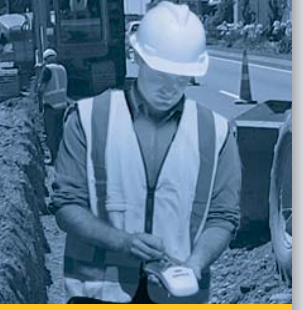
Cape Cod Commission

Mark Congdon
Mapping & GIS Business Channel Manager

Paul Carver
Keystone Precision & Instruments

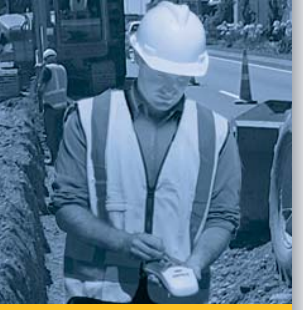
13 April 2010

Trimble



Speaking Best Practices…

- Stand in one spot while rocking back and forth from heel to toe (like a rocking chair).
- Stand in one spot while swaying from side to side (like a pendulum).
- Start the speech by telling the audience you haven't done this presentation in a long time and will probably get lost along the way.
- Use slides that say the exact same thing you're telling the audience.
- Keep turning your back to the audience and speaking to the screen.
- Start your speech by reading the "Starfish" story from "Chicken Soup for the Soul".
- Assume the professor pose (one arm across your body and one hand holding your chin) so no one questions your knowledge.

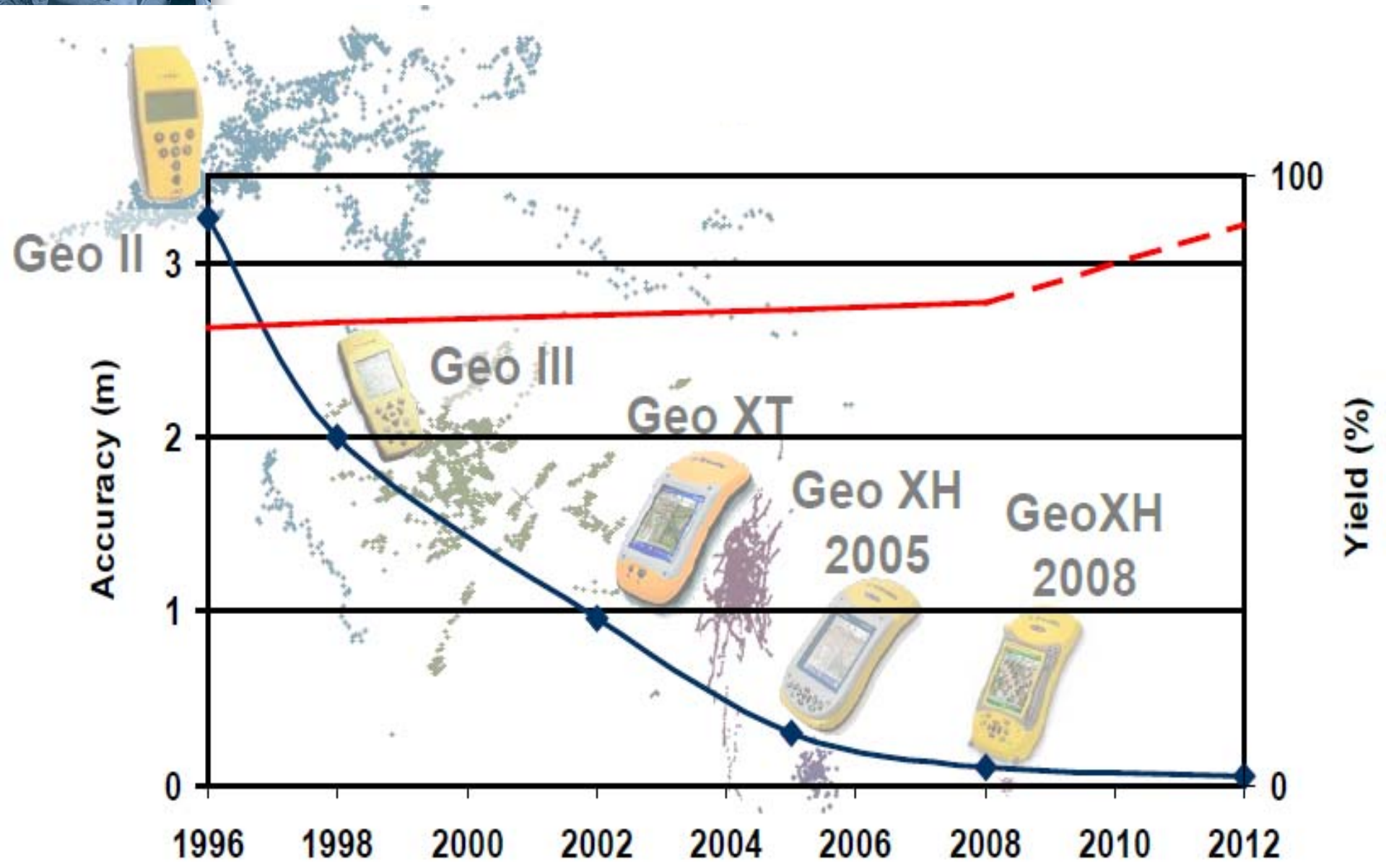


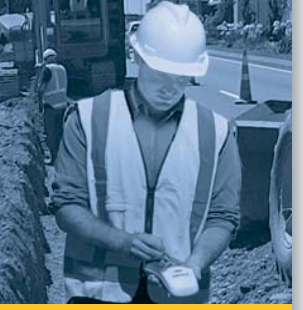
Speakers

- **Mark Congdon**
  - Trimble Sales rep for Northeast
  - 13 years with Trimble
  - BS in Manufacturing Engineering from Arizona State Univ
  - Masters in Business Administration, Univ Colorado at Boulder
  - Manufacturing, R&D, Service, Support & Training

- **Paul Carver**
  - Keystone Precision & Instrument
  - BS Construction Engineering
  - Regional Sales Manager for Survey
  - 25 years Survey, Construction Industry

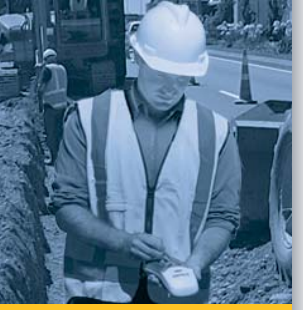
Trends – Positioning Technology





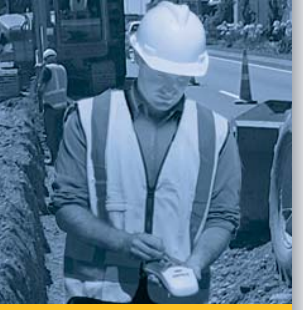
Agenda

- How to choose the right device
- Review of Trimble devices
- Status of Regulations
  - Sign Inventory
  - Wetlands mapping
- Peripherals



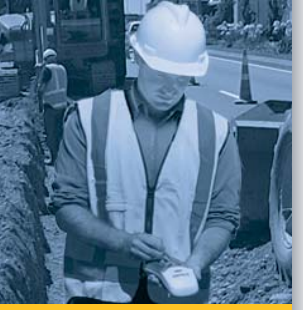
3 things to consider in MGIS world

- **What accuracy will you need**
  - 2-5m products (now 1-3m)
  - Submeter products
  - Decimeter and subfoot products
  - Correction devices
- **What is your environment**
  - Heavy canopy
  - Urban areas with cell coverage
  - Rural areas with open sky
  - Buried assets
- **What is your workflow**
  - Real time vs post processed
  - Field-entered data
  - Real-time server uploads
  - Multiple days in the field
  - Initial data collection, or inspections



MGIS Accuracy

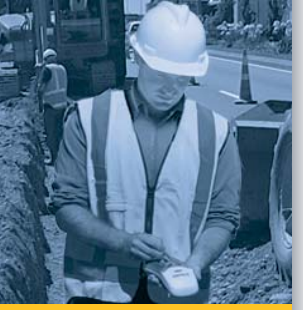
- **2-5m products**
  - Nomad
  - Yuma
  - GeoXM
  - Juno SB and SC
- **Submeter products**
  - GeoXT
  - ProXT
- **Subfoot and Decimeter products**
  - GeoXH
  - ProXH
  - ProXRT
- **Correction**
  - Tornado and Tempest antennas
  - GeoBeacon
  - SBAS



Environment

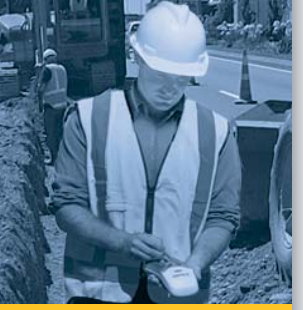
- **Canopy**
  - Trees
  - Urban canyon
  - Multipath
- **Cell coverage**
  - VRS
  - Multi and single base
  - Distance from base
  - No radios
- **Rural areas**
  - No cell coverage
  - Difficulty in repeat visit to assets
- **Buried asset**
  - Real-time data collection
  - “Bucket width”
  - Can’t go back
  - Real time navigation to asset

Trimble



Workflow

- **Data**
  - Initial collection (High accuracy)
  - Inspections (lower accuracy)
- **Field entered data**
  - Data dictionaries
  - Full alpha-numeric keypads (Ranger, TSC2)
- **Real time Server uploads**
  - ArcMobile
  - Need to upload in real time
  - No time to post process
- **Multiple days in the field**
  - Carry lots of data
  - SD cards
  - Cell cards
  - Data comms from hotel room
    - VA Dept of Forestry



www.geneq.com

TOPCON

JAVAD

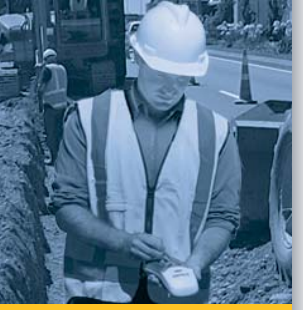
3-D PRO XYZ

中海达

MAGELLAN
PROFESSIONAL

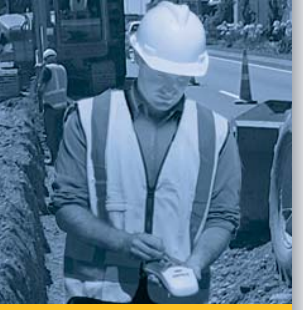
surveylab

Email: support@survey-lab.com
Web: www.survey-lab.com



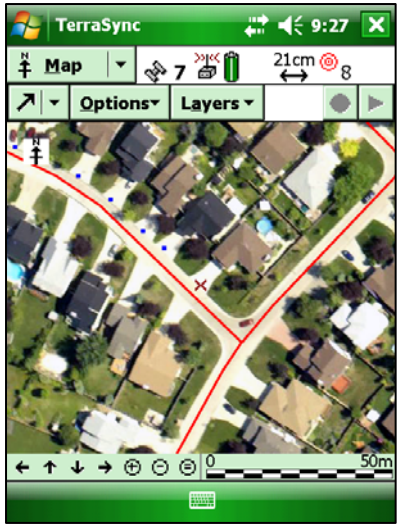
Overview: Current Hardware

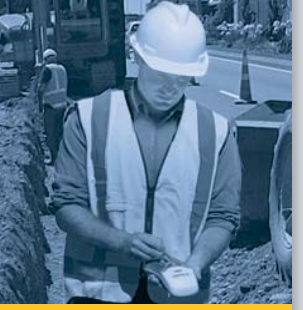
- Geo Explorer 2008 Series
- Trimble Yuma
- Juno Series
- Nomad G Series
- Trimble Ranger
- Trimble Recon
- ProXH/XT
- GeoBeacon receiver



Hardware

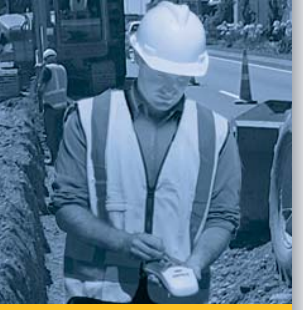
- **GeoXH has an internal L1/L2 antenna**
- **3.5 inch VGA screen**
  - **640 x 480 pixels**
  - **Same actual size as GeoExplorer 2005**
  - **Bezel different – part of overmolding**
- **VRS network access**
- **Integrated stylus (tether optional)**





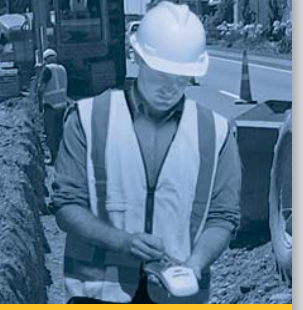
Trimble Yuma rugged tablet computer

- Highly-integrated, ultra rugged tablet computer
- Win7 operating system
- Intel Atom 1.6GHz processor
- All-in-one solution with integrated
  - GPS
  - Bluetooth
  - WiFi
  - 2 digital cameras



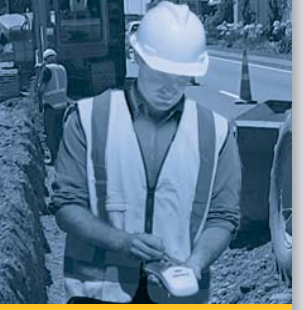
Juno SB/SC specifications

- **PDA**
  - Windows Mobile 6.1 software
  - 533 MHz Samsung processor
  - Outdoor viewable 3.5” QVGA display
  - 128 MB RAM / 128 MB non-volatile Flash storage
  - MicroSD/SDHC memory card slot
  - Internally rechargeable, removable 2600 mAh Li-Ion battery
  - Integrated Bluetooth
  - Integrated 802.11b/g WLAN
- **GPS**
  - Integrated high sensitivity GPS receiver
    - WAAS, and EGNOS
  - 2 to 5 meter accuracy after differential correction (real-time or postprocessed)
  - NMEA and SiRF protocol support



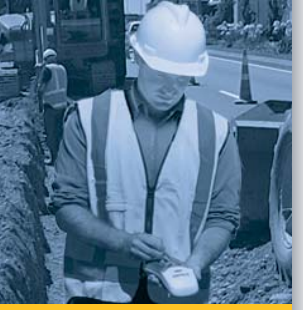
Trimble Nomad G series

- High-performance all-in-one integrated GPS device with WAAS
- Comes with a range of GIS field software solutions
- 6 GB built-in storage as standard
- Ultra-rugged form factor
- Integrated cellular modem option (with AT&T certification)
- Integrated digital camera and barcode scanner options



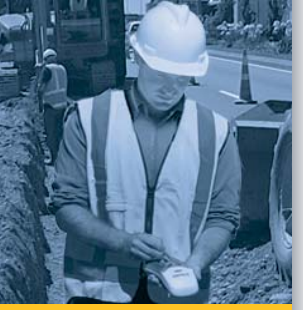
Trimble Ranger handheld

- **Windows Mobile 5**
  - **Persistent storage**
  - **Secure Digital Input Output (SDIO)**
  - **USB Host**
  - **Full alpha-numeric keypad**
  - **Data collector only**



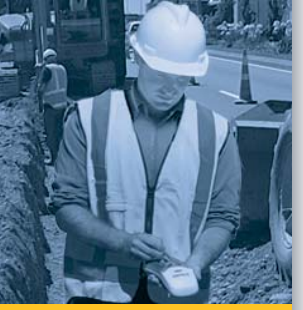
Compact and integrated

- **Receiver, antenna and battery in one unit**
  - Only 1.16 lb (0.53 kg) including battery
- **Compact dimensions**
  - 4.2 in × 1.6 in × 5.75 in
  - (10.6 cm × 4.0 cm × 14.6 cm)
- **Connectivity options**
  - Integrated Bluetooth wireless technology for cable-free connections
  - DE9 Serial port for cabled cor
- **Mounting options**
  - Rangepole
  - Backpack
  - Belt clip
  - Magnetic vehicle mount



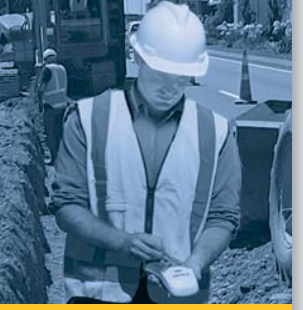
GeoBeacon

- **What is it?**
  - **Lightweight, rugged, Bluetooth® beacon receiver**
  - **Not a gps receiver**
  - **Receives Beacon signal, provides correction**
  - **Replaces Beacon-on-a-Belt (BoB™) receiver**



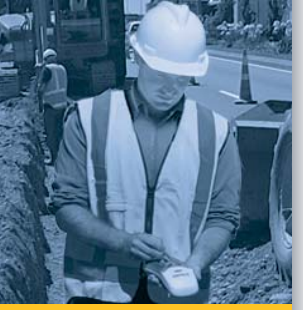
Tornado

- GPS L1/L2
- GLONASS L1/L2 and OmniSTAR capable (L-Band) when used with a GPS Pathfinder® ProXRT receiver
- SBAS capable (WAAS/EGNOS)
- Integrated magnets on the bottom of the antenna, allowing it to be directly mounted on the roof of a vehicle
- TNC antenna cable connector
- Replaces the Zephyr



Tempest

- GPS L1
- SBAS capable (WAAS/EGNOS)
- Integrated magnets on the bottom of the antenna, allowing it to be directly mounted on the roof of a vehicle
- TNC antenna cable connector
- Replaces the Hurricane Antenna
- For use with the GeoXT and ProXT



GeoXH internal antenna

- L1/L2 for faster, more accurate results
- Convenient – no cables or range pole

- Use a Tornado antenna for difficult environments
- Tornado gives 10cm accuracy more often

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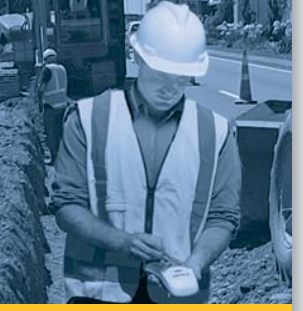

New Post-processing software

- **All software (office and field) is updated**
  - TerraSync v4.10
  - GPS Pathfinder Office v4.20
  - GPScorrect v3.10
  - GPS Analyst v2.20
  - GPS Pathfinder Tools v2.40
- **Functionality changes**
  - Totally new GNSS processing engine
  - Enhancements requested by resellers and customers

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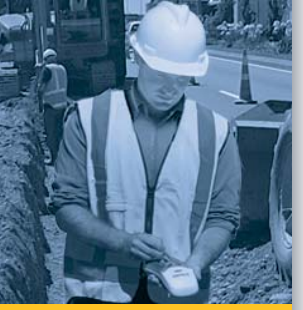

New postprocessing engine benefits

- L1/L2 H-Star processing
  - 10cm accuracy faster, at longer ranges, in tougher environments
  - GLONASS postprocessing now supported for ProXRT
- XT-level gets better accuracy and solution-selection
  - GeoXT and ProXT now specified at 50cm (HRMS)
  - DeltaPhase™ with forward and backward processing
- SiRF processing significantly improved
  - 1-3m accuracy for Juno SB and Juno SC
  - DeltaPhase™ and better solution selection

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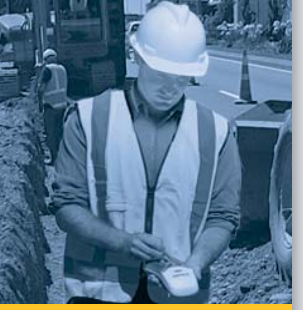

Open sky results

- An ideal GNSS environment with no obstacles, and where GPS antennas are mounted on rigid survey pillars.

GeoXT 2008 Series (Code DeltaPhase results)	Average error	Worst Error
Old Processing Engine	0.57 meters (1.9 feet)	1.49 meters (4.8 feet)
New Processing Engine	0.33 meters (1.1 feet)	1.10 meters (3.6 feet)

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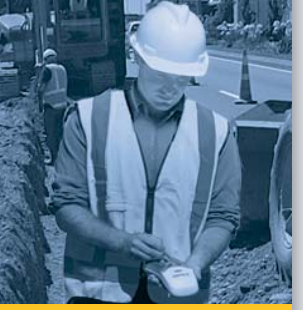
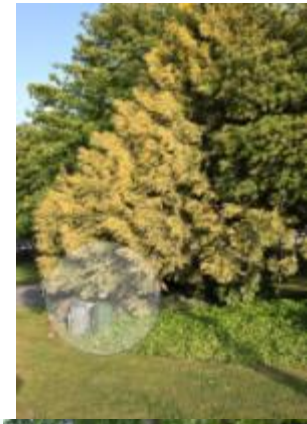
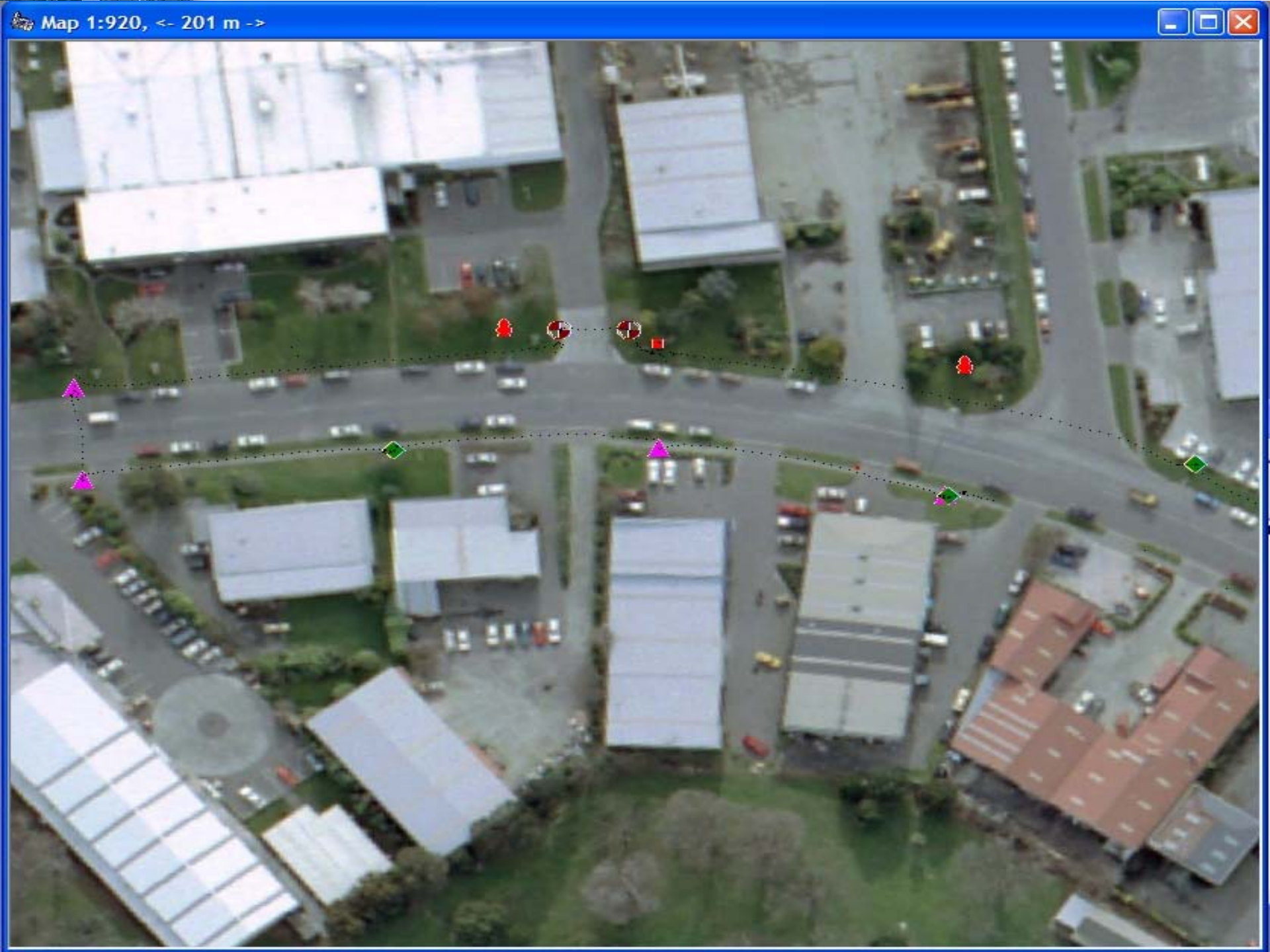


Light industrial / suburban results



- 26 surveyed locations along a 2-lane street
  - Half relatively open, half under/near canopy
  - Two completely under trees
  - One- and two-floor business premises with signage on the road and typically numerous parked vehicles
  - One side of the road has a row of mature trees, while the other is more sparsely planted
  - Realistic features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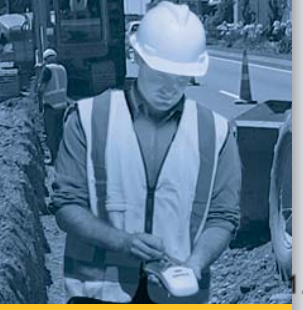
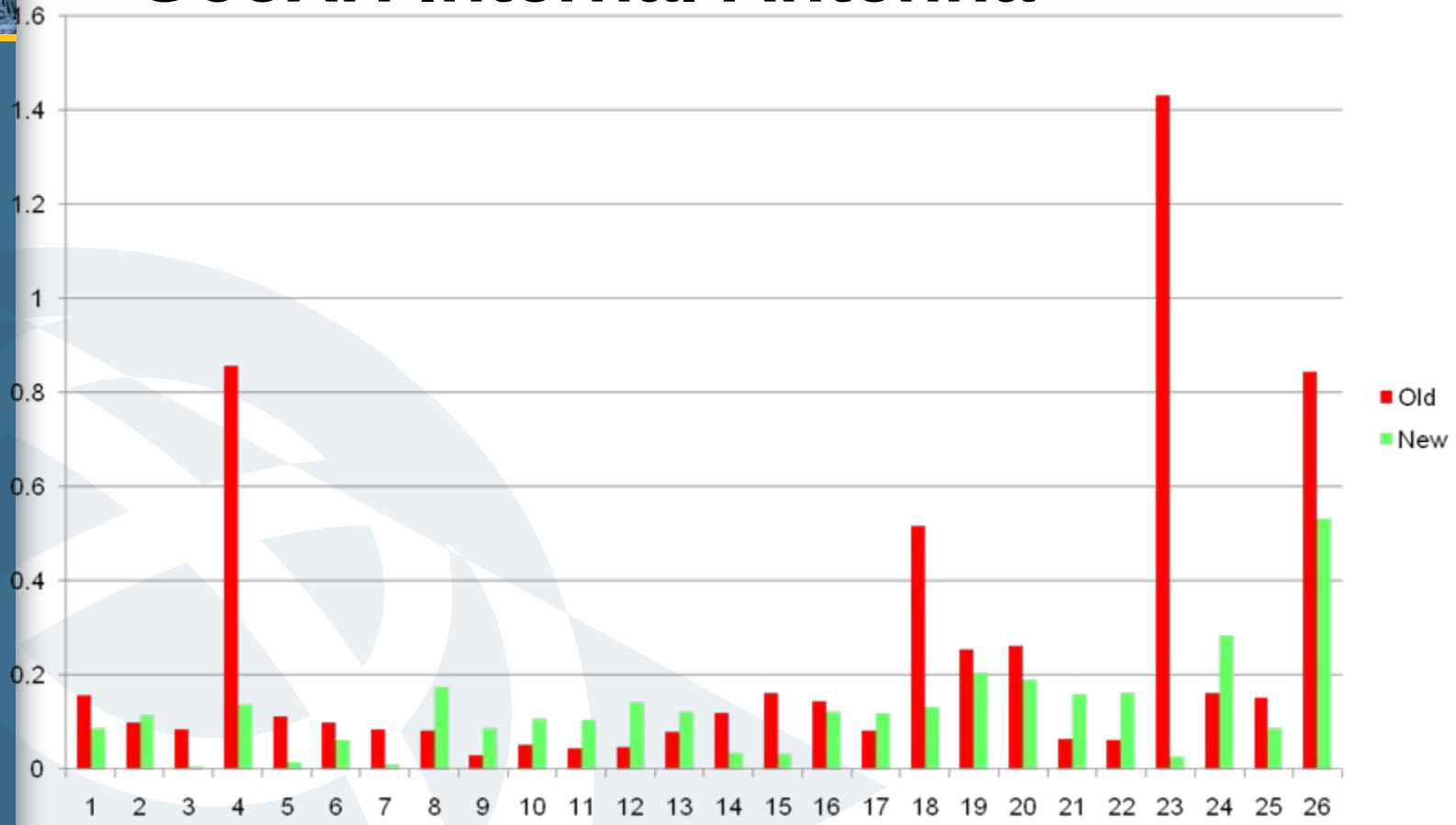
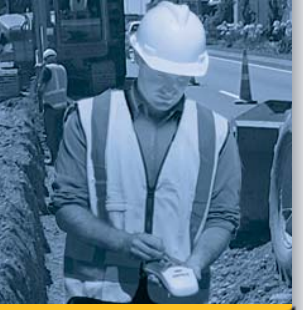


GeoXH Internal Antenna

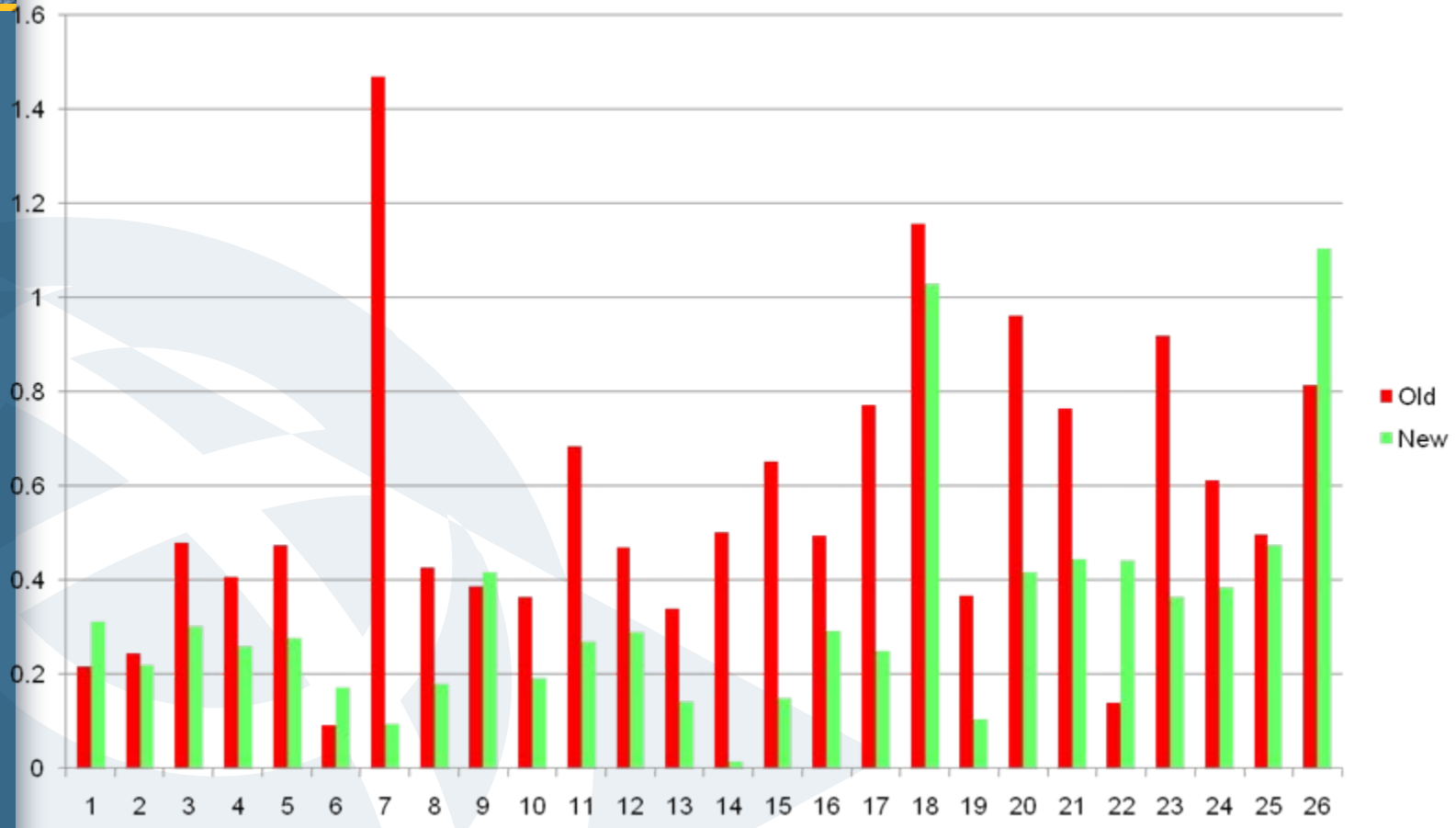


Old average accuracy = 23cm (9”)
New average accuracy = 13cm (5”)

Old worst error = 1.43m (4.7ft)
New worst error = 0.53m (1.7ft)

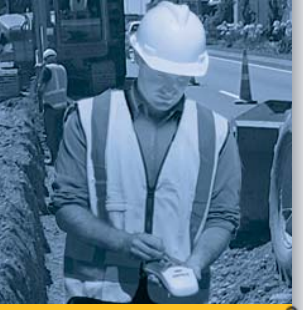


GeoXT Internal Antenna

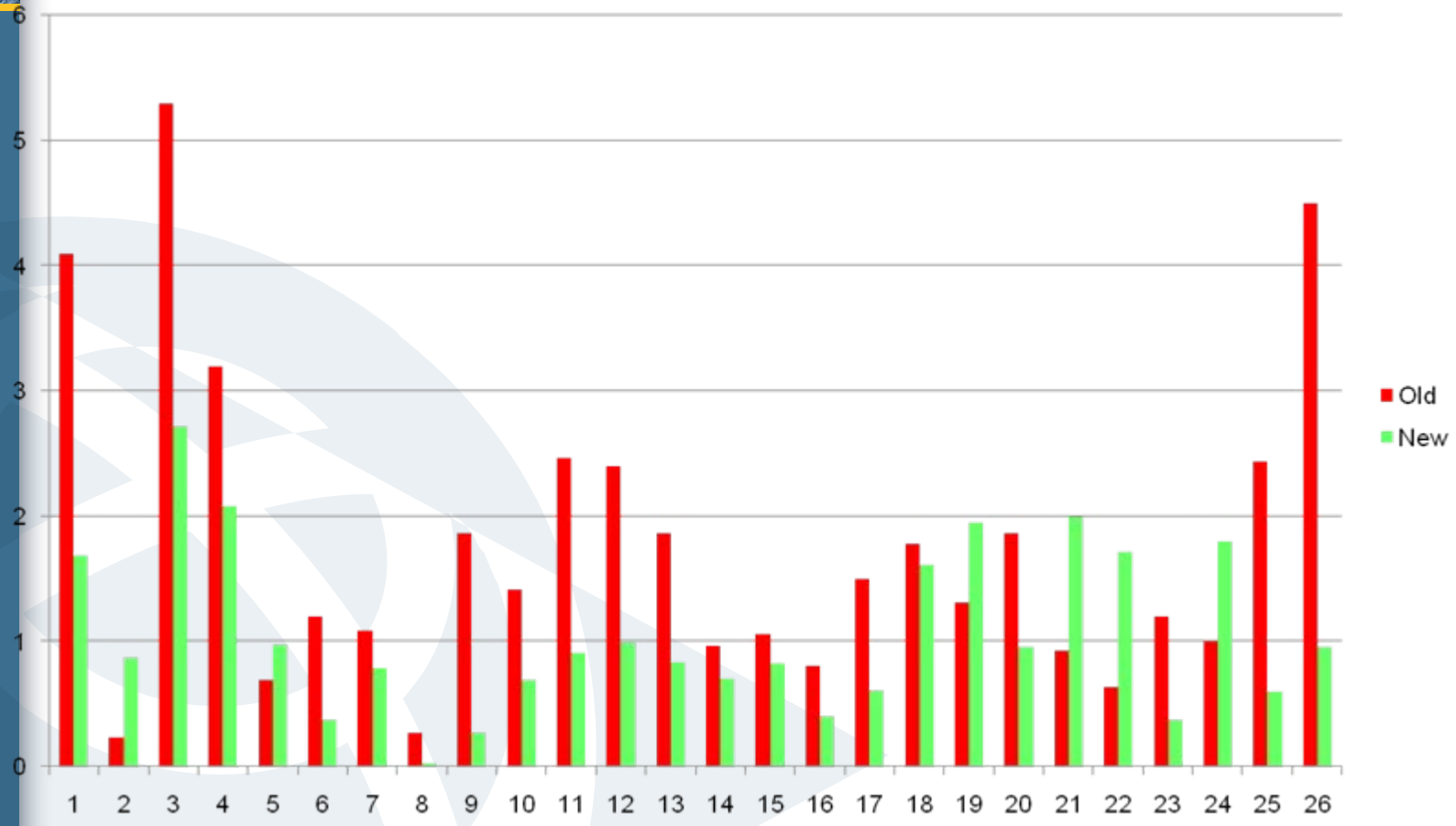


Old average accuracy = 57cm (1.9ft)
New average accuracy = 33cm (1.1ft)

Old worst error = 1.49m (4.8ft)
New worst error = 1.11m (3.6ft)

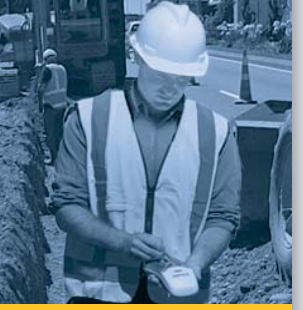


Juno SB Internal Antenna

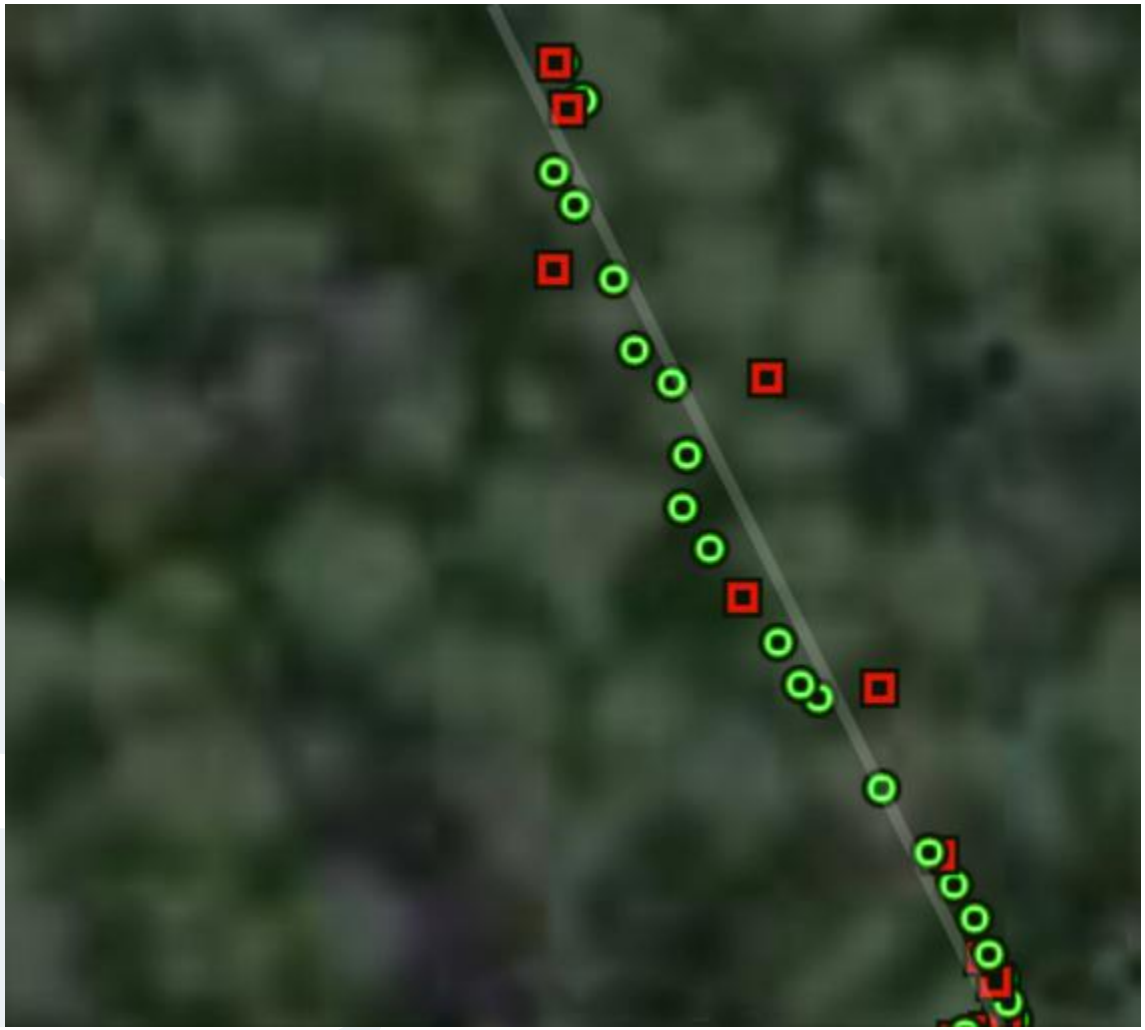


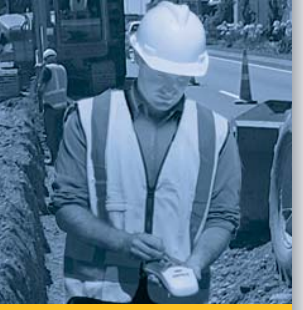
Old average accuracy = 1.78m (5.8ft)
New average accuracy = 1.06m (3.5ft)

Old worst error = 5.30m (17.4ft)
New worst error = 2.71m (8.9ft)

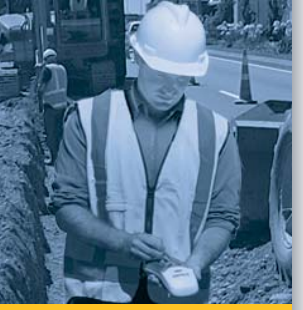


DeltaPhase: GeoXT Under Trees





DeltaPhase: Juno SB Under Trees



Summary

Changes by receiver class

- Juno SB/SC postprocessed accuracy improves to 1-3m
  - Yuma and Nomad unchanged at 2-5m
- GeoXT and ProXT postprocessed accuracy improves to 50cm
- GeoXH now gets decimeter accuracy “most of the time”
  - Still subfoot at extreme range or under tough conditions
- ProXRT now logs GLONASS data for postprocessing

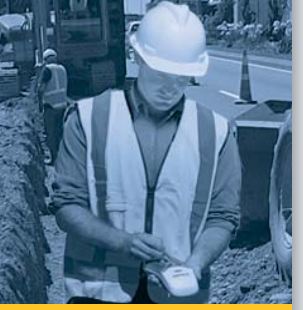
General

- Real-time: set slider in the middle
- Post-processed: run masks wide-open

Exceptions:

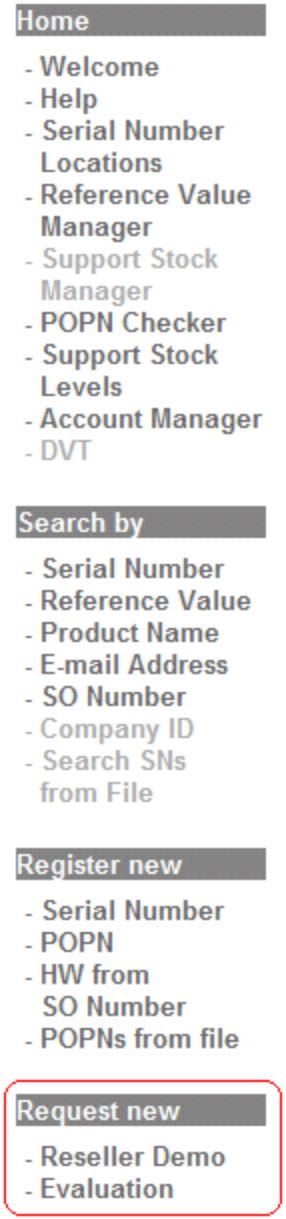
- Receivers that didn’t log carrier or pseudoranges aren’t supported
- When using unsupported software, or data collection settings altered from recommendations

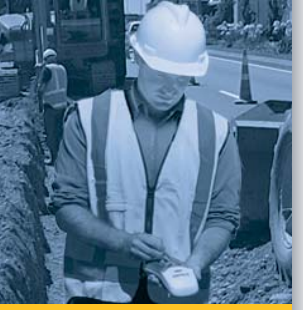
Trimble



Reseller Demonstration / Customer Evaluation

- Available free-of-charge to customers from Resellers
- Trimble website serves an Installation Code
- Software installed on a Windows Mobile device must be activated
- Customer Evaluation – expires after 2 weeks





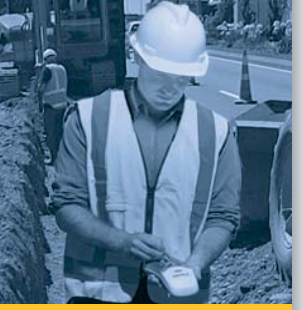
Minimum Retroreflectivity Standards

- **Federally-mandated minimum sign retroreflectivity standards became final on January 22, 2008**
- **Designed to improve the night visibility of traffic signs**

- **Requires state and local agencies to:**
  - Assess the signs on their roads and develop a replacement plan within four years of the final ruling.
  - Replace non-compliant warning and regulatory signs within seven years of the final ruling.
  - Replace guidance and street name signs within ten years of the final ruling.

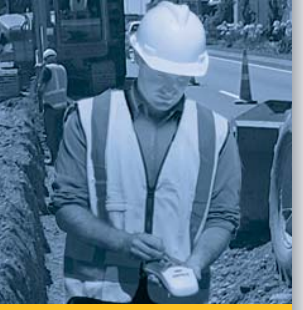
  - http://www.minimumreflectivity.org

Trimble



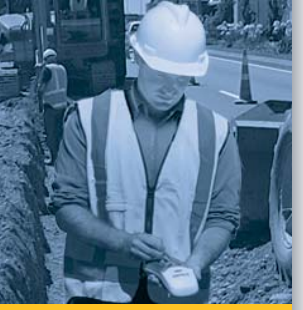
Assessment or management methods

- Visual nighttime inspections
- Measured retroreflectivity
- Expected life
- Blanket replacement
- Control signs



Best Practices

- Maintenance records... to maximize life cycle at retroreflective minimums
- Sign inventory... that locates, identifies and monitors each sign
- Incident report... to collect contemporary information and respond effectively



Develop Database of Current Inventory

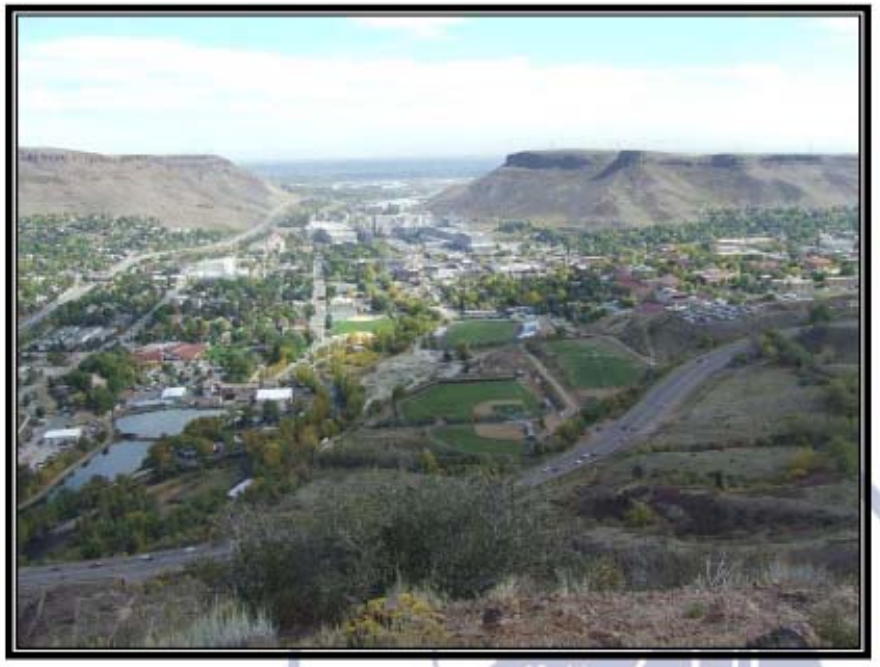
- Sign installation date, location and type
- Record of inspection dates and type conducted
- Log of sign support or maintenance activities
- Environmental conditions or special notes
- Logs of incidents

- ESRI presentation
  - City of Golden Colorado

Summary of Assets

- Located 10 miles west of Denver in the foothills of the Rocky Mountains
- 9.6 square miles in size
- 18,000 People
- 1% Growth Cap
- County Seat of Jefferson County
- 50 Public Works employees (including Admin. Staff)

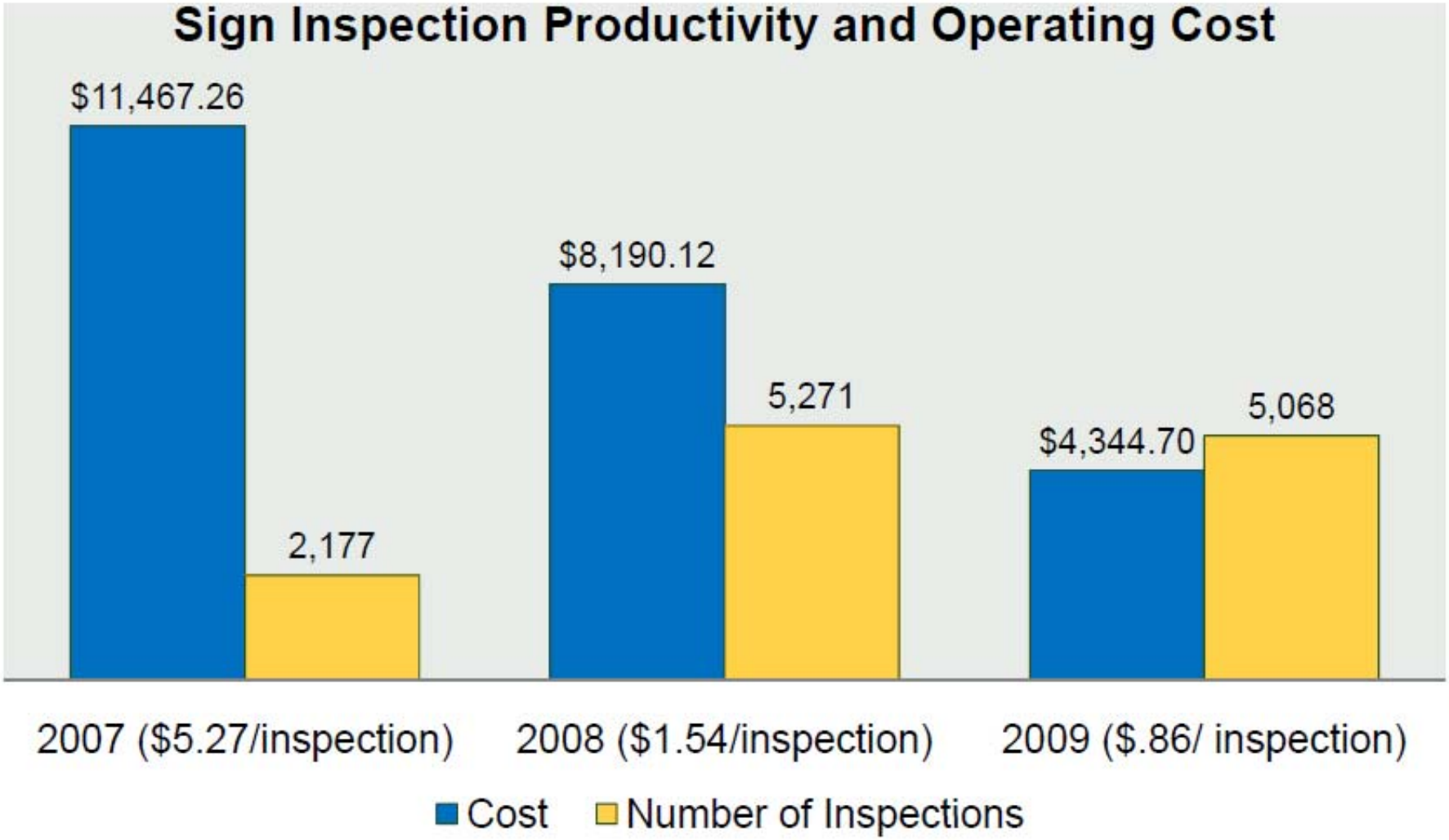
Centerlines	78 ½ miles
Sanitary Manholes	2067
Sanitary Sewer Lines	76 ½ miles
Fire Hydrants	1031
Water Valves	2840
Water Meters	5264
Water Backflows	404
Water Storage Tanks	12
Storm Inlets	2257
Storm Manholes	787
Storm Outfalls	1014
Detention Ponds	198
Storm Lines	52 miles
Storm Channels	11 miles
Street Signs	5000 +

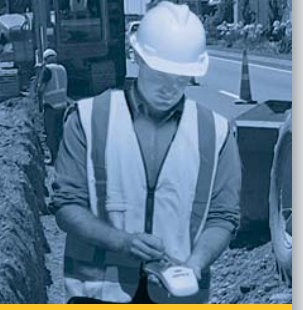


Data Collection

- Sign data has been collected in the field using mapping grade GPS equipment
- All sign information is displayed and analyzed using ArcGIS technology
- All signs are available for viewing in a GIS environment.

Productivity Graph



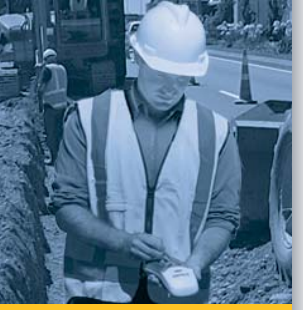


Wetland mapping

- **July 2009 Sec of Interior, Ken Salazar announces new Wetland Mapping Standard**

- **www.fws.gov/wetlands**

- **Two good documents**
  - **FGDC Wetlands Mapping Standards.pdf**
  - **Data collection standards…pdf**



Timmons Group solution

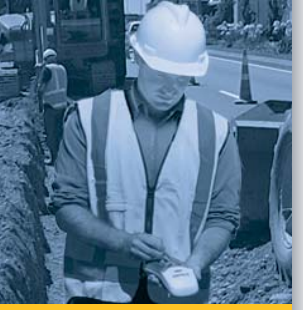
www.wetcollect.com

Collect and Process Wetland Delineation Data in the Field

WetCollect is a next generation software product designed to expedite the data collection and processing of Routine Wetland Determination forms as provided in the new Regional Supplements to the U.S. Army 1987 Corps of Engineers Wetlands Delineation Manual. Developed to run on Windows Mobile or Trimble GPS handheld devices, WetCollect features a highly intuitive touch screen interface which enables wetland professionals to reduce report time by up to 50% by allowing them to record wetland data in the field and eliminate handwritten reports. With the click of a button, the data collected in the field with WetCollect can be transmitted to a secure website. WetCollect users can then easily access their data and print, email, or save their updated regional wetland delineation data form as a PDF.

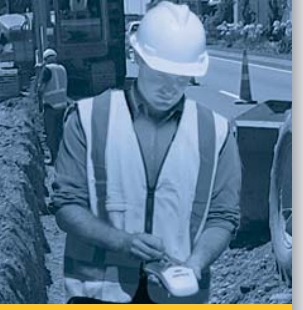
WetCollect
Software for Mobile Wetland Data Collection

Trimble

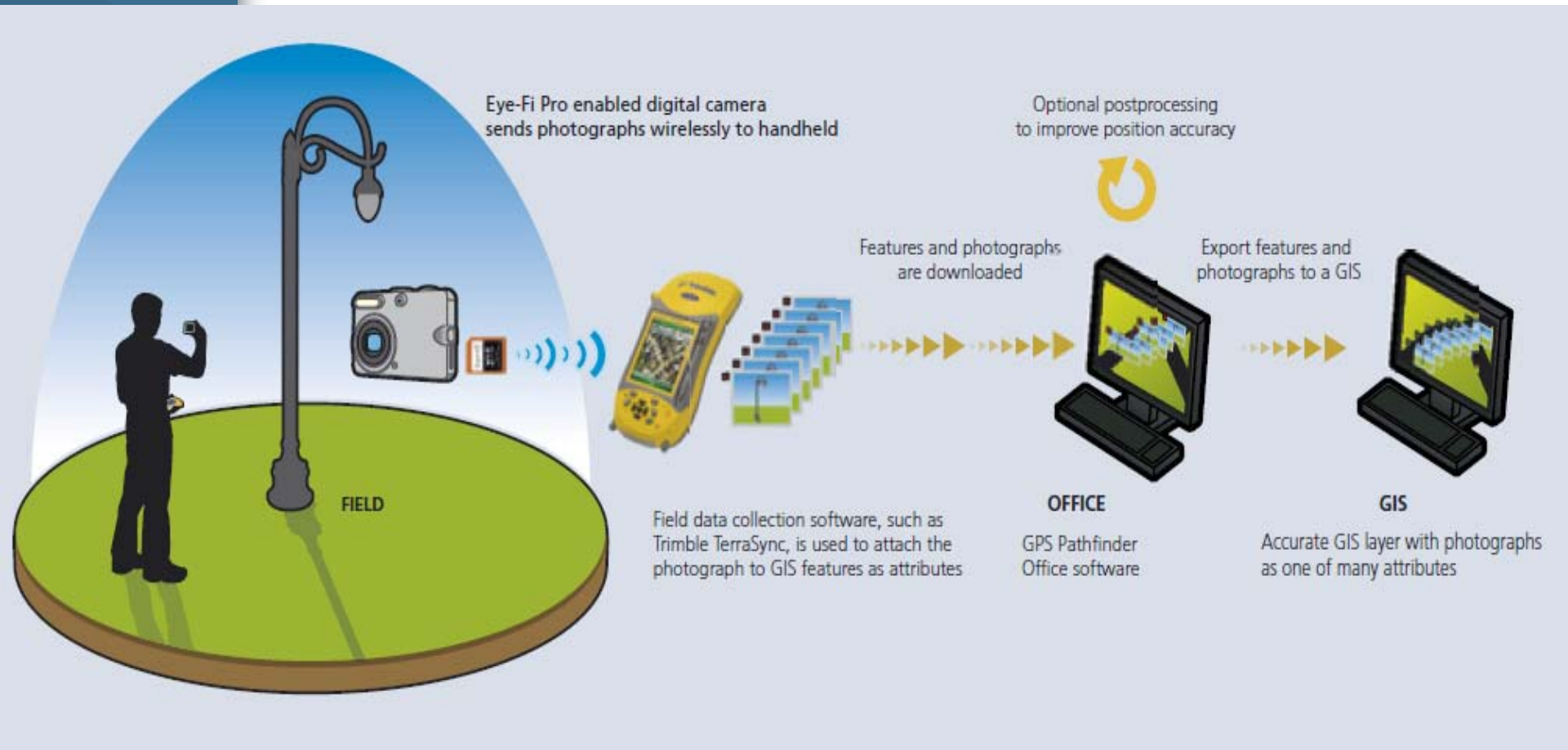


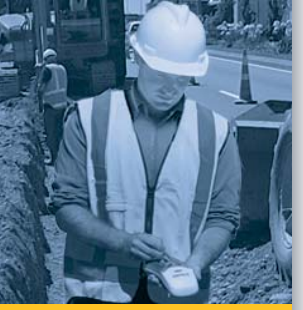
Peripherals

- Camera
- Data/Voice modem
- Barcode scanner
- Laser rangefinder
- Compass
- Others….
- Pros and Cons of integration
  - Less to carry
  - Hardware and software must be integrated
  - Shorter battery life
  - Changes in technology?
  - How often do you use the peripheral?
  - Service life



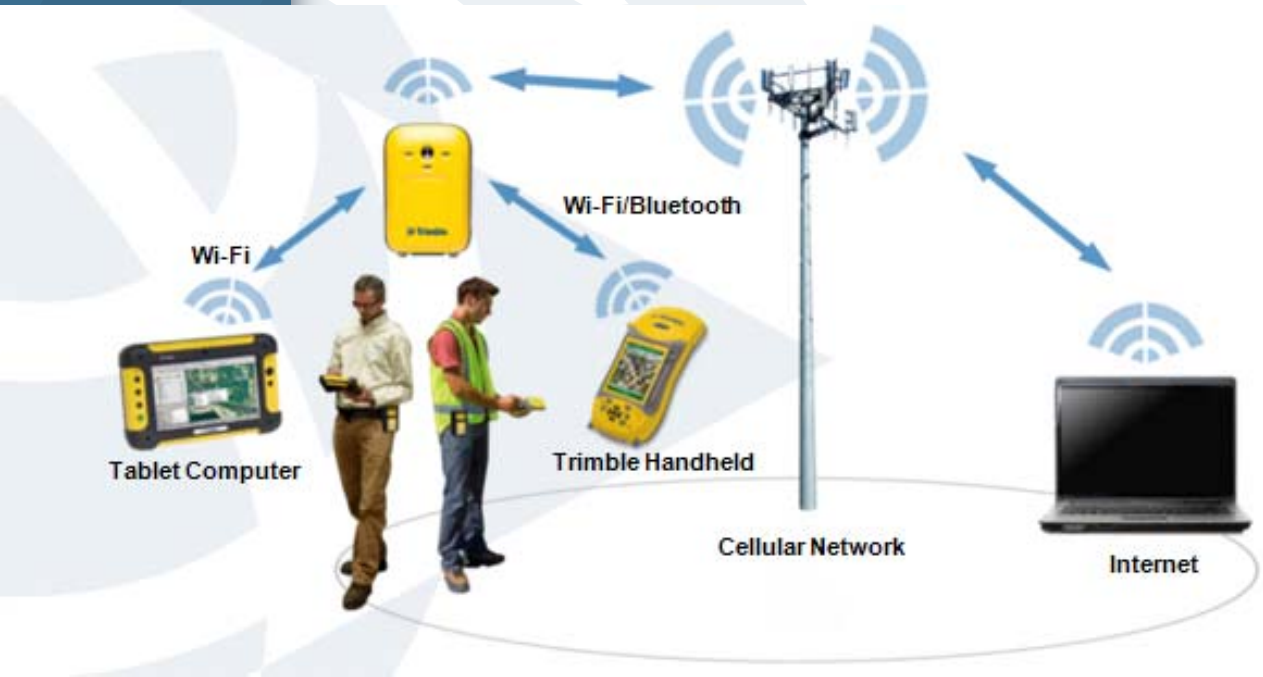
TrimPix Pro

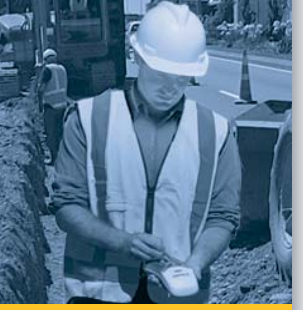

Eye-Fi Pro enabled digital camera
sends photographs wirelessly to handheld
Optional postprocessing
to improve position accuracy
Features and photographs
are downloaded
Export features and
photographs to a GIS
FIELD
Field data collection software, such as
Trimble TerraSync, is used to attach the
photograph to GIS features as attributes
OFFICE
GPS Pathfinder
Office software
GIS
Accurate GIS layer with photographs
as one of many attributes



TDL 3G

- **A cellular modem accessory to add cellular capability to your Trimble handheld device**
- **Connectivity options**
  - **Wi-Fi**
  - **Bluetooth®**
- **Rugged and waterproof**
- **Long battery life for all day use**
- **Pocket-sized and easy to use**





Questions…