

June 28, 2012

Jackfish Lake Land Corporation

**Subject : Tranquil Waters Development
Range Road 24 Roadway Assessment**

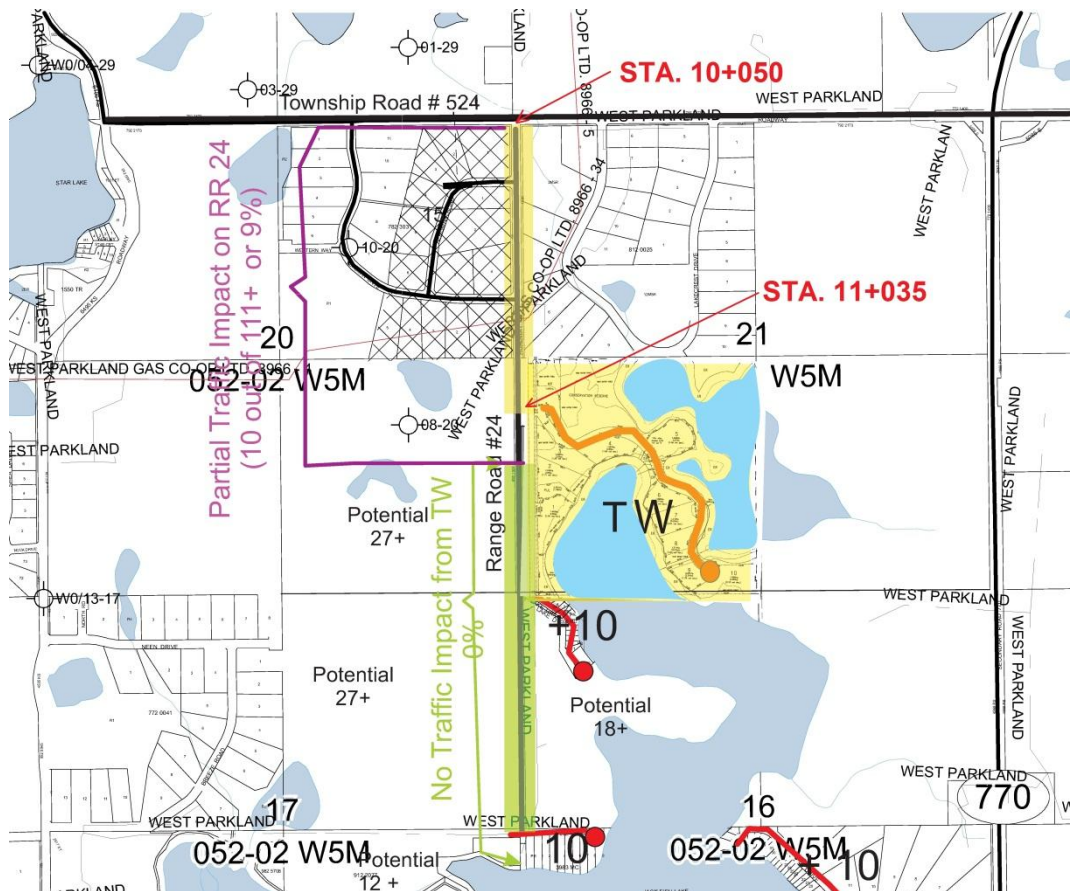
1. OVERVIEW

A roadway assessment was completed on June 9, 2012, and June 28, 2012 by Mr. Darcy Paulichuk, P. Eng., of Range Road 24, between Township Road 524 and Jackfish Lake. Range Road 24 at this location is only 2.4 km approximately in length with a dead end at Jackfish Lake on the south side. It presently provides access to :

- Bergman Estates in NE-20-52-02-W5M, a country residential subdivision,
- A single residential dwelling (Buxton) in SE-20-52-02-W5M,
- Lake Lots at Steven Beach (approx. 10 lots) and
- Lake Lots at the south end of Range Road 24 (approx. 10 lots)

The proposed development of Tranquil Waters would require the use of Range Road 24 from Twp. Rd. 524, Station 10+050, to approximately Station 11+035 to the south.

At this entrance, the new subdivision road would be constructed for accessing the proposed 10 lots in SW-21-52-02-W5M of the Tranquil Waters subdivision (TW).



2. ROAD INSPECTION

Range Road 24 upon visual inspection appears to be a low volume local road with a width averaging 8m of gravelled surface. For the 1st kilometre from Twp. Rd. 524, going south, the road comprises of a constructed embankment with reasonable grade height, sideslopes and ditches. The roadtop appears to be sound, with little to no sign of soft spots.



There are a few locations of moderate fills that require an embankment higher than 1m, but appear to be at a 4 :1 fill slope.

The vertical profile is relatively flat (<2%) until Station 10+600.

Some brush and trees have encroached within the right-of-way. See photo on the left.

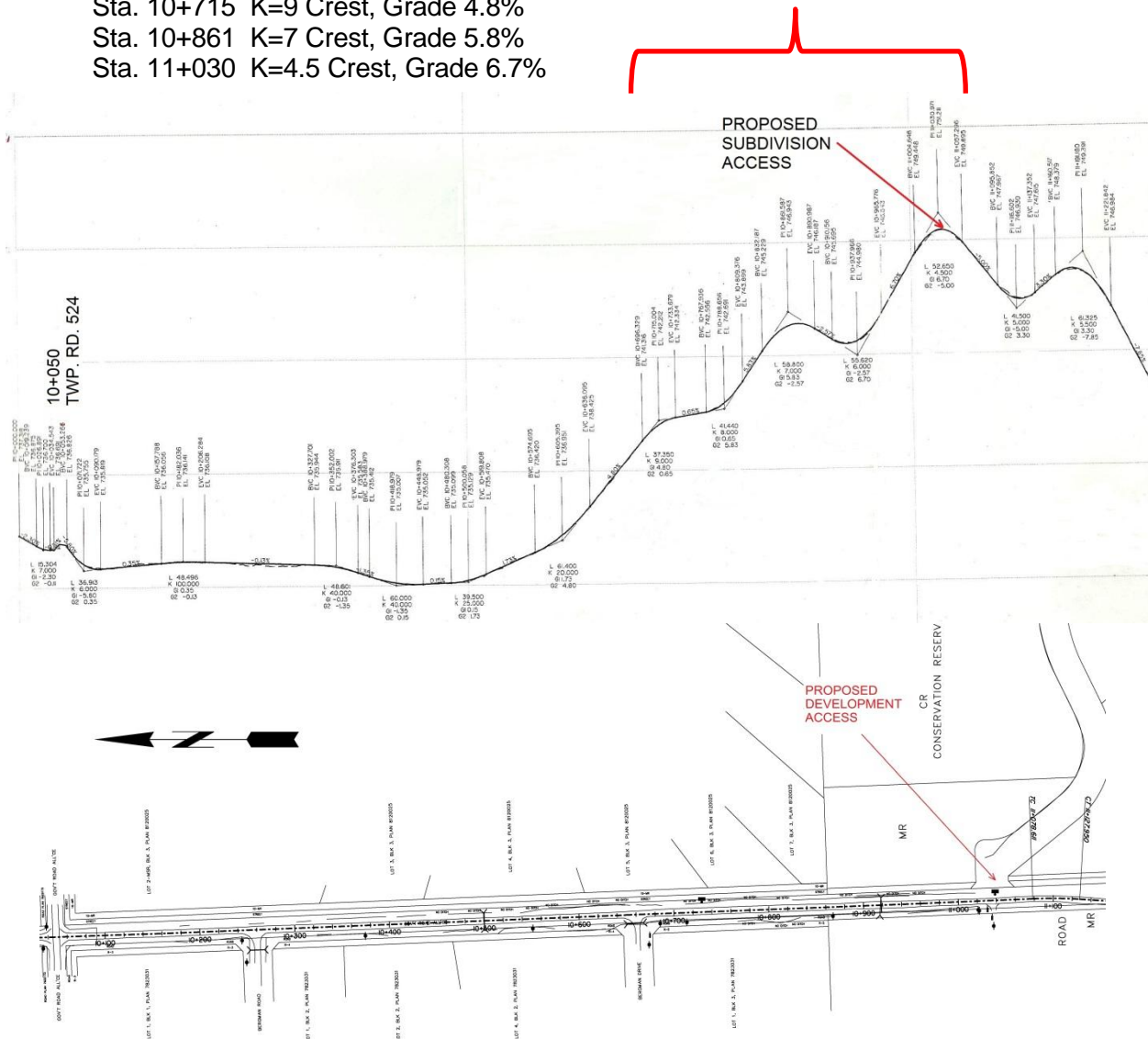
The existing intersection with Twp. Rd. 524 is a standard four-legged configuration with no additional treatment.

Both the north leg and south legs (Range Road 24) are no exit roads, which limits the amount of traffic that will come onto these routes.



Going further south, from Station 10+700 to 11+040, a series of crest and sag curves exist in the vertical profile. This consists of :

- Sta. 10+715 K=9 Crest, Grade 4.8%
- Sta. 10+861 K=7 Crest, Grade 5.8%
- Sta. 11+030 K=4.5 Crest, Grade 6.7%



For the section between Sta. 10+600 to 10+900, the vertical profile does begin to roll with sharp sag and crest curves, however a satisfactory cross section is maintained with an approximate 8m road width and ditches. The ditches do start to shallow towards the south.



Viewing north, Sta. 10+620

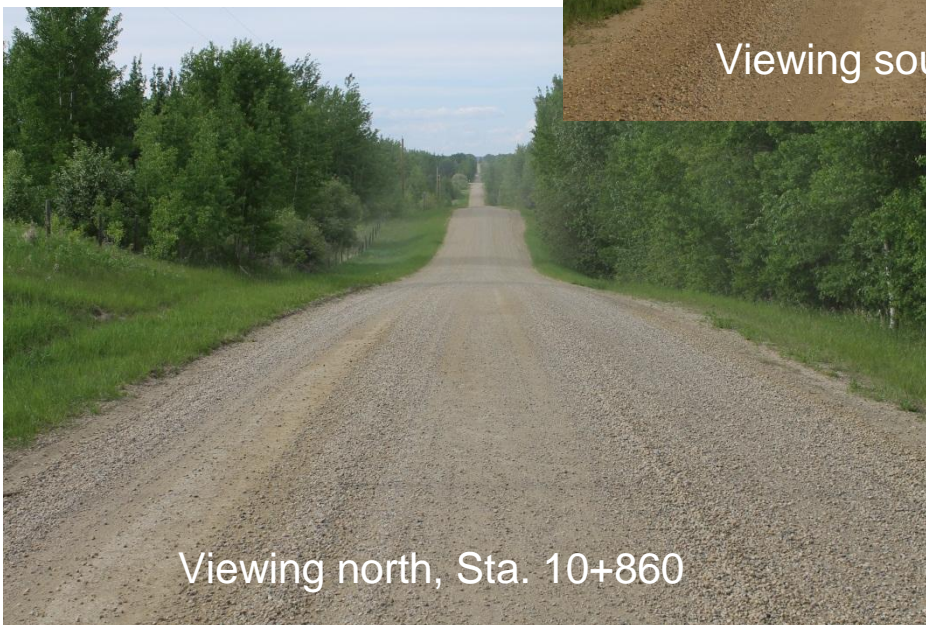
Looking back to the north from Sta. 10+620 (second entrance to Bergman Estates), the roadway characteristics are generally sufficient with only trees encroaching within the right-of-way.

Past Sta. 10+900, the road comprises of the sharpest crest curve with a value of near 4.5 K and grades of 6.7% and 5.0%.

Ditches are shallow and the grade height is about 0.5m. The roadway width narrows and there are trees and vegetation creeping into the ditches.



Viewing south, Sta. 10+680



Viewing north, Sta. 10+860

At Sta. 11+035, where the new access to Tranquil Waters is proposed to the east, an existing access to a residence exists to the west (Buxton's).

South of Sta. 11+040, the horizontal alignment takes a slight shift to the west, following a general down grade via a series of sharp crest and sag vertical curves.

This area exhibits little to no ditches and trees/brush that is encroached almost to the roadway edges.

This area has recently been cleared on the east side to allow for a new power line.



3. ROADWAY STANDARDS

Parkland County has a section for Roadway Systems in their Subdivision Development and Engineering Standards Manual. These standards are noted to be used for “roadways in subdivision development areas within Parkland County”. These roadways “shall typically be developed to a rural cross-section with an asphalt surface and roadway ditches to accommodate stormwater and snowmelt runoff”.

It is important to note that these standards do not differentiate between development of a new road versus upgrading/rehabilitating an existing road. Other jurisdictions such as Alberta Transportation provide allowances for rehabilitation of existing roadways with some flexibility towards the roadway standards. These standards are known as the 3R/4R Geometric Design Guidelines. The purpose of these guidelines is “to extend the service life of existing paved highways and enhance highway safety on a network basis. To accomplish this objective, the standards focus on the most safety-cost effective improvements and also encourage the use of low-cost opportunities to improve safety where major reconstruction is not cost-effective”.

As Range Road 24 is only 2.4 km in length and terminates at Jackfish Lake, it can be considered and classified as a “Residential Local Road” under Parkland County’s Roadway Classifications.

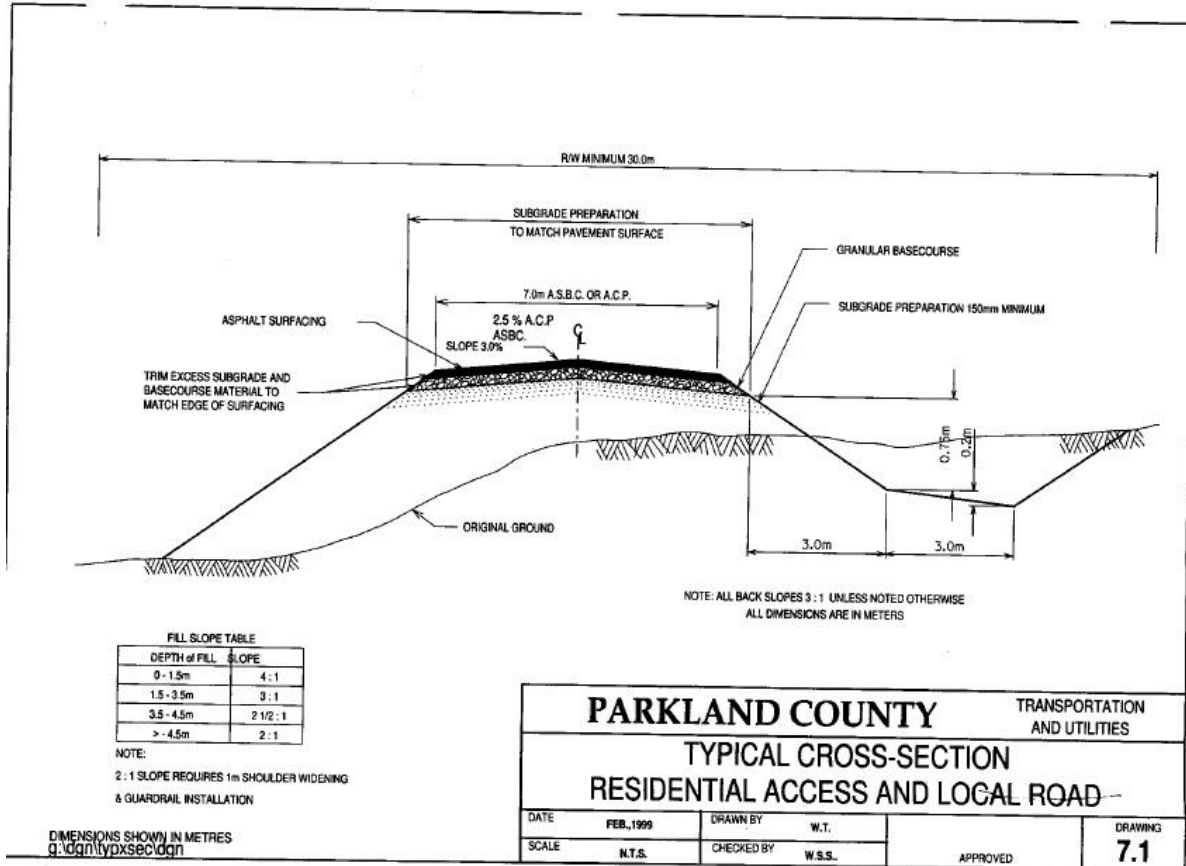
7.2.3 Residential Local Road

The “*residential local road*” classification is applicable to internal residential subdivision roads that, in addition to providing property access, interconnect two or more residential access roads and/or provide the main access to and from the subdivision to the County road system or other subdivisions.

A typical cross-section of a residential local road is illustrated in Drawing No. 7.1.

Since Range Road 24 does not provide any continuity to the local roadway network, as both north and south legs from twp. Rd. 524 are dead ends, Range Road 24 should not be classified as a Collector, but instead as a Local Road. The classification above appears to support this as well since Range Road 24 provides interconnection between 4 subdivisions in the area.

The Drawing for the Residential Local Road is as follows:



The surfacing requirements are as follows :

Table 7.2
Typical Minimum Roadway Structures

Roadway	Residential Land Use		Commercial/Industrial Land Use
	Low Density	High Density	
Access/Local	150 mm Subgrade Prep. 150 mm Aggregate Base Course 75 mm Asphalt Stabilized Base Course	150 mm Subgrade Prep. 200 mm Aggregate Base Course 90 mm Asphaltic Concrete Surface 2 lifts 50 mm/40 mm final*	300 mm Subgrade Prep. 300 mm Aggregate Base Course 125 mm Asphaltic Concrete Surface 2 lifts 80 mm/45 mm final*
Collector	N/A	150 mm Subgrade Prep. 300 mm Aggregate Base Course 100 mm Asphaltic Concrete Surface 2 lifts 60 mm/40 mm final*	300 mm Subgrade Prep. 300 mm Aggregate Base Course 125 mm Asphaltic Concrete Surface 2 lifts 80 mm/45 mm final*

* NOTE: The final lift of asphaltic concrete shall be placed in the second year of the maintenance period.

The Residential Land Use for surfacing is assumed to be low density for Range Road 24.

The remainder of the standards are summarized in the following table :

**Table 7.1
Basic Design Standards**

Design Criteria	Residential Access	Residential Local	Residential Collector	Industrial Local	Industrial Collector
Drawing Reference	No. 7.1	No. 7.1	No. 7.2	No. 7.3	No. 7.4
R.O.W. Requirements (m)	30	30	30	30	30
TAC Classification	RLU 60	RLU 80	RCU 80	RCU 80	RCU 90
Design Speed (km/hr)	60	80	80	60	90
Subgrade Width (m)	9.2	9.2	11.2	11.4	12.4
Finished Surface Width (m)	7.0	7.0	8.0	8.0	9.0
Min. Radius of Curve (m)	120	230	230	230	300
Max. Gradient (%)	8	8	6	4	4
Vertical Curve min. "k" Value	15	35	35	35	55
Embankment Sideslopes/ Backslopes min.	4:1 3:1	4:1 3:1	4:1 3:1	4:1 3:1	4:1 3:1
Min. Ditch Grade (%)	0.5	0.5	0.5	0.5	0.5
Super elevation	0.08	0.08	0.08	0.08	0.08
Crown	Gravel	4%	4%	N/A	N/A
	Paved	2.5%	2.5%	2.5%	2.5%
	A.S.B.C	3%	3%	N/A	

4. COMPARISONS & RECOMMENDATIONS

The proposed development is for 10 residential lots to the north of Jackfish Lake as described above. It would be impractical to complete improvements for Range Road 24 to the full extent of the new development standards for only 10 lots. It seems reasonable that the use of a method such as the Alberta Transportation's 3R/4R Geometric Design Guidelines which targets the most safety-cost effective improvements where major improvements appear not practical. The following table reviews the various components and addresses the issues.

Item	Existing Road Comparison to New Roadway Standards	Recommendation
Right-of-Way	<ul style="list-style-type: none"> • Standard Required = 30m • The existing ROW from Sta. 10+050 to 10+860 appears to be >40m (20m basic + 10m+ per side in additional) • The existing ROW from Sta. 10+860 to 11+040 appears to be 30m. 	Meets the requirements from survey data received.

Roadway Width	<ul style="list-style-type: none"> • Standard Required = 7m finished paved surface • The existing road is gravelled and varies from 7 – 8m. 	The required surfacing structure is 150mm of GBC + 75mm of ASBC = 225mm. With 4:1 sideslopes that will require an 8.8m subgrade. The existing subgrade can be regraded down 0.2 – 0.3m using double subgrade preparation which will provide the extra width required without full grade widening (<1m per side)
Sideslopes	<ul style="list-style-type: none"> • Standard Required = 4 :1 • Existing sideslopes generally close to 4 :1. 	There are no high fills or areas that appear to be a safety concern. Existing is sufficient.
Ditches & Drainage	<ul style="list-style-type: none"> • Standard Required = 0.75m depth & 3m wide, min. 0.5% grade • The existing ditches meet the standard from Sta. 10+050 to Sta. 10+700. No ponding observed. • From Sta. 10+700 to 11+040, ditches are shallow or do not exist. 	Ditches should be excavated from Sta. 10+700 to 11+040. Could allow 1.5m wide ditch to compensate for ROW restrictions.
Vertical Profile	<ul style="list-style-type: none"> • Standard Required = Max. Grade = 8%, Min. k value = 35 • The maximum grade is 6.7% and is flatter than the max. of 8%. • The k values are greater than 35 except between Sta. 10+650 to 11+040, where they are less than 10. 	Re-grading of the road between Sta. 10+650 to 11+040 should be completed to improve the vertical profile. This would be in the form of cutting down the hills and filling in the valleys for about 400m. Since ROW is limited between 10+860 to 11+040, the amount of improvement on the west side of the ROW will be limited (Buxton's property). The full value of k=35 may not be achievable and may likely only reach k=20 to 25. Could lower design speed to 60 or 70 kph.
Horizontal Alignment	<ul style="list-style-type: none"> • Standard Required = Min. Curve Radius of 230m • The existing road is on tangent from Sta. 10+050 to 11+080. 	Meets the requirements.
Intersection Sight Distance	<ul style="list-style-type: none"> • Standard Required = Not specified in County Standards. AT standards require 155m for 	

	<p>passenger vehicles turning out of an intersection (80kph design speed).</p> <ul style="list-style-type: none"> • The Twp. Rd. 524 & RR 24 intersection contains > 155m sight distance. • The new intersection into the proposed subdivision on RR 24 will have 160m of sight distance with RR 24 the way it exists. 	<p>Meets the requirements for passenger vehicles.</p>
Intersectional Treatment	<ul style="list-style-type: none"> • Standard Required = 10m radii at intersections. Vertical Profile with Min. 15m 2% grade with vertical curve and max 8% encroaching • The Twp. Rd. 524 & RR 24 intersection does not contain 10m radii, no vertical curve and grade away is 5.8% going down. • The new intersection into the proposed subdivision on RR 24 will be constructed to meet or exceed these standards. 	<p>For the Twp. Rd. 524 & RR 24 intersection, the 10m radii can be constructed during the surfacing construction.</p> <p>Also, the grade on RR 24 approaching Twp. Rd. 524 is going down, so this is less critical as vehicles will not slide into the intersection during winter. Also the surfacing will improve the approach grade and can be used to improve near the standard required.</p>
Trees/Brush	<ul style="list-style-type: none"> • Standard Required = No standard specified. • The existing road has trees encroaching into the ROW and even up to the roadway in some places. 	<p>This is more of an operational issue that needs to be addressed periodically. At minimum, the trees encroaching the road edge on the south side should be removed.</p>
Access Spacing	<ul style="list-style-type: none"> • Standard Required = Not Specified; Desired to be 200m min. away from intersections. • The approach to the proposed subdivision will be 1.1 km away from Twp. Rd. 524. 	<p>Meets requirements.</p>
Dead Ends	<ul style="list-style-type: none"> • Standard Required = Min. 20m radius turnaround • No existing dead ends 	<p>New dead ends in the proposed subdivision will be constructed to these standards.</p>
Crown	<ul style="list-style-type: none"> • Standard Required = Gravel 4%, ASBC 3% • Existing road is less than 4% in some locations. 	<p>New surface to be ASBC and will be constructed to 3%.</p>

Superelevation	<ul style="list-style-type: none"> • Standard Required = 0.08 Superelevation Table • No horizontal curves between Sta. 10+050 to 11+035. 	Not applicable.
Design Speed	<ul style="list-style-type: none"> • Standard Required = 80 km/hr. 	Due to some of the constraints mentioned above, the design speed may need to be lowered to 60 or 70 km/hr. Since this is a low volume road and is only 2.4 km in total length, lowering the design speed is acceptable.

In summary, Range Road 24 will need some re-grading between Sta. 10+650 and 11+040 in order to improve the vertical profile, construct an appropriate road cross section, and improve drainage. The extent of the re-grading will not likely meet the full requirements of a 80 km/hr design speed due to restricted right-of-way on the west side, however this will still be a substantial improvement from the existing road geometry, and meet a 60 to 70 km/hr. design speed (likely posted at 60 to 70 km/hr). Surfacing will also be required from Sta. 10+050 to 11+040 in the order of 150mm of granular base course and 75mm of ASBC (cold mix). No grade widening is anticipated since the road can be widening by just under 1m per side by using a double subgrade preparation technique that cuts the road down slightly to provide the necessary subgrade width necessary for surfacing.

A cost estimate for this work is as follows:

PRELIMINARY COST ESTIMATE – 2012 Prices

ITEM	QUANTITY	UNIT PRICE	TOTAL
Mobilization	lump sum	lump sum	\$ 42,000
<u>GRADING – 10+650 to 11+050</u>			
Clearing	1 ha	\$15,000/ha	\$ 15,000
Common Excavation : 1000 m3 Topsoil Strip, 6000m3 Cut, 1000m3 Topsoil Place	8000 m3	\$7.50/m3	\$ 60,000
Channel Excavation	50 m3	\$10.00/m3	\$ 500
Culverts	20 m	\$300/m	\$ 6,000
Topsoil Placement	8,000 m2	\$1.50/m2	\$ 12,000
Seeding, Fertilizing and Harrowing	1 ha	\$2000/ha	\$ 2,000
<u>SURFACING – 10+050 to 11+050</u>			
Preparing Subgrade Surface (1st Layer)	8500 m2	\$2.50/m2	\$ 21,250
Preparing Subgrade Surface (2nd Layer)	9000 m2	\$2.00/m2	\$ 18,000
Granular Base Course	3000 tonnes	\$35.00/t	\$ 105,000
Asphalt Stabilized Base Course – 7m top	1300 tonnes	\$140.00/t	\$ 182,000
Sub-Total:			\$ 463,750
Right-of-Way:	Assumed be to \$0		\$ 0
Utility Relocations:	Assumed be to \$0		\$ 0
Engineering:			\$ 10,000
TOTAL (2012 Estimated):			\$ 475,000

Note: This estimate is preliminary and prepared for the purposes of this report. A Detailed Design of the specific site and Design Estimate should be completed by experienced design professionals for accuracy.

Should you have questions or concerns, please feel free to contact me at your convenience.

D&A Paulichuk Consulting Ltd.,



Darcy Paulichuk, P. Eng.
President, Senior Project Engineer

