Survey, Investigation and Preparation of Road & Bridge Projects

Day 1	
Time Period	**Description of Topic**
09.45-11.15	**Overview of DPR preparation** ❖ Scope ❖ Key Personnel in DPR Consultancy Team ❖ Stages in Project Preparation • Inception & QAP • Draft Feasibility • Feasibility • Draft DPR • Final DPR • Project Clearances ❖ Activities in DPR Preparation • Preliminary works • Surveys and investigations • Alignment finalization • Project conceptualization • Economic and Financial Analysis • Analysis and engineering design of elements • Preparation of reports and drawings • Preparation of cost estimate • Preparation of social impact assessment and resettlement action plan • Preparation of environmental impact assessment and environmental management plan • Preparation of utility shifting plan and estimates • Preparation of land acquisition plan and schedule • Procurement of all project related statutory clearances ❖ Client's role and supervision in preparation of DPR
11.30-13.00	**Value Engineering at DPR Preparation Stage**
14:00-17:15	**Modern Topography Survey** ❖ Scope of Surveying in Highway Project ❖ Accuracy ❖ DGPS Survey, Total Station, Auto Level • Equipment • Principle • Procedure • Data Transfer • Fixing of Pillars • Common causes of error and how to prevent the same ❖ Introduction to LiDAR, Drone & Photogrammetry
Day 2	
09.45-13:00	**Traffic Survey and Traffic Demand Estimate** ❖ Classified Traffic Volume Count Survey • Location of Count Station • Methods

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	• Analysis- ADT, AADT, Hourly Variation, Daily Variation vehicle classification wise, Peak Hour ❖ Turning Movement Survey (Location, Methods, Duration, Analysis) ❖ Origin Destination and Commodity Movements Surveys • Location • Zoning • Method • Sample Size • Questionnaire • Period • Analysis- Trip Matrices, Lead & Load Characteristics, Desire Line Diagrams • Axle Load Surveys (Location, Methods, Sample Size Period & Analysis) Determination of VDF ❖ **Turning Movement Surveys** (Location, Methods, Duration, Analysis) ❖ **Speed-Delay Surveys** • Location • Methods • Period • Analysis- Determination of Running Speed & Journey Speed ❖ Pedestrian and Animal Cross Survey ❖ Truck Terminal Survey ❖ Traffic demand estimate, determination of growth rate considering factors such as past trend, population growth rate, elasticity of transport demand, socio-economic development plan, land use etc. ❖ Diverted Traffic, Generated Traffic & Induced Traffic ❖ Level of Service
14.00-17.15	**Pavement Condition Survey, Material Survey & Geo Technical Survey** ❖ Pavement Composition ❖ Pavement Condition- Cracking, Rutting, Ravelling, Pothole, Edge Breaking etc. ❖ Shoulder Condition ❖ Pavement Roughness- BI & IRI ❖ Structural Evaluation of Pavement- FWD Test ❖ Subgrade Characteristics & Strength ❖ Identification of Borrow Areas for Soil based on soil properties, quantity availability and clearance issues ❖ Identification of Quarry for sand, Stone etc. based on material properties, quantity availability and clearance issues ❖ Identification of source of fly ash, slag, alternative sources of materials, recycled materials etc. ❖ Bituminous mix design and concrete mix design ❖ Geo Technical Investigations & Sub-Soil Exploration
Day 3	
09.45-13:00	**Hydraulic & Hydrological Investigations & Studies** ❖ Introduction to Hydrological studies ❖ River Morphology ❖ Catchment Area Characteristics- Topography, Storm Duration, Rainfall Characteristics, Vegetation Cover etc. ❖ Collection of LWL, HFL, LTL, HTL, observed maximum depth of Scour, history of hydraulic functioning of existing bridges etc.

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	❖ Estimating Flood Discharge- Area Velocity Method, Unit Hydrograph Method, ❖ Computation of Linear Waterway, HFL, Afflux , Scour depth ❖ Model Study
14:00-17:15	**Geometrical Design of Highways** ❖ Design Standards ❖ Design Speed ❖ RoW ❖ Lane Width of Carriageway, Median Type & Width, Shoulder Type & Width, Roadway Width ❖ Crossfall ❖ Super Elevation ❖ Sight Distance ❖ Gradients ❖ Lateral and Vertical Clearances at Underpasses and Over Passes ❖ Elements of Horizontal Curve ❖ Design of Horizontal Curve- Circular & Transition ❖ Elements of Vertical Curve ❖ Design of vertical Curve ❖ Access Control ❖ Median Opening ❖ Service Road- Acceleration Lane, Deceleration Lane
Day 4	
09.45-13:00	**General Guidelines for Bridge Design** ❖ Types of Bridges and Bridge Components ❖ Bridge Siting & alignment ❖ Decision on Span arrangement and Preparation of GAD ❖ Bridge Loading ❖ Material Characteristics ❖ Function & Behaviour of different components under different loadings ❖ Design Principles of different components such as Foundation , Substructure, Superstructure, Bearing etc
14:00-15.30	**Road Safety Engineering & Other Measures** ❖ Safe System Approach ❖ Elements & Design Principles of At-Grade Intersections ❖ Elements & Design Principles of Grade Separated Intersections ❖ Road Safety Engineering Measures- Road Signs, Road Markings, Delineators, RPM, Crash Barriers, Traffic Calming Measures etc. ❖ Bus Bays ❖ Truck Lay Bye ❖ Highway Lighting ❖ Way Side Amenities
15.45-17.15	**Land Acquisition & Project Clearances** ❖ Guiding Principles for Land Acquisition ❖ Social Impact Assessment Studies ❖ Preparation of Land Plan, Schedule and Draft Notifications under RFCTLARR ❖ Environmental Impact Assessment Study and Preparation of Environmental Management Plan ❖ Guidelines for Environmental Clearance ❖ Guidelines for Forest Land Diversion ❖ Guidelines for Wild Life Clearance

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	❖ Guidelines for CRZ Clearance
Day 5	
09.45-11.15	**Project Costing** ❖ Standard Data Book ❖ Quantity Calculation ❖ Rate Analysis ❖ Cost Estimation
11.30-13.00	**Economic and Financial Analysis** ❖ Objective of Economic and Financial Analysis ❖ Economic Analysis using HDM-IV • Assessment of the capacity of existing roads and the effects of capacity constraints on vehicle operating costs (VOC) • Calculation of VOCs for the existing road situation and those for the project • Quantification of all economic benefits, including those from reduced congestion, travel distance, road maintenance cost savings and reduced incidence of road accidents • Estimation of the Economic Internal Rate of Return (EIRR) for the project over a 30-year period. (Identification of the tradable and non- tradable components of projects costs and the border price value of the tradable components) • Calculation of Saving in time value. • Estimation of NPV ❖ Financial Analysis • Finalization of the format for the analysis and the primary parameters and scenarios that should be taken into account • Calculation of financial internal rate of return, projected income statements, balance sheets and fund flow statements. • Identification, assessment, and mitigating measures for all risks associated with the project. • Sensitivity Analysis
14.00-17.00	**Use of GatiShakti Portal for Highway Projects** • Planning for DPR Preparation for proposed alignment through National Master Plan Platform • Demonstration of National Portal (PM Gati Shakti Integrated Master Plan) & Ministry of Road Transport & Highways Portal.
17.00-17.15	**Test, Feedback, Concluding and Distribution of Certificates**