



## Advanced Engineering Days

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### Investigation of mining-access roads within the general concept of forest roads

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#### Abstract

Forest resources serve the communities in various aspects, such as raw timber production, recreation, aesthetic, hydrological assurance, health of societies, wildlife management and sustainable management of biodiversity. One third of our country is covered with forest, and the majority of the mining endeavors also exist underneath these forests. Issues regarding the governance of forest resources are regulated under the constitutional act #6831, while the article 16 explains how mining endeavors are allowed within the forest lands. Unless accessible via forest or village roads, access to the mining side and accompanying installations can only be granted with additional linkage and new road layout projects. Since they will also be used as forest roads in the long run, forest service asks from the mining license holders to construct them according to the standards dictated in the notification 292. Although crucial for any type of operation, roads might jeopardize the ecosystem services and cause irreversible harm to the habitats, so utmost importance must be shown while placing them over pristine topographies. In the context of this study, one of the foremost detrimental environmental effects of mining endeavors, access roads were evaluated in terms of the compliance with the notification 292 standards, which stated that any additional non-forestry related road should be constructed according at least to Type-B style forest road.

#### Introduction

In order to manage the forests, forest road networks are laid and maintained to reach the resources, to transport production means to the sites and to efficiently extract the produced timber out of the forest land while preserving the integrity of the soil, remaining stands and landscape aesthetics [1].

As long as the extent of forest road networks is effective and sufficient, any type of scientific, technique and managerial intervention can reach to every part of the land without altering the natural increment cycle of the stands while everything produced in the name of both forest and non-forest products can be taken out of the forest land [2].

According to the act 6831 which was constitutionalized in 1956, Turkish forests are categorized under three categories; production forests, conservation forests and national parks [3]. While constructing the forest roads, the needs of the production forestry are prioritized. However, applying this approach single-handedly leaves the sensitivities of the other categories unanswered [4].

It is the primary objective of forest road planning that they fully serve towards achieving multi-purpose functional use from the forests, provide access to the well-being and development of forest villages, cause minimal land-cover change and degradation, and provide safe and continuous travel year-round.

As in any type of engineering undertaking, forest road planning and construction need to be travel-safe and economic in accordance with environmental concerns. To address these concerns, they must comply with basic standards specified for them [5].

Majority of the forest roads being constructed in Türkiye, suit Type-B Road standards required for timber production needs. The code states that they need be at most 5 m wide, including the side ditch, and the annual tonnage that would be transported over these roads, should not exceed 25000 m<sup>3</sup> [6].

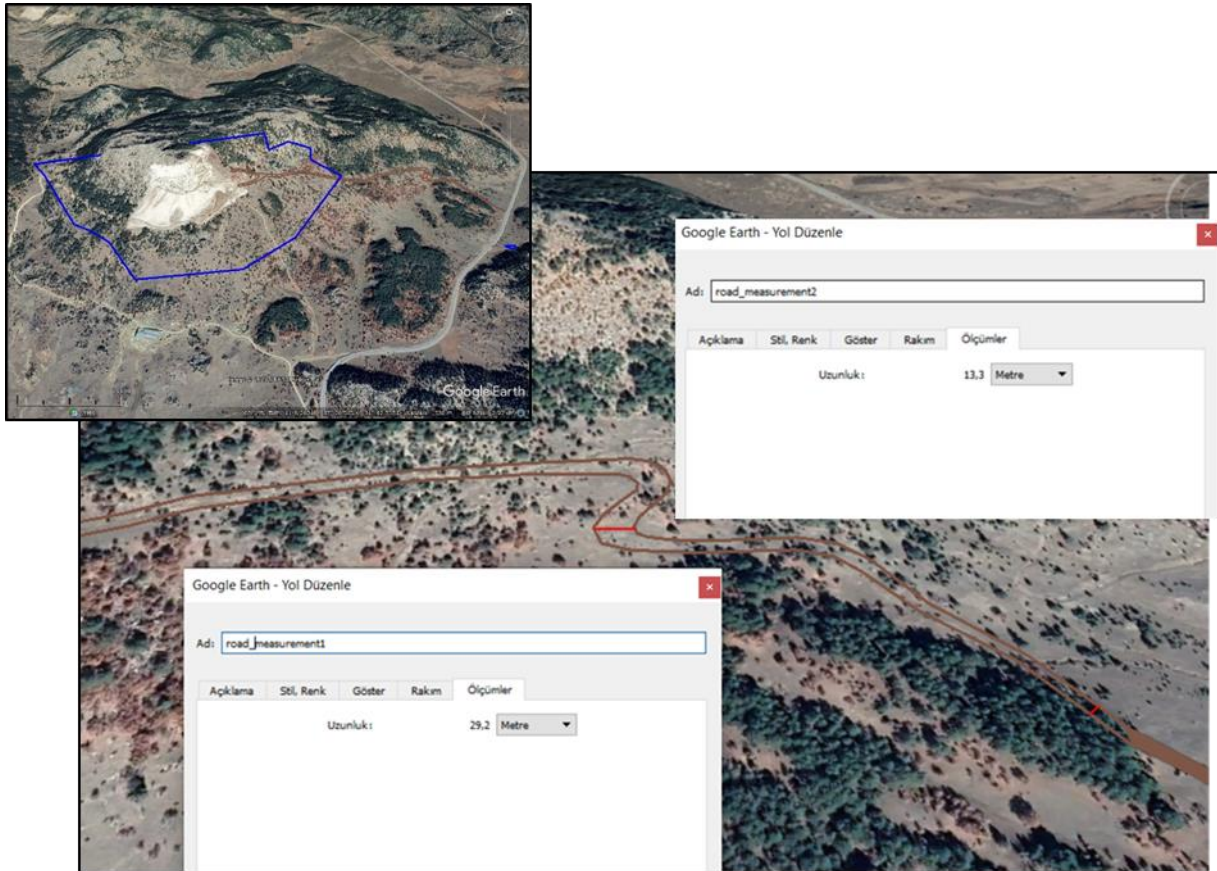
Coincidentally enough, a considerable portion of our natural ore deposits exists underneath the forested lands. Concessions are always granted for mining activities however there is no specified regulation dictating how the site access would be provided. Instead of haphazard site access attempts, the road constructions undertaken by the mining license holders, need to be in accordance with the foresters' practices so when the mining activity is finalized, the access road(s) could easily be integrated into the existing forest road network.

### Environmental effects of mining activities

Mining is one of the building blocks of a developed society, and Türkiye is quite fortunate with such wealth [7]. When mining contribution to GDP is investigated for the last 20 years, it is obvious that it has averaged around 1%, and it is expected to increase more as the 21<sup>st</sup> century progresses [8]. Mining feeds the other crucial sectors, such as industry, energy and agriculture, all of which are key factors in becoming a developed country and providing high standards for the well-beings of its people. As societies grow, the need for rawer material also increases, consequently the mining activities also speed up. However, little or extensive, mining activities in general leaves noticeable scars over the topographies and disrupts the ecologic balance [9]. Especially in open-pit mining, there are multitude of examples across the Earth that the left-over site is ravaged in terms of topography, geology, hill-shade characteristics, water regime, micro-climate and landscape aesthetics, and vegetation cover is stripped (10). Thus, it should never be overlooked that the gain which would be obtained from mining activities for societies' well-being, should never outweigh the environmental concerns that they will surely cause [10].

Concessions, relying on the article-16 under the general forest act of #6831, have long been granted for mining activities and their compulsory installations within the forest lands, therefore especially roads are immediately needed for reaching out the site(s). However, there is no standard which would otherwise be required, for mining related access road installations within the forest roads [11]. Although in 2005, the ministry of environment and forestry dictated all regional directories of forestry that the mining related access road demands coming from the license holders must comply with the forest road construction standards, the practices experienced all around the country fall seriously behind what are expected from them. Consequently, environmental adversities, which are associated with such mining activities, continue expanding beyond the specified concession area(s).

In the scope of this study, visual investigation of a random mining access road was performed over Google-Earth to see if they comply with the required standards so the would-be resulting consequences were kept at bay. Type-b reference forest road standard was observed (Figure 1).



**Figure 1.** Example of mining access road in forest land

We measured the width of a mining access road in random site from google earth. When the widest and narrowest widths were measured, it was obvious that the widest was 29.2 m while the narrowest was 13.3 m. The geometric width standard of a Type-b Forest Road ranges between 3 and 5 m (6), so it was obvious that no standard was followed while planning and laying out this particular road. This particular example showed us that apparently no compliance was mandated and followed while constructing such roads.

## Conclusion

When mining access roads are constructed without caring for the environment, the consequences will surely be detrimental. Mandating and strictly following a standard, Type-b Forest Road, will alleviate the additional adversities caused by these roads, the standard will also provide a judicial backing if non-compliance is sought. Without ravaging the topography, the shortest possible route, which will tie to the existing forest or village road network will diminish the adverse effects, considerably. Direct access demands to paved roads should not be allowed if linkage through other networks is possible.

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