

Engineering Assessment

# Leduc Annex – Gravel Roads Condition Assessment and Maintenance Program Review

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Final Document Prepared on August 19, 2020

Project Report: 126265

## IBI Group



### Corporate Authorization Form

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Date	<u>19 Aug. 2020</u>
<b>PERMIT NUMBER: P 13381</b>	
The Association of Professional Engineers and Geoscientists of Alberta	

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## Document Control Page

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# 1. Introduction and Background

## 1.1 Services Introduction

IBI Group was initially retained by the City of Edmonton to prepare a condition assessment report and maintenance process audit for the Leduc East Annex Roads, specifically Gravel and Oil roads, including geotechnical review & consideration. In addition to this scope, IBI was further asked to provide a representative condition assessment of the West Annex Roads and comment on their current health following our 2019 Summer/Fall deficiency reporting assistance.

From our understanding of the City's service request intent, and in an effort to provide a value-added service to the City, IBI has combined the above scope to establish a comprehensive review of the City's maintenance program that is currently being implemented for the Leduc Annex area gravel and oil mix roads. The report will utilize all data available to IBI to correlate the City's maintenance implementation strategy, maintenance repair program document, and field process in order to provide a formal standard of care assessment.

## 1.2 Project Background – 2019 to 2020

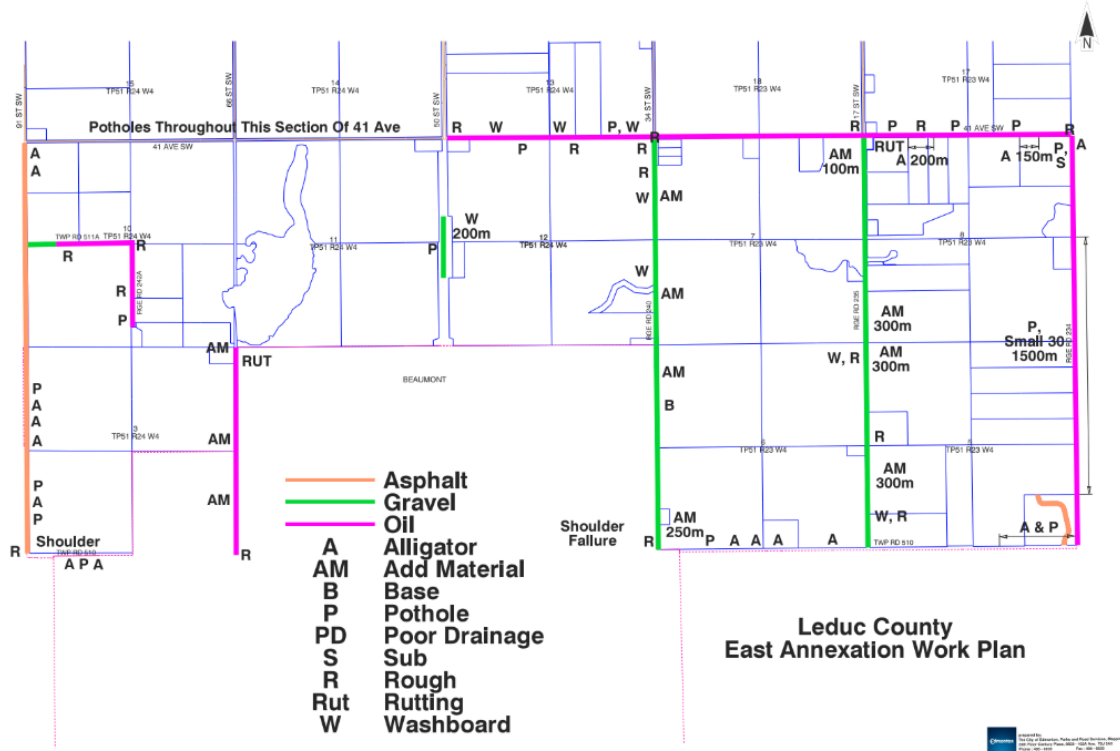
In January 2019, The City of Edmonton completed the annexation of lands from Leduc County, which included approximately 69 km of additional rural road assets. The road assets included gravel structure, oil & gravel mix, and asphalt (cold mix). As part of the asset acquisition, formal maintenance also began on the roadways, by the City of Edmonton, under standard operating practices. The City of Edmonton designated these roads into two major sections, East Annex (Figure 1.1) and West Annex (Figure 1.2).

Through initial events outside the scope of IBI's assessments, it is our understanding that the record amounts of precipitation in the spring and summer of 2019 aggravated existing road conditions such that large portions of the West Annex gravel structure roads suffered compromised crowns. This further resulted in weakening, and ultimately failure, of the existing clay-cap structures supporting the gravel sub-base. As the clay-cap was the bridge supporting these roadway structures above existing organic materials, the resulting failures were catastrophic, leaving large sections of the west annex roads with complete roadway collapse and creating large runs of secondary ditching.

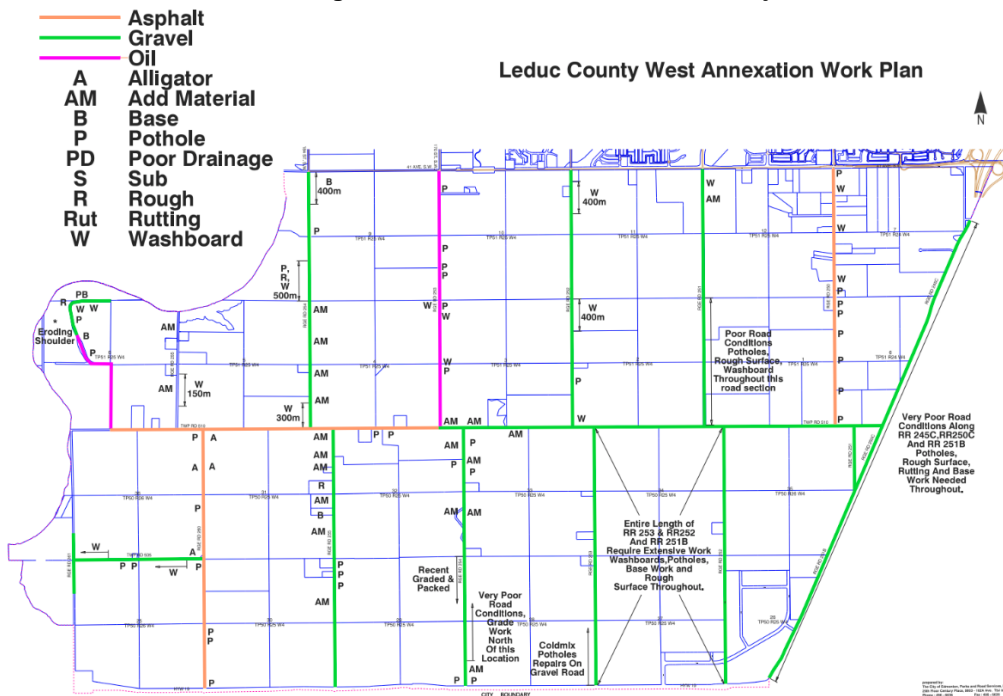
As part of the 2019 Drainage Open Orders program, the City of Edmonton requested that IBI provide services in assisting the reestablishment of these roads. IBI provided continued site reporting, formal deficiency inspections, and a full survey of the gravel roadways inside the West Annex Lands (Figure 1.2). This work will be referenced further as IBI's 2019 work, where a full condition assessment was done for all gravel structure roads within the West Annex. Initial site visits were completed daily, with frequency reductions as the repairs progressed. Throughout the work, a focus was placed on identifying the largest repairs and safety concerns first, with general minor repairs relegated to a secondary priority. After the City completed the re-establishment and major repair of each roadway, IBI then provided a formal deficiency inspection report to identify any new damages or any remaining repairs not yet addressed. Once roadway deficiency reporting was completed and the roads fully restored, IBI provided complete as-built survey of all road elevations, shoulders, ditches, culverts, and street furniture along these roadways. As part of the final 2019 work deliverable's discussion, IBI and the City reviewed options to continue similar reporting efforts for the East Annex roads in 2020 as part of their future maintenance program.

In spring 2020, with the evolving issues surrounding the annex roads, the City of Edmonton and IBI proposed altering the previously discussed East Annex reporting scope to a more focused engineering review of the roadway conditions in consideration of the City of Edmonton's standard maintenance practices. The intent of the new scope was to determine potential improvements or process gaps for the Annex Roads maintenance as it related to industry standards.

As part of our proposed analysis of the City's maintenance program, IBI has also included Geotechnical services from engineering firm CT & Associates. The geotechnical reporting for this assessment, included in full under Appendix 5, was completed by CT & A in conjunction with IBI's assessment work, but was prepared as a separate independent analysis of the City's infrastructure, maintenance process, and IBI's condition assessments.



**Figure 1-1: Leduc East Annex Roads - Project Location**



**Figure 1-2: Leduc West Annex Roads - Project Location**

### 1.3 Subject Area Location

As identified in the above figures, the Annex West project area is bounded on the north by 41st Avenue SW, bounded to the west by 212th Street SW, bounded to the east by 124th Street, and bounded on the south by Highway 19 as the new City of Edmonton Boundary.

The Annex East project shares the same north boundary as the West Annex, however it is bounded on the East by Range Road 234, to the West by 91st Street, and to the south by Township Road 510.

The extent of this 2020 report discussion covers only the Gravel and Oil roads identified in these locations, shown in Figures 1.1 and 1.2.

## 2. 2020 Condition Assessment & Field Review

This section will discuss the current condition of the East and West Annex roads as inspected by IBI Group through several site visits over the months of July and August 2020. The inspections were completed by IBI's Senior Area Managers both on foot and in-vehicle.

For the East Annex roads, each gravel and oil road segment identified on Figure 1.1 has been reviewed to assess the visual health of the roadway, and all individual inspections can be found included under Appendix 1. This report will summarize each assessment individually with an intentional bias towards reviewing viability and industry standards. For the geotechnical assessment, CT & Associates has reviewed all of the East Annex roadways under Appendix 5.

The West Annex roads will be assessed by representation, as IBI completed all initial condition assessments in 2019, with deficiency inspections also completed after the substantial re-construction and repair of the area by the City of Edmonton. IBI has selected 2 less trafficked and 2 high trafficked roadways that were deemed to be suitable representations of the West Annex lands (All individual west inspections included under Appendix 2). A determination will be provided on the validity of the City's re-construction from 2019, and the current vs expected state of these roadways when viewed from development industry standards. As the West Annex roads were almost fully reconstructed in 2019, geotechnical review by CT & A was not completed for this area. However, it should be noted that CT & A has reviewed IBI's West Annex field condition assessment reports as part of their scope (Appendix 5).

Additionally, during IBI's site visits, efforts were made to ensure visual observation of the City's maintenance crews in the process initiating repairs, and a separate limited field evaluation will be provided below.

### 2.1 Condition Assessments – West Annex

- Leduc West Road Annex – Inspection: 153rd Street – Highway 19 to 73 Ave SW: From our 2019 work experience and frequent site visits last year, IBI selected this section as an example of high traffic volumes. Through the review of this approximately 3.1km section, IBI noted 16 deficiencies that would typically be identified with standard industry practices. Much of the roadway suffered from washboarding and minor rutting, with some sections exhibiting soft shoulders and more severe rutting. The soft shoulder and severe rutting locations looked to be recent, and IBI will take into account the frequent rain events this year as part of our overall determination.
- Leduc West Annex – Inspection: 156th Street – 73rd Ave SW to 41 Ave SW: IBI identified this roadway section as another effective representation of a high trafficked roads within the West Annex location. Through the review of this approximately 3.1km section, IBI noted 8 deficiencies that would typically be identified with standard industry practices. Again, most of the roadway suffered from minor amounts of washboarding and rutting, and the area above the culverts showed signs of recent repair work and minor rutting. While inspecting the road conditions, IBI was also able to observe City of Edmonton maintenance crews working on rutting and pothole repairs for the north end of the roadway.

- Leduc West Annex – Inspection: 167<sup>th</sup> Street – 73 Ave SW to Highway 19: This roadway section was deemed to be a lower traffic volume location based on IBI 2019 work experiences. Through the review of this approximately 3.0km of roadway, IBI noted 13 deficiencies that would typically be identified with standard industry practices. The majority of the roadway showed typical rural wear such as washboarding and minor potholes. The inspection did note however, that there was un-addressed debris from fallen trees inside the roadway limits. IBI will take into account that our inspection was completed within days of a major storm event, and reasonable time frames for debris removal may vary depending on adjacent road repair needs and City resources. An informal re-review of the roadway 2 days after the inspection noted the debris had been cleared.
- Leduc West Annex – Inspection: 184<sup>th</sup> Street – 41 Ave to 73<sup>rd</sup> Ave SW: IBI identified this roadway section as another effective representation of a low traffic volume location for the West Annex area. Through the review of this approximately 3.1km of roadway, IBI noted 14 deficiencies that would typically be identified with standard industry practices. The roadway showed minor washboarding, potholes, and soft shoulders for most of its length, though all conditions observed were considered as standard rural wear. While overall ditch and area drainage was not specifically part of IBI's scope, large quantities of water were noted as ponding for the south 50-100m of roadway. The ponding should be reviewed as part of the City's overall long-term drainage strategy for these areas, which will be discussed further in the sections below.
- Leduc West Annex – Inspection: 124 Street at 73<sup>rd</sup> Ave SW – Intersection Review: Through IBI's various discussions with the City of Edmonton Operations Group, it was noted that the titled intersection was experiencing on-going drainage issues due to the frequent heavy rain events this season. As a value-added component to this report, IBI did attempt to provide a cursory review of the intersection. As limited data was available for any detailed review, a visual inspection was completed. From visual inspection onsite, it appears that the NW culvert at the intersection is not draining and thus limiting functionality of the system. In addition, the ditches appear to have grade issues and may require adjustment to ensure positive drainage. IBI recommends obtaining survey of this area, including culvert elevations, for review in relation to the overall area drainage.

To assist with the overall representative assessment of the West Annex roads, IBI has re-reviewed the 2019 final deficiency reports and included them as part of this document under Appendix 3. The final West Annex condition assessment has been based on 3 main criteria:

- Visual Quality of Roadway – A comparison of road safety, driveability, functionality, and accessibility from 2019 to 2020;
- Deficiency Count and Severity – A comparison of the total numbers of deficiencies observed in each assessment and how impactful each item was for road safety and function;
- Outside Factors – A review of external forces such as inspection report timing, weather, and economic climate;

Based on these criteria, IBI has determined that the West Annex roadway 2019 repairs and re-construction efforts were a success, and that the City of Edmonton has effectively maintained these roadways since our previous inspection reporting period. The overall visual quality of the roadways for 2020 were noted as equal to or better than the 2019 reports. 3 out of 4 road sections had less deficiency counts, with less major items impacting the main components of the roadways. Finally, outside factors for 2020 noted similar circumstances to 2019, with more rainfall events of high intensity alongside budgetary and staffing constraints from COVID-19.

## 2.2 Condition Assessments – East Annex

Unlike with the West Annex roads area, IBI Group does not have any internal historical repair records for comparison for the East Annex roads. As such, each individual roadway assessment will be reviewed as a formal deficiency inspection subject to standard industry practices. Any external factors or significant considerations will be noted as part of the applicable summary below and taken into account as part of the final overall condition assessment. Lastly, notes regarding settlement issues are from a purely visible inspection and do not constitute a detailed review of subgrade viability. A subbase/subgrade inspection and test hole program recommendation will be discussed in the following sections.

- Leduc East Annex – Inspection: 41 Ave SW – 17 Street to Meridian Street: As part of our review of this approximately 1.6km of roadway, IBI noted 8 deficiencies that would typically be identified with standard industry practices. Most of the roadway suffers from settlement issues, alligator cracking, and resulting potholes, with limited soft shoulder areas. Several potholes look to be ongoing settlement issues and visually seem to have undergone multiple repairs. While the soft shoulder areas are limited, they are significant in the severity of the deficiency. The alligator cracking, though the most prominent observable deficiency, is the most minor in severity. 41 Ave SW's initial condition will be given consideration on the notable age of the road, the severity of weather through the past 3-5 years, and the high traffic volumes along the roadway.
- Leduc East Annex – Inspection: 41 Ave SW – 34<sup>th</sup> Street to 17<sup>th</sup> Street: As part of our review of this approximately 1.6km roadway, IBI noted 8 deficiencies that would typically be identified with standard industry practices. Similar to the previous section of 41 Ave SW, the roadway suffered from minor settlement, alligator cracking, surface scarring, and minor rutting. While aesthetically visible, the majority of the deficiencies for this section are not severe and do not impact the functionality of the roadway. It was visually noted through the inspection that the culverts located approximately 1km east of 34<sup>th</sup> street may require cleaning and re-shaping of inlet/outlet areas. However, as no standing water was observed, IBI can not fully considered this a major deficiency.
- Leduc East Annex – Inspection: 41 Ave SW – 50<sup>th</sup> Street to 34<sup>th</sup> Street: As part of our review for this approximately 1.6km roadway, IBI noted 10 deficiencies that would typically be identified with standard industry practices. As per the previous section of 41 Ave SW, the roadway suffered from minor settlement, limited alligator cracking, surface scarring, minor rutting, with the additional note of washboarding at the gravel components. While the alligator cracking was limited in its lengths, it was considered sever where visible. The severity of the cracking was mitigated by the additional note that during the inspection, IBI observed City maintenance crews in the process of completion roadway repairs for cracking/scarring.
- Leduc East Annex – Inspection 50<sup>th</sup> Street Service Road: IBI did not find any visible deficiencies along the 50<sup>th</sup> street service road which would be considered under standard industry practices.
- Leduc East Annex – Inspection 17<sup>th</sup> Street – 41 Ave SW to Township Road 510: As part of our review for this approximately 3.1km roadway, IBI noted 11 deficiencies that would typically be identified with standard industry practices. Much of this section of roadway showed very minor rutting, minor washboarding, loose gravel, and minor debris within the roadway limits. While the debris was the most visible deficiency and does pose some safety risk, it was limited in its impact into the roadway limits and does not encroach into the visible drive paths. Consideration will be given that IBI's inspection report for this area was completed within a few days of a major storm event. As an informal note, the debris was able to be removed by IBI's immediately following the inspection and documentation.
- Leduc East Annex – Inspection – Range Road 242 North of TWP RD 510: As part of our review for this approximately 1.6km roadway, IBI noted 6 deficiencies that would typically be identified with standard industry practices. The roadway showed occurrences of minor rutting, washboarding, and soft shoulder areas. The overall severity of each item was considered minor, with the exception of a soft shoulder area located 400 meters north of TWP RD 510. While the roadway section showed little significant issue, the turnaround area identified on the report suffered from severe rutting. While the road functionality appeared un-affected by the turnaround, if it's use is intended to continue, it is recommended the City grade and re-establish the area and edges.
- Leduc East Annex – Inspection – Range Road 242A – East of range Road 243: As part of our review for this approximately 1.5km roadway, IBI noted 15 deficiencies that would typically be identified with standard industry practices. The majority of this roadway was found to be impacted by settlement issues, potholes, ruts, and a lack of top dress material. The potholes and rutting ranged from barely visible incidents, to more severe safety issues. Specifically, the area noted at approximately 400 meters east of Range Road 243 showed a pothole that would be deemed unsafe by industry standards. It was also noted as part of our review that the entire north/south section (deficiency items 8-15) showed areas in need of top dress material. Given the major issues and re-construction efforts encountered in 2019 under

the West Annex roads as a result of material loss, this item should be noted as a high priority review. Under standard industry practices, knowing the subgrade and base material structures, it would not likely be as immediate of a priority.

- Leduc East Annex – Inspection – Meridian Street – Township Road 510 to 41 Ave SW: As part of our review for this approximately 3.2km roadway, IBI noted 24 deficiencies that would typically be identified with standard industry practices. The high deficiency count for this section is due in part to IBI's requirement for 2 separate trips to site, resulting from construction activities for the installation of new culverts. Excluding the construction areas and impacts from our review (though they can be seen on the applicable report in Appendix 1), the roadway suffered from settlement issues, potholes, alligator cracking, washboarding, soft shoulders, and limited double ditching. Sections of settlement and potholes such as 1600 meters north of TWP RD 510 are close to being definite safety concerns and should be reviewed. Though a substantial number of deficiencies were identified, less than half impact the functionality of the road, and the impactful items can visibly be identified as on-going concerns. Some items such as the double ditching will likely need to be addressed as part of a larger drainage assessment for the Annex Areas.

For a consistent review approach, the final East Annex assessment has been based on the same 3 criteria as the West Annex, with an added component towards the age of the deficiency. Without any documented major re-construction efforts, it was necessary for IBI to consider if the underlying cause for a deficiency was due to pre-existing conditions from before the City of Edmonton's annexation of lands.

- Visual Quality of Roadway – A comparison of road safety, driveability, functionality, and accessibility;
- Deficiency Count, Severity, and Age – A comparison of the total numbers of deficiencies observed in each assessment, how impactful each item was for road safety and function, and an added review to determine if underlying condition was existing pre-annexation;
- Outside Factors – A review of external forces such as inspection report timing, weather, and economic climate;

Based on these criteria, IBI has determined that, overall, the maintenance being implemented by the City of Edmonton for the East Annex roadways is effective.

Visually, almost all roadway inspections showed standard signs of gravel road usage such as washboarding or rutting within normal expectations of new industry roadways. As the roadways are existing and not new construction, the East Annex deficiencies were considered minor and under control by the City's maintenance crews. IBI found few deficiencies which impacted the functionality and accessibility of the roadways, and though washboarding is a common gravel road issue, it should be noted that excessive amounts can impact driveability and safety, thus it must be managed properly.

The overall amount of deficiencies noted was 92 items, across approximately 15km of road. This number is, however, inflated due to observational items and the secondary inspection of Meridian Street. IBI considers the effective count to be approximately 5.5 deficiencies per km of roadway. Given the roadway usage, typical occurrence of certain deficiency items, and minor impact for most of the deficiencies observed, these East Annex sections would be considered in acceptable to above average condition based on industry standards and practices.

Of the 9 roadway sections inspected by IBI, only 3 showed severe deficiency areas which were deemed safety issues. IBI's determination took into account that these severe deficiencies were found on the more heavily trafficked roads, and that maintenance crews were in the process of addressing 1 of the 3 major noted items. Consideration was also given to the overall impacts of the excessive amounts of heavy rainfall events which have hit Edmonton this year. Intense rainfall events can be a direct impact on settlement, rutting, and soft shoulder deficiencies.

Lastly, IBI considered that most observed settlement and pothole issues appeared to be re-occurring deficiencies with visible existing repair areas surrounding them. Given that the City of Edmonton has annexed these roadways in an "as-is" condition, reasonable consideration was given to the feasibility of sweeping large scale re-construction/upgrade efforts in a time of poor economic health for the City and Industry.



## 2.3 Field Review – Maintenance Implementation

During our onsite field assessment period, IBI intentionally looked for City of Edmonton maintenance crews that were in the process of completing deficiency repairs/roadway upgrades, in order to observe their construction practices in action. To account for the excessive 2019 and 2020 rainfall in Edmonton, the review also sought to observe the City of Edmonton practices under both dry and wet site conditions.

After some initial efforts and observations, it was deemed that this approach was not an effective usage of IBI's funding, and time was instead shifted to additional discussion and review of the City of Edmonton's implementation strategy for their repair guidelines.

## 2.4 Maintenance Process – Field Review

While the duration of IBI's onsite process observations was limited, we were able to review 3 separate cases of repairs to the East and West Annex roads. Of the 3 cases reviewed, 2 were formally captured on the deficiency inspections reports for: Leduc East Annex – Inspection: 41 Ave SW – 50<sup>th</sup> Street to 34<sup>th</sup> Street, and Leduc West Annex – Inspection: 156<sup>th</sup> Street – 73<sup>rd</sup> Ave SW to 41 Ave SW.

IBI's observations included review of the City of Edmonton's gravel road and oil mix road repair process for potholes, cracking, and re-grading gravel with road crown rehabilitation (washboarding, rutting, settlement). Our visual review considered the crews' activities as they related to standard industry practices that IBI would expect from other municipal or private construction work.

Overall, the maintenance crews were observed as working efficiently and effectively. Little input could be provided to benefit or improve the City's repair implementations. No operational errors or process inconsistencies were observed by any of the individual crew members performing the repairs. In addition, the City of Edmonton equipment operators showed capable skills, with no immediate visible workmanship issues, and would be considered effective in other industry construction activities of similar scope.

## 2.5 Additional Scope - Overall Maintenance Implementation Strategy

After partial completion of our condition assessment reports and field activities review, IBI noted it would be of benefit to this report to discuss with the Operations Group what specific process was being used for an overall implementation strategy, and if documentation was available. In addition to our review of the City's repair program, IBI wanted to understand and assess how the Operations Group implemented the program practices and how City resources were being allocated across these Annex Roads. With IBI's understanding from those discussions, the City's strategy is as follows:

- No firm documentation currently exists for the overall maintenance strategy specific to these Annex roadways; however, the City's existing rural roadway maintenance philosophy is being applied to the Annex areas.
- An overall asset management plan is currently under development within the City of Edmonton. The future document will address roadway priority designations and maintenance implementation. IBI will comment on this note in further sections, however, the City has currently applied the following strategy to the maintenance of the Annex roads:
  - For all Annex Roads, an individual visible inspection is completed daily by a City Operations Group member who physically visits each roadway section.
  - These daily visual inspections are focused on identifying repairs in 3 main areas of concern, listed in order of priority:
    - Safety; The primary focus of the City's strategy was confirmed to be driver safety during use of these roadways. It is IBI's understanding that all deficiencies observed onsite are considered for safety impacts, and that the highest safety repair issues are addressed first and foremost.

- Residential Impacts and Roadway Functionality; The secondary focus noted by the City was an assessment for each visible deficiency as it relates to residents, such as the number of individuals impacted and the overall functionality of the roadways for the standard use;
  - Repair Severity; After review of the first two criteria, the visual inspections then consider the severity of a deficiency as the third area of concern, with the most major items being addressed first when possible. This can vary greatly based on the type of repair identified, required repair processes, and pending review of City of Edmonton budget.
- As an additional consideration, the City of Edmonton noted that expected/historically observed traffic volumes are also taken into account when assessing where repair implementation.

IBI has reviewed the above outlined strategy as it relates to industry standards and best practices. It was compared to typical construction process activities as well as other private and municipal repair program strategies which IBI has witnessed and/or implemented. As implementation strategies vary, IBI also considered other City of Edmonton maintenance programs such as the private industry's Transportation Inspectors Guidelines.

In general, IBI does agree with the overall strategies discussed with the City of Edmonton. If this process is followed, the implementation of the maintenance program (physical repair program) should create a safe road network and provide effective use of City of Edmonton resources. It is accepted practice that, within reasonable assessment, safe use of roadways and general public safety should always be the primary maintenance concern. This directly aligns with the City of Edmonton's maintenance approach. A further note should be made that daily physical inspections of all roadways does exceed industry standards and is considered a significant benefit.

However, one area where IBI would recommend further caution, is in the allocation of resources in response to resident complaints, which does seem to be a primary component of the strategy. While input from adjacent residents and roadway users is important and should not be disregarded, it is common in the development industry to see overstatement of deficiency severity. Residents and roadway users do not typically have the same extent of information on the roadways and may not be aware of other issues, major repair requirements, or sub surface conditions. From a pure efficiency review, it is recommended the City consider the severity of all repairs adjacent to the usability of the roadways, but above the general input of residents unless warranted. IBI also understands that the City of Edmonton is a municipality responsible for maintaining roadway health for these residents, and this may not be a practical change.

### 3. Asset Maintenance Program Review

Part of IBI's combined scope of work was to review the physical maintenance repair guidelines which the City of Edmonton has in place for the Leduc Annex roadways, and to comment on the overall standard of care. The maintenance repair guidelines reviewed by IBI Group have been included with this report and can be found under Appendix 4.

The City of Edmonton Asset Maintenance Plan for Oil and Gravel Roads is a 14-page summary document, which pertains specifically to the noted road structure types, but covers all of the City's infrastructure inventory. It is IBI's understanding that this document is the guiding force behind all gravel and oil mix road repair activities inside the West and East Annex lands. The review from this document will focus on the quality of the program and specified measures as they relate to industry best practices. For a geotechnical engineering assessment, CT & Associates has also reviewed the document in their report found under Appendix 5.

The document itself is well-prepared, and clearly broken out into 15 titled sections with 2 additional appendices. IBI has determined that only some sections and appendix 1 are applicable to our review, sections 6, 8, 9, and 10 - 15 speak to larger internal City of Edmonton processes that are outside the scope of this assessment. To facilitate a thorough review, IBI has assessed each individual section as follows:



1. Program Scope: The maintenance program scope section clearly defines the implications and intended coverage of the document and there are further sub-overviews provided specifically for both gravel and oil mix road structure construction including common maintenance. Though IBI found the information summary to be accurate and concise, further elaboration could be given on several notes. Both scopes note “compacted by roller” but do not mandate a specific compaction testing requirement or clarify if the compaction is in reference to base material or top dress. Although the general process is correct and understood by IBI, given the substantial infrastructure the document covers, best practices would be to further refine each portion of the construction process and remove interpretation errors as much as possible. For the gravel roads specifically, the City should define when and where 25mm and 63mm are to be typically implemented, though again, the overall practice in summary is in line with industry standard practices.
2. Critical Maintenance Factors: This section of the maintenance plan successfully summarizes most major maintenance impact factors as related to gravel and oil roadways. It is noted that the City has also identified culvert maintenance as a key maintenance factor and has further identified the primary seasons for culvert maintenance. From our review of this brief summary, the City of Edmonton has a cohesive concept of the largest impacting factors for gravel and oil road maintenance.
3. Citizen Factors: The City’s plan correctly considers driveability, accessibility, and functional impacts from the point of view of a typical roadway user. IBI does not have any further input regarding this section.
4. Asset Maintenance Categories: IBI considers this a key element to the repair program and an effective overview of roadway categories, however, it can not be applied to the Leduc Annex roads. Lacking a formal asset maintenance plan and defined road characterizations, the Leduc Annex roads are managed as per the overall maintenance strategy outlined earlier. While a defined asset plan for the Leduc Annex would be a significant benefit to the City’s program, and it is IBI’s understanding one is currently underway, the earlier maintenance strategy is still in line with industry standards.
5. Maintenance Tasks: This section is considered the most essential contributing portion of the maintenance program document, as it outlines repair procedures for various deficiencies. The City has correctly identified the most common gravel and oil mix road deficiencies, which are also the most apparent throughout IBI’s condition assessments. In general, the construction requirements identified under each deficiency are correctly in line with standard practices observed through out the City of Edmonton and surrounding municipalities for both public and private infrastructure repairs. IBI does note that minor improvements could be made to the wording and detail of the information, such as expanding on process and avoiding generalizations. Below are some comments which IBI would expect as part of standard industry practices:
  - Potholes/Subsidence: Clearly define the applicable repair scope. Clearly define what size pothole is to be handled by hand crews; Note supporting information in appendix 1.
  - Ditch Maintenance: Provide more detailed information on construction processes and define work required for each type of ditch repair listed internally; Note supporting information in appendix 1.
  - Base Repair/Soft Spots: Clearly define process to determine where base removal and replacement is required. IBI would recommend clear implementation of City of Edmonton proof roll practices inside this component, though it is assumed through our condition assessments and field reviews that the City is following these standards. Note supporting information in appendix 1.

Conceptually the outline of items and process is considered excellent, but from a detailed review approach, the information is considered adequate. With a lack of defined asset management plan for the Annex Roads, IBI notes the maintenance program efficiencies could benefit from added construction process detail.

7. Maintenance Concept: The overall conceptual maintenance outline provided is, by IBI's review, above industry standards. However, lacking a defined asset management plan and roadway designations, it is not fully applicable to the Leduc Annex lands. This maintenance concept is still in line with the above reviewed maintenance strategy which is currently being implemented by the City of Edmonton.

Appendix 1: Asset Deficiency Nomenclature & Repair levels: IBI's review of appendix 1 notes that it shows a firm understanding of gravel road deficiency occurrences, potential causes, and severity of the items found. The appendix shows a familiarity that is consistent with other industry documents of similar scope. The only additional comment that IBI considered, was inclusion of a comprehensive plan that ranks priority for all deficiencies and their various states. Again, while lacking a defined asset plan and road characterizations, the Leduc Annex roads could likely benefit from further detailed outlines.

As a compressive maintenance guide for gravel roads, the City's Oiled and Gravel Roads Maintenance document is considered by IBI to be acceptable in comparison to similar documents within surrounding municipal and private industry practices. From our assessment, the document is intended to be paired with a clear asset management plan which characterizes specific roadways, allowing for clear priority rankings. Once the City has completed their roadway characterizations for the Leduc Annex, and with some minor additional detail noted above, the document would be considered above industry standards.

## 4. Current Standard of Care Assessment

To complete the overall current standard of care assessment, IBI considered the above review of the City of Edmonton's maintenance strategy, maintenance program, and repair processes as it correlates to our desktop assessment, field reviews, and roadway condition inspections. Through this consideration, 4 key component questions were identified to formally assess the standard of care:

- Is the current overall Maintenance Strategy in-line with industry standards?

As noted in section 2.5, while it does lack a formal document specific to the Leduc Annex gravel roads, the overall maintenance strategy being implemented by the City of Edmonton does align to industry best practices. A high emphasis on safety issues and major deficiencies as priority, combined with the amount of physical inspection time being attributed to these roadways, can be considered above industry standard.

- Is the current physical Maintenance Program appropriate based on industry standards?

As noted in section 3.0, the guiding document for the Leduc Annex repair program shows excellent conceptual process and understanding with regards to gravel and oil road deficiencies. With the understanding that this document is the main outline for repair work, IBI considers the current physical maintenance program to be within industry standards. It's clear the Operations Group has a firm conceptual understanding of gravel road maintenance. However, again due mostly to a lack of defined asset management plan and road characteristics, the City document could benefit from additional details for process if it wants to exceed industry standards.

It should be further noted that this report was able to establish a firm example of the City Maintenance Strategy in full implementation, summarized as follows: CT & Associates completed their inspection of 41st Avenue SW - 50<sup>th</sup> Street to 34<sup>th</sup> Street SW on July 15<sup>th</sup>, 2020. As part of their inspection, several items were identified as severe deficiencies which were deemed to require immediate repairs. On July 16<sup>th</sup>, 2020, IBI completed our visual condition assessment of this same roadway and was able to identify City repair crews working on the identified items. In order to provide an effective review of the City Maintenance, no inspection report, condition assessment, or mention of any deficiencies was provided to the City by IBI or CTA prior to deliverable discussions on August 12<sup>th</sup>.

- Is the current Maintenance Program being implemented correctly based on field review?

As noted in section 2.4, while IBI's field review was limited in the number of crew inspections on site, it was visible in all cases that the maintenance crews were effective in completing repairs and following best practices. No workmanship issues were observed by IBI and all individuals appeared competent and capable in their roles. After review of the City's maintenance document, it is noted that the crews were correctly implementing the maintenance program at a site-specific level.

- Is the current Maintenance Program effective based on the observed roadway conditions?

Based on a combined review of all above sections, the City of Edmonton Maintenance for the Leduc Annex roads is effective in its concept scope, repair process outline, and physical implementation. Excluding future considerations for major road re-builds or major redesign and taking into account that large amounts of deficiencies were likely existing pre-annexation conditions, the City of Edmonton Operations Group meets industry standards for effective maintenance.

Overall, IBI finds the standard of care being provided to the Leduc Annex gravel and oil mix roads is at or exceeding industry standards.

Industry standards were established through the approach of a typical municipal improvement inspection process; such that IBI primarily held the City of Edmonton Maintenance's work to the same standard of care that is enforced on other developers through-out the City as part of the overall land development process. IBI's process also accounted for general best management practices defined through APEGA, TAC, AASHTO, and various municipal and provincial regulatory bodies within Canada.

The City of Edmonton Standards Volume 2 Roadways (2015 Edition and 2018 Complete Streets Update) were the primary design standards referenced in IBI's review, given the nature and location of the work. It should be noted, however, that general understandings of rural roadway design practices from TAC and AASHTO, City of Edmonton Standards Volume 3 – Drainage, and the EPCOR Drainage Maintenance program are also incorporated as part of our review.

Our deficiency reporting was influenced by the current iteration of the City of Edmonton Transportation Inspectors Manual to again ensure that the City work being reviewed was held to the same overall expectations as similar land development work within the municipality. The Inspectors Manual document provides guidelines for how City of Edmonton inspectors are intended to assess roadway deficiencies for their CCC and FAC processes and has been established through UDI with the input of various consultants, contractors, and City personnel.

Construction and repair methodology were based on City of Edmonton Construction Standards, the City of Edmonton Inspectors Manual, TAC, AASHTO, as well as IBI and CTA's recommended best engineering practices.

Lastly, IBI considered the practical aspects of the work such as budgetary constraints for the City, working conditions such as COVID 19, and existing condition of the infrastructure upon being acquired by the City.

## 5. Future Considerations

### 5.1 City Initiatives and Long-Term Planning

Through the course of IBI's work on the Leduc Annex review in the months of July and August 2020, IBI had several discussions with various City of Edmonton Operations Group members. In order to complete a full evaluation of the City's Annex road maintenance, part of these discussions focused on what, if any, City initiatives were being implemented to improve the overall conditions and long-term maintenance costs of the Leduc Annex roads. Further these conversations, it is IBI's understanding that the following City initiatives are in various stages of implementation for the Leduc Annex area:

- Overall Asset Management Plan: The City of Edmonton confirmed that an Asset Management Plan, including road characterization, is currently underway for the full Leduc Annex area. The Asset

Management Plan will establish formal maintenance categories and priority ratings for each Annex roadway based on the following breakdown: Arterial Roadway, Collector Roadway, Industrial Roadway, Alley, Rural Roadway, and Rural Highway. This information will directly correlate to the City's maintenance program document for gravel and oil roads. It is IBI's understanding that the Asset Management Plan will include budget planning, roadway upgrade cost analysis, and formal maintenance cost forecasting as part of each roadway designation. IBI considers this to be in line with standard industry practice as it is crucial to understand repair priorities and upgrade/maintenance cost effectiveness to successfully manage budget and resource allocations.

- Traffic Impact Assessment: In discussions regarding anticipated traffic volumes for individual roads, or on which roadways were the expected high traffic volume routes, it was IBI's impression that the City is currently basing flow estimation on individual observations of traffic flow, roadway condition complaint volumes, and frequency of repairs required. IBI's understanding is that a Traffic Impact Assessment is currently being considered by the City of Edmonton, but that no definite funding is available, and no firm delivery requirements have been outlined. While the current flow estimation is a practical and effective strategy for resource allocation on small areas or interim scenarios, it would be beneficial for the City of Edmonton to complete a formal Traffic Impact Assessment for all the Leduc Annex roads. The TIA completion and subsequent analysis would correlate well with the creation of their Asset Management Plan and would be in line with industry practice. As an industry standard, it is typical for larger new areas to undergo a formal traffic analysis to fully understand traffic flows before any effective engineering designs or future planning can be applied.
- Hydrological Assessment: As part of limited review discussions with the Operations Group on the state of the Leduc Annex ditches, it was confirmed to IBI that significant amounts of adjacent resident complaints were due to ditch/property flooding in addition to physical roadway conditions. It is IBI's understanding that, in addition to the extreme frequency of rain events this season, the City of Edmonton has also noted a high water table in several areas contributing to excessive standing water in the ditches; despite frequent culvert maintenance and clearing efforts. Note that consideration for major drainage functionality of the Annex area was outside of IBI's formal project scope. However, it was determined that some comment under this report was warranted as major drainage routing heavily impacts rural roadway subgrade stability and future maintenance forecasting. While only limited ditch areas were noted in IBI's visual assessments as having any significant standing water, the prevalence of soft shoulders and several areas of double ditching does indicate that in-depth review of the Annex drainage could be beneficial. Further discussion with the City then indicated that a preliminary scope and budget are currently being reviewed to establish a full hydrological assessment of the Leduc Annex lands; though specifics for timelines, deliverables, or implementation were not available. From an industry approach, IBI finds the City in line with standard practices, if somewhat behind in the implementation. Understanding the overall major drainage routing and drainage course conditions are essential components to any future planning or engineering with regards to the Annex roadways.

Overall, the City has shown a competent understanding and practice of asset management and is taking the correct steps for effective long-term maintenance planning. The City is correctly looking to establish formal traffic volume values, characterize all roadways for priority/budget/resource allocation, and establish a full understanding of the major drainage for the Annex lands. IBI would note that ideally these processes should be expedited as much as is reasonably possible. It is understood however, that given the current economic climate, available budgets, and the extensive amounts of re-habilitation work required on the West Annex in 2019, a quick turnaround for these substantial high-level documents and analytics may not be possible.

## 5.2 Recommendations

Based on IBI's review of the report items mentioned above, and with our noted understanding of the upcoming City initiatives for the area, the following additional design recommendations are proposed for future consideration:

- Additional Survey Information: Though the City of Edmonton has noted that survey was previously established for the Leduc East Annex area ditches, there was no detailed information on the full extents of the existing as-built information or the date on which it was completed. IBI's interpretation of our discussions with the City finds that the as-built data for the area is incomplete. We recommend establishing a full detailed survey of all property lines, ditches, shoulders, road crowns, culverts, street furniture, drainage courses, and any additional items deemed necessary by CT & Associates (Appendix 5). This information would be key in future design considerations and will be of value for any large-scale hydrological assessment to be completed. As an additional note, IBI further recommends discussions with any private land owners with downstream flow routes on their property to ensure these routes are surveyed and kept clear of debris.
- Interim Drainage Solutions: Separate from, or as a part of, a potential maintenance cost analysis, IBI recommends the consideration of alternate stormwater management solutions to the Leduc Annex area. While drainage issues were not a specific part of IBI's scope in this report, the flooding concerns from the City were discussed in detail. In lieu of a larger overall assessment and re-design of the major drainage, alternative storm water management practices could be implemented on smaller scales or site-specific areas to alleviate inundated ditches and potentially avoid large scale subgrade damages. Methods that either remove runoff from ditch system (such as sub-surface stormwater chambers) or extend the time of concentration (engineered bioswales and high infiltration shrub planting) are two of many possible concepts to mitigate interim flooding.
- Life Cycle Management Software: Having reviewed the City of Edmonton maintenance tracking spreadsheet and google doc system that was provided by the Operations Group as part of our initial project documentation deliverables, IBI recommends transitioning to a more formal life cycle management software. Various software options exist to facilitate municipal asset tracking and management, specifically roadways. Many of them can provide a hub interface which provides easy access to individual road segments, as-built data integration, convenient direct upload capabilities for inspection reporting, and numerous other benefits. IBI has developed various forms of life cycle management software and strategies for large municipalities around the world and would be available to assist the City more on creating, implementing, or consulting on further product reviews.
- Roadway Structure and Sub-Grade Confirmation: It is recommended that a bore-hole/test-pit program be implemented to fully understand the existing roadway structures and sub-grades. This item will be elaborated on further as part of CT & Associates report under Appendix 5.

## 6. Conclusion

In summation of the above report, visible condition assessments performed on both East and West Annex road areas showed limited amounts of necessary major repairs, and no major safety concerns were identified that weren't being addressed immediately.

Field operations were observed to be functioning effectively through various forms of gravel or oil mix roadway repair, and all operator and crew members were viewed as competent.

Review of the City's noted overall maintenance implementation strategy along with the review of its maintenance program document confirms that effective repair procedures and resource allocation are in place to meet or exceed industry expectations.

Proper long-term considerations are being given to the Leduc Annex roadways, including several large-scale initiatives which will further help understand all repair cost implications and future upgrade requirements for the area.

In conclusion and in summary of IBI's assessments, discussions, and findings represented above, IBI considers the City of Edmonton Maintenance process for the Leduc Annex roadways to be in line with, or exceeding, industry standard practices on all accounts.

Respectfully submitted,

**IBI Group**

A handwritten signature in blue ink, appearing to read 'Colin Roy', is positioned below the company name.

Colin Roy, P.Eng  
Associate, Manager – Land Engineering

## **Appendix 1**

### **IBI Site Condition Assessments – East Annex**



IBI Group  
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780 428 4000 fax 780 426 3256

Job #: 126165.8.0

# City of Edmonton

## Leduc Road Annex - East

### 41 AVE SW - 17 ST TO MERIDIAN ST

#### Formal Inspection

Date : 2020-07-16

Weather : few clouds, 22.78 degree celsius

Attendees DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	R, P	Rough road, pothole - 50-100 m east of 17 st.	On map.			
2	A, R, SS-N	Alligator Cracking, rough road, soft shoulder north - 300-400 meters east of 17 st.	On map.			
3	R, A, SS-N	Rough road, soft shoulder north, alligator cracking - 500 meters east of 17 st.	On map.			
4	A	Alligator cracking - 800 meters east of 17 st.	On map.			
5	R, A	Rough road, alligator cracking - 900 meters east of 17 st.	On map.			
6	R, A	Rough road, alligator cracking - 1000 meters east of 17 st.				
7	R, A, SS-N	Rough road, alligator cracking, soft shoulder north - 1500 meters east of 17 st.	On map.			
8	R, A	Rough road, alligator cracking - Intersection of 41 ave SW and Meridian St.	On map.			





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## LEDUC COUNTY EAST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-07-16

41 AVE SW – 17 ST TO MERIDIAN ST

N.T.S.



	Asphalt
	Gravel
	Oil
A	Alligator
AM	Add Material
B	Base
P	Pothole
PD	Poor Drainage
S	Sub
R	Rough
Rut	Rutting
W	Washboard
D	DITCH
SS	SOFT SHOULDER
CI	CULVERT ISSUE
C	CROWN



# 1. Other - Other



# 2. Other - Other



# 2. Other - Other



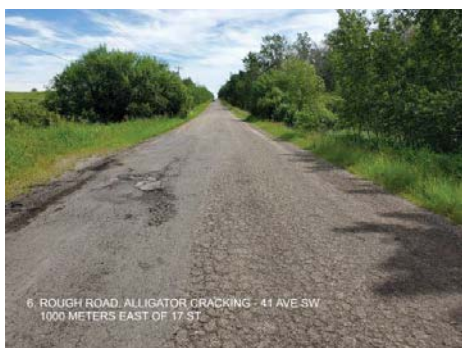
# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



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Job #: 126165.8.0

# City of Edmonton

Leduc Road Annex - East

41 Ave SW - 34 st to 17 st

Formal Inspection

Date : 2020-07-16

Weather : clear sky, 21.11 degree celsius

Attendees DWAYNE FIDDLER - IBI GROUP

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	R, A	Rough road, alligator cracking - 50-200 meters east of 34 st.	On map.			
2	R	Rough road - 300 meters east of 34 st.	On map.			
3	R, W	Rough road, minor washboard - 500 meters east of 34 st.	On map.			
4	R	Rough road, settlement, culverts - 1000 meters east of 34 st.	On map.			
5	R, W, P	Rough road, washboard, pothole - 1100 meters east of 34 st.	On map.			
6	P	Pothole - 1200 meters east of 34 st.	On map.			
7	Damage	Roadway scarring, superficial damaged - 1400 meters east of 34 st.	On map.			
8	R	Rough road - 41 ave at 17 st. Rough road north side of intersection.	On map.			





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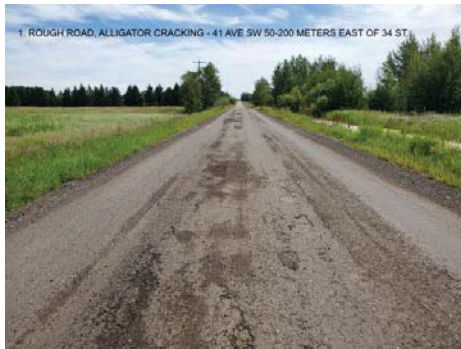
## LEDUC COUNTY EAST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-07-17

41 AVE SW – 34 ST TO 17 ST

N.T.S.



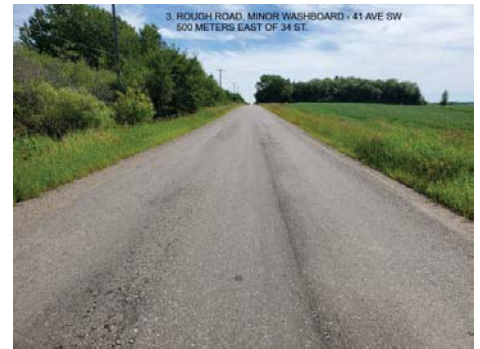
	Asphalt
	Gravel
	Oil
A	Alligator
AM	Add Material
B	Base
P	Pothole
PD	Poor Drainage
S	Sub
R	Rough
Rut	Rutting
W	Washboard
D	DITCH
SS	SOFT SHOULDER
CI	CULVERT ISSUE
C	CROWN



# 1. Other - Other



# 2. Other - Other



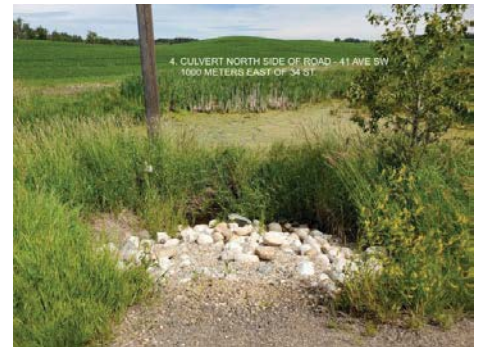
# 3. Other - Other



# 4. Other - Other



# 4. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 8. Other - Other



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Job #: 126165.8.0

# City of Edmonton

## Leduc Road Annex - East

### 41 Ave SW - 50 st to 34 st

#### Formal Inspection

Date : 2020-07-16

Weather : clear sky, 20.56 degree celsius

Attendees DWAYNE FIDDLER - IBI GROUP

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	P	Large pothole at 41 Ave SW and 50 st on the east side.	On map.			
2	W	Minor washboard - 50 meters east of 50 st.	On map.			
3	R, W	Rough road and washboard - 400 meters east of 50 st.	On map.			
4	R, W	Rough road and washboard - 600 meters east of 50 st.	On map.			
5	P, A, R	Large Pothole, Alligator cracking and rough road - 700 meters east of 50 st.	On map.			
6	P, A, R	Potholes, alligator cracking and rough road - 800 meters east of 50 st.	On map.			
7	P	Pothole - 900 meters east of 50 st.	On map.			
8	Work	COE working on repairing road.	On map.			
9	R, A	Alligator cracking and rough road - 1500 meters east of 50 st.	On map.			
10	R	Minor rutting - 41 ave and 34 st.	On map.			





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## LEDUC COUNTY EAST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-07-17

41 AVE SW – 50 ST TO 34 ST

N.T.S.



Asphalt	
Gravel	
Oil	
A	Alligator
AM	Add Material
B	Base
P	Pothole
PD	Poor Drainage
S	Sub
R	Rough
Rut	Rutting
W	Washboard
D	DITCH
SS	SOFT SHOULDER
CI	CULVERT ISSUE
C	CROWN



# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 8. Other - Other



# 9. Other - Other



# 10. Other - Other





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Job #:126165.8.0

# City of Edmonton

Leduc Road Annex - East

50 Street Service Road

Formal Inspection

Date : 2020-07-16

Weather : broken clouds, 17.78 degree celsius

Attendees DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	Good	Road condition good.	On map.			
2	Good.	Road condition good.	On map.			
3	Good.	Road condition good.	On map.			



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## LEDUC COUNTY EAST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-07-16

### 50 ST SERVICE ROAD

N.T.S.



Asphalt	
Gravel	
Oil	
A	Alligator
AM	Add Material
B	Base
P	Pothole
PD	Poor Drainage
S	Sub
R	Rough
Rut	Rutting
W	Washboard
D	DITCH
SS	SOFT SHOULDER
CI	CULVERT ISSUE
C	CROWN



# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



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780 428 4000 fax 780 426 3256

Job #: 126165.8.0

# City of Edmonton

## Leduc Road Annex - East

### RR 235 (17 ST) - 41 AVE SW TO TWP RD 510

#### Formal Inspection

Date : 2020-07-21

Weather : light rain, 21.11 degree celsius

Attendees DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	W, Rut	Minor washboard and minor rutting- 50 meters south of 41 AVE SW.	On map.			
2	W	Minor washboard - 400 meters south of 41 AVE SW.	On map.			
3	LG	Loose gravel - 700 meters south of 41 AVE SW.	On map.			
4	W, LG	Minor washboard, loose gravel - 900 meters south of 41 AVE SW.	On map.			
5	P, DB	Pothole, fallen tree on west shoulder - 1000 meters south of 41 AVE SW.	On map.			
6	W, Rut	Washboard and rutting - 1200 meters south of 41 AVE SW.	On map.			
7	Rut	Rutting - 1400 meters south of 41 AVE SW.	On map.			
8	W, Rut, DB	Minor washboard, minor rutting, fallen trees west shoulder - 1600 meters south of 41 AVE SW.	On map.			
9	DB	Fallen trees west shoulder - 2000 meters south of 41 AVE SW.	On map.			
10	AM, Rut, DB, R	Add material, rutting, rough road and fallen branches west shoulder - 2800 meters south of 41 AVE SW.	On map.			
11	W	Washboard - 3100 meters south of 41 AVE SW. Intersection of TWP RD 510.	On map.			

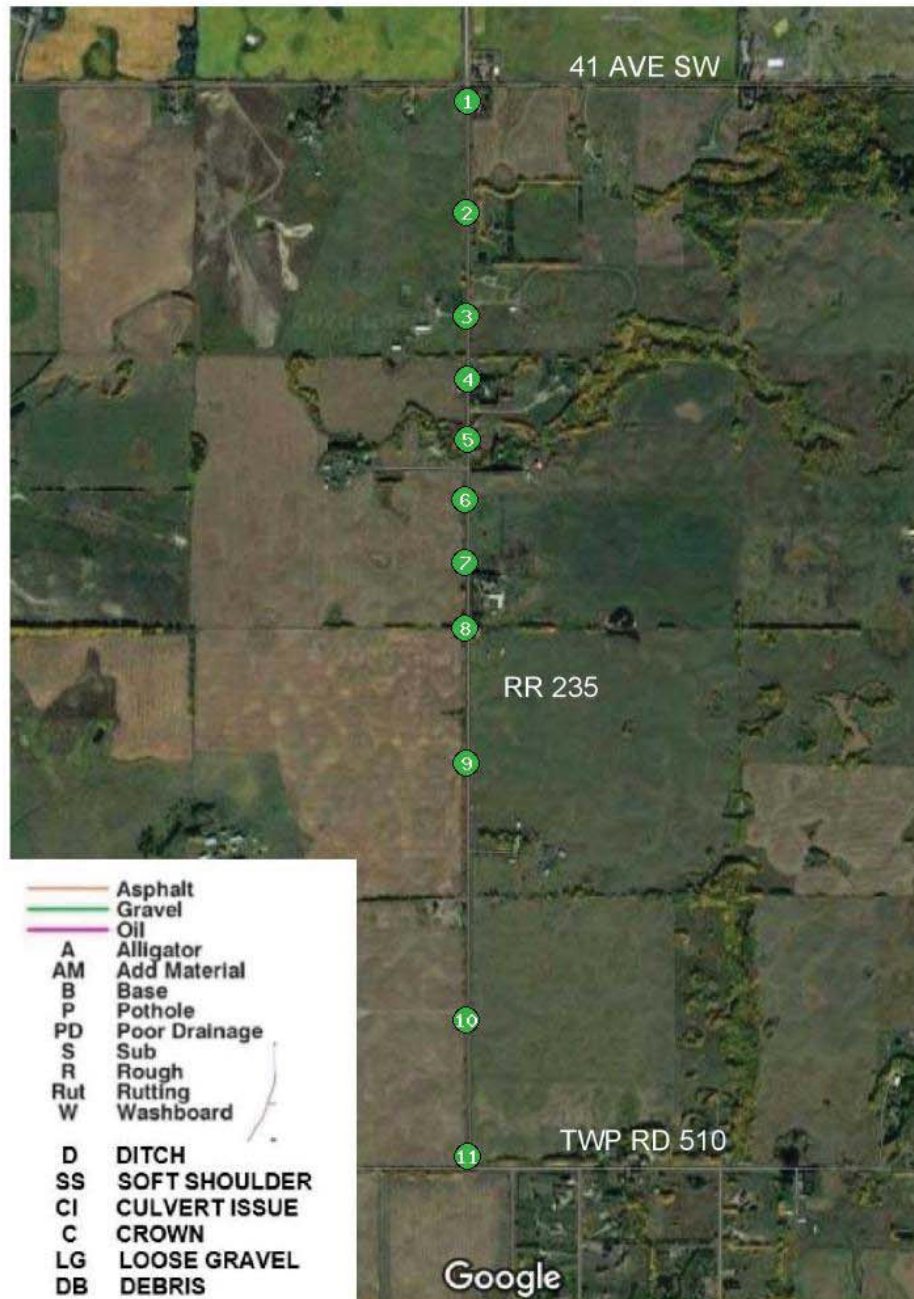


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**LEDUC COUNTY EAST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-07-21**

**RR 235 (17 ST) 41 AVE SW TO TWP RD 510**

**N.T.S.**







# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 5. Other - Other



# 6. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 9. Other - Other



# 10. Other - Other

Image



# 10. Other - Other



# 11. Other - Other



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# City of Edmonton

## Leduc Road Annex - East

### RR 240 (34 ST) - Twp RD 510 to 41 Ave SW

#### Formal Inspection

Date : 2020-07-21

Weather : broken clouds, 22.22 degree celsius

Attendees DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	W	Washboard at intersection of TWP RD 510.	On map.			
2	W	Washboard - RR 240 - 300 meters north of TWP RD 510.	On map.			
3	W, Rut	Washboard and Rutting - RR 240 - 500 meters north of TWP RD 510.	On map.			
4	DB	Fallen branches on west shoulder - RR 240 - 1500 meters north of TWP RD 510.	On map.			
5	W	Minor washboard - RR 240 - 1600 meters north of TWP RD 510.	On map.			
6	W	Washboard - RR 240 - 1800 meters north of TWP RD 510.	On map.			
7	P, Rut, W	Pothole, rough road, washboard - RR 240 - 1900 meters north of TWP RD 510.	On map.			
8	W	Washboard - RR 240 - 2600 meters north of TWP RD 510.	On map.			
9	W	Washboard - RR 240 - 2800 meters north of TWP RD 510.	On map.			
10	W	Washboard at 41 AVE SW intersection.	On map.			



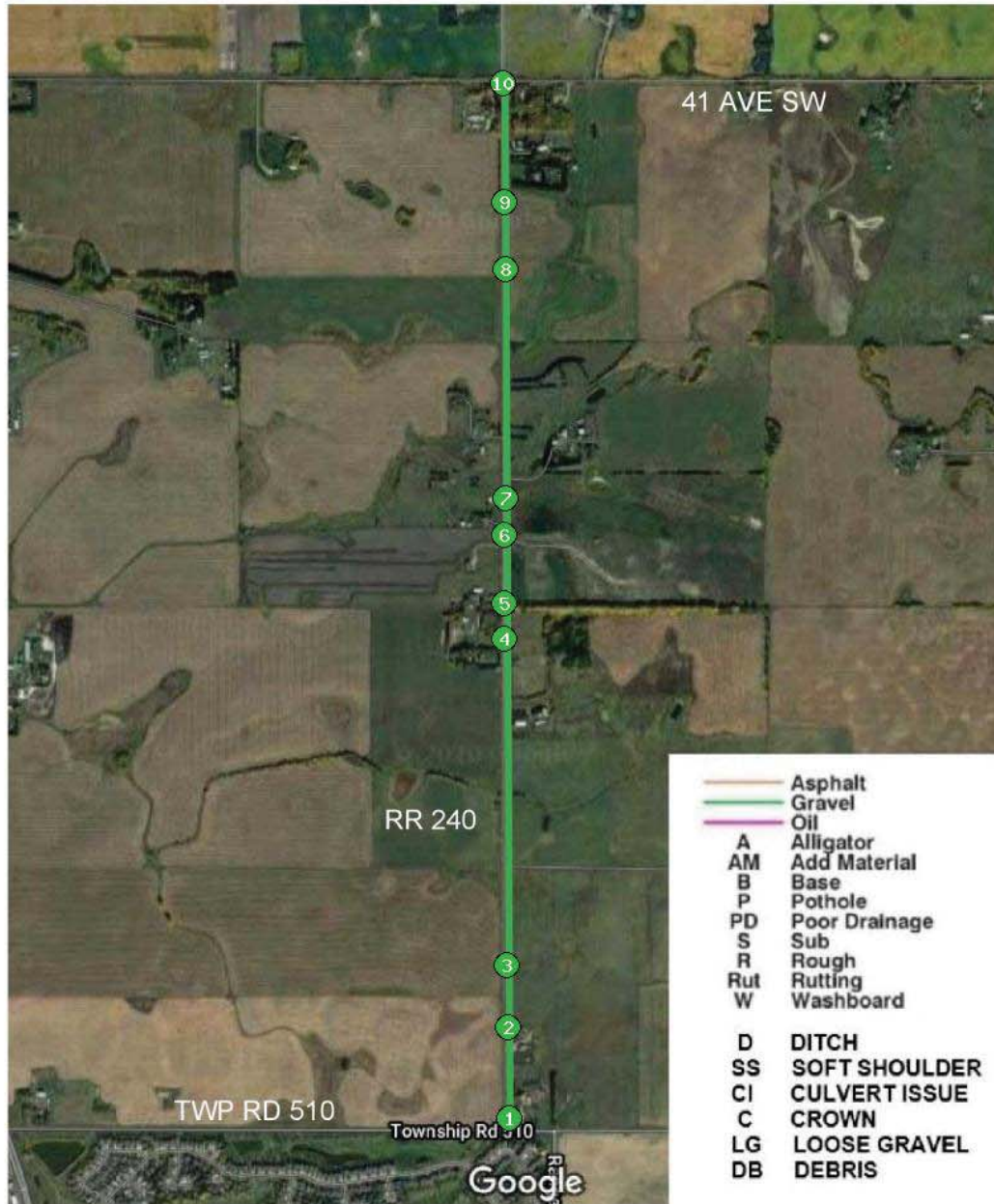


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**LEDUC COUNTY EAST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-07-21**

**RR 240 (34 ST) TWP RD 510 TO 41 AVE SW**

**N.T.S.**





# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 9. Other - Other



# 10. Other - Other



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Job # 126165.8.0

# City of Edmonton

**Leduc Road Annex - East**

**RR 242 North of TWP RD 510**

**Formal Inspection**

**Date : 2020-07-21**

**Weather : light rain, 15 degree celsius**

Attendees      DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	R	Minor rutting at intersection of TWP RD 510.	On map.			
2	R, SS	Rough road, soft shoulder east - 300 meters north of TWP RD 510.	On map.			
3	P, R, SS	Potholes, rough road, soft shoulder - east - 400 meters north of TWP RD 510.	On map.			
4	R, AM	Minor rutting, add material - 800 meters north of TWP RD 510.	On map.			
5	AM, SS	Soft shoulder - East, Add material - 1000 meters north of TWP RD 510.	On map.			
6	R	Major rutting at turnaround - 1600 meters north of TWP RD 510.	On map.			





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## LEDUC COUNTY EAST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-07-21

RR 242 NORTH OF TWP RD 510

N.T.S.





# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other





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780 428 4000 fax 780 426 3256

Job #:126165.8.0

# City of Edmonton

## Leduc Road Annex - East

### RR 242A - East of RR 243

#### Formal Inspection

Date : 2020-07-21

Weather : broken clouds, 25 degree celsius

Attendees DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	W, P	Washboard, potholes - 30 meters east of RR 243	On map.			
2	P, R	Potholes, rough road - 100 meters east of RR 243	On map.			
3	P, R	Large potholes, rough road - 200 meters east of RR 243.	On map.			
4	P, R	Large potholes, rough road - 400 meters east of RR 243.	On map.			
5	P, R	Large pothole, rough road - 500 meters east of RR 243.	On map.			
6	P	Pothole - 600 meters east of RR 243.	On map.			
7	P	Pothole - 700 meters east of RR 243.	On map.			
8	P	Pothole - Intersection of RR242A and TWP RD 511A.	On map.			
9	R, P	Rough road, potholes - Intersection of RR 242A and TWP RD 511A.	On map.			
10	R, AM	Ruts, add material - 100 meters south of TWP RD 511A.	On map.			
11	P, AM	Potholes, add material - 200 meters south of TWP RD 511A.	On map.			
12	R, AM	Ruts, add material - 300 meters south of TWP RD 511A.	On map.			
13	P, R, AM	Potholes, ruts, add material - 400 meters south of TWP RD 511A.	On site.			
14	R, AM	Ruts, add material - 500 meters south of TWP RD 511A.	On map.			
15	R, P, AM	Ruts, potholes, add material - 600 meters south of TWP RD 511A.	On map.			

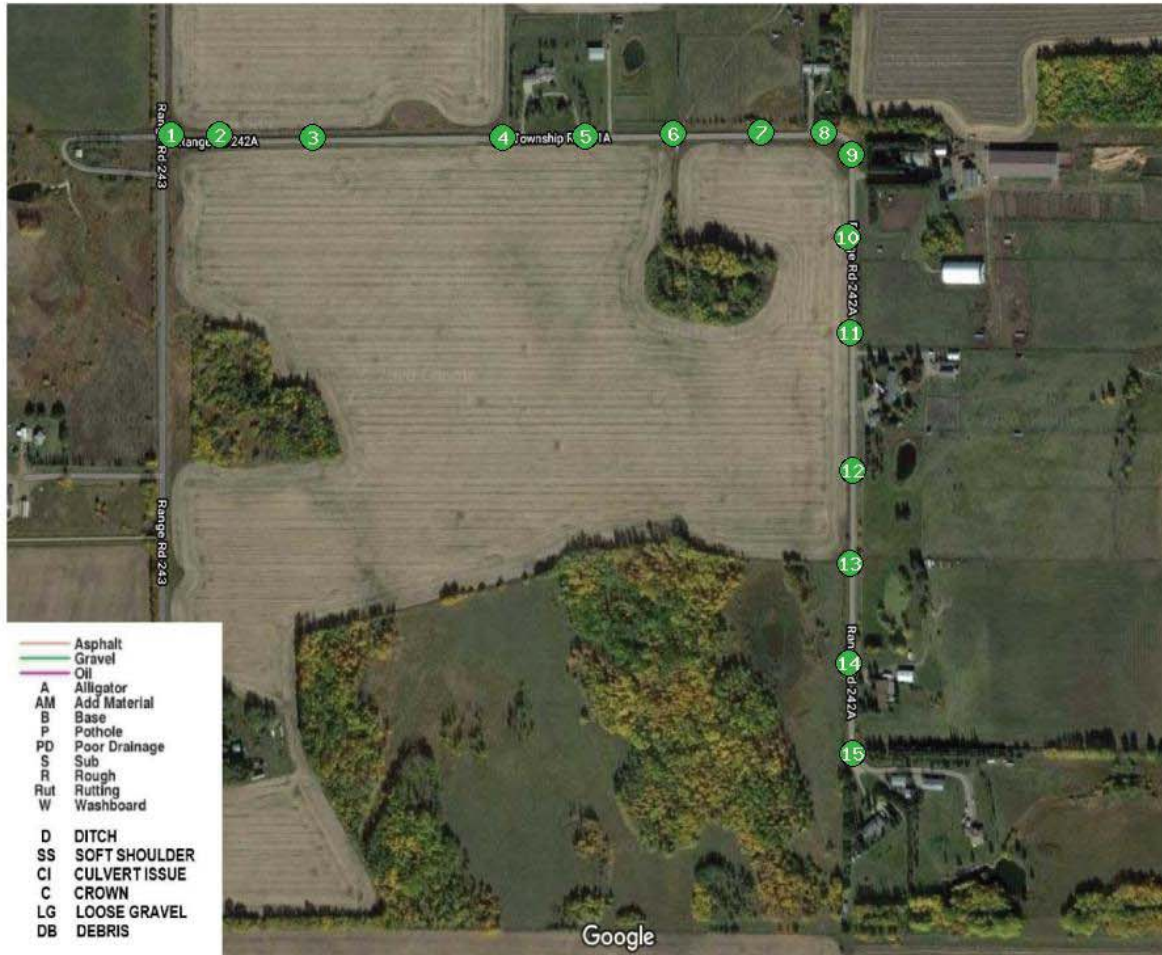


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## LEDUC COUNTY EAST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-07-21

RR 242A – EAST OF RR 243

N.T.S.





# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 9. Other - Other



# 10. Other - Other



# 11. Other - Other





# 12. Other - Other



# 13. Other - Other



# 14. Other - Other



# 15. Other - Other



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Job #: 126165.8.0

# City of Edmonton

## Leduc Road Annex East

### MERIDIAN STREET - TWP RD 510 TO 41 AVE SW

#### Formal Inspection

Date : 2020-08-07

Weather : broken clouds, 18.89 degree celsius

Attendees DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	Good	Road in fair condition.	Intersection of Meridian ST and TWP RD 510.			
2	SS, RUT	Soft shoulder and rutting (East)	50 meters north of TWP RD 510.			
3	P	Minor potholes	100 meters north of TWP RD 510.			
4	SS, R, A	Soft shoulder (East), rough road, alligator cracking.	200 meters north of TWP RD 510.			
5	P, A, R	Potholes, alligator cracking, rough road.	300 meters north of TWP RD 510.			
6	P, A, R	Potholes, alligator cracking, rough road.	400 meters north of TWP RD 510.			
7	Rut, R, A	Rutting, rough road, alligator cracking.	500 meters north of TWP RD 510.			
8	P, A, R	Potholes, alligator cracking, rough road.	550 meters north of TWP RD 510.			
9	Rut, A, R	Rutting, alligator cracking, rough road.	700 meters north of TWP RD 510.			
10	P, A, R	Potholes, alligator cracking, rough road.	800 meters north of TWP RD 510.			
11	W	Minor washboard.	1300 meters north of TWP RD 510.			
12	Rut, A, DD	Alligator cracking, rutting, double ditch forming west side.	1500 meters north of TWP RD 510.			
13	P, A	Major pothole, alligator cracking.	1600 meters north of TWP RD 510.			
14	P, A	Major pothole, alligator cracking.	1700 meters north of TWP RD 510.			





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Job #:126165.8.0

# City of Edmonton

## Leduc Road Annex East

### MERIDIAN STREET - TWP RD 510 TO 41 AVE SW

#### Formal Inspection

**Date : 2020-08-07**

**Weather : broken clouds, 18.89 degree celsius**

15	P	Minor potholes.	2200 meters north of TWP RD 510.			
16	SS	Soft shoulder (West).	2300 meters north of TWP RD 510.			
17	SS	Soft shoulder (West).	2500 meters north of TWP RD 510.			
18	CI	Prarie Erectors installing new culverts, road closed.	2700 meters north of TWP RD 510.			
19	CI	Prarie Erectors replacing culverts, road closed.	2750 meters north of TWP RD 510.			
20	Rut, SS	Soft shoulder (East), rutting along cl of road.	2800 meters north of TWP RD 510.			
21	P, SS, A, Rut	Pothole, soft shoulder (east), alligator cracking, rutting.	2900 meters north of TWP RD 510.			
22	Rut	Rutting center of road.	3000 meters north of TWP RD 510.			
23	Sign	Road closed sign.	3150 meters north of TWP RD 510.			
24	P	Pothole at intersection.	Intersection of 41 AVE SW.			

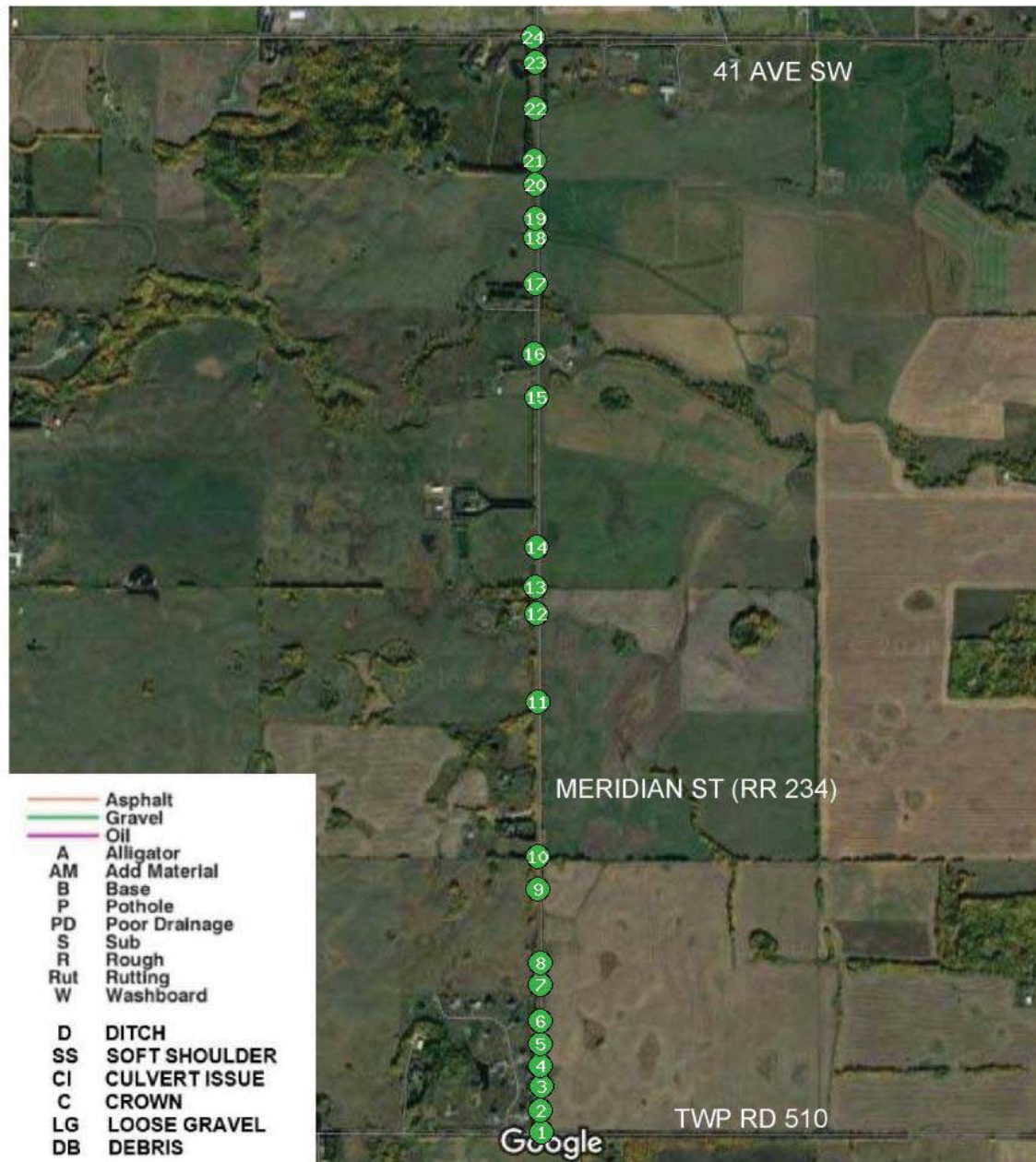


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LEDUC COUNTY EAST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-08-07

MERIDIAN ST FROM TWP RD 510 TO 41 AVE SW

N.T.S.







# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 9. Other - Other



# 10. Other - Other



# 11. Other - Other



# 12. Other - Other





# 12. Other - Other



# 13. Other - Other



# 14. Other - Other



# 15. Other - Other



# 16. Other - Other



# 17. Other - Other



# 18. Other - Other



# 18. Other - Other



# 19. Other - Other



# 20. Other - Other



# 21. Other - Other



# 22. Other - Other



23. MERIDIAN ST - 50 METERS SOUTH OF 41 AVE SW  
RANGE ROAD CLOSED SIGN

# 23. Other - Other



24. MERIDIAN ST - INTERSECTION OF 41 AVE SW  
POTHOLE IN INTERSECTION

# 24. Other - Other



## **Appendix 2**

### **IBI Site Condition Assessments – West Annex Re-Inspection**



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# City of Edmonton

## Leduc Road Annex West

### 153 ST FROM HIGHWAY 19 TO 73 AVE SW

#### Formal Inspection

Date : 2020-08-05

Weather : clear sky, 18.89 degree celsius

Attendees DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	W	Washboard.	Intersection of 153 ST and Highway 19.			
2	SS	Soft shoulders.	300 meters north of Highway 19.			
3	SS, W	Soft shoulder and washboard.	400 meters north of Highway 19.			
4	SS, W	Soft shoulders, washboard.	500 meters north of Highway 19.			
5	SS, W	Soft shoulders, washboard.	600 meters north of Highway 19.			
6	Rut, SS, W	Rutting, soft shoulders, washboard.	800 meters north of Highway 19.			
7	Rut, SS, P	Rutting, soft shoulders, potholes.	1100 meters north of Highway 19.			
8	Rut, SS, W	Rutting, soft shoulders, washboard.	1200 meters north of Highway 19.			
9	Rut, W, SS	Rutting, soft shoulder, washboard.	1300 meters north of Highway 19.			
10	SS, Rut, W	Soft shoulders, rutting, washboard.	1400 meters north of Highway 19.			
11	SS, W, P	Soft shoulder, washboard, potholes.	1500 meters north of Highway 19.			
12	W	Washboard.	2400 meters north of Highway 19.			
13	Rut	Minor rutting.	2800 meters north of Highway 19.			
14	Rut	Minor rutting.	3000 meters north of Highway 19.			
15	SS	Soft shoulder east.	3100 meters north of Highway 19.			
16	Rut	Minor rutting.	Intersection of 73 AVE SW and 153 ST.			

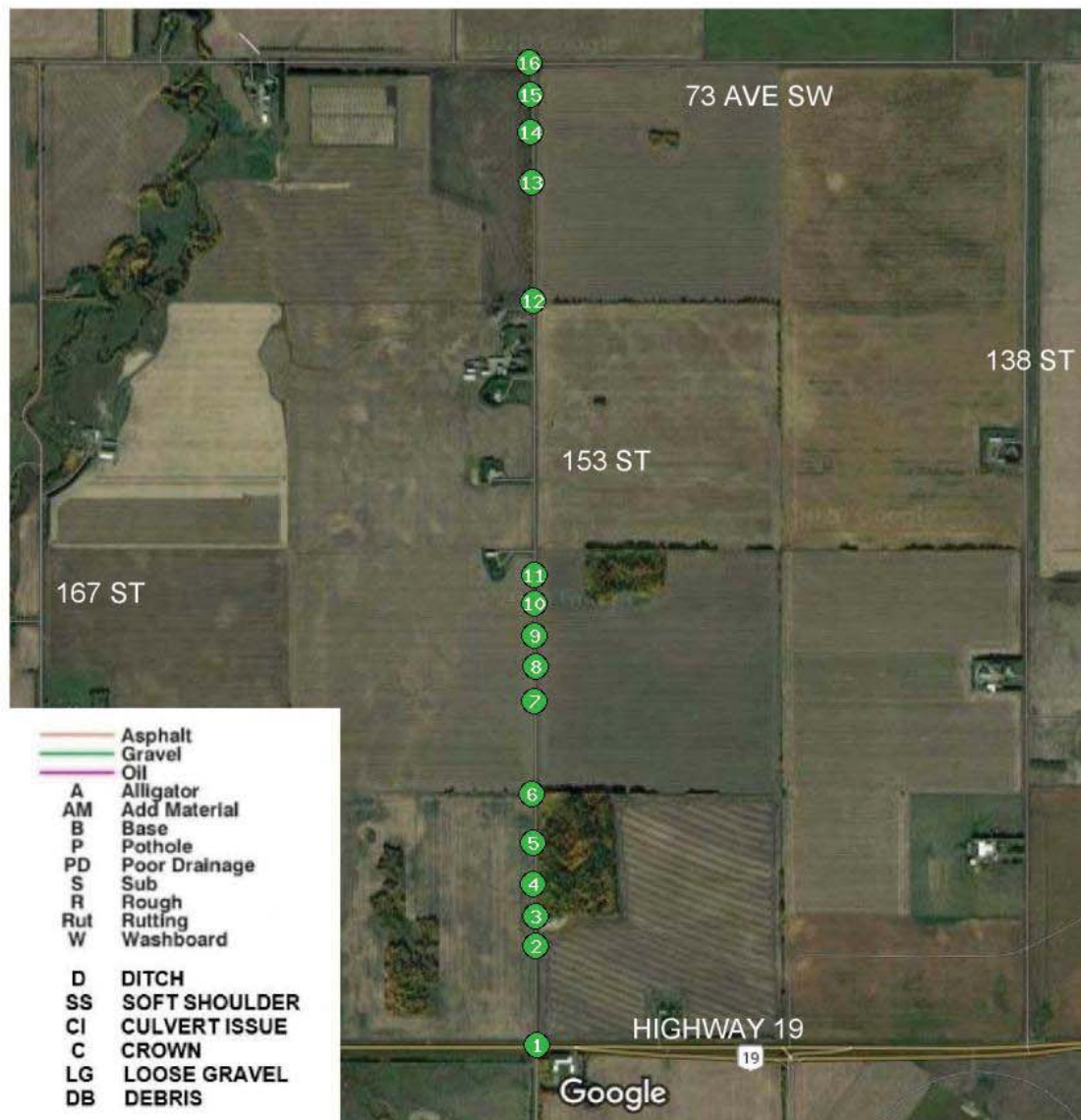


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-08-05**

**153 ST FROM HIGHWAY 19 TO 41 AVE SW**

**N.T.S.**







# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 9. Other - Other



# 10. Other - Other



# 11. Other - Other



# 12. Other - Other



# 13. Other - Other



# 14. Other - Other



# 15. Other - Other



# 15. Other - Other



# 16. Other - Other





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Job #:126165.8.0

# City of Edmonton

## Leduc Road Annex West

### 156 ST - 73 AVE SW TO 41 AVE SW

#### Formal Inspection

Date : 2020-08-05

Weather : clear sky, 18.89 degree celsius

Attendees DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	Repairs, Rut, R, P	COE repair work taking place at intersection. 50 meters north of intersection rough road, rutting and potholes.	Intersection of 73 AVE SW and 156 ST			
2	Rut, W	Rutting, minor washboard.	200 meters north of 73 AVE SW.			
3	Rut, W	Rutting west shoulder, washboard.	300 meters north of 73 AVE SW.			
4	W	Washboard.	800 meters north of 73 AVE SW.			
5	Rut, P, W	Rutting, potholes, washboard.	900 meters north of 73 AVE SW.			
6	Rut, R	Rutting, rough road.	1000 meters north of 73 AVE SW.			
7	CI	Culvert repairs.	1800 meters north of 73 AVE SW.			
8	Rut	Rutting east shoulder.	3150 m north of 73 AVE SW. Intersection of 41 AVE SW.			

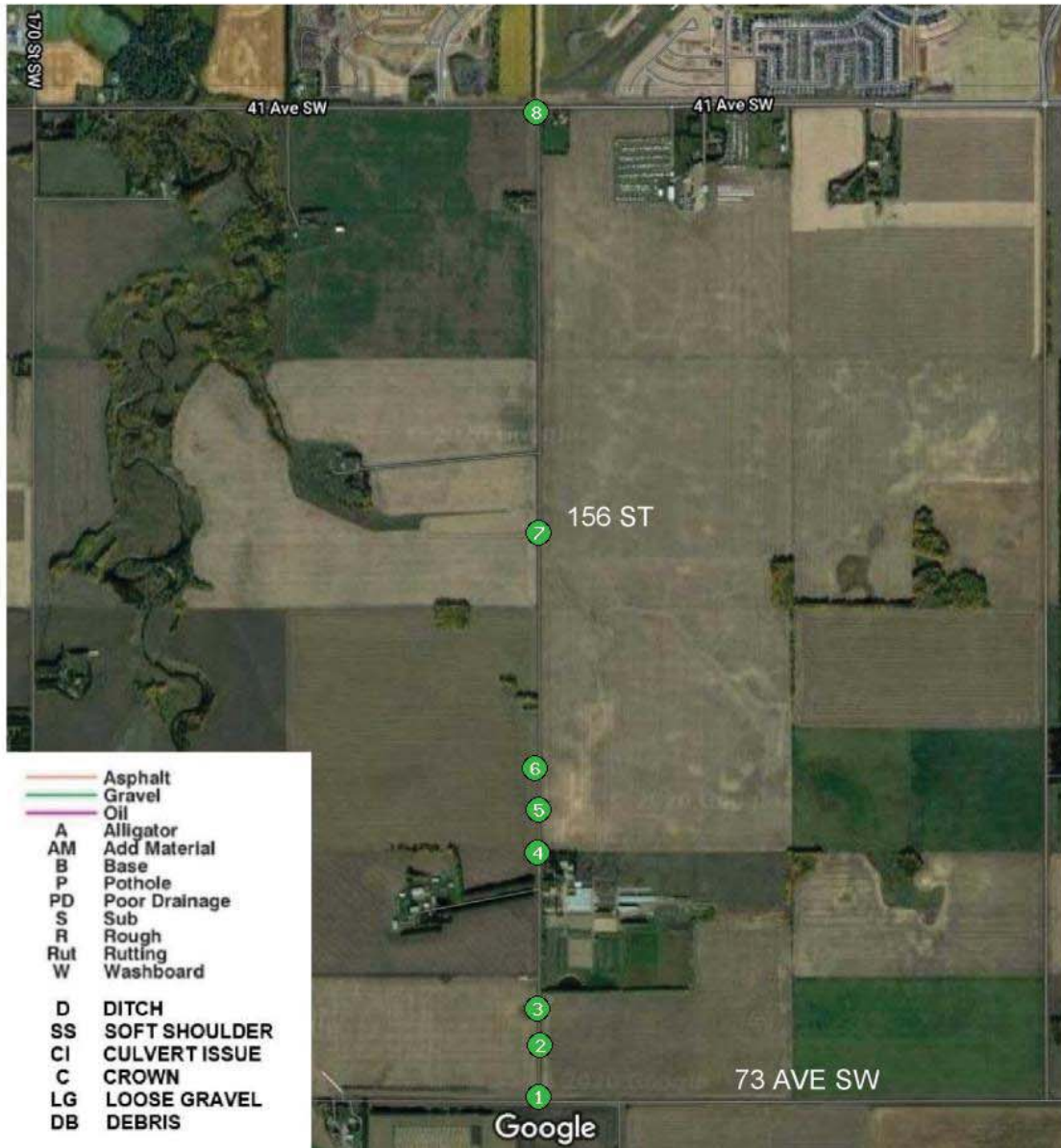


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-08-05**

**156 ST FROM 73 AVE SW TO 41 AVE SW**

**N.T.S.**







# 1. Other - Other



# 1. Other - Other



# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 7. Other - Other



# 7. Other - Other



# 8. Other - Other



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Job #:126165.8.0

# City of Edmonton

## Leduc Road Annex West

### 167 ST FROM 73 AVE SW TO HIGHWAY 19

#### Formal Inspection

Date : 2020-08-05

Weather : light rain, 16.67 degree celsius

Attendees DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	WhAS	WasHboardhadd material.	Intersection of 73 AwE 9W and 167 9T.			
2	WBhDhDB	WasHboardhponding in ditchHdebris and garbage in ditch.	100 meters southHof 73 AwE 9W.			
3	DB	Tree on , est sHoulder.	200 meters southHof 73 AwE 9W.			
4	D	Ponding in , est ditch.	400 meters southHof 73 AwE 9W.			
5	P	PotHole.	500 meters southHof 73 AwE 9W.			
6	PhD	PotHolehponding , est ditch.	600 meters southHof 73 AwE 9W.			
7	Rh99	RougHroadhsoft sHoulder east.	M00 meters southHof 73 AwE 9W.			
8	WhDB	WasHboard and debris on road.	1000 meters southHof 73 AwE 9W.			
M	W	WasHboard.	1100 meters southHof 73 AwE 9W.			
10	P	PotHole.	2500 meters southHof 73 AwE 9W.			
11	P	PotHole.	2800 meters southHof 73 AwE 9W.			
12	W	WasHboard.	2M00 meters southHof 73 AwE 9W.			
13	W	WasHboard.	Intersection of 167 9T and VigH, ay 1M			



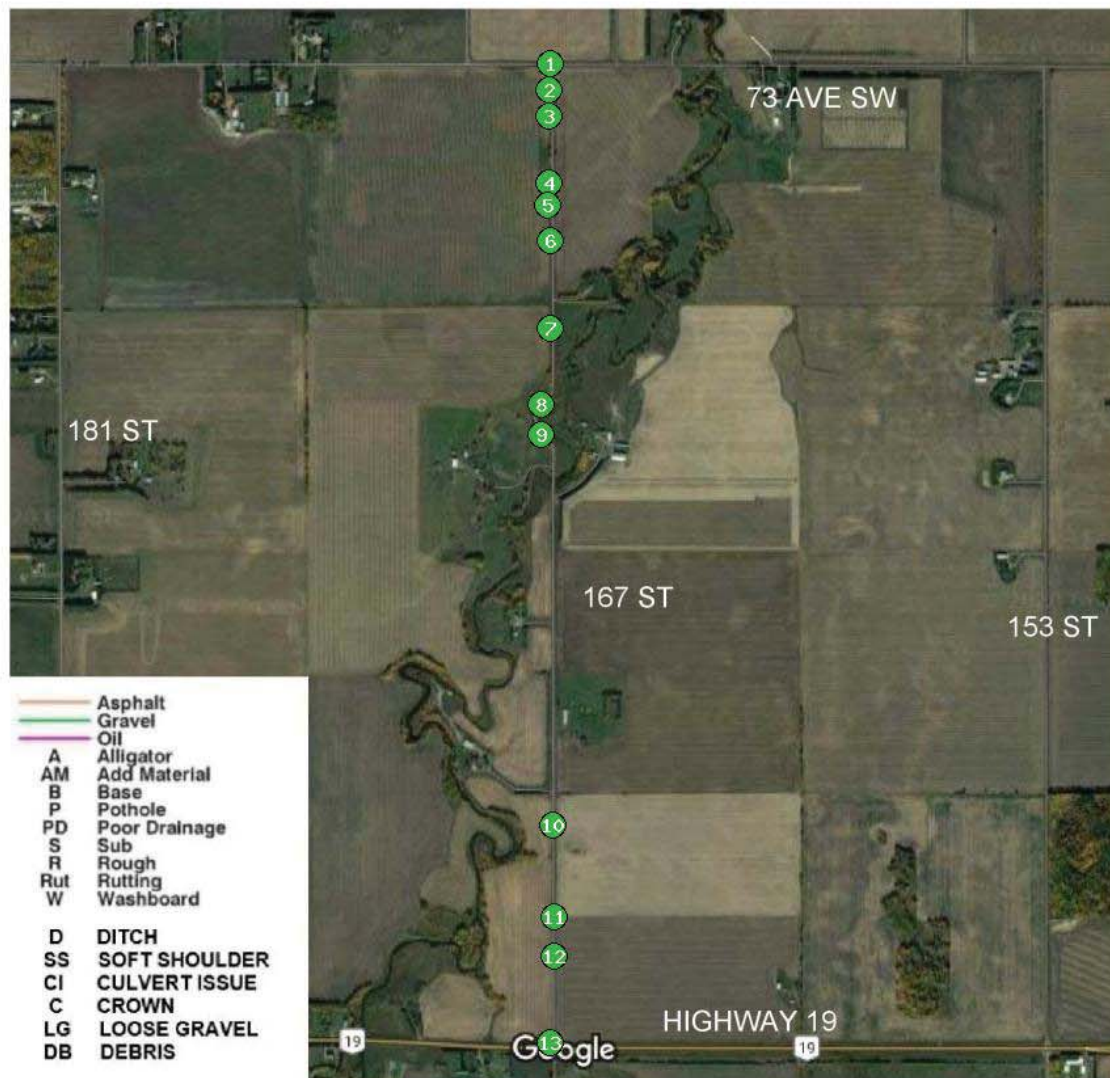


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-08-05**

**167 ST FROM 73 AVE SW TO HIGHWAY 19**

**N.T.S.**

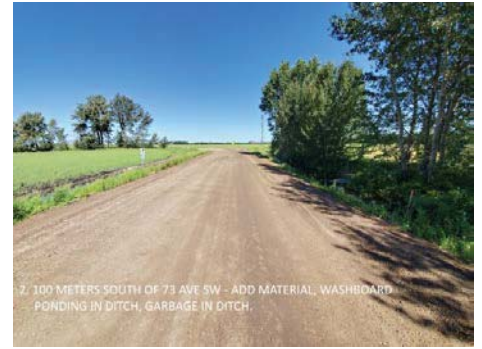




# 1. Other - Other



# 1. Other - Other



# 2. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# M. Other - Other



# 10. Other - Other





# 11. OtHer - OtHer



# 12. OtHer - OtHer



# 13. OtHer - OtHer



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Job #:126165.8.0

# City of Edmonton

## Leduc Road Annex West

### 184 ST FROM 41 AVE SW TO 73 AVE SW

#### Formal Inspection

Date : 2020-08-05

Weather : scattered clouds, 17.22 degree celsius

Attendees DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	W	Washboard.	Intersection of 41 AVE SW and 184 ST.			
2	SS	Soft shoulder west.	600 meters south of 41 AVE SW.			
3	Marker Posts	Marker posts leaning, steep slope west.	800 meters south of 41 AVE SW.			
4	P	Pothole.	900 meters south of 41 AVE SW.			
5	P	Pothole	1000 meters south of 41 AVE SW.			
6	P	Pothole.	1300 meters south of 41 AVE SW.			
7	P, W	Pothole, washboard.	1400 meters south of 41 AVE SW.			
8	P	Potholes.	1500 meters south of 41 AVE SW.			
9	W	Washboard.	1700 meters south of 41 AVE SW.			
10	P	Potholes.	2500 meters south of 41 AVE SW.			
11	P, Rut	Potholes and rutting.	2700 meters south of 41 AVE SW.			
12	P, Rut	Potholes and rutting.	2800 meters south of 41 AVE SW.			
13	D	Ponding in ditches both sides.	3100 meters south of 41 AVE SW.			
14	Good	Intersection in good shape.	73 AVE SW and 184 ST.			





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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-08-05**

**184 ST FROM 41 AVE SW TO 73 AVE SW**

**N.T.S.**







# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 9. Other - Other



# 10. Other - Other



# 11. Other - Other



# 12. Other - Other



# 13. Other - Other



# 14. Other - Other



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Job #:126165.8.0

# City of Edmonton

## Leduc Road Annex West

### 124 ST AT 73 AVE SW - INTERSECTION

#### Formal Inspection

**Date : 2020-08-07**

**Weather : clear sky, 18.89 degree celsius**

Attendees      DWAYNE FIDDLER

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	CI	Culvert not draining NW corner of intersection. Additional grading or culvert allowing drainage to the east 124 st ditch may be required.	124 st and 73 AVE SW			
2	CI	Ditch in NW corner of intersection holding water. Additional culvert or grading may be required to allow proper drainage.	124 ST and 73 AVE SW.			





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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2020-08-07**

**124 ST AT 73 AVE SW – INTERSECTION REVIEW**

**N.T.S.**





# 1. Other - Other



# 1. Other - Other



# 1. Other - Other



# 2. Other - Other



# 2. Other - Other



# 2. Other - Other

## **Appendix 3**

### **IBI Site Condition Assessments – 2019 Deficiency Inspections**



**IBI Group**  
300 - 10830 Jasper Avenue  
Edmonton AB T5J 2B3 Canada  
tel 780 428 4000 fax 780 426 3256

Job #:5.3

# Drainage Open Orders

## Stage:

**Leduc Road Annex - TWP RD 510 from RR245C to RR253N**

Formal Inspection

**Date : 2019-10-02**

**Weather : clear sky, -2.22 degree celsius**

Attendees DWAYNE FIDDLER - IBI GROUP

General road conditions good. Items to address noted on report.

Note: See coding on improvement plan

Item No.	Description	Detail	Location	Quantity	Unit	Responsibility
1	Rut, SS	Rutting and soft shoulder north side of road. Road condition fair.				
2	CI, D	10" Culvert blocked crossing RR251S. Debris and garbage in ditch may cause drainage issues. Culvert not marked.				
3		Road condition good at RR250N				
4	WB, SS, R	Minor washboard, soft shoulder and rutting north side of road.				
5	P	Minor potholes				
6		End of cold mix overlay. Road conditions good.				
7	P	Potholes				
8	R, CI	Rutting at RR252S, Southwest culverts crushed and obstructed RR252S				
9	R, P	Minor rutting and pothole, RR251N Intersection. No picture.				
10	Rut	Rutting				
11	SS, Rut	Soft Shoulder and Rutting				
12	SS, Rut	Soft Shoulder (North) and Rutting.				
13	SS, Rut, D	Soft shoulder, (North), Rutting, Minor double ditch (north)				
14	SS, Rut, P	Soft shoulder (North), Rutting at RR253S Intersection				
15	P	Minor potholes				
16	P, SS, Rut	Potholes (Minor), Soft shoudler (North), Rutting at RR252N Intersection				
17	Rut	Rutting (North)				
18	Rut	Bad rutting, soft conditions.				
19	Rut	Rutting, soft conditions				
20	Rut, W	Rutting, washboard at RR254S Intersection				
21		RR 253N Intersection, condition fair				



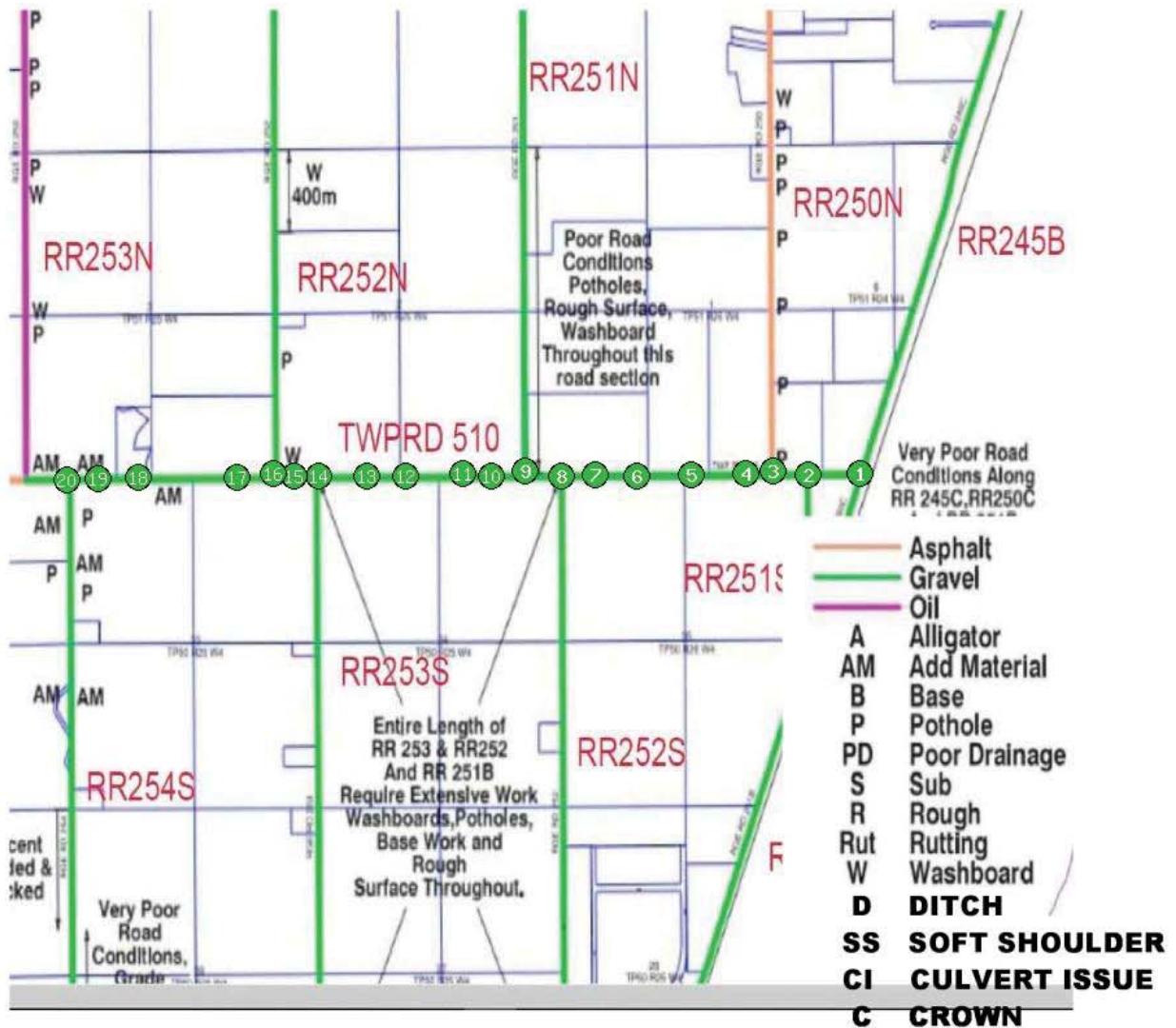


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# LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-02

TWP RD 510 FROM 245C TO RR 253N (170 ST)

N.T.S.

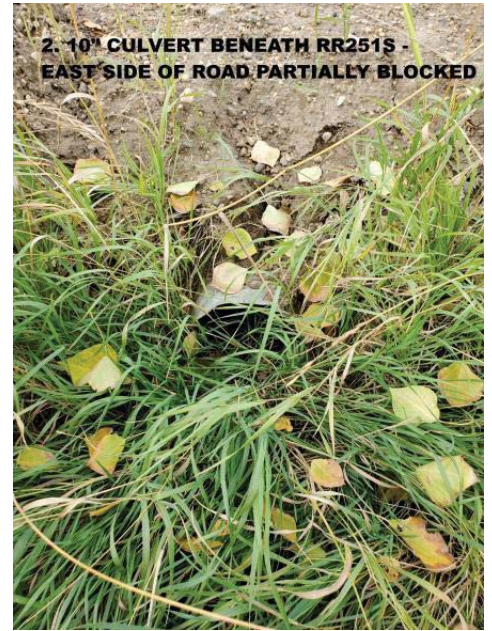




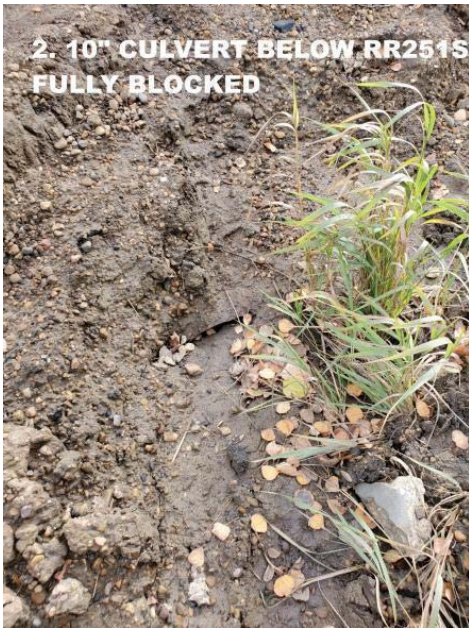
# 1. Other - Other



# 2. Other - Other



# 2. Other - Other



# 2. Other - Other



# 3. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other





# 7. Other - Other



# 8. Other - Other



# 8. Other - Other



# 10. Other - Other



# 11. Other - Other



# 12. Other - Other



# 13. Other - Other



# 14. Other - Other



# 15. Other - Other



# 16. Other - Other



# 17. Other - Other



# 18. Other - Other



# 18. Other - Other



# 19. Other - Other



# 19. Other - Other



# 20. Other - Other



# 21. Other - Other





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Job #:5.3

## Drainage Open Orders

### Stage:

**Leduc Road Annex - RR253S from TWP RD 510 to HWY 19**

Formal Inspection

**Date : 2019-10-07**

**Weather : shower rain, 0.56 degree celsius**

Attendees      DWAYNE FIDDLER - IBI GROUP  
  
Refer to legend on map for descriptions.  
  
No culverts marked in field.

Item No.	Description	Detail	Location	Quantity	Unit	Responsibility
1	Rut, W	Minor rutting and washboard. Tie in to Hwy 19 and first 350 meters.				
2	Rut	Minor rutting. Overall good condition.				
3	Rut	Minor rutting. Overall good condition				
4	Rut, SS, D	Rutting, soft shoulder and double ditch east shoulder of road.				
5	Rut, SS, D	Rutting, soft shoulder and double ditch east side of road.				
6	Rut, SS, D	Rutting east and west, Soft shoulder east and west, Minor double ditch west.				
7	Rut	Minor rutting. Overall road condition good.				
8	AM	More clay, add material if needed. Overall condition fair.				
9	Rut	Rutting at east entrance to field. Overall condition good.				
10	Rut, SS	Rutting, soft shoulder east.				
11	P, AM	Minor potholes. Add material if required. Overall condition fair.				
12	P, AM	Minor potholes, Add material if required. Overall condition fair.				
13	Rut, P, D	Minor rutting, minor potholes, silt in ditches on both side. Minor double ditch (west)				

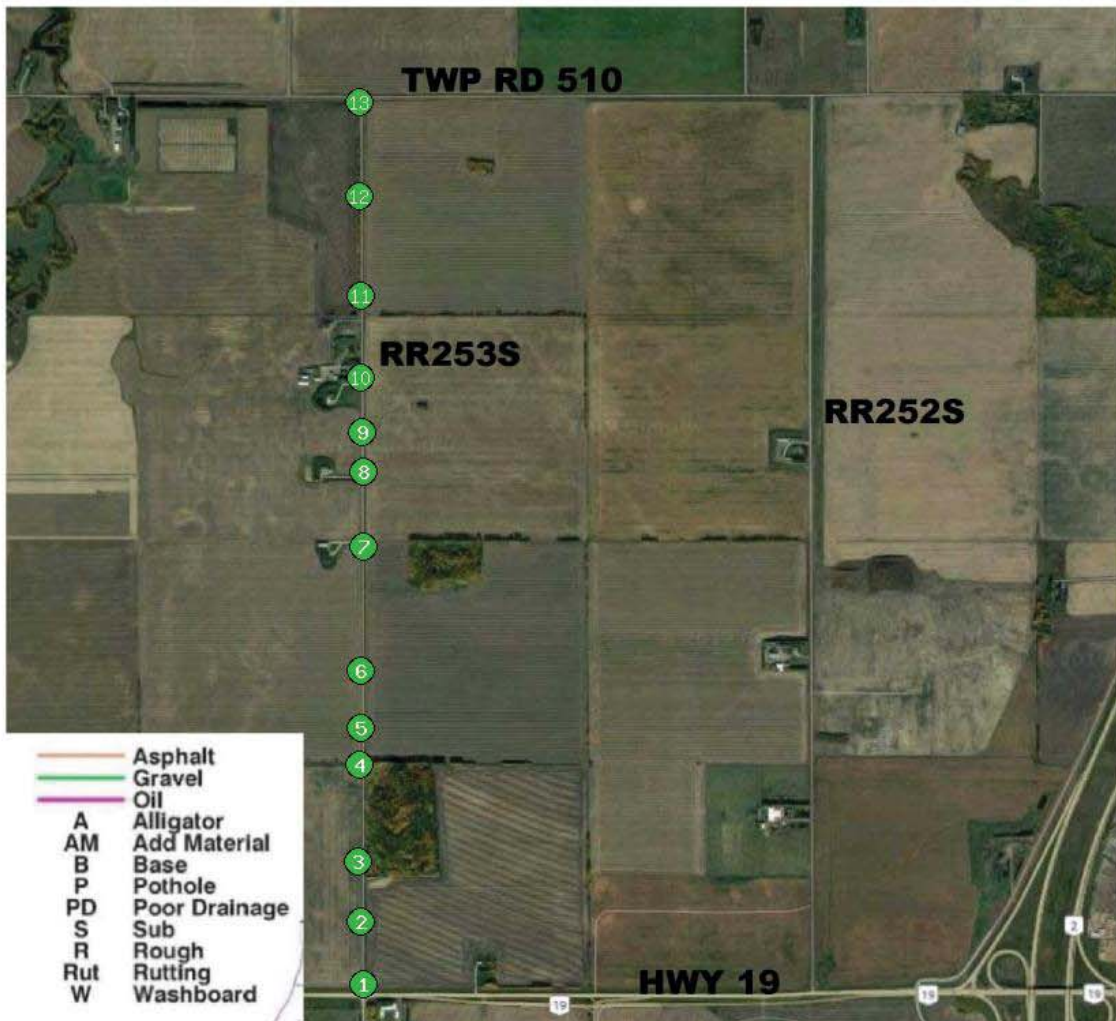


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-07**

**RR253S – TWP RD 510 TO HIGHWAY 19 -**

**N.T.S.**



**D DITCH**  
**SS SOFT SHOULDER**  
**CI CULVERT ISSUE**  
**C CROWN**



# 1. Other - Other



# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



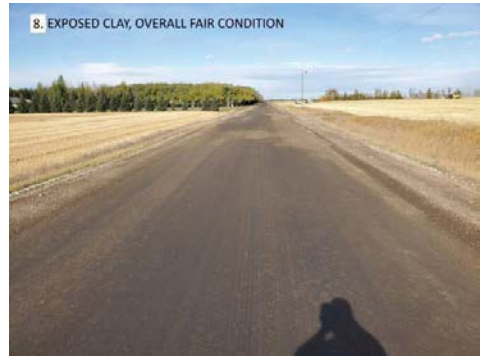
# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



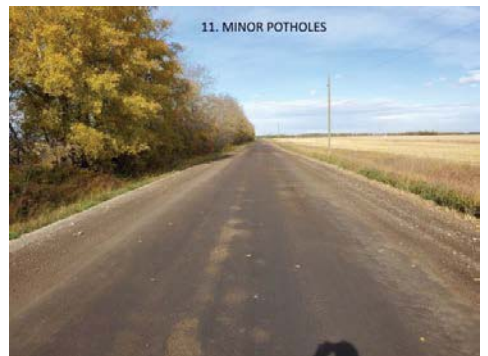
# 8. Other - Other



# 9. Other - Other



# 10. Other - Other



# 11. Other - Other





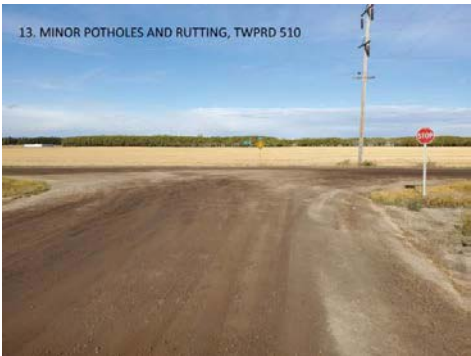
# 12. Other - Other



# 13. Other - Other



# 13. Other - Other



# 13. Other - Other





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Job #:5.3

## Drainage Open Orders

### Stage:

**Leduc Road Annex - RR255S from TWP RD 510 to HWY 19**

Formal Inspection

**Date : 2019-10-07**

**Weather : light snow, 0.56 degree celsius**

Attendees            DWAYNE FIDDLER - IBI GROUP  
  
Refer to legend on map for descriptions.  
  
No culverts marked in field.

Item No.	Description	Detail	Location	Quantity	Unit	Responsibility
1	Rut, W	Minor rutting, wasboard, no culverts marked.				
2	Good.	Road condition good.				
3	Good.	Road condition good.				
4	Good.	Start of cold mix overlay. Road condition good.				
5	Good.	Road condition good.				
6	Good.	End of cold mix overlay. Road condition good.				
7	Good.	Road condition good.				
8	Good.	Road condition good.				
9	Good.	Road condition good.				
10	W	Minor washboard. Road condition fair. Tie in to HWY 19.				

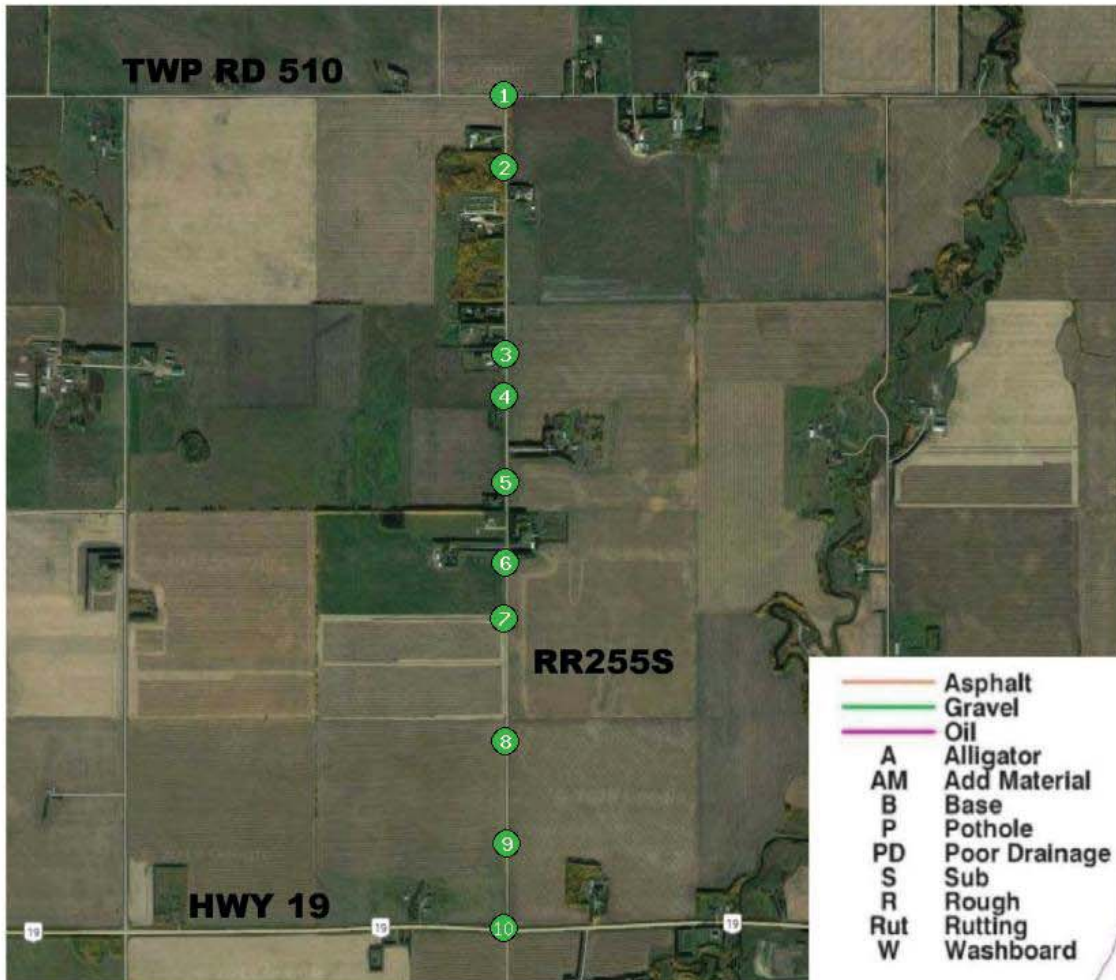


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-07**

**RR255S – TWP RD 510 TO HIGHWAY 19 -**

**N.T.S.**



**D DITCH**  
**SS SOFT SHOULDER**  
**CI CULVERT ISSUE**  
**C CROWN**



# 1. Other - Other



# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 9. Other - Other



# 10. Other - Other



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Job #:5.3

## Drainage Open Orders

### Stage:

**Leduc Road Annex - RR261 between TWP RD 510 and Highway 19**

Formal Inspection

**Date : 2019-10-18**

**Weather : shower rain, 10 degree celsius**

Attendees      DWAYNE FIDDLER - IBI GROUP  
  
Refer to inspection map for descriptions.  
  
No culverts marked.

Item No.	Description	Detail	Location	Quantity	Unit	Completion date
1	RUT, AM	Rutting, ponding, poor road conditions south of TWP RD 505, add material.				
2	RUT	Minor rutting at intersection of TWP RD 505.				
3	GOOD	Road condition good.				
4	GOOD	Road condition good.				
5	RUT	Minor rutting at intersection.				
6	RUT	Minor rutting, end of road.				



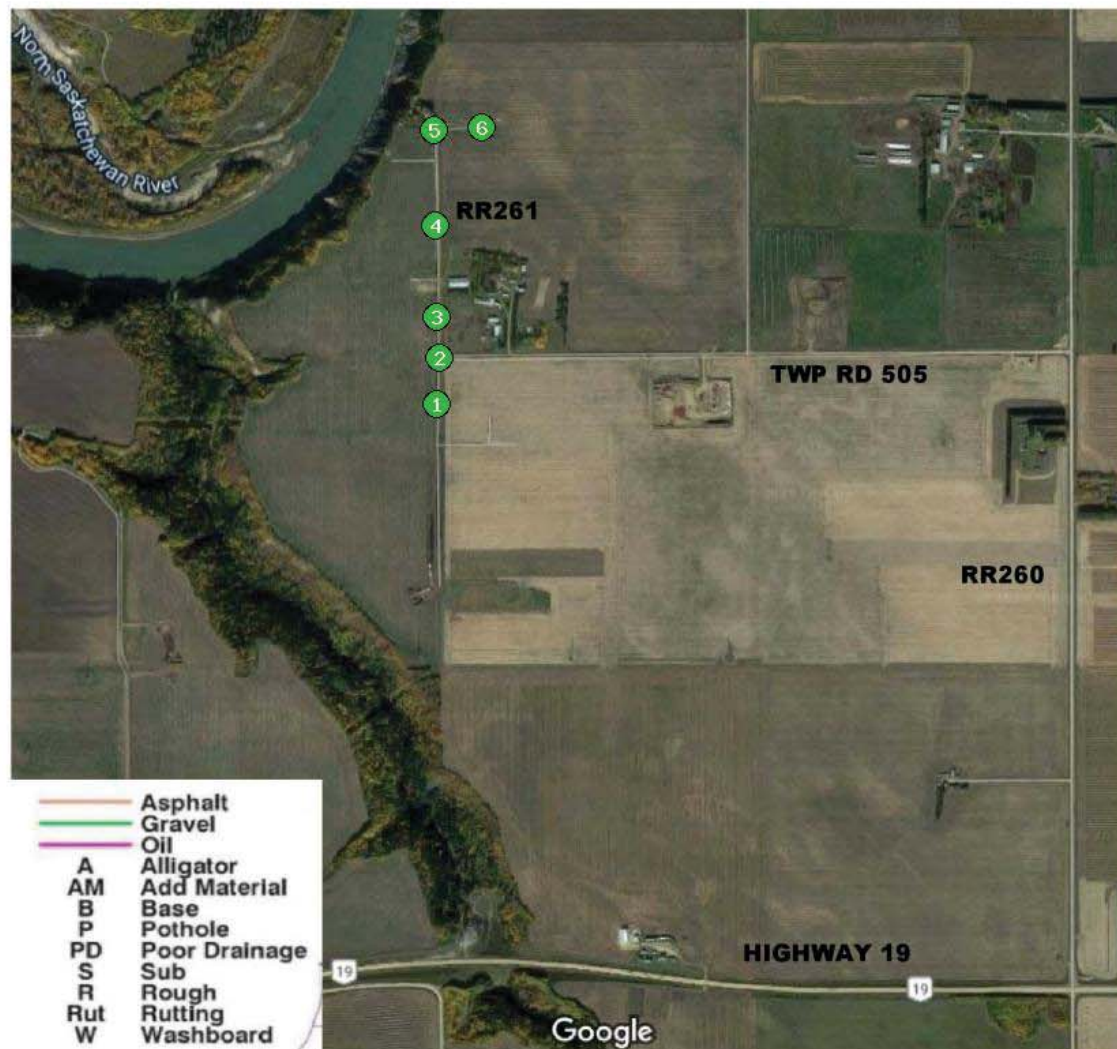


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-18**

**RR261 BETWEEN TWP RD 510 AND HIGHWAY 19**

N.T.S.



**D DITCH**  
**SS SOFT SHOULDER**  
**CI CULVERT ISSUE**  
**C CROWN**



# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 5. Other - Other



# 6. Other - Other





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## Drainage Open Orders

**Stage:**

**Leduc Road Annex - RR245B Inspection**

Formal Inspection

**Date : 2019-10-02**

**Weather : clear sky, 2.22 degree celsius**

Attendees DWAYNE FIDDLER - IBI GROUP

General road condition good, some maintenance required, especially after rainfalls.

Note: See coding on improvement plan.

Item No.	Description	Detail	Location	Quantity	Unit	Responsibility
1	Rut, D	Minor rutting in intersection and east shoulder. Debris in east ditch may cause drainage issues, should be removed. New culverts installed.				
2	SS, Rut, D	Rutting, Soft shoulder (East), Minor double ditch (East)				
3	Rut, SS, D	Rutting, soft shoulder, minor double ditch				
4	Rut	Rutting				
5	Rut, SS	Rutting, soft shoulder (East)				
6	SS, Rut	Soft shoulder, rutting (West)				
7	Rut	Rutting (West)				
8	Rut	Rutting (East)				
9	Rut, W	Rutting and washboard at dressage studio entrance				
10	Rut, SS	Rutting and soft shoulders				
11	Rut	Rutting				
12	Rut, SS	Rutting and soft shoulder (East) at Marty RV Entrance				
13	Rut, P	Rutting, pothole at RV north entrance				
14	Rut	Rutting at 50 Ave SW				
15	Rut	Rutting north of bridge, rutting at turnaround				
16	Rut	Rutting				
17	Rut, D, Fence	Rutting on road and ditch, Fence opened in two places, cars cutting through and rutting ditch. Fence should be closed.				
18	Rut	Rutting at Pump Station entrance				





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RR245B

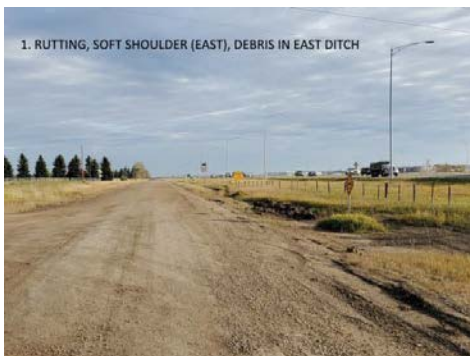
N.T.S.







# 1. Other - Other



# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 9. Other - Other



# 10. Other - Other



# 10. Other - Other





# 10. Other - Other



# 11. Other - Other



# 11. Other - Other



# 12. Other - Other



# 12. Other - Other



# 13. Other - Other



# 14. Other - Other



# 15. Other - Other



# 15. Other - Other



# 15. Other - Other



# 16. Other - Other



# 17. Other - Other



# 17. Other - Other



# 17. Other - Other



# 18. Other - Other



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## Drainage Open Orders

### Stage:

**Leduc Road Annex - TWP RD 510A**

Formal Inspection

**Date : 2019-10-18**

**Weather : clear sky, 10 degree celsius**

Attendees      DWAYNE FIDDLER - IBI GROUP  
  
Refer to inspection map for descriptions.  
  
No culverts marked or visible.

Item No.	Description	Detail	Location	Quantity	Unit	Completion Date
1	P	Entrance to Rabbit Hill. Potholes.				
2	P	Shalom Water Ski Entrance. Potholes.				
3	P, W	Potholes, minor washboard forming.				
4	W, P	Major washboard forming. Potholes. Some cold mix and gravel in this section.				
5	W, P	Major washboard, potholes.				
6	W, P	Washboard, potholes, eroding shoulders, water runs off ditch over road.				
7	W, P	Washboard, potholes, poor road conditions. Start of oil section of road.				



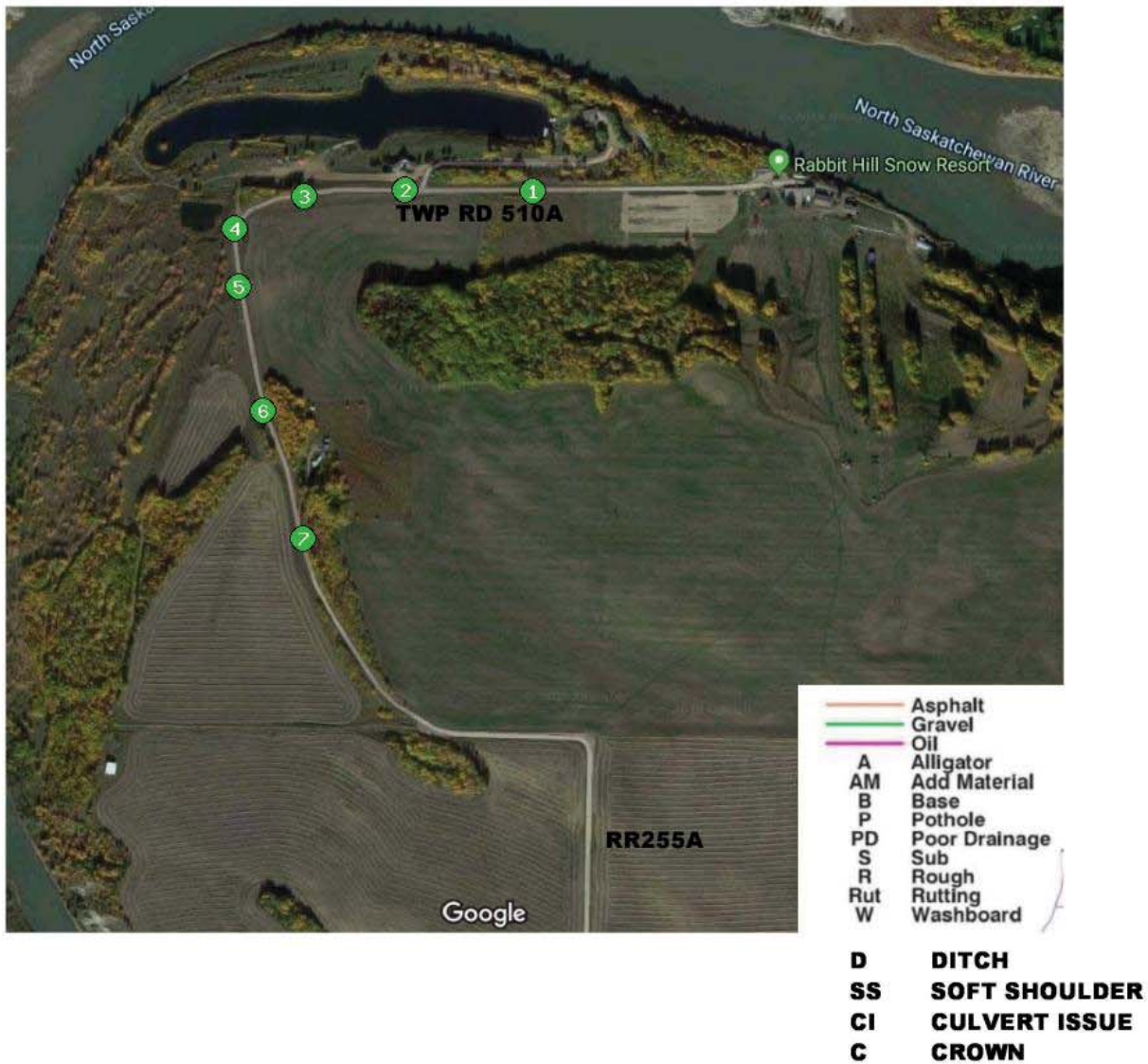


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-18**

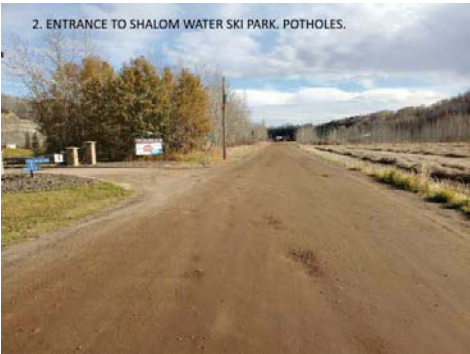
**TWP RD 510A – GRAVEL PORTION FROM RABBIT HILL ENTRANCE**

N.T.S.





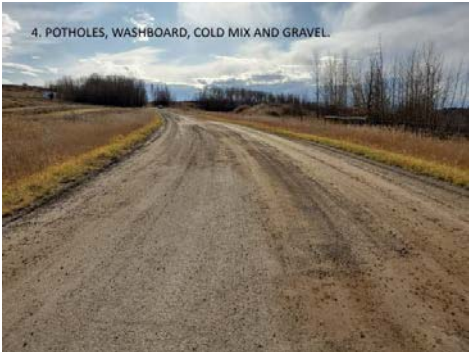
# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



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# Drainage Open Orders

## Stage:

**Leduc Road Annex - RR251N from TWP RD 510 to 41 AVE SW**

Formal Inspection

**Date : 2019-10-09**

**Weather : clear sky, -1.67 degree celsius**

Attendees      DWAYNE FIDDLER - IBI GROUP

Refer to inspection map for descriptions.

Culverts midway marked, no other culverts marked.

More clay than gravel from deficiency 4-9 and 13-14, add material as needed.

Item No.	Description	Detail	Location	Quantity	Unit	Responsibility
1	RUT, W	Rutting and washboard at the tie in to TWP RD 510				
2	RUT	Minor rutting.				
3	SS, RUT	Soft shoulder (east), Minor rutting.				
4	P, D	Minor potholes, minor double ditching (east).				
5	RUT, P	Rutting (east), minor potholes.				
6	RUT, SS	Rutting (east), soft shoulder (east).				
7	RUT, SS, D	Rutting (east and west), soft shoulder (east), minor double ditching (west).				
8	Rut, SS	Rutting (east and west), soft shoulder (east), culverts marked with posts.				
9	RUT, SS, D	Rutting (east and west), soft shoulder (east), double ditch and ponding(west)				
10	RUT, SS	Rutting and soft shoulder (east).				
11	RUT, SS	Rutting and soft shoulder (east).				
12	RUT, SS	Rutting and soft shoulder (east).				
13	RUT, SS	Rutting and soft shoulder (east).				
14	RUT, P	Rutting, potholes, tie in to 41 AVE SW.				





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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-09**

**RR251N FROM TWP RD 510 TO 41AVE SW**

**N.T.S.**



**D DITCH**  
**SS SOFT SHOULDER**  
**CI CULVERT ISSUE**  
**C CROWN**





# 1. Other - Other



# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



# 8. Other - Other



# 9. Other - Other



# 10. Other - Other



# 11. Other - Other



# 12. Other - Other



# 13. Other - Other



# 14. Other - Other



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Job #: 5.3

## Drainage Open Orders

### Stage:

**Leduc Road Annex - RR251S from TWP RD 510 to RR245C**

Formal Inspection

**Date : 2019-10-09**

**Weather : clear sky, -3.89 degree celsius**

Attendees      DWAYNE FIDDLER - IBI GROUP  
  
Refer to lei end on map for descriptions.  
  
No culverts marged.

Item No.	Description	Detail	Location	Quantity	Unit	Responsibility
1	D	Tie in to TWP RD 510, Garbage and debris in ditch may cause drainage issues.				
2	RUT	honor rutting.				
3	RUT, P	honor rutting, PotHole				
4	GOOD	Road condition good.				
5	RUT	Tie in to RR245C, rutting at intersection.				





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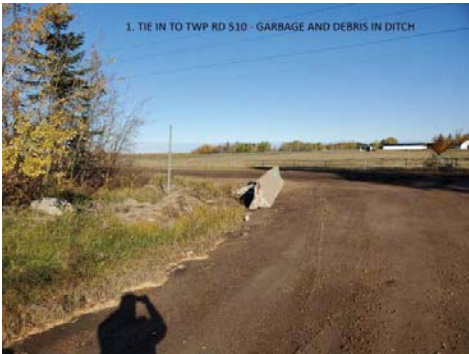
**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-09**

**RR251S FROM TWP RD 510 TO RR245C**

**N.T.S.**



**D DITCH**  
**SS SOFT SHOULDER**  
**CI CULVERT ISSUE**  
**C CROWN**



# 1. OtMer - OtMer



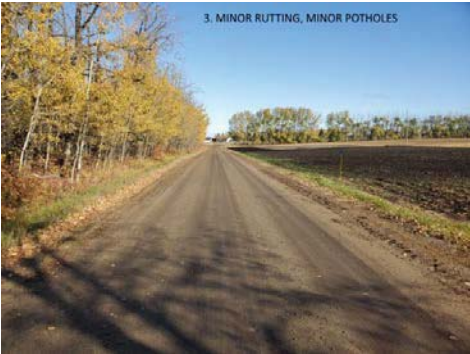
# 1. OtMer - OtMer



# 2. OtMer - OtMer



# 3. OtMer - OtMer



# 3. OtMer - OtMer



# 4. OtMer - OtMer



# 5. OtMer - OtMer





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Job #: 5.3

# Drainage Open Orders

## Stage:

Leduc Road Annex - RR252N from 41 Ave SW to TWP RD 510

Formal Inspection

Date : 2019-10-09

Weather : clear sky, 6.67 degree celsius

Attendees DWAYNE FIDDLER - IBI GROUP  
Refer to legend on map for descriptions.  
One culvert marked Qity p, lonMye rest of tye culverts are unmarked.  
Norty 400 meters ma, rewuire additional gravelMo be added as needed

Item No.	Description	Detail	Location	h uantit,	Unit	Responsibilit,
1	RUTPMWM CI	Tie in to 41 Ave HWM Rutting Mo polyoles Mo asyboard. Culvert on Qest side of road yalf crused and filled Qity gravelM syould be repaired and cleaned out. COE corporate limits sign syould be moved to 9 WY 1S.				
2	RUT	q inor rutting (Qest).				
3	D	q inor double ditcy (Qest). Road recentl, re-Qorked.				
4	D	q inor double ditcy (east)MWyitemud coop Qatermain crossing. Road recentl, re-Qorked.				
5	CI	One culvert end marked Qity pilon. HW culvert damaged and yalf filled Qity gravel. NW culvert damagedMa minor amount of gravel inside. Recommend culvert clean and repair.				
6	GOOD	Road condition good.				
7	GOOD	Road condition good.				
8	GOOD	Htart of cold mix overla, . ATCO yigy pressure pipeline crossing.				
S	GOOD	Cold mix overla, Mondition good.				
10	GOOD	End of cold mix overla, . Road condition good.				
11	GOOD	Road condition good.				
12	PMWMRUT	Tie in to TWP RD 510. q inor polyolesMo asyboard and rutting.				



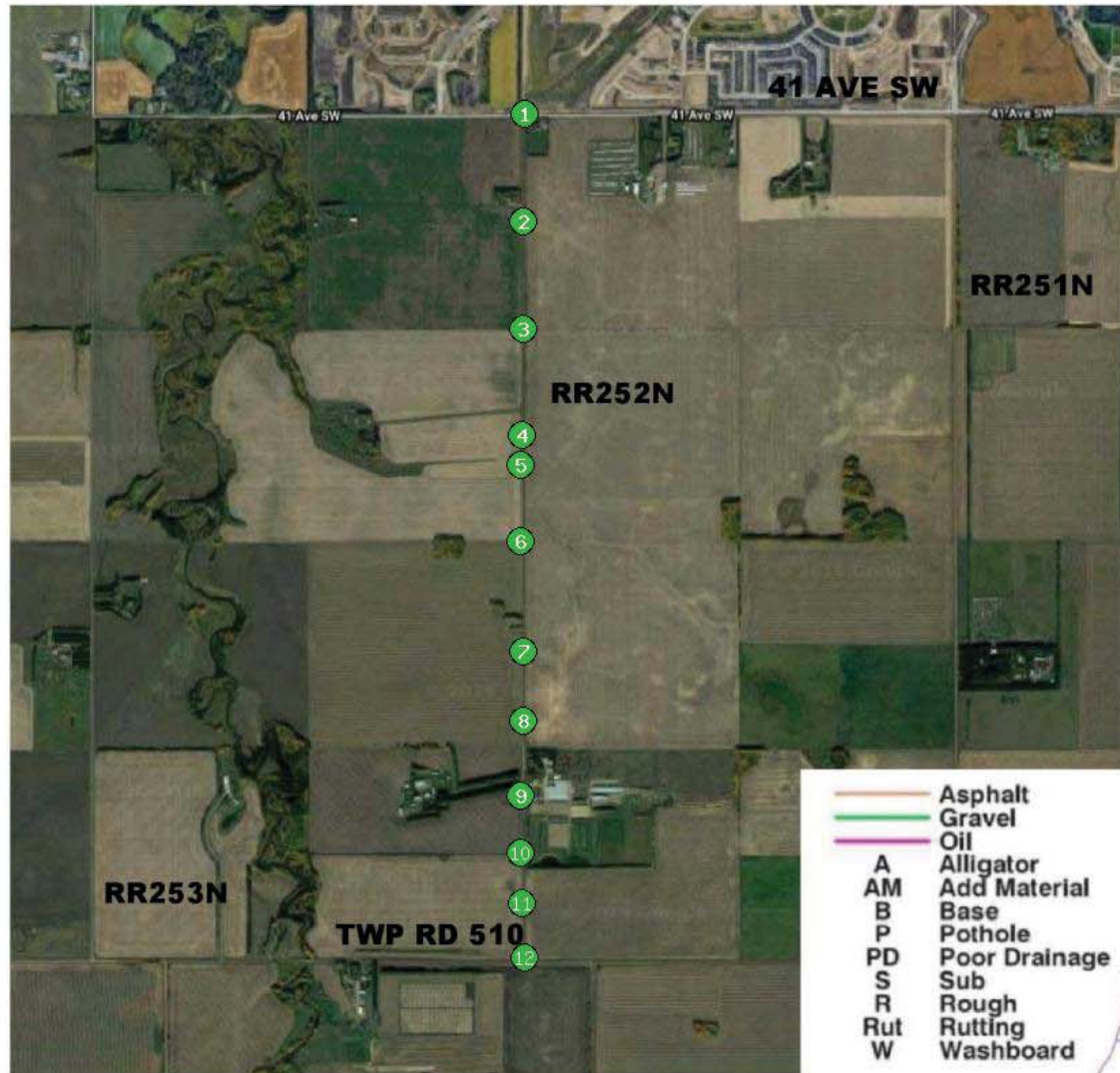


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-09**

**RR252N FROM 41AVE SW TO TWP RD 510**

**N.T.S.**



**D DITCH**  
**SS SOFT SHOULDER**  
**CI CULVERT ISSUE**  
**C CROWN**





# 1. Otyer - Otyer



# 1. Otyer - Otyer



# 1. Otyer - Otyer



# 2. Otyer - Otyer



# 3. Otyer - Otyer



# 4. Otyer - Otyer



# 5. Otyer - Otyer



# 5. Otyer - Otyer



# 5. Otyer - Otyer



# 6. Otyer - Otyer



# 7. Otyer - Otyer



# 8. Otyer - Otyer





# S. Otyer - Otyer



# 10. Otyer - Otyer



# 11. Otyer - Otyer



# 12. Otyer - Otyer





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Job #:5.3

## Drainage Open Orders

### Stage:

**Leduc Road Annex - RR254N from TWP RD 510 to 41 Ave SW**

Formal Inspection

**Date : 2019-10-07**

**Weather : scattered clouds, -3.33 degree celsius**

Attendees DWAYNE FIDDLER - IBI GROUP

Refer to legend on inspection map for descriptions.

No culverts marked in field.

Item No.	Description	Detail	Location	Quantity	Unit	Responsibility
1	W, RUT	Washboard and minor rutting, tie in to TWP RD 510				
2	GOOD	Road condition good.				
3	P, RUT	Pothole, minor rutting.				
4	GOOD.	Road condition good.				
5	SS, RUT	Soft shoulder and rutting (east).				
6	P, RUT	Pothole, minor rutting.				
7	SS, RUT	Soft shoulder, rutting (west)				
8	SS, RUT	Soft shoulder (east and west), rutting.				
9	SS, P	Soft shoulder (east), pothole, guardrai may be required (west shoulder).				
10	SS, P, D	Soft shoulder (east and west), potholes, minor double ditch (west), guardrail may be required (west shoulder).				
11	P	Minor potholes.				
12	P	Minor potholes.				
13	P, RUT	Minor potholes and minor rutting, tie in to 41 ave SW.				

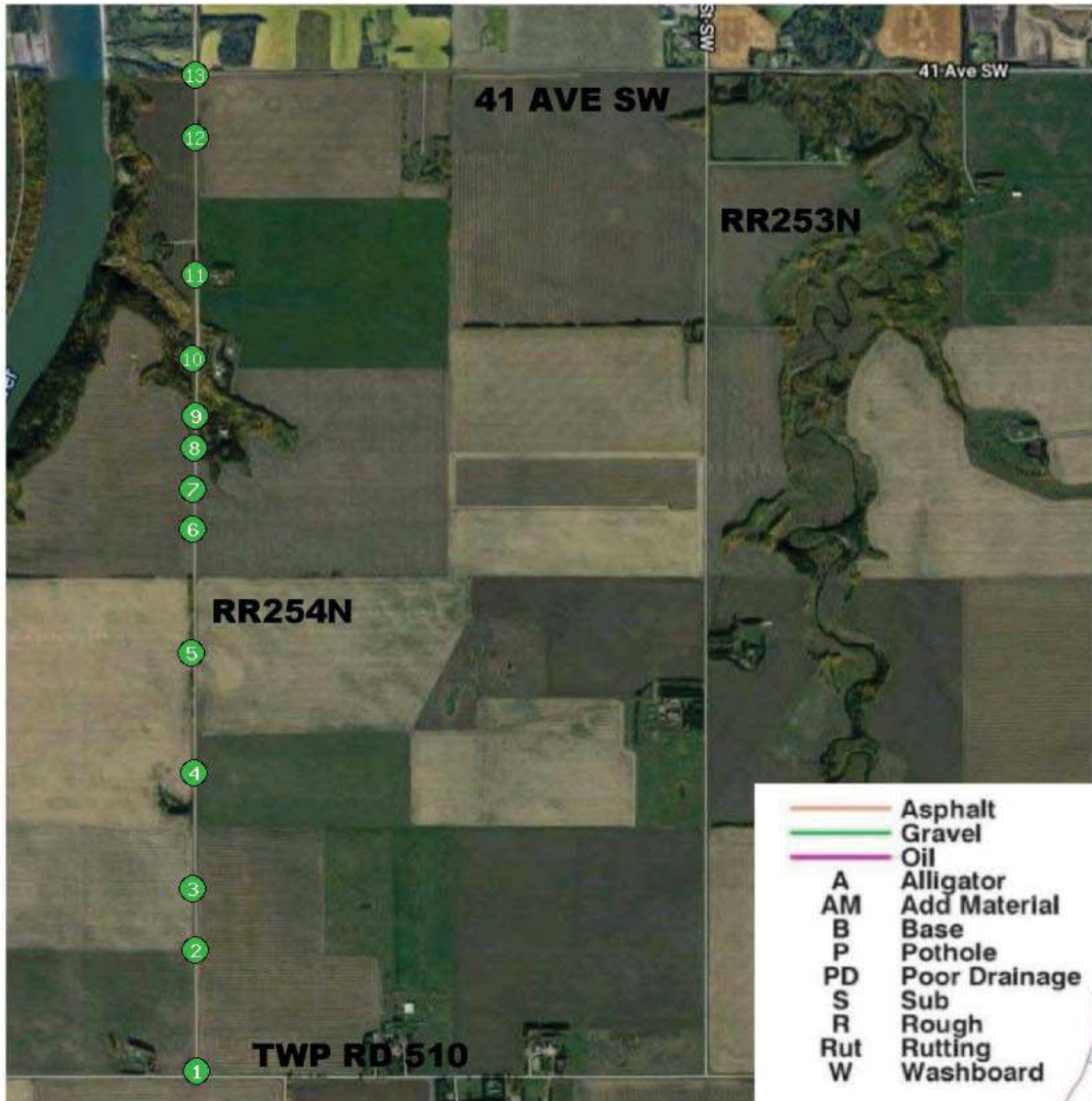


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-07**

**RR254N – TWP RD 510 TO 41 AVE SW -**

**N.T.S.**



**D DITCH**  
**SS SOFT SHOULDER**  
**CI CULVERT ISSUE**  
**C CROWN**





# 1. Other - Other



# 2. Other - Other



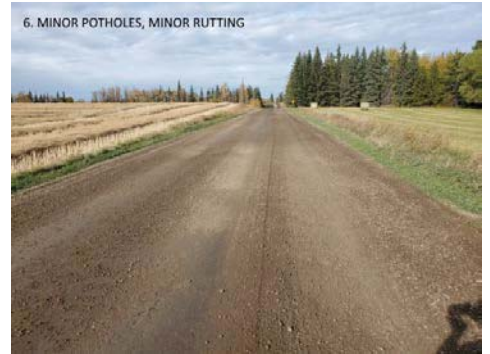
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# 4. Other - Other



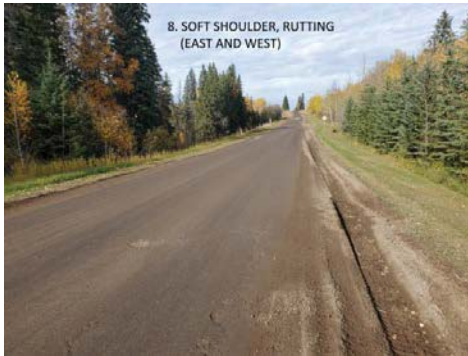
# 5. Other - Other



# 6. Other - Other



# 7. Other - Other



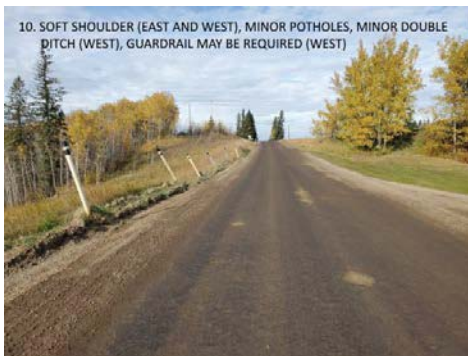
# 8. Other - Other



# 9. Other - Other



# 9. Other - Other



# 10. Other - Other



# 11. Other - Other





# 12. Other - Other



# 13. Other - Other



# 13. Other - Other



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# Drainage Open Orders

## Stage:

**Leduc Road Annex - RR254S from TWP RD 510 to HWY 19**

Formal Inspection

**Date : 2019-10-11**

**Weather : light rain, 2.78 degree celsius**

Attendees DWAYNE FIDDLER - IBI GROUP

Refer to inspection map for descriptions.

Item No.	Description	Detail	Location	Quantity	Unit	Responsibility
1	RUT, , y WyD	Top to TWP RD 510. Rutting soft sMoulders double dgcMn and wasMboard.				
2	RUTyDyAh	Rutting ydouble dgcMyadd material as needed.				
3	RUTyAh y DyC	Rutting ydouble dgcMyadd material as reHuged. Possible crown issuesMould be confirmed once surveys are completed. ATCO reinspection station.				
4	RUTyDyAh	Rutting ydouble dgcMyadd material as needed.				
5	RUTyDyAh	Rutting ydouble dgcMyadd material as needed.				
6	RUTyAh	Rutting yadd material as needed.				
7	RUTyAh yD	Rutting ydouble dgcMyadd material as needed. Guardrail may be reHuged west side of road due to steep drop off to creek.				
8	RUTyAh	Rutting yadd material as reHuged.				
9	RUTyAh	Rutting yadd material as needed.				
10	RUTy, ,	Rutting ysoft sMoulder past.				
11	RUTy, ,	Rutting ysoft sMoulder past.				
12	RUTy, ,	Rutting ysoft sMoulder past.				
13	RUT	Rutting .				
14	RUT	Rutting .				
15	RUTy, ,	Rutting ysoft sMoulders.				
16	RUTy, ,	Rutting ysoft sMoulders.				
17	RUTy, ,	Rutting ysoft sMoulders.				
18	RUTyP	Top to ) wQ1S. Rutting yPotMbleyPogelne crossgri .				

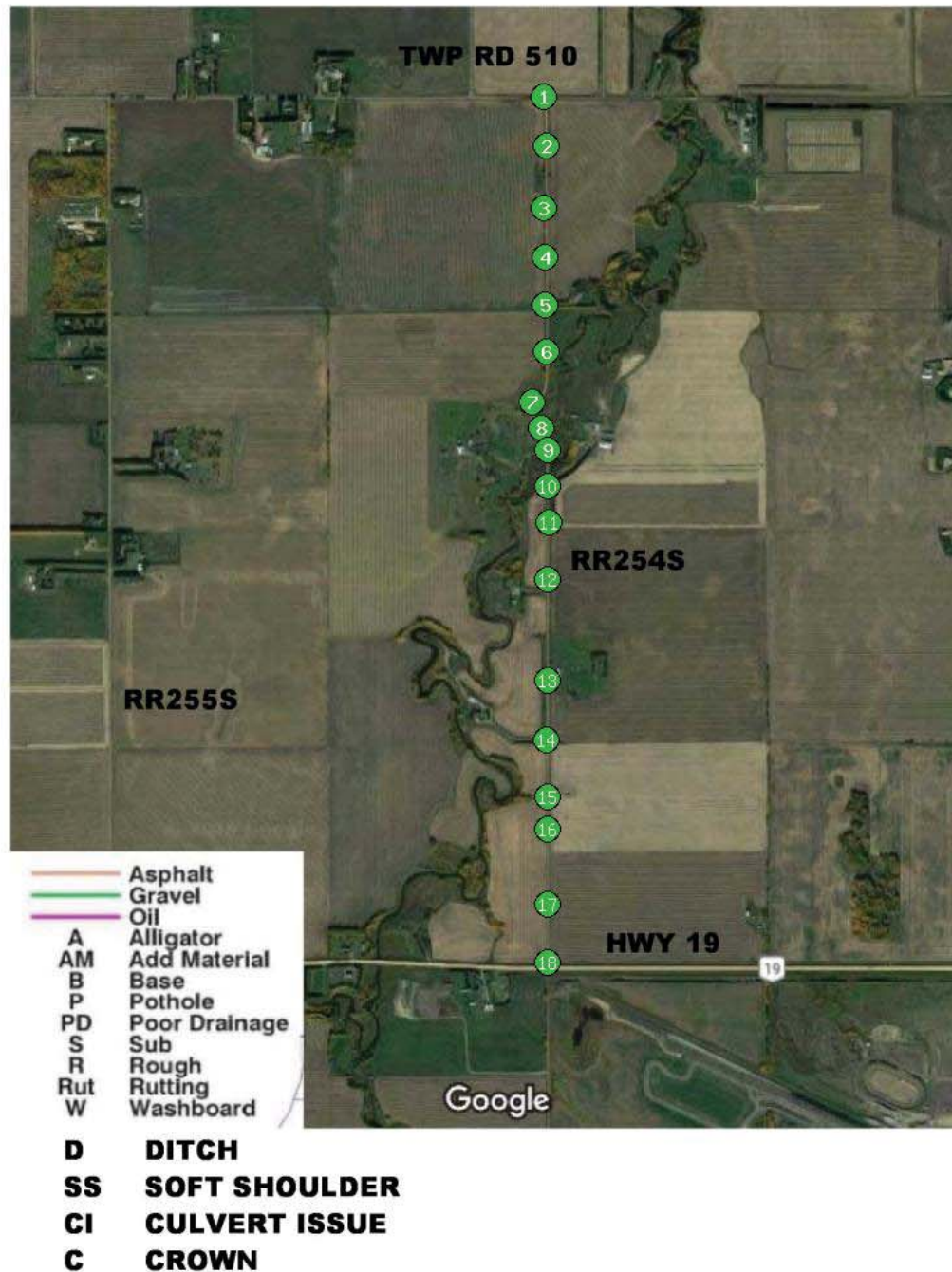


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-11**

**RR254S – TWP RD 510 TO HIGHWAY 19 -**

**N.T.S.**







# 1. OtMer - OtMer



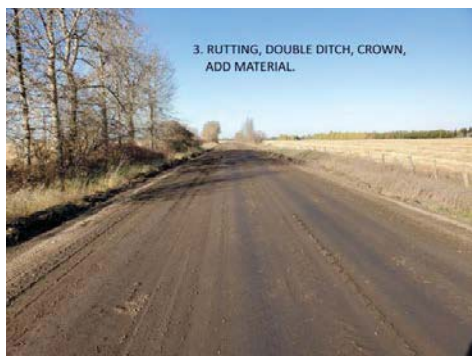
# 1. OtMer - OtMer



# 1. OtMer - OtMer



# 2. OtMer - OtMer



# 3. OtMer - OtMer



# 3. OtMer - OtMer



# 4. OtMer - OtMer



# 5. OtMer - OtMer



# 6. OtMer - OtMer



# 7. OtMer - OtMer

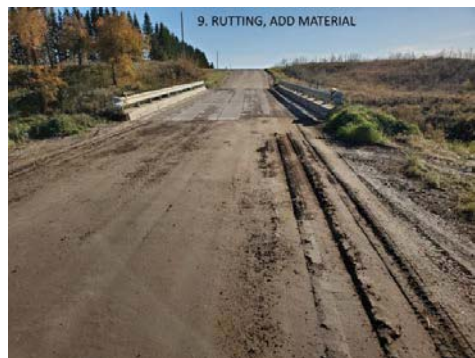


# 7. OtMer - OtMer



# 8. OtMer - OtMer





# S. OtMer - OtMer



# 10. OtMer - OtMer



# 11. OtMer - OtMer



# 12. OtMer - OtMer



# 13. OtMer - OtMer



# 13. OtMer - OtMer



# 14. OtMer - OtMer



# 15. OtMer - OtMer



# 16. OtMer - OtMer



17. RUTTING, SOFT SHOULDERS

# 17. OtMer - OtMer



18. TIE IN TO HWY 19. POTHOLE, RUTTING.

# 18. OtMer - OtMer



18. PIPELINE CROSSING.

# 18. OtMer - OtMer



18. RUTTING

# 18. OtMer - OtMer





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Job #:5.3

## Drainage Open Orders

### Stage:

**Leduc Road Annex - TWP RD 505 from RR261S to RR260S**

Formal Inspection

**Date : 2019-10-09**

**Weather : clear sky, 5.56 degree celsius**

Attendees     DWAYNE FIDDLER - IBI GROUP  
  
Refer to inspection map for descriptions.  
  
No culverts marked.

Item No.	Description	Detail	Location	Quantity	Unit	Responsibility
1	RUT	Tie in to RR261S, minor rutting.				
2	GOOD	Road condition good.				
3	GOOD	Road condition good.				
4	GOOD	Road condition good.				
5	GOOD	Tie in to RR260S. Road condition good. ATCO regulating station north side of road. Plains Midstream facility south side of road.				

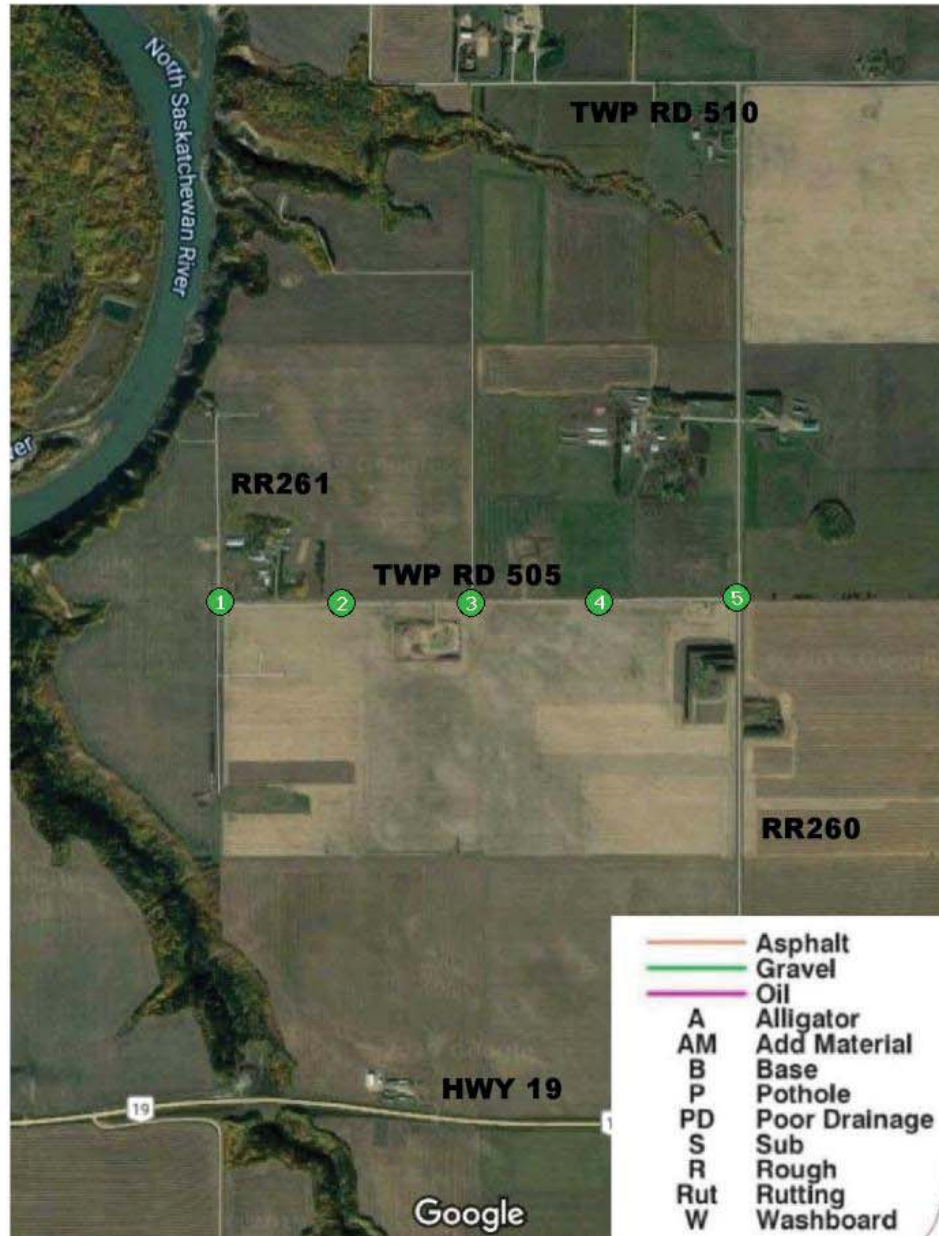


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**LEDUC COUNTY WEST ANNEXATION – SURFACE AND DITCH INSPECTION -2019-10-09**

**TWP RD 505 FROM RR261 TO RR260**

**N.T.S.**





# 1. Other - Other



# 2. Other - Other



# 3. Other - Other



# 4. Other - Other



# 5. Other - Other



# 5. Other - Other



# 5. Other - Other





## **Appendix 4**

### **City of Edmonton Asset Maintenance Plan**

## Asset Maintenance Plan

### Oiled and Gravel Roads Maintenance

Created by	Jason Mackey	Approval Date
Reviewed by	Jitender Kumar	Approved by Caitlin Zerebeski
		Signature

#### 1. Program Scope

*The maintenance and continuous improvement of the 392.53 km's, including the 154.1 km's of oiled and gravel roads in Leduc Annexation, of oiled and gravel roads and 71.38 km's of gravel alleys located throughout the City of Edmonton with the plan to provide safe use for all citizens. (Reference: 2018 Roadway Maintenance Routing Inventory).*

- <https://docs.google.com/spreadsheets/d/11cFNOy-loos0S-iygL3gCSohkiDpDzwIYAx06y6HMml/edit#gid=739120077>.

*The scope of the program is to maintain oiled rural road: Oiled roads are constructed by using oil mix consists of aggregate and cold asphalt binder. The material is laid by using a grader and then compacted by the roller. This type of surfaced road provide more pavement strength . These roads are maintained either by pothole filling or by zipping to mix material to keep it safe and in shape.*

*Gravel rural road: These roads are constructed by using 25/63 mm base material on top of existing ground . The material is laid and spread by the grader and subsequently compacted by the roller. As there is no binder mix with these roads, the roads required frequent maintenance which include blading, adding material and reshaping the ditches along side of the roads.*

*These roads are regulated with the road ban during spring and summer depend upon their type. The list of ban are available on Edmonton.ca.*

### Situational Analysis

#### 2. Critical Maintenance Factors

*Critical maintenance factors that affect the maintenance of Oiled and Gravel roads in the City of Edmonton are detours set up by private contractors around new communities being developed throughout the city of Edmonton, increased axle loads from large trucks and exemptions from road bans. Frozen roads and culverts, in the winter and beginning of spring, not allowing the drainage water to properly flow through the drainage network. Being sure the roads are being maintained properly to*

*keep their shape and crown to allow water to flow across into the ditches and culverts and so the water is not sitting on the roadways letting it break through the roadway and into the base causing soft spots, subsidences or even base issues in the future.*

*Maintenance work is also weather dependant, rain and snow limit our opportunities to properly maintain roads and alleys throughout the maintenance season.*

*Equipment breakdowns, availabilities, not having properly trained operators and limiting working hours because of working during off peak hours as to not disrupt traffic flow can also adversely affect the capacity and timelines to repair any issues.*

### 3. Citizen Factors

*Factors that citizens take into account when travelling oiled and gravel roadways are that they be smooth and safe to travel. They want them to be free from potholes and deficiencies like subsidences and any issues that could potentially cause damage to their vehicles and when possible to have work being completed during off peak hours as to not disrupt the flow of traffic.*

### 4. Asset Maintenance Categories

- *Arterial Roadway - High Capacity Urban / Rural Roadway*
- *Collector Roadway - Moderate capacity roadway which serves to move traffic from residential areas to arterial roadways.*
- *Industrial Roadways - Low capacity roadway that allows access to frontage of industrial properties and businesses.*
- *Alleys - Very low capacity roadway, usually only one direction of travel at a time, allows rear access to residential and business properties.*
- *Rural Roadway - Low traffic roads with speeds up to 80 km's per hour located in forested and rangeland settings that serve residential, recreational and resource management uses.*
- *Rural Highway - Low traffic roadway with higher speeds (80 km's per hour and higher), fewer turning conflicts and less pedestrians.*

### 5. Maintenance Tasks

Deficiency	Maintenance Tasks
Potholes / Subsidence	<i>To maintain roads, gravel / oiled, from potholes, subsidences, etc by blade spreading and reshaping by sometimes adding more material when needed. If potholes are minimal in the area sometimes a handcrew will be sent to fill from the back of a 2 tonne truck by shovel and rake, material used to fix is dependant on the material road is made of, i.e. - gravel / oil mix...equipment used: grader, tandem, 10T roller, flusher, flag crew, crew cab, 2 tonne truck, tamper, barricades, COE or hired equipment as required.</i>



<i>Ditch Maintenance</i>	<i>Brushing; Keeping ditches open for drainage water to flow properly so water doesn't erode or washout road, road edge, culverts crossing under the roads. Equipment used: Grader, backhoe, gradall, skid steer, toolcat, 2 tonne truck, flag crew, crew cab, barricades, COE or hired equipment as required.</i>
<i>Base Repair / Soft Spots</i>	<i>Using a grader and tandem to reshape and level out the uneven areas. If too soft a base crew would be called in to remove the damaged base and replace the base properly to COE standards. Equipment used: Grader, tandem, 2 tonne crew cab, loader, zipper / road hog, flag crew, crew cab, barricades, labourers, COE or hired equipment as required.</i>
<i>Washboard / Ruts</i>	<i>Using a grader and tandem to reshape and level out the uneven areas. Equipment used: Grader, tandem, 2 tonne crew cab, loader, zipper / road hog, flag crew, crew cab, barricades, labourers, COE or hired equipment as required.</i>
<i>Dust</i>	<i>Using a flusher to apply dust abatement to a road surface to reduce the dust levels. Using a grader to dig up the road then level out the gravel, apply dust abatement material through a flusher, i.e. calcium chloride, DL10, magnesium chloride, biobrine / SolNat, DustMAG, DowFlake Xtra, then to mix in the material with the gravel then level it out and roll for compaction. Equipment used would be a grader, flusher, flag crew, crew cab, zipper / road hog, barricades, labourers, 10 ton roller, COE or hired equipment as required.</i>

### 6. Current State Assessment of Program

**Strengths:** *Using current activities to maintain the urban and rural roads (arterial / collectors / residential / industrial and lanes) network and ditches to the COE standards. Using a wide variety of equipment and procedures already in place.*

**Weaknesses:** *Budget, Growth of infrastructure outpacing manpower and equipment allotment. Lack of trained individuals, equipment; ie - break downs, not enough, materials; ie - Not enough procured.*

**Opportunities:** *Possibility of more training, trying new ideas, i.e., applying oil to oiled roads and less material to the road to mix in and level out rather than more and more oil mix material.*

**Threats:** *Major construction projects causing busier rural roads because of detours, etc..., Roadbans, Adverse weather, Staff movement within PARS.*

### Maintenance Delivery

**7. Maintenance Concept:** *Maintain public roads for the safety of citizens traveling them.*

**7a. Inspection Concept:** Routine planned monthly inspection checks by district RMS, district inspectors, 311 notification complaint inspections.

**7b. Preventive Maintenance Concept:** Scheduled regular grading of roads to keep shape and crown profile to facilitate proper drainage and to maintain a safe driving surface for users. Arterial and Collector roadways and alleys are proactively checked and repaired with an oil mix and gravel material when manpower and material supply allow. District Inspectors will combine information from VCI inspections, current customer notification volume, historical notification information in conjunction with planned rehabilitation areas to formulate the planned preventative maintenance areas scheduled for each season. The worst areas will have attention given to them to repair any defects and then move onto the next area in a planned routing agenda. Any alley issues will be addressed in the same way with a grader repairing any defects starting with the worst alleys in the district. In some cases where areas are planned to be rehabilitated in the near future we will mostly address with oil mix or gravel too address any potholes or subsidences in the areas with a 2 tonne truck, proper material and handcrew with the proper tools.

**7c. Corrective Maintenance Concept:** Graders - COE forces. Tandems - COE or Hired, Gradall - Hired, 10 tonne roller - COE or Hired. Flusher (Filling rollers / zipper / applying dust abatement) - COE. Backhoe and operator - Hired. Specialty hired equipment (gradall / vacuum truck) - Hired. Crews to work from closest yard to the work site. Customers log their complaints through the COE 311 system which are then inspected to ensure the problem is valid. Once the complaint has been confirmed it is placed in our queue for repair execution. Five separate districts of the city have their own dedicated resources to allow execution of repairs, including Pavement Operations who has a Complex Repair group to attend to any vibration issues, heaves, base repair issues, etc... Oiled and gravel road work is predominately seasonal, winter time the oiled and gravel roads freeze and are too hard to work with too address any issues, in the case of any issues a temporary fix will likely be used to make safe for the public is options are available, weather dependant.

### 8. Procurement Requirements

Requirement	Existin g (Y/N)	Annual Cost*	Contract Start*	Contract Finish*	Action (Y/N)
20mm Gravel	Y		2019	2022	
20mm Oil Mix	Y		2019	2022	
25mm Gravel	Y		2019	2022	
Gradall	N		2019	2022	
Vacuum Truck	N		2019	2022	

\* Annual cost will either be estimated or actual depending on the status of the contract.  
Contract start and end dates will either be target or actual dates based on whether contract is currently in place.

## 9. Maintenance Service Levels

Major Deficiency	Asset Category	Time to Inspect	Time to Repair
Base Fail / Subsidence	Arterial Roads	24 hrs	5 - 10 days
Base Fail / Subsidence	Collector Roads	24 hrs	10 - 20 Days
Base Fail / Subsidence	Residential / Industrial Roads	24 hrs	20 - 60 Days
Base Fail / Subsidence	Alleys	48 hrs	60-180 Days
Base Fail / Subsidence	Annex	48 hrs	20 - 60 Days
Base Fail / Subsidence	Leduc	48 hrs	20 - 60 Days

Major Deficiency	Asset Category	Time to Inspect	Time to Repair
Ditch Maintenance	Arterial Roads	24 hrs	5 - 10 days
Ditch Maintenance	Collector Roads	24 hrs	10 - 20 Days
Ditch Maintenance	Residential / Industrial Roads	24 hrs	20 - 60 Days



Ditch Maintenance	Alleys	48 hrs	60-180 Days
Ditch Maintenance	Annex	48 hrs	20 - 60 Days
Ditch Maintenance	Leduc	48 hrs	20 - 60 Days

Major Deficiency	Asset Category	Time to Inspect	Time to Repair
Potholes / Washboard	Arterial Roads	24 hrs	5 - 10 days
Potholes / Washboard	Collector Roads	24 hrs	10 - 20 Days
Potholes / Washboard	Residential / Industrial Roads	24 hrs	20 - 60 Days
Potholes / Washboard	Alleys	48 hrs	60-180 Days
Potholes / Washboard	Annex	48 hrs	20 - 60 Days
Potholes / Washboard	Leduc	48 hrs	20 - 60 Days

Major Deficiency	Asset Category	Time to Inspect	Time to Repair
Culvert Washout	Arterial Roads	24 hrs	20 - 60 Days
Culvert Washout	Collector Roads	24 hrs	20 - 60 Days

Culvert Washout	Residential / Industrial Roads	24 hrs	20 - 60 Days
Culvert Washout	Annex	48 hrs	60-180 Days
Culvert Washout	Leduc	48 hrs	60-180 Days

Major Deficiency	Asset Category	Time to Inspect	Time to Repair
Road Edge Rebuilding	Arterial Roads	24 hrs	20 - 60 Days
Road Edge Rebuilding	Collector Roads	24 hrs	20 - 60 Days
Road Edge Rebuilding	Residential / Industrial Roads	24 hrs	20 - 60 Days
Road Edge Rebuilding	Annex	48 hrs	60-180 Days
Road Edge Rebuilding	Leduc	48 hrs	60-180 Days

### Supporting Plans

#### 10. Risk Management

Risk	Likelihood	Impact	Score	Mitigation
Not enough trained operators	2	2	4	Plan for training before the season starts.

<b>Inclement Weather</b>	<b>2</b>	<b>4</b>	<b>8</b>	<b>Plan for alternate work.</b>
<b>Equipment Breakdown</b>	<b>3</b>	<b>2</b>	<b>6</b>	<b>Have access to more equipment, plan for alternate work. Higher maintenance levels.</b>
<b>No Material (No Procurement)</b>	<b>3</b>	<b>4</b>	<b>12</b>	<b>Plan for material 6 months before.</b>

### 11. Quality Control

- *RMS /LD2 to check work crews are doing at the time to be sure it's getting completed properly and afterwards to be sure it is too expectations. Follow the SOP guidelines.*
- *Random locations that have been completed are inspected by Leaders to ensure quality assurance. Locations are rated and logged daily.*
- *LD1 on site to check work to be sure all SOP guidelines are followed throughout the duration of the task.*

### 12. Continuous Improvement- 12 Month Objectives

- *Examine material requirements to be sure material is being used properly for correct application.*
- *Procure proper materials.*
- *Continued training where needed.*
- *Implement schedule for routed inspection of all arterial and collector roadways.*
- *Review of inspection and scheduling process.*

### 13. Stakeholder Management

<b>Position</b>	<b>Incumbent</b>	<b>Impact to Program</b>
<u>RMS</u>	<u>Chuck Dickens</u> <u>Doug Gallacher</u> <u>Laura Ferguson</u> <u>Clarence Hupka</u>	<i>Inspect the oiled and gravel roadways in each district, continually checking the problematic areas, planning a</i>



		<u>Brian Paul</u>	<i>repair method, properly placing the repair in line with safety hazards, planned work in area with contractors, following road bans, etc...</i>
	<u>District Inspectors</u>	<u>TBD</u>	<i>Inspect the oiled and gravel roadways in each district, continually checking the problematic areas, planning a repair method, properly placing the repair in line with safety hazards, planned work in area with contractors, following road bans, etc...</i>
	<u>Leader 1</u>	<u>Various</u>	<i>Implement repair plan, follow proper SOP, quality control.</i>

**14. External Communication Key Messages**

- *Repairs weather dependent.*
- *Growth of city depends on road development.*
- *City of Edmonton utilizes a number of repair methods to ensure repairs can be completed both cost effective and strategically.*

**15. List of Appendices**

1. Asset Deficiency Nomenclature & Repair Levels (Priorities)
2. Summary of Current Program Resources
3. TBA - WBS Framework
4. TBA - Program KPIs (WBS, Accomplishment, Target)
5. TBA - Program One-Pager

### Appendix 1

#### Asset Deficiency Nomenclature & Repair Levels

##### Deficiency: Potholes / Subsidence

Description: A **pothole** is a structural failure in a road surface, due to water in the underlying soil structure and traffic passing over the affected area. Water first weakens the underlying soil; traffic then fatigues and breaks the poorly supported surface in the affected area. Continued traffic action ejects both surface material and the underlying soil material to create a hole in the pavement.

**Subsidence** is the process by which an area of land sinks to a lower level than the land surrounding it. Most commonly caused by road base issues.

Repair Level	Measurement: L x W = X cm
State of repair	X = < 5cm
4	X = 5-10 cm
3	X = 11-19 cm
2	X = 20-29 cm
1	X = >30 cm

##### Deficiency: Ditch Maintenance

Description: A **ditch** is a long narrow channel cut into the ground at the side of a road or field. **Ditch Maintenance** includes; inspection, cleaning and ensuring culvert ends are exposed for proper drainage water flow.

Repair Level	Measurement: Water depth at culvert entrance / blockage
State of repair	30 cm depth
4	40 cm depth
3	50 cm depth
2	60 cm depth
1	60+ cm depth

### Deficiency: Washboard (Corrugated) / Rutting

Description: **Washboard** is the formation of periodic, transverse ripples in the surface of gravel and dirt roads. Washboarding occurs in dry, granular road material with repeated traffic, traveling at speeds above 8.0 kilometres per hour (5 mph). Washboarding creates an uncomfortable ride for the occupants of traversing vehicles and hazardous driving conditions for vehicles that travel too fast to maintain traction and control. A **rut** is a depression or groove worn into a road or path by the travel of wheels or skis. Ruts can be formed by wear, common in cold climate areas, or they can form through the deformation of the asphalt concrete pavement or subbase material. Rut-like depressions can be formed on gravel roads by the erosion from flowing water.

Repair Level	Measurement: L x W = X
State of repair	X = < 5M
4	X = 5 - 10M
3	X = 11 - 20M
2	X = 21 - 30M
1	X = 31 - 40M

### Deficiency: Dust (Dust Abatement)

Description: **Dust abatement** refers to the process of stopping the creation of excess soil dust, a pollutant that contributes to excess levels of particulate matter. The issue is greatly reduced by using dust abatement materials applied to the surface, sometimes mixed in with the surface material to create a harder driving surface with less dust as the molecules from the applied agents hold the materials together.

Repair Level	Measurement: PM10 / Air Quality Index
State of repair	0 - 50 = Good
4	51 - 100 = Satisfactory
3	101 - 250 = Moderately Polluted
2	251 - 350 = Polluted
1	350 - 430 = Very Poor



Deficiency: Base Fail / Soft Spots

Description: **Base Fail / Soft Spots** are when the aggregate used to build a road are broken down from water intrusion, stress from heavy vehicles, expansion and contraction from seasonal temperature changes, etc...

Repair Level	Measurement: L x W x D = X cm's
State of repair	X = < 5 cm's
4	X = 5 - 10 cm's
3	X = 11 - 15 cm's
2	X = 16 - 20 cm's
1	X = 21 - 25 cm's

Deficiency: Road Edge Deteriorating

Description: Most **road edge deteriorating** causes are from improper water drainage in the ditches, ditches fill with water, flowing over the road edge and across the roads, sometimes just sitting there along the edge of the gravel road soaking into the base and road edge making them soft and dangerous for vehicles travelling down the roads getting to close to the road edge. Proper water flow comes from the crown of the road and flows over the edge in the the ditch and them follows the properly maintained ditch network to the proper drainage sites.

Repair Level	Measurement: L x W = X
State of repair	X = < 5M
4	X = 5 - 10M
3	X = 11 - 15M
2	X = 16 - 20M
1	X = 21 - 30M

### Appendix 2

#### Summary of Current Program Resources

*<Identify the internal resources currently available to delivery the program by the four categories of labour, equipment, material, and other>*

Labour : *Hand crews ( Flagging / Labourer ), Speciality Hand crews.*

Equipment : *Grader, Tandem - 3-5 Tonne, Flusher, 2 - 10T Roller, Gradall, Vacuum Truck.*

Material : *63mm, 25mm Gravel, 20mm Gravel, 20mm Oil mix, 10mm Oil mix.*

Other: *Hired contractors, Gradall, Vacuum Truck, 10 Tonne Roller.*

## **Appendix 5**

### **CT & Associates Supplementary Geotechnical Review**



**GEOTECHNICAL CONSULTING AND  
ROADWAY ASSESSMENT**

**LEDUC ANNEX ROADS - EAST**

**SELECT ROADWAYS FROM 91<sup>st</sup> STREET SW TO  
MERIDIAN STREET AND 41<sup>st</sup> AVENUE SW TO  
TOWNSHIP ROAD 510, EDMONTON, ALBERTA**

Prepared for

**CITY OF EDMONTON c/o  
IBI GROUP INC.**

**AUGUST 2020**

**CTA File No. 02-3043**



## **GEOTECHNICAL CONSULTING AND ROADWAY ASSESSMENT**

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Prepared for

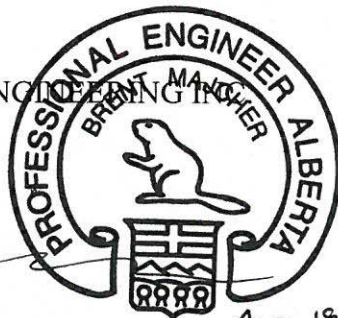
**CITY OF EDMONTON c/o  
IBI GROUP INC.**

AUGUST 2020

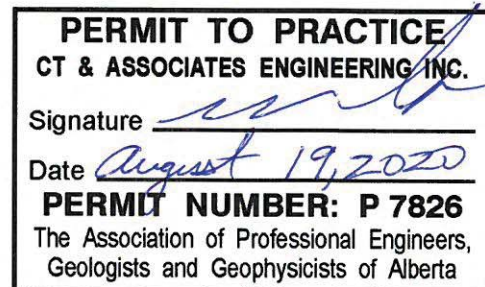
CTA File No. 02-3043

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## **APPENDICES**

Appendix A	Drawing
Appendix B	Roadway Inspection Reports (45 pages)



## 1.0 INTRODUCTION

This report presents the results of a Geotechnical Consulting program conducted by CT & Associates Engineering Inc. for the 'Leduc Annex Roads' in south Edmonton, Alberta. The study area is as presented on the attached Drawing No. A-1, in Appendix A.

Authorization to proceed with the consulting was given by Colin Roy, P.Eng., of IBI Group on July 10, 2020.

The project objective was to provide third-party review and engineering opinion with regards to the City of Edmonton maintenance procedures and protocols, the existing roadway conditions, and to provide recommendations for improvement and long term planning to the overall management framework for the 'Leduc Annex' roadway system.

## 2.0 PROJECT SCOPE

The project study included the following work methodology:

- 1) Conduct a general site reconnaissance of the entire east annex roadway system, with cursory review of the west annex roads, traveled vehicularly with observations made via photography, tagging with select GPS locations, and visual assessment.

Observations included descriptors of failure types, overall roadway condition, and overall ride quality. Where applicable, assessment of subgrade failure or pavement/ roadway failure from a geotechnical standpoint was noted.

It should be noted that every instance of failure or the exact degree of severity was not necessarily noted due to the level of the study;

- 2) Conduct 'spot-check' type inspections during site work to determine if the repair methodology and workmanship of current maintenance activities is to a satisfactory standard;
- 3) Review of available City of Edmonton (CoE) Maintenance Documentation to provide engineering opinion and commentary as it relates to the positive contribution of the roadway(s) performance over the short and long term;
- 4) Collaboration and review of IBI Group deficiency documentation to aid in engineering analysis and to provide further consideration to the overall suitability of the current remedial measures and the CoE maintenance program;
- 5) Bi-weekly (twice) meeting/ project updates until project completion to discuss findings and encourage collaboration on the project between the different team members;
- 6) Preparation of a comprehensive engineering document to provide the following:
  1. General site information, including a comprehensive site plan;
  2. Summary commentary of the City of Edmonton maintenance practices;
  3. Summary commentary of the extent of deficiencies recorded by IBI Group to date;
  4. For each roadway section, CTA roadway assessment, including:
    - Pavement/ roadway failure types;
    - General roadway ride quality;
    - Areas with roadway deterioration requiring immediate action;
    - Workmanship commentary where 'spot-checks' were conducted to evaluate repair standards; and



- Evaluation of the pavement and roadway quality for ongoing evaluation on pavement conditions so that similar study in the future could identify areas of rapidly worsening condition.
5. Summary recommendations, including:
- Suitability of the current City of Edmonton maintenance program;
  - Possible remedial alternatives to the current program to help reduce City of Edmonton long-term maintenance costs; and
  - Recommendations for long-term study and or ‘next-steps’ to further develop an effective maintenance program for the ‘Leduc Annex Roads’.

It should be noted that this report was provided in followup to a summary document delivered on August 14, 2020 titled:

“Geotechnical Consulting - Project Summary

Leduc Annex Roads - Edmonton, Alberta”

by CT & Associates Engineering Inc. dated August 14, 2020

No changes to the findings or conclusions of the above document were noted in preparation of this report.

### **3.0 SITE CONDITIONS**

In January 2019, the City of Edmonton annexed a total of 69 kilometers of road asset from Leduc County. These roads range from basic gravel roadway structures, cold-mix asphalt (in-situ asphalt) or ‘oiled’ surfacing, to hot-mix asphalt (HMA) surfacing.

Detailed condition, structures, and construction processes for these roads was either non-available or was not reviewed as a part of this study.

The roadway system is made up of two areas, a west and an east annex, subdivided by the Queen Elizabeth II highway (QEII), south of Edmonton 41<sup>st</sup> Avenue SW and extending south to Township Road 510. The roads are also enveloped by the North Saskatchewan River to the west and Meridian Street on the far east.

Within this study, only the eastern annex area was studied in detail, with a detailed site plan attached in Appendix A.

The roadways during the initial acquisition period (2019 season) were understood to be in an unacceptable condition. For example, subgrade was becoming exposed with secondary ditch formation resulting in impassable sections of roadway. Other challenges for the city included the heavy precipitation season that accelerated the deterioration throughout the 2019 season and the substantial political pressure to improve the roadway condition promptly.

Engineering Services (CoE) and Leduc County have all been involved with consulting on these roadways to some extent, with provision of a roadway ‘pavement’ structure by one of the parties as follows:

- Existing [subgrade] organic base;
- 63 mm ‘crush’ for structure;
- 20 mm aggregate cap;
- 4 % crown; and
- Calcium Stabilization.

Where the above structure has been utilized, as well as thickness design, is unknown at this time.

## **4.0 ROADWAY ASSESSMENT**

In total, CT & Associates Engineering (CTA) inspected approximately 25.0 kilometers of roadway via the ‘rapid observational method’ proposed in the methodology laid out in Section 2.0 and 4.1 of this report, with the condition of the 18 kilometers formally reported herein. The results of these inspections can be reviewed in detail in Appendix B, Roadway Inspection Reports.

The roadways inspected were a combination of typical rural gravel roadways, and ‘oiled’ or in-situ asphalt/ cold mix asphalt surfacing. The bulk of the field inspections conducted were within the ‘east annex’ area as directed by IBI Group, and reflect the roadways indicated on the “Leduc County - East Annexation Work Plan” prepared by the City of Edmonton.

In the attached Appendix A, CTA has prepared a detailed site plan presenting the areas that were inspected in detail, with respective detailed summary reports and site photographs presented in Appendix B.

### **4.1 METHODOLOGY**

For the study, each section of roadway was classified using CTAs typical roadway assessment procedure, where pavement deficiencies, severity, and type are recorded via site walkthrough or drive. Ride quality at a reasonable speed (40 to 50 kilometers per hour) is assessed by the inspector based on their own experience, as is the weather.

Roadway use and traffic volume are not measured per se, but deduced based on the apparent roadway traffic observed while on-site, and other knowledge the inspector had about the area. All parameters are recorded on a formal roadway inspection report.

With the tangible observations that are made, the reports are also supplemented with photos taken in areas of representative roadway condition or in areas of notable deficiency. Approximate area/ location is noted on the photos, however, some variances in the accuracy of the locations are inherent with the inspection procedure.

Post-inspection, the roadway has a “pavement condition” assigned which is considered subject to bias, based on inspector experience, and with consideration and comparison to other roadways in the area.

## **4.2 FINDINGS**

Detailed recommendations for all roadways inspected are included in the attached “Roadway Inspection Reports” in Appendix B. Considerations are given for both short and long term pavement solutions.

Further, more detailed, pavement/ roadway assessment studies may be beneficial to highlight in greater detail, areas with pavement distress, in particular along the roadways over the west annex (not inspected in detail with the foregoing study). Conditions for the respective roadways are presented below:

- |    |   |   |              |
|----|---|---|--------------|
| 1. | 41 <sup>st</sup> Ave (50 <sup>th</sup> Street to Meridian Street) | - | Poor to Fair |
| 2. | 50 <sup>th</sup> Street Service Road                              | - | Fair         |
| 3. | Range Road 234 (Township Road 510 to 41 Ave)                      | - | Poor to Fair |
| 4. | Range Road 235 (Township Road 510 to 41 Ave)                      | - | Fair         |
| 5. | Range Road 240 (Township Road 510 to 41 Ave)                      | - | Fair         |
| 6. | Range Road 242 (Township Road 510 to 511)                         | - | Fair         |
| 7. | Range Road 242 A/ Township Road 511A                              | - | Poor to Fair |



#### **4.2.1 General Condition of Gravel Roadways**

The condition of the gravel roadways were generally found to be as follows:

- Over the east annex roads (and the west annex based on cursory review), the condition of the gravel surfacing is generally intact and has a fair ride quality as typical of a gravel roadway;
- Ongoing maintenance in line with general industry best practices was observed by senior CTA field staff;
- Some slight rutting or channeling was noted, not impacting the ride quality drastically;
- Some slight to moderate corrugations or washboarding was noted, in particular as approaching locations of intersections;
- The roadway crown was generally sufficient, however the roadway would often benefit from general reshaping, or increasing the roadway crown and corresponding roadway cross-fall;
- In some areas, the roadway shoulder is too high to allow for proper drainage to the adjacent ditch;
- Potholes were noted in areas, however, it is expected that such deficiencies are in higher frequency over the west annex based on our limited review and comparison of the two annexes;
- No impacts were noted regarding excess dust, however with the weather on record (heavy rains), this would be anticipated; and
- Vegetation adjacent the roadway shoulder is overgrown in some areas.

#### **4.2.2 General Condition of Oiled Roadways**

The condition of the 'oiled' or in-situ asphalt/ cold mix surfacing was generally found to be as follows:

- Over the east annex roads, the condition of the cold mix asphalt surfacing is variable, with sections of roadway in complete failure conditions, and with other sections completely intact;
- Ongoing maintenance in these areas was not observed during CTA field work;
- Slight to severe pavement distress types were all observed, including rutting or channeling, corrugations or wash-boarding, alligator cracking, high shoulders, inadequate roadway crown, potholes, complete pavement failure, loose chips, miscellaneous distresses, and rough ride quality;
- Observations were made with regards to interpreted subgrade condition, pavement condition, and overall suitability of the roadway surfacing for the present use;
- CTA conducted crude field “proof-roll” procedure for select sections of the oiled roadway pavement areas and observed a minor deflection under a light weight (relatively) pickup truck vehicle. Subgrade failure is therefore apparent over many sections of the oiled roadway areas (41<sup>st</sup> Ave in particular);
- Immediate hazards that should be addressed in the short term are noted within Section 3.3.

#### **4.3 IMMEDIATE ACTION AREAS**

CTA has noted various pavement/ roadway deficiencies which should have maintenance conducted in the immediate short term, as the level and type of pavement distress may be hazardous to vehicle traffic using the roadway system. All immediate action areas are within the oiled roadway sections. The gravel roadway sections are regarded to not pose such immediate maintenance requirements.

The following Table 1 presents the roadway section and pavement distress that requires attention, with a proposed repair methodology:

**TABLE 1**  
**PAVEMENT AREAS FOR IMMEDIATE REPAIR**

Roadway	Pavement Distress	Proposed Repair
Township 511A & Range Road 242A	- severe potholes requiring patching; - moderate rutting requiring leveling;	Patch potholes with cold mix or resurface deficient pavement sections
41 <sup>st</sup> Avenue SW (50 Street to Meridian)	- severe potholes requiring patching; - loose chips on the roadway surface;	Patch potholes with cold mix and sweep loose chips
Meridian Street or Range Road 234	- severe potholes requiring patching; - moderate rutting requiring leveling; - loose chips on the roadway surface;	Patch potholes with cold mix or resurface deficient pavement sections, and sweep loose chips

## 5.0 CITY OF EDMONTON DOCUMENTATION REVIEW

As a part of the study, CTA has reviewed the current City of Edmonton maintenance procedures and documentation, entitled:

“City of Edmonton - Parks and Roads Service

Asset Maintenance Plan - Oiled and Gravel Roads Maintenance”

by the CoE Parks and Roads Service, understood was implemented in 2019.

It is the opinion of CTA that the above document and content therein is in line with current industry best practices and is a suitable maintenance plan for the ‘Leduc Annex’ roadway system.

Clear direction is given in the maintenance plan that is consistent with generally accepted literature for the rural roadway maintenance (Alberta Transportation, AASHTO, US DOT) and CTA construction experience.

The maintenance plan would benefit from a clear definition and directive regarding the identification of roadways where maintenance is becoming uneconomical based on the roadways long term behavior and needs (i.e. auditing of associated maintenance costs, subsurface information studies, traffic studies, and life cycle cost assessments), however, this may be part of the larger CoE management framework.

## **6.0 MAINTENANCE PRACTICES AND RECOMMENDATIONS**

As part of the study was to include commentary regarding the City maintenance crews practices and workmanship based on ‘spot-check’ type inspections during site visits.

CTA only conducted one such visit, witnessing blading conducted by grader to re-level the gravel roadway surfacing on Range Road 235. CTA did not witness anything that would constitute bad construction practice while on-site.

There would, likely be advantages to implementing the following additional practices to the City maintenance program to increase road crew effectiveness:

- ▶ For partial roadway repairs where re-blading, building the crown higher with additional material, or regrading is insufficient for the roadway needs (in select areas of deterioration), reconstruction should be conducted with the following structure:
  - Existing subgrade soils nominally re-compacted, under;
  - Woven geotextile (Nilex 2006 or equivalent), under;
  - Minimum thickness of gravel of 250 mm or 10 inches.
- ▶ Field inspectors should be trained to identify roadways with insufficient crown or a “parabolic crown”. Roadways with a large width of neutral crossfall in the roadway centre are prone to softening subgrade and gravel surfacing



deterioration. Preserving a linear crossfall from the roadway centre line to the roadway shoulder will improve gravel roadway performance;

- ▶ Ensuring that high quality gravel is purchased (CoE 3-20) and used for roadway repairs and maintenance will improve the performance of the gravel roadways;
- ▶ Increasing the aggregate size (3-40) may also improve the performance of the gravel roadway sections;
- ▶ ‘High shoulders’ creating inadequate drainage condition is frequent in the areas inspected by CTA staff, suggesting roadway crews should identify and reshape the roadway surfacing more diligently, since high roadway shoulders can contribute to further roadway deterioration;
- ▶ Maintenance crews should be trained to conduct “pulling the shoulder” re-blading of gravel or oiled roadway resurfacing to salvage and avoid losing good material to the roadway ditch during reshaping/ blading procedures. This procedure is conducted by tilting the blade to the roadway centre line, rather than to the roadway shoulder; and
- ▶ Mowing the vegetation adjacent to the gravel/ oiled roadways prior to the winter may improve the performance of the roadway surfacing (in particular the oiled roadway) since snow will not build up as readily on the roadway surface, reducing the frequency of snow removal or blading to remove snow, as well as improving drainage and removing moisture from the roadway surface.

## **7.0 IBI GROUP DOCUMENTATION REVIEW**

As a part of the study, CTA has also conducted a thorough documentation review of the following group of documents:

“Leduc Road Annex - East - Formal Inspections, as follows:

1. 50 Street Service Road;
2. 41 Ave SW - 50 st to 34 st;
3. 41 Ave SW - 34 st to 17 st;
4. 41 AVE SW - 17 ST to MERIDIAN ST;
5. RR 235 (17 ST) - 41 AVE SW TO TWP RD 510;
6. RR 240 (34 ST) - Twp RD 510 to 41 Ave SW;
7. RR 242A - East of RR 243;
8. RR 242 North of TWP RD 510;”

by IBI Group, July 16 and 21, 2020.

The documentation consisted of thorough identification on the roadway deficiencies requiring correction, with pavement description given via visual inspection.

CTA has reviewed the ‘deficiency reporting’ and concludes that, generally, CTA and IBI Group concur on the general roadway condition, as well as the different aspects which require attention.

The only deviation noted, was the interpreted condition on 41<sup>st</sup> Avenue (from 50<sup>th</sup> Street to Meridian), where CTA had specifically identified pavement “failure” condition based on the severity of alligator cracking and crude “proof-rolling” procedure conducted with light weight pickup truck. Obvious deflection could be observed in various areas, highlighting this subgrade failure condition.

Notwithstanding, the differences noted with respect to deficiencies is inconsequential, because the conclusion that the pavement remains suitable in the short term is made by both parties.

## **8.0 RECOMMENDATIONS**

In the immediate future, CTA is in agreement with the CoE Asset Maintenance Plan. The plan is in accordance with current industry best practices, with consideration to include for the recommendations in Section 6.0 to improve the program.

Long term considerations for these roadways lies between the two extremities of ongoing maintenance or complete pavement reconstruction via ‘full-depth reclamation’ (FDR) and or new hot-mix asphalt surfacing. Continuing to overlay with additional ‘cold-mix’ surfacing may also be an option, however, this option is discouraged in areas of extensive alligator cracking.

41<sup>st</sup> Avenue SW and Meridian Street from 41<sup>st</sup> Ave to Township Road 510 are both strong candidates for upgrading with hard surfacing within the east annex.

Within the west annex, Township Road 510 is also a strong candidate for upgrading with hard surfacing (worse condition than 41<sup>st</sup> Ave in the east annex), although this roadway should be reviewed and reassessed prior to initiating any capital upgrades on the roadway, since the west annex was not studied to the degree of detail as the east annex as a part of this study.

### **8.1 GEOTECHNICAL STUDIES**

In order to construct a viable new hard surfacing (via FDR or HMA), it is required that further geotechnical studies be initiated that can include (or be a combination of):

- Geotechnical subsurface studies (test holes with SPT soundings in unfrozen condition) to determine the ground conditions and groundwater levels; and/ or

- ‘Falling Weight Deflectometer’ testing to determine the structural number and pavement subgrade condition.

The uncertainty right now for these roads lies in the fact that there is little to no geotechnical subsurface information available for the subgrade conditions. Hot-mix asphalt surfacing is selected, usually, because its return-on-investment is greater than a gravel roadway, in addition to other benefits like improved ride quality and very low maintenance costs. Subsurface information is key in making such a decision with ‘permanent’ capital improvements like hard surfacing.

Lack of a sufficient gravel base underneath cold-mix asphalt or substantial organic deposits for example may prohibit the construction or impact the long-term performance of a conventional hot-mix asphalt surfacing, unless there is a good degree of tolerance for risk.

Organic material for example will present long term settlement issues for any hard surfacing (as will the materials inherent compressibility).

## **8.2 TRIAL REPAIR SECTIONS**

Constructing test sections of various different “remedial” options to research their effectiveness within the sites current condition is worth considering as a pilot study in lieu of geotechnical drilling or testing.

For example, complete pavement reconstruction could be implemented with removal of unsuitable subgrade materials, gravel base construction, and hot-mix asphalt surfacing in one section. Nearby, an alternative section could be constructed with pulverizing the existing surfacing and subgrade with stabilization using a heavy percentage of cement and accompanying overlay with asphalt (with or without underlying gravel base).



Monitoring over the period of a year or two could evaluate the effectiveness versus the cost, with comparison to roadways under perpetual maintenance.

The effectiveness of this type of study is limited, since the ground conditions are likely highly variable. Good performance on a test section may not be applicable in areas even in the immediate vicinity if conditions change in the subgrade. These test sections should ideally be constructed in the areas of intersections, since the pavement is subject to high traffic loading (braking and accelerating) and will likely exhibit failure before other areas of roadway.

### **8.3 CIVIL IMPROVEMENT STUDIES**

Future development (subdivisions) will also continue to progress to the southern extents of the city, and therefore it may be more affordable to continue maintaining the roadway system in the same fashion as current.

In order to determine if upgrading the annex roadway system is economically viable, there should be some consideration given towards conducting traffic assessments or area 'planning' type studies to determine which roadways could use upgrading to permanent hard surfacing considering current and long-term planning needs.

Drainage improvement studies are also of interest with the consideration of any capital improvements (new roadway construction), since keeping the roadway subgrade from becoming saturated by water is key in preserving pavement condition.

## **8.4 LIFE-CYCLE COST ANALYSIS**

Other long term considerations can also be given towards conducting life-cycle cost analysis in tandem with the above studies (in whole or in part) to compare the economic impacts of the two extremities (new pavement vs maintenance). If a typical pavement design life cost is compared to the current maintenance expenditures by the CoE roadway group, then direction can be given to move the roadway maintenance program in the appropriate direction.

## **9.0 CLOSURE**

This report has been prepared in accordance with generally accepted geotechnical practices and procedures.

Conditions identified during the field work, and thereby recommendations presented within this report are considered to be reasonably representative of the site. If however, conditions other than those presented are identified during any subsequent work on the subject property, CT & Associates Engineering Inc. should be notified and given an opportunity to review or modify our recommendations in light of new findings.

## **10.0 QUALIFICATIONS OF ASSESSORS**

### **10.1 FIRM QUALIFICATIONS**

CT & Associates Engineering Inc. (CTA) is a professional engineering firm specializing in geotechnical engineering, environmental site assessments, and materials testing (CSA-certified). CT & Associates Engineering Inc. is a 100% Alberta-owned firm dedicated to advancing engineering and construction throughout the province.

Our firm and personnel have significant geotechnical engineering and materials testing experience in and around the Edmonton area, having completed many projects for various organizations such as government (City of Edmonton, Alberta Infrastructure, and engineering firms as our primary clients).

Of particular note, CT & Associates has significant experience with roadway construction, ranging from small pavement areas such as parking lots, to long stretches of rural highways.

### **10.2 KEY STAFF**

**Senior Project Engineer**     **Danny Niawchuk, P. Eng.**

Mr. Niawchuk is a Senior Geotechnical Project Engineer who was responsible for overall project coordination, engineering evaluation and report review.

He has over 20 years of engineering experience with roadway construction, including subdivision, rural roadway, and commercial development, forensic investigations, and site construction inspection/supervision.



**Project Engineer**

**Brent Majcher, P.Eng.**

Mr. Majcher was the Project Engineer who was responsible for conducting the field work and consulting for the project, including field reconnaissance, 'spot-check' type inspections on the CoE maintenance crews, and all other project requirements.

Mr Majcher has significant engineering experience with roadway construction and subdivision development, including providing engineering recommendations for construction of suitable pavement structures for different types of roadway construction (rural, residential, highway, heavy duty pavements).

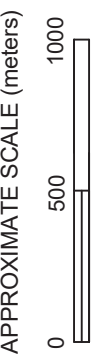
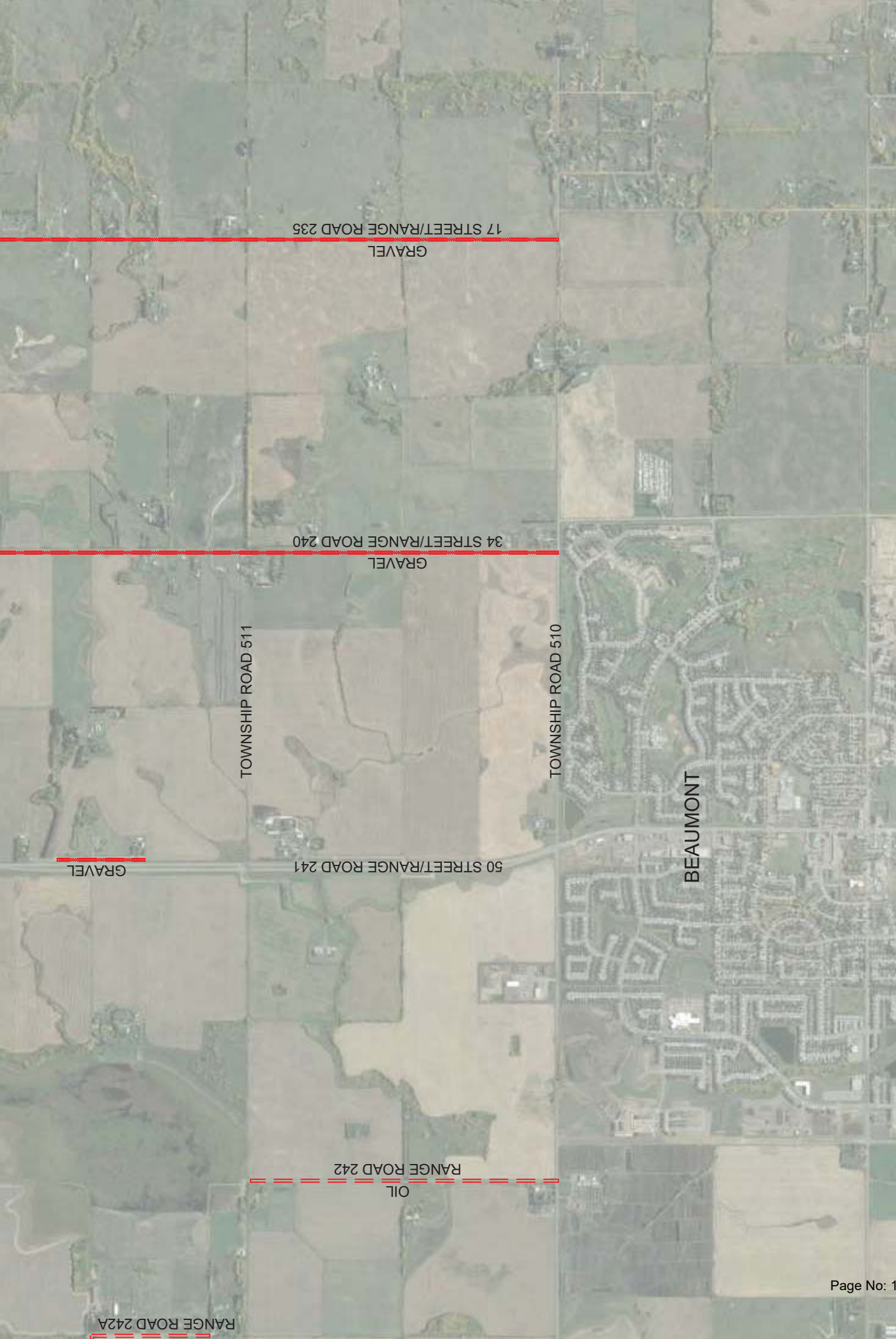
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## **APPENDIX A**

### **DRAWING**





## **APPENDIX B**

### **ROADWAY INSPECTION REPORTS**

## 1.0 ROADWAY INSPECTION REPORT

<b>PROJECT INFORMATION</b>	<b>Project Name:</b>	Leduc Annex Roads – Geotechnical Consulting
	<b>CTA Project No.:</b>	02-3043
	<b>Roadway Location:</b>	<b>41<sup>st</sup> Avenue SW from 17<sup>th</sup> Street SW to Meridian Street</b>
	<b>Inspector:</b>	Brent Majcher, P.Eng.
	<b>Date:</b>	July 15, 2020
	<b>Weather:</b>	Light Rain, Overcast
	<b>Roadway Dimensions:</b>	Approximately 1.6 kilometres long, 7.1 metres wide
	<b>Roadway Surfacing:</b>	In-situ Asphalt or “Oiled”

<b>INSPECTION RESULTS</b>	<b>Methodology:</b>	Visual, Rapid Photography, ‘Riding Quality’ by judgement
	<b>Direction of Travel:</b>	West to East
	<b>Ride Quality (at 40 km/h):</b>	Fair
	<b>Roadway Use:</b>	Rural - Residential
	<b>Traffic Volume:</b>	Moderate (uncertain)
	<b>Equipment Used:</b>	Crew Cab Ford F-350 Pickup Truck, Camera
	<b>Assessment Standard:</b>	N/A
	<b>Pavement Condition:</b>	Poor
	<b>Recommendations:</b>	<p>Studies should be initiated to determine if traffic volume (present and future) would benefit from new roadway construction with HMA (Hot-Mix Asphalt) to COE Standards or FDR (Full-Depth Reclamation). Maintenance roadway resurfacing as described in the full report may be considered. In the interim, <b>spot-repairs are sufficient</b> considering the overall roadway quality.</p> <p>Potholes along the roadway should be immediately patched. Several stretches of roadway have a “high shoulder” and thus should have the roadway shoulder bladed or reshaped to allow for drainage to the roadway ditch. Mowing all grass along the roadway shoulder prior to winter time will also assist with improving drainage from the roadway.</p>



## **2.0 ROADWAY OVERVIEW – 41<sup>st</sup> AVE SW (17 ST – MERIDIAN STREET):**

Pavement is generally in poor condition, with the majority of the road exhibiting alligator cracking (indicative of large-scale subgrade failure). The roadway surface examined (1.6 km) is in-situ asphalt, with some asphalt surface repairs. It is unknown based on the scope of the present study, what the roadway traffic volume is like.

Various types of pavement deterioration have been observed, ranging from slight to severe, all highlighted in the Pavement Distresses section below.

It is likely that the subgrade conditions of 41<sup>st</sup> Ave from 17<sup>th</sup> Street to Meridian Street may be worse (to some extent) than the sections of 41<sup>st</sup> Avenue SW from 50<sup>th</sup> Street to 17<sup>th</sup> Street, based on the notably higher frequency of alligator cracking observed, through traffic volumes are another factor. Drainage conditions were not drastically different, and therefore it is possible that heavy organic deposits may be encountered below the pavement structure.

Ride quality is generally fair, in spite of the pavement condition, with some localized rough sections.

Considering the above factors (low pavement distress density, the roadway length, and the anticipated traffic volume) , it is currently recommended that spot-repairs be conducted in areas of pavement distresses (i.e. filling of potholes and blading high shoulder areas), with more comprehensive fixes such as full-depth reclamation or pavement reconstruction to be considered over the long term.




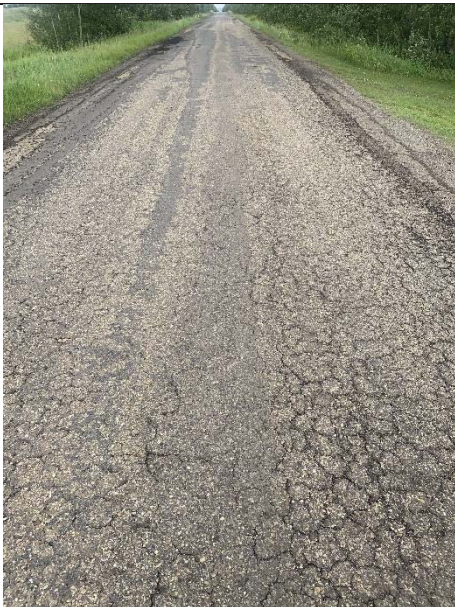
It is also recommended that a traffic study (to determine the exact traffic volume the roadway services and will eventually service) and a follow-up roadway inspection at a later date be conducted to determine how the roadway is evolving (how quickly pavement distresses are developing). Such studies would allow for more insight with regards to economic feasibility of constructing an FDR or HMA pavement/ surfacing.

## **3.0 PAVEMENT DISTRESSES (SEVERITY – SLIGHT, MODERATE, SEVERE):**

1. Potholes (slight);
2. Rutting (slight);
3. Corrugations/ Wash-boarding (slight);
4. Alligator Cracking (slight to severe), high frequency of alligator cracked areas (>20%);
5. Asphalt Repairs/ Patching in poor condition;
6. Roadway Crown sub-optimal in some areas; and

\*Severe pavement distresses are of low density (~10% of the roadway area).

## 4.0 SITE PHOTOGRAPHY:

	
<p>1. In-situ asphalt (oiled) roadway surfacing. Slight to moderate alligator cracking, slight rutting, lack of a roadway crown. Slight washboarding. Approximately 10 metres east of 17<sup>th</sup> Street.</p>	<p>2. In-situ asphalt (oiled) roadway surfacing. Slight alligator cracking, depressions, ponding, slight channeling or rutting. Approximately 25 metres east of 17<sup>th</sup> Street.</p>
	
<p>3. In-situ asphalt (oiled) roadway surfacing. Slight longitudinal cracking, slight to moderate alligator cracking. Ride quality is fair, pavement structure holding up in spite of apparent subgrade failure. Approximately 175 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>	<p>4. In-situ asphalt (oiled) roadway surfacing. Moderate alligator cracking over the entirety of the pavement areas. Roadway crown and ride quality preserved. Repairs present from prior rutting. Approximately 375 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>




	
<p>5. In-situ asphalt (oiled) roadway. Repaired areas exhibiting further subgrade failure. Slight rutting, moderate alligator cracking. Rough ride quality. Approximately 450 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>	<p>6. In-situ asphalt (oiled) roadway. Slight to moderate alligator cracking (high density), rutting repaired via leveling course. Ride quality and crown preserved. Approximately 575 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>
	
<p>7. In-situ asphalt (oiled) roadway. Moderate alligator cracking, slight rutting, roadway crown is lacking. Fair ride quality. Subgrade deflection visible under pickup truck weight. Approximately 675 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>	<p>8. In-situ asphalt (oiled) roadway surfacing. Slight to moderate alligator cracking. Fair ride quality. Approximately 800 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>



	
<p>9. In-situ asphalt (oiled) roadway surfacing. Severe alligator cracking (entire roadway), slight rutting, roadway crown lacking, ponding water, some potholes. Fair ride quality. Approximately 950 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>	<p>10. In-situ asphalt (oiled) roadway surfacing. Slight alligator cracking. Slight pothole formation. Fair ride quality. Approximately 1,050 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>
	
<p>11. In-situ asphalt roadway surfacing. Slight alligator cracking, slight rutting, defective subgrade under a pickup truck, rough ride quality. Approximately 1,200 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>	<p>12. In-situ asphalt (oiled) roadway surfacing. Slight to severe alligator cracking (worse on south side), slight rutting. Approximately 1,350 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>



	
<p>13. In-situ asphalt (oiled) roadway surfacing. Severe alligator cracking (worse on south side) slight rutting. Indicative of subgrade failure. Approximately 1,500 metres east of 17<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>	<p>14. In-situ asphalt (oiled) roadways surfacing. Slight rutting, moderate alligator cracking, roadway crown lacking. Nearby intersection requires traffic braking and further deterioration expected rapidly. Approximately 15 metres west of Meridian Street and 41 Ave SW intersection.</p>

## 1.0 ROADWAY INSPECTION REPORT

<b>PROJECT INFORMATION</b>	<b>Project Name:</b>	Leduc Annex Roads – Geotechnical Consulting
	<b>CTA Project No.:</b>	02-3043
	<b>Roadway Location:</b>	41 <sup>st</sup> Avenue SW from 34 <sup>th</sup> Street to 17 <sup>th</sup> Street SW
	<b>Inspector:</b>	Brent Majcher, P.Eng.
	<b>Date:</b>	July 15, 2020
	<b>Weather:</b>	Light Rain, Overcast
	<b>Roadway Dimensions:</b>	Approximately 1.6 kilometres long, 7.1 metres wide
	<b>Roadway Surfacing:</b>	In-situ Asphalt or “Oiled”

<b>INSPECTION RESULTS</b>	<b>Methodology:</b>	Visual, Rapid Photography, ‘Riding Quality’ by judgement
	<b>Direction of Travel:</b>	West to East
	<b>Ride Quality (at 40 km/h):</b>	Fair
	<b>Roadway Use:</b>	Rural - Residential
	<b>Traffic Volume:</b>	Moderate (uncertain)
	<b>Equipment Used:</b>	Crew Cab Ford F-350 Pickup Truck, Camera
	<b>Assessment Standard:</b>	N/A
	<b>Pavement Condition:</b>	Poor to Fair
	<b>Recommendations:</b>	<p>Studies should be initiated to determine if traffic volume (present and future) would benefit from new roadway construction with HMA (Hot-Mix Asphalt) to COE Standards or FDR (Full-Depth Reclamation). Maintenance roadway resurfacing as described in the full report may be considered, in particular at the location of Site Photo No. 3. In the interim, <b>spot-repairs are sufficient</b> considering the overall roadway quality.</p> <p>Potholes along the stretch of roadway should be immediately patched. Several stretches of roadway have a “high shoulder” and thus should have the roadway shoulder bladed or reshaped to allow for drainage to the roadway ditch. Mowing all grass along the roadway shoulder prior to winter time will also assist with improving drainage from the roadway.</p>

## **2.0 ROADWAY OVERVIEW – 41<sup>st</sup> AVE SW (34 ST – 17 ST):**

Pavement is generally in poor to fair condition, many areas of slight to severe alligator cracking were noted. The roadway surface examined (1.6 km) is in-situ asphalt, with some asphalt surface repairs. It is unknown, based on the scope of the present study, what the roadway traffic volume is like.

Various types of pavement deterioration have been observed, ranging from slight to severe, all highlighted in the Pavement Distresses section below.

The severe pavement distress density is low, approximately 0 to 10% of the roadway surfacing, with the majority of the roadway maintaining a fair ride quality, presenting no immediate hazards to the roadway users. It is noted however, that there is a large portion of pavement areas exhibiting alligator cracking (indicative of subgrade failure).

Considering the above factors (low severe pavement distress density, the roadway length, and the anticipated traffic volume) , it is recommended that spot-repairs be conducted in areas of pavement distresses (i.e. filling of potholes and blading high shoulder areas), with more comprehensive fixes such as full-depth reclamation or pavement reconstruction to be considered over the long term.

It is also recommended that a traffic study (to determine the exact traffic volume the roadway services and will eventually service) and a follow-up roadway inspection at a later date be conducted to determine how the roadway is evolving (how quickly pavement distresses are developing). Such studies would allow for more insight with regards to economic feasibility of constructing an FDR or HMA pavement/ surfacing.





## **3.0 PAVEMENT DISTRESSES (SEVERITY – SLIGHT, MODERATE, SEVERE):**

1. Potholes (slight to moderate);
2. Rutting (slight to moderate);
3. Corrugations/ Wash-boarding (slight);
4. Alligator Cracking (slight to severe);
5. Asphalt Repairs/ Patching in poor condition;
6. High Roadway Shoulder;
7. Roadway Crown sub-optimal in some areas; and
8. Ditch Drainage sub-optimal in some areas.
9. Miscellaneous Damage (Photo No. 9)





\*Severe pavement distresses are of low density (0 – 10% of the roadway area).





## 4.0 SITE PHOTOGRAPHY:

	
<p>1. In-situ asphalt (oiled) roadway surfacing. Severe alligator cracking, moderate slippage cracks, moderate rutting, slight wash-boarding. Subgrade failure and inadequate pavement structure. Approximately 20 metres east of 34<sup>th</sup> Street.</p>	<p>2. In-situ asphalt (oiled) roadway surfacing. Roadway crown minimal, moderate potholes, loose chips, slight alligator cracking. Approximately 150 metres east of 34<sup>th</sup> Street and 41<sup>st</sup> Avenue SW intersection.</p>
	
<p>3. In-situ asphalt (oiled) roadway surfacing. Moderate alligator cracking, slight washboarding, slight to moderate potholes, rough ride quality. Some slight rutting/ channeling. Approximately 200 metres east of 34<sup>th</sup> Street and 41<sup>st</sup> Avenue SW intersection.</p>	<p>4. In-situ asphalt (oiled) roadway surfacing. Fair ride quality, many deficiencies such as slight alligator cracking, lack of roadway crown, high shoulder, moderate rutting and potholes. Approximately 325 metres east of 34<sup>th</sup> Street and 41<sup>st</sup> Avenue intersection.</p>



	
<p>5. In-situ asphalt (oiled) roadway. Slight alligator cracking, slight pothole(s), lack of definite roadway crown. High shoulder on north side of roadway. Good ride quality. Approximately 400 metres east of intersection of 34<sup>th</sup> Street and 41<sup>st</sup> Ave SW.</p>	<p>6. In-situ asphalt (oiled) roadway. Slight alligator cracking in initial stages. Roadway is generally in excellent shape. Good drainage condition. Approximately 775 metres east of intersection of 34<sup>th</sup> Street and 41<sup>st</sup> Ave SW.</p>
	
<p>7. In-situ asphalt (oiled) roadway. Slight washboarding, slightly rough ride quality. Road quality is fair to good. Drainage condition maintained. Approximately 1,100 metres east of the intersection of 34<sup>th</sup> Street and 41<sup>st</sup> Ave SW.</p>	<p>8. In-situ asphalt (oiled) roadway surfacing. Slight potholes and slight alligator cracking. High shoulder on north side of roadway. Roadway in fair to good condition. Approximately 1,225 metres east of the intersection of 34<sup>th</sup> Street and 41<sup>st</sup> Ave SW.</p>

	
<p>9. In-situ asphalt (oiled) roadway surfacing. Damage from an unknown source, likely from overweight piece of construction/ farming equipment tracking the roadway. Approximately 1,450 meters east of 34<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>	<p>10. In-situ asphalt (oiled) roadway surfacing. Moderate alligator cracking within the drive paths and slight alligator cracking along roadway centre. Roadway crown lacking. Slight rutting. Approximately 25 metres west of 17<sup>th</sup> Street SW.</p>



## 1.0 ROADWAY INSPECTION REPORT

<b>PROJECT INFORMATION</b>	<b>Project Name:</b>	Leduc Annex Roads – Geotechnical Consulting
	<b>CTA Project No.:</b>	02-3043
	<b>Roadway Location:</b>	41 <sup>st</sup> Avenue SW from 50 <sup>th</sup> Street to 34 <sup>th</sup> Street SW
	<b>Inspector:</b>	Brent Majcher, P.Eng.
	<b>Date:</b>	July 15, 2020
	<b>Weather:</b>	Light Rain, Overcast
	<b>Roadway Dimensions:</b>	Approximately 1.6 kilometres long, 7.2 metres wide
	<b>Roadway Surfacing:</b>	In-situ Asphalt or “Oiled”

<b>INSPECTION RESULTS</b>	<b>Methodology:</b>	Visual, Rapid Photography, ‘Riding Quality’ by judgement
	<b>Direction of Travel:</b>	West to East
	<b>Ride Quality (at 40 km/h):</b>	Fair
	<b>Roadway Use:</b>	Rural - Residential
	<b>Traffic Volume:</b>	Moderate (uncertain)
	<b>Equipment Used:</b>	Crew Cab Ford F-350 Pickup Truck, Camera
	<b>Assessment Standard:</b>	N/A
	<b>Pavement Condition:</b>	Poor to Fair
	<b>Recommendations:</b>	<p>Studies should be initiated to determine if traffic volume (present and future) would benefit from new roadway construction with HMA (Hot-Mix Asphalt) to COE Standards or FDR (Full-Depth Reclamation). Maintenance roadway resurfacing as described in the full report may be considered, in particular at the location of Site Photo(s) No. 4 and 7. In the interim, <b>spot-repairs are sufficient</b> considering the overall roadway quality.</p> <p>Potholes are severe along the stretch of roadway and should be immediately patched. Several stretches of roadway have a “high shoulder” and thus should have the roadway shoulder bladed or reshaped to allow for drainage to the roadway ditch. Mowing all grass along the roadway shoulder prior to winter time will also assist drainage.</p>

## **2.0 ROADWAY OVERVIEW – 41<sup>st</sup> AVE SW (50 ST – 34 ST):**

Pavement is generally in poor to fair condition; some sections have significant deterioration and or complete pavement failure. The roadway surface examined (1.6 km) is in-situ asphalt, with some asphalt surface repairs. It is unknown based on the scope of the present study, what the roadway traffic volume is like.

Various types of pavement deterioration have been observed, ranging from slight to severe, all highlighted in the Pavement Distresses section below.

The severe pavement distress density is low, approximately 0 to 10% of the roadway surfacing, with the majority of the roadway maintaining a fair ride quality, presenting no immediate hazards to the roadway users.

Considering the above factors (low severe pavement distress density, the roadway length, and the anticipated traffic volume) , it is currently recommended that spot-repairs be conducted in areas of pavement distresses (i.e. filling of potholes, blading high shoulder areas, considering resurfacing at the locations shown in Photo(s) No. 4 and 7), with more comprehensive fixes such as full-depth reclamation or pavement reconstruction to be considered over the long term..

It is also recommended that a traffic study (to determine the exact traffic volume the roadway services and will eventually service) and a follow-up roadway inspection at a later date be conducted to determine how the roadway is evolving (how quickly pavement distresses are developing). Such studies would allow for more insight with regards to economic feasibility of constructing an FDR or HMA pavement/ surfacing.





## **3.0 PAVEMENT DISTRESSES (SEVERITY – SLIGHT, MODERATE, SEVERE):**

1. Potholes (slight to moderate);
2. Rutting (slight to moderate);
3. Corrugations/ Wash-boarding (slight to moderate);
4. Alligator Cracking (slight to severe);
5. Asphalt Repairs/ Patching in poor condition;
6. High Roadway Shoulder;
7. Roadway Crown sub-optimal in some areas; and
8. Ditch Drainage sub-optimal in some areas.





\*Severe pavement distresses are of low density (0 - 10% of the roadway area).



#### 4.0 SITE PHOTOGRAPHY:

	
<p>1. In-situ asphalt (oiled) roadway surfacing. Slight channeling forming in south wheel path. Pavement in good condition, high point of roadway. Approximately 25 metres east of 50<sup>th</sup> Street and 41<sup>st</sup> Ave intersection.</p>	<p>2. In-situ asphalt (oiled) roadway surfacing. High shoulders, poor roadway crown. Cracked and ravelled overlay lift, appearing very thin. Slight alligator cracking in pavement areas outside of the overlay area. Approximately 275 metres east of 50<sup>th</sup> Street</p>
	
<p>3. In-situ asphalt (oiled) roadway surfacing. Slight channeling or rutting forming. Slight washboarding and slight potholing. Approximately 550 metres east of 41<sup>st</sup> Ave and 50<sup>th</sup> Street SW intersection.</p>	<p>4. In-situ asphalt surfacing. Several instances of severe alligator cracking, severe potholes, with a severe rut in the roadway centreline. High shoulder and ponding water at the toe of the pavement. Approximately 700 metres east of 50<sup>th</sup> Street.</p>



	
<p>5. In-situ asphalt (oiled) roadway surfacing. Slight slippage cracking, slight rutting, high roadway shoulder(s). Slight alligator cracking forming. Pavement in fair condition. Approximately 800 metres east of 50<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>	<p>6. In-situ asphalt (oiled) roadway surfacing. Roadway ditch drainage condition non-optimal. Slight alligator cracking forming. Pavement in fair condition. Approximately 1,050 metres east of 50<sup>th</sup> Street and 41<sup>st</sup> Ave NW intersection.</p>
	
<p>7. In-situ asphalt (oiled) roadway surfacing. Moderate alligator cracking, moderate channeling/ rutting, destroyed remedial asphalt overlay, lack of a roadway crown, high shoulder(s). Very poor ride quality. Approximately 1,350 metres east of 50<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>	<p>8. In-situ asphalt (oiled) roadway surfacing. Remedial asphalt surfacing in poor condition. Slight to moderate washboarding or channeling, slight to moderate potholes. Poor ride quality. Lack of a roadway crown. Approximately 1,550 metres east of 50<sup>th</sup> Street and 41<sup>st</sup> Ave SW intersection.</p>

## 1.0 ROADWAY INSPECTION REPORT

<b>PROJECT INFORMATION</b>	<b>Project Name:</b>	Leduc Annex Roads – Geotechnical Consulting
	<b>CTA Project No.:</b>	02-3043
	<b>Roadway Location:</b>	<b>50<sup>th</sup> Street, Adjacent Service Road (East Side)</b>
	<b>Inspector:</b>	Brent Majcher, P.Eng.
	<b>Date:</b>	July 17, 2020
	<b>Weather:</b>	Light Rain, Overcast
	<b>Roadway Dimensions:</b>	Approximately 450 metres long, 7.5 metres wide
	<b>Roadway Surfacing:</b>	Gravel

<b>INSPECTION RESULTS</b>	<b>Methodology:</b>	Visual, Rapid Photography, ‘Riding Quality’ by judgement
	<b>Direction of Travel:</b>	South to North
	<b>Ride Quality (at 40 km/h):</b>	Fair
	<b>Roadway Use:</b>	Rural - Residential
	<b>Traffic Volume:</b>	Low
	<b>Equipment Used:</b>	Crew Cab Ford F-350 Pickup Truck, Camera
	<b>Assessment Standard:</b>	N/A
	<b>Pavement Condition:</b>	Fair
	<b>Recommendations:</b>	<p>Increasing the roadway crown would improve the lifespan of the roadway surfacing. The existing roadway crown condition is not critically deficient.</p> <p>Mowing all grass along the roadway shoulder prior to winter time will help prevent snow drifts from becoming trapped on the roadway surface, assisting drainage and reducing impacts from standing water. Snow removal costs may also be reduced as an additional benefit.</p> <p>More comprehensive fixes are not deemed justifiable for the road in question at this time based on the anticipated roadway volume.</p>



## **2.0 ROADWAY OVERVIEW – 50 ST SERVICE ROAD, NORTH OF BEAUMONT:**

Gravel roadway is generally in fair condition. Some wash-boarding and rutting, but typical of a gravel roadway. Currently, it is estimated that the traffic level is low. As such, the roadway was considered as low use, rural.



The roadway is generally free of deficiencies; however, the roadway crown should ideally be increased to reduce any effects from moisture ponding on the roadway surface.

Roadway is maintained in general accordance with best industry practices.




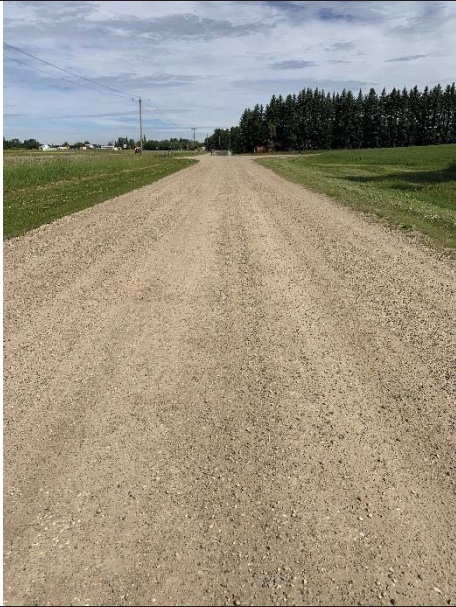
## **3.0 PAVEMENT DISTRESSES (SEVERITY – LOW, MODERATE, SEVERE):**

1. Rutting (slight);
2. Corrugations/ Wash-boarding (none to slight); and
3. Drainage Concerns (minimal roadway crown, moisture remains on roadway following heavy rain).

## **4.0 SITE PHOTOGRAPHY:**

	
<p>1. Gravel roadway surfacing. Roadway fair. Ride quality good. Slight rutting and washboarding. Approximately 250 meters south of service road entrance.</p>	<p>2. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 100 metres south of service road entrance.</p>



	
<p>3. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting and washboarding. Roadway crown could be increased. 10 metres south of service road entrance.</p>	<p>4. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting and washboarding. Roadway crown could be increased. Service road entrance.</p>
	
<p>5. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting and washboarding. Roadway crown could be increased. Approximately 100 metres north of service road entrance.</p>	<p>6. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 150 meters north of service road entrance.</p>

## 1.0 ROADWAY INSPECTION REPORT

<b>PROJECT INFORMATION</b>	<b>Project Name:</b>	Leduc Annex Roads – Geotechnical Consulting
	<b>CTA Project No.:</b>	02-3043
	<b>Roadway Location:</b>	<b>Range Road 234 from Township Road 510 to 41<sup>st</sup> Ave SW</b>
	<b>Inspector:</b>	Brent Majcher, P.Eng.
	<b>Date:</b>	July 16, 2020
	<b>Weather:</b>	Light Rain, Overcast
	<b>Roadway Dimensions:</b>	Approximately 3.2 kilometres long, 6.8 metres wide
	<b>Roadway Surfacing:</b>	In-situ Asphalt or “Oiled”

<b>INSPECTION RESULTS</b>	<b>Methodology:</b>	Visual, Rapid Photography, ‘Riding Quality’ by judgement
	<b>Direction of Travel:</b>	North to South
	<b>Ride Quality (at 50 km/h):</b>	Fair
	<b>Roadway Use:</b>	Rural - Residential
	<b>Traffic Volume:</b>	Low to Moderate (uncertain)
	<b>Equipment Used:</b>	Crew Cab Ford F-350 Pickup Truck, Camera
	<b>Assessment Standard:</b>	N/A
	<b>Pavement Condition:</b>	Poor to Fair
	<b>Recommendations:</b>	<p>Studies should be initiated to determine if traffic volume (present and future) would benefit from new roadway construction with HMA (Hot-Mix Asphalt) to COE Standards or FDR (Full-Depth Reclamation). Maintenance roadway resurfacing as described in the full report may be considered. In the interim, <b>spot-repairs are sufficient</b> considering the overall roadway quality.</p> <p>Potholes along the stretch of roadway should be immediately patched. Several stretches of roadway have a “high shoulder” and thus should have the roadway shoulder bladed or reshaped to allow for drainage to the roadway ditch. Resurfacing in the hazardous areas (including removal of loose chips) is essential.</p>

## **2.0 ROADWAY OVERVIEW – RANGE ROAD 234:**

Pavement is generally in fair condition, with some poor sections that should be looked at immediately.

The area shown in Photo(s) No. 13 and 14 have severe rutting and pavement failure leaving loose chips over the roadway surfacing, in addition to a sharp roadway crown driven by asphalt rutting that a vehicle could encounter while using the roadway. The roadway should be resurfaced in this area and the loose chips removed. Traffic was observed modifying their travel path to avoid the hazards present within the roadway.

The pavement quality worsens from north to south over the roadway. Instances of potholes and corrugations were noted, with the general ride quality fair. The roadway surface is in-situ asphalt or cold-mix asphalt.

Drainage could be improved in select areas, but is not considered a primary concern within the subject roadway. The roadway crown is established with sufficient ditch drainage. Potholes will hold standing water however and should be corrected.

Currently, it is estimated that the traffic level is low. As such, the roadway was considered as low use, rural. Some limited fairly heavy agricultural type equipment likely uses the road.

Considering the above factors (low severe pavement distress density, the roadway length, and the anticipated traffic volume) , it is currently recommended that spot-repairs be conducted in areas of pavement distresses (i.e. filling of potholes and blading high shoulder areas), with more comprehensive fixes such as full-depth reclamation or pavement reconstruction to be considered over the long term.





It is also recommended that a traffic study (to determine the exact traffic volume the roadway services and will eventually service) and a follow-up roadway inspection at a later date be conducted to determine how the roadway is evolving (how quickly pavement distresses are developing). Such studies would allow for more insight with regards to economic feasibility of constructing an FDR or HMA pavement/ surfacing.

## **3.0 PAVEMENT DISTRESSES (SEVERITY – LOW, MODERATE, SEVERE):**



1. Alligator Cracking (slight to severe), high frequency at south end;
2. Potholes (slight to moderate);
3. Rutting (slight to severe), severe in only one area;
4. Corrugations/ Wash-boarding (slight);
5. Longitudinal Cracking (slight);
6. High shoulders;
7. Lack of roadway crown;
8. Loose chips.



#### 4.0 SITE PHOTOGRAPHY:

	
<p>1. In-situ asphalt (oiled) roadway surfacing. Near intersection. Roadway in good condition, good ride quality. Approximately 15 metres south of Range Rd 234/ Meridian and 41<sup>st</sup> Ave SW.</p>	<p>2. In-situ asphalt (oiled) roadway surfacing. Slight alligator cracking visible above surface lift. Slight washboarding. Approximately 50 metres south of 41<sup>st</sup> Ave SW.</p>
	
<p>3. In-situ asphalt (oiled) roadway surfacing. Slight alligator cracking. Ride quality is good. Approximately 200 metres south of 41<sup>st</sup> Avenue.</p>	<p>4. In-situ asphalt (oiled) roadway surfacing. Slight rutting, parabolic crown (ponding water), uncomfortable ride quality. Approximately 570 m south of 41<sup>st</sup> Ave SW.</p>



	
<p>5. Roadway culvert underneath roadway approximately 600 metres south of 41<sup>st</sup> Ave SW. High groundwater table with likely very wet subgrade conditions.</p>	<p>6. In-situ asphalt (oiled) roadway surfacing. Slight to moderate alligator cracking with slight tangential cracking and slight rutting. Approximately 625 metres south of 41<sup>st</sup> Ave SW.</p>
	
<p>7. In-situ asphalt (oiled) roadway surfacing. Slight alligator cracking. Fair ride quality. Ditch drainage suboptimal. Approximately 750 metres south of 41<sup>st</sup> Ave SW.</p>	<p>8. In-situ asphalt (oiled) roadway surfacing. Minimal washboarding/ corrugations. Fair to bumpy ride quality. Location approximately 775 meters south of 41<sup>st</sup> Ave SW.</p>







	
<p>9. In-situ asphalt (oiled) roadway surfacing, with gravel shoulders. Slight rutting and slight to moderate alligator cracking. Slight washboarding/corrugations. Location approximately 1.0 kilometer south of 41<sup>st</sup> Ave.</p>	<p>10. In-situ asphalt (oiled) roadway surfacing. Slight rutting or channelling. Ride quality fair. Slight alligator cracking. Roadway crown lacking. Location approximately 1.2 kilometers south of 41<sup>st</sup> Ave SW.</p>
	
<p>11. In-situ asphalt (oiled) roadway surfacing. Moderate alligator cracking, loose chips, high shoulder on west side, poor ride quality. Approximately 1.3 kilometers south of 41<sup>st</sup> Ave SW.</p>	<p>12. In-situ asphalt (oiled) roadway surfacing. Severe alligator cracking, failure along roadway centreline, moderate to severe potholes, roadway crown lacking. Approximately 1.5 kilometers south of 41<sup>st</sup> Ave SW.</p>



	
<p>13. In-situ asphalt (oiled) roadway surfacing. 15 metres north of Photo No. 12. Large quantity of loose chips hazardous to vehicles and pavement failure at centreline.</p>	<p>14. In-situ asphalt (oiled) roadway surfacing. Moderate to severe alligator cracking, severe rutting, ruts have shoved the asphalt to a sharp crown (hazardous to vehicles). Approximately 1.6 kilometers south of 41<sup>st</sup> Ave.</p>
	
<p>15. In-situ asphalt (oiled) roadway surfacing. Slight to moderate alligator cracking. Slight rutting. Rough ride quality. Approximately 1.8 kilometers south of 41<sup>st</sup> Ave SW.</p>	<p>16. In-situ asphalt (oiled) roadway surfacing. Slight washboarding, fair ride quality, high shoulder on east edge of roadway. Approximately 2.0 kilometers south of 41<sup>st</sup> Ave SW.</p>



	
<p>17. In-situ asphalt (oiled) roadway surfacing. Slight alligator cracking and poor ride quality. Approximately 2.2 kilometers south of 41<sup>st</sup> Ave SW.</p>	<p>18. In-situ asphalt (oiled) roadway surfacing. Moderate to severe alligator cracking, lack of a roadway crown. Poor ride quality. Approximately 2.5 kilometers south of 41<sup>st</sup> Ave SW.</p>
	
<p>19. In-situ asphalt (oiled) roadway surfacing. Moderate to severe alligator cracking. High shoulder. Slight rutting. Lack of a roadway crown and high roadway shoulders. Approximately 2.7 kilometers south of 41<sup>st</sup> Ave SW.</p>	<p>20. In-situ asphalt (oiled) roadway surfacing. Moderate to severe alligator cracking. High roadway shoulders, loose chips. Slight rutting. Poor ride quality. Approximately 3.0 kilometers south of 41<sup>st</sup> Ave SW.</p>



## 1.0 ROADWAY INSPECTION REPORT

<b>PROJECT INFORMATION</b>	<b>Project Name:</b>	Leduc Annex Roads – Geotechnical Consulting
	<b>CTA Project No.:</b>	02-3043
	<b>Roadway Location:</b>	<b>Range Road 235, Township Road 510 to 41<sup>st</sup> Ave SW</b>
	<b>Inspector:</b>	Brent Majcher, P.Eng.
	<b>Date:</b>	July 16, 2020
	<b>Weather:</b>	Light Rain, Overcast
	<b>Roadway Dimensions:</b>	Approximately 3.2 kilometres long, 8.0 metres wide
	<b>Roadway Surfacing:</b>	Gravel

<b>INSPECTION RESULTS</b>	<b>Methodology:</b>	Visual, Rapid Photography, ‘Riding Quality’ by judgement
	<b>Direction of Travel:</b>	South to North
	<b>Ride Quality (at 40 km/h):</b>	Fair
	<b>Roadway Use:</b>	Rural - Residential
	<b>Traffic Volume:</b>	Low
	<b>Equipment Used:</b>	Crew Cab Ford F-350 Pickup Truck, Camera
	<b>Assessment Standard:</b>	N/A
	<b>Pavement Condition:</b>	Fair
	<b>Recommendations:</b>	<p>Increasing the roadway crown would improve the lifespan of the roadway surfacing, however the existing roadway crown condition is not critically deficient.</p> <p>Mowing all grass along the roadway shoulder prior to winter time will help prevent snow drifts from becoming trapped on the roadway surface, assisting drainage and reducing impacts from standing water. Snow removal costs may also be reduced as an additional benefit.</p> <p>More comprehensive fixes are not deemed justifiable for the road in question at this time based on the anticipated roadway volume.</p>

## **2.0 ROADWAY OVERVIEW – RANGE ROAD 235:**

Gravel roadway is generally in fair condition. Some wash-boarding and rutting, but typical of a gravel roadway. Currently, it is estimated that the traffic level is low. As such, the roadway was considered as low use, rural.



The roadway is generally free of deficiencies; however, the roadway crown should ideally be increased to reduce any effects from moisture ponding on the roadway surface.

Roadway is maintained in general accordance with best industry practices.




## **3.0 PAVEMENT DISTRESSES (SEVERITY – LOW, MODERATE, SEVERE):**

1. Rutting (slight);
2. Corrugations/ Wash-boarding (slight); and
3. Drainage Concerns (minimal roadway crown, moisture remains on roadway following heavy rain).

## **4.0 SITE PHOTOGRAPHY:**

	
<p>1. Gravel roadway surfacing. Roadway fair. Ride quality good. Slight rutting. Roadway crown suboptimal, could increase. Approximately 15 meters north of TWP Rd 510.</p>	<p>2. Gravel roadway surfacing. Roadway fair. Ride quality good. Slight rutting. Roadway crown could be increased. 200 metres north of TWP Rd 510.</p>



	
<p>3. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 400 metres north of TWP Rd 510.</p>	<p>4. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 600 metres north of TWP Rd 510.</p>
	
<p>5. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 800 metres north of TWP Rd 510.</p>	<p>6. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 1.1 kilometers north of TWP RD 510.</p>



	
<p>7. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Approximately 1.8 kilometers north of TWP Rd 510.</p>	<p>8. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown should be increased at this location. Approximately 2.1 kilometers north of TWP Rd 510.</p>
	
<p>9. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 2.5 kilometers north of TWP Rd 510.</p>	<p>10. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown should be increased, in particular around the intersection. Approximately 25 metres south of 41<sup>st</sup> Ave.</p>



## 1.0 ROADWAY INSPECTION REPORT

<b>PROJECT INFORMATION</b>	<b>Project Name:</b>	Leduc Annex Roads – Geotechnical Consulting
	<b>CTA Project No.:</b>	02-3043
	<b>Roadway Location:</b>	<b>Range Road 240, 41<sup>st</sup> Ave SW to Township Road 510</b>
	<b>Inspector:</b>	Brent Majcher, P.Eng.
	<b>Date:</b>	July 16, 2020
	<b>Weather:</b>	Light Rain, Overcast
	<b>Roadway Dimensions:</b>	Approximately 3.2 kilometres long, 8.0 metres wide
	<b>Roadway Surfacing:</b>	Gravel

<b>INSPECTION RESULTS</b>	<b>Methodology:</b>	Visual, Rapid Photography, ‘Riding Quality’ by judgement
	<b>Direction of Travel:</b>	South to North
	<b>Ride Quality (at 40 km/h):</b>	Fair
	<b>Roadway Use:</b>	Rural - Residential
	<b>Traffic Volume:</b>	Low
	<b>Equipment Used:</b>	Crew Cab Ford F-350 Pickup Truck, Camera
	<b>Assessment Standard:</b>	N/A
	<b>Pavement Condition:</b>	Fair
	<b>Recommendations:</b>	<p>Increasing the roadway crown would improve the lifespan of the roadway surfacing. The existing roadway crown condition is not critically deficient.</p> <p>Mowing all grass along the roadway shoulder prior to winter time will help prevent snow drifts from becoming trapped on the roadway surface, assisting drainage and reducing impacts from standing water. Snow removal costs may also be reduced as an additional benefit.</p> <p>More comprehensive fixes are not deemed justifiable for the road in question at this time based on the anticipated roadway volume.</p>

## **2.0 ROADWAY OVERVIEW – RANGE ROAD 240:**

Gravel roadway is generally in fair condition. Some wash-boarding and rutting, but typical of a gravel roadway. Currently, it is estimated that the traffic level is low. As such, the roadway was considered as low use, rural.



The roadway is generally free of deficiencies; however, the roadway crown should ideally be increased to reduce any effects from moisture ponding on the roadway surface.

Roadway is maintained in general accordance with best industry practices.





## **3.0 PAVEMENT DISTRESSES (SEVERITY – LOW, MODERATE, SEVERE):**



1. Rutting (slight), moderate rutting along a short section of roadway shoulder;
2. Corrugations/ Wash-boarding (slight); and
3. Drainage Concerns (minimal roadway crown, moisture remains on roadway following heavy rain).

## **4.0 SITE PHOTOGRAPHY:**

	
<p>1. Gravel roadway surfacing. Roadway fair. Ride quality good. Slight rutting and washboarding. Roadway crown suboptimal, could increase. Approximately 15 meters north of TWP Rd 510.</p>	<p>2. Gravel roadway surfacing. Roadway fair. Ride quality good. Slight rutting. High shoulder on west edge. Roadway crown could be increased. 300 metres north of TWP Rd 510.</p>



	
<p>3. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 500 metres north of TWP Rd 510.</p>	<p>4. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 900 metres north of TWP Rd 510.</p>
	
<p>5. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight to moderate rutting along west shoulder. Roadway crown could be increased. Approximately 1.3 kilometres north of TWP Rd 510.</p>	<p>6. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 1.8 kilometers north of TWP RD 510.</p>

	
<p>7. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting. Roadway crown could be increased. Approximately 2.2 kilometers north of TWP Rd 510.</p>	<p>8. Gravel roadway surfacing. Roadway in fair condition. Ride quality good. Slight rutting and slight washboarding. Roadway crown should be increased at this location. Approximately 2.8 kilometers north of TWP Rd 510.</p>



## 1.0 ROADWAY INSPECTION REPORT

<b>PROJECT INFORMATION</b>	<b>Project Name:</b>	Leduc Annex Roads – Geotechnical Consulting
	<b>CTA Project No.:</b>	02-3043
	<b>Roadway Location:</b>	<b>Range Road 242 from Township Road 510 to 511</b>
	<b>Inspector:</b>	Brent Majcher, P.Eng.
	<b>Date:</b>	July 15, 2020
	<b>Weather:</b>	Light Rain, Overcast
	<b>Roadway Dimensions:</b>	Approximately 1.61 kilometres long, 5.4 metres wide
	<b>Roadway Surfacing:</b>	In-situ Asphalt or “Oiled”, Gravel used for maintenance

<b>INSPECTION RESULTS</b>	<b>Methodology:</b>	Visual, Rapid Photography, ‘Riding Quality’ by judgement
	<b>Direction of Travel:</b>	South to North
	<b>Ride Quality (at 40 km/h):</b>	Fair to Good
	<b>Roadway Use:</b>	Rural - Residential
	<b>Traffic Volume:</b>	Low (uncertain)
	<b>Equipment Used:</b>	Crew Cab Ford F-350 Pickup Truck, Camera
	<b>Assessment Standard:</b>	N/A
	<b>Pavement Condition:</b>	Fair
	<b>Recommendations:</b>	<p>Patch all potholes immediately to avoid hazards to motor vehicles. This should immediately be corrected in the ‘narrow’ roadway section.</p> <p>Mowing all grass along the roadway shoulder prior to winter time will help prevent snow drifts from becoming trapped on the roadway surface, assisting drainage and reducing impacts from standing water. Snow removal costs may also be reduced as an additional benefit.</p> <p>More comprehensive fixes are not deemed justifiable for the road in question at this time based on the anticipated traffic volume.</p>

## **2.0 ROADWAY OVERVIEW – RANGE ROAD 242:**

Pavement is generally in fair condition. Instances of potholes and corrugations were noted, with the general ride quality fair to good. The roadway surface is in-situ asphalt, with some bladed gravel, indicative of prior repair methodology. Traffic was observed modifying their travel path to avoid the hazards present within the roadway.



Drainage could be improved in select areas, but is not considered a primary concern within the subject roadway. The roadway crown is established with sufficient ditch drainage. Potholes will hold standing water however and should be corrected.

Currently, it is estimated that the traffic level is low. As such, the roadway was considered as low use, rural. Some limited fairly heavy agricultural type equipment likely uses the road however.





## **3.0 PAVEMENT DISTRESSES (SEVERITY – LOW, MODERATE, SEVERE):**

1. Potholes (slight to moderate);
2. Rutting (slight to moderate);
3. Corrugations/ Wash-boarding (slight); and
4. Narrow Roadway section (potholes and deficiencies have narrowed driveable area)

## **4.0 SITE PHOTOGRAPHY:**

	
<p>1. In-situ asphalt (oiled) roadway surfacing. Slight washboarding/ corrugations, slight rutting, and slight potholes. Approximately 15 metres north of TWP Rd 510.</p>	<p>2. In-situ asphalt (oiled) roadway surfacing, slight corrugations. Approximately 50 metres north of TWP Rd 510.</p>



	
<p>3. In-situ asphalt (oiled) roadway surfacing. Slight rutting and several instances of slight to moderate potholes. Narrow area of 'driveable' road. Approximately 300 metres north of TWP Rd 510.</p>	<p>4. In-situ asphalt (oiled) roadway surfacing. Gravel bladed to the roadway centreline and shoulder indicative of prior pothole repair. Approximately 450 metres north of TWP Rd 510.</p>
	
<p>5. In-situ asphalt oiled roadway surfacing, with gravel shoulders. Slight potholes and corrugations. Gravel bladed to the roadway centreline and shoulder indicative of prior pothole repair. Approximately 600 metres north of TWP Rd 510.</p>	<p>6. In-situ asphalt (oiled) roadway surfacing. Slight to moderate rutting or channelling. Roadway surfacing is lacking in thickness, with subsoils exposed partially. Ride quality fine. Approximately 800 metres north of TWP Rd 510.</p>



	
<p>7. In-situ asphalt (oiled) roadway surfacing, with gravel shoulders. Slight rutting, ride quality similar to gravel roadway. Slight washboarding/ corrugations. Location approximately 1.1 kilometers north of TWP Rd 510.</p>	<p>8. In-situ asphalt (oiled) roadway surfacing, with gravel shoulder. Slight rutting or channelling. Minimal washboarding/ corrugations. Location approximately 1.3 kilometers north of TWP Rd 510.</p>
	
<p>9. In-situ asphalt (oiled) roadway surfacing. Loose bladed gravel deposit at the end of the roadway. Moderate rutting or channelling indicative of poor subgrade condition. Location approximately 1.6 kilometers north of TWP Rd 510.</p>	

## 1.0 ROADWAY INSPECTION REPORT

<b>PROJECT INFORMATION</b>	<b>Project Name:</b>	Leduc Annex Roads – Geotechnical Consulting
	<b>CTA Project No.:</b>	02-3043
	<b>Roadway Location:</b>	<b>Range Road 242A, 91<sup>st</sup> Street to 80<sup>th</sup> Street SW</b>
	<b>Inspector:</b>	Brent Majcher, P.Eng.
	<b>Date:</b>	July 15, 2020
	<b>Weather:</b>	Light Rain, Overcast
	<b>Roadway Dimensions:</b>	Approximately 570 metres long, 5.4 metres wide
	<b>Roadway Surfacing:</b>	In-situ Asphalt or “Oiled”

<b>INSPECTION RESULTS</b>	<b>Methodology:</b>	Visual, Rapid Photography, ‘Riding Quality’ by judgement
	<b>Direction of Travel:</b>	North to South
	<b>Ride Quality (at 40 km/h):</b>	Fair
	<b>Roadway Use:</b>	Rural - Residential
	<b>Traffic Volume:</b>	Low
	<b>Equipment Used:</b>	Crew Cab Ford F-350 Pickup Truck, Camera
	<b>Assessment Standard:</b>	N/A
	<b>Pavement Condition:</b>	Poor to Fair
	<b>Recommendations:</b>	<p>Patch all potholes immediately to avoid hazards to motor vehicles. Low lying vehicles may bottom out in the potholes, especially during evening travel.</p> <p>Mowing all grass along the roadway shoulder prior to winter time will help prevent snow drifts from becoming trapped on the roadway surface, assisting drainage and reducing impacts from standing water. Snow removal costs may also be reduced as an additional benefit.</p> <p>More comprehensive fixes are not deemed justifiable for the road in question at this time based on the anticipated roadway volume.</p>

## **2.0 ROADWAY OVERVIEW – RANGE ROAD 242A:**

Pavement is generally in poor to fair condition. Many instances of potholes and minimal corrugations or washboarding was noted that should be fixed, with the general ride quality of the roadway poor to fair. Traffic was observed modifying their travel path to avoid the hazards present within the roadway.



Drainage concerns of varying degrees were noted, with many instances of ponding water on the roadway surfacing. It would be expected that further deterioration would be observed fairly rapidly over the following years, especially following freeze-thaw cycles.

Currently, it is estimated that the traffic level is low. As such, the roadway was considered as low use, rural.


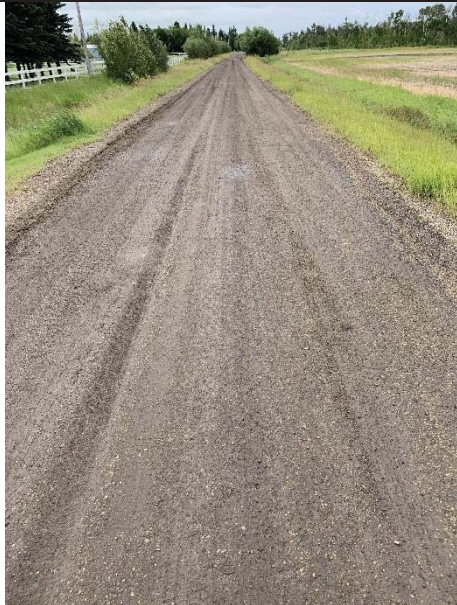


## **3.0 PAVEMENT DISTRESSES (SEVERITY – LOW, MODERATE, SEVERE):**



1. Potholes (slight to moderate);
2. Rutting (slight to moderate);
3. Corrugations/ Wash-boarding (slight); and
4. Drainage Concerns (minimal roadway crown, some ponding on roadway in ruts and potholes, significant ponding at approximately 375 metres south of TWP Rd 511A).

## **4.0 SITE PHOTOGRAPHY:**

	
<p>1. In-situ asphalt (oiled) roadway surfacing, some ponding on roadway surfacing, some instances of minor pot holes. Slight washboarding/ corrugations. Approximately 25 metres south of TWP Rd 511A.</p>	<p>2. In-situ asphalt (oiled) roadway surfacing, slight to moderate rutting or channelling, some minor to moderate potholes. Approximately 75 metres south of TWP Rd 511A.</p>



	
<p>3. In-situ asphalt (oiled) roadway surfacing. Fair shape. Slight rutting occurring. No other pavement distresses noted. Approximately 175 metres south of TWP Rd 511A.</p>	<p>4. In-situ asphalt (oiled) roadway surfacing. Fair shape. Possible high shoulder on east edge. Slight rutting or channelling. Ride quality fair. Approximately 225 metres south of TWP Rd 511A.</p>
	
<p>5. In-situ asphalt (oiled) roadway surfacing. Many potholes of moderate severity. Slight rutting is beginning to occur, the roadway surfacing is fairly dirty from tracked clays and gravels from vehicular traffic, lack of a roadway crown. Approximately 400 metres south of TWP Rd 511A.</p>	<p>6. Ponding water is visible on the west side of the road approximately 375 metres south of TWP Rd 511A. Such ponding is estimated to lie two feet below the roadway surface subgrade. Impacts from future high-volume rain/ storm events may be experienced.</p>

	
<p>7. In-situ asphalt (oiled) roadway surfacing. Slight rutting occurring, lack of a roadway crown leading to minimal ponding. Tracked mud and gravel on roadway surfacing. Roadway surfacing lacking, some areas of subgrade soil exposed. Approximately 450 metres south of TWP Rd 511A.</p>	<p>8. In-situ asphalt (oiled) roadway surfacing. Slight rutting occurring, slight to moderate potholes, tracked mud and gravel on roadway surfacing. Roadway surfacing lacking, some areas of subgrade soil exposed. Approximately 500 metres south of TWP Rd 511A.</p>



## 1.0 ROADWAY INSPECTION REPORT

<b>PROJECT INFORMATION</b>	<b>Project Name:</b>	Leduc Annex Roads – Geotechnical Consulting
	<b>CTA Project No.:</b>	02-3043
	<b>Roadway Location:</b>	<b>Township Road 511A, 91<sup>st</sup> Street to 80<sup>th</sup> Street SW</b>
	<b>Inspector:</b>	Brent Majcher, P.Eng.
	<b>Date:</b>	July 15, 2020
	<b>Weather:</b>	Light Rain, Overcast
	<b>Roadway Dimensions:</b>	Approximately 800 metres long, 6.1 metres wide
	<b>Roadway Surfacing:</b>	Gravel for easternmost 150 metres, In-situ Asphalt or “Oiled” remainder

<b>INSPECTION RESULTS</b>	<b>Methodology:</b>	Visual, Rapid Photography, ‘Riding Quality’ by judgement
	<b>Direction of Travel:</b>	West to East
	<b>Ride Quality (at 40 km/h):</b>	Poor
	<b>Roadway Use:</b>	Rural - Residential
	<b>Traffic Volume:</b>	Low
	<b>Equipment Used:</b>	Crew Cab Ford F-350 Pickup Truck, Camera
	<b>Assessment Standard:</b>	N/A
	<b>Pavement Condition:</b>	Poor
	<b>Recommendations:</b>	<p>Patch all potholes immediately to avoid hazards to motor vehicles. Low lying vehicles may bottom out in the potholes, especially during evening travel.</p> <p>Mowing all grass along the roadway shoulder prior to winter time will help prevent snow drifts from becoming trapped on the roadway surface, assisting drainage and reducing impacts from standing water. Snow removal costs may also be reduced as an additional benefit.</p> <p>More comprehensive fixes are not deemed justifiable for the road in question at this time based on the anticipated roadway volume.</p>



## **2.0 ROADWAY OVERVIEW – TOWNSHIP ROAD 511A:**

Pavement is generally in poor condition. Many instances of potholes and corrugations of varying severity were noted, with the general ride quality of the roadway poor. Traffic was observed modifying their travel path to avoid the many hazards present within the roadway.



Drainage concerns of varying degrees were noted, with many instances of ponding water on the roadway surfacing. It would be expected that further deterioration would be observed fairly rapidly over the following years, especially following freeze-thaw cycles.

Currently, it is estimated that the traffic level is low. As such, the roadway was considered as low use, rural.



## **3.0 PAVEMENT DISTRESSES (SEVERITY – LOW, MODERATE, SEVERE):**

1. Potholes (slight, moderate, and severe);
2. Alligator Cracking (slight to moderate);
3. Longitudinal Cracking (slight to moderate);
4. Rutting (slight to moderate);
5. Corrugations/ Wash-boarding (slight to moderate), high frequency; and
6. Drainage Concerns (minimal roadway crown, some ponding on roadway in ruts).





## **4.0 SITE PHOTOGRAPHY:**

	
<p>1. Gravel road surfacing with moderate severity corrugations/ washboarding, likely related to vehicles braking from mailbox and nearby 91 Street intersection. Very rough ride quality. 10 metres east of 91 Street and TWP Rd 511A Intersection.</p>	<p>2. Gravel road surfacing with slight to moderate corrugations/ washboarding, likely related to vehicles braking at nearby 91 Street intersection. Rough ride quality. 70 metres east of 91 Street and TWP Rd 511A Intersection.</p>



	
<p>3. In-situ asphalt (oiled) roadway surfacing and gravel roadway transition, slight to moderate pothole, slight rutting, and moderate alligator cracking on oiled roadway surfacing. Ponding of water on north edge of roadway shoulder and within ruts.</p>	<p>4. In-situ asphalt (oiled) roadway surfacing, several instances of moderate pot holes, slight alligator cracking, slight rutting, some spots of total pavement failure, lacking roadway crown. Approximately 275 metres east of 91 Street Intersection.</p>
	
<p>5. In-situ asphalt (oiled) roadway surfacing, fair condition, minimal to slight corrugations, longitudinal crack down roadway centre line. Approximately 300 metres east of 91 Street and TWP Rd 511A Intersection.</p>	<p>6. In-situ asphalt (oiled) roadway surfacing. Slight corrugations, lack of roadway crown leading to ponding water. Rough ride quality. Approximately 350 metres east of 91 Street and TWP Rd 511A.</p>



	
<p>7. In-situ asphalt (oiled) roadway surfacing. Slight to severe potholes with many instances, slight rutting or channeling, lack of a roadway crown. Approximately 375 metres east of 91 Street and TWP Rd 511A intersection.</p>	<p>8. In-situ asphalt (oiled) roadway surfacing. Slight to moderate potholes, many instances. Slight alligator cracking and ponding water from lack of roadway crown. Approximately 480 metres east of 91 Street and TWP Rd 511A Intersection.</p>
	
<p>9. In-situ asphalt (oiled) roadway surfacing. Slight corrugations/ washboarding, few instances of potholes (slight to severe), and slight rutting/ channeling leading to ponding water. Longitudinal cracking at roadway centreline. Approximately 600 metres east of 91 Street and TWP Rd 511A intersection.</p>	<p>10. In-situ asphalt (oiled) roadway surfacing. Slight rutting, potholes, and corrugations. Ponding within ruts/ roadway channels. Few instances of highly severe potholes. Approximately 700 metres east of 91 Street and TWP Rd 511A intersection.</p>