Outline of talk given at a meeting of road engineers from India.

Outline of Talk on
Fundamentals of Highway Planning
by H. S. Fairbank
May 1, 1947 - 10:00 a.m. to 12 noon

Epitome of the origins and development of highway transportation in the U.S., illustrated by stereopticon slides - showing U.S. traffic in its ox-cart origins of the early 1900's; the simultaneous existence of a virtually complete rail system; the rarity of surfaced roads; and subsequently the development of highways to the present state, by the example of a single section of U.S. Route 1, pictured at eight stages from mud, through gravel, concrete, widened concrete, black-topped concrete (2-way traffic) and divided highway, covering the period 1917-1947.

First fundamental - Road planning must take account of the principle of growth inhering in highway traffic. Growth principle feeble in early phases - needs fostering, subsidy. Can be killed or retarded by excessive taxation.

Experience in U. S.

First property taxation, next nominal vehicle taxes, these gradually increased, finally gas taxes and heavier vehicle taxes - property tax declining.

Consistent with benefits, which flow first to land and property, only later as roads are connected to road usage.

Strength of growth principle greatest in arterial movement, least in feeder movement.

Second fundamental - All road systems divide by function into an identical classification.

In U.S. terms - Federal aid, State, Federal-aid and State secondary - county and local. (tertiary)

In Indian terms - the proposals of the Nagpur Conference - National, Provincial, District, Village.

In form - a tree and its limbs, branches, and twigs.

Indian proportions differ slightly from U.S.

U.S.	Miles	%	India	%
Federal-aid	232,000	7.7	National	5.8
State (exclusive of F.A.)	106,000	3.3	Provincial	16.7
County & Local	2,662,000	89.0	District	77.5

Traffic service by U.S. systems

	% of total mileage	% of total vehicle mileage	Average daily traffic vehicles
Federal-aid	7.7	53	1,100
State (exclusive of F.A.)	3.3	20	800
County & local	89.0	27	50

Third fundamental - Road improvement should be in balance with traffic requirement.

In time this means stage development - U.S. experience. Caution: location should be initially right, width provision for growth.

In place it means the difference of standard corresponding to system classification.

Fourth fundamental - Traffic is where people are.

Hence, importance of cities.

In U.S.: Origin and destination both urban 49.6%
Origin or destination urban 36.6%
(subtotal 86.2%)
Origin and destination both rural 13.8% - Main highways.

Zones of city influence:

Cities of -

3,000,000 or more	35 miles
1,000,000 - 3,000,000	30 "
10,000 - 25,000	6 "

Traffic variation directly with population of connected cities, inversely with distances between - perhaps the square of distance?

Explains feeble growth of secondary and feeder road traffic.

Fifth fundamental - Highway traffic is traffic of short range.

Eleven State average

Trip length Miles	Percent	Cumulative
0 - 5	38.4	38.4
5 - 10	26.5	64.9
10 - 20	20.1	85.0
20 - 30	6.6	91.6
30 - 40	2.8	94.4
40 - 50	1.3	95.7
Over 50	4.3	100.0

Explains various things:

Short radius of city influence
Complementary rather than competitive service of parallel road and railroad lines
Why toll roads can't serve much traffic
300 transcontinental daily trips in U.S.
Why development of highway systems should proceed from cities outward

Sixth fundamental - Cities cannot be by-passed

At large cities 80 to 90+ % O & D in city
Towns 2500 - 50%
In city from 30 to upwards of 40% of traffic reaching edges of business center not destined to center

Seventh fundamental - Highway traffic is a composite of various speeds.

Free flow means movement of each vehicle at the preferred speed of its operator without hindrance of other vehicles

Hence the approach to uniformity of speed is the approach to congestion

Hence the difference between design speed and operating speed

Eighth fundamental - What is built must stay built.

Road improvement a never-ending process

Retirement by physical depreciation and obsolescence

Lags must be made up

Ninth fundamental - Roads can be built for any vehicle, but not for an indefinite vehicle.

Hence necessity of definite decision on size and weight of vehicles to be accommodated

May differ from present regulatory limits

Design effects of various weights and dimensions -
- Axle load - pavements
- Gross load - bridges
- Width - lane and pavement width
- Height - Vertical clearance
- Length - curvature, sight distance
- Braking capacity - sight distance
- Power - grades

Tenth fundamental - Road design, vehicle regulation, and vehicle taxation must be in balance.

Roads built for vehicles

Vehicles regulated within capacity of roads as built

Vehicles taxed as used and regulated