Bharat Heavy Electricals Limited

(A Govt. of India undertaking)

Boiler Auxiliaries Plant, Ranipet – 632406, Tamilnadu.

Purchase Department

BAP: PUR:UTY:1861267/DBSERVER:Amend-2   **Dt: 08.02.2017**

Subject	Tender Change Notice (TCN) – 02
Job	Supply, installation, configuration, testing and maintenance of Server equipments and licenses at BHEL Ranipet
Ref:	1. BHEL's NIT_31104 dt. 17.01.2017

Pre bid meeting clarifications: **A. IT infrastructure Queries & Clarifications**

S.No	CLAUSE NO.	Tender Clause	VENDORS QUERY	BHEL REPLY
1.	2.2(d)	a. EXPERIENCE of having successfully completed similar works during last 10 years ending last day of month previous to the one in which applications are invited should be either of the following: - Must have executed at least 3 (three) similar works in the last 10 years in India for minimum Rs 6.86 Cr in each order. (or) Must have executed at least 2 (two) similar works in the last 10 years in India for minimum Rs 8.57 Cr in each order (or) Must have executed at least one similar works in the last 10 years in India for minimum Rs 13.72 Cr in each order Note: Similar work means "Complete scope of work namely SUPPLY, INSTALLATION, CONFIGURAION, TESTING AND MAINTENANCE OF SERVER EQUIPMENTS AND ACCESSORIES"	EXPERIENCE of having successfully completed similar works during last 10 years ending last day of month previous to the one in which applications are invited should be either of the following: -1.Must have executed at least 3 (three) similar works in the last 10 years in India for minimum Rs 6.86 Cr in each order/Rate contract **(or)** 2.Must have executed at least 2 (two) similar works in the last 10 years in India for minimum Rs 8.57 Cr in each order/Rate contract **(or)**3.Must have executed at least one similar works in the last 10 years in India for minimum Rs 13.72 Cr in each order /Rate contract -Request to amend-in each order/Rate contract in any PSU/Central govt (Since we have executed Rate contract orders worth Rs.14Cr+ for 2 years for servers across multiple CSIR Labs. Note: Similar work means "Complete scope of work namely SUPPLY, INSTALLATION, CONFIGURAION, TESTING AND MAINTENANCE OF SERVER EQUIPMENTS AND ACCESSORIES	a. **EXPERIENCE** of having successfully completed similar works during last 10 years ending last day of month previous to the one in which applications are invited should be either of the following: - Must have executed at least 3 (three) similar works in the last 10 years in India for minimum Rs 6.86 Cr in each order. **(or)** Must have executed at least 2 (two) similar works in the last 10 years in India for minimum Rs 8.57 Cr in each order **(or)** Must have executed at least one similar works in the last 10 years in India for minimum Rs 13.72 Cr in each order **Note: Similar work means "Complete scope of work namely SUPPLY, INSTALLATION, CONFIGURAION, TESTING AND MAINTENANCE OF SERVER EQUIPMENTS AND ACCESSORIES"**

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2.	3.3	Oracle migration activity	Kindly brief the scope on oracle migration, is it related only to data migration or overall application or database migration is required.	Oracle Database and Application Migration is in BHEL Scope. Activities required during oracle migration as per 3.3 is in the scope of bidder.
3.	3.15.4	On site engineer	is the engineer should be certified on any of the one certifications, either RHEL or Virtualisation. Or both are mandatory	RHEL Certification is mandatory.Atleast One Engineer should be vmWare certified.
4.	3.15.4	On site engineer	is it shift rotation for 3 engineers. Or general shift for all the three engineers	Onsite Engineers will be on Shift rotation basis.
5.	5.2	Server Farm Factor	Request for blade form factor to be quoted.	Not accepted. Bidder to comply BHEL tender requirement.
6.	Table 2 - DR	DB Server	Is the DB license based on number of cores or on users? Can we deliver server with higher number of cores, if 8 cores becomes unavailble at the time of supply?	DB license based on cores. Bidder to comply with cores as per specification.
7.	Table 2 - DR	Application Servers	Can we spread the load across 2 servers while providing necessary cores requested in the RFP	Not accepted. Active-Passive Configuration of Application servers is requested.Bidder to comply BHEL tender requirement.Oracle Application can run in DR for <10 days.
8.	5.2.6	Main Memory	Request amend the memory scalability of 768 GB (about 5x scalability)	Min 500 GB RAM
9.	5.3	Storage Capacity	Please specify the RAID level to be considered for 4 TB on SSD and SAS	Any RAID level is acceptable provided it meets the required 1,00,000 IOPS
10.	5.3.1	RAID Levels	Request to amend the supported RAID levels to widely used 5, 6 and 10	Accepted.Dual Active Controller with no single point of failure in the storage array. RAID Array supporting at least Raid Levels 5, 6 and 10 or equivalent.
11.	5.3.2	Cache	Cache RAM Physical?	Yes,It is physical RAM cache.
12.	5.3.4	Drive Interface	Request to reword the ports to 8 x 12 Gbps SAS Links	Not Accepted, bidder to comply with tender specification
13.	5.3.5	Supported Drives	Request to revise the supported drives to 600 GB, 1200 GB and 1800 GB SAS drives	The storage subsystem shall support 600/900/1200/1800 GB FC /SAS disk and 2 TB or higher SATA/FATA /Near line disk drives.

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14.	5.2.5	Virtual Machines (Applicable to Server 2 Only)	Since these points are related to Virtualization software. We request you to separate it from Server Hardware.	Moved under cl 5.7 Virtualization software
15.	5.2.6	All adapters should be PCIe. All ports must be physical.	Please Remove this point as Hot plug PCIe adapter not possible in requested servers.	Removed.
16.	5.2.7	Suitable disk management software including Volume Manager to dynamically manage the logical volumes to be supplied.	Local disk can be managed via raid management utility and Disk on SAN can be managed via SAN. Please clarify if any other Volume Manager software is required? Please explain what dynamically manage the logical volumes means?	Software to manage local disk and SAN disk to be provided.
17.	5.2.7	All servers should have required drive adapter SCSI/SAS/FC to connect the tape drive on requirement basis. Tape drive should not use the ports specified in Table -1 & 2.	Please specify if SAN based backup is considered or LAN based backup is considered to provide the port accordingly?	SAN based LAN free backup.
18.	5.2.8	The RAID controller should support Raid 0, 1, 5, 10, 50. Raid controller should have an option to upgrade to Raid 6 and 60 as well. Raid controller should support on line Raid level migration, on line capacity expansion and data scrubbing as well.	Since only two Disk per server is requested, we suggest you to change this point. As none of the features required will be utilized with 2 disks. "The RAID controller should support Raid 0, 1, 5, 10, 50."	The RAID controller should support Raid 0, 1, 5, 10, 50."
19.	5.2.8	Partition management software having dynamic configuration feature with GUI / Web interface. Management Consoles for the same to be provided.	Is this point related to Server2 which has Vmware? Please explain which partitions are we refering here? If this is related to Vmware, Please move it to virtualization section.	Moved under cl 5.7 Virtualization software
20	5.2.8	Software to be provided for intelligent workload & partition replacement across a virtualized environment.	Is this point related to Server2 which has Vmware? Please explain which partitions are we refering here? If this is related to Vmware, Please move it to virtualization section.	Moved under cl 5.7 Virtualization software

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21	5.2.8	Software and licenses to be provided for resource allocation / de-allocation to virtual machine.	Is this point related to Server2 which has Vmware?Please explain which partitions are we refering here?If this is related to Vmware, Please move it to virtualization section.	Moved under cl 5.7 Virtualization software
22	5.2.11	The server scalability and upgradeability path in terms of CPU and RAM must be submitted.	Since Two CPU are requested per server and Model requested is E5-26xx series, this cannot be scaled further.	The server scalability and upgradeability path in terms of CPU and RAM must be submitted.
23	5.3.4	Storage should support a minimum of 4 SAS 3.0 or FC ports and the same shall be scalable to 16 SAS 3.0 or FC ports	Each SAS3.0 port has 4 lanes of 12Gbps and it equals 48Gbps bandwidth and single FC port will have 4/8/16Gbps. So we requet you to put throughput requirement instead of ports. "Storage should support a minimum of 96Gbps backend throughput or higher to give the required performance."	Not Accepted, bidder to comply with tender specification
24	5.3.7	Number of disks which will deliver the above mentioned capacity (400 SAS drives) should be capable of delivering at least 60,000 IOPS as defined above	We request you to ask for overall Storage performance scalability to 2,00,000 IOPs instead of SAS disk IOPs scalablility	Number of SAS disks which will deliver the above mentioned capacity should be capable of delivering at least 60,000 IOPS as defined above
25	5.3.9	Proposed storage system should offer a minimum of 1,00,000 IOPS with SSDs and a minimum of 20,000 IOPS with SAS hard disk drives as per SPC-1 benchmark.	We request you to ask for Overall Storage performance as 1,20,00 IOPS instead of separate IOPS for SSD and SAS Drives	Proposed storage system should offer a minimum of 1,00,000 IOPS with SSDs and a minimum of 20,000 IOPS with SAS hard disk drives as per SPC-1 benchmark. In addition, the overall storage IOPS should be 1,20,000.
26	5.5.1	Shall have minimum 50 slots.	Please change this to 48Slots. As 50 Slots is not standard.	Shall have min 48 slots.
27	5.6.3	The offer shall cover licenses required for taking backup of the entire data residing in all the servers/ virtual machine as per Table 1 & 2. Minimum 10 for Linux OS and 3 for other operating systems (Windows) for each location.	SAN free or LAN free backup?	SAN based, LAN free backup.
28	5.6.5	Back-up software shall support backed up data replication to DR for disaster recovery strategy	Clarify on data replication?	Back-up software shall support backed up data copy to DR for disaster recovery strategy.

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29	3.2.11	Fail-over of entire Primary / secondary site.	Fail-over of entire Primary / secondary site : Is it a Two way Infrastructure setup i.e. Primary DC and Disaster recovery site DR or 3 –Way DR ?	It is a two way infrastructure with DC & DR only.
30	-	-	As its Brownfield implementation, please share the existing DC and DR IT Infra setup Landscape & Architecture?	Bidder can visit BHEL premises to learn the existing DC & DR setup. Detailed information will be shared with the successful bidder.
31	3.2.4	Clustering, High availability features	High Availability & Clustering: RAC (Real Application cluster) or OS based?	OS based
32	-	-	Database and Application details and respective failovers?	Refer table 1 & 2
33	3.2.7	Fail-over of a Server with multiple partitions.	Fail-over of a Server with multiple partitions: Existing Compute setup: Physical or Virtual environment? LDOMs (Oracle) / LPAR's (IBM) / VM's (X-86 servers) details? And Desired new architecture on failover?	Detailed information will be shared with the successful bidder.
34	-	-	**Data Migration** from Exiting to New environment? If yes! Provide the data size and Type of data?	Yes,SAN to SAN data migration is in scope of Bidder.
35	3.2.6	Backup and Restore options	Backup and Restore options: Methodology? Disk or Tape, If any data migration/transfer from existing tape to new Tape? Existing tape drives versions and size of data?	Refer RFP Cl 3.2.
36	-	-	As per the RFP its mention SAN based i.e. Storage based replication? do we have to solution for Host based replication as well i.e. Oracle ODG/ADG or SQL log shipping.	SAN based replication.
37	3.2.5	Synchronous and asynchronous SAN based data replication between primary and secondary site.	Replication: Synchronous and asynchronous SAN based data replication between primary and secondary site? Replication between DC and DR will be Asynchronous replication, based on the distance?	Offered storage should support both Synchronous and asynchronous replication.
38	-	-	**Application Migration:** will be done by the Customer application vendor? Application compatibility from the existing to the New environment by Application vendor?	Oracle Database and Application Migration is in BHEL Scope. Activities required during oracle migration as per 3.3 is in the scope of bidder.

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39	-	-	Any DR Drill provisioned in the RFP?	Yes,Refer cl.3.9
40	-	-	Any Database upgrade? Database migration?	Refer 3.3
41		Clause 5, Total number of application server licenses required to meet the cores mentioned above will have to be indicated. Oracle product license cost for application server will be used to determine the overall cost	Since the no. of cores is defined, and all Hardware OEM will quote the same no of cores, and application server licenses is not part of the scope of this bid, request this clause to be removed	Clause 5, Total number of application server licenses required to meet the cores mentioned above will have to be indicated. Oracle product license cost for application server will be used to determine the overall cost
42		Table 1 & 2, Server 3 & 4	To cater to the no. of 10GE and 16Gb FC ports asked for, a 2nd CPU to be populated on the Server. Hence increase the no. of cores to 8 on both Servers	Refer table 1 & 2
43		Table 1 & 2, Server 2	20 cores are asked for, hence E5 2630v4 has to be quoted. Request to confirm no of processors with required cores	Refer table 1 & 2
44		Sl. No. 10, Virtualisation cost	Please mention the Vmware Edition - Standard or Enterprise and Qty as 4 nos. Also Vcentre Std - 2 nos. will be required. Please add this to the BOM	Vmware Enterprise edition(latest) with 24x7 support with Vcentre Standard edition - 1 nos
45		Sl. No. 8, Operating system	Please mention the RHEL version & no. of guest OS especially for Server 2	RHEL 7 or latest. Server 2 will have 3 nos of Guest OS
46		Storage Scalability	Considering that BHEL looking at 400 drives scalability storage system, we suggest to consider IOPS scalability of 240000+IOPs(2X of current requirement)	Number of SAS disks which will deliver the above mentioned capacity should be capable of delivering at least 60,000 IOPS as defined above
47		Request to add	Server & Storage from same OEM	Not accepted.
48		Request to add	Leaders quadrant for servers and storage	Not accepted.
49	-	-	Can we have leasing tie up and have a triparty agreement?	Accepted.
50	5.1 Server details per the below tables	Notes*	Vmware license clarifications	Vmware Enterprise edition with 24x7 support
51	-	-	-	5.1 Note:Vcentre will be installed on separate physical server. (Dual Core, 24 GB server will be provided by BHEL)

S.No	CLAUSE NO.	Tender Clause	VENDORS QUERY	BHEL REPLY
52	-	-	-	5.7: Virtualization Software: 1) Each independent virtual machine should run having its own operating system instance with resources dedicated to it. 2) Total number of application server licenses required to meet the cores mentioned above will have to be indicated. Oracle product license cost for application server will be used to determine the overall cost 3)It should be possible to assign processors and memory logically to any virtual machine or switch processors and memory between virtual machine without reboot of source or target virtual machine or applications. 4) Each virtual machine shall be able to run same or different versions of OS kernel, patch levels, etc, independently. 5) Any configuration change in one virtual machine shall not affect any other virtual machine. 6) Any fault in one virtual machine shall not bring the entire system or other virtual machines down. 7) The OS of each virtual machine shall be upgradeable separately and independently without affecting the other virtual machines. 8) Each virtual machine shall have the capability to start-up and shutdown independently without affecting any other virtual machine on the same server. 9) Virtual machine should have security isolation from one another. 10) Virtual Machine management software having dynamic configuration feature with GUI / Web interface. Management Consoles for the same to be provided. 11) The Web/GUI interface shall support configuration and dynamic (no-reboot) reconfiguration features. 12) Software to be provided for intelligent workload & VM replacement across a virtualized environment. 13) Software and licenses to be provided for resource allocation / de-allocation to virtual machine.

TABLE – 1 DC site

S No.	Server /Purpose	Min. Capacity Required		Minimum Internal Disk / SAN Boot for OS	Min I/O ports Required		HA Cluster (DC_DR)
		CPU Cores (Intel Xeon Processor E5-2637v4) or latest in E5 series.	RAM		10 GbE Ethernet Ports (Physical)	16 GbFC Fiber Channel Ports (Physical)	
1	Server 1 -Database Production (Node1)	8	160GB	2 x 600GB	8	4	Yes
2	Server 2* -Authentication Server, Load Balancer, Application Servers	20	160GB	2 x 600GB	8	4	Yes
3	Server 3 – Engineering	4	80GB	2 x 600GB	8	4	
4	Server 4 - Backup Server	4	64GB	2 x 600GB	8	4	

TABLE – 2 DR Site

S No.	Server /Purpose	Min.Capacity Required		Minimum Internal Disk / SAN Boot for OS	Min I/O ports Required		HA Cluster (DC_DR)
		CPU Cores (Intel Xeon Processor E5-2637v4) or latest in E5 series.	RAM		10 GbE Ethernet Ports (Physical)	16 GbFC Fiber Channel Ports (Physical)	
1	Server 1 -Database Production (Node2)	8	160GB	2 x 600GB	8	4	Yes
2	Server 2* -Authentication Server, Load Balancer, Application Servers	20	160GB	2 x 600GB	8	4	Yes
3	Server 3 – Standby Database	4	80GB	2 x 600GB	8	4	ODG
4	Server 4 - Backup Server	4	64GB	2 x 600GB	8	4	

B. Non - IT infrastructure Queries & Clarifications

S.No	Tender cl. No	Tender Clause	Bidder Queries	BHEL Clarification
1	5.15 Technical Specification for Non – IT Infrastructure	Min 24 kW sensible cooling capacity for cooling of 6 racks; high CFM high sensible close coupled cooling units. Cooling units should be on redundant basis. (N+1 redundancy) Supply of In- rack closed coupled cooling system: -- High CFM high sensible cooling Indoor and Outdoor units - The cooling system should be DX type with R410 refrigerant controlled by an electronic expansion valve, with separate indoor units and outdoor units. The cooling systems should have capability to integrate with remote monitoring system. Throw of the cooling air should in front of the hardware in horizontal direction to have better cooling from zero "U" height to 42U height. Cooling unit should have screen in front of unit to have physical monitoring for all parameters. Cooling unit need to be fit between server / network racks and should have capacity to throw air horizontally on both side to cool racks.	1. Cooling capacity requirement be N+N instead of N+1 for the uniformity of different OEMs. For the uniformity of cooling systems across different OEMs , it should be N+N. For example, a OEM having 2KW capacity can quote 26 KW as N+1 which may not be standard Datacenter design. 2. Cooling system should be controlled by thermostatic / electronic expansion valve.General market standard is both the type of expansion valves	1) Min 28 kW sensible cooling capacity for cooling of 6 racks; high CFM high sensible close coupled cooling units. The redundancy may be planned such that,in event of failure of one or more cooling units, the cooling available should be maintained continuously at 28 kW. 2)Supply of In- rack closed coupled cooling system: -- High CFM high sensible cooling Indoor and Outdoor units - The cooling system should be DX type with R410 refrigerant controlled by an thermostatic / electronic expansion valve, with separate indoor units and outdoor units. The cooling systems should have capability to integrate with remote monitoring system. Throw of the cooling air should in front of the hardware in horizontal direction to have better cooling from zero "U" height to 42U height. Cooling unit should have screen in front of unit to have physical monitoring for all parameters. Cooling unit need to be fit between server / network racks and should have capacity to throw air horizontally on both side to cool racks.
2	5.15 Technical Specification for Non – IT Infrastructure	1U rack mountable device that should have high sensitivity smoke detection with active sampling. It should have a built-in NOVEC 1230 suppression system sufficient for 1 IT rack with integrated fire panel. This device should be monitoring using potential free contacts. With actuator, discharge nozzle, piping complete with accessories. The	Rack mountable built in Novec 1230 Fire Suppression system / Centralised Novec 1230 Fire suppression system covering all 6 six racks.It will be expensive to replace the rack mountable kit based Novec 1230 suppression system often while doing drills every time and time delay involved. Rack mountable kits are one OEM specific	Rack mountable built in Novec 1230 Fire Suppression system / Centralised Novec 1230 Fire suppression system covering all 6 six racks.Usable rack space as per the specification to be maintained.

		system should include a manual abort option. 1 such kit should be installed in each of the racks. Rack-mountable fire detection and suppression system should be able to configure in master and slave manner for ease of controlling and monitoring remotely via master in case of multiple units.	products and need to be a standard product. Centralised fire suppression systems is general market standard and can also be included.	
3		Server Racks with automatic door opening system and complete In-Rack cooling solutions (where hot and cold aisle are contained within the racks) to ensure proper temperature and humidity for servers and networking equipment. Server Rack: 600Wx2000Hx1200D/1800D, 42U server rack with IP 54 category with min.1500kgs load bearing capacity. plain top cover and bottom cover with standard gland plates with foam insert for cable entry, 2 pairs of 42U 19" L - type angles & special assembly kit for mounting 19" angles & punched sections. Side Panel 2000Hx1200D/1800D screw fixed, unvented. Front Sheet Steel Glazed Door- 2000Hx600W. Rear Sheet Steel Door - 2000Hx600W. Vertical metered PDU Strip with 20 nos of IEC C13 Sockets and 4 nos. IEC19 sockets, Indicator switch, 4 mtr power chord with Industrial plug.PDU should be integrated with BMS. Lock insert with unique key. Foam insert for vertical shielding, installed between racks. Metal Shunting Rings 90x60 (pack of 10) Component Shelf 720mm deep. Copper Earth Rail 15x3x500 with 10 points with screws and insulators. The solution should include blanking panels for blocking the empty U space in the racks for improved cooling performance.	1. Rack with automatic front door opening system.Front door opening is always important during emergency for air sucking from ambience for cooling the system for a short duration 2. IP 20 category with min 1000 kg / 1200 kg load bearing capacity. General Market standard for indoor applications is IP20 category which is sufficient with load bearing capacity of 1000 kg to 1200 kg as per the maximum average weight of IT equipments proposed in the project.	1.Server Racks with automatic door opening system and complete In-Rack cooling solutions (where hot and cold aisle are contained within the racks) to ensure proper temperature and humidity for servers and networking equipment. 2. Server Rack: 600Wx2000Hx1200D/1800D, 42U server rack with min IP 20 or higher category with min.1000kgs load bearing capacity.

4		IT Enclosure / IT Racks (6 Racks (252 U usable) for DC & DR respectively)	-	IT Enclosure / IT Racks (6 Racks (Min 230 U usable) for DC & DR respectively)
5	5.15 Technical Specification for Non – IT Infrastructure	CCTV Surveillance system	1. Analog or IP 2. Recording duration 3. Mounting location of NVR	CCTV Surveillance system with DVR(Digital Video Recording):Supply, installation & commissioning of surveillance system for live monitoring in the data centre. UL Listed Color Dome camera(Analog/IP) with fixed lens of 3mm, 1/4" CCD color. 2. Min 2 TB Internal storage,Monitoring & Controlling through LAN using Central Monitoring Software. 3.CCTV camera should be mounted on top of the Server Rack.
6	5.15 Technical Specification for Non – IT Infrastructure	Automatic Transfer Switch	brief on the requirement	Automatic Transfer Switch for power redundancy of network switches.
7	5.15 Technical Specification for Non – IT Infrastructure	Racks	is existing Racks at DC & DR to be reused or new requirement	No exisiting, Racks are conventional racks.
8	5.15 Technical Specification for Non – IT Infrastructure		Existing setup of DC & DR, Brief Knowledge required	Conventional DC & DR with bottom cooling PACs.
9	5.14 Connectivity between primary and secondary site	Fiber Laying	No of Fiber core value layout for DC to DR	2 x 24 Core out-door armed SM OS2 OFC cable
10	5.15 Technical Specification for Non – IT Infrastructure		Implementation roll out Plan , brief note of existing DC to New IT infra	Detailed information will be shared with the successful bidder.
11	5.15 Technical Specification for Non – IT Infrastructure	UPS back time	As per RFP backup time 60 min is envisaged, is it combined backup time of UPS or individual UPS.	Individual UPS should provide 60 min backup.

| 12 | 5.15 Technical Specification for Non – IT Infrastructure | DR site UPS | As per RFP only 2 nos of 30 KVA UPS is asked, but in DR site layout 2 nos of 20 KVA UPS is shown. Whose scope is the 20 KVA UPS? | 2 x 20 KVA UPS for DR site is in the scope of BHEL. Electrical connections from 20 KVA UPS to Server racks is in vendor scope. |

With reference to above, the revised tender submission date may please be noted and complied with, while submitting the offer.

S.No	Tender Reference	Earlier Tender description	Revised description
1	-	Tender submission date 06.02.2017.	Tender submission date 20.02.2017.

All other terms and conditions of the tender shall remain unchanged.

Tenderer shall sign and stamp these pages also and submit it along with the Technical offer as a token of acceptance of the above.

For clarifications, if any, contact

Deputy General Manager / Purchase - Utility
Phone: + 91 - 4172 – 284338
E-mail:mggsekaran@bhelrpt.co.in