



KENO HILL SILVER DISTRICT MINING OPERATIONS

ROAD DEVELOPMENT AND OPERATIONS PLAN

September 2023

Prepared by:

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Prepared for:

Alexco Keno Hill Mining Corp.

VERSION HISTORY

SECTION	RELEVANCE AS IT RELATES TO ROAD DEVELOPMENT AND OPERATIONS
BELLEKENO ADVANCE UNDERGROUND EXPLORATION & DEVELOPMENT, KHSD (ACG, 2008)	
Whole document	Proposed activities have been superseded by completed road development for the operation of the Bellekeno Mine and the District Mill.
CONSTRUCTION SITE PLAN, REVISION1, BELLEKENO PROJECT YUKON (ACG, 2009)	
1 Introduction	Proposed activities have been superseded by mine development
2 Project Schedule	No longer applicable
3 Land Tenure and Mineral Claims	Remains relevant; the Christal Lake Road and Bellekeno Haul Road with the associated mineral claims are illustrated, and third-party land tenure is explained Figure incorporated into current version
4 Construction Plans	Subsection 4.1 General Site Construction Plans as it relates to roads has been superseded by the current approved Water Management Plan, Traffic Management Plan, Waste Rock Management Plan, and Closure and Reclamation Plan. The Borrow Areas discussion has been updated and incorporated into the current version
5 Environmental Management & Monitoring for Construction Activities	Section as it relates to roads superseded by current version (see Best Management Practices)
Appendices	Superseded by as-built drawings and current approved management plans. The Civil Design Criteria has been referenced in subsequent road construction plans
LIGHTNING CREEK BYPASS ROAD CONSTRUCTION AND OPERATION PLAN, QML-0009, BELLEKENO PROJECT (ACG, 2010)	
1 Introduction	Incorporated into YESAA Concordance Tables in current version
2 Lightning Creek Bypass Construction	Incorporated into current version
3 Haul Roads	Superseded by Section 3.0 Road Development Overview (ACG, 2012), and the current approved Dust Abatement and Monitoring Plan and Traffic Management Plan. Travel width incorporated into current version,
4 Highway Access Controls	Superseded by the current approved Traffic Management Plan
5 Communications and Notification Protocols	Superseded by the current approved Emergency Response Plan
Attachments	Superseded by as-built drawings included in Appendix A
ROAD CONSTRUCTION PLAN – KENO CITY BYPASS ROAD, KHSD MINING OPERATIONS, QML-0009 (ACG, 2012)	
1 Introduction	Superseded
2 Site Description	Removed from current version, see current Site Characterization Report
3 Road Development Overview	Remains relevant and incorporated into current version
4 Site Preparation	Remains relevant and incorporated into current version
5 Road Design and Specifications	Remains relevant, except subsection 5.3 which has been superseded by the current approved Traffic Management Plan, and Closure and Reclamation Plan Subsection 5.1 Haul Road Specifications and Subsection 5.2 Access Tie-in and Staging Areas incorporated into current version
6 Borrow Sources	Remains relevant and incorporated into current version

SECTION	RELEVANCE AS IT RELATES TO ROAD DEVELOPMENT AND OPERATIONS
7 Geochemical Evaluation	Remains relevant and incorporated into Revision 3
8 Geotechnical Testing	Remains relevant and incorporated into Revision 3
9 Best Management Practices	Remains relevant and incorporated into Revision 3
ROAD CONSTRUCTION PLAN, KHSD MINING OPERATIONS, QML-0009, REVISION 3 (AKHM, 2015a)	
1 Introduction	Superseded
2 Site Description	Removed from current version, see current Site Characterization Report
3 Road Development Overview	Remains relevant and incorporated into current version
4 Site Preparation	Remains relevant and incorporated into current version
5 Road Design and Specifications	Remains relevant and incorporated into current version, except subsection 5.3 which has been superseded by the current approved Traffic Management Plan, and Closure and Reclamation Plan
6 Borrow Sources	Remains relevant and incorporated into current version
7 Geochemical Evaluation	Remains relevant and incorporated into Revision 4
8 Geotechnical Testing	Remains relevant and incorporated into Revision 4
9 Best Management Practices	Remains relevant and incorporated into current version
ROAD CONSTRUCTION PLAN, KHSD MINING OPERATIONS, QML-0009, REVISION 4 (AKHM, 2018)	
1 Introduction	Superseded
2 Site Description	Removed from current version, see current Site Characterization Report
3 Road Upgrade Overview	Remains relevant and incorporated into current version
4 Site Preparation	Remains relevant and incorporated into current version
5 Road Design and Specifications	Remains relevant and has been incorporated into current version, except subsection 5.3 which has been superseded by the current approved Traffic Management Plan, and Closure and Reclamation Plan
6 Borrow Sources	Remains relevant and incorporated into current version
7 Geochemical Evaluation	Remains relevant and incorporated into current version
8 Geotechnical Testing	Remains relevant and incorporated into current version
9 Best Management Practices	Remains relevant and incorporated into current version
KHSD MINING OPERATIONS, ROAD DEVELOPMENT AND OPERATIONS PLAN (HECLA, 2023)	
See Document Revisions table	Revisions to February 2023 plan made in response to review comments received

DOCUMENT REVISIONS

SECTION	SUMMARY OF CHANGES
Version History	February 2023 Road Development and Operations Plan added
Document Revisions	Table added
1.3 Associated Permits and Authorizations	Need for permits and authorizations future work under the Yukon <i>Highways Act</i> and the federal <i>Fisheries Act</i> added Table 1-2: ERDC Type B water licence updated Table 1-3: Access road descriptions revised for clarity
3 Road Development	Culvert installation and fording of fish-bearing streams added
3.1 Clearing	Restrictions for clearing in riparian areas noted
3.2 Heritage Resources Protection 4.3 Use of Waste Rock and Geochemical Evaluation 6.1.2 Permanent Access Closure	“current approved” added when referring to an associated plan
3.4 Haul Road Specifications	Reference to Parts of the 2022 <i>Workplace Health and Safety Regulations</i> replace reference to superseded regulation
3.4.2 Haul Road Construction Guidelines	Reference to conceptual bridge design Figure 3-2 added
3.5 Clear-span Bridge Construction Guidelines	Section added
3.7 Overview of Road Construction	Construction history and expected changes added Table 3-4: Road construction history added
3.7.2 New Birmingham Mine Traffic Route	Heading “Birmingham Haul Road renamed Description of upgrades to the Duncan Creek Road and Calumet Road added Figure 3-6 renamed
3.7.3 District Mill Truck Access Routes	Heading “Flame & Moth Access Road” renamed Text revised Figure 3-7 figure circa 2015 replaced with a figure circa 2023
3.7.4 Lucky Queen Access	Heading “Keno City Bypass Road” renamed Construction of Onek Bridge described and conceptual plans for the route added Figure 3-8 and Figure 3-9 renamed
4.1 Haul Road Maintenance	Brushing of road rights-of-way added and winter maintenance activities described in more detail
5.2 Road Maintenance	Table 5-1: Road maintenance best management practices reorganized, environmental components renamed, and additional riparian erosion control measures added. Table 5-1: Dust Control and Public environmental components added
5.3 Emergency Response and Followup	Section added
6.1.2 Permanent Access Closure	Keno City Bypass Road renamed Onek Connector and Lightning Creek bridge # 2 renamed Onek Bridge to reflect current nomenclature
8. References	Additional references added
Appendix A As-Built Drawings	Birmingham Road as-builts drawings under stamp of an engineer pending

YESAA DECISION DOCUMENT CONCORDANCE TABLE

TERM	DECISION DOCUMENT	TERM & CONDITION	WHERE ADDRESSED
1	2008-0039	All construction and upgrades that utilize non-AML waste rock shall be done in a manner conducive to monitoring run-off as per the Adaptive Management Plan. This consideration is required as part of the engineered drawings for the road	Section 7
47	2008-0039	The proponent shall ensure that the bridge is capable of supporting the weights that will be crossing it and provide documentation to that effect to the regulator	Section 3.5
49	2008-0039	Prior to constructing the proposed new haul road, proponent must demonstrate that soil conditions beneath and in proximity to the proposed right-of-way are stable to support the intended construction and use	Section 3.3
50	2008-0039	New roads shall be constructed in such a way that minimizes permafrost degradation	Section 3
53	2008-0039	Effective temporary and permanent erosion and sediment control measures shall be implemented on disturbed areas during and after exploration, to prevent sediment from entering any waterbodies and/or water courses	Table 5-1
1	2009-0030	All road construction and upgrades that utilise non-AML waste rock shall be done in accordance with project-specific developed quality assurance and quality control practices (i.e. periodic screening and sampling of waste rock used for road material) that govern the project's waste rock management plan and in a manner conducive to monitoring run-off as per the Adaptive Management Plan. Run-of in areas utilizing non-AML waste rock shall be monitored Monitoring of these areas must be added to the Adaptive Management Plan	Section 3 Section 4.3 Section 7
2	2009-0030	The key Best Management Practices ("BMP") that will be implemented to protect fish and fish habitat when constructing the Lightening Creek clear span bridge include: <ul style="list-style-type: none"> • Minimize the riparian area temporarily disturbed by access activities along the adjacent upland property. Use existing trails, roads, or cut lines where possible to avoid disturbance to the riparian vegetation. • Avoid building on meander bends, braided streams, alluvial fans, active flood plains, or any other area that is inherently unstable and may result in the alteration of natural stream functions or erosion and scouring of the bridge structure • Removal of select plants within the road right-of-way (ROW) may be required to meet operational and/or safety concerns for the crossing structure and the approaches. • This removal should be kept to a minimum and within the road right-of-way. When practicable, prune or top the vegetation instead of uprooting. • Trees will be felled away from watercourses to reduce damage to stream banks and beds. To maintain bank stability, trees within 10 m of watercourses will be close cut and stumps left in place except along the trench line. • Ensure that the clear span bridge is properly designed to address river and channel processes at flows above the ordinary high water mark. • Design and construct approaches so that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation. • Design the bridge so that storm water runoff from the bridge deck, side slopes and approaches is directed into a retention pond or vegetated area to remove suspended solids, dissipate velocity and prevent sediment and other deleterious substances from entering the watercourse. • Generally there are no restrictions on timing for the construction of clear-span structures as they do not involve in-water work. However, if there are any activities with the potential to disrupt sensitive fish life stages (e.g. crossing of watercourse by machinery), these shall adhere to the timing window outlined above. • Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. • To exercise this option, the stream bed at the fording site must be comprised of stable gravel or bedrock and the stream banks must be low and stable. 	Section 3 Section 3.5 Section 5.2

TERM	DECISION DOCUMENT	TERM & CONDITION	WHERE ADDRESSED
		<ul style="list-style-type: none"> If minor rutting is likely to occur, stream bank and bed protection methods (e.g. swamp mats, pads) shall be used provided they do not constrict flows or block fish passage. Grading of the stream banks for the approaches shall not occur. If the stream bed and banks are steep and highly erodeable (e.g. dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary crossing structure or other practice shall be used to protect these areas. Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing window. Fording shall occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding. 	
3	2009-0030	<p>Install effective sediment and erosion control measures, such as silt fencing, temporary diversion berms, clear crush check dams or straw bales, before starting work to prevent the entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.</p> <p>Work that will disturb soils shall be stopped during periods of high precipitation if it is likely to lead to sediment deposition into Lightning Creek</p>	Section 3.5 Table 5-1
8	2009-0030	<p>Vegetate any disturbed areas by planting and seeding with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. All seeding and/or planting trees shall follow the DFO guidance on Riparian Revegetation. If there is insufficient time remaining in the growing season, the site shall be stabilized (e.g. cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.</p> <p>Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.</p>	Section 3.5 Table 5-1 Section 6
68	2009-0030	<p>Best management practices for the industry indicate that dust releases must be minimized through the application of a number of preventative measures, including the following.</p> <p>Haul road surfacing - frequently used roads near Keno shall be hard surfaced to the extent possible</p>	Table 5-1
72	2009-0030	<p>The proponent shall ensure that the bridge is capable of supporting the weights that will be crossing it and provide documentation to that effect to the regulator</p>	Section 3.5
78	2009-0030	<p>Prior to constructing the new access road to the Flame and Moth Mill site and the Keno City bypass, the proponent must demonstrate that soil conditions beneath and in proximity to the proposed right-of-way are stable to support the intended construction and use.</p>	Section 3.3
79	2009-0030	<p>New road construction shall not cause degradation of permafrost.</p>	Section 3
6	2011-0315	<p>The proponent shall ensure that N-AML waste rock with elevated zinc content used as construction and upgrade materials is set back an appropriate distance from surface water to avoid impacts; and shall establish appropriate maximum zinc content for the use of these materials for construction purposes.</p>	Section 3 Section 4.3 Section 7
15	2011-0315	<p>The proponent shall ensure that during winter months breaks in snow-banks on main access roads are created in order to facilitate wildlife crossing and exiting the road.</p>	Section 4
22	2011-0315	<p>The proponent shall install effective erosion control measures before starting work to prevent degradation of soil.</p>	Table 3-3 Table 5-1
24	2011-0315	<p>The proponent shall test for permafrost prior to work in an area to determine a better understanding of the permafrost layer.</p>	Section 3.3
25	2011-0315	<p>The proponent shall make best efforts to avoid work in areas of permafrost, where permafrost cannot be avoided the proponent shall take appropriate measures to avoid or minimize damage to and loss of permafrost.</p>	Section 3.3

TERM	DECISION DOCUMENT	TERM & CONDITION	WHERE ADDRESSED
52	2011-0315	The proponent shall ensure that access along roads and trails for the purpose of project activities does not result in unnecessary rutting or increased levels of garbage and litter along the routes.	Table 5-1
2	2017-0176	Non-acid metal leaching waste materials to be used for construction or segregated for other purposes outside the Waste Rock Storage Area, shall be subject to a revised waste rock screening criteria which incorporates consideration of the effective-NP/AP value required to effectively maintain neutral pH conditions.	Section 3 Section 4.3 Section 7
20	2017-0176	A heritage resources overview assessment shall be completed in advance of ground disturbing activities. Areas with elevated potential for the presence of archaeological or historic sites shall be avoided until such time as a heritage resources impact assessment can be completed.	Section 3.2
21	2017-0176	A heritage resources impact assessment shall be completed in advance Agree of ground disturbing activities in areas with elevated potential for the presence of archaeological or historic sites.	Section 3.2

YESAA PROPONENT COMMITMENT CONCORDANCE TABLE

YESAB ONLINE REGISTRY (YOR)	PROPONENT COMMITMENTS	WHERE ADDRESSED
YOR 2011-0315-032-1	Road building material will not be sourced from historic low grade ore stockpiles. Historic low grade ore piles located on top of Onek waste rock dump are able to be visually differentiated due to mineralization.	Section 3 Section 4.3 Section 7
YOR 2011-0315-032-1	Alexco will monitor any seepage observed at the toe of the historic dumps used for borrow material.	Section 7
YOR 2011-0315-032-1	N-AML material will be used for general construction purposes and surface capping of existing site access roads	Section 3 Section 3.7.4
YOR 2011-0315-032-1	Alexco will monitor seepages from the Bypass road and onsite access roads built with N-AML material, and implement adaptive management responses, if required, as outlined in the approved Adaptive Management Plan.	Section 7
YOR 2011-0315-032-1	Cleared vegetation and topsoil from construction of the Bypass road will be stockpiled along the road right-of-way for road reclamation.	Section 3.7.4
YOR 2011-0315-083-1	The surrounding ground that has been previously disturbed will be scarified and re-seeded to eventually establish a vegetation barrier to dampen noise and improve site aesthetics.	Section 6
YOR 2011-0315-035-1	At closure roads will be re-sloped and scarified, culverts removed and seeded in areas where erosion control is necessary	Section 6
YOR 2011-0315-032-1	At closure as part of road decommissioning, culverts will be removed and natural drainage restored.	Section 6
YOR 2011-0315-032-1	Ditching along the road will facilitate appropriate drainage.	Section 3.7.4 Section 4.1

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APPENDIX A: AS-BUILT DRAWINGS

LIST OF ACRONYMS AND ABBREVIATIONS

ACG	Access Consulting Group
AKHM	Alexco Keno Hill Mining Corp.
BK	Bellekeno
DOC	Dissolved Organic Carbon
ERDC	Elsa Reclamation and Development Company
FNNND	First Nation of Na-Cho Nyak Dun
ICP	Inductively Coupled Plasma
KHSD	Keno Hill Silver District
N-AML	Non acid generating or metal leaching
QML	Quartz Mining Licence
ROW	Right-of-Way
TSS	Total Suspended Solids
WL	Water Licence
YESAA	Yukon Environmental and Socio-economic Assessment Act

1 INTRODUCTION

1.1 OVERVIEW

This Road Development and Operations Plan describes typical road construction considerations, and operating protocols for roads utilized by Alexco Keno Hill Mining Corp. (AKHM) for the Keno Hill Silver District (KHSD) Mining Operations. Road construction and management activities in the following documents has been consolidated into this plan:

- *Water License Application & Mining Land Use Approval Amendment Request, Bellekeno Advanced Underground Exploration & Development, Keno Hill Silver District, Yukon, January 2008 (ACG, 2008),*
- *Construction Site Plan, Revision 1, Bellekeno Project, Yukon, (ACG, 2009),*
- *Lightning Creek Bypass Road Construction and Operation Plan, QML-0009, April 2010 (ACG, 2010),*
- *Road Construction Plan, Keno City Bypass Road, Keno Hill Silver District Mining Operations, QML-0009, (ACG, 2012),*
- *Road Construction Plan, Keno Hill Silver District Mining Operations, QML-0009, Revision 3 (AKHM, 2015a), and*
- *Road Construction Plan, Keno Hill Silver District Mining Operations, QML-0009, Revision 4 (AKHM, 2018).*

1.2 SITE DESCRIPTION

The KHSD Mining Operations is 354 km north of Whitehorse, in the vicinity of Keno City in the central Yukon (Figure 1-1). AKHM owns and operates of a series of small underground silver/lead/zinc mines with a centralized mill as described in Table 1-1. On September 7, 2022, Alexco Resource Corp. (doing business as Hecla Yukon), the parent company of AKHM, was acquired by Hecla Mining Company.

Table 1-1: Keno Hill Silver District mining operations overview

MINES / ORE DEPOSITS	Bellekeno (production 2010 – 2013, suspended 2013 – 2020, production 2020, temporary closure 2021) Flame & Moth (development 2018, suspended 2018 – 2020, development and production 2020 - present) New Birmingham (advanced exploration 2017 – 2018, development and production 2020 - present) Lucky Queen, Onek 990 (advanced exploration 2013, not active)
MILL	District Mill located in Flame & Moth Mine area (Constructed 2010) Tailings placed in Dry Stack Tailings Facility (Established 2010) or underground as backfill
WORK FORCE	~ Camp capacity of 250 employees and contractors during active mine and reclamation operations (as per YESAA 2018-0169 Decision Document)
AIRSTRIP	Village of Mayo, YT
CAMP FACILITIES	Flat Creek camp facilities include a trailer camp, kitchen facility, and welcoming center Four refurbished houses and a bunkhouse located nearby in the townsite of Elsa
POWER	Hydro grid power Yukon Energy, diesel power backup
WATER SUPPLY AND USE	Fresh water supply from Flat Creek and adjacent well Water treatment plants at Bellekeno 625, Flame & Moth, and New Birmingham for mine effluent Process water is recycled from the Mill Pond to the plant
FIRST NATIONS	First Nation of Na-Cho Nyak Dun (FNNND)

The Keno Hill mining camp has a long mining history and is a brownfields site. AKHM develops the mineral resources, operates the KHSD mines and undertakes receiving environmental monitoring and treatment of mine discharge waters. Hecla Yukon’s wholly owned subsidiary Elsa Reclamation and Development Company Ltd. (ERDC) undertakes care and maintenance, environmental monitoring and water treatment of historic adit drainages, district-wide closure planning, studies, and remediation of the historic environmental liabilities.

1.3 ASSOCIATED PERMITS AND AUTHORIZATIONS

AKHM has all permits and authorizations in place for development and production of KHSD mines Bellekeno, Flame & Moth, and New Birmingham, and operations of the District Mill. Approvals, permits, licences and operational management plans associated with the Road Development and Operations Plan are listed in Table 1-2. This plan should be read in conjunction with these documents. Permits to conduct work within a public highway right-of-way are obtained as needed in accordance with the Yukon *Highways Regulation*. Authorizations under the federal *Fisheries Act* are obtained as needed.

Table 1-2: Related approvals, permits, licences and operational management plans

YESSA APPROVALS	<ul style="list-style-type: none"> Decision Documents and Evaluation Reports for projects #2008-0039, #2009-0030, #2011-0315, #2013-0161, #2017-0086, and #2017-0176
QUARTZ MINING ACT APPROVALS	<ul style="list-style-type: none"> Class 4 Mining Land Use Approval LQ00476 expires 2028 Quartz Mining Licence QML-0009, updated January 2023, expires 2037
WATER LICENCES	<ul style="list-style-type: none"> Type A Water Licence QZ18-044 expires 2037 (AKHM) Type B Water Licence QZ21-012 expires 2043 (ERDC)
MANAGEMENT PLANS	<ul style="list-style-type: none"> Management Health and Safety Program / Emergency Response Plan Dust Abatement and Monitoring Plan Environmental Monitoring, Surveillance and Reporting Plan Mill Development and Operations Plan Mine Development and Operations Plan Reclamation and Closure Plan Spill Contingency Plan Waste Rock Management Plan Water Management Plan Wildlife Protection Plan

Quartz Mining Licence QML-0009, Schedule C (dated May 4, 2023) authorizes AKHM access for the KHSD Mining Operations via the Silver Trail Highway and Wernecke Road and to construct, maintain, and utilize:

- the haul road between the Bellekeno East Portal and Bellekeno 625 Adit,
- the Bellekeno Haul Road,
- the Lightning Creek Bypass Road,
- the Christal Lake Road,
- the Keno City Access Road,
- the Flame & Moth Access Road,
- the Birmingham Access Road,
- the Calumet Road, and
- a section of the Duncan Creek Road (between the District Mill and Birmingham Mine).



**KENO HILL SILVER DISTRICT
MINING OPERATIONS**

**FIGURE 1-1
PROJECT LOCATION**

DECEMBER 2022

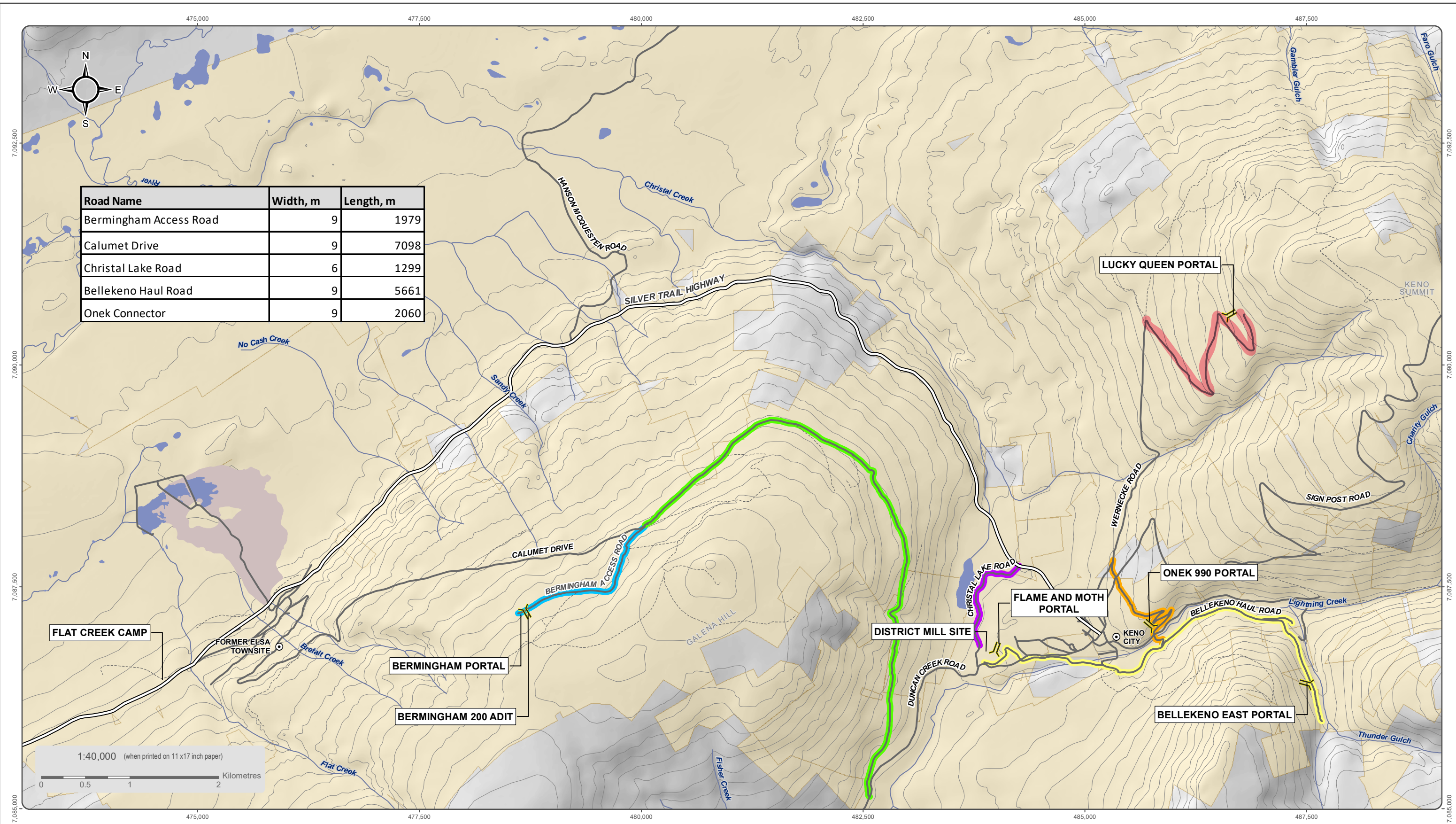
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The access roads utilized for KHSD Mining Operations have been referred to by a variety of names since the original application for road development was prepared in 2008. Table 1-3 provides a summary of the access route names, the locations they have been applied to, and their current description as applied in this plan. Figure 1-2 illustrates the access road names utilized in the current operational management plans.

Table 1-3: Access road descriptions

ROUTE		DESCRIPTION
BELLEKENO HAUL ROAD	Bellekeno Haul Road	Haul road between Duncan Creek Road and Bellekeno East Portal laydown area Includes haul road between Bellekeno East Portal and Bellekeno 625 Adit, Powerline Road, Lightning Creek Bypass Road, and a section of the Sourdough Trail Also referred to as Bellekeno Access Road (ACG, 2012), and Bellekeno Project Bypass Road South (AKHM, 2018)
	Bellekeno 625 Adit Bypass	Haul Road constructed from Powerline Road to Bellekeno East Portal
	Bellekeno East Portal Exploration Access	Decommissioned exploration road (Figure 22, ACG, 2008) that went from Bellekeno East Portal, across the laydown yard and over Thunder Gulch to placer mining access trails
	Haul Road between Bellekeno East Portal and Bellekeno 625 Adit	Haul road constructed from Bellekeno East Portal to Bellekeno 625 Adit Includes the Bellekeno 625 Adit Bypass Also referred to as Bellekeno Haul Road (ACG, 2009; AKHM, 2021), and Powerline Road (ACG, 2010)
	Lightning Creek Bypass Road	Haul road constructed across third party claims between Sourdough Trail and Duncan Creek Road Also referred to as Keno City Bypass Road (ACG, 2009), Bellekeno Bypass South (AKHM, 2015b), and Bellekeno Bypass Road (AKHM, 2018)
	Powerline Road	A section of Bellekeno Haul Road upgraded from a pre-existing powerline right-of-way (ROW)
	Section of Sourdough Trail	A section of Sourdough Trail between Powerline Road and Lightning Creek Bypass Road
BERMINGHAM HAUL ROAD	Birmingham Haul Road	Haul road between Duncan Creek Road and New Birmingham Mine Includes Birmingham Access Road and a section of Calumet Road
	Birmingham Access Road	Haul road between Hector Adit on Calumet Road and New Birmingham Mine, including access to the portal, the P-AML pad, the vent raise, and the New Birmingham Water Treatment Plant
	Section of Calumet Road	A section of Calumet Road between Birmingham Access Road and Duncan Creek Road
CHRISTAL LAKE ROAD	Christal Lake Road	Access road from Silver Trail Highway to Duncan Creek Road, through historic Mackeno Mill site Pre-existing haul road was realigned to include Flame & Moth Access Road, and Mill Bypass Road Also referred to as Keno City Bypass Phase I (ACG, 2009, 2010), and Bellekeno Project Bypass Road North (AKHM, 2015b)
	Flame & Moth Access Road	Spur road from original Christal Creek Road to mill Also called Mill Access (AKHM, 2017)
	Mill Bypass Road	Access road from Flame & Moth Access Road to Duncan Creek Road, which avoids the mill yard
CALUMET ROAD		Public road that extends from Duncan Creek Road to the Elsa Townsite Also referred to as Galena Hill Road (AEG, 2008, 2009), and Calumet Drive (AKHM, 2018)
DISTRICT MILL TRUCK ACCESS ROUTES		Haulage routes at the District Mill site Includes routes from Duncan Creek Road and Flame & Moth Portal to the mill ore pad, routes from District Mill to Dry Stack Tailings Facility, routes from Flame & Moth Portal to the waste rock storage area, and routes to vent raise, storage yards, and monitoring wells. Routes are realigned as necessary to accommodate expanding storage facilities and improvements to infrastructure. Also referred to as Flame & Moth Haul Road (AKHM, 2015a), and Bellekeno Project Bypass Road North (AKHM, 2015a)
DUNCAN CREEK ROAD		Public road from Silver Trail Highway north of the Mayo River crossing to Keno City















ROUTE		DESCRIPTION
LUCKY QUEEN ACCESS ROUTE	Lucky Queen Access Route	Haul road alignment between Bellekeno Haul Road to Lucky Queen Mine, passing through Onek 990 Mine. Includes Lucky Queen Access Road, Onek Connector, and a section of Wernecke Road
	Lucky Queen Road	Pre-existing mine road between Wernecke Road and Lucky Queen Mine
	Onek Connector	Haul road alignment from Bellekeno Haul Road, crosses Lightning Creek at the Onek Bridge, through Onek 990 Mine to Wernecke Road Also referred to as Keno City Bypass Road (ACG, 2012), and Lightning Creek Haul Road (AKHM, 2017)
	Section of Wernecke Road	A section of the Wernecke Road between Lucky Queen Access Road and Onek Connector
LIGHTNING CREEK ROAD		Public road from Keno City eastward along the valley below the south side of Keno Hill
NORTH SIDE BYPASS ROAD		Proposed routing north of Keno City from Silver Trail Highway, crossing Wernecke Road to Signpost Road. Only Wernecke Road to Signpost Road section was permitted for construction
SIGNPOST ROAD		Public road from Keno City to the summit of Keno Hill Also known as Summit Trail, and Signpost Trail
SILVER TRAIL HIGHWAY		Public road from Mayo to Keno City Also know as Yukon Highway 11, Keno Highway, and Mayo-Elsa Road
SOURDOUGH TRAIL		Public road from Keno City to Sourdough Hill
TOWER ROAD		Existing road from the historic Calumet Townsite adjacent the Hector Mine to microwave towers on Galena Hill
WERNECKE ROAD		Public road from Keno City to the historic Wernecke Townsite on the east side of Keno Hill Also referred to as the Gambler Gulch Trail



National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.

Datum: NAD 83; Map Projection: UTM Zone 8N

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 Christal Lake Road	 Place of Interest	 Tailings Area
 Bellekeno Haul Road	 Adit	 Waterbody
 Onek Connector	 Alexco/ERDC Quartz Claims	 Silver Trail Highway
 Calumet Road		 Road
 Birmingham Access Road		 Limited-Use Road
 Lucky Queen Road		



KENO HILL SILVER DISTRICT MINING OPERATIONS

**FIGURE 1-2
ACCESS ROUTES**

OCTOBER 2021

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2 ROAD MANAGEMENT APPROACH

2.1 OBJECTIVES

Proper road management is required to ensure worker safety, maintain environmental integrity, avoid wildlife encounters, and support ongoing site compliance and mine operations.

The objectives of this Plan are to:

- 1) ensure employees and contractors are trained to manage the KHSD Mining Operations access roads in a safe and compliant manner, and
- 2) outline appropriate road development and maintenance measures to ensure environmental protection.

2.2 UPDATED APPROACH

This Road Development and Operation Plan focuses on the road operation and maintenance requirements for roads utilized for the KSHD Mining Operations. The typical civil design criteria used for construction of haul roads for the KHSD Mining Operations are provided. As-built drawings for completed haul roads and bridges are appended.

2.3 ACCESS CONTROL

Signs are posted at all intersections which enter onto private haul roads. These signs indicate that road is not for public entry and only for authorized traffic. All haul and auxiliary vehicle traffic between the KHSD mines and the District Mill site is radio controlled for safety and speed control. The Bellekeno Haul Road above the Sourdough Trail is gated, and the gate locked as deemed necessary. Traffic and access control measures for the Christal Lake Road and Bellekeno Haul Road as implemented in 2010 are illustrated on Figure 2-1. Updated details on access control including the Birmingham Haul Road are provided in the current approved Traffic Management Plan.

During road construction or decommission AKHM consults with Energy Mines and Resources Client Services and Inspections, and Government of Yukon Highways and Public Works, Transportation Branch to determine appropriate methods for limiting access to the sites.



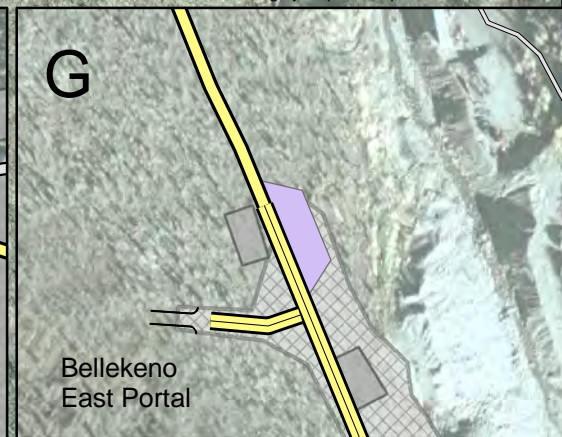
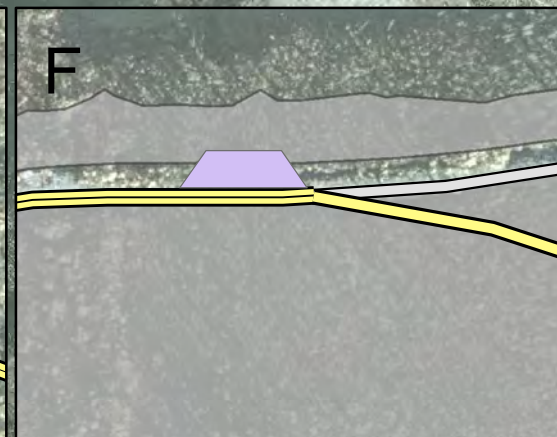
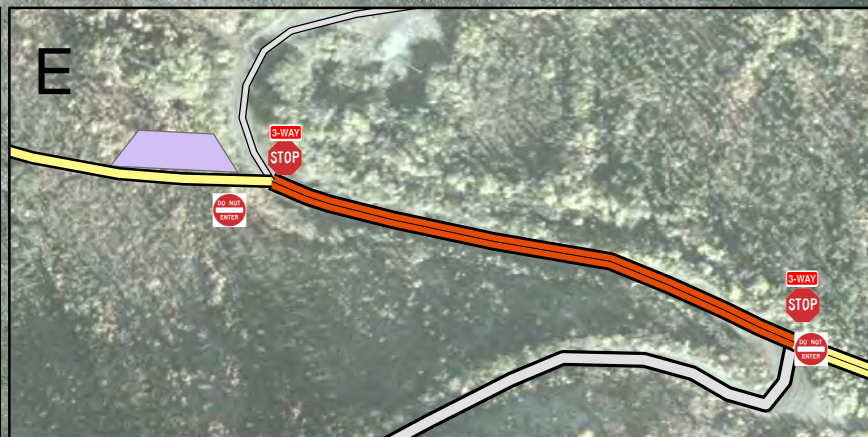
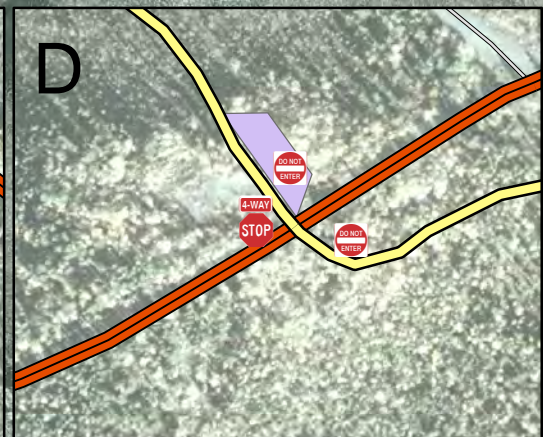
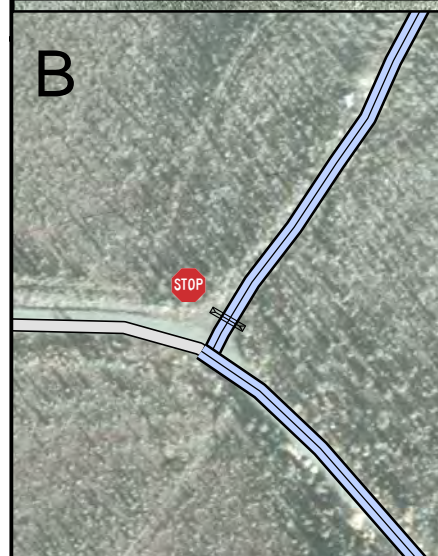
ALEXCO KENO HILL MINING CORP.
BELLEKENO PROJECT
LIGHTNING CREEK BYPASS CONSTRUCTION AND
MANAGEMENT PLAN HAUL ROAD TRAFFIC AND ACCESS CONTROL

DATE: 4/16/2010	FIGURE 2-1	SCALE: 1:15,000
DRAWN BY: EA/MD	CHECKED BY: RLM	*scale on all inset maps is 1:2500
D:\Project\Allprojects\Alex-05-01\Bellekeno\GIS\mxd\QML Plans\Lightning Creek Bypass Plan_mod_24032010.mxd		

Haul Roads	Other Roads	Traffic Management and Access Control
Haul/Public; Two Way	Silver Trail Highway	Private Haul Road Do Not Enter Authorized Traffic Only
Haul Road; One Way	Public Road	Haul Truck Pullout
Haul Road; Two Way	Site Road; No Haul Truck Traffic	

0 250 500 750 1,000 Meters

Layout and final construction may vary as dictated by final engineering design and site conditions encountered during construction.



Aerial photograph obtained from Geodesy Remote Sensing Inc., Calgary Alberta. Imagery acquired September 13 and 14 2006.

3 ROAD DEVELOPMENT

For the construction, and upgrades of access routes, AKHM adheres to the following:

- Ensure that soil conditions beneath, and in proximity to, any proposed access road ROW is stable to support the intended construction and use,
- Non acid generating or metal leaching (N-AML) material is used for road construction and maintenance,
- All construction, and upgrades utilizing N-AML waste rock is done in a manner conducive to monitoring run-off as per the current approved Waste Rock Management Plan,
- New roads are constructed in such a way that minimizes permafrost degradation, and
- Access routes are constructed or upgraded in the following manner:
 - Routes are selected from topographic maps and aerial photos, and walked to evaluate ground conditions and inspect for heritage resources and flagged prior to earthmoving,
 - Routes are to avoid creek crossings and aim to minimize amount of earth moving,
 - Routes are to be located on well drained ground,
 - Areas where ponding occurs are to be avoided,
 - Seeps, marshes, and springs are to be avoided, and
 - Areas disturbed for road construction and upgrades are to be stabilized to prevent long term soil erosion, slumping and subsidence, and to provide conditions suitable to the re-establishment of the vegetative mat.
- Culverts must be installed in dry conditions,
- Should fording of a fish-bearing watercourse be deemed necessary the following conditions will be abided by:
 - Any activities within the watercourse, will be scheduled to avoid disruption of sensitive fish life stages by adhering to appropriate fisheries timing window;
 - Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and will occur only if an existing crossing at another location is not available or practical to use;
 - The stream bed at the fording site will be comprised of stable gravel or bedrock and the stream banks will be low and stable;
 - If minor rutting occurs, stream bank and bed protection methods (e.g. swamp mats, pads) will be used provided they do not constrict flows or block fish passage; and
 - Fording will be undertaken during low flow conditions, and not when flows are elevated due to local rain events or seasonal flooding.

3.1 CLEARING

In general, a dozer or excavator is used for clearing. Trees within 10 m of a water body are to be close cut and stumps left in place. Clearing of riparian vegetation is restricted to removal of select plants with the road ROW only to meet operational and/or safety needs.

3.2 HERITAGE RESOURCES PROTECTION

The road routings are to be ground-truthed by AKHM personnel and a knowledgeable community member prior to upgrades or development. The current approved Heritage Resources Protection Plan for KHSD Mining Operations applies within the road right-of ways (ROW).

3.3 GEOTECHNICAL TESTING

AKHM engineers are to ground-truth the road alignments to assess the geotechnical stability of the road bed. Routing is to follow areas of existing linear disturbance. To the extent possible, routing with sufficient overburden underlain with competent rock is to be selected. Areas showing signs of underlying permafrost (stunted trees, ground slumping) are to be avoided to the extent possible. In areas of potential permafrost ground protection measures, such as installation of additional road foundation material, are to be applied.

3.4 HAUL ROAD SPECIFICATIONS

All haul roads utilized by the KHSD Mining Operations are subject to the Yukon *Workplace Health and Safety Regulations* (Part 1.47, 6.39 and 15.43), which set out minimum design criteria for safety considerations. In addition, mine haul road design guidelines developed by the University of Alberta (Tannant and Regensburg, 2001), or as subsequently updated for haul roads in northern climates, are to be referenced during the development of the road construction plans.

3.4.1 Haul Road Design Criteria

Civil design criteria for haul roads within the KHSD were developed by Wardrop Engineering Inc. (Civil Design Criteria, Appendix C, Construction Site Plan, Revision 1(ACG, 2009)). The road design criteria used for road construction and upgrades are listed in Table 3-1. The design vehicle used as the basis of design criteria is provided in Table 3-2.

Table 3-1: Road design criteria

HAUL ROAD	
Operating Width*	5.88 ¹ or 8.82 ² m
Design Speed	50 km/hr
Cross fall	2%
Maximum Grade	8%
Surface	200 mm
Base	300 mm
Sub-base	500 mm
Cut Side Slope	1.5 : 1
Fill Side Slope	2 : 1
Subgrade Compaction	>80%
Granular Compaction	>85%

* Excludes berms and ditches on both side of haul roads

1. One way traffic
2. Two way traffic (passing)

Table 3-2: Design vehicle Volvo A30E

Volvo A30E	Dimension	
Width	2.94 m	
Length	10.3 m	
Height	3.3 m	
Wheel Base	2.216 m	
Tire Pressure	267 kPa	
Weight	Loaded	Empty
Gross Vehicle Weight	51 060 kg	28 000 kg
Front Axle	14 990 kg	12 500 kg
Drive Axle	36 070 kg	15 560 kg

3.4.2 Haul Road Construction Guidelines

A typical conceptual road section is shown in Figure 3-1. General guidelines for haul road construction include:

- haul roads shall be all-weather construction,
- safety berm will be constructed on all fills >3.0 m,
- height of safety berm will be 1.25 m (0.75x the diameter of tire on Volvo A30E articulated haul truck),
- breaks in the safety berm will not exceed the width of the blade of the equipment constructing and maintaining the breaks to allow for drainage, snow clearance and wildlife crossing,
- sideslope will be maximum 2:1 if embankment is between 0-3 m,
- sideslope will be maximum 1.5:1 if embankment is between >3 m,
- alternating vehicular pull-outs will be used at each end of one-way traffic road segments,
- pull outs length equals 1.5 times the vehicle length,
- pull outs width equals 1.5 times the operating width, and
- a clearly marked emergency runaway lane or retardation barrier capable of bringing a runaway vehicle to a stop will be provided and maintained below where road grade exceeds 5%.

3.5 CLEAR-SPAN BRIDGE CONSTRUCTION GUIDELINES

A typical conceptual bridge design is shown in Figure 3-2. General guidelines for construction of clear-span bridges are summarized as follows:

- ensuring clear span bridge has been designed to support the weight that will be crossing it and to address river and channel processes at flows above the ordinary high water mark,
- ensuring there is no alteration of the stream bed or banks or infilling of the channel,
- bridges are to be no greater than two vehicle lanes in width, do not include sidewalks or biking lanes and do not encroach on the natural channel width by the placement of abutments, footings or rock armouring below the high water mark,
- multiple bridge crossings over the same watercourse must be avoid, and
- ensuring measure to protect fish and fish habitat are adhered to.

Table 3-3 provides a summary of measures to be followed to protect fish and fish habitat when constructing a clear span bridge listed in *The Code of Practice: Clear Span Bridges* (Fisheries and Oceans Canada, 2022).

Table 3-3: Measures to protect fish and fish habitat

ENVIRONMENTAL COMPONENT	MITIGATION
Protection of riparian zone	<ul style="list-style-type: none"> • Temporary disturbance of riparian areas disturbed by access activities along the adjacent upland property will be minimized. Use existing trails, roads, access points or cut lines • Use methods to prevent soil compaction (e.g., swamp mats, pads) • Brushing required for visibility at the bridges will be kept to a minimum and within the road ROW: <ul style="list-style-type: none"> ○ when practicable, vegetation will be pruned or topped the instead of uprooted, ○ trees will be felled away from watercourses, and ○ trees within 10 m of watercourses will be close cut and stumps left in place • Approaches will be near perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation if a new access point is required to reach the watercourse • Restore the banks and riparian vegetation affected by the works • Re-vegetate the disturbed areas by planting and seeding with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate <ul style="list-style-type: none"> ○ if there is insufficient time remaining in the growing season, the site will be stabilized (e.g. cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring, and ○ effective sediment and erosion control measures will be maintained until re-vegetation of disturbed areas is achieved
Protection of aquatic habitat	<ul style="list-style-type: none"> • Locate temporary crossing site where the watercourse is straight, banks are stable and where approaches have low slopes. Meander bends, braided streams, alluvial fans, active flood plains, or any other area that is inherently unstable will be avoided • Do not obtain reinforcement rock from below the ordinary high water mark of any water body • Operate vehicles and machinery in a manner that minimizes disturbance to the watercourse bed and banks.
Protection of fish and fish habitat from sediment	<ul style="list-style-type: none"> • Operate machinery on land in stable dry areas and in a manner that minimizes disturbance to the banks of the watercourse • Ensure approach grades are kept to a minimum. Grading of stream bank approaches are to be avoided • Install erosion and sediment control measures before starting the work including: <ul style="list-style-type: none"> ○ silt fencing, temporary diversion berms, clear crush check dams or straw bales, ○ develop and implement an erosion and sediment control plan to prevent the introduction of sediment into any water body during all phases of the work, ○ inspect erosion and sediment control measures and structures regularly during the course of construction and repair if necessary, ○ maintain the erosion and sediment control measures and structures regularly during all phases of the activities, ○ monitor the watercourse regularly for signs of sedimentation during all phases of the works, undertakings and activities and take corrective action if required, ○ use biodegradable erosion and sediment control materials whenever possible, ○ keep the erosion and sediment control measures in place until all disturbed ground has been stabilized, ○ remove all erosion and sediment control materials (unless biodegradable) once site has been stabilized, and ○ dispose of, and stabilize, all excavated material on land in a designated area; No debris will remain within the high-water mark or placed into a stream. • Remove temporary bridge crossing prior to the spring freshet, unless the crossing has been constructed above the annual spring high water level

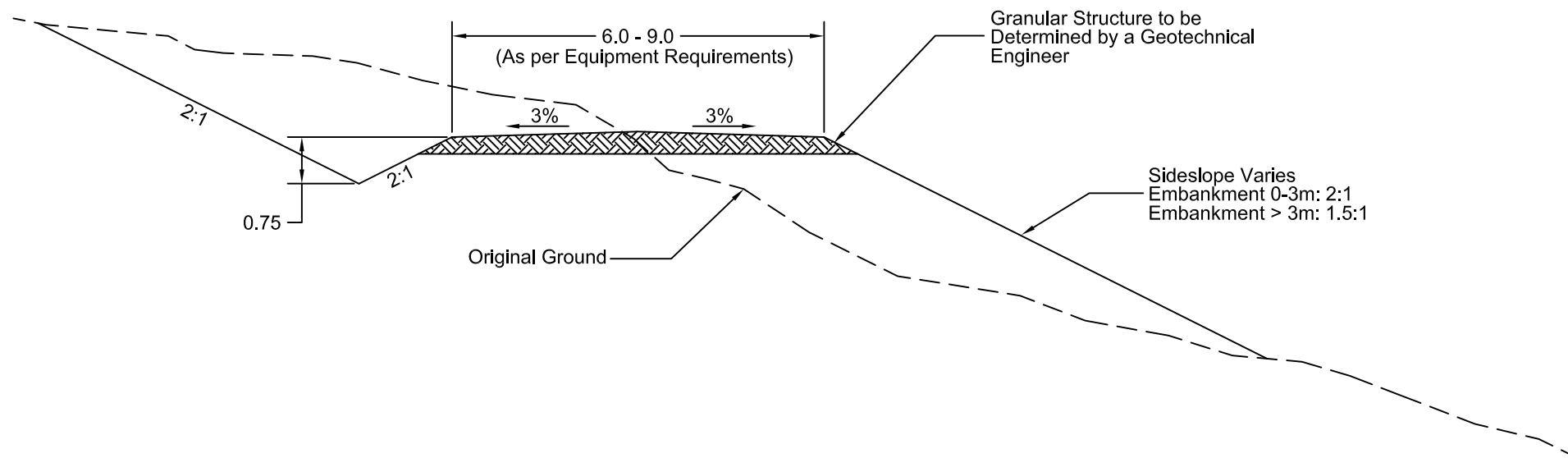
ENVIRONMENTAL COMPONENT	MITIGATION
Protection of fish and fish habitat from other deleterious substances	<ul style="list-style-type: none"> • Prevent deleterious substances such as new concrete (i.e. it is pre-cast, cured and dried before use near the watercourse), grout, paint, ditch sediment and preservatives from entering the watercourse by: <ul style="list-style-type: none"> ○ develop a plan to prevent deleterious substances from entering a water body, ○ maintain all machinery on site in a clean condition and free of fluid leaks, invasive species, and noxious weeds, ○ wash, refuel and service machinery in such a way as to prevent any deleterious substances from entering a water body, ○ store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering a water body, ○ dispose of all waste materials on land in a designated area away from the ordinary high water mark of any water body. • Design the bridge so that storm water runoff from the bridge deck, side slopes and approaches directly run off into a retention pond or vegetated area • Implement a response plan immediately in the event of a spill of a deleterious substance (including sediment). <ul style="list-style-type: none"> ○ stop all works, undertakings and activities. ○ report spill immediately when a deleterious substance enters a water body. ○ contain water with deleterious substances. ○ clean-up and dispose of water contaminated with deleterious substances. • Use an emergency spill kit

3.6 ACCESS TIE-IN AND STAGING AREAS

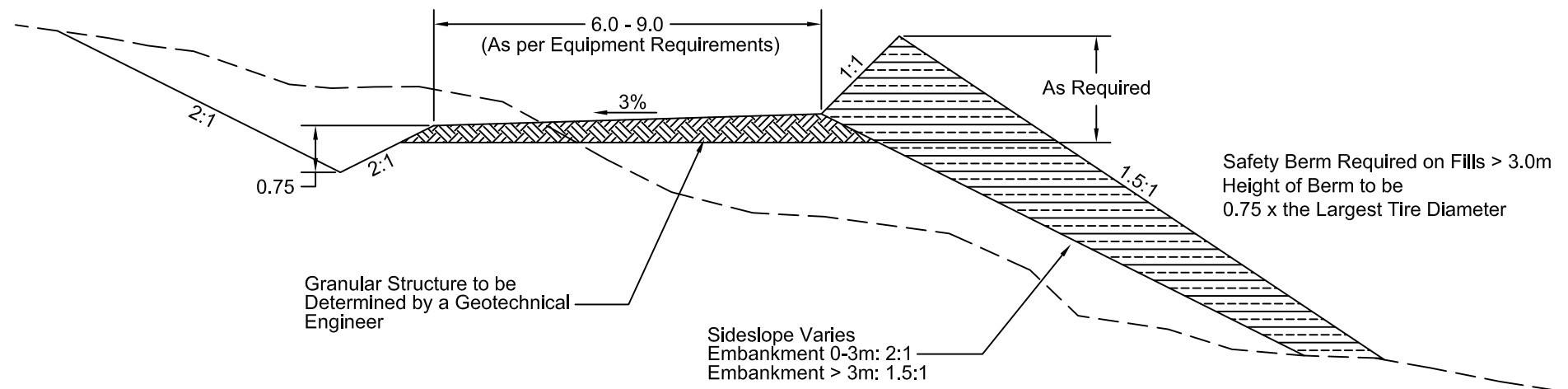
Pre-existing disturbance areas are used for staging construction and road maintenance equipment and material (e.g., N-AML waste rock, sand, inert supplies).

NOT FOR CONSTRUCTION

**Typical Cross-Section
Access Road**



**Typical Cross-Section - Safety Berm
Haul Road**



Notes:

1. Drawings not for construction.
2. Cut and fill as appropriated to suit topography and soil conditions.
3. Contour interval 2m.
4. See detail for typical bridge installation.
5. Pullouts will be required. Locations to be determined and are dependant on the intervisibilty of pullouts.
6. Safety berms required along length of roadway. Height of berm shall be 3/4 the diameter of the largest vehicle tire.
7. Additional roadwidth required to accommodate safety berm construction.
8. Shown for single lane radio controlled application, for two-way traffic road width will be 3x the width of the largest vehicle.

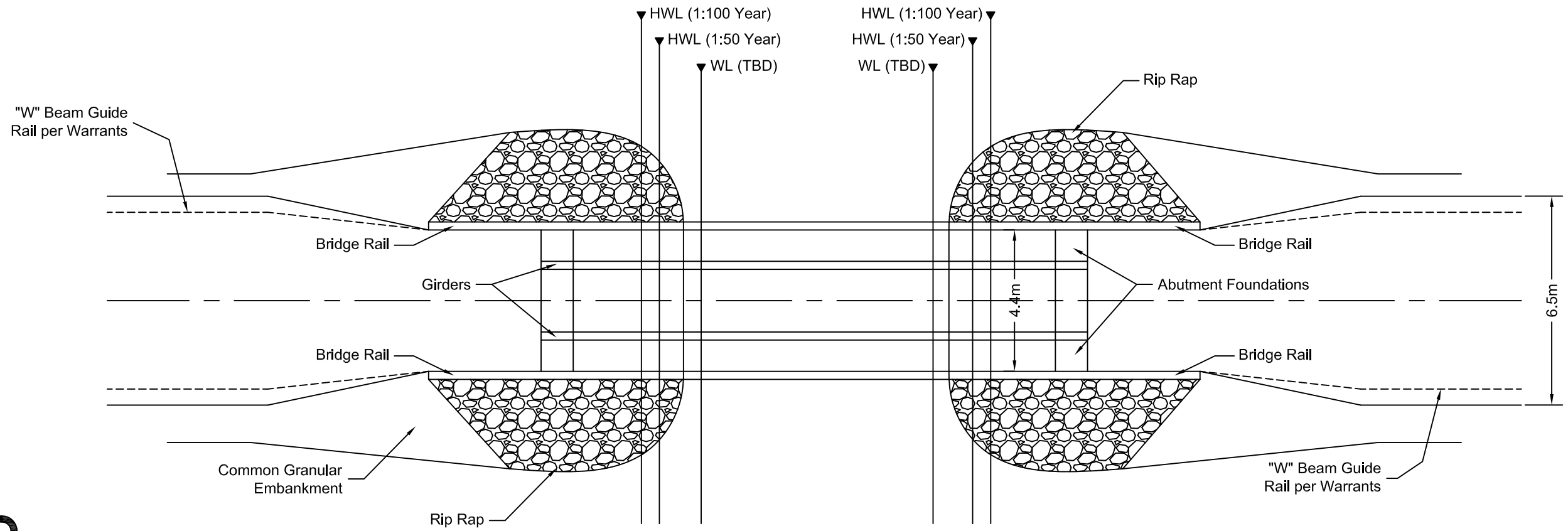


ALEXCO RESOURCE CORP

FIGURE 3-1

DEPT.	APPROVED BY	DATE	COMMENTS
SURVEY			Based on Y.E.S Conceptual Drawing E10012.DWG
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

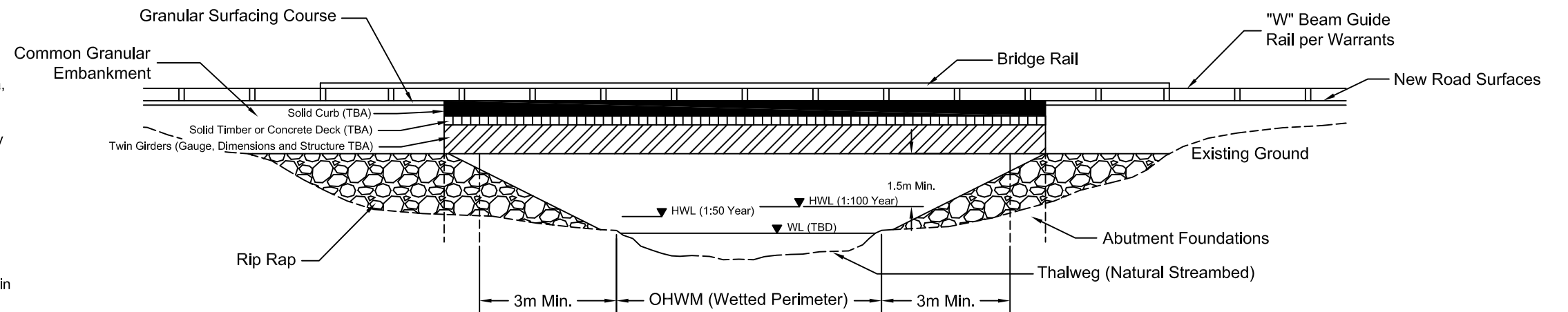
TITLE: Typical Conceptual Road Section	
Keno Hill Silver District Mining Operations	
Drawn by: D. Silander	Scale: 1:100
Date: June 23, 2012	Approval: _____ Date: _____
File:	



NOT FOR CONSTRUCTION

Notes:

1. Bridge elevation, length and abutment positions to be determined by contributing drainage area calculations to a 1:100 year flood event. Governing criteria for the height of the bottom of the bridge girders (lowest Obstacle over the stream) was provided by Transport Canada, marine safety who requires that this elevation be at least 1.5m above the 1:100 flood event elevation. (TBD)
2. Rip rap gradation to be confirmed subject to maximum stream velocity calculations at a 1:100 year flood event.
3. Abutment type and foundation design to be determined subject to geotechnical investigations and recommendations.
4. Silt fencing to be deployed during installation as required.
5. No machine clearing to be employed within 30m of the wetted perimeter (OHWM).
6. Detailed designs will be sealed by a professional engineer registered in the Yukon, and submitted to the appropriate agencies prior to construction.
7. Determine navigable waters protection act applicability first by using "Minor Works and Water User Guide" (Transport Canada).



ALEXCO RESOURCE CORP

FIGURE 3-2



DEPT.	APPROVED BY	DATE	COMMENTS
SURVEY			Based on Y.E.S Conceptual Drawing E10012.DWG
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

TITLE: Typical Conceptual Bridge Design	
Keno Hill Silver District Mining Operations	
Drawn by: D.Silander	Scale: 1:150
Date: June 22, 2012	Approval: Date:
File:	

3.7 OVERVIEW OF ROAD CONSTRUCTION

Access road upgrades for KHSD Mining Operations commenced in 2009. Roads upgraded or constructed between 2007 and 2009 under Keno Hill Exploration Class III Operating Permit LQ00186 were subsequently used for haulage and mill access. Table 3-4 provides a summary of the dates and work completed on the various roads utilized to develop the mineral resource, operate the mines and process the ore.

Table 3-4: Road construction history

	ROUTE	YEAR	DESCRIPTION
BELLEKENO HAUL ROAD	Bellekeno East Portal Exploration Access	2008	Access road constructed from existing placer mine road across Thunder Gulch to laydown yard and portal. Crossing over Thunder Gulch abandoned, and culvert removed when Bellekeno Haul Road constructed.
	Bellekeno East Portal to Bellekeno 625 Adit	2007 2008 2011	Route pioneered Roadbed laid with development rock from the new mine portal Road widened to 9 m or more; clearer lines of site in corners established
	Powerline Road	2007 2009 2011	Brushing of existing road Upgrades included ditching and culvert replacement Road widened to 9 m or more; clearer lines of site in corners established
	Bellekeno 625 Adit Bypass	2010	Road constructed above adit that links to the Powerline Road
	Duncan Creek Road	2010	Road crossing established
	Lightning Creek Bypass Road	2010 2011	Haul road constructed across third party claims and bridge over Lightning Creek installed Completion of Lightning Creek Bridge
	Sourdough Trail	2010	Upgrades to Right-of-Way on the public road
BERMINGHAM HAUL ROAD	Birmingham Access Road	2020 2021 2023	Improvements included grading and construction of berms from Calumet Road to the New Birmingham Portal, water treatment plant and P-AML pad area Road widened and runaway lanes installed Runaway lane widened
	Calumet Road	2009 2021	Upgrades from Duncan Creek Road to Galeno 300 completed Roadbed laid, route widened, berms added, runaway lanes constructed to Hector Adit
	Duncan Creek Road	2021 2023	Upgrades to Right-of-Way on the public road and intersection with Calumet Road Ditches cleared and enlarged where needed
CHRISTAL LAKE ROAD	Christal Lake Road	2009 2010 2011 2022	Ditches cleared and enlarged where needed and culverts placed Road upgraded Berms added Road resurfaced
	Flame & Moth Access Road	2010	Spur road into District Mill Site constructed
	Mill Bypass Road	2011	Construction of road to bypass mill yard from Duncan Creek Road
	Silver Trail Highway	2010	Intersection required widening and brushing to increase visibility
DISTRICT MILL TRUCK ACCESS	Bellekeno Haul Road	2009	Extension of the Bellekeno Haul Road from the Duncan Creek Road to the Mill
	Duncan Creek Road	2009 2021 2023	Intersections with existing roads off of Duncan Creek Road upgraded Brushing of access to Flame & Moth ventilation raise completed to increase visibility Truck loading ramp area widened to reduce encroachment on public road
	Ore pad access	2022	Access to the District Mill yard from the ore pad rerouted to improve worker safety

LUCKY QUEEN ACCESS ROUTE	Bellekeno Haul Road	2011	Intersection with Onek Connector established at along the Powerline Road section
	Lucky Queen Road	2011	Existing road cleared and upgraded to an average width of 6 m
	Onek Connector	2011 2012 2013	Pioneering of the route from Bellekeno Haul Road to Wernecke Road completed Road widened, brush cleared Installation of the Onek Bridge across Lightning Creek completed
	Wernecke Road	2011	Brush clearing, drainage ditch and upgraded to an average width of 6 m from Keno City to the Lucky Queen Road intersection

Upgrades to haul roads and access routes are completed as needed (i.e., in September 2023 improvements to the Birmingham Haul Road runaway lanes were made following an engineering review).

As the reclamation and closure of historic liabilities is implemented by ERDC in the Keno Hill mining camp, some changes to access routes utilized for the KHSD Mining Operations will likely be required.

- It is expected that the Christal Lake Road will be altered for mine traffic to bypass of the ERDC Silver Trail Water Treatment Plant. Pre-existing roads and disturbances in this area will be utilized to accommodate the bypass.
- Upgrades to the Wernecke Road for remediation work in the vicinity of Sadie Ladue and the historic Wernecke townsite will be required. Depending on the timing of the work KHSD Mining Operations activities at the Lucky Queen site may be supported or restricted.
- Reclamation of some historic sites on Galena Hill will utilize roads used for the New Birmingham Mine. Additional maintenance and temporary diversions are expected.

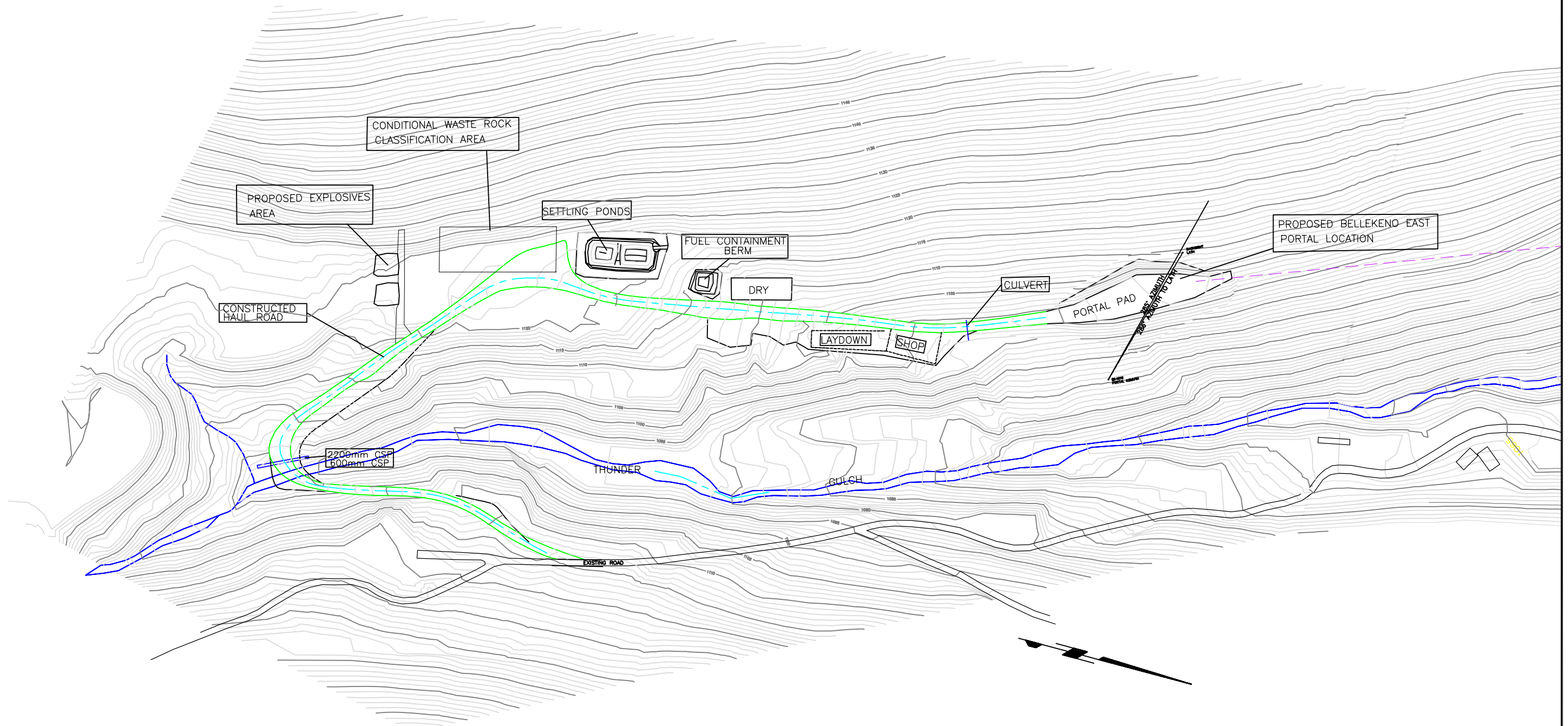
3.7.1 Bellekeno Haul Road

An as-built of a haul road that provided access to the Bellekeno East Portal area prior to the development of the Bellekeno Haul Road was included in the 2008 Bellekeno underground exploration and development application for a water licence and mining land use amendment (see Figure 3-3). The access road proposed to connect the Bellekeno 625 Adit to the Bellekeno East Portal Area and the existing Powerline Road to be upgraded that extended from the Sourdough Trail to the Bellekeno 625 Adit is illustrated on Figure 3-4 (ACG, 2008).

In 2009, the Lightning Creek Bypass Road Construction and Operation Plan was prepared to obtain the necessary permits and authorizations to construct a haul road that would bypass the community of Keno City. The route extends from the Sourdough Trail to the District Mill area and crosses quartz and placer claims held by third parties, as illustrated in Figure 3-5.

The as-built drawings for the Bellekeno Haul Road and Lightning Creek Bridge are included in Appendix A.

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NO	DESCRIPTION	BY	DATE	NO	DESCRIPTION	BY	DATE
					Modified by Access Consulting Group	HD	Jan. 2008

SECTION:	
SCALE: 1:2000	DATE
DESIGNED BY: RSC	15/10/07
DRAWN BY: RSC	12/12/07
CHECKED BY:	
APPROVED BY:	

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REV.
PORTAL.DWG	ED7049	ASBUILT	0

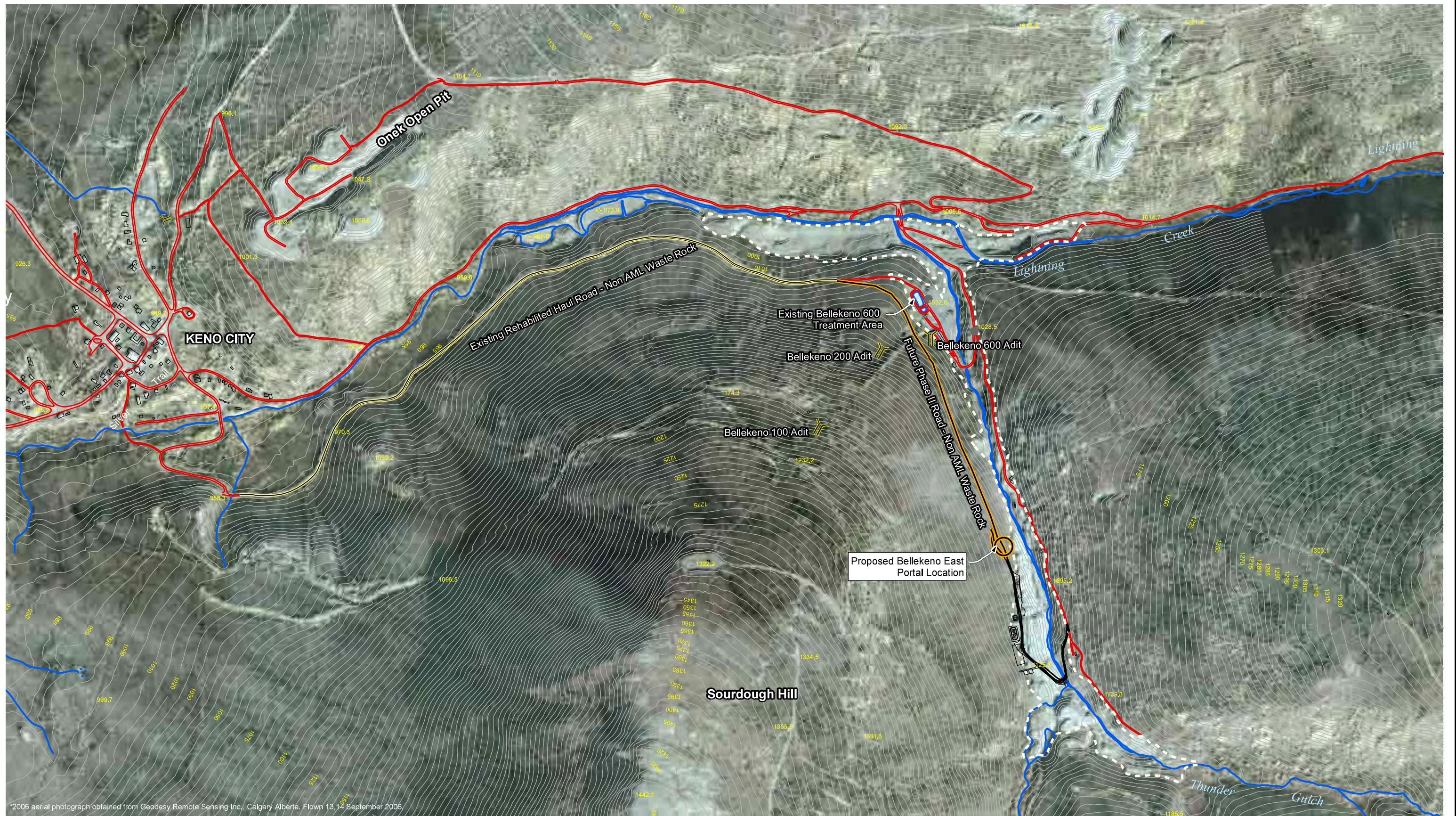


FIGURE 3-3 BELLEKENO EAST SITE PLAN

BELLEKENO PROJECT

ALL WEATHER ACCESS ROAD AND SITE WORKS AS-BUILT

PLAN SHEET ACCESS ROAD



*2006 aerial photograph obtained from Geodesy Remote Sensing Inc., Calgary Alberta. Flown 13,14 September 2006.



1:10,000
(when plotted on 11x17 inch sheet)



Legend

- Adit
- Proposed Portal Location
- Proposed Road
- Existing Rehabilitated Haul Road
- Public Road
- Exploration roads
- Contour
- Surface water (actual and potential)
- Placer Mining Area



ALEXCO RESOURCE CORP.

WATER LICENCE APPLICATION & MINING LAND USE APPROVAL AMENDMENT REQUEST

BELLEKENO LOCATION MAP

Drawn By: HD	Date: December 2007	FIGURE 3-4
Checked by: NS/DC	<small>File: F:\Projects\Map\Projects\ALEX-05-07\gms\Bellekeno\Bellekeno_L10_MLU_Decl10_L10_Bellekeno_20.mxd</small>	



Aerial photograph obtained from Geodesy Remote Sensing Inc., Calgary Alberta. Imagery acquired September 13 and 14 2006.

Quartz and placers claim boundaries are current as of Feb. 24th 2010. Data source: <http://geomaticsyukon.ca>.

1:9,000 (when plotted on 11x17 inch sheet)



Quartz Claim Owners

- AKHM/ERDC
- Matthias Bindig
- Mega Silver Inc.
- Silverquest Resources Ltd.

Placer Claim Owners

- Frank Taylor
- Duncan Creek Goldbusters Ltd.

Roads

- Haul/Public, Two Way
- Haul Road; One Way
- Haul Road; Two Way
- Silver Trail Highway
- Public Road
- Site Road; No Haul Truck Traffic

Other

- Highway Crossing
- Powerline
- Right-of-Way
- Easement

Layout and final construction may vary as dictated by final engineering design and site conditions encountered during construction.



BELLEKENO MINE PROJECT

**FIGURE 3-5
HIGHWAY ACCESS AND WORK
WHITHIN RIGHT-OF-WAY**

Drawn By: MD/EA March 2010 Verified by: RM

D:\Project\AllProjects\ALEX-05-01\Bellekeno\GIS\mxd\QML Plans\New_Roads_Survey_March2010_wt_Claims.mxd

3.7.2 New Bermingham Mine Traffic Route

In 2018, Revision 4 of the KHSD Mining Operations Road Construction Plan was issued to obtain the necessary permits and authorizations to upgrade existing public and private roads for mine traffic associated with the New Bermingham Mine as shown on Figure 3-6. The Bermingham Haul Road includes the Bermingham Access Road, and sections of the Calumet Road. Mine traffic for the New Bermingham Mine utilizes a section of the Duncan Creek Road. As-built drawings are to be provided upon engineer approval.

Upgrades to the Duncan Creek Road included widening, ditch clearing, roadbed improvements and line of sight clearing at the intersection with Calumet Road. The road was upgraded and is maintained using cut and fill techniques from hillside gravel sources.

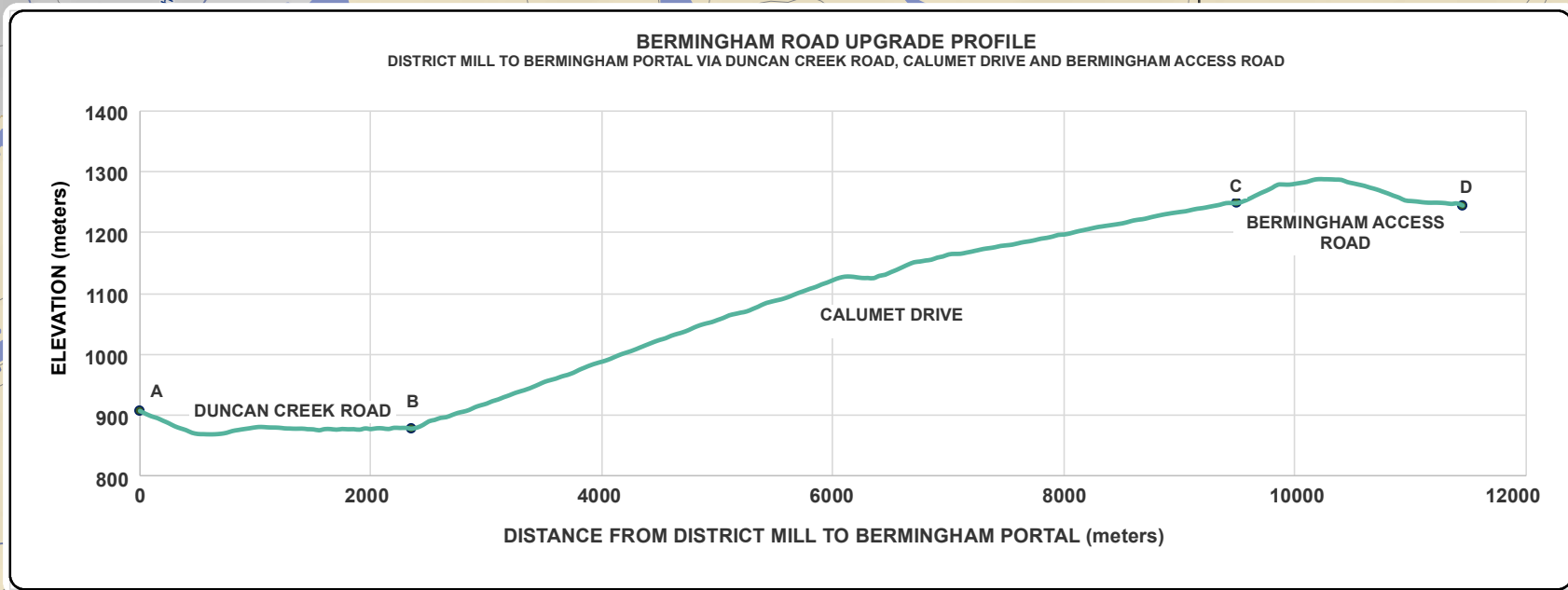
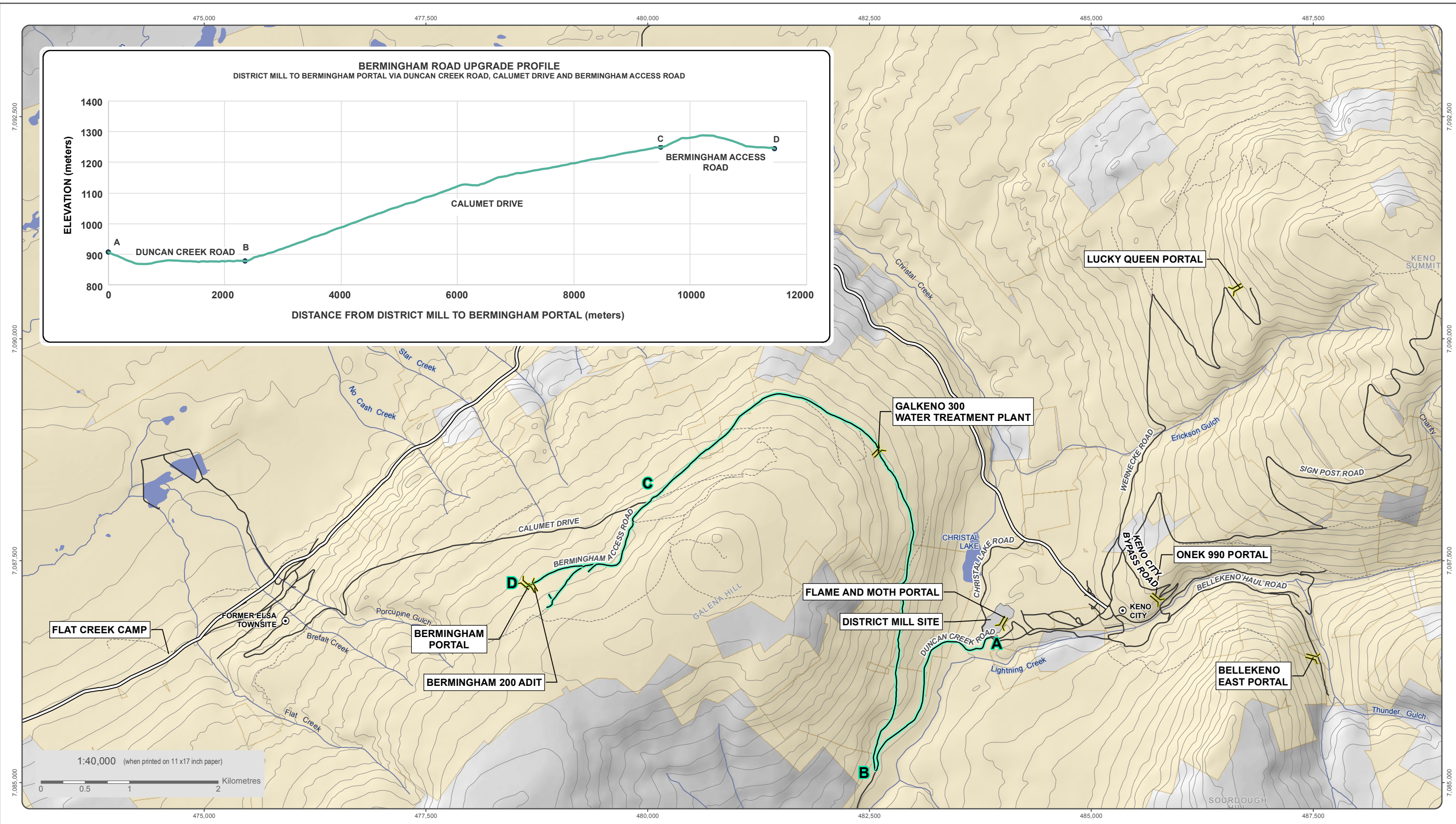
The access road from the Duncan Creek Road to the Hector Mine along the existing Calumet Road underwent an engineering review to identify areas of risk and safety improvement opportunities. As a result of this assessment, the overall safety of the road was improved with the widening of the road where possible, the addition of berms and pullouts for vehicle passing, runaway lanes, and additional warning, speed and radio callout signage.

3.7.3 District Mill Truck Access Routes

Truck access routes at the District Mill are realigned as necessary to accommodate expanding storage facilities and improvements to infrastructure. Haulage routes at the District Mill site include:

- routes from Duncan Creek Road to the mill ore pad,
- routes from Flame & Moth Portal to the mill ore pad,
- routes from the District Mill to the Dry Stack Tailings Facility,
- routes from Flame & Moth Portal to the waste rock storage area, and
- various routes to the vent raise, storage yards, and monitoring wells.

The Dry Stack Tailings Facility Phase 2 expansion will incorporate the haulage route currently in place entering the District Mill area from Duncan Creek Road opposite of the Bellekeno Haul Road. The truck access routes present as of October 2022 are illustrated on the design for the expansion (Figure 3-7).



National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.

Satellite imagery obtained from Yukon Geomatics map service <http://mapservices.gov.yk.ca/ArcGIS/services> on September 2018

Datum: NAD 83; Map Projection: UTM Zone 8N

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- Adit
- KHSD Mill
- Alexco/ERDC Quartz Claims
- Proposed Road Upgrades
- Silver Trail Highway
- Other Road
- Limited-Use Road
- Waterbody
- Watercourse
- Contours (100 ft intervals)



ALEXCO KENO HILL MINING CORP.

FIGUR 3-6

NEW BIRMINGHAM MINE

TRAFFIC ROUTE

SEPTEMBER 2018

D:\Projects\AllProjects\Keno_Area_Mines\BERM\Map01-Overview\04-Specific\Traffic Management\Berm_overview_road_upgrade_profile_20180924.mxd
(Last edited by: amathew@alexco.ca 24/09/2018 14:23 PM)

Q:\Whitehorse\0201 Drawings\Keno DSTF Phase 2 Design\ENG.WARC04307-01 DSTF Final Design Fig. 1-RO JS JUNE 16 2023.dwg [FIGURE 1] June 16, 2023 - 9:28:22 am (BY: SWARTZ, JACOB)



	VOLUME	TONNAGE *
PHASE 1 (ORIGINAL DESIGN) **	125,000 m ³	286,000
PHASE 1 (AS-BUILT)	100,000 m ³	229,090
PHASE 2 (DESIGN)	260,000 m ³	595,000
TOE BUTTRESS (DESIGN)	4,000 m ³	N / A

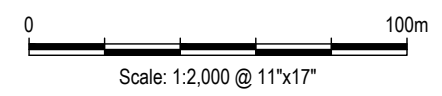
* TONNAGE BASED ON 2.29 T / m³ PER HECLA
 ** FULL FOOTPRINT OF ORIGINAL DESIGN NOT CONSTRUCTED



ISSUED FOR REVIEW

LEGEND	
	- DSTF TAILINGS FOOTPRINT
	- PHASE I AS-BUILT FOOTPRINT
	- PHASE II TAILINGS FOOTPRINT
	- EXISTING SURFACE RUNOFF DITCH
	- PROPOSED SURFACE RUNOFF DITCH (SHOWN WHITE)
	- PHASE I ORIGINAL DESIGN FOOTPRINT

NOTE
 - DRONE IMAGERY COLLECTED BY HECLA IN OCTOBER 2022



CLIENT




**DRY-STACKED TAILINGS FACILITY PHASE II DESIGN
 KENO HILL DISTRICT MILL SITE, YUKON**

**DISTRICT MILL TRUCK ACCESS ROUTES
 OVERALL DSTF FINAL CONSTRUCTION PLAN**

PROJECT NO. ENG.WARC04307-01	DWN CB	CKD IM	REV 0
OFFICE EBA-WHSE	DATE June 15, 2023	Figure 3-7	

3.7.4 Lucky Queen Access Route

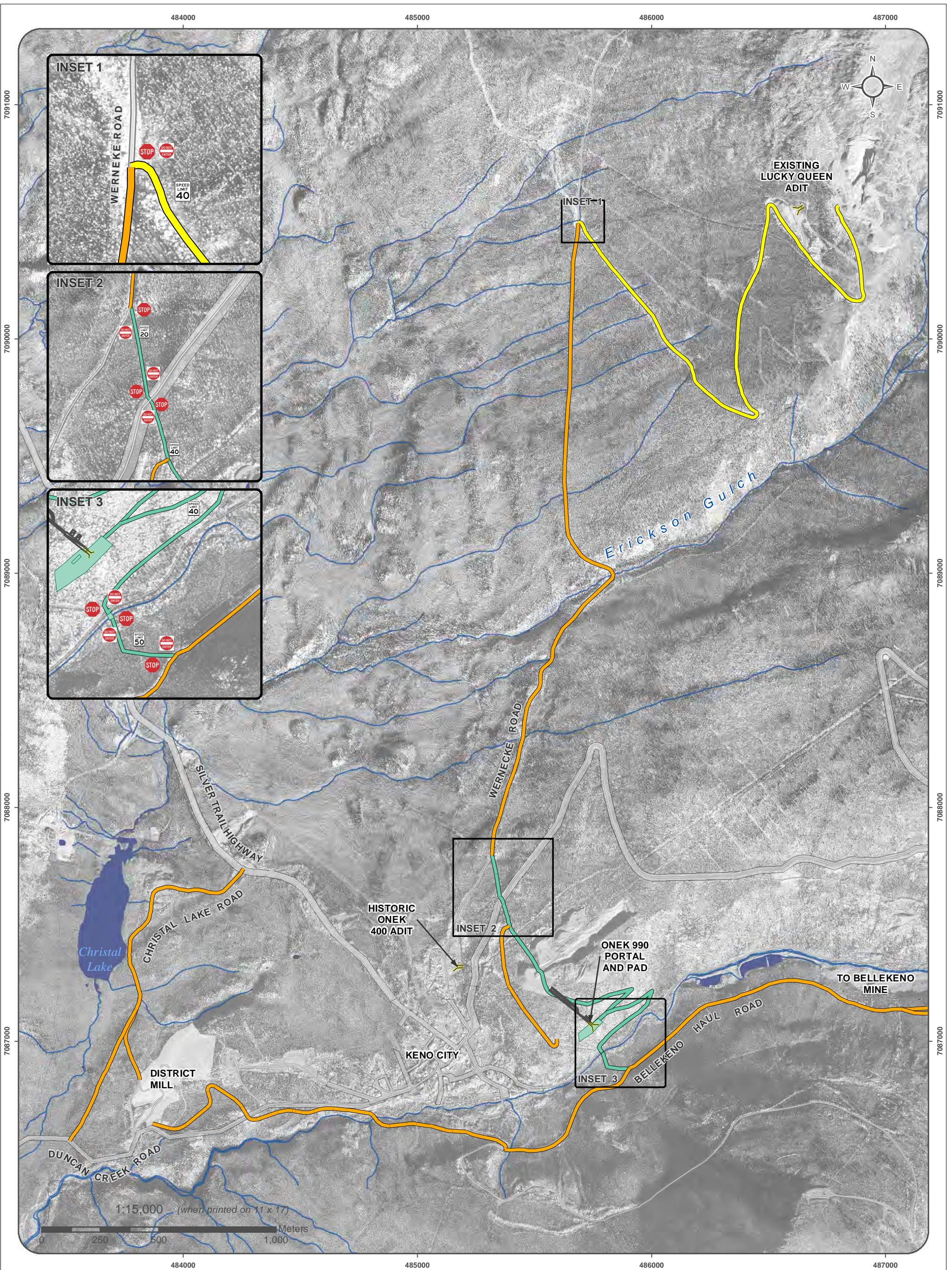
The Lucky Queen Access Route is required to accommodate mine traffic associated with the Lucky Queen and Onek mine sites. The routing diverts mine traffic around Keno City rather than through the community (Figure 3-8). Improvements to the Lucky Queen Road, a section of the Wernecke Road and the Onek Connector are required to satisfy haul road specifications. As part of standard practice, the routing will be surveyed and engineering drawings will be developed to ensure the road is built to appropriate standards. Conceptual and construction engineering drawings will be provided to regulatory authorities as required. The proposed routing shown for environmental assessment is conceptual in nature, and it will be refined incorporating standard engineering inputs.

The Lucky Queen Access Route does not cross or come within 30 m of any watercourse or waterbody other than at the approach to Lightning Creek and at the Onek Bridge. Ditching along the road will facilitate appropriate drainage. Culverts will be installed at the intersections with Wernecke Road, Lightning Creek Road, Bellekeno Haul Road and Signpost Road for drainage. The cleared vegetative debris and topsoil will be stockpiled along the routing in natural cleared areas for road reclamation.

The Onek Connector extends from Wernecke Road, crossing Signpost Road, along the historic Onek power line, to the Onek 990 Portal, crossing Lightning Creek Road and the Onek Bridge across Lightning Creek to the Bellekeno Haul Road (Figure 3-9). Type B Water License MS10-029 for the installation of the Onek Bridge was approved in December 2012, and construction completed in May 2013. The Onek Bridge is a single-lane, steel girder prefabricated bridge, approximately 9 m long and 4.4 m wide. The bridge is designed to have the flow capacity of a 1:100 year flood event; it is designed to support mine haul traffic (at least 100 t) The as-built drawings for the Onek Bridge over Lightning Creek are included in Appendix A.

Pioneering of the Onek Connector from the Wernecke Road to the Bellekeno Haul Road is complete. Further construction of the Onek Connector is required. The Onek Connector is to be a single-lane radio-controlled road, approximately 2.1 km long and 6 – 9 m wide. Some portions of the road will be wide enough to safely accommodate passing mine traffic. It is to be developed with cut/fill construction, using the fill material supplemented by some additional N-AML waste rock material (~15,000 m³ in total required). The N-AML waste rock will be sourced from KHSD Mining Operations in accordance with the current approved Waste Rock Management Plan.

A 6.5 m wide access road will be established on the north and south side of Lightning Creek to the Onek Access Bridge. Two overflow culverts will be installed within the 1:100 year flood event zone. N-AML waste rock will provide the fill material for the access road and abutments. Best management practices for work within riparian areas will be followed (see Table 3-3 and Table 5-2).



— EXISTING ROAD
— ONEK CONNECTOR
— LUCKY QUEEN ROAD

Road Right of Way

— Watercourse
 Waterbody

This map is for illustrative purposes only. This is not a legal document. Quartz claim boundaries are current as of March 26, 2012. Placer claim boundaries are current as of Feb 26th, 2012. Land Disposition data obtained from Canada Lands Survey System, current as of March 2012. Site hydrography and contours derived from 2006 aerial imagery obtained from Aero Geometrics, Calgary Alberta. Aerial photograph obtained from Geodesy Remote Sensing Inc., Calgary Alberta. Imagery acquired September 13th and 14th 2006.

Datum: NAD 83; Projection: UTM Zone 8N

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ONEK AND LUCKY QUEEN

FIGURE 3-8

**LUCKY QUEEN ACCESS ROUTE
AND ACCESS MANAGEMENT**

DRAWN BY MD

NOVEMBER 2012

VERIFIED BY KW

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(Last edited by: jgan 11/14/2012 15:07 PM)

**KENO HILL
SILVER DISTRICT MINING
OPERATIONS**

**FIGURE 3-9
CONCEPTUAL ONEK
CONNECTOR DESIGN**

- Profile A Distance Markers (distance in meters)
- Profile A
- Profile B
- Existing Roads

**NOT FOR
CONSTRUCTION**

Profiles derived from 1 meter contour data derived from 2006 aerial imagery obtained from Aero Geometrics, Calgary Alberta and Site hydrography and contours derived from 2006 aerial imagery obtained from Aero Geometrics, Calgary Alberta.

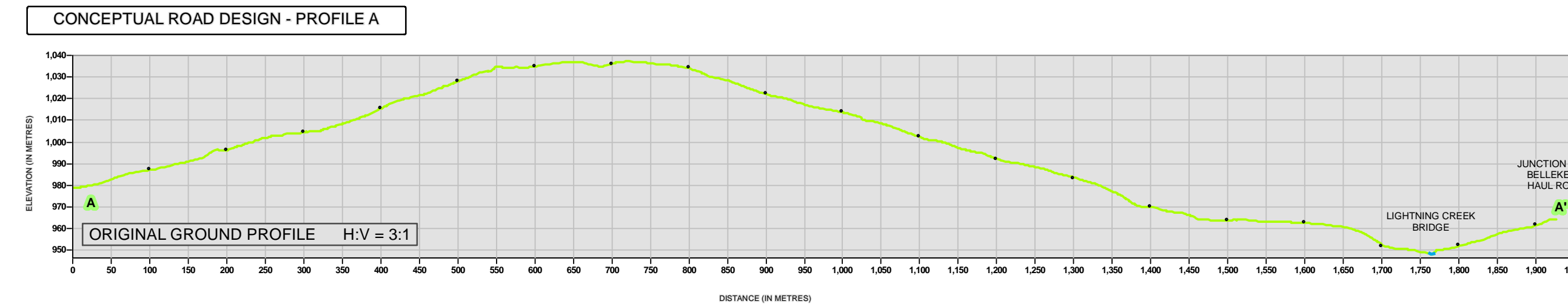
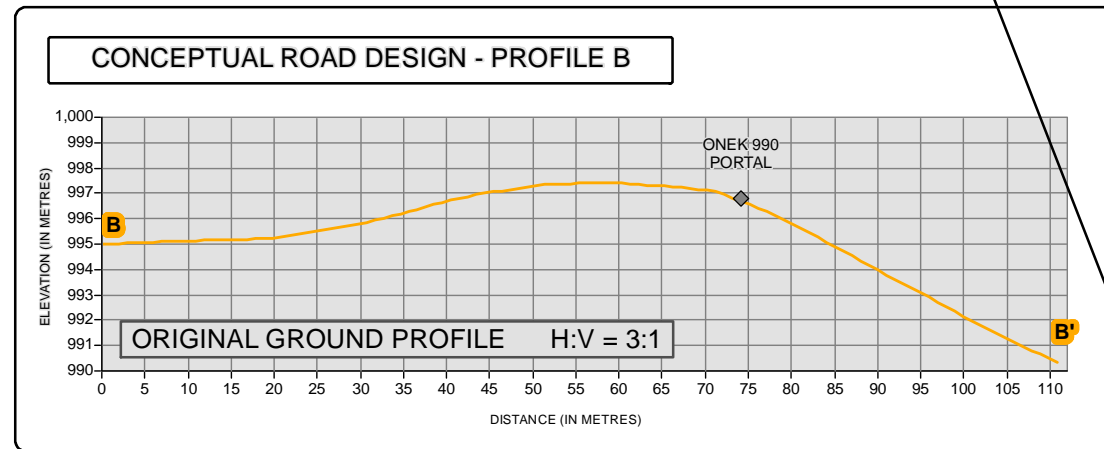
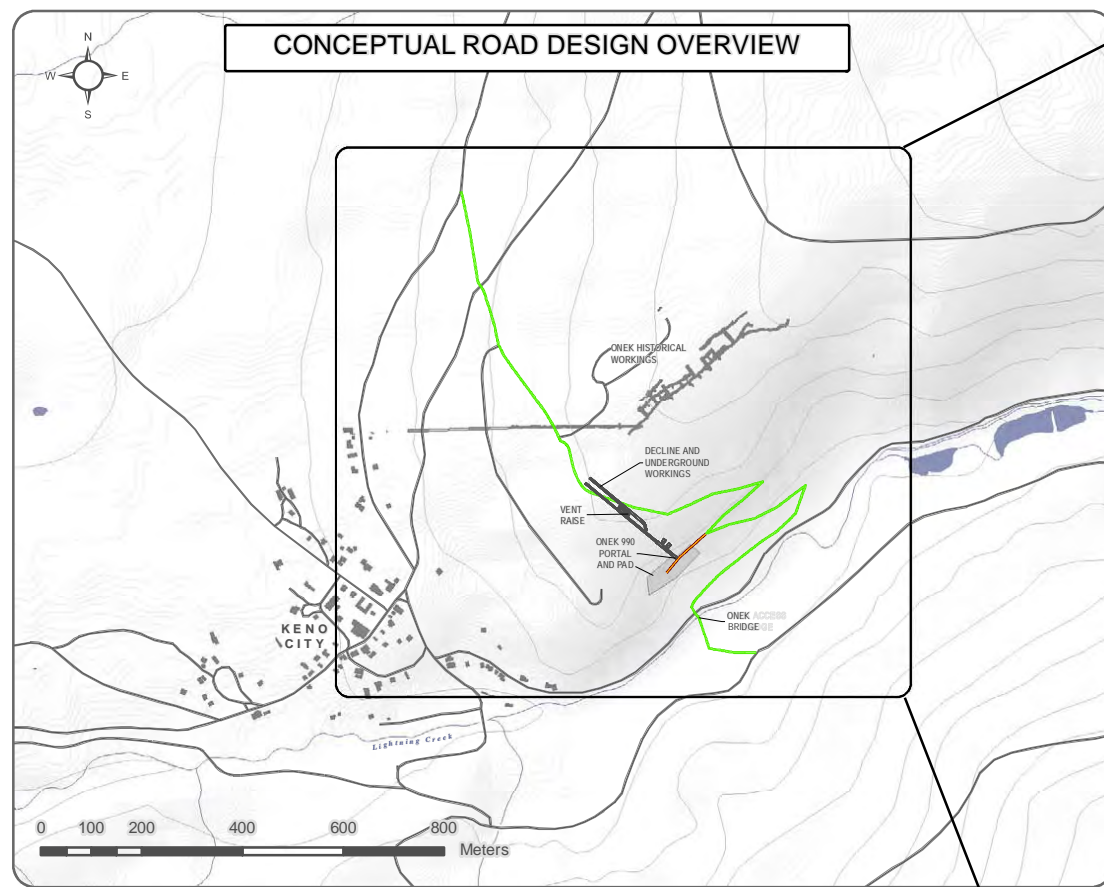
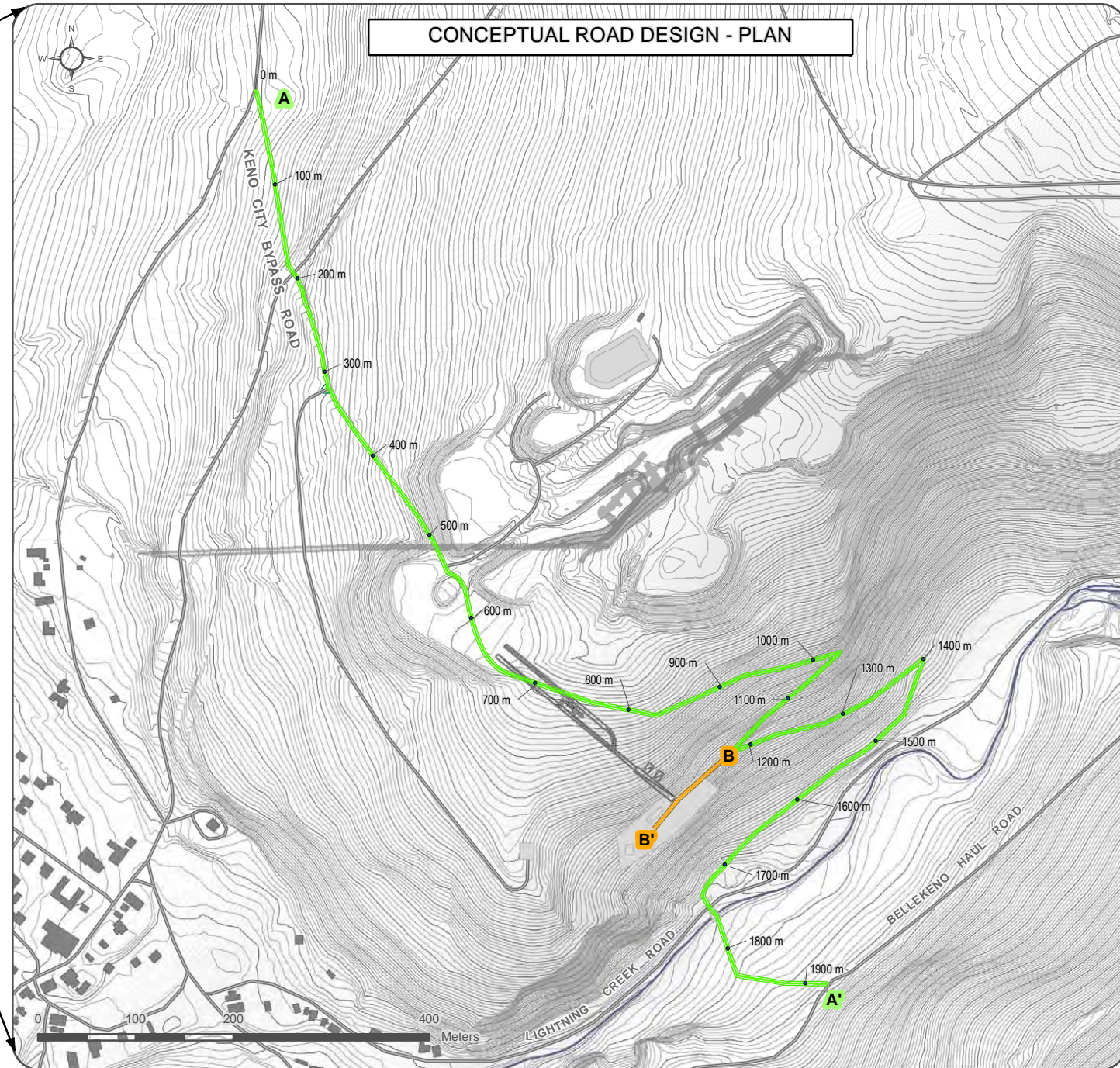
NAD 83 UTM Zone 8N

NOVEMBER 2012



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(Last edited by: medchamr; 11/12/12 15:19 PM)



4 ROAD MAINTENANCE

4.1 HAUL ROAD MAINTENANCE

Periodic grading and resurfacing as deemed necessary will be employed to keep the haul roads in good repair. Brushing within the road ROW will be required for visibility at truck crossings, runaway lanes, and bridges. Accumulated materials and debris from ditches and culvert areas will be removed to allow clean water to pass, to prevent downstream flooding, and to reduce the amount of sediment-laden water going downstream.

During the winter, haul roads will be plowed and sanded to ensure proper traction is maintained. Breaks in snowbanks on the active haul roads are to be maintained to facilitate drainage, snow clearance and wildlife crossing. During winter, access to the runaway lanes is plowed and the visibility of the signs indicating their location maintained. By March 31 of each year, all ditches and culverts are to be cleared of ice, snow and debris that would affect their operational capacity and be maintained free of such obstructions until at least October 31 of each year in accordance with the terms and conditions of Water Licence QZ18-044.

4.2 BORROW SOURCES

Borrow material for the construction, and maintenance of access roads for the KHSD Mining Operations may be extracted from the following sources, in accordance with approved construction plans under QML-0009:

- placer tailings,
- fill from road cuts,
- borrow from near road sources within KHSD Mining Operations right of ways or development footprint, and
- borrow from the District Mill area.

4.3 USE OF WASTE ROCK AND GEOCHEMICAL EVALUATION

Waste rock from the Bellekeno, Lucky Queen, Onek, Flame & Moth and New Birmingham mines, may be used for road construction, upgrades, and maintenance. The KHSD Mining Operations Waste Rock Management Plan is applied when selecting N-AML material appropriate for construction. N-AML waste rock from the New Birmingham and Bellekeno mines may be used for construction purposes throughout the KHSD. N-AML waste rock from the Flame & Moth Mine may only be used at the District Mill and immediately adjacent infrastructure. The use of N-AML waste rock within 30 m of a surface water body additional restrictions apply, as listed in the current approved Waste Rock Management Plan and Water Licence QZ18-044.

To produce suitable sized material from waste rock for construction purposes additional crushing and screening may be required. 2023 upgrades to the District Mill crushing plant will enable the belt below the crusher to be reversed, thus allowing non-ore rock to be stockpiled separately from ore. The Flame & Moth crushed waste rock is to be stockpiled at the District Mill in an area that is not accessible to the public. The New Birmingham crushed waste rock will be staged in pre-existing disturbance areas within existing right of ways or the development footprint and near to sites where the material will be utilized for construction or maintenance.

5 BEST MANAGEMENT PRACTICES

5.1 HAUL TRUCK CLEANLINESS

Haul trucks will be subject to periodic maintenance at the Flame & Moth and New Bermingham mobile maintenance shops. This maintenance may include washing, with care taken that all wash water be recycled or directed to the Flame & Moth water treatment pond, the Mill Pond or captured within the floor drains of the shops.

5.2 ROAD MAINTENANCE

Table 5-1 outlines the best management practices applied to road maintenance for the KHSD Mining Operations to protect environmental conditions and minimize disturbance to the local community.

Table 5-1: Road maintenance best management practices

ENVIRONMENTAL COMPONENT	MITIGATION
Runoff, Sediment and Erosion Control	<ul style="list-style-type: none"> • The roads are graded to allow surface water to drain off the road • Any runoff from the road surface or staging areas is conveyed into permeable roadside ditches and culverts, where it will likely infiltrate in the subsurface. During large storm events it is expected that some runoff volume will reach Lightning Creek and other waterbodies near the access roads. It is expected this volume will not be large enough to cause flooding issues downstream because the road area represents a very small percentage of the overall watershed areas. • Work that will disturb soils will be stopped during periods of high precipitation if it is likely to lead to sediment deposition into Lightning Creek • If replacement rock reinforcement is required to stabilize eroding culvert inlets and outlets: <ul style="list-style-type: none"> ○ place appropriately-sized, clean rocks into the eroding area ○ install rock at a similar slope to maintain a uniform stream bank and natural stream alignment • Operate machinery on land in stable dry areas and in a manner that minimizes disturbance to the banks of the watercourse • All storm water management culverts will be constructed to divert water beneath the roadway between road ditches and will not impact existing systems • As part of road maintenance, ruts that could be prone to erosion will be filled in • Vegetation removal will be minimized to the extent possible • Water bars will be constructed to promote proper drainage, if required • During bridge construction/ adjacent road development, temporary sediment control, such as silt fences or temporary diversion berms, will be installed, monitored, and maintained to prevent sediment runoff into the creek • If minor rutting is likely to occur, stream bank and bed protection methods (e.g. swamp mats, pads) shall be used provided they do not constrict flows or block fish passage • All vehicles will be operated to avoid rutting and gouging of roads and trails
Dust Control	<ul style="list-style-type: none"> • Application of water or non-petroleum dust suppression agents will be employed if required to control fugitive dust from haul road surfaces during the summer months. Run of mine ore from underground operations is generally wet, coarse grained and free of fines and will not create dust • See current approved Dust Management Plan
Contaminant Control	<ul style="list-style-type: none"> • Only N-AML material is used for road maintenance • Equipment used for construction and maintenance is to be free of leaks and excess oil or grease • Spill kits are in handy, nearby locations when road work is ongoing • Spill supplies stored at the warehouse include geotextile cloth and stakes for erecting sediment fencing for erosion control.

Site Isolation to Protect Habitat	<ul style="list-style-type: none"> • Temporary trails will be blocked to prevent further vehicular access • During bridge construction and road construction adjacent water, banks and riparian areas will be cleared with a brush mower or chainsaw. • Use existing trails, roads, or cut lines where possible to avoid disturbance to the riparian vegetation
Public	<ul style="list-style-type: none"> • Appropriate line-of-sight distances will be maintained to ensure crossing trucks and approaching traffic on the public roads are able to see each other

5.3 EMERGENCY RESPONSE AND FOLLOWUP

All workers are to be trained in the AKHM Mining Operations’ health and safety system, hazardous materials handling and spill response procedures. An emergency spill kit will be kept on site in case of fluid leaks or spills from machinery. The first course of action should be to ensure everyone’s safety. The next step should be to safeguard physical instabilities and contain fuels or other contaminants. Where the response involves work near water bodies the measures listed in Table 5-2 are to be followed (from YG 2011).

Table 5-2: Best management practices for emergency road work near water bodies

STAGE	MITIGATION
Actions During an Emergency Response	<ul style="list-style-type: none"> • All equipment must be washed, refuelled and serviced >30 m from water bodies • Prevent any unnecessary material from entering the water course (i.e., dirt, dirty water, concrete, debris) by building or installing structures like berms, containments, sediment fences • Place oversized rock, riprap or other non-erodible materials as necessary to provide stabilization if a bank or structure is in risk of collapsing • Operate equipment from the banks, entering the water only if necessary (i.e., to save a life) • In flooding situations, construct temporary runoff ditches, water bars or diversions to divert flow from the main channel if necessary • When possible, reposition excavated material and debris from the site in a stable location above the high-water mark such that they cannot enter any watercourse • Cover any stockpiles with poly or geotextile cloth as a temporary measure to avoid sediment runoff
Site Restoration and Follow-up	<ul style="list-style-type: none"> • Report (along with pictures) to Fisheries and Oceans Canada, Energy, Mines and Resources, Water Resources Branch and the Yukon Water Board. If the work involved a spill or equipment in water, also send the report to Environment Canada • Grade ground disturbed back to the original slope then employ measures to stabilize and revegetate the surface (i.e., installing erosion control products and silt fences in combination with mulching and seeding) • Discontinue any diversion when no longer required and where possible restore the original channel conditions • Remove rock or riprap if place in a manner that minimizes erosion and sedimentation • Inspect site after the next heavy rain and winter snow melt and stabilize as necessary • Design, obtain necessary approvals and install permanent fixes and remove temporary stabilization materials (i.e., rock) it in a manner that minimizes erosion and sedimentation

6 ROAD DECOMMISSIONING AND SITE RECLAMATION

The closure objectives specific to access roads are to:

- protect public safety, and
- enable pre-mining human and wildlife utilization of linear infrastructure.

6.1.1 Temporary Access Closure

To limit access during temporary closure, pylons and signage will be used to warn road users, and gates will be installed, as required. Bridges will not be decommissioned during a temporary closure.

During a temporary closure road will be visually inspected for signs of instability/erosion, the road surface, ditches, and culverts will be maintained.

6.1.2 Permanent Access Closure

The KHSD Mining Operations Reclamation and Closure Plan addresses the following site access roads:

- Bellekeno Haul Road from District Mill to Bellekeno East Portal (including the Lightning Creek bridge),
- Christal Lake Road (from Silver Trail Highway to the District Mill),
- Onek Connector from Bellekeno Haul Road to Wernecke Road (including the Onek Creek), and
- Birmingham access road from New Birmingham portal to Calumet Drive.

The roads identified for closure above range in width from six to nine meters and are either newly developed or reconstructed/upgraded from existing roads. Standard road decommissioning and reclamation measures at closure are described in the current approved Reclamation and Closure Plan and include culvert removal, re-sloping banks and removal of safety berms to reflect the natural topography as well as provide stability, and surface scarification to encourage natural revegetation. Decommissioning measures will involve removal of the two clear span bridges (and abutments) across Lightning Creek. The banks will be stabilized through revegetation and strategic placement of the existing rip rap. Existing public roads are to remain in place post closure.

7 INSPECTIONS, DOCUMENTATION AND REPORTING

Annual reports submitted under Quartz Mining License QML-009 include a description of any change to road management practices and summaries of road maintenance activities. Annual reports submitted under the QML-0009 include a description of activities undertaken in the previous calendar year, a workplan for the current year, along with additional reporting requirements specified in the license. All annual reports are provided to the FNNND.

Engineered road structures in use for KHSD Mining Operations are inspected weekly by AKHM and annually by an independent engineer in accordance with terms and conditions outlined in QML-0009 and Water Licence QZ18-044. The annual geotechnical inspection by an independent engineer is to be reported under QML-0009 within ninety (90) days of the inspection. The weekly inspections conducted by AKHM must be reported quarterly under Water Licence QZ18-044 and the annual geotechnical inspection is to be submitted with the annual Water Licence report.

Use of waste rock for construction purposes requires monthly inspections between May and October of each year and the following data must be submitted with the Water Licence QZ18-044 annual report:

- a) a record of the following during all inspections and provide the details as part of the annual report,
- b) any physical instability including erosion,
- c) upstream ponding of water and downstream seepage,
- d) the location of ponding and seepage,
- e) the rate of flow, field pH, conductivity and concentrations of inductively coupled plasma (ICP) metals of ponding or seepage,
- f) visual evidence of sulphide oxidation including snow melt areas or the presence of oxidation products, and
- g) trends in pH, conductivity, and concentrations of ICP metals for any recurring seepage or ponding.

Any drainage or seeps observed between May and October from areas where waste rock was used for road construction is monitored for estimated flow volume and basic field parameters of pH and conductivity. Evidence of sulphide oxidation such as snow melt areas or the presence of sulphide oxidation products are also noted. This monitoring occurs in conjunction with the monthly regional surface and groundwater monitoring program.

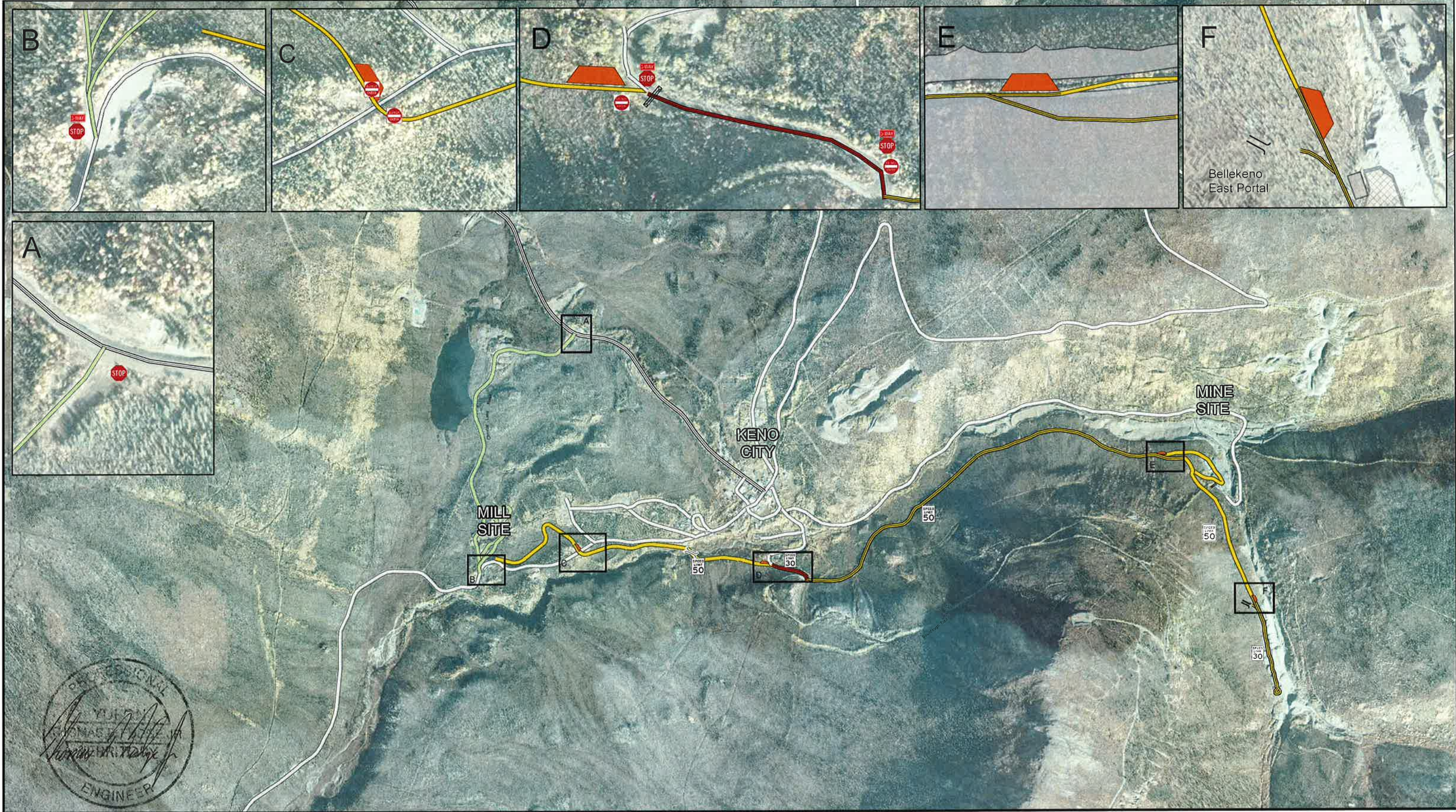
To date, no seeps have been detected from areas where N-AML waste rock was used for road construction. Should the presence of an on-going seep be detected it will also be tested monthly on-site zinc analysis between May and October. If seepage quantity is sufficient, samples will be submitted for dissolved ICP metals, Ammonia-N, Nitrite-N, Nitrate-N, phosphorous, sulphate, dissolved organic carbon (DOC), hardness, alkalinity, total suspended solids (TSS), pH, conductivity and toxicity testing on a quarterly seasonal basis (see current approved Adaptive Management Plan for additional details).

8 REFERENCES

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APPENDIX A:

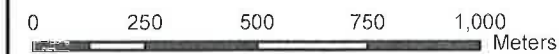
AS-BUILT DRAWINGS



Aerial photograph obtained from Geodesy Remote Sensing Inc., Calgary Alberta, Imagery acquired September 13 and 14 2006. Site hydrography and contours provided by Aero Geometrics LTD, derived from aerial photograph.

Datum: NAD 83, Map Projection: UTM Zone 6N

Main Map: 1:17,000
 All Inset Maps: 1:2,500 (when printed on 11 x17 inch paper)



Haul Roads

- Haul Road, Two Way
- Haul Road, One Way
- Haul Road, Two Way

Other Roads

- Highway
- Local Road
- Mill Access, No Haul Traffic

Traffic Management and Access Control

- Haul Truck Pullout
- Private Haul Road Do Not Enter Authorized Traffic Only
- Gate

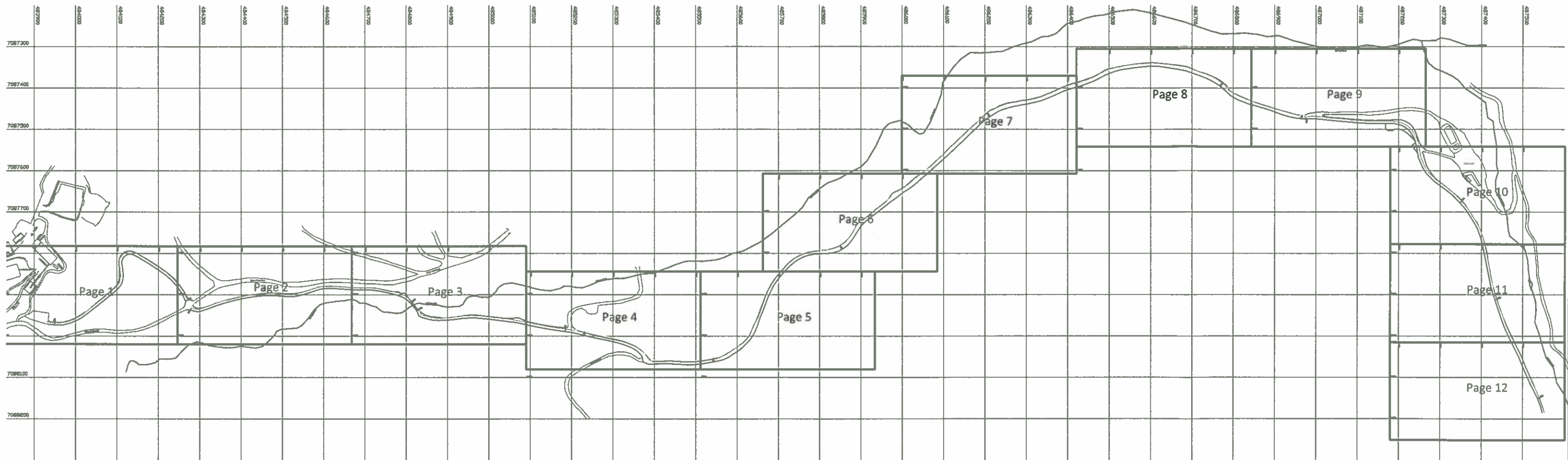


ALEXCO KENO HILL MINING CORP.

BELLEKENO HAUL ROAD

DRAWN BY MD MARCH 2012 VERIFIED BY VB

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Legend	
Existing Road	
Min. Single Lane Width	
Min. Double Lane Width	



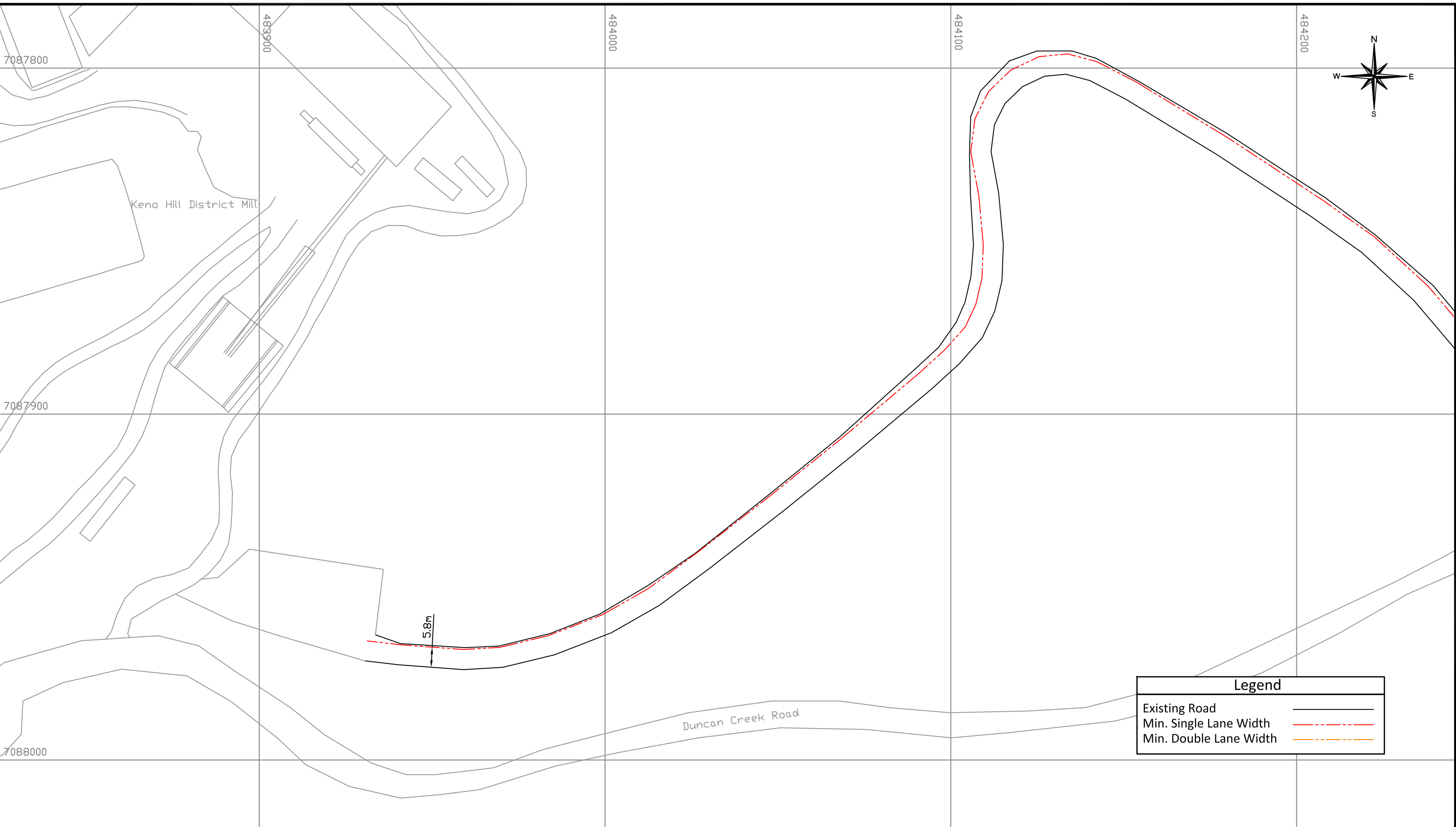
ALEXCO RESOURCE CORP
Bellekeno Mine

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ENGINEERING			
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ALEXCO MANAGER			
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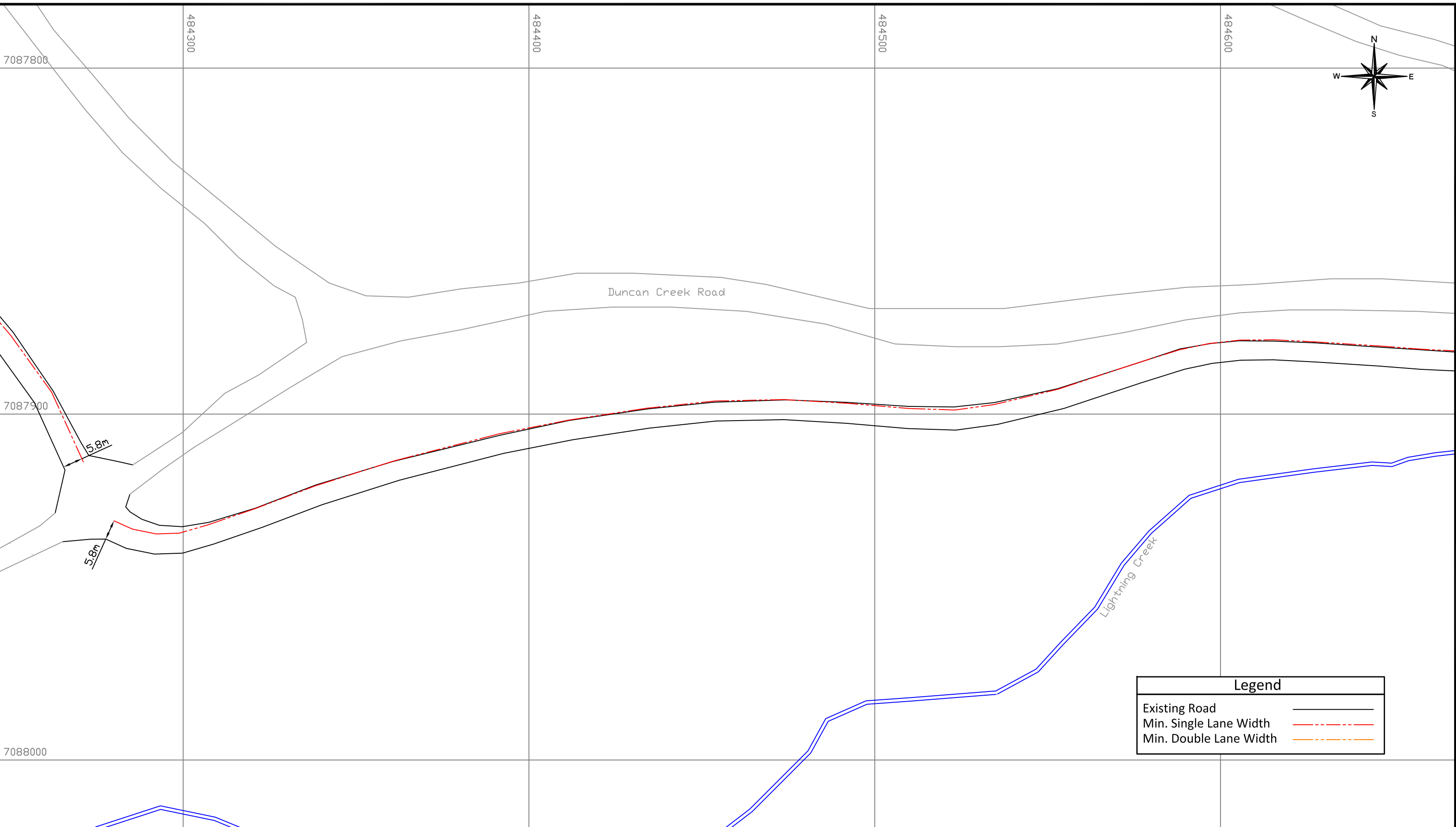
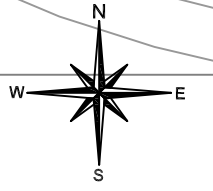
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As-Built

Drawn by: DS	Scale: 1:10000
Date: Nov. 22, 2011	Approval: _____ Date: _____
File:	



Legend	
Existing Road	
Min. Single Lane Width	
Min. Double Lane Width	

 <p>ALEXCO RESOURCE CORP Bellekeno Mine</p>	DEPT.	APPROVED BY	DATE	COMMENTS	TITLE:	Bellekeno Haul Road	
	SURVEY					As-Built	
	ENGINEERING					Page 1 of 12	
	GEOLOGY					Drawn by: DS	Scale: 1:1000
	ALEXCO MANAGER					Date: Nov. 22, 2011	Approval: _____ Date: _____
PROCON SUPER					File:		



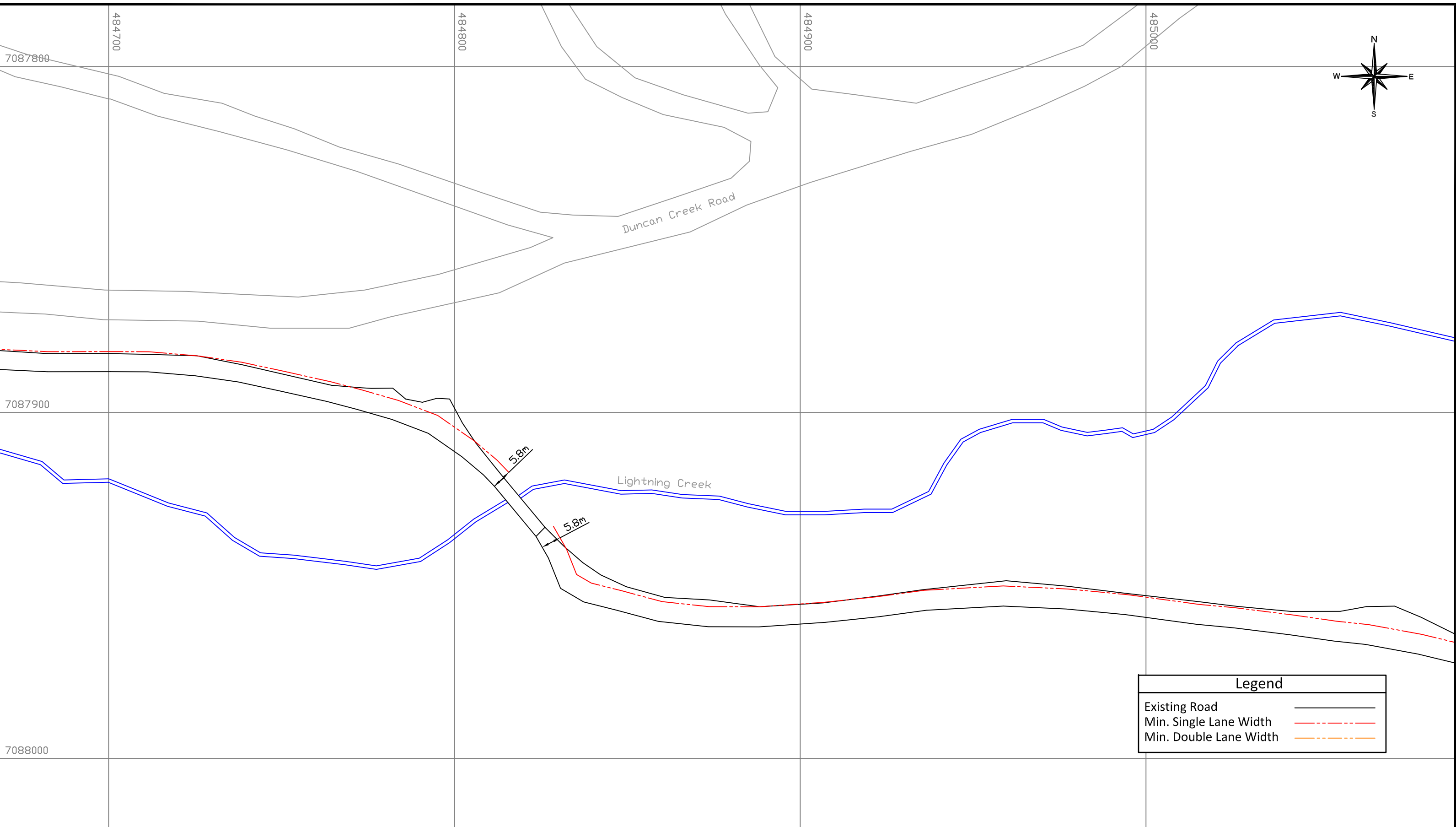
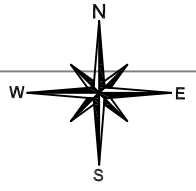
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Existing Road	
Min. Single Lane Width	
Min. Double Lane Width	




ALEXCO RESOURCE CORP
Bellekeno Mine

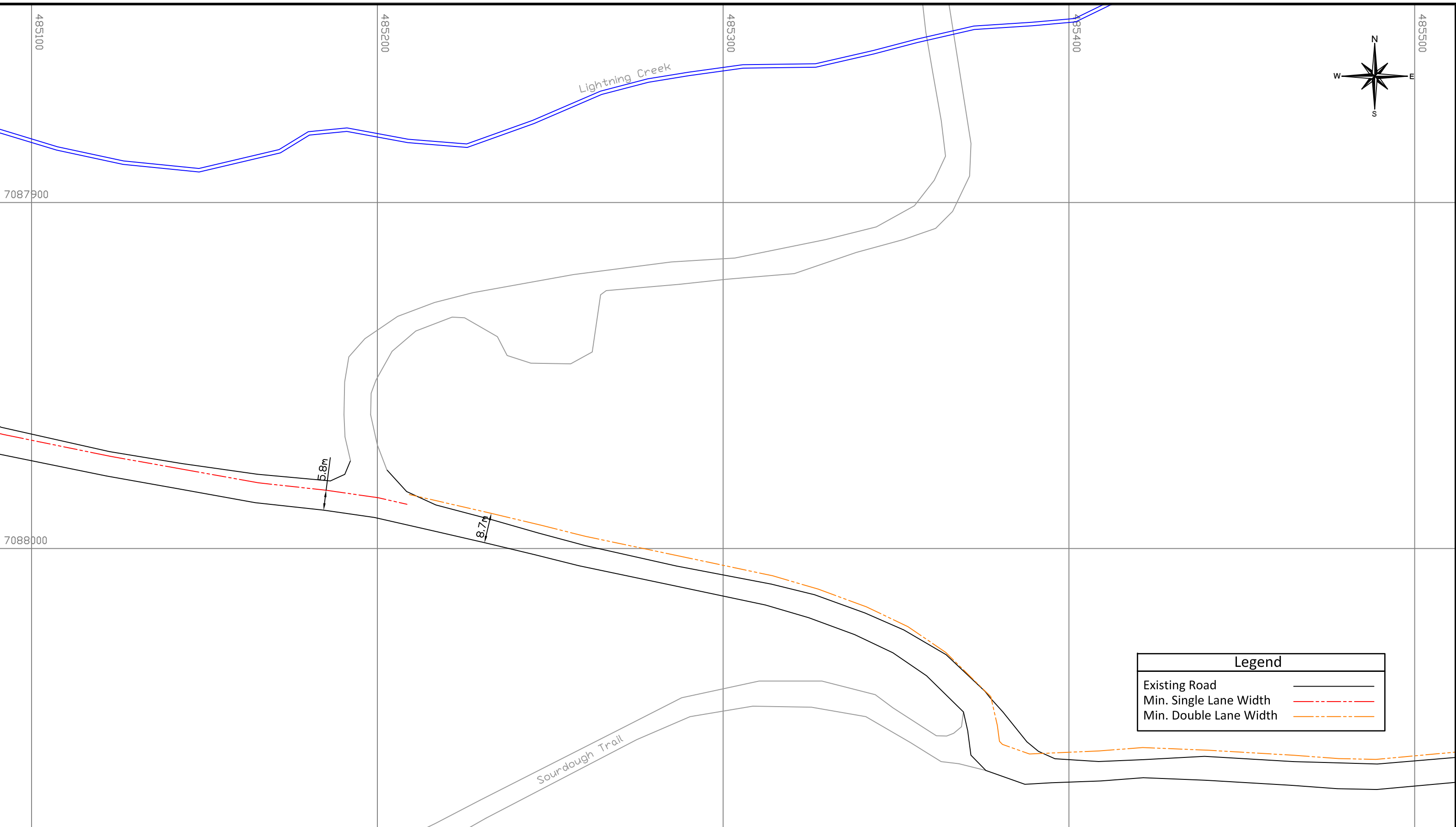
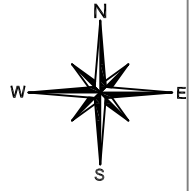
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SURVEY			
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

TITLE: Bellekeno Haul Road	
As-Built	
Page 2 of 12	
Drawn by: DS	Scale: 1:1000
Date: Nov. 22, 2011	Approval: _____ Date: _____
File:	




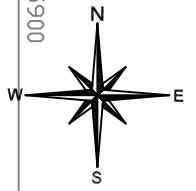
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Min. Double Lane Width	

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	Bellekeno Mine		SURVEY					As-Built		
			ENGINEERING					Page 3 of 12		
			GEOLOGY					Drawn by: DS	Scale:	1:1000
			ALEXCO MANAGER					Date: Nov. 22, 2011	Approval:	Date:
		PROCON SUPER				File:				



Legend	
Existing Road	
Min. Single Lane Width	
Min. Double Lane Width	

 <p>ALEXCO RESOURCE CORP Bellekeno Mine</p>	DEPT.	APPROVED BY	DATE	COMMENTS	TITLE:	Bellekeno Haul Road	
	SURVEY					As-Built	
	ENGINEERING					Page 4 of 12	
	GEOLOGY					Drawn by: DS	Scale: 1:1000
	ALEXCO MANAGER					Date: Nov. 22, 2011	Approval: Date:
PROCON SUPER					File:		



7087900

7088000

485600

485700

485800

485900

Legend	
Existing Road	
Min. Single Lane Width	
Min. Double Lane Width	

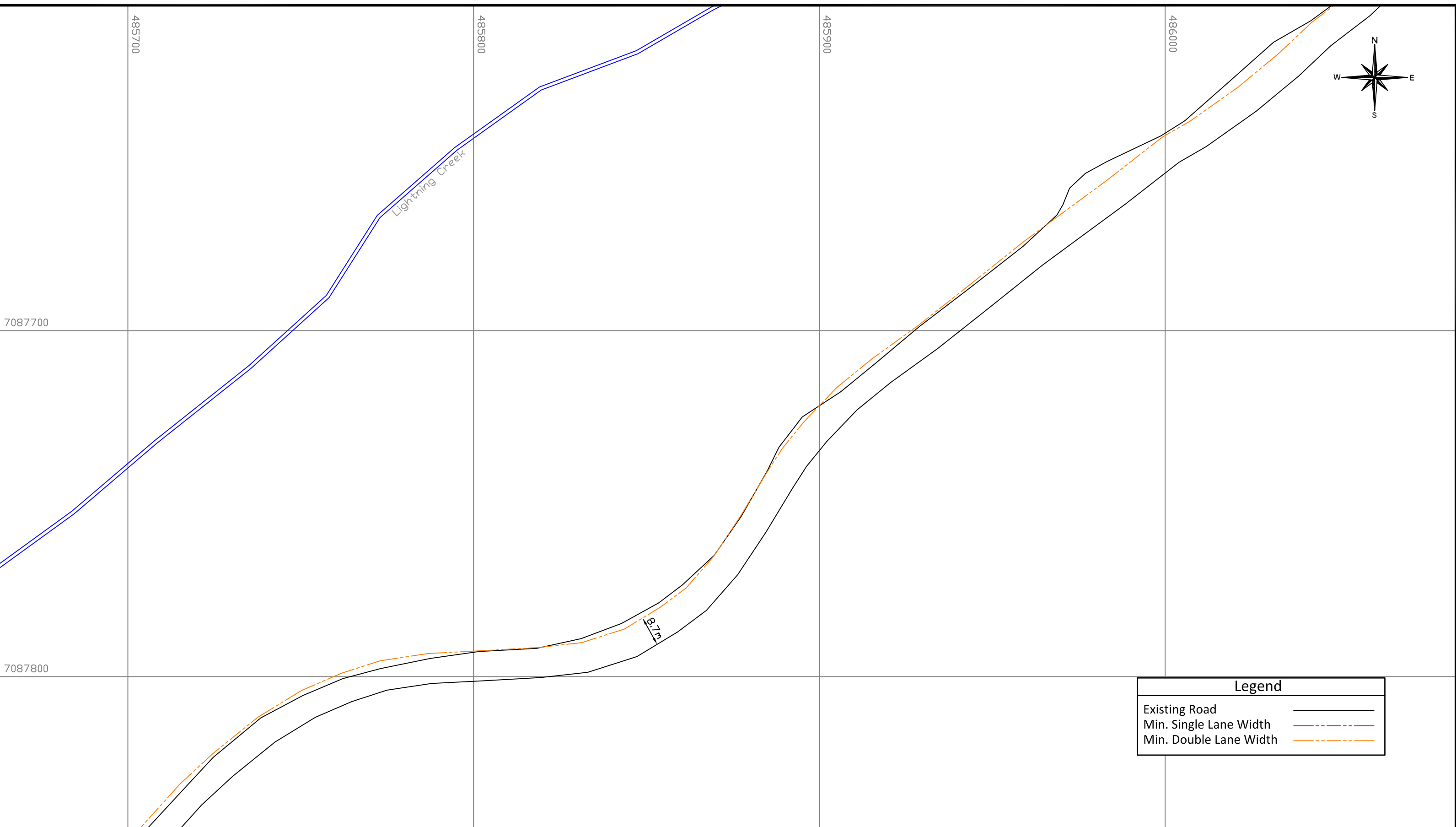
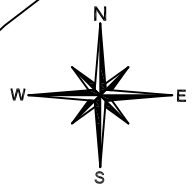
8.7m




ALEXCO RESOURCE CORP
Bellekeno Mine

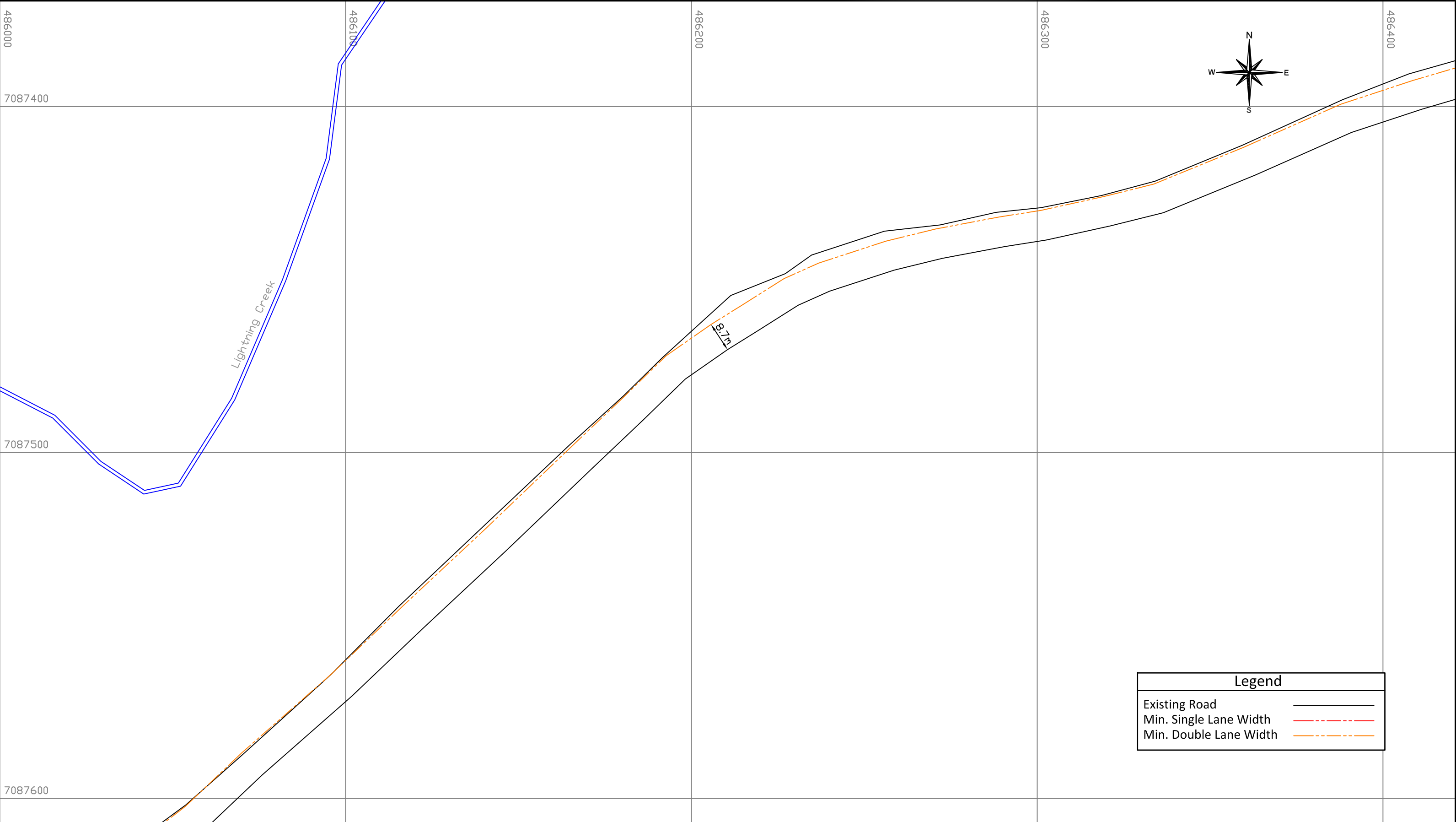
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SURVEY			
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

TITLE: Bellekeno Haul Road	
As-Built	
Page 5 of 12	
Drawn by: DS	Scale: 1:1000
Date: Nov. 22, 2011	Approval: _____ Date: _____
File:	



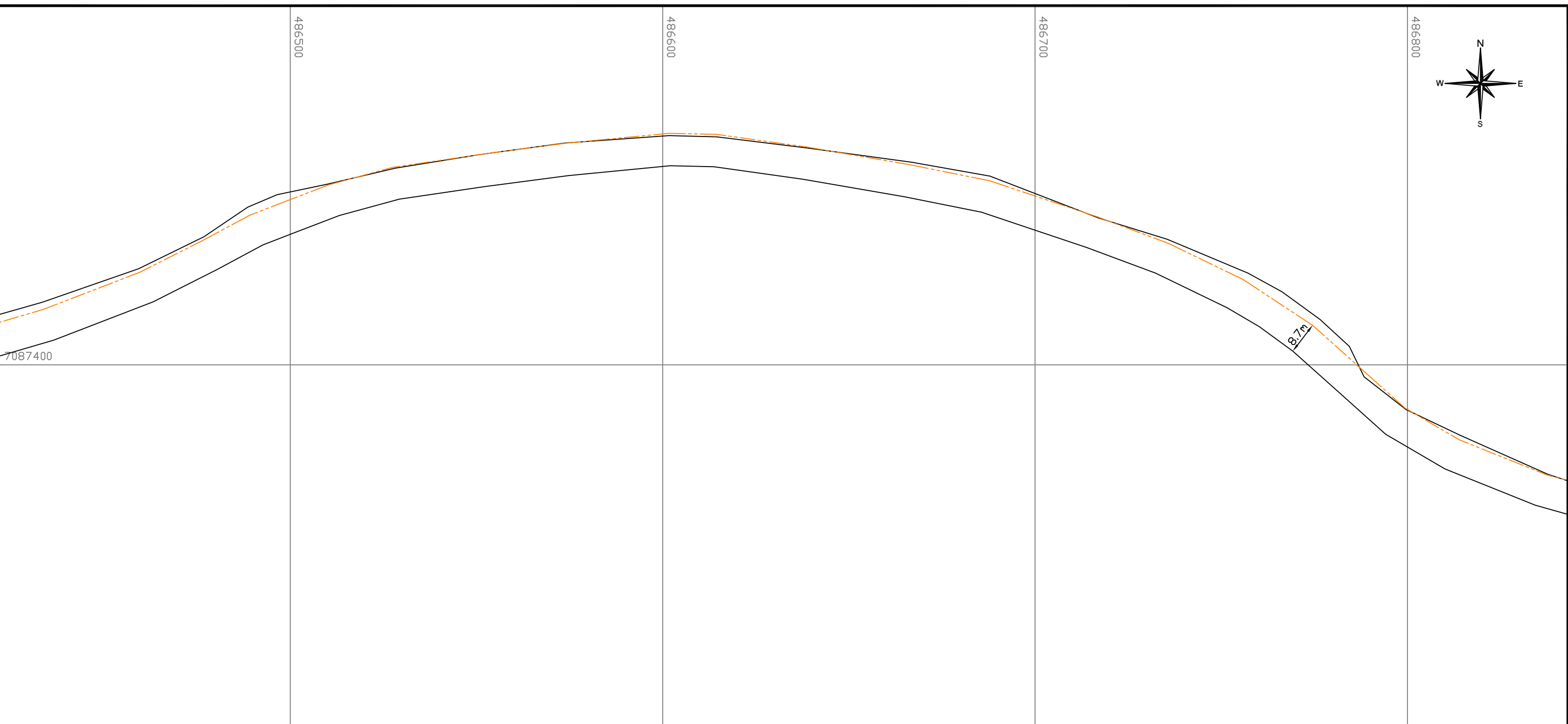
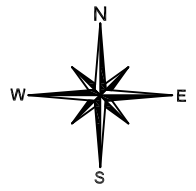
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Min. Double Lane Width	

	ALEXCO RESOURCE CORP		DEPT.	APPROVED BY	DATE	COMMENTS	TITLE:	Bellekeno Haul Road	
	Bellekeno Mine		SURVEY					As-Built	
			ENGINEERING					Page 6 of 12	
			GEOLOGY					Drawn by: DS	Scale: 1:1000
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		PROCON SUPER				File:			



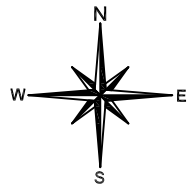
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	ALEXCO RESOURCE CORP Bellekeno Mine		DEPT.	APPROVED BY	DATE	COMMENTS	TITLE:	Bellekeno Haul Road As-Built Page 7 of 12	
	SURVEY						Drawn by: DS	Scale: 1:1000	
	ENGINEERING						Date: Nov. 22, 2011	Approval: Date:	
	GEOLOGY						File:		
	ALEXCO MANAGER								
PROCON SUPER									



Legend	
Existing Road	
Min. Single Lane Width	
Min. Double Lane Width	

	ALEXCO RESOURCE CORP		DEPT.	APPROVED BY	DATE	COMMENTS	TITLE:	Bellekeno Haul Road		
	Bellekeno Mine		SURVEY					As-Built		
			ENGINEERING					Page 8 of 12		
			GEOLOGY					Drawn by: DS	Scale:	1:1000
			ALEXCO MANAGER					Date: Nov. 22, 2011	Approval:	Date:
		PROCON SUPER				File:				



Lightning Creek

486900

487000

487100

487200

7087400

7087500

Legend	
Existing Road	
Min. Single Lane Width	
Min. Double Lane Width	

8.7m

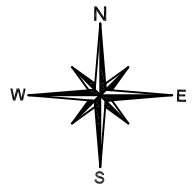
5.8m




ALEXCO RESOURCE CORP
Bellekeno Mine

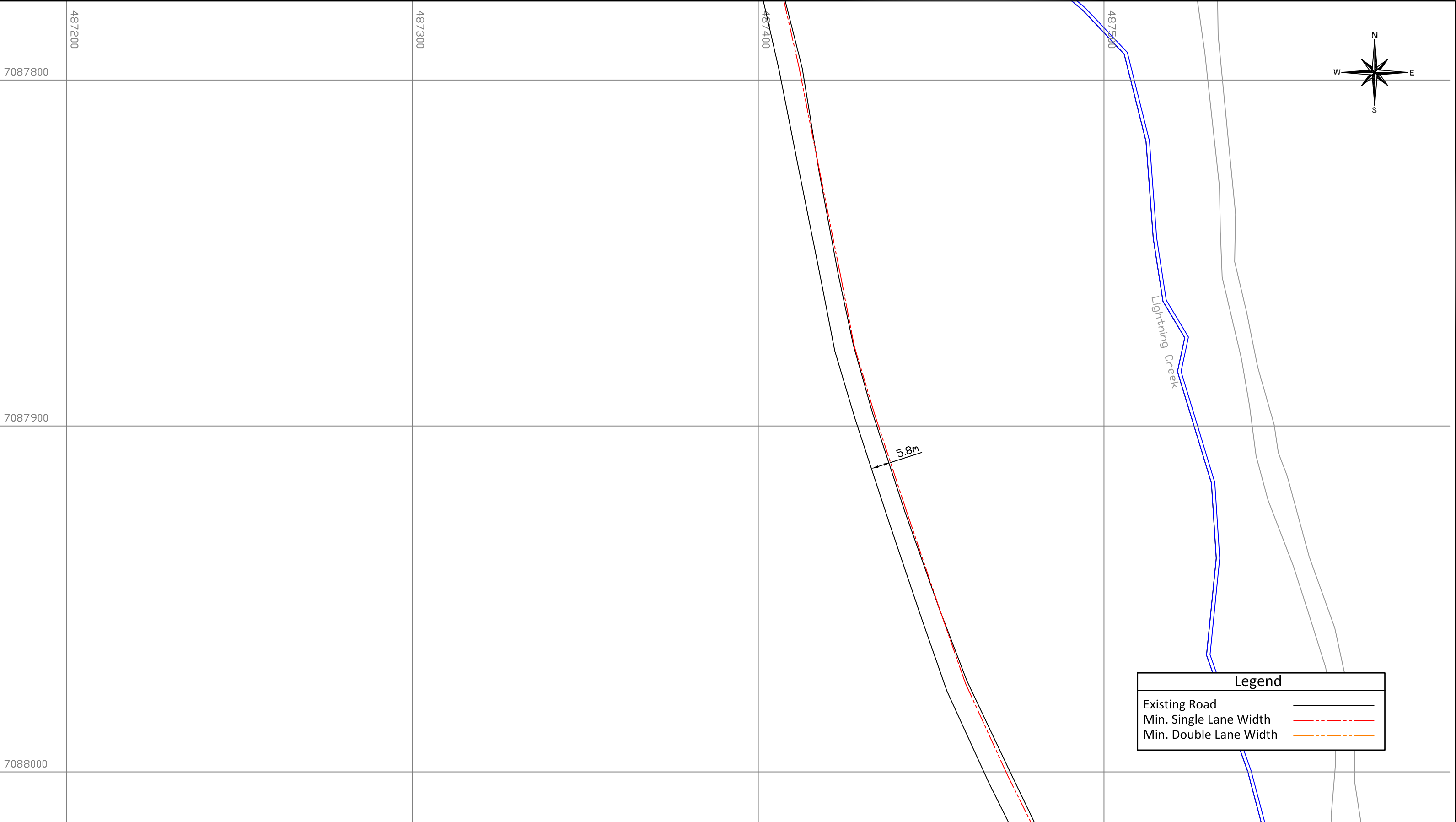
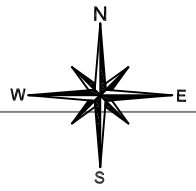
DEPT.	APPROVED BY	DATE	COMMENTS
SURVEY			
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

TITLE:	Bellekeno Haul Road		
	As-Built		
	Page 9 of 12		
Drawn by:	DS	Scale:	1:1000
Date:	Nov. 22, 2011	Approval:	Date:
File:			



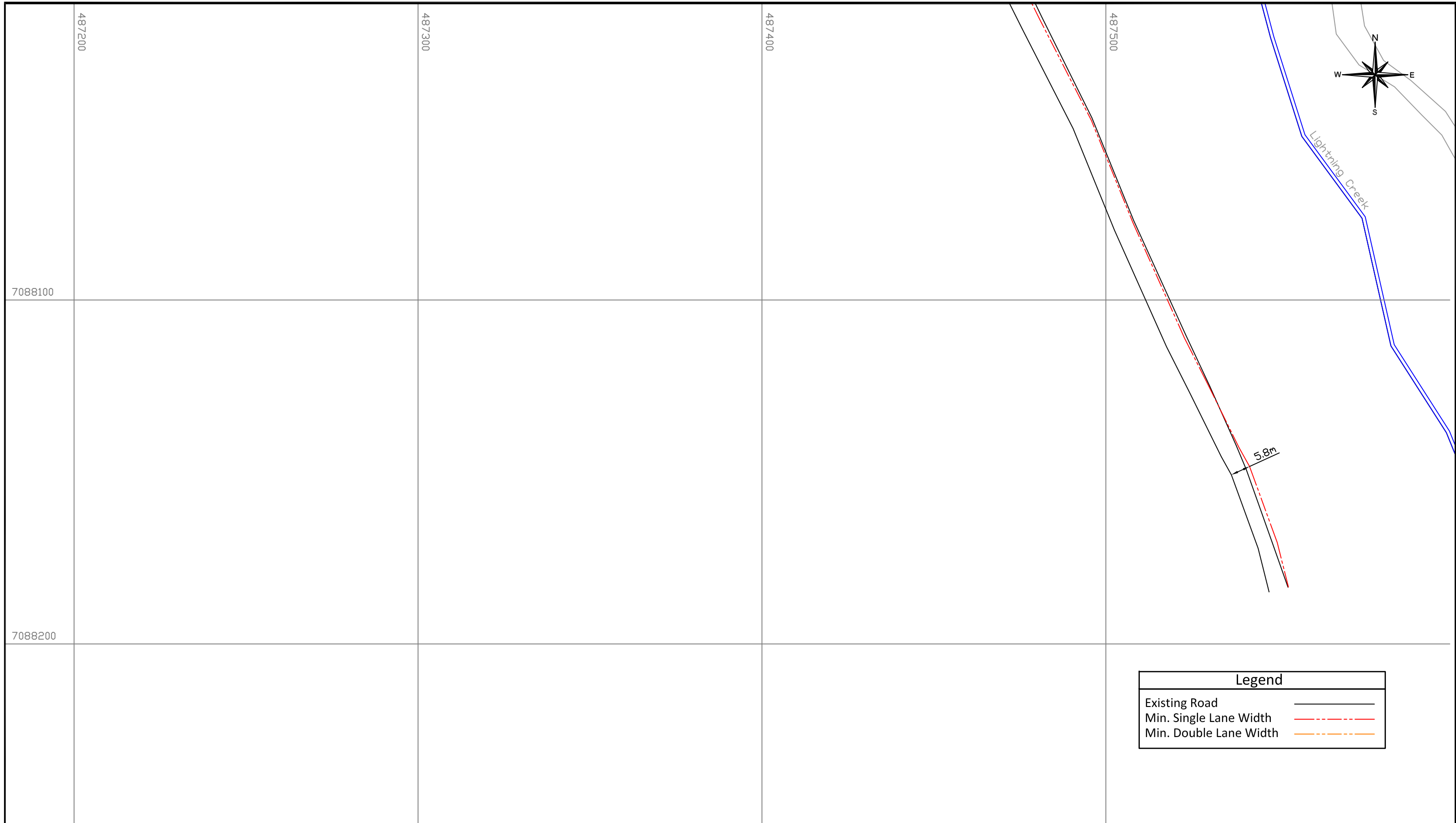
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Min. Single Lane Width	
Min. Double Lane Width	

 ALEXCO RESOURCE CORP Bellekeno Mine	DEPT.	APPROVED BY	DATE	COMMENTS	TITLE:	Bellekeno Haul Road	
	SURVEY					As-Built	
	ENGINEERING					Page 10 of 12	
	GEOLOGY					Drawn by: DS	Scale: 1:1000
	ALEXCO MANAGER					Date: Nov. 22, 2011	Approval: Date:
PROCON SUPER					File:		



Legend	
Existing Road	
Min. Single Lane Width	
Min. Double Lane Width	

	ALEXCO RESOURCE CORP		DEPT.	APPROVED BY	DATE	COMMENTS 	TITLE:	Bellekeno Haul Road		
	Bellekeno Mine		SURVEY					As-Built		
			ENGINEERING					Page 11 of 12		
			GEOLOGY					Drawn by: DS	Scale:	1:1000
			ALEXCO MANAGER					Date: Nov. 22, 2011	Approval:	Date:
		PROCON SUPER				File:				




ALEXCO RESOURCE CORP
Bellekeno Mine

DEPT.	APPROVED BY	DATE	COMMENTS
SURVEY			
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

TITLE: Bellekeno Haul Road	
As-Built Page 12 of 12	
Drawn by: DS	Scale: 1:1000
Date: Nov. 22, 2011	Approval: _____ Date: _____
File: _____	

Note:
 Road Surface Elevation: 921.6m
 Creek Bed Elevation: 916.7m
 Creek H.W.L. Elevation: 917.03m
 Bridge Deck Elevation: 921.6m
 BKR North side Rip Rap Volume: 431.7m³
 BKR South Side Volume: 121.2m³

Interface between original ground and Compacted Granular Embankment is an estimate due to lack of pre-construction survey data

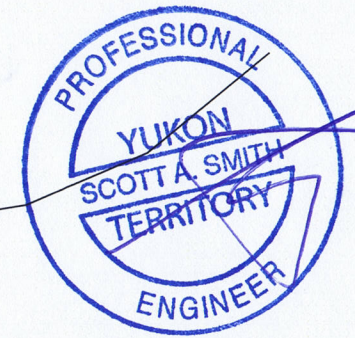
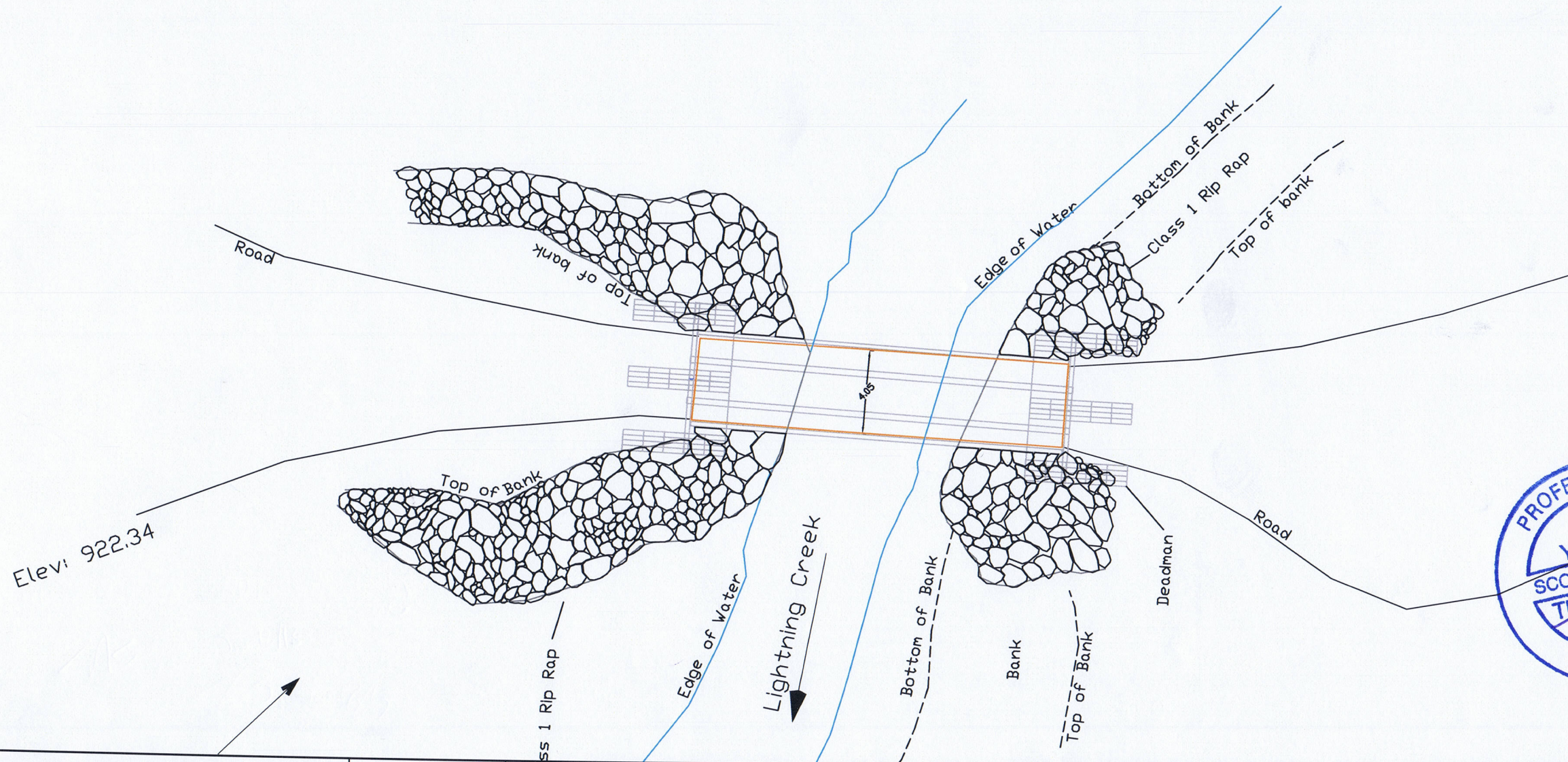
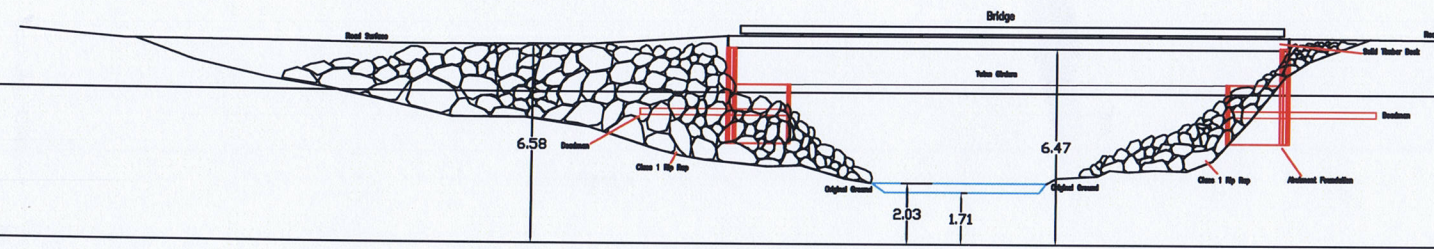
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ELEV: 925

ELEV: 920

ELEV: 915

BRIDGE SECTION



ALEXCO RESOURCE CORP
 BELLKENO MINE

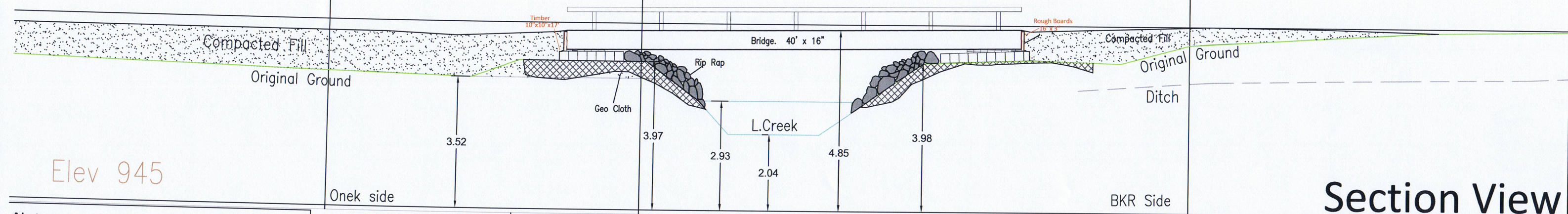
DEPT.	APPROVED BY	DATE	COMMENTS
SURVEY			
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

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Drawn by:	SURVEYOR	Scale: 1:250
Date:	02/18/2013	Approval: _____ Date: _____
File:	P:\Shannon Dennis\Bellekneo Road surveys\090213-bridge-sd.dwg	

Onek Bridge

Elev 950

Elev 945



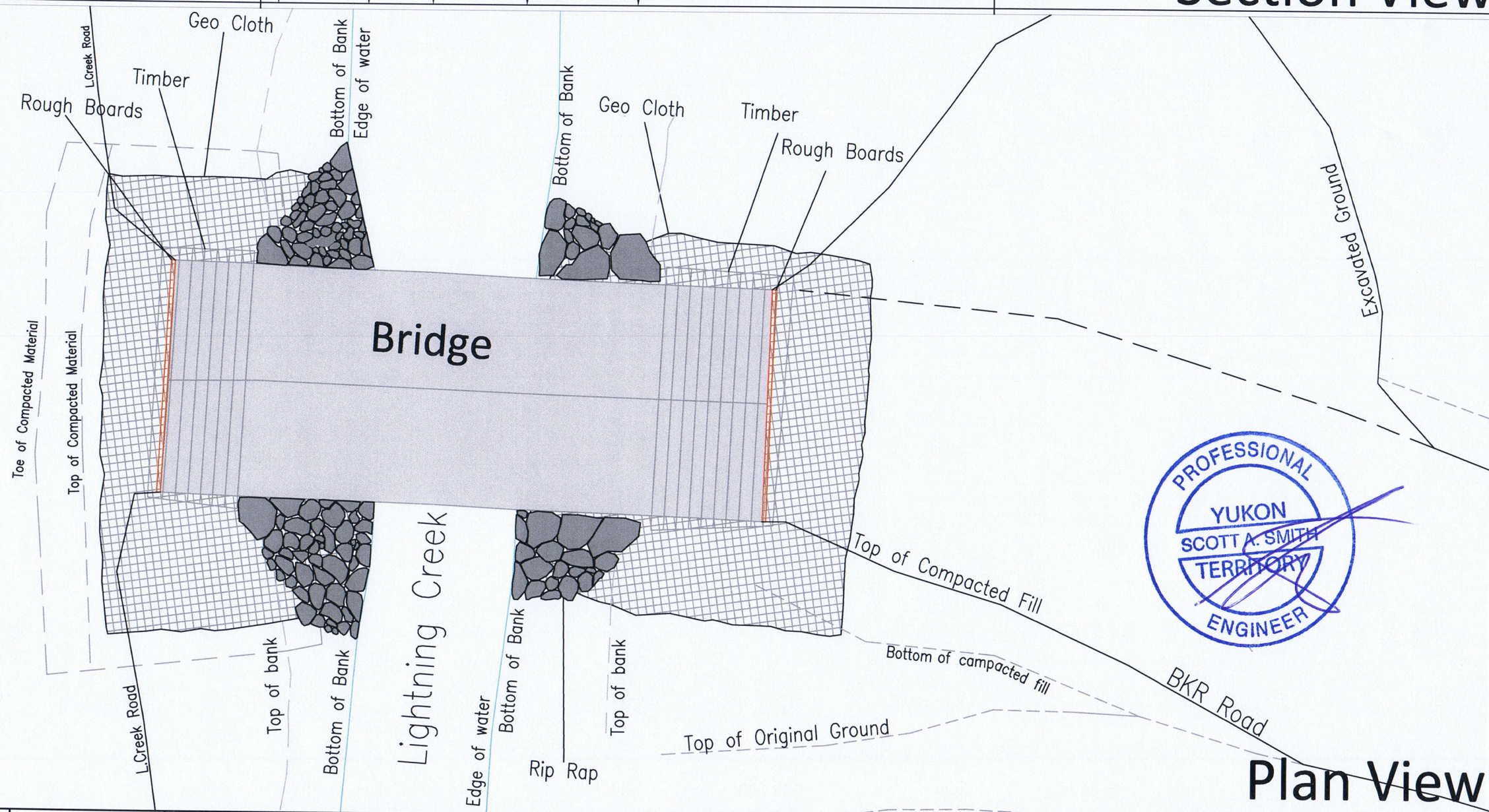
Section View

Notes:


Bridge: 40' x 16'
 Total Timber used: 17 (10"x 10"x 17')
 Total Rough Boards Used: 4 (16"x 3")

Elevations:
 Top of bank Elev: 949.0m
 Bridge deck: Elevation= 949.85m
 Lightning Creek H.W.L.= 947.93m
 Lightning Creek bed Elevation= 947.04m

Volumes:
 Onek Compacted Fill Volume: 365.0m³
 BKR Compacted Fill Volume: 64.26m³
 Rip Rap Total Volume= 18.1m³
 Geo Cloth: 94.1m²



Plan View



ALEXCO RESOURCE CORP
BELLKENO MINE

DEPT.	APPROVED BY	DATE	COMMENTS
SURVEY			
ENGINEERING			
GEOLOGY			
ALEXCO MANAGER			
PROCON SUPER			

TITLE:	ONEK BRIDGE		
Drawn by:	SURVEYOR	Scale:	1:100
Date:	05/04/2013	Approval:	Date:
File:			