

INTRODUCTION TO HIGHWAY

History of Highway Construction

History of road construction can be divided into three ages

- a) Ancient Times
- b) Age of Ancient Roman
- c) The period after the Roman

Ancient times

- Starts 5000 years ago since the beginning custom of wheels for horse and cattle.
- They are found in mesopotamia, china, persia, egypt, india and greece.
- A short road with only a hard surface to withstand the load of vehicles, miles and mortar used in egypt and india.
- Road bricks and asphalt pavement have been found in babylon, mesopotamia.

Ancient Roman era

More systematic way of road construction.

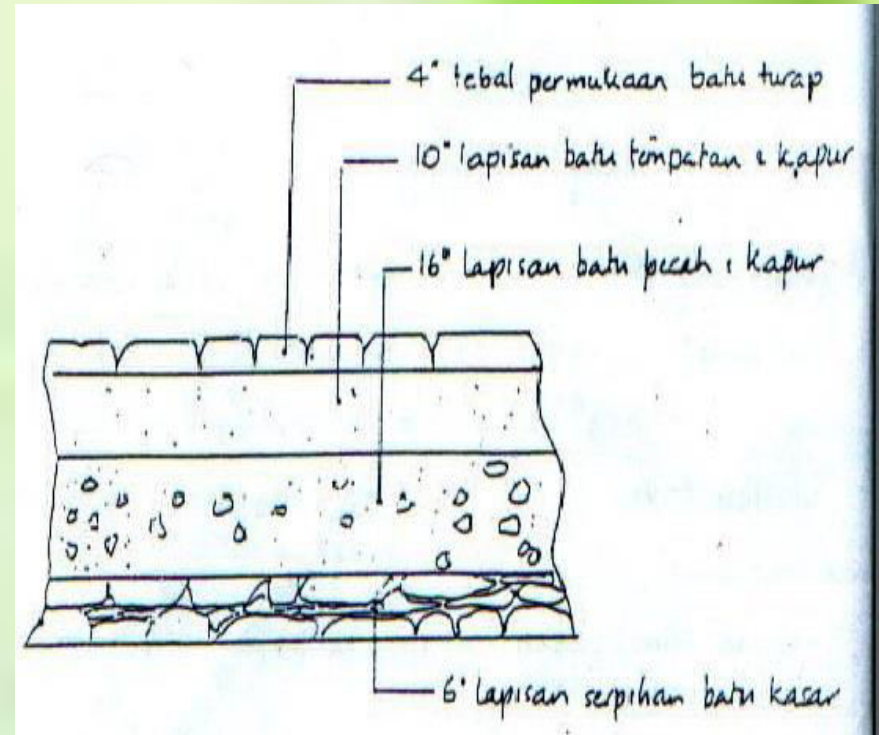
Base for road construction.

The path is higher than ground
structure of road consists three
classes of surface.

- i) Flattened surface
- ii) Gravelled surfaced
- iii) Paving (Paved).

Road width does not exceed 4:25
meters

Main purpose of road - military.



After Roman era

After falling back of Roman era, the construction of roads also have decline.

Roman road however still remains and used as the trade routes.

No new development on road construction until the 18 century.

new road construction at the time was

1. Telford Road
2. Macadam road

History of Road in Malaysia

modern road system in this country begin during the British colonial at the end of the 18th century.

Trading needs and **to centralize the colonial administration** had accelerate construction of roads in Peninsular Malaysia in order to connect the administrative center, commercial, industrial areas, farming areas and the port.

Before independence, all the roads in this country was built by British.

In 1986 there were 4 million vehicles over 24 000 km length of roads and this number will increase with the rapid rate at each year.

Road construction have been given priority in an allocation About 6 billion dollars for the construction of the North South Highway Authority.

Other - other road projects is Ringroad Malacca, Temerloh - Mentakab Bypass and road to Highway Timur branches - the West.

Most Famous person in road construction

Robert Philips: **Apprentice** in road design.

Suggested (1736): gravel layer **will lay** into the road surface and **will be compacted** by traffic to become hardened layer.

TREASAGUET (1716)

- Active in 1746 to 1775
- Introduced more **economical method** by placed all the structure in drain to level with environment.
- Drainage's problem** were solved by built the water proof surface, cambered the subgrade and construct deeper side drain.

John Metcalf (1717)

- Also known as *Blind Jack Of Knaresborough*
- Blind : 6 years old
- Musician, army, horse trader.
- Become an road engineer in age of 40.
- Construct 290 km of road in Yorkshire including bridge, culvert, retaining wall.
- Focused on **drainage and sub base**
- Road were curved for drainage purposes.

Thomas Telford (1757)

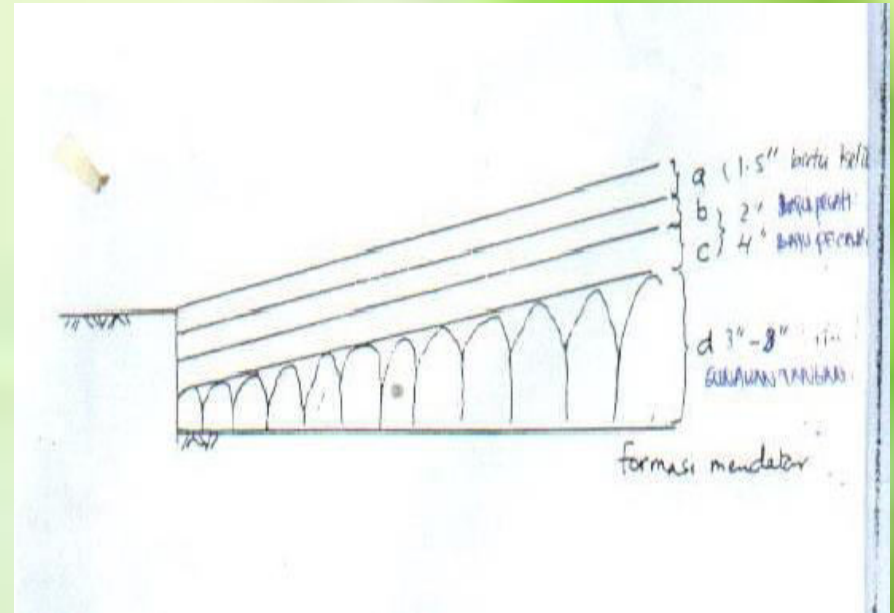
- Designed 1600 km of road, drain, bridge and almost of civil works in Britain and North Europe.
- Road was designed with horizontal formation, sub base, camber and others coarse with uniform thickness.

Telford Road

Formation level is horizontal. Then the camber is provided with changing the layer thickness of 3 " or 4" side is divided to 7 "or 8" in the middle.

- a. Surface layer is 1.5 " gravel moistened and compressed by the traffic.
- b. 2 "thick stone that is being squeezed by the traffic burst
- c. 4 "thick stone that is being squeezed by the traffic burst
- d. base constructed by arranging the stones sized 3 " - 8" by hand.

Empty space between them filled with stone chips (fine chipping).



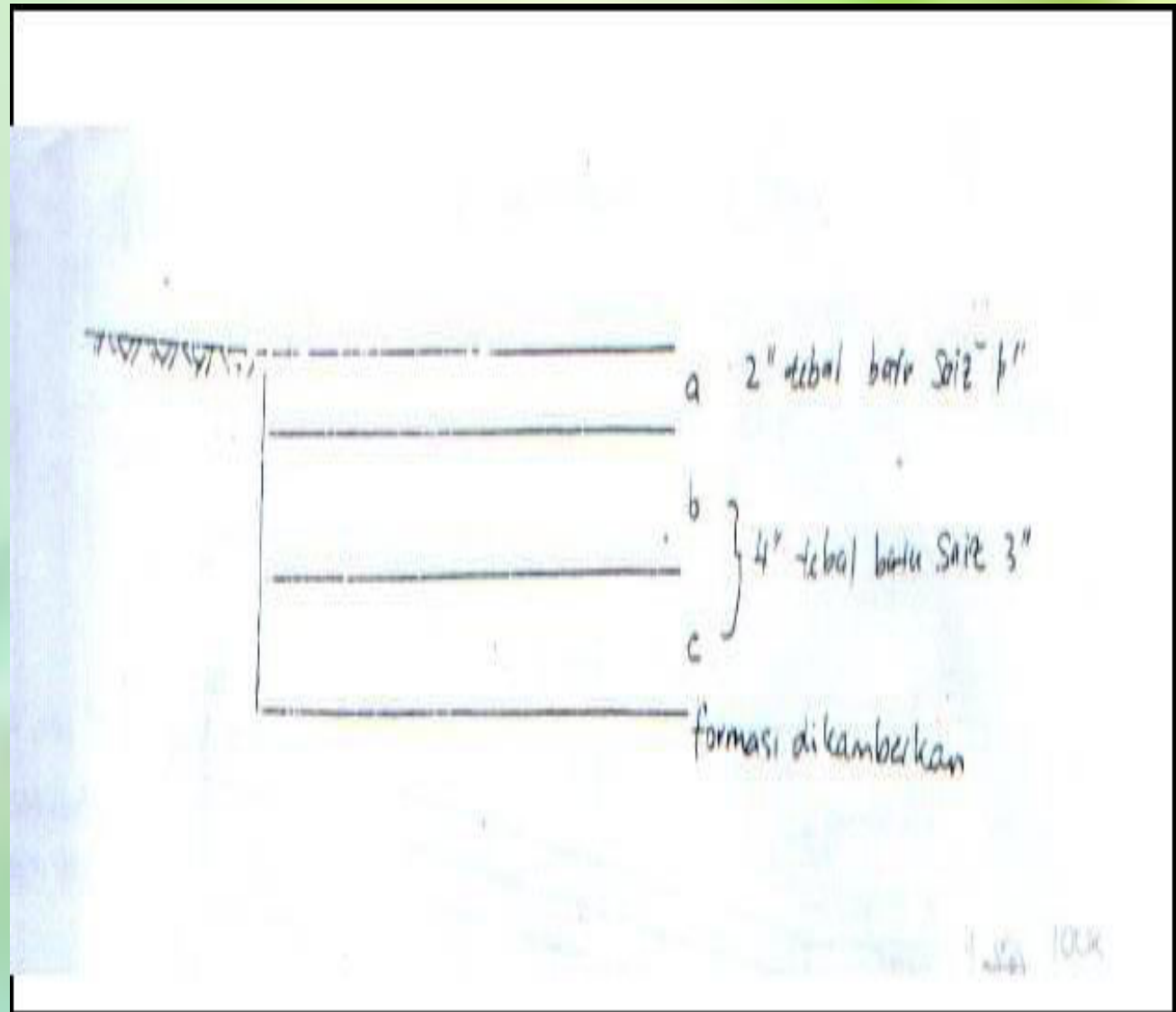
John Macadam (1756)

- 1'st engineering expertise
- Come back from America in 1783- not active until 1816
- 1816 : Surveyor
- Advisor in road construction (1826)
- Road were design with a camber by used broken stone as a material to reduce a cost.

Macadam Road

Macadam road formation level prior to the slope camber 1: 60 to 1: 80.

Three layers of stone and then spread on the formation level.



Types of road in Malaysia

Earth Road/ Unpaved road

- Used soil as road materials.
- Compacted as a surface.
- Rural area
- Laterite

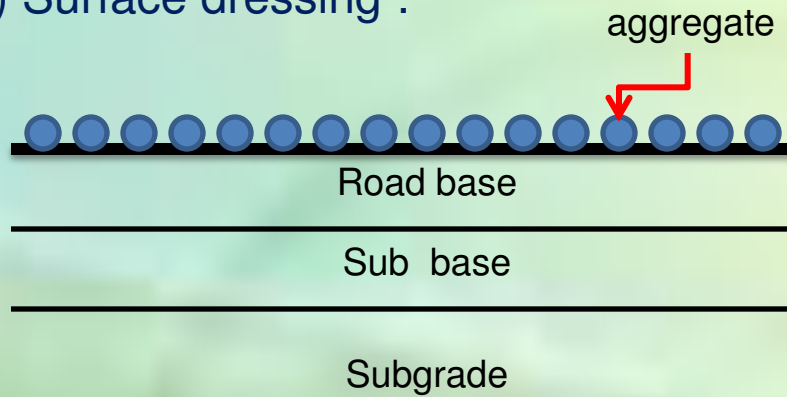
Gravel Road

- Gravel were lay into earth road and compacted.

Bituminous Road

- Paved road
- To take higher traffic loading

i) Surface dressing :



ii) Flexible pavement/ asphaltic concrete

- Many in Malaysia
- Carried more loading compare with surface dressing.

Wearing coarse	Premix (ACW 14)
Binder coarse	Premix (ACB 28)
Road base	
Sub base	
Subgrade	

iii) Porous asphalt

- Same as a asphaltic concrete
- Porous at wearing coarse – purpose: allowed surface water silt through into wearing coarse.
- Advantages :
 - High friction resistance
 - Avoid flood
 - Avoid water splash
 - Reduced unpleasant light at night
 - Durable: coarse aggregate
 - Silent
- Disadvantages???

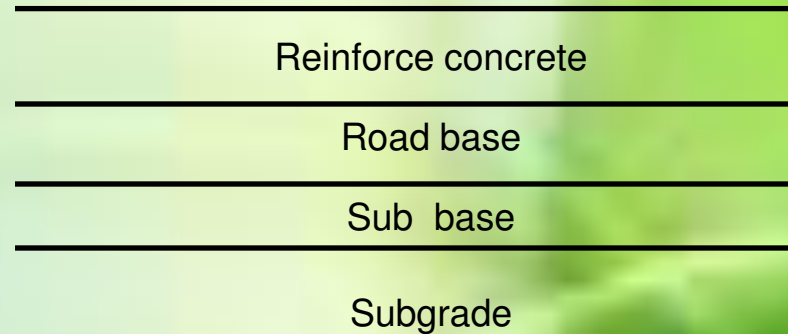
iii) Concrete pavement(Rigid pavement)

- Same as a asphaltic concrete
- Surface used reinforce concrete

- Advantages :

- Quite strong
- Extended life span
- Low maintenance

- Disadvantages???

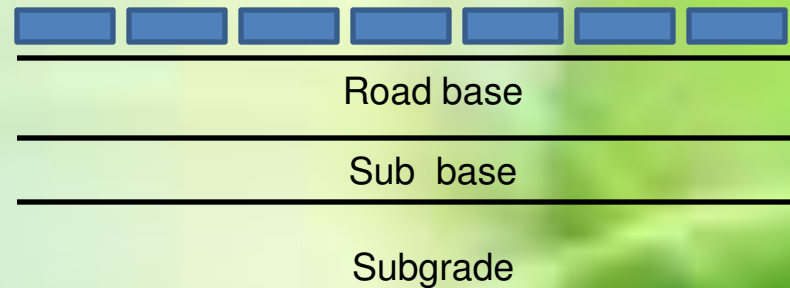


Interlocking Paving Block

- Used at intersection
- Corner
- Bus terminal or jetty

- Advantages :
 - Quite strong
 - Extended life span
 - Low maintenance

- Disadvantages???



Malaysia Road System

- i. Toll highway
- ii. Federal highway
- iii. State road
- iv. Urban road/ municipal road
- v. Rural road

2

Federal Highway, or **Lebuhraya Persekutuan** in Malay (or sometimes called it "**Federal**", "**Highway Persekutuan**" or "**Highway Federal**" by [Klang Valley](#) citizens) is a [Malaysian highway](#) connecting the capital city of [Kuala Lumpur](#), and [Klang](#), [Selangor](#). The highway starts from [Seputeh](#) in [Kuala Lumpur](#) to [Klang](#), [Selangor](#). It is the busiest highway in [Klang Valley](#) during [rush hour](#) from/to Kuala Lumpur. The Federal Highway is coded as [Federal Route](#) .



Malaysian state roads ([Malay](#): *Sistem Laluan Negeri Malaysia*) are the secondary roads in [Malaysia](#). The construction of state roads in Malaysia are funded by [Malaysian Public Works Department](#) (JKR) of each states. The standard of state roads are similar with the [federal roads](#) except for the coding system, where the codes for state roads begin with state codes followed by route number, for example [Johor State Route J32](#) is labeled as [J32](#) .



State Road

- Construction and maintenance to improve connection in state.
- Construct and maintain by JKR State.
- Allocation : by state or federal

Urban road/Municipal Road

- In Municipal area or district including road by developer.
- Allocation by municipal and/or subsidized by federal

Rural Road

- Construct and maintain by district office with state allocation.
- Too low standard – traffic volume low

Organizations & Agencies in road system

Organizations & Agencies	Functions
UPE & BPJ	Planning and controlling of projects. Also allocation
JKR & LLM	Design, construction, maintainance (road/highway)
JPJ LPKP	Road license
Police & JPJ	Enforcement and controlling
Majlis Keselamatan Jalanraya	Keselamatan Jalanraya
Jab.Alam Sekitar	Environment controlling
JPBD	Perancangan Bandar dan Desa
PBKT	Traffic facilities