



# DETERMINATION DEFECT SITES OF WATER NETWORK PROJECT USING GIS

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## ABSTRACT

*Initially the methods of determination defects sites was done traditionally , but after the scientific development in GIS (geographic information system ) which used many applications , the process has become much better , in this research includes determination defect sites in the design of water network and how to processed it .The work was done with a high accuracy corrected satellite photo taken (Quick Bird ) with (0.6m ) resolution for Nasiriyah image 2005 , and in this research the work done by using the Geographic Information sysyem (GIS) program to processed it by Geometric Network tool in the arc catalog & through establishment of layers (shipefile ) for the water pipes of the study area and after drawing process is finished , the tool in the program (Geometric Network) determine defect site in the design water network then processed*

**Key words:** Defect sites, Geometric Network, Geodatabase.

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## 1. INTRODUCTION

From the importance of water in sustain life this led to development of water supply engineering as a part of civil engineering to develop a system for supply protected water to all the people . The water distribution consist of several components such as intake , pumping , transmission , treatment , storage , distribution network ...etc[1] ,because this importance for a long duration and for its necessity for live, it is imperative to be receipt the water by water network for all people , by using extended network for all the houses . More importantly must know if this extended network contains a defect sites before implementation in order to facilitate the implementation process by engineers[1].

GIS is a system for getting the best required results with high accuracy of details for that it is used in many applications (health , navigation , digital maps , producing data managements, and finding the best position ) .This system depends on many kinds of data and this system formed from software ,big amount of data and tools that are used in map producing or data analysis [ 2] .Thus a GIS acts a link between the real world and the user . The real world is the source of information stored in the system .

The user employs the GIS to analyze the information and applies the results to the solution of a problem [ 3 ] . The essential considerations in any GIS , from the stand point of such auser , are data input and storage structure , manipulation and analysis techniques and out putcapacities [4 ] .

The main objective of this research is how to deal with errors that produced during design a water network to a particular area by using Geographic Information system (GIS) program and how to correct these error to diminish the effort and the trouble .

## 2. RESEARCH METHODOLOGY

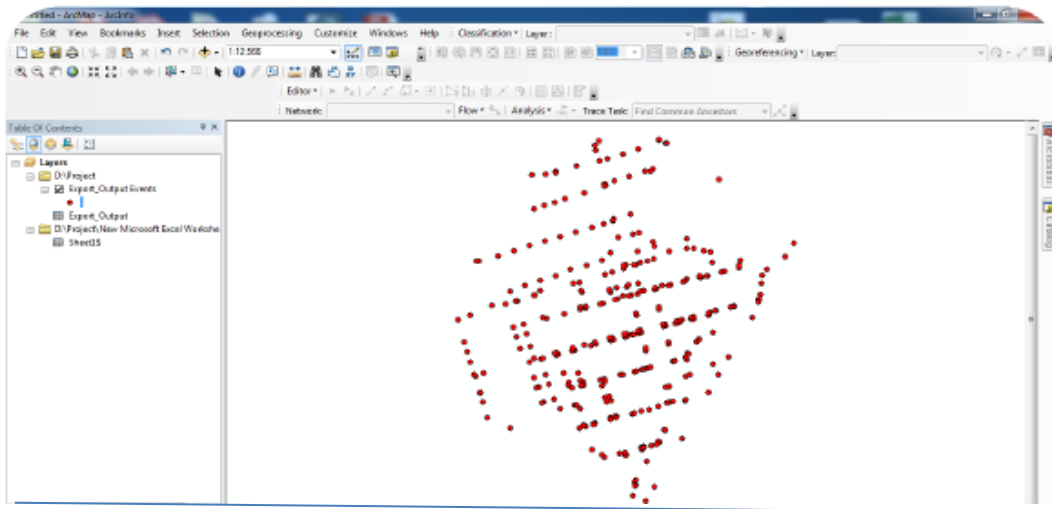
In research methodology the data of network pipes are obtained then drawing the network pips by the following steps :

- Import the excel file from Add data
- Open attribute table
- Select and export the excel data.
- Export I : ( dpf)
- Display X Y data
- Export 2 : ( shp )

As shown in the following figure

	A	B	C	D	E	F	G	H
1	OBJECTID	SHAPE *	pipe_dim	pipe_type	POINT_X	POINT_Y	Enabled	AncillaryRole
2		4 Point	225	pvc	617968.1	3433880	TRUE	None
3		35 Point	225	pvc	618287.5	3434461	TRUE	None
4		36 Point	110	pvc	618017.9	3434326	TRUE	None
5		37 Point	110	pvc	618032.2	3434258	TRUE	None
6		38 Point	110	pvc	618032.4	3434257	TRUE	None
7		39 Point	110	pvc	618030.7	3434329	TRUE	None
8		40 Point	110	pvc	618030.8	3434329	TRUE	None
9		41 Point	110	pvc	618045.9	3434261	TRUE	None
10		42 Point	110	pvc	618046.1	3434260	TRUE	None
11		43 Point	110	pvc	618200.1	3434300	TRUE	None
12		45 Point	110	pvc	618020.6	3434254	TRUE	None
13		46 Point	110	pvc	617802.5	3434195	TRUE	None
14		47 Point	110	pvc	617798.4	3434194	TRUE	None
15		48 Point	110	pvc	618103.1	3434269	TRUE	None
16		49 Point	110	pvc	618100.6	3434265	TRUE	None
17		50 Point	110	pvc	617991.1	3434078	TRUE	None
18		51 Point	110	pvc	617885.9	3433887	TRUE	None
19		52 Point	160	pvc	617880.7	3433897	TRUE	None
20		53 Point	160	pvc	617887.2	3433909	TRUE	None
21		54 Point	160	pvc	617933.4	3433992	TRUE	None
22		55 Point	160	pvc	617914.6	3434046	TRUE	None
23		56 Point	160	pvc	617843.6	3434026	TRUE	None

## Determination Defect Sites of Water Network Project using GIS

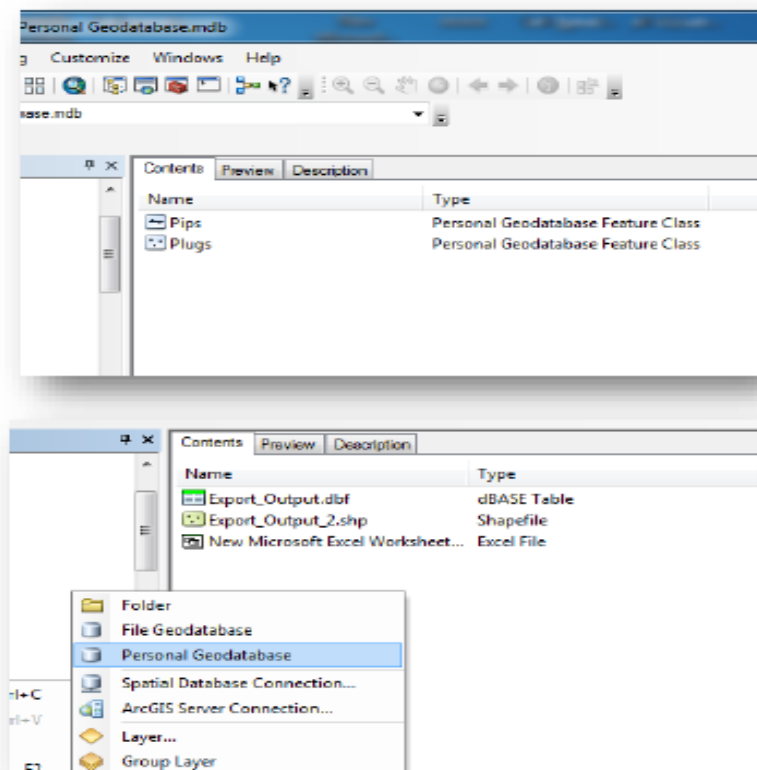


**Figure 2** Drawing the network pipes

The next steps consist of converting shape files to Geodatabase feature class in Arc catalog as :

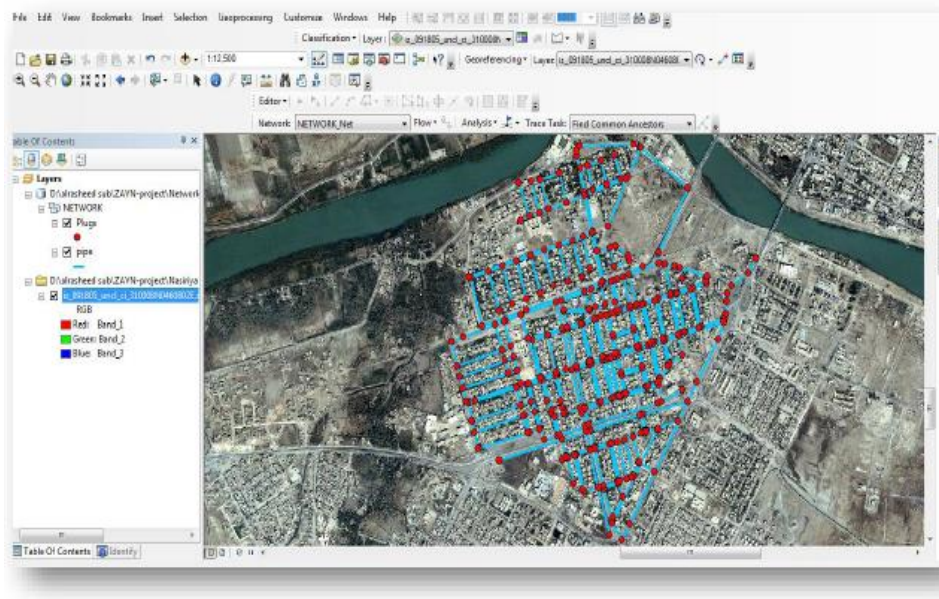
- Add personal Geodatabase
- Add class feature pips
- Export 3 : ( class feature )

As shown below :



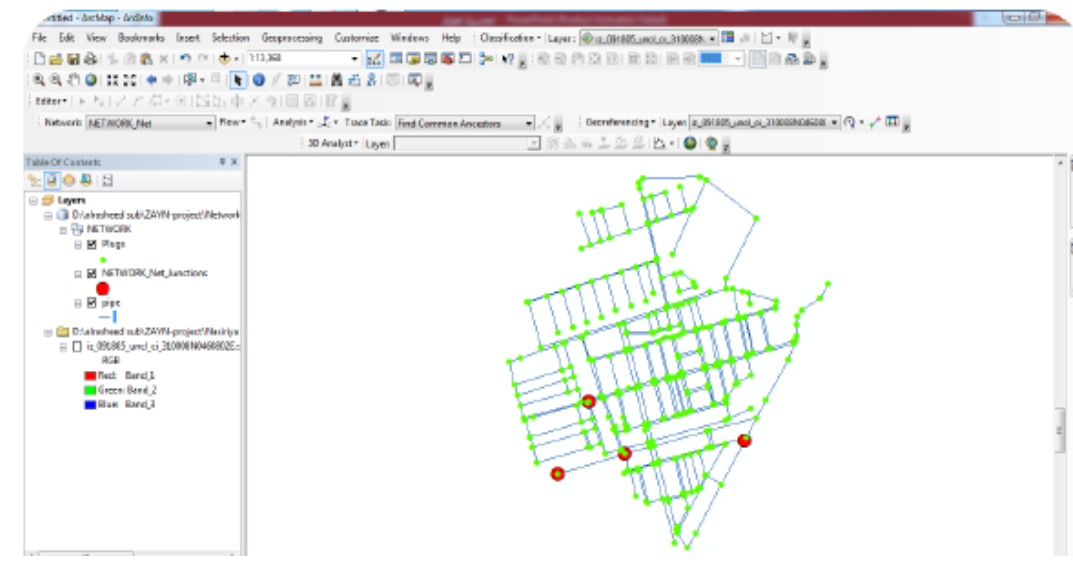
**Figure 3** Add personal geodatabase

Then drawing the network on the satellite image for aclear shape as shown in figure .



**Figure 4** The network pipes on satellite image

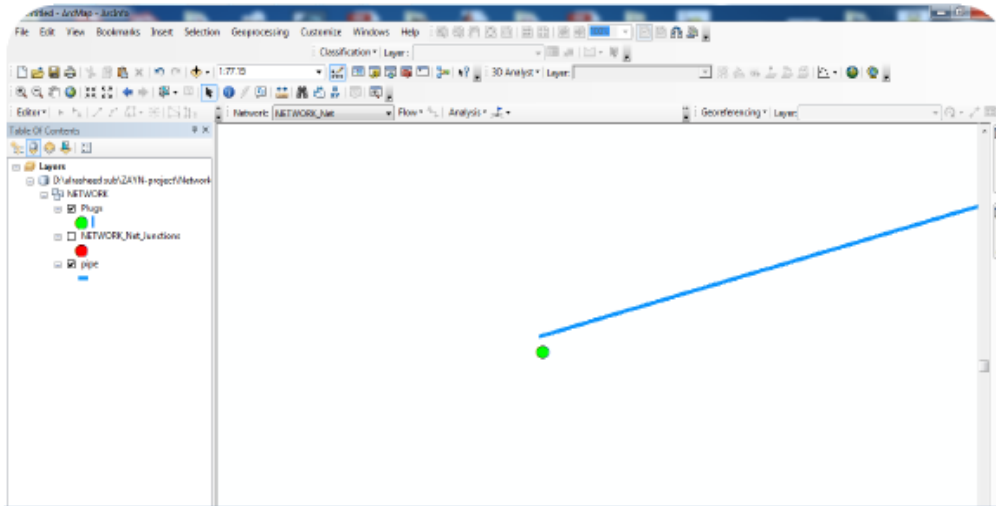
Open the error layer in Arc map as follow :



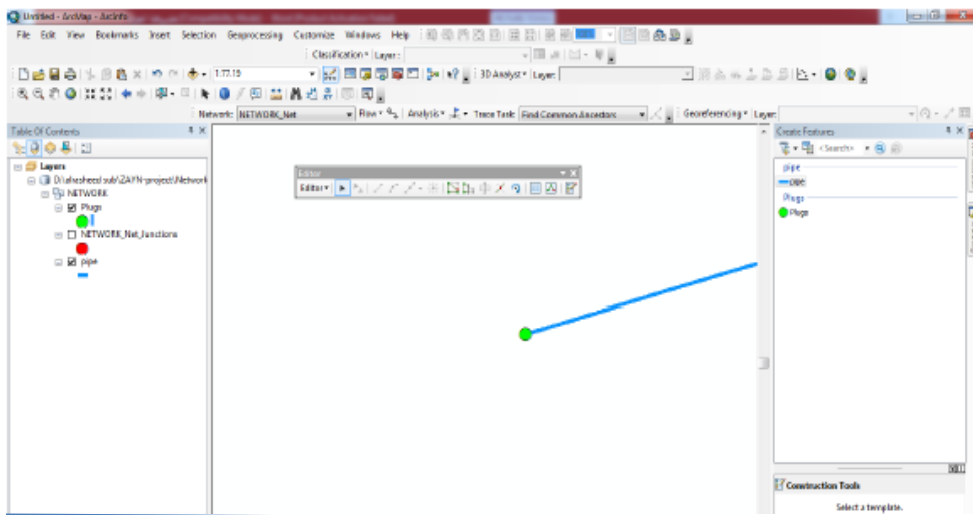
**Figure 5** The error Layer

To clarify more , Zooming in an error site and Removal the error from the end of pipes by using geometric Network as shown in the following figures :

## Determination Defect Sites of Water Network Project using GIS

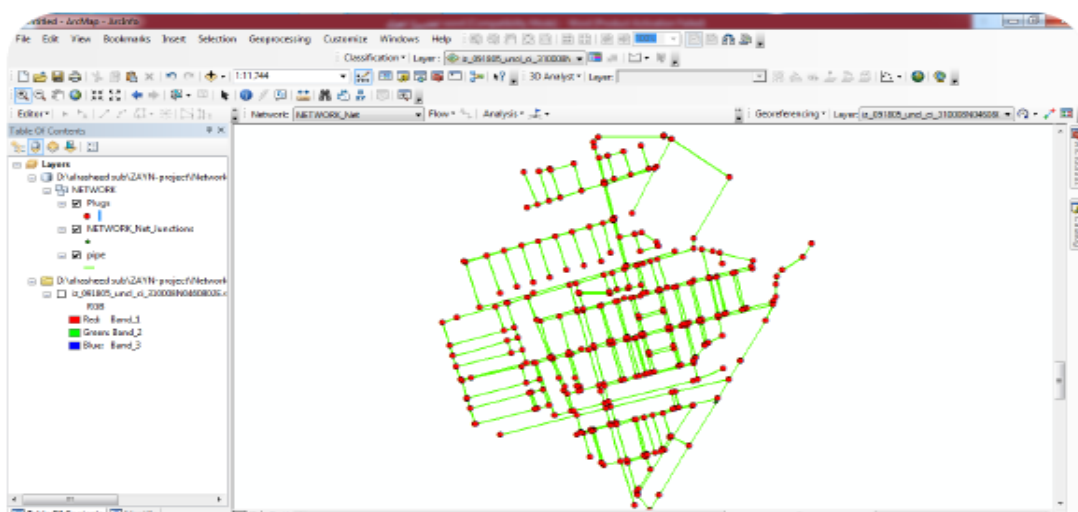


**Figure 6** Error site



**Figure 7** Removal the error from the end of pipes .

And finally determination defect sites in the design water network by using Geographic Information system (GIS) as follow :



**Figure 8** The corrected network

### 3. DISCUSSION

The results indicate the capability and even effective of use the Geometric Network which existing in Geographic Information system (GIS) in invention any defect in the water network and before implementation that is reduces the time and effort , if done execution the water network without detection .

Great water network need fatigue the effort and long time to accomplish and after that , the engineering and the implementers , they do not know where is the problem and the status , but when use this program , it becomes easy to locate it and before implementation also , so we fled effort and time .

As is evident from figure ( 1 ) how to obtain the data and drawing as a Network pipes in figure ( 2 ) , then drawing these network pipes on satellite image to show the work area as show in figure ( 4 ) as well as to get the final corrected network as shown in figures (6),(7),(8).

### 4. CONCLUSIONS

- The using of Geometric Network is very essential in survey works.
- The Geographic Information system (GIS) is useful and powerful tool in developing water supply system and facilitates the following process :
  - Data collection and monitoring .
  - Site selection of water sources .
  - Site selection for surge tank and control values .
  - Routing optimization and visualization .
- It is the important part to the engineering for offering in the works which make the implementation more easily in the future .

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