

Questionnaire 3D-Cadastres: status September 2014 Trinidad and Tobago



This questionnaire is an activity of the FIG working group 3D-Cadastres 2014-2018. The purpose of the survey is to make a world-wide inventory of the status of 3D-Cadastres at this moment and the plans/expectations for the near future (2018). By sharing this information, it should be possible to improve cooperation, learn from each other and support future developments. This is the second time that the questionnaire on 3D-Cadastres is conducted by the FIG working group on 3D-Cadastres. The first time was in 2010 in order to document the status in 2010 and expectations back then for 2014. The responses have been analysed (van Oosterom et al. 2011, Karki 2013). For more information on the FIG working group on 3D-Cadastres see the website www.gdmc.nl/3DCadastres. Now a few notes and suggestions, which should be helpful when completing the questionnaire:

- The conceptual model used as background for the 3D Cadastres questionnaire is the ISO 19152 standard (ISO, 2012): the Land Administration Domain Model (LADM).
- In this questionnaire the concept of 3D-Cadastres with 3D parcels (or 3D spatial units in LADM terminology) is intended in the broadest possible sense. However, what exactly is (or could be) a 3D parcel is dependent on the legal and organizational context in the specific country (state, province). 3D parcels include land and water spaces, both above and below surface.
- A more formal definition: A 3D parcel is defined as the spatial unit against which (one or more) unique and homogeneous¹ rights (e.g. ownership right, lease or other land use right), responsibilities or restrictions are associated to the whole entity, as included in a Land Administration system.
- As the definition above is quite abstract, it is tried in the questions to be more specific and real world situations are used. Many examples with partial/preliminary answers from 2010 are available on-line at <http://www.gdmc.nl/3DCadastres/participants/>. Inspecting some of the completed 2010 questionnaires from different other countries might help when formulation the answers for your jurisdiction.
- A 3D parcel is a 'legal object' describing a part of the space. Often there is a relationship with a real world/physical object, which can also be described in 3D. Please be aware of the difference between these two types of objects and that the focus in the context of 3D-Cadastres is on spaces of the legal objects and not the registration of the physical objects as such.
- If a certain question is not relevant or if you have no clue what to respond, do not spend any time on this (and leave the field blank).
- The questionnaire has been prepared by a mixed Australian (Rod Thompson/Sudarshan Karki)/Dutch (Jantien Stoter/Hendrik Ploeger/Christiaan Lemmen/Peter van Oosterom) team. The questionnaire is grouped in the number of blocks. This has no meaning in the sense of priority and it is often the case that a question could belong to multiple blocks. Please do not feel disturbed by this.
- Similar to the Questionnaire 3D-Cadastres, the completed forms will be made available on website of FIG working group on 3D Cadastres.
- Please complete this questionnaire before *1 October 2014* and send it to P.J.M.vanOosterom@tudelft.nl (or Peter van Oosterom, TU Delft, OTB, P.O. Box 5030, 2600 GA Delft, The Netherlands).

¹ Homogenous means that the same combination of rights equally apply within the whole 3D spatial unit. Unique means that this is the largest spatial unit for which this is true. Making the unit any larger would result in the combination of rights not being homogenous. Making the unit smaller would result in at least 2 neighbour 3D parcels with the same combinations of rights.

1. General/applicable 3D real-world situations

This part of the questionnaire refers to the applicable 3D real-world situations to be registered by 3D parcels. It also addressed the types of 3D geometries, which are considered to be valid 3D representations for these parcels.

	Status 2014	Expectations 2018
1.1. Are all 3D parcels (3D spatial units in LADM terminology) constrained to be within one surface 2D parcel?	Yes. Different strata (condominium) rights limits may be shown in vertical section within the 2D parcel but they are constrained to be in the one parcel.	There are still plans to create legislation for the rights above surface (condominiums) but no plans to change or create a new graphic way of presenting them.
1.2. Are 2D and/or 3D ambulatory ² boundaries permitted?	2D ambulatory boundaries are permitted, both riparian and littoral. 3D ambulatory boundaries do not exist.	There has been no discussion on changing to 3D boundaries
1.3.a. Is it allowed to have 3D parcels (spatial units) not related to physical constructs or objects? (e.g. airspace, subsurface volumes)	No. Condominium rights relate to the building. Mineral mining rights refer to each surface parcel.	No plans
1.3.b. If 1.3.a positive: approximately what proportion of new 3D parcels (spatial units) would involve such cases (not related to physical object)?	none	No plans
1.4. Are disconnected parts of a single 3D parcel allowed?	Only in the instance of the common areas being tied to the condominium. They cannot be transferred separately.	No plans
1.5. Spatial limitation – e.g. must the 3D parcel be related to a closed volume or is it allowed to have ‘open’ or unbounded 3D parcels (e.g. towards the sky).?	The parcels are not spatially or graphically defined in 3D.	No plans
1.6. Are curved surfaces to bound the 3D parcels allowed?	Not defined	No plans
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any other constraint?	Not defined.	No plans
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	The parcels are not so precisely defined.	No plans
1.9. Is there legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	Land Surveyors Rules – Rule 19. “The following plans shall be prepared for all Townhouse	No plans

² An ambulatory boundary is a boundary of a land parcel which follows the movements of a natural feature such as a river. Its position determined at points of time (when a survey is carried out), but between such “fixes”, the definition of the property is the position of the real world natural feature.

	Schemes and Condominium schemes: (1) A location plan which shall record the cadastral data including “common areas” and sufficient measurement to be able to replace all structures (2) Strata plans for all floors within the condominium scheme (3) Elevation plans showing each façade view”.	
1.10. Is the legal text available in original language?	N/A. The country is English-speaking	
1.11. Is the legal text (relevant part) available in English translation?	N/A. The country is English-speaking	
1.12. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	3D example Trinidad and Tobago.jpg	
1.13. Is there a formal model for the 3D parcels (UML style); e.g. based on ISO TC211 series (especially LADM, ISO 19152)?	No	No plans
1.14. Are natural resources (groundwater, mining rights) shown in your land administration? If yes, are they considered as 3D parcels (spatial units) with RRRs attached?	No. natural resource rights are not shown. Reserves such as gas pipelines are shown as 2D parcels. Mining rights are linked to the surface parcels. Oil mining leases in the marine environment are also linked to the surface parcel.	No plans
1.15. Are legally restricted spaces, above or below, such as polluted areas considered as 3D parcels?	No.	No plans
1.16. Are spatial plans considered as 3D parcels (as rights or restrictions are related to them)? Sometimes also called spatial development plans, zoning plans or physical plans (land use, urban, regional, environmental,...)	No. Spatial plans are completely separate from the cadastre and not related to the parcel. They are not 3D.	No plans
1.17. Any other geometric issues related to 3D parcels?		

2. Infrastructure/utility networks

This refers to the situation where an infrastructure network is considered to be defined within the land administration. For example in some jurisdictions, an underground network might be privately constructed for the purpose of leasing space in it for other organisations to run cabling. In this case, a network, or part of that network may be considered to be a real estate object.

	Status 2014	Expectations 2018
2.1. Do you register networks as an entity in the land administration? (e.g. subterranean conduit networks)	Pipeline networks for example are registered as a general plan denoting acquisition from the parent parcels.	No plans
2.2. If so, then (a) can the network structure be viewed graphically in the land administration? (b) can the network structure be traced in the database(s)? (c) are networks registered by means of a cadastral identifier (such as a 'parcel number')? (d) are RRRs and parties attached to these network objects?	(a) The land administration is an index to the plan so the structure can be viewed in 2D. (b) Yes. (c) They are recorded as a plan number as the graphical aspect is separated from the legal aspect. (d) No. Not in the database.	No plans
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	No. Networks such as gas pipelines, water and sewerage, and old railway lines, belong to state companies.	No plans
2.4. If so, are they registered as 3D property parcels (spatial units)?	No.	No plans
2.5. Is the text of relevant laws or regulations (question 2.3) available in original language? If so, give references to relevant document(s).	The country is English-speaking.	
2.6. Is the text of laws and regulations (relevant part) available in English translation?	The country is English-speaking.	
2.7. Do you have example descriptions of typical 3D parcels (spatial units) for networks; either 'prototype' or 'operational'?	No.	No plans
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	Subsurface rights may be described verbally.	No plans
2.9. Any other geometric issues related to the registration of networks?		

3. Construction/building units

This refers to 3D properties that are related to constructions and apartment (condominium) buildings. The individual units are often defined by the actual walls and structure of a building, rather than by metes and bounds. E.g. “unit 5 on level 6 of ... building”.

	Status 2014	Expectations 2018
3.1. Do you register 3D construction/building units?	In the legal land registry with other land parcels.	No plans
3.2. If so, what are the most important types? E.g. apartment units, or also other buildings or even more general constructions (infra related; such as bridge, tunnel or even other, such as windmills,...)	Condominiums or apartments only.	No plans
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Proposed legislation but currently dealt with under companies legislation http://rgd.legalaffairs.gov.tt/Laws2/Alphabetical_List/lawspdfs/81.01.pdf	No plans
3.4. Is the legal text available in original language?	The country is English speaking.	
3.5. Is the legal text (relevant part) available in English translation?	The country is English speaking.	
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	3D example Trinidad and Tobago.jpg	No plans
3.7. What would be typical 3D boundaries in an apartment complex: middle of the wall and floor/ceiling, or walls, floors/ceiling as neutral/shared 3D space? Is it mentioned in any legislation or is it the convention?	These are defined by the land surveyor in his/her plans.	No plans
3.8. Is common property inside the building registered? If so, how?	No All common property defined and registered to the company comprised of all owners in the complex. 3D example common areas T and T.jpg	No plans
3.9. Who owns the common property inside the building?	The company comprised of all the owners.	No plans
3.10. Who owns the land on which the apartment is built?	The company comprised of all the owners.	No plans

3.11. Do you allow sub-division of apartments or apartment blocks?	No	No plans
3.12. Can the land on which the building is built be subdivided or sold or mortgaged without the consent of majority of the apartment owners?	No	No plans
3.13. What is the numbering convention for apartments (please specify in terms of cadastral parcel as well as street addressing)	There is no set convention or regulation. It can be numbered as convenient for example: Apt 2, Unit 1, 23 Smith Street, Port of Spain	No plans
3.14. Any other geometric issues?		

4. X/Y Coordinates

	Status 2014	Expectations 2018
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	No. Parcels are relative to each other. A coordinate is required to be given to assist in identifying the location and to assist in placing the plan in relative position on the cadastral index. The coordinate can be approximate from a handheld GPS appliance.	To require all parcel plans to contain an absolute spatial reference coordinate on UTM WGS84
4.2. Are the cadastral database coordinates authoritative?	No.	No plans
4.3. If not, what is the authoritative source of X/Y coordinates?	The location of the marked boundaries on the ground, as indicated on the survey plan is authoritative.	No plans
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	Yes. When surveyed, dimensions will be put on the survey plan.	No plans
4.5. What is the spatial reference system for X/Y Coordinates?	UTM zone 20. Naparima datum	No plans
4.6. Any other X/Y coordinate issues?		

5. Z Coordinates/height representation

	Status 2014	Expectations 2018
5.1. Are the Z coordinates of 3D parcels relative to local ground?	No. No Z coordinates noted. Levels are indicated as in Level 1, Level 2, etc.	No plans
5.2. Are Z coordinates reduced to a standard datum (absolute)? If so, what is the spatial reference system for the Z coordinate?	Vertical section is shown relative to ground.	No plans
5.3. In principle possible to store both relative and absolute Z coordinate?	No.	No plans
5.4. Is the earth surface (height) explicitly stored (in the DCDB or other accessible register)?	No	No plans
5.5. What is the source of elevation for the 2D surface parcel?	Elevations are not recorded in the cadastral data.	No plans
5.6. Any other Z coordinate issues?		

6. Temporal Issues

	Status 2014	Expectations 2018
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	No. Temporal limits would be as for a lease of a period of years and would be stated in the deed document.	No plans
6.2. Are moving parcels allowed?	No.	No plans
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	N/A	No plans
6.4. Are there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	No.	No plans
6.5. In the case of tidal boundaries, what happens to the 3D ambulatory parcel if the 2D land parcel changes extent due to the movement of High Water Mark?	This has not been tested legally.	No plans
6.6. Any other temporal issues?		

7. Rights, Restrictions and Responsibilities

	Status 2014	Expectations 2018
7.1. Range of RRR on 3D parcels.	Not recorded in cadastre. All RRR would be as for 2D parcels and contained in other legislation such as Planning legislation	No plans
7.2. Are there any limitations on the range of rights related to 3D spatial units? (e.g. subterranean parcels must be owned by Govt).	No.	No plans
7.3. Are there any limitations on the range of restrictions or responsibilities related to 3D spatial units? (i.e. currently in use and related to 2D spatial units, but that would not be applicable to 3D).	No	No plans
7.4. Are there RRRs that are only allowed in 3D (and not valid for 2D)	No	No plans
7.5. Is there specific legislation (laws, regulations) defining 3D RRR types? If so, provide details, e.g. references to documents/ articles.	All laws leave the graphical definition up to the rules of the Director of Surveys and these rules only provide for 2D delimitation of parcels. For example in the Mining legislation: Minerals Act Chapter 61:03 the following occurs: Form of Licence. 21. (1) Subject to this Act, every licence issued under this Act shall— (a) be in such form and be subject to such terms and conditions as may be prescribed; (b) specify the limits of the area in respect of which the licensee is authorised to explore for or mine, process, import or export minerals; and (c) not be transferred or assigned without the written approval of the Minister. And also: 35. (1) The holder of a	No plans

	licence shall— (a) in furtherance of mining operations avoid damage to any adjoining or third party property; (b) have the boundaries to his property properly demarcated at all times, and shall maintain a buffer zone of ten feet from the boundaries of the said property on all sides; and (c) on completion of the operations authorised by the licence or on the date of expiration of his licence, whichever occurs earlier, rehabilitate and restore the land to the satisfaction of the Director	
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other than the person owning the land parcel?	Yes as in mineral rights for example. Subsurface rights can be retained by the state when surface rights are alienated to private individuals. Persons own houses on other persons land parcels.	No plans
7.7. What applications do you foresee for 3D land administration?	Marine rights applications, subsurface pipeline and other networks, complex building models	
7.8. Are the administrative source documents (source of RRRs) title or deed based?	Both systems operate in Trinidad and Tobago	Legislation to be passed for systematic land title registration.
7.9 Who is responsible for the correctness of the specified 3D boundaries in spatial source documents (which authority)?	The Director of Surveys in the Lands and Surveys Division.	No plans
7.10. Is registration of 3D parcels done inside the cadastral mapping agency, the land registry or elsewhere?	All registration is done in the land registry of the Registrar General's Department.	No plans
7.11. Are 3D registrations handled by the same organisation that handles traditional (2D) land administration?	Yes	No plans
7.12. Do you supply paper-based titles or deeds or proof of ownership? If yes, does this contain depictions of the 2D or 3D parcel?	Yes. Certificates of Title or copies of deeds may be supplied. This would contain depictions of the parcel in a survey plan attached to the document and referred to in	No plans

	the document.	
7.13. Any other RRR issues?		

8. DCDB (The Cadastral Database)

	Status 2014	Expectations 2018
8.0. Is database schema LADM based?	No	None
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	No	No plans
8.2. If so, how are they represented (in the DCDB)?	As a surface parcel with reference to the individual survey plans for the parcel.	No plans
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?	As a surface parcel or 2D polygon.	No plans
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	Possibly in the future.	No plans
8.5. Is it possible to manage a 3D topological structure in the DCDB?	Not currently	No plans
8.6. Are constraints/rules defined for valid 3D objects (closed volume, no overlap, no gap in 3D)? What about rules for a mix of 2D and 3D representations?	N/A	No plans
8.7. How can internal and external user query and visualize the 3D content supporting rotating, slicing, transparency, perspective (3D web/view service, 3D pdf documents,...)?	N/A	No plans
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	ArcGIS. 3D capabilities are not used.	No plans
8.9. Do you have any validation rules for 3D representation in the database?	No.	No plans
8.10. What (GIS/CAD) software is used for updating, editing, analysis, and visualization of the cadastral data? Any 3D capabilities included and used?	ArcGIS	No plans
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	http://listt.lmd.gov.tt/parcelviewer/ Only for state land parcels and only in 2D	No plans
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Object oriented	Database to be reconstructed in new software and all data migrated

8.13. How do you query 3D objects in your DCDB?	N/A	No plans
8.14. Is it possible to query neighbourhood parcels to a 3D object, vertically as well as horizontally?	No	No plans
8.15. Any other DCDB issues?		

9. Plans of Survey (including field sketches)

	Status 2014	Expectations 2018
9.1. Do the survey plans carry 3D parcel representations?	Yes	No plans
9.2. If so, how are they represented?	3D example Trinidad and Tobago.jpg	No plans
9.3. Is there specific legislation (regulations) describing the requirements for Plans of Survey in 3D? If so, please give link to the relevant documents.	LAND SURVEYORS RULES revised 21 Nov 2012.pdf Land Surveyors Rules – Rule 19. “The following plans shall be prepared for all Townhouse Schemes and Condominium schemes: (1) A location plan which shall record the cadastral data including “common areas” and sufficient measurement to be able to replace all structures (2) Strata plans for all floors within the condominium scheme (3) Elevation plans showing each façade view”	No plans
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	No	No plans
9.5. Is it possible to define a 3D parcel by referring to other 3D real world objects/ topography (and not specifying coordinates)?	No	No plans
9.6. In what format are the 3D parcels submitted for registration; attached to legal document in a single pdf (which has good 3D capabilities) or in an extension of (city)GML for 3D parcels, or....?	Paper plans	Digital submission.
9.7. Are the 3D parcels somehow checked for spatial validity; e.g. volume is closed, does not overlap with neighbour volume (and also no unwanted 3D gaps)?	No	No plans
9.8. Do you have examples of (prototype or production) 3D survey plans available?	3D example Trinidad and Tobago.jpg	
9.9. Are any reference objects visible	No	No plans

on the survey plan (e.g. real buildings, roads, that is 3D topography)?		
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,...)?	Terrestrial surveying	No plans
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	AutoCAD for creating. No 3D capabilities used.	No plans
9.12. Can 3D parcels be subdivided, consolidated or nullified?	No	No plans
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in the field?	No	No plans
9.14. Are the surveyors required to undertake a field survey for 3D cadastral data?	Yes	No plans
9.15. Are building construction plans used to compile 3D cadastral information for apartments?	Yes	No plans
9.16. Is 2D/3D field survey done by private licensed surveyors or by government surveyors?	Both	No plans
9.17. Are plans of survey created for each new 2D/3D parcel or are they updated in an index map or a cadastral database.	Both	No plans
9.18. Do you show dimensions or isometric views of 3D parcels on survey plans (do you also store this in a database)	Yes	No plans
9.19. Any other survey plan issues?		

10. Dissemination of 3D Cadastral information

	Status 2014	Expectations 2018
10.1. Is there a general purpose web-based dissemination of 2D cadastral (graphical or text) information (e.g. a portal for the public or for professionals)? If yes, does it include 3D data?	There is a portal for professionals only for scanned 2D plans and a portal for the public containing only state land parcels. They do not contain 3D data	No plans
10.2. Are specific file formats or standards used to distribute 3D Cadastral information? (e.g. LandXML, CityGML, BIM/IFC, 3D pdf,...)	No	No plans
10.3. Are there specific cartographic styling rules for representing 3D cadastral plans, or to represent 3D cadastral objects on 2D cadastral maps?	Yes	No plans
10.4. Are there specific cartographic styling rules for 3D cadastral maps (models; e.g. as disseminated in 3D pdf)? If yes, are there 3D specific cartographic rules developed or being developed?	No	No plans
10.5. Is the 3D Cadastral information accessible in integrated manner with the 2D Cadastral information?	N/A	No plans
10.6. Are there specific symbols on the 2D cadastral map (paper, digital or web-based) indicating the presence of 3D Cadastral objects (and in web-context perhaps even linked)?	No	No plans
10.7. Is the legal information (RRRs and Parties) available in integrated manner in dissemination portal with the 3D Cadastral objects? (even if source of legal data may be a different organization, but then use information infrastructure approach)	No	No plans
10.8. Are 2D/3D cadastral data available to the general public or just to the relevant parties?	Yes available	No plans
10.9. Any other 3D cadastral information dissemination issues?		

11. Statistical information

This part of the questionnaire refers to statistical information (and is most relevant for jurisdictions with parts of 3D Cadastre registration operational, but all are encouraged to complete this section, and especially the expectations for 2018).

	Status 2014	Expectations 2018
11.1. What is the smallest 2D and 3D parcel that is present/ allowed to be registered in the land administration?	No limit	No plans
11.2. What is the largest 2D and 3D parcel that is present allowed to be registered in the land administration?	No limit	No plans
11.3. What is the typical (or average) size of 2D and 3D parcels which are registered in the land administration? Subdivide by nature of 3D parcel when relevant (e.g. related to building, apartment, airspace, tunnel,...)	Average 2D = 464m ² Average 3D apartment = 100m ²	No plans
11.4. How many 2D and 3D parcels do you currently have in your land administration?	2D = 100,000 3D = 10,000	No plans
11.5. Which year did you start registering 3D parcels in the land administration?		No plans
11.6. What is the ratio of 3D parcels in rural vs. urban areas?	Rural = 1% Urban = 50%	
11.7. Please specify names of cities or towns or suburbs or regions or locations where there are significant numbers of 3D parcels.	Port of Spain, San Fernando	
11.8. Please provide the following data: (a) Size of jurisdiction in square kilometres (b) Current number of 2D parcels (c) Current number of 3D parcels (d) Current population	5,000 km ² 1000,000 10,000 1,300,000	
11.9. Approximately what are the proportions of various types of the 3D parcels (related to apartments, subsurface parking, subsurface shopping centres, bridges, tunnels, airspace, utility networks, etc)?	All apartments	
11.10. Approximately what surface area of the jurisdiction is affected by 3D parcels (the total area of all the footprint of all 3D parcels).	10%	
11.11. Any other interesting statistical fact(s)?		

12. Reflection

This section is only relevant in case also in 2010 the 3D cadastres questionnaire for your jurisdictions was completed (otherwise skip this section).

	Remarks
12.1. Compared to the 2010 expectations, which 3D land administration developments did go faster than expected?	None
12.2. Same question, but now, which developments did go slower than expected?	All
12.3. If some (limited) form of 3D Land administration functionality has become available, what are the observed benefits? And for who?	For the condominium owners and vendors and purchasers.
12.4. What are the (top-3) challenges of issues to be addressed to realize further 3D Land administration progress?	Development of rules for their representation. Submission of digital plans. Capacities of staff at Lands and Surveys Department
12.5. Any other reflections?	

13. Other Issues

Please include any other issues that may be of interest in an international context. For example, in some foreign jurisdictions 3D parcels can only be separated by horizontal planes.

	Remarks
13.1. Country (State, Province)	Trinidad and Tobago
13.2. Your name, function/position and your organization	Dr Charisse Griffith-Charles Lecturer in Cadastral Systems, land administration, The Department of Geomatics Engineering and Land Management The University of the West Indies, St. Augustine
13.3. Contact details: address email, telephone	The Department of Geomatics Engineering and Land Management The University of the West Indies, St. Augustine Charisse.Griffith-Charles@sta.uwi.edu 868 662 2002 ext 82520
13.4. Other issues	

References

ISO 19152:2012 'Geographic information - Land Administration Domain Model (LADM),
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Peter van Oosterom, Jantien Stoter, Hendrik Ploeger, Rod Thompson and Sudarshan Karki (2011).
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the FIG Working Week 2011, Marrakech, 21 p.
http://www.gdmc.nl/3DCadastres/literature/3Dcad_2011_02.pdf

Sudarshan Karki (2013). 3D Cadastre Implementation Issues in Australia. MSc Thesis, University of
Southern Queensland (Master of Spatial Science Research), 162 p.,
http://eprints.usq.edu.au/23560/1/Karki_2013_whole.pdf

Annexes

1. LAND SURVEYORS RULES, revised 21 Nov 2012
2. 3D Example Stata plans
3. 3D example Common areas

REPUBLIC OF TRINIDAD AND TOBAGO
The Land Surveyors Rules 2012

RULES

MADE BY THE BOARD UNDER AUTHORITY OF SECTION 41 OF
THE LAND SURVEYORS REGULATIONS 1998

THE LAND SURVEYORS
RULES 2012

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PART I PRELIMINARY

Citation

1 These Rules may be cited as the Land Surveyors Rules, 2012

Interpretation

2 (1) Unless the context otherwise appears the definitions given in Section 2 of the Regulations shall apply to these Rules.

(2) In these Rules “the Regulations” means the Land Surveyors Regulations, 1998 made under the Land Surveyors Act No. 33 of 1996;

(3) In these Rules –

“Cassini means the Cassini projection and grid as applied in Trinidad and Tobago

Condominium in these rules mean strata buildings

“GIS” means Geographical Information System

“Sketch” means a plan or drawing, not necessarily to scale, which shows the relationship of various points of interest.

“UTM” means Universal Transverse Mercator coordinate system

(4) In the event of any inconsistency between these Rules and the Regulations, the Regulations shall prevail

PART II EXECUTION OF CADASTRAL SURVEYS

Connection to
control

3 (1) All cadastral surveys shall be connected to:

a) all existing contiguous cadastral surveys or if there are no such contiguous cadastral surveys, to at least one of the nearest existing cadastral surveys as long as such surveys are within two kilometre distance.

AND

b) where possible to two prominent well defined physical features such as fire hydrants, mile marks, manholes, bench marks, or any point that has been previously tied to control

(2) All cadastral surveys that fall within areas designated by the Director of Surveys as being within a two kilometre range of existing National Control shall be tied to such control. These designated areas shall from time to time be listed or delineated on a map and these lists or maps shall be made available at the offices of

the Director of Surveys.

- (3) All co-ordinates provided on cadastral plans shall be UTM Zone 20 co-ordinates on Naparima 1955 datum. Such co-ordinates shall not be a part of the legal definition of the extent of parcels.
- (4) The National GPS Network is based on the International Terrestrial Reference Framework (ITRF), year _____ and epoch _____.
- (5) The transformation to be used when converting GPS derived positions to Naparima 1955 is _____ with the following parameters: _____ or as amended from time to time by the Director of Surveys
- (6) The geoid to be used when converting GPS derived heights to TGR or Scarborough is _Carib97_____ or as amended from time to time by the Director of Surveys
- (7) The required accuracy of any geodetic point shall be calculated using the formula: $e = a + b.L$ where a is ____ metres and b is ____ parts per million
- (8) A check set of co-ordinates should be supplied with any report, chart or other output, in both ITRF and Naparima 1955 such that it is possible both to verify the correct application of the necessary transformation and the computation of same.

Cadastral Index Map

- 4 There shall be a digital Cadastral Index Map to be prepared by the Office of the Director of Surveys using the digital topographic data and cadastral sheets. The Cadastral Index Map shall be retained at the Office of the Director of Surveys. All plans presented for registration shall be compared with this map for positional and graphical accuracy. (remove to Act)

Perimeter misclosure

- 5 The accuracy of cadastral surveys shall be tested by perimeter misclosure, or by comparison with co-ordinated permanent survey marks at the beginning and end of the traverse which shall not exceed the following limits:
 - (1) On urban surveys, 0.05 metre, plus one part in 8000
 - (2) On sub-urban surveys, 0.1 metre, plus one part in 5000
 - (3) On rural surveys, 0.2 metre plus one part in 3000

Survey Notices

- 6 Notices given under Section 55 of the Regulations may be in the form in Appendix A of these rules.

PART III IRREGULAR BOUNDARIES

Accuracy of survey

- 7 When boundaries follow natural features such as streams they shall be

surveyed so that the straight line joining adjacent survey points shall not be displaced from the natural boundary by more than:

- (1) On urban surveys, 0.5 metre
- (2) On sub-urban surveys, 1 metre
- (3) On rural surveys, 2 metres

Remote Methods

- 8 Provided that the accuracy specified in Rule 6 is achieved, natural boundaries may be plotted from GIS data, satellite imagery, or by photogrammetric methods, in which case the method shall be stated on the plan.

PART IV BOUNDARY BEACONS/MONUMENTS

**Boundary
Beacons/Monuments**

- 9 (1) Boundary beacons/monuments shall be solid steel pipes, 1.58 cm in diameter and 50cm long. Longer lengths may be used in soft, muddy conditions. In rocky conditions or on concrete areas, drill holes, chiselled marks in stone, concrete or steel, punch marks, or pre-cast bronze discs may be used.
 - (2) Boundary beacons/monuments shall, as far as possible, be capable of withstanding random or accidental interference.
 - (3) Adjacent boundary beacons/monuments shall be inter-visible wherever possible and:
 - (a) Boundary beacons/monuments shall be placed at every change in direction along regular boundaries
 - (b) Boundary beacons/monuments shall be placed to identify the boundaries of all parcels of land measured or redefined in the course of a survey.
 - (4) Surveyors are required to warn all owners and petitioners of land, the boundaries of which are defined or re-defined by survey, that they are responsible for the proper care and upkeep of all concrete pillars, iron stakes and other stakes and other marks of whatsoever nature, which may be placed at the corners of or along the boundaries of the said land.

PART V REFERENCE AND BOUNDARY LINEs

Reference lines

- 10 Every cadastral survey shall be connected to a reference meridian derived from:
 - a) two National Triangulation Network stations, or

- b) two National GPS Network stations, or
- c) two first order GPS stations
- d) the meridian of an adjoining survey, or
- e) astronomical observations to the Sun or stars, or
- f) the magnetic needle, where appropriate

How the reference meridian was derived shall be stated and the position of every reference meridian shall be shown on the plan.

Boundary lines

- 11 The bearings of boundary lines shall be expressed as UTM Zone 20 bearings.

PART VI UNITS OF MEASUREMENT

Survey Data

- 12 (1) The bearings of the boundary lines on plans shall be stated in degrees, minutes (and seconds if required for ties to first order stations) to a precision consistent with the accuracy of the meridian of the survey.
- (2) All lengths shall be stated in metres to two (2) decimal places.
- (3) Areas shall be shown in square metres with one decimal place; or in hectares to four (4) decimal places.
- (4) Co-ordinates shall be stated in metres to two (2) decimal places.
- (5) Data copied from a previous survey; deduced; or calculated shall be shown as “copied”, “deduced” or “calculated” as the case may be.

PART VII CADASTRAL SURVEY PLAN PREPARATION

General

- 13 (1) Detail such as proper names, the direction of roads, the direction of flow of rivers and streams, book and plan references shall be recorded on survey plans.
- (2) The type of permanent mark placed at each station e.g. iron monument, spike, or cross scribed in concrete shall be recorded on survey plans. Temporary marks and pegs need not be identified.
- (3) Every plan which forms part of a larger parcel shall, as far as possible, show its relative location within the larger parcel and the access to the public road. If no access is provided there shall be a statement on the plan that the landowner is aware of the situation.
- (4) A cadastral sheet section showing the location of the survey shall accompany all surveys.

- | | |
|-----------------------|--|
| Materials | <p>14 (1) Every cadastral plan shall be presented for registration on durable parchment material and in black, waterproof ink.</p> <p>(2) The cadastral plan shall be produced on legal size material (8 ½" x 14") if the scale allows.</p> <p>(3) When a plan cannot be produced on legal size material the following sizes shall be used 11" x 17" or 24" x 36"</p> <p>(4) No plan shall be constructed on material larger than 24" x 36".</p> |
| Scale of Plans | <p>15 All cadastral plans shall be drawn to a natural scale. Wherever practicable, one of the following scales shall be used:
1:500, 1:1000, 1:1250, 1:2500, 1:5000 or 1:10,000</p> |
| Data on Plans | <p>16 The following data shall be shown on cadastral survey plans:</p> <ol style="list-style-type: none"> (1) Unique Parcel Reference Numbers (if available) (2) The cadastral sheet number. (3) The development or village name. (4) The county. (5) The ward. (6) The municipality where appropriate. (7) The Survey Order number, and file number. (8) The area of the parcel both in numbers and in words. (9) The bearing and distance of every boundary line, and sufficient data to be able to check closure and the area of the parcel. (10) The co-ordinates of at least one station on the survey derived from survey observations or the approximate co-ordinates of at least one station on the survey as obtained from topographic data derived from 1994 or later photography and obtainable at the offices of the Director of Surveys. Whether the co-ordinates are derived from control, or are approximate, must be denoted on the plan. Such co-ordinates are NOT part of the legal definition of parcels. (11) The names of all known neighbours, or information which may be used to identify the neighbours. (12) All structures existing on the site. Where the dimensions of a structure are not measured, the approximate position of the structure shall be shown in broken black lines. (13) The position of all walls fences and drains etc in relation to the boundaries. (14) All encroachments with the approximate area of the encroachment if possible. This includes overhead and underground encroachments. Encroachments shall be differentiated from the surrounding parcel by the addition of an area symbol (15) The widths, names and types of all roads. (16) The diameter and type of all utility pipelines where the reserves of |

these affect the allowable use of the land as defined by the planning authority.

- (17) All utility poles where these fall within the limits of the parcel being surveyed.
- (18) The scale at which the plan is drawn as a representative fraction e.g. 1:2500.
- (19) The grid north which in every case shall be at the top, right of the plan, and if practicable shall be parallel to the side of the sheet and indicate the grid projection used. The dimensions of such grid north must not exceed 8 cm x 2 cm
- (20) The projection – UTM Zone 20
- (21) The date, signature and the seal of the TTLS.
- (22) The procès verbal should contain a statement of professional responsibility in accordance with Regulation 25 (1) of the Land Surveyors Regulations 1998 e.g.

(i) **Surveyed Parcels:-**

Plan of a parcel of land coloured pink in the ward of.....containing.....square metres surveyed by me with due authority in.....for.....

Certified correct in accordance with Regulation 25 (1) of the Land Surveyors Regulations 1998.

(ii) **Remaining Portion Plan:-**

Plan ofsquare metres originally transferred (or granted) to.....showing a portion coloured pink and containing.....square metres being the remainder after.....previous transfers of another (other) portions(s) of the land.

In accordance with Regulation 25 (1) of the Land Surveyors Regulations 1998, I certify that this plan represents the remaining portion.

(iii) **Plans prepared from other plans:-**

Plan of a parcel of land coloured pink in the Ward of.....containing.....

Prepared by me with due authority.

In accordance with Regulation 25 (1) of the Land Surveyors Regulations 1998, I certify that this plan is a true representation of the plan filed in BK.....folio.....

(iv) **Consolidation Plans**

Plan of a parcel coloured pink in the ward ofcontaining

Prepared by me with due authority in.....

In accordance with Regulation 25 (1) of the Land Surveyors Regulations 1998, I certify that this plan represents the parcels to be consolidated

Note that there may be particular situations that would require some variations to the given examples (i) – (iv) above but the procès verbal must always reflect what the TTLS is personally responsible for in accordance with Section 25 (1).

**Additional Data on
RPO Plans**

- 17 (1) The RPO reference, Volume and Folio numbers.
(2) The Certificate of Title reference Volume and Folio numbers.
(3) The names of original and current title holders.
(4) On RPO plans for acquisition purposes the following areas should be given in numbers:
i) original grant
ii) 1/20 of grant
iii) previously resumed
iv) area to be resumed
v) area to be acquired
(5) On RPO remaining portion plans all the owners names and Certificate of Title numbers of previously transferred parcels should be shown.
(6) A line labelled “Approved, Director of Surveys” for Director of Surveys signature.

**Colours and
Symbols**

- 18 (1) AREAS
In keeping with the requirement to scan and record plans in the legal registers, areas shall in future remain uncoloured on plans. Area symbols would be used for clarity if required, or if the plan is unusually complex. Copies of the original plan with areas coloured may be provided to assist users of the plan. Until such time, the following colours may be used on the plan:
Blue – water features
Raw Sienna – areas acquired or to be acquired
Brown – roads of all types
Yellow - areas vested in the State
Pink – other areas surveyed, lands to be resumed and lands acquired by private treaty
Red – bordering lands held under the provisions of the Real Property Ordinance.

- (3) **LINES**
 Boundary lined surveyed – solid black lines
 Boundary lines not run – dashed black lines
 Tie lines – dotted red lines
- (4) **POINTS (SURVEY STATIONS)**
 Primary control stations – red triangle, apex up, 2-3mm sides
 Secondary control stations – black triangle, apex up, 2-3mm sides
 Other control stations and marks placed by a surveyor – black circle 2-3mm in diameter.
 Traverse stations – black square 2-3mm sides

Condominiums and townhouses

- 19 The following plans shall be prepared for all Townhouse Schemes and Condominium schemes:
- (1) A location plan which shall record the cadastral data including “common areas” and sufficient measurement to be able to replace all structures
 - (2) Strata plans for all floors within the condominium scheme
 - (3) Elevation plans showing each façade view.

PART VIII

REGISTERING OF SURVEYS REQUIRED TO BE APPROVED BY THE DIRECTOR OF SURVEYS

Registering of Surveys

- 20 The principle to be observed shall be that the surveyor is responsible for his work, although the Office of the Director of Surveys shall ensure:
- (1) That the survey identifies the correct parcel.
 - (2) That the area of the parcel conforms to the accuracy limits as defined by these rules.
 - (3) That the regulations and all other legislation have been observed including for RPO the Town and Country Planning final approval for sub-division.
 - (4) That the plan may be readily incorporated into the state Registers.
 - (5) That the plan may be readily used for the purpose for which it was prepared.

PART IX

SURVEY RECORDS

Scope of Engineering survey

- 21 The following technical records shall be kept for all engineering surveys

records

- i) The name of the project;
- ii) The Client organisation's reference number for the project;
- iii) The surveyor's reference number for the project;
- iv) The date of commencement of the survey;
- v) The date of completion of the survey;
- vi) The name, signature and authorised seal of the Registered Land Surveyor (Engineering Surveying) responsible for the work;
- vii) Purpose for which the survey may be used;
- viii) All correspondence and specification sheets passed between the client organisation and the surveyor;
- ix) All site notes, print-outs of collected data, unedited plot(s), final plot(s);
- x) Control (plan and height) stations used;
- xi) Location sketches and descriptions of plan & height control used in the survey shall be prepared. The sketch shall be sufficient to allow the control positions to be easily identified on the ground.
- xii) Standard List for the project (Appendix A to the Land Surveyors Code of Best Practice 2012 for Engineering Surveying);
- xiii) Despatch notes;

For the purposes of the Land Survey Act 1996 a Registered Land Surveyor (engineering surveying) shall on request of the Director of Surveys:
allow inspection of all records used in the collection of the data;
supply copies of engineering surveying records;
Supply data on a suitable medium e.g. CD, Disk, film or paper.

**Scope of geodetic
survey records**

- 22 The following records shall be kept for all geodetic surveys –
A diagram of the survey. The diagram shall use the symbols and conventions as prescribed in Rule 16 Section (3). The diagram shall show as a minimum –
- i) The name, signature and authorised seal of the Registered Surveyor responsible for the work.
 - ii) The date of first and last observation.
 - iii) The scale of the diagram.
 - iv) All control held fixed for the computation.
 - v) All station numbers and/or names.
 - vi) All observations used in the final computation.
 - vii) All new stations determined by the survey.

The following lists shall be produced –

- i) Co-ordinates derived by the survey.
- ii) Standard errors for all new stations in the survey.
- iii) Residuals
- iv) Observations taken but excluded from the computation

- v) Each new station in the survey shall be described and a sketch prepared. The sketch shall be sufficient to allow the station to be found on the ground.
- vi) The standard error of an observation of unit weight

**Scope of
Hydrographic
survey records**

23 The scope of hydrographic survey records is stated in the data attribution section of the hydrographic surveying reference document referred to in Part X of these Rules.

**Scope of
Photogrammetric
survey records**

24 The following technical records shall be kept for all photogrammetric surveys

(1) A record of the survey. The record shall use the symbols and conventions as time to time prescribed by the Director of Surveys. The diagram shall show as a minimum –

- i) the name, signature and authorised seal of the Registered Land Surveyor responsible for the work;
- ii) Project information;
- iii) Project designation – name & reference;
- iv) Purpose for which the survey may be used;
- v) Products – film/orthophotographs/scanned data etc;
- vi) Primary client;
- vii) Proposed/estimated or actual start & completion date of capture of photography;
- viii) film type;
- ix) focal length of camera;
- x) Data type if any, e.g. GEO-TIFF;
- xi) the flight index diagram with film and exposure numbers, at an appropriate scale to overlay with topographic detail;
- xii) instrument calibration details e.g. camera, scanner, plotter;
- xiii) location diagram of all survey control.

(2) The following lists shall be produced –

- i) control co-ordinates;
- ii) residuals of final aerial triangulation computation;
- iii) residuals of individual model Absolute Orientation parameters.

(3) Location sketches and descriptions of plan & height control used in the survey shall be prepared. The sketch shall be sufficient to allow the control positions to be easily identified on the ground.

For the purposes of the Land Survey Act 1996 a Registered Land Surveyor (Photogrammetric surveying) shall on request of the Director of Surveys allow inspection of all records used in the collection of the data, and at the least possible cost supply:

- i) copies of photogrammetric survey records;

- ii) copies of the images/photographs/data in the form of diapositive, film image, contact print or copy thereof;
- iii) data on a suitable medium e.g. CD,DVD, DLT, Disk, Tape or other medium.

**Confidentiality of
Supply of material
or information**

- 25 The supply of any material or information to the Director of Surveys under section 15 (2) of the Land Surveyors Act or under section 57 of the Land Surveyors Regulations shall not in any way breach the confidentiality of a clients information, copyright therein or professional code of ethics of the person supplying them or of any other owner of such copyright.

PART X REFERENCE DOCUMENTS

Reference Document

- 26 (1) Engineering Surveys shall be carried out by reference to the Land Surveyors Code of Best Practice for Engineering Survey – March 2000.
- (2) Hydrographic Surveys shall be carried out by reference to the IHO minimum standards for Hydrographic Surveys Special Publication No 44 (4th Edition, April 1998).
- (3) Photogrammetric surveys shall conform with Internationally accepted standards for aerial survey specifications which shall at least be the equivalent of the standards identified in the series of FIG Specifications as here defined:
- (a) Vertical Aerial Photography and Derived Digital Imagery – Client Specification Guidelines (1st Edition, April 2000)
 - (b) Specification for Mapping at Scales between 1:1000 and 1:10000 (2nd Edition 1988)
 - (c) Surveys of Land, Buildings and Utility Services at Scales of 1:500 and Larger – Client Specification Guidelines (2nd Edition 1996)

APPENDIX A

NOTICE OF SURVEY

Date:

Dear,

In accordance with Regulation 54 of the Land Surveyors Regulations 1998 which states,

1. Before commencing any cadastral survey, the Trinidad and Tobago Licensed Surveyor, shall cause notice to be given to all proprietors of lands lying adjacent to the parcel being surveyed

2. The notice to be given shall include the name of the TTLS who will be carrying out the cadastral survey, and the date and the time of the cadastral survey.

3. Where lands are to be brought under the provisions of The Real Property Ordinance, the purpose of the cadastral survey shall be stated and the period of the notice shall be seven clear days but in all other instances three clear days notice shall be given.

4. Nothing in this regulation shall prevent a Trinidad and Tobago Licensed Surveyor from carrying out a cadastral survey after giving reasonable notice to any neighbouring proprietor, in unforeseen or unavoidable circumstances.

I,, hereby give notice that the parcel of land situated at, owned/occupied by me will be surveyed byTTLS, Trinidad and Tobago Licensed Surveyor, on beginning at a.m. for the purpose of These lands adjoin property owned/occupied by you.

You are advised to be present on the day of the survey (or to send a representative) and to have available any documents (deeds, plans etc.) which would assist in determining the common boundary.

Thanking You,
Yours Respectfully

.....
Owner/occupier/agent

Received by:

..... Owner/occupier/agent on

boundary

I hereby waive the requirement for 3 days notice

..... Owner/occupier/agent on

boundary

Dated day of 2012.,

Mr. Andrew Bowles

Chairman, Land Survey Board of Trinidad & Tobago



SCALE 1/200

and the Entertainment Division

coloured, pink on one surface of first barbed net, green, blue and orange containing zero point, three non three species barbed nets (CT, WU-105, FW-417, Weiss of Lauen, WU-5110, FW-227) and containing three point into nine non three barbed nets (a portion of four described in (NO, 20050/2466220001) containing zero point into three four barbed nets (NO, 200200/241990001) and containing zero point into two three three barbed nets (NO, 2006002/2790001).

in accordance with Regulation 25 (1) of the Land Surveyors' Regulations 1998

Entered.....
Provided & Tobacco Land Surveyor 28th May 2004

Trinidad & Tobago Land Surveyor 28 May 2004

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
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Training data			
Classed Data (Classes = 1 - 2)			
	Class 1	Class 2	Class 3
Dataset 1	7	2	
Dataset 2	5	6	
Class 1	1	1	
Class 2	1	1	
Class 3	1	1	
Class 4	1	1	
Class 5	1	1	
Class 6	1	1	
Class 7	1	1	
Class 8	1	1	
Class 9	1	1	
Class 10	1	1	
Class 11	1	1	
Class 12	1	1	
Class 13	1	1	
Class 14	1	1	
Class 15	1	1	
Class 16	1	1	
Class 17	1	1	
Class 18	1	1	
Class 19	1	1	
Class 20	1	1	
Class 21	1	1	
Class 22	1	1	
Class 23	1	1	
Class 24	1	1	
Class 25	1	1	
Class 26	1	1	
Class 27	1	1	
Class 28	1	1	
Class 29	1	1	
Class 30	1	1	
Class 31	1	1	
Class 32	1	1	
Class 33	1	1	
Class 34	1	1	
Class 35	1	1	
Class 36	1	1	
Class 37	1	1	
Class 38	1	1	
Class 39	1	1	
Class 40	1	1	
Class 41	1	1	
Class 42	1	1	
Class 43	1	1	
Class 44	1	1	
Class 45	1	1	
Class 46	1	1	
Class 47	1	1	
Class 48	1	1	
Class 49	1	1	
Class 50	1	1	
Class 51	1	1	
Class 52	1	1	
Class 53	1	1	
Class 54	1	1	
Class 55	1	1	
Class 56	1	1	
Class 57	1	1	
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Class 81	1	1	
Class 82	1	1	
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Class 92	1	1	
Class 93	1	1	
Class 94	1	1	
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Class 96	1	1	
Class 97	1	1	
Class 98	1	1	
Class 99	1	1	
Class 100	1	1	
Class 101	1	1	
Class 102	1	1	
Class 103	1	1	
Class 104	1	1	
Class 105	1	1	
Class 106	1	1	
Class 107	1	1	
Class 108	1	1	
Class 109	1	1	