TRANSPORTATION ENGINEERING

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Highway Development in India

- Jayakar Committee (1927)
- Central Road Fund (1929)
- Indian Roads Congress (IRC), 1934
- Central Road Research Institute (CRRI), 1950
- Motor vehicle act (1939)
- National Highway Authority of India (NHAI),1995
- First twenty year road plan (1943-63)
- Second twenty year road plan (1961-81)
- Highway Research board (1973)
- National Transport Policy committee (1978)
- Third twenty year road plan (1981-2001)

NAGPUR ROAD PLAN :

NH + SH +MDR (KM) = [A/8 + B/32 +1.6N + 8T] +D – R

A- AGRICULTURAL AREA KM2

B- NON AGRICULTURAL AREA KM2

N- NO. OF TOWNS (POPULATION) RANGES 2001-5000

T - >5000

D - DEVELOPMENT ALLOWANCE 15 – 20 %

R – EXISTING LENGTH OF TRACK (KM)

ODR + VR (KM) = [0.32V + 0.8Q +1.6P + 3.2S] + D

V - <500

Q – 501-1000

P – 1001-2000

S – 2001-5000

D - DEVELOPMENT ALLOWANCE 15 – 20 %

BOMBAY ROAD PLAN:

NH (KM) = [A/64 + B/80 + C/60]+[32K+8M]+D

NH + SH (KM) = [A/20 + B/24 + C/32] + [48K + 24M + 11.2N + 1.6P

NH + SH + MDR = [A/8 +B/16 + C/24] + [48K +24M+11.2N+9.6P +12.8Q+4R+0.8S+0.32T] + D

NH + SH + MDR + ODR = [3A/16 + 3B/12 + C/16] + [48K + 24M + 11.2N + 9.6P + 12.8Q + 4R +0.8S + 0.32T] + D

NH + SH + MDR + ODR + VR = [A/4 + B/8 + C/12] + [48K + 24M + 11.2N + 9.6P + 12.8Q + 5.96R +1.6S + 0.64T + 0.2V] + D

A – DEVELOPED / AGRICULTURAL AREA KM2

B – SEMI DEVELOPED AREA

C- UNDEVELOPED AREA

K - >1,00,000

M – 50001 – 100000

N – 20001 – 50000

P – 10001- 20000

Q – 5001 – 10000

R – 2001 – 5000

S – 1001 – 2000

T – 501 – 1000

V - <500

D – 5%

LUCKNOW ROAD PLAN :

NH = AREA / 50

SH = AREA / 25

(OR)

[62.5 * NO.OF TOWNS in the state] – [AREA/50]

MAX

MDR = AREA / 12.5

(OR)

[90 * NO.OF TOWNS in the state]

Classification of Highways:

Depending on weather

All weather roads

Fair weather roads

Depending the type of pavement (or) Carriage way

Paved roads(WBM)

Unpaved roads(earth road or gravel road)

Depending upon the pavement surface

Surfaced roads(bituminous or cement concrete road)

Un surfaced roads

Based on the Traffic Volume

Very Heavy traffic road - > 600 vehicles / day
Heavy traffic road - 251 -600
Medium traffic road - 70 - 250
Light traffic road - <70

Based on Load or Tonnage

Class A - above 1524
Class B - 1017 -1524
Class C - 508 - 1017
Class D - below 508

Based on location and function

Urban Roads

Arterial Streets - 80 KMPH	50-60m
Sub-arterial streets - 60KMPH	30-40m
Collector streets- 50KMPH	20-30m
Local Streets - 30KMPH	10-20m

Rural Roads

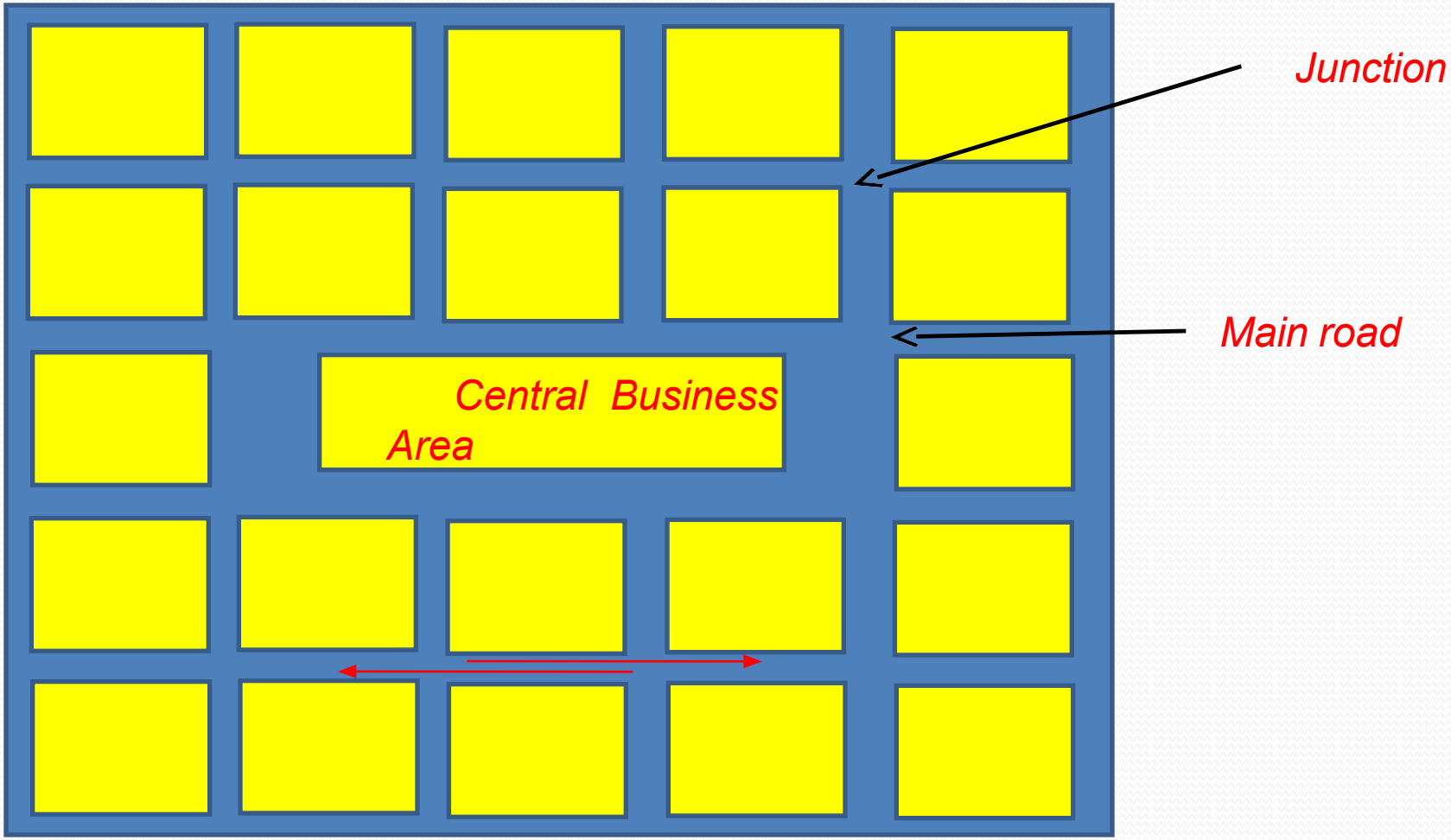
Primary	
National Highways	100-120 KMPH
Secondary	
SH	80-100KMPH
MDR	60-80KMPH
Tertiary	
ODR	50-60 KMPH
VR	40-50KMPH

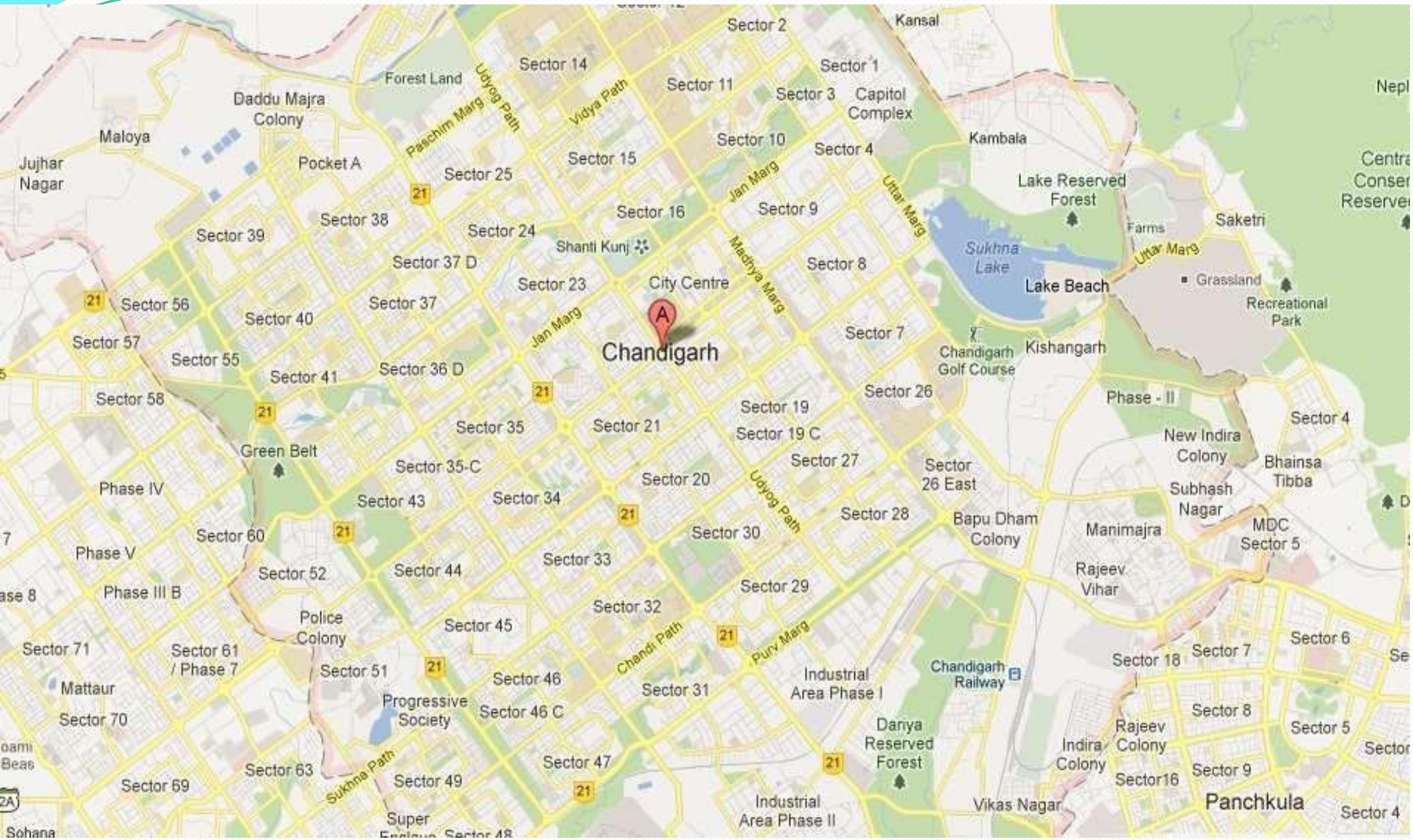
ROAD PATTERENS

Rectangular or Block pattern

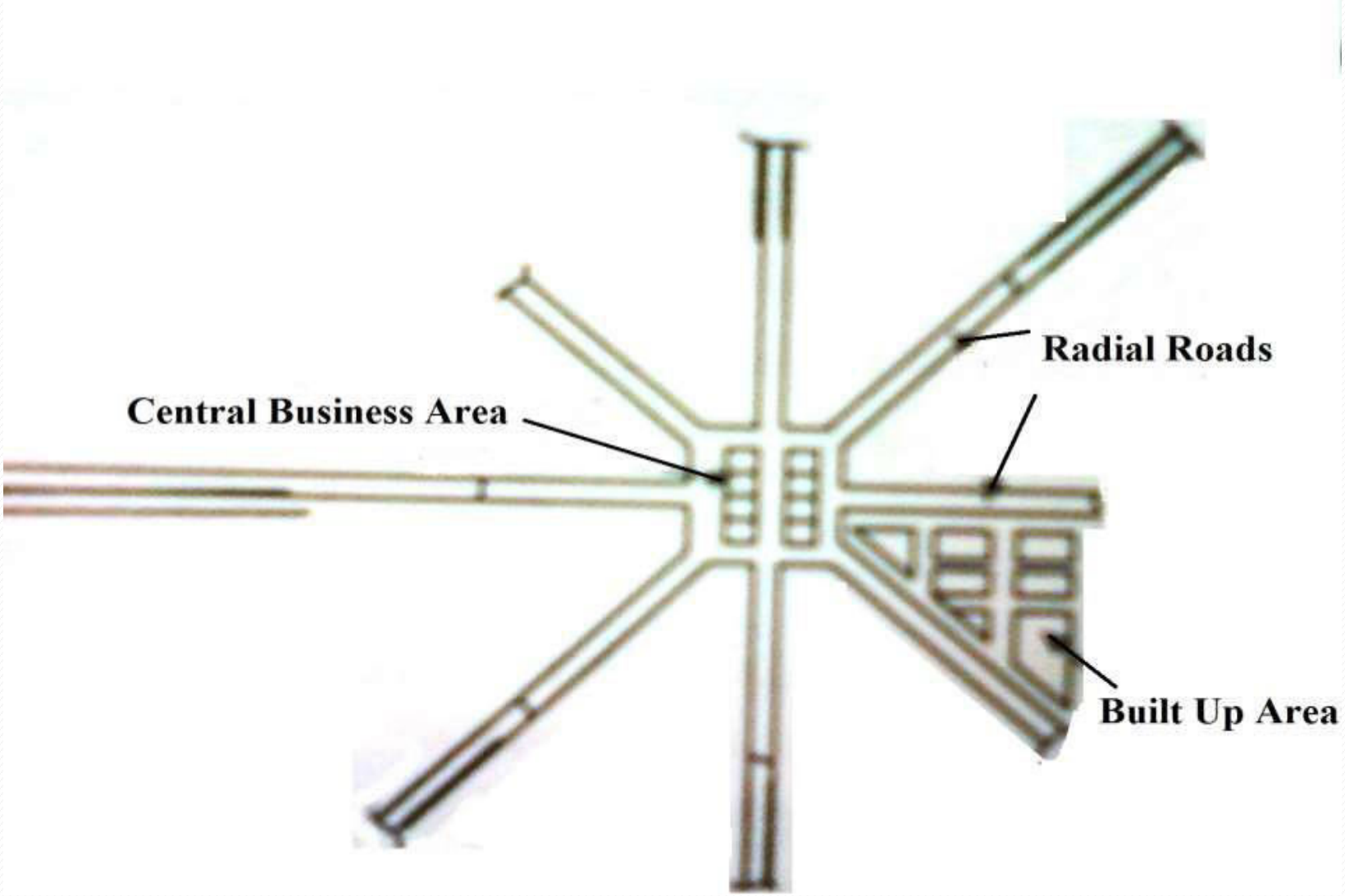
- Radial or star and block pattern
- Radial or star and circular pattern
- Radial or star and grid pattern
- Hexagonal pattern
- Minimum travel pattern

RECTANGULAR OR BLOCK PATTEREN:

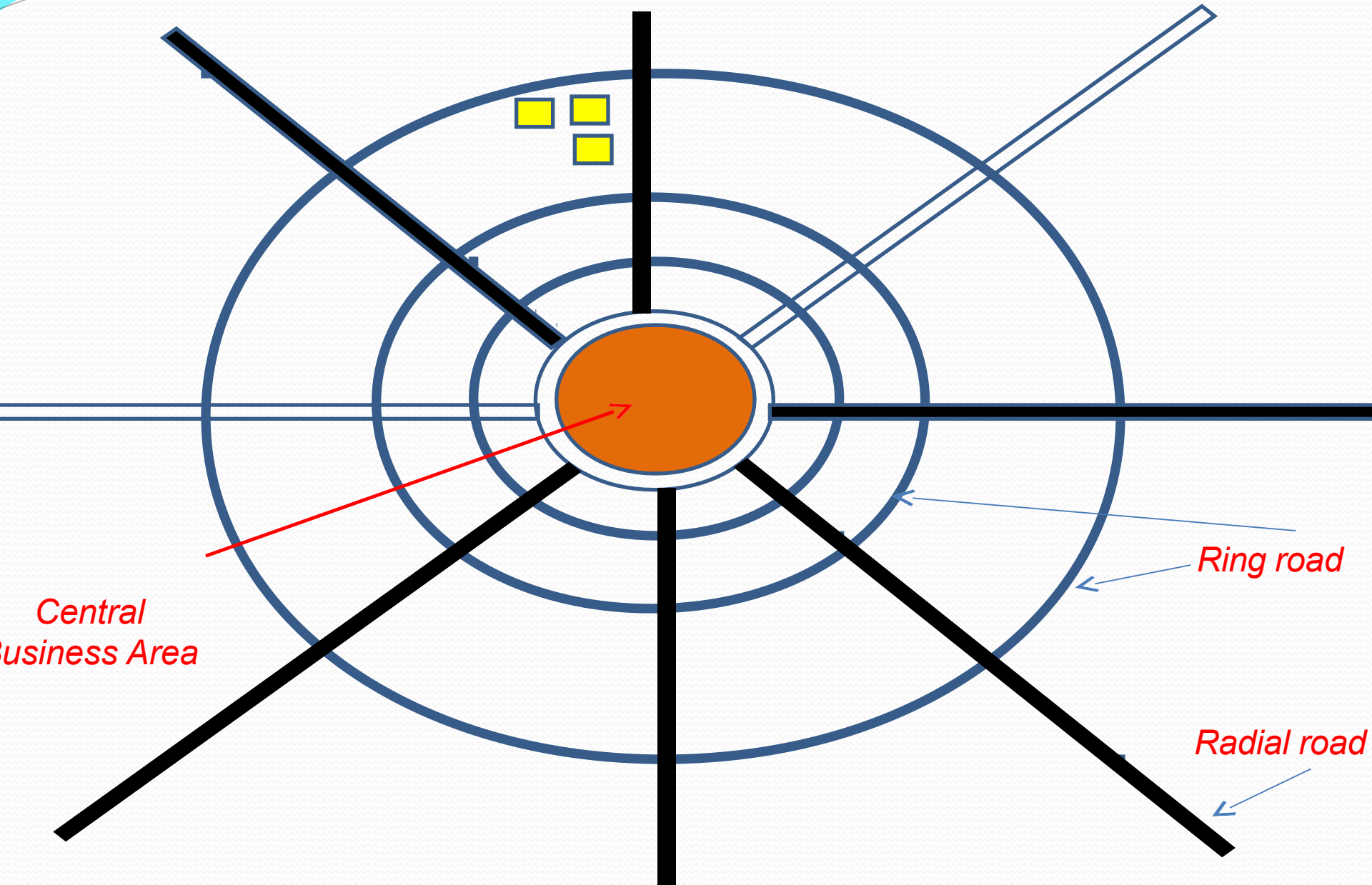



Chandigarh
A
Sector 2
Kansal
Sector 14
Forest Land
Udyog Path
Sector 1
Sector 11
Sector 3
Capitol Complex
Daddu Majra Colony
Paschim Marg
Vidya Path
Maloya
Sector 10
Sector 4
Kambala
Jujhar Nagar
Pocket A
Sector 15
Sector 25
Jan Marg
Uttar Marg
Lake Reserved Forest
Sector 38
Sector 16
Sector 9
Sector 39
Sector 24
Farms
Saketri
Shanti Kunj
Madhya Marg
Sukhna Lake
Uttar Marg
Sector 37 D
Sector 8
Sector 23
City Centre
Lake Beach
Grassland
Recreational Park
Sector 56
Sector 37
Sector 40
Sector 57
Sector 7
Chandigarh Golf Course
Kishangarh
Sector 55
Sector 41
Sector 36 D
Sector 58
Sector 26
Phase - II
Sector 19
Sector 4
Sector 35
Sector 21
Sector 19 C
New Indira Colony
Green Belt
Sector 27
Bhainsa Tibba
Sector 35-C
Sector 20
Sector 26 East
Phase IV
Subhash Nagar
Sector 43
Sector 34
Udyog Path
Sector 28
Bapu Dham Colony
Sector 60
Sector 30
Manimajra
MDC Sector 5
Phase V
Sector 33
Sector 52
Sector 44
Rajeev Vihar
Phase III B
Sector 29
Sector 32
Police Colony
Sector 45
Sector 71
Sector 61 / Phase 7
Chandi Path
Purv Marg
Sector 18
Sector 7
Sector 6
Sector 51
Sector 46
Industrial Area Phase I
Chandigarh Railway
Mattaur
Sector 31
Progressive Society
Sector 46 C
Sector 8
Sector 70
Rajeev Colony
Sector 5
Darya Reserved Forest
Indira Colony
Sector 63
Sector 47
Sukhna Path
Sector 16
Sector 9
Sector 69
Sector 49
Industrial Area Phase II
Vikas Nagar
Panchkula
Sector 4
Super
Sohana

Radial or star and block pattern



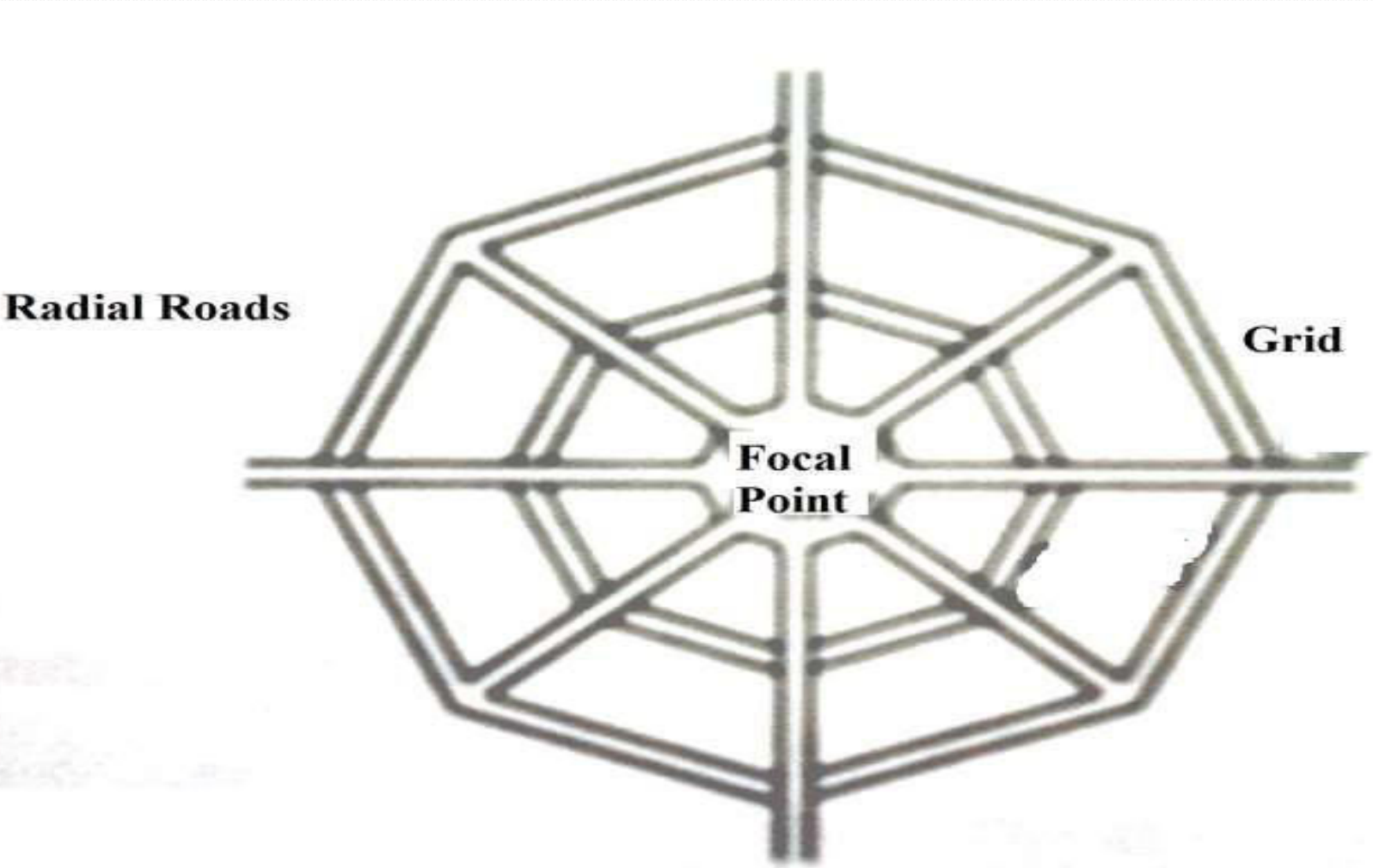
Radial or star and circular pattern




A
New Delhi
Panchkuian Road
Ramakrishna Ashram Marg
Main Bazar Rd
Baba Namdev Marg
Basant Rd
Ramdwara Rd
PK Ln
Railway Stadium
Qutab Rd
State Entry Rd
Bhavbhuti Marg
Minto Rd
Tagore Rd
Asaf Ali Rd
Jawaharlal Nehru Marg
Press Enclave
Jahangir Rd
Press Rd
Maharaja Ranjeet Singh Marg
Mata Sundri Rd
Mirdard Marg
Sector C
Sector 3
DIZ Area
Bangla Sahib Rd
Kalawati Saran Childrens Hospital
H Block
Basant Ln
Peshwa Rd
Doctor Ln
Gole Market
The Corus
D Block
Shivaji Bridge
Kotla Marg
Deen Dayal Upadhaya Marg
Rajiv Chowk
E Block
M Block
Jain Mandir Marg
Jain Mandir Rd
The Metropolitan Hotel & Spa
Rajiv Chowk Metro Station Entrance
F Block
The LaLiT Hotel New Delhi
Mahawat Khan Rd
Bal Bhawan
Arya School Ln
Babar Rd
Barakhamba Rd
Gandhi Peace Foundation
Bhai Vir Singh Marg
Shivaji Stadium Metro
Hanuman Ln
Hanuman Rd
Fire Ln
Kalibari Rd
Kali Bari Ln
Todarmal Ln
Todarmal Rd
Tansen Marg
Ymca Tourist Hostel
Bangla Sahib Sarovar
Tolstoy Rd
Janpath Rd
Hailey Ln
Agrasen ki Baoli
Hailey Rd
Curzon Rd
Kharak Singh Marg
Ashoka Rd
Mandi House
Sikandra
Atul Grove Rd
Atul Grove Ln
Vakil Ln
Delhi College of Arts

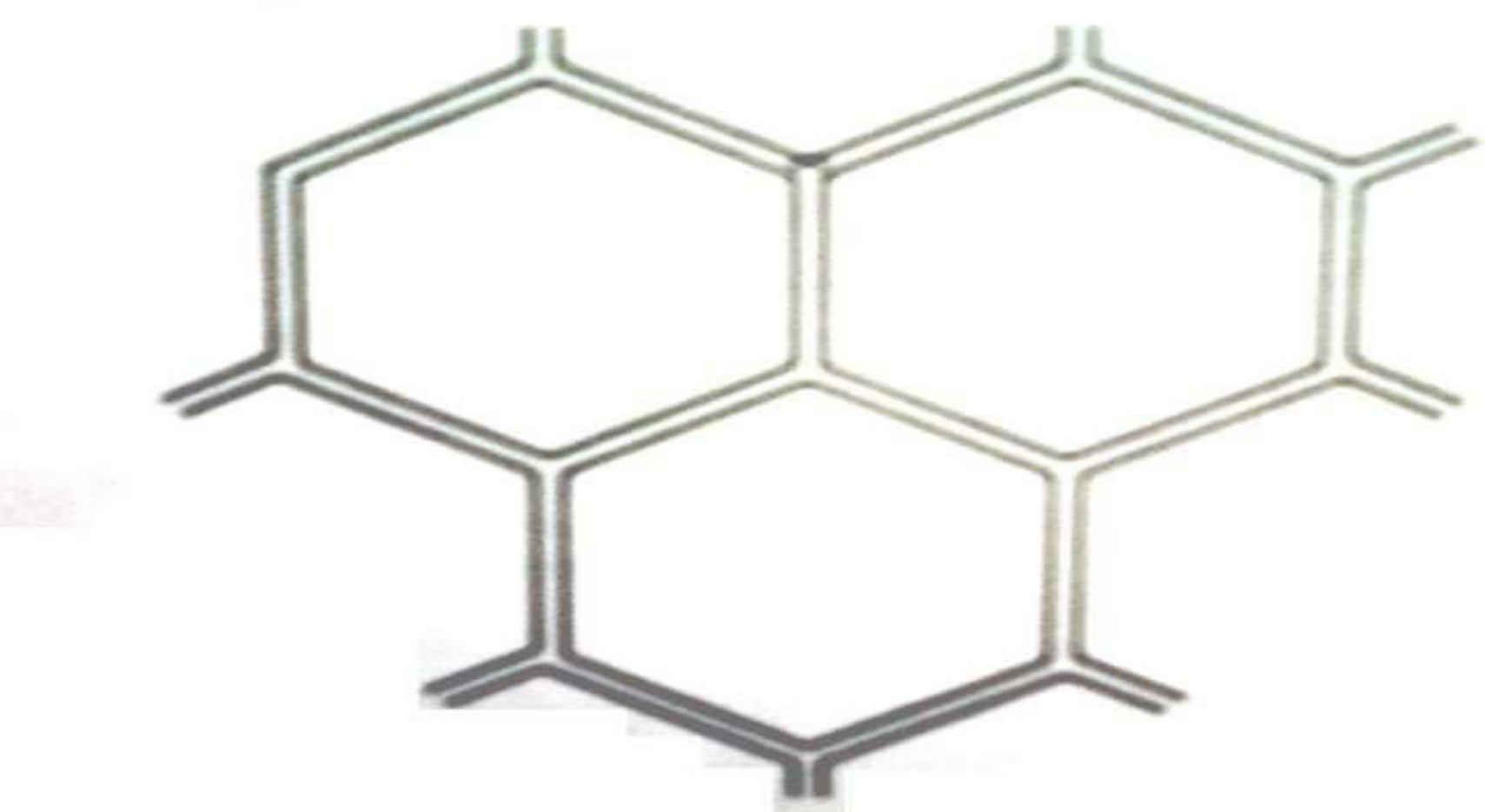

DigitalGlobe

Radial or star and Grid pattern



Concentric Street System

Hexagonal Pattern

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Highway Planning

Planning is a prerequisite for any engineering activity or project; this is particularly true for the development of a highway network or system in a country.

The objectives of highway planning

- (i) Planning a highway network for safe, efficient and fast movement of people and goods.
- (ii) Keeping the overall cost of construction and maintenance of the roads in the network to a minimum.
- (iii) Planning for future development and anticipated traffic needs for a specific design period.
- (iv) Phasing road development programmes from considerations of utility and importance as also of financial resources.

Planning Surveys

Economic Studies
Financial studies
Traffic and road use studies
Engineering studies

Highway alignment

- The position or lay out of centre line of the highway on the ground is called the alignment
- Horizontal alignment

  straight path

  curves
- Vertical alignment

  Vertical curves

  Vertical Gradients
- Due to improper alignment , the disadvantages are,
  - Increase in construction
  - Increase in maintenance cost
  - Increase in vehicle operation cost
  - Increase in accident cost
- Once the road is aligned and constructed, it is not easy to change the alignment due to increase in cost of adjoining land and construction of costly structure.

Requirements of highway alignment

- Short
- Easy
- Safe
- Economical

- **Short-** desirable to have a short alignment between two terminal stations.

- **Easy-** easy to construct and maintain the road with minimum problem also easy for operation of vehicle.

- **Safe-** safe enough for construction and maintenance from the view point of stability of natural hill slope, embankment and cut slope also safe for traffic **operation.**

- **Economical-** total cost includinginitial cost, maintenance cost and vehicle operation cost should be minimum.

Factors controlling alignment

- Obligatory Points
- Traffic
- Geometric design
- Economics
- Other considerations additional care in hill roads
- Stability
- Drainage
- Geometric standards of hill roads

Engineering Surveys for Highway locations

Before a highway alignment is finalized in highway project, the engineering survey are to be carried out.
The various stages of engineering surveys are

- **Map study (Provisional alignment Identification)**
- **Reconnaissance survey**
- **Preliminary survey**
- **Final location and detailed surveys**