ASCE
SRI LANKA SECTION

VISION BIG

ISSUE III | JANUARY 2025

FIELD VISIT TO UPPER ELAHERA CANAL PROJECT

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PRESIDENT'S MESSAGE

It is my great pleasure to be elected as the President of the American Society of Civil Engineers - Sri Lanka Section (ASCE-SLS) for the year 2024/ 2025. Thank you for all my colleagues in the Executive Board for the confidence placed in me.
It is my honor and privilege to send this message as the President for the Official News Letter "VisionBig" for the first quarter of the year 2025.

I am proud to announce you that our membership now have been increased to over 1600 members including Student Chapter Members. Further we have started establishing Student Chapters in each University, both Government and Private, and recently we visited Department of Civil Engineering, NSBM Green University to participate for their inauguration session.
As in the past years, this year too we have scheduled to facilitate professional development activities such as Site Visits, Seminars, Public Lectures etc. The first public lecture was already conducted in December 2024 for which resource persons given presentations were Professors from Japan and Sri Lanka.
In addition to facilitating CPD events it is our another vision to organize social events to motivate and keep the members and also our colleagues working in the industry with their families happy and joyful despite to their busy day to day schedules. We were able to successfully conclude Musical Night in November 2024 and Christmas Party in December 2024, both were for the first time despite to the challenges posed by the country's financial crisis and this success is attributed to the proper planning and monitoring, dedication, and unwavering commitment of our Executive Board, Sponsors, Volunteers, and members for which my heartfelt gratitude is extended.

I am confident that the Newsletter scheduled to publish quarterly will definitely contribute to enhance and exchange the knowledge both technical and practical among members and readers in all the sectors in Civil Engineering practices. I appreciate the committee in charge of publishing the Newsletter for their commitment and dedication given to raise our Newsletter to a higher standard.
I am confident that all our members will cooperate to the utmost in order to help our association to move forward with our planned activities and I wish you all the very best, good luck and great Success in this year, 2025.

Thank You

(ENG.) DR. DENZIL R. LOKULIYANA

Ph.D, MSc., BSc. (Eng.) Hons., MBA
C.Eng.MIE(SL),MRICS(UK),MPMI(USA),CPEng.,MASCE(USA),MJSCE(Japan),FICPM(SL)

President - ASCE - Sri Lanka Section

SECRETARY'S MESSAGE

It is my pleasure to extend warm greetings to you all as we embrace the final quarter of 2024. This year has been one of remarkable growth, innovation, and collaboration within our section, and I am proud to witness the continued dedication of our members towards enhancing the Civil Engineering profession in Sri Lanka.
The past months have been filled with vibrant events and initiatives that highlight the impact of Civil Engineering on the progress of our nation. From technical workshops and knowledge-sharing sessions to hands-on projects and community outreach, ASCE Sri Lanka has continued to uphold its mission of advancing the science and practice of civil engineering.

As we look forward to the remaining months of the year, I encourage all members to actively participate in our upcoming events and initiatives. A special highlight on our calendar is the "Sing Along & Dancing event, featuring nostalgic 70s' and 80s' Music". It promises to be an evening of fun and fellowship, accompanied by dinner, at Solis Hotel, Pitakotte. This exciting event will take place on Saturday, 09th November 2024, from 1900hrs onwards. We look forward to seeing you there, enjoying great music, lively dancing, and the company of fellow members. It will be a wonderful opportunity to unwind and celebrate together.

In this edition of "Vision Big", we showcase the latest achievements of our members, highlight key developments in the Civil Engineering field, and provide insights from experts who continue to push the boundaries of what is possible in infrastructure and design. I hope you find these articles as inspiring and thought-provoking as I do.
Thank you for your unwavering support and commitment to the ASCE Sri Lanka Section. Let's continue to build on the strong foundation we have set and look forward to a future of excellence in civil Engineering.

Warm Regards,

DESHAMANYA. ENG. (DR.) PRAGEETH WIJESEKARA
Secretary - ASCE - Sri Lanka Section

THE EDITORIAL

Greetings!
The year 2024 has been a remarkable one for the ASCE Sri Lanka Section, filled with impactful events, knowledge-sharing initiatives, and meaningful collaborations. Building on the momentum from previous years, we continued to create opportunities for professional growth and engagement within our engineering community.

One of our key achievements was publishing the second issue of our newsletter last year, and we are delighted to continue this initiative in 2025 as well. This newsletter serves as a platform to share knowledge, showcase our activities, and highlight contributions from our members.

Throughout the year, we organized a variety of events, including social gatherings to strengthen our network and webinars that brought together experts to share insights and experiences. We also successfully initiated a field visit for university students, giving them practical exposure to real-world engineering challenges. A milestone event for us was the inauguration of the ASCE Student Chapter at NSBM University, a step forward in inspiring the next generation of civil engineers.

This issue brings you highlights from all these activities, along with thought-provoking articles that address pressing topics in the field. You'll find insights on adapting modern technology to enhance transportation, an area where innovation is crucial to overcoming challenges and improving efficiency. It is encouraging to see young minds stepping up to explore solutions for the evolving transportation industry. Additionally, we feature an article on the inspection and repair of a hydropower plant, shedding light on the technical expertise required to maintain such critical infrastructure.

As we look ahead, we remain committed to creating more opportunities for professional development, collaboration, and knowledge exchange. We thank all our members, contributors, and partners who made this year a success. Let's continue to build on this momentum and work towards an even more impactful future.

Happy reading!

ENG. (MRS.) DILINI GAMAGE
Editor- ASCE - Sri Lanka Section

MEET THE BOARD OF OFFICIALS 24/25 & THE GOVERNER - REGION 10

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ASCE-SLS MUSICAL EVENING -2024

SING ALONG AND DANCING WITH 70S 80S MUSIC

The Social Events Committee of ASCE-SLS hosted a spectacular “Musical Evening with Dinner” on November 9, 2024, at the Solis Hotel’s Rainbow Hall, Pita Kotte. The event, dedicated to the iconic music of the 70s and 80s, was a resounding success, drawing enthusiastic participation and praise.

The evening kicked off with smooth registration managed by Eng. Ishara Ranasinghe and Eng. (Mrs.) Dilini Gamage, who ensured a seamless check-in process and guided guests to their tables. A photo booth at the video wall added a touch of glamour, allowing participants to capture memories of the night.

At 7:45 p.m., the ceremonial program commenced with an introduction by the compere, Mr. Thilina Udayaratne. ASCE-SLS President, Eng. Dr. Denzil Lokuliyana, delivered a warm welcome speech and introduced the Board Members. This was followed by a presentation on event sponsors and remarks by Eng. Kapila Nawaratne, Head of the Social Events Committee. The ceremonial segment concluded with a Vote of Thanks by Secretary, Eng. Dr. Prageeth Weerasekara.

The musical highlight of the evening featured a vibrant performance by Mr. Damayantha Kuruppu and Lasantha of Shiiksha, who got the crowd grooving to timeless hits. The dance floor came alive with enthusiastic participants, who were rewarded with gifts for being the first two couples to step onto the floor, the most entertaining table, and winners of the lively baila competition, both solo and couples.

A buffet dinner featuring delectable dishes and desserts added to the evening’s charm, and the celebration continued until midnight, leaving attendees in high spirits. As the event wrapped up, participants commended the Board Members for organizing an unforgettable evening of music, dance, and camaraderie.

ASCE-SLS has once again proven that engineering minds know how to create moments of joy and connection through vibrant social gatherings.


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ASCE-SLS Musical Evening-2024
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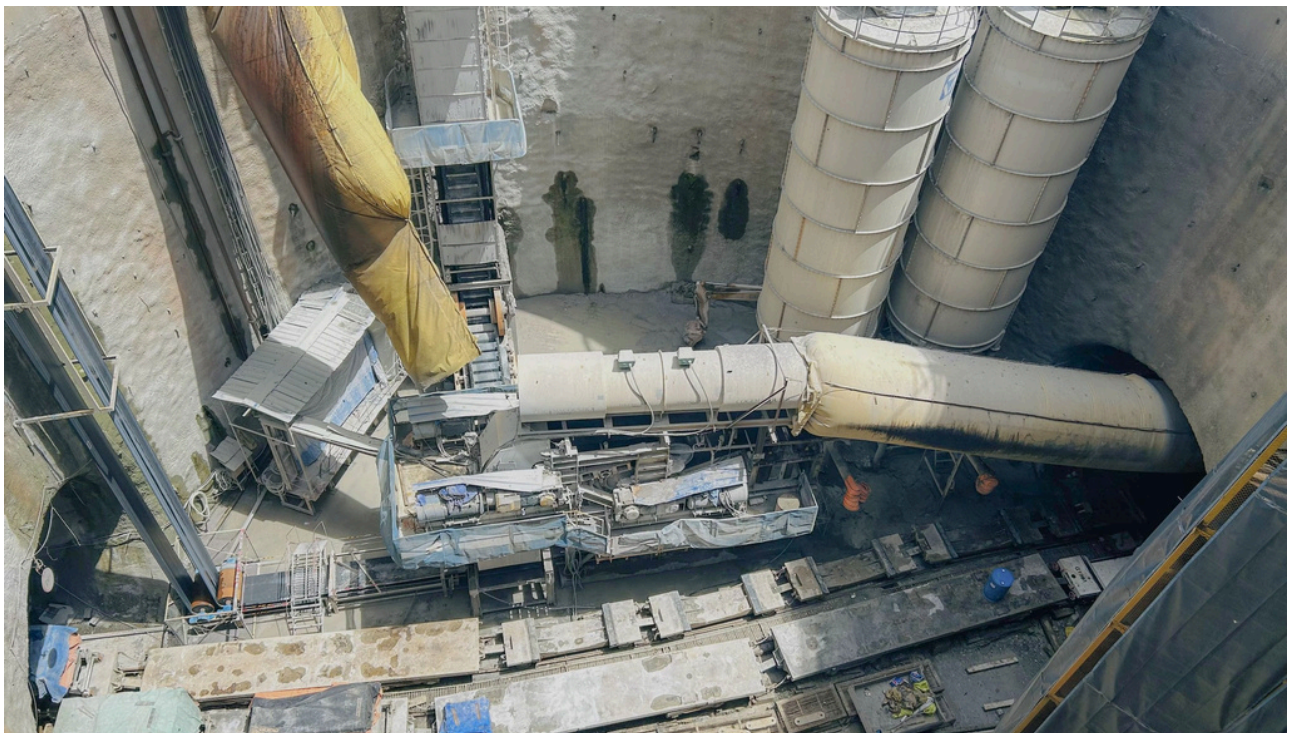
FIELD VISIT TO UPPER ELAHERA CANAL PROJECT

A field visit to the Upper Elahera Canal Project was organized on October 26, 2024, with the sponsorship of the Sri Lanka Association of the Institution of Civil Engineers (SLAice) and the American Society of Civil Engineers (ASCE) Sri Lanka Section. A total of 50 students, equally representing both student chapters, participated.

The Upper Elahera Canal Project is the only ongoing mega canal project in Sri Lanka. With a duration of 72 months and an estimated cost of USD 253.91 million, the project aims to enhance water security in the North Central and Northern Provinces. The Mahaweli Water Security Investment Program serves as the employer, with the Project Management Design and Consultant firm acting as the consultant. The main contractor is China State Construction Pvt. Ltd.

The canal, spanning 65.5 km, will transport water from the Moragahakanda Reservoir to the Hurulu Wewa Reservoir. During the visit, students observed construction activities, engineering techniques, and project management strategies. They also engaged with industry experts, gaining valuable insights into large-scale water infrastructure development.

This visit provided a practical learning experience, bridging the gap between academic knowledge and real-world engineering applications.



SMART MOBILITY: TRANSFORMING PUBLIC TRANSPORT IN SRI LANKA

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As Sri Lanka strides towards a more connected and sustainable future, the transformation of its public transport system through smart mobility solutions is becoming increasingly vital. This article delves into the various facets of smart mobility and how they are set to revolutionize public transport in Sri Lanka.

Introduction to Smart Mobility

Smart mobility encompasses a range of innovative technologies and practices aimed at making transportation more efficient, sustainable, and user-friendly. It involves the integration of digital technologies, data analytics, and sustainable practices to enhance the overall transportation experience.

The Need for Transformation

and environmental impact. With urbanization and population growth, these issues are becoming more pronounced. Smart mobility offers solutions that can address these challenges and pave the way for a more efficient and sustainable transport system.

Key Components of Smart Mobility

1. Smart Ticketing Solutions

1.1 Contactless Payments: Implementing contactless payment systems using smart cards, mobile wallets, and bank cards can streamline the ticketing process, reduce queues, and enhance passenger convenience. Passengers can simply tap their card or phone to pay for their journey, eliminating the need for cash transactions. This not only speeds up the boarding process but also reduces the risk of handling cash, which can be a source of errors and fraud.

1.2 Mobile Ticketing: Mobile apps that allow passengers to purchase and store tickets digitally can eliminate the need for physical tickets and reduce the hassle of queuing at ticket counters. These apps can also provide real-time updates on bus and train schedules, making travel planning more efficient. Additionally, mobile ticketing can offer personalized travel information and alerts, enhancing the overall passenger experience.

2. Intelligent Transport Systems (ITS)

2.1 Real-Time Data Analytics: Using IoT devices and sensors to collect real-time data on traffic conditions, passenger numbers, and vehicle locations can help optimize routes and schedules. This data can be used to predict and manage traffic flow, reducing congestion and improving travel times. For example, real-time data can help transport operators adjust bus frequencies based on passenger demand, ensuring that resources are used efficiently.

2.2 Traffic Management: Advanced traffic management systems can reduce congestion by dynamically adjusting traffic signals and providing real-time traffic updates to drivers and passengers. These systems can also prioritize public transport vehicles, ensuring they move more efficiently through busy areas. For instance, traffic lights can be programmed to give priority to buses during peak hours, reducing delays and improving service reliability.

3. Electric and Sustainable Public Transit

3.1 Electric Buses: Transitioning to electric buses can significantly reduce carbon emissions and operational costs. These buses are quieter, cleaner, and more efficient than traditional diesel buses. They also require less maintenance and have lower fuel costs, making them a cost-effective option for public transport. Electric buses can also contribute to improved air quality in urban areas, benefiting public health.

3.2 Sustainable Infrastructure: Developing infrastructure to support electric vehicles, such as charging stations, is crucial for the widespread adoption of electric public transport. This includes installing charging points at bus depots and along major routes to ensure buses can recharge during their routes. Additionally, integrating renewable energy sources, such as solar panels, into charging infrastructure can further enhance sustainability.

4. Shared Mobility Services

4.1 Ride-Sharing and Car-Pooling: Encouraging ride-sharing and car-pooling can reduce the number of vehicles on the road, easing congestion and lowering emissions. Platforms like Uber and Pick Me can facilitate these services, providing flexible and affordable transport options. Shared mobility services can also complement public transport by providing first-mile and last-mile connectivity, making it easier for passengers to access bus and train stations.

4.2 Bike-Sharing Programs: Implementing bike-sharing programs in urban areas can provide a sustainable and healthy alternative for short-distance travel. These programs can be integrated with public transport systems, allowing passengers to easily switch between different modes of transport. For example, bike-sharing stations can be located near bus stops and train stations, encouraging multimodal travel.

5. Urban Air Mobility

5.1 Drones and eVTOLs: While still in the early stages, the use of drones and electric vertical takeoff and landing (eVTOL) aircraft for urban transport can offer quick and efficient travel options, bypassing ground traffic. These technologies can be used for passenger transport, as well as for delivering goods and services in congested urban areas. For instance, drones can be used to deliver medical supplies to remote or hard-to-reach areas, improving access to essential services.

Implementation Strategies

1. Infrastructure Development

1.1 Upgrading Existing Systems: Modernizing existing buses, trains, and other public transport vehicles with smart technology is essential. This includes installing contactless payment readers, GPS tracking, and real-time data collection systems. Upgrading infrastructure also involves improving bus stops and train stations to support these technologies. For example, bus stops can be equipped with digital displays that provide real-time arrival information.

1.2 Building New Infrastructure: Developing new infrastructure, such as dedicated lanes for electric buses and charging stations, is crucial for supporting smart mobility initiatives. This also includes creating integrated transport hubs where passengers can easily switch between different modes of transport. For instance, transport hubs can offer seamless connections between buses, trains, and bike-sharing services, enhancing the overall travel experience.

2. Public Awareness and Education

2.1 Passenger Education: Conducting awareness campaigns to educate passengers about the benefits and usage of smart mobility solutions can drive adoption. This can include workshops, online tutorials, and informational brochures. Educating passengers about the environmental and economic benefits of smart mobility can also encourage more sustainable travel behaviors.

2.2 Training for Transport Staff: Providing training for transport staff to manage and support new technologies ensures smooth implementation and operation. This includes training drivers, conductors, and maintenance staff on how to use and maintain smart ticketing systems and electric vehicles. Ongoing training programs can also help staff stay updated on the latest technological advancements.

3. Policy and Regulation

3.1 Government Support: Strong government support through policies and regulations is necessary to promote the adoption of smart mobility solutions. This includes incentives for electric vehicle adoption and investments in infrastructure. Policies can also mandate the use of smart ticketing systems and ITS in public transport. For example, the government can offer tax incentives for transport operators who invest in electric buses and smart ticketing systems.

3.2 Public-Private Partnerships: Collaborations between government bodies and private companies can facilitate the development and deployment of smart mobility technologies. These partnerships can provide the necessary funding and expertise to implement large-scale projects. For instance, private companies can invest in the development of charging infrastructure, while the government can provide regulatory support and incentives.

4. Pilot Programs and Feedback

4.1 Testing and Refinement: Implementing pilot programs in select areas allows for testing and refinement of smart mobility solutions. Gathering feedback from users and stakeholders can help identify areas for improvement before a full-scale rollout. Pilot programs can also demonstrate the benefits of smart mobility, encouraging wider adoption. For example, a pilot program for electric buses can be launched in a specific city, with plans to expand to other areas based on the results.

Case Studies and Global Examples

Singapore: Singapore's smart mobility initiatives, such as the use of autonomous buses and a comprehensive ITS, have significantly improved traffic management and public transport efficiency. The city-state's integrated transport system provides a seamless travel experience for passengers. Singapore's success can serve as a model for Sri Lanka, demonstrating the potential benefits of smart mobility.

London: London's Oyster card system is a successful example of smart ticketing, providing seamless and convenient travel across various modes of public transport. The system has reduced queues and improved the efficiency of the city's transport network. London's experience highlights the importance of integrating different transport modes into a unified ticketing system.

Copenhagen: Copenhagen's extensive bike-sharing program and investment in cycling infrastructure have made it one of the most bike-friendly cities in the world. The city's focus on sustainable transport has reduced congestion and improved air quality. Copenhagen's approach shows how promoting active transport modes, such as cycling, can complement public transport and enhance urban mobility.

Conclusion

Smart mobility solutions offer a transformative approach to addressing the challenges faced by Sri Lanka's public transport system. By enhancing convenience, operational efficiency, and security, these systems can significantly improve the travel experience for passengers. As Sri Lanka continues to embrace digital transformation, smart mobility will play a crucial role in shaping the future of public transportation. The successful implementation of these solutions will require collaboration between government, private sector, and the public, ensuring that the benefits of smart mobility are realized across the country.

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INSPECTION AND REPAIRING OF CANYON POWER TUNNEL, SRI LANKA

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Introduction

The Canyon Power Project represents the third and last stage of cascade development of the Maskeliya Oya Project (MOP Stage III). It utilizes the hydro potential between the Maussakelle reservoir and the regulating pond at Canyon Dam. The project comprises a concrete-lined head race tunnel, a surge tank and a steel penstock feeding a 30MW Powerhouse, which capacity is later increased to 60MW by the installation of another penstock and a turbo-generator unit of 30MW.

The Canyon tunnel conveys water from the Maussakelle reservoir to the Valve House at the top of the Penstocks leading to the Canyon Powerhouse at Hapugastenna. The tunnel is fully lined with a length of 4110m having a horse-shoe shape and a modified horse-shoe shape with two different excavated diameters of 3.1m and 3.4m with curved invert and flat invert in some sections.

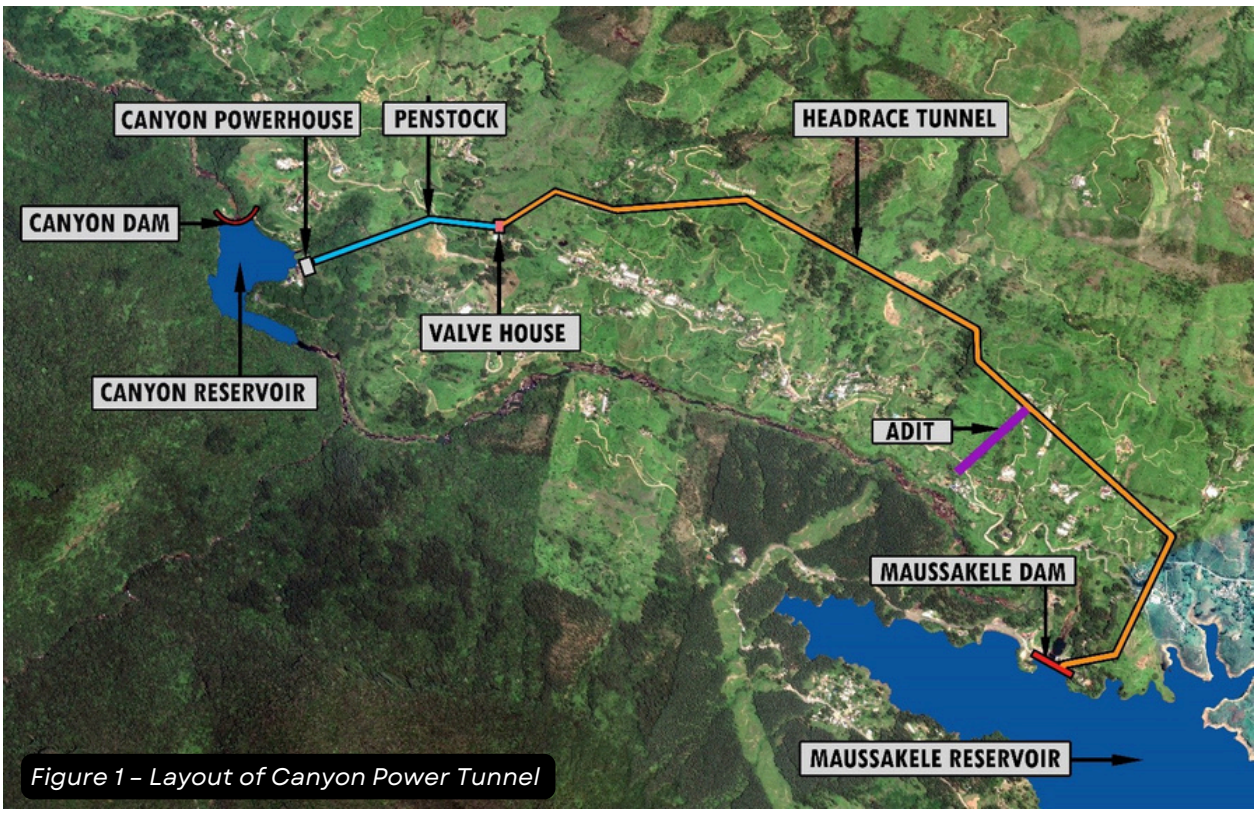

Figure 1 – Layout of Canyon Power Tunnel

The tunnel was first filled with water in December 1982 but dewatered immediately due to heavy water leakages through the periphery of the concrete Adit plug and the cracking in the tunnel lining exceeding about 100m between Stn. 3+757m and Stn. 3+863m. Subsequently, the tunnel was re-commissioned by March 1983, after attending to the immediate remedial measures. In June 1988, the tunnel was dewatered again in parallel with the commissioning of the Phase II power plant and installed 110m long steel lining along the cracked zone. Thereafter, the operations were restarted in November 1988.

1.1 Principal Statistics

Principal statistics of the Canyon power tunnel are as follows:

Length of Tunnel	4110 m
Tunnel Shape	Horseshoe & Modified Horseshoe
Excavated Diameter	3.10 & 3.40m
Tunnel Slope	0.0085
Invert Level at Intake	1139.95 masl
Invert Level at Surge Tank	1107.13 masl
Invert Level at Valve House	1104.31 masl

2. Background

In August 2020, an incident of a shear pin failure in one of the wicket gates of Canyon power station occurred and found a piece of concrete came through the waterway and coarse sand collected in the lower draft tube belly. Further, the colour of water discharging from the tailrace was changed considerably during this period raising a suspicion on some damage to the headrace tunnel.

Thereafter, CEB obtained a 3-month outage from January 2022 to inspect the tunnel and for the remedial work. This was the first tunnel inspection made after 33 years of operation.

Figure 2 – Concrete piece found on the draft tube

3. Tunnel Dewatering

Tunnel dewatering is one of the vital part of this project. Since the tunnel had previous records of cracking during the first filling, tunnel dewatering was carried out smoothly with close monitoring.

On 02nd January 2022, the intake valve and main inlet valves (MIV) were closed and the tunnel was isolated to check for any leaks from the tunnel to the outside. Therefore, the water levels inside the tunnel were continuously monitored and observed a raising of 16cm within four hours. This presumes no significant water leak from the tunnel to outside and some seepage into the tunnel takes place from outside where the ground water table is higher than the reservoir water level.

On 3rd January 2024, the tunnel dewatering was started through the penstock drain valve and maintained a dewatering rate of 25cm per hour and limited to 6.0m height per day. Tunnel dewatering was completed on the 8th day on 11th January 2022. Both penstocks were dewatered independently from the powerhouse since the penstock guard valves were closed before starting tunnel dewatering.

4. Inspection

After dewatering, the tunnel between the Intake valve house and Penstock valve house was first inspected on 13th January 2022. Access to the tunnel was through the manholes in the steel liner at Intake, Adit door at Stn. 1+700m and manholes in the penstock located downstream of the penstock guard valve.

When the water level in the tunnel passed the Adit junction, the manhole at Adit was opened and then the manholes at Inlet valve house were opened. The manholes in the Penstock were opened after the tunnel was emptied completely. Silt collected near the Adit door was removed to make safe access to the tunnel through the Adit.

The inspection team entered the tunnel through the manhole located inside the Inlet valve house and walked up to the Adit junction and came out. Then inspection continued for the balance length of the tunnel up to the penstock guard valve and came out through the manhole in the penstock.

5. Observations

General observations of the tunnel were as follows.

i. A thick deposition of brown-coloured fine silt with an average thickness of 2.5cm was observed on the tunnel walls as well as on the invert.

ii. Although drain holes were provided in the entire tunnel length, only a few of them make water. It suggests that most of the tunnel length has no external water pressure.

iii. Several cavities were observed in the concrete lining above the tunnel spring level.

iv. A cavity was observed at Stn. 2+093m in the invert which made pale colour water with some silt. A 10cm diameter PVC pipe had been placed in the tunnel invert nearby as a drainpipe during construction. The quantity of leakage was less than 10 l/min.

v.Some minor defects of concrete lining such as erosion and honeycombed areas were observed.

vi. Some weathered rock bands were observed in the unlined Adit tunnel section between the junction and the Adit door. Which decomposed due to the long-term exposure to water and resulted in some rock falls

vii. Concrete pieces which detached while forming cavities were not found on the tunnel invert at same locations. It suggests that those concrete pieces would have been transported down with the tunnel flow and either collected at the silt trap or passed through the power plant.

Figure 3 – Silt Deposition at Adit Door

Figure 4 – Cavities in concrete lining

Figure 5 – Cavity on tunnel invert at Stn. 2+093m

6. Remedial Measures

Since the time duration of the tunnel outage is limited, only the vital repair works required for the smooth operation of the tunnel that could be completed during this outage period were done. Balance remedial works identified are planned to be done in a future tunnel outage. Remedial works attended during the tunnel outage are as follows;

i. Filled all cavities in the tunnel lining with concrete and carried out backfill grouting.

Figure 6 – Repairing a cavity at the tunnel lining

Figure 7 – Repairing a cavity at tunnel invert

Figure 8– Removal of silt in concrete lining

Figure 9 – Application of protective layer

Repairs to the cavities in the concrete lining were done with concrete 1: 1: 3 (Cement: Sand: Aggregate) volume ratio. When the surface area of the cavity is more than 0.5m2, 12mm diameter steel dowels were installed at 75cm spacing and 12mm diameter rebar was placed inside the cavity at 20cm spacing in both ways. A total of 27.0 m3 of concrete and 4412.5kg of cement were used for the repair works and backfill grouting respectively.

ii. Cleaned and filled the cavity in the tunnel invert at Stn. 2+093m.
This cavity had formed by the gradual washing of clayey material formed by weathering along a weak band consisting of limestone. Clayey material in the cavity was further removed by mixing with water using a submersible pump and the depth at the deepest location of the cavity was about 2m.

50mm diameter perforated PVC pipes were positioned at the two deepest points in the cavity and the cavity was first filled with 20mm aggregates to a depth of approximately 1m. Since it is difficult to make the hole completely dry with the inflow of water, a dry concrete mix was used to fill the cavity to a depth of 0.5m immediately after removing the water. Balance height of the cavity was concreted in stages under dry conditions. The total volume of concrete used for filling the cavity was 8.4m3.

iii. Removed the silt deposited on the concrete lining and sprayed a protective layer.
As the time does not permit to supply a suitable material, a trial was made with spraying of cement grout on cleaned concrete surface. The treated surfaces were resists for high-pressure water jet, proving the layer will not be damaged by the water flow. However, when silt deposits again on cement grout, the deterioration is possible with time. This treatment was done up to Stn. 1+000m due to limited time available.

iv. Applied a 100mm thick shotcrete lining with steel fiber reinforcement to the rock surface between Adit junction and steel door.
v. Repaired major concrete defects in the concrete lining which are deeper than 5cm.
vi. Cleaned the silt traps and other places on the invert where some water pools formed due to irregularities of levels.

In addition to the civil works, painting of the steel liner inside the tunnel between Stn. 3+757m and Stn.3+863m and repairing of several mechanical equipment in the powerhouse were performed.

Figure 10 - Painted steel liner

Civil works of the tunnel were entrusted to State Development & Construction Corporation (SD&CC) and the steel liner painting was done by Dockyard General Engineering Services (DGES).

7. Tunnel Refilling

After the remedial works, the final inspection of the tunnel was conducted on 23rd March 2022. Tunnel water filling was commenced just after the final inspection and completed on 30th March 2022 with filling rates of 40cm per hour for the first 20m height and 25cm per hour thereafter for the rest of the height. Power generation was continued from 31st March 2022.

8. Conclusion and Recommendations

- Before the dewatering commenced, tunnel was isolated by closing the Inlet valve and two penstock guard valves and confirmed that there was no resultant leak from the tunnel to outside.
- Due to the discolouring of tailrace water, tunnel flow was controlled until a tunnel inspection, suspecting some erosion from the tunnel. No evidences were found to substantiate such erosion and the tunnel is performing generally well as per the designed criterion.
- Rock surfaces seeing through the cavities found in the tunnel lining was in good condition and the appearance of the concrete lining surfaces with no signs of deformations, suggests the geological condition along the tunnel route is favourable and no special treatment for the improvement of the geological condition around the tunnel is required.
- Presence of large number of cavities in the tunnel crown presumes, there may be similar cavities above the concrete lining in other areas of tunnel crown but could not identify as the thicker concrete layers at those areas and hence no failure happened so far. It is suggested to carry out backfill grouting in the crown of the entire concrete lined tunnel length at close intervals to make sure all such cavities to filled with cement grout.
- In order to control the silt deposition and deterioration of the tunnel concrete lining, it is required to make routine tunnel inspections and clean the silt and attend to necessary repairs.

Acknowledgement

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THE IMPORTANCE OF BIM IN SRI LANKAN URBAN DEVELOPMENT

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Urban development plays a vital role in the overall infrastructure growth of a country, providing the foundation for sustainable communities and modern cities. In Sri Lanka, urbanization is a driving force for economic and social progress, particularly in developing village areas under the Urban Development Authority's (UDA) jurisdiction. Local government bodies like the Pradeshiya Sabha work closely with clients to submit approval drawings to the UDA for review. However, one persistent challenge is the reliance on 2D plans, which are not always tailored to the specific needs of clients or their sites.

The use of standard 2D drawings, while functional, often lacks the depth of detail and precision required for comprehensive urban planning. Many contractors and draughtsmen provide standard designs that do not take into account site-specific conditions, leading to potential issues during the construction phase. This approach contrasts sharply with the growing trend in developed countries, where 5D Building Information Modeling (BIM) is becoming the standard. These advanced tools incorporate dimensions of time and cost, enabling detailed project planning, simulation, and cost management, all in one integrated platform.

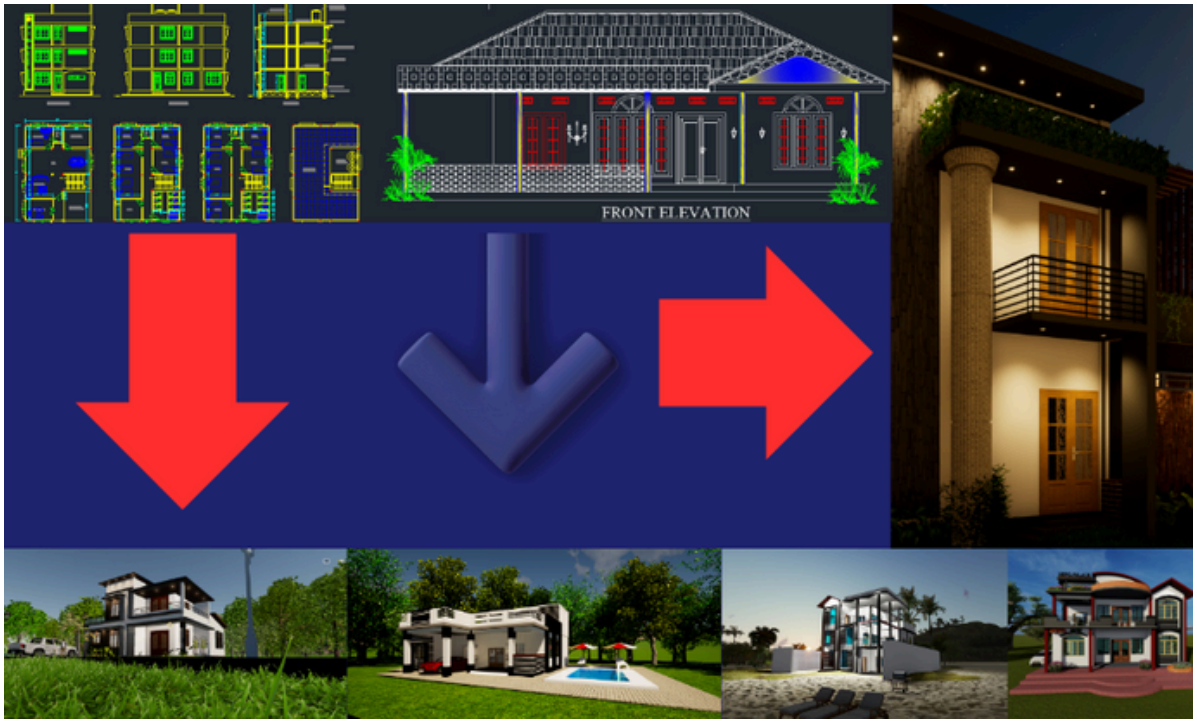
While Building Information Modeling (BIM) is at an early adoption stage in Sri Lanka, there have been initial steps toward integrating this technology into local projects. For example, in Colombo's smart city initiatives, BIM has been introduced in select infrastructure projects to aid in efficient planning and minimize rework. Partnerships with academic institutions like the University of Moratuwa have also fostered BIM training programs, helping build a skilled workforce supporting wider BIM adoption. However, challenges remain, including high costs and limited technological infrastructure, which the government could address through policies supporting digital transformation in the construction industry.

The shift to BIM would benefit the urban development process in multiple ways:

1. Improved Planning and Visualization: BIM allows for accurate 3D models that offer better visualization of the final output. This aids UDA officials in reviewing projects more effectively, ensuring that they meet urban planning guidelines.

2. Enhanced Collaboration: Since BIM models are data-rich, they allow all stakeholders, including architects, engineers, contractors, and local authorities, to collaborate on a single platform. This reduces communication gaps and ensures that everyone works with the same up-to-date information.

3. Cost and Time Efficiency: With the integration of scheduling and cost estimation (4D and 5D BIM), urban development projects can be executed within budget and on time, making planning more efficient and reducing unexpected delays or expenses.



4. Sustainability and Smart Cities: As Sri Lanka moves toward smart city initiatives, BIM can support sustainable urban development by integrating data on energy usage, water management, and other environmental considerations. This will contribute to more sustainable living environments and modern infrastructure solutions.

Prioritizing BIM adoption in Sri Lanka, starting with 3D models, will help local governments and the UDA make informed, sustainable urban planning decisions. BIM aligns with SDG 11 by optimizing resource use, reducing environmental impact, and supporting smart city goals through improved traffic flow, energy efficiency, and low-carbon solutions for livable, resilient cities.

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THE ROLE OF NEW TECHNOLOGIES IN MODERN TRANSPORTATION ENGINEERING

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Student Member of ASCE

Transportation is an essential need of the human race but due to the over-population, Traditional transportation technologies are not adequate to fulfill these demands. Therefore, Scientists, engineers, and transport specialists are seeking the most effective ways to address these gaps. As civil engineers, Understanding and blending with these technologies is a must. The objective of this article is to be aware of what are ground-breaking, cutting-edge technologies that make our lives easier.

GLOW IN THE DARK ROADS

Instead of havingroad lights everywhere, it is betterto have light-up markingsalong the pavementsto help motorists. [1] It is a much cheaper and eco-friendly alternative to save energy. Therefore, this new concept is called Glow-in-the-dark-roads. These glow-in-the-dark markingsare all made of paint that containsa photoluminescent powder that charges during the day. When the sun goes down, the road is ready to show the road's margin. This concept was successfully implemented in the Netherlands (N329 Highway in the Netherlands). These glowing green markings extend to 1600 feet and glow 8 hours every night.

GEO WEBS

Geo web is a 3D structure that keeps the base road layer extra strong, giving the next asphalt and concrete layers a better foundation. The meaning is that roads are going to stay smoother and longer. It is a simple design with an ingenious purpose, but the geoweb also makes for a morepermeable road that needs half the infillit. [2] Also, there are some great environmental benefits there as well. The geoweb reduces the amount of stormwater runoff by creating its ownretention basin, and the permeable material also helps to keep the pavement cool in even hotter months.

PLASTIC ROADS

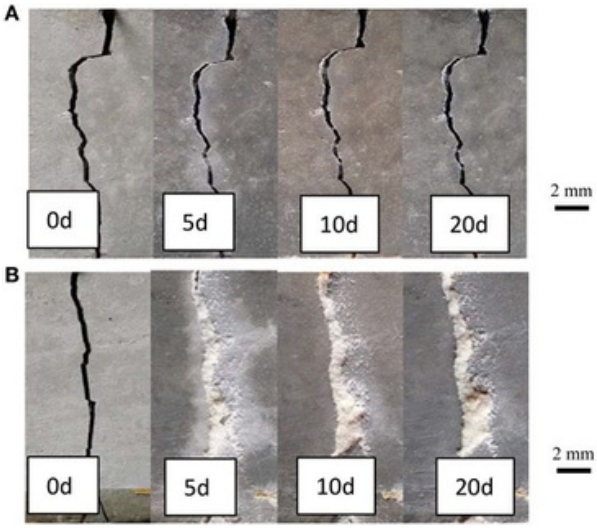
Plastics have become a serious problem for humanity. Instead of just tossing them into the trash after a singleuse we can incorporate them into our roads. According to the Wildlife Fund, concrete production contributes to 8 percent of global carbon-dioxide emissions every year but what if we replace these finite resources with one of humanity's infamous byproducts, such as plastics? However, India has been fillingpotholes using plastics as a binder on a small scale for years.
UK engineer Toby McCartney has even developeda way to turn recycled plastics into pellets that can be added to asphalt to decrease the use of binders. This process makes the road considerably strongerand lasts much longer than traditional material. [3] However, this conceptis a more productive way to recycle and reuse plastic waste. The United Kingdom has already adoptedthis technique.

INTELLIGENT SPEED BUMPS

A lot of motorists think speed bumps are dumb, but then what about intelligent speed bumps? The method of coming to a complete stop and driving over it slowlyis not helping the environment. Because that stop-start strategy creates a massive spike in emissions. Therefore, the intelligent speed bump comes equipped with a systemthat detects the speed of the oncoming vehicle and acts accordingly. Thistechnology is being tested in Guanajuato City, Mexico, for a 3-month trial with one intelligent speed bump installedalong the road adjacent to a local school. Anyone traveling at the speed limit typically 25 miles per hour. They will feel just the slightest bump and then be on their way but anyonegoing over that speed limit is going to watch the intelligent speed bump rise to meet them. [4]

SELF-REPAIRING ROADS

Driving over poorly paved and pothole-filled roads can be a real drag and damage your car. [5] Wouldn't it be awesome if roads could fix themselves? However,researchers at the University of Bath, Cardiff,and Cambridge had the same idea and went to find a solution using cement-based construction materials. They were able to create what they call smart concrete as opposed to dumb concrete the smart stuff is filled with microcapsules of bacteria that germinate wheneverwater enters the cracks from their limestone, therefore plugging up the crack before water and oxidation begin to ruin the steel reinforcement below. It is an awesomeidea.



This technology will save billionsof dollars for repairingroads and maintenance. The United Kingdomhas already started to utilize this technology effectively.

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EVENTS FROM LAST QUARTER

CHRISTMAS CELEBRATION

The ASCE Sri Lanka Section, in collaboration with the ice Sri Lanka Association, hosted a joyous Christmas party on December 20, 2024. The event brought together members and their families for an evening filled with festive cheer.

The gathering was warmly welcomed by Eng. K.P.I.U. Dharmapala, Chairman of SLAice, followed by an address from Eng. (Dr.) Denzil Lokuliyana, President of ASCE Sri Lanka Section. A special Christmas message was delivered by Rev. Fr. Sriyan Ranasinghe, adding a spiritual touch to the celebration.

The evening featured Christmas carols, fun games for children, and the much-anticipated arrival of Santa Claus, spreading joy among attendees. Awards were also presented to recognize outstanding contributions. The event concluded with a Vote of Thanks by Eng. (Dr.) Prageeth Wijesekara, Secretary of both SLAICE and ASCE Sri Lanka Section, followed by a delightful dinner.

This celebration strengthened bonds within the engineering community while spreading the true spirit of Christmas.

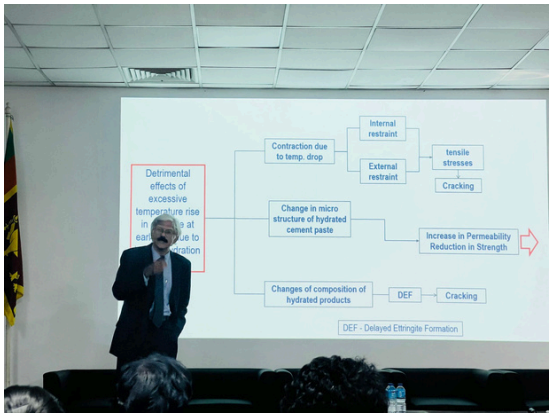
ASCE-SLS TECHNICAL SESSION 2024

ASCE Sri Lanka Section Technical Session 2024 was held on December 18, 2024, at the Wimalasurendra Auditorium of IESL, Colombo.
The event brought together members of the ASCE-SLS main body, including senior engineers, fresh engineers, and student chapter members from universities across the country.

A special thanks to our distinguished speakers:

- Prof. Hikaru Nakamura (Professor in Civil and Environmental Engineering, Nagoya University, Japan), who delivered an insightful lecture on 'Numerical Evaluation on Mechanism of Reinforcement Detailing in Concrete Structures'.

- Prof. Anura Nanayakkara (Emeritus Professor, University of Moratuwa), who shared his expertise on 'Temperature Control in Mass Concrete at Early Age'.



ASCE-SL STUDENT CHAPTER INAUGURATED AT NSBM UNIVERSITY

The ASCE Student Chapter at NSBM marked a significant milestone with its inaugural session on January 7. During the event, the student body was officially selected, paving the way for greater engagement in civil engineering activities.

The occasion was honored by the presence of Eng. Dr. Kamal Laksiri, Governor of ASCE Region 10; Eng. Dr. Denzil R. Lokuliyana, President of ASCE Sri Lanka Section; and Eng. Dr. Prageeth Wijesekara, Secretary of ASCE Sri Lanka Section.

Adding further prestige to the event, Dr. Chandana Perera, Dean of the Faculty of Engineering at NSBM, joined along with department heads Eng. Isuru Lakmal and Eng. Prabhath Buddhika, faculty members Eng. Vihanga Senevirathne and Eng. Hiruni Dassanayake, and students from the civil engineering degree program.

This inaugural session marks the beginning of an exciting journey for NSBM's civil engineering students, fostering professional growth, networking, and collaboration within ASCE and the wider engineering community.

Send us your articles, news and information that worth sharing with fellow Civil Engineers!
We value your constructive feed back too!

Reach us

secretaryasceslig@gmail.com

THANK YOU!
Editorial board- ASCE-SLS