

## MODERN MECHANISM TO REDUCE TRAFFIC (HYDRAULIC TRS)

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### ABSTRACT

One of the primary challenges has been traffic congestion. India is one of the world's quickest and largest economies. Because India has such a large population, there are a large number of private vehicles on the road, causing traffic congestion. As a result, we've introduced the new way to address this issue. In the event of an emergency, on the roadside if there is heavy traffic and an emergency vehicle needs to pass. We can allow the vertical movement of the footpath so that cars can simply crawl on to it and clear their way by employing a hydraulic traffic reduction system, which uses a hydraulic mechanism beneath the sidewalk. By incorporating this system into the construction of the new road, we will be able to save money while also assisting in times of need. As a result, we can reduce traffic congestion during inclement weather and emergencies.

**Keywords:** Traffic Congestion, Emergency, Footpath, Hydraulic System.

### I. INTRODUCTION

One of the primary challenges has been traffic congestion. Congestion on roadways began to obstruct the safe and efficient circulation of transportation as vehicular traffic increased. Congestion can have a direct impact on emergency response vehicles. To avoid this, we developed the Hydraulic TRS idea for easy and efficient vehicle movement.

#### 1.1 Objectives

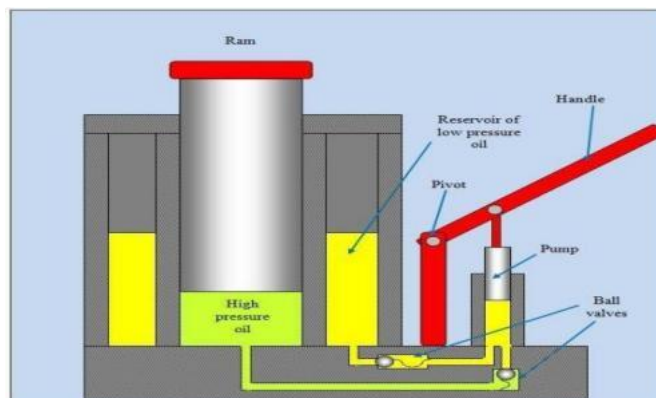
The study's main goal is to find a solution to the problem of traffic congestion in cities. The following are the other goals:

- To reduce traffic during inclement weather.
- In order to improve traffic flow.
- In the event of an emergency, use the walkway as an extra lane.
- To ease traffic flow and alleviate traffic congestion.

#### 1.2 Concept

The hydraulic jack/mechanism will be installed underneath the walkway to allow for vertical movement.

**Hydraulic Jack:** A hydraulic jack is a device that uses a hydraulic cylinder to apply force to lift heavy items. The force provided by the pressure in the cylinder chamber lifts the loads with a hydraulic jack.



**Fig -1:** Conceptual hydraulic mechanism/jack

## II. LITERATURE REVIEW

1.	Rongrong Tian, Xu Zhang	suggested using the TRANSYT traffic modelling software to find the best fixed-time signal plan and the VISSIM micro-simulation software to confirm and evaluate the TRANSYT model and help assess the best signal plan; build an adaptive frame signal plan and refine and evaluate it using VISSIM with the VS-PLUS emulator. It was demonstrated through micro-simulation that the adaptive signal control had a considerably shorter latency than the fixed time control.
2.	Jianhua Guo et al	proposed a new strategy for optimising area-wide traffic signal scheduling under user-balanced traffic. The optimization model was designed as a multi-dimensional search problem with the goal of minimising the total travel time connected with the urban street network as well as the variance of journey time for a given distance. The model solution was derived using a genetic algorithm. To build the logic frame and function module of the area-wide traffic signal control system, a simulation control protocol incorporated in PARAMICS software tool capable of conducting area-wide micro simulation was used. His results shown that mobility improvements are achieved after applying the proposed model along with the genetic algorithm for area-wide signal timing optimization, assessed by extended capacity ratio, and reductions in through and turning movement delays, as well as average and variance of travel time for unit distance of travel.
3.	Gustav Nilsson	A family of dynamic feedback traffic signal control schemes based on a generalised proportional allocation rule were studied. There is a differential inclusion for which existence and, in the special case of orthogonal phases, uniqueness of continuous solutions are demonstrated using a generalisation of the reflection principle. The stability of the closed-loop system is then demonstrated by understanding the generalised proportional allocation controllers as minimises of a specific entropy-like function, which is then employed as a Lyapunov function.

## III. METHODOLOGY

We use the fundamentals of hydraulics and its concepts because our concept is built on the hydraulic jack mechanism.

**Principle of Hydraulics:** The Pascal's Law governs hydraulics.

**Pascal's Law** states that any change in pressure at any point in an enclosed fluid at rest is communicated unequally to all other places in the fluid.

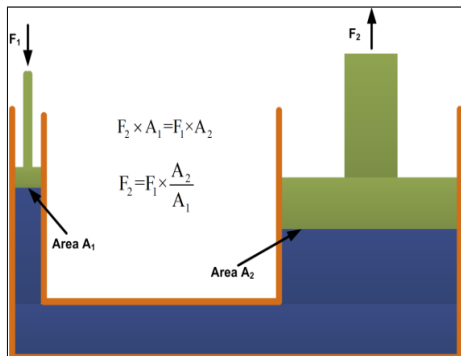


Fig -2: Pascal's law

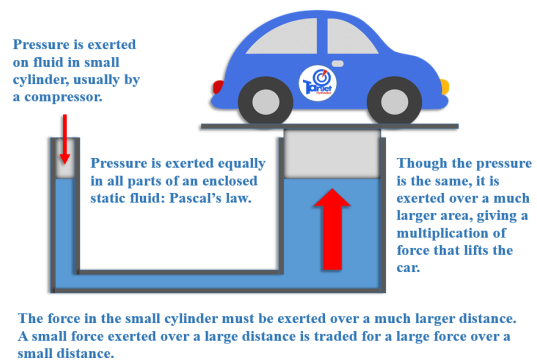


Fig -3: Principle of hydraulic jack

### Working of Hydraulic Jack

Consider figure 2.

- There are two platforms inside a hydraulic jack, one with a smaller size and the other with a bigger area; it is a tube-like construction that is filled with uniform fluid.
- At both ends of the tube, there are two pistons (P1 and P2).

- The cross-sectional area of piston P1 is A1, whereas the cross-sectional area of piston P2 is A2.
- When force F1 is applied to P1, pressure is created, and according to Pascal's law, pressure is transmitted in both directions, with the identical pressure being exerted on the opposite end.
- As a result, the Piston P2 ascends.
- Advantage of using hydraulic lift is that by applying small force on the small area we are able to generate a larger force.

Mathematically:-  $F_2 = PA_2$

where  $F_2$  = Resultant Force,  $A_2$  = area of cross-section

$F_2 = (F_1/A_1)A_2$  where  $P = F_1/A_1$  (Pressure P is due to force  $F_1$  on the area  $A_1$ )

$F_2 = (A_2/A_1)F_1$ . This shows that the applied force has increased by  $A_2/A_1$ .

- Because of Pascal's law the input gets magnified.
- At a very basic level, hydraulics is the liquid counterpart of pneumatics, which concerns gases. Fluid mechanics provides the theoretical foundation for hydraulics, which focuses on the applied engineering using the properties of fluids.

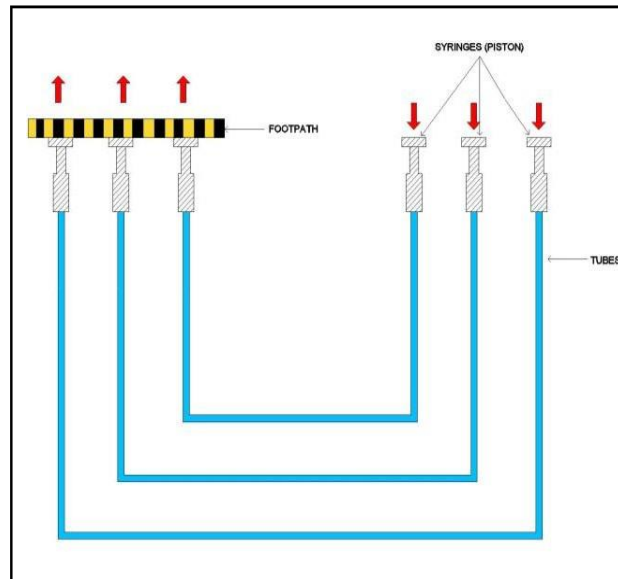


Fig -4: Conceptual design for actual Hydraulic TRS

DUE TO APPLICAION OF FORCE ON THE ONE END, THIS END LIFTS UP i.e. FOOTPATH IS RISEN & VICE VERSA

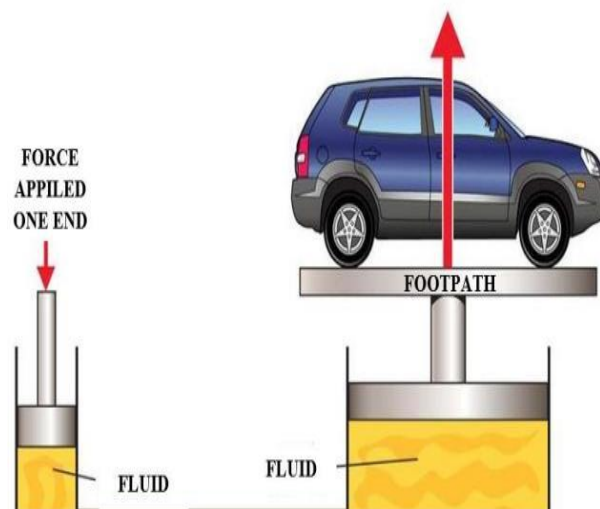


Fig -5: Demonstration of hydraulic jack actual in footpath

Whenever liquid pressure is applied to one end of the cylinder, the other end is lifted. Similarly, in the event of In the event of an emergency, the sidewalk will be lowered to road level so that vehicles may easily crawl over it and clear their path.

#### IV. SURVEYS

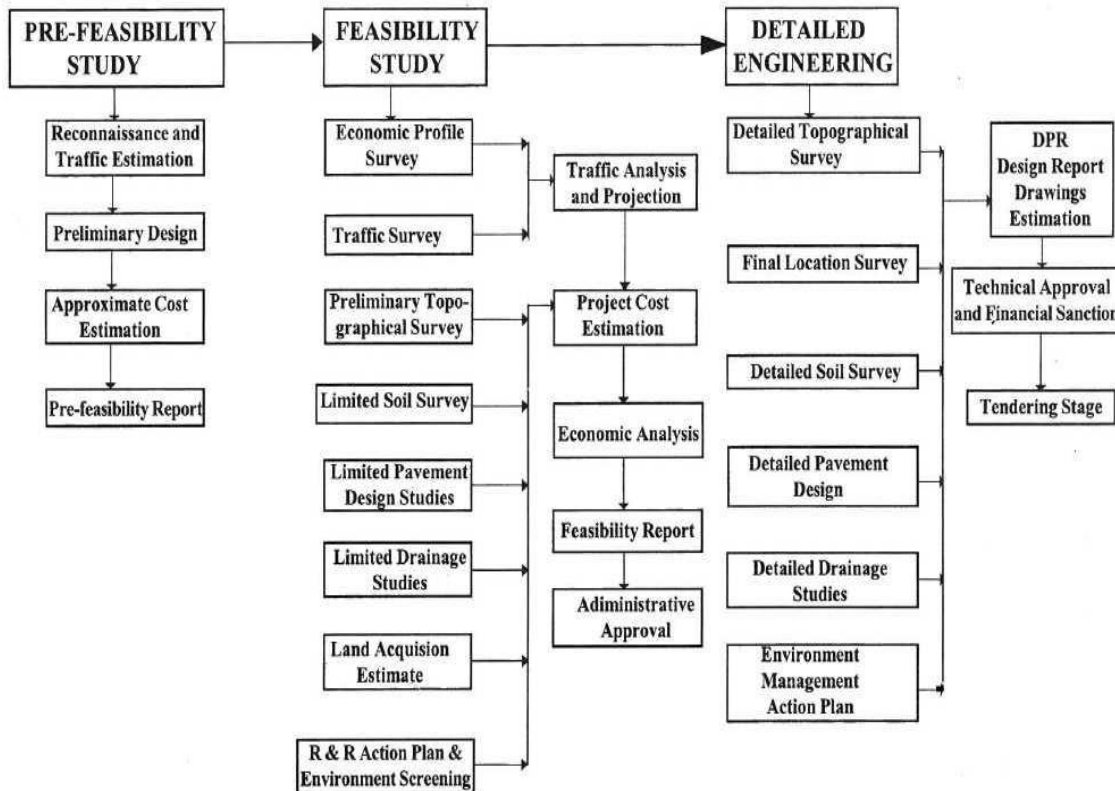


Fig -6: Stages in project preparation

#### V. FUTURE SCOPE

In the current world, we can help to alleviate traffic congestion by implementing this notion of deploying hydraulic jacks beneath the pavement for the construction of new roads.

#### VI. CONCLUSION

Traffic congestion is a worldwide problem that wastes time and energy while also polluting the environment. Identification of congestion is the first step in determining the best approach for avoiding it. Congestion is divided into numerous categories to make it easier to grasp. The problem of traffic congestion can be caused by a variety of factors. There are several options for dealing with traffic congestion. Regularity measures and economic measures are two related measures for traffic management that have been proposed. Access and parking management, as well as price policies, are examples of regularity measures.

Overall, this approach can be used to solve difficulties. I am optimistic that it will help to alleviate traffic congestion in the future.

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