Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning

INTRODUCTION

- This Geographic Information System (GIS) Applications in Transportation Systems Engineering / Planning training course is set to deliver a comprehensive understanding of the fundamentals of Geographic Information System (GIS) and introduce transportation infrastructure and road safety-related data collection, and analytical methodologies and techniques utilizing Geographic Information System (GIS).
- Authorities in many developed countries now actively use Geographic Information System (GIS) for highways and transport management, mainly due to the benefits of falling costs and increasing ease in planning, monitoring and managing complex systems involved in transportation planning and management, accident analysis, and route planning.
- The Geographic Information System (GIS) tools and techniques significantly aid in determining capacity enhancements, improving operations, and identifying the most strategic investments for keeping the transportation system in any country running optimally. This seminar is designed not only to cover the technical aspects of how to use Geographic Information System (GIS) but also to develop critical spatial thinking and spatial decision-making skills.

This training course will highlight:

- Fundamentals and Major Functions of Geographic Information System (GIS)
- Geospatial Data, Database, and Geo-Referencing Techniques
- Visualization and Geographic Information System (GIS) Data Query
- Spatial Analysis and Modeling
- Multilayer Mapping and Overlay Analysis
- Heat Maps and Hotspot Analysis

OBJECTIVES

By the end of this training course, participants will be able to:

- Have a thorough understanding of how Geographic Information System (GIS) can help in transportation studies
- Identify trends in traffic operations and safety performance measures, leading to improvement in transportation safety
- Detect root causes of traffic incidents and determine effective countermeasures
- Evaluate the performance of segments, corridors, networks, or regions
- Pinpoint hot and cold spots via density estimation heat mapping
- Conduct complex spatial analysis required to plan the transportation systems of the future
- Build dynamic and rich mapping applications
- Gain critical spatial thinking skills and become confident in spatial decision making

TRAINING METHODOLOGY

- This training course will have subjects presented by the instructor utilizing a variety of proven adult learning techniques, focused on case studies and best practices. This will include active participation, in-class practice cases, followed by intense group sessions, video materials and tabletop activities.

ORGANISATIONAL IMPACT

- The organisation will benefit from advancing its efficiency in transportation infrastructure solutions, manage to reduce costs and improve its organization workflow by employing a strong geospatial data analysis platform.

The participants on this Geographic Information System (GIS) Applications in Transportation Systems Engineering / Planning training course, will:

- Adopt state-of-the-art spatial data analytics in traffic / transport planning, design, and management
- Improve the operational processes, policies, and workflows
- Enhance the robustness of their infrastructure solutions services
- Demonstrate advanced presentation methods via comprehensive mapping applications
- Reduce costs of performance evaluation and assessment processes
- Improve the comprehension of their decision-making skills

PERSONAL IMPACT

Upon attending this training course, all participants establish a solid foundation and gain practical experience in transportation-related applications of Geographic Information System (GIS) through the following:

- Learn how Geographic Information System (GIS) can assist in transportation engineering and urban planning practices
- Develop a solid background in geospatial data preparation, processing, and analysis
- Adopt the adequate type of data, and analysis process for complex road infrastructure, safety, management, and planning problems
- Develop the theoretical understanding of spatial problems
- Evaluate and assess the environmental and socio-demographic impacts on road infrastructure

WHO SHOULD ATTEND?

- This Geographic Information System (GIS) Applications in Transportation Systems Engineering / Planning training course is suitable to a wide range of professionals but will greatly benefit, those who are involved in traffic and transportation engineering concepts, road infrastructure and road safety, urban planning, and traffic management centers.

This training course is suitable wide range of professionals but will significantly benefit:

- Traffic & Transportation Engineers and Professionals
- Professionals in Urban Planning and Development
- Project Managers in Infrastructure Solutions Consulting
- Data Analysts, Technicians in Traffic Management Centers
- Researchers and Consultants
- Practitioners in Traffic and Transport Engineering
- Traffic Safety Professionals
- Highway and Roadway Design Engineers

Course Outline

Geographical Information Systems (GIS) Fundamentals

- Geographic Information System (GIS) Applications in General
- Geographic Information System (GIS) Applications in Transportation Studies
- Major Functions of Geographic Information System (GIS)
- Relating Information from Multiple Sources

Understanding Geographic Information System (GIS) Maps

- Data Information
- Spatial data
- Geographic Information System (GIS) Database
- Raster vs. Vector Data
- GIS Shapefiles
- ESRI Shapefile format
- Displaying and Navigating Geographic Information System (GIS) Maps
- Feature Attributes
- Census Units
- The Point, Line, Polygon Data

Data Collection

- Global Positioning System (GPS)
- Geographic Data Library
- Census Data
- Transportation Data and Analytics with Geographic Information System (GIS)
- Geospatial Crash Analysis

Visualization and Data Processing

- Symbolizing and Labeling Geographic Information System (GIS) Data
- Continuous and Categorical Data
- Classification Methods
- Normalization
- Geographic Information System (GIS) Data Query
- Classification
- Identify, Select, Find
- Select Features by Attributes
- Joining and Relating Tables
- Spatial Joining
- Dissolving and Clipping layers

Geospatial Analysis and Hotspot Analysis

- Introduction to Spatial Analysis
- Buffering Features
- Overlaying Data
- Spatial Analysis Methods to Identify Hotspots
- Fishnet-based Analysis
- Kernel Density Estimation