Traffic Signal Control

INTRODUCTION

- This Traffic Signal Control training course will provide a comprehensive understanding of the purpose, benefits, components of a traffic signal control system, in addition to practical tools and techniques utilized in data preparation and modeling processes.
- There are two primary practices of signal control systems in transportation studies. First, a traffic problem is addressed for one or multiple urban arterials, where each arterial consisting of several intersections that are controlled by traffic signals. Arterials are usually designed to move large numbers of travelers with different modes, including automobile drivers, transit riders, bicyclists, and pedestrians, through the system with minimum stops and delays. Based on the performance objectives, these coordinated systems often give priority to specific travel modes (e.g., transit riders). Second, the focus of the study is on the operation of an individual signalized intersection. Accordingly, this training course is set to deliver guiding principles for both practices in traffic signal control systems based on global standards.

This training course will highlight:

- Purposes and Benefits of the Traffic Signal Control
- Exploring the System and Providing a Framework
- Collecting and Utilizing High-Resolution Field Data for Signalized Intersections
- Processes, Tools and Techniques for Modelling and Designing Traffic Signal Systems
- The Micro-simulation Environment of Signalized Intersections

OBJECTIVES

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

- Understand traffic signal operations including various controller types and platforms
- Perform signal timing optimization to maximize transportation system throughput
- Develop traffic microsimulation models of signalized intersections
- Understand signal timing design evaluations and assessments
- Evaluate the performance of a signal control system

TRAINING METHODOLOGY

- This Traffic Impact Analysis training course will have topics 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 active group sessions, video materials and tabletop activities.

ORGANISATIONAL IMPACT

- The organization will acquire a thorough understanding of traffic signal design, operations, timing optimization, and state-of-the-art signal controllers to implement Traffic Signal Control solutions and improve their organization workflow through the proper application of Traffic Signal Control systems.

Impact on the organisation from delegates in attending this Traffic Impact Analysis training course includes the following benefits:

- Establish a thorough foundation regarding the fundamentals of Traffic Signal Control Systems
- Adopt an organized and planned way of Traffic Signal Control systems
- Improve the mobility at intersections and junctions
- Reduce labor costs in design and modeling of signalized intersections

PERSONAL IMPACT

- Evaluate and assess a problematic signalized intersection / junction
- Solid understanding of modelling and design of signal control systems
- Great insight of simulation environment for signalization
- Understanding potential issues in design and modelling processes
- Confidence in decision-making on signal control systems
- Able to integrate information (i.e., field data), justify choices, and communicate results

WHO SHOULD ATTEND?

- This Traffic Signal Control training course will significantly benefit those who are involved in traffic and transportation engineering concepts, roadway design, urban planning, traffic management centers, and road infrastructure.

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

- Traffic & Transportation Engineers and Professionals
- Highway and Roadway Design Engineers
- Project Managers in Infrastructure Solutions Consulting
- Professionals in Urban Planning and Development
- Researchers and Consultants

Course Outline

- Introduction to the Traffic Signal Control System-Modelling
- Exploring the System and Providing a Framework
- Introduction to the Traffic Signal Timing Manual
- Queuing Systems
- Modelling Traffic Flow at Signalized Intersections
- Using High-Resolution Field Data to Visualize Traffic Flow
- From Model to the Real World: Field Observations
- Basic Operational Principles

Whose Turn is it? (Phasing, Rings, and Barriers) and Traffic Controller Timing Processes

- Phasing, Rings, and Barriers
- Traffic Controller Timing Process
- How a Traffic Phase Times and Terminates
- Exploring a Controller Emulator
- Constructing a Traffic Control Process Diagram
- Signal Timing Parameters

Timing Processes on One-Approach and for the Intersection

- Considering Minimum Green Time, Passage Time, and Detection Zone Length
- Relating the Length of the Detection Zone to the Duration of the Green Indication
- Determining the Length of the Minimum Green Time
- Understanding the Variation of Vehicle Headways in a Departing Queue
- Actuated Traffic Control Processes
- Assessing the Effect of the Minor Street Vehicle Extension Time on Intersection Operations
- Determining the Effect of the Maximum Green Time on Intersection Operations
- Setting the Maximum Green Timing Parameter for All Approaches of an Intersection

Left Turn Phasing and Right-of-Way Change

- Permitted Left Turn Operations
- Comparing Permitted and Protected Left-Turn Phasing
- Comparing Protected / Permitted and Protected Left-Turn Phasing
- Analysis and Design of Left Turn Treatment
- Change and Clearance Intervals
- Determining Vehicle Change and Clearance Intervals
- Yellow and Red Clearance Intervals

The Simulation Environment and Final Design

- Micro-simulation Models and the Traffic Control System
- Building a Simulation Model Network
- Traffic Analysis Tools
- Integrating Information, Justifying Choices, and Communicating Results
- Assembling Information for Your Timing Plan Design
- Signal Timing Design in Practice
- Design Report
- Design Evaluations and Assessments