



Connecting people to information through integrated data and maps.

ESRI INTERNATIONAL USER CONFERENCE & AEC SUMMIT

JULY 2014

SAN DIEGO, CA

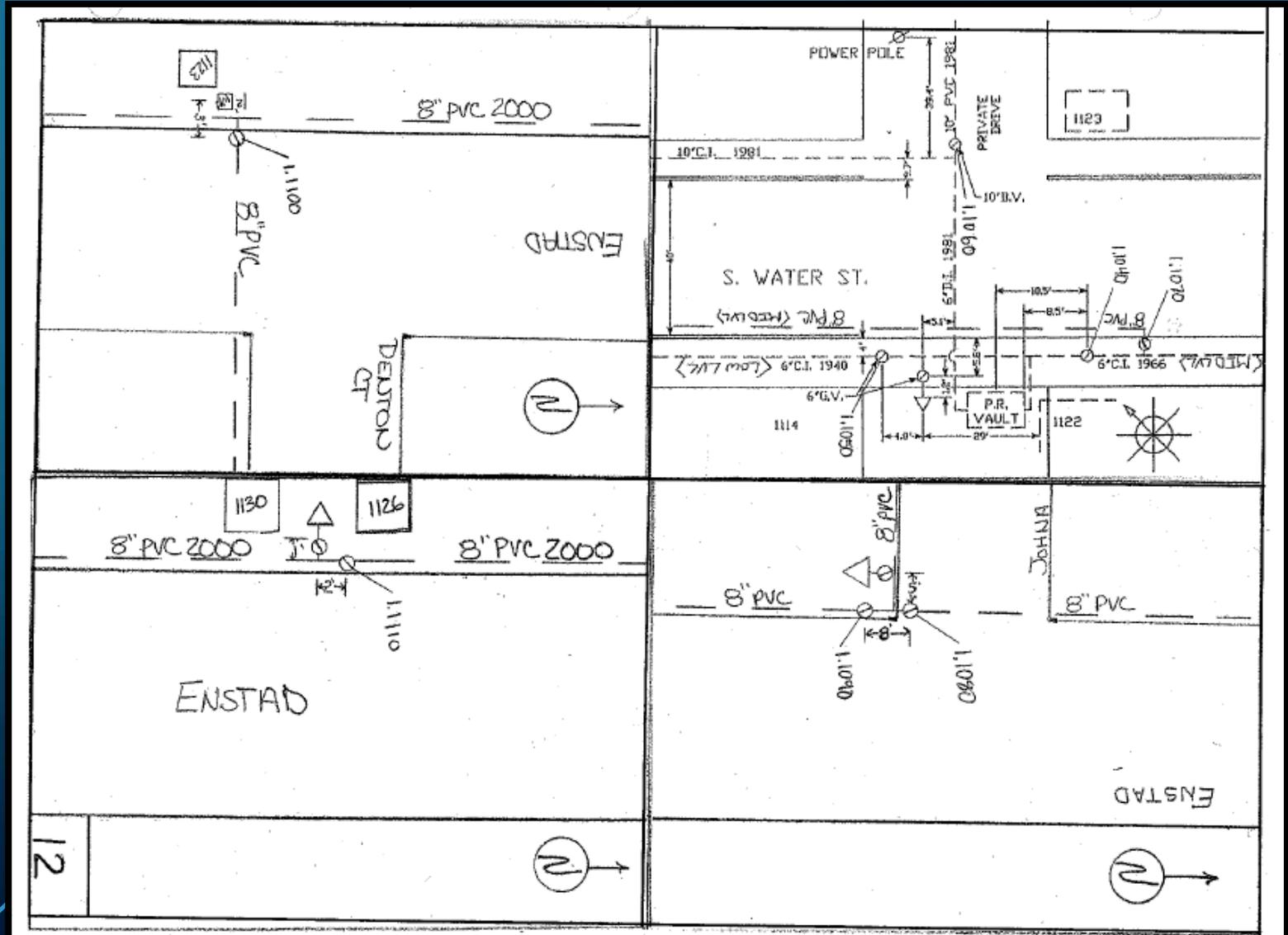
EVALUATE THE SYSTEM

- The Big Meeting:
 - PW Director
 - Superintendent of Water & Streets
 - Superintendent of Sewer & Stormwater
 - Engineering Division: Civil, Environmental & GIS
- Graded each GIS feature:
 - All points, lines, and polygons assigned
 - Confidence levels: High, Medium, Low
 - Precision/Accuracy: aerial photo, GPS, or survey

Goal - How “good” is our GIS



HAND DRAWINGS FROM PW DIRECTOR — BORLAND'S CARDS —



THE PROBLEM

One example:

- February 2011
- McMenamins - Edgefield
- A fire hydrant was hit
- Field crew unable to locate the shut off valve using GIS and as-built drawings
- Spatial data >50 ft off



POSSIBLE SOLUTIONS



- Tape measure the town
 - Hand drawings from PW Director – example from another city
 - Lots of \$, lots of time (years) – too many crew hours
 - Multiple crews – inconsistency
 - Laborious to integrate into GIS



- GPS the city
 - Lots of \$, lots of time (years)
 - Many crew hours



- Field Survey every street
 - Requires Request For Proposal (RFP) process
 - Lots of \$\$\$\$
 - Limited data capture (only select features)



- 3D Mobile LiDAR Scan
 - < 8 hours
 - Captures everything in site at once:
 - Each point has location, elevation, and measurement information
 - Overnight post processing
 - 4 hours of training the next day, ready to get data into GIS
 - Saved on a single hard drive with backup of raw data files, city owned data
 - Record of the City of Troutdale 2011
 - Easily repeatable in future



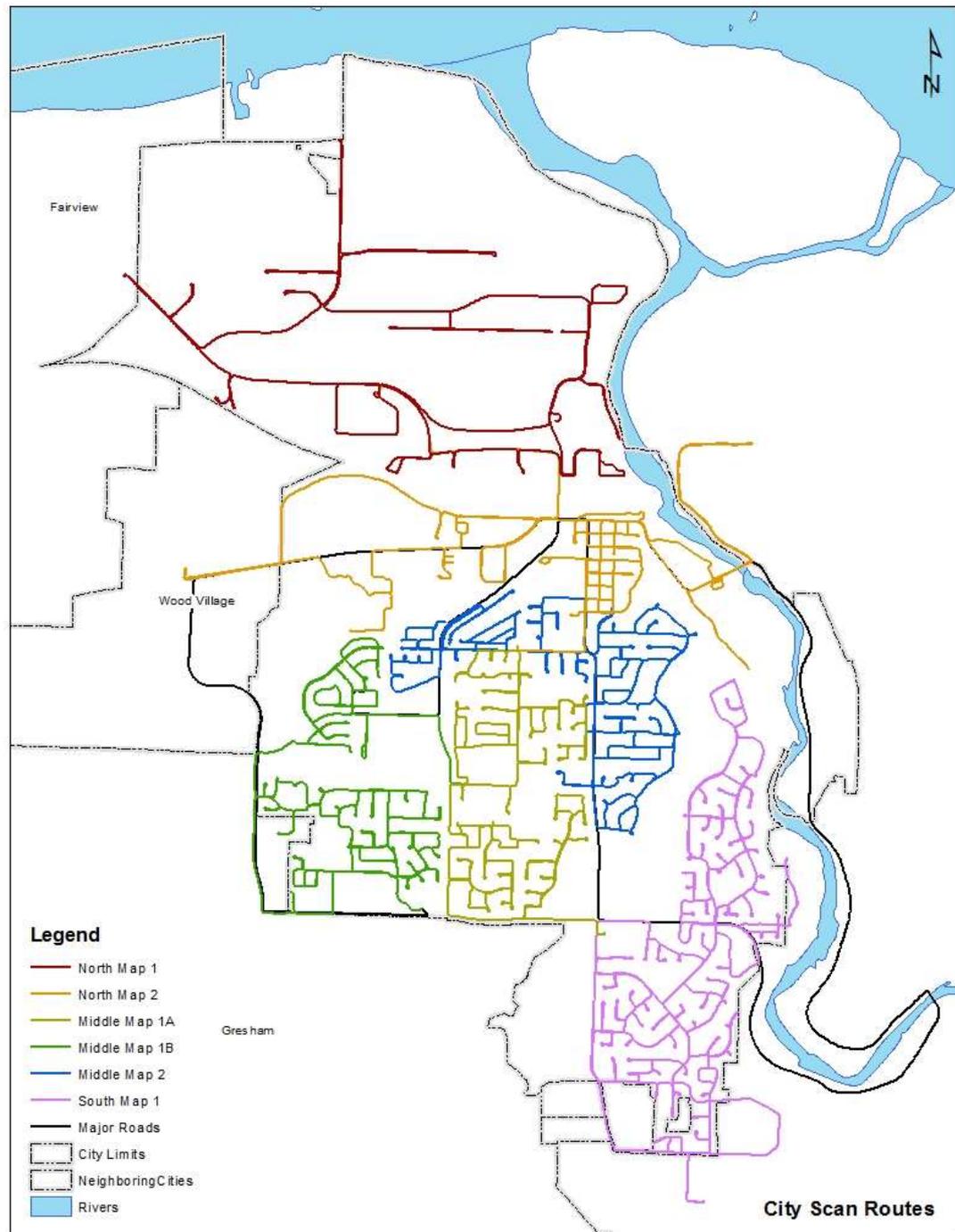
CITY OF TROUTDALE'S 3D MOBILE MAPPING PROJECT

- August 22, 2011
- Rented IP-S2 system from PPI Group, Portland
- Created a map with 6 routes - 1 hour sections
- Set up a base station at a well site - near the center of city
- If we have an extra 30 min. at the end of the day
 - we scan the county streets within the city limits

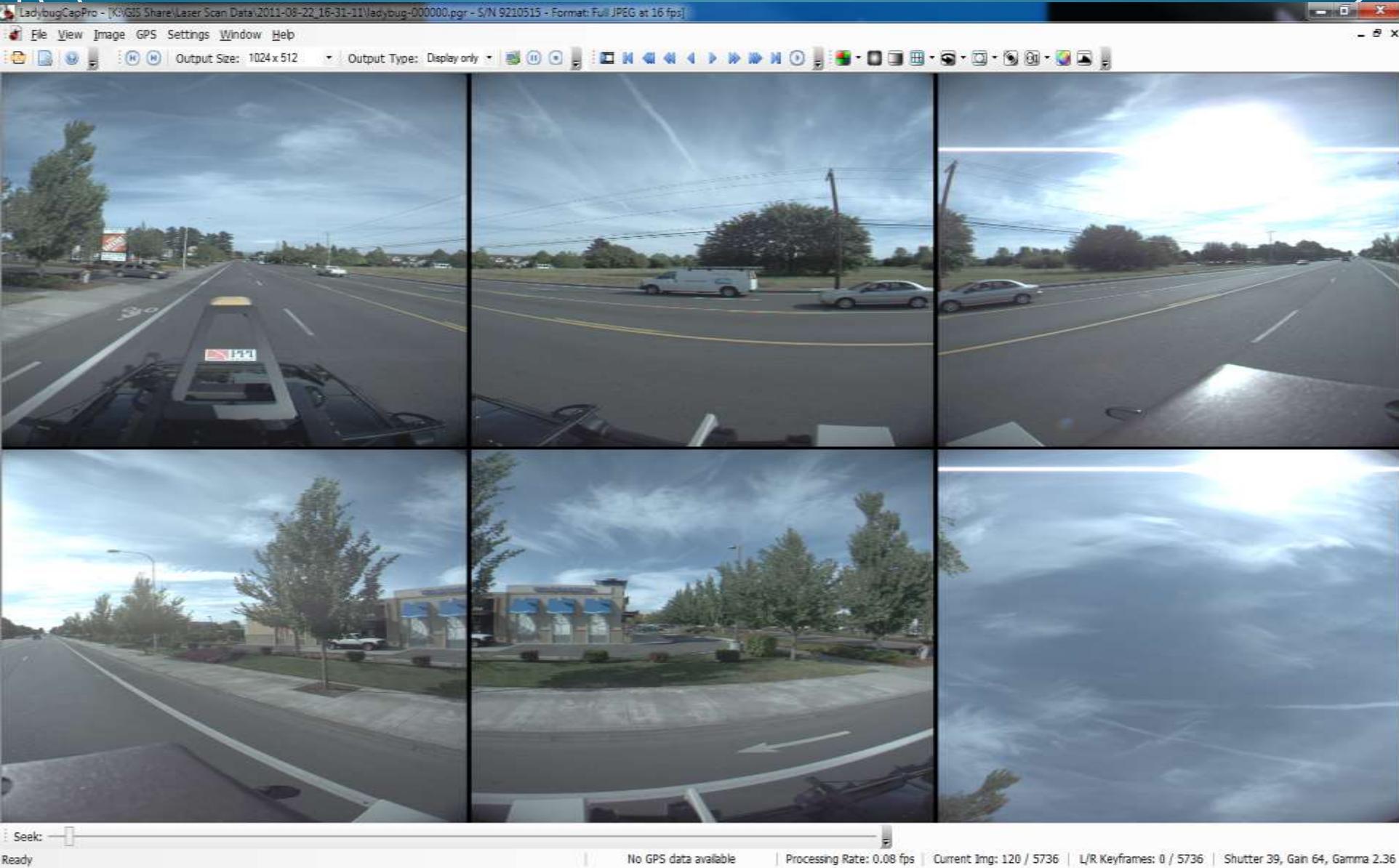


ROUTE MAP

- 6 - 1 hour sections
- Timed by staff
- Reboot points selected
- Transition paths
- North - morning
- South – afternoon
- Trajectory map product



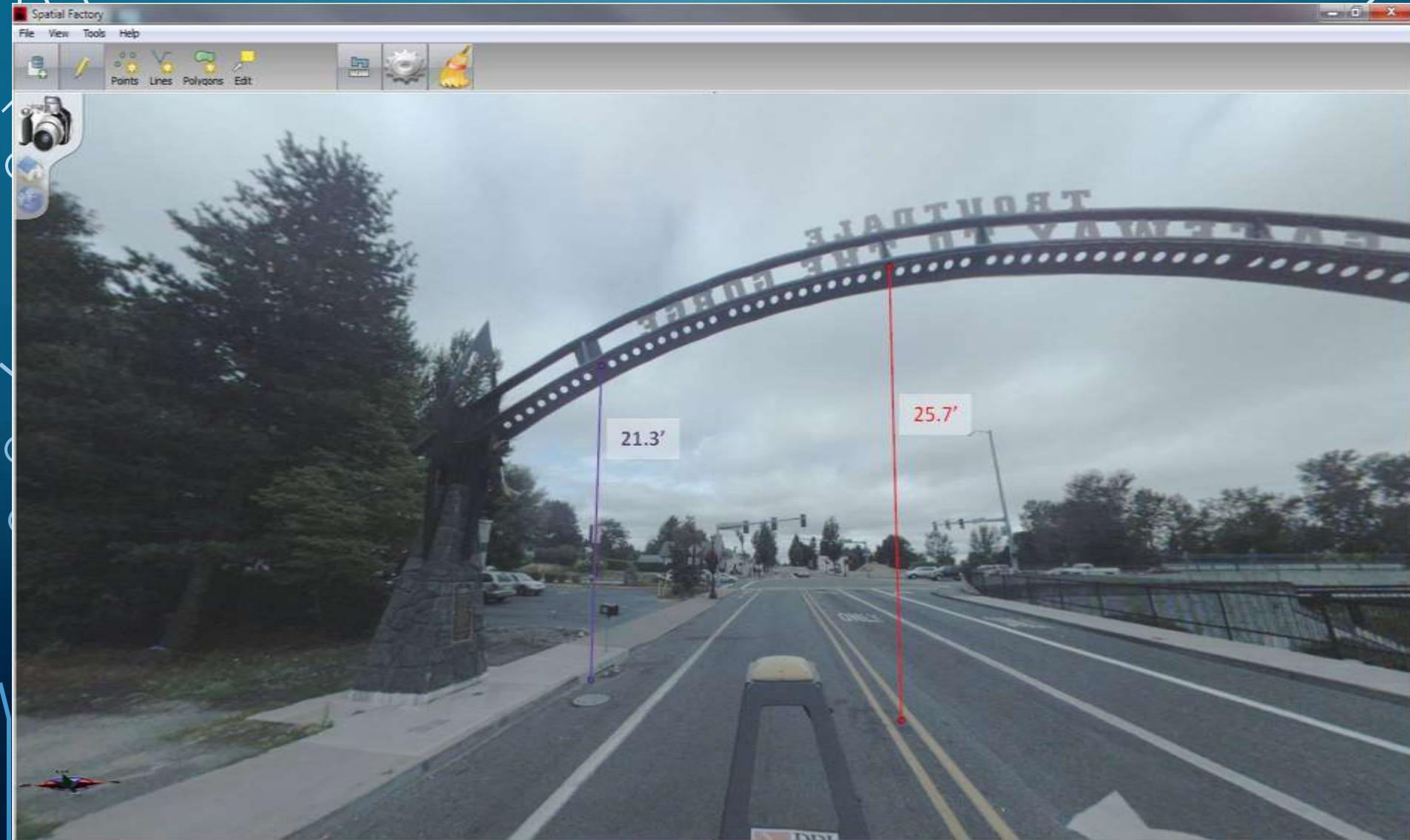
IMAGES CAPTURED EVERY 3 METERS



THE POINT CLOUD



EASILY TAKES MEASUREMENTS (+/- 3 CM)



REAL TIME DISPLAY WHILE DRIVING

The screenshot displays the Spatial Collect software interface. The window title is "Spatial Collect" and the menu bar includes "File", "View", "Tools", and "Help".

On the left side, there is a vertical toolbar with the following components:

- System:** Includes "Stop" (red X icon) and "Full" (green up arrow icon) buttons.
- GPS:** Represented by a house icon.
- Ladybug:** Represented by a ladybug icon.
- Sick:** Represented by a Sick (Sensor Inertial Camera Kit) icon.
- Encoder:** Represented by a wheel icon.
- IMU:** Represented by a yellow sensor box icon.

The main display area shows a blue path on a dark background. A red "Logging" label is positioned above the path. A white rectangular box is overlaid on the path. In the top right corner of the display, the following information is shown:

- Time: 0:29:53
- RMS: 0.51m

At the bottom left of the display, there is a compass rose icon. At the top right of the window, there is a text input field labeled "Record notable events here..." and an "Enter" button.

WHY DID WE CHOOSE TO SCAN ?

Accurately locate all utility surface features and more

- Fire hydrants
- Catch basins
- Storm and sewer manholes (mains)
- Street trees
- Pavement marking
- Street signs
- Water valves (mains)
- Face of curb
- Railroad crossings
- Bridges
- Tunnels
- Utility poles (PGE, Frontier)
- Traffic Signals (Multnomah County)
- and a lot more

Data collection speed and cost

- 1 working day, a total of 8 hours with breaks, ~ 108 miles
- Spent \$ 5K for drive time, \$ 2K for processing & training, \$ 5K software
- Entire city's record fits on a 500 GB ext. hard drive
- City owns the data, we have rights to sell data
- Historical record of the entire city in summer of 2011



2 YEARS LATER ... PROGRESS REPORT

- Goal accomplished
- Positive newspaper and web articles
- Extra info gathered simultaneously
- Features gleaned from program:
 - Data transferred to GPS machines
 - attributes updated by field crew during work related activities



Water System

Fire hydrants: 497
Water valves: 1551
Water meters: 4739
Water mains partially fixed

Stormwater System

Catch basins: 1493 :1562
Stormwater manholes: 979 : 997
Drywells:130 :132
Inlets, culverts, ditch lines
Stormwater mains fixed (~2 months)

Sewer System

Sewer manholes: 1180 : 1360
Sewer cleanouts
Sewer mains fixed (~15 days)

Streets

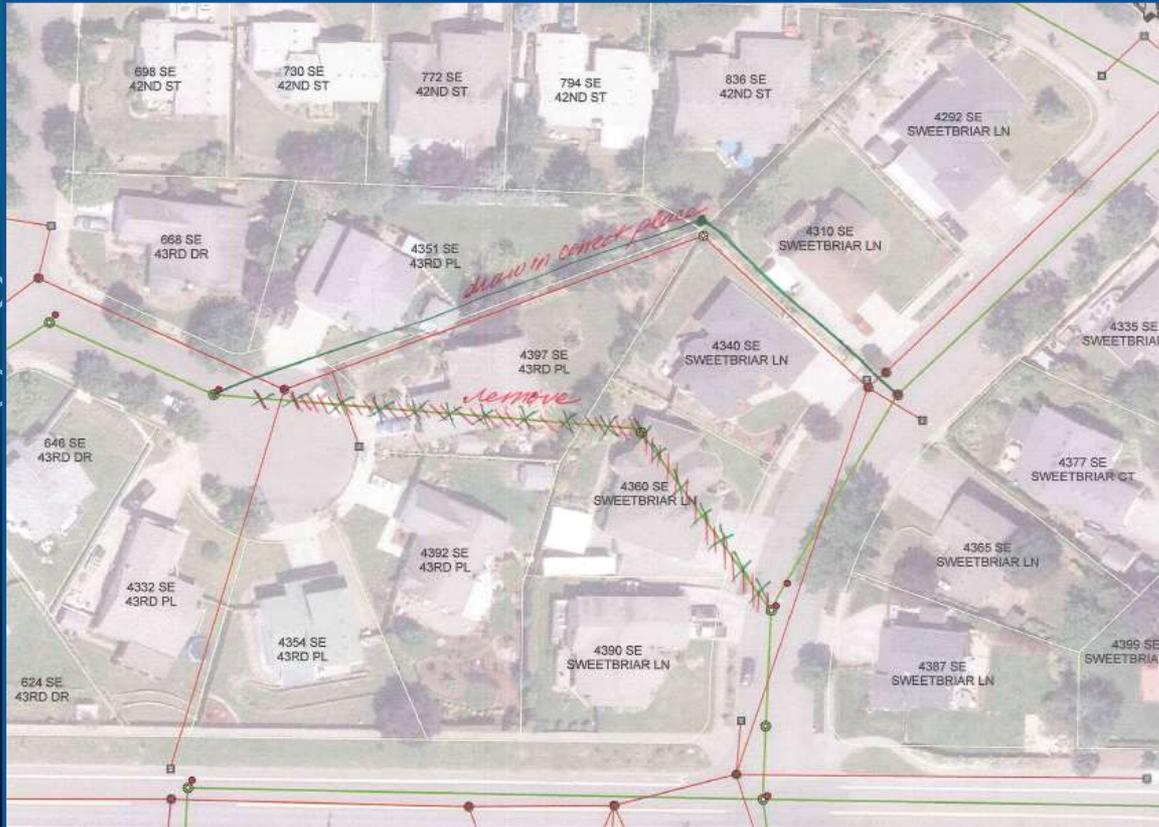
Street Trees: 4470
Street signs
Sidewalks
Pavement Markings
Face of curb
Right of way



COMPARE LOCATIONS – OLD VS. NEW



Engineering as-built



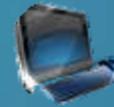
Sewer system fixed

READY TO SHARE



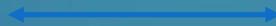
GIS Server

- ArcGIS 10 Server
- ArcGIS 10 Map
- Flex Viewer
- Website Root



GIS Workstation

- ArcMap 10.2.2
- Microsoft Expression Web
- Active Sync, Sync Toy



All City Employees

- ArcReader 10.2



Web/Online

- Flex Viewer
- Adobe Reader - PDFs
- ArcGIS Online - (iPads & iPhones)



Sync - Offline

- Current GIS Geodatabases
- Current Maps
- RLIS Quarterly updates, 911



Trimble GPS Units

- ArcPad & Trimble Positions
- Water & Streets
- Sewer & Stormwater
- Engineering (2)



Laptops

- ArcReader 10.2
- Spatial Factory
- Engineering
- Service Truck



External Drives

- Backup
- Cloud
- Building & Planning

Enterprise GIS Design 2013

- We are designing simple and elaborate bridges that connect people to information.

INTEGRATED GIS

Complete Redesign of the City's Enterprise GIS

- New GIS Server: website, GIS data, ArcServer 10.0
- ArcGIS 10.2.2 for all editors
- All city employees can access data through ArcReader or ArcGIS Online
- Field crews are using Trimble, iPhones & iPad Devices
- Online Interactive Maps & pdfs for the world
- Permitting & Street Trees databases are joined to features
- Building, Planning & Parks Departments layers synced
- Finance Department's utility billing database linked
- FEMA Flood Datasets & digital FIRMs created
- Future Projects:
 - Story maps for the Parks & Rec. Department
 - 3D City Engine integrated maps

- We are designing simple and elaborate bridges that connect people to information.

