

## APPENDIX D

Annual Report  
TRB Roundabout Committee  
Sub-Committee on a Semi-Automated Roundabout Inventory

A review of the project might be in order.

### I. Description of the concept

The idea of this project is to create and semi-automatically maintain a comprehensive inventory (database) of circular intersections in the United States that is publicly accessible and enhanced via the Internet.

Terms:

- **Create** means to acquire a set of geographic locations of circular intersections from a cooperating source, acquire a suitable computer database program, and load the locations into the program to establish the database.
  - **Cooperating source** means one of the private firms in the business of collecting and selling geolocated roadway information to various customers, including to the corporations who sell GIS guidance software that is now ubiquitous on cell phones and dedicated GPS units, both handheld and installed in vehicles.
  - **Geolocation**: <https://en.wikipedia.org/wiki/Geolocation>
  - One firm in this business is HERE:  
  
[https://en.wikipedia.org/wiki/Here\\_\(company\)](https://en.wikipedia.org/wiki/Here_(company))
  - Nokia has since sold HERE. This March 10, 2016, article from The Atlantic Citylab illustrates the extent of the circular intersection data available from vendors:
    - [http://www.citylab.com/commute/2016/03/america-traffic-roundabouts-street-map/408598/?utm\\_source=SFTwitter](http://www.citylab.com/commute/2016/03/america-traffic-roundabouts-street-map/408598/?utm_source=SFTwitter)
  - Another example of such information is seen in the images below from Google Earth, where the satellite image depicts the "before" condition of a conventional intersection, yet the roadway overlay depicts a roundabout that is about to be constructed (and by now has been constructed). Whatever source Google gets its data from knows about the roundabout even before it is constructed. Because this information is extremely valuable and sellable, substantial resources are devoted to collecting and updating it. The idea that cars equipped with 360 degree rooftop cameras would be plying every street in the world would be much too much too believe only a short time ago, but is now a common, everyday utility because the images are placed in the commons, for all to access unfettered and for free.
  - The *cooperating source* agrees to provide the initial comprehensive data set, and to provide updates on a regular basis such as quarterly.
- **Inventory** means a compilation of the geographic locations of the circular intersections where each intersection is a record.
- **Geographic location** means the X-Y coordinates of the intersections.

- Geographic location would also include a URL (link) to each circular intersection location in Google Map.
- **Comprehensive** means virtually all USA circular intersections would be included in the inventory.
- **Maintain** means the inventory would be kept up to date, comprehensively, according to some schedule such as quarterly.
- **Publicly accessible** means the inventory would reside openly on the Internet.
- **Publicly enhanced** means the public could add additional information, such as attributes or comments, to individual intersection records.
  - **Additional information** means information besides the X-Y coordinates and URL to Google Maps. Users would not normally be able to add or subtract records, unless provided for separately.
  - **Attributes** means information such as traffic volume, dimensions, number of legs, number of circulating lanes, crash history, shape of the central island (round, elliptical, oval, etc.), presence of public art, funding source, classification (modern roundabout, traffic circle, rotary, mini-roundabout, etc.), and so forth.
  - There could also be *private* fields accessible via password only to users so privileged, such as transportation officials or some sort of body of users such as members of the TRB Roundabout Committee or subscribers to the TRB Roundabout Listserv. Databases can be quite flexible these days, and can grow and morph in response to needs and other circumstances.
- **Circular intersections** means every intersection identified by the *cooperating source* as a roundabout, traffic circle or rotary.
  - The private firms that collect and sell this geographic information typically have GIS "layers" or other means for tagging entities, and one or more of them have a layer designated for "roundabouts."
    - This fact is demonstrated by the computer voice in the car GIS unit that tells the driver to "Take the second exit from the roundabout." Sometimes the voice says "traffic circle" instead and often the distinction would meet the approval of many modern roundabout practitioners.
    - Either way, it seems the data vendors have faithfully identified the existence and location (X-Y coordinates) of all circular intersections everywhere. Any they somehow miss are eventually spotted by various means, such as the path the Google Streetview cars take or annual updates, including crowd-sourcing. Accurate, complete, current roadway geodata is a valuable, sellable product and that fact provides both the impetus and the funding.
  - That some intersections emphatically are not modern roundabouts won't present a problem because eventually an interested user will flag those intersections through a process nowadays called crowd-sourcing which has been demonstrated to be very effective in scientific surveys for decades (bird counts, for example) and with the advent of universal mobile access to the Internet via smart phones communicating with the cellular telephone network, has taken on many novel and quite productive forms.
  - As to which intersections that approximate modern roundabouts are "true" modern roundabouts, this is a question unsettled in the discipline so can hardly be expected to be resolved to everyone's satisfaction by the *cooperating source*.
- **Semi-automatically maintain** means the periodic update of the inventory would take place with very little human time and effort. Downloading the complete Kittelson database of roundabouts takes a GIS practitioner only a few clicks and a few minutes, for example.

- Intersection records would not be added or subtracted by individuals, such as volunteers, or by agencies.
- Consequently, the inventory will always contain some intersections of no interest to some users of the inventory, but that won't present a problem because like any database the records can be easily and almost instantaneously filtered to show whatever intersection records *are* of interest at the moment.

Key to the concept are *comprehensive*, *current*, and *semi-automatically maintained*.

- If the inventory isn't *comprehensive*, would-be users searching for information will quickly be disappointed and soon lose interest in using it, let alone be motivated to enhance it with additional attribute information.
- The same applies if the inventory isn't *maintained* (kept current).
- *Semi-automatic maintenance* is critical; this means a few mouse clicks and ten minutes of effort 4 times per year by a GIS practitioner to download updates provided by the *cooperating source*. These updates will mostly consist of new geolocations (X-Y) coordinates for newly constructed (or discovered) circular intersections, each of which will go to create a new record in the inventory.
  - Multiple efforts to date have demonstrated that an inventory that relies on volunteers to submit intersection information singly or in small numbers at a time cannot hope to be comprehensive, let alone current.
  - Volunteer efforts are haphazard, sporadic, scattered, and incomplete, and volunteers typically have only enough time to devote to the task as it takes to send in material in whatever format they conveniently have it. This raises the requirement for someone to painstakingly filter, convert and enter the incoming information, an overwhelming, unprofitable, chore which will only get worse as the number of circular intersections increases (exponentially, according to one assessment).
  - Volunteers can only submit intersections they know about, and of those will submit only the ones for which the volunteer has some motivation to submit. All this leaves gaping holes in the inventory which will only grow worse as the number of roundabouts increases (exponentially, by one assessment).
  - Even if all fifty state DOT agencies were somehow to be staffed and funded on a permanent basis to create and maintain inventories of state, county and municipal roundabouts on web-hosted software made open to anyone, that situation would still fall far short of a single, comprehensive, consistent inventory because in order to search the 50 roundabout inventories researchers, roundabout practitioners and others would still have deal with 50 user interfaces and 50 internal database organization schemes on 50 websites.

From a practical standpoint, key also are that the *cooperating source* provide the initial intersection geolocations and updates for free or a very nominal amount; and that some willing entity create the GIS database and host the website with the inventory.

- Persuading the cooperating source to provide the set of X-Y coordinates for free may be easier if the hosting entity is a government agency or a non-profit organization, or if a government agency such as FHWA blesses the project as hosted by a non-profit organization.
- For a GIS practitioner, creating and semi-automatically updating the inventory is not a major effort, but still, someone motivated has to be found to actually do it.

- For a GIS practitioner with the computer and software resources, hosting the inventory website is not a major effort, but still, someone motivated has to be found to actually do it.
- For an organization that is accustomed to supporting non-profit projects to benefit a greater community, sponsoring a hosted website is not a major effort, but still, such an motivated organization has to be found to actually do it.

## II. Need for the inventory

A partial list of reasons to create and maintain (keep current) an online accessible inventory of modern roundabouts:

- Modern roundabouts are the biggest traffic safety breakthrough since seat belts in the 1950's and therefore have the potential to be of considerable interest to traffic professionals, public safety officials, researchers and many others. Very early research by Richard Retting with availability of only sparse data found that modern roundabouts reduce fatalities by 90%, a figure trumpeted by the FHWA (seat belts by 45-55%, depending upon whether the wearer is in the front or back seat).
- Modern roundabouts are proliferating in the United States, but no one knows where they all are or even how many there are. Estimates of the current number range from 2,000 to 3,000 and higher. One assessment pegs the increase as exponential.
  - Other, much smaller, countries have constructed thousands and tens of thousands of roundabouts in the past 10-15 years. Extrapolating by population from either France or Australia gives a equivalent number in the US of 145,000.
- Practitioners have to rely on volunteers who have time to subscribe to the TRB roundabout listserv to provide locations of roundabouts that meet whatever criteria they need for their purposes, a severely catch-as-catch-can means. But a searchable online GIS database would provide the locations of circular intersections that match search criteria in seconds.
  - The existing Kittelson roundabout database and many other databases are examples of this ease of search by criteria. Google is an example of how easy and instantaneously fast it can be to search a truly vast collection of information: the Internet.
- It's important to understand that once the circular intersection geolocations (X-Y coordinates) are resident in a GIS database, they can easily be correlated to all sorts of other geolocated information which is freely available, such as nearby schools, RR tracks, evacuation routes, population demographics, etc.--this is what GIS practitioners do all day long, every day. They also produce maps, especially thematic maps that visually reveal relationships.
- Researchers presently have no good means of assembling a bias-free set of roundabouts to study.
- Like other such tools, this accessible inventory will likely be put to many uses not yet imagined. Who would have thought, for example, that virus outbreaks could be detected weeks ahead of the public health reporting system by Google merely writing a algorithm to track certain search terms that spike in the first and second day of presenting symptoms. Early detection is essential for containment, and containment is extremely important because every so often a virus wipes out a large proportion of the human population.

### III. Original concept

The original idea was inspired by the fact that for years ordinary hand-held consumer-grade cameras have had the ability to detect several human faces in a frame, place boxes around them, and set the focus and exposure automatically for the benefit of the photographer. Inexpensive cameras can detect when everyone is smiling at the same time and snap the photo then, and even detect a frown or neutral expression and make it into a smile by turning the mouth upward--automatically. Now cell phone cameras can, too.

It seemed software running on much more powerful PCs could easily detect circular intersections in aerial photographs and store their X-Y coordinates. But there were formidable obstacles, such as where to get free aeriels and the detection software. Worse case, it seemed software could be written, perhaps as a computer science or GIS doctoral thesis, to sequentially access and analyze free Google Map images one after the other, marching across the country in bands.

But planner Erin Gentle found a much better path to the solution. She had done some digging and discovered that the industry that collects and sells road map data to the firms that sell navigation gizmos for cars, also has a layer of information identifying circular intersections and their X-Y coordinates. In other words, in a sense the circular intersection inventory already exists as a subset of commercially available GIS information. This was a breakthrough discovery, because the rest is fairly straightforward, given relatively minor resources.

### IV. Current status of the project

The way forward has been stymied at several junctures:

1. A **good entre' into the vendor(s)** who sell the X-Y coordinates is needed. Two industry contacts have been identified, as well as one FHWA contact who has been working with one of the vendors on a project to locate RR crossings.
2. A GIS practitioner with the desire, skill and computer resources (including software) to **create the roundabout inventory database**, and put it into a **web-based format**, although it's not a big deal for any GIS practitioner who already does those kinds of projects.
3. A suitable entity with the desire and resources to **host the roundabout inventory**, although it's not a big deal for GIS practitioners who already do that. No government agency has yet stepped forward to offer resources (which may not exist in the first place, anyway).

### IV. The way forward

A local GIS professional of Ken Sides' acquaintance with the necessary skills and resources to create the circular intersection GIS database and hosting website, Gui De Almeida, has expressed an interest in the project. Further, Mr. De Almeida belongs to a non-profit organization, the Urban Charrette, that has already previously supported

similar GIS undertakings to benefit the public and is supportive of his involvement in this project.

The next step is to create a scope to establish and outline what the Urban Charrette's role will be, and determine what can be provided within the constraints of the UC's non-profit license for the GIS software.

The Urban Charrette:

- <http://cltampa.com/tampa/urban-charrette-architects-and-planners-have-designs-on-the-future-of-tampa/Content?oid=2033413#.Vum7pOlJpg>
- <http://helmofthepublicrealm.com/tag/urban-charrette/>
- <http://www.83degreesmedia.com/features/Charrette030210.aspx>
- [http://www.aiatampabay.com/pdf/urbancharrette\\_welcomeletter\\_may\\_.pdf](http://www.aiatampabay.com/pdf/urbancharrette_welcomeletter_may_.pdf)
- <http://www.newnorthalliance.com/2014/08/29/tampas-urban-charrette-and-congress-for-the-new-urbanism-wil-host-open-mic-at-pj-dolans-irish-pub-grille/>

Stay tuned!

-Ken

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