The justification for the provision of the central marshalling yard at Bapsfontein (Sentrand)

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Synopsis
The historical problems of handling goods traffic in the Witwatersrand/Pretoria area are outlined. The advantages of a central yard and connecting lines are detailed and the costs thereof given in general terms.

Opsomming
Die historiese probleme met die hantering van goedereverkeer in die Witwatersrand/Pretoria gebied word brefsprek. Die voordele van 'n sentrale terrein en verbindingslyne word beskryf en die koste daaraan verbonde word kortlikwe weergegee.

Introduction
In 1952, when Kaserne goods and marshalling yard was commissioned, the South African Railways, now known as the SA Transport Services, handled 40 million ton of goods traffic per annum, coal traffic excluded.

Over the next 30 years goods traffic excluding coal increased to three times the 1952 figure. Little improvement was however made during this period to marshalling yards countrywide and in particular to those in the Witwatersrand/Pretoria area. As this area generates and absorbs the bulk of the goods traffic adequate marshalling yard capacity is essential.

The existing yards have however insufficient tracks for the traffic that has to be handled while most of these tracks are in addition too short for the increased lengths of trains now operating. As the yards are hemmed in by residential and/or industrial development, the cost of any expansion would be exorbitant.

However, even if it were possible to enlarge some or all of the existing marshalling yards, the problem of handling goods traffic efficiently, making use of approximately 10 yards distributed over the Witwatersrand/Pretoria area, would still not be solved. This is due to the fact that practically every goods train coming into the Reef area has traffic for several destinations. As a result no matter which of the existing marshalling yards the train enters some of its traffic will be in the wrong yard. This ‘foreign traffic’ has to be sorted and then removed from the yard to, or nearer to, its destination.

The amount of additional work caused by such foreign traffic may be better appreciated when it is realized that nearly 80 per cent of the traffic entering the marshalling yards in the Reef area goes initially to a yard which is not its destination. To put it in another way, on average every wagon coming into the Reef complex enters and leaves 2½ marshalling yards before reaching its destination.

A further serious problem experienced with practically all the existing marshalling yards is that the flow of goods traffic to and from them is brought to a stop by the morning and evening suburban passenger train peaks. This interference in the flow of goods traffic probably reduced the throughput of the various yards by 30 per cent.

Investigation into the need for a central marshalling yard
Although the need for a central marshalling yard in the Reef area was investigated in 1956 and again in 1965, the first comprehensive analysis was carried out in 1969. This analysis used as data details of all wagons that passed through the various Reef marshalling yards on 23 January 1969. The actual loads despatched from the various marshalling yards were compared with the loads that could have been despatched from a hypothetical central yard.

As an example the flow along the line through Vereeniging to the Orange Free State, the Cape Eastern and the Cape Midlands systems can be considered. On the day under consideration five of the Reef yards had sufficient traffic on hand to make up a total of 14 partly full-load trains for Kroonstad and beyond. However, only Welgedag, one of the five yards, had sufficient traffic to make up a block load for Kroonstad and two block loads for Bloemfontein and beyond. The other 11 trains had to shunt at Kroonstad and Bloemfontein and, in some cases, at intermediate stations as well.

If this traffic had all been concentrated at a single yard it would have been possible to despatch the traffic as follows in only 11 trains:

1. single destination block load for Kroonstad
2. load for Kroonstad’s responsibility zone
3. single destination block load for Welkom
4. load for the Free State goldfields
5. loads for Bloemfontein’s responsibility zone
6. load for Queenstown and beyond
7. single destination block load for Port Elizabeth
8. load for Port Elizabeth and vicinity

These loads would have required little or no shunting en route.

Connecting lines to the new yard
If the growth of the railway network country-wide is analysed it will be found that most lines were built to transport goods traffic, not passengers. As the larger cities developed, however, the demand for suburban passenger services led to the existing lines being used for the conveyance of both goods and passengers. This would have been acceptable if suburban passenger traffic was, like goods traffic, fairly evenly spread over 24 hours. As mentioned previously, however, in the older yards the flow of goods traffic was brought to a stop at most of the larger centres by the morning and evening suburban passenger train peaks. This resulted in few, if any, goods trains moving into or out of the various marshalling yards for approximately 30 per cent of the day.

To ensure that the proposed central yard did not lose capacity in this way it was essential that connecting lines should be so planned as to ensure that goods traffic could move independently of suburban passenger traffic. This aspect is covered in greater detail in the paper entitled ‘Planning and design of Sentrand Marshalling Yard’.

Advantages of a central marshalling yard
The main advantages of a central marshalling yard are:

1. All traffic, except block loads, within or coming into the Reef complex proceeds to the central yard (named Sentrand). The sorting of foreign traffic that is necessary with the multiplicity of yards in this area therefore falls away. The result is a saving in yard staff as well as in shunting locomotives and in the staff to man them.
2. Further, time lost due to foreign traffic passing through 2½ yards unnecessarily is reduced by not less than 60 per cent. This improves truck availability and so reduces the amount of capital required to

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John Walls reached retirement age while occupying the post of Project Coordinator in the General Manager’s Planning section of the SA Transport Services with direct responsibility for Sentrand. He stayed on in his position, however, to see this huge project through to completion. Walls graduated from the University of Cape Town in 1938 and joined the SA Railways in 1939, spending most of his first 23 years on construction on the Northern Cape, Orange Free State and Western Transvaal systems. He was transferred to General Manager’s office in 1960’s when he became involved in planning. In 1970 he was promoted to inspecting engineer and given the task of planning a central marshalling yard in the PWV complex. He led a multi-disciplinary team on an extensive international tour to study the latest developments in marshalling yards. He was appointed to the post of Chief Superintendant (Planning) in 1977 and to his present position two years later.
purchasing new trucks.

3. Not only the yards in the Reef complex have the problem of foreign traffic. Where trains which are not block loads are despatched from the Reef the same problem is experienced at all yards en route for which some of the wagons are destined. As it is much easier for block loads to be prepared in Sentrarand than could be done in the older yards, the problem of foreign traffic at these outside yards is largely eliminated. Savings are effected in the number of yard staff as well as in main line and/or shunting locomotives and in the staff to man them.

4. A further saving resulting from the ability to build block loads in Sentrarand is illustrated in the example given above of the trains required to move traffic from the Reef to Vereeniging and beyond. With traffic distributed over five yards, only three block loads could be despatched while the other 11 trains were on average carrying only 70 per cent of the permissible load when they left the Reef. It will be appreciated that the use of block loads reduces the number of main line locomotives and staff required.

5. With inadequate marshalling yards, which are furthermore cluttered up with foreign traffic, trains wishing to enter a yard are often unable to do so immediately due to lack of a suitable track to receive them or due to shunting movements taking place. Similarly a train wishing to leave a yard may be delayed for the latter reason. With Sentrarand these types of delay are minimal resulting in savings in main line locomotives and staff.

6. With several separate yards there is an appreciable amount of light running by locomotives from yard to yard, from yard to servicing depot and return. This feature is considerably reduced resulting in savings in main line locomotives and staff.

7. The building of Sentrarand will largely eliminate the need for improvements at existing yards and thus save capital.

8. The flow of traffic into, within and out of the Reef is more efficiently controlled than is the case where several yards are involved each with its own control. This saves rolling stock and staff.

9. As Sentrarand is automated and particularly as the speed of the individual wagons is under control at all times in the classification process the need for brakemen in the main classification yard falls away. With the elimination of this hazardous occupation the chances of staff being killed or injured in Sentrarand are appreciably lower than in the older yards.

10. A further advantage resulting from the controlled speed of wagons is the elimination of high speed collisions which under previous conditions caused damage to wagons and/or to their contents.

11. As the connecting lines between the new yard and the existing railway network have been so planned as to avoid the suburban traffic area it is possible for goods traffic to flow into and out of the yard for 24 hours a day.

12. With the decrease in traffic to be handled by yards in the Reef area it is possible, during the daytime off-peak period, to use some of the tracks in such yards to stage suburban passenger coaches nearer to the starting point of the afternoon homeward rush than could previously be done. This will improve the efficiency of the suburban passenger service.

Financial aspects

The first six advantages mentioned above could be quantified. From the resultant analysis it was found that an expenditure, based on 1981/82 values, of roughly R450 million could be justified. Although the remaining advantages could not be quantified it is obvious that the savings resulting from them must also be appreciable.

The cost of the facilities including the connecting lines from Sentrarand to Kaalfontein and to Glenroy which were introduced at Sentrarand towards the end of 1982 is of the order of R350 million. This can be split as follows:

- Civil: 59 per cent
- Electrical: 10 per cent
- Signals and telecommunication: 17 per cent
- Mechanical: 14 per cent

Further expenditure of R300 million is being incurred in the provision of the connecting lines from Sentrarand to Pretoria and to Vereeniging. The former is scheduled to come into operation in the middle of 1984 and the latter 12 to 15 months later. The cost of this work can be split as follows:

- Civil: 75 per cent
- Electrical: 10 per cent
- Signals and telecommunication: 15 per cent

While the cost of these additional connecting lines is high, it should be borne in mind that not only do they contribute to the efficient working of Sentrarand but will also provide appreciable relief in the complexes they serve. This in turn will delay for a long while the expenditure of considerable amounts that would otherwise be necessary to improve the flow of traffic in the complexes concerned.

Excluded from the R650 million is the cost of certain facilities which were separately justified and would have had to be provided even if the yard had not been built. However, once it was decided that the yard was necessary the logical site for these facilities was at the yard. These additional items are an electric locomotive shed, an intermediate diesel depot, a carriage and wagon depot, and a hostel. The total cost thereof is nearly R50 million which can be split as follows:

- Civil: 79 per cent
- Electrical: 16 per cent
- Signals and telecommunication: 1 per cent
- Mechanical: 4 per cent

Conclusion

To ensure that future extensions to Sentrarand are not inhibited by development immediately outside the boundary, an area has been obtained sufficiently large to permit the capacity of the yard to be quadrupled.

As a yard cannot function efficiently if the lines feeding it are inadequate, provision has been made for the traffic from all directions to move without hindrance to and from Sentrarand. The proposed lines will total nearly 400 route km of which a distance of approximately 45 per cent has been completed or is under construction. As Parliamentary approval was granted in 1974 to obtain the land required for all the proposed lines, no danger exists that industrial or residential development will in future interfere with those lines that are not to be built for some time.

Doubling, quadrupling and even sextupling of these lines in future will increase their capacity when required. In addition, to avoid the troubles experienced on many existing lines, these lines are dedicated to the conveyance of goods traffic only.

While the cost of this project is high it will not only result in more efficient transportation of goods traffic but should also result in a saving of R10 million to R20 million per annum in operating costs.