



IR@AIKTC-KRRC

Bridge Design & Engineering

PRESENTED BY

PROF. MOHAMMED JUNAID SIDDIQUI

B.E (CIVIL), M.E (STRUCTURE), PHD (PURSUING)
DEPARTMENT OF CIVIL ENGINEERING
KALESEKAR TECHNICAL CAMPUS, NEW PANVEL

2017-18

Engineers are there, in every walk of life.

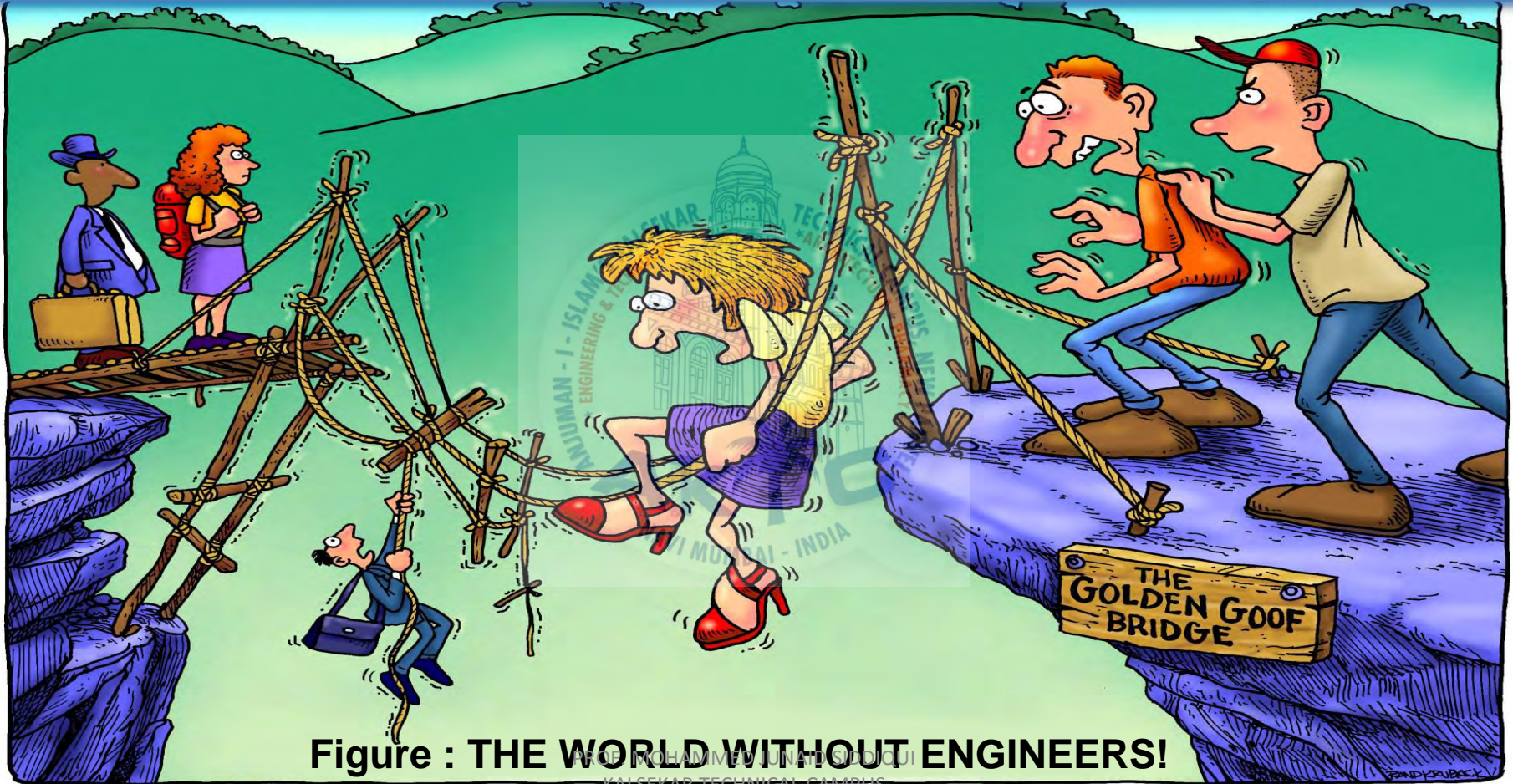


Figure : THE WORLD WITHOUT ENGINEERS!

Who made the first bridge?

- **NO ONE...**

The first bridge was made by mother nature itself — as simple as a log fallen across a stream or stones in the river.



Natural bridge, Andaman

A bridge is a structure built to span physical obstacles without closing the way underneath such as a body of water, valley or road for the purpose of providing passage over the obstacle.



HOW BRIDGES WORK??

Every passing vehicle shakes the bridge up and down, making waves that can travel at hundreds of kilometers per hour.

Luckily the bridge is designed to damp them out, just as it is designed to ignore the efforts of the wind to turn it into a giant harp.

A bridge is not a dead mass of metal and concrete: it has a life of its own, and understanding its movements is as important as understanding the static forces.



Bridge vs. Buildings

- Bridges typically do not have architects
 - Structural Engineer is responsible for aesthetics
 - Structural system is always exposed (both good and bad)
- Bridges are subjected to large moving, repetitive loads (i.e. Trucks)
 - Fatigue is of primary concern (accumulated damage/cracking due to repeat loading)

Bridge vs. Buildings

- Bridges are exposed to the elements
 - Expansion and contraction due to temperature changes is a major concern
 - Durability is a major design consideration
 - Routine inspection and maintenance (initial versus life-cycle cost)

CONSTRUCTION OF BRIDGES



DENMARK-SWEDEN BRIDGE

Impossible Bridges - Denmark to Sweden (megastructures - documentary).mp4 - VLC media player

Media Playback Audio Video Tools View Help



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這是最長的斜張橋

Structures - The Arch.mp4 - VLC media player

Media Playback Audio Video Subtitle Tools View Help

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BANDRA-WORLI SEA LINK

Virtual Tour - Bandra Worli Sea Link.mp4 - VLC media player

BANDRA WORLI SEALINK PROJECT



CHENAB RAILWAY BRIDGE CONSTRUCTION

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airtodspace.org

Chenab Railway Bridge construction Animation - CADMEC.mp4 - VLC media player

ANIMATION
PROGRAM
CHENAB RAILWAY BRIDGE
CONSTRUCTION

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MILITARY BRIDGES

Military Bridges_-_Armored Vehicle Launched Bridge_-_US Army R and D Progress Report 1_ 1960 US Army.mp4 - VLC media player

Media Playback Audio Video Tools View Help



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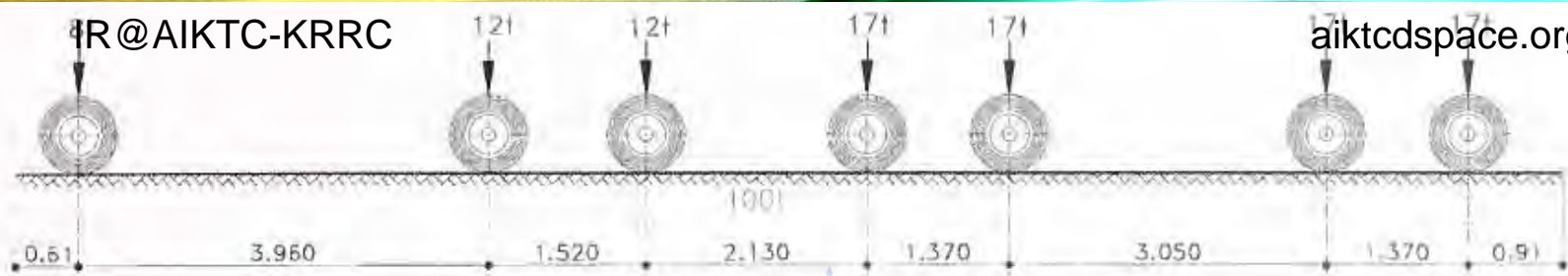
SYLLABUS



IRC LOADING

IRC: 6-2014

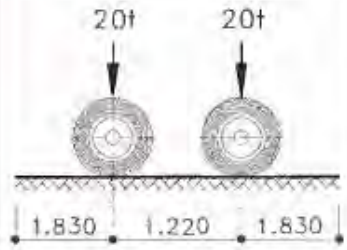
- IRC Class 70R Loading - Wheeled Vehicle
- Tracked Vehicle
- IRC Class AA Loading - Wheeled Vehicle
- Tracked Vehicle
- IRC Class A Loading - Wheeled Vehicle
- IRC Class B Loading - Wheeled Vehicle



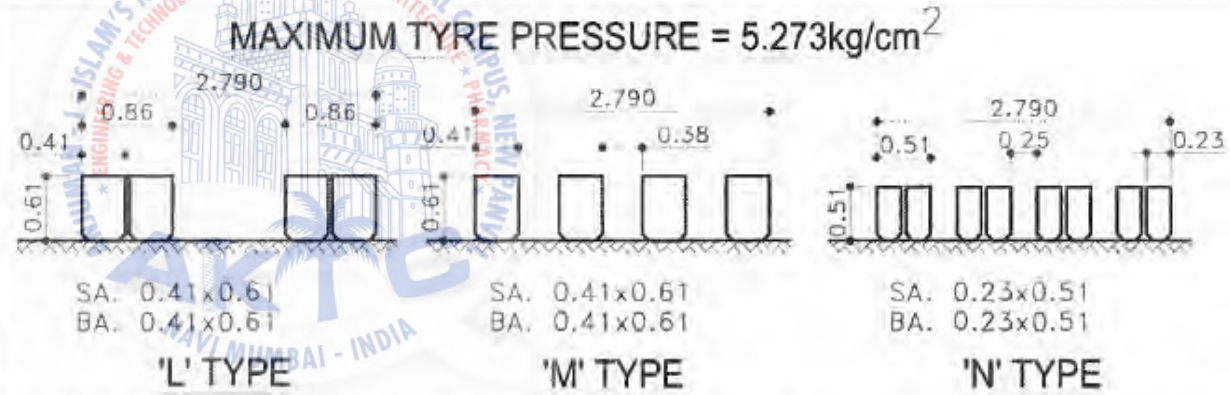
CLASS 70R (WHEELED) - LONGITUDINAL POSITION



MAX. SINGLE AXLE LOAD



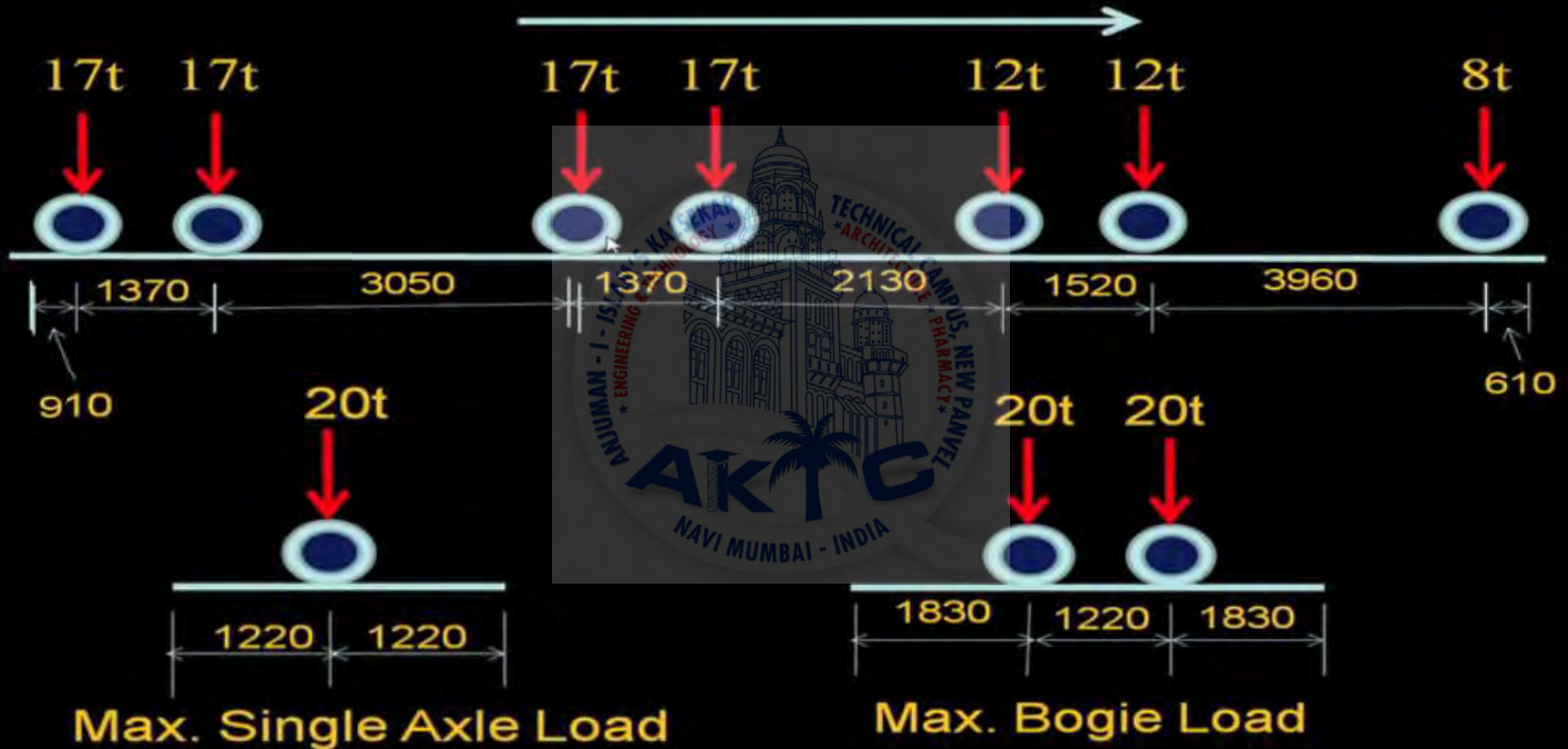
MAX. BOGIE LOAD



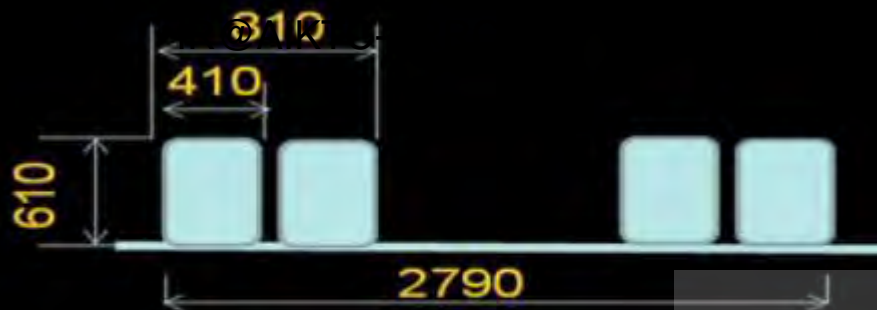
MINIMUM WHEEL SPACING & TYRE SIZE OF CRITICAL (HEAVIEST) AXLE

WHEEL ARRANGEMENT FOR 70R (WHEELED VEHICLE)

IRC 70R Wheeled Vehicle



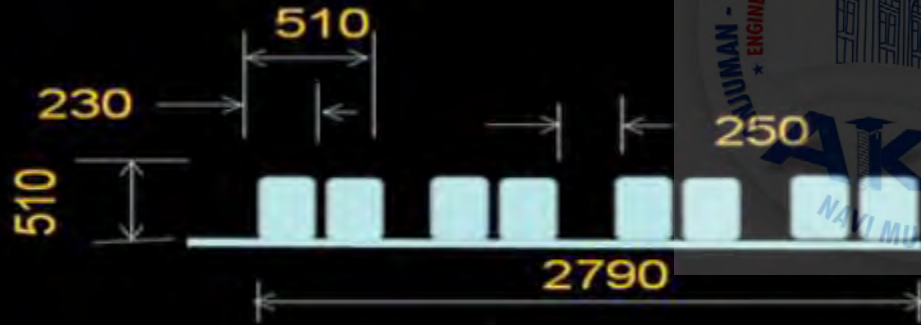
Maximum Tyre Pressure 5.273 kg/sqm



L Type



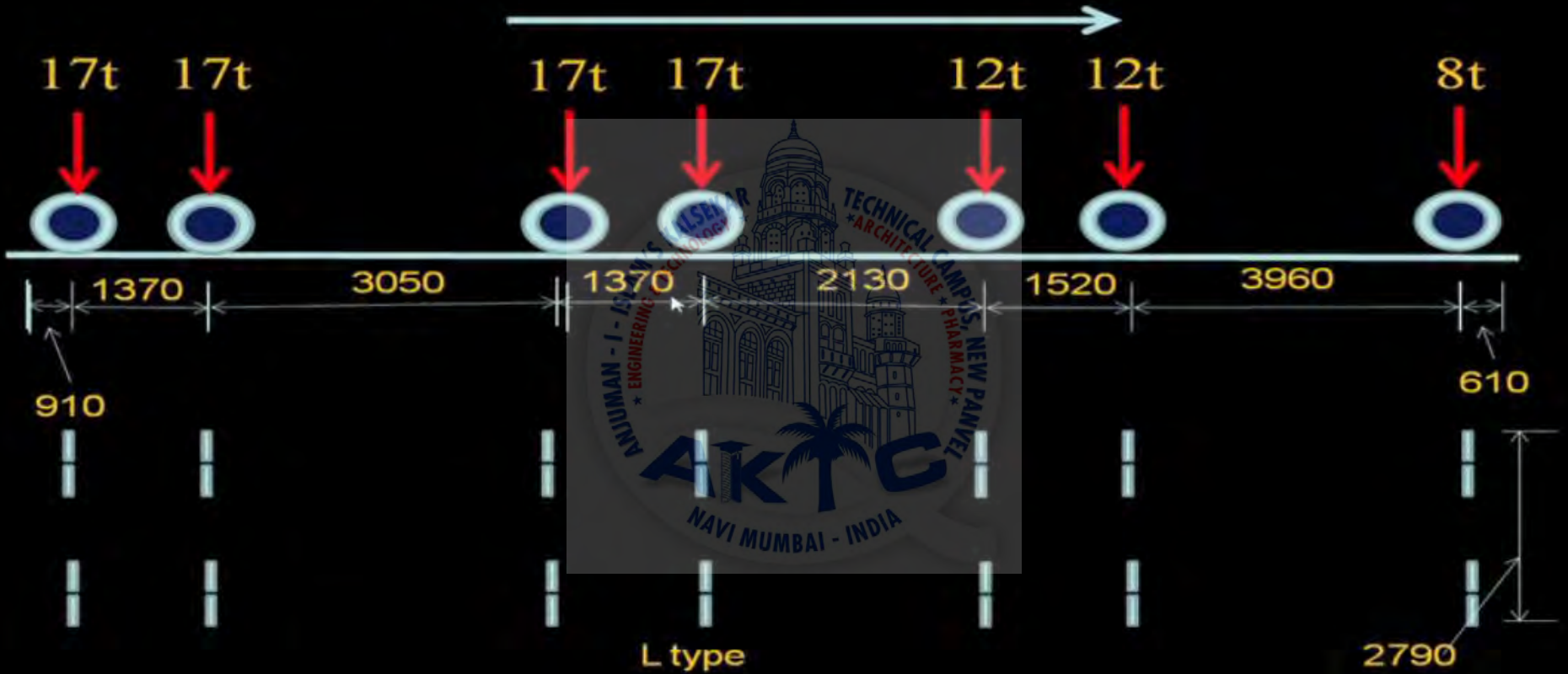
M Type



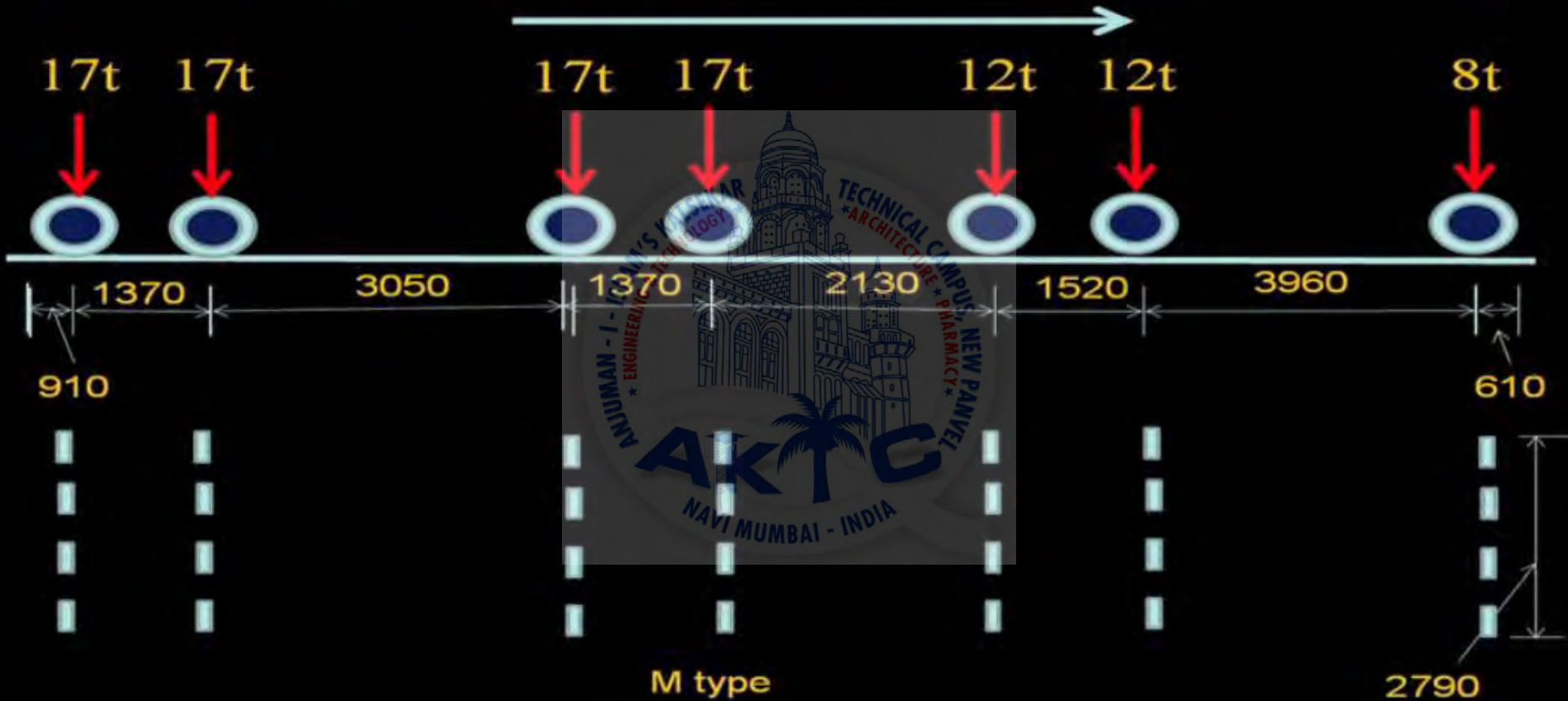
N Type



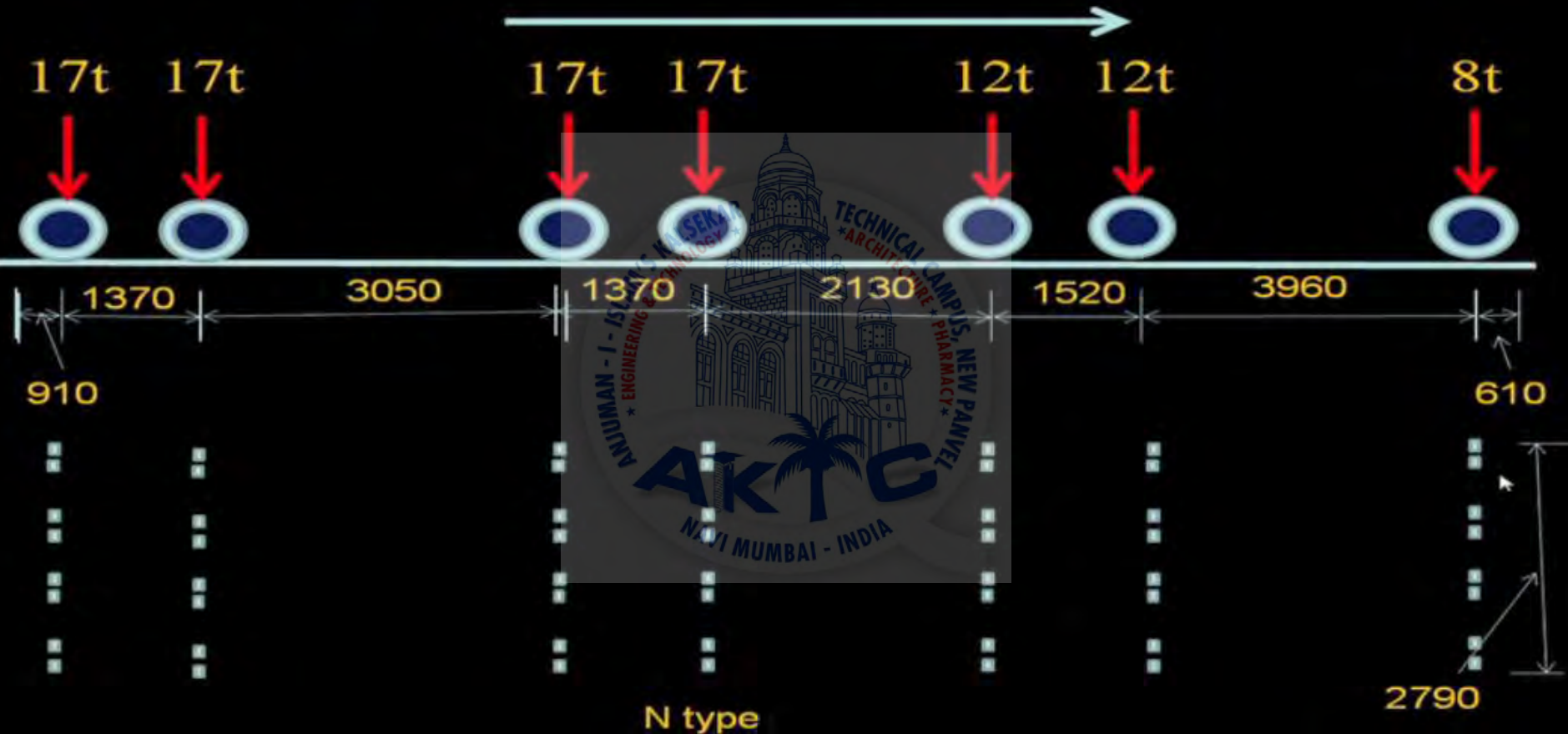
IRC 70R Wheeled Vehicle

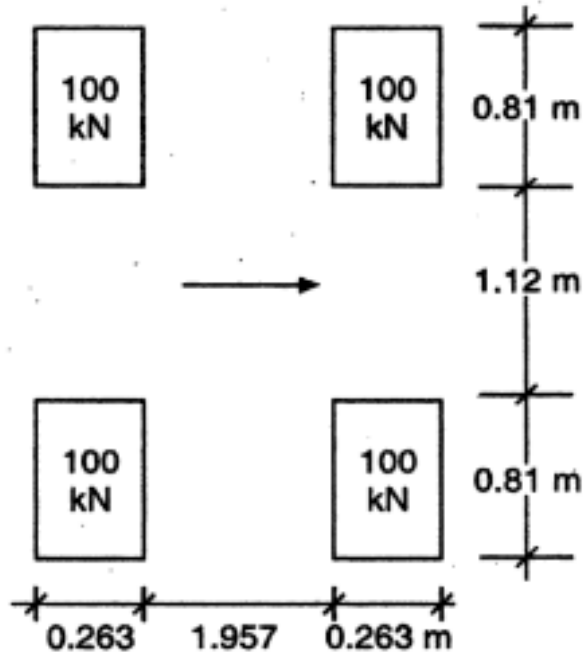


IRC 70R Wheeled Vehicle

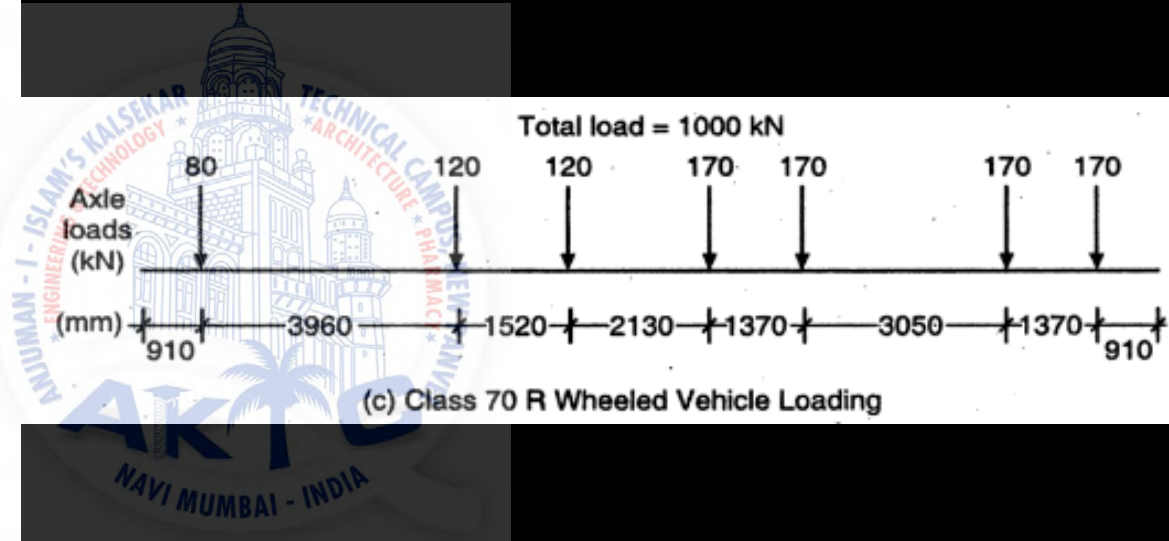


IRC 70R Wheeled Vehicle



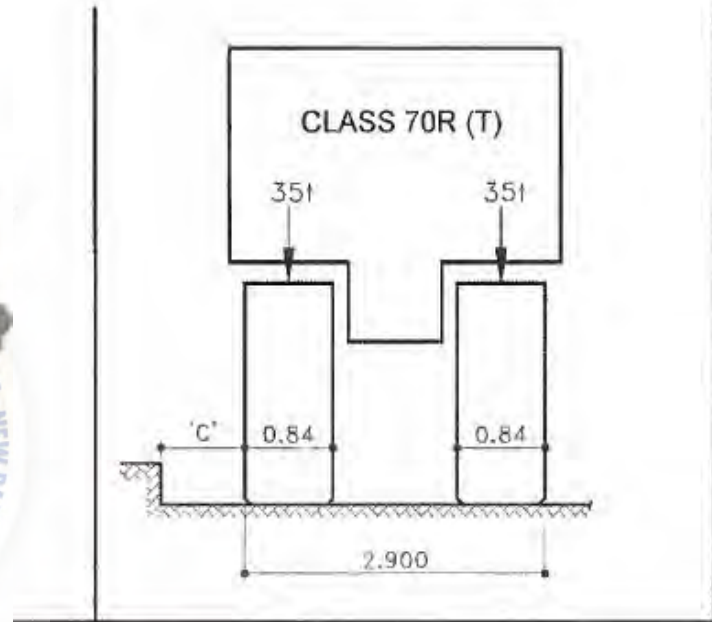


(b) Class 70 R Bogie Axle Type Vehicle



(c) Class 70 R Wheeled Vehicle Loading

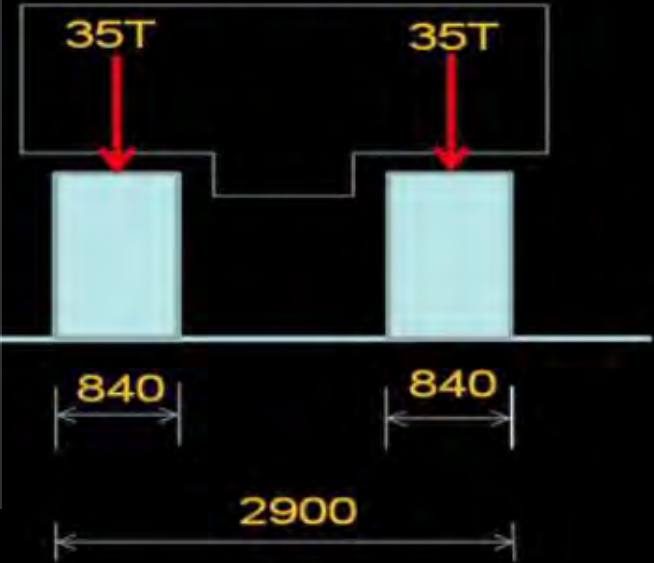
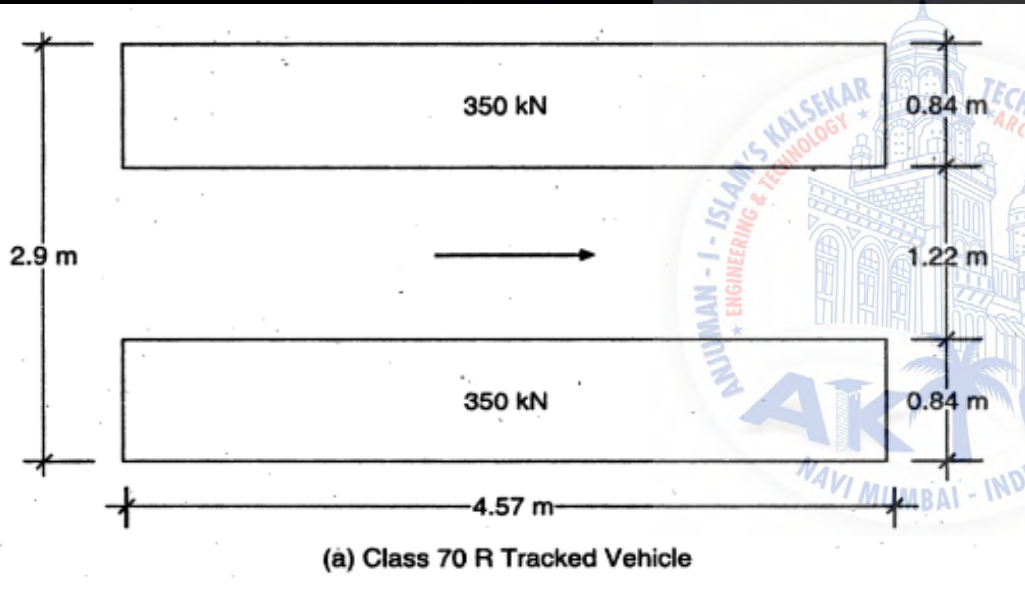
I.R.C CLASS 70 R WHEELED VEHICLE



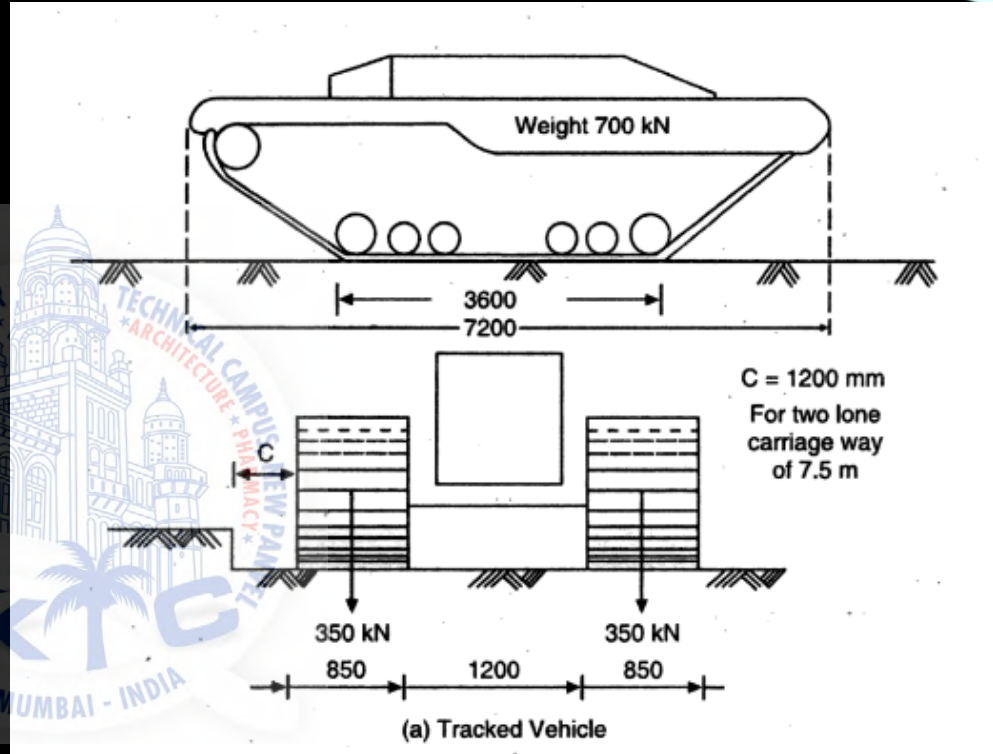
WHEEL ARRANGEMENT FOR 70R (TRACKED) VEHICLE

Fig. 1 Class 70R Tracked and Wheeled Vehicles (Clause 204.1)

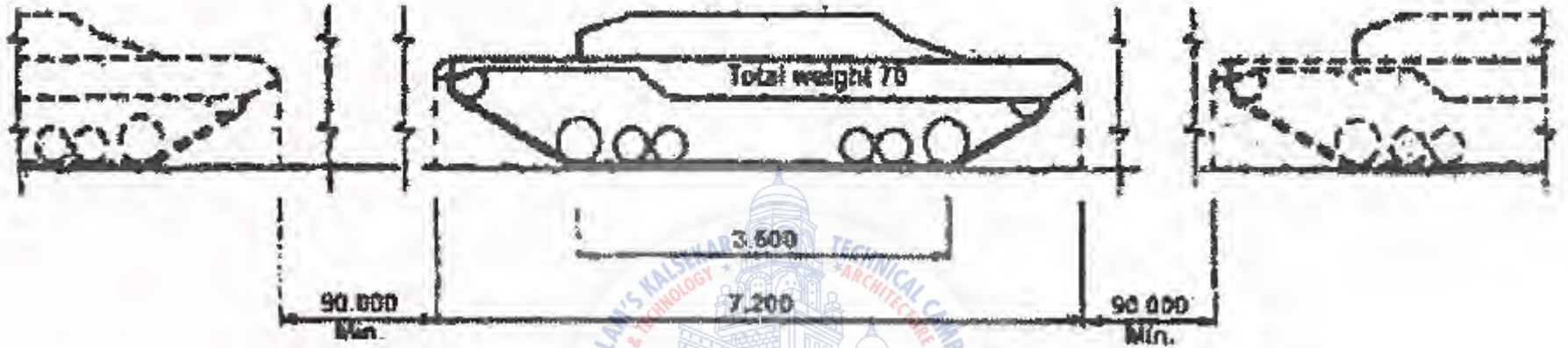
IRC 70R Tracked Vehicle



I.R.C CLASS 70 R TRACKED VEHICLE

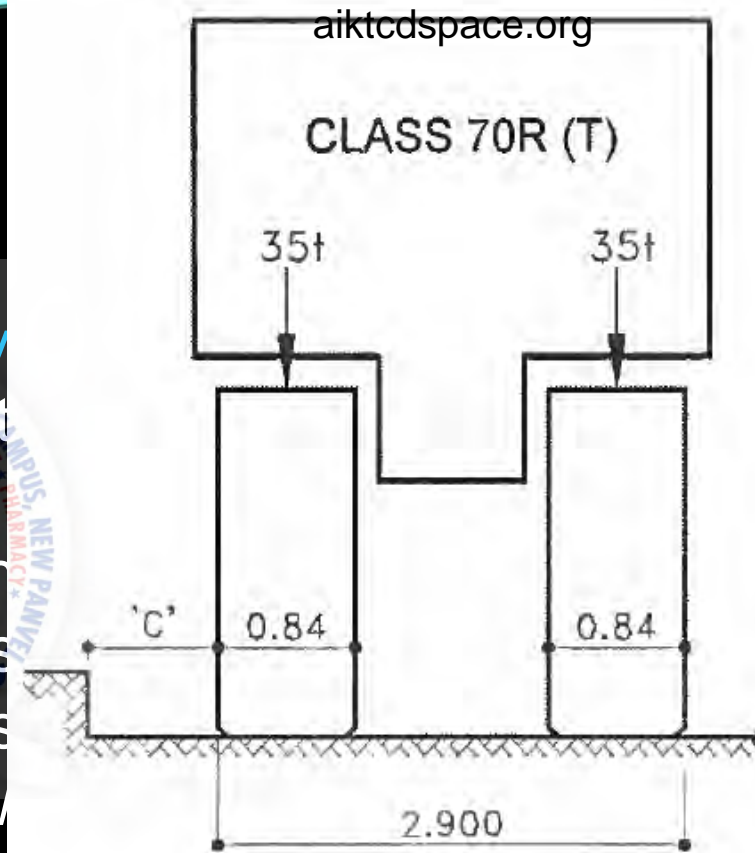


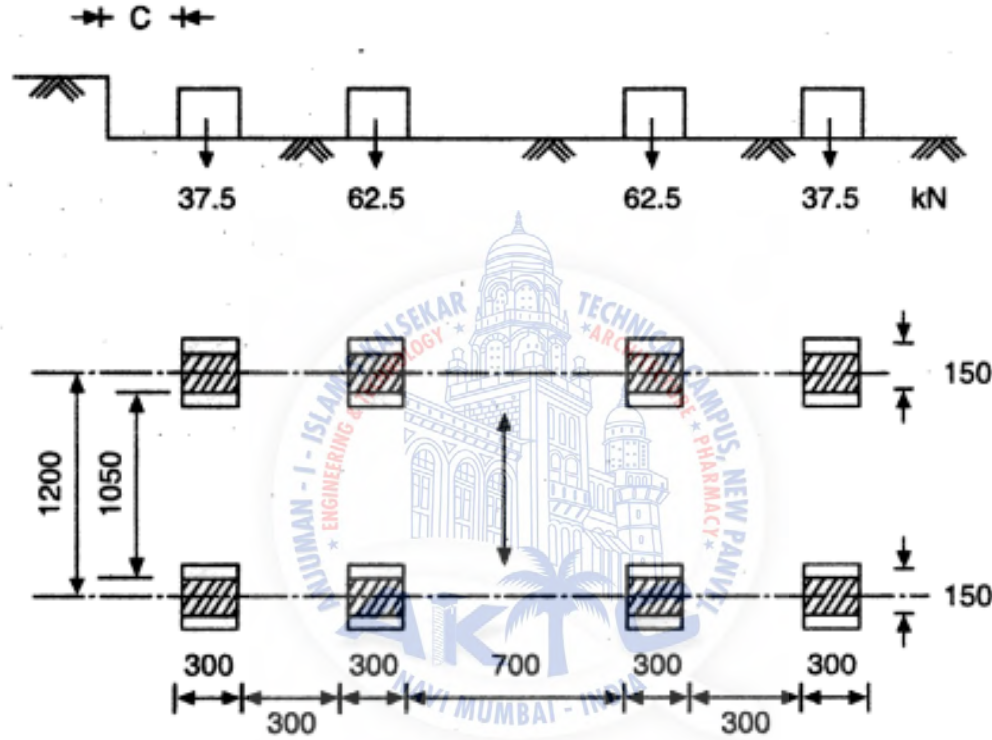
I.R.C CLASS AA TRACKED VEHICLE



CLASS 70R (TRACK) - LONGITUDINAL POSITION

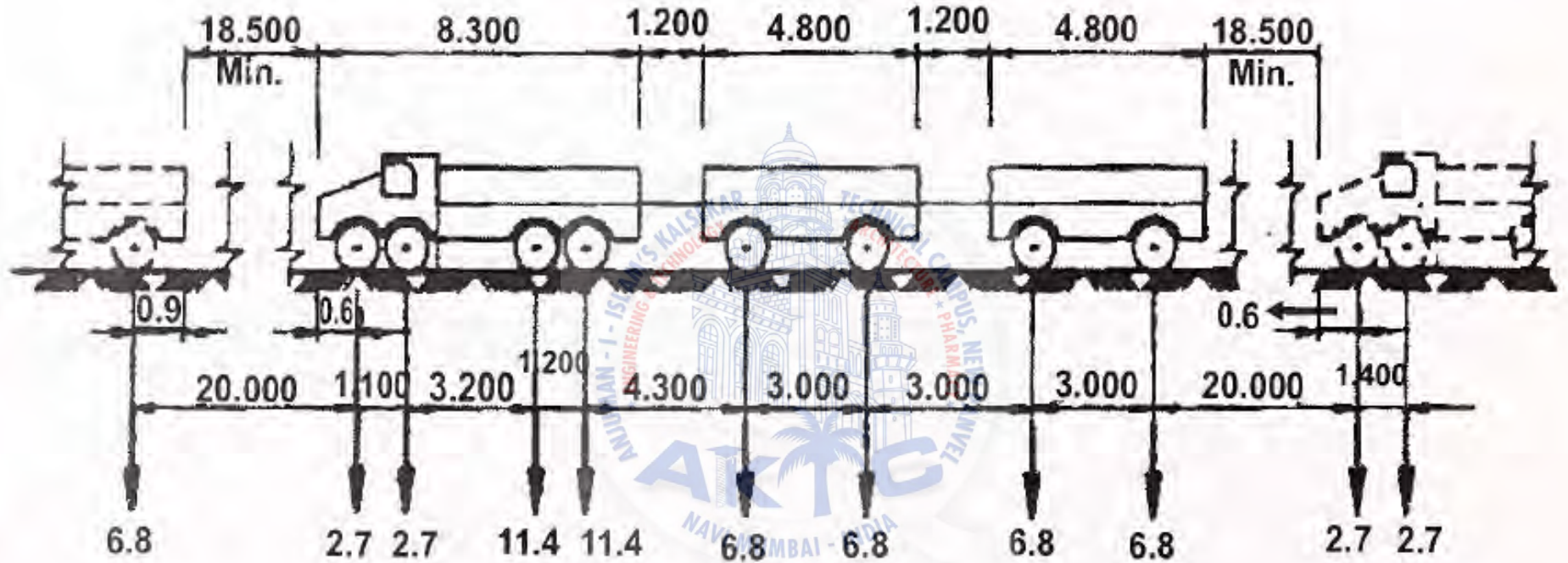
- Class 70R loading is applicable on a **carriageway width of 5.3 m and above**.
- The minimum clearance between the top of the vehicle and the outer edge of the wheel or the track of passing or crossing vehicles shall be 1.2 m. Vehicles passing or crossing shall be of the same class or different class, Tracked or Wheeled.
- Axle load in tonnes, linear dimension in meters.





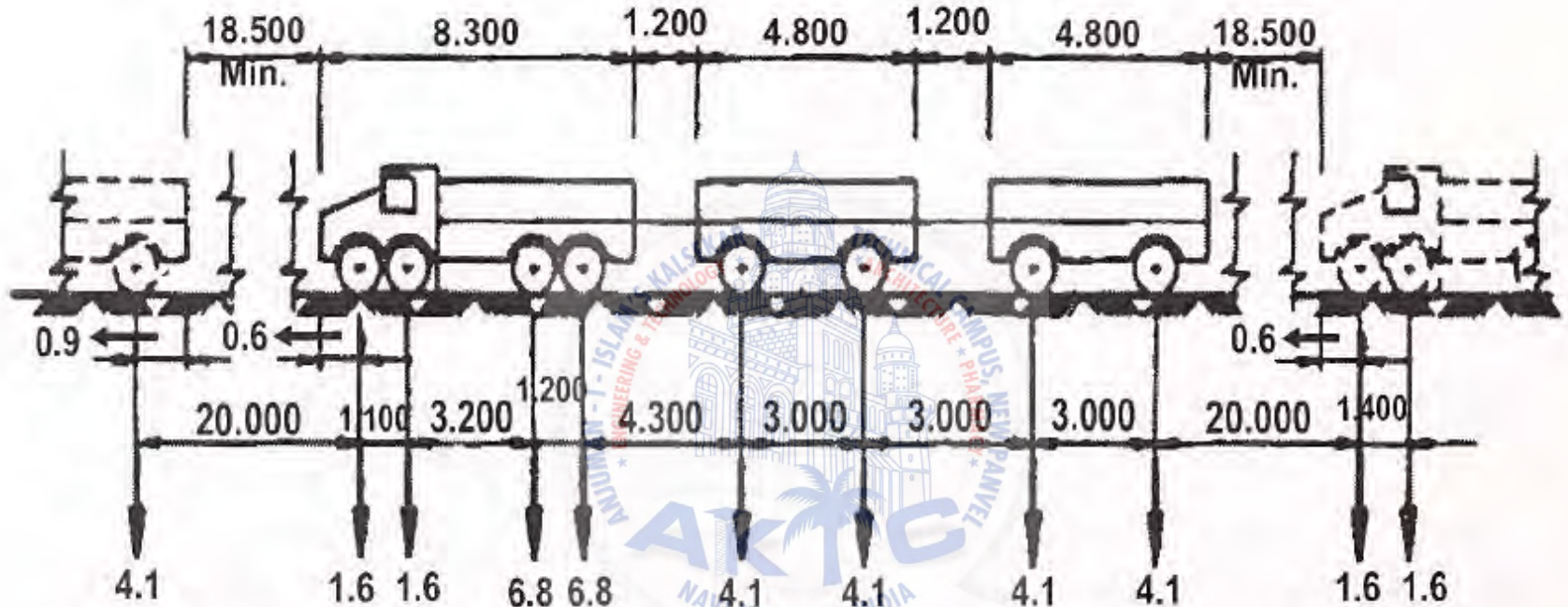
(b) Wheeled Vehicle

I.R.C CLASS AA WHEELED VEHICLE



Class A Train of Vehicles

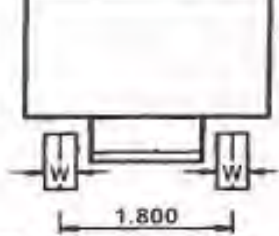
I.R.C CLASS A LOADING VEHICLE



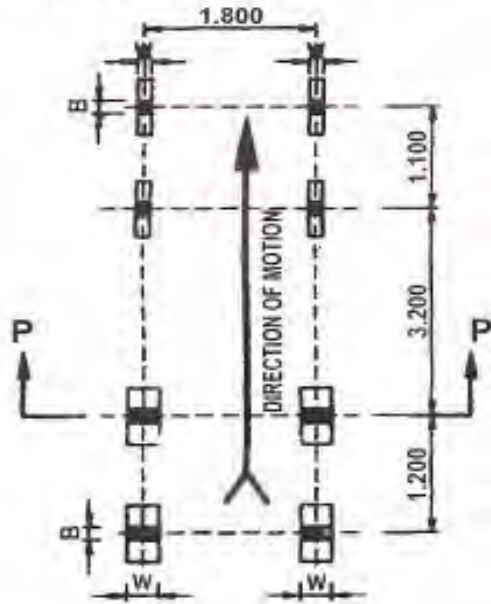
Class B Train of Vehicles

I.R.C CLASS B LOADING VEHICLE

- The nose to tail distance between successive trains shall not be less than 18.5 m.
- For single lane bridges having carriageway width less than 5.3 m, one lane of Class A shall be considered to occupy 2.3 m. Remaining width of carriageway shall be loaded with 500 Kg/m², as shown in Table 2.
- For multi-lane bridges each Class A loading shall be considered to occupy single lane for design purpose. Live load combinations as shown in Table 2 shall be followed.
- IRC:6-14



SECTION ON P-P



PLAN DRIVING VEHICLE

The ground contact area of the wheels shall be as under

Axle Load (t)	Ground Contact Area	
	B (mm)	W (mm)
11.4	250	500
6.8	200	380
4.1	150	300
2.7	150	200
1.6	125	175

I.R.C CLASS A & B LOADING VEHICLE

DESIGN OF CULVERT RC DECK SLAB [ONE WAY SLAB]

Q: Design the deck slab for a culvert to meet the following requirement

- 1) Carriageway : 2 Lane [7.5 m wide]
- 2) Footpath : One metre on either side
- 3) Clear span : 6m
- 4) Wearing Coarse : 80mm
- 5) Width of bearing : 0.4m
- 6) Loading : IRC Class AA tracked vehicle

Use Material M25 and Fe 415 HYSD

THANK YOU!!!

