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# Planning, Scheduling and Monitoring Methodology for Construction Practices

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Abstract: The main objective and aim to be achieved through this mini project is to identify a small construction project and collect its documents defining the scope, prepare the work breakdown structure involving activities in the project execution and schedule the project considering duration and resource allotment, activity, working calendar, etc.

### I. SCOPE OF PROJECT

A. *Type* Rural Water Supply Scheme

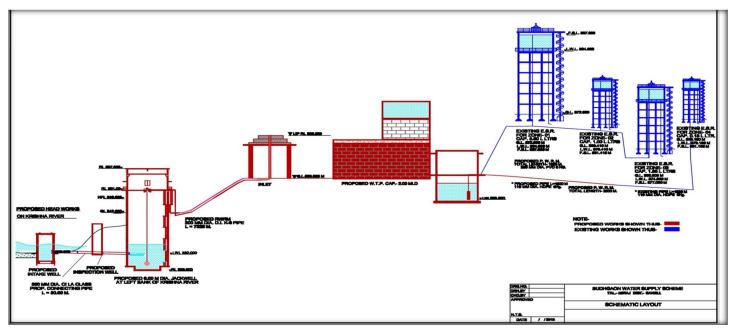
*B. Location* Budhgaon, Tal. Miraj, Dist. Sangli

### C. Purpose

The project aims to provide an efficient conventional water supply system for rural region of Budhgaon. The project consists of typical components of a water supply/distribution system such as intake well, jack well, connecting pipes, rising main pumping stations, water treatment plant with components, elevated service reservoir, etc. Water from Krishna river is used by the project.

### D. Assumptions

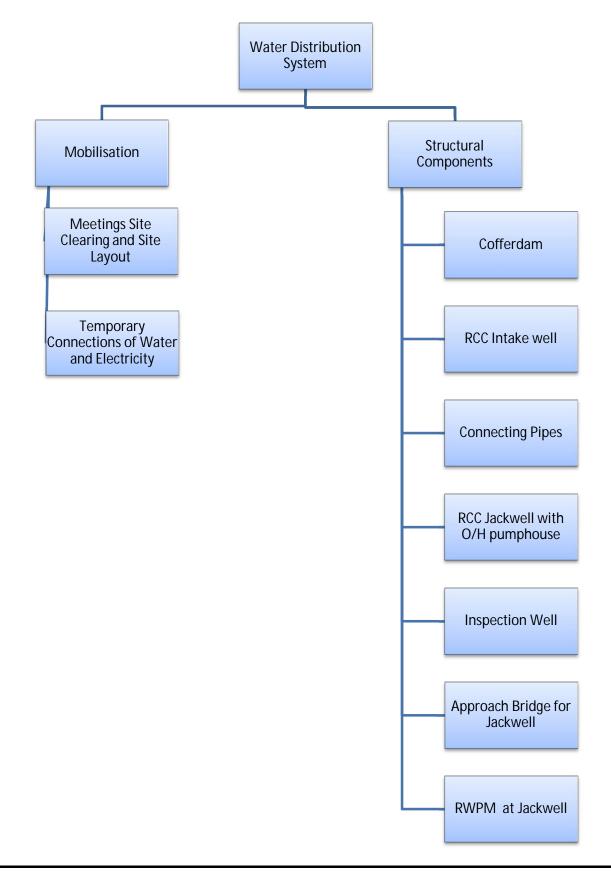
The Estimate of this Water Distribution System was procured from regional Zilla Parishad and the duration were deduced from the estimates and thus the duration was calculated based on the various resources and the rate of work through resource allocation. The division of durations of a sub-activity in the project is approximated and is raw and may actually vary slightly. For the updating purpose, it is assumed that the work gets delayed and falls short in following the schedule due to strike of workers for a period of 15 days.



### II. PLAN OF WATER DISTRIBUTION SYSTEM



### III. WORK BREAKDOWN STRUCTURE





### DETAILED WORK BREAKDOWN \$TRUCTURE

	Tack	Wedgeselvese	Anticle
Subproject	Task Klakett Maakan	Workpackage	Activity
	Kickoff Meeting Site Cleaning		
	Site Layout	1	
	Temporary Water	1	
Mobilisation	Connection		
	Temporary Electricity	1	
	Connection		
	Labour Huts	1	
	Completion of	1	
	Devide a lange dave	Excavation in general	
	Providing impervious /semi-impervious	soft material and	
	material on both sides of	simultaneous lifting up	
	B.C soll (in gunny bags	Lead of 150 M including	
	if required) including	barricating, guarding,	
	ramming compacting	disposing off within	
Coffer dam		0.5km rad	
Conerciam	Excavation	4	
	Filling middle position		
	with B.C. soll (gunny		
	bags if required)		
	and a construction of a		
			<ol> <li>Excavation in general soft</li> </ol>
		1. Excavation in soft	material and simultaneous lifting up
		murum	ii) Lead of 150 M including
			barricating, guarding, disposing off
			<ol> <li>Excavation in hard material using</li> </ol>
		2. Excavation in hard	controlled blasting and
		menum	simultaneous lifting
			ii) Lead of 150 M including
	Sub-structure		barricating, guarding, disposing off
		BProviding and casting	
		in situ cement concrete	
		1.1/2.3 in M20 for	
		foundation and bedding	
RCC intake well		4. Providing and casting	i) Centering
		in situ coment concrete	ii) PCC bedding
		for RCC Raft slab M:30	iii)Reinforcing
			iv) Shuttering
			A Casking assesses
		5. Providing and casting	v) Casting concrete
		5. Providing and casting in situ cement concrete	i) Casting concrete
		5. Providing and casting in situ cement concrete for RCC Vertical wall &	I) Casting concrete II) Shuttering
		in situ cement concrete	i) Casting concrete
		in situ cement concrete for RCC Vertical wall &	I) Casting concrete II) Shuttering
	Super-structure	in situ cement concrete for RCC Vertical wall & slab &landing M30 6. Providing and fixing in position steel bar	I) Casting concrete II) Shuttering
	Super-structure	in situ cement concrete for RCC Vertical wall & slab &landing M/30 6. Providing and fixing in position steel bar reinforcement of various	I) Casting concrete II) Shuttering
	Superstructure	In situ cement concrete for RCC Vertical wall & slab &landing M/30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC	I) Casting concrete II) Shuttering
	Super-structure	in situ cement concrete for RCC Vertical wall & slah &lanring M30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings,	I) Casting concrete II) Shuttering
	Super-structure	In situ cement concrete for RCC Vertical wall & slab &landing M/30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft	I) Casting concrete II) Shuttering
		In situ cement concrete for RCC Vertical wall & slab Alandino M 30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc	I) Casting concrete II) Shuttering
	1. Providing & supplying	In situ cement concrete for RCC Vertical wall & slab Alandino M 30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes	In situ cement concrete for RCC Vertical wall & slab Alandino M 30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl	In situ cement concrete for RCC Vertical wall & slab Alandino M 30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes	In situ cement concrete for RCC Vertical wall & <u>slab &amp;landing M130</u> 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl	In situ cement concrete for RCC Vertical wall & <u>slah &amp;landing M130</u> 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl	In situ cement concrete for RCC Vertical wall & <u>slah &amp;landing M130</u> 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc I) Excavation in general soft material and	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl flanged/S&S specials 3. Excavation in soft	In situ cement concrete for RCC Vertical wall & <u>slah &amp;landing M130</u> 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc I) Excavation in general soft material and simultaneous lifting up	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl flanged/S&S specials 3. Excavation in soft munum	In situ cement concrete for RCC Vertical wall & slab Alandino M'30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc i) Excavation in general soft material and simultaneous lifting up ii) Lead of 150 M	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl flanged/S&S specials 3. Excavation in soft munum	In situ cement concrete for RCC Vertical wall & sish Alandino M'30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc i) Excavation in general soft material and simultaneous lifting up ii) Lead of 150 M including barticating,	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl flanged/S&S specials 3. Excavation in soft munum	In situ cement concrete for RCC Vertical wall & slab Alandino M:30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc I) Excavation in general soft material and simultaneous lifting up II) Lead of 150 M including barricating, guarding, disposing off	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl flanged/S&S specials 3. Excavation in soft munum	In situ cement concrete for RCC Vertical wall & slab &landing M:30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc i) Excavation in general soft material and simultaneous lifting up ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad	I) Casting concrete II) Shuttering
	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl flanged/S&S specials 3. Excavation in soft munum	In situ cement concrete for RCC Vertical wall & slab Alandino M:30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc I) Excavation in general soft material and simultaneous lifting up II) Lead of 150 M including barticating, guarding, disposing off within 0.5km rad I) Excavation in hard	I) Casting concrete II) Shuttering
Connecting places	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl flanged/S&S specials 3. Excavation in soft munum	In situ cement concrete for RCC Vertical wall & slah &landing Mr30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc i) Excavation in general soft material and simultaneous lifting up ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad i) Excavation in hard material using controlled	I) Casting concrete II) Shuttering
Connecting pipes	1. Providing & supplying ISI mark C.I. S/S pipes 2. standard Cl flanged/S&S specials 3. Excavation in soft munum	In situ cement concrete for RCC Vertical wall & slab Alandino M:30 6. Providing and fixing in position steel bar reinforcement of various diameters for RCC pipes, caps, footings, foundation a. RCC Raft slab 120kg/Cum of Conc I) Excavation in general soft material and simultaneous lifting up II) Lead of 150 M including barticating, guarding, disposing off within 0.5km rad I) Excavation in hard	I) Casting concrete II) Shuttering



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	murum	ii) Lead of 150 M	
		including barricating,	
		guarding, disposing off	
		within 0.5km rad	
	5. Providing and casting		
1	in situ cement concrete		
	for foundation and		
1	6. Lowering, laying and		
	joining SBR rubber 7. Dewatering the		
	excavated trenches		
	8. Refilling the trenches		
			i) Excavation in general soft
		1. Excavation in soft	material and simultaneous lifting up
		murum	ii) Lead of 150 M including
			barricating, guarding, disposing off
	Sub-structure		i) Excavation in hard material using
		2. Excavation in hard	controlled blasting and
		murum	simultaneous lifting
		THE STORE	ii) Lead of 150 M including
			barricating, guarding, disposing off
		<ol><li>Providing and laying</li></ol>	
		stones, aggregate for	
		foundation and bedding	
			1) Centering
		4. Providing and casting	i j contrati i ja
		in situ cement concrete	ii) PCC bedding
		RCC footing M30	iii)Reinforcing
			Iv) Shuttering
1		5. Providing and caseing	v) Casting concrete
		in situ cement concrete	i)Reinforceing
		RCC vertical wall & slab	ii) Shuttering
		A local co M300	iii) Casting concrete
	'age	6 Providing and casting	Reinforceing
	<b>MMM</b>	in situ content concrete	() various carrig
		RCC Beams and lintels	ii) Shuttering
		M300 and 4. Providing	iii) Casting concrete
		and casting in situ 7. Dewatering in	in parate ing contained
1		excavated trenches	
		8. Providing and fixing	
		M.S. ladder	
		9. Providing and fixing	
		G.I. pipe railing	
		10. Providing and fixing	
		Steel window C.R.C	
RCC (ackwell with O/H		11. Providing and fixing	
pumphouse		rolling shutter	
		<ol> <li>Providing second class burnt brick</li> </ol>	i) Providing bricks
		masonry	ii) Constructing Wall
		13. Plastering-Mixing of	
	Super-structure	material and applying on	
		surface.	
		14. Waterproof treatment-	
		Lifting BB at required	
		place and providing	
4		waterproof treatment of	
		15. Applying of	
		distemper-Scaffolding	
		and applying 2 coats of all bound distances	
		oil bound distemper	
		16. Applying 2 coats of	
			i) Cleaning and Prepairing surface
1		including cleaning and	
		preparing surface and	ii Apolying two coats
		preparing surface and watering for 2 days.	II Applying two coats III Watering



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		17. Earthing-Excavation	
		for earthing pit and	
		providing and fixing	
		copper wire with copper	
		plate including laying	
		18. Providing mild steel	
		sluies gate	
		19. Providing and laying	
		cement concrete	
		20. Refilling of trenches	
		excavated for pipelines	
		with soft material	
		21. Refilling of trenches	
		with hard material for	
		22. Compaction and	
		leveling of excavated	
			<ol> <li>Excavation in general soft</li> </ol>
		<ol> <li>Excavation in soft</li> </ol>	material and simultaneous lifting up
		material	ii) Lead of 150 M including
			barricating, guarding, disposing off
			i) Excavation in hard material using
		2 Evenuation in hand	controlled blasting and
		2. Excavation in hard	simultaneous lifting
		material	ii) Lead of 150 M including
			barricating, guarding, disposing off
		3. Dewatering of	
		excavated trenches	
		including disposing of	
		4. Providing and laying	
		stones or hard material	
		like trap, granite etc. for	
		foundation, bedding etc.	
		5.providing and laying	
		steel, cement,	
		accregates etc. on site	
	1()[	6. Centerleg and start of	
Pa	$\mathbf{A} \mathbf{A} \mathbf{V}$		
		7. Reniforcement pf	
		columns	
		8. Shuttetring for	
		foundation	
Inspection well Su	b-structure	9. Concreting and curing	
		10. Shuttering for	
		11. Concreting and	
		curing of columns	
		12. Shuttering for beam	
		and slabs.	
		13. Providing and fixing	
		steel for slab, beam,	
		staircase etc.	
		14. Providing and fixing	
		CI Dapuri steps	
I		15 Applying 3 coats of	
		anticorrosive paints	
I		16. Applying 2 coats of	
		anticorrosive paints on	
		inverted J type cowel	
		type ventilators with	
		mosquito top proof	
I		17. Fixing of cowel type	
		ventilators	
I		18. Refilling of trenches	
I		with available	
		excavated stuff with soft	
		19.Refilling of	
		avanuated terms in a volume	
		excavated trenches with	
		hard material for 15cm.	
		hard material for 15cm. 1. Providing and laying	
		hard material for 15cm.	



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	Sub-structure	<ol><li>Fixing and centering</li></ol>	
		poisions of piles for pile	
		foundation.	
		3. Boaring and installing	Providing and fixing MS bars in
		shell for pile foundation.	Concreating of piles and curing
		4. Laying MS bars	
		(reinforcemennt) for Pile	
		cap	
		Concreating of Pile cap	
		and curing	
		and coming	
		5. Centering and laying	shuttering of Colums
Approach bridge for		MS bar reinforcement	
[ackwell		For columns	Concreating of columns
			Curing of columns
		6. Deshuttering of	
	Suppresentation	column formwork.	
		7. Shuttering for slab	
		and beam	
-		8. Installation of steel for	
		slabs and beam	
		9. Concreting of slab	
		and beam and curing	
		10. Deshuttering of slab	
		and column.	
		11. Providing and fixing	
		GI pipe railing and	
		painting anticorrosive	
		Excavation as per	
		design	
RWPM at jackwell	RCC foundation for	Providing reinforcement	
	pump house	Casting and curing	
		thereafter	
Handover/Close down			

### IV. ACTIVITY SCHEDULING

				Activity Schedul	e I			
Sr. No.	Activity		Quantity	Unit	Resource	No.	Productivity	Duration
		Kickoff meeting						1
		Site cleaning			excavator	1		4
1	MOBILISATION	Site layout			Engineer	1		2
		Temporary Connections			Labour	2		5
					Engineer	1		1
					Labour	2	8 cum per day	
		Excavation	61.35	Cum	Excavator	2	25 cum per hr	1
					dumper	1		
	COFFER DAM and RCC INTAKE WELL	Filling BC Soil at middle and rammer	62	Cum	Male Coolie,Female Coolie	1	8 cum per day	4
2					Centering labour	2		1
	WELL				Shuttering Labour	2		8
		<b>Cement Concreting</b>	43.70	Cum	Mixer	1		
					Casting labour	5	8 cum per day	8
		Steel	2.31	MT	Steel Labour	2	100 kg steel per day	16
		steel	2.51	WI1				
					Engineer	1		
		Excavation	2468.00	Cum	Labour	2		26
		Excavation	2400.00	Cum	Excavator	1	25 cum per hr	20
3	CONNECTING				dumper	2	25 cuil per li	
5	PIPES	DI pipes	50.00	RM	Labour	2	8 m per day	4
					Mixer	1		
		Cement Concreting	14.00	Cum	Casting labour	5	8 cum per day	4



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					Engineer	1		
		T	2640.00	Com	Labour	2	8 cum per day	
		Excavation	2640.00	Cum	Excavator	1		22
					dumper	2	25 cum per day	
		Dewatering	13650.00	bhp/hr	Pump	1		1
		Providing ladder	29.00	RM	MS ladder	1		1
	RCC	Detab	10.00	Cum	Mason	2	1	6
4	JACKWELL	Brick masonry	19.00	Cum	Labour	1	1 cum per day	0
-	WITH O/H PUMP				Centering labour	2		8
	HOUSE	Cont			Shuttering Labour	2		45
		Cement Concreting	14.00	Cum	Mixer	1		
		concreting			Casting labour	5	8 cum per day	34
					Steel Labour	0		62
		Plastering	221.00	Sqm	Mason	3	8 sqm per day	4
		Flastering	221.00		Labour	3	o squi per day	4
		Waterproofing	35.00	Sqm	Labour	2	8 sqm per day	3
		Excavation	236.00	Cum	Engineer	1		
		Excavation	230.00		Labour	2	8 cum per day	6
		Dewatering	4000.00	bhp/hr	Pump	1	20 HP	1
					Centering labour	2		8
	INSPECTION	Cement	14.00	Cum	Shuttering Labour	2		
5	WELL	Concreting	14.00	Cuii	Mixer	1	8 cum per day	
	WEEE				Casting labour	5	o cum per day	
		CI Dapuri steps	36.00	no.	Steel Labour	2	100 kg steel per day	1
		CI Dapuri steps	50.00	110.	Labour	1	100 kg steer per day	1
		CI cowel	3.00	no.	Labour	1		
		Ventilators	5.00	110.	Labour	1		
		Centering,	20.00	RM	Casting labour	3		11
		Casting	20.00	IXIVI	Steel Labour	3		
6	APPROACH	Providing Casing,			Shuttering Labour	2		20
0	BRIDGE	<b>RCC</b> Foundation,	2086.00	Kg	Steel Labour	2	100 kg steel per day	23
		RCC Column,	15.13	Cum	Casting labour	6	1.5 cum per day	11
		Beams, Slab,	36.00	RM	GI Pipe railing	3		2

V. MICROSOFT PROJECT SCHEDULING

ID	ID ID	Task		Duration	Start	Finish	Prede	Succes	s Resource Names	Q4 Q1 Q2 Q3 Q4 Q1
1	1			408.5 days?	Thu 21-11-19	Sat 02-01-21				
2	2	*	Mobilisation	9 days		Fri 29-11-19				8
3	3	-	Kickoff Meeting	1 day	Thu	Thu 21-11-19		5	Kickoff Meeting Cost	3 Kickoff Meeting 1 day
4	4	-	Site Cleaning	4 days	Sun	Wed 27-11-19	5	6,7	Labour	4 Site Cleaning 4 days
5	5	-	Site Layout	2 days	Fri 22-11-19	Sat 23-11-19	3	4	Labour	5 Site Layout 2 days
6	6	-	Temporary Water Connection	2 days	Thu 28-11-19	Fri 29-11-19	4	8	Water Connection Charges	6 Temporary Water Connection 2 days
7	7	-	Temporary Electricity Connection	2 days	Thu 28-11-19	Fri 29-11-19	4	8	Electricity Connection	7 Temporary Electricity Connection 2 days
8	8	-	Completion of Mobilization	0 days	Fri 29-11-19	Fri 29-11-19	6,7	12,13		<b>2</b> 9-11
9	9	*	Structures and components	370 days	Sat 30-11-19	Thu 03-12-20				B
10	10	*	Coffer dam	7 days	Sat 30-11-19	Fri 06-12-19				
11	11	*	Excavation	3 days	Sat 30-11-19	Mon 02-12-19				•
12	12	-	Excavation in general soft material and simultaneous lifting up	3 days	Sat 30-11-19	Mon 02-12-19	8	14	Excavation in soft soil using pokland	12 Excavation in general soft material and simultaneous lifting up 3 days
13	13	-	Lead of 150 M including barricating, guarding, disposing off within 0.5km rad	1 day	Sat 30-11-19	Sat 30-11-19	8	14	Lead by dumpers	13 Lead of 150 M including barricating, guarding, disposing off within 0.5km rad 1 day
14	14	-	Filling middle position with B.C. soil (gunny bags)	2 days	Tue 03-12-19	Wed 04-12-19	12,13	15	Male Coolie,Female Coolie	14 Filling middle position with B.C. soil (gunny bags) 2 days
15	15	-	Providing impervious /semi-impervious material on both sides of black cotton soil ( in gunny bags ) including ramming compacting	2 days	Thu 05-12-19	Fri 06-12-19	14	19,20	Rammer, Male Coolie	15 Providing impervious /semi-impervious material on both sides of black cotton 2 days
16	16	-	RCC intake well	40.5 days	Sat 07-12-19	Thu 16-01-20				r
17	17	-	Sub-structure	7.5 days	Sat 07-12-19	Sat 14-12-19	1			-
18	18	-	1. Excavation in soft murum	0.5 days	Sat 07-12-19	Sat 07-12-19				•
19	19	-	<ul> <li>i) Excavation in general soft material and simultaneous lifting up</li> </ul>	0.5 days	Sat 07-12-19	Sat 07-12-19	15	22,23	Excavation in hard murum using pokland[1]	19 📉 Excavation in general soft material and simultaneous lifting up 0.5 days
20	20	-	<li>ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad</li>	0.5 days	Sat 07-12-19	Sat 07-12-19	15	22,23	Lead by dumpers	20 Ti) Lead of 150 M including barricating, guarding, disposing off within 0.5km 0.5 days
21	23	*	2. Excavation in hard murum	0.5 days	Sat 07-12-19	Sat 07-12-19	,			
22	22	-	<ul> <li>i) Excavation in hard material using controlled blasting and simultaneous lifting</li> </ul>	0.5 days	Sat 07-12-19	Sat 07-12-19	19,20	24	Excavation in hard murum using pokland[1]	22 (1) Excavation in hard material using controlled blasting and simultaneous lifti 0.5 days
		Tas	k Project Summary		nual Task	_	_	Start	-only E	Deadline 🐥 Manual Progress ———
	CPM_V ue 17-1	VD Spli 2- Mile		Du	nual Task ration-only nual Summary Roi nual Summary	lup		Finis Exte	-only L h-only J mal Tasks anal Milestone IIII	Deldine Mitrival Progress Critical Critical Split Progress
						P	age 1	00055		



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	ID	Task Task Mode	Name	Duration	Start	Finish	Prede	Succes	Resource Names	2020 2021 2021 2021 2021 2021 2021 2021
23	23	-	<li>ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad</li>	0.5 days	Sat 07-12-19	Sat 07-12-19	19,20	24	Lead by dumpers	23 Ti) Lead of 150 M including barricating, guarding, disposing off within 0.5kr 0.5 days
24	24	-	<ol> <li>Providing and casting in situ cement concrete 1.1/2.3 in M20 for foundation and bedding</li> </ol>	1.5 days	Sun 08-12-19	Mon 09-12-19	22,23	326	Cement 53 Grade[1],Coarse Aggregate[1],River Sand[1],Casting Labour Rate	24 73. Providing and casting in situ cement concrete 1.1/2.3 in M20 for foundat 1.5 days
25	25	*	4. Providing and casting in situ cement concrete for RCC Raft slab M:30	5 days	Mon 09-12-19	Sat 14-12-19	1			
26	26	-	i) Centering	1 day		Tue 10-12-19	24	27	Lobour	26 附 Centering 1 day
27	27	-	iii)Reinforcing	2 days	Tue 10-12-19	Thu 12-12-19	26	28	Steel[1],Binding Wire[1],Steel Labour Rate	27 👬ii)Reinforcing 2 days
28	28	-	iv) Shuttering	1 day	Thu 12-12-19	Fri 13-12-19	27	29	Shuttering Labour Rate	28 Tiv) Shuttering 1 day
29	29	-	v) Casting concrete	1 day	Fri 13-12-19	Sat 14-12-19	28	33	Cement 53 Grade[1],Coarse	29 🖏 Casting concrete 1 day
30	30	*	Super-structure	33 days	Sat 14-12-19	Thu 16-01-20				
31	31	*	5. Providing and casting in situ cement concrete for RCC Vertical wall & slab &landing M:30	32 days	Sat 14-12-19	Wed 15-01-20				
32	32	-	i)casting	8 days	Tue 07-01-20	Wed 15-01-20	34	37,38,	Cement 53 Grade[1],Coarse	32 vi)casting 8 days
33	33	-	ii) Shuttering	8 days	Sat 14-12-19	Sun 22-12-19	29	34	Shuttering Labour Rate	33 📶) Shuttering 8 days
34	34	-	iii) Reinforcement	16 days	Sun 22-12-19	Tue 07-01-20	33	32,36	Steel[1],Binding Wire[1],Steel Labour Rate	34 🎬 Reinforcement 15 days
35	35	-	6.Dewatering excaveted trenches	1 day	Wed 15-01-20	Thu 16-01-20	32		Pump	35 <sup>*</sup> 6.Dewatering excaveted trenches 1 day
36	36	-	7.Providing & fixing C.I. Dapuri steps	0.5 days	Tue 07-01-20	Tue 07-01-20	34		CI Dapuri Steps[1]	36 7.Providing & fixing C.I. Dapuri steps 0.5 days
37	37	-	8. Providing & fixing rose piece	0.5 days	Wed 15-01-20	Wed 15-01-20	32		Rose Pieces	37 <sup>*</sup> 8.Providing & fixing rose piece 0.5 days
38	38	*	9.fixing C.I man hole frame	0.5 days	Wed 15-01-20	Wed 15-01-20	32		CI Manhole	38 9.fixing C.I man hole frame 0.5 days
39	39	-	10. Providing ventilators	0.5 days	Wed 15-01-20	Wed 15-01-20	32		Ventillators	39 10. Providing ventilators 0.5 days
40	40	-	11.Refilling the trenches	1 day	Wed 15-01-20	Thu 16-01-20	32	45,46,	Pokland	40 T1.Refilling the trenches 1 day
41	41	*	Connecting pipes	38 days	Thu 16-01-20	Sun 23-02-20				
42	42	-	1. Providing & supplying ISI mark C.I. S/S pipes	0.5 days	Thu 16-01-20	Thu 16-01-20	40			42 11. Providing & supplying ISI mark C.I. S/S pipes 0.5 days
43	43	-	2. standard CI flanged/S&S specials	0.5 days	Thu 16-01-20	Thu 16-01-20	40			43 2. standard CI flanged/S&S specials 0.5 days
44	44	*	3. Excavation in soft murum	18 days	Thu 16-01-20	Mon 03-02-20				
roject: Nate: Tu		Task Split Milestone	Project Summary     Inactive Task     Inactive Miletone	-1	Manual Task Duration-only Manual Summary Ro	lup			-only C 1-only J nal Tasks	Critical Manual Progress
		Summary	Inactive Nullsone	-	Manual Summary		_		nal Milestone 🗇	Progress

ID		isk Name	Duration	Start	Finish	Prede	Succes	Resource Names	2020 2021 2021 2021 01 01 01 01 01
45	-		18 days			40	48,49	Excavation in soft	45 DExcavation in general soft material and simultaneous lifting up
46	-		18 days			40	48,49		46 10 Lead of 150 M including barricating, guarding, disposing off within 18 days
47	*	4. Excavation in hard murum	8 days						ein .
48	-	<ol> <li>Excavation in hard material using controlled blasting and simultaneous lifting</li> </ol>	8 days			45,46		murum using	48 1) Excavation in hard material using controlled blasting and simulta 8 days
49	-	<li>ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad</li>	8 days			45,46	550	Lead by dumpers	49 to Lead of 150 M including barricating, guarding, disposing off wit 8 days
50	-	5. Providing and casting in situ cement concrete for foundation and bedding	4 days	Tue 11-02-20	Sat 15-02-20	48,49			50 75. Providing and casting in situ cement concrete for foundation a 4 days
51	-	6. Lowering, laying and joining SBR rubber gasket	4 days			50	52	SBR rubber gasgate	51 56. Lowering, laying and joining SBR rubber gasket 4 days
52	-	7. Dewatering the excavated trenches	1 day			51	53	Pump	52 7. Dewatering the excavated trenches 1 day
53	-	8. Refilling the trenches	3 days			52	57,58	Pokland	53 🗱 Refilling the trenches 3 days
54	*	RCC jackwell with O/H pumphouse	179 days						
55	*	Sub-structure	21.5 days						
56	*	1. Excavation in soft murum	17 days						
57	-	<ul> <li>i) Excavation in general soft material and simultaneous lifting up</li> </ul>	17 days			53			57 ): Excavation in general soft material and simultaneous lifting u 17 days
58	-	<li>ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad</li>	7 days			53	60,61	Lead by dumpers	58 Tii) Lead of 150 M including barricating, guarding, disposing off 7 days
59	*	2. Excavation in hard murum	4.5 days						
60	-	<ul> <li>i) Excavation in hard material using controlled blasting and simultaneous lifting</li> </ul>	4.5 days			57,58			60 (7) Excavation in hard material using controlled blasting and s 4.5 days
61	-	<ul> <li>Lead of 150 M including barricating, guarding, disposing off within 0.5km rad</li> </ul>	2 days	Wed 11-03-20	Fri 13-03-20	57,58	363	Lead by dumpers	61 Ki) Lead of 150 M including barricating, guarding, disposing o 2 days
62	*	Super-structure	157.5 days						
63	-	<ol> <li>Providing and laying stones, aggregate for foundation and bedding</li> </ol>	1 day			60,61	165	Cement 53 Grade[1],Coarse Aggregate[1],Crush Sand[1],Casting	63 🔁 Providing and laying stones,aggregate for foundation and 1 day
64	*	4. Providing and casting in situ cement concrete RCC footing M30	6 days						
65	-	i) Centering	1 day			63	66	Labour	65 🐴 Centering 1 day
66	-4	ii) PCC bedding	1 day			65	67	Casting Labour Rate,Coarse	66 tii) PCC bedding 1 day
			D	ration-only	llup		Finist Exter	n-only 🔲	Deadine   Manual Progress  Critical  Critical  Progress  Progress
	45 46 47 48 49 50 51 52 53 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66	Model 45 45 45 45 45 47 47 48 48 49 50 50 50 51 51 52 53 55 55 55 55 55 55 55 55 55 55 55 55	Mod       i) Excavation in general soft material and simultaneous lifting up         45       ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad         47       4. Excavation in hard murum         48       i) Excavation in hard material using controlled blasting and simultaneous lifting         49       ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad         50       5. Providing and casting in situ cement concrete for foundation and bedding         51       6. Lowering, laying and joining SBR rubber gasket         52       7. Dewatering the excavated trenches         53       8. Refilling the trenches         54       RCC jackwell with O/H pumphouse         55       Sub-structure         56       1. Excavation in soft murum         57       i) Excavation in soft material and simultaneous lifting up         58       ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad         59       2. Excavation in hard material using controlled blasting and simultaneous lifting up         60       ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad         61       ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad         62       Super-structure         63       3. Providing and laying stones, aggregate for foun	Mod       i) Excavation in general soft material and simultaneous lifting up       18 days         46       ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad       8 days         47       4. Excavation in hard material using controlled blasting and simultaneous lifting       8 days         48       i) Excavation in hard material using controlled blasting and simultaneous lifting       8 days         50       5. Providing and casting in situ cement concrete for foundation and bedding       4 days         51       6. Lowering, laying and joining SBR rubber gasket       4 days         52       7. Dewatering the excavated trenches       1 day         53       8. Refilling the trenches       3 days         54       RCC jackwell with O/H pumphouse       17 days         55       Sub-structure       21.5 days         56       1. Excavation in soft murum       4.5 days         57       9       1. Excavation in general soft material and simultaneous lifting up       17 days         58       ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad       4.5 days         60       i) Excavation in hard material using controlled blasting and simultaneous lifting up       17 days         61       ii) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad       5.4 days	Model     Image: Constraint of the second state of the secon	Model     JExcavation in general soft material and simultaneous lifting up     JB days     Thu 150:12:0     Mon 03:02:20       46     I) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad     IB days     Thu 160:12:0     03:02:20       47     4. Excavation in hard murum     8 days     Mon 03:02:20     II:02:20       48     I) Excavation in hard material using controlled blasting and simultaneous lifting     8 days     Mon 03:02:20     II:02:20       49     III (Lead of 150 M including barricating, guarding, disposing off within 0.5km rad     8 days     Mon 03:02:20     II:02:20       50     5. Providing and casting in situ cement concrete for foundation and bedring     4 days     Sat 15:02:20     Vec2 11:02:20       51     6. Lowering, laying and joining SBR rubber gasket     4 days     Sat 15:02:20     Vec2 19:02:20       53     8. Refilling the trenches     3 days     Sun 20:02:20     23:02:20       54     RCC jackwell with O/H pumphouse     17 days     Sun 23:02:20     11:03:20       55     Sub-structure     21:5 days     Sun 23:02:20     11:03:20       56     1. Excavation in general soft material and simultaneous lifting up disposing off within 0.5km rad     17 days     Sun 23:02:20     11:03:20       57     9. Excavation in hard material using controlled blasting and simultaneous lifting     15:03:20     11:03	Model         IDExcavation in general soft material and simultaneous lifting up         Is days         Thu 1601.20         Mone 30.02.20         40           46         II) Lead of 150 M including barricating, guarding, disposing off within 0.5km rad         Is days         Thu 1601.20         03.02.20         40           47         A. Excavation in hard murum         8 days         Mone 03.02.20         11.02.20         54.40           48         I) Excavation in hard material using controlled blasting and simultaneous lifting         8 days         Mon 03.02.20         Tuce 03.02.20         11.02.20         54.40           50         S. Providing and casting in situ cement concrete for foundation and bedding         4 days         Sat 15-02.20         48.44           51         G. Lowering, laying and joining SBR rubber gasket         4 days         Sat 15-02.20         Ved 19.02.20         50           52         7. Dewatering the excavated trenches         1 day         Wed 19.02.20         52         20.02.20         51.0           53         8. Berfilling the trenches         3 days         Sun 23.02.20         11.03.20         52           54         RCC jackwell with 0/H pumphouse         17 days         Sun 23.02.20         11.03.20         53           55         Sub-structure         11.03.20         53	Mode         I) Excavation in general soft material and simultaneous lifting up         Is days         Mon 160-120         Mon 03-02-20         A         A           46	Mode         Is aday         Form         Non         Add         A



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			Summary	Inactive Summary		Manual Summary		_		nal Milestone 🛛 🗇		Progress				
roject: C late: Tue			Split Milestone	Inactive Task		Duration-only Manual Summary Ro	llup		Finis	,		Critical Critical Split		-		
			Task	Project Summary		Manual Task			Start	-only C		Deadline	•	Manual Progress		
87	8	17	-	<ol> <li>Plastering- Mixing of material and applying on surface.</li> </ol>	4 days	Thu 06-08-20	Sun 09-08-20	86	88	Bricks (15cm thk.)[1],Labour Rate for Brick masonry				87 🏋 13. Plasterir 4 days	ig- Mixing of	material an
	8	6		ii) Constructing Wall	6 days	Fri 31-07-20	Wed 05-08-20	78	87	Bricks (15cm thk.)[1],Labour Rate for Brick masonry				6 days		
85			-		1 day		20-08-20	83	07	D.1.1. (45				85 1) Providir 1 day 86 1ii) Constructi		
84			*		20.5 days	Fri 31-07-20	20-08-20									
83	8	13	-	11. Providing and fixing rolling shutter	0.5 days	Wed		93	85	Rolling Shutter[1]				83 11. Provid 0.5 days	ling and fixin	ıg rolling sh
82	8	12	-	10. Providing and fixing Steel window C.R.C sheet	0.5 days	Wed 19-08-20	Wed 19-08-20	93		Steel window[1]			0.5 4	82 10. Provid	ling and fixin	ig Steel win
81	8	1	-	9. Providing and fixing G.I. pipe railing	0.5 days	Fri 19-06-20	Fri 19-06-20	73		GI Pipe rayling				9. Providing and fixi	ng G.I. pipe i	railing
80	8	0	-	8. Providing and fixing M.S. ladder	0.5 days	Fri 19-06-20	Fri 19-06-20	73	79	MS Ladder[1]				8. Providing and fixi	ng M.S. ladd	er
79	7	9	-	7. Dewatering in excavated trenches	1 day	Fri 19-06-20		80		Pump			79 1 da	7. Dewatering in exc	avated trend	hes
78	7	8	-	iii) Casting concrete	12 days	Sun	Thu 30-07-20	77	86	Coarse Aggregate[1],Crushe				2 days 78 🎽 ii) Casting con 12 days	crete	
77	7	7	-	ii) Shuttering	12 days	Tue 07-07-20	Sat 18-07-20	76	78	Shuttering Labour Rate			77	\min) Shuttering		
76	7	6	4	situ cement concrete RCC Column M300	18 days	Fri 19-06-20		73	77	Steel[1],Steel Labour Rate			76	)Reinforcing		
75	7	5	*	6. Providing and casting in situ cement concrete RCC Beams and lintels M30 and Providing and casting in	42 days	23-03-20 Fri 19-06-20	23-03-20 Thu 30-07-20					10	day?	-		
74	7	4	-		1 day?	Mon	18-06-20 Mon			Aggregate[1],Cemei		74				
73	7	3	-	iii) Casting concrete	22 days	Thu		71	76,80	Rate Coarse		2		Casting concrete		
72	7	2	-	ii) Shuttering	22 days	Mon		69	71	Labour Rate Shuttering Labour			44 days Tii) Shuttering			
71	7	'1	-	vertical wall & slab & landing M30 i)Reinforcing	44 days	Tue		72	73	Steel[1],Steel			71 i)Reinforcir	ig.		
70	7	0	*	5. Providing and casting in situ cement concrete RCC	88 days	Mon	22-03-20 Thu			Aggregate[1],Cemei		1	day			
69	e	9	-	v) Casting concrete	1 day	Sun	Sun	68	72	Rate Coarse			day v) Casting conc	rete		
68	e	8	-	iv) Shuttering	1 day	19-03-20 Sat 21-03-20	Sat 21-03-20	67	69	Labour Rate Shuttering Labour		2 d 68	lays iv) Shuttering			
67	e		Mod	iii)Reinforcing	2 days	Thu	Fri 20-03-20	66	68	Steel[1],Steel	Q4	67	Q2 Tiii)Reinforcing	Q3	Q4	Q1

0	ID		od Name		Duration	Start	Finish	Prede	Succes	s Resource Names	04	2020 Q1	02	2021
88	88		14. Waterprod	of treatment- Lifting BB at required viding waterproof treatment of BB coba	2 days		Tue 11-08-20	87	89,96	Water Proofing[1]	Q4	01	02	88 14. Waterproof treatment- Lifting BE 2 days
89	89	-	15. Applying o coats of oil bo	f distemper- Scaffolding and applying 2 und distemper	4 days	Wed 12-08-20	Sat 15-08-20	88	91	Distemper[1]				89 15. Applying of distemper- Scaffold 4 days
90	90	*		ning and preparing surface and	3 days		Tue 18-08-20							
91	91	-	i) Cleaning a	ind Prepairing surface	1 day		Sun 16-08-20	89	92					91 (i) Cleaning and Prepairing surface 1 day
92	92	-	ii)Applying	wo coats waterproof cement	1 day		Mon 17-08-20	91	93	cement waterproofing[1]				92 ii)Applying two coats waterproof c
93	93	-	iii)Watering		1 day		Tue 18-08-20	92	82,83,	1				93 Tiii)Watering 1 day
94	94		providing and	xcavation for earthing pit and fixing copper wire with copper plate g and fixing conductors	1 day		Wed 19-08-20	93	95					94 717. Earthing- Excavation for earthin 1 day
95	95	-	18. Providing	nild steel sluice gate	0.5 days		Thu 20-08-20	94		Slice gate				95 T18. Providing mild steel sluice gate 0.5 days
96	96		19. Providing	and laying cement concrete flooring.	1 day		Wed 12-08-20	88	100,1	Coarse Aggregate[1],Crus Sand[1],Cement 5				96 19. Providing and laying cement cor 1 day
97	97	*	Inspection well		46 days		Sun 27-09-20							
98	98	*	Sub-structure		46 days		Sun 27-09-20							
99	99	*	1. Excavation	in soft material	4 days		Sun 16-08-20							8
100	100		i) Excavatio simultaneo	n in general soft material and us lifting up	4 days		Sun 16-08-20	96	103,1	Excavation in soft soil using pokland				100 (i) Excavation in general soft materia 4 days
101	101	-		50 M including barricating, guarding, if within 0.5km rad	2 days	Thu 13-08-20	Fri 14-08-20	96	103,1	Lead by dumpers				101 i) Lead of 150 M including barricati 2 days
102	102	* *	2. Excavation	in hard material	1 day		Mon 17-08-20							1
103	103			n in hard material using controlled I simultaneous lifting	1 day		Mon 17-08-20	100,:	1	Excavation in hard murum using pokland[1]				103 Ti) Excavation in hard material using 1 day
104	104	-		50 M including barricating, guarding, If within 0.5km rad	1 day		Mon 17-08-20	100,:	1 105,1	Lead by dumpers				104 Tii) Lead of 150 M including barricat
105	105			of excavated trenches including ater to safe site	2 days		Wed 19-08-20	104	108,1	Pump				105 3. Dewatering of excavated trench 2 days
106	106	5		nd laying stones or hard material like tc. for foundation, bedding etc.	1 day		Tue 18-08-20	104						106 4. Providing and laying stones or h
107	107	-	5.providing an on site	d laying steel, cement, aggregates etc.	1 day		Thu 20-08-20	105						107 5.providing and laying steel, cemer 1 day
108	108	-	6. Centering a	nd start of pcc	1 day		Thu 20-08-20	105	109,1	1 Labour				108 6. Centering and start of pcc 1 day
109	109	•	7. Reniforcem	ent of foundation	2 days	Fri 21-08-20	Sat 22-08-20	108	110	Steel[1],Steel Labour Rate				109 7. Reniforcement of foundation 2 days
roject: C	PM_W		ask plit	Project Summary I Inactive Task	1	Manual Task Duration-only			Start Finis	-only C h-only J		Deadline Critical	*	Manual Progress
ate: Tue	17-12	1.	dilestone 🔶	Inactive Milestone		Manual Summary Rol	lup			nal Tasks		Critical Split		
		S	iummary I	Inactive Summary	-	Manual Summary			Exter	nal Milestone 🛛 🗇		Progress		



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	ID		ask Task Name Aod		Durati	on Start	Finish	Prede	Succes	s Resource Names	04	2020	02	Q3 Q4 Q1
110	110			tetring for foundation	1 day	Sun 23-08-20	Sun 23-08-20	109	111	Shuttering Labour Rate	Q4		Q2	110 8. Shuttetring for foundation
111	111		9. Conc	reting and curing	1 day		Mon 24-08-20	110	112,1	1Coarse Aggregate[1],Cemei				111 9. Concreting and curing
112	112	2	reinford	cement of vertical walls	16 da	ys Tue 25-08-20	Wed 09-09-20	111	113	Steel[1],Steel Labour Rate				112 Treinforcement of vertical walls 16 days
113	113	3	4 12. Shu	ttering for wall and slabs.	8 day	s Thu 10-09-20	Thu 17-09-20	112	114	Shuttering Labour Rate				113 212. Shuttering for wall and sla 8 days
114	114	1	concret	ing and curing of vertical walls	8 day	s Fri 18-09-20	Fri 25-09-20	113	118	Coarse Aggregate[1],Cemei				114 concreting and curing of vert 8 days
115	115	5	- 14. Pro	viding and fixing CI Dapuri steps	1 day	Tue 25-08-20	Tue 25-08-20	111		CI Dapuri Steps[1]				115 *14. Providing and fixing CI Dapu 1 day
116	116	5	-\$ 15 App	ying 3 coats of anticorrosive paints	1 day	Fri 21-08-20	Fri 21-08-20	108		Anti-corrosive paints[1]				116 T15 Applying 3 coats of anticorrosi 1 day
117	117	7	inverte	Nying 2 coats of anticorrosive paints of d J type cowel type ventilators with n of aluminium paint.		Sun 27-09-20	Sun 27-09-20	118		J type cowel type of ventilator				117 16. Applying 2 coats of anti 1 day
118	118	3	5 17. Fixi	ng of cowel type ventilators	1 day	Sat 26-09-20	Sat 26-09-20	114	117,1	2				118 17. Fixing of cowel type ver 1 day
119	119	,	Approach br	idge for jackwell	68 da	ys Sun 27-09-20	Thu 03-12-20							
120	120	) ,	Sub-struc	ture	12 da	ys Sun 27-09-20	Thu 08-10-20							•
121	121	1	1. Provi foundation	iding and laying granite, other materi tion	al for 1 day	Sun 27-09-20	Sun 27-09-20	118	122					121 1. Providing and laying gra 1 day
122	122	2	<ul> <li>2. Fixin foundation</li> </ul>	g and centering positions of piles for tion.	pile 1 day	Mon 28-09-20	Mon 28-09-20	121	123	Labour				122 2. Fixing and centering po 1 day
123	123	3	- 3. Boar	ing of piles	5 day	s Tue 29-09-20	Sat 03-10-20	122	124	Boaring of piles[1]				123 🐴 Boaring of piles 5 days
124	124	1	4. Insta	llation of piles	5 day	s Sun 04-10-20	Thu 08-10-20	123	126	Laying of precast piles				124 🚺 Installation of piles 5 days
125	125	5 7	Super-structure	ucture	56 da	ys Fri 09-10-20	Thu 03-12-20							
126	126	5	Shutter	ing for Pile cap	3 day	s Fri 09-10-20	Sun 11-10-20	124	127	Shuttering Labour Rate				126 Shuttering for Pile cap 3 days
127	127	7	Laying	MS bars (reinforcemennt) for Pile ca	p 3 day	s Mon 12-10-20	Wed 14-10-20	126	128	Steel[1],Steel Labour Rate				127 Laying MS bars (reinford 3 days
128	128			ating of Pile cap and curing	5 day	15-10-20	Mon 19-10-20		129	Casting Labour Rate,Coarse				128 Concreating of Pile cap a 5 days
129	129	•	column		For 5 day	20-10-20	Sat 24-10-20			Steel[1],Steel Labour Rate				129 👗 Centering and laying N 5 days
130	130		•	ing of columns	5 day	25-10-20	Thu 29-10-20		131	Shuttering Labour Rate				130 Shuttering of columns 5 days
131	131			ating of columns and curing	5 day		03-11-20		132	Coarse Aggregate[1],Cemei				131 Concreating of colum 5 days
132	132			tering of column formwork.	1 day	04-11-20	Wed 04-11-20		133	Shuttering Labour Rate				132 Deshuttering of colu 1 day
133	133	3	4 Shutter	ing for slab and beam	10 da	ys Thu 05-11-20	Sat 14-11-20	132	134	Shuttering Labour Rate				133 Shuttering for slab a 10 days
roject: C ate: Tue		D	Task Split Milestone	Project Summary Inactive Task Inactive Milestone	¢	Manual Task     Duration-only     Manual Summary Re	ollup		Finis Exte	t-only E h-only J mal Tasks		Deadline Critical Critical Split	•	Manual Progress
			Summary	Inactive Summary	1	1 Manual Summary	-		1 Exte	rnal Milestone 🛛 🗇		Progress		

>	0	ID		Fask Name	Duration	Start	Finish	Prede	Succes	s Resource Names		2020				2021
	U		Mode								Q4	Q1	Q2	Q3	Q4	Q1
134		134	-	Installation of steel for slabs and beam	15 days	Sun 15-11-20	Sun 29-11-20	133	135	Steel[1],Steel Labour Rate					134 1n 15 da	stallation of steel fo ys
135		135	-4	Concreting of slab and beam and curing	1 day	Mon 30-11-20	Mon 30-11-20	134	136	Coarse Aggregate[1],Crushe					135 1 d	Concreting of slab ay
136		136	-	Deshuttering of slab and column.	1 day	Tue 01-12-20	Tue 01-12-20	135	137	Shuttering Labour Rate					1 d	
137		137	4	Providing and fixing GI pipe railing and painting anticorrosive paint.	2 days	Wed 02-12-20	Thu 03-12-20	136	138	GI pipe railing[1],Anti-corro paints[1]					2 d	·
138		138	-	Handover/Close down	1 day?	Fri 04-12-20	Fri 04-12-20	137								*Handover/Close d ay?

	Task	_			Manual Task	-		C	Deadline	*		
Designati CDM 14/D			Project Summary		Duration-only		Finish-only	3	Critical		Manual Progress	
Project: CPM_WD Date: Tue 17-12-	Milestone	•	Inactive Task Inactive Milestone	*	Manual Summary Rollup		External Tasks	-	Critical Split			
	Summary		Inactive Summary		Manual Summary Roliup		External Milestone	\$	Progress			
	Junning		macave summary		mandar summary		External milestone	~	rigies			
						Page 7						



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#### VI. SAFETY MANAGEMENT PLAN

### A. Introduction

- 1) Management Commitment: Safety and health issues will be addressed on site by continuous evaluation of contractor/subcontractor work methods, equipment and work areas.
- 2) Contractor Employee Involvement: All contractor employees are expected to perform their duties safely and comply with all applicable laws and regulations (local, state and federal). Employees are encouraged to freely discuss their safety concerns with their immediate. All employees are charged with personal responsibility for safe behavior. Unsafe acts will not be tolerated.
- 3) Training Safety: Training is an integral part of safety program. Contractors are expected to educate their employees on the basic elements of this manual as well as other applicable regulatory requirements.
- 4) Injury Management/Early Return-to-Work: All contractors/subcontractors are expected to return any injured employee to a productive environment as soon as possible after an injury. Contractors must evaluate each lost-time injury and review the restrictions placed on each injured employee by his/her medical provider. If modified work can be found within the assigned restrictions on site, contractors/subcontractors must provide employment within those restrictions. The University of Rhode Island's Claims Representatives will work closely with each injured employee's treating physician and rehabilitation specialist, which in return will enable a program of this nature to be successful.
- B. Safety Orientation
- 1) General Requirements: All contractors shall ensure that their employees receive safety orientation prior to starting work on this project. Each contractor shall maintain, and make available for inspection, records of such safety orientation and training. The orientation shall consist of the written format specified on the attachment on the next page in addition to any job specific information. All contractors shall ensure that each employee receives a copy of this orientation and signs the acknowledgement page at the end.
- Contractors/Subcontrctors shall Ensure That 2)
- a)The coordination of all proposed procedures and implementation plans within their assigned work areas.
- All implementation requirements are fulfilled and documented. *b*)
- Availability of their manual to their employees and subcontractors. c)
- d) All affected employees are trained on new/revised policies, practices and procedures.
- Tracking the implementation of each procedure or policy. e)

#### С. Construction Safety Checklist

City/Address	
Observer	
Date Observed	
Checklist Completed: Check $\square$ boxes that apply	Instructions:
$\Box$ Offsite before or after work	Yes = Observed and in compliance
□ Onsite	No = Observed and not incompliance
Every section of the audit should have a check $\square$	

ction of the audit should have a check i

#### D. Subcontractor Site Safety Representative:

Provide the name(s) of those person(s) onsite who are capable of identifying existing and predictable hazards in the surrounding or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them. The subcontractor shall ensure that the Site Safety Representative(s) listed have been appropriately trained as applicable:

Site Safety Representative:	
Site Safety Representative:	



### E. CAL/OSHA Competent & Qualified Person(s):

Provide the name(s) of those persons onsite who by possession of a recognized degree, certification, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems relating to the subject matter, the work, or the project. The subcontractor shall ensure that each qualified and competent person listed has been trained in the following areas as applicable:

Asbestos Competent Person:	
Lead Competent Person:	
Crane Competent Person:	
Confined Space Entry Supervisor:	
Demolition Competent Person:	
Electrical LOTO Qualified Person(s):	
Energized Electrical Qualified Electrical Worker(s):	
Excavation & Trenching Competent Person:	
Fall Protection Competent Person:	
Fall Protection Qualified Person:	
Ladder Competent Person:	

Perso	onal Protection Equipment – PPE	Yes	No
1	Head Protection		
	Supplied by employer		
	Worn when required		
2	Boots	by employer en required en req	
	Supplied by employer		
	Worn when required		
3	Hearing Protection		
	Supplied by employer		
	Worn when required		
4	Eye Protection		
	Supplied by employer		
	Worn when required		
5	Respiratory Protection		
	Supplied by employer		
	Worn when required		
	Training Provided		

Ladde	rs
1	Correct size for the job
2	Firm foundation for ladder feet
3	Proper climbing procedures
4	Three-point contact rule followed
5	Free from obvious defects
6	Workers stand below top



Scaffol	ds	
1	Fall protection used if over 10 feet tall	
2	Set up on level, stable footing	
3	Platform is appropriate width for type of scaffold	

Fall Pro	otection	
1	Fall protection provided for heights 6 ft. or more	
2	Harness is worn properly and attached to secure anchorage	
3	Slide guards are installed across full width and all sides	

Fire I	Protection	
1	Has a fire protection program been developed?	
2	Is firefighting equipment conspicuously located?	
3	Is firefighting equipment periodically inspected and maintained in operating condition?	
4	Has an educational program to familiarize employers with the general principles of fire extinguishers use and the hazards involved been provided?	
5	Will work include the use of open flames such as torches, welders, grinders, tar pots or any other tool or process/procedure that could cause sparks or open flames?	
6	Is at least one portable fire extinguisher with a rating of not less than 20- B:C located within 75 feet of each pump, dispenser, underground fill pipe opening and lubrication or refueling service area?	

Signs,	Signals and Barricades	
1	Are accident prevention signs and tags visible at all times when work is being performed and/or removed or covered promptly when the hazard no longer exists?	
2	Is signaling by flaggers?	
3	Are barricades used for protection of workers?	

Stocki	Stocking and Handling of Materials		
1	Are materials which are stored in tiers either stacked, racked, blocked,		
	interlocked, or otherwise secured to prevent sliding, falling, or collapse?		
2	Are materials stored more than 6 feet from any hoist way or inside floor		
	opening and more than 10 feet from any exterior walls that do not extend		
	above the top of the stored materials?		
3	Are waste materials disposed of properly?		

Hand and Power Tools			
1	Will the work involve the use of electrically powered tools?		
2	Will the work involve the use of pneumatically powered tools?		
3	Will the work performed on this project involve the use of powder-actuated tools?		



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Hand and Power Tools

Hand a	Hand and Power Tools		
1	Will the work involve the use of electrically powered tools?		
2	Will the work involve the use of pneumatically powered tools?		
3	Will the work performed on this project involve the use of powder-actuated tools?		

Weldin	g and Cutting
1	Are frames of all arc welding and cutting machines grounded?
2	Are employees instructed in the safe means of arc welding and cutting?
3	Will the work involve welding/cutting stainless steel?
4	Subcontractor will submit the following items for welding or hot cutting on
	non-lead containing surfaces (new steel construction):
	- Respiratory Protection Program
	- Qualitatively fit tested 1/2 mask negative pressure respirator with fit test
	records
	- Medical approval to wear respirators
	- Respiratory protection training records
5	Subcontractor will submit the following items for welding or hot cutting on
	lead containing surfaces (where lead paint exists or has been abated):
	- Respiratory Protection Program
	- Quantitatively fit tested full face-piece Powered Air Purifying
	Respirator (PAPR) and fit test records
	- Medical approval to wear respirators
	- Blood lead baseline sample results (excluding employee SSNs)
	- Documentation that workers have received lead awareness training.
	- Respiratory protection training records
6	Subcontractor will submit the following items for welding or hot cutting on
	stainless steel:
	- Respiratory Protection Program
	- Quantitatively fit tested, full face-piece negative pressure respirator and
	fit test records.
	- Medical approval to wear respirators
	- Documentation of hexavalent chromium training.
	- Respiratory protection training records

Electri	Electrical Protection		
1	Does the employer examine all electrical equipment to ensure that recognized electrical hazards		
2	Is sufficient working space provided to permit safe operation and maintenance of electrical equipment?		
3	Do all pull boxes, junction boxes, and fittings have covers?		
4	Are all cabinets, cut out boxes, fittings, boxes, panel board enclosures, switches, circuit breakers, and switchboards located wet or damp locations enclosed in weather proof enclosures.		
5	Is all electrical equipment used in hazardous locations either approved for the location or intrinsically safe?		



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### Excavation and Trenching

Lineara	cavation and Trenening		
1	Will this work scope involve any excavation up to 5 feet deep?		
2	Will this work scope involve any excavation deeper than 5 feet?		
3	Will this work scope involve sanitary sewer line repair or replacement?		
4	Will this work scope involve storm sewer line repair or replacement?		
5	Subcontractor will submit the following items for Excavation and         Trenching:         - JHA detailing Shoring Plan         - Training Records		

Concre	Concrete Construction		
1	Is all protruding reinforcing steel, onto or into which employees could fall,		
	guarded to eliminate the hazard of impalement?		
2	Is all form work for cast-in-place concrete designed, fabricated, erected,		
	supported, braced, and maintained so that it will support without failure all		
	loads that may be anticipated?		
3	Is erected shoring equipssment inspected immediately prior to, during and		
	immediately after concrete placement?		

Steel I	Erection and Assembly	
1	Is steel erection part of this work scope?	
2	Subcontractor will submit the following items for Steel Erection and Assembly:	
	<ul> <li>Site-Specific Erection plan</li> <li>Fall protection work plan (per ANSI/ASSE Z359)</li> </ul>	
3	Has the controlling contractor provided in writing to the steel erector that the concrete has cured properly before steel erection begins and any repairs, replacements and modifications were conducted?	

Cofferdams			
1	At cofferdams, are warning signals for evacuation of employees in case of emergency developed and posted?		

Blastin	Blasting and Use of Explosives		
1	Are only authorized and qualified persons permitted to handle explosives?		
2	Is every vehicle or conveyance used for transporting explosives marked on both sides, front, and rear with placards reading "EXPLOSIVES" in red letters not less than 4 inches high on white background?		
3	Are explosives and related materials stored in approved facilities?		



## Heavy Equipment Identify heavy equipment that will be used on this project below: 1 Backhoe 2 Transit Mixer 3 Earth Compactor 4 Hyva Tipper 5 Mucking Machine JCB 6 7 Other

### VII. RISK MANAGEMENT PLAN

- A. Constructional Requirement
- 1) Changes in the work
- 2) Late drawings and instructions
- 3) Availability of resources
- 4) Accidents (such as collision, fire and so on)
- 5) Damage to persons or property
- 6) Defective design
- 7) Actual quantities of work
- 8) Equipment commissioning
- B. Financial and Economic
- 1) Inflation
- 2) Funding
- C. Performance
- 1) Productivity of labour
- 2) Productivity of equipment
- 3) Suitability of materials
- 4) Defective work
- 5) Labour disputes
- D. Contractual And Legal
- 1) Delayed dispute resolution
- 2) Delayed payment on contracts and extras
- *3)* Change order negotiation



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- E. Technical Risks
- 1) Design process
- 2) Owner involvement in design
- 3) Inadequate and incomplete design
- 4) Errors in completion of structural / geotechnical / foundation
- F. Construction Risks
- *1)* Work permissions
- 2) Delayed deliveries and disruptions
- 3) Worker and site safety
- 4) Unsuitable equipment and materials
- 5) Environmental risks (such as projects close to a river, floodplain, coastal zone, high habitat sensitivity, and so on)
- G. External Risks
- 1) Political factors change (political interference)
- 2) Political climate
- 3) Economic instability
- 4) Market condition
- H. Organizational Risks
- *1)* Inexperienced staff assigned
- 2) Losing critical staff at crucial points of the project
- 3) Insufficient time to plan
- 4) Priorities change on existing program
- I. Project Management Risks
- 1) Project purpose definition, needs, objectives, costs, deliverables are poorly defined or understood
- 2) No control over staff priorities
- 3) Too many projects
- *4)* Consultant or contractor delays
- 5) Estimating and/or scheduling errors
- 6) Communication breakdown with project team
- 7) Lack of coordination / communication
- 8) Inexperienced workforce / inadequate staff / resource availability
- J. Accidental Risks
- 1) Unanticipated damage during construction is a
- 2) Any type of accidents on construction site like machineries accidents, overexertion, accidental falls etc. can be disastrous for the project.
- K. Uncertain market condition
- 1) Price inflation
- 2) As this risk is usually unavoidable, clients should choose an appropriate type of contract; while contractor should always avoid using fixed price contracts to bear the risk.
- L. Time/Funds
- 1) Time and cost are always closely correlated, a lengthy schedule will undoubtedly wreck the project cost benefit.
- 2) Correlation between time and cost is a quantitative risk
- M. Utilities
- 1) Shortage of these utilities would create problems on site.



### VIII. QUALITY ASSURANCE OF MATERIALS

### A. Cement(OPC-43 GRADE) IS:8112-1989

Test	Frequency	Ref Codes	Acceptance/Standard
1) Chemical Tests	Once for every source	As per IS:	i)5.0 % max
(i) Loss on ignition, percent by mass	approval	4032-1985	ii)6.0 max
(ii) Magnesia (Mgo), percent by mass	Once for every lot		iii)3.0 % max
(iii) Sulphuric anhydride (So3) Percent	Once for every 3 months		iv)x + 4.0(100-x)/100
by mass			where x is the declared % of
(iv)Insoluble material, percent by mass			flyash in the given Portland
			pozzolona cement

2.) Physical Tests	Once for every source	i) Min.30 min.
(a) Setting Time	approval	ii) Max.600 min.
	Once for every lot	10mm (max.)
(i) Initial		0.8% (max) by Autoclave method
(ii) Final		
(b) Soundness (Le-Chatelier Expansion)		
	Once for every 3 months	Not less than 16 MPa strength
(c) Compressive Strength		Not less than 22 MPa strength
		Not less than 33 MPa strength
(i) At 72±1 hr		Specific surface shall not be less
(ii) At 168±2 hrs		than 300 M2/kg
(iii) At 672±4 hr		Not be more than 0.15%
(d)Fineness		
(e) Drying shrinkage		

### B. Cement (OPC-43 GRADE) IS : 8112-1989

Test	Frequency	Ref Codes	Acceptance/Standard
1.Chemical Tests	Once for every source	As per IS:	0.05 % max
Chlorides (as Cl)	approval	4032:1985	0.66 % min
Ratio of Alumina to that of Iron Oxide	Once for every lot	As per IS :	6.0 % max
Magnesium (MgO)	Once for every 3 months	4031-1988	3.0 % max
Total Sulphur content (SO3)	Once for every source		5.0 % max
Loss on Ignition	approval		2.ss0 % max
Insoluble residue	Once for every lot		0.66- 1.02
Lime saturation factor	Once for every 3 months		Not less than 30 min.
2. Physical Tests			Not less than 600 min
(a) Setting Time			10mm (max.)
(i) Initial			and 0.8% (max)by Auto clave
(ii) Final			method
(b)Soundness (Le-Chatelier Expansion)			Not less than 23 MPa strength
(c)Compressive Strength			Not less than 33 MPa strength
(i) At 72±1 hr			Not less than 43 MPa strength
(ii) At 168±2 hrs			
(iii)At 672±4 hr			
(d)Fineness (Blain's air permeability	225 M2/kg Minimum		
method)	Residue not to exceed 10 %		
By sieving on 90µ sieve			



- C. Aggregates
- *1)* Test for Fine Aggregate

Test	Frequency	Ref. of Codes	Acceptance/Standard				
	Once for every	IS: 383-1970	Fine aggregates should be grading for as given below				
1. Particle	source approval	IS: 2386 (Part I) -	IS Sieve	Percent by	weight pa	ssing for	
Sizes	Once in a month	1963	Designat				
(a) Sieve		IS: 1542-1992	ion				
Analysis		IS: 2116-1980		Zone I	Zone	Plaster(I	Masonry
				(High	II(Stan	S:1542)	(IS:2116)
				Strength	dard		
				conc.)	conc.)		
			10mm	100	100	100	
			4.75mm	90-100	90-100	95-100	100
			2.36mm	60-95	75-100	95-100	90-100
			1.18mm	30-70	55-90	90-100	70-100
			600µm	15-34	35-59	80-100	40-100
			300µm	5-20	5-20	20-65	5-70
			150µm	0-10	0-10	0-15	0-15

### 2) Silt Test

Not more than 8% by weight in natural sand.

Not more than 10% by weight in case of crushed stone sand.

a) Organic Impurities

A colorless liquid indicates a clean sand free from organic matter.

A straw colored solution indicates some organic matter but not enough to be seriously objectionable.

Darker color means that the sand contains injurious amounts and should not be used unless it is washed, and a retest shows that it is satisfactory.

b) Bulkage of Sand

Test	Frequency	Ref. of Codes	Acceptance/Standard	cceptance/Standard		
1.Deleterious Materials	Once for every source approval	IS: 383-1970 IS: 2386 (Part II) – 1963	DeleteriousMaterial	Percent by weight(Max.)		
	Once in a month		Coal and lignite	1		
			Clay and Lumps	1		
			Material finer than 7 micron IS sieve	3		
			Soft Fragment	-		
			Shale	1		
			Total % of all.	5		
2.Silt Content	Once for every source approval Once daily		Maximum 8% or as spec	cified in Agreement		
3.Specific Gravity and	Once for every source	IS: 383-1970	Test is required for maintain	ning uniformity of material		
Density	approval Once every 3 months	IS: 2386 (Part III) – 1963	brought from the source			
4.Water Absorption	Once for every source	IS: 383-1970	Test required for adjusting the	he water content in the mix		
	approval Once Daily	IS: 2386 (Part III) – 1963	design before starting any concrete mixing			
5.Soundness	Once for every source	IS: 383-1970	Maximum average loss of w			
	approval Once every 3 months	IS: 2386 (Part V) – 1963	<ul><li>(i) Tested with Sodium Sulphate - 10%</li><li>(ii) Tested with Magnesium Sulphate - 15%</li></ul>			



- 3) Test for Coarse Aggregate (Stone Grit)
- a) Sieve Analysis & Fineness Modulus Test

Test	Frequency	Ref. of Codes	Acceptance/Standard
Particle Size (a) Sieve Analysis	Once for every source approval Once in a week	IS: 383-1970 IS: 2386 (Part I) – 1963	According to IS code
(b)Flakiness Index and Elongation Index		IS: 2386(I) – 1963	35% Maximum value of combined Elongation and Flakiness Index
2. Deleterious Materials (crushed aggregate)	Once for every source approval At every change of source	IS: 383-1970 IS:2386(II) – 1963	
3. Specific Gravity and Density	Once for every source approval Once in a fortnight	IS: 383-1970 IS: 2386 (Part III) – 1963	Test is required for maintaining uniformity of material brought from the source
<ul> <li>4. Mechanical properties</li> <li>(a) Aggregate</li> <li>Crushing Value</li> <li>(b) Impact Value</li> </ul>	Once for every source approval	IS: 383-1970 IS: 2386 (Part IV) – 1963	<ul><li>45% maximum by Weight</li><li>45% maximum by Weight</li><li>Not less than 5 tonnes</li><li>50% maximum by Weight</li></ul>
<ul><li>(c) 10 percent Fines</li><li>(d) Abrasion Value</li></ul>	Once for every source approval		
5. Soundness	Once for every source approval	IS: 383-1970 IS: 2386 (Part V) – 1963	Maximum Average Loss of weight after 5 cycles (i) Tested with Sodium Sulphate - 12% (ii) Tested with Magnesium Sulphate - 18%
6. Surface Moisture content	Once for every source approval At every change of mix design	IS: 383-1970 IS: 2386 (Part III) – 1963	Test required adjusting the water content in the mix design before starting any concrete mixing.
7. Alkali Reactivity	Once for every source approval	IS: 383-1970 IS: 2386 (Part VII) – 1963	Innocuous Aggregate



- D. Concrete
- 1) Slump Test

Sl. No.	Placing Conditions	Ref. codes	Degree of workability	Slump in mm
1	Blinding concrete; Shallow sections; Pavement using pavers	IS: 456 - 2000 IS : 1199 - 1959	Very low	< 25
2	Mass concrete; Lightly reinforced sections in slabs, beams, walls, columns; Floors; Hand placed pavements; Canal lining; Strp footings		Low	25 - 75
3	Heavily reinforced sections in slabs, beams, walls, columns; Slip form work; Pumped concrete		Medium	50 – 100 75 – 100
4	Trench fill;		High	100 - 150
5	In-situ piling Tremie concrete		Very high	> 150

### 2) Compressive Test

Group	Grade Designation	Compressive strength on 15 cm cubes for work test In N/mm2				
		Min at 7 days	Min at 28 days			
Ordinary Concrete	M 10	7.0	10			
	M 15	10.0	15			
	M 20	13.5	20			
Ston dand Can anota		17.0	25			
Standard Concrete	M 25 M 30		25 30			
	M 30 M 35	20.0 23.5	35			
	M 33 M 40	23.3	40			
	M 40 M 50	27.0	50			
	M 50 M 55		55			
High strength Concrete	M 60		60			
0 0	M 65		65			
	M 70		70			
	M 75		75			
	M 80					



- E. Steel
- 1) Test of Steel For Reinforcement IS: 1786-2008

Test	Frequency	Ref Codes	Acceptance/Standard
1. Chemical Tests	Once for every	IS : 228 (1-24)-	0.30 Max.
Carbon	source approval	1987	0.06 Max.
Sulphur	Once for every lot	IS: 1786: -1985	0.06 Max.
Phosphorus	Once every 3	IS: 1608-2005	0.11 Max.
-(Sulphur+ Phosphorus)	months	IS :1599-1985	10% more than the actual 0.2%
2. Physical Test	Once for every	IS :1786-2008	proof stress but not less 485
Ultimate tensile strength	source approval		MPa
0.2% proof stress	Once for every lot		Min 415 MPa
% Elongation	Once every 3		Min 14.5 %
Bend Test	months		To be satisfactory
Re-bend Test			To be satisfactory
Mass per meter run (kg)			6.31 ±3% for 32 mm Dia,
			$4.830 \pm 3\%$ for 28 mm dia.,
			$3.85 \pm 3\%$ for 25 mm dia.,
			$2.470 \pm 3\%$ for 20 mm Dia,
			$1.580\pm5\%$ for 16 mm Dia,
			$0.888 \pm 5\%$ for 12 mm Dia,
			$0.617 \pm 7\%$ for 10mm dia,
			$0.395 \pm 7\%$ for 8mm dia,
			$0.222 \pm 7\%$ for 6 mm dia.

### F. Mild Steel (Structural)

Test	Frequency	Ref Codes	Acceptance/Standard								
1.Chemi cal	Once for every source	IS:2062-2006	Grad e	Designati on	C	Mn	S	Р	Si	Carbon e value max.	qual
Composit ions	Once in a	Once in a	А	Fe410 WA	0.23	1.5	0.05	0.0 5	0.0 4	0.420.41	
	project for each source		В	Fe410 WB	0.22	1.5	0.046	0.0 45	0.0 4	0.39	
			С	Fe410 WC	0.20	1.5	0.040	0.0 4	0.0 4		

#### Tensile strength of structural steel

Sl. No.	Test	Standards
1	Yield strength	250 MPa
2	Ultimate strength	400 MPa
3	Density	7.8 g/cm3



G. Water For Construction Purposes

Test	Frequency	Ref. Codes	Acceptance/Standard
	Once for every source	IRC: 21-2000	
1. Chemical Analysis	approval	IS: 3025 (Part 32) - 1987	a) Minimum 6
	Every Quarterly		
(a) PH value	Chemical tests daily in		b) 2000mg/L for concrete not
(b) Chlorides (as Cl)	the site		containing embedded steel and
	Laboratory with testing		500mg/L for RCC and PSC
	kits		
(c) Sulphates (as SO3)		IS: 3025 (Part 28)	
(d) Neutralization with		-1987	c) 400mg/L
NaoH (with		IS: 3025 (Part 22)	
phenolphthalein as		-1987	d) Max. 5 ml of 0.2 normal
indicator)			
			NaOH to neutralize 100 ml.
			sample of water
2. Physical Analysis	Once for every source	IS: 3025 (Part 23)	
	approval	- 1987	a) 2000 mg/ l max.
(a) Suspended Matter	Every Quarterly	IS: 3025 (Part 17)	
(b) Organic Matter		IS: 3025 (Part 18)	b) 200 mg/ 1 max.
(c) Inorganic Matter		IS: 3025 (Part 19)	c) 3000mg/l max.
		- 1987	

### H. Checks And Tests Of Finished Works

S1.	Name of	Test	Reference	Frequency	Mini. Samp.	Check	Standards
No.	material		Codes		size	level	
1	2	3	4	5	6	7	8
1	MORTAR		•	•			
1.1	Water	(i)PH value	IS : 3025-	Water from each	One liter	I&IIA	> 6
		(ii)Limits of Acidity	1987	source shall be got			Max. 5 ml of 0.02
		(iii)Limits of Alkality		tested before the			NaoH in 100 ml
		(iv)Percentage of solids		commencement of			water.
		(a)Chlorides		work and			Max. 25 ml of 0.02
		(b)Suspended matter		thereafter once in			H2SO4 in 100 ml
		(c) Sulphates		every 3 months till			water
		(d)Inorganic solids		the completion of			a)2000 mg/l PCC
		(e)Organic solids		work. Water from			500 mg/l
				municipal source			RCC
				need be tested			b)2000 mg/l Max.
				once in 6 months.			c)400 mg/l
				Number of tests			d)3000 mg/l Max.
				for each source			e)200 mg/l
				shall be 3			



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1.2	Cement	(a)Physical requir (i)Fineness (ii)Soundness (iii)Setting time(I Final) (iv)Compressive s (v)Consistency standard cement p (a)Organic impuri (b)Silt content ( c)Particle distribution	nitial & strength of baste	IS : 44 1988 IS : 2 1963	386-	Every 10 tonnes or part thereof. Each brand of cement brought to site shall be tested as per this frequency. Every 20 cum or part thereof or more frequently as decided by EIC		-	I&III I&IIA	<ul> <li>i)Not &gt; 10%</li> <li>ii)10mm Max.</li> <li>iii)Initial 30 mint.</li> <li>minimum</li> <li>Final 600 mint.Max.</li> <li>iv) &gt; 43</li> <li>Mpa</li> <li>As per IS : 383-1970</li> <li>Max. 8%</li> <li>As per IS : 383-</li> </ul>
2	CONCRET	(d)Bulking of san E WORK	d							1970
2.1	Stone aggregate	<ul> <li>(a) Percentage of soft or deleteriou material</li> <li>(b)Particle size</li> <li>( c)Organi impurities</li> <li>(d)Surface moisture</li> <li>(e)Determination of 10% fine value</li> <li>(f)Specific gravity</li> <li>(g)Bulk density</li> <li>(h)Crushing strength</li> <li>(i)Impact value</li> </ul>	us 1963 .c e		thereof	40 cum or part or more ntly as decided by	6.5 K	g	I,IIA&II B	a)Max .5% As per IS: 383 - 1970 e)Not less than 5T h,i) 45% Max. 30% for wearing surface
2.2	Concrete	Slump test	IS 1959	:516-	15 cum	n or part thereof	As by EI	directed C	I&IIA	As per grade
3	R.C.C. Wor	k								1
3.1	Concrete	(a)Cube test (b)Slump test	IS :516-19	6- 16 31	15 m3 5-30 m3 1-50 m3	1 sample - 2 sampl 8 - 3 sampl 8- 4 sampl hen reqd.	As by EI	directed	I&IIA	As per Grade.
3.2	Steel	<ul> <li>(i) Ultimate tensile strength</li> <li>(ii) 0.2% proof stress</li> <li>(iii)% Elongation</li> <li>(iv)Bend Test</li> <li>(v)Re-bend Test</li> <li>(vi)Mass per metre</li> </ul>	2005 IS: 15 1985 IS: 17 2008	(1-	Under 10mm 10- 16mm 0ver 16mm dia.	1 sample for e 25T 1 sample for e 35T 1 sample for e 45T	each	3 pieces of 100 cms. for each size.	)	i)485Mpa min. ii)410Mpa min. iii)Minim. 14.5% C = 0.3 P = .06 S = .06 P&S = 0.11 Max



I. Checklist

Name		Yes	No	Need Changes
Cement	(PPC)			
1	Physical Tests			
2	Chemical Tests			
Cement	(OPC)			
1	Physical Tests			
2	Chemical Tests			
AGGRE	EGATE-			
Fine Ag	gregate			
1	Particle Sizes			
2	Silt Test			
3	Bulkage of Sand			
4	Organic Impurities			
Coarse Aggregate				
1	Sieve Analysis & Fineness Modulus			
2	Deleterious Materials			
3	Specific Gravity & Density			
4	Mechanical properties			
5	Soundness			
6	Surface Moisture Content			
7	Alkali reactivity			
Concret	e			
1	Slump Test			
2	Compressive Test			
Steel				
1	Test of steel for reinforcement			
2	Tensile Strength of structural steel			
Water				
1	Chemical Analysis			
2	Physical Analysis`			

### J. Bricks

Visual	
All Classes for masonry	Over Burnt for road
Shall have a uniform deep cherry red color, and shall be thoroughly burnt and not over burnt. The bricks must give a clear ringing sound on being struck. They may be free from cracks, chips, flaws and stones lumps of any kind.	Shall have a deep copper color, and shall be over-burnt and regular in shape. The bricks should emit a clear ringing sound when struck. The bricks must be free from cracks, chips, flaws and stones or lumps and spongy matter.



Dimensions						
All Classes Non Modular Bricks (In	mm)					
Length		$4600 \pm 80$		Stan	Standard size of one brick	
Width		$2200 \pm 40$		Leng	Length : 230 mm	
Height		$1400 \pm 40$ for 70 mm high		Wid	Width : 110 mm	
		$600 \pm 40$ for 30 mm high		Heig	Height : 70 mm or 30 mm	
Straight Over Burnt Bricks						
Length		177.5'' to 182.5''		Stan	Standard size of one brick	
Width		85'' to 87.5''		Leng	Length : 8 7/8''	
Height		52.5 to 55.0''		Wid	Width : 4 1/4''	
				Heig	ht: 2 5/8"	
Modular Bricks						
Length		$3800 \pm 80 \text{ mm}$		Standard size of one brick		
Width		$1800 \pm 40 \text{ mm}$		Length : 190 mm		
Height		$1800 \pm 40$ cm for 90 mm high		Width : 90 mm		
		$\pm$ 40 for 40 mm high		Height : 90 mm or 40 mm		
Water Absorption						
Sl. No.	Class	Ref. codes			Limit	
1	For Maso	nry	IS: 3495(II)-1992 Not more than 20% b weight			
2	Straight of road work	over burnt for			Not more than 10% by weight	

Efflorescence			
Sl. No	Standard	Definition	Ref. code
1	Nil	When there is no perceptible deposit of	IS: 3495(II)-1992
		efflorescence	
2	Slight	When not more than 10% of area of the	
		brick is covered with a thin deposit of salt.	
3	Moderate	When there is a heavier deposit than under	
		slight and covering up to 50% of the brick	
		surface but unaccompanied by powdering	
		of flaking of the surface.	
4	Heavy	When there is a heavy deposit of salts	
		covering up to 50% or more of the brick	
		surface but unaccompanied by powdering	
		of flaking of the surface.	
5	Serious	When there is a heavy deposit of salts	
		accompanied by powdering and for flaking	
		of the surface and tending to increase with	
		repeated weathering of the specimens.	



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Compressive Strength			
Class Designation	Average compressive strength		Ref. IS codes
	not less than		
	N / mm2	Kg / cm2	
35	35	350	IS : 3495 (I) – 1992
30	30	300	
25	25	250	
20	20	200	
17.5	17.5	175	
15	15	150	
12.5	12.5	125	
10	10	100	
7.5	7.5	75	
5	5	50	
3.5	3.5	35	











45.98



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