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Resource planning for construction of road bridge at 5.45km in Cauvery – Vaigai – Gundar link – a component of peninsular rivers development

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ABSTRACT

The Indian Rivers Inter-link is a proposed large-scale civil engineering project that aims to link India's rivers by a network of reservoirs and canals and so reduce persistent floods in some parts and water shortages in other parts of India. The average rainfall in India is about 4,000.

Billion cubic meters, but most of India's rain fall comes over a 4 month period June through September. Further the rains across the nation are not uniform, the east and north gets most of the rains, while the west and south get less. India also sees years of excess monsoons and floods, followed by below average or late monsoons with droughts. This geographical and time variance in availability of natural water versus the year round demand for irrigation, drinking and industrial water creates a demand-supply gap that has been worsening with India's rising population. Proponent so the river inter-linking project claim the answers to India's water problem is to conserve the abundant monsoon water bounty, store it in reservoirs, and deliver this water - using rivers inter-linking project-to are as and over times when water becomes scarce.

The Construction projects, especially the river inter link projects, uses huge amount of resources on and off the field in various forms of resources viz. The uniqueness of the projects makes the resource planning a tedious job as the efficiency of each resource depends upon a huge number of working condition factors. It is identify resources for the construction of a single Road bridge in Slice 1 and to ascertain the obtained result with the theory of Construction Project Management

INTRODUCTION

Water is one of the most important natural resources, the other being the air available freely everywhere and at each split of second. In a nutshell, the universal importance of water can be put as the biological, geo-chemical, meteorological component of the environment, indispensable for the origin, existence and perpetuation of the Mother Earth and the biota inhabiting it. Hence, there is an immense demand for this unique renewable single chemical compound. The total water resources of the earth, the un-utilizable component accounts for more than 99%, this includes 97.2% of oceanic waters, 2.15% of glaciers and icecaps and 0.3% of un utilizable

groundwater. In fact, comparatively, a trivial quantity of less than 0.4%, including 0.3% of usable groundwater and even less percentage surface waters, is available for direct consumption.

HIGHWAY ROAD BRIDGE

Highway construction at the beginning of the nineteenth century most of the highway project report stated that the work could not have been done any faster or more efficiently in our days. In contrast to this view of one large project, it may also point to the continuous change an Improvement occurring in traditional material and technique. This continuous improvement in

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techniques help to plan and distribute the resources as per the requirement and efficient distribution of all these resources helps in close monitoring and actual progress of the work which includes resources like man, material, machinery and money with productivity.

INTERLINKING RIVERS IN INDIA

Keeping in mind the increasing demand for water, the government of India has developed a new National Water Policy which claims that water is a prime natural resource, a basic need and a precious national asset. India's National

Water Development Agency (NWDA) has suggested the interlinking of rivers of the country. This proposal is better known as the Inter-River Linking Project (IRL). It is a mega project that engages money, resources, engineering, management and

Human understanding. It is designed to ease water shortages in western and southern India and aims to link 30 major rivers. The estimates of key project variables - still in the nature of back-of-the-envelope calculations - suggest it will cost around US \$ 123 billion (or Indian Rs 560,000 crores, at 2002 prices), handle 178 km of inter-basin water transfer/per year, build 12,500 km of canals, create 35 gega watt of hydropower capacity, add 35 million hectares to India's irrigated areas, and create an unknown volume of navigation and fishery benefits.

THE NEED OF RIVER INTER LINKING

In February 2012, while disposing a Public Interest Litigation (PIL) lodged in the year 2002, Supreme Court (SC) refused to give any direction for implementation of Rivers Interlinking Project. SC directed the Ministry of Water Resources to constitute an experts committee to pursue the matter with the governments as no party had pleaded against the implementation of Rivers Interlinking Project [1-5].

DROUGHT, FLOODS AND SHORTAGE OF DRINKING WATER

India receives about 4,000 cubic kilometers of rain annually, or about 1 million gallons of fresh water per person every year. However, the precipitation pattern in India varies dramatically across distance and over calendar months. Much of the precipitation in India, about 85%, is received during summer months through monsoons in the Himalayan catchments of the Ganges-Brahmaputra- Meghna (GBM) basin. The northeastern region of the country receives heavy precipitation, in comparison with the northwestern, western and southern parts. The uncertainty of start date of monsoons, sometimes marked by prolonged dry spells and fluctuations in seasonal and annual rainfall is a serious problem for the country. The nation sees cycles of drought years and flood years, with large parts of west and south experiencing more deficits and large variations, resulting in immense hardship particularly the poorest farmers and rural populations. Lack of irrigation water regionally leads to crop failures and farmer suicides. Despite abundant rains during July- September, some regions in other seasons see shortages of drinking water [6-12].

Major benefit

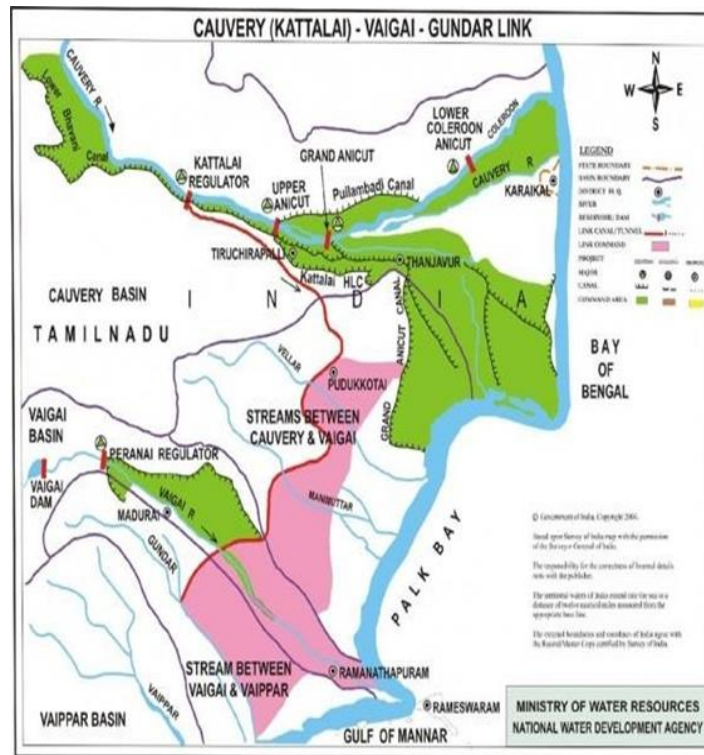
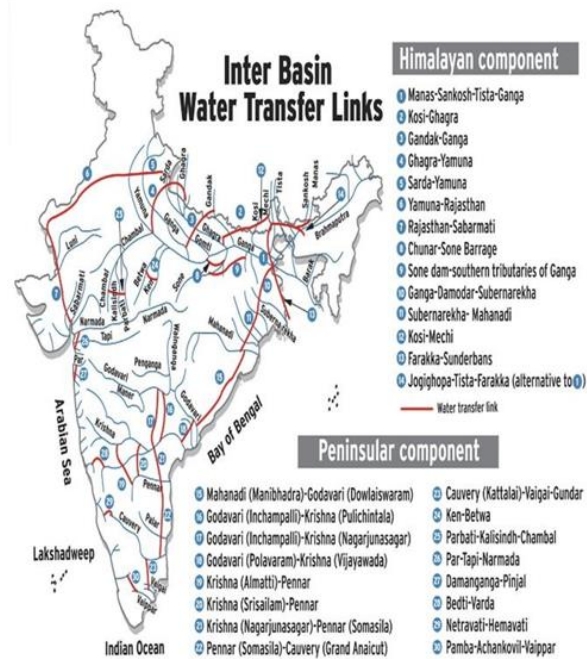
Create the potential to increase agricultural production by an additional 100 per cent over the next five years;

- Unify the country by involving every Panchayat as a share holder and implement agency;
- Provide for enhancing the security of the country by an additional waterline of defense;
- Provide employment to the 10 lakh people for the next 10 years;
- Eradicate the flooding problems which recur in the north- east and the north every year;
- Solve the water crisis situation by providing alternative, perennial water resources;

River interlinking components

The National Perspective Plan comprised, starting 1980s, of two main components:

1. Himalayan Rivers Development
2. Peninsular Rivers Development



STUDY AREA 1 LOCATION

Cauvery (Kattalai)-Vaigai-Gundar link which forms a part of scheme of transfer of surplus rivers water of Mahanadi and Godavari rivers to the

deficit basin of Krishna Pennar, Cauvery and Vaigai, is an important part of various inter basin water transfer proposals envisages under the peninsular river development component of the national perspective plan. Cauvery- Vaigai-

Gundar link project envisages diversion of 2252Mm³ of water, from Kattalai barrage proposed by NWDA at a location downstream of the existing Kattalai bed regulator across CauveryRiver

- A new barrage at Kattalai is proposed to be utilized as off take of canal for the intended diversion.
- The link canal will provide irrigation to an area of 337717 ha in the districts of Karur, Tiruchchirappalli, Pudukkottai, Sivaganga, Ramanathapuram, Virudhunagar and Thoothukudi of Tamil Nadu state.
- The irrigation water requirement is estimated to be 1952.3Mm³.
- Apart from irrigation, it is also proposed to provide for future domestic and industrial water requirements in the command area.
- The link canal is designed as a lined canal with trapezoidal shape with rounded corners.

- The maximum carrying capacity of the canalis
- 180.30 cumec with corresponding cross section of
- 20.40 m of bed width and 5 m of full supply depth in the head reaches.
- The canal passes mostly through agricultural fields

PROJECT PROPOSALS

Phase – I

Excavation of New canal from Cauvery (Kattalai Barrage) – Agniyar – South Vellar. (Length – 118.46 km)

Phase – II

Extension of the canal from South Vellar to Manimuthar, Vagai and Gundar Rivers. (Length – 139.532 km) Total Length – 257.992 km

PHASE – I

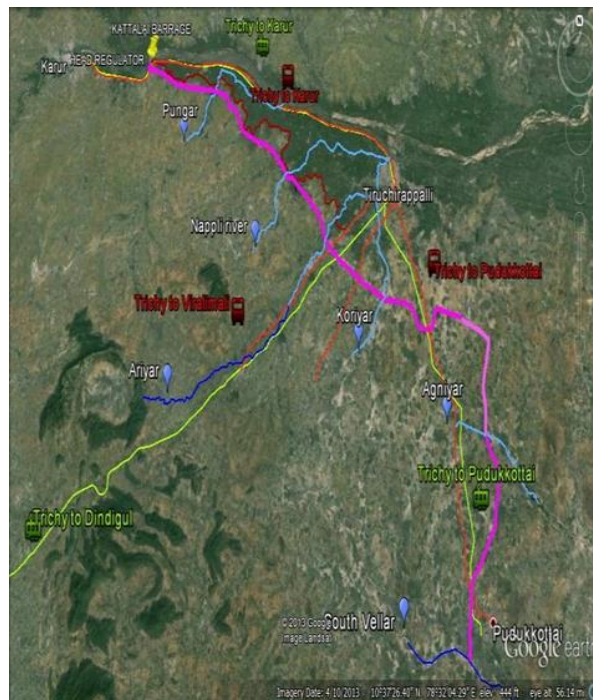
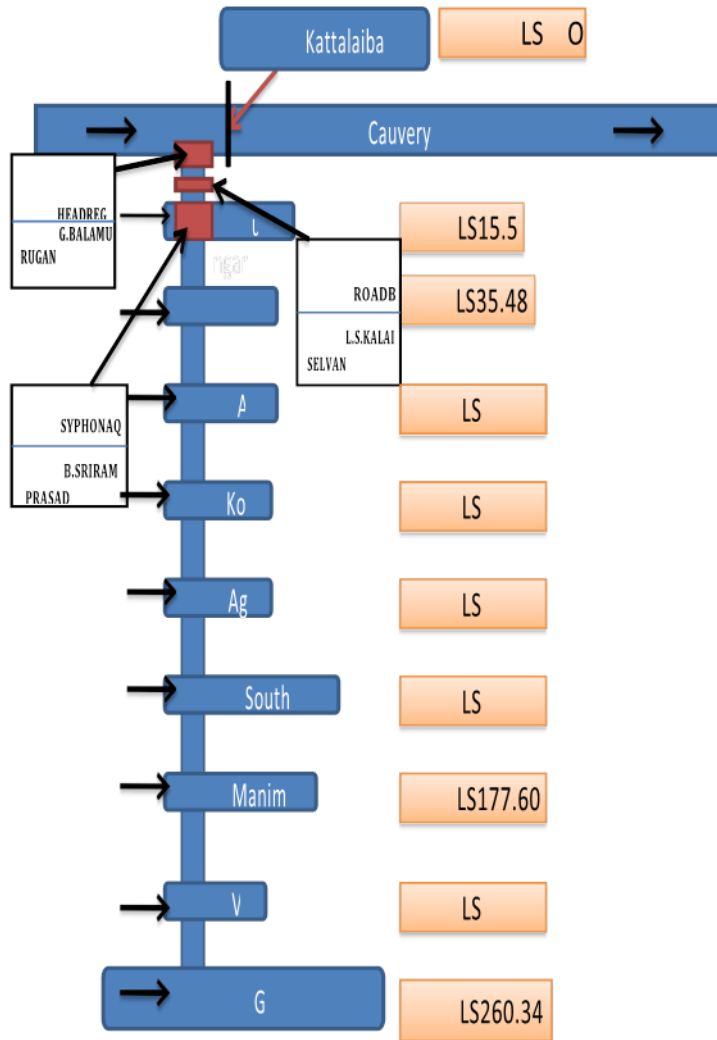


Fig 3.2 Cauvery (Kattalai)-Vaigai-Gundar Link (Phase- 1)

PHASE – I

Excavation of New canal from Cauvery (Kattalai Barrage) – Agniyar SouthVellar. (Length – 118.46 km)
 [No of Slices :08]



Major river crossing land acquisition

Slice No	Patta (Acres)	Poramboke(Acres)	Total (Acres)
Slice I	472.09	43.32	515.41

S.No	Slice no (ls in km)	Length of canal (km)
1.	Slice I (0 - 18.185)	18.185
2.	Slice II(18.185 – 35.485)	17.300
3.	SliceIII (35.485–47.635)	12.150
4.	Slice IV (47.635 –60.235)	12.600
5.	Slice V(60.235 -78.050)	17.815

6.	Slice VI(78.050 –94.150)	16.100
7.	Slice VII(94.150 –112.750)	18.600
8.	Slice VIII(112.75-118.46)	5.710
	Total	118.460

Hydraulic particulars

Resource planning methodology

Planning construction work force by determining the size of project work force, its structuring into functional groups and workers team and scheduling manpower recruitment to match task requirement. After this plan the construction materials which involves identifying the materials required, estimating quantities, defining specifications, forecasting requirements,

locating sources material sample approved, material inventory.

Planning construction work force for road bridge

The project man power planning primarily focuses on determining the size of project work force, its structuring into functional groups and workers teams, and scheduling the manpower recruitment to match the task requirement.

Cost Estimation of Road Bridge

S. No	Qty	Item of work	Rate in Rs.	Amounts in Rs.
1.	329m ³	Earth work excavation in all classes of soils except hard rock requiring blasting and depositing on bank as per SS20B with all leads and lifts and all other incidental charges such as bailing out water shoring strutting, walling & forming protective per relevant standard specification	76m ³	25004
2.	931m ³	Earth work excavation in all classes of soils except hard rock requiring blasting and depositing on bank with all leads and lifts as per SS20B, including cost of all labour, equipment's and all incidental charges such as providing and maintaining necessary cofferdams, sheeting, shoring, bracing and their standard specification for FOUNDATION OF RAFT AND CUTOFF WALLS	243 m ³	226233
3.	212m ³	Earth work excavation in all classes of soils except hard rock requiring blasting and depositing on bank with all leads and lifts as per SS20B, including cost of all labour, equipment's and all incidental charges such as providing and maintaining necessary cofferdams, sheeting, shoring, bracing and their sub sequent removal, removal of all logs, stumps and other deleterious matter and obstructions, trimming bottom of excavation backfilling, and clearing the site and disposal of all surplus materials etc., complete as per relevant standard specification for FOUNDATION OF TOEWALLS OF REVETMENTSAND FLEXIBLE APRON	164 m ³	34768
4.	38840m ³	4.Vibrated Cement Concrete of grade M20 (nominal mix 1:1.5:3) using40mm HBG metal including cost and	5112m ³	1985501

		conveyance of all material to site and cement at site including cost of formwork, soft water, labour charges for mixing, transporting, laying and curing concrete working at depths, Tools and Plants and incidental charges such as maintaining of protective bunds, cofferdams, shoring, strutting etc., complete as per relevant standard specification for FOUNDATION OF RAFT AND CUT OFF WALL(below sill level)		
5.	647.1m ³	Filling inside the raft with clean good coarses and including cost and conveyance of sand to work site, laying, handling charges and filling in layers, tamping under optimum moisture content to get the maximum density including watering, with all leads of water and all other incidental charges etc. complete	582m ³	376613
6.	106.30m ³	Vibrated Cement Concrete of grade M20 (nominal mix 1:1.5:3) using 40mm HBG metal including cost and Conveyance of all materials to site and cement at site including cost of formwork, soft water, labour charges for mixing, transporting, laying and curing concrete working at depths, Tools and Plants and incidental charges such as maintaining of protective bunds, cofferdams, shoring, strutting etc., complete as per relevant standard specification for SUBSTRUCTURE OF ABUTMENT, WING AND PIER(Above sill level)	5260m ³	559138
7.	30N3	Providing and fixing seepage pipes of 100mm PVC pipes of required lengths for abutments and wings including cost and conveyance of all materials to worksite, cost and labour for 900mm dia semi-spherical backfill arrangements with 100mm size broken granite chips at the periphery and labour charges for fixing, etc., complete as per drain the backfill.	175Nos	5250
8.	7.10m ³	Reinforced cement concrete M30 design mix using ISS graded hard granite crushed stone including cost and conveyance of all materials to site and cement at site excluding cost and fabrication of steel but including formwork and centering, soft water, labour charges for mixing, transporting and placing in position, vibrating and compacting, finishing and curing, working at heights, hire charges for tools and plants including all other incidental charges etc., Complete as per specification for BEDBLOCK Cum DIRT WALL OVER ABUTMENTS.	7934m ³	56331
9.	74m ³	Vibrated reinforced cement concrete M30 (Design mix) using ISS graded hard granite broken metal including cost and conveyance of all materials to site and cement at site excluding cost and fabrication of steel but including formwork and centering soft water labour charges for mixing, transporting, placing in position vibrating and compacting finishing and curing concrete, working at heights, hire charges for tools and plants, including all other incidental charges etc complete as	7459m ³	551966

10.	3sets	per Specification for RCC DECK SLAB Providing and fixing 200mm thick PVC EXPANSION JOINT in between deck slabs over abutment and pier as shown in the drawing including cost an conveyance of expansion joints	3000.0sets	9000
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Efficient material management in project environments calls for an integrated approach covering numerous functions such as materials planning and programming, materials purchasing, inventory control, store-keeping and ware housing, materials transportation and handling at site, materials codification and standardization and the disposal of surpluses

ACTIVITIES OF PROJECT MANAGEMENT

Project management is composed of several different types of activities such as:

- Planning the work or objectives
- Analysis & Design of objectives
- Assessing and controlling risk or Risk management
- Estimating Resources
- Allocation of Resources
- Organizing the work
- Acquiring human and material Resources
- Assigning the task

RESULT AND DISCUSSION

Based on the results obtained from the above discussed resource planning methods for the study

area, the resource estimates were arrived and discussed below.

COST ESTIMATION OF ROAD BRIDGE

The total cost of Road Bridge the work is Rs. 7291332.00. The minimum cost is Rs. 5000.00 for providing and fixing of cast iron drainage spouts and maximum cost is Rs.1985501.00 for foundation of raft and cutoff wall. The following table 5.15 is shows the individual costs of all works.

REPORT GENERATION

Communicating the project schedule is a vital ingredient successful project management. A good presentation will greatly ease the manager's problem for understanding the multitude of activities and their interrelationships. Moreover, numerous individuals and parties are involved in an any project, and they have to understand their assignment.

Graphical presentations of project schedules are particularly useful since it is much easier to comprehend a graphical display of numerous pieces of information than to shift through a large table of numbers.

RESOURCE SCHEDULING

Activity ID	Budgeted Total Cost	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish
may 16 wall	Rs0		226	226	0%	16-May-15	13-Jun-15
A	Rs0	Earthwork excavation dress	38	38	0%	16-May-15	20-May-15
B	Rs0	Earthwork excavation raft a	22	22	0%	20-May-15	23-May-15
C	Rs0	Earthwork excavation toe w	12	12	0%	23-May-15	24-May-15
D	Rs0	Cement concrete M20 raft a	59	59	0%	25-May-15	01-Jun-15
E	Rs0	Filling coarse sand	35	35	0%	25-May-15	29-May-15
F	Rs0	Cement concrete M20 abutr	16	16	0%	01-Jun-15	03-Jun-15
G	Rs0	Providing & fixing seepage p	8	8	0%	29-May-15	30-May-15
H	Rs0	RCC M30 Ditt wall over	2	2	0%	03-Jun-15	03-Jun-15
I	Rs0	RCC M30 Deck slab	11	11	0%	30-May-15	31-May-15
J	Rs0	Providing PVC expansion joi	3	3	0%	03-Jun-15	03-Jun-15
K	Rs0	Providing filter media behind	9	9	0%	31-May-15	01-Jun-15
L	Rs0	Gravel filling for behind abut	18	18	0%	04-Jun-15	06-Jun-15
M	Rs0	Supply & fabrication of 415 c	24	24	0%	01-Jun-15	04-Jun-15
N	Rs0	Base coarse below approac	4	4	0%	06-Jun-15	06-Jun-15
O	Rs0	Approach slab M30 grade	4	4	0%	04-Jun-15	05-Jun-15
P	Rs0	Wearing coat of 7mm unifon	12	12	0%	06-Jun-15	08-Jun-15
Q	Rs0	Crash barrier over deck slab	6	6	0%	05-Jun-15	06-Jun-15
R	Rs0	Crash barrier parapet M20	4	4	0%	08-Jun-15	08-Jun-15
S	Rs0	Providing & fixing of cast iron	4	4	0%	08-Jun-15	08-Jun-15
T	Rs0	Granite rough stone dry pac	21	21	0%	08-Jun-15	11-Jun-15
U	Rs0	Supply & fixing of high qualif	42	42	0%	06-Jun-15	11-Jun-15
V	Rs0	Dismantling & cleaning	15	15	0%	11-Jun-15	13-Jun-15

And when required resource management. Apart from different technical factors affecting the productivity. The logistical arrangement at site plays a major role in the production rate. For major

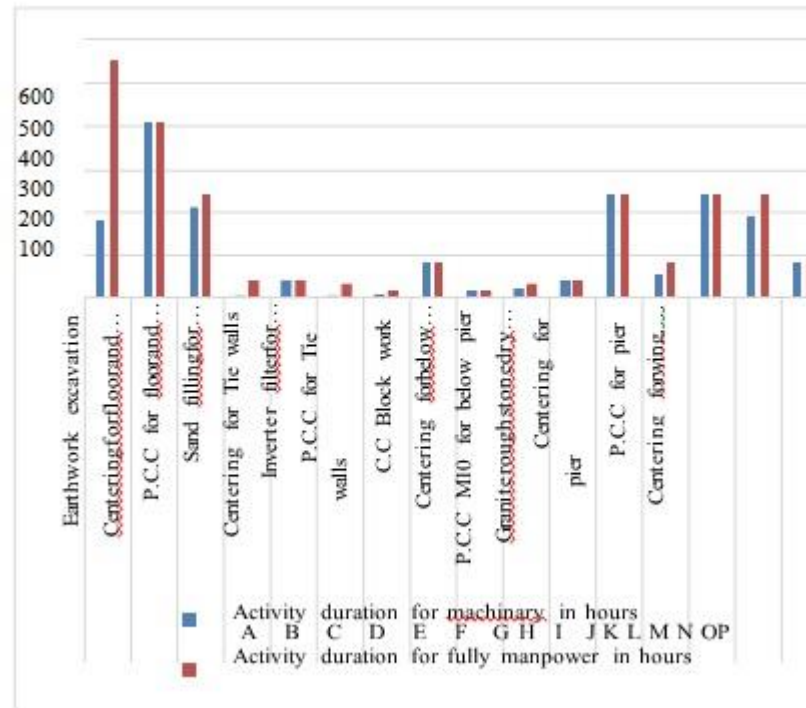
equipments like patching plant, ready mix plant etc. The logistics is the key factor for determining the productivity.

RESOURCE PLANNING

Equipment cost for any project comprises of mainly 20-30% of project cost plus additional cost for maintenance, repair and operation cost of equipment to be controlled properly by efficient allocation of equipment for different phase of

works. So for using equipment effectively and efficiently equipment becomes necessary. Analysis is shows the necessary equipment in productivity and its reduce activity duration then done through manpower in road bridge work. Following figure 6.1 shows the equipment efficiency and productivity then manpower.

Activity Duration Difference b/w Machinery and Fully Manually



CONCLUSION

The visit to road bridge project site and study of available database in the project site. The present construction practices in India is still adopt the various methodology Material planning is done to achieve requirement of project at different phases of construction work and it also reduces excessive wastage of materials. The material planning for individual activity is controlling the exceeding for estimated cost

Manpower planning is the process by which organization ensures that it has the right number and right kind of people, at the right place, at the

right time, capable of effectively and efficiently completing those tasks of road bridge construction and that will help to achieve its overall objectives with in constraint time. In from the analysis of this project, most of the activities are done team productivity. Also a team productivity is depends on deriving equipment.

The estimated duration of road bridge work is depend on the material and manpower, equipment productivities. PERT is used for analysis of work done through the machineries and CPM is used for analysis of work fully done through the manpower

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