

The Importance of Cultural Dialogue: using oral history to inform the design process

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Introduction

Broken Hill is a mining community in the arid Far West of New South Wales, Australia. The city has been dominated by the mining industry since its establishment in 1883 but what is left of the distinctive 7.3 km long ore body is now deeper and, increasingly, of lower grade making it less profitable to mine. The last of the operational mines is scheduled to close in 2006 and with it the industry that has supported the city for over 110 years will cease to exist in all but the memory of those who have experienced it.

Like many western communities who have in recent years been faced with the decline of significant manufacturing or mining industries, Broken Hill is looking to develop tourism as a strategy for survival. In 1998, as part of that strategy, the University of South Australia was engaged to design and document a Visitors Centre. This followed two years of involvement by architecture students in a range of studio projects resulting in the choice of a student scheme for a Miners Memorial. The Visitors' Centre was to act as an immediate gateway to the Memorial and as a source of information about other attractions along a site rich in its contribution to the economic and industrial growth of the nation.

This paper will focus on the use and importance of history, specifically oral history, in the development of a theoretical framework for the design of the 'Line of Lode' Visitors Centre. To provide an appropriate context, the paper will initially describe the city's physical environment and outline the industrial and socio-cultural history of Broken Hill. The paper will then conclude by outlining the theoretical design framework developed for the Visitors Centre, arguing that the historical research undertaken as background to the design development was a critical factor in the acceptance of the project by the local community.

Context: the physical setting

The city of Broken Hill is located around one large orebody called the 'Line of Lode'.¹ The original orebody of lead, silver and zinc had a continuous length of 7.3 kilometres, a maximum width of 250 metres and a maximum vertical extent of 850 metres.¹ A longitudinal section through the deposit shows a distinct boomerang shape inclining away from the surface at either end.² Current activities are limited to the deeper, south-western end at levels in excess of 1,500 metres. The central section of the orebody was originally visible above ground level and was described in 1885 as resembling "... part of an old broken blunt tooth saw."³ Whilst early operations largely removed this surface section, it has been replaced by the residue dumps and mullock heaps that are a characteristic feature of the city skyline (Fig 1).

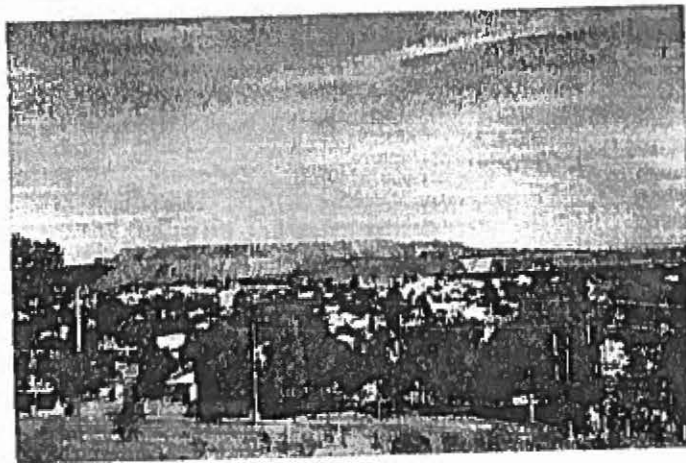


Figure 1. The mullock heap that dominates the city skyline and the site of the Miners Memorial and Visitors Centre.

Broken Hill is some 500 kilometres from the nearest state capital, Adelaide, and over 1,100 kilometres from Sydney. The city sits in the Barrier Ranges characterised by undulating hills rising above extensive low-lying plains. The climate is semi-arid with warm to hot summers (average maximum of 32°C) and cool winters (average maximum of 19°C). Rainfall is erratic with a yearly average of 240 millimetres though annual falls as low as 57 millimetres have

been recorded.⁴ With a highest recorded temperature of 46.6°C and a lowest of -2.8°C,⁵ the climate could be described as harsh adding much to the hardships of the early community.

Sometimes it would get up to a hundred and ten but that wouldn't go many days. If you went three or four days at that, well it was pretty bad. I can remember as a little girl having it at about a hundred and fourteen and mother used to lay us children under the table. She'd lay a tablecloth over the table and that would hang over, which would create a breeze in underneath.⁶

The original natural vegetation surrounding Broken Hill consisted of low and sparse native trees and shrubs.⁷ With the rapid growth in population and early development of smelting operations by the mining companies, this was heavily utilised for fuel, grazing of stock and as a source of underground timber. Even though the last of the smelting operations were moved to the coastal city of Port Pirie in 1898, the local vegetation continued to be used for fuel and the pasturing of livestock for domestic use. This meant that by the 1930s the landscape was barren and the city was suffering severe dust storms and soil erosion.

The dust storms, oh they were dreadful. Oh! Dreadful, red! Oh God! They were dreadful. If you'd never lived here you'd never have no idea what it was like. Your house ... the dust would come in every crack and corner, and then you'd be the next day cleaning up all the mess that the dust left. That red dust, coming off and over the plains. Going!⁸

In 1936 one of the mining companies, the Zinc Corporation, initiated the fencing and re-planting of sections of land immediately surrounding the city. These regeneration areas effectively reduced the incidence of severe dust storms and improved the microclimate and visual amenity of the city. It was also the start of a paternalistic relationship between the mining companies and the community who had, until then, been largely in conflict over industrial conditions and community welfare.

Low rainfall not only meant a fragile natural environment. Water shortages and inadequate sanitation also threatened the early community's health. Between 1886 and 1890 the mortality rate in Broken Hill was almost twice that for the state of New South Wales and serious health problems continued well into the 20th century. Contributing factors aiding the spread of disease at the time were the close boarding house conditions endured by many of the single men and the generally poor quality of housing typical of isolated mining settlements.⁹

Water storage was also a serious concern. Initial attempts to legislate for a private water supplier failed, with accusations of corruption and speculation being levied at the State Government. It wasn't until 1891 that a reservoir was completed at Stephen's Creek, some 16 km to the north east of the city, followed in 1915 by the opening of a second reservoir at Umberumberka, 31 km to the north west of the city. Both reservoirs had small catchment areas and this, combined with the low rainfall and high level of evaporation, meant that the city required additional shipments of water to be made by rail, initially from South Australia and later from the Darling River to the south.¹⁰

The Broken Hill Water Supply and Sewerage Act, 1938, established the Broken Hill Water Board and legislated for the commencement of a sewerage system. The sewerage system took a further 26 years to complete and it was not until 1952, when a 100 km pipeline was completed to the Menindie lake system on the Darling River, did the need for rail supply of water cease. A stormwater system was also commenced in 1955.¹¹ Gradual improvements in sanitation and water quality, together with advances in general health care such as vaccines against typhoid and diphtheria meant a decrease in the incidence of infectious diseases by the 1940s.

Context: the industrial setting

The district surrounding Broken Hill had been an established area of mineral production for ten years when Charles Rasp first pegged a series of mining leases at Broken Hill in 1883. It was not until 1885 that what was initially thought to be a tin deposit was found to be the extremely rich silver chloride orebody of the 'Line of Lode'. The syndicate officially registered the Broken Hill Proprietary Company Limited on 10th August 1885 and full-scale production began soon after.¹²

The success of the BHP mine encouraged the opening of other mines nearby and led to a rapid increase in population. By 1886 the population stood at around 8,000, by 1890 this had grown to almost 20,000. Many original settlers of this period drifted in from the surrounding Barrier Ranges and a large proportion of the early population also moved to Broken Hill from the South Australian copper fields of Burra, Moonta and Kadina.¹³

Trade unionism developed as a strong force in the city as a result of a combination of the city's isolation and the dangerous nature of the working conditions. The militancy and success of the union movement in Broken Hill is best captured by Donald Horne who commented in 1964 that "... Broken Hill is run by its trade unions and as far as Broken Hill is concerned the Barrier

Industrial Council is stronger than the state of New South Wales."¹⁴ Blainey also suggests the strength of the union movement came as a result of there being up to eleven operating mines on the Lode at the turn of the century resulting in a lack of employer unity.¹⁵ Strikers at one mine were often supported by working men at another, thus, allowing the striking miners to hold out for longer periods than was usual in the industry at the time.

Bitter and protracted strikes occurred in 1892, 1909 and 1919. In 1916 the employees of Broken Hill won a Federal Court award that established the right to a 44 hour working week, designed to maintain metals production during the First World War. The award was for a period of three years and in 1919, toward the date of the termination of the award, severe unrest resulted in productive operations ceasing along the 'Line of Lode' for a period of eighteen months. In September 1920 the Commonwealth Court of Conciliation and Arbitration issued a new award. This award included an underground working week of 35 hours, compensation for lung related diseases contracted in the mines and limits on the type of work conducted on night shifts. This was a landmark agreement of national significance in terms of working conditions and is talked about with a degree of pride by the community. In 1925 the employers and the unions won the right to negotiate outside of the National system of wage fixation and a lead bonus profit sharing incentive was introduced.¹⁶

A total of 754 deaths have been recorded along the 'Line of Lode' since 1885.¹⁷ Deaths were recorded in all mines along the 'Line of Lode' except at the Victoria Cross. They were usually violent and often marked by the courage of others trying to either save their mates or recover their bodies. The inquest report of a rescue attempt made at the South Mine on 21st March, 1949 states:

Great courage shown by Jack Faulkner and John McCarthy, who without hesitation had gone to Schadow's rescue, knowing that there were sixteen charges of gelignite, which would be going off at any minutes time.¹⁸

Whilst death was taken to be an occupational hazard along the 'Line of Lode', it still marked those who came close to it.

My brother was buried alive ... rotten filthy damned death, his wife still hasn't gotten over it. He was twelve months older than me and Harold made 738 killed. Since I've been retired mates of mine have fallen down shutes, down ore passes, killed by a 40 ton train. This was in the last seventeen years. Two mates of mine that I knew very well ... blown to pieces by explosive, just straight through the wall, looked like a bloody butchers shop you just couldn't even see where they were, just minced meat, terrible.¹⁹

The physical danger was not confined to the mine lease and many deaths from the lung diseases pneumoconiosis, silicosis and pneumonia remain unrecorded. Lead poisoning or plumbism was also a constant threat with water based drilling techniques (the flotation process of mineral extraction became common practice in the 1930s and 1940s).

The main worry from the disease point of view was the dust on the lungs. The dry boring and men working in the smoke all tended to set up an irritation in the lungs, and the man would gradually fade and eventually he would pass on. Most of the dust was from the boring - dry boring - and the firing. You see in them days they blasted in the middle of the shift and the men would be underground.²⁰

In the very early days when I came here (1906) you could still see a man fall in the gutter in a fit. It would be the effect of the poisoning on his system that throws him into a fit. I've seen them in Argent Street and they'd take these fits. No smelting bought that about. It was the results of lead poisoning on the man and his lungs.²¹

A decrease in lung diseases followed the findings of the Technical Commission of Inquiry established during the 1919-20 strike to investigate working conditions in the mines. Several acts of parliament, including the Workmen's Compensation (Broken Hill) Act, 1920, followed to provide compensation for Broken Hill miners suffering lung diseases. The Acts placed the mining companies under considerable moral and financial obligation to provide safe working conditions.

Whilst the men suffered violent deaths underground or prolonged deaths due to lung disease, women faced a different but no less harsh reality. In 1901, the Miners Accident Relief Act was introduced for all but the smallest mines of New South Wales. This made an allowance of 12s. For a funeral, 8s. Weekly to a widow and 2s.6d. Weekly for children under 14 years old.²² For comparison, in 1909 following a lengthy strike over wages, Justice Higgins of the Federal Arbitration Court, ruled that the going rate of 7s.6d. Per shift or £2/11/9 per week for unskilled labour was not enough for a family to live on. The life of a widow would, therefore, have been extremely harsh indeed, particularly if there were young children and no extended family for support.

Records indicate that many women married three and four times and many undertook domestic work to make ends meet. Many more died in childbirth, hence the need for men to marry again if there were young children. The situation created one of mutual dependency between men and women, particularly in the early years. There is respect for the strength of the women of the community and acknowledgement that without their strength, the wages and

conditions won during the various strikes would never have been achieved, nor would the collective sense of community have grown to that which it is today.

Context: the socio-cultural setting

The city plan is set out in two slightly offset grid patterns bisected by the mining precinct (Fig 3). This was noted in the 1994 'Line of Lode' Identification Study as '... a unique example of town planning strategies' as it follows the shifting orientation of the 'Line of Lode' rather than the more usual compass points used at the time.²³ It also locates the mining operations as an integral part of the township. Other irregularities in the grid relate to the Silverton and Tarrawingee rail lines, both important to the city's early survival.



Figure 3. Aerial view of Broken Hill showing the mine leases along the 'Line of Lode' bisecting the residential areas of the city.

Many of the major public buildings and a number of substantial hotels were erected in the 1890s and 1900s but the majority of the population remained housed in tents or iron clad, dirt floored timber frame dwellings, many of which remain in use today with minor modifications. The uncertain extent of the mineral deposit slowed the development of, and improvement in, both housing standards and the city's amenities and in these early years the city developed a

frontier air as a result of the dangerous work and its harsh isolated environment.²⁴

It was not until 1936 that a detailed investigation of the ore reserves forecast a minimum of 25 years production. This prompted an expansion of production and a re-building of the surface workings at the Zinc Corporation Ltd. and North Broken Hill Pty. Ltd. The feeling of a degree of permanence, together with a post-war period of optimism and prosperity, generated a housing boom and general improvements to the city's amenities including the sewerage system and pipeline to the Darling River referred to earlier.

A total of 1,900 houses were erected or purchased through housing societies financed by the Zinc Corporation and North Broken Hill between 1940 and 1981. During this period the companies also constructed houses for senior managers. These tended to be larger and more refined in appearance than the workers cottages. They were also grouped in small enclaves on the mining leases - emphasising the distinct divide that had existed between management and working class in the city since 1885. The companies also funded a free nursery for employees to encourage tree planting. House and garden competitions were sponsored and amenities, such as sports ovals, lakes, parks, a swimming pool, a pre-school kindergarten and bowling greens were also provided during the 1950's and 1960's. This paternalistic approach united the community at the same time as it emphasised the social structure mentioned above.

The later half of this century has witnessed the construction of a number of significant government buildings including the Broken Hill Civic Centre, the Broken Hill City Council Administration Building and the State Government Offices. These all have a corporate international character not totally in keeping with the existing built environment but are not located on Argent Street where the main Civic Group of heritage buildings are located. Residential architecture has also adopted the styles of the larger urban centres to the south. Again, the majority of new dwellings are located on the outskirts of the city in North Broken Hill and do not impact unduly on the existing residential character of the city.

The later half of this century has also witnessed an increase in unemployment, a decline in total population and an increase in the proportion of the population in the over 65 category. Only one mine now remains fully operational and employs fewer than 500 people. The population has correspondingly declined from a high of 35,000 in 1915 to 23,000 today and the union power that once saw Broken Hill celebrated as the bastion of unionism in Australia has dwindled to near insignificance.

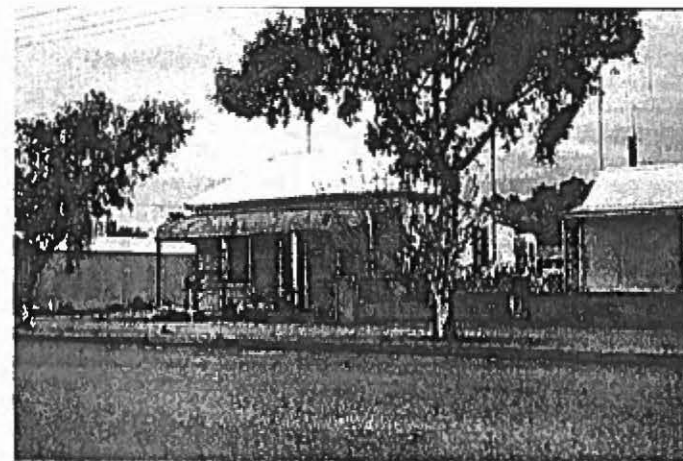


Figure 4. A Miner's Cottage

The 'Line of Lode' Project

In 1992 with only 15 years of production remaining, the last two companies still in operation, Normandy Poseidon Pty Ltd and Pasminco Mining, offered to lease the non-working surface infrastructure along the 'Line of Lode' to the community for development as an educational and tourism centre. The Normandy Poseidon operations have since been taken over by Pasminco who still remain committed to what is now known as the 'Line of Lode Project.'

An archaeological Identification Study²⁵ conducted in 1994 provides a detailed *Statement of Cultural Significance* in which the 'Line of Lode' is described as significant for historical, technical, social and architectural reasons. Its association with several of Australia's largest industrial companies, the rise of unionism and technological innovations are considered to make it a significant contributor to the modern day identity of Australia. The built environment is also considered to provide excellent examples of architectural styles from the utilitarian, turn of the century, structures at the South Mine to Art Deco at the Zinc Corporation and further substantial, physical remains are evident in the form of ruins along the site.

The Identification Study²⁶ further suggests that cultural significance refers to a wide range of qualities - historical, social, aesthetic, archaeological, architectural, scientific and technological - that make some places especially important to a community. Understanding and articulating those qualities is the first step in the process of managing cultural heritage. Determining appropriate

uses and interpretations for the sites, to ensure that they remain protected and embraced as an integral part of the history of a community, is the next step. *The Identification Study* concludes that, whilst individual features could be singled out as representative examples of different aspects of the mining industry, they lose their interpretative value when removed from the overall context. For this reason, the broader heritage site also includes the retail, civic and residential areas, presenting the entire city as a unique living museum of industrial heritage and cultural significance.

The 'Line of Lode' in its present form is not only evidence of the economic and technological development of mining over a 110 year period, it is evidence of work practices, social structures, political struggles and working and living conditions that have helped form the national character of modern Australia. The 'Line of Lode Project' is also one of national significance because it comes at a crucial time in the history of nation searching for identity and a sense of place in an increasingly global environment of sameness. In September 1998, in response to this significance, the Deputy Prime Minister announced a Centenary of Federation Government Grant to the 'Line of Lode Project' of AU\$4.625 million.

The 'Line of Lode Project' is focused on the mine leases starting at the former Zinc Corporation site which includes a concentration mill, administration building, headframe, winder and crusher house. A national mining museum is proposed for this site. The South and Central Mines contain some of the oldest surviving remains from the early period of mining on the 'Line of Lode'. This has also been the centre of much of the later zinc recovery operations. The South and Central mines presently form the basis of a heritage walk. Ruins form a significant element along the entire length of the precinct and are most evident in the remains of the Broken Hill Proprietary Company Limited concentration mill fronting on to the central business area of the town. The North Mine is the third major site along the precinct. Buildings include an administration block, headframe and crusher house, mill and changehouse. Educational and exhibition facilities are proposed for the site. The Grant will be used to implement a general maintenance and restoration program and to construct several key elements of the Project, including the 'Line of Lode' Miners Memorial, the Visitors Centre and a heritage walk at the South Mine.

Cultural Dialogue: oral history informing the design process

The use of oral history is not a unique, but certainly not a typical, means of gathering information for an architectural commission. A brief for an architectural project is often generated by a client organisation with little room

for the design team to probe beyond the mechanics of spatial requirements, budgets and corporate vision statements. With a continued global growth in tourism, however, there is an opportunity for architects to increasingly tap into specific histories of place and identity in order to aid the process of interpretation of places of cultural and environmental significance and, also, to assist in advocacy for the preservation of communities such as Broken Hill.

Given the powerful and symbolic nature of the Visitors Centre project and the unique and isolated history of the community, analysing personal accounts was considered to be an important part of the briefing process from the outset. This was despite the fact that the author had grown up in the city and knew its history well. The architectural team felt that to not reach out to the community for inspiration would have been a grave insult to the historical place that the community holds in the development of the nation. It would also have been betraying our role as designers. The role of interpretation was eloquently put by Bruce Allsopp when he suggested that architecture '...is the exercise of an artistic skill in the service of people.'

The oral accounts recorded by the author were taken over an Easter weekend. Eleven people participated in two briefing sessions, a mixture of retired and recently redundant miners alongside others involved in commercial activities in the city. Further recordings were made on an underground mine tour. The intention was never for the briefing sessions to develop into an academic oral history but merely for them to aid the architects in the development of a theoretical approach to the design of the Visitors Centre.

The briefing sessions were structured around two key issues. The first session was designed to initially generate memories of the city's history. The second session concentrated on which of these memories should be incorporated into the Visitors Centre. The sessions were recorded on audiotape and key points progressively noted on large sheets of paper to encourage further group discussion and agreement. The author initially used her own memories to coax responses but each session quickly relaxed and little intervention was required to prompt discussion. The key issues to emerge are outlined in greater detail below but all participants agreed that the Visitors Centre should not be a literal interpretation of physical elements found along the Lode.

Many of the oral histories presented in this paper are taken from a book by Edward Stokes who moved to Broken Hill in 1981. His book, *United We Stand: Impressions of Broken Hill 1908-1910*, was initially intended as a pictorial history following the discovery of a wealth of photographs in the city dating back to its foundation. He then decided to narrow his study to a particular period represented by a collection of photographs by James Wooler and to compliment the photographs with oral histories. Stokes recorded nearly one hundred hours

of memories from fifteen men and fifteen women who were deliberately selected to represent a wide cross section of the community. The publication represents a lively and invaluable addition to the otherwise official written version of the city's history.

The 'Line of Lode' Visitors Centre Design Framework

The Visitors Centre has two main functional requirements: firstly, to act as a gateway to the Miners Memorial and to the larger 'Line of Lode' Project and, secondly, to provide a brief background to the history of the city and its economic, technical and political contributions to the nation. A broader theoretical objective of the Visitors Centre is to provide an environment that captures the aesthetic and cultural spirit of Broken Hill.

The following theoretical principles were developed from this key objective and the results of historical research and the briefing sessions discussed earlier.

- The design should reflect but remain subservient to the Miners Memorial.
- The design should reinforce the existing positive block and street pattern of the city whilst maintaining a connection with the edge of the mullock heap.
- The design should reflect its role as a gateway to the history of the community by being visible and open to city.
- The design should present itself as an orchestrated journey moving people down and through an increasingly constricted space, the experience should be directional and monumental, one of anticipation and of an increasing sense of powerlessness and slight unease.
- The complex axial reference to the city and curved reference to the edge of the mullock heap should be used to develop spaces that are slightly disorienting in order to reflect travel underground (where you move without reference to the sun and the horizon).
- Through materials and form the design should express the powerful industrial nature of the mining industry contrasted against the lighter more tenuous nature of the domestic environment - management and worker, men and women, man and nature.
- Through materials and form the building should also reflect the dominant character of the underground experience: fractured plates of rock, propped uneasily overhead, in a sheltering yet dangerous manner.

Conclusion

The Visitors Centre schematic design was presented to the board of the Line of Lode Association in May 1999. The theoretical framework used to design the project was outlined by the author while a collection of slides of the city, including some taken in the 1950s and 1960s by the authors grandfather, were shown as background. A 1:200 scale model (Figures 5 and 6) and drawings of the project were then unveiled and the Board invited to view the work in closer detail. The reactions were instant and justified the design process undertaken with the briefing session and the historical research.

Comments from the board related principally to the points outlined in the theoretical framework. The subservience of the Visitor Centre to the Memorial was evident, crucial in the eyes of those present, given the deeply felt feelings of debt owed by the community to those who had died along the Lode. The jagged, descending roof line and powerful wing walls provided the increasingly constricted and directional sense of journey, together with the feeling of unease and shifting orientation that we had hoped for, and references to solidity and fragility could be seen in the building's articulation and fenestration. The building captured the broader aesthetic and cultural spirit of the city as intended without literal references to timber stopes, headframes and drives. The model and drawings were subsequently displayed in several locations around the city to raise awareness of the project with similar comments coming from the general public.

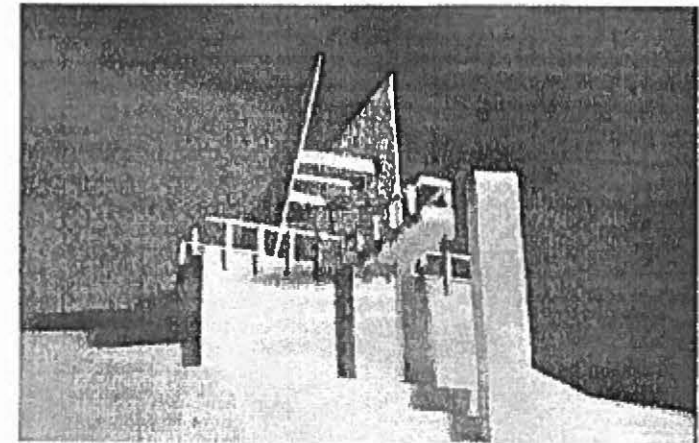


Figure 5. Model of the Miners Memorial

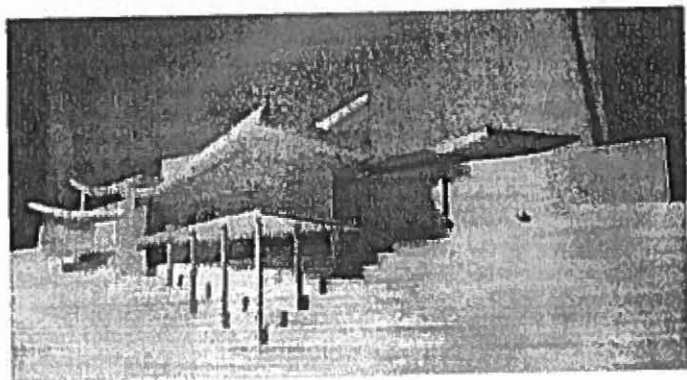


Figure 6. Model of the 'Line of Lode' Visitors Centre

The Visitors Centre is due for completion in December 2000 and progress on site is well underway (Figs. 7, 8, 9, 10, and 11). Provision is being made in the foyer for a multimedia display that will include photographic and video images set to oral and scripted histories. The display is intended only to broadly outline the city's history and to entice visitors to the other elements of the 'Line of Lode' project. As an architect, the initial briefing session was undertaken in an attempt to enlighten the design process. Upon reflection, a valuable opportunity was lost to formally record memories and experiences that will soon be a thing of the past.

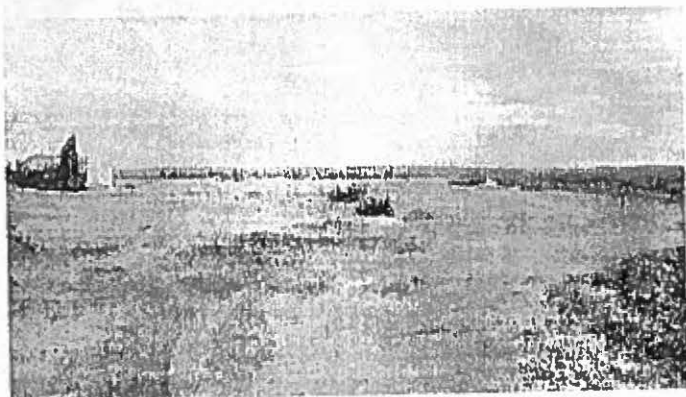


Figure 7. The Visitors Centre site prior to the commencement of construction.



Figure 8. Excavations and steelwork for the Visitors Centre footings.



Figure 9. The completed Visitors Centre footings and floor slab.

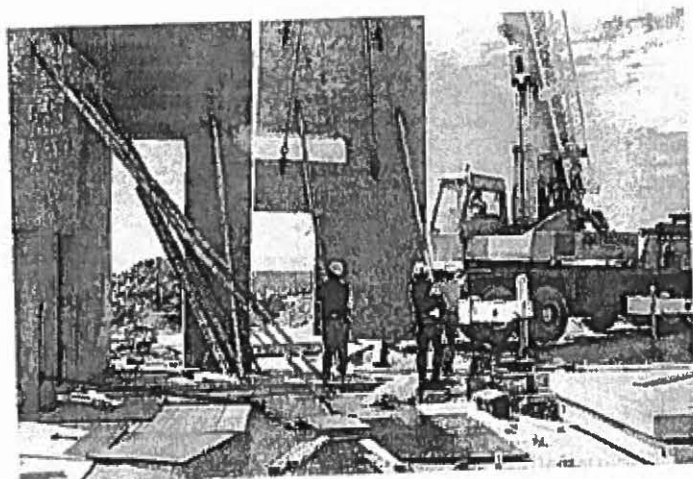


Figure 10. Erecting the concrete tilt-up panels to the central foyer and services Core.

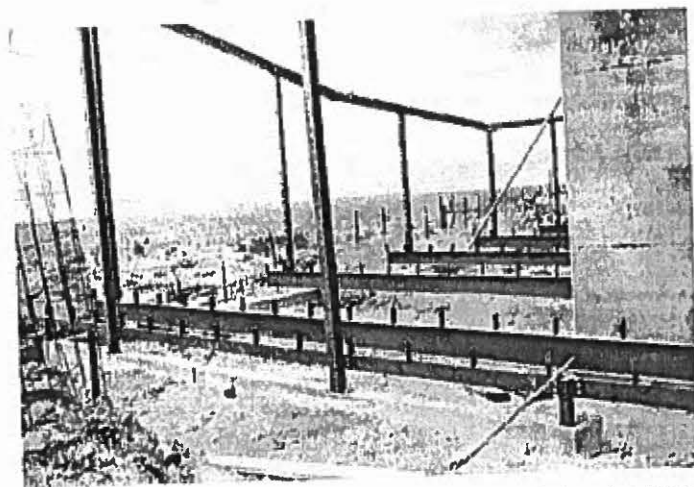


Figure 12. View north across the city with the primary steel roof and floor members in place for the café.

The subsequent reactions of the community to the Visitors Centre scheme have helped confirm that the decision to use oral histories and design briefing sessions to inform the development of a theoretical design framework was a correct one. The power of personal recollections, coloured with individual experience, helped to emphasise aspects that might otherwise have seemed insignificant. An example is the feeling of inevitability and powerlessness recorded in the following statement and reflected in the descending roof form and wing walls of the Visitors Centre.

I never thought about going underground, I just took it for granted as a matter of course. The majority of men were the same. You just had to adjust yourself to working with a candle and you had to be careful, keep your eye out for anything.²⁷

The result is a scheme with greater intensity of meaning and symbolism than might otherwise have been achieved. The following comments from a former miner indicate how quickly the present becomes the past and how precious the gift of memory and word are to our understanding of the future.

That's the conditions I've been enjoying. We've had lots of strikes over the last 50 odd years to keep those conditions but today it's all gone. The modern miner, he's a bloody big sook. Ever since the big strike [1918-19] we've had two men work together. Two miners, if you were an electrician you had a mate, if you were a boiler maker you had a mate, no-one walked around alone . . . there's always two of you so if one gets hurt he can always go for help but today it's all different . . . the modern miner wouldn't know what bloody day it was.²⁸

Notes and References

¹ Brian Turner and Associates, *Broken Hill Strategy Report*, Griffin Press Limited, Netley, South Australia, 1983, p.66. The Strategy Plan provides a detailed summary of the natural, built and demographic characteristics of the city using data from the Australian Bureau of Statistics Census, government records and company annual reports.

² O H Woodward, *A Review of the Broken Hill Lead-Silver-Zinc Industry*, West Publishing, Sydney, 1965, pp.47-54. Woodward provides a detailed discussion of the geology and mineralogy of the 'Line of Lode' orebody.

³ The Leader (Melbourne), 14 November 1885, in G Blainey, *The Rise of Broken Hill*, The Griffin Press, Netley, SA, 1968, pp. 16-17

⁴ R J Solomon, *The Richest Lode: Broken Hill 1883-1988*, Hale & Iremonger, Sydney, 1988, p. 28. Solomon provides a detailed account of the city's industrial, political, economic and socio-cultural history.

⁵ Turner and Associates, *City of Broken Hill Strategy Report*, pp.61-63

⁶ Interview with Hilda Ferguson cited in E. Stokes, *United We Stand: Impressions of Broken Hill 1908-1910*, The Five Mile Press, Canterbury, Victoria, 1983, p.100

⁷ Woodward, *A Review of the Broken Hill Lead-Silver-Zinc Industry*, pp.15-16

⁸ Interview with Gertrude Clutterham cited in E. Stokes, *United We Stand*, p.28

⁹ Infectious diseases notifications cited in Solomon, *The Richest Lode*, pp.207 and 328

¹⁰ Solomon, *The Richest Lode*, pp.36-40

¹¹ Latona Masterman and Associates, *A Tale of Tin and Silver: Broken Hill Heritage Study*, unpublished report, Sydney, 1987, Appendix A, p. 58

¹² Blainey, *The Rise of Broken Hill*, and Woodward, *A Review of the Broken Hill Lead-Silver-Zinc Industry*. Both give a detailed account of the establishment of the various leases along the Lode.

¹³ Turner and Associates, *City of Broken Hill Strategy Report*, pp. 48-49

¹⁴ Donald Horne, *The Lucky Country*, Penguin Books Pty Ltd, Ringwood, Victoria, 1968, pp.59-60

¹⁵ Blainey, *The Rise of Broken Hill*, pp.150-152

¹⁶ Woodward, *A Review of the Broken Hill Lead-Silver-Zinc Industry*, pp 305-334. Woodward provides a detailed account of the development of industrial relations in Broken Hill to 1964.

¹⁷ D J Kenny, *An Account of the Men Killed on the Line of Lode and Surrounding Mines from 1885*, unpublished report, 1979, pp. 52-53

¹⁸ Kenny, *An Account of the Men Killed on the Line of Lode*, p. 6

¹⁹ Fieldwork interviews recorded by the author: a former miner, now a tour guide at Delprats Mine, Broken Hill; 2 April, 1999

²⁰ Interview with Bill Eriksen cited in E Stokes, *United We Stand*, p. 38

²¹ Interview with Les Buck cited in E Stokes, *United We Stand*, p. 52

²² Kenny, *An Account of the Men Killed on the Line of Lode*, p. 3

²³ Austral Archaeology, *Broken Hill Line of Lode Identification Study Vol. 1*, Unpublished report for the Broken Hill City Council, 1994, pp. 52-54

²⁴ Blainey, *The Rise of Broken Hill*, pp. 150-152

²⁵ Austral Archaeology, *Broken Hill Line of Lode Identification Study*, pp. 48-49

²⁶ Austral Archaeology, *Broken Hill Line of Lode Identification Study*, p. 48

²⁷ Interview with Bill Erikson cited in Stokes, 1986, p 34

²⁸ Fieldwork interviews recorded by author: a former miner, now a tour guide at Delprats Mine, Broken Hill; 2 April, 1999