Table of Contents

List of Figures

List of Tables

Abstract

Trancoso is a small city in the state of Zacatecas, Mexico that has experienced flooding problems along the stream Barrio del Refugio. In recent years, the flooding, which starts at the road towards the western edge of town, has flooded nearby buildings to a height of over 5 ft. The residents of the area say the stream floods two to three times per year. Two upstream sub-basins contribute to this stream. Each year, runoff from the two upstream sub-basins results in flooding, mainly in the part of the town that is downstream from a major road. There is a large detention basin, located just west (upstream) of the city that was designed to hold runoff from major storm events. Prior to the completion of this study, the probable causes of the flooding were assumed to be: 1) the detention basin is too small to hold the runoff from its upstream basin, which allows water to pour over its spillway and contribute to the flooding downstream, and 2) the culverts that run under the road in the town are too small or in such poor condition that they cannot transport the needed amount of runoff.

This analysis, including the computer hydrologic and hydraulic modeling, as well as a recent site visit to Trancoso, found that the detention basin is in fact large enough to capture and hold all the runoff from the upper sub-basin for up to the 10 year storm and most of the runoff from the 25 and 50 year storms. Because the detention basin is large enough to hold all the runoff for up to a 10 year storm, the amount of runoff that reaches the town is a direct result of the rainfall on the two lower sub-basins at and above the town. The culverts were not specifically analyzed, but are not considered to be the major source of the flooding because the flooding does not start until after the culverts.

A recent site visit verified that the stream channel meant to contain the runoff from the storms is the main source of the flooding problem. The channel upstream from the road is extremely steep so the storm water runs off without any flooding. However, where the road crosses over the stream channel, the stream channel becomes extremely flat and even flows uphill in some areas. This causes the runoff in the channel to back up and eventual flooding of the surrounding homes and buildings occurs. Another problem with the stream channel is that it is not an actual defined channel – it is completely flat in some areas with the homes and buildings acting as the sides of the channel, and it is a very small, triangular, natural channel in other areas that is not even large enough to hold a 1 year storm. In collaboration with students from the University of Zacatecas, precipitation, digital elevation, soil type, and land use information was obtained and used to create a hydrologic model of the area. The detention basin was also incorporated into the model to see its effects on the amount of runoff from various storm events.

Using the values obtained by the modeling process, it was decided that either a storm drain system or a deeper, defined stream channel was needed to mitigate the flooding. Cost estimates of both solutions show that an equally effective channelization of the stream would be less expensive, easier to build, and easier to maintain than a storm drain system. HEC-1 was utilized to determine the amount of flow that reaches the outlet at the downstream edge of the town of Trancoso. This information, along with the stream cross sections, was entered into a HEC-RAS model to determine the dimensions of a

stream channel that would help solve the flooding problem. The proposed trapezoidal stream channel, designed to hold runoff from a 25 year storm without any flooding, is 5 meters wide at the top, 1 meter wide at the bottom, and 1 meter deep.

1. Introduction

Trancoso, a small city in the state of Zacatecas, Mexico has been experiencing flooding problems along the stream Barrio del Refugio. In recent years, the flooding, which starts at the road towards the western edge of town, has flooded nearby buildings to a height of over 5 ft. The residents of the area say the stream floods two to three times per year. Two upstream sub-basins contribute to this stream. Each year, runoff from the two upstream sub-basins results in flooding, mainly in the part of the town that is downstream from a major road. There is a large detention basin, located just west (upstream) of the city, that was designed to hold runoff from major storm events. Four BYU students, in conjunction with three students at the University of Zacatecas, conducted an analysis of the watershed to determine the peak flow entering the flooded area, and the depth of flooding from various design storms. After the analysis, the students at BYU engineered a system to mitigate the flooding hazard.

This document is divided into two main sections. The first section reports the methods and results of the watershed analysis. The second section outlines the designed solution for mitigation of the flooding. The completed plan set should be consulted for specifics. The second section also discusses the design process, including a description of the various engineering disciplines involved in the project and the realistic constraints that had to be met during the design process. Also included is a summary of design fees and a cost estimate for the construction of the flood mitigation system.

2. Watershed Analysis

2.1. Methods and Materials

The computer software tools used for modeling the problem included the Watershed Modeling System (WMS), Hydrologic Engineering Center – 1 (HEC-1), and Hydrologic Engineering Center – River Analysis System (HEC-RAS). Each program played an integral role in developing the final model. The basic outline for solving the problem involved delineating the watershed in WMS, calculating the runoff at the point where flooding begins using HEC-1, and finally, developing flood depths with HEC-RAS. The input data needed to run each of these programs was obtained and delivered electronically by the students in Zacatecas.

In order to delineate the watershed, the digital elevation map (DEM) was opened in WMS and an outlet was placed at the end of the flood zone. One of the objectives of the project was to make the model more accurate than previous attempts by including the effects of the detention basin above the city as well as the runoff from the main highway.

Because of the limitations of using a low resolution DEM, the delineated watershed had to be modified to meet these objectives. The effects of the highway were incorporated into the watershed by creating stream arcs that channeled the runoff to the existing culvert. To include the detention basin, a new outlet was placed at its location, creating a sub-basin in the upper portion of the watershed. An additional outlet was also created at the culvert where all the runoff crosses the highway. These outlets were needed to make the HEC-1 model work correctly. Figure 1 below displays the delineated watershed.

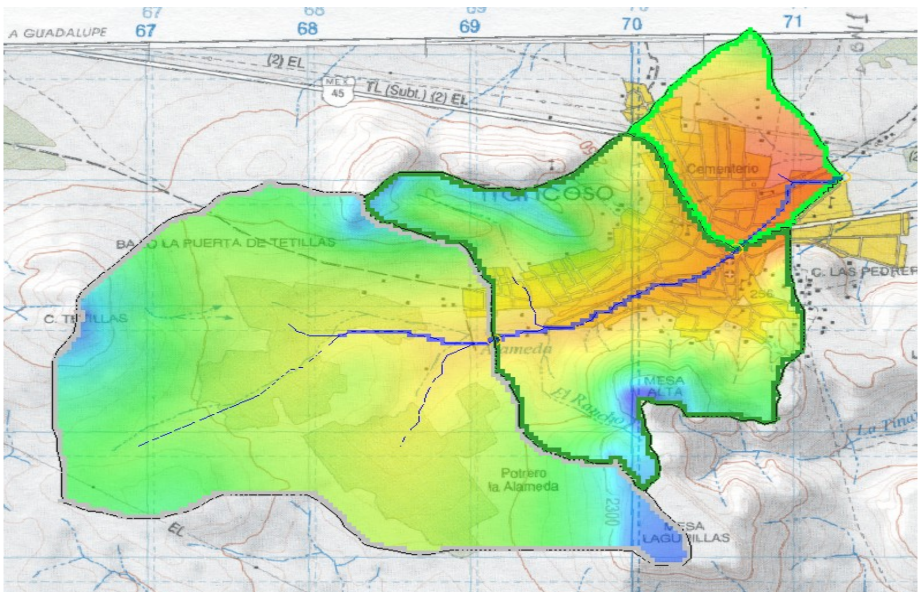

Figure 1. Delineated Watershed

Once the geographic parameters were set up in WMS, the information needed to run HEC-1 was added. Input parameters for HEC-1 include basin and precipitation data, loss methods, and a unit hydrograph. The basin data was derived from the delineated watershed created in WMS. The other parameters had to be calculated using more information obtained by the students in Zacatecas.

Historical precipitation records, including the maximum 24-hour storm per month for the past 56 years, were provided by the University of Zacatecas. All the maximum 24 hour storm precipitation data were organized lightest to heaviest and the 50 heaviest storms were used in the Weibull Formula to determine the approximate return periods (Reference 1). With this information, design storms for the 5, 10, 25, and 50 year storms were created for use in HEC-1 hydrologic model.

The loss method used was the SCS Curve Number Method. To create a composite curve number for each sub-basin, land use and soil type maps were georeferenced and digitized into the WMS model. Based on the descriptions of each different land use and soil type, individual curve numbers were assigned, and the total composite curve number was calculated (Reference 2). To include the detention basin in the model, the outlet point created at that location was converted to a reservoir. The dimensions of the reservoir were added to the point, and the runoff was routed based on the Muskingum Reservoir

Routing Method. With the data ready, HEC-1 was run, developing flow levels to be used in the HEC-RAS model (Reference 3).

The existing conditions model included surveyed cross-sections of the channel provided by the University of Zacatecas, and design flow rates from the HEC-1 hydrologic model. A Mannings 'n' value was used, which corresponds to a natural, dry stream. Due to the gradual longitudinal channel slope, normal depth was used as the downstream boundary condition. The parameters used in the HEC-RAS model are summarized in Table 1.

Table 1. HEC-RAS Parameters

Parameter	Value
Manning's 'n'	0.03
Downstream boundary condition	Normal depth
Flow regime	Steady
Geometry	Surveyed cross-sections
Input flows	From HEC-1 model

2.2. Results

Figure 2 shows the delineated watershed with significant features marked.

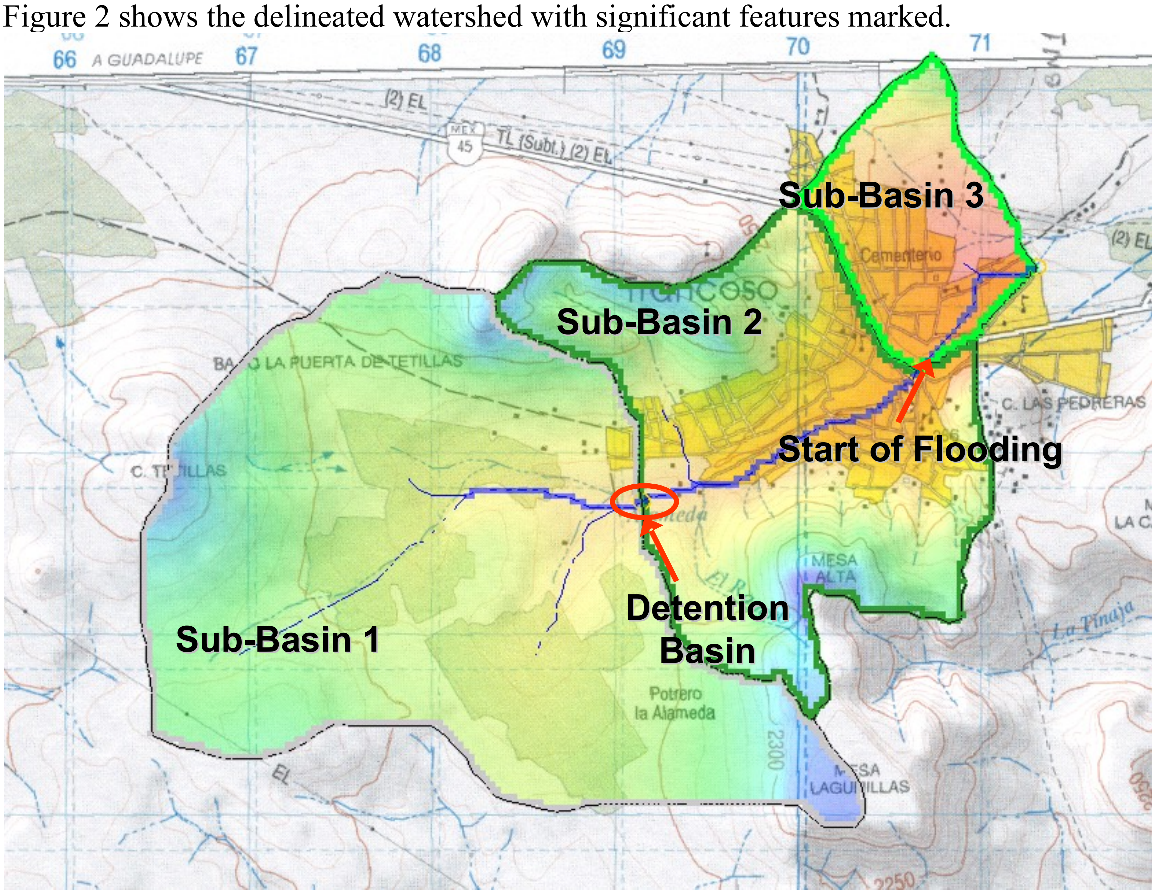

Figure 2. Delineated Watershed with Important Features

Table 2 lists the rainfall depths calculated from historic precipitation data. In addition, it lists the peak flow, time to peak, and flood water volume associated with each storm.

Table 2. Calculated Design Storms and Runoff Values

Return Period (years)	Precipitation (in)	Peak Flow (cfs)	Time to Peak (hours)	Volume (ac-ft)
50	2.70	247	13.0	94.7
25	2.54	212	13.0	71.9
10	2.37	177	13.0	49.9
5	2.15	135	13.0	39.8

The runoff hydrograph resulting from the HEC-1 analysis of the 50, 25, 10, and 5 year storms is shown in Figure 3.

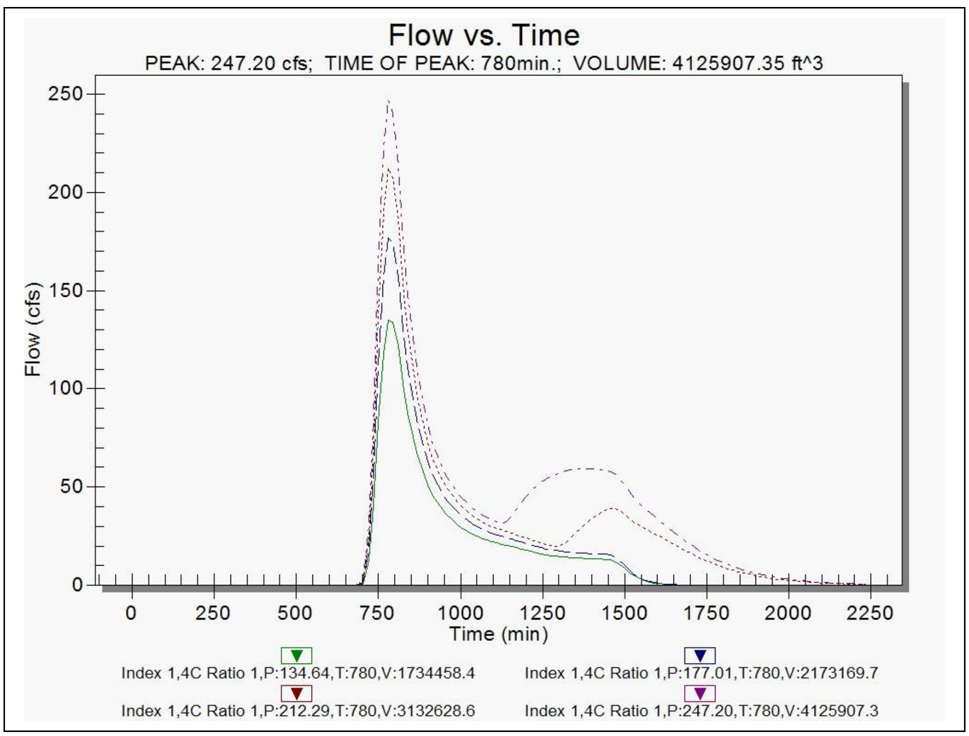

Figure 3. Runoff Hydrographs

Figure 4 shows the depth of flooding along the existing profile for the 25, 10, and 5-year storms.

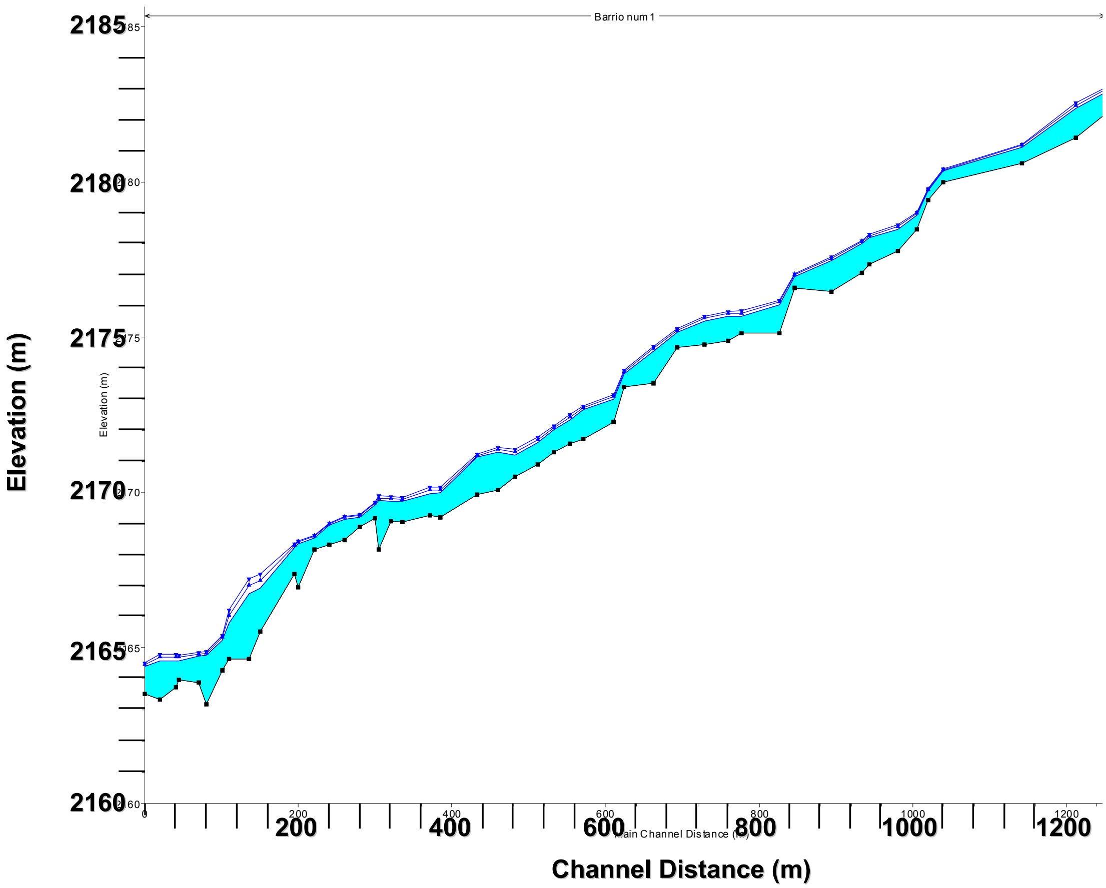

Figure 4. Hydraulic Model- Flood Depths

2.3 Discussion of Results

The rainfall depths given in Table 1 show that the flooding is not caused by excessive rainfall. As a comparison, Trancoso's 50 year storm (2.7 inches) is less than Provo's 25 year storm (2.8 inches). The flooding is caused by a combination of watershed shape, ground slope, land use, and soil type. The true source of the flooding can be inferred from the runoff hydrograph given in Figure 3. As seen, an initial peak flow occurs at 780 minutes. This represents the time of concentration for the watershed directly upstream of the inundated area. The second peak, which occurs between 1300 and 1500 minutes represents the water which spills over from the upstream detention basin. This second peak is much smaller that the first and is lagged sufficiently not to contribute to the peak flow. Therefore, the detention basin upstream of the inundation area is large enough for flood control purposes. The highest upstream basin, labeled Sub-Basin 1 in Figure 1, is not the cause of the flooding. Rather, runoff from Sub-Basin 2 causes the flooding.

The hydraulic model shows that the flooding is usually around 1 to 1.5 meters high, but it is as high as 2.5 meters in some places in the event of the 25 year storm. This is consistent with observations made by local residents. As shown in Figure 3, the water surface elevations are about 1/3 of a meter higher in the 25 storm than in the 5 year storm.

3. Project Management/ Design

3.1. Proposed Design

Before completing the watershed analysis, three possible designs were considered: an improved culvert, an improved outlet control for the existing detention basin above the community, and a defined storm drain channel. Upon completing the necessary analysis, the first two proposed designs were found to be unnecessary. The culvert and the detention basin outlet were both found to be in good condition; any repairs made on them would be superfluous and would not significantly help to mitigate the flooding problem. The third design, a defined storm drain channel, was selected as the preferred solution to substantially reduce the flooding.

After modeling the natural channel, various trapezoidal channel shapes were entered in HEC-RAS, and the best fitting, most economical channel was chosen. The channel was designed to contain the 25 year, 24 hour storm event. A wider channel section was also designed for vehicle crossings, but to be conservative, the additional channel capacity at the crossings was not incorporated into the HEC-RAS model. Due to limited funding for the project, the channel was designed to work with either an earth or concrete lining. A sample cross section is shown in Figure 5. The complete design can be found in the accompanying plan set.

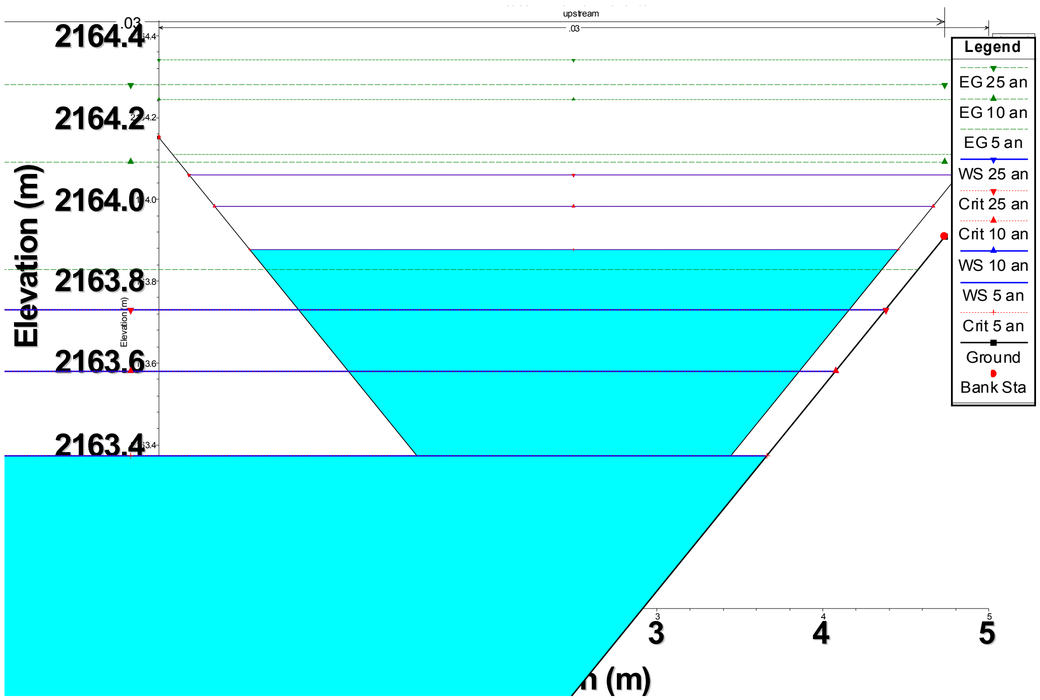

Figure 5. Proposed Channel Cross-Section

3.2. Design Constraints

This project included the following constraints which influenced the proposed solution:

1- Economic. The Mexican city of Trancoso does not have much funding for civil engineering projects. A more complete solution, including a second detention basin at the start of the flooding zone, was not feasible, because of the high cost of re-routing roads or removing buildings. Also, the channel was designed to be hydraulically effective with a significantly less-expensive earthen channel instead of a concrete-lined channel.

2- Social/Cultural. The homes on either side of the channel are in the 1-year floodplain. The most effective way to mitigate such a flooding problem would be to exercise eminent domain to buy the homes then relocate the residents. The homes are of low quality and are already badly damaged by reoccurring floods. This option, though logical, did not fit within the social/cultural constraints of Mexico. One Mexican government disaster responder explained that if the government relocated the people to new houses, the people would sell the new houses and move back to the old abandoned houses near the dry stream. For this reason, our design solution could not relocate a single home. This limited our channel width to 5 meters.

3.3. Engineering Disciplines

This project was principally a water resource project, which involved hydrologic modeling, reservoir routing, and 1-dimentional hydraulic flow modeling. The programs and methods used to accomplish this project are the same programs and methods used by water resources engineers world wide.

This project included a transportation element, in addition to the obvious water resources elements. While most of the existing channel is lined by houses, in a few places, dirt roads cross the stream. The proposed cross-section given in Figure 5 would be too steep to allow vehicles to cross. To overcome this problem, a second channel cross-section with more shallow side-slopes was designed for the dirt-road crossings.

3.4. Design Costs

In the written proposal for the Trancoso Watershed Model Project, the total number of project labor hours and cost was estimated for the task types necessary to complete this project: Project manager, clerical, WMS technician, HEC-RAS technician, and faculty member. Because all the members of the group are on the same basic skill level, all team members completed various tasks associated with each position, with the exception of the faculty member. Hourly compensation rates for the time to complete tasks in these various categories are: $60.00 for project manager, $35.00 for clerical, $50.00 for WMS technician, $50.00 for HEC-RAS technician, and $75.00 for the faculty member. The approximate number of hours proposed for each task type and what each would be paid as a result for completing the various tasks for the project, as well as the total proposed time and cost for the project, are shown in Table 3.

Table 3. Originally Proposed Design Fees

	Project Manager	Clerical	WMS Technician	HEC-RAS Technician	Faculty Member
	$ 60.00	$ 35.00	$ 50.00	$ 50.00	$ 75.00
Individual Labor Hours	66	83	101	82	50
Individual Labor Cost	$3,960.00	$2,905.00	$5,050.00	$4,100.00	$3,750.00

Total Project Labor Hours	382
Total Project Labor Cost	$19,765.00

Table 4 shows the breakdown of the hours per team member in association with each of the task types, the total amount each team member would be paid, according to the number of hours worked and types of tasks completed, the totals and costs for each task type, and the overall project labor time and cost.

Table 4. Actual Design Fees

	Project Manager	Clerical	WMS Technician	HEC-RAS Technician	CAD Technition	Faculty	Total Labor Hours per Person	Total Cost per Person
	$ 60.00	$ 35.00	$ 50.00	$ 50.00	$ 40.00	$ 75.00		
John Shelley	12	16.25	27.75	13.5			69.5	$ 3,351.25
Aaron Cook	14	20	17	9	9		69	$ 3,200.00
Lindsay Esplin	22	4	14	20.5	1		61.5	$ 3,225.00
Danielle Jeppson	20.5	14.5	16	12	1		64	$ 3,177.50
Jim Nelson						12	12	$ 900.00

Individual Labor Hours	68.50	54.75	74.75	55.00	11.00	12.00
Individual Labor Cost	$ 4,110.00	$ 1,916.25	$ 3,737.50	$ 2,750.00	$ 440.00	$ 900.00

Total Project Labor Hours	276
Total Project Labor Cost	$ 13,853.75

As can be seen by comparing Tables 3 and 4, there are a few differences from the proposed project costs and the actual project costs. A sixth task type was added: CAD technician to be paid $40.00 per hour. Even with this addition, the project finished under budget and in fewer hours than originally proposed. The time allotted for the faculty member as well as for the clerical, WMS technician and HEC-RAS technician task types was about 100 hours more than what was required to successfully complete the project. The actual project cost was about $6,000 under the proposed budget.

3.5. Construction Costs

The construction costs of this storm drain channel are shown in Table 5. This cost estimate used American prices, which assume American costs for construction labor. Because the cost of construction labor is significantly lower in Mexico, the overall construction cost will be lower as well. The construction costs associated with both a concrete and an earthen channel are shown in Table 5. Because of economic constraints, as mentioned previously, the earthen canal is more likely to be built.

Table 5. Construction Costs

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	Mobilization	1	LS	$ 1,000.00	$ 1,000.00
2	Survey	1	LS	$ 1,000.00	$ 1,000.00
3	Grading*	4100	LF	$ 22.00	$ 90,200.00
4	4" Concrete Lining*	7750	SY	$ 30.00	$ 232,500.00
5	Concrete Flatwork*	240	SY	$ 30.00	$ 7,200.00
				Total (with concrete)	$ 331,900.00
				Total (without concrete)	$ 92,200.00

3.6. Costs Summary

In summary, the total number of labor hours; and total project cost, including compensation for each group member and the channel design and construction costs are shown in the Table 6.

Table 6. Costs Summary

Total Design Hours	270
Total Design Fees	$ 13,853.75
Total Construction Costs (Earth Canal)	$ 92, 200.00
Total Project Cost	$ 106,053.75

4. Conclusion

This watershed analysis demonstrated that the flooding of the stream Barrio del Refugio in the Mexican city of Trancoso, Zacatecas is a result of the runoff from the basin immediately upstream of the area of inundation. The detention basin is sufficiently large to negate the effect of the upper-most basin on the flooding downstream. The flooding, as reported in the results section of this paper, was found to be up to 2.5 meters high during a 25 year storm.

The proposed solution to the flooding is a man-made canal capable of completely containing the runoff from the 25 year storm event. This channel was designed to fit within the physical and cultural framework of Trancoso, Mexico by being simple and relatively inexpensive to construct, by not requiring the relocation of any residents, and by allowing vehicle crossings to remain where they are currently located. Until such a flood control system is implemented, Trancoso will continue to experience flooding on a regular basis.

References

1. Return-period storms calculated using the Weibull method as described in *Hydrology: Water Quantity & Quality Control*, M. Wanielista, R. Kersten, R. Eaglin. 1997.

2. Curve Numbers from *Hydrology: Water Quantity & Quality Control*, M. Wanielista, R. Kersten, R. Eaglin. 1997.

3. HEC-RAS – Hydrologic Engineering Center – River Analysis System is hydraulic modeling software that can simulate natural or manmade channels. It is a one-dimensional model based on the energy equation that incorporates losses from friction and expansion/contraction. It can handle gradual or rapidly varied flow, as well as steady and unsteady conditions. Data inputs for a channel model fall under geometry or steady flow parameters. Geometry data includes stream cross sections, Manning's roughness values, and the location of banks and centerlines. The steady flow parameters include design flow rates, and hydraulic boundary conditions. The model outputs include water surface profiles, flow velocity, Froude number, and other hydraulic parameters.

APPENDIX

A.1. CD Contents

Folder	File Type	Contents	Description
CAD Files	.dwg	Channel Design	Final plan set
		PlanoTrancoso	Site Plan Data
		TrancosoHidraulico	Hydraulic Data
		TrancosoPlantaFinal	Final Plat Data
		TrancosoSecc	Channel Section Data
Cost Estimate	.xls	Engineer's Estimate	Rough Cost Estimate
Design Storm	.xls	Precipitation Data	Historic Rainfall Data
		Precipitation Worksheet	Design Flow Calcs
HEC-RAS Model	.xls	Cross Section Data	Channel Section Data
	.prj etc…	New	Existing HEC-RAS
		Design	Design HEC-RAS
Pictures	.jpeg	(Various)	Site Photos
Presentation	.ppt	Presentation	Spanish Version
Proposal	.doc	Trancoso Project Proposal	Final Proposal
		Appendix	Appendix
		ChangeOrder	Memo
		RFP Letter	Request for Proposal
		Deliverables	Memo
WMS Model	.wpr etc…	Trancoso_CN	WMS Files

A.2. Correspondence

Progress Report 1

Que tal, gracias por mandar su informacion. Estamos entusiasmados de estar trabajando con ustedes.

Ya hablamos con Alejandro concerniente empezando la modificacion del DEM para que incluya el arroyo, la carretera, y la presa. Podemos hacer todo esto utilizando WMS. Para ayudarles a conocer como se hace esto, vean las tutorias, volumen 2, capitulo 2. Todo el capitulo se trata de la modificacion de DEM's y tiene algunos ejemplos.

Para ayudarnos a nosotros a entender mejor el projecto y el area de estudio, esperamos que nos puedan mandar el DEM y la informacion topografica de la carretera, el arroyo, y la presa. Si el archivo con este informacion no esta demasiado grande, se lo peuden mandar por email. Sin embargo, si esta demasiado grande, lo pueden poner ("upload") en el sitio ftp anonimo: ftp.emrl.byu.edu

Yo no se explicar bien en espanol este proceso de ponerlo en el sitio ftp. Si no me entienden, ni en ingles abajo, no se vacilen en pedirme por una explicacion mejor.

Con este informacion, podremos ayudar con preguntas mas especificas que las tutorias tal vez no contestaran.

How is everybody doing? Thanks for sending your information. We are looking forward to working with you all.

We already talked with Alejandro about getting started with modifying the existing DEM so that it includes the river, road, and detention basin. All this can be done using WMS. If you need some initial ideas and help knowing how to do that, look in the tutorials, Volume 2, Chapter 2. It is all about modifying DEM's and has some examples you could look at.

To help us better understand the area and the project, we were hoping you could send us the DEM and the topographical (survey) information for the road, stream, and detention basin. If the file with this information is not too big, you could just email it to us. If the file is too big though, you could upload it to the anonymous ftp site: ftp.emrl.byu.edu

With this information, we will be able to help with more specific questions that the tutorials might not answer.

Progress Report 2

Que tal. Primero, para contestar su pregunta, no es dificil modificar el DEM con las secciones.

Nosotros seguimos trabajando con la informacion que nos han dado. Para que sepan, nos juntamos como grupo los lunes y miercoles. La mayoria del trabajo hacemos los miercoles. Lo que hicimos la semana pasada:

1. Practicamos delineando la cuenca con la salida donde el arroyo cruza la carretera, solo para mejor conocer el area.

2. Creamos un coverage de uso de suelo y tipo de suelo con las mapas que nos mandaron.

Tambien, tenemos algunas preguntas

1. Es posible que necesitamos ambos las secciones y niveles en cuanto a la topografia. El problema que tengo yo, es que creo que no entiendo bien que significan los dos tipos de informacion. Si pueden mandar una explicacion nos ayudaria. Abajo, explico exactamente que necesitamos en ingles. Tal vez esta nos ayudara.

2. Tambien, la informacion de los usos y tipos de suelo muestran donde hay tipos diferentes, pero no explican que son. Por ejemplo, los usos de suelo dicen AtpA, Pn-No, Me-Pn-No, pero no sabemos que significan estes simbolos. Pueden ustedes mandar informacion en cuanto a estos diferentes tipos y usos de suelo?

3. Tienen ustedes datos de precipitacion? O tal vez conocen una pagina del web que contiene este informacion?

Bueno, espero que me explico bien, pero temo que no. Tal vez pueden mejor entender el ingles abajo. Sentimos que el proyecto esta progresando bien.

Hey. First off, to answer your question, it is not very difficult to modify the DEM with the survey data.

We are working with the information that you sent us before. Just to let you know, our group meets Mondays and Wednesdays. We do the majority of our work on Wednesdays. This is what we got done last week:

1. We practiced delineating the watershed with the outlet where the stream crosses the road.

2. We made land use and soil type coverages, but with out attribute data.

Some questions we have:

1. I still don't think I understand exactly what you mean by niveles and secciones when refering to the survey data. What we need for the road is the exact location in like an autoCAD file that we can put over the DEM in WMS and change the stream paths to follow the road. For the stream, cross sections every 30 meters are needed. So elevation readings on each side of the stream, and at the bottom, every 30 meters. For the detention basin we just need the dimensions and location, because we don't have to put it into the DEM.

2. The land use and soil type maps have symbols that we don't understand, like AtpA, Pn-No, Me-Pn-No. Could you send us information that explains what each of these different land use and soil types are?

3. Do you have precipitation data? Or do you know of a website that has precipitation information?

Well, I hope I have explained everything well, but I am afraid I have not. We think the project is going well. Please email if anything is unclear or if you have new questions.

Progress Report 3

Bueno, primero, voy a intentar a contestar algunas de sus preguntas.

1. El lunes pasado, yo mande a Oscar Dzul la lista de informacion necesaria para integrar el almacenamiento. Tal vez el peude mandarles a ustedes este informacion. Si no, lo puedo mandar otra vez.

2. Si, recibimos los archivos de topografia de Trancoso. Tambien, ya encontramos la informacion del uso y tipo de suelo en la descripcion del proyecto.

Creo que tenemos toda la informacion necesaria, menos lo del almacenamiento.

Ahora, nosotros tenemos algunas preguntas nuevas:

1. ?Cual es la diferencia entre la elevacion del centro de canal y la del eje de apoyo? No sabemos que significa el eje de apoyo en las secciones.

2. Vea la segunda figura en la pagina del internet. ?Esta el arroyo del archivo de autoCAD en el lugar correcto? Si esta correcto, estamos listos a corregir el DEM.

Siguimos trabajando con las secciones para entregrarlas en WMS. Tambien, estamos estudiando como mejor entegrar el almacenamiento. Cuando mejor entendemos, lo explicaremos a ustedes. Mientras, pueden seguir utilizando las tutorias para aprender mas estos procesos.

En caunto a nuestro viaje a Zacatecas, tenemos algunas otras preguntas. Nuestro grupo esta responsible por organizar una cena con todos ustedes. Creo que el ano pasado cocinaron en un parque o algo, mientras que jugaron al futbol. Podemos hacer algo asi otra vez, o podemos ir a una restaurante. ?Cual prefieren ustedes? ?Nos peuden ayudar a organizar algo asi?

How's it going? We think we are making some progress. You can look at the website http://www.et.byu.edu/groups/cemexico/2007/Trancoso/ to see what we did this week.

Well, first I will try to answer some of your questions.

1. Last Monday, I sent the list of needed information for integrating the detention basin to Oscar Dzul. Maybe he could send it to you guys. If not, I can send it again.

2. We did receive the files with Trancoso topographic information. We also

found the information we needed for soil type and land use.

I think we have all the information we need except the detention basin.

Now, we have a few new questions:

1. What is the difference between the elevation “del centro de canal” and “del eje de apoyo”? We are not really sure what “eje de apoyo” found on the cross section dreawings means.

2. Look at the webpage. Is the stream from the autoCAD file in the right place. If it is correct, we can fix the DEM to match it.

We are still working on the cross sections, integrating them into WMS. We are also trying to learn more about integrating the detention basin. When we understand it better, we will try to explain it to you guys. In the mean time, you can keep using the tutorals to learn these processes.

Regarding our trip to Zacatecas, we have some other questions. Our group is responsible for organizing a dinner with you guys. I think that last year they did a barbeque in a park or something, while they played soccer. We could do something like that again, or go to a restaurant. Which would you prefer? Could you help us organize something like that?