A Case Study on Planning and Scheduling of a Project PIPLMC of a Package - 6A using Microsoft Project 2016

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Abstract: There have been many case studies/review papers in area of project planning and scheduling from last few years. Various construction activities are managed to achieve the profit within limited funds, resources, and time. In project management there are many techniques are used for scheduling and coordinating the various resources by controlled method. Management techniques such as Critical Path Method (CPM), Program Evaluation and Review Techniques (PERT) have been successfully implemented prior to the 1970's, in various construction projects in the countries like Canada, USA, Japan, Australia, etc. These techniques are helpful to manage in efficient and economic use of resources for completion of project objectives with limitless availability of resources, though it is observed that resources are limited in real time project scenario. While the focus of this paper will be on the project schedule of Polavaram Irrigation Project of Left Main Canal (PIPLMC) of Package-6A of 25.78KM from KM 111.000 to KM 136.780 (Part Work) by using MS Project 2016. This paper will briefly present an overview of the scheduling the project duration using software MS Project 2016. In this project, preparing an accurate and workable plan is very difficult. In this project by using project management technique like priority rule-based scheduling method used to resolve resource conflicts and useful in minimizing the project duration within limited availability of resources and time to make the project profitable and within project duration.

Keywords: Planning, Scheduling, PIPLMC, MS Project 2016, Project Management, Gantt Chart, Project Management, Time, Activities.

1. Introduction

Scheduling is the process of arranging, controlling & optimizing work, and workloads in a construction project. Project management techniques like critical path method and program evaluation and review technique are useful in scheduling and coordinating various resources [1]. By using traditional software like Microsoft Excel for project planning, scheduling, and control is still used by 80% of India's construction industries, while 86% felt the need to adapt to new software. The results after using MPS in the project planning, scheduling, and control is achieved were far better than those obtained using traditional software [2,3]. Project schedule is considered as core of the project plan, and the purpose of the project schedule is to show the organization how the work will be performed to uncover the mistakes [4].

A schedule or a timetable, as a basic time-management tool, consists of a list of times at which possible tasks, events, or actions are intended to take place, or of a sequence of activities in the sequential order in which such things are intended to take place. The process of creating a schedule - deciding how to order these tasks and how to commit resources between the varieties of possible tasks - is called scheduling, and a person responsible for making a particular schedule may be called a scheduler [5].

Establishing a project management schedule involves listing milestones and activities with intended start and finish dates. The process schedule is used for the planning of the production or the operation, while a resource schedule aids in the logistical planning for sharing resources among several entities. Scheduling of projects, therefore, requires the identification of all the tasks necessary to complete the project, and the earliest time at which each task can be completed. In creating a schedule, a certain amount of time is usually set aside as a contingency against unforeseen days. This time is called scheduling variance, or float, and is a core concept for the critical path method.

Importance of Project Management

Project gets started at the right way but as it proceeds further, gets off the track. Owing to this it's important to manage the activities in the right way, thus project management plays a vital role in arranging the critical activities of the project which is called as task to function in the appropriate way. Project Management aid the project in better efficiency to deliver services.

Traditional Approach to Project Management in Construction Sector

A traditional phased approach identifies a sequence of steps to be completed. In the "traditional approach", five developmental components of a project can be distinguished: 1) Initiation

- 2) Planning & Designing
- 3) Execution and Construction
- 4) Monitoring and controlling systems
- 5) Completion

Priority rule-based scheduling

Project scheduling is the act of constructing a timetable for each project activity, respecting the precedence relations and the limited availability of the renewable resources, while optimizing a predefined scheduling objective. The presence of resources during project scheduling often leads to a complex scheduling process and hence, simple prioritybased scheduling rules are used to facilitate this scheduling

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process. The priority rule-based scheduling approach is discussed along the three following dimensions:

- a) Priority rule-based scheduling: An overview of the general principle of this technique.
- b) Priority rules: Assign priorities to project activities and create a ranking
- c) Generation schemes: Assign start and finish times to project activities and construct a schedule.

Project Data	Activity List	Feasible Schedule
Activity Information Number of Activities Activity Duration Network Information Procedure Relations Resource Information Number of Resource Resource Requirements Resource Available Critical Path Critical Activities 	 Priority Rules Ranking of the Activities Based on the Project Data Determines order of Schedule Construction 	 Schedule Generation Scheme Serial or Parallel Generation Using the Activity List Construction of the Schedule Feasible Baseline Schedule Respecting all Procedure Relations No Resource Conflicts Optimizing a Regular Scheduling Objective

Figure 1 The priority rule-based scheduling approach to construct a feasible for any project schedule.

Brief Overview of Microsoft Project

Microsoft Project is the world's most popular project management software developed and sold by Microsoft. This MSP tool is designed to assist Project Managers/Coordinator in developing plans, assigning resources to tasks, tracking progress, managing budgets, and analyzing workloads. MSP tool creates critical path schedules, although a critical chain third-party add-ons is available from Prochain and Spherical Angle. Schedules can be resource levelled. The chain is visualized in a Gantt chart.

Resource definitions (people, equipment, and materials) can be shared between projects using a shared resource pool. Each resource can have its own calendar which defines what days and shifts a resource is available. Resource rates are used to calculate resource assignment costs which are rolled up and summarized the resource level. Each resource can be assigned to multiple tasks in multiple plans and each task can be assigned multiple resources. MSP schedules task work based on the resource availability as defined in the resource calendars. All resources can be defined in an enterprise resource pool.

MSP tool creates budgets based on assignment work and resource rates. As resources are assigned to tasks and assignment work estimated, MSP calculates the cost equals the work times the rate. This rolls up to the task level, then to any summary tasks and finally to the project level. Schedules can be resource leveled, and task networks are visualized in a Gantt chart. Additionally, Microsoft Project can identify divergent classes of the users. These different classes of users can have differing access levels to projects, views, and other data. Customization of aspects in Microsoft Project such as calendars, views, tables, filters, and fields are stored in an enterprise global which is accessible by all users.

2. Literature review

Shubham Laddha et, al (2017) have studied about the planning and scheduling of project by using Microsoft project software, he said that the rational method of planning

of construction project is uneconomical and takes more time with many complications and error at execution of project so using MS project tool help for optimum and effective organization of activities which helps to give the vision to complete the project in planned duration and within economy.

Rhuta Joshi, this et, al (2016) author studied about "Resource Scheduling of construction project", the type of resource was labor. Lack of labor power on site will increase the project duration. So, as the duration of project increase cost will also increase. Thus, the scheduling of resources reduces the unexpected loss of project which may occur due to differences in utility of resources.

Rathod Rajshekhar Gopal (2016) a case study planning, scheduling, and delay analysis, his paper states that if proper controlling is done while planning, scheduling, and execution of work the delay cost can be minimized. The experience or well skill team or employee can reduce or minimized the delay cost, but the delay cannot be avoidable because of bad weather, lack of labor power on site, approval, or any other reasons. So, by proper planning, construction leads to lesser or minimized extra cost of delay.

Abhishek Sharma et, al (2015) his paper states that manpower planning, scheduling, and tracking of construction project by MSP. Many projects suffer from time and cost overruns due to improper planning, scheduling, and completing works that results in numerous issues like delay in providing facilities, development, cutback in quality of construction and making the project more expensive. A little consideration shows that the time required to complete the project is inversely comparative to the supply of manpower. As the manpower is increased, the completion time of the project is decreased and on the other hand if the manpower is decreased, the completion time of the project is increased. A comparison between the baseline duration and cost to actual duration and cost of manpower of project is also determined using project management software tool Microsoft Project.

S Ragavi, et, al (2016) a review of project management software and primavera, according to study of author planning and scheduling helps in future situation and implementation of project. Primavera software provides user friendly options while performing any task. The cost of individual work break down can be known along with duration. Thus, decisions can be made sensible for proper management. In multiple projects resource leveling is very important to maintain proper resource allocation. For multiple projects is also an important standard for managing multiple projects. For resource constrained analysis resource leveling is arranged. Scheduling using Microsoft project software gives good controlling and clear schedule to a project, this project deals with scheduling using Microsoft project.

P.M. Wale et, al (June 2015) proposed the "planning and scheduling of construction project using msp". Project not only need great deal and money, but it needs proper planning and execution. Author said that traditional method of scheduling is time consuming and tedious. So, the study proves that traditional way of planning doesn't sub divide the main task which future gets the hurdle of over allocation of resources, improper judgment of resources for activities etc. Microsoft Project is the modern tool of Project Management that aid to overcome the obstacles faced project management system in station work project and the importance owing to traditional way of Planning and Management. It helps for the optimum and effective organization of activities which helps to give the vision to complete the project in planned duration and within the Economy.

Nikhil Mahajan et, al (January 2017), he states the study of resource scheduling in construction project by using MSP. Every work in need a proper planning, without planning we cannot achieve our goal. Scheduling of resources by traditional way is time consuming and costly. So, author highlighted the cost efficiency and time management at construction site by using this new technique of MSP.

3. Planning and Scheduling of Project

3.1 *Scope of Project:* Estimate for conducting detailed investigation preparation of hydraulic particulars, designs and engineering, preparation of estimates and excavation of

main canal, formation of banks including canal lining and construction of CM & CD works from Km 111.000 to Km 136.780 of LMC of Polavaram Irrigation Project package – 6 on EPC turnkey system – Entrustment of part of balance work to another agency under clause 60(C) of APDSS.

Table 1: A table containing value of work of all activities of the contract price at different stages of construction

<u>1</u>		U		
Description of Work	Amount (Crores)	Bid %	Quantity (in m ³)	Length/ No's
Earthwork Excavation	53.727	35.081	3993581	3455m
Canal Lining	10.611	6.929	38810	5728m
Structures	63.612	41.535	133100	50 No
Investigation, Design & drawing for Flumed Section	0.050	0.033	0	2000m
Retaining Wall	12.637	8.251	41068	2160m
Cut & Cover	11.494	7.505	17680	200m
Protection Works (Stone Pitching)	0.218	0.142	0	1800m
Additional Works	0.731	0.477	1551	355m
Maintenance	0.073	0.048	0	3455m
Total	153.15	100%		

3.2 Project Activities Details: In this project cumulative earthwork activity length consists of 3.455km out of 25.780km and the quantity of consists of 39,93,581 m3 and therefore, the detail partial length and quantity of earthwork activity is shown in table no 2 respectively. The cumulative canal lining length consists of 5.728km out of 25.780km and the quantity of consists of 38,810 m3 (excluding of retaining wall and cut & cover) and therefore, the detail partial length and quantity of canal lining activity is shown in table no 2 respectively. The total no. of structures yet to be construct in the project are 50 no's (20 no's of Super Passage, 14 no's of Outlets, 6 no's of Single Line Road Bridge, 4 no's of Under Tunnel, 4 no's Super Passage cum Single Line Road Bridge and 2 no's of Cross regulator). The retaining wall, cut & cover and protection works are construction in flumed section region and therefore, the detail partial length and quantity of retaining wall, cut & cover and protection works activity is shown in table no 2 respectively.

	ocation		As Per 60(C)			Earthwork	Details	•		Lining Details				Structures @	Chainage				Ketaining Wall	Details	a C	Cover	Details	Remarks
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1	Flumed section	111.000	113.000	2000	111.000	113.000	2000	3038475	11.280 111.000	11.640 111.280	360 280	111.825	111.65	111.533	111.544	ı	111.02	11.280 111.000	11.640 111.280	360 280	112.600	112.800	200	Protection Works (Stone Pitching)

Table 2: A table containing activities chainage details of part work of whole project.

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3	Bed Str	114.0	115.0	100	50	575		8(14.650	14.707	57	87	7		'	'		1	1		1	'	1	
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53m Bed Structure gap	53m]	Bed Stru	cture gap	53m Bed Structure gap	53m Bed Structure gap	53m Bed Structure gap	53m Bed Structure gap	53m Bed Structure gap	53m Bed Structure gap	53m Bed Structure gap	53m Bed Structure ga	58m Bed Structure ga	p Structure g	ap Stru	ìm Bed cture gap	58m B Structur	ed e gap
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135.717 135.20	0 134.925	5 134.694	l 134.525	133.799	ı	131.622	130.702 130.404	129.000	128.925	127.474	126.880 126.7	33 126.700 126.3	44 125.965 125	.232 124.6	56 124.051	123.751	23.128
135.738 135.27.	5 134.960) 134.725	134.575	133.900	ı	131.666	130.750 130.456	129.300	129.000	127.587	127.056 126.7	80 126.733 126.3	90 126.020 125	.285 124.6	78 124.497	123.876 1	23.400
21 75	35	31	50	101	1	44	48 52	37	15	113	176 47	33 46	55 5	3 22	446	125	272
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OTAL		26		
5780	53m Be	d Structi	ure gap	
		136.000		
		136.780		
3455		780		
87725	136.750	136.650	136.150	-
	136.780	136.675	136.200	I
	30	25	50	I
5728	7479	6459	15305	I
20	136.750	136.650	136.125	135.856
14	136.780	136.675	136.175	135.900
6	30	25	50	44
4	-	136.661	136.158	
4		136.550		
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2160				
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200		,		
		ı		
5780		,		

3.3 Strip Chart

The detail status of project activities of Earthwork, Lining and Structures in shown in below figure.



Figure 2: Strip Cart of Project

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3.4 Project Milestone

site, machinery, manpower, etc., so in that case the 1st milestone of the project is scheduled in slow progress.

As per contract agreement the project work is divided into 4 milestone for every three months. For the establishment of

		Table 3: A table containing P	roject Milestone		
Milestone	Months	Item Description	Quantity per Milestone	Length/	Milestone Bid %
Whiestone	Wolluis	as per Milestone	$(\text{in } \text{m}^3)$	No. of Structures	as per Milestone
1 st Milastona	Eshmany 2010	Earthwork Excavation	1424141	1232	12.510%
Working period of	rebruary-2019	Canal Lining	6105	901	1.090%
3 months)	April-2019	Structures	10648	4	3.323%
5 montilis)	71pm 2019	Sub	o-Total		16.923%
		Earthwork Excavation	1765662	1528	15.510%
2 rd Milestone	May-2019	Canal Lining	11688	1725	2.087%
(Working period of	to	Structures	39930	15	12.460%
3 months)	July-2019	Retaining Wall	13689	720	2.750%
		Sut	o-Total		32.807%
		Earthwork Excavation	803778	695	7.061%
and M.1	4 (2010	Canal Lining	12867	1899	2.297%
Working period of	August-2019	Structures	39930	15	12.460%
3 months)	October-2019	Retaining Wall	23576	1240	4.737%
5 montilis)	000000 2019	Protection Works (Stone Pitching)	-	1800	0.142%
		Sut	o-Total		26.697%
		Earthwork Excavation	0.000	0	0.000%
		Canal Lining	8151	1203	1.455%
4 th Milestone	November-	Structures	42592	16	13.291%
(Working period of	2019 to	Retaining Wall	3803	200	0.764%
3 months)	January-2019	Cut & Cover	17680	200	7.505%
	<i>vanaary</i> 2017	Additional Works	1551	355	0.477%
		Sut	o-Total		23.492%
		Total			100%

4. Results and Discussion

Scheduling with Gantt Chart: Microsoft project software is work on the Gantt chart concept and its allows for a clear understanding of the work's progress in relation to the time schedule. Gantt charts are a special type of view that are used extensively in project management.

In this project the earthwork is schedule in 232 days (7 months, 20 days), canal lining is schedule in 335 days (10 months, 29 days), structures are schedule in 335 days (10 months, 29 days), retaining wall is schedule in 260 days (8 months, 15 days) and cut & cover is schedule in 76 days (2 months, 15 days). The whole is scheduled excluding protection works and additional works.

ID	0	Task Mode	Task Name	Start	Finish	Predecessors	Successors	Qtr 1, 2019	Feb	Mar	Qtr 2, 20	019	Man	lun	Qtr 3, 2019	Aug		San	Qtr 4, 2019	Nov
1		*	BSR INFRA-TECH	Sat	Thu						1. 1.4			200	70	Plug		sep	ou	nor
			INDIA LIMITED	16-02-19	30-01-20															
2		*?	PIPLMC - PACHAGE																	
			6A (111.000 - 136.780)																	
3	(i)~		Project PIPLMC 60C-Earthwork	Mon 25-02-19	Fri 15-11-19					1										
1	~	-	EARTHWORK EXCAVATIO	Mon 25-02-19	Fri 15-11-19					·			_				_			_
2	~	-	1st Mile Stone	Mon 25-02-19	Wed 15-05-19)	26						T)							
3	~	-	15th February, 2019 to 15th March, 2019	Mon 25-02-19	Fri 15-03-19		11			—										
4	~	*	111.000 - 113.000	Mon 25-02-19	Fri 15-03-19		12			II										
5	~	*	128.925 - 129.300	Mon 25-02-19	Fri 15-03-19		13													
6	~	*	123.150 - 123.300	Mon 25-02-19	Fri 15-03-19		14			H										
7	~	*	127.575 - 127.600	Mon 25-02-19	Fri 15-03-19															
8	~	*	130.400 - 130.450	Mon 25-02-19	Fri 15-03-19		15													
9	~	*	136.150 - 136.200	Mon 25-02-19	Sun 10-03-19		10													
10	~	*	136.650 - 136.675	Sun 10-03-19	Fri 15-03-19	9	17			Ě.										
11	~	-	15th March, 2019 to 15th April, 2019	Fri 15-03-19	Mon 15-04-19	3	19			ľ		1								
12	~	*	111.000 - 113.000	Fri 15-03-19	Mon 15-04-19	4	20													
13	~	*	128.925 - 129.300	Fri 15-03-19	Mon 15-04-19	5	21			×	-									
14	~	*	123.150 - 123.300	Fri 15-03-19	Mon 15-04-19	6	22			i i i i i i i i i i i i i i i i i i i	1									
15	~	*	130.400 - 130.450	Fri 15-03-19	Tue 26-03-19	8	16			¥	-									
16	~	*	134.525 - 134.575	Tue 26-03-19	Mon 15-04-19	15	23,24				ř									
17	~	*	135.725 - 135.750	Fri 15-03-19	Sun 31-03-19	10	18			Ě										
18	~	*	136.750 - 136.780	Sun 31-03-19	Mon 15-04-19	17					ř-									
19	~		15th April, 2019 to 15th May, 2019	Mon 15-04-19	Wed 15-05-19	11	27				i	r	T							
20	~	*	111.000 - 113.000	Mon 15-04-19	Wed 15-05-19	12	28													
21	~	*	128.925 - 129.300	Mon 15-04-19	Wed 15-05-19	13	29					r								
22	~	*	123.150 - 123.300	Mon 15-04-19	Wed 15-05-19	14	30				i		4							
23	~	*	134.675 - 134.725	Mon 15-04-19	Wed 15-05-19	16					i		1							
24	~	*	135.825 - 135.875	Mon 15-04-19	Wed 15-05-19	16	25,31,32				i	*								
25	~	-	Earthwork Excavation 1st Mile Stone	Wed 15-05-19	Wed 15-05-19	24	27						\$ 15-0	5						

Figure 3.1: MSP Gantt Chart Screenshot (Conti 1.)

ID		Task	Task Name	Start	Finish	Predecessors	Successors	Qtr 1, 2019 Qtr 2, 2019 Qtr 3, 2019
26	~	Mode	2nd Mile Stone	Wed 15-05-19	Thu 15-08-19	2	46	Jan Feb Mar Apr May Jun Jul Aug Sep
27	~	-4	15th May, 2019 to 15th June, 2019	Wed 15-05-19	Sat 15-06-19	19,25	33	P
28	~	*	111.000 - 113.000	Wed 15-05-19	Sat 15-06-19	20	34	r
29	~	*	128.925 - 129.300	Wed 15-05-19	Sat 15-06-19	21	35	
30	~	*	114.650 - 114.675	Wed 15-05-19	Sat 15-06-19	22	36	
31	~	*	122.375 - 122.425	Wed 15-05-19	Sat 15-06-19	24	37	· · · · · · · · · · · · · · · · · · ·
32	~	*	124.200 - 124.500	Wed 15-05-19	Sat 15-06-19	24	38	
33	~		15th June, 2019 to 15th July, 2019	Sat 15-06-19	Mon 15-07-19	27	39	r 1
34	~	*	111.000 - 113.000	Sat 15-06-19	Mon 15-07-19	28	40	at 1997
35	~	*	128.925 - 129.300	Sat 15-06-19	Mon 15-07-19	29	41	· · · · · · · · · · · · · · · · · · ·
36	~	*	121.000 - 121.025	Sat 15-06-19	Mon 15-07-19	30	42	· · · · · · · · · · · · · · · · · · ·
37	~	*	123.850 - 123.900	Sat 15-06-19	Mon 15-07-19	31	44	
38	~	*	124.200 - 124.500	Sat 15-06-19	Mon 15-07-19	32	43	<u>*</u>
39	~	-	15th July, 2019 to 15th August, 2019	Mon 15-07-19	Thu 15-08-19	33		ř.
40	~	*	111.000 - 113.000	Mon 15-07-19	Thu 15-08-19	34	48	*
41	~	*	128.925 - 129.300	Mon 15-07-19	Thu 15-08-19	35	49	· · · · · · · · · · · · · · · · · · ·
42	~	*	114.000 - 114.025	Mon 15-07-19	Thu 15-08-19	36		*
43	~	*	124.200 - 124.500	Mon 15-07-19	Thu 15-08-19	38		*
44	~	*	125.250 - 125.275	Mon 15-07-19	Thu 15-08-19	37	45,50	
45	~	-	Earthwork Excavation 2nd Mile Stone	Thu 15-08-19	Thu 15-08-19	44	47	▲ 15-08

Figure 3.2: MSP Gantt Chart Screenshot (Conti 2.)



Figure 3.3: MSP Gantt Chart Screenshot (Conti 3.)

ID	0	Task	Task Name	Start	Finish	Predecessors	Successors	Qtr 1, 2019	Eab	Mar	Qtr 2, 2019	Mari	Qtr 3, 2019	500
20	v	INIOUE	2nd Mile Stone	Wed 15-05-1	Thu 15-08-1	9 2	42	Jan	Feb	Mar	Apr	May Jun	JUL A	ig sep
21	~	-4	15th May, 2019 to 15th June, 2019	Wed 15-05-19	Sat 15-06-19	11,19	31	_				r n		
22	\checkmark	*	122.348 - 112.435	Wed 15-05-19	Mon 10-06-1	9 14	29					1		
23	~	*	123.128 - 123.372	Wed 15-05-19	Sat 15-06-19	16	32					1		
24	✓	*	126.344 - 126.390	Wed 15-05-19	Thu 23-05-19	9 17	28					🍋 🗌		
25	~	*	135.200 - 135.275	Wed 15-05-19	Sun 09-06-19	9 18	30							
26	~	*	135.717 - 135.738	Wed 15-05-19	Mon 20-05-1	918	27					i i		
27	✓	*	133.799 - 133.900	Mon 20-05-19	Sat 15-06-19	26						ř.		
28	~	*	134.525 - 134.575	Thu 23-05-19	Sat 15-06-19	24						ř.		
29	 Image: A start of the start of	*	134.694 - 134.725	Mon 10-06-19	Sat 15-06-19	22	33					ě.		
30	✓	*	134.925 - 134.960	Sun 09-06-19	Sat 15-06-19	25	34					Ě.		
31	~	-	15th June, 2019 to 15th July, 2019	Sat 15-06-19	Mon 15-07-19	21	36					r	ī	
32	✓	*	111.280 - 111.500	Sat 15-06-19	Mon 15-07-1	9 23	37					4		
33	✓	*	123.372 - 123.400	Sat 15-06-19	Thu 27-06-19	9 29	35					¥	-	
34	✓	*	124.051 - 124.386	Sat 15-06-19	Mon 15-07-1	9 30	40					Ě		
35	~	*	135.856 - 135.900	Thu 27-06-19	Mon 15-07-1	9 33	39						řena i	
36	~	-,	15th July, 2019 to 15th August, 2019	Mon 15-07-19	Thu 15-08-1	9 31							ř	
37	\checkmark	*	124.386 - 124.497	Mon 15-07-19	Thu 15-08-19	9 32	44						i *	h
38	\checkmark	*	114.650 - 114.707	Thu 01-08-19	Thu 15-08-19)	45							h
39	✓	*	113.000 - 113.100	Mon 15-07-19	Thu 15-08-19	35	46						i *	r
40	~	*	111.500 - 111.640	Mon 15-07-19	Thu 15-08-19	9 34	41,47						ř	n
41	~		Canal Lining in meters 2nd Mile Stone	Thu 15-08-19	Thu 15-08-19	9 40	43						•	15-08

Figure 3.4: MSP Gantt Chart Screenshot (Conti 4.)

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ID	0	Task Mode	Task Name	Start	Finish	Predecessors	Successors	Qtr 1, 2019	Eab	Mar	Qtr 2, 2019	May	lun.	Qtr 3, 2019	1.5	San San	Qtr 4, 2019	New	Der	Qtr 1, 2020	Eab
42	√	-	3rd Mile Stone	Thu 15-08-19	Fri 15-11-19	20	60	2011		11.2			2011			ř	ou	Ŋ		2011	100
43	~	-	15th August, 2019 to 15th September, 2019	Thu 15-08-19	Sun 15-09-19	41	49									*					
44	\checkmark	*	111.640 - 111.800	Thu 15-08-19	Sun 15-09-19	37	50									*					
45	✓	*	121.328 - 121.547	Thu 15-08-19	Sun 15-09-19	38	51									*					
46	~	*	123.751 - 123.876	Thu 15-08-19	Sun 15-09-19	39	52									ř					
47	✓	*	126.700 - 126.733	Thu 15-08-19	Tue 03-09-19	940	48									ř i i i i i i i i i i i i i i i i i i i					
48	~	*	126.733 - 126.780	Tue 03-09-19	Sun 15-09-19	47										<u> </u>					
49	~	4	15th September, 2019 to 15th October, 2019	Sun 15-09-19	Tue 15-10-19	43	55									Ť	1				
50	~	*	111.000 - 111.053	Sun 15-09-19	Mon 30-09-19	944	53									÷.					
51	~	*	111.800 - 112.256	Sun 15-09-19	Tue 15-10-19	45										÷					
52	V.	*	130.702 - 130.750	Sun 15-09-19	Mon 30-09-19	46	54	_								É.					
53	×.	*	114.000 - 114.053	Mon 30-09-19	Tue 15-10-19	50	56	_									-				
54	×.	*	121.547 - 121.628	Mon 30-09-19	Tue 15-10-19	52	57														
55	×.	-	15th October, 2019 to 15th November, 2019	Tue 15-10-19	Fri 15-11-19	49		_									Ţ				
56	×.	*	111.053 - 111.280	Tue 15-10-19	Fri 15-11-19	53	(A)	_													
57	×.	*	112.256 - 112.600	Tue 15-10-19	Fri 15-11-19	54	62										-				
58	×,	*	125.232 - 125.285	Tue 05-11-19	Fn 15-11-19	50	59,63	-													
59	×.	4	Canal Lining in meters 3nd Mile Stone	Fn 15-11-19	Fn 15-11-19	58	61											15-			
60	~	-	4th Mile Stone	Fri 15-11-19	Thu 30-01-20	42												Ť			1
61	1	4	15th November, 2019 to 15th December, 2019	Fri 15-11-19	Sun 15-12-19	59	65	_										ľ	-		
62	~	*	112.600 - 112.850	Fri 15-11-19	Sun 15-12-19	57	66														
63	V.	*	112.940 - 113.000	Fri 15-11-19	Wed 04-12-19	58	64	_										Ľ	-		
64	~	*	116.196 - 116.231	Wed 04-12-19	Sun 15-12-19	63	70												È.		
65	×	-	15th December, 2019 to 15th January, 2020	Sun 15-12-19	Wed 15-01-20	61	72	_											Í	-1	
66	~	*	112.850 - 112.940	Sun 15-12-19	Wed 15-01-20	62	73												-		
67	~	*	117.587 - 117.612	Thu 02-01-20	Sun 05-01-20		71													B	
68	~	*	118.595 - 118.676	Thu 02-01-20	Wed 15-01-20)	74	_													
69	×.	*	122.739 - 122.811	Thu 02-01-20	Wed 15-01-20)	8.	_											1		
70	×.	*	128.925 - 129.140	Sun 15-12-19	Wed 15-01-20	064	76													*	
71	 ✓ 	*	131.622 - 131.666 15th January, 2020 to	Wed	Thu 30-01-20	65		-													•
73	1		30th January, 2020	15-01-20 Wed 15 01 20	Sup 10.01.20	66	75	-												+	
74	Ň	*	115.000 - 115.058	Wed 15-01-20	5un 19-01-20	00 49	15													Ţ	
74	ž	*	115.470 - 115.546	Sup 10 01 20	Thu 30-01-20	72														.+	
76		*	120 140 - 120 300	Wed 15.01.20	Thu 30-01-20	70	77	-													
77	~	-	Canal Lining in meters	Thu 30-01-20	Thu 30-01-20	76	78														30-01
78	1		Canal Lining in meters	Thu 30-01-20	Thu 30-01-20	77															30-01
5	0 /	-	Project PIPLMC	Fri 01-03-19	Thu 20 01 20																1
1	1		STRUCTURES	Fri 01-03-10	Thu 30-01-20	1		-	-												-
2	J		1st Mile Stone	Fri 01-03-19	Wed 15-05-10)	11	-													1
2	J		15th February, 2010 to	Fri 01-03-19	Fri 15-03-10		5	-		_ n		1									
	j	,	15th March, 2019	Fri 01-03-19	Fri 15-03-19		-	-		_											
5	J		15th March, 2019 to 15th	Fri 15-03-19	Mon	3	7.9.8	-		*	n										
Ľ	ľ.,		April, 2019		15-04-19	-	19790				1										

Figure 3.5: MSP Gantt Chart Screenshot (Conti 5.)



igure 3.6: MSP Gantt Chart Screenshot (Conti 6.)

ID		Task	Task Name	Start	Finish	Predecessors	Successors	Qtr 1, 2019		1	Qtr 2, 2019		Qtr 3, 2	019			Qtr 4, 2019
11		Mode	2nd Mile Stone	Wod 15-05-19	Thu 15-08-19	2	31	Jan	Feb	Mar	Apr	May	Jun .	ul A	lug	Sep	Oct
	×.	-+	2nd white Stone	Weu 15-05-19	Thu 13-06-19		10	_				÷.			•		
12	~	-4	15th May, 2019 to 15th June, 2019	Wed 15-05-19	Sat 15-06-19	7,10	18					-	ſ				
13	\checkmark	*	133.452	Wed 15-05-19	Sat 15-06-19	8	19					ř					
14	\checkmark	*	133.900	Wed 15-05-19	Sat 15-06-19	9	20					1 1					
15	\checkmark	*	134.550	Wed 15-05-19	Sat 15-06-19	8	21					ř					
16	~	*	134.698	Wed 15-05-19	Sat 15-06-19	9	22					ř					
17	~	*	135.383	Wed 15-05-19	Sat 15-06-19	9	23					ř.					
18	~	-	15th June, 2019 to 15th	Sat 15-06-19	Mon	12	24						r *	η			
			July, 2019		15-07-19												
19	\checkmark	*	111.020	Sat 15-06-19	Mon 15-07-19	13	25						ř	H I			
20	\checkmark	*	111.533	Sat 15-06-19	Mon 15-07-19	14	26						1	H			
21	\checkmark	*	120.400	Sat 15-06-19	Mon 15-07-19	15	27						1	H			
22	\checkmark	*	124.650	Sat 15-06-19	Wed 03-07-19	16	28						×				
23	\checkmark	*	135.850	Sat 15-06-19	Mon 15-07-19	17	29						*	н			
24	~	-	15th July, 2019 to 15th August, 2019	Mon 15-07-19	Thu 15-08-19	18	32							*	т		
25	✓	*	111.544	Mon 15-07-19	Thu 15-08-19	19	33							*	0		
26	~	*	114.317	Mon 15-07-19	Tue 30-07-19	20	34							*	h		
27	\checkmark	*	114.350	Mon 15-07-19	Thu 15-08-19	21	35							*			
28	~	*	114.687	Mon 15-07-19	Thu 15-08-19	22	36								1		
29	\checkmark	*	114.700	Mon 15-07-19	Thu 15-08-19	23	30,37,38							*	6 -		
30	~		Total No. of Structures in 2nd Mile Stone	Thu 15-08-19	Thu 15-08-19	29									15-08		

Figure 3.7: MSP Gantt Chart Screenshot (Conti 7.)

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ID	0	Task Mode	Task Name	Start	Finish	Predecessors	Successors	Opr 1, 2019 Opr 2, 2019 Opr 3, 2019 Opr 4, 2019 Opr 4, 2019 Opr 1, 2020 Jan Feb Mar Apr May Jun Jul Aug Sep Dct Nov Dec Jan Feb
31	~	-	3rd Mile Stone	Thu 15-08-19	Fri 15-11-19	11	51	<u>ř</u> 1
32	~	-	15th August, 2019 to 15th September, 2019	Thu 15-08-19	Sun 15-09-19	24	39	ř – – 1
33	~	*	111.650	Thu 15-08-19	Sun 15-09-19	25	40	<u>1</u>
34	~	*	123.795	Thu 15-08-19	Sun 15-09-19	26	41	S
35	~	*	123.795	Thu 15-08-19	Sun 15-09-19	27	42	
36	~	*	123.796	Thu 15-08-19	Sun 15-09-19	28	43	
37	~	*	126.733	Thu 15-08-19	Tue 27-08-19	29		ř – 1
38	~	*	126.733	Thu 15-08-19	Sun 15-09-19	29	44	ž
39	~	•	15th September, 2019 to 15th October, 2019	Sun 15-09-19	Tue 15-10-19	32	45	ř—1
40	~	*	111.825	Sun 15-09-19	Tue 15-10-19	33	46	1
41	~	*	112.375	Sun 15-09-19	Tue 15-10-19	34	47,48	
42	~	*	114.009	Sun 15-09-19	Tue 15-10-19	35		
43	~	*	121.572	Sun 15-09-19	Mon 30-09-19	36	49	
44	~	*	121.572	Sun 15-09-19	Mon 30-09-15	38		ž – 1
45	~	•	15th October, 2019 to 15th November, 2019	Tue 15-10-19	Fri 15-11-19	39		- F
46	~	*	125.269	Tue 15-10-19	Fri 15-11-19	40	53,57	
47	1	*	125.290	Tue 15-10-19	Fri 15-11-19	41	54,58	
48	~	*	130.464	Tue 15-10-19	Sat 26-10-19	41	55	
49	1	*	135.440	Tue 15-10-19	Fri 15-11-19	43	50,56	
50	~	-	Total No. of Structures in 3nd Mile Stone	Fri 15-11-19	Fri 15-11-19	49	52	a [*] 15-11
51	~	-	4th Mile Stone	Fri 15-11-19	Thu 30-01-20	31		
52	~	-	15th November, 2019 to 15th December, 2019	Fri 15-11-19	Sun 15-12-19	50	59	ř
53	~	*	112.900	Fri 15-11-19	Sun 15-12-19	46	60	
54	~	*	116.211	Fri 15-11-19	Sun 15-12-19	47	61	
55	~	*	117.550	Fri 15-11-19	Tue 26-11-19	48	62	
56	~	*	122.386	Fri 15-11-19	Sun 15-12-19	49	63	
57	~	*	131.298	Fri 15-11-19	Sun 15-12-19	46	64	
58	1	*	132.750	Fri 15-11-19	Sun 15-12-19	47	65	
59	~	-	15th December, 2019 to 15th January, 2020	Sun 15-12-19	Wed 15-01-20	52	66	ř—1
60	~	*	117.600	Sun 15-12-19	Wed 15-01-20	53	67	
61	~	*	118.600	Sun 15-12-19	Sun 29-12-19	54	68	
62	~	*	118.643	Sun 15-12-19	Sun 29-12-19	55	69	
63	~	*	122.766	Sun 15-12-19	Sun 29-12-19	56	70	
64	~	*	129.203	Sun 15-12-19	Wed 15-01-20	57		
65	~	*	131.643	Sun 15-12-19	Wed 25-12-19	58		
66	~	-	15th January, 2020 to 30th January, 2020	Wed 15-01-20	Thu 30-01-20	59		ř
67	~	*	113.625	Wed 15-01-20	Thu 30-01-20	60		
68	~	*	115.522	Wed 15-01-20	Thu 30-01-20	61		
69	1	*	115.784	Wed 15-01-20	Sun 26-01-20	62		
70	1	*	129.203	Wed 15-01-20	Thu 30-01-20	63	71	
71	~	-	Total No. of Structures in 4th Mile Stone	Thu 30-01-20	Thu 30-01-20	70	72	a ⁷ 30-01
72	~	-	Total No. Structures	Thu 30-01-20	Thu 30-01-20	71		30-01
6	0~	-	Project PIPLMC 60C-Retaining Wall	Wed 15-05-19	Thu 30-01-20			
1	~	-	RETAINING WALL	Wed 15-05-19	Thu 30-01-20			

Figure 3.8: MSP Gantt Chart Screenshot (Conti 8.)



Figure 3.9: MSP Gantt Chart Screenshot (Conti 9.)

5. Conclusion

In this project of planning and scheduling selected the project of PIPLMC of package - 6A, site located near Tuni, Andhra Pradesh, India.

- Proper planning and scheduling are very important to ensure that the project should be completed within a given period duration. MSP helps for this project to optimum and effective organization of activities which helps to give the vision to complete the project in planned duration. In this project every activity is scheduled as per site and weather conditions by using priority rule-based scheduling method.
- In the table no. 1 statement showing that the project value of work is divided into activities of the contract price at different stages of construction and in the table no. 2

statement showing the project activities details and it is represented in strip chart figure no. 2 statement showing with detail chainage locations.

- Programmer for completion of work as per milestone is shown in table no. 3 and it will plan for monthly wise activities as shown in table no. 4 to complete of project in a project duration.
- The programmer for completion of work is scheduled by using priority rule-based scheduling method in MS project 2016 and the result shown in MSP Gantt Chat figure no. 3 screenshots. The time calculated for the construction of PIPLMC of package 6A with the help of MSP is 350 days (11 months, 15 days).
- Activities that may cause delays to the project were identified and rescheduled appropriately. The traditional way of construction shows more time with several

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complications and large errors that actual project execution.

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