

Skagit PUD's Journey to Becoming a GIS-Centric Utility

PNWS-AWWA 2018 Tacoma Conference

April 25, 2018

Quick Stats!

Appx 600 Miles of Water Mains

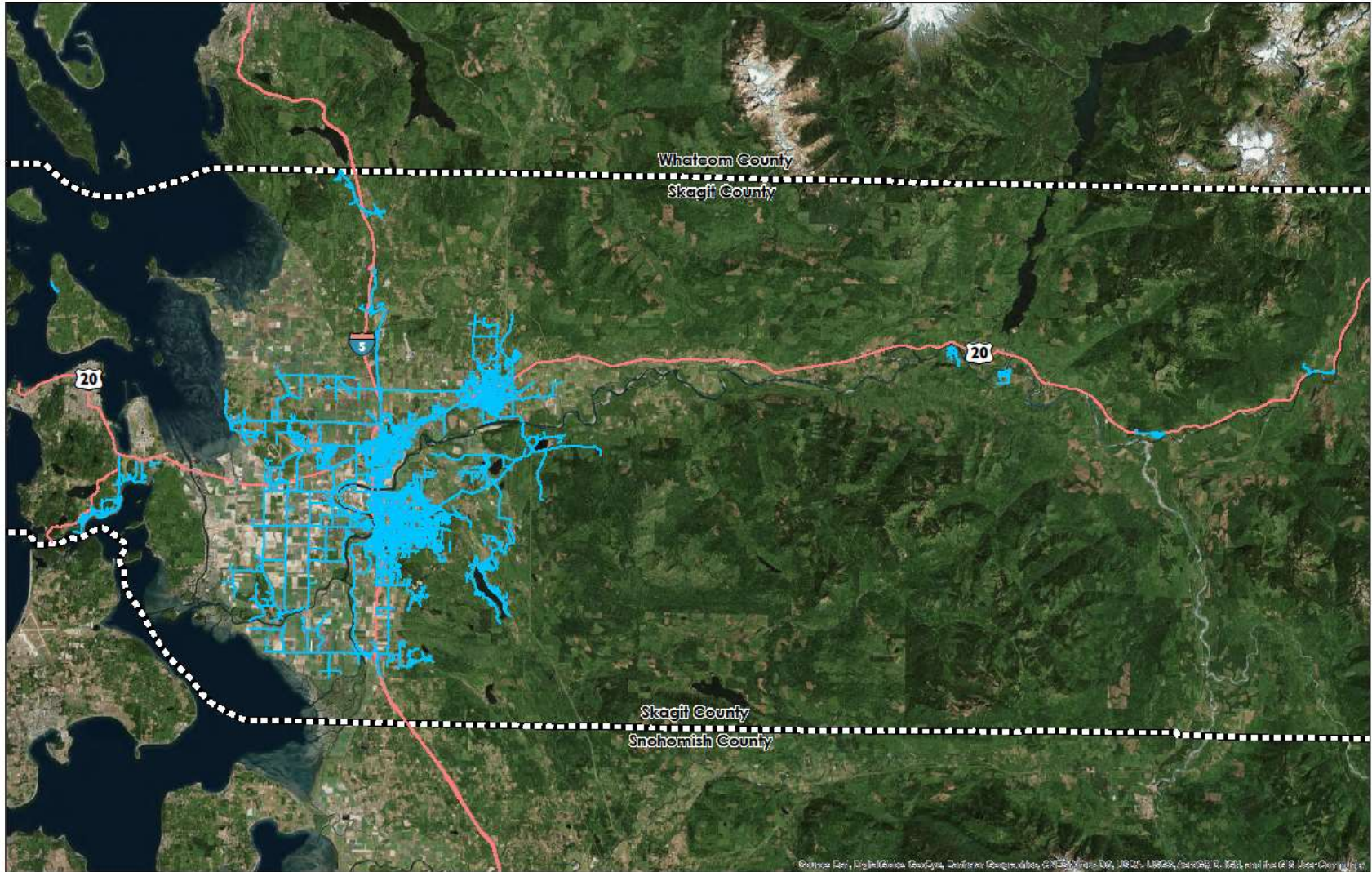
Appx 27,000 Service Connections

(Avg 45 Connections Per Mile of Pipe)

Appx 80 Employees



Water System



Me.



Outline

Pre-Enterprise GIS

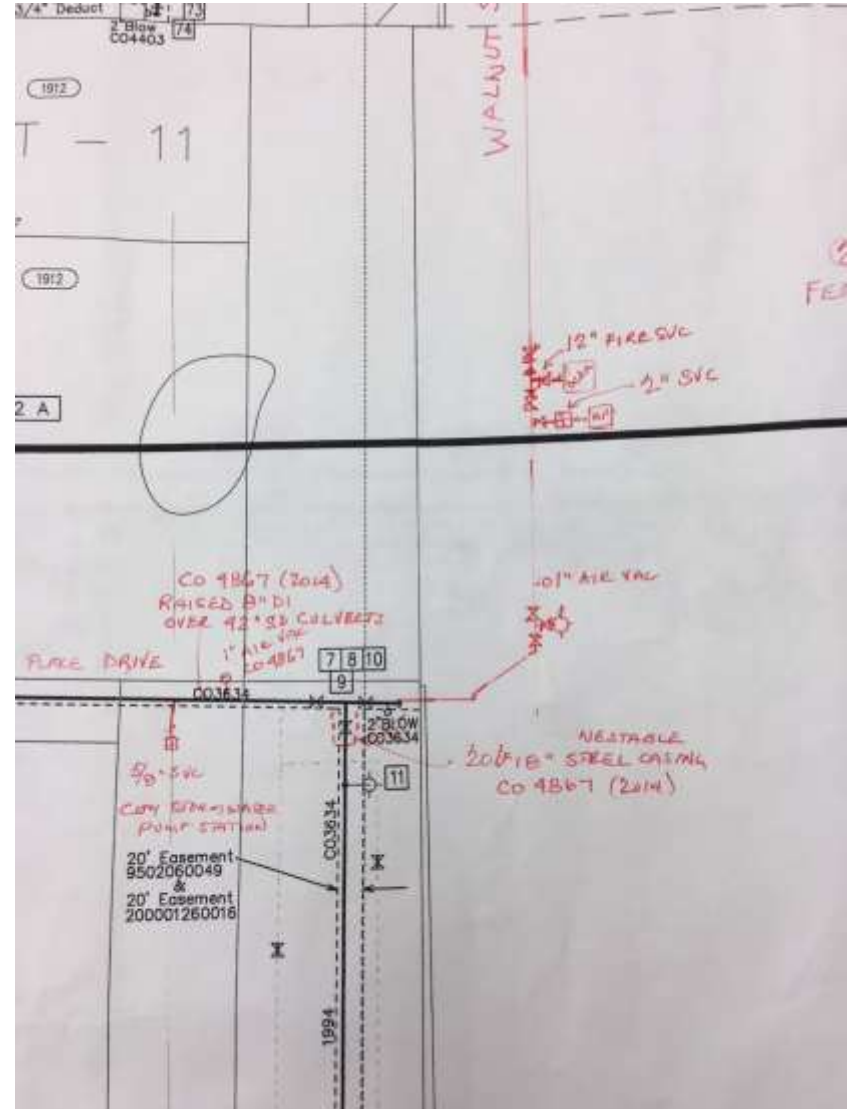
Migration to Enterprise GIS

GIS Alignment Correction

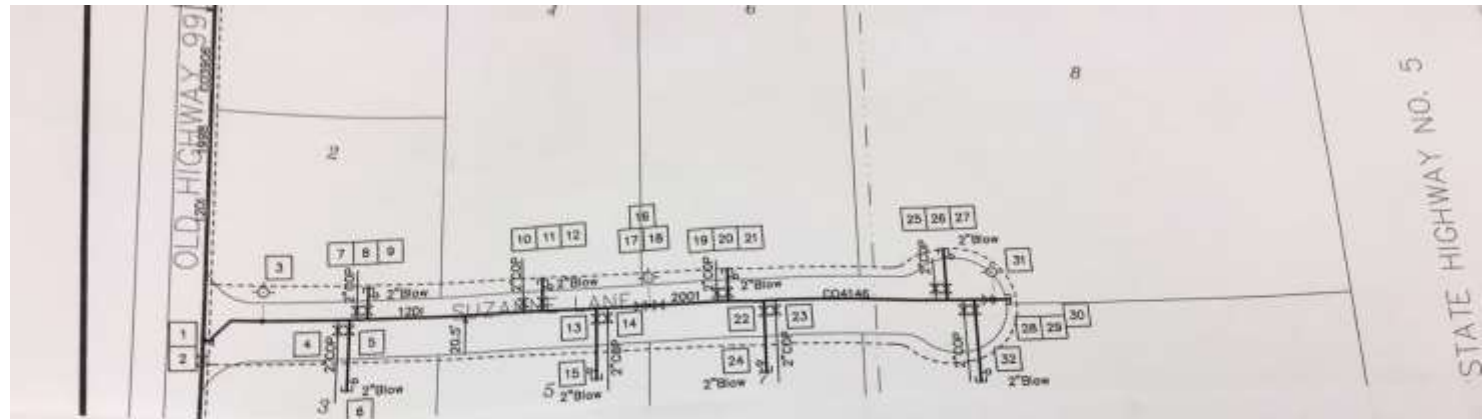
Web GIS Solutions

Asset/Work Management

Pre-Enterprise GIS



Pre-Enterprise GIS



| YEAR INSPECTED | | TYPE | SIZE | TURN | VALVE LOCATION | STREET LOCATION |
|----------------|------|------|------|------|--|---------------------------------|
| | | | | | | |
| | 2006 | | | | | |
| | 2/17 | | 8 | | 6'E of fuel line | Blodgett Road |
| | | | 12 | | 12.6'S of catch basin; 10'E of man | Blodgett Road & Ridgewood Drive |
| | | | 12 | | 13.6'S of catch basin; 19'E of man | Blodgett Road & Ridgewood Drive |
| | | | 8 | | 14.6'S of catch basin; 18'E of man | Blodgett Road & Ridgewood Drive |
| | | | 6 | | 2'W of hydrant | Blodgett Road & Ridgewood Drive |
| | | | 2 | | 100'SW of end of culvert crossing driveway; 44'NW of S end of culvert crossing Cypress St. | Ridgewood Drive & Cypress St |
| | | | 2 | | 100'SW of culvert crossing dr; 43'NW of culvert crossing Cypress St. | Ridgewood Drive & Cypress St |
| | | | 1 | | 18.5'W of end of split rail fence; 8'E of water service | Cypress St |
| | | | 1 | | 8'S of SW cor of cose. Dr. to 1765; 3.3'E of prop. Car post. | Ridgewood Drive |
| | | | 1 | | 34'E of tel ped. 1765. | Jacks Lane |
| | | | 6 | | | Jacks Lane |
| | | | 8 | | 8'SW of fire hydrant; 10'N of curb | No. of Dale way |
| | | | 7 | | | |

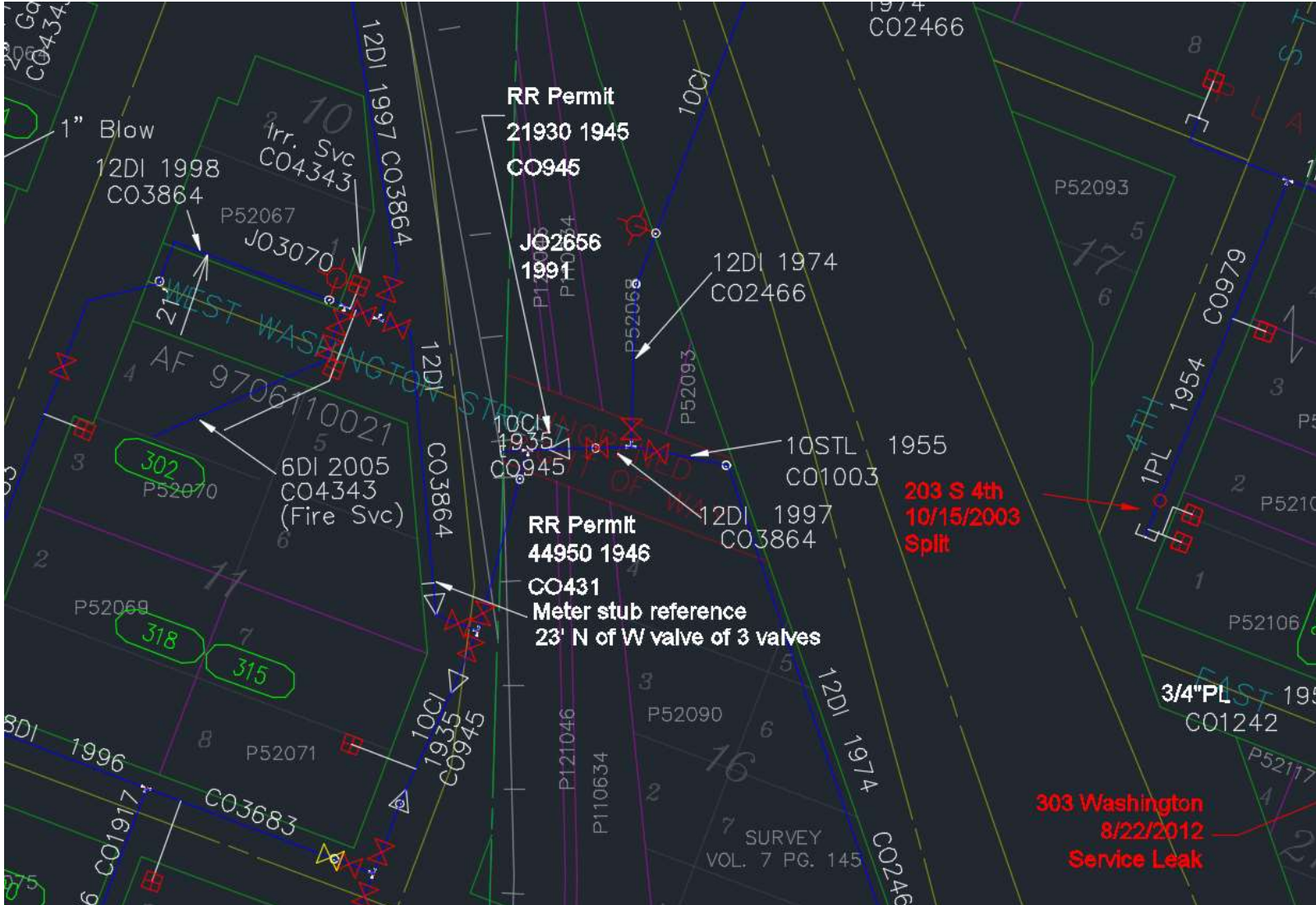
Pre-Enterprise GIS

SHAPEFILES; EW!

| Name | Type |
|-------------------------------|-------------|
| e101309c | Folder |
| Eaglemont | Folder |
| FiberRoutes by Segment | Folder |
| Hamilton Grant | Folder |
| Large County Fiber Map | Folder |
| Morford Road | Folder |
| Mount Vernon to Hamilton | Folder |
| Mount Vernon to SW | Folder |
| mount_vernon_ | Folder |
| Permit Drawings | Folder |
| Route Information | Folder |
| Seattle City Light | Folder |
| Sedro Woolley to Hamilton | Folder |
| Shape Files | Folder |
| South Mount Vernon | Folder |
| BURL_SW.shp | Shapefile |
| Burlington.shp | Shapefile |
| CONC_SEATTLE_LIGHT.shp | Shapefile |
| CONCRETE_LIBRARYBNDRY.shp | Shapefile |
| CROWN_PACIFIC_SITE.shp | Shapefile |
| HAMILTON_LIBRARYBNDRY.shp | Shapefile |
| HW20_to_SW.shp | Shapefile |
| MV_BURL.shp | Shapefile |
| Phase 1.shp | Shapefile |
| Phase 2.shp | Shapefile |
| PSE_Label_Set.shp | Shapefile |
| PSE_Pole_Numbers.dbf | dBASE Table |
| PSE_Pole_Numbers1.dbf | dBASE Table |
| PSE_Pole_Numbers2.dbf | dBASE Table |
| PSE_Pole_Numbers2.txt | Text File |
| PSE_Poles_Final.shp | Shapefile |
| PSE_XY_POLE_DETAIL_EVENTS.shp | Shapefile |
| SW.dbf | dBASE Table |

| Name | Type |
|--------------------------------------|----------------|
| LymanElementarySchool | Folder |
| PoleSurvey | Folder |
| PSE | Folder |
| WSDOT | Folder |
| 111_Landsc...an_Area_Fib...SEPA.mxd | Map Document |
| 2011_clip3 | Raster Dataset |
| 2011_clipc1 | Raster Dataset |
| 2011_clipc3 | Raster Dataset |
| 2011_clip3.tif | Raster Dataset |
| 2012Customers.shp | Shapefile |
| CabinCreekExhibit for Lori LE.mxd | Map Document |
| CabinCreekExhibit_revised11.8.12.mxd | Map Document |
| CustomerAddress.xls | Excel File |
| CustomerAddress.xlsx | Excel File |
| ExistingFiber_GIS.shp | Shapefile |
| Geocoding_Result.shp | Shapefile |
| Geocoding_Result_2.shp | Shapefile |
| Geocoding_Result_3.shp | Shapefile |
| JenniPoleSurvey.mxd | Map Document |
| Lyman Fiber Optics.mxd | Map Document |
| PermittingAnalysis.mxd | Map Document |
| Prevedal_Option2.mxd | Map Document |
| Proposed_Fiber.shp | Shapefile |
| Proposed_Fiber_Fruitdale.shp | Shapefile |
| Proposed_Fiber1.shp | Shapefile |
| proposedfiber_fromCAD.shp | Shapefile |
| ProposedPole.shp | Shapefile |
| RiverRdWorking.mxd | Map Document |
| RiverRoadExhibit_working.mxd | Map Document |
| SEDROExhibit.mxd | Map Document |
| SEPA Water Resources.mxd | Map Document |
| VicinityMap.mxd | Map Document |

Pre-Enterprise GIS



CAD System Map Conversion

- Convert CAD data to Shapefile
- Design the Geodatabase (ESRI LGIM)
- Edit the Geodatabase schema
- Join Features to Attribute Tables (CAD Attributes)
- Load data into Geodatabase
- Perform QA on Geodatabase

GIS Alignment Correction

Oh Yeah.... Parcel Shift....

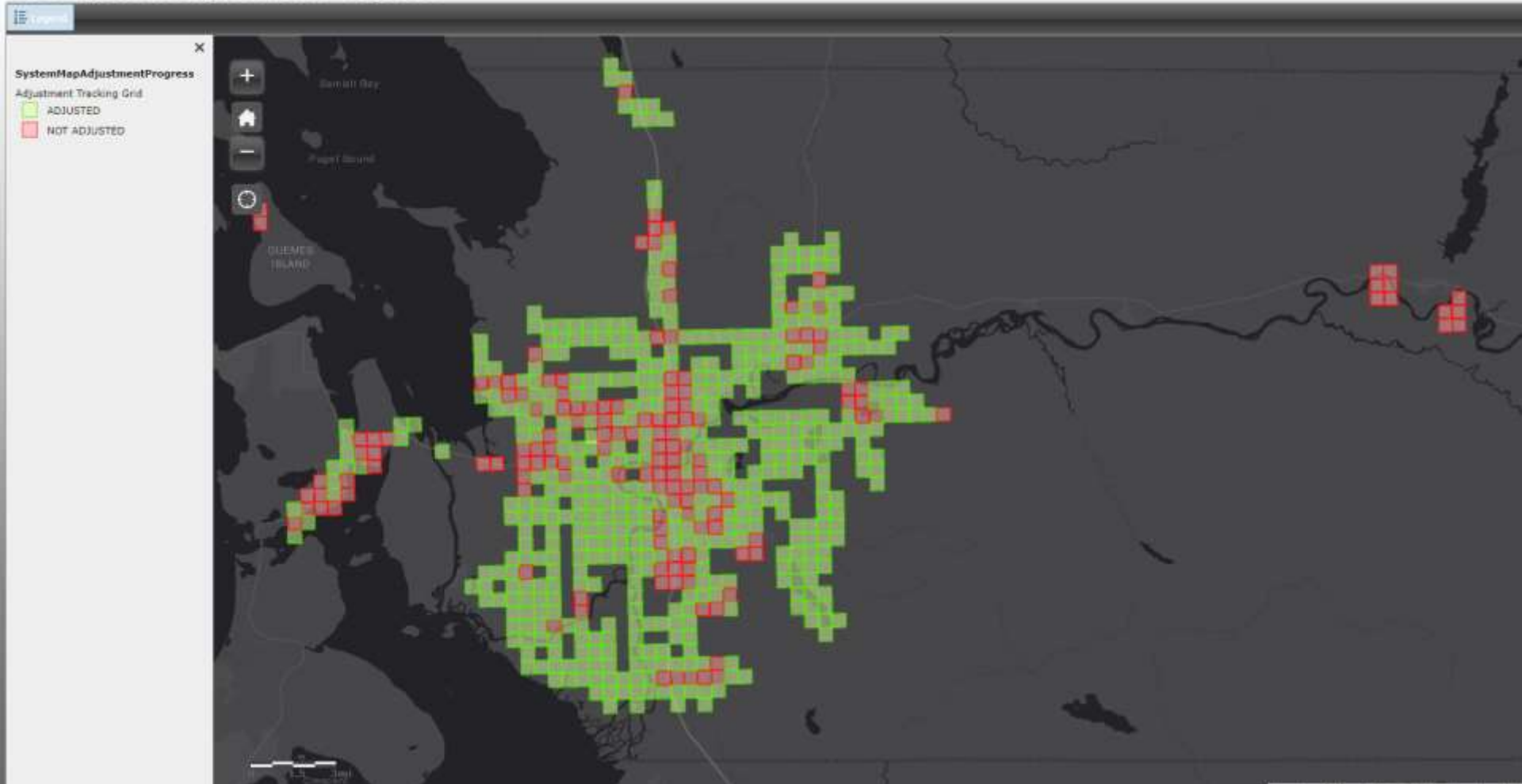


GIS Alignment Correction

GPS and Alignment of 15,500 Valves



GIS System Adjustment Progress

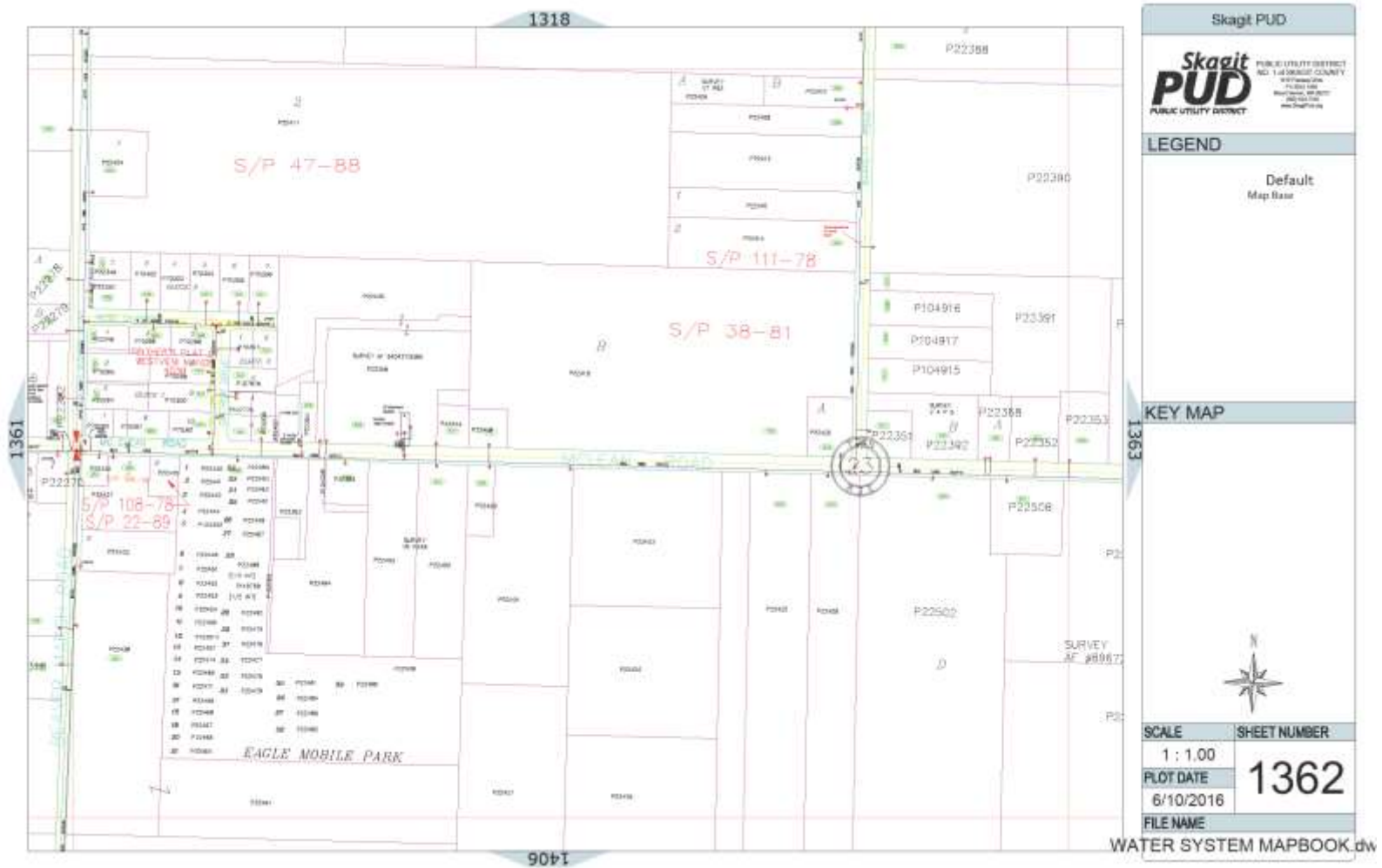


As-Built and CAD Map Hyperlinking

The screenshot displays a web GIS interface with an aerial map of a residential area. Red lines on the map represent utility main lines. A legend on the right lists various data layers, including 'Open Meter Inspections', 'New Meter Installs', 'All Leak Reports', 'All Main Repairs', 'Water System', '2017 Aerial', 'Street Map', and 'Selected - Main Line'. Below the map is a data table with the following columns: AsBuilt, CADMapSheet, LifecycleStatus, Diameter, LegacyJobNum, Subtype, PipeMaterial_Code, Enabled, ProjectName, Shape, YearInstalled, and AssetID. The first two columns, 'AsBuilt' and 'CADMapSheet', are circled in red in the original image, indicating a hyperlink relationship between the data and the map.

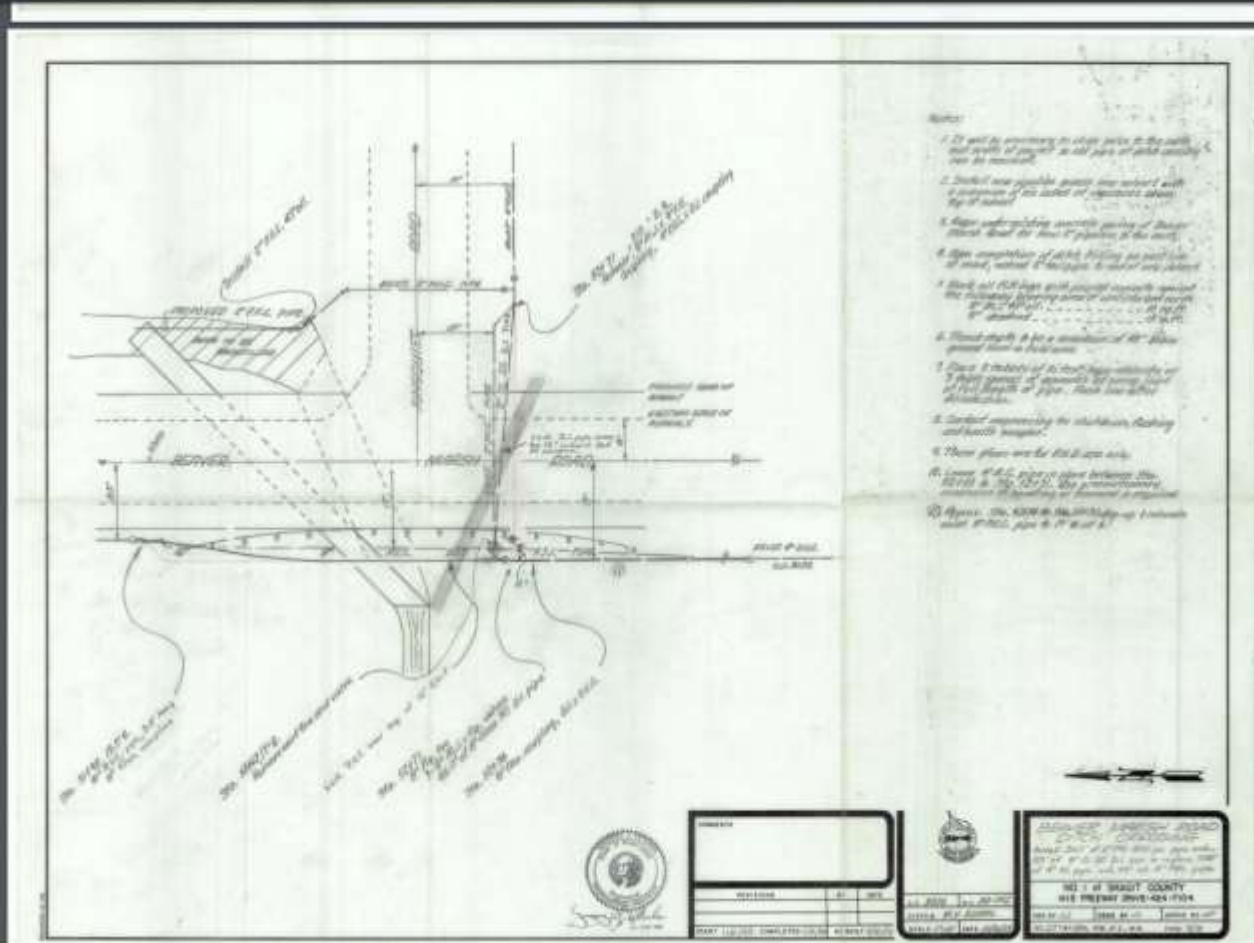
| AsBuilt | CADMapSheet | LifecycleStatus | Diameter | LegacyJobNum | Subtype | PipeMaterial_Code | Enabled | ProjectName | Shape | YearInstalled | AssetID |
|-------------|-------------|-----------------|----------|--------------|-------------------|---------------------|---------|-------------|-------|---------------|---------|
| CO03206.pdf | 1362.pdf | ACTIV | 4 inch | CO3206 | Distribution Main | Plastic | Yes | | --- | 1987 | ML1490 |
| CO02127.pdf | 1363.pdf | ACTIV | 8 inch | CO2127 | Distribution Main | Asbestos Concrete | Yes | | --- | 1969 | ML2153 |
| CO02067.pdf | 1362.pdf | ACTIV | 4 inch | CO2067 | Distribution Main | Poly Vinyl Chloride | Yes | | --- | 1960 | ML2154 |
| CO02067.pdf | 1318.pdf | ACTIV | 4 inch | CO2067 | Distribution Main | Poly Vinyl Chloride | Yes | | --- | 1968 | ML6649 |
| CO03206.pdf | 1362.pdf | ACTIV | 8 inch | CO3206 | Distribution Main | Ductile Iron | Yes | | --- | 1987 | ML6665 |
| CO02067.pdf | 1362.pdf | ACTIV | 4 inch | CO2067 | Distribution Main | Ductile Iron | Yes | | --- | 1968 | ML6666 |
| CO00538.pdf | 1361.pdf | ACTIV | 8 inch | CO0538 | Distribution Main | Asbestos Concrete | Yes | | --- | 1947 | ML6667 |
| CO00538.pdf | 1362.pdf | ACTIV | 8 inch | CO538 | Distribution Main | Asbestos Concrete | Yes | | --- | 1947 | ML6668 |
| CO01358.pdf | 1362.pdf | ACTIV | 4 inch | CO1358 | Distribution Main | Ductile Iron | Yes | | --- | 1958 | ML6669 |
| CO02112.pdf | 1361.pdf | ACTIV | 8 inch | CO2112 | Distribution Main | Asbestos Concrete | Yes | | --- | 1969 | ML6683 |

CAD Mapbook Sheet



Web GIS Solutions

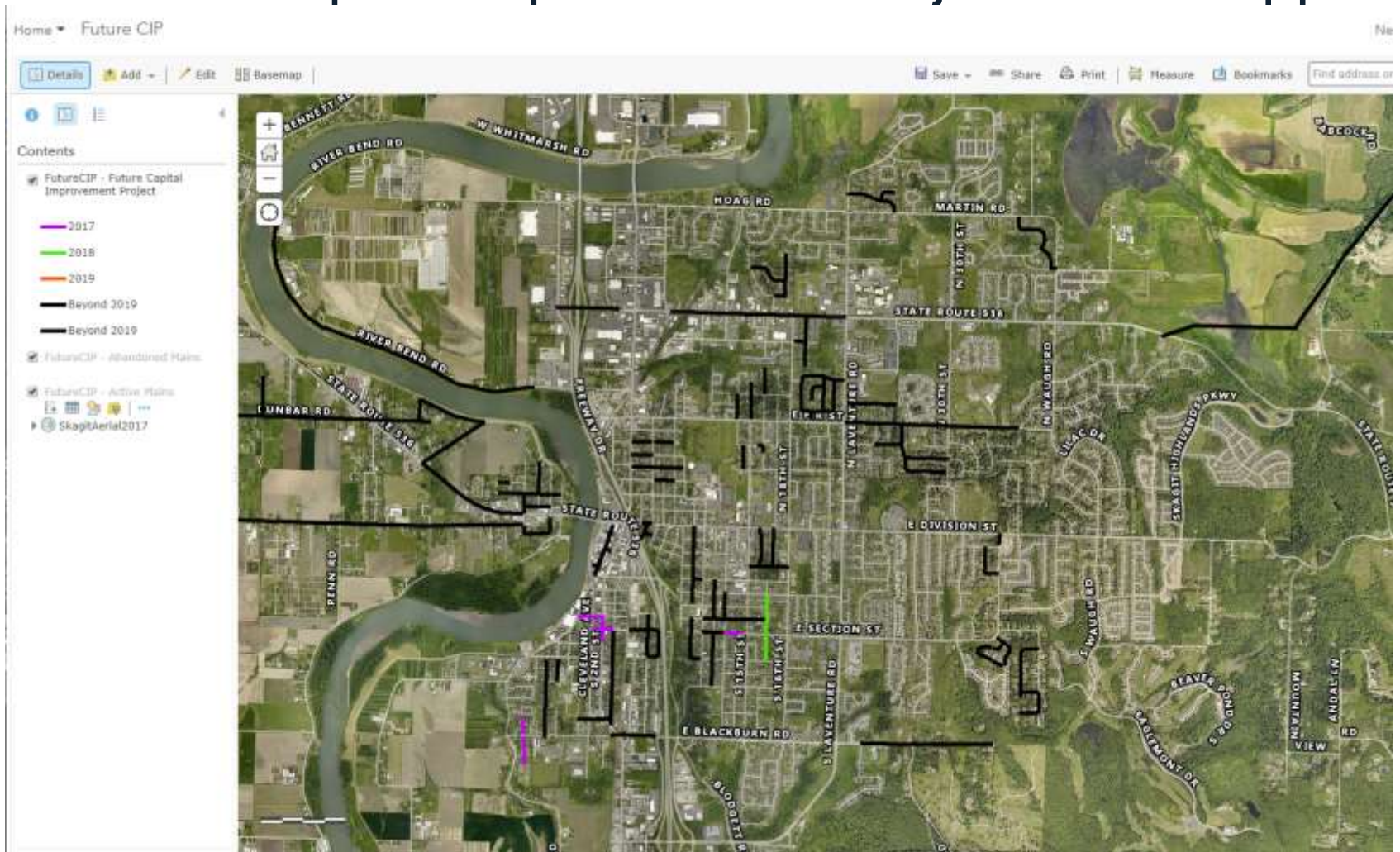
As-Built Sheet



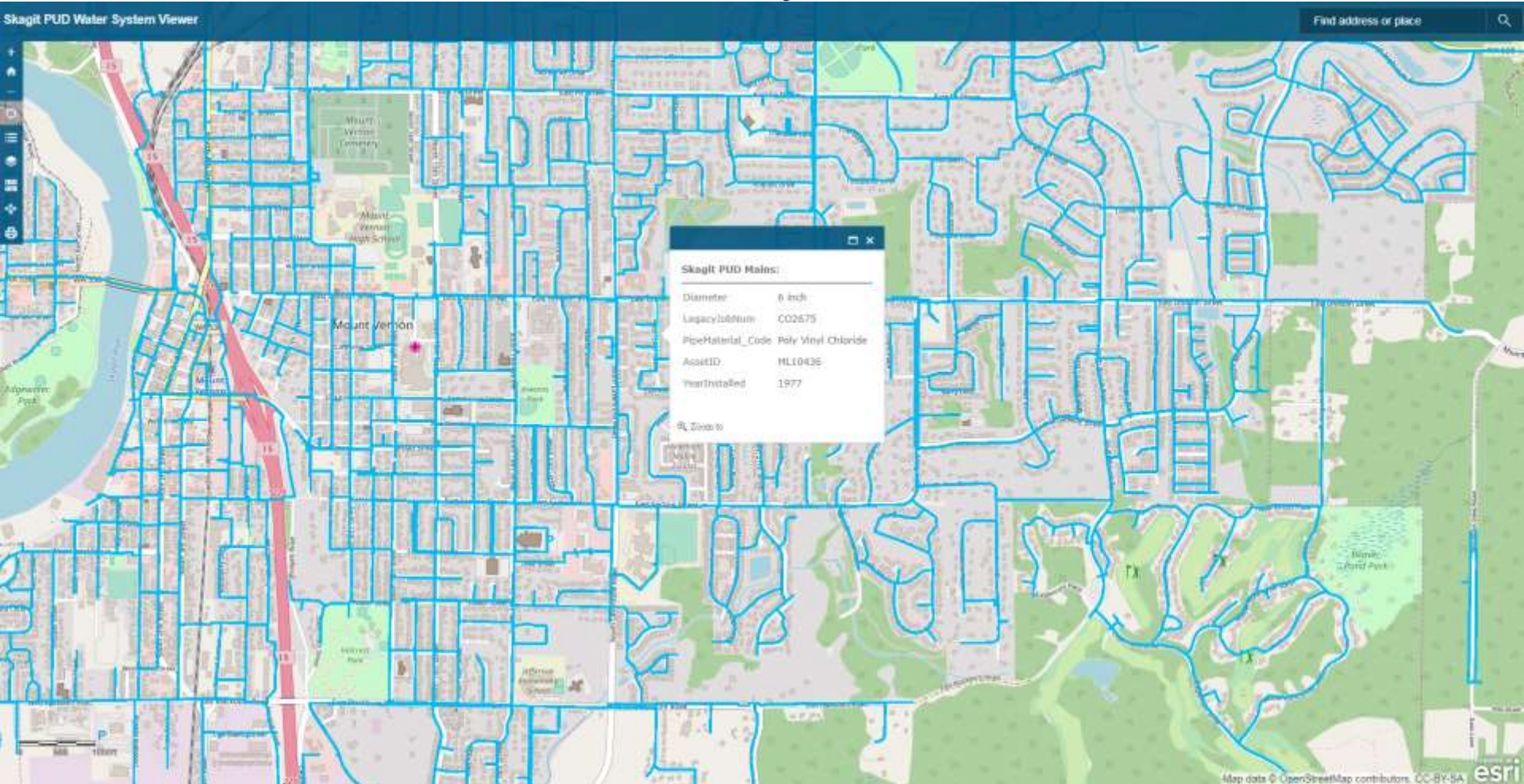
Redlining Web App



Future Capital Improvement Projects Web App



Public Water System Viewer





GPS Collection



Trimble GeoXH 6000

Small Screen

All-in-One Unit: Must replace whole unit to support new software/hardware

Poorly Designed Interface

2-3ft Accuracy with Diff Correction

Laborious Field-To-Office Workflow



EOS Arrow Gold RTK

Any sized screen!

Device Independent: Receiver “grows” with you as technology advances

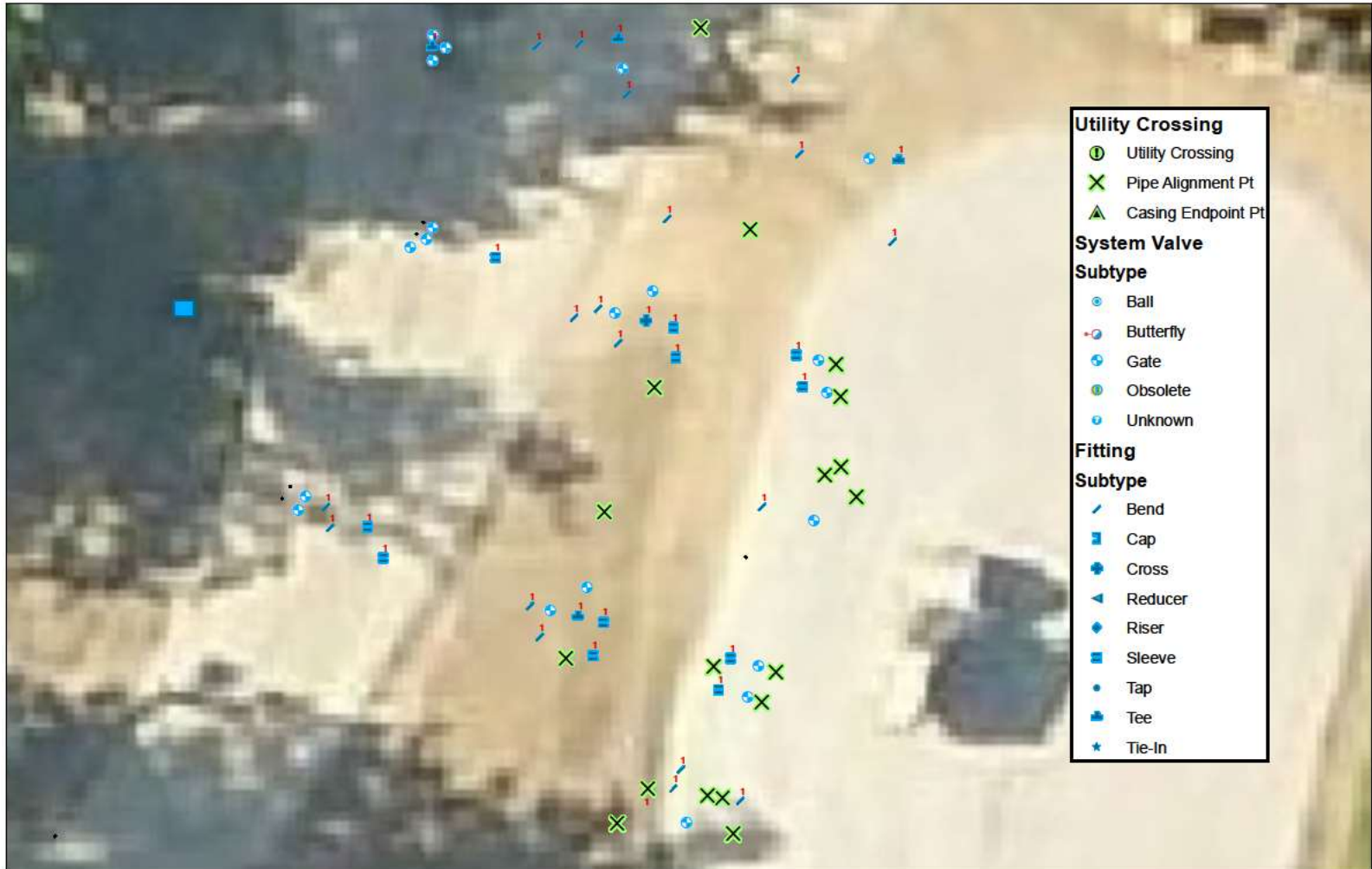
Intuitive Interface (Collector)

1cm Avg Accuracy w/RTK

Instant Update to Server

Web GIS Solutions

GPS Collection



Web GIS Solutions

GPS Collection



Cityworks®

Web GIS-Based Asset Management Platform

- Asset Registry is Sourced from GIS
- Work Orders, Service Requests, and Inspections
- Workflow/Task Management
- Asset Condition Scoring/Analytics
- Mobile Workforce Deployment
- APIs Available for 3rd Party Software Integration

Asset/Work Management

Work Order Example (New Full Service Install)

The screenshot displays a comprehensive Work Order Management System interface. The main window is divided into several panels:

- Work Order Panel:** Contains the description "5/8\" Type 1-New Full Service", WO Number "3865", and Entity Type "WMETER". It lists the category as "Water" and shows the status as "Completed". Key personnel include HEIDT, EDWARD (initiated, requested, submitted) and STANFORD, ALAN (completed). Dates range from 02/14/2018 to 02/23/2018.
- Location Information Panel:** Shows the address "718 Jennings Ave Sedro Woolley" and location details for Jennings Ave. It also specifies the water system as "Judy" and provides X and Y coordinates.
- Custom Fields Panel:** Lists specific meter information: Meter Serial # 48,205,688; Meter AMR ID # 87,178,605; Service Pressure 95; Meter Charge Type Type 1; Property Account # 57,836; Backflow Prevention Required No; Meter Locked NO.
- Assets Panel:** Displays a table with one asset: WMETER 108280 MT27642. A note indicates that pink rows indicate inventory still under warranty.
- Map Layer Fields Panel:** Shows a "Asset" field.
- Tasks Panel:** A list of 11 tasks with SeqID, Name, and Description, such as "Blue & CC Forms are filled out and money Received" (SeqID 1) and "WO Reviewed before Completing" (SeqID 11).
- Work Cycle Panel:** Shows reporting options: Report: None; Interval: 6 Months; From: Actual Finish Date; Date Rptd: 2/23/2018; Next Print Date: 2/16/2018.
- Details Panel:** Shows job identity "CA-SVCMTR-1NE8", contract information, and cost breakdown: Labor Cost: \$479.11, Material Cost: \$530.84, Equipment Cost: \$234.88, Permit Cost: \$6.88, Total WO Cost: \$1,243.81.

Work Order Tasks

Work Order

Tasks

Work Order ID: 3565

| SeqId | Name | Description | Status | Proceed | Rework | Assigned To |
|-------|---------------------|---|----------|---------|--------|------------------|
| 1 | W_METER_BLUEFORMS_1 | Blue & CC Forms are filled out and money Received | COMPLETE | False | False | |
| 2 | W_METER_CC | CC Coordinator reviewed backflow recommendation | COMPLETE | False | False | |
| 3 | W_METER_B11 | Locates have been called | COMPLETE | True | False | VAN ASSCHE, PETE |
| 4 | W_METER_PARTS | Parts are ready for installation | COMPLETE | True | False | MIDDLETON, JERRY |
| 5 | W_METER_INSTALLED_2 | Parts picked up, installed and info added to WO | COMPLETE | True | False | VAN ASSCHE, PETE |
| 6 | W_METER_NORTHSTAR | Information added to Northstar & Account # to WO | COMPLETE | True | False | MOE, SINDI |
| 7 | W_METER_BFINPECT | Backflow device inspected | COMPLETE | False | False | |
| 8 | W_METER_BFTTEST | Backflow device passed test | COMPLETE | False | False | |
| 9 | W_METER_GPS | Meter GPS'ed and Information verified | COMPLETE | True | False | SCHWETZ, DAMON |
| 10 | W_METER_GIS | Meter connected in GIS & Cityworks | COMPLETE | True | False | MORGAN, KAREN |
| 11 | W_METER_REVIEW_1 | WO Reviewed before Completing | CURRENT | False | False | HEIDT, EDWARD |

Task/Entity

PUD

- Fleet
- New Meter Install
- Water

| Asset | Asset Id | Location | Warranty Date |
|--------|----------|----------|---------------|
| WMETER | MT27842 | | F |

Work Order Costs (Cayenta Integrated)

| Actual Labor Costs | | | | | | |
|--------------------|----------|-------|--------------|-----------|-------|--------------|
| Name | Type | Group | Contractor # | Rate Type | Hours | Start Date |
| STANIFORD, ALAN | Employee | | | Hourly | 3.00 | 2/24/2018 12 |
| KAHNS, SCOTT | Employee | | | Hourly | 3.00 | 2/24/2018 12 |
| JOHNSON, EDDIE | Employee | | | Hourly | 3.00 | 2/24/2018 12 |
| FRINGE, BENEFITS | Employee | | | Hourly | 0.00 | 2/24/2018 12 |

| Actual Equipment Costs | | | | | | |
|--------------------------|-------|-------|-----------|---------|-----------|-----------|
| Description | Hours | Units | Rate Type | Cost | Source | Entity Id |
| 1996 173-INTL 4900 DT466 | 3.00 | 1.00 | Hourly | \$96.00 | Inventory | |
| 2017 JD EXCAV 50G | 3.00 | 1.00 | Hourly | \$60.00 | Inventory | |
| 2006 218-CHEV SILVERADO | 3.00 | 1.00 | Hourly | \$78.00 | Inventory | |

| Actual Material Costs | | | | |
|--------------------------------|-------|----------|--------|---------------|
| Description | Units | Cost | Source | Stock Updated |
| ADP NL- BR MPAK 1" CTS | 1.00 | \$14.46 | N/A | False |
| ADP NL- BR FPL 1" INSERT | 1.00 | \$11.72 | N/A | False |
| ADP NL- BR FPAK 1" CTS | 1.00 | \$17.29 | N/A | False |
| BOX METER SMALL PLASTIC (1419) | 1.00 | \$16.98 | N/A | False |
| BOX METER COVER PLASTIC (1419) | 1.00 | \$9.20 | N/A | False |
| CLAMP SRV-465 6" PVC X 1" IPT | 1.00 | \$33.78 | N/A | False |
| CORP STD 1" NL-BR | 1.00 | \$43.86 | N/A | False |
| EXT PLASTIC SMALL (1419) | 1.00 | \$15.29 | N/A | False |
| COPPERSETTER 3/4" NL-BR | 1.00 | \$173.00 | N/A | False |
| NIPPLE NL- BR 1 X 6 | 1.00 | \$6.21 | N/A | False |
| METER 5/8" RECORDALL M25 NL-BR | 1.00 | \$189.05 | N/A | False |

| Estimated Labor Costs | | | | | | | | |
|------------------------|------|-------|--------------|-----------|-------|------------|-------------|------|
| Name | Type | Group | Contractor # | Rate Type | Hours | Start Date | Finish Date | Desc |
| No records to display. | | | | | | | | |

| Estimated Equipment Costs | | | | | | | |
|---------------------------|-------|-------|-----------|------|--------|-----------|-------------|
| Description | Hours | Units | Rate Type | Cost | Source | Entity Id | Entity Type |
| No records to display. | | | | | | | |

| Estimated Material Costs | | | | | | |
|--------------------------|-------|------|--------|---------------|-----------|-------------|
| Description | Units | Cost | Source | Stock Updated | Entity Id | Entity Type |
| No records to display. | | | | | | |

Looking Forward

- North|Star CIS Integration with Cityworks
- North|Star CIS Integration with GIS
- Public Service Request Portal (Cityworks/ESRI)
- GIS Asset Registry for WTP
- Migrate Land Records to GIS

Questions?

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