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**Reconstruction and Reopening of
Highway 5 (Coquihalla)
British Columbia**

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Part A: Poster presentation

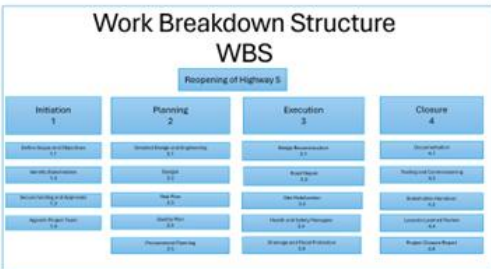
Reopening of Highway 5

Coquihalla Corridor Reconstruction
Location: British Columbia, Canada

Module: Project Management LCLM 5003
Student : Alexandra Ivan, 2330887
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Introduction

In November 2022, an atmospheric river event caused severe flooding and landslides across British Columbia, Canada. The Coquihalla Highway (Highway 5) — a critical transportation corridor linking the Lower Mainland with the rest of Canada — suffered extensive damage, including washed-out bridges, collapsed culverts, and eroded sections. The loss of this corridor disrupted supply chains, limited access to emergency services, and caused significant economic losses.



RACI MATRIX

TASK	PROJECT MANAGER	ENGINEER	CONTRACTOR	MINISTRY	ENVIRONMENT AGENCY
Define Project Scope	R	R	I	A	I
Secure Funding	I	I	I	A	I
Design and Engineering	R	A	I	R	R
Environmental Assessment	I	R	I	R	A
Construction	R	R	A	I	I
Quality Assurance	A	R	R	I	I
Risk Management	A	R	R	I	I
Project Closure	A	R	R	R	I

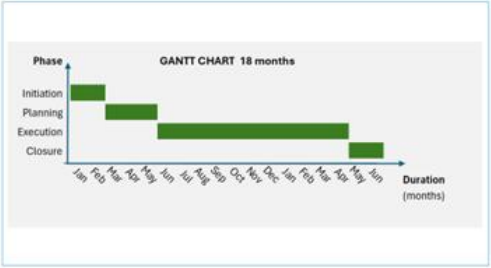
Risk Assessment

ID	Risk Category	Risk Effect	Type	P	I	S	Score (P*I*S)	Owner	Subsequent Strategy
1	Contract awarded	Schedule overrun	Environmental	7	8	56		Project Management	Develop Contingency Schedule, Insurance
2	Supply chain disruption	Cost escalation	Operational	8	7	42		Procurement Lead	Source local suppliers, stock critical materials
3	Design errors	Rework, delays	Technical	4	8	24		Design Engineer	Peer review and QA checks
4	Environmental non-compliance	Regulatory fines, delays	Regulatory	5	7	35		Environmental Officer	Regular compliance audits
5	Worker injury	Work stoppage	Health and Safety	3	8	27		Health and Safety Officer	Strict safety protocols and training
6	Stakeholder opposition	Project delays	Social	5	6	30		Communication Lead	Proactive community engagement
7	Budget overrun	Funding shortfall	Financial	4	8	32		Finance Manager	Cost control, monthly financial reviews

QUAD CHART

PURPOSE (AIMS/OBJECTIVES)	CUSTOMERS (STAKEHOLDERS)
Reconstruct and reopen Highway 5 to restore transportation between the Mainland and Interior BC, incorporating flood resilient infrastructure	BC Ministry of Transportation and Infrastructure Local Communities Trucking Associations Contractors

DESIRED END RESULTS (CRITICAL SUCCESS FACTORS)	MEASURES OF SUCCESS (STANDARDS / CRITERIA)
Highway reopened safely and on time Infrastructure resilient to future flooding Minimal environmental impact Positive stakeholder engagement	Completion with Safety and Environmental standards 80% Stakeholders satisfaction Reduced vulnerability to extreme weather events



Conclusion

The Reconstruction and Reopening of Highway 5 is a high-impact project essential for economic recovery and transportation resilience in British Columbia. This Project Management Plan ensures structured delivery through clear phases, active stakeholder management, rigorous risk control, and measurable success criteria.

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Fig 1. Poster

Part B: Reflection

1. Description

Using Gibbs' Reflective Cycle, this reflection considers my experience presenting my project plan in class. My presentation took place in front of my classmates, and because the teacher followed hierarchical order, I was the first to present. I had no example to guide me, which made the experience more intense. After presenting, I received constructive feedback from both the tutor and my peers. They highlighted areas I delivered well, as well as elements that needed improvement for the final project plan.

2. Feelings

Emotionally, I felt extremely nervous as I walked to the front. My "heart was in my teeth," and I kept wondering what the teacher expected, especially since I had no previous presentation to model mine on. I took a deep breath to calm myself and tried to ignore the overwhelming emotions. After receiving feedback, I felt relieved but also motivated. The positive comments boosted my confidence, while the constructive points encouraged me to reflect critically on how to strengthen my work.

3. Evaluation

In terms of strengths, both the tutor and my peers noted that my presentation was well-structured and clear. They praised my confidence despite being the first to present, as well as my ability to explain the project aims in a simple and logical manner. They also commented that my visuals were clean and easy to follow. However, several weaknesses were identified. I was told that I needed to provide more detail regarding my research methods and show clearer links between my objectives and proposed activities. Some peers mentioned that certain sections felt rushed, possibly because of my nervousness. The tutor also suggested expanding my risk-management plan and adding more realistic timelines.

4. Analysis

Reflecting on this, I realised the lack of examples affected my confidence and contributed to my rushed delivery. Being first meant I had no sense of pacing or expectation. However, this challenge also revealed that I can still perform well under pressure. The feedback showed that my foundational planning is strong but needs deeper development. My strengths lie in clarity, structure, and presentation skills. My weaknesses include lack of detail in planning sections, limited justification of decisions, and insufficient time spent explaining methodological choices. The analysis highlighted the importance of preparation beyond surface-level understanding; I need to show stronger critical thinking and a more strategic approach in my project plan.

5. Conclusion

The experience helped me understand that while I communicate ideas well, I must strengthen the depth of my content. The feedback offered direction and emphasised the value of more thorough planning. Presenting first taught me resilience and adaptability.

6. Action Plan

For the final project plan, I will:

- Expand research methods with clear justification.
- Strengthen links between objectives, activities, and outcomes.

- Develop a more thorough risk-management section.
- Create a realistic timeline supported by evidence.
- Practise explaining complex sections to avoid rushing.
- Seek feedback earlier in the drafting process to ensure clarity and depth.

Part C: Project Management Plan

1. Introduction

The reconstruction and reopening of the Coquihalla Highway (Highway 5) represents one of the most significant infrastructure recovery projects in recent Canadian history. Following the atmospheric river event of November 2021, British Columbia experienced unprecedented flooding and landslides that severely damaged major transportation corridors, including Highway 5. The washout of bridges, erosion of roadbeds, and collapse of culverts caused major disruptions to supply chains, emergency services, and interregional mobility (Watson & Ahn, 2022). As the Coquihalla is a critical artery linking the Lower Mainland with the Interior of British Columbia and the broader Canadian transportation network, its closure had profound economic and social implications. This Project Management Plan (PMP) provides a systematic framework for guiding the reconstruction and reopening of Highway 5 using established project management methodologies. The plan outlines key components including scope definition, work breakdown structure (WBS), risk assessment, scheduling, stakeholder engagement, resource allocation, and performance criteria. The intent is to ensure that project delivery is structured, transparent, and aligned with best practices in post-disaster infrastructure recovery.

The plan also incorporates resilience-focused design principles to ensure that the rebuilt infrastructure is better prepared for future extreme weather events (Liang et al., 2022). Through thorough planning and stakeholder involvement, the project aims to support long-term regional stability, safeguard supply chains, and address vulnerabilities that became evident during the disaster event. The PMP ultimately serves as a roadmap for decision-makers, contractors, engineers, and environmental authorities to collaborate effectively and deliver a reconstructed highway that meets safety, environmental, and operational standards.

2. Project description

The reconstruction and reopening of Highway 5 is a major infrastructure recovery initiative designed to restore a vital freight and transportation corridor damaged by catastrophic flooding and landslides. The project encompasses structural rebuilding, geotechnical rehabilitation, environmental restoration, and the implementation of improved drainage and erosion-control systems. These interventions are essential to re-establish road connectivity between the Lower Mainland and the Interior, regions that rely heavily on this corridor for economic activity, emergency response, supply chain movement, and daily commuting. The flooding event caused the destruction of multiple bridges, the washout of several kilometres of highway, and extensive instability along steep slopes adjacent to the roadway (van Ginkel et al., 2021). The project's core purpose is to rebuild these assets while modernizing them to meet higher resilience standards. Key activities include bridge reconstruction, slope stabilization, roadbed reinforcement, drainage upgrades, hydrological redesigns, and the enhancement of culverts and water channels to withstand future storm surges or rapid snowmelt conditions.

The project is divided into structured phases—initiation, planning, execution, and closure—to ensure efficient progression. During execution, tasks are carried out concurrently where possible to meet accelerated timelines required for restoring essential transportation services. Safety, environmental protection, and stakeholder engagement remain central throughout all stages. Given the highway's strategic importance, the project also incorporates innovations in resilient infrastructure design, informed by lessons learned from global post-flood recovery programs (Serdar & Al-Ghamdi, 2023). The completed project is expected to deliver a safer, more robust transportation corridor that supports long-term regional sustainability and economic growth.

RACI MATRIX

TASK	PROJECT MANAGER	ENGINEER	CONTRACTOR	MINISTRY	ENVIRONMENT AGENCY
Define Project Scope	R	C	I	A	I
Secure Funding	I	I	I	A	I
Design and Engineering	C	A	I	C	C
Environmental Assessment	I	C	I	C	A
Construction	C	C	A	I	I
Quality Assurance	A	R	C	I	I
Risk Management	A	C	C	I	I
Project Closure	A	C	C	C	I

Fig 1. Raci matrix

3. Scope

The project scope outlines the boundaries, deliverables, and constraints governing the reconstruction and reopening of Highway 5. Its primary objective is to restore full highway functionality while strengthening infrastructure resilience against future extreme weather events. The scope includes activities related to planning, engineering, construction, environmental mitigation, stakeholder engagement, and post-completion evaluation.

In-scope activities include:

- Damage assessment and geotechnical analysis: Evaluating landslide-prone areas, hydrological behaviours, and structural failures.
- Bridge reconstruction: Rebuilding damaged bridges to modern engineering standards, including widened spans and deeper foundations.
- Roadway and slope restoration: Stabilizing slopes using retaining structures, rock bolting, and improved grading.
- Drainage and culvert upgrades: Enhancing water conveyance systems to prevent future washouts.
- Environmental rehabilitation: Restoring riverbeds, riparian zones, and fish habitats affected by construction activities (Government of BC, 2022).
- Traffic management planning: Ensuring emergency and limited commercial vehicles can access temporary detours or partially restored sections.
- Quality assurance and compliance monitoring: Regular inspections to ensure construction meets regulatory standards.
- Project closure documentation: Including performance reviews and long-term monitoring strategies.

Out-of-scope activities include:

- Expansion of the highway beyond original design capacity.
- Upgrades to unrelated transport corridors.
- Broader watershed management outside the immediate project area.

The scope is defined to prevent cost overruns, reduce ambiguity, and ensure alignment between stakeholders, contractors, and project managers. A clear scope also facilitates efficient resource allocation and risk mitigation, which are essential in a post-disaster reconstruction environment where timelines are compressed and environmental conditions require careful management.

4. Work breakdown structure

The Work Breakdown Structure (WBS) provides a hierarchical decomposition of project deliverables, allowing systematic task organization and resource planning. The WBS for the reconstruction of Highway 5 is structured into four major levels: Initiation, Planning, Execution, and Closure.

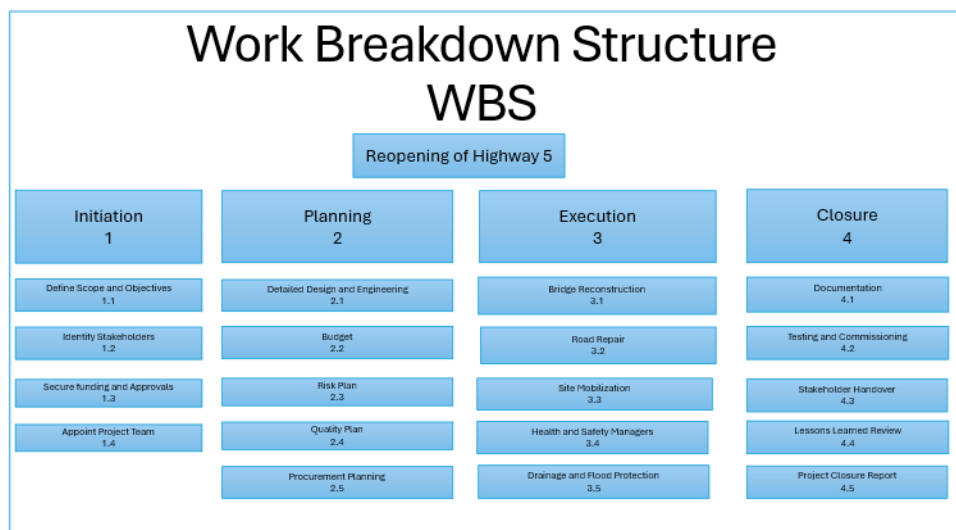


Fig 2. Work breakdown structure (WBS)

Level 1: Initiation

Tasks include establishing the project team, confirming funding, finalizing project charters, and conducting preliminary site assessments. Initial safety inspections, environmental scans, and regulatory reviews are completed during this phase. Early stakeholder meetings help define expectations and constraints (PMI, 2021).

Level 2: Planning

This includes developing the full project management plan, risk assessments, procurement strategies, scheduling, communication plans, and quality assurance procedures. Planning also defines the detailed engineering designs and cost estimates required for reconstruction activities. Environmental permits, Indigenous consultation protocols, and tendering processes are executed here.

Level 3: Execution

Execution consists of multiple sub-components:

- Bridge reconstruction
- Roadbed reconstruction
- Slope stabilization
- Drainage and culvert system upgrades

- Environmental restoration
- Traffic and safety management

These work packages operate concurrently where feasible to accelerate project delivery.

Level 4: Closure

Closure activities include final inspections, commissioning, environmental sign-off, financial reconciliation, and formal handover to provincial authorities. The WBS ensures clarity by breaking the project into manageable sections that can be assigned to specialized teams. It supports coordination among engineers, contractors, environmental agencies, and project managers, ensuring that activities align with the project's scope and performance requirements. The structured nature of the WBS reduces scheduling conflicts, improves accountability, and enhances monitoring of progress and costs.

5. Quad chart

The Quad Chart is a concise project communication tool that summarizes key elements across four quadrants: Purpose, Customers/Stakeholders, Desired End Results, and Measures of Success. It is commonly used in government infrastructure projects to streamline reporting and ensure strategic alignment (Kerzner, 2022).

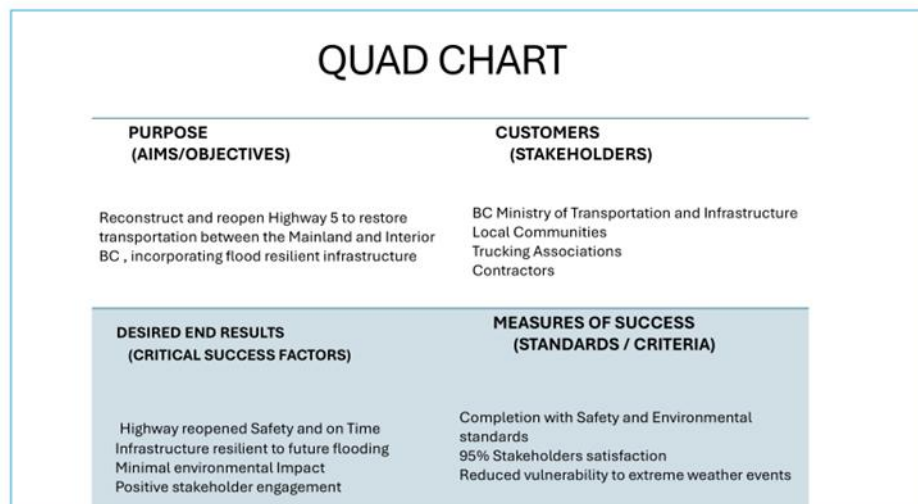


Fig 3. Quad chart

Purpose

The project's purpose is to reconstruct and reopen Highway 5 to restore essential transportation between British Columbia's Lower Mainland and Interior regions. It emphasizes building back better through resilient infrastructure systems capable of withstanding future extreme weather events.

Customers/Stakeholders

Stakeholders include the BC Ministry of Transportation and Infrastructure, Indigenous communities, commercial trucking associations, local businesses, residents, federal emergency agencies, and environmental organizations. Each group has distinct interests ranging from economic continuity to environmental protection and cultural considerations.

Desired End Results

The project aims to:

- Reopen the highway safely and efficiently.
- Improve infrastructure resilience to flooding, erosion, and landslides.
- Reinforce critical supply chain connections.
- Minimize long-term maintenance demands and vulnerability to climate-related hazards.
- Measures of Success
- Success indicators include:
- Completion within approved budgets and timelines.
- Compliance with environmental and safety standards.
- Positive stakeholder satisfaction indicators.
- Measurable improvements in drainage capacity and slope stability.

The Quad Chart serves as a high-level visual summary that guides decision-makers throughout the project. It aligns stakeholders with the overarching vision, simplifies reporting, and ensures that every project component contributes to defined goals and measurable outcomes. This tool is particularly effective in post-disaster projects where rapid communication and shared understanding are essential.

6. Gantt chart

The Gantt chart provides a detailed project schedule, illustrating the timeline, sequencing, and duration of key tasks required to complete the reconstruction of Highway 5. Often spanning approximately 18 months, the chart organizes the project across its major phases—Initiation, Planning, Execution, and Closure—while identifying dependencies and overlapping work streams.

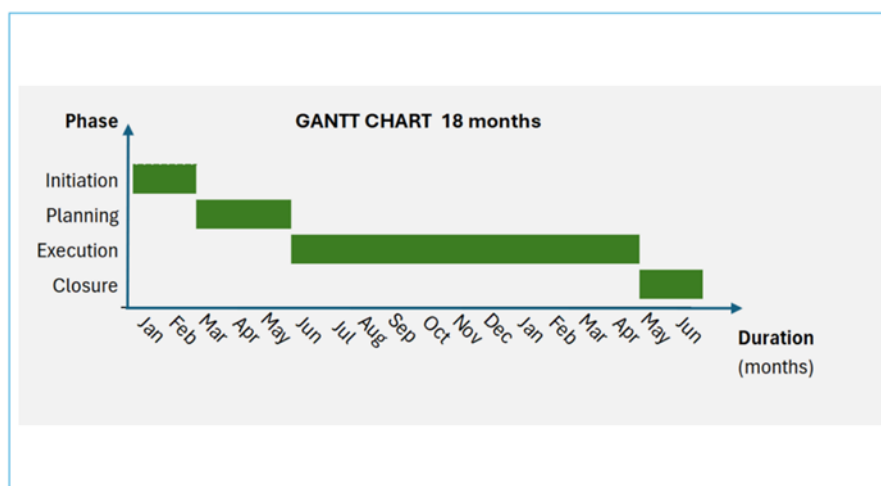


Fig 4. Gantt chart

GANTT CHART (18 months)

Phase	Start	Duration	End Date
Initiation	January 2023	2 months	February 2023
Planning	March 2023	3 months	May 2023
Execution	June 2023	11 months	April 2024
Closure	May 2024	2 months	June 2024

Fig 5. Gantt chart schedule table

Initiation (Months 1–2)

The schedule begins with site assessments, initial damage surveys, funding approval, risk identification, and stakeholder consultations. These tasks form the foundation for the planning phase and must be completed before engineering design can proceed.

Planning (Months 3–5)

Planning includes geotechnical investigation, engineering design, environmental permitting, procurement, tendering, and detailed scheduling. The Gantt chart highlights parallel planning activities to optimize efficiency.

Execution (Months 6–16)

This is the longest and most resource-intensive phase. Work packages include:

- Bridge reconstruction
- Roadbed rebuilding
- Drainage improvements
- Slope stabilization
- Environmental rehabilitation
- Installation of safety systems

The Gantt chart shows interdependencies—for example, slope stabilization preceding road paving. Many construction tasks run concurrently to accelerate reopening.

Closure (Months 17–18)

Final inspections, commissioning, documentation, and handover activities are scheduled, along with performance assessments and lessons-learned review. The Gantt chart is essential for tracking progress, identifying delays, reallocating resources, and ensuring transparency across stakeholders (Burke, 2020). It also provides early warning signals if milestones fall behind schedule, enabling corrective action. In post-disaster reconstruction projects, such scheduling tools are critical for balancing accelerated timelines with stringent safety and environmental requirements.

7. Stakeholders involvement

Effective stakeholder involvement is essential to the success of the Highway 5 reconstruction project, given its complex social, economic, and environmental implications. Stakeholders include government agencies, Indigenous communities, construction contractors, local residents, environmental organizations, commercial freight operators, and emergency services. Their participation ensures that project outcomes align with community expectations, legal requirements, and long-term regional development goals (Mitchell et al., 1997).

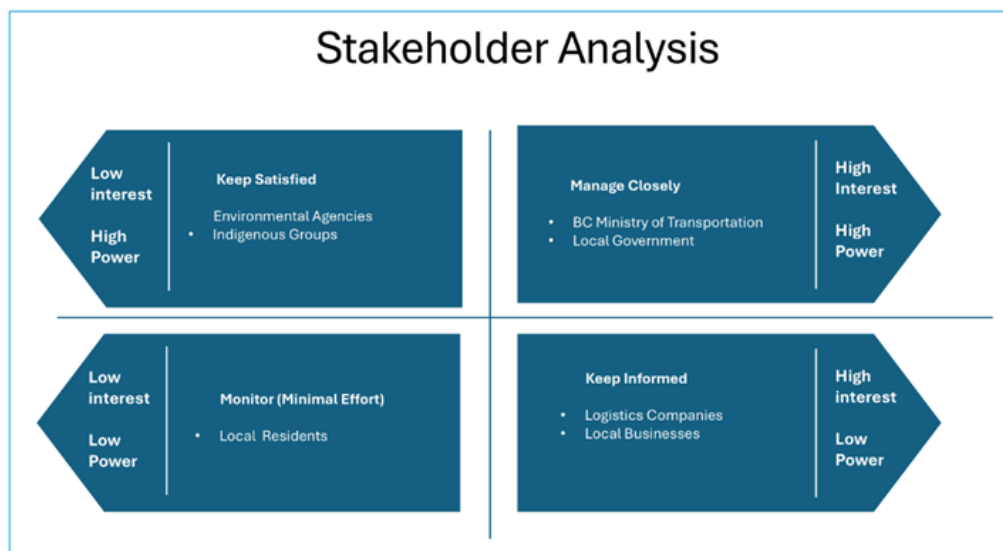


Fig 6. Stakeholder analysis

Stakeholders are categorized based on their power, interest, and influence, which guides the engagement strategies applied. For example:

- High-power, high-interest stakeholders
- BC Ministry of Transportation and Infrastructure
- Engineering consultants
- Major contractors

These stakeholders are managed closely through regular meetings, progress reports, and shared decision-making:

- High-power, low-interest stakeholders
- Federal transport regulators
- Provincial emergency agencies
- They are kept satisfied by providing periodic updates and ensuring compliance with regulations.
- Low-power, high-interest stakeholders
- Local residents
- Environmental NGOs
- Indigenous communities

These groups require active engagement through consultations, public meetings, and feedback mechanisms to address concerns related to noise, environmental protection, and cultural site preservation:

- Low-power, low-interest stakeholders
- General public
- Occasional road users
- They are informed through public advisories, media updates, and website postings.

Strong stakeholder engagement enhances project legitimacy, reduces conflict, and improves long-term acceptance. It also ensures that environmental, cultural, and socio-economic concerns are integrated into the reconstruction process, making the project more sustainable and resilient.

8. Allocation of resources

Resource allocation is a critical component of the Project Management Plan, ensuring that labour, equipment, materials, and financial assets are distributed effectively across all phases of reconstruction. The rapid restoration requirements for Highway 5 necessitate optimized resource scheduling and prioritization to minimize delays and cost overruns (Flyvbjerg, 2021).

Human Resources

A multidisciplinary team is required, including civil and geotechnical engineers, hydrologists, construction workers, environmental scientists, project managers, and safety officers. Workforce planning ensures that skilled labour is available at critical stages, such as bridge erection and geotechnical stabilization.

Equipment

Heavy machinery such as excavators, cranes, rock-scalers, concrete mixers, geotechnical drilling rigs, and erosion-control equipment must be mobilized strategically. Equipment allocation is coordinated through contractors to avoid downtime and ensure availability during peak construction periods.

Materials

Key materials include concrete, steel girders, aggregates, geotextiles, drainage pipes, asphalt, and erosion-control mats. Supply chain disruptions caused by the original disaster require careful procurement planning to secure reliable material delivery.

Financial Resources

Funding is allocated from provincial budgets, federal emergency programs, and contingency reserves. Budget tracking ensures that expenditures remain within approved limits and that additional funds can be mobilized quickly if unforeseen challenges arise.

Environmental and Cultural Resources

Environmental monitors and Indigenous cultural liaisons ensure compliance with ecological standards and cultural heritage protections.

Effective resource allocation supports seamless project execution, reduces inefficiencies, and ensures that the reconstruction is completed within targeted timelines and quality parameters.

9. Risk analysis

Risk analysis is essential for anticipating challenges that may jeopardize the reconstruction of Highway 5. Risks are categorized into environmental, technical, financial, operational, and social factors, each evaluated based on probability, impact, and mitigation strategies (Hillson, 2017).

Risk Assessment							
ID	Risk Cause	Risk Effect	Type	P	I	Score (Pxl)	Owner
1	Extreme weather delays	Schedule overrun	Environmental	7	8	56	Project Management
2	Supply chain disruption	Cost escalation	Operational	6	7	42	Procurement Lead
3	Design errors	Rework, delays	Technical	4	6	24	Design Engineer
4	Environmental non-compliance	Regulatory fines, delays	Regulatory	5	7	35	Environmental Officer
5	Worker injury	Work stoppage	Health and Safety	3	9	27	Health and Safety Officer
6	Stakeholder opposition	Project delays	Social	5	6	30	Communication Lead
7	Budget overrun	Funding shortfall	Financial	4	8	32	Finance Manager

Fig 7. Risk Assessment

Environmental Risks

These include further flooding, landslides, or extreme weather disrupting construction. Mitigation involves real-time weather monitoring, slope stabilization, improved drainage design, and scheduling flexibility.

Technical Risks

Engineering design errors, inadequate geotechnical data, or structural failures represent significant risks. These are mitigated through peer-review processes, geotechnical modelling, and strict adherence to Canadian Highway Bridge Design Codes.

Operational Risks

Challenges such as equipment breakdowns, labour shortages, and supply chain delays may affect timelines. Risk responses include contingency equipment, backup suppliers, and workforce planning.

Financial Risks

Inflation, cost overruns, or unexpected material price increases can impact budget stability. The project includes financial contingencies, ongoing cost tracking, and transparent reporting to funding agencies.

Social and Stakeholder Risks

Community opposition, Indigenous rights concerns, or environmental advocacy may cause delays. These risks are mitigated through active consultation, environmental stewardship, and cultural site protection.

A structured risk register is continuously updated, enabling proactive monitoring and escalation of emerging issues. By integrating comprehensive risk management practices, the project

maintains resilience against uncertainties and ensures adherence to safety, environmental, and budgetary standards.

10. Conclusion

The reconstruction and reopening of Highway 5 is a complex, high-impact infrastructure project essential for restoring transportation resilience, economic stability, and regional connectivity in British Columbia. This Project Management Plan provides a structured framework that integrates established project management techniques with resilience-oriented engineering practices suitable for post-disaster recovery environments. Through clear scope definition, detailed WBS, structured scheduling, and robust risk management, the project is positioned to deliver a safe, efficient, and durable transportation corridor. Stakeholder involvement plays a critical role in ensuring that diverse community, environmental, and regulatory concerns are addressed collaboratively. Effective resource allocation and rigorous quality assurance standards further support the project's successful delivery. The plan emphasizes not only restoration but also long-term resilience, recognizing the increasing frequency of extreme weather events due to climate change. By incorporating enhanced drainage systems, improved slope stabilization, and reconstructed bridges designed for higher loads and greater hydrological variability, the project aims to reduce future vulnerabilities and ensure sustainability. Ultimately, the reconstruction of Highway 5 represents more than a technical undertaking; it is a strategic investment in regional infrastructure security and socio-economic stability. This Project Management Plan ensures that the highway is not only rebuilt but strengthened, providing lasting benefits to residents, industries, and communities across British Columbia.

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