

The Logistics of Minas Tirith

Some Speculations on Infrastructure and Civil Engineering

by Anders Blixt

*En bergsvind fylld av pinjedofter
Och fjällens svala ro
Här sveper över Anors slätt mot
Osgiliaths fallna bro.
På Anduins strand vid grå Mindolluin
En tidlös stad är byggd.
Klarvit och muromgärdad
Är hon ett fäste tryggt.*

Minas Tirith is a city planner's nightmare. It is a big city on a hill, with seven concentric walls and a very small number of gates. The outer wall has only one gate through which all traffic in and out of the city must pass. This creates a serious problem of logistics. The reasoning in the following paragraphs is speculative, due to lack of primary source references, though based on sound historical and military facts.

If we assume that Minas Tirith has approximately 50 000 inhabitants – realistic considering the size of Gondor – and that each consumes 2.5 kg of food per day (excluding water which is supplied by wells inside the city and by rain cisterns), the city must daily receive 125 metric tons of food supplies¹. There is obviously a steady stream of wagons coming from the docks of Harlond and on the roads from Anórien and Lebennin to the city. Assuming that one wagon can load about 400 kg of supplies, 300 wagons² a day must reach the city, which makes approximately one every five minutes if the wagon traffic runs 24 hours a day. However, it seems unlikely that the wagoners would work during night due to the absence of proper artificial lighting³. Instead it is more realistic to assume that the rate is one wagon every two minutes. The roads running to Minas Tirith must clearly have at least two, and preferably three or four lanes, to be able to deal with this amount of traffic, four lanes being a necessity for the Harlond road.

The layout of Minas Tirith prevents the use of large wagons in the city. Instead, the city's porters must use smaller and more agile carts, perhaps something similar to a hand-drawn rickshaw, to be able to pass through the numerous tunnels and tight street curves. In ancient Rome, transportation of goods was only allowed during the dark hours to prevent congestion of the streets during the daytime. Most likely there are similar regulations in Minas Tirith.

Outside the Great Gate there must be a reloading and storage depot where goods are transferred from wagons to carts. The wagons arrive by day to deposit goods there and, after sunset, the city porters come with their carts to take the goods inside the walls. One consequence of this arrangement is that the city's bakeries and butcher shops should be located on the lowest level, preferably as close to the Great Gate as possible.

It is possible to have hoists on top of the walls to alleviate the congestion. That would only be practical at the outermost city level, where flour sacks could be hoisted straight from a wagon over the city wall to the backyard of a bakery. Such devices are not mentioned in *Return of the King*, but it is likely that the Steward would have ordered their removal when the war approached.

¹ It is of course possible for the city-dwellers to cultivate vegetables and raise poultry in their back-yards but such efforts would have an insignificant impact on the city's general supply needs.

² The calculation is somewhat simplified since much of the meat can be delivered as herds of sheep and cattle. These need not use the roads, but they must pass through the Gate before reaching the abattoirs on the First Level.

³ Torches and lanterns would hardly provide sufficient light for safe working conditions. In the primary world, satisfactory street illumination appeared with the introduction of city gaslights in the 19th century. Among the Eldar of the First Age, there were magical lighting devices, but since there are no reference to them in LR, the Dúnedain do not possess such illumination. (Whether it existed in Númenor is unknown.)

Every morning, crowds of servants descend from the upper city levels to buy fresh food. If there is a daytime city food market – very likely –, it is probably located in an open field just outside the Great Gate so that the peasants do not have to enter the city to sell their wares. There should also be a similar fish market right next to Harlond.

There are also deliveries of raw materials to city artisans and the transportation of their products to other parts of Gondor, creating additional traffic through the Great Gate.

A big fortified city in medieval Europe had numerous gates in its outermost wall just to be able to deal with the transportation of goods. (Fourteenth-century Visby in Sweden, a town much smaller than Minas Tirith, had three gates towards the adjacent farmlands and a big port.)

The city's main road, which winds back and forth from the Great Gate up to the citadel, must be paved with stones to be able to withstand the constant heavy traffic. It is likely very crowded day and night since it is the only route *through* the city.

Considering these restraints on movement inside the city, it is indeed practical to have a big inn located near the main gate⁴. The weary traveller arriving at dusk in the city would not like to ascend *uphill* on a long and crowded road⁵.

Fifty thousand people generate quite a quantity of garbage each day (at least 50 metric tons). In a medieval European city the inhabitants dumped much of it in the streets, letting the rain flush it away, or throwing it into nearby body of water (most such cities were located on a river or at the sea)⁶. Intuitively it seems likely that the culturally advanced Dúnedain, being very skilled in civil engineering, use more sophisticated methods to dispose of garbage. Minas Tirith is located at a distance from the Anduin. The city probably has a corps of professional garbage collectors, whose job is transport solid refuse out of the city and dump it in the river⁷ (in the process creating more traffic through the Great Gate).

The city might have a sewer system as well, stone tubes running downhill under the streets, buildings and walls and transporting rainwater and refuse from the streets out of the city. Sewer tubes running from the city under the Pelennor all the way to the Anduin are possible, considering the Númenoreans' construction skills. However the maintenance of such an underground sewer system is probably not trivial; clogging may present a serious problem.

After considering all the factors mentioned above, this writer's conclusion is that Minas Tirith's layout is clearly that of a fantasy world, making her an imposing beauty, though quite improbable in practice.

⁴ Cf the reference to The Old Guesthouse in *Return of the King*, bk V, ch 1.

⁵ It would also be practical if the innkeeper has access to some pastureland near the gate, where the inn's guests could let their mounts graze.

⁶ Scholars claim that it was possible for a medieval traveller to perceive the stench of a city one day before arriving in it. Whether that is the case with Gondorean cities, too, is unknown.

⁷ If the garbage is not deposited in the river, there should be one or more big garbage hills just outside the city—keep in mind that Minas Tirith during the War of the Ring is more than 3000 years old. Such a hill could—judged by archaeological evidence of the primary world—easily reach a height of 50 metres and a diameter of 300 metres. Since no such terrain features are mentioned in the Pelennor description in *Return of the King*, it is most likely that the Anduin is used as the dump.