SURVEYING APPS ARE CHALLENG FOR ADVANCED TOTAL STATION

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Abstract— Before the introduction of mobile phone in projects, surveyors used to choose their **Total station** according to the type of work, such as the construction, Roads, tunnel, dams how advanced Total station needs to be and what programs should be installed so that the surveyor can solve the challenges he faces.

Programs such as area **calculation, monitoring, traverse, Ref line** and **ref arc**, calculation on the height of excavation or embankment, Tunnels with so slopes and vertical arc like the tunnels of the dam power plant. Also surveyors need to office for transferring data to computer for drawing and calculation. Maybe surveyors need to **Total station** with **USB** port or **Bluetooth** we know that the more features required, the more complex **Total station** expensive it will be and surveyors will need training. The arrival of mobile phone and its development in terms of increasing the speed of calculations and **Bluetooth**, **GPS**, **OTG** equipment are changing surveying in both land and office sectors. As with the arrival of the computer, university courses related to it, including programming and the use of different software, were added to the courses of surveyors engineer, mobile phone and simple programming software can also help the in designing programs and performing calculations and drawing at the time of surveying. Surveyors will help not having to go to the office and buy expensive and complicated Total station will be a great help to surveyors.

Keywords—DATATRANSFER, DTM CUTFILL, SECTION, 3DMAP, Pixel.

I. INTRODUCTION

Surveying apps are a solution to solve challenges

LET'S take a look at some of the challenges of surveyors and apps that are programmed to eliminate these challenges.

You can see 26 apps on mobile phone of a surveyor in figure.1, also you can see 3D model of KHODA AFARIN dam excavation in Iran. In this project, the surveyor engineer used a simple Total station with *surveying apps* to control excavation and tunnel. Page and CUTFILL and DTM-CUTFILL were used for excavation. Traverse, DIST, SURVEYING, TABDIL, LOCAL, GIZEMENT were used for calculation of base coordinate stations. Track was used for producing map of exist ways. Tunnel and section were used to control the section of tunnels and draw them. Drawing was used to drawing map and monitoring. 3DMAP was used to make topography, section, calculation of excavation volume and filling. Bluetooth was used to connecting surveyors and transferring coordinate data. DATATRANSFER was used to transfer coordinate data from TOTAL STATION to mobile phone through cable. PIXEL used to transfer picture on 3dmodel with DXF format, you can see in Fig.1.

Fig.1 shows surveying apps

[1] Shows where to download apps.

Data transfer challenge

In the past, Total stations had fewer features and you could only transfer data to a computer through a cable.

Many of them are used in the world, and today, advanced Total stations with a USB port allow access to data without the need for the computer.

If you have Total station without USB port and you need coordinate points outside office you are in challenge.

"**DATATRANSFER**" is an app for transfer data from Total station to mobile phone.
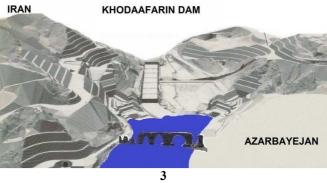
Fig.2 shows DATATRANSFER app

[2] Shows link in play store.

A. After connecting the cable to the Total station and mobile phone, this app can download the data into the mobile phone, so the surveyor will not need to buy new Total station with USB port.

Set the port setting in the app equal to the Total station settings, press the open button so that is ready to receive data from Total station, then select the data transfer menu in the Total station, select job and send data, in the end press close button in the app.

Data will be saved in usb-data.txt in mobile phone also you can make plan points through Export menu with DXF format and see plan points on app.

3

"DTM CUT FILL"

One of the challenges of surveyor is to control drilling or embankment in large dimension such as dams and roads, tunnel and the curved view of building. Buy having a DXF format file that includes lines and 3dface, you can easily perform the necessary calculations without this you will need to buy an expensive Total station and license the **DTM stakeou**t program.
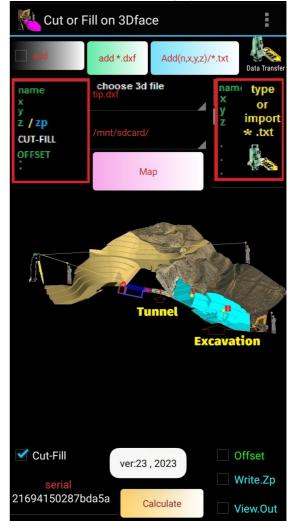

Fig.4 shows DTM CUTFILL app was used to excavation

Fig.5 shows 3D face and line in DXF file and calculations.

Fig.7 shows tunnel entrance

Fig.6 section was calculated and drawn
Surveyor can control section of tunnel in app.
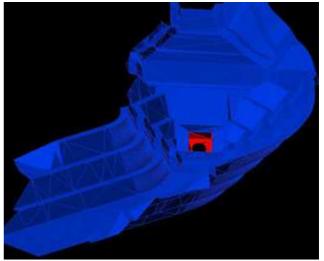

Fig.8 shows tunnel in dam

Fig.9 shows challenge tunnel in KHODA AFARIN dam

Power plant tunnel in dam is a challenge for surveying.
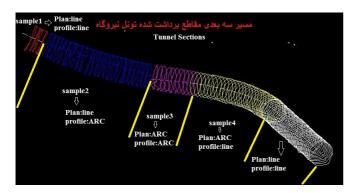

Fig.10 shows section tunnel

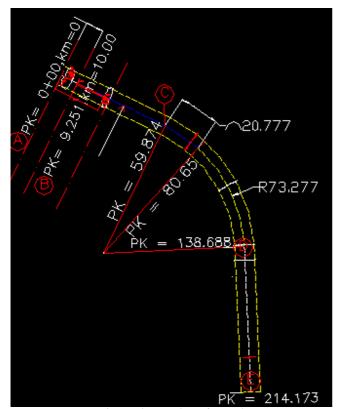Fig.11showes 3D sections tunnel

Fig.12 shows Plan of tunnel

Tunnel is a challenge if slope is 45 degrees.

Fig.13 shows "**section app**"

Section app can use in challenge tunnel. [3] Shows link in play store.

[4] Shows tunnel app link in play store.

In this app, you can enter the ID tunnel in straight path or circular arc, in the plan and longitudinal section, the coordinate of points relative to the section are calculated and drawn on the app.

Also you can draw the sections in DXF format.

If you have DATATRANSFER app in your mobile phone you can transfer data to SECTION app through cable.
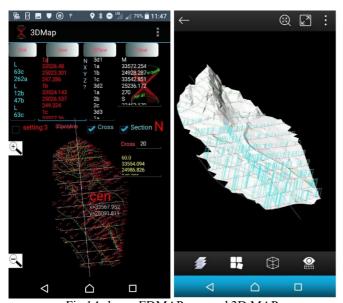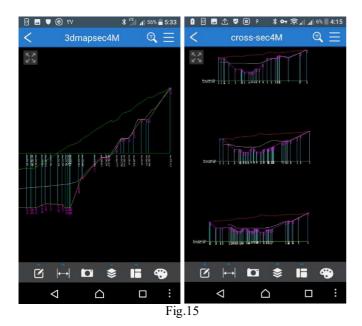
Fig.14 shows EDMAP app and 3D MAP
"3Dmap app" is similar to SDRMAP or CIVIL.

You can make 3Dface, Section, do drawing, make topography and calculate volume when you transfer coordinate to mobile phon.

Fig.15

The benefits of using apps

Surveyors who have the app they need do not need to buy expensive and complicated total station.

The use and training of apps is much easier than similar programs that are installed on total station.

The feature that the apps will have much more than the programs that can installed on total station.

Whit the right app, the surveyor has less need to go the office for calculations and drawing.

[5] Shows similar apps in Total Station.
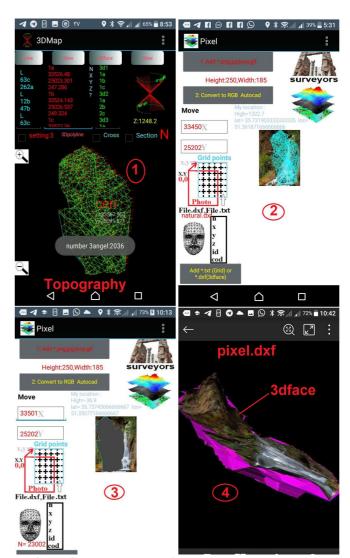[6] Shows similar apps in Total Station.

Fig.16 shows "**Pixel app**" that converts raster to vector

With pixel app you can import 3Dface and line objects if file is DXF format and put that on picture then create grid points and join picture on 3Dmodel then export picture with DXF format.

II. CONCLUSION

Surveying apps are helpful for surveyors but create challenges for TOTAL STATION sellers because surveyors will not need to buy expensive TOTAL STATION with expensive license program so surveyor has to design by himself without support from the company.

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