Part- III

GENERAL PLANNING CRITERIA

CONTRACT No. NGNDD01

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Section G
GENERAL PLANNING AND DESIGN REQUIREMENTS

G1 PURPOSE AND SCOPE

The purpose of this Appendix is to include other criteria and requirements not included elsewhere that are necessary for the full development

G 2 SITE DESIGN

G 2.1 Principles and Standards

This section lists the main principles and standards for urban design, site design, and landscaping at stations. This includes basic design principles, vehicular and pedestrian circulation, and parking. Circulation patterns for traffic within station sites and on approaching streets shall be determined on a site specific basis for each station site. Three conditions shall always be considered:

- Integration of stations and associated property development with the existing urban fabric, respect for local traditions, where applicable, and minimising visual intrusion into the urban landscape are important NMRC goals.
- Separation of traffic modes to allow convenient, safe, and rapid access to and from NMRC facilities.
- Accommodation of passenger design loads for NMRC traffic.

G 2.2 Access Modes

NMRC passengers will arrive at and depart from the stations via five basic modes of transport. In order of priority for station access, these transport modes are as follows:

- Pedestrian Walk-in;
- Scooter and Cycle with parking;
- Bus;
- Taxi, Auto-Rickshaw, Cycle-Rickshaw and Car Drop-off;
- Automobile with Station Parking.

G 2.3 General Site Circulation Parameters

Pedestrian Link.

Entrances shall cater to the pedestrian. In most cases, the station will be tied by a pedestrian link to the podium level of adjacent development. Various ground circulation systems will be located below the level of the pedestrian podium.

Entrance Conditions.

An entrance shall be visible from the bus-loading area, if possible, and at a minimum shall be easily accessible from the loading area. Covered access from the vehicle drop-off areas to the station entrance shall be provided. In most cases this will be provided by the podium level above the station. Where there is insufficient building

structure to cover the area, an additional canopy shall be considered.

Property Development.

Station and property development circulation shall be separated.

Orientation.

Site circulation layouts shall be simple and direct, allowing easy orientation for drivers and facilitating the movement of pedestrians.

Parking Layout.

Station parking areas shall be laid out so that queuing for parking will not obstruct bus circulation or automobile and taxi drop-off areas.

Intersections.

Where conditions permit, roadways shall be one-way circulation, with turning loops eliminating intersections within the site.

Sightlines.

Sightlines at merges or intersections shall be left clear.

G 2.4 Pedestrian Access

From Adjacent Streets

Direct and safe approaches for pedestrians shall be provided into the station area from all adjacent streets.

Crossing Traffic

Right-of-Way. Pedestrians shall have the right-of-way over vehicles at crossings of internal roadways.

Visibility

Pedestrian crossings shall have good visibility for both pedestrians and drivers.

Refuge Area.

Pedestrian crossings at streets wider than four traffic lanes shall have a refuge area in the median.

Path Direction.

A pedestrian's path from a parking stall to the station entrance shall be as direct as possible. Where possible, the use of natural light shall serve to identify this route. The coefficient of directness, i.e., length of path divided by straight line distance, shall not exceed 1 in 4, preferably 1 in 2.

Kerb Cuts

At all pedestrain crossings, kerb cuts shall be provided for Persons with Special Needs. All kerb cuts shall be marked with signs.

Markings

Pedestrian crossings shall be emphasised with textured pavement or crosswalk markings. Where major pedestrian paths cross roadways, the paving material, or a material of similar colour, shall be carried across the roadway to emphasise the pedestrian right-of-way.

Number of Crossings.

The parking pattern shall be designed to allow pedestrians to walk toward the station with a minimum of traffic crossings.

Minimum Dimensions.

Minimum dimensions of pedestrian walkways and crosswalks shall comply with Indian Road Congress(IRC) requirements.

Pedestrian Parapets and Missile Screens

All structures, including podium areas, parking structures, roof terraces, and walkways that cross over railway tracks, shall have solid parapets 1500mm high. The parapets shall be designed to prevent persons from walking or standing on top of them, including protection to the ends to deny access. Lightweight missile screens above parapets shall be provided to a combined height of 3000mm minimum above finish floor level to prevent articles from being thrown directly onto the track.

G 2.5 Vehicular Access

Traffic Distribution.

Vehicular entrances shall be located to distribute traffic loads evenly over the site.

Entrance Location.

Vehicles shall enter from secondary roads, where possible, with provision for sufficient waiting and stacking space.

Separation of Types.

Entrance and exits from station parking shall be separated, where possible, from those of bus and auto drop-offs.

Number of Entrances.

The number of vehicular entrances along any one street shall be kept to a minimum.

Turning Lanes.

Where required for traffic mitigation, turn lanes shall be provided for entering or exiting vehicles. Left turns into and out of the station are preferable to right turns.

Emergency Vehicle Access.

Emergency vehicle access shall be provided to all building structures, especially the station entrances. Station access roads and parking lot perimeter roads shall accommodate emergency vehicles including fire trucks.

Auto Drop-off

A drop-off and pick-up zone, preferably with boarding on the left hand side, is required adjacent to the main entrance of the station. This area shall be sheltered, in most cases, by the station or the podium of the property development. A kerb cut shall be provided within or adjacent to this area for Persons with Special Needs. The location of the kerb cut shall be marked with signs.

Where site area permits, a parking area for persons waiting to pick up passengers shall be conveniently located close to the pick-up zone. This parking area shall provide good visibility of the station exit and shall permit convenient re-circulation of

vehicles.

G 2.6 Station Parking

Locations.

Parking shall be provided at some stations. Space will generally be provided in structured garages. Where space permits, parking may also be provided at ground level.

Aisle Direction.

The direction of the parking aisles shall be determined by the needs of both the pedestrians and the vehicles. In most cases, the aisles shall be perpendicular to the station entrance. Where site conditions dictate parallel aisles, provision shall be made for pedestrians to cross the parking row.

Angle of Parking.

Standard 90° parking is preferred.

Wheel Stops.

Wheel stops within each parking space shall not be used as they are a maintenance problem.

Landscaping.

Where station parking is provided at-grade, landscaping shall be used to sub-divide the parking area and to provide shade.

Payment.

Parking shall be on a pay per entry basis. Entrance and exit gates shall be operated by means of a card validated at the parking shroff. Details of payment for and management of parking areas shall be determined at a later date.

Special Needs Parking.

Parking designated for Persons with Special Needs shall be located as close to the station entrance as possible. Roadway crossings from these spaces to the station entrance shall be kept to a minimum.

Numbering.

All public parking places shall be numbered.

G 2.7 Taxi and Bus Lay-Bys

Bus lay-bys shall be provided at stations to facilitate passenger transfers to bus transport in the event of emergency or train failure. Additional bus lay-bys shall be designed to suit site specific requirements and demand forecasts.

G 2.8 Pedestrian Ways and Overpasses

Walkway, stair, and escalator space requirements shall be based on Level of Service “C” as described in *Pedestrian Planning and Design*, John J. Fruin, original copyright 1971.

G 2.9 Cycle Facilities

Cycle facilities shall be provided at selected stations. Stations most suited for cycle facilities include those in areas of low-density development and those adjacent to

existing or planned cycle tracks. A list of selected station locations will be developed during the Technical Studies phase. Cycle facilities shall conform to the criteria given below.

- Connections to Community. Cycle tracks shall be designed to provide a direct, convenient connection between the station and any existing or proposed bike routes throughout the community.
- Vehicle/Cycle Interface. Cycle track design shall avoid any undue conflicts of cycles with motor vehicles moving parallel to the cycle track, turning across the cycle track, or crossing the cycle track at street intersections.
- Safety. Cycle tracks shall be designed to promote public safety. Cycle tracks that are near steps or kerbs or are hidden from public view shall be avoided.
- Cycle Track Configuration. At stations, cycle tracks shall be designed to pass through an uninterrupted corridor with access to station cycle-parking facilities.
- Pedestrian/Cycle Interface. Cycle-parking facilities shall be located out of the way of pedestrian walkways. They shall be detectable to the visually impaired by means of paving, kerbs, or railings, and shall be within view of station entrances.
- Equipment. Short-term cycle parking shall consist of a securing device that allows the two wheels and frame to be locked. Cycle racks shall not be placed on pedestrain walkways.

G 3 LANDSCAPING

G 3.1 Railway Alignment

The design shall provide for suitable landscaping and introduction of appropriate vegetation along the route of the viaduct to improve the aesthetic appearance of the structures. It shall also confirm to the master plan recommendations.

The design shall specify shrubs, trees and ground cover, suitable to their location and the city environment to be provided within the full length of the central median to improve and soften the impact of the structure on the city scene after completion of construction.

The design shall provide for watering points at appropriate centres along the median to enable plantings along this strip to be properly maintained.

G 3.2 Station Areas

The design shall include in the station design for the provision of appropriate planting to enhance and soften the appearance of the station box and the approach structures.

Landscaping and external works around station entrances and inter-change facilities to be included in the tender documents shall include:

- Standard Schedule Formats
- Typical Landscaping Details
- Fencing, Barriers and Bollards
- Site Fixtures, Furnishings and Equipment

G 3.3 Irrigation

The purpose of the following criteria is to provide efficient water use through proper design and management of landscape irrigation. Landscape irrigation systems shall conform to local codes and policies of the communities in which NMRC facilities are located.

Co-ordination with Plant Material.

Irrigation systems shall be organised so that non-drought-tolerant planting shall be watered separately from the rest of the landscaping.

Location.

Sprinklers and sprays shall not be used in areas less than 2500mm wide. Drip and bubbler devices shall be used with the minimum flow rate necessary to water plant materials.

Slope Conditions.

Sprinkler heads on slopes exceeding 15% or on slopes exceeding 10% within 3000mm of hardscape areas shall be calibrated to prevent excess runoff.

Valves and Circuits.

Valves and circuits shall be separated based on water use.

Trees.

Drip or bubbler irrigation systems shall be required for trees.

Sprinkler Heads.

Sprinkler heads shall have matched precipitation rates within each control valve circuit. Sprinkler head spacing shall be designed for head-to-head coverage

Check Values.

Serviceable check valves shall be required where elevation differential may cause low head drainage.

Runoff.

Irrigation systems shall be designed for minimum runoff and overspray to non-irrigated areas.

Programming.

All irrigation systems shall be equipped with a controller capable of dual or multiple programming. Controllers must have multiple-cycle start capacity and a flexible calendar program.

Control.

All irrigation systems shall be controlled by a central computer.

Irrigation Schedule.

Every controller shall have an irrigation schedule attached for maintenance personnel to follow. Irrigation schedule shall reflect time of year and plant maturity.

Water Budget.

Plans shall include a water budget that includes the following:

- Estimated annual water use (in litres) and area irrigated (in square metres);
- Precipitation rates for each valve circuit;
- Monthly irrigation schedule for plant establishment period and the first year

thereafter.

Vacuum Breakers.

All vacuum breakers and controllers shall be located to eliminate the need for corrective screening.

Quick-Disconnect Valves.

In parking, podium, and plaza areas, quick-disconnect valves shall be provided for washing pavement and watering trees in pockets.

Rain Detection.

Rain shutoff devices with automatic controller and automatic moisture sensors shall be used. Precipitation rates for a given circuit shall not exceed soil absorption rates.

G 4 UTILITIES

G 4.1 The DDC is responsible for determining the extent of existing services in the area of the Works, and for planning, in co-ordination with Utility Agencies the relocations and diversions of the services to enable the Permanent Works to be carried out. The DDC will follow the requirements of the Utility Agencies for relocation or diversion of their services.

If the DDC is required to relocate or divert any utility to a higher standard or capacity than the existing system, the DDC will advise the Employer's Representative.

G 4.2 The DDC will note that in addition to any liaison with the Utility Agencies regarding diversion works, any works which will affect the operation of the Highway will have to follow the appropriate procedures as laid down by the Noida-Greater Noida authorities and/or the **highway authority** in this respect.

G 5 ACCESS FOR INSPECTION AND MAINTENANCE

The design shall incorporate suitable access provisions for the inspection and maintenance of all structures and equipment.

This will include provision for inspection of structural and non-structural elements within the station structures. Any bearings shall be accessible for inspection and, where necessary, replacement. Half joints in structures should be avoided where possible.

G 6 ENVIRONMENTAL REQUIREMENTS

G 6.1 General

The DDC shall note the requirements in respect of the Environmental Protection Requirements to be applied to the Works.

G 6.2 Noise

The design of the Permanent Works shall minimise noise emission due to operation of the railway, and shall comply in full with the following requirements:

(a) The design of all parts, including non-structural parts, of the structures shall minimise as far as practicable the radiation of noise due to vibration caused

by the passage of trains. Particular attention shall be paid to the minimisation of noise at the low end of the acoustic frequency spectrum.

(b) Walls and slabs intended to contain airborne noise from the railway shall be of concrete of 200 mm minimum thickness or shall be purpose-made, non-combustible, vibration absorbing/damping GRC panels or similar construction.

G 7 SECURITY REQUIREMENTS

G 7.1 The Permanent Works shall be sufficiently robust to restrict, to acceptable levels, their vulnerability to accidental or malicious damage.

G 7.2 All security measures shall be subject to the consent of the Employer's Representative.

G 7.3 Security against unauthorised access to the various parts of the Permanent Works shall be provided.

G 8 DURABILITY AND MAINTENANCE

G 8.1 The design shall ensure, by means of the appropriate choice of structural forms, details and materials, that the structure shall remain in a serviceable condition over its life, with due regard to its location and the environmental and climatic conditions prevailing. In particular, the following shall apply:

(a) Only materials and details having a proven record of durability in similar conditions shall be used.

(b) All bearings shall be replaceable without major disruption to traffic using the bridge or to rail, waterway or other operating traffic or to other activity scouring underneath the bridge. Appropriate jacking points shall be provided.

G 8.2 Access shall be provided for inspection and maintenance to all elements of the structure.

G 8.3 Maintenance requirements shall be minimised by appropriate detailing and the selection of suitable materials that will reduce weathering and staining as far as possible. Structures shall be detailed so as to shed surface water in such a way that ponding and streaking do not occur and details which encourage the accumulation of debris shall be avoided. Details shall be designed for ease of maintenance.

G 9 ROAD PAVEMENTS

Road pavements for reinstatement of roads excavated by the DDC shall be designed to the same standard and form as the existing road, to the satisfaction of the Authority responsible for the road.