Using GIS to Enhance the Value of Speed Display Board Data: City of Ottawa Case Study Part 2

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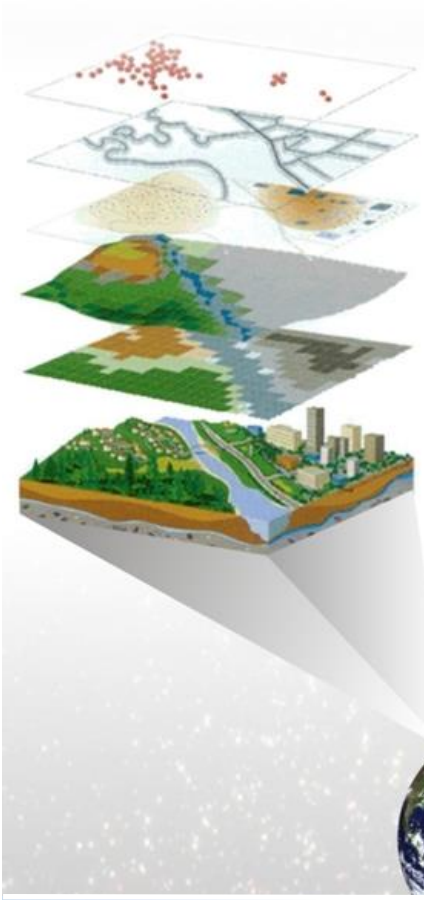

Special Report

Research Project Chronicling the Use of Transparency and Accountability as Political Buzzwords, or as Drivers Ensuring the Standard of Access to Public Records in Canada Is Best Practice

http://wellar.ca/informationresearch/Publications.html

February 2024

1. Background

The preceding report, Using GIS to Enhance the Value of Speed Display Board Data: City of Ottawa Case Study Part 1, was necessarily closed prior to receiving a response from the City of Ottawa regarding:

1. The number of SDBs installed in each ward.
2. The location of SDBs by ward, and across the city.

The circumstances behind the decision to move forward to publication are described in Using GIS to Enhance the Value of Speed Display Board Data: City of Ottawa Case Study Part 1, so are not repeated here.

However, it may be instructive for activists, journalists, emerging researchers, *et al* to briefly comment on how this project absorbed the delayed publication and research reality which is common in dealing with politicians and governments. **(1)**

In short, I was caught between the need to take on another project and uncertainty about whether and when I would receive any useful information from the City of Ottawa.

In the interests of initiating and promoting research in this field, it was decided to publish the materials in hand for sharing with interested parties in Canada, the U.S., and elsewhere, and to prepare an update upon receipt or non-receipt of the requested information.

The requested materials have been received, Plan B has been replaced by Plan A, and this update discusses the materials as part of the assets in place in sections 5, 6, and 10 of the prior report, Using GIS to Enhance the Value of Speed Display Board Data: City of Ottawa Case Study Part 1.

2. Email Communication from Councillor Laine Johnson

The email of January 15, 2024, from Councillor Laine Johnson is included to complete our exchange of communications prior to publishing this report. In addition, it provides context for remarks in email 2 from Byron Hemlow, Program Manager, Traffic Investigations & Surveys, City of Ottawa.

Exhibit 1. Email communication of January 15, 2024, from Councillor Laine Johnson: Speed display board records; response from staff?

From: Johnson, Laine <laine.johnson@ottawa.ca>
Sent: Monday, January 15, 2024 9:36 AM
To: wellar.barry@gmail.com
Cc: Loan, David <david.loan3@ottawa.ca>; Hemlow, Byron

<Byron.Hemlow@ottawa.ca>
Subject: Re: Speed Display Board records; response from staff?

Hi Barry,

Thank you for your email. I have copied Byron Hemlow from Traffic Services to pass along your request. Byron, do we have a map of the speed boards, how many and where in each ward?

That said, I remain concerned that your research may be hindered by the unreliability of speed board data. The devices are intended as a deterrent to speeding drivers, but we have found them unreliable in terms of accurate data. In fact, the City won't use speed board data when considering traffic calming options for neighbourhoods because of their inaccuracy.

Recently, a speed board on Centrepointe was observed displaying speeds over 120km/h, though vehicles were clearly not moving anywhere near that fast. That's an extreme example, but we know that they do not provide consistently accurate data. Furthermore, low atmospheric light levels (from snow, clouds, etc.) sometimes prevent the speed boards from operating at all as they are solar powered.

You may know that some (certainly not all) speed boards have the capacity to share data wirelessly. Unfortunately, that service has again been very unreliable both in my experience and in the experience of Traffic Services staff. This problem is so persistent that Traffic staff have recommended ending the contracts for this service, and my office no longer subscribes to the online data service for College Ward.

I am disappointed in the unreliability of these devices for capturing speed data. However, they continue to be useful as traffic calming devices and we will keep using them for that purpose. We did chat on the phone about your seeking out other cities' data approaches for speeding behaviour. I wonder if you have had any success in that pursuit?

Thank you again for your email, Barry, and good luck with your research.

Warm regards,

Laine

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Councillor Johnson's engagement with the project through a detailed response is much appreciated. Three items warrant comment for this report.

First, the research design of this project does not involve considerations of accuracy or precision of speed display board data for good reason.

That is, the state of the art, science, or technology of these speed measuring devices is not at a level to pass accuracy or precision tests that meet court standards, for example. Consequently, their use in this research project respects what the City of Ottawa intends them to do, namely, to provide a reasonable approximation of vehicle speeds for the purpose of influencing driver behaviour. **(2)**

By way of brief comparative comment, automated speed enforcement devices (ASEDs) meet court tests and are also highly sophisticated and more expensive relative to SDBs.

Therefore, because relatively low-tech and inexpensive SDBs are not in the ASED class and are currently used to 'influence' driver behaviour, concerns about high-end accuracy, precision, viability, and other top-end performance measures are misguided.

Second, regarding the statement, "We did chat on the phone about your seeking out other cities' data approaches for speeding behaviour. I wonder if you have had any success in that pursuit?", initial contacts have been made. Follow-on discussions are on hold until this report has been in circulation for six months or so.

Because this project is breaking new ground for a number of localities **(3)**, it may take several months of exposure including presentations at professional, academic, of technical conferences to identify participant cities with research inclinations to lead the research agenda.

Third, prior to the completion of Using GIS to Enhance the Value of Speed Display Board Data: City of Ottawa Case Study Part 1, reasons emerged that the scope of the exploratory pilot study needed to be broadened and deepened.

By way of brief recall, the original intent of this project was limited to promoting an expansion of the City of Ottawa's capture of speed board data, and to using GIS to facilitate making those data available to residents, community associations, public interest groups, councillors, police, researchers, safety advocates, and other users.

However, further review of the goals and operations of the temporary traffic calming program (TTCP) combined with consultations about failures of City of Ottawa politicians to deliver on transparency and accountability promises, prompted a project pause: mid-course corrections to the research design are required if this project is to contribute to

effectively addressing traffic safety problems that have plagued this city for many decades.

Primary causes of the design corrections are summarized as follows.

In my experience, the TTCP program is too restricted in its traffic safety goals, it lacks effectiveness measures and means to achieve those measures, and it lacks due regard for substantive citizen, community group, and public interest group engagement in using speed boards to significantly affect speeding behaviours.

By way of brief context for that critique, a presentation requested by former Ottawa Centre MPP Yasir Naqvi for the Community Summit, *Speed Limits and Road Safety*, May 30, 2015, is recalled.

In the presentation, Speed Limits and Road Safety: Examples of Questions to Ask to Ensure the Safety of Pedestrians, eight questions posed almost nine years ago are directly pertinent to this report:

> "10. Are traffic surveillance standards for police, radar, and cameras at road intersections used by pedestrians appropriate to ensure pedestrians' safety?
>
> 11. Are traffic surveillance operations by police, radar, and cameras at road intersections used by pedestrians appropriate to ensure pedestrians' safety?
>
> 12. Are traffic enforcement standards for police, radar, and cameras at road intersections used by pedestrians appropriate to ensure pedestrians' safety?
>
> 13. Are traffic enforcement operations by police, radar, and cameras at road intersections used by pedestrians appropriate to ensure pedestrians' safety?
>
> 14. Are traffic surveillance standards for police, radar, and cameras on roads proximal to schools, playgrounds, parks, seniors' residences, community centres, arenas, outdoor rinks, ball diamonds, soccer fields, etc. appropriate to ensure pedestrians' safety?
>
> 15. Are traffic surveillance operations by police, radar, and cameras on roads proximal to schools, playgrounds, parks, seniors' residences, community centres, arenas, outdoor rinks, ball diamonds, soccer fields, etc. appropriate to ensure pedestrians' safety?
>
> 16. Are traffic enforcement standards for police, radar, and cameras on roads proximal to schools, playgrounds, parks, seniors' residences, community centres, arenas, outdoor rinks, ball diamonds, soccer fields, etc. appropriate to ensure pedestrians' safety?

17. Are traffic enforcement operations by police, radar, and cameras on roads proximal to schools, playgrounds, parks, seniors' residences, community centres, arenas, outdoor rinks, ball diamonds, soccer fields, etc. appropriate to ensure pedestrians' safety?"

In view of what has not improved in nine years, the critique is on the generous side.

Further, based on surveys of City of Ottawa politicians for the 2018-2022 and 2022-2026 terms, there are many good reasons to limit the control which these politicians have over public access to city records. Some of these reasons are contained in such reports as

- Interim Report 23. Analysis and Implications of Survey #1, City of Ottawa Mayor and Councillors, 2022-2026: Do You Agree that Citizens Are Entitled to Free, Easy, Timely, and Direct Online Access to the Public Records Held by the City of Ottawa?;
- Contributions by City of Ottawa Council to Best Practice Standards for Citizens' Access to Spatial Records Held by Local Governments; and
- BEST PRACTICE STANDARDS FOR CITIZENS' ACCESS TO SPATIAL RECORDS HELD BY LOCAL GOVERNMENTS (Presentation Slides).

The alternative explored here is to suggest ways that citizens, community groups, *et al* can utilize speed boards directly and not waste time twiddling their thumbs waiting for the city to provide speed board data.

Finally, achieving better use of speed boards and effective spending of tax dollars requires high standards of transparency and accountability of politicians and staff,

Regrettably, both the previous and current councils have been roundly criticized for failing to provide citizens proper access to records on contentious issues – bus transit, light rail transit, Lansdowne re-development 1.0 Lansdowne re-development 2.0, Chateau Laurier 're-construction', Ottawa Police Services Board secrecy, Ottawa Police Service secrecy, councillor-developer ties, so-called 'freedom' convoy bumbling, Bill 23, provincial funding shortfalls, silence on the mayor's million tree planting election promise, affordable housing failures, Experimental Farm shade dealings, etc., etc.

The phrase 'Cone of silence' is often used to characterize the city hall mindset about failure to properly inform citizens.

As a result of those consultations and further reviews, the scope of the exploratory pilot study is expanded in Part 2 to comprise the following topics:

- Using GIS to enhance the value of speed board stations;

- Using GIS to enhance the value of speed board data not captured by the board operator;
- Using GIS to enhance the value of speed board data captured by the board operator.

The response received from the City of Ottawa regarding the number and locations of SDBs installed in each ward is discussed in section 3, and then section 4 and section 5 present the case for using GIS to enhance the value of speed boards and speed board data.

3. Communication regarding the number and location of speed display boards in each ward for the City of Ottawa

The email received from Byron Hemlow, City of Ottawa, is presented in its entirety as Exhibit 2, with only minor re-formatting of the graphic for space purposes and labelling the graphic Table 1 for ease of referencing.

Exhibit 2. Email communication of January 15, 2024 from Byron Hemlow, Program Manager, Traffic Investigations & Surveys, City of Ottawa, Subject: Speed display board records; response from staff? Number of SDBs installed in each ward.

From: Hemlow, Byron <Byron.Hemlow@ottawa.ca>
Sent: Monday, January 15, 2024 3:37 PM
To: wellar.barry@gmail.com
Cc: Loan, David <david.loan3@ottawa.ca>; Johnson, Laine <laine.johnson@ottawa.ca>; Mustafa, Luay <luay.mustafa@ottawa.ca>; Brydges, Zac <Zac.Brydges@ottawa.ca>
Subject: RE: Speed Display Board records; response from staff?

Good afternoon Barry:

Traffic Services as of Dec 31, 2023, has deployed a Speed Radar Board (SRB) at 851 locations.

Note that due to the nature of the spatial join required to merge datasets together, there is a slight degree of error in the count of ward column. This is due, (in a handful of instances) to the roadway the device is deployed on also coincidentally being the Ward boundary line. We have also attached a .KMZ file which geographically represents each location as well as some high-level metadata you may find of use i.e. speed limit of roadway (at time of implementation), Year of installation, Ward, roadway name (with From/To) etc.

Table 1. Distribution of Speed Radar Boards (SRBs) by Ward*

Ward	# of SRBs
1	50
2	46
3	29
4	30
5	69
6	30
7	28
8	46
9	57
10	33
11	40
12	10
13	15
14	15
15	31
16	30
17	20
18	28
19	54
20	61
21	58
22	31
23	24
24	16
Total	**851**

***** For reasons given in the text, this project uses the term “speed display board” (SDB) rather than “speed radar board” (SRB).

Note that due to the nature of the spatial join required to merge datasets together, there is a slight degree of error in the count of ward column. This is due, (in a handful of instances) to the roadway the device is deployed on also coincidentally being the Ward boundary line. We have also attached a .KMZ file which geographically represents each location as well as some high-level metadata you may find of use i.e. speed limit of roadway (at time of implementation), Year of installation, Ward, roadway name (with From/To) etc.

I would be remiss if I did not echo, the Councillor’s comments regarding the viability/accuracy of speed radar board data for study purposes. While in the

appropriate context it can prove a somewhat useful source of information, it is not one with which the City has, or ever will use as the basis for business decisions.

Should you have questions please feel free to reach out to Luay, Zac or myself.

Regards,

Byron

Byron Hemlow (he,him)
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Cell: 613-978-8159
Byron.hemlow@ottawa.ca

The email communication from Byron Hemlow (Exhibit 2) reports on the number and location of speed radar boards (SRBs) installed in each ward. Three comments are made about those remarks before discussing the number of boards in sections 4 and 5, and the location of boards in section 5.

First, in the email the speed monitoring devices are referred to as speed radar boards (SRBs), whereas the devices are referred to as. speed display boards (SDBs) in this project's reports.

Our preference for speed display board (SDB) may be summarized as follows using the City of Ottawa's own materials about the purpose of the devices.

If the primary purpose of the boards is to inform and influence drivers about their vehicle speeds, as declared by the City of Ottawa, then that is done by displaying the numbers, hence the use of 'display' as in speed display board (SDB) in my reports.

Members of asset in place groups base their engagement on what is displayed on boards, and consultations revealed that they agree with the SDB terminology.

On the other hand, SRB is seen to be in the 'black box' category because, while the term radar has *cachet* as a means of detecting vehicle speeds, it does not appear to jump into anyone's mind that they are seeing numbers on the boards because they are 'radar boards'.

Rather, numbers representing detected speeds are displayed on the boards by the City of Ottawa primarily to inform and advise vehicle operators and members of the selected

in-place asset groups – residents, community associations, public interest groups, elected officials, city staff, and police – about vehicle speeds. Consequently, we retain the SDB term in our productions.

Second, we dealt with the accuracy concern in comments on Councillor Johnson's communication, and those comments apply to the statement "I [B. Hemlow] would be remiss if I did not echo, the Councillor's comments regarding the viability/accuracy of speed radar board data for study purposes." presented in Exhibit 2.

The essential point is that City of Ottawa speed boards are intended to have an influential effect, not to provide evidence for court cases (civil or criminal).

As a result, while there are degrees of accuracy from low end ('in the ballpark') to high end ('right on the money') for measuring devices in general, I believe that reasonable approximation of accuracy is an appropriate expectation in the case of Ottawa's speed boards. Therefore, that level of accuracy is sufficient for this phase of the speed board project. **(4)**

Third, this report describes the exploratory pilot study phase of the SDB-GIS research project, and is focused on SBB numbers, SDB locations, using GIS to enhance the value of SDB stations, of SDB data which are not captured by the City of Ottawa, and of SDB data which are captured by the City of Ottawa and made available at a best practices level to residents, community associations, public interest groups, safety advocates, and researchers. **(5)**

Consequently, the statement,

> "While in the appropriate context it [speed radar board data?] can prove a somewhat useful source of information, it is not one with which the City has, or ever will use as the basis for business decisions."

is extraneous to my request for data on the number and location of speed boards and opines on matters which are outside the scope of this phase of the project. Therefore, it is not pursued here.

4. Significance of the Number and Location of SDBs to Using GIS to Enhance the Value of SDB data

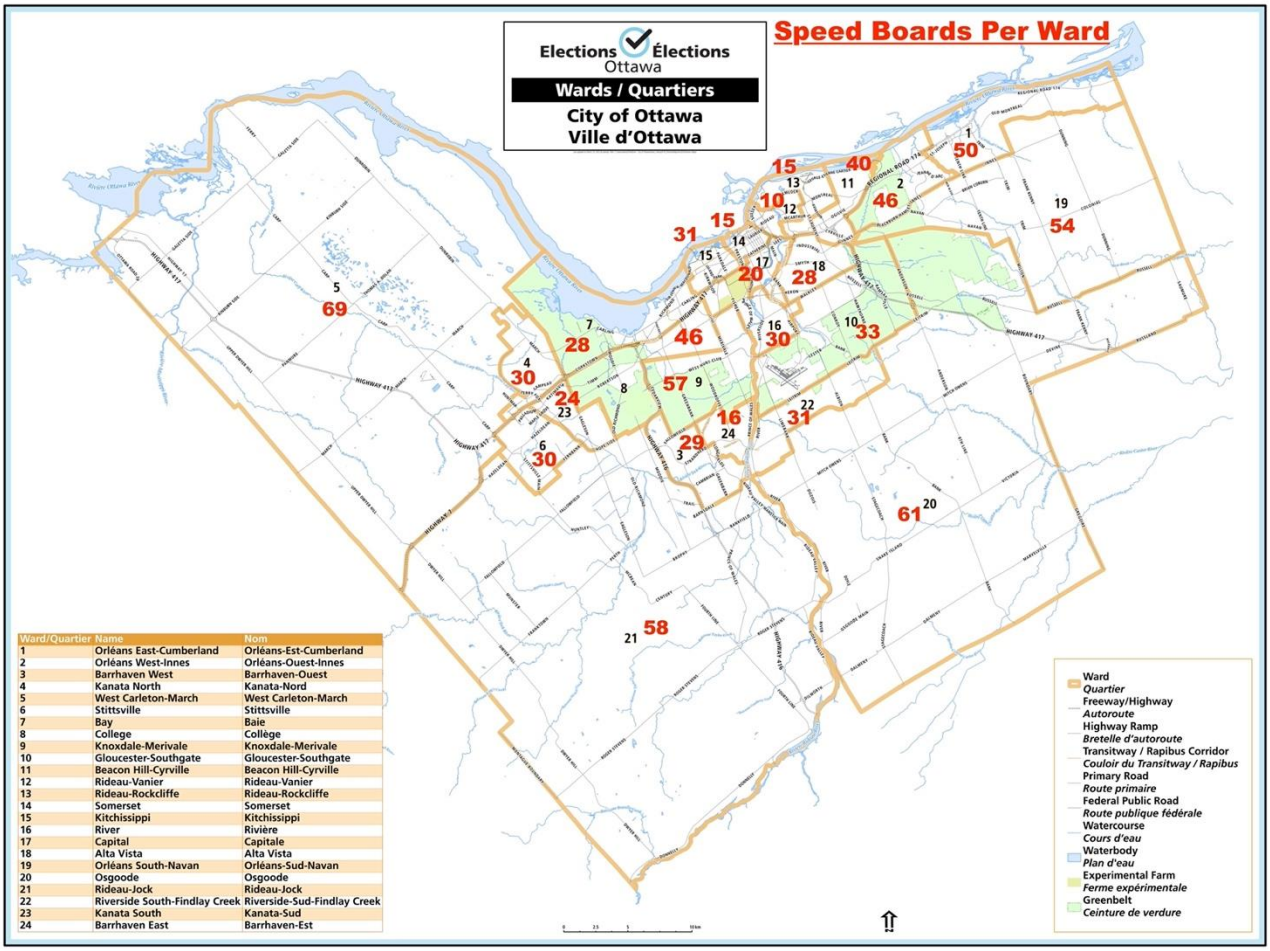
The following comments are preliminary and indicative, and I expect that residents, community groups, public interest groups, councillors, police, researchers, and safety advocates could add many comments to this brief listing.

A. Stations are deployed in all wards.

Because speed board stations are deployed in all wards as shown in Figure 1 and Table 2, there are no blank spaces or empty cells on maps or in tables to complicate analytical activities.

As a result of that extensive coverage, there is no need to engage in interpolation, extrapolation, or other estimation technique to fill in blanks.

Figure 1. Distribution of Speed Boards in Wards, City of Ottawa, December 31, 2023*



* It is recalled as a caution from Table 1 of Using GIS to Enhance the Value of Speed Display Board Data: City of Ottawa Case Study Part 1 that several dozen measures can be employed in temporary traffic calming programs. The focus in this report is on speed boards, but we hasten to emphasize that the numbers of boards in wards is not sufficient by itself to prudently critique the effectiveness of traffic calming measures employed in a ward..

Table 2. Ward Numbers, Ward Names, and # of Speed Boards Per Ward, City of Ottawa, December 31, 2023*

Ward #	Ward Name	# of SDB Stations
1	Orleans East -Cumberland	50
2	Orleans West-Innes	46
3	Barrhaven West	29
4	Kanata North	30
5	West Carleton	69
6	Stittsville	30
7	Bay	28
8	College	46
9	Knoxdale-Merivale	57
10	Gloucester-Southgate	33
11	Beacon Hill-Cyrville	40
12	Rideau-Vanier	10
13	Rideau-Rockcliffe	15
14	Somerset	15
15	Kitchissippi	31
16	River	30
17	Capital	20
18	Alta Vista	28
19	Orleans South-Navan	54
20	Osgoode	61
21	Rideau-Jock	58
22	Riverside South-Findlay Creek	31
23	Kanata South	24
24	Barrhaven East	16

*For reasons given in the text (p.9), this report refers to speed display boards (SDBs) rather than radar speed boards (RSBs).

In addition to speed board deployment in all wards, the range of stations deployed in wards is 10-69 and, as shown in Table 3, there are entries for all frequency distribution classes 10-19, 20-29, 30-39, 40-49, 50-59 and 60-69.

Again, with entries in all classes there is no need to engage in interpolation or extrapolation excises to bridge gaps.

Table 3. Grouped frequency distribution of speed boards (SDBs/SRBs)

# of SDBs/SRBs in a ward	# of wards (N=24)
Under 10	0
10-19	4
20-29	5
30-39	6
40-49	3
50-59	4
60-69	2

B. Current numbers of speed boards in wards and citywide are sufficient to generate qualified general findings.

The number of stations in several wards are on the skimpy rather than the robust side, which means that more emphasis will likely need to be placed on deriving parameters rather than statistics.

However, the application of more sophisticated techniques of analysis can generate qualified general findings, with the need for qualifiers to decline as stations are added in wards that are currently on the skimpy side in relative terms.

Finally, graphically depicting skimpy and robust populations of stations is readily handled by GIS functionality.

C. Current numbers of speed boards are sufficient to lay a foundation for comparative analysis, trend analysis and other studies.

The Temporary Traffic Calming Program (TTCP) began in 2015 with budgets set at $40,000 per councillor, increasing to $50,000 in 2018, and $75,000 in 2023. That budget allocation imposes a limit on how much councillors can spend annually on speed boards as part of their overall traffic calming activity.

I have not been informed of nor have I located any comparative analysis, trend analysis, and other time-related studies undertaken by the City of Ottawa or other party.

However, it is quite possible that City of Ottawa began an annual research program in conjunction with the launch of the TTCP, or at some time during the past nine years of its existence, or that the Auditor General or other agency reviewed the TTCP.

If so, then residents, community groups, public interest groups, politicians, and police, as well as safety advocates, researchers, and others already have a body of longitudinal documentation on record to consider.

And, if the city has not undertaken that kind of benchmarking research, then residents, community groups, public interest groups, police, safety advocates, and researchers can begin at the beginning and develop their own approach to getting a handle on the development of the speed board network.

Mapping the location of speed boards and the distribution of ward and inter-ward traffic and relating numbers of speed boards and traffic data – volumes, speeds, timing, etc., – on ward maps all involve spatial phenomena, and all are longstanding GIS applications.

D. Current numbers of boards are sufficient to ask ward councillors about decisions behind their ward deployments of speed boards relative to deployments in other wards.

As illustrated in Table 1 and Table 2, with a range of 10 to 69 speed boards in the wards, there is a significant amount of variation in the deployment of speed board stations.

Councillors who were elected to office in November 2022 for the 2022-2026 term have only one year to account for their speed board actions or non-actions.

However, those who were previously in office in the 2014-2018 term and/or 2018-2022 term have considerably more to explain about speed board deployment actions and non-actions, with emphasis on the reasons behind patterns of locations.

In all cases, whether dealing with one year or nine years of making decisions about numbers and locations of stations, these data are readily entered into a GIS and can be spatially manipulated in numerous ways for analytical, evaluation, demonstration, and whatever other decision tasks come to the minds of councillors or citizens, community associations, et al.

E. A selection of variables illustrating how numbers and locations of speed boards point to questions about board deployment decisions and actions.

It is likely that all types of variables including ordinal, nominal, interval, and ratio are pertinent to explanations that residents, community groups, public interest groups, safety advocates, and researchers might wish to seek from councillors, city staff, and police.

The brief list of illustrative variables in Table 4 is selected from the learned, technical, professional and government literatures as well as broadcast media and social media accounts.

It is emphasized that the selected variables are general and should be directly applicable to all wards.

In addition, they can be fine-tuned in terms of distances, temporal aspects (e.g., hours, days, months) and other characteristics that the user wishes to specify for all wards, or a particular ward or wards.

And it is further emphasized that the list of variables is indicative, is intended solely for illustrative purposes, the order does not represent priority among variables, and the variables do not necessarily represent conditions in any ward.

Table 4. Selected variables illustrating how numbers of speed boards point to questions about board deployment decisions and actions*

v1. SDBs/k of regional roads

v2. SBDs/k of major collectors

v3. SDBs/k of minor collectors

v4. # of speeding citations on roads with SDBs

v5. # of speeding citations on roads without SDBs

v6. # of citations in 40k zones within 200k of SDB

v7. # of citations in 40k zones within 400k of SDB

v8. # of citations in 60k zones within 300k of SDB

v9. # of citations in 60k zones within 600k of SDB

v10. # of complaints to OPS traffic based on SDB displays in 40 kph and 60 kph zones

v11. # of responses by OPS traffic to complaints based on SDB displays in 40kph and 60kph zones

v12. % of OPS traffic responses to complaints based on SDB displays in 40kph and 60kph zones

V13. # of displayed speeds exceeding 50kph in 40kph zones

V14. # of displayed speeds exceeding 80kph in a 60kph zones

*In the interests of space, v = variable, # = number, SDB = speed display board, k= kilometre, kph = kilometre per hour, OPS = Ottawa Police Service, % = percentage

GIS applications involving these, and many other variables are used in thousands of communities worldwide, so there is a massive literature available to assist in developing applications specific to the City of Ottawa if needed.

F. The number of stations and their locations is not a technological burden.

Given the state of latest, later, and even late generation geographic information system technology (hardware, software, and peripherals), it appears fair to say that prudently incorporating data captured from the current total of less than 1,000 SDBs is not a major technical challenge. **(6)**

Further, given the state of latest, later, and even late generation geographic information system science and applications, extracting information from data prudently captured from less than 1,000 SDBs is well within the sphere of expertise of many if not most geographic information system professionals (GISPs) as well as, for example, geo-statisticians, professional transportation planners, professional engineers, and those with training in geomatics and geo-analytics.

The bottom line, then, is that the current number of less than 1,000 stations is not seen as a challenge to the GIS functionality already in place at the City of Ottawa.

With those remarks establishing the general significance of knowing the numbers of speed boards per ward and citywide for GIS purposes, section 5 presents a selection of variables which could be used in comparative analysis, trends analysis and other analyses which are available for GIS enhancement even before captured speed board data are employed.

Three comments should be sufficient to outline the potential of using the number and location of SDBs in wards to ask questions and investigate issues involving SDB-related decisions and actions.

First, residents, community groups, public interest groups, safety advocates, researchers, and others have expertise and experience to significantly expand the list of variables pertinent to seeking explanations from councillors, staff and OPS traffic enfacement about decisions and actions involving the distribution and deployment of SDBs.

Second, SDB data are not required to investigate situations, relationships, etc., represented by those variables but, once data from SDBs are available, the number of variables listed in Table 3 pales in comparison to the number which could be incorporated into analyses.

Third, investigations involving the variables in Table 3, and many other variables, can be conducted to some degree without the support of a GIS infrastructure component. As

part of its due diligence, the City of Ottawa may already have lists of variables that have been derived from discussions with residents, residents, community groups, public interest groups, politicians, and police, as well as safety advocates, researchers, and others, although I have not engaged in any communications in that regard. **(7)**

However, many thousands of reports in the learned literature, professional literature, government reports, and other bodies of literature point to considering the contribution that GIS could make to enhancing the value of speed display board data, and especially captured speed display board data.

5. Thoughts on Using GIS to Enhance the Value of Speed Board Stations, User-Captured Speed Display Board Data, and Host-Captured Speed Display Board Data

A. Context Remarks.

By way of brief background, and out of respect for those who conducted original research and development in this field, conceptual inquiries and feasibility studies using GIS for transportation studies and applications took serious root in the 1960s and 1970s on many fronts and have increased by leaps and bounds ever since. **(8)**

This project in 2024 is a derivative of thousands of previous productions, and they are duly acknowledged.

What appears to be new or different in this line of inquiry is using speed display boards, speed display board data which are not captured by the speed board operator, and vehicle speed board data which are captured by the board operator, for input to a geographic information system (GIS).

The proposition underlying this exploratory pilot study is that GIS can be used to enhance the value of speed boards, SDB data which are not captured by the board operator, and SDB data which are captured by the board operator. These enhancement opportunities are considered in sections b. c, and d. **(9)**

But first, it is necessary to present the materials provided by Bryan Hemlow, City of Ottawa, in response to the second part of the request for SDB/SRB information namely, the location of SDB/SRB stations.

As stated in Exhibit 2**,**

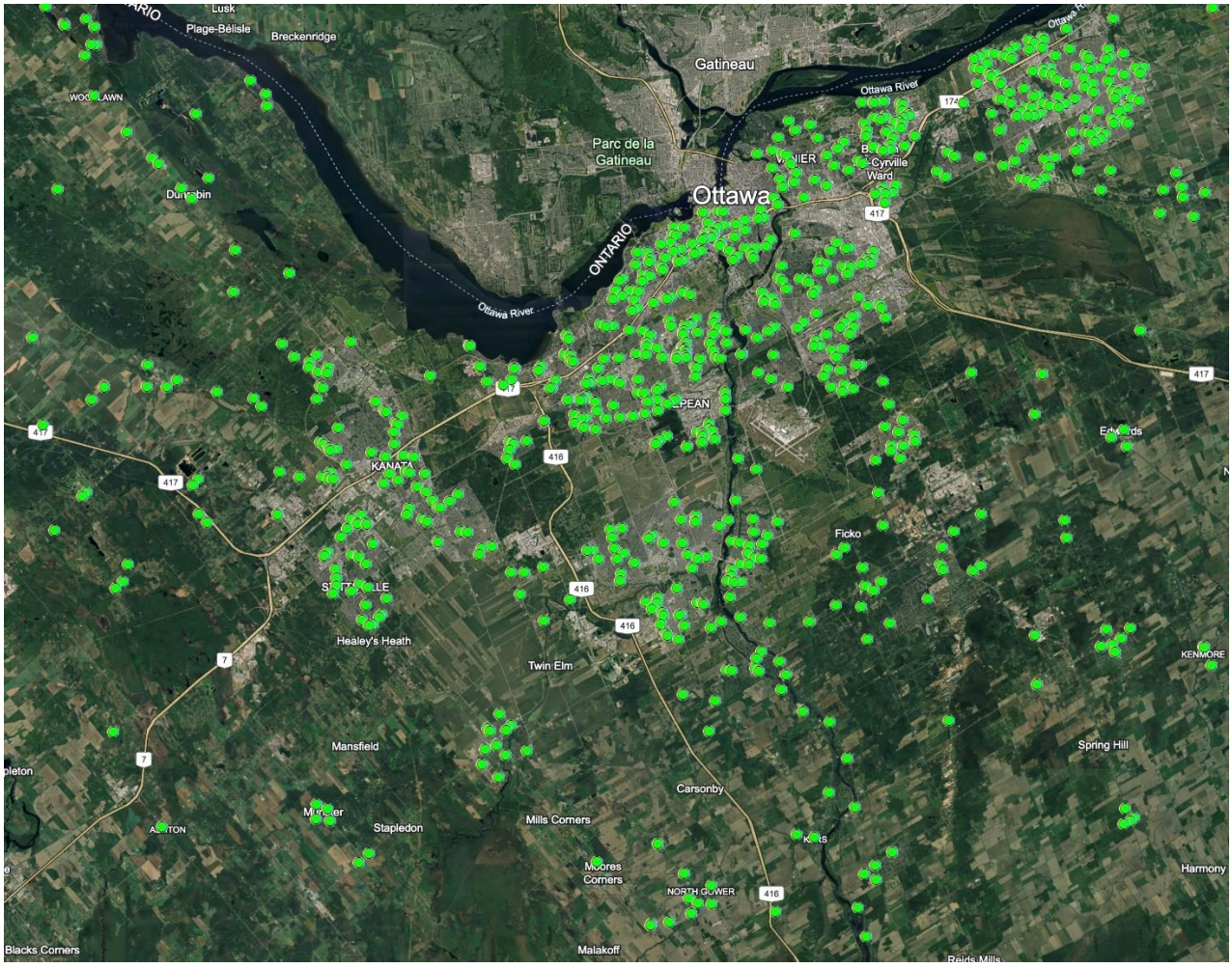
> “We have also attached a .KMZ file which geographically [underline added] represents each location as well as some high-level metadata you may find of use i.e. speed limit of roadway (at time of implementation), Year of installation, Ward, roadway name (with From/To) etc.”

A geographic representation of 851 speed boards across the City of Ottawa is shown in Figure 2.

The key term in the KMZ file communication for this production is “geographically”, which brings us to thoughts on using GIS to enhance the value of:

- speed board stations;
- speed board data not captured by the board operator;
- speed board data captured by the board operator.

Figure 2. Geographic Representation of City of Ottawa Speed Boards, December 31, 2023



B. Using GIS to enhance the value of speed board stations.

The 851 speed board stations across the city represent 851 points of reference for a number of the variables in Table 4, including many which have geographic attributes:

V4. # of speeding citations on roads with SDBs

V5. # of speeding citations on roads without SDBs

V6. # of citations in 40k zones within 200k of SDB

V7. # of citations in 40k zones within 400k of SDB

V8. # of citations in 60k zones within 300k of SDB

V9. # of citations in 60k zones within 600k of SDB

V10. # of complaints to OPS traffic based on SDB displays in 40 kph and 60 kph zones

V11. # of responses by OPS traffic to complaints based on SDB displays in 40kph and 60kph zones

V12. % of OPS traffic responses to complaints based on SDB displays in 40kph and 60kph zones

V13. # of displayed speeds exceeding 50kph in 40kph zones

V14. # of displayed speeds exceeding 80kph in 60kph zones

There are numerous ways that variables with geographic characteristics can be used by residents, community associations, public interest groups, councillors, police, safety advocates and researchers to analyze traffic speed patterns by locations and times, police citations issued by locations and times, and relationships between the SDB locations of recorded speeds of vehicles and types of roads.

Further, because they live in the midst of motor vehicle travel and may be vehicle operators themselves, I expect that after a preliminary round of discussions about variables and the geographic aspects of speed display station locations, it is most likely that area residents, community associations, public interest groups, safety advocates and researchers will arrive at questions which lead to more geographic variables that need to be taken into account in SDB decisions and actions.

By way of illustration, the term ‘spacing’ is a core geographic concept, and these examples indicate how the reality of geography is a front and center factor in SDB decisions:

- Is there a logic to the spacing of SDBs to achieve maximum influence on vehicle operators? If so, what is the basis of this logic and how is its effectiveness measured?
- Is there a logic to the spacing of SDBs v. intersection traffic signals?
- Is there a logic to the spacing of SDBs v. STOP signs?
- Is there a logic to the spacing of SDBs v. SCHOOL ZONE signs?

In addition to those examples, the 851 SDB stations now in place can be used as the basis for creating neighbourhood and ward maps linking schools, seniors' residents, parks, shopping centres, and other gathering places with SDB stations on regional roads, major connectors, minor collectors, and local streets.

However, as previously noted in our first report on this topic (Using GIS to Enhance the Value of Speed Display Board Data: City of Ottawa Case Study Part 1), and as more than 50 years of research confirm, it is only with the support of a geographic information system that speed display board stations themselves can significantly contribute to influencing the behaviour of some drivers some of the time.

C. Using GIS to enhance the value of speed board data not captured by the speed board operator.

Speed display board data are, as the term suggests, the displayed numbers representing recorded speeds of vehicles upon entering and proceeding through a board's sensing zone.

However, displayed speed numbers change when replaced by another number, and when a vehicle exits the sensing zone, and when other rules set by the speed board operator take effect.

Because these data are not captured at source by automated means it is necessary for interested parties to directly observe the boards, or remotely sense the boards, to obtain data which could be applied to variables such as those in Table 4.

And the challenge of that task cannot be over-stated.

If an internal or external automated recording capability is not in place to 'handle' whatever data are displayed on the boards **(10)**, then recording the populations of displayed data and even samples can quickly become a tedious, arduous, time-consuming, and non-sustainable exercise by participants.

However, if residents, community groups, public interest groups, councillors, police, safety advocates, researchers, and other groups choose to make the effort to capture data from SDBs, then examination of the productions made available by as few as three

or four websites should be sufficient to reveal that using GIS could markedly enhance the value of what might be termed self-captured data. **(11)**

By way of brief comment, the evidence is abundant about using GIS to generate, process, store, and disseminate municipal data, because some 80% of all municipal records are geographic in nature, and there is no other way to 'handle' millions upon millions of geographic data elements and items in numerous formats.

Further, evidence is abundant in millions of pages of text and millions of paper and digital maps and other productions documenting how GIS increases the value of geographic and other data for policy, program, planning, and operations purposes in thousands of municipal agencies around the world. **(12)**

Speed display board data are not an exception to the rule in the above regards, because geographic data are geographic data whether taken off speed display boards by citizens or transmitted from board stations to a digital device operated by a municipality.

Since it is beyond the scope of this project to provide a review of the literature on using GIS to enhance the value of geographic data, a selection of questions is presented which have been used on many occasions to direct inquiries and investigations into GIS uses is presented in Table 5. **(13)**

Table 5. Examples of Questions to Use in Online Searches of productions describing how GIS Enhances the Value of Data*

1. How does GIS enhance the value of geographic data?
2. How does GIS enhance geographic data use?
3. How does GIS enhance the body of geographic data users?
4. How does GIS enhance spatial thinking?
5. How does GIS enhance spatial decision-making?
6. How does GIS enhance public participation?
7. How does GIS enhance linking multiple data recording devices in multiple locations?
8. How does GIS enhance public access to public geographic *records?

*Reference is to online searches because a large proportion of the massive volume of materials on this topic is electronically available. However, for

> original thoughts from which many online works are derived, it may be necessary to refer to hardcopy productions of the 1960s, 1970s and 1980s which have not been incorporated on online productions.

Speed display board data are a body of subject matter data, and scans of search engine results reveal that all the questions yield numerous sources of response to each question. **(14)**

The critical point about using speed board data not captured by the speed board operator, is that the data are on the boards for the taking, copying, imaging, whatever, and there is no need to get permission, support, co-operation, assistance, make a case, etc., or wait around until:

1. The city decides to capture the data for the SDB(s) of interest;
2. The city acts to capture the data for the SDB(s) of interest;
3. The city decides to make the captured data of interest available to the public;
4. The city acts to make the captured data of interest available to the public;
5. Access to SDB data captured by the city meets best practices standards (e.g., free, easy, timely, direct, online), and is supported by GIS.

Based on experiences over the past 50 years, overwhelming evidence supports what is proposed about using GIS to enhance the value of speed board data not captured by the speed board operator.

And conversely, no substantive evidence has been identified to counter the posit that using GIS would enhance the value of speed board data not captured by the speed board operator.

D. Using GIS to enhance the value of speed display board data captured by the board operator.

We are now dealing with data that are captured by the operator, that is, the speeds displayed on the boards are registered by the operator City of Ottawa as records of the speeds of vehicles proceeding through the sensing zone of each SDB which is included in the capture protocol. As of December 31, 2023, there could be a maximum of 851 SDB stations in the capture protocol.

The core data systems difference between 5b and 5c is that transient speed board displays in 5b now have the added feature of becoming data records inside the SDB infrastructure in 5c, with the capacity to be directly incorporated by the board operator in a GIS.

It appears that everything stated in section 5b about using GIS to enhance the value of speed board data not captured by the speed board operator also applies to the case of board data captured by the speed board operator.

I hasten to add, however, that the scenario described in 5b represents a lower-order threshold of what can be achieved by using GIS to enhance the value of operator-captured speed display board data.

Simply put, the literature is clear that having captured data available for the variables and relationships identified in 5b is the 'tip of the iceberg' when it comes to the variables and relationships that could be addressed in GIS applications using data captured by 851 speed display boards.

Further, from the perspective of better traffic speed monitoring, more effective traffic speed enforcement, and more effective deployment of traffic speed enforcement resources at both the individual ward and citywide ward levels, it seems to be a given to use GIS to combine the speeds captured by automated speed enforcement devices (ASEDs) with those captured by SDB stations or, at a systems level, automated speed enforcement systems and speed display board systems.

As for the relationship between SDBs and ASEDs, they share many geographic features. These commonalities are illustrated by the geographic features contained in the City of Ottawa summary statement about an automated speed enforcement system, (https://ottawa.ca/en/parking-roads-and-travel/road-safety/enforcement#section-650d22c7-e9a1-46c2-ad14-e71f5ce1c757), and those which have already been noted about a speed display board system.

The bottom line with regard to the SBD/SRB database captured by the operator, City of Ottawa, is that due to its overwhelmingly geographic nature, its potential volume, the dynamic aspect, and the need for analytical capabilities to support data-driven decisions about traffic safety initiatives, it appears fair to say that using GIS is required in order to enhance the value of data captured by speed display boards.

And, based on what has already been stated about GIS capabilities, it appears evident that the state of the science, technology, and applications in the field of geographic information systems is fully capable of enhancing the value of data captured by speed display boards.

The next two sections briefly report on important developments that occurred while this report was in its final stages. Both developments are substantial issues in their own rights, and these comments are intended to 'put them on the table' for future consideration.

Section 6 discusses the Region of Durham's provision of speed board data to Durham Regional Police Services, and section 7 discusses the rich body of material about GIS applications which is available online courtesy of university and college student projects.

6. Durham Region Could be a Case Study Regarding the Need to Know about Data from Speed Board Signs (Boards)

The link to the radar speed signs (boards) page, Traffic Operations Centre, Durham Region is https://www.durham.ca/en/living-here/radar-feedback-board.aspx#What-do-you-do-with-the-data-collected-from-the-signs

The statement of direct interest to this project for two reasons is:

> **What do you do with the data collected from the signs?**
>
> *Speed and volume data is transmitted from the radar speed signs to the Region of Durham through cloud software. Data is [sic] analyzed by regional staff to determine compliance levels to the posted speed limit. Durham Regional Police Services may be notified if compliance is low and provide extra enforcement in these sensitive areas.*

First, the need to know about speed limit compliance may go far beyond Durham Regional Police Services and include, for example, Durham Region residents, community associations, public interest groups, elected officials, public safety advocates, researchers, journalists, and others.

Second, for reasons of accountability and transparency, Durham Region residents, community associations, public interest groups, elected officials, public safety advocates, researchers, journalists, and others may need to know what actions are taken by Durham Regional Police Services, when, and where, and the consequences of actions taken or not taken.

It appears fair to say that the Durham Region materials point directly to the themes of this exploratory pilot study, namely that much better use can be made of speed board data, and that a core means for that to happen is hanging the speed board system on a GIS infrastructure.

7. Student Contributions to Thinking about How to Use GIS to Enhance the Value of Geographic Data

Because about 80% of the data in municipal government records in federations (federal government first tier; provincial, state, or territorial governments, second tier; and local governments (regional, municipal) third tier) have a geographic attribute **(15)**, thousands

of municipal governments around the world have adopted a geographic information system (GIS) as part of its administrative infr6astructure for executive, policy, program, planning, operational, and other purposes. **(16)**

As an abundant literature makes clear, faculty and students in universities and colleges are primary catalysts and support agents for GIS development in local governments and have played a leading role in that movement through their contributions in GIS research, education, training, applications, and management, as well to advances in GIS science and technology. **(17)**

One element of academic participation in GIS evolution which is especially pertinent to this exploratory pilot study is the engagement of students and interns in GIS Day events, in GIS courses at the graduate and undergraduate levels, and in training courses with private sector companies and government agencies.

That is, and based on decades of involvement in both municipal government affairs and GIS (science, teaching, research, training, applications, and management), I believe that the work of students and interns could be an informative and persuasive way to engage those outside the GIS community to participate in a project using GIS to enhance the value of speed display boards and speed display board data.

Towards that end, and having regard for time constraints, I contacted a selection of faculty members and business associates who I thought could respond directly, or would forward my inquiry to the person responsible for links to GIS Day posters and student productions arising from GIS assignments.

Communications seeking links and responses containing links to student productions are presented in Exhibit A.

I believe the list of links to student and intern productions is sufficient to inform those outside the GIS community why I propose a speed display board and GIS connection in this exploratory pilot study.

And, I am optimistic that the productions will encourage residents, community associations, public interest groups, public safety advocates, researchers, and police to conduct their own studies into using GIS to enhance the value of speed display boards and speed display board data.

8. Conclusion

The identified problem underlying this exploratory pilot study is that of chronic speeding, which is facilitated by decades of failure on the parts of governments and area police forces to achieve much if any reduction in the amount of speeding throughout the

former Region of Ottawa-Carleton, which is now the City of Ottawa. Same old, same old on the speeding front, one might say.

This exploratory pilot study undertakes to ascertain whether better outcomes could be made of speed display boards than simply using them as possible influencers of driver behaviour, that is, influence vehicle operators them to reduce their speeds.

As noted, this is a serious challenge.

For many years there have been thousands of speed signs along Ottawa roads with the word MAXIMUM across the top. Observations and traffic studies reveal that the word MAXIMUM has little influence on many drivers.

Further, I went down this path almost nine yeas ago as the keynote speaker at a Community Summit convened by former Ottawa Centre MPP Nasir Naqvi on *Speed Limits and Road Safety*. The presentation, Speed Limits and Road Safety: Examples of Questions to Ask to Ensure the Safety of Pedestrians, includes eight questions directly pertinent to this exploratory pilot study which, to my knowledge, have not yet been answered.

The story line in brief is that there has been a speeding problem for decades, including the last decade, and no evidence was found of the influence that speed display boards have had on reducing speeds.

While bearing that circumstance of chronic failure in mind, this study postulates that geographic information systems (GIS) can be used to enhance the value of speed display boards, speed display board data not captured by the City of Ottawa, and speed display board data which are captured by the City of Ottawa.

It is the finding of this exploratory pilot study that no argument or evidence discounts, counters, or otherwise negates any aspect of the study postulate.

And, it is a further finding that the postulate is affirmed as feasible, practical, doable, sustainable, and actionable as a consequence of assets in place, a massive supportive literature in the GIS field, as well as decades of experience in bringing GIS science and technology to bear on data-driven municipal government operations, including those dealing with traffic safety.

9. Endnotes

1. I refer primarily to those who may not yet be aware that it is advantageous to have both a Plan A and a Plan B in dealings with politicians and governments. Plan A assumes timely and pertinent responses to inquiries will be received, and Plan B assumes responses will not be received, or will be lacking because they are not timely,

not pertinent, etc. In the former case it is usually confirmed early on that it is go time, and in the latter case if a politician must be asked twice that is a sign that the delay or ignore mode is in play so cut any losses and put Plan B in gear.

2. I found no evidence that the City of Ottawa expected highest-, higher-, or even high-level accuracy performance from its speed boards. That being the case, it appears fair to say that the City's expected accuracy and precision standards are in the domain of reasonable approximation for most recorded speeds. And, by extension, any purported claims or concerns by City of Ottawa officials about accuracy or precision are 'misconceived' at best.

3. Literature searches and consultations did not yield any findings that the topic of this project has been considered in any locality in Canada. If that is in fact the case, then it may take considerably longer to expand this body of research beyond the City of Ottawa case study.

4. That comment is a point of clarification. No one at Ottawa city hall saw the project terms of reference prior to receiving the request for SDB numbers and locations, so impressions or speculations about the project are just that, impressions, or speculations.

5. The case for achieving a best practice level has been stressed in a number of reports, beginning with a council that believes citizens are entitled to free, easy, timely, and direct online access to public records except those which are precluded for legal reasons, and acts to make that best practice level reality. For further discussion see Contributions by City of Ottawa Council to Best Practice Standards for Citizens' Access to Spatial Records Held by Local Governments; Panel Discussion: Best Practice Standards for Citizens' Access to Spatial Records Held by Local Governments; BEST PRACTICE STANDARDS FOR CITIZENS' ACCESS TO SPATIAL RECORDS HELD BY LOCAL GOVERNMENTS (Presentation Slides).

6. A second opinion obtained from Gordon Plunkett, Director, Spatial Data Infrastructure, Esri Canada, is that incorporating speed board data captured from less than 1,000 SDBs is not a major GIS challenge: "The state of modern technology is not a concern for collecting data from a thousand SDBs as fast and reliable wireless data communication is available in Ottawa; vast quantities of cloud data storage is accessible at relatively low cost; and current GIS processing capabilities are such that functions and applications to collect, store, process and display the SDB data can be easily developed and operationalized quickly. Most likely the SDBs are using an Internet of Things (IoT) protocol, that is supported by the ArcGIS Velocity product (https://www.esri.ca/en-ca/solutions/modernization-drivers/iot) which can support billions of sensor feeds and provide human consumable visualizations and other products."

7. Again, this is an exploratory pilot study proposal, not a response to a call for proposals, so inquiring into details about what the City of Ottawa has done from a public engagement perspective is beyond the scope of this work.

8. Organizations whose members have made significant contributions to the literature on using GIS for transportation studies and applications include the Urban and Regional Information Systems Association (URISA), American Association for State Highway Transportation Officials (AASHTO), Geospatial Information & Technology Association (GITA), and Transportation Research Board (TRB).

9. It is again emphasized that this project represents an exploratory pilot study and is not a pretest or a trail run. For more information on their roles and relationships in methodologically designed research see R. Ackoff, *The Design of Social Research*, University of Chicago Press, 1953.

10. There are many terms to describe how data are 'handled' by a geographic information system from inputs to throughputs to outputs. For details about the state of the art, science, or technology of GIS operations, capabilities, functionalities, and applications in the City of Ottawa it is necessary to refer to the city's documentation on such matters. That said, it is highly likely that the GIS in place, City of Ottawa, would have no trouble handling whatever speed board data are presented to it for GIS inclusion.

11. Websites with materials demonstrating how using GIS could markedly enhance the value of self-captured data include hundreds of college and university websites in Canada, the U.S, and abroad, featuring GIS Day events. These websites post the products of thousands of students who use GIS to enhance data which they collect, acquire, assemble, etc., and create storyboards and mapboards that present descriptions, analyses, predictions, etc., of geographic situations, events, phenomena, processes, and so on that appeal to the students. There is every reason to think that members of community groups, public interest groups, researchers, public safety advocates, *et al* can do the same. Links to posted GIS Day events include https://www.bespatialontario.ca/event-3740077; https://www.lib.sfu.ca/find/other-materials/data-gis/gis/gis-events/gis-day/gis-day-2022; https://www.slideshare.net/wellarb/gis-day2014slides-final; https://www.esri.com/about/newsroom/arcwatch/99-ways-to-celebrate-gis-day/

12. As search engines can attest upon request, millions of publications report on the value of using GIS to transform geographic reality to geographic data, geographic data to geographic information, and geographic information to decisions, actions, knowledge, and other products. In the municipal government field, organizations which can assist in processing this massive amount of documentation include BeSpatial Ontario, Urban and

Regional Information Systems Association, and Municipal Information Systems Association. For illustrative publications on the transform process see, for example, Slides for the Friday Lunch Discussion Club (FLDC) Presentation: HOW GEOGRAPHY and GEOGRAPHIC INFORMATION SYSTEMS EXPOSE the MYTH of 'MISINFORMATION';
Using the Powers of Geographic Information and GIS to Expose the Myth of 'Misinformation'; and The Inescapable Truth about *Disinformation* and *Misinformation*? They have NOTHING at all to do with Information.

13. GIS can also enhance the value of non-geographic data by linking those data to geographic data, but that topic is beyond the scope of the pre-test.

14. A mix of search engines is available to perform literature search scans. In my experience those with training in library science are invaluable for such task-based searching.

15. The figure 80% is an approximation which is in a state of flux as higher levels of government engage in uploading but primarily downloading exercises which change record-keeping obligations of local governments.

16. Reference here is primarily to local governments in federated systems as opposed to those in unitary systems, because different responsibilities tend to be assigned to local governments in the unitary case.

17. A foremost international association in developing the local government and information system connection, including the geographic information system (GIS) connection, is the Urban and Regional Information Systems Association. https://urisa.org/resource/resmgr/documents/resources/foundations_final2.pdf.

APPENDIX A

Emails About Links to Access GIS Day Posters and GIS Assignments

The scope of this exploratory pilot study changed several times as the research unfolded. Adding a request about links to GIS Day posters and class assignments in GIS, geomatics, and related subjects is one of those changes.

It was my experience through 30 years of teaching GIS courses and participating in a number of GIS Day events that reports and posters are produced, but whether they are available via links was an unknown. I hasten to add that I retired from academia in 2005, and with just sporadic interaction between then and now, I was far from *au courant* as to those responsible for such matters.

Hoping for the best, two emails were transmitted, the first asking about links to GIS Day posters and the second about links to class assignments.

Despite the short notice several sources promptly responded in the affirmative, and their responses are gratefully included in Appendix A.

Email 1 and email 2 were sent to about 25 academics in 25 universities in Canada, and some were subsequently forwarded to were forwarded to colleagues or support staff.

Email 1. Request Regarding Links to GIS Day Student Productions

From: wellar.barry@gmail.com <wellar.barry@gmail.com>
Sent: Saturday, February 10, 2024, 2:26 PM
To: 'Michael Sawada' <Michael.Sawada@uottawa.ca>
Subject: GIS Day posters video link?

Mike,

Re: Using GIS to Enhance the Value of Speed Display Board Data: City of Ottawa Case Study Part 1

I am now working on the Part 2 report for an exploratory pilot study, and I am in search of links to GIS Day productions by students.

In brief, perceived beneficiaries of speed display board data include residents, community groups, public interest groups, councillors, police, public safety advocates, and researchers.

However, assistance and encouragement may be required, and my mind turns to students and GIS Day.

It is my recollection that in celebration of GIS Days past, students created posters which adorned the halls of many Geography departments.

I believe that links to videos of posters, wall hangings or digital files, would be an informative addition to Part 2, and I hope that you can assist in this regard.

I would appreciate any link(s) you can provide, and suggestions about who to contact for more links.

Thanks in advance for assistance.

Dr. Barry Wellar, C.M., GISP (Ret.)
Professor Emeritus, University of Ottawa
President, Information Research Board
133 Ridgefield Crescent
Nepean, ON, K2H 6T4
wellar.barry@gmail.com
https://wellar.ca/informationresearch/

Email 2. Request Regarding Links to Class Assignment Productions

From: wellar.barry@gmail.com <wellar.barry@gmail.com>
Sent: Tuesday, February 13, 2024 4:03 PM
To: 'Benjamin DeVries' <bdv@uoguelph.ca>
Cc: 'Nairne Cameron' <nairne.cameron@algomau.ca>; 'Michael Sawada' <Michael.Sawada@uottawa.ca>; 'Marikka Williams' <Marikka.Williams@flemingcollege.ca>; 'Gordon Plunkett' <gplunkett@esri.ca>; grant.mckenzie@mcgill.ca; wellar.barry@gmail.com; chendm@queensu.ca; chrisbone@uvic.ca; crinner@torontomu.ca; damian.maddalena@utoronto.ca; david.walker@umanitoba.ca; 'William E Huxhold' <hux@uwm.edu>; 'Info Sandra Crutcher' <info@bespatialontario.ca>; j.storie@uwinnipeg.ca; jfwang@uwo.ca; Julia.Siemer@uregina.ca; 'Nigel Michael Waters' <nwaters@ucalgary.ca>; 'Kim McDonough' <oldmapper@gmail.com>; pjdeadma@uwaterloo.ca; peter.pulsifer@carleton.ca; peter_keller@sfu.ca; rponce@trentu.ca; 'René Duplain' <Rene.Duplain@uottawa.ca>; scottdm@mcmaster.ca; sally.hermansen@geog.ubc.ca; victoria.fast@ucalgary.ca; 'Wanhong Yang' <wayang@uoguelph.ca>; 'Will Craig' <wcraig@umn.edu>; 'Greg Babinski' <gbabinski@gmail.com>
Subject: FW: GIS Day posters video link?

Prof. DeVries,

Thank you, very helpful in more ways than one.

The basis of the initial ask about links is my perception that a compilation of GIS Day posters could have considerable ‘curb appeal’ for those new to GIS.

Further, since most of those reading the Part 1 and Part 2 SDB reports are not likely to be members of the GIS community, posters might offer an easy introduction to the field.

However, examination of the link materials suggest that I expand the scope of the ask to include GIS-related class assignments for those who want immediate access to more

in-depth “how to” materials, but are not keen about delving into theses, journal articles, etc.

Therefore, by copy I am going ‘back to the well’ one more time should there be others among those contacted on this matter who maintain a record of GIS-related productions by students.

Thank you again for your response.

Dr. Barry Wellar, C.M., GISP (Ret.)
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President, Information Research Board
133 Ridgefield Crescent
Nepean, ON, K2H 6T4
wellar.barry@gmail.com
https://wellar.ca/informationresearch/

Email 3, email 4, and email 5 are responses containing links to students’ GIS Day and/or class assignment productions.

Email 3. Response Regarding Links to Students’ GIS Day and/or Class Assignment Productions: Ben DeVries, University of Guelph

From: Ben DeVries <bdv@uoguelph.ca>
Sent: Monday, February 12, 2024 8:39 AM
To: wellar.barry@gmail.com; Wanhong Yang <wayang@uoguelph.ca>
Subject: Re: GIS Day posters video link?

Hi Barry,

You can find full reports of our students’ GIS projects at the following links:
https://geg.uoguelph.ca/undergraduate-research-projects

If you scroll to the bottom, you will find reports from some of the previous years as well.

Thanks,

Ben

Email 4. Response Regarding Links to Students' GIS Day and/or Class Assignment Productions: Patrick Deluca, McMaster University

From: Deluca, Patrick <delucapf@mcmaster.ca>
Sent: Wednesday, February 14, 2024 9:04 AM
To: wellar.barry@gmail.com
Cc: Scott, Darren <scottdm@mcmaster.ca>
Subject: Re: GIS Day posters video link?

Hi Barry

On this page, at the bottom you will find links to posters from the Esri Young Scholar competition:

https://sees.mcmaster.ca/gis/esri-award-winners/

On this page, you will find all of our Web App Challenge participants. Some links may not work anymore if they are no longer maintained by Esri Canada:

https://sees.mcmaster.ca/gis/esri-canada-centre-of-excellence/

And this is the page to our GIS Day event from his year:

https://sees.mcmaster.ca/gis/gis-day/#tab-content-university-students-staff-faculty

IF there is anything else you need, please let me know.

Pat

Patrick DeLuca, MA, GISP

GIS Specialist / Instructional Assistant / Lecturer

School of Earth, Environment & Society

McMaster University
1280 Main St. West
Hamilton, ON L8S 4K1

Email 5. Response Regarding Links to Students' GIS Day and/or Class Assignment Productions: Patrick, Deluca, McMaster University

From: Deluca, Patrick <delucapf@mcmaster.ca>
Sent: Wednesday, February 14, 2024 9:06 AM
To: wellar.barry@gmail.com

Cc: Scott, Darren <scottdm@mcmaster.ca>
Subject: RE: GIS Day posters video link?

I forgot to add that I do have links to the slides that most of these people presented.

Cheers

Pat

Emails were also sent to contacts in the U.S. inquiring about use of GIS in association with speed boards, and about links providing access to students' GIS Day and GIS class assignment productions.

In my GIS Day and Geography Awareness Week experiences with the Canadian Association of Geographers, the American Association of Geographers, URISA, and other organizations, the productions by students have considerable public interest appeal. The links providing access to GIS-related materials are much appreciated.

Acknowledgements

In addition to providing proofreading assistance, **Craig MacAulay** created an impressive image repository of speed display board stations and their environs, including the speed board photos on the cover and the images in Figure 1 and Figure 2.

I also acknowledge with many thanks the text formatting, graphic design, and technical assistance of **Sam Herold**, a University of Ottawa alumnus and one my former students (Geography, Environmental Studies, and Geomatics) who made valuable contributions to this report.

The final word of thanks recognizes the sage advice provided by **Gordon Plunkett**, Director, Spatial Data Infrastructure, Esri Canada.