Report on the Technical Training Conducted on topic of "Concept of PSC Bridge with Midas Civil Software"

Workshop Overview:

Organized by: School of Engineering and Technology, GTU
Coordinated by: Dr. K. M. Gondaliya, OSD-Assistant Professor, SET, GTU
Invitee & Program Coordinator: Dr. J. A. Amin, Professor, SET, GTU
Experts/Speakers: Mr. Sai Manoj Vemula, Mr. Vishal Jagad
Date & Time: September 26 - 27, 2024 at 10:30 AM – 5:30 PM
Venue: Class 318, Second floor, Block – 5, SET, GTU, Ahmedabad – 382424
Participants: PG- Civil (Structural) Engineering Students

Introduction:
The 2-day workshop aimed to provide structural engineering students with hands-on experience in using MIDAS Civil software, a leading tool for structural analysis and design. The workshop combined theoretical concepts with practical applications, ensuring participants gained valuable insights into the capabilities of the software.

Day 1: Workflow for a PSC BOX Bridge Using MIDAS Civil:

Session Highlights:

1. Geometry Definition
- Define the overall bridge geometry using the graphical interface or the bridge.
- Set up the number of spans, lengths, deck dimensions, and support conditions.
- Define the bridge superstructure, including cross-sectional properties, deck type, and PSC-specific attributes.

2. Manual Modeling
- Geometry: Defined using nodes and elements (beams, shells).
- Pre-Stressing Tendons: Tendon profiles and forces are manually applied with construction staging.

3. Tendon Layout and Prestress Definition

- Define the tendon layout and specify tendon profiles and stress zones.
- Input prestress forces, considering time-dependent factors like relaxation and losses due to friction.
- MIDAS Civil enables users to define tendons as either bonded or unbonded, which significantly affects the load transfer mechanism.

4. Construction Stage Analysis

- Set up construction stages to simulate how the bridge will be built, including the erection of girders, placement of concrete, and application of prestressing forces.
- Perform time-dependent analysis, including creep, shrinkage, and tendon relaxation.

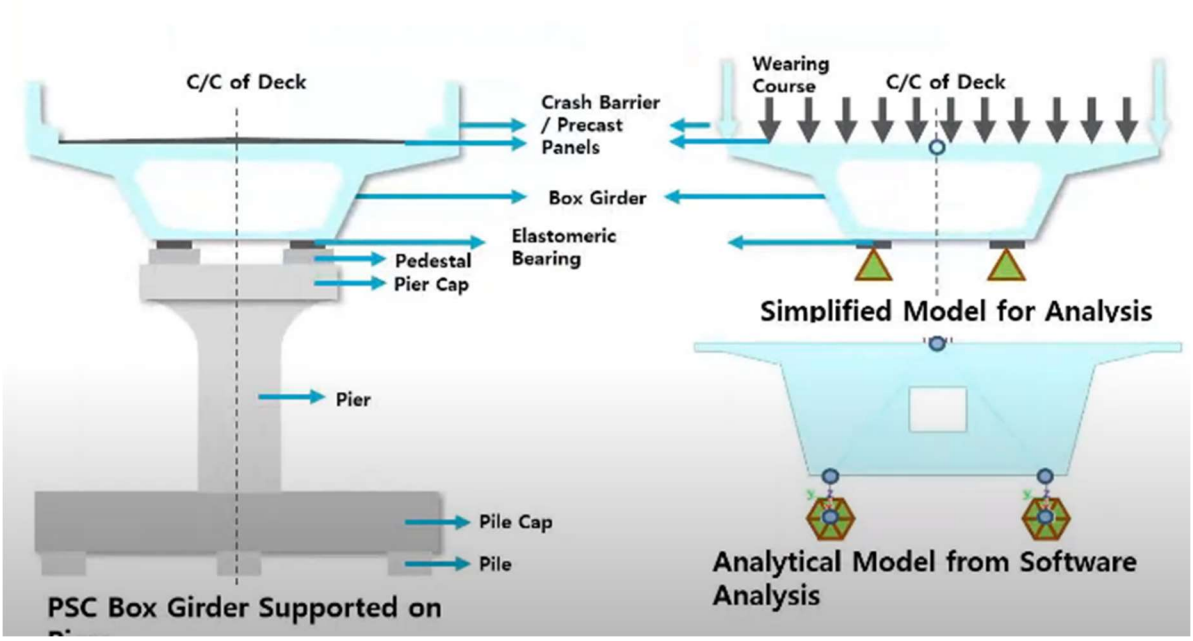
5. Load Application

- Apply various Static loads, including Self Weight, Wearing Course, Crash Barrier.

6. Analysis Review

- Conduct structural analysis to verify the adequacy of the prestress and the strength of the bridge under different load combinations.
- Review analysis results, including internal forces, stresses, deflections, and construction stage behavior.

Images:



Day 2: Single-Span PSC Composite I-Girder Bridge:

Session Highlights:

1. Introduction to PSC Composite I-Girder Bridges

- Definition and components of a PSC composite I-girder bridge.
- Benefits of combining prestressed concrete with composite I-girders, including improved strength-to-weight ratio, reduced material costs, and enhanced durability.
- Structural behavior of I-girder bridges under various loads and the role of prestressing.

2. Prestressing and Composite Action

- Modeling of prestressing tendons in the I-girder: defining tendon layout, profile, and prestressing force.
- Composite action between the prestressed concrete deck and steel I-girder.
- Introduction to the concept of shear connectors for composite action and their role in ensuring force transfer between the concrete deck and steel girder.
- Consideration of tendon losses such as friction, anchorage slip, and relaxation.

3. Time-Dependent Effects

- Time-dependent effects like creep, shrinkage, and relaxation of the prestressed tendons.
- Long-term structural behavior and its impact on the overall performance of the bridge.

4. Construction Stage Analysis

- Step-by-step analysis of construction stages: erection of I-girders, casting of the concrete deck, and application of prestressing forces.
- Analysis of stresses and deflections during each stage of construction.
- Evaluating how the construction sequence influences the final structural behavior of the bridge.

5. Design Optimization and Compliance

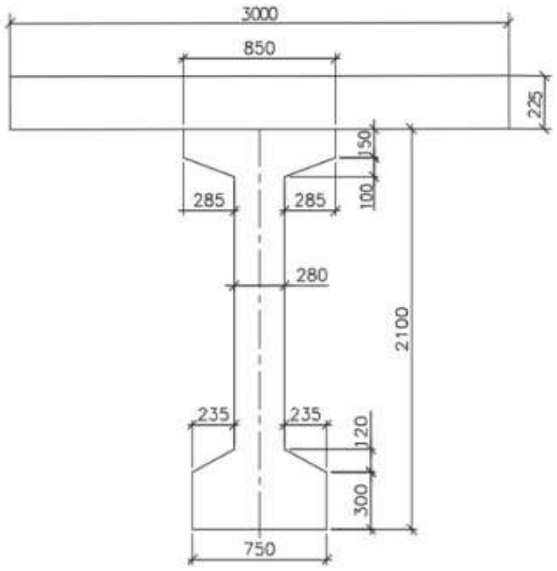
- Verifying designs against international codes (IRC).
- Participants optimized tendon layouts and material usage for efficiency and compliance.

Conclusion:

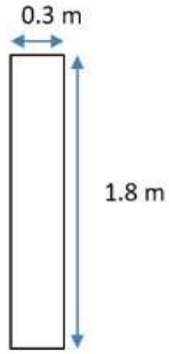
The 2-day workshop on MIDAS Civil software for PSC Box Bridge & PSC Composite I Girder design was a comprehensive and practical training experience. Participants gained valuable insights into both the theoretical and practical aspects of PSC bridge design. It is recommended that similar workshops be held periodically to keep up with software

updates and to provide ongoing skill development for civil and structural engineers. Additionally, incorporating real-life case studies could enhance the learning experience in future workshops.

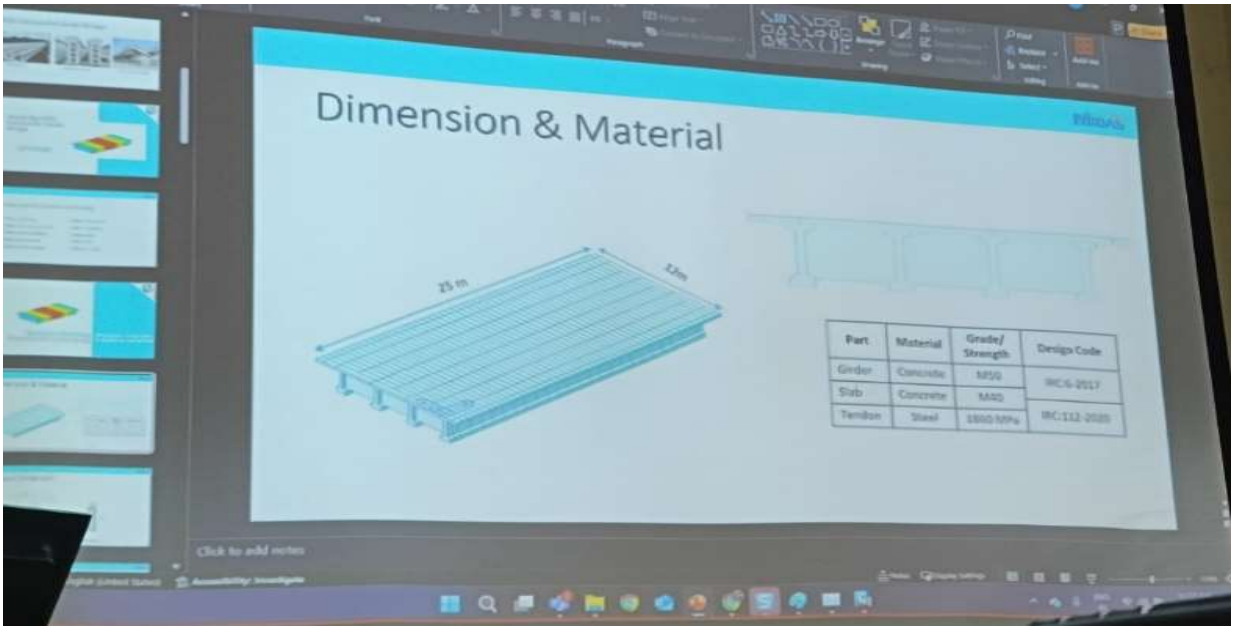
Images:



Composite Section



Diaphragm Section



Glimpse of Expert Session