

# **Matheran`s Toy Train - the Joy and Pride of Maharashtra, India**

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## **Goodbye to Matheran's Toy Train?**

**Safety under Scrutiny**

**a Safety Issue**

**Unsafe Conditions of the Rail Track**

**The Ultimate Goal to provide safe Joy Rides  
on the Heritage Rail Road**

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Chuckling around Panorama Point on the Abyss without any Protection Wall and without any Protection Guard-Rail to prevent Derailments and Coaches to tumble down the Precipice

**Feature Article by  
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**Matheran October 2016  
Revised November 2016**

## **FAZIT and RECOMENDATIONS:**

The Track and the Operation of Matheran`s Toy Train has to be regarded under modern internationally acknowledged, state-to-the art SAFETY and RISK MANAGAMENT Standards and Norms as

### **UNSAFE.**

To redesign the toy train up to modern state-to-the art **SAFETY STANDARTS**,

- ◆ the rail-track has to be brought on a well-drained stable formation with a top formation width of about 5.50 to 6.00 metre with the trough steel-sleepers resting on a clean, un-fouled 6 to 7 inch ballast-cushion,
- ◆ the curves have to be provided with transitions of appropriate length to ease the offset at the couplers, when the rolling stocks enter the circular or body-curve,
- ◆ kinks at the rail-joints, especially on curves, have to be eliminated,
- ◆ on traces alongside of precipices outside protection guard-rails and on bridges inside protection guard-rails have to be provided,
- ◆ to safeguard trains on traces alongside of precipices sturdy retaining/barrier walls, preventing derailed rolling stocks to tumble down the abyss, have to be erected,
- ◆ or alternatively the track has to be shifted to the hillside and conducted in protection-galleries,
- ◆ the rolling stocks have to be provided with jerk and shock absorbing couplers; see page 14,
- ◆ as train-brake system an easy to maintain and to service direct working single-pipe compressed air-brake system without the need of distribution valves and reservoirs, working on **SPRING LOADED BRAKE CYLINDERS**, is advisable.

### **See:**

- ◆ Publication ***INDIAN RAILWAY TRACKS – A TRACK ENGINEERING COMPENDIUM, 2016***
- ◆ and Technical Railway Paper ***RISK AND HUMAN ERROR MANAGEMENT, 2016***,

with the affiliated Literature,

which can be free downloaded from the website

<http://www.drwingler.com>.

## INTRODUCTION

The Matheran Toy Train, opened on 22<sup>nd</sup> March 1907, had been planned and constructed as a 2 ft Narrow Gauge **TRAMWAY** by the Entrepreneur ABDUL HISSEIN, the son of the business tycoon Sir Adamjee Peerbhoy. The construction of the line was authorised by the Public Works Department Bombay under notification No. 34, dated July 28, 1904. Abdul Hussein floated a company in the title "**MATHERAN STEAM LIGHT TRAMWAY COMPANY (MLR)**", wholly owned by the Peerbhoy Family.

The line climbs from the rail-link of the Bombay-Puna line at Neral 720 metres with a maximum gradient being 1 in 29 over 21 km with 221 curves with a tightness of up to 60 feet and with one short "**ONE KISS TUNNEL**".

Until 31.03.1948 the **MATHERAN STEAM LIGHT TRAMWAY** had been a private enterprise managed through an agency of the company, when on 01.04.1948 the Matheran Light Railway was taken over by the Indian State. The Toy Train is now managed and run by Central Railway.

The German Manufacturer Orenstein and Koppel engineered and delivered 1905/1907 in two batches 4 three-axle Steam Locomotives with articulated hollow axles managing to negotiate the tight curves. They served until 1955, when they have been replaced by articulated Diesel-hydraulic B+B Locomotives tailor-build in Germany by **Jung**.

A "carcasses" of Steam Locomotive No. 741 is exposed at the Matheran Station on a pedestal:



Steam Locomotive No. 741 exposed at Matheran Station

The remains of the Locomotive No. 739 found its way to the National Rail Museum in Delhi. No. 740 had been gifted in working condition to the nostalgic Leighton Buzzard Narrow Gauge Railway in Bedfordshire, England, where it nowadays is still running well restored, preserved, maintained and serviced:



Steam Locomotive No. 739 at Delhi National Rail Museum



Steam Locomotive No. 740 at Leighton Buzzard Narrow Gauge Railway in Bedfordshire, England

No. 738 had been 2013 restored at Parel Workshop of Central Railway. After few nostalgic test-runs on the hill section, it had been found as too difficult to run this rehabilitated Steam Locomotive with skilled personnel. The forest department did not allow to run any more a

fired steam Locomotive The locomotive is now resting exposed to the corrosive weather conditions on a pedestal at the Neral loco-shed.



Steam Locomotive No. 738 exposed to Corrosion on a Pedestal at Neral

To learn more about the history of the Matheran Light Railway, read the book ***MATHERAN LIGHT RAILWAY*** (1904-2003) by R.R. Bhandari, published 2004 by National Rail Museum, New Delhi; <http://www.railmuseum.org>.

An article in **TIMES OF INDIA**, May14th, 2016, (**“Goodbye to Matheran's toy train for now - Times of India [timesofindia.indiatimes.com](http://timesofindia.indiatimes.com) > City > Mumbai**) raises question about the **SAFETY** of Matheran`s Toy Train, which has become an instinctive part of Tourism in Maharashtra.

Two recent unwanted severe **MISHAPS**, two coach **DERAILMENTS** and a **RUN-AWAY** with narrow escapes for the passengers, on 01/07. May and 26. April 2016, have send Safety related authorities into a tizzy. In the latest development on the **SAFETY-ISSUE** the toy train service has been suspended. A report has stated that Central Railway has not the independent technical expertise to redesign the toy train up to modern state-to-the art **SAFETY STANDARTS**. Central Railway has recommended to tie-up with international consultants in order to revamp it and to make it safe for passenger service.

This issue has also brought talks of doing more for the tourism in this hill station. The suspension of the train service has left about 5000 locals worried about their daily income for livelihood from tourism.



Matheran's Toy Train Coach-Derailment near Aman Lodge; 01. May 2016



Narrow Escape for Passengers at the Abyss at Jhumpati, 26. April 2016

>Passengers had a close escape on the Neral-Matheran railway line when the famous toy train derailed and nearly tumbled into the valley yesterday < [www.mid-day.com](http://www.mid-day.com) › News › National News

# SAFETY ISSUES

As already mentioned, Matheran`s Toy Train has been built over 100 years ago as a private **LIGHT STEAM TRAMWAY** and not as a Railway as the other scenic Indian Hill Railways **KALKA-SHIMLA, KANGRA RAILWAY, DARJEELING RAILWAY** and **OOTY NILGIRI RAILWAY** have been engineered and build.

Until recently nobody has raised serious concerns about the **SAFETY-SHORTCOMINGS** of Matheran`s Toy Train under modern Safety and Risk Management perspectives.

Although India has made progress in the last decades in Railway Safety and Safe Train Operation, India is still regarded internationally as a country with a relatively low **SAFETY RECORD** of its Railways.

The **ULTIMATE GOAL** should be to prevent Railway Accidents; see Arya Bhushan and M.M. Agarwal **INDIAN RAILWAY SAFETY – Ultimate Goal to prevent Railway Accidents**, Bahri Brothers, Delhi 2015, ISBN 81-900613-x and James Reason, **THE HUMAN CONTRIBUTION**, Ashgate Publishing Company, Farnham, UK, ISBN 978-0-7546-7402-3, 2013.

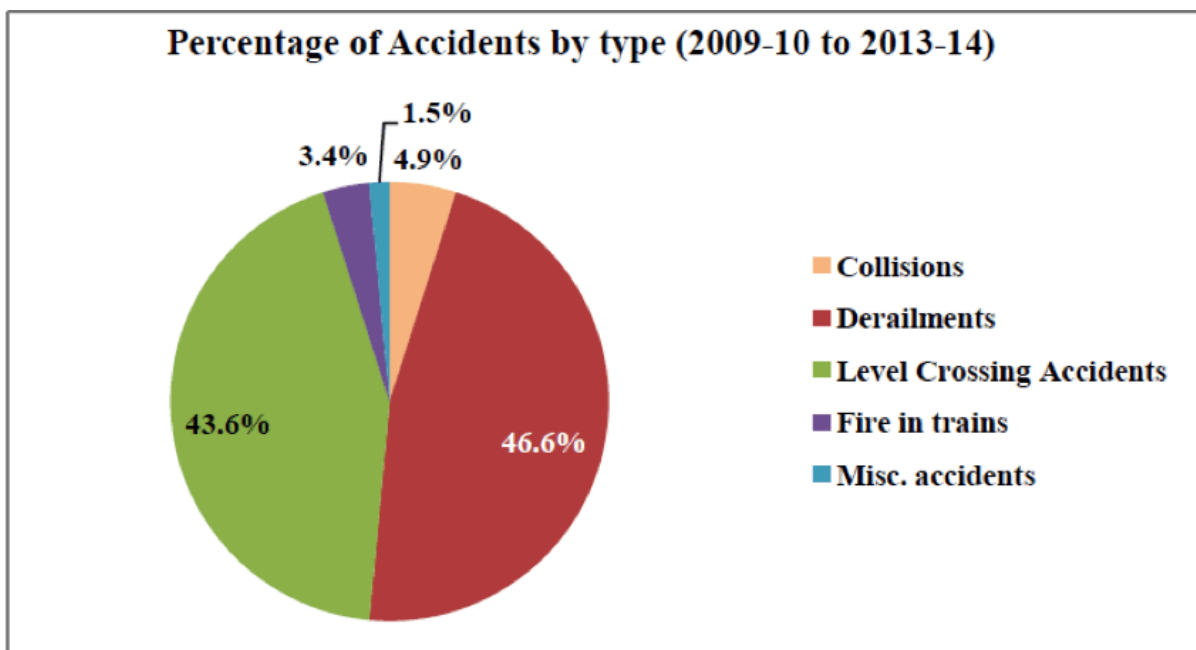
Worldwide modern technical organisations of high risk potential as in nuclear or thermal Power Generation, Space Technology, Aviation, Oil Exploration/Rigging, Railways, Chemical Industries and Land and Sea Transport make nowadays use of the methodologies, error management tools and practical guides in **MANAGING THE RISKS OF ORGANISATIONAL ACCIDENTS** by James Reason; Ashgate Publishing Company, Farnham, UK, ISBN 978-1-84014-105-4, 2011. Essential is a so-called “Generative Culture” with proactive measurements. Engineering a **SAFETY CULTURE** and an **INFORMATION SYSTEM** on observations about unsafe matters are essential tools of a modern Risk Management. On basis of this methodology and doctrines British Rail has gained in the last years a remarkable improvement off its safety records. South African, New Zealand, Canadian, Austrian, Swiss and German Railways follow this methodology and doctrines on their path to avoid unwanted bad events. For Japan Railway any unwanted bad event or near missed event is affiliated with **ORGANISATIONAL SHORTCOMINGS**.

In modern, state-to-the art **SAFETY and RISK MANAGEMENT** each unwanted bad event or near missed bad event has to be investigated and regarded as an outcome of an **ORGANISATIONAL FAILURE** with the “parents” of **PREVAILING LATENT UNSAFE CONDITIONS**, often with far reaching history, and based on **FAILURES IN THE SYSTEM**; see Dr. Frank Wingler: **RISK AND HUMAN ERROR MANAGEMENT**, and Chapter 20 of the internet Publication **INDIAN RAILWAY TRACKS – A TRACK ENGINEERING COMPENDIUM** (free for download from <http://www.drwingler.com>) and the affiliated literature.

The percentage of the types of accidents of INR for the period from 2009 to 2014 is given by the chart below. Derailments contribute to Accidents in India with 46.6 %. Safety Experts got nowadays very sensitive for Derailments on their way to improve the overall Safety Records; so also for the recent **Matheran Train Derailment**. The latest bad Derailment event with over 145 killed passengers INR faced on 20-11-16 at about 3 am at Pukhrayan in Kanpur District:



Derailed Indore Patna Express 19313 at Pukhrayan near Kanpur



Risky procedures, which might had been allowed or tolerated in the past, cannot any more allowed and tolerated under the auspices of modern Safety and Risk Management Norms and Standards. ***“What did not happen yesterday is more likely to happen tomorrow”***. From the **NON-OCCURANCE** of bad unwanted events in the past one cannot make predictions for the future.

Indian Railways have nowadays to invest Railway Accidents by international Safety Methods looking for **Organisational Shortcomings**, prevailing **unsafe Conditions** and **Failures in the System**.

The April/May 2016 incidents on the Matheran Toy Railway show that this system is not safe and is derailment prone. Luckily the passenger coaches did not tumbled down the precipice or capsized, since at the derailment spot there had been a rudimentary formation. On other sections there is no ballast, and the formation has been swept away by water or trampled down by pedestrians using the rail track as a trail or foot path as delineated by the following pictures:

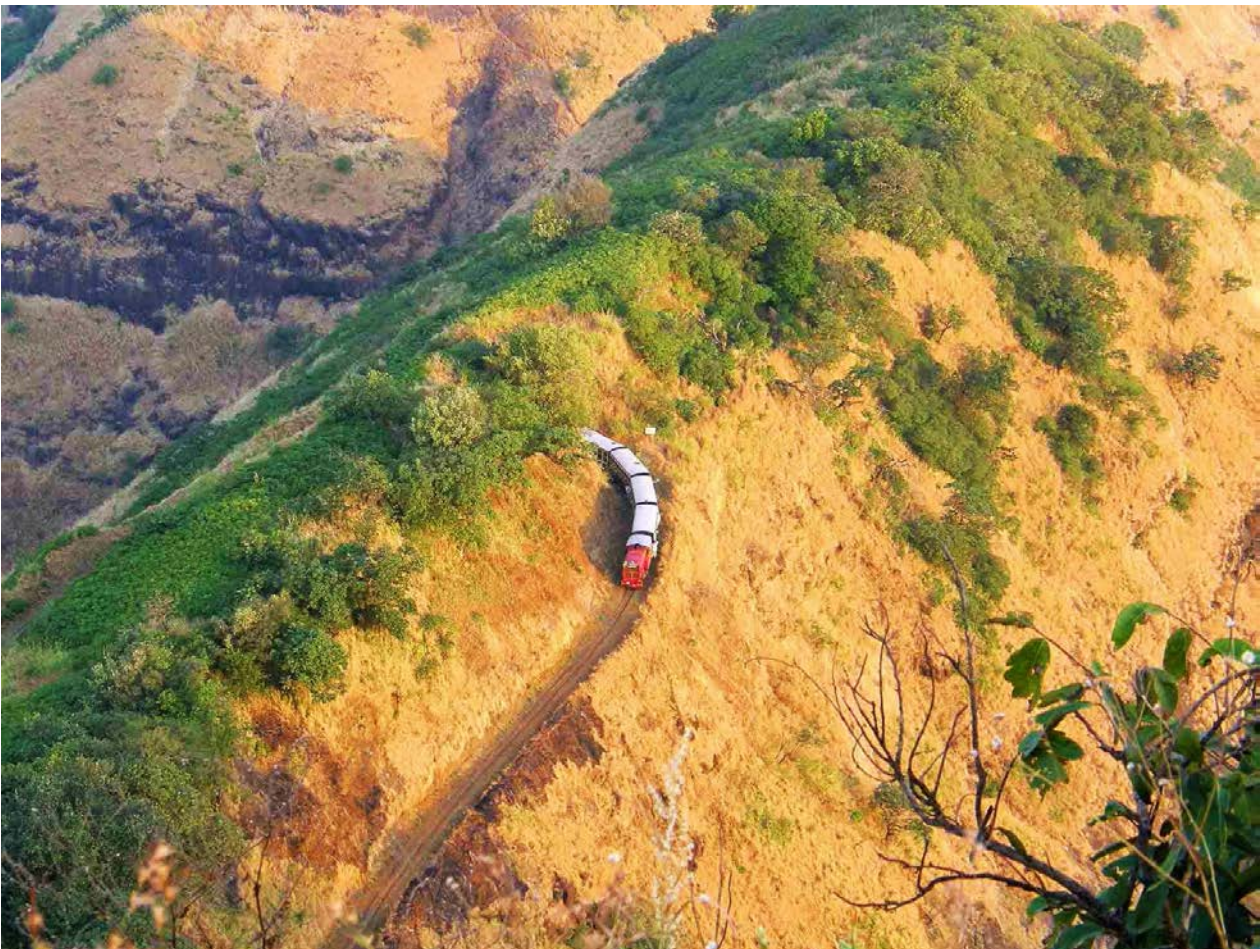


Formation and Ballast missing along the Track

On many sections the track is laid along the rim on the Abyss without any Protection Wall and without any Protection Guard-Rail to prevent Derailments and the Tumbling down the Precipice, as delineated by the following Picture Gallery:

## **PICTURE GALLERY OF THE MATHERAN RAIL TRACK**







Chuckling at the Abyss without any Protection Devices



Chuckling around Panorama Point at the Abyss without any Protection Devices



Chuckling around Panorama Point at the Abyss without any Protection Devices



Chuckling around Panorama Point on the Abyss without any Protection Wall and without any Protection Guard-Rail to prevent Derailments and Coaches to tumble down the Precipice



Formation flowing down the precipice between Aman Lodge and Matheran near Wayside Inn; kinking Curve Rail-Joint

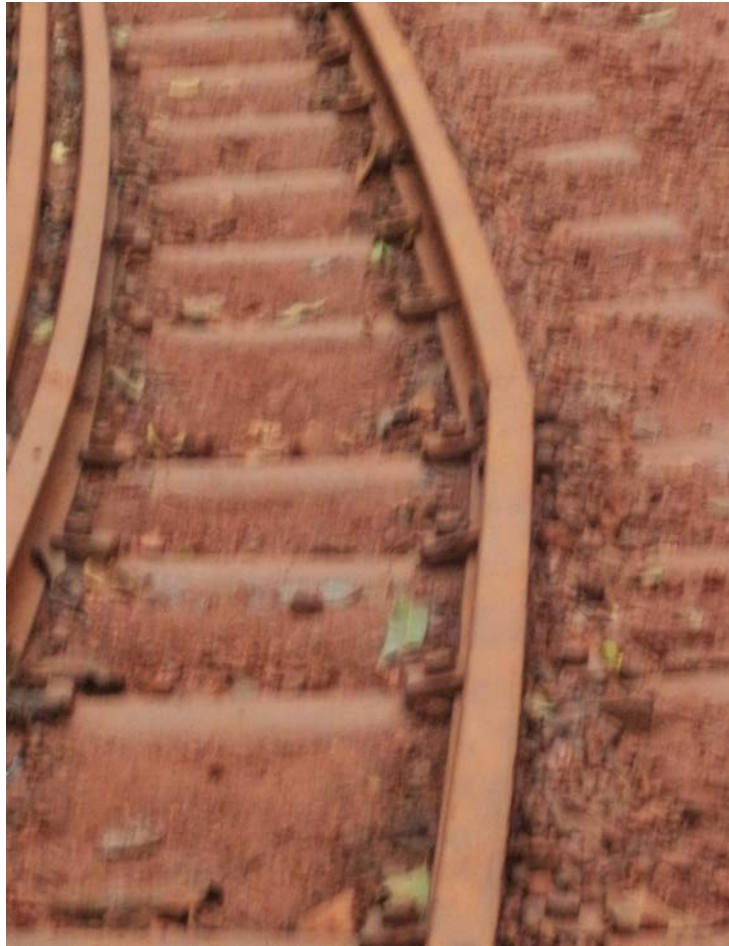
The May 2016 Aman Lodge Coach Derailments show all signs of a so-called “**SLOW SPEED FLANGE CLIMBING DERAILMENT**”; see **Chapter 20.2: “DERAILMENT INVESTIGATIONS AND MECHANISM”** in the internet Publication **INDIAN RAILWAY TRACKS – A TRACK ENGINEERING COMPENDIUM**; free for download from <http://www.drwingler.com>, and the affiliated literature.

A Slow Speed Flange Climbing Derailment may occur, when several shortcomings come together as there are:

**Track Misalignment (Geometry) Parameters, worn Wheel-Treat Profiles, Train-Set Jerks, Sand or Dirt at the Rail Running Corner, corroded or rusted Rails.**

If such parameters come together a derailment might be triggered off. To mitigate derailment proneness, train-set **JERKS** should be avoided, Rails kept clean and running corners in curves lubricated.

At many spots the rails are not aligned as they should be. One can detect risky and badly maintained kinks at several curve rail joints:



Kinking Rail Joint in a Curve make the Track Derailment prone

The Steel-Trough Sleepers are mostly laid on mud and red earth instead on a 6 to 7 inch clean un-fouled ballast cushion, making it difficult to maintain properly the track alignment.

The coach brakes are operated mechanically by handbrakes with a weight-lever. The operator ("**Brake Porter**") hangs between two coaches without any safety provision or platform. Since the coaches are NOT coupled by an elastic coupling device, **JERKS** can be easily produced, if the handbrake system is not operated synchronically with the Locomotive brake. **JERKS can contribute to Derailments.**

**The Matheran RLW rolling stocks should be provided with a jerk-free elastic coupling system, which can damp shocks and jerks:**



**Jerk damping German Coupling Systems for NG Train-Sets with Telescope Damper**



"Brake Porter" operating the manual Coach Brake between the Coaches



Inelastic simple Coupling Device

The technical system must become such that the wellbeing of the passengers become independent from the skills of the "brake porters" and not put on risk by derailments caused by lapses or malfunctions of the "brake porters".

Experiments to install on the coaches the **two-pipe graduate release compressed air brakes** with brake cylinders, distribution valves and compressed air reservoirs had up-to now not successful. Such a system has to be regarded as not suitable for the small coaches under the poor maintenance, repair and test facilities, and therefore doomed to fail on this toy train. Coaches installed for trials with this system got soon vandalised for spare parts. For the needs to service, maintain, repair, test and check with brake certificates; see P.C. GUPTA: **AIR BRAKE SYSTEM GUIDE**, 5<sup>th</sup> Edition 2006, available at Jain Book Agency, New Delhi, JBA Book Code 5537, 150 Rupees.



Vandalised Dual-Pipe Compressed Air Brake Components at Neral

The prevailing conditions on this toy train are not such, that the described procedures for the Broad Gauge Coaches and Train Brakes can be followed to satisfaction on the Toy Train.

For Safety Reasons, one has to become independent from possible lapses and malfunctions of the hand-brake operators, who can easily produce jerks contributing to derailments, like recently at Aman Lodge,



01.05.16 Aman Lodge Derailment

or even can forget to apply the brake as at the Jhumpati incident of 26<sup>th</sup> April 2016.

One can learn from Heritage Narrow Gauge Toy Railways in England, some of which use a **simple one-pipe, direct working compressed air-brake system without distribution valves**. The Brake Cylinders are loaded with a Spring. When compressed air is introduced into the cylinder it will work against the load-force exerted by the spring and keep the brake system in a released state. The brake is applied by gradually exhausting the air-pressure allowing the load-spring to bring the system into braking position. The system is *fall-safe*. With the drop in air pressure pipe or host in case of a rupture or leakage the brake applies mechanically. With a lever the brake can be released mechanically in case of absent of any air-pressure supply.

The bogies of the Matheran coaches have only a primary suspension with a short play making it difficult to follow short length track irregularities. The tight curves are not provided with transitions of appropriate length, resulting in a coach-end off-set between the coaches with their primitive inelastic coupling system, when entering a curve from straight (see: Technical Railway Paper by Dr. F.A. Wingler **RAIL TRACK GEOMETRY** under <http://www.drwingler.com>). Those facts contribute to the **DERAILMENT PRONENESS** of the coaches.

One reason, why this fragile tramway could operate in former times without major severe bad incidents is that that time there had been a common awareness for hazards amongst the minds of the operating personnel, and everybody identified himself with the operational rules and the safety. This can nowadays not anymore be expected. The technical system has to be adopted therefore accordingly.

How a 2 ft NG rail-track can be laid with trough steel-sleepers on a well ballasted cushion for safe passengers service can be learned from the UK, North Wales, 25 miles long nostalgic and scenic **WELSH HIGHLAND RAILWAY**, which had been recently rebuild and revamped (see also the Technical Railway Paper by Dr. F.A. Wingler **RAIL TRACK GEOMETRY** under <http://www.drwingler.com>):



Laying 2 ft. NG Rail Track on Trough Steel-Sleepers on a well ballasted Formation;  
Welsh Highland Scenic Railway, Wales, England

On risky sections along the precipices as around the Panorama-Point/Mt.Berry/Governor Hill Rim the track-trace should be shifted towards the hillside and the track run through Protection-Galleries as can be seen on the following picture of the alpine St. Bernina Railway in Switzerland:



Protection-Gallery, Bernina Railway, Switzerland



Protection-Gallery, Bernina Railway, Switzerland



Protection-Gallery; Schöllenen Gorge, Switzerland



Derailment-Protection at Bridge by Guard-Rails



Protection at Precipices by outside Guard-Rails on 2 ft. NG scenic Festiniog Railway, Wales, England

## IN A NUTSHELL

To revamp Matheran`s Toy Train up to modern Safety Standards, Norms and Safe Train Operation Practises will become highly costly without any chance of a return of the needed capital investment. The **ORGANISATIONAL SYSTEM** and the **PREVAILING CONDITIONS** must be revamped in such a way that a **SAFE PASSENGER TRAIN OPERATION** will remain the **ULTIMATE GOAL**. Without the needed Capital Investment-Input this Joy and Pride will go down the Memory Line.

To rebuild and revamp the trace in order to become safe for passenger transport under up-to-date safety norms and standards, heavy machinery cannot be used. To transport the needed material to the sites will become a bottle neck. Earth, trace, retaining/barrier wall, protection-gallery, embankment, formation and track-works will have to be executed manually by labourer forces. This labourer intensive works will become not only a financial but also a logistic challenge for Central Railway.

## ALTERNATIVE TRAFFIC SHEMES FOR MATHERAN

For the social-economic wellbeing of the unique ecological hill-station **MATHERAN** a proper road access is essential. Of the Neral-Matheran road access, the risky, steep and curvy section between Jhumpati and the point of entrance to the municipal at Dasturi is mostly in a deplorable state-of-affairs:



Risky Road Access to Matheran; mostly in a deplorable State-of-Affairs



Neral-Matheran Road, risky and mostly in a deplorable State-of Affairs

There is no proper carpark for the numerous taxis and frequent visitors coming by their own road vehicles, neither at Neral nor at Dasturi. Cars are parked at Dasturi in the forest and even on the trail to Panorama Point; at Neral the Taxis block the roads:



Visitors park their Cars in the Forest on the Trail to Panorama Point

Most urgent are a proper all-season-stable well drained stable and safe tar-road access and a proper carpark at Dasturi, even if for a proper and stable infrastructure a small part of the forest has to be sacrificed.

Between Dasturi and Matheran-Market there is a steep unfortified cart-road, which turns during rainy season in a mud path and during dry season in a rough and stony dust-fuming trail. Coolies have to take unbearable pain to push up heavy load on their hand-carts:



Coolies with Hand-Cart and Carrier-Horses

A road stabilisation with a sturdy pavement resisting the climate situations, enabling an all-season smooth and easy movement of the delivery hand-carts and customer rickshaws is of utmost priority. Such a stable road could also be used by pedestrians, who nowadays take their footway from Dasturi to the Market over the rail-track trampling down the formation and ruining the embankment:



Unfortified Dasturi Matheran-Market Cart-Road in a deplorable State-of-Affairs



Unfortified Dasturi Matheran-Market Cart-Road in a deplorable State-of-Affairs



Pedestrians using the Rail Track along the Abyss as a Trail to Matheran

The horses should be banned from a revamped supply road, and an separate dedicated horse trail should be provided up to the Matheran Railway Station. The horse route has to be segregated from the hand-cart and rickshaw route.

In the last years there had been a so-called **“Shuttle-Service”** provided on rail between Aman Loge and Matheran Railway Station. This shuttle had been operated with two Diesel locomotives in push-pull formation. To run this short shuttle service a huge number of personnel is needed. Since at Matheran there is no loco shed or repair/maintenance workshop and no facility to fuel the locomotives, every evening one locomotive has to be brought down to Neral for service, maintenance, repairs and checking, and one locomotive in ready fuelled and workable condition has to be brought up the next morning:



Shuttle Service chuckling from Matheran to Aman Lodge

Locals of Matheran are of the wrong opinion, that this shuttle-service is profitable for Central Railway. But if one calculates this enterprise in an economical professional manner taking also in account the investment costs, the annual return of costs, the overall operational cost over the year for rolling stocks, repairs, maintenance of track and rolling stocks, infrastructure, manpower ect. one can easily find out that this shuttle service operates with a big financial loss for Central Railway. To make the present shuttle service profitable, the way it operated until May 2016, a fare of about 500 Rupees for one ride must be levelled.

Under political pressure this unprofitable shuttle service has been kept alive until May 2016, when the two Accidents in short interval have raised severe **CONCERNS** about the **SAFETY** and the **SAFE OPERATION**.

And even if the outcome of the present fierce political discussion and agitations might have the outcome that the shuttle service will be resumed, but the passenger transport service from Neral to Aman Lodge will be not allowed anymore because of the up to now unsafe rail trace and operational modes, the rail connection to Neral must be kept alive to bring the rolling stocks and the locomotives without passengers up and down in intervals.

The **FUTURE** of this Joy and Pride of India`s tourism is brim. In case this Heritage Toy Train will go down the **MEMORY LINE**, the rail-trace between Dasturi and Matheran could be converted into a dedicated **HORSE TRAIL** segregated from the **Hand-Cart** and **Rickshaw Road**:



Aman Lodge – Matheran Trace could be converted into a dedicated Horse-Trail



Aman Lodge – Matheran Trace could be converted into a dedicated Horse-Trail