VOLUME 23

Panchayats, Urban Planning & Land Records

Grama Panchayats Act & Rules · ODA planning rules · RERA · town planning · DILRMP · NH land acquisition

23

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GOVERNMENT OF ODISHA
HOUSING & URBAN DEVELOPMENT DEPARTMENT
3rd Floor, Kharavel Bhawan, , Bhubaneswar, Pin-751001
****

No 7238 /HUD., Dated 26.04.2022
HUD-TP-POLICY-0001-2015

From

Sushanta Kumar Mishra,
Additional Secretary to Government

To

The Vice Chairmans of all Development Authorities.

The Executive Officer of Khordha Municipality/ Jatni Municipality/ Pipili NAC/ Choudwar Municipality/ Chatrapur NAC / Gopalpur NAC / Sundargarh Municipality/ Biramitrapur Municipality/ Rajgangpur Municipality / Puri Municipality / Konark NAC / Nimapara NAC / Angul Municipality / Talcher Municipality / Vasyanagar Municipality / Paradip Municipality.

Sub: Transfer of planning functions to Urban Local Bodies from Development Authorities through delegation under Section-111 of ODA Act, 1982.

Ref: This office Order No. 7678 of 30.03.2010 and 1781,dated 19.01.2015.

Sir,

In inviting a reference to the subject cited above, I am directed to inform you that it has been decided to transfer the Planning function to the Urban Local Bodies from the Development Authorities in keeping with the mandate of 74th amendment of the constitution.

Earlier order of Government Vide HUD-TP-Policy-0001-2015/1781/HUD, Dated 19.01.2015 may be referred in this regard. Keeping in view of the capacity constraint of the Urban Local Bodies to discharge the Planning functions, the resources available with Development Authorities, wherever it is possible will be utilised by the Urban Local Bodies, in consultation with the vice chairman of respective Development Authorities at the initial stages. Subsequently, when the Urban Local Bodies acquire adequate capacity, such manpower deployed from the Development Authorities may be withdrawn.

It has been decided that the following functions would be delegated to the Urban Local Bodies by the concerned Development Authorities under Section-111 of ODA Act, 1982:

a) Issues related to Building Plan approvals,

b) Lay out/ Sub divisional Regulation approval cases,

c) Authority to deal with unauthorized constructions.

To enable the Urban Local Bodies to discharge the delegated functions, the operating procedures as delineated here under may be followed.

1. Development Authorities shall on receipt of model agenda & proceedings of the Authority Meeting relating to delegation of Planning Functions are to get the same approved before 05th of May, 2022.(Model Agenda & model proceeding are enclosed Annexure-1.)

2. Development Authority shall notify the delegation of power before 07th of May, 2022. (Model notification is at Annexure-II)

3. Human Resources Deployment

I. Subject to availability of staff, the Vice Chairpersons may take a decision to deploy the Planning Members, Town planners, Assistant Town Planners or Junior Town Planners of the respective Development Authorities to discharge the duty of planning Members and planning officials of the Urban Local Bodies in addition to their original duties.

II. Subject to availability of staff, the Vice Chairpersons may take a decision, to deploy the Planning Assistant/ Draftsman and Amin to different ULBs.

III. In case, the DAs are not in a position to deploy the above mentioned staff in the ULBs, they may delegate the planning function to the ULBs and upon such delegation, functions of different planning officials may be discharged by the officers of the ULBs as follows:

a. Municipal Engineers (not below the rank of Executive Engineer) as the Planning Members.
b. Engineers of the rank of Assistant Engineers or above as the Planning Officers.
c. Junior Engineers of the respective ULBs as the Planning Assistants.

All these officers shall discharge their duties under the direct supervision of the Executive Officers.

4. The Urban Local Bodies should allocate the logistics as outlined below for delivery of planning functions to the citizens:

I. Office space with furniture and fixtures for functioning of Planning Section to accommodate the staff deployed by the DAs or the officials of the ULBs designated to deal with the planning function.
II. Two Computer Systems with Printers.
III. Stock & Stationery.

5. An orientation programme of the Nodal Engineers from ULBs has already been conducted by H&UD Department on 21st and 22nd of April, 2022 to acquaint them on the process of Building Plan Approval/ Layout Approval, etc.

6. The Urban Local Body shall issue a notice on commencement of planning function in the respective ULBs w.e.f. 09th of May, 2022 for general information of public unfailingly. A model public notice is enclosed as annexure -III.

7. The application for approval of building plan, layout etc. pending with the DAs on the date of issuance of this letter shall be transferred to the ULBs and upon receipt of such cases the ULBs shall take over the proceeding of such cases from whatever stage such cases might be pending on the date of such transfer.

All the Nine Development Authorities and Urban Local Bodies are therefore requested to complete the above activities and sub activities as per the timeline enclosed in annexure-IV.

This may be treated as most urgent.

Enclosures: As above.

Yours faithfully

26/4/22

Additional Secretary to Government

Annexure I

Model Agenda and proceeding for delegation of powers by

Development Authorities to .. ..Municipality/NAC

Sub: Delegation of power in respect of approval of building plan cases U/S 111 of ODA Act 1982.

1. This is regarding delegation of power as per the provision of 111(1) of the Odisha Development Authority Act, 1982 for approval of Building Permission cases. As per order of Govt. Vide no. Reforms-UR-10/2010/7678/HUD, dt. 30.03.2010, ...Development Authority is to delegate the powers of according building permission and development/sub division of land in favour of .... Urban Local Body existing within its development plan area.
2. In the mean time, Govt. In H & UD Deptt. Vide Order No.HUD-TP-Policy-0001-2015-1781/HUD, dt.19.01.2015 clarified that delegation from Development Authorities to Urban Local Bodies u/s 111 of the Odisha Development Authority Act, 1982 will include the following:
   (a) Issues related to Building plan approval
   (b) Layout/sub-divisional Regulation approval cases,
   (c) Authority to deal with unauthorised constructions

In view of the above as per provision u/s-111(1) of ODA Act, 1982, power of the authority is delegated to....."
Municipality/NAC
within.....Development Authority area.

(a) Building plan permission:- Full power subject to the following conditions:

i. Adherence of Order No. 14926/HUD/Date:21.08.21 of H&UD Department.
ii. The DPBP Committee of the respective DA will continue to exercise their powers over the matters as provided under Law in respect of cases pertaining to the ULBs delegated with Planning functions and in such event the Executive Officer and the Municipal Engineer or such other Officer of the ULB, who is delegated with the powers of the Planning member or planning Officer, as the case may be, shall be deemed to be members of the DPBP Committee in respect of cases pertaining to respective ULBs;
(ii) Provisions of the Odisha Development authority (Planning & Building Standards) Rules, 2020 and respective Planning & Building Standards Regulations of the Authorities shall be followed.

(b) Lay out Approval: Full powers as detailed below:

i. Planning Assistants: Upto 500sqm
ii. Planning Officer: Above 500sqm upto 4000sqm
iii. Planning Member: Above 4000sqm upto1 Hactare
iv. DPBP Committee: Above 1 Hactare

(c) (i) Authority shall delegate the powers u/s 91 & 92 to deal with un-authorised construction to Executive Officer _____(name of the respective ULB) or any other officer authorised by him w.e.f. 12th April, 2022. All new cases of unauthorised construction in Municipality/NAC area will be detected and dealt by ..... Municipality/NAC from above date and disposed of as per provision of ODA Act and Rule and Regulation made there under.

(ii)For cases which are in the hearing stage as of now, the DA concerned will conclude such cases at their level.

Proceedings

Approved

Planning Member | Engineer Member | Finance Member

Administrator Municipal Corporation | Administrator of other ULBs | Vice-Chairman

Chairman

Annexure II

.....DEVELOPMENT AUTHORITY

.....

Notification

Letter No..... Dated.
.....

In exercise of powers vested in it vide Section 111 (1) of Odisha Development Development Authority Act, 1982, ...Authority, vide its . ..... meeting, held on ..... .delegates the powers of according Building Permission and Development and sub division of land in favour of ..... Municipality/NAC existing within its development plan area to the extent outlined below.

(i) Building permission

(ii) Lay-out/ sub-division of land approvals

(iii) Authority to deal with unauthorised constructions While disposing the cases they will follow the provisions of .....Development Authority, Planning and Building Standard Regulation, _____, as amended from time to time.

This will come into force with immediate effect.

By order of the Authority,

Secretary.

Annexure-III

…….. MUNICIPALITY/NAC

……..

Notification No……..
Date……..

PUBLIC NOTICE

Sub: Commencement of Planning Department in Municipality/NAC area & receipt of application for building plan and lay-out plan approval.

1. It is hereby notified that building plan approval and layout plan approval will be given by ……Municipality/NAC from 09th May, 2022.

2. As building plan and layout plan has been delegated to ……... Municipality/NAC under ODA Act, 1982, therefore the provisions of ODA Act/Rules and regulations made thereunder which are applicable to …… Municipality/NAC Jurisdiction will remain applicable for the same and all cases will be dealt accordingly by _____Municipality/ NAC.

Executive Officer,

.....Municipality/NAC

Annexure-IV

Activity Chart and Timeline for Transfer of Planning function from Development Authorities to ULBs

SI No.	Activity	Sub Activity	Action by	Timeline
1	Resolution of Authority meeting for Delegation of Powers	Circulation of Common agenda and proceeding for Authority meeting Holding of Authority meeting/ proceeding through circulation	H & UD Dept. Development Authority	26th of April, 2022 By 05th of May, 2022
2	Notification by Development Authorities regarding Delegation of Powers		Development Authority	07th of May, 2022
3	Manpower Deployment		DA	As may be decided by the VCs of DAs.
		(A) Appointment of Technical and Non-Technical persons	DA and ULB	By 07th of May, 2022
4	Orientation Programme for DA Officers Staff of Municipal ULBs	• SOP for Building Plan Approval • Information on CDP and In Land use classification • Land use plan in cadastral • Documents to be attached with application • Site inspection and reportings • Scrutiny	H&UD Department	Completed on 21st and 22nd of April, 2022

		process and details • Approvals, Refusals Show cause, etc.		
5.	Infrastructure /Logistics	• Office Space 800 Sq. ft • Furniture • Stationany (Fly Leaf,Notesheet, First Page,Registers, Forms, Papers etc) • Computers with Printers (2 nos)	ULBs	02nd of May, 2022
6.	Public Notice on Commencement of Planning Functions in ULBs		ULBs	09th of May, 2022

Government of Odisha

Housing & Urban Development Department

****

File No 22996 /HUD, Bhubaneswar, dated 21.11.2023

HUD-TP-MISC-0031-2023

Notification

GUIDELINES FOR OPERATIONALISING CITY LEVEL URBAN PLANNING PROFESSIONALS (CLUPPs)

In consonance with the 74th Constitutional Amendment Act, 1992, Government of Odisha has delegated Town Planning functions to all the Urban Local Bodies. In the absence of adequate numbers of qualified planners, it had been decided to delegate the powers of building plan/ layout approvals to the Engineers working in the ULBs. Accordingly, the Engineers have been delivering the Town Planning functions in the smaller ULBs. The process of recruitment of Planning Officials has already been initiated. However, completion of the process of recruitment may take some time, therefore it has been decided by the Govt. to engage qualified and experienced planning professionals through outsourcing basis to augment the capacity of the ULBs. It is in this backdrop that City Level Urban Planning Professionals have been engaged by adopting a fair and transparent process of procurement. In the first phase Thirteen Senior Planning Consultants (SPC), Fourteen Junior Planning Consultants (JPC) and Three Field Planning Consultants (FPC) have been engaged and their services have been placed with the District Urban Development Agencies. Subsequently, more Planning Consultants are proposed to be engaged through CLUPPs so as to make their services available to all the ULBs.

In order to ensure that the Planning Consultants are absorbed in the system in a way that will reduce the burden on the ULB Officials and the town planning services will be delivered to the citizens in a hassle-free and flawless manner, it is essential to

formulate a set of guidelines incapsulating the roles and responsibilities of all the stakeholders. Besides, the guidelines also become essential for successful adaption of the Online Building Plan Approval System (OBPAS) developed under SUJOG. The DUDAs, ULBs and CLUPPs shall meticulously adhere to the provisions spelt out in these guidelines in supersession of previous instructions.

A. Roles and Responsibilities of PD, DUDA

PD, DUDAs shall:

- Coordinate with all ULBs of the District for smooth delivery of Town Planning functions & operationalisation of OBPAS in all ULBs.
- Ensure that the newly engaged Planning Consultants visit regularly to different ULBs on fixed days of every week.
- Ensure submission of the Weekly & Monthly Progress Report on work done by the Planning Consultants to the Director of Town Planning (DTP), Odisha on every Monday of the week & on 5th of every month respectively.
- Ensure submission of the Absentee Statement of the SPC, JPC & FPC engaged in DUDAs by 25th of every month to the DTP, Odisha.
- Be responsible for overall monitoring of different activities pertaining to approval of Building Plans/ Layout Plans & Preparation of Master Plan/ CDP of all the ULBs under their jurisdiction.
- Ensure that all the logistic support, including proper work space & access to online system is made available to all the newly engaged Planning Consultants at DUDAs and at all the ULBs.

B. Roles and Responsibilities of Executive Officer of the Concerned ULBs

Executive Officers shall:

- Ensure sitting arrangement & logistic support to the Planning Consultants with access to computer systems & internet for delivering services under OBPAS.
- Ensure that User IDs are created for the SPC/ JPC/ FPC engaged in ULB to access OBPAS.

- Ensure that FPC engaged through outsourcing or the existing field staffs of the ULBs, as the case may be, assist the SPC/ JPC for site inspection, wherever required.
- Ensure that building plan approvals under SUJOG are done strictly in OBPAS (Online Mode) and offline receipt of application and payments are discontinued.
- Facilitate the Planning Consultants to monitor and supervise in preparation of Master Plan/ CDP.
- Ensure timely holding of Stakeholders Meeting, conducting surveys by the respective Agencies and monitor the progress as per the agreement.
- Conduct review at ULB level on progress of Preparation of Master Plan/ CDP with Agencies engaged for preparation of Master Plan/ CDP.
- Review regularly the status of disposal of the Building Plan / Layout applications.
- Ensure that SPC/ JPC are allowed to dispose Building Plan/ Layout approvals. (Projects upto 1 Hectare and Building height upto 15 mts., shall be disposed of at the level of SPC/ JPC).
- Ensure that the practice of approval of Building Plan/ Layout Plan by Engineers for the above applications is discontinued after joining of the SPC/ JPC in accordance with the provisions of these guidelines.
- Help the Planning Consultant to find a suitable accommodation.

C. Roles and Responsibilities of SPC/ JPC

The SPC/ JPC shall:

- Ensure receipt of Building Plan on SUJOG-OBPAS only.
- Ensure that the Document Verifier forwards the application to the Field Consultant/ Amin (Designated) on the same day, in such cases where field inspection is required otherwise, he/ she shall forward the application directly to SPC/ JPC.
- Shall scrutinize the Building Plan/ Layout Plan as per Planning and Building Standard Rules.
- Conduct field inspection for other than low risk buildings, wherever necessary.

- Dispose Building Plans/ Layout Plans upto 1 Hectare and Building height upto 15 mts.
- Scrutinize building height upto 30 mts. and forward to the Municipal Engineer (Rank of Executive Engineer), who shall approve it.
- All Buildings having height more than 30 mts. shall be scrutinized by the SPC/ JPC and referred to MP & BP Committee or DP & BP Committee, as the case maybe, through the Municipal Engineer (Rank of Executive Engineer).
- Visit to each ULBs assigned as per the list enclosed at **Annexure-I** for delivery of smooth & timely Town Planning functions.
- Furnish the Weekly/ Monthly Progress report, in the format enclosed, to the DTP with a copy to PD, DUDA.
- Follow up the progress of preparation of Master Plan/ CDP of the ULBs with the agencies engaged for the purpose.
- Meticulously monitor the timelines specified for all activities relating to Preparation of Master Plan/ CDP and intimate to DTP/ Executive Officer of the ULBs.

REPORTING FORMAT FOR CLUPP

The SPC/ JPC shall submit the progress as per the format attached in **Annexure-II.**

CHECK LIST FOR SCRUTINY BY SPC/ JPC

The SPC and JPC shall check the documents submitted by the applicant strictly as per the Checklist enclosed at **Annexure-III.**

These guidelines shall also be applicable to all the ULBs so far as it relates to the process of approval of Building Plan/ Layouts and the checklist devised for scrutiny of application by the Planning Assistants or any officer authorized for performing the functions of Planning Assistant.

21/11/23

(G. Mathivathanan, IAS)
Principal Secretary to Government

ANNEXURE- I

PLACEMENT LIST OF 30 PLANNING CONSULTANTS					
Sl. No.	Placed Location	Professionals Name	Designation	Assigned ULBs/ Office-Day for ULB Visit	Contact Details Mobile No. & Email ID
1	Directorate of Town Planning	MR. MANOJ KUMAR NAYAK	Junior Planning Consultant		MOB: 7008531772 EMAIL: manoj.nayak199967@gmail.com
		MR. SHAKTI PRASANNA MISHRA	Junior Planning Consultant		MOB: 8984050120 EMAIL: shaktimishra400@gmail.com
2	DUDA, Angul	MISS. SWARANI PATTANAIK	Senior Planning Consultant	Angul M – Mon, Tues, Wed Talcher M – Thurs Athamalik N – Fri	MOB: 9668447268 EMAIL: swarani.pattanaik@gmail.com
3	DUDA, Balasore	MISS. B. LITIKA	Senior Planning Consultant	Balasore M – Mon, Tues Remuna N – Wed Alternatively Jaleswar M – Wed Alternatively Soro M – Thurs Nilagiri N – Fri	MOB: 9348973583 EMAIL: litika.bal@gmail.com
4	DUDA, Balangir	MR. CHAINESH JOSHI	Senior Planning Consultant	Balangir M – Mon, Tues Titlagarh M – Wed Patnagarh N – Thurs Kantabanjhi N – Fri Alternatively Tusura N – Fri Alternatively	MOB: 8878182099 EMAIL: joshichainesh@gmail.com
5	DUDA, Bargarh	MR. SUBHAM KUMAR SETH	Junior Planning Consultant	Baragrh M – Mon, Tues, Barpali N – Wed Padampur N – Thurs	MOB: 6370372123 EMAIL: subhamseth145@gmail.com

				Attbira N – Fri Alternatively	
				Bijepur N – Fri Alternatively	
6	DUDA, Bhadrak	MR. SOBHAN KUMAR MOHANTY	Senior Planning Consultant	Bhadrak M – Mon, Tues	MOB: 8328868066 EMAIL: sobhan.mohanty13@gmail.com
				Dhamnagar M – Wed	
				Basudevpur M – Thurs	
				Chandabali N – Fri	
7	DUDA, Cuttack	MR. PUNEET PATNAIK	Senior Planning Consultant	Banki N – Mon, Tues, Wed	MOB: 8280011855 EMAIL: puneetpatnaikofficial@gmail.com
				Athagarh N – Thurs	
				Choudwar M – Fri	
8	DUDA, Deogarh	MISS. RACHITA LAL	Senior Planning Consultant	Deogarh M – Mon to Fri	MOB: 9668525713 EMAIL: rachitalal56@gmail.com
9	DUDA, Dhenkanal	MISS. SARBANI MISHRA	Senior Planning Consultant	Dhenkanal M – Mon, Tues	MOB: 7978874833 EMAIL: sarbanimisra@gmail.com
				Hindol N – Wed	
				Bhuban N – Thurs	
				Kamakhynagar N – Fri	
10	DUDA, Ganjam	MISS. SONALI SUBHADARSHINI	Junior Planning Consultant	Chatrapur N – Mon, Tues	MOB: 8917266929 EMAIL: sonalisubhadarshini.01@gmail.com
				Gopalpur N – Wed Alternatively	
				Rambha N – Wed Alternatively	
				Ganjam N – Wed Alternatively	
				Khallikot N – Wed Alternatively	
				Purushottampur N – Thurs	
				Digapahandi N – Fri Alternatively	
				Chikiti N – Fri Alternatively	
		MR. DEEPAK	Field	Same as Junior	MOB: 904066718, 9438500000

		KUMAR PANDA	Planning Consultant	Planning Consultant	EMAIL: erdeepakpanda@gmail.com
11	DUDA, Jagatsinghpur	MR. SASHI BHUSAN SAHOO	Senior Planning Consultant	Jagatsinghpur M – Mon, Tues, Wed Paradeep M – Thurs, Fri	MOB: 8337989867 EMAIL: contact.sashibhusan@gmail.com
12	DUDA, Jharsuguda	MISS. PALLAVI SINGH	Senior Planning Consultant	Jharsuguda M – Mon, Tues, Wed Belpahar M – Thurs Brajarajnagar M – Fri	MOB: 6371629833, 8093807787 EMAIL: pallavikri2911@gmail.com
13	DUDA, Jajpur	MR. ABHISEK NAIK	Senior Planning Consultant	Jajpur M – Mon, Tues, Wed Vyasanagar M – Thurs, Fri	MOB: 7684864384 EMAIL: anaik068@gmail.com
14	DUDA, Khurdha	MISS. PARNA SARKHEL	Senior Planning Consultant	Khordha M – Mon, Tues, Wed Balugaon N – Thurs. Fri	MOB: 9040174144 EMAIL: parnasarkhel14@gmail.com
		MISS. SWATISAGARIKA PALEI	Junior Planning Consultant	Jatani M – Mon, Tues, Wed Banapur N – Thurs. Fri	MOB: 7205556724 EMAIL: swatisagarika.palei45@gmail.com
15	DUDA, Keonjhar	MISS. HARAPRIYA BEHERA	Senior Planning Consultant	Keonjhar M – Mon, Tues Anandapur M – Fri Alternatively Champua N – Fri Alternatively Barbil M – Wed Joda M – Thurs	MOB: 9040064493, 700892892 EMAIL: harapriya0099@gmail.com
16	DUDA, Kandhamal	MR. BIKASH CHANDRA SAHOO	Junior Planning Consultant	Phulbani M – Mon, Tues G. Udayagiri N – Thurs, Fri Baliguda N – Wed	MOB: 7008940479 EMAIL: ashbik7745@gmail.com
17	DUDA, Kalahandi	MR. SOUMYAPRATIK SAHOO	Junior Planning Consultant	Bhawanipatna M – Mon, Tues Kesinga N – Wed	MOB: 7008147731 EMAIL: soumyapratik91@gmail.com

				Junagarh N – Thurs Dhamtagarh – Fri	
18	DUDA, Koraput	MISS. SAGARIKA ROUT	Junior Planning Consultant	Jeypore M – Mon, Tues Koraput M – Wed Sunabeda M – Thurs Kotpad N – Fri	MOB: 6372343426 EMAIL: saga.nata.143@gmail.com
		MR. KUNMUN ROUT	Field Planning Consultant	Same as Junior Planning Consultant	MOB: 7684895959, 8763700000 EMAIL: chinurouta03@gmail.com
19	DUDA, Mayurbhanj	MR. KSHIROD CHANDRA MOHANTA	Junior Planning Consultant	Baripada M – Mon, Tues Rairangpur M – Wed Karanjia N – Thurs Udala N – Fri	MOB: 7504925728 EMAIL: kshirodchandra20@gmail.com
20	DUDA, Nayagarh	MR. ADITYA NARAYAN PRADHAN	Junior Planning Consultant	Nayagarh N – Mon, Tues Khandapara N – Wed Ranpur N – Thurs Odagaon N – Fri Alternative Daspalla N – Fri Alternative	MOB: 7008151550 EMAIL: pradhanadityan@gmail.com
21	DUDA, Nuapada	MISS. RAJASHREE DEWANGAN	Junior Planning Consultant	Nuapada N – Mon, Tues Khariar Road N – Wed, Thurs Khariar N – Fri	MOB: 7894134672 EMAIL: rinurajshree@gmail.com
22	DUDA, Puri	MISS. ITISHA BEHERA	Senior Planning Consultant	Konark N – Mon, Tues, Wed Nimapada N – Thurs Pipili N – Fri	MOB: 7008916738 EMAIL: itisha988@gmail.com
23	DUDA, Sambalpur	MISS. POOJA KUMARI RANA	Junior Planning Consultant	Kuchinda N – Mon, Tues, Wed Redhakhol N – Thurs, Fri	MOB: 8249864343 EMAIL: poojarana25499@gmail.com
24	DUDA, Sundargarh	MR. HIMANSHU SHEKHAR	Junior Planning	Biramitrapur M – Mon, Tues	MOB: 9827876514 EMAIL:

		TANTY	Consultant	Sundargarh M – Wed, Thurs Rajgangpur M – Fri	himanshusekhartanty99@gmail.com
		MR. JAYANTA KUMAR SETH	Field Planning Consultant	Same as Senior Planning Consultant	MOB: 9439806780, 8917500575 EMAIL: jayantaseth7gmail.com
25	DUDA, Sonepur	MISS. GAYATRI PANDA	Junior Planning Consultant	Sonepur M – Mon, Tues, Wed Tarbha N – Thurs Binika N – Fri	MOB: 8917325867 EMAIL: lbabli50@gmail.com

N.B: 1. In cases, where the ULB visit days have been declared holidays, the Planning Consultants are required to visit the ULB on the Saturday of the same week for delivering of Town Planning services. In case, all the approval at the assigned ULBs is completed, The Planning Consultants can work from DUDA on Saturday.

2. For the purpose of above table:

Mon – Monday, Tues – Tuesday, Wed – Wednesday, Thurs – Thursday, Fri – Friday.

ANNEXURE-II

BASIC INFORMATION	NAME OF THE PLANNING PROFESSIONAL	
	NAME OF THE DUDA	
	ASSIGNED ULB	
	WPR/ MPR PERIOD	FROM: TO:
	DATE OF JOINING	
Basic ULB Information	No. of Wards	
	No. of Households	
	Name of the ULB Authority (MC/EO)	
	Contact number of the ULB Authority	
	ULB contact E-mail Id	
Human Resource Engaged in Planning Activities	Document verifying officer-1	Name- Mob-
	Document verifying officer-2	Name- Mob-
	Document verifying officer-3	Name- Mob-
	Add rows if required--	
	Field Inspector-1	Name- Mob-
	Field Inspector-2	Name- Mob-
	Field Inspector-3	Name- Mob-
	Add rows if required--	
	Planning Assistant-1	Name- Mob-
	Planning Assistant-2	Name- Mob-
	Planning Assistant-3	Name- Mob-
	Planning Officer-1	Name- Mob-
	Planning Officer-2	Name- Mob-
	Planning Officer-3	Name- Mob-
	Name of the Planning Member/ City Planner/ Town Planner-1	Name- Mob-
	Name of the Planning Member/ City Planner/ Town	Name- Mob-

		Planner-2	
		Name of the Planning Member/ City Planner/ Town Planner-3	Name- Mob-
		Any other Person Involve in Planning Activities	Name- Mob-
IT Infrastructure Readiness		Availability of Computers/ Printers and supporting equipment (Yes/No)	
		No. of Computers used for BPAS	
		No. of Printers used for BPAS	
		Availability of Adobe Pdf Reader in the Computer systems (Yes/No)	
		Availability of AutoCAD Software in the Computer systems (Yes/No)	
		AutoCAD Software Version In Year	
		Any other Design Software Used	
Progress of Layout Plan Approval			
1	No. of Layout Plan Applications Received		
2	Number of Layouts Approved		
3	Approvals in relation to Master Plan		
4	Number of Layouts Rejected		
5	Number of Layouts Pending		
6	Layout Application Pending at Scrutiny Level		
7	Layout Application Pending at Field Inspection Level		
8	Layout Application Pending at Approval Level		

Progress of Building Plan Approval System (BPAS)										
Total No. of Applications Status			Status of Pending Applications				Periodicity of Pendency			
No. of Applications Received	No. of Applications Approved	No. of Applications Rejected	No. of Applications Pending for Compliances	Pending at ULB Level			Pending Less than 1 Month	Pending Over 1 Month	Pending Over 3 Months	Pending Over 6 Months
				Field Inspection	Scrutiny	Approving Officer				
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)			

Revenue Generation	Total Amount of Revenue Generated From BPAS		

Progress of Master Plan/ Comprehensive Development Plan										
Inception Report Submitted	Interactive Workshop-1 Completed	Concept Report Submitted	Status Survey Report Submitted	Interactive Workshop-2 Completed	Draft CDP/ Master Plan Submitted	Notification of Draft Master Plan	Interactive Workshop-3 Completed	Hearing by Board of Enquiry & Compliance	Final Master Plan Submit for Govt. Approval	Final Master Plan Notification & Publication
(Y/N)										
Date:										

If any other specific task assigned to you Mention the task		
Sign of Planning Professional		Sign of MC/ EO

ANNEXURE-III

1	**Applicant's Name**			
2	**Documents submitted** (tick in the box, as applicable)			Correct/ Incorrect /remarks
	i	Self-signed Xerox copies of Ownership Documents	S / NS /NR	
	ii	Copy of Agreement with Project Management Organisation *[see Rule 45, 46 and 4 of ODA (CAF) Rules, 2016 and Rule 16, 17, 18 & 19 of OTP&IT (P&BS) Rules, 2021]*	S / NS /NR	
	iii	Copy of certificate of registration of Architect/Technical Person	S / NS /NR	
	iv	Affidavit in original in prescribed format	S / NS /NR	
	v	Two photographs of the site	S / NS /NR	
	vi	Supervision Form	S / NS /NR	
	vii	Structural Stability Certificate	S / NS /NR	
	viii	Submission of copy of plan showing Final plot of approved layout plan/ Government or statutory body scheme/ regularized plot.	S / NS /NR	
3	**Plans submitted** (tick in the box, as applicable)			Correct/ Incorrect /remarks
	(i)	Key Plan	S / NS	
	(ii)	Site Plan	S / NS	
	(iii)	Site Layout Plan (where applicable)	S / NS /NR	
	(iv)	Sub-division Layout Plan (where applicable)	S / NS /NR	
	(v)	Building Services Plan	S / NS /NR	
	(vi)	Electrical layout plan	S / NS /NR	
	(vii)	Landscape Plan	S / NS /NR	
	(viii)	Waste Management Plan	S / NS /NR	
	(ix)	External Infrastructure Development Plan	S / NS /NR	
	(x)	Specifications	S / NS	
	(xi)	Whether all plans, drawings, statements, design details have been signed by the applicant/ architect/ technical person.		YES NO

4	**NOC's/clearance submitted** along with the application form, if any (please tick)			Correct/ Incorrect /remarks
	(i)	EIDP NOC from ULB/PDDRDA	S / NS /NR	
	(ii)	Fire Safety Recommendation	S / NS /NR	
	(iii)	NOC from Airports Authority of India	S / NS /NR	
	(iv)	NOC from State Archaeology	S / NS /NR	
	(v)	NOC from National Monuments Authority (NMA) -for ASI protected monuments	S / NS /NR	
	(vi)	NOC from Commissioner of Police for construction near important buildings.	S / NS /NR	
	(vii)	NOC in respect of Eco-Sensitive Zone	S / NS /NR	
	(viii)	NOC from Pollution Control Board	S / NS /NR	
	(ix)	NOC from WATCO/PHEO for water supply and sewerage	S / NS /NR	
	(x)	NOC for Ground Water withdrawal	S / NS /NR	
	(xi)	Environmental Clearance	S / NS /NR	
	(xii)	Structural Vetting	S / NS /NR	
	(xiii)	Any other -Please specify	S / NS /NR	
5	**Existing Road Width** (means of access):			(in meter)
6	**Proposed Activity** (specify activities; e.g, Apartment/ Hotel / Hostel/ Shopping Mall / Hospital/ IT-ITES, etc.)			
7	The proposed activity of the building or part of the building falls under which of the following:			
	Assembly Building	Special Building	Hazardous Building	None of these

8	**Built-up Area** (in Sq.m)	
	Total Built-up Area (including exemptions):	
	Total Built-up Area (calculated towards FAR)	
	Total Built-up (FAR) Area upto Base FAR	
	Total Built-up (FAR) Area above Base FAR	

9	**Floor Area Ratio** (Rule 35)

	Base FAR:	2.00	Max Permissible FAR:		FAR Achieved:	

10	**Proposed Building Height** Specify:–	(in meter)

11	**Setback Requirement** (open spaces around the building- Rule 33)					
	Required Setback (in meter)	Specify:	Provided as per drawing (in meter):	Front: Left: Right: Rear:	Whether complying with the norms?	YES NO
12	Ground Coverage:		Required:		Provided:	

13	**A) Off-street Parking Requirement** (Rule 37, as per ODA (P&BS) Rules, 2020 and Rule 34, as per OTP&IT (P&BS) Rules, 2021).	Required:	Provided:

14	**Basement Uses:**	Conforming/ Non-conforming	Remarks:

15	**Security Deposit**	Required/ Not Required	Remarks:

16. Whether building requires DP&BP committee approval/recommendation	YES NO
Remarks.–	

Name of Technical Person

Signature of Technical Person
(Planning Assistant/A.A.D./Arch.Asst /D.Man/J.E.)

N.B: For the purpose of this checklist:
S – Submitted,
NS – Not Submitted,
NR – Not Required.

Memo No. 22997 /HUD, Dated 21.11.2023

Copy forwarded to the P.S. to the Hon'ble Chief Minister, Odisha / P.S. to the Hon'ble Minister, Housing & Urban Development / P.S to Chief Secretary, Odisha / P.S. to Development Commissioner-cum-Additional Chief Secretary, Odisha / P.S to Principal Secretary to Govt., Housing & Urban Development Department for information and necessary action.

Additional Secretary to Government

Memo No. 22998 /HUD, Dated 21.11.2023

Copy forwarded PD, all DUDAs/ the Executive Officer, All Urban Local Bodies of the State for information and necessary action.

Additional Secretary to Government

Memo No. 22999 /HUD, Dated 21.11.2023

Copy forwarded to all Departments of Government/All Heads of Departments/ R.D.C (CD), Cuttack / R.D.C(ND), Sambalpur/ R.D.C(SD), Berhampur/ All Collectors/ D.T.P, Odisha, Bhubaneswar for information and necessary action.

Additional Secretary to Government

Memo No. 23000 /HUD, Dated 21.11.2023

Copy forwarded to the Directorate Section/ P.H, section/ Water Supply section / L.F.S Section / Municipal Section/ Project Section / Housing Section / Sanitation Section / UPA Section / T.P. Section for information and necessary action.

Additional Secretary to Government

The Digital India Land Records Modernization Programme

(DILRMP)

Guidelines, Technical Manuals and MIS

2018-19

Department of Land Resources

Ministry of Rural Development

Government of India

FOREWORD

For modernization of land records system in the country, a modified programme, viz., the National Land Records Modernization Programme (NLRMP) a Centrally Sponsored Scheme, was formulated by merging two Centrally-sponsored schemes of Computerization of Land Records (CLR) and Strengthening of Revenue Administration and Updating of Land Records (SRA&ULR) and was approved by the Cabinet on 21.08.2008. The NLRMP, has since been revamped as the Digital India Land Records Modernization Programme (DILRMP) as a Central Sector Scheme with cent per cent Central funding with effect from 01st April 2016 and extended up to 2019-20. While extending the programme beyond 31.03.2017, it was also mandated to revise the guidelines. It has been revised in consultation with all stakeholders accordingly.

Detailed Guidelines and Technical Manual are enclosed for better implementation of the DILRMP. The Technical Manuals have been revised after obtaining inputs from the leading technical agencies as well as from the field experience of States which have done commendable work in specific areas of the programme.

These Guidelines comprise three parts - Part-**A The Guidelines**, **Part-B The Technical Manuals** and Part-C The MIS.

I wish to bring on record our thanks and appreciation for those Agencies and their representative(s) who spared their valuable time to contribute towards framing the Guidelines and Technical Manuals, namely:

I would like to thank the officers and staff of DoLR who have spent hours pouring over these Guidelines and Manuals especially Shri Jaideep Govind Special Secretary & Financial Adviser, Smt. Veena Ish Special Secretary (LR) and Shri Hukum Singh Meena, Joint Secretary (LR). The Department is grateful for the overall guidance and encouragement it received from the Hon'ble Minister of State for Rural Development and the Hon'ble Minister of Rural Development.

No work is ever perfect and I am sure the same is true for this document. Despite our best efforts, if any errors are detected or if there are suggestions for further improvement, we would be more than happy if the same are sent to us for consideration of their inclusion in the document before its publication.

If inadvertently, any contributor has been left out, it is highly regretted but we remain thankful, nonetheless.

28.12.18

(ANANT KUMAR SINGH)

Secretary

Department of Land Resources

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OPERATIONAL GUIDELINES OF DIGITAL INDIA LAND RECORDS MODERNIZATION PROGRAMME (DILRMP)

1. INTRODUCTION:

1.1 The National Land Records Modernization Programme (NLRMP), approved in 2008 as a Centrally Sponsored Scheme, has since been revamped as the Digital India Land Records Modernization Programme (DILRMP) as a Central Sector Scheme with cent per cent Central funding with effect from 01st April 2016.

1.2 Up till now, the programme has following major components:

(i) Computerization of land records; (ii) Survey / resurvey and updating of the survey & settlement records (including ground control network and ground truthing); (iii) Computerization of Registration; (iv) Modern record rooms / land records management centres at tehsil / taluk / circle / block level; (v) Training & capacity building; (vi) Core GIS; (vii) Legal changes; (viii) Programme management.

1.3 These components in effect translated into the following activities:

(i) computerization of record of rights; (ii) digitization of cadastral maps; (iii) integration of record of rights (textual) and cadastral maps (spatial); (iv) survey / re-survey; (v) modern record rooms; (vi) computer centres at tehsil, sub-division, district and data centre at state level; (vii) connectivity between revenue offices; (viii) computerization of registration; connectivity between sub-registrar offices and tehsils; and (ix) integration of registration and land records.

1.4 Need for formulation of revised guidelines has arisen to incorporate changes emerging out of the recommendations of the EFC for extension of the programme beyond 31.03.2017 to 31.03.2020 that *inter alia* include:

1. Change in funding pattern from sharing basis (between State and Centre) to 100% assistance from Centre. Release of 30% mobilization advance during 2018-19 and subsequent releases on reimbursement basis.

2. Change in release mechanism through Expenditure Advance Transfer (EAT) module of Public Finance Management System (PFMS).

3. Change in policy related to Survey/Resurvey component.

4. Liberty to the States/UTs to add-on State specific needs from their own resources.

2. OBJECTIVE:

(a) to build upon the commonalities that exist in the arena of land records in various States;

(b) to develop an appropriate integrated land information management system across the country; and

(c) to facilitate different States to add State-specific needs as they may deem relevant and appropriate.

3. SCOPE:

3.1 Computerization of land records

a) Data entry/re-entry/data conversion of all textual records including mutation records and other land attributes data

b) Digitization of cadastral maps

c) Integration of textual and spatial data

d) Tehsil, sub-division/district Computer centers

e) State-level data centres

f) Inter-connectivity among revenue offices

3.2 Survey/resurvey and updating of the survey & settlement records:

Only the sanctioned works under survey/re-survey component will be implemented. In no case, any new activity under this head would be carried out from NLRMP/DILRMP funds. This component including ground control network and ground truthing should be implemented using the following modern technology options.

a) Pure ground method using total station (TS) and differential global positioning system (DGPS)

b) Hybrid methodology using aerial photography and ground truthing by TS and DGPS

c) High Resolution Satellite Imagery (HRSI) and ground truthing by TS and DGPS

d) Other technologies as approved by Core Technical Advisory Group (CTAG).

3.3 Computerization of Registration

a) Computerization of the sub-registrar's offices (SROs)

b) Data entry of valuation details

c) Data entry of legacy encumbrance data

d) Scanning & preservation of old documents

e) Connectivity of SROs with revenue offices

3.4 Modern record rooms/land records management centres at tehsil/taluk/circle/block level

3.5 Training & capacity building

a) Training, workshops, etc.

b) Strengthening of the Survey and Revenue training institutes

3.6 Core GIS

a) Village index base maps by geo-referencing cadastral maps with satellite imagery, for creating the core GIS.

b) Integration of three layers of data: (i) Spatial data from aerial photography or high-resolution satellite imagery; (ii) Survey of India and Forest Survey of India maps; and (iii) GIS-ready digitized cadastral maps from revenue records. Once the basic plot-wise data is created by the States/UTs, seamless integration would be possible for micro and macro-planning and other relevant applications.

3.7 Legal changes

a) Amendments to The Registration Act, 1908

b) Amendments to The Indian Stamp Act, 1899

c) Amendments to land related legislations of the States/UTs

3.8 Programme management

a) Programme Sanctioning & Monitoring Committee in the DoLR

b) Core Technical Advisory Group in the DoLR and the States/UTs

c) Programme Management Unit (PMU) in the DoLR and the States/UTs

d) Information, education and communication (IEC) activities

e) Evaluation

4. IMPLEMENTATION

4.1 The State Governments/UT Administrations will implement the programme through their Project Management Units already set up under the Programme.

4.2. The district will be taken as the unit of implementation, where all activities under the programme will converge. States/UTs will ensure that all districts shall complete all the components/ activities of the programme latest by 31.03.2020.

4.3 All the activities shall be taken up in a systematic manner. A diagrammatic depiction of the indicative nature of activities being/to be undertaken is provided at **Annexure-GL-I**. The States/UTs may suitably adapt them with suitable modifications as per their need with exercising proper re-engineering process involved, if any.

4.4 A mobilization advance of up to 30% will be released as the first installment to the States/UTs based on their approved annual action plan. Subsequent installments (out of remaining amount) will be released on reimbursement basis on the basis of entry of bills/vouchers furnished by the vendor on completion of different milestones of work which are entered in the Expenditure Advance Transfer (EAT) module of the Public Finance Management System (PFMS). All sanctions will be done on the basis of Detailed Project Reports (DPRs), which will be part of annual action plan prepared by the States / UTs in the prescribed Proforma. States will have to make available funds to the PMU for meeting the expenditure which will enable them to claim reimbursement.

4.5 All the States shall have to release corresponding share of the release corresponding to fund released by the Central Government upto 31.03.2016. Cent percent funds would be released to the Project Management Unit (PMU) established in the States for the purpose by Central Government w.e.f. 01.04.2016.

4.6 States/UTs shall identify a nodal Department for implementing the DILRMP. This Department must, in turn, put in place a Programme Management Unit (PMU) under the charge of an officer not below the rank of Secretary to oversee the DILRMP in its entirety. This PMU will ensure coordination among all concerned Departments as well as among the various units of the implementing Department. For each activity under this Programme, the duties and responsibilities of officials as well as of the vendors, if any, must be listed out in detail in harmony, as far as possible, with the Guidelines and also be intimated to the DoLR. The PMU must ensure that milestones and time frames,

as well as physical and financial achievements, are monitored on a regular basis and online data are uploaded.

4.7 PMU will receive funds from Govt. of India and shall follow the procedure/rules and will implement Public Financial Management System (PFMS) including Expenditure, Advance & Transfer (EAT) module and on boarding of vendors on the module from time to time.

5. CONTENT MANAGEMENT

5.1 Data Entry, Updation & Data Verification/Validation Process

5.1.1 Land records data are available as (a) textual data, and (b) spatial data (cadastral maps). All textual data including the records of rights (RoRs), mutation orders and other land attributes shall be updated and computerized. All pending mutation orders shall be incorporated in records and the data entry pertaining to such updation shall be completed on priority basis. All spatial data shall also be updated and digitized as described below.

5.1.2 Each State/UT, wherever applicable, should fix a reasonable cut-off date after which only computerized RoRs should be issued, and issue of manual RoRs should be discontinued thereafter. After the cutoff date, further mutation and updation of data shall be done in the computerized system on an ongoing basis, after following the due procedure as prescribed in the modified Land Records laws/manuals.

5.1.3 Responsibility of Revenue officials shall be fixed to ensure 100% checking, verification and validation of the data so entered. The patwari (by whatever names the grass root revenue functionaries are known like Lekhpal, Halka Karamchari, patwari, Talati etc.) shall carry out 100% checking, and the Revenue Inspector, or an officer of the equivalent rank, the Tehsildar, the SDO and the Deputy Commissioner/District Collector shall randomly check at least 50%, 10%, 3% and 1%, respectively, of the data, so as to ensure the accuracy of the data vis-à-vis the manual records. Accuracy of data entry and assurance of the same through verification is key to the success of this exercise, which

would ultimately results in reduction in land disputes in future. Therefore, a strict view needs to be taken where unexplained errors are found in the records.

5.1.4 The States/UTs, which have authorized Gram Panchayats to pass mutation orders, must ensure their inter-connectivity with the corresponding Revenue offices for real time updation of records.

5.1.5 As for the encoding standards, the UNICODE should be used for data storage, local language display and support. Any database created using the ISCII or any other font-based solution should be converted into the UNICODE. The necessary assistance in data conversion may be taken from NIC.

5.2 Procedural Changes for maintenance of Land Records

5.2.1 The States/UTs should carry out the procedural changes, wherever necessary, including the following:

1. Simplify/amend/revise/prepare the land records, manuals, RoR formats on land records maintenance procedures for the entire State/UT.

2. Standardize the codifications, feature codes etc. in case of cadastral maps, RoRs and other land attributes. Standard data codes for land attributes have been prepared by the NIC and placed on the DoLR web site http://dolr.gov.in.

3. Confer legal sanctity to the computerized land record extracts as the official records.

4. Discontinue manual land record writing and issuing of hand-written copies of the RoRs, once the computerized system stabilizes.

5.2.2 Wherever a State Government/UT Administration adopts any procedure detailed in these Guidelines and Technical Manuals, it must ensure that it is duly incorporated in the relevant State/UT laws/rules/regulations/manuals or that the same are duly amended to ensure their legal validity.

5.3 Digitization of Maps and its Integration with Textual Data

5.3.1 There is an urgent need to convert the existing cadastral maps into GIS-encoded digital mode to facilitate updating of cadastral maps in sync with the changes made in the RoRs. RoRs provide information on ownership of land, its classification, uses, irrigation status, etc. Detailed attributes of every piece of land, called “parcel” or “plot”, shall be shown in the digital map accurately in 1:4000 scale. The smallest piece of land that can be measured is 1 decimal (1/100th of an acre) i.e. 435.6 sq. feet. Changes in a cadastral map may take place due to various reasons, e.g. a plot of land may have been further sub-divided into two or more sub-plots and transferred to other persons by way of deed of gift or sale or inheritance, or conversion of classification of land use. The need for indicating these changes in the map arises every time a change as mentioned above takes place so as to depict the ground reality.

5.3.2 Broadly, there are two ways in which spatial data have been organized in the country. In certain States/UTs, village maps with parcel boundaries are used, whereas, in certain other States, ladder data on individual land parcels or tippans or field measurement books (FMBs) or gat maps are used. In most parts of the country, the land parcels depicted in village maps are covered in one or more sheets, depending upon the scale of mapping and area of the village. These village maps/sheets will be considered as the basic input for digitization and mosaicing of the cadastral maps in these States/UTs. In other States/UTs, where ladder data or gat maps/tippans/FMBs are used, the same will be taken for digitization and further mosaicing of the maps.

5.3.3 GIS encoded digitization of cadastral maps and their integration with RoRs involve the following steps:

1. Scanning of the village map or part of the village map and feeding this scanned map into the computer to create a computer image of the map which is known as a **raster map**.

2. The next step involves going over the outline of the village boundary on the computer image of the map with the mouse and marking the outlines of

each plot. This process, known as **vectorisation**, provides the coordinates of each point on the map.

3. A printout of this vectorised map is given to the Revenue Department by the digitizing agency for thorough checking with the original cadastral map. The Revenue Department checks the vectorised map on a glass table with the original map placed below it. This process is known as the **table check**. Every line and point on the two maps have to match. The correctness of the digitized map is certified by the Revenue Department. If any error is detected, the same has to be rectified by the vendor/digitizing agency.

4. The software used in the digitization process creates a number of files. Each of these files pertains to a GIS-based layer and each layer consists of three files. The GIS data are organized in layers. Each layer contains a subset of information that would be present on a regular map, such as (1) geographic information (where something is located), (2) attributes information (what is located at a specific location), and (3) its interlinking information. These three sets of information are represented in three physical files in the computer. For example, the software used in West Bengal uses 9 GIS-based layers and creates 27 files. In addition, 8 to 11 other files, known as database files and image files, are also created, totaling from 35 to 38 files. All the files are placed in a storage device (e.g., a CD) and given to the Revenue Department for checking. If any error is detected, the same has to be rectified.

5. The GIS layers are of three types: point layers, line layers & area layers. Each of the 9 GIS layers mentioned above belongs to one of the three types. Symbols (known as alamats in West Bengal) are used to record the legends that have been made on the map such as wells, temples, etc. These alamats are incorporated in all the three layers, i.e., point, line and area layers.

6. Once the Revenue Department clears the vectorised map and the files, the digitizing agency proceeds to add each of the handwritten information on the original map except the signature at the bottom.

7. While digitizing the land records including scanned copies or vector formats, open series specification of datum and projections parameters would be followed.

5.3.4 Integration of spatial database with textual RoR data involves the following process:

1. Each plot of land is represented on the digital map as a closed polygon. Each polygon is identified by a unique plot number, which, for example, in West Bengal is a 5 digit number. In the textual RoR database, each plot is also referenced by this unique plot number. This provides a basis for integration of digital map data with the textual RoR data.

2. The basic textual RoR database consists of several tables (in West Bengal, 7 main tables & several master tables) which provide information on ownership, land classification, etc. All the tables are linked by certain common data fields, for example, in West Bengal, by two common data fields, which are:

Idn: a seven digit code to identify a Mouza (2 digit for District, 2 digit for Block & 3 digit for the Mouza)

Plot No: a five digit Plot number

3. After integration of the textual and spatial RoR data, the digitized map is shown on the computer, which indicates through colour codes the plots which do not have a corresponding textual detail or plot number, or where the textual and spatial data do not match each other. Such plots require patch survey using Total Station (TS) and Global Positioning System (GPS) and re-entry of the correct data to produce a 100% correct digitized map. Thereafter, computerized and digitized RoRs can be issued to property owners.

5.3.5 Citizen Services

The integration software facilitates citizen services, some of which are:

1) RoR with plot map (parcel map), showing dimensions of each side, area & the adjoining plots.

2) Deriving various maps based on possessions, land use classifications, sizes of plots, sources of irrigation, types of crops etc.

3) Textual RoR updation in sync with spatial data updation.

5.3.6 The technical details are available in the Technical Manual-Chapter-1. Two models of digitization of maps have been described viz. Model-1 based on the West Bengal experience, and Model-2 based on the use of satellite imagery. The States/UTs may adopt either of the models as per their convenience or develop a model suitable to the State/UT, in which case the details may be communicated to the Department of Land Resources.

6. TEHSIL/ SUB-DIVISION/DISTRICT COMPUTER CENTRES

A computer centre at the tehsil/sub-division is necessary for maintaining the village-wise property records and for easier services to the citizens. District-level databases may be maintained for data analysis, planning, verification, etc. at the district level. The tehsil/taluka/sub-divisional Computer Centre will consist of computer systems comprising of appropriate level server and client computers with local area connectivity (LAN), switches, storage area network (SAN) where feasible and necessary UPS, printer (including map printer / Plotter), scanner, touch screen kiosk, biometric/smartcard readers, and CD writers. The server room will be secured and separated from the public area. Proper arrangements shall be made for land records/data storage in compactors as well as computerized and indexed data retrieval system. There should be enough space for seating the public in a proper reception area. District Computer Centre will collate the land records data of all the sub-divisions and tehsils in the respective districts. These district data centres too will be equipped with appropriate level computer systems with sufficient storage provided with LAN connectivity and switches.

7. STATE-LEVEL DATA CENTRES

In order to maintain data repository and backup, each State/UT may need to establish a dedicated data centre for the land records data (including maps and registration data) at the State/UT level. This data centre would have estimated storage capacity scalable from 2 to 20 terabytes, depending upon the volume of records, along with high speed processors, switches, fiber optic channels, software and security devices. Further, these would have appropriate backup media (like CDs and tape devices, etc.) for high volume storage. Storage area network (SAN) may also be set up where feasible and necessary. Action for setting up of the SLDCs may be taken up when sufficient data has been created in the districts for storage at the State/UT level.

8. INTER-CONNECTIVITY AMONG REVENUE AND REGISTRATION OFFICES

All the land record offices, from the State/UT level to the tehsil or equivalent level, as well as the registration offices may be securely connected via local area network (LAN) or wide area network (WAN) in an appropriate configuration based on the functional and technical requirements. In order to achieve functional integration among the tehsils, districts, SROs and State data centres, each location would be provided with network connectivity with 2 mbps link for last mile connectivity from the point of presence (PoP) of the State Wide Area Network (SWAN). From there upwards, the data would ride over the NICNET network. In addition, each site would require one set of switch/ router and modem. Time required for this would vary, depending upon the progress made on the SWAN project of the Department of Information Technology. However, alternative approaches can be taken for connectivity in the interim period, such as broadband/leased line with virtual private network (VPN) infrastructure for secure data transmission. This network may have a centralized architecture connecting the tehsils, sub-registrar offices, sub-divisions, districts and the State/UT Data Centres for enabling online data updation, easy access and sharing of data. The network may be designed by or with input from the NIC and by enforcing the approved security protocols and access control protocols

of the MeITY, GoI. Where the SWAN is available, horizontal connectivity to tehsils or SR offices may be drawn from the nearest available PoP using leased lines or other secure connectivity. At places where the SWAN is yet to be implemented, other options such as broadband with VPN or VSAT connectivity could be established. From the district upwards, the system could ride over the NICNET network.

9. SURVEY/RE-SURVEY AND UPDATION OF SURVEY & SETTLEMENT RECORDS

All committed liabilities and ongoing sanctioned works under survey / re-survey may be implemented out of the unutilized funds available with States/UTs as on 31.03.2017. In no case, any new activity under this head would be carried out from DILRMP funds. Efforts may be undertaken to ensure that unspent balance at the State level/IA level are reduced to the optimum extent possible through "just-in-time" release of funds through PFMS platform.

9.1 India has about 6,40,867 villages (as per 2011 Census). Most of the villages were surveyed and corresponding village (cadastral) maps were prepared at 1:4,000 to 1:10,000 scales during late 19th and early 20th century. However, where original cadastral survey is yet to take place, the States/UTs will need to draft the laws/manuals/guidelines for the purpose, and Government of India would be willing to extend necessary help in this regard.

9.2 The cadastral survey of an area which has already been surveyed earlier is known as Resurvey. This may be required under the following circumstances:

- When the framework of survey in field has completely broken down. In such cases, the boundaries shown in the records do not tally with the actual conditions on the ground. This may happen due to obliteration of field and sub-division of boundaries and/or due to misplacement of a large percentage of the local ground control point markers, as a result of which it is difficult to identify the fields with reference to the records.

- Resurvey is also necessary in the case of sudden development of the area due to causes such as:
    - Sub-divisions
    - Transfer of dry lands into wetlands
    - Large scale transfer of holdings

9.3 Factors influencing the mode of survey/re-survey: In place of the conventional, chain survey, plane table survey and theodolite methods of survey, modernized technology in the form of Total Station (TS) and Global Positioning System (GPS) are now available. The selection of technology for cadastral survey depends upon several factors as shown in Flow Chart No.1 in Chapter-2, Model-I of the Technical Manual. These are enumerated below:

- Terrain conditions (hilly, undulating, plain)
- Vegetative cover (dense, sparse)
- Built-up areas
- Size of survey area
- Accuracy
- Timeliness
- Cost

9.3.1 Terrain conditions: Where the land area is within a gradient of 15%, aerial photography or high-resolution satellite imagery is expected to give adequately accurate output. However, in undulating terrain and hilly slopes, pure ground method using TS+GPS may be used for cadastral survey.

9.3.2 Vegetative cover: Dense vegetation obstructs the line of sight in the vertical direction, thus preventing the aerial and satellite images from capturing the field boundaries. Pure ground based methods using TS+GPS are suitable in these conditions. In open areas, devoid of vegetation, aerial photography or satellite imagery is likely to give adequately accurate output. However, sparse vegetative cover prevents pinpointing the field corners and in these conditions,

aerial photography or satellite imagery should be supplemented by ground truthing.

9.3.3 Built-up areas: In urban areas, high-rise buildings prevent aerial/satellite images from capturing building corners and boundaries. A lot of shadow areas appear in the remote sensing data, depending upon the height of the buildings. In these conditions, pure ground based methods using TS+GPS are preferable for cadastral survey. Where there are lower built-up areas, aerial images or high-resolution satellite images are likely to give better results.

9.3.4 Size of survey area: In a small survey area, ground-based survey will give faster output, but in a larger area, such as a district, aerial photography or high-resolution satellite imagery is likely to suffice.

9.3.5 Accuracy: In cadastral survey, the scale of the map and precision of the instruments greatly influences its accuracy. The accuracy of the survey is the highest with TS followed by, plain table and chain survey, respectively.

9.3.6 Timeliness: Pure ground truthing methods of cadastral survey such as chain, plain table and total station, which require 100% measurement to be made on the ground, are time-consuming. Ortho-products from aerial photos and satellite images supplemented by ground validation greatly reduce the time factor in preparation of cadastral maps.

9.3.7 Cost: The cost is the driving force in adopting a particular technology for cadastral survey. High-resolution satellite images from CARTOSAT series are cost effective, compared to digital aerial images and pure ground methods.

9.4 For reaching the stage of integrated land information management system which ultimately lead to conclusive titling as envisaged in erstwhile scheme of NLRMP, the States/UTs shall undertake survey/re-survey using modern technology of surveying & mapping, i.e., aerial photography or high resolution satellite imagery combined with ground truthing using TS+GPS so as to ensure true ground depiction on cadastral maps and land records,

adopting the methodology most appropriate for the terrain, location, etc. and update the survey & settlement records subject to provisions contained in Policy Circular dated 08th December 2016 mentioned hereinafter in Para 9.9.

9.5 For fresh survey, in areas where cadastral maps are not available, the following options are suggested:

i. Total System (TS) + Differential Global Positioning System (DGPS)
ii. Aerial Photographs + TS + DGPS
iii. High resolution satellite images < 1 m spatial resolution

In open areas, the process will be greatly facilitated by the use of aerial photography, combined with TS+DGPS for ground truthing. In densely vegetated areas, use of TS+DGPS is suitable. In hilly areas, use of terrain-corrected aerial photographs (digitally-rectified ortho-photographs) with TS+DGPS for ground truthing may be appropriate. All efforts should be made to arrange for aerial photography; however, where it is not possible to arrange for aerial photography, TS+DGPS must be adopted for completing the work with the desired level of accuracy.

9.6 For resurvey, aerial photography (wherever possible) and TS+DGPS for ground truthing is recommended.

9.7 Where large open areas and large land holdings are there, e.g., arid and semi-arid areas, and good quality and reasonably up-to-date cadastral maps are available, the vectorized cadastral maps may be geo-referenced using high resolution satellite data and GPS control points. The geo-referenced cadastral maps shall be overlaid on the high resolution satellite imagery (HRSI) to study the discrepancy, both qualitatively and quantitatively. If the discrepancies are high, ground truthing using TS+DGPS is recommended.

9.8 The technical details on different methodologies as mentioned above and setting up of the ground control network are given in Chapter-2 of the Technical Manual.

9.9 A Policy Circular has been issued by the Department on 8th Dec 2016 (**Annexure- GL-IV**) to ordinarily carry out record or survey / re-survey operations from DILRMP funds only in places where record of rights or field book or map are not available or have been destroyed / damaged / outdated etc. and not to have unnecessary Surveys / re-Surveys when land records are available as per the normal.

10. COMPUTERIZATION OF THE REGISTRATION PROCESS

10.1 The manual (non-computerized) registration process involves maintenance of paper copies of all the registered documents. This procedure of maintaining and registering property documents often results in misclassification of documents, misrepresentation of facts, and other such losses. Searching of reports, records and issuance of non-encumbrance certificates also take long time and turn out to be cumbersome tasks.

10.2 Computerization of registration is necessary not only for making property registration efficient and hassle-free but also for initiation of mutation process immediately thereby bringing more transparency in effecting changes in records. Registration, therefore, has been made one of the major components of DILRMP. The Sub-Registrars' Offices (SROs) in the States/UTs carry out registration and recording of various types of documents related to the transfer of immovable property. In order to facilitate computerization of registration system some States/UTs have aligned the Rules made under the Registration Act 1908. Other States/UTs also need to align their Rules to make the process of computerization legally tenable and effective.

10.3 DILRMP provides full support of computerization of all components of registration. All the SROs will be fully computerized with adequate hardware, software, process re-engineering, staff training and connectivity with the revenue records maintenance system, banks, treasuries, etc. Also, the following functions will be computerized:

10.3.1 Determination of Stamp Duty

It can be facilitated by preparing the list of prevalent circle rates, list of properties, list of plots, floor space, nature and year of construction, etc., or by computerizing the guidance values/circle rates for different kinds of land and properties so that the transacting parties can ascertain stamp duty liability online.

10.3.2 Formats

Re-engineer the process, wherever necessary, by fixing the templates/formats of the deeds in 2-3 pages. The first page may contain the parties' details, second page property/land details, and the third page may contain legal issues and conditions, or as the State/UT may decide and place the format(s) on the web.

10.3.3 E-stamping

E-stamping or franking system, etc. for depositing stamp duty should be implemented as soon as possible.

10.3.4 Verification of identity of executors

Computerizing the registration process involves verification of identity of the presenting person(s), taking photographs, fingerprints, other biometric identification, verification of stamp duty, etc.

10.3.5 Legacy data

Entry/scanning of legacy registered data for distribution of copies of registered deeds and non-encumbrance certificates.

10.3.6 Integration

Integration of the registration process with the land records maintenance system so that mutation notices and mutation remarks in the corresponding RoRs are generated automatically after registration.

10.4 The technical details are available in Chapter-3 of the Technical Manual.

10.5 Deeming it to be the need of the time for the country in the arena of registration of documents and deeds, and to aptly address the diversity prevailing across the States on account of languages, processes, formulae and formats, the Department has developed and field tested a National Generic Document Registration System (NGDRS) through NIC / NICSI under the broad aegis of 'computerization of registration' component of the DILRMP to include requirements of all the States. Country-wide uniformity in computerized registration through NGDRS will enable 'anywhere access' to data and information (including consolidated country-wise reports etc.) to both enforcement and regulatory agencies as well as the common man. The Department of Land Resources will facilitate all States and UTs towards adoption of this system. All technical assistance will be provided by the NIC, however, there will be no financial liability on the part of DoLR/NIC. So far five States/UTs viz. Punjab, Andaman & Nicobar Islands, Manipur, Goa and Jharkhand have already adopted NGDRS. Other may also avail the facilities/benefits of NGDRS.

11. MODERN RECORD ROOMS/LAND RECORDS MANAGEMENT CENTRES

Support for upgrading modern record rooms/land records management centres with a) a storage area with compactors/storage devices for physical storage of records and maps, b) an operational area with computers/servers, storage area network (SAN), printers, etc., and c) a public services area for waiting/reception, etc. The land records details may be indexed and stored. A document management system, i.e., scanning of old records, digital storage and retrieval system should be introduced for online storage and retrieval of the records, indexing of data and images, etc. so as to move towards cyber record rooms/maintenance of land records in the dematerialized (demat) format.

12. TRAINING & CAPACITY BUILDING

12.1 States/UTs are required to draw up a comprehensive training programme to develop their human resources for effective maintenance and sustenance of the DILRMP, covering the policy makers, heads of the departments of revenue, survey, registration and their offices and staff, master trainers and field-level functionaries including the surveyors, village accountants and other revenue staff, who will be trained for operating the system including mutation and updating of land records, issue of authenticated copies of RoRs with maps-to-scale, handling modern survey equipment such as GPS, TS and photogrammetry.

12.2 Expert organizations like the Survey of India, NIC and Indian Space Research Organization (ISRO), etc. should be involved in imparting training to master trainers, who in turn, will train the State/UT staff on TS/GPS, survey methodologies, scanning, digitization, GIS and ICT activities. For better outreach, e-learning and video-conferencing facilities may be used. The capacity building programme should include awareness/appraisal workshops, long-term training programmes for field-level officers with hands-on training, and short-term training modules for senior-level officers.

12.3 The capacity building programme should cover not only technical contents, but also quality procedures, technological advancements, outsourcing procedures, project management, etc. The States/UTs may tie up with leading training institutions for this purpose. A core group of officers and staff from the States/UTs may be sent on exposure visits to other States/UTs which have demonstrated considerable success in implementing the project. Discussion forums and help lines may be established to guide the field staff in solving technical problems.

13. CHOICE OF SOFTWARE AND STANDARDS

13.1 Based on the process and functionality requirements, user-friendly application software for capturing, editing and updating land records textual data, integration of textual data and maps, registration system workflow,

integration of registration with mutation, and proper authentication mechanism using digital signature/public key infrastructure (PKI), etc. may be required by the States/UTs.

13.2 In order to have uniformity, standardization and integration, the software development and software maintenance support may be provided by the NIC, which may set up core development teams consisting of IT and GIS experts at the Central level, supported by State/UT-level teams for software customization, technical coordination and State/UT-wide support. While it will be open for the users to select the operating system for their client machines—Windows-based or Linux-based, but in so far as the server machines are concerned, open-source platforms that implement mandatory access control policies are preferred. A write-up on the choice of software and standards, prepared by the NIC, is given **in Chapter-4 of the Technical Manual**.

14. DATA SECURITY

14.1 Assuring security and effective performance

The Integrated Land Information Management System (ILIMS) gives rise to new concerns and new functions that need to be properly understood and addressed. These concerns relate to security of information system assets and data integrity. One important information system function, therefore, is asset safeguarding and data integrity. At the international level, two sets of standards have been codified by the International Organization for Standardization (ISO): one is the ISO/IEC 27001, also called the information security management system (ISMS) standard of 2005; the other is ISO/IEC 27002:2005, a codification of practices for information security management. The ISO/IEC 27001 (earlier called ISO/IEC BS-17799) lists the standards required from any management in implementing information system security function. This lays down standards for the management to perform four core functions: planning--determining the goals of information systems function and the means of achieving this goal; organizing--gathering, allocating and coordinating the

resources needed to accomplish the goals; leading--motivating, guiding and communicating with personnel; and controlling--comparing actual performance with planned performance as a basis for taking any corrective action that may be needed. This also deals with management processes: plan-do-check-act (PDCA) model. The ISO 27002 lists the security controls (such as password controls). The two standards, together, imply that unless the management itself is serious about security and goes about doing it in a systematized way (ISO/IEC 27001), no amount of technical controls (ISO/IEC 27002) would suffice. Extracts from the report of the Committee of Revenue Secretaries on CLR, covering the Information Security Requirements and Authentication Mechanism are at **Technical Manual Chapter-5 (Section-A).**

14.2 User and Data Authentication

14.2.1 User authentication is the process of identifying a user. The information system must satisfy itself that the user is the one who he/she claims to be. There are a number of ways a user can be authenticated. Password authentication is sufficient for the purpose of extracting user-related information. However, for users who are to have more privileges on the database than that of merely reading it, then stronger forms of authentication are recommended. For such users, a two-factor authentication scheme is recommended; for example, authenticating a user both with a password and the biometric technology.

14.2.2 Besides authenticating the user, every land record data that is entered into the database needs to be approved/authenticated by the officer who is competent for the purpose as per the local revenue manual. The land information system should provide a user interface for performing this task. Once a data item has been approved/authenticated, the application system does not allow any further changes to it. That is, there is no user interface provided to make any change directly to an approved record. If any change does occur, a new record is entered, verified and authenticated. Thus, the

information system also records a history of the changes occurring to any piece of data.

14.2.3 In a database environment, the database administrator (DBA) may have all privileges on the database, i.e., he/she can insert any record, change any record or delete any record, irrespective of the fact that he/she is not the approving authority as per the local revenue manual. Such overriding privileges with a single person must be used with propriety; otherwise, these can be abused. On the one hand, centralizing certain functions to be performed in the database environment improves communication, coordination and control. On the other hand, vesting substantial powers in the DBA role runs contrary to the fundamental principles of sound internal control. This problem is not unique to Integrated Land Information Management System, but is common to all e-Governance initiatives that use databases. Therefore, the States/UTs must take remedial measures for reducing the risks associated with the DBA role. Certain suggestions in this regard are outlined in **Technical Manual Chapter-5 (Section-B).**

States may put in place a system to prevent misuse of the privileges of the data base administrator (DBA), system of electronic approvals by the legally prescribed competent authorities.

15. PURCHASE PROCEDURES

The States/UTs shall follow their Governments' rules and procedures in purchase of services, hardware, equipment, etc. with comprehensive warranty.

16. PUBLIC-PRIVATE PARTNERSHIPS (PPP)

16.1 The DILRMP has generated an enormous workload on the existing Revenue and Registration machinery. It also requires a high level of technological inputs at almost every stage. Capacity building of the in-situ staff is essential but is likely to take time. In order to streamline the implementation of the Programme and to achieve the targets within the proposed timeframe,

the States/UTs may like to go for the PPP models in respect of certain activities under the Programme or outsource them on a turnkey basis.

16.2 All outsourcing/PPP arrangements under the DILRMP shall be subject to the following conditions:

(a) No outsourcing or PPP should normally be allowed in the sensitive districts/areas, as identified by the appropriate Government.

(b) All legal duties/actions required under the State/UT laws shall continue to be performed by the designated officials.

(c) The State/UT must work out a modus operandi and affix responsibilities of Departmental officials to conduct and verify 100% quality check of the work done by the outsourced/PPP vendor(s). Outsourcing/PPP is merely a convenience and will in no way absolve the State/UT from its legal obligations.

(d) Full control and responsibility for the execution and monitoring of the outsourced/PPP works, as well as of utilization of funds released by the DoLR, shall rest with the concerned State/UT, which will be responsible for rendering the accounts thereof, to the DoLR.

(e) No extra funding beyond the approved cost norms shall be provided by the DoLR.

(f) Proper tendering processes must be followed for outsourcing/PPP.

(g) The technical output of the outsourced/PPP works must be compatible with the IT system architecture/parameters being followed in the State/UT in areas relevant to the DILRMP.

16.3 Where the State/UT opts for a private agency for implementing any work under the DILRMP, it may be beneficial to the State/UT to involve the NIC in an advisory role in the following areas:

(a) Support and advice the State/UT on relevant technical matters.

(b) Help the State/UT in formulating the terms of references (ToRs) for outsourcing/PPP and in establishing the relevant milestones and time frames.

(c) Vet the relevant deliverables including the architecture, standards, technical specifications, business process re-engineering (BPR), functional requirement specifications (FRS), software/system requirement specifications (SRS), etc. from the vendor(s) and give specific recommendations on these to the State/UT.

(d) Support the State/UT in the evaluation of the technical and financial bids.

(e) Assist the State/UT in reviewing the progress and quality of the work carried out by the vendor(s).

(f) Bring to the notice of the State/UT any deviations from the standards for software development on the part of the vendor(s) responsible for the development and integration of application software.

(g) Assist the State/UT in exercising strategic control over critical components including data, database, applications, network and security components for maintaining sovereignty and accountability of the State/UT, and to help the State/UT formulating a strategic control policy for the purpose.

(h) Interface with the certifying agencies for third-party certifications for the IT infrastructure and software developed and deployed by the vendor(s).

16.4 These must be ensured at the time of signing the MoU with the outsourced agency, and the State/UT may consider entering into a tripartite MoU with the vendor and the NIC in this regard. However, the overall decision-making responsibility, supervision, monitoring and control in respect of these matters shall rest with the State/UT.

16.5 Given below are some of the activities that can be considered for outsourcing/PPP:

1. Preparation of the DILRMP Perspective Plan/Detailed Project Report (DPR) for the State/UT and district, respectively.

2. Survey/resurvey work using modern survey technology (only for ongoing activities as per EFC).

3. Ground-truthing through TS/GPS.

4. Data entry/re-entry of textual records.

5. Preparation of records of undisputed mutations for the approval of designated authority as per the relevant laws.

6. Data entry of approved mutation records, subject to mandatory authentication by designated Departmental officials as per the State/UT laws.

7. GIS-ready digitization of cadastral maps and integration of digitized textual and spatial records.

8. Computerization of the Sub-Registrar's office.

9. Data entry of legacy data regarding property.

10. Data entry of property valuation details.

11. Scanning and preservation of old records.

12. Setting up of, preferably self-sustaining, information kiosks.

13. Training and capacity building.

14. Development of Integrated Land Information Management System (ILIMS)

15. Information, Education and Communication (IEC) activities.

16. Evaluation.

17. ROLE OF THE PANCHAYATI RAJ INSTITUTIONS & NGOs

Gram Panchayats (GPs) can play a significant role in updation of land records and identification of property owners in the course of the settlement operations.

The Gram Sabha could be involved to facilitate survey/re-survey, wherever necessary. The States/UTs can think of giving the power of doing undisputed mutations to the gram panchayats subject to making necessary provisions in revenue laws. Where GPs are involved in carrying out undisputed mutations, inter-connectivity with tehsils may be worked out by the States/UTs with their own funds or by dovetailing funds from other sources. The District Administration may take help from the Panchayati Raj Institutions and reputed NGOs in building up awareness about the Programme. The District Monitoring and Review Committee, of which the CEO/EO of Zila Parishad is also a member, may give due weightage to the recommendations of the PRIs in the implementation of the Programme.

18. TECHNICAL SUPPORT TO THE STATES / UTs AND IMPLEMENTING AGENCIES

The necessary technical guidance and hand-holding support to the States/UTs and the implementing agencies shall be arranged through the Core Technical Advisory Group (CTAG) created for the DILRMP in the DoLR with members from the national-level technical agencies such as the NIC, Survey of India, NRSC, ISRO, C-DAC, Forest Survey of India, Soil & Land Use Survey of India, and experts in the field. A copy of the order issued in this regard is given at **Technical Manual Chapter-6 (Section-A)** The States/UTs may also approach the regional offices of these technical agencies, wherever necessary. The addresses of these technical agencies along with their regional offices are given at **Technical Manual Chapter-6 (Section-B)**. Specifically, technical support of the following nature may be obtained after following due procedure from these agencies:

(A). Survey of India: Training to the survey staff/master trainers, guidance in application of modern survey technology.

(B). NRSC/ISRO: Guidance in aerial photography and use of high resolution satellite imagery for survey/re-survey purposes.

(C). C-DAC: Guidance in Indian language computing.

(D). Forest Survey of India: Guidance in mosaicking of the cadastral maps with forest boundaries and overlaying of forest boundaries.

(E). Soil & Land Use Survey of India: Guidance in data coding of the relevant data.

(F). NIC: Software development and customization, training of staff/master trainers, ICT support to the State/UT staff in computer applications, data coding and digitization of map systems and standards, interfaces for integration of textual and spatial data, data centre specifications at various levels, inter-connectivity amongst revenue and registration offices, computerization of registration, technical guidance in setting up of land record management centres and strengthening of survey and revenue training institutes, data security/backup and disaster recovery, authentication mechanism, wherever necessary.

19. MONITORING AND REVIEW MECHANISM

The following monitoring and review mechanism at different levels is to be adopted under the Programme.

19.1 District-level Monitoring and Review Committee: All the districts need to have a District-level Monitoring and Review Committee under the Chairpersonship of the District Collector/Deputy Commissioner/ and District Magistrate, along with ADMs/SDMs dealing with land revenue matters, CEO/Executive Officer of the Zila Parishad, Sub-district Registrar, Survey & Settlement/Consolidation Officer having jurisdiction over the district, representative of State Forest Department and District Informatics Officer of the NIC as members. Representatives from other technical agencies such as the SoI, NRSC/ISRO, C-DAC, FSI, and SLUSI may be involved as per the need as special invitees. The Committee will review the progress of implementation of the Programme at least once in a quarter, and the District Collector/Deputy Commissioner shall submit report to the State-level Monitoring and Review

Committee. Online monitoring reports shall be submitted by the District Collector/Deputy Commissioner to the State Govt. as well as to the DoLR as per the MIS reporting formats and periodicity prescribed.

19.2 State/UT- level Monitoring and Review Committee:

A State/UT-level Monitoring and Review Committee shall be constituted in each State/UT for the DILRMP under the chairpersonship of the Chief Secretary/Chairman, Board of Revenue. It is recommended that a representative from the Board of Revenue, Principal Secretary/Secretary of the Departments of Revenue, Registration, Finance, Planning and IT, the Divisional Commissioners, Inspector General of Registration, Commissioner/Director of Survey & Settlement and of Land Records, State Forest Department, State Informatics Officer of the NIC and any other expert as decided by the State Government/UT Administration should be its members. The Committee shall monitor and review the progress of implementation of the Programme, facilitate the necessary process re-engineering, and guide the implementation authorities. The Committee shall submit quarterly progress reports in the prescribed format to Department of Land Resources. The States/UTs shall develop a system of checks by the State/UT level officers through field visits.

19.3 Monitoring and Review at the National Level:

At the national level, for sanctioning of projects and monitoring and reviewing of the programme, a Project Sanctioning and Monitoring Committee (PS&MC) has been set up under the Chairpersonship of the Secretary, Department of Land resources. The Committee will monitor and review progress of the DILRMP work in the country. Area Officers / Officers from the Department of Land Resources would also be visiting the States/UTs to review the implementation of the Programme.

20. EVALUATION OF THE PROGRAMME

20.1 To get the impact assessment and feedback about the actual implementation of the Programme at field level, the DoLR will get the concurrent and terminal evaluation of the Programme carried out through reputed organizations such as the Lal Bahadur Shastri National Academy of Administration (LBSNAA), the National Institute of Rural Development (NIRD), State Administrative Training Institutes (ATIs), etc. The States/UTs are also advised to carry out concurrent evaluation and impact assessment through in-house teams/experts to assess the on-site progress vis-à-vis deliverables of the sanctioned projects and suggest the measures for improving the system. These concurrent evaluation results must be intimated to the DoLR for obtaining the second instalment of Central funding.

20.2 Since land record procedures and systems are different in different States, a baseline survey on the current status of the States and their requirements under the sanctioned components of the programme along with evaluation of the work already undertaken so far is required to be completed within the financial year 2018-19. Due to rapid change in space technology and sophistication in the measurement process, DoLR will firm up technology related guidelines with sufficient flexibility for the State Government to execute the programme as per their contextual need.

20.3 DoLR will take appropriate action for conducting third party independent evaluation of the scheme and rationalization / restructuring of the scheme accordingly for achieving the desired results and also to take appropriate action to reduce unspent balances.

While undertaking the third party independent evaluation of the progress of the scheme so far, the baseline survey may also be conducted to ascertain the current status of the States/UTs on each component of DILRMP and the further need and requirements. The expenses on this count may be borne from the head “Evaluation Studies”, IEC and Training.

States /UTs are free to add any additional components in terms of their contextual needs on the basis of such data being available (or already available) from their own resources and converge the same with DILRMP.

21. FUNDING

21.1 Allocation of Funds and Fund Flow Mechanism

The DILRMP is a demand-driven scheme. Funds will be allocated / released to the State Governments/UT Administrations or their designated implementing agencies for carrying out the activities under the DILRMP. Funds for various components of the DILRMP will be provided at different scales by the Central Government. The assistance of Central Government will be restricted to the cost approved by the EFC as given in **Annexure-GL-III**. The following was the funding pattern and sharing of costs between the Centre and the States under the erstwhile NLRMP upto 31.03.2016:

a) Computerization of land records (100% Central funding – maximum upto the approved unit cost norm)

- Data entry/re-entry/data conversion/mutation data entry
- Digitization of cadastral maps and integration of textual and spatial data
- Tehsil, sub-division, and district data centres
- State-level data centres
- Inter-connectivity amongst revenue offices

b) Survey/resurvey and updating of survey & settlement records (including ground control network and ground truthing) (Central funding - maximum upto 50% of the approved unit cost norm for the States and 100% for the UTs)

c) Computerization of registration (Central funding - maximum upto 25% of the approved unit cost norm for the States and 100% for the UTs)

- Data entry of valuation details

- Data entry of legacy encumbrance data
- Scanning & preservation of old documents
- Connectivity to SROs with revenue offices

d) Modern record rooms/land records management centres at tehsil/taluk/block level (Central funding - maximum upto 50% of the approved unit cost norm for the States and 100% for the UTs)

e) Training & capacity building (100% Central funding to the extent approved by the Project Sanctioning & Monitoring Committee)

- Training, workshops, etc.
- Strengthening of Revenue training institutes

The DILRMP has become Central Sector Scheme with 100% funding from Centre with effect from 01.04.2016.
State Government are required to release their corresponding share, if any, to the funds released by the Central Government upto 31.03.2016.

21.2 Proposals / Annual Action Plan including detailed project reports would be submitted by the States and UTs. Proposals would be scrutinized and approved by the National-level Project Sanctioning and Monitoring Committee. Proposals received from States/UTs will be discussed by the Committee. States/UTs wishing to make presentations or have discussions on their proposals may intimate the DoLR in advance.

21.3 The total outlay of the scheme "Digital India Land Record Management Programme" (DILRMP) is Rs. 950 crore for the three year period 2017-18 to 2019-20 with the following components:

Sl. No.	**Name of Component**	**Outlays (in Rs. Crore)**
1.	State Level Data Centre	45.10
2.	Modern Record Room	216.44

3.	Data Entry/Re-entry/Data Conversion	20.11
4.	Digitalization of Cadastral Maps	276.92
5.	Computerization of Registration	353.69
6.	"Evaluation Studies", IEC and Training	37.74
	Total	**950.00**

DoLR can change the inter se allocation among these broad heads within the range of (+) (-) 30 % of individual allocations within the overall allocation of Rs.950 crore as per actual need and utilization of funds.

The year wise allocation as per actual budgetary allocation in RE 2017-18, BE 2018-19 and estimated 2019-20 will be as under:

2017-18 (RE)	2018-19 (BE)	2019-20 (Estimated)
Rs.100 crore	Rs.250 crore	Rs.600 crore

Depending on the utilization of funds, DoLR can seek additionality of requirement for 2018-19 at the supplementary stage. In view thereof, the year wise allocations may undergo a change according to actual utilization of the funds.

With regard to Core GIS, Programme Management and rehabilitation / resettlement, the committed liabilities of ongoing sanctioned works will be met out from the overall sanctioned outlay of Rs.950 crore as flexibility of inter se allocation among various components has been provided. The expenditure will be borne from the concerned components including "Computerization of registration", Digitalization of Cadastral Maps", and other relevant head(s) as deemed appropriate by DoLR.

21.4 Once a proposal / project is sanctioned / recommend by Project Sanctioning and Monitoring Committee (PS&MC), conveying of the sanction

and release of funds to States/UTs/Agencies (all instalments) and also inter-component transfer of funds will be done with the approval of Divisional Head in consultation with Integrated Finance Division (IFD).

21.5 The funds will be released through PFMS on reimbursement basis for which States require necessary and reasonable period to prepare for changes in the system / mechanism of release of funds and to ensure mobilization of advance resources. To ensure smooth implementation of the scheme the following mechanism is approved:

"A mobilization advance of up to 30% be released as the first installment and the subsequent installments (out of remaining amount) be released on reimbursement basis on the basis of entry of bills/vouches furnished by the vendor on completion of different milestones of work which are entered in the EAT module of PFMS." This may be done in consultation with the O/o CGA / PFMS expeditiously.

All the instructions / circulars etc. issued by the Ministry of Finance on the subject should also be adhered to by the concerned.

21.6 Since Aadhaar integration is vital to check benami /fraudulent transactions of land and also essential to promote Direct Benefit Transfer (DBT) to the beneficiaries, States are advised to make necessary modifications in their Land Records software so as to enable consent based Aadhar integration and also to expeditiously send proposal with realistic estimates. The above assessment may be done by the States / UTs along with baseline survey as mentioned in para 20.

21.7 Operational and Maintenance (O&M) Costs

States/UTs may make provision for O&M costs and also fix suitable user charges on deliverables for sustainability of the Programme and meeting the expenses of hardware maintenance and obsolescence, etc. The State/UT may

consider putting in place appropriate institutional mechanisms for the purpose, wherever necessary.

22. PUBLICITY

States/UTs may arrange for wide publicity about the advantages of the Programme at the revenue village, gram panchayat, tehsil, district and State levels, involving elected representatives in different media and fora. States/UTs may highlight the success stories of the Programme through newspapers, radio, television, cinema slides, posters, video films, road shows, publications, literature, etc.

23. MISCELLANEOUS

23.1 In case any clarification is required on any point, the DoLR may be contacted. Final decision will be taken by DoLR in consultation with the concerned States.

23.2 The DoLR may revise/update the guidelines and its annexures, technical manuals and the MIS formats, from time to time in consultation with concerned Ministries/Departments of Government of India and State Governments.

Annexure-GL-I

Primary & Secondary Ladders proposed under the DILRMP

- Primary ladder – for reaching the stage of Integrated Land Information Management System

Primary Ladder: approach 1

• Registration -computerization of SROs • Integration of registration and land records maintenance systems • Automated mutation process following registration • Mutation – updating of pending cases and their computerization • Integration of textual and spatial data • Survey, including ground control networks and ground truthing (ongoing)	• Training and strengthening of training institutions • Strengthening of technical organizations • Record rooms at Registration/ tehsil levels • Link up with development process • Legal changes for maintenance of records • Integrated Land Information Management System

Primary Ladder approach 2

• Survey, including ground control networks and ground truthing (ongoing) • Mutation – updating of pending cases and their computerization • Integration of textual and spatial data • Registration -computerization of SROs • Integration of registration and land records maintenance systems • Automated mutation process following registration	• Training and strengthening of training institutions • Strengthening of technical organizations • Record rooms at Registration/ tehsil levels • Link up with development process • Legal changes for maintenance of records • Integrated Land Information Management System

- Secondary ladder – for archival purposes and strengthening of revenue administration

    - Computerization of old records
    - Scanning of old survey maps
    - Computerization of legacy mutation data
    - Establishing Record Rooms

Annexure-GL-II

Digital India Land Records Modernization Programme

Memorandum of Understanding (MoU) Between the Department of Land Resources, Government of India and the State Government/ UT Administration / Implementing Agency

1. Preamble

1.1 *WHEREAS* the Digital India Land Records Modernization Programme, hereinafter referred to as DILRMP, has been launched by merging two existing Centrally-sponsored schemes of Computerization of Land Records (CLR) and Strengthening of Revenue Administration and Updating of Land Records (SRA&ULR) for nation-wide implementation.

1.2 *AND WHEREAS* the main components of the DILRMP are computerization of land records, digitization of existing cadastral maps, integration of textural and spatial data of RoRs, undertaking survey/resurvey to depict true ground positions and boundaries, automation of the registration process, integration of registration process with mutation for updation of records, and strengthening the capacities of revenue and registration staff to handle new instruments/equipments and technologies

1.3 *AND WHEREAS* the Department of Land Resources, Ministry of Rural Development, Government of India, and the concerned Department in the State Government/UT Administration/ State Implementing Agency shall be parties to this Memorandum of Understanding.

1.4 *NOW THEREFORE* the signatories to this Memorandum of Understanding (hereinafter referred to as MoU) have agreed as set out here in below.

2. Duration of the MoU

This MoU will be operative with effect from the date of its signing by the parties concerned and will remain in force till the end of financial year 2019-20 i.e. the

period up to which the Government has approved to implement the scheme. Thereafter, it can be extended with mutual consent subject to further continuance of the scheme.

3 Government of India Commitments

The DoLR will:

3.1 frame guidelines for the implementation of the programme, detailing the components, indicative methodology/technology and funding pattern under the scheme.

3.2 provide financial assistance as per the approved norms, out of the budget available under the DILRMP scheme.

3.3 coordinate the production of technical guidelines, at the national level, among the technical agencies such as NIC, Survey of India, NRSA and ISRO and others.

3.4 assist the State Governments/UT Administrations in capacity building to ensure that the DILRMP is properly implemented.

3.5 develop and disseminate uniform data codes, training modules and other materials necessary for effective implementation of the program.

3.6 host online monitoring system for real time monitoring of the scheme.

4. State Government/UT Administration Commitments:

The State Government/UT Administration of …… will:

1.1 identify a nodal Department for purposes of receipt of Central and State funding for the DILRMP and for implementing the same. This Department shall, in turn, put in place a Programme Management Unit (PMU) in the charge of an officer not below the rank of Secretary, to oversee the DILRMP in its entirety. The nodal Department shall submit monthly progress reports to the DoLR as delineated in **Part-C-MIS**.

1.2 set up a State-level Monitoring and Review Committee for the DILRMP to monitor and review the progress of the implementation of the programme, facilitate coordination and the necessary process re-engineering and to give guidance, wherever required.

1.3 Provide corresponding State share, if any, to the funds released by the Central Government upto 31.03.2016.

1.4 take the district as the unit of implementation of the DILRMP.

1.5 prioritize the activities under the DILRMP in the chosen district(s) in the systematic, ladder-like manner, as indicated in the Annexure-GL-I of the guidelines.

1.6 set up a District-level Monitoring and Review Committee in each district covered under the DILRMP, under the Chairpersonship of the District Collector/Deputy Commissioner to review the progress of implementation of the programme on a regular basis.

1.7 ensure submission of online monitoring reports from the District Collector/Deputy Commissioner of each district covered under the DILRMP, to the nodal department of the State Government/UT Administration, which in turn will submit the necessary monthly progress reports as indicated in para 4.1 above.

1.8 carry out concurrent evaluation and impact assessment in each district covered under the DILRMP and intimate the results to the DoLR.

1.9 bring the district(s) where the DILRMP activities have been completed under the law for conclusive titling.

1.10 make a Perspective Plan indicating the time-frame within which the State/UT Administration will cover all its districts under the DILRMP, preferably by 2019-20.

1.11 undertake all process re-engineering involved in implementing the DILRMP, including legal changes, wherever required.

1.12 undertake all necessary action for capacity building of the staff to ensure that the DILRMP is implemented properly.

1.13 make positive efforts towards deployment of the Revenue, Survey and Registration staff for their designated tasks under the DILRMP and divesting them of non-departmental duties.

1.14 provide “single window” service to citizens for distribution of RoRs and for registration.

1.15 set up a Core Technical Advisory Group for providing technical guidance in implementing the DILRMP.

1.16 place the updated property records on the official website(s) in such a manner that property owner(s)/enjoyer(s) have access to their property records.

1.17 make a time-bound programme for abolition of stamp paper and introduce payment of stamp duty and registration fees through banks/treasuries.

1.18 ensure adherence to the DILRMP guidelines issued by the Central Govt. or any other advisories issued from time to time.

5. Redressal Mechanism

5.1 Any irregularity brought to the notice of the State Government/UT Administration shall be enquired into promptly and corrective action taken thereupon. Non-compliance of the commitments and obligations set hereunder and/or lack of satisfactory progress may require the Department of Land Resources to review the financial assistance provided under the DILRMP, leading to suspension, reduction, cancellation and/or recovery thereof.

5.2 In the case of any dispute between the State Government/UT Administration and the DoLR on any matter covered under this MoU, the matter shall preferably be resolved mutually. In other cases, the decision of the DoLR on such matters shall be final.

6. This MoU shall be signed by the officers duly authorized by the State Government/UT Administration and by the DoLR.

Signed this ……day of……. ……. of ……....

(Date) (Month) (Year)

For and on behalf of the State Government/UT Administration of ……	For and on behalf of the Government of India, Ministry of Rural Development, Department of Land Resources
(Designation)	(Designation)

ANNEXURE-GL-III

Components and Activities under the DILRMP and their Estimated Costs

The following is an outline of the components and the estimated costs of the activities to be taken under the DILRMP:

I. Computerization of land records

(a) Data entry/re-entry/data conversion

For the DILRMP scheme, support would be provided for tehsil or equivalent level as the primary data entry point for RoR and other land attributes data, although variations may be allowed on proper justification. Monitoring and data repository, backup/disaster recovery arrangements will be at the State/UT head quarter level.

Based on the current status of the data entry work in the States / UTs and considering the need-based requirement of data re-entry or data conversion, State / UTs need support for entry of data and re-entry of earlier entered data or data conversion as per the uniform national land data codes developed by the NIC, plus for entry of additional data of land attributes (over and above the RoR data) @ ₹ 10 lakh per district for data entry and ₹ 5 lakh per district for data re-entry or data conversion. The committed liability for the ongoing works already sanctioned in 457 Districts is Rs. 8.91 crore. Additionally Rs 11.20 crore is needed to complete the task in the remaining 681 (-) 457 = 224 Districts (where no activity has been sanctioned till now). The total requirement of funds is 8.91+11.20 = Rs. 20.11 crore.

An amount of Rs. 20.11 Crore has been earmarked for this component for the period from 2017-18 to 2019-20.

(b) Digitization of Cadastral maps

Digitization of cadastral map is a requirement *per se* as well as a prerequisite for integration of textual data (RoRs) and spatial data (cadastral

maps). This activity, once completed and integrated, will help in the auto updation of land records. Till now sanctions have been accorded (partially or fully) in 27 States / UTs. So far 24 States / UTs have started the digitization of Cadastral Maps / FMBs. Total no. of cadastral maps in the country is 15,47,097 out of which 4,50,089 no. are digitized. Balance cadastral maps to be digitized are 10,97,008 no. Total no. of FMBs in the country are 4,20,00,000 out of which 1,52,23,010 no. have been digitized. Balance 2,67,76,990 no. FMBs have to be digitized. Fund requirement is as follows: -

(a)	Amount sanctioned to 18 States for digitization of cadastral maps	₹ 45.23 crore
(b)	Amount released to 18 States for digitization of cadastral maps	₹ 29.49 crore
(c)	Amount to be released (a-b)	₹ 15.74 crore
(d)	Amount sanctioned to 9 States for digitization of FMBs	₹ 16.98 crore
(e)	Amount released to 9 States for digitization of FMBs	₹ 8.72 crore
(f)	Amount to be released (d-e)	₹ 8.26 crore
(g)	For digitization of 10,97,008 numbers of cadastral maps (@ ₹ 1500 per map sheets)	₹ 164.55 crore
(h)	For digitization of 2,67,76,990 number of FMBs (@ ₹ 33/- per FMBs)	₹ 88.37 crore
	Total funds required (c+f+g+h)	**₹ 276.92 crore**

An amount of Rs. 276.92 Crore has been earmarked for this component for the period from 2017-18 to 2019-20.

Integration of spatial and textual data

Integration of textual data with spatial data for each plot will require specialized utility software and interface software which will help in matching and tuning textual record of each plot with corresponding plot map. This will be one time effort required to be performed at the time initialization. The necessary software may be developed by the NIC and made available to the States/UTs. This will help in establishing information security management system.

(c) Tehsil, sub-division and district Computer Centres

For hardware and software for land data management system at sub-divisions and districts, where needed, and for technology upgradation at some tehsil or equivalent locations. District-level database may be maintained at the district level, and the computer facilities on the sub-division level may also be used for data analysis, planning, verification, etc.

(d) State Level Data Centres (SLDC)

In order to maintain data repository and backup, each State/UT may need to establish a dedicated data centre for land records data (including maps and registration data) at the State/UT level

There are 29 States and 7 UTs (total 36). Data Centre in 15 States/UTs have been sanctioned (i) @ Rs.1.00 crore for small States / UTs and (ii) @ Rs.2.00 crore for big States at an amount of Rs.27 crore. Till now funds for an amount of Rs.18.90 crore have been released to these 15 States / UTs (to set up State level data centres) and an amount of Rs.8.10 crore is yet to be released. An amount of Rs. 37.00 crore is required for the remaining 36 (-) 15 = 21 States / UTs. The total funds required for this component are 8.10+37.00 = Rs.45.10 crore.

An amount of Rs. 45.10 Crore has been earmarked for this component for the period from 2017-18 to 2019-20.

(e) Inter-connectivity among revenue Offices

(i) Authentication mechanism

Authenticated land records data may be put on the Web from a central location in each State or UT under the control of a duly designated official of the State or UT govt. The aim is to view and/or generate authenticated reports (such as RoRs with maps-to-scale, other details) on demand in a secure manner via any computer connected to the Web. The authentication mechanism would be decided in consultation with the NIC, financial institutions, Law Ministry, etc.

(ii) Web-enabling with access control

Data, duly authenticated at the *tehsil* or higher level in the revenue set up of the State/UT Govt., would be transferred over secure network to the State-level Data Centre (SLDC). The NIC may develop the security protocols, access control protocols and web portals, etc. for this purpose. The ISP servers (web servers, DNS servers, firewall, etc.) and other hardware and software may be arranged through the existing facility of the NIC for web hosting in each State/UT, without any extra cost.

(iii) Secure connectivity via LAN or WAN

All the land record offices, from the State level to the *tehsil* or equivalent level, as well as the registration offices may be securely connected via local area network (LAN) or wide area network (WAN) in an appropriate configuration based on the functional and technical requirements.

II. Survey/resurvey and updating of survey & settlement records (including ground control network and ground truthing)

A Policy Circular was issued by the Department on 8th Dec 2016 to ordinarily carry out record or survey / re-survey operations from DILRMP funds only in places where record of rights or field book or map are not available or have been destroyed / damaged / outdated etc. and not to have unnecessary

Surveys / re-Surveys when land records are available as per the normal. [It may be noted that exact one-to-one co-relation between the area recorded in the record of rights and in the map is not readily feasible, nor albeit absolutely necessary, and, if the area differs, the area recorded in the record of rights prevails (map-correction is duly undertaken if area materially differs).]

Funds have been sanctioned for 323 districts for Survey / re-Survey out of which work has commenced in 111 districts. 323 (-) 111 = 212 districts are being revisited to see whether there is need for survey / re-survey as per the policy circular of 8th Dec 2016. It is envisaged that about 75 districts (out of 212) would qualify for Survey / re-Survey as per the policy. In addition, of the remaining 681 (-) 323 = 358 districts about 50 districts would qualify for Survey / re-Survey as per the policy. In these 75 + 50 = 125 districts the Survey / re-Survey would be possible at the proposed enhanced rates of [a]: High-Resolution Satellite Imagery (HRSI) and Ground Truthing by TS and DGPS ₹ 25550/sq_km, [b]: Hybrid methodology using aerial photography and Ground Truthing by TS and DGPS ₹ 27600/sq km and [c]: Pure ground method using TS and DGPS Manual ETS / DGPS ₹ 34050/sq km for the three methods. These rates have been recommended on 11-08-2016 by the Core Technical Advisory Group (CTAG) chaired by Secretary DoLR with inter alia DG NIC, DG C-DAC, SGI, RGI and Director, Soil and Land Use Survey of India M/ A&FW as members.

All committed liabilities and ongoing sanctioned works under survey / re-survey may be implemented out of the unutilized funds. In no case, any new activity under this head would be carried out from DILRMP funds. Efforts may be undertaken to ensure that unspent balance at the State level/IA level are reduced to the optimum extent possible through “just-in-time” release of funds through PFMS platform.

III. Computerization of registration

Registration process computerization is a major component of the DILRMP scheme. Computerization of the registration process is necessary not only for making the property registration system efficient and hassle-free but also creating automated mutation process for updating RoRs.

An amount of Rs. 326.31 crore has been sanctioned for 3839 sub registrar offices. So far an amount of Rs.34.96 crore has been released as central share and contribution of matching share from States/UTs (75%) is Rs.88.38 crore (upto 31.03.2016). The committed liability to complete this activity in these 3839 sub registrar offices is 326.31(-) 34.96 (-) 88.38 = Rs.202.97 crore.

Funds required for the remaining 1256 sub registrar offices [5095 (total SRO)-3839 (so far sanctioned)] are Rs.150.72 crore. Total funds required to complete computerization of registration are Rs.202.97 + Rs.150.72 = Rs.353.69 crore.

An amount of Rs. 353.69 Crore has been earmarked for this component for the period from 2017-18 to 2019-20.

(a) Computerization of SROs

The majority of States and some UTs have initiated computerization of the registration process on their own. They have used their own funds, many have adopted a PPP model, and most have instituted user charges for cost recovery to a certain extent.

Support for computerization of SROs may be provided on a demand-driven basis to those states and UTs where this process has not started or the process has started but is lagging because of want of funds.

For the SROs that have already been computerized, there may be demand from some States for technology upgrade or ancillary items.

(b) Data entry of valuation details

The States or UTs which have a system of guidance values may computerize the data for online availability of guidance values for payment of stamp duty and registration fees. Valuation will have to be fixed by local authorities for each survey number as per local criteria.

(c) Data entry of legacy encumbrance data for determined period

In order to create the quick search facility for encumbrances, data entry for legacy registered deeds and data, based on registration numbers, names and property address particulars would be required for a determined period, usually 13 years (15 years in some states, 30 years in Puducherry) for issuance of encumbrance certificates, etc., and the cost of this activity will depend upon the number of documents to be digitized.

(d) Scanning and preservation of old documents

For preserving and archiving the old deed documents for future reference, such documents would need to be scanned and stored at each SRO.

The available banking and treasury networks could be appropriately interfaced for having secure access to the SROs for facilitating payment of stamp duties (in place of stamp papers) and registration fees.

(e) Connectivity to SRO with Revenue Offices

In order to achieve functional integration among the tehsil and State data centres as well as the corresponding Sub-Registrars' offices, it would be required that each SRO location is provided with network connectivity. *Notices will be automatically generated after registration to all recorded interested persons and the general public to effect changes in the Records of Rights (RoRs).*

IV. Modern records rooms/land records management centres

The component of Modern Record Room provides for storage of information and delivery of services. There is a provision of modern record room at each tehsil @ ₹25.00 lakh as one-time assistance on non-recurring basis. Earlier the funding was shared in the ratio of 50:50 by central government and state governments but now the scheme has been made a central sector scheme with effect from 01.04.2016 with 100% funding by central government. This activity was earlier envisaged to cover 4880 tehsils in the country at a budgetary allocation of ₹1220.00 crore including State share. At present the number of tehsils has increased to 6673 in the 681 districts currently being reflected by the States / UTs on the central MIS portal of DILRMP.

The Department has already sanctioned Modern Record Room in 3652 tehsils. Funds required for completion of the earlier sanctioned projects are as follows:

Central share yet to be released : ₹ 216.44 crore.

An amount of Rs. 216.44 Crore has been earmarked for this component for the period from 2017-18 to 2019-20.

V. Core GIS

Village Index base maps from satellite imagery for creating the Core GIS

Three layers of data: (a) spatial data from high resolution satellite imagery/aerial photography, (b) maps and data from the Survey of India and the Forest Survey of India, and (c) revenue records data from cadastral maps and the RoR details will be integrated and harmonized on a GIS platform.

In this regard, the thematic GIS layers are already available or would become available (including the periodic updates) through the NIC, the National Spatial Data Base (NSDB) of the Planning Commission, the National Spatial Data Infrastructure (NSDI) partners, the National Natural Resource Management System (NNRMS), etc., with the NIC and the DILRMP national mission playing

the coordinating and leadership roles. The cadastral layer will become available from the States and UTs once the maps and other data get digitized. However, village index base maps may have to be obtained from satellite imagery vendors.

Various state govts. have also generated digitised and geo-referenced cadastral maps of the states using the state funds with the help of State Remote Sensing Centres.

Similarly, ISRO has also funded for 4 states fully and 4 states partially for scanning, vectorisation, geo-referencing and mosaicking components of the cadastral maps. These states are (1) Andhra Pradesh; (2) Telangana; (3) Haryana; and (4) Kerala for full component; (5) Assam; (6) West Bengal partially under Space Based Information Support for Decentralized Planning (SIS-DP) project; and (7) Karnataka and (8) Gujarat partially under Cadastral Referencing and Data capture (CRD) project.

(a) The committed liabilities of ongoing sanctioned works may be met out from the overall sanctioned outlay of Rs.950 crore as flexibility of inter se allocation among various components has already been provided.

(b) The above expenditure at (a) may be borne from the concerned components including “Computerization of registration”, Digitalization of Cadastral Maps”, and other relevant head(s) as deemed appropriate by DoLR.

(c) With regard to core GIS, DoLR will seek the assistance of MeitY to carry out pilots in a few States for examining the utility of Core GIS.

VI. Legal Changes

The following actions are to be undertaken in order to reach conclusive titling system in the country: (a) Amendments to the Registration Act, 1908; (b) Amendments to the State Stamp Acts; (c) Other legal changes; and (d) Model law for conclusive titling. The cost for these activities will be covered under Programme Management Cost.

VII. Programme Management

(a) Programme Sanctioning and Monitoring Committee in DoLR:

At the national level project sanctioning and monitoring committee be constituted, which will periodically review progress of the scheme and resolve issues/difficulties faced by the States and give suitable instructions for implementation of the scheme. It will also take necessary decisions about changes in technology, security of data, records to be computerized, City surveys and urban land records, amendments in the guidelines, sanctioning innovative projects, etc.

For monitoring the implementation of the works under the DILRMP at the State/UT level, there may be a State-level Monitoring and Review Committee and the members would include the Secretaries of the concerned departments including Information Technology, Science and Technology; State Informatics Officer of the NIC, Director of Survey and Settlement, Director of Land Records, and the head of the State Revenue Training Institute. The Committee would review the progress of on-going works on a monthly basis.

(b) Core Technical Advisory Group in the DoLR and the States/UTs

The DILRMP will be implemented in a mission mode. For this, a core technical advisory group at the national level as well as at the state level may be formed although the exact nomenclature, composition, etc. may be determined in due course.

(c) Programme Management Unit (PMU) in the DoLR and the States/UTs

In the DoLR, a programme management unit constituted in the States/UTs, would have responsibility of running the project and coordinating with all concerned departments with agencies responsible for the work. The State Governments/UT Administrations will implement the programme through their Project Management Units already set up under the Programme.

With regard to Programme Management and rehabilitation / resettlement:

(i) The committed liabilities of ongoing sanctioned works will be met out from the overall sanctioned outlay of Rs.950 crore as flexibility of inter se allocation among various components has already been provided.

(ii) The above expenditure will be borne from the concerned components including “Computerization of registration”, Digitalization of Cadastral Maps”, and other relevant head(s) as deemed appropriate by DoLR.

(d) IEC

The States/UTs would be advised to carry out wide publicity of the advantages of the DILRMP through *Gram Sabhas*, publicity campaigns, and revenue camps, involving local elected representatives. The success stories may be highlighted through newspapers, video films and road shows, etc.

(e) Evaluation

DoLR may authorize a competent external agency to get impact assessment and feedback on implementation of the programme at the field level. The States/UTs would also be advised to carry out concurrent evaluation studies and independent audits through experts to assess the progress of the sanctioned projects and the suggested remedial action, if any.

(f) Training and capacity building

States will draw up a comprehensive action plan to develop their human resource for effective maintenance and sustenance of the DILRMP scheme. Support would also be provided by way of grants to the States/UTs for strengthening/upgrading Revenue Training Institutions and arranging professional support teams at various levels.

An amount of Rs. 37.74 Crore has been earmarked for “Evaluation Studies”, IEC and Training component for the period from 2017-18 to 2019-20.

*****

Annexure – GL IV

Most Immediate

F. No. 28012/34/2016-LRD
Government of India
Ministry of Rural Development
Department of Land Resources

NBO Building, Nirman Bhawan,
New Delhi-110011

Dated the 08th December 2016

To:
Chief Secretaries / Administrators of all States / Union Territories

Subject: Survey / re-survey under Digital India Land Records Modernization Programme (DILRMP) [Policy circular no. **1 of 2016**]

Sir,

1. I am directed to refer to the above-mentioned subject and to say that essentially the following activities are currently being carried out under the Digital India Land Records Modernisation Programme (DILRMP):

(i) computerisation of record of rights
(ii) digitization of cadastral maps
(iii) integration of record of rights (textual) and cadastral maps (spatial)
(iv) survey / re-survey
(v) modern record rooms
(vi) data centres at tehsil, sub-division and district level
(vii) state data centre
(viii) connectivity between revenue offices
(ix) computerisation of registration
(x) connectivity between sub-registrar offices and tehsils and
(xi) integration of registration and land records

2. In respect of the component of survey / re-survey (para 1 (iv)) it is felt appropriate to ordinarily carry out record or survey operations from DILRMP funds only when the record of rights or field book or map are not available or are destroyed / damaged / outdated etc. and not to unnecessarily conduct surveys / re-surveys when the land records are available as per the normal.

3. It may be noted that the primary objective is to computerize the record of rights and digitize the cadastral maps as they exist in physical form (and to further integrate the two on the land information management system).

4. An institutionalized mechanism is also required to be put in place for the concurrent and continuous updation of computerization / digitization, so that it mirrors the physical reality at every point of time.

5. It goes without saying that as and when the record or survey operations are conducted in the normal course by the State Governments / UT Administrations, the computerization / digitization would also be accordingly updated.

6. It may further be noted that that exact one-to-one co-relation between the area recorded in the record of rights and the map is not very feasible and albeit not very necessary either; it is the settled principle that if the area differs, the area recorded in the record of rights prevails (and map- correction is duly undertaken if and as required).

7. Having regard to the above, it has been decided **to ordinarily carry out record or survey / re-survey operations from DILRMP funds only in places where the record of rights or field book or map are not available or have been destroyed / damaged / outdated etc. and not to have unnecessary surveys / re-surveys.**

8. For all future district project proposals under DILRMP, para 7 above will be applicable.

Where funds have earlier been sanctioned for survey / re-survey and the work has duly been initiated and is in progress, the same may be duly completed.

Where funds have earlier been sanctioned for survey / re-survey but the work has not been initiated, para 7 above will be applicable.

9. This has the approval of Competent Authority.

(Hukum Singh Meena)
Joint Secretary to Government of India
Tel. No.23063462

Copy to: Secretaries in-charge of Revenue Departments of all States / Union Territories

PART-B: TECHNICAL MANUALS

DILRMP Technical Manual

Chapter-1

Digitization of Cadastral Maps and Integration with RoR Data

Model-I

(Based on the system followed in West Bengal)

The following technical details may be helpful to the digitizing agency or the vendor, if the work is outsourced, in GIS-ready digitization of cadastral maps and their integration with the textual RoR data:

2. Mouza Map: West Bengal has geo-referenced Mouza (a revenue village) maps showing plots (land parcels) in the scale 16" = 1 mile which is equivalent to 1:3960. In densely populated areas such maps are prepared on bigger scales i.e. 32"=1 mile (1:1980) or 64"=1mile (1:990). There are 66,348 such map sheets in A0/A1 size paper covering all the 42042 Mouza of West Bengal, prepared by well established detailed cadastral survey techniques. Each Mouza map contains 1200/1500 plots (property parcel boundaries) on the average surveyed true to scale by Theodolite traverse and chain survey. Later on, the length of each side of the plot and plot area are extracted from the paper map using acre comb. No field dimensions of the individual plots are noted on the map. Each Mouza map has the following features-

1. Sheet heading (Mouza Name & North Direction.)
2. Scale of the map
3. Plot boundaries with Plot numbers
4. Legends

5. Conventional signs (Alamats), Bata Plot nos. & Missing Plot nos.

6. Contents of the certificate block i.e. contents of the rectangle bearing the signature of the Revenue Officer certifying the contents of the map

3. Scope of work for digitization: In order to prepare GIS-ready digitized cadastral Mouza maps, they should be digitized in 3 layers i.e. area layers, line layers and point layers so as to facilitate digital capturing of all the features of the existing paper map. Maps, digitized in this way, provide flexibility required for future corrections. Each plot of land is viewed as a closed polygon and digitized in area layer to provide the area of the plot. A 5 digit number, which is written within the paper map itself, is used for unique identification of the digital polygon. Maps should be scanned to their true scale, vectorized and converted into shape file format consisting of three files i.e. the shape file (*.shp), the index of the shape file (*.shx) and the data associated with the shape file (*.dbf) [item 2 & 3 above], .gif (graphic interchange format) formats [item 1,4, 5 & 6] along with the data in .dbf format [item 5] as detailed in the scope and methodology of the work.

Sl. No.	**Job Discerption**
1.	Accurate scanning of original paper-based maps (generation of raster image of the map).
2.	Digitization of plots (drawing digital line on each plot boundary of the scanned map).
3.	Topology creation and closed polygon generation in area layer.
4.	Creation of plot numbers in polygon area layer.
5.	Creation of rendered plot numbers (RPN) and centroid point of each polygon in point layer. The centroid, which is the geometric centre point of the

polygon, is where the plot number is indicated. When the size of the polygon is too small for the number to be written within it, then the last one or two digits are written to represent the original number. This plot number is called **rendered plot number**.

6. Creation of in-situ lines, i.e., geographically fixed lines and point alamats (line and point layers).

7. Thoka lines of mouza (i.e., boundary lines of the other two neighbouring mouzas) and sheet control points (fixed points on earth used while preparing the maps which are also used for future references), tri-junction pillars (pillars fixed at the meeting point of three neighbouring mouzas), permanent features or marks, old control stations used in earlier surveys, roads, railway tracks, rivers or streams, relay lines of acquisition plans (i.e., demarcation lines of the land proposed to be acquired – relevant only in land acquisition cases), etc., in .shp format of line, point and area layers.

8. Creation of DBF files for point/area alamats and bata (sub-divided) plots (point and area layers).

9. Creation of GIF files of non-map features (sheet heading, north direction, legends, list of conventional signs, contents of certificate block).

10. Creation of text files in point layer.

4. Four Database Tables

The following four database tables should be developed from the data available in the paper map. This is done by carefully observing each plot in the map sheet.

Table No. 1 - The conventional signs or alamats have to be codified along with the reference of bata plot number in the following dbf:

Mouza Code	Sheet No	LR/RS (L or R)	Plot No.	Alamat Code	Reference of bata plot numbers
1	2	3	4	5	6

The original plot numbers are to be written in Column 4 and any reference of parent plot number from which the original plot has been created is to be written in Column 6.

Table No. 2 - Data developed with respect to alamats in point layer is master data information and should be developed and maintained centrally, and not developed separately, for each map. It should contain the following information:

Alamat Code	Alamat name	Actual file as OLE (Object linking and embedding) object
1	2	3

Table no. 3 - This table contains the information on the first plot and the last plot number in a sheet of cadastral map for a particular mouza.

Mouza Code	Sheet no.	L or R for LR / RS	First plot no.	Last plot no.
1	2	3	4	5

Table no. 4 - This table will keep track of missing plots and missing plot numbers within the 1st and last plot numbers in a particular sheet of a mouza.

Mouza Code	Sheet no.	L or R for LR / RS	Missing plots.
1	2	3	4

5. Stringent accuracy requirement:

The digitized map should exactly match the original map, like a contact print, since the dimensions and area of plots, or the whole village, are to be extracted from the map itself. As such, a difference of 0.25 mm of sheet measurement in 1:3960 scale between the original map and its copy, whether conventional or digitized, gives rise to a difference of about 1 metre on the ground. So, an accuracy of 0.25 mm or higher is desirable and tolerance may be treated as nil to 0.25 mm per metre.

6. Outputs of digitization:

6.1 Vectorised map can be stored in any open GIS format without any loss of freedom, as the conversion from one format to another is built into the software for automatic raster to vector conversion. One of the popular open formats is SHP format, which is essentially a bundle of three formats to store spatial objects in .shp, text data attached to spatial objects in .dbf, and the format for linkage of .dbf and .shp, i.e., .shx. Many popular automatic raster to vector digitization software are available, which can be used, such as R2V or AutoCAD map. These GIS files are to be provided by the digitizing

agency/vendor to the Revenue Department in CD media along with a printout of the digitized map.

6.2 About 35 files are generated for a typical GIS-ready mouza map, namely:

Serial No.	File Name	Description
1.	JlNo.shp	Shape file for Mouza Map Sheet
2.	JlNo.shx	Shx file for Mouza Map Sheet
3.	JlNo.dbf	Dbf file for Mouza Map Sheet
4.	Alml. shp	Shape for Alamat in line layer
5.	Alml. shx	Shx file for Alamat in line layer
6.	Alml.dbf	Dbf file for Alamat in line layer
7.	Almp.shp	Shape file for Alamat in Point layer
8.	Almp.shx	Shx file for Alamat in Point layer
9.	Almp.dbf	Dbf file for Alamat in Point layer
10.	Bnd.shp	Shape file for Sheet Boundary, it denotes the extent of the sheet.
11.	Bnd.shx	Shx file for Sheet Boundary
12.	Bnd.dbf	Dbf file for Sheet Boundary
13.	Centroid.shp	Shape file for the points where to place the Plot Numbers

14.	Centroid.shx	Shx file for the points where to place the Plot Numbers
15.	Centroid.dbf	Dbf file for the points where to place the Plot Numbers
16.	Img.shp	Shape file for the points where to insert the GIF files
17.	Img.shx	Shx file for the points where to insert the GIF files
18.	Img.dbf	Dbf file for the points where to insert the GIF files
19.	Mbnd.shp	Shape file for Mouza Boundary
20.	Mbnd.shx	Shx file for Mouza Boundary
21.	Mbnd.dbf	Dbf file for Mouza Boundary
22.	Scale.shp	Shape file for Scale of the Mouza Sheet
23.	Scale.shx	Shx file for Scale of the Mouza Sheet
24.	Scale.dbf	Dbf file for Scale of the Mouza Sheet
25.	Text.shp	Shape file for Texts of the Mouza Sheet
26.	Text.shx	Shx file for Texts of the Mouza Sheet
27.	Text.dbf	Dbf file for Texts of the Mouza Sheet
28.	sign.gif	Gif file for Certificate book
29.	alm_bata.dbf	Dbf file for conventional signs or alamats along with the reference of bata plot no.
30.	missp.dbf	Dbf file for Missing Plots in Mouza Sheet

31.	first_last.dbf	Dbf file for First & Last Plot Number for Mouza Sheet
32.	lege.gif	Gif file for legends
33.	name.gif	Gif file for Map Heading, i.e. it contains the District name, Mouza name, Idn etc.
34.	bata.gif	Gif file for list of bata
35.	Idn.tif	TIF image file for Mouza Map Sheet (raster image)

Sometimes, the legend is broken into more than one file. These files are named lege1.gif, lege2.gif, lege3.gif and lege4.gif. Accordingly, the total number of files varies from 35 to 38.

7. Methodology for digitization:

7.1 The Directorate of Land Records and Survey is the nodal organization under the Govt. of West Bengal. Currently, the organization is involved in digitization of mouza maps from existing manually-prepared maps. The process involves (i) scanning of maps to produce raster data, (ii) checking the dimensional accuracy of the raster data, (iii) garbage cleaning in the raster data, (iv) vectorising the raster data, (v) cleaning the vector data, (vi) topology building, i.e., building each plot polygon as a totally connected entity, to ensure that all the polygons are closed and connected; (vii) data integration, (viii) map composition from different layers, and (ix) integration of regional language script as label.

Sl. No.	**JOB DESCRIPTION**	**Responsibility**

1	Putting label of mouza code, whether RS or LR map and the sheet number sticker on the map sheet	Department Employees (DA)
2	Handing over the labeled map to the vendor for digitization	DA
3	Scanning of original paper based maps.	Agency (EA)
4	Study of original paper map for dimension extraction. This is to measure the dimensions of any two points in the horizontal and vertical directions in the original paper map	EA
5	Adjustment of scanned raster map with the measurement as available in Sl. No. 2.	EA
6	Digitization of plots using R2V or AutoCAD software	EA
7	Cleaning up of map, topology creation and closed polygon generation using AutoCAD map software	EA
8	Creation of plot numbers and attaching text database with the spatial data	EA
9	Quality checking to account for all plots and plot numbers available in the map	EA
10	Printing for dimensional accuracy-checking of all plots	EA
11	Comparison of print with original for accuracy checking	EA
12	Refinement of digitized map with respect to Sl. No. 9 and repeat of Sl. Nos. 9 and 10 till desired accuracy is achieved	EA
13	Quality checking for correctness of plot numbers as attached	EA
14	Creation of rendered plot numbers (RPNs) and centroid points	EA

15	Creation of in-situ lines and point alamats	EA
16	Quality checking to ensure that all alamats are considered and coded correctly	EA
17	Creation of DBF files for point/area alamats and bata plots	EA
18	Creation of GIF files	EA
19	Handing over the print copy for checking correctness	EA
20	Checking of print copy with the original	DE
21	Handing over the soft copy	EA
22	Soft copy check (availability of files - 35-38 numbers)	DE
23	Generation of complete map from the files available and also digital RoR database using software developed by the NIC	DE
24	Printing of composed map in 120 GSM paper for preservation	DE
25	Software checking of areas extracted digitally with that available in the RoR for each plot. This provides an error report showing plots whose areas in the RoR do not match with the areas extracted digitally.	DE
26	Error report is sent to districts for review and correction	DE
27	Integration of RoR data with spatial data using the software developed by the NIC (explained in detail below)	DE
28	Map and record correction through the software developed by the NIC (explained in detail below)	DE

7.2 Scanning and dimensional accuracy

7.2.1 The original map is scanned to produce the raster form. For cadastral map, scanning may be done in 400 dpi (dots per inch). Special attention should be given to see that the map is not deformed dimensionally. For this purpose, “X” (cross) marks are placed at corners of the original map before scanning. In the next step, the lengths between the “X” marks of the original map are compared with those of the scanned map to check whether any differences exist. Finally, raster editing is done for the elimination of unwanted patches in order to enhance vectorisation of the raster data.

7.2.2 Dimensional accuracy of the raster data implies total correspondence between the raster data and the original map. The following procedures are used to achieve dimensional accuracy:

1. Checking for expansion.
2. Checking for contraction.
3. Checking for translation.
4. Checking for rotation.

Raster form of the map may appear to be expanded or contracted as compared to the original map, which in turn affects the vector data. The checking for expansion and contraction is based on the principle that ‘area is invariant’. The Land Records Department has Jurisdiction List (JL) in which the total mouza area is defined and the land records information contains each plot area of an owner. These two are compared with the vector data of the map to check for the expansion or contraction of the map with respect to the original map. Using a GIS tool, the NIC West Bengal State Unit has developed software which can easily integrate the land records data with the digitized data based on the plot numbers. Using the software, one can easily compare the total mouza area (as defined in JL) with digitized mouza data as well as digitized plot area with the individual plot area defined in the land records database.

Translation and rotational error may occur during the scanning process. Checking for this purpose is done using the check point. A calibrated plotter HP 1050C or higher is used to plot a map from the vector data. This map is then compared with the original map to find complete correspondence between the lines of the two maps. Any mismatch between the two reveals the existence of the abovementioned errors. These errors may be removed by accurate scanning of the original map and confirming its correctness with the original.

7.2.3 While digitizing, the scale should be maintained accurately, so that the output corresponds 1:1 with the original. Either flat-bed scanner or roller-type scanner can be used for scanning. For maps that are brittle, flat-bed scanners would be more suitable.

7.3 Vectorizing, topology building and data integration:

7.3.1 The raster data may be converted to vector data using raster-to-vector converting software. This software works in three distinct methods as mentioned below:

1. Fully automated method
2. Semi-automated method
3. Completely manual method

The Semi-automated method is preferable, because traverse lines may have some breaks which can be corrected through this method during the process of vectorisation, but which create problems with the fully automated method.

7.3.2 No plot on the map is isolated; hence one should posses some knowledge about its adjacent plots. That is why topology building is necessary. This is done by treating each intersecting point as a node. Overshoot, undershoot and duplicate lines are the major problems, which are to be eliminated during the process of topology building. The overshooting lines are deleted and the undershooting lines are extended to their nearest node.

7.3.3 Non-spatial data (plot number, area, etc.) are included in the database containing the spatial data for the map, during the process of data integration.

7.4 Testing of correctness of the digitized map:

7.4.1 The printed copy of the digitized map should be thoroughly checked so that all the plot boundaries and other line works match with the original like a contact print. Plot numbers assigned should also match with the original. In-situ alamats should be placed at exactly the same points as they are located in the original map. A glass table, lighted from below, is used to match such accuracy.

7.4.2 Software checking is done through the "Map Management System" software developed by the NIC to find all the files deliverable for a map sheet.

8. Map composition and query retrieval:

8.1 Different layers (point, line, area) are used for map composition. Line layers are required for the map composition part, while area layers are mainly required for both map checking and composition. However, map composition not only involves construction of the map from a particular layer, but also the inclusion of various non-map features such as the legend for the map, the label of the map specifying its identification from the point of view of Police Station Code, Jurisdiction List Number, etc., bata information for the mouza, the authentication seal of the Government, etc. and various geographical features (the alamats) such as the railway lines, the traverse stations, letter boxes, etc., which can be represented by symbols. The NIC West Bengal State Unit has developed software to compose map by integrating different layers and alamats.

8.2 The non-map features are mostly available in the form of images. A point layer is provided for the insertion of these images. The point layer contains the coordinates of the points where the images are to be positioned. During map composition, the images are to be placed on the map (already composed from the line layer) at their appropriate positions. The geographical features (alamats) can be displayed on the map by using the line, area and point layers.

Specific symbols are used for this purpose and the layers contain information regarding these symbols. The final output is a completely composed map identical to the original one.

9. Specifications and alamats

9.1 Images

The images (in *.gif format) provided for map composition must be accompanied with a point layer in which each point coordinate would give the **lower-left** corner of the image. The layer must have a separate attribute column, named "**image**" along with the necessary columns (specific to a point layer table). This attribute column will contain the file name of the image files corresponding to each point of the point layer. There is no restriction on the names of the image files, but it must be noted that the file names mentioned in the "**image**" column of the point layer must correspond to the file names of the images provided. The base name of the files for this point layer must be "**img**". Thus, the ".shp" file for the above mentioned point layer must be "**img.shp**". The names of other necessary files (.shx, etc.) for the same point layer must be given accordingly. All the images (*.gif or *.tif) of a particular sheet must be given in the same directory, i.e., the **JL**-No. sub-directory.

Note: i) The scale of the map must not be an image, but must be digitized and provided in the line layer.

ii) Attribute naming: The "image" attribute column must be a character field and have a maximum length of 8 characters.

9.2 Alamats

9.2.1 At point layer

Some of the alamats that can be represented by points should be provided in a point layer. The point layer required for this purpose must contain the attribute field "alamat symbol code" along with other necessary fields. The following

Table 1 contains the “alamat symbol code” column for the above mentioned point layer. The other columns are given as descriptions to the “alamat symbol code” column. The column named “Sl. No.” is the serial number of the various symbols as per the conventions followed by the Directorate of Land Records and Survey. The base name of the files for the point layer for the alamats must be “almp” i.e. the “.shp” file for the point layer must be “almp.shp”. The names of other necessary files (.shx, etc.) for the same point layer must be given accordingly.

Note: i) Some alamat notations comprise of a line and several points on the line. In such cases, the points are to be provided in the point layer and the lines are to be provided in the line layer that is described below.

ii) Attribute naming: The “alamat symbol code” attribute column must be a character field and have a maximum length of 4 characters.

Table 1

Item	**Alamat symbol code as specified by the NIC**	**Descriptions**	**Required features for West Bengal (NR: Not Required, R: Required) (*)**
Municipal/Notified Town Boundary	1	**1)** Only the circles on the boundary line should be given in the point layer (the broken line being on	NR

		the line layer as described in the next table). **2)** The center of each circle should lie exactly on the line representing the boundary.	
Wire fencing/railing along property boundary (showing ownership)	2	Only the 'X' marks should be given in the point layer, the line being given in the line layer (as mentioned in the next table).	NR
Village (or plot) boundary cutting across river or road	3	Only the dots on the boundary should be given in the point layer.	R
Village boundary cutting along the length of river/ road	3	Only the dots on the boundary should be given in the point layer.	NR
Village boundary along one bank/ edge of the river/ road not common to two units	3	Only the dots on the boundary should be given in the point layer.	NR

Geodetic Triangulation Station (GTS)		4	**1)** Appropriate name of the GTS should be given as an image. **2)** The dot in the middle of the symbol should be at the 'surveyed in situ' position of GTS	R
Bench Mark with number		5	**1)** The dot in the symbol should be at the position of the Bench Mark as surveyed in situ. 2) The figure indicating height should be the appropriate height of the Bench Mark concerned above the Mean-Sea.	NR
Tri-junction Pillar		6	Only the dot at the center of the triangle should be given in the point layer.	R
Traverse Station	(i) Present Survey	7a		R
	(ii) Last Survey	7b		R
Boundary Mark (pillar)	(i) Permanent pillar	8a		R

	(ii) Iron pillar	8b		R
Swampy Land or Marsh		10	Several points in close proximity should be given such that entire marsh is covered.	NR
Overhead Tank		11	Only the center of the symbol should be provided in the point layer.	R (.dbf)
Pucca well		12	Only the center of the symbol should be provided in the point layer.	R (.dbf)
Kutcha well		13	Only the center of the symbol should be provided in the point layer.	R (.dbf)
Tube well		14	Only the center of the symbol should be provided in the point layer.	R (.dbf)
Deep Tube well / Shallow tube well		15a	Only the dot at the center of the	R (.dbf)
		15b	symbol should be given in the point layer.	
Hillock with peak of known height		16	Only the center of the symbol should be provided in the point layer.	NR

Hillock without peak of known height	17	Only the center of the symbol should be provided in the point layer.	NR
Mill / Factory	18	Only the base of the symbol should be provided in the point layer.	R (.dbf)
Coal pit	19	Only the center of the symbol should be provided in the point layer.	R (.dbf)
Temple	20	Only the base of the symbol should be provided in the point layer.	R (.dbf)
Mosque	21	Only the base of the symbol should be provided in the point layer.	R (.dbf)
Church	22	Only the base of the symbol be provided in the point layer.	R (.dbf)
Gurudwara	23	Only the base of the symbol should be provided in the point layer.	R (.dbf)
Graveyard	24	1) Several points (each point representing one symbol) should be given such that the entire plot is covered.	R (.dbf)

		2) Only the base of each symbol should be given in the point layer.	
Pucca building within a plot	25	Only the base of the symbol should be provided in the point layer.	R (.dbf)
Pucca building within a plot not surveyed in situ	26	Only the base of the symbol should be provided in the point layer.	R (.dbf)
Kutcha house	27	Only the base of the symbol should be provided in the point layer.	R (.dbf)
Tin/tiled shed having pucca plinth	28	Only the base of the symbol should be provided in the point layer.	R (.dbf)
Daily market with plot boundary	29	The point must be taken inside the plot and preferably on the lower-left corner of the plot such that the symbol can be fitted completely within the plot.	R (.dbf)
Tree	30	Only the base of the symbol should be provided in the point layer.	R (.dbf)
Trees in grove (not surveyed in situ) other than orchard	30	Several points in close proximity should be given such that entire grove is covered.	R (.dbf)

Forest (reserved / protected) with name	31a	1) Several points in close proximity should be given such that entire forest is covered. 2) Only the base of each symbol is to be provided in the point layer.	R (.dbf)
	30 & 31b		R (.dbf)
	30, 31a & 31b		R (.dbf)
Bush jungle	32	Several points in close proximity should be given such that entire bush jungle is covered.	R (.dbf)
High grass	33	Several points in close proximity should be given such that entire High grass is covered.	R (.dbf)
Uncultivable fallow	34	Several points in close proximity should be given such that entire uncultivable fallow is covered.	R (.dbf)
Bamboo clumps	35	Several points in close proximity should be given such that entire bamboo clump is covered.	R (.dbf)
Cluster of palmyra	36	Several points in close proximity should be given such that entire plot containing cluster of palmyra is covered.	R (.dbf)
Cluster of coconut palm	37	Several points in close proximity should be given such that entire plot containing cluster of coconut palm is covered	R (.dbf)

Cluster of date palm	38	Several points in close proximity should be given such that entire plot containing cluster of date palm is covered	R (.dbf)
Cluster of betel palm	39	Several points in close proximity should be given such that entire plot containing cluster of betel palm is covered	R (.dbf)
Orchard (perennial – like mango, litchi, etc.)	40	Several points in close proximity should be given such that entire plot containing the orchard is covered.	R (.dbf)
Flower garden	41	Several points in close proximity should be given such that entire plot containing flower garden is covered.	R (.dbf)
Light house	42	The symbol should be drawn at some convenient space inside the plot concerned.	R (.dbf)
Burning ghat	43	The point must be taken inside the plot and preferably on the lower-left corner of the plot such that the symbol can be fitted completely within the plot.	R (.dbf)
Power house	44	The symbol is to be drawn at some convenient space inside the plot concerned.	R (.dbf)

Electric sub-station	45	The symbol is to be drawn at some convenient space inside the plot concerned.	R (.dbf)
Transmitting/ microwave station	46	The symbol is to be drawn at some convenient space inside the plot concerned.	R (.dbf)
Trestle of ropeway	47	The center of the baseline of the symbol should be provided in the point layer.	R (.dbf)
Pylon/electric/ telegraph/ telephone post with line	48	Only the dots at the center of the symbol should be given in the point layer.	R (.dbf)
Lamp post	49	Only the dot at the center of the symbol should be given in the point layer.	R (.dbf)
Letter box (immovable) of P&T Deptt.	50	Only the dot at the center of the symbol should be given in the point layer.	R (.dbf)
Kilometer post	51	Only the mid-point of the base of the symbol should be given in the point layer.	R (.dbf)

North Direction	52		NR
Text scripts mentioned on the map	53a, 53b, 53c, …		NR

(*) These may be customized as per the need of individual states.

9.2.2 At line layer

9.2.2.1 Some of the alamats that can be represented by lines are to be provided in a line layer. The line layer required for this purpose must contain the attribute field “style” along with other necessary fields. The following table contains the “style” column for the above mentioned line layer. The other columns are given as descriptions to the “style” column. The column named “Sl. No.” is the serial number of the various symbols as per the conventions followed. The base name of the files for the line layer for the alamats must be “alml” i.e. the “.shp” file for the line layer must be “alml.shp”. The names of other necessary files (.shx, etc.) for the same line layer must be given accordingly.

9.2.2.2 In order to define the extent of the total map area, it is essential to have a sheet boundary. This boundary is to be provided in a separate line layer, which must contain similar attribute fields as defined previously for the above mentioned line layer. This layer should contain a single line with thickness of style number 16. The base name of the files for the line layer for sheet boundary must be “bnd”, i.e., the “.shp” file for the line layer must be “bnd.shp”. The names of other necessary files (.shx, etc.) for the same line layer must be given accordingly.

Note: i) Some alamat notation comprises of a line and several points on the line. In such cases the lines are to be provided in the line layer and the points are to be provided in the point layer that is described in Table 1.

ii) Attribute Naming: The “style” attribute column in the following Table 2 must be a character field having a maximum length of 4 characters.

Table 2

Item	**Style (specified by the NIC)**	**Description**	**Required features for West Bengal (NR: Not Required, R: Required) (*)**
Specific lines on the village boundary	0	The portion of the village boundary drawn with broken lines must be digitized in a continuous fashion as a separate line and provided with the mentioned style no.	R
Village boundary	1	The alignment of the village boundary is along the middle of the thick line.	R
Municipal/Notified Town Boundary	2	Only the broken line of the boundary should be given in the line layer.	NR
Ward (municipal) boundary	2	This is for the broken line denoting the boundary.	NR

	4	This is for the small line segments that are perpendicular to the broken line.	NR
Forest boundary	3	Only the line representing the forest boundary should be given in the line layer. The entire boundary may be divided into different segments such that each segment is an entity in the line layer, provided all these segments contain the same style no.	NR
Wire fencing/railing along property boundary (showing ownership)	4	Only the line representing the property boundary should be given in the line layer (the 'X' marks had already been given in the point layer as mentioned in the previous table). The entire boundary may be divided into different segments such that each segment is an entity in the line layer, provided all these segments contain the same style no.	NR

Village boundary cutting along the length of river/road	2	Only the line representing the village boundary should be given in the line layer. The entire boundary may be divided into different segments such that each segment is an entity in the line layer, provided all these segments contain the same style no.	R
Village boundary cutting across a water body	2	Only the line representing the village boundary should be given in the line layer.	R
Plot boundary where there is a water body across it	2	Only the line representing the plot boundary should be given in the line layer.	R (.dbf)
Tram line	5	Only the line representing the Tram line should be given in the line layer. The entire line may be divided into different segments such that each segment is an entity in the line layer, provided all these segments contain the same style no.	NR

Railway	6	Only the line representing the Railway line should be given in the line layer. The entire line may be divided into different segments such that each segment is an entity in the line layer, provided all these segments contain the same style no.	R
Trekking route in hilly areas (too narrow for both sides of the path to be surveyed separately).	7	Only the line representing the Trekking should be given in the line layer. The entire line may be divided into different segments such that each segment is an entity in the line layer, provided all these segments contain the same style no.	NR
Culvert	4	Only the small line segments representing the culvert should be given in the line layer.	NR
	4	1) Style 4 is used for the edges of the Road	NR

Road (flyover) over Railway	6	(flyover) above the Railway. 2) Style 6 is used for the Railway line under the Road (flyover). 3) The Railway line as shown in the figure comprises of two line segments on either side of the road (flyover).	NR
Railway (flyover) over road	4	1) Style 4 is used for the edges of the railway (flyover) above the road. 2) Style 6 is used for the road under the railway (flyover). 3) The road as shown in the figure comprises of two parts on either side of the railway (flyover).	NR
	6		NR
	4		NR

Railway (flyover) over railway	6	1) Style 4 is used for the edges of the flyover. 2) Style 6 is used for the railway line passing under the flyover. 3) The railway line as shown in the figure comprises of two line segments on either side of the road (flyover).	NR
Subway (underground) under railway	2	1) Style 2 is used for the broken line denoting the subway under the railway line. 2) Style 6 is used for the railway line.	NR
	6		NR
Subway (underground) under road	2	1) Style 2 is used for the broken line denoting the subway under the road. 2) Style 4 is used for the road above the subway.	NR
	4		NR
Road (flyover) over road	4	The road lying below consists of two parts on either sides of the road lying above it	NR

Level crossing	7	It is assumed that the railway line is already present as an item as given in Sl. No. 19.	NR
River with, ferry and direction of flow of water	4	1) Style 4 is used to denote the direction of water flow along the river. 2) The entire arrow showing the direction should be digitized. 3) Style 7 is used denote the ferry.	NR
	7		NR
Tidal stream	4	The entire arrow is to be digitized.	NR
Jhora (rivulet in hills)	4	1) Style 4 is used to indicate the edges of the jhora as surveyed in situ. 2) Style 8 is used to indicate the middle of the deepest courses of the jhora as surveyed in situ.	NR
	8		NR
Narrow water channel along the plot boundaries with direction of flow of water (having width too	9	The arrows on the line (boundaries) must be digitized such that it shows the proper direction of the water flow.	NR

small to be surveyed).			
Drain/nala (in basti or town areas) with direction of flow of water.	4	The arrow showing the direction of flow of water should be given in the line layer.	NR
Pylon/electric/ telegraph/telephone post with line	2	Only the broken line is required in the line layer, the dots being provided in the point layer as mentioned in the previous table.	NR
The north-west sides of the water bodies including tank drawn with thick lines in the map	16	Only the thick lines are to be provided with the mentioned style number. Any other lines inside the mouza having a line thickness identical to the north-west side of the water bodies should be allotted the same style.	NR

(*) These may be different for individual States.

9.2.3 At area layer

Some of the alamats (in-situ) that are to be represented by areas must be provided in an area layer. The area layer required for this purpose must contain the attribute field “shade” along with other necessary fields. The following table contains the “shade” column for the above mentioned area layer. The other

columns are given as descriptions to the “shade” column. The column named “Sl. No.” is the serial number of the various symbols as per the conventions followed by the Directorate of Land Records and Survey. The base name of the files for the area layer for the alamats must be “alma” i.e. the “. shp” file for the line layer must be “alma.shp”. The names of other necessary files (.shx, etc.) for the same line layer must be given accordingly.

Note: i) Some alamat notation comprises of a line and several points on the line. In such cases the lines are to be provided in the line layer and the points are to be provided in the point layer that is described in Table 1.

ii) Attribute Naming: The “shade” attribute column must be a character field having a maximum length of 4 characters.

Table 3

Item	**Shade (specified by the NIC)**	**Description**	**Required features for West Bengal (NR: Not Required, R: Required)**
Pucca buildings (in situ)	1	Specific to State	NR
Pan baroz	2	Specific to State	NR
Sand char	3	Specific to State	R (.dbf)

Note: IMPORTANT

1. The “.shp”, “.shx” and the “.dbf” files for the mouza containing the area and the line layer should be named as “<JLNo>.shp”, “JL.shx” and “JL.dbf”

respectively. Thus, if the JL No. of a mouza is 100, then the three abovementioned files should be “100.shp”, “100.shx” and “100.dbf” respectively. The files are to be placed in the “JL No.” subdirectory under the corresponding “PS Code” directory in the following format:

<PS Code> \ <JL No.> \ <JL No>.shp

<PS Code> \ <JL No.> \ <JL No>.shx

<PS Code> \ <JL No.> \ <JL No>.dbf

Thus, if for a particular mouza, the PS Code is 50 and the JL No. is 100, then the files corresponding to the layers of that mouza should be organized as follows:

50 \ 100 \ 100.shp

50 \ 100 \ 100.shx

50 \ 100 \ 100.dbf

2. If the mouza map comprises of more than 1 sheet, then the files for all the sheets are to be given the same names and as per the convention mentioned in point 1 above. However, in order to avoid controversy, the files must be kept in different subdirectories denoting the sheet number under the “JL No” directory, which itself is kept under the “PS Code” directory. Thus, if the mouza map with JL No. 100 (see the example in point 1) comprises of 2 sheets then the file should be organized as follows:

For sheet no. 1	For sheet no. 2
50 \ 100 \ 1 \ 100.shp	50 \ 100 \ 2 \ 100.shp
50 \ 100 \ 1 \ 100.shx	50 \ 100 \ 2 \ 100.shx
50 \ 100 \ 1 \ 100.dbf	50 \ 100 \ 2 \ 100.dbf

3. The layers for the images and the alamats need not be qualified with their corresponding JL Nos., but they must be kept in the same directory along

with the layer files mentioned in the above two points. The files will be named as centroid.shp, almp.shp, alml.shp, scale.shp, bnd.shp, mbnd.shp, img.shp, alm_bata.dbf, first_last.dbf, missp.dbf, name.gif, lege.gif, bata.gif, sign.gif, etc.

4. The attribute field giving the plot number of each plot of the mouza is a compulsory field. It must be a 5-character field and have the name “plotno”.

5. The list of conventional symbols for the alamats as followed by the department should be referred whenever required.

6. For symbols, which are not “in-situ”, the points of insertion of the symbol are to be given at the approximate center of the symbol in the point layer for alamats.

7. The scale for each map should be digitized and provided as a separate line layer along with the other layers for the mouza. The base name of the files for the line layer for the alamats must be “scale”, i.e., the “.shp” file for the line layer must be “scale.shp”. The names of other necessary files (.shx, etc.) for the same line layer must be given accordingly.

8. The values in the different attribute fields in the various layers should be left justified.

10. Integration of map with RoR

10.1 Each plot of land is represented on the digital map as a closed polygon. Such polygons are identified by a unique 5 digit number, that is, its plot number. In the RoR database, such plot numbers are referenced. This provides a basis for integration of digital map with the digital RoR data. The RoR database consists of several related tables (7 main tables and several master tables) of information that provide ownership, land classification, etc. information which are essentially text data types. All the tables are connected by two common data fields. These are:

Idn: a seven digit code to identify a Mouza (2-digit for District, 2-digit from Block & 3-digit for the Mouza)

Plot No.: a five digit Plot number

10.2 For digital map, data (contained in more or less 36 files) are distributed in three tables under various columns having the above two common fields (Idn. and Plot No). Shape files (.shp, .shx and .dbf) are binary files, and are stored in BLOB data format -- a facility available in the MS-SQL Server 2005 DBMS. The existing RoR database is added along with the above three tables containing map information to form an extended database of RoR.

10.3 Data, both spatial and textual, are used by the application software "BHUCHITRA" (developed by the NIC, West Bengal State Unit) to provide the necessary integration of data. Such integration provides all the flexibility to manipulate textual data and spatial data without any constraint and provides a platform for various improved citizen-centric services and MIS reports. Some of them are given as follows:

1) Providing plot map (parcel map), showing dimensions of each side and area along with the RoR.

2) Generating various derivative maps based on possessions, classifications, legal sections applicable, size of the plot, etc.

3) Generating analytical reports on area in the RoR with respect to the digital map so as to help in data correction, both text as well as map.

4) Integrating the RoR updation with its map updation.

11. Map updation

11.1 Problem definition and purpose

Every digitized map needs to be updated every time when classification of a portion of the plot changes or ownership of a portion changes. Such plot divisions are effected on the digital map based on field measurements data.

11.2 Scope

It aims to realize the following processes and database requirements:

I) Divide the mentioned plots as per requirement with the help of field measurements.

II) Calculate the areas for newly-generated plots along with their mother plots and update the RoR data in the database.

11.3 Techniques

Digital map looks like the following:

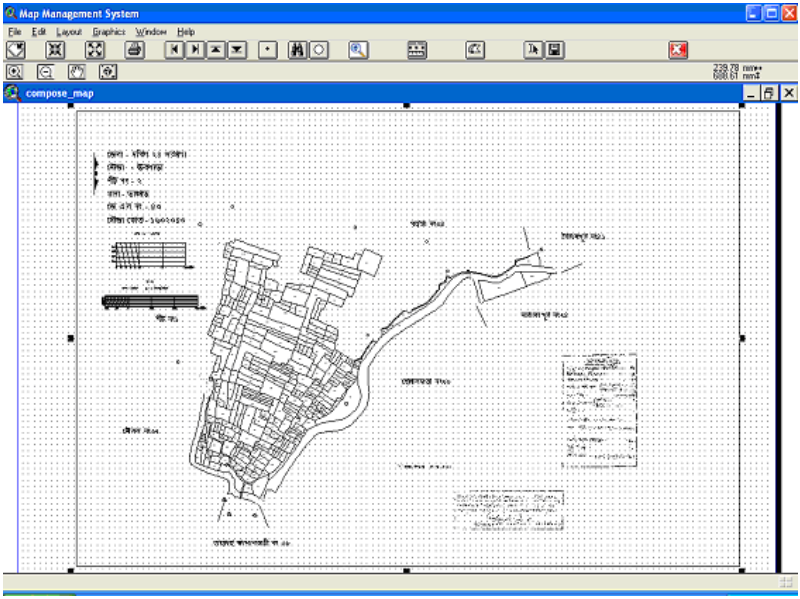


Figure 1: Composed Digitized Mouza Map

11.3.1 Updating the digitized map with the help of the field measurements

There are mainly four types of processes following which updation may happen. Those are:

1. Division by straight-line having end points at boundary.
2. Division by poly-lines.
3. Division by parallel lines.
4. Division by perpendicular lines.

These sub-processes with their graphical representation are discussed below.

11.3.1.1. Division by straight-line having end points at boundary

This is the simplest and easiest amongst all other techniques. The user just needs to supply the distances. For example, one has to supply the distance from vertex D along the line DA to get new vertex E. As well as, one has to give the distance from vertex B along the line BC to get new vertex F. MUS will need to create a poly-line (EF) between those new vertexes to split the old polygon (as given in Figure 2b). Then, one has to provide new plot number for the newly-created child plot (closed polygon, CDEF). The information (ownership details, area, etc.) of the newly-created polygon will be added into the database (RoR and DBF) and the information of the older one (closed polygon, ABFE) will be edited in same database (RoR and DBF).

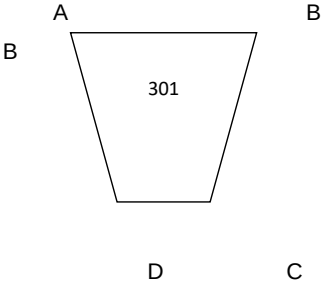


Figure 2a: Before updating

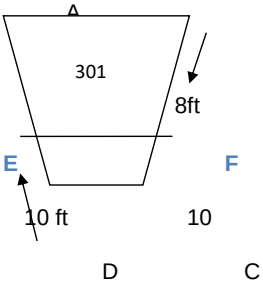


Figure 2b: After updating

11.3.1.2. Division by poly-lines

This technique is applicable when multi-segmented division is required (as given in Figure 3a). According to the picture given below, the polygon ABCD needs to be segmented in several subparts. Such as AEGF, HIJB, MNDC.

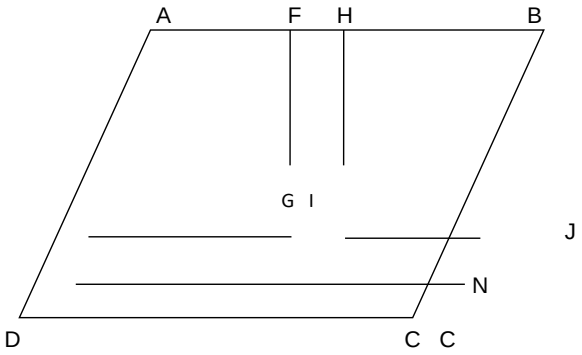


Figure 3a: After Updating ABCD with poly-lines

To find out the actual points, one needs to apply the bisecting radius method (as given in Figure 3b). Suppose the user wants to split a polygon AEGF from ABCD polygon. To get the point G, two circles will be drawn taking E and F as their corresponding centers. The bisecting point of these two circles will be the new vertex G (as shown in the figure). After getting the point G, one needs to join GE and GF to get the resultant polygon (AEGF).

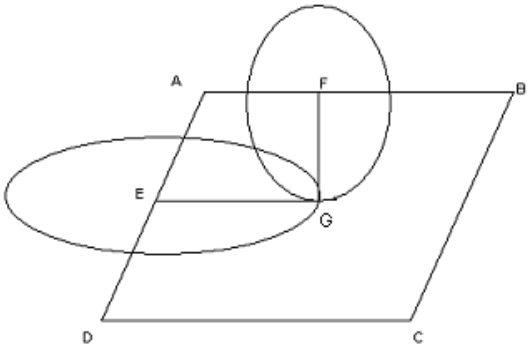


Figure 3b: Getting the bisecting point

11.3.1.3. Division by parallel lines

This technique is very useful when users require a parallel division with respect to any side of the older polygon (as shown in Figure 4). According to the figure, ABCD is the parent polygon and EFCB is the child one. MUS will need to calculate two different points E and F along the line BA and CD respectively. MUS will also need to join the points E and F to get the line EF for the resultant polygon (EFCB).

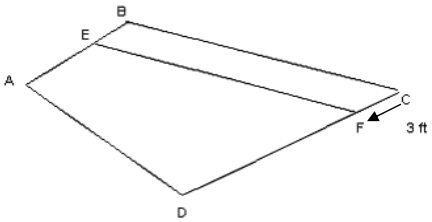


Figure 4: After updating ABCD with parallel line

11.3.1.4 Division by perpendicular lines

This technique is applicable when perpendicular deviation is required (as shown in Figure 5). As shown in the figure given below, the point E is 8 ft. far from the point D along the line DA and the point G is 12 ft. far from the point C along with CD. Then, one will draw a perpendicular EF at the point E on the line DA. The line EF is 6 ft. long. FG will be joined. Now, one gets the resultant polygon EFGD.

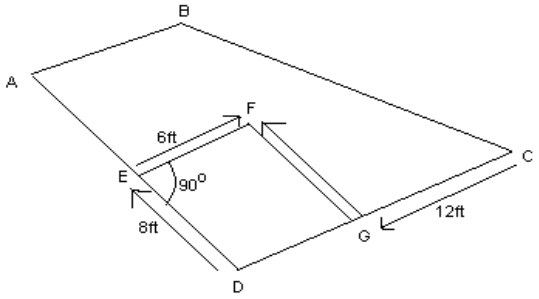
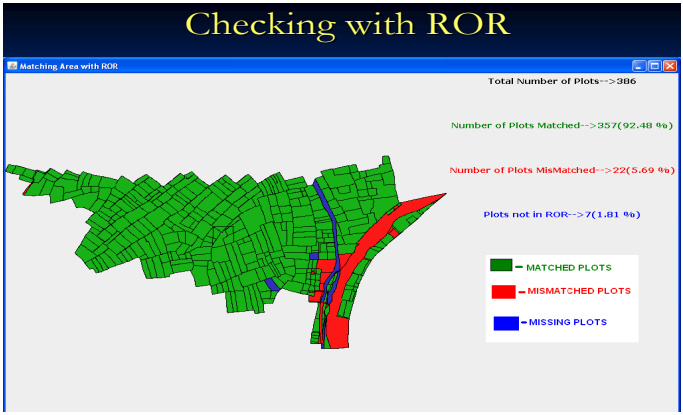


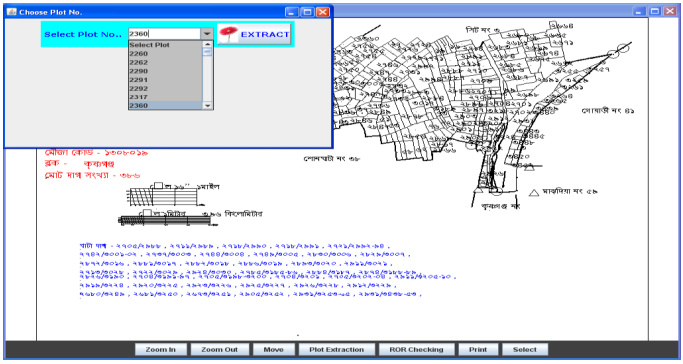
Figure 5: After updating ABCD with Perpendicular line

12. Some screen shots

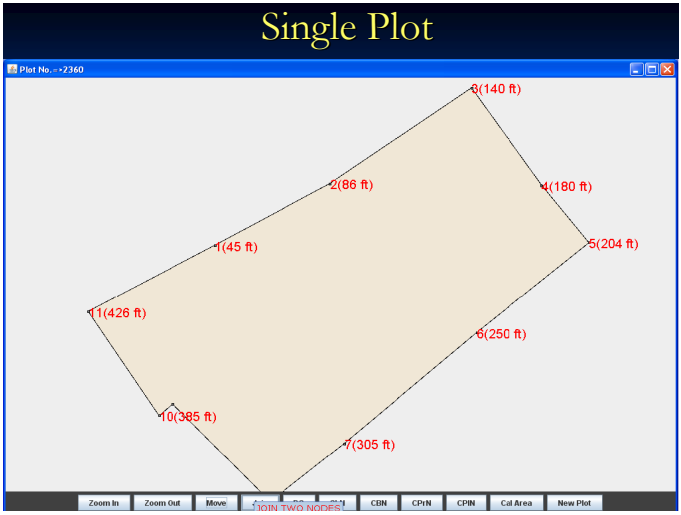
a) Comparison the Composed mouza map with the ROR data:



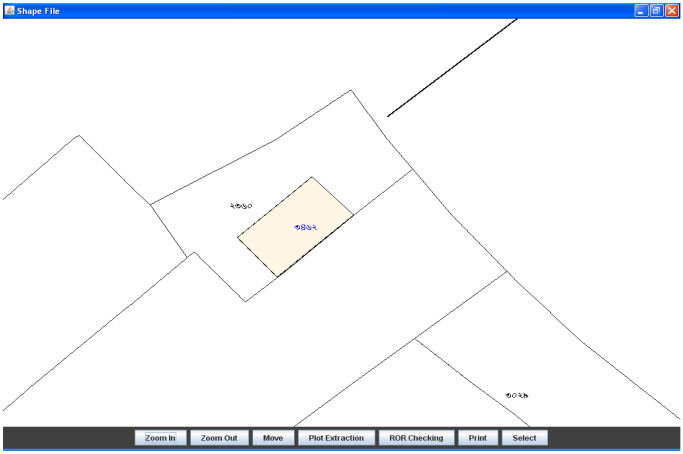
b Extraction of a single plot:



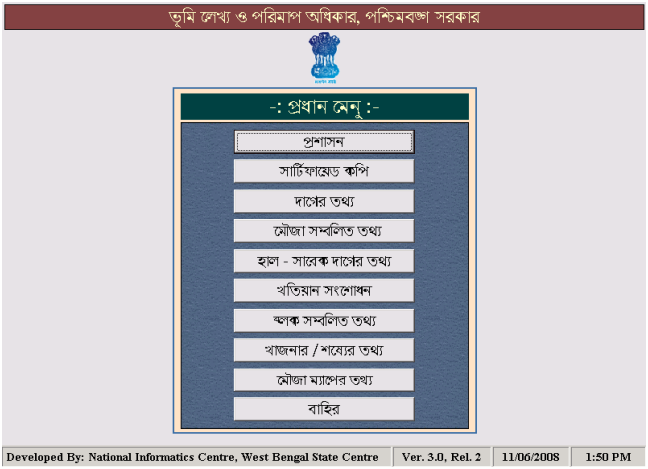
c Single Extracted Plot:

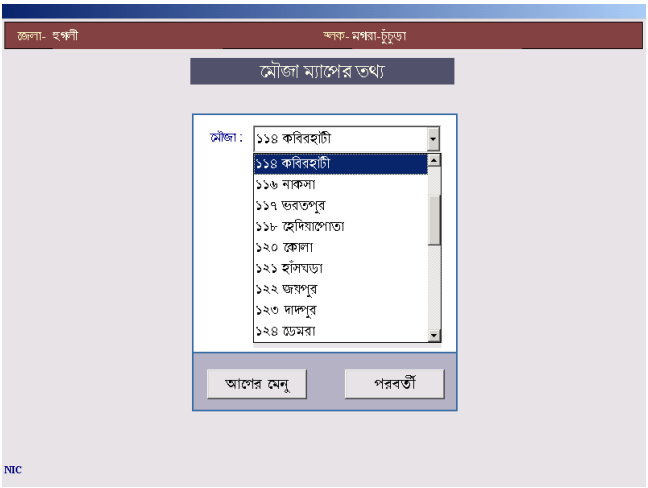


d. Updating a Plot in the Mouza map:

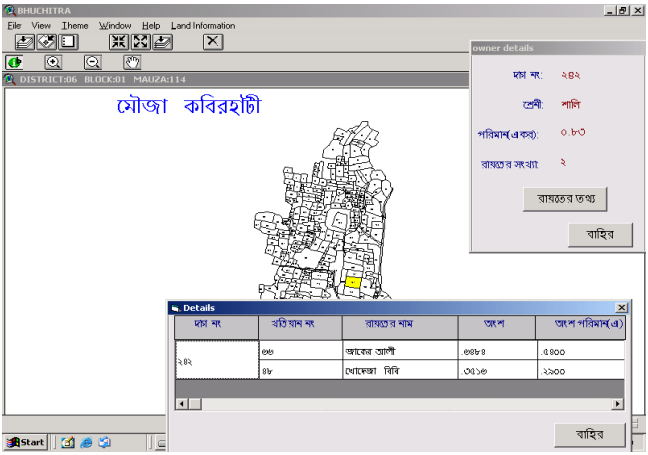


e Integration of Map with RoR text data

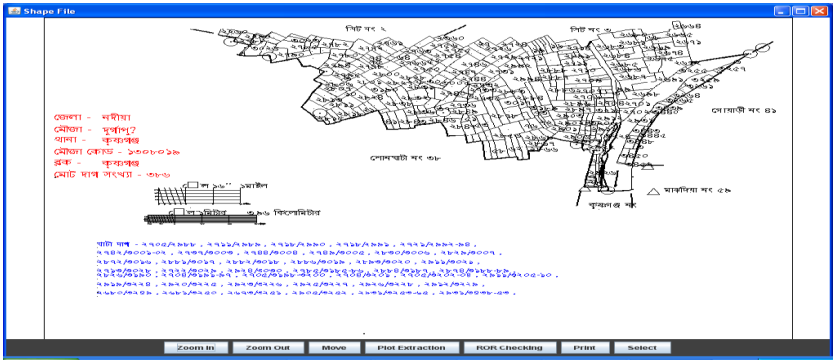




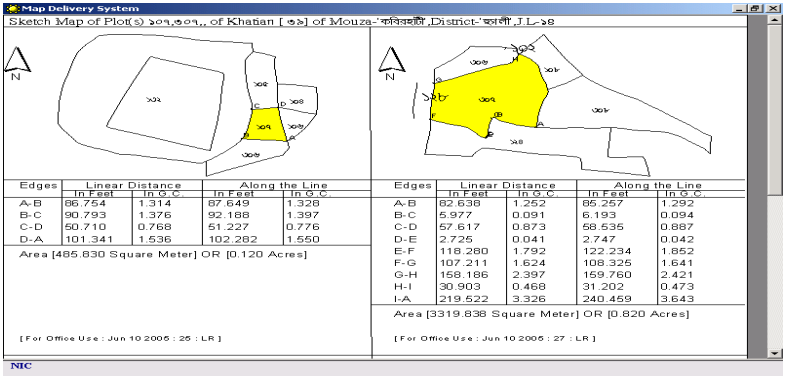
f. Displaying ROR text data within the composed mouza map:



g. A complete digitized map showing alamats, also called "Composed map"



h. Service of Plot map along with certified copy of ROR:



Digitization of Cadastral Maps and Integration with RoR Data

Model-II

(Based on inputs from the ISRO/NRSC, involving use of High-Resolution Satellite Imagery)

1. The cadastral map for each village is available on larger scales like 1:4000 to 1:10,000. These maps depict the survey boundaries with survey numbers, cultural features like transport network, location features viz. temple, trees, abadi and natural features like drainage etc. These cadastral maps have been prepared using plane table survey and chain survey. These maps need to be brought under standard projection/coordinate system for effective linkage of the developmental plans generated in the GIS environment. The following is the general description of the scope of the work of digitization of the cadastral village maps, geo-coding and their integration with textural data (RoR):

- The village cadastral maps will be traced on to tracing film/paper wherever required, scanned and grid-corrected.
- These maps will then be vectorized and labeled, parcel-wise.
- The parcel-wise information will then be attached uniquely to identify with the help of key identifier to obtain the details of each parcel.
- A grid-corrected map of the original sheets has to be provided in hard copy format.
- The sheets will be edge-matched, mosaiced, and the topology created as per the conventions specified.
- The mosaiced digitized maps will then have to be converted to GIS format and transformed using ortho-rectified geo-coded High Resolution Image.

- The accuracy standards should be maintained as per the pre-specified spatial framework, projection system, co-ordinate units, tolerances, feature-coding scheme, etc.
- The deliverables have to be provided in proper format, structure, precision and metadata, as specified, so that they are ready for use with other revenue-related activities.

2. STEPS FOR DIGITIZATION OF CADASTRAL VILLAGE MAPS

The process of digitization can be summarized in following steps (Fig 1):

1. Collection of analog cadastral village maps (sheet-wise)
2. DQC-1 (Input data evaluation)
3. Tracing or re-production of the analog map
4. Sheet indexing and scanning of the analog maps (converting analog to raster cadastral images)
5. DQC-2 (check DPI, format, quality, speckle removal and cleaning)
6. Grid correction of the scanned (raster) map
7. DQC-3 (grid overlay checking with scanned map)
8. Feature abstraction from the scanned map
9. DQC-4 (check for the accuracy of the type, location and attributes)
10. Layout and printing hard copy for evaluation by the Land Revenue Department (LRD)
11. DQC-5 (detailed checking of the digitized features by the LRD)
12. Incorporation of the corrections suggested by the LRD

13. Sheet mosaicing of a village

14. DQC-6 (feature continuity and attribute carry forward)

15. Conversion of the digitized data into topologically-correct GIS data format

16. DQC-7 (checking for GIS feature conversion, attributes, null and duplicate errors)

17. Final deliverables (hard copy print and GIS data for geo-coding)

18. Metadata preparation

2.1 Collection of the sheet-wise analog cadastral village maps

Before executing the project, availability of sheet-wise cadastral maps have to be ascertained. The maps should be up-to-date and in good condition. The condition should be such that it can be scanned through a contact (roller) scanner or a flat-bed scanner (prefer flat-bed scanner). The DQC-1 has to be performed at this stage before it is sent for scanning. The quality check procedure will include the condition of the map – it should not be a cloth mounted, nor be torn or ragged, and not have too many folds. The control points (tics) should be available. The features of the map should be clear and distinguishable. Parcel number (khasra no.) should be distinct and readable. All symbols (*alamats*) should be distinct and properly understandable. Once found acceptable on all the above-mentioned characteristics, the sheet is tagged suitable for scanning.

2.2 Tracing or re-production of the analog map

If the sheet is not suitable, then the sheet has to be sent for tracing (preferably on a 75-100 GSM mylar film) or reproduction of the sheet by the LRD. The reproduced sheet has to be quality checked (DQC-1) and finally sent for scanning. The maps are to be traced using the following specification:

- Tracing to be done on 75 micron polyester film.
- Tracing should be done with 0.1 pen using black ink only.
- All the features should be traced.
- The labels should be placed neatly in the center of the feature with free hand drawing.
- In case the feature is too small to accommodate the label, it should be placed at a convenient location with a marker arrow.
- The heading and legend data should also be traced along with scale, north arrow, sheet no., etc. along with map border.

2.3 Sheet indexing and tics (tick-marks) highlighting

2.3.1 All sheets have to be indexed with appropriate index numbers. The index number is to be generated using the village metadata with respect to the various administrative codes (State, district, tehsil, and revenue inspector/patwari/thana/mouza and village code). The index number should be a unique number with information of the administrative hierarchy of the village. A typical example of index number may be I120501007035101 (IDDTTRRHHHVVVVnn).

2.3.2 One of the very important processes before scanning is the highlighting the tics (wherever they are present) and transferring of the tics (where absent). The following procedure should be followed in this regard:

- **Gridlines & tics are available** - The tics on the maps may be faint or in the form of grid lines. Uniformly distributed tics should be highlighted with a cross (X) depicting the exact intersection of the gridlines or tic position. The distance between the tics/gridlines, based on the scale, has to be ascertained and measured. This will be useful in selecting the mathematical grid for grid correction.

- **Four corner tics available** – The tentative distance of the corner tics has to be measured, based on the scale, and highlighted with a cross (X) depicting the tics position.

- **No gridlines or tics available** – This map will have no reference points, but to remove the scanning error, if any, the situation may be rectified by using the transferred tics. The tics from standard mathematical grid (grid will change depending upon the scale) have to be transferred on the analog sheets by overlay method on light-table. These transferred tics will rectify any distortion during scanning of the sheet. However, the map sheet can be corrected by registering the graphical scale with the standard template scale.

2.4 Scanning of the analog maps (converting analog to raster cadastral images)

2.4.1 The cadastral maps are scanned using AO size raster scanner. While scanning, the important parameter -- DPI (dots per inch) -- has to be precisely set. The DPI is based on drawing characteristics and information required. In general, the following minimum specifications should be adopted while scanning the cadastral sheets: Maps should be scanned at 100-200 DPI Black/White (8 bit gray tone) mode depending upon the density of the features. If all the details are not picked up during scanning, the scanning parameters should be changed to 400 DPI on 24-bit color. While scanning, the sheet has to be fed in straight upright position and smoothened so that any fold is not generated while scanning. In the flat-bed scanner, the map has to be laid flat on the glass, smoothened and scanned; and bulging should be avoided.

2.4.2 After successful scanning, the DQC-2 procedure has to be followed. The raster image of scanned map should be stored in TIFF format (*.tif or tagged image format). The scanned map orientation should be upright (north oriented). The scanned map should be cleaned and free from noise (i.e., unnecessary pixels or darkness in the image). To remove the noise, de-speckling should be

applied. The measured length and width within the bounding box of the scanned map should be +/-0.1% of the map manuscript measurements. The scanned image should not be skewed or warped; if there are any, it should be de-skewed or necessary correction should be applied, or it should be re-scanned. The scanned image should not have any line dropouts or stretched pixels; otherwise, it will have to be re-scanned. The scanned file will take the name of map index name, such as **I120501007035101.tif**

2.5 Grid correction of scanned cadastral map

2.5.1 Even after appropriate quality checks during the scanning process, there can be few errors due to machine specification and scanning techniques. There can be also some distortion in the input manuscript (analog cadastral map). The scanned map may carry forward the errors due to differential scanning, wear and tear or differential shrinkage/expansion. The net result may be non-uniform scale at parts of the map, deflection in north orientation, etc. To make the map plani-metrically accurate, rectifying the map with the vector grid is suggested.

2.5.2 Prior to the correction, selection of the appropriate grid has to be made. The grid is scale-dependent. Generally, the grid found on 1:3960 (16"=1mile) will be placed at a distance of 10 zaribs (i.e., 50.8 cm or 2.00000008 inch); the maps with 1:4000 scale will have a metric system grid and will be placed at a distance of 25 cm. Each sheet will have 10 X 14 grid blocks in 1:3690 scale, or 20 X 28 grid blocks in 1:4000 scale sheet. After ascertaining the scale of the maps under consideration, appropriate mathematical grid has to be generated.

2.5.3 After selecting the appropriate grid, the cadastral scanned maps have to be registered with the grid.

- **Gridlines and tics are available** - The highlighted tics in the scanned map have to be stitched/tagged with its appropriate intersections of the gridlines of the mathematical grid and then transformed.

- **Four corner tics available** – The highlighted four corner tics in the scanned map have to be stitched/tagged with its appropriate intersections of the gridlines of the mathematical grid and then transformed.

- **No gridlines and tics available** – This needs to be executed in two steps:

(a) The transferred tics before scanning are to be stitched/tagged with its appropriate intersections of the gridlines of the mathematical grid which was used to transfer the tics. Then first transformation is made. This will remove the scanning distortion, if any.

(b) Comparing the available graphical scale of the map with the mathematically generated graphic scale of the same type and then registering the scale and transform. This may correct the distortion of the map scale, if any.

2.5.4 The process should eliminate the possible warping effect of cadastral maps. High accuracy and low residual error are to be achieved in grid correction of cadastral images. The transformed rectified cadastral scanned image is termed as 'registered scanned cadastral map' and can take the name such as **R120501007035101.tif**. The quality check DQC-3 is performed on the image to see whether the gridlines overlay with the tics of the map. If the errors are not within the acceptable limits, re-registration has to be performed.

2.6 Feature abstraction from the grid-corrected scanned cadastral images

2.6.1 Template creation: Before starting the vectorization, a standard template has to be created. In the template, the layer name, line type, color and thickness for each feature (e.g., parcel, roads, canals, river, etc.) present on the map is standardized. Different graphical representation (symbol-*alamats*) in the map is to be standardized as point features with proper layer name, symbol and colour. This maintains uniformity in all the map outputs. The template also holds various mathematical grids, graphical scales, and other map features like north

arrow, boundary lines, headings and other permanent annotations. A symbol library is created, which contains the various symbols shown in a village map. The symbol library gets depicted in the legend of the template. The main intention behind this is to maintain the uniformity over all the village maps that are digitized. The template should also address the font type of the annotation in the maps. Generally, UNICODE system is adopted with proper font for depicting the local language script. However, the template standards may vary from State-to-State and have to be regenerated with changes in the input specifications.

2.6.2 Feature abstraction is the process of capturing the point, line, and polygon features as vectors and text as annotation. The grid-registered scanned cadastral map sheet is displayed in the background, the required environment settings for digitization are set, and the required features are captured into different layers (based on the feature type). During digitization, attributions to the features will also be done. Only heads-up manual digitization should be carried out. Auto-vectorisation should not be attempted. Error should be within permissible limits for digitization, viz., weed tolerance, coordinate movement tolerance, sliver polygon tolerance, coordinate unit, planimetric errors, fuzzy tolerance, etc.

2.6.3 The uniformity in layers, line type, color, annotation, etc. during digitization will be maintained by using the template, as described above, to capture all the features in their respective layers. The final output of this process will be a digital map which will be a true copy of the paper map, along with necessary legends, scale bar, north arrow, borders, etc.

2.6.4 Once the digitization process is over, the DQC-4 is performed. This process assures the features abstracted from the scanned map sheets are true in its type (i.e. point, line or polygon), accurate in location and its attributes. Tag should be maintained wherever the feature/annotation could not be read along with null and duplicate errors. The errors have to be reported in the draft output

map, which will be sent to the LRD for through checking (*for details refer to the Quality assurance*)

3. Guidelines for feature digitization/abstraction

3.1 The general specifications for digitization are given below:

- The data is to be digitized using heads-up digitization.
- The features are to be captured such that the polygon features are put in one layer, the line features are in another layer while the points are in a different layer.
- The lines are to be digitized as polylines only, coincident lines are to be digitized once and copied to appropriate layer.
- Feature specific codes are to be assigned uniquely as given in the format.
- The data should be topologically correct for each of the layer.

3.2 The accuracy requirement and specifications for each of the type of features is indicated below:

3.2.1 Polygon feature specifications

- The parcel boundary should be digitized in such a manner that the resulting vector line falls in the center of the raster data image element being vectorized.
- The parcel boundaries are generally straight, hence should be digitized using 2 nodes/vertices in keeping with the shape of the polygon.
- The feature should be digitized in such a manner that there is no overshooting or undershooting of arcs, or duplicate arcs.
- The feature should be captured with specked symbol.

- The feature should be digitized with minimal number of vertices while, at the same time, maintaining the smoothness or angularly of the lines, as the case may be.
- The feature should be a closed polygon without any dangles or sliver.
- Each polygon should have a unique PIN as per the coding scheme indicated below.
- The tolerance values for arcs, node snapping and vertices should be such that the features snap within the pixels defining that feature and do not snap outside.
- All features like parcels, roads, rivers, etc., which form the polygons, are to be digitized and coded as per the coding scheme.
- The connectivity of the rivers/roads is to be maintained and should not be disjointed.
- The label (parcel no.) should be placed in the center of the feature.
- Nodes are to be added wherever symbols are depicted on the parcel boundaries.

3.2.2 Point feature specifications

The features shown on maps as points, like wells, temples, trees, etc., are to be digitized as point features, for which the digitizing rules and coding scheme are given below:

- The feature should be digitized as a point placed at the center of the raster image defining it.
- There should only be one point at one location.
- Each feature should have a unique ID.

3.2.3 Line feature specifications

The linear features shown as single line arcs on the map or linear double line features or symbols like rivers, roads, pipelines, etc. are to be digitized and compiled into the line layer for the village. The single line arc features, whether shown as continuous lines or broken lines, are to be captured from the map image. In addition to this, the double line roads, rivers, pipelines, etc. from the polygon coverage are also to be put into the line coverage. The feature coding guidelines are given below:

- The river/roads depicted on the image represent the outside edges in case of double line features and should be digitized as such. The resulting vector should not deviate from the pixels defining it. These features should be captured only once and copied into the appropriate layers before building the topological relationships.
- The feature should be vectorized in such a manner that the shape is captured and retained as it is.
- The feature should be vectorized using optimum member of nodes/vertices so that the shape is retained and does not appear jagged.
- The continuity of the features such as rivers, roads, etc. must be maintained across the map sheets.
- At crossings, the features should be digitized with or without intersection, as the case maybe.
- In case of single line features, they should be captured as a single continuous feature from one end of the feature to the other end without break.
- In case of double line features the centerline should not be digitized. This will be represented by appropriate symbol.

- There should not be any gap between two connecting features, nor any over-shoots; the features should be snapped to connecting features.
- **The features should be coded as per the coding scheme.**

3.2.4 Attribute data specifications

Attribute data for each parcel is attached in the text layer. The parcel number and parcel land use are the two main attributes that are linked to the village polygons. Parcel number is the primary key for linking of RoR details.

4. Layout and printing hard copy for evaluation

4.1 Hard copy color output would be generated using the template decided upon by the State/UT concerned for the purpose, as described above. The first draft hard copy is generated at the original scale of input map for each sheet. Good quality paper is used for printing the digitized map. The color scheme and paper thickness should be according to the standards specified for printing and is to be decided by the State/UT.

4.2 The officers from the concerned department dealing with land records/maps should carry out 100% validation of the hard copy color output (DQC-5). The output will be validated completely for physical dimensions, parcel size, shape, numbering, feature location and coding, annotation, etc. The corrections are marked on the output and are to be incorporated in the digitized digital data.

4.2.1 Quality check guidelines on hardcopy output by Land Revenue Department

Input:

- Plotter output at A0 size generates at the true scale
- A4 size output depicting zero fills and duplicate labels

Process:

The quality check is carried out on total population (100% data) and there is no sampling involved in this quality check.

- Check for the color scheme in the hardcopy output with reference to the template designed for this project
- Check for content, size and color of the various elements of the map
- Check for the logo details:
    - Group number
    - Village number
    - Bandobust number
    - Village name
    - Halka number
    - Halka name
    - Revenue Inspector (RI) circle name
    - RI circle number
    - Tehsil name
    - District name
    - Year
    - Scale
    - Sheet number
- Check for legend details
- Check for title disclaimer details
    - Project name

- Map title
- Generated for ____
- Generated by _____

- Check for sheet index
- Check for north arrow
- Check for the dimensions of the grid cells and the map with reference to the original map used for digitization
- Check for feature matching
  - parcel boundaries
  - parcel number
  - parcel attributes – zero fills, duplicate labels
  - part parcels, combined parcels, etc.
- The features to be checked are:
  - Permanent parcel boundaries, temporary parcel boundaries, paddy bund boundaries, village boundaries, etc.
  - Drainage and water body details
  - Road network, rail network, cross drainage details, etc.
  - Vegetation details, etc.
  - Traverse lines and points details
  - Forest boundary details
  - Historical, religious places, etc.
  - Amenities details
  - Settlement locations, etc.

- After validation by the LRD, check for the signature of the validation officer from LRD for authenticating the quality check
- Check for the list of all parcel numbers provided on A4 size with reference to the details available from the LRD

4.2.2 Incorporation of the corrections suggested by the LRD

The draft hard copy color output, checked and corrected in all aspects by the Land Records Department is compared with the digital data. The corrections suggested by the LRD are incorporated in to-to. Special checks have to be preformed to certify the incorporation of the error-corrections. After the correction of each sheet, the sheets pertaining to each village is mosaiced.

5. Sheet mosaicing of a village

Village-level mosaicing is done by joining the individual map sheets of the village to form a complete village map. Edge matching is done by bringing two different map sheets of the same village into the same file and matching their edges with reference to the grid and the features on the maps. Continuity should be maintained for all the features at the edges and its attributes. Care is taken to eliminate all dangles (undershoot/overshoot) and label errors. On-screen checking is done to check the common edge between the mosaicing maps. One has to ensure the completeness of the polygon features such as parcels, continuity in line features such as rivers, roads, etc. Duplicate features along the edge, especially symbols have to be removed. Finally, topologically correct features for the entire village have to be generated and quality checked. The DQC-6 quality check procedure is for ascertaining the feature continuity and attribute carry forward.

6. Conversion of the digitized data into topologically correct GIS data format

6.1 After mosaicking, the digital data is converted into topologically-corrected GIS data features. The GIS data will have separate point, line,

polygon and annotation features. The strength of the GIS features is the establishment of the spatial relationships within and between the various features with respect to position, containment, contiguity, proximity, adjacent and intersection. After establishing the topology, the attribute data in the standard structure should be filled up. The unique primary key and the foreign key are generated. The completeness and accuracy of the attributes are checked by both display and automatic S/W method.

6.2 Null and duplicate attributes' lists are generated, both as text file and spatial data outputs. This forms part of the DQC-7 procedure. The error report is again evaluated and checked. Wherever possible, corrections are incorporated, or else tagged with appropriate error codes. The data, at this stage, is ready for the further process of overlaying on the satellite data and query.

7. Final deliverables (hard copy print and GIS data for geo-coding)

The final hard copy print is taken on a paper of specified thickness (preferably 150 GSM of A1 size) of the actual sheet size for archival. The GIS data in prescribed format has to be stored in the central data warehouse and used for further processing of linking with the RoR data.

8. Metadata preparation

8.1 The system and procedures of database generation should evolve a strong metadata, for which the metadata standard has to be designed. The objectives of the standard are to provide a common set of terminology and definitions for the documentation of digital geospatial data. The standard establishes the names of data elements and compound elements (groups of data elements) to be used for these purposes, the definitions of these compound elements and data elements, and information about the values that are to be provided for the data elements.

8.2 The major uses of metadata are:

- to maintain an organization's internal investment in geospatial data,
- to provide information about an organization's data holdings to data catalogues, clearinghouses, and brokerages, and
- to provide information needed to process and interpret data to be received through a transfer from an external source.

8.3 The information included in the standard are based on four roles that metadata play:

- Availability -- data needed to determine the sets of data that exist for a geographic location.
- Fitness for use -- data needed to determine if a set of data meets a specific need.
- Access -- data needed to acquire an identified set of data.
- Transfer -- data needed to process and use a set of data.

Finally, developed metadata will store information pertaining to the each cadastral village map layer and tabular data available from all sources. Future metadata should also describe the updation rate, time and history of the land transaction.

9. QUALITY ASSURANCE

9.1 A comprehensive quality control program for ensuring the quality of data has to be followed based on the criteria provided and permissible accuracy. The measure of accuracy derived based on the allowable limits would fall under one of the following heads, viz., physical accuracy and logical accuracy.

9.2 Physical accuracy

In any data conversion, some amount of variations would creep into the data sets depending on the type of digitization procedures followed and the

subsequent projection and transformation methods followed. Following tests would be made to ensure that all the features in a dataset are within the permissible limits:

Point features

- Location of a feature with reference to a standard layer would be the same or within the prescribed limits.
- A feature carries the same information after migration.

Line features

- Variation in length of a line segment selected based on an attribute or combination of attributes.

Polygon features

- Variation in the number of lines that makes the polygon, their length (perimeter) and subsequently amounting to area.

9.3 Logical accuracy

This accuracy corresponds to completeness and correctness of data when a data set is analyzed. Following tests would be performed to ensure the logical accuracy of the data sets:

An attribute query run on the datasets should give a consistent result in terms of

- Number of features selected;
- The content of the features selected.

Any data set resulting out of analysis of two or more datasets should be logical.

Any spatial query run on the datasets should give the same result in terms of

- Number of features selected;

- The content of the features selected.

10. DATABASE DESIGN & STANDARDS

10.1 A data design provides a comprehensive architecture for the database to be viewed in it's entirely and evaluated as to how the various aspects of it need to interact. A good design results in a well constructed, functionally- and operationally-efficient database that –

- Satisfies the objectives and supports requirements.
- Contains only required data without redundancy.
- Organizes data so that different users access the same data.
- Accommodates different versions of the data (i.e., allows manipulation and updates).
- Distinguishes applications that maintain data from those that use it.
- Appropriately represents codes and organizes geographical features and their relationships (topology).
- Support interoperability.

10.2 Database standards are an important element of the database design. Standards enable applications and technology to work together, they encourage efficiency and effectiveness, help reduce costs, protect investments in data against technological change, and lead to availability of accurate, compete and current data. Tools, applications and data affect each other, and the standards are established with this condition.

10.3 Database construction guidelines

The digital database prepared under the DILRMP should form the base of any further activities, viz., revenue data management (RoR), spatial data management (geo-database), development and updation of land records, etc.

Strong database standards, supported with the link to survey/resurvey procedures and future operational and maintenance procedures, are a must. This helps in backward and forward integration of the existing database with the ever-changing database management technology. Broadly, the database construction guidelines can be divided into four major categories under the present scope of digitization of cadastral maps, overlay on the satellite data and integration with textual data:

1. Satellite image database preparation.
2. Digitization (analog to digital conversion) of cadastral village maps.
3. Geo-referencing of digitized GIS data with satellite image data.
4. Metadata generation and achieving of the database for transactional use.

10.4 Procedures for building the database

10.4.1 The elements of the database are to be created as per the standards herein and the vendors/agency/service provider has to take care that digitization is as per the standards. The inputs are subject to validation at each stage and will include qualitative as well as quantitative checks for input and output accuracy.

10.4.2 The creation of a clean digital database (topologically-corrected and geo-coded) is the most important and complex task upon which the usefulness of the database lies. Two aspects need to be considered here: one is the geographic data necessary to define where the parcel of land or, for that matter, any other feature is located, and second is its unique identification for associating attributes that link to the records. At every stage, there should be necessary and proper data verification to ensure that the resultant database is as free as possible from error. Errors would generally be of the following types:

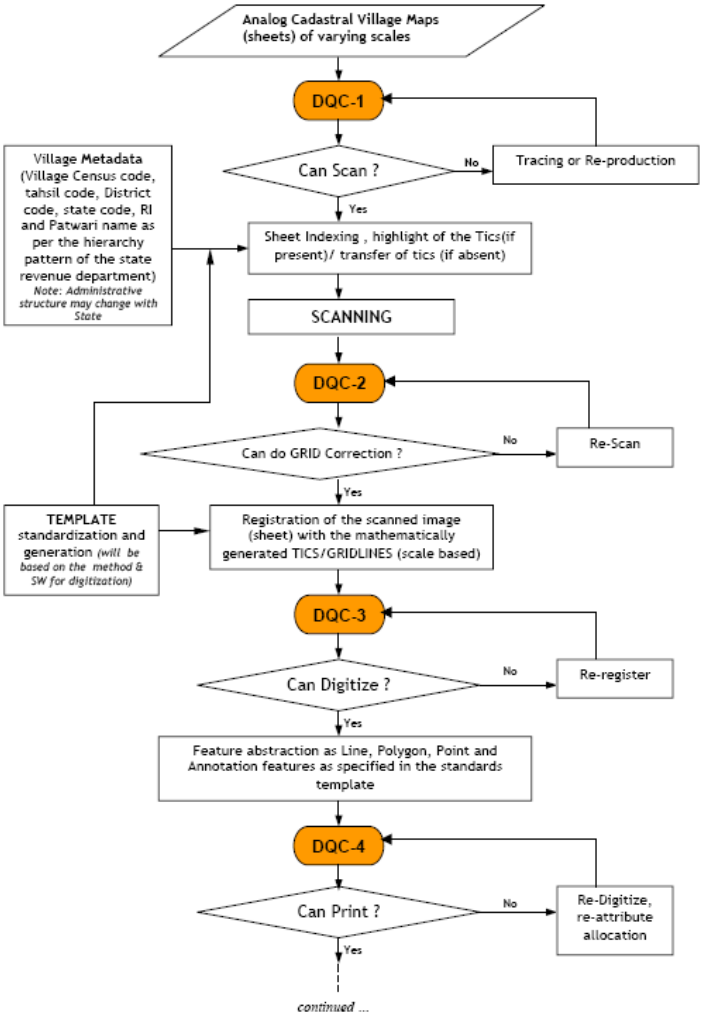
- Spatial data are incomplete or double.

- Spatial data are in the wrong place.
- Spatial data are at the wrong scale.
- Spatial data are distorted.
- Spatial data are linked to wrong attributes.
- Non-spatial data are incomplete.

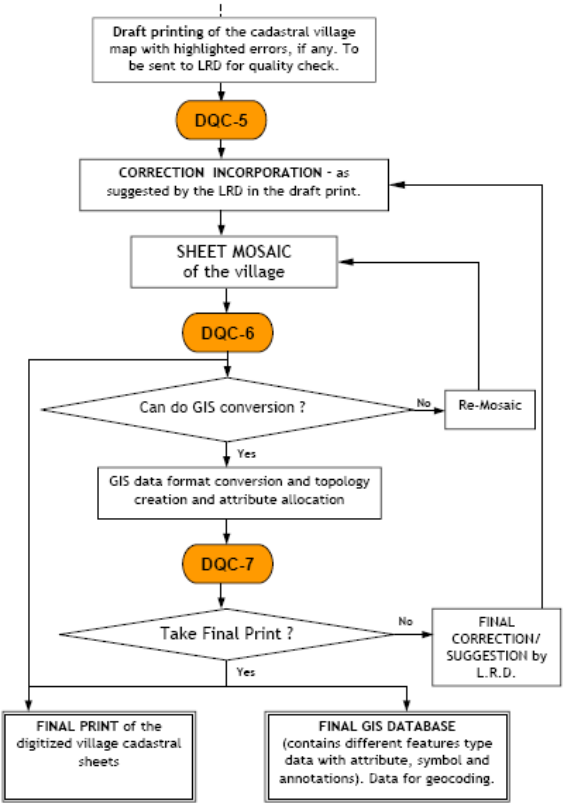
10.4.3 For evaluating the digital data, the following guidelines/parameters would be followed:

1. Assuring that appropriate digitization methods with proper template, accuracy, precision and quality check procedures are followed.
2. Verification of the co-ordinate system (in CAD); projection and datum (in geo-database).
3. Checks for digitization errors like silvers, dangles, and topology rules.
4. Attribute verification providing the correctness of feature coding by listing it out and comparing with the manuscript maps. Randomly checking a few parcels for shape and form listing of polygons with null and duplicate attributes.
5. Verification of edge-match with adjacent sheets and villages by displaying them side by side.
6. Comparison of the total area of the village by aggregating the parcels, etc. vis-à-vis the area reported in census handbooks or available with the Land Records Department in the RoRs.
7. Verification of geo-referenced control points (GCPs) and RMS (Root Mean Square) error for the transformation model.
8. Checks for mosaicing of maps and overlay on the satellite data.
9. Attachment of appropriate metadata at all stages of the database preparation.

Flow chart of the Digitization process in NLRMP



Flow chart of the Digitization process in NLRMP



Digitization Quality Check (DQC 1 to 7) :

DQC-1 : Visual quality check of the analog sheets for visibility, readability, folds/straightness and scan worthy.
DQC-2 : Checking of the digital scanned sheets for DPI, format, quality, speckle removal, scan lines dropout, feature clarity and GRID correction worthy.
DQC-3 : Final checking of the GRID corrected scanned image with overlaid mathematical grid (scale dependent) and approval for the final feature abstraction.
DQC-4 : Quality assurance of the features abstracted from the sheet for its type, location and attribute. Also checking has been done for the unread attributes, features, null attribute and duplicate errors, if any.
DQC-5 : Detail quality checking of the digitized sheet be the Land Record Department (LRD) with detail error reporting and suggestion, if any.
DQC-6 : Checking for the feature continuity and attribute carry forward or loss of features of attribute during the mosaic process.
DQC-7 : Checking for the topologically corrected GIS feature conversion, its attribute allocation, duplicate IDs and Null IDs.

Digitization of FMB/Tippans

1. In the States where ladder data is the basic records, the same is fed into the computer to generate tippan. The tippans are mosaiced to generate village maps.

2. Field Measurement Book (FMB)

FMB is a sketch showing measurement boundaries of the survey number. It is a rough sketch and not to scale. It provides a record of measurement and boundaries. Field Measurement Book contains several field measurement sheets covering measurements of all lands in a village. In some cases it is drawn to a scale of 1:1000 or 1:2000 showing all field and subdivision boundaries and their measurements. It is also called the atlas of field maps. A record of measurement of individual fields and subdivisions is thus provided, which will enable any inspecting officer to identify the boundaries, and whatever is required for investigation of boundary disputes, detection of encroachments, and for the measurement of further sub-divisions, etc.

2.1 Various components of the Field Measurement Book are discussed below:

2.1.1 *G-line*

This is an imaginary line (Guess Line) which converts the map into various sizes of triangles in order to accurately fix the boundary lines and the various points in the map. This line is the foundation on which the entire map is built. Any error in a G-line will affect all calculations based on that G-line.

2.1.2 *F-line*

It is the outer boundary line in a sketch, which signifies the actual field boundaries of the outer lines of the sketch. The F-line points are fixed with reference to its offset distance from the G-line.

2.1.3 *Subdivision lines*

These lines demarcate a small parcel of land within a survey number. A sub-divisional polygon's extent is directly correlated to the extent found for the particular sub division. The sub-division lines are generally defined through a ladder, except for the graphical representation in the FMB.

2.1.4 *Ladder*

As mentioned earlier, the field line points are defined with reference to an offset distance from the G-line. The offset distance may be to the left or right side of the G-line. This left or right angle deviation (offset) is depicted by the ladder. By converting the ladder details into electronic data, once can produce the outline of the FMB sketch. The ladder details get attracted whenever there is a change in the field line, involving a bend.

2.1.5 *Extension lines*

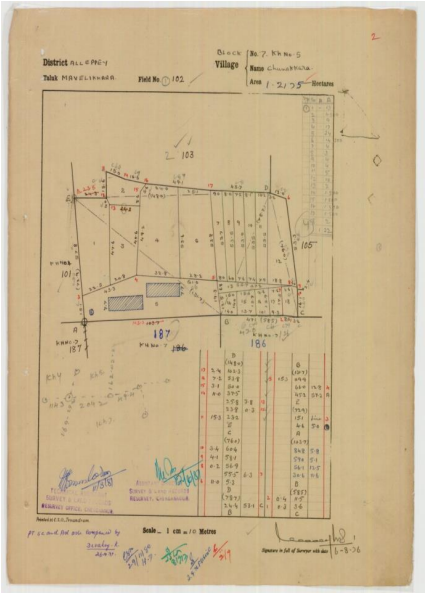
Each survey number field is an integral part of the village map and hence other fields surround each sketch. The exact direction in which the subject field joins the neighboring field is shown on the FMB as an extension line.

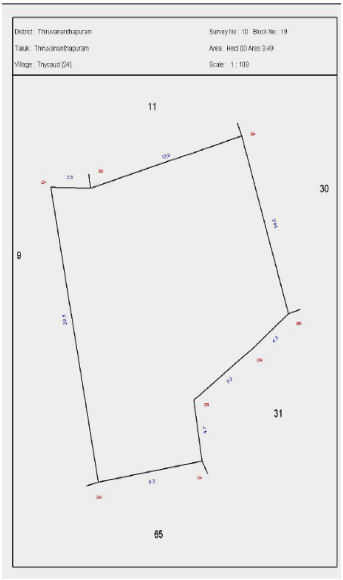
2.1.6 *Neighboring field survey numbers*

As mentioned earlier, each survey sketch is surrounded by other fields. These surrounding field numbers are marked around each FMB. This enables mosaicing of FMBs into D-sketches and village maps and so on.

3. In FMB, the traverse coordinates are provided in five columns. The FMBs also depict the dimensions of each field boundaries and the sub-divisions. As mentioned earlier, the field line points are defined with reference to an offset distance from the G-line. The offset distance may be to the left or right side of the G-line. This left or right angle deviation (offset) is depicted by Ladder. By converting the ladder details into electronic data, once can produce the outline of the FMB sketch. The ladder details get attracted whenever there is a change in the field line, involving a bent.

4. At present, Field Measurement Books are drawn and maintained manually. Digitisation of Field Measurement Books will result in faster processing of the FMB sketches including creation of new sub-divisions, modification of existing sketches, portability of data, facility to draw the FMB sketches to different scales leading to higher clarity, and quicker delivery of copies of FMBs to land-owners.





Chapter-2

(A) Survey/Re-survey

Model-I

Pure Ground Method using TS and DGPS

1. Methodology: This model should be adopted for survey/re-survey of the areas for which the ortho-photos from aerial photography or high-resolution satellite imagery (HRSI) are not available, or it is decided to carry out the survey work using TS+DGPS and without going for aerial photography or HRSI. The technical details are also applicable to ground truthing in the hybrid methodology involving aerial photography or HRSI. The major steps involved will be:

1.1 Notifications, survey plan and publicity

a) Publication of notifications under the relevant rules of the State Government/UT Administration in the State/UT and District Gazettes by the Department concerned with the survey and settlement work.

b) Opening of a publicity cell at the district level, which will generate awareness among the owner(s)/enjoyer(s) in the area notified for survey, emphasizing the need for them to be present at the time of visit of the survey team, and to show the boundaries of their land parcels and participate in the survey and settlement process. The establishment of the publicity cell shall be the responsibility of the Department concerned with the survey and settlement work.

c) Preparation of a detailed schedule, tehsil/taluk-wise, of the visit of the survey team to each village, and to publish them at the district, tehsil/taluk and village levels. The program should be given wide publicity. The detailed schedule should be prepared by the survey agency, and, where the agency is outsourced, approved by the Department concerned with the survey and

settlement work.

d) Circulating the detailed schedule of the visits of the survey team among the heads of the land-owning departments, so that the officials from those departments help the survey agency in the identification of the boundaries of the land parcels owned by their departments.

e) Publication of the village-level survey-plans, showing details of the day-wise program of survey in the concerned tehsil/taluk/village, at least 10 days before commencement of field survey. The revenue village should be taken as a unit for survey.

1.2 Preparations for the survey work using TS+DGPS

a) There should be adequate number of survey teams and adequate number of adjudicating teams to complete the work as per the schedule.

b) Each survey team should have at least one TS operator, one plane-tabler and four support staff.

c) Each survey team should have adequate number of field workers and supervisory staff conversant with the local language.

d) The adjudication team shall consist of the survey adjudicator, who will invariably be a Government official, assisted by one surveyor and one TS operator. Where the work is outsourced, the vendor will provide the TS operator along with a TS.

e) A well-equipped survey centre shall be established in each village by the survey agency. Where the work is outsourced, the State Government/UT Administration may decide upon sharing of the expenses between the government and the vendor.

f) A Gram Sabha meeting should preferably be called, to which the concerned local officials should be invited, and the entire action plan (including the day-wise survey schedule) should be discussed before commencing the survey

work to facilitate further cooperation for the survey exercise.

g) Two tertiary control points and one auxiliary control point should be established with the help of the DGPS by extending the primary/secondary control network, before the commencement of ground truthing.

h) The tertiary and auxiliary control points should be plotted on a blank plane-table (PT) section on 1:2000 scale, on which the Universal Traverse Mercator (UTM) grids (X,Y) have been drawn.

1.3 Participatory ground truthing

(a) The field work shall commence as per the schedule published.

(b) Delineation of parcel boundaries shall be carried out using TS and plane-tabling, as indicated below:

i) The surveyor with TS will start the work from a tertiary control point, using the auxiliary control point for back sighting. The vertices/corner points of the land parcel will be surveyed as offsets from various traverse stations. The traverse will finally be closed on the second tertiary point for checking the accuracy of the traverse. The systematic errors in the traverse will be distributed for computing the final co-ordinates of vertices/corners of the land parcel. The work will be carried out with reference to the existing land records and as per the procedure laid down in the relevant Revenue manual, in the presence of the concerned owner(s)/enjoyer(s) and the owner(s)enjoyer(s) of the adjacent land parcels.

ii) The land parcel boundary, as surveyed using the TS, will be plotted on the PT section in the field itself. For this purpose, the plane-tabler will position himself/herself close to the TS, so as to enable plotting of the parcel boundaries simultaneously.

iii) Wherever there is reserved forest or land transferred to the Forest Department, or Government/community land is involved, the concerned officials should be involved in identifying the relevant parcel boundaries.

iv) The survey team should take care that the ridges which are not actually boundaries of the parcels, are not taken into account for delineation of the parcel boundaries.

v) In cases where collective cultivation is done, or where boundaries are not demarcated, the parcel boundaries should be recorded only after their demarcation on the ground has been carried out with reference to the existing land records and as per the procedure laid down in the relevant revenue manual, in the presence of the concerned owner(s)/enjoyer(s).

vi) Each land parcel should be identified by its owner(s)/enjoyer(s) and should be given a unique ID which shall be used for linking the attributes data collected in respect of the land parcel.

vii) The land owner(s)/enjoyer(s), who intend to affix stones at their field junctions, may be shown the points where stones can be affixed.

viii) The current land use, irrigation status and other land attributes data shall also be collected by the survey team. All such information should also be incorporated on the PT and its auxiliary records.

1.4 Survey of Government/community lands

(a) The village-wise list of Government/community lands with area and the list of private lands adjoining those lands shall be prepared by the survey agency. The Government/community lands shall be surveyed first, preferably in the presence of officials from the concerned departments/PRI representatives, who should bring necessary records with them, and the owner(s)/enjoyer(s) of the adjoining parcels.

(b) The land parcel maps pertaining to the Government/community land parcels should be handed over to the concerned officials, who shall record objections, if any.

(c) Details of the land parcels should be recorded in the prescribed formats.

1.5 Acknowledgement, responsibilities and quality control

After surveying the parcel boundaries and plotting them on the plane-table sections, the authorized representative of the survey team shall affix his/her signature and seal on the spatial record so created, and, thereafter, shall proceed to obtain the signatures of the owner(s)/enjoyer(s) and also those of the concerned Revenue official(s), in case the survey work is outsourced, certifying that the survey has been carried out in their presence and to the satisfaction of the owner(s)/enjoyer(s). Information containing the details of the surveyors, who have carried out the survey, should also be recorded. 100% verification and validation shall be carried out, by the Department concerned with the survey and settlement work, for quality control, against each field PT section.

1.6 Digital topographic database (DTDB) and final plotting

The boundaries of parcels surveyed shall be downloaded from the TS and linked with the attributes data collected, in the GIS format so as to create the DTDB. The final plotting and softcopy DTDB of the land parcels and other topographic details shall be generated from the TS data and associated software by the survey agency.

2. Preparation and distribution of draft land parcel maps (LPMs) and linking attributes

(a) The draft LPM should be prepared for each land parcel, in duplicate. The draft LPM shall be given to the concerned owner(s)/enjoyer(s) preferably by the same evening, or latest by the next morning, for receiving objections, if any.

(b) The draft LPM shall contain:

i) The LPM sketch at a suitable scale to fit to an A4 size paper. The scale should be rounded off to the next scale of 50 (e.g., if the scale is coming to 1:446, then it should be fitted to a scale of 1:450; in case the scale is coming as 1:421, then it should be fitted to a scale of 1:450; and in case the scale

required to fit in the paper is 1:496, then it should be fitted to a scale of 1:500).

ii) The actual dimensions of the parcel and details of the adjoining survey numbers should be indicated on the sketch.

iii) The attributes of the land parcel should also be printed in a tabular form, at the back of the sketch.

3. Recording objections

A register shall be maintained by the survey agency to record and track the objections raised by the owner(s)/enjoyer(s). The objections should also be flagged in the DTDB for better control and monitoring.

4. Objections redressal/adjudication

(a) Individual notices in the prescribed format, as per the provisions of the applicable revenue manual, shall be given to all recorded owner(s)/enjoyer(s) with a copy of the land parcel map and measurement details, marked on the same notice. The notices shall be served, either personally, or sent by registered post with acknowledgement due, if the land owner(s)/enjoyer(s) live outside the concerned area. On the expiry of the stipulated period, if any objection is raised by the owner(s)/enjoyer(s), it shall be recorded in the Objections Register.

(b) The survey team shall assist the Government officers in resolving the objections. The survey team will resurvey the field of the owner(s)/enjoyer(s), if required and incorporate the necessary changes and generate the revised LPM.

(c) The survey team shall maintain the Objections Register. The objections shall also be tracked in the DTDB in GIS form.

5. Survey completion report

After completion of the survey, the survey team shall submit the completion

report to the Department concerned with the survey and settlement work.

6. Promulgation of survey

(a) Subsequently, the draft record of land register, village map, and individual parcel maps of agricultural and non-agricultural lands would be displayed for the stipulated period in the office of the Gram Panchayat and tehsil/taluk for the information of the public.

(b) A record of the complaints received during the above-mentioned period, should be maintained, and each complaint received should be acknowledged by a receipt.

(c) The complaints received shall be verified and necessary corrections, if warranted, shall be carried out. The survey agency shall carry out the resurvey of the land parcel, if required.

(d) The adjudication team will take up the objections, village-wise. They should draw up a day-wise program for redressal of the objections and inform the concerned owner(s)/enjoyer(s) within the prescribed timeframe as per the State/UT laws/manuals. They shall dispose of all objections as per the relevant Acts/rules.

(e) As soon as the disposal of objections is completed, a final notification under the relevant Acts/rules/regulations will be published as per the prescribed procedure, completing the process of survey.

(f) The land parcel register will be updated by the survey agency as per the information received from the adjudication team, after the latter has redressed the objections.

7. Importance of quality check

Since these survey records will form the basis of the conclusive titling system, they must be prepared with utmost care and accuracy. Hence, the Department concerned with survey and settlement will be responsible for ensuring 100%

quality check at each stage of the preparation of the survey records and the responsibilities for this checking must be clearly spelt out among the Departmental officials. The patwari shall carry out 100% checking, and the Revenue Inspector, tehsildar or an officer of the equivalent rank, the SDO and the Deputy Commissioner/District Collector should randomly check 50%, 10%, 3% and 1%, respectively, or as stipulated in the State/UT laws/manuals. A strict view should be taken where too many errors are found un-checked in the survey records.

Model-II

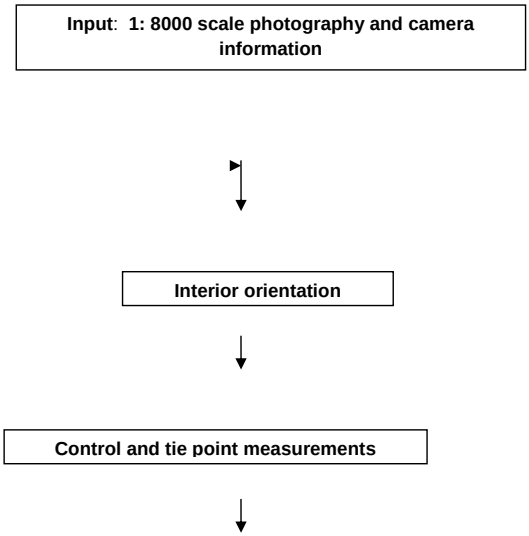
Hybrid Survey Methodology using Aerial Photography and Ground Truthing using DGPS/TS

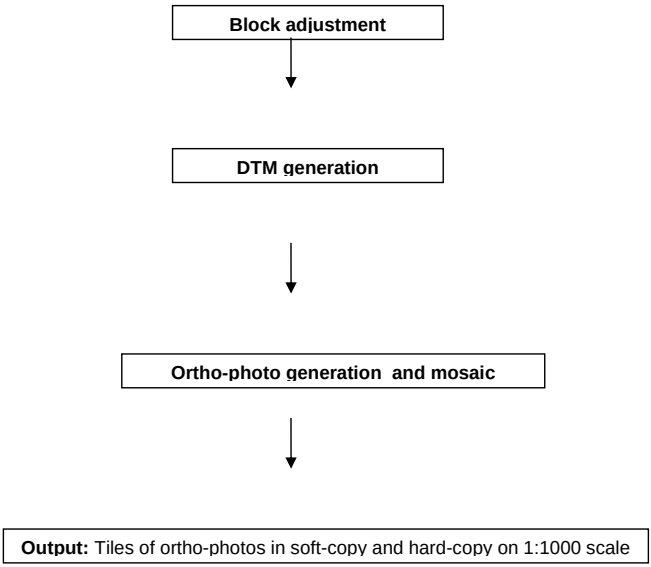
(Based on the system followed in Gujarat)

1. Survey methodology

1.1 The major steps involved in cadastral survey using aerial photography and ground truthing by TS/DGPS are:

1.1.1 Generation of ortho-photos, i.e., terrain-corrected digitally-rectified aerial photographs in softcopy and hardcopy (bromide/coated paper prints) by digital photogrammetric techniques by the technical agency/vendor designated for the purpose by the State Government/UT Administration. The following flow chart indicates the technical process involved:





1.1.2 Notifications, survey plan and publicity

a) Publication of notifications under the relevant rules of the State Government/UT Administration in the State/UT and District Gazettes by the Department concerned with the survey and settlement work.

b) Opening of a publicity cell at the district level, which will generate awareness among the owner(s)/enjoyer(s) in the area notified for survey, emphasizing the need for them to be present at the time of visit of the survey team, and to show the boundaries of their land parcels and participate in the survey and settlement process. The establishment of the publicity cell shall be the responsibility of the Department concerned with the survey and settlement work.

c) Preparation of a detailed schedule, tehsil/taluk-wise, of the visit of the survey

team to each village, and to publish them at the district, tehsil/taluk and village levels. The program should be given wide publicity. The detailed schedule will be prepared by the survey agency, and, where the agency is outsourced, approved by the Department concerned with the survey and settlement work.

d) Circulating the detailed schedule of the visits of the survey team among the heads of the land-owning departments, so that the officials from those departments help the survey agency in the identification of the boundaries of the land parcels owned by their departments.

e) Publication of the village-level survey plans, showing details of the day-wise program of survey in the concerned tehsil/taluk/village, at least 10 days before commencement of field survey. The revenue village should be taken as the unit for survey.

1.1.3 Preparations for ground truthing

a) There should be adequate number of survey teams and adequate number of adjudicating teams to complete the work as per the schedule.

b) Each survey team should have at least one TS operator and two support staff.

c) Each survey team should have adequate number of field workers and supervisory staff conversant with the local language.

d) The adjudication team shall consist of the survey adjudicator, who will invariably be a Government official, assisted by one surveyor and one TS operator. Where the work is outsourced, the vendor will provide the TS operator along with a TS.

e) A well-equipped survey centre shall be established in each village by the survey agency. Where the work is outsourced, the State Government/UT Administration may decide upon sharing of the expenses between the Government and the vendor.

f) All tiles of ortho-photos (on bromide/coated paper prints) covering a village shall be handed over to the village-level survey team well before the commencement of field work.

g) Before the commencement of survey in the village, quality checking of the ortho-photo images shall be carried out for clarity of details in the bromide/coated paper prints. A report shall be submitted by the survey team regarding the suitability/unsuitability of the print for ground truthing. If the print is of poor quality or of poor brightness/contrast, or if there is any problem relating to plotting, a fresh print will be taken out.

h) A Gram Sabha meeting should preferably be called, to which the concerned local officials should be invited, and the entire action plan (including the day-wise survey schedule) should be discussed before commencing the survey work to facilitate further cooperation for the survey exercise.

1.1.4 Participatory ground truthing of land parcels

a) The field work shall commence as per the schedule published.

b) The field team shall mark boundaries of the land parcels on the bromide/coated paper prints, as shown by the concerned owner(s)/enjoyer(s) in the presence of the owner(s)/enjoyer(s) of the adjacent land parcels.

c) After identifying boundaries in the presence of the owner(s)/enjoyer(s) and marking them in the bromide/coated paper prints, the survey team should obtain an acknowledgement from the owner(s)/enjoyer(s)/concerned officials that the boundaries and details of the land parcel are recorded in their presence and to their satisfaction. The details of the surveyors, who have carried out the survey, should also be recorded.

d) In case the parcel limits are obscured in the ortho-photo, or the ortho-photo is not available, parcel boundaries, as shown by the concerned owner(s)/enjoyer(s) in the presence of the owner(s)/enjoyer(s) of the adjacent land parcels, shall be surveyed using TS/DGPS. In such cases, the survey

agency shall generate the land parcel map based on their TS readings and obtain acknowledgement of each plot/parcel from the owner(s)/enjoyer(s).

e) The tertiary control point should be used as the reference station for DGPS. The tertiary control point and auxiliary point should be used for TS survey. The plot boundaries can also be surveyed using the offsets from the details appearing on the ortho-photo, in which case, tertiary control and auxiliary points will not be needed.

f) The survey team should take care that the ridges, which are not actually boundaries of the parcels, are not taken into account for delineation of the parcel boundaries.

g) In cases where collective cultivation is done, or where boundaries are not demarcated, the parcel boundaries should be recorded only after their demarcation on the ground has been carried out with reference to the existing land records and as per the procedure laid down in the relevant Revenue manual, in the presence of the concerned owner(s)/enjoyer(s).

h) Each land parcel should be identified by its owner(s)/enjoyer(s) and should be given a unique ID, which shall be used for linking the attributes data collected in respect of the land parcel.

i) The land owner(s)/enjoyer(s), who intend to affix stones at their field junctions, may be shown the points where stones can be affixed.

j) The current land use, irrigation status and other land attributes data shall also be collected by the survey team as per the Data Model Structure (DMS).

1.2 Survey of Government/community lands

a) The village-wise list of Government/community lands with area and the list of private lands adjoining those lands shall be prepared by the survey agency. The Government/community land shall be surveyed first, preferably in the presence of officials from the concerned Departments/PRI representatives, who should bring necessary records with them and the

owner(s)/enjoyer(s) of the adjoining parcels.

b) The land parcel map pertaining to the Government/community land parcels should be handed over to concerned officials, who shall record objections, if any.

c) Details of land parcels should be recorded in the prescribed formats.

1.3 Acknowledgement, responsibilities and quality control

After surveying the parcel boundaries, the authorized representative of the survey team shall affix his/her signature and seal on the spatial record so created, and, thereafter, shall proceed to obtain the signatures of the owner(s)/enjoyer(s) and also those of the concerned Revenue official(s), in case the survey work is outsourced, certifying that the survey has been carried out in their presence and to the satisfaction of the owner(s)/enjoyer(s). Information containing the details of the surveyors, who have carried out the survey, should also be recorded. 100% verification and validation shall be carried out, by the Department concerned with the survey and settlement work, for quality control.

1.4 Creation of Digital Topographic Database (DTDB)

The boundaries of parcels delineated in the presence of owner(s)/enjoyer(s)/officials should be digitized in GIS format and the attribute information collected in prescribed proforma should be linked as GIS to create the Digital Topographic Database (DTDB).

2. Preparation and distribution of draft land parcel map (LPM) and linking attributes

2.1 The draft LPM should be prepared for each land parcel, in duplicate. The draft LPM shall be given to the concerned owner(s)/enjoyer(s) preferably by the same evening or latest by the next morning, for receiving objections, if any.

2.2 The draft LPM shall contain:

a) The LPM sketch at a suitable scale to fit to an A4 size paper. The scale should be rounded off to the next scale of 50 (e.g., if the scale is coming to 1:446, then it should be fitted to a scale of 1:450; in case the scale is coming as 1:421, then it should be fitted to a scale of 1:450; and in case the scale required to fit in the paper is 1:496, then it should be fitted to a scale of 1:500).

b) The actual dimensions of the parcel and details of the adjoining survey numbers should be indicated on the sketch.

c) The attributes of the land parcel should also be printed in a tabular form, at the back of the sketch.

3. Recording objections

A register shall be maintained by the survey agency to record and track the objections raised by the owner(s)/enjoyer(s). The objections should also be flagged in the DTDB for better control and monitoring.

4. Objections redressal/adjudication

a) Individual notices in the prescribed format, as per the provisions of the applicable revenue manual, shall be given to all recorded owner(s)/enjoyer(s) with a copy of land parcel map and measurement details, marked on the same notice. The notices shall be served, either personally or sent by registered post with acknowledgement due, if the land owner(s)/enjoyer(s) live outside the concerned area. On the expiry of the stipulated period, if any objection is raised by the owner(s)/enjoyer(s), it shall be recorded in the Objections Register.

b) The survey team shall assist the Government officers in resolving the objections. The survey team will resurvey the field of the owner(s)/enjoyer(s), if required, and incorporate the necessary changes and generate the revised LPM.

c) The survey team shall maintain the Objections Register. The objections shall also be tracked in the DTDB in GIS form.

5. Survey completion report

After completion of the survey, the survey team shall submit the completion report to the Department concerned with the survey and settlement work.

6. Promulgation of survey

a) Subsequently, the draft record of land register, village map, and individual parcel maps of agricultural and non-agricultural lands would be displayed for the stipulated period in the office of the Gram Panchayat and tehsil/taluk for the information of the public.

b) A record of the complaints received during the above-mentioned period, should be maintained, and each complaint received should be acknowledged by a receipt.

c) The complaints received shall be verified and necessary corrections, if warranted, shall be carried out. The survey agency shall carry out the resurvey of the land parcel, if required.

d) The adjudication team will take up the objections, village-wise. They should draw up a day-wise program for redressal of the objections and inform the concerned owner(s)/enjoyer(s) within the prescribed timeframe as per the State/UT laws/manuals. They shall dispose of all objections as per the relevant Acts/rules.

e) As soon as the disposal of objections is completed, a final notification under the relevant Acts/rules/regulations will be published as per the prescribed procedure, completing the process of survey.

f) The land parcel register will be updated by the survey agency as per the information received from the adjudication team, after the latter has redressed the objections.

7. Importance of quality check

Since these survey records will form the basis of the conclusive titling system, they must be prepared with utmost care and accuracy. Hence, the Department concerned with survey and settlement will be responsible for ensuring 100% quality check at each stage of the preparation of the survey records and the responsibilities for this checking must be clearly spelt out among the Departmental officials. The patwari shall carry out 100% checking, and the Revenue Inspector, tehsildar or an officer of the equivalent rank, the SDO and the Deputy Commissioner/District Collector should randomly check 50%, 10%, 3% and 1%, respectively, or as stipulated in the State/UT laws/manuals. A strict view should be taken where too many errors are found un-checked in the survey records.

Model-III

Survey Methodology using Satellite Imagery and Ground Truthing with DGPS and TS

(Based on inputs from the ISRO)

1. The DGPS survey is a very critical element in this methodology. The high-resolution satellite imagery is geo-coded using precise ground control survey. The GPS coordinates for each ground control point (GCP) are collected and processed in a precise manner. The sequence of steps of the DGPS survey is given below:

- Identification of the reference station in the centre of the study area
- GPS data collection, using dual frequency geodetic GPS receivers, for 72 hours
- Determining the reference station coordinates with reference to National Spatial Reference Frame (NSRF) established by Survey of India as per National Map Policy (NMP), 2005
- Identification of GCP locations in the satellite image
- Collection of GPS data at GCP locations for 3 hours
- Determining the GCP coordinates, with reference to the reference station, in DGPS mode
- Quality verification of GCP coordinates

2. Where multiple over-lapping images are taken and control points established, all images can be adjusted for parallax simultaneously. This process is known as Bundle Block Adjustment. Digital photogrammetric bundle block adjustment of multi-resolution and multi-mode satellite data, all together,

is carried out in DPS COTS (Digital Photogrammetric Station Commercial Off-the-Shelf) packages:

Cartosat-1 Stereo-scopic data for entire area

- LISS-IV MX nadir mono-scopic data for entire area
- Cartosat –2/2A nadir mono-scopic data limited area.

The final adjusted block is seamless among Cartosat-1, LISS-IV and Cartosat-2. The photogrammetric processing will ensure perfect one-to-one correspondence between different data sets facilitating optimum utilization of multi-resolution satellite data set.

3. Digital Elevation Model (DEM) Generation: DEM can be generated by semi-automatic techniques to the accuracy required for ortho-rectification. A regular DEM is generated from the point clouds produced by forward intersection via triangulation and interpolation. DEM editing via cloud- and water-masks, etc. is carried out to generate error-free DEM.

4. Ortho-Product Generation, i.e., generating an image corrected for terrain- induced distortions for achieving better planimetric accuracy

- Ortho-rectification of Cartosat-1 Aft images for the entire study area
    - Physically separate images, but virtually seamless
- Ortho-rectification of LISS-IV MX images for the entire study area
    - Physically separate images, but virtually seamless
- Ortho-rectification of Cartosat-2/2A images for few areas
    - Physically separate images, but virtually seamless with Cartosat-1 and Linear Imaging Self-Scanner (LISS)-IV images

5. Data Fusion, i.e., synergistic merging of higher resolution black-and-white (panchromatic) data with coarser resolution colour (multi-spectral) data for getting colour-coded images of high resolution

- Fusing of CartoSAT-1 PAN and LISS-IV MX ortho-images to obtain high resolution (2.5m) MX images, individually for the entire area.
- Fusing of Cartosat-2/2A PAN and LISS-IV MX ortho-images to obtain high resolution (1m) MX images, individually for selected dense cadastral area.

6. Quality Verification

- Accuracy of fused ortho-products (10 cm and 20 cm) is carried out using GPS- based ground check points.
- Positional accuracy of individual product or image, internal distortions within an image and seamlessness across images (image-to-image) are carried out through checkpoints.
- Only those products which pass through this quality verification should be used.

7. Overlay of Cadastral Maps on High-Resolution Satellite Image (HRSI)

The vectorized cadastral maps are overlaid on high-resolution satellite images to find out the changes in parcel quantity and quality in terms of size and shape. Based on the changes, the areas are identified for re-survey and updation. The procedure is described in Flow Chart 4 and the details are given below:

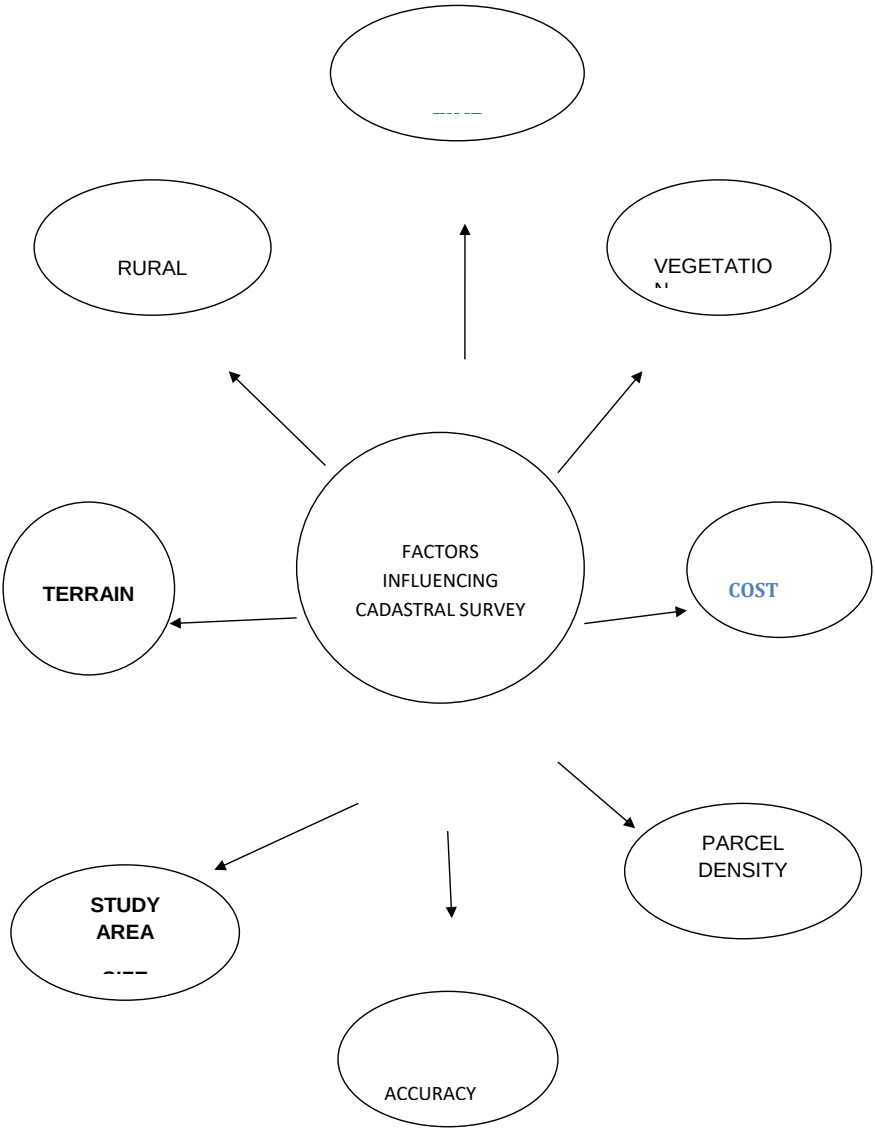
- The high-resolution satellite images are generated from fused ortho-products from CartoSAT-1, CartoSAT-2/2A and LISS-IV MX images.
- The analog cadastral maps are vectorized and village-level digital cadastral maps are prepared. Few ground control points are collected using DGPS survey.
- For each village, 15 to 20 GCPs are collected with reference to HRSI. The GCP numbers and their distribution play a major role in overlaying the cadastral maps on HRSI with good accuracy.

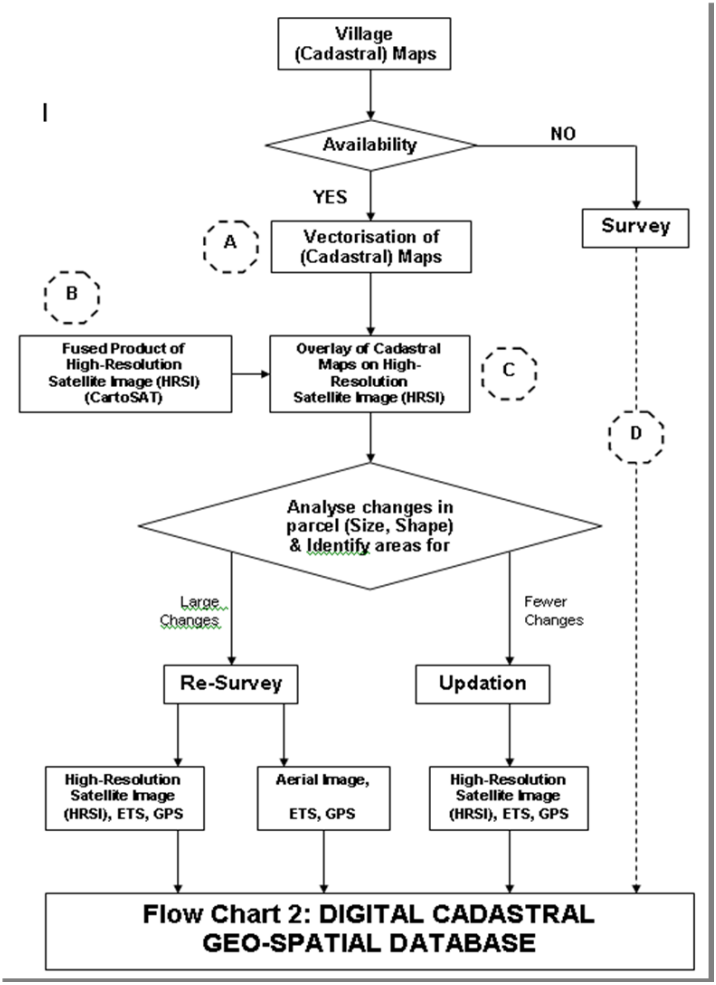
- For transferring the cadastral map to the HRSI image, the mathematical model used is the affine transformation model. The model is validated in terms of residual error at each GCP location and root mean square value of the model. In general, the threshold for RMS value and residual error is 1-pixel and 2-pixels respectively.
- Based on the validated model, the village cadastral maps are geo-referenced and new outputs are generated.
- The individual geo-referenced vectors are overlaid on HRSI. The primary network of each village map, i.e., road network, drainage network, water-bodies and *abadi* is verified across the village. Well-defined field boundaries are also validated.
- Using a similar process, all villages in a tehsil/taluk are geo-referenced and validated.
- All the villages in a tehsil/taluk are overlaid on the satellite data and validated for under-lap and over-lap across the villages as per the acceptable threshold defined for the purpose.
- Based on the thresholds, appropriate corrections are carried out.
- After due corrections, a single mosaic of all the village parcels in a given tehsil/taluk is generated.
- This is the final product that is used for identifying the areas for resurvey and updation.

8. Ground Truthing

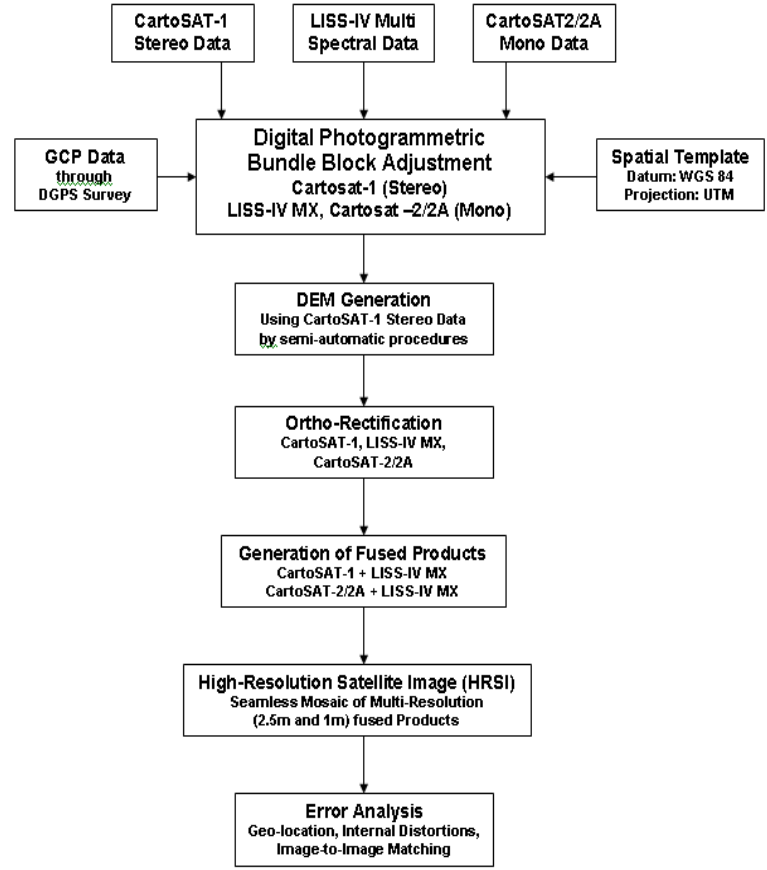
For ground truthing and other steps in completing the survey and settlement process, the Model-I (Ground Method of survey/resurvey using TS and DGPS) may be referred to.

Flow Chart 1: Factors influencing Cadastral Survey

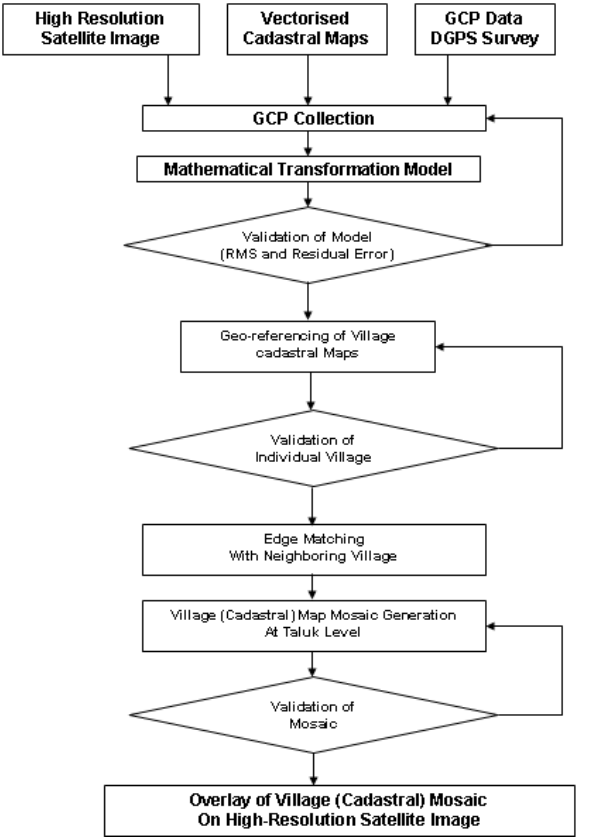



Village (Cadastral) Maps
Availability
NO
YES
Survey
A
Vectorisation of (Cadastral) Maps
B
Fused Product of High-Resolution Satellite Image (HRSI) (CartoSAT)
Overlay of Cadastral Maps on High-Resolution Satellite Image (HRSI)
C
D
Analyse changes in parcel (Size, Shape) & Identify areas for
Large Changes
Fewer Changes
Re-Survey
Updation
High-Resolution Satellite Image (HRSI), ETS, GPS
Aerial Image, ETS, GPS
High-Resolution Satellite Image (HRSI), ETS, GPS
Flow Chart 2: DIGITAL CADASTRAL GEO-SPATIAL DATABASE

Flow Chart 3: High-Resolution Satellite Image (HRSI) Products



Flow Chart 4: Overlay of Cadastral Maps on High-Resolution Satellite Image (HRSI)



(B) Setting up the Ground Control Network

1. INTRODUCTION

The Survey of India is undertaking the task of establishing a ground control point library (GCPL) for the entire country. In the first phase, 300 points of GCPs have been established at a spacing of 200 to 300 km apart. 2200 points, at a spacing of 30 to 40 km apart are to be established in the second phase of their project. Survey of India is in the process of establish Continuous Operating Reference Stations (CORS) network for the entire country which would become the National Spatial Reference Frame for provision of Ground Control Network Points. Therefore, extension of Tertiary & Auxiliary establishment of ground control points has to be done by implementing agency only.

2. All the control points should be based on datums given below:

Horizontal Datum: WGS-84 (i.e., the latest version of the World Geodetic System standard for use in cartography)

Vertical Datum: MSL, i.e., the Mean Sea Level.

3. Primary Control Points

3.1 <u>Horizontal</u>

The primary control points of the Survey of India (SoI), provided by static GPS observation (72 hours) with dual frequency GPS receivers, should be used. The primary control points of the SoI have been post-processed with precise ephemeris adjusted with the help of Bernese s/w to the ITRF co-ordinate system. All the secondary and tertiary control points should be connected to the primary control points of the SoI, to ensure connection to the National Framework.

2.2 **Vertical**

The precision Bench Marks of the SoI should be used as primary vertical control.

3. Secondary Control Points

3.1 Horizontal

The secondary control points of the SoI should be used, wherever available. In areas where the requisite density of secondary control points (16 km) are not available from the SoI, these should be provided.

i. **Best places for affixation:** In protected areas like premises of government buildings including school buildings, veterinary hospitals, etc. and other protected structures, etc. The selected site should be open and clear to sky with a cut off angle of 15º. High-tension power lines, transformers, electric sub-stations, microwave towers, high-frequency dish antennas, radars, jammers, etc., which interfere with GPS signals, should be strictly avoided.

ii. **Densification:** 16 km average

iii. **Instrument to be used:** Dual-frequency GPS receivers

iv. **Accuracy levels required:** 1 cm as determined by the residuals of the network adjustment with 95% confidence interval

v. **GPS network design:** Secondary control points should be observed with a geometrically sound network plan, connected to primary control points of the SoI.

vi. **Schedule of observations:** Observations should be scheduled with proper mission planning, considering the optimum availability and geometric dilution of precision (GDOP) of satellites (i.e., geometric strength of satellite configuration on GPS accuracy). Minimum observation time should be 3 hours.

vii. **Monumentation of secondary control points**

a. Rock-stone or Sand-stone 23*23*75 cm or RCC.

b. The control point should be 15 cm above the ground and 60 cm inside the ground.

c. The control points should be fixed to the ground using at least 15 cm of cement block.

d. Monuments shall bear a triangle on top with a plummet hole in the middle and a 15 cm steel rod inserted (flush with concrete surface).

e. The control point number should be inscribed on the monument.

3.2 Vertical

All the secondary control points should be connected by spirit-leveled heights. The leveling lines for such connections should terminate at precision control points of the SoI and all errors adjusted within them.

Permissible error for leveling line: 0.025 ♪k (in metres), where k is the length of leveling line in km.

4. Tertiary Control Points

i) **Distribution:** These shall be governed by the photogrammetric requirements of the block of imagery for which photogrammetric survey is to be carried out. The distribution and location of horizontal, vertical and full control points should be decided after preparing the photo-index with the help of input images.

ii) **GCP selection criteria:** The selection of location for a control point on the photograph will depend on the identification of the image point and the measurement characteristics of the image point. But, at the same time, they should also meet the horizon parameters (15º cut-off angle). Thus, the criteria for selection of such points should be:

a) GCP should be precisely identifiable on aerial imagery as well as on the ground.

b) GCP should be a sharp point on image and ground.

c) The selected GCP shall be open and clear to the sky, without any obstruction to the sky.

iii) **Post-pointing:** All tertiary control points should be post-pointed on imagery (i.e., the points should be identified on the image), preferably in softcopy. If post-pointing on hardcopy is to be done, the control point should be post-pointed at full resolution. In addition, a sketch magnifying the vicinity of control points and their detailed description should be prepared on the ground, to aid the photogrammetric operator.

iv) **Additional points:** In addition, tertiary control points may be provided on structures like village boundary tri-junction or bi-junction, existing govt./non-govt. buildings like gram panchayat offices, school buildings, veterinary hospitals, etc., as per the field survey requirements.

v) **Instrument :** Single/Double-frequency GPS, Total Station

vi) **Accuracy levels required:** 5 cm

vii) **Monumentation of tertiary control points**

Since the location of control points will be governed by photogrammetric requirements of the block of images and the selection criteria of the GCP, it will not be possible to construct a monument at most of the tertiary control. However, some additional control points provided with the objective of further survey by TS may be monumented. The specifications of monumentation are as given below:

4) Pillar should be of rock-stone or sand-stone 15*15*45 cm.

5) The pillar should be 10 cm above the ground and 35 cm inside the ground.

6) The pillar should be fixed to the ground using at least 15 cm of cement block.

7) Monuments shall bear a triangle on top with plummet hole in the middle and a 15 cm steel rod inserted (7.5 cm inside and 7.5 cm outside).

8) Provision of a strip of granite to put GPS reading on.

9) The control point number should be inscribed on the monument.

10) In case some modern technology develops later, the details will be circulated separately.

viii) **GPS network design:** Tertiary controls should preferably be observed as triangular offsets. Single offsets should generally be avoided.

ix) **Schedule of observations:** Observations should be carried out with proper mission planning. Minimum observation time should be 45 min to 1 hour.

x) **Vertical control:** Single GPS offset upto 5 km from secondary vertical control may be allowed for connection of GPS heights in WGS 84 datum to MSL heights. However, such offsets should not be extended.

5. Auxiliary Control Points

i) **Best places for affixation**: Each secondary and monumented tertiary control point shall be paired with one auxiliary control point, which should be located on permanent structures like bridges, culverts, permanent building corners, etc. The auxiliary control points should be within the line of sight from the primary, secondary and tertiary control points.

ii) **Densification:** There shall be one auxiliary point for each secondary and tertiary control point, typically 200 m or more.

iii) **Instrument:** Dual/Single-frequency GPS Receiver (as used for main control).

iv) **Accuracy levels required:** same as their respective primary, secondary and tertiary control points.

Note:

1) The co-ordinate list and description of the location of all the control points shall be submitted to the State Land Revenue and Survey authorities. The locations and IDs of all the control points should be maintained in GIS form.

2) The co-ordinate list should be supplied both for geodetic system (Lat/Long) and Projected System – Universal Traverse Mercator, i.e., the UTM projection of the respective zone.

3) In case a village tri-junction has not been marked and monumented by a primary, secondary or tertiary control point, the same should be monumented as per the parameters.

6. General Requirements

11) Village boundaries are to be marked.

12) The (X, Y, Z) coordinates for the control points should be given in spherical coordinates, i.e., geometric figures in three dimensions using three coordinates, as well as in Cartesian coordinates, i.e., each point defined uniquely in a plane through two numbers, called the *x-coordinate* or abscissa and the *y-coordinate* or ordinate of the point, separately.

13) The (X, Y) coordinates should be in WGS 84.

14) The survey agency should specify the specifications of the instruments used to achieve the required accuracy.

15) Some baselines for calibration of the monumentation should be maintained at selected locations.

16) A sketch for each category of the control points shall be submitted, showing the location of the control points along with their description for easy identification.

17) A district map showing all the primary, secondary and tertiary control points along with their coordinates shall be submitted to the State Land Revenue and Survey authorities.

18) The survey agency shall submit a village map showing the primary, secondary and tertiary control points along with their description and coordinates in the prescribed format to the State/UT Land Revenue and Survey authorities.

19) The grid supplied by the State Land Revenue and Survey authorities has to be superimposed on the geodetic network of the Survey of India to derive the control point numbering.

20) Control points should be on the boundaries of the land parcels and not in between.

21) When located in govt. premises, the control point should be at a corner of the building or the premises.

Chapter-3

Computerization of Registration and Integration with the Land Record Management System

(Based on the system followed in Haryana)

1. Introduction

In the deed registration system as followed in India today, property registration deals with the registration of deeds and documents involving transactions related to immovable property. Registration of property transactions triggers about 90% of the changes in land records. Integration of the property registration and land records maintenance systems is very important and a necessary step for achieving the goal of maintaining real-time revenue records. This, in turn, will help in reducing the risk factor due to reduction in the number of frauds and litigations. Thus, the integration of the Revenue and Registration systems through IT services is imperative.

2. Working of the Integrated System

The steps leading to the integrated system are given below:

1) Pre-Registration

2) Registration

3) Post-Registration

4) Citizen Services

Each of these steps consists of a number of activities, as delineated below:

2.1 Pre-Registration – This stage includes the following activities:

a) **Obtaining a copy of the Record of Right (RoR)** after paying the vendor service charges and the Government fee.

b) **Calculation of the stamp duty** – on the basis of the value of the property as per the approved collector/circle rates.

E-Stamping - E-Stamping will be implemented in collaboration with the nationalized banks. Under E-stamping, the transferee will deposit the requisite stamp duty in the designated Bank and the latter will issue a receipt printed on security paper from Security Press, Nasik, containing security features such as watermarking, unique number, special sticker, etc. This special receipt will be pasted on the deed. At the time of registration, the Registration staff will check the particulars of the receipt online from the website of the Bank, which will issue the username and password to the staff of SR office for checking the details of stamp duty received by the Bank. One hard copy of the scroll of the transactions will be sent by the Bank to the concerned Sub-Registrar's office and to the Treasury office for verification purposes. Nominal charges may be levied by the Banks for providing the E-stamping service. It is recommended that all State Governments and UT Administrations make concerted efforts to introduce E-stamping services as early as possible, as part of the citizen services charter, and abolish the cumbersome use of stamp papers.

c) **Deed Preparation** – For drafting a deed, three options are available:

- ❖ Self-drafting
- ❖ Drafting by a deed writer
- ❖ Drafting by an advocate

It will be convenient and time-saving if templates of standard deeds are created for deed preparation with facility for editing, wherever required. Deeds prepared by the software will be treated as the self-drafted deeds.

d) **Deed Presentation** – Interested parties will appear before the concerned sub-registrar to present the above-mentioned deed. Sub-registrar will mark the deed to the Registry Clerk (RC). The RC will check the deed and the attached annexures. If the deed has all the requisite annexures attached with it, then the RC will put the stamp "Checked and Found OK" on the deed and send it to the Registration counter. Otherwise, the software will print the list of objections.

2.2 Registration – Registration stage is one of the most important stages in the whole document registration process.

1) **Data entry of basic details of the deed** - like property location and area, and details of the parties.

For the areas having land records integrated with the registration system, the details of the property, as well as of the sellers, will be verified from the land records database. Since the transferor cannot sell the property without mutation in the land records first, this process will help eliminate mutation pendency and fraudulent sales on the basis of fake RoRs will no longer be possible.

2) **Capturing of fingerprints and photographs** – of the parties and the witnesses using a fingerprint device and a webcam. Photographs and fingerprints will be stored in the database.

3) **Generation of endorsement and certificate of registration** – Endorsement will be printed on the backside of the first page of the deed. To check errors in the data entry, some of the details of the deed such as property location, area, consideration amount, stamp duty and Registration fee should be printed along with the endorsement. Endorsement will be in the local language. Certificate of registration will be printed on the backside of the last page of the deed. It will also contain the photographs of the parties and witnesses.

4) **Signatures of the Sub-Registrar** – Finally, the deed will be again presented to the Sub-Registrar for signatures. After the signatures of the Sub-Registrar, the deed will be regularized in the software to freeze the transaction. The regularization process will send a remark to the relevant RoR, automatically. This remark will contain the registration no., date of registration and names of seller(s) and buyer(s), and may be recorded in red colour until the time the mutation process is completed. While the mutation is pending, it will also alert any other prospective buyer that a transaction has already taken place in respect of the property. In this way, any fraudulent attempt at multiple sale of the same piece of land will be checked.

5) **Post-Registration audit of deed** – will be done by the auditor of the Registration Department within the specified time period.

6) **Document delivery** – After the post-registration audit, the deed will be returned to the Registry Clerk, who will deliver it to the concerned party within the specified time period. In case of areas having land records integrated with the registration process, mutations will be entered in the software immediately after the deed is signed by the SR and a hard copy of this mutation can be given to the buyers for their reference.

This entire process of computerized Registration should be completed within half-an-hour to one hour.

2.3 Post-Registration activities include deed scanning and the mutation process (mutation notice generation, data entry, verification, sanction and incorporation of the mutation in the RoR).

i. **Deed scanning** will be a background operation, which is required in order to provide copies of the registered deeds to the buyer(s). In the process of deed scanning, digital index will be created for locating the scanned deeds in the computerized registration record maintenance system.

ii. **Mutation notice generation –** The mutation notice mentioning the tentative date, venue and time when the concerned Revenue authorities shall carry out the required formalities for sanctioning the mutation, will be generated by the software, the copies of which shall be given to the buyer(s) and seller(s).

iii. **Mutation data entry –** The mutation data entry will be done through the registration software. First of all, the Sub-Registrar will mark the particular deed for mutation data entry. The mutation data will be entered for the marked deed, capturing the details of the seller(s) and buyer(s) from the registration database. In the RoR, this data entry will remove the red remarks created during the registration process and generate the "pencil" remarks for further action by the Revenue authorities. This linkage of the registration and mutation processes will also track the pending mutation cases and help the Revenue officers to reduce mutation pendency.

iv. **Mutation verification and sanction –** The Kanoongo or equivalent Revenue Officer will verify the mutation and send it to the Circle Revenue Officer (CRO)/Tehsildar/Assistant Collector or equivalent Revenue Officer for sanctioning. The CRO will hold a public hearing to sanction or reject the mutation. The Tehsildar can reject the mutation on the grounds mentioned below. After the mutation is sanctioned, the color of the remarks in the Parat Patwar of Jamabandi will automatically change to red, by the software, in the RoR in place of the pencil remarks.

Grounds for rejection

1) Non-payment of fee.

2) Absence of buyer.

3) Legal heirs not confirmed by the Nambardar/designated official in case of inheritance.

4) Land mortgaged to bank.

5) Registration is not in confirmation with Jamabandi/village-level land record.

Procedure to be followed after rejection

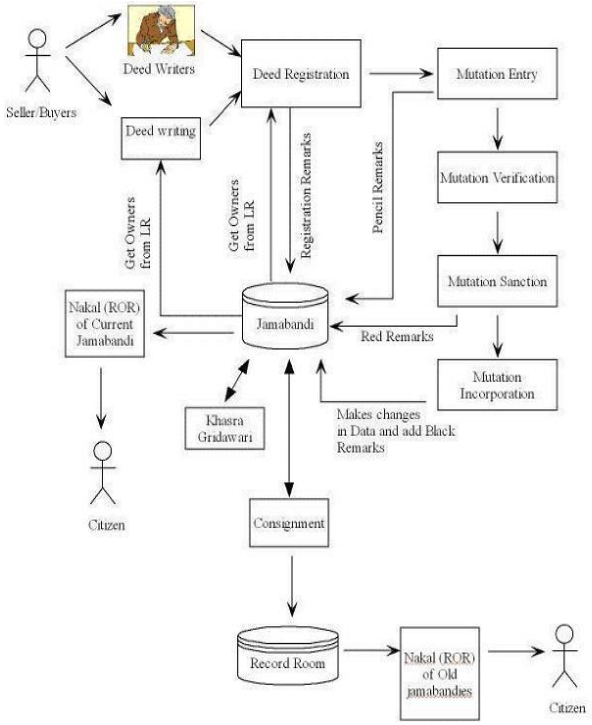
6) Mutation fee will be refunded to the concerned party.

7) Party can appeal within 30 days to District Revenue Officer (DRO) or Sub-Divisional Magistrate as per the location of the property. If decided in the favour of party a mutation will be sanctioned otherwise party can further appeal to Collector. Appeal of collector will go to Divisional Commissioner and appeal of Divisional Commissioner will go to Financial Commissioner Revenue (Principal Secretary). If the party is not satisfied with the decision of Financial Commissioner they can go to civil court.

8) If the rejection was because of absence of buyer or due to some mistake in the earlier mutation then a fresh mutation will be written.

i. **Mutation incorporation and scanning** – All the sanctioned mutations will be incorporated in the RoR by the designated officer. Red remarks for the sanctioned mutations will be converted to black remarks in the next Jamabandi/updation of village-level land records. The Tehsildar records his order on the mutation register generated by the software. The detailed order of the Tehsildar is scanned so that copies can be issued to the concerned parties.

"Integrated Registration and Mutation workflow"



2.4 Citizen Services

The following services will be available to the citizens due to integration of registration and land records system:

(i) Title Search

Using this feature, a citizen can enquire about the details of the property including its current and past ownerships.

(ii) Issue of non-encumbrance certificates/certified copies

All details of past transactions in respect of a property including the old registered deeds and index registers, i.e., the historic data, will be digitized/scanned and entered into the computerized system.

Chapter-4

Choice of Software and Standards

1. Open Standards

Open standards are technical specifications and policies governing information flow across projects. They cover domain, interconnectivity, data integration, e-services, access and content management. The principles and practice of operating the standards make them “open”, i.e., they are available for all to read and use. This creates fair and competitive market for implementation of the standards and do not lock the customer to a particular vendor or group. Generally, open standards are available free of cost to the user.

1.1 Benefits of using open standards

1) Ease of inter-operability and communication with other systems or data sets.
2) Open specifications, i.e., the outputs are known to all.
3) Protection against obsolescence of the data and files created using standards.
4) Easier porting or transfer of data and application from one platform or format to another, since the technical implementation follows known guidelines and rules, and the interfaces, both internally and externally, are known.
5) No dependence on, or locking with, any single technology or product.

1.2 Some examples of the standards that can be used under the DILRMP are listed below:

i) Scanning process:

1) 300 dpi in black and white.
2) Image should be stored in .tiff (tagged image file format) or .gif (graphic interchange format) only.
3) The image orientation should be upright.

4) The image should be cleaned and free of noise.
5) Legibility features should be good.
6) Measured length and width with in bounding box of the maps.
7) The image should not be skewed or wrapped.
8) Quality printout of 100% matching (1:1) scanned map on 90-micron transparent sheet for verification with original sheet.
9) Final printout: One printout of verified scanned map on 75-micron matt polyester paper.

ii) Digitization of cadastral maps

1) Layers to be computerized

2) Administrative boundaries of a revenue village with name of village, tehsil and district
3) Parcel boundaries with plot numbers
4) Road network along with road code and type
5) Railway network
6) Major water bodies and drainage network
7) **File format**
    i) Shape file (.shp)
    ii) 100% matching (1:1)
    iii) Final printout – 75-micron matt polyester paper
8) Scale: 1:4000
9) Accuracy: 0.025%

iii) Registration Process

1) Database standards

SQL-92 (Relational Model) /SQL -1999 (Object Model) to be adopted as standard for relational database management systems (RDBMSs).

iv) Indian language computing

UNICODE – character encoding for each and every alphabet of all the languages. The most commonly used encodings are UTF-8 (Unicode transformation format) and UTF-16.

v) Survey

1) Scale: 1:2000
2) Format –Shape format or geo-database format
3) Projection System = UTM (Universal Transverse Mercator)
4) Datum: WGS 84 (World Geodetic System-1984)
5) Reference with survey stone details/bench mark point
6) Contour interval: 1 meter contour with height information
7) Village/taluk/district boundaries with annotation
8) Village boundaries with tri-junction pillars
9) District/tehsil/village codification as per Census 2011
10) Distances in meters
11) Area in hectares/sq meters
12) Output:
13) Accurate geo-referenced digital map using established control survey network around existing Survey of India permanent reference points
14) Proper indexed map with proper sheet number
15) Sheet-wise as well as complete mosaic map of village/tehsil/taluk/district
16) Open file format (.shp)
17) Spatial and non-spatial data dictionary with feature codes, feature type (point, line and polygon)
18) Feature description and symbols
19) Accuracy: horizontal accuracy of 20 cm for rural areas, 10 cm for urban areas, or better.

vi) Location codification – As per the Census codes, as further updated by the NIC.

1.3 The use of open standards is mandatory for the States/UTs for data sharing and inter-operability among different systems.

2. Open Source vs. propriety software

2.1 Open Source Software (OSS)

OSS is defined as computer software for which source codes are available in the public domain. This permits the users to use, change and improve the software and to redistribute it in a modified or unmodified form. It is developed in a public and collaborative manner.

2.1.1 Advantages of OSS

a) Most OSS products are available free of royalties and fees.

b) The OSS have qualities of adaptability to standards and integration with other systems.

c) It has better software security, because of the availability of source codes and multi-user, network-centric environment.

d) It offers wider testing and faster fixation of problems and is, therefore, more reliable and stable.

e) Near-zero vulnerability to viruses, thereby eliminating the need for virus checking, data loss and downtime.

f) Since it is collaborative development and source codes are freely available, the same can be easily customized as per the user requirements.

g) Small footprint allows use on older computers.

h) Service orientation, rather than product orientation, for induction of IT solutions in e-Governance.

2.1.2 Disadvantages of OSS

a) Lack of professional support, since there is no direct obligation or responsibility on anyone.

b) There is no co-ordination of different releases and version upgrades. Since new developments keep coming up, the support vendors find it hard to provide the immediate solution.

c) Several updates keep getting released without any centralized mechanism to handle them, leading to erratic updates.

2.2 Proprietary software

It is the computer software which is legal property of one company. The terms of use for the buyer are defined by contract and licensing. The terms may include restrictions on privileges to share, alter, dissemble and use of the software.

2.2.1 Advantages of proprietary software

a) Better vendor professional services.

b) Better user interface.

c) Regular and easy availability of updates and patches to the users.

d) These systems are available in packaged and modular form.

2.2.2 Disadvantages of proprietary software

a) Proprietary software comes at a significantly higher cost.

b) Complete dependence on the vendor.

c) Source codes are generally not available to the end-user, leading to lack of freedom to modify or adapt the software to changed requirements.

d) At times, proprietary software may be locked to a proprietary standard, making inter-operability difficult.

e) Vulnerability to withdrawal of support by, or collapse of, the vendor.

f) Unforeseen gaps may be discovered in the course of software deployment, causing gaps in functionalities.

3. Choice of software

While making a choice of the software, State Governments/UT Administrations should keep in mind the cost and inter-operability of the system, as well as the time taken for designing software. Since inter-connectivity, inter-operability and completion of projects within set timeframes have been emphasized as major planks in the DILRMP, isolated systems may present a major difficulty in the future. It has been seen that where IT penetration is less, proprietary software services and solutions are better and reliable assistance is available from the supplier. However, open source provides distinct cost advantages where the number of installations are large. The States/UTs should bear in mind that they have to meet the required funding for software from their own resources.

With regard to further updates on open sources and open standards, the website of the Ministry of Electronics & Information Technology, i.e., www.meity.gov.in may be seen from time to time.

Chapter-5 (Section-A)

Data Security

Information Security requirements and Authentication Mechanism

(Revenue Secretary Committee Report)

Purposes and Scope:

One of the terms of reference of the Committee was to deliberate in depth about the security framework for the CLR domain and suggest a suitable framework for security of the system and digital land record data sets. NIC has prepared detailed Security Guidelines for Computerization of Land Records listing the purpose, procedure and security framework, which also envisages creation and adoption of an Information Security Policy and Standards for the Land Records Information System domain. The committee discussed the security framework and agreed to the following guidelines;

The Security guidelines primarily focus on the following:

- To extend necessary guidance and lay standards for the land revenue department on various IT-security related issues such as physical, technical and administrative concerns, which need to be addressed from the implementation/operational perspective of Land Records Computerization at the Tehsil (Revenue circle) level.
- ISO/IEC BS 17799 has been recommended for cyber security standards. ISO –BS 17799 is the internationally recognized security framework, which extensively deals with almost all security mechanisms in terms of 127 controls. According to domain needs 60 security controls have been short listed out of these 127 controls for the security mechanism of the land records domain.
- Information for designers & developers of applications software and databases that should be taken into account by technology service providers.
- Security Audit and Risk assessment that are necessary constituents for reducing vulnerabilities.
- Important technological devices and methods to strengthen security in the operational workflow environment.

Requirements for building a Security Framework:

It has been observed by the committee that several states have successfully implemented Computerization of Land Records without following proper security standards. In such a scenario, it is necessary to create a security management system for land records and documents, as these are of immense significance due to rising land values. It may be mentioned that without adequate physical and administrative security, reliable digital security is not possible. In the case of digital data, issues and concerns regarding integrity and authentication of data need to appropriately addressed. Necessary provision for backup, storage, archiving of digital data is to be made to fit the requirements of the domain.

The extent of security management is directly dependent on risk assessment. It will be very difficult to determine the severity of the risk without any critical assessment study. In case of total automation, any damage to the IT system will have a very serious impact especially when the manual system of records is done away with. Therefore, the importance of security management cannot be over emphasized.

Observations of the Committee:

After detailed deliberations on the issues relating to security, the Committee made the following observations:

- It was noted that the existing manual system has various safeguards, descriptive procedures, roles and responsibilities, set out in the State land administrative manuals. It is necessary that while switching over to an IT enabled system for LR, appropriate steps be initiated to incorporate suitable provisions catering to the requirements for a secure computerized environment for Land Records. Therefore, it is necessary to accord high priority to confidentiality and Integrity of the available data, records, process and systems.
- The Committee observed that as of today, prime security concerns relate to PHYSICAL as well as CYBER security. Accordingly, it is necessary to have a composite strategy for domain security.
- The Committee is of the opinion that there are several areas pertaining to physical, technological and administrative security that need attention in the existing scenario of computerized operations at the Tehsil level.
- Security requirements are dynamic in nature. To build an appropriate security management system, it is necessary that each state should follow the Security

policy guidelines. Moreover, each state should create a mechanism to continuously assess the risks and vulnerabilities and strengthen security measures through rules, procedures, responsibilities and technology.

- The Committee understands that ISO/IEC BS 17799 is an internationally accepted standard, which could be used to define the standard framework for the Land Record domain. ISO/IEC BS 17799 standards cover various aspects on policy, review mechanism, risk assessment, confidentiality and integrity needs for an Information Security management system.

Recommendations:

In view of these observations, the Committee recommends that the suggestions given below must be initiated to strengthen the existing security provisions.

- Adoption of Security policy guidelines and annual audit of security of data software and hardware.
- Risk assessment for operational sites and security breaches.
- Policy for hardware, software, system software configuration management.
- Policy for Password, Confidentiality and Accountability required
- Policy and procedures for backup of data and software for a defined period.
- Policy for access control of system, data and other resources.
- Arrangement for physical security of the digital infrastructure.
- Technical updates for users and responsible officials.
- Policy for data access over network and distribution.
- Provision of documented procedures for legal compliance and security.
- Budgetary allocation for an accepted level of security

Approaches for Security Management & the Information Security Management System:

The Committee agreed that there is a need for uniformity in standards and protocols for security management amongst the states. "ISMS" is an approach by which management can monitor and control information security to reduce risk to an acceptable level to fulfill corporate, customer and legal requirements. Implementation of Security management requires that:-

- Security controls are in place and are effective;
- Residual risks are acceptable; and
- Assumptions about threats remain valid.

These security controls as specified in the ISO/IEC specification will help in minimizing the risks of human error, theft, fraud or misuse of facilities. These measures may be adopted to secure confidentiality, accountability and integrity of the system. For this purpose, it is necessary to address various issues concerning Physical and Cyber Security in the LR domain, Access Control, Security Awareness and Training, System Configuration, Data Management, etc.

The document on security guidelines provides a detailed description of various security measures to be adopted to reduce risk and curtail vulnerabilities.

Cyber security is an ongoing process and it is desirable that security concerns should be addressed and resolved through a permanent mechanism.

Security Audit:

Security audit is important for protecting digital data. Keeping this in mind, the Committee agreed that each state should create a security review mechanism and mitigation management plans. Further, it is also recommended that security audit should be carried out for each state by a third party/expert once the policy is implemented. It is suggested that NIC should take necessary steps to ensure application software security. The major steps involved in LR Information system security are:

a) System study;
b) Application Security audit; and
c) Infrastructure audit for known vulnerabilities & configurations.

The security audit should be carried out as per guidelines issued by the Government of India in this regard. The following approach could be followed at various levels:

(i) **At site of operation:**

a. Physical security and access control at Taluk level
b. System hardening and Incident detection /reporting at site of operation.

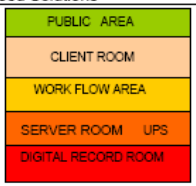
c. Workflow authentication, non-repudiation and record management.
d. Backup and Archival data, software and records.
e. Security updation, Version control and Configuration management

(ii) **At State Level:**

a. Steering committee to review the security of operations periodically;
b. Incident management mechanism and support;
c. Technological and financial support;
d. Address various legal & policy issues emanating from field experiences.

Recommended Technical measures for Secured Operation at Tehsils/SRO:

The committee recommends the following security measures:

	Issues	Proposed Solutions
1	**Physical Security of the Site** Access Control - For Public - Work- flow area - Server Area - Client Area - Digital Record Room Equipped with Access Control Device and Log Register	
2	**Electrical and Fire Safety:**	As per the fire safety and electrical requirements. (Expenditure to be supported under site preparation fund as provided in existing CLR guidelines – unit cost per Taluk)
3.	**LAN Connection:** - Server and Client - Network Device - kiosk	Protected connectivity to avoid interception of the clinet/server over/through LAN.Entire set-up should be within restricted access area. (No cost as of now. In future hub may be replaced with switch)

4.	**HARDWARE:** - Server - Clients - Printer - Scanner	All servers/clients/printers/scanner should be as per the configuration prescribed in the CLR guidelines. All these devices should be entered in stock register . Each machine should be authenticated.
5.	**System Software & updates:**	Valid copy of System Software should be used for installation. The Hard Disk should be partitioned for the Operating System(OS) and data. Funds for this has been provided under the revised tehsil unit cost.
6.	**Password:** - Administrator - Default accounts - Guest accounts - BIOS level password - Bio Metric Thumb impression - Digital Signature (Digital Signature Certificate to authenticate server and client with secure communication may be taken from NIC)	The administrator password should have a minmum of eight characters incorporating the special characters and alphanumeric. All guest and default accounts should be disabled. System should have BIOS password The user is accountable for keeping the password with himself. Only specified finger is to be used in bio-metrics device. Funds for Biometrics are already allocated under revised unit cost of tehsil. Digital Signature Certificate(DSC) for each site may be acquired from NIC which requires Rs. 3600 per site for card & readers (one for each machine).
7.	**Virus and Intrusion Detection System:** - Disabling unwanted ports	Updation of Virus protection with latest Updates
8.	**Version Control:** - Key validation - Key revalidation with request - Same version of s/w at all sites	Application Software with key Duration of the Land Record application s/w can be extended by request and keys granted by the administrator. One version at all sites.
9.	**Disabling of Floppy Drive/Desktop:** - Desktop should be disabled	Floppy Drive may be disabled Application s/w should run directly at the system startup
10.	**Installation of DATABASE:** - Certified copy - Database users password	SQL database should be installed using the authorized CD. System Administrator "sa" password

		should be changed and protected regularly
11.	**Creation of LRC Users:** - **Authentication and authorization** - Role bases Access - Unused accounts	Authenticated users with password / biometrics. Role based authentication and function All unused accounts/guest should be disabled.
12.	**Backup/Restore of Database:**	Backup of database with password. Stored at different location. Backup under the custody of the officer in charge System before shutdown must prompt for backup.
13.	**Routine Check up of the System for unwanted s/w and games:**	Only authorized s/w should be installed in the server/client
14.	**Use of LR s/w beyond schedule hours:** - Use of s/w on holidays - Use of s/w beyond working hours	Use of the computer center and application s/w beyond schedule hours should be recorded and permitted only on permission from competent authority.
15.	**Security breaches log/report:** - Breaches of security - Unintended use of a module - Wok flow violation	Documentation of all breaches & reporting.
16.	**Audit log:**	Periodic log will be kept separately in CDs with time stamp
17.	**Backup of Application & Language s/w:**	LR s/w and Language Related Application s/w will be backed up in CDs with all keys.

Chapter-5 (Section-B)

Data Security

Evaluating and implementing ISO/IEC 27001 and ISO/IEC 27002 security standards

1. For any Land Records Information System, asset safeguarding (that includes data security) and data integrity are important objectives. Regular assessments need to be carried out as to how well these objectives are being met. This is an Information System Audit function. Information system (IS) auditing is the process of collecting and evaluating evidence to determine whether a computer system safeguards assets, maintains data integrity, allows organizational goals to be achieved effectively and uses resources efficiently. Information system auditing must be carried out by an agency other than the implementing agency (which in most cases is the NIC) and holds necessary competency/accreditations. IS Audit is carried out by organizations empanelled by the Indian Computer Emergency Response Team (CERT-In), an organization that works under the auspices of the Department of Information Technology, Government of India. Carrying out of periodic (at least twice a year) IS Audit of a computerized land records management system is strongly advised. Such auditing will increase usability of computerized land records and bring in more confidence among institutional users, such as banks, who may base some of their decisions on these records.

1.1 It is recommended that State Governments/UT Administrations may strive to achieve ISO 27001 certification as regards the computerized land records system. CERT-In website (www.cert-in.org.in/ProgressiveSteps.htm) lists the progressive steps that a State Government/UT Administration may take to achieve this certification. The certification process can be set into motion as

soon as even one component of the land records system, say the text-database has been put in production use.

2. Making the data secure as per the ISO standards and drawing up the security policies

While it is debatable whether an IT audit organization should be associated right from the inception stage of the computerized land records system, yet with the growing complexity of information systems, auditors do need to have in-built tools and outputs to test various internal system processes and collect evidence. Auditors may also suggest various controls at system development stage that may reduce threats to system. If these suggestions are taken into account at system development stage itself, a more integrated and robust system evolves. Therefore, there is a growing tendency among organizations implementing IT-based solutions to also associate an accredited IT system auditor at the system development stage itself.

2.1 This IT system auditor should also be assigned the important task of helping the State Government/UT Administration in writing and promulgating across the State/UT various security policies/best practices-related memoranda/circulars in line with the ISO standards. However, to maintain audit independence and objectivity, the IT system auditor team who was associated at the system development stage may not be engaged later at the actual auditing of the computerized lands records system, i.e., after the system has started functioning.

3. Supervising the security policy implementation

Formulating and implementing security policies and internal control practices give rise to another organizational issue, that is, of a requirement of overseeing such functions within the State/UT. There is a need for an information system security and internal controls administrator at the State/UT-level with the responsibility for ensuring that the information system assets are secure and data integrity is maintained. One major function of the security administrator is

to conduct security program. A security program is a series of ongoing, regular periodic reviews conducted to ensure that assets (including data) associated with the information system function are safeguarded adequately. Each review leads to changes in security and internal control policies. The very first security review (possibly conducted in association with the IT system auditors and the NIC) is often a major exercise. Subsequent security reviews, carried independently, might focus on changes that have occurred since the last review. A formal approach to security review has eight major steps: (1) preparation of the security review plan, (2) identification of the assets, (3) valuation of the assets, (4) threats identification, (5) threats likelihood assessment, (6) exposures analysis, (7) controls adjustment, and (8) report preparation.

3.1 Result of a security review is a security policy in respect of nine major threats, as: (a) unauthorized intrusion — access controls must be designed to prevent both logical and physical intrusion; (b) hackers — strong logical access controls mitigate expected losses from the activities of hackers; (c) viruses and worms —controls should be implemented to prevent use of virus infected programs and to close security loopholes that allow worms to propagate; (d) misuse of software, data and services — a code of conduct should govern the actions of information systems employees that should also prominently take into account user privacy concerns; (e) fire — well-designed, reliable fire-protection systems must be implemented; (f) water — facilities must be designed and sited to mitigate losses from heavy rain, moisture and flooding; (g) energy variations — voltage regulators, circuit breakers and uninterrupted power supplies be used; (h) structural damage — controls must exist to safeguard against structural damage occurring from earthquakes and other disasters; (i) pollution — regular cleaning of facilities and equipment should occur; also, take steps to prevent heavy corrosion in equipments installed at sea-side locations.

Chapter-6 (Section-A)

Core Technical Advisory Group

No.18014/01/2008-LRD
Government of India
Ministry of Rural Development
Department of Land Resources

G-Wing, NBO Building
Nirman Bhawan, New Delhi

Dated the October, 2008

ORDER

Subject: Setting up of a Core Technical Advisory Group for the National Land Records Modernization Programme (NLRMP).

A Core Technical Advisory Group, with the composition and terms of reference as indicated below, is hereby constituted to advise the Department of Land Resources, Government of India and the States/UTs on the technological aspects related to the implementation of the NLRMP:-

(i)	Secretary, Deptt. of Land Resources	Chairperson
(ii)	Additional Secretary, Deptt. Of Land Resources	Member
(iii)	The Director-General, National Informatics Centre (NIC), or his representative	Member
(iv)	The Surveyor General of India, or his representative	Member
(v)	A representative of the Indian Space Research Organization (ISRO)	Member

(vi)	A representative of the National Remote Sensing Agency (NRSA)	Member
(vii)	The Director-General, C-DAC, or his representative	Member
(viii)	The Director General, Forest Survey of India, or his representative	Member
(ix)	The Director, Soil and Land Use Survey of India, Ministry of Agriculture, or his representative	Member
(x)	The Registrar General of India, or his representative	Member
(xi)	A representative of the Ministry of Home Affairs, Govt. of India	Member
(xii)	A representative of the Ministry of Defence, Govt. of India	Member
(xiii)	Shri Vinod Agrawal, IAS, Govt. of Andhra Pradesh	Member
(xiv)	Shri Rajeev Chawla, IAS, Govt. of Karnataka	Member
(xv)	Dr A.K. Singh, IAS, Director (LR), Deptt. of Land Resources	Member
(xvi)	Director (NLRMP), Deptt. of Land Resources	Convenor

2. The terms of reference of the Advisory Group would be to advise the Department of Land Resources and the States and UTs on the technological aspects of the implementation of the NLRMP including its following components and activities:

I. Computerization of land records

a) Data entry/re-entry/data conversion of all textual records including mutation records and other land attributes data
b) Digitization of cadastral maps
c) Integration of textual and spatial data
d) Tehsil, sub-division/district data centers
e) State-level data centres
f) Inter-connectivity among revenue offices

II. Survey/resurvey and updating of the survey & settlement records (including ground control network and ground truthing) using the following modern technology options:
a) Pure ground method using electronic total station (ETS) and global positioning system (GPS)
b) Hybrid methodology using aerial photography and ground truthing by ETS and GPS
c) High Resolution Satellite Imagery (HRSI) and ground truthing by ETS and GPS

III. Computerization of registration
a) Computerization of the sub-registrar's offices (SROs)
b) Data entry of valuation details
c) Data entry of legacy encumbrance data
d) Scanning & preservation of old documents
e) Connectivity to SROs with revenue offices

IV. Modern record rooms/land records management centres at tehsil/taluk/circle/block level

V. Training & capacity building
a) Strengthening of the Survey and Revenue training institutes

VI. Core GIS

a) Village index base maps from satellite imagery, for creating the core GIS

b) Integration of three layers of data: (i) Spatial data from aerial photograph or high-resolution satellite imagery; (ii) Survey of India and Forest Survey of India maps; and (iii) Cadastral maps from revenue records

VII. Programme management

a) Information, education and communication (IEC) activities

b) Evaluation

3. The Advisory Group may associate any other official/non-official expert for guidance.

4. The TA/DA of the non-official experts shall be borne by the Department of Land Resources, Ministry of Rural Development, Govt. of India.

(A.K. Sahu)
Director (NLRMP)

To

1. All members of the Committee
2. PS to MRD
3. PPS to Secretary (LR)
4. PS to AS(LR)

Chapter-6 (Section-B)

Addresses of Technical Agencies

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vinay@nic.in

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NIC State Centre
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Silvassa

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sgo@nde.vsnl.net.in

sgo@sancharnet.in

helpdesk.soi@gov.in

GEO-SPATIAL DATA CENTRES

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2	Assam and Nagaland Geo-spatial Data Centre, Guwahati	Director, Assam and Nagaland Geo-spatial Data centre, Survey of India, Ganeshguri Chariali Dispur G S Road, Guwahati - 781006 Fax: 0361-2261725 E-mail: angdcguwahati@yahoo.co.in
3	Bihar Geo-spatial Data Centre, Patna	Director, Bihar Geo-spatial Data Centre, 164, Sheikhpura House (Near JD Women's College), PO- B.V. College, Patna-800014 (Bihar). Tel:0612-2280756, 2280261 Fax: 0612-2280265 Email: bihargdc@yahoo.co.in
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17	Rajasthan Geo-spatial Data Centre, Jaipur	Additional Surveyor General, Rajasthan Geo-spatial Data Centre, Survey of India, Great Arc Bhawan, Plot No.19, Sector-10, Vidyadhar Nagar, Jaipur- 302023 Fax: 0141-2236891/2236286. E-mail: surwest@datainfosys.net
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20	Tripura, Manipur and Mizoram Geo-spatial Data Centre, Silchar	Director, Tripura, Manipur and Mizoram Geo-spatial Data Centre, Survey of India, P.O.Rangir Khari, N.S. Avenue, Haila Kandi Road, Silchar - 788005 Fax: 03842-240555
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22	Uttaranchal Geo-spatial Data Centre, Dehradun	Director, Uttaranchal Geo-spatial Data Centre, Survey of India, 17 E.C. Road, DehraDun-248001 Fax: 0135-2656402. E-mail: surveynco@sancharnet.in
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2	GIS & Remote Sensing Directorate	Director, GIS & Remote Sensing Directorate, Survey of India, Uppal Hyderabad-500 039 Fax: 040-27200430 E-mail: hyd2_dmchdsoi@sancharnet.in
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4	National Geo-spatial Data Centre, Dehra Dun	Director, National Geo-spatial Data Centre, Block 6, Hathibarkala Estate, Dehra Dun (Uttarakhand) Fax: 0135- 2747623 E-mail: ngdcsoi@yahoo.co.in
5	National Spatial Data Infrastructure (NSDI), New Delhi	Director, National Spatial Data Infrastructure(NSDI),East Block No. 7,Level-5 R K Puran ,New Delhi - 66 Fax: 011 - 26519530 E-mail: Siva_k@nic.in

6	Indian Institute Of Surveying & Mapping , Hyderabad.	Director, Indian Institute Of Surveying & Mapping, Survey of India, Uppal, Hyderabad - 500039 Fax: 040 - 27200286 E-mail: hyd2_surtrain@sancharnet.in Website: www.soisti.gov.in
7	Digital Mapping Centre, Dehradun	Director, Digital Mapping Centre, 17 EC Road, Dehra Dun - 248001 (Uttarakhand) Phone/Fax: 0135- 2656945

3) NATIONAL REMOTE SENSING CENTRE

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4) FOREST SURVEY OF INDIA

4 Forest Survey of India		
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2	Regional Director(Central Zone)	Forest Survey of India **(CENTRAL ZONE)** C.G.O. Complex, A-Block Ground Floor, East Wing Seminary Hills **NAGPUR – 440 006** Phone: 0712 – 2510194 & 2510432 FAX: 0712 – 2510194
3	Regional Director(South Zone)	Regional Director (SZ), Forest Survey of India, 8th Floor, B-Wing, Kendriya Sadan, Koramangala, Bangalore - 34.
4	Regional Director (Eastern Zone)	Deputy Director Forest Survey of India, 97/1-B, Hazra Road, Kolkata - 700 026.
5	Regional Director (North Zone)	Regional Director (North Zone) Forest Survey of India (Northern Zone), Himlok Parisar, "Shivalik Khand", Batsley Longwood, Shimla, Himachal Pradesh – 171001.

5) NATIONAL SOIL AND LAND USE SURVEY

5. National Bureau of Soil and Land Use Survey	
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6) **C-DAC**: **Centre for Development of Advanced Computing**

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Part-C: MIS

ANNEXURE-XIX

PROFORMA FOR THE SUBMISSION OF PROPOSALS FOR THE RELEASE OF FUNDS

SECTION A: STATE - LEVEL INFORMATION	
1. Name of the State/ UT:	
2. Number of revenue districts	
3. Number of sub-divisions	
4. Number of *tehsil*s/*taluk*s/*mandal*s	
5. Number of revenue circles/RI circles/*patwari* circles	
6. Number of revenue villages	
7. State-level data centre	Yes/No If no, whether the same is proposed to be taken up during 2018-19, and if so, its cost estimate:

Section B: Plan to cover all the districts within three years (2017-18 to 2019-20)			
Sl. No.	**Year**	**No. of districts to be taken up during the year**	**Names of the districts**
1.	**2017-18**		
2.	**2018-19**		
3.	**2019-20**		

Section C: District-wise proposal for 2018-19

DISTRCT – 1

Table – I

Name of the District:		
District profile:		
7)	Geographical area (in sq.km.) 8) Rural 9) Urban 10) Forest 11) Total	
12)	No. of sub-divisions	
13)	No. of *tehsils/ taluks/ mandals*	
14)	No. of revenue circles/RI circles/Patwar circles	
15)	No. of revenue villages	
16)	No. of cadastral map sheets or FMBs in the District 17) Rural 18) Urban 19) Total	
20)	No. of land parcels (khatian, etc.) in the District: 21) Rural 22) Urban	

	23)Total	
24)	No. of Sub-registrar's offices:	
25)	District-level data centre If no, whether the same is proposed to be taken up during 2018-19, and if so, its cost estimate:	Yes/No

Section: C – continued….

District - 1

Table - II

Data entry/ re-entry/ data conversion	**No. of Tehsils in which:**			**No. of Tehsils to be taken up in 18-19 for:**		
	Data entry completed	Data entry going on	Data entry not taken up	Data entry	Data re-entry	Data conversion
				Unit cost:	Unit cost:	Unit cost:
				Total cost:	Total cost:	Total cost:
Digitization of maps	**No. of Tehsils where:**			**No. of Tehsils where the work is proposed to be taken up during 2018-19 and total number of map sheets/FMBs there:**		
	Work completed	**Work going on**	**Work not taken up**			

				Unit cost:
				Total cost:

Section: C – continued….

District - 1

Table – II continued…

Data centres	No. completed	No. in progress	No. to be taken up in 18-19
Tehsil-level data centres			
			Unit cost:
			Total cost:
Sub-division-level data centres			
			Unit cost:
			Total cost:
Tehsil-level modern record rooms	No. completed	No. in progress	No. to be taken up during 18-19:

			Unit cost: Total cost:
Connectivity among Revenue Offices	**Tehsil**	**Sub-division**	**District.**
	Yes/ No	Yes/ No	Yes/ No
	Unit cost:	Unit cost:	
	Total cost:	Total cost:	Cost:

Section – C… contd.

District - 1

Table – III

Computerization of Registration

	No. completed	No. in progress	No. to be taken up in 2018-19
Computerization of Registration offices			
			Unit cost:
			Total cost:
Data entry of valuation details			
			Unit cost:
			Total cost:
Data entry of legacy encumbrance data			
			Unit cost:
			Total cost:
Scanning and preservation of old documents			
			Unit cost:

			Total cost:
No. of Registration offices connected with the concerned Tehsil office			
			Unit cost:
			Total cost:

Section – C.. contd.

District - 1

Table – IV

Survey/ resurvey (only ongoing works)

The year in which the last survey & settlement operation was carried out in the District		
Modern survey methodology being proposed now for survey/ resurvey of the district	Pure ground method using ETS & GPS; or	
	Hybrid methodology using aerial photography and ground truthing by ETS & GPS; or	
	Hybrid methodology using high-resolution satellite imagery and ground truthing by ETS&GPS	
Total estimated time for completing the survey/resurvey of the entire district (in months)		
Estimated cost for completing the survey/resurvey of the entire district (including ground control network and ground truthing) Cost per sq.km.: Total cost:		
Milestones along the timeline for completing the survey/ resurvey in the entire district, please indicate the month by which it will be completed:		
26) Establishing the ground control network		

27) Aerial photography or HRSI, if opted for	
28) Ground truthing by ETS & GPS	
29) Completion of the settlement operation	
30) Updating of the maps and textual data in the computerized environment	

Section – D

Table V

Training & capacity building plan for the entire State/ UT

Total number of officers and staff to be trained:	
31) At policy level and the HoD level, including the 2nd- and 3rd –in-command levels	
32) From the land records establishment	
33) From the survey & settlement (or consolidation) organization	
34) From the SROs	
35) Master trainers to be trained for training the field-level staff, out of 36) Above (c) Above 37) Above	

Preferred training institution(s), if any:	
Duration of training, batch-sizes, best time of the year, separately, for each of the above categories; and the estimated cost:	

Section - E

Table – VI

Financials

(Separately, for each district proposed to be taken up during 2018-19)

Sl. No.	Components/activities	Total cost (Rs. in lakhs)	Central share (Rs. in lakhs)	State share (Rs. in lakhs)
1.	**Computerization of land records**			
	Data entry/re-entry/ data conversion			
	Digitization of cadastral maps and integration of textual and spatial data			
	Tehsil, sub-division/ district data centres			
	Inter-connectivity among revenue offices			
2.	**Survey/resurvey and updating of survey & settlement records (including ground control network and ground truthing) (only ongoing works)**			
3.	**Computerization of registration**			
	Computerization of SROs			
	Data entry of valuation details			
	Data entry of legacy encumbrance data			
	Scanning & preservation of old documents			

	Connectivity to SROs with revenue offices			
4.	**Modern record rooms/land records management centres at tehsil/taluk/ circle/block level**			
	Total			

Section – E contd.

Table – VII

Financials

(Summary table for the State/UT for the year 2018-19)

Sl. No.	Components/activities	Total cost (Rs. in lakhs)	Central share (Rs. in lakhs)	State share (Rs. in lakhs)
1.	**Computerization of land records**			
	Data entry/re-entry/ data conversion			
	Digitization of cadastral maps and integration of textual and spatial data			
	Tehsil, sub-division/ district data centres			
	State/UT level data centre			
	Inter-connectivity among revenue offices			
2.	**Survey/resurvey and updating of survey & settlement records (including ground control network and ground truthing) (only ongoing works)**			
3.	**Computerization of registration**			
	Computerization of SROs			
	Data entry of valuation details			
	Data entry of legacy encumbrance data			
	Scanning & preservation of old documents			
	Connectivity to SROs with revenue offices			

4.	**Modern record rooms/land records management centres at tehsil/taluk/ circle/block level**			
5.	**Training & capacity building**			
	Total			

Annexure-XV

Formats for Quarterly Progress Report – District files – Milestones and Timeframes – National Perspective Plan – Fix responsibilities

Annexure-XVI

Online Monitoring Format for DILRMP

(District Wise)

1 District Profile (One Time Entry)

1.	Name of District	**Select from List**
2.	Number of Sub-divisions	
3	Number of Tehsil/Taluks	
4.	Number of Sub-Registrar Offices	

2. Physical Performance (Quarterly Reporting)

A. Computerization of Land Records

District Level Centre

1	Whether District Centre set up under NLRMP/CLR	Y/N
2	IF not, is it sanctioned during current year	Y/N
3	If Yes, Progress made so far	

Sub-Division Level Centre

Sr.	Activities	Name of Sub-Divisions		
1	Whether Sub-division Computer Centre set up	Y/N	Y/N	
2	If not, is it sanctioned during current year	Y/N	Y/N	

3	If yes, progress so far			

Tehsil Operational Details

	Activities	Name of Sub-divisions			
		Name of Tehsils		Name of Tehsils	
1	Whether Tehsil Computer Centre set up	Y/N	Y/N		
	IF not, is it sanctioned during current year	Y/N	Y/N		
	If yes, progress so far				
2	Data Entry of RoR completed	Y/N			
	If not progress so far				
3	Data Entry of other attributes completed				
	If not progress so far				
4	Whether copies of RoR being distributed through computers	Y/N			
	If not progress so far				

5	Whether legal sanctity given to computerized copy of RoR	Y/N			
	If not progress so far				
6	Whether manual distribution of RoR stopped	Y/N			
	If not, by when manual distribution of RoR will be stopped				
Issuance of other Certificates					
7	Distribution of other Certificates from Tehsil Computer Centre (Tick out of the following)	Domicile			
		Income			
		Caste			
		Backward Area			
		Succession			
		Others			
Connectivity Details					
7	Details of Last Mile connectivity arranged (Tick out of following)	Broadband			
		Broadband with VPN			
		Leased Line			
		SWAN -POP			
		Other			

		Not yet arranged			
Digitization of cadastral Maps					
8	Total Number of Maps/FMB/Gat maps				
9	No of Maps /FMB Vectorized				
10	Whether Mosaicing done for all villages	Y/N			
	If not, progress so far				
11	Whether Geo-referencing done for all villages	Y/N			
	If not, progress so far				
12	Whether textual and spatial data integrated?				
	If not progress so far				

D. Computerization of Registration

	Activities	Sub- registrar -1	Sub-registrar -2	……
1	Whether SRO computerized	Y/N	Y/N	
	If Yes, tick the functions computerized	Availability of Deed Formats on Web		

		Property Valuation		
		Property & parties details capturing		
		Photo and Finger Printing		
		Scanning and Retrieval System		
		Issue of Non-Encumbrance Certificate		
		Any Other....		
	If Not, progress so far			
Connectivity Details				
2	Details of Last Mile connectivity arranged *(Tick out of following)*	Broadband		
		Broadband with VPN		
		Leased Line		
		SWAN -POP		
		Other		
		Not yet arranged		
3	Whether SRO and Tehsil have been integrated			
	If Not, progress so far			

E. Survey and Settlement using modern technology

Total area of districts in SQ KM:

Choice of Technology

Technology being used (Tick)	*Area being surveyed in SQ KM*
38)Aerial Photography +GPS/ETS	
39)GPS+ETS (Ground Methods)	
40)HSRI+GPS+ETS	
41)Any other...LIDAR/ALTM etc	

F. Modern Land Records Management Centre under DILRMP at Tehsil/Taluk Level

Name of Tehsil /Taluk:

1	Whether Record Room co-located with tehsil computer Centre	Y/N
2	Physical Storage	Physical storage through compactors Y/N
		No of compactor installed :
		Whether stored file(Paper) indexed and referenced through computerised system
3	Operational Area	No of Server installed :
		No of Clients installed:

		Whether Storage Area Network (SAN) required: Y/N
		Whether archival records scanned and stored digitally : Y/N
		If yes, stored in CD/DVD/TAPE/HDD/SAN (Tick)
4	Public Services	Whether scanned records are distributed
5	Reception and Waiting facility exist	Y/N

3. Financial Performance/ Position (Quarterly Reporting) - District Wise

Sr. No	Broad Activities	Opening Balance as on 1st April of the year	Funding Received during the years (in Lakhs)			Total Amount Available (in Lakhs)	Amount Utilized (In Lakhs)
			Central Share	State Share	Total		
1	Computerization of Land Records						

2	Survey/resurvey and updating of survey & settlement records (only ongoing work)						
3	Computerization of registration						
4	Modern record rooms/land records management centres at Tehsil						
5	Training and capacity Building						

GLOSSORY

1.	ADM	Additional District Magistrate
2.	ASA	Audited Statement of Accord
3.	ATI	Administrative Training Institutes
4.	CDAC	Centre for Development of Advanced Computing
5.	C-DAC	Centre for Development of Advanced Computing
6.	CEO	Chief Executive Officer
7.	CERT	Computer Emergency Response Team
8.	CLR	Computerization of Land Records
9.	CRO	Circle Revenue Officer
10.	DEM	Digital Elevation Model
11.	DGPS	Differential Global Positioning System
12.	DILRMP	Digital India Land Records Modernization Programme
13.	DMS	Data Model Structure
14.	DoLR	Department of Land Resources
15.	DPI	Dots Per Inch
16.	DPR	Detailed project Reports
17.	DPS	Digital Photogrammetric Station
18.	DRO	District Revenue Officer
19.	DTDB	Digital Topographic Data Base
20.	EO	Executive Officer

21.	ETS	Electronic Total Station
22.	FMB	Field Measurement Books
23.	FSI	Forest Survey of India
24.	GCP	Geo-referenced Control Point
25.	GCPL	Ground Control Point Library
26.	GDOP	geometric dilution of precision
27.	GIS	Geospatial Information System
28.	HRSI	High Resolution Satellite Imagery
29.	IEC	Information, Education and Communication
30.	IGS	International Geodetic Survey
31.	ISMS	Information Security Management System
32.	ISRO	Indian Space Research Organization
33.	JL	Jurisdiction List
34.	LAN	Local Area Network
35.	LBSNAA	Lal Bahadur Shastri National Academy of Administration
36.	LISS	Linear Imaging Self-Scanner
37.	LPMs	Land Parcel Maps
38.	LRD	Land Revenue Department
39.	MoU	Memorandum of Understanding
40.	NGO	Non-Governmental Organisation
41.	NIC	National Informatics Centre

42.	NIRD	National Institute of Rural Development
43.	NLRMP	National Land Records Modernization Programme
44.	NNRMS	National Natural Resource Management System
45.	NRSC	National Remote Sensing Centre
46.	NSDB	National Spatial Data Base
47.	NSDI	National Spatial Data Infrastructure
48.	O&M	Operational and Maintenance
49.	OSS	Open Source Software
50.	PMU	Programme Management Unit
51.	PoP	Point of Presence
52.	RDBMS	Relational Database management Systems
53.	RMS	Root Mean Square
54.	RoR	Record of Rights
55.	RPN	Rendered Plot Numbers
56.	SAN	Storage Area Network
57.	SDM	Sub-Divisional Magistrate
58.	SDO	Sub-Divisional Officer
59.	SLDC	State Level Data Centres
60.	SLUSI	Soil & Land Use Survey of India
61.	SOI	Survey of India
62.	SRA&ULR	Strengthening of Revenue Administration and Updating of Land Records

63.	SROs	Sub-Registrar‘s Offices
64.	SWAN	State Wide Area Network
65.	TS	Total Stations
66.	UT	Union Territory
67.	UTF	Unicode transformation format
68.	UTM	Universal Traverse Mercator
69.	VPN	Virtual Private Network
70.	WAN	Wide Area Network
71.	WGS	World Geodetic System

****

No. NH-11011/30/2015-LA
Government of India
Ministry of Road Transport & Highways
Transport Bhawan, 1, Parliament Street, New Delhi-110001

Dated, the 28th of December, 2017

To

1. Chief Secretaries to all State Governments/ Administrators of Uts;
2. The Addtional Chief Secretary/ Principal Secretary/ Secretary, Public Works Departments of all State Governments/ Union Territories;
3. The Chairman, National Highways Authority of India, G-5&6, Sector- 10, Dwarka, New Delhi-75;
4. The Managing Director, National Highways Infrastructure Development Corporation Ltd, PTI Building, Parliament Street, New Delhi- 110001.

Subject: Land acquisition under the National Highways Act, 1956 - comprehensive guidelines thereon.

Sir,

I am directed to say that the land required for National Highway Projects is acquired under the provisions contained in Section 3 of the National Highways (NH) Act, 1956. Pursuant to the enactment of the RFCTLARR Act of 2013 and its coming into force with effect from 01.01.2014, certain provisions of the 2013 Act became applicable to the other related Acts mentioned in the Fourth Schedule, including the NH Act, 1956 with effect from 01.01.2015 in terms of Section 105(3) of the RFCTLARR Act, 2013.

2. Accordingly, the Ministry of Road Transport & Highways (MoRTH) has issued various OMs/ Circulars on the subject from time to time, as mentioned at **Annexure-1.** Similarly, the Department of Land Resources, Ministry of Rural Development, have also issued guidelines/ orders on the subject, being the nodal Department of Government of India for the administration of RFCTLARR Act, 2013 and its application to the other related statutes mentioned in the Fourth Sechedule of the Act ibid. These guidelines/ orders/ clarifications are mentioned in **Annexure - 2.**

3. The entire issue has been examined afresh in view of the calrifications emerging in due course of time. The Ld. Attorney General of India has also been consulted on certain issues. Accordingly, it has been decided to issue these comprehensively revised guidelines in supersession of the guidelines issued hereinbefore. These are as follows:

4. Applicability of the 'RFCTLARR Act 2013' to the enactments mentioned in the Fourth Schedule of the Act ibid:

(i) The 'RFCTLARR Act 2013' came into force with effect from 01.01.2014. Section 105 of the Act deals with the subject of applicability of provisions of the RFCTLARR Act, 2013 to the related statutes enumerated in the Fourth Schedule. Provisions of Section 105 (3) read as under:

> "(3) The Central Government shall, by notification, within one year from the date of commencement of this Act, direct that any of the provisions of this Act relating to the determination of compensation in accordance with the First Schedule and rehabilitation and resettlement specified in the Second and Third Schedules, being beneficial to the affected families, shall apply to the cases of land acquisition under the enactments specified in the Fourth Schedule or shall apply with exceptions or modifications that do not reduce the compensation or dilute the provisions of this Act relating to compensation or rehabilitation and resettlement as may be specified in the notification, as the case may be."

(ii) The Central Government came out with an Ordinance (No. 9 of 2014) dated 31st December, 2014, entailing an amendment to, inter-alia, Section 105 vide Clause 10 of the Ordinance, substituting sub-section (3) of Section 105 and omitted Sub-section (4) of Section 105. The substituted sub-Section (3) is reproduced below:

> "(3) The provisions of this Act relating to the determination of compensation in accordance with the First Schedule, rehabilitation and resettlement in accordance with the Second Schedule and infrastructure amenities in accordance with the Third Schedule shall apply to the enactments relating to land acquisition specified in the Fourth Schedule with effect from 1st January 2015."

(iii) The provisions of Ordinance No. 9 of 2014 were continued further vide Ordinance No. 4 of 2015 dated 03.04.2015 and vide Second Ordinance dated 30.05.2015 (No. 5 of 2015) which was valid up to 31st August, 2015.

4.2 Subsequently, the Department of Land Resources, Ministry of Rural Development, Government of India, issued The RFCTLARR (Removal of Difficulties) Order, 2015 vide Notification dated 28th August, 2015. The said Order is reproduced below:

> "(1) This Order may be called the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Removal of Difficulties) Order, 2015.
>
> (2) It shall come into force with effect from the 1st day of September, 2015.
>
> (3) The provisions of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, relating to the determination of compensation in accordance with the First Schedule, rehabilitation and resettlement in accordance with the Second Schedule and infrastructure amenities in accordance with the Third Schedule shall apply to all cases of land acquisition under the enactments specified in the Fourth Schedule to the said Act."

4.3 It is clear from a reading of the above that requisite action in compliance of Section 105(3) was taken within one year's time with the promulgation of Ordinance No. 9 of 2014 dated 31.12.2014. This position continued with the issuance of two Ordinances in 2015, which was thereafter followed by the

'Removal of Difficulties Order" without any break in time. As such, operation of the provisions of RFCTLARR Act 2013, which came into effect from 01.01.2014, has been given effect in respect of the enactments specified in the Fourth Schedule (including the NH Act, 1956) with effect from 01.01.2015, in compliance of sub-section (3) of Section 105 of the RFCTLARR Act, 2013.

4.4 Following the notification of the aforesaid Ordinances, the Ministry of Road Transport & Highways issued a letter dated 29.04.2015 whereby the select provisions of RFCTLARR Act, 2013 were made applicable to the NH Act, 1956 with effect from 01.01.2015. A conjoint reading of the aforesaid shows that the Ordinance (Amendment) remained in force till 31st August 2015. *'Removal of Difficulties Order'* was issued by the Department of Land Resources on 28th August 2015, which took effect from 01.09.2015. However, since the date of application of the selected relevant provisions of the RFCTLARR Act, 2013 to the NH Act, 1956 was 01.01.2015 in terms of the Ordinance (Amendment) No. 9 of 2014, it remains an unambiguous and accepted position that the provisions of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, relating to the determination of compensation in accordance with the First Schedule, rehabilitation and resettlement in accordance with the Second Schedule and infrastructure amenities in accordance with the Third Schedule have been made applicable to all cases of land acquisition under the NH Act, 1956, i.e. the enactment specified at Sr. No. 7 in the Fourth Schedule to the RFCTLARR Act, **with effect from 01.01.2015.**

4.5 Applicability of Section 24 of the RFCTLARR Act 2013 to the NH Act, 1956.

(i) MoRT&H had issued instructions vide OM bearing No. 11011/30/2015-LA dated 13th January 2016 clarifying that Section 24 of the RFCTLARR Act, 2013 was applicable to the NH Act, 1956. However, the issue as to whether Section 24 of the RFCTLARR Act, 2013 is applicable to the NH Act, 1956 has been under consideration and revisited in consultation with the Ld. Attorney General, who has observed as under:

> "A reading of Section 24 makes it abundantly clear that the provision is applicable only to acquisitions that have been undertaken under the Land Acquisition Act, 1894, in as much as the legislative intent can be ascertained from the specific mention of the 'Land Acquisition Act, 1894'. Further, Section 105(1) of the RFCTLARR Act 2013 specifically excludes the application of any Section of the RFCTLARR Act 2013 to the Acts mentioned in the Fourth Schedule. The only exception to Section 105(1) is Section 105(3), which makes only the First, Second and Third Schedule applicable to the Fourth Schedule Acts."

(ii) As such, it is now clear that Section 24 of the RFCTLARR Act, 2013 is not applicable to the acquisitions under the NH Act, 1956.

4.6 Date of determination of market value of land

(i) Another related but important question is regarding the date on which the market value of land is to be determined in cases where land acquisition proceedings had been initiated under the NH Act, 1956 and were at different stages as on 31.12.2014. While there is no ambiguity regarding land acquisition proceedings initiated on or after 01.01.2015, this question assumes significance in view of the financial implications in respect of cases where the process of acquisition was at different stages as on 01.01.2015.

(ii) Section 26 of the RFCTLARR Act stipulates that *"the date for determination of market value shall be the date on which the notification has been issued under Section 11 (corresponding to Section 3 A of the NH Act)"*. Same was the position under the 1894 Act. This is further fortified from the provisions contained in Section 69(2) of the RFCTLARR Act. As such, it is clarified that the relevant date of determination of market value of land is the date on which notification under Section 3 A of the National Highways Act, 1956 is published.

(iii) By now, it is also a settled proposition that the First, Second and Third Schedule of the RFCTLARR Act, 2013 shall be applicable to the NH Act ,1956 with effect from 01.01.2015. As such, the following is clarified:

(a) All cases of Land acquisition where the Awards had not been announced under Section 3G of the NH Act till 31.12.2014 or where such awards had been announced but compensation had not been paid in respect of majority of the land holdings under acquisition as on 31.12.2014, the compensation would be payable in accordance with the First Schedule of the RFCTLARR Act, 2013.

(b) In cases, where the land acquisition process was initiated and award of compensation under Section 3G had also been announced before 01.01.2015 but the full amount of Award had not been deposited by the acquiring agency with the CALA, the compensation amount would be liable to be determined in accordance with the First Schedule w.e.f. 01.01.2015;

(c) In cases, where the process of acquisition of land stood completed (i.e. Award under Section 3G announced by CALA, amount deposited by the acquiring agency with the CALA, and compensation paid to the landowners in respect of majority of the land under acquisition) as on or before 31.12.2014, the process would be deemed to have been completed and settled. Such cases would not be re-opened.

5. Payment of additional amount calculated @ 12% on the market value in terms of sub-section (3) of Section 30 of the RFCTLARR Act, 2013

5.1 Another issue that has emerged pertains to the admissibility of payment of an additional amount calculated @12% per annum on the market value of land in respect of acquisitions under the NH Act, 1956 as it is not mentioned under the First Schedule to the RFCTLARR Act, 2013. The position has been carefully examined in terms of the provisions in this behalf. Sub-section (3) of Section 30 of the RFCTLARR Act reads as under:

> "In addition to the market value of the land provided under Section 26, the Collector shall, in every case, award an amount calculated at the rate of twelve percent per annum on such market value for the period commencing on and from the date of publication of the notification of the Social Impact assessment study under sub-section (2) of Section 4, in respect of such land, till the date of the award of the Collector or the date of taking possession of the land, whichever is earlier."

5.2 Sub-section (3) of Section 105 of the RFCTLARR Act stipulates that:

> "The Central Government shall, by notification, within one year from the date of commencement of this Act, direct that any of the provisions of this Act relating to determination of compensation in accordance with the First Schedule and rehabilitation and resettlement specified in the Second and Third Schedules, being beneficial to the affected families, shall apply to the cases of land acquisition under the enactments specified in the Fourth Schedule or shall apply with such exceptions or modifications that do not reduce the compensation or dilute the provisions of this Act relating to compensation or rehabilitation and resettlement as may be specified in the notification, as the case may be."

5.3 The proviso under Section 26 of the RFCTLARR Act stipulates that *"the date for determination of market value shall be the date on which the notification has been issued under Section 11 (corresponding to Section 3 A of the NH Act)"*. Similarly, Section 69 (2) of the RFCTLARR Act, 2013 also stipulates that such additional amount is to be *"calculated @ 12% on such market value for the period commencing on and from the date of publication of the preliminary notification under section 11 in respect of such land to the date of the award of the Collector or the date of taking possession of the land, whichever is earlier"*. Since the acquisition of land for the National Highways is exempted from the Social Impact Assessment, it is absolutely clear from a harmonious reading of all related provisions that the calculation of such amount shall be made with effect from the date of publication of the Notification under Section 3A of the NH Act, 1956.

5.4 The compensation amount has to be determined in accordance with the First Schedule, (which contains references to Section 26, 29 and 30(1) of the RFCTLARR Act) in its application to the NH Act. Provision for amount calculated @ 12%

interest is under sub-section (3) of Section 30 of the RFCTLARR Act, to which no reference has been made in the First Schedule. Further, Section 30(3) stipulates that the additional amount calculated @ 12% is payable with effect from the date of publication of the notification of the Social Impact Assessment Study, which is not applicable to the land acquisition for National Highways. On the other hand, Section 69(2) of the RFCTLARR Act, 2013 stipulates that the additional amount calculated @ 12% is to be calculated from the date of publication of the preliminary notification under Section 11 (corresponding to Section 3(a) of the NH Act, 1956). Further, the Ordinances and the Removal of Difficulties Order do not include the portion *"being beneficial to the affected families, shall apply to the cases of land acquisition under the enactments specified in the Fourth Schedule or shall apply with such exceptions or modifications that do not reduce the compensation or dilute the provisions of this Act relating to compensation or rehabilitation and resettlement as may be specified in the notification, as the case may be"*. Hence, a strict textual reading of the relevant provisions shows that it is an arguable point if the 'amount' under Section 30(3) is payable in respect of land acquired under the NH Act, 1956 or not.

5.5 However, a harmonious reading of all the related provisions of the RFCTLARR Act, the pronouncements of the Courts on payment of compensation under Section 23 (1A), Section 23(2) and Section 28 of the Land Acquisition Act, 1894 in respect of land acquired under the NH Act, 1956, read with Section 105(3) of the RFCTLARR Act, 2013, especially when the market value has to be reckoned as on the date of issue of Section 3A of the NH Act, would go to show that payment of 'amount' of 12% on the market value of land from the date of publication of Section 3A of the NH Act, 1956 till the announcement of award under Section 3G or taking possession of land, whichever is earlier, is payable.

5.6 This issue has been examined in detail by the Ld. Attorney General who has finally opined *"that a holistic reading of the provisions of the RFCTLARR Act, 2013 would require the payment of the 'amount' mentioned under Section 30(3) of the RFCTLARR Act, 2013"*. As such, in supersession of the OM bearing No. NH-11011/140/2017-P&M/LA dated 7th September 2017, vide which it was clarified that the said 'amount', not being part of the First Schedule to the Act, was not payable in respect of land acquisition under the NH Act, 1956, **it is clarified that the 'amount' calculated @ 12% per annum, as prescribed under Section 30(3) of the RFCTLARR Act, 2013, though not specifically mentioned in the First Schedule, would be payable to the landowners.**

5.7 Still, another set of two questions arise i.e. (i) the date from which the amount payable under Section 30(3) is to be calculated, and (ii) as to whether the 'amount' as mentioned in Section 30(3) of the RFCTLARR Act, 2013 is a **stand-**

alone component and paid as such or it would get added to the market value, and then count for the purposes of Multiplication Factor and/ or Solatium also. This issue has also been examined by the Ld. Attorney General, whose opinion is reproduced below:

> "There are **two other issues** that are related to payment of 'amount' under Section 30(3). **The first** is in regard to the date from which this amount has to be calculated. Section 30(3) states that this date will be the date of 'social impact assessment' under Section 4 of the RFCTLARR Act. However, Section 4 is not applicable to the national Highways Act, Therefore, as was being done earlier, this amount may be paid from the date of issuance of preliminary notification under Section 3A of the National Highways Act. **The second issue** is in regard to whether this 'amount' is a standalone component or wheher the same has to be calculated after addition of the multiplication factor and solatium. The answer to this question is to be found in Section 30(3) which clearly states that the amount is payable in addition to to the market value of the land and is calculated as a percentage of 'market value'. There is a distinction between 'market value' and compensation. Market value is determined under Section 26. Section 27 provides that the Collector having determined the total market value, will proceed to determine the compensation. This compensation is determined under Section 28 of the Act. Therefore, a reading of these sections would lead to the conclusion that the 'amount' has to be awarded only on the 'market value' which in turn is determined under Section 26 of the Act."

5.8 It may be noted that the computation of different components of the total compensation is in seriatum and sequential from Section 26 to Section 30 of the RFTCLARR Act, 2013. Keeping the aforesaid opinion of the Ld. Attorney General in view, and the fact that the payment of 'amount' under Section 30(3) has been prescribed as "In addition ..." after the provision for payment of solatium, **it is clarified that it would be payable as a 'stand-alone component' and shall not count for the purposes of Multiplication Factor and the Solatium.** Illustration given in **Annexure - 4** to these guidelines may be referred for correct methood of calculation of the compensation amount.

6. Issue of the Multiplication Factor (MF)

6.1 It is clear that the compensation of land acquired under the NH Act, 1956 with effect from 01.01.2015 is to be determined in accordance with the provisions contained in the First Schedule to the RFCTLARR Act, 2013 (in so far as it relates to the Multiplication Factor prescribed by the appropriate government).

6.2 The Department of Land Resources, Ministry of Rural Development, Government of India issued a Notification dated 9th February 2016 in this behalf, which reads as under:

> "In exercise of the powers conferred by column No. 3 of serial No. *2 of the First Schedule read with sub-section (2) of Section 30 of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (30 of 2013), the Central Government, hereby, notifies that in the case of rural areas, the factor by which the market value is to be multiplied shall be 2.00 (two)."

6.3 Soon after the aforesaid Notification was issued by the Department of Land Resources, certain states like Andhra Pradesh, Maharashtra, Punjab, Jharkhand, Chhatisgarh and Bihar started using a Multiplication Factor of 2.00 in respect of land acquired/ to be acquired for the NH Projects (read Central Government Projects) on the basis of 9th February Notification of the Department of Land Resources whereas the Multiplication Factor applicable to the jurisdiction of the state was to be notified by the appropriate government. The MoRTH also issued two OMs dated 12.08.2015 and 08.08.2016 on the subject. A reference was made in this behalf by the then Chairman, NHAI to the Secretary, Department of Land Resources. Certain references were also made by the states. The reference specifically mentioned the issue of two different sets of MFs being adopted by certain states for the Central Projects and the State Projects. The State of Chhatisgrah continues with such classification even on date.

6.4 Some of these confusions have been set at rest and clarified by the DoLR vide its letter F. No. 13013/ 02/ 2016-LRD dated 8th May, 2017, more specifically the issue of differential MFs for the State and the Central Projects. The DoLR has further clarified vide its F. No. 13013/02/2016-LRD dated 14th December 2017 that the DoLR Notification of 9th February 2016 was applicable **only** to the UTs, except Puducherry, as the DoLR is the appropriate Government **only** in respect of the UTs, except Puducherry.

6.5 The DoLR Notification of 9th February 2016 prima facie appears to be inconsistent with the provisions contained in the First Schedule, especially in respect of the following three points:

(i) Firstly, it gave an impression (though erroneous) as if the Central Government was the 'appropriate government' to notify the Multiplication Factor (MF) in respect of all Central Government projects across all the states;

(ii) Secondly, it did not clearly state that the Notification was applicable only in relation to the Union Territories, except Puducherry;

(iii) Thirdly, the prescription of a MF of 2.00 without co-relating the distance of the project from the urban area is prima facie inconsistent with the contents of the First Schedule. The said entry reads as under:

Serial Number	Component of Compensation package in respect of land acquired under the Act	Manner of determination of value	Date of determination of value
(1)	(2)	(3)	(4)
2.	Factor by which the market value is to be multiplied in the case of rural areas	1.00 (one) to 2.00 (Two) **based on the distance of project from the urban area,** as may be notified by the appropriate Government.	

6.6 The DoLR, however, has clarified the position with regard to the points mentioned at (i) and (ii) of para 6.5 above, as mentioned under para 6.4 above. The DoLR has clarified vide its OM of 8th May 2017 that there cannot be two sets of Multiplication Factors, one for the state projects and the other for the Central projects. Since the issue regarding sub para (iii) of para 6.5 above still remained unsettled, the matter was referred to the Ld. Attorney General, who has opined as under:

> "The MoRTH has sought my opinion on whether it is open to the appropriate Government to fix a uniform multiplication factor of 2 for all rural lands. The query is a result of notifications issued by the Department of Land Resources and certain states like ... which have stated a multiplication factor of 2 in respect of land acquired/ to be acquired for all National Highway Projects whereas a different multiplication factor has been prescribed for land acquired by the State Government.
>
> In my opinion, the appropriate government must have a graded approach to fixing the multiplication factor. This is evident from the words in the schedule "*1.00 (one) to 2.00 (two) based on the distance of project from the urban area*". For this purpose, the appropriate government has to apply its mind and take into consideration the distance of lands from urban areas."

6.7 A number of states like West Bengal, Rajasthan, Mahrasthra and others have already notified the graded scale of Mutiplication Factor as applicable in their respective jurisdiction. The position in this behalf, as available with MoRTH on the date of issue of these guidelines, is enclosed as **Annexure - 3.** While the matter is being taken up with the DoLR again to revisit its Notification of 9th February 2017 with regard to a single Multiplication Factor of 2.00 for the rural areas *qua* the UTs (except the state of Puducherry), the concerned officers of MoRTH and NHAI/ NHIDCL are advised to take up the matter with the states where a uniform MF of 2.0 has been notified for the Rural Areas without using a scale/ graded MF linking the distance of the project area from the urban limits.

6.8 The Chief Secretaries of the concerned states like Bihar, Chhatisgarh, Gujarat, Jharkhand, Uttrarakhand and Uttar Pradesh are requested to take necessary corrective measures in this matter in order to ensure that the 'multiplication factor' notified in their respective states is in conformity with the legal provisions

in the First Schedule to the RFCTLARR Act, 2013, as also advised by the Attorney General of India.

6.9 Keeping the aforesaid in view, it is clarified as under:

(i) The multiplication factor by which the 'market value' is to be multiplied in case of urban areas shall be 1.00 (One) as specified in the First Schedule. The 'Urban Area' shall mean the area situated within and up to the boundary of the Urban Local Body as notified by the concerned State Government (i.e. a Municipal Corporation/ Council/ Committee, by whatever name it may be called).

(ii) The multiplication factor by which the market value is to be multiplied in case of rural areas (from the end-point of the urban limit) shall be the one as notified by the concerned State Government, being the appropriate government for such state. It may be noted that the Multiplication Factor notified by the State shall remain the same for the state government and the central government projects. There cannot be two different sets of multiplication factors in the same state, as already clarified by the Department of Land Resources, Ministry of Rural Development, vide its OM dated 8th May, 2017.

(iii) As regards the Multiplication Factor in the case of rural areas in the Union Territories (other than Puducherry), the Multiplication Factor shall be 2 (Two) in terms of the DoLR Notification No. S.O.425 (E) dated 09.02.2016 tll the same is reviewed by the Department of Land Resources.

(iv) The Multiplication Factor by which the market value is to be multiplied in case of rural areas situated in the Union Territory of Puducherry shall be the same as notified by the Government of Union Territory of Puducherry.

7. Bulk Acquisitions/ Purchase of Land through Consent of Landowners

7.1 Various state governments have come out with their respective guidelines/ policies/ rules/ statutes for acquisition of land on consent basis. Proposals have been received in MoRTH from such state governments for acquition of land for the National Highways within their jurisdiction under their respective consent acquisition policies/ guidelines/ statutes. MoRTH has agreed to the proposals of the following states and issued OMs in this connection subject to the condition that the compensation amount paid in such cases is in consonance with the provisions of the RFCTLARR Act 2013, as applicable to the NH Act, 1956 for the purpose:

Sr. No.	Subject	Date of Issue
(i)	Kerala, Chhattisgarh	02.08.2016
(ii)	West Bengal, Uttar Pradesh, Telangana, Punjab,	03.08.2016
(iii)	Rajasthan, Goa, Odisha,	24.08.2016
(iv)	Bihar,	29.08.2016
(v)	Maharashtra, Himachal Pradesh	26.09.2016
(vi)	Karnataka	16.11.2016
(vii)	Madhya Pradesh	06.09.2017

7.2 In supersession of the above OMs, it has been decided by the Competent Authority that following guidelines shall be followed henceforth with immediate effect and until further orders regarding Bulk acquisition/ Purchase of Land through Consent of landowners:-

(i) There is a specific Central statute for acquisition of land for the National Highways i.e. **National Highways Act,1956.** As such, legally, the Central Government and its authorised project executing agencies are competent to acquire land for the construction/ development of National Highways under the NH Act, 1956 and the States do not have a case to insist that the land for the NHs in their jurisdiction should be acquired under the statutes/ policies framed by the State Governments/ UT Administrations.

(ii) However, considering the urgent need for minimizing litigation and ensuring early availability of land for completion of the NH projects, land for NH projects can be procured through direct purchase with the consent of the landowners in accordance with the existing Acts/ Rules/ Policies of the concerned State Governments subject to the condition that the total amount of compensation so worked out **will be no more than what is payable when the land is acquired under the NH Act, 1956, which in any case is in conformity with the compensation payable in accordance with the provisions of RFCTLARR Act, 2013.**

(iii) Further, MoRTH/ NHAI/ NHIDCL would also be agreeable to acquisition of land for the NH Projects in accordance with such consent mechanism of the state subject to the condition that the concerned State Government/ UT Administration agrees to bear the incremental cost, if any, from its own resources. To illustrate, if the amount of total compensation payable for one hectare land in terms of the First Schedule to the RFCTLARR Act, 2013 [including the amount calculated @ 12% in terms of Section 30 (3) of RFCTLARR Act, 2013] is Rs. 1.50 crore/ hectare and the amount determined under the consent mechanism of the state government works out to Rs. 1.75 crore/ hectare, the State Government/ UT Administration would have to

bear the differential compensation amount of Rs. 25.00 Lakh/ hecatre from its own sources.

(iv) Henceforth, with the above principles having been laid down, there will be no need to issue any state specific guidelines on the subject.

8. Acquisition of land for Missing Plots

The Ministry has issued detailed guidelines vide its letter dated 15.03.2016 for acquisition of land through consent of landowners, preferably limited to 10% of total quantum of land acquisition in a construction package in the cases of (i) Missing plots which are inadvertently left out from the bulk acquisition, and/ or (ii) additional land required due to alteration of alignment at implementation stage. These guidelines shall continue to remain in force until further orders.

9. Notification of a stretch as a NH under Section 2 of the NH Act, 1956 before initiating the process of Land Acquisition under Section 3 of the NH Act?

(i) The issue as to whether it is necessary to notify a certain stretch as a National Highway under Section 2 of the NH Act before initiating the process of acquisition of land for building a National Highway under Section 3 of the NH Act has come up for consideration. The Ministry was of the view that Section 2 and Section 3 of the NH Act are independent of each other. This issue was also referred to the Ld. Attorney General for his opinion. The Attorney General has advised vide his supplementary reference dated 24.12.2017 as under:

> "Section 3A deals with the power to acquire land and Section 3A(1) provides as follows:
>
> > *3A Power to acquire land, etc. - (1) Where the Central Government is satisfied that for a public purpose any land is required for the building, maintenance, management or operation of a national highway or part thereof, it may, by notification in the Official Gazette, declare its intention to acquire such land.*
>
> Under Section 3A(1), the Central Government may acquire land for the purpose of building a National Highway. The term **'building'** is not defined in the National Highways Act. The New Webster's Dictionary of the English Language (Deluxe Encyclopedic Edn) defines 'building' as *' the act of one who builds'*. The term 'build' is defined as *'to construct or erect, as a house; to form by uniting materials into a regular structure; to make; to establish by gradual means; to raise as on a support or foundation'*. When the Central Government notifies land for acquisition, the nature of these lands may be paddy fields or waste lands or vacant lands. These lands cannot be called a Highway. What is acquired is only land without a Highway existing at the

time. The very concept of a Highway is defined in common law as *'a way over which there exists a public right or passage... at all seasons of the year freely... to pass and re-pass without let or hindrance ('Halsbury's Laws of England, 4th Edn. Vol 21 Page 9). Vacant* lands and paddy fields can never be termed as Highways. It is only when the road is built/ constructed and established, and is able to take traffic, and when a passage comes into existence for persons to pass and re-pass, that it can be notified.

In view of the above, my answer to the query is that it is not necessary to notify a road project as a National Highway in terms of Section 2 of the National Highways Act, 1956 for initiating the process of land acquisition under Section 3A of the Act .

I advise accordingly."

(ii) Accordingly, it is clarified that it is not necessary that a stretch must be notified as a National Highway under Section 2 of the NH Act, 1956 before initiating the process of land acquisition under Section 3 for building a National Highway.

10. Competent Authority for Land Acquisition (CALA) and due diligence at the time of determination of compensation amount by the Competent Authority.

(i) The Central Government (i.e. the Ministry of Road Transport & Highways) appoints the Competent Authority for Land Acquisition (CALA) in exercise of its powers under Section 3(a) of the NH Act, 1956. As such, the CALA appointed by the Central Government, is obliged to take all action for acquisition of land under the NH Act, 1956 and the guidelines issued by the Central Government on the subject.

(ii) It may be noted that the provisions contained in the RFCTLARR Act, 2013 from Section 26 to Section 30 are in seriatum i.e. sequential. Para 5.8 of these guidelines may be referred in this behalf. As such, an illustration on how the total compensation amount is to be calculated is given in **Annexure-4.** This has to be strictly followed by all CALAs appointed by the Central Government.

(iii) Certain undesirable practices have come to notice of the Central Government. These include change in the nature of land or adoption of incorrect classification of land for determination of market value of land. It may be noted that the nature of land has to be taken as recorded in the revenue records on the day of publication of Section 3A notification. For instance, if some landowner/ interested person has raised a factory building or a commercial building upon the land under acquisition without obtaining the "Change in Land Use" from the competent authority prescribed by the

state government, he/ she cannot take the benefit of treatment of such land as "Industrial" or "Commercial". Therefore, due diligence has to be exercised by the CALA while determining the land use/ nature of land and working out the market value of land.

(iv) It may be further noted that the market value of land is to be determined as on the date of publication of the preliminary Notification under Section 3A of the NH Act, 1956. It is for this reason that in addition to the market value of land and solatium, the landowner is also paid an amount calculated @ 12% per annum from the date of initial notification under Section 3A till the announcement of Award or possession of land, whichever is earlier. Instances have come to notice where the landowners/ interested persons have undertaken certain improvements over the land notified under Section 3A after the publication of notification in order to enhance the quantum of compensation. This would include plantation of trees on such land to add value. As such, the CALAs are duty bound to ignore any improvement done over the notified land after the date of notification while determining the compensation amount and announcing the Award under Section 3G of the NH Act, 1956.

(v) The CALA, while announcing the Award under Section 3G, shall append a certificate at the end of his Award that he/ she has strictly followed the legal provisions and these guidelines in determination of the compensation amount.

11. Disbursement of Compensation amount and possession of land

(i) It has been observed that the process of disbursement of compensation amount to the landowners or the persons interested therein goes on for a long period for a variety of reasons, which leads to delays in taking possession of the land acquired and required for construction of the highway. Some of the most common reasons are mentioned as under:

(a) There are certain landowners who do not maintain their usual residence where the land is situated and can be called as absentee landowners;

(b) The land records are not updated and the successors-in-interest are not clearly identified with their respective shares.

(ii) It is, therefore, important that the CALAs adopt the following procedure in order to ensure that the possession of acquired land is not delayed for any reasons:

(a) Apart from issue of notice to the landowner/ person interested therein

in terms of sub-section (1) of Section 3E of the NH Act, 1956, a public notice may also be published in the same set of two newspapers in which the Notification under Section 3A (3) was published informing the landowners/ persons interested in the acquired land about the announcement of the Award by the CALA in respect of subject land, calling upon them to collect the compensation amount from the office of the CALA within a period of sixty days.

(b) As soon as the period of 60 days is over, another public notice may be caused to be published in the same set of newspapers, calling upon such landowners to surrender or deliver possession thereof to the competent authority forthwith, failing which the possession shall be taken with the assistance of the local police in accordance with sub-section (2) of Section 3E of the NH Act, 1956.

(iii) A typical sample/ format of the two sets of Public Notices are enclosed as **Annexure - 5.**

12. Appointment of Arbitrator under Section 3G(5) of the NH Act, 1956

(i) Reference is made to Section 3G(5) of the NH Act, 1956 which stipulates that *"If the amount determined by the competent authority under sub-section (1) or sub-section (2) is not acceptable to either of the parties, the amount shall, on an application by either of the parties, be determined by the arbitrator to be appointed by the Central Government".*

(ii) Further, attention is also drawn to sub-section (4) of Section 3H of the NH Act, 1956 which stipulates that *"If any dispute arises as to the apportionment of the amount or any part thereof or to any person to whom the same or any part thereof is payable, the competent authority shall refer the dispute to the decision of the principal civil court of original jurisdiction within the limits of whose jurisdiction the land is situated."*

(iii) A perusal of the above provisions makes it clear that the jurisdiction of the 'Arbitrator' appointed by the Central Government and that of the 'Principal Civil Court of original jurisdiction' have been clearly demarcated.

(iv) The CALAs may, while making a reference to the 'Principal Civil Court of original jurisdiction' wherever required, may also seek leave of such Court to deposit the undisbursed amount of compensation in respect of such landowners/ interested persons with the Court so that the possession of such land is not held-up on this account, leading to delays in taking up the highway development works.

13. Administrative charges for Land Acquistion for NH Projects

A total of 13 states levy administrative charges for acquisition of land for the National Highways. Demi-official communications have been sent at the level of Secretary, MoRTH to Chief secretaries of these states in this behalf. A copy of the said letter, which is self contained, is enclosed as **Annexure-6**. Action may be taken by all concerned accordingly.

14. Supersession of previous guidelines:

With the issue of these comprehensively revised guidelines, the guidelines mentioned at **Part A** of **Annexure-1** continue to remain in operation for the time being till these are also comprehensively revised , whereas those mentioned under **Part B** of **Annexure-1** are superseded. These guidelines shall take effect from the date of issue.

15. Savings:

The Ministry has been issuing guidelines on the subject of Land Acquisition from time to time based on clarifications/ developments as these came along, which may have resulted in higher outgo on account of amounts of compensation paid to the landowners. Since it is practically not feasible to recover any such excess paid amount from the landowners/ interested persons, it is clarified that any compensation amount paid in the past in terms of guidelines issued by the Ministry from time to time, and which may not be payable in terms of these revised guidelines, shall be deemed to have been paid as per the extant guidelines and shall not be called into question on account of these revised guidelines.

16. These guidelines, which issue with the approval of the Hon'ble Minister, Road Transport & Highways, may be brought to the notice of all concerned for further necessary action and strict compliance.

Yours faithfully,

28.12.2017

(Amit Kumar Ghosh)
Joint Secretary to the Government of India
Tel No. 011-23718527

Enclosures - As Above

Copy for necessary action to:-

1. Director General (Roads Development) & Special Secretary, MoRT&H
2. All the Addl. Director Generals of MoRTH;
3. CE (P-1)/ CE (P-2)/ CE (P-3)/ CE (P-4)/ CE (P-5)/ CE (P-6)/ CE (P-7)/ CE (P-8)/ CE (LWE)/ CE (SARDP- NE)/ CE (NHDP- IVA)/ CE (Mon.)/ CE (Planning)
4. All ROs/ ELOs/ PIUs of the MoRT&H/ NHAI/ NHIDCL

Copy for information to:

1. PS to Minister (RTH&S)
2. PS to MoS (RTH&S)
3. Sr. PPS to Secretary (RT&H)
4. PPS to AS & FA.

Annexure- 1

Guidelines/ Istructions issued by the Ministry of Road Transport & Highways from time to time

Sr. No.	Subject	Date of Issue
A.	**Previous Guidelines that continue to operate**	
(i)	RFCTLARR (Amendment) Ordinance, 2015	03.04.2015
(ii)	Applicability of RFCTLARR Act 2013 to land acquisition under the NH Act, 1956 – First Schedule reg.	29.04.2015
(iii)	RFCTLARR (Amendment) Second Ordinance, 2015	30.05.2015
(iv)	RFCTLARR (Removal of Difficulties) Order, 2015	28.08.2015
(v)	Acquisition of missing plots through consent reg.	15.03.2016
(vi)	Guidelines for monitoring of Land Acquisition for NH Projects – engagement of consultant reg.	19.04.2016
(vii)	Facilities to CALA and TILR reg.	16.06.2016
(viii)	Guidelines for monitoring of Land Acquisition for NH Projects – appointment of additional CALA reg.	20.07.2016
(ix)	Facilities to arbitrator reg.	04.10.2016
B.	**Previous Guidelines which stand superseded**	
(i)	Applicability of RFCTLARR Act 2013 to land acquisition under the NH Act, 1956 – Multiplication factor reg.	12.08.2015
(ii)	Applicability of RFCTLARR Act 2013 to land acquisition under the NH Act, 1956 – Second and Third Schedule reg.	11.09.2015
(iii)	Acquisition of land for NH Projects – Return of unutilized land reg.	09.12.2015
(iv)	Applicability of RFCTLARR Act 2013 to land acquisition under the NH Act, 1956 – Section 24 reg.	13.01.2016
(v)	Applicability of RFCTLARR Act 2013 to land acquisition under the NH Act, 1956 – Multiplication factor reg.	31.03.2016
(vi)	Applicability of RFCTLARR Act 2013 to land acquisition under the NH Act, 1956 – Multiplication factor reg.	08.08.2016
(vii)	Administrative charges and other charges payable to State Government reg.	17.10.2016
(viii)	Applicability of Interest in determination of amount payable as compensation	07.09.2017
(ix)	**Acquisition of land through consent as per concerned State Government - reg.**	
(a)	Kerala, Chhattisgarh	02.08.2016
(b)	West Bengal, Uttar Pradesh, Telangana, Punjab	03.08.2016
(c)	Rajasthan, Goa, Odisha	24.08.2016
(d)	Bihar	29.08.2016
(e)	Maharashtra, Himachal Pradesh	26.09.2016
(f)	Karnataka	16.11.2016
(g)	Madhya Pradesh	06.09.2017

Annexure – 2

Guidelines/ Instructions issued by the Department of Land Resources, Ministry of Rural Development, Government of India on the subject of land acquistion from time to time

Sr. No.	Subject	Date of Issue
(i)	Applicability of RFCTLARR Act 2013 to Land acquisition under the NH Act, 1956 – First Schedule - reg.	29.04.2015
(ii)	Applicability of RFCTLARR Act 2013 to land acquisition under the NH Act, 1956 – Second and Third Schedule - reg.	11.09.2015
(iii)	Applicability of RFCTLARR Act 2013 to land acquisition under the NH Act, 1956 – First Schedule - reg.	13.01.2016
(iv)	Aplicability of the Multiplying factor provided in the First Schedule to the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013	F. No. 13013/02/2016-LRD dated 8th May 2017
(v)	Notification of the multiplying factor provided in the First Schedule to the RFCTLARR Act, 2013	F. No. 13013/02/2016-LRD dated 14th December 2017

Annexure – 3

Multiplication factor notified by the State Governments in compliance to Sr. No. 2 of the First Schedule to the RFCTLARR Act, 2013

Sr. No.	Name of the State	Multiplication Factor for acquisition of Land in Rural Areas	Reference No.
1.	Andhra Pradesh	1. 1.25 – Other than Scheduled areas, and 2. 1.50 for scheduled (Tribal) areas	
2.	Bihar	2.00 (Two)	
3.	Chhatisgarh	1.00 for the State Projects, and 2.00 for the Central Projects	Dated _____
4.	Gujarat	Multiplication Factor of 2 (two)	Resolution No. LAQ: 22-2014/179/GH dated 10.11.2016
5.	Haryana	1.00 (one)	Gazette Notification No. 2331-R-5-2014/16094 dated 4th December 2014
6.	Himachal Pradesh	1.00 (One)	Govt Gazette dated 2 April 2015
7.	Jharkhand	2.00 (Two)	Calculation of interest component under Section 30(3) made part of the amount on which 100% solatium is to be paid.
8.	Karnataka	1. 1.5 in respect of project areas outside the limits of urban areas extending up to 5 kms, and 2. 2.00 (Two) in all other rural areas	No. RD 58 Bhuswabe 2014 dated 03-05-2014
9.	Kerala	Sr. No. / Distance from Urban Area / Multiplication Factor (i) Urban area – 1.00 (ii) Up to 10 kms from outer limit of Urban Area – 1.2 (iii) From 10 km - 20 km – 1.4 (iv) From 20 km – 30 km – 1.6 (v) From 30 km to 40 km – 1.8 (vi) From 40 km and above – 2.0	No. B1/321/2017-REV dated 09/08/2017
10.	Madhya Pradesh	1.00 (One)	Dated 29.09.2014 published in the State Gazette dated 3rd October 2014
11.	Maharasthra	1. 1.50 for Areas covered by Regional Plans for Districts as well as Development Plan prepared in	Dated 26th May 2015

Annexure – 3

Multiplication factor notified by the State Governments in compliance to Sr. No. 2 of the First Schedule to the RFCTLARR Act, 2013

Sr. No.	Name of the State	Multiplication Factor for acquisition of Land in Rural Areas	Reference No.
		accordance with the provisions of the Maharasthra Regional Town Planning Act, 1966 for non-Municipal areas, excluding the areas mentioned in clauses (a) to (d) above; 2. 2.00 for Rural Area, excluding the areas mentioned in Entries 1 and 2 above	
12	Meghalaya	Sr. No. / Distance in Km from Urban Area (as the crow fly) / Multiplier Factor (i) < 10 kms — 1.00 (ii) 10 and above — 1.1 (iii) 20 and above — 1.2 (iv) 30 and above — 1.3 (v) 40 and above — 1.4 (vi) 50 and above — 1.5 (vii) 60 and above — 2.00	10th September 2014
13	Odisha	Sr. No. / Radial Distance from Urban Area / Multiplier Factor (i) 0-10 — 1.00 (ii) 11-20 — 1.20 (iii) 21-30 — 1.40 (iv) 31-40 — 1.80 (v) Above 40 — 2.00	No. LA (a)-46/13 (Misc) 4030/R&DM dated 07.02.2014
14	Punjab	1. 1.00 (one) in case the affected area is situated up to 10 kms from the limits of an urban area, and 2. 1.25 in case the affected area is situated beyond the above distance.	No. 24/84/2013-LR-1/6/96 dated 30.10.2014
15	Rajasthan	Sr. No. / Radial Distance from Urban Area / Multiplier Factor (i) 0-10 kms — 1.25 (ii) >10 kms but up to 20 kms — 1.50 (iii) >20 kms but up to 30 kms — 1.75 (iv) >30 kms — 2.00	Notification Dated 14.06.2016
16	Tamil Nadu	Sr. No. / Distance of Project from from Urban Areas / Multiplier Factor (i) Within 30 kms — 1.25	No. SROA-41(c-3)/ 2017 dated 20th September, 2017

Annexure – 3

Multiplication factor notified by the State Governments in compliance to Sr. No. 2 of the First Schedule to the RFCTLARR Act, 2013

Sr. No.	Name of the State	Multiplication Factor for acquisition of Land in Rural Areas			Reference No.
		(ii)	Beyond 30 kms and within 50 kms	1.5	
		(iii)	Beyond 50 kms	2.0	
17	Telengana	(i) 1.25 – Other than Scheduled areas, and (ii) 1.50 for scheduled (Tribal) areas			G.O. Ms. No. 50 dated 19.12.2014
18	Uttarakhand	2.00 (Two)			10 October 2016
19	Uttar Pradesh	2.00 (Two)			Notification dated 22 October 2014
20	West Bengal	Up to 20 km from nearest urban area		1.1	No. 2083-LA/3M-49/14 dated 30th July 2014
		Above 20 km and up to 40 km		1.2	
		Above 40 km and up to 80 km		1.3	
		Above 80 km and up to 100 km		1.5	
		Above 100 km and up to 120 km		1.75	
		Above 120 km		2.00	

Note: The above information is subject to any updation/ correction.

Annexure – 4

Method of Calculation of the Total Compensation amount

Step 1: Determination of market value of land in accordance with Sub-section (1) of Section 26, read with sub-section (3) of Section 26 and Section 28 of the RFCTLARR Act, 2013;

Step 2: Apply the Mutiplication Factor to the amount determined in accordance with step 1 above in terms of sub-section (2) of Section 26 of the RFCTLARR Act, 2013;

Step 3: Calculate the value of assets (buildings, trees etc.) attached to the land under acquisition in terms of Section 29 of the RFCTLARR Act, 2013;

Step 4: Add the amount determined under Step 2 and Step 3 and then provide for 100% solatium on the amount so arrived;

Step 5: Calculate the amount @ 12% per annum on the market value determined under Step 1 in terms of Section 30(3) of the Act;

Step 6: Total Compensation amount = **Step 4 + Step 5.**

Illustration

Step	Action in Sequence	Illustrative Amount (per hectare)
1	Determination of basic market value of land in accordance with Sub-section (1) of Section 26, read with sub-section (3) of Section 26 and Section 28 of the RFCTLARR Act, 2013, say:	40,00,000/-
2	Apply the Mutiplication Factor to the amount determined in accordance with step 1 above in terms of sub-section (2) of Section 26 of the RFCTLARR Act, 2013	Say, MF is 1.25 = 50,00,000/-
3	Calculate the value of assets (buildings, trees etc.) attached to the land under acquisition in terms of Section 29 of the RFCTLARR Act, 2013, say:	5,00,000/-
4	Add the amount determined under Step 2 and Step 3 and then provide for 100% solatium on the amount so arrived:	50,00,000/- + 5,00,000/- = 55,00,000 x 2= 1,10,00,000/-
5	Calculate the amount of interest on basic market value @ 12% in terms of Section 30(3) of the Act, Say:	4,00,000.00
6	Total Compensation amount	1,14,00,000/-

Annexure – 5 (i)

1. Sample/ Format of the **First Public Notice** to be issued by the CALA upon annoucement of Award under Section 3 G of the NH Act, 1956.

Public Notice

Announcement of Award for acquisition of land for construction of a National Highway
for Land owners/ persons interested therein

Kind attention of all landowners/ interested persons is invited to the Notification dated _____ issued under Section 3A of the NH Act, 1956 for acquisition of land for the building/ construction of a National Highway and the Notification dated _____ issued under Section 3 D of the NH Act, 1956 and published in the following newspapers:

Sr. No.	Notification	Names of Newspapers in which published	Date of Newspaper
1	Section 3 A		
2	Section 3 D		

It is informed that the undersigned has announced the Award in respect of the said land under Section 3 G of the NH Act, 1956 vide order dated _____. The land acquiring agency (MoRTH/ NHAI/ NHIDCL) has placed the requisite amount of compensation at the disposal of the undersigned. Notices have also been issued to the concerned landowners/ interested persons as required under Section 3 E of the NH Act, 1956.

Accordingly, all the concerned landowners/ interested persons are hereby informed/ notified through this additional **Public Notice** that the claimants entitled to receive the compensation amount may collect their amount of compensation from the office of the undersigned on any working day between _____ am to _____ pm within a period of 60 days and surrender or deliver the possession of the subject land to the undersigned, failing which the possession of subject land will be taken with police assistance on expiry of the period of 60 days.

(_____)
Competent Authority for Land Acquisition, and

_____
(name of the regular office and address)
Dated: _____

Annexure – 5 (ii)

2. Sample of the Second Public Notice to be issued by the CALA upon announcement of Award under Section 3 G of the NH Act, 1956.

Public Notice

for Land owners/ persons interested therein for

Delivery of possession of land acquired for construction of a National Highway

Kind attention of all landowners/ interested persons is invited to the Public Notice published in the following newspapers informing them regarding:

- Announcement of award;
- Calling upon them to collect the compensation amount within a period of 60 days; and
- Requesting the landowners to handover the possession of the subject land to the undersigned.

Sr. No.	Names of Newspapers in which published	Date of Newspaper
1		
2		

The prescribed time of 60 days has expired on _____.

Accordingly, all the landowners/ interested persons are hereby called upon to hand over the possession of the acquired land to the undersigned immediately, failing which the same shall be taken with the police assistance in accordance with sub-section (2) of Section 3 E of the NH Act, 1956.

Needless to say, such of the landowners/ interested persons, who have still not collected their compensation amount, may collect the same on any working day from the office of the undersigned.

(_____)
Competent Authority for Land Acquisition, and
_____
(name of the regular office and address)
Dated: _____

0-0-0-0-0

No. NH-11011/30/2015-LA
Government of India
Ministry of Road Transport & Highways
Transport Bhawan, 1, Parliament Street, New Delhi-110001

Annexure - 6

D.O. No. NH-11011/73/2016-LA (pt.)
December 11, 2017

Dear Sh. _____

Kindly recall my D.O. letter dated 06.07.2017 on the subject of **Administrative Charges** being levied by your state for acquisition of land for the National Highway Projects as a percentage of the compensation amount (copy enclosed for ready reference).

2. It may be noted that the states of Andhra Pradesh, Jammu & Kashmir, Karnataka, Odisha, Telangana, Rajasthan, North-Eastern states (except Assam) do not levy any administrative charges for acquisition of land for the National Highways. However, 13 states including your state have been levying these charges as per the details given in **Annexure-1**. Excepting the state of Uttarakhand (who have agreed with the Ministry's proposal), we have not received any response to my aforesaid DO reference from any other state.

3. It is understood that your state has prescribed these charges as a percentage of the amount of compensation towards administrative costs under the rules famed under the 1894 Act. The determination of compensation amount, use of multiplication factor and provision of 100% solatium under the revised law has completely changed the landscape whereby the compensation amount has gone up by 3 to 4 times whereas the prescribed percentage of administrative costs has not been rationalized. On the other hand, the States appoint the Competent Authority for Land Acquisition (CALA) for acquisition of land for the National Highways, who are not committed to this work on full-time basis and the support system is left wanting. As a result, the NHAI/ NHIDCL supplement these resources and deploy Land Acquisition Supporting Units comprising of retired revenue officials and other support systems. As such, it is the need of the hour to re-visit these charges and rationalise the same.

4. The administrative costs involved in Land Acquisition for NHs and associated facilities by a state involve the process/ steps as tabulated in the enclosed **Annexure-2.** A perusal of the details given in the enclosure shows that even if an officer i.e. CALA, along with a supporting staff of two personnel, and then the costs associated with the functions discharged by the Arbitrators appointed under Section 3-G(5) for settlement of arbitral issues, are deployed on full-time on the given jobs, their salaries, office expenses, office accommodation, use of vehicle(s) etc. for a period of one full year also would only be a small fraction of the administrative charges vis-à-vis the amount calculated @ 2.5% of the compensation amount.

5. You would appreciate that construction of NHs generate a lot of value and economic activity. As a matter of fact, these serve as major arteries of economic development and growth in the state concerned. Ideally, keeping in view that the state is the major beneficiary of the economic gains arising from National Highways developed/ constructed within its jurisdiction, the administrative costs should be borne by the state government as its token contribution in this behalf. You would agree that the administrative costs on land acquisition for the National Highways cannot be reckoned as a source of additional revenue generation for the state. As such, the states

are expected to contribute their bit in this endeavour and the least they can do is to assist in the administrative process as part of their contribution. In any case, treatment of levy of administrative charges for Land Acquisition by the State concerned as a source of revenue generation, beyond the actual costs incurred in the process, is unacceptable.

6. Notwithstanding the above, in case you still decide to levy and recover the administrative costs for acquisition of land for the National Highway Projects in your state, I request you to kindly revisit the existing level of administrative costs and take recourse to any of the following options:

(i) Raise a bill for the actual expenditure incurred by the State Government on land acquisition for the National Highways (this would entail a complex accounting problem in terms of working out the part time and effort of the deployed officers); or

(ii) Consider prescribing a fixed amount per hectare acquisition cost (as in the case of Haryana, it is Rs. 1.00 lakh per acre or Rs. 2.5 lakh per hectare); or

(iii) Cap the administrative charges at a uniform rate of 2.5% of the compensation amount, while allowing for adjustment of the expenditure incurred by the Project Implementing Agencies of this Ministry, on engagement of the Special Land Acquisition Support Units to assist the CALAs.

7. The project executing entities of MoRTH (e.g. NHAI/ NHIDCL and others) have been advised to restrict the payment of administrative charges up to 2.5% of the compensation amount in respect of land acquisition for all the on-going and future NH projects. I am constrained to clarify that it will be extremely difficult for the MoRTH and its project executing agencies to proceed further with their NH projects in your state without any further reference on the subject in the event your state has any reservations in accepting the above principle. I would be grateful if the Ministry could be informed about the decision of the state in the matter.

With regards

Yours sincerely,
Sd/-
(Y. S. Malik)

1. Shri Rajive Kumar,
   Chief Secretary to Government of Uttar Pradesh,
   Lal Bahadur Shastri Bhavan,
   UP Secretariat, Lucknow-226001

2. Shri Vinod Kumar Pipersenia,
   Chief Secretary to Government of Assam
   Secretariat, Dispur,
   Guwahati - 781006

3. Shri J. N. Singh,
   Chief Secretary to Government of Gujarat,
   Sachivalaya Complex,
   Gandhinagar - 382010

4. Shri Malay Kumar De,
   Chief Secretary to Government of West Bengal,
   Writers' Building,
   Kolkata - 700001

5. Dr. K. M. Abraham
   Chief Secretary to Government of Kerala,
   Secretariat, Thiruvanthapuram

6. Shri Anjani Kumar Singh,
   Chief Secretary to Government of Bihar,
   Old Secretariat, Patna - 800 015

7. Shri V C Pharka,
   Chief Secretary, Government of Himachal Pradesh,
   Secretariat, Shimla-171001

8. Sh. Sunil Kumar
   Chief Secretary to Government of Chhattisgarh
   CM Secretariat, D.K.S. Bhawan,
   Mantralaya, Raipur,
   Chhattisgarh – 492001

9. Smt. Raj Bala Verma
   Chief Secretary to Government of Jharkhand,
   Project Building, Dhurwa,
   Ranchi- 834004

10. Shri Basant Pratap Singh,
    Chief Secretary to Government of Madhya Pradesh,
    Vallabh Bhavan, Bhopal-462003

11. Shri Sumeet Mullick,
    Chief Secretary to Government of Maharashtra,
    Mantralaya, Mumbai-400032

No. NH-11011/30/2015-LA
Government of India
Ministry of Road Transport & Highways
Transport Bhawan, 1, Parliament Street, New Delhi-110001

Annexure-1

Details of Administrative Costs/ Charges levied by 13 States on acquisition of land for the National Highways

1. The States of J&K, Punjab, Rajasthan, Karnataka, Andhra Pradesh, Telengana, and Tamil Nadu and all North-esat States (except Assam) are not levying any administrative costs/ charges for acquisition of land for the NHAI projects. In case of Haryana also, the rates are very reasonable and the state has never insisted on payment of the same.

2. Following 13 states are levying the administrative charges on acquisition of land for the National Highways:

Sr. No.	State	Admin. Charges (AC)	Remarks
1	Assam	10% of the Compensation Amount	(i) Not all States are charging Administrative Costs (AC) at present. As per section 3(i) of RFCTLARR Act, 2013, AC is included in the cost of acquisition and such AC is to be specified by the appropriate Govt. (ii) As may be seen, different State Governments are charging different ACs which do not appear to be based on any norm. Land acquisition expenses, on an average, have increased by 3 to 4 times as compared to pre-January, 2015 acquisitions, however, administrative charges being levied by the State Governments have not been rationalized.
2	Bihar	20.5% of the Compensation Amount (20% +0.50% contingencies)	
3	Chhattisgarh	10% of the Compensation Amount	
4	Gujarat	10% (for valuation amount above Rs.10 Lakh)	
5	Haryana	Rs. 1.00 lakh per acre as per clause 19 (ii) of Government of Haryana Government Notification dated 09.11.2010.	
6	Himachal Pradesh	9% (7% towards establishment charges + 2% contingencies) of Compensation Amount to be paid to the State Government.	
7	Jharkhand	6% to 21% of the Compensation Amount (5% to 20% Establishment Charges + 1% AC)	
8	Kerala	20% on cost of land or 50% of the total establishment charges of the regular LA Unit, whichever is less (as per order dated 14.06.1999).	
9	Madhya Pradesh	10% of the Compensation Amount	
10	Maharashtra	6% (3% AC to be deposited with State Govt. + 3% (to be deposited in PLA) for facilities to the office of LAO)	
11	Uttarakhand	10% of the Compensation Amount	The State has agreed to levy administrative charges @ 2.5% of the compensation amount.
12	Uttar Pradesh	10% of the Compensation Amount	
13	West Bengal	10% of the Compensation Amount + capitalisation of 50% of market value of land.	

Annexure-2

Sr. No.	Activity	Scope of work	Agency bearing/ sharing the Costs
A.	**Land Acquisition proceedings**		
1	Section 3(a) of the NH Act, 1956	Notification of Competent Authority for Land Acquisition (CALA) by the Ministry on the recommendations of the State concerned	Involves no administrative costs. Invariably, CALAs are full-time serving officers who look after this work in addition to their own office work.
2	Section 3-A of the NH Act, 1956	Preparation of the Notification Issue of initial Notification containing brief description of the land.	Basic ground-work done by the Land Acquisition Supporting Unit (comprising a team of contract/ retired revenue officials) engaged by NHAI/ NHIDCL and cost met by the acquiring agency.
		Vetting and issue of Notification by CALA	The time and effort put in by the CALA and his supporting staff of one or two employees is very limited.
		Publication in the newspapers	Cost of publication in the newspapers is borne by MoRTH or its agency e.g. NHAI, NHIDCL etc.
3	Action under Section 3-B of the NH Act	Survey and Investigation of the land	Action by CALA duly supported by the DPR Consultant and the land Acquisition Supporting Unit of NHAI/ NHIDCL.
4	Section 3-C of the NH Act, 1956	Invitation, examination and settlement of Objections received/ filed by the landowners/ interested persons	This is a substantive work but the inputs are provided by the DPR Consultants/ Land Acquisition Supporting Unit
7	Section 3-D of the NH Act, 1956	Declaration of Acquisition	The basic ground work and details under this sub-section are prepared by the DPR Consultants and the Land Acquisition Supporting Units, of course with due involvement/ association of the revenue officials of the jurisdiction. The actual expenditure on issue/ publication of Notices in the local newspapers is in any case borne by the land acquiring agency
8	Section 3-E of the NH Act, 1956	Power to take possession	-do-
9	Section 3-F of the NH Act, 1956	Entering upon the land vesting in the Central Government	-do-
10	Section 3-G of the NH Act, 1956	Determination of amount payable as compensation	The details under this sub-section are prepared by the DPR Consultants and the Land Acquisition Supporting Units, of course with association of the revenue

Sr. No.	Activity	Scope of work	Agency bearing/ sharing the Costs
			officials of the jurisdiction. The actual expenditure on issue/ publication of Notices in the local newspapers is borne by the land acquiring agency.
11	Section 3-H of the NH Act, 1956	Deposit and payment of amount	-do-
B.	**Arbitral proceedings**		
12	Section 3 G (5) of the NH Act, 1956	Appointment of Arbitrator	By the Central Government on the recommendations of the State Government
		Receipt of claims	By the Arbitrator's Office
		Hearings	By the Arbitrator
		Adjudication of the Claim	By the Arbitrator
	Note: The NHAI separately pays financial assistance for enagement of supporting staff required to assist the Arbitrator for all the processes (up to a period of one year): (i) An amount of Rs. 40,000/- per month where the no. of Arbitration cases are up to 150. (ii) An amount of Rs. 60,000/- per month if the number of Arbitration cases are more than 150.		

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