

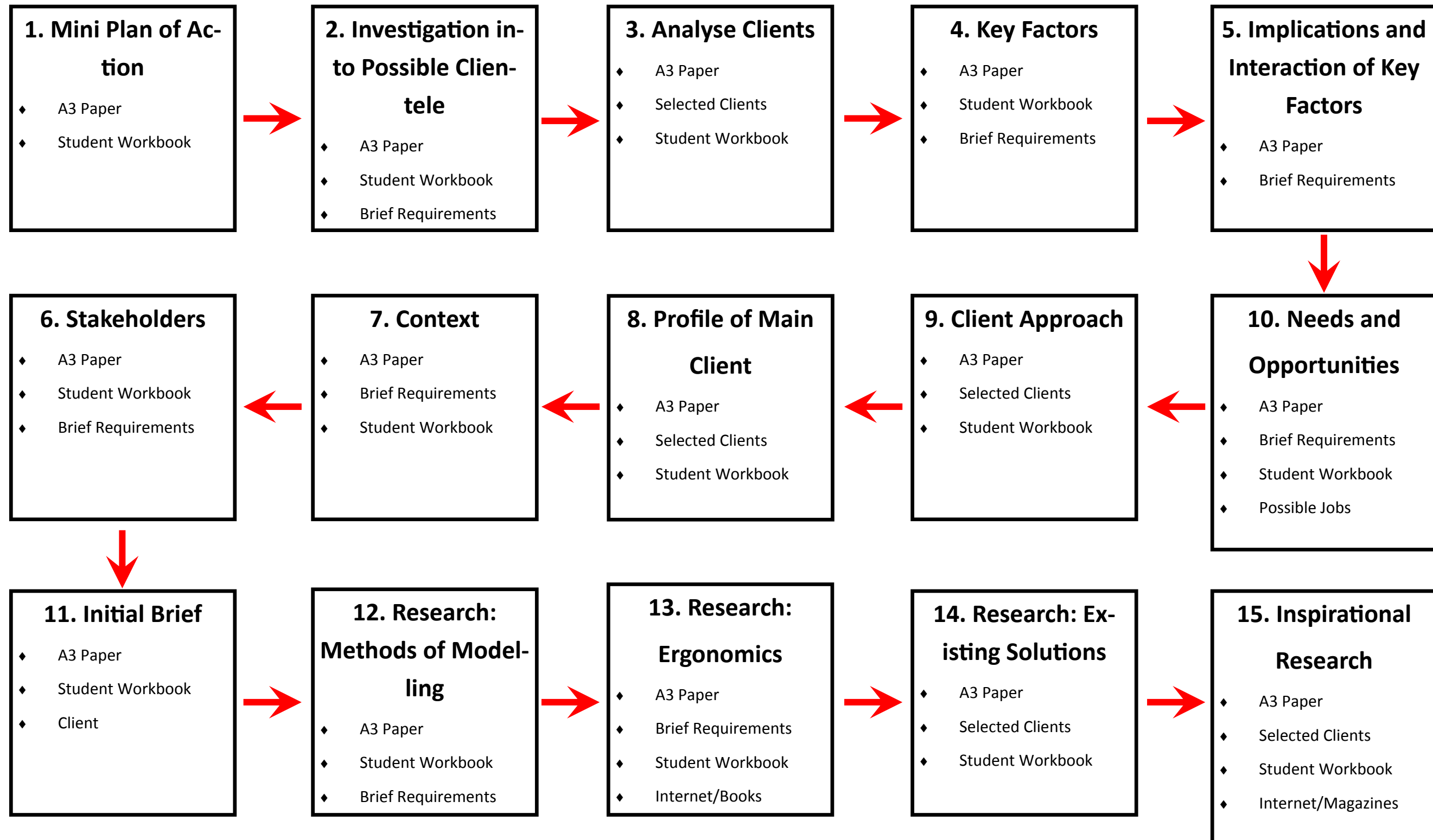
Materials Technology

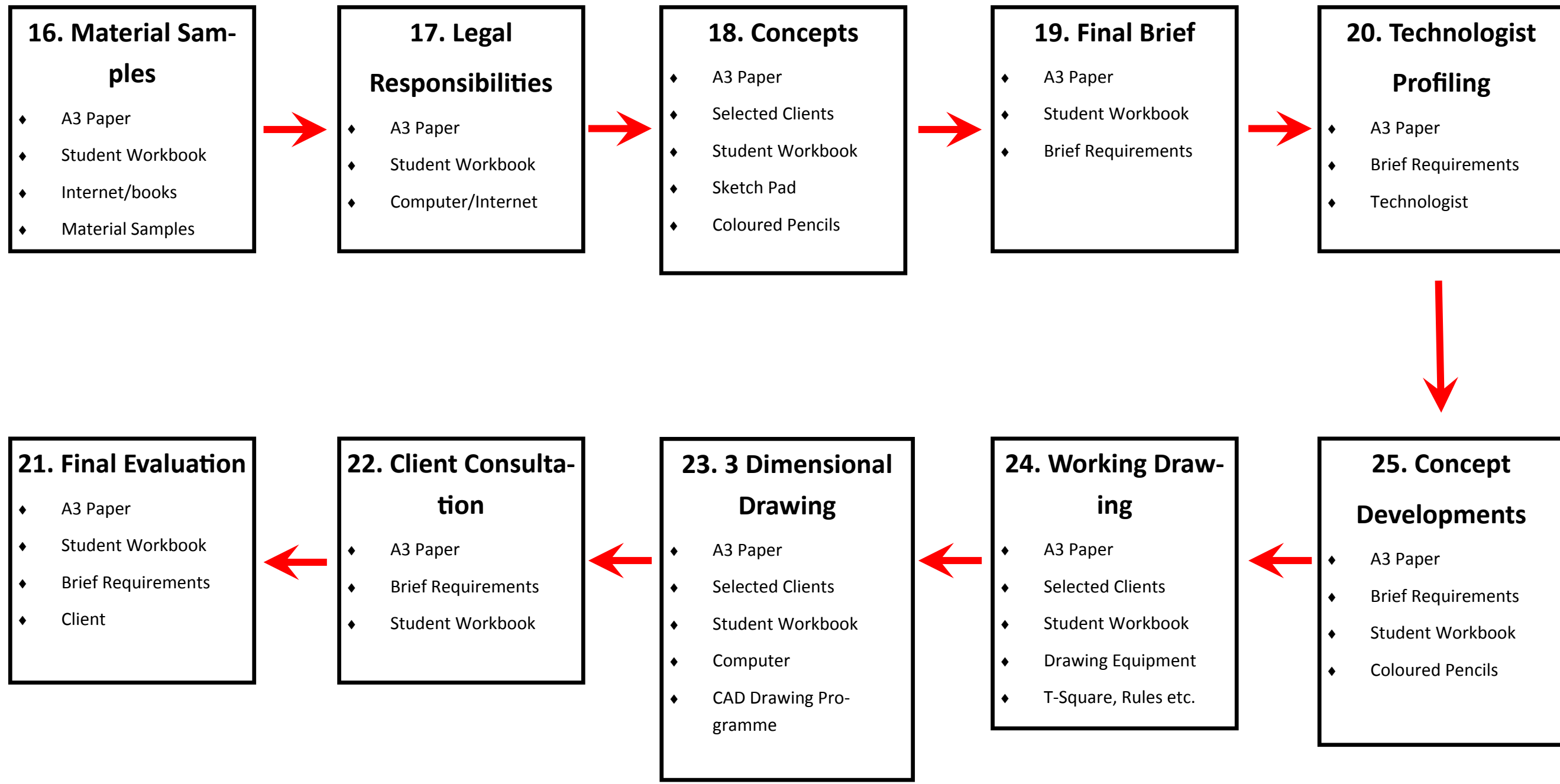
Trent Summers

NSN: 133 009 621

Achievement Standard 3.1

Mini Plan of Action:





Investigation into Possible Clients:



Analyse Clientelle:

Farmers

- ◆ Effluent Management
- ◆ Fencing
- ◆ Irrigation
- ◆ Machinery Modification

Community Church

- ◆ Seating
- ◆ Podium/Lectern
- ◆ Stage
- ◆ Signage

Hauraki District Council

- ◆ Signage
- ◆ Fencing
- ◆ Pest Control
- ◆ Park Development

*Opportunities Within
Each Area of Study*

Cafés

- ◆ Signage
- ◆ Breakfast Bars
- ◆ Food Prep Areas
- ◆ Storage

Waitakaruru Play Centre

- ◆ Playground Equipment
- ◆ Tables
- ◆ Work Benches

Thames Valley Hockey

Association

- ◆ Grandstand Seating
- ◆ Watering System
- ◆ Score Board
- ◆ Display Cabinet

Prioritised Key Factors:

- 1) **Client:** *The client plays a huge role in the project that I am doing. It is important for me to select the right client to ensure the project that this person has lines up with my unit of work to ensure that I can get the most out of the issue that he/she has. The client will provide will provide me with a design brief which I will work to and consultation with the client will form the basis of my folio. With this in mind, I have select client as the most important Key Factor in relation to my work.*
- 2) **Time:** *The due date for this unit of work is the end of Term 3. This means that I will be restricted with the projects that I can and can't do. Projects that I would generally leap at may have to be reconsidered due to the commitment of time that they will require. I also have commitments to other subjects which require a lot of time devoted to study towards external examinations at the end of the year. Being Head Boy for 2011 will also take up a lot of my time as I will be out in the community representing the school on a number of occasions as well as organising school events and the leadership team. Outside of school I am very involved in my hockey playing for a number of different teams which mean time spent towards trainings, fitness sessions and games. This busy schedule means I will be restricted in terms of the amount of time that I can spend on my technology studies. With this in mind, I have place time as the second most important key factor as it has the potential to play a major role on the project I eventually choose to do and could be the difference between finishing or not finishing before my deadline.*
- 3) **Budget:** *The client will set a budget that I will be required to work to when designing a solution to their design brief. This has the ability to limit my work significantly as a low budget will restrict the final outcome, forcing me to be more conservative in the designing process when deciding on materials, shapes and forms in order to reduce the cost of the final product. On the other hand, a large budget will provide me with freedom to be more creative in the designing process and allow me to use more elegant materials and designs that a lower budget would not be able to cater for. This illustrates the importance of budget to my unit of work which is why I have elected to position this Key Factor as the third most important in my list.*
- 4) **Materials:** *The materials required for the design solution are essential in terms of providing the right visual communication. Texture, colour, transparency, shininess, line, movement and flow are all aesthetics that combine together to ensure a great design. Materials are an important aspect in this concept and it is important, when selecting my materials that I keep this in mind. I also need to ensure that when selecting my materials I avoid defects or imperfections in the materials. These tend to be unsightly and could also impose major structural threats as the defect could weaken the overall strength of the final product. This is why I have chosen to situate materials as my fourth-most important Key Factor.*
- 5) **Environment:** *The intended environment of the product is of huge importance. Aspects such as the degree of weather exposure and the surrounding environment both have significant roles in terms of the designing process. For instance, It is important for me to ensure that the design matches the surrounding environment of which it is intending to go in. If the design is exposed to the elements then measures will need to be taken to ensure durability under thee conditions to ensure structural safety and also durability or appearance, i.e. rusting of metal or fading of natural timbers and paints.*
- 6) **Safety:** *Safety, as always, remains a hugely important factor in any society. Safety will apply to a number of aspects of my work both to myself and others around me. As the manufacturer of a product I will need to ensure that the solution is safe for general use and meets the basic requirements of construction so that no one is hurt or injured during the use of my product. I also have a responsibility to keep myself safe during the construction process. I may be required to use machinery in order to construct my solution so I need to ensure that I wear the correct and appropriate safety equipment and take all the necessary precautions to ensure that I keep myself and others around me safe during this process. Depending on the nature of my brief there may be specific legislation relating to the safety aspects of my solution. It is my responsibility to research these requirements and ensure that my product fulfils these criteria to ensure safe and enjoyable use of the final product.*
- 7) **Skills:** *The skills I have already will have a significant impact on the project that I select. I need to be confident within the area that the clients brief falls within to ensure that I can produce what he/she is asking of me. A lack of skills and experience within a certain area will result in a lot of time lost because I don't know what to do or I have to relearn basic techniques specific to that area. Skill levels could also affect the overall finish of the design. The client will be expecting a high quality, professionally made product at the end of the project. It is my responsibility that I learn all the necessary skills to ensure that I can make this possible.*
- 8) **Legal Requirements:** *Materials Technology generally involves projects that are specifically made for other people. Depending on the type of project there may be some aspects of legislation that the final project will have to comply to. For instance, Council Bylaws vary between districts. My project could be affected by this legislation and it could prevent me from progressing the brief further. Before a project is commence I will have to ensure that there is no significant aspect of the law that could interfere with progress of the brief further down the track.*
- 9) **Resources:** *There may be some instances where the client requires something within the brief that may not possible for me to produce. In particular, materials could be significant within this aspect as materials such as metals and glass require different work spaces than wood. I will need to first look at the resources I have to determine which briefs are possible and which cannot be done due to the lack of resources I have specific to that brief.*
- 10) **Researching:** *Researching plays an integral part of this achievement standard and the project that I decide to do. As this project includes both construction and design I will be required to research throughout the entire portfolio, however even more so throughout the designing stage. The research I conduct will be closely linked to solutions that are already available around the world and I will study these solutions in order to determine the best possible design to have and the best construction methods to implement in order to make that design become a reality. There will also need to be some significant research done*

Needs and Opportunities:

Key:

Key Factor is a major issue for this opportunity	Key Factor has a neutral influence on the opportunity	The Key Factor is not an issue for this opportunity

	Client	Time	Budget	Materials	
Church Signage	<p><u>Issue:</u></p> <p>I have met with Steve Millward who is the leader of crossroads church located in Mangatangi. The church require a sign to be situated beside the road to promote the crossroads church. The sign needs to match the existing environment and be clearly visible for people driving past. Steve is a very enthusiastic person and I am confident that I could build a strong working relationship with him.</p>	<p>Due my various other commitments that I have going on in my life at the moment a sign could be the right kind of project to suit me as it can be as simple or as complicated as I want to make it. Therefore this project is flexible and this is exactly what I am looking for in a project. However, the client ,may want a sign with complex themes and materials. This could take time that I don not have and therefore could also be unsuitable for what I require.</p>	<p>The client has already given me an initial budget of \$12,000 for this project due to funding received . This is an incredible amount of money, as a result I do not feel any pressure in regards to bringing the final product in within budget and I will be able to explore a large array of different ideas and look into different materials that a smaller budget would not have allowed for.</p>	<p>A sign requires large amount of thinking in terms of materials. Because the sign will be situated outside, the materials will need to be durable within the elements, not just in strength, but also in appearance as over time, materials such as wood, certain types of metals and also paints warp, twist, rust, crack and fade respectively. As a result I will need to carefully select my materials to ensure that they are able to cope with the work required of them.</p>	<p>Steve the th eral a whole and as due to stand easy t</p>
Turf Watering System	<p><u>Issue:</u></p> <p>I have met with the Treasurer of the Turf Trust, an organisation that controls and maintains the Thames Valley Hockey facility. The trust require a new automated watering system, that is more economic to run than the standard ones used globally and also eliminates wind as a factor of even water coverage. Ian is very motivated and passionate about hockey within this area and I can see us being able to generate some very good concepts however he is also a very busy man so at times I may not be able to get hold of him.</p>	<p>The watering system will involve a number of different stages within the design process. As this project is revolutionary, I will need to have a lot of meetings with the client and trust members, experts within the field of water management and also the surface manufacturers to determine what standards they have in terms of coverage. This will all take a lot of time and with my other commitments I don't feel like I would be able to complete this project within the required time frame.</p>	<p>The client would like this to be an investigative project to determine what sort of costs could be involved in both the implementation of this system but also the maintenance such as water costs and repairs. Because of this, there is no fixed budget and he is open to ideas. However, measures should be taken to try and keep costs down where possible to ensure that the system is a cost effective alternative to the conventional system used at other hockey complex's.</p>	<p>The standard turf watering systems that I have seen are all constructed out of metal with rubber used for seals and nozzle attachments. However, to remove the wind as a factor of water coverage the design may have to run along the ground. Because of this I may have to investigate into the use of lighter materials such as aluminium or carbon fibre. As the hockey complex is outdoors the design will need to be weather durable and maintain its strength after a number of years being exposed to the elements.</p>	<p>Hockey ling at which have l system pacts</p>
TV Cabinet	<p><u>Issue:</u></p> <p>My parents require a new TV cabinet for their main lounge. The existing one has been damaged and the door no longer opens properly. The cabinet also lacks storage space as they have upgraded a number of appliances. My parents are very easy to work with but I think it may be hard to get beyond the personal relationship that we have and keep it professional. This could be an issue as my brief requires a professionally negotiated brief.</p>	<p>In terms of time a TV cabinet would be perfect as it is a small piece of furniture that would be relatively quick and easy to make. Due to my busy schedule this is exactly what I need in order to reduce the amount of pressure that I have on me to meet the deadline on late term 3.</p>	<p>The client has a store of timber that he would like to use for the project. This will greatly decrease the costs involved to make the product as all the materials are supplied.</p>	<p>The client has told me that he has a store of macrocarpa timber that he would like to be used for this project. He has informed me that he would like the furniture to be constructed entirely out of natural materials as this would match the existing theme of his house.</p>	<p>The p The cl timbe earthy wood sunligh the su wood posur vent c</p>

Justification: I have decided to progress the Church Signage further. In terms of my key factors the TV Cabinet did fit the best as it fits in well with my key factors. However, I am a person who s always after a challenge and although the TV cabinet seemed to be the easiest solution I feel as though I would not be challenged enough for this piece of work. Also, I would be working alongside my parents which, although I get along with them well, I feel that we would not be able to remove the personal aspect of our relationship and this would pose a problem as this unit of work needs to be kept professional to ensure that it is done to a high standard. The watering system, would be an awesome project to do and I have worked with Mr Clark during my L3 Graphics project last year. This means that I now how he works and we have already built a strong working relationship. However, the aspects within this project involve too much time and there are a number of factors that could be further increased in difficulty as I go further into the project. Unfortunately due the amount of time that I have available this could not be possible. The church signage is sort of the middle ground. It would be relatively straightforward to do however there is enough room for growth within the brief to be creative and a large part of the work will involve selecting the right design. I could run into problems with rules and regulations surrounding the sign however this is the type of problem solving problem I am looking for. There are a number of experience professionals that I have access to and I am confident that with the help of these people I will be able to make a high quality solution to the clients issue.

Client Questionnaire:

Ideally, what would you want to achieve from this project:

A sign that fits our context e.g. building and dream

Are there any future developments of the grounds that may need to be compensated for within the design?

Yes. The use of native plants at the entrance accompanying the sign due to what we are hoping to plant in our gully that is visible to the entrance

What are the main values of crossroads church:

Our vision is: To bring communities and Christ together. We desire to be a place where people at a crossroads in their lives may find a fresh start, hope for the future, healing, forgiveness, inspiration, and vision to make a positive difference in the world.

Are there any underlying themes that you want to be reflected within this design?

To be a place of beauty, a light in the darkness, an oasis in a desert, a place of healing, welcoming, restorative e.g. hospitals are built by green places and Ps 23 says He makes me lie down in green pastures he restores my soul.

A place that provides a whole spiritual experience, physical, spiritual, emotional, and psychological.

Do you want this sign viewable from multiple Directions? If so, what directions?

From the road travelling in both directions

Are there any constraints in terms of proportions? I.e.. Height, width etc.

I do not know what the council regulations are but bigger is better than smaller and it needs to fit the context land/building

What components must be included within the sign?

Our logo and name and contact details, and service time

And if we go with two signs : Welcome to Mangatangi Nau mai Haere mai

Do you have any preferences on materials?

This will be impacted by budget

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Finally, is there anything else you think I need to consider before commencing the designing process?

I am thrilled Trent is willing to do this. We have had two or three very profitable meetings I am very excited about this project and believe it will enhance our local community and our Church. I also believe we can set a standard for entrances for community buildings in our region and for Churches generally. I want more than a sign I want a statement, an experience that welcomes people and brings a sense of peace – aroha. The Celts talked of thin places between heaven and earth. I hope our entrance way and sign will help this to occur.

I have also shared with Trent that we will need to look at how we can raise funding to pay for this. This may include some of our guys doing some of the work.

Profile of Main Client:

Steve Millward:

Interests - surfing, reading, going out to new restaurants with Ruth my wife and spending time with her, painting, gardening, tramping, new stuff, progress, numbers and films

In 1997 I came to be Pastor of Crossroads for two reasons:

My father in law encouraged me to and my wife loves living in the country, so here we are in our 15th year. I continue because we continue to see progress

I attended High School at Rutherford High and was Head Boy. After School I worked as a Commercial Trainee Cadet with Air New Zealand for 5 years.

After making a major decision in my life to believe and follow Jesus Christ, as a 21 year old, I began a three year degree in theology and then began working in a large Church in Papakura under John Balchin who became my father in law.

We have four great kids - Rachel and our son in law who are both doing honours at Auckland University, Daniel who is coaches tennis at Eden Epsom and Remuera and will be going to Auckland University next year, and Sara who has started Auckland University this year. Two live at home half the week and Andrew and Rachel live down the road.

In 1997 we moved to Mangatangi and apart from two more years of post graduate study have continued here at Mangatangi including regional and national work in and through our Church.



Cross Roads Church Mangatangi:

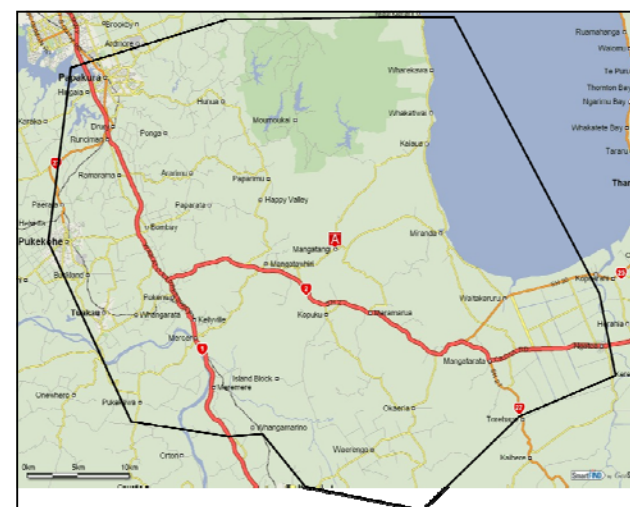
Cross Roads Church is based in the small rural community of Mangatangi in the Franklin district.

The church is a relatively new structure with construction of the new building in Mangatangi completed in early 2010. They are the largest church between Pukekohe and Thames and Pukekohe and Huntly with a catchment area of over 3000km². Although recently established the church is already receiving a large amount of interest and there are talks about the need for expansion with their Sunday service reaching numbers of up to 200 people.

Cross Roads is a Presbyterian Christian Church and is apart of the PCANZ.

The church has a weekly Sunday service the church also has kids and youth church programmes in place and also organises a number of events that specifically target today's youth through the Voltage Idol programme, Beach Missions and Leadership development courses. The church is also home to Faith fest which is a Christian festival held annually and has grown to over 500 teenagers attending.

As well as being a place of worship the church also doubles as a community centre for school productions and events and even has a café on site for people to connect with each other on a regular basis.



Cross Roads Church catchment area



Voltage Idol advertisement

Initial Brief:

Context: Signs have been used throughout history and over time, have developed according to the needs and desires of the cultures that use them. The definition of a sign is a symbol that is used to transfer information to observers through the use of pictures or text. Symbols have been used amongst humans since the very beginning of artistic expression. However, the first known application of symbols to form signs has been recorded in ancient Rome where Roman numerals were carved into marble columns along roadways to inform travellers the distance to Rome. As towns and cities began to grow these signs developed and then applied to crossroads to inform travellers where they were headed. In the early 1900's, following the introduction of early cars and automobiles the first set of road signs were developed. These early signs were either painted or carved onto wood. In the 1970's, the first neon tube sign was developed to be used on a newly-opened freeway. Over time, technology has continued to improve our road signs. Initial changeable signs consumed a lot of energy and were very high maintenance. With the introduction of LED technology, signs have become a lot more efficient to run. With this, signs have now become more elaborate, often featuring multiple messages electronically programmed into the sign to provide different lighting, flashes, patterns and messages. This allowed signs to become more eye-catching to people passing by and also allowed these signs to be used at night effectively.

Issue: Steve Millward is the pastor for Crossroads church. They are a newly established church and have recently completed the construction of their new building based at the heart of the community of Mangatangi. The church has now been fully operational for a few months now the church now require a roadside sign to promote the church and make it easy to locate. Steve also has a vision to have the whole complex have an overall unified theme. This means that the solution would have to be based on features of the existing structure.

Need: The client requires a sign promoting the church to be situated at the roadside. This needs to be clearly visible and match the theme of the existing structure.

Opportunity: This project gives me the opportunity to research existing materials, safety requirements, and legislation specific to the proposed solution. I will also be given the opportunity to design an original structure specific to the clients brief. During the construction process I will be able to gain experience within the area of technology and this will provide me with skills that I can use for a trade or apply the management aspects of this project to running a business.

Restrictions/Constraints:

- ◆ **Budget-**The church have been allocated \$12,000 of funding towards this project. Obviously this is a very healthy budget and this will allow me to be more creative with the design however I will need to ensure that this project does not exceed the budget.
- ◆ **Location-**The sign will be situated beside the road. There may be some legislation or requirements about the distances or sizing's in regards to building a structure of this nature beside a road.
- ◆ **Timeframe-**This project needs to be completed as part of my folio before the end of term 3. Ideally, I will have the solution in place before this date so that I have more time at the later end of the term to tidy up my folio and prepare it for marking.
- ◆ **Materials-**There has been no specific mention of materials and my client is open to the concepts that I will put forward. The materials may be limited to the design though as the sign has to match the existing building. This means that the colours and line within the design could restrict the materials used.
- ◆ **Safety-**The design, due to its size, will have a number of restrictions in terms of safety. The sign will have to have secure foundations which will prevent it from falling over and potentially injuring someone. The sign also has to be safe for people who may be walking past the design. The solution will have to be free from sharp objects, exposed moving parts and overhanging pieces and free from general hazards so that people walking past cannot be hurt.

Brief: I am going to plan, design and test a solution to the clients issue.

Identified Main Client: Steve Millward, Crossroads Church, Mangatangi

Client Specifications:

- ◆ The sign must match the corresponding building to ensure that there is no significant clash.
- ◆ The design must be durable and able to withstand a range of weather conditions and be free from defects such as colour fade and cracking.
- ◆ The final product must not exceed the allocated budget.
- ◆ The client is open to ideas regarding proportions, shape and materials used for the design.
- ◆ The sign must have the crossroads logo and motto within the design somewhere.

Key Factors:

Initial Brief:

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- ◆ *The sign must have the crossroads logo and motto within the design somewhere.*

Key Factors:

1. **Time:** *Time has become more important because the design will depend entirely on whether or not I think that it can be completed before my deadline. Although I have until the end of term 3 I would prefer to have the project finished before this date so that I can spend the remaining time putting together the folio and touching it up prior to it being sent away.*
2. **Client:** *Steve will play a hugely important role in this project as he is my main contact for the church and it will be his initial ideas that get my designing process up and running. However, Steve is not the only person that needs to be satisfied with the final product. Crossroads church, like any other organisation, has a board of representatives that manage and maintain the church. These people will also have their opinions on how the sign will look and consultation through group meetings will need to be conducted regularly to ensure that everybody is happy with the process and that a solution can be reached that everybody is satisfied with.*
3. **Budget:** *The Budget is healthy as \$12,000 worth of funds has been allocated towards this project. I need to ensure though, that I carefully plan the design so that I can be sure that the design will not exceed this budget. This means that the design will need to be thoroughly priced prior to construction and if necessary, cheaper alternatives sought after.*
4. **Safety:** *Safety is a hugely important factor as I am designing this product for somebody else. In particular with this sign, the foundations will be crucial. Depending on the design, there may be a fair bit of load that will need to be supported and the first step with this is getting the foundations right. This may require consultation with an engineer to ensure that the design will be able to be supported by the foundations and there is not risk of falling down, potentially injuring someone around it.*
5. **Materials:** *The design will be situated outside full-time. This means that it will be exposed to the weather all year round. I will need to carefully select the materials so that I can be certain that they will be durable within these conditions and able to withstand these for years to come, not only in strength, but in appearance as well.*
6. **Religion:** *This sign is being designed for a church. Because of this, I will need to conduct some research into some of the symbolism and phrases used by this religion to ensure that the sign is appropriate. I will need to be careful as there could be some symbols, words, patterns or phrases that could be seen as offensive to people using these facilities.*
7. **Environment:** *The client has said to me right from the start that he would like a sign that matches the style of the church so that the whole complex has a form of unity.*
8. **Skills:** *At this stage, It is too early to tell whether the skills I have will be adequate to the project that I am doing. The skills I have and their effectiveness for this project will be determined mostly by the design itself and the materials used.*
9. **Legal Requirements:** *The design that is selected could be subject to certain aspects of legislation that apply to a sign situated beside a major road. There could be issues regarding the height of the sign, colour, distance from the road, and requirements regarding materials that can actually be used and their impact on things like reflectiveness which could distract drivers.*

Implications & Interactions of Key Factors:

Time Vs. Design Vs. Materials: Time is a huge stand-alone key factor due to the multiple commitments I have going on in my life such as my hockey, leadership role and other subjects which are heavily external based. Due to these other commitments that I have going on I don't have as much time available to me as I would have liked and this affects a number of other areas significantly. None more so than Design and Materials. The design is one of the most important aspects as far as the client is concerned. The client is after an attractive and exciting sign to be constructed which captures the attention of people passing by. At the same time however, a balance needs to be found between what looks good and what can actually be achieved within the set time frame that I have. Time will also impact the materials that I chose to use. My material knowledge is pretty limited to general woodworking with a bit of background engineering knowledge. This means that if I were to choose a radical new material to use, I would first need to learn how to work with that material and may need to have either guidance from a local professional or send the design away and have it made. This could impact on the time constraints that I have as these options would take up valuable time and I may deem that it is time that I cannot afford to spend and as a result I may choose to use a simpler material to work with.

Environment Vs. Design Vs. Safety: The Environment plays a huge role in the project that I have selected to do. Based in a rural community the sign needs to match the surrounding landscape and the design aspect of this build will play a huge role in that. There have been initial indications from the client that the sign needs to match the existing building in order to create a flow-on effect and bring across a sense of unity across the whole complex. With this in mind, the design will need to cater for this and this is yet another indication of the link that these factors have. As well as from a design perspective, the sign also needs to be safe to use and be around. This will need to be one thing that I ensure I investigate properly during the designing phase as any injury caused from this product could hold me accountable and this is something I would rather avoid. Safety also applies to the environment that the sign is going to be situated within. Because of its close proximity to the road, the sign may be required to meet certain criteria in terms of road safety to ensure that it does not pose a threat to passing traffic. These relevant legislation will need to be investigated prior to the construction of the final design.

Client Vs. Design: The sign is for the Cross Roads church which is situated in Mangatangi. Although I will be working a lot with Steve Millward, the pastor of the church, the design needs to be approved by the entire board before the design can be progressed into reality. This could pose a few issues as the board are comprised with a wide range of people and all of them may have different opinions about what they would want in regards to a sign for the church. Also, I need to remember that this is client negotiated brief and that although I may have my own design preferences or ideas, the client may not agree with these so I need to ensure that I am accepting of this and maintain a professional working relationship with the client.

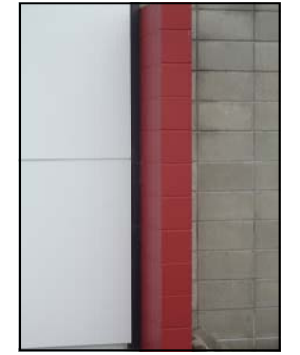
Budget Vs. Materials Vs. Design: Budget plays a huge role in terms of what can and can't be done within a project. Generally, with a project of this nature, a small budget will place a lot of restrictions in terms of design and also materials. If I had a small budget I would need to be conservative within the designing process to ensure that the expected cost was affordable enough and this could mean opting for cheaper grades of materials which could impact the overall quality and appearance of the sign. Fortunately, the church have been able to allocate \$12,000 to this project. This is a large sum of money and will enable me to really be creative in terms of producing a unique design for this brief and gives me the ability to experiment with a wide range of materials.

Equipment Vs. Materials Vs. Experience: Materials Are important as they are one of the key considerations within a design. The materials I select could be impacted by my familiarity with them. Within the school we have an engineering and furniture workshop that have specialised tools and teachers whom I have access to. This means that I am able to work with a range of timber and also a few grade of metals for this project. If I choose to use a material outside of this range, for instance, glass or plastics, I may need to look outside of school and seek help and resources from local businesses in the community. The businesses may have the equipment and experience that I am looking for. However, there needs to be a balance between the work that I am able to do and the work that I am getting others to do. It may be that I am confronted with a material that I am unfamiliar with and have no way of gaining access to the equipment required so I will need to look for an alternative solution.

Legislation/Requirements Vs. Design: As the intended site for this sign is situated by a road; there may be specific legislation and building requirements that this structure will need to comply with. To be certain of these, an investigation will need to be conducted and both the NZTA and Waikato District Council need to be contacted to figure out what constraints there are in relation to this activity. It may be that there are certain requirements and legislation in place and this could prevent me from building a design that previously I was keen to develop further. If this is the case however, I will simply have to re-design the concept to ensure that it meets these guidelines that have been put in place otherwise the build could be deemed unlawful and could instigate legal action being taken against me or the client.

Designing Vs. Communicating Ideas: These two key factors link strongly together. Designing is a factor that is crucial right throughout the folio and it is something that the client relies heavily on in order to generate an idea of what they want. Communication is also important. In particular, the communication of my ideas. I can produce all the design ideas that I want however, if I cannot communicate these ideas effectively then no one will be able to understand them and it would be a huge waste of time. People vary in terms of how they visualise things and understand ideas. This means that I will need to explore a wide range of modes in order to create a presentation of my design ideas that suits everyone. Some of the designs can be sketched out as 2D objects as some people have no problem with visualising things and how they look, however, many people struggle with this so I need to produce some 3D models either on the computer or made by hand or both. These models would be constructed out of materials that looked the same as the ones intended on being used and then photos of these models can be placed in the intended environment photos so that the client and board can get a visual of how the design will look like. By thinking through my

Intended Environment:



These are the different colours and textures within the design. They each serve a different purpose and possess strong linear movement within each. I have noticed that the closer the lines are in regards to each other in each material, the darker and more vivid the material. This means that they contrast not only in colour but in texture and linear movement as well.



This is the front entrance of the church. 2 Circular columns support the overhanging roof. The front view is very linear in style and there a range of colours and textures used in this view. The building also appears to be based on many different stories. I.e. The horizontal lines in this view increase in height similar to stairs in staircase.



This is a view of the church as a whole. This is what is seen from the road and is what the sign will need to match as the church will be in the signs 'backdrop'.



This is a view of the front face of the building. This is the view that faces the road and is the one that the sign will need to match. The Red pillars within this design are a dominant angular form and contrast heavily with the flat wall surfaces.



This is the sign used currently. This was the original drawing used during the construction process so that the community had a visual representation of what was being built. Since they have moved in they have added the 'Sunday Church' and information below so that they can continue on basic operation.

Prioritised Stakeholders:

- 1) **Client:** I have chosen client to be the number 1 most important stakeholder without identifying a client it would be very difficult to develop a project. These people involved will be providing a suitable budget, help to develop design input for me to produce exactly what they require. To identify this I need to consult and work along side them to identify specifications and to develop a positive working relationship.
- 2) **Myself:** I have chosen myself as the second most important stakeholder because I am directly responsible for planning, producing and conducting research into my product. I also have the task of working alongside my client with whom I will be consulting design ideas, materials for construction and specifications in order to fulfil my client's desires. As a stakeholder I have a direct influence into the product that I am making and ultimately determine the outcome of the finished product.
- 3) **Parents:** I have chosen my parents as the third most important stakeholder because I have identified 'home' as the area of study that I wish to condone myself in. Because of this my parents will play a huge role in the development of my product-what designs will work with the current themes throughout our home and which timbers would best compliment this and also offering advice and/or feedback on which concepts clash with their surrounding environment. My parents will also provide financial support for my project during the construction process, providing materials and furnishings in order for me to make my product.
- 4) **Teacher(s)** I have chosen Teacher as the number 4 most important stakeholder because the teacher is the person that will be guiding me through the designing and production of my product. When necessary he will be offering advice from a professional's perspective which will help me improve the quality and effectiveness of my product. If there is something I am unsure about the teacher is usually the first person I go to for help as he has experience in the furniture production industry and will be able to offer support when needed. The teacher also plays the role of a supervisor ensuring that my work and practices are meeting safety requirements and similar legislation.
- 5) **Principle:** I have chosen principal as the fifth most important stakeholder because the principal is directly responsible for the day to day running of the school. Because of this I am able to have the opportunity to design and construct my product as well as have a safe working environment around me. The principal is also responsible for employing staff which influences me in that I have teachers that are there to help and supervise me whilst I am designing and making my product.
- 6) **Board of Trustees:** I have chosen the Board of Trustees (B.O.T) as the sixth most important stakeholder because this group of people (along with the principle) is responsible for the direction in which the school is heading as well as linking the school with the wider community. In doing so, creates outside interest from parents, members of the public and businesses which results in their support towards the school in terms of financial support, donations of equipment of assisting with fundraising events. The board is also works along side the government to establish the curriculum inside the school and because of this we have a wood working workshop as well as a wide range of equipment and tools that allows me to construct my product to the highest quality.
- 7) **Suppliers:** I have placed suppliers as the seventh most important stakeholder because the supplier is responsible for the distribution of materials that will ultimately become my product. The supplier ensures that I have high quality materials that meet current commercial standards in order for me to construct my product.
- 8) **Professionals/Technologists:** I have placed professionals as the eighth most important stakeholder because if I am having difficulty with the designing or construction process of my product these are the groups of people that I turn to. Professionals are people that either work in or have an in depth understanding of that particular area of expertise. Because of this they will be able to give me advice on design-ing aspects as well as construction processes that will relate directly to my product. This will help me make better choices in terms of materials and how I go about completing certain tasks.
- 9) **Government:** I have placed Government as the ninth most important stakeholder because they provide the curriculums that the schools are implementing in my education. It is because of this that we are able to do this type of technological study at school and are also able to carry out a practical aspect which is constructing my product. The Government also works alongside the B.O.T to help determine the direction in which the school is heading as an educational institute. Government agencies such as OSH ensure that procedures are followed in which promote safe working practice throughout the industry. I will also have to meet OSH standards when constructing my product to ensure that my product is of a safe construction and that no injury results from its use.
- 10) **Council:** The council will play an important part in my project as the final product may be subject to resource consents and/or safety checks ensuring that it complies with safety legislation and building requirements specific to the job. This could have the potential to limit my work as these requirements could prevent me from developing a design further or building a final product.
- 11) **NZTA :** The New Zealand Transport Agency has the potential to greatly affect the project that I am doing. Due the close proximity of the intended site for this structure to the road, there may be some regulations or restrictions that the organisation have in place to keep road users safe. Fro instance, there could be certain materials that can't be used or a set distance that the structure must be from the road or the overall proportions of the structure. There may even have to be crumple zones in the design in case a motor vehicle crashes into it.. Because of this, the NZTA could have a major influence on my project and this is why they are included in this Stakeholder list.
- 12) **Local Community:** The sign is being situated beside the road and is open for the public to see. Because of this, the local community may need to be consulted in order to get the best opinions and overall de-

Existing Solution:



This would be an example of a wall hung sign that could be used at the church. Currently, there is no such wall available to put this sign on and I don't think it would be the right way to go as this project as the board are still trying to develop the surrounding landscape so a wall may not be approved for the design as it may not be in their plan.



This would be a sign situated on a shop wall overhanging a footpath. There are no specific walls around the fence line so I don't think this design would be very suitable. As the sign is being situated by a road I think visibility would be an issue as well.

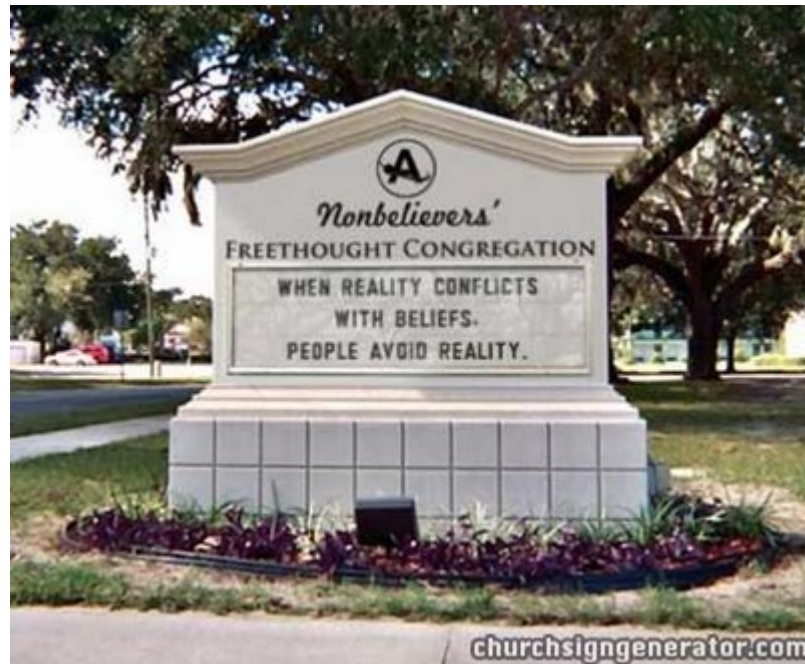


This would be an ideal form of sign that could possibly suit the clients brief. Although simple in design, the sign can be placed by the road and this would be ideal for what the client wants. I would be looking at a more modern type of sign and would be looking at using multiple materials not just wood.

This sign is very American. Although attractive in terms of drawing in the attention of people passing by, the design would not suit the intended environment outside the church. In order for the sign to be welcoming I think some curves would need to be incorporated into this design to ensure that it does not look too harsh which these strong lines and angles create.



Existing Solution:



This sign is very simple and also has reference to the cross which is a significant religious symbol and makes it easily recognisable to people driving past who will instantly be able to tell that it is for a church. This is the kind of visibility that I think the client is after however in a general sense the design is quite boring and I think with a bit more shape and curved form the design can be eye-catching through both symbolism and shape/style.



This is a solid design and would be sturdy enough to withstand weather exposure in the intended environment. My only concern is that the road is actually higher than ground level. This means that the size of the sign needs to be quite high. With concrete, the base would have to be massive to support the height of the sign and it would also be very heavy which the ground may not be able to support.

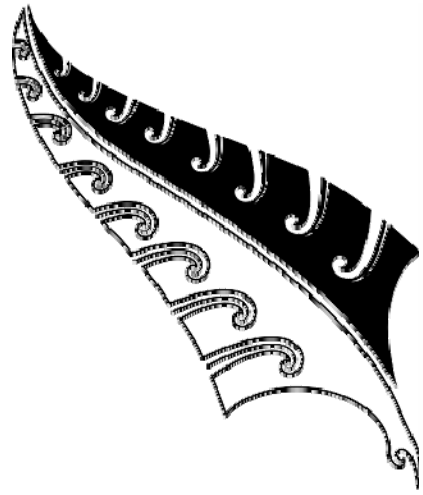
Again this is another simple sign design but I like the way they have used natural timbers to surround the frame as a sort of border. You could get quite a nice affect if you left the bolts untreated to a certain extent. That way, the bolts would rust slightly, giving an authentic look. However, the church is quite modern so this might not match the building.



Evaluation of Client Response:

I emailed this sheet away to the client so that he could present it to a board meeting that the church were having. As suspected, the feedback I received was not very positive towards these signs. The overall opinion in regards to these solutions was that none of them captured the vision that the church had for their sign and there were a few concepts that the board thought of as very 'Americanised'. Sending this away I had a feeling that this was the response I was going to get because currently there is nothing that I could find that seemed to suit the church as a symbol. The church sign will be very unique and this has been reinforced with the feedback that I have received. From this information I have now been able to confirm that this is not what the church are after and I can now begin designing a range of new ideas that are more uniquely suited to the church.

Inspirational Research:



Cross Roads is a church, so obviously there needs to be some form of religious symbolism within the design. The use of the cross is a perfect example of religious symbolism and is instantly recognisable. I know that the church has their own unique cross and they are keen to keep it, but they may be open to new ideas if they are shown them through a few concepts.



There is nothing significant about this picture however I liked the way that the curved form in the middle was framed to give a 'suspended' appearance. The combination of straight lines and curved form works well in this design and is something that I wish to emulate through my conceptual designs.

The client has said to me that he would like a sign that reflects the church and the local community and bring them together as one. Mangatangi has a large Maori population and New Zealand is well-known for the combination of Maori designs and nature. Because of this I have explored the different types of Maori designs and the ways in which they can be used so that this can come through as a theme in a couple of my concepts. The fern is a classic example as it has subtle Maori connections with the repeated koru pattern, however it is instantly recognised as being true NZ as the fern is an iconic symbol of this country and this is the image I would like to portray in a design. Maori designs utilise curved form extremely well and curves, to me, are portrayed as more relaxing and welcoming than straight lines which is again another feature I would like to portray.



I am not sure why, but for some reason I am drawn to the shape of a sail caught in the wind. If included in a design, a sail feature would add a whole new dimension to the concept as it is not only curved horizontally, but it comes out towards you, or away from you depending on which way the curve is going.

Concepts:

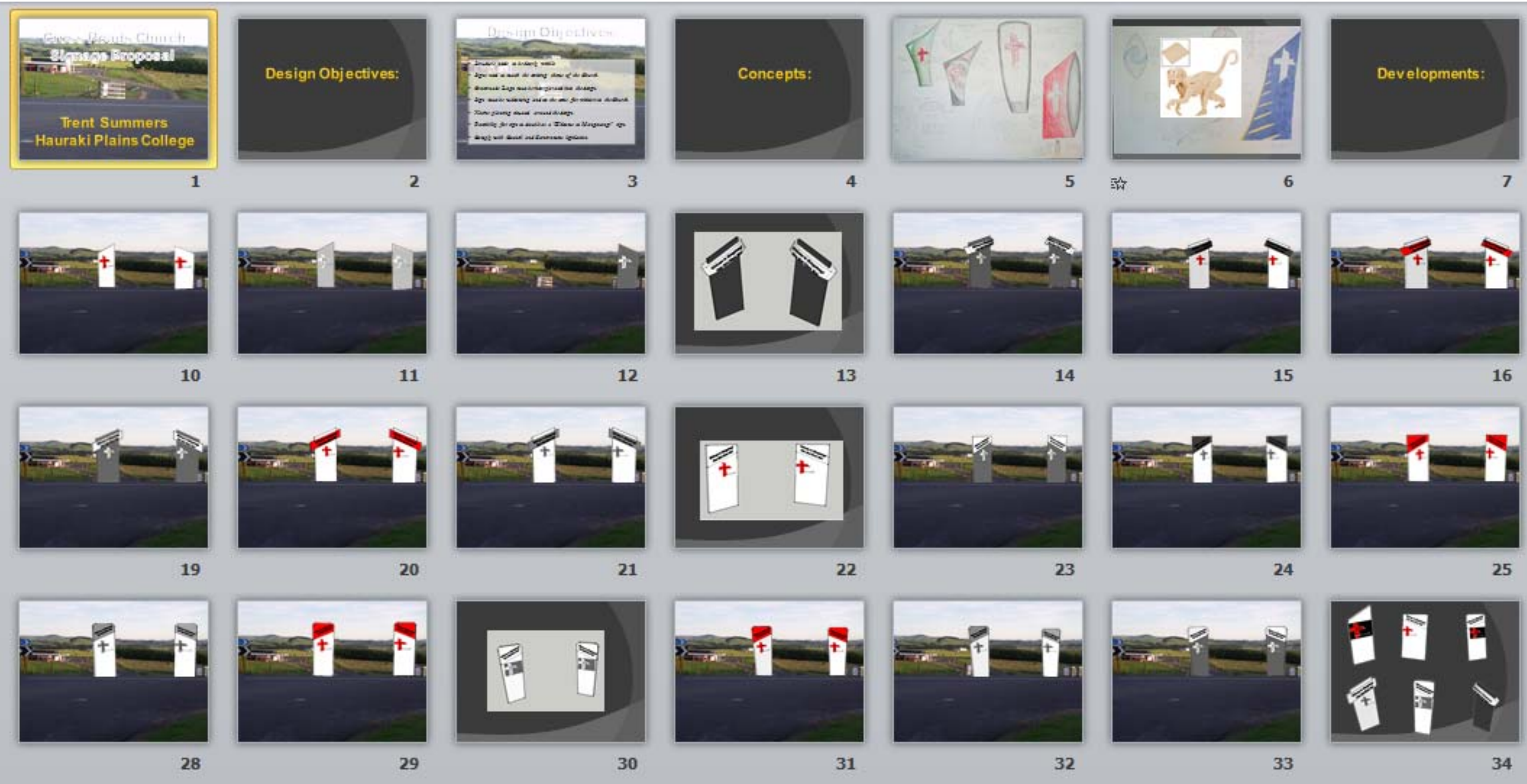


Concepts:



Presentation of Concepts:

Below is a printout of the slideshow that I used to present the concepts to the client and the Cross Roads board. I was able to talk about each design in detail and explain the reasoning behind the design decisions that I made. I was able to explore different colour combinations with the board by putting the design into the intended environment photograph and this gave them a clear idea of what the design was going to look like and how the environment affected the design decisions.



Brief Development:

Following the meeting I had with the Cross Roads board there were a number of changes that the board wanted to make to the concepts that I had produced. As a result of this meeting that I had, new ideas were brought forward and the board had different ideas in mind about how they wished to approach this project. Due to this, there have been a number of changes that have been made to the initial brief so that the next batch of concepts can better meet the vision of the main client and board. All changes have been identified through the use of blue coloured font.

Context: *Signs have been used throughout history and over time, have developed according to the needs and desires of the cultures that use them. The definition of a sign is a symbol that is used to transfer information to observers through the use of pictures or text. Symbols have been used amongst humans since the very beginning of artistic expression. However, the first known application of symbols to form signs has been recorded in ancient Rome where Roman numerals were carved into marble columns along roadways to inform travellers the distance to Rome. As towns and cities began to grow these signs developed and then applied to crossroads to inform travellers where they were headed. In the early 1900's, following the introduction of early cars and automobiles the first set of road signs were developed. These early signs were either painted or carved onto wood. In the 1970's, the first neon tube sign was developed to be used on a newly-opened freeway. Over time, technology has continued to improve our road signs. Initial changeable signs consumed a lot of energy and were very high maintenance. With the introduction of LED technology, signs have become a lot more efficient to run. With this, signs have now become more elaborate, often featuring multiple messages electronically programmed into the sign to provide different lighting, flashes, patterns and messages. This allowed signs to become more eye-catching to people passing by and also allowed these signs to be used at night effectively.*

Issue: *Steve Millward is the pastor for Crossroads church. They are a newly established church and have recently completed the construction of their new building based at the heart of the community of Mangatangi. The church has now been fully operational for a few months now the church now require a roadside sign to promote the church and make it easy to locate. Steve also has a vision to have the whole complex have an overall unified theme. This means that the solution would have to be based on features of the existing structure. **It was noted in the meeting that matching the building was no longer a concern as the actual viewing time of the building from the road when driving past was only a few seconds. Instead, emphasis has now been placed on ensuring that the structure matches the surrounding community and reflects the rural background that Mangatangi has. The design needs to be unique and eye catching to ensure that it attracts the attention of traffic passing by and commands a 'second look'. This can be achieved either through shape or colour.***

Need: *The client requires a sign promoting the church to be situated at the roadside. This needs to be clearly visible and match the theme of the existing structure. **The sign no longer needs to match the church. The client requires a sign that promotes the church and is eye catching. The sign must incorporate the full crossroads logo and display relevant contact information.***

Opportunity: *This project gives me the opportunity to research existing materials, safety requirements, and legislation specific to the proposed solution. I will also be given the opportunity to design an original structure specific to the clients brief. During the construction process I will be able to gain experience within the area of technology and this will provide me with skills that I can use for a trade or apply the management aspects of this project to running a business.*

Brief Development:

Restrictions/Constraints:

- ◆ **Budget**-The church have been allocated \$12,000 of funding towards this project. Obviously this is a very healthy budget and this will allow me to be more creative with the design however I will need to ensure that this project does not exceed the budget. *I have recently been advised that the budget was not what I originally thought. As I was discussing design ideas with the main client, he informed me that they had received an initial quote for a sign valued at \$12,000, and that it was a misunderstanding. The budget that the church are looking around is \$2,000. This is a significant reduction in what I had initially planned for so the design may need to be adjusted to try and meet these new budget requirements.*
- ◆ **Location**-The sign will be situated beside the road. There may be some legislation or requirements about the distances or sizing's in regards to building a structure of this nature beside a road. *Research conducted into the location and potential legislation surrounding it indicate that there are no real regulations surrounding the structure as the design is situated in the church's property and does not fall on any road reserves. Because of this, the regulations surrounding it barely apply.*
- ◆ **Timeframe**-This project needs to be completed as part of my folio before the end of term 3. Ideally, I will have the solution in place before this date so that I have more time at the later end of the term to tidy up my folio and prepare it for marking.
- ◆ **Materials**-There has been no specific mention of materials and my client is open to the concepts that I will put forward. The materials may be limited to the design though as the sign has to match the existing building. This means that the colours and line within the design could restrict the materials used.
- ◆ **Safety**-The design, due to its size, will have a number of restrictions in terms of safety. The sign will have to have secure foundations which will prevent it from falling over and potentially injuring someone. The sign also has to be safe for people who may be walking past the design. The solution will have to be free from sharp objects, exposed moving parts and overhanging pieces and free from general hazards so that people walking past cannot be hurt.

Brief: I am going to plan, design and test a solution to the clients issue.

Identified Main Client: Steve Millward, Crossroads Church, Mangatangi

Client Specifications:

- ◆ The sign must match the corresponding building to ensure that there is no significant clash. *This specification is no longer relevant. Instead, the design must reflect the rural community and the surroundings as seen from the road by passing traffic.*
- ◆ The design must be durable and able to withstand a range of weather conditions and be free from defects such as colour fade and cracking.
- ◆ The final product must not exceed the allocated budget.
- ◆ The client is open to ideas regarding proportions, shape and materials used for the design.
- ◆ The sign must have the crossroads logo and motto within the design somewhere. *Modification to incorporate FULL logo with arrow and symbol included.*

Brief Development:

Key Factors:

- Budget:** The Budget is healthy as \$12,000 worth of funds has been allocated towards this project. I need to ensure though, that I carefully plan the design so that I can be sure that the design will not exceed this budget. This means that the design will need to be thoroughly priced prior to construction and if necessary, cheaper alternatives sought after. **The budget has instantly been promoted to the most important key factor as I learned that the \$12,000 dollars was a misunderstanding between parties. The budget they would like the sign to be constructed for is \$2000. Personally, I think this budget is a bit unreasonable considering the amount of materials that need to be purchased and the design objectives they have put in place. However, I will take all measures to ensure that I reduce the cost of the final design as much as possible to ensure that I can close the gap between their budgeted price and the final estimated costing.**
- Time:** Time has become more important because the design will depend entirely on whether or not I think that it can be completed before my deadline. Although I have until the end of term 3 I would prefer to have the project finished before this date so that I can spend the remaining time putting together the folio and touching it up prior to it being sent away. **Time remains as the number one important key factor as the description written above still applies.**
- Safety:** Safety is a hugely important factor as I am designing this product for somebody else. In particular with this sign, the foundations will be crucial. Depending on the design, there may be a fair bit of load that will need to be supported and the first step with this is getting the foundations right. This may require consultation with an engineer to ensure that the design will be able to be supported by the foundations and there is not risk of falling down, potentially injuring someone around it. **Safety has been promoted to the 2nd most important key factor due to the size of the structure. Because of this there are a lot more aspects that come into play, in particular the affect that wind will have on the structure and how the foundations will cope with the extra weight. This is important to consider as if I were to get this wrong, ultimately the design could fail structurally and could potentially injure someone who may be near it at the time.**
- Client:** Steve will play a hugely important role in this project as he is my main contact for the church and it will be his initial ideas that get my designing process up and running. However, Steve is not the only person that needs to be satisfied with the final product. Crossroads church, like any other organisation, has a board of representatives that manage and maintain the church. These people will also have their opinions on how the sign will look and consultation through group meetings will need to be conducted regularly to ensure that everybody is happy with the process and that a solution can be reached that everybody is satisfied with. **Although client has been bumped down it is still a significantly important factor as Steve, along with the board ultimately decide what is going to be built. The board is comprised of a large number of people, each with their own different opinions and design tastes. This means it will be harder for a design to be approved straight away and more work will need to be done during the designing phase to ensure that a compromise can be reached by all.**
- Materials:** The design will be situated outside full-time. This means that it will be exposed to the weather all year round. I will need to carefully select the materials so that I can be certain that they will be durable within these conditions and able to withstand these for years to come, not only in strength, but in appearance as well. **Materials has been moved up as there has been a lot of emphasis placed on the use of materials and how this can affect the appearance of the design and the ability that design has to blend in or match the surrounding environment. Because the client changed his preferences on the requirements of what the structure should match (the rural community instead of the church) the use of material has become even more important and the incorporation of rural materials such as corrugated iron and natural timber need to be investigated.**
- Religion:** This sign is being designed for a church. Because of this, I will need to conduct some research into some of the symbolism and phrases used by this religion to ensure that the sign is appropriate. I will need to be careful as there could be some symbols, words, patterns or phrases that could be seen as offensive to people using these facilities.
- Environment:** The client has said to me right from the start that he would like a sign that matches the style of the church so that the whole complex has a form of unity. **This has now been changed. The environment now focuses on the community as a whole and the design needs to reflect the rural upbringing of Mangatangi. There is no longer a major emphasis on the design matching the existing church building as the church is not very visible from the road, instead the focus has been put on making the sign as eye catching as possible and ensuring that it links to its rural roots.**
- Skills:** At this stage, it is too early to tell whether the skills I have will be adequate to the project that I am doing. The skills I have and their effectiveness for this project will be determined mostly by the design itself and the materials used.
- Legal Requirements:** The design that is selected could be subject to certain aspects of legislation that apply to a sign situated beside a major road. There could be issues regarding the height of the sign, colour, distance from the road, and requirements regarding materials that can actually be used and their impact on things like reflectiveness which could distract drivers.

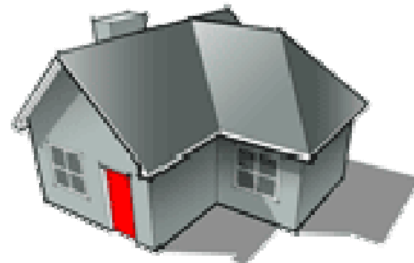
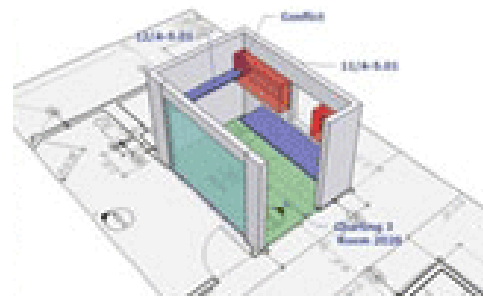
Resources:

<i>What do I need to accomplish?</i>	<i>What is the resource(s) that I require?</i>	<i>What is the availability of this resource (s)?</i>
<p><i>The design I have selected is a curved shape. Under recommendations from my technologist I need to construct the frame out of steel in order for it to withstand the stresses imposed by the wind exposure and sheer height of the design. I need adequate workspace and machinery to be able to bend this steel to the desired radius.</i></p>	<p><i>I require a workshop or relevant machinery that has the ability to work with and manipulate steel into a curve.</i></p>	<p><i>After meeting with my technologist I was able to get in contact with Norm Bates of Norm Bates Engineering who has agreed to work alongside me to help bend the steel. He has a steel roller which can bend the steel to a set radius. I have also talked to the engineering teacher at school and he has given me permission to construct the design in the school's engineering workshop where I will have access to welding equipment and other relevant tools.</i></p>
<p><i>I need to ensure that the design is legitimate and meets all the relevant legislation that may apply to this kind of activity.</i></p>	<p><i>The local Waikato District council and NZTA may have set requirements in place so I would need to get in touch with these organisations</i></p>	<p><i>With modern technology as it is to day, it is easy to contact organisations such as these ones as I am able to email or ring these people from a contact that can be obtained off their website so the availability of these resources is very easy.</i></p>
<p><i>I need to construct this design out of high quality materials but I also require accurate quotes to inform the client of relevant costs associated with this design.</i></p>	<p><i>I require suppliers of the materials that I need in order to construct this project. These people will be able to give me accurate costing information as well as relevant properties associated with the materials which will allow me to generate a more informed solution in</i></p>	<p><i>There are a number of local professionals and suppliers of materials. I can contact these people to obtain the information that I require and when it comes down to it, I will be able to order the necessary materials.</i></p>
<p><i>The modelling stage of the design process will require me to design and construct a series of models that will test my design ideas using a range of different media.</i></p>	<p><i>I require a computer drawing programme that allows me to produce 3D models digitally in order to come meet the requirements of the modelling aspect of using a range of different media.</i></p>	<p><i>The school has a computer drawing programme known as Google SketchUp and I also have a license for this programme. This programme would be suitable to use as everything is drawn to scale and you can also change material types for a given surface so it gives you</i></p>
<p><i>There a number of unknown aspects within this brief and as a result I will need to conduct some research in order to bridge this gap of knowledge.</i></p>	<p><i>Most of the research I'll do will require access to the internet as this is the most relevant and readily available source of information.</i></p>	<p><i>The school has internet connection however it is often patchy and is very slow. Therefore most of the research I do will need to be done at home where our internet speed is a lot quicker.</i></p>
<p><i>There will be a number of instances during this project when I will be required to present my ideas and findings to the Cross Roads board.</i></p>	<p><i>For a presentation I will require a projector to act as a visual aid to what I am saying. A projector will also come in handy when presenting my design ideas as this way the board can physically see the deign relative to the surrounding environment.</i></p>	<p><i>The school has a portable projector that I will be able to borrow for meetings providing no one else is using it. If the meetings are all at the church then I will not need this as the church have there own fixed projector that I can simply plug my laptop into.</i></p>

Methods of Modelling:

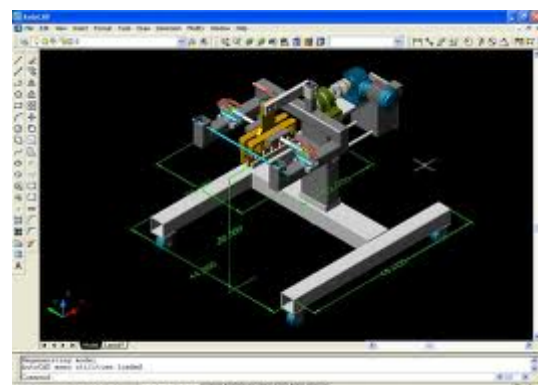
Google SketchUp

Google SketchUp is a computer drawing programme that allows me to design and produce scaled models of concepts. I have had a lot of experience using this programme and am fairly confident in my abilities in using it. This programme is quick and easy to use and allows me to generate a fairly accurate visual representation of design for presentation. Some of the disadvantages with this programme is that the detail is not that great and you lack the ability to produce sectioned views and to accurately show what material is being used. For presentations, sometimes the quality of the drawing is not too flash and it can sometimes become very distorted when used in conjunction with other programmes such as Photoshop and PowerPoint.



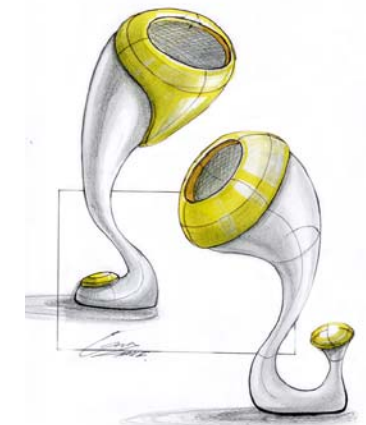
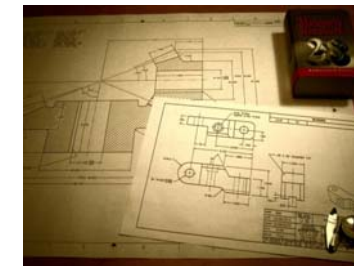
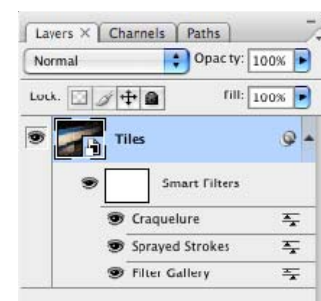
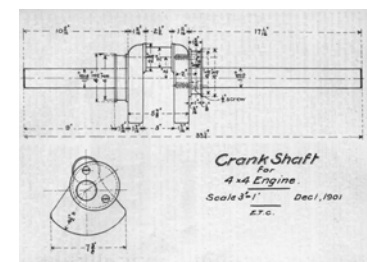
3 Dimensional Scaled Models

Scaled Models are an effective modelling tool as the client can physically see all the components of the design and has the ability to take apart components to get a better understanding of how the product will be put together. The advantages with modelling are that materials used to construct the model can be replications of the actual materials that are intended to be used and the client can get a feel for the textures and contrast created by these different combinations. The disadvantages with this method is that scaled models can take a while to produce depending on the complexity of the design and the quality of the finish required.



Working Drawings

Although old fashioned, Working drawings are still an effective way of presenting a design to the client. These drawings are quick and easy to construct and have the potential to be very effective at communicating my design ideas to the client. I have taken Graphics for a number of years and am confident in my drawing ability so this method of modelling is very viable for me.



Freehand Drawings

Freehand drawings are a quick and relatively simple way of communicating ideas visually. I have struggled with the idea of sketching and it is not a strength of mine however it is a vital component of the designing phase and there will need to be a balance between both freehand sketches and alternative modelling methods.



Photoshop

Adobe Photoshop is a tool used to modify images that have been taken. This can be used as an advantage for a unit of work like this as it means that I can edit an image of concepts and place them in a photo of the intended environment. This allows the client to have an accurate indication of how the design will look when placed in its situation and then he can make decisions from there as to whether to continue the design or decide whether to re-design. The design may look great on its own however may not suit the intended environment which is overall what needs to happen. Before, the clients would realise this once the design was constructed and it was placed in the environment. With this programme, I can now check to see whether the existing environment compliments the design or whether the contrast is too great which is a huge advantage.

Research-Foundations:

Shallow foundations:

Shallow foundations are those founded near to the finished ground surface; generally where the founding depth (D_f) is less than the width of the footing and less than 3m. These are not strict rules, but merely guidelines: basically, if surface loading or other surface conditions will affect the bearing capacity of a foundation it is 'shallow'. Shallow foundations (sometimes called 'spread footings') include pads ('isolated footings'), strip footings and rafts.

Shallow foundations are used when surface soils are sufficiently strong and stiff to support the imposed loads; they are generally unsuitable in weak or highly compressible soils, such as poorly-compacted fill, peat, recent lacustrine and alluvial deposits, etc.

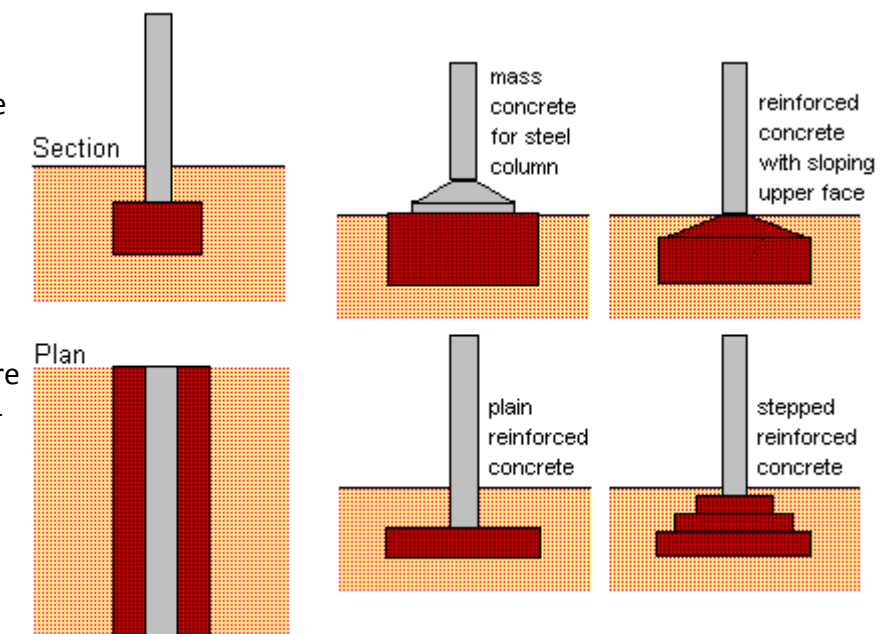
Types of Shallow Foundations:

Pad foundations: Pad foundations are used to support an individual point load such as that due to a structural column. They may be circular, square or rectangular. They usually consist of a block or slab of uniform thickness, but they may be stepped or haunched if they are required to spread the load from a heavy column. Pad foundations are usually shallow, but deep pad foundations can also be used.

Strip foundations: Strip foundations are used to support a line of loads, either due to a load-bearing wall, or if a line of columns need supporting where column positions are so close that individual pad foundations would be inappropriate.

Raft foundations: Raft Foundations are used to spread the load from a structure over a large area, normally the entire area of the structure. They are used when column loads or other structural loads are close together and individual pad foundations would interact. A raft foundation normally consists of a concrete slab which extends over the entire loaded area. It may be stiffened by ribs or beams incorporated into the foundation.

Raft foundations have the advantage of reducing differential settlements as the concrete slab resists differential movements between loading positions. They are often needed on soft or loose soils with low bearing capacity as they can spread the loads over a larger area.



Deep foundations:

Deep foundations are those founded too deeply below the finished ground surface for their base bearing capacity to be affected by surface conditions, this is usually at depths >3 m below finished ground level. They include piles, piers and caissons or compensated foundations using deep basements and also deep pad or strip foundations. Deep foundations can be used to transfer the loading to a deeper, more competent strata at depth if unsuitable soils are present near the surface.

Types of Deep Foundations:

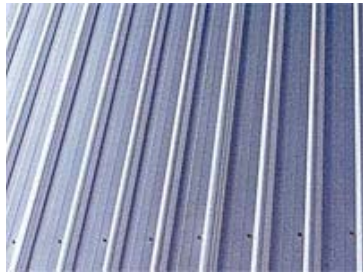
Piles: Piles are relatively long, slender members that transmit foundation loads through soil strata of low bearing capacity to deeper soil or rock strata having a high bearing capacity. They are used when for economic, constructional or soil condition considerations it is desirable to transmit loads to strata beyond the practical reach of shallow foundations. In addition to supporting structures, piles are also used to anchor structures against uplift forces and to assist structures in resisting lateral and overturning forces.

Piers: Piers are foundations for carrying a heavy structural load which is constructed inside in a deep excavation.

Caissons: Caissons are a form of deep foundation which are constructed above ground level, then sunk to the required level by excavating or dredging material from within the caisson.

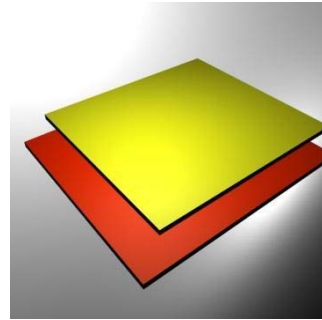
Compensated foundations: Compensated Foundations are deep foundations in which the relief of stress due to excavation is approximately balanced by the applied stress due to the foundation. The net stress applied is therefore very small. A compensated foundation normally comprises a deep basement.

Research-Material Samples:



Corrugated Iron:

Corrugated Iron is a building material commonly used in roofing. The material is constructed out of sheets of hot-dipped galvanised steel that is rolled cold to form the corrugations. The corrugations increase the bending strength of the material against the corrugations but not parallel to them. Corrugated Iron is used widely however is extremely common in rural areas and it is lightweight and easy to transport. Corrugated Iron is resistant to corrosion through the use of its zinc layer however it will rust after a few years if exposed to constant rainfall. For a longer lifetime it is recommended that another paint layer be applied to the steel to give it an extra layer of protection against corrosion. There are a number of different styles of corrugations ranging in shape, pitch depth and the distance between corrugations. However, any extra features do incur extra costs opposed to the standard corrugation pattern.



ACP's:

Aluminium Composite Panels (ACP's) is a term used to describe a flat sheet containing a non-aluminium core bonded against two aluminium sheets. These sheets are widely used however are more commonly used for cladding and signage. The advantage this product has is that it is light weight, flexible and is easy to fix.



Plywood:

Plywood is a manufactured material made from thin wood veneers. It is one of the most widely used wood products, sought after for its resistance to cracking and twisting as well as its overall strength. Plywood is cheap and easy to work with, able to be curved to cheap and is readily available at most supply stores around the country. By using different grades and species of timber it is possible to improve the strength and flexibility of the plywood. There are also a number of grades such as marine ply which is used on boats and as a cladding and is achieved by treating the timber to resist rotting in high moisture environments..



Steel:

Steel is now widely used throughout the world. It is an alloy of carbon and iron, and depending on the mixture of these two elements, as well as a large number of others, different grades of steel and properties can be obtained. Because of improvement to production over the years, steel has become a lot cheaper and is now very affordable. Steel is desired for its versatility, by simply creating different alloys of steel you can modify properties such as hardness, strength, ductility and corrosion resistance.



Concrete:

Concrete is a building material that is becoming increasingly used. Concrete is a composite material, constructed from gravel or crushed rocks, sand, water and a number of chemicals to make it harden. Concrete is poured into a pre-constructed mould where it is levelled and then left to set. Concrete has an extremely wide range of uses, from pathways, to pipes, to buildings and foundations. To add to its strength and prevent it from moving and cracking, reinforcing bar is used (see reo). Concrete is the most used man-made product in the world. It is relatively cheap and extremely durable.

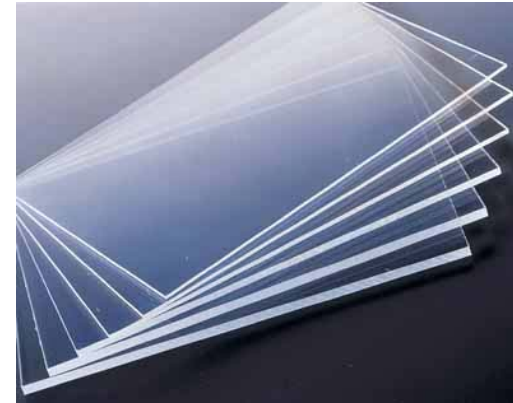


Reo:

Concrete reinforcing bars (rebar, reo) is made from carbon steel and is used to reinforce concrete. The reo is usually constructed into a cage or sheet depending on the shape of the concrete mould. The reo network is then placed into the mould and concrete poured on top of it. The reo acts as a reinforcement for the concrete as the ridges on the bar allow for a better anchoring of the concrete.



Research-Material Samples:

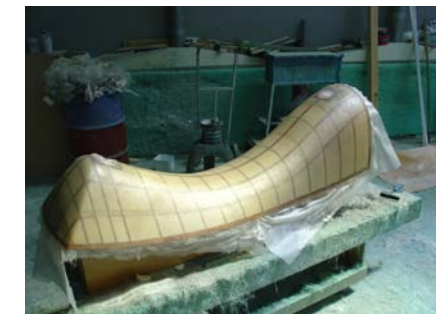


Veneers:

A veneer is a thin slice of surface material which is used to cover a core of generally cheaper, lower quality material. Veneers are used widely in furniture and used extensively on Kitchen bench tops. The thin slice of material is glued onto the core, usually under extreme pressure to give the appearance of a solid material. Veneers can come in a range of materials from wood, to aluminium. This material and method of construction is a cheaper method than constructing the product out of solid material and can be seen today utilised in flat-pack furniture.

Acrylic Glass:

Clear acrylic is often used as a shatter resistant alternative to glass as it is safer to use and more durable. Also called Perspex, acrylic is not just limited to clear, but can come in a range of different colours and has the ability to be heat moulded to shape.



Aluminium:

Aluminium is the most abundant metal in the earth's crust and sought after for its incredibly low density and its ability to resist corrosion. Because it is so light weight and comparatively strong, Aluminium is used widely in the aeronautical and transportation industry. Aluminium is very easy to shape however does require specialist welding equipment and fixtures to prevent the aluminium reacting with other products.

Fibreglass:

Glass-reinforced plastic (fibreglass) is a lightweight, extremely strong and robust material. The material is far less brittle than Carbon fibre, however the strength as a result it compromised. Carbon fibre is relatively cheap and easy to apply once a pre-constructed mould is in place. Fibreglass involves laying a plastic matrix in layers with an adhesive applied between each layer. Common applications for fibreglass include boat hulls, water tanks and automobiles.

Stained Glass:

Stained glass refers to coloured glass which is used widely among churches to create stained glass windows which are often priceless pieces of art. Stained glass is formed by adding metallic salts during manufacture. Stained glass can also be made from a paint which is applied to the glass and then fused to it by heat in a kiln.

Research-Material Samples Evaluation:

Following the investigation into materials I got in touch with the client and discussed the options he had available to him in terms of materials. Through this discussion we were able to identify materials that would be suitable for the design and ones that would be unsuitable. Below is a list of the materials I looked at with a summarised response from the client and evidence from technologists that suggested/contradicted the appropriateness of the materials.

Corrugated Iron: *I investigated this material under client request. Following the initial meeting I had with the client I was asked to look at this material as the church is based within a rural community and the board felt that the sign should portray the community that it is based around. One of the most obvious features is that it is heavily used in farming both as a roofing material but also fencing. Corrugated iron is flexible when the corrugations are vertical so this will be beneficial as the board want the design to be unique and creative.*

ACP's: *Again, this is a material the client and board really like. ACP's are flexible and durable, with a life of 10 years. ACP's are also very easy to use and install. My technologist from Art Effects exclaimed that all that is required is double sided tape stuck to a frame and then applying the sheet on top of that. He did recommend that I test the tape first to establish whether the tape performs as well on galv steel as he usually uses aluminium for the frame.*

Steel: *The steel being used will have to be galvanised as the exposure to the elements will cause the black steel to rust. However, further investigation will need to be conducted in regards to the method of galvanisation. There are a number of different options open to me. The first, is to buy all of the steel as black steel, weld the product up and then send it away to be hot-dipped galvanised. The second option available to me is to buy all of the steel as galv, weld the frames up and then paint over the welds. When I spoke to another technologist, Norm Bates, he said that it didn't really matter which method I chose as both methods would outlast the other materials being used by at least a decade. He explained that hot-dip galvanisation is the most durable method, however it is also the most expensive as they calculate the cost on weight and all the frames are very heavy. I would also need to work out where I would place drain holes for the zinc on the inside to drain out. By painting over the welds I would be saving a lot of money but only be sacrificing a little bit of durability as he explained to me that the ACP's would need replacing before the painted welds and frames did.*

Reo: *Reinforcing rod is vital to the strengthening of concrete and it will be used primarily for the foundations of each of the foundations. The technologist has recommended to me that I use 12mm threaded reo as this is a standard product and will give me the strength of concrete that I require to support the weight of the structure above. The reo will be constructed into a cage where it will be placed into the foundation for the main column with threaded bar on top whereas the corrugated curves will have the cages fixed to the posts and the structure will be poured in place.*

Plywood: *Plywood is another option I had to use for construction of the main column. The advantages of plywood are that it is easy to bend round into a curve, it is very affordable, and the different types of plywood can be treated to be more resistant to rotting and bending. The client was relatively happy with this material, the major draw card being the affordability of the product. He thought it would look good painted however recommended the use of a higher grade as both him and the board did not like the knots that were showing. Although the product is cheap, I still have some concerns over whether this material is capable of withstanding the elements over a long period of time. I have seen many examples of plywood which has failed to do this when used as signage and as an external cladding. I would need to consult heavily with a technologist if this final solution is selected.*

Concrete: *Concrete is the only material that is suitable to be used as a material to construct the foundations due to its strength. The concrete has to be strong enough to support the weight of the structures above it. Alex Quinn, a local engineer that I am using as a technologist, helped me design the foundations and recommended the use of 20 MPa concrete. All this is the weight that the concrete can support safely in mega pascals (20 mega pascals or 3000 psi).*

Veneers: *The client liked the use of veneers as it is a cheap alternative to constructing the sign out of solid material and it also makes the design look like it is constructed out of a higher quality material than it actually is. However, when I emailed manufacturers of the product they were not too keen to use their products outdoors as they are only intended for interior use. The products that they recommended me were ones that deteriorate quickly when exposed to the elements constantly, one of the products that I received information only had a life span of 3 years and at that cost, was an unrealistic material to be used for construction so this rules out high pressure laminates as a construction material for this project.*

Acrylic Glass: *Acrylic glass seemed like a good option however the client and board members were concerned that the acrylic would be damaged due to vandalism. You see a lot of this product around, particularly in the suburbs in bus stops because it is shatter proof and therefore safe to use, however you also see that this product is gauged and carved with graffiti and this is the major drawback. The board were worried that this could happen to this product if it was used in a sign here and if it did, the whole design would be ruined and would need replacing which would cost extra money that the church simply don't have and the chance of it happening on more than one occasion if it happened in the first place is significantly high so the board did not want to take this risk.*

Stained Glass: *This is a good idea from a design point of view as the glass would add a whole new element to the design with its translucency. However, the board were not too keen on this material as the risk of it being broken was high whether it be from vandalism or its close proximity to the road. The board noted the speeds at which cars travel down the road and how easy it is for stones to flick up and smash the glass. To toughen it would cost extra money and not simply, the board felt that there were better options of materials.*

Research-Corrugate Capping:



Drainage Pipe:

Drainage Pipe (weeping tile) is usually used for drainage along the walls of buildings, especially levels which are below ground. The pipe sits in a trench that is hard up against the wall and is then filled in with rock or drainage metal. This metal allows the water to seep through it and it runs through the small slits that have been cut into the pipe where it is then taken away from site through this pipe. The pipe is typically constructed out of plastic and is very flexible and durable.



Galv Steel:

To form galvanised steel, the steel goes through the process of galvanization where the steel is dipped into a molten bath of zinc heated to a temperature around 460°C. The zinc layer protects the steel by reacting with the air around it to form Zinc Oxide (ZnO) which protects the steel against corrosion when exposed to the elements.



Butynol:

Butynol is a roofing product used as a waterproofing layer and can be used as a substitute for roofing iron. Butynol is flexible and extremely durable, not corroding due to water. Butynol is installed using a gas torch and now can be installed using environmentally friendly adhesives.



Evaluation:

After reviewing a number of options that are available to me I have come up with a decision on which product would be best. The reasoning behind the decisions and results of testing conducted are as follows:

- **Drainage Pipe**-Although the drainage pipe would probably work because of its flexibility, the actual final product would be quite hard to produce because the pipe needs to be split right down the middle evenly and with the machinery that I have access to this would be very hard to do. The final product would also look pretty ugly because of the extra line that is created and this would contrast from the vertical corrugations of the iron too greatly.
- **Galv Steel**-This seemed like a good idea however I tested this idea in the engineering room where I made up the shape that I required and bent the Galv steel to shape. I was unable to bend it width ways with the machinery I had available and talking to the engineering teacher he said that even if I was able to do this the Galv steel would stretch across the width of the design and would not look very good at all. It could be possible to take cuts out of the sides to assist the bending however this would not look very good as a final product.
- **Butynol**-This idea is the best one that I have come across and is the most viable solution that I have available to me. The butynol can be heated up and melt around the corrugations and then be riveted to the iron. However, the rubber can't be painted as it does not hold it very well so this is the only drawback. Because I am using a dark colour for the wrap arounds I don't think this will matter as much as a lighter colour would plus the butynol capping could actually frame the design quite nicely.

Research-Legal/Ethical Responsibilities:

Safety: Safety is my number one legal responsibility as I have I need to ensure that the design is able to be constructed and implemented successfully without posing a threat to any one surrounding or working around this structure. This involves designing and constructing the structure to a high standard and ensuring that I do some planning as to what the design is likely to encounter such as wind exposure and potential loads. This will allow me to construct the product accordingly and reinforce the structure where required. I will also send the plans away for checking prior to construction to ensure that the foundation designs, framework and material selection are all correct and that they meet the relevant safety standards.

Copyright: Copyright, by definition, is a set of exclusive rights that have been granted to the author or creator of an original work. Because I am designing and producing a product I need to ensure that it does not copy or replicate and current solutions as I would be in breach of this act.

Code of Conduct: As this is a client negotiated brief and I am working for the client, he will have certain expectation of how I am to behave and act on the job. It is up to me to act in a professional manner when working alongside the client and sure that I meet and exceed his expectations. I also need to remember that I am representing the school in the wider community when I am working on this job so anything I do in association to this job will reflect back to the school.

Consumer Guarantees: The client is expecting to receive a professionally made product that fulfils the brief requirements and is able to operate as intended. Toe ensure that this happens I will need to seek the advice and guidance of local professionals that work within this field to get a better understanding of the construction standards and final finishes that are expected.

Compliance: The design will need to meet relative regulations in relation to the location of the environment. I have already determined that because the road is not a state highway there is no limitations that NZTA have in place as it does not fall within their jurisdiction. The only regulations that I have to comply with are those set by the Waikato District Council. I have already done some research into their requirements and it appears to be little in regards to the structure that I am creating however, just to be safe I will contact them again once the final design has been confirmed to make sure that the sign will comply.

Research-Ergonomics:

Looking through the standards of Ergonomics and the practical applications of this idea I was struggling to find the relevance of this and how it applied to my signage. Ergonomics is more based around the everyday use of an object such as a desk or a chair, however looking deeper at it, there are a couple of key principles that would apply to my brief and I would have to be mindful of them when I am designing the structure.

Ergonomics is the study of designing equipment and objects around the human body and its movement to achieve a better posture, comfort and prevent health affect as a result of long term use of that product. For instance, a computer desk has ergonomic principles surrounding its height, shape and design depth for ease and safe use. For a sign however, there are very few principles that apply to it as it is not something that is being physically used by a human. However, there are visual factors which do apply and these are stated in the regulations for signs in the New Zealand building code to do with font heights for comfortable viewing and comfortable viewing heights. Instead of preventing injury, the ergonomics that apply to the sign are more about making it easier for viewers to read what is being said so aspects such as contrast, visibility, height of the sign and font type will also need to be addressed. As most of the people reading the sign will be people driving past at high speeds the sign will need to be easily read and the font big enough and clear enough so that people passing by can read the sign quickly which will lessen the amount of time that they will be distracted from the road. Distraction from the road does raise safety issues so the design will need to be mindful of these issues and prevent them as much as possible. Having letters at an easily read size will be a start to ensuring that the design does not cause too much of a distraction and that the contrast between letters and background it significantly to assist in the ability to read the sign.

In summary, there are no set standards on ergonomics for signs however I can take the approach that I am designing a sign to be easily read and understood in a short space of time. This will help for people driving past in particular as at these high speeds there is less time where the viewer is exposed to the sign and the longer that person looks at it, the greater the risk of an accident occurring.

LETTER VISIBILITY CHART

LETTER HEIGHT	DISTANCE FOR MAX. IMPACT	READABLE DISTANCE
3 in.	30 ft.	100 ft.
4 in.	40 ft.	150 ft.
6 in.	60 ft.	200 ft.
8 in.	80 ft.	350 ft.
9 in.	90 ft.	400 ft.
10 in.	100 ft.	450 ft.
12 in.	120 ft.	525 ft.
15 in.	150 ft.	630 ft.
18 in.	180 ft.	750 ft.
24 in.	240 ft.	1,000 ft.
30 in.	300 ft.	1,250 ft.
36 in.	360 ft.	1,500 ft.
42 in.	420 ft.	1,750 ft.
48 in.	480 ft.	2,000 ft.
54 in.	540 ft.	2,250 ft.
60 in.	600 ft.	2,500 ft.

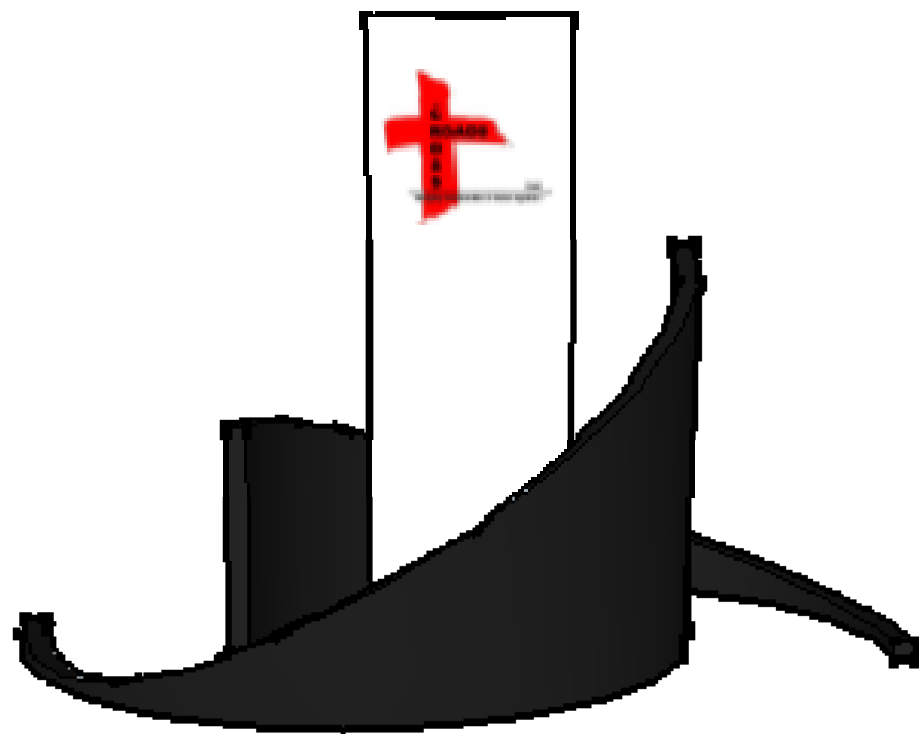
The Distances Vary With Different Colour Combinations.

Developments: Design #1



Design Overview:

This design is based around using some of the information that I obtained from the concepts meeting that I had with the board. I have used a central spire that is similar to what I had in the initial concepts. There were a couple people in the group that thought the spire alone was too plain so to add a bit of flare to the design I have incorporated two wrap arounds that will be constructed out of steel framing and can be covered in corrugated iron. This brings in the rural theme with the use of the iron which was a requested material from the board. The wrap arounds will also act as a contrasting form to the design and in my opinion gives a more welcoming and interesting impression. The centre spire will be constructed out of steel framing again however will be covered in ACP's which are very durable, relatively cheap and easily installed. The cross roads logo is incorporated into this design and is a sticker that can be made through the same people that I am getting the ACP's from. The design utilises all the colours of the church and the centre spire is white because this is the clearest colour to see from the road and from a distance, has a maximum impact.



Clients Impression:

The client was blown away by the design and thought it was a viable option for the brief that they had presented me with. The client was particularly impressed with the wrap arounds and he felt that this added a whole new dimension to the design and made the design both visually impressive and attractive. He noted the colour of the centre spire and was happy with the reasons that I had supplied him with in terms of my justification of the colours to create the most visible design possible. He liked the fact that the cross stood out from the design and was main feature within the design because they are after this sign to be instantly recognised and the crossroads logo is a symbol which can do just that. He liked the use of the materials within this design and felt that the corrugated iron in particular gave the design a real rural connection and suited the environment that it was going into.

Developments: Design #2



Design Overview:

This design is has a small twist and is based largely on what I produced during the concept stage. The sole point of this design is to offer a simpler, cheaper alternative to the first design that I had produced. The client has strict restriction set in place in terms of budget and the amounts that they have available to put towards this project. The first design is rather expensive, therefore this concept is a simpler version that if the client chooses can be a viable option for the brief. The design has two curved faces, these faces will be corrugated iron and will be screwed to a steel frame which supports the whole design. On the ends I have used ACP's to finish the design and offer a bit of contrast in terms of texture. The top is also an ACP which will be custom shaped to form the shape of the cap required. The design is white because this is the colour that stands out the best from the environment that it is going to be situated in. The cross on the log will be constructed out of corrugated iron and painted red and the lettering of the logo will be stickers which will be made through the same person that I am getting the design through the ACP's from.

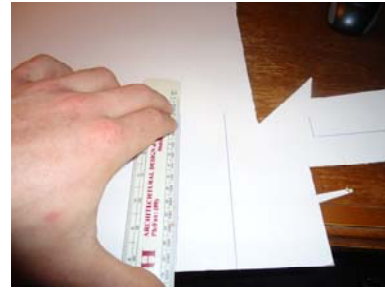
Clients Impression:

The client saw the potential for this design and recognised the importance of giving the board two choices. Although he liked the first design the best he saw was able to relate to the fact that the more complicated the design, the larger the costs are involved. He liked the idea of the corrugated iron being the dominant material in this design as it really brings out the rural feeling about the design which suits the environment that it is going into.

Photographic Diary: 3D Model Construction



To start construction of the models I used both corrugated card and plain stiff card as my raw materials of construction.



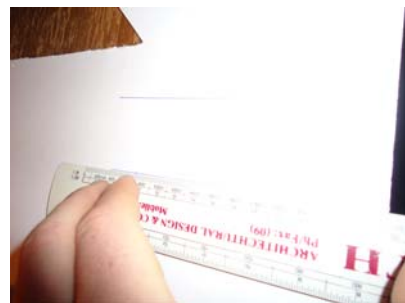
I first drew the shape required using a pen and scale rule.



Once the shape had been drawn I used a pocket knife to cut the shape out on the corrugated card.



I had to use scissors to cut out the shape with the stiff card because the top layer peeled off as seen above.



Once all the shapes and sizes of the pieces had been cut out I double checked the sizes using the scale rule.

To stick the pieces together I used a hot glue gun and clear glue sticks.

Once the glue gun had heated up enough I applied the glue to one edge of the model piece.

With the other hand I held the separate piece in places and waited for the glue to set.



To strengthen the joint I ran some glue up the inside edge.

I used the hot tip of the glue gun to melt the visible glue and this removed all the lumps seen which gives a tidier finish.



To glue the wrap arounds in place I used wood glue and applied this to one side of the shape.



I applied the other edge of the shape and then put the component under a heavy piece of wood to set overnight.

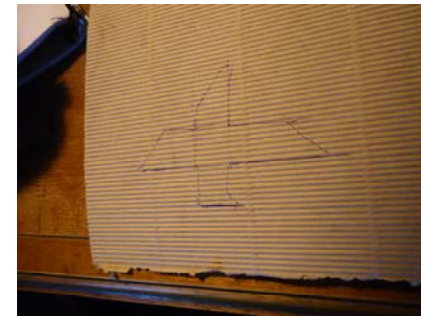
Photographic Diary: 3D Model Construction



Once dry, I had to shape the object to the desired radius. It just so happened that the radius of our plates are the right size so I used this to bend the component to size.



I then required a cross for the logo. I made this out of the same corrugated card that I used for some of the other components.



I drew the shape on a piece of the corrugated card using pen.



When happy with the final shape I used scissors to cut the shape out.



I required two of these shapes for each side of the design so I used the first one and traced around it to produce the second cross.



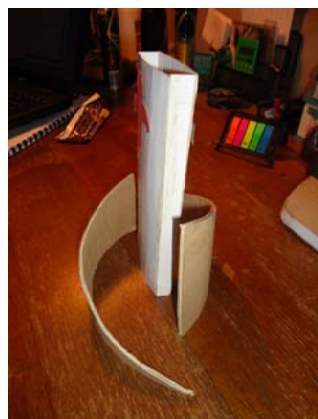
I used red vivid to colour in the cross.



I used blue tack to apply the cross to the design. This allowed me to make the crosses interchangeable between the different designs.



The second design was constructed using exactly the same methods.



A range of different views of the 3D model of design #1 that I have produced.



A range of different views of the 3D model of design #2 that I have produced.

Initial Quote-Design 1

Material	Description	R.R.P/Quantity	Amount Required	Total Price GST Inclusive	Company/Supplier
Concrete	20MPA	\$250/m ³ deliv. Incl.	2m ³	\$500	Schular Thames Valley
Corrugated Iron	Standard Zinc- 760mm cover	\$22.50/m	40m	\$900	NZ Steel
CAP Sheet	3650x1500mm sheet	\$295/sheet	3 sheets	\$885	Art Effects-Thames
Tape	Double-Sided Tape	\$120/roll	1 roll	\$120	Art Effects-Thames
Steel-RHS	125x75 Galv	\$50/m	12m	\$600*	NZ Steel
	75x75 Galv	\$35/m	11m	\$385*	NZ Steel
	75x25 Galv	\$19/m	25m	\$475*	NZ Steel
Steel-Flat	50x5 Galv	\$17/m	12m	\$204*	NZ Steel
Steelite Screws	Screws	\$0.30 each	400	\$120	NZ Steel
Excavation	Foundations, scraping				
Reinforcing	10mm threaded Reo	\$11/m			
Paint	primer	tbc			
	colour	tbc			
Corrugate Cap	Material/method undecided	Investigating Cheapest	Method Available	and Further Testing Needs	to be Done
			Current Total	\$4,189	
	Unforeseen costs	15%		\$628	
			Estimated Total	\$4,817.00	
	*note freight not included in steel calculations				

Initial Quote-Design 2

Material	Description	R.R.P/Quantity	Amount Required	Total Price GST Inclusive	Company/Supplier
Concrete	20MPA	\$250/m ³ deliv. Incl.	1.8m ³	\$450	Schular Thames Valley
Corrugated Iron	Standard Zinc- 760mm cover	\$22.50/m	25m	\$563	NZ Steel
CAP Sheet	3650x1500mm sheet	\$295/sheet	1 sheet	\$295	Art Effects-Thames
Tape	Double-Sided Tape	\$120/roll	1 roll	\$120	Art Effects-Thames
Steel-RHS	125x75 Galv	\$50/m	12m	\$600*	NZ Steel
	75x25 Galv	\$19/m	30m	\$570	NZ Steel
Steelite Screws	Screws	\$0.30 each	200	\$60	NZ Steel
Excavation	Foundations, scraping				
Reinforcing	10mm threaded Reo	\$11/m			
Paint	primer	tbc			
	colour	tbc			
			Current Total	\$2,658	
	Unforeseen costs	15%		\$400	
			Estimated Total	\$3,058	
	*note freight not included in steel calculations				

Final Brief:

I met with Steve and the chairman of the Cross Roads Board to show them the final proposals that I had constructed. I had accumulated the relevant information such as rough costing, dimensions, material samples and construction to give them a more informed decision to make. After viewing these they decided to go with design 1 however could not make a final decision until they had consulted with the rest of the board at their meeting later on that night. The reason for the separate meeting was because I was unable to make the meeting due to sporting commitments so this meeting was a replacement. The next day, Steve contacted me to say that the meeting went well and that the board had decided to go with design #1. This allowed me to produce a final brief and take a step closer to starting construction. Below is the developed brief which has been reviewed and any changes have been highlighted using Green text.

Context: Signs have been used throughout history and over time, have developed according to the needs and desires of the cultures that use them. The definition of a sign is a symbol that is used to transfer information to observers through the use of pictures or text. Symbols have been used amongst humans since the very beginning of artistic expression. However, the first known application of symbols to form signs has been recorded in ancient Rome where Roman numerals were carved into marble columns along roadways to inform travellers the distance to Rome. As towns and cities began to grow these signs developed and then applied to crossroads to inform travellers where they were headed. In the early 1900's, following the introduction of early cars and automobiles the first set of road signs were developed. These early signs were either painted or carved onto wood. In the 1970's, the first neon tube sign was developed to be used on a newly-opened freeway. Over time, technology has continued to improve our road signs. Initial changeable signs consumed a lot of energy and were very high maintenance. With the introduction of LED technology, signs have become a lot more efficient to run. With this, signs have now become more elaborate, often featuring multiple messages electronically programmed into the sign to provide different lighting, flashes, patterns and messages. This allowed signs to become more eye-catching to people passing by and also allowed these signs to be used at night effectively.

Issue: Steve Millward is the pastor for Crossroads church. They are a newly established church and have recently completed the construction of their new building based at the heart of the community of Mangatangi. The church has now been fully operational for a few months now the church now require a roadside sign to promote the church and make it easy to locate. Steve also has a vision to have the whole complex have an overall unified theme. This means that the solution would have to be based on features of the existing structure. **It was noted in the meeting that matching the building was no longer a concern as the actual viewing time of the building from the road when driving past was only a few seconds. Instead, emphasis has now been placed on ensuring that the structure matches the surrounding community and reflects the rural background that Mangatangi has. The design needs to be unique and eye catching to ensure that it attracts the attention of traffic passing by and commands a 'second look'. This can be achieved either through shape or colour.**

Need: The client requires a sign promoting the church to be situated at the roadside. This needs to be clearly visible and match the theme of the existing structure. **The sign no longer needs to match the church. The client requires a sign that promotes the church and is eye catching. The sign must incorporate the full crossroads logo and display relevant contact information.**

Opportunity: This project gives me the opportunity to research existing materials, safety requirements, and legislation specific to the proposed solution. I will also be given the opportunity to design an original structure specific to the client's brief. During the construction process I will be able to gain experience within the area of technology and this will provide me with skills that I can use for a trade or apply the management aspects of this project to running a business.

Final Brief:

Restrictions/Constraints:

- ◆ **Budget**-The church have been allocated \$12,000 of funding towards this project. Obviously this is a very healthy budget and this will allow me to be more creative with the design however I will need to ensure that this project does not exceed the budget. *I have recently been advised that the budget was not what I originally thought. As I was discussing design ideas with the main client, he informed me that they had received an initial quote for a sign valued at \$12,000, and that it was a misunderstanding. The budget that the church are looking around is \$2,000. This is a significant reduction in what I had initially planned for so the design may need to be adjusted to try and meet these new budget requirements. The client and Board have moved to accept my initial quote for the design. This gives me a little flexibility within the budget however I will need to be mindful that I finish the product close to the quoted price but I would have a maximum limit of \$5000..*
- ◆ **Location**-The sign will be situated beside the road. There may be some legislation or requirements about the distances or sizing's in regards to building a structure of this nature beside a road. *Research conducted into the location and potential legislation surrounding it indicate that there are no real regulations surrounding the structure as the design is situated in the church's property and does not fall on any road reserves. Because of this, the regulations surrounding it barely apply. An issue arose around the boundary fence that had been put in place. The fence appears to be a good 3 or 4 meters back further back from the road than next door properties. It was noted that if the little section of land in front of the land was the property of the church, they would simply just moved the fence and bring the design up to the edge of their property boundary for the closest proximity to the road in order to have the best possible impact.*
- ◆ **Timeframe**-This project needs to be completed as part of my folio before the end of term 3. Ideally, I will have the solution in place before this date so that I have more time at the later end of the term to tidy up my folio and prepare it for marking. *This timeframe still stands however I would like to finish the design as soon as possible so that I can have enough time to study for my practice exams and end of year exams.*
- ◆ **Materials**-There has been no specific mention of materials and my client is open to the concepts that I will put forward. The materials may be limited to the design though as the sign has to match the existing building. This means that the colours and line within the design could restrict the materials used. *The design will be constructed from a galv steel frame and finished with corrugated iron and ACP's.*
- ◆ **Safety**-The design, due to its size, will have a number of restrictions in terms of safety. The sign will have to have secure foundations which will prevent it from falling over and potentially injuring someone. The sign also has to be safe for people who may be walking past the design. The solution will have to be free from sharp objects, exposed moving parts and overhanging pieces and free from general hazards so that people walking past cannot be hurt.

Brief: I am going to plan, design and test a solution to the clients issue.

Identified Main Client: Steve Millward, Crossroads Church, Mangatangi

Client Specifications:

- ◆ The sign must match the corresponding building to ensure that there is no significant clash. *This specification is no longer relevant. Instead, the design must reflect the rural community and the surroundings as seen from the road by passing traffic.*
- ◆ The design must be durable and able to withstand a range of weather conditions and be free from defects such as colour fade and cracking.
- ◆ The final product must not exceed the allocated budget.
- ◆ The client is open to ideas regarding proportions, shape and materials used for the design.
- ◆ The sign must have the crossroads logo and motto within the design somewhere. *Modification to incorporate FULL logo with arrow and symbol included.*

Final Brief:

Key Factors:

These Key Factors have been reviewed and are still relevant to the project and there can has been only a couple of notable that has arisen as a result of this review. The remaining key factors are true and accurate.

- Budget:** *The Budget is healthy as \$12,000 worth of funds has been allocated towards this project. I need to ensure though, that I carefully plan the design so that I can be sure that the design will not exceed this budget. This means that the design will need to be thoroughly priced prior to construction and if necessary, cheaper alternatives sought after. **The budget has instantly been promoted to the most important key factor as I learned that the \$12,000 dollars was a misunderstanding between parties. The budget they would like the sign to be constructed for is \$2000. Personally, I think this budget is a bit unreasonable considering the amount of materials that need to be purchased and the design objectives they have put in place. However, I will take all measures to ensure that I reduce the cost of the final design as much as possible to ensure that I can close the gap between their budgeted price and the final estimated costing. The client has become more flexible with the budget after seeing the initial quote. He has decided to reprioritise some projects in order to free up funds for this design as he sees it as an important project, without it the church looks unfinished. This means tat I have the ability to construct the design to the quoted price however there is a little breathing room with a maximum budget of \$5000. The client is happy with the budget and is under the impression that it will cost whatever it costs, so long as the design is completed to a high standard and within a reasonable price he will be happy.***
- Time:** *Time has become more important because the design will depend entirely on whether or not I think that it can be completed before my deadline. Although I have until the end of term 3 I would prefer to have the project finished before this date so that I can spend the remaining time putting together the folio and touching it up prior to it being sent away. **Time remains as the number two most important key factor as the description written above still applies.***
- Safety:** *Safety is a hugely important factor as I am designing this product for somebody else. In particular with this sign, the foundations will be crucial. Depending on the design, there may be a fair bit of load that will need to be supported and the first step with this is getting the foundations right. This may require consultation with an engineer to ensure that the design will be able to be supported by the foundations and there is not risk of falling down, potentially injuring someone around it. **Safety has been promoted to the 3rd most important key factor due to the size of the structure. Because of this there are a lot more aspects that come into play, in particular the affect that wind will have on the structure and how the foundations will cope with the extra weight. This is important to consider as if I were to get this wrong, ultimately the design could fail structurally and could potentially injure someone who may be near it at the time.***
- Client:** *Steve will play a hugely important role in this project as he is my main contact for the church and it will be his initial ideas that get my designing process up and running. However, Steve is not the only person that needs to be satisfied with the final product. Crossroads church, like any other organisation, has a board of representatives that manage and maintain the church. These people will also have their opinions on how the sign will look and consultation through group meetings will need to be conducted regularly to ensure that everybody is happy with the process and that a solution can be reached that everybody is satisfied with. **Although client has been bumped down it is still a significantly important factor as Steve, along with the board ultimately decide what is going to be built. The board is comprised of a large number of people, each with their own different opinions and design tastes. This means it will be harder for a design to be approved straight away and more work will need to be done during the designing phase to ensure that a compromise can be reached by all.***
- Materials:** *The design will be situated outside full-time. This means that it will be exposed to the weather all year round. I will need to carefully select the materials so that I can be certain that they will be durable within these conditions and able to withstand these for years to come, not only in strength, but in appearance as well. **Materials has been moved up as there has been a lot of emphasis placed on the use of materials and how this can affect the appearance of the design and the ability that design has to blend in or match the surrounding environment. Because the client changed his preferences on the requirements of what the structure should match (the rural community instead of the church) the use of material has become even more important and the incorporation of rural materials such as corrugated iron and natural timber need to be investigated. The design will be constructed out of steel and corrugated iron and finished with ACP's***
- Religion:** *This sign is being designed for a church. Because of this, I will need to conduct some research into some of the symbolism and phrases used by this religion to ensure that the sign is appropriate. I will need o be careful as there could be some symbols, words, patterns or phrases that could be seen as offensive to people using these facilities.*
- Environment:** *The client has said to me right from the start that he would like a sign that matches the style of the church so that the whole complex has a form of unity. **This has now been changed. The environment now focuses on the community as a whole and the design needs to reflect the rural upbringing of Mangatangi. There I no longer a major emphasis on the design matching the existing church building as the church is not very visible from the road, instead the focus has been put on making the sign as eye catching as possible and ensuring that it links to its rural roots.***
- Skills:** *At this stage, It is too early to tell whether the skills I have will be adequate to the project that I am doing. The skills I have and their effectiveness for this project will be determined mostly by the design itself and the materials used. **The final design features steel and ACP's. I have the relevant resources to work with these materials but not the required skill. However, there are a number of people that I can use for help and they will be able to teach me the relevant skills associated with the job***

Working Drawing:



Cutting List:

<u>Component</u>	<u>Material</u>	<u>Actual Length</u>	<u>Allowance</u>	<u>Cutting Length</u>	<u>Finish</u>	<u>Quantity</u>	<u>Completion</u>
<u>Centre Spire:</u>							
Foundation Posts	125x75 Galv RHS	3850	0	3850	Safety Edges	3	
Horizontal Ribs	50x5 Galv Flat		200		Rolled to curve	8	
Curved Front	ACP's	3650x1300	-	-	Peel off cover sheet	2	
Side Panels	ACP's	3650x135	15	3650x150	Peel off cover sheet	2	
Capping panel	ACP's	custom shape	-	-	Peel off cover sheet	1	
Foundation	Reo						
	Threaded Bar						
	Steel Plate						
<u>Large Corrugate Wrap</u>							
Foundation Posts	75x75 Galv RHS	varying	0		Safety Edges	3	
Horizontal Ribs	75x25 Galv RHS	Custom			Rolled to curve		
Covering	Corrugated Iron						
Capping	tbc						
<u>Small Corrugated Wrap</u>							
Foundation Posts	75x75 Galv RHS	varying	0		Safety Edges	3	
Horizontal Ribs	75x25 Galv RHS	Custom			Rolled to curve		
Covering	Corrugated Iron						
Capping	tbc						

Final Evaluation:

Evaluation of the Final Design:

The final design was produced according to the client's specifications that he had set. The best way to evaluate the design in terms of function and suitability is to compare the final product with the specifications. The client requirements are listed below along with the procedures that I took to ensure that they were satisfied.

- **The design must reflect the rural community and the surroundings as seen from the road by passing traffic.**

The structure that I have produced is one that contrasts the surroundings as seen from the road in terms of shape and colour. The colours that I have chosen have been taken from the church building so in this respect the design does tie in with the theme of the church and there are some similarities between both structures. Overall, the final design stands out from the intended environment which is what is required if it is to function as a sign. By standing out, the sign will be more visible and easier to recognise which fulfils the requirements of the original brief. In saying this, the design is not so prominent that it overpowers the environment, by incorporating curved forms into the design and careful selection of colours I have ensured that the design does not contrast the intended the environment too greatly and I have avoided producing a design that is overpowering.

- **The design must be durable and able to withstand a range of weather conditions and be free from defects such as colour fade and cracking.**

The design's durability comes from how it is constructed. I spent a great deal of time investigating a range of materials and their properties. I have decided to go with galvanised steel as the frame. This steel doesn't rust and is strong, being capable of supporting the design against the strong wind exposure that the design will encounter. The design is also curved as a result of consultation with my technologists. It was discovered that the design will be more protected as the force of the wind will be partially deflected when hitting a curved surface as opposed to a flat one. The ACP's have a life of 10 years. This is extremely sustainable as the client and board are bound to have changed the format or some aspects of the design within this time frame so this is a very good deal. The ACP's are also very cheap to buy so replacing them will not be a huge expense which is another positive. The third material used is corrugated iron. Although this is not the most durable material I will be painting over this so the paint will act as a weather proofing which will prevent the iron from rusting and will prolong the life of the material. With these materials combined I am confident that the design meets the requirements that the client had set of wanting a design that is durable and capable of withstanding the elements over a long period of time.

- **The final product must not exceed the allocated budget.**

The client was looking at a relatively unrealistic budget of \$2000. Although I did my best to try and reduce costs and keep within this budget, the cost of materials alone exceeded this budget but quite a significant amount. After the final presentation of the design the client decided to go with the design that I had chosen with the budget that went with it. By rearranging the church's finances and putting other projects on hold this design would be able to be achieved. The client thinks this project is important and he would like to get it done. As a result they have accepted this budget as their own and would like the design constructed according to it. At this stage, the design should not exceed the price that I have quoted as I spent a lot of time planning the costing's to ensure that they were accurate. I have also given myself a bit of money to account for unexpected costs. Because of this, I am confident that I will be able to stick within the budget for this project.

- **The client is open to ideas regarding proportions, shape and materials used for the design.**

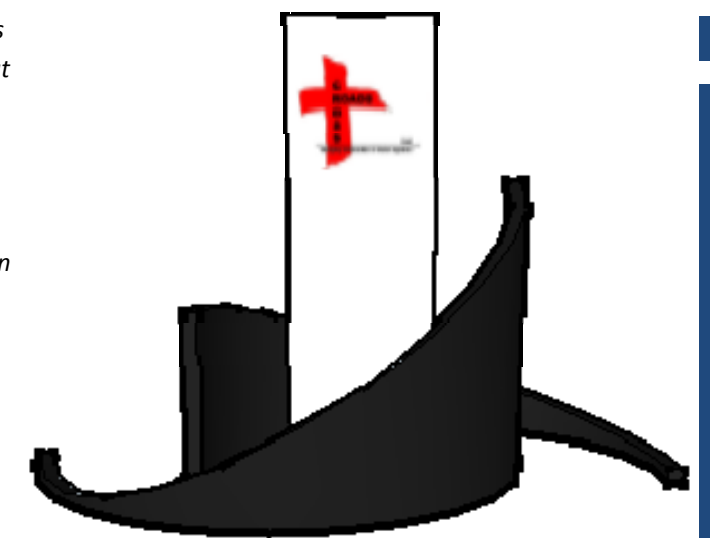
This aspect was hard to work with as the client gave me no real specifications that he wanted to work with. Through consultation I was able to identify that the client had an interest in angular forms and flat, square objects. However, the client was not the only one on the board and after the first board meeting I discovered that they all had very different ideas on what should be constructed and very different tastes when it came to preferences on shape and form. No one was really keen on the fact of incorporating curved shapes into the design. However, through further consultation I was able to show them that curved forms would be the most appropriate to use as it is the most welcoming and interesting to look at from a design point of view however curved forms also serve a practical function as the wind hitting a curved form partially deflects the wind and as a result suffers from less stress due to wind than a flat shape. In terms of size, again the board were unsure however I was able to identify that there was a significant drop from the road to the intended environment so in order for the sign to have the most impact the design would have to be around 3 or 4 metres high. The board accepted this solution and were happy with the work that I had done in obtaining this outcome. Overall I think the design meets this criteria perfectly, although the criteria was mostly self-imposed as the client was unsure on what he wanted, without realising it he actually gave me the criteria he wanted through further consultation when I talked to him about concepts, relative heights and materials. As a result I was able to ensure that the design met these requirements so that the client was happy and the design was appropriate to the environment in which it was going to be placed.

- **The sign must have the crossroads logo and motto within the design somewhere.**

One of the key focuses for this design is recognition. I have spent a lot of time looking into the design and trying to ensure that it can be instantly associated with the church. To do this I worked on incorporating the church's logo into the design and creating the right sort of contrast so that the logo could stand out from the structure and be easily seen. To do this I used a red cross which stood off the white background. This allows the cross to be easily seen from a great distance and is exactly what the client requires. The whole logo including the arrow is used in this design which was what was specifically requested from the client and the board. This is in keeping with the requirements as stated.

As seen above, the design that I have produced has met all of the requirements that the client has given me. This illustrates that the design is appropriate for its intended use and is a good measure of the job that I have done to provide a solution to the client's brief.

One of the most important things for me to ensure was that the design suited the surrounding environment and that it would not look out of place when finally put into the intended site. One aspect that needed to be taken into account was the fact that the site dropped down away from the road. This meant that the design had to be designed taller than originally intended so that it could have the same impact on people driving along the road. Another aspect that needed to be addressed was the wind exposure that the design could be open to. I was informed by the board that the wind can get quite strong and that the design would need to account for this. After consultation with my technologists arrangements were made to further reinforce the foundations that the design sits on and to also increase the strength of the framework that ran through the middle of the design. When these two alterations were made the end result was a design that was stronger and would be able to withstand the



Final Evaluation:

Evaluation of Key Factors:

Budget: This was the most important key factor towards the end due to the misunderstanding between the client and me. I learned that the budget had changed significantly to around \$2000. To combat this I tried to keep costs as low as possible and then priced up the design. After the client and the board reviewed this they decided to compromise and accepted the final costing.

Time: Time, or the lack of it, has always been a significant factor. I found I was being overwhelmed with academic and sporting workload and I found I wasn't getting much done at all as I had hockey most nights. To solve this I changed my timetable around. Instead of trying to stay up late and do school work after hockey, which was often pointless because I was exhausted, I started going to bed earlier and getting up at 5am to do work before school. I am a morning person by nature and this was a lot easier. As a result, I was able to complete the work set and hockey was not interfering.

Safety: Safety is a huge factor and was something that was kept as a key consideration for the design. To ensure that safety was maintained and to be reassured that the design that I had produced was safe I sought the advice of technologists and looked over the regulations surrounding this activity that the council had.

Client: The client played a significant role in this project. When we started out, the client was very hard to get a hold of however as we worked more and more together I began to pick up on methods that allowed me to work more effectively with him. When I arranged meetings with the client I ensured that I planned ahead and worked out what I would need to get from him in advance of the stage I was doing as I knew that he was difficult to get in touch with due to his busy schedule. I also utilised the email by sending things through that which proved to be a huge advantage.

Materials: After I did the concepts it became clear that there were going to be some restrictions around materials where they wanted the design to reflect the local community. This meant using materials that could be portrayed as rural and ensuring that they matched the surrounding environment. I used corrugated Iron and I also used ACP sheets. The corrugated iron is typical of being associated with the rural community and this suits the surrounding farming background. Although the ACP sheets are not considered to be a rural material, it provides a good contrast in texture and compliments the corrugated iron nicely.

Religion: The religion factor was huge in terms of the design as it was important I didn't offend anyone from the use of inappropriate colour or symbolism. To ensure this was not the case I worked with the client during the design process and consulted with him in terms of design, symbolism and colour to make sure that the sign was not going to be offensive or contrast their beliefs.

Environment: Starting out, the design had to match the surrounding environment including the church design in terms of colour, shape and proportion. After consultation it was found that this was not a crucial factor and instead, the client preferred that the design reflect the surrounding community instead. To do this I made a design that reflected the rural theme using colour and materials that are commonly seen around the community as it is a rural setting. In doing this I was able to satisfy this factor.

Skills: The design had a lot of steel in the framing and I will be required to weld this up when I start construction of the project. I don't think this will be a factor as I have plenty of access to the necessary equipment to do this and it is just a matter of being taught. I feel that I am a pretty quick learner and this should not be a problem when it comes time to construct the design.

Legal Requirements: The legal requirements were crucial in this design. I needed to ensure that the design was going to comply with the relevant legislations otherwise the design was at risk of being ordered for demolition and this could also have implications on me or the client. Fortunately the regulations I had to comply to were minimal and the only real constraint was building the design in the clients land. Other than that, I was able to do what I liked in terms of design and usage which was a huge advantage for me.

Client Evaluation of the Final Design:

What are your thoughts on the design?

I like the design very much

It fits our landscape, complements our building, and addresses our need to advertise who we are

Would you change anything about the design if you were to do it again? Why, why not and what are the thoughts or ideas behind the changes being made?

No I wouldn't change the design

I like it very much

Did it meet the requirements you had set? How?

I think Trent has done an excellent job. He has taken on board all the suggestions made and has come back with various options of which we adopted one that fits the bill in every way

See above for more detail

How did I perform during this work? Was it up to standard? How? Why/why not?

Trent has performed at a very high level of competency and has adopted a professional approach to everything we have done

I cannot wait to see the final result

What were your thoughts about the presentations I did and would you have any advice or recommend I make any changes to it for future reference? Were the methods of modelling appropriate? (E.g. PowerPoint, 3d models etc.) Why/why not?

I thought the powerpoint and the 3d models were able to convey all the information we needed to make the right decisions

Thoughts on material selection and combinations?

I like the combination of materials and the colours adopted, and I like the size recommended to us by Trent

All in all I think Trent has done an excellent job

Anything else you would like to add or comment on.

Through out the process Trent has been respectful, prompt, on time, helpful, creative, hard working and diligent.

I could not have asked for more.

Yours Truly

Steve Millward