NEWSLETTER

RETIRED CHARTERED ENGINEERS ASSOCIATION
WORTHING

Hon. Secretary: S. Oliver. Elphin, North Drive, Angmering, BN16 4JJ ☎ 01903 787116

FORTHCOMING EVENTS

4th April	Wednesday	**Outing** to Petworth House Cancelled **due to foot and mouth outbreak**
9th May	Wednesday	**Outing** to Horsham Museum and the Causeway see pages 7 & 9 for details and signing up
22nd May	Tuesday	Committee meeting 2.30 p.m.
5th June	Wednesday	**Outing** to Hamble River Cruise see pages 7 & 9 for details and signing up
4th July	Wednesday	**Outing** to Chatham Dockyard see pages 8 & 9

Coffee Mornings

Denton Lounge, Worthing Pier. Every Monday

Albion Inn, 110 Church Road, Hove.	First Wednesday of the month 4 Apr, 2 May, 6 Jun, 4 Jul, 1 Aug
The Spotted Cow, Angmering	Third Thursday of the month 19 Apr, 17 May, 21 Jun, 19 Jul, 16 Aug
Beach Hotel, Worthing (with Ladies)	Last Thursday of the month 29 Mar, 26 Apr, 31 May,

28 Jun, 26 Jul, 30 Aug

Coffee mornings commence at 10.30 a.m., except at The Beach, which is from 10.45 a.m.

Copy date for next Newsletter 6 Aug

Membership

We regret to record the death of H. Kember in December, 2000 and of C.H. Forster on 5th February, 2001.

We welcome the following new member:

2000 SLATER, B.F., M.I.Marine.E, M.I.Mech.E. *60 Dorchester Gdns, Grand Ave, Worthing* *BN11 5AY (01903 245977)* 1944-49 Harland Wolff, Liverpool, marine fitting apprentice. 1949-50 Blue Star line, Southhampton,4th Eng. officer. 1950-54 Borg & Beck Co., Leamington Spa, sales, friction clutches. 1954-55 J & H Mclaren, Leeds, sales, diesel engines. 1955-59 Fluidrive Energy Co., Isleworth, marine applications Eng. 1960-78 Remold, Manchester. product promotion manager, *Interests:* Tennis, Squash, Walking, The human race, Current affairs,Politics, Socialising. Holidays in the sun	

Sheila Parsons is now home and has recovered from her misfortunes and wishes to thank all the members and friends who sent cards and flowers for their kindness.

To date we have 116 members which includes 7 life members and there are in addition 9 widows who are treated as members.

Bridges 2000 - talk by A.S. Whitaker, member, held at Field Place, Tuesday 9th January, 2001 at 2.30 p.m.

The updating of all bridges from HB loading of 38 tons to 40 tons was required for all bridge owners in accordance with EEC requirements. Bridges on Motorways, TR, Class 1 Roads were already up to the 38 ton standard but each LA bridge had to be checked for DL + UDLL and some unit of HB loading. The Highways Agency had obtained means from the Treasury to carry out all their assessments and most of the strengthening works. It is the LA who found it more daunting financially: M and TR bridges number some 13,000, British Rail and British Waterways some 14,000 leaving LA with some 128,000 bridges of which some 10,000 had failed the 40 ton loading and some 30,000 were suspect. There is still an argument as to payment between Railtrack and LA in respect of their overline bridges which were originally designed for 24 ton vehicles whilst British Waterways may still be sitting on the fence waiting for that decision.

LA have always carried out inspections on a regular basis if not to the same standard. It was interesting to see those bridges which West Sussex CC had to inspect, manage and maintain, which consisted of additional Private Right of Way footbridges, private bridges, BR under and over line bridges, as well as their disused ones. They inspected some bridges yearly, others biennial and every four years such that taking all the numbers it worked out at some 400 every year. Some CC like Lancashire where I started in 1946 had an officer (at Lancashire CC regular RE officer MICE) to record detail in every bridge file with land take, position of statutory undertakers and inspection dates and extent of any work carried out. To try and retrieve from lack of maintenance 1938/9 I had to form a DL organization dealing with bridge painting, waterproofing, erection of 80 foot DS Bailey bridge to keep traffic moving whilst redecking to 38 tons on TRA590 from Barrow to TRA6 and out of the county to deal with very heavy loads from Vickers. At the same time every bridge subjected to colliery subsidence had to be regularly cross checked by steel tape and all levels taken by an Engineer because of possible court action. One bridge on TRA580 over Bridgewater Canal, had had 2ft 6in reduction in headroom but the consultant had put in jacking beams. However the ingress of water had corroded them so the bridge had to be jacked up by other means. At Lancashire CC I was brought up to be cautious and ensure a good factor of safety as extra steel put in at the start was never as expensive as later strengthening and bridges were built for 120 years.

This experience was useful when I was asked to join the Institution of Structural Engineers technical group on Bridge Management and Maintenance some 8 years ago in order to assist staff with the assessment and then strengthening of substandard bridges. I did check some 17 older type bridges in rural areas, mainly brick and stone arch bridges with widenings in Steel, CI and WI and found all but two up to standard but requiring better maintenance work. Many of the bridges I had built during 1956-63 in Warwickshire consisting of pretensioned concrete I beams and post tensioned 2 span concrete bridges had passed the assessment for 40 ton loading but a 3 span steel beam railway bridge widening had to be strengthened with an RC overlay. The centuries of bridge building had been in stone and brick arches from trade moving across the country to Europe, followed by General Wade`s building roads and bridges from Northumberland through Scotland for “Butcher Cumberland” to enforce its subjection, then the race of Canal Companies and finally the Railway impetus. The 1884 Local Government Act gave County Councils the control over road and bridge building and their maintenance so that the most important routes were greatly improved. Mass concrete arch bridges were then built as well as stone arch bridges in the more rural areas but steel girder bridges were more economic and quicker to erect. Many existing bridges had to be

strengthened and widened, such as at Arundel and the elegant Waterloo Bridge at Bettsw-y-Coed for the newer loadings. The advent of motorways in Europe had led to the use of pretensioned and post tensioned concrete beams as designed by Freysinnet and manufactured in long beds at factories. Motorways and dual by-pass roads required very many farm underbridges, culverts and large service ducts which were usually constructed in concrete as arches or as box culverts for which waterproofing, careful back filling and drainage was required. However it was more economic to construct precast RC box culverts in a factory to any length and standard size, transport to site, crane in and back fill. These were also used to strengthen bridge abutments when not constricting width and headroom by constructing off site but on line on steel plates and then winched into position by a tracking system patented by John Ropkins, as a deviation of wire rope anti drag systems used in tunneling and then the sides and top of the box grouted up.

Mass concrete abutments were more economical for small span bridges and arch bridges of greater span but where ground conditions were inadequate, piles were used. The majority of arch bridges from Roman times had made good use of timber piles, planks and fascines which were founded under water for longevity but did make widenings difficult. The base of an abutment and wingwall were always sloped back from the face to counter sliding pressures and the face of a wing wall is usually sloped back for aesthetic reasons. To reduce the span of a dual or three lane bridge abutments had been constructed which were inclined forward as initiated in Warwickshire RCU, where increasing the width of the base could be extended under the verge, or slow lane to meet the different loading conditions and the filling needed to be a dense type. The types of piles are varied, precast concrete, concrete cast in steel bored shells, steel cylinders of two types as “bearing piles” or “raking piles” for which the bearing capacity is obtained from formula based on the research of Terghazi. There are several patented types of piles such as “Vibro”, “Raymond” and “Franki” as well as British Steel piles.

The use of de-icing salts on roads had become the most destructive to both deck and substructure as it can penetrate through deck joints in spite of seals and waterproofing. This caused endless repair work and even reconstruction to the Midlands Motorway link where the viaducts were made up of single span steel beams with RC deck. Other viaducts such as the M5 at Marsh Mills had slip roads reconstructed for similar reasons. The A19 Tees Viaduct, 68 span 2km crossing has had a 16 year programme of repair work where all the deck joints had to be replaced, large areas of the deck cut out and 80 roller bearings replaced, renewal of

waterproofing and later the concrete crossheads and even whole piers replaced. The other danger to concrete bridges has been ASR(Alkaline Silica Reaction) leading to some bridges being reconstructed and others saved in time to cut out the damaged portions. It has shown that using continuous spans will cut out some of the problems. A number of bridges have been strengthened using carbon fibres for CI, WI and Steel beams as well as for shear problems at abutments ends. One of the most interesting bridges for assessment was at Rochdale, the country`s widest bridge some 452m over the 20m. River Roch. The oldest bridge was a 3 span masonry arch built in 1603 and then widened 5 times which passed the 40 ton loading but the next WI deck section had to be rebuilt. In order to link the sections in 1884 to carry steam and then extend for electric traction trams, in1904 one of the earliest RC bridges was built and tests showed that the concrete core strengths gave an impressive 30N compared with the 20N of the newer adjacent concrete sections. The last section was constructed in 1924 with another RC section, and even this was under strength. Fortunately the fact that the tramway had extra depth allowed an RC slab to be built compositely with the old deck slabs. There is no doubt that the majority of brick and stone arch bridges have been assessed to carry the 40 ton loading and some up to 50 tons, which has led BR and some LA to erect several precast RC arch bridges where headroom is not critical.

Many special footbridges had been constructed for the Millennium but unfortunately the one in London was wobbley under pedestrian loading through excessive resonance which had to be and is still closed whilst Ove Arup whose analysis admitted no resonance retracted to deal with the problems under the direction of the Bridge Trust`s consultant. There have been numerous letters stating that these problems should be dealt with structurally by using cross bracing under the deck and wiring the main longitudinal steel cables together. Another scheme to provide footways on either side of Hungerford Railway Bridge had foundation problems with two LU lines which stopped the use of piling in their vicinity because of the existence of German unexploded bombs in the river bed which led to driving caissons and costly laborious hand excavation There has been criticism at the rising cost of these schemes the first at £22m+ and the latter at £46m+. In contrast the spectacular lifting footbridge at Gateshead, the Maidstone cable footbridge, the similar footbridge to the Leary Museum etc at Salford, Southwark Council`s scheme for an enclosed footbridge on the upstream pier of Cannon Street Railway Bridge and several LA schemes such as an arch footbridge which opens out to cover the confluence of the River Calder and the River Ribble in Lancashire costing less than £1m have exercised even more letters.

It is interesting to see that the boarding platform for the London Eye was built by Littlehampton Welders Ltd.

Alan Whitaker

How we supplied the Troops in the First World War - talk by

R.A.A. Newman, member, at Field Place Tuesday 13th February, 2001.

First World War history books give scant recognition of the engineering achievements of the time, yet a number of “firsts” were recorded.

H.G. Wells’ 1903 science fiction dream of "landships" was brought to reality when the first prototype was designed over a pint in a Lincoln pub and was produced within 37 days. Over 700 were supplied to the Western Front, shipped as "water carriers" to confuse the enemy. Hence their present name of "tanks".

To overcome supply bottlenecks at the channel ports, where refugees and wounded were flooding back to England, the Royal Engineers established a new port and manufacturing complex at Richborough, at the mouth of the river Stour, on the East Kent coast just north of Sandwich. Work started in 1916 and by 1918 some 19000 soldiers and civilians were employed there. Known as "the Government Workshops", they turned their hands to most things. They had a concrete block yard, a foundry, pattern shop, machine shop, fitting and erection sheds, railway wagon shop, locomotive and tractor repair sheds, a permanent way shop making points and crossings, a sawmill, records offices, seventy five miles of railway sidings and their own power station.

The principal activities were the manufacture, loading, unloading and servicing of barges for cross-channel towing. Unlike English waterways which deteriorated with the coming of railways, French canals were still in good condition. Barges were towed to where the supplies were needed. The first barges were of riveted steel construction but soon changed to a "rivetless" type - the first all welded barges in the country, designed by ex-ship designer R.E. officers. Motorised versions were used for anchoring observation balloons. A third version was constructed as sea plane lighters. Aircraft range was as yet insufficient to reach the German coast and back, so sea planes were fast towed closer to their targets and the rear of the lighter submerged to allow the seaplane to float off and take off in the normal manner. Return was by the reverse procedure. They were particularly useful in mining the entrances to the German submarine pens as well as in bombing.

220 barges of the various types were made at Richborough and another 81 at other commercial yards. From 1917 to 1919 1.4 million tons were conveyed to France by barge and 0.39 million tons returned for repairs or as salvage.

A later addition at Richborough was the train ferry terminal at the mouth of the river, plying to Calais and Dunkirk and duplicated Southampton to Dieppe. The first ever train ferry commenced service across the Firth of Forth in 1850 and several others had since been constructed overseas. A cross-channel service had twice been mooted but the existing lucrative cross-channel steamer services held sway.

Proposals for three ferries were approved in January 1917 and went into service in February 1918. They had open decks, four side-by-side rail tracks and a capacity of 54 10 ton rail wagons. For conveying road transport, baulks of timber were placed between the rails. Each boat was powered by two triple expansion steam engines supplied from oil fired boilers. Turn-round time was about half an hour. In the period 1918 to 1919 259000 tons of supplies were shipped out and 384000 tons returned excluding the weight of railway wagons. The larger return figures no doubt included lorries returned from the front in 1919 to alleviate the transport strike at home. The service continued until 1922.

The ferries and barges all survived the war and were again put to good use in the Dunkirk rescue in 1940. One of the train ferries went into commercial service as the "Essex Ferry" between Harwich and Zeebrugge until scrapped in 1957 after 40 years of service. The second was sunk by air attack while rescuing the Highland Division at Dieppe in 1940 and the third struck a mine and sank in 1945.

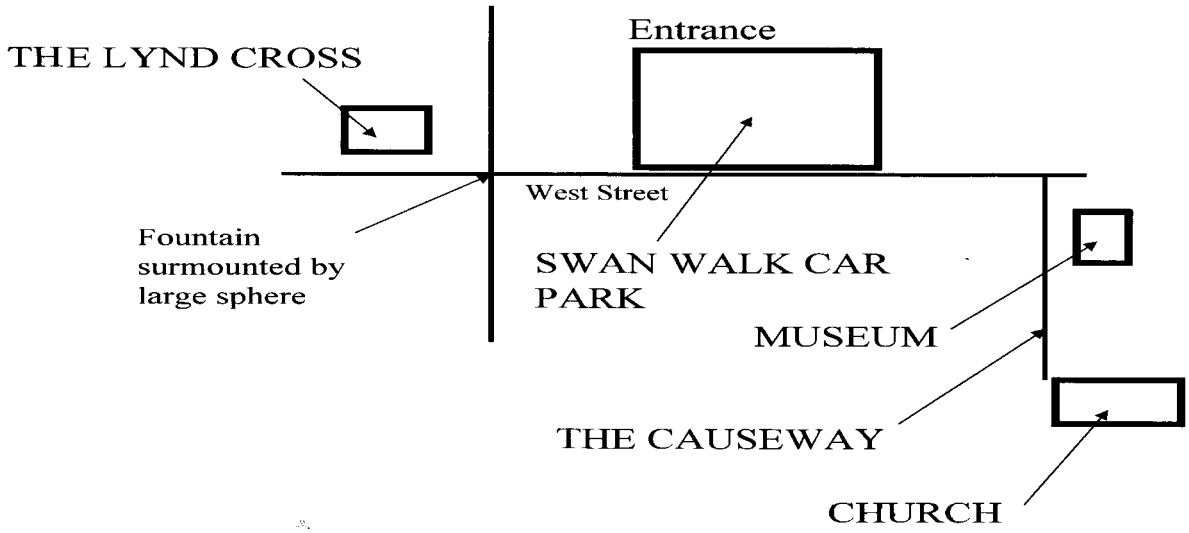
Richard Newman

Richard, who used to work at Richborough, acknowledged the work of retired naval officer Robert Butler of Sandwich whose work on modelling boats triggered the research and he illustrated his talk with slides, and anecdotes drawn from the various archives.

Outing with partners to Horsham Museum and the Causeway, on Wednesday 9th May 2001.

We meet at The Lynd Cross public house at 12-30 for lunch and then we walk along West Street to the Museum for a conducted tour of the Causeway and Church followed by a visit to the Museum which starts at 2.00. pm. A donation of £1 per person attending is requested to be handed to Ken Wheeler.
Latest date for applications is 30th April 2001

Closing date for applications 30th April, 2001 - please return form on page 9.



Outing with partners to Hamble River Cruise, on Wednesday 5th June 2001 at 2.30 p.m.

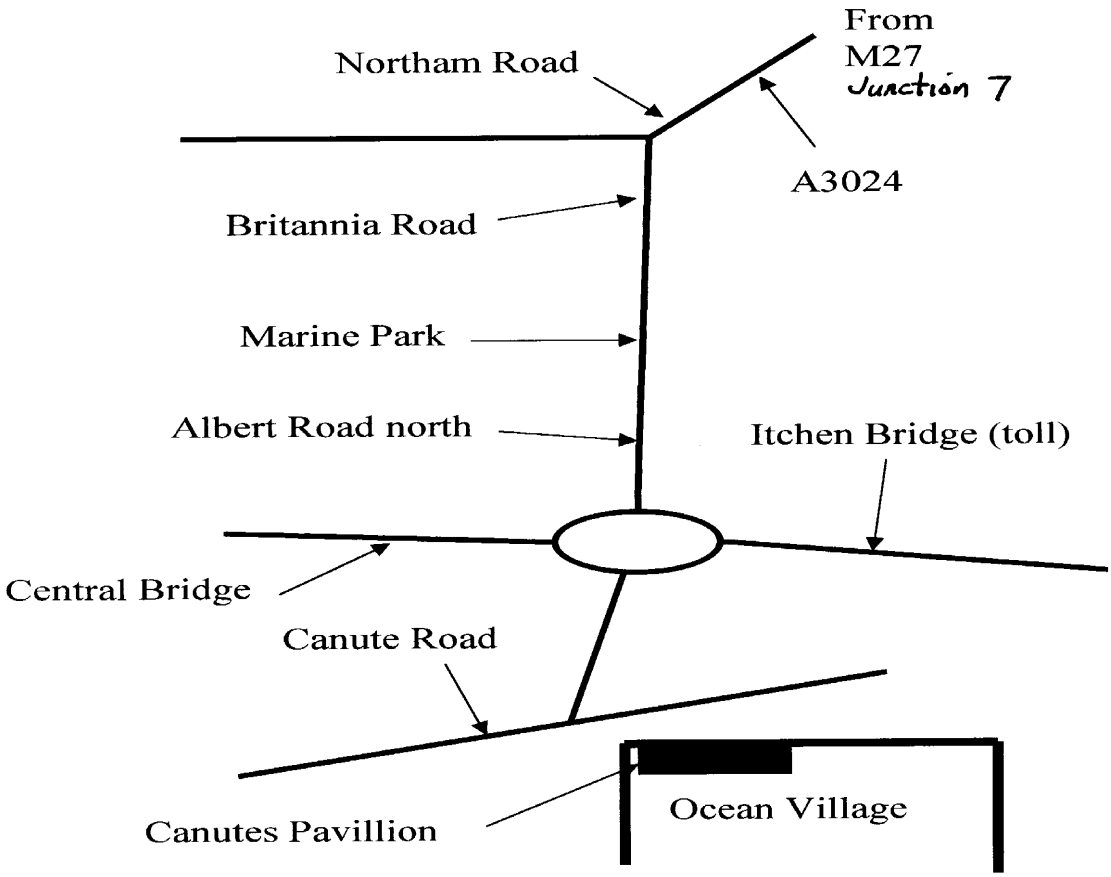
Funnel Cruises, Howards Way, river cruise lasting 2 hours, including a cream tea, commencing at 14-30 hours .

We meet for lunch at the Harry Ramsden fish restaurant at the Ocean Village at 12-30 hours (cost of lunch not included)

To get to Ocean Village, take the M27 and leave at junction 7. Find A3024 Northam Road, Left turn into Britannia Road, which becomes Marine Parade and then Albert Road North (B3038). At roundabout, look for Ocean Village sign. Enter car park, proceed short distance to Harry Ramsden and wait there for boat tickets from Ken Wheeler, which **may** include a discretionary discount for lunch.

Price £10 per person in advance. Cheques made payable to RCEA

Closing date for applications 21st May 2001 - please return form on page 9.



Outing with partners to World Navel Base, Chatham Dockyard, on Wednesday 4th July 2001 at 2.30 p.m.

World Naval Base, Chatham is Europe's most exciting maritime heritage destination. The 80 acre site dates back over 400 years and was once one of Britain's most important naval bases. Among its thrilling displays are warships, informative exhibitions and some of the country's most breathtaking naval architecture.

Three of the nation's most powerful fighting ships - HMS Cavalier, Britain's last remaining WWII destroyer, the spy submarine Ocelot and the last Victorian Sloop Gannet. Guided tours around the destroyer and through the spy submarine are included in the entry price.

The award winning Wooden Walls animatronic gallery allows visitors to walk through the Royal Dockyard of 1758 and discover how Britain's wooden warships were built. Lifeboat!, the R.N.L.I. National Exhibition Hall, tells the heroic story of one of Britain's most famous volunteer services with an exciting display of 15 full size lifeboats, film and artefacts. New for 2001, exciting gallery highlighting Chatham's role in naval heritage.

The Ropery is a unique quarter of a mile long building where craftsmen still use fascinating traditional techniques to make quality rope that still rigs the world's grandest sailing ships. The Kent Police Museum, craft workshops, a working foundry and conservation laboratory are also available on site.

Meet for coffee 11.00 a.m. at the Wheelwrights' Restaurant

Directions

Take M25 - M26 – M20 and at junction 6 follow signs to Chatham, A229, then A230 and A231 and the brown tourist signs, Brown Anchor signs lead to the visitor entrance at the north end of the site where there is ample free parking for cars.

Entrance fee adults £8.50 concessions £6.50

Please note that no confirmation of your application will be made and no tickets will be issued. However if there are any problems, eg there is a waiting list, then you will be notified.

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To: K.J. Wheeler, 14 Musgrave Avenue, East Grinstead, RH19 4BS Tel: 01342 321291
I wish to participate in the outing to **Horsham Museum** on Wed, 9th May, 2001 at 12.30 p.m.

Full Name .....(Block capitals)

Address .....

.....

Phone No.....

Applications by 25th April, 2001

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To: K.J. Wheeler, 14 Musgrave Avenue, East Grinstead, RH19 4BS Tel: 01342 321291
I wish to participate in the outing to **Hamble river cruise** on Wed, 5th June, 2001 at 12.30 p.m.

Full Name .....(Block capitals)

Address .....

.....

Phone No.....

My guests will be……

I enclose a cheque for ……payable to RCEA for river cruise and cream tea (£10.00 per person)

Applications by 22nd May, 2001

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To: K.J. Wheeler, 14 Musgrave Avenue, East Grinstead, RH19 4BS Tel: 01342 321291
I wish to participate in the outing to **Chatham Dockyard** on Wed, 4th July, 2001 at 11.00 a.m.

Full Name .....(Block capitals)

Address .....

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Phone No.....

Applications by 21st June, 2001