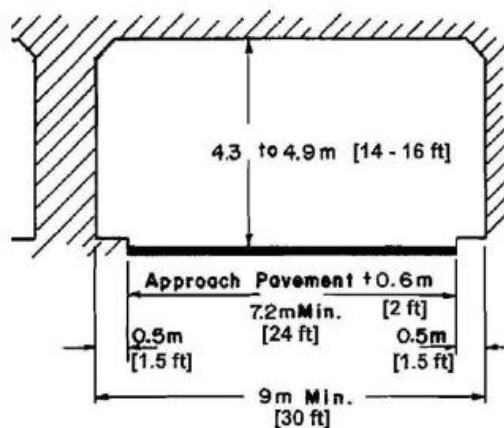
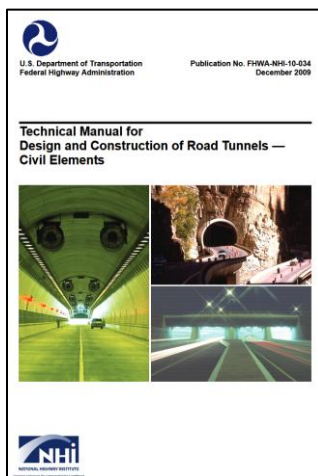


Use Case 09: Standards compliance

Purpose

For the design of tunnels, there is a wide range of (largely national) regulations and technical norms that must be fulfilled. The respective regulations range from structural capacities, to fire safety over to ventilation to minimal required distances.

Currently, the compliance of the tunnel design with these norms and standards is checked manually, both by the designer as well as by the construction authority.



Clearance requirements according to the FHWA Technical Manual

The purpose of this use case is to allow for an automated checking for design and construction norms compliance on the basis of geometric-semantic tunnel BIM models and digitized rule sets.

To this end, applicable norms as well as the project's specific functional requirements must be translated into machine-interpretable form. The BIM model must provide the necessary information on such requirements, preferably in IFC format, to allow for its traceability at the time of the works acceptance (comparison between functional requirements and as-built structure's capacity).

Dependent upon the type of requirements to be checked, this may involve specific geometric as well as semantic information, relevant to the construction components or the systems' equipments. The model checking application performs the actual compliance checks and produces the corresponding reports, preferably including issues in BCF format.

Exchange scenario

The exchange scenario that must be supported by IFC-Tunnel is the exchange of models from BIM authoring systems to the model checking software.

An important pre-requisite is the translation of the effective norms and requirements in machine-readable format. In the moment, there is no standard available for encoding these rules. Thus, vendor-specific representations must be used.

Requirements for IFC-Tunnel:

The requirements for IFC-Tunnel lie in the provision of geometric as well as semantic information in a form that allows the automated checking against the rules of codes or standards.

Geometry: The required geometry is deeply dependent on the type of rules to be checked. For many rules, the usage of explicit geometry (triangulated faceset) is sufficient, others require an implicit geometry to allow direct access to geometric properties such as dimensions, radii and distances.

Semantics: Also the required semantics dependent on the specific type of rule to be checked, but a general requirement is the incorporation of a suitable classification system for object types (spaces, structural components and systems parts).