

Manual of Specifications and Standards for State Highways

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Context

- Manual of Specifications and Standards
 - In relation to Schedule D of MCA
 - Integral part of MCA
- Project highway shall conform to the Manual of Specifications and Standards
- Deviations from the Manual
 - To be listed
 - Approval needed for deviations

Key Objectives

- Quality supply at reasonable cost
- No compromise on safety
- Harnessing private sector
 - Better performance
 - Cost reduction/effectiveness
 - Efficiency of operations
- Standardise
 - Scope of works
 - Performance requirements
- Flexibility for project-specific requirements
- Phased development approach

The DRILL

- Task of preparing Manuals entrusted to Indian Roads Congress (IRC)
- IRC : A body of professional Engineers in the highway sector (government, private, academia and research)
- Process
 - Group of Experts (Base Document)
 - Project Preparation Committee
 - General Standards & Specifications Committee
 - Executive Committee
 - IRC Council
 - Secretary General IRC authorised to finalise and publish

Manuals

- Two laning/two laning plus paved shoulders
IRC SP73-2007
- Four laning: IRC SP84-2009
- Six laning (under printing by IRC)

Coverage

- General
- Geometric design
- Intersections, grade separators
- Road embankment and cuttings
- Pavement design and drainage
- Design of structures – bridges, culverts, ROBs/RUBs, flyovers
- Materials for construction
- Traffic control devices, road safety features
- Toll plazas
- Landscaping and tree plantation
- Project facilities: Rest areas, truck/bus bays, HTMS, TAP, MAP, etc.
- Special requirement for hill roads
- Guidelines for preparing schedules A,B,C,D & H of MCA

General

- Basically, current IRC standards, but Concessionaire free to innovate in design, construction
- Only core design and construction requirements stipulated
- Project-specific requirements to be given in Schedules of CA by the government.
- Land to be provided by Government
- Feasibility Report by Government
- Surveys and detailed design by Concessionaire
- IE to review designs, drawings, QAM, and indicate non-conformity with the requirements for rectification
- Safety of traffic and workers in construction zones
- Utilities relocation to be accounted for

Phased Development Approach (Two Laning Manual)

- Minimum 7 years before second stage
- If initial traffic less than 8000 PCUs/day in plains – Two Lane (with granular shoulders)
- If initial traffic more than 10000 PCUs/day in plains – Two Lane with 1.5m wide paved shoulders
- If initial traffic 8000-10000 PCUs/day in plains – choice left to state government
- Section through built up area to be 4-lane
- If land a constraint, bypass
(alignment of bypass by government, eccentrically placed)

Geometric Design Features

- Design speeds (100, 80, 50, 40 km per hour depending upon nature of terrain) and geometric features as per IRC standards
- Ruling design speed to govern unless site conditions restrictive
- Roadway 12m in plain/rolling terrain and 10 m in mountainous/steep terrain
- Shoulders to be fully paved in built-up area
- In hill areas, shoulder hill side – 1 m, valley side – 2m

Design Service Volumes of 2-Lane Highways in PCUs per day (LoS 'B')

Terrain	Without Paved Shoulders	With Paved Shoulders
Plain	15000	18000
Rolling	11000	13000
Mountainous and Steep	7000	9000

Intersections, Interchanges

- Locations, layout to be specified by Government
- General principles as per IRC standards
- Grade separators when project highway intersects a road carrying traffic more than 15000 PCUs/day
- Vertical clearance 5.5 m for vehicles and 3.0 m for pedestrians
- Design standards IRC SP 41, 35, 67; IRC 92
- Carriageway with four-lanes to be at level and flyover with two-lanes at raised level
- Carriageway with 4-lanes to be at existing level and flyover with 2 lanes at raised level

Road Embankment and Cuttings

- Existing roadway, if deficient, to be widened
- Raising, if required, to be specified by Government
- Smooth vertical profile while approaching structures
- For new roads, bottom of subgrade 1.0m above HFL
- No borrow pits within ROW or along the road
- Subgrade material not less than 7 CBR
- Proper drainage arrangements
- Where required, design of ground improvement, high embankment, flyash usage

Pavement Design

- Normally Flexible Pavements (IRC 37, 81)
- If CC pavement, to be specified by Government as a deviation together with maintenance requirements – IRC 58
- New Pavement: Minimum design period 15 years. However, initial bituminous binder/ wearing courses can be for minimum 8 years. (subbase and base 15 years)
- For strengthening of existing pavement: Min design period 8 years for initial overlay and 5 years for subsequent overlay
- Pavement performance: Roughness not more than 2000 mm/km
- Rutting/cracking – NIL
- Milling/Recycling of existing pavement allowed

Drainage

- Roadside drains
- Median drainage
- Drainage of high embankment
- Catch water drains
- Subsurface drains
- Internal drainage of pavement
 - CC lining in paved areas, erodible soils and vicinity of embankment toe.

Structures

- Width of structure upto 60 m length, equal to roadway
- Width of structure beyond 60 m length = 7.5m unless specified otherwise (footpath to be specified by Employer. Raised. 12m)
- ROB/RUBs unless specified otherwise
- Bridges/culverts which are distressed to be reconstructed and specified
- Retain existing sound bridges with 7.5 m carriageway
- Specify utility services if to be taken on the structure
- Reinforced earth – not more than 6 m

Traffic Control Devices, Roadside Furniture, Safety Works

- As per IRC standards. They are in conformity with UN International Conventions
- Retro reflection requirements as per latest instructions/revision by MORTH and IRC 67:2010
- Warrants given for roadside crash barriers

Toll Plazas

- General Layout given
- Number of toll booths to increase with traffic growth and peak hour factor
- Semi-automatic facilities as minimum
- ETC lanes envisaged
- Land by Government. Concessionaire can be asked to procure on behalf of Government
- Minimum number of lanes: 5 years forecast

Landscaping and Tree Plantation

- Minimum number for compensatory afforestation to be specified by Government
- Guidelines for planting given. Minimum distance from centre line of extreme traffic lane – 10 to 12 m (future widening to 4-lane be considered)
- Regular trimming, minimum 6m vertical clearance in non-urban areas

Project Facilities

- Pedestrian facilities
- Street lighting
- Truck Lay byes
- Bus shelters, bus bays
- Cattle crossings
- Traffic Aid Posts
- Medical Aid Posts

As and where specified by Government

Special Requirements for Hill Roads

- IRC SP: 48 (updating taken up separately)
- Protective structures
 - Parapets
 - Boulder nets
 - Safety barriers
- Visibility at curves
- Hairpin bends
- Climbing lanes
- Tunnels
- Retaining walls
- Disposal of debris

Costs

- Unit costs showing heavy escalation
- Matter of concern and requiring some attention
- Risk of wipe-out of programme
- Research effort to promote use of natural occurring materials near project sites without compromise on quality/performance standards
- Recycling of pavement another major area needing some focus

Feasibility Report

- Key requirement for inviting offers
- Good/sound FR an asset for sector
- Win-win for both Government and Concessionaire.

Currently a Weak Area

Scope of Services (Feasibility Report Consultant)

- Traffic Survey and demand assessment
- Engineering surveys and investigations
- Location and layout of toll plaza
- Location and layout of truck laybys
- Location and layout of bus bays and bus shelters

Scope of Services (contd.)

- Social impact assessment
- Environment impact assessment
- Preliminary designs of road, bridges, structures, etc.
- Preparation of Land Plan Schedules and Utility Relocation Plans
- Preparation of indicative BOQ and rough Cost Estimates
- Preparation of Schedules A, B, C, D and H of the Concession Agreement

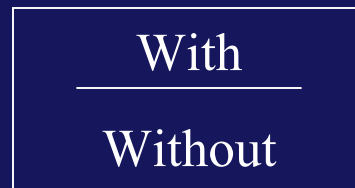
Two Initial Activities (Very Useful for Government)

- Report on ALIGNMENT including geometric improvements and first traffic survey.
- Report on Land Plan schedules and utility relocations.

Knowledge Management: R & D Thrust Areas

- Capacity and Design Service Volumes

- Two Lane
- Four Lane
- Six Lane



- Paved Shoulders
- Service Roads

- Type and width of Paved Shoulders on two, four and six lane highways
- Diagnosing health of existing bridges / culverts
- Promoting use of naturally occurring materials
- Predicting rate of deterioration of pavements: APTF available with CRRI
- Permanent Traffic Counts and Axle Load Surveys
- Wealth of data in DPRs/FRs, put data in public domain

Thank you for
Your kind attention

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