Thursday, July 06, 2017

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RE: Traffic Review
Strada Aggregates Inc. Melancthon Pit Extension

HDR Corporation (HDR) was retained to undertake a Traffic Review for the expansion of the Strada Aggregates Inc. Melancthon Pits located in the northeast quadrant of County Road 17 and Melancthon 4th Line in the Township of Melancthon, County of Dufferin.

Strada Aggregates Inc. currently operates two pits (Pit #1 and Pit #2) and would like to expand operations onto the lands adjacent to the current operations. The expansion of the current extraction onto the adjacent lands will not result in an increase in traffic generated or the yearly extraction tonnage. The yearly extraction limit for the existing pits is 1.25 million tonnes per year combined. Furthermore, since operations will be confined to adjacent lands and traffic generation is expected to remain unchanged, no new accesses to the external road network are proposed. The existing driveway to Pit#1 (referred to as the 'Northerly Driveway', located approximately 1.64 kilometres north of County Road 17) and Pit #2 (referred to as the 'Southerly Driveway', located approximately 600 metres north of County Road 17) will remain as-is and will serve all traffic to and from the existing Strada Aggregate lands and the adjacent expansion lands. From a traffic perspective no change to operations (trip generation, haul routes, site traffic volumes etc.) are expected.

HDR (previously iTRANS) prepared the report entitled, ***Melancthon Pit Traffic Study*** (September 2008) in support of Pit #2. Prior to the 2008 study, HDR also prepared a 2002 report entitled, ***County Road 17 Route Evaluation Study*** in support of Pit #1. The reports outlined several road network improvements which were implemented by the County at Strada's expense.

The Township has requested that a Traffic Review be prepared which will review the current traffic conditions and confirm that the previous improvements outlined in each previous report have been implemented, and to review conditions of those improvements as well as the general traffic conditions, and the condition of the road network.

A field visit was performed on Tuesday June 20th between 1:00pm and 5:00pm. During the field visit the weather conditions were generally overcast. Earlier in the day (before 3:00pm) there were scattered thunderstorms and showers which resulted in the pavement being wet but did not reduce visibility or alter the driving conditions or driver behaviour during the PM peak period (3:30

pm onwards) during which traffic observations were performed. During the traffic observations the conditions were generally sunny with intermittent cloud cover.

Road Network Improvements

The ***County Road 17 Route Evaluation Study*** recommended the following road network improvements:

- County Road 17: platform widening to 7.0m on tangents and 7.5m on curves;
- County Road 17 @ 4th Line: addition of a westbound right-turn lane and intersection widening; and,
- County Road 17 @ County Road 124: addition of northbound and southbound left-turn lanes.

In addition to these improvements the following improvements were also implemented prior to the ***Melancthon Pit Traffic Study***:

- County Road 17 @ County Road 124: signalization and addition of a northbound right-turn lane;
- County Road 17 @ 4th Line: addition of a flashing overhead red and amber beacon; and,
- 4th Line @ Northerly Driveway: addition of a northbound right-turn lane.

During the June 20th, 2017 site visit HDR confirmed that these improvements have been implemented and remain as previously reported.

Pavement Marking Condition

During the site visit there were two deficiencies noted regarding the pavement markings:

- County Road 17 @ 4th Line: the southbound approach stop bar was not visible (**Exhibit 1**);
- County Road 17 @ County Road 124: the northbound left-turn lane, trailing left-turn arrow (nearer the stop bar) has faded and is difficult to see (**Exhibit 2**).

It is recommended that the above noted pavement markings be repainted.

Exhibit 1: County Road 17 @ 4th Line Southbound Approach – Missing Stop Bar (Looking North)

Exhibit 2: County Road 17 @ County Road 124 Northbound Trailing Left-turn Arrow (Looking South-west)

Pavement Condition

4th Line Pavement Condition

The pavement condition along 4th line can generally be characterized as fair and in a functional condition. For purposes of this assessment, the pavement condition is reported as fair because it is experiencing general cracking and signs of normal wear.

'Alligator cracking' is observed along the length of 4th line from the Northerly Driveway to County Road 17, from the edge of pavement towards the crown about 2 metres, and on both lanes of the roadway (**see Exhibit 3**).

In addition to the general pavement condition, there are some localized areas that are in poor condition due to unsupported pavement edges. Cracking is most prominent in the vicinity of the Northerly Driveway and to the south of the Northerly Driveway (see **Exhibit 3**). **Exhibit 3** demonstrates the likely problem (standing water/poor drainage) leading to the alligator cracking at this location and throughout the roadway.

Approximately 160 metres south of the Northerly Driveway there are potholes and early signs of rutting in the roadway as shown in **Exhibit 4**.

A similar 'alligator cracking' effect is occurring to the south in the vicinity of the Southerly Driveway, as shown in **Exhibit 5**.

Exhibit 3: Northerly Driveway 'Alligator Cracking' in the lane, standing water, and raveling pavement edges (Looking South)

Exhibit 4: Potholes on 4th Line Approximately 160 metres South of Northerly Driveway (Looking South)

Exhibit 5: Southerly Driveway 'Alligator Cracking' and Pooling (Looking North)

County Road 17 Pavement Condition

The pavement condition along County Road 17 can be characterized as good to fair. There are occasional transverse cracks in the pavement as well as longitudinal cracks along the centreline, but the pavement was observed to be in a stable and functional condition. The cracks do not appear as though they have been repaired but the condition is acceptable and should be monitored. Examples of transverse and longitudinal cracking along County Road 17 are shown in **Exhibit 6**.

Exhibit 6: Typical Transverse and Longitudinal Cracking along County Road 17 (Looking East)

Conclusions

It is recommended that the potholes located approximately 160 metres south of the northerly driveway on 4th Line be repaired. 'Alligator cracking' along 4th Line should be monitored for repairs in the future because they may become pot holes.

The pavement condition along County Road 17 is generally acceptable and does not require immediate repairs. However, the cracking should be monitored as it could require crack repair at some future point.

Sightlines

The haul route was driven several times in both directions between the northerly driveway on 4th Line, along County Road 17, and south on County Road 124. No apparent sightline issues were found including along the "S" curves on County Road 17, at site driveways, or study intersections.

Peak Period Traffic Observations

Traffic operations were observed during the peak period between 3:30pm and 5:30pm. West of County Road 124 along County Road 17, 3rd Line, and 4th Line, there were no queues or issues observed (no conflicts, no close calls, no horns honked, no 'screeching' of wheels). Traffic in the area was a mixture of smaller vehicles, pickup trucks, articulated and dump trucks, and school buses.

Two school buses were observed at the intersection of County Road 17 and County Road 124 but not elsewhere during the site visit or during the observations. The school buses were full sized and encountered a red light upon arriving at the intersection. One travelled westbound through the signalized intersection and another travelled southbound through the intersection. Neither bus turned or stopped to pick-up or drop-off students.

The observations were therefore focused on the signalized intersection of County Road 17 and County Road 124 where there was the most activity. The traffic signal was operating properly and was semi-actuated on the minor street approaches (County Road 17) with no advance turn phases. Queuing along County Road 124 was minimal (2 vehicles or less).

Queuing on the minor street approaches peaked at 6 vehicles eastbound and 4 vehicles westbound. These observed maximum queues did not include trucks. All queues dissipated within one cycle with the exception of the eastbound queue which had a spillover of two vehicles (one time) over the two hour period. The eastbound approach appeared to be comprised of mostly eastbound left-turning vehicles.

The ***Melancthon Pit Traffic Study*** forecasted 193 eastbound vehicles during the PM peak hour of which 125 were right-turns, 37 were through, and 33 were left-turns, and the Synchro analysis reported a 95th percentile eastbound queue of 18.2 metres during the 2020 PM peak hour under total conditions. The assignment of non-site trips does appear to differ slightly. The projected 2020 total traffic condition queues can be compared to those observed in 2017 while taking into account that the approach is shared for all movements in a single lane, and that the assignment appears to differ slightly from the forecasts.

Standard vehicles typically occupy 7.0-7.5 metres in queue. Converting the observed eastbound queue of 6 vehicles, to metres, results in a 42-45 metre eastbound queue, which is over two times greater than the queue reported by Synchro. This is expected due to a larger number of left-turning vehicles (compared to the projections) which would encounter delays due to opposing westbound traffic. Furthermore, the Synchro 95th percentile queue is not the longest anticipated queue which is what was observed and would also account for a longer in-field observation.

The ***Melancthon Pit Traffic Study*** reported a 95th percentile westbound queue of 9.1 metres during the 2020 PM peak hour under total conditions. Applying the same conversion factor to the

4 vehicle westbound queue results in a queue length of 28-30 metres, which is over three times longer than the queue reported by Synchro, but given that a single vehicle can occupy 7.5 metres or more in a queue, simply adding one additional vehicle to the queue would result in a queue almost double that reported by Synchro. Also as previously mentioned, the in-field observations of the longest queue are expected to be longer than the reported 95th percentile queue.

The observed six vehicle eastbound queue is shown in **Exhibit 7** with the sixth vehicle arriving but not yet queued. HDR staff confirmed that five of the six vehicles in the eastbound queue turned left. This queue was observed at 4:08pm.

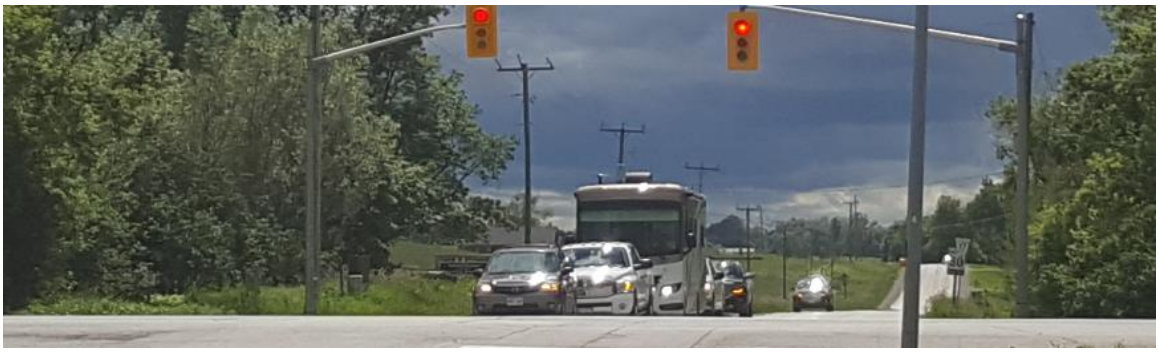

Exhibit 7: County Road 124 @ County Road 17 Maximum Observed Eastbound Queue

As shown in **Exhibit 8**, the vehicle behind the RV was able to clear the left-turn during the amber phase which means that two vehicles were unable to clear the queue. This was caused because the eastbound left-turning vehicle had to wait for the opposing westbound vehicles (**Exhibit 9**).

Although the eastbound queue did not clear in one cycle it is likely just a result of the coincidental east-west queues that occurred simultaneously as well as the higher left-turning volume than was forecasted in the ***Melancthon Pit Traffic Study***, resulting in additional delays to the eastbound left-turning vehicles. Overall there were no operational concerns observed and since the cycle length of this intersection is 55 seconds, level of service should remain within acceptable thresholds (Level of Service 'D' or better).

Exhibit 8: County Road 124 @ County Road 17 Maximum Observed Eastbound Queue Clearing

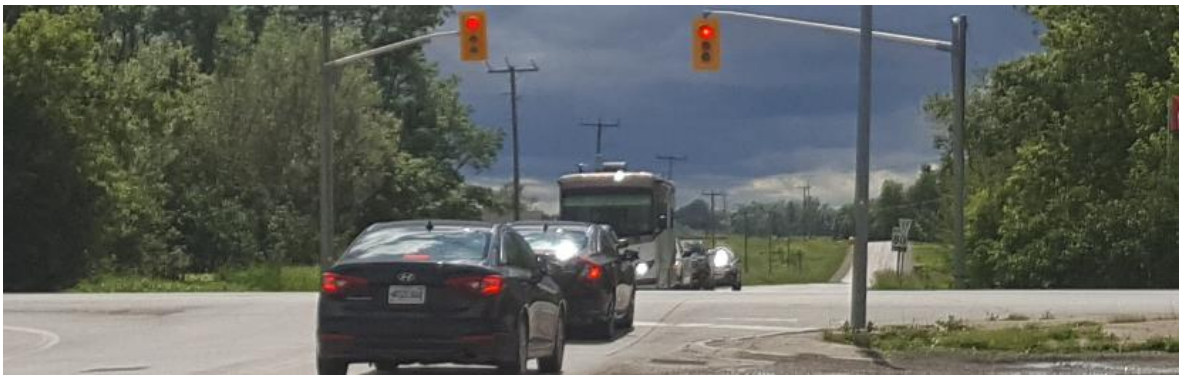

Exhibit 9: County Road 124 @ County Road 17 Eastbound and Westbound Opposing Queues

Conclusions

In summary:

- It was found that the recommended road network improvements from the previous studies have been implemented correctly and remain in good functioning condition;
- There are no operational or safety concerns in the road network;
- The pavement condition along County Road 17 is acceptable. It is recommended that the pavement condition along 4th line be monitored and that potholes south of the northerly driveway be fixed; and,
- The southbound stop bar at County Road 17 and 4th Line, as well as the trailing northbound left-turn arrow at County Road 17 and County Road 124, should be repainted.

Should you have any questions on the above assessment please contact the undersigned

Sincerely,
HDR Corporation

Adam Beausoleil, P.Eng.
Transportation Engineer