

Address of DG(RD) & SS on 12-05-2023 at 11.00 am with Zonal Heads (N-I, NER and S-I) and respective ROs of MoRTH and CE-NH through Video Conferencing on Field Level Monitoring of NH works and Strategies for increasing the pace of construction of NH projects and preparation of detailed functional NH network maps in 2023-24

General:

- Monitoring of NH works for achieving targets is required at different levels from the highest authority to field level engineers. Broadly, the monitoring at senior level is targeted at removing the administrative bottlenecks in the way of construction of NH works like delays in pre-construction activities by concerned State Governments, lack of action or lack of appropriate intervention at the higher levels of executing agencies and taking decisions in respect of non-performing contracting and consulting agencies etc.
- Major improvements in pace of construction without delays could be achieved only through detailed construction planning and monitoring of deployment of resources including material, machinery and manpower through detailed field level monitoring.
- Detailed planning of project construction activities is the basic requirement to pursue the deployment of adequate resources and achieving of construction targets.
- Through a detailed planning and monitoring of construction activities / deployment of resources, repeated defaults of the contractor in mobilising and deploying of various resources and in achieving different milestones are to be recorded and brought out so that stringent actions against substantially under-performing contractors especially when they are not improving their performance even after repeated directions could be taken well in time without huge loss of time.
- For the above process of scrupulous monitoring, basic detailed project construction planning supported with planning of deployment of resources

involving contracting agencies is highly essential. For this broad approach along with an example project is brought out below for reference and guidance.

- The initial pre-construction planning including, resources deployment schedule are to be worked out jointly by the officers of Regional Office, MoRTH, officers of NH Wing of executing agencies, team of contractor, team of the authority engineer and team of the DPR consultants based on relevant documents and details.
- Detailed pre-construction activity planning including land acquisition, forest clearances, tree cutting permissions, utility shifting clearances, approval for GADs for ROB/RUBs etc., should be done with activity wise target dates jointly by the Regional Offices and executing agencies like State PWD/BRO etc.,. These agreed schedules should be placed before the highest authorities of executing agencies like State PWDs/BRO etc., for their information and necessary monitoring of the progress.
- Project Zone of the Ministry should involve themselves in the above broad planning activities of pre-construction activities as well as construction planning and monitoring through joint meetings either at Ministry's Hqrs., or at the Regional Offices or CE-NH offices or project locations as may be feasible and convenient.
- All the stakeholders should work as a team for optimum results.

Preparation of the project component-wise Bar Chart:

- The optimum time unit for planning and monitoring of highway projects can be taken as a 'week'.
- As most of the highway projects are sequential in nature which can only be executed one activity after the other generally after completion of the previous one, a well prepared detailed Bar Chart will serve the purpose of project planning to a large extent without the need of more complex network planning tools like Critical Path Method (CPM) and Project Evaluation and Review Technique (PERT) .

- Monsoon is a regular cyclic phenomenon which occurs broadly for a specific period in every region as per the seasonal weather cycle of that particular region. While preparing the Bar Chart, the monsoon period in which no outdoor activity can generally be carried out should be duly considered and only indoor activities are to be planned during the monsoon months to make the project planning realistic and feasible.
- For carrying out the serial activities certain amount of time lag between predecessor activities and successor activities is required to carry out the execution. For example, unless sub-grade preparation is carried out for some length, GSB layer-I cannot be started. Similarly, unless GSB layer-I is completed in some length, GSB layer-II cannot be started and so on.
- After ensuring the above time lag, the activities in different layers which are serial in nature can be executed in a parallel mode deploying adequate machinery and manpower so that the entire project could be executed within the scheduled period.
- The time required for executing a particular component of work say for example WMM layer-I depends on the main BOQ item of that activity and the critical equipment for that main BOQ item. Therefore, considering the requirement of completing a particular component within a particular time period, feasibility of deploying the required quantum of critical machinery, the number of weeks in which the particular component is to be completed along with number of critical construction equipment to be deployed are to be worked out in an iterative manner for firming up the Bar Chart.
- In the above manner, the entire Bar Chart needs to be worked out for all components of the project reflecting time period and time schedule in terms of weeks for each of the activities as shown in the example Bar Chart placed at [Annexure-A1](#) for a real project of km 0.00 to km 19.887 of Phasighat - Singer stretch in the State of Arunachal Pradesh. In case completion of a particular project activity based on feasible deployment and critical machinery indicates requirement of long duration which cannot be accommodated within the project

completion schedule, the option of two shifts or three shifts per day can be explored.

Material, Machinery and Manpower Resource Planning:

- Once the project construction component wise Bar Chart is firmed up, the period required in number of weeks for each project component, the main BOQ item for that component, critical equipment for executing that BOQ item gets firmed up. Generally, taking six days a week, 8 hours a day and suitable effective outputs of the critical machinery, the number of critical machinery/equipment to be deployed, the number of shifts of working required are to be worked out.
- Once the critical component is firmed up, other supporting equipment required to support the output of the main critical equipment including their capacities and numbers are to be firmed up. For example, for carrying out DBM, the critical equipment are the vibratory roller and pneumatic roller. The other supporting equipment are Hot mix plant, pavers, tippers, emulsion sprayer etc. Requirement of all these supporting equipment are also to be worked out and firmed up.
- Taking into account the critical equipment and other supporting equipment the manpower requirements including the machines, drivers, mechanic, labour, Mistry, Mason, Supervisor etc., should also be worked out and planned.

The physical progress assessment for field level monitoring:

- In order to be realistic, while assessing the physical progress, components of work which require larger time need to be given higher weightage compared to those requiring lesser time even though the former ones are low-cost components compared to the latter ones. For example, earth work in cutting warrants higher weightage compared to the DBM layer though the former is less costly than the latter. Therefore, the total number of weeks required for all the project components put together is an appropriate denominator to work out the weightages for each component of work as has been shown in the physical progress assessment of the example project placed at [Annexure-A2](#).

- The above way of realistic assessment of physical progress gives proper indication about the components of work with higher weightages of physical progress and accordingly the necessity of deploying sufficient quantum of critical equipment and supporting equipment for these components with higher weightage.
- The physical progress assessment of the project “S” curve of targeted physical progress and actual physical progress etc., for the above example project are placed at [Annexure-A3](#) for reference and guidance. Draft targets for above example project are also placed at [Annexure-A4](#) for reference.
- A format for monitoring the pre-construction activities can be prepared and circulated by the project zones for regular monitoring. Further, break up of pre-construction activities and their monitoring should be done appropriately by Regional Offices, overseen by the Project Zones.

Deployment of material:

- Based on the project planning, Bar Chart firmed up above with time schedules in number of weeks, different materials required can be easily worked out based on the analysis of prices of different BOQ items. Accordingly, the targets for mobilisation of material and their quantities / timing should be fixed with time targets through a joint meeting of all the stakeholders including the Contractor as explained above. The targets for deployment of various resources like materials, manpower and machinery agreed to by the Contractor with signature of the representative of the Contractor should be communicated to them for adherence.
- Revised resource deployment schedule and failures of the contractor in adhering to the resource deployment agreed to by them should be regularly communicated to them with cautionary advises and warnings.
- Project milestone failures should also be continuously brought and communicated to the Contractor giving cure period notices and other notices

as per contract conditions including intention to termination notice etc., to sensitize and bring the project progress to the track.

- It is also emphasised that scrupulous project construction planning including planning for deployment of resources leads to early completion of the project within the stipulated schedule which is also very much beneficial to the Contractor apart from to the Authority which would be a win-win situation. These are to be emphasised and explained to all the stakeholders for effective actions.

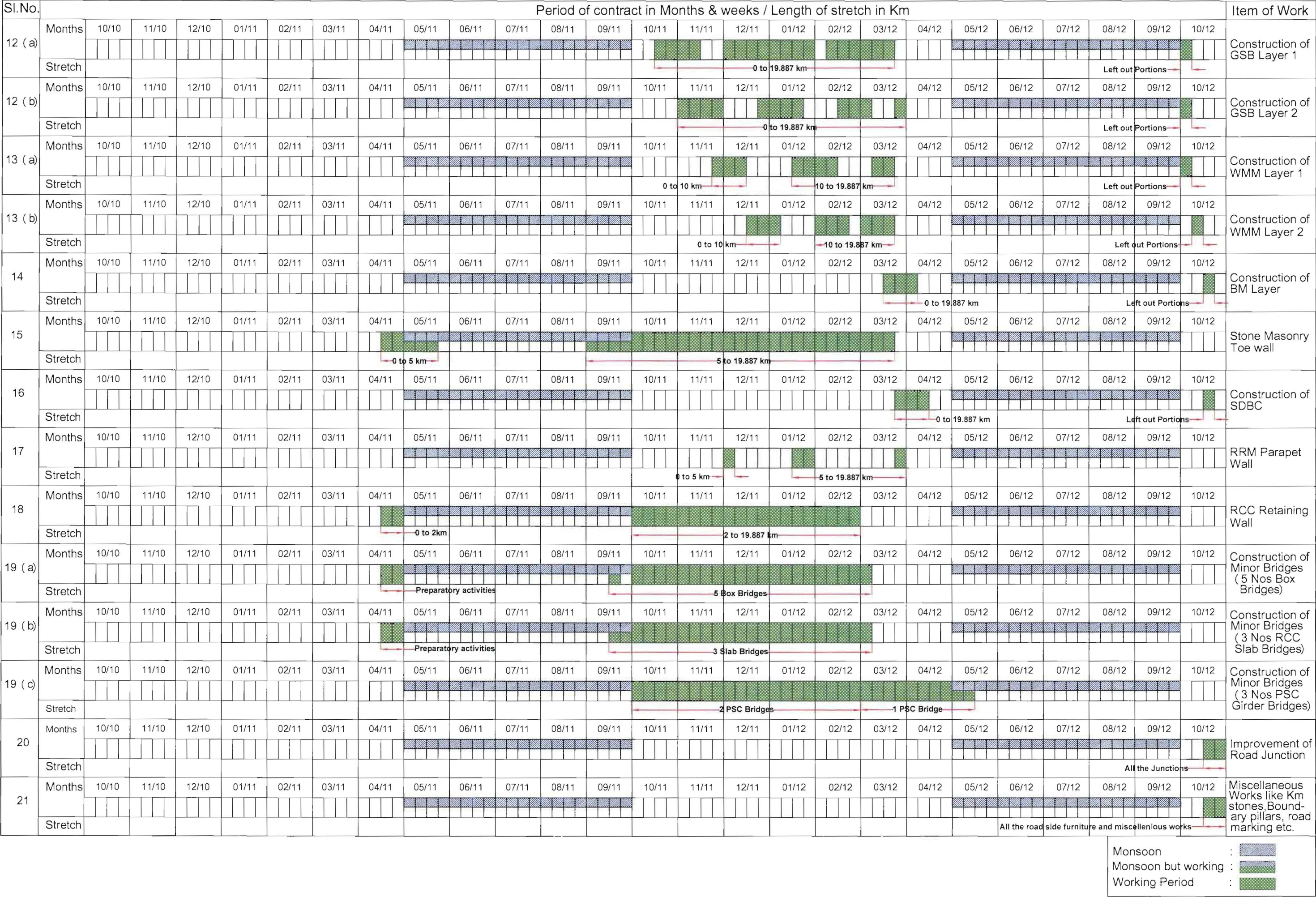
Preparation of Detailed Functional NH Network Maps:

- Generating a soft copy of detailed functional NH network map for each State indicating each NH in a distinct colour highlighting each district indicating the chainages of intersection of two or more NHs, the starting and ending points of the NHs, the starting and ending points of the NH stretches with NHAI/with NHIDCL/ with BRO etc., in distinct notation while retaining the chosen colour for that NH have all been explained during the meeting. It was decided that the detailed functional NH maps as explained above for each of the States of N-I Zone shall be prepared within 15 days and for NER Zone within 30 days. Such NH maps for S-I Zone have already been prepared. Two such detailed functional NH maps pertaining to Telangana and Karnataka States are placed At [Annexure-A5](#) for reference and guidance.



Ravi Prasad V.V.S. S. Palakodeti
Director General (Road Development) & Special Secretary

12.05.2023



1 st Work Programme - Pasighat-Mariyang-Yingkiong (Km 0-19.887 Pasighat - Singer)										
Job No: Pasighat-Singer river-Ar Pkg-2010-11-018										
Period of construction 28th Oct 2010-27th October 2012						06.08.2011				03-12-2011
	Component of work		Main BOQ Items related to component of work			Deployment of Machinery				Remarks
SI No	Item	Quantity in Physical units of monitoring	Item	period in weeks	Main BOQ Quantity	Type of machine/Critical equipment	Effective capacity	Nos	Shift in Hours	No of working days per week should be indicated in this column
1	Clearing and grubbing	19.887 km	Clrng & Grbg	9	25.04 hect.	Pockline EX-200- 1No	600 sqm/hr	1	8 Hrs	6 Days
2	Cutting of trees of different girth	6529 Nos	Cutting of trees	26	6529 nos	POWER(Hitachi) Saw Machine-2nos , Manualsaw-2Nos	4x13 (power saw)+2x6 (Manual saw) =64Nos/day	4+2	8 Hrs	6 Days
3	Dismantling of culverts	140 nos	Concrete+masonary	6	740 Cum	Back hoe 1No	3 cum/hr	1	8 Hrs	6 Days
4	Excavation in soil / ordinary Rock									
	a) Soil	19.887Km	Soil excavation	40	851427.08 Cum	Excavator(Hitachi 200) 3Nos + Excavator(Hitachi 270) 1No	80 cum/hr	3Nos+ 1No	16 Hrs	6 Days
	b) Ordinary rock	19.887Km	Ordinary rock excavation	16	150159.65 Cum	Excavator(Hitachi 200) 1 No + Excavator(Hitachi 270) 1No	60cum/hr+ 40 cum/hr	1 each	16 Hrs	6 Days
	c) Hard rock	19.887Km	Hard rock	24	88000 cum	Excavator Hitachi 270 1No	40cum/hr	1	16 Hrs	6 Days
5	Earthwork in embankment	19.887Km	Earth work in embt.	29	212028 Cum	*Vibratory RollerDynapac Soil compactor	80 Cum/hr	2	8 Hrs	6 Days
6	Loosening and recompacting the sub-grade(Additional Item)	19.887 Km	Loosening &compacting	24	124234 Cum	*Vibratory RollerDynapac Soil compactor	60 Cum/hr	2	8 Hrs	6 Days
7	Construction of Box culverts	Total 40 Nos								
	a) 2x2m	19 Nos	Concrete	60	7128 Cum	**RM-800 Concrete Mixer 1 No /Shutteringrequired for one box culvert - 4 Sets	5 Weeks/ 4 Culverts	1	8Hrs	6 Days
	b) 2x3m	8 Nos								
	c) 3x4 m	9 Nos								
	d) 4x3m	1 No								
	e) 4x5m	3 Nos								

	Component of work		Main BOQ Items related to component of work			Deployment of Machinery				Remarks
SI No	Item	Quantity in Physical units of monitoring	Item	period in weeks	Main BOQ Quantity	Type of machine/Critical equipment	Effective capacity	Nos	Shift in Hours	No of working days per week should be indicated in this column)
8	Protection works at Box culverts	Total 40 Nos								
	a) 2x2m	19 Nos	Concrete/RRM	20	4000 Cum	**RM-800 Concrete Mixer 1 No & 8 Sets of Shutterings	4 Culverts per 12days	1	8Hrs	6 Days
	b) 2x3m	8 Nos								
	c) 3x4 m	9 Nos								
	d) 4x3m	1 No								
	e) 4x5m	3 Nos								
9	Construction of Hard shoulders/ Earthen shoulder	19.887Km	Soil in shoulder work	12	21682 Cum	*Vibratory RollerDynapac Soil compactor	20 Cum/hr	1	16Hrs	6 Days
10	Construction of Drain	19.887Km	RRM	42	8086.4 Cum	Manual : 8 Teams of (1 Mate + 5 Mason + 5 Mazdoor)	32 cum/Day	1	8Hrs	6 Days
11	Construction of breast wall	6890 m	RRM	45	6500 Cum	Manual : 6 Teams of(1 Mate + 5 Mason + 5 Mazdoor)	24 cum/Day	1	8Hrs	6 Days
12	Construction of GSB									
	a GSB Layer I	19.887 Km	GSB	19	39958 Cum	*Vibratory Roller (2nd Shift)	50 Cum/hr	1	8Hrs	6 Days
	b GSB Layer II	19.887Km	GSB	13	26639 Cum	*Vibratory Roller (2nd Shift)	50 Cum/hr	1	8Hrs	6 Days
13	Construction of WMM									
	a WMM Layer I	19.887Km	WMM	10	18405.08 Cum	*Vibratory Roller (2nd Shift)	45 Cum/hr	1	8Hrs	6 Days
	b WMM Layer II	19.887Km	WMM	10	18405.08 cum	*Vibratory Roller (2nd Shift)	45 Cum/hr	1	8Hrs	6 Days
14	Construction of BM Layer including prime coat and tack coat etc.	19.887 Km	BM	4	7195 Cum	Tandem Roller	20 Cum/hr	2	8 Hrs	6 Days
15	Stone masonry toe wall	1075 m	RRM	32	11545 Cum	Manual :1 6 Teams of(1 Mate + 5 Mason + 5 Mazdoor)	64 Cum/Day	1	8 Hrs	6 Days
16	Construction of SDBC	19.887Km	SDBC	4	1926 Cum	PTR -1,	10 Cum/hr	1	8 Hrs	6 Days
17	RR masonry parapet wall	19.887Km	RRM	4	300 Cum	Manual: 4 Teams of(1 Mate + 5 Mason + 5 Mazdoor)	16 Cum/Day	1	8 Hrs	6 Days
18	RCC retaining wall	1200 m	Concrete	22	5376 cum	3 Sets of Shuttering for 15 m Length each	45 Cum /Day	1	8 Hrs	6 Days

	Component of work		Main BOQ Items related to component of work			Deployment of Machinery				Remarks
SI No	Item	Quantity in Physical units of monitoring	Item	period in weeks	Main BOQ Quantity	Type of machine/Critical equipment	Effective capacity	Nos	Shift in Hours	No of working days per week should be indicated in this column)
19	Construction of Minor Bridges	11 Nos.	Concrete	48	7500 Cum	Mini Batching and mixing plant 1No	15cum/hr	1	8 Hrs	6 Days
a	i) At Km 0.686 (6Mx4 M)	1 No	1) 5 nos of box bridges	24		5 Sets of Shuttering & Centering	24 Weeks for 5 box bridges.			6 Days
	ii) At Km 3.800 (1x 40m PSC Box bridge)	1 No								
	iii)At Km 4.178 (6 Mx6M)	1 No								
	iv) At Km 4.660 (1x40m PSC Box bridge)	1 No								
b	v) At Km 7.537 (1x40m PSC Box bridge)	1 No	2) 3 Nos of R.C.C Slab Bridges of 1x15 m	24		3 Sets of Shuttering & Centering for foundation & Sub structure and One Set for Superstructure			8 Hrs	6 Days
	vi)At Km 8.951 (8Mx6M)	1 No								
	vii) At Km 9.923 (1x15 m RCC Slab bridge)	1 No								
	viii) At Km 10.538 (8M x 9M)	1 No								
c	ix)At Km 14.769 (1x15 m RCC Slab bridge)	1 No	3) 3 Nos of PSC Bridges (1x 40 m Span)	30		2 Sets of Shuttering & Centering for foundation & Sub structure & 2 Set for Superstructure	8Weeks for foundation and substructure and 12weeks for super structure for each PSC bridge		8 Hrs	6 Days
	x)At Km 17.600 (1x15 m RCC Slab bridge)	1 No								
	xi) At Km 19.411 (8Mx5 M)	1 No								
20	Improvement of road junction	1 No	LUMP SUM	2				1	8 Hrs	6 Days
21	Miscellaneous works like Km stones, Boundary pillars, road marking etc.	19.887Km	LUMP SUM	2				1	8 Hrs	6 Days
* Same vibratory soil compactor will be used in second shift for granular pavement layers										
* * RM - 800 Concrete mixture has sufficient capacity to cater to different items considered.										

1st Revised Work Programme - Pasighat-Mariyang-Yingkiong (Km 0-19.887) Job No: Pasighat-Singer river-Ar Pkg-2010-11-018											
Period of construction 28th Oct 2010-27th October 2012										22--08--2011	
REVIEW DATE:30.06.2011											
	Component of work	Main BOQ Items related to component of work					Deployment of Machinery				Remarks
SI No	Item	Balance Qty in physical units of monitoring	Item	Balance period in weeks after review date	Balance Main BOQ Quantity	Unit	Type of machine/Critical equipment	Effective capacity	Nos	Hours/Day (1 or 2 Shifts)	No of working days per week should be indicated in this column)
1	2	3	4	5	6	7	8	9	10	11	12
1	Clearing and grubbing	8.593 km	Clrng & Grbg	4	10.82	Hectare	*Excavator EX-200- 1No	600 sqm/hr	1	8 Hrs	6 Days
2	Cutting of trees of different girth	2123 Nos.	Cutting of trees	14	2123	Nos.	POWER(Hitachi) Saw Machine-2nos , Manualsaw-2Nos	4x13 (power saw)+2x6 (Manual saw) =64Nos/day	4+2	8 Hrs	6 Days
3	Dismantling of culverts	140 Nos.	Concrete+masonary	6	140	Nos.	*Back hoe 1No	3 cum/hr	1	8 Hrs	6 Days
4	Excavation in soil / ordinary Rock										
	a) Soil	16.563 km	Soil excavation	20	709115.84	Cum	Excavator(Hitachi 200) 3Nos + Excavator(Hitachi 270) 1No+1 Dozer 6H	80 cum/hr+100 Cum/hr +100 Cu m/hr	3Nos+ 1No+ 1No.	16 Hrs	6 Days
	b) Ordinary rock	17.491 km	Ordinary rock excavation	14	132068.31	Cum	Excavator(Hitachi 200) 1 No + Excavator(Hitachi 270) 1No	60cum/hr+ 40 cum/hr	1 each	16 Hrs	6 Days
	c) Hard rock	19.887 km	Hard rock	21	88000	Cum	Excavator Hitachi 270 1No+ 1 No Excavator with rock breaker attachment	60 cum/hr	1	16 Hrs	6 Days
5	Earthwork in embankment	16.717 km	Earth work in embt.	23	220085.73	Cum	*Vibratory RollerDynapac Soil compactor +1 grader	80 Cum/hr	2	10 Hrs	6 Days
6	Loosening and recompacting the sub-grade(Additional Item)	19.887 km	Loosening &compacting	24	124234	Cum	*Vibratory RollerDynapac Soil compactor	60 Cum/hr	2	8 Hrs	6 Days

SI No	Item	Balance Qty in physical units of monitoring	Item	Balance period in weeks after review date	Balance Main BOQ Quantity	Unit	Type of machine/Critical equipment	Effective capacity	Nos	Hours/Day (1 or 2 Shifts)	No of working days per week should be indicated in this column)
1	2	3	4	5	6	7	8	9	10	11	12
7	Construction of Box culverts	39.6 Nos.	Concrete	55	7056.72	Cum					
	a) 2x2m						**RM-800 Concrete Mixer 1 No /Shutteringrequired for one box culvert - 5 Sets	5 Weeks/ 4 Culverts	1	12 Hrs	6 Days
	b) 2x3m										
	c) 3x4 m										
	d) 4x3m										
	e) 4x5m										
8	Protection works at Box culverts (Total 40 Nos.)	40 Nos.	Concrete/RRM	20	4000	Cum					
	a) 2x2m(19 Nos.)						**RM-800 Concrete Mixer 1 No & 8 Sets of Shutterings	4 Culverts per 12days	1	12 Hrs	6 Days
	b) 2x3m(8 Nos.)										
	c) 3x4 m(9 Nos.)										
	d) 4x3m(1 No.)										
	e) 4x5m(3 Nos.)										
9	Construction of Hard shoulders/ Earthen shoulder	19.887 km	Soil in shoulder work	12	21682	Cum	*Vibratory RollerDynapac Soil compactor	20 Cum/hr	1	16Hrs	6 Days
10	Construction of Drain	19.887 km	RRM	42	8086.4	Cum	Manual : 8 Teams of(1 Mate + 5 Mason + 5 Mazdoor)	32 cum/Day	1	8Hrs	6 Days
11	Construction of breast wall	6890 m	RRM	41	6500	Cum	Manual : 7 Teams of (1 Mate + 5 Mason + 5 Mazdoor)	28 cum/Day	1	8Hrs	6 Days
12	Construction of GSB										
	a GSB Layer I	19.887 km	GSB	19	39958	Cum	*Vibratory Roller (2nd Shift)+1 Grader	50 Cum/hr	1	8Hrs	6 Days
	b GSB Layer II	19.887 km	GSB	13	26639	Cum	*Vibratory Roller (2nd Shift)	50 Cum/hr	1	8Hrs	6 Days
13	Construction of WMM										
	a WMM Layer I	19.887 km	WMM	10	18405.08	Cum	*Vibratory Roller (2nd Shift)	45 Cum/hr	1	8Hrs	6 Days
	b WMM Layer II	19.887 km	WMM	10	18405.08	Cum	*Vibratory Roller (2nd Shift) +1 Paver	45 Cum/hr	1	8Hrs	6 Days
14	Construction of BM Layer including prime coat and tack coat etc.	19.887 km	BM	4	7195		Tandem Roller	20 Cum/hr	2	8 Hrs	6 Days
15	Stone masonry toe wall	1075 m	RRM	27	11545	Cum	Manual 18 Teams of (1 Mate + 5 Mason + 5 Mazdoor)	72 Cum/Day	1	8 Hrs	6 Days
16	Construction of SDBC	19.887 km	SDBC	4	1926	Cum	PTR -1,	10 Cum/hr	1	8 Hrs	6 Days

SI No	Item	Balance Qty in physical units of monitoring	Item	Balance period in weeks after review date	Balance Main BOQ Quantity	Unit	Type of machine/Critical equipment	Effective capacity	Nos	Hours/Day (1 or 2 Shifts)	No of working days per week should be indicated in this column)
1	2	3	4	5	6	7	8	9	10	11	12
17	RR masonry parapet wall	19.887 km	RRM	4	300	Cum	Manual : 4 Teams of (1 Mate + 5 Mason + 5 Mazdoor)	16 Cum/Day	1	8 Hrs	6 Days
18	RCC retaining wall	1200 m	Concrete	22	5376	Cum	3 Sets of Shuttering for 15 m Length each	45 Cum /Day	1	8 Hrs	6 Days
19	Construction of Minor Bridges	10.8 Nos.	Concrete		7500	Cum	Mini Batching and mixing plant 1No	15 cum/hr			6 Days
a	i) At Km 0.686 (6Mx4 M) Box Bridge		1) 5 nos of box bridges	24		Nos.	5 Sets of Shuttering & Centering	24 Weeks for 5 box bridges.	1	8 Hrs	6 Days
	ii) At Km 4.178 (6M X 6 M) Box bridge					Nos.					
	iii)At Km 8.951 (8 Mx6M) Box Bridge					Nos.					
	iv) At Km 10.538 (8 Mx 9 M) Box bridge)					Nos.					
	v) At Km 19.411 (8 M X 5 M) Box bridge)					Nos.					
b	vi)At Km 9.923 (1x15M) RCC Slab Bridge		2) 3 Nos of R.C.C Slab Bridges of 1x15 m	24		Nos.	3 Sets of Shuttering & Centering for foundation & Sub structure and One Set for Superstructure	24 Weeks for 3 RCC Slab bridges.	1	8 Hrs	6 Days
	vii) At Km 14.769 (1x15 m RCC Slab bridge					Nos.					
	viii) At Km 17.600 (1 x 15M) RCC Slab Bridge					Nos.					
c	ix)At Km 3.800 (1x40 m) PSC Box bridge		3) 3 Nos of PSC Bridges (1x 40 m Span)	30		Nos.	2 Sets of Shuttering & Centering for foundation & Sub structure & 2 Set for Superstructure	8 Weeks for foundation and substructure and 12 weeks for super structure for each PSC bridge	1	8 Hrs	6 Days
	x)At Km 4.660 (1x40 m)PSC Box bridge					Nos.					
	xi) At Km 7.537 (1x40 M) PSC Box Bridge					Nos.					
20	Improvement of road junction	LS	LUMP SUM	2	LS				1	8 Hrs	6 Days
21	Miscellaneous works like Km stones, Boundary pillars, road marking etc.	19.887 km	LUMP SUM	2	19.887	KM			1	8 Hrs	6 Days

* Same vibratory soil compactor will be used in second shift for granular pavement layers

* * RM - 800 Concrete mixture has sufficient capacity to cater to different items considered.

*Same Excavator will be used in clearing & grubbing & Excavation of ordinary rocks.

*Same backhoe will be used in dismantling of culverts & Construction of drains.

Pasighat-Mariyang-Yingkiong (Km 0-19.887) Job No: Pasighat-Singer river-Ar Pkg-2010-11-018

Machinery and Man power requirement assessment calculations

08-09-2011

Sl No	Item of work	Out put required per day	Main machine type	Nos required	Supporting machine / equipment type	Nos required	Man power Category	Nos required	Remarks
1	2	3	4	5	6	7	8	9	10
1	Clearing and Grubbing	0.48 Hect	Excavator EX 200	0	Nil	Nil	Excv optr	0	Excavation is directly being done after tree cutting. Hence Excavator is not required for this item.
							Helper	1	
							Mazdoor	4	
							Supervisor	1	
2	Cutting of trees	64 Nos	Power Saw	2	Tractor trolley	3	Skilled Mazdoor	4	7 trees per trip, 4trips per day for trolley
							Tractor driver	3	
			Manual Saw	2			Mazdoor	6	
3	Dismantling of culverts	24 cu m	Back hoe	1	Tractor trolley	1	Back hoe operator	1	
							Helper	1	
							Mate	1	
							Mazdoor	3	
							Tractor driver	1	
4	Excavation in soil	7040 cu m = 8448 cu m loose qty 1274 cu m loose for carriage 7004 cu m loose for dozing	Excavator EX 200	3	Tipper(20t) - AMW	3	Excv optr	8	2shifts for excavator and Dozer, Dozer capacity 200 cu m per hr,12 cu m per AMW tipper @ 3 trips per hr and16 hrs per day (i.e., two shifts). Helper for Excavator and Dozer Loose quantity = 1.2X Naturally compacted quantity. Excavation per day = 16X (80X3+100X1+100X1) =7040 Cu m/day
			Excavator EX 270	1	Dozer D6G	2	Dozer optr	6	
			Dozer D6G	1			Helper	14	
							Tipper driver	6	
5	Excavation in ordinary rock	1600 Cum=2080 Cu m loose quantity 240 Cu m=312 Cum loose for carriage 1768 Cu m loose for dozing	Excavator EX 200	1	Tipper 10t capacity	2	Tipper driver	2	2shifts for excavators and Dozer, Dozer capacity 200 cu m per hr, 7 cu m per tipper @ 3 trips per hr and 8 hrs per day. Helper for Dozer and Excavator and one helper for two tippers.
			Excavator EX 270	1	Dozer D6G	1	Dozer optr	2	
							Helper	7	
							Excv optr	4	

SI No	Item of work	Out put required per day	Main machine type	Nos required	Supporting machine / equipment type	Nos required	Man power Category	Nos required	Remarks
1	2	3	4	5	6	7	8	9	10
6	Excavation in hard rock	960 Cum=1248Cum loose volume entire for carriage	Excavator 200 LCI	1	Tipper(20t) - AMW	3	Excv optr	4	2shifts for excavators , 9 cu m per tipper AMW @ 3 trips per hr and 16 hrs per day i.e., two shifts Mazdoor for sundry work. Helper for Excavator and one helper for two tippers
			Excavator EX 270 with rock breaker attachment	1			Tipper driver	6	
							Mazdoor	3	
							Helper	7	
7	Earthwork in embankment	1600 Cum = 1920 Cu m loose quantity	Vibratory Roller	2	Water tanker	3	Grader Operator	1	Rolling in single shift, grader capacity 200 cu m per hour, Tanker requirement at 1 hr per 100 cu m due to higher moisture content in the soil prevailing in the site. Helper for roller, water tanker and two helpers with Quality engineer.
					Grader	1	Water tanker driver	3	
					Camber Board with spirit level	3	Roller operator	2	
							Helper	7	
							Quality Engineer	1	
							Supervisor	1	
8	Loosening and recompacting the sub-grade(Additional Item)	960 Cum	Vibratory Roller	2	Grader	1	Grader Operator	1	Loosening and re-compaction in single shift, grader capacity 200 cu m per hr, tractor capacity 60 cu m per hr
					Water tanker	1	Water tanker driver	1	
					Tractor with ripper attachment	2	Roller operator	2	
					Camber Board with spirit level	3	Tractor driver	2	

SI No	Item of work	Out put required per day	Main machine type	Nos required	Supporting machine / equipment type	Nos required	Man power Category	Nos required	Remarks
1	2	3	4	5	6	7	8	9	10
9	Construction of Box culverts	72Cum of concrete	RM-800 Concrete Mixer	1	Tractor trolley	2	RM-800 operator	1	<p>4 culverts per 30 days. Out of 30 days, 10 days spent for material carriage for culverts and 10 days for concreting of 4 culverts.</p> <p>10trips for one tractor trolley per day,10trips for aggregate,5 trips for sand,2 trips for water. Bar bending will be carried out in 20 days out of 30 working days.</p> <p>Steel reinforcement requirement per day for bar bending = $[72 \times (10/20) \times 120 \text{ Kg per cu m}] / 1000 = 4.32 \text{ t say 4t}$</p> <p>one truck for carrying steel. 1 Back hoe deployed for dismantling will be used for excavating foundations.</p> <p>1.68 mate, 6 mason 36 mazdoor for all operations of shuttering concreting etc complete for 120 cu m of concrete using Batching plant, concrete pump, Transit mixer etc. 0.34 mate, 2 black smith and 6.5 Mazdoor per 1 t of steel.</p> <p>Quantity of concrete per day = $7056 \times (4/40) / 10 = 70.56 \text{ Say 72 Cu m}$</p> <p>Mazdoor for concrete: 22 and Mazdoor for steel: 26. Total : 48 say 50.</p>
			Shuttering of 15m length (Each set for one culvert)	5 sets	Truck	1	Vibrator operator	5	
					Backhoe	0	Tractor driver	2	
					Vibrator pin type	5	Truck driver	1	
							Back hoe operator	0	
							Quality Engineer	1	
							Helper	3	
							Mate	3	
							Mason	4	
							Blacksmith	8	
							Mazdoor	50	
10	Protection works at Box culverts	100 Cum of concrete	Shuttering of 15m length (Each set for one culvert)	8 sets	Truck	0	Truck driver	0	<p>For Concreting+formwork transport deployed for main Box culverts will be used.No separate requirement.</p> <p>4 days out of 12 days considered for concreting for 4 culverts. Bar bending will be carried out in 8 days per 12 working days.</p> <p>Steel reinforcement per day for bar bending = $[100 \times (4/8) \times 120 \text{ kg /cu m}] = 6 \text{ t}$</p> <p>Same backhoe as above will be used here also for excavation .No separate machinery including vibrators are required as the concrete mixer vibrator deployed for main box culvert can be used for this item by staging concreting activity. Labour requirements are as per the rates given for main box culverts. Truck deployed for main box culverts will be used for transporting steel.</p> <p>Two helpers with Quality Engineer.Mazdoor for concrete = 30 + Mazdoor for steel 39, total = 69</p> <p>Quantity of concrete = $4000 \times (4/40) / 4 = 100 \text{ cu m/ day}$</p>
					Vibrator pin type	0	Vibrator operator	0	
							Mate	4	
							Mason	5	
							Blacksmith	12	
							Mazdoor	69	
							Quality Engineer	1	
							Helper	2	

SI No	Item of work	Out put required per day	Main machine type	Nos required	Supporting machine / equipment type	Nos required	Man power Category	Nos required	Remarks
1	2	3	4	5	6	7	8	9	10
11	Construction of Hard shoulders /Earthen shoulder	320 Cum=384 Cum loose quantity	Small Vibratory roller(1m)	1	Tractor trolley	5	Roller operator	1	Same Quality Engineer and helper deployed for BM/SDBC will take care of the requirements for this item. 12 tractor trips per day considered. Quantity above WMM level only is considered. Below WMM level rolling will be done along with granular base and sub-base layers.
					Water tanker	1	Tractor driver	5	
							Water tanker driver	1	
12	Construction of Drain	32 Cum masonry			Tipper 10t capacity	1	Tipper driver	1	Tipper used for carrying boulders will carry cement and sand also. 8 tractor trips per day. 0.1 mate, 1.2 mason and 1.2 mazdoor per cu m of stone masonry.
							Mate	4	
							Mason	40	
							Mazdoor	40	
							Quality Engineer	1	
							Helper	2	
13	Construction of breast wall	28 cum			Tipper 10t capacity	1	Tipper driver	1	Tipper used for carrying boulders will carry cement and sand also. 8 tractor trips per day. 0.1 mate, 1.2 mason and 1.2 mazdoor per cu m of stone masonry.
							Mate	3	
							Mason	35	
							Mazdoor	35	
14	Construction of GSB Layer I&II (Not staggered but covered in two shifts)	800 Cum = 1760 t	Vibratory Roller	1	Grader	1	Grader Operator	2	12 Cum capacity tipper AMW for material transport
					WMM plant(120TPH)	1	WMM Plant Operator	2	GSB material-800x2.3=1760t/day,120 t/hr capacity 1 WMM plant working for 16 hrs a day i.e., two shifts
					Tipper(20t) - AMW	5	Tipper driver	10	12 cum per trip per tipper. 16trips per day i.e., two shifts.
					water tanker	1	Water tanker driver	2	Front End loader 1cum bucket capacity working for 16hrs i.e., in two shifts @50cum/hr.
					Front end loaderJCB-4DX	1	Loader Operator	2	Water tanker 10KL capacity working in two shifts taking 3 hrs for 225 cum GSB watering.
					Diesel generator(62KVA)	1	Quality Engineer	1	Grader 50 cum per hour capacity working for 16 hrsper day i.e., in two shifts.
					Water pump	1	Helper	12	One lighting mast 9m high can give lighting for 150 m length. Two shifts for rolling.
					5HP motor	2	Roller operator	2	
					Lighting Masts(Mobile)	2	Electrician	2	
					Camber board with spirit level	3			

SI No	Item of work	Out put required per day	Main machine type	Nos required	Supporting machine / equipment type	Nos required	Man power Category	Nos required	Remarks
1	2	3	4	5	6	7	8	9	10
15	Construction of WMM Layer I/II staggered	360 Cum=432 Cum loose quantity	Vibratory Roller	1	WMM plant(120TPH)	1	WMM Plant Operator	2	12Cu m per trip @ 8trips per day
					Diesel generator(62KVA)	0	Loader Operator	2	360Cum=850t/day for WMM plant,120 t/hr capacity 1 WMM plant working for 8 hrs
					Front end loaderJCB-4DX	1	Tipper driver	10	Front End loader 1cum bucket capacity working for 8 hrs@50cum/hr.
					Tipper(20t) - AMW	5	Paver operator	2	Water tanker 10KL capacity taking 3 hrs per 225 cum GSB watering
					Camber board with spirit level	3	Roller operator	1	Diesel Generator of GSB item will work for this item also
					Sensor paver finisher	1	Helper	6	Helper for plant, paver and roller
16	Construction of BM Layer including prime coat and tack coat	160Cum	Tandem vibratory roller	1	Tipper(20t) - AMW	3	Tipper driver	3	160 Cum/day=384t/day,120 t/hr 1 Hot mix plant working for 8 hrs
					Hot mix plant(120TPH)	1	Hot mix plant operator	2	7 cum per tipper trip working for 8 hrs. 8 trips per day.
					Diesel generator(62KVA)	1	Bitumen Sprayer operator	1	Sensor Paver capacity 40 cum/hr.
					Bitumen Distributer	1	Paver operator	1	Tandem roller capacity 40 cum/hr.
					Diesel generator(10KVA)	1	Tandem roller operator	1	Diesel generator(10KVA) is for office and QC lab.
					Sensor paver finisher	1	Helper	5	
							Quality Engineer	1	
17	Construction of SDBC	80Cum	Sensor paver finisher	1	Tipper 10t capacity	2	Tipper driver	2	Same Sensor paver & Hot mix plant of BM will be used in SDBC.No separate plant is required
					Hot mix plant(120TPH)	1	Hot mix plant operator	1	This item is not a parallel activity. Machine requirement of this item will be taken care of by other machines freed from other items.
							Paver operator	1	
							Helper	1	
18	Stone masonry toe wall,parapet wall	88 Cum=114 Cum loose material			Tipper(20t) - AMW	2	Tipper driver	2	12 cum per tipper trip working for 8 hrs
							Helper	2	0.1 mate ,1.2 mason & 1.2 mazdoor required for 1 cum RRM
							Mate	22	
							Mason	110	
							Mazdoor	110	

Sl No	Item of work	Out put required per day	Main machine type	Nos required	Supporting machine / equipment type	Nos required	Man power Category	Nos required	Remarks
1	2	3	4	5	6	7	8	9	10
19	RCC retaining wall	135 Cum concrete	Shuttering of 15m length	9 sets	Tractor trolley	3	Tractor driver	3	Steel required =[135 X(10/20)X80 kg per cu m of concrete]/10 Cement Bags=7X45=315 Bags/day,5 trips@ 60 bags/trip. Aggregate+ sand 10 trips. Bar bending will be carried out in 20 days out of 30 working days. 1 MT steel reinforcement bending requires 0.4 mate,2 black smith & 6.5 mazdoor. 1.68 mate, 6 mason 36 mazdoorfor all operations of shuttering concreting etc complete for 120 cu m of concrete using Batching plant, concrete pump, Trasnsit mixer etc. 0.34 mate, 2 black smith and 6.5 Mazdoor per 1 t of steel. Quantity of concrete per day=9X15X1X1=135 Cu m / day Time period =5371÷[9X15X1X1X(6/3)] =19.91 weeks say 22 weeks
					Vibrator pin type	3	Vibrator operator	3	
					RM-800 Concrete Mixer	1	Mate	5	
							RM-800 operator	1	
							Mason	2	
							Mazdoor	81	
							Blacksmith	12	
20	Minor Bridges	60 Cu m Concrete			Transit Mixer	3	Mini Batching plant operator	2	10 t capacity 1 truck working for 1 shift@ 1 trip per 1 hr.Steel requirements =[60X120kg/cu mX(10/20)]/1000=3.6t say 4t per day. 15 cum/hr Mini Batching Plant working for 16 hrs. Mazdoor for concrete = 18 + Mazdoor for steel=26=44. 7 cum capacity 1-Transit mixer working for 16 hrs@ 1 trip per 2 hr 1.68 mate, 6 mason 36 mazdoorfor all operations of shuttering concreting etc complete for 120 cu m of concrete using Batching plant, concrete pump, Trasnsit mixer etc. 0.34 mate, 2 black smith and 6.5 Mazdoor per 1 t of steel. stressing 16 hours per day One day concreting per 3 working days is possible which gives finished concrete in 3 days. For five Box bridges quantity of concrete is 2712 Cu m to be done in 144 days . Quantity of concrete for box bridges = 2712÷(144/3)=56.5 cu m say 60 cu m. Out of 30 working days 10 days concreting will be done for box bridges 10 days for RCC slab bridges and 10 days PSC bridges respectively. Each shuttering set is for 2 abutments.
			Shuttering of 15m length(each set for 2 abutments)	13 sets	Vibrator pin type	13	Batching plant helper	2	
					Truck	1	Transit mixer Driver	6	
					Diesel generator(125KVA)	1	Helper	19	
					Stessing Jack with pump	2	Vibrator operator	13	
					Grouting pump with agitator	2	Truck driver	1	
					Diesel generator 35 KVA	1	Quality Engineer	5	
					Mini Batching Plant	1	Mate	3	
							Mason	3	
							Mazdoor	44	
							Blacksmith	8	

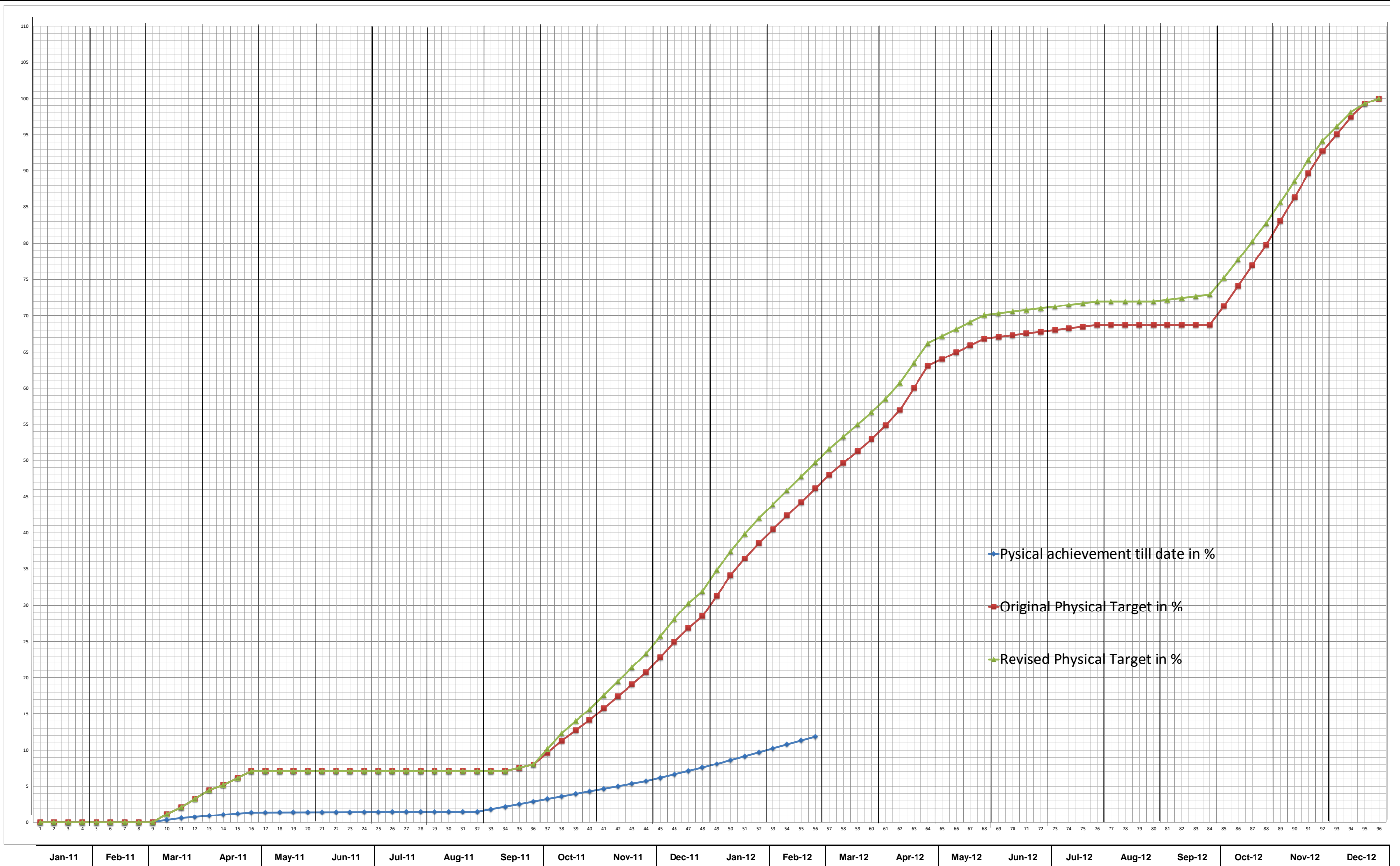
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WEIGHTED % age OF WORK COMPLETED IN WEEK UPTO 31 st JULY 2011
NAME OF WORK-2- LANING PASIGHAT TO PANGIN FROM KM 56+920 TO 71+051
(PACKAGE 'IV')
JOB NO: 229/Ar.Pkg/2010-11/016

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Cumulative Physical Achieved Curve 2 Laning Pashighat to Pangin Km-56+920 to 71+051 Upto 31st July,2011
(PACKAGE-'IV')
JOB NO-229/Ar.Pkg/2010-11/016

Targeted /Achieved Cumulative Physical Progress in %



No of Weeks from the Date of Commencement to Shcedule Date of Completion

**Draft Targets fixed by RO MORT&H Itanagar through discussion with Mr K.S Goel and Mr Pramod Kumar of JKM infra on 09-03-2011 for the work of two laning of Pasigaht- Singer
Job No SARDP-NE -Ar.Pkg-2010-11-018**

Date:-10-03-2011

MILESTONE	PERIOD	MAJOR ACTIVITIES COMPLETED	
Milestone - I	28 th Oct. 2010 to 27 th April, 2011	1) Clearing & grubbing, tree cutting etc. 2) Excavation in soil/ordinary rock/ Hard rock 3) Embankment work 4) Box culvert i) 6m X 4m ii) 2m X 2m	0 to 10 km 0 to 5.0 km 0 km to 5.0 km 1 No 3 Nos.
Milestone – II	28 th April, 2010 to 27 th Oct, 2011	<u>MONSOON PERIOD</u> Box culvert	4 Nos.
Milestone – III	28 th Oct, 2011 to 27 th April, 2012	1) All Road work except Bridge Approaches and Miscellaneous items like road marking/traffic sign etc. 2) Box culvert 3) Minor Bridges	32 Nos. 8 Nos. RCC minor bridges completion 3 Nos. PSC Bridges Part completion
Milestone - IV	28 th April, 2012 to 27 th Oct, 2012	Completion of all culverts and Bridges with complete road works including miscellaneous items like Road Junction, road markings, traffic sign etc. including all balance items required for completion of the work as per contract agreement.	100% complete

Annexure - A5

