Feasibility Assessment of a Land Development for Recreational Purpose in Peradeniya, Sri Lanka

Kumudu Vidana Gamage

Abstract: In this study, an alternative proposal was done for the engineering and technology Centre, which was proposed to have in Peradeniya area in Sri Lanka near the faculty of engineering, within university premises. Therefore, it is essential to include professional buildings in the land.
It has been widely recognized that the land, which is bordered by the Kandy-Gampola road, Mahaweli River and the footpath between the Akbar halt and the Akbar Bridge, should be improved in order to attract both local and foreign tourists with the aids of conference hall, technical museum, information and technology centre, children's park and a restaurant.
In order to protect the site from the flood, a dyke was proposed. Due to the steep slope, a road cannot be provided along the existing ground surface of the site. Therefore, a bridge was designed along the slope to overcome the high gradient of the slope as well as to increase the attractiveness. An Information & technology centre was designed for ninety users and it can be used to conduct computer classes and to provide computer facilities with internet, to the people who are using the facilities within the premises. A technical museum was designed to educate the people about the history of the discoveries and the current developments in the engineering field. A conference hall was design for 300 participants. Other than having conferences, it can be used for hold workshops, educational programs, films and stage dramas.
The project was estimated to a total cost of hundred and fourty nine million rupees inclusive of the equipment, furnishing and initial establishment costs. The present proposal was to construct a well-planned, aesthetically pleasing and economically sustainable Engineering & Technology Centre (ET Centre) to achieve above objectives.

Keyword: **Professional Buildings, Technical Museum, Dyke, IT Centre**

1. INTRODUCTION

It has been widely recognized that the land which is bordered by the Kandy-Gampola road, Mahaweli River and the footpath between the Akbar halt and the Akbar Bridge should be improved in order to attract the both local and foreign tourists. The area of the land was 7.5 acres. Since the land is located in the university premises between the faculty of Engineering and the faculty of Arts, it was essential to include professional buildings in the land.

Because of the increasing tendency of having conferences in Kandy region, there is a necessity of a suitable conference hall. In addition, since the land is located in the university premises there is a possibility of using the above hall as an auditorium to show films and dramas. Due to the unchanging curiosity of the people to realize that how the things have been evolved through the history, it is necessary to having a technical museum within the premises.

In order to provide the internet facilities to the people those who are participating to the conferences there should be an Information & Technology center. In addition, the Information & Technology center can be used for conducting computer classes for both university students and outside people.

Since there is a conference hall within the premises, it is necessary to provide the accommodation facilities to the participants. So having a rest house is very vital. Other than that, there are many tourists in Kandy region during the "Kandy perahara" season. Therefore, the rest house can be even used to fulfill their accommodation requirements and it will be a rest place for those who traveling trips along the Kandy-Gampola road bounding Nuwara-Eliya and Sripadha. The layout diagram of the proposed land development site is shown in Figure 1.

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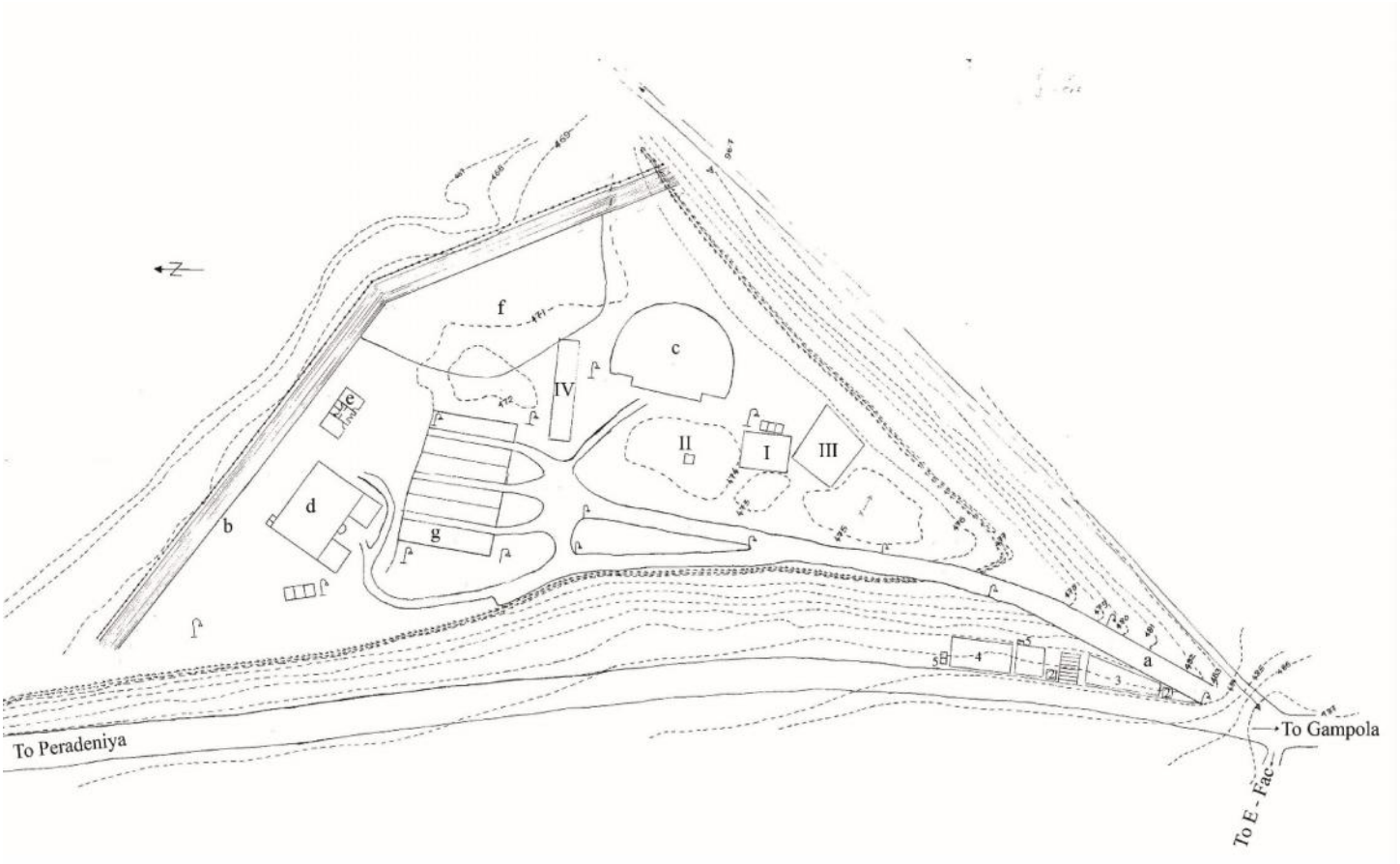

Fig -1: Layout Diagram of the Site

2. MATERIALS AND METHODS

2.1 DATA COLLECTION

2.1.1 Collection of Flood Data

It was necessary to study the flood levels of the Mahaweli River as the land was situated near by the river. A project report [1] about the flood plain analysis of the same land was followed in order to have an idea about flooding risk of the land. The water levels of the Mahaweli River before and after the construction of Kotmale reservoir have also been analyzed.

2.1.2 Collection of Rainfall Data

Due to the proposed dyke and the surrounding embankments, there was a risk of flooding the site in heavy rainy times. Hence it was necessary to design a proper drainage system that could capable of convey the rain water to the river without flooding the site. Hence rainfall data within ten years (1995 to 2005) at Gannoruwa gauging station was collected from the Natural Resources Management Centre of Peradeniya.

2.1.3 Collection of Data from Kandy National Museum

The curiosity of people to realize that how the things have been changed and developed through the history is not going to be changed. Having a technical museum within the premises is a good opportunity to attract both local and foreign tourists. Having that purpose, data from Kandy National Museum was collected.

2.1.4 Collection of Data for the Conference Hall

The tendency of having conferences around Kandy area has been increased during last few years. Therefore, the demand for a conference hall has been increased. Other than that, there is a possibility of using the hall as an auditorium for showing films and stage dramas. Therefore, the data of recent past conferences, which was held around Kandy area, was collected.

2.1.5 Data Collection for the Information & Technology Centre

The presence of the conference hall in the premises attracts various kinds of people from different parts of the world for conferences. Therefore, it is needed to have computer facilities within the premises. With the view of providing computer facilities for the participants for conferences and for conducting computer classes, an Information & Technology centre was designed. Since, there is a great demand for the computer education today and the Peradeniya town is very populated, it is economical to provide an Information & Technology centre for conducting computer classes.

Required details for the designing of an Information & Technology centre was collected from Peradeniya University Information & Technology centre. The details of number of computers, space required for a computer and the arrangement of computers were collected from the university Information & Technology centre.

2.1.6 Data Collection for the Hotel
Because of the limited availability of accommodation facilities in Peradeniya area, it is worth to include a hotel in the premises which provide accommodation facilities for the people participating for conferences and in addition to that, this can be rented out for the outside parties that are going trips and pilgrimages. With this intention details of visitors in few hotels during various seasons were collected. Further, details of visitors to Peradeniya botanical garden were also collected. For the reason that, when designing the hotel, it was assumed that certain percentage from this would get accommodate in the designed hotel.

2.2 PRELIMINARY CALCULATIONS AND CONCEPTUAL DESIGNS

2.2.1 Design of the Entrance to the Site
Since the Akbar halt, entrance to the faculty of engineering and the entrance to the site are much closed to each other, the place is going to be very congested especially during the office hours. Therefore, in order to avoid that congestion, a channelization was provided. Other than that, a zebra cross section was provided in the backside of the Akbar halt.

2.2.2 Design of the Bridge
Due to the steep slope, a road cannot be provided along the existing ground surface of the site. Therefore, a bridge was designed along the slope in order to overcome the high gradient of the existing ground.

2.2.3 Design of the Dyke
After analyzing the collected data, the maximum flood level that the site can undergo was identified and a dyke was designed to protect the site from this flood.
Side of the dyke, which is facing to the children's park, was provided with the steps. So, the parents or guardians of children can be seated on those steps. A handrail was provided over the dyke in order to protect the people. The outer side surface of the dyke was kept as slope. The dyke was proposed to construct using 1:2:4 concrete.

2.2.4 Design of the Drainage System
Analyzing the collected rainfall data, the month with the maximum rainfall was taken and it was assumed that rainfall was fallen within one day. With that assumption, the drainage system was designed and this can be directed to the Mahaweli River without any problem.

2.2.5 Design of the Cafeteria, Bookshop and the Restaurant
The cafeteria, bookshop and the restaurant were enclosed into one building as it was easy for people, those who have accommodated in the rooms to get their meals. In addition, since the cafeteria is a noisy place it was crucial to keep it separated from the conference hall, Information & Technology center and the technical museum. Since the top slab of the building was in a high elevation, the two water tanks could be located on top of that. The heights of each floors and the top level of the building with respect to the mean sea level were designed accordingly.

2.2.5.1 Design of the Cafeteria and the Bookshop
The cafeteria was designed to provide food facilities for the participants of the conferences and those who are coming to visit the museum and the Information & Technology centre. A bookshop was designed near to the cafeteria with a view of providing souvenirs for the visitors. By considering the comfortability of the users and with the intension of providing nice looking atmosphere to the accommodators, the cafeteria was located in the ground floor while the rooms were in upper floors.

2.2.5.2 Design of the Restaurant
The restaurant was designed in order to provide accommodation for the people those who are coming to conferences. In addition, the other local and foreign tourists can reserve the restaurant for their accommodation. The restaurant was comprised with six single rooms, eighteen double rooms, and six large rooms. Altogether, there were thirty rooms, so Environmental Impact Assessment was not required. Other than that, it has two common kitchens, two common washing rooms, two common rooms and two visitors' rooms as one in each floor. The arrangements of the first floor and the second floor of the building were same.

2.2.6 Design of the Information & Technology Center, Technical Museum and the Conference Hall
Since a calm and quiet environment is required for the Information & Technology center, technical museum and the conference hall they were enclosed into one building. In order to overcome the discomfort of the students and the other computer users, the Information & Technology center was located in the ground floor of the building. With the intension of providing a noiseless background for the conference hall, it was located in the top floor of the building. The heights of each floors and the top level of the building with respect to the mean sea level were designed accordingly.

2.2.6.1 Design of the Information & Technology Centre
To accommodate hundred computers, the Information and Technology centre was designed by considering the area required for a single computer.

2.2.6.2 Design of the Technical Museum
The technical museum was designed with the intension of exhibiting history of engineering in Sri Lanka, the technological discoveries and developments in all over the of the world and inventions & projects of the engineering undergraduate students.
Using the collected income data, the maximum number of people who can visit the museum at a time was calculated.

2.2.6.3 Design of the Conference Hall
After analyzing the collected data, the average number of people that could participate to a certain conference was found. Other than that in order to show films a screen was provided and a stage and two dressing rooms were provided for stage dramas. In addition, six interpretation rooms for translators and an area for media were allocated.

2.2.7 Design of the Water Tanks
After calculating the total number of people that can be present in the premises, water demand for all locations including the Information & Technology center, Technical Museum, Conference Hall and for the restaurant was calculated [2].
These two water tanks will be constructed on the top of the restaurant building.

2.2.8 Design of the Car Park
The car park was designed with the intension of providing the parking facilities for those who are visiting to the institute.

2.2.9 Design of the Children's Park
The children's park was designed with the intension of providing a suitable place to play for the children in the families that are accommodating in the restaurant and visit to the site. In the middle of the park, a pond was provided and around that, the other playing instruments were located.

2.2.9 Design of Air-Conditioning System
An air conditioning system was designed for the conference hall and information technology centre [3].

2.2.11 Design of Fire Precautions
As it is vital to have fire precautions, required number of fire precaution cylinders for each location was calculated [4].

2.3 COST ESTIMATION
After all requirements have been finalized, the total project cost was estimated.

3. RESULTS

3.1 COLLECTED DATA

3.1.1 Flood Data
The flood contour map after the construction of Kotmale reservoir was referred and it is indicated in the Fig. 2.

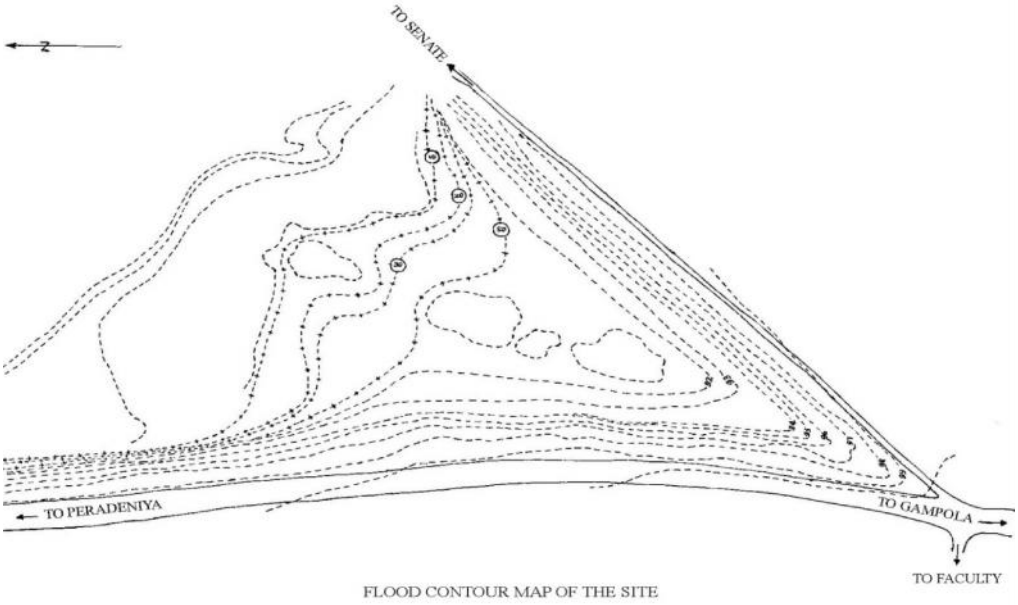

Fig -2: Flood Contour Map of the Site

3.1.2 Rainfall Data
Rainfall data collected from Gannoruwa g

Table 1: Monthly Variation of Rainfall in Millimeters

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
1994	62.8	147.9	0.0	104.0	97.8	58.9	203.5	47.4	101.3	382.7	301.3	59.9
1995	212.5	90.4	78.5	256.7	256.5	97.7	53.0	96.3	128.6	413.1	272.2	24.5
1996	4.1	84.7	68.8	281.6	10.8	140.8	144.0	104.7	256.1	271.5	249.4	197.9
1997	0.0	2.2	0.0	122.9	239.0	52.3	139.8	86.6	386.2	283.8	434.1	181.5
1998	44.3	2.7	50.2	58.3	169.0	148.7	287.5	147.9	356.8	221.1	161.4	193.9
1999	192.2	150.7	111.8	335.1	260.3	241.9	73.3	68.4	111.6	347.1	283.0	109.9
2000	82.1	177.1	78.0	255.0	160.8	103.7	47.0	226.4	155.6	219.1	166.7	170.5
2001	154.2	66.7	32.1	350.9	45.5	130.4	205.2	18.9	218.7	173.9	143.7	387.2
2002	14.6	26.8	148.5	579.9	180.3	179.3	117.2	155.4	66.8	205.6	404.9	130.7
2003	171.3	26.3	188.6	237.4	91.4	107.7	150.3	132.2	107.6	121.8	179.8	9.0
2004	9.8	18.2	230.4	172.9	125.6	165.2	109.5	95.4	91.7	152.3	160.0	249.8

3.1.3 Data for National Museum

The collected income levels in the Kandy National Museum are shown in the Fig 3 and Fig 4.

Day	Income (Rs.)
Mon	22500.00
Tue	18750.00
Wed	21300.00
Thu	22600.00
Fri	20000.00
Sat	26500.00
Sun	27500.00

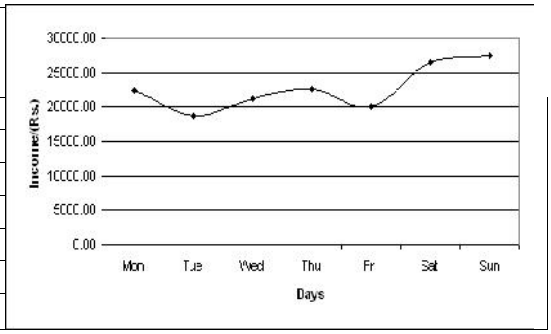

Fig -3: Daily Variation of Average income of Kandy National Museum

Month	Income (Rs. Lakhs)
Jan	9.0
Feb	6.5
Mar	6.5
Apr	7.0
May	6.7
Jun	10.5
Jul	27.0
Aug	22.5
Sep	9.8
Oct	6.7
Nov	6.5
Dec	8.0

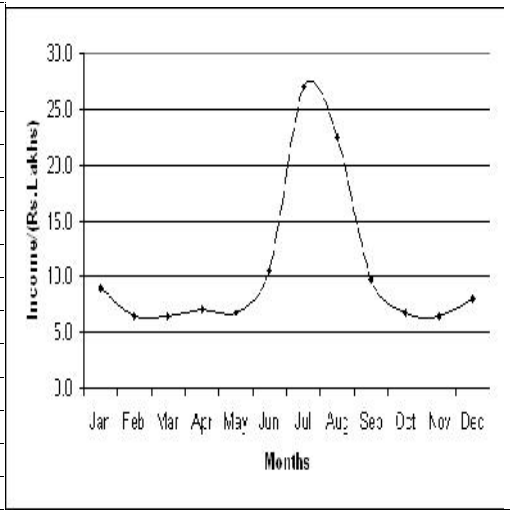

Fig -4: Monthly Variation of Average Income of Kandy National Museum

3.1.4 Data for the Conference Hall

Details collected from the past conferences held in Kandy was collected and shown in Table 2.

Table -2: Details of Recent Past Conferences

Category of Participants	Asian Congress of Fluid Mechanics	International Conference on Industrial and Information Systems
Foreign	125	121
Local	25	185
Committee Members	32	41
Total	**182**	**347**

3.1.5 Data for the Hotel

Data collected from Peradeniya botanical garden from year 2001 to 2006 is shown in Table 3 and from various hotels in Kandy is shown in Table 4.

Table -3: Visitors to the Botanical Garden in Year 2001 - 2006

Month	Local Adults	Local Children	Foreign Adults	Foreign Children	Foreign Students
Jan	270682	24464	72406	1106	860
Feb	339348	44689	80027	1114	952
Mar	271339	142817	79577	642	1047
Apr	321128	102574	60602	1532	957
May	293752	83427	41172	680	592
Jun	272522	124951	35493	643	732
Jul	305888	189643	65294	2566	2474
Aug	347138	109519	67082	2711	2127
Sep	278939	67716	53730	290	840
Oct	205975	51450	46157	659	667
Nov	165121	25184	54722	381	677
Dec	233152	24753	48332	1372	1070

Table -4: Details of Hotels

Hotel	No. of Rooms
Hilltop	55
Hotel Topaz	80
Earls Regency Hotel	159

3.2 CALCULATIONS AND CONCEPTUAL DESIGNS

3.2.1 Design of the Entrance to the Site

The proposed design for the entrance to the site is shown in Figure 5. To avoid the congestion near the site entrance, a channelization was provided.

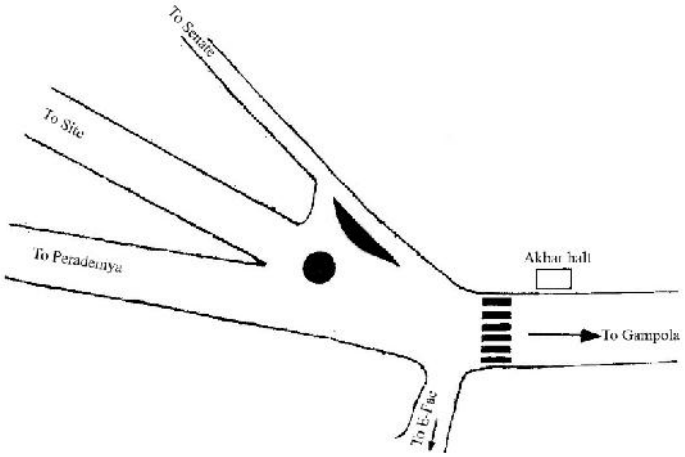

Fig -5: The Layout Diagram of the Entrance Area

3.2.2 Design of the Bridge

Due to the steep slope, a road cannot be provided along the existing ground surface of the site. Therefore, a bridge was designed along the slope in order to overcome the high gradient of the existing ground. The gradient of the

proposed bridge and the existing ground slope is indicated in the Figure 6.

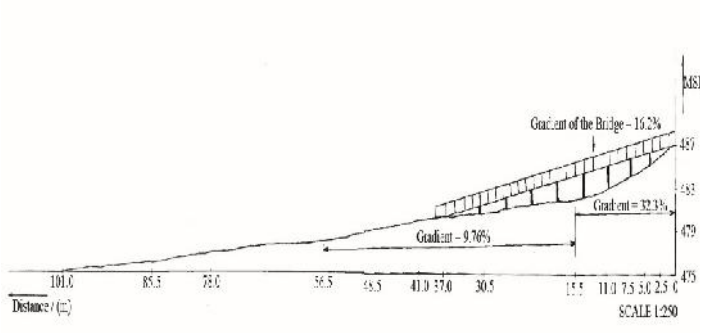

Fig -6: The Gradient of the Existing Ground and the Gradient of the Proposed Bridge

3.2.3 Design of the Dyke

As the Figure 2 shows, the maximum flood level that the site can undergo is fifty years flood. So, a dyke that can protect the site from the fifty years flood was proposed.
Bottom level of the dyke from M.S.L.= 470 m
Level of 50 years flood from M.S.L.= 474 m
Therefore, required height of the dyke= (474-470) m
= 4 m
Side of the dyke, which is facing to the children's park, was provided with the steps. So, the parents or guardians of children can be seated on those steps. A handrail was provided over the dyke in order to protect the people. The outer side surface of the dyke was kept as slope. The dyke will be constructed by using 1:2:4 concrete. The cross section of the dyke is shown in the Fig. No. 3.3

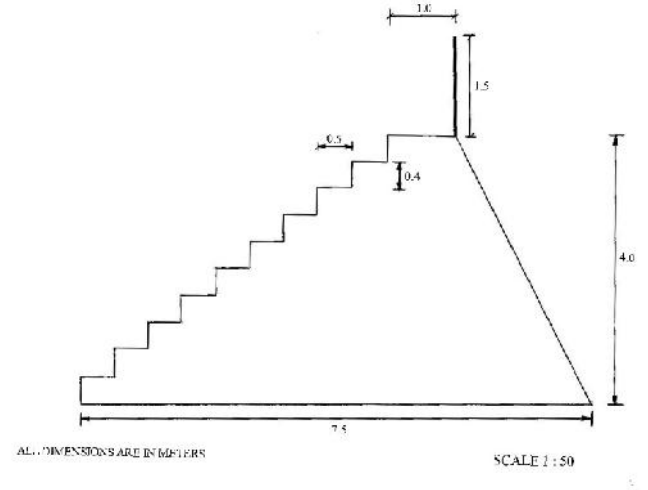

Fig -7: The Cross Section of the Dyke

3.2.4 Design of the Drainage System

According to the collected rainfall data, the month with the maximum rainfall was taken and it was assumed that rainfall was fallen within one day.
Maximum rainfall= 579.9 mm
= 0.58 m
Total area= 28330 m^2
Therefore, total volume of rain water= 0.58 * 28330 m^2
= 16431.4 m^3
Assume the rain exists over one day
Therefore, flow rate of rain water = 16431.4 m^3

24*3600
= 0.19 m^3/s
Assume the velocity of rainwater through the drain is 1 m/s
Therefore, minimum cross sectional area of the drain= 0.19 m^3/s

1 m/s
= 0.19 m^2
Therefore, the width of the drain= 0.6 m
Height of the drain= 0.6 m
Designed cross sectional area of the drain= 0.6 * 0.6 m^2
= 0.36 m^2
According to the designed drain, the rainfall, which falls in to the site, can be directed to the Mahaweli River, without any problem.

3.2.5 Design of the Cafeteria, Bookshop and the Restaurant

The cafeteria, bookshop and the restaurant are enclosed into one building, because it is very helpful to people, those who have accommodated in the rooms to get their meals. In addition, since the cafeteria is a noisy place it must be separated from the conference hall, Information & Technology center and the technical museum. Since the top slab of the building is in a high elevation, the two water tanks were located on top of that. The heights of each floors and the top level of the building with respect to the mean sea level were designed as follows.

Assume;
Height of the ground floor (canteen & bookshop) = 5.0 m
Height of the first floor (restaurant) = 5.0 m
Height of the second floor (restaurant) = 5.0 m
Height of the roof= 5.0 m
Total height of the building= (5.0+5.0+5.0+5.0) m
= 20.0 m
Base level w.r.t. M.S.L. = 470 m
Therefore, top level w.r.t. M.S.L. = (470+20) m
= 490 m

The front elevation and the end elevation of the building is shown in the Fig. No. 3.4 and Fig. No. 3.5 respectively.

Fig -8: Front Elevation

Fig -9: End Elevation

3.2.5.1 Design of the Cafeteria and the Bookshop

The cafeteria was designed to provide food facilities for the participants of the conferences and those who are coming to visit the museum and the Information & Technology centre. A bookshop was designed near to the cafeteria with a view of providing souvenirs for the visitors. By considering the comfortability of the users and with the intension of providing nice looking atmosphere to the accommodators, the cafeteria was located in the ground floor while the rooms were in upper floors. The plan view of the cafeteria and the bookshop is indicated in the Fig. No. 3.6

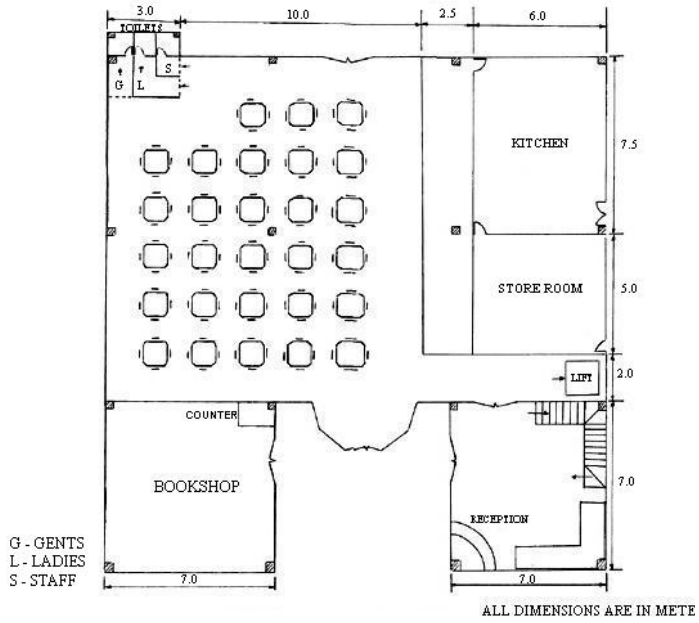

Fig -10: Plan View of the Cafeteria and Bookshop

3.2.5.2 Design of the Restaurant

The restaurant was designed in order to provide the accommodation for the people those who are coming to conferences. In addition, the other local and foreign tourists can reserve the restaurant for their accommodation. The restaurant is comprised with six single rooms, eighteen double rooms, and six large rooms. Altogether, there were thirty rooms, so Environmental Impact Assessment was not required. Other than that, it has two common kitchens, two common washing rooms, two common rooms and two visitors' rooms as one in each floor. The arrangements of the first floor and the second floor of the building are same. The plan view of such a floor is indicated in the Fig. No. 3.7.

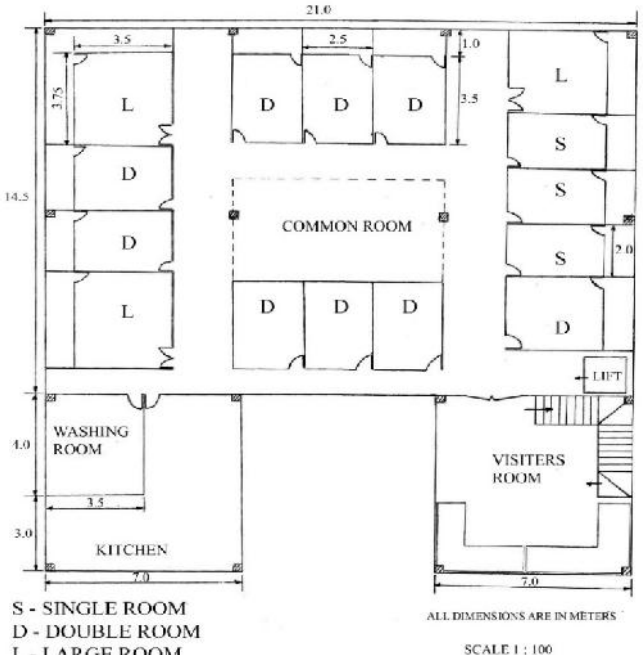

Fig -11: Plan View of the First and Second Floor of the Restaurant

3.2.6 Design of the Information & Technology Center, Technical Museum and the Conference Hall

Since a calm and quiet environment is required for the Information & Technology center, technical museum and the conference hall they were enclosed into one building. In order to overcome the discomfort of the students and the other computer users, the Information & Technology center was located in the ground floor of the building. With the intension of providing a noiseless background for the conference hall, it was located in the top floor of the building. The heights of each floors and the top level of the building with respect to the mean sea level were designed as follows.

In the conference hall, the seats will be provided in step by step in order to give a better view for those who are in back seats.

Step height= 150 mm

No. of steps= 12

Level at last step w.r.t. first step= 150 * 12

= 1800 mm

= 1.8 m

Normal height of the conference hall= 5.0 m

Therefore, required height due to steps= (5.0+1.8) m

= 6.8 m

Assume;
Height of the museum= 6.0 m
Height of the IT centre= 5.2 m
Height of the roof = 6.2 m
Therefore, the total height of the building=
(6.8+6.0+5.2+6.2) m
= 24.2 m
Base level w.r.t. M.S.L. = 472 m
Therefore, top level w.r.t. M.S.L. = (472+24.2) m
= 496.2 m

The front elevation and the end elevation of the building are shown in the Fig 12 and Fig 13 respectively.

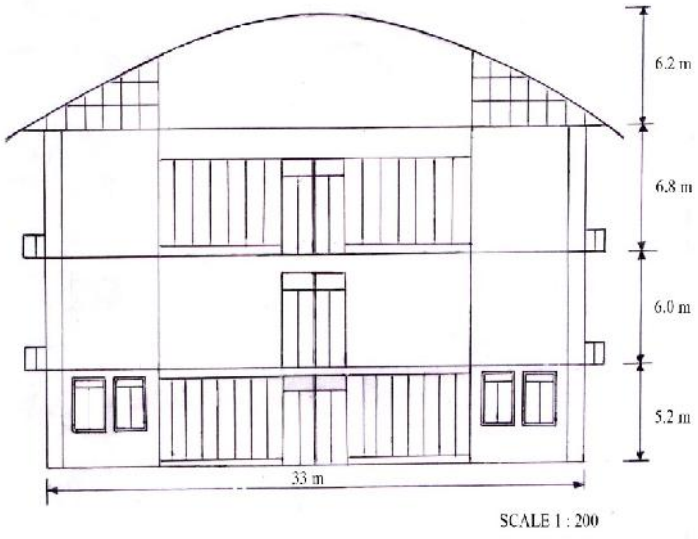

Fig -12: Front Elevation

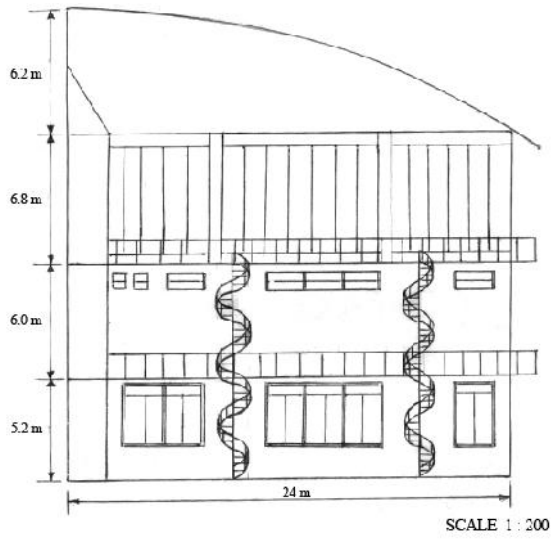

Fig -13: End Elevation

3.2.6.1 Design of the Information & Technology Centre
Design details of the Information & Technology centre is given below.
No. of computers= 100
Area required for one computer= 1 m^2
Therefore, area required for all computers= 100 m^2
The plan view of the Information & Technology centre is shown in the Fig. No. 3.10.

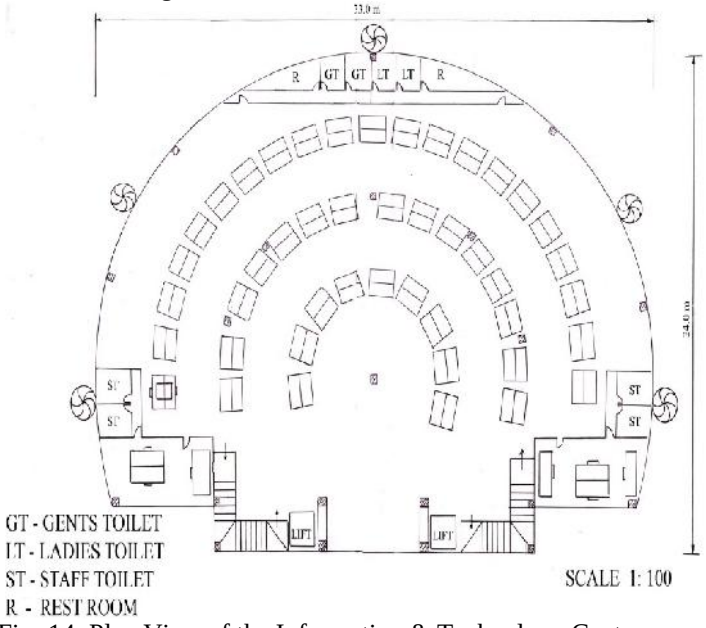

Fig -14: Plan View of the Information & Technology Center

3.2.6.2 Design of the Technical Museum
The technical museum was designed with the intension of exhibiting history of engineering in Sri Lanka, the technological discoveries and developments in all over the of the world and inventions & projects of the engineering undergraduate students. The design details of the technical museum are given below and the plan view is indicated in the Fig. No.3.11.

Total income per week= Rs.158, 000.00
Average income per day= $\frac{\text{Rs. 158,000.00}}{7}$
= Rs.22, 571.00
Assume;
Average income per day= Rs. 24,000.00
Assume 2/3 of income is gaining from foreign tourists
Therefore, income from foreign tourist= $\frac{\text{Rs. 24,000.00} * 2}{3}$
= Rs. 16,000.00
Ticket price per foreign tourist= Rs.500.00
No. of foreign tourists= $\frac{\text{Rs. 16,000.00}}{\text{Rs. 500.00}}$
= 32
Income from local tourists= $\frac{\text{Rs. 24,000.00}}{3}$
= Rs. 8,000.00
Assume half of the income is from adults and half is from children
Income from adults= $\frac{\text{Rs. 8,000.00}}{2}$
= Rs. 4,000.00
Ticket price per adult= Rs. 20.00
No. of adults= $\frac{\text{Rs. 4,000.00}}{\text{Rs.20.00}}$
= 200
Income from children= $\frac{\text{Rs. 8,000.00}}{2}$

= Rs. 4,000.00
Ticket price per child= Rs. 5.00
No.of children= Rs. 4,000.00 / Rs.5.00
= 800

Total tourists= 32+200+800
= 1032
Assume one person visits the museum one and half-hours, and the number of office hours per day is ten hours.
Therefore, no. of slots per day= 10/1.5
= 7
Therefore, no. of people at a time in the museum= 1032 / 7
= 147
Design value = 150

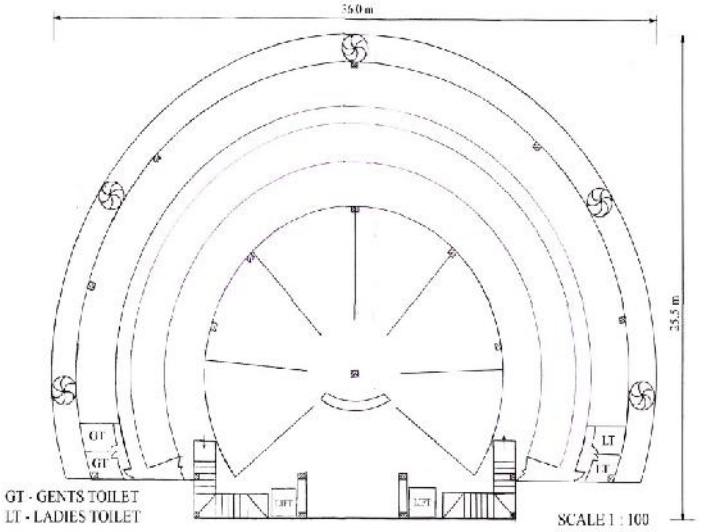

Fig -15: Plan View of the Technical Museum

3.2.6.3 Design of the Conference Hall
According to the collected data, the average number of people that could participate to a certain conference was 265. Therefore, 260 seats were provided in the conference hall. Other than that in order to show films a screen was provided and act dramas a stage and two dressing rooms were provided. In addition, six interpretation rooms for translators and an area for media were allocated. The plan view of the conference hall is shown in the Fig. No. 3.12.

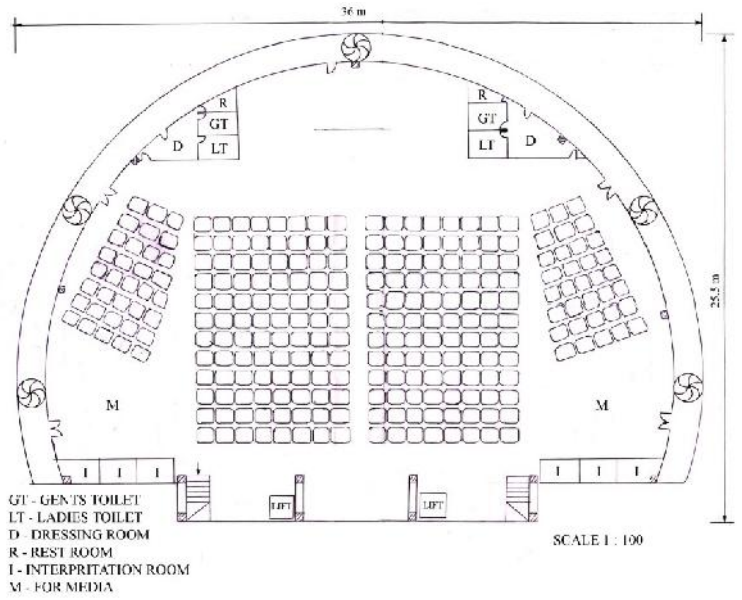

Fig -16: Plan View of the Conference Hall

3.2.7 Design of the Water Tanks
For the Information & Technology center, Technical Museum and the Conference Hall

Total number of people= 1350
Per capita usage= 20 L / h / d
Therefore, water demand= 1350 * 20
= 27000 L / d
Total water demand for two days storage= 27000 * 2
= 54000 L
= 54 m^3
Design water demand = 60 m^3

For the Restaurant
Total number of people= 190
Per capita usage= 200 L / h / d
Therefore, water demand= 190 * 200
= 38000 L / d
Total water demand for two days storage= 38000 * 2
= 76000 L
= 76 m^3
Design water demand= 80 m^3

Total water demand= (60+80) m^3
= 140 m^3
In order to have two rectangular water tanks with the dimensions of 6m * 6 m
Required height of the water tank= $\frac{140\ m^3}{2 * 6 * 6\ m^2}$
= 2 m
These two water tanks will be constructed on the top of the restaurant building. It is shown in the Fig. No. 3.4.

3.2.8 Design of the Car Park
The car park was designed with the intension of providing the parking facilities for those who are visiting to the institute. The design details of the car park are given below.
Number of People
For the museum= 150
For the conference hall= 300

For the restaurant= 60

Number of Vehicles
For the museum= 16
For the conference hall= 30
For the restaurant= 8
Total number of vehicles= 54

Calculation for the Floor Area
Area required for a car= 2.4 * 4.8 m^2
No. of cars= 54
Therefore, total area required= 2.4 * 4.8 * 54 m^2
= 622 m^2
Floor area for the access= 80 m^2
Therefore, total floor area required for the car park
= (622+80) m^2
= 702 m^2

3.2.9 Design of the Children's Park

The children's park was designed with the intension of providing a suitable place to play for the children in the families that are accommodating in the restaurant and visit to the site. In the middle of the park, a pond was provided and around that, the other playing instruments were located. The layout diagram of the children's park is shown in the Fig. No. 3.13

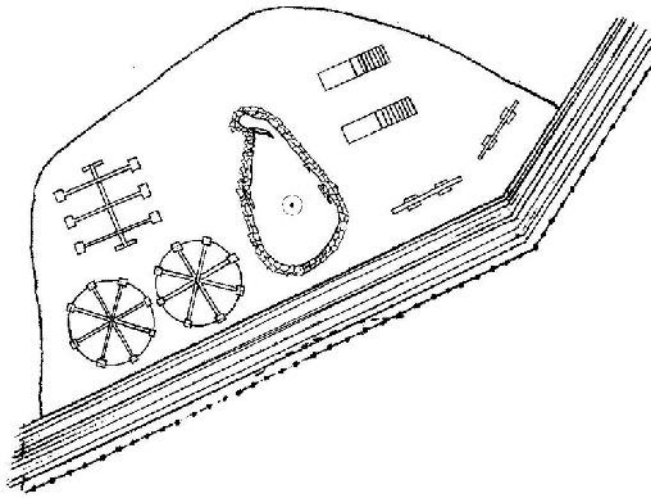

Fig -17: Layout Diagram of the Children's Park

3.2.10 Design of Air-Conditioning System

Required temperature level= 20 ^{0}C – 25 ^{0}C
Required humidity level = 50% - 60%
No. of air revolutions per hour= 3

Calculation for the Conference Hall

Heat generated from a person= 650 B.T.U. / hr
No. of people= 300
Heat generated from people= 650 * 300 B.T.U. / hr
= 195, 000 B.T.U. / hr
Heat generated from lights= 8532 W
= 8532 * 3.415
= 29, 136.78 B.T.U. / hr

$$\text{Required air content} = \frac{195{,}000 + 29{,}136.78}{73.4 * 3 * 0.019}$$

= 53,573.00 ft^3 / hr

$$\text{Cooling load} = \frac{634,\ 500 * 300}{500}$$

= 380, 700 B.T.U. / hr

Calculation for the Information Technology Centre

Heat generated from a person= 650 B.T.U. / hr
No. of people= 100
Heat generated from people= 650 * 100 B.T.U. / hr
= 65, 000 B.T.U. / hr
Heat generated from light facilities= 8532 W
= 8532 * 3.415
= 29, 136.78 B.T.U. / hr
Heat generated from a computer= 2500 B.T.U. / hr
No. of computers= 100
Heat generated from computers= 2500 * 100 B.T.U. / hr
= 250, 000 B.T.U. / hr

$$\text{Required air content} = \frac{65,\ 000+29{,}136.78+250{,}000}{73.4 * 3 * 0.019}$$

= 82,255.00 ft^3 / hr

$$\text{Cooling load} = \frac{634,\ 500 * 400}{500}$$

= 507, 600 B.T.U. / hr

Table -6: Details of Air-conditioning

Venue	Air Flow Rate (ft^3 / hr)	Cooling Load (B.T.U./ hr)
Conference Hall	53,573.00	380,700
IT Centre	82,255.00	507,600

3.2.11 Design of Fire Precautions

Weight of a cylinder= 4.5 kg
Assume;
One cylinder can use to protect 75 people

For the Conference Hall
No. of people in the conference hall = 300
Required No. of cylinders = 300 / 75
= 04

For the Information & Technology Center
No. of people in the IT center = 100
Required No. of cylinders = 100 / 75
= 02

For the Technical Museum
No. of people at one time = 150
Required No. of cylinders = 150 / 75
= 02

For the Cafeteria & Bookshop
No. of people at one time = 125
Required No. of cylinders = 125 / 70
= 02

For the Restaurant
No. of people at one time in one floor = 30

Required No. of cylinders for one floor = 30 / 70
= 01
Required No. of cylinders for both floors = 02

Total number of cylinders required = 12

3.3 COST ESTIMATION

Cost for each and every item was calculated and the total project cost was evaluated.

Table -7: Cost Estimation

Item	Amount (Rupees)
01. Mobilization and Demobilization	500,000.00
02. Earthwork	210,700.00
03. Concrete work	24,486,110.00
04. Masonry Work	924,200.00
05. Water Proofing	178,100.00
06. Plumbing	1,250,000.00
07. Electrical Installations	5,720,000.00
08. Floor and Wall Finishes	70,949,685.00
09. Doors and Windows	850,000.00
10. Painting	695,300.00
11. Roofing	10,500,000.00
12. Fire Precautions	96,000.00
13. Air Conditions	115,000.00
14. Furniture	2,021,000.00
15. Wetland	500,000.00
16. Landscaping	125,000.00
17. Children's Park	150,000.00
18. Bridge	9,605,700.00
19. Dyke	14,200,000.00
20. Car Park and Roads	2,700,000.00
21. Miscellaneous	3,000,000.00
TOTAL	**148,767,795.00**

The total project cost is 149 Million Rupees.

4. DISCUSSION

The site is in a risk of getting flood because it is located very closely to the Mahaweli river. Therefore, a dyke was proposed in order to protect the site from the flood. Other than that, the inner side of the dyke was provided with steps having the intension of providing seating facilities for those who are watching the children's park. Nevertheless, this is very costly structure and it interrupts the natural beauty of the surrounding, because people cannot see the riverside directly. However, this effect is minimized, because of that steps are provided in the dyke.

Since it is hard to find a conference hall within the Kandy region, it is very vital to have a conference hall in the premises. In addition, this can be used as a meeting place for professionals to hold their meetings, discussions and to educate people. Other than that, the outsiders could reserve this for workshops, educational programs, film festivals and stage drama. Therefore, that provides additional income for the institute. On the other hand, the times where such programs are not held then no income from the hall. Nevertheless, we have to spend the maintenance cost.

The Information & Technology center provides the computer facilities including internet facility for the participants of the conferences and for the people who accommodated in the hotel. Therefore, people have an interest of visiting the place again. The institute can gain income from hiring the Information & Technology center for computer classes. In addition, this can be used to conduct computer educational programs for university students.

Almost all the museums in Sri Lanka are historical museums. So by having a technical museum people especially like schoolchildren, foreign and local tourists can be attracted to the premises. Therefore, the institute can have a better income. This is very helpful to people those who are learning about history of the discoveries and current developments in engineering in Sri Lanka and all over the world. In addition, the engineering students have a chance to exhibit there new inventions in the area allocated for them. Therefore, they may have opportunities from the participants for conferences.

Since it is hard to find a better place for accommodate within the Peradeniya region people can be attracted to the premises by having a good quality restaurant. The participants for conferences and their family members can get accommodation facilities near to the conference hall. Therefore, that is very useful for them. The institute can have an additional income by providing the accommodation facilities for the people those who are traveling trips.

The children's' park provide a good place for playing for the children of the families those who are accommodating in the restaurant.

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BIOGRAPHIES

Kumudu Vidana Gamage is presently pursuing her Master of Philosophy degree in Civil Engineering at Curtin University, Western Australia. She has earned her bachelor of Engineering degree from University of Peradeniya, Sri Lanka and carried out this project as a fulfillment of her degree.