Recreation of Gävle after the Second Fire

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by

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Abstract

In 1776, the City of Gävle was immersed in a blazing fire, almost the whole city burned down and buildings that managed to survived have either been demolished or replaced by another one. To provide an actual view of Gävle from 1800-century is difficult due to the three different fires. A three-dimensional visualization model presents the entire city between 1776-1815 as it might have appeared. Archival images and information was provided from Länsmuseet Gävleborg, Fogden, City library of Gävle and the City Archive. The three-dimensional model of the entire city is presented in a QuickTime movie format for viewing.

Keywords: Länsmuseet Gävleborg, Gävle, City library of Gävle, City Archive, Second fire, Recreation, 1776-1815, 3D model
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1 Introduction

For a long time, Gävle was a small town with limited merchant shipping. This was due to the restrictions placed on the merchant ships. The reason for this was to strengthen the capital city as an important foreign trade city. Not until 1900-century did things start to change and the city grew. At this point, the small city of Gävle would have been immersed by fire three times, 1569, 1776, and 1869. The inhabitants were mostly farmers and like everyone else they lived in houses made of wood, which was a common material used to make buildings at this time period.

The advantages of using wood were many. Not only did it cost less, it was also an easy material to work with as well as to obtain or replace. On the other hand, it burns easily and with the help of the wind fire could spread from one building to another erasing everything in its path leaving hundreds and even thousands homeless. Each time a fire spread only a few buildings survived including the church, Heliga Trefaldighetskyrkan, the castle and a couple of houses thanks to their location.

A great deal was lost during this time, which included almost all of the buildings and countless objects as well. To obtain an actual picture of Gävle as it looked before 1800-century is difficult to trace today, it is perhaps even impossible. The few blueprints that survived the fire were stored at the Gävle city archive.

An attempt to recreate the town as it looked during the 1800-century has been made earlier. It was a simple camera rotation over the city with buildings taken from mid 1900-century. All of the buildings were represented by simple squares and rectangles. The whole animation was made in a three-dimensional (3D) program. Because of the simplicity there were no elaborate details created such as roofs, windows, doors, etc.

The idea from the beginning of the first project is to recreate only a small part of the town. I will attempt to go one step further and create individual buildings and combine these into the city of Gävle as it looked between 1776 and 1815. As far as I know, nothing in Gävle has ever been created to this scale before; therefore it will also hold both education and historical value. The main question at this point will of course be is this even possible to accomplish? Is there enough information to recreate a city from the end of 1800-century? Something would have to be preserved in order to assist me in this project. The best result would be achieved by obtaining real blueprints; however I suppose that I will have to utilize different illustrations from books and/or individuals that address to on this subject. Remember, the camera was not invented yet during this time period. This will tremendously slow down the progress in finding factual information for modelling the different buildings.

By the end of my research period, I will have a three-dimensional model with realistic textures maps of Gävle as it looked at the end of 1800-century. Everything will be presented by short movie clips which will display the town more in detail, when zooming into the town. I will also create one long clip with less concentration on the details but better view over the entire city.
2 Theoretical Background

As I mentioned before, a short movie clip has been made before, but it was mostly from high above with zoom in on specific section of the town. I am unsure on this research due to the information I have obtained on the movie clip from another source. Evidently, it was made in a few days to show how a 3D model of Gävle could appear. This would explain the flaws that I found on a couple of the buildings. Due to its simplicity and faults this movie clip will not be used a reference or for any kind of help. However, it would provide the viewer a nice but slightly incorrect picture of the 1800-century Gävle.

Why the project did not continue I do not know, neither have I been able to obtain more information on it. All I know is that no further attempt has been made to recreate the city of Gävle. Therefore, I will be the first to do a recreation not only of the city but with additional details as well. The major problem will of course be to obtain information on the buildings. I am concerned that many of the building will have to be duplicated to replace the lack of historical information.

3 Method

To obtain the information needed for this project, some research will have to be investigated at the end of 1800-century. That can be accomplished in the library, Gävle stadsbibliotek, which I hope will provide me with books and information about this timeframe or even illustrations that will show me some kind of picture of how it looked in the late 1800-century.

The museum has to be visited as well, Länsmuseet Gävleborg. The idea for this came when I read about a presentation on Gävle, “Gävle 1800-century to today.” Two things hold me back from visiting this presentation, a fee of 500sek and the wrong timeframe. Even though my time stretches as far as 1815, I am fairly sure this would not help me much in my research. There is also a place called, “[8] Fogden,” it is a part of the “[9] Länsmuseet Gävleborg” but has only information on Gästrikland. It is also here that my supervisor has his office.

The last place to visit will be the city archive, “[7] Gävle Stadsarkiv”. According to my advisor, there is a high possibility to find blueprints and maps here from my timeframe. Otherwise, it might be a valuable place for information that I will require to proceed with my modelling.

The Internet might have some information on specific buildings and colour/material but I will rely more on my advisor and go to him if the internet proves to be insufficient.

The software program that will be used for the creation of the three-dimensional models and scene is Alias Maya when starting this research project. However, they are now called Autodesk Maya. I will work in polygons, because I believe that it will speed up the workflow. All buildings will be modelled, saved with a building number as a separate file, when completed all of the buildings will be imported to one scene. At this point, I will texture, colorize and render them as one or several short movie clips.
4  Realization

After accepting this assignment, I contacted my supervisor and we met the following day at his office. We discussed this assignment, talk about what he expected and if it would be possible to create this model. Not knowing much about 3D, I explained to him the time it would take to create the different buildings and the different results that could be obtained, low polygon and high polygon.

I myself had no previous concept of the 1800-century buildings and had a quick lesson of that time period, when viewing pictures of the buildings that I was to create. The books which I started to model from were the books “[2] Ur Gävle Stads Historia” and “[1] Gävle Stadsbild.” The first one [1] even had a number of some pictures of several blueprints from the end of 1800-century. These buildings were very simple which were one or two floor houses without any actual details.

I was also provided with a map. The only problem with this was that the map was from 1706. This did not help for I was to create the end of 1800-century, which was not the correct time period that I needed to create from.

Going through the books, I noticed that the pictures of the blueprints only had a top and front view. Of course, it is easy to place doors and windows, however, a number of more complex buildings would be difficult, especially when it came to the roof tops. We jointly decided that I should create what I could with the difficult rooftops, as well as other parts that were not shown on the blueprints. Simply recreate the models of the buildings as realistic as possible. My advisor told me to begin modelling with the church and its surrounding houses. As a result, this was the major section of the city that he wanted most to be created.

Heading back to the modelling, I remembered an old barn in the district “Brynäs.” It had been there since the end of 1900-century and might come in hand to use for creating textures, especially the doors and windows. To my disappointment the barn had been renovated, the lower half of it was new wood and at the moment the barn was not dark-brown but a mixture of brown and white, new and old wood. Some of the windows were not renovated, like the one on the second floor. These I had photographed for later use. The roof was to no use due to the exchange of a metal roof.

With this information, it was time to start modelling. I started the project with something easy to test what would be the best and fastest method to create a building. As time passed, I learned more and more and could work with more time consuming buildings than before. Each building had a creation time from fifteen minutes to about two hours. This only included the modelling part on small buildings.

By using a scanner, I copied perfect pictures to model the buildings from the time period needed and for some time everything seemed fine. All pictures were taken from “[2] Ur Gävle Stads Historia,” which I found more useful than the other book, “[1] Gävle Stadsbild,” because it only held illustrations.
A few days later after completing a couple of houses, I decided to pay a visit at the museum and Gävle stadsbibliotek. At the museum, I was told the earliest information about Gävle they had was from mid 1900-century and they redirected me to Fogden, where my supervisor had his office.

Shortly after that, I headed over to the library. Neither did I find much information there. And the books that were of added interest I had already borrowed from my supervisor.

While I was downtown, I might as well pay a visit to the city archive. Unknowing what I would find there, this trip would provide even more valuable information than all the earlier information I had received thus far.

The people at the archive were very kind and guided me through how to locate each building by using two different maps, one map from around 1850 and the other from 1747. Both maps were divided in different areas, each with its own number which represented a folder that could be found in a steel cupboard. The maps produced another idea that I could use them for the placement of the models in the future on this project.

This research would become one of the most time consuming element of the project. These folders hold the original blueprints back to around the end of 1800-century. Unfortunately, most of the blueprints were from around 1840 or newer. My main area, also called “district two,” was the most important section where the work started by going through all of these folders. After finding a few buildings from the correct time frame, I noticed that all these blueprints had one thing in common. The method from which they were created was from painted buildings on colored paper.

Finding this information sped up the process a great deal now that I only had to open a folder and looked at it once to view if it were from the correct time or not. Having found about fifteen folders, it was time to take digital pictures of the blueprints. The camera I had only had a 64Mb memory card, therefore I had to be careful not to take any unnecessary pictures. I also saved taking pictures and blueprints of the church for another day for I had enough images to work from for some time. To know what picture belonged to which number on the map, I wrote down a numbered list followed by the number of the house. From this, I could just take picture by picture and knew exactly what number it was for easy placement in the future.

With my camera loaded with blueprints, every house number written down and each folder put back at its original place, it was time to transfer the pictures to the computer and continue with the modelling of the buildings. Many of the pictures were ready to use right from the start, however some of them needed a little work in Photoshop for they were not a satisfactory quality for modelling. I tried to take the pictures by standing straight in front of them. Depending on where I stood and the size of the blueprints, some of them needed to be corrected. The adjustment took little time, using the perspective tool to make some lines that were bent more straight. After this correction was finished the pictures were now ready to use for modelling.

The next time I returned to the archive, I went through “district one,” which was everything south of Gavleån. I also spent a certain amount of time to gather information about the church from district two. To my disappointment, I was redirected to a place called “[10] Kyrkans hus” due to the lack of information and blueprints.
The blueprints were more likely to be stored there. Due to the heavy influence the church had for many hundreds of years, they did not need any permission to construct a church in a specific location. Therefore they kept all the blueprints by themselves.

When I arrived, I did not have any problems finding people who were in charge of the storage of the blueprints. They were more than glad to narrate the historical information about the church. To my disappointment, I found out that the side, back and front-views did not exist anymore, however, the church had been looking the same way since the end of 1800-century. Speaking of the views, the only side-view I had ever seen is from “[2] Ur Gävle Stads Historia,” where there were only two pictures of a proposal for a rebuilding. It was a black and white picture that I could use in the future for the modelling segment. Having received a copy of the top view, all I needed to do then was to take pictures of the church and model from them. I also learned that the church was modified several times, due to the fact it was close to falling apart. The last add-on to the church was made somewhere between 1750 and 1780, which was the small house on the left side.

I was aware my 64MB memory card would not be much help when it came to taking reference pictures, therefore I spoke with a friend of mine, Tobias. He was nice enough to take all of the necessary pictures for me. Altogether, there were about 100 reference pictures.

4.1 Heliga Trefaldighetskyrkan

The modelling of the church was rather tricky due to the two different pictures that I was using. This was the first large model to create. There were many extra details added which were extremely time consuming to create. With this mistake, I have learned not to go so extensive when it comes to the details due to their low visibility from far away. When looking at the church, it seems to be made up of simple geometric forms. Information that I did not know at this point was that the church had several flaws, such as a tilt tower for example. It was no wonder that things were not making any sense when I tried to model them. Other than that, everything went on smoothly.

The texture for the roof was made with a modified picture from the Internet. The windows and doors were from my reference pictures taken earlier. The color was similar to the one today according to the people at the Kyrkans Hus. Below are pictures of the finished result. The first picture [Figure 1.1] shows the church from the front and the second [Figure 1.2] from the side.
4.2 Berggrenska Gården

This was an interesting building to create, not only for all the blueprints that were available but also for the details that came with them. Being the largest folder among the others at the city archive, this building has been changed about four times. Last time was during the 2000-century. In the big fire in 1869, if the legend is believable, the building was saved by all the people in the town who worked there by pouring water on the building, keeping it from catching on fire. If this legend was true or not no one knows.

Anyhow, this was the earliest blueprint on the building. It is from 1811, which was truly a piece of art, especially, if compared with the other blueprints from this time period. The level of detail was very high and the building was drawn from every view except the back. If only all the blueprints were similar to this one. Below are two pictures of a small section from the blueprint. The first one [Figure 2.1] is a side and front view and the second [Figure 2.2] shows the details on the portal of the main entrance. The finished result can be seen in picture [Figure 2.3] and [Figure 2.4].

![Figure 2.1. Bergrenska Gården 1811, side and front view.](image)
Figure 2.2. Bergrenska Gården 1811, main entrance, detail close-up

Figure 2.3. Bergrenska-gården, finished model  
Figure 2.4. Bergrenska-gården, finished model
4.3 The Castle

I returned to the [?] archive once again to go through district three. I also took the chance to ask about blueprints for the castle. Of course, I did not receive any and instead was redirected to the central archive in Stockholm. I also received a small text taken from the Internet and printed out by a worker there. This was of great help because it held a brief history of the castle and according to the text the castle was renovated in 1988-1990 and restored, at least in colors to its original appearance as it had been in the 1800-century. This was great news for now I could use the blueprints from early 2000-century. The castle had also three small buildings beside it which was no problem to create due to their simple construction. The building of the original castle begun in 1583 and was finished in 1597. It had four towers and looked something like the picture below [Figure 3.1].

![Figure 3. Castle of Gävle, 1600-century](image)

A fire broke out in 1727 at the castle and the renovation first begun in 1741. In 1754, the castle stood ready and had the same appearance as it has today. Last time it was renovated was 1988-1990, when it was restored to its colors from 1800-century.

It is a shame the original castle was not rebuilt for I have always seen castles as huge expensive buildings fit for kings and queens, a lot of sculptures and other details. They were always the one to stand out from the crowd, the crown of a city, not a white and yellow box shaped building that blends in pretty much with the surroundings.

With this model, I decided to try something different. The previous larger constructions were time consuming due to the level of detail, which did only show up close. And there were no intentions to show them up close from the start. This time I would only create the larger things that would be noticeable from further away.

For being a castle, it was pretty easy to create a model of it, probably due to its square shape and lack of any hard to do details. I found out that the windows that stick out from the roof were added later. The 1800-century castle only had one window sticking out on each side. The hardest part for this model must have been the texture for the roof. Being a more luxury building, the castle had a metal roof, which was pretty expensive at the 1800-century. The finished result can be seen below in picture [Figure 3.2].
4.4 Town City Hall

The town city hall [Figure 4.1] was just as easy to model as the castle, perhaps a little more time consuming due to the windows on the ground floor. Similar to the castle, the city hall had a metal roof. I noticed at once this was an important building, not only because of its metal roof and more advance architecture but by the style the blueprints were presented. All together about ten blueprints were arranged similar to a book with a skin cover. The first page held King Gustav III autograph and approval to construct this building.
4.5 Other buildings

After creating the buildings for district three, the town city hall, and the castle, I returned to the archive once more to continue on district four. This was the last district. Working on this district, I realized that many details that I had been working with so far were of no use, especially, the church.

4.5.1 Järnvågen

This was a building that served as scale, actually for merchant ships and merchants who wanted to sell their iron. Here they could weigh their iron to sell later. All together Gävle had four of these structures. The location of the first was unknown but it was mentioned in a letter from 1585. This model [Figure 5.1] was from 1774 and was placed east of what today is the railway station. The last “Järnvåg” was shut down in 1885.

![Figure 5.1. Järnvågen](image)
4.5.2 Residences

These, mostly one floor houses, were the easiest to create but still took most of the modelling time because of their numbers. This was understandable due to these building or houses made up most of the city. During this time period, every house had its own field to grow vegetables or similar. There were no hard to do details and the finished result of a couple of building can be seen in picture [Figure 6.1], [Figure 6.2] and [Figure 6.3].
4.5.3 Sheds

Since they were not as important as the rest of the buildings, I had quite a lot of freedom when creating these sheds. These small buildings were placed out along the canal. More of them exists on the min 1800-century map and my guess is that after the fire in 1776 they moved them out of the town and put them on the east side of the city.

After a quick search on the Internet, I found a black and white picture of two sheds, one smaller and one bigger. They would be adequate enough and having two different sheds would provide some variation. I also came to use the window texture from the old barn from the district “Brynäs.” It produces a nice appearance but perhaps it is a little too dark. The final models can be seen in the picture below [Figure 7.1].

![Figure 7.1. Sheds](image)

Thus far everything was looking satisfactory but what I forgot was to look at height. When placed out on the map, these small sheds suddenly became very large in comparison with the residences. This had to be changed.

Of course, bigger and smaller sheds exists but having so many of this kind looked terrible. All I could think of at this point was a third shed, a really small one to make the houses that people lived in look big again. Going through some pictures on the internet, I found one [7.2]. This would be a perfect contrast to the other sheds. This one even came from the harbor of Gävle and belonged to a company called Baggarevarvet which was a shipyard company.

![Figure 7.2. Shred](image)
5  Assembly of the buildings

Having done over 50 unique buildings, it was time to put them in place, texture and colorize them. As I mentioned earlier, the demand was not to texture the buildings, however now that I knew I would have some time at least I wanted to create some textures for the roof tops.

For the texturing/colorizing part, I obtained the help from “[6] Martin Åhrén”. He is a color specialist and knows a great deal about 1800-century colors, roof tops, materials ect. For one thing, some colors were more expensive than others and its most likely Falu rödfärg was the most common color to paint a house. In some cases only the side that was visible from the street was painted and the back was often left colorless. It seemed I would make a pretty exclusive picture of Gävle and I would be able to color all of the houses.

Before I could texture and colorize the buildings, I had to place them in their location. For that, I used a map from 1850 which I modified by removing things that were build after 1815, such as the prison, a small church in district four, a bathhouse, the theatre, a school, and of course the railway and its surrounding buildings which was replaced with 1747-years map fields.

After the modification was complete, I started to place the buildings district by district. Of course, I had to resize all of the buildings to fit the map and most important, to make them look realistic in size.

I am sorry that I left all the texturing/colorizing to the end of the project. A smarter and quicker method would have been to create the textures directly after the buildings were completely modelled, which is a mistake that I will not repeat in the future. I regret this because some of the buildings did not show correct inside Maya which made them harder to texture and colorize.

This was a time consuming task and it was at this point that I saw how much was actually missing, and it was a lot. As I was explaining on my last meeting with my advisor, it was most likely that there were simple one-floor houses at this time where the buildings that I placed on the missing parts were probably small houses.

I also added a couple of things such as the river, the streets, and the fields. This was created because I found modelling these elements look better than the original one did. Besides, when creating something this size, why not go all the way?

The project deadline was nearing and it was time for some lights to lighten up the whole scene. For this step, I used a mixture of different lights, mostly directional lights. I had some problems with some areas getting brighter than others but I found a solution by modifying the light strength. Even though I wish that I had a more realistic light, I did not have time to work on this part.

The whole scene is rendered out in several small clips and one large, mainly to show both the entire city from above and also get a feeling of walking among the buildings.
6 Result Discussion

The result is a 3D model of Gävle between 1776 and 1815. Compared to the previous movie clip, this one has more details in from of windows, doors, textured roofs and many more items. It has also a realistic size of each building. Adding lights and a background to the scene has given it a better look and the river, fields, and streets gave the idea of a complete 3D scene.

Even though, I know it is not 100% accurate at least it provides an assumption of how it might have looked during the time period.

The method used for this research thesis and creation is perhaps not flawless but according to me, very good. The city archive held a great deal of information, everything from maps to blueprints ect. and therefore I spent most of my research time here. On the internet, I did find some information but mostly historical dates and times. In one way or another, it has been helpful but most of the information I had already received through “[7] Gävle Stadsarkiv” or my supervisor [5] Bo and colour/material specialist [6] Martin.

At the beginning the city would come to look very basic with only colours added to it and no textures, there was no plan of streets, the river or all the fields. The result I received was not the one I had expected. It exceeded not only mine but also my supervisors.
7 Conclusions

When I start with this project I knew it would be big, but I never imagined something this size. Things that I though was simple to create took longer time than expected, and mistakes have been made but hopefully will not be repeated. Usually, I blame bad planning in the beginning for doing things in haste at the end but not this time. I followed the request as well as I could and even added models of my own.

Something lost so long ago has been reborn in form of 3D, how it looked exactly we will never be sure but at least this 3D model will give everyone a better picture of how small and simple this town was. As the end of this project came closer and closer, I started to see what mistakes have been made and what should have been made better.

As I mentioned earlier the whole idea was to use simple coloured models placed on a map. As time passed, more have been added, the streets, the river, and all the fields. The main thing that I regret is the lack of textures on the side of the walls, which would have added a lot to the project or even better texture on the whole model. It was an idea that I had in the beginning and should have stayed with but instead I choose quantity before quality.

Creating something of this size is a lot of work and a second person would have been tremendous help, one to create the models and the second to do the textures. Not only would it have sped up the production but also increase the quality of the model. Anyone that would wish to create something as large as this project or even perhaps do an update, try to work together with someone else.

When it comes to the research, the books I used were not much help as I mentioned earlier. And most of my information, when it came to the models, came from Gävle Stadsarkiv and textures/colours from my advisor and Martin.

I do not regret taking this assignment even though it became huge in the end. It has been instructive and for me a great deal when in comes to creating models of this size.
8 References

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People


Places

[8] Fogden, part of Gävle museum
[9] Länsmuseet Gävleborg, museum of Gävle
Appendix