

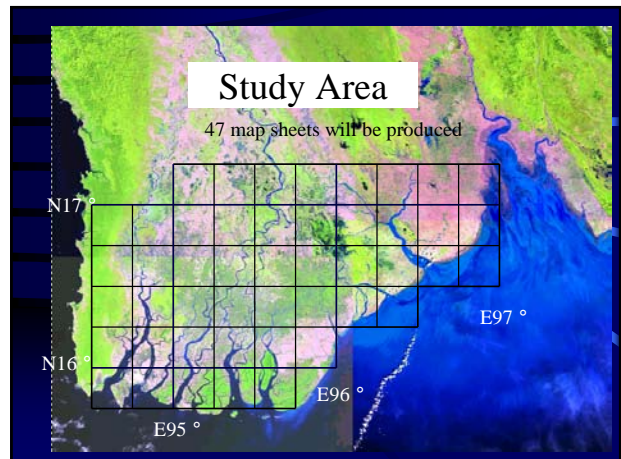
**Slides 2: Presentation of Progress Report 1**



# The Establishment of Geographic Database for National Rehabilitation and Development Programme in The Union of Myanmar

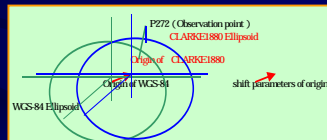
Presentation of Progress Report 1

16 July 2002  
Yangon, Myanmar



## Fundamental Geodetic Element

- Reference Ellipsoid : Everest 1830  
Semi major radius :  $a=6,377,276.345$  m,  
Flattening :  $f=1/300.8017$
- Parameters of Origin shift  
 $dX = -246.632$  m  
 $dY = -784.833$  m  
 $dZ = -276.923$  m

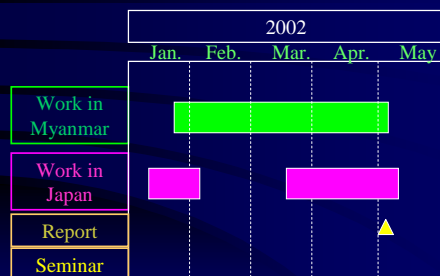


## Geodetic Datum

- Horizontal Datum  
1st-Order Control Point  
Fixed control point : Yangon(Kaynathpo)  
Latitude : N16-58-20.62762  
Longitude : E96-07-36.99653
- Vertical Datum  
1st-Order Benchmarks
- Map projection  
UTM Projection



## Study of the first year



## UTM Project

Work Items	UTM Project	JICA Project
Ground Controls	: GPS Survey	: GPS Survey
Signalization	: Signalization	: Pricking
Aerial photography	: 1/25,000, 1/50,000	: 1/50,000
Leveling	: Digital Leveling	: Digital Leveling
Field Identification	: Contact prints	: Orthophotos
Digital plotting	: DVP, Summit Evolution	: Summit Evolution
Digital compilation	: TNTmips	: TNTmips
Compilation for Print	: TNTmips	: TNTmips
Printing	: 6-color Offset print	: 6-color Offset print

## Three Topographic Maps

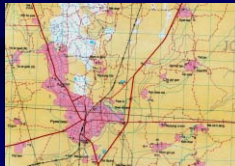
3 kinds of map were collected to examine the specifications



1 inch 1 mile  
topographic map



1/50,000 topo-  
graphic map



UTM Project

## Aerial photography

## Signals

3 types of signal were examined



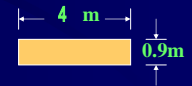
Size of one wing is 4 m x 0.9 m



## Signals on Aerial photo



We confirmed that size of  
signal is enough to identify  
on photo



## Aerial photography

### Specifications of photography

- Photo scale : 1/50,000
- Length of photography: 4,548 line-km
- Area of photography : 44,700km<sup>2</sup>
- Over-lap : 60%
- Side-lap : 30%
- Type of photo : Panchromatic

## Execution of aerial photography

28 flight courses were taken to cover the whole study area.



## Annotating on Negative Film

Negative film was annotated by Run No. and photo No after development.



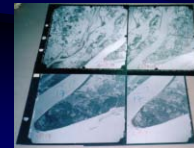
## Products of aerial photography



Contact printer



Print processor



Contact prints



2-times enlarged prints

## Quality Control

Photograph data												
Area name	MYANMAR DELTA 2002						Scale	1 : 50,000				
Camera	RC-30						f :	152.35				
Aircraft	Cessna Citation II						Direction	W → E				
Day	01/03/02						Lati distance	106,764.04				
Road No	14						Long distance	110663.93				
Run No	1		Max Distances Photo No.	1401018		1401010	Min	4,654		59.2%	2.3	
Master number	Latitude	Longitude	North latitude		East longitude		Unit point distance	Unit point CK	κ			Remark
1401001	17.2433	94.4821	17	14	36	94	27	7				
1401002	17.2450	94.4850	17	14	42	94	29	44	4,639	59.2%	2.3	
1401003	17.2459	94.5387	17	14	46	94	32	19	4,616	59.0%	1.3	
1401004	17.2469	94.5921	17	14	49	94	34	35	4,620	59.0%	1.3	
1401005	17.2477	94.6254	17	14	52	94	37	30	4,599	59.0%	1.6	
1401006	17.2488	94.6696	17	14	56	94	40	7	4,611	59.0%	1.5	
1401007	17.2497	94.7118	17	14	59	94	42	43	4,614	59.0%	1.3	
1401008	17.2506	94.7550	17	15	2	94	45	18	4,606	59.0%	1.2	
1401009	17.2512	94.7982	17	15	5	94	47	54	4,620	59.0%	1.0	

Quality was evaluated by items as stated above

## 3-Dimensional Exposure Position

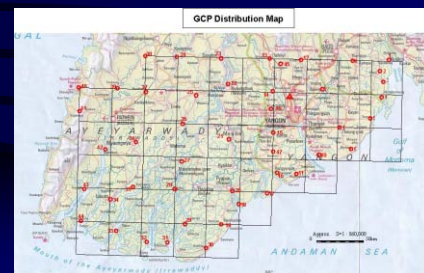
Exposure positions were calculated at 3-dimensional coordinates based on the reference ellipsoid.

001	2	17.243316539	94.482050135	7709.887	447417.622810	0.130	0.130	0.156
001	2	17.244869307	94.495490028	7709.192	447424.652089	0.086	0.086	0.105
001	3	17.245944728	94.538733860	7709.272	447491.409670	0.089	0.090	0.110
001	4	17.246913137	94.582050154	7710.381	447528.163838	0.095	0.095	0.119
001	5	17.247879748	94.625429303	7710.816	447564.263888	0.091	0.091	0.112
001	6	17.248757037	94.668615513	7711.865	447599.722777	0.092	0.092	0.112
001	7	17.249694974	94.711832042	7712.536	447634.527910	0.096	0.097	0.119
001	8	17.250597760	94.754870827	7713.212	447668.772611	0.093	0.093	0.113
001	9	17.251304890	94.798300616	7709.216	447702.746127	0.116	0.116	0.143
001	10	17.252042930	94.841498208	7709.186	447736.497337	0.107	0.107	0.130
001	11	17.252689530	94.885017492	7707.868	447770.129081	0.093	0.093	0.114
001	12	17.253423866	94.928141777	7706.266	447803.263638	0.099	0.099	0.126
001	13	17.254171485	94.971590261	7705.258	447836.398180	0.089	0.089	0.112
001	14	17.254920827	95.014689675	7703.022	447869.254952	0.076	0.076	0.093
001	15	17.255670189	95.057850676	7704.319	447902.110059	0.097	0.097	0.119
001	16	17.256420035	95.101153396	7707.391	447934.967254	0.103	0.103	0.153
001	17	17.256836501	95.144204092	7705.017	447967.545319	0.098	0.099	0.123
001	18	17.259257814	95.187797077	7704.887	448000.401499	0.073	0.073	0.086
001	19	17.260143107	95.230984624	7707.374	448032.980032	0.094	0.095	0.142
001	20	17.260856929	95.273997575	7705.952	448065.279684	0.072	0.073	0.086
001	21	17.261561295	95.317164700	7705.067	448097.579735	0.072	0.072	0.089

## Ground control Survey

## Plan of GPS Observation

Following control points were planned to observe where taken local access into consideration.



## Observation of GPS

Select point to be able to prick easily.



Select point to be able to observe enough GPS signal.



## Base Line Analysis

Acquired data were solved using the base line analysis program "PRIZM".



GPS surveyors and GPS observation instrument

## Quality Control 1

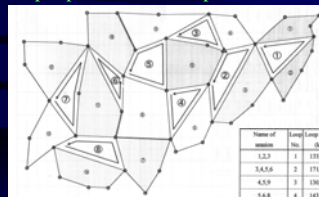
Quality control was carried out by checking differences of duplicated observed sides.

Baseline from -- to	Session No.	No. adopted	Baseline (km)	DX (m)		DY (m)		DZ (m)	
				(m)	diff.	(m)	diff.	(m)	diff.
GCP24 -- GCP25	9	○	35,256	14356.346	3mm	-8380.543	2mm	31397.522	4mm
	10			14356.343	0.1ppm	-8380.541	0.1ppm	31397.518	0.1ppm
GCP27 -- GCP28	8	○	23634	2437.788	1mm	6863.009	18mm	-22484.050	24mm
	11			2437.789	0ppm	6862.991	0.8ppm	-22484.074	1.0ppm
GCP20 -- GCP28	7	○	46785	46586.102	4mm	4238.672	37mm	780.824	9mm
	8			46586.106	0.1ppm	4238.635	0.8ppm	780.825	0.2ppm

Difference error should be less than 1 ppm.

## Quality Control 2

Result was checked by misclosure errors of peripheral sides composed of some sessions.



Name of station	No.	Long Length (km)	Number of Sess	DX (mm)	DY (mm)	DZ (mm)	Misclosure (ppm)	Adm. (ppm)
3,5,5,6	2	171,920	4	-0.064	0.064	0.010	0.3	1.0
4,5,9	3	130,951	4	0.021	-0.003	-0.029	0.3	1.0
5,6,8	4	143,190	3	-0.008	0.002	-0.126	0.9	1.0
8,9,5,10	5	172,517	4	-0.051	0.004	0.129	1.0	1.0
8,9,5,11	6	134,300	3	0.022	-0.027	-0.044	0.5	1.0
11,12,13	7	104,412	4	-0.047	-0.044	-0.007	0.7	1.0
7,11,13,14	8	148,497	4	0.011	0.029	-0.066	0.2	1.0

Misclosure error should be less than 1 ppm.

## Result of GPS Survey

DESCRIPTION OF PRICKING POINT			
Station No.	UTM Zone	Operated by	THAN AXE
GCP-17	47	Checked by	
		Date	21 Feb 2002
Coordinates and Distance			
Point Name	N (m)	E (m)	D (km)
Main Point	179084.879	97229.214	1.000
Reference Point 1	179085.682	97229.857	1.081
Supplementary Point 1	179081.001	97229.200	1.076
Sketch Map			

GPS Survey result and Description of point

Point	Geographical coordinates		Ellipsoidal Height
	Latitude	Longitude	
CP1	17 17 47.59278	96 54 04.66392	12.968
CP2	17 12 27.33679	96 49 13.34660	13.569
CP3	17 06 16.33948	96 49 54.83889	12.210
CP4	16 58 30.15540	96 49 22.72351	11.363
CP5	16 49 07.28353	96 45 20.26332	11.576
CP6	17 15 30.93444	96 38 04.77391	9.459
CP7	17 02 09.32125	96 22 56.96293	5.715
CP8	16 45 29.42592	96 31 04.40737	7.152
CP9	16 34 55.01365	96 35 59.93285	9.286
CP10	16 31 27.61514	96 21 29.28448	6.575

## Leveling

Leveling was carried out using Digital Level.





## Leveling Route

Four leveling routes were added to keep vertical accuracy which bridging distances is 12.

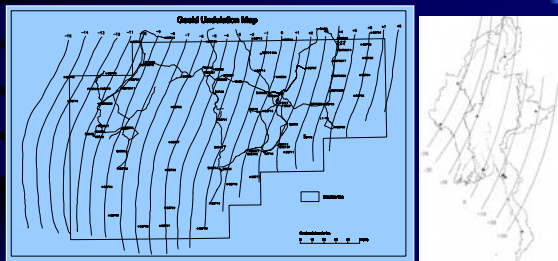


## Quality Control of Leveling

QUALITY CONTROL							
Project				Operated by	Than Khine		
Area		Data	11.3.02 - 06.4.02	Checked by	Maung Maung Soe		
Route	Number of Station	Type	Distance	Allowable error	Error	Operator	Comments
GCP 6	85	Leica NA3003	12.14	174	20	Than Khine	OK
GCP13	2	Leica NA3003	0.1	16	1	Than Khine	OK
GCP14	2	Leica NA3003	0.2	22	-1	Than Khine	OK
GCP19	94	Leica NA3003	12.11	174	-37	Than Khine	OK
GCP22	14	Leica NA3003	1.48	61	4	Than Khine	OK
GCP24	34	Leica NA3003	4.98	112	-13	Than Khine	OK
GCP42	11	Leica NA3003	0.93	48	1	Than Khine	OK

Quality of leveling was checked by residual errors between go and return or closed benchmarks.

## Geoid Undulation Map



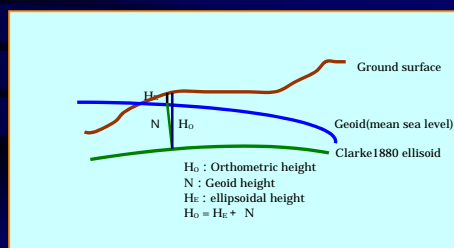
Geoid undulation map was prepared by interpolation between observed points.

## Orthometric height and Geoid height

Point No.	Ellip. height	Ortho. height	Geoid height
GCP 6	9.459	5.666	3.793
GCP 7	5.715	3.674	2.041
GCP 8	7.153	3.255	3.898
GCP 9	9.286	4.061	5.195
GCP13	7.232	9.251	-2.019
GCP14	1.923	3.280	-1.357
GCP15	3.297	3.133	0.164
GCP16	2.838	1.568	1.270
GCP19	-0.177	1.533	-1.710
GCP20	0.495	1.855	-1.360

Geoid heights were derived from differences between Ellipsoidal height and Orthometric height.

## Geoid and Ellipsoid Height



## Final results of GPS Survey

Point	Latitude	Longitude	Elevation
CP1	17 17 47.59278	96 54 04.66392	6.838
CP2	17 12 27.33679	96 49 13.34660	8.039
CP3	17 06 16.33948	96 49 54.83889	6.440
CP4	16 58 30.15540	96 48 22.77351	5.563
CP5	16 49 07.28353	96 45 20.26332	5.818
CP6	17 15 30.93444	96 38 04.77391	5.666
CP7	17 02 09.32125	96 22 56.96203	3.674
CP8	16 45 29.42592	96 31 04.40737	3.255
CP9	16 34 55.01365	96 35 59.93285	4.091
CP10	16 31 27.61514	96 21 29.28448	3.205

Finally coordinates of Control points on the reference ellipsoid were determined corrected by Geoid map.

## Pricking

Pricking works was carried out to identify control points on aerial photos.



## Observation & Calculation of Eccentric Reference Points

Eccentric reference point of ground control were observed by plane table or compass transit, and then their coordinates were calculated.



Calculation by Table

CP#	Station	Station Point's coordinate
1	CP#1	124587.200
2	CP#2	78487.200
3	CP#3	158.7.35
4	CP#4	9.7.35
5	CP#5	158.7.35
6	CP#6	158.7.35
7	CP#7	158.7.35
8	CP#8	158.7.35
9	CP#9	158.7.35
10	CP#10	158.7.35
11	CP#11	158.7.35
12	CP#12	158.7.35
13	CP#13	158.7.35
14	CP#14	158.7.35
15	CP#15	158.7.35
16	CP#16	158.7.35
17	CP#17	158.7.35
18	CP#18	158.7.35
19	CP#19	158.7.35
20	CP#20	158.7.35
21	CP#21	158.7.35
22	CP#22	158.7.35
23	CP#23	158.7.35
24	CP#24	158.7.35
25	CP#25	158.7.35
26	CP#26	158.7.35
27	CP#27	158.7.35
28	CP#28	158.7.35
29	CP#29	158.7.35
30	CP#30	158.7.35

## Description of Pricking

DESCRIPTION OF PRICKING POINT			
Station No.	47	Operator	Thun Khine
Checked By	Maung Maung Soe	Date	20 Mar 2002
Point Name	N/04	Point	8/01
Machine	NA3003	Station	158.7.35
Instrument	NA3003	Station	158.7.35
Supervisor		Field Photograph	
Sketch Map	Field Photograph		

Topographic feature was pricked on photo to identify ground controls and arranged on description of Pricking.

## Quality Control of Leveling

QUALITY CONTROL								
Project							Operated by	Thun Khine
Area							Checked by	Maung Maung Soe
			Data	11.3.02 - 06.4.02				
Route	Number of Station	Type	Distance	Allowable error	Error	Operator	Comments	
GCP 0	85	Leica NA3003	12.14	174	20	Thun Khine	OK	
GCP13	2	Leica NA3003	0.11	16	1	Thun Khine	OK	
GCP14	2	Leica NA3003	0.2	22	-1	Thun Khine	OK	
GCP19	94	Leica NA3003	12.11	174	-37	Thun Khine	OK	
GCP22	14	Leica NA3003	1.48	61	4	Thun Khine	OK	
GCP24	34	Leica NA3003	4.98	112	-13	Thun Khine	OK	
GCP42	11	Leica NA3003	0.93	48	1	Thun Khine	OK	

Quality of leveling was checked by residuals errors of height difference between go and return.

Residual errors should be less than 5cm x(Square) S.

## Preparation of Digital Image Data



Digital image data was converted to from negative film by high precision scanner and stored on CD-ROMs.

## Technology Transfer



## Technology Transfer 1

Technology transfer was carried out OJT.

- Signalization
- GPS Survey



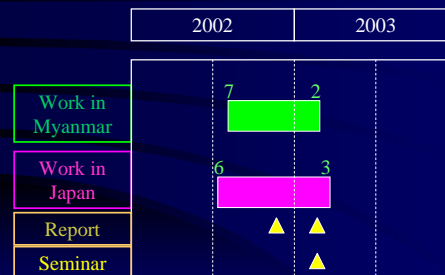
## Technology transfer 2

- Leveling
- Pricking



## The Second year's work

## Study Work in 2002



## Work items of second year

Following work items will be carried out in the second year.

- Discussion of the technical specifications for Topographic data mapping and printing maps
- Airborne GPS supported aerial triangulation
- Digital plotting
- Field identification

## Seminar 1

Seminar 1 will be held in February 2003.

- Explanation of this Study
- Explanation of the operation manual
- Discussion about step up digital mapping technology of SD
- Presentation of Digital map in the world
- Presentation of standardization for Geographic information

## Seminar 1

Seminar 1 will be held in February 2003.

- Presentation of the Interim report
- Explanation of the draft of specifications for survey and mapping
- Explanation of the operation manual for Topographic mapping
- Discussion of technical enforcement to digital mapping in SD.
- Presentation of applications of GIS

Thank you for listening !

