

# Optimum Establishment of Total Station

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## SUMMARY

At least two control points must be available in order to determine the position and orientation of a total station (TS). This paper analyses optimum horizontal location of TS with respect to the control points and gives an answer to question “What is the best location of total station with respect to the control points if the goal is to determine the coordinates of TS and detail points as precisely as possible?” The optimality is deemed based on the uncertainty of the horizontal coordinates of the TS and of the points measured from it, as well as on the uncertainty of the TS orientation. The investigation of this optimality problem was performed both analytically and by the trial-and-error method.

It was found that the optimum location of TS is in the center of gravity of all control points. For a given configuration of the control and detail points, the location of TS does not influence significantly the positional uncertainty of the surveyed detail points. If the location of control points is not fixed, e.g. when using GNSS observations to establish TS, the control points should surround the working area so that the detail points to be surveyed are close to the centroid of the control points.