Pillar Engineering Consultants
Group 4
Colin Coombes
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EN 8700 –Engineering Project Plan

Design of Overpass -
Topsail Road Access Interchange on the Team Gushue Highway
Mount Pearl, NL

Client:
Dana Dalton and Lloyd Osmond
Department of Transportation and Works

Prepared for:
Dr. S. Bruneau, Memorial University

Tuesday, February-01-11

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1 Project Description

The project being completed by Pillar Engineering Consultants (Pillar) is to design a prestressed concrete overpass at the Topsail Road access interchange on the Team Gushue Highway (TGH). The TGH currently extends from the Outer Ring Road to Kenmount Road. The proposed extension that can be seen in Figure 1.1 will provide service through the centre of St. John's and into Mount Pearl where it will link into the Pitts Memorial Highway and also provide service to the Goulds Access Road and the Southern Shore Highway. The overpass being designed for this project is for an access ramp that must pass over the TGH at the Topsail Road interchange.

The project will include highway design of the ramps leading to the overpass including the alignment and the superelevation required. Based on the highway design, the maximum clearance available for the overpass can be determined which will form a constraint for the overpass design.

Three types of structural supports are being considered for the project and are as follows:

- Canadian Precast Prestressed Concrete Institute, or CPCI, Girders,
- Prestressed Box Girders,
- A Pre-Tensioned Deck.

Each type of structural support will be investigated for its feasibility, its advantages and disadvantages compared to the other feasible support systems, and its cost.

A detailed design of the chosen type of overpass will be provided with detailed hand calculations and software analysis. The main elements of the overpass that will be designed are the girders, the deck, the abutments, and the footings. Along with the detailed design, a detailed cost estimate of the overpass will be provided in a final report for the client and the course instructor.

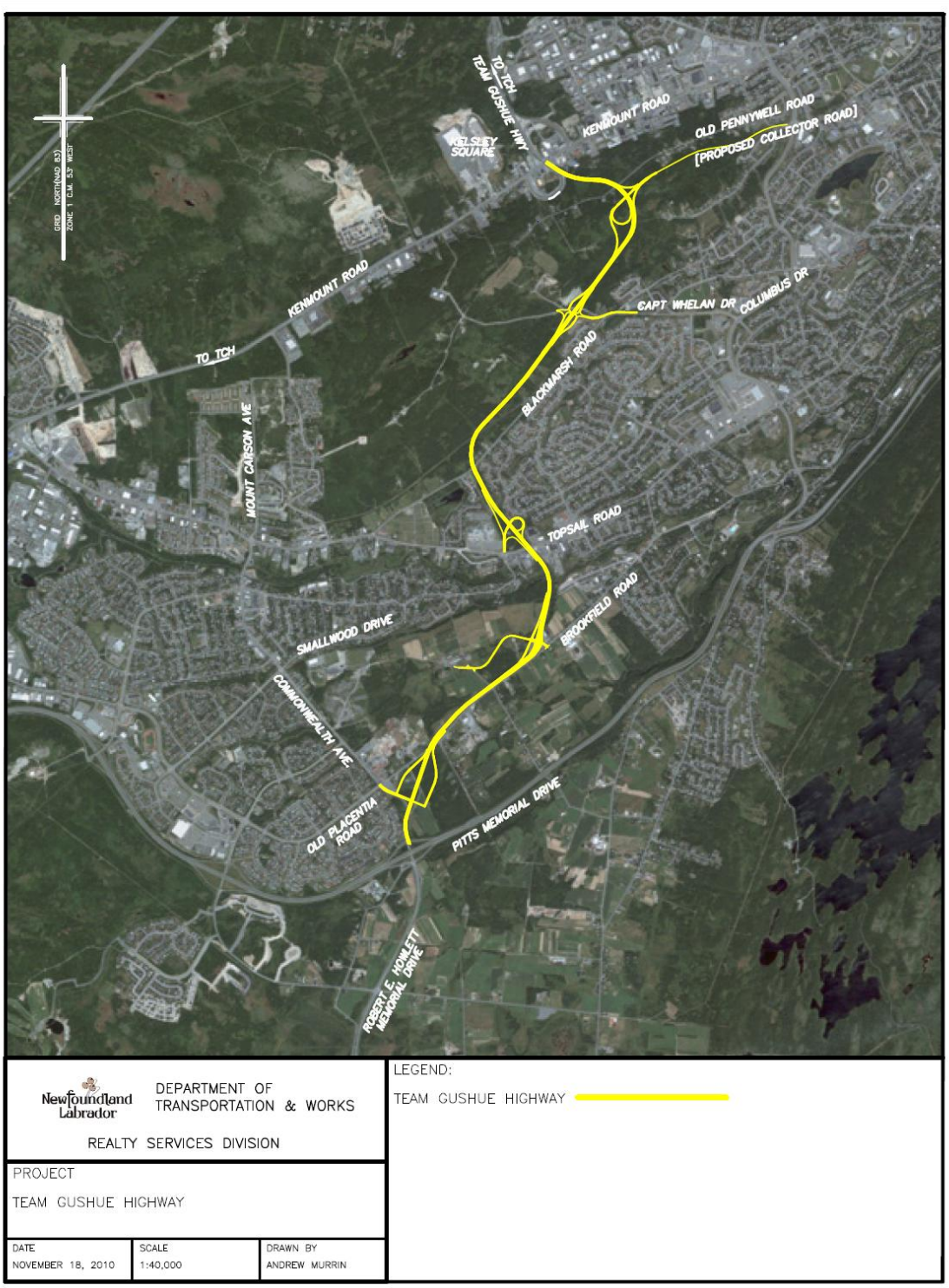


Figure 1.1: Proposed Team Gushue Highway Extension Route (Murrin, A., 2010)

2 Statement of Project Requirements

The student requirements for this project are as follows:

- Determine ramp alignments approaching the overpass
- Determine the superelevations required for the ramps based on TAC guidelines
- Calculate the available clearance below the overpass
- Investigate different overpass alternatives, including; a prestressed CPCI girder, a prestressed box girder, and a post-tensioned deck
- Choose the most appropriate and cost effective alternative and fully design the overpass including the girder, the deck, the abutments, and the footings
- Provide both software based and hand calculations for all the detailed design work
- Develop a detailed cost estimate for the chosen overpass

3 Methodology

Pillar Engineering Consultants were retained by the Newfoundland & Labrador Department of Transportation and Works (DOT) on January 17, 2011 to design a prestressed concrete overpass at the Topsail Road Access Interchange on the Team Gushue Highway in Mount Pearl, NL.

3.1 Scope of Work

Scope of work for the project includes the verification of ramp grading and superelevation, required overpass clearance height, as well as structural design of the concrete overpass including necessary foundations and retaining walls. Concurrent with these tasks, Pillar will research various concrete overpass structures, including post-tensioned deck, prestressed box girder, and prestressed CPCI sections. This research will be used to determine the most feasible design option given the restrictions of superelevation, road clearance, and span length.

The centerline grading of the ramp has been previously determined, while the superelevation must be calculated using ramp design speeds. The determination of the superelevation of the ramp at the beginning of the overpass will govern the deck's superelevation and in turn, determine the attainable road clearance below the deck. The minimum clearance can be no less than 5.0m. The clearance will then determine the maximum depth of the overpass deck, which will have a major impact on concrete structure selection. The concrete structure selection will determine the maximum allowable span length, which influences the overall design of whether the overpass will be a single or double-span structure. Design of the overpass structure will be completed as per CSA Standard A23.3-04 Design of Concrete Structures, CSA Standard S6-06 Canadian Highway Bridge Design Code, and the Government of Newfoundland & Labrador Transportation and Works Master Design Specification.

3.2 Group Roles

Each member of the group has been given certain responsibilities within the project. This member may do all the work in their given area or will delegate certain responsibilities to ensure all timelines are met and to keep each member's work load approximately equal.

Ben Gerrior is responsible for the cost estimates, the road alignment calculations and document control. As part of his responsibilities, Ben will track and maintain any documents relating to the project that are acquired either by our own means, from the Client, or Memorial University faculty members. Ben will be working closely with Matt in the first few weeks of the project on the road alignment calculations while Colin and Jordan will be focused on completing the project plan. During the detailed design phase, Ben will insure the proper quantity takeoffs of each section are determined and will lead the detailed cost estimate which will be a group effort.

Colin Coombes is assigned the role of project manager and is responsible for the project scheduling, editing of project deliverables, and drafting. Colin is responsible for insuring deadlines are met and keeping the group on track with the project schedule. During the detailed design phase, Colin will be responsible for any drafting work that will be required for the final report. It will be up to Colin to delegate reporting tasks when required.

Jordan Hardy is responsible for research and insuring all codes are met throughout the design phase. Jordan's leadership over the first few weeks on researching relevant codes and design options leading up to the detailed design phase will be vital to insure the group progress into the design phase according to plan. He will also be responsible for delegating research topics to each member when required and insuring all relevant codes are met through the design phase.

Matt Hardy is the lead structural design engineer on the project and is also sharing the road alignment calculations with Ben. It is Matt's responsibility to provide the main structural design for the project and to delegate design tasks to the other members as required. Each member will be working closely with Matt throughout the design phase in particular as each member's work will be very dependent on the chosen designs. Matt will also be responsible for the alternative selection phase of the project with Jordan's assistance in research.

3.3 Client Interaction

Meetings with Pillar Engineering Consultants and the clients from the Department of Transportation and Works will occur every Thursday from 3:00 – 4:00 PM. Every Wednesday, a meeting agenda will be emailed to the Clients to give an outline of what will be discussed at the meeting and meeting minutes will send by email following each meeting as a summary of what was discussed.

The Clients have been very forthcoming with project data and advice since Pillar was selected with this project and will continue to provide guidance throughout the term. The weekly meeting will be used to discuss progress with the project, clarify any uncertainties Pillar may have, and overall to insure that

Pillar remain on the correct path to completing this project. In return, Pillar are committed to working to the best of their ability on this project and to meet all deadlines set out by Pillar or by the Client for each weekly meeting.

3.4 Work Strategy & Expected Outcomes

In order to complete the project efficiently, Pillar plans on meeting as a group at least twice a week and assigning personal tasks each week to be completed throughout the week. The first weekly meeting will be Thursday night following the meeting with the Client in the afternoon. This will provide the group with an opportunity to prepare the meeting minutes and discuss any items that were brought up during the meeting. During this meeting, each member will develop their work plan to ensure that the group as a whole stays on schedule. Depending on the type of work required, certain members may plan other meetings if their work plans overlap. The second meeting each week will take place on Monday evening to provide an opportunity to discuss each member's progress with their work and to provide assistance to one another.

The cost estimate for this project will have a high level of accuracy to help aid in the justification of alternative selection and to provide DOT with an accurate idea of cost before entering the tendering phase of the project. To ensure a high level of accuracy, close attention will be paid to the quantity takeoffs during the design. Also, cost considerations will play a large role in selecting the preferred alternative for the type of overpass as well as for the design of each section of the overpass.

If problems arise with the project during the term, the Clients will be Pillar's first choice on contact, followed by the course instructor, and then other members of the MUN Engineering Faculty. Pillar, has received a support from each of these resources and they have all insured they will be available to help throughout the remainder of the term.

Through completing this project, the members of Pillar expect to gain experience in highway engineering, prestressed concrete design, overpass design, and practice working as a consulting group.

4 Tasks

Eight critical tasks have been identified that are integral to the successful completion of the overpass design for the Team Gushue Highway Interchange. Each primary task is comprised of more focused subtasks, with some of these subtasks being broken down further. The projected durations, required resources and personnel allocation for each subtask can be found in detail in the project schedule in section 5.

4.1 Preparatory Work

Prior to the actual preliminary design of the interchange, Pillar must conduct appropriate background research into the different options available for designing

the bridge span. The options for the span have been limited to the following: pre-stressed CPCI girder, post-tensioned deck and box girder. The initial pros and cons of each option as well as their differing applications will be investigated at this stage. It will also be required to compile and obtain all relevant codes, specifications and software that will be needed throughout the design process. The last step of this phase will be to plan the duration of the project, which will include personnel allocation and the formulation of a detailed project schedule. The total process is expected to take nine days and all group members will partake in varying aspects of the required tasks.

4.2 Highway Design

The initial phase of the project will involve mainly highway design work. The first step will be determining the superelevations of all the ramps, utilizing the plan and elevation drawings supplied by the Client. The radii of curvature and location of the curves have already been provided and these dimensions result in a 40km/hr speed limit with a maximum superelevation of .06m/m. The bridge alignment will be set once the curve design is complete. Using the determined elevations and the existing survey data provided by the Client, it will then be possible to identify the available clearance available. The clearance value calculated will significantly impact the final design of the structure as there is some potential for challenges achieving the specified 5.0 meters of clearance required. The Government of Newfoundland Master Specification as well as the TAC highway manual will be utilized throughout the highway design process. The majority of the calculations will be performed by Ben Gerrior and Matt Hardy with aid from the remainder of the group.

4.3 Pre-Stressed CPCI Investigation

In order to provide the optimal design for the overpass span, three design options will be investigated. The first option is a prestressed CPCI supported span. This CPCI span consists of precast, prestressed support elements, which are typical I-beam shape girders which will support the bridge deck. It will first be determined what size girders will be required and if this option meets our available clearance constraints. The initial dimensions will be based on the CPCI Design Manual and will take into account a multitude of variables including the loading requirements and size restraints. Both a single span and double span options will be investigated followed by an installation feasibility study of the chosen option. Once it is the design is proved to satisfy the CSA Standard S6-06 Canadian Highway Bridge Design Code and considered feasible, an initial cost estimate of the design will be completed.

4.4 Post Tensioned Deck Investigation

The second option to be considered will be a post-tensioned deck. This span option utilizes cast-in-place concrete that includes longitudinal tendon reinforcement that will be prestressed. A similar process for this option will be

followed that was employed when examining the CPCI span. This investigation will include an initial cross section calculation, clearance checks, identifying if a double span is more practical than a single span followed by the determination if an open or closed section will be employed. Once the ideal post-tensioned deck design is complete, all necessary code checks will be completed and will determine if the installation is feasible. If the option is considered practically feasible a cost estimate will be performed to discover if the design is economically viable.

4.5 Box Beam Investigation

The final span option to be investigated is the prestressed concrete box beam configuration. This span type consists of precast hollow sections to be utilized as girders to support the bridge deck. The same investigation pattern will be used in determining the initial dimensions of the box beam section and all of the same design considerations will be undertaken when evaluating this option.

4.6 Final Design

After the three initial investigations have been completed, Pillar will identify the strongest design solution for this particular application. The entire Pillar team will be engaged in this decision and the final selection will be made in consultation with the Client after presenting them with our investigation findings. Once this decision is made the final design of the structure will be undertaken. The structure is divided into four main components, which includes; girder design, deck design, abutment design and footing design.

Each component is broken down into four main subtasks. The first subtask is the detailed structural design of the component; this will be mainly completed by Matt Hardy providing hand calculations with the aids of software. The second subtask is labeled as code checking, this will be the job of Jordan Hardy who will work closely with the structural designer ensuring the finished product meets all applicable codes and regulations. This task will be completed with the aid of structural software and the use of the CSA Standard S6-06 Canadian Highway Bridge Design Code. Ben Gerrior will be in charge of a materials take off for each of the components that are designed and Colin Coombes will be our lead drafter who will complete the final drawings using AutoCAD.

4.7 Detailed Cost Estimate

The data from the materials take offs for the individual components will be compiled, using this information a detailed cost estimate will then be calculated. Pillar Engineering Consultants will draw on personal experience and utilize cost estimating software such as RS Means to provide the most accurate cost estimate possible. The entire group will be involved of this phase of the project and five days is currently scheduled to complete the task.

4.8 Deliverables

Throughout the duration of the project many deliverables will have to be completed and submitted. Some are required on a weekly basis such as the completion of meeting minutes and agendas that stem from our meetings with the Client as well as weekly progress updates which are provided to the course instructor. Larger deliverables will be submitted at certain milestones and include this Project Plan and the Final Report/Presentation which will be submitted to both the Client and course instructor. The weekly items will be ongoing over the course of the project and the milestone items will be ongoing on an interim basis. All group members will be involved in the completion of these items at varying times over the duration of the project.

5 Project Schedule

A project schedule is completed to help ensure that all components of the project execution plan are met and to provide a method by which progress can be tracked throughout the project. The project schedule, created with Microsoft Project 2003, is included below. The weeks in the schedule are composed of 5 days with 8 hours per day. This does not accurately represent time allotment to this project but does give an accurate representation of the work planned for each week. Progress will be insured by having certain items required to be complete prior to each weekly client meeting which will then be discussed with the Client. Since issues may arise at weekly meetings with the work that had previously been completed, it is assumed that any corrections that are required after a meeting will be included in the following week's work without affecting the other planned works that that week.

The project schedule is developed with the weekly client meetings everything Thursday afternoon as milestones. The first main task of preparatory work was to begin immediately after Pillar was matched with the Department of Transportation and Works on January 17th. Some background research was requested by the Client on match night which was to be completed before the first meeting on Thursday, January 20th. The project plan is included in the preparatory section of the schedule but continued past the first meeting due to the amount of work and time required for this document.

The next task is the ramp design which is required before any overpass design can begin because it will provide the amount of clearance available below the overpass. This work was to begin immediately after the initial few days after performing background research concurrently with work on the project plan since the overpass design itself is anticipated to require a considerable amount of time and Pillar wish to begin working on this segment of the project as early as possible. To accomplish this, Colin and Jordan are to focus on the project plan while Matt and Ben focus on the ramp design with everyone providing additional help where necessary.

The ramp design is planned to be complete by the meeting on February 3rd so that Pillar can begin selecting the optimum type of overpass. Investigating the

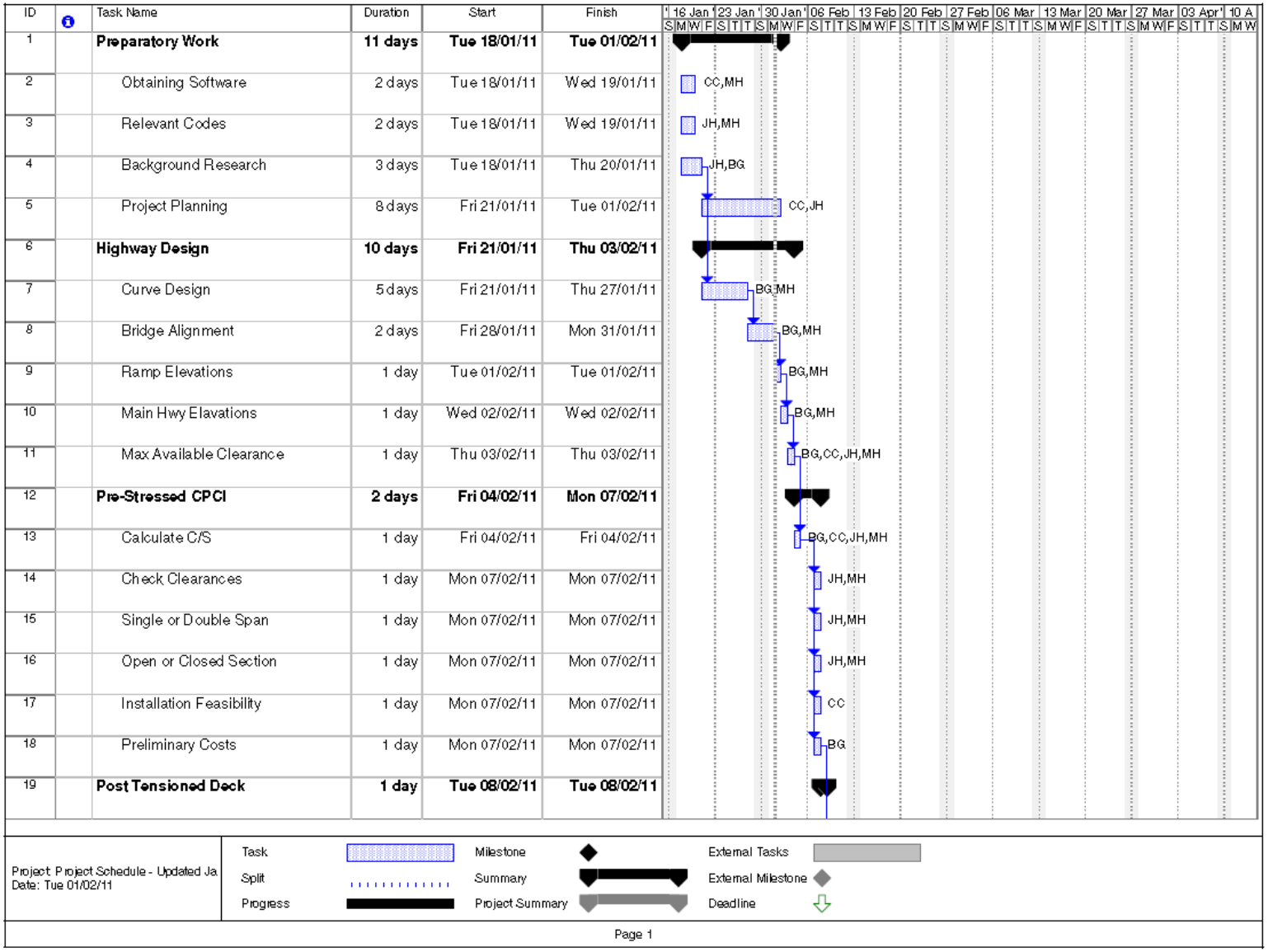
three options presented is allotted a week and is to be complete by the meeting on February 10th to allow sufficient time for the detailed design work. The group's resources will be divided so that each member will focus on one section of the alternative selection to be able to complete this considerable amount of work in one week.

The next task will be the detailed design of the overpass beginning with the girder which is anticipated to be the most difficult aspect to design. Following the girder, Pillar will design the deck, the abutments, and then the footings. Each item is anticipated to take approximately a week with some days moved from the deck design to the girder and abutment designs due to the anticipated levels of difficulty.

Following the detailed design will be a detailed cost estimate and the preparation of the project deliverables. The project deliverables will include preparation of final documents and preparing the final report and presentation.

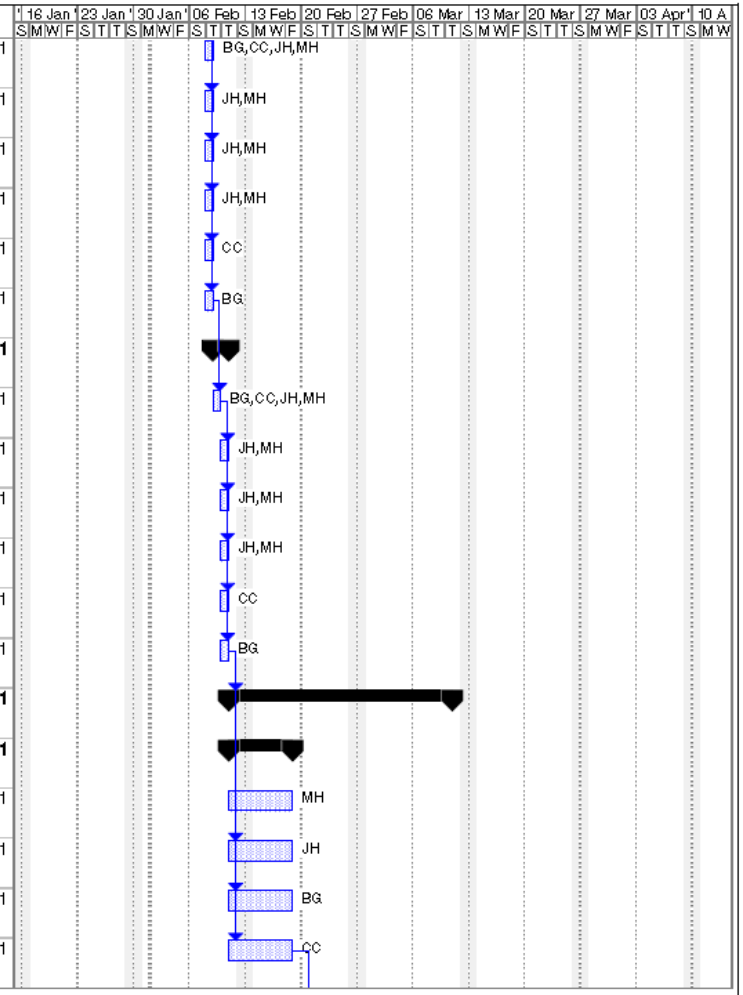
Resources have been provided as well in the schedule with the initials of each member used to identify who will be responsible for each item. Some tasks are quite complex and will required multiple members of the group or even the whole group while others will require only one member. The resource allotment is based on each member's role in the group, although every member is expected to provide assistance when needed. For exampled, each member is only responsible for one item each through the detailed design phase of the project, however, the group will be working very closely on all matters of the detailed design.

The project schedule is divided into three pages and is as follows.



ID	Task Name	Duration	Start	Finish
1	**Preparatory Work**	**11 days**	**Tue 18/01/11**	**Tue 01/02/11**
2	Obtaining Software	2 days	Tue 18/01/11	Wed 19/01/11
3	Relevant Codes	2 days	Tue 18/01/11	Wed 19/01/11
4	Background Research	3 days	Tue 18/01/11	Thu 20/01/11
5	Project Planning	8 days	Fri 21/01/11	Tue 01/02/11
6	**Highway Design**	**10 days**	**Fri 21/01/11**	**Thu 03/02/11**
7	Curve Design	5 days	Fri 21/01/11	Thu 27/01/11
8	Bridge Alignment	2 days	Fri 28/01/11	Mon 31/01/11
9	Ramp Elevations	1 day	Tue 01/02/11	Tue 01/02/11
10	Main Hwy Elavations	1 day	Wed 02/02/11	Wed 02/02/11
11	Max Available Clearance	1 day	Thu 03/02/11	Thu 03/02/11
12	**Pre-Stressed CPCI**	**2 days**	**Fri 04/02/11**	**Mon 07/02/11**
13	Calculate C/S	1 day	Fri 04/02/11	Fri 04/02/11
14	Check Clearances	1 day	Mon 07/02/11	Mon 07/02/11
15	Single or Double Span	1 day	Mon 07/02/11	Mon 07/02/11
16	Open or Closed Section	1 day	Mon 07/02/11	Mon 07/02/11
17	Installation Feasibility	1 day	Mon 07/02/11	Mon 07/02/11
18	Preliminary Costs	1 day	Mon 07/02/11	Mon 07/02/11
19	**Post Tensioned Deck**	**1 day**	**Tue 08/02/11**	**Tue 08/02/11**

ID	Task Name	Duration	Start	Finish
20	Calculate C/S	1 day	Tue 08/02/11	Tue 08/02/11
21	Check Clearances	1 day	Tue 08/02/11	Tue 08/02/11
22	Single or Double Span	1 day	Tue 08/02/11	Tue 08/02/11
23	Open or Closed Section	1 day	Tue 08/02/11	Tue 08/02/11
24	Installation Feasibility	1 day	Tue 08/02/11	Tue 08/02/11
25	Preliminary Costs	1 day	Tue 08/02/11	Tue 08/02/11
26	**Box Girder**	**2 days**	**Wed 09/02/11**	**Thu 10/02/11**
27	Calculate C/S	1 day	Wed 09/02/11	Wed 09/02/11
28	Check Clearances	1 day	Thu 10/02/11	Thu 10/02/11
29	Single or Double Span	1 day	Thu 10/02/11	Thu 10/02/11
30	Open or Closed Section	1 day	Thu 10/02/11	Thu 10/02/11
31	Installation Feasibility	1 day	Thu 10/02/11	Thu 10/02/11
32	Preliminary Costs	1 day	Thu 10/02/11	Thu 10/02/11
33	**Final Design**	**20 days**	**Fri 11/02/11**	**Thu 10/03/11**
34	**Girder Design**	**6 days**	**Fri 11/02/11**	**Fri 18/02/11**
35	Structural Design	6 days	Fri 11/02/11	Fri 18/02/11
36	Code Check	6 days	Fri 11/02/11	Fri 18/02/11
37	Materials Takeoff	6 days	Fri 11/02/11	Fri 18/02/11
38	Drafting	6 days	Fri 11/02/11	Fri 18/02/11



Project: Project Schedule - Updated Ja
Date: Tue 01/02/11

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

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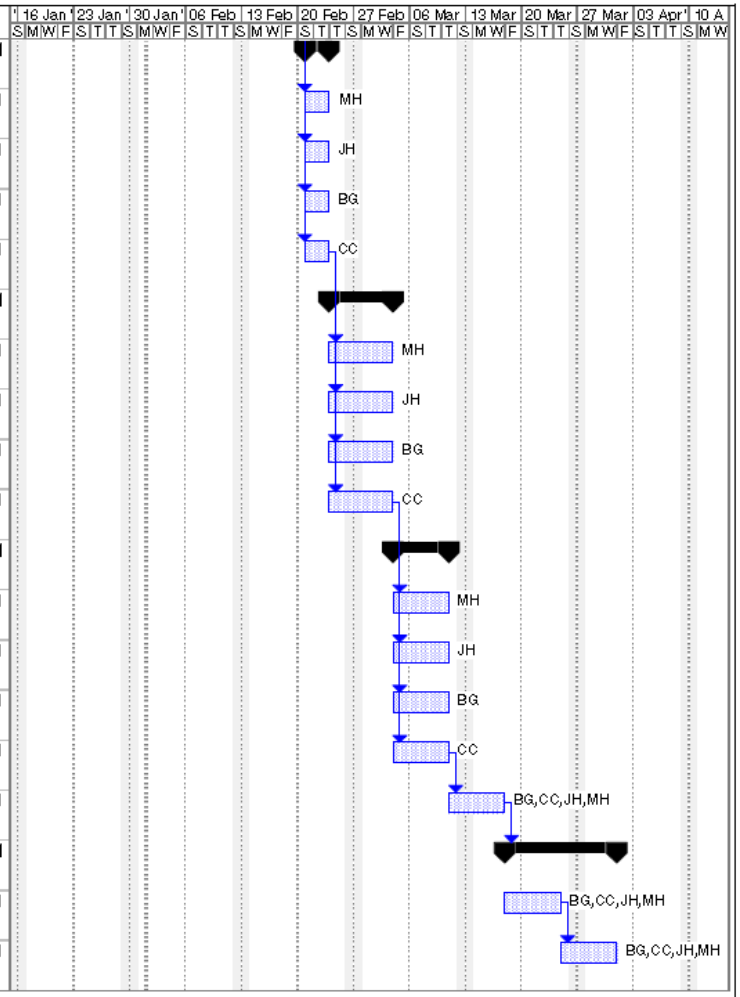
ID	Task Name	Duration	Start	Finish
39	**Deck Design**	**3 days**	**Mon 21/02/11**	**Wed 23/02/11**
40	Structural Design	3 days	Mon 21/02/11	Wed 23/02/11
41	Code Check	3 days	Mon 21/02/11	Wed 23/02/11
42	Materials Takeoff	3 days	Mon 21/02/11	Wed 23/02/11
43	Drafting	3 days	Mon 21/02/11	Wed 23/02/11
44	**Abutment Design**	**6 days**	**Thu 24/02/11**	**Thu 03/03/11**
45	Structural Design	6 days	Thu 24/02/11	Thu 03/03/11
46	Code Check	6 days	Thu 24/02/11	Thu 03/03/11
47	Materials Takeoff	6 days	Thu 24/02/11	Thu 03/03/11
48	Drafting	6 days	Thu 24/02/11	Thu 03/03/11
49	**Footing Design**	**5 days**	**Fri 04/03/11**	**Thu 10/03/11**
50	Structural Design	5 days	Fri 04/03/11	Thu 10/03/11
51	Code Check	5 days	Fri 04/03/11	Thu 10/03/11
52	Materials Takeoff	5 days	Fri 04/03/11	Thu 10/03/11
53	Drafting	5 days	Fri 04/03/11	Thu 10/03/11
54	Detailed Cost Estimate	5 days	Fri 11/03/11	Thu 17/03/11
55	**Admin / Deliverables**	**10 days**	**Fri 18/03/11**	**Thu 31/03/11**
56	Preparation of Final Documents	5 days	Fri 18/03/11	Thu 24/03/11
57	Prepare Report & Presentation	5 days	Fri 25/03/11	Thu 31/03/11



Project: Project Schedule - Updated Ja
Date: Tue 01/02/11

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

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6 Cost

The anticipated costs for Pillar to complete this project are considered to be minimal. All testing of the project design will be completed using structural steel software, most likely SAFI, as this is the software used by DOT for similar work. The Client has indicated that Pillar will use their licence of the software for the design aspects of this project.

Any costs related to administrative supplies and travel to and from the project site and client meetings are deemed to be very low for Pillar. Both the project site and client office are very close to Memorial University so the cost of transportation is not considerable. Any and all design models produced will be generated by software, and not build as speculative models. No materials testing or other such services will be required as the criteria of this project are to provide a detailed theoretical design and comparison of design options.

7 Deliverables

All project documents will be submitted to DOT as softcopy Word, PDF, or CAD files as deemed most efficient. These documents include, but are not limited to, meeting agendas, meeting minutes, weekly progress reports, design drawings, project plan, and mid-project and final reports. Hard copies of the design drawings, project plan and final reports will also be distributed to DOT and the course instructor, along with hard copies of weekly progress reports to the course instructor.

8 Risk

A project of this nature is very familiar to the project staff at DOT, so they already have a strong grasp of design criteria and final design for this overpass. Based on the depth of knowledge and experience of the Client and their assistance throughout the design process, it is anticipated that the risk to DOT for this project is negligible and that Pillar does not foresee any issues with successfully completing the project to the satisfaction of the Client.

Any risks associated with completion of the project on schedule will be successfully mitigated by efficient task delineation and planning among members of the group. DOT is an effective resource for questions; therefore, there should be no problems delivering this project on time and to the required specifications.

9 References

Murrin, A., Newfoundland and Labrador Department of Transportation and Works "Proposed Team Gushue Highway Extension". (2010) Retrieved from http://www.tw.gov.nl.ca/highway.html on January 31, 2011

10 Appendix

Appendix A: Statement of Qualification – Pillar Engineering Consultants

PILLAR ENGINEERING CONSULTANTS

Colin Coombes
Ben Gerrior
Jordan Hardy
Matt Hardy

Contact Information:
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Strong Solutions For Today's Challenges

Pillar Engineering Consultants

Mission Statement

Pillar Engineering is committed to providing strong solutions to meet engineering challenges. The company has diverse experience in the civil engineering field allowing us to accommodate specific client needs.

About Pillar

Pillar Engineering Consultants is a team of four Term 8 Civil Engineering Students at Memorial University of Newfoundland who have successfully completed projects together in the past. Each member of Pillar will be graduating in May 2011 and each has two years of relevant work experience to date in a variety of civil disciplines.

The group's work experience includes structural concrete placement, architectural design, municipal infrastructure installation, project estimating and scheduling, heavy civil and mining planning and execution, offshore oil and gas regulatory compliance, hydroelectric generation and transmission services, geomatics and digital mapping, project management, and materials testing.

Pillar Team

Colin Coombes

Colin is a hard working student who has focused his courses on Structural and Hydrotechnical Engineering. His co-op terms provided experience in many different sectors including federal government, municipal government, oil and gas, materials testing and inspection, and hydroelectric generation and transmission.

Work Highlights:

- **Site inspections with Halifax's Traffic Services Group**
- **Materials testing and road building supervision**
- **Feasibility level transmission tower design for the Lower Churchill Project**
- **Flood mapping of the Halifax River using LiDAR data in ArcGIS**

Ben Gerrior

Through work terms, Ben has gained valuable experience doing design work and surveying for the Department of Transportation and Works, construction compliance testing for Jacques Whitford (now Stantec), and project estimates, construction management and quality control inspections for PCL Construction. He is a diligent worker with excellent communication skills and great attention to detail.

Work Highlights:

- **Construction management/quality control on the Edmonton Clinic South**
- **Estimating on the Rabbit Hill Road Overpass**
- **Plotting and surveying on the Trans-Labrador Highway**

Pillar Team

Jordan Hardy

Jordan is a motivated and hardworking individual with a wide range of skill sets obtained from previous projects. He has a strong background in project management, materials testing as well as concrete foundation placements and specializes in underground infrastructure. Jordan has worked extensively in the field and draws on his first hand experiences to be a productive member of the Pillar Engineering team.

Work Highlights:

- **Point Aconi Generating Station Disposal Facility**
- **Neutralization Building Concrete Placement (Long Harbour Project)**
- **Wabush Terminal Station Building Extension**

Matt Hardy

Matt has a wide range of experience in several areas of the civil engineering discipline including; materials testing, heavy civil and mining, municipal engineering, building construction, and consulting. He has field experience working on all sides of construction projects representing the owner, consultant, or contractor on varied projects ranging from small scale residential construction to heavy civil construction and mining.

Work Highlights:

- **The 2009 Labrador City Streets Reconstruction Project**
- **The 2009 Reclamation Project – Syncrude Base Plant**
- **CFB 12 Wing Shearwater Maritime Helicopter Squadron Facility**

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