adopted:

1. Localized or minor damage should be restored to compliance with the original design requirements by functional or structural rehabilitation measures such as local tightening, straightening, repair or component replacement.
2. Where damage is severe and repair is not feasible, the function of the traffic safety facilities should be restored through complete replacement.
3. Where existing traffic safety facilities do not match the current safety needs of the road section, modification measures such as strengthening, removal, new installation, relocation or integrated treatment may be adopted to optimize and upgrade the facilities and improve the section's traffic safety performance.

Source commentary to 5.7.2

According to the appendix to the Measures for the Administration of Highway Maintenance Engineering (Jiao Gong Lu Fa [2018] No. 33), corrective maintenance of traffic safety facilities includes improvement of associated ancillary facilities in conjunction with pavement rehabilitation, and concentrated replacement, new installation, repair and replacement of traffic safety facilities. This clause identifies two types of distress and defects to be addressed by corrective maintenance design.

The first is deterioration of the physical condition of the facilities themselves. Localized or minor damage can be restored to the original design requirements by tightening, repairing components and similar measures. Where damage is severe and repair is not feasible, complete replacement restores basic service functions.

The second arises where changes in external conditions, such as the road network, traffic volume or environment, mean that existing facilities no longer match current safety needs. Strengthening, removal, new installation, relocation and integrated treatment provide optimization and upgrading.

The emphasis on "comprehensive consideration" means that design is not confined to a single factor. Functional needs (service and safety) and implementation conditions (management, environment and cost) need to be considered together when determining the measures. For example, replacement or modification may be prioritized on sections with pronounced safety risks even where distress is relatively minor.

The guardrail-related distress types in Table 5.7.2 also apply to railings, movable barriers and impact-attenuation facilities.

Translator's note S-1: The source commentary is placed here, before the translated table, for readability. Its content is retained in full. The table continues over the next two pages.

Table 5.7.2 - Localized or Minor Damage

Main distress and defect types for corrective maintenance of traffic safety facilities. Source: printed page 77 (PDF page 81). This is the first category of the original table.

Facility	Distress and defects
Traffic signs	Sign face obscured or otherwise not visible. Local bending or deformation of the sign face, with changes in flatness affecting recognition. Broken aluminium fastening channels, or a rivet-detachment ratio between the channels and sign panel not exceeding 5%. Locally evident scratches, damage, bubbles, wrinkles, cracks, peeling or uneven colour in retroreflective sheeting, affecting no more than 10% of the sign face. Loose or corroded fasteners; corrosion on other components covering less than 20% of their area, with no corrosion perforation. Cracks in welds or visible defects in support structures such as posts. Cracking, delamination or spalling of concrete foundations.
Road markings	Local contamination, peeling or missing markings. Local cracking, blistering, wear, fading, or clearly visible old markings showing through. Severe local distortion or deformation.
Guardrails / safety barriers	Irregular barrier alignment with local twisting. Local damaged or missing steel-barrier components, looseness or leaning posts. Corrosion covering less than 30% of an individual steel component, with no corrosion perforation. Local evident cracking, damage or deformation of concrete barriers. Loose or deformed foundations.
Raised pavement markers and delineation facilities	Marked local distortion or deformation of alignment guidance. Local fading or contamination of reflectors. Loose, aged or corroded foundations, connectors or fasteners.
Anti-glare facilities	Loose, aged or corroded connectors or fasteners. Localized damage or missing parts, leaning or deformation of anti-glare structures.
Fencing and falling-object protection nets	Local broken wires, corrosion, missing parts, damaged or leaning posts, or similar defects.

Translator's note T-1: Table categories and numerical comparisons are reproduced, not converted into stand-alone acceptance rules. Read the table together with 5.7.2, the inspection provisions and the applicable design standards.

Table 5.7.2 - Continued

Source: printed pages 77-78 (PDF pages 81-82).

Category: Severe damage where repair is not feasible

Facility	Distress and defects
Traffic signs	Information overload, incorrect information or missing content; missing sign panels; bent or damaged panels that cannot be repaired. Evident scratches, damage, bubbles, wrinkles, cracks, peeling or uneven colour in retroreflective sheeting affecting more than 10% of the sign face; coefficient of retroreflection below 50% of the design value. Signs intruding into the highway clearance envelope or installed in non-compliant positions that cannot be corrected. Broken aluminium fastening channels, or a rivet-detachment ratio between channels and panel greater than 5%. Corrosion covering at least 20% of an individual component, or corrosion perforation. Deformed members, cracked welds, visibly bent, deformed or unstable posts that cannot be corrected. Relevant functional indicators seriously failing to meet design indicators.
Road markings	Obvious overall fading, clearly visible old markings showing through, or severe contamination, crazing or peeling, making recognition impossible. Marked loss of skid resistance, such as a skid-resistance test compliance rate below 60%. Marked loss of night-time retroreflective performance, such as a coefficient-of-retroreflected-luminance test compliance rate below 60%. Markings damaged or missing as a result of subgrade or pavement maintenance works.
Guardrails / safety barriers	Vehicle impacts or natural damage causing damage to posts, beams, barrier rails, foundations or other components of cable barriers or corrugated-beam barriers; severe cracking or damage of concrete barriers or reinforcement deformation, with severely inadequate containment capability. Corrosion covering more than 30% of an individual steel-barrier component, or corrosion perforation. Subgrade or pavement maintenance reducing barrier post height, or inadequate soil-foundation compaction, resulting in insufficient containment capability. Movable barriers or crash cushions missing or no longer functional.
Raised pavement markers and delineation facilities	Cracked or broken markers, or seriously loose foundations; obvious fading or marked loss of reflective performance; extensive missing facilities.
Anti-glare facilities	Severe corrosion, missing parts or failure of anti-glare structures, connectors or fasteners; extensive missing anti-glare structures.
Fencing	Widespread severe corrosion, collapse or missing sections.

Category: Existing facilities do not match current safety needs

Road sections requiring traffic safety improvement: Sharp curves, steep grades, long continuous downgrades, poor sight distance or hazardous roadsides affecting driving safety; unsafe behaviour such as speeding, mixed motorized and non-motorized traffic, a high proportion of large vehicles, crossing pedestrians, or adverse weather; crash concentrations or severity markedly exceeding other sections of the same highway; incomplete facilities, discontinuous or contradictory information, or information inconsistent with actual conditions.

Data Collection and Project-Specific Inspection

Source: printed page 79 (PDF page 83).

5.7.3 Data collection for corrective maintenance design of traffic safety facilities shall comply with the following:

1. Traffic parameters for the most recent three years, including traffic volume, composition and speed, shall be collected, together with maintenance records, inspection reports and safety assessment reports for the facilities.
2. For safety-improvement sections, data shall be collected on crash time, location, weather, crash configuration, numbers of persons killed or injured, and vehicle types involved. For expressways and Class I highways, crash data covering at least three consecutive years shall be collected. For other highways where crash data are absent or incomplete, traffic safety conditions shall be investigated through visits, interviews and discussions.

5.7.4 Project-specific inspection for traffic safety facility design shall comply with the following:

1. Where collected traffic parameters do not meet design needs, field data shall be collected. Manual counts or traffic detectors may be used.
2. Field inspection shall cover installation location, visible condition, recognizability, damaged or missing components, corrosion, fastening tightness and structural damage. Visual inspection or measurement and testing with dedicated tools may be used. Sampling shall be determined from actual conditions within the design unit. For each structural type of traffic sign, the sample should be at least 10% of the total; for other traffic safety facilities, it should be at least five locations per kilometre on each side.
3. In addition to items 1 and 2, project-specific inspection for safety-improvement sections should cover Table 5.7.4-1.

Table 5.7.4-1 Project-specific inspection for safety-improvement sections

Item	Content and method	Inspection frequency / sampling
Traffic operation	Observe vehicle trajectories, lateral interference, traffic conflicts and other operating conditions on site; manual observation or video recording.	At least 1 h of continuous observation during a peak hour or a period when crashes are concentrated.
Operating speed	Collect actual operating speeds; manual radar-gun measurements or geomagnetic, laser, microwave or other traffic detectors.	Collection conditions, measurement cross-sections and sample size to satisfy Appendix B of GB 5768.5-2017, Road Traffic Signs and Markings - Part 5: Speed Limit.
On-road driving	Conduct an actual drive-through of crash-prone sections.	At least one actual drive-through for each safety-improvement section.
Other	Necessary specific tests, such as pavement skid resistance, may be undertaken according to safety objectives or crash causes, using relevant test methods.	Determine locations and frequency according to section characteristics and the requirements of the specific test method.

Assessment, Coordination and Scheme Selection

Source: printed page 80 (PDF page 84). Continuation of 5.7.4.

4. Analysis of distress and defects in traffic safety facilities shall cover Table 5.7.4-2.

Table 5.7.4-2 Distress and defect analysis

Assessment item	Analysis and assessment content
Compliance	Compare the technical specifications used in the original design with current specifications; check design indicators and assess compliance.
Functionality	Assess the functional condition of components and the facility as a whole according to the extent, severity and quantity of defects.
Suitability	Assess suitability for road, traffic and environmental conditions according to road-network plans, traffic volume and composition, traffic safety conditions and the facilities' service life.

5. Before facilities such as guardrails and signs, existing structures or materials are reused, they shall be inspected and tested. They may be used only after meeting current relevant technical requirements.

5.7.5 Traffic safety facilities shall be coordinated and designed comprehensively with highway civil works, other roadside ancillary facilities and environmental works, and shall satisfy the following:

1. They shall be designed, constructed and brought into operation and use concurrently with highway civil maintenance works. Associated foundations, reserved openings and embedded items shall be implemented with the civil works.
2. Civil works shall provide installation space and load-bearing conditions for guardrails and other safety facilities through subgrade widening, slope treatment, drainage adjustments or similar measures.
3. Sign and guardrail design schemes shall be determined according to highway vertical clearance and pavement elevation after pavement maintenance.
4. When signs or guardrails are added or modified on bridges or in tunnels, the load-bearing capacity of the bridge or tunnel structure shall be verified by calculation.
5. Corrective maintenance design shall check whether existing landscaping affects sight distance, obscures signs or affects the roadside clear zone.

5.7.6 At the technical design stage, at least two technical schemes shall be compared at the same level of detail, and the following shall apply:

1. For technically difficult modifications of guardrails and other safety facilities, design parameters including vehicle types to be contained and traffic volume shall be established. Civil-works modification, barrier replacement and barrier modification schemes shall be compared, analysed and substantiated.
2. On expressways, Class I highways and trunk highways with pronounced safety problems, safety-improvement sections shall be analysed using traffic volume, operating speed and crash data to identify principal risk factors or diagnose crash causes. Different modification schemes shall be compared through cost-benefit analysis.
3. For large-scale corrective maintenance of traffic safety facilities across a road network, scheme comparison shall establish the design scheme and harmonize technical standards.

Signs, Markings and Safety Barrier Design

Source: printed pages 80-81 (PDF pages 84-85).

5.7.7 Corrective maintenance design for the colour, shape, dimensions, symbols, lettering and structural components of traffic signs shall comply with the current GB 5768.2, Road Traffic Signs and Markings - Part 2: Road Traffic Signs; JTG D81, Specifications for Design of Highway Safety Facilities; and JTG D82, Specifications for Layout of Highway Traffic Signs and Markings, and shall satisfy the following:

1. New signs shall maintain continuity with the directional-sign information in the road network, and their content shall not be contradictory.
2. Information overload shall be avoided when adding signs or information. The total number of information items on one sign panel should not exceed six. The number of signs at the same cross-section or on the same support structure should not exceed three.
3. New signs and other facilities shall not obscure one another.
4. Where a replacement panel is larger than the original, or additional signs are installed on an existing support structure, the sign structure shall be verified by calculation.
5. For partial application of retroreflective sheeting, the new and existing sheeting should have the same retroreflectivity class.

5.7.8 Corrective maintenance design for the colour, shape, dimensions, thickness, position and performance of road markings shall comply with the relevant provisions of the current GB 5768.3, Road Traffic Signs and Markings - Part 3: Road Traffic Markings; JTG D81, Specifications for Design of Highway Safety Facilities; and JTG D82, Specifications for Layout of Highway Traffic Signs and Markings. It shall be consistent with information conveyed by signs, traffic signals and information display boards, without contradictions.

5.7.9 Corrective maintenance design for barrier containment level, minimum installation length, material, geometry and installation method shall comply with the current JTG D81, Specifications for Design of Highway Safety Facilities. For local barrier modifications, verification shall be performed according to site conditions, vehicle types to be contained and barrier structure using the methods in Appendices C and D of JTG/T D81-2017, Guidelines for Design of Highway Safety Facilities, or the modified barrier shall be capable of passing the safety-performance evaluation specified in the current JTG B05-01, Standard for Safety Performance Evaluation of Highway Barriers.

Translator's note S-2: The English titles of referenced Chinese standards are descriptive translations. Their designations identify the documents. "Current" is retained wherever the source uses it; this attachment does not independently confirm later revisions. The explicit 2017 edition references are retained as printed.

Translator's note S-3: "Containment level" is a performance classification, not merely steel grade, thickness or galvanizing mass. This translation does not equate a Chinese level with an EN 1317 or MASH level. Clause 5.7.9 requires verification or evaluation of the barrier arrangement concerned; it is not a product-certification statement by China Guardrail.

Insufficient Safety Barrier Height

Source: printed page 81 (PDF page 85).

5.7.10 Where barrier height is insufficient, the barrier containment level shall be assessed through a dedicated technical study or testing, taking account of actual highway traffic volume, traffic composition, operating speed, crashes and other conditions, and a design scheme shall be determined. Replacement or modification design shall be undertaken in the following circumstances:

1. The difference between the beam-panel height of a W-beam steel barrier and the value specified by the design standard exceeds **20 mm**.
2. The difference between the beam-panel height of a thrie-beam steel barrier and the value specified by the design standard exceeds **50 mm**.
3. For basic-profile (NJ-type), modified-profile (F-type) and strengthened concrete bridge barriers, and composite bridge barriers, the reserved height at the bottom of the foundation is less than the thickness of the added pavement layer or overlay.

Source commentary to 5.7.10

The values in items 1 and 2 are based on the Technical Guidelines for the Special Action to Improve Highway Bridge Safety Protection Capability (Jiao Ban Gong Lu [2019] No. 44) and relevant research findings: containment function is significantly reduced when the centre height of a W-beam rail is more than 20 mm below the standard value, or that of a thrie-beam rail is more than 50 mm below it.

In item 3, insufficient reserved height at the bottom of a concrete-barrier foundation means that a pavement overlay reduces the barrier's effective height and consequently its containment capability.

In this clause, "beam-panel height" is the height of the centre of the barrier rail above the design reference line. Where a kerb is provided on the traffic-facing side of the barrier and the kerb does not coincide with the barrier face, beam-panel height is measured from the top of the kerb.

Translator's notes - separate from the source

H-1 | Reference point matters. The 20 mm and 50 mm comparisons in this clause concern beam-panel centre height, not the top edge of the rail, post length or a universal permitted height reduction. The opening requirement for a dedicated assessment remains part of the clause.

H-2 | Do not substitute a foreign threshold. These values are reproduced from this Chinese standard for the specified context. They do not replace local regulations, project design criteria or the requirements of a separately tested barrier system.

H-3 | Preserve strict comparisons. Items 1 and 2 say "exceeds," not "equals or exceeds." Table 5.7.2 separately uses "less than 30%" and "more than 30%" for steel-barrier corrosion; it does not expressly assign the exact 30% case. No missing boundary condition has been invented in this translation. Seek clarification where such a boundary affects a decision.

H-4 | Clarification rather than redesign. The notes explain reading and terminology only. They do not specify an installation detail, establish that a particular barrier is safe, or authorize reuse, height adjustment or component substitution.

Terminology, Translation Notes and Sources

Requirement levels

The source's wording explanation (printed page 110 / PDF page 114) distinguishes strict requirements, recommendations with limited choice, and permitted options. In this translation:

Source wording	English rendering and function
Ying / bu ying / bu de	Shall / shall not: a requirement or prohibition in the source's drafting convention.
Yi / bu yi	Should / should not: a recommended approach, allowing a degree of choice where conditions permit.
Ke	May: a permitted option under the stated conditions.

This convention reproduces the strength of the Chinese wording; it does not determine the standard's legal applicability in another country. The source also distinguishes very strict "must" and "strictly prohibited" wording, but those forms do not occur in the selected operative clauses.

Professional terminology

Term used here	Intended meaning
W-beam / thrie-beam barrier	Two-corrugation / three-corrugation steel-beam barrier, respectively.
Guardrail / safety barrier	Vehicle restraint facility in this context; concrete and cable systems are included where the source specifies them.
Railing	The separately named railing category in the source commentary; not an automatic claim of vehicle containment.
Movable barrier / crash cushion	A movable barrier system / an impact-attenuating device; not an ordinary fence.
Containment level	Barrier protection-performance classification under the referenced assessment framework.
Highway clearance envelope	Space that must remain free of intrusions; distinct from vertical clearance alone.
Roadside clear zone	Roadside recovery area; distinct from the highway clearance envelope.
Corrective maintenance	Maintenance addressing damage, defects or inadequate function; broader than simple component replacement.

Translator's note T-2: In Table 5.7.2, a "compliance rate below 60%" concerns the proportion of test results meeting the relevant criterion, not a skid-resistance or retroreflection measurement of 60. The table's percentage thresholds and component-level scope are retained.

Translator's note T-3: The source table repeats broken aluminium fastening channels in both local/minor and severe/unreparable categories. Both occurrences are retained rather than silently corrected. Assess the case in the context of 5.7.2 and seek source clarification if necessary.

Original source and traceability

Chinese original: **JTG/T 5410-2026, Specifications for Design of Highway Maintenance Engineering**, Ministry of Transport of the People's Republic of China; 114-page supplied PDF. Section 5.7: printed pages 76-81 / PDF pages 80-85. Related selections: page 2 of this translation.

[Official Ministry of Transport announcement \(Chinese\)](#)

[Download the complete Chinese original \(114-page PDF\)](#)

Translation and notes: **China Guardrail** | chinaguardrail.com | sales@chinaguardrail.com

Unofficial selected translation. The Chinese original governs in case of ambiguity.