A Statement on How your Past And/ Or Potential Contributions to Diversity and Inclusion Will Advance ASU's Commitment to Inclusive Excellence…!!!

As Postdoctoral Research Fellow will contribute through research and development methods along with evaluating urban cooling strategies and cutting – edge technologies in close collaboration with industry and Local/ State/ Regional/ National as well as an **"International Government Disciplinary" (IGD)**. Through using a combination of computer simulation across scales, laboratory measurements, and field campaigns to inform the development and optimal deployment of technologies and strategies for cooling neighborhoods and cities in and around the entire world scale.

Successfully and confidently… I will assist in overseeing several existing and emerging projects with local and international partners. This will include providing project oversight, mentoring graduate students, and using a combination of computational and observational skills and tools to address research questions. Indeed… such type of research efforts will significantly focus on evaluating the spatial/ temporal variability of heat (abruptly rising climatic temperature, heat waves day by day @ present situation/ condition) and air pollution from the projected sites to city scales, quantifying surface energy balances @ test sites, and using validated models to estimate impacts of large/ medium/ small/ macro – as well as micro – level scale deployment/ assignment of cooling technologies.

I would also like to work closely with other faculty in the **"Urban Climate Research Center" (UCRC)** across **"Arizona State University" (ASU),** with their graduate students, and various government and industry partners through helping coordinate and integrate related efforts… from the bottom of my heart…!!!

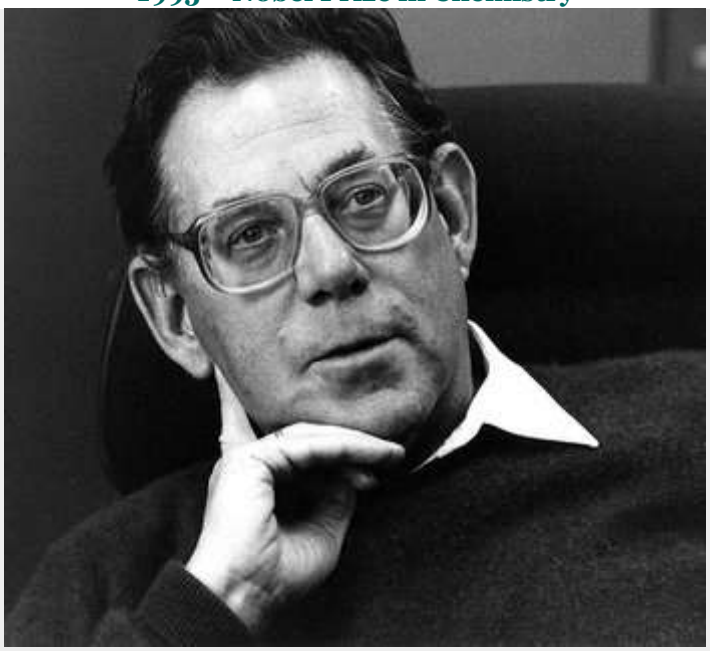
Would Like to Perform Essential Duties as Depicted Below:

1. *Instrument sites, and fieldwork for gathering and analyzing meteorological weather records and air quality index data to explore factors explaining the spatial and temporal variation of key parameters with emerging advanced technologies/ methodologies;*
2. *Development of logical as well as technological simulations models of urban cooling design alternatives applied @ either the building, civil construction work, or neighborhood projected site scales;*
3. *Also I would like to **Suggest the Most Burning Topic on "Environmental Mechanism Techniques" (EMT) and Urban "Heat Mitigation Measures" (HMM)** as depicted in the **Table 1,** which will enhance, contribute and coordinate research among team members, co – workers, researchers, academicians, mentor graduate students, and facilitate the development of technical/ applied science/ industrial engineering reports, presentations, and research work publications on interdisciplinary/ multidisciplinary approach and system, etc.…!!!*

It would be my immense pleasure to be associated with having a background in Geography, Earth, Atmospheric and Oceanic Science, Engineering {In Various Diverse Fields including Environmental as well as Civil Highways Construction Production Networks}, and another related discipline that kind of experience would be quite outstanding, prominent, remarkable, striking, exciting, enthusiastic about joining a highly interdisciplinary/ multidisciplinary teamwork efforts. The **College of Liberal Arts and Sciences (https://thecollege.asu.edu/faculty) @ ASU** values cultural and intellectual diversity, and continually strives to foster a welcoming and inclusive environment. I am exclusively and especially interested as an applicant candidature credentials… who can strengthen the College's variety or diversity records of the academic communities…!!!

Past Experience... Round about 18 Years Back...!!! Indeed it was Marvelous and Excellent Exposure And/ Or Potential Contributions as Collaborative Teamwork with Eminent Personality and Novel Laurate Professor Paul Crutzen, Max Planck Institute for Chemistry, Mainz (1933 – 2021)... when I had participated and worked for 12 days program on dated 4th to 16th October, 2004, Hanimaadhoo, Republic of Maldives, Observatory for training on **"Atmospheric Brown Cloud (ABC) Training School Program,"** announced and sponsored by **(http://www-ramanathan.ucsd.edu/)** UCSD ABC/ UNEP – RRCAP, USA California and Thailand.

1995 – Nobel Prize in Chemistry



Paul Crutzen
Max Planck Institute for Chemistry, Mainz
(1933 – 2021)

The work of **Paul Crutzen**, **Mario Molina** and **Sherwood Rowland** in atmospheric chemistry has largely contributed to explaining the chemical processes that cause ozone to form and decompose. They demonstrated, among other things, how sensitive the ozone layer is to the anthropogenic emission of air pollutants.

PRESENTATION @ MALDIVES NASA OBSERVATORY: Lecture Delivered by him on Topic Anthropocene (Prof. P. J. Crutzen) Was Highly Informative and Inspiring Conducted on 6th October, 2004.

In many ways human activities are expanding and outpacing nature. Human population, has increased tenfold in the past 3 to 4 centuries: almost half of the people live in cities and mega – cities. Almost half of the continental surface has been changed by human. The release of SO_2 (160 Tg/ Year) by coal and oil burning is at least twice the sum of all natural emission; over land the increase has been 7 fold, causing acid rain, health effects, poor visibility and climatic effects due to aerosols. Releases of NO to the atmosphere from fossil fuel and biomass burning is larger amount than natural sources, producing ozone in the troposphere.

- On the other hand large ozone depletion has been large in the stratosphere (the ozone hole);

Human impact on the atmosphere has resulted in the growth of so – called **"Green House Gases" (GHG)** leading to a **"Global Warming" (GW)** by about 0.6°C, with more to come. Human activities have grown too much that it is justifiable to propose that we are in the Anthropocene, the human – dominated era.

- *IPCC – 2001;*

  - GHG including Tropospheric Ozone (since pre – industrial times): Their effect on radiative forcing;
  - *GHG forcing ~ 2.7 W/ m² (very well known);*
  - Heating of the ocean ~ 0.3 W/ m²; and
  - *Increasing upward IR ~ 1 W/ m² (from hotter surface of earth), assuming constant relative humidity.*

Therefore, in order to get energy balance, there has been an increased albedo effect ~ 1.4 W/ m² (~ 50% of GHG). This word means that half of **"Green House Gases" (GHG)** warming is balanced by increased backscattering of solar radiation to space due to increased cloudiness and backscattering of radiation by aerosol, or a combination of both. This too probably involves human activities in short air pollution. This may imply that reducing air pollution (particularly from the atmosphere may mean increasing climate warming).

The addition of the heat of energy use by humans is about 0.025 W/ m². The problem with human energy use is that the energy largely comes from fossil fuel burning, enhancing the warming to 2.7 about 100 W/ m² times larger.

- Climate cause and effect (feedback) linkage;
- *Human activities is very hard to predict;*
- Global climate 2000: IPCC projected that the global temperature increase up to 1.4°C – 5.8°C in 2100 from the year 2000. After 1960 the temperature increase can only be explained by increasing human activities;
- *"There is new and stronger evidence that most of warning observed over the last 50 years is attributable to human activities" (IPCC – 2001);*
- To stabilize climate CO_2 reduction is required greater than 60%, Nitrous Oxide is required 70% – 80%;
- *We should not count on nature to **"Heal"** the impact of **"Green House Gases" (GHG)** emission on climate. When temperature is increasing @ the same time as CO_2 and CH_4 are also increases; and*
- GHG emission per capita is highest in North America and lowest in the developing country. Developing countries are expecting to emit increasing amount of **"Green House Gases" (GHG)** in the near future.

PRESENTATION @ MALDIVES NASA OBSERVATORY: The Role of the Tropics in Atmospheric Chemistry Was Eminently Explored and Delivered by Prof. P. J. Crutzen on 8th October, 2004.

CO_2 is important to the photosynthesis. For the chemistry in the atmosphere is not important. In the atmosphere, annual growth of methane was +0.6% per year, but has stabilized at the present. O_3 and CH_4 are very important to study chemistry in the atmosphere. They are also **"Green House Gases" (GHG)**. O_3 is very low concentration in the troposphere, but more concentration in the stratosphere (~30 Km). Nitrous oxide (GHG) is 0.31 ppm. The annual growing is +0.25% per year for annual growth. $CFCl_3$ and CF_2Cl_2 are very low concentration (0.27×10^{-9} and 0.53×10^{-9}), but there are very important in the atmosphere. Because CFC will affect O_3 in the stratosphere.

The decreasing of temperature is up to 200 mb and then stable because of ozone. From 200 mb ozone is increasing rapidly. Maximum ozone concentration can be seen usually in 20 Km – 25 Km.

Why we would have ozone in the troposphere?

The ozone from the stratosphere leak at around 310 nm and by photolysis form OD' which react water vapor to form OH, which despite very low concentration (globally average molar ratios of 3×10^{-14}) is responsible for the removal of almost all gases that are emitted by natural processes and human activities. Radical which react with trace gases can form ozone. For example CH_4, NO_X.

OH Formation : $O_3 + UV \rightarrow O('D) + O_2$
: $O('D) + H_2O \rightarrow 2OH$

Ozone get some energy (≤ 320 nm) then OH is formed. Some of gases will go to the stratosphere. Aerosol will be removed by rainfall.

Tropospheric Ozone Production Photochemical Process : $CO + OH \rightarrow H + CO_2$
: $H + O_2 + M \rightarrow HO_2 + M$
: $HO_2 + NO \rightarrow OH + NO_2$
: $NO_2 + UV \rightarrow NO + O$
: $O + O_2 + M \rightarrow O_3 + M$
: ⇨ **$CO + 2O_2 \rightarrow CO_2 + O_3$**

Ozone formation depends how much of NO is present in the stratosphere, which acts as a catalyst, If the ratio of NO and O_3 is less than 1/ 4000, the ozone is destroyed.

Ozone Formation Depends How Much of NO is Present in the Stratosphere : $CO + OH \rightarrow H + CO_2$
: $H + O_2 + M \rightarrow HO_2 + M$
: $HO_2 + O_3 \rightarrow OH + 2O_2$
: ⇨ **$CO + O_3 \rightarrow CO_2 + O_2$**

Reaction with OH determines life time of most gases that are emitted the atmosphere.

For Example CH_4 8 Years : Almost as much in the Southern as in the Northern Hemisphere.
C_2H_6 : 2 Months etc.
C_5H_8 (Isoprene Emitted by Trees) : A few hours... Only in Tropical Forest...!!!

OH does not react with $CFCl_3$, $CFCl_2$ CCl_4 etc.

At wavelength less than 200 nm the main gases, oxygen and nitrogen absorbed solar radiation at high altitudes. In the range of 200 nm – 300 nm is O_3. 310 nm is UV – B comes down to the surface and will damage the skin. So wavelength is less than 310 nm is safe for humans.

- *Distribution of tropospheric O_3 still uncertain;*
- *Distribution of CO still uncertain; and*
- *Distribution of CO still uncertain, distribution of NO_x even far less certain, vary variable.*

Time series of GHG: Methane is increasing to the present day, but has now stabilized (no growth at present).

Tropospheric Sources of NO (10^{12} g N/ Year)

Natural	:	*Soil*	:	5 – 20
	:	*Lightning*	:	2 – 10
	:	*Stratosphere*	:	0.5 ($N_2O + O'D \rightarrow 2NO$)
Anthropogenic	:	*Fossil Fuel Burning*	:	21 – 33
	:	*Biomass Burning*	:	2.5 – 10
	:	*Aircraft Operation Activities*	:	0.6

The comparison among several years (during 1968 – 1989) found that ozone concentration in 1968 was less than in 1989 in the troposphere, but in the stratosphere is vice versa. We can do the ozone modeling and take a look the results.

In 1965: *Maximum total ozone in the spring in both the Southern Hemisphere in the Northern Hemisphere. In the tropic area the ozone is minimum, about 280 Dobson Units, corresponding to 2.8 mm*

of ozone if it could be compressed to conditions of the earth's surface. Note that 90% of all ozone in the atmosphere is formed in the stratosphere.

Minimum total ozone in the vertical and maximum water vapor are formed in the tropics. That is where most OH is formed. The density activity in the atmosphere by reaction with OH maximizes in the tropics. The tropic should, therefore, be the cleanest part of the atmosphere. Unfortunately, the pollution sources over land are also very strong in the tropics, especially during the dry season.

How much methane and **"Carbon Monoxide" (CO)**: between industrial era (in the 1980's) and pre – industrial era.

CH_4 Budget (10^{12} g/ Year)

Losses (1980 – 1990 Average)	:	*Troposphere (OH)*	:	530 ± 50
	:	*Soil Uptake*	:	30 ± 10
	:	*Stratosphere (OH, Cl, O'D)*	:	40
			:	600 ± 60
	:	*Average Increase Rate*	:	30
		Total Source	:	**630 ± 60**
Losses (Pre – Industrial)	:	*Troposphere (OH)*	:	240
	:	*Soil Uptake*	:	15
	:	*Stratosphere*	:	20
		Total Natural Source	:	**275**
Anthropogenic Contribution (630 – 275)	:	***Mixed Sources***	:	**355**
	:	*Ruminants*	:	*80 ± 20*
	:	*Animal Manure*	:	*30 ± 10*
	:	*Rice Fields*	:	*65 ± 40*
	:	*Biomass Burning*	:	*40 ± 20*
	:	*Municipal Landfills*	:	*40 ± 20*
	:	*Natural Gas/ Oil*	:	*65 ± 15*
	:	*Coal Mining*	:	*35 ± 10*

CONCLUSION:

METHANE EMISSION AND CONCENTRATIONS HAVE INCREASED BY MORE THAN 2 TIMES. THIS IS CONFIRMED BY CH_4 MEASUREMENTS IN ICE CORES.

MENTION THAT BIOMASS BURNING IS A MAJOR SOURCE OF POLLUTION IN THE TROPICS. IF WE CONSIDER BIOMASS BURNING, MUCH OF IVOLVING DEFORESTRATION, SAVANNA GRASS FIRES, AGRICULTURAL WASTE BURNING AND SHIFTING AGRICULTURE, IT BECOMES CLEAR THAT AIR POLLUTION IS VERY STRONG IN THE TROPICS, INCLUDING THE TROPICAL AND SUBTROPICAL SOUTHERN HEMISPHERE. BIOMASS BURNING LEADS TO HIGH LEVELS OF POLLUTANTS, FOR INSTANCE CO, NO_X AND O_3 (OZONE), WHICH HAS BEEN OBSERVED. EVEN FROM SATELLITES OR SPACE CRAFTS LAUNCHING SYSTEM WHOLE AROUND THE GLOBE ETC...!!!

1. Urban Heat Mitigation Strategies, Technologies in Terms of Cooling Cities Strategies... to Mitigate Urban Heat

Description: Although the **"Urban Heat Island" (UHI)** phenomenon was been documented over a century ago, the effect of the urban heat island on the urban climate and environment during the summer has only been the focus of research over the last three to five decades. One main characteristic of the recent research has been to evaluate the summertime Heat Waves' effects on UHI through Energy Use, Air Pollution, Outdoor Ambient Temperature, and Citizen Health. The second aspect of the recent research has been the development and evaluation of materials to counter the effects of summertime UHI. This study provides a selective representation (by topic) review of the research on the development and evaluation of **Urban "Heat Mitigation Measures" (HMM),** including cool roofs, cool pavements, and urban vegetation.

This diversified and expanded analysis of the different natural and built environment strategies and technologies for adaptation – ***"Urban Greenery, Green Roofs, Walls, Water – Based Technologies, Cool Roofs, and Cool Pavements – To Help Local Governments Reduce the Effect of Increased Heat on Their Communities and Citizens"****. The study stresses that "individually, each mitigation strategy can reduce high temperatures in urban areas; together in a citywide adoption, they can drastically reduce the* ***"UHI" (Urban Heat Island)*** *effect itself while providing many additional co – benefits".*

This discussion also examines the existing urban heat mitigation policies and interventions, including "government operations themselves, mandatory or incentives for private choices, and public education. Governments face challenges in adapting to urban heat because of the complexity of choices available, limited resources, the need to coordinate among many local agencies, and, in some cases, skepticism about **"Climate Change" (CC)** as depicted in **Table 1**. Although commissioned by many governments, the geographical focus is mainly characterizing the policy recommendations, while the analysis of the available policies, measures, and technologies has a global focus and can be relevant for European countries, in particular, the Southern ones.

As illustrated in **Figure 1** the urban energy balance is driven by shortwave radiative input from the sun. In mid – latitudes, the summer midday shortwave flux may exceed 1000 W/ m^2. As the shortwave radiation reaches surfaces in the urban environment it is partially absorbed and partially reflected. The ratio of reflected total incoming solar radiative heat flux is referred to as the albedo. It is important to note that solar radiation spans the frequency spectrum with most of the sun's energy content being concentrated in the shortwave (0.4 μm to 0.7 μm) visible range. Hence high albedo surfaces are generally characterized by being light in color, or white. One key cause of heat islands is that cities tend to have lower albedos than the unbuilt surroundings. Compounding this albedo difference is the underlying morphology of cities. When solar radiation is reflected from a street surface some of it escapes the urban canopy, but some (depending upon the sky view factor) are intercepted and partially absorbed by exterior building walls. So, the effective albedo of a city can be significantly lower than that of the rural countryside and even lower than the albedo of any individual component surface.

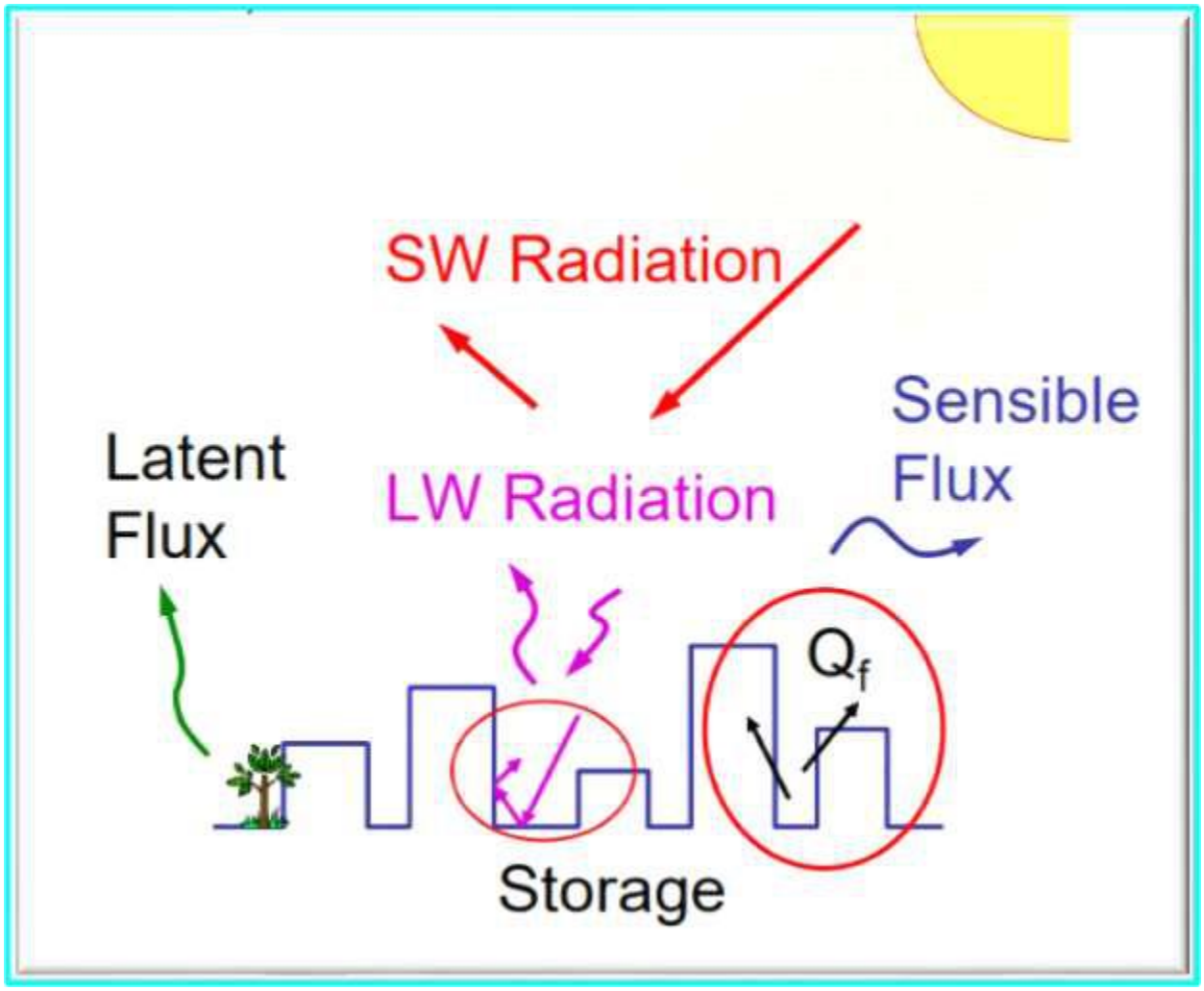


Figure 1: A Simplified Model of the Urban Energy Balance Including Anthropogenic Activities OR Industrial Heating as a Source Term (Q_f).

2. MITIGATION STRATEGIES

As noted above the urban heat island exists in both summer and winter seasons. In fact, it is generally largest in the winter when it has some beneficial characteristics related to reducing the demand for heating energy. In summer, however, the existence of the heat island has negative implications in three key areas – air quality, human health, and energy consumption for air conditioning. It is this summertime heat island that generally spawns an interest in mitigation. Hence, mitigation strategies are generally focused on reducing summertime heat island magnitudes and may have less desirable effects during the winter.

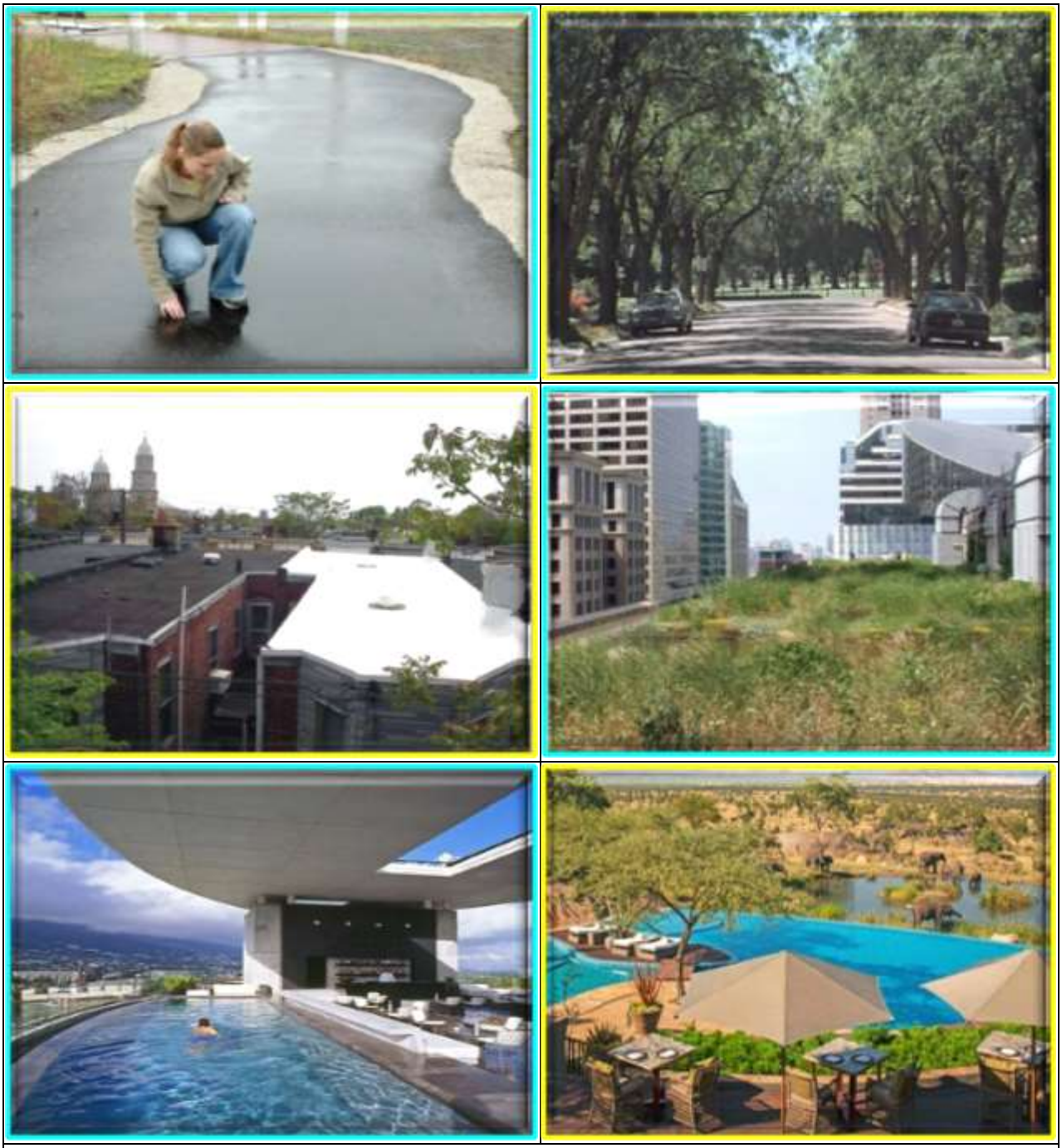


Figure 2: Reflective Pavements, Full Fledged Lush Green Trees' Plantation and Installation of Water Proof Roof Top Swimming Pool like Luxurious Hotel Swimming Pools Whole around the World.

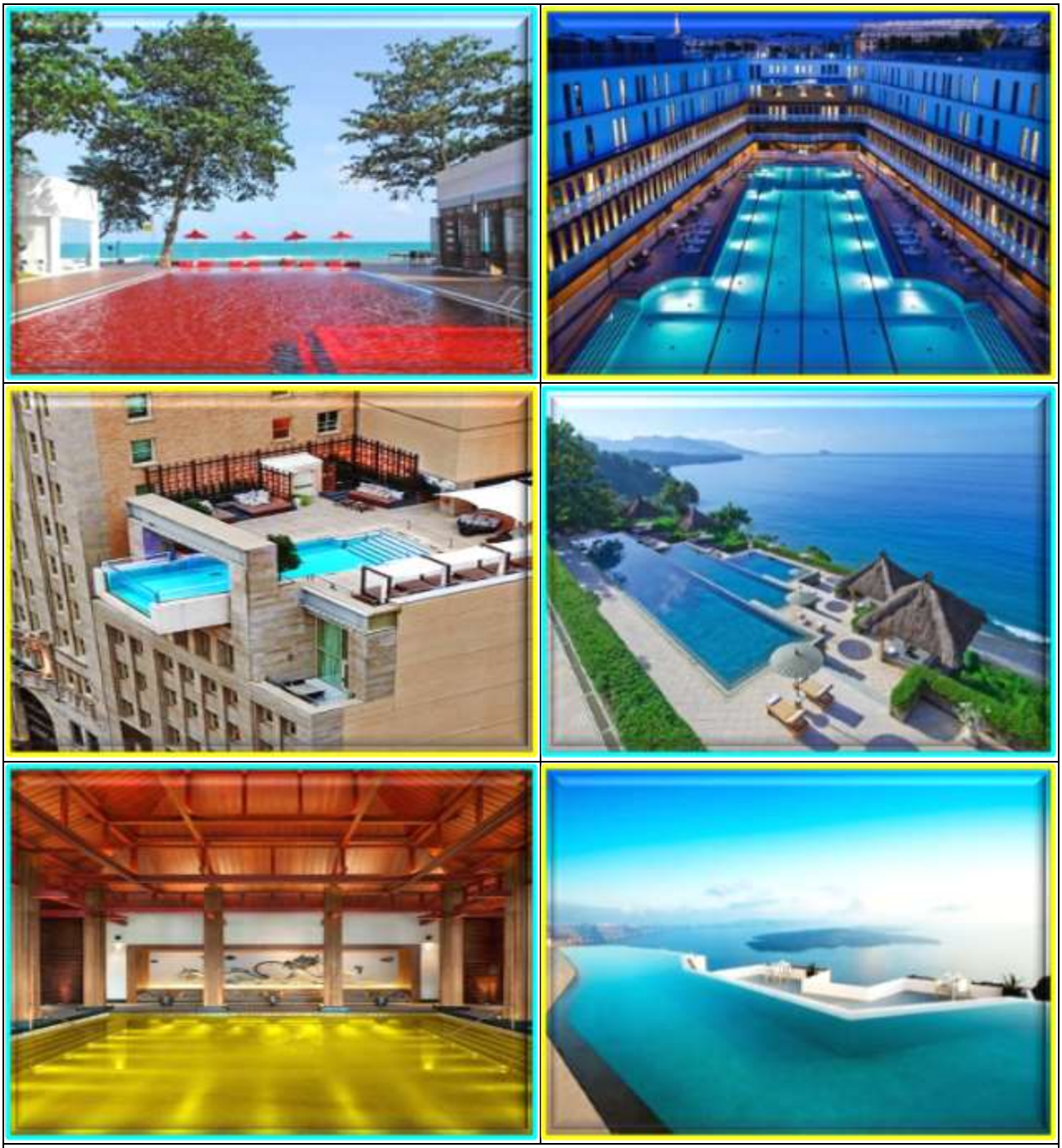


Figure 3: Reflective Pavements, Full Fledged Lush Green Trees' Plantation and Installation of Water Proof Roof Top Swimming Pool like Luxurious Hotel Swimming Pools Whole around the World.

Figure 4: Reflective Pavements, Full Fledged Lush Green Trees' Plantation and Installation of Water Proof Roof Top Swimming Pool like Luxurious Hotel Swimming Pools Whole around the World.

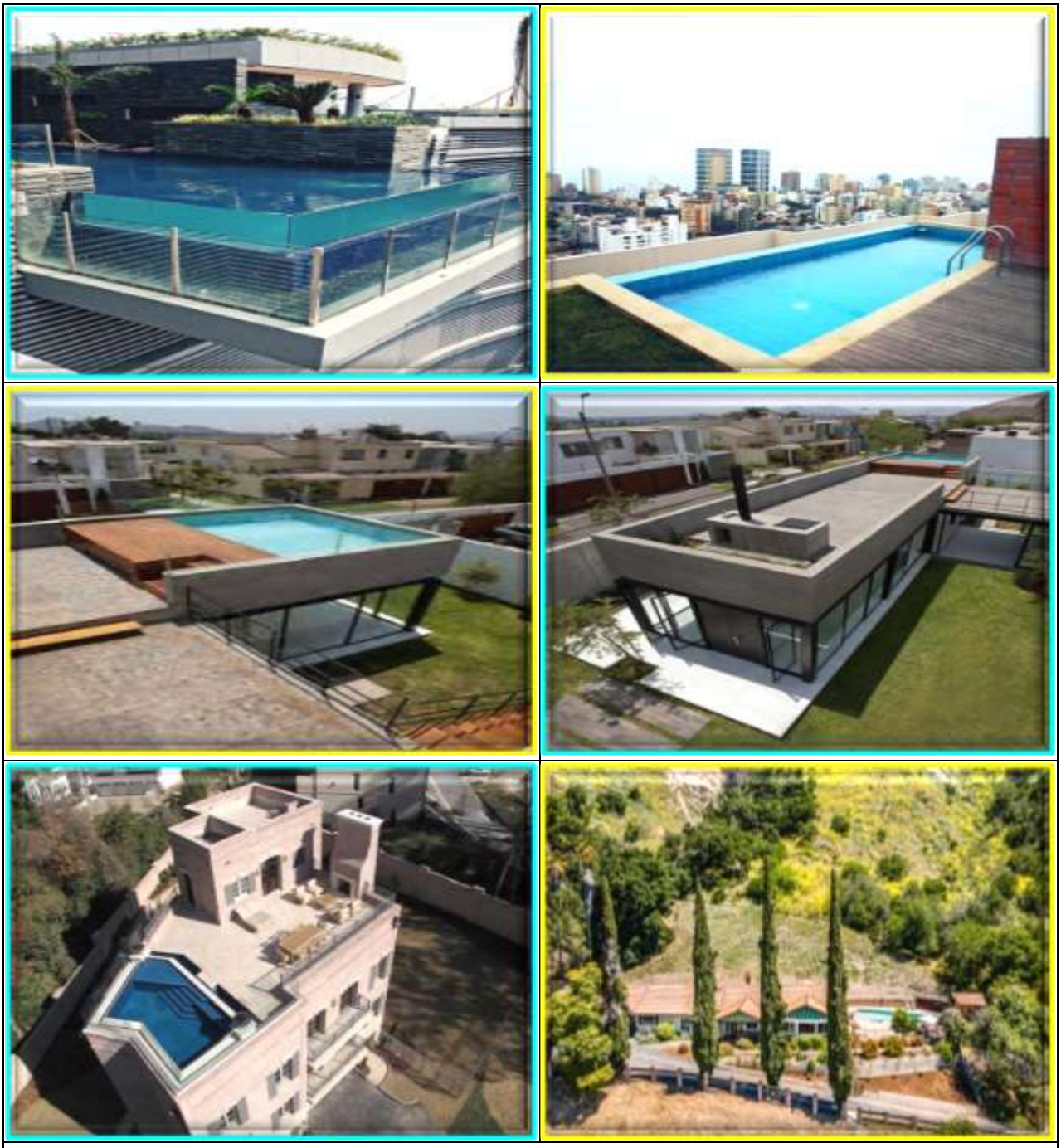
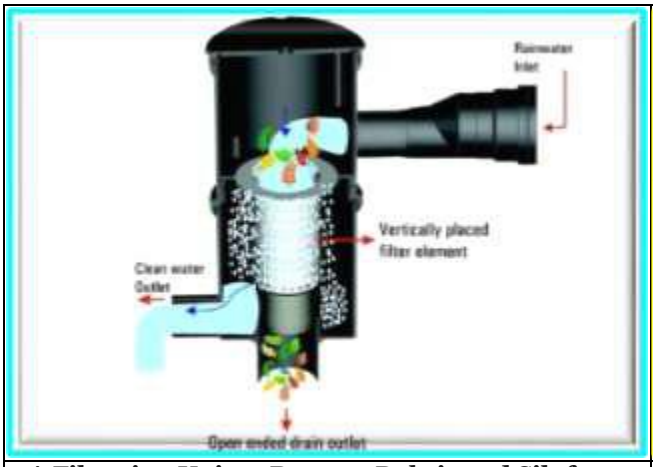


Figure 5: Reflective Pavements, Full Fledged Lush Green Trees' Plantation and Installation of Water Proof Roof Top Swimming Pool like Luxurious Hotel Swimming Pools Whole around the World.



A Filtration Unit to Remove Debris and Silt from the Harvested Water.

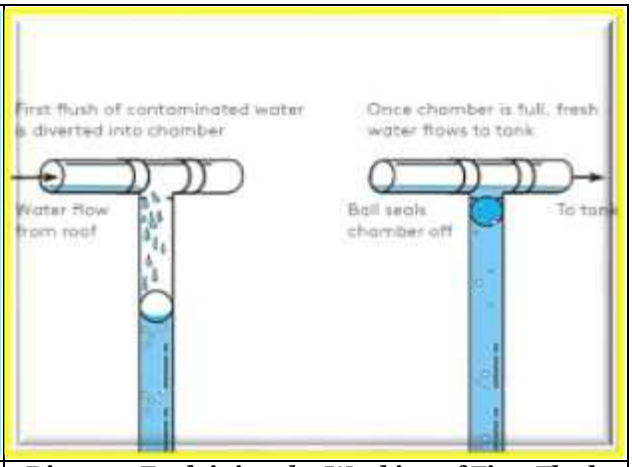


Diagram Explaining the Working of First Flush Diverters.

A Typical Filter Arrangement in a Rainwater Harvesting System.

Installing the Pipe System for the Rainwater Collection.

Figure 6: Building a Storage Tank for Rainwater Collection. A People Walking through a Flooded Street in Mumbai. Mumbai Receives Heavy Rains Every Year Which gives it a Potential to Excel @ Rainwater Harvesting System.

2.1 Each Drain Pipe and Collecting System Should Have:

- A mesh filter at the mouth and first flush (also known as *roof washer*) device which will divert the first flow of water away from the tank;
- A filtration system before connecting to the storage tank;
- An air gap to prevent storm water backflow;
- Each tank should have an excess water overflow system;
- Excess water could be diverted to the recharge system;
- *Water from storage tanks can be used for secondary purposes such as washing and gardening etc*.

The main advantage of collecting and using rainwater during the rainy season is not only to save water from conventional sources... but also to **"Save and Conserve Energy Resources"** incurred on transportation and distribution of water at the doorstep.

This also conserves groundwater, if it is being extracted to meet the demand for freshwater.

- Determining the amount of storage is dependent on the site and the purpose for which water would be used;
- *To get a good idea of how much tank volume would be needed one needs to have access to some good rainfall data. If there is no access to good data then will have to fill in the blanks with estimates*.

2.2 Decide on the Features of the System:

1. First Flush Diverters:

- The first flush is a device used to flush off the water received in the first shower. The first shower of rain needs to be flushed – off to avoid contaminating storable/ rechargeable water with the probable contaminants of the atmosphere and the catchment roof; and
- *It will also help in cleaning silt and other material deposited on the roof during dry seasons. Provisions of the first rain separators should be made at the outlet of each drainpipe*.

2. Filter:

- Filters are used for the treatment of water to effectively remove turbidity, colour, and microorganisms. After the first flushing of rainfall, water should pass through filters;
- Gravel, sand, and ***"Netlon Mesh Filters"*** are designed and placed on top of the storage tank; and
- *It prevents silt, dust, leaves, and other organic matter from entering the storage tank*.

The filter media should be cleaned daily after every rainfall event. Clogged filters prevent rainwater from easily entering the storage tank and the filter may overflow.

3. Limited Sources of Contamination:

- Check your roof surface materials is suitable for collecting appropriate quality water and trim overhanging vegetation; and
- *Install gutter mesh to prevent leaves and debris from blocking gutters and pipes*.

4. Additional Features Which Could be Added:

- Add a UV filter in case it is to be used for drinking water;
- Gravity feed to tanks;
- Pumped distribution system;
- Each tank can individually be emptied for cleaning;
- Recharging of groundwater aquifers; and
- *Automated irrigation technique/ methodology implementing system*.

2.3 Installing the Pipes and Tank

For Installing Pipes:

1. Seek the necessary permissions (if required) from the authorities to lay the pipes;
2. Dig Trenches, if laid underground as per requirement as portrayed in the **Figures 7, 8, and 9**;
3. It is preferable to have the pipe as a single fall to avoid sediment collecting in places that cannot be reached easily for cleaning;
4. Lay the pipes in trenches or otherwise and connect them using connectors; and
5. *For the system to work the collector site must be at a higher level than the inlet to the tank and hence the sump*.

2.4 Waste Management System/ Structure Coordination" (WMS/ SC)

- *The Contractor should provide separate garbage bins in the camps for bio – degradable, non – biodegradable **"Waste Management System/ Structure Coordination" (WMS/ SC)** and ensure that these are regularly emptied and disposed – off in safe and scientific manner;*
- *The disposal of kitchen waste and other bio – degradable matter will be disposed in approved **"Landfills Sites" (LS)** through arrangement with local civic bodies;*
- *Non – biodegradable waste like discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, metal containers, strips and scraps of metal etc. and other such materials will be sold/ given out for recycling or disposed in approved **"Landfills Sites" (LS)** through arrangement with local civic bodies;*
- *No incineration or burning of wastes should be carried out on **"Landfills Sites" (LS)**;*
- ***"Effluent Treatment System" (ETS)** like septic tank with **"Soak Pits" (SP)** provided for toilets should be sited, designed, built and operated in such a way that no health hazard occurs and no pollution to the air, soil properties or characteristics, land area, ground or adjacent watercourses takes place and **"Area Method" (AM)** of **"Land Filing Solid Wastes" (LFSW)** along with **"Trench Method" (TM)** of **"Land Filing Solid Wastes" (LFSW)** for Small Landfills must be applied for **"Waste Management System/ Structure Coordination" (WMS/ SC)** at Projected Site **{Figures 7 and 8}**;*
- *Soak pits must be provided to collect waste water from bathrooms and kitchen sideways through **"Pit Method" (PM)** of **"Land Filing Solid Wastes" (LFSW)** for Large Landfills at Projected Site **{Figure 9}**;*
- *"Septic tank must be provided for toilets and the sludge should/ must be cleaned by municipal exhausters".*

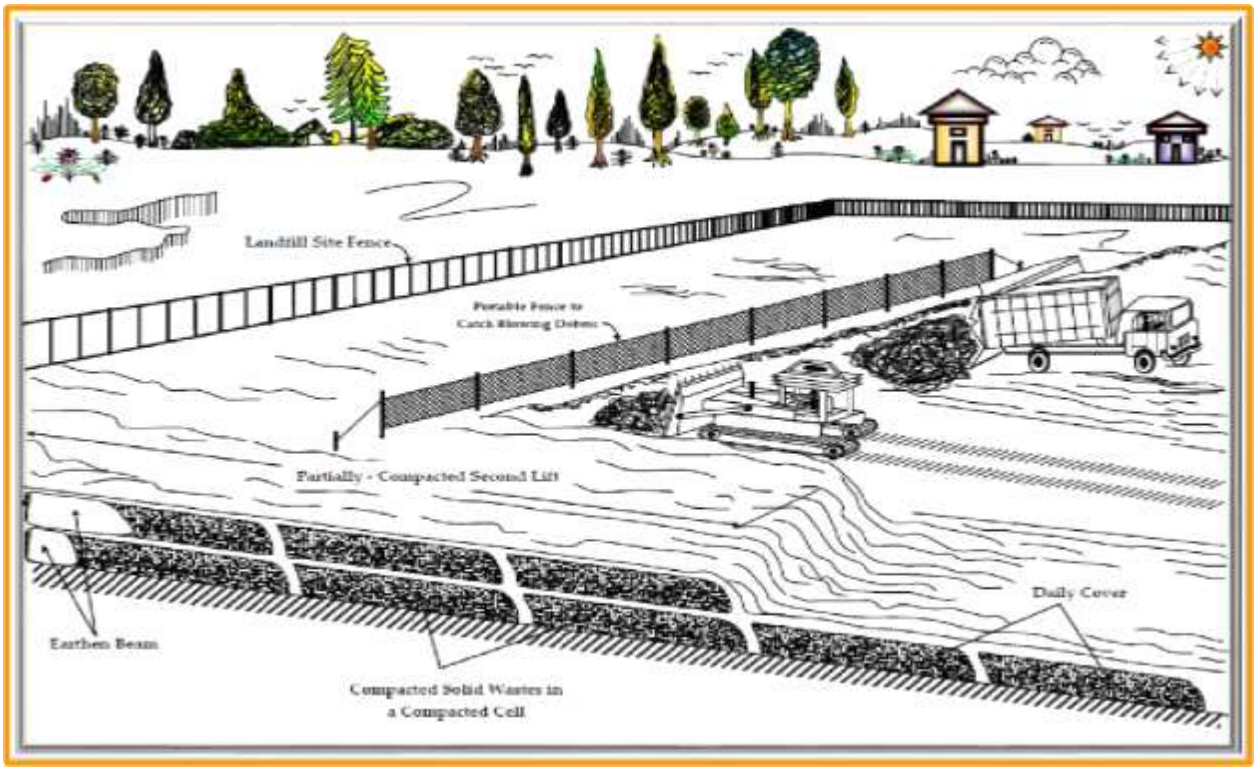


Figure 7: Proposed/ Recommended/ Optional/ Suggested Area Method of Land Filing Solid Wastes at Projected Site.

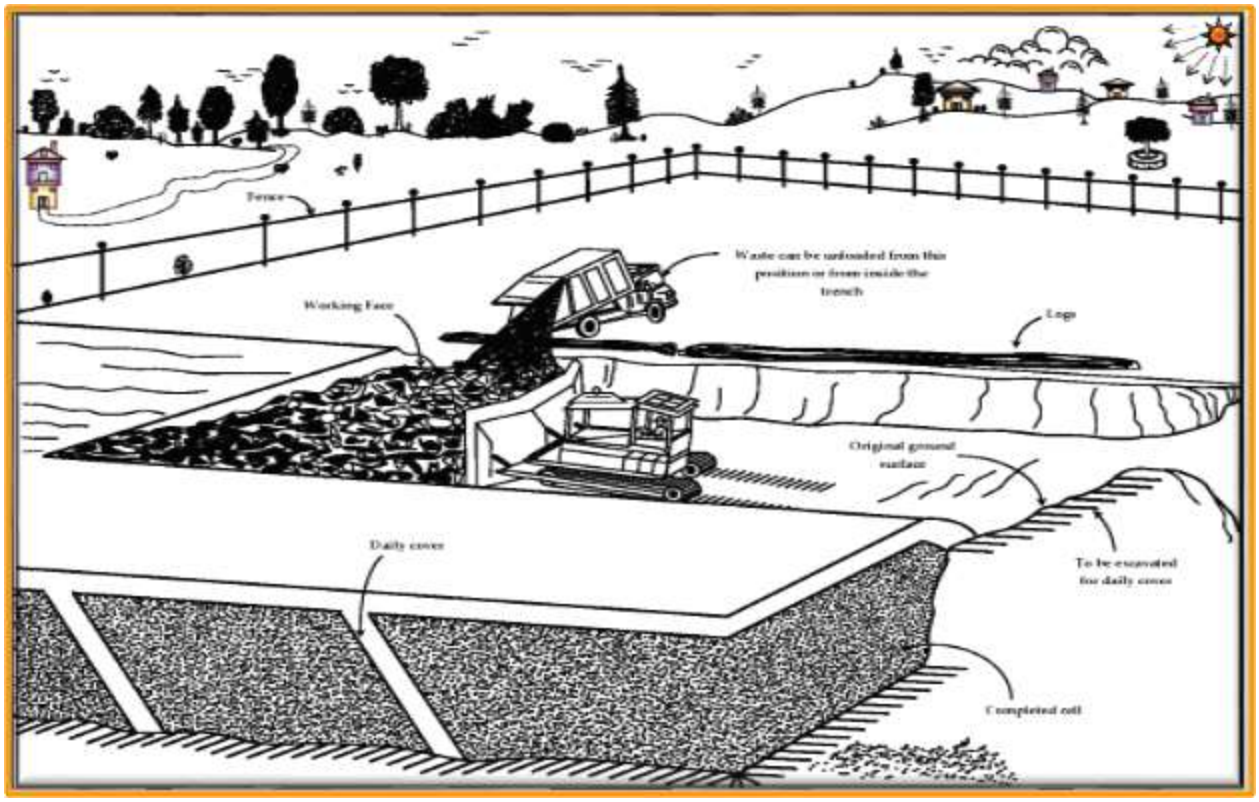


Figure 8: Proposed/ Recommended/ Optional/ Suggested Trench Method of Land Filing Solid Wastes at Projected Site.

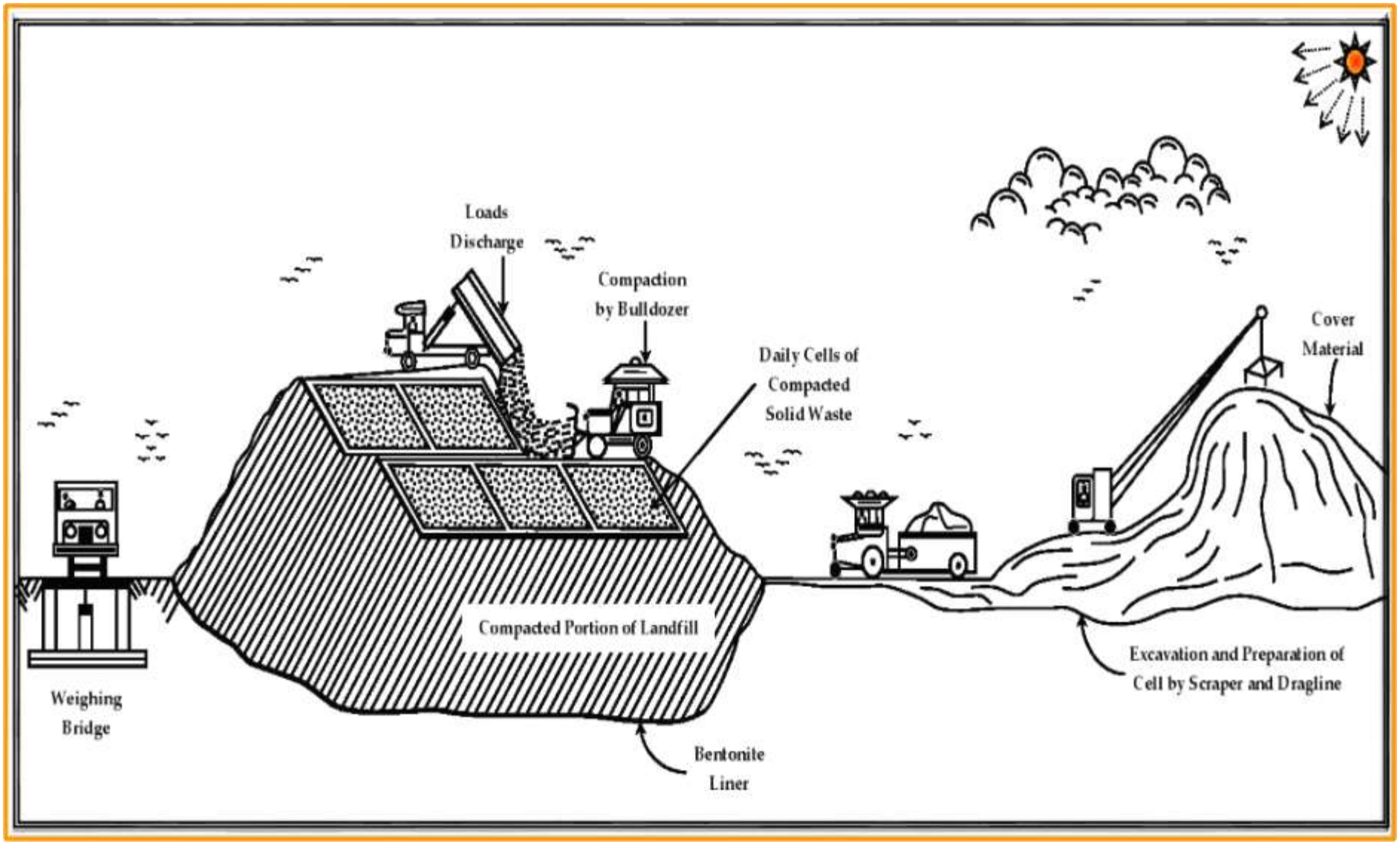


Figure 9: Pit Method of Land Filing Solid Wastes for Large Landfills at Projected Sites.

For Installing Tanks, Sump:

1. Make a tank stand suitable to the property;
2. Put the tanks on the stand and ensure that they don't blow away when empty;
3. Connect them up so they can behave as one volume. Recommend putting a valve for each tank mostly for maintenance;
4. Install first flush diverters to keep the most contaminated rainwater out of your rainwater tank;
5. Connect some sort of overflow arrangement. If the tanks are in a sump it would require an overflow arrangement and lots of drainages. When the overflow is undersized, pumps will flood;
6. Make the final connections between the PVC collector pipes and the tanks;
7. *Install a tank gauge to regularly monitor your water level and usage*.

For Installing Pumps and Managing Standing Water:

1. Use a pump to distribute the water or pump it to an overhead tank or for watering the garden etc.;
2. The pump should be right – sized or it can be marginally oversized;
3. Adequate pressure must be maintained by using pressure couplings;
4. Put some water in the collectors and check the water flows into the tanks and the functioning of the entire system;
5. For standing water, use a wet – dry valve or first flush in – ground diverter to drain your pipes in between rainfall events;
6. *Install a solar shield to block sunlight and prevent algae growth*.

RAINWATER HARVESTING A SIMPLE SOLUTION FOR MUMBAI AND IT'S SUBURBS' WATER PROBLEMS

Rainwater harvesting proved to be a solution for the water crisis in many parts of India, but the Municipal Corporation of Greater Mumbai is not pushing it in the city. Even after making it mandatory in 2002 and suggesting it in Development Plan for Year up to 2034.

While many *Mumbaikars* have taken symbolic gestures of saving water – like not using water during the festival of *Holi* – more concrete steps need to be taken to ensure Mumbai, as a city, is at least partly self – reliant on water.

Mumbai has a population of 18.41 million and it's growing. With many parts of Maharashtra – Marathwada, Solapur and Ahmednagar, Sangli – suffering from droughts regularly, serious questions need to be raised about water consumption in Mumbai.

According to data released by the **"Brihanmumbai Municipal Corporation" (BMC),** the city's demand is 4,200 **"Million Liters Daily" (MLD)** and the BMC which is 3,400 MLD, that is a 20% shortfall of 800 MLD.

Could Rainwater Harvesting Be Implemented By The Authorities?

In 2002, the BMC put in place legislation mandating that all constructions on an area of 1,000 m^2 have to set – up a water harvesting plant as a prerequisite for obtaining a completion certificate.

In 2007, the BMC amended it and made it mandatory for plots measuring 300 m^2 and above to show a rainwater harvesting plant in its plans. It has also made recycling compulsory for buildings having centralized AC plants.

But despite putting in place such legislation more than a decade ago, the government still doesn't have concrete data to show the number of buildings that have implemented rainwater harvesting.

Where Is The Water Being Used?

- ***Data shows that on average, a household uses only 20% of its water supply for cooking and drinking;***
- 60% of it is used for flushing, cleaning and bathing. Importantly, a single flush still uses 10 – 12 liters of clean water. This amounts to over 60% of potable water going down the drain.

Does Mumbai have the potential to tap rainwater?

- ***Mumbai city has the potential to harvest 2394.52 MLD (Million Liters per Day) of water, which 950 times as big as an Olympic Swimming Pool during the monsoon period; and***
- The data further suggests that if one considers 70% of the city to be paved and 50% of it roofed, collecting 70% of the rainwater that falls over it will result in the harvesting of 589.34 MLD of water **(almost 15% of Mumbai's water requirement)** which can be reused.

A significant portion of the water shortfall can be made up.

RAINWATER HARVESTING SYSTEM IN MUMBAI AND THE REST OF INDIA

Cities like Delhi and Ahmedabad use recharging techniques, while cities such as Chennai and Bangalore tend to store their roof water in sumps and recharge the soil with surface run – off water.

- ***Mumbai needs a combined method of storage and recharging due to the monsoon pattern the city receives; and***
- According to a BMC report, Mumbai, which has incessant rainfall followed by dry spells, needs a combined method of recharging aquifers and water storage.

Residents of Chennai, considered a city that has almost successfully implemented rainwater harvesting to tackle its shortfall, have gone a step further and have started potable consumption of harvested rainwater. All three – storied buildings in the city have to mandatorily have a rainwater harvesting system. New water and sewer connections are provided only after the installation of rainwater harvesting systems.

- ***Approximately 30 Indian cities will face 'Water Risk' by 2050;***

While the implementation of existing laws, especially environment – related, have always been sluggish, initiatives at the individual and community level can pave the way for a self – reliant and sustainable system. Several societies in Mumbai and Thane have taken a pro – active approach and voluntarily implemented RWH system which has helped them to reduce the water problem in their societies and also reduce water bills.

The process of rainwater harvesting is an easy and indigenous process of water conservation and can ensure self – sufficiency at an individual and community level in the long run.

2.5 Heat Island Cooling Strategies:

Many communities are taking action to reduce urban heat islands using five main strategies: ***1)*** Increasing Trees' Plantation and Vegetative Cover, ***2)*** Installing Green Roofs, ***3)*** Installing Cool — Mainly Reflective — Roofs, ***4)*** Using Cool Pavements (Either Reflective or Permeable), and ***5)*** Utilizing Smart Growth Practices. The links below lead to detailed information on each of these strategies and examples of the activities that governments and communities are implementing in present recent situation and conditions **(Figures 2, 3, 4, 5 and 6)**.

2.6 *Strategies and Technologies:*

(1) **Trees' Plantation and Vegetation –** Increasing tree and vegetation cover lowers surface and air temperatures by providing shade and cooling through evapotranspiration. Trees and vegetation can also reduce storm water runoff and protect against different kinds of erosions like soil erosion.

(2) **Green Roofs –** Growing a vegetative layer (plants, shrubs, grasses, and/ or trees) on a rooftop reduces temperatures of the roof surface and the surrounding air and improves storm water management. Also called **"Rooftop Gardens" "Eco – Roofs" "Green Roofs" "Roof Top Water Storage Tank" "Install Water Proof Roof Top Swimming Pool like Five Star Hotels" or "Rainy Seasons' Roof Top Water Storage/ Harvesting Tank Installation as Mandatory Techniques/ Methodologies"** may achieve these benefits by providing shade and removing heat from the air through evapotranspiration.

(3) **Cool Roofs –** Installing a cool roof – one made of materials or waterproofing reflective coatings that significantly reflects sunlight and heat waves... away from a building – reduces roof temperatures, increases the comfort of occupants, and lowers energy demand.

(4) **Cool Pavements –** Using paving materials on sidewalks, parking lots, and streets that remain cooler than conventional pavements (by reflecting more solar energy and enhancing water evaporation) not only cools the pavement surface and surrounding air, but can also reduce storm water runoff and improve nighttime visibility.

(5) **Smart Growth –** These practices cover a range of development and conservation strategies and mitigation measures on a large scale that helps to protect the natural environment and @ the same time make our communities more attractive, economically stronger, and more livable as well as viable for "**Smart Growth**".

2.7 *More Significant and Magnificent Points May be Considered as Depicted Below:*

- **Sustainable Cities and Society: Quantifying the cooling effect of urban green space: A case from urban parks in a tropical mega metropolitan areas (India).**
- **Energy Reports: High rise office building makeovers — Exploiting architectural and engineering factors in designing sustainable buildings in different climate zones.**
- **Energy and Buildings: Influence of the building enclosed forms on thermal contribution of retro – reflective and high – reflective coatings.**
- **Journal of Cleaner Production: The cooling effects of hybrid landscapes at the district scale in mega – cities: A case study of other countries as well.**

Table 1: Suggested Most Burning Topics on Climate Change in Terms of "Environmental Mechanism Techniques" (EMT) and Urban "Heat Mitigation Measures" (HMM).

Sr. No.	Description		Remarks
1.	Theoretically As Already Everyone Knows About Our Eminent Scientist Albert Einstein's Formula...!!! *e.g.,* **E = M × C²** *Indeed, Seriously in Forthcoming Days... A Day will Come... When All Together... We will have to Follow Diversified and Initiated the Newly Constructed Approachable/ Certainly Applicable Modified Formula...!!!* Which would Mostly be Concerned and Related to Our Preciously – Heavenly – Sustainable Environment **"The Living Paradise The Planet Earth"** and its Surrounding Natural Eco – Friendly Environmental Kingdom is depicted below as: **Environment = Materials** *{In Terms of Non – Recycled Hazardous/ Polluted Wastes (Solid, Liquide and Gaseous State Substances)}* × **Climate Change** *{In Terms of Green House Effect, Global Warming Causing Generation of More Deadly Bacteria's as well as Dangerous Viruses Such as COVID – 19 VS Monkey Pox, Ebola etc. And Increasing Abruptly Unlamented/ Unprecedented Temperature Rise Day by Day... @ Present Condition/ Situation...Whole in and Around the WORLD...!!!}.*		**Suggested Most Burning Topic on "Environmental Mechanism Techniques" (EMT) and Urban "Heat Mitigation Measures" (HMM)**

3. NASA

Researchers led by NASA's Marshall Space Flight Center were instrumental in bringing the technology of **"Geographical Information System" (GIS)** remote sensing to bear on this problems of urban heat island assessment and mitigation. A highlight of NASA's heat island research efforts is Project Atlanta. Project **"ATLANTA"** {**AT**lanta **L**and – use **AN**alysis: **T**emperature and **A**irquality} was initiated with funding from the NASA – EOS **"Interdisciplinary Science" (IDS)** program in 1996 (see www.ghcc.msfc.nasa.gov/atlanta for details). The goals of this project were to observe, measure, model, and analyze how the rapid growth of the Atlanta, Georgia metropolitan area since the early 1970's has impacted the region's **"Climate Change" (CC)** and **"Air Quality Index" (AQI)**.

The objectives included:

(1) *Modeling the relationship between Atlanta urban growth, land cover change, and the development of the urban heat island phenomenon through time;*

(2) *Investigating the relationship between urban growth and land cover change on air quality through time; and*

(3) *Modeling the overall effects of urban development on surface energy budget characteristics across the urban landscape.*

By addressing these objectives NASA researchers were able to arrive at an improved understanding of how land cover changes associated with urbanization can affect local and regional climate, surface energy flux, and air quality index etc. characteristics.

In more recent work NASA researchers are partnering with stakeholder focus groups coordinated by Georgia Cool Communities (www.coolcommunities.org) to assess relationship between future growth scenarios for the Atlanta region and the resulting heat island signature. They have defined **"Urban Heat Island" (UHI)** mitigation scenarios to represent conditions attainable by 2030 given strong support from local governments. The three strategies considered are: ***(1)*** use of high albedo roof materials; ***(2)*** use of high albedo paving materials; and ***(3)*** increasing vegetative cover through tree planting initiatives. All

scenarios were developed with detailed consideration of existing surface cover and likely future development patterns. A sample result from this work is illustrated in **Figure 10**. This figure shows that it may be possible to cool most of metropolitan Atlanta by about 0.5° C (in mid – afternoon during the summer).

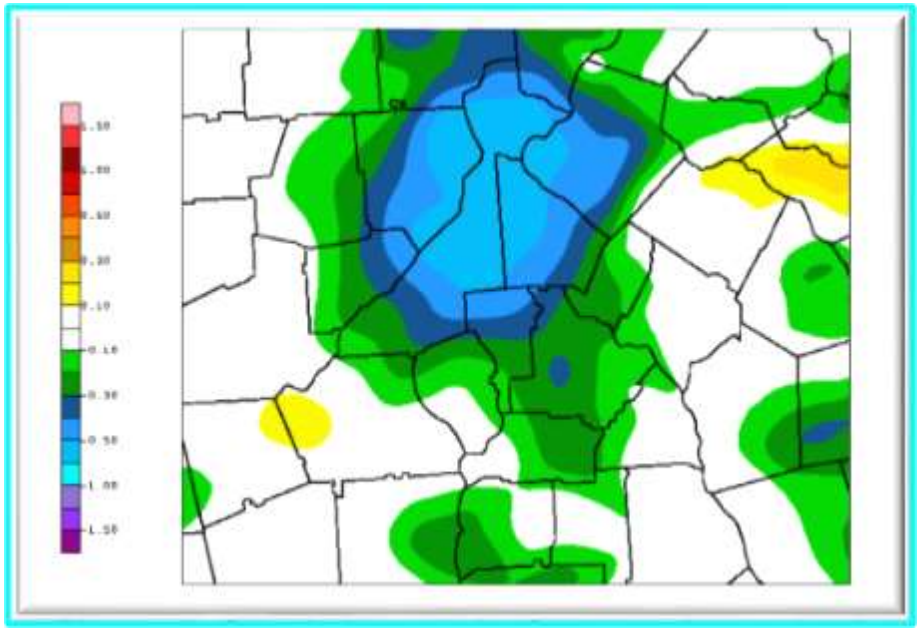


Figure 10: Simulation results for urban heat island mitigation impacts on 2 – meter air temperatures in Atlanta GA relative to a baseline scenario (courtesy of NASA MSFC). {2030 Combined Mitigation – 2030 Baseline 3:00 PM EDT Day 3}.

4. Mitigation Efforts in US Cities

Examples of mitigation efforts in US cities are widespread. Some of these efforts have been introduced in the preceding sections that focused on large agency initiatives. Few additional examples of mitigation in US cities are presented below. These particular examples illustrate mitigation approaches that are largely driven by local agencies and governments.

5. Mitigation Efforts in Canada

Local governments and organizations in several cities across Canada have initiated research into implementing heat island mitigation strategies. In Toronto, a business coalition known as Green Roofs for Healthy Cities intends to install and monitor green roofs on two city – owned buildings. Their measurements will focus on energy savings and storm water reduction benefits of the green roofs. One of the demonstration sites is located on the 464 m^2 roof of the Eastview Community Centre, the other is on a 557 m^2 portion of the roof of City Hall.

6. Mitigation Efforts in Japan

Researchers in Japan have played a major role in understanding the urban heat island. Their efforts have included laboratory investigations, observations, and computational modeling. With respect to mitigation efforts much of the work in Japan has focused on numerical simulation. For example, all sought to evaluate how various aspects of the urban environment in Japanese cities impact the urban climate or

building energy consumption. In 2000 the city of Tokyo created a building design guidance document that encourages larger new public and private commercial developments to cover @ least 20% of any flat roof area with an eco – roof. While this guidance is not binding it represents a first step toward establishing some mandatory eco – roof requirements for future construction activities in the field.

7. Mitigation Efforts throughout Europe

While heat island mitigation using urban vegetation is an emerging phenomenon in the US, eco – roof technology has been widespread throughout Europe for decades. The various European efforts (only a few of which are summarized here) provide a powerful example of how governments can assist the implementation of mitigation strategies on a very large scale. Germany has been at the forefront of eco – roof implementation and legislation for decades. Many German cities possess by – laws that ensure that industrial buildings incorporate as a green roof system. Stuttgart subsidizes by up to 50% the cost of green roof installation on industrial buildings. The policy requires that green roofs be installed on new or altered low slope roofs. The policy compensates developers and building owners for the additional expense by allowing higher densities and building heights. Throughout Germany, planning policies that require or encourage green roofs have had significant impact. It is estimated that 43% of German cities offer financial incentives for roof greening and that more than 10% of all flat roofs in Germany incorporate some level of eco – roof. This translates into over 55 million square meters of eco – roof implementation (through 1997). Netherlands is another leader in adopting environmental legislation. Eco – roofs can be seen in such prominent locations as the Schipol International Airport and throughout the entire community of Ecolonia. The Ecover manufacturing plant in Belgium has been hailed as **"The World's First Ecological Factory"**. It contains more than two acres of roof – top native grasses and wildflowers. The Swiss have taken an aggressive approach to green roof implementation in that they require all new buildings to relocate the green space covered by the building's footprint at grade to the roof – top, and existing buildings, regardless of age or roof slope, to green 20% of their roof – scape. The city of Linz, Austria has implemented a similar roof greening program that requires developers to compensate for any green space lost in development by covering an equivalent amount of space with greenery.

8. FUTURE PROSPECTS

8.1 Co – Benefits

In many cases the success of heat island mitigation strategies will hinge on the ability to demonstrate co – benefits in areas other than the urban climate. A good example is the eco – roof which has direct effects on the building by providing additional insulation in summer and winter, but also provides habitat, aesthetic beauty, storm water runoff reduction, and air quality and its index benefits. As a general rule it is important to perform relatively comprehensive life – cycle cost – benefit analyses of mitigation strategies to evaluate their true value and results of the region/ state/ place.

8.2 Climate Change

It is possible, and perhaps likely that global climatic variations are amplified in urban settings through various feedback mechanisms. One such positive feedback mechanism is a result of the relationship between air conditioning demand and air temperature. As the air warms demand for air conditioning increases. The waste heat (or anthropogenic heat) from increased air conditioning further raises the ambient air temperature. So, under conditions of regional/ global climatic change the **"Urban Heat Island" (UHI)** may increase in both magnitude and importance. The added stress of climate change combined with long term changes in various socio – economic factors may also impact the relative benefits of various mitigation strategies. For example, under increased competition for limited water resources

albedo – based mitigation strategies may gain some competitive advantage over vegetation – based strategies, although both approaches may still yield net benefits.

8.3 New Technologies

It has long been recognized that albedo and urban vegetation along with more traditional technological advances will be crucial components of addressing the **"Urban Heat Island" (UHI)** problem. It is likely that the future will hold technological advances that will lessen barriers to implementing UHI mitigation strategies, while simultaneously making them more effective. One example is in the area of high albedo surface coatings. Researchers are already working on new roof and paving systems that have increased overall albedo while being only moderately reflective in the visible spectrum. This engineering of the spectral reflectivity of surface coating systems holds great promise for breaking the implementation barriers in the residential roofing market. **Figure 11** is a qualitative representation of two important aspects of spectral reflectivity. The top panel of this figure illustrates how two surfaces may be engineered in such a way that they have similar albedo, but very different reflectivities in the visible spectrum. Specifically, material B would be darker in visible color, yet have similar albedo as A. The lower panel of this figure illustrates how two materials with a similar visible color (same spectral reflectance in the 0.4 μm to 0.7 μm wavelength range) can be engineered such that one (material D in this case) has a much higher albedo. So, if a consumer wants a grey roofing shingle they may one day be able to choose from a traditional shingle with an albedo of less than 0.15 or one with the same gray color, but an engineered albedo in excess of 0.30.

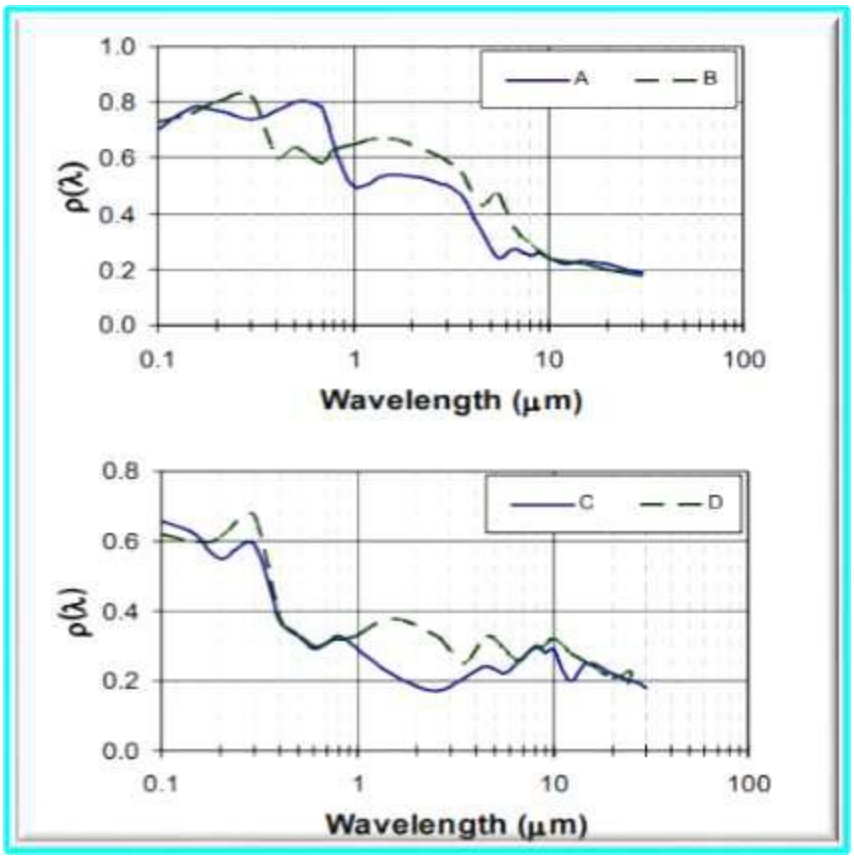


Figure 11: A plot of the spectral reflectivity of hypothetical surfaces. Surfaces A and B have similar albedo but different color. Surfaces C and D have the same color but different albedo.

9. CONCLUSIONS

This study has provided a summary of the physical mechanisms responsible for the urban heat island phenomenon. These mechanisms motivate the development of mitigation strategies that incorporate aspects of increasing albedo, increasing vegetative cover, decreasing the areal coverage of impervious surfaces, and decreasing waste heat from anthropogenic activities. The various mitigation strategies that are commonly employed for heat island mitigation have been presented along with a discussion of limitations and barriers to widespread implementation. The conclusion of this aspect of the present summary is that it is important to consider the wide range of costs and benefits of any heat island mitigation strategy. This includes undesirable wintertime penalties as well as unintended co – benefits. Likewise, full life – cycle cost – benefit analyses are important to fully assess the merits of any mitigation strategy. Finally this study also provides a brief assessment of the future of heat island mitigation. It appears from the work done to date that there is significant momentum and potential for ongoing and expanded large – scale mitigation projects in the future. Some of the current barriers to implementing these strategies are being addressed by aggressive research programs and a grass – roots efforts within communities and local governments to establish incentives, standards, and legislation to further promote implementation of **"Urban Heat Island" (UHI)** mitigation strategies and technologies **{Figures 12, 13, 14, 15 (a) and (b)}.**

10. MODELING TIPS FOR URBAN PROJECTS' DEVELOPMENT

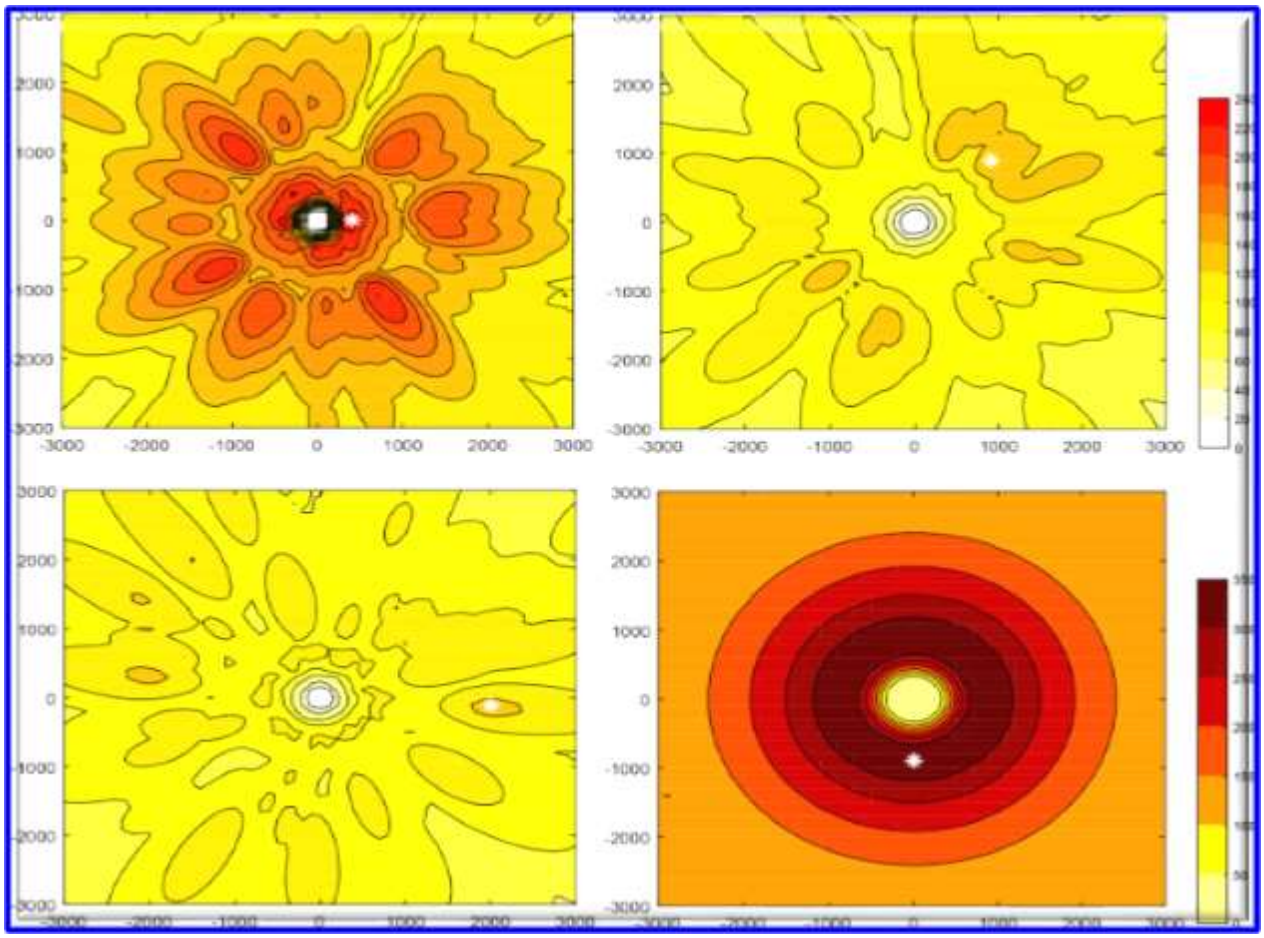


Figure 12: Gaussian Plume Dispersion Models...! Atmospheric Dispersion Modeling...!!!

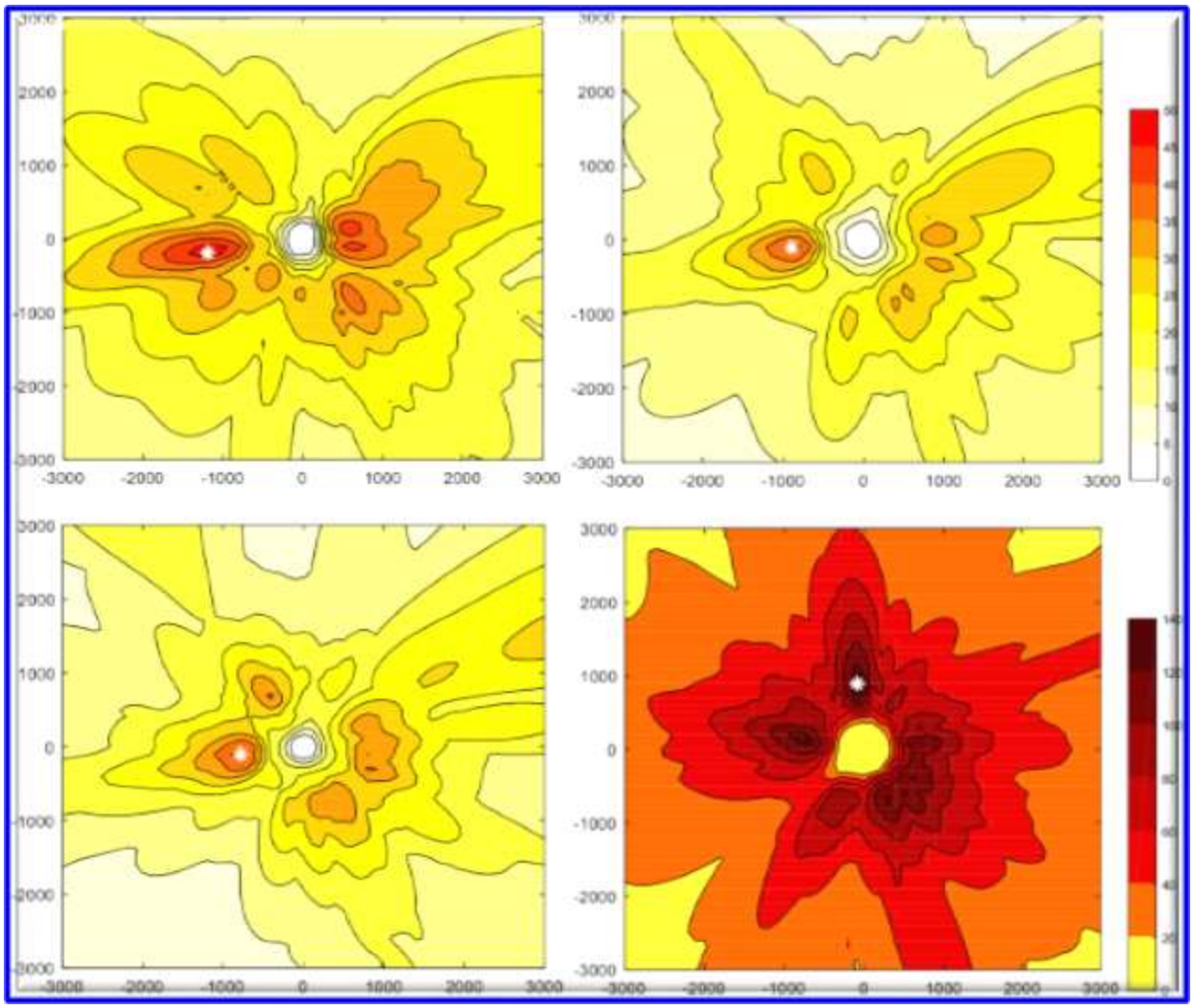


Figure 13: Inter – Comparison of Gaussian Plume Dispersion Models Applied to Sulfur Dioxide Emissions from a Stationary Source in the Suburban Area of Prague, Czech Republic.

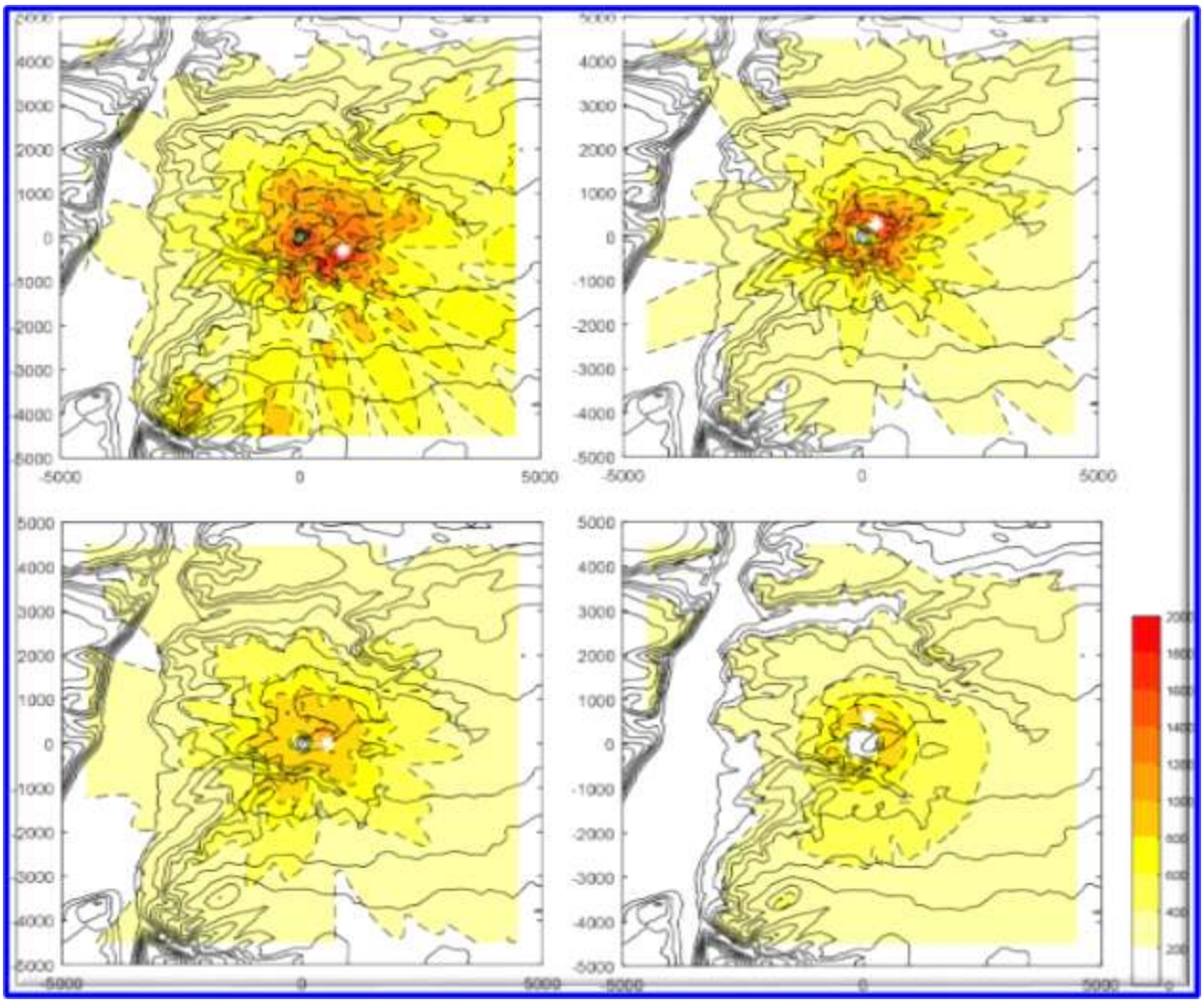


Figure 14: Inter – Comparison of Gaussian Plume Dispersion Models Applied to Sulfur Dioxide Emissions from a Stationary Source in the Suburban Area of Prague, Czech Republic.

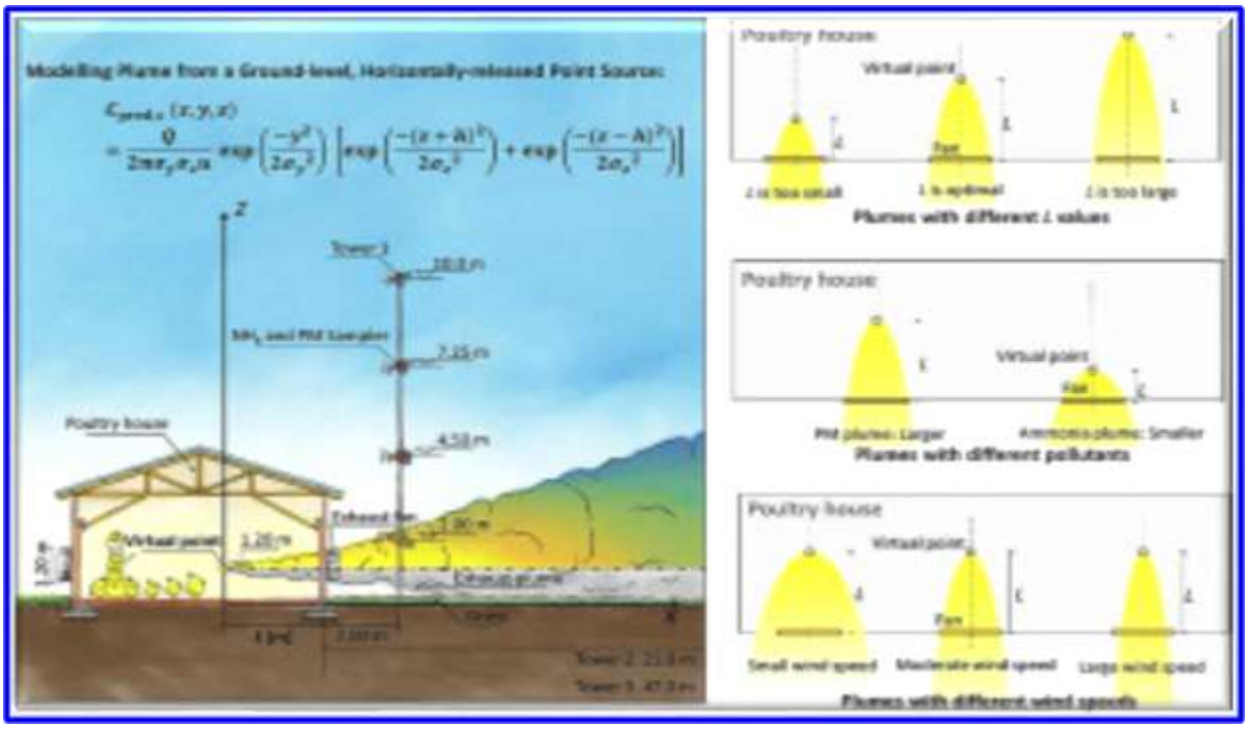


Figure 15 (a): Considerations for Evaluating Green Infrastructure Impacts in Microscale and Macroscale Air Pollution Dispersion Models.

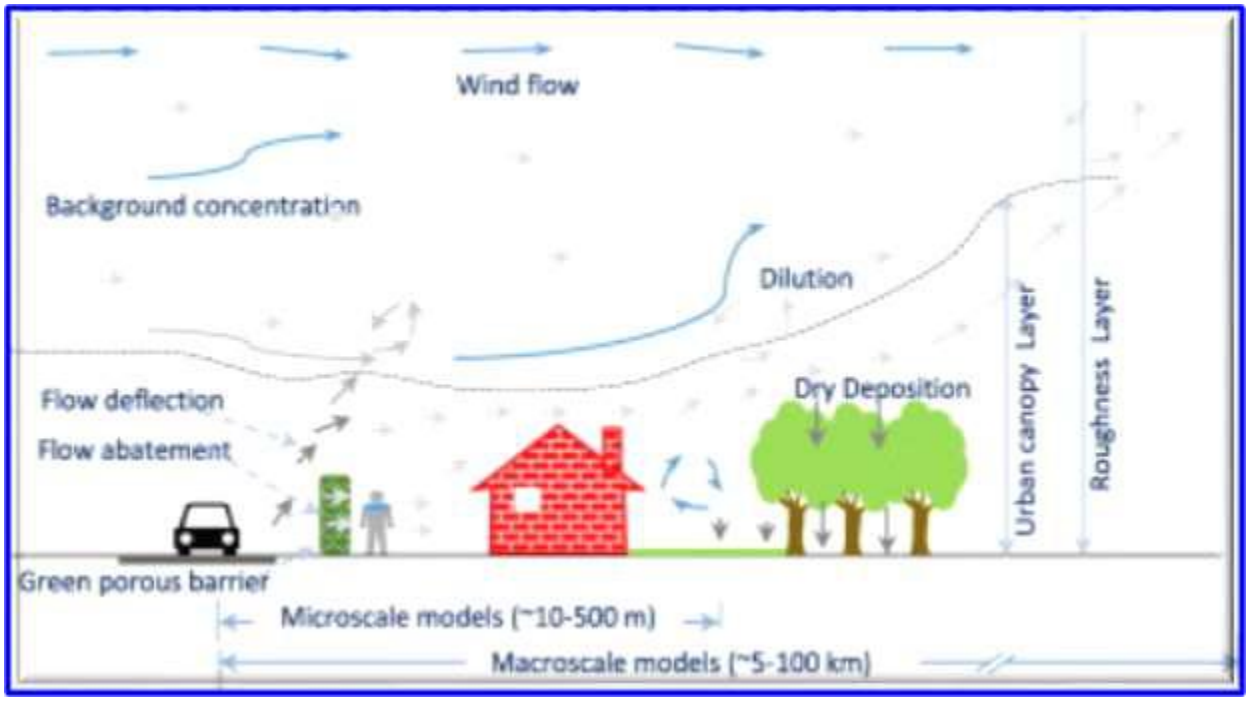


Figure 15 (b): Considerations for Evaluating Green Infrastructure Impacts in Microscale and Macroscale Air Pollution Dispersion Models.

Overview

In this project, you will use the Point Source Gaussian Plume Model to approximate concentrations of a pollutant downwind of a power plant.

The Point Source Gaussian Plume Model is given by

$$C(x,y,z) = \frac{Q}{2\pi\sigma_y\sigma_z u_H}\left[e^{\frac{-y^2}{2(\sigma_y)^2}}\right]\left[e^{\frac{-(z-H)^2}{2(\sigma_z)^2}} + e^{\frac{-(z+H)^2}{2(\sigma_z)^2}}\right]$$

where x is distance along the plume centerline (m), y is the horizontal distance from the plume centerline (m), z is the vertical distance from ground surface at the emission site (m), Q is the source emission rate (μg/s), H is the effective stack height (m), u_H is the average wind velocity at z = H, σ_y and σ_z are the dispersion coefficients in the y and z directions (m).

Model Inputs

The average emission rate of SO_2 from the power plant is 500 g/s, from a stack of height 100 m (assume H=120 m). The topography in the region is relatively flat so we can assume a ground surface at z=0 everywhere. The ground-level windspeed is 2m/s (for both stability classes B and D).

Debug Output Files in AERMOD

When conducting an air dispersion modeling analysis with the **AERMOD Modeling System,** modelers may encounter situations where they want to validate or verify the model's calculations. To support this, the model has the ability to generate **Debugging Output Files** of intermediate calculation results. This is controlled by the **Control Pathway** using the **DEBUGOPT** Model Keyword.

As the model's capabilities have expanded over the years, the U. S. EPA has added new debugging output files to address different features and functions. As of the AERMOD 22112 release, the debug types are listed below:

MODEL: *Prints intermediate model result calculations for each source and receptor. Dispersion parameters and plume heights are displayed in this file.*

METEOROLOGY: Gridded profiles of meteorological variables for each hour of data are output here.

PRIME: *Contains plume rise calculations impacted by building downwash for specific point source and wind direction combinations.*

NO_X/ NO_2: For each NO_2 conversion method (ARM2, PVMRM, OLM, GRSM, TTRM), details either the model's rationing techniques or ozone molar calculations. This option also includes the ability to debug the non – default TTRM2 (added in **22112**) which assesses the before and after calculations when comparing PVMRM, OLM, or ARM2 against TTRM.

AREA/ LINE/ OPEN PIT: *Calculations related to the area, line, and open pit source types.*

RLINE/ RLINEXT: Details characteristics of the integrated points generated along the length of line for each RLINE or RLINEXT Source.

BUOYANT LINE: *Prints plume rise heights and distances for all Buoyant Line Sources.*

URBAN: New in 22112, this option creates two output files – one for profile meteorology and one for surface meteorology – of the model – generated urban boundary layer.

DEPOSITION: *Creates two separate output files – one for gaseous deposition calculations (*.GDP) and one for particle deposition calculations (*.PDP). Includes parameters such as depositional velocity. When used independently of the MODEL debug option, a separate file (DEPOS.DBG) will also be generated detailing wet deposition information.*

AWMA DOWNWASH: Creates a file containing detailed information about the Air & Waste Management Association's non – default downwash options.

PLATFORM: *New in **22112**, this file contains details about downwash of point source emissions that occur in offshore platforms.*

In **AERMOD View**, Debugging Output Files are primarily controlled by the **Debug Files** option of the **Control Pathway** window. Place a checkmark in the box of the file type you want to enable. The **Save** icon can be used to assign a different name to the file, and the **Preview** icon can be used after a successful model run to open the selected file in the text editor chosen in the **Preferences** menu.

*Debugging output files for two non – default options – **AWMA Downwash** and **Platform Downwash** – can be found in the dialogs for those specific operations.*

11. Recommendations

a) After Studying the Features of the Project Area and Screening Exercises the following Conclusions and Recommendations are made:

a) The detailing of trees and forest areas along the project stretch will be the part of detailed **"Environmental Impact Assessment" (EIA)** study;
b) A further study on the project section having these feature would be required during detail **"Environmental Impact Assessment" (EIA)** study at subsequent stage;
c) Careful study of alternate analysis is recommended to avoid critical environmental interference/ intrusion;
d) One side widening options should be explored to avoid impact on large trees as well as to mitigate the impacts on forest areas/ particular land sites;
e) Other clearances required for the project are Forest Clearance for diversion of Reserved/ Protected Forests, NOC from State Pollution Control Board, Permission for Tree Felling etc.

b) Mitigation for Quarries and Borrow Areas:

Quarry and borrow pits may be filled with rejected construction waste and afterward should be given a vegetative cover. If this is not possible, then the excavated slopes will be filled in such a way that they resemble an original ground surface.

- *Aggregates will be first sourced from licensed quarry sites (which are in operation) that comply with environmental and other applicable regulations;*
- *Occupational health safety procedures/ practices for the workforce will be adhered to in all quarries;*
- *Quarry and crushing units will be provided with adequate dust suppression measures;*
- *Regular monitoring of the quarries by concerned authorities to ensure compliance with environmental management and monitoring measures;*
- *Prior approval will be obtained from concerned authorities and all local environmental regulations are complied with;*
- *Within all identified borrow areas, the actual extent of the area to be excavated will be demarcated with signs and access to the operational area controlled;*
- *Borrow pit plant and machinery will conform to CPCB – EHS noise emission regulations;*
- *Protective gear will be provided to the workforce exposed to noise levels beyond threshold limits and there should be a proper rotation of such personnel; and*
- *All operation areas will be water sprinkled to control dust levels to **"National Ambient Air Quality Monitoring" (NAAQM)** Standards.*

c) Small Sewage Treatment Plant: "Installation of Small Sewage Treatment Plan under Environment Mitigation Measures" Measures for Nagpur/ Amravati/ Washim/ Aurangabad/ Nashik/ Mumbai under MSRDC/ NMSCEL (Nodal) Director. Mandatory Reference Official Order Issued on Dated: 20/ 10/ 2022 for other/ Regions/ Places/ States too Like Urban Heat Mitigation Strategies, Technologies in Terms of Cooling Cities Strategies... to Mitigate Urban Heat as an Example Portrayed in the Annexure – 2.

Annexure – 2:

स्वातंत्र्याचा अमृत महोत्सव

नागपुर मुंबई सुपर कम्युनिकेशन एक्सप्रेसवे लिमिटेड
(विशेष उद्देश वाहन)

हिं.ह.बा.ठा.म.स.म. म.रा.र.वि.म.

No. MSRDC/NMSCEW/2022/ 7174
Date: 20 OCT 2022

To,
The Project Director,
Nagpur/Amravati/Washim/Aurangabad/Nashik/ Mumbai
NMSCEL

Subject: Construction of Access Controlled Nagpur Mumbai Super Communication Expressway "**Hindu Hrudaysamrat Balasaheb Thackeray Maharashtra Samruddhi Mahamarg**" on EPC mode in Construction Package no. CP-01 to CP-16 in the State of Maharashtra

Regarding: - Installation of small sewage treatment plant under environment mitigation measures.

Reference:-

1. Office note dated 21.09.2022

The Construction of Access Controlled Nagpur-Mumbai Super Communication Expressway (Maharashtra Samruddhi Mahamarg) is in progress through EPC contractors in packages 1 to 16.

As per clause 3.9.3 of CA, & IRC-SP-99, Clause No. 1.15 & 14.2 the Contractor is required to take necessary preventive measures to avoid environmental damage.

The toll plaza complex & all building works are the part of the development of the Samruddhi Mahamarg and the sewage of these buildings is likely to cause pollution to the ground water.

It is the obligation of the EPC contractor to carry out various parameter for mitigation of adverse environment impact. (Clause No. - 3.9.3, Vo-ll of CA & IRC-SP-99, Clause 1.15& 14.2).

Accordingly, all Project Director are instructed to give directives to EPC Contractor to install small sewage treatment plant as per requirement of the toll plaza complex, police station buildings and all other building works in the Samruddhi Mahamarg as per the Contract agreement.

(A.B. Gaikwad)
Director, (Nodal)
NMSCEL

सीआयएन:U45309MH2017SGC295599
जीएसटी: 27AAFCN6530N1Z2

नोंदणीकृत कार्यालय: नेप्पियन्सी रोड, प्रियदर्शनी पार्क जवळ, मुंबई -४०००३६
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दूरध्वनी: (०२२) २३६९ ६१०९ / ३६७१
फॅक्स: (०२२) २३६८ ४९४३

कॉर्पोरेट कार्यालय: वांद्रे रेक्लेमेशन डेपोसमोर, लिलावती हॉस्पिटलजवळ, के.सी. मार्ग, वांद्रे (प), मुंबई - ४०००५०
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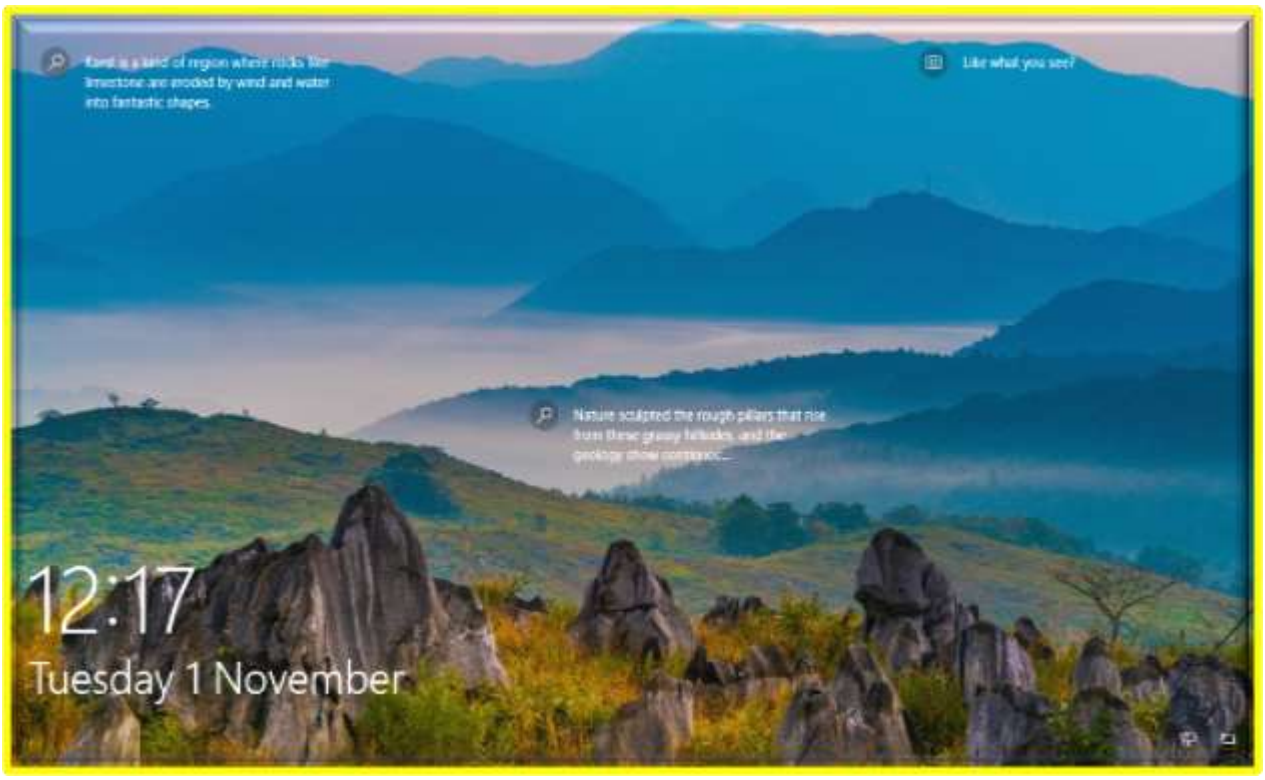
फॅक्स: (०२२) २६४१ ७८९३

www.msrdc.org

Annexure – 3:

"APPLIED AND PERTICIPATING FOR INTERNATIONAL EDUCATOR OF THE YEAR 2022 REWARD" in "Centre for Scientific Development and Environment Advocacy"


Like what you see?
12:17
Tuesday 1 November


Like what you see?
12:42
Wednesday 2 November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SAVE/ PRESERVE/ CONSERVE FANTASTIC AND ECCENTRIC SHAPES' OF "NATURAL ECOSYSTEM AND ATMOSPHERIC ENVIRONMENT"...!!!

Ph.D. Abstract on Rapid and Unplanned Industrialization and Urbanization has resulted in the Deterioration of India

Awarded on June 28th 2003, Entitled *"Development and Applications of Air Environment Management Models --- Cases in Regional Environmental Planning",* at School of Future Studies & Planning (Faculty of Engineering Sciences), D. A. University, Indore (M.P.)

Abstract: Rapid and unplanned industrialization and urbanization have resulted in the deterioration of India's air quality according to air – quality monitoring carried out in seven major Indian cities in industrial and residential areas between 1995 and 2000. Suspended particulate matter (SPM) levels in Indian cities are in the range 50 µg/m^3 to 550 µg/m^3. NO_X values are high in Delhi's residential areas, with values of 33 µg/m^3 in the year 1995 and 34.6 µg/m^3 in 2000, while in an industrial area values of 29.4 µg/m^3, were found in 1995, increasing to 33.7 µg/m^3 in 2000. SO_2 values are very high in Pune city, ranging from 43.3 µg/m^3 in residential to 43.69 µg/m^3 in an industrial areas in the year 2000.

Keywords: Anthropogenic Activities; Air Quality; Vehicular Pollution; Industrial Activities.

Please give a summary of your work and how it relates to this training programme. *

As an **ENVIRONMENTAL EXPERT/ SPECIALIST/ ENGINEER** my work is based on road infrastructure development considering all parameters like air, water, soil and noise pollution, which certainly affects surrounding environment. I have worked and prepared lots of project reports on road infrastructure development and during academic/ teaching credential I wrote **"TWO"** international books published in New Delhi, India.

- **Two Books are Published in November, 2015 – 16 and 2016 – 17:**

  Laxmi Publications (P) Ltd.
  7/19, Ansari Road, Daryaganj,
  New Delhi – 110002. Ph: 2325 2574, 2327 6799.
  E-mail: colaxmi@hotmail.com; ratnesh.gupta@laxmipublications.com; info@laxmipublications.com;
  Website: laxmipublications.com;
  Laxmi - http://www.laxmipublications.com/servlet/lpgetbiblio?bno=B000177&pageName=Keywords
  Amazon - http://www.amazon.in/UEE-9753-320-Energy-Environ-Ethi-Soc-Gup-Na/dp/9383828609/ref=sr_1_1?ie=UTF8&qid=1445662495&sr=8-1&keywords=9789383828609
  Flipkart - http://www.flipkart.com/uee-9753-320-energy-environ-ethi-soc-gup/p/itme3btjzz8zut7b?pid=9789383828609

  (1) **Entitled: A Textbook of Energy, Environment, Ethics & Society (First Edition: 2014-15)**

  (2) **Entitled: A Textbook of Energy, Environment, Ethics & Society (Second Edition: 2016-17)**

- **Paperback:** 398 Pages;
- **Publisher:** Laxmi Publications Private Limited; First edition (1 May 2015);
- **Language:** English;
- **ISBN-10:** 9383828609;
- **ISBN-13:** 978-9383828609;
- **Product Dimensions:** 24.1 x 18.4 x 2 cm;
- **Average Customer Review:** Be the first to review this item;
- **Amazon Bestsellers Rank:** #5,29,308 in Books (See Top 100 in Books);
  - #459 in Biotechnology Engineering Textbooks;

For just your kind information definitely it is related to this research, development and training programme. I have applied theoretical, technical as well as practical applications for infrastructure project write – up and development process.

The aim of reconnaissance survey is to assess the scope of land acquisition and resettlement study and accordingly the detailed plan of action is prepared for the preparation of land acquisition planning and resettlement plan for people living on our precious paradise **"Heavenly Body the Planet Earth"**. The transparent process for land acquisition for industrialization, development of essential infrastructural

facilities and urbanization with the least disturbance to the owners of the land and other affected families and provide just fair compensation to the affected families whose land has been acquired or proposed to be acquired or are affected by such acquisition and make adequate provisions for such affected persons for their rehabilitation and resettlement and for ensuring that the cumulative outcome of compulsory acquisition should be that affected persons become partners in development leading to an improvement in their post – acquisition social and economic status and for matters connected therewith or incidental thereto.

What is your motivation to attend the training programme? *

I commit to motivation as well as innovation in terms of Inclusive Excellence about performance and everything as I do in TEAMWORK. Moreover, its success to date is largely due to its philosophy of delivering "Innovation/ Motivation Based on the Need for Change"...!!!

At least, it's a process that I can go through with our people for Motivation as well as Innovation is not just about technology – that's just the enabler.

*It's about re – engineering processes and leveraging strategic partnerships. It's about approaching and solving clients' problems in new ways and traditions. Over the years, I have established myself as an **ENVIRONMENTAL EXPERT/ SPECIALIST/ ENGINEER** partner for affecting technological and business process transformation for our clients, and in several cases, entire industry applicability. Not every company can say it changed an industry, but I can execute with specific goals and approaches. But I can visualize **"Climate OR Weather"** is changing day by day rapidly and people are not seriously supposed to contribute to the concerned subject matter.*

The exploration of cutting – edge technologies and methodologies, coupled with a deep passion to drive more... diversified and modified business transformation and an entrepreneurial spirit, most probably defines about me. I always used to carry out this philosophy @ already engaged research and development centers for **"Economics of Climate Change Adaptation" (ECCA),** which comes under the process of **"Climate Change Initiatives" (CCI)**.

How do you expect to apply the knowledge and skills acquired in the training as well as in the research development programme?

I would like to expect and apply this knowledge with skills acquired during a training a program in the broad spectrum for motivation of **"Economics of Climate Change Adaptation" (ECCA),** which comes under the process of **"Climate Change Initiatives" (CCI)** for common people. The approach would be imperative, informative, and valuable to apply in our daily life. Which will cover the following points as mentioned below one by one:

- Search and use of resources to achieve targets through this programme for common people or laymen;
- Ability and Capability to handle significant task independently during completion of project assignments @ camp site with teamwork through this programme guidance;
- Sort – out the problems to convert and get best options and opportunities from training programme aims to equip stakeholders in the Asia and the Pacific region with economic tools necessary to identify, prioritize, design and implement climate – resilient projects and policies for adaptation action and fast reaction;
- Moreover organization will consider it while achieving their objectives as per the skills acquired during research and training program for implementing the most significant part of climate – resilient projects and policies.

- ❖ Dedicated to complete the task in specific areas time to time while implementing and motivating economics of climate – resilient projects adaptation;
- ❖ Intended to take initiatives and motivational approach in research and developmental activities under specific defined areas like climatic change adaptation for all living beings surviving on this precious planet **"THE EARTH"**;
- ❖ Through this programme I would like to learn or change or improve the system according to organization's essential needs and requirements.

INNOVATION: IS THE ABILITY TO SEE CHANGE AS AN OPPORTUNITY – NOT A THREAT.

Being a good team worker is essential and I can perform best in teamwork as given below with details in 100 words each:

ABOUT MYSELF (in not more than 100 words, each)

My Strengths:

External Environment		Threats	Opportunities
		Confront	*Avoid*
		Exploit	*Search*
		Strengths	Weaknesses
		Internal Environment	

(Strengths, Weaknesses, Opportunities, Threats)

- Search and use of diversified, significant, meaningful resources to achieve **"TARGETS"** and **"GOALS"**;
- *Capability to handle significant and magnificent tasks independently;*
- Sort – out the problems to convert and get the best options and opportunities;
- *Strength is a resource or capacity the organization can use effectively to achieve its **"OBJECTIVES";***
- A weakness is a limitation, fault, or defect in the organization that will keep it from achieving its **"OBJECTIVES"**.

My Areas of Improvement:

- Dedicated to complete the task in specific areas @ Projected Camp Sites with **"TEAM WORKERS"** and **"COORDINATORS"**... time to time as per day by day;
- *Fully determined to reduce the weakest points in subjective as well as objective matter of areas/ sites;*
- Intended to take initiatives in research and development activities under specific defined areas;
- *I would like to change and improve the system according to organization essential needs accord to space and time;*
- Leaning on every new subject matter is also the part of improvement and enhancement process in the teamwork or collaborative work in the system.

My Career Objectives:

- Encourage to promote the professional growth and objectives with **"CAREER GOALS AND OBJECTIVES"**;
- *A dynamic personality and challenging capabilities in a well – established firm and its organization;*
- Encouraging to continuing personal as well as **"PROFESSIONAL GROWTH"**;
- *Always ready to innovate and initiate the proficient activities in all respect with **"FACTS AND POSITIVE OUTCOMES/ RESULTS";***
- Always become ready to create a basic platform for everyone/ someone who really needs it in their life as a **"SUPPORTIVE RESEARCH CANTIDATE"**.

Expectations from the Job:

- I expect higher academic credential from the esteemed organization to achieve the TARGETS and GOALS;
- *I expect support from organization to create innovative points to explore in broad ways with teamwork collaboration;*
- I also have great expectations to fulfill my objectives to reach the academic credentials' **"GOALS"**;

- *Expectations are more during occupation from the organization to get academic success in life;*
- I also require sympathy of the organizations' people to make an association with leaps and bounds.

How would a person close to you describe your five biggest strengths and five biggest development needs?

- A person close to me first of all will tell about my curiosity to achieve the **"ASPIRATIONS AND INTENTIONS"**;
- *Secondly one will also appreciate my hard work toward my **"RESERCH FELLOW CANDIDATURE";***
- Thirdly person will recognize me as very cooperative and down to earth with everyone;
- *Fourth point is I am extremely sensitive to fulfill the task accord to nature of work;*
- Fifth point is the point in which I always found to be fully devoted to mission provided as per need and requirement.

- First of all I always believe in development for the organization according to their needs, deeds and breeds if exceeds indeed...!!!;
- *Second task for the implementation of assignments on the projected sites/ camps;*
- Thirdly development is not a single man task it requires everyone's support or teamwork to reach mission and achieve objectives;
- *Fourthly development in terms of expansion and dedicated to work would prove to be satisfactory for the organization;*
- Fifthly research and development activities or work are the biggest achievement for the person to get success in life.

What is the one thing about yourself you like the most?

- One thing I would like to express myself is the most... that I have grown up with logical thinking and definitely such type of reasonable characteristic comes out to be the part of improvement and development in all respect. I always believe in innovations and creations which may be the component of social, cultural or natural activities and as a writer I have given a stress to follow the path of innovators and creators. In the field of innovators and creator's one could be a great writer, poet, teacher, preachers, researchers or eminent scientists. So I always followed them with their precious and remarkable footprints to sustain peaceful life on the natural environment and its surroundings. **"AT LAST SIMPLE LIVING *i.e.*, DOWN TO EARTH AND HIGH THINKING MATTERS ALWAYS... WHOLE IN AND AROUND THE WORLD"...!!!**

If you could change two things about yourself, what would they be?

- If I will have to change myself then I will change firstly the two things weakest and poorest points. No doubt these are the obstacles in the existing life of the person. Secondly if I found lacking in strength and confidence then I would like to change according to space and time. Career – oriented as well as projected – targets with logical, reasonable, pioneering skills and inspired consistent philosophy may diminish the weakest, poorest and lower strength issues penetrate into the real life to setup ambition. At last simply I will say to prove myself to be a dissimilar and exceptional personality as it requires extraordinary thoughts in terms of coherent approach, which could change the meaning of life and its system.

In what ways are you different today than five years ago?

- Than five years ago... today, I have achieved many things as a Researcher/ Academician/ Consultant/ Environment Specialist/ Expert/ Engineer... because in the past I was only intended to focus on the study, research and philosophy... not any other activity. Recently time has changed and now I am fully acquainted with many new interdisciplinary/ multidisciplinary approaches and things in terms of technical with engineering skills, teaching, writing and academic performance. I have crossed many barriers, obstacles in life and always approached the path of hardworking fellows. In the next forthcoming five years I would like to be the part of organization to fulfill their requirement and their needs as well as creeds. Indeed if got an opportunity in rest of the remaining $1/4^{th}$ life span then ***I will demonstrate myself to be courageous, enthusiastic, enhanced in the respective Post – Doctoral Research Fellowship Employment Position Carefully and Energetically. In short to get accomplishment in life I believe in this formula PREPARE, PRODUCE and PRACTICE as well as REDUCE,***

REUSE and RECYCLE...!!! Hence this is the law of NATURE itself on this precious living and loving paradise "THE HEAVENLY BODY THE GREEN PLANET EARTH".

I May Help to Maintain And Upgrade @ Nurtures' Existing Projects On Sites…!!! Which Would Be More Compatible Eco – System Friendly in the Environment As Well As… SMARTER…!!!

S – SPECIFIC…!!!
M – MEASURABLE…!!!
A – ATTAINABLE…!!!
R – REALISTIC…!!!
T – TIMELY…!!!
E – ENVIRONMENTAL – FRIEDLY…!!!
R – RESPONSIBLITY…!!!

Approximately 18 years back...!!! when I had participated and worked for 12 days program on dated 4th to 16th October, 2004, Hanimaadhoo, Republic of Maldives, Observatory for training on **"Atmospheric Brown Cloud (ABC) Training School Program,"** announced and sponsored by **(http://www-ramanathan.ucsd.edu/)** UCSD ABC/ UNEP – RRCAP, USA California and Thailand.

Indeed Excellent and Marvelous Scene as 100% Clear Visibility, Sky and Sea Coastal Area along Beach Side Near NASA Observatory Setup @ Maldives – 1.

Hanimaadhoo (Dhivehi: ހަނިމާދޫ) is one of the inhabited islands of Haa Dhaalu Atoll administrative division and geographically part of **Thiladhummathi Atoll** in the North of the Maldives. Located in the South **Thiladumathee (Haa Dhaalu) Atoll, Hanimaadhoo** with 3.11 Km of land area is one of the biggest natural islands in the Maldives. Hanimaadhoo island is one the biggest islands in the Maldives. Its length is approximately **7.0 Km**...!!! And it is **"Just" 750 m Wide**. The island is 288.84 Km (179 mi; 156 nmi) North of the country's capital, Malé. The Hanimaadhoo Meteorological Observatory is located on this island **Hanimaadhoo (ހަނިމާދޫ)**. The island is planned to be one of the developmental centres of the newly planned Mathi – Uthuru Province. The island is the site of Hanimaadhoo Airport, one of the few domestic airports of the Maldives.

Climate

The Hanimaadhoo Meteorological Observatory is located on this island. Many flight scientific research such as those investigating aerosol concentrations in the atmosphere and the Brown Cloud phenomenon have been initiated from Hanimaadhoo. On 16th April 2016, Hanimaadhoo recorded a temperature of 34.9°C (94.8°F), which is the highest temperature to have ever been recorded in the Maldives.

Clear Visibility, Sky and Sea Coastal Area Scene along Beach Side Near NASA Observatory Setup @ Maldives – 2.

Clear Visibility, Sky and Sea Coastal Area Scene along Beach Side Near NASA Observatory Setup @ Maldives – 3.

Nice Gorgeous, Splendid, Fabulous and Chaotic Cloudy View from NASA Observatory Tower – 1.

Data Analysis by Expert Professor T. Nakajima CCSR, University of Tokyo, Japan in NASA Observatory @ Maldives – 1.

Technical Data Study, Preparation with Compilation and Analysis in the Observatory – 1.

Technical Data Study, Preparation with Compilation and Analysis in the Observatory – 2.

Technical Data Study, Preparation with Compilation and Analysis in the Observatory – 3.

Day Time Very Nice Looking... Exterior View/ Scene of NASA Observatory @ Maldives – 1.

Day Time Striking, Super Formation of Clouds @ Exterior View of NASA Observatory – 2.

Day Time Striking, Super Formation of Clouds @ Exterior View of NASA Observatory – 3.

Day Time Striking, Super Formation of Clouds @ Exterior View of NASA Observatory – 4.

Day Time Striking, Super Formation of Clouds @ Exterior View of NASA Observatory – 5.

Day Time Striking, Super Formation of Clouds @ Exterior View of NASA Observatory – 6.

Day Time Striking, Super Sea Waves Formation @ Exterior Coastal View near NASA Observatory Setup – 8.

Day Time Striking, Super Sea Waves Formation @ Exterior Coastal View near NASA Observatory Setup – 9.

Day Time Striking, Super Clear Visibility with Fabulous and Magnificent Sea Sight @ Superficial Coastal View near NASA Observatory Setup – 9.

Day Time Striking, Super Prominent Sea Waves Creation @ Outward Coastal View near NASA Observatory Setup – 1.

Day Time Striking, Super Noticeable Sea Sight with White Sand Formation @ Outward Coastal View near NASA Observatory Setup – 1.

Day Time Striking, Excellent Stroll on Beach Side as Noticeable Sea Sight with Milky White Sand @ Apparent Coastal View near NASA Observatory Setup – 2.

Day Time Striking, Super 100% Visibility along Beach Side as Evident Sea Sight with Milky White Sand @ Ostensible Coastal View near NASA Observatory Setup – 3.

Day Time Striking, Super 100% Visibility along Beach Side as Evident Sea Sight with Milky White Sand @ Ostensible Coastal View near NASA Observatory Setup – 4.

Day Time Striking, Super 100% Visibility of Cirrus Clouds Formation with Chaotic Weather View near Observatory Site – 1.

Day Time Cirrus Clouds Formation with Chaotic Weather View near Observatory Site – 2.

Day Time Cirrus Clouds Formation with Chaotic Weather View near Observatory Site – 3.

Day Time Cirrus – Cumulous Clouds Formation with Chaotic Weather View/ Scene near Observatory Site – 4.

Day Time Cirrus Clouds Formation with Chaotic Weather View near Observatory Site – 5.

Dr. Dohyeong Kim Center for Atmospheric Science, Scripps Institute of Oceanography, University of California, San Diego @ NASA Observatory in Maldives – 1.

Dr. Kim Guiding Instruments' Operation as Installed Near NASA Observatory Tower – 2.

Dr. Kim Guiding Instruments' Operation as Installed Near NASA Observatory Tower – 3.

Dr. T. Nakajima CCSR, University Tokyo, Japan with Miss Bidya Banmali Pradhan International Centre for Integrated Mountain Development from Nepal – 1.

Evening Time Snapshot View/ Scene with Milky White Sand of Sea Site Coastal Area – 1.

Evening Time Snapshot View/ Scene with Milky White Sand of Sea Site Coastal Area – 2.

Evening Time Snapshot View/ Scene with Milky White Sand of Sea Site Coastal Area – 3.

Evening Time Snapshot View/ Scene with Milky White Sand of Sea Site Coastal Area – 4.

Drip Irrigation Method/ Technology Used for Farming in Agricultural Fields' Snapshot – 1.

Drip Irrigation Method/ Technology Used for Farming in Agricultural Fields' Snapshot – 2.

Drip Irrigation Method/ Technology Used for Farming in Agricultural Fields' Snapshot – 3.

Drip Irrigation Method/ Technology Used for Farming in Agricultural Fields' Snapshot – 4.

Drip Irrigation Method/ Technology Used for Farming in Agricultural Fields' Snapshot – 5.

Drip Irrigation Method/ Technology Used for Farming in Agricultural Fields' Snapshot – 6.

Drip Irrigation Method/ Technology Used for Farming in Agricultural Fields' Snapshot – 7.

Group Snapshot Occupied in the Midafternoon near to Observatory Site View/ Scene – 1.

Group Snapshot Occupied in the Midafternoon near to Observatory Site View/ Scene – 2.

Group Snapshot Occupied in the Midafternoon near to Observatory Site View/ Scene – 3.

Group Snapshot in the Morning Time Observatory Site View/ Scene with Teamwork – 1.

Group Snapshot in the Midafternoon Time Observatory View/ Scene with Teamwork – 2.

Group Snapshot in the Midafternoon Time outside Observatory View/ Scene with Teamwork – 4.

Group Snapshot in the Midafternoon Time outside Observatory View/ Scene with Teamwork – 5.

Group Snapshot in the Midafternoon Time outside Observatory View/ Scene with Teamwork – 6.

Group Snapshot in the Midafternoon Time outside Observatory View/ Scene with Teamwork – 7.

Hygienic/ Disinfected Food Preparation for All Team Workers, Delegates and Experts – 1.

Hygienic/ Disinfected Food Preparation for All Team Workers, Delegates and Experts – 2.

Hygienic/ Disinfected Food Preparation for All Team Workers, Delegates and Experts – 3.

Hygienic/ Disinfected Food Preparation for All Team Workers, Delegates and Experts – 5.

Individual Magnificent Papaya Garden View/ Scene Snapshot near NASA Observatory – 1.

Individual Magnificent Papaya Garden Snapshot View/ Scene near NASA Observatory – 2.

Individual Glorious Snapshot View/ Scene along Seashore Beach Site and Coastal Area – 3.

Individual Glorious Snapshot View/ Scene along Seashore Beach Site and Coastal Area – 4.

Individual Glorious Snapshot View/ Scene along Seashore Beach Site and Coastal Area – 5.

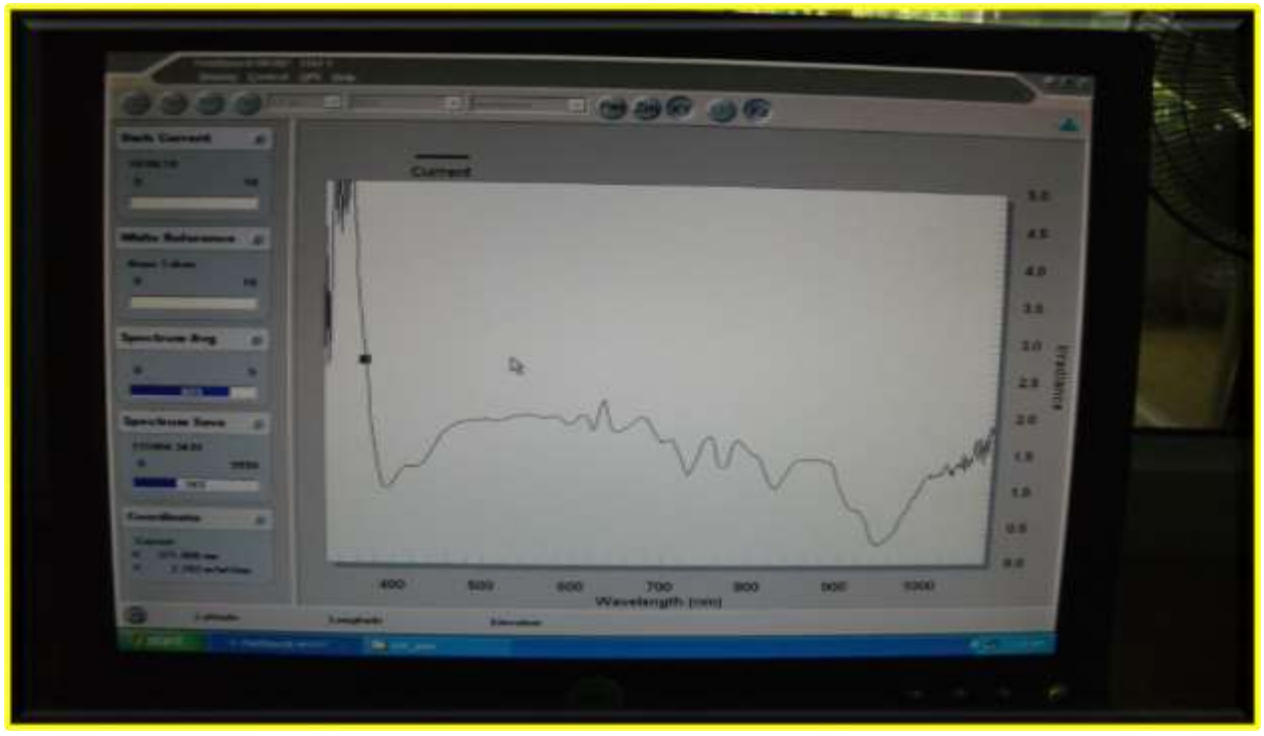
Individual Glorious Snapshot View/ Scene along Seashore Beach Site and Coastal Area – 6.

Individual Glorious Snapshot View/ Scene along Seashore Beach Site and Coastal Area – 7.

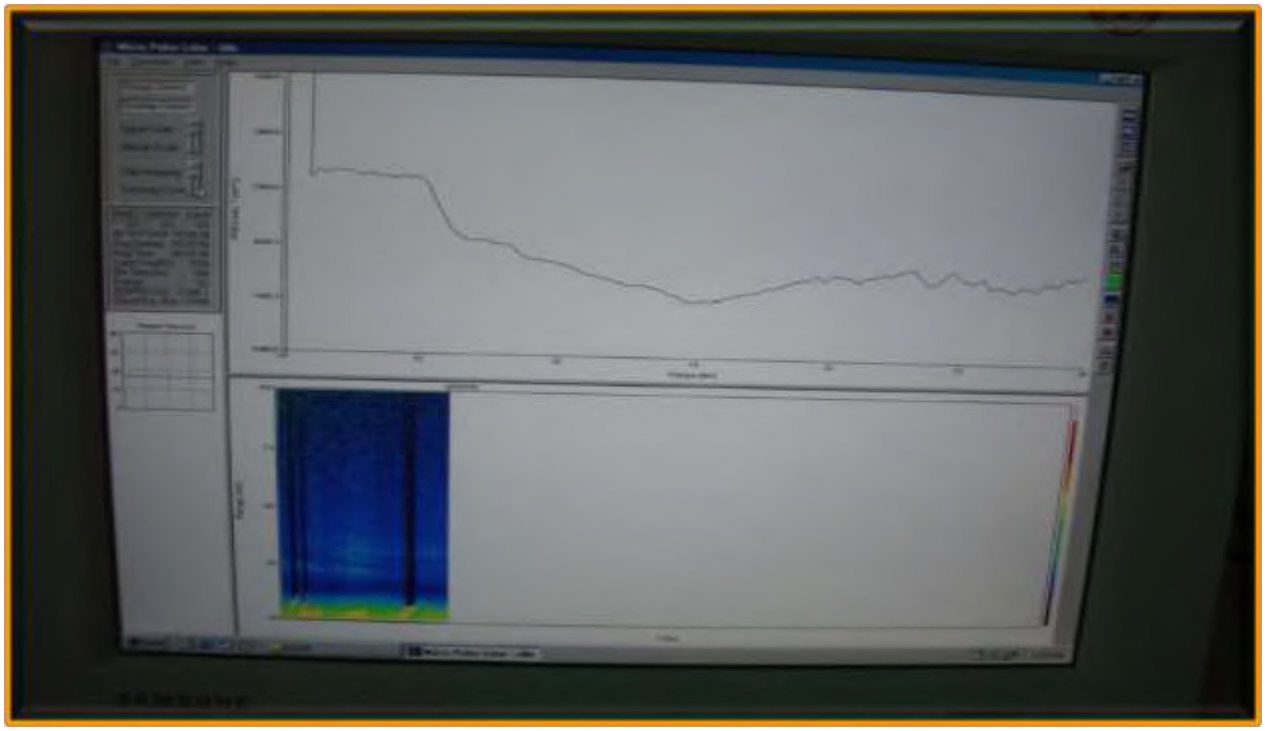
Individual Glorious Papaya Garden Snapshot View/ Scene near NASA Observatory – 8.

Individual Glorious Snapshot View/ Scene along Seashore Beach Site and Coastal Area – 9.

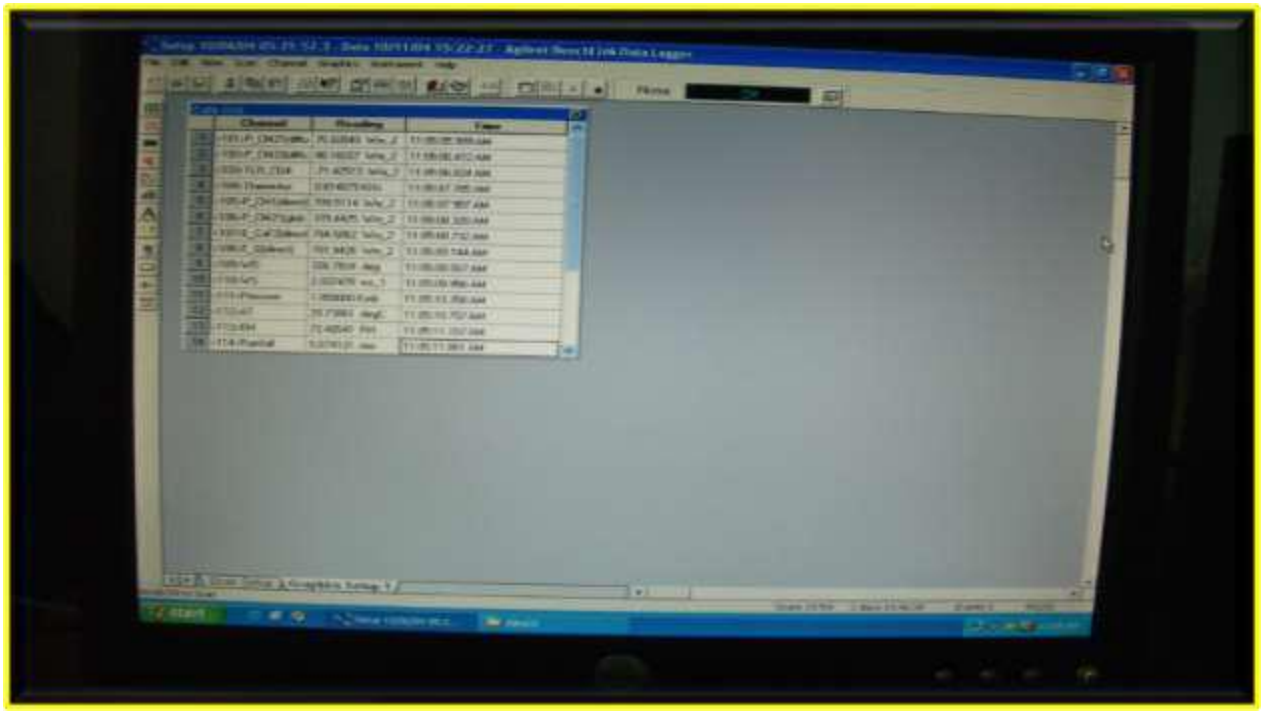
Individual Superb Snapshot View/ Scene along Seashore Beach Site and Coastal Area – 10.



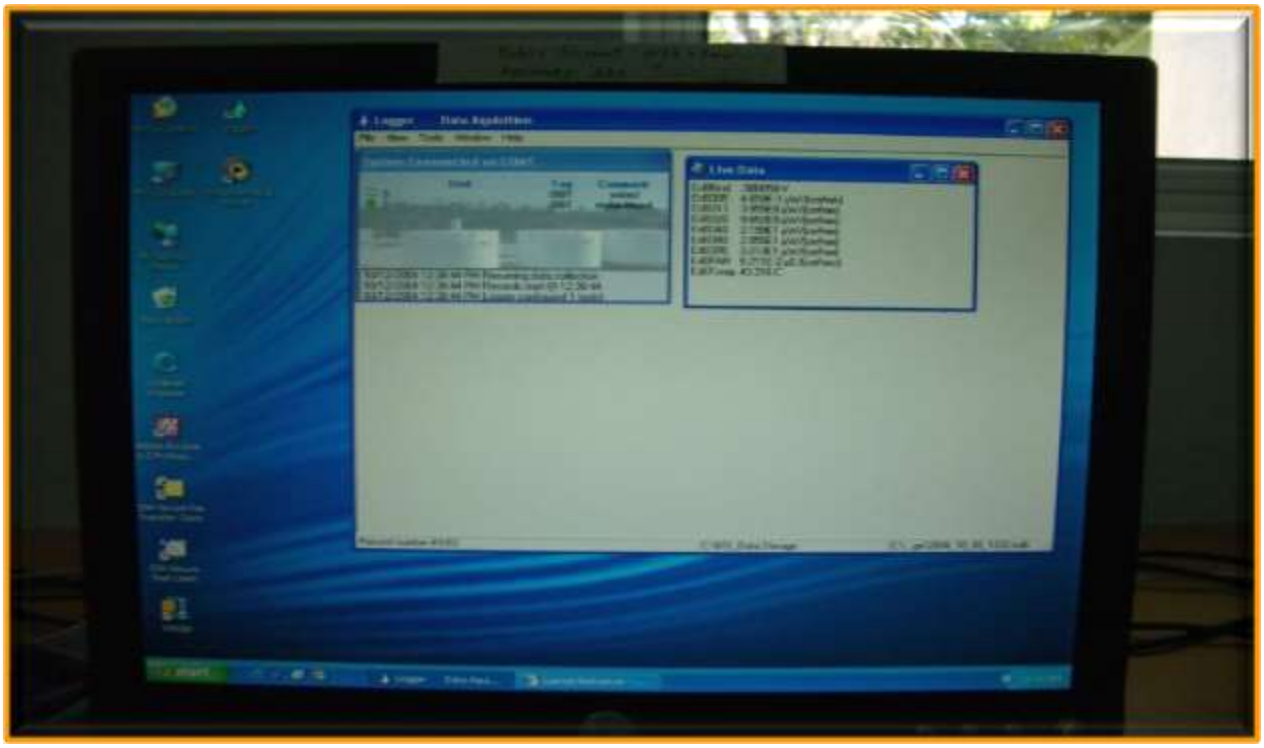
Inside Observatory GRAPHICAL AS WELL AS ANALYTICAL View/ Scene of NASA Laboratory in Maldives – 1.



Inside Observatory GRAPHICAL AS WELL AS ANALYTICAL View/ Scene of NASA Laboratory in Maldives – 2.



Inside Observatory GRAPHICAL AS WELL AS ANALYTICAL View/ Scene of NASA Laboratory in Maldives – 3.



Inside Observatory GRAPHICAL AS WELL AS ANALYTICAL View/ Scene of NASA Laboratory in Maldives – 4.

Inside Instruments' Functioning View/ Scene of NASA Observatory in Maldives – 1.

Inside Instruments' Functioning View/ Scene of NASA Observatory in Maldives – 2.

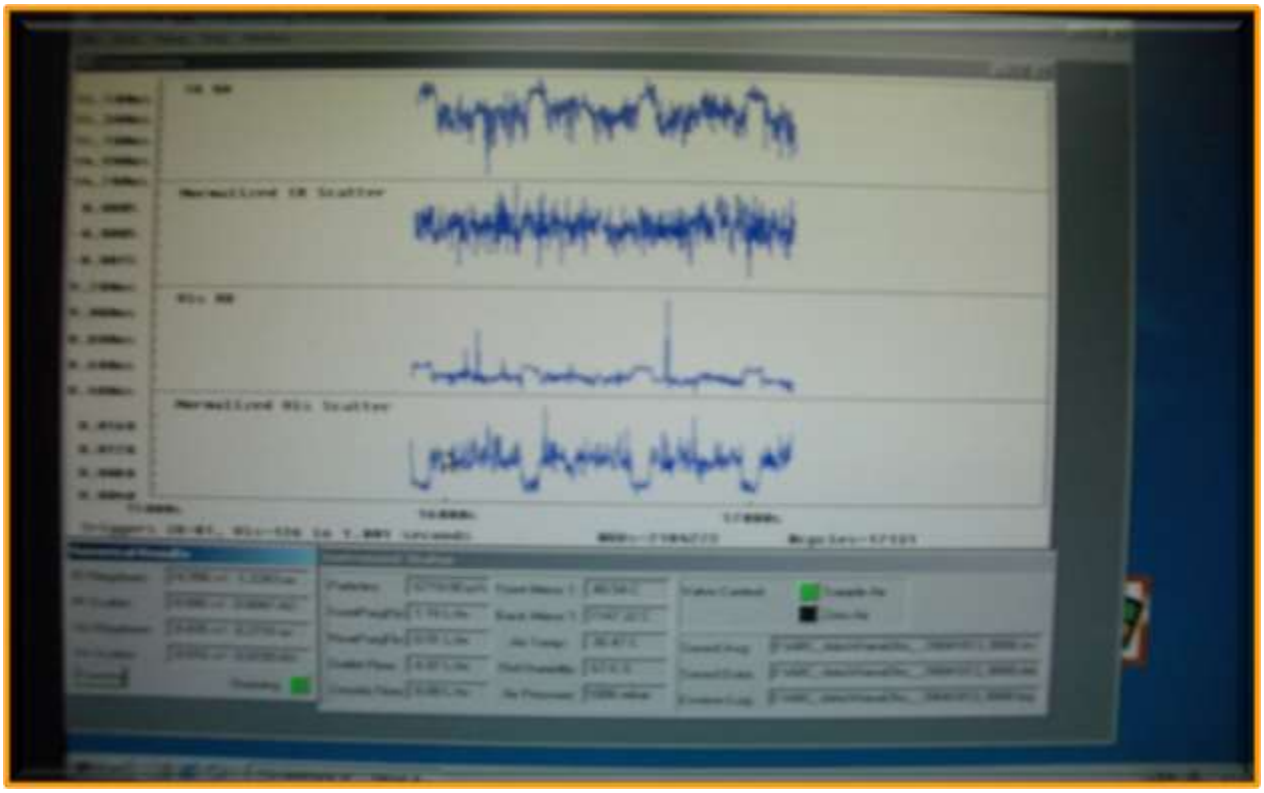
Inside Instruments' Functioning View/ Scene of NASA Observatory in Maldives – 3.

Inside Instruments' Functioning View/ Scene of NASA Observatory in Maldives – 4.

Inside Instruments' Functioning View/ Scene of NASA Observatory in Maldives – 5.

Inside Instruments' Functioning View/ Scene of NASA Observatory in Maldives – 6.

Inside Instruments' Functioning View/ Scene of NASA Observatory in Maldives – 7.



Inside Instruments' Functioning View/ Scene of NASA Observatory in Maldives – 8.

Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 9.

Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 10.

Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 11.

Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 12.

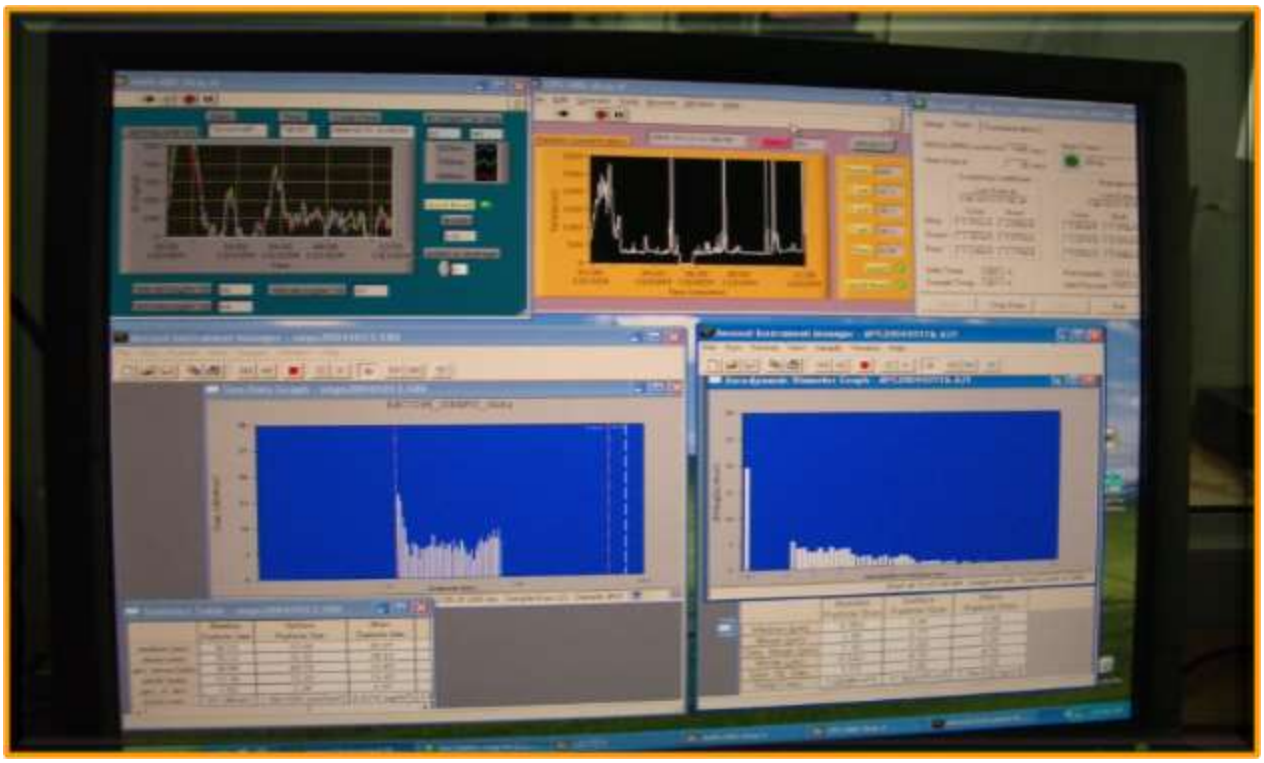
Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 13.

Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 14.

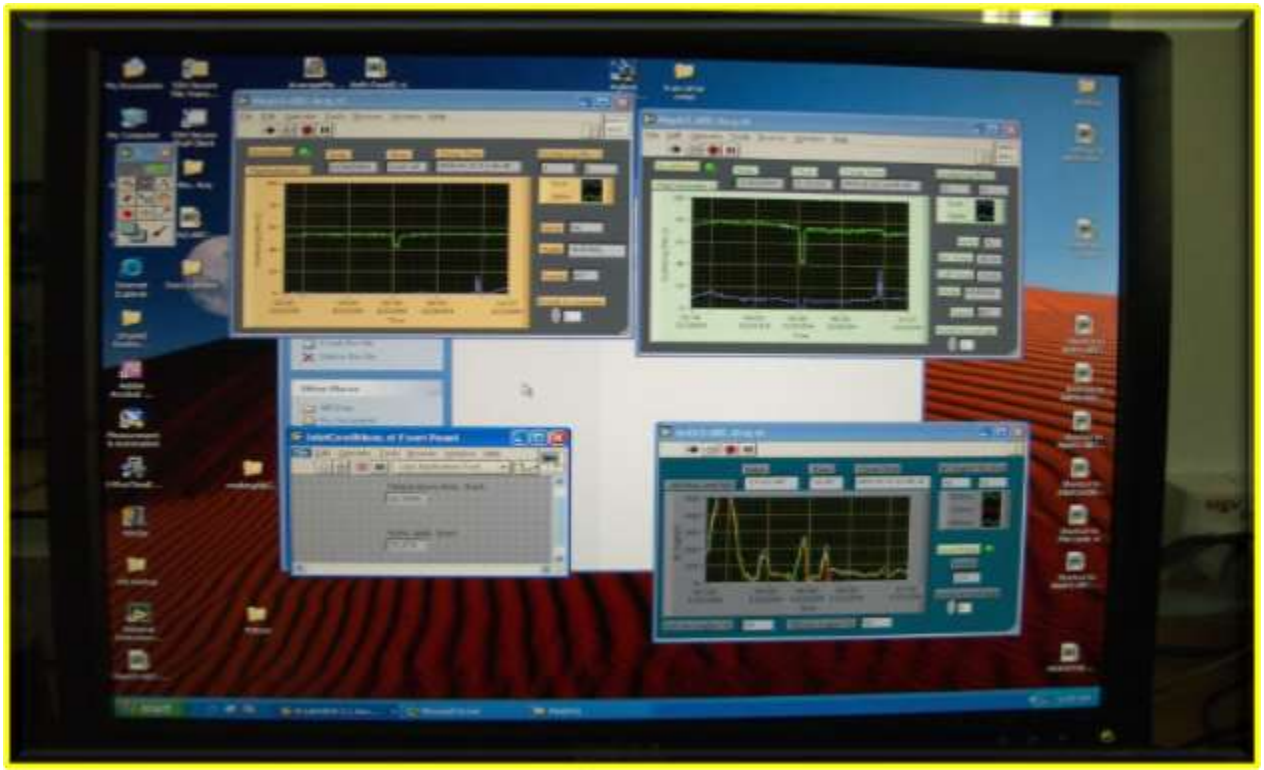
Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 15.

Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 16.

Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 17.



Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 18.



Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 20.

Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 20.

Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 21.

Inside Instruments' Good Functioning View/ Scene of NASA Observatory in Maldives – 22.

Instruments' Good Functioning View/ Scene Installed Near NASA Observatory Tower – 1.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 1.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 2.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 3.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 4.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 5.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 6.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 7.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 8.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 9.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 10.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 11.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 12.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 13.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 14.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 15.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 16.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 17.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 18.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 19.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 20.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 21.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 22.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 23.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 24.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 25.

Instruments' Spontaneous Functioning View/ Scene Installed on Observatory Tower – 26.

Indeed Spectacular, Fabulous Chaotic Nice – Looking Cloudy Island Aerial View/ Scene – 1.

Indeed Spectacular, Chaotic Nice – Looking Light Cloudy Island Aerial View/ Scene – 2.

Indeed Spectacular, Nice – Looking Cloudy and Sun Shine Island Aerial View/ Scene – 3.

Indeed Spectacular, Chaotic Nice – Looking Light Cloudy Island Aerial View/ Scene – 4.

Indeed Spectacular, Chaotic Nice – Looking Clear Weather Island Aerial View/ Scene – 5.

Ferryboat Number 21 and 41 along Seashore @ Maldives Presidents' Locality/ Area.

NASA Observatory's Inside View of Installed Instruments Functioning and Recording Data.

Neat + Clean + Green Habitated Area with 1,200 {Internal People} + 14 {External People} Living People near Observatory Site – 1.

Neat + Clean + Green Habitated Area with 1,200 {Internal People} + 14 {External People} Living People near Observatory Site – 2.

Nephelometer Temperature, Relative Humidity Measurement inside Observatory – 1.

Nephelometer Temperature, Relative Humidity Measurement inside Observatory – 2.

Night Time Organized Barbeque Carnival/ Fete Celebration of Last Day in Maldives – 1.

Night Time Organized Barbeque Carnival/ Fete Celebration of Last Day in Maldives – 2.

Night Time Organized Barbeque Carnival/ Fete Celebration of Last Day in Maldives – 3.

Night Time Organized Barbeque Carnival/ Fete Celebration of Last Day in Maldives – 4.

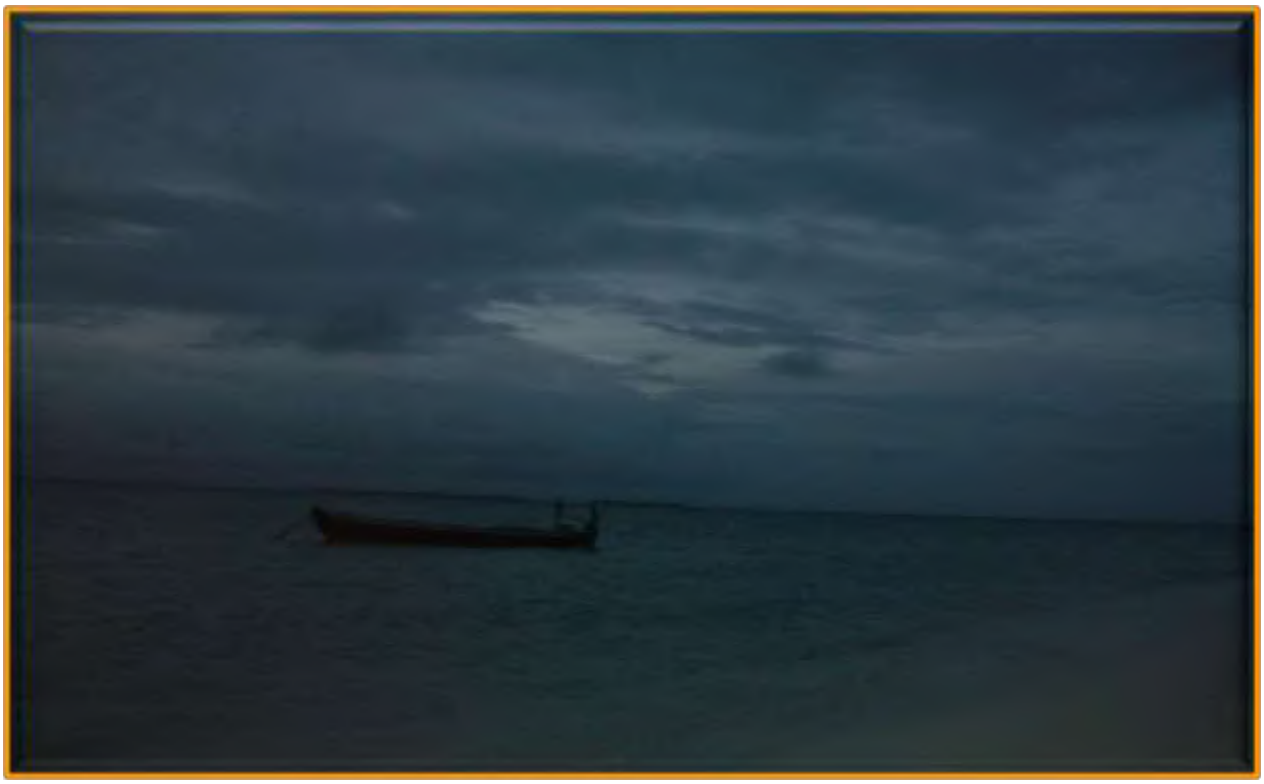
Night Time Organized Barbeque Carnival/ Fete Celebration of Last Day in Maldives – 5.

Night Time Organized Barbeque Carnival/ Fete Celebration of Last Day in Maldives – 6.

Night Time Organized Barbeque Carnival/ Fete Celebration of Last Day in Maldives – 7.

Night Time Huts and Shelters, Hanimaadhoo Island View/ Scene near Observatory Site – 1.

Night Time Tree and Shelters, Hanimaadhoo Island View/ Scene near Observatory Site – 2.

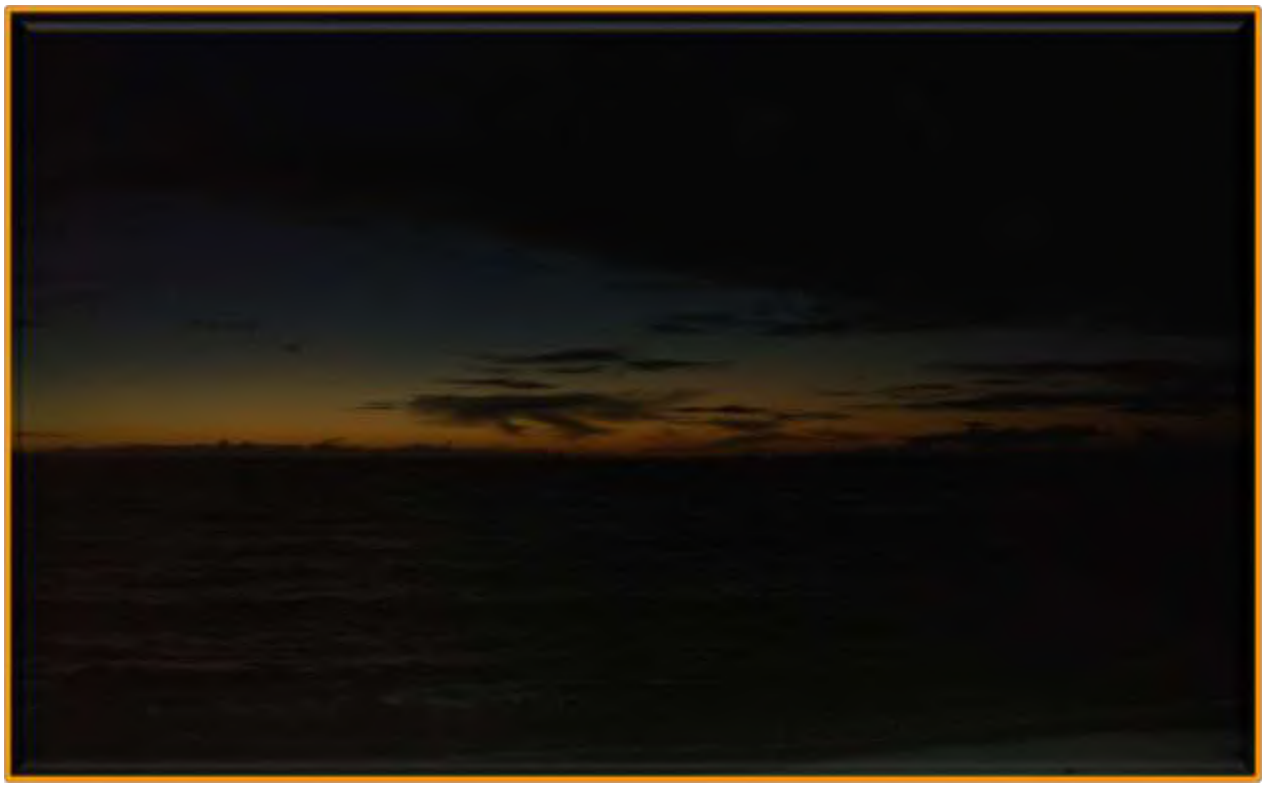


Night Time Boating on Shore, Hanimaadhoo Island View/ Scene near Observatory Site – 3.

Night Time Sea Side Waves Formations and Chaotic View/ Scene near Observatory Site – 4.

Night Time Toona Fish Laying on Seashore Beach a View/ Scene near Observatory Site – 5.

Night Time Toona Fish Laying on Seashore Beach a View/ Scene near Observatory Site – 6.



Night Time Dark Cloudy with Seashore Waves a View/ Scene near Observatory Site – 8.

Night Time Dark Cloudy with Seashore Waves a View/ Scene near Observatory Site – 9.

Night Time Dark Cloudy with Seashore Waves a View/ Scene near Observatory Site – 10.

Night Time Dark Cloudy with Seashore Waves a View/ Scene near Observatory Site – 11.

Night Time Sapphire Coming Out from White Sand Hole, Scene near Observatory Site – 12.

Night Time Sapphire Coming Out from White Sand Hole, Scene near Observatory Site – 13.

Night Time Sapphire Coming Out from White Sand Hole, Scene near Observatory Site – 14.

Night Time Sapphire Coming Out from White Sand Hole, Scene near Observatory Site – 15.

Night Time Sapphire Coming Out from White Sand Hole, Scene near Observatory Site – 16.

Night Time Sapphire Coming Out from White Sand Hole, Scene near Observatory Site – 17.

Night Time Most Darkest Cloudy and Quite Mysterious View near Observatory Site – 18.

Night Time Most Darkest Cloudy and Quite Mysterious View near Observatory Site – 19.

Observatory's TEAMWORK with Analytical and Technical Talent Perfect Schoolwork – 1.

Observatory's TEAMWORK with Analytical and Technical Talent Perfect Schoolwork – 2.

Observatory's Homework Assignment with Analytical and Technical Skill View/ Scene – 1.

Observatory's Homework Assignment with Analytical and Technical Skill View/ Scene – 2.

Observatory's Office Work Assignment with Analytical and Technical Skill View/ Scene – 1.

Observatory's Work Office Interior Designed Furniture's with Wi – Fi Network System – 1.

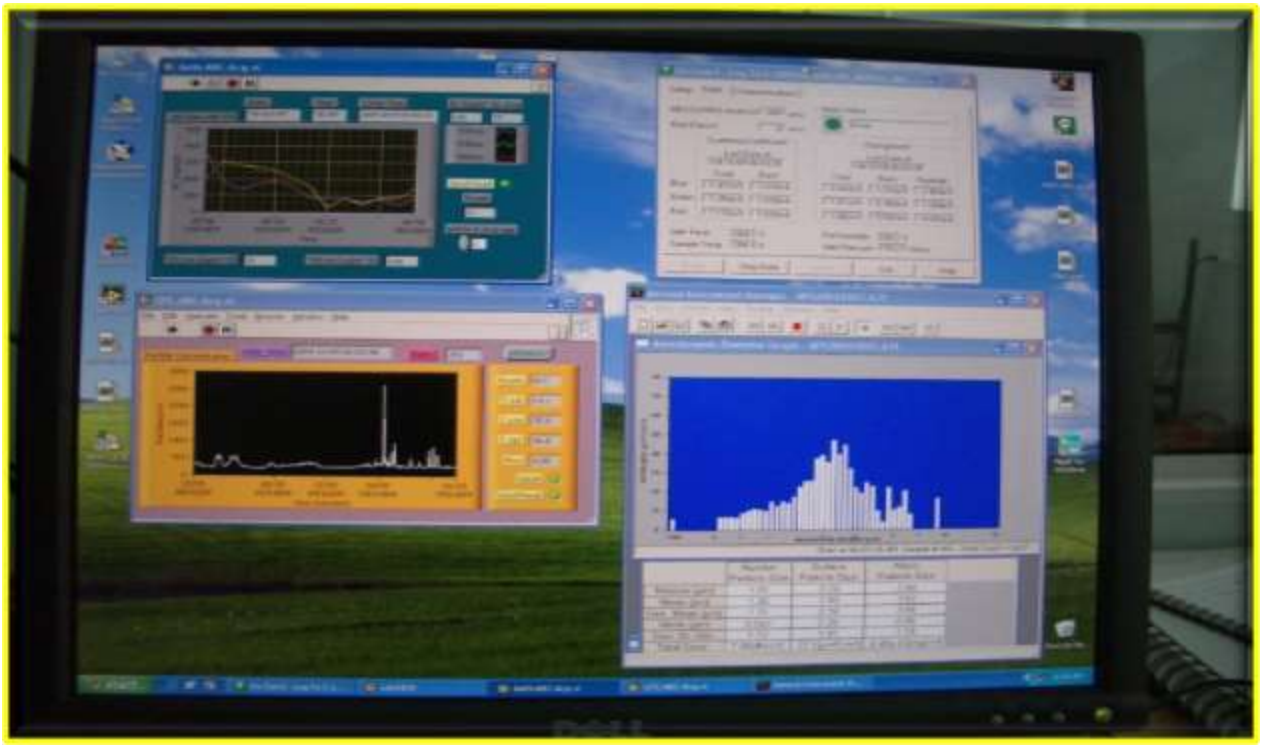
Observatory's Work Office Interior Designed Furniture's with Wi – Fi Network System – 2.

Thrilling NASA Observatory Tower Well Equipped with Ample Instruments @ Maldives – 1.

Thrilling NASA Observatory Tower Well Equipped with Ample Instruments @ Maldives – 2.

Outside Weather Greatest, Study of Cloud Formation @ NASA Observatory in Maldives – 1.

Outside Weather Greatest, Study of Cloud Formation @ NASA Observatory in Maldives – 2.



Analytical/ Technical Particle Concentration Measurement in NASA Observatory Setup – 3.

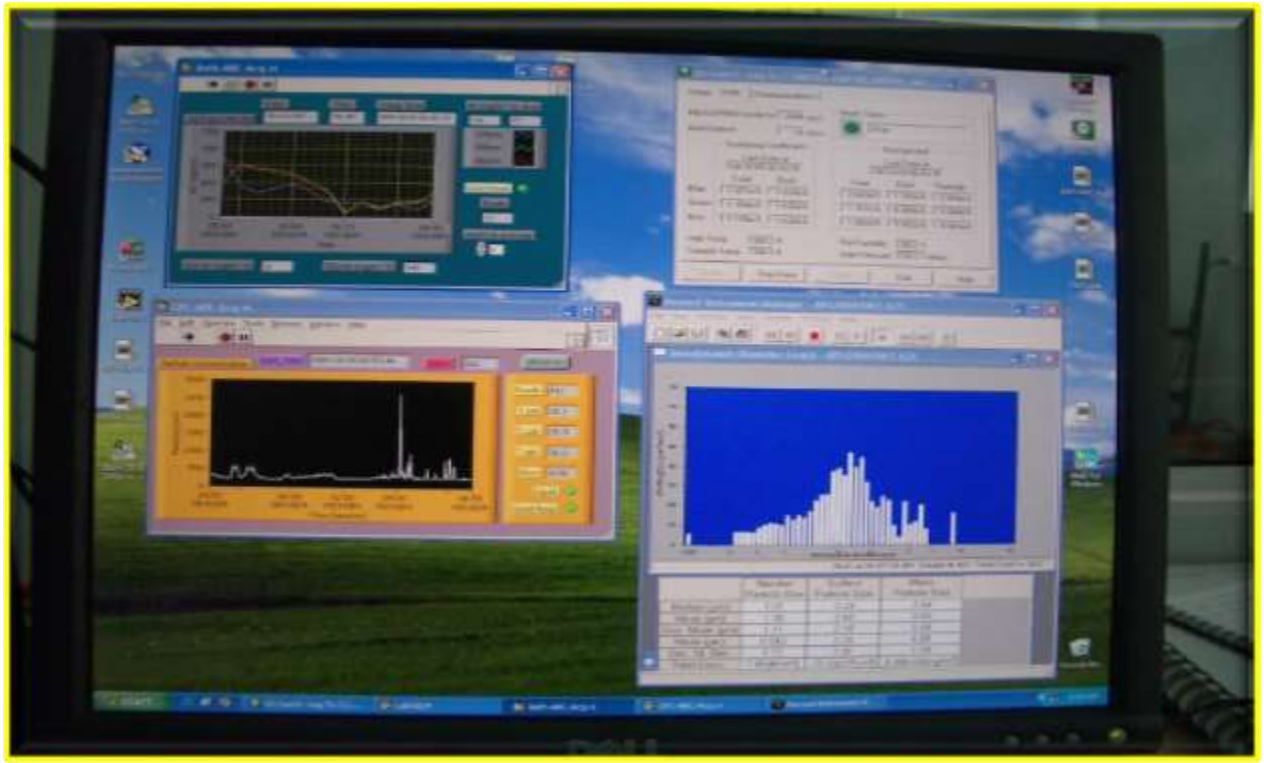
Professor Paul J. Crutzen Co – Chief Scientist, ABC Project MPI for Chemistry, Mainz, Germany with Boossarasiri Thana Chulalongkorn University, Bangkok, Thailand and Bidya Banmali Pradhan International Centre for Integrated Mountain Development, Nepal – 1.

Professor Paul J. Crutzen Co – Chief Scientist, ABC Project MPI for Chemistry, Mainz, Germany with Boossarasiri Thana Chulalongkorn University, Bangkok, Thailand and Bidya Banmali Pradhan International Centre for Integrated Mountain Development, Nepal – 2.

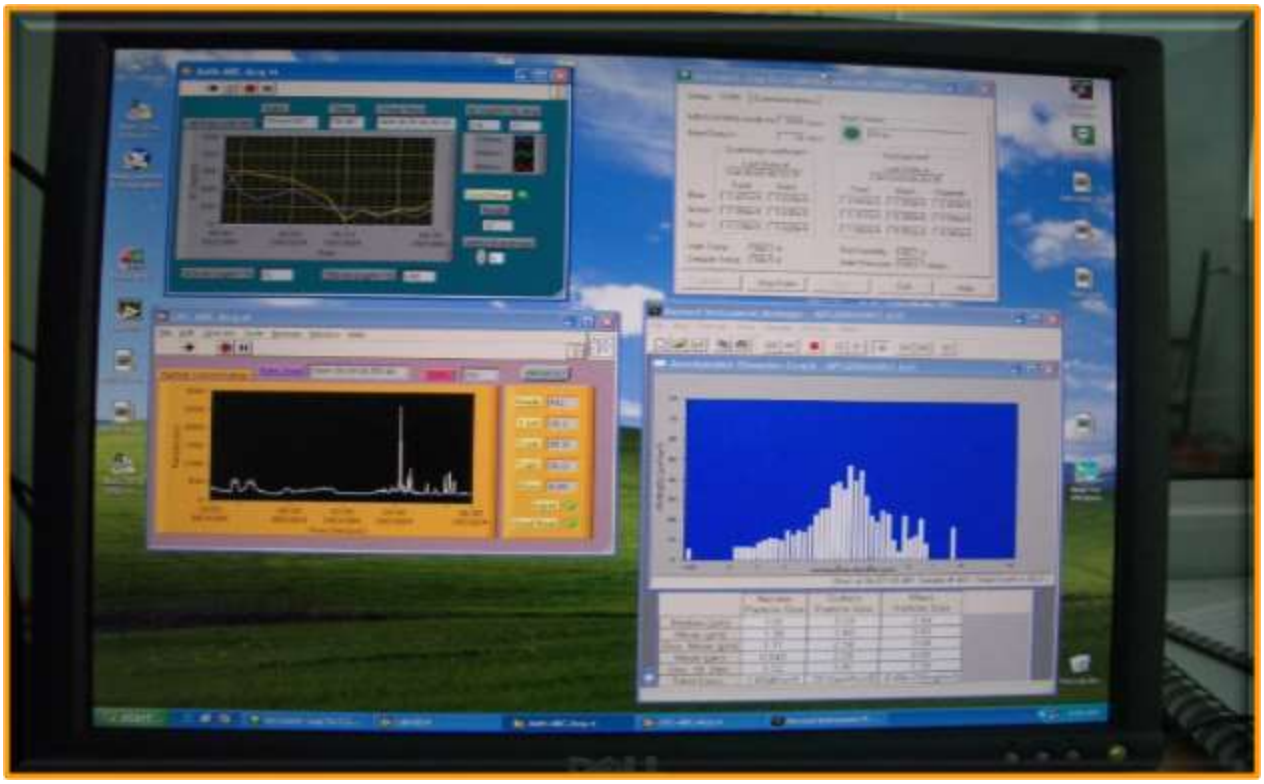
Presentation of Professor V. Ramanathan Co – Chief Scientist, ABC Project Co – Director, ABC Training School C4, SIO, UCSD, La Jollaa, USA.

Gathering and Discussions with Presented Topic with Professor V. Ramanathan Co – Chief Scientist, ABC Project Co – Director, ABC Training School C4, SIO, UCSD, La Jollaa, USA.

President Excellency of Maldives with TEAM MAMBERS in NASA Observatory @ Maldives.



Analytical/ Technical Particle Concentration Measurement in NASA Observatory Setup – 4.



Analytical/ Technical Particle Concentration Measurement in NASA Observatory Setup – 5.

Rain Water Harvesting System Tactic and Method Shadowed...!!! Rainy Day on Island – 1.

Nice Gathering, Welcome and Meeting Conducted with Residential' People of Maldives.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 1.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 2.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 3.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 4.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 5.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 6.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 7.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 8.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 9.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 10.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 11.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 12.

Scenic Eye – Catching Beauty/ Natural Environment View Taken @ Observatory Tower – 13.

Scenic Eye – Catching Beauty and Natural Environment View on Observatory Tower – 14.

Scenic Eye – Catching Beauty and Natural Environment View on Observatory Tower – 15.

Scenic Eye – Catching Beauty and Natural Environment View on Observatory Tower – 16.

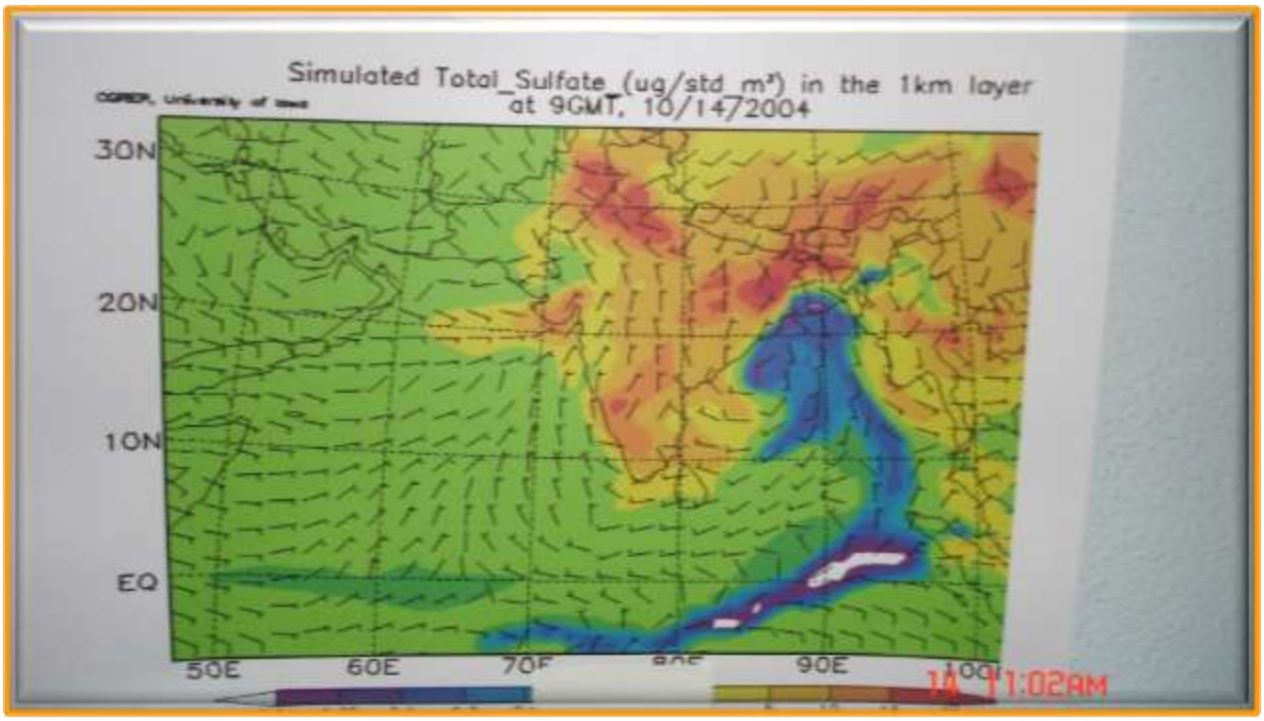
Scenic Eye – Catching Beauty and Natural Environment View on Observatory Tower – 17.

Scenic Eye – Catching Beauty and Natural Environment View on Observatory Tower – 18.

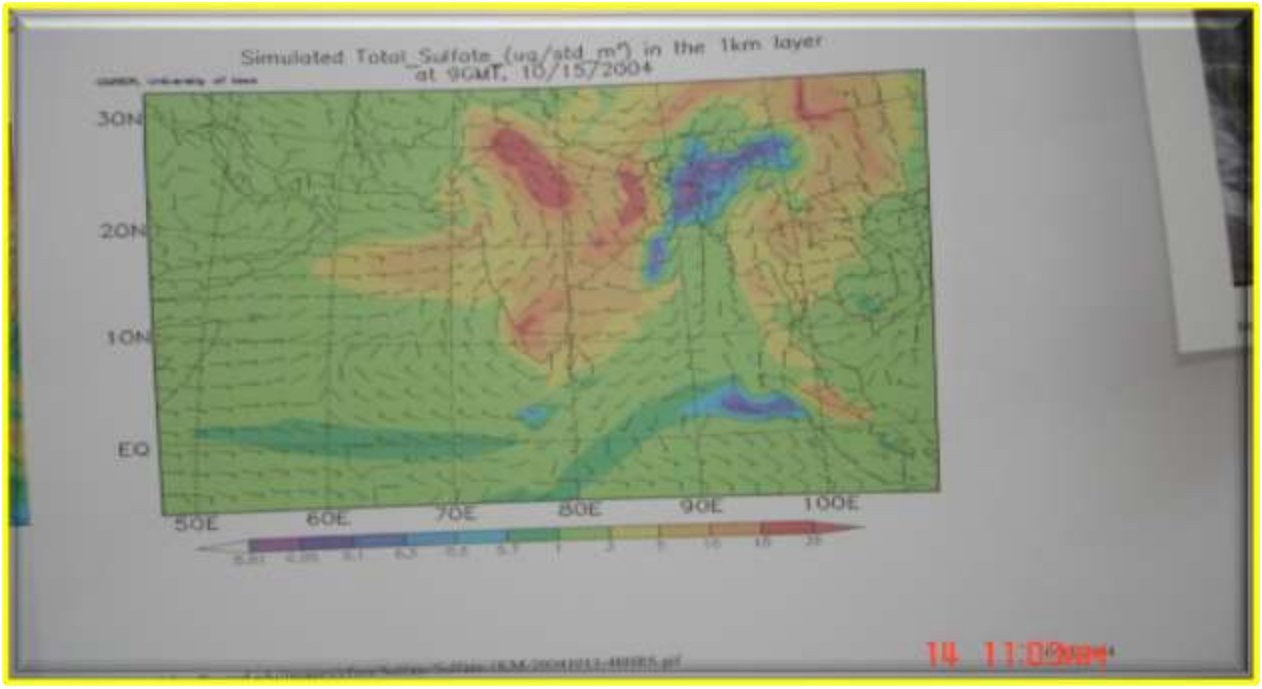
Scenic Eye – Catching Beauty and Natural Environment View on Observatory Tower – 19.

Eminent Innovator, Researcher and Scientist Working @ NASA Observatory in Maldives – 1.

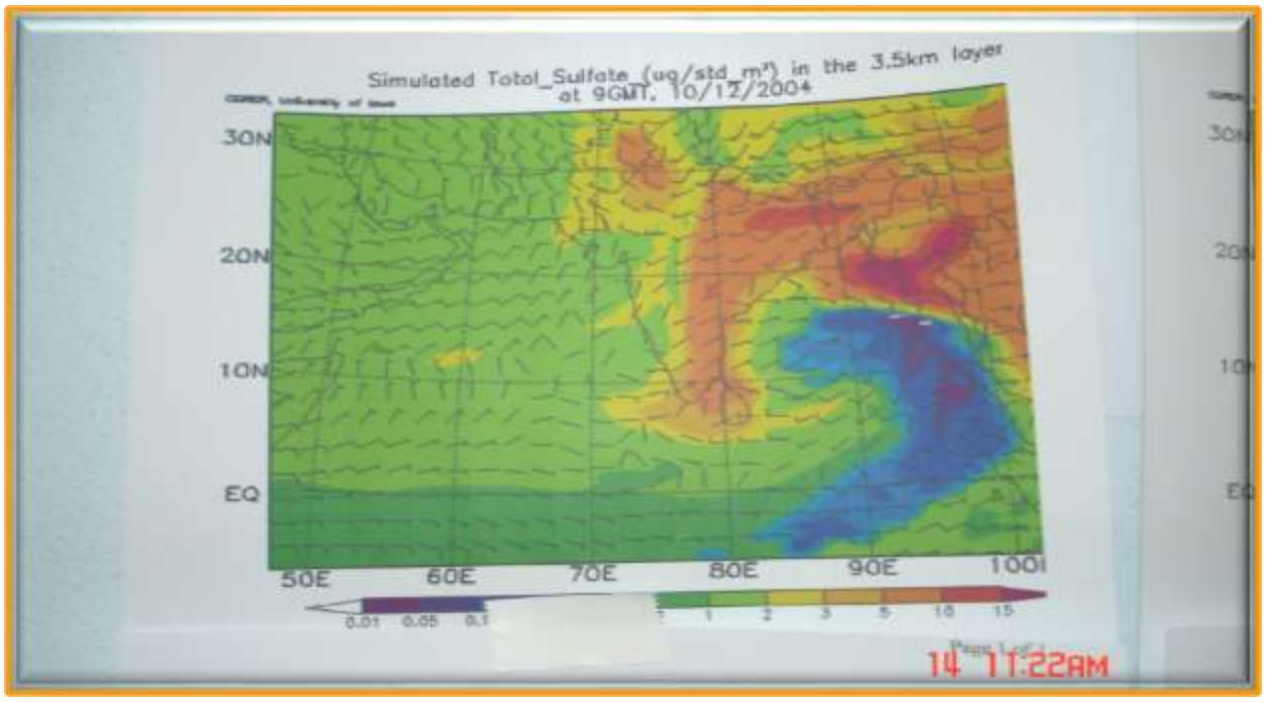
Neat Clean Shop View/ Scene Taken after Raining near Observatory Area @ Maldives – 2.



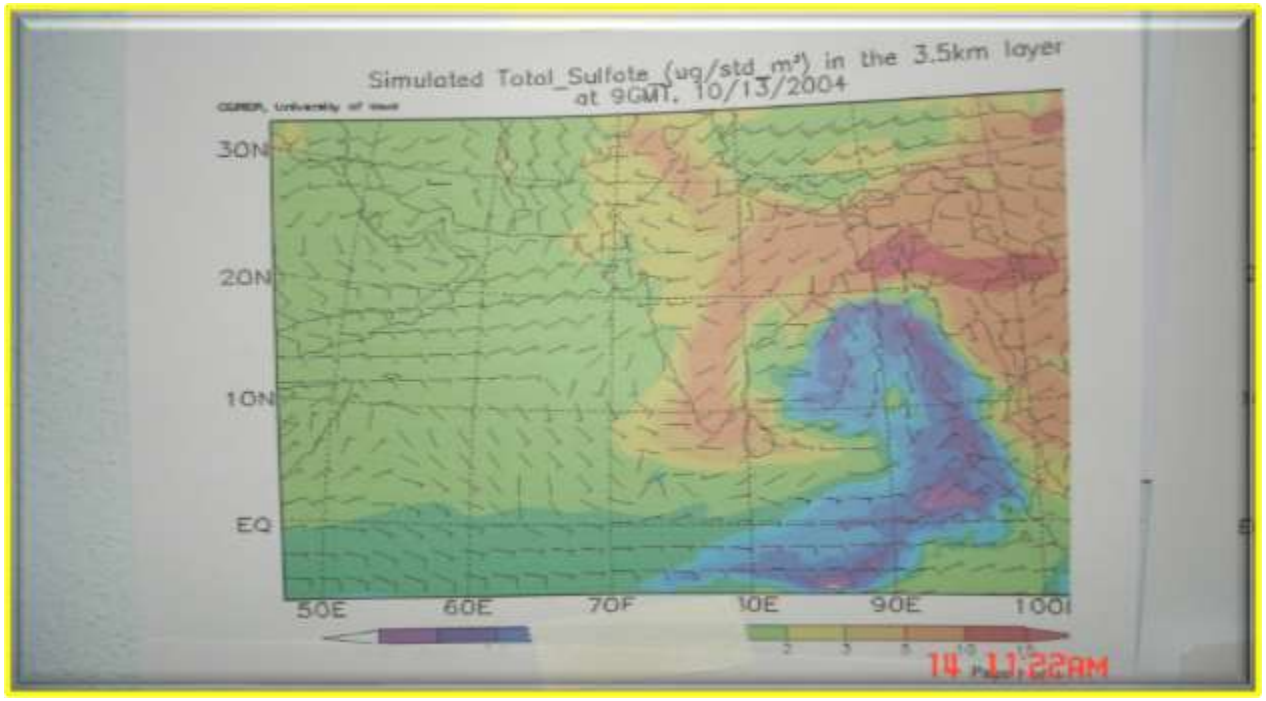
Simulated Total Sulfate (µg/ std m³) in the 1 Km Layer @ 9 GMT, 10 – 04 – 2004, Experimental Observations by The "Center for Global and Regional Environmental Research" (CGRER), University of Lowe – 1.



Simulated Total Sulfate (µg/ std m³) in the 1 Km Layer @ 9 GMT, 10 – 15 – 2004, Experimental Observations by The "Center for Global and Regional Environmental Research" (CGRER), University of Lowe – 2.



Simulated Total Sulfate (µg/ std m³) in the 3.5 Km Layer @ 9 GMT, 10 – 12 – 2004, Experimental Observations by The "Center for Global and Regional Environmental Research" (CGRER), University of Lowe – 3.



Simulated Total Sulfate (µg/ std m³) in the 3.5 Km Layer @ 9 GMT, 10 – 13 – 2004, Experimental Observations by The "Center for Global and Regional Environmental Research" (CGRER), University of Lowe – 4.

Sun Shine OR Intense Insolation Recorder Installed for Measurement @ Observatory Tower – 1.

Sun Shine OR Intense Insolation Recorder Installed for Measurement @ Observatory Tower – 2.

Calm and Peaceful TEAMWORK Environment @ NASA Observatory Setup in Maldives – 1.

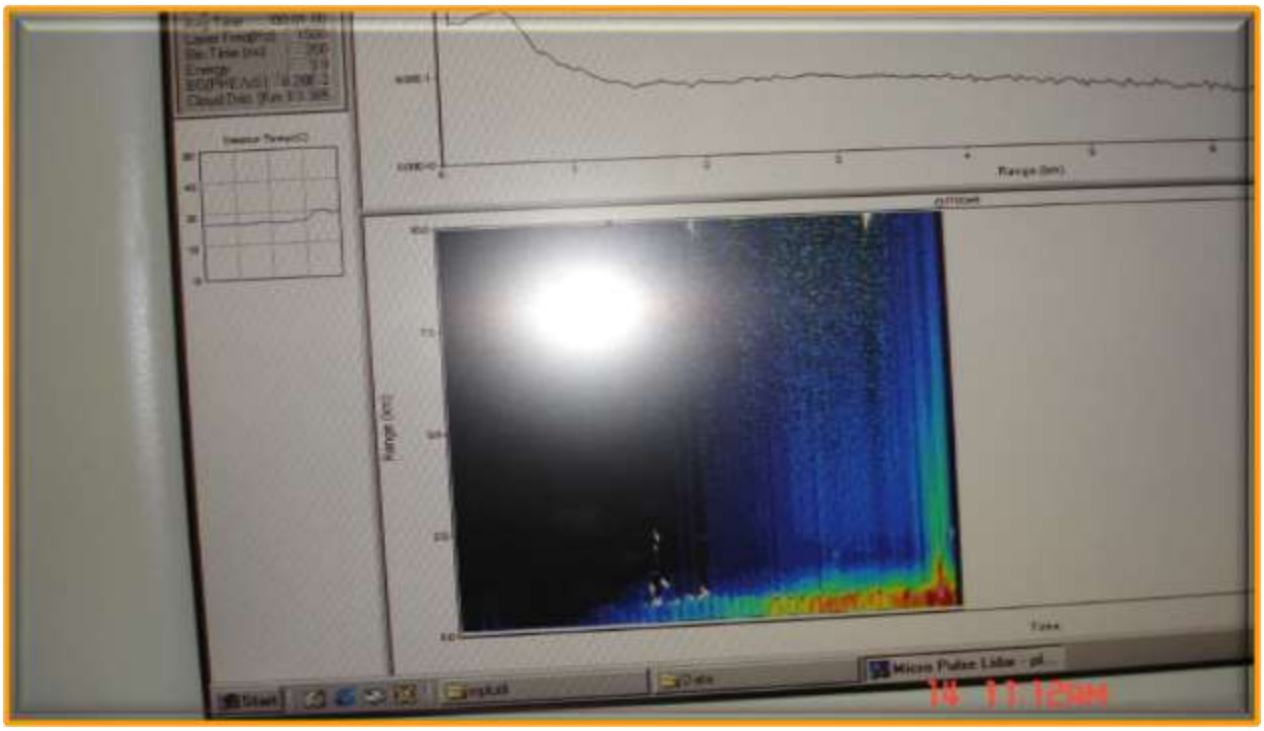
Official Lunch Break Time for TEAMWORK Fellows @ NASA Observatory in Maldives – 2.

Md. Abdul Hannan, University of Dhaka, Bangladesh, A. Jayaraman Co – Director, ABC Training School PRL, Ahmedabad, India, and T. Nakajima, CCSR, Univ. Tokyo, Japan as TEAMWORK Fellow @ NASA Observatory in Maldives – 3.

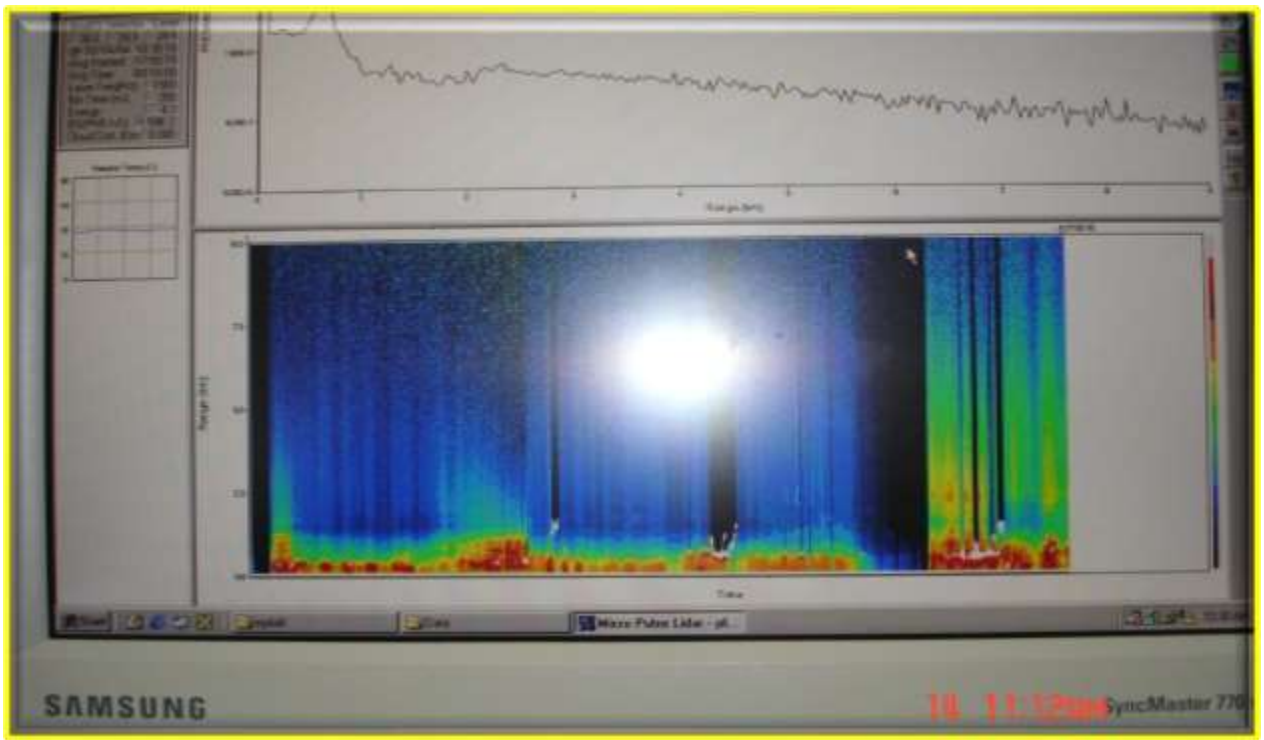
Md. Abdul Hannan, University of Dhaka, Bangladesh, A. Jayaraman Co – Director, ABC Training School PRL, Ahmedabad, India, and T. Nakajima, CCSR, Univ. Tokyo, Japan as TEAMWORK Fellow @ NASA Observatory in Maldives – 4.

Sverdlik Leonid, Kyrgyz – Russian – Slavic University, Kyrgyzstan, Anup Krishna Prasad, Indian Institute of Technology, Kanpur, India, Md. Abdul Hannan, University of Dhaka, Bangladesh as TEAMWORK Fellow @ NASA Observatory in Maldives – 5.

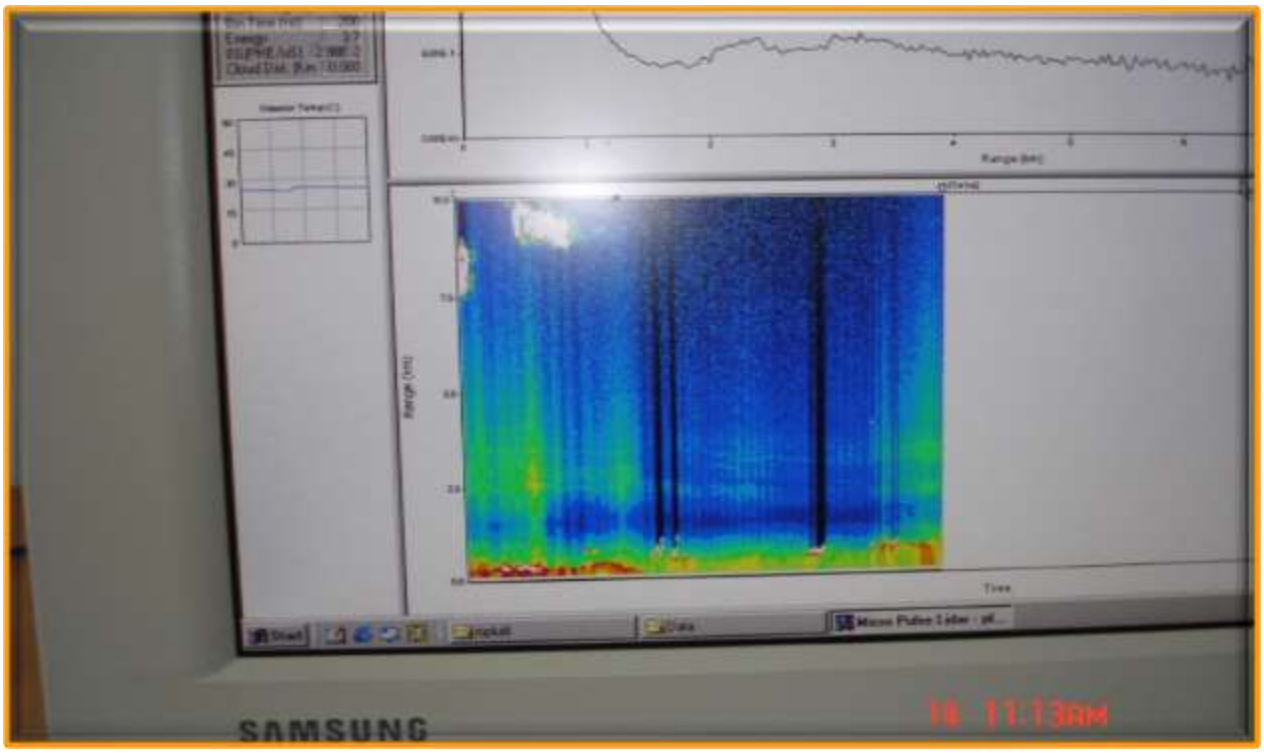
Anup Krishna Prasad, Indian Institute of Technology, Kanpur, India, Sverdlik Leonid, Kyrgyz – Russian – Slavic University, Kyrgyzstan, Dr. Harish Kumar Gupta, Devi Ahilya University, Indore, India, Md. Abdul Hannan, University of Dhaka, Bangladesh as TEAMWORK Fellow @ NASA Observatory in Maldives – 6.



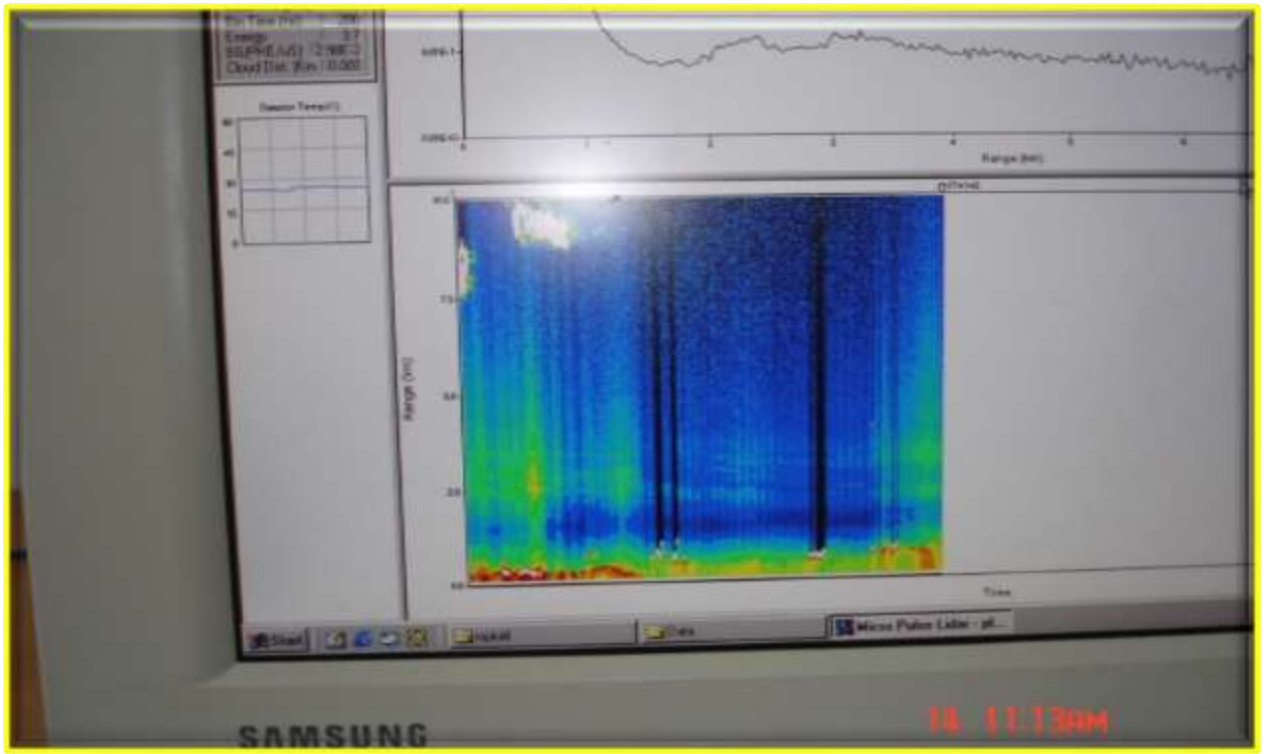
Temperature Detector with Time and Range Calculations Accomplished @ NASA Observatory Maldives – 1.



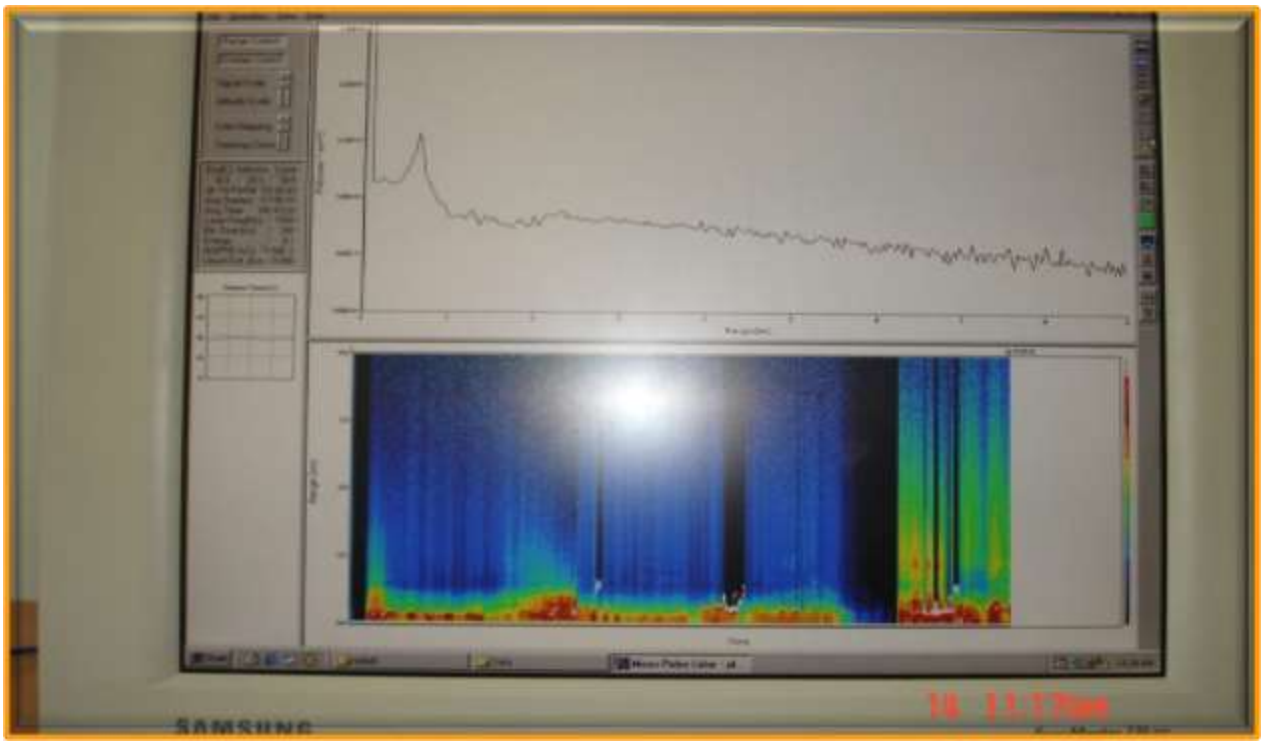
Temperature Detector with Time and Range Calculations Accomplished @ NASA Observatory Maldives – 2.



Temperature Detector with Time and Range Calculations Accomplished @ NASA Observatory Maldives – 3.



Temperature Detector with Time and Range Calculations Accomplished @ NASA Observatory Maldives – 4.



Temperature Detector with Time and Range Calculations Accomplished @ NASA Observatory Maldives – 5.

Training, Exploration and Analysis Performance Completed by Bidya Banmali Pradhan International Centre for Integrated Mountain Development, Nepal – 1.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 1.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 2.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 3.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 4.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 5.

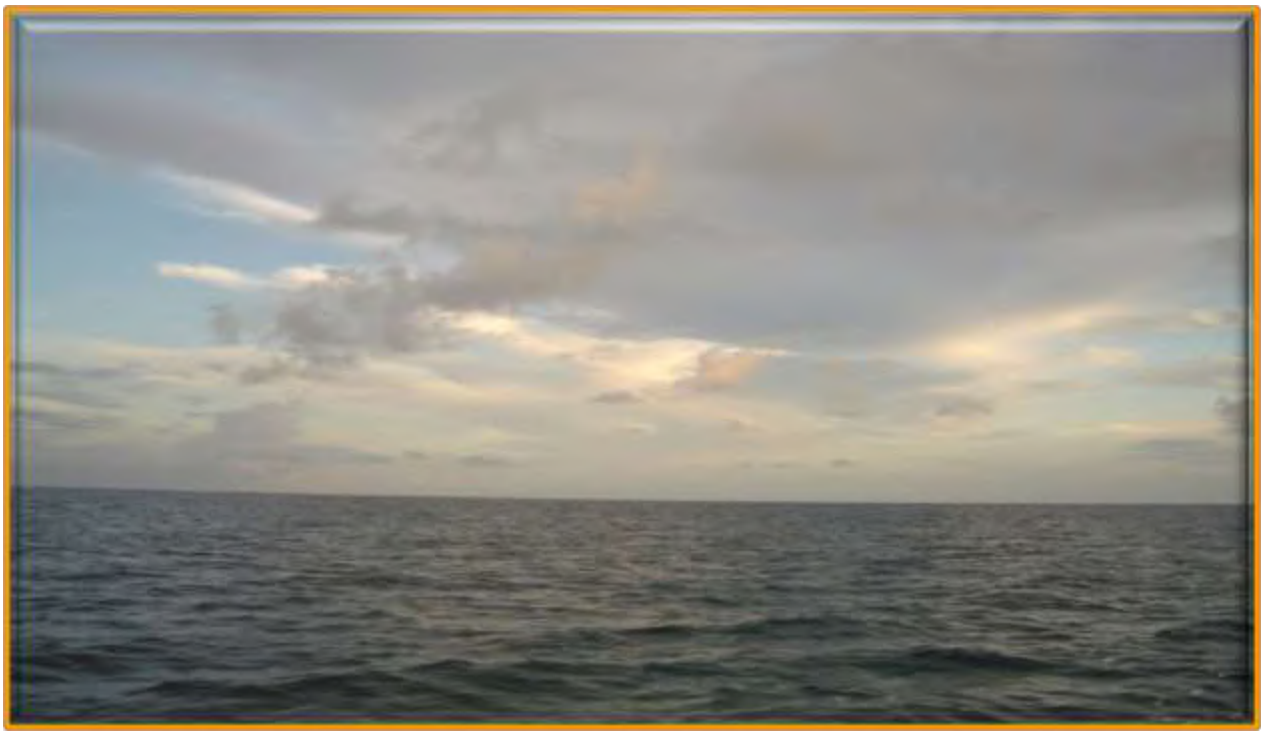
Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 7.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 8.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 9.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 10.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 11.



Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 12.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 13.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 14.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 15.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 16.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 17.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 18.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 19.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 20.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 21.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 22.

Travelling Towards Presidents' Official Residential Meeting and Gathering @ Maldives – 23.

Unmanned Flight Operators, Creators and Inventors @ NASA Observatory in Maldives – 1.

Unmanned Flight Operators, Creators and Inventors @ NASA Observatory in Maldives – 2.

Unmanned Flight Operators, Creators and Inventors @ NASA Observatory in Maldives – 3.

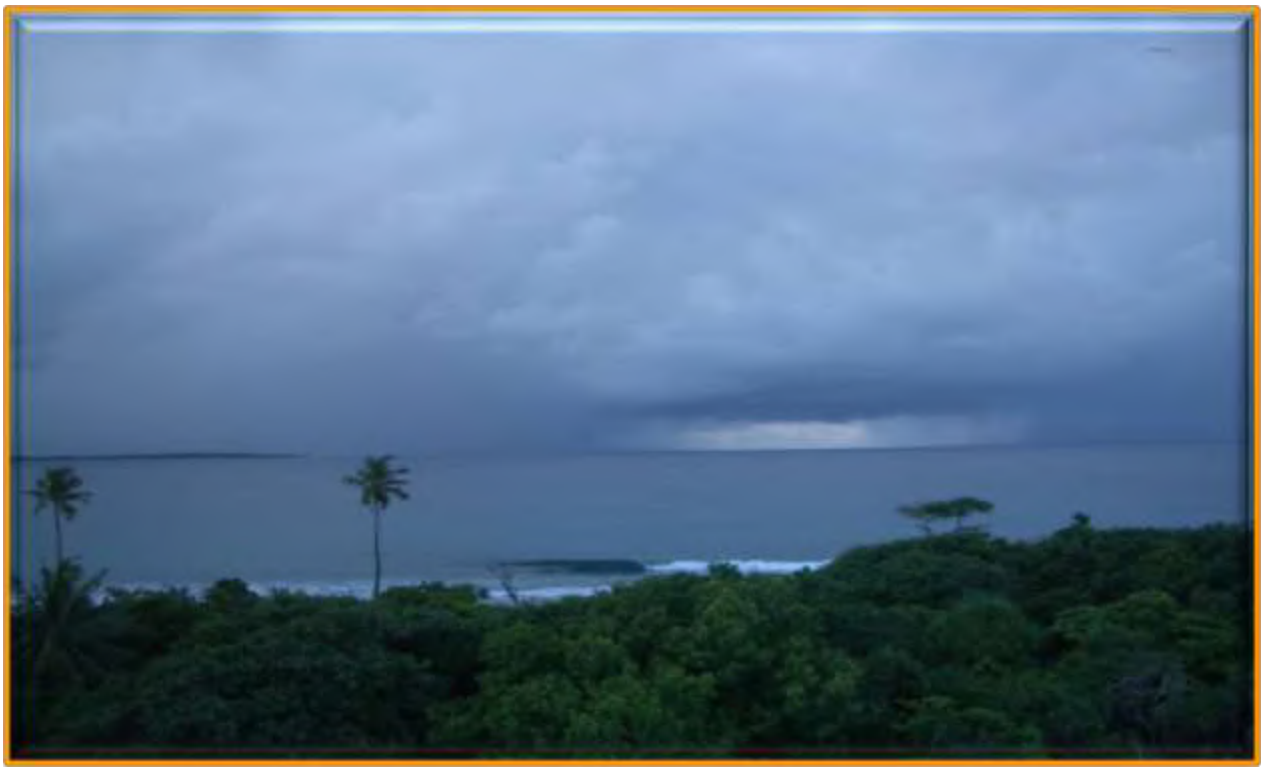
Unmanned Flight Operators, Creators and Inventors @ NASA Observatory in Maldives – 4.

Waiting for CERTIFICATES, AWARDS AND REMUNERATION of Last Day in Maldives – 1.

Way to NASA Hanimaadhoo Observatory Site, Approximately 7.0 Kilometers of Island – 2.

Way to NASA Hanimaadhoo Observatory Site, Approximately 7.0 Kilometers of Island – 3.

Way to NASA Hanimaadhoo Observatory Site, Approximately 7.0 Kilometers of Island – 4.



Indeed Amazing and Astonishing Weather and Rainfall View from Tower Observatory – 5.

Indeed Amazing and Astonishing Clear Weather Assessment near Observatory Site – 6.

Indeed Astonishing Weather Assessment Synopsis by Cloudy Sky near Observatory Site – 7.

Hanimaadhoo International Airport (HIA) and Maldives Climate Observatory (MCO)

Located @ Hanimaadhoo (Dhivehi: ހަނިމާދޫ) is One of the Inhabited Islands of Haa Dhaalu Atoll Administrative Division and Geographically Part of **Thiladhummathi Atoll** in the North of the Maldives. Located in the South **Thiladumathee (Haa Dhaalu) Atoll, Hanimaadhoo – 8.**

Annexure – 2

MORE...!!! INTER – DICSIPLINARY AND MULTI – DICSIPLINARY DIVERSITY STATEMENT...!!! IN CIVIL ENGINEERING AS WELL AS ENVIRONMENTAL, CONSTRUCTION, HIGHWAYS' ROAD NETWORKS/ FIELDS...!!!

Employment Record

Ph.D. (Environmental Engineering Science, DAVV INDORE): As an ENVIRONMENTAL EXPERT/ SPECIALIST/ ENGINEER has Prepared More than 250 Technical Reports such as IEE/ EIA/ EMP/ ES (Initial Environmental Examination/ Environmental Impact Assessment/ Environmental Management Plan/ Environmental Screening) Project Reports for (BRO/ MORTH/ PWD/ NHAI/ CPWD/ MPRDC etc. for L. N. Malviya Infra Projects Pvt. Ltd. INDIA...!!!

Total Experience	**10 + 10 + 2 + 5 Years 10 Months (Teaching + Research + Industrial + Consultancy) = 27 Years and 10 Months**

- **Two Books are Published in November, 2015 – 16 and 2016 – 17:**

Laxmi Publications (P) Ltd.
7/19, Ansari Road, Daryaganj,
New Delhi – 110002. Ph: 2325 2574, 2327 6799.
E-mail: colaxmi@hotmail.com; ratnesh.gupta@laxmipublications.com; info@laxmipublications.com;
Website: **laxmipublications.com;**
Laxmi - **http://www.laxmipublications.com/servlet/lpgetbiblio?bno=B000177&pageName=Keywords**
Amazon - **http://www.amazon.in/UEE-9753-320-Energy-Environ-Ethi-Soc-Gup-Na/dp/9383828609/ref=sr_1_1?ie=UTF8&qid=1445662495&sr=8-1&keywords=9789383828609**
Flipkart - **http://www.flipkart.com/uee-9753-320-energy-environ-ethi-soc-gup/p/itme3btjzz8zut7b?pid=9789383828609**

(3) Entitled: A Textbook of Energy, Environment, Ethics & Society (First Edition: **2014-15**)

(4) Entitled: A Textbook of Energy, Environment, Ethics & Society (Second Edition: **2016-17**)

- **Paperback:** 398 Pages;
- **Publisher:** Laxmi Publications Private Limited; First edition (1 May 2015);
- **Language:** English;
- **ISBN-10:** 9383828609;
- **ISBN-13:** 978-9383828609;
- **Product Dimensions:** 24.1 × 18.4 × 2 cm;
- **Average Customer Review:** Be the first to review this item;
- **Amazon Bestsellers Rank:** #5,29,308 in Books (**See Top 100 in Books**);

#459 in Biotechnology Engineering Textbooks;

- **Total 45 Publications in Standard Journals (Published 11 International Papers and 18 National Papers and 10 Papers are presented in International Conferences and 06 International Conferences attended on ENVIRONMENT).**

- **Among 2000 Outstanding Scientists 2010 Award: The International Biographical Centre is situated in the historic city of Ely, near Cambridge, England. (http:www.internationalbiographicalcentre.com).**

- **Awarded and visited on date 4th to 16th October, 2004, Hanimaadhoo, Republic of Maldives, Observatory for training on "Atmospheric Brown Cloud (ABC) Training School Program," announced and sponsored by (http://www-ramanathan.ucsd.edu/) UCSD ABC / UNEP – RRCAP, USA California and Thailand.**

- **Worked as Project Fellow, Air Pollution Control Division, National Environmental Engineering Research Institute (NEERI), Nehru Marg, Nagpur – 440 020 (MS).**

- **Summer Training Fellowship through Indian Academy of Science (IAS), Bangalore at APCD, NEERI, Nagpur.**

- **SRIJAN 2016, has honoured the faculty members of Engineering and Pharmacy Colleges who have helped their students reach topmost position in the University... students have topped in the following subject in academic year 2014 – 15: Subject Name:- BE 202 – CE – Energy Environment Ecology & Society at the Facilitation Ceremony on 10th April 2016 at Auditorium of M. P. Council of Science and Technology, Bhopal (http:www.technosrijan.org).**

Post Doctorate

- Worked as **Principal Investigator and Scientist Fellow for 3 Years (January 01st, 2005 to 31st, December 2007)** sponsored by **Department of Science and Technology, Ministry of Environment and Forest (http://www.serc-dst.org/), New Delhi,** under scheme **"SERC FAST TRACK PROPOSAL FOR YOUNG SCIENTISTS – (Earth and Atmospheric Sciences)" Project entitled "A Systems Approach for Managing Air Quality in an Urban Area"** at **School of Future Studies and Planning, Devi Ahilya University (http://www.dauniv.ac.in/),** Khandwa Road, **Indore – 452 017 (MP)**.

Sr. No.	Date	L. N. M. Bhopal, Negotiation Meeting/ Interview Place and Project Name	Client/ Authority Project Details with Construction Period and Security Performance.
1.	*05.03.2017*	**On Visit from Arunachal to Tezpur (Assam),** Also Surveyed Roads at Arunachal Pradesh like **NGG – BJ Gompa – LGG – Muktokhet – Teli – Bomdir – Tawang – Kameng Villages**.	
2.	*05.04.2018*	***Leh – Ladakh to Attended an Interview of BORDER ROADS ORGANISATION MINISTRY OF DEFENCE CHIEF ENGINEER "THE PROJECT HIMANK" {CE (P) HIMANK/ 24/ 2017 – 18}.***	
3.	*28.05.2018*	**Attended Interview of SRINAGAR – BARAMULA – URI (NH – 1) including Baramulla Bypass.**	
4.	*09.07.2018*	***Attended an Interview of BORDER ROADS ORGANISATION (BRO) MINISTRY OF DEFENCE CHIEF ENGINEER "THE PROJECT HIMANK" {CE (P) HIMANK/ 24/ 2017 – 18}.***	
5.	*03.08.2018*	**MPRDC Meeting and Interview for ADB Project.**	
6.	*20.08.2018*	***Attended an Interview/ Negotiation of BORDER ROADS ORGANISATION (BRO) MINISTRY OF DEFENCE CHIEF ENGINEER "THE PROJECT SWASTIK" {CE (P) SWTK/ 08/ 2018 – 19}.***	
7.	*13.12.2018/ 15.12.2018/ 17.12.2018*	**ON TOUR TO LEH – LADAKH AND VISITED WILDLIFE WARDEN "OFFICER WHO & WHEN" TO MEET WITH MR. PANKAJ SHARMA (SFS)/ FOREST RANGER AND SUBMITTED "EIA DRAFT REPORT".**	
8.	*06.09.2019*	**Negotiation Meeting/ Interview with NHAI Official For Road Network Project at Solapur, Maharashtra State.**	**Annexure – 9**
9.	*30.09.2019*	**Delhi to Gurgaon to Solapur Office for Negotiation Meeting/ Interview; Document Verification Technical Manager at NHAI Office with Team Leader Asheesh Suhaney Sir: Solapur.**	**Annexure – 9**
10.	*28.12.2019*	**Negotiation Meeting/ Interview with NHAI Official For NHAI Project Dhanbad, with Er. Sanjit Kumar and Project Director.**	**Annexure – 10**

11.	***06.01.2020***	**Negotiation Meeting/ Interview with NHAI Official For Appointment in Gurgaon Project, Narnaul Bypass with Er. Jagbir Singh and Project Director (PD).**	**Annexure – 11**
12.	***30.02.2020***	**Negotiation Meeting/ Interview with NHAI Official For Appointment in Varanasi Project, as an Environmental Expert, Varanasi Ring Road with Team Leader (TL) Er. Rajendra Singh Rajput and Project Director (PD).**	**Annexure – 12**
13.	***17.02.2020***	**Negotiation Meeting/ Interview with NHAI Official For PIU NHAI, Project Office at Dharwad – Goa – Karnataka for an Interview with Project Director (PD) and Team Leader (TL) Er. Madhukar Dani and Harsha D, Quality Surveyor (QS).**	**Annexure – 13**
14.	***26.06.2020***	**CONSULTANCY SERVICES FOR AUTHORITY'S ENGINEER FOR SUPERVISION (NHAI) OF Development of Emergency Landing Facility on the Stretch from Km. 1274.000 to Km. 1277.600 (3.60 Km) on Chilakaluripet – Nellore Section of NH – 16 in the State of Andhra Pradesh on EPC Mode. (Telephonic/ Online Interview) with Project Director (PD) and Team Leader (TL) Sri. Sanjay Channa, Nellore.**	**Annexure – 14**
15.	***09.02.2020***	Nagpur – Mumbai Super Communication Expressway (Maharashtra Samruddhi Mahamarg) in the State of Maharashtra on EPC Mode for Package – 07 from Km 296.900 to Km 347.190 (Village Banda to Village Sawargaon Mal).	**Annexure – 15**
16.	***28.09.2020*** **12.01.2021**	**Official Visit to KSHIP: 1 (C) Four Laning of Bengaluru (NICE Road) to Magadi and Two Laning with Paved Shoulder of connector from Magadi to NH – 75 via Chikkamudigere and Iyandahalli (50.7 Km), Bengaluru. Meeting with Project Director (PD) and Team Leader (TL) Mr. Manoj Upadhyay, Mr. Mohan, Mr. Ananda Reddy (EHS), Mr. Bhimagouda (Env. Engg.), Mr. Shivakumar, Mr. Mahantesh (EE), Mr. Basavantappa.**	**Annexure – 16**
17.	**07.01.2021**	**Interview with NHAI Official at Durgapur (WB) For Appointment in (Puruliya) Ranchi, Jharkhand Road Project, as an Environmental Expert, with Team Leader (TL) Mr. Durgesh Kumar and Mr. S. K. Mallik, Project Director (PD).**	**Annexure – 17**
18.	**01.03.2021 To 04.03.2021**	**Environmental Visit and Meeting with Mr. Verendra Kumar (GM)/ Mr. Sunil Kumar (AGM)/ Mr. Shitanshu Vaibhav (PM), Mr. Pratyush Anand (Project Coordinator) JUIDCO Officials For Balance Work of under Construction Flyover from Yogoda Ashram, Bahu Bazar to Shantinagar, Kokar via Kantatoli Chowk in Ranchi, Jharkhand Flyover.**	**Annexure – 18**
19.	**22.11.2021 To 14.12.2021**	**Environment Audit Related Sites' Visit along Solapur to Vijayapura Road @ Chainages 000 + 00 to 109.08 Km Design Length and Data Collection For Quarterly Environmental Report Work for NHAI and e – Attendances, Project Director (PD) Office @ Solapur, Maharashtra State (MS);**	**Annexure – 9**
20.	**-------**	**-------**	**-------**

Annexure – 9:

Table 9 (a): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance (CAPDCPSP)
1.	**Client/ Authority: The Chief Project Officer, Project Implementation Unit, "National Highway Authority of India (NHAI).**
2.	***Project Name: Four/ Six Laning of Solapur to Bijapur of NH – 13 (New NH – 52) from Km 000.000 to Km 110.545 (Design Length 109.08 Km) in the States of Maharashtra & Karnataka to be Executed as BOT (Toll) Project under DBFOT Pattern under NHDP: Phase – III.***
3.	**Length of Project:** 109.08 Km.
4.	**Contract/ Phase/ Package:** Mode of Execution DBFOT Toll Basis.
5.	**Project Bid Cost:** INR: Rs. 1700.16 Crores + 34.745 (COS – I) Crores.
6.	**Independent Engineer:** M/s. L. N. Malviya Infra Projects Pvt. Ltd.
7.	**Consulting Engineer:** M/s. L. N. Malviya Infra Projects Pvt. Ltd.
8.	**Authorized Representative of Consultant:** Team Leader (TL) Mr. Asheesh Suhaney.
9.	**Date of Signing of Consultant Agreement:** 14th December, 2017.
10.	**Concessionaire:** SPV: Vijayapura Tollways Private Limited (VTPL); Parent Company: IJM Corporation.
11.	**Authorized Representative of SPV:** Vijayapura Tollways Private Limited (VTPL); Parent Company: IJM Corporation.
12.	**Date of Signing of CA:** 14th December, 2017.
13.	**EPC Contractor:** DBFOT Toll Basis.
14.	**Sub – Contractor: National Highway Authority of India (NHAI).**
15.	**Appointed Date:** 26th October, 2018.
16.	**Concession Period:** Almost 20 Years.
17.	**Construction Period:** Nearby 910 Days OR 29.9178 Months OR 2.49315 Years.
18.	**Schedule Date of Completion:** On Dated 19.10.2021 (Revised) and Further 19.01.2022 (Recommended by IE).
19.	**Performance Security (Concessionaire):** Not Applicable.
20.	**Agreement Number:** 382 (JUIDCO) 15 – 12 – 2020.
21.	**Work Order Issue:** LOA Vide Letter No.: JUIDCO/ Flyover/ KTFO/ Extended DPR & PMC/ 2401/ 2020 – 3113 (02 – 11 – 2020).
22.	**Provisional Work Order Issued Vide Letter No.:** 3640, Dated: 07 – 12 – 2020.
23.	**Letter No.:** JUIDCO/ Flyover/ KTFO/ Extended DPR & PMC/ 2401/ 2020 – 3766 (15 – 12 – 2020).
24.	-------

Table 9 (b): Package Roads under Four Laning of "Solapur to Vijayapura" (SEAR) of NH – 13 (New NH – No. 52) from Km 00.000 to 110.542 (Design Length 109.08 Km) in the "State of Maharashtra & Karnataka" under NHAI: Salient Features of Highway Project' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	:	***Four/ Six Laning of Solapur to Bijapur of NH – 13 (New NH – 52) from Km 000.000 to Km 110.545 (Design Length 109.08 Km) in the States of Maharashtra & Karnataka to be Executed as BOT (Toll) Project under DBFOT Pattern under NHDP: Phase – III.***
(2)	**NH No. (New/ Old)**	:	*New NH – 52/ Old NH – 13.*
(3)	**Scheme/ Phase**	:	*DBFOT Pattern under NHDP, Phase – III.*
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate/ Others)**	:	*Mode of Execution DBFOT Toll Basis.*

(5)	**No. of Lanes/ Configuration**	**:**	*04 – Laning.*
(6)	**Length of the Project (in Km)**	**:**	*Designed Total Road Length is Approximately 109.08 Km.*
(7)	**Total Project Cost (in Crores)**	**:**	*INR: Rs. 1700.16 Crores + 34.745 (COS – I) Crores.*
	Grant (in Crores)	**:**	*INR: Rs. 367.00 Crores.*
(8)	**No. of Bypasses (Name of Town, Length)/ Major Realignment**	**:**	***Total 02 Number (s): 01)** Solapur @ 21.003 Km; **02)** Nandani @ 01.060 Km.*
(9)	**No. of Minor Bridges (Number and Location)**	**:**	*NIL.*
(10)	**No. of Major Bridges**	**:**	***Total 03 Number (s): 01)** Sina River @ Chainage 24 + 440 Km; **02)** Bhima River @ Chainage 38 + 800; **03)** Tidagundi River @ Chainage 87 + 106 Km.*
(11)	**No. of Toll Plazas (Number and Location)**	**:**	***Total 02 Number (s): 01)** @ Chainage: 31 + 100 Km; Nandani and **02)** @ Chainage: 85 + 950 Km @ Tidagundi.*
(12)	**No. of Grade Separators**	**:**	***Total 06 Number (s): 1)** 00 + 000 Km @ Crossing of NH – 9; **2)** 05 + 345 Km @ Crossing of NH – 166; **3)** Chainage: 29 + 246 Km @ Crossing of SH – 149; **4)** Chainage: 57 + 576 Km Intersection with SH – 141; **5)** Chainage: 101 + 570 @ Vijayapur Bypass; **6)** Chainage: 107 + 847 Intersection with NH – 128 @ Vijayapur Bypass.*
(13)	**No. of Fly Overs (Number and Location)**	**:**	*NIL.*
(14)	**DPR Consultant Name**	**:**	*M/s. L. R. P. Consultants Consortium Pvt. Ltd.*
(15)	**Lead & Consortium Members of Banks**	**:**	*HSBC Bank, UOB Standard Chartered.*
(16)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	**:**	*SPV: Vijayapura Tollways Private Limited (VTPL); Parent Company: IJM Corporation.*
(17)	**Date of Award (LOA Date)**	**:**	*16th November, 2017.*
(18)	**Date of Signing Concession Agreement**	**:**	*14th December, 2017.*
(19)	**Appointed Date**	**:**	*26th October, 2018.*
(20)	**Concession Period**	**:**	*Almost 20 Years.*
	Construction Period (in Days)	**:**	*Nearby 910 Days OR 29.9178 Months OR 2.49315 Years.*
(21)	**Commercial Operation Date (COD)**	**:**	*To be Determined.*
(22)	**Operation & Maintenance Period (in Days)**	**:**	*To be Determined.*
(23)	**EOT (if Any)**		*Second EOT being awaited by Competent Authority of NHAI.*
(24)	**Scheduled Date of Completion**	**:**	*On Dated 19.10.2021 (Revised) and Further 19.01.2022 (Recommended by IE).*
(25)	**Independent Engineer/ Authority Engineer**	**:**	*M/s. L. N. Malviya Infra Projects Pvt. Ltd.*
(26)	**IE/ AE Agreement Date**	**:**	*19th July, 2019.*
(27)	**IE/ AE Mobilization Date**	**:**	*01st August, 2019.*
(28)	**IE Scheduled Completion Date**	**:**	*To be Determined.*
(29)	**IE EOT (Extension Of Time)**	**:**	*To be Determined.*
(30)	**Others... etc.**	**:**	-------

Annexure – 10

Table 10 (a): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance
1.	**Client/ Authority:** Project Director, Project Implementation Unit Dhanbad, **"National Highways Authority of India" (NHAI)**.
2.	**Project Name:** "Six Laning of Khairatunda to Barwa Adda Section of NH – 2 from Km 360.300 to Km 400.132 in the State of Jharkhand under NHDP Phase – V on Hybrid Annuity Mode".
3.	**Length of Project:** 40.333 Km.
4.	**Contract/ Phase/ Package:** NHDP Phase – V.
5.	**Project Bid Cost:** INR 860.1 Crores.
6.	**Independent Engineer:** M/s. L. N. Malviya Infra Projects Pvt. Ltd.
7.	**Authorized Representative of IE:** Mr. Rajib Ghoshal (Team Leader).
8.	**Date of Signing of IE Agreement:**
9.	**Concessionaire:** M/s. Ashoka Khairatunda Barwa Adda Road Limited.
10.	**Authorized Representative of SPV:** Mr. Ganesh Kumar.
11.	**Date of Signing of CA:** 27.04.2018.
12.	**EPC Contractor:** M/s. Ashoka Buildcon Limited.
13.	**Appointed Date:** 08.01.2019.
14.	**Concession Period:** 2 Years Construction Period, 0.5 Year EOT Plus 15 Years of Operation and Maintenance Period.
15.	**Construction Period:** 2 Years Construction Period Plus 0.5 Year EOT.
16.	**Schedule Date of Completion:** 07.07.2021.
17.	**Performance Security (Concessionaire):** INR 43.01 Crores.
18.	-------
19.	-------
20.	-------

Table 10 (b): Package Roads' Narnual Bypass Crossing to Paniyala Mor: Salient Features of Highway Projects' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	:	"Six Laning of Khairatunda to Barwa Adda Section of NH – 2 from Km 360.300 to Km 400.132 in the State of Jharkhand under NHDP Phase – V on Hybrid Annuity Mode".
(2)	**NH No. (New/ Old)**	:	NH – 19 (New).
(3)	**Scheme/ Phase**	:	NHDP Phase – V.
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate/ Others)**	:	Mode of the Execution **"DBFOMT ANNUITY" OR "Hybrid Annuity Basis" (HAB)** under NHDP Phase – V.

(5)	**No. of Lanes/ Configuration**	**:**	Six – Laning.
(6)	**Length of the Project (in Km)**	**:**	40.333 Km.
(7)	**Total Project Cost (in Crores)**	**:**	INR 860.1 Crores.
(8)	**No. of Bypasses (Name of Town, Length)**	**:**	One Number at Rajganj Village, ***(i)*** Km @ 389 + 800 Chainage Number to ***(ii)*** Km @ 392 + 300 Chainage Number.
(9)	**No. of Major Bridges (Number and Location)**	**:**	NIL.
(10)	**No. of Toll Plazas (Number and Location)**	**:**	NIL.
(11)	**No. of Fly Overs (Number and Location)**	**:**	NIL.
(12)	**DPR Consultant Name**	**:**	M/s. L. N. Malviya Infra Projects Pvt. Ltd.
(13)	**Lead & Consortium Members of Banks**	**:**	State Bank of India.
(14)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	**:**	M/s. Ashoka Khairatunda Barwa Adda Road Limited (Mr. Ganesh Kumar).
(15)	**Date of Award (LOA Date)**	**:**	05th March, 2018.
(16)	**Appointed Date**	**:**	08.01.2019.
(17)	**Concession Period**	**:**	2 Years Construction Period, 0.5 Year EOT Plus 15 Years of Operation and Maintenance Period.
(18)	**Construction Period (in Days)**	**:**	2 Years Construction Period Plus 0.5 Year EOT.
(19)	**Commercial Operation Date (COD)**	**:**	To be Determined.
(20)	**Operation & Maintenance Period (in Days)**	**:**	4,380 Days Maintenance Period.
(21)	**Scheduled Date of Completion**	**:**	07.07.2021.
(22)	**Independent Engineer**	**:**	M/s. L. N. Malviya Infra Projects Pvt. Ltd.
(23)	**IE/ AE Agreement Date**	**:**	-------
(24)	**IE/ AE Mobilization Date**	**:**	-------
(25)	**IE Scheduled Completion Date**	**:**	-------
(26)	**IE EOT (Extension Of Time)**	**:**	-------
(27)	**Others...etc.**	**:**	-------

Annexure – 11

Table 11 (a): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance
1.	**Client/ Authority:** Project Director, "Project Implementation Unit" (PIU), **"National Highways Authority of India" (NHAI).**
2.	**Project Name:** Narnaul "4/ 6 Laning of Narnaul Bypass Crossing to Paniyala Mor (NH – 148 B) (at NH – 48 Junction) Nizampur Link Road & Narnaul Bypass Crossing to Pacheri Kalan (NH – 11) Package – 01, in the State of Haryana under Bharatmala Pariyojana on **"Hybrid Annuity Mode Basis" (HAM)** Package – 01.
3.	**Length of Project:** 45.30 Km.

4.	**Contract/ Phase/ Package:** NHAI/ Bharatmala Pariyojana/ HAM/ Package – 01.
5.	**Project Bid Cost:** INR 1,137 Crores.
	Independent Engineer: L. N. Malviya Infra Projects Pvt. Ltd.
6.	**Authority's Engineer:** Not Applicable.
7.	**Authorized Representative of IE:** Mr. M. K. Jain, Director (Projects).
8.	**Date of Signing of IE Agreement:** 25.06.2019.
9.	**Concessionaire:** M/s. Gawar Narnaul Highway Pvt. Ltd.
10.	**Authorized Representative of SPV:** Mr. Mukesh Pundir.
11.	**Date of Signing of CA:** 28.02.2019.
12.	**EPC Contractor:** M/s. Gawar Construction Ltd.
13.	**Sub – Contractor**: Not Applicable.
14.	**Appointed Date:** 19.09.2019 (To be determine).
15.	**Concession Period:** 35.96 Months (30 Months as per CA + 5.96 Months as per Approved EOT) (Including Construction Period).
16.	**Construction Period:** 35.96 Months (30 Months as per CA + 5.96 Months as per Approved EOT) (Including Construction Period).
17.	**Schedule Date of Completion:** 12th September, 2022 (To be determine).
18.	**Performance Security (Concessionaire):** INR 56.85 Crores.
19.	-------
20.	-------
21.	

Table 11 (b): Package Roads' Narnual Bypass Crossing to Paniyala Mor: Salient Features of Highway Projects' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	**:**	Narnual "4/ 6 Laning of Narnual Bypass Crossing to Paniyala Mor (NH – 148 B) (at NH – 48 Junction) Nizampur Link Road & Narnual Bypass Crossing to Pacheri Kalan (NH – 11) Package – 01, in the State of Haryana under Bharatmala Pariyojana on **"Hybrid Annuity Mode Basis" (HAM)** Package – 01.
(2)	**NH No. (New/ Old)**	**:**	NH – 148 B/ 11 and 48 Junction (New).
(3)	**Scheme/ Phase**	**:**	NHAI/ Project Implementation Unit/ Package – 01.
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate/ Others)**	**:**	Mode of the Execution under Bharatmala Pariyojana on **"Hybrid Annuity Mode Basis" (HAM)** under NHAI/ "Project Implementation Unit" (PIU).
(5)	**No. of Lanes/ Configuration**	**:**	4/ 6 Laning of Narnual Bypass Crossing.
(6)	**Length of the Project (in Km)**	**:**	45.30 Km.
(7)	**Total Project Cost (in Crores)**	**:**	INR 1,137 Crores.
(8)	**No. of Bypasses (Name of Town, Length)**	**:**	02 Nos.: {**(1)** Nangal Choudhary, Chainage: 15 + 850 to Chainage: 20 + 350 – Total Length 4.50 Km; **(2)** Nizampur Link Road, Chainage: 00 + 000 to Chainage: 02 + 760 – Total Length 2.76 Km}.

(9)	**No. of Major Bridges (Number and Location)**	**:**	02 Nos.: {Chainage: 01 + 543 (Nizampur Link Road) and Chainage: 02 + 888 (NH-11)}.
(10)	**No. of Toll Plazas (Number and Location)**	**:**	01 Nos.: (Chainage: 23 + 000 NH – 148 B).
(11)	**No. of Fly Overs (Number and Location)**	**:**	NIL.
(12)	**DPR Consultant Name**	**:**	RITES Ltd.
(13)	**Lead & Consortium Members of Banks**	**:**	Axis Bank.
(14)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	**:**	M/s. Gawar Narnaul Highway Pvt. Ltd.
(15)	**Date of Award (LOA Date)**	**:**	15th January, 2019.
(16)	**Appointed Date**	**:**	19.09.2019.
(17)	**Concession Period**	**:**	2.98 Years (2.50 Years as per CA + 0.48 Years as per EOT Approved).
(18)	**Construction Period (in Days)**	**:**	1,089 Days (910 Days as per CA + 179 Days as per Approved EOT).
(19)	**Commercial Operation Date (COD)**	**:**	Not Applicable.
(20)	**Operation & Maintenance Period (in Days)**	**:**	15 Years.
(21)	**Scheduled Date of Completion**	**:**	12th September, 2022.
(22)	**Independent Engineer**	**:**	L. N. Malviya Infra Projects Pvt. Ltd.
(23)	**IE/ AE Agreement Date**	**:**	25.06.2019.
(24)	**IE/ AE Mobilization Date**	**:**	03.09.2019.
(25)	**IE Scheduled Completion Date**	**:**	17th March, 2022.
(26)	**IE EOT (Extension Of Time)**	**:**	Not Applicable.
(27)	**Others... etc.**	**:**	-------

Annexure – 12

Table 12 (a): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance
1.	**Client/ Authority: "National Highways Authority of India" (NHAI).**
2.	**Project Name:** Construction of 4 – Lane NH – 56 Bypass Connecting NH – 2 (Rakhauna Village Km 782.546 of NH – 2) with NH – 56 (Vajidpur Village Km 271.300 of NH – 56) as part of Varanasi Ring Road, (Phase – II, Package – 01), Design Chainage Km 00.000 to Km 16.400 (Total Length 16.980 Km Including Interchange Loop at NH – 2) in the State of Uttar Pradesh under NHDP Phase – VII on EPC Mode.
3.	**Length of Project:** 16.980 Km (Including Interchange Loop at NH – 2).
4.	**Contract/ Phase/ Package:** EPC/ PH – II/ Package – 01.
5.	**Project Bid Cost:** INR 405.67 Crores.
6.	**Authority's Engineer:** L. N. Malviya Infra Projects Pvt. Ltd.

7.	**Authorized Representative of AE:** Mr. R. S. Rajput, Team Leader (Projects).
8.	**Date of Signing of AE Agreement:** 04th October 2019.
9.	**Concessionaire:** Mr. Sanjeev Kumar Singh.
10.	**Authorized Representative of EPC Contractor:** Mr. Sanjeev Kumar Singh.
11.	**Date of Signing of CA:** 21st August, 2018.
12.	**EPC Contractor:** M/s. G. R. Infra Projects Limited.
13.	**Appointed Date:** 15th September, 2019.
14.	**Concession Period:** Not Applicable.
15.	**Construction Period:** 910 Days.
16.	**Schedule Date of Completion:** 12th March, 2022.
17.	**Performance Security (Contractor):** INR 20.29 Crores.
18.	-------
19.	-------
20.	

Table 12 (b): Package Roads' Varanasi Ring Road: Salient Features of Highway Projects' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	**:**	Construction of 4 – Lane NH – 56 Bypass Connecting NH – 2 (Rakhauna Village Km 782.546 of NH – 2) with NH – 56 (Vajidpur Village Km 271.300 of NH – 56) as part of Varanasi Ring Road, (Phase – II, Package – 01), Design Chainage Km 00.000 to Km 16.400 (Total Length 16.980 Km Including Interchange Loop at NH – 2) in the State of Uttar Pradesh under NHDP Phase – VII on EPC Mode.
(2)	**NH No. (New/ Old)**	**:**	NH – 2, 56 (Bypass New Alignment).
(3)	**Scheme/ Phase**	**:**	NHDP Phase – VII/ Package – 01.
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate/ Others)**	**:**	On EPC Mode of the Execution under NHDP Phase – VII by M/s. G. R. Infra Projects Limited.
(5)	**No. of Lanes/ Configuration**	**:**	Construction of 4 – Lane Bypass Connecting Varanasi Ring Road.
(6)	**Length of the Project (in Km)**	**:**	16.980 Km.
(7)	**Total Project Cost (in Crores)**	**:**	INR 405.67 Crores.
(8)	**No. of Bypasses (Name of Town, Length)**	**:**	Project is Bypass New Alignment.
(9)	**No. of Major Bridges (Number and Location)**	**:**	01 No. at Chainage Number 13 + 830.
(10)	**No. of Toll Plazas (Number and Location)**	**:**	NIL.
(11)	**No. of Fly Overs (Number and Location)**	**:**	02 Nos. at Chainage Number ***(1)*** 00 + 000 and Chainage Number ***(2)*** 07 + 528.
(12)	**DPR Consultant Name**	**:**	Consulting Engineering Service (India) Private Limited.

(13)	**Lead & Consortium Members of Banks**	**:**	Not Applicable.
(14)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	**:**	M/s. G. R. Infra Projects Limited.
(15)	**Date of Award (LOA Date)**	**:**	30th January, 2018.
(16)	**Appointed Date**	**:**	15th September, 2019.
(17)	**Concession Period**	**:**	Not Applicable.
(18)	**Construction Period (in Days)**	**:**	910 Days.
(19)	**Commercial Operation Date (COD)**	**:**	Under Construction.
(20)	**Operation & Maintenance Period (in Days)**	**:**	1,460 Days (4 Years) from the Provisional Certificate.
(21)	**Scheduled Date of Completion**	**:**	12th March, 2022.
(22)	**Independent Engineer/ Authority Engineer**	**:**	L. N. Malviya Infra Projects Pvt. Ltd.
(23)	**IE/ AE Agreement Date**	**:**	04th October, 2019.
(24)	**IE/ AE Mobilization Date**	**:**	10th October, 2019.
(25)	**IE Scheduled Completion Date**	**:**	**.....**
(26)	**IE EOT (Extension Of Time)**	**:**	Not Applicable.
(27)	**Others...etc.**	**:**	**-------**

Table 12 (c): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance
1.	**Client/ Authority: "National Highways Authority of India" (NHAI).**
2.	**Project Name:** Construction of 4 Lane NH – 29 Bypass Connecting NH – 29 (Near Sandaha Village Km 11.170 of NH – 29) (Revasa Village Km 818.800 of NH – 2) as Part of Bypass to Varanasi (Phase –II, Package – 02) from Design Chainage Km 30.600 to Km 57.320 = 26.720 Km (Total Length = 27.270 Km Including Interchange Loop at NH – 2) in the State of Uttar Pradesh under NHDP Phase – VII on EPC Mode.
3.	**Length of Project:** 27.270 Km (Including Interchange Loop at NH – 2).
4.	**Contract/ Phase/ Package:** Varanasi Ring Road/ Project Phase – II/ Package – 02.
5.	**Project Bid Cost:** INR 949.00 Crores.
6.	**Authority's Engineer:** L. N. Malviya Infra Projects Pvt. Ltd.
7.	**Authorized Representative of AE:** Mr. R. S. Rajput, Team Leader (Projects).
8.	**Date of Signing of AE Agreement:** 04th October, 2019.
9.	**Concessionaire:** Not Applicable.
10.	**Authorized Representative of EPC Contractor:** Mr. Prakash Brahmapurkar**.**
11.	**Date of Signing of CA:** 24th August, 2018.
12.	**EPC Contractor:** M/s. Gammon Engineers and Contractors Private Limited.

13.	**Appointed Date:** 15th February, 2019.
14.	**Concession Period:** Not Applicable.
15.	**Construction Period:** 1,095 Days.
16.	**Schedule Date of Completion:** 13th February, 2022.
17.	**Performance Security (Concessionaire):** INR 47.45 Crores.
18.	-------
19.	-------
20.	

Table 12 (d): Package Roads' Construction of 4 Lane Bypass Connecting Varanasi Ring Road: Salient Features of Highway Projects' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	**:**	Construction of 4 Lane NH – 29 Bypass Connecting NH – 29 (Near Sandaha Village Km 11.170 of NH – 29) (Revasa Village Km 818.800 of NH – 2) as Part of Bypass to Varanasi (Phase –II, Package – 02) from Design Chainage Km 30.600 to Km 57.320 = 26.720 Km (Total Length = 27.270 Km Including Interchange Loop at NH – 2) in the State of Uttar Pradesh under NHDP Phase – VII on EPC Mode.
(2)	**NH No. (New/ Old)**	**:**	NH – 2, 29 (Bypass New Alignment).
(3)	**Scheme/ Phase**	**:**	Varanasi Ring Road/ Project Phase – II/ Package – 02.
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate/ Others)**	**:**	On EPC Mode of the Execution under NHDP Phase – VII by M/s. Gammon Engineers and Contractors Private Limited.
(5)	**No. of Lanes/ Configuration**	**:**	Construction of 4 Lane Bypass Connecting Varanasi Ring Road.
(6)	**Length of the Project (in Km)**	**:**	27.270 Km.
(7)	**Total Project Cost (in Crores)**	**:**	INR 949.00 Crores.
(8)	**No. of Bypasses (Name of Town, Length)**	**:**	NIL.
(9)	**No. of Major Bridges (Number and Location)**	**:**	01 No. at Chainage Number 39 + 168 to 40 + 640 Over Ganga.
(10)	**No. of Toll Plazas (Number and Location)**	**:**	NIL.
(11)	**No. of Fly Overs (Number and Location)**	**:**	02 Nos. at Chainage Number ***(1)*** 30 + 975 and Chainage Number ***(2)*** 57 + 300.
(12)	**DPR Consultant Name**	**:**	Consulting Engineering Services (India) Private Limited.
(13)	**Lead & Consortium Members of Banks**	**:**	Not Applicable.
(14)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	**:**	M/s. Gammon Engineers and Contractors Private Limited.
(15)	**Date of Award (LOA Date)**	**:**	13th February, 2018.
(16)	**Appointed Date**	**:**	15th February, 2019.

(17)	**Concession Period**	**:**	Not Applicable.
(18)	**Construction Period (in Days)**	**:**	1,095 Days.
(19)	**Commercial Operation Date (COD)**	**:**	Under Construction.
(20)	**Operation & Maintenance Period (in Days)**	**:**	1,460 Days (4 Years) from the Provisional Certificate.
(21)	**Scheduled Date of Completion**	**:**	13th February, 2022.
(22)	**Independent Engineer/ Authority Engineer**	**:**	L. N. Malviya Infra Projects Pvt. Ltd.
(23)	**IE/ AE Agreement Date**	**:**	04th October, 2019.
(24)	**IE/ AE Mobilization Date**	**:**	10th October, 2019.
(25)	**IE Scheduled Completion Date**	**:**	**.....**
(26)	**IE EOT (Extension Of Time)**	**:**	Not Applicable.
(27)	**Others...etc.**	**:**	-------

Annexure – 13

Table 13 (a): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance
1.	**Client/ Authority: "National Highways Authority of India" (NHAI).**
2.	**Project Name:** Two laning with paved shoulders from 30.800 Km to 68.000 Km and without paved shoulders from 68.000 Km to 82.300 Km for PIU NHAI, Project Office at Dharwad – Goa – Karnataka.
3.	**Length of Project:** 52.3 Km.
4.	**Contract/ Phase/ Package:** Package – II.
5.	**Project Bid Cost:** INR 380.07 Crores.
	Independent Engineer: NIL.
6.	**Authority's Engineer:** L. N. Malviya Infra Projects Pvt. Ltd.
7.	**Authorized Representative of AE:** Mr. Anil Kumar Saxena.
8.	**Date of Signing of AE Agreement:** 18th June, 2019.
9.	**Contractor:** Dilip Buildcon Ltd.
10.	**Authorized Representative of SPV:** NIL.
11.	**Date of Signing of CA:** 18th March, 2018.
12.	**EPC Contractor:** M/s. DILIP BUIDCON LTD.
13.	**Sub – Contractor:** NIL.
14.	**Appointed Date:** 5th November, 2018.
15.	**Concession Period:** 6 Years (including Construction Period).
16.	**Construction Period:** 30 Months.

17.	**Schedule Date of Completion:** August 2021.
18.	**Performance Security (Concessionaire):** NIL.
19.	-------
20.	-------
21.	

Annexure – 14: Not Available

Annexure – 15

Table 15 (a): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance
1.	**Client/ Authority:** The Chief Project Officer, Project Implementation Unit, **"Maharashtra State Road Development Corporation" (MSRDC).**
2.	**Project Name:** Nagpur – Mumbai Super Communication Expressway (Maharashtra Samruddhi Mahamarg) in the State of Maharashtra on EPC Mode for Package – 07 from Km 296.900 to Km 347.190 (Village Banda to Village Sawargaon Mal).
3.	**Length of Project:** 51.19 Km.
4.	**Contract/ Phase/ Package:** MSRDC/ NMSCEL/ Package – 07.
5.	**Project Bid Cost:** INR 1,906.99 Crores.
6.	**Independent Engineer:** AE itself is an Independent Engineer.
7.	**Authority's Engineer:** L. N. Malviya Infra Projects Pvt. Ltd., and J. V. HEC.
8.	**Authorized Representative of IE:** Mr. A. D. Kulkarni, Director (Projects).
9.	**Date of Signing of IE Agreement:** 27th November, 2018.
10.	**Concessionaire:** Government of Maharashtra.
11.	**Authorized Representative of SPV:** Shri A. B. Gaikwad.
12.	**Date of Signing of CA:** 20th November, 2018.
13.	**EPC Contractor:** M/s. Reliance Infrastructure Ltd.
14.	**Sub – Contractor**: M/s. Roadway Solutions India Infra Ltd., Pune.
15.	**Appointed Date:** 13th April, 2019 (To be determine).
16.	**Concession Period:** 9 Years (including Construction Period).
17.	**Construction Period:** 30 Months.
18.	**Schedule Date of Completion:** 09th October, 2021 (To be determine).
19.	**Performance Security (Concessionaire):** INR 95.34 Crores.
20.	-------
21.	-------

Table 15 (b): Maharashtra Samruddhi Mahamarg in the State of Maharashtra: Salient Features of Highway Projects' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	:	Nagpur – Mumbai Super Communication Expressway (Maharashtra Samruddhi Mahamarg) in the State of Maharashtra on EPC Mode for Package – 07 from Km 296.900 to Km 347.190 (Village Banda to Village Sawargaon Mal).
(2)	**NH No. (New/ Old)**	:	New Alignment (Maharashtra Samruddhi Mahamarg).
(3)	**Scheme/ Phase**	:	MSRDC/ NMSCEL/ Package – 07.
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate/ Others)**	:	EPC Mode by M/s. Reliance Infrastructure Ltd. / M/s. Roadway Solutions India Infra Ltd., Pune.
(5)	**No. of Lanes/ Configuration**	:	3 + 3 Lane with 15 meter Median + 300 meter Paved Shoulder on either Side. 3 + 3 (6) Lanes, 3.75 meter Wide on Both Sides (On Both Sides 3.0 meter Paved Shoulders and 2.0 meter Earthen Shoulder).
(6)	**Length of the Project (in Km)**	:	51.19 Km.
(7)	**Total Project Cost (in Crores)**	:	INR 1,906.99 Crores.
(8)	**No. of Bypasses (Name of Town, Length)**	:	Nil.
(9)	**No. of Major Bridges (Number and Location)**	:	01 – Number at Chainage Number 321/ 450.
(10)	**No. of Toll Plazas (Number and Location)**	:	01 – Number at Chainage Number 339/ 807.
(11)	**No. of Fly Overs (Number and Location)**	:	Viaducts – 9 Numbers.
(12)	**DPR Consultant Name**	:	Stup Consultants Pvt. Ltd.
(13)	**Lead & Consortium Members of Banks**	:	State Bank of India.
(14)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	:	Government of Maharashtra through MSRDC & SPV.
(15)	**Date of Award (LOA Date)**	:	30th August, 2018.
(16)	**Appointed Date**	:	13th April, 2019
(17)	**Concession Period**	:	6 Months (EOT).
(18)	**Construction Period (in Days)**	:	930 Days OR 2.5 Years.
(19)	**Commercial Operation Date (COD)**	:	08th March, 2022 (Project Completion Date Revised).
(20)	**Operation & Maintenance Period (in Days)**	:	1,460 Days & 78 Months (2,370 Days).
(21)	**Scheduled Date of Completion**	:	08th March, 2022.
(22)	**Independent Engineer/ Authority Engineer**	:	L. N. Malviya Infra Projects Pvt. Ltd.
(23)	**IE/ AE Agreement Date**	:	20th November, 2018.
(24)	**IE/ AE Mobilization Date**	:	20th November, 2018 (Revised Schedule).
(25)	**IE Scheduled Completion Date**	:	08th March, 2022.
(26)	**IE EOT (Extension Of Time)**	:	Not Applicable.
(27)	**Others...etc.**	:	-------

Annexure – 16

Table 16 (a): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance
1.	**Client/ Authority:** The Chief Project Officer, Project Implementation Unit, **"Karnataka State Highway Improvement Project" (KSHIP)**.
2.	**Project Name:** ***(a)*** Two Lanning with Paved Shoulder of Kollegal to Hannur (Km 00.000 to Km 04.900 along Kollegal and Madhuvanhalli Bypass, from Km 66.888 to Km 85.770 of SH – 79, Length 23.8 Km), ***(b)*** Two Lanning with Paved Shoulder of Chintamani to AP Border (Km. 47.203 to Km 86.977 of SH – 82, Length 39.8 Km), and ***(c)*** Four Laning of Bengaluru (NICE Road) to Magadi (Km 15.325 to Km 50.850 of SH – 85) and Two Lanning with Paved Shoulder of Connector from Magadi to NH – 75 via Chikkamudigere and Iyandahalli (Km 50.850 to Km 66.150 of MDR) (Length 50.7 Km), in the State of Karnataka, India on **"Hybrid Annuity Basis" (HAB)** under KSHIP – III, ADB 2nd Loan.
3.	**Length of Project:** 114.30 Km.
4.	**Contract/ Phase/ Package:** ADB/ KSHIP – III/ Package – 01.
5.	**Project Bid Cost:** INR 1,062 Crores.
6.	**Independent Engineer:** L. N. Malviya Infra Projects Pvt. Ltd.
7.	**Authorized Representative of IE:** Mr. A. D. Kulkarni, Director (Projects).
8.	**Date of Signing of IE Agreement:** 26th April, 2019.
9.	**Concessionaire:** M/s. K. N. Highways Development Limited.
10.	**Authorized Representative of SPV:** Mr. Basavaraju K. V.
11.	**Date of Signing of CA:** 20th February, 2019.
12.	**EPC Contractor:** M/s. DNR Infrastructure Limited.
13.	**Appointed Date:** 01.07.2020 (To be determine).
14.	**Concession Period:** 9 Years (Including Construction Period).
15.	**Construction Period:** 730 Days.
16.	**Schedule Date of Completion:** 30.6.2022 (To be determine).
17.	**Performance Security (Concessionaire):** INR 53.10 Crores.
18.	-------
19.	-------
20.	-------

Table 16 (b): Package Roads 1A, 1B and 1C: Salient Features of Highway Projects' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	:	***(a)*** *Two Lanning with Paved Shoulder of Kollegal to Hannur (Km 00.000 to Km 04.900 along Kollegal and Madhuvanhalli Bypass, from Km 66.888 to Km 85.770 of SH – 79, Length 23.8 Km),* ***(b)*** *Two Lanning with Paved Shoulder of Chintamani to AP Border (Km. 47.203 to Km 86.977 of SH – 82, Length 39.8 Km), and* ***(c)*** *Four Laning of Bengaluru (NICE Road) to Magadi (Km 15.325 to Km 50.850 of SH –*

			*85) and Two Lanning with Paved Shoulder of Connector from Magadi to NH – 75 via Chikkamudigere and Iyandahalli (Km 50.850 to Km 66.150 of MDR) (Length 50.7 Km), in the State of Karnataka, India on **"Hybrid Annuity Basis" (HAB)** under KSHIP – III, ADB 2nd Loan.*
(2)	**NH No. (New/ Old)**	**:**	*Connected to NH – 75 (New).*
(3)	**Scheme/ Phase**	**:**	*ADB/ KSHIP – III/ Package – 01.*
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate/ Others)**	**:**	*Mode of the Execution **"DBFOMT ANNUITY" OR "Hybrid Annuity Basis" (HAB)** under KSHIP – III, ADB 2nd Loan.*
(5)	**No. of Lanes/ Configuration**	**:**	*Four Lanning (40.820 Km) and Two Lanning (73.480 Km) with Paved Shoulder.*
(6)	**Length of the Project (in Km)**	**:**	*114.30 Km.*
(7)	**Total Project Cost (in Crores)**	**:**	*INR 1,062 Crores.*
(8)	**No. of Bypasses (Name of Town, Length)**	**:**	*One Number at Maduvanalli Village, Km 00 + 000 to Km 04 + 900, Package – 1A.*
(9)	**No. of Major Bridges (Number and Location)**	**:**	*One Number at 33 + 775 (Total Span 95 Meters) Package – 1C.*
(10)	**No. of Toll Plazas (Number and Location)**	**:**	*Total Three Numbers at Km 78 + 400, Package – 1A, Km 60 + 250, Package – 1B, Km 38 + 400 Package – 1C.*
(11)	**No. of Fly Overs (Number and Location)**	**:**	*One Number at Km 23 + 875, Package – 1C (Total Span 270 Meters).*
(12)	**DPR Consultant Name**	**:**	***"Intercontinental Consultants and Technocrats" (ICT)** Pvt. Ltd. in joint Venture with **"Pricewater House Copers" (PWC)** Pvt. Ltd. in Association with Dhir and Dhir Associates 9 as Sub – Consultant.*
(13)	**Lead & Consortium Members of Banks**	**:**	*Not Applicable.*
(14)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	**:**	*M/s. K. N. Highways Development Limited (Mr. Basavaraju K. V.).*
(15)	**Date of Award (LOA Date)**	**:**	*26th April, 2019.*
(16)	**Appointed Date**	**:**	*01.07.2020.*
(17)	**Concession Period**	**:**	*9 Years (Including Construction Period).*
(18)	**Construction Period (in Days)**	**:**	*730 Days.*
(19)	**Commercial Operation Date (COD)**	**:**	*To be Determined.*
(20)	**Operation & Maintenance Period (in Days)**	**:**	*2,555 Days Maintenance Period.*
(21)	**Scheduled Date of Completion**	**:**	*30.6.2022.*
(22)	**Independent Engineer**	**:**	*L. N. Malviya Infra Projects Pvt. Ltd.*
(23)	**IE/ AE Agreement Date**	**:**	*26th April, 2019.*
(24)	**IE/ AE Mobilization Date**	**:**	*03.05.2019.*
(25)	**IE Scheduled Completion Date**	**:**	*30.6.2022.*

(26)	**IE EOT (Extension Of Time)**	**:**	*Not Applicable.*
(27)	**Others... etc.**	**:**	-------

Annexure – 17

Table 17 (a): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance
1.	**Client/ Authority:** The Project Director, NHAI, PIU Durgapur, **"National Highway Authority of India" (NHAI).**
2.	**Project Name:** Consultancy Services for Authority's Engineer for Rehabilitation and Upgradation of Existing Road of 2 – Lane with Paved Shoulders Configuration in Purulia (Jharkhand Border) – Chandil (Junction with NH – 33) Section of NH – 32 *[from Km 70.524 (Jharkhand/ WB Border) to Km 84.000 (near Sainik School, Purulia) and from Km 94.300 (near Simulia Junction, Purulia) to Km 153.705 (near Chandil, Junction with NH – 33 in the State of Jharkhand)]* in the States of West Bengal and Jharkhand under NHDP: Phase – IVB on EPC Mode.
3.	**Length of Project:** 73.281 Km.
4.	**Contract/ Phase/ Package:** EPC Mode.
5.	**Project Bid Cost:** INR 719.29 Crores.
6.	**Authority Engineer:** L. N. Malviya Infra Projects Pvt. Ltd.
7.	**Authorized Representative of IE:** Er. Durgesh Kumar (Team Leader)
8.	**Date of Signing of AE Agreement:** 12th March, 2020.
9.	**EPC Contractor:** M/s. Dineshchandra R. Agrawal Infracon Pvt. Ltd.
10.	**Authorized Representative of SPV:** Not Applicable.
11.	**Date of Signing of CA:** 05th March, 2019.
12.	**EPC Contractor:** Dineshchandra R. Agrawal Infracon Pvt. Ltd.
13.	**Appointed Date:** 12th December, 2019.
14.	**Concession Period:** Not Applicable.
15.	**Construction Period:** 910 Days.
16.	**Schedule Date of Completion:** 8th June, 2022 (To be determine).
17.	**Performance Security (EPC):** INR 35.415 Crores.
18.	-------
19.	-------
20.	-------

Table 17 (b): Package Roads under EPC Execution Mode: Salient Features of Highway Project' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	**:**	*Consultancy Services for Authority's Engineer for Rehabilitation and Upgradation of Existing Road of 2 – Lane with Paved Shoulders Configuration in Purulia (Jharkhand*

			Border) – Chandil (Junction with NH – 33) Section of NH – 32 [from Km 70.524 (Jharkhand/ WB Border) to Km 84.000 (near Sainik School, Purulia) and from Km 94.300 (near Simulia Junction, Purulia) to Km 153.705 (near Chandil, Junction with NH – 33 in the State of Jharkhand)] in the States of West Bengal and Jharkhand under NHDP: Phase – IVB on EPC Mode.
(2)	**NH No. (New/ Old)**	**:**	*Connected to NH – 32 (Old) and NH – 18 (New).*
(3)	**Scheme/ Phase**	**:**	*NHDP: Phase – IVB.*
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate/ Others)**	**:**	*EPC Execution Mode.*
(5)	**No. of Lanes/ Configuration**	**:**	*Two Lane with paved shoulder [from Km 70.524 (Jharkhand/ WB Border) to Km 84.000 (near Sainik School, Purulia) and from Km 94.300 (near Simulia Junction, Purulia) to Km 153.705 (near Chandil, Junction with NH – 33 in the State of Jharkhand)] with Paved Shoulder.*
(6)	**Length of the Project (in Km)**	**:**	*73.281 Km.*
(7)	**Total Project Cost (in Crores)**	**:**	*INR 708.30 Crores.*
(8)	**No. of Bypasses (Name of Town, Length)**	**:**	*Two (02) Numbers, Balrampur Bypass at Chainages: 4.150 Km (120 + 650 Km to 124 + 800 Km) and Chandil Bypass 9.975 Km (143 + 730 Km to 153 + 705 Km).*
(9)	**No. of Major Bridges (Number and Location)**	**:**	*Four (04) Numbers at Chainages: 111 + 250 Km; 141 + 848 Km; 149 + 273 Km and 152 + 698 Km.*
(10)	**No. of Toll Plazas (Number and Location)**	**:**	*Two (02) Numbers at Chainages: 81 + 400 Km to 81 + 800 Km and 142 + 100 Km to 142 + 500 Km.*
(11)	**No. of Fly Overs (Number and Location)**	**:**	*Not Applicable.*
(12)	**DPR Consultant Name**	**:**	*Intercontinental Consultants and Technocrats Pvt. Ltd. (A – 8, Green Park, New Delhi – 110 016, India).*
(13)	**Lead & Consortium Members of Banks**	**:**	*Not Applicable.*
(14)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	**:**	*Dineshchandra R. Agrawal Infracon Pvt. Ltd.*
(15)	**Date of Award (LOA Date)**	**:**	*31st March, 2018.*
(16)	**Appointed Date**	**:**	*12th December, 2019.*
(17)	**Concession Period**	**:**	*78 Months (Including Construction Period).*
(18)	**Construction Period (in Days)**	**:**	*910 Days.*
(19)	**Commercial Operation Date (COD)**	**:**	*Not Applicable.*
(20)	**Operation & Maintenance Period (in Days)**	**:**	*1,460 Days.*

(21)	**Scheduled Date of Completion**	**:**	*8th June, 2020.*
(22)	**Independent Engineer**	**:**	*L. N. Malviya Infra Projects Pvt. Ltd.*
(23)	**IE/ AE Agreement Date**	**:**	*5th March, 2020.*
(24)	**IE/ AE Mobilization Date**	**:**	*24th March, 2020.*
(25)	**IE Scheduled Completion Date**	**:**	*8th June, 2020.*
(26)	**IE EOT (Extension Of Time)**	**:**	*Not Applicable.*
(27)	**Others... etc.**	**:**	-------

Annexure – 18

Table 18 (a): Client OR Authority Project Details with Construction Period and Security Performance.

Sr. No.	Client OR Authority Project Details with Construction Period and Security Performance
1.	**Client/ Authority: The Chief Project Officer, Project Implementation Unit, "JUIDCO/ PWD Road Development Corporation" (JUIDCO/ PWD).**
2.	***Project Name: Balance Work of under Construction Flyover from Yogoda Ashram, Bahu Bazar to Shantinagar, Kokar via Kantatoli Chowk in Ranchi, Jharkhand Flyover.***
3.	**Length of Project:** 2.240 Km.
4.	**Contract/ Phase/ Package:** EPC/ SOQ Mode.
5.	**Project Bid Cost:** INR 241.74 Crores.
6.	**Independent Engineer:** Consultant itself is an Independent Engineer/ IIT Mumbai.
7.	**Consulting Engineer:** M/s. L. N. Malviya Infra Projects Pvt. Ltd.
8.	**Authorized Representative of Consultant:** Team Leader (TL) Mr. Tarasen Naik.
9.	**Date of Signing of Consultant Agreement:** 09th November, 2020.
10.	**Concessionaire:** Government of Jharkhand, Ranchi.
11.	**Authorized Representative of SPV:** Not Applicable.
12.	**Date of Signing of CA:** To be Determined.
13.	**EPC Contractor:** To be Determined.
14.	**Sub – Contractor**: Jharkhand Urban Infrastructure Development Company (JUIDCO Ltd.).
15.	**Appointed Date:** To be Determined.
16.	**Concession Period:** Not Applicable.
17.	**Construction Period:** 730 Days OR 2.0 Years.
18.	**Schedule Date of Completion:** To be Determined.
19.	**Performance Security (Concessionaire):** Not Applicable.
20.	**Agreement Number:** 382 (JUIDCO) 15 – 12 – 2020.
21.	**Work Order Issue:** LOA Vide Letter No.: JUIDCO/ Flyover/ KTFO/ Extended DPR & PMC/ 2401/ 2020 – 3113 (02 – 11 – 2020).

22.	**Provisional Work Order Issued Vide Letter No.:** 3640, Dated: 07 – 12 – 2020.
23.	**Letter No.:** JUIDCO/ Flyover/ KTFO/ Extended DPR & PMC/ 2401/ 2020 – 3766 (15 – 12 – 2020).
24.	-------

Table 18 (b): Package Roads under Jharkhand Urban Infrastructure Development Company (JUIDCO Ltd.): Salient Features of Highway Project' as Project Overview.

Sr. No.	Key Project Report Details		Item Description
(1)	**Project Name**	**:**	***Balance Work of under Construction Flyover from Yogoda Ashram, Bahu Bazar to Shantinagar, Kokar via Kantatoli Chowk in Ranchi, Jharkhand Flyover.***
(2)	**NH No. (New/ Old)**	**:**	*New Alignment.*
(3)	**Scheme/ Phase**	**:**	*JUIDCO/ PWD.*
(4)	**Mode of the Execution (BOT Toll/ BOT Annuity/ EPC/ HAM/ Item Rate/ Others)**	**:**	*EPC/ SOQ Mode.*
(5)	**No. of Lanes/ Configuration**	**:**	*4 – Lane.*
(6)	**Length of the Project (in Km)**	**:**	*2.240 Km.*
(7)	**Total Project Cost (in Crores)**	**:**	*INR 241.74 Crores.*
(8)	**No. of Bypasses (Name of Town, Length)**	**:**	*Not Applicable.*
(9)	**No. of Minor Bridges (Number and Location)**	**:**	*01 Number (s).*
(10)	**No. of Toll Plazas (Number and Location)**	**:**	*Not Applicable.*
(11)	**No. of Fly Overs (Number and Location)**	**:**	*Not Applicable.*
(12)	**DPR Consultant Name**	**:**	*M/s. L. N. Malviya Infra Projects Pvt. Ltd.*
(13)	**Lead & Consortium Members of Banks**	**:**	*Not Applicable.*
(14)	**Concessionaire/ Contractor Name (SPV & Parent Company)**	**:**	*Not Applicable.*
(15)	**Date of Award (LOA Date)**	**:**	*To be Determined.*
(16)	**Appointed Date**	**:**	*To be Determined.*
(17)	**Concession Period**	**:**	*24 Months.*
(18)	**Construction Period (in Days)**	**:**	*730 Days OR 2.0 Years.*
(19)	**Commercial Operation Date (COD)**	**:**	*Not Applicable.*
(20)	**Operation & Maintenance Period (in Days)**	**:**	*To be Determined.*
(21)	**Scheduled Date of Completion**	**:**	*To be Determined.*
(22)	**Independent Engineer/ Authority Engineer**	**:**	*M/s. L. N. Malviya Infra Projects Pvt. Ltd.*
(23)	**IE/ AE Agreement Date**	**:**	*To be Determined.*
(24)	**IE/ AE Mobilization Date**	**:**	*To be Determined.*
(25)	**IE Scheduled Completion Date**	**:**	*To be Determined.*
(26)	**IE EOT (Extension Of Time)**	**:**	*To be Determined.*

(27)	Others... etc.	:	-------

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https://www.art-3000.com/picture/?iid=213345

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