

Roads and Building Department Gandhinagar





(ii) Air Conditioned Area (in Sq.Mtr)

(a) Central Air Condition Area

Block No. 1 to 7

(1) Secretary Chamber	= 48.51	
(2) Cabins		= 43.06
(3) Conference Hall	= <u>48.51</u>	
		Total = 140.08

For Block No. 2,4,5,&7

(Each Bl. Having 9 Floors) $140.08 \times 4 \times 9 = 5042$
Say = 5050

For Block No. 1 8 Floors x 500 Sq.Mtrs = 4000

Total $5050 + 4000 = 9050$



For Vidhansabha
 2nd Floor = 1300
 3rd Floor = 1080
 4th Floor = 520
 Assembly Hall (2nd) = 570
 Assembly Gallery (3rd) = 800
Total = 4270

Grand Total 9050 + 4270 = 13320



(b) Window Air Conditioners Area (in Sq. Mtr)

October 2001 to September'2002 = 7813 sq.mtr
 October 2002 to September'2003 = 7813 sq.mtr
 October 2003 to September'2004 = 8333 sq.mtr
 October 2004 to September'2005 = 8333 sq.mtr

**(iii) Non Air Conditioned Area = 189775 – 13320-7813
 = 168642**

(iv) Total Carpet Area

Name of Building	Carpet Area in Sq.Mtr
Sardar Bhavan Cluster – I (Block No. 1 to 7)	61350
Sardar Bhavan Cluster – II (Block No. 8 to 14)	61350
Vithalbhai Patel Bhavan- Assembly Bldg. (Vidhansabha)	20110
Total	142810

(V) Total Connected Load (in kW)

(a) Lighting (kW)

(A) For Block No. 1 to 14

Single Tube Fittings	Per Floor	50 Nos.	
Total No. of Floor	112		
Total No. of Fittings	50 x 112		= 5600 Nos.



(i) Window Air Conditioners (kW)

(1) Block No. 1 to 7 120 Nos.
(2) Assembly Building 80 Nos.
(3) Block No. 8 to 14 270 Nos.
Total 470 Nos.

Split Air-conditioning

(1) Block No. 1 to 7 40 Nos.
(2) Assembly Building 6 Nos.
(3) Block No. 8 to 14 20 Nos.
Total 66 Nos.

Total Ton 470 x 1.5 = 705
66 x 2 = 132
= 837 Ton

$$837 \times 1400/1000 = 1171.80 \text{ Kw}$$

Say 1172Kw

For October' 03 - September' 04

Additional Split Air conditioning = 30 Nos. , 52 Tons Capacity
= 78 kW
Total = 1172 + 78
= 1250 kW

(ii) Central Air-conditioners (kW)

Central Air –conditioned Plant =1050 Ton

Auditorium & Conf. = 80 Ton
= 1130 Ton

$$1130 \times 1400\% 1000 = 1582 \text{ Kw}$$

For the Year October'2001 to September'2002 Say 1582 kW

For the Year October'2002 to September'2003 Say 1582 kW

Due to Reduction of Water Pumping Load is as follows.

- ❖ For the Year October' 2003 to September'2003 Say 1426 kW
- ❖ For the Year October'2004 to September'2005 Say 1426 kW

(c) Space Heating – Room Heatres & Strip Heaters (kW) = Nil

(d) Water Pumping (kW)

For 1 to 7 Block 41 + 25 + 25 = 91 Hp

For 8 to 14 Block 25 + 25 = 50 Hp

Assembly Bldg. 41 + 25 = 66 Hp
Total = 207 HP

$$0.746 \times 207 \text{ Hp} = 154.42$$

Say 155 Kw

(e) Ceiling Fans (Kw)

For Block No. 1 to 14 = 7000 Nos.
Vidhansabha = 900 Nos.
Total = 7900 Nos.

$$7900 \times 70w \% 1000 = 553 \text{ Kw}$$

(f) Computers & Other Office Equipments

For October'2001 to September'2002	= 15 kW
For October'2002 to September'2003	= 45 kW
For October'2003 to September'2004	= 450 kW
For October'2004 to September'2005	= 600 kW

(g) Other Loads (Please Specify) (kW)

(A) Lifts

(1) High Speed Lift 2.5 mtr /sec

Total No.of Lifts 36 Nos. each of 24 HP (Motor)

$$24 \text{ kW} \times 36 \text{ Nos.} = 864 \text{ kW}$$

(2) Low Speed Lift

Total No.of Lifts 4 Nos.

$$18 \text{ kW} \times 4 \text{ Nos.} = 72 \text{ kW}$$

(3) Goods Lift

Total No.of Lifts 6 Nos.

$$28 \text{ kW} \times 6 \text{ Nos.} = 168 \text{ kW}$$

(4) Elevators

Total No.of Lifts 4 Nos.

$$15 \text{ kW} \times 4 \text{ Nos.} = 60 \text{ kW}$$

Total (1+2+3+4) = 1164 kW

(B) Water Coolers

Total No. of Water Coolers

1. Block No. 1 to 7	= 56 Nos.
2. Block No. 8 to 14	= 56 Nos.
3. Assembly Building	= <u>24 Nos.</u>
Total	= 136 Nos

Total No.of Water Coolers 136 Nos. each at 1 ton capacity

$$136 \text{ Nos.} \times 1.4 \quad \% 1000 = 190.4 \text{ kW}$$

Say 190 kW

Total A+ B = 1164 + 190 = 1354 kW

Say 1355 kW

Data of Energy Consumption						
Oct – 2001 to Sept-2002 Contract Demand = 3400 Kws						
Sr.No.	Months	Units	P.F.	Actual Demand	Billed Demand	Amount
1	10/2001	735900	91	3582 Kws	3582 Kws	3280769
2	11/2001	532650	90	3018 Kws	3018 Kws	2412571
3	12/2001	337950	94	1527 Kws	2890 Kws	1683427
4	01/2002	328020	96	1266 Kws	2890 Kws	1644961
5	02/2002	370530	95	2334 Kws	2890 Kws	1918606
6	03/2002	618870	96	3169 Kws	3159 Kws	2874813
7	04/2002	735690	90	3753 Kws	3753 Kws	3235679
8	05/2002	892260	90	3630 Kws	3630 Kws	3983123
9	06/2002	911490	90	3819 Kws	3819 Kws	4094126
10	07/2002	813840	89	3600 Kws	3600 Kws	3785310
11	08/2002	711960	92	3351 Kws	3351 Kws	3307977
12	09/2002	615090	92	3162 Kws	3162 Kws	2986735
Total →		7604250				35208097

Average P.F. = 92.08 Average Actual Kw = 3017.58

Data of Energy Consumption						
Oct – 2002 to Sept-2003 Contract Demand = 3400 Kws						
Sr.No.	Months	Units	P.F.	Actual Demand	Billed Demand	Amount
1	10/2002	627600	92	3063 Kws	3063 Kws	2961649
2	11/2002	390360	93	2481 Kws	2890 Kws	2032096
3	12/2002	283800	97	1236 Kws	2890 Kws	1653423
4	01/2003	285120	97	1113 Kws	2890 Kws	1657303
5	02/2003	328170	96	2277 Kws	2890 Kws	1823279
6	03/2003	535020	93	2805 Kws	2890 Kws	2547521
7	04/2003	601470	92	2982 Kws	2982 Kws	2843670
8	05/2003	768840	91	3315 Kws	3315 Kws	3696576
9	06/2003	782400	92	3420 Kws	3420 Kws	3697701
10	07/2003	789480	91	3269 Kws	3269 Kws	3571929
11	08/2003	635250	92	2796 Kws	2890 Kws	2958779
12	09/2003	689100	91	3045 Kws	3045 Kws	3174908
Total →		6716610				32618834

Average P.F. = 93.08 Average Actual Kw = 2650.16

Data of Energy Consumption						
Oct – 2003 to Sept-2004 Contract Demand = 3400 Kws						
Sr.No.	Months	Units	P.F.	Actual Demand	Billed Demand	Amount
1	10/2003	604740	93	3027 Kws	3027 Kws	2866385
2	11/2003	466380	95	2640 Kws	2890 Kws	2296540
3	12/2003	296190	99	1284 Kws	2890 Kws	1694332
4	01/2004	282180	99	1080 Kws	2890 Kws	1645345
5	02/2004	338040	97	2049 Kws	2890 Kws	1843942
6	03/2004	577260	93	2928 Kws	2928 Kws	2668885
7	04/2004	643530	93	3171 Kws	3171 Kws	2999818
8	05/2004	814860	93	3609 Kws	3609 Kws	3697264
9	06/2004	853830	92	3702 Kws	3702 Kws	3956984
10	07/2004	816180	92	3432 Kws	3432 Kws	3667009
11	08/2004	630330	93	2991 Kws	2991 Kws	2922875
12	09/2004	692640	92	3234 Kws	3234 Kws	3191652
Total →		7016160				33451031

Average P.F. =94.25 Average Actual Kw = 2762.25

Data of Energy Consumption						
Oct – 2004 to Sept-2005 Contract Demand = 3400 Kws						
Sr.No.	Months	Units	P.F.	Actual Demand	Billed Demand	Amount
1	10/2004	599460	93	3111 Kws	3131 Kws	2866385
2	11/2004	422610	94	2433 Kws	2890 Kws	2296540
3	12/2004	333630	97	1338 Kws	2890 Kws	1694332
4	01/2005	276120	97	1056 Kws	2890 Kws	1645345
5	02/2005	318090	96	1872 Kws	2890 Kws	1843942
6	03/2005	557700	92	2514 Kws	2890 Kws	2668885
7	04/2005	582240	92	3177 Kws	3177 Kws	2999818
8	05/2005	730140	91	3282 Kws	3282 Kws	3697264
9	06/2005	806490	91	3456 Kws	3456 Kws	3956984
10	07/2005	721140	91	3213 Kws	3213 Kws	3064857
11	08/2005	658020	92	3093 Kws	3093 Kws	2984943
12	09/2005	711060	91	2998 Kws	3468 Kws	2995696
Total →		6716700				32714991

Average P.F. = 93.08 Average Actual Kw =2628.58

8 (A) October 2002 to September-2003

Project - 1

- Replacement of Conventional Tube Lights by T-5 Tube Lights



- ✓ Total No. of Tube Light Replaced = 7500 Nos.
- ✓ Consumption of Conventional Tube Light = 52 Watt
- ✓ Consumption of T-5 Tube road = 29 Watt

- ✓ Savings per tube road 52-29 = 23 Watt
- ✓ Total Load reduction = $23 \times 7500 / 1000$ = 172.5 Kw

The above lighting retrofit project was implemented under the demand side management programme of the utility. The Project was implemented under the lease finance scheme arrange by the utility. The upfront investment, therefore, is NIL.

For Energy Conservation this office has taken the following actions.

(1) By means of installation of T-5 tube rod the No. of tube light are reduced as T-5 tube rods gives 15 to 20% more illumination. The total No. of tube lights reduced are as under.
For passages We have reduced to 7 nos of tubelight instead of 13 Nos. tube light



Hence Total No. of passage are 50 Nos.

$$\begin{aligned}
 \text{Total Tube light reduced} &= (13-7) \times 50 \\
 &= 300 \text{ Nos.} \\
 \text{Total Kw reduced} &= 300 \times 52 / 1000 \\
 &= 15.6 \text{ Kw} \dots\dots\dots (1)
 \end{aligned}$$

(2) No of Tube light reduced in the office area per Floor = 60 Nos.

$$\begin{aligned}
 \text{Total Nos. of Floors} &= 22 \\
 \text{Total Tube light reduced} &= 60 \times 22 = 1320 \text{ Nos.} \\
 \text{Total reduced muw} &= 1320 \times 52 / 1000 \\
 &= 68.64 \text{ Kw} \dots\dots\dots (2)
 \end{aligned}$$

$$\text{Total Kw reduced} = (1) + (2)$$

$$= 15.60 \times 68.64$$
$$= 84.24 \text{ Kw}$$

Total load reduced due to replacement of Tube light & reduction of Tube light
= 172.50 + 84.24 = 256.74 Kw

LIFTS IN THE PASSAGE



Step-2 :- New Sachivalaya Complex is the bunch of 10 Nos. of multistoried building, One No. Assembly Bldg. (Multi Storied) and 4 Nos. two storied building. There are total 50 Nos. (Lifts) elevators / escalators in this campus. However each multi storied building has two nos. lift in the center of the building. Looking to the occupancy of the building and persons visiting the building we found that the maximum rush hours are 10 Am. to 11Am, 2 pm to 3pm and 5.30 pm, to 6.30 pm. So

this office decided to give facility of two lifts during above rush hours and for the rest of the time only one lift is sufficient to match with the requirement. We achieved savings by implementing the above system for the operation of Lift.

CENTRAL AIR CONDISING PLANT



Step-3 :- New Sachivalaya Campus has 1050 ton central air condition plant bunching of 150 ton, 7 Nos. chillers. The air-condition plant generally starts at 8.30 a.m. and it runs still the last secretary leaves the office. Thus normal running time of the plant was 8.30 am. To 8.00 pm. In general case. In this type of situation running the plant for very small occupancy we found this system very uneconomic so we have started the following system for running of a A.C.Plant. The A.C. Plant now begin at 9.00 am to match with A.C. requirement in the office area at 10.30 am.

However we stops the plant running at 6.30 pm instead of 8.00 pm. To give A.C. facilities in chambers in the office hours only. If somebody wants to seat after office hours. He has to put on the ceiling fan or pedestal fans where as the case may be. Thus we save the energy by reduction in the timing for running of 1050 ton Air conditioning plant.

Thus by adopting above timing for the A.C. Plant / energy savings steps in comparisons with the year sept 01 to October 2002 the net saving is **887640 KWH** and **Rs. 2589263/-** as per the factual data.

Power Saved in kWh = 887640

Power Saved in Amount= Rs. 2589263/-

October'2003 to September'2004

Replacement of helogen fittings by S.R. G.B. fittings in central assembly hall for Gujarat State



Tots Nos. of helogen fittings	= 48 Nos. of each of 1000 watts	
Total consumption	= 48 Kw	
Total No. of S.R.G.B. fittings	= 50 Nos. of each of 330 watt	
Total consumption	= 50 x 330 / 1000	= 16.5 Kw
Total Savings	= 48 Kw – 16.5 Kw	
	= 31.5 Kw	



The Assembly Hall illuminated by installing 48 Nos. halogen fittings each of 1kW. However by edging effect and non-availability of the spare parts. It was a need to replace the halogen fittings. This office decided to go for Energy-Saving fittings so in place of halogen fittings SRGB (Canara make) fittings are installed. One fitting consumes only 330 watts and gives illumination more than that of 1kW halogen fittings; by this way energy saving is achieved.

Step-2

Replacement of conventional cooling tower installed at Terrace of the building by FRP cooling tower including installation place from terrace to ground floor. In the sachivalaya complex the total air-condition made through central A.C. Plant of the capacity 1050 TR. For water cooling system we had two nos. of cooling towers situated at the terrace of the building for water circulation system there were ten nos. of 35 HP motor pumps used in this project. We have now installed three Nos. of RRP cooling towers at the ground floor level. Mean the plant it self. Thus instead of running all the ten nos. of 35 HP motor pump set now we can match the requirement of water circulation system by only power pumps.



The tentative calculation for power savings is mention below

For conventional cooling Towers

$$35\text{Hp} \times 10 \text{ Nos.} \times 0.746 = 261.1 \text{ Kw}$$

For FRP Cooling Towers

$$35\text{Hp} \times 4 \text{ Nos.} \times 0.746 = 104.44 \text{ Kw}$$

$$\begin{aligned} \text{Total Saving in Kw} &= 261.1 - 104.44 \\ &= 156.66 \text{ Kw} \end{aligned}$$

Increase in load in the year of 2003-04

1500 computers are installed in the various govt. department during the year. So the total load of computers is tentatively calculated as below :-

$$1500 \text{ Nos.} \times 300 \text{ W} / 1000 = 450 \text{ Kw}$$

It has also appeared in total connected load in Kw for the year 2003-2004

2. In the Sachivalaya complex total renovation as taken place on fifth floor of block no. 1 and we have installed 30Nos. split A.C. Machine of different capacity. The total 52 tons capacity A.C. Machines are installed.

$$\text{So } 52 \times 1400 / 1000 = 78 \text{ Kw}$$

$$\begin{aligned} \text{Total load increased} &= 450\text{Kw} + 78 \text{ Kw} \\ &= 528 \text{ Kw} \end{aligned}$$

So looking to the above calculation theoretically

$$528 \times 0.6 = 316.8 \text{ kw increased in load looking to the 60 \% utility factor}$$

However looking to the details given in 6 (V) the increased in connected load

$$= 6338 - 5855 \text{ compare with 2002 to 2003}$$

$$= 438 \text{ Kw.}$$

So inspite of savings 156.66 Kw the bill and Kwh is increased in consumption with compare to 2002-2003 over all increased in load

$$= 316.8 - 156.66 \text{ Kw}$$

$$= 160.14 \text{ Kw}$$

Thus savings achieved by the Energy savings above steps the bill as well as the KWh is incurred in the year 2003-2004

The tentative calculation to be increased. Kwh

$$\begin{aligned} &= 160.14 \times 11 \text{ Hrs} \times 24 \text{ days} \times 12 \text{ months} \\ &= 507323 \end{aligned}$$

Looking to the factual data kWh increased

$$\begin{aligned} &= 7016160 - 6716610 \\ &= 299550 \text{ Kw} \end{aligned}$$

So we can say that the total Kwh saving

$$= 507323 - 299550$$

$$= 207773 \text{ Kwh}$$

$$\text{Overall savings in Rs. } 207773 \times 3.33 = 691884/-$$

Tentative calculations of savings by implementing energy savings steps

$$\begin{aligned} \text{Total Savings in Kwh} &= 156.66 \times 1 \text{ Hrs} \times 24 \text{ Days} \times 12 \text{ Months} \\ &= 496298.88 \end{aligned}$$

$$\begin{aligned} \text{and tentative savings in Rs.} &= 496298.8 \times 3.33 \\ &= \text{Rs. } 1652675.20 \end{aligned}$$

However here we can say that the savings achieved in the year 2002-2003 with compare to 2001-02 is also appeared as a recurring savings.

Oct'2004 to Sept'2005

Project One :- Replacement of Sodium Street Light fittings by metal helide street lights fittings



In the Sachivalaya Complex campus there were 200 Nos. of Street Light fittings installed on poles for street light (Compound Lighting)

$$\begin{aligned} \text{The total Load} &= 200 \text{ Nos} \times 350 \text{ Watt} / 1000 \\ &= 70 \text{ Kw} \end{aligned}$$

We replaced the above fittings by installing 150 watt metal helide fittings

$$\begin{aligned} \text{The total load} &= 200 \text{ Nos} \times 200 \text{ W} / 1000 \\ &= 40 \text{ Kw} \end{aligned}$$

$$\begin{aligned} \text{So total savings in Kw} &= 70 \text{ Kw} - 40 \text{ Kw} \\ &= 30 \text{ Kw} \end{aligned}$$

Increase in Load

(1) In the different department in the campus 600 Nos of additional computers are installed. The load of the computer is calculated as

$$600 \text{ Nos} \times 300 \text{ W} / 1000 = 180 \text{ Kw}$$

(2) Increased in load due to installation decorative fountain in front of Block No.1



Total Nos. of Motor 3 – (10 HP, 7.5HP & 7.5 HP)
 Total lighting 60 Nos of 150 W compatalux lamps & 18 Nos of flood light each of 500 watt

$$\begin{aligned} \text{Total load of fountain} &= (10 + 7.5 + 7.5) \times 0.746 \\ &= 18.65 \text{ Kw} \dots\dots\dots (a) \end{aligned}$$

$$\begin{aligned} \text{Total lighting load} &= (60 \text{ Nos} \times 150 \text{ W}) / 1000 + (18 \text{ Nos} \times 500\text{W})/1000 \\ &= 9 \text{ Kw} + 9 \text{ Kw} \\ &= 18 \text{ Kw} \dots\dots\dots (b) \end{aligned}$$

$$\text{Total Kw} = a + b$$

$$= 18.65 + 18$$
$$= 36.65 \text{ Kw}$$

So total increase in load

$$= 180 \text{ Kw} + 36.65 \text{ Kw}$$
$$= 216.65 \text{ Kw}$$

Looking to the above calculation during the year overall increase in load

$$= 216.65 - 30$$
$$= 186.65 \text{ Kw}$$

Thus instead of increase in connecting load the savings achieved in terms of Kwh with ref. to Oct2003 to September 2004 is

$$= 70161160 - 6716700$$
$$= 299460 \text{ & in}$$

Terms of Rs.

$$= \text{Rs. } 33451031 - 32714991$$
$$= \text{Rs. } 736040$$