OBJECTIVES

To evolve a policy framework for plantation along National Highways;

To reduce the impact of air pollution and dust as trees and shrubs are known to be natural sink for air pollutants;

To provide much needed shade on glaring hot roads during summer;

To reduce the impact of ever increasing noise pollution caused due to increase in number of vehicles;

To arrest soil erosion at the embankment slopes;

To prevent glare from the headlight of incoming vehicles;

To moderate the effect of wind and incoming radiation;

To create employment opportunities for local people;

1. Introduction:

1 Loss of vegetation is one of the inevitable consequences of Highway Development. It is the responsibility of the highway development agencies to offset this loss by way of following the approach of Corridor Development & Management. The highway development agencies must strive to enhance the aesthetics of the highway corridor at all possible locations. Highways shall not be looked upon merely as a means of transportation, but an integral part and parcel of the physical environment and Socio-economic milieu.

1.2 Often, while preparing the Land acquisition Plans for the highway projects, the land needed for the avenue plantation and landscape improvement is not considered during the DPR stage. As a result, after construction, when the planting is actually to start, there is no option but to accommodate planting in whatever space available. The width of the remaining ROW is, many times, not sufficient to accommodate even a single row of plants; whereas at some places, three to four rows can be planted. In order to ensure availability of sufficient width throughout for avenue planting, it is necessary that the requirement of land for tree plantation shall be included in the Land Acquisition Plans prepared by the DPR consultants.

2. Institutional arrangements and Financing Pattern

2.1 It is experienced that the scenario of road side plantation is not satisfactory in most of the projects implemented through BOT, DBFOT and public funded projects. This is the responsibility of road implementation agencies to develop green corridor along highways for aesthetic enhancement of the project corridors and places of importance by planting selective ornamental trees, landscaping and turfing with grasses and ornamental shrubs, in order to reduce the impact of air pollution and dust as trees and shrubs are known to be natural sink for air pollutants and carbon sequencing. It also reduces noise pollution and provides much needed shade on glaring hot roads during summer. Plantation arrests soil erosion at the embankment slopes, prevents glare from the headlight of incoming vehicles and moderates the effect of wind and incoming radiation. Green corridors guide the drivers for long distance curves and openings.

2.2 For successful implementation of plantation in an eco-friendly manner throughout the country, development of green belts along the highways will be done through outsourcing of Plantation work to expert & experienced agencies/organizations. The Nodal Agency will appoint empanelled agencies for plantation work on National Highways. The successful agency shall follow the model TOR, IRC-SP-21, 2009 and project specific conditions for plantation and maintenance.

2.3 The Nodal agency for forest areas will be the concerned Forest Division. In case of Public Funded Projects the concerned Regional Officer of MoRT&H/ NHAI will be the nodal agency. In cases where roadside plantation is included in the concession agreement, the concerned concessionaire will be the nodal agency.

2.4 MoRTH or its authorised agencies shall take up the plantation work if the contractor/ concessionaire fail to implement the plantation program within the stipulated time period as per agreement at the risk and cost of the concerned contractor/concessionaire after terminating the particular scope of the contract. The responsibility of ensuring compliance to specifications will, however, rest with the nodal agency as per IRC-SP:21-2009.

2.5 The selection of species will be strictly done as per guidelines or as per the recommendation of adjoining forest department with site specific native species.

2.6 The planting agency will have no right whatsoever on the land under plantation. Such agency will not be authorized to undertake any other form of under-plantations or any other activity on such land, other than included in the approved planting scheme. An MOU shall be signed with the agency for strict compliance of the technical specification, species, maintenance schedule, survival, payment terms and conditions and on the legal right of the land as well as forest produce.

2.7 One percent of the Total Project Cost (TPC) as Plantation Fund which will be kept in a separate account with the Authorised Agency appointed by the Ministry.

2.8 The Procurement of the agency for plantation and maintenance shall be done by a committee consisting of concerned Regional Officer NHAI/MoRT&H, Representative of the Monitoring Agency and the Concessionaire in case of BOT projects. In case of Public Funded Projects, a representative of CE(Planning) MoRT&H/CGM(Environment),NHAI

will also be a member of the procurement committee. The cost of the Plantation & Maintenance will be borne from the One Percent of the Total Project Cost(TPC) earmarked and kept in a separate account with the Authorised Agency.

2.9 There will be a District level Advisory committee which will meet once in a quarter and give its recommendations/advice to the monitoring cell. The ROs/PDs of MoRTH/ NHAI in the district will be the convener of this committee.

3. Land Requirement

3.1 Based on the inventory, an action plan shall be prepared as regards additional landscaping measures and traveller amenities. If available land width is insufficient to implement this plan, acquisition of additional land shall be seriously considered keeping in view the following requirements during feasibility/DPR study:-

I. To provide flatter side slopes in cuts and fills along with contouring of the adjacent land.

II. To provide enough space for planting suitable trees and plants.

III. To provide sufficient area for parking, look out spots and other aesthetic features.

4. Plantation Agency

4.1 The entire highway network will be divided into two categories based on the legal status of the existing road-side plantations. In the first category are those areas, where plantations on the ROW have been notified as protected forests, and highway alignments passing through forest areas. For these areas, permission for tree cutting is required to be taken from the forest department under the Forest Conservation Act, 1980. While granting the permission, the forest department stipulates the conditions not only for compensatory afforestation (CA) but also for avenue plantations. In these cases, the amount for avenue plantation is deposited with the Forest Department and normally the work of avenue plantation is taken up by Forest Department apart from CA.

4.2 As the second category, such highway corridors where the ROW is not declared as protected forest, the roadside plantations may be taken up either through the contractor (if it is a BOQ item) or the Concessionaire (if it is included in the concession agreement), forest department and department dealing the Watershed Development in the State, Watershed Cell-cum-Data Centre[WCDC] at district level and the Watershed Committee [WC] at local level with local communities /local self government institutions / Women Self Help Groups (WSHGs) / Self Help Groups (SHGs) / Joint Forest Management Committees (JFMC), or through open bidding by empanelled agencies.

4.3 **Plantation through bidding process:**

The plantations and its maintenance may be taken up through outsourcing following bidding process as per standard protocol of procurement of MoRTH and its agencies for the stretch/ROW not declared as protected forest under Forest Conservation (Act) 1980.

4.4 **Empanelment of Agencies**

Ministry of Road Transport and Highways will appoint an authorised agency for empanelment of Plantation Agencies. A separate panel of Agencies having specialisation in Transplanting of trees will also be prepared. Only empanelled agencies will be allowed to bid for planting work on the National Highways.

5. Role of Local Self Governments

5.1 For roadside plantations, nodal agencies will be encouraged to involve the local institutions like local self governments, JFMCs & SHGs for plantations, watering, protection and sharing of usufructs. Local Self Governments [LSGs] may assist in selecting the plantation agencies in their areas.

5.2 All plantations, except those carried out by the Forest Department in compliance to any statutory condition, will be carried out under an MOU entered by the nodal agency with the plantation agency.

5.3 Convergence with schemes of other government departments and agencies will be articulated and encouraged wherever feasible.

6. Plantation Scheme

6.1 The plantation scheme has been broadly classified into two categories which are as follows:-

a) Tree planting along the Highway Turfing with grasses and shrub/herb.

b) planting on medians/special landscapes/embankment slopes.

6.2. Selection of Tree Species for roadside plantations:

6.2.1 Plantation is one of the most important constituents of soft landscaping. Trees, shrubs and climbers have been used to enhance the soft natural ambience against harsh elements in most of the enhancement schemes. The planting species are decided based on the physical growth characteristics of trees, like form and shape, foliage pattern, growth rate, branching pattern, soil characteristics and conditions of the strip like water logged areas etc. While selecting the species of trees for landscaping, a great care shall be taken to choose the species, which already exist along the project corridor. On the other hand, if a pure avenue of single species is planted for a considerable length of the road, it gives a harmonious and pleasing look. It is, therefore, essential that mixtures of different species shall be avoided and pure avenues of a single species be planted over long stretches of road. This will enhance the aesthetic quality and will also render management easier.

6.2.2 The selection of plant types and planting arrangement shall be based on the following considerations:-

I. Aim and objective of plantation

II. Shape and size (size and spread) of the canopy

III. Texture and colour of foliage/flower/fruits in different seasons and stages of growth.

IV. Adaptability and suitability to agro-climatic regions/zones

V. Growth rate (slow/fast) average age of maturity and replacement cycle

VI. After care and maintenance required for sustenance and growth

VII. Economic and other social/recreational benefits

VIII. Drawbacks and demerits if any, like prone to insects/pests disease, animal grazing and human interference.

6.2.3 The Guidelines on Landscaping and Tree Plantation (IRC:SP:21-2009), provide for detailed specifications with respect to roadside plantations and Median Plantation.

6.3. Plantation Pattern

6.3.1 The road landscape shall be developed envisaging a holistic approach to the entire stretch. A concept shall be evolved so as to maintain visual characteristics and uniformity in terms of landscape along the stretch. In the absence of uniform land availability for the plantations, different schemes may be worked out in tune with local variations in the design. To achieve this, the entire stretch of the project corridor shall be divided into homogenous landscape sections based on similarity in terms of available width, soil conditions, climate (temperature and rainfall) and topography. A study on the local flora and vegetative cover native to these sections shall be carried out as part of the field surveys to enable a choice of the suitable species for particular section. Depending on the available ROW, plantation pattern shall be worked out as follows:-

- The first row along the Highways will be of small to medium sized ornamental trees.
- Subsequent rows depending on the availability of width will comprise of ornamental and/or shade bearing species, of more height than those in the first row. In rural sections the last row will always be of shade bearing tall trees.
- Planting of shrubs in the median.
- Planting of herbaceous species as ground cover in the median, special landscapes, and embankment slopes.
- Turfing with grass in the median, special landscapes, and embankment slopes.

6.3.2 Table 1, 2 and 3 list a few species, which can generally be planted throughout India.

Table 1

Species Recommended for 1st Row of Avenue Plantations

S.NO.	SOIL	BOTANICAL NAME	LOCAL NAME
1.	Loamy	*Delonix regia*	Gulmohar
2.		*Cassia fistula*	Amaltas
3.		*Bauhinia sps.*	Kachnar
4.		*Cassia nodusa*	Cassia
5.		*Jacaranda mimosaefolia*	Jacranda
6.		*Peltophorum ferrugineum*	Peltophorum
7.	Water logged condition	*Terminalia arjuna*	Arjun
8.		Syzygiumcuminii	Jamun
9.		*Cordia dicotma*	Lasoda
10.	Alkaline soils[Usar]	*Terminalia arjuna*	Arjun
11.		*Pongamia pinnata*	Kanji
12.		*Albizzia lebbek*	Kala Siris

Table 2

Species Recommended for 2nd and subsequent row, except the last row of Avenue Plantations

S.NO.	SOIL	BOTANICAL NAME	LOCAL NAME
1.	Loamy	*Melia azadiracta*	Bakain
2.		*Pongamia pinnata*	Kanji
3.		*Gravillea robusta*	Slver Oak
4.		*Albizzia lebbek*	Kala siris
5.		*Dalbergia sissoo*	Shisham
6.		*Terminalia arjuna*	Arjuna

Table 3

Shade trees recommended for last (or the only) row in roadside avenues

S.NO.	SOIL	BOTANICAL NAME	LOCAL NAME
1.	Loamy	*Ficus religiosa*	Peepal
2.		*Ficus infectoria*	Paker
3.		*Madhuca indica*	Mahua
4.		*Mangifera indica*	Mango
5.		*Azadirachta indica*	Neem
6.		*Tamarindus indica*	Imli
7.		*Syzynium cuminii*	Jamun
8.		*Dalberjia sissoo*	Shisam
9.		*Dalbergia sissoo*	Shisam
10.	Sandy	*Azadirachta indica [at ph up to 8.5]*	Neem
11.	Alkaline soil [Usar]	*Pongamia pinnata [upto 9.0 ph]*	Kanji
12.		*Terminelia arjuna*	Arjun
13.		Syzyniumcuminii	Jamun
14.	Water Logged Area	*Terminalia arjuna*	Arjun

6.3.3 The above lists represent common species, which can be planted almost throughout India. Region-wise specific choices can be made with the help of local experts from the Forest department and Horticulture department. As far as possible, fruit bearing trees like Mango, Neem, Jamun and Imli are ideal for areas near habitations throughout India. Other locally useful fruit bearing species like Jackfruit, Mahua, Bel, etc., may also be preferred.

6.4 The shrubs to be planted in the median shall be of low or medium height for prevention of the headlight glare. One to two rows of flowering shrubs may be provided according to the varying width of the median in different sections. In sections where the median width is less than 1.5m, only grasses turf is advisable. Some herbaceous species may also be planted as a ground cover, not only on the medians but on special landscapes and embankment slopes also. The species proposed for the purpose of turfing/ ground cover are: *Cynodon dactylon, Cythocline perpurea, Solanum nigrum, Alternanthera, Chlorophytum, Eupatorium, Wedelia, Duranta, Portulacca, Ipomea, Pelia cadrii, Beleprone oblongata, Tradescantia, Asparagus, Opheopogon grass etc.* The shrub species proposed

the climatic conditions, requirement of water and future management. However, other species suitable and suggested by Forest Department/Horticulture Department can also be used.

7. Technical Specification

7.1 The technical specification for planting along the Highways are as follows:-

(i) Ornamental plants except last row

Distance from embankment	1.0 mt. away from the toe of the embankment
Spacing between plant to plant	3 mts.
Spacing between rows	3 mts.
Size of the pits[Normal soil]	60x60x60 cms
For Alkaline soil [Usar]	By Augar
Water logged areas	mounds with height varying depending on the water level
No. of plants per km	333
Activity and time schedule	As per agreement
Height of the plant	1.5m to 2 m

[ii] Shade plants (Last row)

Distance from the preceding row	3 mts
Spacing between plant to plant	12 mts.
Size of the pits[Normal soil]	60x60x60 cms
Alkaline soil [usar]	By Augur
Water logged areas	Mounds
Species recommended	As per agreement
No. of plants per km	84
Height of the plants	more than 2 mts.

7.1.2 In localities where a really bad patch of usar occurs, there is a need to dig deep pits by auger [mechanical device] to break the kankar pan down below and replacing the soil by good quality soil. The soil amender Gypsum 1 to3 kg. depending on the pH along with 2 kg. composite and sand are filled in the pits. The treatment helps in lowering down the pH and thus enabling better survival of plants.

7.2 Specifications for Median Plantation:

7.2.1 One or two rows of flowering shrubs are recommended in accordance to the varying width of the median in different sections. In sections where median width is less than 1.5 meter, only grass turf is recommended. In median width of 3 meters, one row of shrub whereas in 5 meter median width, plantation of two rows of flowering shrubs are proposed.

7.2.2 Only two rows of shrubs will be planted on median width of 5 meters and these plants will be at a spacing of 1.5 meters from the inner edge of the median.

7.2.3 The plants will be at spacing of 3 x 3 meters and size of the pits for planting will be 0.6m dia and deep. Therefore, total no. of plants per km will be 333 in case where single row is proposed and 666 in case of two rows.

7.2.4 The surface for the median plantation shall be well prepared. The masses of loose derbies on the median and any convexities will be removed and similarly any concavities are to be filled by good soil. The surface shall have sufficient layer of good quality soil so as to have a better growth and survival of grasses and shrubs.

8. Transplantation

8.1 Occasion may arise when a grown-up tree has to be cut for making room for constructing a road, a building or other structure. It will be desirable to save this plant by transplanting it at a suitable site. To do this successfully some time is necessary. In winter when the tree is dormant or less active, it shall be pruned heavily leaving a bare framework of the large branches. A 40 to 50 cm wide trench 1 to 2 m deep shall be dug around the stem as much distance away from it, depending upon the stature of the specimen, cutting all the roots, big and small, in the process. The job of tree transplantation is quite complex and requires high quality expertise, technique besides specialised equipment and infrastructure.

8.2 The location for transplantation is to be identified and preliminary treatment is to be done at least 3-months in advance before the area is ready for transplantation. Transplantation of trees depends on the soil and climatic conditions of that area. Specialised techniques are required in transplantation of trees with specialised equipments and machinery. Transplantation of trees will be done to the maximum extent possible on the national highways to save the grown trees along existing ROW. The Translocation site shall be within 5 Kms. of the existing tree location.

9. Protection measures

The fencing of single row plantations will be done by using iron/brick/cement guards. Locally available bamboo guards or thorn fencing may also be used where protection can be ensured through these. The specifications for the iron guards are as per IRC-SP-21, 2009

The fencing of multiple row plantations will be done preferably by barbed wire. A five strand barbed wire fencing, with cross strands, stretched on angle iron poles fixed at a distance of 4 meter from one another is recommended. Live fencing/bamboo fencing/ thorn fencing may also be used where protection can be ensured through these. The specifications for barbed wire fencing are as per IRC-SP-21, 2009.

10. Road Safety

The first row of plantation shall be sufficiently away from the roadway so that they are not a hazard to road traffic or restrict the visibility. Most vulnerable location in this regard are the inside of curve, median, junction corner and cut slopes. Trees shall be planted at a minimum distance of 14m from the central line of the extreme traffic lane to provide recovery area for the vehicle that runs off the road. The second row is 3m away from the first row. The third and the subsequent rows is also be 3 m away from the second and so on as per availability of land. Growth of vegetation close on road curve may lead to serious reduction of clear sight distance and may cause accidents. Tall and overgrowth plants on and near the curve is not permissible. In plain terrain, a stopping site distance of 170 m corresponding to the designed speed of 100 Km per hour shall be ensured on all curved sections, on the innermost lane of the curve. Highway medians of upto 1.5 m width shall not be planted, as there is hardly any space left on such medians for maintenance. Undertaking maintenance on such medians

13.3 The project coordinator of the plantation agency will submit Progress report to the monitoring Agency with a copy to the concerned Project office of PD/RO, MoRTH/NHAI by 18th and 3rd date of every month, for the preceding fortnight (i.e., 1st to 15th, and 16th to the last day of every month, respectively), in excel format through e-mail.

13.4 The Horticulturist/Supervisor of plantation agency will compile and report quarterly status to the monitoring agency with a copy to concerned (Regional office) by 7th date of every quarter, in excel format by e-mail.

13.5 The monitoring agency shall examine the reports and send feedback and action points to planting agency, nodal agency and will send a comprehensive report with recommendation to NHAI/MoRTH.

13.6 The concerned monitoring division in MoRTH/NHAI will examine the reports and forword a verfied copy for inclusion in the monitoring database for uploading on the website.

14. Performance Audit

The monitoring Agency will conduct performance audit of Executing agencies for various projects on an Annual basis and award of new contracts to the agencies will be decided based on their past performance.

15. Awards to Best Plantation Agencies

Based on the performance in terms of plantation and maintenance of median and ROW plantation, Awards will be given to the Best Performing Agencies every year.

16. Sharing of usufructs

The usufructs from the roadside plantations will be shared as per the following arrangement:

- From plantations raised by the Forest Department, the share will be determined and approved by the competent authority in the Forest Department and will be specified in the plantation scheme.

from the carriageway may pose safety hazards. In case it is decided to raise plants on medians, permanent pipelines / drip irrigation systems must be laid to avoid use of tankers for watering.

11. Maintenance of Plantation

The scope of the maintenance work is as per agreement, IRC-SP-21, 2009 and also as per the schedule of the forest department for those items which are not included in the agreement/IRC guidelines.

12. Default

12.1 If the agency fails to arrange the sufficient quantities of material/manure/ pesticides/manpower/equipment (in good working condition) required to maintain the work in good condition within 7 days of its notification, the nodal agency will reserve the right to get it arranged at their risk and cost and will charge extra 20% on the actual expenditure incurred. In exceptional cases, RO, MoRTH/NHAI may consider to extend the time limit mentioned above. The decision of RO, MoRTH/NHAI shall be final and binding on the contractor in respect of extension of time for rectification of defects. However, all complaints will be attended promptly and within the time limit specified by RO, MoRTH/ NHAI

12.2 In case of default on the part of the Concessionaire with respect to planting or maintenance of plantations (as provided under Schedule C and Schedule K of the concession agreement), and based on the report and recommendations of the monitoring agency, action may be taken as per the conditions of the Concession Agreement or MOU with the concerned agency.

13. Monitoring

13.1 The Monitoring Agency will monitor progress of planting and status of plantations on continuous basis.

13.2 This agency shall carry out the site visit for field verification in respect of survival, growth and size of plantation and maintenance of the same.

Agreement/Contract Agreement or MOU with the concerned agency. The legal and financial liabilities shall be borne by the plantation agency for non compliances to Forest (Conservation) Act 1980 and subsequent amendments and Forest Conservation Rule and also local laws.

21. Review of Policy

Ministry of Road Transport & Highways reserves the right to renew or amend the policy from time to time.

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- In case of plantations raised by WSHGs, JFMCs, SHGs or other such local institutions, the said agency will have full rights on intermediary produce like dried fuel wood, fruits, etc. for the period of contract only.
- The Local Self Government will have full rights on intermediary produce like dried fuel wood, fruits, etc with in their jurisdiction after the expiry of the contract period of plantation and maintenance with the plantation agency with the condition that they will protect the encroachment of ROW and plantation from the 1st day of project under implementation. An MOU shall be signed with the Local Self Government Agency in this regard.

17. Compliance to Forest Conservation Act and local laws

Before starting any plantation, the local forest department will be consulted for ensuring compliance to any regulation in force that may affect raising, maintenance, and harvesting of the raised plantation. Necessary modifications will be made in the plantation scheme, in consultation with the forest department, to ensure compliance to law and to avoid complications at the time of harvesting and transportation of forest produce. In case the State Government has any provision for registration of such plantations, the same will be ensured under the relevant scheme.

18. Survival

The survival shall be 90% after raising the plantation of age one year at any stage during contractual period with normal shape and size.

19. Payment Terms & Conditions

The project shall be awarded on a turnkey basis based on the quantum of plantation for the specific site through bidding and payment will be made as per agreement.

20. Penalty

In case of default on the part of the Contractor/Concessionaire with respect to planting or maintenance of plantations, action will be taken as per the conditions of the Concession

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भारत सरकार
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