Lamont County

Transportation Master Plan For South Lamont Heartland Industrial District

Prepared for: Lamont County
Prepared by: Stewart Weir
Our file no.: ED5536342
Date: September 4, 2013

Stewart Weir

Table of Contents

Tables

Appendices

1 Introduction

Stewart, Weir & Co. Ltd. is pleased to provide Lamont County with the South Lamont Heartland Industrial District Transportation Master Plan. The project Initialization Meeting was held at Lamont County Office on February 8, 2013 and attended by Jim Newman, Harold Hamilton, Marie Kurylow of Lamont County; and Sean Snowden of Stewart Weir. Topics of discussion included the project scope, roads to be included in the Transportation Master Plan (TMP), road classifications, traffic counts, and project schedule.

The primary objective of this study is to identify roadway improvements necessary to accommodate existing and future developments and to assist the County in developing budgets and priorities for the transportation system network in the District. This Plan provides a review of all the County-owned roadways, intersections (including County roadway intersections with Alberta Transportation roadways), and bridges located within Lamont County's South Lamont Heartland Industrial District. A Plan study area map can be seen in Appendix A.

Inspections were undertaken on all District roadways. The inspections included reviews of: existing surfacing treatments; roadway geometry such as horizontal and vertical alignment and cross-section; and widening requirements. The completed field forms and photographs from the inspections can be found in Appendix B and C, respectively.

The Roadway Improvement Priority Matrix, found in Table 1, was completed using condition data collected during the inspections and information provided by Lamont County. The matrix is a comparison tool that evaluates the need or urgency to upgrade a roadway based on criteria including current conditions, traffic volume, safety, and other requirements. The Improvement Matrix is sorted by priority for the roadways based on a weighted average calculation of the aforementioned roadway data.

Cost estimates were also developed for each roadway based on average unit construction costs for grading, GBC, and ACP. The lengths of each roadway were multiplied by the unit construction upgrade costs and the total costs to upgrade were extended. The Cost Estimate Summary can be found in Table 2 and the details in Appendix D.

Intersection movement traffic counts were conducted at six key intersections within the District and automatic traffic recorder counts were conducted at four locations within the District. The traffic count data was used in conjunction with aggressive growth (5%/year) to conduct intersection treatment analyses. Traffic count data can be found in Appendix E, trip generation information can be found in Appendix F, and intersection treatment analyses can be found in Appendix G.

2 Roadway Inspections

Inspections of Lamont County's South Lamont Heartland Industrial District roadways were done by Bob Maxwell, Senior Project Manager, between May 2 and May 9, 2013. Roadway conditions and appurtenances were recorded on forms developed by Stewart Weir, and are presented in Appendix B. Roadways were evaluated for existing surface type (i.e. gravel, ACP, etc.), existing road width, overall condition, side slopes, ditch width, and horizontal/vertical alignment; and appurtenances including conditions were reviewed and recorded for culverts, guardrail, and signs. Photos were taken during the inspections, and are presented in Appendix C.

3 Roadway Improvement Priority Matrix

The Roadway Improvement Priority Matrix is a comparison tool that evaluates the need or urgency to upgrade a roadway. The higher the scoring priority is, the greater the need to undertake timely roadway improvements. The priority scoring total is a summation of the scoring of the categories evaluated. The Matrix can be found in Table 1.

The following categories were evaluated as part of the Priority Matrix, and the weighting for each category follows in parentheses. The total of all category weightings is 154 points:

1. Surface Condition (20)
2. Alignment (20)
3. Roadway Width (20)
4. Average Annual Daily Traffic (20)
5. Traffic Composition (Percent Trucks) (10)
6. Roadway Function (20)
7. Adjacent Roadway Features (9)
8. Potential Development (15)
9. Continuity (20)

The priority ranking matrix criteria and scoring has been developed based on our experience with similar rural road studies in municipal districts and counties in Alberta. Details of the category methodology can be found below.

Priority Rating Methodology

1) Condition Rating – The condition rating assesses the surface condition of the roadway segment. For the road with better condition it is less likely that there is a need for upgrading or improvements. Therefore, roads that are deficient in rider stability, maintenance, or geometric standard are rated a higher priorities than those roads that are not.

a) Surface Condition – Highest priority scoring was assigned to poor and unimproved surfaces and lowest scoring was assigned to good asphalt surfaces. Medium priority was assigned to good gravel surfaces.
b) Alignment – Horizontal alignment is the arrangement of straight tangents and curved sections on the road as would be viewed in an overhead plan view map. Vertical alignment is the projection of vertical elevations along the horizontal alignment. It can be explained as the view of a roadway as if it was cut along the centerline. Generally, sharp horizontal curves and numerous and sharp vertical curves are indicative of lower standard roadway designs. If the horizontal and vertical alignment condition is very good there is no need for improvement, then the lowest scoring is given. Higher scoring is assigned to roadways with poor horizontal and vertical alignments. Medium priority is awarded for roads with some room for improvement in horizontal and vertical alignment at some locations.
c) Roadway Width – Highest scoring is given to roads with much narrower width than desired and lowest scoring points for roads with existing width and road surfaces matching the desired width and road surface. The priority points awarded from 0 to 20 are dependent on the degree of widening required.

2) Traffic Rating – The traffic rating is based on the user demands being placed on a segment of road. A lower score would be assigned to those roadways with lower demands due to such things as low overall traffic volume, fewer trucks, or a high existing operating speed.
   a) Average Annual Daily Traffic (AADT) - A measure used primarily in transportation planning and transportation engineering. It is the total volume of vehicle traffic on a highway or road for a year divided by 365 days. 0 to 20 scoring points awarded based on AADT, 20 priority points for AADT more than 2000 and 0 for AADT 0. Stewart Weir's 2013 traffic count data was used for the determination of AADT for all road sections, except for Range Road 202 where Alberta Transportation's 2012 turning movement diagram was used. Range Road 200 was assumed to have a similar AADT as Range Road 201. Traffic count data can be found in Appendix E.
   b) Traffic Composition – Percentages of trucks in the traffic indicates how much priority should be given to each road. The highest priority is assigned to a roadway with truck percentages of more than 25% and least priority is given to roads with truck percentage lower than 5%. This ensures that roadways with higher commercial vehicle traffic are given a higher priority due to higher severity of collisions involving truck traffic.

3) Network Rating - The network rating priority points given to each roadway depends on the importance of the roadway in the overall transportation network. Factors such as roadway function and adjacent features can be scored for each roadway section in terms of how critical it is for the movement of people and goods within the county.
   a) Roadway Function - Roadway function can be defined by the pattern of particular roadway traffic by taking into account whether it is travelled by local, collector

traffic, arterial (through) traffic, or mixed. Highest ranking points are given to a roadway with a higher percentage of through traffic and the least amount of points is given to a roadway with purely local traffic.

b) Adjacent Features – Ranking points awarded depending on the surrounding area features from which the roadway passes or ends. Highest priority is given to emergency services and school routes, and medium priority is given to recreation centres and industrial areas. Moderate priority is given to transfer stations and landfills.

4) Potential Development – Ranking points to be assigned based on prevalence of existing adjacent development, with highest scoring given to roadways with extensive adjacent development, and lowest scoring given to roadways with no adjacent development. As the industrial zoned land within Lamont County gets developed, this portion of the ranking matrix will need to be updated.

   Potential Development category has been calibrated to four scoring levels based on what we understand to be the development potential on the basis of known developments and discussions with the County regarding development. It is a qualitative assessment of development in the South Lamont Industrial Heartland. We have classified development potential in this way to address the frequently evolving needs of developers in the industrial area and the ambiguity of what future development will look like.

5) Continuity – Ranking points to be assigned based on whether a road improvement will link adjacent improved roads, extend improved roads, or represent a stand-alone improvement. Highest ranking points will be assigned to roads where linkage between adjacent improved roads is offered.

Table 1

LAMONT COUNTY ROADWAY IMPROVEMENT PRIORITY RATING MATRIX

PRIORITY RANKING	ROAD NAME	POSTED SPEED (Km/hr)	EXISTING SURFACE TYPE	EXISTING AVE. ROADWAY WIDTH	RECOMMENDED SURFACE TYPE	RECOMMENDED WIDTH	RECOMMENDED SECTION	CONDITION RATING: SURFACE CONDITION	CONDITION RATING: ALIGNMENT	CONDITION RATING: ROADWAY WIDTH	TRAFFIC RATING: EXISTING AVERAGE ANNUAL DAILY TRAFFIC	TRAFFIC RATING: TRAFFIC COMPOSITION	NETWORK RATING: ROADWAY FUNCTION	NETWORK RATING: ADJACENT FEATURES	FEASIBILITY RATING: ENVIRONMENTAL FACTORS	FEASIBILITY RATING: CONSTRUCTION FACTORS	FEASIBILITY RATING: PUBLIC SUPPORT	POTENTIAL DEVELOPMENT	CONTINUITY	TOTAL RANKING POINTS
CRITERIA: ROADS SHOWN IN GREEN / COLLECTOR ROADS SHOWN IN BLUE								GOOD - ASPHALT SURFACE; POOR SURFACED OR REQUIRES PAVEMENT / OIL FULL; GOOD - GRAVEL OR OILED SURFACE; FAIR - GRAVEL SURFACE; POOR - UNIMPROVED	GOOD HORIZONTAL & VERTICAL ALIGNMENTS; FAIR HORIZONTAL & VERTICAL ALIGNMENTS; POOR HORIZONTAL & VERTICAL ALIGNMENTS	SUBGRADE WIDTH = DESIRABLE; EXISTING SUBGRADE WIDTH 0 TO 1 M NARROWER THAN DESIRED; EXISTING SUBGRADE WIDTH 1 TO 2 M NARROWER THAN DESIRED; EXISTING SUBGRADE WIDTH 2 TO 3 M NARROWER THAN DESIRED; EXISTING SUBGRADE WIDTH MORE THAN 3 M NARROWER THAN DESIRED	0 < AADT < 150; 150 < AADT < 400; 400 < AADT < 1000; 1000 < AADT < 2000; AADT > 2000	5% > TRUCKS; 5% < TRUCKS < 15%; 15% < TRUCKS < 25%; > 25% TRUCKS; > 25% TRUCKS WITH PED. & CYCLISTS	PURELY LOCAL TRAFFIC; SMALL AMOUNT OF COLLECTOR TRAFFIC; MOSTLY COLLECTOR TRAFFIC; SOME THROUGH TRAFFIC; MOSTLY THROUGH TRAFFIC; SCHOOL BUS ROUTE	LANDFILL / TRANSFER STATION; REC. AREAS / RESOURCE EXTRACTION / INDUSTRIAL; EMERGENCY SERVICES / SCHOOLS	SIGNIFICANT ENVIRONMENTAL IMPACT; SOME ENVIRONMENTAL IMPACT; MINOR ENVIRONMENTAL IMPACT; NO ENVIRONMENTAL IMPACT	MAJOR CONSTRUCTION DIFFICULTIES EXPECTED; AVERAGE CONSTRUCTION DIFFICULTIES EXPECTED; MINIMAL CONSTRUCTION DIFFICULTIES EXPECTED	STRONG OPPOSITION; EVEN SPLIT FOR AND AGAINST; MOST TAXPAYERS IN FAVOUR; ALL IN FAVOUR	EXTENSIVE ADJACENT DEVELOPMENT; SOME ADJACENT DEVELOPMENT; LIMITED ADJACENT DEVELOPMENT; NO ADJACENT DEVELOPMENT	PAVED LINK BETWEEN TWO PAVED ROADS; EXTENTION OF PAVED ROAD; STAND ALONE PAVED ROAD; GRAVEL ROAD	
	RANKING POINTS							0; 7; 9; 15; 20	0; 10; 20	0; 5; 10; 15; 20	0; 10; 15; 18; 20	0; 2; 4; 8; 10	0; 6; 12; 16; 20	0; 3; 6; 9	0; 1; 2; 3	0; 1; 2	0; 1; 2	15; 10; 5; 0	20; 10; 5; 0	
1	Range Road 202	80	Gravel	9.5	ACP	11.0		15	0	20	15	8	16	6				15	20	117
2	Township Road 482	80	Gravel	7.0	ACP	9.0		15	10	20	0	0	18	6				10	20	99
3	Range Road 203	80	Gravel	7.5	ACP	9.0		15	0	20	10	2	12	6				10	20	95
4	Range Road 201	80	Gravel	7.5	ACP	9.0		15	0	20	0	4	12	6				15	10	82
5	Range Road 200	80	Gravel	7.0	ACP	9.0		15	10	20	0	0	12	6				5	10	76
6	Range Road 195	80	Gravel	7.5	ACP	9.0		15	0	20	0	8	12	6				0	10	71

4 Cost Estimates

We have developed roadway improvement unit costing (per km) for upgrades from existing roadway to Lamont County standard sections. Costs were developed using estimated grading, GBC, and ACP quantities required. Contingencies and engineering costs have also been included. Added costs for utilities, railroad crossings, bridge files, and intersection upgrades were also considered in the estimate.

Alberta Transportation unit price averages were used as the basis to determine unit pricing for earthworks, GBC, and ACP placement, with corrections for local conditions and scale of work required. The lengths of each roadway were multiplied by the unit construction upgrade costs and the total costs to upgrade were extended. The Cost Estimate Summary can be found in Table 2 and the details in Appendix D.

The Cost Estimates, in conjunction with the Roadway Improvement Priority Matrix, will allow Lamont County to schedule roadway work within the County moving forward that meet annual budget allocations, which can tend to fluctuate from year to year. For example, in Year 1, the County may decide to undertake priorities 1, 3, and 5, if the total cost estimate works out closely to the budget allocation for roadway capital work, rather than just undertaking priorities 1 and 2, which may be estimated at the same dollar value.

Table 2

LAMONT COUNTY ROADWAY IMPROVEMENT									ESTIMATE			
	PRIORITY RANKING	ROAD NAME	POSTED SPEED (Km/hr)	EXISTING SURFACE TYPE	EXISTING AVE. ROADWAY WIDTH	RECOMMENDED SURFACE TYPE	RECOMMENDED WIDTH	LENGTH IN KILOMETERS	APPROXIMATE GRADING COST	APPROXIMATE BASE PAVE COST	TOTAL COST
ARTERIAL ROADS SHOWN IN GREEN		COLLECTOR ROADS SHOWN IN BLUE									
	1	Range Road 202	80	Gravel	9.5	ACP	11.0	3.25	$6,223,000	$2,616,000	$8,839,000
	2	Township Road 560	80	Gravel	7.0	ACP	9.0	6.60	$3,070,000	$4,531,000	$7,601,000
	3	Range Road 203	80	Gravel	7.5	ACP	9.0	3.25	$2,443,000	$2,231,000	$4,674,000
	4	Range Road 201	80	Gravel	7.5	ACP	9.0	4.05	$2,023,000	$2,780,000	$4,803,000
	5	Range Road 200	80	Gravel	7.0	ACP	9.0	4.05	$1,935,000	$2,780,000	$4,715,000
	6	Range Road 195	80	Gravel	7.5	ACP	9.0	4.05	$2,075,000	$2,780,000	$4,855,000

5 Traffic Counts

Traffic counting was done using a combination of intersection turning movement counts and automated traffic recorder counts at strategic locations. Intersection turning movement counts were conducted by Brad Geib, C.E.T., Project Technologist on Mar. 5 – 20, 2013. Automatic traffic recorder (ATR) counts were conducted by Tony Dhitivara, P.Eng., Project Engineer on Apr. 1 – 8. ATR counts were delayed due to seasonal grader activity on the road surface. Subsequent peak hour and daily traffic analyses were also undertaken. Counts were taken at the following locations:

Intersection Turning Movement

- Range Road 203/Highway 15
- Range Road 203/Highway 45
- Range Road 201/Highway 15
- Range Road 201/Township Road 560
- Range Road 200/Highway 29
- Township Road 560/Highway 831

Automatic Traffic Recorder

- Range Road 195 (0.8 km north of Highway 29)
- Range Road 201 (2.3 km south of Township Road 560)
- Range Road 203 (2.0 km north of Highway 15)
- Township Road 560 (2.0 km east of Range Road 200)

Traffic count data can be found in Appendix E.

6 Trip Generation

Future land use and projected traffic generators have been reviewed on the basis of zoning maps, development permit information provided by Lamont County, and extensive discussions with County staff. Known current and future major developments within the study area include:

- Western Asphalt
- Blue Horizon Bio-Diesel
- Canexus Chemicals
- Tervita Corporation
- Triton Projects Inc.
- Canadian Heartland Lamont Industrial Park
- Alberta Midland Railway
- Graymont

The lands that are not currently linked to a specific development are primarily zoned for Industrial use, with lands closest to Lamont and Bruderheim zoned for Agricultural use to provide a buffer between these municipalities and potential industrial developments.

Stewart Weir has calculated approximate trip generation traffic volumes for the AM and PM peak hours for the industrial lands within the study area. For the developments for which development permit information was available, the developable area and number of employees were summed up to come up with an assumed value for employees per acre of land. This employee per acre value was then used to project development traffic generated by the developments within the study area using the Institute of Transportation Engineers (ITE) Trip Generation Manual per employee rate for a Light Industrial development. A map showing the projected trip generation volumes is included in Appendix F.

7 Intersection Treatment Analysis

To determine whether intersection upgrades were needed a "Traffic Volume Warrant Chart for at-grade Intersection Treatment" (Alberta Transportation's Highway Geometric Design Guide) and Intersection Analysis charts were used. Charts and summary of findings can be found in Appendix G. The results of the analyses are incorporated in the cost estimates for the relevant roadway sections.

8 Closure

Thank you for allowing Stewart Weir the opportunity to carry out this assignment. We recommend that inspections and revisit of traffic distributions and cost estimates should occur on a regular basis in order for the document to stay current and the recommendations valid. We trust this information will be beneficial to your roadway asset management program, and we look forward to the opportunity to present further to your County Council. Please contact our office at (780) 410-2580 if you require any clarification.

Yours truly,

Stewart Weir

Prepared by:

Andrew Luis, E.I.T.
Project Engineer

Reviewed by:

PROFESSIONAL ENGINEER ALBERTA
SEAN ERIC SNOWDEN

Sept. 4, 2013

Sean Snowden, P. Eng.
Project Director