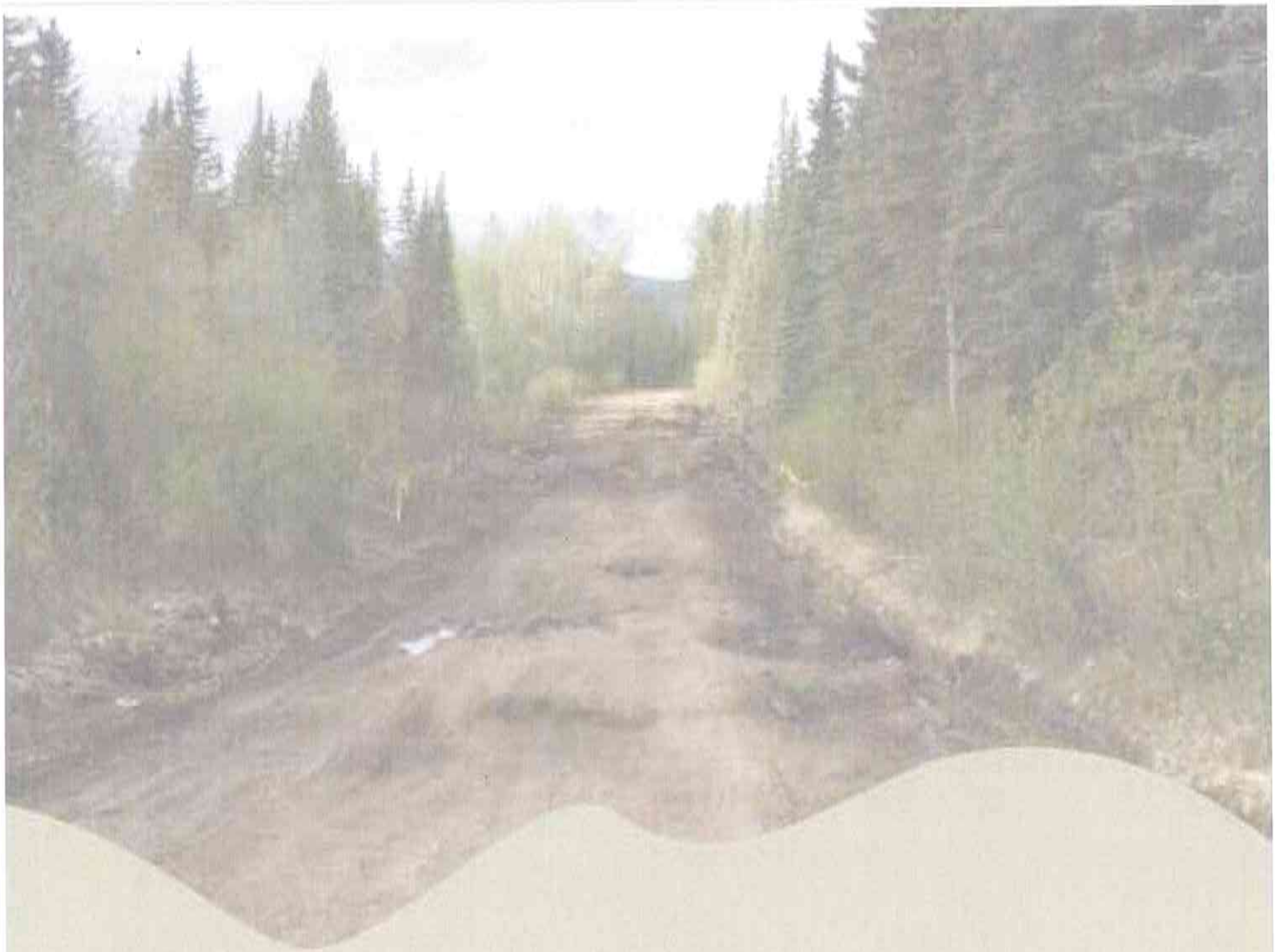

Yukon Resource Gateway Program Amendment

Loation: Yukon, Canada

Legal Name of Applicant: Government of Yukon, Department of Highways and Public Works

Date Submitted: May 3, 2019

Yukon

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Introduction:

Rationale:

This amendment request has two components:

1. Unbundling to permit Yukon government to engage individually with Yukon First Nations to develop projects and proceed with work as project agreements are signed.
2. Flexibility to add and delete important projects that align with First Nations and industry priorities.

Yukon government faces a number of challenges that continue to prevent the implementation of Gateway as originally proposed. The amendments we propose will provide the opportunity to overcome those challenges and permit Gateway to be implemented.

Challenge: Some First Nations are ready to proceed with Gateway activities. Other First Nations need more time or capacity for a rigorous assessment or do not wish to proceed at this time. The requirement for all agreements to be signed by directly impacted settled First Nations before activities can begin means First Nations that are ready to proceed cannot move forward and the Gateway program as a whole cannot advance, even though in many cases, their traditional territories and project areas do not overlap. This creates conflicts between First Nations because First Nations not impacted by the project are preventing work within the traditional territory of other First Nations, where they have no jurisdiction.

Opportunity: Proceeding with Gateway activities once First Nations have reached agreements specific to projects that are in their traditional territories allows project activities to flow, while giving other First Nations the time they need to assess how the proposed activities in their traditional territory align with their values and priorities. First Nations can opt not to proceed without affecting the autonomy of other First Nations. This promotes reconciliation and reduces the potential for conflict between First Nations. The requirement for agreements remains and activities will not proceed without the agreement of affected First Nation(s).

Challenge: Yukon needs to prioritize transportation infrastructure with consideration of existing industry needs, balanced with preparing the network over a 75-year horizon.

Opportunity: Strategic selection of infrastructure upgrades allows us to support existing and anticipated industry activity while also planning ahead to build long-term resilience into the transportation network. Project flexibility permits Yukon government to adapt to changing priorities of First Nations and industry needs.

Challenge: As part of our commitment to reconciliation, Yukon government has a responsibility to listen to concerns shared by First Nations and change its approach in response to those concerns.

Opportunity: Extensive discussions with Yukon First Nations have revealed concerns with the original approach to Gateway, so we have developed this amendment to address those concerns.

Challenge: Infrastructure investments are intended to benefit Canada on a national scale and not just the local region.

Opportunity: Large-scale mining activity in Yukon has national economic benefits, including skilled and unskilled employment in the mining sector as well as related sectors (e.g. construction) and transportation activity (e.g. shipping from ports).

In the absence of this amendment, the risk of Gateway not proceeding is significant. The failure to implement Gateway will be seen as a Canadian and Territorial failure. This amendment is required for Yukon to implement projects in 2020 and Canada and Yukon will be able to promote the success of the program and provide a positive message about reconciliation with First Nations.

Overview:

This program amendment is based on Yukon government's continued commitment to meet the goals and objectives of the Yukon Resource Gateway Project (YRGP), with amendments that allow for the project to proceed while also allowing for continued and meaningful consultation with Yukon First Nations and the flexibility to respond to First Nations concerns, the effects of a changing climate and shifts in industry activities.

Consultation and Engagement

Consultation with affected First Nations is fundamental to the successful delivery of the amended YRGP. Consultation with First Nations is an ongoing process that flows from the current project agreement negotiations, including identifying opportunities for First Nations through training, employment and potential business opportunities during construction, while also working collaboratively with First Nations throughout the planning, assessment, design and development stages of the project.

By engaging First Nations from the very beginning of the project, Traditional Knowledge, culture and heritage components are being meaningfully incorporated into project planning and design. This is also integral to the project's formal assessment, as input by affected First Nations is required as part of the submission for socio-economic and environmental effects assessment.

We are also engaging other stakeholders, including industry proponents and residents in the community where the project is located. Ongoing communication and stakeholder engagement allows Yukon to advance project delivery by knowing what projects are of interest to the First Nation and the community as well as industry.

Amended Approach to Project Agreements

Project agreements with First Nations prior to construction will remain a requirement of the amended YRGP. We are seeking additional flexibility to engage with First Nations in order to prioritize projects that are of interest and value to Yukon First Nations and adapt to changes in industry activity. We believe that this approach to agreements will better reflect the priorities and mitigate the concerns of Yukon First Nations.

Since the original announcement of YRGP by the Prime Minister on September 2, 2017, Yukon government has undertaken significant consultation with First Nations that are impacted by the work included in YRGP. The initial submission included an obligation for all directly impacted First Nation governments with Final Agreements sign project agreements with Yukon government prior to finalizing a contribution agreement with Canada. However, this has become a significant and possibly insurmountable hurdle for advancing the project. The removal of this obligation is critical to allow Yukon to continue to consult with Yukon First Nations about projects in their traditional territory while also allowing the delivery of projects in other areas of the Yukon in the traditional territories of other First Nations.

Because of the distances involved, different project components have vastly different contexts. To illustrate, the trip along the Robert Campbell Highway and North Klondike Highway from Watson Lake, the seat of Liard First Nation, to Dawson City, the seat of Tr'ondëk Hwëch'in, is 933 km and would take 13 hours under ideal conditions. This is roughly the same driving time as Halifax to Montreal and slightly less than the driving distance from Calgary to Vancouver. Further, this obligation also presents issues for First Nations, because First Nations that are interested in advancing work within their traditional territories currently cannot proceed with this work because of the negotiation challenges with other First Nations on projects that are outside of their traditional territory. For example, Yukon government has secured a project agreement with Little Salmon Carmacks First Nation to carry out work on the Carmacks Bypass, but activities cannot proceed because agreements with other First Nations have not been reached. This is essentially allowing one First Nation to veto the decision of another First Nation, even though their traditional territories do not overlap.

While unexpected, the current requirement for Canada and Yukon to enter into a contribution agreement is proving to be problematic and not aligned with the spirit of reconciliation. First Nations that have agreements are likely to experience project delays because of negotiation hurdles occurring outside their Traditional Territories. Removing the obligation to secure all agreements concurrently allows Yukon government to work directly with impacted First Nations closely and advance activities that are in alignment with First Nations priorities in one traditional territory, without being impacted by longer negotiation timelines in other traditional territories. This critical shift will put Yukon in a much better position to advance YRGP in partnership with First Nations.

Additionally, over the past two years of project agreement negotiation with First Nations, Yukon government has heard strong concerns that the road upgrades included in YRGP may increase access into First Nation traditional territories and consequently have adverse effects on the land. For example, there is concern that better access could result in increased hunting in the area, which may affect wildlife populations. Yukon government has also faced challenges because of the timelines and significant scope of work tied to these large project agreements, such as negotiating a ten-year project agreement for complete reconstruction of highway corridors. The scope and duration of these large activities have resulted in First Nations being extremely cautious at the negotiation table, in part due to capacity issues First Nations are experiencing when trying to make decisions about projects of this scale. This amendment will allow Yukon to respond to these concerns by reframing project agreements to decrease scope and timelines, so that Yukon government and First Nations can negotiate on smaller YRGP projects. This revised approach will allow First Nations to provide input on smaller pieces as the program proceeds, and will enable Yukon government to meet frequently with First Nations to help ensure projects are successful. The success of initial projects will then support the successful negotiation of future project agreements, as relationships are strengthened and the capacity of the First Nation is expanded.

First Nation governments have identified a strong interest in the employment, training and potential business opportunities of YRGP, but for many, these benefits do not mitigate their concerns about the cumulative effects of road upgrades that are included in the initial YRGP submission. On previous projects, Yukon government has successfully collaborated with First Nations to deliver capacity building benefits through training, employment and contracting opportunities. Project agreements focused on a smaller, more easily achievable scope will put Yukon government and First Nations in a better position to develop and agree on tangible and implementable capacity building benefits.

Additional Amendment Improvements

The regions targeted by the amended Gateway project reflect Yukon's current mineral inventory, which is dominated by precious and base metals: commodities that have historically driven exploration in the territory. Looking forward, the Yukon Geological Survey anticipates an increase in global demand for high tech metals such as lithium and cobalt, and strategic metals such as rare earth metals and vanadium. This is anticipated to drive exploration into different areas of the territory, likely creating new access infrastructure needs. The North Canol Road, one of the currently-identified road corridors, connects not only known lead-zinc and tungsten resources near the border with Northwest Territories but also transects a region that is prospective for vanadium. This strategically important road is therefore one that could enable both near-term and longer-term resource development opportunities.

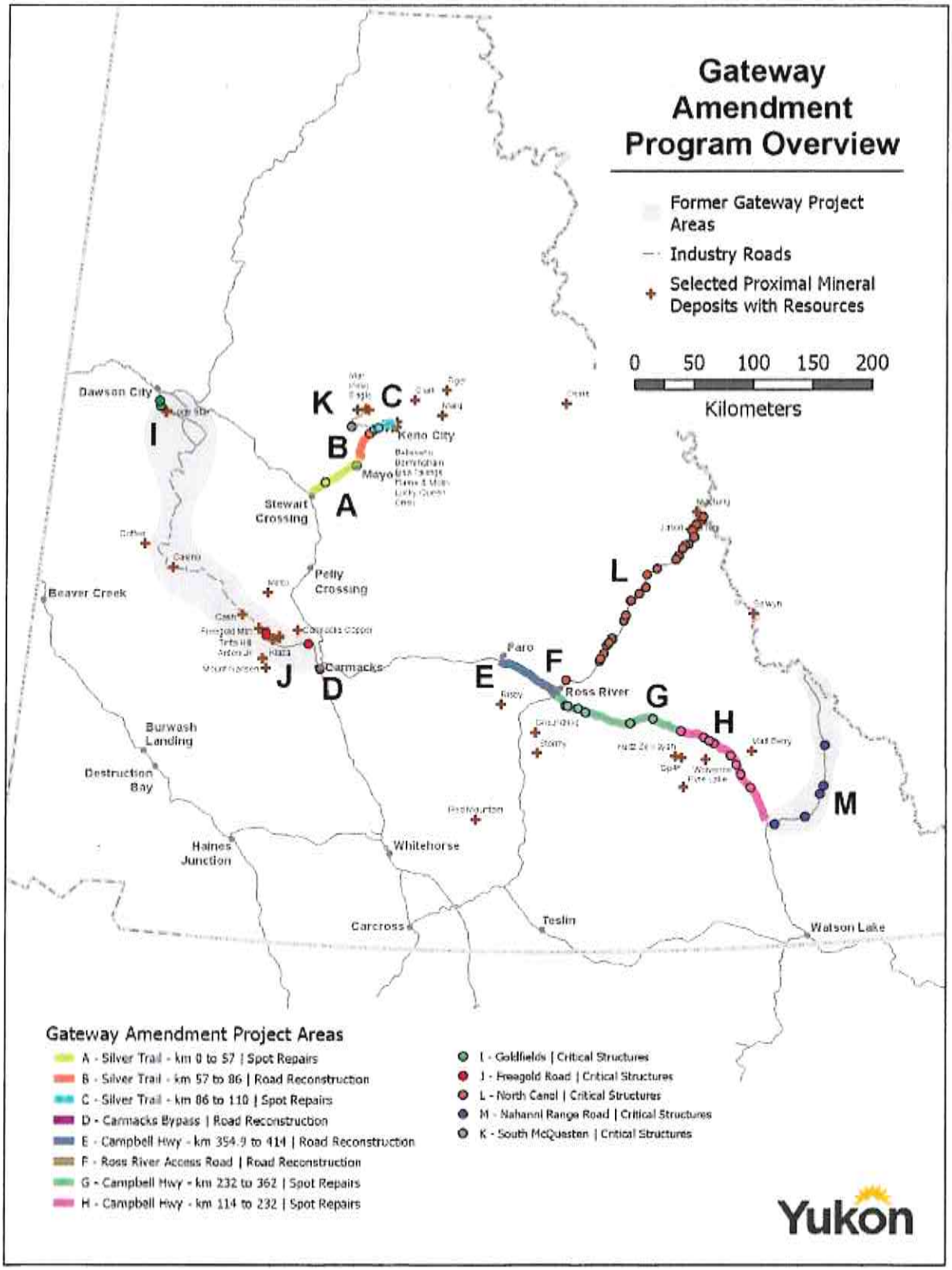
The original Gateway submission highlighted anticipated outcomes and benefits that remain consistent for the amended program. This amendment poses significant potential for additional benefits to be realized by opening up additional corridors in proximity to the Silver Trail, South McQuesten Road, Robert Campbell and North Canol highways. Importantly, while a flexible planning and project delivery approach is proposed in the amended program, the focus and objective remains on delivering the original Gateway program and project portfolio.

By including the Robert Campbell Highway in the amended program, we also introduce road redundancy, thereby increasing the reliability of the territory's road network. Given the complexities of transportation in the north, ranging from severe weather conditions to wildfires in the boreal forest, this is a benefit to the region as a whole. This proposed work will have the additional benefit of decreasing maintenance costs on this highway.

As part of our new approach, we propose to increase asset resiliency by replacing critical structural assets in the roads included in YRGP, such as replacing and upgrading bridges and large structural culverts. We will also target areas for remediation that are at risk of washouts due to the increased precipitation arising from climate change, and methods will be chosen that minimize permafrost degradation, such as the use of insulated culverts. Over time, these various works will add up to a refurbished working highway to support modern transportation weight and size, thereby supporting reliable industry access to resources while not improving the overall road surface and potentially drawing more traffic to the area. This addresses a significant First Nation concern about increased public access into their traditional territories and also addresses a critical industry concern about the reliability of structures on these resource roads. This specific shift allows Yukon government and First Nations to negotiate project agreements for projects that are of immediate interest to both parties. It also allows YRGP funding for critical infrastructure to flow while maintaining the ability to negotiate project agreements and proceed with road improvements in addition to critical structures if that is found to be a joint priority of Yukon government, First Nations, and industry. As an additional benefit, this approach will also increase the road network's resiliency to climate change.

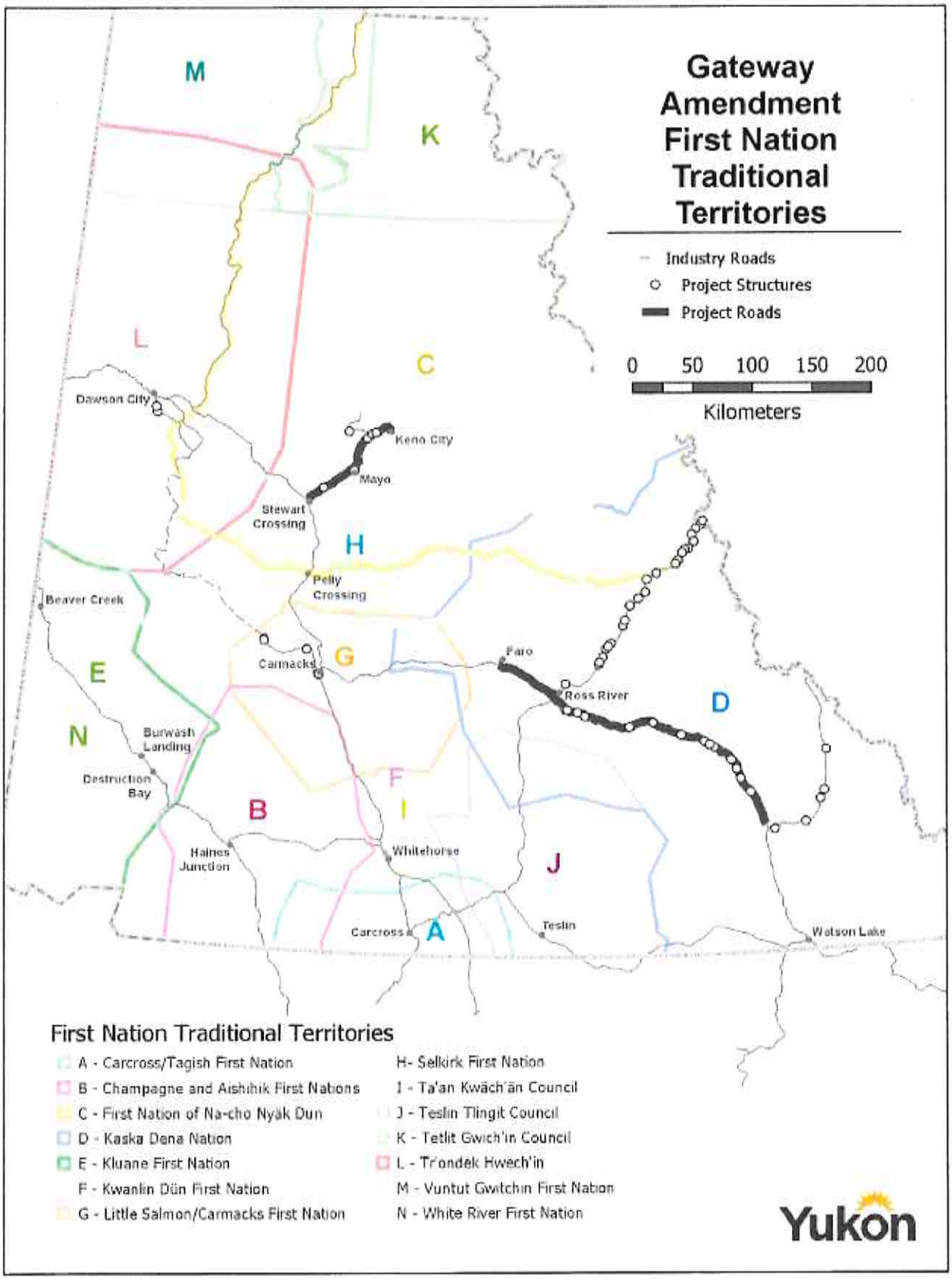
Program Area Overview Map:

Figure C.1 – Program Locations



Yukon First Nations Traditional Territories Map:

Figure C.2 – Yukon First Nations Traditional Territories



Operationalizing an Amended Gateway Program:

Yukon's 5,000 kilometre maintained highway network is the backbone of its resource-focused economy and the conduit for its northern communities, First Nations, and adventure-seeking tourists.

Key factors complicating the task of maintaining and revitalizing Yukon highways include:

- First Nations land management concerns,
- climate change,
- increased traffic volumes,
- heavier freight movements (e.g. heavy-haul ore haulage and LNG shipments),
- aging assets,
- re-emergence of mine developments, and
- recent termination of the $300 million-plus US-Canada Shakwak program.

Highway engineering projects generally address one to two of the following objectives: reduce safety/economic risks, manage deterioration, and renew or reconstruct transportation infrastructure components or corridors. As budgets are often focused on risk of failure, must-do projects *first* and lifecycle deterioration projects *second*, funds for strategic projects are typically constrained in any budget year. The factors listed above further constrain financial resources and limit the opportunity to strategically optimize the highway network. National Infrastructure Component (NIC) funding allows the Yukon government to advance strategic economic and social outcomes while also managing critical infrastructure issues. As Yukon's resource sector opportunities increase, the cost of not addressing critical infrastructure components and corridors escalates. The following picture highlights the impacts of flooding and erosion vulnerability on the Robert Campbell Highway in a mineral-rich region of Yukon. With rising levels of precipitation observed over recent decades and climate change models predicting higher levels in the decades to come, the task of upgrading the resilience of Yukon resource corridors is increasingly important.

The goals of the original and the amended Gateway programs are identical. Both are focused on upgrading the highway to tap into resource sector opportunities, strengthen northern communities, and create lasting benefits for First Nations. A key point of differentiation is the inclusion of a secondary list of projects that, with the agreement of affected First Nation governments, could be activated in the amended program in years where the original Gateway projects cannot be carried out due to First Nations or other concerns.

The following table outlines the characteristics of the original and the amended Gateway program.

Table 1 – Original Gateway vs Amended Gateway Characteristics

Issue	Original Program	Amended Program	Amendment Rationale
Project location	Projects situated on resource corridors, near targeted mineral deposits	Projects situated on resource corridors, some near targeted mineral deposits and others further down the transportation corridor route	Critical vulnerabilities exist on primary, low volume highways (e.g. R. Campbell, N. Canol)
Project composition	Focus on continuous road reconstruction; increase speed of travel and capacity (use volume); increase load-bearing capacity	Focus on targeted vulnerabilities and climate change resilience; focus on drainage and structural projects; some continuous road reconstruction; maintain current speed of travel and capacity (use volume); increase load-bearing capacity	More targeted on site-specific problems to shore up resilience on entire resource corridor
Traffic volumes	Projects situated in remote regions with traffic volumes that would ramp up as mining exploration and activity increases	Projects situated on primary highways in semi-remote regions with moderate traffic volumes that would moderately increase as regional mining exploration and activity increases	Elevated traffic volumes in remote areas is a key concern for several First Nations
Access impacts and cumulative effects	Some First Nations have expressed concerns over traffic impacts on wildlife and cumulative effects	Reduces project impacts on wildlife and cumulative effects	Selected construction projects not anticipated to have incremental impacts

The public component of the initial Gateway program involved eight major projects located on the Goldfield Roads, Freegold Road, the Carmacks Bypass, and Nahanni Range Road. The secondary list in the amended program includes one reconstruction program from Ross River to Faro on the Robert Campbell Highway. It also includes rehabilitation and resiliency upgrades to two sections of the Robert Campbell Highway between Ross River and Tuchitua to address critical deficiencies in a route used for resource extraction. Bridge and drainage structure projects on the North Canol are included as another distinct project area. The secondary project list also includes scaled back work on bridges and structural culverts (diameter > 1.5 metres) on the Freegold, Goldfield, and Nahanni Range roads. This shift is intended to address the concerns raised during the negotiation process with First Nations, while retaining the intent of the original submission. The amended program has a secondary list of projects provided in Annex A.

The projects that are selected will be assembled into three-year plans that will be submitted to Canada annually. Projects from the original Gateway program will be prioritized if and where agreements with affected First Nations have been formalized. At present, only the Carmacks Bypass project is supported by a signed agreement between Little Salmon Carmacks First Nation and the Government of Yukon. Therefore, the initial three-year plan (2019/20 to 2021/22) will include this project coupled with additional projects from the secondary project list. At the end of each fiscal year, an additional year of prioritized and planned projects will be included in year three of the new three-year plan.

Amended Program Design Logic:

A logic model has been developed as a project design tool. It articulates the linkage between high-level Yukon government priorities, National Infrastructure Component funding outcomes, and related activities and outputs of Yukon's Department of Highways and Public Works. Logic models can help in drafting a crude map of the four transformative program elements: inputs, activities, outputs and outcomes. They can also aid in formalizing performance measures and indicators with attention to goal setting and improved performance.

In designing the logic of the proposed project, select *Government of Yukon Performance Plan* priorities were identified as high order outcomes. These priorities stand alone as ultimate high-level economic, social and environmental outcomes for the project:

1. Our strong government-to-government relationships with First Nations foster reconciliation;
2. Our strategic investments build healthy, vibrant, sustainable communities; and
3. Our diverse, growing economy provides good jobs for Yukoners in an environmentally-responsible way.

Relevant immediate or intermediate-level "Outcomes and Benefits for Canadians" were extracted from Section III, Annex A, of the NIC application guide. These have been adapted to the Yukon highway infrastructure context as follows:

1. Improved highway safety;
2. Improved access to remote areas with proven resource sector development potential;
3. Improved social and economic outcomes for affected First Nations and rural communities;
4. Extended life of the existing transportation infrastructure assets;
5. Reduced social, physical and economic risks associated with natural hazards, climate change and transportation activity; and
6. Improved resiliency of public infrastructure to natural hazards and climate change.

To successfully achieve these outcomes, the Department of Highways and Public Works' Transportation Division will initiate internal, unit-level program activities in the areas outlined below before engaging and supervising private sector engineers and construction contractors.

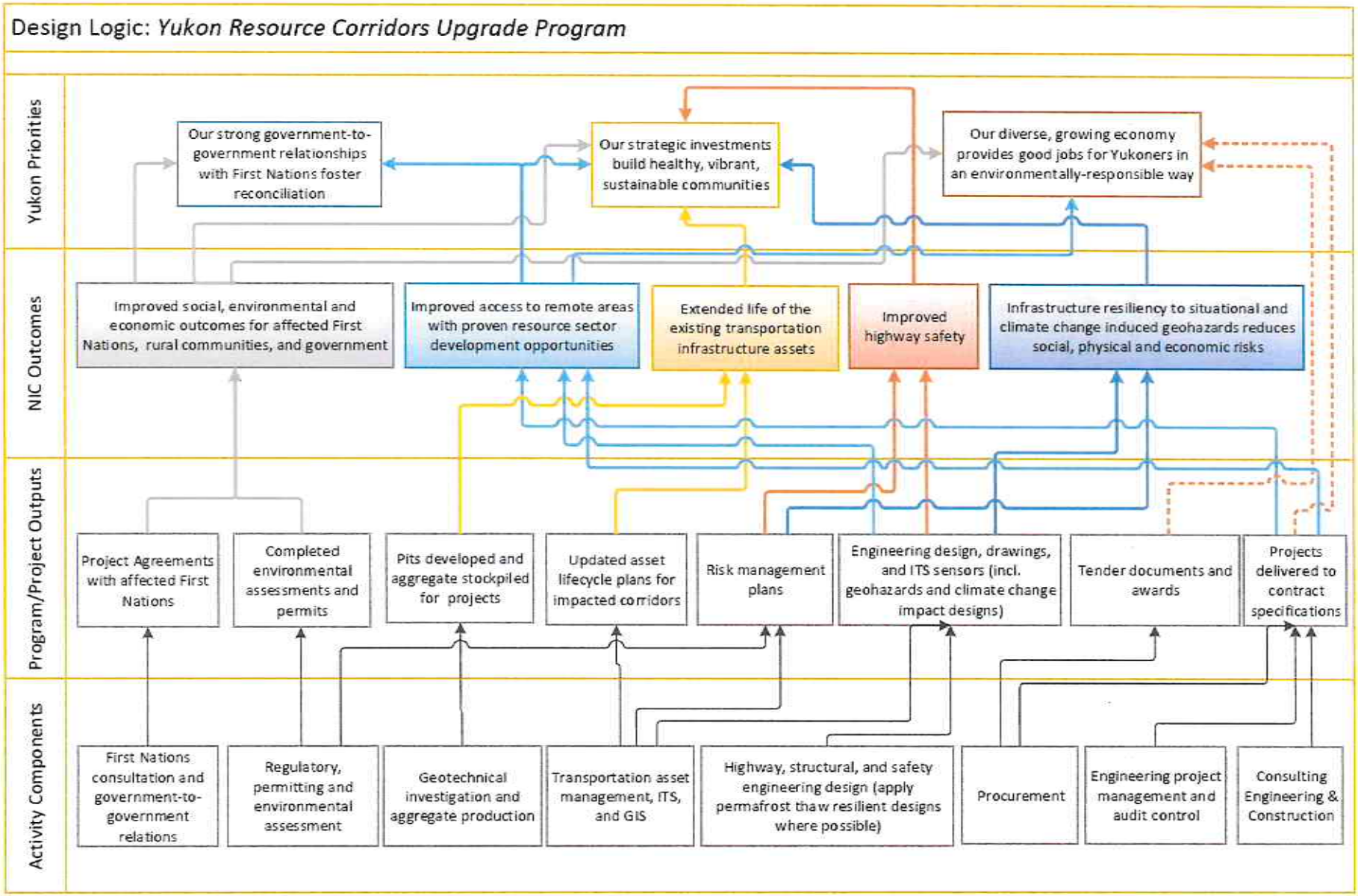
- First Nations consultation and government-to-government relations;
- Regulatory, permitting and environmental assessment;
- Economic development;
- Transportation asset management and planning;
- Highway, structural, and safety engineering design;
- Procurement; and
- Engineering project management and audit control.

These activities are designed to produce a number of necessary outputs for successful program delivery, the key of which are as follows:

1. Project Agreements with affected First Nations;
2. Completed environmental assessments and permits;
3. Pits developed and aggregate stockpiled for projects;
4. Private local contractor strategies for capacity alignment with market;
5. Updated asset lifecycle plans for impacted corridors;
6. Risk management plans;
7. Engineering design, drawings, and ITS sensors (incl. geohazards and climate change impact designs);
8. Tender documents, awards, and construction industry partnerships; and
9. Projects delivered to contract specifications.

The hierarchy of program design and the linkage between activities, outputs, outcomes and priorities are reflected in Figure 3 - Design Logic Model that follows (next page).

Figure 3 – Design Logic



Achievement of NIC Program Outcomes and Benefits:

A key driver of this application for funding is the alignment between the objectives of the NIC program and the interests of Yukon government and northern resource industry stakeholders. More to the point, NIC program outcomes and benefits reflect directly on the interests of the Yukon government and Yukoners in general, namely:

- economic, social and environmental benefits arising to Yukoners, and Canadians in general, from improved access to regions of resource development potential;
- improved highway safety through infrastructure and environmental engineering efforts that reduce the prevalence and impacts of highway geohazards and climate change; and
- and enhanced economic performance through reduced travel times and costs of travel (for commercial operators, tourists and commuters alike).

These NIC outcomes have been included in logic and performance design work in developing the amended project. As noted in later sections of this submission, these outcomes feed forward into key Yukon government priorities, and backward into Highways and Public Works activities and outputs. This program logic is captured in a logic model and project portfolio decision model that invokes two decision tools: a screening tool to preselect viable versus untenable projects and a prioritization tool that allows projects to be rated against the capacity to realize NIC outcomes and benefits.

The logic model provides a foundation for articulating performance measures and objectives. The decision model enables the creation of an initial detailed three-year construction plan which is included in a report section below. It also provides a framework and process for developing revised three-year plans at the beginning of every year of the amended program.

Amended Program Overview

Performance Measures Strategy:

Transportation Engineering Branch will work closely with the Procurement Support Centre to posted tenders early in the construction season to assist contractors in preparing and planning for the short and intense building season. We will strive to stagger the closing dates of public tenders to make it easier for contractors to bid on more than one tender, and to encourage prices to remain stable. As the program will approximately double the volume of territorial transportation engineering and construction work over the coming decade, we will pursue creative solutions to increase the capacity of the local contracting community. We anticipate an increase in mining investment in the coming years, which will increase demand for labour and earth moving and other heavy equipment, so we will work proactively with the contracting community to find ways for supply to keep pace with demand. Typically, our construction workforce is bolstered by out-of-territory workers, and there may be opportunities for local businesses to partner with businesses in northern British Columbia or Alberta.

As outlined in Government of Canada's Evaluation Centre of Excellence literature, the best time to develop performance measures is at the program design stage. The process of building logic models and performance measures is akin to the process of defining the architecture of projects in terms of intended results or outcomes and tracing paths back to required activities, outputs and inputs.

The performance measurement and management process is vital to developing purposeful and constructive relationship with stakeholders. By measuring what matters, we can focus on root causes of performance problems and key attributes of success. Performance measurement for the amended Gateway program will be addressed monthly at the activity level and quarterly at the senior management level.

In keeping with best practices in performance management, performance indicators have been developed for each individual program outcome and activity output. Outcomes, outputs, performance indicators, frequency of data collection and targeted improvements over the 10-year project timeframe are captured in the following table.

Table 2 – Performance Measures

Ultimate Outcomes			
Outcomes	**Performance Indicator**	**Frequency**	**Target**
Our strong government-to-government relationships with First Nations foster reconciliation	Number of First Nations – Government of Yukon agreements developd through program	Annual	90% of projects undergoing env. permitting move forward to costruction through First Nations authorized construction project
Our strategic investments build healthy, vibrant, sustainable communities	Cumulative investment amount per corridor	Calculated every three years	Direct infrastrucure investment at 90%+ of total program spending
Our diverse, growing economy provides good jobs for Yukoners in an environmentally-responsible way.	Increased employment levels in most affected communities	Estimate every five years	5% increase in employment in communities adjacent to corridor

Intermediate NIC Outcomes			
Outcomes	**Performance Indicator**	**Frequency**	**Target**
Improved social and economic outcomes for affected First Nations and rural communities	Survey results: Perceived improvements in key First Nations social and economic indicators (TBD)	Benchmark (year 2) survey and summary evaluation surve on completion of funed program	10% improvements in perceived social and economic status over 10 years
Extended life of the existing transportation infrastructure assets	Transportation Asset Management Unit (HPW) assessement of asset condition, i.e. bridge conditions and Gravel/BST road condition index level	Information available annually as per data collection protocol	10% average condition improvement score for bridges and/or road surfaces
Improved resiliency of public infrastructure to natural hazards and climate change	Additional years of service (above average) for resurfacing	Estimated over 10 program years	Actual spending is 5% lss than predicted spending for 10-year period.

Immediate Outcomes			
Outcomes	**Performance Indicator**	**Frequency**	**Target**
Improved safety	Reported injury and fatality collisions	Five years	10% reduction over 10 year period
Improved access to remote areas with proven resource sector development potential	Annualized ore haul loads by corridor	Bi-annual	5% annual growth in ore haul couns
Reduced social, physical and economic risks associated with natural hazards and climate change	Documented occurrence of geohazards in roadway	Tracked on occurrence	Hold geohazard count to zero growth (in light of currently intensifying climate change impacts)

Outputs			
Outputs	**Performance Indicator**	**Frequency**	**Target**
Project Agreements with affected First Nations	Number of weeks to develop agreement	Attached to each agreement	4 weeks
Completed environmental assessments and permits	Number of months to secure permits and complete environmental assessments	Annual check-in	3 months inhouse delay/permit (average) and 3 months internal assessment

Pits developed and aggregate stockpiled for projects	Measure of gap between required and supplied aggregate	Annual	Zero gap level
Private local contractor strategies for capacity alignment with market	Number of developed and delivered conrtractor strategies to address capacity growth	Tracked on occurrence	5 local contractors develop growth strategies over 10 year program
Updated asset lifecycle plans for impacted corridors	Completion of transportation asset management plans on targeted resource corridors addressing 10-year program timeframe	Annual check	100% plan coverage
Risk management plans	Projects assessed through risk management framework	Tracked on occurrence	100% coverage
Engineering design, drawings, and ITS sensors (incl. geohazards and climate change impact designs)	-Engineering analysis and drawings/reports completed in line with project requirements -Design modifications to address permafrost thaw and increased water flow rates in drainage structures due to climate change.	Tracked on occurrence	Less than 10% of projects delayed due to late production of: safety designs, conceptual or pre-eng. designs (where required), and final designs. -2 engineering designs prepared each year to address climate change
Tender documents preparation	Tender documents prepared with adequate time for tendering and awarding projects	Tracked on occurrence	90% of tender documents produced in accordance with scheduled procurement
Constructed Projects	-Projects completed to contract specifications -Project completed on time and on budget	Tracked on occurrence	-75% of projects delivered to contract specifications -75% of projects delivered on time and on budget

Program Decision Model:

Decision Model Overview:

The initial four years of the amended program includes a 2019/20 year of planning and pre-engineering work (i.e. permitting, environmental assessment, planning and geotechnical activities) followed by engineering and construction project work in 2020/21 and 2022/23. Beyond the initial four years of scheduled project-based activities, we propose a fluid approach that is responsive to First Nation priorities and concerns and economic (or industry) priorities.

If the amended program is approved, and if the original program is not achievable, then a modified three-year plan would be developed using a combination of projects from the original and the amended program lists of projects that retains the NIC objectives. Where agreements for the original projects are negotiated with First Nations, the projects presented in the original submission will be prioritized for delivery. Each new three-year plan will be presented for annual approval.

To address project portfolio uncertainty beyond 2022/23, the Department of Highways and Public Works proposes to implement a two-part decision modelling process. Projects will undergo an initial screening to determine their feasibility using a simplified project screening tool. Projects that are successfully screened will then be assessed using a project prioritization tool that has been used in the department and modified for decision modelling purposes over the past three years.

Project Screening Tool

The project screening tool is used to shortlist prospective projects for possible inclusion in a future three-year project portfolio. Projects are screened based on agreements with First Nations, securing of water licenses and other environmental permits, and the need for additional consultation and public engagement, and risk management elements.

Following screening into the three-year planning process, the project will undergo a detailed prioritization process to help compare, contrast and select the most valued projects from a list of options. The chart below has the structure of project goals and objectives used to prioritize Yukon's transportation engineering projects. Prioritization components that currently align with NIC outcomes are circled.

Environmental considerations are not included in the chart. They are treated as mitigations or compliance tasks because road work is rarely undertaken to deliver on environmental service objectives.

A simplified approach must be adopted in order to apply priorities from a large number of objectives to a large number of projects. In operation, the Transportation Engineering Branch recruits engineers and specialists to qualitatively assess network innovation, efficiency, safety and reliability factors at the project level. Social and economic development benefits of individual projects are assessed using a broader approach and audience. Each of the six, second-tier objectives is weighted through a pairwise assessment and a matrix operation (Analytical Hierarchy Process).

Decision Model: Multiple Accounts Analysis

The Yukon Government has developed a decision making framework that will allow us to prioritize each candidate project based on the degree to which the projects satisfy the various outcomes identified in the program logic model.

A process called a Multiple Accounts Analysis (MAA) was selected to evaluate the various projects. The process provides a clear, transparent and defensible framework that enables relative ranking of candidate projects in order to optimize the degree which the program can attain the intended outcomes.

Multiple Accounts Analysis is a two step process. The first step is to develop a list of accounts (Contextualized NIC Outcomes), subaccounts (project-level sub-accounts) and indicators. Furthermore, these accounts are weighted according to their relative importance. The accounts, subaccounts, indicators and relative weighting are listed in Table 3 – Accounts & Sub-Accounts below:

Table 3 – Accounts & Sub-Accounts

Contextualized NIC Outcome	Outcome Weight	Project-Level Sub-Accounts	Sub-Account Indicators
Improved social, environmental and economic outcomes for affected First Nations, rural communities, and government	**25%**	Minimizes negative social impacts	Project planned and designed to minimize new negative social impacts and may reduce existing impacts.
		Minimize negative environment impacts	Project planned and designed to minimize new negative environmental impacts and may reduce existing impacts, e.g. replacing a structural culvert with a bridge to improve stream navigability and fish habitat.
		Minimize intermediate to long term highway operation and maintenance costs	Project reduces overall costs of operating and maintaining highway network (improving condition of assets would reduce O&M costs whereas increasing the class of the road would increase O&M costs)
		Support rural and FN economic opportunities	Project support rural economic and FN opportunities by creating any of the following: employment opportunities, business opportunities, training opportunities or other economically advantageous opportunities.
Improved access to remote areas with proven resource sector development opportunities	25%	Reduces travel delays and increases reliability	Project will reduce potential delays caused by congestion and/or issues of route reliability.
		Route redundancy	Project will provide route redundancy for long haul options.
		Increases efficiency of access.	Project improves access efficiency by decreasing travel times and increasing weight-bearing capacity of the route.
Extended life of existing transportation infrastructure assets	15%	Minimizes life cycle costs	Project represents the optimal intervention strategy for the asset in order to minimize total life cycle costs.
		Improves decision making and planning	Project improves capacity to optimize planning and design through information and analytical tools (e.g. ITS, Asset Management, Information systems).
		Extends life of infrastructure	Project will extend the life of the asset.
Improved highway safety	**20%**	Reduces risk of injury or property damage	Project reduces risk or injury or property damage by improving highway safety (e.g. barriers, sight distance, alignment, hazards, etc.)
Infrastructure resiliency to situational and climate change induced geohazards reduces social, physical and economic risks	**15%**	Reduces susceptibility to service disruption	Project reduces susceptibility of route to disruption from natural hazards (storms, earthquakes, fire, etc.) and climate change.

The second step includes evaluating the degree to which each project satisfies the sub-account indicators. The choices and associated scoring are listed in Table 4 – Degree of Agreement below. For example, if the project evaluation committee determines that they strongly agree that project 1 satisfies the first sub-account indicator, then that project would receive a score of 4 for that indicator.

Table 4 – Degree of Agreement

Scoring Scale	
Strongly agree	4
Agree	3
Neutral	2
Disagree	1
Strongly disagree	0

The scores for each sub-account indicator within each account are added up and multiplied by the outcome weight to provide an outcome score for each project. Each outcome score is then added up to provide and overall project score.

As a result of this process is project is ranked according to a systematic and transparent manner such that the value basis for the combination of impacts is readily apparent.

The impacts of the projects, particularly the social, economic and environmental, can be difficult to accurately predict, describe or quantify. This makes the evaluation of these impacts more difficult, and as such, much of the assessment is based on judgment rather than deterministic analysis.

A sample of performance measures under the proposed framework is as follows:

Figure 4 – Decision Model Components

Contextualized NIC Outcome	Outcome Weight	Project-Level Sub Accounts	Sub-Account Indicators	Carmacks Bypass	Nahanni Range Road - Original	Nahanni Range Road - Amended	Goldfield Roads - Original	Goldfield Roads - Amended	Freegold Road - Original	Freegold Road - Amended	R Campbell Highway: Km 114-232	R Campbell Highway: Kms 232-354	R Campbell Highway: Kms 349-414.48	Silver Trail	North Canol	South McQuesten Road
Improved social, environmental and economic outcomes for affected First Nations, rural communities, and government	25%	Minimizes negative social impacts	Project planned and designed to minimize new negative social impacts and may reduce existing impacts.	SA	A	N	A	N	A	N	A	A	SA	SA	A	A
		Minimizes negative environment impacts	Project planned and designed to minimize new negative environmental impacts and may reduce existing impacts, e.g. replacing a structural culvert with a bridge to improve stream navigability and fish habitat.	A	N	N	D	N	D	N	A	N	N	D	A	SA
		Minimizes intermediate to long term highway operation and maintenance costs	Project reduces overall costs of operating and maintaining highway network (improving condition of assets reduces O&M costs whereas increasing the class of the road increases O&M costs)	D	SD	A	SD	A	SD	A	SA	SA	N	SA	A	SA
		Supports rural and FN economic opportunities	Project supports rural economic and First Nation opportunities by creating any of the following: employment opportunities, business opportunities, training opportunities or other economically advantageous opportunities.	SA	SA	A	SA	A	SA	A	A	A	A	SA	A	SA
			NIC Outcome Score	2.25	1.75	2	1.75	2	1.75	2	2.5	2.5	2.25	3	2.25	2.75
Improved access to remote areas with proven resource sector development opportunities	25%	Reduces travel delays and increases reliability	Project will reduce potential delays caused by congestion and/or issues of route reliability.	SA	SA	A	SA	A	SA	A	SA	SA	SA	SA	SA	SA
		Provides route redundancy	Project will provide route redundcy for long haul options.	A	N	N	A	N	A	N	SA	SA	SA	N	N	N
		Increases efficiency of access.	Project improves access efficiency by decreasing travel times and increasing weight-bearing capacity of the route.	A	SA	A	SA	A	SA	A	SA	SA	SA	SA	SA	SA
			NIC Account Score	2.50	2.50	2.00	2.75	2.00	2.75	2.00	3.00	3.00	3.00	2.50	2.50	2.50
Extended life of existing transportation infrastructure assets	15%	Minimizes life cycle costs	Project represents the optimal intervention strategy for the asset in order to minimize total life cycle costs.	N	SD	A	SD	A	SD	A	A	A	N	SA	SA	SA
		Improves decision making and planning	Project improves capacity to optimize planning and design through information and analytical tools (e.g. ITS, Asset Management, information systems).	N	N	A	N	A	N	A	A	A	SA	A	A	A
		Extends life of infrastructure	Project will extend the life of the asset.	N	SA	A	SA	A	SA	A	SA	SA	SA	SA	SA	A
			NIC Account Score	0.90	0.90	1.35	0.90	1.35	0.90	1.35	1.50	1.50	1.50	1.65	1.65	1.50
Improved highway safety	20%	Reduces risk of injury or property damage	Project reduces risk of injury or property damage by improving highway safety (e.g. barriers, sight distance, alignment, hazards, etc.)	SA	SA	A	SA	A	SA	A	SA	SA	SA	SA	SA	A
			NIC Account Score	0.80	0.80	0.60	0.80	0.60	0.80	0.60	0.80	0.80	0.80	0.80	0.80	0.80
Improved infrastructure resiliency to situational and climate change induced geohazards	15%	Reduces susceptibility to service disruption	Project reduces susceptibility of route to disruption from natural hazards (storms, earthquakes, fire, etc.) and climate change.	A	SA	A	SA	A	SA	A	SA	SA	A	SA	SA	SA
			Account Scores	0.45	0.60	0.45	0.60	0.45	0.60	0.45	0.60	0.60	0.45	0.60	0.60	0.60

	Carmacks Bypass	Nahanni Range Road - Original	Nahanni Range Road - Amended	Goldfield Roads - Original	Goldfield Roads - Amended	Freegold Road - Original	Freegold Road - Amended	R Campbell Highway: Km 114-232	R Campbell Highway: Kms 232-354	R Campbell Highway: Kms 349-414.48	Silver Trail	North Canol	South McQuesten Road
Total Scores	6.90	6.55	6.40	6.00	6.40	6.00	6.40	8.40	8.40	8.00	8.55	7.80	8.15
Pre Screen Ranking	7	10	11	8	11	8	11	2	2	5	1	6	4
Authorization Screen Score	100%	0%	75%	0%	50%	0%	50%	100%	100%	100%	100%	100%	100%
Post-Screen Score	6.9	0	4.8	0	3.2	0	3.2	8.4	8.4	8	8.55	7.8	8.15
Post-Screen Ranking	7	11	8	11	9	11	9	2	2	5	1	6	4

Amended Gateway Economic Benefits and Impacts:

In reviewing mining and transportation investment in Yukon, economists are expecting investment to taper off this summer as construction nears completion at the Eagle Gold Mine on the South McQuesten Road. Investment will increase in 2020/21 if development efforts accelerate at the Coffee gold mine, as planned.

Historically, out-of-territory workers have accounted for as much as one-third of the construction workforce. Attracting out-of-territory workers to meet local shortages is becoming increasingly difficult due to a strong economy in B.C where Yukon has traditionally drawn half of its out-of-territory workforce from. Though, this could be mitigated somewhat by slack labour market conditions in Alberta.

Highway construction uses more unskilled labour (25%) than construction work (11%). Highway construction does, however, require much more heavy equipment operators and transportation specialists. Since by its nature, highway construction takes place in remote areas it's easier to bring in capital and labour resources from other jurisdictions and from local labour resources where available.

The estimated annual spend on highway construction work of $40 million to upwards of $60 million is historically substantial. Over the last 10 years, according to Statistics Canada data, the territory has spent an average of $57.9 million on transportation and engineering infrastructure. Previous peaks in construction spending do not appear to have led to a substantial increase in construction costs or crowding out of investment in other areas, though these impacts can be nuanced and difficult to discern from available evidence.

The economic impacts of the amended Gateway program are similar to reports provided in the original submission. The distribution of capital spending dollars in Yukon have followed a pattern of approximately one-third channelled to inputs, much from outside Yukon, 30% on labour and 38% on capital. The impacts of $360 million investment in Yukon's highway infrastructure, using Statistics Canada's 2014 Provincial Input-Output multipliers for Yukon (L97 Level), are forecast over the 10-year construction timeframe as follows:

Table 5 – Input/ Output Model Values

	Within Yukon	Outside Yukon	Canada Total
Shock	$ 360,183,000		
GDP basic price	$ 195,356,202		
Labour income	$ 96,991,438		
Jobs	1830		
Direct plus Indirect Output	$ 430,360,479	$164,131,122	$594,491,602
GDP basic price	$ 234,286,196	$84,364,423	$318,650,619
Labour income	$ 123,188,968	$47,040,696	$170,229,664
Jobs	2311	668	2,979
Direct plus Indirect Output	$ 479,532,068	$234,555,664	$714,087,732
plus Induced GDP basic price	$ 268,388,608	$122,934,516	$391,323,125
Labour income	$ 133,754,290	$65,954,443	$199,708,733
Jobs	2611	1,052	3,663

With a total of 3,663 job-years anticipated for Canada as a whole, and 2,611 job-years for Yukon alone, the impacts will be significant. This translates into roughly 260 and 366 new jobs created in Yukon and Canada, respectively, for the ten-year life of the program. The $360 million investment in highway infrastructure is anticipated to stimulate over $390 million of induced GDP and $170 million in labour income for Canada as a whole.

While economic spin-off arising from transportation infrastructure spending is impactful, longer lasting local and national benefits are derived from the availability of upgraded infrastructure. The focus of the amended Gateway program on rural structures and vulnerable highway sections will provide up to 75 years of benefits, the expected lifespan of drainage structures in the territory. An improved highway network will enable shipments of ore from mineral rich zones of Yukon for decades to come.

Economic forecasts indicate that of the $360 million invested in transportation infrastructure, approximately $118 million would be spent on goods and services (inputs) from various jurisdictions. A portion of these goods and services would be imported through interprovincial/territorial trade, a portion would be purchased directly from southern jurisdictions, and the remaining amount imported from countries outside Canada. Apply estimates on direct spending on factors and inputs, the value of goods and services produced in various jurisdictions across Canada and internationally is anticipated to be as follows:

Table 6 – Goods and Services from Point of Origin

Goods and Services Points of Origin		
Yukon	$	45,960,000
Outside Canada	$	6,300,000
Interprovincial Imports	$	2,990,000
Western Provinces	$	610,000

The number of out-of-territory residents working in Yukon in the construction industry is typically around 20% of total employment. The salary/social contributions by jurisdiction of residence can be estimated from this breakdown value. Economic analysts expect that for transportation engineering construction higher-than-average shares of out-of-territory workers than construction. Total payroll by jurisdiction of residence is anticipated to approximate values in the following table:

Table 7– Employment Shares and Values by Jurisdiction

YT	80.8%	$96,775,000
BC	9.0%	$10,835,000
ON	3.4%	$4,077,000
AB	2.7%	$3,218,000
QC	1.0%	$1,234,000
SK	0.7%	$858,000
MB	0.6%	$697,000
NT	0.5%	$644,000
NS	0.4%	$536,000

Program Budget:

Original resource Gateway Submission - Funding Source		
Industry	108,662	-
Yukon	112,004	112,004
Canada	248,179	248,179
	468,845	360,183

Amended Resource Gateway Submission - Funding Source	
Industry	-
Yukon	103,947
Canada	311,841
	415,788

		1	2	3	4	5	6	7	8	9	10	11	Total	
		2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30		
		1,994	24,860	62,493	61,504	34,800	35,600	30,778	51,278	41,471	50,619	20,393	415,788	TOTAL ELIGIBLE
		1,495	18,645	46,869	46,128	26,100	26,700	23,083	38,458	31,103	37,964	15,294	311,841	CANADA 75%
		498	6,215	15,623	15,376	8,700	8,900	7,694	12,819	10,368	12,655	5,098	103,947	YUKON 25%
PART OF ORIGINAL RESOURCE GATEWAY	Carmacks Bypass	219	2,688	11,313	12,563	0	0	0	0	0	0	0	26,781	
	Nahanni Range Road	0	2,281	13,406	0	0	100	350	10,350	5,288	12,538	0	44,313	
	Goldfields	319	6,506	6,288	0	0	0	0	0	0	0	0	13,113	
	Freegold Road	194	1,225	8,850	16,250	0	0	0	0	0	0	0	26,519	
	Silver Trail	313	1,938	3,519	7,625	7,719	8,031	7,094	8,031	7,094	8,031	3,625	63,019	
	North Canol Road	0	435	2,036	4,329	4,500	3,525	2,844	3,188	2,825	2,600	0	26,281	
	South McQuesten	0	50	813	0	0	0	0	0	0	0	0	863	
	Campbell Highway - Ross River to Faro	200	5,206	5,206	5,206	5,206	5,319	7,209	7,209	7,190	6,875	7,543	62,369	
	Ross River Access Road	0	0	0	0	0	0	0	3,138	3,138	3,138	2,725	12,138	
	Campbell Highway - KM 114 to KM 232	375	1,938	5,063	3,969	8,688	8,281	6,969	7,769	8,563	6,625	250	58,488	
	Campbell Highway - KM 232 to KM 354.9	375	2,594	6,000	11,563	8,688	10,344	6,313	11,594	7,375	10,813	6,250	81,906	

Program Timeframes:

	Original Gateway							Amended Gateway			
Project	1 2019-20	2 2020-21	3 2021-22	4 2022-23	5 2023-24	6 2024-25	7 2025-26	8 2026-27	9 2027-28	10 2028-29	11 2029-30
Carmacks Bypass											
Nahanni Range Road											
Goldfields											
Freegold Road											
Silver Trail											
North Canol Road											
South McQuesten											
Campbell Highway - Ross River to Faro											
Ross River Access Road											
Campbell Highway - KM 114 to KM 232											
Campbell Highway - KM 232 to KM 354.9											
Total Eligible Expenditures ($000s)	$ 1,394	$ 24,860	$ 62,496	$ 61,504	$ 54,830	$ 55,600	$ 30,778	$ 51,278	$ 41,47	$ 50,619	$ 20,395

Applicant Information

Applicant Organization

Organization and Contacts

Full Legal Name: Legal Status:	Government of Yukon Department of Highways and Public Works Territorial Government
Primary Contact:	Paul Murchison, Director, Transportation Engineering Branch Telephone: 867-633-7930 Email: paul.murchison@gov.yk.ca
Secondary Contact #1:	Robin Chambers, Manager, Major Programs Telephone: 867-335-6101 Email: robin.chambers@gov.yk.ca
Secondary Contact #2:	Amanda Price, Manager, Planning and Programming Telephone: 867-336-0151 Email: amanda.price@gov.yk.ca
Address:	461 Range Road, c/o P.O. Box 2703 (W-13) Whitehorse, YT Y1A 2C6

Organization's Mandate, Role, and Suitability

In his January 2017 mandate letter to the Minister of Highways and Publics Works (HPW), Yukon Premier Sandy Silver emphasized the need to:

- Make the most of government investments to support economic activity, diversification and better access to government services across the territory; and
- Make thoughtful and careful decisions about spending to support meaningful, effective investments in jobs, people and communities across Yukon.

HPW is responsible to the Government of Yukon (YG) for building and maintaining transportation infrastructure, systems, and programs to ensure safety for travellers and to support economic growth within the territory. HPW's mandate includes:

- Improving capital planning to ensure the effective delivery of budgeted programs for Yukoners;
- Developing and implementing asset management frameworks and/or systems for the transportation assets managed by HPW; and
- Implementing the departmental strategy to make progress on the commitments in the Climate Change Action Plan in the areas of procurement, vehicles, buildings, and roads.

Key functions of HPW's Transportation Capital Program include:

- Plan, construct, operate, market, and maintain transportation systems and services in a cost-effective and efficient manner;
- Develop transportation policies and programs to support Yukon's economic and social development; and
- Promote safe and efficient movement of people and goods.

HPW's role in the project will be to contract construction work but retain an "Owner" procurement role in managing contractor/consultant work as per tender standards and specifications. Transportation Engineering

Branch (TEB) project managers will lead the project. Their responsibilities include: creating detailed designs for each segment (i.e. realignment, cuts and fills, widening, drainage, and resurfacing); preparing cost estimates, tender and contract documents; monitoring quality of construction; and closing out the project. Upon completion, HPW will own, operate, and maintain the asset through its life cycle.

HPW is the best-suited organization to lead the project because it holds the responsibility and authority through legislation such as *Motor Vehicles* Act and *Highways* Act. TEB has a staff with diverse expertise that has demonstrated its capability to deliver major highway reconstruction projects through planning, design, construction, and operation and maintenance phases. The branch has relevant and up-to-date functional plans in place which identify short-, medium- and long-term upgrade requirements for maintaining an acceptable level of service for the foreseeable future on the North Klondike Highway.

Project Team

Project Personnel

HPW will lead design and delivery of the project. The project team is presented in the following table. The mailing address for all identified team members is as identified in section C.1.1 above. See Table 3.1 – Project Team.

Governance Structure

HPW will contract construction work and will retain an "Owner" procurement role in managing contractor/consultant work in accordance with Yukon tender standards and specifications. TEB project managers will lead the project, with the following responsibilities:

- Create detailed designs for each segment (i.e. realignment, cuts and fills, widening, drainage, and resurfacing);
- Prepare cost estimate, tender, and contract documents;
- Undertake the environmental impact assessments including aboriginal consultations;
- Undertake the geotechnical investigations, pit development and crushing of granular pavement materials;
- Manage the construction projects;
- Monitor quality of construction; and
- Close-out of the project.

Each construction project will be procured using the YG Tender Management System (TMS).

Table 8 – Project Team

Project Role	Team Member	Qualifications
Project Director	Paul Murchison Director Phone: 867-633-7930 Email: paul.murchison@gov.yk.ca	• Bachelor of Engineering in Civil Engineering. • Bachelor of Science in Biology. • Professional Engineer registered in Yukon. • Six years of senior management in the transportation sector. • Over 15 years of engineering experience with specialization in transportation, geotechnical, and permafrost engineering. • Experience overseeing the development and implementation of multiple, large, multidisciplinary transportation programs.
Major Programs	Robin Chambers Manager, Major Programs Phone: 867-335-6101 Email: robin.chambers@gov.yk.ca	• First Nation consultation & engagement • Project Management & Implementation • Finance & Procurement • 5 years management experience • Director, Kluane First Nation Economic Development Corporation • Chair, Kluane National Park Management Board
Engineering Design and Construction - Highways	Brian Crist Manager, Highways and Airports Design & Construction Phone: 867-335-0235 Email: brian.crist@gov.yk.ca	• Bachelor of Engineering in Civil Engineering. • Queen's Executive Program – General Management. • Professional Engineer registered in Yukon. • 20 years of management experience. 35 years of experience delivering civil engineering projects.
Engineering Design and Construction - Bridges	Josée Perron Manager, Bridges Phone: 867-336.0344 Email: josee.perron@gov.yk.ca	• Bachelor of Engineering in Mechanical Engineering. • Master of Engineering in Mechanical Engineering. • Professional Engineer registered in Yukon. • 10 years of management experience. 12 years of experience delivering engineering projects.
Environmental Affairs Manager	Andrew McCoy Manager Environmental Affairs Phone: 867-336-1004 E-mail: andrew.mccoy@gov.yk.ca	• Bachelor of Science (Aquatic Ecology and Botany) • Bachelor of Education • Masters of Environmental Design (Land Use Planning) • 10 years teaching experience in NWT and Nunavut • 15 years of experience in environmental impact assessment, regulatory permitting and First Nations consultation
Geotechnical Manager	Muhammad Idrees Manager, Geotechnical & Materials Program Phone: 867-335-0575 E-mail: muhammad.idrees@gov.yk.ca	• Master of Civil Engineering. • Professional Engineer registered in Yukon and Ontario. • 25 years of engineering experience. • 10 years specializing in project management and design for highway construction projects and bridge construction projects. • Coordinated a similar reconstruction program for the Atlin Road in Yukon. Designed small- and medium-span bridges in Yukon.

Appendices:

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Appendix A: Activity Components

The Design Logic Model presented in the second section of this submission highlighted a number of activities. Briefly, these activities contribute to intermediary outputs that, in turn, produce outcomes and benefits, many of which are noted criteria for the NIC funding program. The activities presented in the logic model are primarily functions of Yukon government's departments of Highways and Public Works and Energy, Mines and Resources, with some additional private sector consultant and contractor activity. These inter-related activities are delivered in concert by a team of dedicated transportation (civil/structural), environmental, geotechnical and traffic safety engineers; First Nations and government relations specialists; transportation planners; asset management, ITS and GIS managers and technicians; and finance officers. A summary of key activities supporting the delivery of this program is provided below.

1. Project Delivery Chart

These timelines outline the project processes for major roads and bridges, showing the project lifespan from initial planning through assessment, consultation and permitting to project execution. Additional time may be required for high complexity projects linked to components such as First Nation consultation, design, regulatory processes, construction scheduling and/or procurement. A sample of these project delivery charts are provided on the following pages; Figure A.1 – Complex Road Project Delivery Chart and Figure A.2 – Complex Bridge Project Delivery Chart.

Figure A.1 – Complex Road Project Delivery Chart

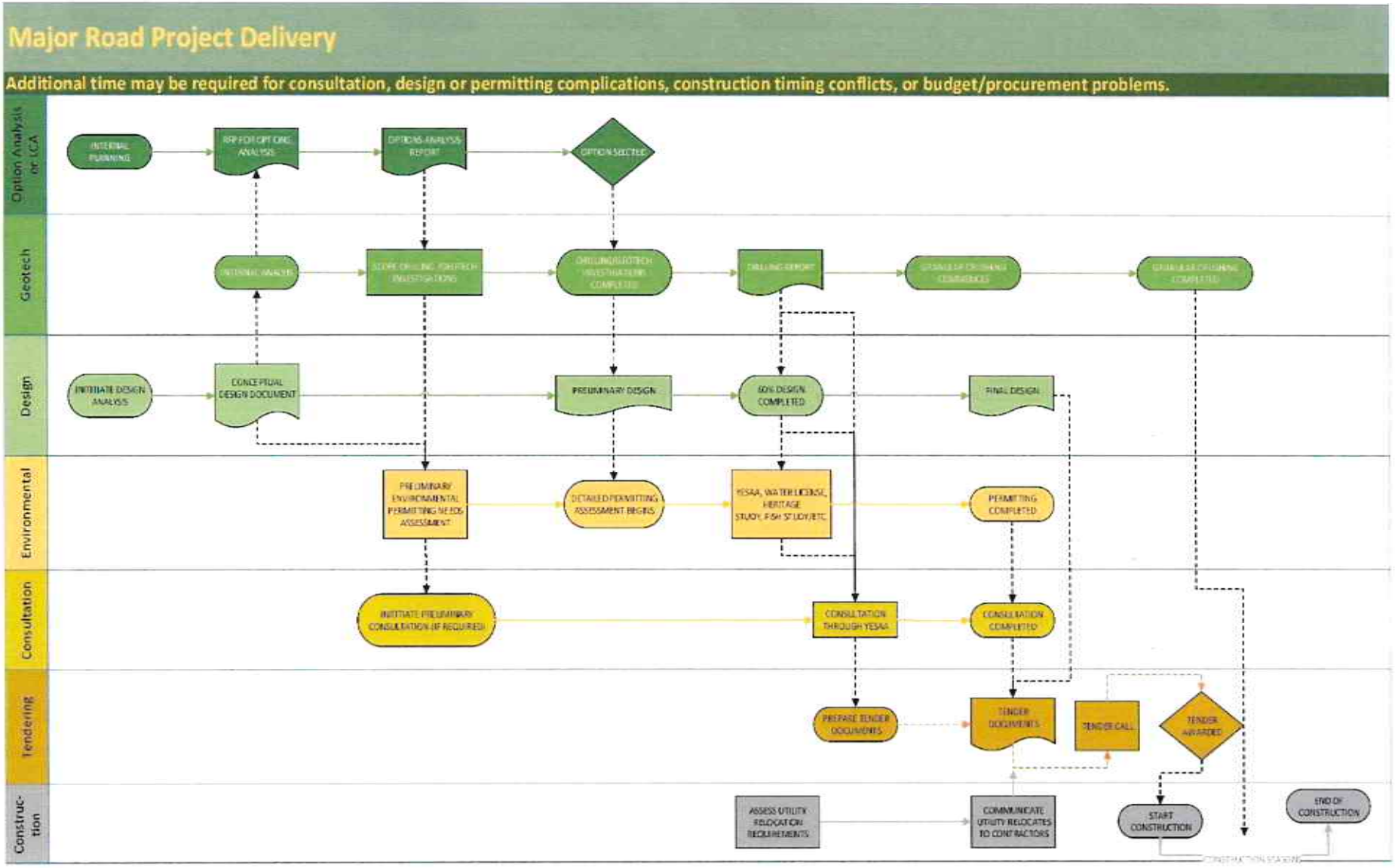
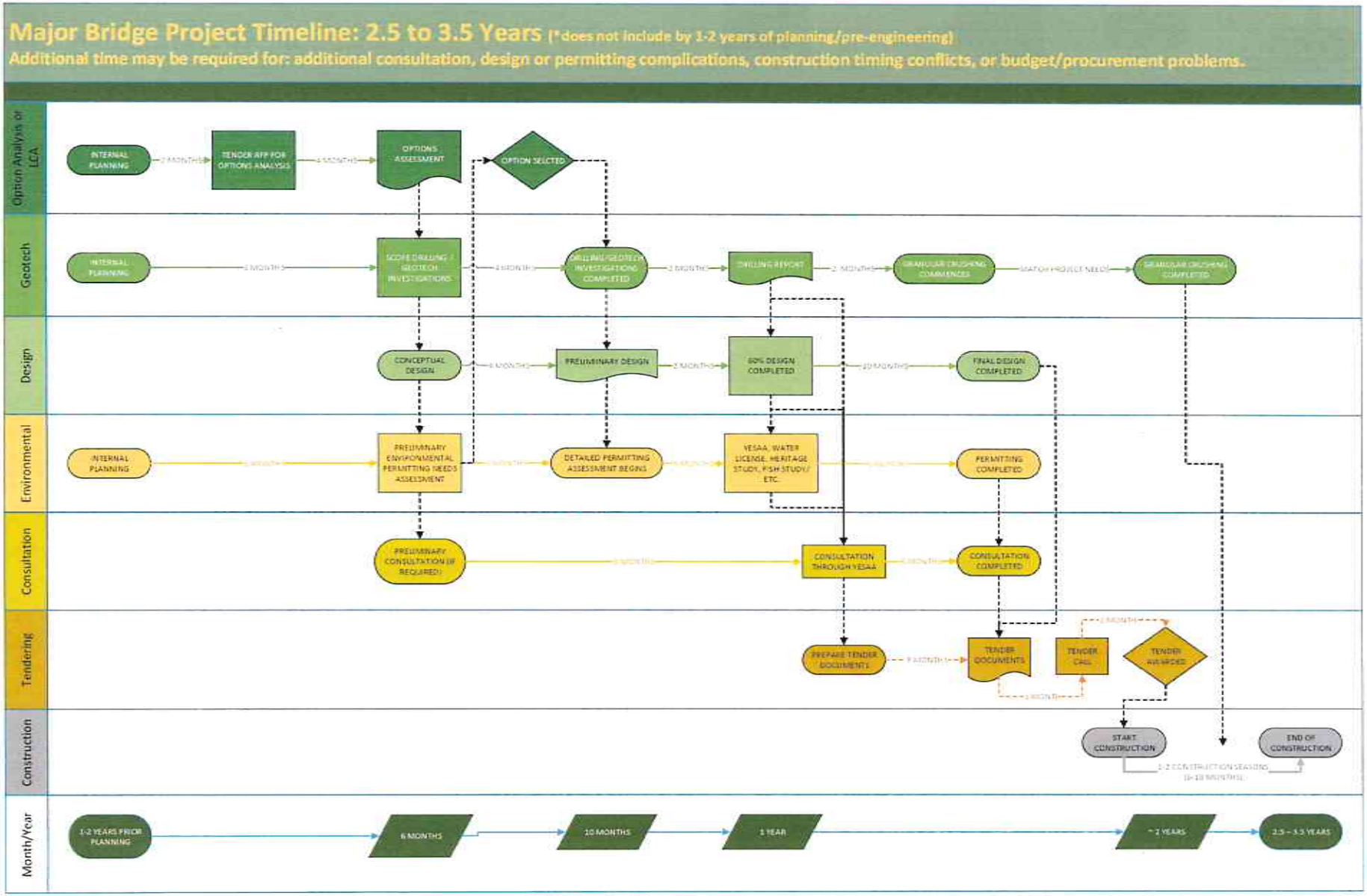


Figure A.2 – Complex Bridge Project Delivery Chart



2. First Nations Consultation and Government-to-Government Relations

All components of the amended program are located within traditional territories of various Yukon First Nations, including some with final land claim agreements. Yukon government continues to recognize our obligations under these agreements, as well as our obligations to the First Nations without final land claim agreements. One of our *Government of Yukon Performance Plan* priorities is "Our strong government-to-government relationships with First Nations foster reconciliation". We view this program as an opportunity to work collaboratively with First Nations to advance the shared interests and values of First Nations citizens, Yukoners in general and Yukon government. Project agreement negotiations between directly affected First Nations with final agreements and Yukon government have been taking place over the past eighteen months, and government-to-government negotiations will continue in order to achieve project-specific agreements with First Nations.

Beyond fulfilling consultation obligations, we are working to involve First Nations directly in the project planning, assessment and development process for the program. We have been negotiating project agreements on this basis. Yukon government believes this program offers economic development opportunities to local First Nations communities with the potential for long-term capacity development, including training and employment opportunities, and we are working collaboratively with First Nations to maximize these benefits.

Based on the extensive discussion that has taken place with diverse First Nations, we believe that First Nations will be supportive of the amended program. Program amendments focus on improving infrastructure reliability while addressing specific concerns raised at project agreement negotiations such as the impacts of improved access into their traditional territories on wildlife. Additionally, the amendments provide critical upgrades to improve access for exploration, development, and production in key areas of mineralization while also benefiting Yukoners in living in remote communities, who are primarily First Nations citizens.

The amended program is designed to be responsive to the concerns we have heard, offering First Nations options that mitigate their concerns regarding cumulative effects and increased access into their traditional territory while still providing economic opportunities and inviting involvement in the project.

3. Major Programs Unit

In 2017, Yukon Government, Highways and Public Works (HPW), established a Major Programs Unit that is responsible for leading and executing the development and implementation of large infrastructure development projects for the Transportation Division, such as the Yukon Resource Gateway Project (YRGP).

Major Programs is engaged in ongoing and complex project agreement negotiations with First Nations and is responsible for implementing obligations that arise from negotiated project agreements with regular and ongoing contact with Yukon First Nations to appropriately consult and engage on all matters related to development, socio-economic impacts, resource use and access.

Major Programs participates in cross-government engagement and consultation, ensuring all responsibilities and obligations such as consultation obligations and duties, environmental considerations, economic analysis and community engagement and participation are effectively carried out for large infrastructure development projects.

The Major Programs Unit is responsible for leading activities that support:

- Improvements and expansion of the transportation network to support territorial economic development,
- Clarity and certainty around control and responsibility for roads,
- Fair, transparent and consistent regulatory processes,
- Consideration of public interest in decision making, and
- Minimization of negative environmental cumulative impacts.

In response to the 2016 YRGP application that identified a Yukon Resource Gateway Office (YRGO) be provided for the overall management of the YRGP, the Major Programs Unit established an office within the Transportation Engineering Branch of HPW. The YRGO, in cooperation with First Nation governments and industry, will coordinate the delivery of environmental assessment and permitting, design, contract development and tendering, contract administration, and NIC Agreement administration with Canada, in relation to the YRGP.

4. Regulatory, Permitting, and Environmental Considerations

Environmental and socio-economic assessments in Yukon fall under the *Yukon Environmental and Socio-Economic Assessment Act* (YESAA), an outcome of the Umbrella Final Agreement process. The Act was proclaimed under federal legislation in 2003.

Assessments under YESAA are managed and administered by the Yukon Environmental and Socio-Economic Assessment Board (YESAB), an arms-length body independent of government. YESAB is responsible for administering the assessment process and for providing project-specific recommendations for each project assessed under the legislation.

The YESAA and its associated regulations dictate activity thresholds for assessment, establish the assessment methodology, identify the process for public input and determine timelines for the assessment process. YESAB provides recommendations as to whether a project should proceed and if so, may identify additional terms and conditions to be incorporated into the project delivery.

YESAB's recommendations are sent to the authorizing agency(ies) for the project; the Decision Body(ies). Upon receipt of the recommendations, Decision Bodies issue a Decision Document for the project, whereupon it then proceeds to the permitting and authorization stage.

Depending on the scale, complexity and activities proposed to occur, various permits and authorizations may be required for a project. These could include but not be limited to a Water License under the *Yukon Waters Act*, an authorization under the Federal *Fisheries Act* and/or an authorization under the *Navigation Protection Act (NPA)*.

Each of these permits has its own application and review process and typically provide an additional opportunity for public input and comment.

Given the scope and scale of the project components and the activities being proposed as part of the re-profiling process, it is likely that all project components will at least be reviewed and likely be assessed under YESAA. The nature, location and scale of the activities for each project component will dictate the permits and authorizations required for the work to proceed. For example, roadwork with no or little impact to or use of water will likely not trigger or require a water license or a Fisheries authorization; whereas the replacement of a bridge may require a water license, a Fisheries authorization and an authorization under the NPA.

Typically, large projects such as YRGP aren't assessed or permitted as one entire application; rather, the project is broken down further into manageable scopes of work. A single application/permitting process could potentially be used for activities that are similar in nature, or a contiguous scope of work that may occur over a longer time frame (e.g. reconstruction of a longer section of road).

The separation of project components into discrete standalone applications for assessment and permitting will be determined as part of the ongoing planning, design and scheduling process for the project. Consideration and compliance with all relevant assessment and regulatory legislation will be initiated in the early planning stages of project/activity design and development. As with all the infrastructure work and undertakings by Yukon government, activities and projects that meet the requirements and thresholds for assessment and permitting will be submitted to the respective regulatory and assessment agencies. Assessment applications will have detailed descriptions of project components to support a comprehensive analysis of the project activities and the potential impacts associated with the work. Yukon government will participate in and follow all processes required for permitting and assessment, including a public review and consultation process. We will address and mitigate any concerns or issues that are raised. This process of public engagement and working with all stakeholders and regulators to address any concerns will continue through the stages of project design and delivery.

5. Geotechnical Investigations and Aggregate Production

The geotechnical overview includes both desktop and field components. We have carried out preliminary desktop studies including review of previous studies, mapping, and borehole logs. We performed photogrammetric analysis using 1:12,500 scale air photographs for detailed terrain/surficial materials mapping, identification of known or potential geohazards, reconnaissance level assessment of aggregate resource potential, and identification and mapping of permafrost features. Through this work, we have identified specific areas of concern along the corridor. In our functional plans, we also completed ground-truthing of surficial geology mapped during photogrammetric analysis and flagged areas with potential geohazards, permafrost, drainage management, and other issues such as flooding potential.

As part of Gateway, we will perform detailed assessment for areas with geotechnical issues that were outside the scope of the functional plans, such as geohazards, drainage and borrow sources. We will also carry out geotechnical work to support potential future highway improvements identified in the functional plans, such as widening of the road surface and realignments.

We will need construction aggregate to upgrade and resurface the new roads. Where possible, we will expand existing gravel pits to reduce the need for new permits, but existing gravel sources will not be sufficient to meet all the project's requirements. We will carry out a comprehensive borrow source assessment and inventory based on terrain mapping along the corridors to determine where new gravel pits are needed, with haul distances reduced as much as possible.

According to the functional plans, aggregate sources should be spaced less than 15 km apart in order to reduce haul and mobilization cost. We anticipate that approximately 6,000 to 10,000 cubic metres of aggregate will be required per kilometre of road construction and rehabilitation, including these products:

- Pit run;
- Subbase coarse aggregate;
- Base coarse aggregates;
- Riprap; and
- Surfacing aggregates

Sources for these materials must meet the following criteria:

- Aggregate products should be of suitable engineering quality for the required purposes;
- The transport distance to the location(s) where they are needed should ideally be kept to a minimum;
- For new sites, or for expansion of existing sites that would require a permit, the sites should contain sufficient quantity to warrant permitting and planning efforts; and
- There should be no constraints to development of sites as an aggregate source, such as socio-environmental issues, fisheries/watercourses, First Nations claims, and archaeological issues.

Extraction of the resources should be readily achieved. For example, overburden thickness should be moderate/minimal, presence of groundwater should not impede extraction, and site preparation costs should be balanced with economic aspects of provision of aggregates from existing or easier to-develop sites.

For preliminary costing purposes, we anticipate a development cost of $300,000 per aggregate source, including environmental assessment, preliminary geotechnical assessment and investigation, detailed geotechnical investigation and analysis, construction of an access road, preparation of stockpile area, and clearing and stripping of the source area.

The geotechnical investigation program will be dependent on the proposed roads, bridges and culverts that need to be replaced and rehabilitated. Typically, we drill five to six-meter-deep boreholes with a spacing of 200 metres along the proposed route. After preliminary design has taken place, additional boreholes or deeper boreholes will be required in extensive cut and fill areas to assess the suitability of the material for use as fill. Additionally, soft areas of existing road, slope stability concerns and geohazards that have been identified in the functional plans will be further investigated and evaluated. In areas where subsurface investigation is required for bridges, culverts, and extensive cut and fill or permafrost areas, generally a drill rig is required due to the depth of investigation and in situ testing. We use an excavator capable of excavating four to five metres deep to assess aggregate sources. In areas of roadway distortion/rutting or where the roadway requires widening or reconstruction, it is recommended to carry out a subsurface investigation using shallow augured test holes, with individual boreholes for localized distortion/rutting.

It is anticipated that investigation will be required for the following:

- Aggregate resource areas;
- Bridge and culvert replacement and upgrades (if any);
- Areas of existing roadway distortion and rutting;
- Seepage and slope instability areas; and
- Geohazard areas.

For preliminary costing purposes, road geotechnical investigation will cost approximately $9,000 per kilometre. The cost of geotechnical investigation for bridges will be dependent on the size of bridge and crossing. One borehole is usually

recommended at each abutment and pier location. The cost of one borehole for bridge geotechnical investigation is in the range of $25,000. For a single span bridge, usually two boreholes are required, one at each abutment to depth of 20 to 30 metres, costing in the range of $50,000.

6. Transportation Asset Management

Yukon government has been practicing various forms of asset management for over 25 years. In recent years, we have made significant advances in our asset management approaches and have aligned our practices with the internationally recognized asset management standards, ISO 55000. We have also developed an implementation plan to identify, collate and prioritize improvement projects, including those that use tactical planning to achieve asset management objectives and incorporate risk. This includes the following completed and planned asset management system improvements:

- Yukon government approved a transportation asset management policy in 2018 which clearly describes the scope and context of the asset management program.
- A dedicated Transportation Asset Management Unit was formed in October of 2018 to lead tactical planning, including developing asset management plans. This team also supports the asset management system by providing tools, templates, training and support to other branches within government.
- In 2018, we adopted a strategic asset management plan which documents the objectives, practices and actions we take when delivering services. The aim is to balance current asset service provision with government and stakeholders' expectation over the longer term.
- In 2019, we adopted a highway functional classification framework which groups highways into like categories based on a consistent, logical and transparent framework. These categories, or classifications, can then be used to apply consistent levels of service. Currently there as six distinct highway classifications, with Class 1 roads receiving the highest level of service, and Class 6 roads receiving the lowest level of service within the primary highway network. The aim of the classification system is to provide consistency and impartiality to the way decision are made in order to better direct investments and meet stakeholders' expectations over the long term.

Asset Management improvements that are currently underway and planned for the upcoming year include the following:

- We are currently working on developing specific asset management plans for highway surfaces and the highway right of way. These plans will document the activities, resources and timelines required to achieve the Government's asset management objectives and provides the business cases that support our long term financial forecasts.
- In the upcoming year, we will further define our levels of service at both a technical and customer level.
- We are currently in the process of implementing new Asset Management IT systems that will act as a force multiplier, allowing us to do more compressive and robust planning and more efficient analysis. These systems are:
    - Pavement management system
    - Bridge management system
    - Maintenance management system

- We are also developing a process to incorporate risk management into our transportation Asset Management System (AMS), thereby allowing us to understand the cause, effect and likelihood of adverse risks and to manage these risks. We are anticipating three major deliverables:
    - Risk Management Framework – a transportation risk management framework for risk identification, assessment, reporting, mitigation and monitoring. It will identify risk tolerance and treatment thresholds and prepare guidance documents for undertaking asset risk assessments.
    - Risk Management Plan Approach - a risk management plan outlining the organization's risk management approach including documented actions to address risks and opportunities.
    - Asset Group Risk Management Plans - document risks associated with individual asset groups, critical assets and develop management plan for these assets.

7. Intelligent Transportation Systems

Prior to 1990, we had limited opportunity to manage highway data through an integrated systems approach. However, in the late 1990s, technological advances made integrated data management possible. In the early 2000s, Transport Canada published the first Intelligent Transportation System (ITS) Architecture for Canada and the federal government appropriated funding for a newly created program called the Strategic Highway Infrastructure Program (SHIP) which identified ITS development as a top priority. Enabled by new technologies, the Canadian federal government and its provincial and territorial counterparts began developing increasingly sophisticated highway data collection and analysis systems. All ITS components within this amendment will align with the current and proposed ITS Architecture for Canada.

Yukon's ITS comprises a network of sensors, communication and computing infrastructure and public messaging technologies, combined with advanced analytical capabilities. The information generated by ITS provides data to support decision making for Yukon government's highways, bridges, aviation facilities and transport services. Yukon's ITS infrastructure includes existing traffic, thermistor, road weather, and traveller information management systems (511 road report, speed radar boards, and variable message boards) with projects in development for structural monitoring, stream and water course monitoring and a commercial vehicle module with domestic and international border crossing data. For this project, we will use an integrated approach to data collection, retention, analysis, and dissemination to provide needed information to decision makers and the travelling public.

Transportation Division's core ITS business areas encompass the following information/data groups:

- Information to public: 511 Traveller Information System, fixed dynamic message signs, portable dynamic message signs, wildlife detection and speed radar signs;
- Sensor data for decision-makers: bridge monitoring devices, frost monitoring, road weather information systems, and traffic counts;
- Efficient commercial vehicle operations: border clearance, commercial vehicle pre-clearance, and commercial vehicle administrative processes; and
- Operational efficiency: Spot/InReach GPS-powered monitoring devices, work zone traffic lights, hand-held data collection devices, construction site video monitoring, bridge site video monitoring, and regional traffic management technologies.

Transportation Division has finalized and updated its 2016 ITS Strategy, which identified the need to upgrade outdated ITS systems and develop an integrated data warehouse with clearly defined, efficient and effective data transmission processes. HPW will continue to use advanced and emerging technologies to save lives, time, money, energy and the environment.

8. Design and Construction

Highway Design Standards

The Government of Yukon follows the most current Transportation Association of Canada (TAC) guidelines for highway construction and restoration projects on public highways, including the Geometric Design Guide for Canadian Roads. This guide provides recommended geometric design criteria depending on the type of road under consideration. Yukon government designs bridges along the public network in accordance with the most current version of the Canadian Standards Association (CSA) Canadian Highway Bridge Design Code (CHBDC). Yukon government also uses other road standards such as the American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide. Road designs also integrate anticipated traffic volumes and a design speed limit. Other design considerations include oversizing drainage structures and stream crossings to accommodate for climate change as well as safety considerations such as road widening to allow for roadside barrier installations where required.

Both the Robert Campbell Highway (#4) and the Silver Trail (#11) are Schedule B highways in the Government of Yukon's Motor Vehicle Act, with a maximum posted speed limit of 90 kilometers per hour. Geometric designs for these highways will meet minimums recommended through the TAC guideline, and lower design speeds may be incorporated into portions of the highways where necessary due to terrain or excessive design costs. The table below outlines the basic design criteria for reconstruction of the Robert Campbell Highway and the Silver Trail which will be followed.

Road Design Criteria					
Criteria	Design Speed (kph)	# Lanes	Road Width (m)	Max Grade (%)	Min Curve Radius (m)
Carmacks Bypass	80/90	2	10.5	8	300
Robert Campbell Highway	80/90	2	10.5	8	300
Silver Trail	80/90	2	10.5	8	300

Impacts of Varying Geometric Design Along Yukon's Transportation Network

As motorists drive down a road, they become accustomed to the way the road was built. Elements of the road geometry like width, curve radius, and maximum grade inform the driver how fast they can safely drive on a road. These geometric characteristics are all part of the design standard of the road. To keep users safe, the design standard must be consistent along a road so it does not violate driver expectation. Designers must strive to maintain design consistency along a road.

Driver Expectation

Previous experience, both long-term and short-term, helps shape expectations around driving. These expectations help drivers to react to situations more quickly and effectively. Long-term expectations can come from years of driving experience, while short-term expectations come from site-specific experience. This means driver expectation is partially informed by the road the driver is on. According to the Transportation Association of Canada's Geometric Design Guide (GDG), "Drivers tend to anticipate upcoming situations and events that are common to the road they are travelling" and "The road and its environment upstream of a site create an expectation of downstream conditions."

Violating driver expectations can cause driver confusion and reduce safety. The GDG cautions: "Drivers are more likely to experience problems in transition areas and locations with inconsistent design or operation" and "The more predictable the road feature, the less likely will be the chance for errors." That is, design consistency is important for meeting driver expectations.

Design Consistency

Design consistency means that different parts of the road are all designed to the same standard. This is often broken down into cross section consistency, operating speed consistency, and driver workload consistency.

Consider how a driver navigates curves. If a driver is on a highway that can accommodate an operating speed of 90 kilometres per hour, they will take corners at that speed. If the design standard suddenly changes, the driver may try to navigate a corner at 90 kilometres per hour, even though that corner may not be able to safely accommodate that speed. This cannot be controlled by the posted speed limit, since drivers take the surrounding environment and road geometry into account when selecting their speed. Switching back and forth between design standards will send road users mixed messages and violate driver expectations.

The GDG says of design consistency, "The more consistent road designs are over a wide geographic area, the more effective the designer's contribution will be to reducing collision occurrence." It also specifically mentions that width should stay consistent on a given road: "For a given classification of road in given terrain conditions, cross section elements should ideally be the same everywhere, but certainly on any specific road."

Conclusion

Based on the likelihood of frequent changes in design standard or road width violating design consistency and defying driver expectation, Yukon government should strive to have the smallest number of transitions possible on a given section of highway. Road upgrading activities should start at one end and continue to the other end, rather than upgrading disparate locations and consequently introducing frequent transitions in the design standard.

Project Management and Audit Control

Each of the project activities will have a project manager overseeing the process from conception, through design, construction and project closeout. Yukon government will retain onsite field staff to carry out project inspection during construction phases, appropriately documenting progress, quantities and all other necessary reporting requirements. After construction completion, project record drawings, final reports and project audits will be completed for each project.

As part of the management of projects involving Yukon government contract expenditures, Transportation Engineering Branch has developed a multi-level approach to auditing individual projects. This process is designed to ensure a consistent approach to project management and project record organisation. The audit process has three levels of project audits.

The first two levels of the audit process (Level 1 and Level 2) fall under the project control and standards monitoring. These two levels of audits are typically managed internally by Transportation Engineering Branch.

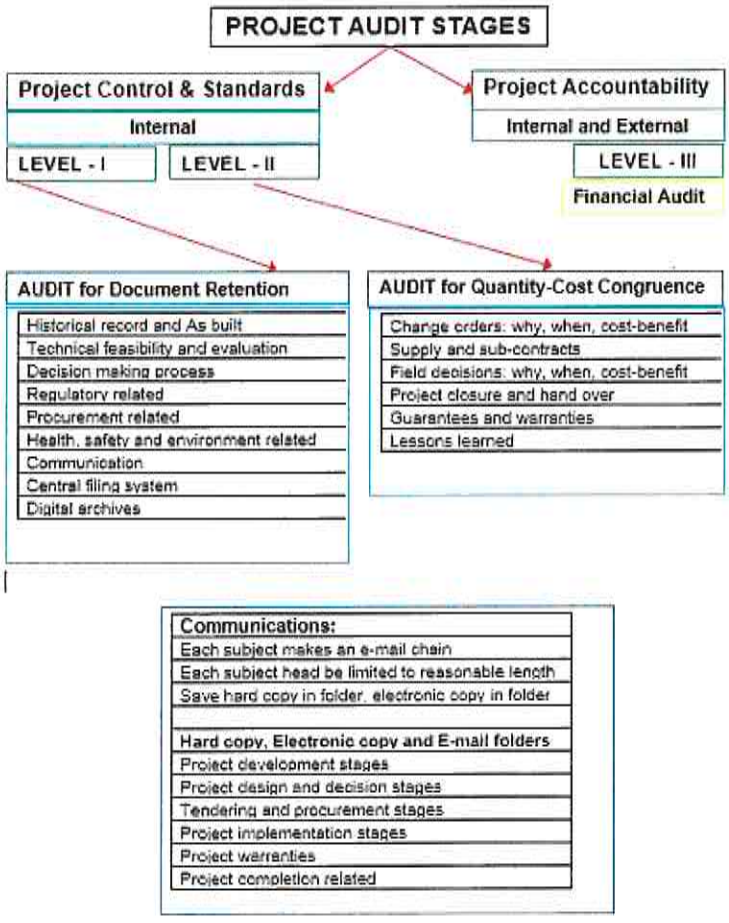
A level one audit assesses the document retention aspect of record management. This process evaluates the project file content for key areas such as historical records, feasibility studies, decision making processes, regulatory requirements, procurement records, health and safety management, direct communication records during the course of the contract execution, project filing methods and project archiving.

A level two audit reviews quantity-cost congruence. This evaluation looks at how the project was managed and how the project flowed from start to finish. The level two audit reviews all change orders to the original contract (why, when, cost benefit analysis), project contracts and any sub-contracts required in the performance of the contract, field decision rationale and outcomes, project closure and handover processes as well as final project lessons learned.

The level three audit is the final financial audit that is triggered either from an internal review process or from an external review request. These financial audits are approached on a case-by-case basis and may require contracting an external auditor to conduct the financial review to ensure that the project financial management was done appropriately and with the appropriate accountability.

Transportation Engineering Branch ensures that each project and the associated records of each project are reviewed and archived in a consistent manner. The multi-level reviews provide oversight of specific aspects of a project, thereby ensuring that the project records are complete and consistent.

The diagram shown below highlights the key audit levels and their areas of review.



Project Risk and Mitigation Strategy:

All Yukon government activity involves some degree of risk. A successful risk management approach addresses risk proactively rather than reactively. Risk management involves assessing risk, determining risk tolerance levels, strategically making informed decisions and taking action under conditions of uncertainty. Enterprise risk management is the integrated and coordinated application of risk management practices across Yukon government. Risks identified within units, branches or departments may have an impact that extends beyond the areas where they were originally identified. In these cases, the risks are elevated to a higher level and re-assessed within the new context.

Yukon Government's Enterprise Risk Management System is based on ISO 31000 specifications. Each risk management exercise involves five basic steps.

1. Establish the context: Establishing the context involves defining the external and internal factors that organizations must consider when they manage risk. An organization's external context includes its external stakeholders, its local, national, and international environment, as well as any external factors that influence its objectives. An organization's internal context includes its internal stakeholders, its approach to governance, its contractual relationships and its capabilities, culture and standards.
2. Identify the risk: The identification process looks at what is critical for the success of the business unit, program or project and then considers what may go wrong. This is the risk. For each risk, possible causes are identified and the impacts, should the risk occur, are defined.
3. Analyze the risk: This process identifies and analyzes the risk in terms of consequence and likelihood in order to calculate the risk severity.
4. Evaluate the risk: This process evaluates the risk and existing controls to determine whether action is required and identifies who is responsible for managing the risk.
5. Treat the risk: After evaluating the risk, determine whether risk tolerance levels have been exceeded. To manage the risk, the responsible area creates mitigation strategies. All of the mitigation strategies together for a particular business unit, program or project make up the risk treatment plan. The responsible area schedules and assigns mitigation strategies in this plan.

In addition to these five steps, the following two elements occur continually throughout the process.

1. Communicate and consult – ensures that all participants are aware, understand, are involved in and contribute to the process.
2. Monitor and review – an ongoing part of risk management that is integral to every step of the process. Monitoring and reviewing ensures the important information generated by the risk management process is captured, used, and maintained.

Appendix B: Project Details

1. Project List

1.1. Carmacks Bypass

Project Overview:

Constructing a new road, the Carmacks Bypass, would allow heavy, industrial traffic to bypass the Village of Carmacks site when travelling between future mining operations on the Freegold Road to destinations south of Carmacks via the Klondike Highway. Currently, the only vehicle connection between the Klondike Highway and the Freegold Road is via River Road through the Village of Carmacks, which is located on the south shore of the Yukon River; and is the primary access to existing residential streets, schools, parks and neighborhoods in the Village of Carmacks. To complete the connection to the Freegold Road, a new two-lane bridge over the Nordenskiold River will be constructed.

Project Budget:

CARMACKS BYPASS - ROAD RECONSTRUCTION AND STRUCTURE												
	1	2	3	4	5	6	7	8	9	10	11	Total
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING	75	1,050	1,050	50	-	-	-	-	-	-	-	2,225
Geotechnical Investigations and Granular Pit Development	25	1,000	1,000									2,025
Heritage Assessments and Environmental Studies	50	50	50	50								200
Preliminary Designs												-
DETAILED DESIGN	100	100										200
CONSTRUCTION	-	1,000	8,000	10,000	-	-	-	-	-	-	-	19,000
Carmacks Bypass Road Construction		1,000	8,000									9,000
Nordenskiold River Bridge Construction (Bypass)				10,000								10,000
TOTAL:	175	2,150	9,050	10,050	-	-	-	-	-	-	-	21,425
CONTINGENCY 25%	44	538	2,263	2,513	-	-	-	-	-	-	-	5,356
GRAND TOTAL	219	2,688	11,313	12,563	-	-	-	-	-	-	-	26,781
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	219	2,688	11,313	12,563	-	-	-	-	-	-	-	26,781
CANADA 75%:	164	2,016	8,484	9,422	-	-	-	-	-	-	-	20,086
YUKON 25%:	55	672	2,828	3,141	-	-	-	-	-	-	-	6,695

1.2. Nahanni Range Road

Project Overview:

The amendment includes five critical structures on Nahanni Range Road; four bridge replacements and one bridge rehabilitation.

Two of the structures, Upper Francis and Hyland River Bridges, will be completed within the first four years of the amended program because the existing deficiencies warranted replacement and rehabilitation respectively.

The other three bridges, Dolly Varden, Spruce and Conglomerate Creek Bridges, are scheduled for replacement starting in year 8. The existing bridges are single lane temporary oilfield type structures installed in 2012-13 after a major flooding event. The existing bridges will remain unless there is a trigger i.e., increase in mining activity. Example below of washout and post replacement.

1. **Upper Francis River Bridge km 8.1 – Replacement:**
    - Francis River Bridge is the largest bridge of the five and is currently a one-lane bridge requiring significant weight restrictions, not allowing for any oversized loads. The bailey bridge was originally constructed in the 1940's, various small rehabs have taken since.
    - The proposed replacement will be a new three spans, single lane, cast in place concrete deck on steel girder bridge designed to CAN/CSAS6-14 : Canadian Highway Bridge Design Code (CHBDC), CL-800 loading. The bridge is designed as a lifeline structure.
    - The new bridge deck elevation is designed to be 316 m, which is the preliminary elevation for the 200 year discharge and a 2 m clearance from the high water level to the bottom of the bridge soffit. A new bridge alignment would be located approximately 15 m upstream of the existing bridge centerline.
    - Construction will take place over one year.

Upper Francis River Bridge

2. **Dolly Varden Creek Bridge km 38 – Replacement**:
    a. Bridge replacement would be a permanent single-lane bridge.

3. **Spruce Creek Bridge km 64 – Replacement:**
    a. Bridge replacement would be a permanent single-lane bridge.

4. **Conglomerate Creek Bridge km 73 – Replacement:**
    a. Bridge replacement would be a permanent single-lane bridge.

5. **Hyland River Bridge km 110 – Rehabilitation:**
    - The Hyland River Bridge is a two-lane bridge constructed in 1982. The bridge is 75 m long, with three equal spans of 25 m. Each span consists of simply supported precast pre-stressed concrete box girders placed side by side. The abutments on either end of the bridge are composed of a precast concrete bearing pad supported on steel pipe piles.
    - Rehabilitation activates include; replacement of approach guiderails, rehabilitation of the guardrails, expansion joint replacement and rip-rap placement as erosion protection.
    - Rehabilitation will take place over two years – year one bridge rehab and year two rip-rap placement.

Hyland River Bridge

Project Budget:

NAHANNI RANGE ROAD - STRUCTURES												
	1	2	3	4	5	6	7	8	9	10	11	Totals
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING	-	1,025	525	-	-	80	180	180	130	30	-	2,150
Geotechnical Investigations and Granular Pit Development		1,000	500				100	100	100			1,800
Heritage Assessments and Environmental Studies		25	25			30	30	30	30	30		200
Preliminary Designs						50	50	50				150
DETAILED DESIGN		100					100	100	100			400
CONSTRUCTION	-	700	10,200	-	-	-	-	8,000	4,000	10,000	-	32,900
KM 8.1 Upper Frances Bridge Replacement			10,000									10,000
KM 110 Hyland River Bridge Rehabilitation		700	200									900
KM 38 Dolly Varden Creek Bridge Replacement								8,000				8,000
KM 64 Spruce Creek Bridge Replacement									4,000			4,000
KM 73 Conglomerate Creek Bridge Replacement										10,000		10,000
TOTAL:	-	1,825	10,725	-	-	80	280	8,280	4,230	10,030	-	35,450
CONTINGENCY 25%	-	456	2,681	-	-	20	70	2,070	1,058	2,508	-	8,863
GRAND TOTAL	-	2,281	13,406	-	-	100	350	10,350	5,288	12,538	-	44,313
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	-	2,281	13,406	-	-	100	350	10,350	5,288	12,538	-	44,313
CANADA 75%:	-	1,711	10,055	-	-	75	263	7,763	3,966	9,403	-	33,234
YUKON 25%:	-	570	3,352	-	-	25	88	2,588	1,322	3,134	-	11,078

1.3. Goldfield Roads

Project Overview:

The amendment includes two critical structure replacements on the Goldfield Roads – Bonanza Creek Bridge km 9.1 Bonanza Creek Road and Upper Bonanza Creek Bridge km 0.1 on Upper Bonanza Creek Road.

Designs have not been started for theses bridges. It has been decide though that they will be permanent two lanes structures. The rationale for a two-lane permanent structure is based on existing traffic volumes and traffic type, miners and tourists (because it is close to Dawson City on a suggested tourists route to historical landmarks).

Project Budget:

GOLDFIELDS - STRUCTURES												
	1	2	3	4	5	6	7	8	9	10	11	Totals
	2019/20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING	180	130	30	-	-	-	-	-	-	-	-	340
Geotechnical Investigations and Granular Pit Development	100	100										200
Heritage Assessments and Environmental Studies	30	30	30									90
Preliminary Designs	50											50
DETAILED DESIGN	75	75										150
CONSTRUCTION	-	5,000	5,000	-	-	-	-	-	-	-	-	10,000
KM 9.2 Bonanza Creek Bridge - Bonanza Road		5,000										5,000
KM 0.1 Upper Bonanza Creek Bridge - Upper Bonanza Road			5,000									5,000
TOTAL:	255	5,205	5,030	-	-	-	-	-	-	-	-	10,490
CONTINGENCY 25%	64	1,301	1,258	-	-	-	-	-	-	-	-	2,623
GRAND TOTAL	319	6,506	6,288	-	-	-	-	-	-	-	-	13,113
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	319	6,506	6,288	-	-	-	-	-	-	-	-	13,113
CANADA 75%:	239	4,880	4,716	-	-	-	-	-	-	-	-	9,834
YUKON 25%:	80	1,627	1,572	-	-	-	-	-	-	-	-	3,278

1.4. Freegold Road

Project Overview:

The amendment includes three bridge replacements on the Freegold Road – Crossing Creek Bridge km 24, Seymour Creek Bridge km 66 and Bow Creek Bridge km 67.

Bow Creek Bridge will be replaced as it is in bad condition. The other two bridges are not in bad condition, Seymour Creek and Crossing Creek have both been replaced recently (see pictures below). Should mining activity increase, Seymour and Crossing Creek Bridges will be replaced.

Designs have not been started for theses bridges but they will be replaced with permanent structures with a 75 year life.

Bow Creek Bridge

Seymour Creek Bridge

Crossing Creek Bridge

Project Budget:

FREEGOLD ROAD - STRUCTURES												
	1	2	3	4	5	6	7	8	9	10	11	TOTALS
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING	155	730	580	-	-	-	-	-	-	-	-	
Geotechnical Investigations and Granular Pit Development		500	500									1,000
Heritage Assessments and Environmental Studies	80	80	80									240
Preliminary Designs	75	150										225
DETAILED DESIGN		250	500	-		-		-		-		750
CONSTRUCTION	-	-	6,000	13,000	-	-	-	-	-	-	-	19,000
KM 24 Crossing Creek Bridge Construction				5,000								5,000
KM 66 Seymour Creek Bridge Construction				8,000								8,000
KM 67 Bow Creek Bridge Construction			6,000									6,000
TOTAL:	155	980	7,080	13,000	-	-	-	-	-	-	-	21,215
CONTINGENCY 25%	39	245	1,770	3,250	-	-	-	-	-	-	-	5,304
GRAND TOTAL	194	1,225	8,850	16,250	-	-	-	-	-	-	-	26,519
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	194	1,225	8,850	16,250	-	-	-	-	-	-	-	26,519
CANADA 75%:	145	919	6,638	12,188	-	-	-	-	-	-	-	19,889
YUKON 25%:	48	306	2,213	4,063	-	-	-	-	-	-	-	6,630

1.5. Silver Trail

Project Overview:

The amendment includes road reconstruction and critical structures on the Silver Trail. The project has been broken out into three segments i.e., km 0 to km 57, km 57 to km 86 and km 86 to km 110. This project is to support the increase in heavy haul traffic associated with the Victoria Mine being developed at the end of South McQuesten Road and other mining activities in the area e.g., Keno Hill Silver District Operation. Project scope was developed based on the highway functional plan.

Km 0 to km 57 and km 86 to km 110 – Spot Repairs

Existing surface types will not change; km 0 to km 57 segment is surfaced with bituminous surface treatment (BST) and gravel from km 86 to km 110.

The scope for these two segments are spots repairs rectifying areas with geometric deficiencies (horizontal and vertical), rehabilitation of Mayo River Bridge and replacement of four structural culverts. Road surface width will not increase.

Km 57 to km 86 – Reconstruction

This section will be reconstructed to support mining traffic. Scope includes rectification of geometric deficiencies, road widening (10.5m surface), upgrade to BST (currently gravel), improve drainage, and grade raises.

Project Budget:

SILVER TRAIL - KM 0 TO KM 110 - ROAD RECONSTRUCTION AND STRUCTURES												
	1	2	3	4	5	6	7	8	9	10	11	TOTAL
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING & DETAILED DESIGN	250	250	265	400	250	250	250	250	250	-	-	2,415
Geotechnical Investigations and Granular Pit Development												
Heritage Assessments and Environmental Studies												
Preliminary Designs												
DETAILED DESIGN												-
CONSTRUCTION	-	1,300	2,550	5,700	5,925	6,175	5,425	6,175	5,425	6,425	2,900	48,000
Mayo River Bridge KM 51 - Rehabilitation					500							500
Clearing (11 KM/year) Locations TBD		550	550	550	550	550	550	550	550	550	550	5,500
Road Reconstruction (Includes 4 Multiplate Replacements)												
KM 0-24 Spot Repairs + Multiplate KM 17.2 Unnamed			2,000	2,400								4,400
KM 24-48 Spot Repairs				2,000	2,400							4,400
KM 48-57 Spot Repairs, KM 57-61 Reconstruction					2,000	2,400						4,400
KM 61-67 Reconstruction						2,000	2,400					4,400
KM 67-73 Reconstruction							2,000	2,400				4,400
KM 73-79 Reconstruction								2,000	2,400			4,400
KM 79-86 Reconstruction + Multiplate KM 83.3 Unnamed									2,000	2,400		4,400
KM 86-110 Spot Repairs + Two Multiplates KM 89 Unnamed and KM 91.9 Silver King Ck										3,000	1,400	4,400
Produce and Stockpile Aggregate		750		750		750		750				3,000
BST					300	300	300	300	300	300	600	2,400
Revegetation					175	175	175	175	175	175	350	1,400
TOTAL:	250	1,550	2,815	6,100	6,175	6,425	5,675	6,425	5,675	6,425	2,900	50,415
CONTINGENCY 25%	63	388	704	1,525	1,544	1,606	1,419	1,606	1,419	1,606	725	12,604
GRAND TOTAL	313	1,938	3,519	7,625	7,719	8,031	7,094	8,031	7,094	8,031	3,625	63,019
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	313	1,938	3,519	7,625	7,719	8,031	7,094	8,031	7,094	8,031	3,625	63,019
CANADA 75%:	234	1,453	2,639	5,719	5,789	6,023	5,320	6,023	5,320	6,023	2,719	47,264
YUKON 25%:	78	484	880	1,906	1,930	2,008	1,773	2,008	1,773	2,008	906	15,755

1.6. North Canol

Project Overview:
This project consists of the full or partial replacement of all 27 bridge structures on the North Canol Road.

Existing Structures:

- All bridges are single-lane with timber decks and curbs and are single-span with the exception of two i.e., Macmillan River Bridges #1 and #3.
- The superstructures consist of either older Bailey truss, older recycled steel girder or newer oilfield.
- The substructure consists of bin wall abutments, temporary substructure (e.g. lock block or mudsill directly on the ground) or geosynthetic reinforced soil (GSR).

Existing conditions: Most structures on the road have reach their end of service life. There is currently load restrictions as result of the older Bailey truss superstructures. The current steel girder superstructures capacity is currently unknown i.e., the superstructures were installed without record drawings provided. In most instances, the binwall substructures were installed in or near the creek with no compaction record and built with poor material; resulted in rotation of the abutments.

The 27 bridges were prioritized as follows:

1. bailey truss bridges - full replacements (4) and partial replacement (1)
2. steel girder bridges – full replacement (16)
3. oilfield bridges that were installed with a temporary lock blocks substructures - replacement of the substructure (6)

The five bailey bridges are the highest priority because they are triggering weight restrictions; this will however does not remove the overall road weight restrictions because, as mentioned above, capacity of the girder bridges is unknown. Prioritization may change because most structures are at the end of their service life, shifts in proposed schedule will be based on annual spring inspections. Below are pictures of two bailey bridges Tay Creek Bridge and Macmillan River #3 Bridge

Project Budget:

NORTH CANOL ROAD - STRUCTURES												
	1	2	3	4	5	6	7	8	9	10	11	Totals
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING	-	348	606	360	325	270	285	360	220	-	-	2,774
Geotechnical Investigations and Granular Pit Development			148	125	140	105	105	140	140			903
Heritage Assessments and Environmental Studies			98	95	80	60	60	80	80			553
Preliminary Designs		348	360	140	105	105	120	140				1,318
DETAILED DESIGN												-
CONSTRUCTION	-	-	1,023	3,103	3,275	2,550	1,990	2,190	2,040	2,080	-	18,251
KM 238.6 Tenas Ck Bridge - Full replacement					180	510						690
KM 279.7 Gravel Ck Bridge - Full replacement					180	510						690
KM 282.1 Flat Ck Bridge - Full replacement					180	510						690
KM 287.9 Beaver Ck Bridge - Full replacement					180	510						690
KM 295.8 180 Mile Ck Bridge - Abutment replacement										520		520
KM 299.1 Tay Ck Bridge - Full replacement			235	510								745
KM 306.1 Blue Ck Bridge - Abutment replacement										520		520
KM 323.3 Caribou Ck Bridge - Full replacement				235	510							745
KM 328 Pup Ck Bridge - Superstructure replacement only			228	78								306
KM 343.3 Twin Ck #1 Bridge - Abutment replacement										520		520
KM 343.6 Twin Ck #2 Bridge - Abutment replacement										520		520
KM 354.1 Riddel Ck Bridge - Full replacement						190	510					700
KM 362.5 Sheldon Ck Bridge - Full replacement						160	510					670
KM 376.7 Moose Ck Bridge - Full replacement						160	510					670
KM 387 Boulder Ck Bridge - Abutment replacement				-	520							520
KM 408.6 Itsi Ck Bridge - Full replacement							140	510				650
KM 410.6 Wagon Ck Bridge - Full replacement			180	510								690
KM 412.9 Macmillan R #1 Bridge - Full replacement				515	1,015							1,530
KM 421.5 Jeff Ck Bridge - Full replacement			190	510								700
KM 425.3 Hess Ck Bridge - Full replacement				235	510							745
KM 428.7 Dewhurst Ck Bridge - Full replacement							160	510				670
KM 438.6 Macmillan R #2 Bridge - Full replacement								190	510			700
KM 445.5 Sekie Ck No. 1 Bridge - Full replacement							160	510				670
KM 452.2 Macmillan R #3 Bridge - Full replacement			190	510								700
KM 458.8 Macmillan R #4 Bridge - Full replacement								140	510			650
KM 460.6 Macmillan R #5 Bridge - Full replacement								140	510			650
KM 462.5 Macmillan R #6 Bridge - Full replacement								190	510			700
TOTAL:	-	348	1,629	3,463	3,600	2,820	2,275	2,550	2,260	2,080	-	21,025
CONTINGENCY 25%	-	87	407	866	900	705	569	638	565	520	-	5,256
GRAND TOTAL	-	435	2,036	4,329	4,500	3,525	2,844	3,188	2,825	2,600	-	26,281
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	-	435	2,036	4,329	4,500	3,525	2,844	3,188	2,825	2,600	-	26,281
CANADA 75%:	-	326	1,527	3,247	3,375	2,644	2,133	2,391	2,119	1,950	-	19,711
YUKON 25%:	-	109	509	1,082	1,125	881	711	797	706	650	-	6,570

1.7. South McQuesten Road

Project Overview:

The amendment includes one critical structure replacement, South McQuesten Bridge km 23.6 on the South McQuesten Road. The bridge will be replaced with prefabricated custom made steel girder bridge - CL-800 single lane, with a wider clear deck width to accommodate wide load related to mine activities.

In 2017, StrataGold (Victoria Gold Corporation) needed to transport some heavy equipment to the Eagle Gold Project mine site located 85 km North of Mayo, Yukon. However, they were unable to do so, due to the weight and width of their mining equipment exceeding the load carrying capacity and width dimension of the existing South McQuesten Bridge (older bailey truss). Due to financial and time limitations at that time, the Government of Yukon was not in a position to replace the existing South McQuesten Bailey Bridge for Victoria Gold. As a result, JDS Energy & Mining Inc. (now Victoria Gold Corporation) requested permission from the Government of Yukon to replace the bridge and widen the approaches using their own forces. The Government of Yukon permitted Victoria Gold to replace the South McQuesten Bridge using existing abutments and the placement of a new oilfield over the existing Bailey bridge as a temporary solution. The current bridge requires full replacement as this structure is on the maintained portion of our highway network.

Project Budget:

SOUTH MCQUESTEN ROAD - STRUCTURE												
	1	2	3	4	5	6	7	8	9	10	11	TOTALS
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING	-	40	-	-	-	-	-	-	-	-	-	
Geotechnical Investigations and Granular Pit Development		10										10
Heritage Assessments and Environmental Studies		5										5
Preliminary Designs		25										25
DETAILED DESIGN			25									25
CONSTRUCTION	-	-	625	-	-	-	-	-	-	-	-	625
KM 23.6 South McQuesten Bridge Replacement			625									625
TOTAL:	-	40	650	-	-	-	-	-	-	-	-	690
CONTINGENCY 25%	-	10	163	-	-	-	-	-	-	-	-	173
GRAND TOTAL	-	50	813	-	-	-	-	-	-	-	-	863
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	-	50	813	-	-	-	-	-	-	-	-	863
CANADA 75%:	-	38	609	-	-	-	-	-	-	-	-	647
YUKON 25%:	-	13	203	-	-	-	-	-	-	-	-	216

1.8. Campbell Highway

Overview:

The Robert Campbell Highway is an important transportation route that connects the Alaska and Klondike Highway, and provides access to remote communities and existing and future mine developments in the region. The highway has already been improved from km 0 to km 114, and from km 414 to km 583 to meet a Rural Arterial Undivided 90 km/h (RAU 90) highway design standard. The section between km 114 and km 414 remains unimproved and in sub-standard condition. In order to encourage future economic development, the Yukon government must show potential businesses that the roads in the area will fulfill their needs without excessive costs or delays.

The three proposed Campbell Highway projects are:

- Spot Repairs and Structures - km 114 to km 232
- Spot Repairs and Structures – km 232 to 354.39
- Reconstruction – Ross River km 354.9 to Faro km 414.4

These improvement projects address high-risk and problematic sections of the Robert Campbell Highway. The projects are designed to:

- upgrade the highway in key locations to improve industrial/multi-modal freight transportation and commuter traffic safety and efficiency;
- enhance measures of socioeconomic inclusion in northern Yukon communities;
- result in a more resilient trade corridor that more effectively withstands the impacts of climate change and bulk/heavy haul freight;
- reduce vehicle operating costs; and
- reduce related transportation budgetary pressures by upgrading and improving the highway to achieve future cost reductions in terms of future remediation, rehabilitation and maintenance.

1.9. Campbell Highway: 354.9 to Km 414.4

Project Overview:

The project entails reconstructing 54km the Campbell Highway between two communities, Ross River and Faro. Existing road does not meet Transportation Association of Canada (TAC) design guidelines for a 90km/h Rural Arterial Undivided (RAU-90) low volume road. The road width varies from 8m to 9m and the surface is unsealed (gravel).

The highway will be upgraded to meet TAC RAU-90 standard and sealed with bituminous surface treatment (BST). The construction phase will be completed over 10 years, averaging 5.4km per year. Segment scheduling is based on granular availability which has already been developed closer to Ross River in anticipation of this project; additional granular will be developed closer to Faro as the project progresses.

Project Budget:

CAMPBELL HIGHWAY - ROSS RIVER KM 354.9 TO FARO 414.1 - ROAD RECONSTRUCTION												
	1	2	3	4	5	6	7	8	9	10	11	TOTAL
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING	85	85	85	85	85	85	85	85	85	85	85	935
Geotechnical Investigations and Granular Pit Development	25	25	25	25	25	25	25	25	25	25	25	275
Heritage Assessments and Environmental Studies	10	10	10	10	10	10	10	10	10	10	10	110
Preliminary Designs	50	50	50	50	50	50	50	50	50	50	50	550
DETAILED DESIGN	75	75	75	75	75	75	75	75	75	75	75	825
CONSTRUCTION	-	4,005	4,005	4,005	4,005	4,095	5,607	5,607	5,592	5,340	5,874	48,135
Road Reconstruction		3,780	3,780	3,780	3,780	3,780	5,292	5,292	5,292	5,040	5,544	45,360
BST		225	225	225	225	315	315	315	300	300	330	2,775
TOTAL:	160	4,165	4,165	4,165	4,165	4,255	5,767	5,767	5,752	5,500	6,034	49,895
CONTINGENCY 25%	40	1,041	1,041	1,041	1,041	1,064	1,442	1,442	1,438	1,375	1,509	12,474
GRAND TOTAL	200	5,206	5,206	5,206	5,206	5,319	7,209	7,209	7,190	6,875	7,543	62,369
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	200	5,206	5,206	5,206	5,206	5,319	7,209	7,209	7,190	6,875	7,543	62,369
CANADA 75%:	150	3,905	3,905	3,905	3,905	3,989	5,407	5,407	5,393	5,156	5,657	46,777
YUKON 25%:	50	1,302	1,302	1,302	1,302	1,330	1,802	1,802	1,798	1,719	1,886	15,592

1.10. Ross River Access Road

Project Overview:

This project has the same scope as km 354.9 to km 414.4 reconstruction project. The main difference is that the cost per km is higher because the road is at a lower standard and construction will take place over four years rather than 10.

Project Budget:

ROSS RIVER ACCESS ROAD - KM 1 TO KM 8.7 - ROAD RECONSTRUCTION												
	1	2	3	4	5	6	7	8	9	10	11	TOTAL
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING	-	-	-	-	-	-	-	85	85	85	85	340
Geotechnical Investigations and Granular Pit Development								25	25	25	25	100
Heritage Assessments and Environmental Studies								10	10	10	10	40
Preliminary Designs								50	50	50	50	200
DETAILED DESIGN								75	75	75	75	300
CONSTRUCTION	-	-	-	-	-	-	-	2,350	2,350	2,350	2,020	9,070
Road Reconstruction								2,200	2,200	2,200	1,870	8,470
BST								150	150	150	150	600
TOTAL:	-	-	-	-	-	-	-	2,510	2,510	2,510	2,180	9,710
CONTINGENCY 25%	-	-	-	-	-	-	-	628	628	628	545	2,428
GRAND TOTAL	-	-	-	-	-	-	-	3,138	3,138	3,138	2,725	12,138
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	-	-	-	-	-	-	-	3,138	3,138	3,138	2,725	12,138
CANADA 75%:	-	-	-	-	-	-	-	2,353	2,353	2,353	2,044	9,103
YUKON 25%:	-	-	-	-	-	-	-	784	784	784	681	3,034

1.11. Campbell Highway: Km 114 to Km 232 and km 232 to km 354.9

Project Overview:

The spot repairs and structural culvert replacements will (a) benefit local traffic travelling to and from Watson Lake, Ross River, Faro and Carmacks, (b) support the mining industry through improved road conditions, and (c) promote economic and socioeconomic benefits through industrial developments, spin-off opportunities, and through anticipated Industrial Benefits Agreements with First Nations in the area.

The decision to improve the Robert Campbell Highway from km 114 to km 354.9 stems from the deteriorated current condition of the roadway surface and culverts, as well as the impacts of vegetation over-growth. These current conditions, together with a narrow road width, geometric deficiencies, and poor roadway structure, result in a roadway that does not provide adequate user safety and roadway reliability. The highway road top surface width varies from 6.5m to 7.8m.

The plan for both projects km 114 to km 232 and km 232 to 354.9 are similar; see project budget for more details. The improvements projects will address high-risk and problematic sections of the Robert Campbell Highway over an eleven-year timeframe. These two projects are the first stage of a multi-stage approach to upgrade the unimproved section of the highway to meet a consistent RAU 90 km/h design standard. The upgrades between km 114 to km 354.9 will enhance community inclusion, highway safety, climate resiliency, reliability and efficiency through geometry upgrades, road widening with a top surface width of 10.5m and strengthening of the gravel structure to support sustained heavy ore haul traffic.

99 Mile Creek Culvert

km 195

Project Budget:

CAMPBELL HIGHWAY - KM 232 TO KM 354.9 - ROAD RECONSTRUCTION AND STRUCTURES												
	1	2	3	4	5	6	7	8	9	10	11	TOTAL
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING & DETAILED DESIGN	300	300	300	300	300	300	300	300	300	300	300	3,300
Geotechnical Investigations and Granular Pit Development												
Heritage Assessments and Environmental Studies												
Preliminary Designs												
DETAILED DESIGN												-
CONSTRUCTION	-	1,775	4,500	8,950	6,650	7,975	4,750	8,975	5,600	8,350	4,700	62,225
Clearing												
KM 230-242		600										600
KM 242-252			500									500
KM 252-262				500								500
KM 272-286					700							700
KM 286-303						850						850
KM 320-331							550					550
KM 340-358								900				900
KM 362-372									500			500
KM 303-320										850		850
KM 331-340											450	450
Road Reconstruction - Spot Locations												
KM 230.5-239.9			4,000	4,950								8,950
KM 244.9-252				3,000	3,750							6,750
KM 252-256, KM 257 Little Campbell Creek 2 Structural Culvert Replacement					2,000	3,000						5,000
KM 274.8-275.2, 283.4-284.8, KM 280.0 Mink Creek 2 Structural Culvert Replacement						3,000						3,000
KM 288.5-295, 296.2-298.5, 302.5-302.9							4,000	5,150				9,150
KM 321-324.2, KM 322.9 Horton Creek Structural Culvert Replacement								2,000	2,300			4,300
KM 330.7 Bruce Creek Structural Culvert Replacement												
KM 341.8-346, KM 340.3 Ketza Creek Head Wall Repair, KM 342.3									2,500	2,700		5,200
Little Ketza River & Beautiful Creek Structural Culvert Replacement												
KM 346-354.5										4,700	4,000	8,700
Produce and Stockpile Aggregate		1,175		500		925		925				3,525
Revegetation					200	200	200		300	100	250	1,250
TOTAL:	300	2,075	4,800	9,250	6,950	8,275	5,050	9,275	5,900	8,650	5,000	65,525
CONTINGENCY 25%	75	519	1,200	2,313	1,738	2,069	1,263	2,319	1,475	2,163	1,250	16,381
GRAND TOTAL	375	2,594	6,000	11,563	8,688	10,344	6,313	11,594	7,375	10,813	6,250	81,906
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	375	2,594	6,000	11,563	8,688	10,344	6,313	11,594	7,375	10,813	6,250	81,906
CANADA 75%:	281	1,945	4,500	8,672	6,516	7,758	4,734	8,695	5,531	8,109	4,688	61,430
YUKON 25%:	94	648	1,500	2,891	2,172	2,586	1,578	2,898	1,844	2,703	1,563	20,477

Project Budget:

CAMPBELL HIGHWAY - KM 114 TO KM 232 - ROAD RECONSTRUCTION AND STRUCTURES												
	1	2	3	4	5	6	7	8	9	10	11	TOTAL
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	
PRE-ENGINEERING	300	300	300	300	300	300	375	390	300	300	-	3,165
Geotechnical Investigations and Granular Pit Development												
Heritage Assessments and Environmental Studies												
Preliminary Designs												
DETAILED DESIGN												-
CONSTRUCTION	-	1,250	3,750	2,875	6,650	6,325	5,200	5,825	6,550	5,000	200	43,625
Clearing												
KM 122-136		700										700
KM 136-152			800									800
KM 152-160				400								400
KM 160-174					700							700
KM 190-200						500						500
KM 208-219							550					550
KM 114-122								300				300
KM200-208									400			400
KM 219-230										550		550
Road Reconstruction - Spot Locations												
KM 184.3-185.3, 186.5-188.6			2,950									2,950
KM 175.7-180.2, KM 178.7 Dick Creek Structural Culvert Replacement				2,000	2,900							4,900
KM 122.6-123.5, 126.5-127.5, 134-135.3					3,050							3,050
KM 137.4-138, 150.9-152, KM 144.5 Jules Creek Structural Culvert Replacement						2,400						2,400
KM 152.5-153.6, 154.4-158, KM 158.8 99 Mile Creek Structural Culvert Replacement						2,500	2,600					5,100
KM 160-162.6, 165.5-166.6, 168.3-169, KM 167.5 Caesar Creek Structural Culvert Replacement							2,000	2,700				4,700
KM 191.3-192.6, 194.5 Rotational Failure, 196.4-197.2,								2,000	2,200			4,200
KM 198.6 Light Creek & KM 202.7 Van Bibber Creek Structural Culvert Replacement												
KM 208.7-215, 218.3-218.8, KM 208.4 Wolverine Creek Structural Culvert Replacement									3,500	3,600		7,100
KM 229.9 Replace Finlayson Creek Structural Culvert with New Bridge									300	750		1,050
Produce and Stockpile Aggregate		550		375		675		675				2,275
Revegetation				100		250	50	150	150	100	200	1,000
TOTAL:	300	1,550	4,050	3,175	6,950	6,625	5,575	6,215	6,850	5,300	200	46,790
CONTINGENCY 25%	75	388	1,013	794	1,738	1,656	1,394	1,554	1,713	1,325	50	11,698
GRAND TOTAL	375	1,938	5,063	3,969	8,688	8,281	6,969	7,769	8,563	6,625	250	58,488
INELIGIBLE COSTS	-	-	-	-	-	-	-	-	-	-	-	-
ELIGIBLE COSTS	375	1,938	5,063	3,969	8,688	8,281	6,969	7,769	8,563	6,625	250	58,488
CANADA 75%:	281	1,453	3,797	2,977	6,516	6,211	5,227	5,827	6,422	4,969	188	43,866
YUKON 25%:	94	484	1,266	992	2,172	2,070	1,742	1,942	2,141	1,656	63	14,622

Appendix C: Maps

Relevant project maps are included in this appendix.

Figure C.1 – Project Locations

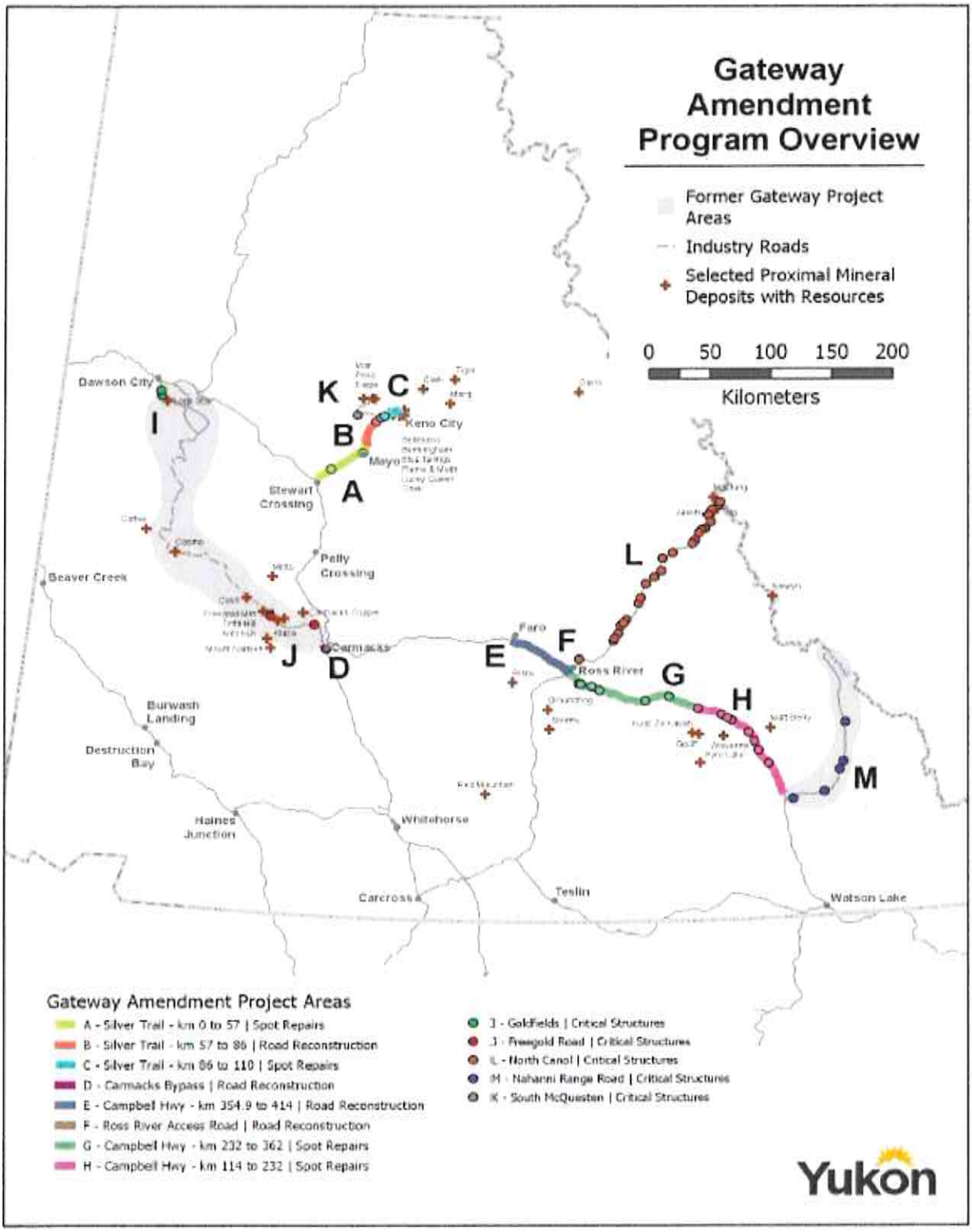


Figure C.2 – Yukon First Nations Traditional Territories

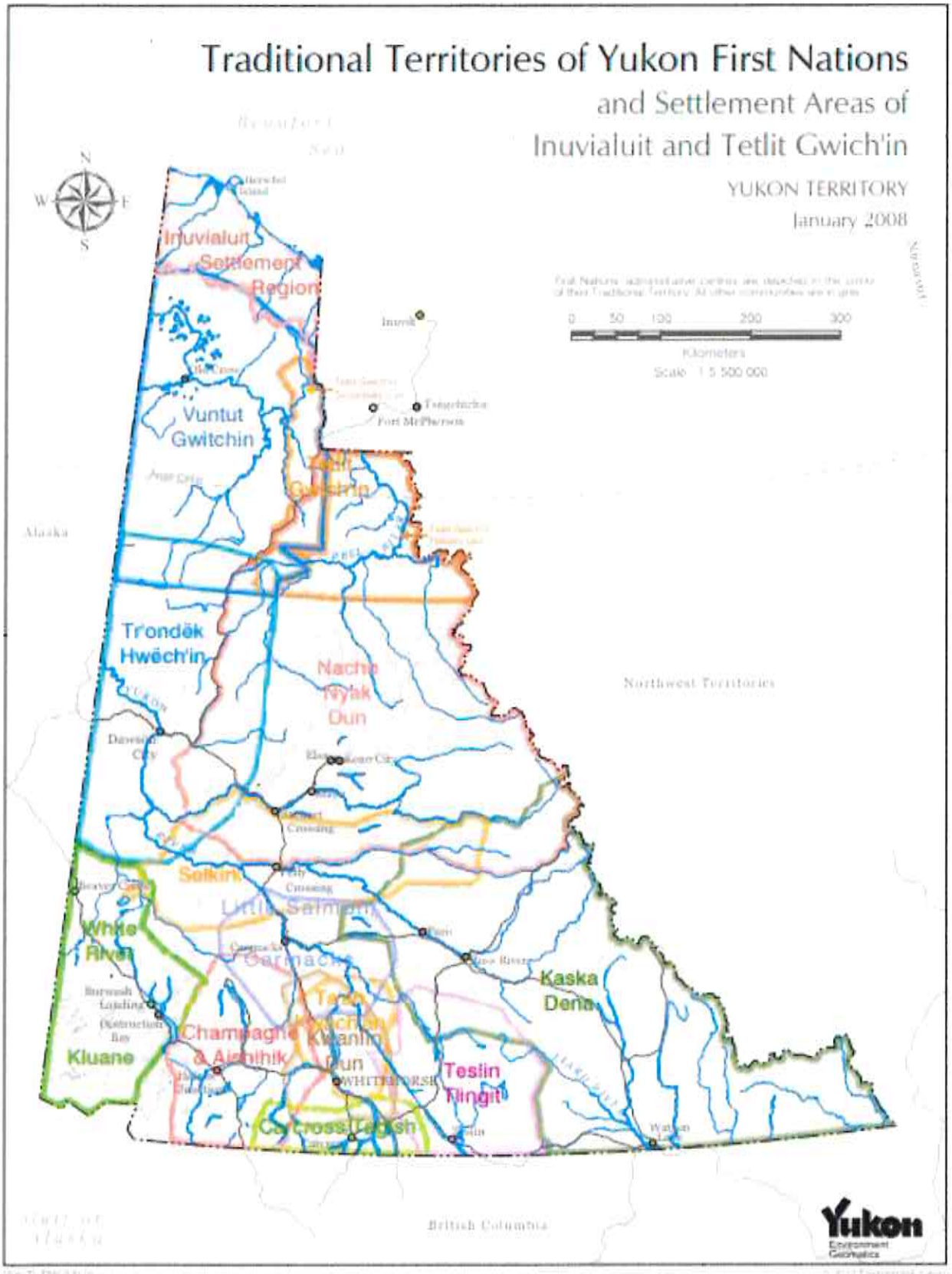


Figure C.3 – Campbell Highway Km 114-km 232

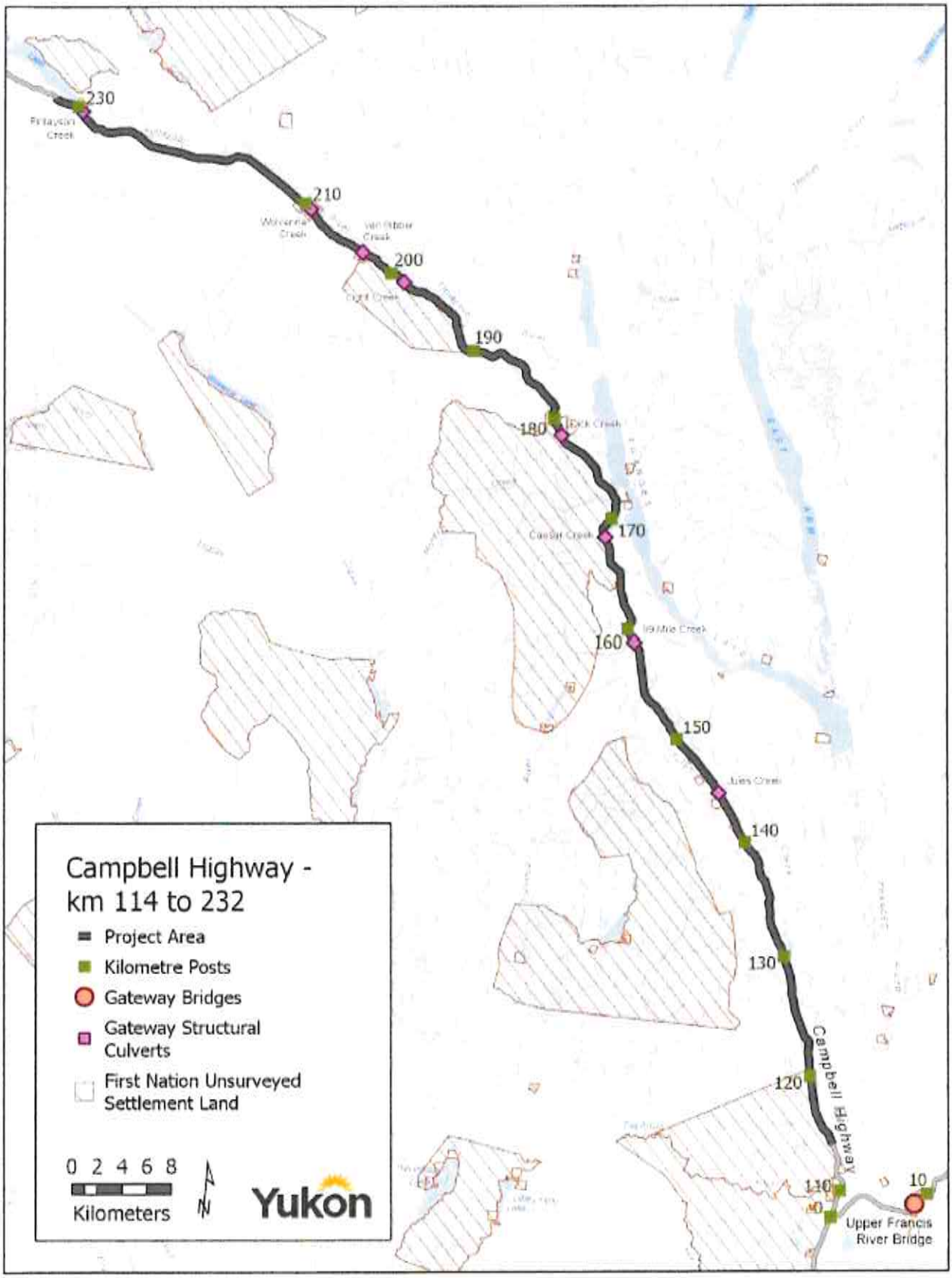


Figure C.4 – Campbell Highway Km 232 – Km 354.9

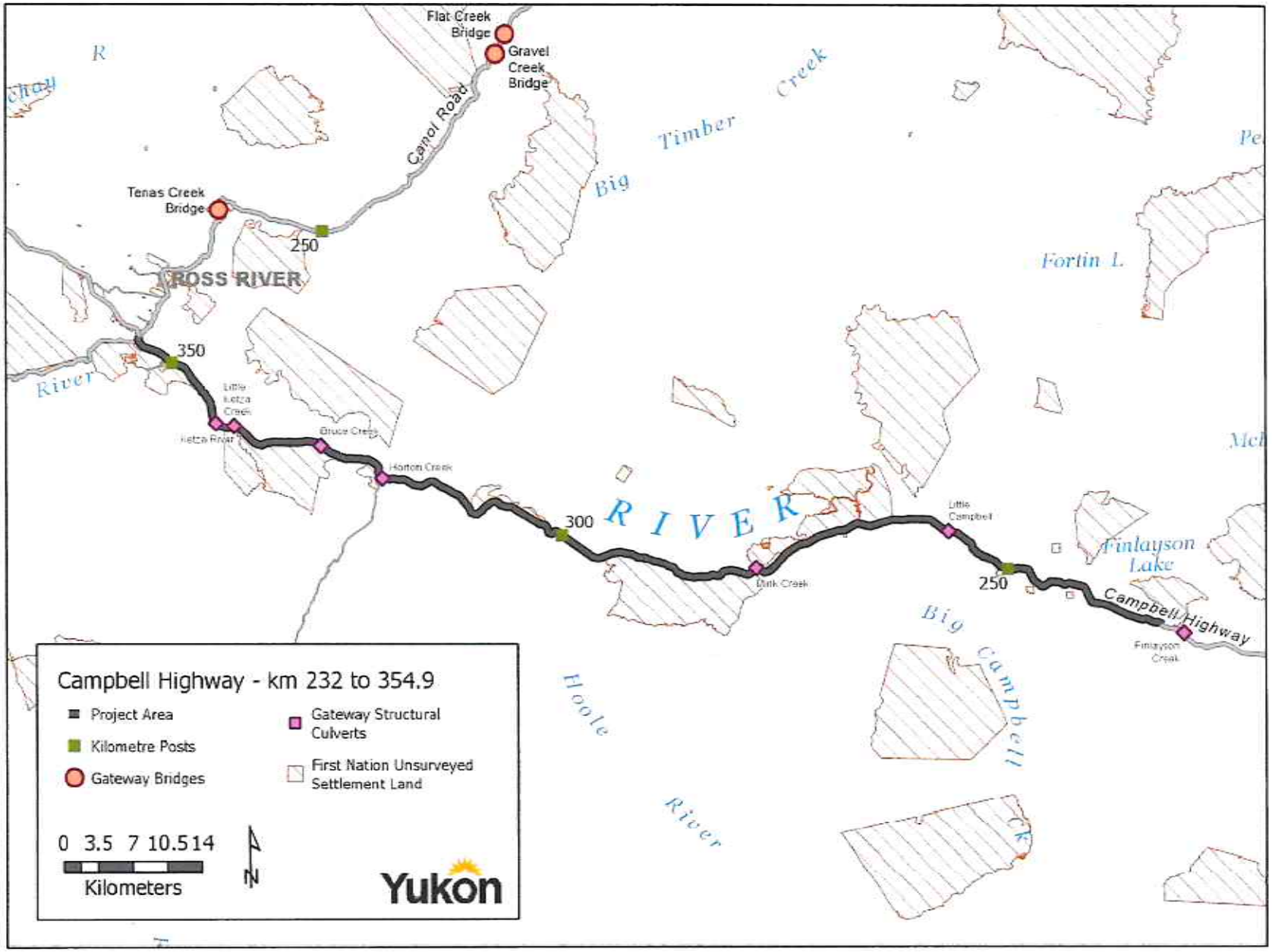


Figure C.5 – Campbell Highway Km 354.9 – Km 414

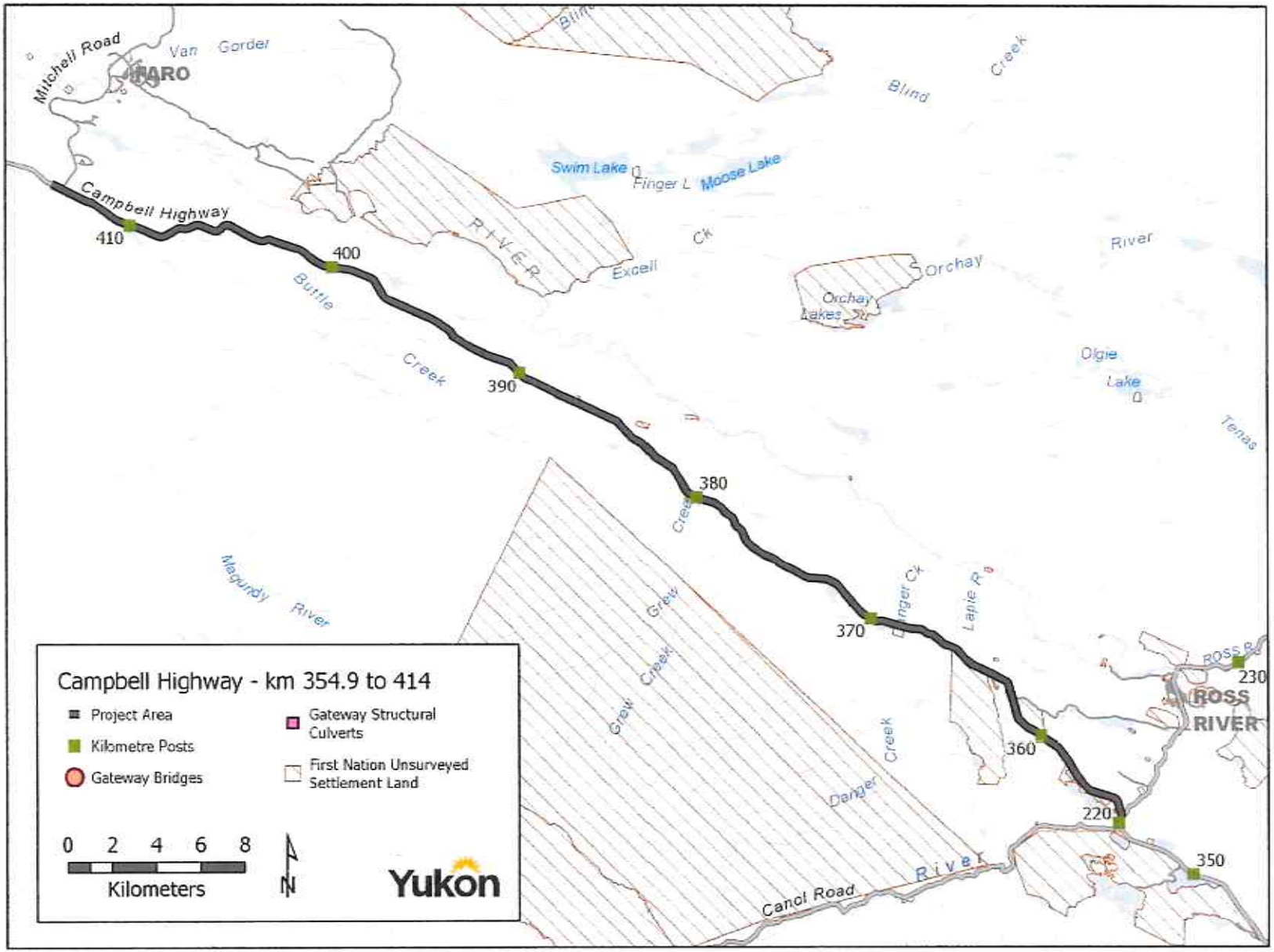


Figure C.6 – Ross River Access Road Km 0 – Km 8.7

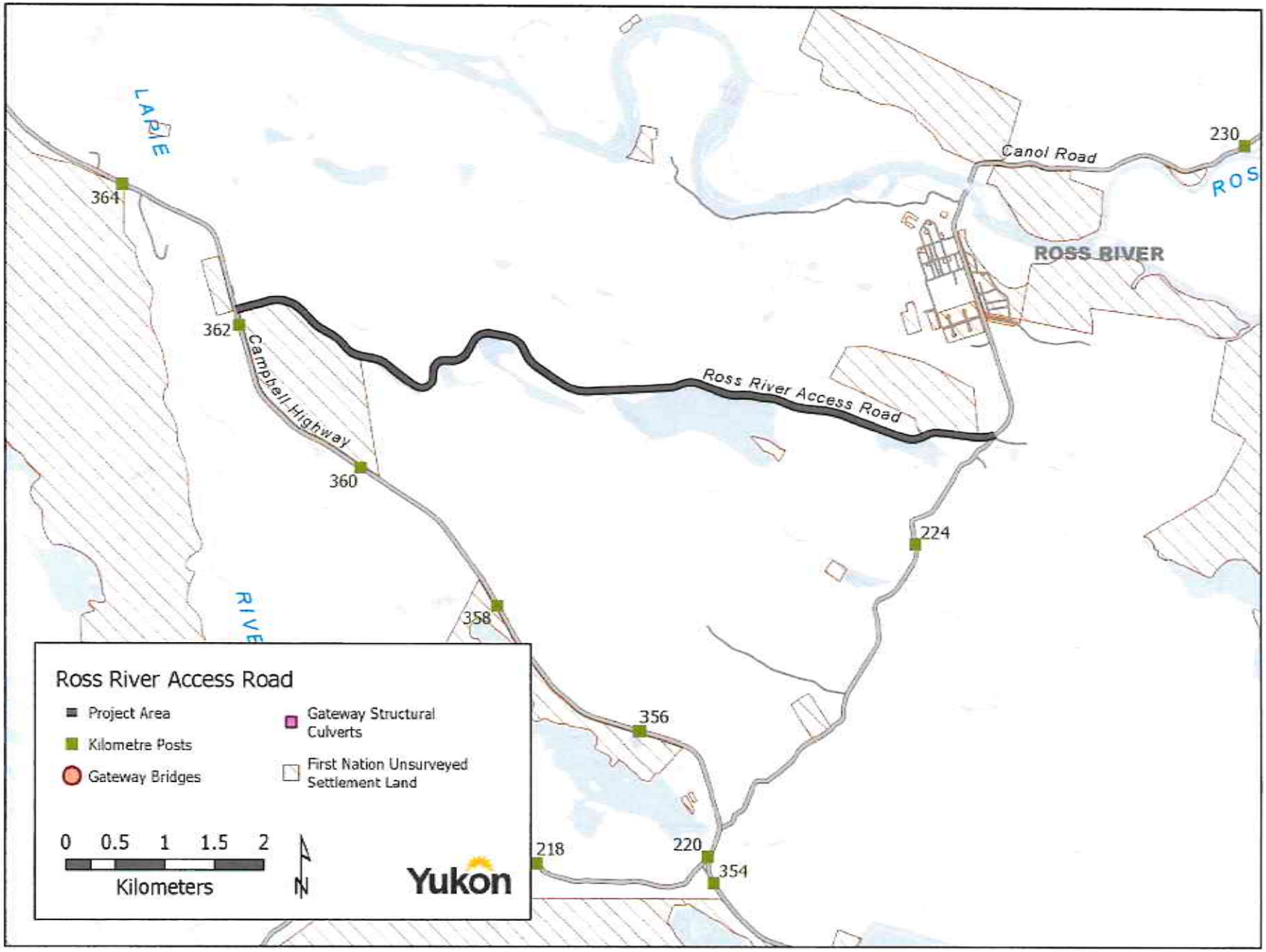


Figure C.7 – Silver Trail Km 0 – km 57

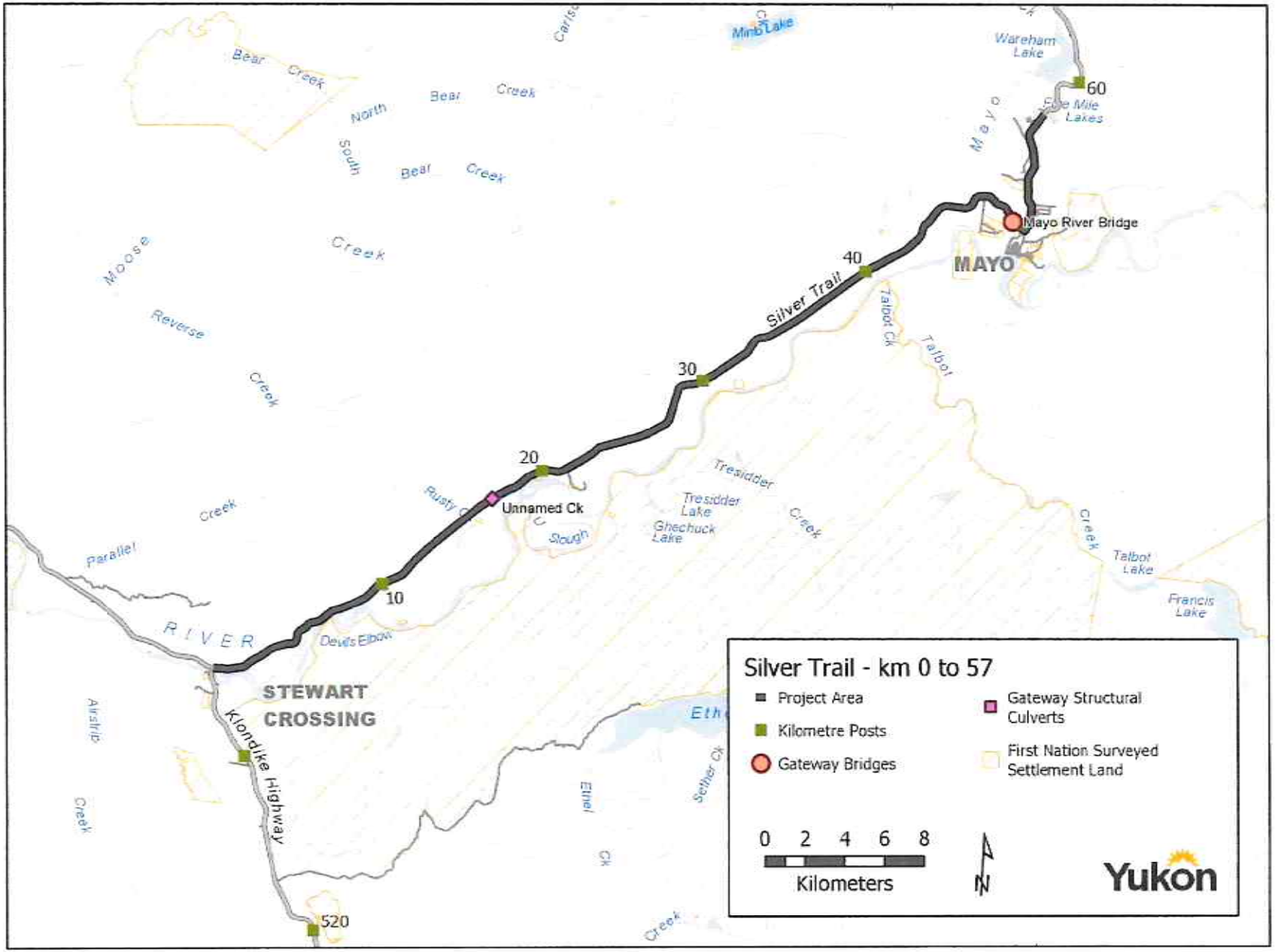


Figure C.8 – Silver Trail Km 57 – 86

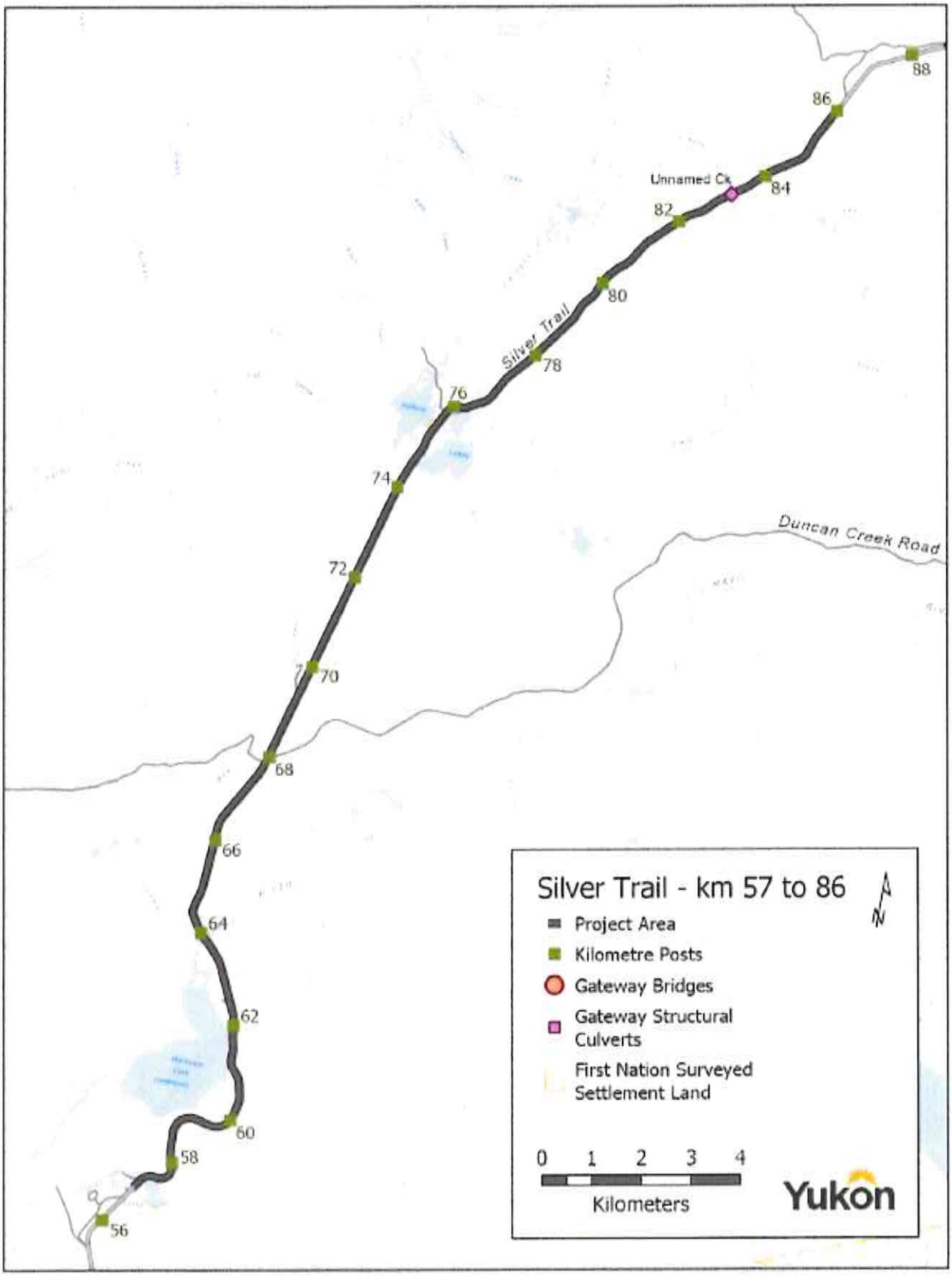


Figure C.9 – Silver Trail Km 86 – Km 110

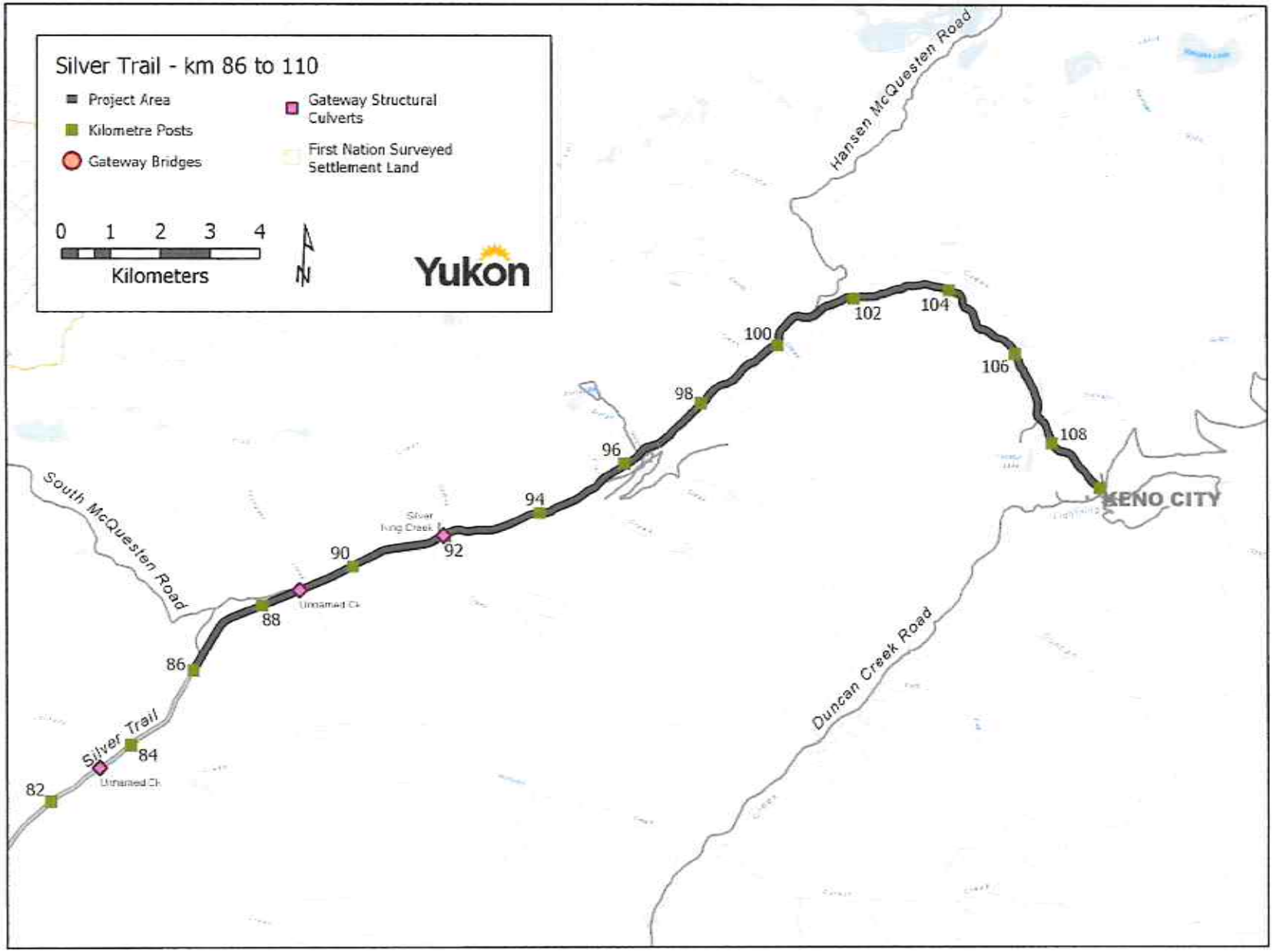


Figure C.10 – South McQuesten Road Critical Structures

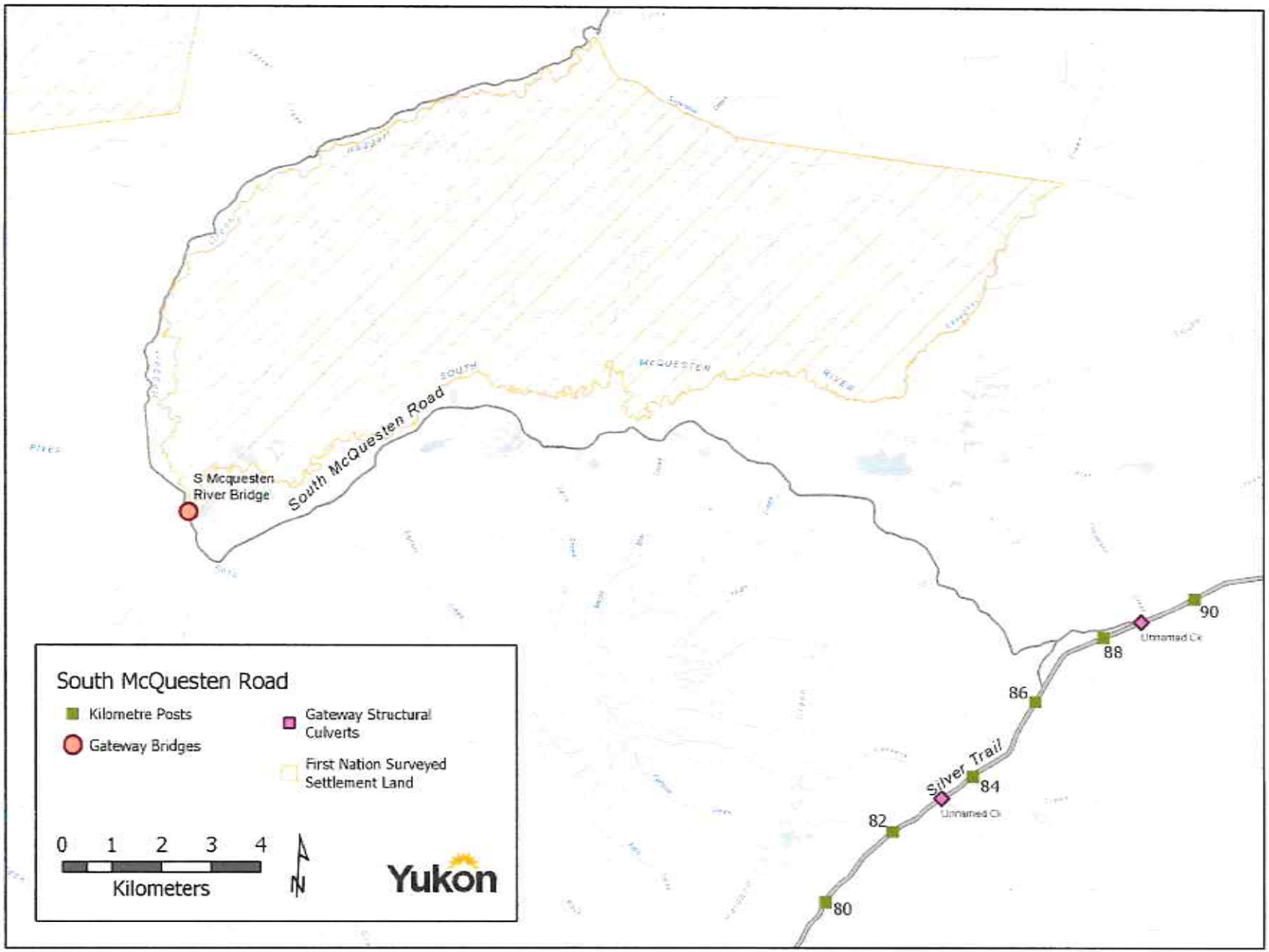


Figure C.11 – Freegold Road

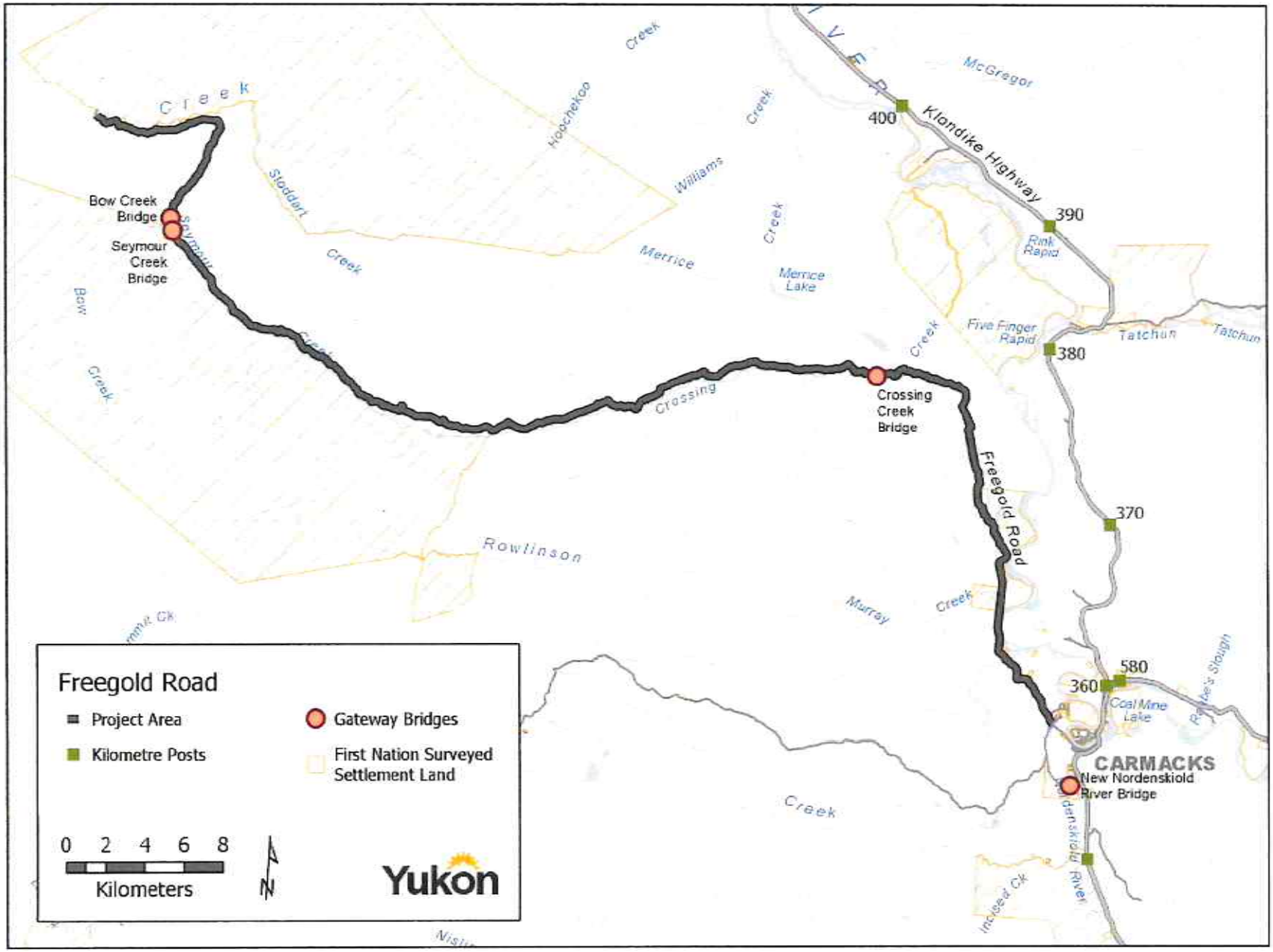


Figure C.12 – North Canol Critical Structures

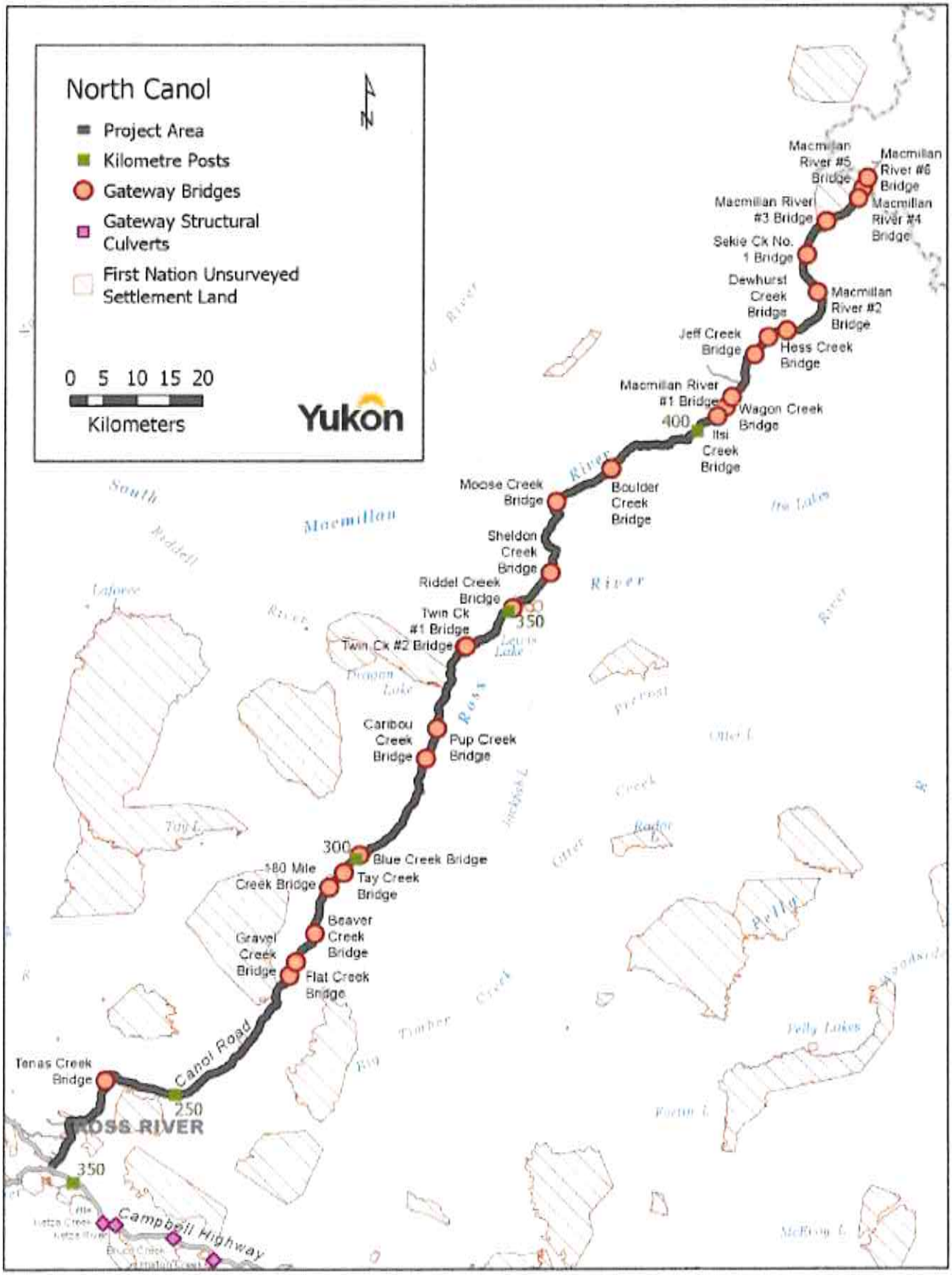


Figure C.13 – Carmacks Bypass

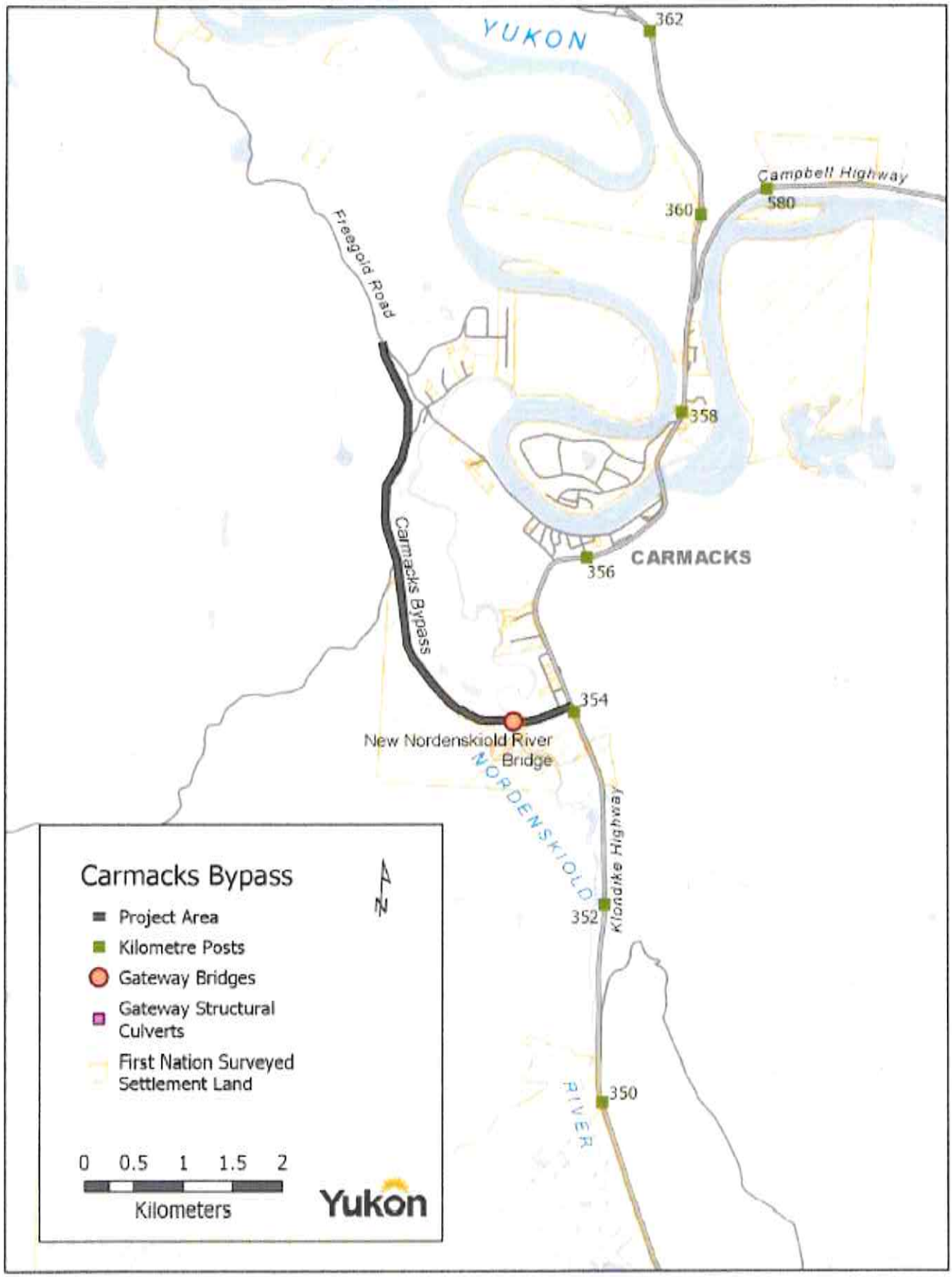


Figure C.14 – Goldfield Roads

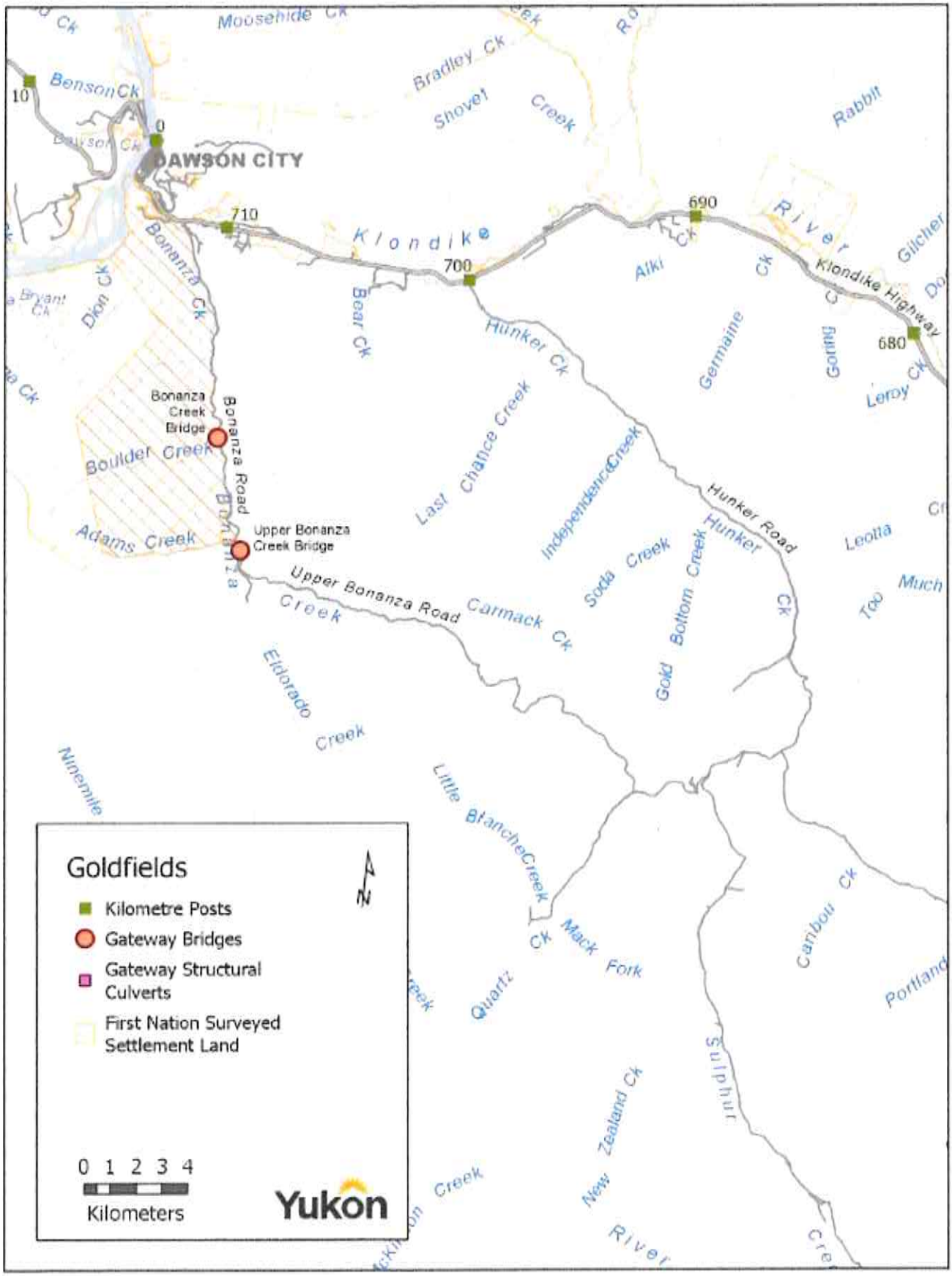
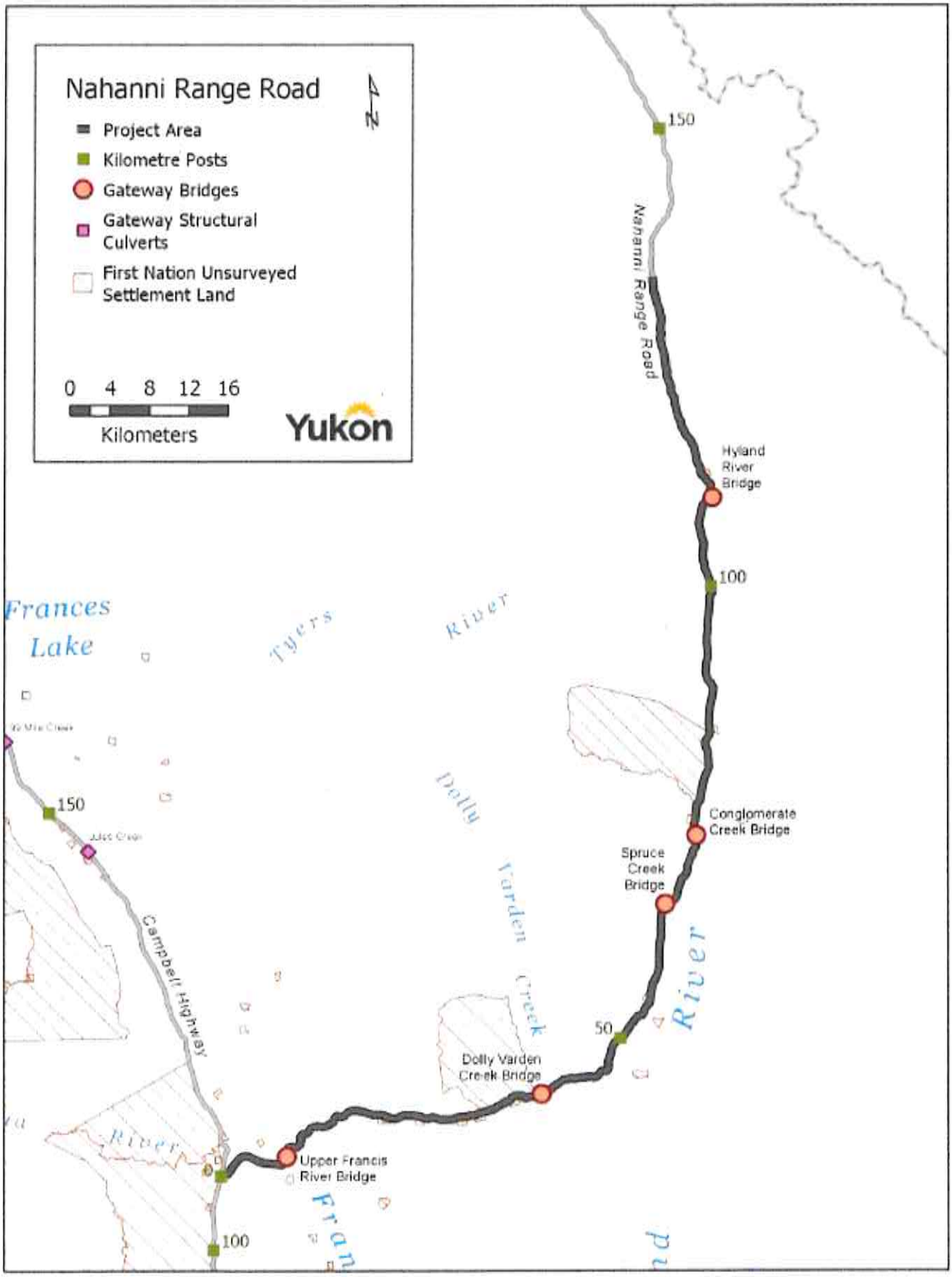


Figure C.15 – Nahanni Range Road



Appendix D: Design Drawings

This sections contains design drawings for the Nordenskiold River Bridge as well as the Campbell Highway Km 232-354.9, as well as the standard drawings used by Transportation Engineering Branch.

Nordenskiold River Bridge

Yukon

Highways and Public Works

Transportation Engineering Branch

YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
90% DESIGN
YUKON 2018 - 2020

KEY MAP

DRAWING LIST		
DRAWING NO.	TITLE	REVISION
309-0000-001	COVER SHEET - KEY MAP AND DRAWING LIST	B
309-0000-002	GENERAL ARRANGEMENT - SHEET 1 OF 2	B
309-0000-003	GENERAL ARRANGEMENT - SHEET 2 OF 2	B
309-0000-004	FILL LAYOUT AND DETAIL	-
309-0000-005	NORTH ABUTMENT DETAIL	B
309-0000-006	SOUTH ABUTMENT DETAIL	B
309-0000-007	ABUTMENT REINFORCEMENT - SHEET 1 OF 2	A
309-0000-008	ABUTMENT REINFORCEMENT - SHEET 2 OF 2	-
309-0000-009	BEARING DETAIL	A
309-0000-010	GIRDER LAYOUT	A
309-0000-011	GIRDER DETAIL - SHEET 1 OF 5	A
309-0000-012	GIRDER DETAIL - SHEET 2 OF 5	A
309-0000-013	GIRDER DETAIL - SHEET 3 OF 5	A
309-0000-014	GIRDER DETAIL - SHEET 4 OF 5	A
309-0000-015	GIRDER DETAIL - SHEET 5 OF 5	A
309-0000-016	DECK LAYOUT AND DETAIL	A
309-0000-017	END DIAPHRAGM LAYOUT	A
309-0000-018	END DIAPHRAGM DETAIL	A
309-0000-019	APPROACH SLAB LAYOUT AND DETAIL	A
309-0000-020	BRIDGE LUMINAIRE	-
309-0000-021	RIPRAP LAYOUT AND DETAIL	-
309-0000-022	REFERENCE PLAN AND PROFILE	B

EXISTING BRIDGE REFERENCE DRAWINGS	
NO. OF DRAWINGS	TITLE
7 SHEETS	GOVERNMENT OF YUKON TERRITORY - STRUCTURAL DRAWINGS - 1970
4 SHEETS	RE-DECKING AND REPAIR DRAWINGS - 1985
5 SHEETS	PUBLIC WORKS CANADA - EXISTING PEDESTRIAN WALKWAY

wsp

REV.	DATE	DESCRIPTION	APPROVED
B	09/14/18	90% DESIGN SUBMISSION	CS
A	07/24/18	PRELIMINARY DESIGN SUBMISSION	CS

CONTRACT No.: C00041117 FILE No.: 17N-00158-11

DRAWN: HR SHEET No.: 1 OF 22

DRAWING No.: 309-0000-001

LAYOUT: COVER SHEET
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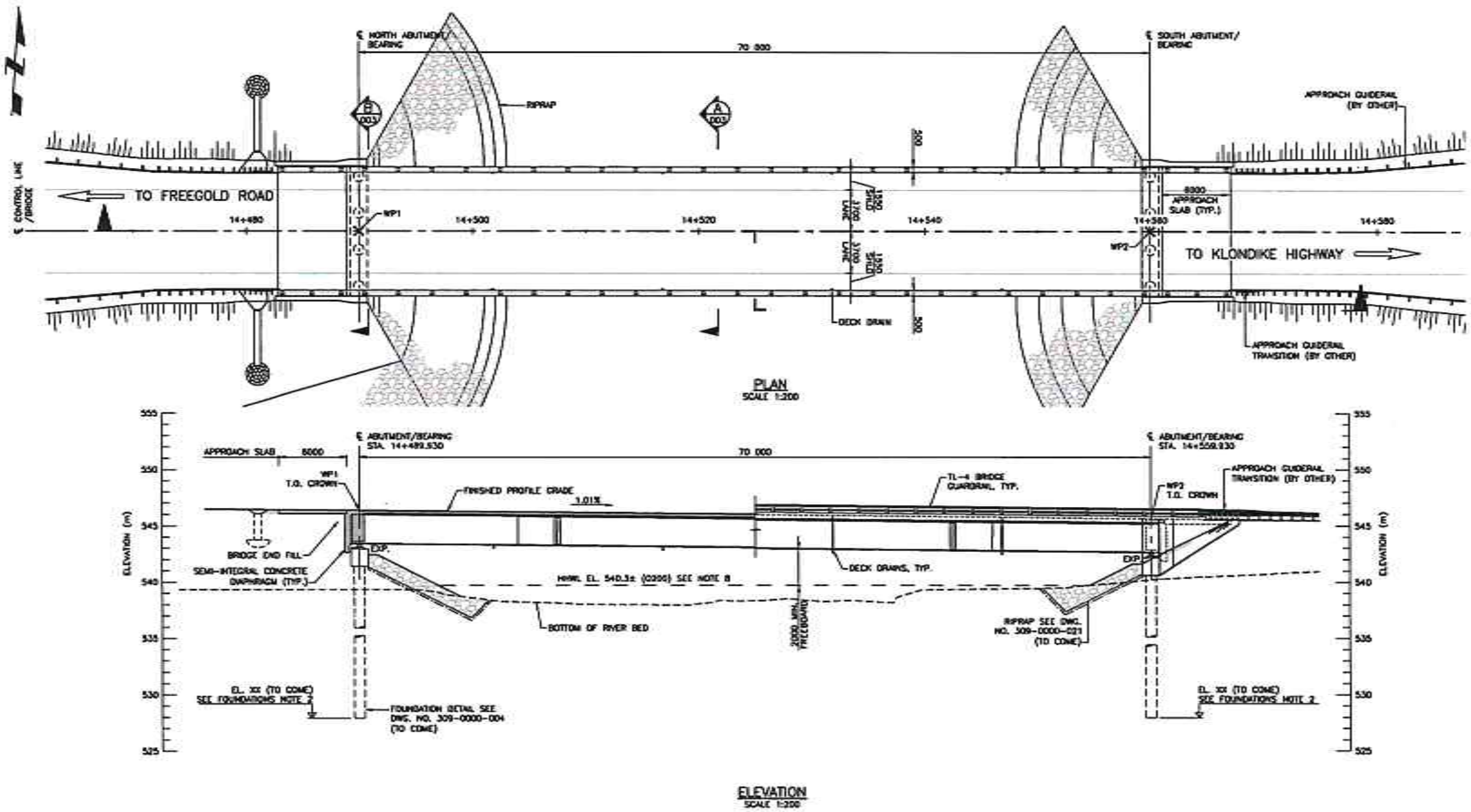

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. DESIGN CODE CAN/CSA-S6-14 "CANADIAN HIGHWAY BRIDGE DESIGN CODE"
3. LIVE LOADS: CL-800
4. FATIGUE DESIGN:
   - CL-800 TRUCK
   - SERVICE LIFE: 75 YEARS
   - HIGHWAY CLASS: 'A'
5. SEISMIC IMPORTANCE CATEGORY:
   - LIFELINE BRIDGE
6. CLIMATIC DATA (WHITEHORSE)
   - MAXIMUM DAILY MEAN TEMPERATURE 24 °C
   - MINIMUM DAILY MEAN TEMPERATURE -48 °C
   - WIND LOAD 1/50 YEAR REFERENCE VELOCITY PRESSURE = 0.37 kPa
7. DATUM:
   - ALL STATIONS AND ELEVATIONS ARE IN METRES.
8. AS PER 2018 WSP BATHYMETRY SURVEY.

CONCRETE:

1. ALL CONCRETE TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 35 MPa AT 28 DAYS. PROPORTION CONCRETE CONFORMING TO CAN/CSA A23.1 IN ACCORDANCE WITH THE SPECIFICATIONS.
2. ALL EXPOSED EDGES OF CONCRETE TO BE CHAMFERED 20mm UNLESS NOTED OTHERWISE.
3. CONCRETE SURFACE SHALL BE CONFORMING TO CAN/CSA-A23.1 AND AS FOLLOWS:
   - CONCRETE NOT EXPOSED TO VIEW: ROUGH FORM FINISH
   - CONCRETE EXPOSED TO VIEW: SMOOTH FORM FINISH
   - DECK AND APPROACH SLAB SURFACE SHALL RECEIVE A TINED FINISH TRANSVERSELY TO THE DIRECTION OF TRAFFIC. THE TEXTURE SHALL EXTEND UNIFORMLY WITHIN 300 mm OF THE CURB.

REINFORCING:

1. ALL REINFORCING STEEL TO CONFORM TO CAN/CSA - G30.18 GRADE 400R UNLESS NOTED OTHERWISE.
2. MAIN REINFORCING STEEL IN COLUMN AND PILES TO CONFORM TO CAN/CSA G30.18 GRADE 400W WITH MAXIMUM YIELD STRENGTH OF 525 MPa.
3. STAINLESS STEEL REINFORCING BARS SHALL CONFORM TO ASTM A276 AND ASTM A955M MINIMUM GRADE 420.
4. WELDING OF REINFORCING IS NOT PERMITTED.
5. SPLICES ARE TO BE STAGGERED SO THAT NOT MORE THAN EVERY SECOND BAR IS SPLICED AT ANY ONE LOCATION EXCEPT AS OTHERWISE INDICATED.
6. COVER TO REINFORCING:

   PIER, ABUTMENT, WINGWALL, END DIAPHRAGM:
   - CAST AGAINST SOIL - 100 mm
   - FORMED OR TOP SURFACE - 70 mm

   DECKS, CURBS:
   - TOP SURFACE - 80 mm
   - SOFFIT - 50 mm

   APPROACH SLAB:
   - TOP SURFACE - 80 mm
   - SOFFIT - 100 mm
   - OTHER SURFACE - 70 mm

   ALL OTHER SURFACES: - 60 mm
7. ALL LAPS OF REINFORCING FOR SPLICES IN 35 MPa CONCRETE SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE.

	UNCOATED	UNCOATED TOP BARS*
10M	360	460
15M	510	660
20M	630	820
25M	1000	1300
30M	1190	1540
35M	1460	1840

*HORIZONTAL BARS PLACED WITH MORE THAN 300mm FRESH CONCRETE BELOW THE BARS.

STEELWORK:

1. SEE DWG. NO. 309-0000-010

FOUNDATIONS:

1. SEE DWG. NO. 309-0000-004
2. PILE TIP EL. ON HOLD UNTIL GEOTECHNICAL SUBSURFACE EXPLORATION IS COMPLETE

WORKPOINTS			
WORKPOINT	NORTHING	EASTING	ELEVATION
WP1	6882981.332	432127.981	546.397
WP2	6882986.035	432197.823	545.691

NOT FOR CONSTRUCTION

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
B	05/14/18	90% DESIGN SUBMISSION	CS
A	07/24/18	PRELIMINARY DESIGN SUBMISSION	CS

REVISIONS

wsp

PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018-2020

DRAWING TITLE:
GENERAL ARRANGEMENT
SHEET 1 OF 2

DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
RK	PL	CS	PM

CONTRACT NO.: C00044147 — FILE NO.: 17M-00158-11
SCALE: AS SHOWN — DATE: 05/14/18 — SHEET NO.: 2 OF 22
DRAWING NO.: 309-0000-002

DATE: 2018-05-14 - 3:09pm (fung)
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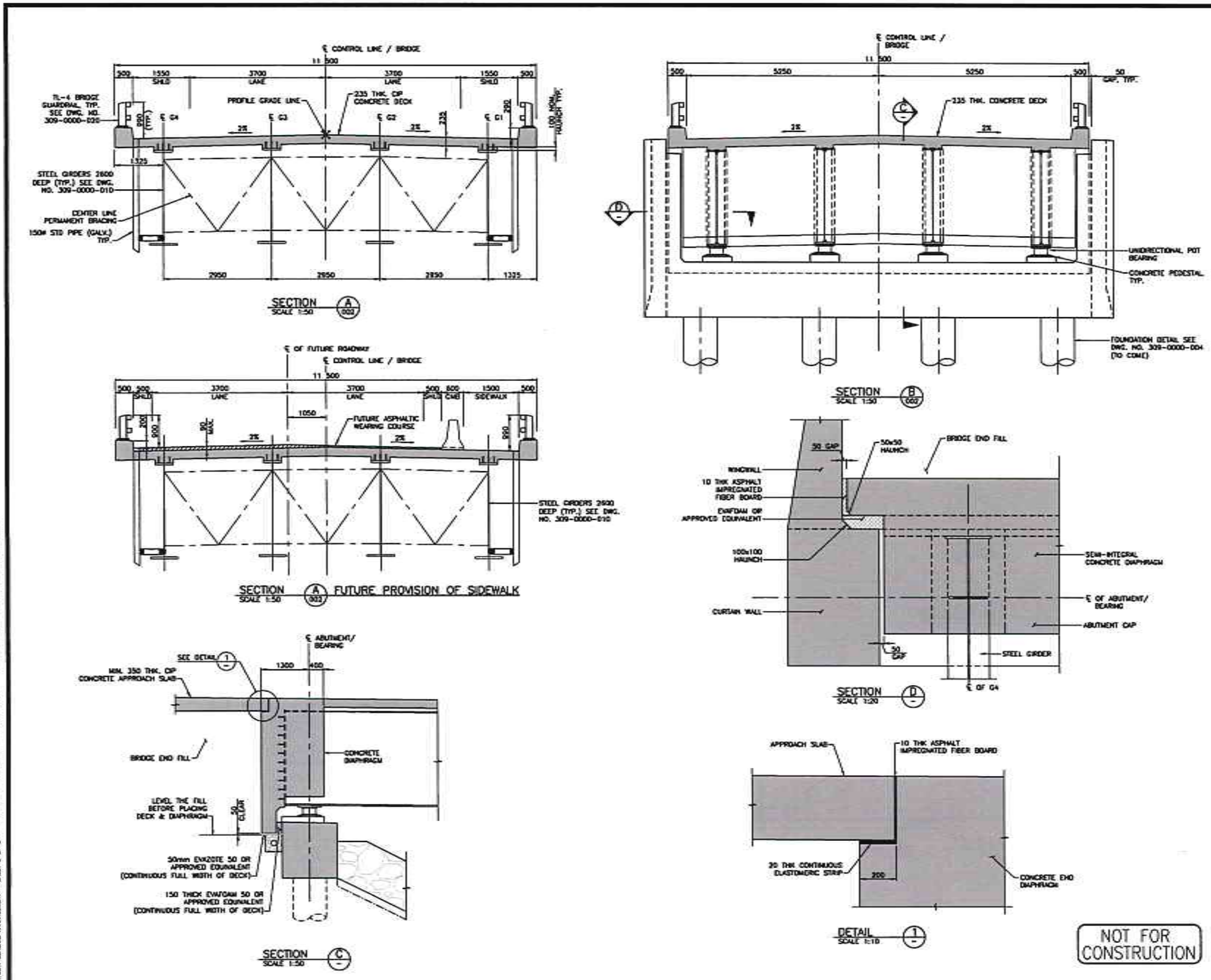

SECTION A
SCALE 1:50
SECTION A FUTURE PROVISION OF SIDEWALK
SCALE 1:50
SECTION B
SCALE 1:50
SECTION C
SCALE 1:50
SECTION D
SCALE 1:20
DETAIL 1
SCALE 1:10
℄ CONTROL LINE / BRIDGE
℄ OF FUTURE ROADWAY
TL-4 BRIDGE GUARDRAIL, TYP. SEE DWG. NO. 309-0000-020
PROFILE GRADE LINE
235 THK. CIP CONCRETE DECK
235 THK. CONCRETE DECK
STEEL GIRDERS 2600 DEEP (TYP.) SEE DWG. NO. 309-0000-010
CENTER LINE PERMANENT BRACING
150⌀ STD PIPE (GALV.) TYP.
FUTURE ASPHALTIC WEARING COURSE
UNIDIRECTIONAL POT BEARING
CONCRETE PEDESTAL, TYP.
FOUNDATION DETAIL SEE DWG. NO. 309-0000-004 (TO COME)
BRIDGE END FILL
WINGWALL
50x50 HAUNCH
10 THK ASPHALT IMPREGNATED FIBER BOARD
EVAFOAM OR APPROVED EQUIVALENT
100x100 HAUNCH
CURTAIN WALL
SEMI-INTEGRAL CONCRETE DIAPHRAGM
℄ OF ABUTMENT/ BEARING
ABUTMENT CAP
STEEL GIRDER
℄ OF G4
MIN. 350 THK. CIP CONCRETE APPROACH SLAB
SEE DETAIL 1
CONCRETE DIAPHRAGM
LEVEL THE FILL BEFORE PLACING DECK & DIAPHRAGM
50mm EVAZOTE 50 OR APPROVED EQUIVALENT (CONTINUOUS FULL WIDTH OF DECK)
150 THICK EVAFOAM 50 OR APPROVED EQUIVALENT (CONTINUOUS FULL WIDTH OF DECK)
APPROACH SLAB
20 THK CONTINUOUS ELASTOMERIC STRIP
CONCRETE END DIAPHRAGM
NOT FOR CONSTRUCTION

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
B	09/14/18	90% DESIGN SUBMISSION	CS
A	07/24/18	PRELIMINARY DESIGN SUBMISSION	CS

REVISIONS

wsp

PROJECT TITLE:

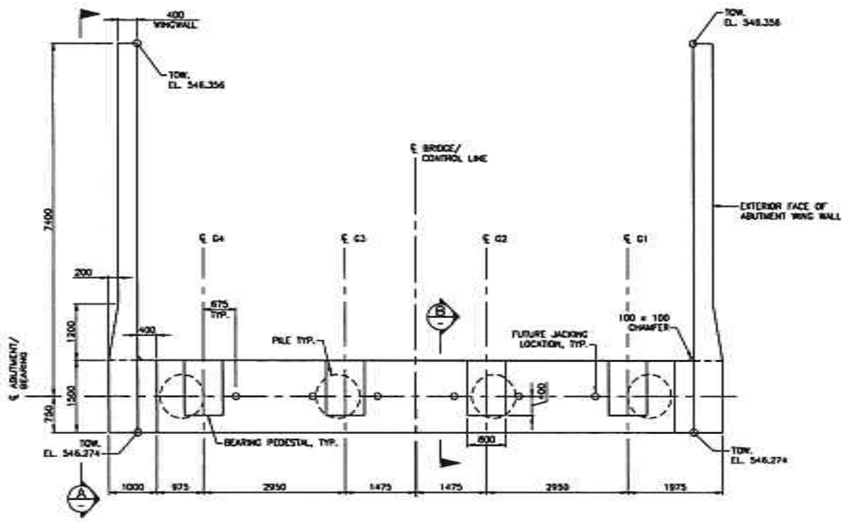
YUKON RESOURCE
GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018-2020

DRAWING TITLE:

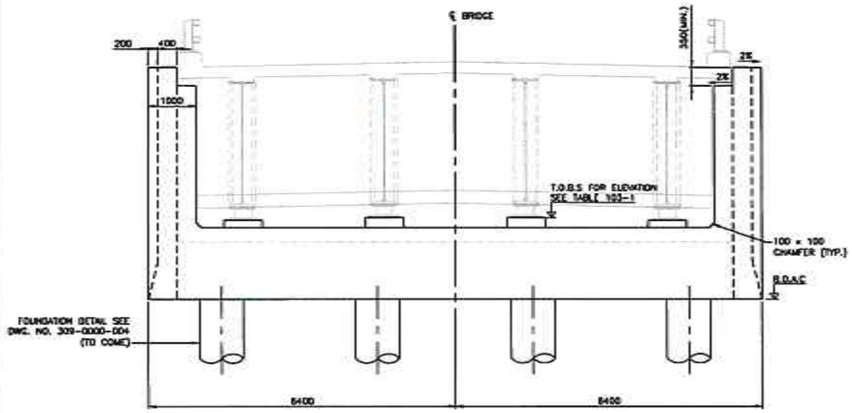
GENERAL ARRANGEMENT
SHEET 2 OF 2

DESIGN BY:	DRAWN BY:	REVISED BY:	APPROVED BY:
KK	PL	CS	RA
CONTRACT NO.:		FILE NO.:	
C00044147		17M-00156-11	
SCALE:	DATE:	SHEET No.:	
AS SHOWN	09/14/18	3 OF 22	

DRAWING No.:
309-0000-003


400
WINGWALL
TOW,
EL. 546.356
℄ BRIDGE/
CONTROL LINE
EXTERIOR FACE OF
ABUTMENT WING WALL
℄ G4
℄ G3
℄ G2
℄ G1
7400
200
675
TYP.
PILE TYP.
FUTURE JACKING
LOCATION, TYP.
100 x 100
CHAMFER
1200
1500
750
400
℄ ABUTMENT/
BEARING
BEARING PEDESTAL, TYP.
800
TOW,
EL. 546.274
1000
975
2950
1475
1475
2950
1975

PLAN – NORTH ABUTMENT
SCALE 1:50



ELEVATION – NORTH ABUTMENT
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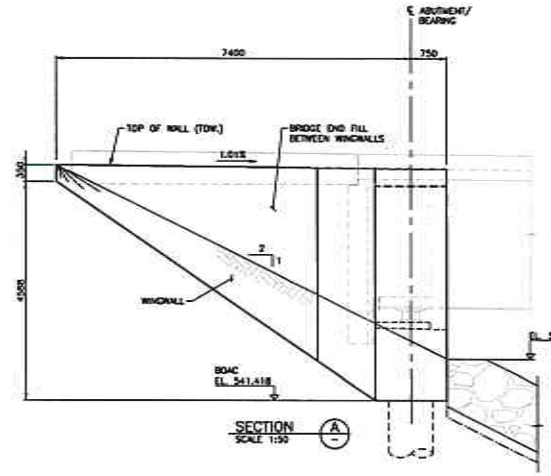

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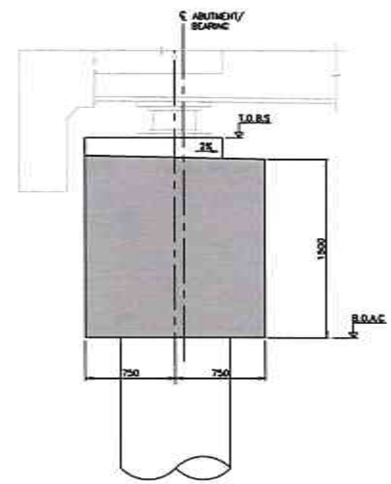

SECTION (B)
SCALE 1:20

LEGENDS:

TOW : TOP OF WALL
TOBS : TOP OF BEARING SEAT
BOAC : BOTTOM OF ABUTMENT CAP

TABLE 103-1
TOP OF BEARING SEAT ELEVATION

LOCATION	ELEVATION
G1	543.061
G2	543.120
G3	543.120
G4	543.061

NOTES:

1. FOR GENERAL NOTES SEE DWG. NO. 309-0000-002

NOT FOR CONSTRUCTION

Yukon
Highways and Public Works
Transportation Engineering Branch

B	08/14/18	95% DESIGN SUBMISSION	CS
A	07/24/18	PRELIMINARY DESIGN SUBMISSION	CS
MARK	DATE	DESCRIPTION	APPROVED

REVISIONS

wsp

PROJECT TITLE:
YUKON RESOURCE
GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

DRAWING TITLE:
NORTH ABUTMENT DETAILS

DESIGN BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:
KK	HR	CS	RK
CONTRACT No.: C00044147		FILE No.: 174-00158-11	
SCALE: AS SHOWN	DATE: 08/14/18	SHEET No.: 5 OF 22	

DRAWING No.:
309-0000-005

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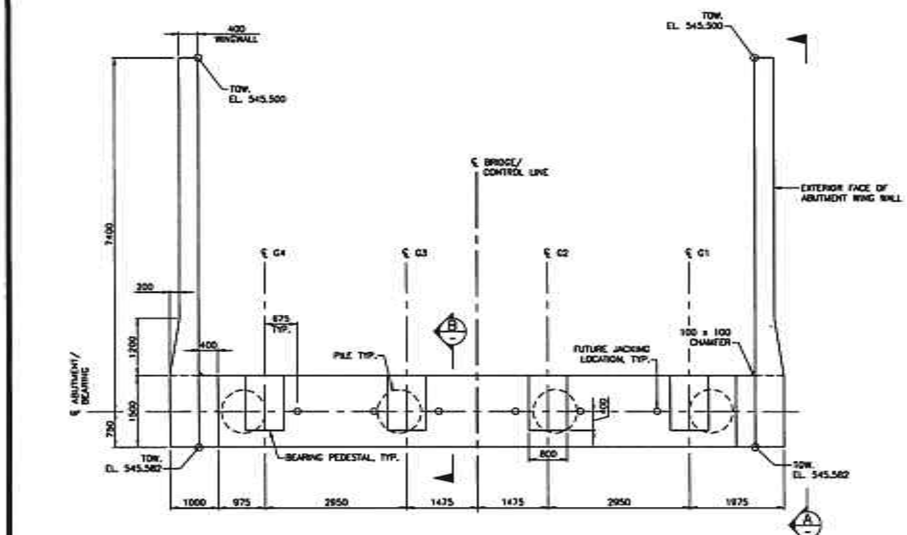
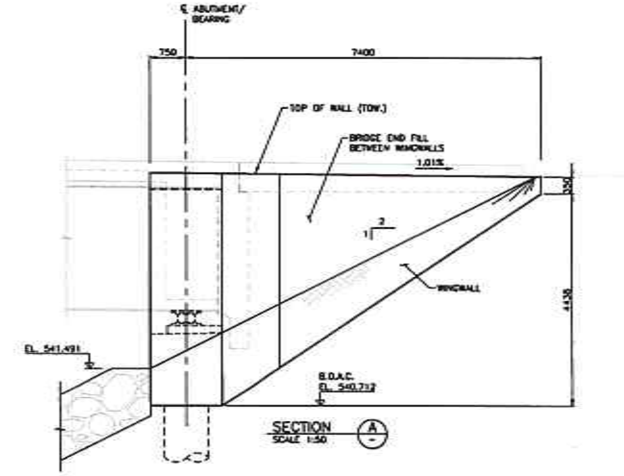

400 WINGWALL
TOW. EL. 545.500
℄ BRIDGE/ CONTROL LINE
EXTERIOR FACE OF ABUTMENT WING WALL
℄ G4
℄ G3
℄ G2
℄ G1
PILE TYP.
FUTURE JACKING LOCATION, TYP.
100 x 100 CHAMFER
BEARING PEDESTAL, TYP.
℄ ABUTMENT/ BEARING
TOW. EL. 545.582
7400
200
1200
1500
750
875 TYP.
1000
975
2950
1475
1475
2950
1975
800

PLAN – SOUTH ABUTMENT
SCALE 1:50



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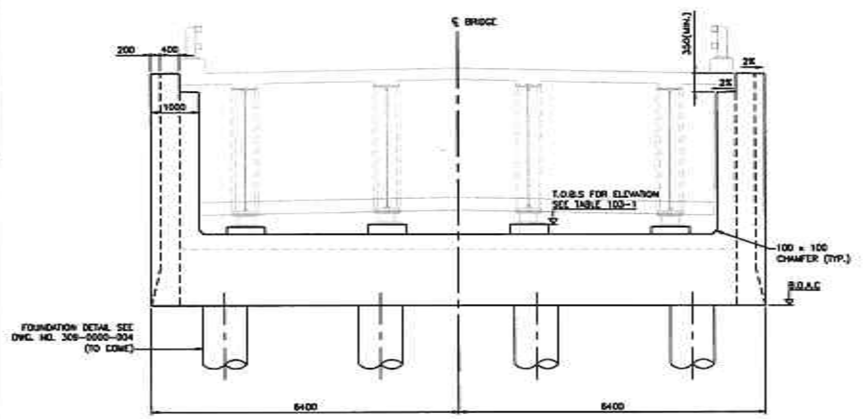
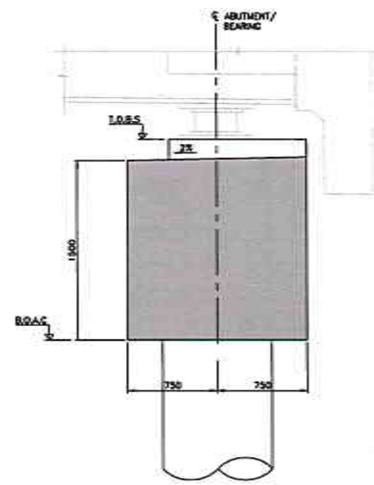
SCALE 1:50



ELEVATION – SOUTH ABUTMENT
SCALE 1:50



SECTION (B)
SCALE 1:20

LEGENDS:

TOW : TOP OF WALL
TOBS : TOP OF BEARING SEAT
BOAC : BOTTOM OF ABUTMENT CAP

TABLE 103–1
TOP OF BEARING SEAT ELEVATION

LOCATION	ELEVATION
G1	542.301
G2	542.380
G3	542.360
G4	542.301

NOTES:

1. FOR GENERAL NOTES SEE DWG. NO. 309-0000-002

NOT FOR CONSTRUCTION

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
B	09/14/18	90% DESIGN SUBMISSION	CS
A	07/24/18	PRELIMINARY DESIGN SUBMISSION	CS

REVISIONS

wsp

PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

DRAWING TITLE:
SOUTH ABUTMENT DETAILS

DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
XX	MR	CS	PA

CONTRACT No.: C00044147 — FILE No.: 17M-00158-11
SCALE: AS SHOWN — DATE: 09/14/18 — SHEET No.: 6 OF 22
DRAWING No.: 309–0000–006

DATE: 2018-09-14 – 9:10pm (llunge)
PATH: \\CAYWH00HYP01\Project\30-17000FS\17M-00158-11 – Gateway Nordenskiold\Drawings\CAD – Bridges\309-0000-006 South Abutment.dwg
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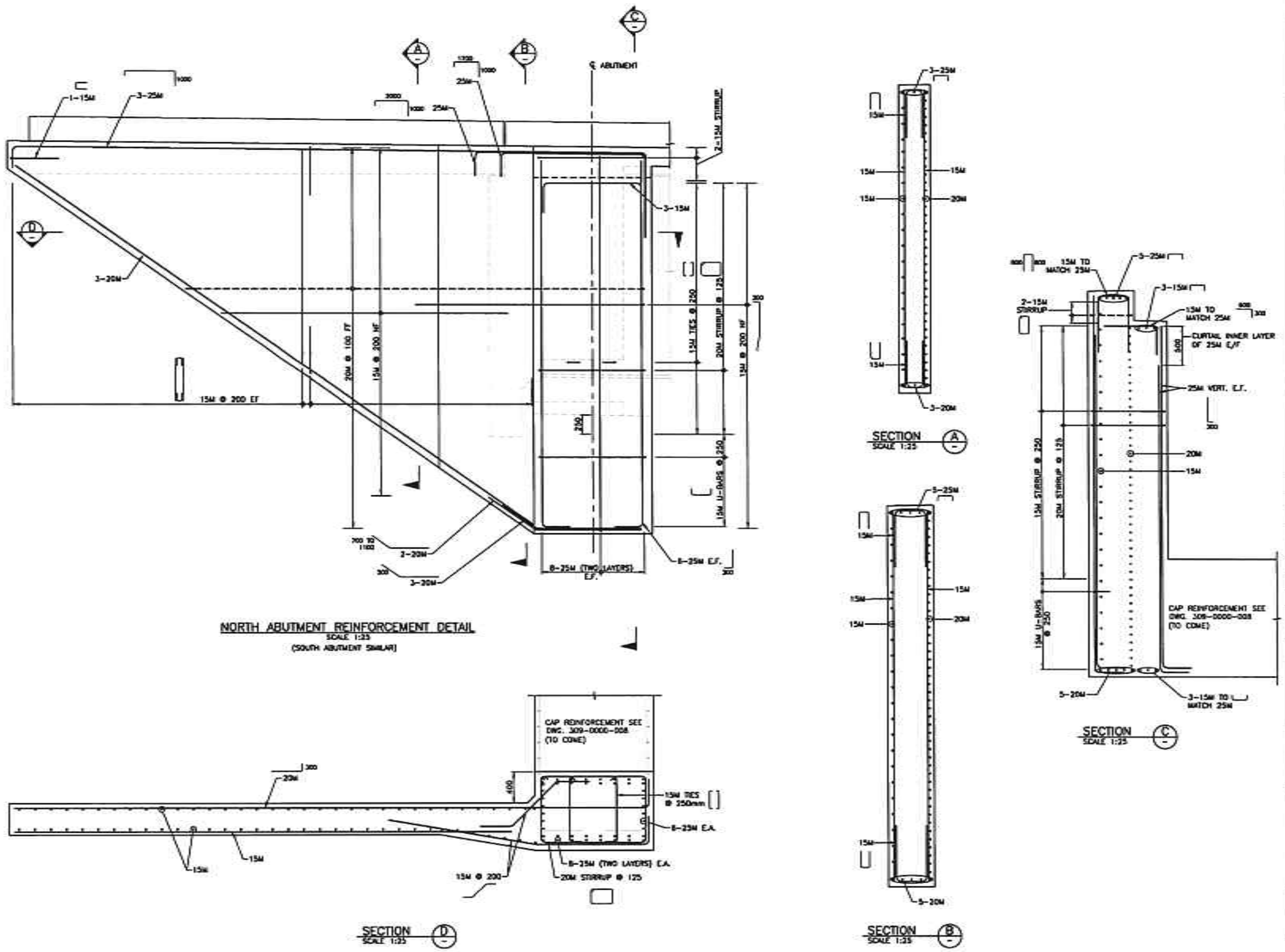


NOT FOR CONSTRUCTION

NOTES:

1. FOR GENERAL NOTES SEE DWG. NO. 309-0000-002

Yukon
Highways and Public Works
Transportation Engineering Branch

A	09/14/18	90% DESIGN SUBMISSION	CS

REVISIONS

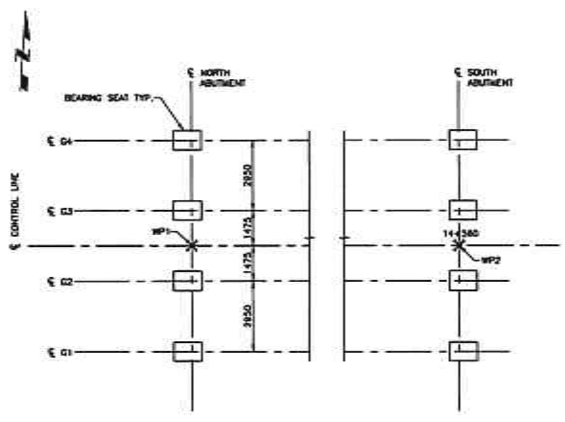
wsp

YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018-2020

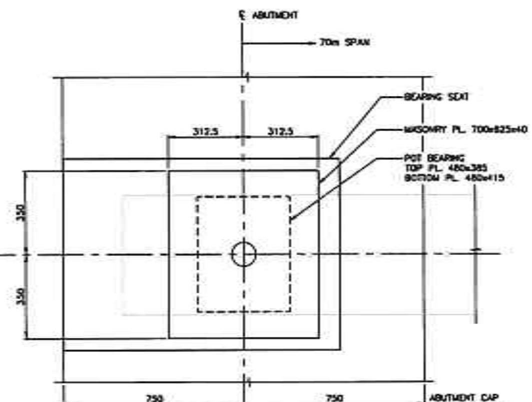
ABUTMENT REINFORCEMENT DETAILS
SHEET 1 OF 2

KK	HR	CS	RA
C00044147		17M-00138-11	
AS SHOWN	09/14/18	7 OF 22	

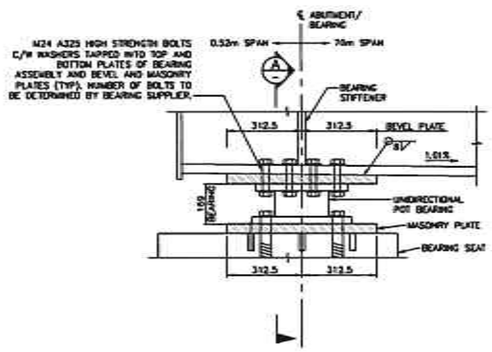
309-0000-007



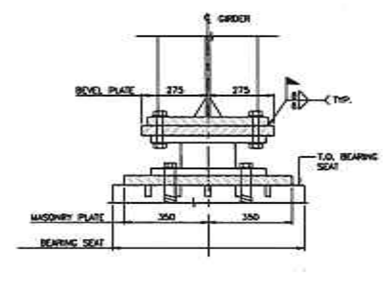
ABUTMENT BEARING LAYOUT
SCALE 1:100



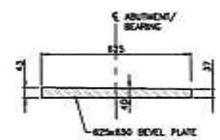
PIER BEARING LAYOUT
SCALE 1:20
(NORTH ABUTMENT SHOWN, SOUTH ABUTMENT SIMILAR)



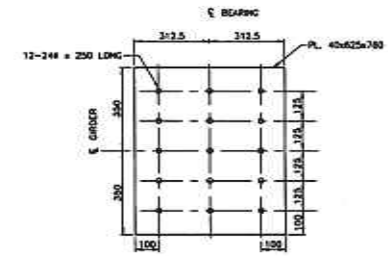
BEARING DETAIL
SCALE 1:10
(WEST ABUTMENT SHOWN, EAST ABUTMENT SIMILAR)



SECTION (A)
SCALE 1:10



BEVEL PLATE DETAIL
SCALE 1:10



MASONRY PLATE DETAIL
SCALE 1:10

NOTES:

1. FOR GENERAL NOTES, SEE DWG. 309-0000-002.
2. BEARING AND BEVEL PLATES SHALL CONFORM TO CSA G40.12 GRADE 350A.
3. BEARING PLATE STEELWORK TO BE HOT-DIP GALVANIZED IN ACCORDANCE WITH CSA G164 TABLE 1 AFTER FABRICATION.
4. ALL WELDING SHALL CONFORM TO CSA-W59 AND BE UNDERTAKEN BY A COMPANY CERTIFIED BY THE C.W.B. TO THE REQUIREMENT OF CSA W47.1 DIV. 3 OR BETTER. MIN. FILLET WELD 8mm UNLESS NOTED.
5. ANCHOR BOLTS AND BEARING BOLTS TO CONFORM TO ASTM A325 TYPE 3. BOLTS SHALL BE SUPPLIED COMPLETE WITH WASHERS IN ACCORDANCE WITH ASTM STANDARD A436 TYPE 3.
6. ANCHOR BOLTS AND BOLTS CONNECTING GALVANIZED STEEL PLATES TO BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A123.
7. SHEAR STUDS SHALL CONFORM TO CSA W59 TYPE B WITH F_u = 450MPa OR EQUIVALENT.
8. BEARING SEATS SHALL BE CAST AFTER ABUTMENT CAP CONCRETE HAS ATTAINED MINIMUM 25MPa.
9. POT BEARING SHOWN ON THIS DRAWING IS CONCEPTUAL AND IS FOR INFORMATION ONLY. POT BEARING SHALL BE DESIGNED, SUPPLIED, AND FABRICATED BY AN APPROVED PROPRIETARY POT BEARING SUPPLIER.
10. POT BEARINGS SHALL BE DESIGNED AND DETAILED FOR EASE OF BEARING REPLACEMENT. BEARING ASSEMBLY SHALL BE DETAILED TO CONNECT GIRDER BOTTOM FLANGE AND TOP OF ABUTMENT CAP WITH BOLT CONNECTIONS. BEARINGS SHALL BE DESIGNED SO THAT THEY CAN BE REPLACED BY LIFTING THE GIRDER NO MORE THAN 10mm.
11. POT BEARING INCLUDING CONNECTIONS TO GIRDER AND PIER CAP TO BE DESIGNED BY BEARING SUPPLIER AND REVIEWED BY THE ENGINEER PRIOR TO FABRICATION.
12. SUBMIT SHOP DRAWINGS AND DESIGN CALCULATIONS FOR REVIEW PRIOR TO FABRICATION. SHOP DRAWINGS AND DESIGN CALCULATIONS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN YUKON.
13. ALL POT BEARINGS SHALL BE PLANT-ASSEMBLED AND SHALL NOT BE DISASSEMBLED UNTIL THE BEARINGS ARE CONNECTED TO GIRDER BOTTOM FLANGE AND BEFORE THE SEAT ON SUBSTRUCTURES IS CAST.
14. BOTTOM OF GIRDER FLANGE AND BOTH SIDES OF SOLE PLATE SHALL BE MACHINED TO A SURFACE FINISH OF 6.4mm AND A FLATNESS TOLERANCE OF 0.001 X BEARING DIMENSION.
15. SURFACE OF TOP PLATE OF BEARING ASSEMBLY IN CONTACT WITH GIRDER SHALL BE PAINTED WITH TWO COATS OF EPOXY MASTIC PAINT.
16. FIXED POT BEARING: GOODCO Z-TECH PMCG 2250 OR ACCEPTABLE ALTERNATIVE.
17. BEVEL SOLE PLATES AND MASONRY PLATES ARE SIZED BASED ON THE INFORMATION FROM GOODCO FOR PMCG 2250. THEY SHALL BE VERIFIED BY CONTRACTOR PRIOR TO FABRICATION. THESE PLATES REQUIRE ADJUSTMENT IF ALTERNATIVE BEARINGS ARE USED.
18. BOLT BEARING TO BEVEL PLATE AND MASONRY PLATE TO MEET HORIZONTAL LOAD REQUIREMENTS.
19. IF THE CONTRACTOR PROPOSES ALTERNATIVE BEARING, THE CONTRACTOR SHALL BE RESPONSIBLE TO MAKE ALL ELEVATION ADJUSTMENTS AND CORRECTIONS.

NOT FOR CONSTRUCTION

BEARING LOAD, MOVEMENT AND ROTATION TABLE

LOCATION	BEARING TYPE	DIRECTION OF MOVEMENT	QUANTITY	LIMIT STATE	LOADS (kN)					MOVEMENT	ROTATION	
					VERTICAL PERMANENT (MAX)	VERTICAL PERMANENT + TRANSITORY (MAX)	VERTICAL PERMANENT + TRANSITORY (MIN)	HORIZONTAL LONGITUDINAL (MAX)	HORIZONTAL TRANSVERSE (MAX)	LONGITUDINAL (mm)	ROTATION DEMAND (rad)	ADDITIONAL ROTATION ALLOWANCE (rad)
ABUTMENT	POT	FIXED IN TRANSVERSE FREE IN LONGITUDINAL	8	SERVICEABILITY	1553	2236			338	-25/+10	±0.0066	±0.005
				ULTIMATE	1887	3177			338			

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	05/14/18	90% DESIGN SUBMISSION	CS

REVISIONS

wsp

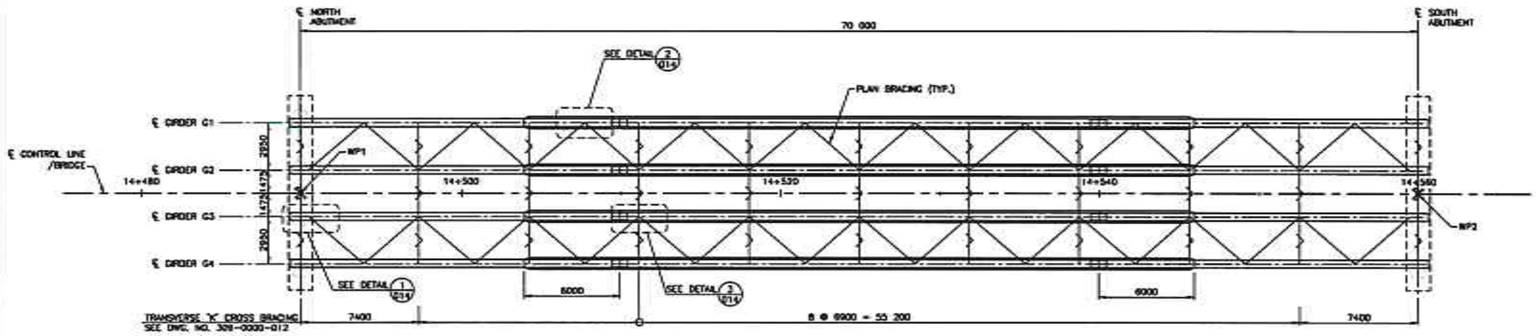
PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

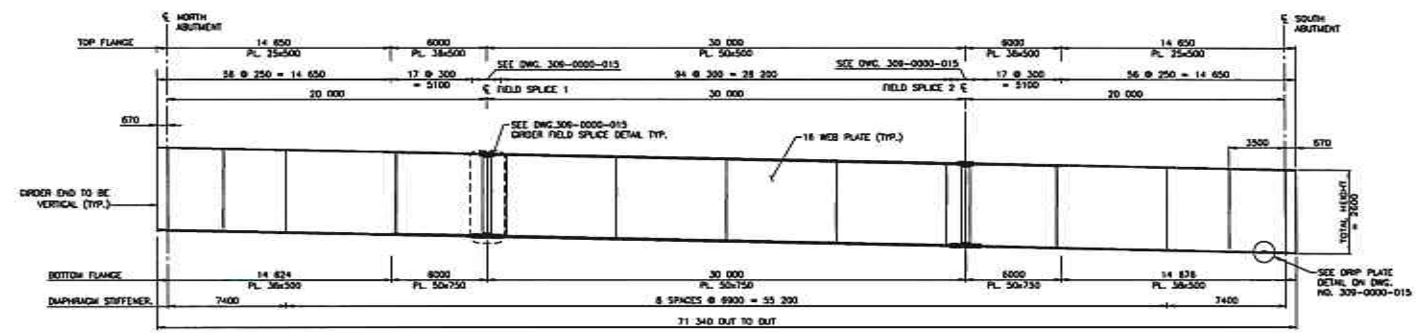
DRAWING TITLE:
BEARING DETAIL

DESIGN BY	DRAWN BY	REVIEWED BY	APPROVED BY
XX	HR	CS	RA

CONTRACT No.: C00044147 | FILE No.: 17N-00138-11
SCALE: AS SHOWN | DATE: 05/14/18 | SHEET No.: 9 OF 22
DRAWING No.: 309-0000-009

DATE: 2018-05-14 - 5:11pm (hunge)
PATH: \\CAWHI... \Project\30-17... \17N-00138-11 - Gateway Nordenskiold\Drawings\082 - Bridges\309-0000-009 BEARING DETAIL SHEET.dwg
LAYOUT: BEARING DETAIL





SCHEMATIC GIRDER ELEVATION

SCALE HORZ. 1:150
VERT. 1:75

ALL DIMENSIONS ARE MEASURED HORIZONTALLY ALONG TOP FLANGE AT 15°C
(SHEAR STUDS NOT SHOWN FOR CLARITY)

LEGEND:

AS: ABUTMENT BEARING STIFFENER
(BOTH SIDES OF WEB FOR ALL GIRDERS)

IS: INTERMEDIATE DIAPHRAGM STIFFENER
(BOTH SIDES OF WEB FOR GIRDER G2 & G3
INTERIOR SIDE FOR GIRDER G1 & G4)

SS: SHEAR STIFFENER (ONE SIDE OF EACH GIRDER)

EP: GIRDER END PLATE

NOTES:

1. FOR GENERAL NOTES SEE DRAWING 309-0000-002.
2. ALL STEELWORK SHALL CONFORM TO CAN/CSA – G40.21M GRADE 350AT.
3. ALL BOLTS SHALL BE HIGH STRENGTH STRUCTURAL BOLTS CONFORMING TO ASTM F3125 GRADE A325, TYPE 3 UNLESS NOTED OTHERWISE. BOLTS SHALL BE M24 DIAMETER WITH THREADS EXCLUDING FROM THE SHEAR PLANE, c/w WASHERS AND NUTS CONFORMING TO ASTM A-436 TYPE 3.
4. ALL HOLES FOR BOLTS SHALL BE 27Ø UNLESS NOTED OTHERWISE.
5. SHEAR STUDS SHALL CONFORM TO CSA W59 TYPE B WITH Fu = 450MPa OR EQUIVALENT.
6. FLANGE TO WEB WELDS SHALL BE BY AUTOMATIC PROCESS WHICH PROVIDES A CONTINUOUS WELD THROUGHOUT THE LENGTH OF EACH GIRDER SEGMENT.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND PROVISION OF ANY TEMPORARY BRACING REQUIRED TO STABILIZE THE GIRDER DURING TRANSPORTATION, ERECTION, HANDLING AND DECK SLAB CONSTRUCTION UNTIL THE STRUCTURE IS COMPLETE.
8. GIRDER SHALL BE CAMBERED TO VALUES SHOWN ON CAMBER DIAGRAM ON DRAWING 309-0000-014.
9. ALL WELDING SHALL BE UNDER TAKEN BY A COMPANY CERTIFIED BY THE CANADIAN WELDING BUREAU TO THE REQUIREMENTS OF CSA-W47.1 DIVISION 2 OR BETTER.
10. WITH THE EXCEPTION OF CROSS BRACING AND PLAN PLAN BRACING, ALL THE CONTACT SURFACE OF BOLTED CONNECTIONS SHALL CONFORM TO CLASS B AS SPECIFIED CAN/CSA-S6-14. CROSS BRACING AND PLAN BRACING SHALL CONFORM TO CLASS A OR BETTER.
11. BEARING STIFFENERS AND GIRDER END PLATES TO BE VERTICAL. INTERMEDIATE STIFFENERS AND CROSS BRACINGS TO BE AT RIGHT ANGLES TO GIRDER TOP FLANGE.
12. CONSTRUCTION REFERENCE TEMPERATURE IS 15°
13. CONTRACTOR SHALL BE RESPONSIBLE FOR STRENGTH AND STABILITY OF GIRDERS DURING SHIPPING AND ALL STAGES OF ERECTION.
14. GIRDERS SHALL BE ERECTED ONLY AFTER PEDESTAL CONCRETE ATTAINING A MINIMUM COMPRESSIVE STRENGTH OF 25 MPa.

NOT FOR CONSTRUCTION

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	09/14/16	90% DESIGN SUBMISSION	GS

REVISIONS

wsp

PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

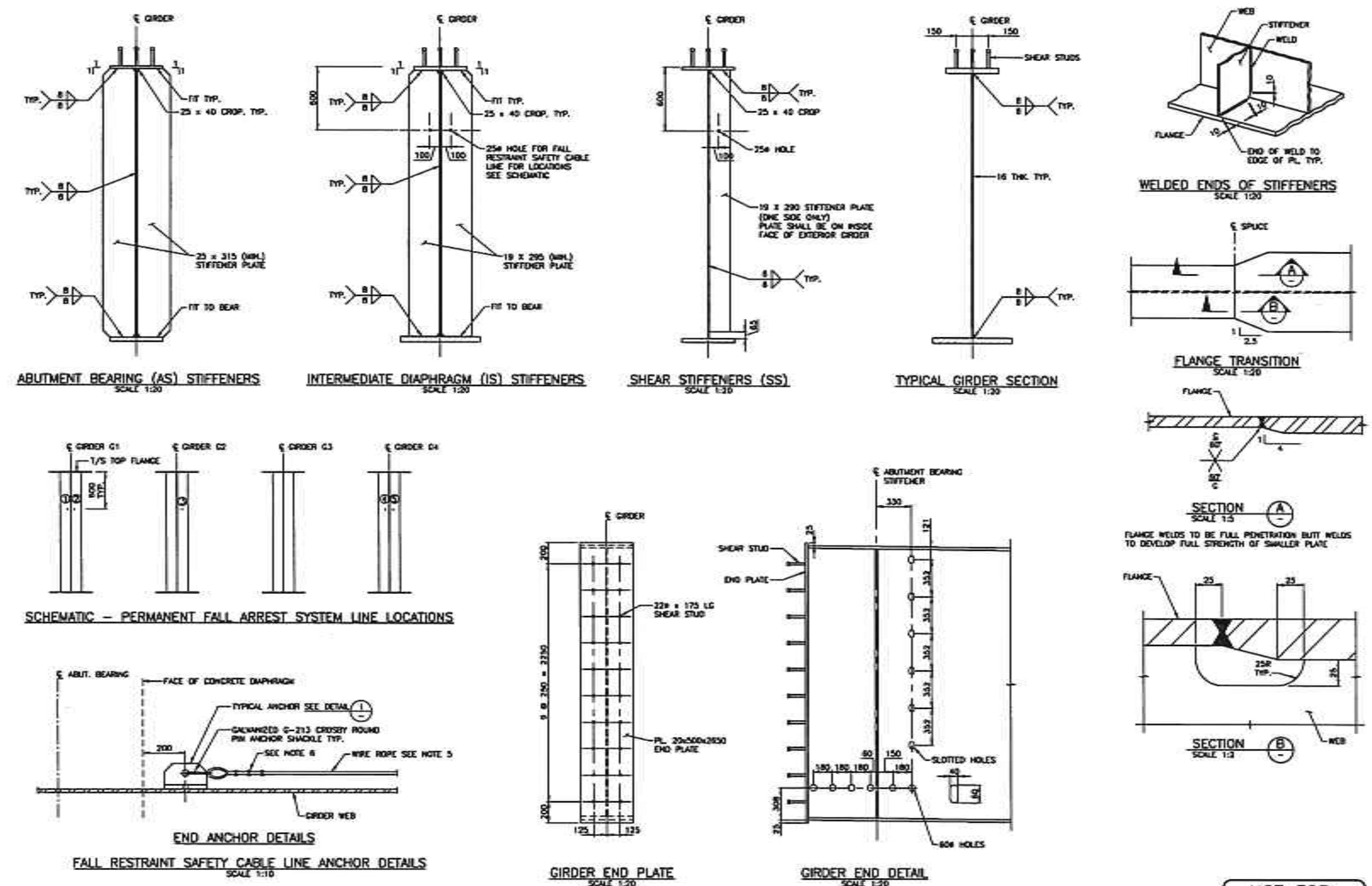
DRAWING TITLE:
GIRDER LAYOUT

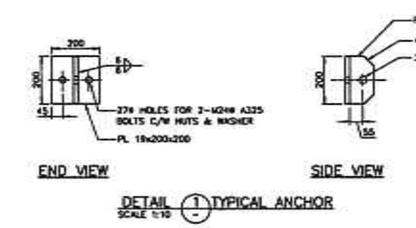
DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
KK	HR	GS	RA

CONTRACT No.:	FILE No.:
C00044147	17M-00138-11

SCALE:	DATE:	SHEET No.:
AS SHOWN	09/14/16	10 OF 22

DRAWING No.:
309-0000-010





NOT FOR CONSTRUCTION

NOTES:

1. FOR GENERAL NOTES SEE DRAWING 309-0000-002.
2. FOR STEELWORK NOTES SEE DRAWING 309-0000-010.
3. PERMANENT FALL ARREST SYSTEM TO CAN/CSA-Z259.16-04 "DESIGN OF ACTIVE FALL PROTECTION SYSTEMS".
4. THE SYSTEM IS RATED FOR A MAXIMUM OF 3 WORKERS. WORKERS SHALL USE A FULL BODY HARNESS TO CAN/CSA-Z259.11 WITH MAX 1.8m LONG DOUBLE LANYARD INCORPORATING A PERSONAL ENERGY ABSORBER (PEA).
5. WIRE ROPE TO BE GALVANIZED 6x19 IWRC WITH NOMINAL BREAKING STRENGTH OF 119kN.
6. ALL SAFETY LINE ANCHOR BRACKET STEEL SHALL CONFORM CSA G40.21M GRADE 350A OR ASTM A588 GRADE 50.
7. WIRE ROPE TO BE TERMINATED ROUND A THIMBLE AND SECURED WITH G-450 CROSBY CLIPS AS PER MANUFACTURE'S INSTRUCTIONS. THIMBLE TO BE CONNECTED TO ANCHOR POINT USING 25MM (1") GALVANIZED G-213 CROSBY ROUND PIN ANCHOR SHACKLE.
8. WIRE ROPE TO BE PRE-TENSIONED TO THE MAXIMUM AMOUNT BY HAND AND THEN CLAMPED OFF. THE MAXIMUM OF SAG BETWEEN SUPPORT POINTS SHALL NOT BE MORE THAN SPAN/60.

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	09/11/18	90% DESIGN SUBMISSION	CS

REVISIONS

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PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

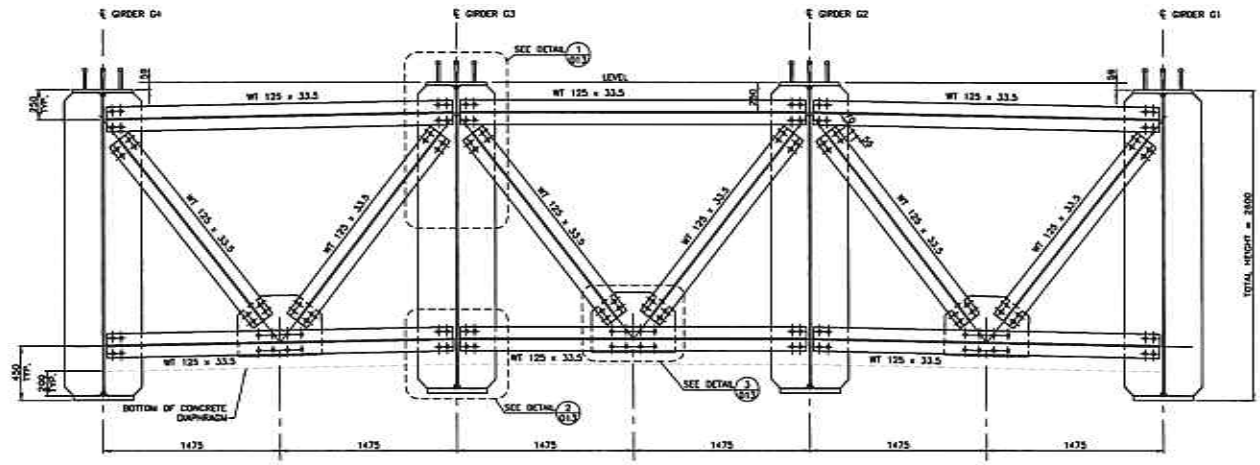
DRAWING TITLE:
GIRDER DETAILS
SHEET 1 OF 5

DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
RK	HR	CS	RA

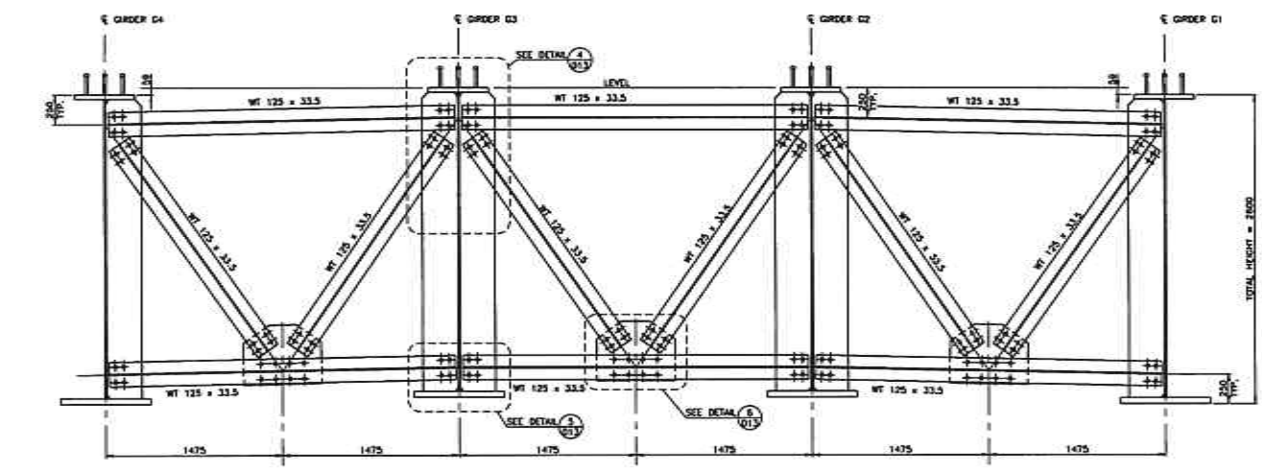
CONTRACT No.:	FILE No.:
C00044147	17N-00158-11

SCALE:	DATE:	SHEET No.:
AS SHOWN	09/14/18	11 OF 22

DRAWING No.: 309–0000–011



ELEVATION – ABUTMENT DIAPHRAGM
SCALE 1:20
(NORTH ABUTMENT SHOWN, SOUTH ABUTMENT SIMILAR)



ELEVATION – INTERMEDIATE DIAPHRAGM
SCALE 1:20

NOT FOR CONSTRUCTION

NOTES:

1. FOR GENERAL NOTES SEE DRAWING 309-0000-002.
2. FOR STEELWORK NOTES SEE DRAWING 309-0000-010.

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Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	09/14/18	90% DESIGN SUBMISSION	CS

REVISIONS

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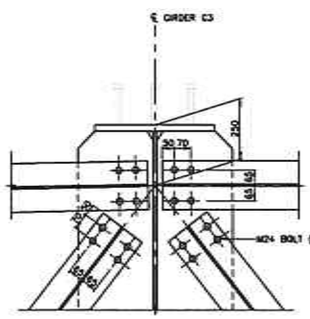
PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

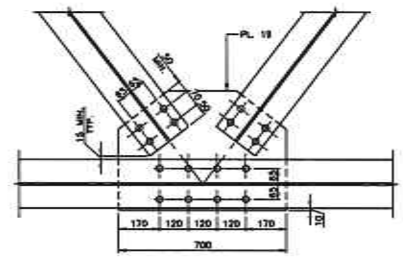
DRAWING TITLE:
GIRDER DETAILS
SHEET 2 OF 5

DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
IDK	WR	CS	RA
CONTRACT No.: C00044147		FILE No.: 17N-00158-11	
SCALE: AS SHOWN	DATE: 09/14/18	SHEET No.: 12 OF 22	

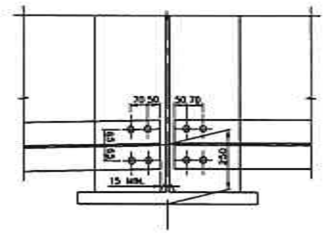
DRAWING No.: 309-0000-012



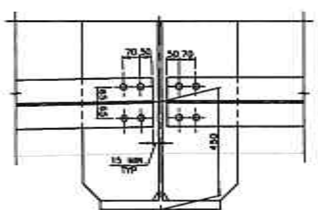
DETAIL 1/012
SCALE 1:10



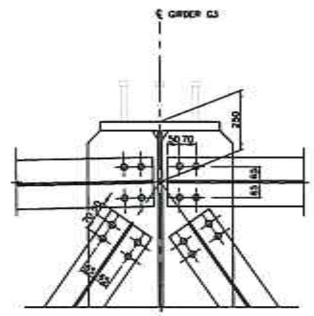
DETAIL 3/012
SCALE 1:10



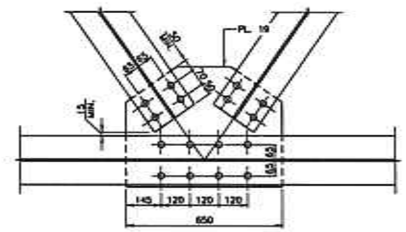
DETAIL 5/012
SCALE 1:10



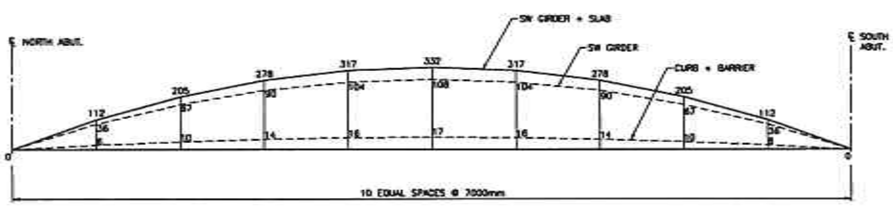
DETAIL 2/012
SCALE 1:10



DETAIL 4/012
SCALE 1:10



DETAIL 6/012
SCALE 1:10



CAMBER DIAGRAM
SCALE 1:20

NOT FOR CONSTRUCTION

NOTES:

1. FOR GENERAL NOTES SEE DRAWING 309-0000-002.
2. FOR STEELWORK NOTES SEE DRAWING 309-0000-010.

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	09/14/18	90% DESIGN SUBMISSION	CS

REVISIONS

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PROJECT TITLE:

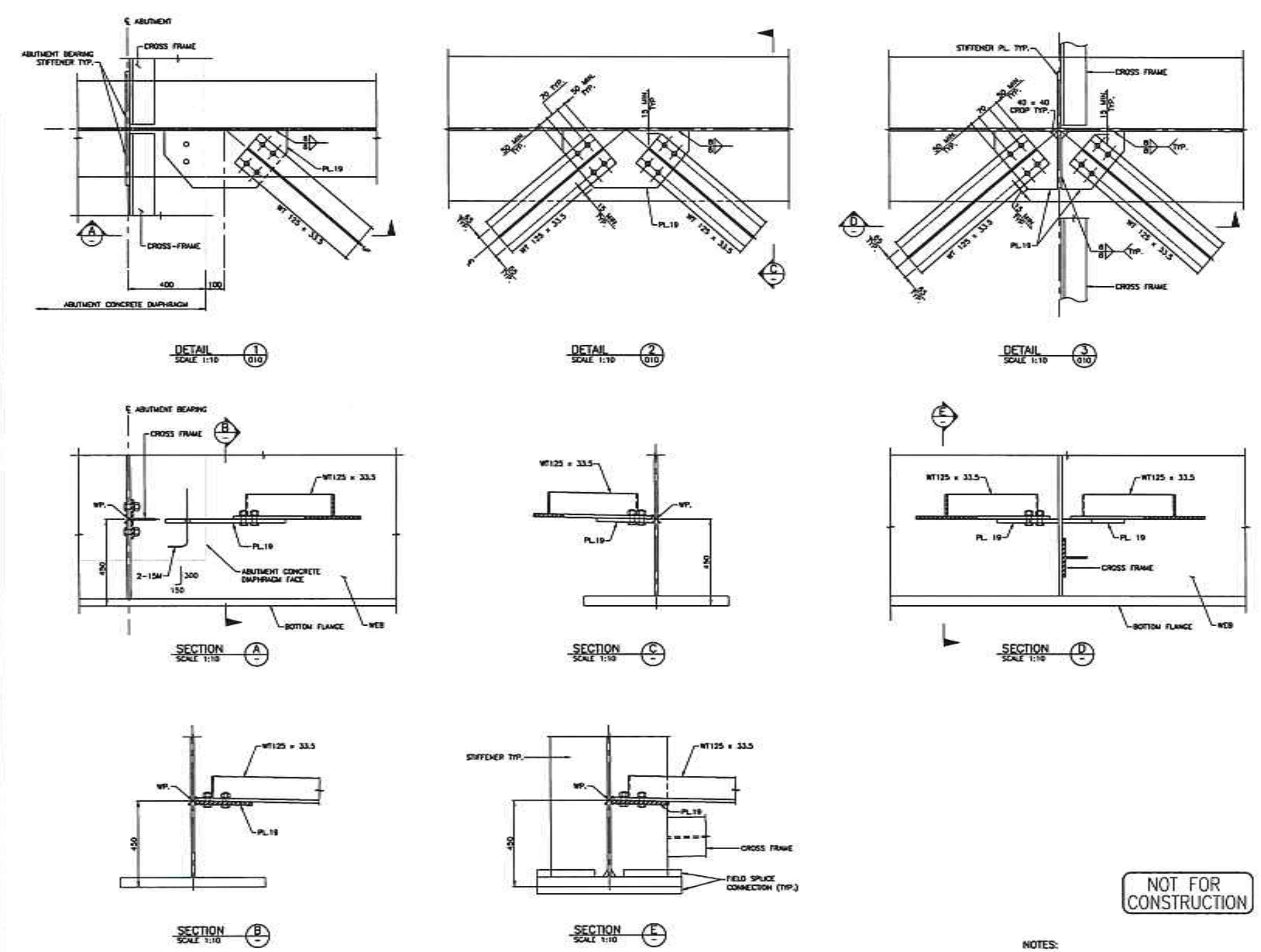
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

DRAWING TITLE:

GIRDER DETAILS
SHEET 3 OF 5

DESIGN BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:
KK	HR	CS	RA
CONTRACT No.: C00014147		FILE No.: 17N-00158-11	
SCALE: AS SHOWN	DATE: 09/14/18	SHEET No.: 13 OF 22	

DRAWING No.: 309-0000-013



NOT FOR CONSTRUCTION

NOTES:

1. FOR GENERAL NOTES SEE DRAWING 309-0000-002.
2. FOR STEELWORK NOTES SEE DRAWING 309-0000-010.

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	09/14/18	90% DESIGN SUBMISSION	CS

REVISIONS

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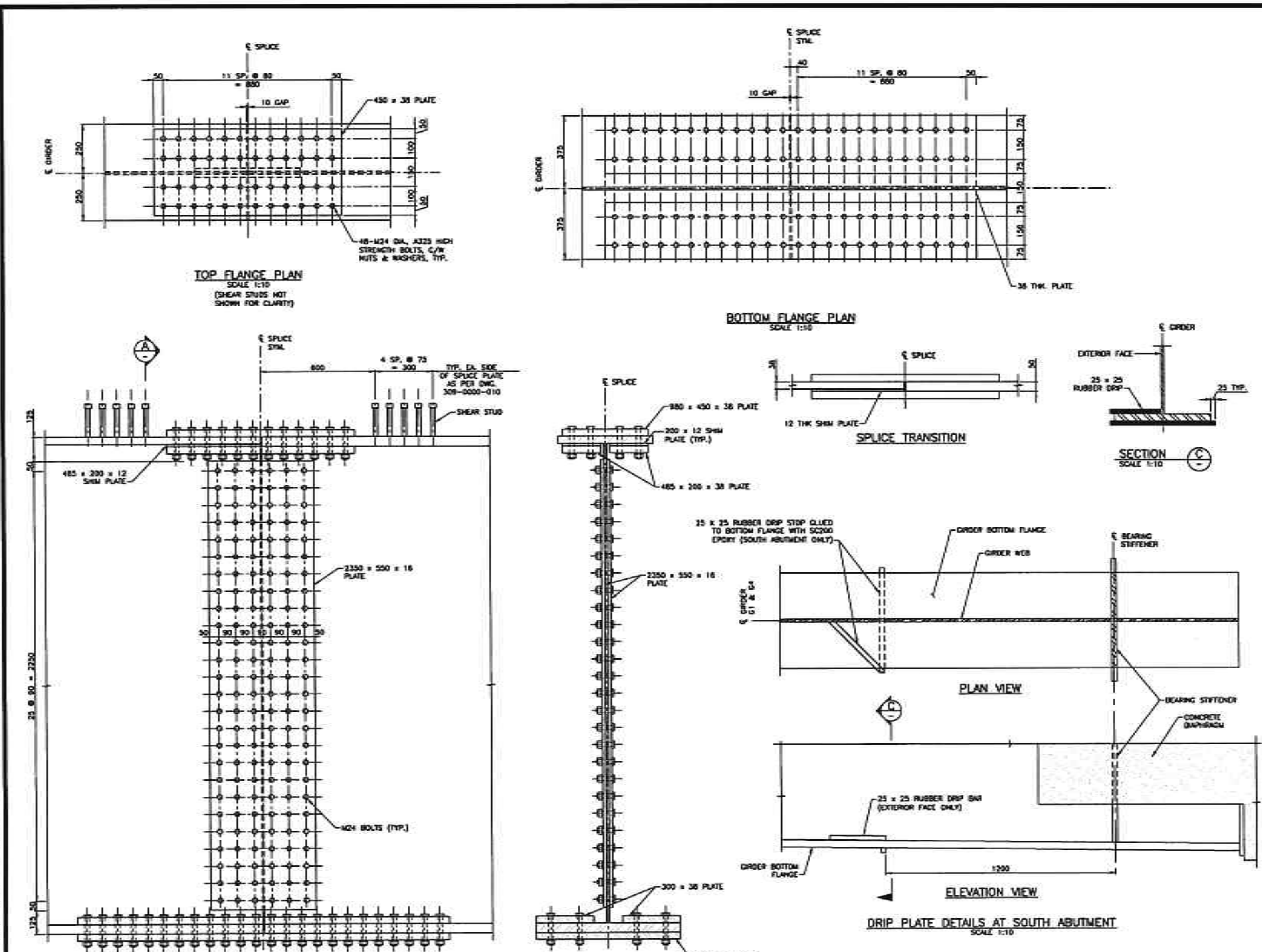
PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

DRAWING TITLE:
GIRDER DETAILS SHEET 4 OF 5

DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
KK	MR	CS	RA
CONTRACT No.: C00044147		FILE No.: 17N-00158-11	
SCALE: AS SHOWN	DATE: 09/14/18	SHEET No.: 14 OF 22	

DRAWING No.: 309-0000-014


TOP FLANGE PLAN
SCALE 1:10
(SHEAR STUDS NOT SHOWN FOR CLARITY)
℄ SPLICE
11 SP. @ 80 = 880
10 GAP
450 x 38 PLATE
48-M24 DIA. A325 HIGH STRENGTH BOLTS, C/W NUTS & WASHERS, TYP.
℄ GIRDER
BOTTOM FLANGE PLAN
SCALE 1:10
℄ SPLICE STN.
38 THK. PLATE
GIRDER FIELD SPLICE DETAIL
SCALE 1:10
4 SP. @ 75 = 300
TYP. EA. SIDE OF SPLICE PLATE AS PER DWG. 309-0000-010
SHEAR STUD
485 x 200 x 12 SHIM PLATE
2350 x 550 x 16 PLATE
M24 BOLTS (TYP.)
25 @ 90 = 2250
SECTION A
SCALE 1:10
980 x 450 x 38 PLATE
200 x 12 SHIM PLATE (TYP.)
485 x 200 x 38 PLATE
300 x 38 PLATE
750 x 38 PLATE
SPLICE TRANSITION
12 THK SHIM PLATE
SECTION C
SCALE 1:10
EXTERIOR FACE
25 x 25 RUBBER DRIP
25 TYP.
PLAN VIEW
25 x 25 RUBBER DRIP STOP GLUED TO BOTTOM FLANGE WITH SC200 EPOXY (SOUTH ABUTMENT ONLY)
GIRDER BOTTOM FLANGE
GIRDER WEB
℄ BEARING STIFFENER
℄ GIRDER G1 & G4
BEARING STIFFENER
CONCRETE DIAPHRAGM
ELEVATION VIEW
25 x 25 RUBBER DRIP BAR (EXTERIOR FACE ONLY)
1200
DRIP PLATE DETAILS AT SOUTH ABUTMENT
SCALE 1:10

NOTES:

1. FOR GENERAL NOTES SEE DRAWING 309-0000-002.
2. FOR STEELWORK NOTES SEE DRAWING 309-0000-010.

NOT FOR CONSTRUCTION

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	08/14/18	90% DESIGN SUBMISSION	CS

REVISIONS

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PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

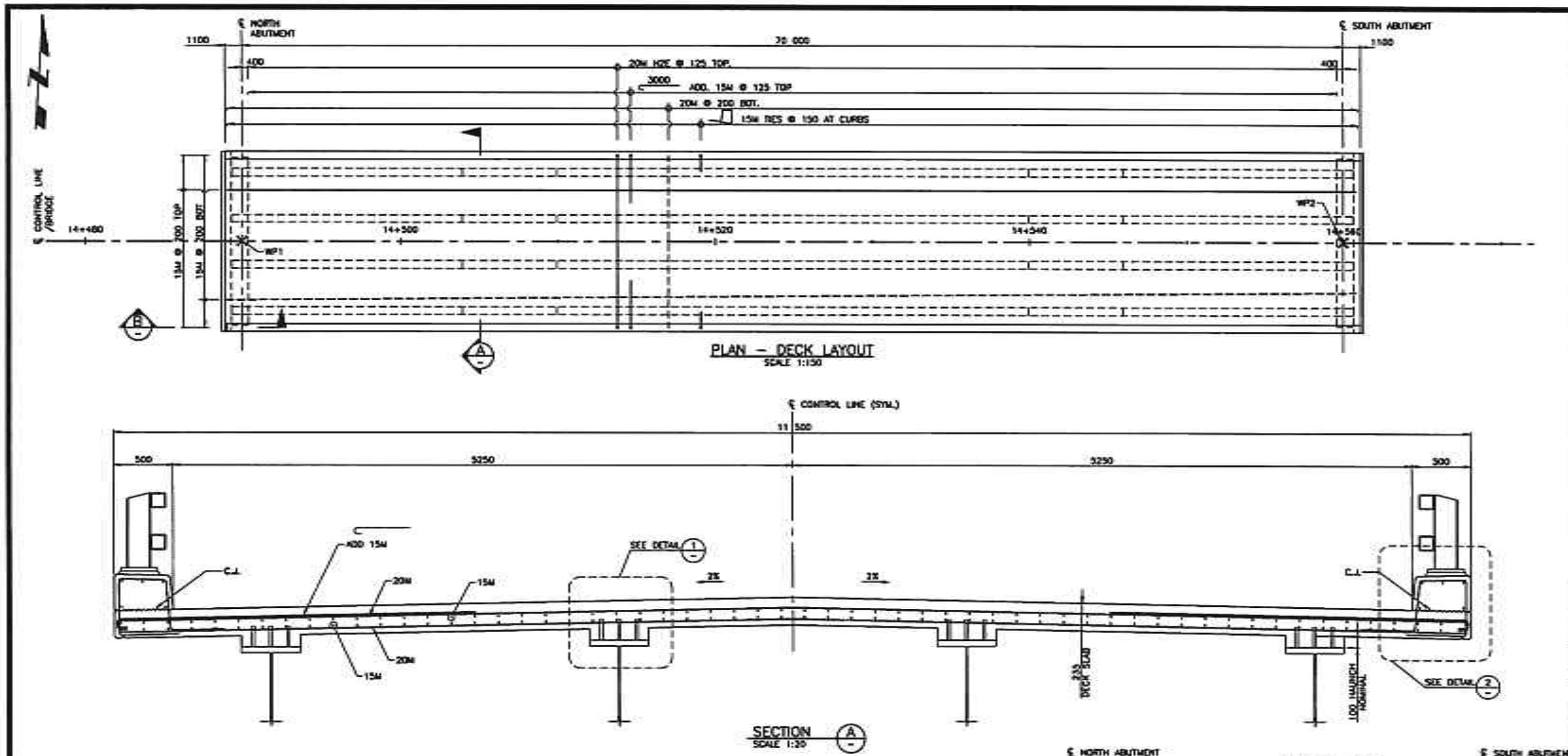
DRAWING TITLE:
GIRDER DETAILS
SHEET 5 OF 5

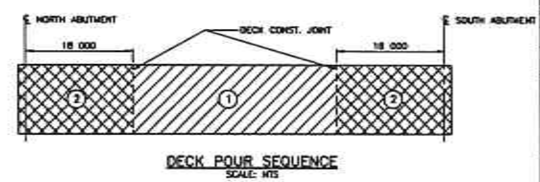
DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
KK	MR	CS	RA

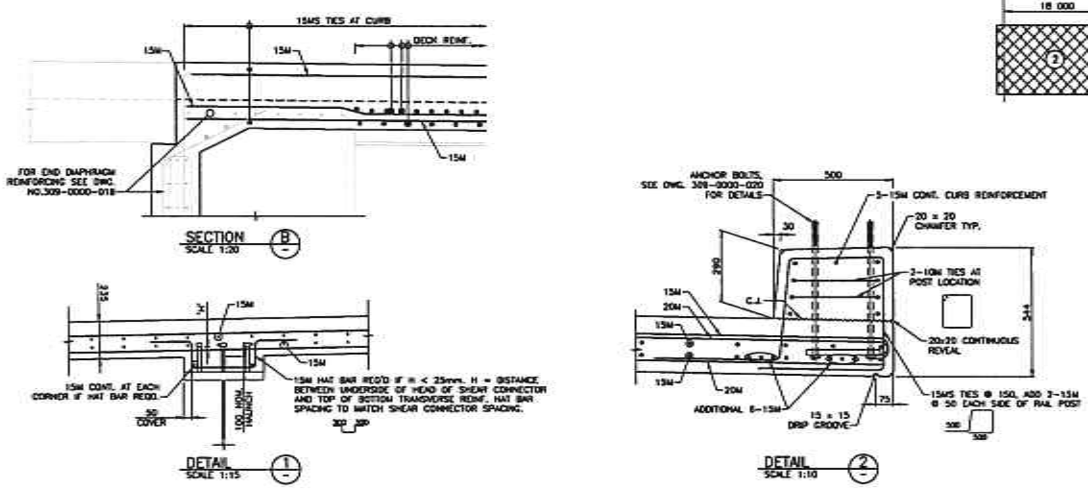
CONTRACT No.:	FILE No.:
C00041147	17M-00150-11

SCALE:	DATE:	SHEET No.:
AS SHOWN	08/14/18	13 OF 22

DRAWING No.:
309-0000-015


℄ NORTH ABUTMENT
℄ SOUTH ABUTMENT
70 000
1100
400
20M HZE @ 125 TOP.
3000
ADD. 15M @ 125 TOP
20M @ 200 BOT.
15M TIES @ 150 AT CURBS
℄ CONTROL LINE /BRIDGE
14+480
14+500
14+520
14+540
14+560
WP1
WP2
15M @ 200 TOP
15M @ 200 BOT
PLAN - DECK LAYOUT
SCALE 1:150
℄ CONTROL LINE (SYM.)
11 500
500
5250
300
ADD 15M
SEE DETAIL 1
C.J.
20M
15M
2%
235 DECK SLAB
100 HAUNCH NOMINAL
SEE DETAIL 2
SECTION A
SCALE 1:20




15MS TIES AT CURB
DECK REINF.
15M
FOR END DIAPHRAGM REINFORCING SEE DWG. NO.309-0000-018
SECTION B
SCALE 1:20
15M CONT. AT EACH CORNER IF HAT BAR REQD.
50 COVER
100 NOM. HAUNCH
15M HAT BAR REQ'D IF H < 25mm. H = DISTANCE BETWEEN UNDERSIDE OF HEAD OF SHEAR CONNECTOR AND TOP OF BOTTOM TRANSVERSE REINF. HAT BAR SPACING TO MATCH SHEAR CONNECTOR SPACING.
DETAIL 1
SCALE 1:15
ANCHOR BOLTS, SEE DWG. 309-0000-020 FOR DETAILS
500
5-15M CONT. CURB REINFORCEMENT
20 x 20 CHAMFER TYP.
2-10M TIES AT POST LOCATION
20x20 CONTINUOUS REVEAL
C.J.
20M
ADDITIONAL 6-15M
15 x 15 DRIP GROOVE
15MS TIES @ 150, ADD 2-15M @ 50 EACH SIDE OF RAIL POST
DETAIL 2
SCALE 1:10

NOTES:

1. FOR GENERAL NOTES SEE DWG. No. 309-0000-002
2. CONCRETE SHALL ATTAIN A STRENGTH OF 20 MPa BEFORE ANY CONSTRUCTION LOAD IS APPLIED TO THE CURING CONCRETE.
3. CONCRETE SHALL BE POURED IN THE DIRECTION STARTING FROM MOST DEFLECTING TOWARDS LEAST DEFLECTING POINTS IN RESPECTIVE ZONES MARKED IN 'DECK POUR SEQUENCE'
4. CONCRETE FOR ABUTMENT DIAPHRAGM AND NEARBY DECK SHALL BE POURED TOGETHER WITHOUT ANY CONSTRUCTION JOINT.

NOT FOR CONSTRUCTION

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	09/14/18	90% DESIGN SUBMISSION	CS

REVISIONS

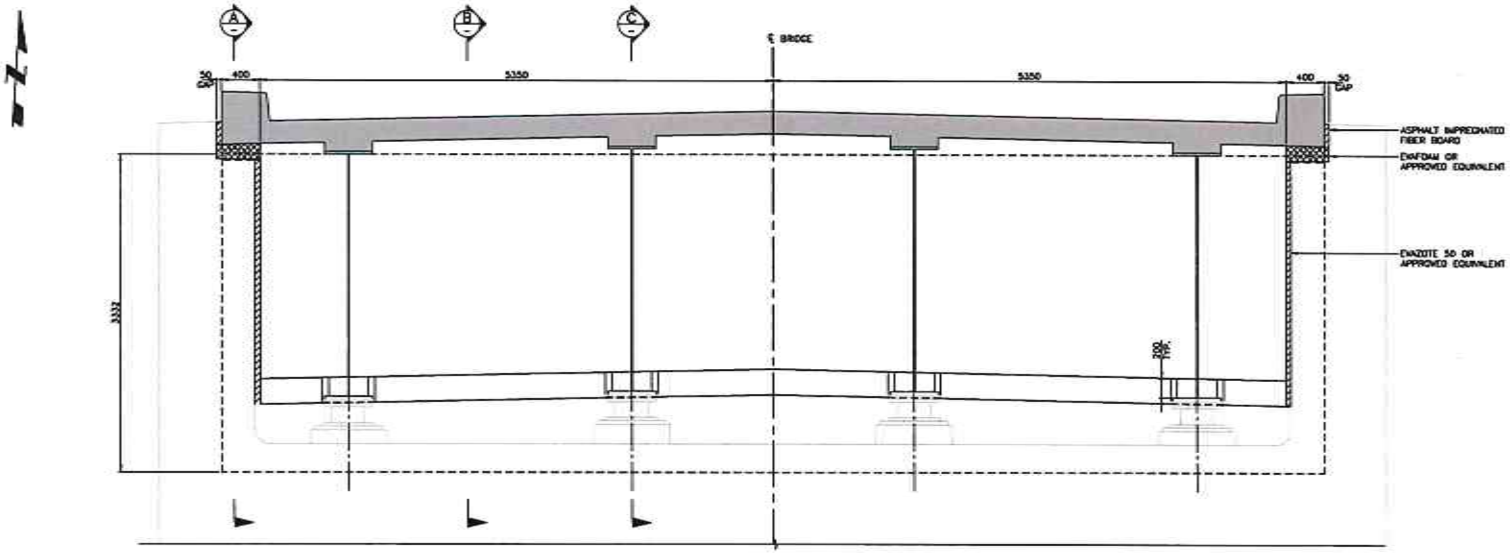
wsp

PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

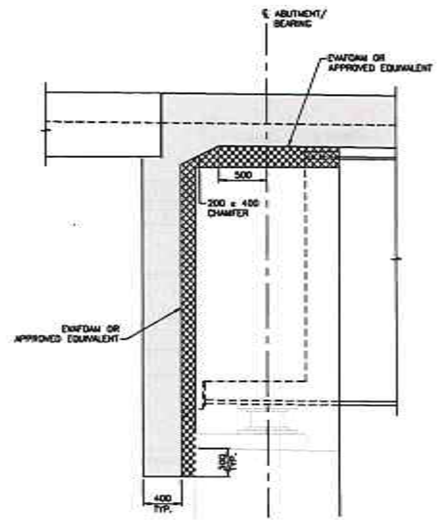
DRAWING TITLE:
DECK LAYOUT AND DETAILS

DESIGN BY	DRAWN BY	REVIEWED BY	APPROVED BY
KK	HR	CS	KA
CONTRACT No.: C00044147		FILE No.: 17M-00158-11	
SCALE: AS SHOWN	DATE: 09/14/18	SHEET No.: 16 OF 22	

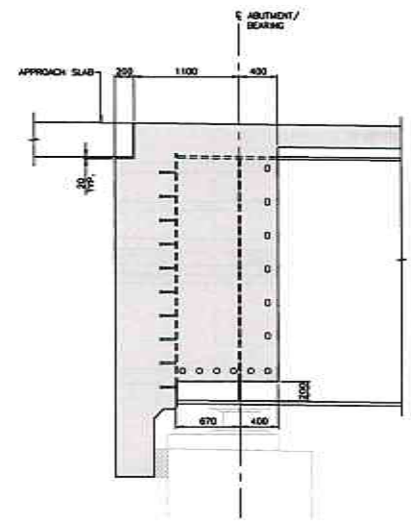
DRAWING No.: 309-0000-016



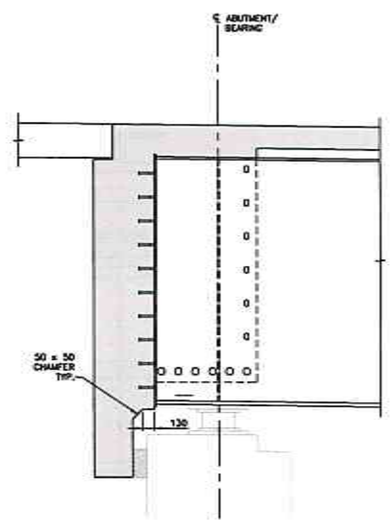
ABUTMENT DIAPHRAGM ELEVATION
SCALE 1:25



SECTION A
SCALE 1:25
WINGWALL NOT SHOWN FOR CLARITY



SECTION B
SCALE 1:25



SECTION C
SCALE 1:25

NOTES:

1. FOR GENERAL NOTES SEE DWG. NO. 309-0000-002

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	09/14/18	90% DESIGN SUBMISSION	CS

REVISIONS

wsp

PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

DRAWING TITLE:
END DIAPHRAGM LAYOUT

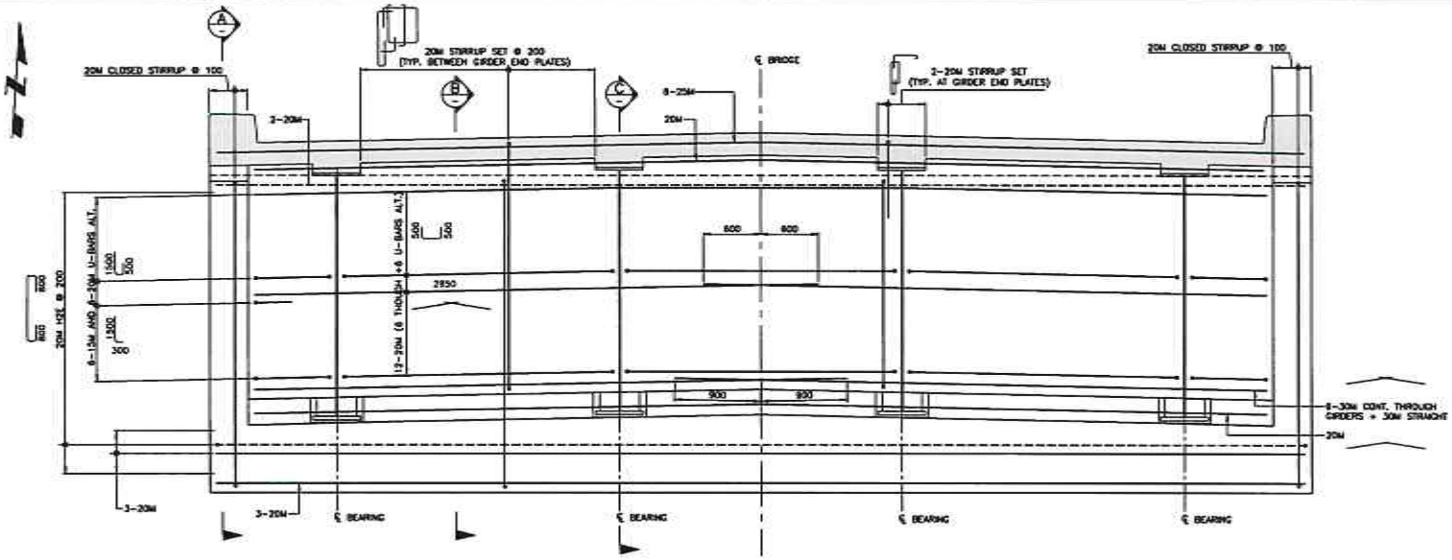
DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
KK	HR	CS	RA

CONTRACT No.:	FILE No.:
C00044147	17M-00158-11

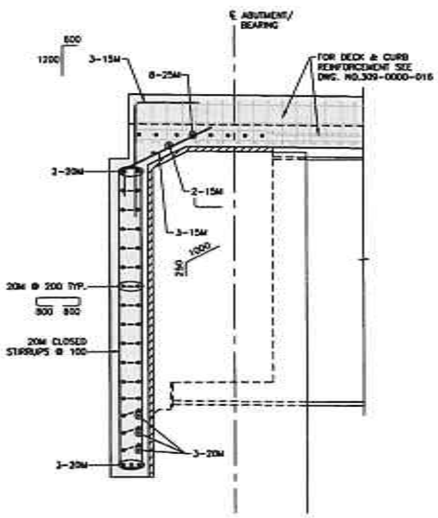
SCALE:	DATE:	SHEET No.:
AS SHOWN	09/14/18	17 OF 22

DRAWING No.:
309-0000-017

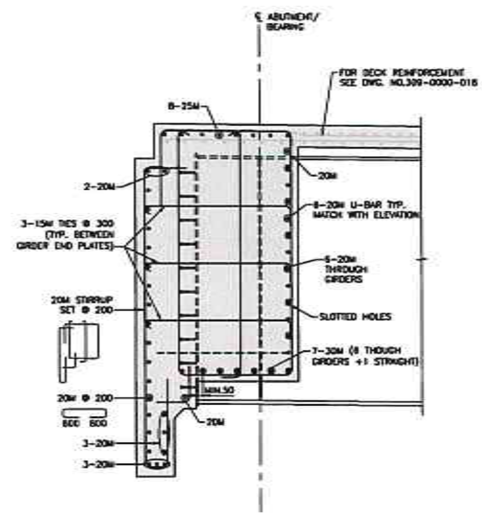
DATE: 2018-09-14 - 3:13pm
LAYOUT: END DIAPHRAGM LAYOUT


20M CLOSED STIRRUP @ 100
20M STIRRUP SET @ 200 (TYP. BETWEEN GIRDER END PLATES)
℄ BRIDGE
2-20M STIRRUP SET (TYP. AT GIRDER END PLATES)
20M CLOSED STIRRUP @ 100
8-25M
20M
2-20M
12-20M (6 THOUGH +6 U-BARS ALT.)
2850
6-15M AND 6-20M U-BARS ALT.
20M H2E @ 200
8-30M CONT. THROUGH GIRDERS + 30M STRAIGHT
20M
3-20M
3-20M
℄ BEARING
℄ BEARING
℄ BEARING
℄ BEARING

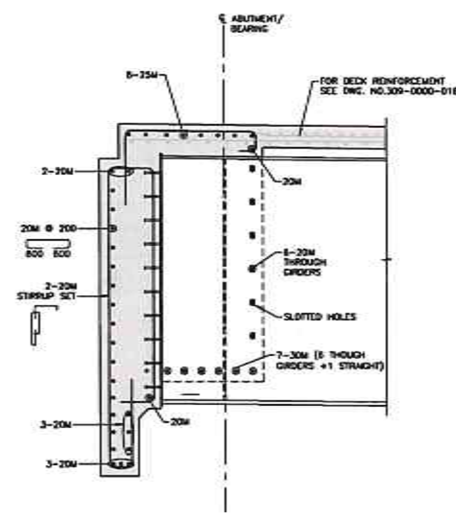
ABUTMENT DIAPHRAGM ELEVATION
SCALE 1:25



SECTION (A) SCALE 1:25 — WINGWALL NOT SHOWN FOR CLARITY


℄ ABUTMENT/ BEARING
8-25M
FOR DECK REINFORCEMENT SEE DWG. NO.309-0000-016
2-20M
20M
8-20M U-BAR TYP. MATCH WITH ELEVATION
3-15M TIES @ 300 (TYP. BETWEEN GIRDER END PLATES)
5-20M THROUGH GIRDERS
20M STIRRUP SET @ 200
SLOTTED HOLES
7-30M (6 THOUGH GIRDERS +1 STRAIGHT)
MIN.50
20M @ 200
20M
3-20M
3-20M

SECTION (B) SCALE 1:25



SECTION (C) SCALE 1:25

NOTES:

1. FOR GENERAL NOTES SEE DWG. NO. 309-0000-002

Yukon Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	05/11/18	90% DESIGN SUBMISSION	CS

REVISIONS

WSP

PROJECT TITLE:
YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018-2020

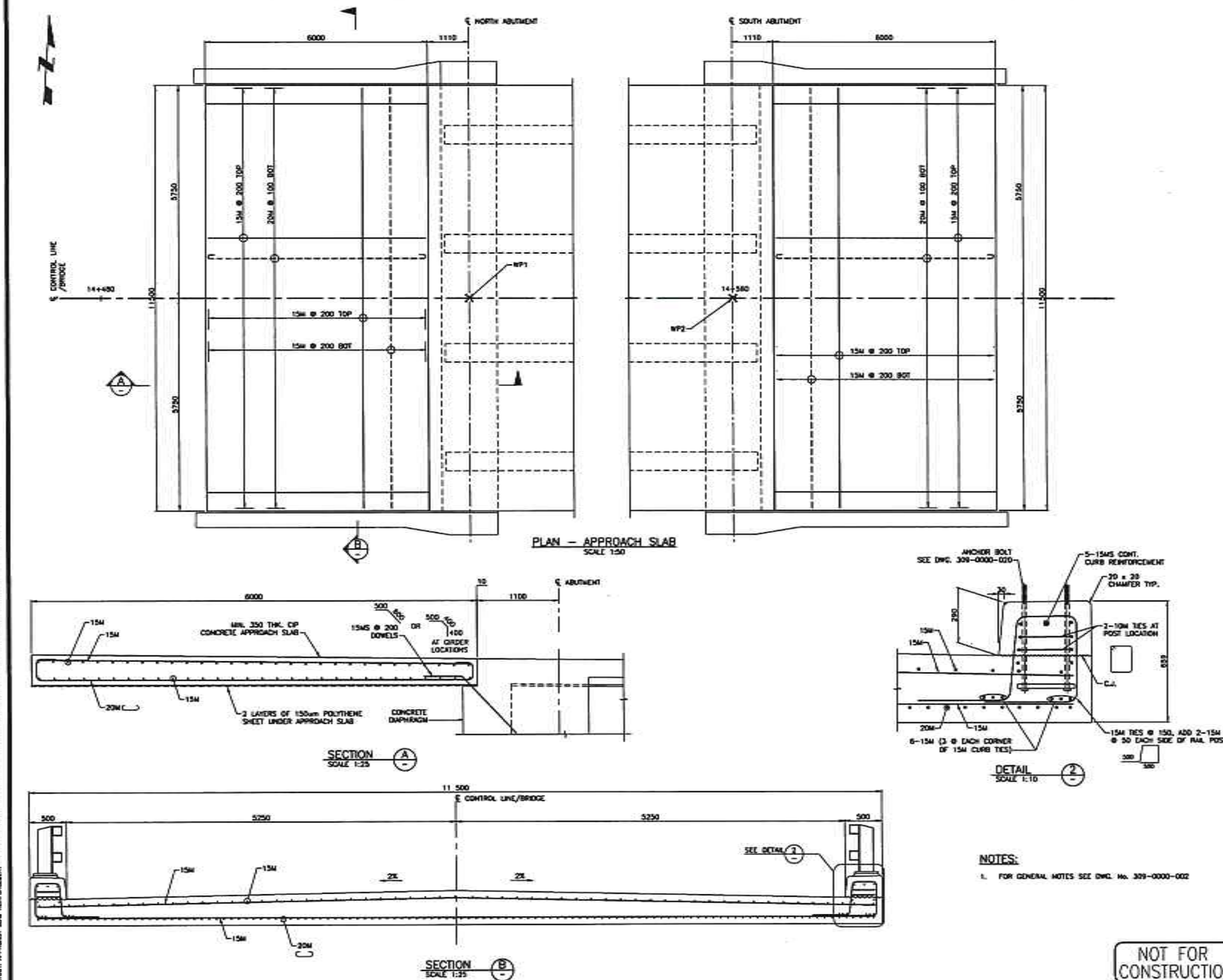
DRAWING TITLE:
END DIAPHRAGM REINFORCEMENT DETAILS

DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
KS	HR	CS	RA

CONTRACT No.:	FILE No.:
C00044147	17M-00158-11

SCALE:	DATE:	SHEET No.:
AS SHOWN	05/11/18	18 OF 22

DRAWING No.: 309-0000-018


PLAN – APPROACH SLAB
SCALE 1:50
℄ NORTH ABUTMENT
℄ SOUTH ABUTMENT
℄ CONTROL LINE /BRIDGE
14+480
14+580
WP1
WP2
6000
1110
5750
11 500
15M @ 200 TOP
20M @ 100 BOT
15M @ 200 BOT
SECTION A
SCALE 1:25
MIN. 350 THK. CIP CONCRETE APPROACH SLAB
15MS @ 200 DOWELS
AT GIRDER LOCATIONS
2 LAYERS OF 150um POLYTHENE SHEET UNDER APPROACH SLAB
CONCRETE DIAPHRAGM
℄ ABUTMENT
1100
SECTION B
SCALE 1:25
℄ CONTROL LINE/BRIDGE
5250
500
2%
SEE DETAIL 2
DETAIL 2
SCALE 1:10
ANCHOR BOLT SEE DWG. 309-0000-020
5-15MS CONT. CURB REINFORCEMENT
20 x 20 CHAMFER TYP.
2-10M TIES AT POST LOCATION
C.J.
15M TIES @ 150, ADD 2-15M @ 50 EACH SIDE OF RAIL POST
6-15M (3 @ EACH CORNER OF 15M CURB TIES)

NOTES:

1. FOR GENERAL NOTES SEE DWG. No. 309-0000-002

NOT FOR CONSTRUCTION

Yukon
Highways and Public Works
Transportation Engineering Branch

MARK	DATE	DESCRIPTION	APPROVED
A	20/11/18	90% DESIGN SUBMISSION	CS

REVISIONS

wsp

PROJECT TITLE:

YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

DRAWING TITLE:

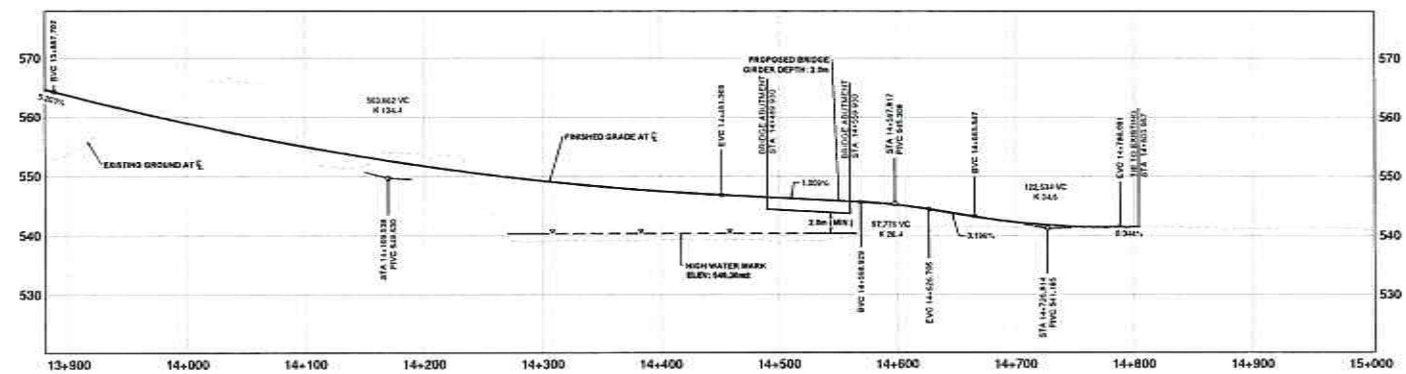
APPROACH SLAB LAYOUT AND REINFORCEMENT DETAIL

DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
KK	HR	CS	RA
CONTRACT No.:		FILE No.:	
C00044147		17M-00159-11	
SCALE:	DATE:	SHEET No.:	
AS SHOWN	09/14/18	19 OF 22	

DRAWING No.: 309-0000-019

DATE: 2018-09-14 – 3:13pm (Svoys)
PATH: \\CAVAN... – Gateway Nordenskiold\Drawings\083 – Bridges\309-0000-019 Approach Slab Layout and Details.dwg
LAYOUT: APPROACH SLAB REINFORCEMENT

LAYOUT PLAN
STA 13+900 TO 14+803,567
SCALE 1:2000


570
560
550
540
530
13+900
14+000
14+100
14+200
14+300
14+400
14+500
14+600
14+700
14+800
14+900
15+000
BVC 13+887.702
503.862 VC
K 134.4
EXISTING GROUND AT ℄
FINISHED GRADE AT ℄
PROPOSED BRIDGE GIRDER DEPTH : 2.0m
BRIDGE ABUTMENT
BRIDGE ABUTMENT
1.200%
2.0m MIN
57.775 VC
K 26.4
3.196%
122.534 VC
K 34.6
0.344%
HIGH WATER MARK
ELEV: 546.36m±

PROFILE
STA 13+900 TO 14+803,567
SCALE H 1:2000 V 1:400

NOT FOR CONSTRUCTION

Yukon
Highways and Public Works
Transportation Engineering Branch

NOTES:

1. CONTOUR INTERVAL IS 10.0m

MARK	DATE	DESCRIPTION	APPROVED
B	05/14/18	95% DESIGN SUBMISSION	LAR
A	07/21/18	PRELIMINARY DESIGN SUBMISSION	LAR

REVISIONS

wsp

PROJECT TITLE:

YUKON RESOURCE GATEWAY PROGRAM
NORDENSKIOLD RIVER BRIDGE
YUKON 2018–2020

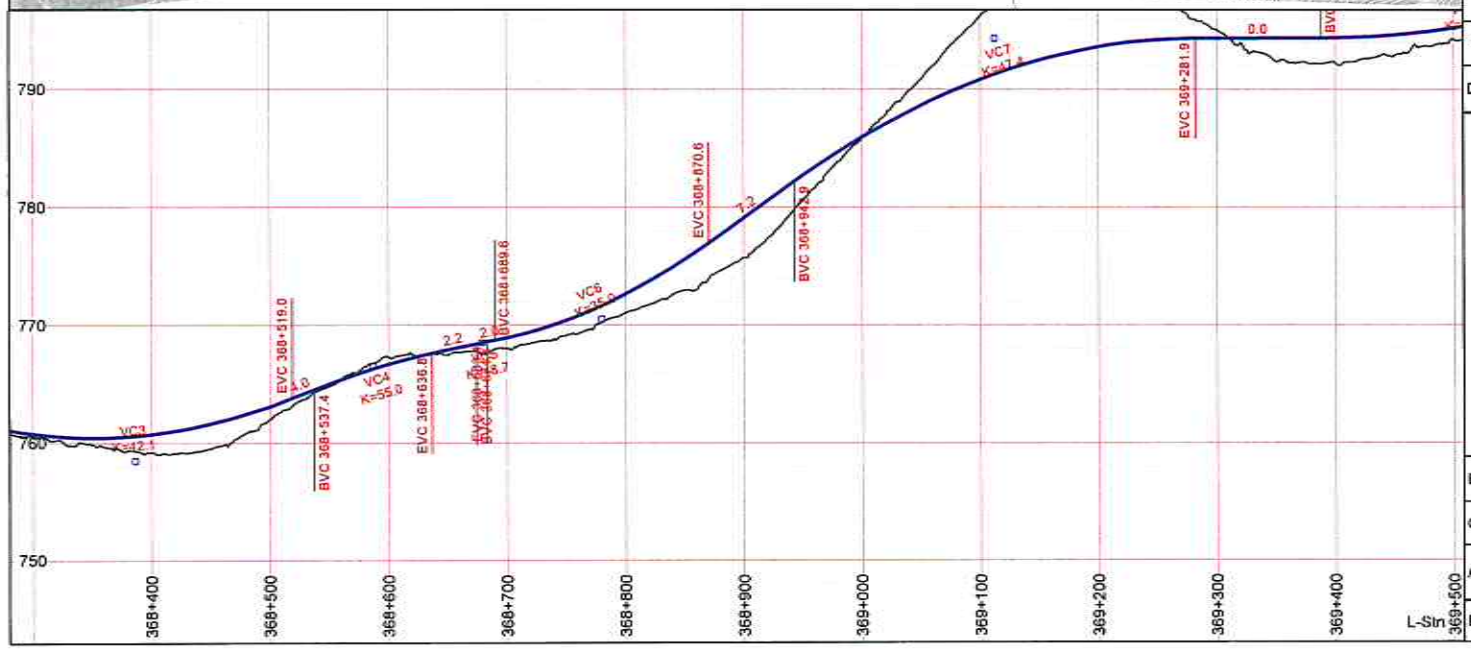
DRAWING TITLE:

REFERENCE PLAN AND PROFILE

DESIGN BY:	DRAWN BY:	REVIEWED BY:	APPROVED BY:
NQ	NQ	LAR	LAR
CONTRACT No.:		FILE No.:	
C00044147		17M-00158-11	
SCALE:	DATE:	SHEET No.:	
AS SHOWN	09/14/18	22 OF 22	

DRAWING No.:
309–0000–024

Campbell Highway Km 232 – Km 354.9



Yukon

Department of Highways and Public Works

NOTES:
1. NOT FOR CONSTRUCTION, FOR REFERENCE ONLY
2. CONTOUR INTERVAL = 1.0M
3. GRADELINE SHOWN IS FINISHED GRADE.
4. COORDINATE GRID SHOWN IS NAD83-ZONE 7 (CSRS).

PROJECT:

Campbell Highway Reconstruction
KM 362 to KM 414
Campbell Highway #4
2019

DRAWING TITLE:

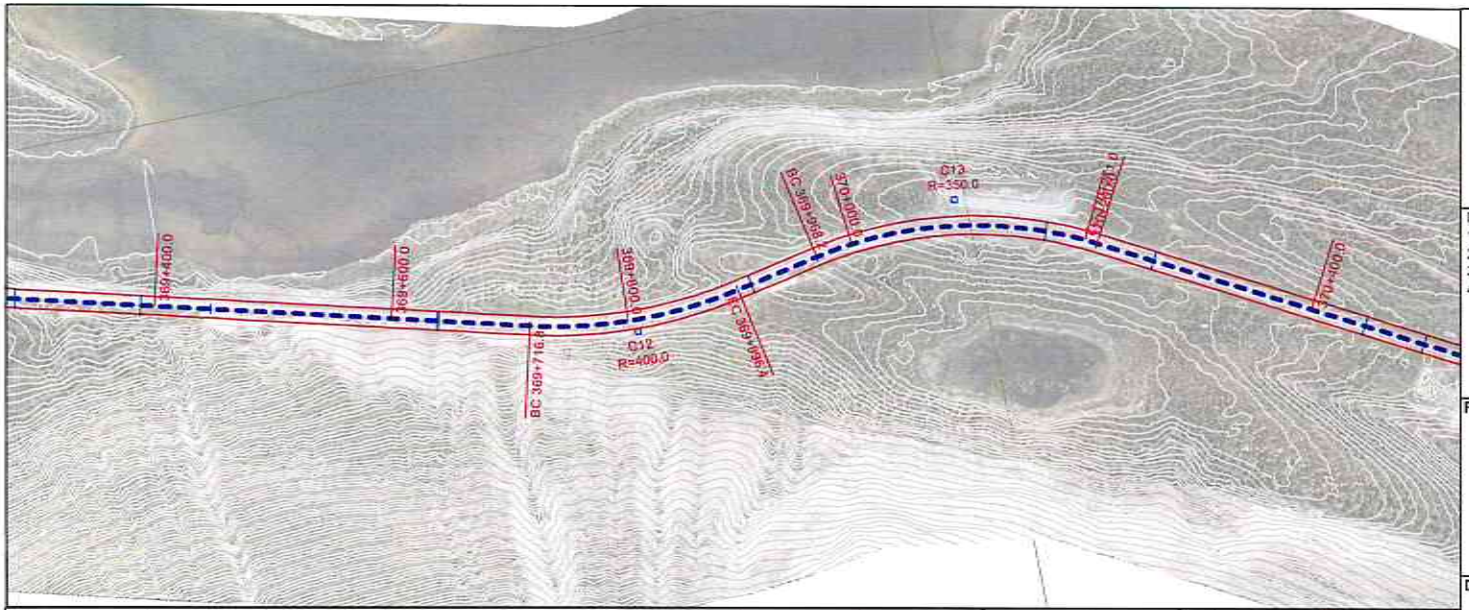
DATE: NOV 2018	HORIZONTAL SCALE: 1: 4000
DRAWN: pcs	VERTICAL SCALE: 1: 400

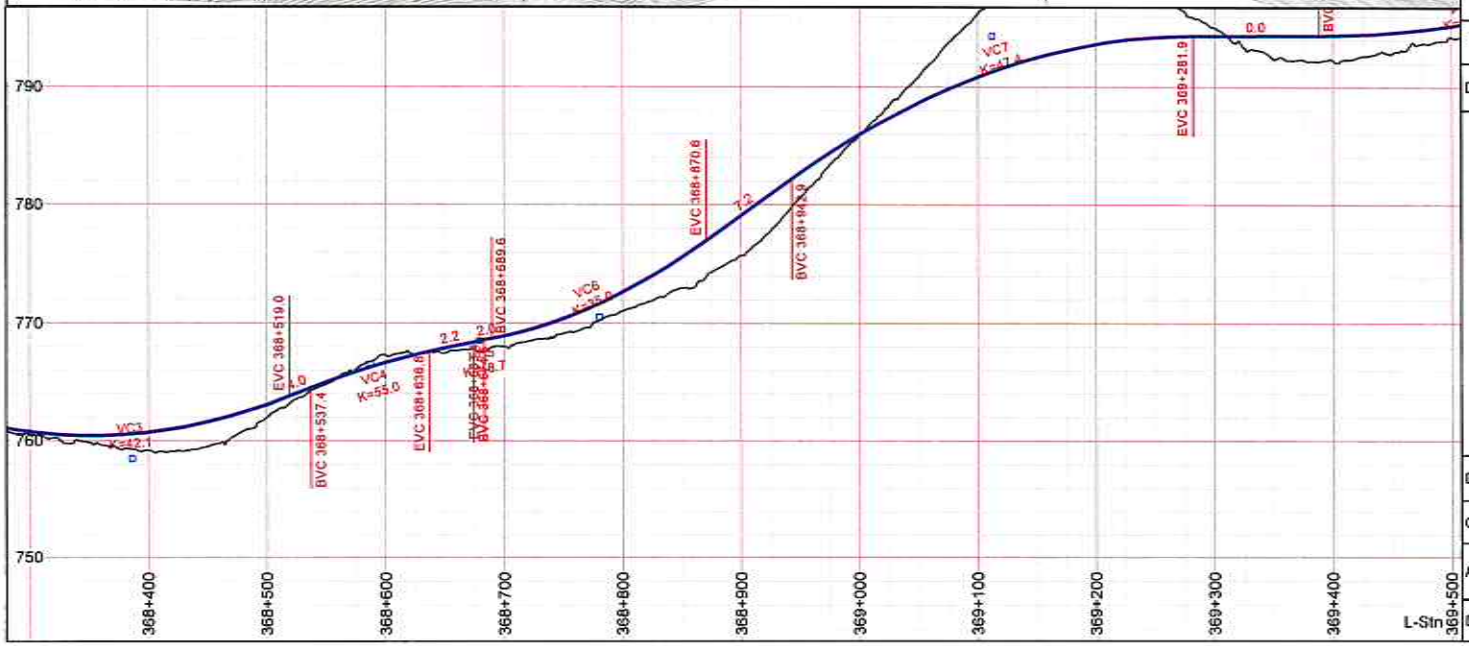
DESIGN: pcs

CHECKED:

APPROVED:

DRAWING NO. 07km 368	SHEET 7 of 52





Yukon

Department of Highways and Public Works

NOTES:
1. NOT FOR CONSTRUCTION, FOR REFERENCE ONLY
2. CONTOUR INTERVAL = 1.0M
3. GRADELINE SHOWN IS FINISHED GRADE.
4. COORDINATE GRID SHOWN IS NAD83-ZONE 7 (CSRS).

PROJECT:

Campbell Highway Reconstruction
KM 362 to KM 414
Campbell Highway #4
2019

DRAWING TITLE:

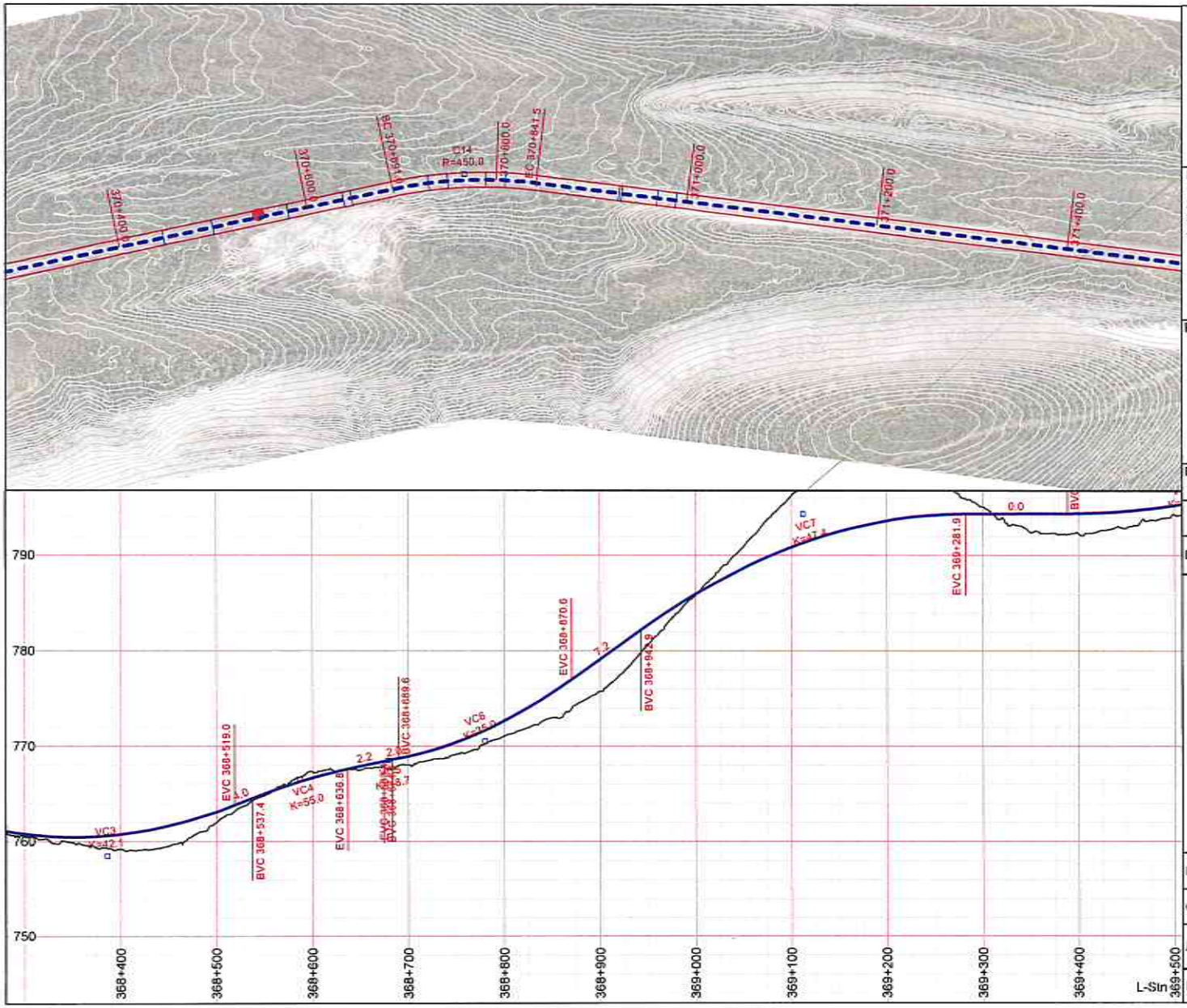
DATE: NOV 2018	HORIZONTAL SCALE: 1: 4000
DRAWN: pcs	VERTICAL SCALE: 1: 400

DESIGN: pcs

CHECKED:

APPROVED:

DRAWING NO. 07km369	SHEET 8 of 52



Yukon

Department of Highways and Public Works

NOTES:
1. NOT FOR CONSTRUCTION, FOR REFERENCE ONLY
2. CONTOUR INTERVAL = 1.0M
3. GRADELINE SHOWN IS FINISHED GRADE.
4. COORDINATE GRID SHOWN IS NAD83-ZONE 7 (CSRS).

PROJECT:

Campbell Highway Reconstruction
KM 362 to KM 414
Campbell Highway #4
2019

DRAWING TITLE:

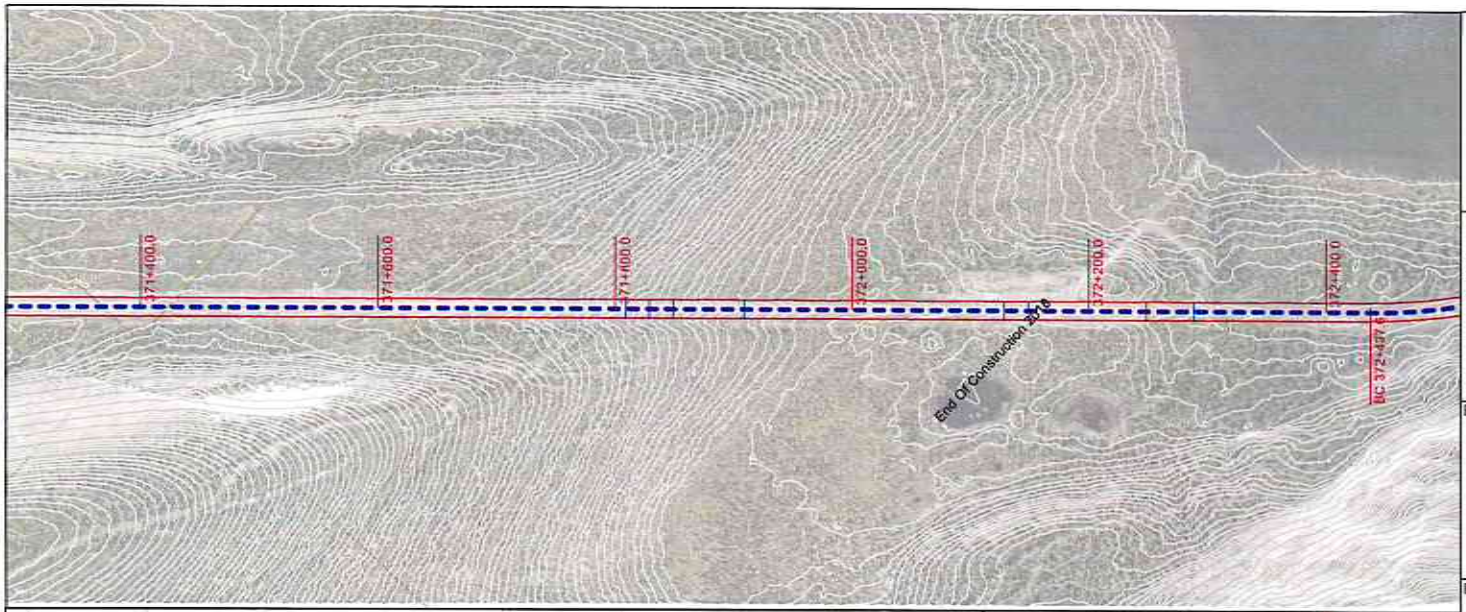
DATE: NOV 2018	HORIZONTAL SCALE: 1: 4000
DRAWN: pcs	VERTICAL SCALE: 1: 400

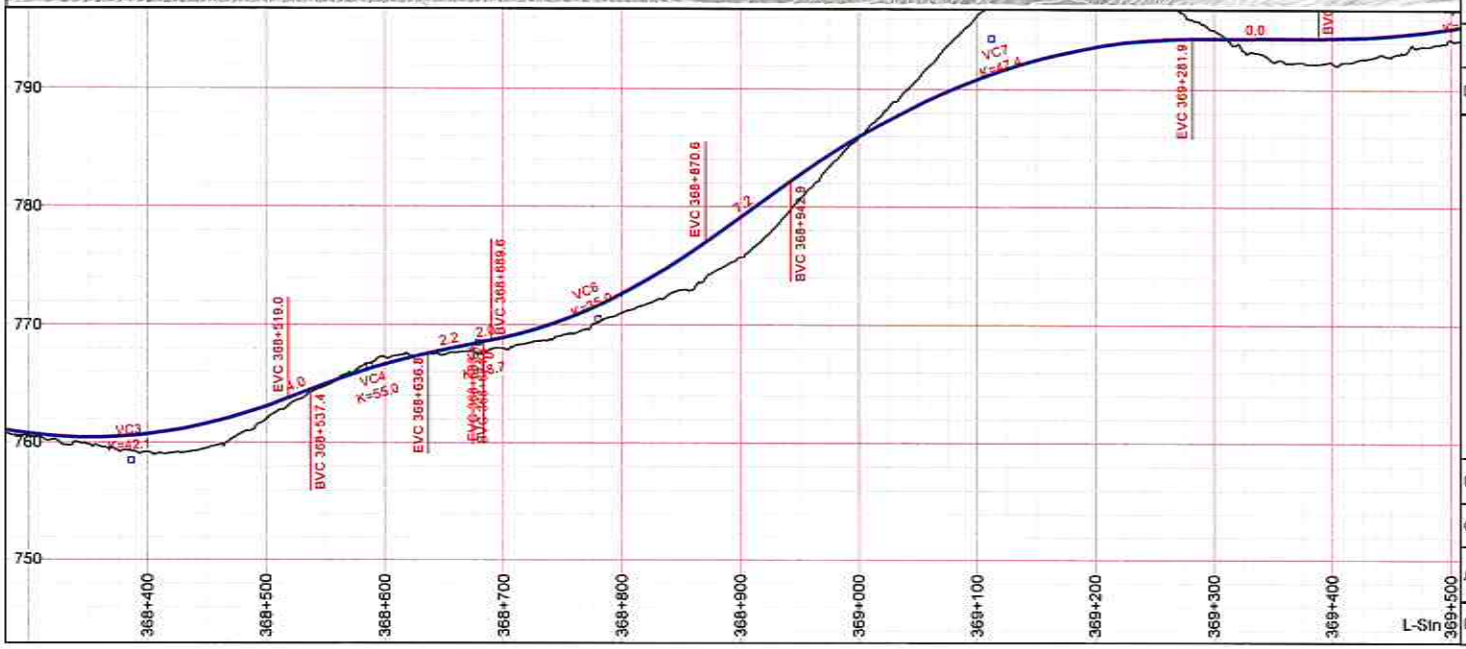
DESIGN: pcs

CHECKED:

APPROVED:

DRAWING NO. 07km 370	SHEET 9 of 52





Yukon

Department of Highways and Public Works

NOTES:
1. NOT FOR CONSTRUCTION, FOR REFERENCE ONLY
2. CONTOUR INTERVAL = 1.0M
3. GRADELINE SHOWN IS FINISHED GRADE.
4. COORDINATE GRID SHOWN IS NAD83-ZONE 7 (CSRS).

PROJECT:

Campbell Highway Reconstruction
KM 362 to KM 414
Campbell Highway #4
2019

DRAWING TITLE:

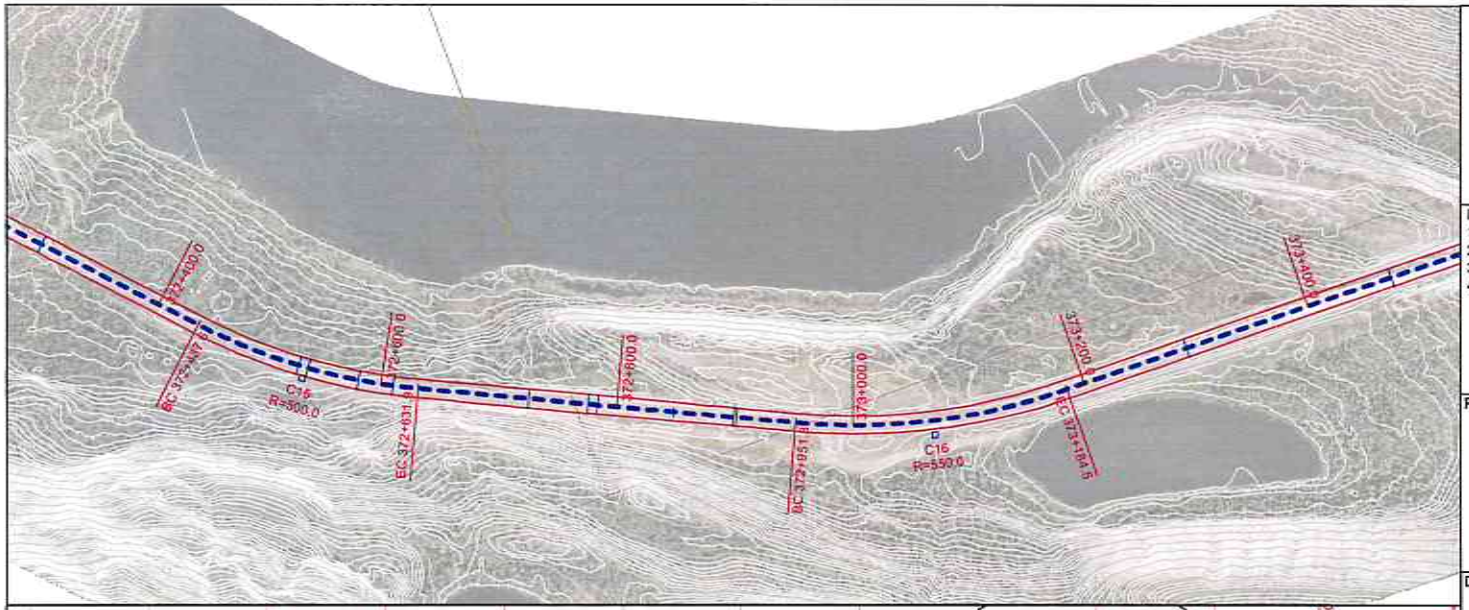
DATE: NOV 2018	HORIZONTAL SCALE: 1: 4000
DRAWN: pcs	VERTICAL SCALE: 1: 400

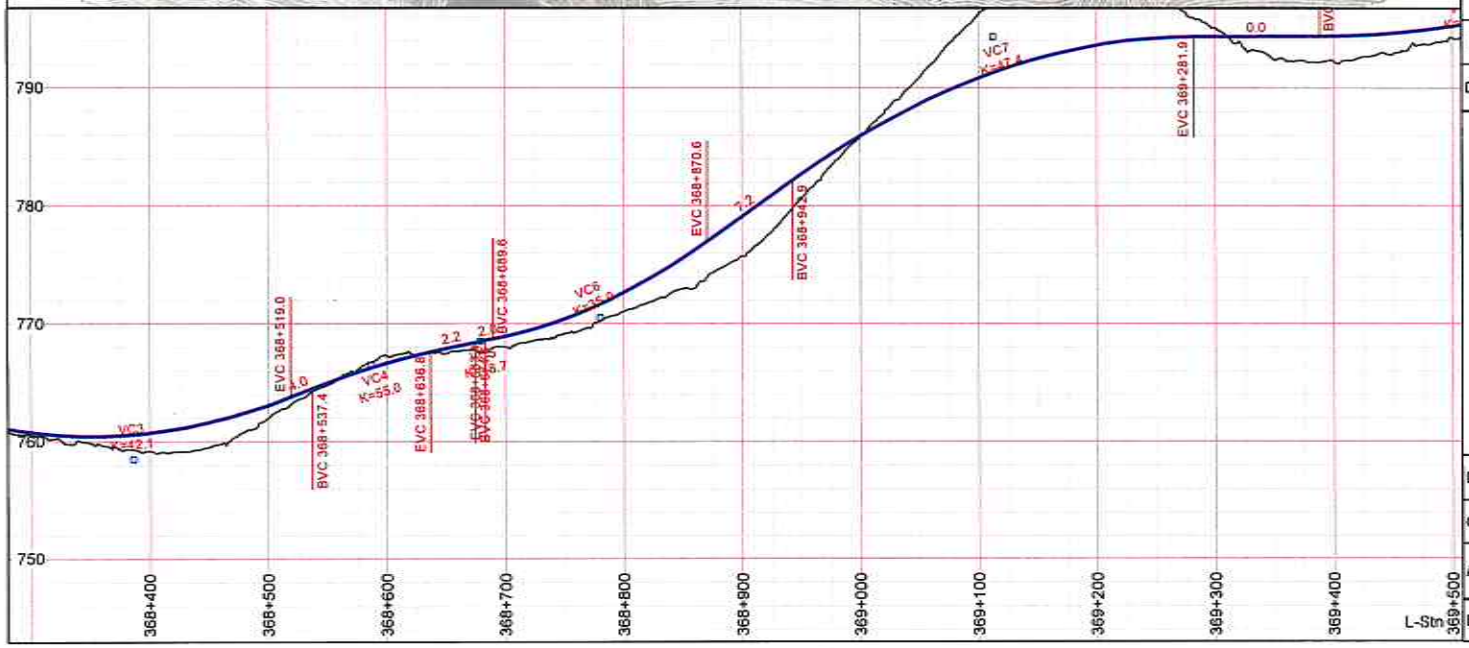
DESIGN: pcs

CHECKED:

APPROVED:

DRAWING NO. 07km371	SHEET 10 of 52





Yukon

Department of Highways and Public Works

NOTES:
1. NOT FOR CONSTRUCTION, FOR REFERENCE ONLY
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3. GRADELINE SHOWN IS FINISHED GRADE.
4. COORDINATE GRID SHOWN IS NAD83-ZONE 7 (CSRS).

PROJECT:

Campbell Highway Reconstruction
KM 362 to KM 414
Campbell Highway #4
2019

DRAWING TITLE:

DATE: NOV 2018	HORIZONTAL SCALE: 1: 4000
DRAWN: pcs	VERTICAL SCALE: 1: 400

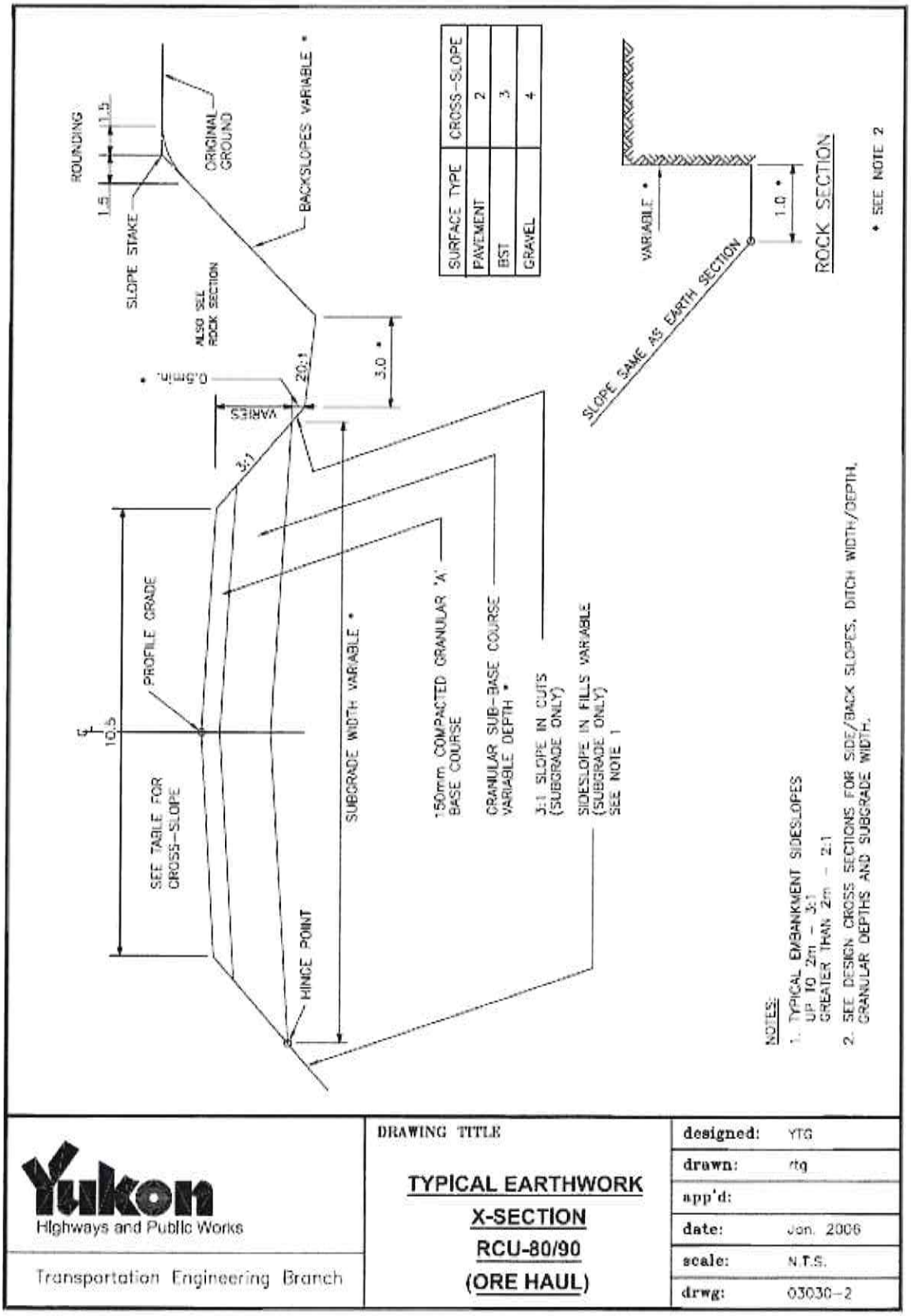
DESIGN: pcs

CHECKED:

APPROVED:

DRAWING NO. 07km 372	SHEET 11 of 52

Typical Earthwork Cross Section – Ore Haul Standard



Appendix E: Environmental, Aboriginal Consultation and Project Location Questionnaire