Research on location control of GPS in Super high-rise building construction

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Summary

The transforming of survey datum and the control of axis, vertical level, and elevation are of great importance on controlling quality of high-rise building construction. In order to maintain project quality and construction efficiency, to improve the efficiency of survey position and observing precision, also to explore the more scientific and faster method in survey position of constructions, this dissertation systematically elaborates the base principles in using GPS technology on high-rise building construction, putting forth the base method in the design of technology, operation, data processing, and error analysis etc, when GPS technology is used in high rise building construction. And then it is proved by using this technology in the project of Construction Bank building of Xiamen.

Keywords: Super high-rise building;GPS position;Construction control and implementation;Data analysis and processing.

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The fieldwork of GPS location in high-rise building construction includes the choice of GPS mark, the choice of operation mode, and the remanding of survey etc. Before the points are selected we should collect and try to understand the position and the original survey control markís situation about high-rise building, so we can decide the suitable marks. The adoptable operation mode of GPS location in high-rise building construction mainly is static locations and dynamic locations.

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Between them the static location mode was used in datum transmitting, location molding of structure and the sunshine deformation in GPS survey; and also the dynamic location mode was used in surveying dynamic deformation in GPS survey. The basic technical targets that GPS location and observing in high-rise building construction based on the satelliteís angle of elevation, the number of satellite in effective observing, the number of observing time phase, the number of repeating station, the length of time phase, the interval of data sampling. Before observing we should have the common test, carrying electric test, inspective test. When observing we should define the effective observing procedure.

Data processing of GPS location in high-rise building construction mainly includes data processing, the coordinate transformation of location result and the decision of GPS elevation etc. Data processing mainly discussed data predisposing, datum line calculating and the smooth level of network. The main operating points of predisposing data were inspecting the smooth filtration to data, getting out of gross errors, unifying the format of data files, operating the standard of data files, and correcting the mode of observing data. We can use the coordinates of ephemeris that satellites emit as the beginning data of datum line calculated. This dissertation determines standard of each stage for the beginning observing data on GPS location in high-rise building construction. Data processing of GPS location in high-rise building construction includes the calculation of datum line and the surveying adjustment of net as two stages, so we can adopt random software or other software which is formal identified to work it. This dissertation explicated that the vectors of GPS base line adopt the method of double different observing numbers to solve, and has an analysis according the location features of high-rise building construction. At the same time it investigated the analysis of precision estimating and solving result, and also explicated the method of three-dimensional surveying adjustment restrained and the united surveying adjustment of ground net in survey of high-rise building construction.

GPS location technology is first used in Construction Bank building of Xiamen. It has built the control network of floor construction; Precision of location and setting out can meet the needs of high-rise building construction; Deformation curve reflects the law of sunshine deformation; Frequency spectrum chart of kinematics deformation monitoring reflects kinematics feature and the law of deformation. The curve of sunshine deformation and frequency chart of kinematics deformation has important direction meaning on high-rise building construction. It shows that GPS technology does good for location and setting out, sunshine deformation, kinematical deformation in high-rise building construction.

The errors of GPS location in high-rise building construction mainly include the error of satelliteís system, the error of satelliteís signal broadcasting, the error of receiving equipments etc. This dissertation systematically investigated on the causes and solved methods of last error analyses. It is reasonably proposed to select observing stations and set up the boards of restrained path, and also other practical measures, especially to errors of a few effective paths, at the same time it still puts forth detailed methods to reduce the errors of receiver position.

The experiment analysis of GPS location in high-rise building construction determine technology scheme making use of GPS location survey. Through the experiment analysis of technology on GPS location, it can provide experiment values of GPS location precision and use it as a basis for determining survey equipment. Through the experiment analysis of GPS survey on dynamic deformation of high-rise building construction, it can provide displacement and time history curve and provide technology advisable support for building construction.

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