



September 2, 2014  
Project: 110650

Glenn Scheels, MCIP, RPP  
GSP Group  
201-72 Victoria Street South  
Kitchener ON N2G 4Y9  
Dear Mr. Scheels:

**Re: Paris on the Grand Residential  
Development TIS  
Response to City of Brant Comments**

We are writing to you to address the concerns presented by the County of Brant regarding the conclusions of the Paris on the Grand Transportation Impact Study, prepared by Paradigm Transportation Solutions Limited (PTSL) in January 2013. The County raised concern over the poor operations at the intersection of Paris Links Road and Grand River Street North and has requested further analysis in an effort to mitigate these conditions.

**EXISTING CONDITIONS**

At the County Council Meeting held earlier this year, concerns over the existing operations of the intersection of Paris Links Road with Grand River Street were highlighted as major concerns for local area residents. The TIS report noted that the LOS during peak hours was quite good. Council expressed concern over this conclusion. **Table 1** depicts the overall traffic operations at the intersections of Paris Links Road with Grand River Street.

**TABLE 1: EXISTING TRAFFIC OPERATIONS AT  
PARIS LINKS ROAD AND GRAND RIVER STREET**

Analysis Period	Intersection	Control Type	MDE	Direction / Movement / Approach																		
				Eastbound				Westbound				Northbound				Southbound				OVERALL		
				LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH			
AM Peak Hour	4 - Silver Street & Grand River Street North	Signal	LGS	B		A	B						A	B		B		C	A	B	B	
			Delay	16		5	11							8	12		12		23	6	20	14
			V/C	0.22		0.22								0.22	0.47				0.52	0.11		
AM Peak Hour	5 - Paris Links Road & Grand River Street North	TWSC	LGS					C		C	C		A	A	A	A	A			A	A	
			Delay					16	16	16	16		0	0	0	0	2	0			1	2
			V/C					0.22	0.22					0.18	0.11		0.04	0.20				
PM Peak Hour	4 - Silver Street & Grand River Street North	Signal	LGS	B		A	A					B	B		B		E	A	D	C		
			Delay	16		5	10					17	16		16		56	5	47	30		
			V/C	0.19		0.24						0.56	0.61				0.96	0.22				
PM Peak Hour	5 - Paris Links Road & Grand River Street North	TWSC	LGS					C		C	C		A	A	A	A	A			A	A	
			Delay					19	19	19	19		0	0	0	1	0			0	1	
			V/C					0.10	0.10				0.24	0.14		0.03	0.25					

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Subsequent to the meeting additional data were collected in June while the High School was still in session. The data collected illustrated the following:

- ▶ The side-street volumes were affected for a brief period of time around school dismissal (3:00pm).
- ▶ The average number of cars in queue throughout the 8 busiest hours was less than 2 vehicles.
- ▶ The average delay per vehicle on Paris Links Road during the AM peak hour was less than one minute, which is consistent with the findings of the TIS;
- ▶ The average delay per vehicle on Paris Links Road during the PM peak hour was less than one minute, which is consistent with the findings of the TIS;
- ▶ A gap study was conducted for the westbound left-turning traffic from Paris Links Road onto Grand River Street and it was found that there is a gap every 13 seconds in the AM peak hour and every 20 seconds in the PM peak hour. This represents a V/C of 0.34 and 0.18, respectively; and
- ▶ There is little empirical evidence to support County Council's assertions.

## BACKGROUND

The proposed development includes 410 residential units with connection into Paris via Paris Links Road to the west. The proposed development plan is shown in **Figure 1**.

The TIS concluded that the intersection of Paris Links Road and Grand River Street North will operate at poor levels of service for all horizon years. The LOS for this intersection, as presented in the TIS, is seen in **Table 2**.

**TABLE 2: FORECAST TRAFFIC OPERATIONS AT  
PARIS LINKS ROAD AND GRAND RIVER STREET AT FULL BUILD-OUT (2022)**

Horizon Year	Analysis Period	Intersection	Control Type	MODE	Direction / Movement / Approach																OVERALL				
					Eastbound				Westbound				Northbound				Southbound								
					LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH					
2017 Total Traffic	AM Peak Hour	5 - Paris Links Road & Grand River Street North	TWSC	LOS					F		F				A	A			A	A					C
				Delay					175		175				0	0			1	0					20
				V/C					1.17		1.17				0.26	0.17			0.08	0.34					
	PM Peak Hour	5 - Paris Links Road & Grand River Street North	TWSC	LOS					F		F				A	A			A	A					B
				Delay					224		224				0	0			4	2					11
				V/C					1.16		1.16				0.41	0.27			0.20	0.40					
2022 Total Traffic	AM Peak Hour	5 - Paris Links Road & Grand River Street North	TWSC	LOS					F		F				A	A			A	A					C
				Delay					213		213				0	0			2	1					24
				V/C					1.27		1.27				0.27	0.18			0.09	0.35					
	PM Peak Hour	5 - Paris Links Road & Grand River Street North	TWSC	LOS					F		F				A	A			A	A					B
				Delay					268		268				0	0			4	2					13
				V/C					1.26		1.26				0.42	0.28			0.21	0.41					



The recommendations of the TIS are as follows:

- ▶ Grand River Street North be expanded to a 5-lane cross-section with a centre two-way left-turn lane from north of Bradbury Crescent to south of St. Patrick Street; and
- ▶ In the long term, the County and Town undertake the necessary studies to review the feasibility of re-aligning Paris Links Road northerly to connect as the east leg of the intersection of Silver Street and Grand River Street North.

### **STAGING OF IMPROVEMENTS FROM TIS**

Per the request of the County, analysis was conducted to determine the staging of the improvements recommended in the TIS.

### **FIVE-LANE CROSS SECTION ON GRAND RIVER STREET NORTH**

This recommendation was proposed as a result of the 25 metre southbound left-turn lane warranted at the intersection of Paris Links Road and Grand River Street North. Due to the close proximity of this intersection to Silver Street and Grand River Street, there is insufficient separation between the intersections to add the required left-turn storage and taper. As an alternative an altered cross-section for Grand River Street North was recommended. To accommodate the queuing at both intersections, a five-lane cross-section with center tow-way left-turn lane would provide adequate storage for both the southbound left-turn at Paris Links Road and Grand River Street and the northbound through at Grand River Street and Silver Street. A 15-metre left-turn lane is warranted prior to development begins and will suffice until the development is 100% complete at which point a 25 metre left-turn lane is warranted.

### **IMPROVEMENTS TO PARIS LINKS ROAD**

The operations at Paris Links Road and Grand River Street are very poor for all future horizon years and the public has expressed concerned over the existing conditions of this intersection. Exclusive westbound left and right-turn storage lanes would improve the operations at this intersection, significantly decreasing the delay to the westbound right-turning traffic. These lanes are warranted as soon as development proceeds. A 45 metre right-turn storage lane would allow for the right-turning traffic to get around the queued up left-turning traffic.

### **SIGNALIZATION OPTIONS**

The option to signalize the intersection of Paris Links Road and Grand River Street was analyzed to determine whether or not signalization would mediate the delay. The signal was analyzed with the modified cross-section discussed above. With 2017 and 2022 total traffic conditions, the signalized intersection of Paris Links Road and Grand River Street operates at acceptable levels of service with no problem movements. The operations are shown in **Table 3** for the 2017 horizon year and **Table 4** for the 2022 horizon year.



**TABLE 3: 2017 TOTAL TRAFFIC OPERATIONS WITH SIGNALS**

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																OVERALL
				Eastbound				Westbound				Northbound				Southbound				
				LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	
AM Peak Hour	1 - Silver Street & Grand River Street North	Signal	LOS	B		A	<b>B</b>					A	A		<b>A</b>		B	B	<b>B</b>	<b>B</b>
			Delay	16		5	<b>11</b>					9	8		<b>9</b>		15	15	<b>15</b>	<b>12</b>
			V/C	0.24		0.26						0.33	0.13				0.37	0.37		
	2 - Paris Links Road & Grand River Street North	Signal	LOS					B			A			B	B		B	B		<b>B</b>
			Delay					13			6			11	11		12	12		<b>12</b>
			V/C					0.35			0.26			0.47	0.47		0.23	0.48		
PM Peak Hour	1 - Silver Street & Grand River Street North	Signal	LOS	C		A	<b>B</b>				C	A		<b>B</b>		C	C	<b>C</b>	<b>B</b>	
			Delay	22		7	<b>13</b>				21	8		<b>11</b>		21	21	<b>21</b>	<b>16</b>	
			V/C	0.29		0.35					0.68	0.35				0.73	0.73			
	2 - Paris Links Road & Grand River Street North	Signal	LOS					B			A	A			B	B			<b>B</b>	
			Delay					16			6			10	10		18	11		<b>11</b>
			V/C					0.17			0.17			0.54	0.54		0.49	0.47		

**TABLE 4: 2022 TOTAL TRAFFIC OPERATIONS WITH SIGNALS**

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																OVERALL
				Eastbound				Westbound				Northbound				Southbound				
				LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	
AM Peak Hour	1 - Silver Street & Grand River Street North	Signal	LOS	B		A	<b>B</b>				A	A		<b>A</b>		B	B	<b>B</b>	<b>B</b>	
			Delay	17		5	<b>11</b>				9	10		<b>10</b>		16	16	<b>16</b>	<b>12</b>	
			V/C	0.27		0.27					0.34	0.33				0.40	0.40			
	2 - Paris Links Road & Grand River Street North	TWSC	LOS					C			A	A		<b>A</b>	A	A		<b>A</b>	<b>A</b>	
			Delay					19			10	<b>15</b>		8	8	<b>8</b>	10	8		<b>9</b>
			V/C					0.52			0.39			0.35	0.35		0.17	0.35		
PM Peak Hour	1 - Silver Street & Grand River Street North	Signal	LOS	C		A	<b>B</b>				C	A		<b>B</b>		C	C	<b>C</b>	<b>B</b>	
			Delay	29		8	<b>17</b>				31	8		<b>14</b>		25	25	<b>25</b>	<b>19</b>	
			V/C	0.36		0.39					0.77	0.40				0.83	0.83			
	2 - Paris Links Road & Grand River Street North	TWSC	LOS					C			A	A		<b>A</b>	C	B		<b>B</b>	<b>B</b>	
			Delay					19			6	<b>12</b>		10	10	<b>10</b>	18	11		<b>12</b>
			V/C					0.19			0.19			0.54	0.54		0.51	0.48		

While the signalization of this intersection improves the operations, there are queuing issues between the two. The northbound queue at Silver Street reaches 66 metres in the 2022 PM peak hour which exceeds the available storage space of 60 metres. The northbound queue at Silver Street and Grand River Street for the existing conditions also exceeds the 60 metres of available storage with a 95<sup>th</sup> percentile queue of 62 metres. While the level of service is improved from signalization, the queue reach exceeds the available storage capacity, and operational issues will result.

Due to the proximity of the two signals they cannot be treated independently. Signal timings will need to be optimized such that vehicles aren't 'trapped' on Grand River Street between the two signals. Eastbound right-turns from Silver Street onto Grand River Street will also need to be restricted to no right-turns on the red signal. The installation of optical signal heads should also be considered as it adds a measure of safety, discouraging drivers from accelerating through the two signals as they are unable to see which signal is illuminated until they are within a specified distance.



## LONG-TERM TRANSPORTATION IMPROVEMENTS

Section 5.4 of the TIS Report noted that in the long-term, realignment of Paris Links Road to Silver Street or Capron Street could be considered. County Staff has asked for additional operational assessments of these options.

Based on the close proximity of the intersections of Paris Links Road and Grand River Street, and Grand River Street and Silver Street, the option to realign Paris Links Road to become the fourth leg of the intersection with Silver Street was analyzed. This new four-legged intersection was analyzed for the 2022 total traffic conditions, these operations are shown in **Table 4**. The intersection operates at acceptable levels of service with LOS C in both the AM and PM peak hours.

**TABLE 4: 2022 TOTAL TRAFFIC OPERATIONS AT GRAND RIVER STREET & SILVER STREET/PARIS LINKS ROAD**

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																OVERALL
				Eastbound				Westbound				Northbound				Southbound				
				LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	
AM Peak Hour	1 - Silver Street & Grand River Street North	Signal	LOS	C	A	A	<b>B</b>	D	B	B	<b>C</b>	C	C	A	<b>C</b>	C	D	A	<b>D</b>	<b>C</b>
			Delay	30	9	9	<b>17</b>	43	12	12	<b>27</b>	32	21	1	<b>21</b>	29	41	1	<b>36</b>	<b>27</b>
			V/C	0.38	0.47	0.47		0.58	0.33	0.33		0.65	0.56	0.10		0.25	0.86	0.18		
PM Peak Hour	1 - Silver Street & Grand River Street North	Signal	LOS	D	B	B	<b>C</b>	D	C	C	<b>C</b>	<b>E</b>	C	A	<b>C</b>	B	D	A	<b>C</b>	<b>C</b>
			Delay	40	12	12	<b>22</b>	37	27	27	<b>31</b>	<b>59</b>	21	0	<b>27</b>	13	37	3	<b>30</b>	<b>28</b>
			V/C	0.48	0.50	0.50		0.29	0.45	0.45		<b>0.92</b>	0.60	0.12		0.29	0.85	0.29		

A southern re-alignment with Capron Street was also considered. Given the location of the hospital on the southwest corner of the intersection of Capron Street and Grand River Street, signalization of this intersection is favourable for the purpose of accommodating emergency traffic. A re-alignment of Paris Links Road to form the fourth leg of this intersection would benefit both the hospital and the school across the street. This option was reviewed for the 2022 total traffic conditions. The operations are shown in **Table 5**.

**TABLE 5: 2022 TOTAL TRAFFIC OPERATIONS AT GRAND RIVER STREET & CAPRON STREET/PARIS LINKS ROAD**

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																OVERALL
				Eastbound				Westbound				Northbound				Southbound				
				LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	LEFT	THROUGH	RIGHT	APPROACH	
AM Peak Hour	1 - Capron & Grand River Street North	Signal	LOS	C	B	B	<b>C</b>	D	A	A	<b>C</b>	B	B	A	<b>B</b>	B	B	B	<b>B</b>	<b>B</b>
			Delay	25	15	15	<b>21</b>	36	10	10	<b>22</b>	16	16	1	<b>14</b>	17	15	15	<b>15</b>	<b>16</b>
			V/C	0.05	0.06	0.06		0.47	0.33	0.33		0.30	0.30	0.08		0.12	0.25	0.25		
PM Peak Hour	1 - Capron Street & Grand River Street North	Signal	LOS	C	B	B	<b>B</b>	C	B	B	<b>C</b>	B	B	A	<b>B</b>	B	B	B	<b>B</b>	<b>B</b>
			Delay	22	13	13	<b>16</b>	33	14	14	<b>20</b>	15	15	3	<b>14</b>	18	15	15	<b>15</b>	<b>15</b>
			V/C	0.05	0.08	0.08		0.22	0.32	0.32		0.47	0.47	0.11		0.29	0.45	0.45		



## CONCLUSIONS

Based on the above listed analysis, the following is noted:

- ▶ The intersection of Paris Links Road and Grand River Street will continue to operate at poor levels of service under the existing configuration;
- ▶ A 25-metre southbound left-turn is warranted at the intersection of Paris Links Road and Grand River Street with 100% development;
- ▶ Signalization of the intersection of Paris Links Road and Grand River Street significantly improves the level of service at this intersection however problematic queuing issues exist;
- ▶ Re-aligning Paris Links Road to be the fourth leg of the intersection of Silver Street and Grand River Street produces good levels of service; and
- ▶ Re-aligning Paris Links Road to be the fourth leg of the intersection of Capron Street and Grand River Street produces good levels of service and also benefits the nearby hospital.

## RECOMMENDATIONS

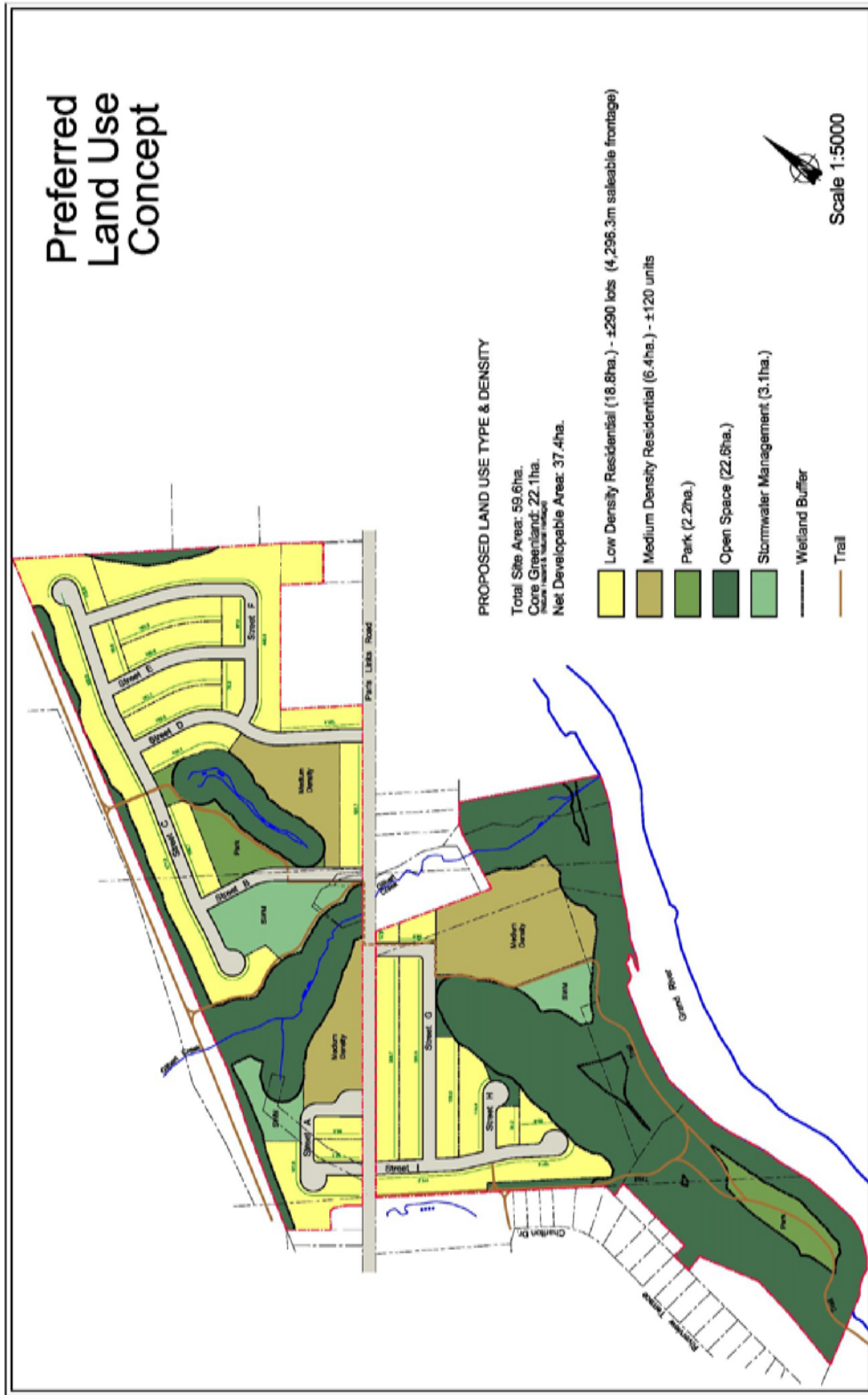
Based on the above conclusions, it is recommended that the County move forward with the installation of an exclusive right-turn storage lane (45 metres) on Paris Links Road at Grand River Street.

It is further recommended that the County move forward with the required studies in support of re-alignment of Paris Links Road to the fourth leg of the intersection of Silver Street and Grand River Street or Capron Street and Grand River Street.

Yours very truly,

**PARADIGM TRANSPORTATION SOLUTIONS LIMITED**

**James J.L. Mallett**  
M.A.Sc., P.Eng., PTOE  
Vice President



**Figure 1**  
**Development Concept**

Paris on the Grand TIS

