

# ÉTUDE COMPARATIVE DES COÛTS DE GENIE CIVIL SELON LES SYSTEMES DE TRANSPORT GUIDÉS ADOPTÉS

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## SUMMARY

After a geometrical and technical description of the 20 urban guided mass transit systems in operation or on study in France, this report makes a comparative analysis of tunnel and viaduct construction costs depending on the ground geology, the vehicles geometry and capacity .

This analysis is done for a 400 and an 800 meters segment ( tunnel or viaduct ) including one station adapted to each system: the comparison is achieved for an equal capacity of transport. The costs are computed by 2 models called METROV and ESTIM whose descriptions are included in appendix with the unit price list, established on Jan. 1992.

The construction methods considered in this study are :

- a cut and cover method or superficial covered trench,
- a cut and covered method or deep covered trench,
- a shield method or tunneling with a tunnel boring machine,
- a conventional mining excavation method
- a viaduct.

The interest to bore one or twin tubes to realize a double track tunnel is also examined for the main mass transit systems.

The comparison is ended by an analysis of civil engineering costs per seat as a function of the number of transported passengers per hour for each considered system .

Finally, for each construction method the increase of civil engineering cost is examined as a function of the dimensional parameters such as diameter, width and height of constructions. In this report the gauge of the described vehicles is studied between 1.60 and 2.90 meters and their length between 3.12 and 312 meters.

The report shows the possible benefit when reducing the width and the height of a cut and cover construction or the diameter in the case of a tube.

In conclusion, this study brings to the fore the civil engineering costs depending on many variables. The viaduct is the least expensive construction and among the underground construction methods, the tunnelling boring machine method can be the least expensive beyond a minimum segment of tunnelling construction: in some cases a twin tubes construction works can be less expensive than for a one tube construction.

It is important to improve the design of a subway construction in relation with the frequentation expected in a short and a long term and to choose a mass transit system flexible enough to absorb the increasing demand of transport and if possible without supplementary construction works in transportation capacity improvements.

**Keywords:** Civil engineering; cut and cover; viaduct; construction cost; urban guided systems; light rail transit; metro; heavy rail system; gauge; capacity; RER