Planning of Forest Roads with Plateia Software

Yilmaz Turk *, Selcuk Gumus **, Remzi Eker*, Tarkan Ural ******

* Assist. Prof. Dr., Faculty of Forestry, Duzce University, Duzce, Turkey
e-mail: yilmazturk@duzce.edu.tr
** Assist. Prof. Dr., Faculty of Forestry, Karadeniz Technical University, Trabzon, Turkey
e-mail: sgumus@ktu.edu.tr
***Ress. Asst., Faculty of Forestry, Duzce University, Duzce, Turkey
e-mail: remzieker@duzce.edu.tr
**** Teaching Asst., Faculty of Forestry, Duzce University, Duzce, Turkey
e-mail: tarkanural@duzce.edu.tr

Abstract

It is easier to make the projects and applications of forest roads on the terrain through developed technological tools in today. Road planning and designing by computer aided software is become very demanding task for road engineers. Various software products such as Advenced Road Design, Allplan, Anadelta Tessera, AutoCAD Civil 3D, AutoRoads, Bentley In Roads, Bentley MXROAD, CAD&PILLAR, Carlson Civil, Civil Designer, DIGICORP CIVIL Design, Diolkos, HEADS Pro, HighRoad, HY-SZDL, ISTRAM ISPOL, KeyTERRA-FIRMA, LISCAD, NetCAD, Novapoint, NovaTDN, Odos, Optimum Road Design Model, PDS, Plateia, RoadEng, SierraSoftProSt, and VESTRA Roadare used in the planning stage of forest roads. Apart from these, there is RoadEng software, which as developed exclusively for highway planning (Akgul and Esin, 2011).

One of these software is Plateia (developed for road design and reconstruction) that has been used in highway planning. The enables more effective planning of roads owing to have the ability of dynamic data processing as auto-updating revisions on any part of the projects by planners. Its ability of dynamic data processing enables to make optimal decisions from one stage of planning to another in a project (Araguave et al., 2005). Although there is any commercial software which developed for only forest road planning (Akgul and Esin, 2011), like these software which have the ability of dynamic data processing have been used for designing vertical alignment of forest roads and optimization (Nicholson, 1973; Trietsch, 1987).

Albeit a forest road is a type of the highway, the technical and economical standards of forest roads differ from the highways in terms of transported forest products (Hasdemir and Demir, 2001; Acar, 2005). In Turkey, forest roads are divided into three main categories such as primary forest roads, secondary forest roads (Type A and Type B secondary forest roads) and tractor roads. The geometric standards of all types of forest roads are given in Table 1. Each category of forest roads is determined depending on the objective of construction, traffic density, the amount of the load to be transported, tonnages of trucks in accordance with the Communique No. 292 by General Directorate of Forests. As well, the processof forest road planning is conducted according to this communique.

Table 1. Geometrical standards of all types forest roads (GDF, 2008).

Road features	Unit	Main forest roads	Secondary forest roads				Tractor roads
			A - Type	B – Type			
				HBT	NBT	EBT	
Platform width	m	7	6	5	4	3	3.5
Number of road line	Number	2	1	1	1	1	1
Roadway width	m	3	3	3	3	3	3
Maximum longitudinal slope	%	8	10	9	12	12	20
Minimum vertical curve diameter	m	50	35	20	12	8	8
Shoulder width	m	0.50	0.50	0.50	0.50	0.50	
Ditch width	m	1.00	1.00	1.00	1.00	0.50	
Superstructure width	m	6	5	4	3	3	
Bridge width	m	7+(2 x 0.6)	6+(2 x 0.6)	5+(2 x 0.6)		4+(2 x 0.6)	

HBT: High standard B type forest road, NBT: Normal B type forest road, EBT: Extreme B type forest road

In the present study, using Plateia, which is AutoCAD-based software and has a user-friendly interface, a road plan was conducted for forest road with 59 code numbered in Balıklı Forest Distinct (Duzce-Turkey). The Balıklı Forest Distinct which is covered 5822 ha is located in Western Black Sea Region between latitudes 40º 38' 40" - 40º 42' 40" N and longitudes 30º 57' 35" - 31º 06' 45" E (Figure 1).

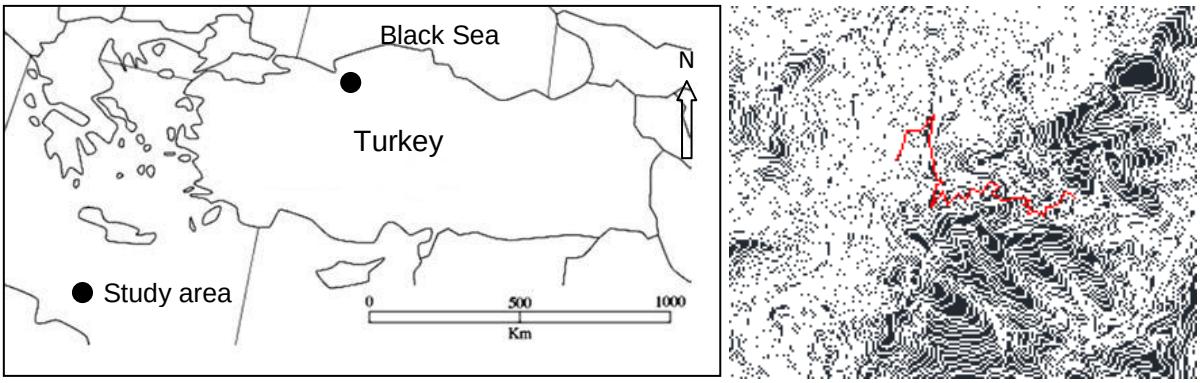

Figure 1. Location of study area and planned forest road

Required base-inputs such as locations (or coordinates) of beginning points and endpoints of planned road and Digital Elevation Model (DEM) belongs to study area was determined in fieldworks and obtained from topographical map with 1/25000 scaled in office, respectively. All drawing styles (named as GDF in this study) were created in metric units. The planned forest road is assumed as B-type forest road of which cut slope equals 1:1, fill slope equals 3:2, and ditch equals 3:1 with 1 meter width. Total volume table and Bruckner diagram were created depending on profile of created road corridor with 1/2000 horizontal scale and 1/200 vertical scale (Figure 2).

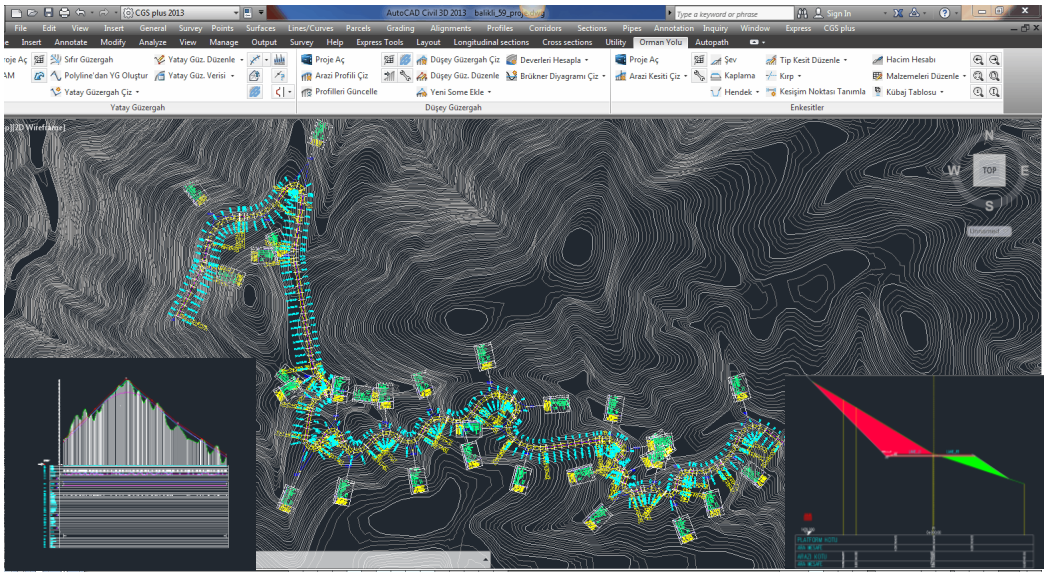

Figure 2. Forest road corridors, profile and assembly

The length and width of planned forest road are 3.297 kilometers and 4 meters, respectively. Cut and fill volume of road are 21194 m^3 and 5516 m^3, respectively. The average slope of the road is 5% and the average slope of the land slope is 56%. And also, there are 29 curves over planned road of which curve radius values range between 20-120 meters. It is shown with this study that all phases of planning studies of forest road is able to be made more effective, time consuming, and low costly than the traditional method applied in Turkish forestry applications. But the validation of cut and fill volumes of planned road by comparison with real road construction studies and also what kind of parameters (such as resolution of used DEM) effects the outputs of the software have to be investigated.

Key words: forest roads, plateia software, road planning