Mapping Land Field in *Kampung Tua Nongsa* using NRTK Method Based on PTSL Activites

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Abstract. Measurement and mapping of land parcels is a series of activities in carrying out land registration, this activity can be carried out by various methods, such as: photogrammetric methods, remote sensing, terrestrial and other methods. Complete Systematic Land Registration or commonly called PTSL is a program from the government in the land sector in the form of land dispute resolution or land certificate activities simultaneously in one work area and carried out by collecting data simultaneously. At the same time, data collection can reduce the risk of land and property rights disputes, both within the community and with the government.By measuring land registration using the RTK method with INA-CORS BIG as the base, the results of this measurement produce a Map of Land (PBT), where the target of the measurement is 1,500 parcels of land. PTSL 2021 *Kampung Tua Nongsa* with a measurable area of 1,591 fields.

Keywords: Land Registration, PTSL, RTK, INA-CORS BIG, Map of Land, PBT.

1 Introduction

Since the beginning of the era of the Complete Systematic Land Registration/*Pendaftaran Tanah Sistematis Lengkap* (PTSL) program in 2017 published by Jokowi, there has been a change in policy direction in the Agrarian and Spatial Planning/National Land Agency/*Badan Pertanahan Nasional* (BPN) environment. The policy in question is a land registration system in Indonesia which is being rapidly implemented with the aim of surveying more land parcels each year.

This mapping was carried out using a tool, namely GPS Geodetic using the NRTK and INA-CORS methods as the base, with the accuracy of the tool reaching 1-5cm [1].

GNSS is a global positioning and navigation satellite system that is currently being used and developed. There are several countries that have developed this GNSS such as GPS in America, GLONASS in Russia, Galileo in the European Union, Beidu/Comppass in China and others. GNSS is a technology for determining the position and location (latitude, longitude and height) and time of scientific units on Earth. GNSS satellites transmit highfrequency radio signals

containing time and position data that can be obtained by the receiver, so that they can be placed anywhere on the earth's surface [2].

Kampung Tua Nongsa is located in *Batu Besar* Village, which is located at 1.15250 (ºN) and 104.12887 (ºE) [3]. Batu Besar Village has an area of 96.86 KM2, has a total population of 20,554 people [3].

PTSL What is meant by systematic land registration is the activity of registering land for the first time which is carried out simultaneously which includes all land registration objects that have not been registered in the territory or part of the territory of a Village/Kelurahan [4].

SmartPTSL application is an application that accelerates the work of complete systematic land registration (PTSL). SmartPTSL application is a GIS (geography Information System) based application that runs with web and android media with features that meet the needs of PTSL. SmatPTSL application is not a measuring instrument, but a medium to pour the measuring numbers either from the meet band, intepretasi aerial photography or connection to external GNSS. SmartPTSL based on geographic information systems can assist in solving problems by displaying data so that it is easy to understand [5]

RTK (Real-time kinematic) system is a differential real-time positioning system using Phase data. In conjunction to provide real-time data, the reference station must transmit phase and pseudorange data to the user in real-time using a data communication system. Reference stations and users must be equipped with a transmitter and receiver system that can function properly so that data communication can run properly [6].

InaCORS BIG is a Continuously Operating Reference Station (CORS) which has a system consisting of several components, namely Field Station devices, servers, communication networks, and users. Inacors station in the field consists of several outdoor devices and indoor devices. The outdoor device consists of a GNSS antenna and meteorological sensors. The GNSS antenna is mounted on top of the pillar while the meteorological sensor is near the location of the pillar antenna. Indoor devices are located in a device box consisting of a power system, GNSS receiver, and telecommunications equipment [7].

Autocad a software to create design drawings. Usually the design of the processed image is used by the architecture in the construction of construction and usually fall into the technical sign [8].

2 RESEARCH METHOD

The location of this study is located at 1.15250 (ºLU) and 104.12887 (ºBT) Riau Islands, Batam City in Nongsa District, Batu Besar Village, precisely in Fig.1 at *Kampung Tua Batu Besar Nongsa*
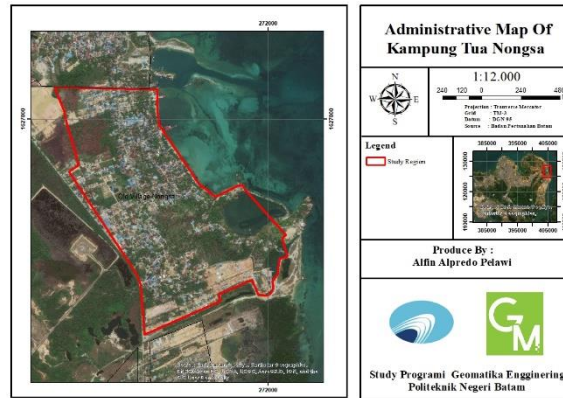
Fig. 1. Map of *Kampung Tua Nongsa*

When taking measurements, tools and materials are needed, so that the measurement runs well and smoothly. The following tools and materials are used when taking measurements on Table 1 and Table 2:

- Tools

Table 1. Tools Used

No	Name	amount
1	GPS Geodetik South Galaxy Rover	3
2	Monopole	3
3	SmartPTSL Application	3
4	Handphone	3
5	AutoCAD Map 2012 Application	1
6	Laptops	3

- Materials

Table 2. Materials Used

No	Name
1	File Shapefile *Kampung Tua Nongsa*
2	Map of Measurement Result in format DWG 2021

Before taking measurements of land plots there are several stages of preparation that must be done on Fig. 2 Research Flowchart, a simple explanation as follows:

- Inventory of base station distribution as a binding point (BIG station in Batam is in Sekupang District, Tanjung Riau Village).

- Iventaris land registered / not registered.

- Coordinate with other agencies, village officials, and the community on Fig. 3.
- Measurement equipment setup
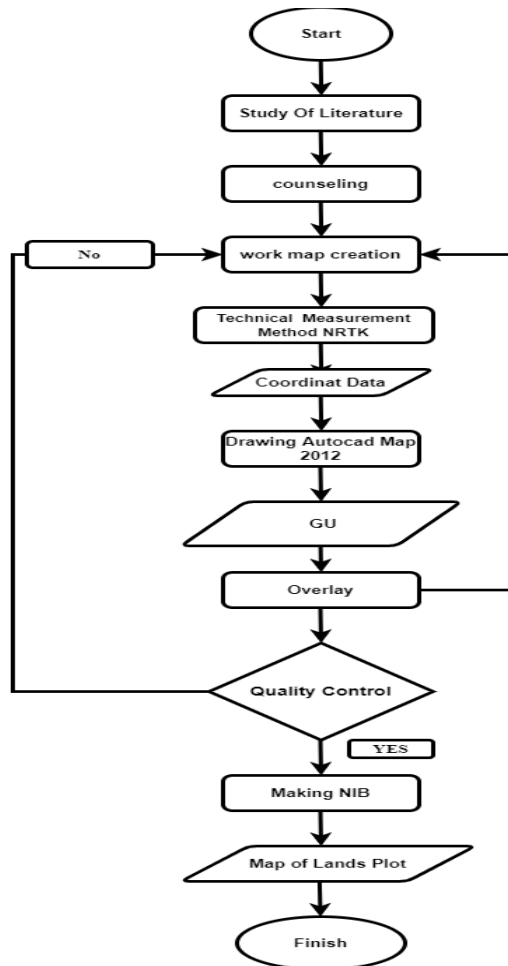- Preparation of a working map

Fig. 2. Research Flowchart

Fig. 3. Coordinat Data

After taking measurements, the measurement data will be obtained in the form of coordinates that have previously been exported through the SmartPTSL application, then the data is changed in the form of a script so that it can be called using the AutocadMap 2012 application on Fig. 4, after being called it will be called point point and after that it is connected using a polyline to become a land plot on Fig. 5.
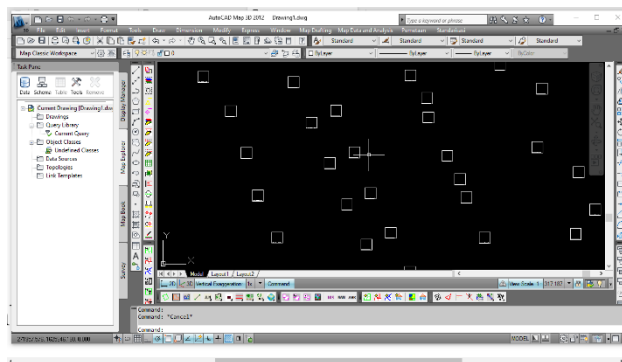
Fig. 4. Point in AutocadMap 2012
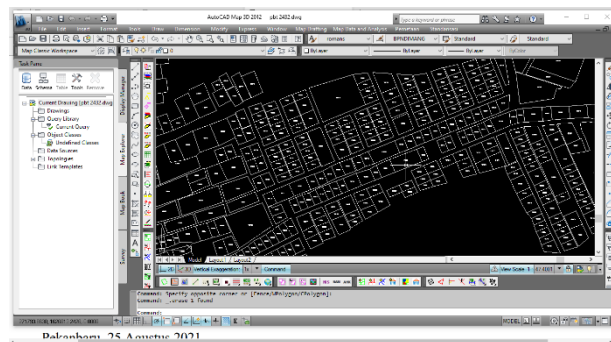
Fig. 5. Field of Land Results

Next will be followed by a topological process, usually this process is assisted by using GeoKKP. This process aims to smooth out overlapping fields or errors when drawing on Fig. 6. Topological Process.
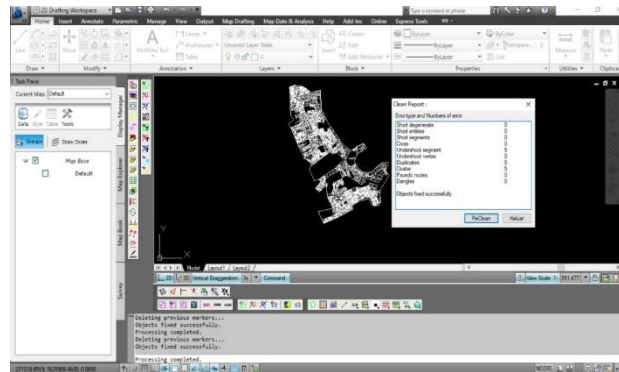
Fig. 6. Topological Processes

The above stage is the first stage when doing topology that is doing clean on the ground. It aims to remove cross lines, overlapping fields and others. Reclean is done repeatedly until all error notifications become 0 or Ground plane does not Error in topological process in Fig 7.
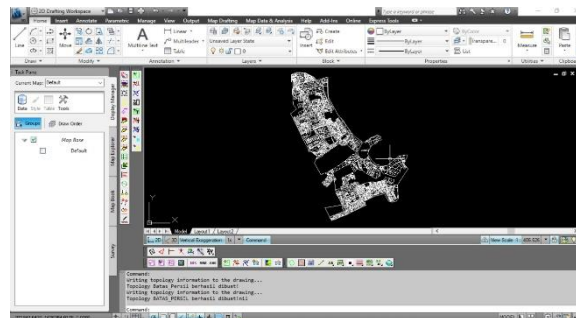
Fig. 7. Ground plane that does not Error in topological processes

3. Result and Discussion

Fig. 8. Map of Land

The result of land mapping is a map of land (PBT) K1 in Fig. 8, a map of land (PBT) is the result of mapping one or more land areas on sheets of paper with a certain scale that the limits have been set by the competent authorities and used for the announcement of physical data. PBT is the final result of the PTSL program that is done after the land plots have been uploaded to the system and accepted by BPN.

In mapping land plots in *Kampung Ttua Nongsa* there are several factors that can hinder the work when taking measurements, among others:

- Many fields that do not have a boundarymark/peg

Fig. 9. Installation of Stakes at The Time of Measurement Takes Place

In this case, public awareness plays an important role in the implementation of a complete systematic land registration (PTSL), such as there are several plots of land whose fields have not been equipped by boundary signs. so that when measuring the physical team waits for the fields to be pegged first as in Fig. 9 which results in the measurement process being slow.

- Tool and signal constraints

Fig. 10. Signal Not Fixed

In this case, the tool plays an important role in making measurements for physical data retrieval, when measuring PTSL, the tool used is GPS Geodetic South. Constraints that often occur are often lost signal as in Fig 10 so that the tool does not reach the fix resulting in the scales can't be measured and cause measurement of complete systematic land registration (PTSL) to be hampered.

- Residents were not present at the measurement

In this case, residents play an important role in the process of running the measurement of complete systematic land registration (PTSL), if residents are not present during the measurement process of land plots, the measuring team will find it difficult to find out the name of the owner on the field to be measured so that it will slow down the measurement process. Therefore, people are required to be present at the time of measurement.

CONCLUSION

- The procedure for mapping land using the NRTK method with INA-CORS is carried out by measuring land using a geodetic GPS device that has been registered or has been registered with CORS. In accessing CORS, a stable internet network is needed so that data correction gets maximum results. For measurement of ground plane required fix signal.

- For the manufacture of maps of land (PBT) has several stages, such as measurement of land, data processing, depiction of land that is not in the status of problematic/dispute, not overlaid with a working map on the application AutoCAD Map 2012, and after that the land has been drawn meal proceed to the process of Quality Control (QC) of BPN, after which the provision of NIB if the land passed the QC selection. Map of land plots (PBT) printed after it was signed by the physical task force

- That in general the mapping of land plots in *Kampung Tua Nongsa* has been able to run quite well. Although there are still some obstacles or obstacles encountered. The dominant constraint is a technical constraint that is often lost signal resulting in physical data collection is hampered and becomes long.

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