
Trancoso Watershed Model



GROUP G ENGINEERS

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CEEn 470

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Group G Engineers will provide the highest quality of engineering work to Brigham Young University for the Trancoso Watershed Model Project. Our team has qualified experience in watershed delineation and modeling, as well as hydraulic and hydrologic analysis as is required to complete this project.

Current Situation in Trancoso --- ---

Trancoso, Mexico, is having problems with watershed management. A small stream runs through the center of town from a large watershed outside of the town. Each year, excessive rain falls on the watershed above the city which results in flooding. A small detention basin, located just west of the city, has proven inadequate to mitigate the hazard. In recent years, the flooding, which starts at a road towards the western edge of town, has flooded nearby buildings to a height of over 5 ft. The location of Trancoso, Mexico is shown in Figure 1. Figure 2 shows the upstream contributing watershed, an existing detention basin, and the road that marks the start of the flooding. The stream which experiences the flooding is shown in Figure 3.



Figure 1. Location of Trancoso, Mexico

Source: Mapquest.com

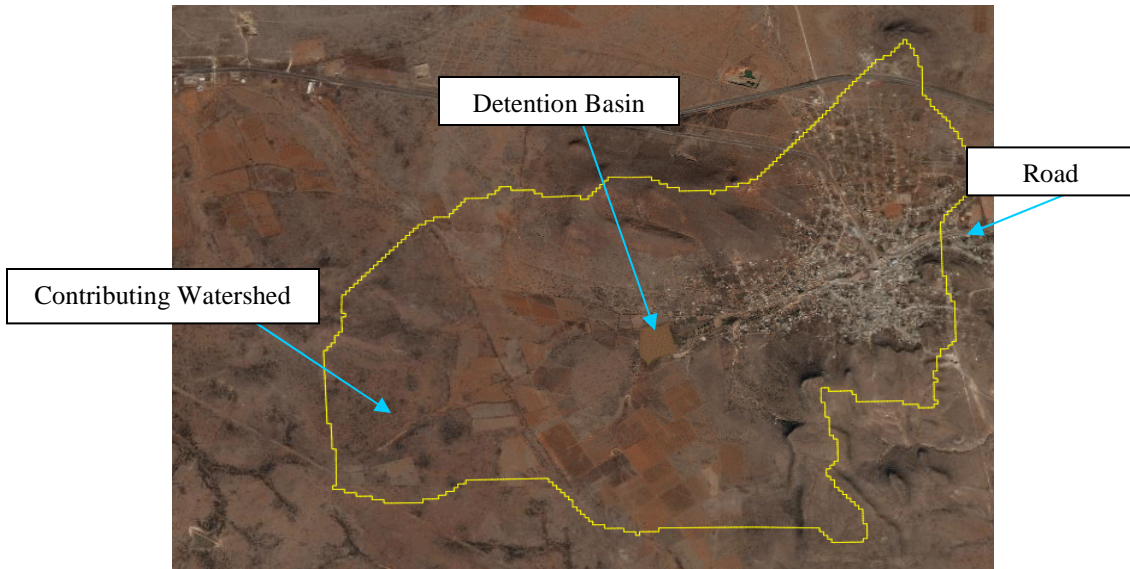


Figure 2. Upstream of Trancoso



Figure 3. The Stream in Trancoso

Project Understanding/Approach

In collaboration with students from the University of Zacatecas, we will create a model of the existing hydrologic conditions of the Trancoso, Mexico watershed. Our team will be primarily responsible for the modeling, while the group in Zacatecas will be primarily responsible for data gathering. Our model will estimate the effects the precipitation from the watershed has on the city. The model will include a hydrologic analysis, which predicts runoff from the watershed and includes routing through the detention basin, and a hydraulic analysis of the stream that runs through the city that will show the effect of the road and culverts on the flooding. We will use WMS, HMS, and HEC-RAS to create this model.

Project Team

The following table describes the primary responsibilities of each team member. The team members are by no means limited to these tasks and are expected to be involved in all aspects of the project.

	Focus	Primary Responsibilities
John Shelley	Team Leader	Organize meetings, and keep the project on schedule. Compile presentation documents.
Aaron Cook	Communication	Handle translation, communication and general understanding with the team in Mexico.
Danielle Jeppson	WMS	Complete hydrologic model of the watershed in WMS with help from the team.
Lindsay Esplin	HEC-RAS	Model culverts and stream channel for use in the WMS watershed model.

Mentor: Dr. E. James Nelson, Civil Engineering Professor, Brigham Young University

Experience and References

Team members are experienced and capable in their respective expertise. John Shelley has had leadership responsibilities and experienced successful teamwork in engineering projects. Aaron Cook speaks fluent Spanish, having lived in Mexico for two years. He also has interoffice communication and technical writing experience. Danielle Jeppson has experience with WMS watershed modeling and hydrology calculations. Lindsay Esplin has experience running HEC-RAS and modeling floodplains.

General team experience includes floodplain delineation and WMS modeling, as well as running GIS and CAD programs. All team members have taken courses in hydrology and water modeling. More detailed experience and qualifications are included in the team member resumes in the Appendix.

Availability

We have assessed the workload of the Trancoso Watershed Model Project and can commit our time and resources as necessary to Brigham Young University in order to complete this project.

Description of Scope of Work Task	Total Hours	John Shelley	Danielle Jeppson	Lindsay Esplin	Aaron Cook	Dr. James Nelson
Task 1 - Initial Work						
Obtain Existing DEM, Land Use, and Soil Type	4	1	1	1	1	
Obtain new data to integrate into DEM	4	1	1	1	1	
Road						
Detention Basin						
Topographical Cross Sections						
Culvert Sizes						
Obtain Precipitation Data	8	2	2	2	2	
Task 2 - Meetings/Coordination						
Colaboration with students in Mexico	12	2	2	2	6	
Task 3 - Preliminary Analysis						
DEM Modification	12	2	4	2	4	
Delineate Watershed	8	2	2	2	2	
Route Flow Through Detention Basin	20	7	3	7	3	
Merge HEC-RAS Data With WMS	16	5	3	5	3	
Calculate Flows	8	2	2	2	2	
Task 4 - Final Model						
Determine Storm Flows	4	2		2		
Display Floodplain in WMS	8	2	2	2	2	
Calculate Hydrographs	4		2		2	
Task 5 - Presentation						
Field Trip/Site Visits	250	50	50	50	50	50
Poster	8	2	2	2	2	
Presentation	16	4	4	4	4	
Total Labor Hours	382	84	80	84	84	50

Project Schedule of Key Tasks

We provide the following table which illustrates timing and sequencing of key tasks for the Trancoso Watershed Model Project in order to complete the final design phase by the beginning of April 2007.

Task	Jan 2007	Feb 2007					Mar 2007					Apr 2007	
	29-31	1-3	4-10	11-17	18-24	25-28	1-3	4-10	11-17	18-24	25-31	1-7	8-9
Task 1 - Initial Work													
Obtain Existing GIS Data													
DEM													
Land Use													
Soil Type													
Obtain new data to integrate into DEM													
Road													
Detention Basin													
Topographical Cross Sections													
Culvert Sizes													
Obtain Precipitation Data													
Task 2 - Meetings/Coordination													
Colaboration with students in Mexico													
Task 3 - Preliminary Analysis													
DEM Modification													
Delineate Watershed													
Route Flow Through Detention Basin													
Merge HEC-RAS Data With WMS													
Calculate Flows													
Task 4 - Final Model													
Determine Storm Flows													
Display Floodplain in WMS													
Calculate Hydrographs													
Task 5 - Presentation													
Field Trip/Site Visits													
Poster													
Presentation													

Project Cost Estimate

Description of Scope of Work Task	Labor Cost	Total Hours	Project Manager	Clerical	WMS Technician	HEC-RAS Technician	Faculty Member
			\$ 60.00	\$ 35.00	\$ 50.00	\$ 50.00	\$ 75.00
Task 1 - Initial Work							
Obtain Existing GIS Data	\$ 155.00	4		3	1		
DEM							
Land Use							
Soil Type							
Obtain new data to integrate into DEM	\$ 170.00	4		2	2		
Road							
Detention Basin							
Topographical Cross Sections							
Culvert Sizes							
Obtain Precipitation Data	\$ 280.00	8		8			
Task 2 - Meetings/Coordination							
Colaboration with students in Mexico	\$ 570.00	12	6	6			
Task 3 - Preliminary Analysis							
DEM Modification	\$ 600.00	12			12		
Delineate Watershed	\$ 400.00	8			8		
Route Flow Through Detention Basin	\$ 1,000.00	20			10	10	
Merge HEC-RAS Data With WMS	\$ 800.00	16			4	12	
Calculate Flows	\$ 400.00	8			4	4	
Task 4 - Final Model							
Determine Storm Flows	\$ 200.00	4				4	
Display Floodplain in WMS	\$ 400.00	8			6	2	
Calculate Hydrographs	\$ 200.00	4			4		
Task 5 - Presentation							
Field Trip/Site Visits	\$ 13,500.00	250	50	50	50	50	50
Poster	\$ 330.00	8	2	6			
Presentation	\$ 760.00	16	8	8			
Total Labor Hours		382	66	83	101	82	50
Total Labor Cost	\$ 19,765.00		\$ 3,960.00	\$ 2,905.00	\$ 5,050.00	\$ 4,100.00	\$ 3,750.00