



Low Cost GPS Accuracy Improvements for Mobile Data Collection

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Town of Huntington - Department of Transportation & Traffic Safety

(for 31 more work days, but who's counting)

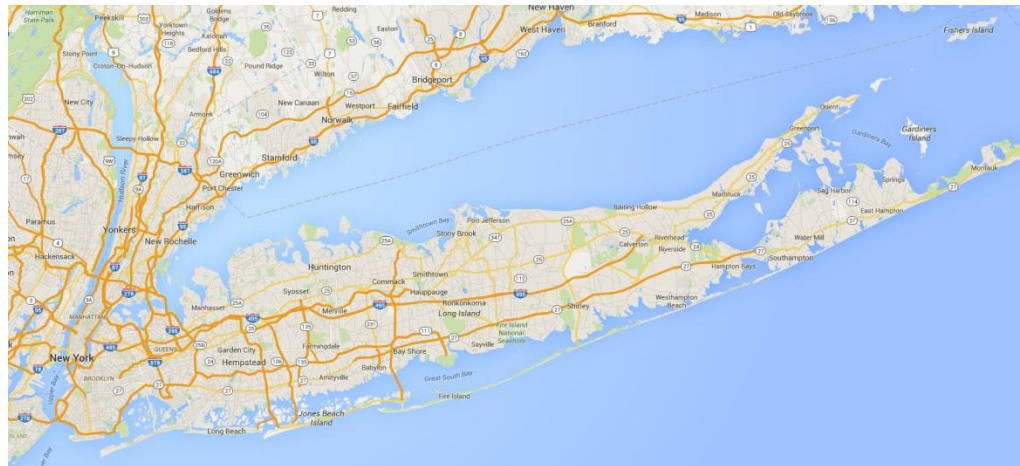
NYSGeoCon 2015 - Albany, New York

October 30, 2015



Me

- I have worked for the Town of Huntington for 32 years.
- The Town of Huntington is on the north shore of Long Island. It is 93 mi² and has about 205,000 residents



- Major use of GIS/GPS for managing major storm events like Superstorm Sandy in 2012. 540,000 yds³ of debris, over 19,000 truckloads.
- Chairman of Long Island Geographical Information Systems User Group (LIGIS) from 2007 to 2014



Description

- Using various tools and software to get reasonably accurate GPS points for local infrastructure
- Dr. Mix, Associate Professor in Geography and Planning at Buffalo State College – “Field Data Collection Using Smart Phones, tablets, and GPS Devices: A Case Study”
- [Dr. Mixs' NYGeoCon 2013 Presentation](#)
 - <https://youtu.be/GqIQdq0DrGA>
- Take it a step further
- Mapping free standing light fixtures



Low(er) Cost GPS Ideas

- [ArcGIS Collector External GPS Options](#)

- <http://www.spatialtimes.com/2014/11/arcgis-collector-external-gps-options/>

External GPS	Price (CDN\$)	Accuracy*	Receiver	SBAS/WAAS	Battery Life	Update Rate	Hardware model
Garmin Glo	\$109.00	3.0m (CEP?)	GPS + GLONASS	Yes	12h	10 Hz	010-01055-15
Bad Elf GPS Pro	\$199.99	2.5m (CEP?)	GPS only	Yes	16h	1-10Hz	BE-GPS-2200
Bad Elf GPS Pro+	\$299.99	2.5m (CEP?)	GPS + GLONASS	Yes	24h	1-10Hz	BE-GPS-2300
Bad Elf GNSS Surveyor	\$599.99	1.0-2.5m**	GPS + GLONASS	Yes	24h	1-10Hz	BE-GPS-3300
DUAL XGPS160 SkyPro	\$149.50	2.5m (CEP)	GPS + GLONASS	Yes	10h	1-10Hz	XGPS160
Geneq iSXBlue ii GNSS	\$3,300.00	0.25m (CEP)	GPS + GLONASS	Yes	8+h	1-10Hz	iSXBlue ii GNSS
iPad Air (Cellular+Wi-Fi)	\$579.00	5.0m (?)	GPS + GLONASS	?	10h	?	iPad Air v1

- [Bad Elf](#)

- <http://bad-elf.com/pages/products>

- [Garmin Glo](#)

- <https://buy.garmin.com/en-US/US/oem/sensors-and-boards/glo-/prod109827.html>

- [Dual GPS Receiver](#)

- <http://gps.dualav.com/explore-by-product/xgps150a/>



Equipment I Used

- GeoXH - many thousands
- Samsung S5 Active - \$600 to buy
- Trimble Nomad – couple of thousand
- iPad - \$500
- Garmin Glo (Bluetooth GPS) - \$100
- Samsung Note 10.1 - \$600



Software

- ArcGIS Online
- Google Streetview
- Bing Streetside
- ArcGIS Pro
- ArcGIS Desktop
- ArcGIS Server
- ArcPad
- ESRI Collector



(Almost) Free Stuff

- [Penn State Courseware](#)
 - <http://open.ems.psu.edu/courseware>
- [Open Street Map](#)
 - <https://www.openstreetmap.org/>
- [QGIS](#)
 - <http://www.qgis.org/>
- [GeoServer](#)
 - <http://geoserver.org/>
- [PostgreSQL](#)
 - <http://www.postgresql.org/>
- [PostGIS](#)
 - <http://postgis.net/>
- [pgRouting](#)
 - <http://pgrouting.org/>
- [ArcGIS \(and extensions\), ArcGIS Online \\$100 for home use. One year license](#)
 - http://store.esri.com/esri/showdetl.cfm?SID=2&Product_ID=1315&Category_ID=121



PENNSTATE



PostgreSQL

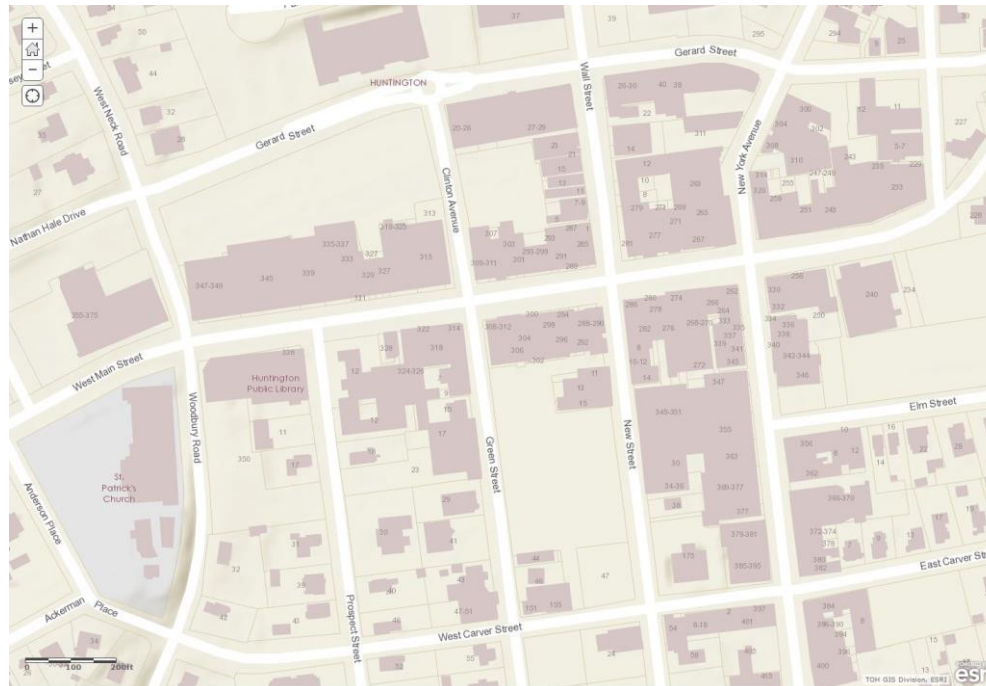


GeoServer



Tile Package

- A tile package allows you to create a set of tiles (images) from a map, then use the set of tiles as a basemap in ArcGIS applications.
- [Create Your Own Basemap](#)
 - <http://blogs.esri.com/esri/arcgis/2014/03/23/using-your-own-basemap-layers-with-collector-for-arcgis/>



Methodology

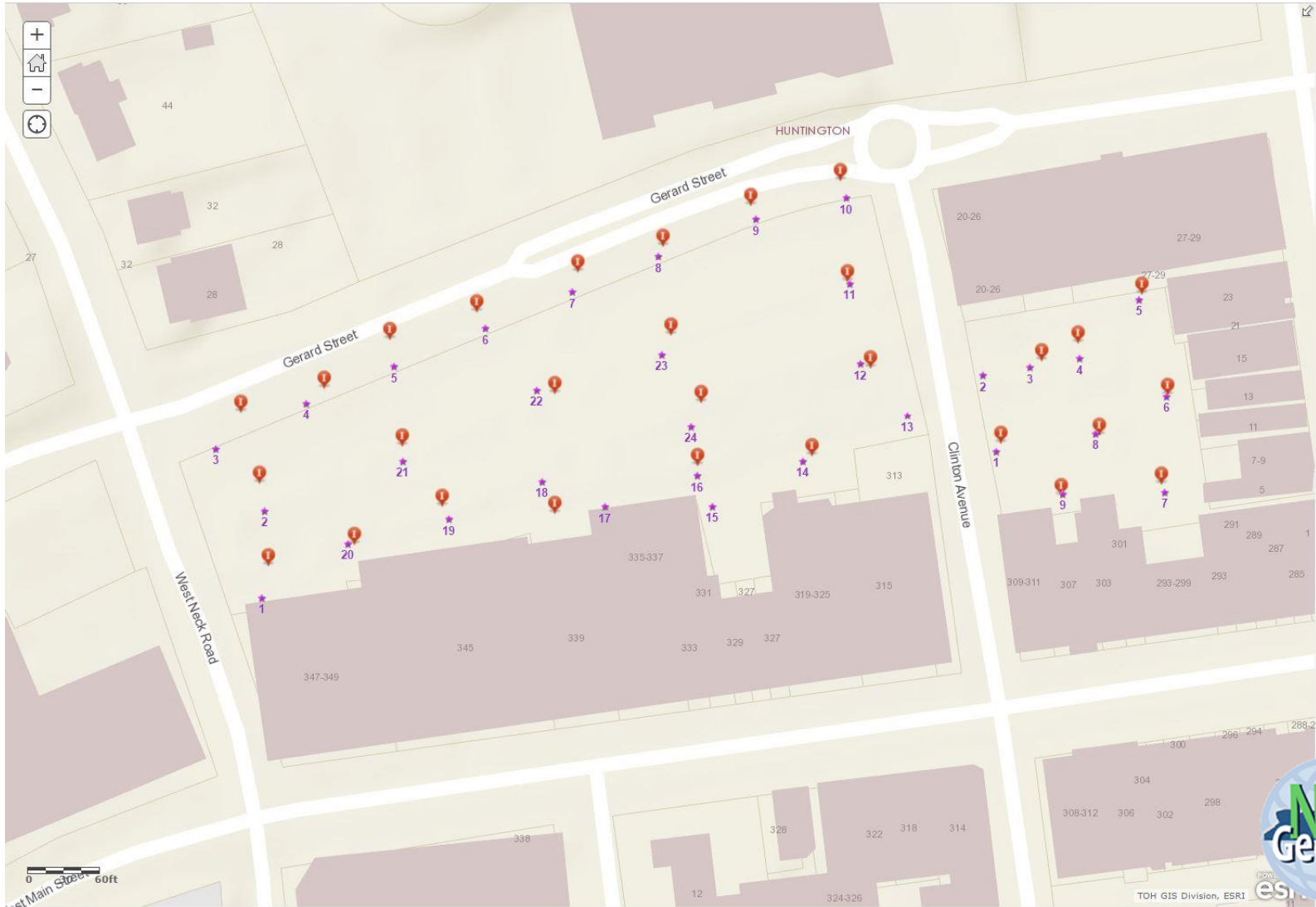
- Different devices
- ArcPad and ArcGIS Online
- Are the NYS DOQ's good to use?
 - State QA/QC
 - What I found
- Bing Streetside
 - <https://www.bing.com/mapspreview?FORM=Z9LH2>
- Google Streetview
 - <https://www.google.com/maps/>



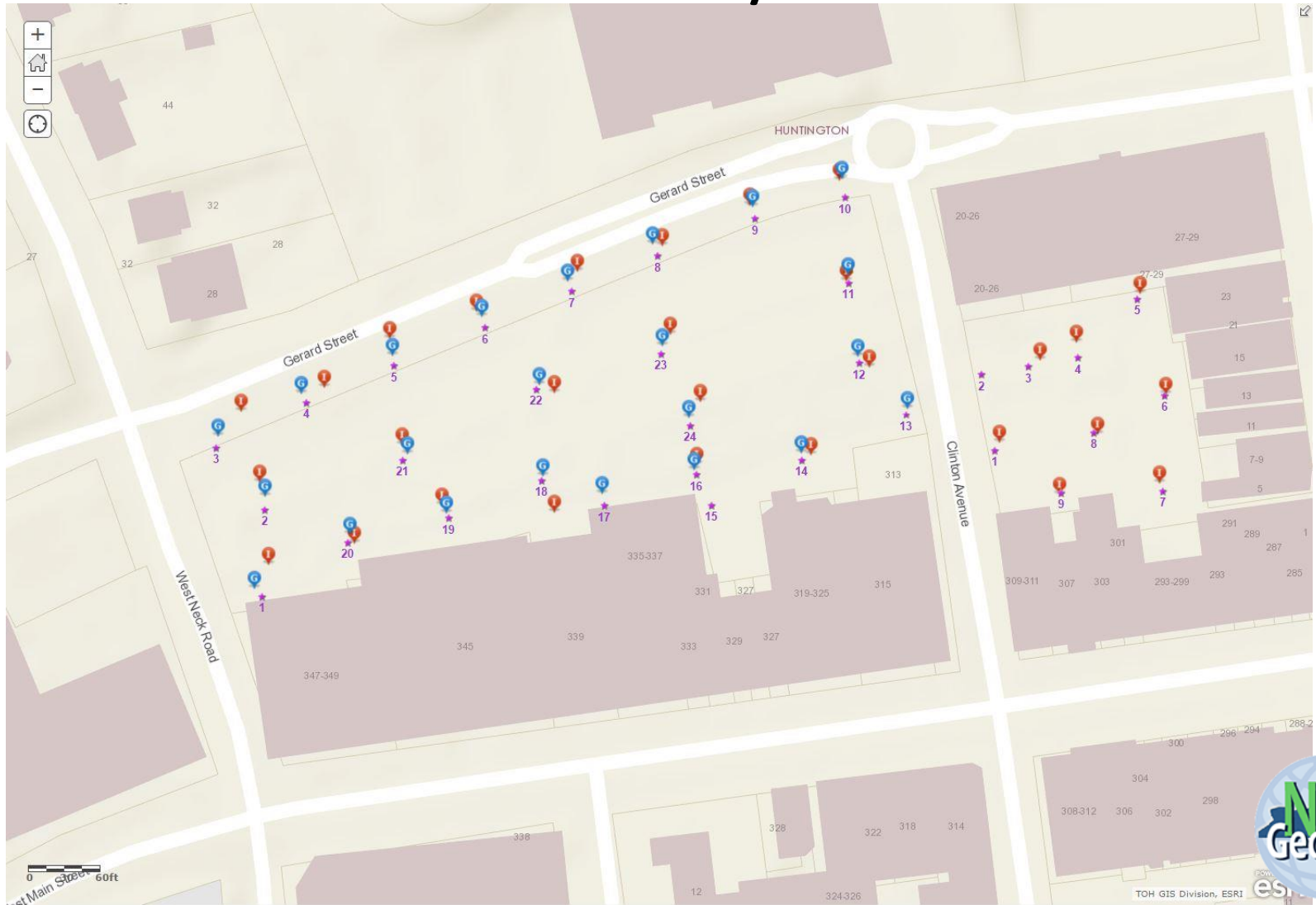
Huntington Village



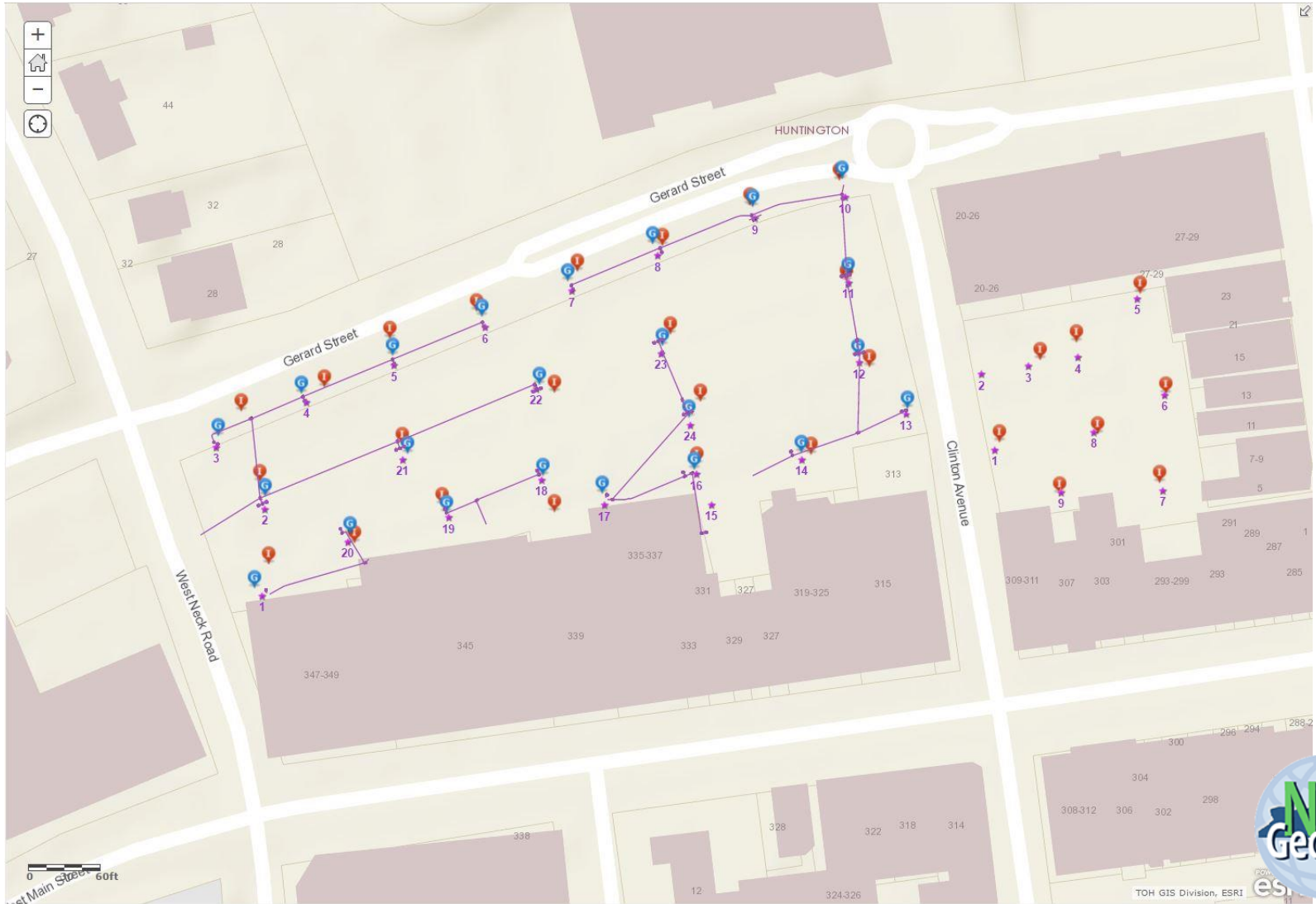
Gerard St – GeoXH and iPad



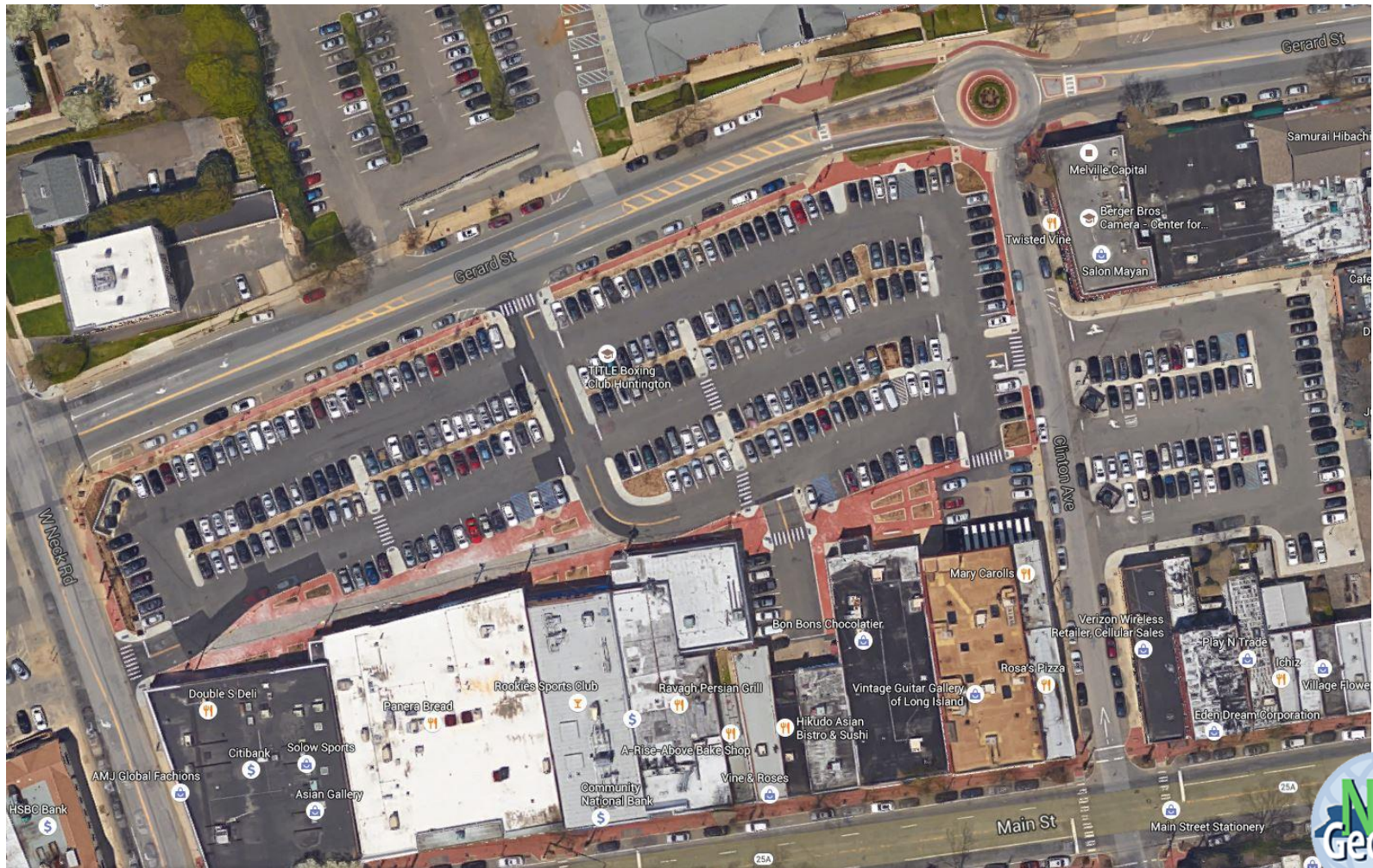
Gerard St – GeoXH and iPad with/wo Garmin Glo



Gerard St – with AutoCAD



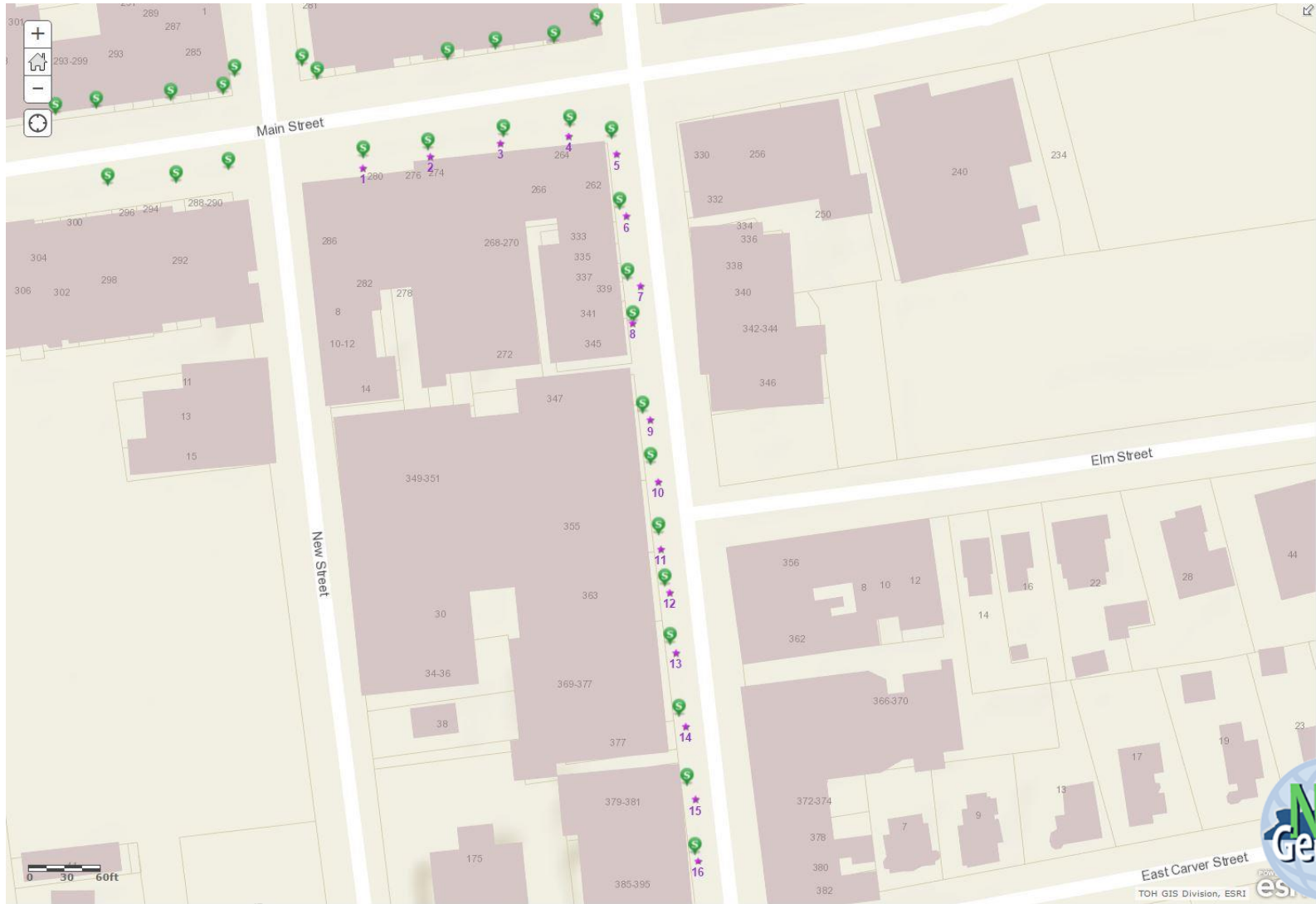
Gerard St – Google Aerial 2015



Main St and NY Ave - Streetview



Main St and NY Ave Streetview and GeoXH



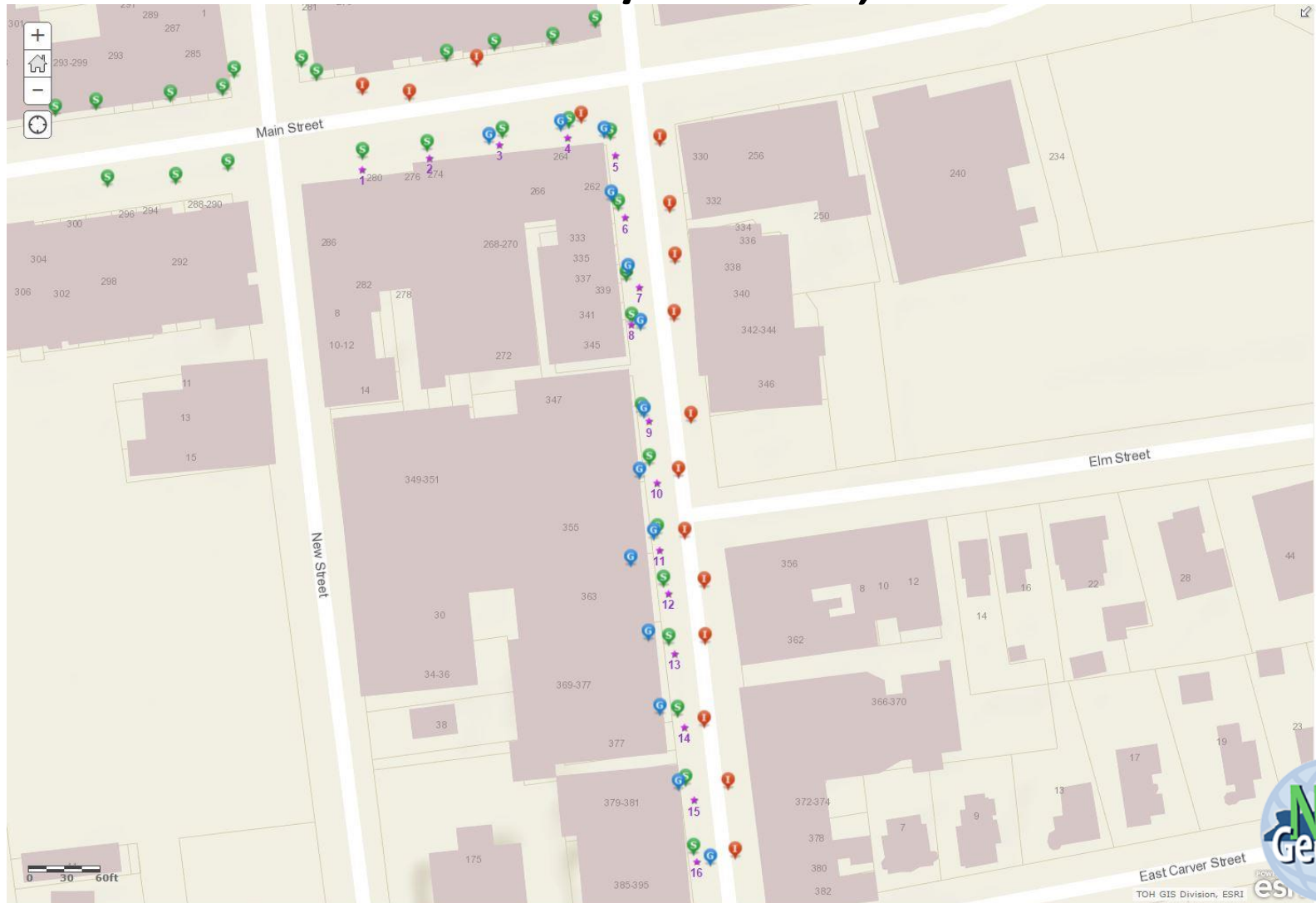
Main St and NY Ave Streetview and iPad



Main St and NY Ave – iPad With and Without Glo

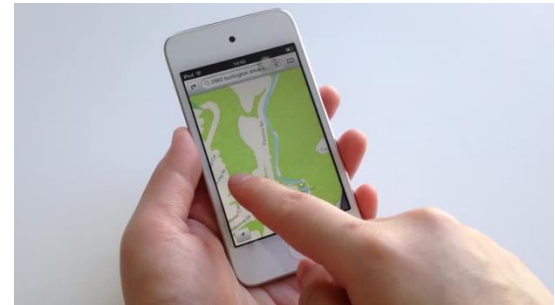


Main St and NY Ave – Streetview iPad With and W/O Glo, and GeoXH



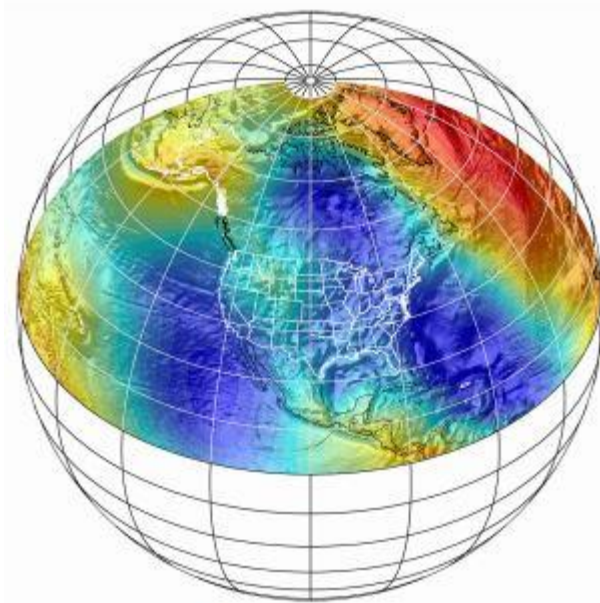
Conclusions

- Google Streetview and/or Bing Streetside in conjunction with NYS DOQ's
- Finger on a map
- Tile Package
- Garmin Glo



P.S.

- [New Datums for 2022](#)
 - <http://geodesy.noaa.gov/INFO/OnePagers/NewDatumsOnePager.pdf>



The new datums will extend across CONUS and U.S. territories. The geometric datum replacing NAD 83 will be consistent with geocentric global reference frames defining latitude and longitude. The geopotential datum replacing NAVD 88 will be based on a gravimetric geoid model, enhanced by data from NGS' Gravity for the Redefinition of the American Vertical Datum (GRAV-D) Project.



Thanks for listening
Questions or comments?





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October 30, 2015

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