

HERITAGE INFORMATION SERIES

ENGINEERING AND INDUSTRIAL HERITAGE



This information sheet was prepared by the Engineering Heritage Committee of Engineers Australia, Sydney Division.

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Engineering and Industrial Heritage

Major engineering works, such as large bridges, dams and industrial complexes like steelworks and power stations, are easily identified and accepted as having potential heritage value. However, because many of our engineering and industrial enterprises are considered commonplace or are hidden under the guise of other professions, their value to engineering heritage can be easily overlooked.

This publication is therefore aimed at assisting in the identification and assessment of items of engineering and industrial heritage.

Definitions

Technology is the branch of knowledge that deals with science and engineering, or its practice. It is ever ever-changing and accelerating in development.

Engineering is the practical application of technology into the social world in which we live.

Industry is the application of technology to produce goods for our social world.

Engineering and Industrial Heritage

Virtually every facet of our lives owes something to engineering. Our industries, transport, communication, health, food, water supply and sewerage systems, buildings (in terms of their structure and services), entertainment and the convenience and comfort of our homes - all rely to a greater or lesser extent on engineering.

However, much of this technology is not spectacular or of great aesthetic appeal. Much of it is hidden from view (for example, water and sewerage systems), and because it is commonplace and considered utilitarian items tend to be discarded and replaced when worn out or no longer wanted. Their heritage value can thus be easily overlooked.

Engineering and industry are an important part of our cultural heritage, and as well as having obvious heritage value, they can:

- demonstrate stages of technological development;
- aid understanding of the history of society and the influences on its growth and development;
- demonstrate the nature of work and changes in working conditions and practices.

Vigilance and an open mind are therefore needed in observing the commonplace and identifying engineering and industrial items that might have heritage significance.

Some years ago it was reported that in one of our historic towns there was a plaque outside the butcher's shop which announced:

This building became a butchery at the turn of the century. Note today that the original stone guttering of the street still shows depressions worn by butchers sharpening knives and implements.

Despite this, when the local council started a street beautification program, the stones were removed because the council said they were too worn!

Engineering is often a component of highly visible items. It is, for instance, an essential element in major buildings but its heritage value can be easily overlooked when assessing the heritage significance of the building. The foundations, structural work and services may have significant heritage value in their own right, separate from the architectural design of the building.

The engineering of a structure may have innovative aspects; it may represent an advance in technology or thinking, and it may have an association with an important engineer. A most obvious case in point is the Sydney Opera House which spawned great advances and innovations in structural design and in construction techniques. Without these developments the building in its final form would not have been possible. But this can also apply to much more modest structures.

Some Examples of Engineering and Industrial Heritage

Like other areas of heritage, items of engineering and industrial heritage may be **fixed**, such as a bridge, or **movable**, such as an x-ray machine.

Fixed heritage items include:

- water supplies and storages – dams, weirs, reservoirs, pipelines, canals, pumping stations, treatment works;
- sewerage systems – treatment works, pipes, pumping stations, outfalls;



Sewer Vent, Lewisham

- transport - roads, rails, culverts, runways, bridges, airports, stations, railway signalling;



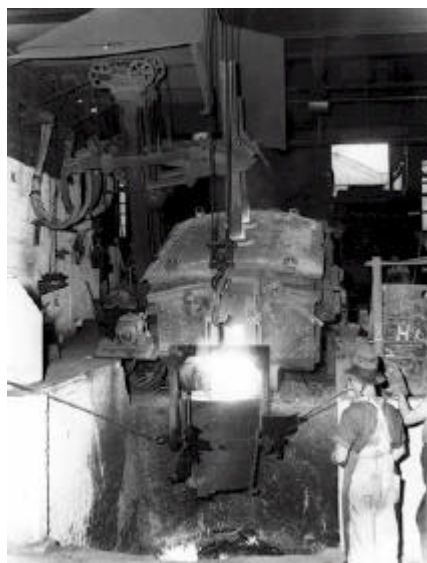
Victoria Pass, built on Surveyor Mitchell's line of 1832, the third crossing of the western escarpment of the Blue Mountains

- gas supply – retorts, gas holders, meters, piping;



Gasworks, Bathurst, NSW, 1887.
The first municipally-owned works in Australia.

- electricity – power stations, boilers, generators, switch-yards, transmission towers, poles, transformers;
- drainage systems – pipes, canals, pumping stations, sediment and refuse traps;
- communications – telephone poles, exchanges, power supplies, radio & TV towers, long distance radio antennas ;
- flood mitigation works – levees, drains, floodgates, revetments, pumping stations, flood monitoring stations;
- agricultural/pastoral – elevators, silos, sieves, shearing sheds, dips, scours;
- mining operations – excavations, shafts, addits, poppet heads, puddling and grinding mills;
- smelters and foundries – fixed infrastructure such as buildings, plant;



Foundry, Eveleigh Railway Workshops NSW, 1917

- manufacturing and food processing works – fixed infrastructure, buildings, plant;
- saw mills – saws, kilns, moulders, wood waste burners, log handling machines;
- buildings – special load bearing floors, elevators, unique building design for handling goods such as sugar or malt, structural stability mechanisms;
- astronomy – telescopes, radio telescopes and dishes.



Radiotelescope, Parkes, NSW.
Commissioned 1961.

Movable engineering heritage

Movable engineering heritage may include all items of tooling and equipment that can be readily transported from site to site. It could also extend to full sets of factory or mill equipment such as mine processing plant or dredges, which are relocated once the work is completed.

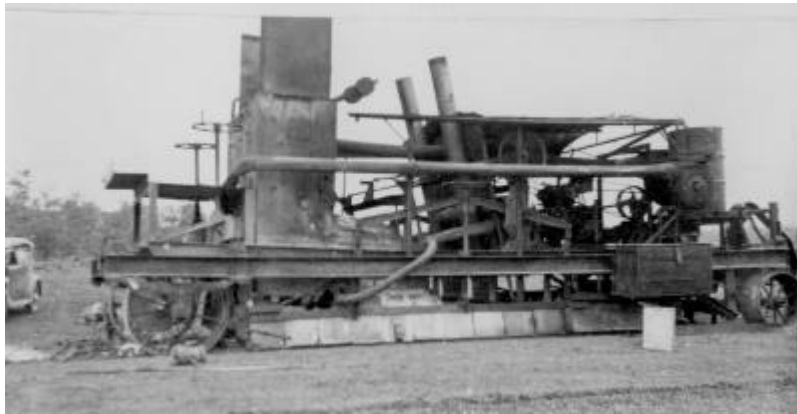
Movable heritage items include:

- blacksmithing equipment – forge, bellows, and anvil;
- shearing equipment– shearing machine and combs;
- hospital equipment– X-ray machine, theatre equipment, boilers, sterilizers;
- telecommunications equipment– telephones, switch boards, computers;



Early telephone exchange with heritage significance

- laboratory equipment – testing equipment;
- construction equipment – graders, bulldozers, tractors;



Irvine Roadburner, 1927
 Commissioned by the DMR in 1935 for a burn on the
 Sturt Highway, west of Narrenderra, Queensland.

- mining equipment – dredges, mining trains, drills , bucket elevators, winding equipment;



Rail tip wagon, Burrinjuck Dam



Hebburn steam winding plant, Goulburn, NSW.
 Originally from the Newcastle coalfields.

- agricultural implements– ploughs, headers, tractors, farm implements;
- manufacturing equipment – furnaces, forges, machine tools, presses;
- transport vehicles – cars, trains, trams, aircraft, ships.



Australia's Nomad aircraft



Early tram, Sydney, NSW

It is important to emphasize that the heritage professional should be on the lookout for *significant* technology when performing a heritage study and not only 'old' engineered and industrial works. The local hospital, telephone exchange, bank or TAFE computer facilities may have more heritage significance than the local bridge or railway precinct.

Assessment of Engineering and Industrial Heritage

Today engineering fields extend into robotics and medicine. This accelerated technological growth makes engineering heritage independent of time, and makes it increasingly difficult for the heritage professional to identify and evaluate. For example, a computer just a decade old may well be identified as having heritage value because it has been completely superseded technologically by more current equipment.

The same rules apply to the assessment of heritage significance of engineering and industrial items as they do to buildings and other heritage items and places. However, since technology changes quickly the time factor or age of an item may have little relevance to the significance of an item. For example, computer and medical equipment have developed rapidly and items only ten years-old may be highly significant, whereas a building may need to be much older before it is considered of comparable heritage value. The small computer shown is only 17 years-old, however it is an example of its class and it may well have significance within computer equipment where technological change is so rapid.



Cambridge Z88 computer, 128kb
ROM,
1987

Engineering and industrial items generally require evaluation by a person knowledgeable in the relevant technology and its history. Just as an engineer cannot be expected to competently assess the heritage significance of a building or an archaeological site, so an architect or archaeologist cannot be expected to pronounce on the heritage values of engineering works, specific machinery, medical equipment or industrial processes. Similarly, mining engineers have a different understanding and perspective to forestry and processing engineers. The people most suited to this task are those who are knowledgeable about the relevant equipment or works.

These knowledgeable people are often found within the locality or may be traced through local sources. Their assistance in guiding the heritage practitioner through the relevance of the items being considered in a heritage study could far outweigh any library search.

Some Issues Relating to Engineering Heritage

Engineering heritage can be:

Difficult to assess

Compared to heritage buildings where knowledge is more readily available, obtaining the technical understanding and significance of an item within a specific field of engineering may be difficult. This is why the relevant expert, engineer, tradesman or technologist is required. This does not mean they have to be a heritage professional, although this would be preferable.

Difficult to locate

Many engineered items or works may be hidden or even relocated from the original site. Engineered structures used to support a floor in a building may be hidden by the building's outer fabric, and communication cables are often hidden for their own protection within walls and underground.

An industry that served the town at its outset may have been relocated as economic factors determined its fate. This is a common practice in the manufacturing world.

Familiarity and commonality may also disguise the significance of a familiar engineered item, for example, a bridge, a telephone exchange, a rusty machine in the corner of the yard.

Difficult to conserve

Engineered and industrial works are usually built for a specific purpose, and once that purpose is no longer required there may be little other use for the items; a bridge can be used for little else apart from as a bridge. The means, materials and the skills to create and construct the works may disappear, along with the knowledge to conserve them. For example, riveted steam boilers are now difficult to maintain because the appropriate trade skills are becoming rare.

The social standards of today may also not match the heritage item being considered. The current safety regulations and industrial laws are far more stringent than what was foreseen when many works and machinery were developed. For example, old cranes may no longer comply with current safety legislation.

Other issues such as site contamination, adaptive re-use, public liability and current legislation may create conflict with normal conservation practice.

Costly to conserve

Many engineered and industrial works were constructed for a financial gain and built to operate and be maintained on the income of the operation. Once that income ceases the maintenance of the item will also be difficult to achieve.

Further, the methods of construction were most likely a lot cheaper and hazardous than under today's liability regime. For example, it is unlikely that the Sydney Harbour Bridge could now be built at the same cost with current safety legislation.

Costly to maintain

For many engineered and industrial works it was the income from the engineered work or industry, or the provision of finance, that provided for their ongoing operation and maintenance. Without that income or finance it becomes very difficult to fund conservation of the item.

Some materials, such as timber, are becoming difficult to obtain in the species and sizes required for conservation. This also makes conservation difficult to sustain e.g. the maintenance of the timber viaducts shown.



Heritage road and rail viaducts,
Gundagai, NSW

Environmental regulations now place stringent requirements on certain operations, thus increasing the cost over old practices e.g., old paint removed from steel structures like the Harbour Bridge, must now be caught and disposed of as landfill, instead of being allowed to fall to the ground or into the water.

Some Useful Resources to Assist in Assessing Engineering Heritage

- Sydney Division Engineering Heritage Committee
http://www.sydney.engineersaustralia.org.au/heritage/heritage_index.htm
- Engineering Heritage Australia
http://www.engineersaustralia.org.au/about_us/sig/eha/
- Engineering Heritage email forum:
engineeringheritageaustralia@yahoo.com
- National Trust of Australia (NSW), Industrial Heritage Committee
- Heritage Council of NSW Technical Advisory Group
Refer to Conservation pages on Heritage Office website

Publications and References

- Engineering Australia's Sydney Division Engineering Heritage Committee web site
www.engheritage-sydney.org.au
- Engineering Heritage Australia
www.engineersaustralia.org.au/learned-groups/interest-groups

Contacts for Help

- The relevant local technician or engineer pertinent to the works or industry.
- Specialist heritage engineers can be found at the NSW Heritage Office website at www.heritage.nsw.gov.au. See *Heritage Consultant Lists* on the Publications and Forms page.
- Contact the heritage officers at the relevant State Government Authority e.g. Roads and Traffic Authority, Sydney Water, State Rail, Rail Infrastructure Corporation for works related to these authorities.
- Contact the engineer at the local government area council or shire office.
- Find an appropriate local engineer under the section 'engineers' of your local yellow pages telephone directory.
- Contact Engineering Heritage Sydney
Phone (02) 9410 5600; Fax (02) 9410 0000
www.engheritage-sydney.org.au
- Contact one of the NSW regional contacts for **Engineers Australia:**

Newcastle Division

Engineering Heritage Australia (Newcastle)
PO Box 208
The Junction NSW 2630
Phone: 4926 4444
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Sydney Division

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Engineers Australia, Sydney Division
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- Contact the National Office of Engineers Australia

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