ASSOCIATION OF CONSULTING CIVIL ENGINEERS (INDIA)
KAKINADA CENTRE

INVITES YOU TO ATTEND THE WEBINAR ON

INTEGRATING ROAD SAFETY INTO HIGHWAY ENGINEERING PRACTICE

Speaker: Er. L.S.Subrahmanyam

Deputy Executive Engineer (R&B)
Soil Testing Cell, Vijayawada.
Certified Road Safety Auditor by the Ministry of Road Transport & Highways

On Sunday, 25th May, 2025, 11.00Am

Please Join Through the Webex Link

https://acceindia.webex.com/acceindia/j.php?MTID=mcacabf0deb6e1b23db26b61504ec4f28

Meeting number: 2513 977 6637
Password: 12345

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Er.Y. SUBRAHMANYAM
Co -Opted MEMBER

TERM 2023 - 2025

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#1-378, ADB Road, Surampalem – 533 437, Near Peddapuram, E.G.Dist., A.P.

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DEPARTMENT OF CIVIL ENGINEERING

PEC/CE/Circular

Date: 23-05-2025

CIRCULAR

This is to inform that Department of CIVIL ENGINEERING In Association with Association of Consulting Civil Engineers (India), Kakinada centre cordially organizing a Webinar on **"INTERGRATING ROAD SAFETY INTO HIGHWAY ENGINEERING PRACTICE"** by **"Er. L.S. SUBRAHMANYAM DE (R&B) SOIL TESTING CELL, VIJAYAWADA, CERTIFIED ROAD SAFETY AUDITOR BY MINISTRY OF ROAD TRANSPORT & HIGHWAYS"** on Sunday 25Th MAY 2025.

Link:https://acceindia.webex.com/acceindia/j.php?MTID=mddbad0f3ef9455dd03bfef3e1566c9db

All the students and faculty members are requested to utilize this opportunity with your presence.

HOD-CE

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DEPARTMENT OF CIVIL ENGINEERING

Report

"INTERGRATING ROAD SAFETY INTO HIGHWAY ENGINEERING PRACTICE"

– Er. L.S. SUBRAHMANYAM DE (R&B) SOIL TESTING CELL, VIJAYAWADA, CERTIFIED ROAD SAFETY AUDITOR BY MINISTRY OF ROAD TRANSPORT & HIGHWAYS

Date: 25th MAY,2025

Department of CIVIL ENGINEERING and Association of Consulting Civil Engineers (India), PRAGATI Engineering College, SURAMPALEM organized a WEBINAR on **"INTERGRATING ROAD SAFETY INTO HIGHWAY ENGINEERING PRACTICE"** by **"Er. L.S. SUBRAHMANYAM DE (R&B) SOIL TESTING CELL, VIJAYAWADA, CERTIFIED ROAD SAFETY AUDITOR BY MINISTRY OF ROAD TRANSPORT & HIGHWAYS"** on 25th MAY 2025, 11:00 Am (IST) Onwards. He explained various concepts about **ROAD SAFETY** and **causes for ROAD ACCIDENTS, CONFLICT ZONES.** He explained about forensic structural analysis on failure of structures.

Road safety is an increasingly critical component of highway engineering practice, moving beyond a reactive approach to traffic accidents towards a proactive strategy focused on preventing fatalities and serious injuries. This integration is essential for creating a transportation system that is not only efficient but also inherently safe for all road users.

Here's a breakdown of how road safety is integrated into highway engineering practice, encompassing key principles, stages of implementation, and essential tools:

Integrating Road Safety into Highway Engineering Practice

Integrating road safety into highway engineering practice means embedding safety considerations throughout the entire lifecycle of a road project, from initial planning and design through construction, operation, and maintenance. This holistic approach is driven by the understanding that human error is inevitable, and the road system itself must be designed to be forgiving and minimize the consequences of such errors.

1. Guiding Philosophy: The Safe System Approach

The **Safe System Approach (SSA)** is the overarching philosophy guiding modern road safety integration. It recognizes that humans are fallible and vulnerable, and therefore, the entire road system (roads, vehicles, speeds, road users, and post-crash care) must be designed to accommodate human error and limit the kinetic energy of crashes to levels that the human body can withstand without serious injury or death.

Key principles of the Safe System Approach:

- **Death and Serious Injury are Unacceptable:** The primary goal is to eliminate fatalities and serious injuries.
- **Humans Make Mistakes:** The system must be designed to accommodate human error.
- **Humans Are Vulnerable:** Road design and vehicle technology must account for the physical limits of human tolerance to crash forces.
- **Responsibility is Shared:** All stakeholders, including engineers, policymakers, vehicle manufacturers, and road users, share responsibility for safety.
- **Safety is Proactive:** Identify and address risks *before* crashes occur, rather than reacting to crash history.
- **Redundancy is Crucial:** Multiple layers of protection are built into the system, so if one fails, others still protect.

2. Stages of Integration in Highway Engineering

Road safety considerations are systematically integrated at various stages of highway project development:

- **Planning and Feasibility Stage:**
    - **Strategic Safety Assessment:** Evaluate potential safety impacts of proposed new alignments or major upgrades.
    - **Data Analysis:** Use existing crash data, traffic volume, and road characteristics to identify high-risk areas or potential future safety concerns.
    - **Consideration of Vulnerable Road Users (VRUs):** Plan for safe passage of pedestrians, cyclists, and motorcyclists from the outset.
    - **Route Selection:** Prioritize routes that minimize conflicts and provide opportunities for safer design.
- **Design Stage (Preliminary and Detailed Design):** This is where the most significant safety improvements can be "designed in."
    - **Geometric Design:**
        - **Alignment (Horizontal and Vertical):** Ensure adequate sight distance (stopping sight distance, passing sight distance, decision sight distance) at

all points, especially on curves, at crests, and near intersections. Avoid sudden changes in alignment.

        - **Cross-Section Elements:** Design appropriate lane widths, shoulder widths (including paved and unpaved shoulders for recovery), clear zones (obstacle-free areas alongside the road), and medians (to prevent head-on collisions).
        - **Intersections:** Design for reduced conflict points, lower speeds, and improved visibility. This includes roundabouts, restricted crossing U-turns (RCUTs), diverging diamond interchanges (DDIs), and channelized turns.
        - **Roadside Design:** Implement forgiving roadsides by removing or relocating fixed objects, using breakaway supports for signs and lighting, and installing appropriate crash barriers (guardrails, median barriers) where hazards cannot be removed.
    - **Drainage Design:** Ensure drainage features do not create roadside hazards or hydroplaning risks.
    - **Pavement Design:** Specify pavement surfaces with adequate skid resistance and good drainage to prevent skidding and hydroplaning. Include rumble strips on shoulders and centerlines to alert drowsy or inattentive drivers.
    - **Signing, Marking, and Delineation:** Design clear, consistent, and highly visible signage and pavement markings that conform to standards. Utilize retroreflective materials for night visibility. Proper delineation helps guide drivers, especially on curves and at night.
    - **Lighting:** Provide adequate lighting at intersections, complex interchanges, pedestrian crossings, and high-crash locations to improve nighttime visibility and reduce crash risk.
    - **Human Factors Integration:** Design elements considering human perception, reaction time, expectancy, and potential for error. Roads should be "self-explaining."
    - **Road Safety Audits (RSAs):** Independent and systematic examinations of highway projects (at preliminary, detailed, and pre-opening stages) to identify potential safety deficiencies and recommend improvements.
- **Construction Stage:**
    - **Temporary Traffic Management:** Implement safe and effective temporary traffic control plans to protect both workers and road users during construction. Ensure clear guidance, adequate warning signs, and proper channeling.
    - **Quality Control:** Ensure construction adheres to design specifications, particularly those related to safety-critical elements like pavement friction, barrier installation, and sign placement.
- **Operation and Maintenance Stage:**
    - **Routine Maintenance:** Keep roads in good repair (e.g., repairing potholes, maintaining clear zones, trimming vegetation affecting sightlines).
    - **Safety Inspections:** Regularly inspect existing roads for safety deficiencies, deterioration, or emerging crash patterns.
    - **Crash Data Analysis:** Continuously monitor crash data to identify blackspots, analyze crash contributing factors, and prioritize safety improvement projects.

- **Targeted Safety Improvements:** Implement countermeasures (e.g., rumble strips, improved signage, minor geometric adjustments) at locations identified as high-risk through crash analysis or safety inspections.
- **Intelligent Transportation Systems (ITS):** Utilize technologies like variable message signs, traffic monitoring systems, and incident management systems to enhance safety by providing real-time information and managing traffic flow.
- **Post-Opening Road Safety Audits:** Conduct audits on newly opened or significantly upgraded roads to identify any unforeseen safety issues in real-world operating conditions.

3. Key Tools and Methodologies

- **Road Safety Audit (RSA):** A formal, systematic, and independent examination of a road project (existing or future) to identify potential safety problems and suggest measures to eliminate or mitigate them. RSAs are crucial at all project stages.
- **Crash Data Analysis:** In-depth analysis of crash records to understand patterns, contributing factors, and high-risk locations. This informs targeted interventions.
- **Road Safety Impact Assessments (RSIA):** Evaluate the potential safety implications of new or significantly altered road projects.
- **Network Screening:** A systematic process to identify and rank high-risk locations or corridors on a road network for detailed safety investigation.
- **Safety Performance Functions (SPFs) / Accident Prediction Models:** Statistical models that predict the number of crashes on a road segment or at an intersection based on its characteristics (e.g., traffic volume, number of lanes).
- **Human Factors Engineering:** Applying knowledge of human capabilities and limitations to design roads that are intuitive and forgiving of errors.
- **Cost-Benefit Analysis:** Evaluating the economic benefits of proposed safety improvements (e.g., reduced crash costs) against their implementation costs.
- **Star Rating for Roads (e.g., iRAP):** A globally recognized system that objectively assesses the safety of roads by providing a star rating (1- to 5-star, with 5 being the safest) based on infrastructure features and exposure to risk for all road users.

4. Challenges and Opportunities

Challenges:

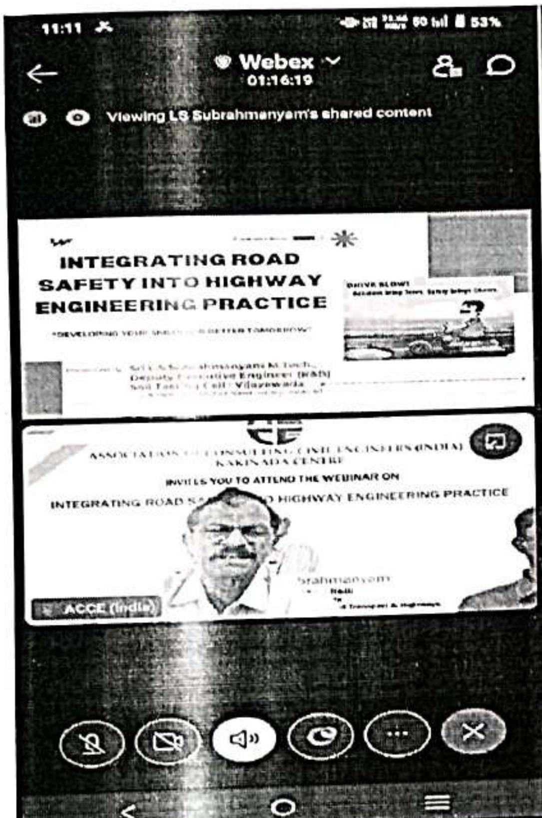
- **Cost Constraints:** Implementing comprehensive safety features can increase project costs.
- **Existing Infrastructure:** Retrofitting safety improvements on older roads can be complex and expensive.
- **Lack of Awareness/Training:** Some engineers may lack specific training in advanced road safety principles.
- **Data Gaps:** Insufficient or unreliable crash data can hinder effective analysis and intervention.
- **Resistance to Change:** Traditional engineering practices may be slow to adapt to new safety philosophies.

Opportunities:

- **Technological Advancements:** ITS, connected vehicles, and autonomous vehicle technologies offer new avenues for safety.
- **Increased Public Awareness:** Growing demand for safer roads from the public and advocacy groups.
- **International Best Practices:** Learning from successful safety initiatives and policies implemented globally.
- **Economic Benefits:** Investing in road safety yields significant economic benefits through reduced crash costs (healthcare, property damage, productivity losses).
- **Sustainable Development Goals:** Road safety directly contributes to achieving global sustainable development goals related to health and infrastructure.

Total number of 70 members attended the session out of which 34 Pragati students had participated the session.

Some of the glimpses of webinar are shown below.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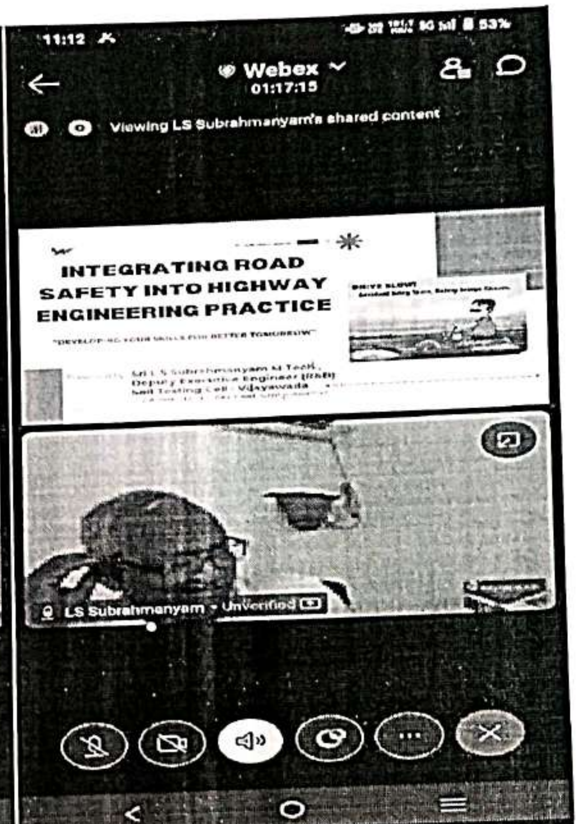
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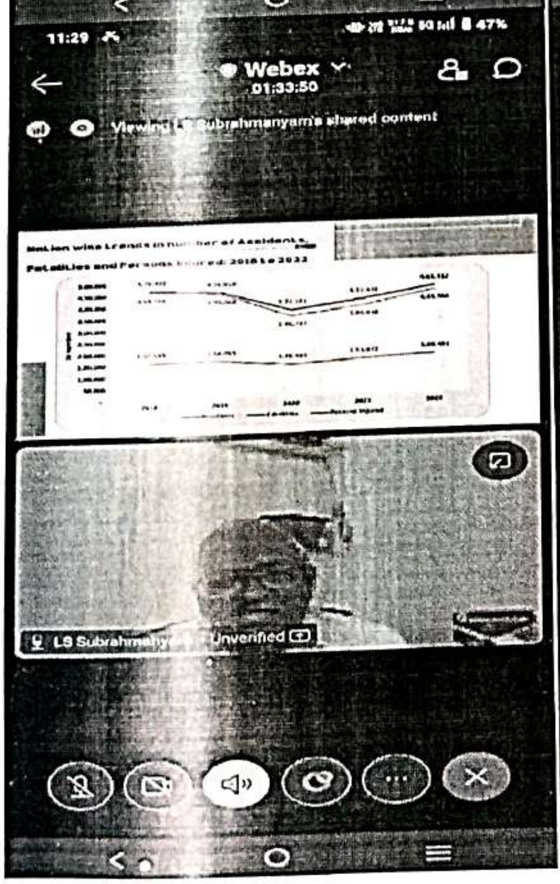
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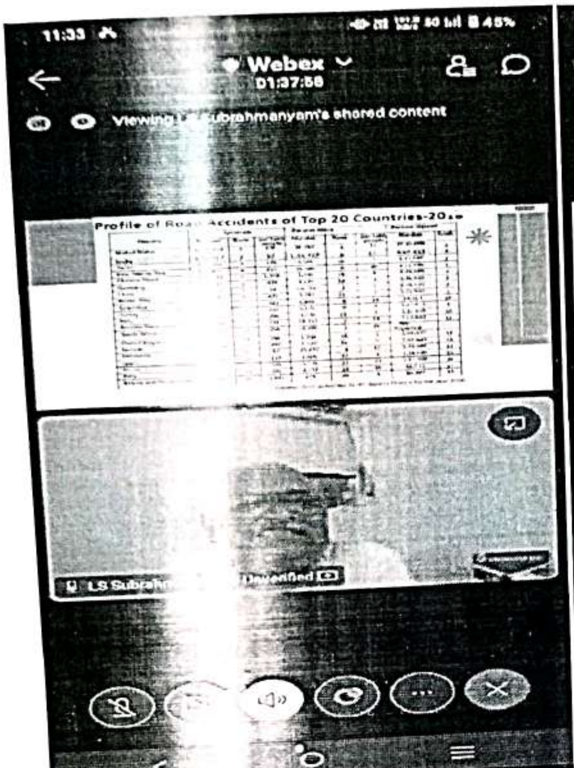
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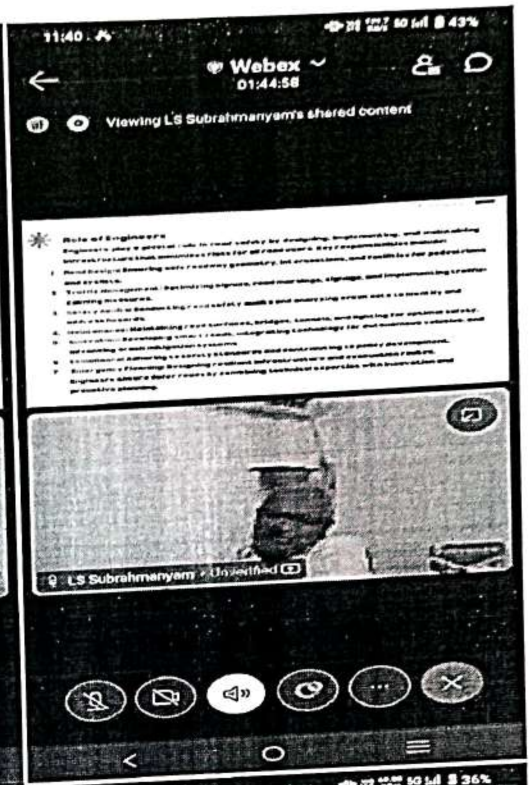
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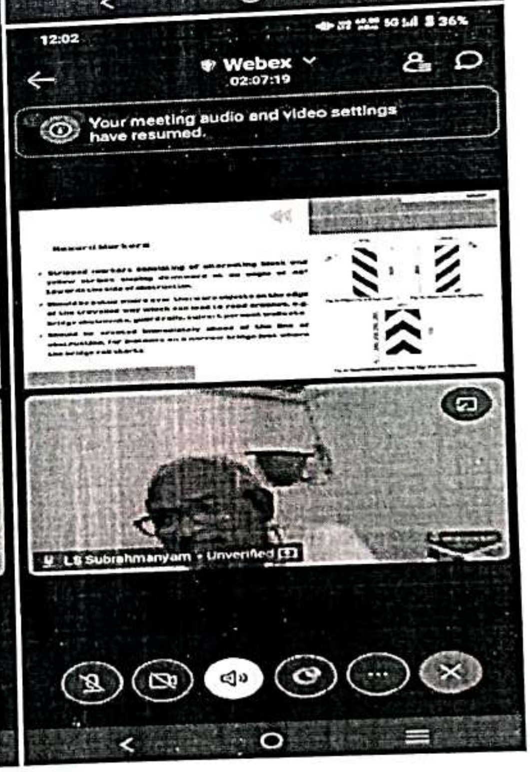
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DEPARTMENT OF CIIVL ENIGNEERING
ACCE (I) STUDENT CHAPTER
LIST OF STUDENTS ATTENDED

Event: "INTERGRATING ROAD SAFETY INTO HIGHWAY ENGINEERING PRACTICE"

Date: 26-05-2025

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