

# 大型油罐软土地基设计

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**摘要** 描述大型油罐软土地基设计方法。考虑建在海洋粉质黏土地基之上的油罐, 位于加拿大安大略北部沿James Bay湖边的一个小镇Attawapiskat。2个油罐直径为29 m, 高12 m, 为Attawapiskat以西大约100 km处的一个钻石矿提供燃料。每一个油罐具有7.5×10<sup>6</sup> L的存储容量, 并且发挥140 kPa的最大油罐压力。考虑软土处理和席形基础的设计, 针对潜在的整体地基剪切破坏和局部地基剪切破坏设计标准要求充分的安全系数, 并达到严格的不均匀沉降限制。其他设计考虑包括冻结效应、有限的粗粒和堆石料、短施工时间和燃料溢出保护。稳定性分析表明, 油罐边界局部基础剪切破坏模式比整体基础破坏模式更关键, 同时, 强调对于软土改进的需要。地基处理利用土工合成加筋材料加强油罐外围基础, 利用预制竖排水管加速地基固结沉降, 并结合预压软土降低工后沉降。设计研究确认在短期内建造大型油罐地基的可行性, 但要结合上述的软基处理技术。

**关键词**

[基础工程](#); [油罐](#); [软土](#); [地基](#); [预制竖排水管](#); [沉降](#); [固结](#); [设计](#)

分类号

## DESIGN OF FUEL TANK FOUNDATIONS ON SOFT CLAY DEPOSIT

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### Abstract

A foundation design method and considerations for two large-sized fuel tanks on soft marine clay deposit in Attawapiskat, located in the James Bay coastal area of Northern Ontario, Canada are describes. The tanks with diameter of 29 m and height of 12 m are required for fuel supply for a diamond mine, located approximately 100 km west of Attawapiskat. Each tank has a volume capacity of 7.5 million litres; and the maximum tank pressure of 140 kPa is exerted. The design involving a mat foundation is introduced. The design criteria require adequate safety margin against potential failure(bearing pressure and edge pressure) and relatively stringent settlement (differential) limits. Other design considerations include frost effects, limited availability of granular and rockfill materials, short construction period, and spill containment. Stability assessment indicates the edge failure to be more critical than the bearing capacity failure mode, and emphasizes the need for soil improvement. The uses of geosynthetic reinforcement along the perimeter of the tank and

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prefabricated vertical drains(PVDs) in the foundation soil in conjunction with site preloading are expected to reinforce the foundation, accelerate consolidation and reduce post-construction settlement. The design studies confirm the feasibility of constructing a mat foundation within short time, provided that the ground improvement measures mentioned above were incorporated.

**Key words** [foundation engineering](#); [fuel tank](#); [soft clay](#); [foundation](#); [prefabricated vertical drain](#); [settlement](#); [consolidation](#); [design](#)

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