Consider – Compressed air transport for the world.

Cities are growing rapidly. The world cannot sustain the use of fossil fuels, land, and CO2 emissions caused by current passenger and freight transport.

Existing passenger and freight rail services divide communities, causing dangerous and expensive traffic congestion e.g. at level crossings. Very fast trains (VFT) are extremely expensive, infrequent and slow. Short haul aircraft (SHA) require airports near cities. Maglev is expensive.

Decentralisation requires frequent, quick, cheap, silent, non-polluting, underground access to city centres for work and recreation.

The transport system that solves these problems is BETTS.

“It is the nature of things, that a change in one element in a complex system can bring about fundamental changes in that system”

David Dalrymple, inventor of BETTS.

What is BETTS?

BETTS is a capsule like aircraft fuselage, in an evacuated tube, on suspension bridges (or underground) propelled at high speed by jets of compressed air.

We already harness the immense power of compressed air e.g. in building construction, pumping concrete to the top of the world’s tallest buildings. However, compressed air has not previously been widely used in transport because sufficient air has not been able to be stored in the vehicle.

BETTS provides a unique solution to this problem.
1. Faster than a plane. Replaces the train. Like flying only safer.

It is a lightweight bus sized aeroplane like capsule in a near frictionless evacuated tube propelled and supported at 800 km/h by injected air compressed by the sun, on light high suspension bridges, or underground. 1/10 of the cost of conventional construction. No CO2.

2. We need to discuss planning implications as transport is the main consideration in planning.

3. There is an urgent need for fast transport of people and freight on inland routes connecting major cities.

4. The Very Fast Train (VFT) does not satisfy these needs. It is too slow, too heavy, too infrequent, too dangerous, too expensive to build, fuel and maintain. It cannot service the centres it cuts through and assist in decentralisation. It degrades the land use, and does not serve the whole community.

5. BETTS can pick up and put down passengers whilst cruising at a constant speed above 800 km/h. It can service Melbourne, Ballarat, Bendigo, Shepparton, Albury Wodonga, Wagga, Canberra, Moss Vale, Sydney, Newcastle, Moree, Gold Coast, and Brisbane. The smaller centres are all within 30 mins of major centres for work education and recreation making DENCENTRALISATION profitable for the first time.

6. To attract passengers from Short Haul Aircraft (SHA) it is necessary to provide a clearly superior service. SHA are the major users of airports. Melbourne Central - Sydney Central takes 3 hours by air. BETTS takes 1.5 hours Melbourne Central - Canberra - Sydney Central on the inland route. THERE IS NO NEED FOR NEW AIRPORTS.

7. Supporting suspension bridge towers can be constructed from twin vertical cylinders housing pistons connected over a pulley. Water is recycled (using upper and lower tanks) to create an Air Pump by depressing the pistons alternatively producing high pressure air and vacuum very economically. The water can be pumped up using photo voltaic electricity during daylight hours.

8. The lightness of the capsules make it possible to use inexpensive, light, high, widely spaced suspension bridge towers thus preserving the landscape and ELIMINATING THE NEED FOR THE MASSIVE COST OF LAND ACQUISITION AND EARTH WORKS TUNNELS ETC.

9. Construction time is greatly reduced.

10. BETTS makes it possible to underground a cities train transport system WITHOUT INTERRUPTION OR TUNNELING TO CREATE A LINEAR GARDEN CITY above, enabling cycle paths and the elimination of vehicular traffic congestion.

11. Melbourne’s central dockyards were necessary for sailing ships and wagons. BETTS makes it PROFITABLE FOR PORTLAND (A unique deep sea port adjacent to an international shipping lane and abundant land) TO BECOME AUSTRALIA’S NEW PORT enabling the creation of a seaside resort at Melbourne’s transport centre.

12. BETTS is designed to do anything a train will do at 20 times the speed and a fraction of the cost. As each capsule is sealed, and individually powered and self-sufficient in air water and electricity the tubes can carry passengers or freight mostly using adjacent platforms and lifts.

13. The number of capsules in the system at any particular time is centrally controlled using the Twin Tube System for shunting capsules in and out of the system permitting express services similar to trains.
HOW BETTS WORKS.

1. At the station the aircraft like capsule complete with hostess comes to rest in the tube with doors aligned, surrounded by inflated gaskets allowing passengers to get off and on. The doors close. There are 3 variations of what can happen next.
   1.1 The capsule silently elevates (as passengers are surrounded by vacuum) due to the Hovercraft effect and jets of compressed air at the rear and beneath accelerates it ahead of the next oncoming capsules. They seal allowing any passenger to enter the rear capsule to get off at the next station.
   1.2 The 3 wheels at each end of the capsule engage the tube walls, and compressed air is injected at its rear. When a speed of about 200 km/h is reached the wheels are retracted and the Hovercraft effect etc. takes over.
   1.3 As in 1.2 above except that the initial motion is caused by compressed air injected between a cut-off plate and the rear of the capsule giving maximum tolerable acceleration.

2. Supporting suspension bridges can be high light and inexpensive spanning distances of 5km, clearing irregular terrain, maintaining uninterrupted land use, avoiding most earth works and eliminating the need for massive land acquisition costs.

3. Wind effects require design for upward downward and lateral forces.

4. The bridge could have only one upper and one lower suspension cable connected by hanger cables spread at the midpoint by beams supporting the passenger tubes. Lateral stability can be achieved by continuing some hanger cables to ground anchors.

5. The mirror image of the upper and lower bridges would be ascetically pleasing.

6. At intervals of approx. 50km bridge supporting pylons can incorporate twin cylinder water driven Air Pumps.

7. The passenger tube could be constructed with two concentric steel tubes structurally integrated by a corrugated steel mesh for lightness. After erecting this space can be pumped full of concrete for longer spans and penetration resistance.

8. Capsules are self-sufficient in terms of on-board compressed air, vacuum, electricity (compressed air motor generator) and electrically driven wheels, all sufficient to reach the nearest emergency exit.

9. Stations can be serviced at any height by lifts in a hotel like foyer because the capsules are short and light.

10. Thermal variations can be controlled by using hydraulic jacks at the tube supports adjusted prior to each passage of the capsules using laser beams at the front and GPS.

11. Thermal variations in the length of the main tube, pressure and vacuum pipes can be controlled by doughnut shaped expansion joints at intervals of approx. 5km.

12. Safety can be maintained by “cut-off plates” in the doughnuts which are automatically operated and overridden independently automatically in the event of the sudden change in the vacuum pressure. This isolates a 5km section of the tube between 2 doughnuts. Cut-off is designed to be at the rear of one capsule and the front of the next.

13. At 800km/h at intervals of 2 minutes the capsules are separated by a distance of 27km. Controlled ingress of outside air can produce maximum safe deceleration. Based on car braking distances of (60 metres/ 100 km/h). 800 km/h to 0km/h in 4.3 seconds and a distance of 0.48km.

14. The capsule is decelerated at the other end of the tube by reverse jets and or controlled introduction of outside air into the tube.

15. MELBOURNE CENTRAL – MELBOURNE AIRPORT express
16. MELBOURNE CENTRAL – DONCASTER express
17. These direct distances of 30 km enable simple inexpensive solutions.
18. Suspension bridges capable of spanning 5 km carrying 2 passenger tubes separated by an open mesh service / emergency road should suffice.
19. Intermediate bridge supports (including an air pump) and lateral stabilisers can be accommodated on single house lots. The height of the effectively shadowless silent system will cause essentially no loss of amenity to the residents.
20. On leaving the station 2 articulated bus like capsules are accelerated by one of the 3 methods above.
21. The capacity of the 2 tubes working independently is 2 tubes x 2 capsules of 100 persons per capsule x 60/15 minute intervals = 1600 persons per hour.
22. Greater capacity can be achieved by connecting the tubes to run as a loop by transporting the capsule at the end stations (In vacuum) from one tube to the adjacent return tube. At intervals of 2 mins the capacity is 2 capsules of 100 persons x 60/2 min intervals i.e. 2 x 100 by 60/2 = 6,000 p per hour.
23. Melbourne Central (Southern Cross Station) is the centre of Victoria’s railway system.
24. For a detailed analysis of the undergrounding of this system beneath a very large international hotel at Melbourne Central, the linear garden city concept for undergrounding the suburban rail system, and the creation of an extensive waterfront recreation area by building a new port at Portland is described at www.blowthroughtransport.com.
25. The first stage of the international hotel need accommodate the only 3 above ground stations necessary i.e. 1. Melbourne Central Ballarat- Adelaide Sydney Brisbane 2. Melbourne Central – Melbourne Airport 3. Melbourne Central – Doncaster.
26. Capsules can be accommodated in hotel like foyers at levels to clear buildings in their path. The three level open lobbies can be connected by escalators accessed by ticket holding passengers only.

BETTS reduces CO2 in all areas of transport. It reduces traffic congestion, and damage to existing roads.
In complementing existing infrastructure it can generate massive profits, which will attract private enterprise similar to early railway development.
200 years ago Stephenson demonstrated his Rocket train with steel wheels on steel rails. This system continues to this day.
The very fast train with steel wheels grinding on steels rails has reached its limit.
BETTS time has come.
It is like traveling in an aeroplane.
It is not futuristic.
It is the application of freely available technology.
It is essentially frictionless.
It is simple and capable of immediate application.

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See www.blowthroughtransport.com
Or search for Blowthrough Evacuated Tube Transport System using your internet search engine

D G Dalrymple
10/8/18
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PART A: BETTS
Blowthrough Evacuated Tube Transport System

Cities are growing and sprawling rapidly.

Decentralisation is the solution but it requires frequent, quick, cheap, silent, non-polluting, underground access to city centres for work and recreation.

The world cannot sustain the use of fossil fuels, land, and CO2 emissions caused by current passenger and freight transport.

Existing passenger and freight rail services divide communities, causing dangerous and expensive traffic congestion e.g. at level crossings.

Very fast trains (VFT) are extremely expensive, infrequent and slow.

MagLev is expensive.

Short haul aircraft (SHA) require airports, which cannot be near city centres.

The only known transport system that solves these problems is BETTS.

BETTS

Capsule like aircraft fuselages, in an evacuated tube, on suspension bridges (or underground) propelled at high speed by jets of compressed air.

The immense power of compressed air (for example, pumping concrete to the top of the world’s tallest buildings) is widely used. Compressed air has not previously been widely used in transport, because sufficient air cannot be stored in the vehicle.

BETTS provides a unique solution to this problem.

*It is the nature of things that a change in one element in a complex system can bring about fundamental changes in that system*

BETTS changes the way we live.

BETTS does not cost, it generates massive profits.

Therefore, delay in implementation can be costly.

Delay can result in:
Irreversible decisions being made in planning e.g. VFT between Melbourne, Canberra and Sydney.

The unnecessary construction of a new airport near Sydney and/or Melbourne.

Inappropriate planning for expansion of cities.

Delay in decentralisation.

**VERY FAST TRAIN (VFT)** is too slow, too infrequent, too dangerous, and too costly in time and energy to service the intermediate centres it cuts through.

It is too expensive to construct, maintain and acquire land, and too destructive of the physical and social environment. The VFT serves a small section of the community, diverting funds from a greater need, decentralisation.

**SHORT HAUL AIRCRAFT (SHA)** usage needs to be reduced to avoid the cost of a new airport at Sydney and/or Melbourne.

The aeroplane is noisy and polluting and requires airports to be built outside cities. It occupies and renders undesirable large areas of land, which could have been used for housing.

Planes and infrastructure are expensive. The true cost is not reflected in ticket prices. Airports require expensive transport links to city centres

**“MAGLEV” IS EXPENSIVE.**

**DECENTRALISATION IS THE MAIN SOLUTION TO SPRAWLING CITIES** with their associated social and transport costs and the pressure to build on unsuitable land such as agricultural, flood and fire prone.

**WE NEED FAST, QUIET, UNDERGROUND, NON POLLUTING ACCESS TO THE CENTRE OF OUR CITIES. BETTS WILL DO THIS.**

Indicative travel times:

<table>
<thead>
<tr>
<th>Journey</th>
<th>VFT</th>
<th>BETTS (Frequency of 5 mins)</th>
<th>Air Direct City Centre to City Centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melb-Canberra-Syd (M-C-S)</td>
<td>3hr</td>
<td>1.5hr</td>
<td>3hr Melb-Syd</td>
</tr>
<tr>
<td>M-C-S-Brisbane (M-C-S-B)</td>
<td>6hr</td>
<td>3hr</td>
<td>4hr Melb-Bris</td>
</tr>
<tr>
<td>M-C-S-B-Cairns</td>
<td>12hr</td>
<td>6hr</td>
<td>5hr Melb-Cairns</td>
</tr>
</tbody>
</table>
PART 1: WHAT IS BETTS?

IT IS LIKE FLYING IN AN AIRCRAFT AT NIGHT

It is not futuristic.
It is immediately practicable.
It is an application of proven, freely available technologies.
It is a simple design, enabling quick and inexpensive evaluation and implementation.

IT IS THE ONLY ALL WEATHER, ALL TERRAIN, RELIABLE (AND BY FAR THE CHEAPEST) FORM OF TRANSPORT BECAUSE IT IS IN A SAFE, CONTROLLED ENVIRONMENT. No combustible fuel or high voltage electricity. Only end to end collision has to be avoided by a number of independent safety devices.

IT WILL CHANGE THE WAY WE LIVE

For example, in Victoria, Australia, it would decentralise the population to cities such as Ballarat, Bendigo, Shepparton and Warragul because it will give the residents access to Melbourne's amenities within 30 minutes, in much less time than it takes to travel from the outer suburbs.

It will transport passengers in capsules or freight from Melbourne SCS to Sydney Central in less than 1.5 hours, at intervals of 5 minutes, at a cruising speed in excess of 700 km/h picking up and putting down passengers and freight at intermediate stations such as Ballarat, Bendigo, Shepparton, Albury-Wodonga, Wagga, Canberra and Moss Vale.

There will be no need to acquire land. Rent for pylons only.

The cost will be a fraction of the cost of any known alternative.

IT HAS ZERO CO2 EMISSIONS AND REDUCES OTHER SOURCES OF CO2

It will dramatically reduce damaging, dangerous, polluting interstate and cross city road transport and short haul aircraft travel.

It could eliminate the need for another airport at Sydney and/or Melbourne.

It is an aircraft like fuselage (capsule) in an evacuated tube, approximately 12 metres long, and 3 metres diameter, see fig 1.

It is a loosely fitting piston, or hovercraft, propelled by jets of pressurised air (from a continuous high pressure pipe) beneath and to the rear and/or 2 horizontally opposed jets to the rear. Exhausted by valves at the top of the capsule to a continuous vacuum pipe.
The capsule is composed of three concentric cylinders, spaced a distance apart. There is an onboard cylinder, beneath the passenger deck, which picks up and stores high pressure air from the injectors, to release to the outer cylinder.

The inner cylinder is at atmospheric pressure, for passengers. The middle cylinder contains a vacuum. The outer cylinder contains high pressure air, with jets for propulsion, creation of the hovercraft effect and for maintaining a cushion of air between the capsule and the outer evacuated tube.

Air can be injected by valves between the cylinders for various purposes, such as electricity generation and air supply to the passenger cabin, docking of capsules end to end, and sealing the connected passenger accommodation, so as to maintain atmospheric pressure for the passengers, see fig 2.

Walk through capsules dock end to end at cruising speed. Passengers wishing to alight at the next station enter the rear capsule, which is jettisoned to come to rest at the next station, where passengers alight via an air-lock, and new passenger’s board. They accelerate to cruising speed ahead of the next oncoming capsules, and they dock. Passengers wishing to alight at the next station proceed to the rear capsule etc. There are different methods of docking at stations.

In its most simple application, it is a closed system, with a fixed number of capsules, progressing station by station around a loop, while maintaining cruising speed - similar to a relay race.

At stations air pressure gasket sealed doors align in the tube and capsules.

Alternatively, at stations a connected dual tube can slide laterally to permit the main tube with its capsule to be removed while the other tube replaces it. The main tube section with capsule and passengers can be returned at any time, as determined by the central computer, see fig 5.

The main tube could be sky coloured, lightweight, extruded plastic, lined with stainless steel continuously supported on a truss, using the steel vacuum tube, and steel high pressure tube, as top and bottom cords. This truss is supported at intervals by a suspension bridge. Alternatively, the tubes can be underground, see fig 3.

Both of the tubular columns of the suspension bridge pylon house a vertical tube with two cable connected pistons. Water is pumped alternatively from one tower to another, simultaneously producing a vacuum in one pipe, and high pressure in another. The water is pumped up to a reservoir by photoelectric cells during daylight (or wind power) to propel the pistons by gravity. At night, it provides base load power, see fig 4.

The bridge pylons can be spaced to suit topography while preserving the landscape in the country, capable of spanning most gorges because it has only to support four light capsules at one time. The space above existing rail lines and cuttings can be used in the country and city.
The tubes can be at any height to clear overpasses, buildings and landscape irregularities. The effect of this is to elevate the tubes above eye level, making them less noticeable.

At high speeds, there can be little change of direction, similar to aircraft. Obviously slower speeds are necessary when using rail airspace, but the capsules, being light in comparison with trains, can rapidly accelerate to benefit from the straighter sections.

**The Rotating Piston Turntable**

The rotating piston turntable enables the capsules to be relocated to any angle or height. For example, in Melbourne, below the Southern Cross Station, a number of tubes converge, and a change of direction or elevation is required. The capsules enter the 25 metre diameter vertical terminal tube, where they are redirected by a piston turntable, in about 30 seconds, similar to loading torpedo tubes, see fig 7.

**The Rotating Turntable**

Enables the junction of two lines at the one level.

The small number of passengers per capsule makes it possible to provide small, comfortable terminal lounges, more like hotel lobbies. This accommodation can be contained in a high rise tower, above Southern Cross Station, centred upon the 25m diameter rotating piston turntable.

*Small is beautiful, small and frequent is better.*
PART 2: OVERALL VIEW OF SE AUSTRALIA

MAP 1: HIGH SPEED INTERSTATE TRANSPORT

Map 1 shows a high speed system of transport for passengers and freight capable of connecting Melbourne, Ballarat, Bendigo, Shepparton, Albury, Wagga, Canberra, Moss Vale and Sydney in less than 1.5 hours.

DECENTRALISATION IS MOST IMPORTANT

Map 1 shows how both these goals can be achieved.

It makes it possible for residents in Ballarat, Bendigo and Shepparton to live there whilst working studying and enjoying the unique cultural benefits of a capital city such as Melbourne in less time (30 minutes) than those living in outer suburbs.

Employment remote from home has been shown to be detrimental to families and their community.

The environmental and cost benefits will attract others to decentralise.

Local industry will follow.

Decentralisation will reduce Melbourne’s sprawl and invigorate rural cities.

Ballarat

Ballarat is the hub of the system.

The route has been chosen to service the most productive areas in Victoria and NSW, coinciding with the most suitable topography avoiding most Alpine country, see map 1.

Ballarat connects Portland, Adelaide, Sydney and Melbourne

Ballarat has an important history with an outstanding city centre built for a great future only now to be realised.

Portland, Victoria’s only Commercial Port

This port has a unique role. It is uniquely a deep sea port immediately adjacent to the international shipping route.

Compare this with Melbourne, which made sense with sailing ships and horses and carts.

BETTS makes it profitable to transfer all major commercial shipping to Portland, saving the major costs associated with dredging, docking, social and transport costs.
Consider the great value of the central waterfront real estate thereby made available.

Portland enables not only the construction of a new high tech efficient dock yard but a new concept for freight handling.

Security is a problem when locked containers can only be unlocked at their final destination. X-ray etc is unsatisfactory because of size etc.

Containers will only go from the ship to the dockyard security area and back to the ship.

Containers are opened, inspected and the contents given bar codes which directs them to their destination on palettes in capsules.

Export containers are filled from palettes of compatible dimensions from capsules that are pre packed by the exporter.

**BETTS HANDLES MOST FREIGHT, FROM LETTERS, COURIER ITEMS, CARS, GRAIN, MINERALS, PERISHABLES AND LIVESTOCK, I.E. MOST ITEMS CARRIED BY TRAINS.**

Capsules travel at high speed until they join the urban system where speed is reduced. There they are delivered underground by a rotating piston turntable continuing to Melbourne central rotating piston turntable and on to one of the main transport terminals.

The main Melbourne transport terminals are Mordialloc, Dandenong, Clayton, Ringwood, Greensborough, Epping, Broadmeadows, Tullamarine, Sydenham, Deer Park and Laverton.

Intermediate distribution centres for “courier services” e.g. Sunshine, Footscray, Melbourne Central, Camberwell, Box Hill.

Commercial vehicular traffic is thereby greatly reduced.
PART 3: MELBOURNE, THE LINEAR GARDEN CITY

MAP 2 SHOWS MELBOURNE’S RAILWAY SYSTEM IN RED. It is proposed that many of these railway reserves become linear garden parks by placing BETTS underground.

The major benefits in this is the reuniting of communities formerly divided by railways, restoring the free flow of traffic formerly concentrated at level crossings.

A huge quantity of land can be made available (of similar size to the Botanic Gardens) by undergrounding the rail transportation services at Spencer st and North Melbourne. When combined with the vacated docklands area, a truly wonderful waterfront parkland at the focal point of Melbourne’s transport system can be created.

Melbourne’s population can be increased greatly where it is most desired by building higher density housing adjacent to the linear gardens.

The continuous community gardens can be sculptured from excavated soil to form undulating curved pathways, mounds pools amphitheatres skate board parks, climbing hills community gardens and community sheds (where adults can introduce the young to many crafts), cafes, barbecues, and pedestrian walkways.

OVERHEAD IS A COVERED BICYCLE PATH, SUPPORTED BY THE SUSPENSION SYSTEM PREVIOUSLY USED BY THE MAIN TUBES, WHICH ARE NOW UNDERGROUND. IT CURVES TO BLEND IN WITH THE TOPOGRAPHY OF THE HILLS AND TREES.

Beneath this is provided shelter from the sun and rain for pedestrians and park users.

Some terminals such as Dandenong have a Rotating Piston Turntable which takes the very fast capsules from Sale and places them into the slower underground metro system. The major freight and passenger terminals require considerable space, most of which need not be adjacent to the terminal.

BETTS allows for the temporary removal of capsules from the system, see fig 5.

For example, servicing only Ringwood, Blackburn, Box Hill, Glenferrie, Camberwell, Hawthorn, Melbourne central, say 30 mins at 90 km/h equals a 5 minute service. Servicing say, 12 stations gives a 2.5 minute service.

The “queuing” for best service is controlled by the central computer which responds to ticket journey information, passenger numbers in capsules etc. Off peak permits freighting to run express, for example, Ballarat, Melbourne, Dandenong.

Branch lines join the mainlines via a turntable, see fig 6.
**Method of undergrounding**

1. Construct BETTS above the existing operating rail system without interruption.
2. Cease the rail system and begin the overhead BETTS system simultaneously or within a few days.
3. Excavate. Construct concrete channels, stations etc. No excavation need be trucked from site.
4. Lower existing overhead system into the channel by lowering the suspension systems at the pylons.
5. Disconnect tubes and elevate suspension system.
6. Cover the channel progressively and construct the linear garden.
7. Construct the overhead bicycle path at ground level, connect to the suspension system and elevate above the linear garden.

**Melbourne – Tullamarine**

It appears the most suitable route is via the Tullamarine freeway (12 or more metres above ground level, to clear bridges or housing) to the Flagstaff railway station via Peel street. The starting point at Tullamarine would be at the upper level above the roadway then to the freeway to Peel street, William street to the Flagstaff underground railway station. Later to be continued to Melbourne Central rail terminus.

**Melbourne - Doncaster**

This service is 12m or more above ground or underground. To initially start at the Flagstaff Gardens underground station and Tullamarine junction, later to extend to Melbourne Central Gardens. It continues along La Trobe St, Punt Rd and the Eastern Freeway to Doncaster Park and Ride. Later to extend to Doncaster Shoppingtown, Eltham and Greensborough. The main tube to continue to join East Link to Dandenong and later extend to Mordialloc via Hutton road and Governor road.

The overall plan would be to create a tubular ring road system, above existing roads, or underground, linking Mordialloc, Dandenong, Ringwood, Doncaster, Eltham, Greensborough, Thomastown, Broadmeadows, Keilor, Deer Park and Laverton, see map 2.

**Melbourne Central Waterfront Gardens Hotel and Terminus**

The location of this hotel at the international, interstate and city transport centre justifies a hotel of major international significance.

As the transport system is underground, the wonderful existingroofed area with the hotel rising from it can form tropical gardens with formal open air restaurants, casual outdoor dining and stall type eating areas leading to the open air gardens and waterside would be a centre of attraction. The roof height would permit mounding above eye level for visual effect and sound separation, ponds and child minding facilities.
The rotating piston turntable would be located at the centre of the hotel giving access to passengers especially the rooftop restaurants and viewing platforms, see fig 8.
PART 4: THE MECHANICS

There is no need for long platforms or large areas for shunting trains.

Existing tacks occupy much land for shunting and by having to bring spur lines into a parallel line in order to shunt the train across points to merge with the main line.

Much land can be gained by eliminating existing tracks.

By comparison the BETTS system permits one or two capsules at a time to enter the turntable of about 25 metres diameter where four tubes intersect (two on the main line and two on the spur line) centred on the 25m diameter turntable are cut to permit the tubes on the turntable to rotate allowing two capsules to be directed from the spur line into position on the main line, see fig 6.

At capsule stops (stations) the two main tubes are separated by about 3 metres to permit tubes to be slid laterally together with its capsule out of the main tube while pulling its adjacent length of tube into place to complete the main tube while sealing with sliding cylindrical collars. Passengers can alight from and enter the capsules and be thrust laterally back into the main tube, sealed and transported at a time programmed by the central computer.

The lateral movement of capsules can permit stored capsules to be given any order of priority in the main tube.

This system permits goods operation “off peak” using the same platform as passengers.

Essentially it is as simple as finding a slot in the tube for a capsule. This is governed by computers which read the ticket destinations etc, see fig 5.

Generally each line ends underground at Melbourne Central Waterfront Gardens Hotel where the capsules exit the tube, maintaining vacuum and move sideways and return in the adjacent tube.

Passenger can change routes here similar to trains, see fig 8.

Any capsule has the ability to enter a satellite turntable which aligns the capsule to enter the central rotating piston turntable to direct it to the appropriate tube.

The need for freight to travel ‘express’ in many instances, from say Ballarat to Dandenong is achieved by going through the central rotating piston turntable.

The maximum capacity of a line at Melbourne Central Garden is approximately 7,000 passengers per hour.

PART 5: ECONOMICS

The costs resulting from maintaining existing rail tracks, rolling stock and power source causes most railways to be run at great expense to the public, most of whom do not use it.

BETTS serves a greater community. It is a source of government income, by comparison with the VFT it is frictionless with few wearing parts, no expensive polluting power source (jet engines, diesel or electric) and therefore little capital expense.

The major benefit results from capital and operating costs at least one tenth of the current costs.

Hence the urgency to realise the benefits of BETTS.

But there are existing contracts and infrastructure to be considered.

Capital is required for its introduction.

The answer is simple. Where money is to be made capital will be found.

The BETTS Metro system can raise capital by negotiating the lease of land for housing development in the railway reserves.
PART 6: SUMMARY

Since the introduction of the steam train over 150 years ago we have seen great advances in transportation. Train tracks cover the world. Trains are getting bigger and faster reaching the limit of steel wheels on steel rails.

The rail system represents a large portion of community investment.

Any modernisation of this form of transport should utilise these assets.

It should complement the existing – leading to a progressive change which BETTS permits.

Some systems should remain for their tourist benefits. Some can have the BETTS overhead such as the expensively constructed Very Fast Trains (VFTs)

VFT running costs could be reduced by using a slower speed for tourists to view scenery with BETTS overhead travelling at twice the speed and picking and putting down passengers and freight at intermediate stations, unlike the VFT which can only service major cities because of the great cost in time and fuel accelerating from rest.

Road traffic flow is disrupted concentrating it to dangerous and expensive bottle necks such as level crossings, see map 2.

The cost of eliminating level crossings is great.

The amount of government land occupied by the rail system is so great that the sale or leasing of some of this land would make a major contribution to placing BETTS underground.

The profit from BETTS would be great.

Consider the reduction in running cost, safety and all weather reliability.

No expensive maintenance of rail tracks, wheels, bogies and locomotives related to friction wear and tear.

BETTS has virtually no friction and therefore little wear and tear.

Little disruption to existing services as overhead tubes can be lowered into the previously prepared trench, complete with station and amenities.

BETTS enables higher density housing at the most desirable locations with a safe frequent service within walking distance.

No overloading of services as new services can be laid in the underground trench.
PART B: BRAVE
Blowthrough Road Air Vehicle Electric

Comments on some known technologies

1. Petroleum
   a. High environmental and financial costs of extraction, transport to refineries by pipeline and sea (Exxon Valdez), storage, refinery and distribution to service stations to burn in vehicles.
   b. CO2 is released at all stages.
   c. High cost of plant to produce motor vehicles.
   d. High cost of maintenance. A significant part of one’s income.
   e. Cars are a status symbol requiring excessive expenditure on the perfect maintenance of these excessively decorated, shiny fragile symbols.
   f. Petroleum is a convenient dense source of energy. Too bad about CO2.

One hundred years of costly development of assets should be utilised, example, compressed air vehicles using existing service stations.

2. Electric vehicles
   a. Environmentally unsound. Batteries/rare earths etc.
   b. Excessive cost of batteries.
   c. Energy wasted in propelling heavy batteries.
   d. Low kilometre range.
   e. Charging batteries at night is a good means of storing excess electricity which base load coal (stations) need to produce by the nature of the process.

3. Petrol/diesel-electric
   a. A duplication of two bad ideas.
   b. Expensive.

4. Internal combustion air vehicles
   a. Complex system based upon the financial commitment to the internal combustion industry and the inability to store sufficient air on the vehicle.

5. Fuel cells

6. Hydrogen

7. Air Electric. Eliminates expensive and heavy engines gear boxes and transmission. The momentum of these parts together with the jagged metal body of a vehicle are the major cause of damage in a collision.
BRAVE

Four wheels are driven electrically by a quarter of the normal electric car battery pack. On board air pressure tanks are injected from a pressure pipe beneath the road surface. The tanks can also be filled in 3 minutes at service stations. A small light and inexpensive onboard air engine (eg Di Pietro) generates electricity to charge the batteries and drive the wheels.

Battery pack range about 40 kms.
On board air range about 30 kms.

Driving a BRAVE car

Remember to unplug the overnight battery charger from its domestic current outlet. Inside the instruments show battery charge full. Air charge operational. Had you called into the local service station to have the air tank supercharged when you got takeaway last night you would have outperformed all conventional cars. Because of technical considerations supercharging pressures are only available at service stations. Operational pressures are maintained automatically whilst moving by air injected from road injectors at various locations. Your battery has enough range to get you to and from work. Your air tank is always at least operational. Have a good day and do not worry about having a few bumps on your way. But more about that later.

The air tank is carbon fibre, shaped to maximise air volume while forming part of the structural base to which the double skinned foam filled recycleable weldable polypropylene body will be attached. The body is designed to resist even severe impacts and springs backs to its original form. They will not be pretty in the normal sense of today’s cars. They will become cult cars for very good reasons and there will be no need for them to be small. These cars will obviously be cheap. Surely the absurd cost and snobbery surrounding today’s car must end.

Picture an international car show. A beautiful woman enters with a long handled hammer and smashed a bright sparkling expensive car. She turns and smashes into a modest BRAVE car which just bounces back into shape showing no marks on its plain matte surface.

Method of payment for compressed air. Supercharging at service stations is payable as for petrol. In road air paid by a flat charge levied by the motor registration branch based or city or country and vehicle type plus an additional charge due to self declared speedometer readings in excess of 10,000 kilometres, or by Phone App.

Air Supply

1) Country main roads.
   BETTS type underground air pressure generators are connected by under road pipes in the outer slower traffic lane to inject vehicles.
2) City areas can be serviced similar to the above with water driving pistons in cylinders and storage tubes placed underground at service stations servicing adjacent in-road air jets at intersections. Utilising photoelectric power to pump the water to the top when the sun shines with sufficient storage to allow for when the sun does not shine.
SUSPENSION BRIDGE PYLON
GREEN BASE LOAD POWER

SUSPENSION CABLES

TOP TANK
WATER VOLS V1 AND V2

VALVES

PISTONS CABLE PULLEYS

PISTON P1

STEEL TUBES
BODILY ACCESS

CABLE
CYLINDER

INFLATABLE RINGS
LUBRICATING RING
PRESSURE VALVE

DETAIL - A
PISTON ELEVATION

TRUSS, TOP CHORD VACUUM PIPE
BOTTOM CHORD PRESSURE PIPE

PASSENGER CAPSULE

VALVES X

VALVES X
PISTON P2

BOTTOM TANK
V3
GROUND

THREE EQUAL VOLUMES (V) OF WATER V1, V2, V3 IN A CLOSED CIRCUIT. TOP TANK HOLDS V1 AND V2. BOTTOM TANK HOLDS V3.
A 24 HOUR CYCLE. CYCLE SHOWS V2 DISCHARGED TO BOTTOM TANK. V1 COMMENCES TO FORCE P1 DOWN AND DISCHARGE V1 TO
BOTTOM TANK AFTER V2 AND V3 HAS BEEN PUMPED TO THE TOP TANK DURING DAYLIGHT HOURS. THE CYCLE REPEATS.

NOTE: OTHER PYLONS ARE TO SUPPORT CABLES ONLY.

FIG. 4

APPENDIX 3 - NOTES

Discussion of details must necessarily be limited, but some aspects need be noted.

1. The cost of minimising air pressure in the main tube, which has to accommodate passengers and other goods such as electrically driven ambulances. The more air needing to pass the capsule, the greater the clearance between capsule and tube.

2. An assessment of the necessity to insert steel plates at the end of a capsule when exiting or inserting the capsule, see fig. 5.

3. Air volumes, pressures, temperatures, location and size of injectors etc.

4. The function of air pressure generation as applicable to pylons.

5. The design of the main tube, could it be plastic extruded with longitudinal holes similar to bamboo? Note vacuum cleaner ads show a cheap, vacuum cleaner with a normal wire coil, in a thin plastic tube, suspending a bowling ball. Should it have a stainless steel liner? The control of expansion in the main tube. Could an elliptical cross section reduce the turning circle of the tube?

6. **Aesthetics** Suspension bridges are generally regarded by the public as a beautiful expression of mans achievements. The footprint of multilane roads at necessarily low levels can be unpleasant. BETTS has a much smaller footprint and can be economically elevated at little extra cost to pylons and lifts at stations. BETTS can be underground with the ‘pylons pistons’ drilled deep into the ground. Above ground, extra height can be used to clear buildings and when it is necessary to have sufficient radius of tube. None of the above considerations involve new or novel science. All involve known, freely available technologies.

7. **Freight and passenger inter-changeability**. Capsules can be designed to take both passengers and freight. ‘Courier household type goods’ can be loaded in pallets, in the same capsule as passengers, provided a passageway exists for passengers. It takes less than a minute for an electrically operated device to remove and/or replace a pallet. In event of delay in the tube, lasers in the oncoming capsule will detect the obstruction and the capsule would be automatically shunted sideways and the adjoining clear tube replaces it.
8. **Costs.** Great savings in:
   a. Construction by elimination of major earthworks and land acquisition. BETTS only pays rental for pylons.
   b. The cost of fuel and ‘engines’. Initial cost and maintenance reduced due to air-cushioned propulsion.
   c. Capital cost of passenger service i.e. airports, railway stations etc.
   d. Environment. VFT, cutting through communities, providing only for those in major cities. Short haul aircraft, degrading large areas of land. Necessarily remote, requiring special access from the city centre.
   e. BETTS. Clearly cheaper than quoted for evacuated tube transport at 1/10 of the cost of alternatives, none of which can offer the benefits of BETTS.

9. **Safety**
   All other forms of transport have obvious dangers. BETTS form of transport is by far the safest and most reliable because it can be designed to withstand the effects of:
   a. Earthquakes
   b. Snowstorms
   c. Hurricanes
   d. Floods
   e. Bushfires
   f. Mechanical breakdowns, because there is little complex, high performance engineering requiring expensive maintenance.

Safety precautions include:
   a. Laser beams to detect obstructions at a safe distance
   b. Reverse thrust air jets
   c. Valves in the main tube that automatically open to atmospheric pressure causing a very effective braking pressure
   d. At close range, each capsule automatically releases air from its on board tank, producing an air cushion.
   e. In an emergency at speeds below 100 km/h aircraft like wheels can move to engage the tube. The wheels are driven by an on board battery (charged by a...
generator driven by eg a Di Pietro air engine) to the nearest station.

If this fails, the passengers can remain in position and be towed by an electrically driven emergency bus.

If all this fails, the passengers can exit the capsule and walk to the nearest emergency exit and balcony.

PARK and RIDE. (P. R.)

It is known that the cost of providing car spaces uneconomically high. A family needs two cars if one is at P. R. all day. BETTS underground transport can provide (with about half the number of stations) improved patronage by redesigning bus feeder routes and introducing Asian style stripped down Battery Electric Scooters with a box for full rain protection overalls. Battery range approximately 15K. Available to long term patrons with a small bond payment. Battery can only be charged at the station. Drive to station, check in, deposit scooter on carousel which is connected to storage, battery charging, and maintenance. Depart after checking in and collecting A scooter from the carousel.
APPENDIX 4 – INVITATION TO TENDER

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