

ADVANCED LAND SURVEYING BY USING GPS & GIS AT KITS CAMPUS

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ABSTRACT

Cartography is the art and science of making maps. Until the 1960s, maps were made the time-honored, traditional way. J.B Harley and David Woodward have assembled an international team of specialists to compile a much needed up-to-date survey of the development of cartography a science and an art .The Global Positioning System (GPS) is the most common surveying instrument today where we can obtain accuracies of high order with a speed and cost efficiency that has not previously been available to the survey community. Precise positioning is possible using GPS receivers at reference locations providing correction and relative positioning data for remote receivers. The main objective of this thesis is to do practical evaluation of the influence of GPS error sources, processing strategies and reference stations on positioning accuracy e.g. single point positioning solution and relative positioning solution with different reference stations. In the present study, we are making a comparison between conventional land surveying and advanced land surveying. By doing software operations on GPS points we make this project. Draw an original map by hand, based on land survey measurements and other information. Print as many copies as you need. That change with the advent of computers, satellite imagery, and Global Positioning System (GPS), made making maps much easier .finally we are getting approximately 200 sq.m as an error.

Key words: Cartography, Global Positioning System, satellite imagery, cost efficiency, positioning accuracy.

1. INTRODUCTION

Normally all the people do not have idea about the modern surveying techniques such as total station, EDM (Electronic distance measurement equipment), GPS – global positioning system, Laser Distance meter, Electronic Theodolite. By using these equipment's we can save manpower, duration of the project moreover we can decrease the cost of the project. Due to innovation of modern equipment's we can increase the accuracy of work up to 10cm accuracy. For the operating of old equipment's we must need a technically skilled person for understanding that methodology of calculations but by using of advanced surveying we didn't require that much of skilled persons due to their easily understanding techniques. In this present project we are doing survey by using modern equipment's i.e using GPS, GIS and for preparing a contour map we used auto level for calculating levels in my college playground. By using GPS navigator we are taken the latitude-longitude values and with the help ARCGIS software tools we are a making a land use and land cover map .we also derived 3d model of my study area by using ARCSCE tool in ARCGIS software.

1.1SCOPE OF WORK

The scope of this study is limited within evaluating and comparing the accuracy, precision and time expenditure of three surveying methods. Determining and evaluating the accuracy of the measurement need quite stable weather condition and carefulness. During this work there have been a lot of limitations especially related with whether condition (cold, snow and wind). Due to this problem, the study couldn't complete according to the time frame work.

1.2 AIM OF THE WORK

- To know about significance of advanced surveying in field measurements in terms of utility and precision of data collection.
- To learn on the principles of latitude longitude measurements and their accuracy
- To get introduced to the concept of GIS in preliminary identification and map making.
- To know in detail the concept of remote sensing in identification of land features from space and to get introduced to different data acquisition techniques like DGPS.

- To get introduced to the field of geodesy, coordinate systems, Map projections, GPS, its working principles, data collection, data processing and analysis.

1.3 APPARATUS AND MATERIALS

In this present project we are using the following apparatus

Tape:

In this present project we are using 30m tape for doing manual type of survey throughout the kits campus

Mobile phone with handy GPSapp:-

For getting the GPS data we must need to have GPS tracker, due to some financial aspects we are recommended handy GPS mobile app from play store, which is also excellent app for getting GPS data 5.3

Observation notes:

For noticing the GPS (latitude-longitude) data we must need an observation notes. After noticing it's a material for data entry

Auto level:

For getting the levels in playground in kits campus we use this auto level apparatus concordance with handy GPS app, and note down in observation notes

Leveling staff:

For getting levels in auto level we must have leveling staff for noticing the elevation values

Microsoft Excel:-

After getting the all the of GPS data, elevation values in observation note book we must enter into Microsoft excel in **s.no-latitude-longitude**

ARCGIS 10.1 software:-

For advanced surveying purpose we use ARCGIS 10.1 software in it we have different components ARCMAP 10.1, ARCSCENE 10.1, ARCGLOBE 10.1.

In this presentation we use ARCMAP 10.1, ARCSCENE 10.1 mostly.

2. METHODOLOGY

In the present project (advanced land surveying by using GPS and GIS at kits campus) we are taking both normal survey values and GPS values for creating a map of land use and land cover data, 3d model of kits campus and creation of contour maps for playground in kits campus. Normal survey is done by using only tape and a field book, while in advanced land surveying we using only with 4g mobile, with app name is handy GPS, ARCGIS software and auto level for taking contour level in playground .The steps involved in project while taking the values for different maps (LULC, 3D MODEL, CONTOUR MAP)

- Taking data in normal survey method
- Taking data with GPS method
- Taking levels with auto level for contouring with GIS software

2.1 Taking data in normal survey method:

In normal survey method we go with tape only , every element in the campus must should be calculated with tape only like boundary, compound wall area of building s, playground ,gardens in front of college blocks,roads,dividers ,footpath etc.,

The following are the measurements in normal surveying method

FEATURE	COLLEGE BOUNDARY
TYPE OF SURVEY	NORMAL SURVEY
MATERIALS REQUIRED	TAPES,OBSERVATION NOTES

MANPOWER	5 PERSONS
TIME REQUIRED	270 MINUTES

TABLE NO: 1 SHOWING DATA FOR COLLEGE BOUNDARY

FEATURE	COLLEGE BUILDINGS(A,B,C BLOCKS)
TYPE OF SURVEY	NORMAL SURVEY
MATERIALS REQUIRED	TAPES, OBSERVATION NOTES
MANPOWER	4 PERSONS
TIME REQUIRED	240 MINUTES

TABLE NO: 1.2 SHOWING INFORMATION OF A, B, C BLOCKS

FEATURE	PARKING AREA,PLAY GROUND
TYPE OF SURVEY	NORMAL SURVEY
MATERIALS REQUIRED	TAPES, OBSERVATION NOTES
MANPOWER	3 PERSONS
TIME REQUIRED	193 MINUTES

TABLE NO: 1.3 SHOWING INFORMATION OF PARKING AREA CABLE

FEATURE	ROADS,HOSTEL,MBA,WALL
TYPE OF SURVEY	NORMAL SURVEY
MATERIALS REQUIRED	TAPES, OBSERVATION NOTES
MANPOWER	3 PERSONS
TIME REQUIRED	267 MINUTES

TABLE NO: 1.4 SHOWING INFORMATION OF ROADS, HOSTEL, MBA, and WALL

FEATURE	MISCILENEOUS AREA
TYPE OF SURVEY	NORMAL SURVEY
MATERIALS REQUIRED	TAPES, OBSERVATION NOTES
MANPOWER	3 PERSONS
TIME REQUIRED	156 MINUTES

TABLE NO: 1.4 SHOWING INFORMATION OF MISCILENEOUS AREA

All the data related to the above tables are noted in observation notes and plan is prepared with that normal surveying method by including all the dimension's and finally for preparing a plan of kits campus with land use and land cover

2.2 Taking data with GPS method:

For taking the GPS values we must have GPS tracker, due to financial aspects we are unable to buy a GPS tracker, instead of that we take **HANDY GPS** mobile app in a sensor supported mobile.

These following are the steps for taking GPS values

- Firstly install handy GPS in android mobile phone from play store
- After that we must need to enable the GPS sensor in android mobile phone and also connect the server by enabling the mobile data
- For calibrating purpose we need to check the compass direction by rotating the mobile phone in all directions

Then go to point where we want to calculate the GPS position in earth surface, place the mobile at that position and note down the latitude and longitude values in observation notes .The way of taking GPS points is based on accuracy of data; in this project we take largest interval of 30m for calculating boundary area

For remaining features we take according to convenience of structure and shape of features

As like the above process we go for all the things in kits college campus such as building blocks, roads, gardens, playground, dividers, boy's hostel, MBA & canteen, and remaining miscellaneous areas .After noticing al the GPS data into observation notes we completed the field work now we need to enter that GPS data values into Microsoft excel by providing **s.no, latitude, and longitude** as a format.

LATITUDE	LONGITUDE
15.78961	79.25817
15.78962	79.25805
15.78948	79.25805
15.78944	79.25815
15.78906	79.25798507
15.78905	79.25809759

TABLE NO 2.1.1: WORKERS SHED

latitude	longitude
15.78721	79.2594
15.78727	79.2594
15.78739	79.25941
15.78777	79.25941
15.7879	79.25942
15.78843	79.25944
15.78893	79.25946
15.78904	79.25946
15.78969	79.25947

TABLE NO6.2.1.2: DIVIDER 1 COLLEGE

3. EXPERIMENTAL PROCEDURE

In this procedure we need GPS (Global positioning system) GIS(Geographic information system) GPS is an advanced surveying instrument and while it is an android application(Handy GPS), GIS is an application for collecting satellite data an plot it on the ARCMAP 10.1

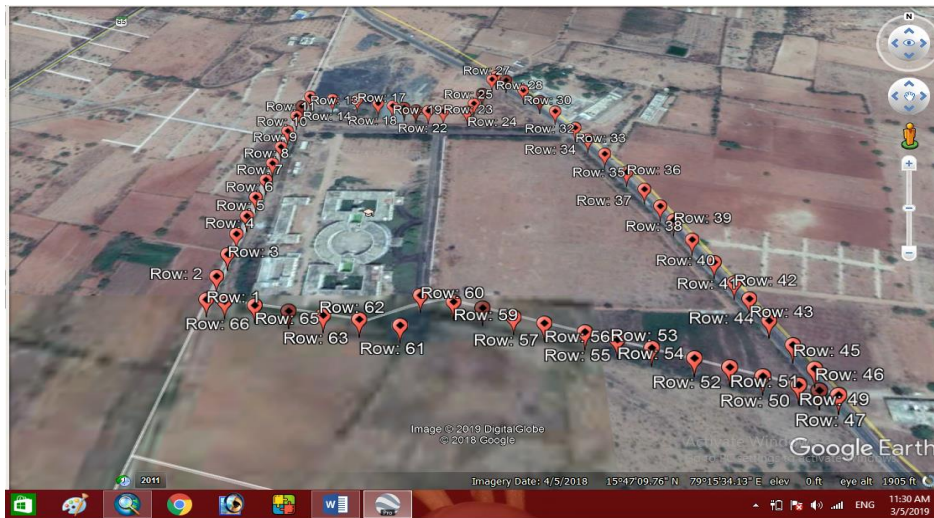
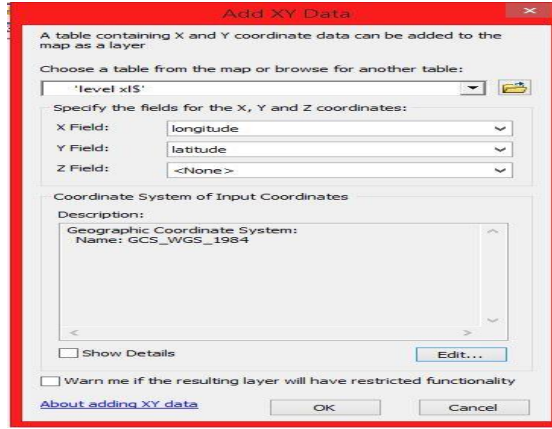
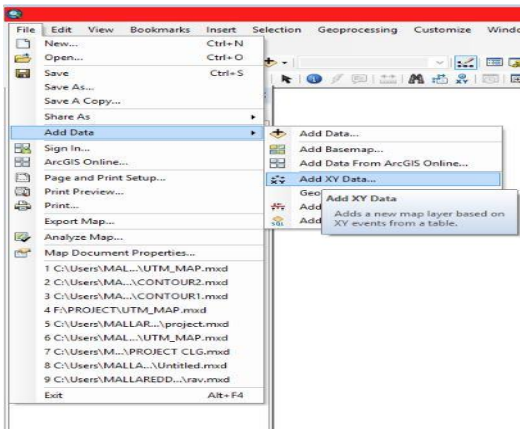


FIGURE: showing KML format data in Google earth

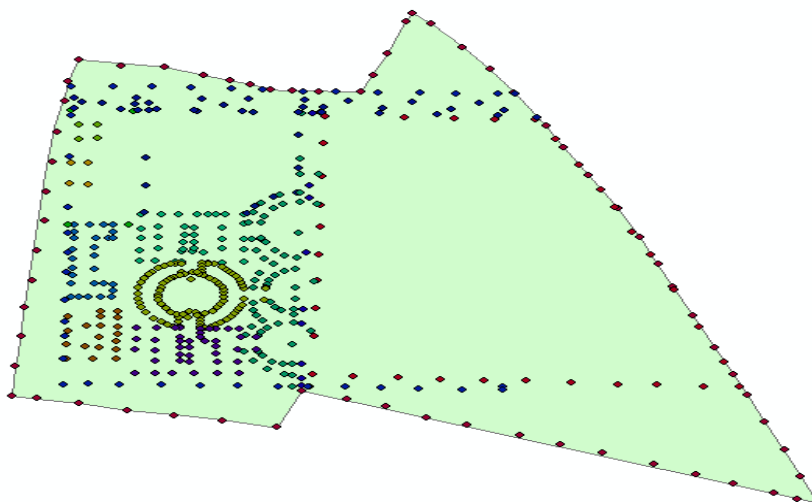


FIGURE: showing start editing, creatfeature table

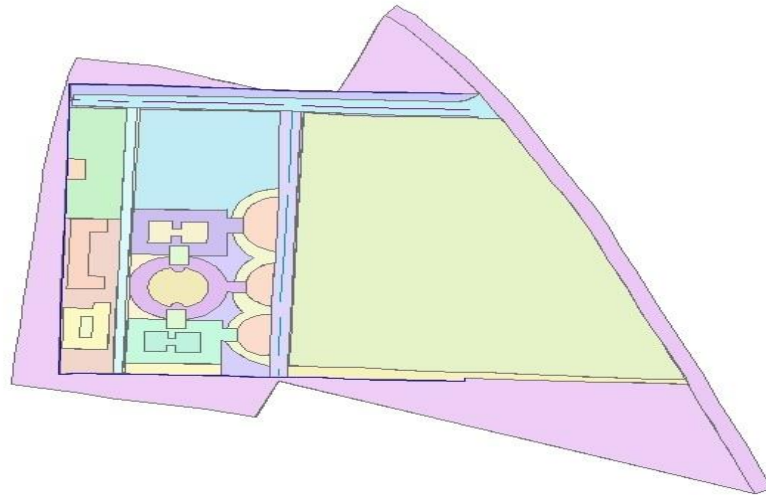


FIGURE: showing completion of all shape files editing

- After completion of all editing, we need to give respective color according to their usage and general colors

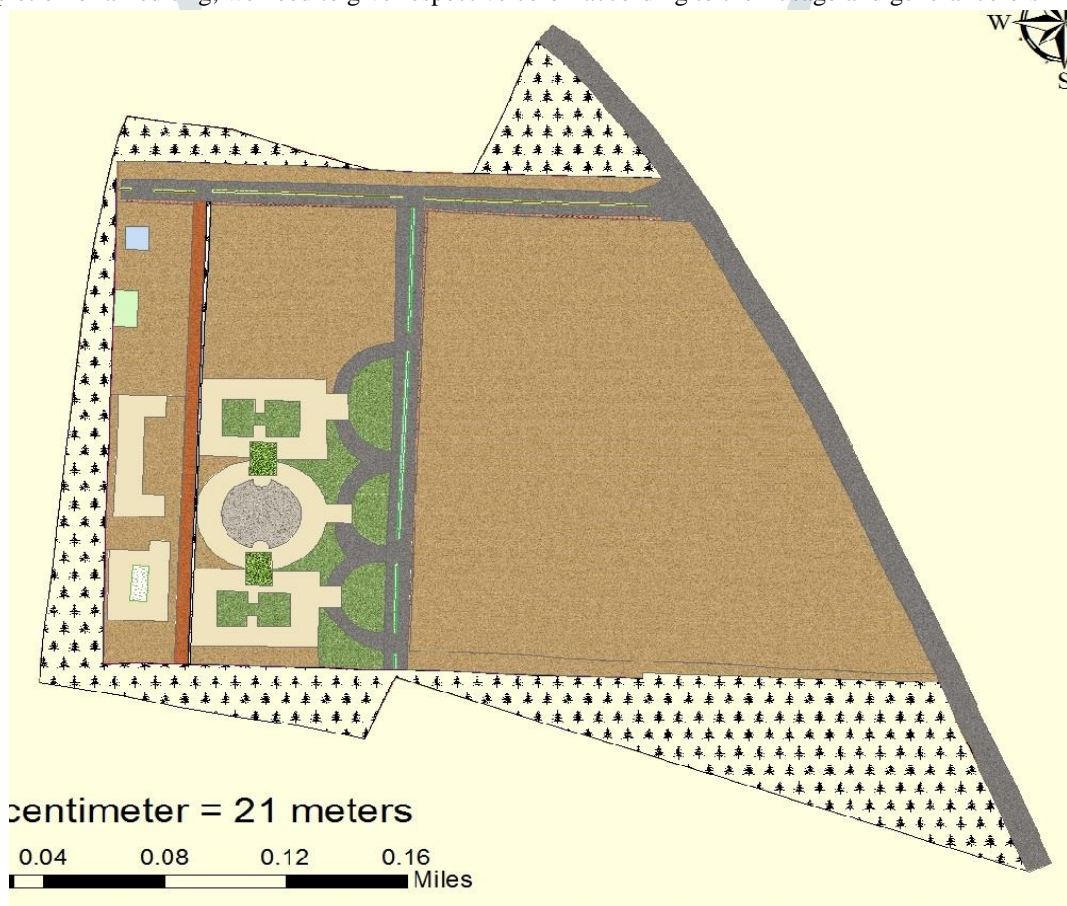


FIGURE final map after all editing

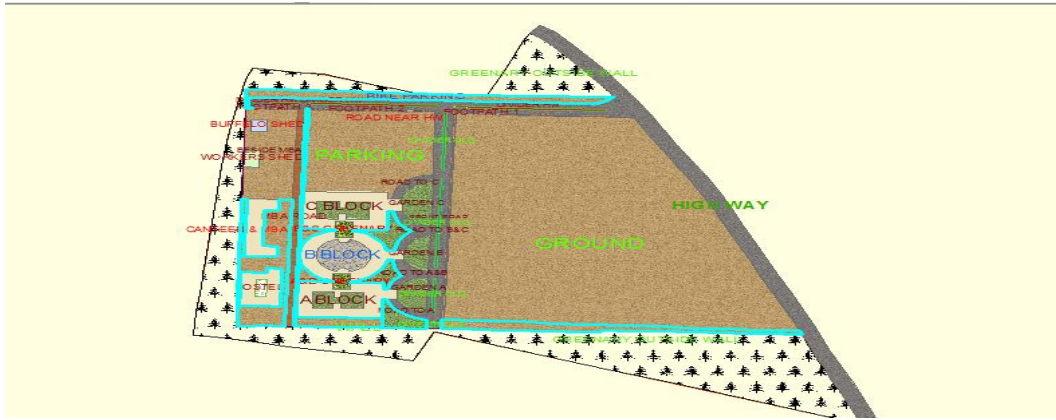


FIGURE: Remaining Area In Kits Campus (12926.4 Sq.m)

- We have also the some small areas in kits campus like bike parking area, place near to ground, place in backside of b block and other small areas are included as whole area of 12926.4 sq. m
- After calculating area of campus we need to map document properties in file menu ,page and print setup after that we go for legend, scale bar, scale text, north arrow etc. are included in map

CREATING 3D MODEL OF KITS CAMPUS

- For the creation of 3d map it's just small process after completion of original 2d map that process is given in steps wise
- Firstly open the ARCSCENE 10.1 and take a blank map
- In that map drag and drop the each edited or created shape file data into working window
- After dragging all the data go to contents window and then click mouse right side for and go to properties in that properties window we see extrusion option
- In that extrusion option we just need to give height value
- Then by pressing ok button we can get the 3d model of that object

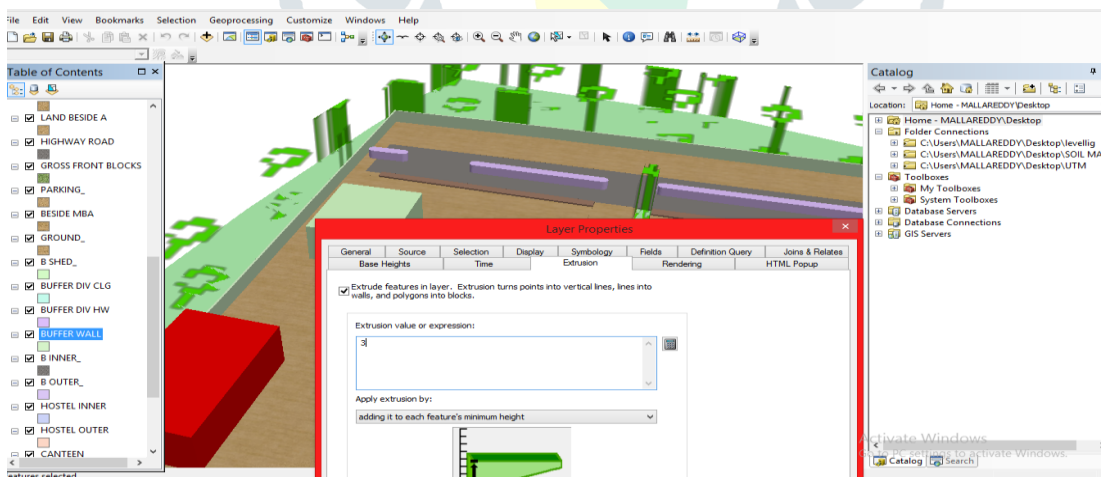


FIGURE: showing how to give extrusion data

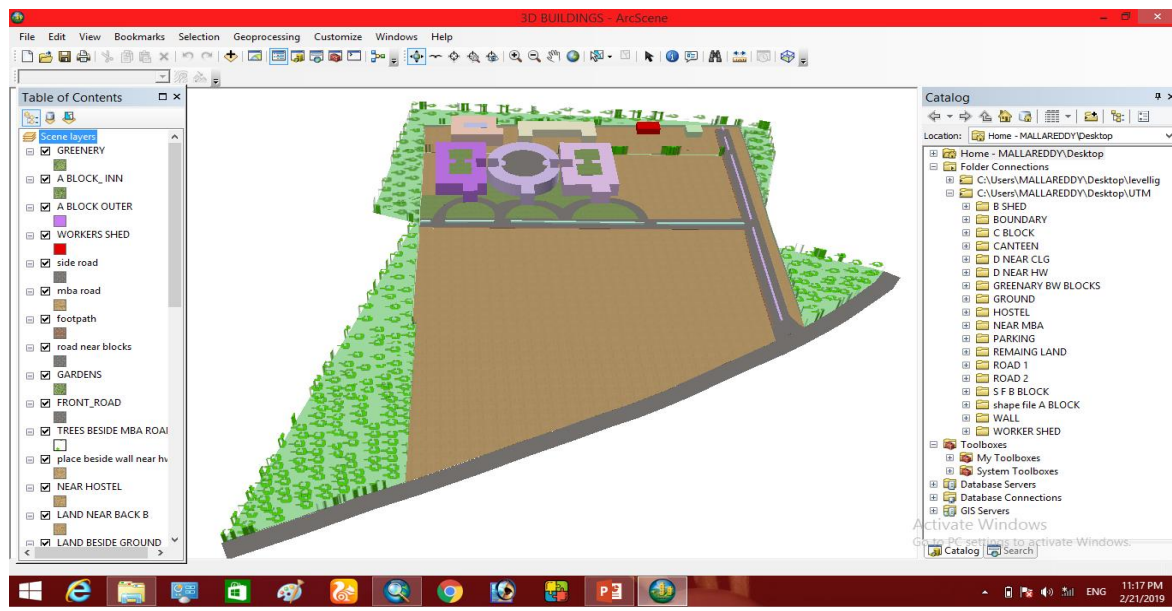


FIGURE: showing final output of 3D model

4. CONCLUSION & FUTURE SCOPE

In this present project we are doing comparison between conventional surveying and advanced surveying (GPS), finally we get the land use, land cover map, 3D modeling of kits campus, spatial elevation model, contour map for kits campus playground by using ARCGIS 10.1 software. In conventional surveying we are taken the values by using tapes only. By considering the both works i.e. according to the time and labor and convenience of working advanced land surveying by using GPS and GPS is better than as compared with the normal surveying but as compared with accuracy wise we get an error amount of 200 sq.m approximately. With this advanced survey we can do work by reducing the cost of the surveying by reducing the its time of project and man power required to done that survey.

FURTHER SCOPE OF STUDY

By adopting the latest technology like DGPS (differential global positioning system) we can get accurate data up to 1 cm accuracy, which the upcoming technology .by is using this DGPS technology we can reduce labor cost and time required to take survey automatically.

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