



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 51451-2025

Replacing CJJ 176-2012

**Technical standard for geotechnical engineering of municipal
solid waste sanitary landfill**

生活垃圾卫生填埋处理岩土工程技术标准

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Foreword

This document was issued on 21 April 2025 by the Ministry of Housing and Urban-Rural Development of the PRC, jointly with the State Administration for Market Regulation and takes effect on 1 September 2025.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies.

The document runs to 198 pages. The identification, the dates, the classification and the table of contents on this page are taken from the cover and the printed contents of the standard itself.

This standard was approved and issued by the Ministry of Housing and Urban-Rural Development of the People's Republic of China as Announcement No. 67 of 2025, dated 21 April 2025, and takes effect on 1 September 2025.

On its implementation date it supersedes the industry standard CJJ 176-2012 "Technical code for geotechnical engineering of municipal solid waste sanitary landfill", which is abolished at the same time.

The standard was drafted in accordance with the notice of the Ministry of Housing and Urban-Rural Development issuing the 2016 plan for the formulation and revision of engineering construction standards (Jianbiao Han [2015] No. 274). The drafting group carried out extensive investigation and research, summarised practical experience and referred to the relevant international and domestic advanced standards.

The main content of the standard is: general provisions; terms and symbols; basic requirements; landfill stability; landfill settlement; pollution containment of the landfill; and safety monitoring and early warning of the landfill.

The Ministry of Housing and Urban-Rural Development is responsible for the administration of this standard.

1 Scope

GB/T 51451 is the Chinese national standard for the geotechnical engineering of municipal solid waste landfills. A landfill is a soil structure built out of rubbish, and it fails the way a soil structure fails: the slope slides, the dam moves, the liner is punctured, the cover cracks. What makes it harder than an ordinary embankment is that the fill decomposes, so it settles for decades, produces gas that raises the pore pressure inside the body, and generates leachate that has to be kept out of the groundwater. This document addresses each of those in turn: the shear strength parameters of the waste and of the geosynthetic interfaces, and the slope and dam stability analyses built on them; settlement, and with it the calculation of landfill capacity and of the capacity gained by settlement, which is what decides how long a site can go on being used; pollution containment, covering the horizontal liner, the vertical barrier, the soil cover and the construction quality control of each; and safety monitoring and early warning, on leachate level, gas pressure and the deformation of the waste body and the dam. Five annexes carry the calculation methods, including the breakthrough time of a horizontal liner and the thickness of a capillary barrier cover in arid regions. The 2025 edition replaces the industry standard CJJ 176-2012 and raises it to a national standard.

2 Terms and symbols

Clause 2 is organised as follows: 2.1 Terms; 2.2 Symbols.

4 Landfill stability

Clause 4 is organised as follows: 4.1 General rules; 4.2 Shear strength parameters of municipal solid waste; 4.3 Interface shear strength parameters of geosynthetic materials; 4.4 Slope stability analysis of the landfill; 4.5 Stability analysis of the waste dam; 4.6 Control of slope instability induced by leachate; 4.7 Control of slope instability induced by landfill gas.

5 Landfill settlement

Clause 5 is organised as follows: 5.1 General rules; 5.2 Settlement calculation of the waste body; 5.3 Calculation of landfill capacity and capacity increase; 5.4 Analysis and control of differential settlement of facilities in the landfill area.

6 Pollution containment of the landfill

Clause 6 is organised as follows: 6.1 General rules; 6.2 Design of the horizontal liner; 6.3 Design of the vertical barrier; 6.4 Design of the soil cover layer; 6.5 Construction and quality control of the anti-pollution vertical barrier wall; 6.6 Construction and quality control of the

compacted clay layer.

7 Safety monitoring and early warning of the landfill

Clause 7 is organised as follows: 7.1 General rules; 7.2 Leachate level monitoring and early warning; 7.3 Landfill gas pressure monitoring and early warning; 7.4 Waste body deformation monitoring and early warning; 7.5 Waste dam deformation monitoring and early warning; 7.6 On-line monitoring of the landfill.