

## Objective

Formulate innovative alternative project management strategies for the ongoing preliminary activities on 78 Ave. pertaining to the construction of a car underpass and pedestrian tunnel for the future Green Line LRT project in Calgary, AB.

## Project Scope

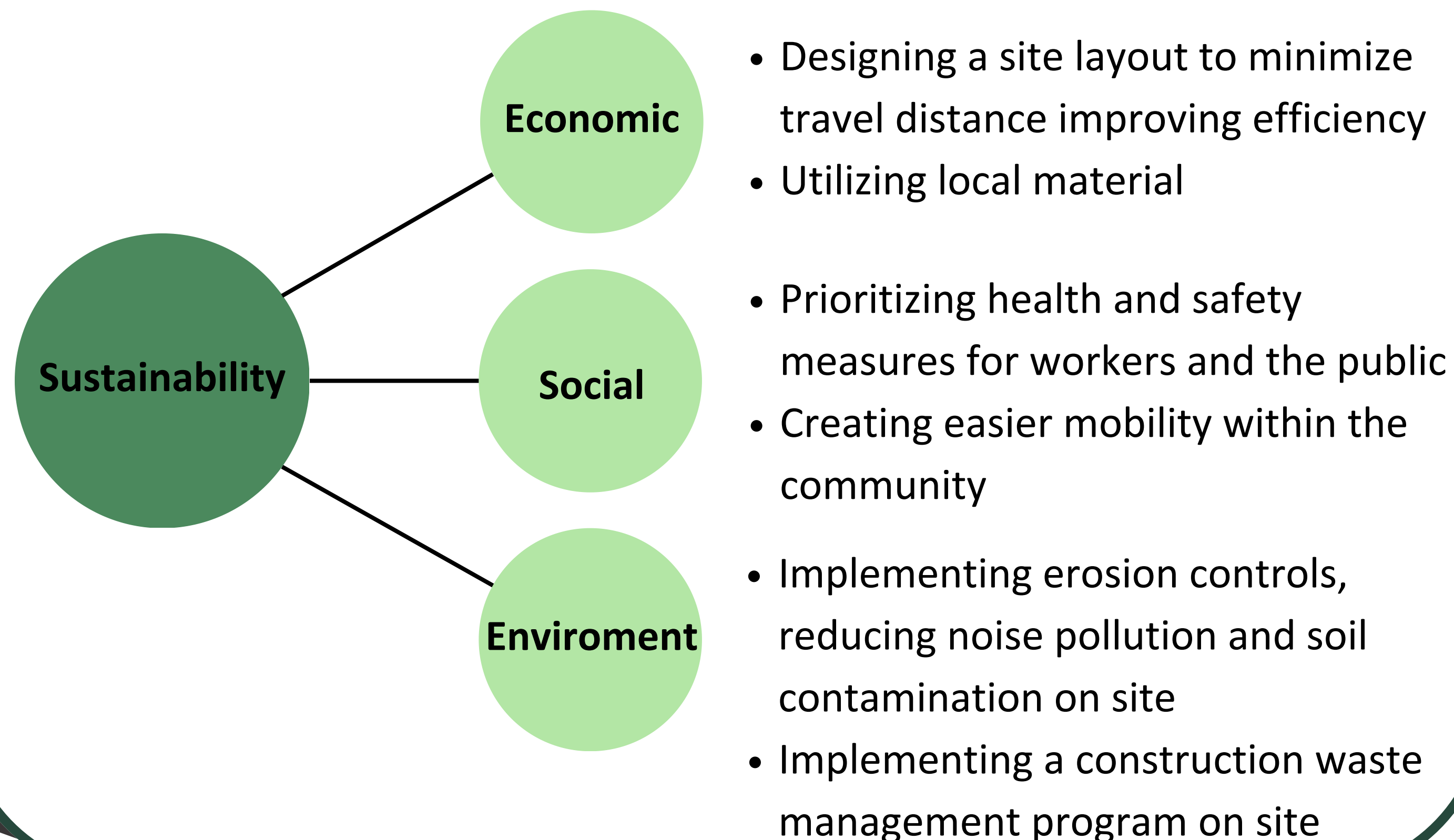
Utilize current site construction drawings provided by Graham Construction Inc. to develop the following project deliverables:

- Produce Work Packages
- Create a Work Breakdown Structure
- Conduct Quantity Takeoffs
- Develop two alternative project plans consisting of schedules and site layouts
- Cost Estimate for the chosen project plan
- Project Risk Management Plan
- 3D Site Modelling and VR Site Representation
- Sustainable Project Solutions
- Quality and Safety Report

## Project Constraints

- Allow for CPKC Trains to continue operations without interruptions for the duration of the project
- Meet the 6-month (pedestrian tunnel) and 9-month (car underpass) CPKC diversion track schedule restrictions

## Sustainability



## Risk Management Plan

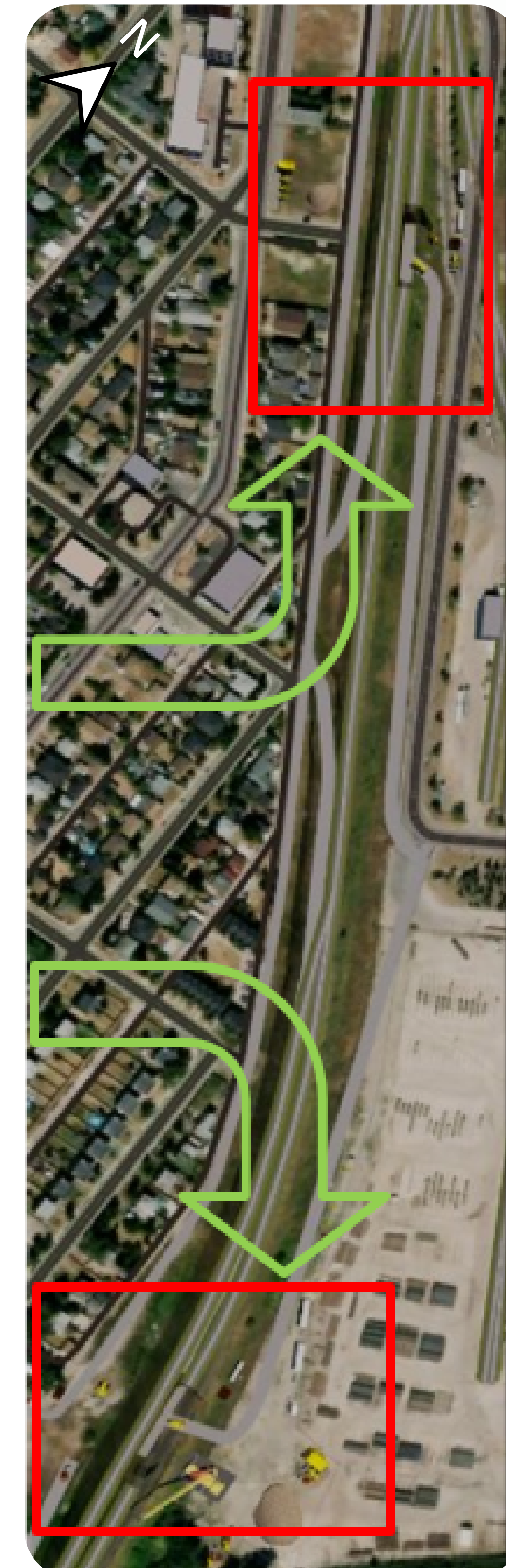
#	Top Risks	Description	Mitigation
1	Safety on site	Accidents related to the proximity of the railway & heavy machinery.	-Safety training, safety inspection, & emergency plan. -Engineering controls (ie. guardrails) -qualified personnel to alert workers of incoming trains -PPE, as a last resort.
2	Delays in obtaining permits	Many approvals are needed for this project.	-Apply to approvals early. -Effective communication. -Ensure approval requirements are met.
3	Structural & Geotechnical Design Risk	Poor design and/or insufficient quality control can result in a structural or geotechnical failure.	-Concrete testing. -Soil testing. -Drainage system. -Consulting professionals.
4	Weather changes	Calgary's harsh winters.	-Schedule to avoid winter. -Monitor the daily weather. -Use durable equipment & material.

## 3D Modelling

Pedestrian Tunnel

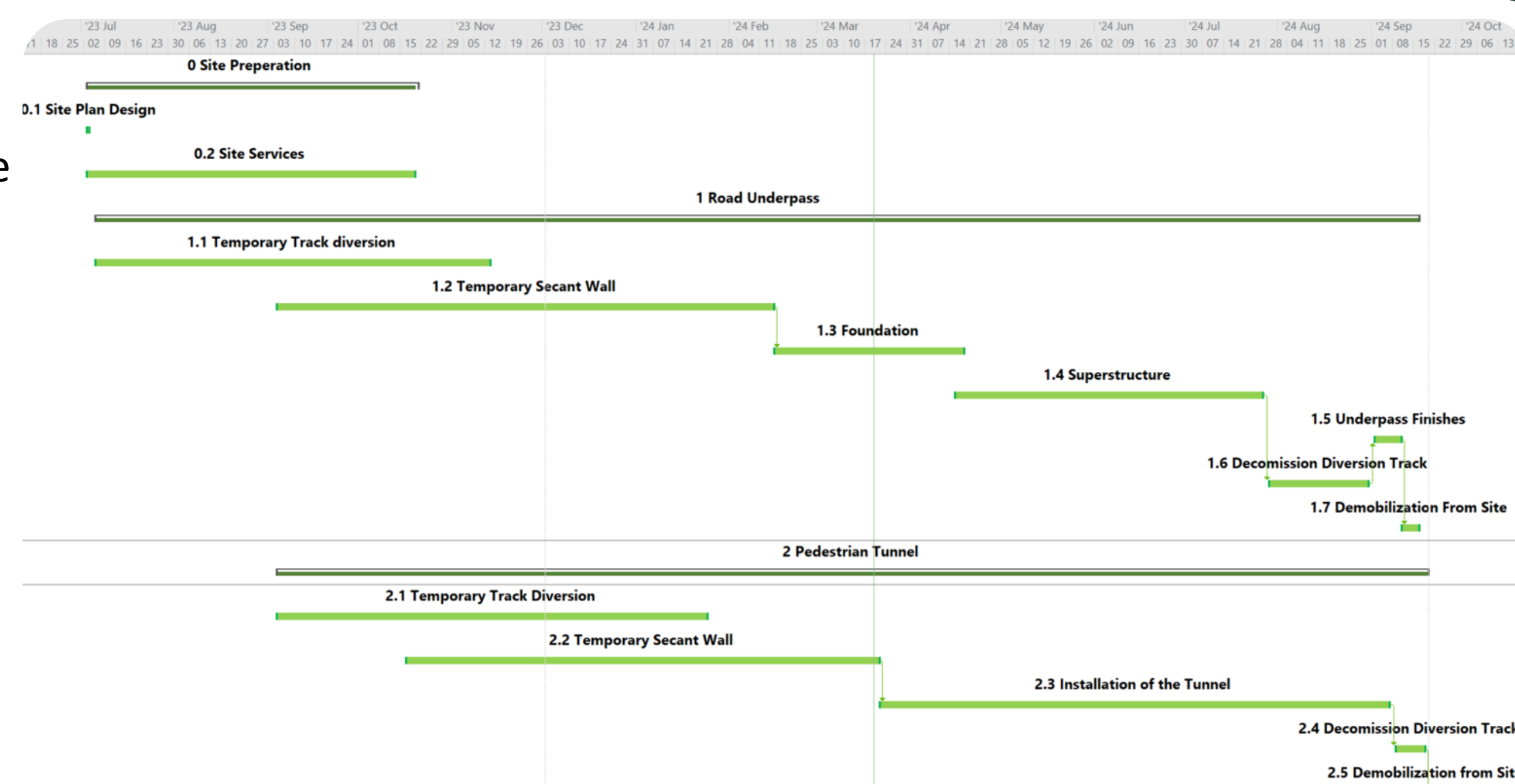


Car Underpass



## Schedule

- Simultaneous construction schedule best meeting project constraints
- Total Duration 445 Days
- Minimized winter work
- Increased project flexibility due to two simultaneous work fronts
- Increased labor and equipment efficiency from the ability to share resources between both project components



## Cost Estimation

Code	Area	U OF M	Material	Equipment	Labour	Sub-Contract	Bare Cost
0	Indirect	LS	\$88,184.06	\$63,443.20	\$1,034,136.00	\$410,000.00	\$1,595,763.26
1	78th Avenue Underpass	LS	\$7,974,604.00	\$1,489,781.58	\$563,158.43	\$3,050,000.00	\$13,077,544.02
2	Ogden Pedestrian Tunnel	LS	\$2,774,706.65	\$410,864.38	\$347,910.09	\$0.00	\$3,533,481.12
<b>Total Bare Cost</b>							<b>\$18,206,788.40</b>
<b>Contingency (10%)</b>							<b>\$1,820,678.84</b>
<b>Overhead (10%)</b>							<b>\$1,820,678.84</b>
<b>Profit Margin (10%)</b>							<b>\$1,820,678.84</b>
<b>Total Cost</b>							<b>\$23,668,824.91</b>

## Acknowledgments:

Special thank you to our advisors who supported and guided us throughout this project!

Dr. Estacio Pereira - Academic Advisor  
Angela Doig - Industry Advisor  
Graham Constructing & Engineering Inc.