

# SIDRA MODEL FUNDAMENTALS

## Online Training Program Contents

### Right-Hand Traffic | US Customary Units

The content of this training program has been prepared according to **driving on the right-hand side of the road and using US Customary Units.**

## Module A

Traffic Flow Fundamentals, Uninterrupted and Interrupted Flows

### Topic A1: Traffic Models - An Introduction

Model Benefits / Objectives, Model Consistency, Movement Classes. Analytical and Microsimulation Models, Model Categories, Model Types, Model Level of Detail, Lane-Based Modeling. About Microsimulation Models. Model Complexity vs Model Error, Uncertainty: Accuracy and Precision, Decisions based on traffic modeling, Understanding Traffic Models.

### Topic A2: Fundamentals of Traffic Flow

Uninterrupted and Interrupted Flows, Three Key Parameters, Headway - Spacing - Speed relationship. Density and Flow Rate.

#### Exercise A2: Speed, Spacing, Headway, Density, Flow Rate

### Topic A3: Uninterrupted Flows

Definition, Spacing - Speed - Flow, Other Fundamental Relationships, Speed-Flow Models for Uninterrupted Traffic Facilities. Spot Speed, Travel Speed and Travel Time. Bunched Headway Model, Proportion Bunched for Uninterrupted Flows, Extra Bunching for Upstream Signal Effects. Arrival Headway Distributions.

#### Exercise A3: Proportion Bunched and Extra Bunching

## Q & A

## **Topic A4: Interrupted Flows**

Definition, Conflict points at intersections. Choice of intersection type: Signals vs Roundabouts. Traffic Control (Intersections, Crossings, Interchanges). Alternative intersections and interchanges, SIDRA INTERSECTION Network Templates. Summary of Models for Traffic Control (Interrupted Flow).

## **Topic A5: Demand, Capacity, Degree of Saturation**

Demand Flows, Peaking. Residual Queue and Oversaturation Delay. Capacity, Degree of Saturation, Practical Capacity

### **Exercise A5: Saturation Flow Rate and Degree of Saturation**

## **Topic A6: Lane Flows and Unequal Lane Use**

Causes of Unequal Lane Use at Intersections. Unequal Lane Use at Closely-Spaced Intersections. Lane Utilisation Ratio. Approach Capacity (Effective). Unequal Lane Use Example. Defacto Exclusive Lanes.

### **Exercise A6: Lane Utilisation Ratio and Approach Capacity (Effective)**

## **Q & A and Training Evaluation Survey**

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## **Module B**

Signal Timing, Saturation Flows, Pedestrians, Signal Coordination

### **Topic B1: Saturation Flow**

Saturation Flow Rate and Speed, Queue Discharge Surveys. Saturation Headway Model. Saturation Flow, Start Loss, End Gain. Displayed and Effective Green Times. Saturation Flow Survey, SCATS MF. Short Lane Saturation Flow, Short Lane Queue.

### **Exercise B1: Saturation Headway and Saturation Flow Rate**

### **Topic B2: Saturation Flow Estimation**

Saturation Flow Estimation in veh/h, Movement Class and Turning Vehicle Effects. Flow Rate and Saturation Flow Rate in veh/h and tcu/h. Shared Lane Saturation Flow Rate. Right Turn On Red Capacity Estimation.

### **Exercise B2: Shared Lane Saturation Flow Rate**

## Q & A

### Topic B3: Traffic Signal Timing

Signal Timing Analysis Methods (EQUISAT / Pretimed and Actuated). Appropriate Cycle Time option according to the objective of modeling. Signal Phasing, Variable Phase Sequence Analysis. Common Control Groups. Critical Movement Diagram.

#### Exercise B3: Critical Movement Diagram

### Topic B4: Pedestrians

Pedestrian Crossing Types (Signalised Intersections, Midblock Crossings). Pedestrians at Signals, Pedestrian Protection. Pedestrian Crossing Distances and Speeds, Pedestrian Minimum Time, Pedestrian Timing Parameters. Pedestrian Actuation. Unsignalised Pedestrian Crossing Analysis.

#### Exercise B4: Pedestrian Minimum Time

### Topic B5: Traffic Signal Coordination

Signal Platoon Patterns, Platoon Ratio, Arrival Type. Platoon Dispersion Model. Offset Definition, Relative Offset, Stopline Travel Time. Time-Distance Diagram.

#### Exercise B5: Platoon Ratio and Arrival Type

## Q & A and Training Evaluation Survey

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## Module C

Roundabouts, Sign Control, Network Modeling,  
Performance and LOS, Model Calibration

### Topic C1: Roundabouts

Roundabout Capacity Models, Unequal lane use cases as observed at UK Roundabouts. SIDRA Roundabout Capacity Model. Capacity model with roundabout approach interactions. Follow-up Headway and Critical Gap, A useful rule of thumb for gap acceptance parameters, Other Features of SIDRA Roundabout Model, Bunched Headway Model, Geometry parameters. Capacity Constraint, Unbalanced Flows, Roundabout Metering Signals.

#### Exercise C1: Circulating Flow Rate with Capacity Constraint

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## Topic C2: Sign Control

Gap Acceptance Model (Driver Behavior Focus), Gap Acceptance Parameters (Base values and Adjustments), Movement Class Effects, Opposing Flow Effects. Gap Acceptance Model by Signal Analogy. Gap Acceptance Survey Method.

### Exercise C2: Critical Gap and Follow-Up Headway Adjustment

#### Q & A

## Topic C3: Intersection Performance and Level of Service

Delay definitions, Queue definitions. SIDRA Performance Estimates. Back of Queue Survey, Back of Queue, Queue Move-ups, Delay. Overflow Concept, Fundamental Diagram of Intersection Performance. Level of Service (Intersection, Network, Route). Vehicle Path Model, Acceleration - Deceleration Models. Fuel Consumption and Emissions, Operating Cost.

### Exercise C3: Level of Service

## Topic C4: Model Calibration

Local Conditions and Model Calibration. Key Model Calibration Parameters. SIDRA Excel Applications for Field Surveys. Signal Saturation Flow Example. SIDRA Lane-based INTERSECTION and NETWORK model. Iterative Methods for Intersection and Network Modeling.

### Exercise C4: Saturation Flow Calibration

## Topic C5: Network Modeling

Lane Blockage and Capacity Constraint. SIDRA NETWORK Model. Signalised Diamond Interchange (SDI), Diverging Diamond Interchange (DDI), Continuous Flow Intersection (CFI). Lane Movement Flow Proportions. Capacity Constraint Example. Capacity Reduction due to Lane Blockage, Midblock Lane Changes.

### Exercise C5: Capacity Reduction due to Lane Blockage

#### Q & A and Training Evaluation Survey

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