Designing and Planning Handbook for Rail Museums

-Bipin Chobhe

TABLE OF CONTENTS

1. THE ROLE OF RAIL MUSEUMS

1. THE ROLE OF RAIL MUSEUMS

Rail Museums look after the Indian Railway's cultural property and interpret it to the public.

Indian Railways provides a special status to heritage preservation and Railway Board is committed to the same. It is part of the nation's natural and cultural heritage and may be of a tangible or intangible character. Such properties provide the primary evidence in a number of subject disciplines such as locomotives, coaches, heritage buildings and the communication devices that have been instrumental in the building of this national asset, and therefore represents an important contribution to knowledge and national pride. Rail Museums are vehicles for communicating the nation's industrial design and technical achievement as a symbol of national unity. It is also a significant component in defining Indian Railway's identity, nationally and internationally.

Museums have much to show for their over two centuries of rich history and heritage. Also, such knowledge needs to be assimilated using state of the art technology for

improved interpretation and adaptation to the needs of the modern visitor.

The Indian Railways have recently upgraded the National Rail Museum (NRM) in Chanakyapuri, New Delhi and the Rewari Steam Centre (RSC) with modern facilities to match international standards. Indian Railways has over 30 Rail Museums across the country and more are being planned to highlight the regional attributes of heritage. This document uses the experience of modernization of NRM and RSC to showcase an example so as to share the knowledge with the regional museums and help them upgrade / modernize. Rail Museums have peculiar attributes which are way different in terms of exhibit size, restoration, protection, interpretation, dissemination of knowledge and hence cannot be benchmarked with other Museums. This document highlights the essential infrastructure requirements in a Museum and then provides recommendations for indoor, outdoor and document preservation assets. The document further recommends the need and character of Operations and Maintenance requirements of modern Rail Museums.

2. MUSEUM INFRASTRUCTURE

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Museums are public spaces and need to satisfy all requirements of the same. Indian Railways has a good experience in building public space. This document highlights only the special needs that are required for building museum infrastructure.

A Museum is a place where visitors come to appreciate and assimilate knowledge in a friendly and entertaining environment. The visitors include small children and senior citizens; hence the infrastructure needs must cater to the entire spectrum of visitors. Facilities for differently abled personnel must also be a part of museum planning.

2.1. *Civil Work Specification*

Civil work specification for museums need to be of very high quality. The environment needs to be clean and free of any suspended dust particles. The indoor gallery would essentially be air conditioned which will help in controlling and maintaining the temperature and humidity. The civil infrastructure should specify all goods preferably matching ISI standards and the same should be implemented with high quality skilled manpower. Architecture of museum buildings has to be appealing and aesthetic aspects should be given enough importance. Hence the anticipated cost of civil works for museums is bound to be much higher than that of normal works in the Indian Railways.

Figure No.1: Civil Work of Museum (under process)

2.2.   *Wi-fi Infrastructure and Connectivity in the Museum*

Internet coverage has been gaining importance over the years. Internet is almost the primary medium of communication. Phone communication and text messaging is also started to move from telecom providers to an internet-based system. Not having proper internet coverage in this age especially looking at the future might affect future communication channels and create a roadblock down the line.

Apart from just communication, other systems such as CCTV, PA and other museum systems are also gaining IP capabilities. It has been convenient to provide an internet connection wirelessly rather than laying long and wires varying from system to system.

Museum visitors include visitors from outstations and require to be in constant network connectivity. Visitors use internet to upload their pictures, leave reviews and reflect on the information they witness in the museum. An internet connection also helps visitors to use services like audio guides and information on scannable barcodes.

2.3.   *Indoor Space Lighting*

Museum lighting is a critical and specialized activity. The lighting designers must ensure that.

a. There is sufficient ambient lighting
b. The ambient lighting is not too bright to overpower the exhibit lighting
c. Every exhibit needs focused light to display detailed features
d. Pathways ducting visitor movement clearly marked.
e. Effect of adjacent lighting and reflections from Kiosks should be planned and accounted for.

f. Light fittings should emit minimum hear

g. Light fittings attract dust through insects. They should be appropriately protected / enclosed to avoid exhibit damage.

Figure No.2: Lighting for Exhibit

Figure No.3: Lighting for Diorama

2.4. *Sound Isolation in Indoor spaces*

Museum audio guides and exhibits having sound are bound to be disturbing to visitors of adjoining exhibits. Hence, the design of sound systems and the level of attenuation along with sound insulation / absorbing features are an important part of museum design.

2.5. *Pathways*

The pathway should be created taking into consideration of differently abled personnel so that wheelchair can easily operate on it along with sufficient space so that people can walk easily. The pathway will be built so that each exhibit can be viewed properly.

Pathway / Pedestrian routes should be free from detectable obstructions such as plants, pot etc., and should be wide enough for operation of the golf cart. Care should be taken in the design of storm water drainage from and around the pathways.

Figure No.4: Pathways

Figure No.5: Wheel-chair accessible Pathways

2.6. *Electrical Infrastructure*

There should be an Electrical Control Room where all electrical controls of entire museum will be placed. All switches, MCBs, Emergency Switches should be in the Electrical Control Room.

Backup power supply in the form of Generator Sets and UPS shall be provided. Electrical wiring should be designed to permit future addition of loads.

The room should be properly ventilated, and all safety precautions taken so that there will be no danger to electrical equipment.

2.7. *Storm Water Drainage*

Railway museums will have large number of outdoor exhibits which are the size of train locos. These exhibits need to be protected by appropriate sheds. Exhibits such as Coaches and locomotives are placed on rails in the museum. Outdoor exhibits are commonly linked with pathways. All these are potential water collection areas. Collection of storm water is a public health hazard and also leads to deterioration of museum property. Hence the museum should be designed with an appropriate storm water drainage system. In areas where water is scarce, rain – harvesting is recommended.

2.8. *Toilets*

Toilets are an essential public facility. Care should be taken that these are designed for the entire spectrum of visitors which includes small children and senior citizens. The capacity of toilets should be designed for peak visitor loads and as per recommendations of the architect's council of India.

Toilets for physically challenged person:

Public toilets and restrooms can present accessibility challenges for people with disabilities, for example those in wheelchairs. Stalls may not be able to fit a wheelchair and transferring between the wheelchair and the toilet seat may pose a challenge. Accessible toilets are designed to address these issues by providing more space and bars for users to grab and hold during transfers.

Common modifications include:

- adding a raised toilet seat,

- attaching a versa frame,

- ensuring the toilet paper is within reach and can be detached with one hand

Recommendations appearing in legal requirements

The following recommendations are becoming more common in public toilet facilities, as part of a trend towards universal design:

- a wheelchair-height toilet, to help the user on and off the toilet, with handles (grab bars);

- an emergency alarm, in the form of a red cord that reaches the ground, connected to a buzzer and a flashing red light;

- a wheelchair-height sink and hand dryer;

- wheelchair-width doors leading to it, allowing sufficient space for a wheelchair when a door is open

Figure No.6: Toilets for physically challenged ones

2.9. *Air Conditioning & Ventilation*

Air conditioning of indoor spaces and archives is critical. The temperature and humidity need to be in control not only for human comfort but also for preserving the artifacts and archived documents. It is recommended that automated central air conditioning systems with microprocessor controls and inverter-based refrigeration modules be used in the museum.

Museum is huge premises and lots of visitor comes daily to visit the heritage of Indian Railway. So, to maintain proper ventilation and for comfort of visitors, there should be suitable Air-Conditioning system at every place. The system should be designed taking into account maximum load during hours of peak use such as a weekend in a hot summer.

Figure No.7: Supply Air Duct

Figure No.8: Touch Screen AC Controller

2.10. *Landscaping and Horticulture*

Since outdoor exhibits form a major part of Rail Museums, it is of critical importance to have well planned and designed landscape. Appropriate landscaping would help in improving aesthetics, cleanliness and safe movement of visitors. It is always a good idea to reuse scrap generated for designing landscape.

Figure No. 9: Landscaping for used wooden sleepers

2.11.   *Electrically Powered Golf Cart*

For movement within Museum, there should be environmentally friendly Electric Golf Cart.   Golf cart carries a minimum of 4 people. The golf cart should be high performance having speed range of 15-25 km/hr. and its battery, once charged last for 6-8 hrs.   If the Museum is spread across a large area, it is a good idea to provide battery operated trains for children that could move over the pathways.

Figure No.10: Golf Cart

2.12.   *Facilities for differently abled person*

An accessible museum is a museum that welcomes people with all types of disabilities in its galleries, exhibitions and programs. Separate parking should be provided for special ability people. The walkway and other public area should be wheelchair accessible.

2.13. *Cleaning Equipment*

Museum is generally very large area and it is crowded on most times. So, it is very essential to maintain the cleanliness of the surrounding environment. Hence, there should be Cleaning equipment according to different applications. Given below are some of the modern cleaning equipment available.

2.13.1 *Walk Behind Sweeper*

Walk behind sweeper is used for cleaning of concrete block floor surfaces, even in crevices and joints. Infinitely adjustable main brush ensuring perfect sweeping results without strain. The adjustable side brush can be lifted up.

Figure No.11: Walk Behind Sweeper

2.13.2 Ride on Sweeper

Ride on sweeper is battery operated vehicle used to collect large amount of dirt. It has a large flap and 70 liters of hopper to easy collecting dirt and large debris. It has a Climbing rate up to 20%. It is made up with Strong polyethylene construction plus steel frame; with robust solutions to avoid sources of malfunctions and to minimize servicing.

Figure No.12: Ride on Sweeper

2.13.3 High Pressure Machine

There are certain applications where we need water to for cleaning purpose, high pressure machine serves the same application. It is a single-phase cold high-pressure water jet. It has an infinitely variable pressure and water flow control on the unit. The machine is highly maneuverable and can be easily transported. The machine comes with air cooled synchronous motor and a robust 3 piston axial pump with brass cylinder head.

Figure No.13: High Pressure Machine

2.13.4   Scrubber Drier

For cleaning purpose inside the museum area, scrubber drier is used. This machine cleans any small hard surfaces powerfully and smoothly. The significant feature of this machine is that it can be used as a common vacuum cleaner as well as scrubber dryer.

Figure No.14: Scrubber Drier

2.14.   *Museum Security System / Safety System*

2.14.1   *Fire Detection System*

To safeguarding against severe accidents due to fire, there should be high quality and state of the art Fire Protection System along with all spares and accessories. Fire safety is essential from the point of view of

a.   The visitors

b.   Exhibits / artifacts

c.   Critical archived documents.

Each of these would require specialized planning and equipment.

Figure No.15: Fire Extinguisher

2.14.2   *Closed Circuit Television(CCTV) System*

As Museum is huge and crowded area, hence, to maintain safe environment and to avoid any misbehavior across the premises, CCTV system should be installed in premises of museum along with recording system (DVR). The CCTV cameras should be bifurcated all over the museum according to the requirement. The cameras used is of fixed direction covering specific area as per their setup angle. There should be different cameras depending upon application such as Dome type, Bullet Type, etc.

Figure No.16: CCTV Cameras

2.14.3   *Intercom System*

To communicate inside the whole museum, there should be intercom system at every significant place of museum. The intercom system which basically combines all the advantages of traditional telecommunications together with IP technology- in a cost-effective package. It should have several features like:

- Memory backup duration 7 years
- Call queue with waiting message
- External Battery: +36 V DC
- Conference Call Trunk: From 10 x 3-party conference call to 4 x 8-party conference call

- USB 1

- Automated attendant

It should support the latest mobile-phone integration technology - enabling calls directed to an office extension to be redirected to a Mobile telephone. Calls can then also be transferred back to a colleague's office extension or even back to the office voice mail system. Mobile telephones can be integrated to allow incoming calls to ring both the desk phone and the mobile handset simultaneously, allowing officials to publish "one-number" access while providing users with the added flexibility to pick-up calls from either their desk phone or mobile phone.

Figure No.17: Intercom System

2.14.4   Public Address System

Museum conducts various functions like children day, Museum Day, Christmas, Drawing competition and other programs for the school students. So, there is need of suitable Public-Address System which will cover entire museum area. Considering the area of total museum, there should be state of the art technology Public Address System.

Figure No. 18: Public Address System

2.14.5   Emergency Medical Kit and Signboards

Indicating telephone numbers of nearby hospitals / ambulance services / Doctors on duty should be placed across the Museum.

2.15. *Audio Guides*

A multimedia audio guide is an electronic device which will be used to give audio guidance related to each exhibit.

It is designed to give audio, visual, textual information related to exhibits. It will be operated with or without intervention of visitor.

Figure No.19: Audio Guides

3. INDOOR GALLERY

3.   INDOOR GALLERY

The Indoor Gallery is the heart of any modern museum because it is able to communicate with its visitors in a modern and effective way. The Indoor Gallery would house small size artefacts appropriately restored displayed for maximum preservation and is supported by signages for efficient interpretation.

In addition to the historical artefacts modern museums visitors demand interactive communicating exhibits. Education or transfer of knowledge using entertaining means has become a necessity. Dioramas offer to communicate the message effective. Kiosks and quizzing station improve the attentiveness of visitors. Simulator and Virtual Reality provide an immersive environment for experiencing the "real" thing.

3.1. *Exhibit Restoration & Display*

The existing indoor exhibit should be refurbished into a new restored and secure exhibit.

The restoration work includes:

- Removal of rusting,
- Repairing of damaged part
- Painting as per standard original exhibit
- Reconstruction of exhibit with maintaining same style as per original archive
- Secure suitable casing as per size of exhibit
- Placing of exhibit taking consideration of each age group visitor
- Lighting to display each focus area
- Making easily accessible for working models
- Readable Name plate for each exhibit
- Providing suitable informative charts for exhibit

Figure No.20: Exhibit Restoration

Figure No.21: Before Exhibit Restoration

Figure No.22: After Exhibit Restoration

Figure No.23: Before Exhibit Restoration – East Indian Railway IIIrd Class Coach

Figure No.24: After Exhibit Restoration – East Indian Railway IIIrd Class Coach

Figure No. 25: Before Exhibit Restoration – Restaurant in Coach

Figure No. 26: After Exhibit Restoration – Restaurant in Coach

3.2.   *Edutainment Equipment*

3.2.1   *Operational equipment of Point Machine*

Point machine model demonstrate to the visitors the working of actual point machine of Indian Railways.

The track should be made with 1:8 ratio of actual track, wooden sleepers, lever, base structure of aluminum extrusion should be used to make the model. Rail should be electroplated to increase the life of model.   To make the system operational every time, motor and timers should be used.

Figure No.27: Model of Point Machine

3.2.2   Introduction to Locomotive Wheel

To understand the wheel structure of Indian Railway to visitors, cut section model of wheel neat painted should be placed in the Museum. The model should be mounted on stand to highlight key features of the wheel, axle, bearing design. Physical model consists of wooden wheel, rail and base structure of aluminum extrusion.

Figure No.28: Model of Locomotive Wheel – Cut Section

3.2.3   *Parts of Steam Loco*

To highlight the internal parts of steam locomotive, steam loco with lifted up using crane should be installed.   This model should be G-scale model (1:22.5) of loco and crane.   Crane Model should be made up of aluminum and motor, power supply and timer are to be used to keep it operational all the time so that visitors will get the knowledge of steam loco construction.

Figure No.29: Model of Steam Loco lifted up with Crane

3.2.4 *Understanding OHE Equipment*

Many times, visitors get confused about from where electric loco gets energy, how the whole railway system works on non-interrupted electric energy. To answer their questions, there should be an OHE model that is Overhead Equipment Model to better understand electric power distribution system of Indian Railways. In this model, HO scale (1:87) model of track and electric loco along with wooden and aluminum base structure should be used. Also, self-explanatory informative diagram should be there at the back of model to understand the OHE equipment better.

Figure No.30: Model of OHE Equipment

3.2.5 *Basic Model of Rail Wheel Friction*

The rail wheel model should be built up taking in consideration to make the visitors aware about rail-wheel interaction and rail-wheel friction of Indian Railways. There should be three bogies of different material placed on three different tracks, one is of metal, one of wooden and one of rubber. The model should be placed in stair like structure so that visitors even children can operate it and understand the frictions in rail and wheel from each of model.

This will also explain the evolution on track in history of Indian Railways.

Figure No.31: Model of Rail Wheel Interaction

3.2.6   *Air Brake in Trains*

Many visitors might be wondering how the train stops after application of brakes, how the railway breaks work. To resolve their doubts, there should be Air Braking Trainer which shows the working of Air Brake in Trains using simple and elaborative mimic panel. Air brake trainer should show major components of Air Brake system and their working. Trainer will also teach how to troubleshoot the fault. The trainer will facilitate the runtime changes in the software and interfaced hardware system on the panel.

Figure No.32: Air Braking in Train

3.2.7   Electro Pneumatic Air Braking in Coach

The LHB Coach Trainer will help to understand the most important system of locomotive to the all age group visitor in simple and elaborative mimic panel.

The trainer will facilitate the runtime changes in the software and interfaced hardware system on the panel. The interactive software will help to understand the braking system of Railway LHB coaches by demonstrating the working of MR and BP pipe pressures and at different train brake position. Also, trainer demonstrate the role of pressure valves, pipes, air reservoirs, bogie system with the position of train brake. Trainer will also teach how to troubleshoot the fault.

Figure No.33: Electro Pneumatic Air Braking in Coach

3.2.8   *Basic Understanding of Diesel Locomotive*

To make the visitor aware about the how the Railway Engine works, what are their constructional parts, this trainer plays important role. Diesel Engine Trainer helps the visitors to understand the basic component and their working of I.C. (Internal Combustion) Engine which is used in Railways.

Figure No. 34: Model to understand Diesel Locomotive

3.2.9 *Diesel Locomotive Loco Cooling System*

Diesel Locomotive Cooling System Trainer makes the visitor understand the cooling system used in ALCO and GM Locomotive. This trainer also consists different faults, so that Railway Staff will learn how to troubleshoot the faults if occur in system.

Figure No.35: Model of Diesel Locomotive Cooling System

3.2.10   Diesel Locomotive Loco Fuel Oil System

To understand the Fuel Oil System used in Diesel Engine of ALCO and GM Locomotive, this trainer is used.

It consists different buttons on panel to troubleshoot the faults encountered by an Instructor for learning purpose.

Figure No.36: Model of Diesel Locomotive Fuel Oil System

3.2.11   Diesel Locomotive Loco Lube Oil System

Lubrication System used in Diesel Locomotive plays vital role in functioning of Engine.

This trainer teaches visitors, how the whole system works along with simulation of different faults which can come in lube oil system.

Figure No.37: Model of Diesel Locomotive Lube Oil System

3.2.12   *Electric Locomotive Brake– IRAB9 System*

Electric Loco Brake Trainer is very important trainer which impart the knowledge of significant brake component used in Electric loco to the museum visitors.

This trainer should be designed to understand and demonstrate the single pipe and twin pipe braking system of Electric Loco, to understand the working of bogie mounted air brake system on locos and coaches, to understand the **construction, operation and maintenance** of all the pneumatic valves.

Figure No 38: Model of Electric Locomotive Brake

3.2.13 Controlled Discharge Toilet System

Most of the visitors have confusion in their mind that how the waste disposal system in Railways works. To avoid their confusion, there should be Controlled Discharge Toilet System which demonstrate components and working of LHB Coach controlled discharge toilet. It will show Pneumatic and Water Flow application.

3.2.14 Dioramas

Dioramas should be placed to educate the visitor by showcasing the historical, social and economic impact of railways in India.

3.2.14.1 Gandhiji and Railways

This diorama depicts Gandhiji's journey of independence in association with the railways.

Figure No. 39: Diorama – Gandhiji & Railways

3.2.14.2   *Early Traction Power*

This diorama depicts the traction power in early stages of Railways. The horses were used to haul the wagons and coaches. Beautiful landscaping and old age environment should be created in this diorama.

Figure No.40: Diorama – Early Traction Power

3.2.14.3   *Track Laying Mechanism*

Track laying mechanism should be explained by this diorama. Landscaping, track laying machines and vehicles will focus the attention of visitor.

Figure No.41: Diorama – Track Laying Mechanism

3.2.14.4   *Pir Panjal Tunnel*

Many of visitor might be keep thinking how the way inside the tunnel get created. To answer them, Pir Panjal Tunnel Diorama should be prepared which depicts operation of Tunnel Boring Machine inside the huge tunnel.

Figure No. 42: Diorama – Pir Panjal Tunnel

3.2.14.5   *Freight Locomotives*

The working of freight locomotive from freight yard should be explained through this diorama. Along with this, coal freight train running should be shown. Large rail network should be shown.

Figure No. 43: Diorama – Freight Locomotives

3.3.   *Interactive Multimedia*

3.3.1   *Steam Locomotive in 3D Walkthrough Software*

There should be interactive software which will be an illusion created by the program such that it gives a gaming environment to the locomotive. It will be a sort of role playing game where we get to observe, examine all aspects of Steal Loco. Various functions such as zooming, rotating in all directions of loco will be possible etc.

Figure No. 44: Steam Locomotive in 3D Walkthrough Software

3.3.2   *Interactive Indian Railway Map Game*

The Indian railway expanse at different remote parts of India can be depicted by using this exhibit. This interactive game will be used to identify railways station at various parts of country. It helps to portray the expanse of Indian Railways and provides interactive gaming exhibit for children in museum.

Figure No. 45: Indian Railway Map Game

3.3.3 Rail Efficiency Display

The software can show different statistical report for different route selected from the list also show the selected route path on Railway map shown on display. Main purpose is to highlight rail travel as an efficient, fast, fuel efficient and environmentally friendly mode of public transport and to impart the importance of railway in both personal and industrial transportation.

The statistical graph of comparison in all three modes of transportation are shown on display which will cover Money required, Time consumed, Fuel consumption, Harmful emission. The GUI used for graph comparison in Road, Railway and Airway on above parameter will be more clear and understandable.

Figure No. 46: Rail Efficiency Display

Figure No. 47: Rail Efficiency Display Game Screen

Figure No. 48: Rail Efficiency Display Game Screen

3.3.4   *Interactive multiplayer quizzing Game*

A multiplayer quizzing competition to enhance the curiosity and enthusiasm among the visitors about Museum will be designed.

The interactive game can be held among 6 *(six)* people. Special questions related to museum should be planned for quiz. The Fastest Finger contest criteria can be used for playing the game. Software for each activity will be designed such as for quick answering, question displaying and database maintenance.

Figure No. 49: Multiplayer Quizzing Game

3.3.5 *Pick and place Loco / Coach / Wagon Software*

The pick and place assembly game will be provided in this model. There are total five types of model which are steam locomotive, electric locomotive, diesel locomotive, coach and wagon.

Figure No. 50: Pick and Place Software

3.3.6   *Visitor's Feedback and Museum Times*

In this model, newspaper cum feedback kiosk in computer system should be provided.

It takes feedback related to different attractions of museum from customers and provides visitor a good takeaway museum newspaper with his/her photo printed on it. It also acts a Souvenir for visitors and collects information of visitors.

Figure No. 51: Visitor's Feedback Form

Figure No. 52: Visitor's Feedback Kiosks

Figure No. 53: Museum Times

3.3.7　*Indoor Kiosk with Informative Software*

This kiosk model will be presented in very attractive shape with interactive GUI. Main purpose is to provide a learning center that will also act as a knowledge bank for children of 6 to 12 years old and to understand basic railway concepts. It will also teach children about Indian railways heritage.

a.　　　Inception of Indian Railways

b.　　　Building Rail Network

c.　　　History and Heritage of Indian Railway

d.　　　Research Development and Innovation, Safety and Security

Figure No. 54: Indoor Kiosk

Figure No. 55: Indoor Kiosk

3.3.8   *Interactive Learning Center*

This kiosk model should be presented in very attractive shape of star with interactive GUI.

10 Different software have provided on each computer system with monitors which will be mounted on kiosk. Multiple users can access these software at a time on different monitors. The software contains the information in multiple choice question type covering different topics like: General knowledge about railways, Famous Railway station, Major Locomotives, Main railway Bridges, Railway Signaling system.

Figure No. 56: Interactive Learning Center

Figure No. 57: Interactive Learning Center

Figure No. 58: Interactive Learning Center

3.3.9   *Reception Kiosk*

Large LCD screens which continuously shows information about Museum should be available in Reception Center.   Visitors can have look at different museum activities at a place only.

Figure No. 59: Reception Kiosk

3.3.10 Informative Video Kiosk

This kiosk should be presented in attractive shape. It displays information in audio video format. Main purpose is to provide a learning center that will also act as a knowledge bank and to understand basic railway concepts.

It will also teach children about Indian railways heritage.

- Early transportation in India
- Production Units - Gems of Indian Railway
- Heritage of Indian Railway
- Ticketing video

Figure No. 60: Indoor Video Kiosk

3.3.11   *Software Library of Rail Information in Multimedia*

e-Learning Interactive Modules to get core information of the history, operations and technical aspects of rail vehicles should be part of the Museum.

Suggested titles are as follows:

- Air Conditioning System in Coaches
- Twin Pipe Graduated Release Air Brake System for Coaches- Construction and Operation of Coach Air Brake Components.
- 2nd Sleeper & AC-ICF Coach Wiring
- 140T Gottwald Crane
- Construction and Working of Lubrication Oil System (ALCO)
- Concept and functioning of Woodward and EH governor-ALCO
- Construction and Working of Lubrication Oil System (EMD-GM)
- Loco Engine Cooling System (with current developments) – (EMD-GM)
- Cooling Water Treatment and Temperature Control – (EMD-GM)
- Forced Air Cooling System (EMD-GM) in modern Locomotives.
- Fundamental Concepts in Electricity, Electronics, Microprocessor and their application in modern Locomotives.
- Computer Controlled Braking System in Locomotives.
- Construction and Working of Major Engine Components – (EMD-GM)
- Construction and Working of Fuel Oil System Components- ALCO
- Loco Cooling System
- 28LAV1 Braking System in Locomotives
- IRAB1 Braking System in Locomotives
- Understanding Fuel Feed System in Diesel Locomotives
- Traction converter cabinets (TCC) components and their use in Diesel – Electric Locomotives

- Tap Changer and Thyristor Control used in Electric Locomotives
- Multiple Unit operation of Locos.
- Electrical Braking and regeneration Systems

Rail Traffic Operations / Signalling

- Signaling Systems
- Absolute Block System
- Use of various equipment in Station Masters Cabin
- Route Relay Interlocking
- Solid State Interlocking
- Modern could and GPS base train controls
- Accident Avoidance Systems

3.4. *Simulators*

Use of Simulators in Museums have now become essential for giving a first hand immersive experience of the real environment to the visitors. Hence, simulators for different types of locomotives and coaches are recommended. The use of virtual reality enhances the capability to provide a completely immersive environment.

3.4.1 *Steam Locomotive Simulator*

This is a DHR Steam Loco Simulator with actual drivable features giving the user an experience of driving an actual Steam Engine.

Starting from the CAB details like a throttle, emergency brakes, horn to the CGI projection of the track with changes in terrain, weather and scenario. The passenger gets a feel of driving the DHR through the routes of Darjeeling-Himalayan. It also has an additional feature like a fire-box with coal stubs for firing-up the engine at regular intervals.

Along with all these real effects, there will be a motion platform which makes the ride a memorable experience. The uphill and downhill ride is worth a try by all age groups.

Figure No. 61: Steam Locomotive Simulator

3.4.2   *Diesel Locomotive Simulator*

The **WDG5** that is Wide Gauge Diesel Engine Loco generally called as "Bheem Simulator" which gives immense experience of driving a real Loco Train Engine.

It's a closed CAB structure including traction, emergency brakes, horn along with high quality projection screens through windows of cab makes the user feel that he/she is driving a realistic Train.

Additionally, Motion platform adds the essence of up-downs on the rail track. Obstacles like elephant makes the ride more entertaining. The inside sound system makes the user to immersed in train driving. All-together Bheem Ride should be taken by each visitor.

Figure No. 62: Diesel Locomotive Simulator – Cab View

Figure No. 63: Diesel Locomotive Simulator – Inner View

3.4.3   *Virtual Reality Coach Simulator*

A very unique feature in this ride is a virtual reality created to enjoy all the eras of Indian Railways.

Passengers get to wear high-tech Oculus gear and drive in the virtual world of "Steam, Diesel, Electric and even Bullet Train", showing the past, present and future of Indian Railways.

Along with all these real effects, there will be a motion platform which makes the ride a memorable experience.

Figure No. 64: Virtual Reality Coach Simulator

3.4.4   Steam Maintenance Simulator

It is the unique and first of its kind of simulator not only in India possibly in World too. This simulator is purposefully designed to train Steam Engine Maintenance staff especially who works in Steam Loco Shed. To train them by showing actual thermodynamics process which takes place inside Steam Loco which otherwise cannot be explained practically as Steam Loco has been discarded from service.

The huge Steam Loco Simulator with its boiler cut-section shows complete simulation of steam and water along with all major integral boiler components.

Complete simulation of boiler gives real time response of water level, steam generation rate, steam-water-firebox temperature according to running of simulator.

The changing quantity of coal can be seen on boiler cut section as and when the user adds coal inside firebox using shovel on frequent interval of time. Inside Cab components like Main valve, Reverser handle, Throttle, Steam Whistle Rope makes the simulator to look like actual Steam Loco.

Figure No. 65: Steam Maintenance Simulator

Additionally, Simulator will be loaded with 80 faults to train the user to deal with malfunctions that arise in steam loco. Overall, to enjoy Heritage of Steam Era, this simulator is must visited.

3.4.5   *Electric Locomotive Simulator*

WAG9 is one of the electric locomotive widely used in Indian Railways. Globally, WAG9 Loco Simulator is used as a training equipment to Train the Drivers.

In Museum this simulator serves both functions by providing introductory operational information of electric locomotive cab and entertainment to the visitors.

In simulator, a full electric loco driver's Cab should be replicated. The Cab should be provided with an opportunity to be fully immersed into a real cab environment. The Cab will contain a highly realistic interior with all the controls and Cab sub-systems. All Cab equipment will be functional and suitably modified to generate a highly realistic Audio and visualization experience.

Figure No. 66: Electric Locomotive Simulator – Cab View

Figure No. 67: Electric Locomotive Simulator – Inner View

3.4.6   *Virtual Reality Simulator with Motion Platform*

The Virtual Reality Mobile Simulator is the compact one amongst all simulators which can be taken to any location easily hence it's named as "Mobile Simulator".   This simulator gives Virtual ride of simulator.   The 360° environment makes the user to get involved in virtual world of Railway.

The touch control of VR headset makes the operation of Loco more interesting in virtual world. Along with this all virtual effects, motion platform under the seat of user makes the ride more realistic.

Figure No. 68: Virtual Reality Simulator with Motion Platform

3.4.7   *Mobile Locomotive Simulator*

Another compact simulator is Locomotive Simulator setup in the Nano Car.

As this simulator will be built up in Nano this can be driven to any location.   The simulator inside the car replicates all the in-CAB components of Electric Loco.

Figure No. 69:   Mobile Locomotive Simulator – Outer View

Figure No. 70: Mobile Locomotive Simulator – Inner View

Figure No. 71: Mobile Locomotive Simulator – Inner View

3.5.   *Miniature India*

Miniature model will be designed in museum with working train models to the HO scale (1:87). Visitors can walk around the Layout installed on a raised structure to have a good glimpse of various working models and static features.

Figure No. 72: Miniature India on HO Scale

The Model should contain detailing like various locomotives, coaches, wagons, trees, stations, turntable, buildings, airport, bridges, stadium, rocket launching, metro station with landscaping.

Figure No. 73: Miniature India on HO Scale

3.6.   *Mini Theatre*

3.6.1   *Seating Infrastructure*

Ergonomic designed with high comfort level auditorium chairs should be available in the theatre. While designing the seating arrangement following parameters should be keep into consideration:

- Seat Widths

- Row Spacing

- Floor Design

- Building Code & Safety Guidelines

- Visibility

Figure No. 74: Mini Theatre

3.6.2   *Projection and Sound System*

3.6.2.1   *Projector with Projection Screen*

Various Simulators like, Steam Simulator, Bheem Simulator; games like India Map Game, Quizzing Game, it all require Projector System as an essential component in their functionality. Projectors with RGB Liquid Crystal Shutter Projection System (3LCD Technology) should be installed as well as white projection screen will be fitted in the viewing area in front of the projector.

Figure No. 75: Projector

3.6.2.2   *Sound System*

All the simulators and games are incomplete without proper sound system. Sound system is an integral component of Museum. As per the purpose of system, there should be latest state of art digital sound system of reputed make with all the necessary hardwires synthesizer and speakers at various places in the museum.

Figure No. 76: Sound System

3.6.2.3   Stage

Visibility to audience is one of the most crucial parts of minitheater. The stage must consist of a platform or series of platform with sound proof and eco free sound system. The stage should have large opening to view the performance. It may include extend part of apron for additional playing area. It should facilitate both movie projectors as well as small stage acts by small groups.

Figure No. 77: Stage

4. OUTDOOR ATTRACTION

4   OUTDOOR ATTRACTION

Major Rail Exhibits are outdoor exhibits. While it is recommended that these be preserved under complete or partial sheds, it may not be always feasible.

Outdoor areas are the most attractive for the younger generations. Facilities that provide fun and entertainment are an essential element of outdoor planning.

4.1   *Outdoor Exhibit Restoration & Maintenance*

The existing outdoor exhibit like locomotive coaches can be refurbished into a new restored exhibit.

The restoration work includes:

- Removal of rusting,

- Repairing of damaged part

- Painting as per standard original exhibit

- Reconstruction of exhibit with maintaining same style as per original archive

- Readable Name plate for each exhibit

- Providing suitable informative charts for exhibit

Figure No. 78: Before Exhibit Restoration – E207

Figure No. 79: Before Exhibit Restoration – E207

Figure No. 80: Before Exhibit Restoration – E207

Figure No. 81: After Exhibit Restoration – E207

Figure No. 82: After Exhibit Restoration – E207

Figure No. 83: After Exhibit Restoration – E207

4.2   *Toy Train*

This is a one of its kind experience for people of all age groups. Imagine sitting on a miniature steam train and travelling through a scenic wonderland of miniature bridges, tunnels, signals and stations while enjoying the beauty of waterfalls and lush green parks. Covering a distance of entire periphery of museum m users get the feel of sitting on a real train with actual train engine like sounds and drivability.

Figure No. 84: Toy Train with station

Figure No. 85: Toy Train Ride

4.3   *Joy Train*

Joy Train is one of the most attractive part of museum. The tracks of the train will be spread all over the museum so that any visitor taking ride through Joy Train will see the beauty of entire museum. People of any group can take advantage of Joy Train. It will especially made for the purpose of enjoying train ride with family.

Figure No. 86: Joy Train

A Joy Train has a larger capacity and can be designed on a 750mm gauge. However, this would require larger Museum space to accommodate for the minimum turning radius.

4.4 *Amphitheatre*

In Museum premises, frequently there will be functions like birthday celebrations, school awards ceremony, etc. So, to host and conduct these ceremony, Amphitheatre should be provided to Museum.

Figure No. 87: Activities at Museum

4.5   *Gaming Area*

For the entertainment of kids of small age group, there should be dedicated

area which contains various Outdoor playing games like slides, swings, sea-saw, and many more. The kids will enjoy it.

Figure No.88: Ludo Table

Figure No.89: Indoor Games - Chess

Figure No.90: Outdoor Games – Swings, Slides

Selfie Points

Selfie points at Museum by including Bollywood theme or other exhibit theme can be

i.   Selfie point with different Railway exhibit and Bollywood celebrity's relation.

Figure No. 91: Selfie Points

ii.   Statue of actor with train exhibit.

Figure No. 92: Selfie Points with Gandhiji

iii. Movie poster (Sholey, The burning train etc.)

Figure No. 93: Selfie Points with Movie Poster

4.6   *Outdoor Kiosks*

There will be lots of exhibits in the outdoor area of museum. To display the information of exhibits, Outdoor Kiosk will be mounted.

The Kiosk should be mounted such that it will not harm to anyone that is mounted taking into consideration of safety of museum visitor. Also, it will be mounted such that, there will not be any adverse effect of any weather on kiosk.

Figure No. 94: Outdoor Kiosk

4.7   *Garden Train Layout*

A Rail Garden is one of the most popular attractions for people of all ages.

Here you will get to see working models of trains surrounded by vehicles and scenic gardens. Covering a distance of 1 km our Rail Garden depicts different kinds of 1:22.5 scale working models of passenger trains, goods train, waterfalls, ropeways, funiculars and even steam trains in the hilly region.

Indigenously manufactured trains will move around the heritage stations such as CST Mumbai, Lucknow, Chennai Central, Guna and Delhi Junction.

Figure No. 95: Garden Train Layout

Figure No. 96: Garden Train in Hilltop Area

Figure No. 97: Garden Train – Night View

Figure No. 98: Garden Train – Under Bridge

4.8   Models of Heritage Buildings

There are number of buildings and station buildings in India which is considered a Heritage Buildings such as Delhi Station, Lotus Temple, CST Mumbai Station, Lucknow Station, Guna Station, Kanpur Station, Chennai Station, etc.   All these buildings will be modelled in a to scale version so that visitors will get to know about heritage of India.

Figure No.99: Heritage Building – Delhi Station

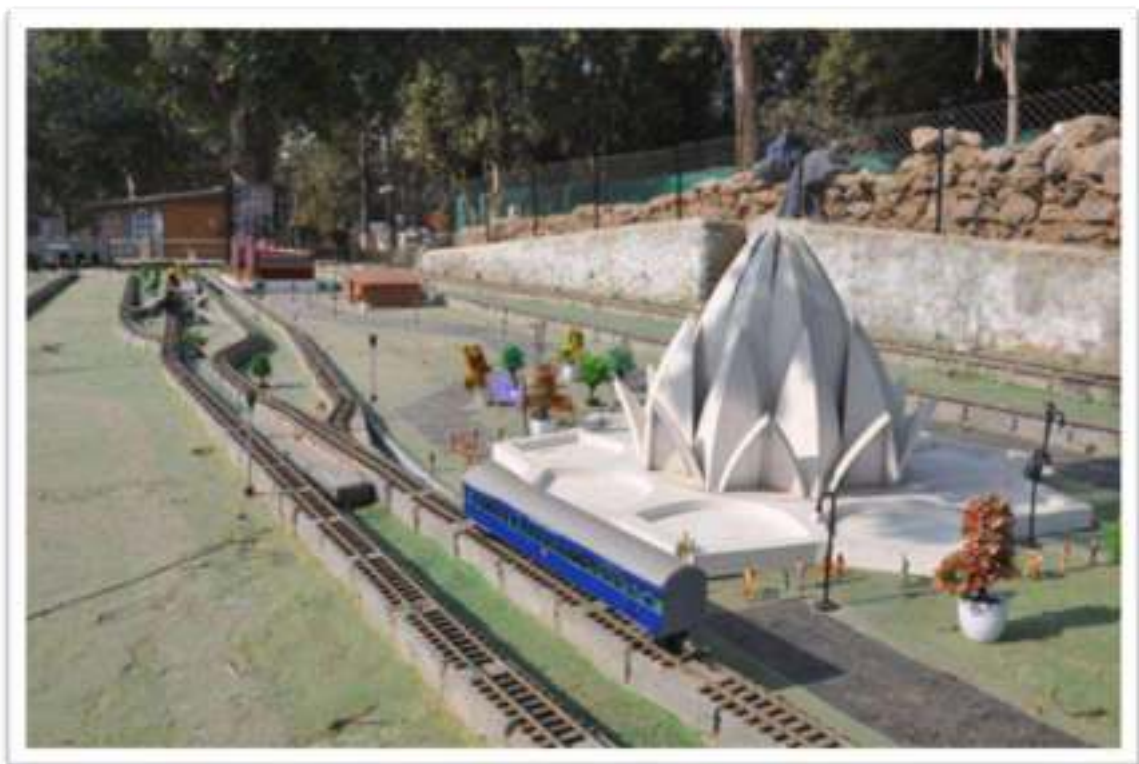*Figure No. 100: Heritage Building – Chennai Station*

Figure No. 101: Heritage Building – Lotus Temple

4.9   Mobile Exhibition
Museum on the Rails / the Road

The Museum on Rails/Road is a pioneering outreach initiative for Indian Railways, a Train / Bus with travelling exhibitions on different themes, which changes periodically.   The Train / Bus are designed to reach mainly schools, colleges, NGOs within the city of New Delhi and beyond, into the interiors of India with an aim to –

- Create an appreciation of rich heritage and culture of Indian Railways.

- Establish a connect between heritage of the past and its relevance in present-day society and encourage hands-on participation of local communities with heritage and culture.

- Be inclusive, diverse and widespread in its reach to as many sections of the city (and beyond) as possible for whom it is difficult to access the Museum and its offerings.

'The Museum on Rails/Road' will be a dedicated Museum carrying travelling exhibitions of the Museum to distant places in a customized air-conditioned bus/coach. The Railway Coaches /Buses will be fully equipped with display cases for objects, interactive demo kits, art supplies, audio-visual equipment, train simulators and digital media such as touch screens and digital tablets to set up exhibitions in semi urban and rural areas, aimed at providing information and insights into a wide range of subjects in a fun and interactive manner.

The Museum shall organize fun educational activities and workshops around the exhibition inside the Bus / Train.   There shall be events that offer opportunities for artists and performers within the area to participate and showcase their talent. Attached are proposed drawings and suggested

pictures of exhibit space that could be placed in an ICF coach or a VOLVO 9700 Bus.

Figure No.102: Sample Image of Museum on the Road

Figure No. 103: Sample Image of Interior of Bus / Coach

Figure No. 104: Sample image showing Mechanically Extended Temporary Wall

Figure No. 105: Sample Image showing Interior of Bus

Figure No. 106: Mobile Rail Museum in Volvo 9700 Design Option 1

Figure No. 107: Mobile Rail Museum in ICF Coach

5. PRESERVATION OF ARCHIVES

5 PRESERVATION OF ARCHIVES

5.1 *Preventive Measures: Storage Cabinet*

The storage cabinet space saving units that provides safe and convenient storage of office material at offices, factories, laboratories, colleges, research institutes should be provided for storage of archives.

Figure No. 108: Storage Cabinet

5.2 *Curating Facility*

Facilities are to be created for the following:

i.   Curing/ deep cleaning

ii.   Physical cleaning

iii.   Numbering or pagination

iv.   Opening of spine and separation of sheets

v.   Stabilizing

vi.   Test whether ink on paper is soluble in water?

vii.   Machine lamination

viii. Test of Acidity

ix.   Sorting

x.   De-acidification

xi.   Strengthening

xii.   Mending

xiii. Packaging

5.3   *Digitization Facility*

For digitization of archives there should be following items:

A.   **DSLR Camera**

Figure No. 106 DSLR Camera

B.   **Tripod Stand**

Figure No. 107 Tripod Stand

C.   **PC Scanner**

Figure No. 109: PC Scanner

5.4   *Environment Control System*

Fumigation Chamber is ideal for sterilization and de-acidification of documents and books and allied materials carrying out documentary heritage. There should be the facility for prevention of archives and meant for fumigating specimens with insecticide for preservation.

Figure No. 110: Fumigation Chamber

5.5 Environment Control System

Wireless data loggers are used for time and date-stamped temperature and humidity measurements. It is fully programmable, initially via a built-in USB interface, and thereafter wirelessly via the Wi-Fi link using included Windows-based software. Programmable parameters include a unique logger name, °F or °C, logging rate, report rate, as well as temperature and humidity alarms. The same software acts as a repository for temperature and humidity data, which the data logger uploads at programmable periodic intervals.

Figure No. 111: Environment Control Equipment

6. SOUVENIR SHOP

6   SOUVENIR SHOP

Souvenirs are referred to as keepsakes or mementos and can be any item that somebody keeps for the memories it brings back. Whether it's a shirt, hat, a story book or a train model, souvenirs can be quite profitable and help in recovering costs of the museum.

Though much of your business will come from tourists making impulse buys, you can also build a customer base with the locals, who may buy gifts for friends, associates and relatives or items they

want for themselves. Souvenir shop can have an online presence and can create its identity by selling unique merchandise.

6.1   *Infrastructure of Souvenir Shop*

Souvenir Shop containing reception table, display cases, racks with suitable plan should be provided. Detailed idea of souvenir shop with display case location and air conditioning facility should be provided. Souvenir shop facilitates the storage and display maximum number of souvenir items. It will be also designed for proper navigation path for each visitor to get access of maximum merchandise.

Figure No. 112: **Sample Map of Souvenir Shop**

6.2   *Satellite Shop Management Software*

It is very difficult to control and monitor all the aspects of shop situated at different premise, but with the help of Satellite shop management software we can easily control of all distributed business and chain store system.

It has facility to present current control on each output branch.

Figure No. 113: Flow Chart explaining Satellite shop management software

6.3   *Barcode System*

Barcode system will consist of barcode printer, barcode scanner and barcode generator software.

A reliable barcode printer is computer peripheral for printing barcode labels or tags that can be attached to, or printed directly on, physical objects will be provided.

The software will have a database for generating barcode tags and printing data of the products. It will generate various standard codes and scanning of codes will also be an added feature.

Figure No. 114: Barcode Printer

Figure No. 115: Barcode Scanner

6.4   Souvenir Items

6.4.1   Resource Pack

Resource Pack consists of separate set of Books, Multimedia CDs, Activities intentionally designed for kids of different age groups.

According to age groups, two levels contains in Resource Pack i.e., *Level 1* and *Level 2* according to the content in book, CD and activity would be decided.

Level 1

Each Resource Pack is available in bilingual i.e., English and Hindi. Level 1 is particularly designed for kids of age group of 04 years to 09 years. These resource pack contains total 7 (seven) Kits in English and same 7 (seven) in Hindi.

- **English**

    i.   BHOLU at the Level Crossing

        The resource pack contains:

        - Story Book
        - Multimedia CD
        - Activity

        o   *Story Book*

            Small story book contains exciting story especially written for kids. The story is revolved around four children and their experience of Railway Rides and adventures activities they do while travelling.

At the end of story, as a part of lesson small portion is added which is named as "Do you know" which tells some unknown facts of Railways to kids.

Figure No. 116: Story Book – Bholu at the Level Crossing

o   *Multimedia CD*

Multimedia CD contains two parts, one is animated multimedia video and other is e-book.

Figure No. 117: Multimedia CD – Bholu at the Level Crossing

Multimedia video is created to easily understood by the kids in different rules and important information about Indian Railways. e-Book is the same book which contains in Resource pack kit but in electronic form so that kids will read it by taking full interest.

Figure No. 118: ebook – Bholu at the Level Crossing

o *Activity*

Activity is introduced in Resource pack kit to make it more interesting for kids so that they will learn more from it. This resources pack contains Jig-saw puzzle activity.

Figure No. 119: Activity – Jig-Saw Puzzle

List of other Resource pack which contains similar data but based on different stories and activities are as below:

i. Bholu and the Lucky Coin

ii. Bholu at the School Excursion

iii. Bholu at the Platform Ticket

iv. Bholu at the Smart Card

v. Bholu at the Fairy Queen

vi. Bholu and the Thief

- **Hindi**

    List of Hindi Resource Pack are as below, which contains same data as mentioned in English Resource Pack but provided in Hindi Language.

    i.   Level Crossing par Bholu

    ii.   Bholu aur Lucky Sikka

    iii. Scholli sair aur Bholu

    iv.   Bholu aur Platform Ticket

    v.   Bholu aur Smart Card

    vi.   Bholu aur Fairy Queen

    vii. Bholu aur Chor

Level 2

Level 2 Resource Pack is also available in bilingual i.e., English and Hindi. Level 2 is particularly designed for kids of age group of 10 years to 16 years. With consideration of age group, these resource pack contains more information than Level 1 Resource pack as well as it is focused on more technical knowledge about Indian Railways. These resource pack also contains total 7 Kits in English and same 7 in Hindi.

- *English*

    The Duranto Adventure

    The resource pack contains:

    ●   Story Book

    ●   Multimedia CD

    ●   Activity

o   *Story Book*

Figure No. 120: Story Book – The Duranto Adventure

The Duranto Adventure story is based on Electric Locomotive used in Indian Railway as Duranto Express in an Electric Engine Train. Same four kids from story of Level 1 came here also in picture, they were travelling from Duranto Express and story is basically their learning and adventures activities in the train.

o   *Multimedia CD*

Figure No. 120 Multimedia CD – The Duranto Adventure

Multimedia CD contains two parts, one is animated multimedia video and other is e-book.

Multimedia Videos in Level 2 Kits contains more technical knowledge about Railways and their functionality. The video here is of longer duration comparing with Level 1 Multimedia video. E-book is the same book which contains in Resource pack kit but in electronic form so that kids will read it by taking full interest.

Figure No.121:   e-book – The Duranto Adventure

o   *Activity*

Figure No. 122: Activity – Make your own Electric Locomotive

The activity in each resource pack is designed in consideration with age group of kids that is these activities are tricky one and kids will utilize their skills in building it. One pictorial activity guide sheet is also provided with each kit to help the kids with activity exercise. The activity in this resource pack kit is "Make your own Electric Locomotive".

List of other resource pack from this category is:
i.   Toy Train
ii.   Back on Track
iii.   Stop
iv.   Explosion
v.   Adventure on Konkan Railway
vi.   Catch that Bullet Train

- Hindi

List of Hindi Resource Pack are as below, which contains same data as mentioned in English Resource Pack but provided in Hindi Language.

i.   The Duranto Adventure

ii.   Toy Train

iii.   Back on Track

iv.   Stop

v.   Explosion

vi.   Adventure on Konkan Railway

vii.   Catch that Bullet Train

6.4.2   *Museum Guide Books*

Museum Guide book is mainly designed to guide the visitors which come to visit Museum. The book guides the visitor by its map of whole museum. There is tremendous information of various locos and its historic importance. Also, book serve as an important guide to plan your visit to museum by giving you pre-exposure of museum in well advance.

Figure No. 123: Museum Guide Book

Figure No. 124: Museum Guide Book - Exhibit Information

6.4.3   Audio Books in CD

In today's generation kids are more attracted towards electronic media and keep doing the things which saves their time. Here is audio form of book in CD using which kids will get same information which they could take from books.

Audio books will be generated using actual expressions and voices which will attract the attention of any kind of kids to hear it. In this way, kids will get to know about Railways.

6.4.4 Models

6.4.4.1 Scale models of Indian Heritage Locomotives and Engines

Figure No. 125: Models of Indian Heritage Locomotives and Engines

6.4.5 Books

- Informative books for all ages
- Stories and other activity books
- Books available on all e-book formats

6.4.6   Apparels

- Caps, T- shirts, sweat shirts and other museum wearable goodies

Figure No. 126: Caps, T- shirts, Sweat Shirts

6.4.7   Kids Section

- Train building sets for children of all ages

6.4.8   Railroad Souvenirs

- Other accessories like wallets, key chains, mugs, coasters

- Gift items such as pens, pocket watches can also be provided

Figure No. 127:   Gift Items

6.4.9   Frames and Prints

- A3 posters, Greeting cards and other customized framed prints also available

7. RESTAURANT / FOOD KIOSKS

7   RESTAURANT / FOOD KIOSKS

Restaurants are essential in any Museum. Theme based restaurants relevant to Rail Museums enhance the visitor experience. One may opt for restaurants inside coaches on a turntable as provided in the Rail Museum in Nagpur or have a specially designed restaurants and food kiosks demonstrated below.

The Restaurant at the Museum is a unique attraction for museum guests and railway enthusiasts. The key attraction for this restaurant is that the food will be served using trains. A G-Scale locomotive pulling G-scale carriages specifically designed for transporting food is used to serve the meals. The meals are also customized to fit in this train.

All the train related models such as track, signals, points, stations, locomotives, coaches are provided. Whole system is satellite operated.

Figure No. 128: Train Carrying Food in Restaurant

Figure No. 129: Restaurant

8. IMMERSIVE THEMED SPACES

8   IMMERSIVE THEMED SPACES

Immersive theme space in a Rail Museum in Japan

An immersive world is a place in which anyone can get wrapped up in an environment that you don't want to leave. An immersive experience will provide maximum learning or knowledge transfer. Visitors are encouraged to role play. This not only make the experience enjoyable but also provides a long-lasting memory of the knowledge that is transferred. Immersive spaces are the modern means of grabbing attention of the younger visitors. Given below are some ideas of such immersive environments in the world of Railways.

The main aim of this zone is to create specific area for children which would enable them to explore, discover, experience, enact and learn about Railways. It will also develop mental, physical and social skills of child.

It includes multidimensional educational experiences in a hands-on, active and child-centered environment. The kids zone will offer captivating activities for children relating to Indian Railways which includes:

- Mechanisms
- Systems
- Behavior
- Safety
- Facilities etc.

8.1   *Outdoor Kids Zone*

It will include following Models:

- Bullet Train Simulator
- Coach
- Railway Platform
- RPF
- Ticket Checker
- Manned Gate
- Bookstall
- Restaurant
- Toilet
- Drinking Water
- Signaling Center
- Track Laying
- Ticket Window
- Bank
- Enquiry Window
- Waiting Room
- Station Manager

8.1.1   *Bullet Train*

a.   A 1:2 scale bullet train simulator for kids

b.   Simple operations simulating functions such as

- speed notch handle

- emergency brake

- horn

- Headlights

- CGI

c.   The kids will get to play the role of

- bullet train driver

- co-pilot

Figure No. 130: Bullet Train

8.1.2   Coach

a.   Coaches of scale 1:2 will be attached to the bullet train. which includes

- chair car

- sleeper car

- pantry car

- toilet block.

b.   Each coach will have specific activities such as

- Cooking practices

- birth climbing,

- linen spreading and tucking

- use of toilets

- coach cleaning

- on-board housekeeping scheme

Figure No. 131:   1:2 Scale Coach

8.1.3   Railway Platform

- A 1:2 railway platform would be built which includes the basic things such as dry and wet waste dustbins, seating, signboards, book stalls etc.

- The children will be given cleaning machines and they must keep the platform clean using various equipment's such as miniature ride on sweeper, colorful brooms, miniature vacuum cleaners etc.

Figure No. 132:   1:2 Scale Railway Platform

8.1.4   Railway Protection Force

- A 1:2 RPF tent is to be built by children. They will have the RPF uniform and caps as well. Children will be given tasks such as lost and found, attend complaints, thefts etc.

- Activities such as children will play the role of RPF and help Bholu find his Bag. They will register complaints, organize search parties and scout the area to find Bholu's belongings.

Figure No. 133: RPF Tent

8.1.5   Ticket checker

- The ticket checker will get to issue and check railway tickets from everyone.

- The children will have the uniform of the ticket checker and have a checking clamp and notepad to keep track of issued tickets.

Figure No. 134:   Ticket Checker Uniform and Checking Clamp

8.1.6   Manned GATE

- Children will get paddle vehicles of the shape of a train and a car. They will then enact the scenario cars crossing a manned gate.

- The children playing the gate operator's role will have to close the gate when the trains arrive.

Figure No. 135: Manned Gate

8.1.7 Bookstall

- A 1:2 Bookstall will be provided with a book trolley and activities related to book selling on platform.

- A giant book stands of approximate scale 1:8 will contain the Railway Timetable book at outdoors.

- This book will cover topics such as

- Reading the timetable

- Understanding the routes.

- Number of stoppages of a train.

Figure No. 136: 1:2 Scale Bookstall

8.1.8   Restaurant

- There will be two restaurants provided: as a pantry car in coach and one at platform.

- Both the restaurant will include:
  - Kitchen area
  - Seating arrangement

- Children will be given items such as bread, sauces, vegetables and juice etc.

- They should prepare the sandwich in the pantry while the train is moving.

- They will also be provided with plastic utensils, aprons, hats and cooking gloves for safety.

Figure No. 137: Restaurant

8.1.9   Toilet

- Children will be taught the DO's and Don'ts regarding healthy toilet practices while travelling in trains.

- A miniature toilet setup will be attached to the set of coaches.

- Here children will have to perform activities such as steps in personal hygiene, proper utilization of water etc.

Figure No. 138: Miniature Toilet

8.1.10 Drinking Water

- A miniature clean and hygienic water dispenser of the scale 1:2 will be provided, specially for kids.

Figure No. 139: 1:2 Scale Water Dispenser

8.1.11 Signaling Center

- A 1:2 signaling center will be provided where a computer program with proper GUI will enable children to track, control and monitor the actual 1:2 scale train running in the area.

- Activity of Signal + Basketball where kids will throw red, yellow and green colored balls through the respective colored signal when the shutter opens.

Figure No. 140 :   1:2 Scale Signaling Center

8.1.12   Track Laying

- A 'H' shaped balloon will be provided for children to create their own track.

- Additional equipment's such as air pump, safety helmet, glasses, compass, measuring scale etc. will be provided.

- The kids must connect the track between two miniature stations.

Figure No. 141: Track Laying Activity

8.1.13 Ticket Window

- A ticket window of 1:2 scale will be provided.

- PRS (Passenger Reservation System) complete software with Kiosk.

Figure No. 142 1:2 Scale Ticket Window

8.1.14 Online transactions by kiosk (BANK/ATM)

- A1:2 scale ATM will be provided where the children will deposit large coins and notes.

- Children will get a giant receipt for every deposit and withdrawal as well.

F

igure No. 143 1:2 Scale ATM

8.1.15 Enquiry Window

- A 1:2 scale enquiry window/ kiosk will be provided where an entire database of the miniature train such as journey time, arrival time, passenger details etc. will be displayed

- Children can visit this kiosk and pose any enquiry.

Figure No. 144 1:2 Scale Enquiry Window

8.1.16 Waiting Room

- A 1:2 scale waiting room will be provided where parents and children can wait their turns for the respective activities.

- Here they will also learn about the facilities provided in waiting rooms by Indian Railways.

- Toilet behavior inside waiting room would be explored.

Figure No. 145 1:2 Scale Waiting Room

8.1.17 Station Manager

- A 1:2 scaled Station Manager cabin will be provided.

- Here the children will take reports from each staff about their respective work done and he will maintain a log book for doing the same.

- A Station manager's hat, uniform and badge will be given to each child.

Figure No. 146: Station Manager Uniform

8.2   *Indoor Area Kids Zone*

It will include following models:

●   Baby zone

●   Art studio

●   Build your track

●   Exploration center

●   Role play center

●   Story telling center

●   Childrens library

●   Gaming center

8.2.1   *Baby zone*

●   This is a zone for babies of the age 0-24 months.

●   Activities such as crawling, climbing, cruising and take train rides, sponge-train models where babies can sit.

●   A track would be laid around the baby zone and train trolleys will be provided for strolling the babies.

Figure No. 147: Train Trolley in Baby Zone

8.2.2   Art Studio

- An art studio will be built which will have exploratory art and craft activities for kids.

- This will include kids with washable paints, markers and craft paper.

- Activities such as glass painting, wall canvas painting, train building, pebble painting, paper dress, clay modeling etc.

Figure No. 148: Art Activities

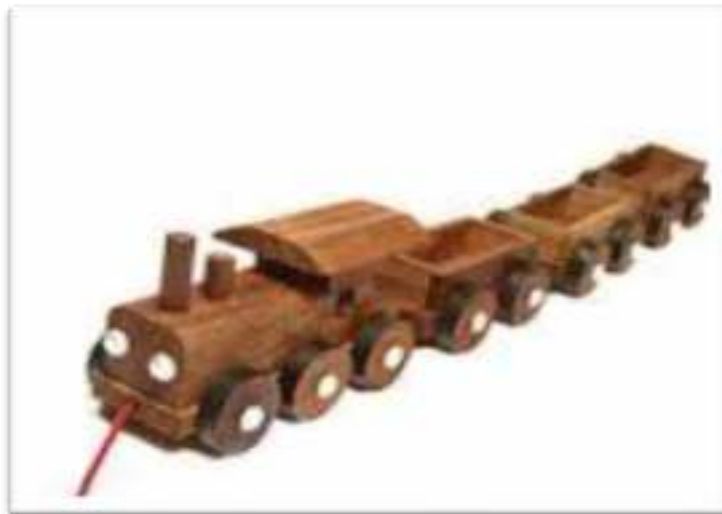## 8.2.3   Build your Track

- The playing structure will involve children in building tracks, train stations and place signals.

- Activities such as building track and train using cushion blocks, building your own India Map using track parts connecting famous places.

- Games related to tracks such as slides, obstacle race, join the dots etc.

Figure No. 149: Activities related to Train

8.2.4   *Exploration Center*

- This area will house hands-on activities for learning science in a fun way.

- Activities include the science behind steam engine operation, steam building, electricity building, thermal power generation, tunnel boring games etc.

- Rock climbing, sack race and other fun activities will enhance motor skills of children.

Figure No. 150: Science Activities

8.2.5   Role Play Center

- An Amphitheatre will be provided with individual podium and script.

- Each child can play any role of a railway staff such as driver, ticket collector etc.

- They will be provided with hats and badges.

Figure No. 151: Role Playing - Station Master

8.2.6   Story Telling Center

- Here the teacher/parent will be provided with story books and educational charts which will help the children learn more about Indian railways.

- Activities which are included in the story will be then performed by the children; such as craft, cutting, paper pasting, coloring etc.

Figure No. 152: Story Telling Session

8.2.7   *Children Library*

- This is an ideal place for gaining railway knowledge.

- Children will find all types railway related books such as history of railways, physics and mechanics of railways, science behind steam generation etc.

- Also, children will get a chance to complete various exercise books and puzzles etc.

Figure No. 153:   Children Library

8.2.8   Gaming Zone

- Children will get to play multiple exciting games at this zone.

- Games such as computer games, scavenger hunt, tug of war, fire and ice etc.

- Activities such as spot the mistake, crossword, corn-hole toss, jig-saw, scrabble etc. will also be provided.

Figure No. 154: Gaming Zone for Children

9. Mobile App, Website, Social Media Page

9   MOBILE APP, WEBSITE, SOCIAL MEDIA PAGE

Given the fact that we live in a technological era where it is imperative for all businesses to have an online presence. Online presence is also important because every business is today inclined towards a growth beyond boundaries and hence the online world plays a pivotal role in its overall growth and market penetration.

Hence, there should be a museum dedicated website, android based mobile application, and social media page.

9.1   *Mobile App*

It is android base mobile application, developed for museum with audio and video features in English language.

Android Mobile App should be provided with Interactive, sensitive Content to the Railway Museum Visitor on their Android Mobile which contains the detailed information of:

-       **Exhibit**

Information of each indoor and outdoor exhibit such as Photos, History, Importance, information, Location of Exhibit is provided.

Link to museum website and map of Museum

-       **Social Media Access**

Happening events get fetched from social media such as Facebook.

Virtual tour (via videos)

Videos of different attractions of museum are listed with their information in very interactive manner.

- **Information Scanner Tool**

This tool helps to get the details from QR code as lots of details can be mentioned in it. Details regarding some attractions of museum should be pasted in the form of QR code on respective objects. If visitor want to get more information, he/she can just scan code and it will appear on smart phone

Content consists of Audio books, Multimedia clips, Sound Files, Photographs, & Textual Content.
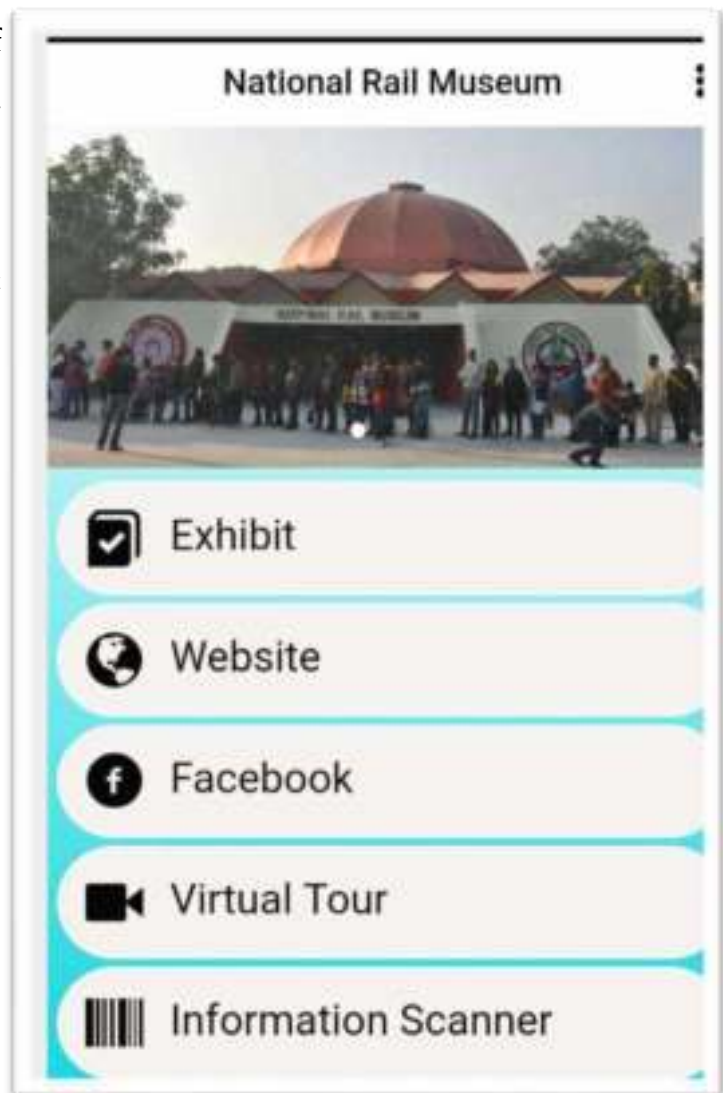

Figure No. 155: Sample of Mobile App

Figure No. 155: Sample of Mobile App

9.2   *Website*

The web has a far wider reach than any other form of advertising. Museum dedicated website should be designed to access all the museum attractions with single click.

Museum featuring website covers the topics such as history of rail museum, activities conducted at museum, treasures of Indian railway preserved at museum, attractions of museum such as Toy train ride or Shops, and guideline for visitors.

The website will also be available in local language.

Figure No. 156: Sample of Website

Figure No. 157: Sample of Website

9.3   *Social Media Page*

Social media posts can be used to drive targeted traffic. Using social media for business boosts site's SEO. So, there will be museum's page on Facebook website.

It keeps users updated with the events happening at Museum. Visitors can also share their photographs and experiences at Museum.

Figure No. 158: Sample of Social Media Page

10. MUSEUM OPERATION & MAINTENANCE

10   MUSEUM OPERATION & MAINTENANCE

The Role of Museum and the Professional Code of Ethics

A Museum is a place where visitors comes daily.   A Museum in this scale must be properly operated and maintained so that it can provide an enriching experience and some memorable moments for its visitors. These objectives can only be satisfied if a present rules and procedures are followed during the operations of this Museum.

10.1   Operations

The operation of a museum of this scale is a complex task that requires a diverse skill set and a procedure that incorporates the individuality of the diverse resources used in the museum. Furthermore, the hospitality skills necessary for front end staff (direct interactions with customer or end user) need to be established and defined explicitly. The museum operators must also consider the safety and security as this is of utmost importance. All these will directly lead to increasing the social presence of the museum that leads to an increased footfall at the museum.

Museum operations encompasses various tasks that need to be performed to ensure smooth operations and increasing footfall at the site. The responsibilities for a museum operator can be briefly summarized as the following:

i.   Management of a diverse Human Resource

ii.   Increasing events and activities at the Museum

iii.   Security and Safety of the visitors.

iv.   Preservations of exhibits.

v.   Guided tours and hospitable customer interactions.

vi.   Operating trains, simulators and other equipment

vii.   Create apps for visitor information

viii.   Handicap assistance mechanisms.

ix.   Websites and CRM software

x.   Regular performance reports that depict performance of the operators

10.2   Human Resource & its Functions

A museum needs a set of varied skills that form a team. This team comprises of the following key aspects and personnel.

i.   General Manager

ii.   Manager for Operations

iii.   Manager for Maintenance

iv.   Historians

v.   Event Manager

vi.   Social Media Manager

vii.   Equipment Operators

viii.   Cleaning Staff

These resources need to be trained to refine their skill sets and be effective in their assigned roles. An historian has the required knowledge that needs to be communicated to the visitors but lacks the communication and hospitality skills for the same. Such skills need to be refined so as to create the necessary skills and polish the existing skills. These training sessions need to be conducted prior to visitor interactions.

It is the responsibility of the operator to ensure that the appropriately trained staff is working at the museum.

Figure No. 159: Staff of Museum explaining details of Exhibit to Visitors

Safety plays a paramount role in the successful execution of any operation contract. The staff working at museum needs to be trained in the proper safety procedures as required during fires, floods, earthquakes or any other natural disasters or manmade disasters such as terrorism or accidents at the museum. Training of staff in this field is very important as the instinctive reaction from a person can be wrong in many occasions. Safety is a habit not a response. The safety procedures must become habitual and natural step to all employees.

The responsibilities of every person must be made crystal clear. They should have clearly defined metrics for performance that evaluates their performances. They should be able to get feedback for their performance without intervention from any senior. These human resource factors need to be explicitly defined and created to satisfy the purpose. These are the major reasons management of Human resources can be challenging as different roles will have different goals that need to be achieved.

10.3   Marketing

Advertising and mass media communication is useful in a various of ways. It is a great mechanism to connect with your users as well as getting useful feedback for the same. It is important for your social media page to achieve these objectives among others:

i.   Engage your audience

ii.   Communicate your message effectively

iii.   Get feedback efficiently.

iv.   Create targeted activities based on the response for previous activities

v.   Address issues and complaints.

Social media platforms such as Facebook ©, Instagram ©, Twitter ©, YouTube © and others are constantly evolving. It is important that the pages of the organization are constantly evolving with these trends. If your organization's social media is updated and caught up with the latest trends, it can have a positive impact on the footfall and responses received.

Social media is a vast and complex network and you need a dedicated professionally to handle the same. Social media allows you to receive responses sorted by age, frequency of visits, interests, relationship status, employment history among other things. These can help you get a targeted program together so as to target a particular group of people; may them be frequent visitors such as railway enthusiasts to infrequent users such as school students.

Social media also helps you communicate emergency procedures and messages in cases of emergency. A huge percentage of individuals these days are equipped with an electric device connected to some form of social media

account. This can be advantageous to an organization to communicate SOS texts and course of actions to the visitors.

Addressing issue and complaints is a major concern for various museum operators. These issues and complains can be effectively addressed and sorted using apps such as Facebook. These tools need to be used and training for using these tools is very crucial. Addressing the concerns of people effectively and efficiently can change a person's impression of the organization by a great for free.

As social media can play such a huge role in influencing people and their thought process, it has been widely adapted by museum's and tourist organizations worldwide and incorporating them in the museum setup is crucial to the museum's success.

10.4 Websites and Customer Resource Management

Figure No. 160: Sample image of Website

The website of any organization can be the major selling point for undecided tourists. An attractive website can increase footfall more than any event or activity. A website must be easy to navigate, communicate the correct messages, highlight key attractions and most importantly be up to date with the latest information and event information. A person's outlook to a museum can be easily influenced by the quality of the museum's website. The Paris museum and the Smithsonian museum are a prime example of this point.

A website must also provide concise information that a visitor may require when he/she visits the museum. This must include timings of the museum, key attractions, special events, location of food stalls and restrooms as well as ticketing information, discounts and options to schedule a visit (Plan a visit).

CRM software's are another major source to generate repeat footfall. CRM software are critical for a museum to stay in touch with its past visitors. This

software is used to document what a visitor liked during their visit as well as store their preferences for events, activities and other specialized occasions. The lost can them be sorted based on either age, sex, preferences, likings, attractions, interests, employment history. future ambitions among other things. You can therefore send target messages to these group thus increasing repeated footfall.

The operator must be responsible for operating both the website and the CRM software as these are critical to the success of the museum. These must be done by trained people as these can be key influence to the success of the organization.

10.5   Caring for Visitors

10.5.1   Events & Activities

Events and Activities can help generate targeted footfalls so as to enhance the visitor experience. They can be organized to increase footfall in the off season or for publishing a new venture or exhibit. These events and activities sometime tend to be a major attraction for the visitors and can register repeated foot falls as well.

Figure No. 161: Painting Competition

These events can be targeted towards particular community festivals, current events in the country, games for kids or various other reasons. These events in some form must communicate back its roots to Indian Railways as the main reason for the museum must not be forgotten but always highlighted. Events and competitions planned and created for children can attract lots of attentions from schools and colleges. These events can be customized as per requirements of particular schools, courses or the background of the children visiting the museum for that event. These events can therefore be a major attraction and advertising point that the museum operators must make full use of.

Figure No. 162: Children Activities at Museum

10.5.2 *Assistance to Differently-abled persons.*

A museum's success can also be measured by their treatment and facilities available to the differently abled people as well as people requiring assistance for their daily activities. These facilities can be broadly summarized as the following:

i.   Access to all area via wheelchairs

ii.   Audio Tours for people with hearing difficulties

iii.   Toilets with seating for wheelchair bound people

iv.   Braille sign boards for the blind or vision deprived people.

v.   Guides specially trained to take care of handicapped people.

These facilities must be maintained so that they are easily accessible when required. Spare wheelchairs, medical kits and other requirements must always be at hand and volunteers willing to work these must always be present. Golf carts to transport old and sick people in the museum must also be purchased. These small steps to incorporate differently abled people can go a long way in the success of an organization.

Furthermore. there are countless NGOs dedicated to the welfare for old, sick or differently abled people. It is the duty of the operator to organize planned tours for them at discounted costs or free of costs to make them feel involved in the community. These small acts can be a huge influence on the outlook of the museum and hence increase the prestige of the same.

Figure No. 163: Assistance for Physically disabled person

10.6   *Mobile Application (App) for additional information*

The mobile is a device that has revolutionized communications in every household. These divided can also be a great source of information if they are used appropriately. A great use for these can be made in museums to communicate the necessary information to the visitors.

An App developed for the museum as shown in the picture alongside can communicate all the necessary information to the visitor. Clearly visible text as well as easy to navigate menus can make the app a major attraction to the visitors.

Figure No. 164: Sample image of Mobile App

The app must also include features to generate contact information as well as emergency procedures to the visitor. The app must be regularly updated to be complete with the required information. The app may also be used to generate feedback from the visitors and that can be of great interest to the visitor.

In the future Cash-Less India, this app can be used to purchase tickets as well as access to the special events at the museums. This app can store profiles as well as highlight the key features of the museum based on a person's liking and interests,

10.7   *Museum Security, including Disaster Preparedness*

Public spaces in this day and age are targets for terrorist organizations. Events such as riots and strikes also make public spaces easy targets. Preserving heritage exhibits is essential and the damage done should be kept to a minimum. To ensure that, a dedicated team for monitoring and taking action in a time sensitive fashion is essential.

Figure No. 165: Museum Security using CCTV system

Implement state of the art security instrumentation with the help of the following:

- CCTV cameras with monitoring
  - o   In this age it is very important to have public spaces under CCTV coverage. Monitoring and relaying information to respective crew members without any delay is very important.
- Sensors and well-lit surroundings
  - o   Proximity and temperature monitoring sensors in areas where fragile and important exhibits are placed
- Fire safety with exit plans
  - o   Specialized waterless fire-fighting solutions to stop damage of exhibits and archived documents.
- Radio Communication

o RF communication ensures a secure line in communication between required parties with lightning fast response. Swift communication can help organize crowds, find missing persons and request for emergency help when in need.

10.8 Operators for Trains / Simulators / Other Equipment's

Instruments and machinery usually have a variety of manufacturers and require specialized training with respect to each and every manufacturer. Simulators and other key equipment requires a detailed

Skilled manpower to ensure a safe and reliable operations of equipment which may include but not restricted to the following:

- Simulators
- Toy / Joy Trains
- Cleaning Equipment
- Golf Carts

10.9 Asset Management

10.9.1 Collection Management

10.9.2 Inventories and Documentation

Figure No. 167: Conservation of Inventories

Preservation and Conservation are very time taking and essential to an organization like a museum. Files, books, maps, blueprints, designs and other documents should be preserved and cataloged in the right manner. The first step to get archives in working order is to get the archive curated. Curating is the process which ensures that the documents are sorted, documented and organized in an academic fashion. The second step after organizing the documents is to ensure that the documents are kept in a manner which causes no harm to the document. Documents sometimes are exposed to silverfish, rotting, humidity and other environmental factors causing damage to the original document.

Services include:

- Curating
- Preservation of books / maps
- Restoration of train or other modular equipment
- Digitization of archive material
  - Transferring all documents to a digital library
  - Converting all files to a PDF
- Record / Storage management
  - Creating asset registers
- Handel Research queries for scholars and researchers

10.10   *Care & Preservation of Rail Exhibits*
Display Exhibits and Exhibitions (Maintenance)

Maintenance of the exhibits and key attractions at the museum can have dramatic impacts on footfall. Poorly maintained equipment can cause accidents or mishaps and lead to poor publicity for the museum. The equipment can also cause huge capital opposed to the museum and render the equipment useless. Maintenance of the equipment is critical to the success of a museum venture.

The maintenance must be done by trained professionals only as these equipment's are safety critical. The simulators and motion platforms are expensive that can be damaged if improperly maintained. These equipment's are also very difficult to maintain and can be hazardous to the health of the maintenance staff. Hence these checks are best carried out by professionals. Such equipment usually have hydraulic, pneumatic and other high pressure systems which if not maintained properly might lead to some sort of small explosion. Proper maintenance must be carried out using Annual Maintenance Contracts or similar arrangements. Staff needs to be able to work with multiple systems with different specifications and their respective protective gear.

Proper maintenance requires lot of directly translates to lower downtime in equipment. Downtime in machinery & equipment directly translates to a loss in revenue and a poor sentiment score for the visitor /customer. Timely maintenance and proactive efforts towards a zero-downtime system requires immense knowledge of the system and its manufacturers. Prompt response in repairing can only be executed if the suppliers and service providers are in constant contact with the maintenance staff. Spare parts availability and trained staff are essential in providing a comprehensive maintenance service with zero downtime.