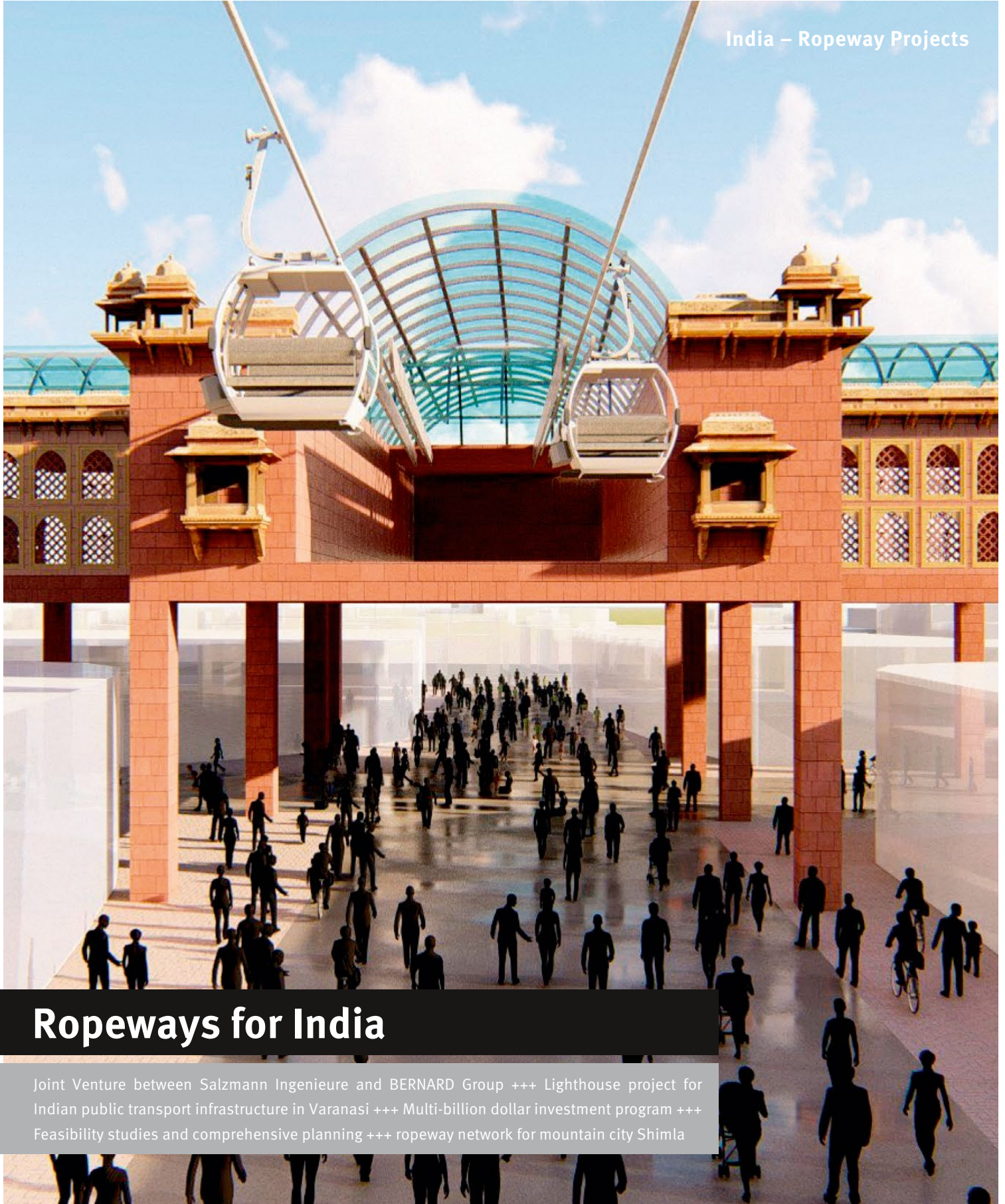


SALZMANN

INGENIEURE

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India – Ropeway Projects



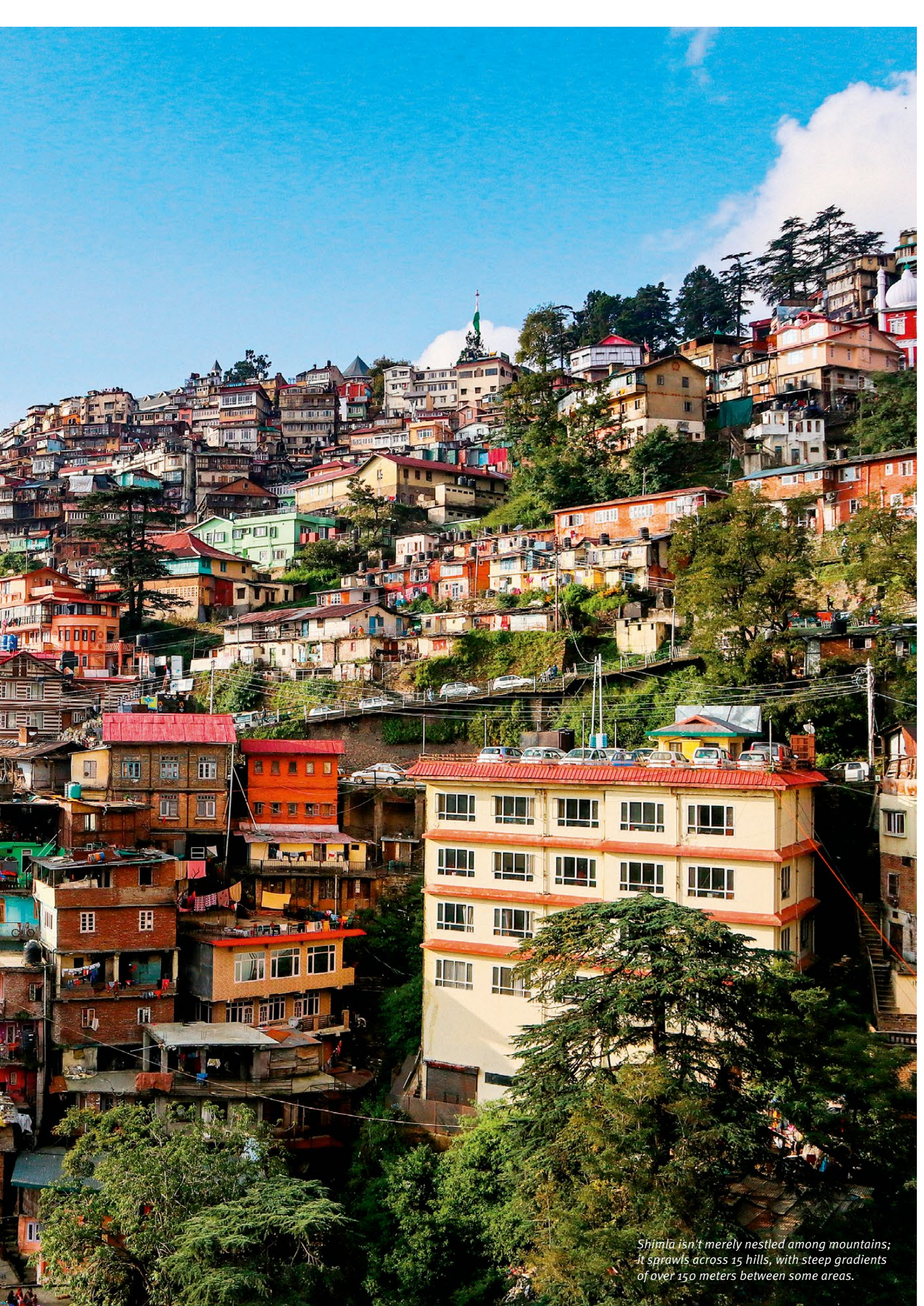
Ropeways for India

Joint Venture between Salzmänn Ingenieure and BERNARD Group +++ Lighthouse project for Indian public transport infrastructure in Varanasi +++ Multi-billion dollar investment program +++ Feasibility studies and comprehensive planning +++ ropeway network for mountain city Shimla

"Such an opportunity might only come once in a lifetime. India, with its topographical and urban structure, is tailor-made for ropeways: limited space, dense populations, jungles, and mountains."

DI Stephan Salzmann, General Manager Ropeway, Salzmann Ingenieure





Shimla isn't merely nestled among mountains; it sprawls across 15 hills, with steep gradients of over 150 meters between some areas.

INDIA

Ropeways for India

Sacred temples, dense jungles, four-lane roads teeming with people, vehicles, and animals, temperatures soaring up to 45 degrees in the shade, and incessant honking: Salzmänn Engineers, in collaboration with the BERNARD Group from Hall in Tyrol, took the leap to India. Together, these two specialists are examining suitable locations for ropeways across the subcontinent and have been instrumental in the planning of two flagship projects.

In the "eternal city" of Varanasi, the joint venture ensured the swift realization of the country's first urban ropeway. From May 2025, it will transport 3.000 pilgrims hourly to the renowned Kashi Vishwanath Temple. Meanwhile, three lines with a 14-kilometer network are being constructed in the mountain town of Shimla. The ropeway system aims to significantly improve the lives of those living over 2.000 meters above sea level.

Embarking on the Adventure

For the team at Salzmänn Engineers, it all began with a call from the BERNARD Group. The internationally operating engineering firm from Hall in Tyrol planned to participate in India's massive infrastructure project, "Parvatmala," and sought a partner with ropeway expertise. Markus Türtscher from the BERNARD Group dialed Stephan Salzmänn's number in November 2021, discussing the 3.5-billion-dollar ropeway investment program by the National Highways Logistics Management Limited (NHLML).

While the BERNARD Group, with its local presence in Delhi, would manage the project coordination and all construction matters, Salzmänn Engineers would oversee the ropeway technology design. Initially, the focus was on examining potential locations and conducting feasibility studies. The flagship project in the pilgrimage city of Varanasi followed, with Shimla's mountain town coming later. "Such an opportunity might only come once in a lifetime. India, with its topographical and urban structure, is tailor-made for ropeways: limited space, dense populations, jungles, and mountains," recounts Stephan Salzmänn.

The entire team was immediately captivated. "Of course, we had concerns. We are experts in ropeways, a field we have excelled in for 50 years. However, we had never operated outside of Europe. India would present us with numerous cultural, linguistic, climatic, bureaucratic, and legal challenges. Participating in the bidding was a leap into the



unknown," Salzmänn reflects. Together with the BERNARD Group, the company established a joint venture – and secured the contract.

Project Validation from North to South

Around 300 locations were submitted by states and union territories for the "Parvatmala" program. Salzmänn Engineers and the BERNARD Group were assigned 20 of these for feasibility assessments. "This underscored the immense scale of the project," Salzmänn recalls. The potential locations span from the far north in the Union Territory of Ladakh to the southern state of Tamil Nadu, covering over 3.500 kilometers. The projects range from urban traffic relief to managing pilgrim flows and tourism. Some routes are short, while others span several kilometers. The "pre-feasibility" phase involves analyzing locations, traffic situations, and visitor flows.



Stephan Salzmann, CEO of Salzmann Engineers, presented the ropeway projects in India for the state client NHLML.

"From the mountain temple at 3,000 meters above sea level to installations in the jungle, we've seen it all," Marie Bach remarks. Evaluating feasibility considers not only geographical factors but also ownership and religious considerations. "Temple authorities influence the route planning and often have the final say. Power lines must not be disrupted. Trees, especially in nature reserves, are sensitive. While clearing is sometimes necessary for support structures, it can be a challenge, with military involvement and flight restrictions complicating drone surveys and measurements," Salzmann sheds light on unexpected challenges.

Alongside "pre-feasibility" studies, the joint venture is tasked with twelve planning projects, producing "Detailed Project Reports" (DPR) and general contractor tenders (Build & Operate). Safety is paramount. While large projects adhere to European standards, smaller installations lack comparable national standards. "We align with European standards and address safety concerns primarily through design elements, like integrated evacuation," emphasizes Stephan Salzmann.

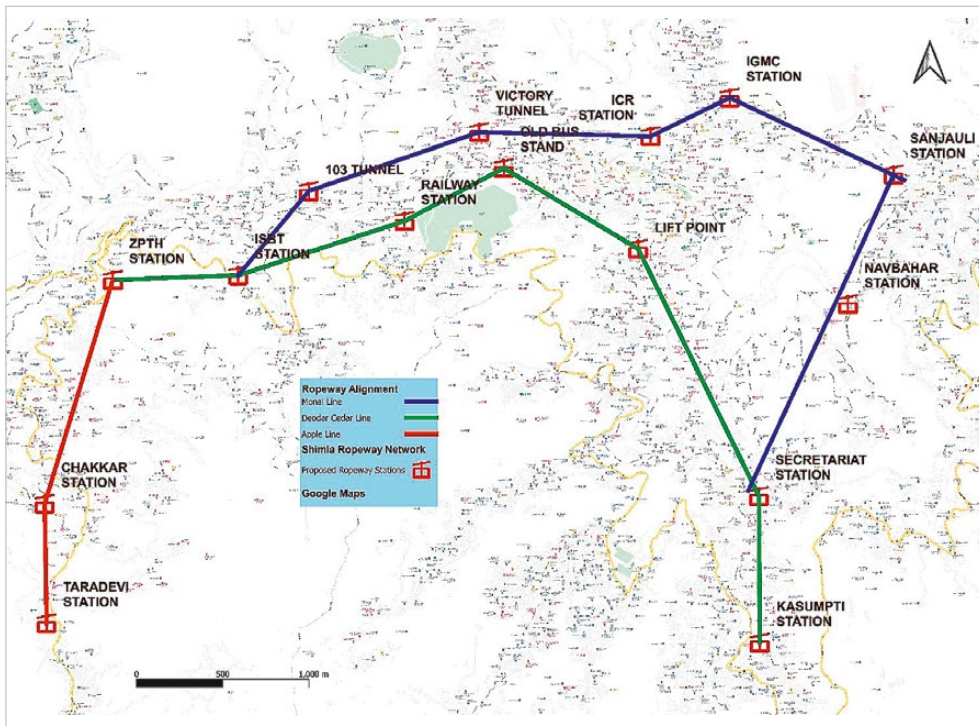
Pilgrim Flows Over the Rooftops of Varanasi

Varanasi in the state of Uttar Pradesh stands as one of the world's oldest inhabited cities, boasting over 3,000 years of history. The sacred city on the Ganges is believed to be the abode of Lord Shiva, drawing millions of pilgrims annually to its 2,000 temples. The epicenter of religious devotion is the Kashi Vishwanath Temple complex, with the Ghats by the Ganges. Daily, over 90,000 people make this pilgrimage – a staggering number. Until now, the journey involved navigating congested streets bustling with vehicles. "Extreme caution was required during visits. Those unfamiliar risked their lives," Salzmann recounts.

A visionary ropeway project from the "Varanasi Cantt" station to the temple complex and the "Godowalia Chowk" station aims to change this. The Kashi ropeway is India's first urban ropeway, a flagship project of the "Parvatmala" program championed by Prime Minister Narendra Modi. After preliminary planning, the project stalled, bringing Salzmann Engineers and the BERNARD Group into play.



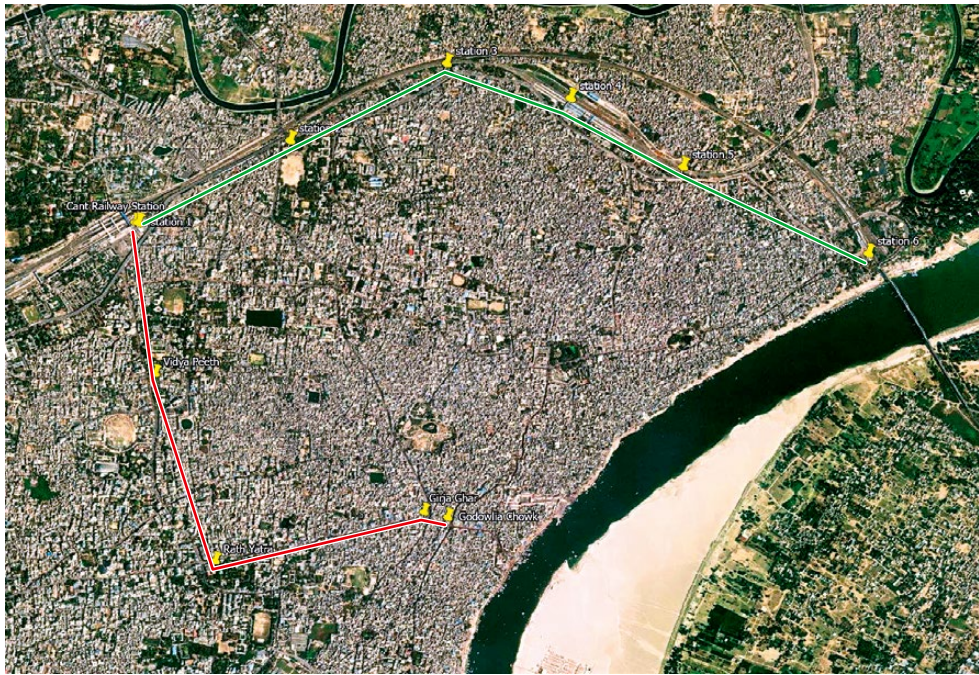
On duty day at night: Mrigank Shekhar (CEO BERNARD India), Marie Bach and Stephan Salzmann at the construction site in Varanasi



Shimla Ropeway Network

System:	10 Passenger MGD
Lines:	Apple Line, Deodar Cedar Line, and Monal Line
Length:	13,820 meters
Number of Stations:	21
Number of Towers:	103
Capacity:	3,000 persons/hour (Apple and Deodar Cedar) or 2,500 persons/hour (Monal)

Three ropeway lines are set to connect the neighborhoods of the mountain city Shimla.



Urban Ropeway in Varanasi

System:	10 Passenger MGD
Length:	3,730 meters
Number of Stations:	5
Number of Cabins:	132
Number of Towers:	30
Capacity:	3,000 persons/hour
Maximum Speed:	6 m/s

The new urban ropeway in Varanasi (red) is planned to be supplemented by an additional railway line (green) in its second phase.

Immediately following the joint venture's initial project assignments, the Varanasi ropeway was added as a priority. "We had to act swiftly. Our work was part of the general contractor tender," Bach recalls. This encompassed the entire ropeway design, including building planning, structural design, and foundation concepts.

While station locations were set, determining the optimal route over the city's rooftops posed challenges due to diverse property ownership. A unique aspect of Indian law simplified matters. "Ropeways are treated like high-voltage lines. If they pass over property, compensation is provided. Thus, only building rights for the support locations are needed," Salzman explains. The team scoured state-owned properties like roads and traffic islands, aiming to create a straight line at regular intervals.

After five weeks, the basic structure was in place. State support was evident: "There was always a strong political interest, crucial for swift implementation," Salzman notes. Spanning four sections and five stations, the 3.7-kilometer route seamlessly integrates into the historic fabric, supported by 29 towers up to 46 meters tall. With Prime Minister Modi's groundbreaking in March 2023, construction began. By May 2025, modern 10-person cabins will transport pilgrims – 3,000 per hour for 16 hours daily. Varanasi envisions a comprehensive network, with plans underway for the next phase from the Cantt station to the Namoh Ghat.

Time Constraints in Mountainous Shimla

Dubbed the "Queen of the Hills," Shimla's picturesque setting on the lower Himalayan foothills is immediately



City cable cars like those in Varanasi reduce the traffic load at junctions.

captivating. The state capital of Himachal Pradesh, home to over 170,000 residents at over 2,000 meters above sea level, welcomes around three million tourists annually. Shimla isn't merely nestled among mountains; it sprawls across 15 hills, with steep gradients of over 150 meters between some areas. "As if relocating Innsbruck to the Nordkette," describes Stephan Salzmänn. The ideal topography for an urban cable car. The local transportation authority also saw it that way and approached the by now well-known joint venture.

"There were hardly any specifications, just a very strict schedule. It was a very intensive time," reports Marie Bach. She started at the Bregenz engineering office in March 2022 and was challenged from the beginning. For the optimal routing through residential areas, oak, cedar, and

pine forests, all options were considered – always taking into account the already known location challenges for supports and stations. Like in Varanasi, public properties were identified. After just one month of planning, the team presented a cable car network with three lines, 15 sections, and a total length of about 14 kilometers. The project was the basis for the ongoing general contractor tender. If everything goes according to plan, construction is set to start in 2024.

Full Team Effort

Salzmänn Engineers have so far mastered the great adventure in India as a strong team. Managing Director Stephan Salzmänn and planner Jörg Egger soon received support. Since her first day at work, Marie Bach has been the interface to the BERNARD Group team in India, keeping track of the constantly growing mountain of tasks and the changing order situation. Loris Rau started at Salzmänn Engineers in April 2023 and was immediately involved with Marie Bach in the Shimla project. For Stephan Salzmänn, the past few months have been proof of the power of collaboration: "Together we achieve more and have much more ahead of us. This is just the beginning of our journey in India." ■



Engagement in India

Joint Venture between Salzmänn Engineers and BERNARD Group

Urban and Touristic Ropeways

Feasibility studies for 20 ropeway projects

"Detailed Project Reports" (DPR) for 12 ropeway projects



Stephan Salzmann
General Manager Ropeway



Judith Salzmann
General Manager



Jörg Egger
Project Manager



Katrin Mangeng
Architect



Simon Stöckler
Project Planning



Tamara Behmann
Civil Engineer



Susanne Riemerth
Project Assistant



Loris Rau
Project Engineer



Marie-Therese Bach
Civil Engineer

PROJECT DEVELOPMENT
ROPEWAY PLANNING
PROJECT MANAGEMENT

Salzmann Ingenieure ZT GmbH
Angelika-Kauffmann-Straße 5
6900 Bregenz, Austria
Tel. +43 (0)5574/45524-0
www.salzmann-ing.at