

# Reporting Thailand Cadastral System in Cadastre 2014 Trends

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**Key words:** cadastre2014, land registration, title, digital mapping

## SUMMARY

Cadastral System is defined to the limit of land parcel based on laws, rights, and title/deed registration for the parcel or property, traditionally. Thailand, Department of Land(DOL), had upgraded the cadastral system on Land Tilting project completely for 20 years. A new series of 1/4000 cadastral mapping were produced base on rectified photomap. The procedures for title deed survey is on new technology, on line processing. On this learning, the cadastral survey have been interesting that DOL cadastral system under law are reviewed including cadastral survey for mapping processing for hardcopy data. After the system had developed on Land Tilting Project for new tenure system which cadastral base maps were created Universal Tranverse Mercator projection on Indian datum and new technology started implement. Currently, the system is on digital era the official or license surveyor can work online via internet. The cadastral survey system have been transformed to digital model as database. This paper is showed whether DOL cadastral system is in Cadastre 2014 trends, or not. The comparison between Cadastre 2014 characteristics and DOL procedures are scrutinized the evidences. The conclusion, DOL cadastral system is in Cadastre 2014 trends to show the complete legal situation of land in the future official application and integration to national standard cadastral data model.

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## 1. INTRODUCTION

In the modern reformation of information system, Thailand, DOL (Department of land), Ministry of Interior is the one official to flow business processes in the national cadastre and national mapping organizations as digital information communication. The paper cadastral map and land registration had been transformed to digital data already as an image of geographic area and a table of owners on database. The purpose of cadastre for tenure system has not changed. The land register is the list of owners of the parcels which show on the cadastral map. The spatial structure of the parcel consisted of boundaries, ground corners which each object is described by tags and labels. The definition of boundaries for parcel of land in Thailand is described by meters and bounds. Those are only dimensions without bearing showed on survey plats and legal descriptions. The system, reflected the measurement technology, is easy to measure lines by traditional instrument, theodolite and tape, to locate point on the earth's surface. Even the digital mapping methods were cartographic - scanning, digitizing without a field survey base, the cartographic base map can served many GIS application very well. Moreover some GIS user need for increased accuracy information, the new position accurate datasets point out the current cartographic base map inaccuracy.

This paper is focuses on how Thailand land tenure system can work on digital cadastral base map through a meters and bounds without coordinate mapping even coordinate calculations are used by coordinate geometry principle. Moreover, the DOL cadastral system has been changed to digital format that is followed through to Cadastre 2014 definition or not which will be guided line to develop for further cadastral data.

## 2. THAILAND CADASTRAL SYSTEM BACKGROUND

Thailand, the Civil and Commercial Code(1932) has been dealing in private land under the Land Code(1954) that contains the main legal provisions covering tenure and administration of land. Under this code the Department of Land (DOL) is responsible for all cadastral surveys, including subdivision, for maintaining the land registers and for issuing land title document. Private land can be divided in to three categories(Angus-Leppan and Williamson);

1. Land held by title deed (NS4) which are based on a full survey and adjudication;
2. Land held by certificates of utilization which some circumstance these are negotiable documents and can be used for mortgages, they have limited legal standing. The plan consists of a sketch based on rudimentary survey (NS3) or identification of boundaries on non rectified photograph(NS3k);
3. Undocumented land which some of this land is held on the basic of pre-emptive or claim certificates, some without any documentation, though the occupiers may have a legal claim to the land.

The title deeds and certificates of utilization are two major documents which are both negotiable and can be registered. All transfers and dealing of land titles are carried out a recorded in the province land office for each a province. There are various indexes and records supporting the registration system to actual title documents in Fig 1, Fig 2 as follows;

1. a proprietorship index showing, the proprietor of all land titles or certificate listed alphabetically in the province or district;
2. a survey file giving all survey and subdivision information for each parcel;
3. a series of official cadastral plans covering the province or district.; and
4. a dealing file for each parcel, consolidating all dealing documents for initial adjudication on wards, in chronological order.

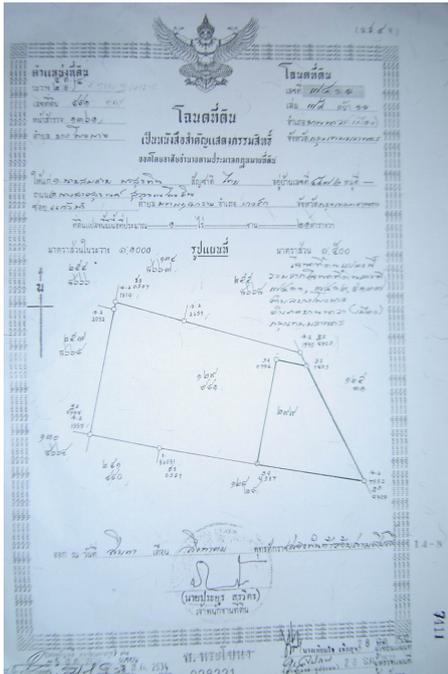


Fig 1. The front title document shows proprietorship index, survey file, series official.

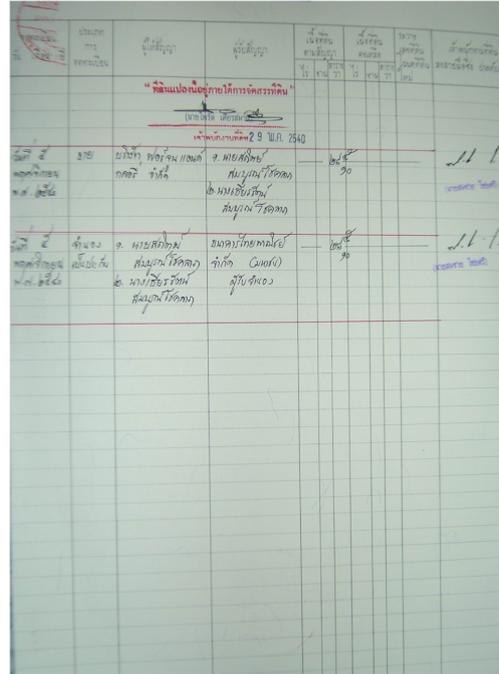


Fig 2. The back title document shows a dealing file in

For mapping, DOL has been carried out cadastral surveying and mapping of land titles based on 1/4000 scale is showed the graphical parcel in meters and boundaries, cornerstones, and land information data. It is generated from 1/50,000 topographic map scale, under Loyal Thai Army Department(LTAD), called L7017 series. A 1/50,000 map is covered 15X15 minus (about 27X27 kms) and equal to 169 sheet on 1/4000 scale. On 1/50,000 map, the grid lines are 1,000 meters apart in both rectangular axis and showed UTM coordinate on India datum with two zones, 47 and 48, for each grid line in the ten thousandth and a thousandth meter unit (the tenth and a kilometer unit) on bold capital number. So a 1/4000 map sheet, 2,000 meters distance on ground is equal to four rectangular grids on a 1/50,000 map sheets.

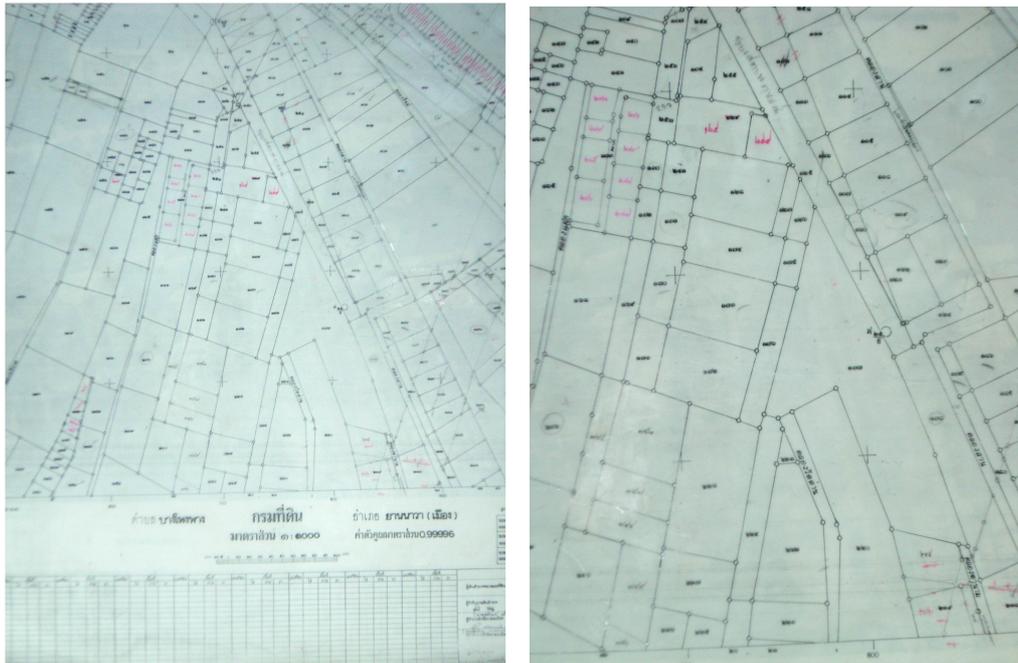


Fig 3. Cadastral Base Map in 1/4,000 and Zoom in

The land tenure system in Thailand concerns the use and possession of land in order to retain ownership or legal interest. The physical boundaries of parcel are generally defined by the legal boundaries, following the general boundary approach which based on aerial photography. There are two categories of cadastral system for land title (NS4);

For the first class in urban area, most of individual survey job is for subdivision. These systematic surveys are used usually carried out in area where sufficient cadastral control can be provided. The first class survey is as followed;

- a. boundaries are adjudicated, adjudication documents have to be signed by all adjacent owners and numbers concrete blocks are placed at each corner;
- b. all boundaries corners are surveyed by radiation from the control traverse, using theodolite and chain;
- c. all calculation are checked in the field, The final calculation is done in head office in Bangkok, where the cadastral map is plotted by computer and
- d. the final plan is checked in the field, certificated of title prepared and issued by temporary field office set up for the systematic survey.

The second class surveys are base on rectified photomap at 1:4000 in rural area, on traverse and tape survey at 1:1000 in village and urban area.

### 3. DIGITAL CADASTRAL MAP(DCM)

Modern digital cadastral map, responding to DOL, is no layer on GIS concept, it is done by scanning and digitizing on map documents in the same scale, same detail. The parcels are showed as polygon features with parcel index as labels to verify parcel area by the boundaries

between the lands and field survey under DOL specification. The land parcel index are assigned in registration, processed after the field resurvey processing without geodetic control. The digital cadastral map is intended to be used for images purposes, not for surveying measurement and reference. The DCM in order as sheet or plat become the similar map documents for the cadastral base map (Fig 4).

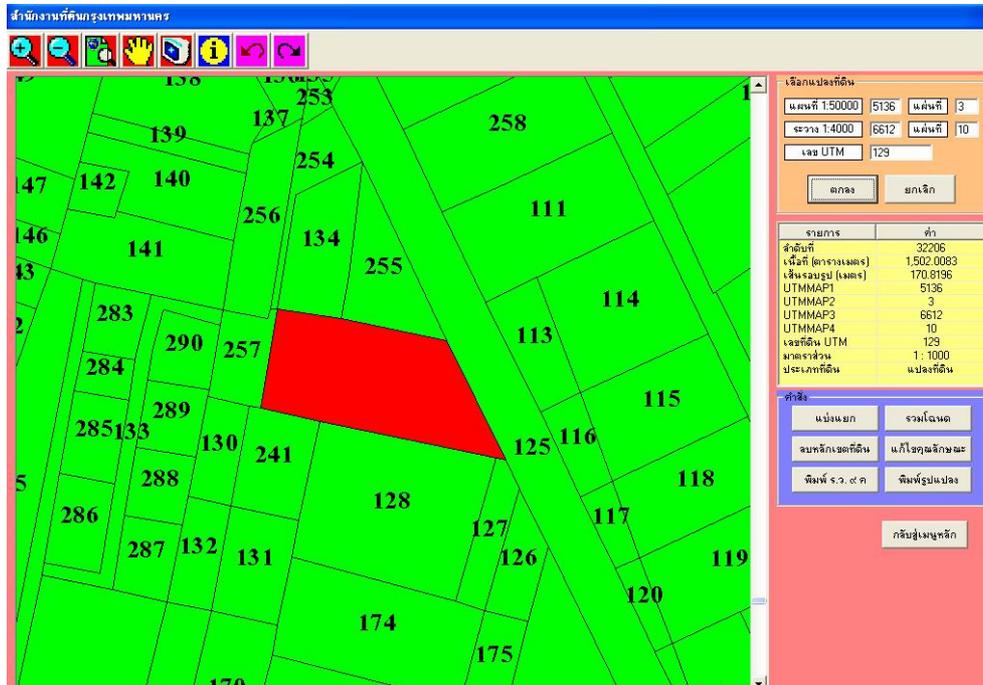


Fig 4. Digital Cadastral Base Map or Sheet

For resurveying by surveyors, when the lands are needed to be legal transition in any business, they have to assess the DCM for detail of adjacent land owner around a land and evidence of field surveying data. So the past survey data, field book and plans, contains both dimensional information about parcel boundaries and field data about the value and methodology at time of measurement (Fig 5).

The need of Department of land for an overall boundary survey rule under the Land act to improve or verify the land boundary situation which the DOL could administer the legal definition of a new grant land parcel and the redefinition of an old land parcel, with appropriate technical accuracy acceptable to the general public whether the government is providing the secure land boundary system to the people. Boundaries in Thailand are described by the textual and graphical document of the land grant and in the way the registered document is the legal evidence of the boundary. Torrence system is used for an official; record for all boundary rights which is described in words for registration and an attached plan together with the titles. It is strong in dealing with land parcel boundary especially in conveyance requirement, a land surveying expert have to verify and give evidence under adjacent land owners acceptance and approving.

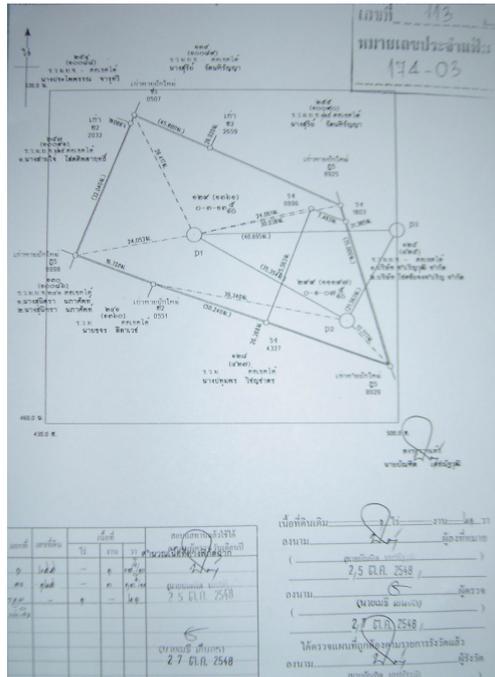


Fig 5. Field Book and Plan or Plat

In general a land parcel will be verified or resurveyed when the land is on owner demand for checking and disputing of the adjoining of land including the adjudication on court. Mostly a land parcel is on the government survey department process for subdivision in partial land and consolidation to homogenous parcel. Event a land parcel is on any case of the demand, the survey plat and legal descriptions describe each parcel of land by the distances around its boundary that is a close polygon and this polygon must have additional connections to corners as survey reference marks.

#### 4. CADASTRAL SURVEYING PROCEDURES.

A land owner who has the name on a title has authority to request for making any land business under legal procedure at local government land office. The title has to be showed and attached the requesting form including a copy of people identification card. That is land registration processing to verify the status of land right for boundary surveying as the request. Generally, the surveyor has to fellow as on line processing via internet and;

Must denote Ampur and Province Name, Sheet name as applicable (Fig 6) on the database.

Must denote land owner names and deed references of all tracts, including all adjoiners, along with their area of record in area (rai-ngan-wha squares) and recorded subdivisions along with their Plat Book and page numbers (Fig 6) on the database.

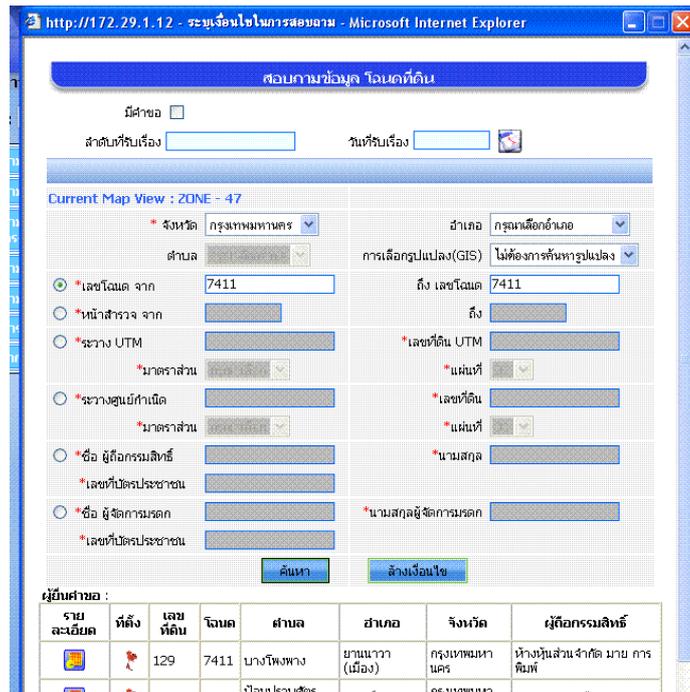


Fig 6. Searching screen for parcel and register reference.

Point of beginning must be reference from Corner of a recorded and platted major subdivision with a found monument. Each course or line must be described with a distance expressed in meters to the nearest thousandths. The area of any tracts shall be sated in rai-ngan-wha squares to the nearest tenths.

The land owner as client has to discuss prior to the surveyor for the purpose of the survey, the scope of services, geographic condition around the parcel, including the time for working of the survey, fees and all legal pertinent details of the contract. The land record shall be searched for the registration record description based on the current and prior deeds. It shall included descriptions of adjoining properties and land owners. All records of information shall be retained as a permanent record.

On a surveying day, all the client and adjoining land owners have to endorse the field survey to the surveyor who shall perform survey for physical land.

The field survey shall consist of the following:

1. A field search for controlling evidence as monument on corners;
2. A discussion of evidence with owner and attempt at notifying the joiners;
3. A reasonable attempt of talking to the joiners or others having knowledge of the boundaries;
4. The location of evidence by appropriate methods and procedures.

The surveyor shall use method and equipment suitable for the purpose of the survey and the field notes shall be retained as a permanent record.

Distance shall be reported in meters, or parts thereof, and no angles or directions shall be reported in degrees or parts thereof. The observation shall be measured to a precision that will produce the desired level of accuracy. The area of the tract being surveyed shall be measured

and reported to precision consistent with the purpose of the survey. All measuring devices shall be checked periodically for accuracy and condition.

Monument is required for all new or reestablished corners, or reference monument for inaccessible corners, and is encouraged at visible points between corners. Set monuments shall be made of durable material and set firmly in the ground.

A reference shall be prepared for all boundary or partition surveys, unless specifically prohibited by the client in the contract. The plat shall show the results of the field survey and be provided to the client. Plat shall be a scale large enough to show significant detail.

## **5. STUDYING IN CADASTRE 2014 TRENDS.**

As mentioned, DOL cadastre is a key link between social activities and land use and its management as transition or subdivision for adjudication as the dynamic nature of society imposes continuous change on the land in land market. The cadastre is serving both individual and community information and providing certainty over long time. A successful cadastre should provide security of tenure, be simple and clear, be easily accessible, provide current and reliable information and all at low cost (Christian and Jurg). The reformation of DOL cadastre is changed not different as a successful cadastre, including computer mapping and digital cadastral database (DCDB), full cost recovery, value added services, rationalisation and transfer of land ownership, government restructuring and integration of survey and land title processes by DOLSURVEY on line software.

The goal integration of survey and land title process is key feature that will be investigated to Cadastre 2014 as following.

Statement 1 Cadastre shows complete legal situation, including public rights and restrictions.

This is the concept of cadastre that is relationship between records ownership and private interests which showed the complete legal situation of land including public rights and restriction. The processes are required a full knowledge and analysis of right on land as well as physical constrain and feature. Local authorities and other agencies need DCDB as a base for separately recording own interests or information for other application such tax map, soil map and can be integrated to others data. Cadastral map are to be used in future opportunity for more interactive sharing or exchange of information for increasing interest in planning data at the parcel level. That is maintained base layer and available to other agencies to overlay in GIS concept.

From Fig 4 and Fig 6, they are verified that the cadastre in DOL has showed completely itself to recording ownership or legal status of land, excluding public rights and restriction. Legal cadastral map in digital form are not drawn with different laws, can not meet the complete legal situation. This is the next possibility to develop the role of the cadastre as any land management tools for other agencies.

Statement 2 Separation Between Maps & Registers Abolished as the differences eliminated.

Alignment between survey for map and title registration processes are closed operation is DOL cadastre benchmark which is designed to achieve a full integration of both processes and data flow.

Fig 6 is searching screens for parcel map on Torrens systems and the adjacent parcel ownership information. The processes bring maps and registration together automatically as integrated organizational structure and data flows.

Statement 3 Digital cadastral modelling must be effective instead of cadastral survey maps.

The cadastral mapping have been dead, those data attributes are be readily depicted on a map which characteristics of the cadastral map are static and attempted to work on many application. But the difficulty are many necessary attributes are not readily depicted in map such as the changing spatial and legal state of the cadastre with time including field survey observation and marks. So cadastral data is increasingly put to a multipurpose and a cadastral map for view cannot meet all requirements. DOL cadastral map has been formed in model that become a view of the database.

Database is structured to support many views and accesses and automatically linked spatial and textual data. The user can updated with new data, whilst retaining original dimensions which data contains survey observations and dimensions linked to a modern geodetic system depending on cadastral surveying specification. Even, the DOL digital data has been extracted by a layer or theme for land parcel polygon which feature is area of land right. On the computer, the digital data are a truly real- scale and up date in a real- time spatial database.

Fig 4, Fig 6, Fig 7, Fig 8 are retrieved from digital cadastral database, evolved into a cadastral survey and title database. These processes will not be integrated as the data flows and considered among the users community in the new data model, particularly with its improved links between spatial data as map and any purpose of attributes.

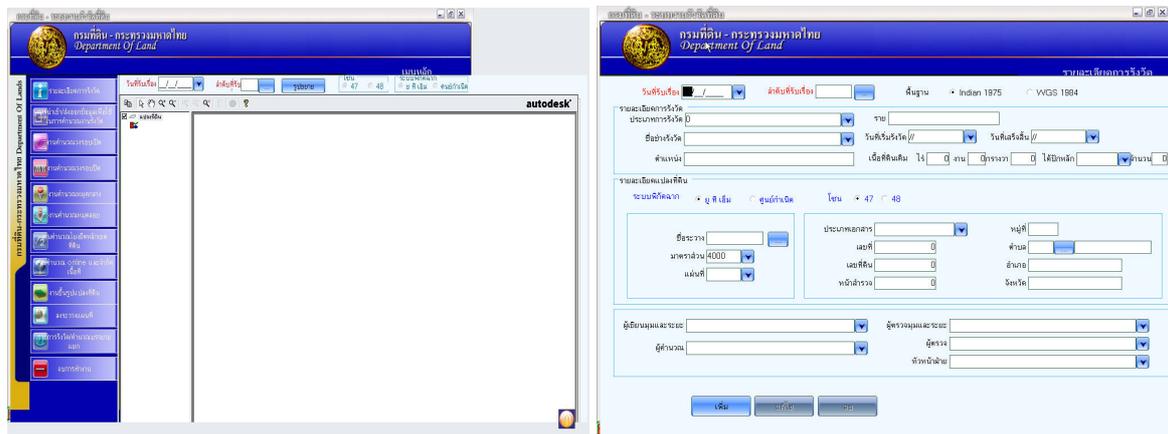


Fig 7. First page of DOLSURVEY Software for creating cadastral database.

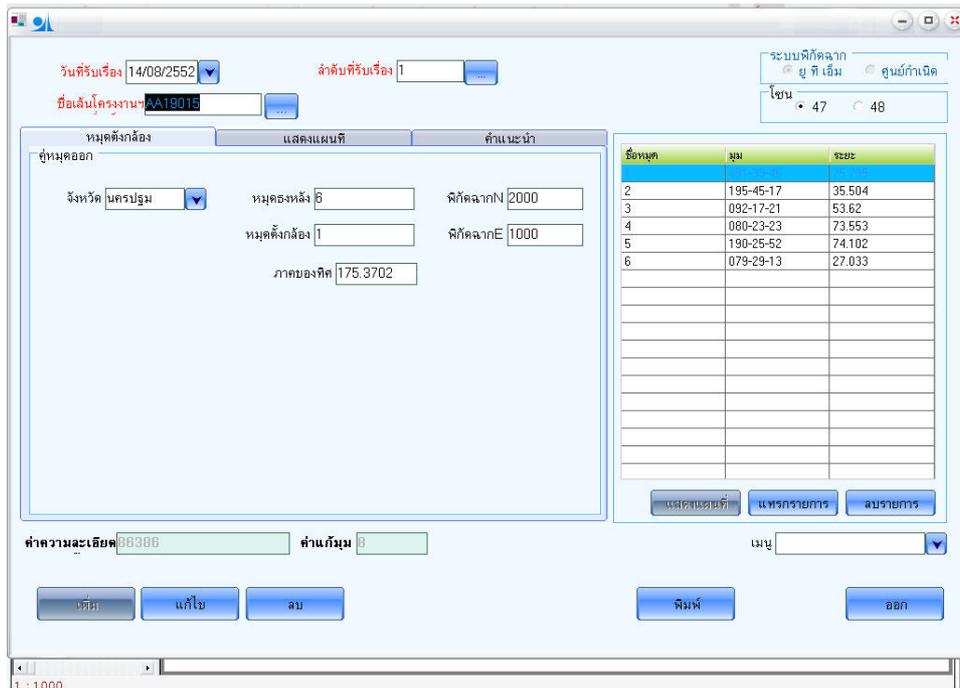


Fig 8. DOLSURVEY Software for field survey measurement inputs.

#### Statement 4 Paper & Pencil - Cadastre Gone

On DOL cadastral map, surveyor has to build structured databases in on-line survey software for the survey plan as a data transformed to digital format in database. For viewing, the survey plan is required to change from being a paper and pencil input to being a digitally generated output of the database (Fig 9).

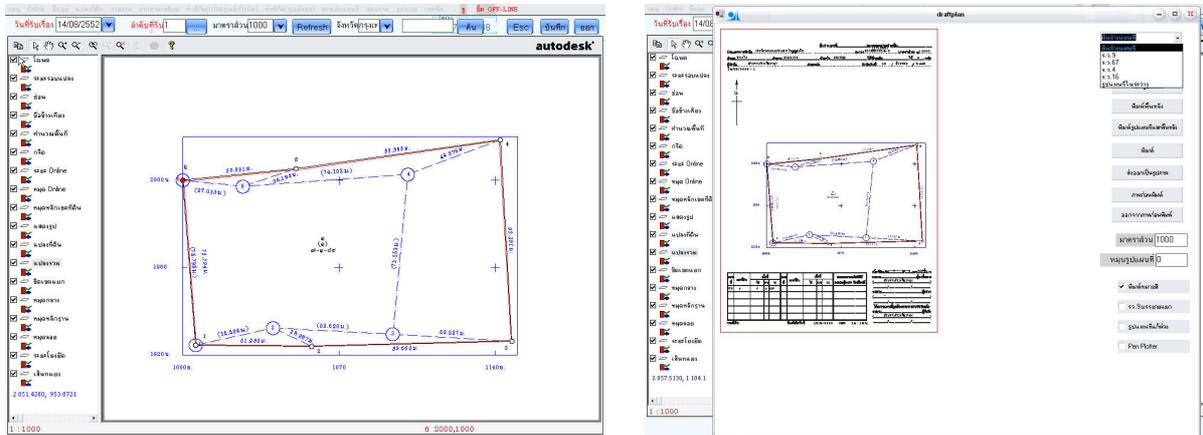


Fig 9. Field survey book as plan or plat on DOLSURVEY Software

The software creates a structure survey database, including entering the data into the database for processing and updating. The survey plan can be viewed directly in digital from without paper and pencil.

Statement 5 Public & Private Sector Roles are closely together.

DOL cadastral map has been established by private sector on contraction that is a partnership with shared responsibility between Government and Private Sector under DOL provides strategic and regulatory infrastructure, processes, and information systems. The private can registration surveyor is involved in all aspects of land subdivision, from land owner demand and legal assessment. How much are privates involved in any aspects depending on government regulations for the ability to retrieve survey data and information? The information can be shared responsibility of the private and public sectors for the integrity and efficiency of the survey system that can be developed to further application of land feature.

Statement 6 Cost Recovery

DOL cadastral system, both survey and registration, is fully cost recovered, mainly through statutory fees levied on transactions. The digital cadastral system is regarded as a strategic government base map for any applications purposes that are cost recovery from accuracy and saving cost in data capture without inconsistent. The standard of survey framework and records are confidence in the system with costs reduced.

## 6. CONCLUSION

The Thailand Cadastre by DOL has not been already well on the road to Cadastre 2014 completely. The major one are trying to integrated recording of both private and public rights and restriction, and in the development to fully others attributes database for spatial integration management and use land based data that should be a truly multipurpose cadastre. Both land registration and cadastral map are basic level under growing interest in population, asset, hazard and environmental data at the parcel or street address which are needed to more effective management of land resources by government of e-commerce and interaction of information systems. The DOL cadastre development in cadastre 2014 trend as a management process will be supported the traditional role focused on individual and private rights to increasingly constrained or influenced by community and environmental interests for competition of land resource use. Form studying, DOL cadastre is not completely legal situation of land except for land tenure but land parcel data in polygon feature should be base map for application of environment concerns and commercial efficiencies. There will be a requirement to record a variety of public restrictions, or rights to public resources over privately owned land.

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## BIOGRAPHICAL NOTES

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