# ENERGY TRANSFER PARTNERS

## VIS Meeting

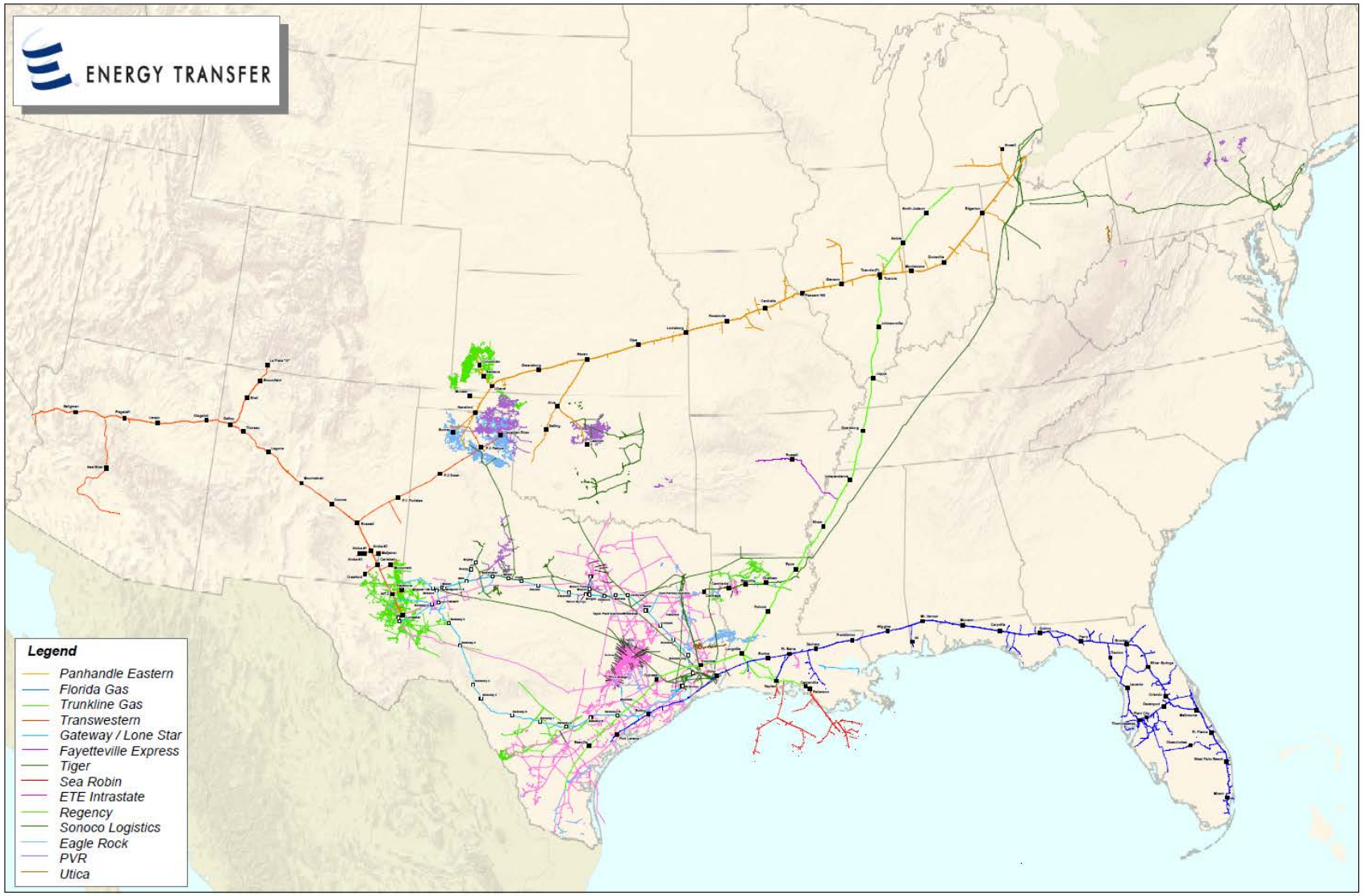
June 29-30, 2017


## David Nemeth

Sr. Director – GIS Systems, Engineering Records, & As-Built Services

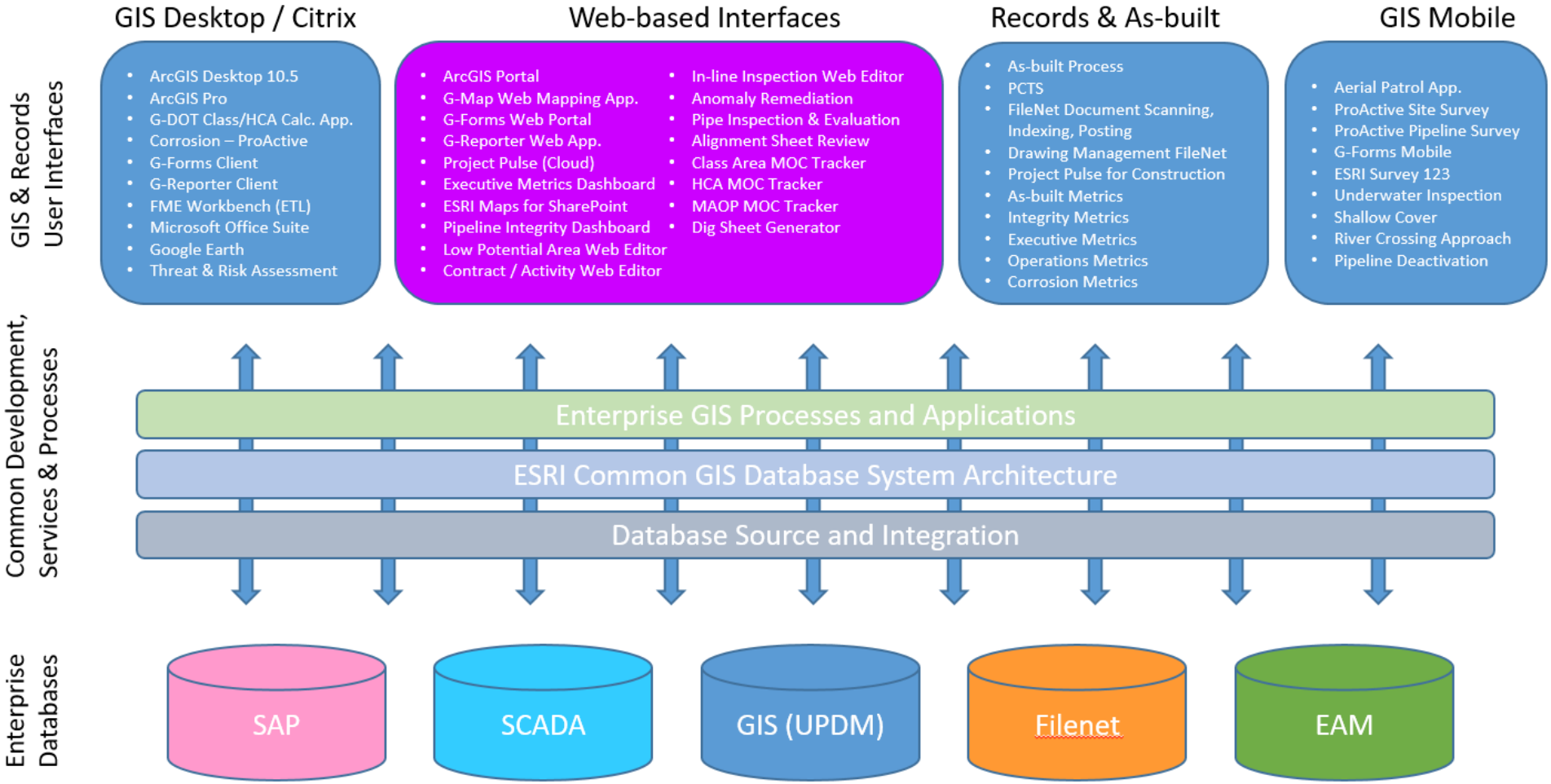

ENERGY TRANSFER

# GIS, ENGINEERING RECORDS, & AS-BUILTS



# GIS, ENGINEERING RECORDS, & AS-BUILTS

- **System Architecture**



# GIS, ENGINEERING RECORDS, & AS-BUILTS

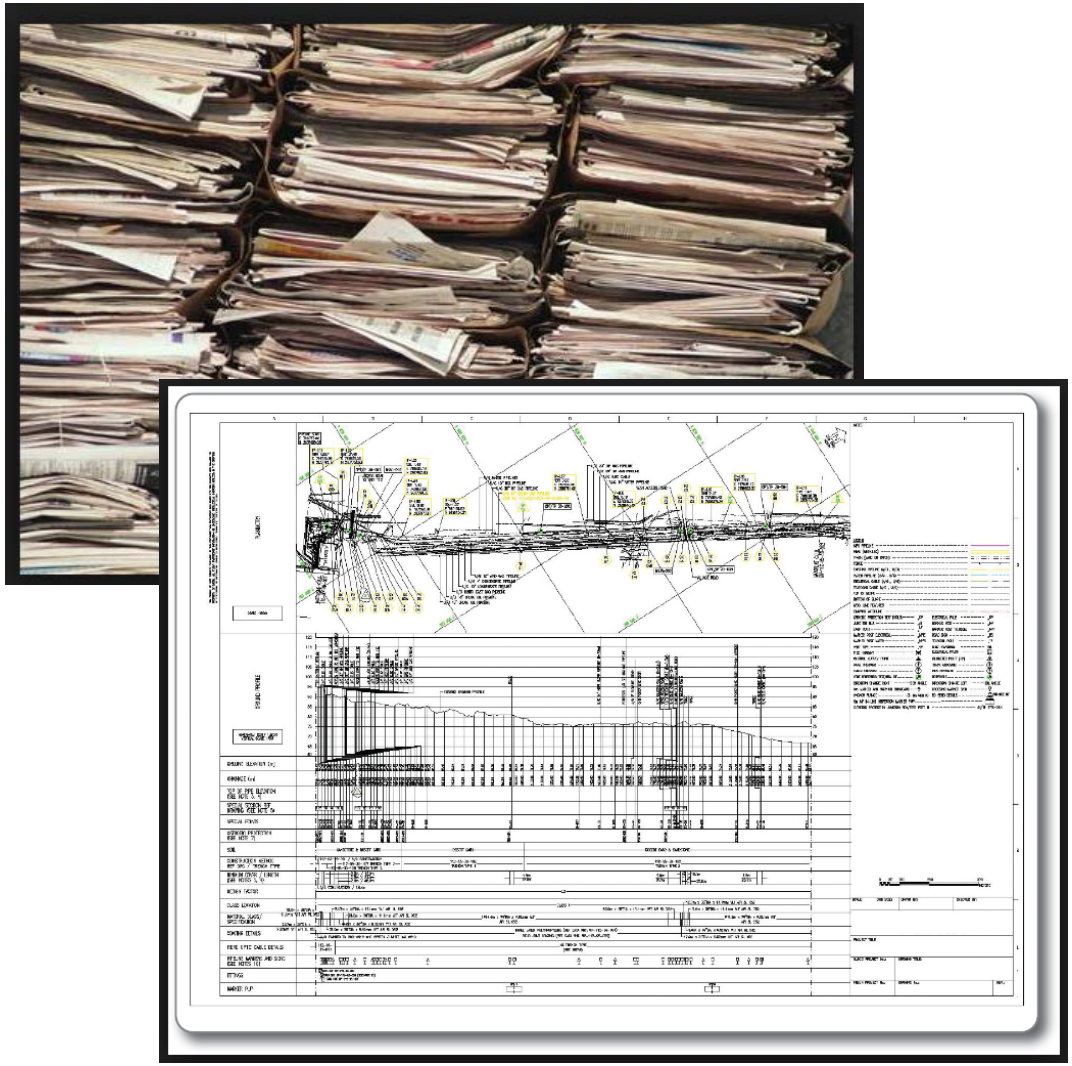
- **A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data.** The acronym GIS is sometimes used for geographic information science (GIScience) to refer to the academic discipline that studies geographic information systems and is a large domain within the broader academic discipline of geoinformatics. What goes beyond a GIS is a spatial data infrastructure.

- GIS applications are tools that allow users to create interactive queries (user-created searches), analyze spatial information, edit data in maps, and present the results of all these operations.

- **GIS can relate unrelated information by using location as the key index variable.** Locations or extents in the Earth space–time may be recorded as dates/times of occurrence, and x, y, and z coordinates representing, longitude, latitude, and elevation. All Earth-based spatial–temporal location and extent references should be relatable to one another and ultimately to a "real" physical location or extent. This key characteristic of GIS has begun to open new avenues of scientific inquiry.

# GIS, ENGINEERING RECORDS, & AS-BUILTS

History Story…….1990 Source Data



# GIS, ENGINEERING RECORDS, & AS-BUILTS

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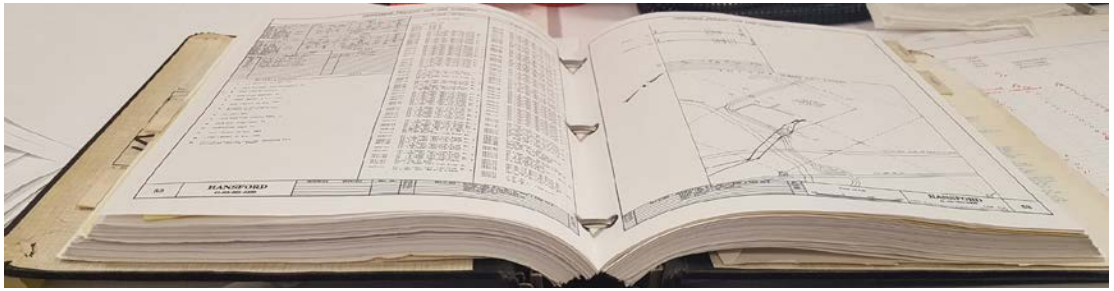

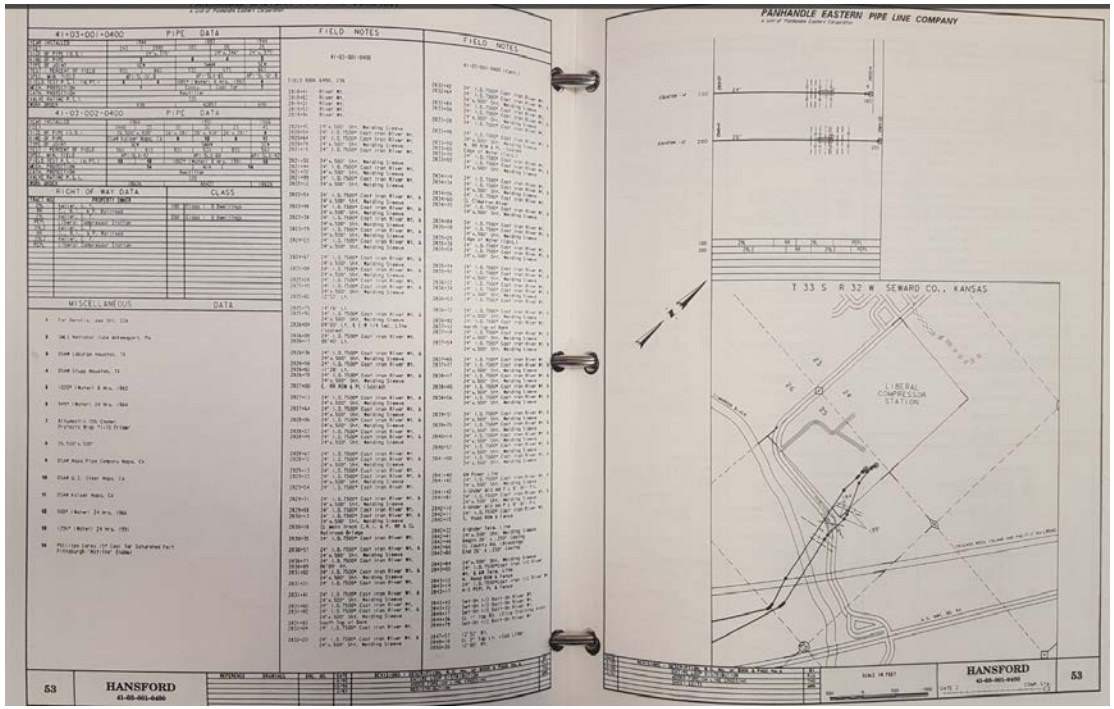

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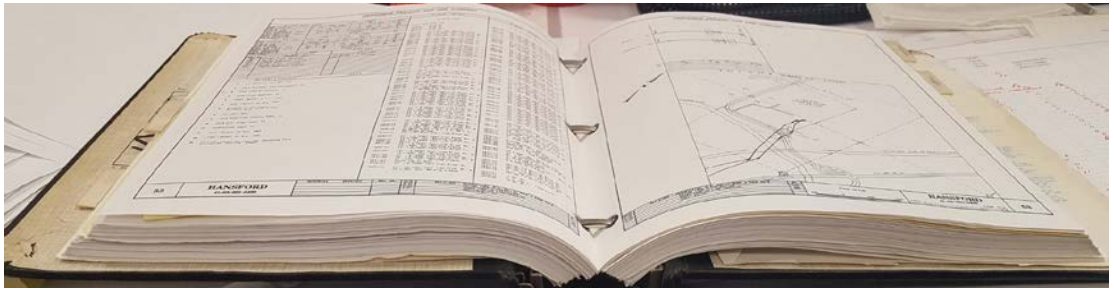

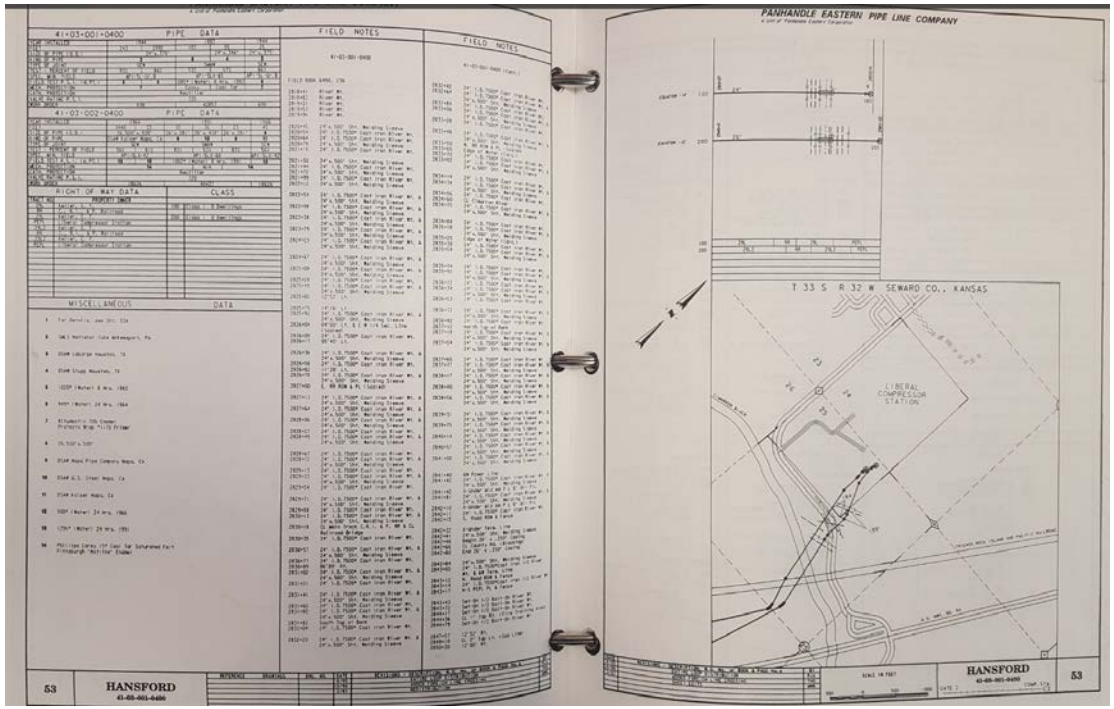

# GIS, ENGINEERING RECORDS, & AS-BUILTS

History Story…….1990 Source Data

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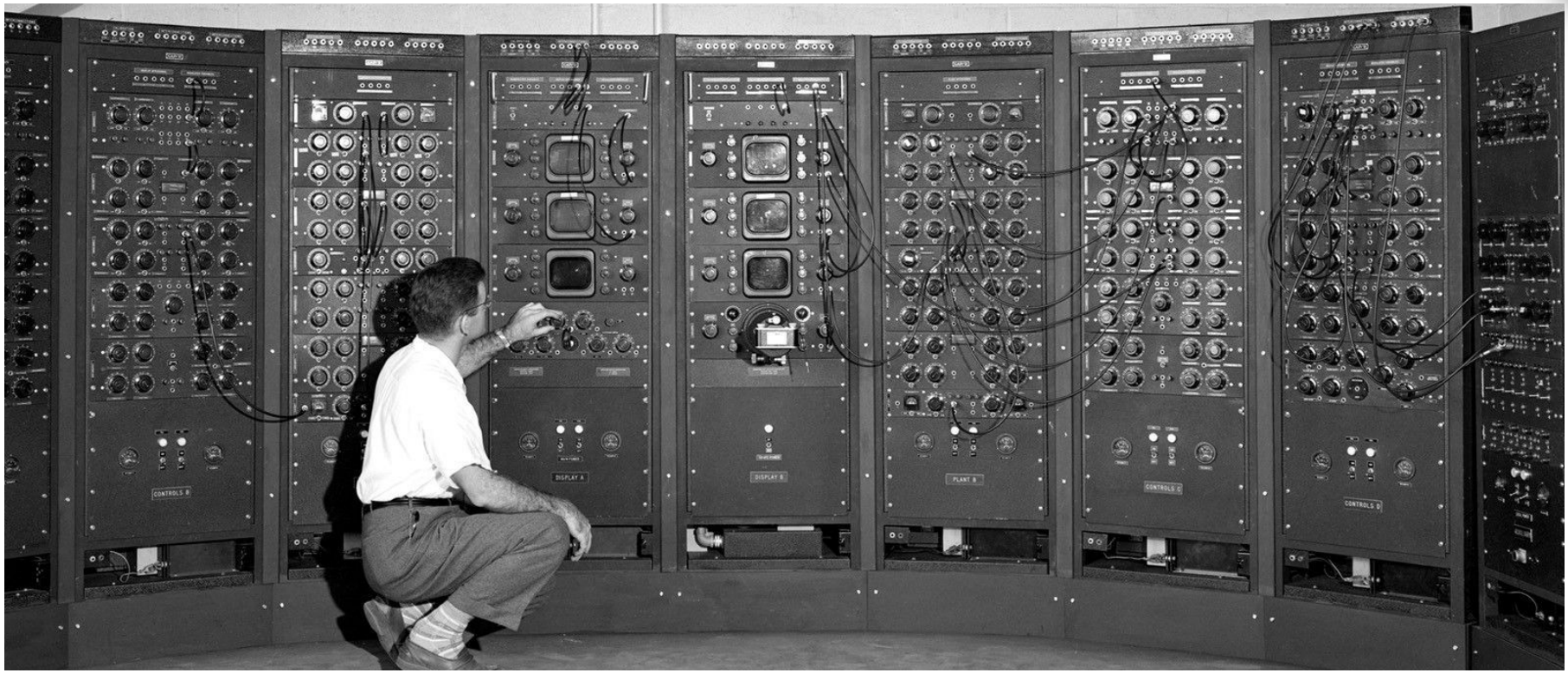



Eric…circa 1990

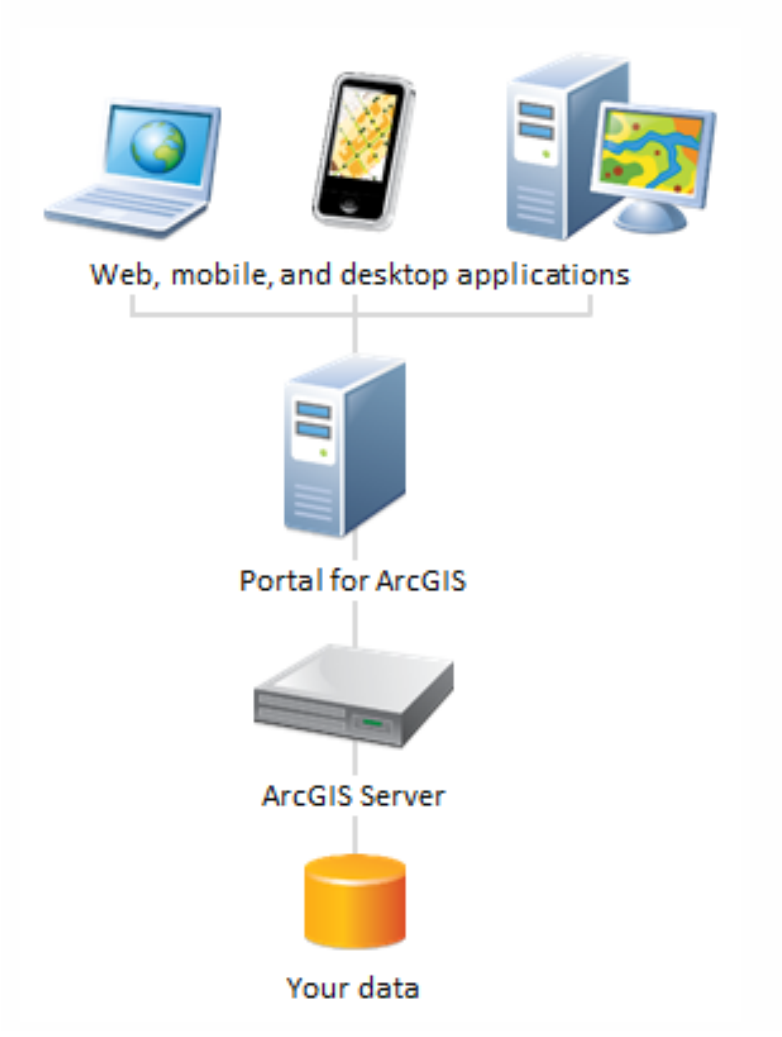
# GIS, ENGINEERING RECORDS, & AS-BUILTS

History Story…….1990 Source Data

Low Tech….Low Availability
High Volume of Non-Digital Data
Virtually NO Digital Data
Digitizing 7.5 Minute USGS Quads for Landbase
Inaccurate CL Digitizing
No GPS
Meets and Bounds Surveys
Linear Surveys
Needed an Army of Data Entry folks to Capture Data
Special Cooled Room for Huge Computer

# GIS, ENGINEERING RECORDS, & AS-BUILTS

Fast Forward 20 Years…….Simple Architecture Configuration



# GIS, ENGINEERING RECORDS, & AS-BUILTS

Publicly Available Standard Data Models – Free!!!!!!!

## 2015 - UPDM – Utility & Pipeline Data Model

ESRI's Utility and Pipeline Data Model (UPDM) is a geodatabase schema template for operators of pipe networks in the gas and hazardous liquids industries. UPDM is a moderately normalized data model that explicitly represents each physical component of a gas pipe network from the wellhead to the customer meter, or hazardous liquids pipe network from the wellhead to the terminal or delivery point, in a single database table object.

## 2003 - APDM – ArcGIS Pipeline Data Model

The ESRI's ArcGIS Pipeline Data Model is designed for storing information pertaining to features and conditions found on or along gathering and transmission gas and/or liquid pipelines.

## 1998 - PODS – Pipeline Open Data Model

Provides Pipeline Operators a highly-scalable database architecture to integrate critical records and analysis data with geospatial location.

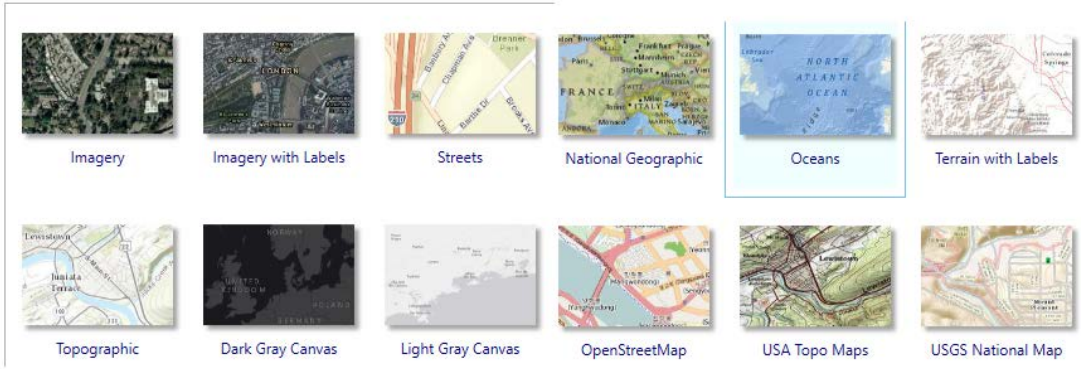
## 1994 - ISAT – Integrated Spatial Analysis Techniques

The efforts to develop an industry-standard pipeline data model began in 1994 with the development of the ISAT pipeline data model project. ISAT was designed to be customizable and has been expanded for numerous clients to support data integration, field data collection, one-call, right-of-way, environmental, marketing, risk assessment, and pipeline integrity applications.

# GIS, ENGINEERING RECORDS, & AS-BUILTS

## Publicly Available Geo-Referenced Landbase

Add Basemap




**GIS data for the United States**

| Name | Description |
|---|---|
| The National Map | Topographic data from the USGS and other federal, state, and local partners. |
| US National Atlas | All raw data from the National Atlas. Everything from agricultural census data, election results, airports, railways, glaciers, arsenic content in groundwater, etc. Was merged with The National Map in 2014. |
| National Geophysical Data Center | All free data from the NGSC. Includes elevation models, land cover, seismology, etc. |
| The Geospatial Platform | Search for and download a wide variety of datasets from this portal developed by the member agencies of the Federal Geographic Data Committee through collaboration with partners and stakeholders. |
| USDA ERS Data Products | Data from the Economic Research Service, including the Atlas of Rural and Small-Town America, Farm Program Atlas, Food Access Research Atlas, and Food Environment Atlas. |
| USGS Remote Sensing Phenology | Data from the USGS on seasonal changes in vegetation across the US. Includes start of season, time of maximum, amplitude, etc. |
| Terrestrial Ecological Systems of the United States | A mid-scale ecological classification of over 800 ecosystems in North America. |
| USGS Gap Analysis Program | The USGS Gap Analysis Program maintains four primary data sets: land cover, protected areas, species and aquatic. The GAP Land Cover Data Set is the most complete map ever produced of vegetative associations for the US. Classified into 551 ecological systems, and 32 modified ecological systems (where human impacts have had an effect). |
| National Hydrology Dataset | Hydrological information for the US. Includes lakes, ponds, streams, rivers, dams, streamguages, and flow modelling. |
| National Water Quality Assessment Data Warehouse | Large amounts of georeferenced data about water quality. Includes ground and surfacewater sampling data, discharges and health information. |
| OpenTopography | OpenTopography facilitates community access to high-resolution, Earth science-oriented, topography data, and related tools and resources. Supported by the National Science Foundation (NSF). |
| NOAA Coastal Service Center | Coastal related datasets such as: benthic cover, LIDAR, high resolution ortho, marine jurisdictions, coastal IfSAR, etc. |
| US Census Bureau US basemaps and US demographic data | U.S. Gazetteer, TIGER/Line shapefiles, census data. |
| National Historical Geographic Information System | NHGIS provides free of charge, aggregate census data and GIS-compatible boundary files for the United States between 1790 and 2012. |
| Atlas of Historical County Boundaries Project (AHCBP) | The AHCBP documents all boundary changes in states and counties in United States territory, including non-county areas never before compiled or mapped, providing unrivaled historical and geographic coverag Primary sources are cited for every change, providing extensive historical documentation. |
| USDA Natural Resources Conservation Services | USDA NRCS soil data. Can interact with the dataset with Web Soil Survey online mapping tool. |

# GIS, ENGINEERING RECORDS, & AS-BUILTS

Current Data Source

It’s the DATA!

# GIS, ENGINEERING RECORDS, & AS-BUILTS

2017 Current State

High Tech….High Availability
High Volume of Digital Data
Virtually NO Non-Digital Data
“Free” Landbase
Imagery
LiDAR
Spectral Imagery
Change Detection
Highly Accurate
GPS Accurate CL
Digital Property Polygons
Single Person Can Complete Entire Task
Cell Phone

# GIS, ENGINEERING RECORDS, & AS-BUILTS

2017 Energy Transfer GIS Implementation

**Our Mission Statement**

***The Engineering Records, As-built, and GIS teams' mission is to promote safety, compliance, reliability and environmental stewardship through data acquisition, data integration and information publishing.***

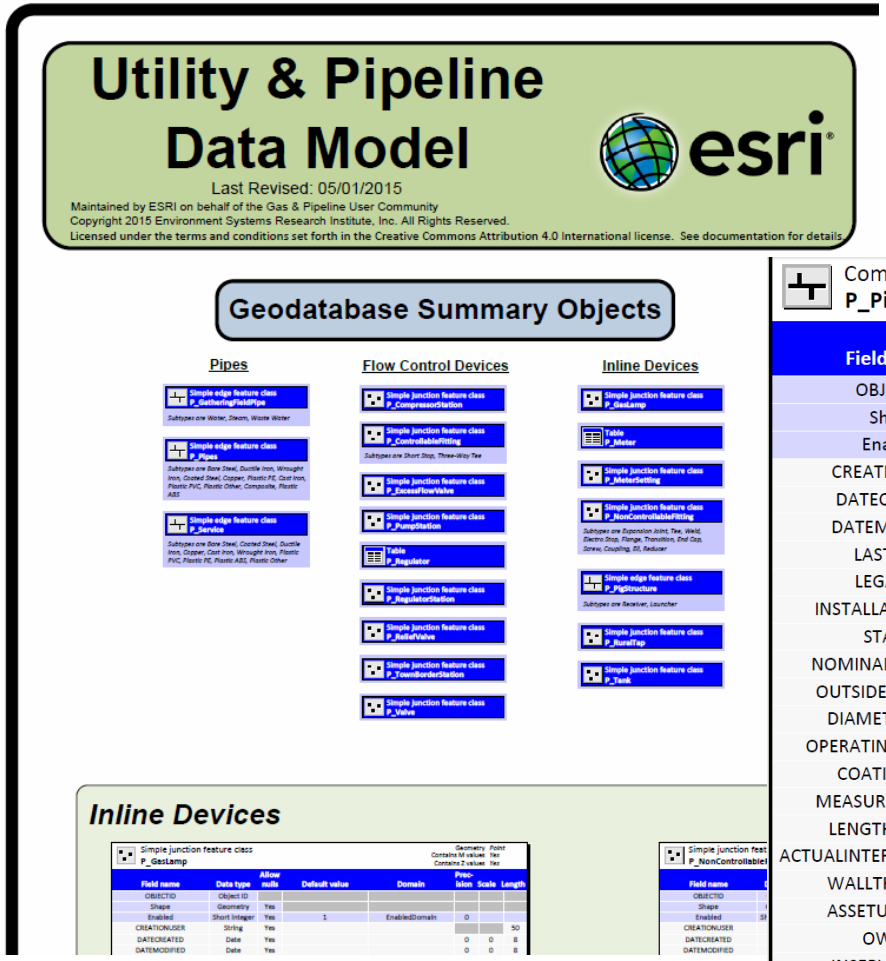
The function of the GIS group is to provide reliable, consistent pipeline information to the whole of the company, ensuring that all groups can make sound process and business decisions. We are dedicated to maintaining the highest quality pipeline system information so that Energy Transfer can always operate safely, ensure compliance, and be a leader in our industry.

The GIS group is always looking to future technology to better support the Technical Services and Operations divisions, and provide more intuitive ways to serve the pipeline data to audiences throughout our corporation.

2000+/- Projects Per Year
Acquisitions
Large Capital Projects

# GIS, ENGINEERING RECORDS, & AS-BUILTS

## UPDM Data Model




Complex edge feature class
**P_Pipes**

Geometry *Polyline*
Contains M values *Yes*
Contains Z values *Yes*

| Field name | Data type | Allow nulls | Default value | Domain | Prec-ision | Scale | Length |
|---|---|---|---|---|---|---|---|
| OBJECTID | Object ID | | | | | | |
| Shape | Geometry | Yes | | | | | |
| Enabled | Short integer | Yes | 1 | EnabledDomain | 0 | | |
| CREATIONUSER | String | Yes | | | | | 50 |
| DATECREATED | Date | Yes | | | 0 | 0 | 8 |
| DATEMODIFIED | Date | Yes | | | 0 | 0 | 8 |
| LASTUSER | String | Yes | | | | | 50 |
| LEGACYID | String | Yes | | | | | 38 |
| INSTALLATIONDATE | Date | Yes | | | 0 | 0 | 8 |
| STATUS | String | Yes | Proposed | Pipe Facility Status | | | 20 |
| NOMINALDIAMETER | Double | Yes | | | 0 | 0 | |
| OUTSIDEDIAMETER | Double | Yes | | | 0 | 0 | |
| DIAMETERUNITS | String | Yes | | | | | 20 |
| OPERATINGPRESSURE | Double | Yes | | | 0 | 0 | |
| COATINGTYPE | String | Yes | | Coating Type | | | 30 |
| MEASUREDLENGTH | Double | Yes | | Measured Length | 0 | 0 | |
| LENGTHSOURCE | String | Yes | | Length Source | | | 25 |
| ACTUALINTERNALDIAMETER | Double | Yes | | | 0 | 0 | |
| WALLTHICKNESS | Double | Yes | | PipeWallThickness | 0 | 0 | |
| ASSETUNITCODE | String | Yes | | | | | 20 |
| OWNER | String | Yes | | | | | 20 |
| INSERVICEDATE | Date | Yes | | | 0 | 0 | 8 |
| DATE_RETIRED | Date | Yes | | | 0 | 0 | 8 |
| INSTALLATIONMETHOD | String | Yes | Direct Bore | Pipe Install Method | | | 20 |

# GIS, ENGINEERING RECORDS, & AS-BUILTS

ETE UPDM Data Model

The ETE UPDM Data Model contains hundreds of features that we represent in our GIS. Facility Data, Inspection Data, Operational Data, Survey Data, Land Owner Data, etc.

Some Examples of that data are:

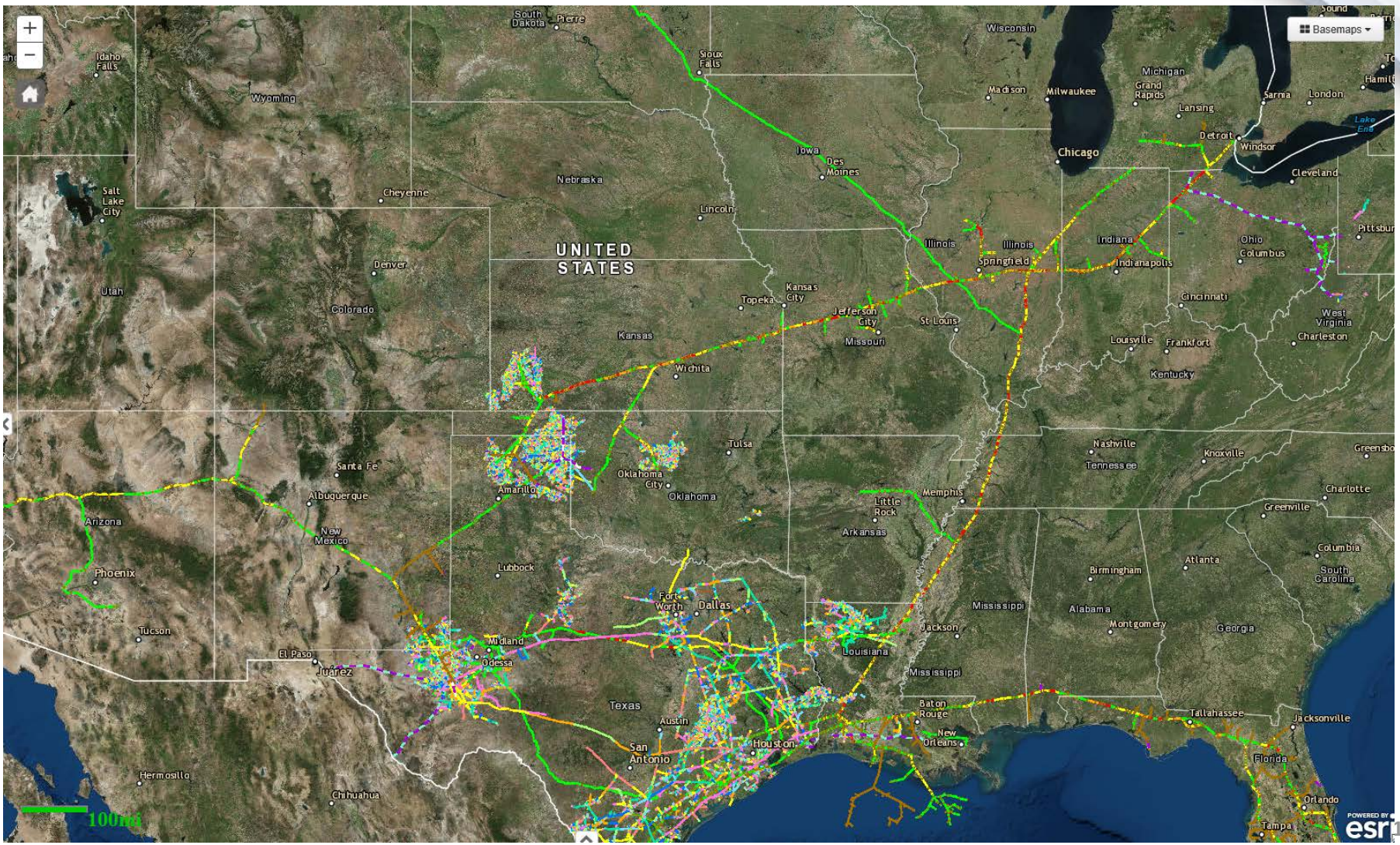
Pipe Segment
Valves
Coating
Hydrostatic Test Data
Fittings
Inspection Data
Repair Data

MAOP – Maximum Allowable Operating Pressure
Class Location – Population Density
HCA Data – Environmental Data, Population Density

Operational Data
Historical Data

# GIS, ENGINEERING RECORDS, & AS-BUILTS

Feature Layers



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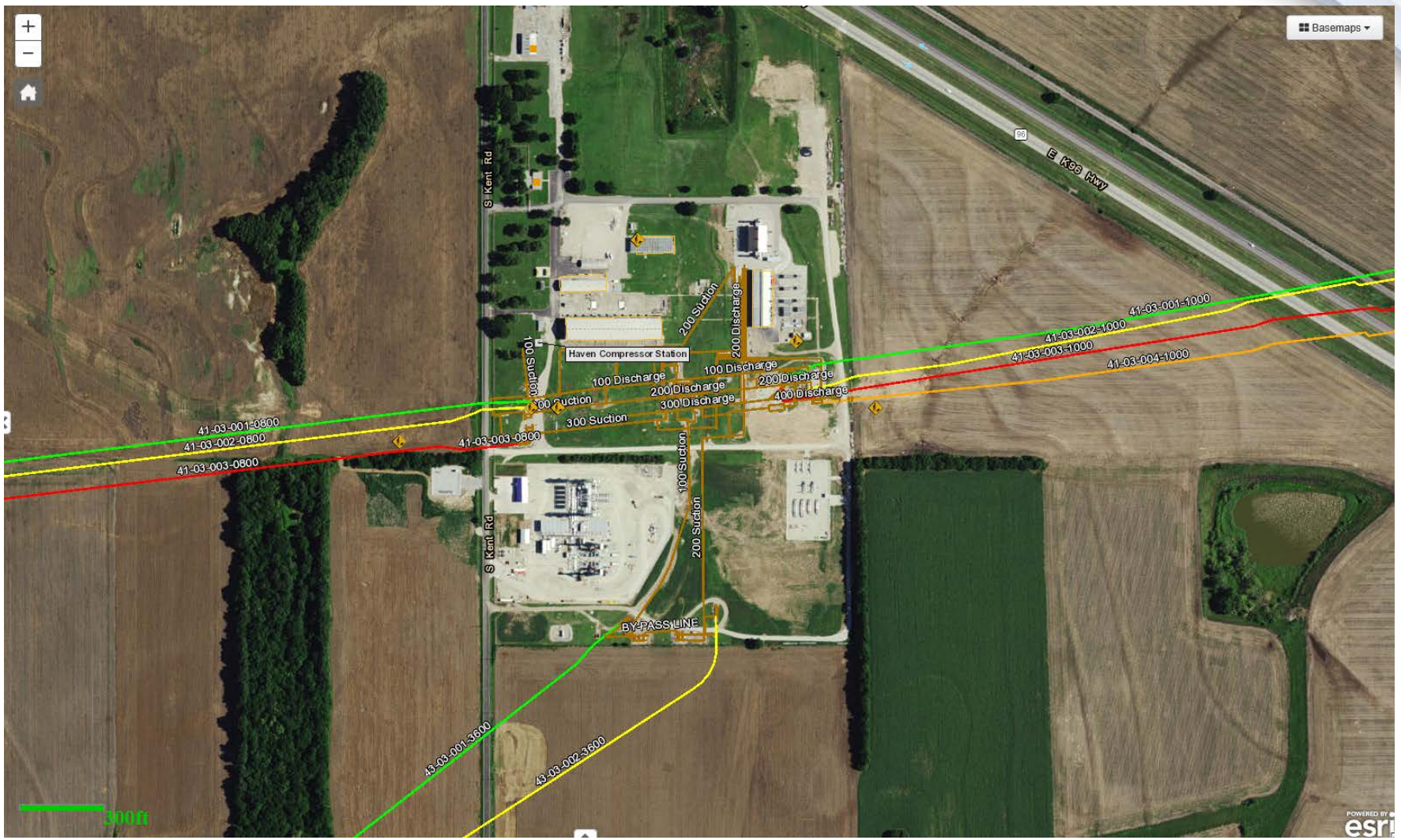
Feature Layers



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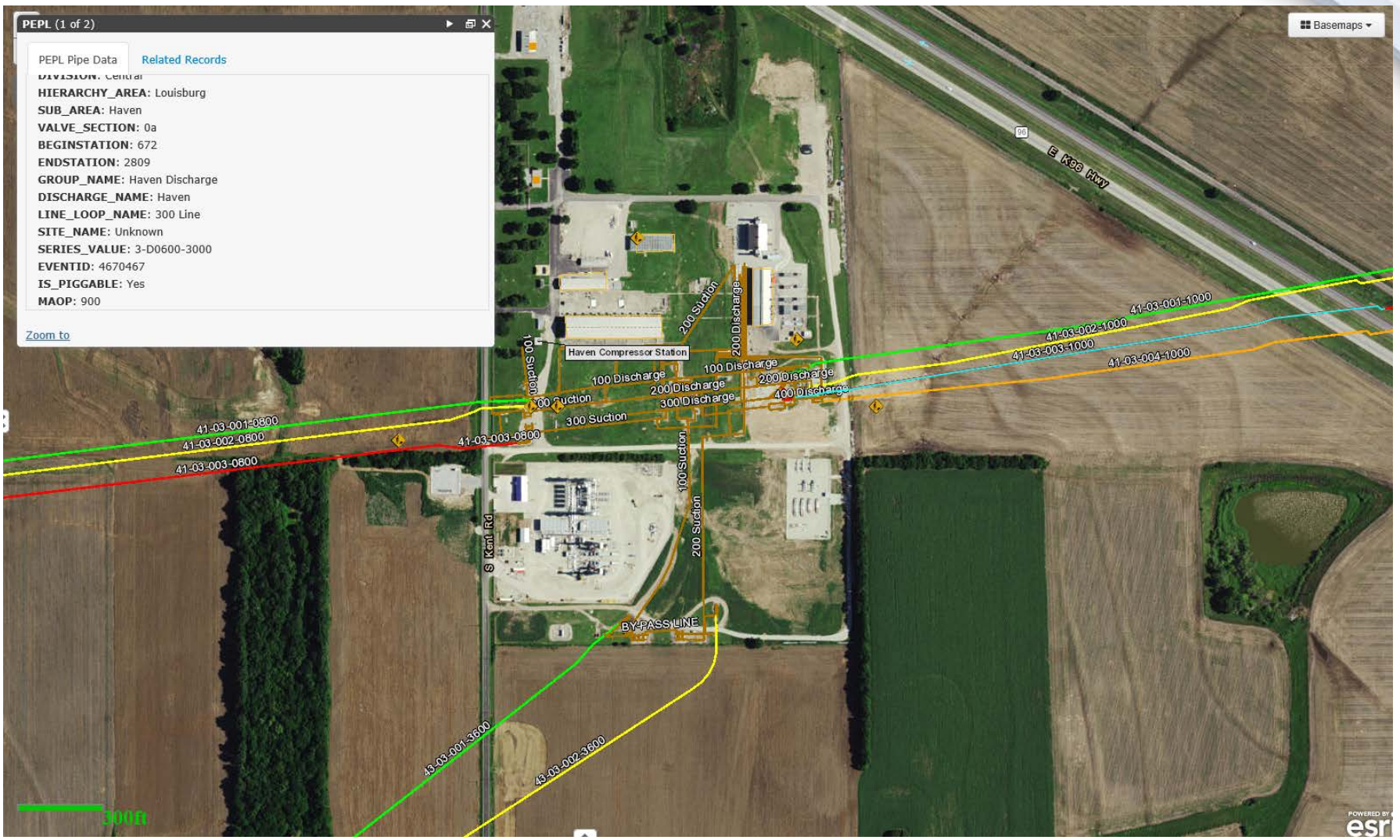
## Feature Layers



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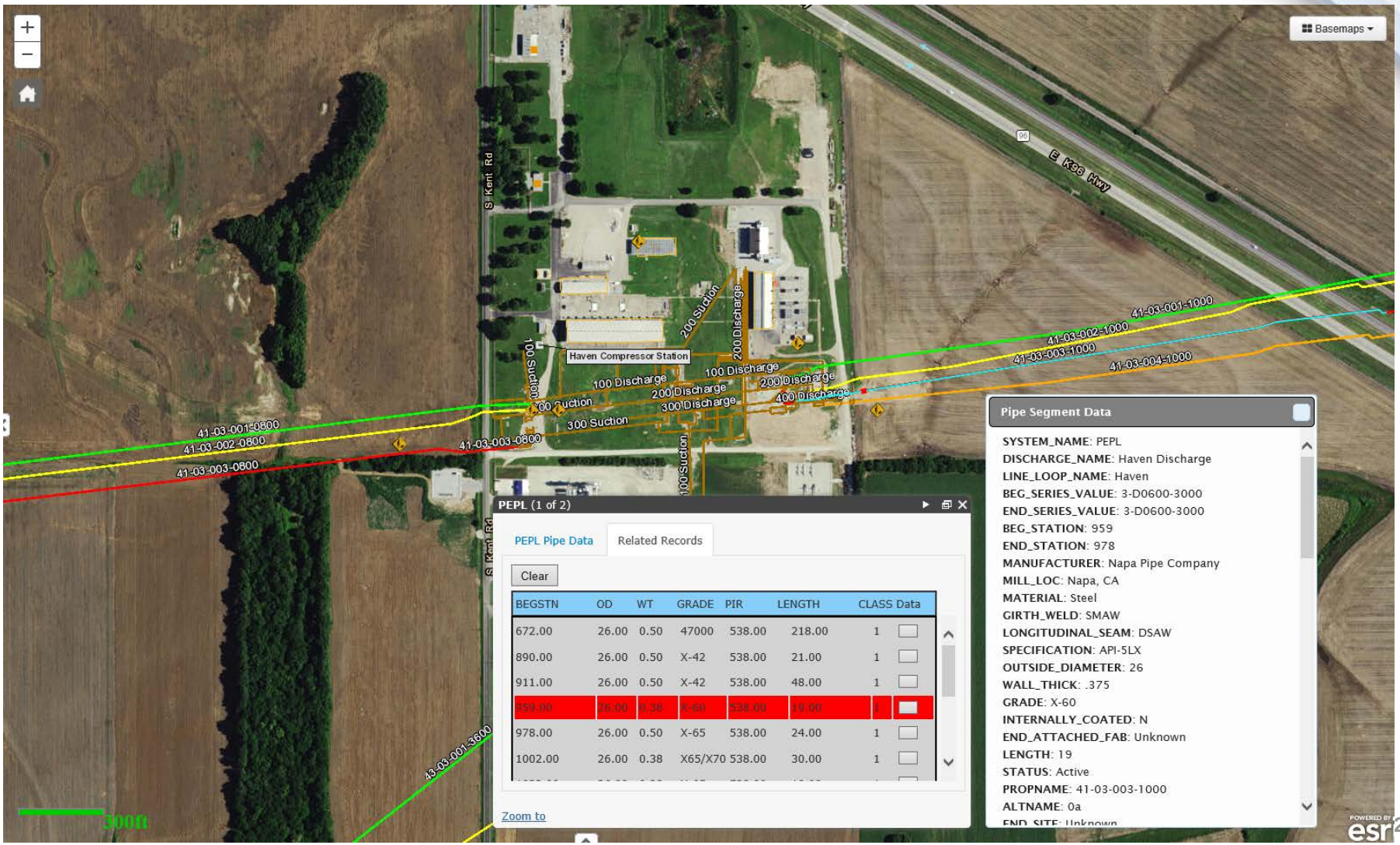

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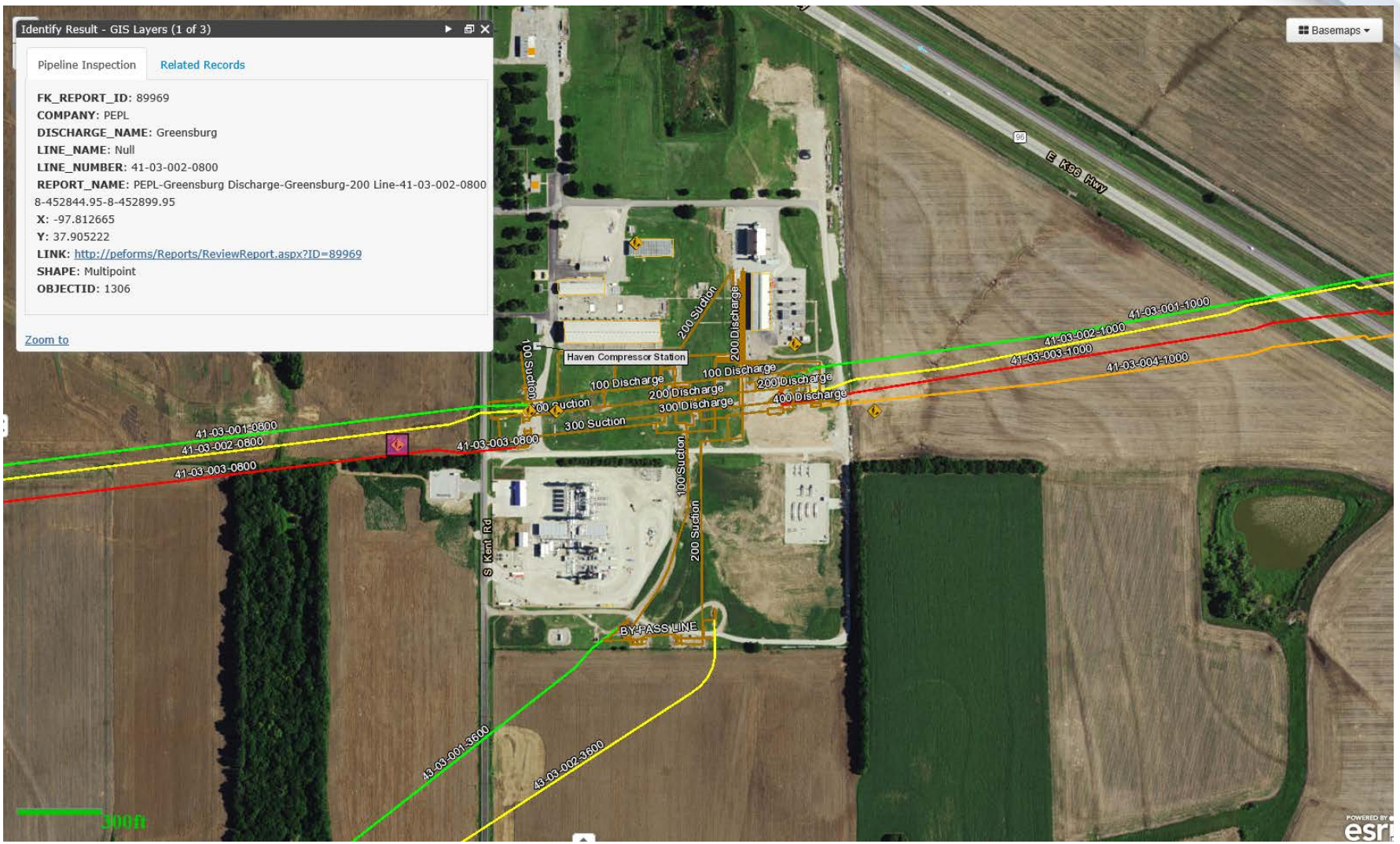
## Feature Layers



# GIS, ENGINEERING RECORDS, & AS-BUILTS

## Feature Layers

G-Forms Home | Dashboard | Forms | GReporter | Public Awareness | Aerial Patrol

Anomaly Remediation

Print To PDF | Map Report | Edit Report | Report History

**Pipeline Inspection - ID: 89969**

**•Location Criteria**

**Inspection Description**
Greensburg 200Hydro HavenStation Tie In

**Locate by:**
◉ Onshore/Offshore Pipelines ○ Onshore Sites ○ Offshore Platforms

**Company**
PEPL

**Discharge Group**
Greensburg Discharge

**Discharge**
Greensburg

**Line Name**
200 Line

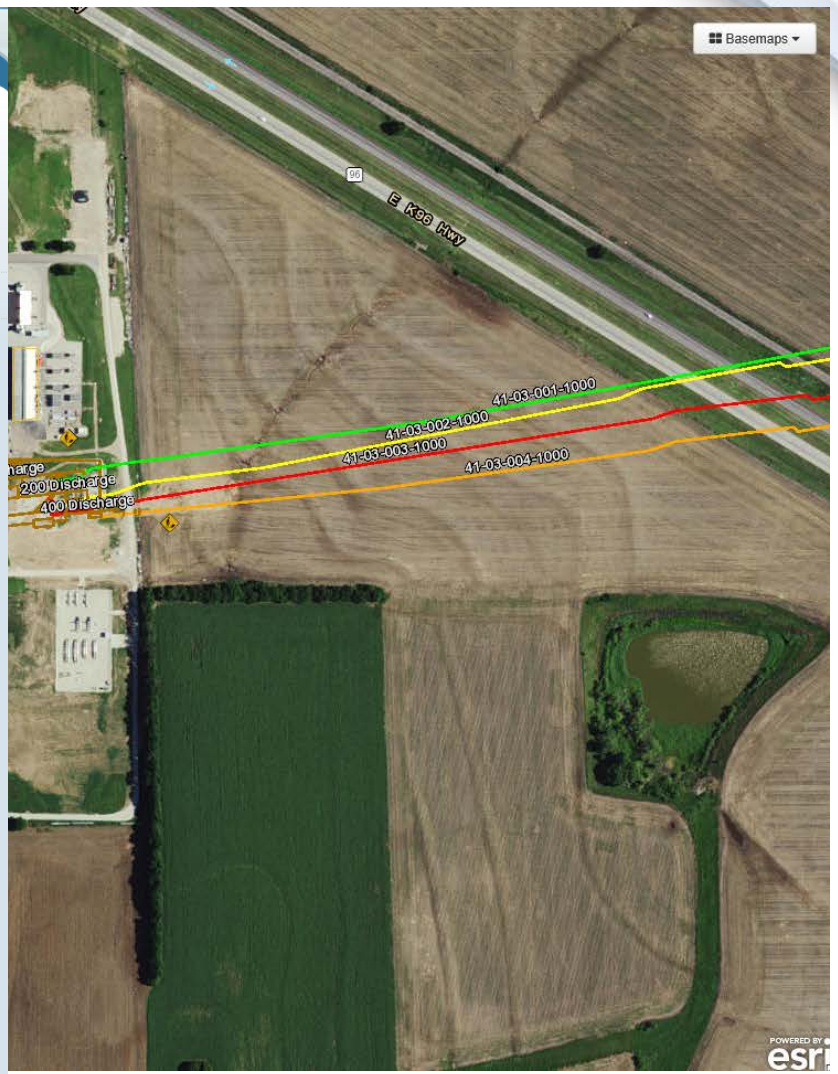
**Line Number**
41-03-002-0800

**Begin Valve Section**
8

**Begin Station**
452844.95
(389343 - 453283)

**End Valve Section**
8

**End Station**
452899.95
(389343 - 453283)



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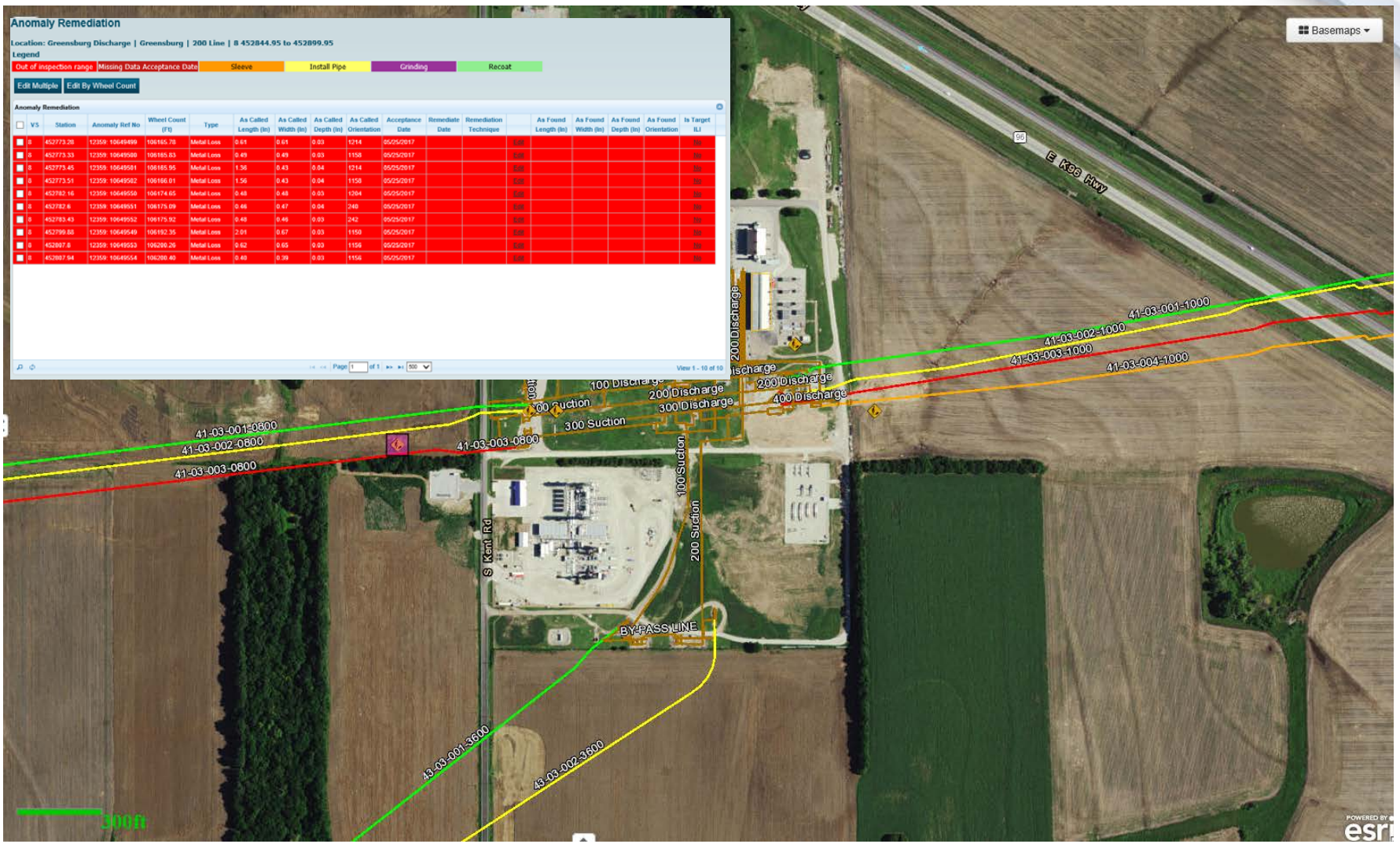

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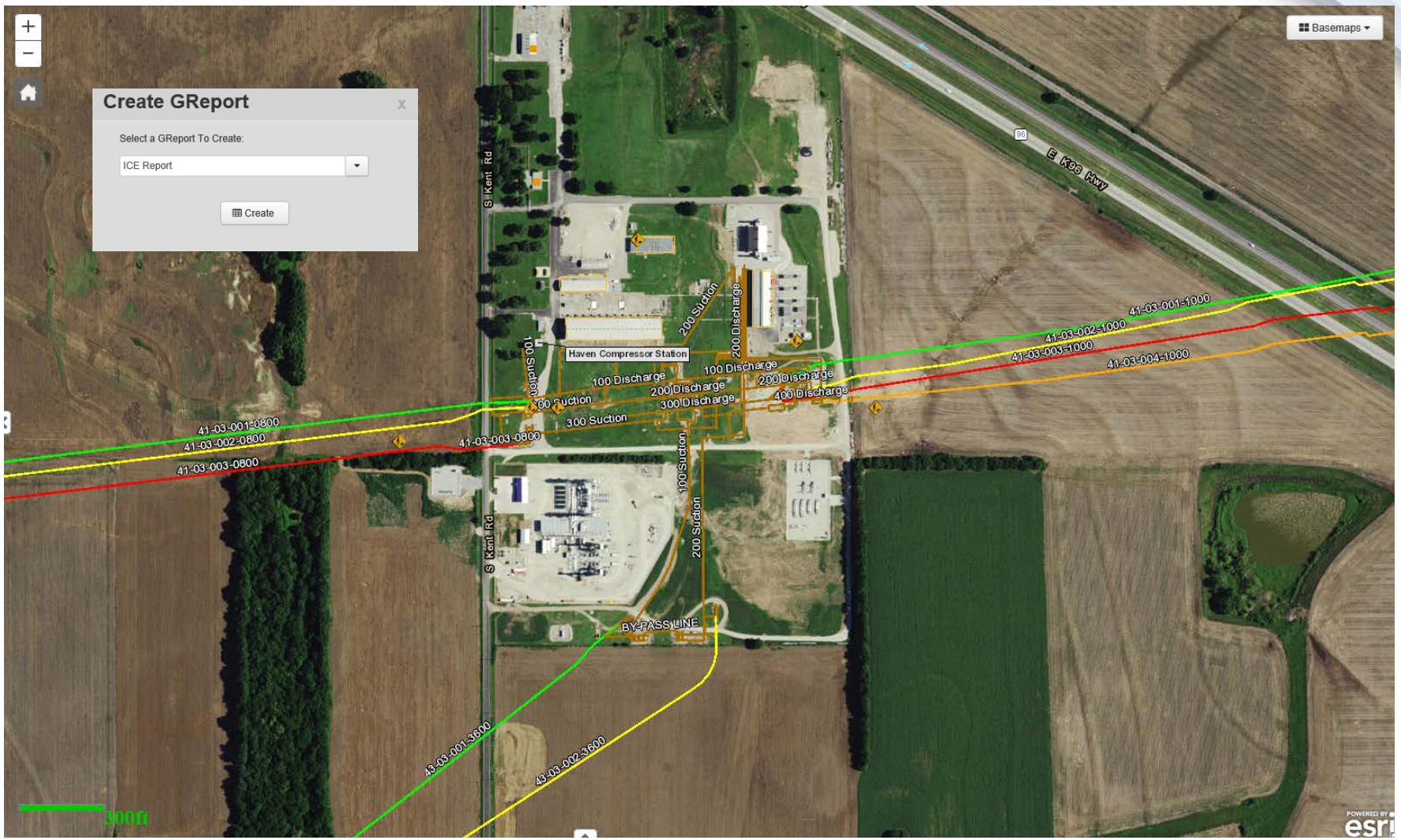

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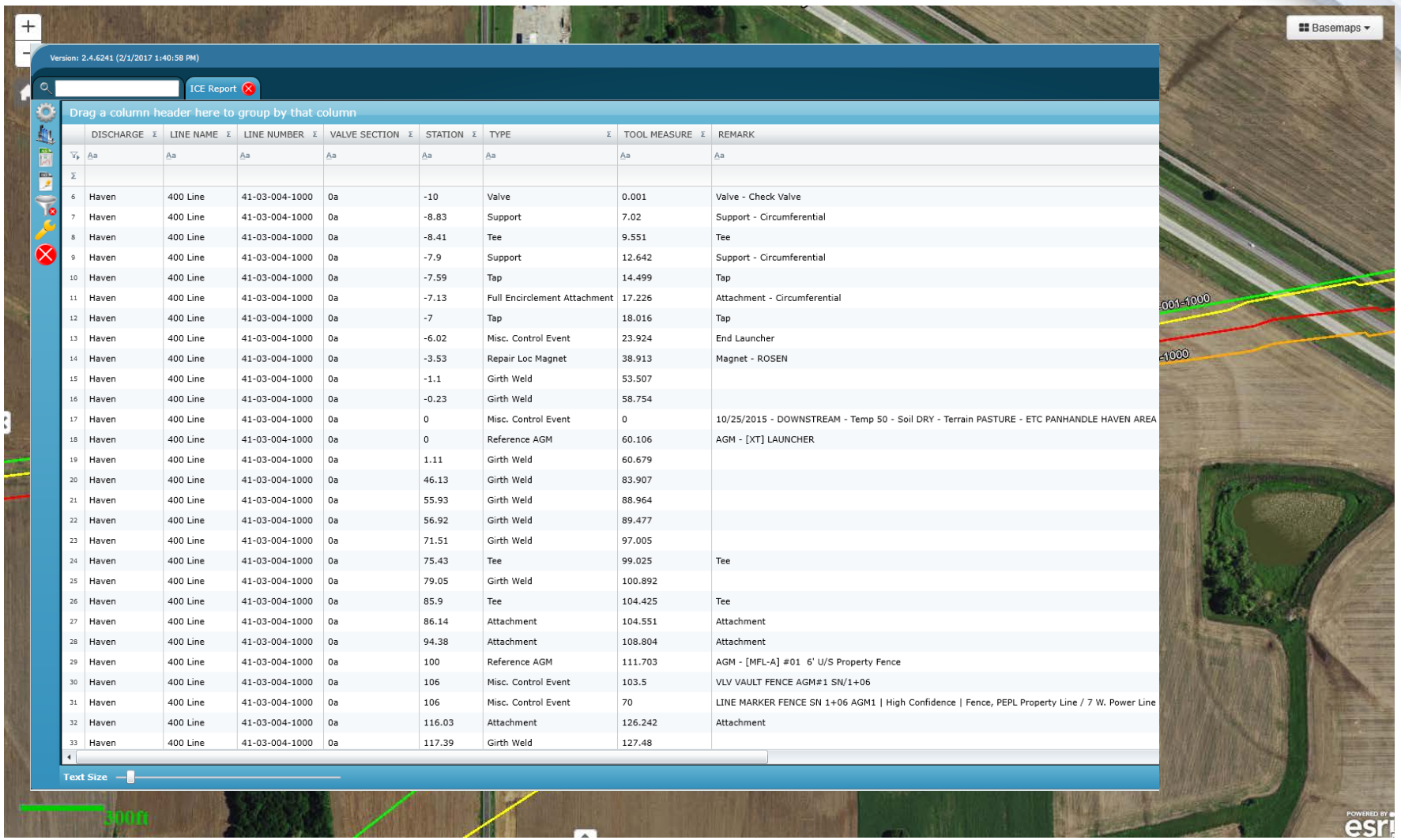



| | DISCHARGE | LINE NAME | LINE NUMBER | VALVE SECTION | STATION | TYPE | TOOL MEASURE | REMARK |
|---|---|---|---|---|---|---|---|---|
| 6 | Haven | 400 Line | 41-03-004-1000 | 0a | -10 | Valve | 0.001 | Valve - Check Valve |
| 7 | Haven | 400 Line | 41-03-004-1000 | 0a | -8.83 | Support | 7.02 | Support - Circumferential |
| 8 | Haven | 400 Line | 41-03-004-1000 | 0a | -8.41 | Tee | 9.551 | Tee |
| 9 | Haven | 400 Line | 41-03-004-1000 | 0a | -7.9 | Support | 12.642 | Support - Circumferential |
| 10 | Haven | 400 Line | 41-03-004-1000 | 0a | -7.59 | Tap | 14.499 | Tap |
| 11 | Haven | 400 Line | 41-03-004-1000 | 0a | -7.13 | Full Encirclement Attachment | 17.226 | Attachment - Circumferential |
| 12 | Haven | 400 Line | 41-03-004-1000 | 0a | -7 | Tap | 18.016 | Tap |
| 13 | Haven | 400 Line | 41-03-004-1000 | 0a | -6.02 | Misc. Control Event | 23.924 | End Launcher |
| 14 | Haven | 400 Line | 41-03-004-1000 | 0a | -3.53 | Repair Loc Magnet | 38.913 | Magnet - ROSEN |
| 15 | Haven | 400 Line | 41-03-004-1000 | 0a | -1.1 | Girth Weld | 53.507 | |
| 16 | Haven | 400 Line | 41-03-004-1000 | 0a | -0.23 | Girth Weld | 58.754 | |
| 17 | Haven | 400 Line | 41-03-004-1000 | 0a | 0 | Misc. Control Event | 0 | 10/25/2015 - DOWNSTREAM - Temp 50 - Soil DRY - Terrain PASTURE - ETC PANHANDLE HAVEN AREA |
| 18 | Haven | 400 Line | 41-03-004-1000 | 0a | 0 | Reference AGM | 60.106 | AGM - [XT] LAUNCHER |
| 19 | Haven | 400 Line | 41-03-004-1000 | 0a | 1.11 | Girth Weld | 60.679 | |
| 20 | Haven | 400 Line | 41-03-004-1000 | 0a | 46.13 | Girth Weld | 83.907 | |
| 21 | Haven | 400 Line | 41-03-004-1000 | 0a | 55.93 | Girth Weld | 88.964 | |
| 22 | Haven | 400 Line | 41-03-004-1000 | 0a | 56.92 | Girth Weld | 89.477 | |
| 23 | Haven | 400 Line | 41-03-004-1000 | 0a | 71.51 | Girth Weld | 97.005 | |
| 24 | Haven | 400 Line | 41-03-004-1000 | 0a | 75.43 | Tee | 99.025 | Tee |
| 25 | Haven | 400 Line | 41-03-004-1000 | 0a | 79.05 | Girth Weld | 100.892 | |
| 26 | Haven | 400 Line | 41-03-004-1000 | 0a | 85.9 | Tee | 104.425 | Tee |
| 27 | Haven | 400 Line | 41-03-004-1000 | 0a | 86.14 | Attachment | 104.551 | Attachment |
| 28 | Haven | 400 Line | 41-03-004-1000 | 0a | 94.38 | Attachment | 108.804 | Attachment |
| 29 | Haven | 400 Line | 41-03-004-1000 | 0a | 100 | Reference AGM | 111.703 | AGM - [MFL-A] #01 6' U/S Property Fence |
| 30 | Haven | 400 Line | 41-03-004-1000 | 0a | 106 | Misc. Control Event | 103.5 | VLV VAULT FENCE AGM#1 SN/1+06 |
| 31 | Haven | 400 Line | 41-03-004-1000 | 0a | 106 | Misc. Control Event | 70 | LINE MARKER FENCE SN 1+06 AGM1 \| High Confidence \| Fence, PEPL Property Line / 7 W. Power Line |
| 32 | Haven | 400 Line | 41-03-004-1000 | 0a | 116.03 | Attachment | 126.242 | Attachment |
| 33 | Haven | 400 Line | 41-03-004-1000 | 0a | 117.39 | Girth Weld | 127.48 | |

# GIS, ENGINEERING RECORDS, & AS-BUILTS

Feature Data Alignment – ILI, CIS, CP, etc.

| | A | C | D | E | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CONTRA( | DISCHA | LINE_LOOP_NAN | VS | STATION | WC_FT | ICE_REMARK | ICE_WTLENFT | PIPE_LENFT | GIS_FEATURE_RE | APDM_ID | APDM_TABLE | NET_STATION | Tie Point? | DIST IN WC | DIST IN FT | %DIFF(FT/WC) | DIFF FT (FT-WC) | USWC | DSWC |
| 2 | 12768 | Haven | 400 Line | 8 | 352551 | 3.143 | WT Change: WT_Change - NWT 0.638 / 0.5 | 75.456 | | | 5111167 | integrity_control | 0 | Y | 124.764 | 54.387 | -56.40 % | -70.3770 | 3.143 | 127.9070 |
| 3 | 12768 | Haven | 400 Line | 8 | 352551 | | | | 4 | 36.25" x .5", DSAW | 4670255 | pipe_segment | 0 | | 124.764 | 54.387 | -56.40 % | -70.3770 | 3.143 | 127.9070 |
| 4 | 12768 | Haven | 400 Line | 8 | 352555 | | | | 5 | 36.25" x .5", DSAW | 4670256 | pipe_segment | 4 | | 124.764 | 54.387 | -56.40 % | -70.3770 | 3.143 | 127.9070 |
| 5 | 12768 | Haven | 400 Line | 8 | 352560 | | | | 3 | 36.25" x .5", DSAW | 4670257 | pipe_segment | 9 | | 124.764 | 54.387 | -56.40 % | -70.3770 | 3.143 | 127.9070 |
| 6 | 12768 | Haven | 400 Line | 8 | 352563 | | | | 65 | 36.25" x .5", DSAW | 4669778 | pipe_segment | 12 | | 124.764 | 54.387 | -56.40 % | -70.3770 | 3.143 | 127.9070 |
| 7 | 12768 | Haven | 400 Line | 8 | 352583.893 | 78.599 | WT Change: WT_Change - NWT 0.5 / 0.375 | 357.592 | | | 5110522 | integrity_control | 32.893 | | 124.764 | 54.387 | -56.40 % | -70.3770 | 3.143 | 127.9070 |
| 8 | 12768 | Haven | 400 Line | 8 | 352625.406 | 436.191 | WT Change: WT_Change - NWT 0.375 / 0.3 | 39.954 | | | 5110178 | integrity_control | 74.406 | | 348.238 | 22.613 | -93.50 % | -325.6250 | 127.907 | 476.1450 |
| 9 | 12768 | Haven | 400 Line | 8 | 352628 | 476.145 | WT Change: WT_Change - NWT 0.369 / 0.3 | 15523.957 | | | 5110847 | integrity_control | 77 | Y | 5880.584 | 6286.367 | 6.90 % | 405.7830 | 476.145 | 6356.7290 |
| 10 | 12768 | Haven | 400 Line | 8 | 352628 | | | | 21867 | 36" x .375", DSAW | 4669779 | pipe_segment | 77 | | 5880.584 | 6286.367 | 6.90 % | 405.7830 | 476.145 | 6356.7290 |
| 11 | 12768 | Haven | 400 Line | 8 | 368596.982 | 16000.102 | WT Change: WT_Change - NWT 0.375 / 0.3 | 39.314 | | | 5111480 | integrity_control | 16045.982 | | 6966.204 | 7009.039 | 0.60 % | 42.8350 | 12280.679 | 19246.8830 |
| 12 | 12768 | Haven | 400 Line | 8 | 368636.537 | 16039.416 | WT Change: WT_Change - NWT 0.378 / 0.3 | 5792.441 | | | 5110524 | integrity_control | 16085.537 | | 6966.204 | 7009.039 | 0.60 % | 42.8350 | 12280.679 | 19246.8830 |
| 13 | 12768 | Haven | 400 Line | 8 | 374495 | 21831.857 | WT Change: WT_Change - NWT 0.375 / 0.5 | 196.43 | | | 5110526 | integrity_control | 21944 | Y | 196.43 | 197 | 0.30 % | 0.57 | 21831.857 | 22028.2870 |
| 14 | 12768 | Haven | 400 Line | 8 | 374495 | | | | 197 | 36.25" x .5", DSAW | 4669780 | pipe_segment | 21944 | | 196.43 | 197 | 0.30 % | 0.57 | 21831.857 | 22028.2870 |
| 15 | 12768 | Haven | 400 Line | 8 | 374692 | 22028.287 | WT Change: WT_Change - NWT 0.5 / 0.375 | 984 | | | 5111481 | integrity_control | 22141 | Y | 984 | 975 | -0.90 % | -9 | 22028.287 | 23012.2870 |
| 16 | 12768 | Haven | 400 Line | 8 | 374692 | | | | 975 | 36" x .375", DSAW | 4669781 | pipe_segment | 22141 | | 984 | 975 | -0.90 % | -9 | 22028.287 | 23012.2870 |
| 17 | 12768 | Haven | 400 Line | 8 | 375667 | 23012.287 | WT Change: WT_Change - NWT 0.375 / 0.5 | 79.918 | | | 5110850 | integrity_control | 23116 | Y | 79.918 | 80 | 0.10 % | 0.082 | 23012.287 | 23092.2050 |
| 18 | 12768 | Haven | 400 Line | 8 | 375667 | | | | 80 | 36.25" x .5", DSAW | 4669782 | pipe_segment | 23116 | | 79.918 | 80 | 0.10 % | 0.082 | 23012.287 | 23092.2050 |
| 19 | 12768 | Haven | 400 Line | 8 | 375747 | 23092.205 | WT Change: WT_Change - NWT 0.5 / 0.375 | 2796.883 | | | 5112442 | integrity_control | 23196 | Y | 2796.883 | 2805 | 0.30 % | 8.117 | 23092.205 | 25889.0880 |
| 20 | 12768 | Haven | 400 Line | 8 | 375747 | | | | 1218 | 36" x .375", DSAW | 4669783 | pipe_segment | 23196 | | 2796.883 | 2805 | 0.30 % | 8.117 | 23092.205 | 25889.0880 |
| 21 | 12768 | Haven | 400 Line | 8 | 376965 | | | | 1301 | 36" x .375", DSAW | 4669784 | pipe_segment | 24414 | | 2796.883 | 2805 | 0.30 % | 8.117 | 23092.205 | 25889.0880 |
| 22 | 12768 | Haven | 400 Line | 8 | 378266 | | | | 286 | 36" x .375", DSAW | 4669785 | pipe_segment | 25715 | | 2796.883 | 2805 | 0.30 % | 8.117 | 23092.205 | 25889.0880 |
| 23 | 12768 | Haven | 400 Line | 8 | 378552 | 25889.088 | WT Change: WT_Change - NWT 0.375 / 0.5 | 238.904 | | | 5112106 | integrity_control | 26001 | Y | 238.904 | 239 | 0.00 % | 0.096 | 25889.088 | 26127.9920 |
| 24 | 12768 | Haven | 400 Line | 8 | 378552 | | | | 239 | 36.25" x .5", DSAW | 4669786 | pipe_segment | 26001 | | 238.904 | 239 | 0.00 % | 0.096 | 25889.088 | 26127.9920 |
| 25 | 12768 | Haven | 400 Line | 8 | 378791 | 26127.992 | WT Change: WT_Change - NWT 0.5 / 0.375 | 16472.165 | | | 5112107 | integrity_control | 26240 | Y | 2448.921 | 2189.286 | -10.60 % | -259.6350 | 26127.992 | 28576.9130 |
| 26 | 12768 | Haven | 400 Line | 8 | 378791 | | | | 16521 | 36" x .375", DSAW | 4669787 | pipe_segment | 26240 | | 2448.921 | 2189.286 | -10.60 % | -259.6350 | 26127.992 | 28576.9130 |
| 27 | 12768 | Haven | 400 Line | 8 | 395312 | 42600.157 | WT Change: WT_Change - NWT 0.375 / 0.5 | 159.59 | | | 5112437 | integrity_control | 42761 | Y | 159.59 | 119 | -25.40 % | -40.5900 | 42600.157 | 42759.7470 |
| 28 | 12768 | Haven | 400 Line | 8 | 395312 | | | | 119 | 36.25" x .5", DSAW | 4669788 | pipe_segment | 42761 | | 159.59 | 119 | -25.40 % | -40.5900 | 42600.157 | 42759.7470 |
| 29 | 12768 | Haven | 400 Line | 8 | 395431 | 42759.747 | WT Change: WT_Change - NWT 0.5 / 0.375 | 9795.702 | | | 5111163 | integrity_control | 42880 | Y | 3517.31 | 3631.28 | 3.20 % | 113.9700 | 42759.747 | 46277.0570 |
| 30 | 12768 | Haven | 400 Line | 8 | 395431 | | | | 31881 | 36" x .375", DSAW | 4669789 | pipe_segment | 42880 | | 3517.31 | 3631.28 | 3.20 % | 113.9700 | 42759.747 | 46277.0570 |
| 31 | 12768 | Haven | 400 Line | 8 | 405368.558 | 52555.449 | WT Change: WT_Change - NWT 0.375 / 0.3 | 39.6 | | | 5112104 | integrity_control | 52817.558 | | 6220.279 | 6275.387 | 0.90 % | 55.1080 | 50207.818 | 56428.0970 |
| 32 | 12768 | Haven | 400 Line | 8 | 405408.508 | 52595.049 | WT Change: WT_Change - NWT 0.37 / 0.31 | 21846.706 | | | 5111164 | integrity_control | 52857.508 | | 6220.279 | 6275.387 | 0.90 % | 55.1080 | 50207.818 | 56428.0970 |
| 33 | 12768 | Haven | 400 Line | 8 | 427312 | 74441.755 | WT Change: WT_Change - NWT 0.375 / 0.5 | 491.185 | | | 5112443 | integrity_control | 74761 | Y | 491.185 | 493 | 0.40 % | 1.815 | 74441.755 | 74932.94 |
| 34 | 12768 | Haven | 400 Line | 8 | 427312 | | | | 493 | 36.25" x .5", DSAW | 4669790 | pipe_segment | 74761 | | 491.185 | 493 | 0.40 % | 1.815 | 74441.755 | 74932.94 |
| 35 | 12768 | Haven | 400 Line | 8 | 427805 | 74932.94 | WT Change: WT_Change - NWT 0.5 / 0.375 | 6286.607 | | | 5111482 | integrity_control | 75254 | Y | 56.735 | 12.084 | -78.70 % | -44.6510 | 74932.94 | 74989.6750 |
| 36 | 12768 | Haven | 400 Line | 8 | 427805 | | | | 6315 | 36" x .375", DSAW | 4669791 | pipe_segment | 75254 | | 56.735 | 12.084 | -78.70 % | -44.6510 | 74932.94 | 74989.6750 |
| 37 | 12768 | Haven | 400 Line | 8 | 434120 | 81219.547 | WT Change: WT_Change - NWT 0.375 / 0.5 | 50.551 | | | 5110177 | integrity_control | 81569 | Y | 59.846 | 61 | 1.90 % | 1.154 | 81219.547 | 81279.3930 |
| 38 | 12768 | Haven | 400 Line | 8 | 434120 | | | | 48 | 36.25" x .5", DSAW | 4669792 | pipe_segment | 81569 | | 59.846 | 61 | 1.90 % | 1.154 | 81219.547 | 81279.3930 |
| 39 | 12768 | Haven | 400 Line | 8 | 434168 | | | | 5 | 36.25" x .5", DSAW | 4669793 | pipe_segment | 81617 | | 59.846 | 61 | 1.90 % | 1.154 | 81219.547 | 81279.3930 |
| 40 | 12768 | Haven | 400 Line | 8 | 434171.526 | 81270.098 | WT Change: WT_Change - NWT 0.5 / 0.613 | 12.504 | | | 5110521 | integrity_control | 81620.526 | | 59.846 | 61 | 1.90 % | 1.154 | 81219.547 | 81279.3930 |
| 41 | 12768 | Haven | 400 Line | 8 | 434173 | | | | 3 | 36.25" x .5", DSAW | 4669794 | pipe_segment | 81622 | | 59.846 | 61 | 1.90 % | 1.154 | 81219.547 | 81279.3930 |
| 42 | 12768 | Haven | 400 Line | 8 | 434176 | | | | 5 | 36.25" x .5", DSAW | 4669795 | pipe_segment | 81625 | | 59.846 | 61 | 1.90 % | 1.154 | 81219.547 | 81279.3930 |
| 43 | 12768 | Haven | 400 Line | 10a | 434181 | | | | 5 | 36.25" x .5", DSAW | 4669796 | pipe_segment | 81630 | | 57.513 | 51 | -11.30 % | -6.513 | 81279.393 | 81336.9060 |
| 44 | 12768 | Haven | 400 Line | 10a | 434183.846 | 81282.602 | WT Change: WT_Change - NWT 0.613 / 0.5 | 54.304 | | | 5112101 | integrity_control | 81632.846 | | 57.513 | 51 | -11.30 % | -6.513 | 81279.393 | 81336.9060 |
| 45 | 12768 | Haven | 400 Line | 10a | 434186 | | | | 3 | 36.25" x .5", DSAW | 4669797 | pipe_segment | 81635 | | 57.513 | 51 | -11.30 % | -6.513 | 81279.393 | 81336.9060 |
| 46 | 12768 | Haven | 400 Line | 10a | 434189 | | | | 5 | 36.25" x .5", DSAW | 4669798 | pipe_segment | 81638 | | 57.513 | 51 | -11.30 % | -6.513 | 81279.393 | 81336.9060 |
| 47 | 12768 | Haven | 400 Line | 10a | 434194 | | | | 2 | 36.25" x .5", DSAW | 4669799 | pipe_segment | 81643 | | 57.513 | 51 | -11.30 % | -6.513 | 81279.393 | 81336.9060 |
| 48 | 12768 | Haven | 400 Line | 10a | 434196 | | | | 36 | 36.25" x .5", DSAW | 4669800 | pipe_segment | 81645 | | 57.513 | 51 | -11.30 % | -6.513 | 81279.393 | 81336.9060 |
| 49 | 12768 | Haven | 400 Line | 10a | 434232 | 81336.906 | WT Change: WT_Change - NWT 0.5 / 0.375 | 22574.016 | | | 5112102 | integrity_control | 81681 | Y | 122.225 | 134.877 | 10.40 % | 12.652 | 81336.906 | 81459.1310 |
| 50 | 12768 | Haven | 400 Line | 10a | 434232 | | | | 998 | 36" x .375", DSAW | 4669801 | pipe_segment | 81681 | | 122.225 | 134.877 | 10.40 % | 12.652 | 81336.906 | 81459.1310 |
| 51 | 12768 | Haven | 400 Line | 10a | 435230 | | | | 21681 | 36" x .375", DSAW | 4669802 | pipe_segment | 82679 | | 5525.164 | 5529.837 | 0.10 % | 4.673 | 81459.131 | 86984.2950 |
| 52 | 12768 | Haven | 400 Line | 10a | 456911 | 103910.922 | WT Change: WT_Change - NWT 0.375 / 0.5 | 49.665 | | | 5112438 | integrity_control | 104360 | Y | 48.858 | 21.482 | -56.00 % | -27.3760 | 103910.922 | 103959.78 |
| 53 | 12768 | Haven | 400 Line | 10a | 456911 | | | | 50 | 36.25" x .5", DSAW | 4669803 | pipe_segment | 104360 | | 48.858 | 21.482 | -56.00 % | -27.3760 | 103910.922 | 103959.78 |
| 54 | 12768 | Haven | 400 Line | 10a | 456961 | 103960.587 | WT Change: WT_Change - NWT 0.5 / 0.375 | 5391.172 | | | 5112439 | integrity_control | 104410 | Y | 5391.172 | 5425 | 0.60 % | 33.8280 | 103960.587 | 109351.7590 |

# GIS, ENGINEERING RECORDS, & AS-BUILTS

Feature Data Alignment – ILI, CIS, CP, etc.

Along with ILI Data – MFL, GEO, CMFL, etc.
Facility Characteristics – Pipe, Valves, Ratings, etc.
CIS Data – Lat/Long
Corrosion Control Data – ProActive – Lat/Long & Pipeline
Coupling Data – Pipeline & Inspection Data
Casing Data – Pipeline & Inspection Data
Crossing Data – Fences, Utilities, Pipelines, Etc.
Repair Data – Pipe Replacements, Recoatings, Sleeves, etc.
Hydrostatic Test Data – Pipeline & Lat/Long

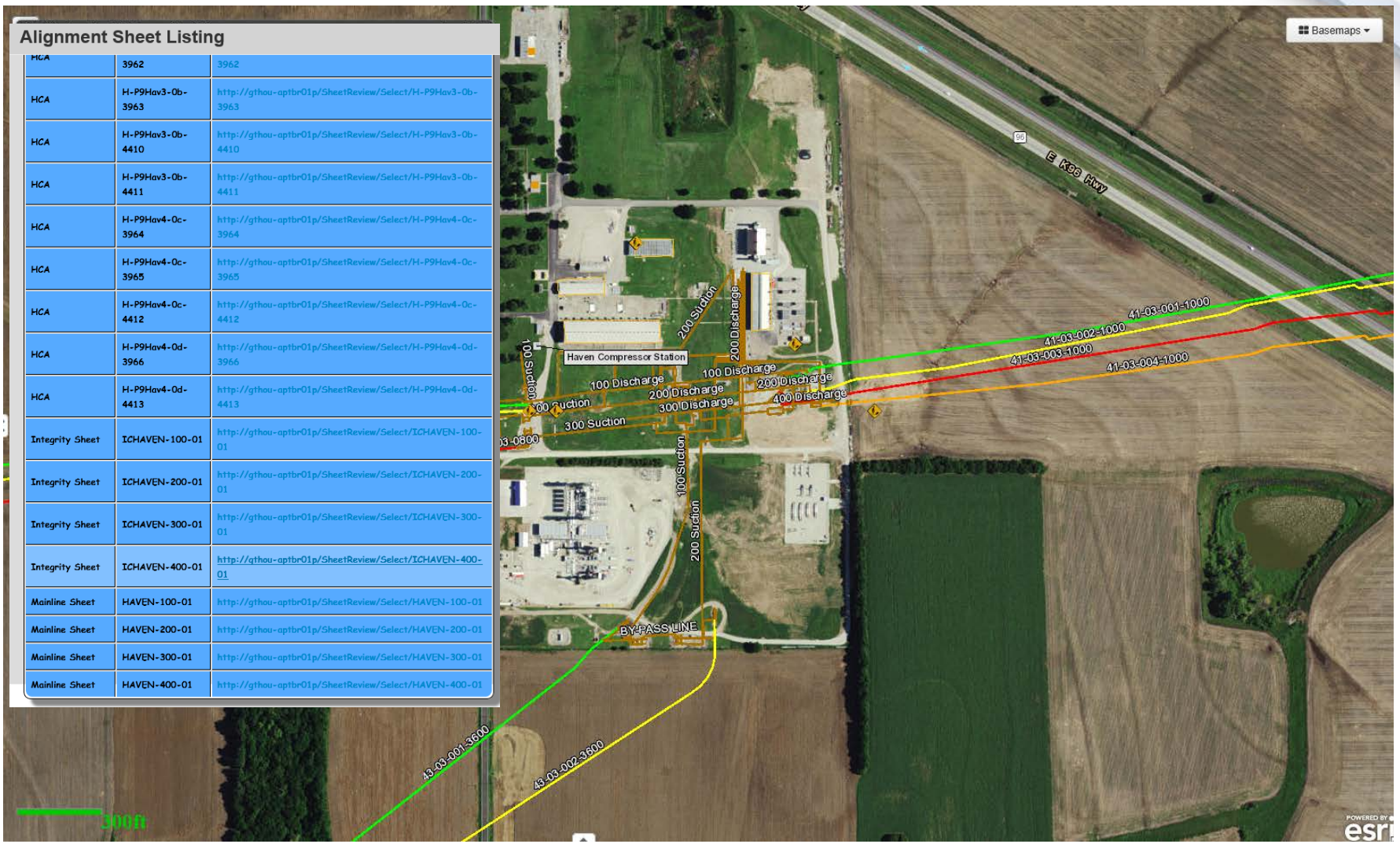
Class Location Data
HCA Data
Operations Forms Data
- Pipe Inspections
- Shallow Cover
- Water Crossings

# GIS, ENGINEERING RECORDS, & AS-BUILTS

## Feature Layers

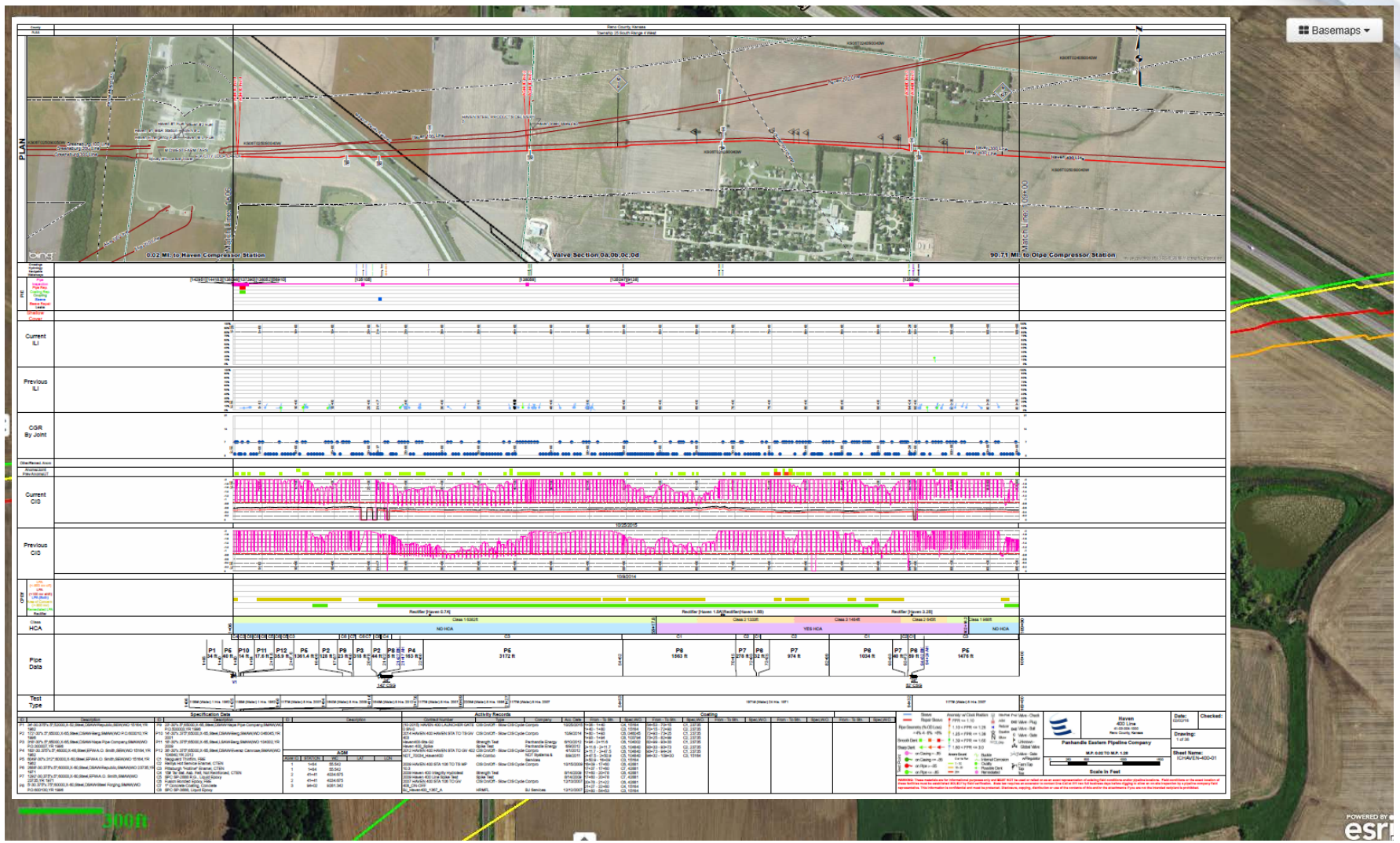
**Alignment Sheet Listing**

| | | |
|---|---|---|
| HCA | 3962 | 3962 |
| HCA | H-P9Hav3-0b-3963 | http://gthou-aptbr01p/SheetReview/Select/H-P9Hav3-0b-3963 |
| HCA | H-P9Hav3-0b-4410 | http://gthou-aptbr01p/SheetReview/Select/H-P9Hav3-0b-4410 |
| HCA | H-P9Hav3-0b-4411 | http://gthou-aptbr01p/SheetReview/Select/H-P9Hav3-0b-4411 |
| HCA | H-P9Hav4-0c-3964 | http://gthou-aptbr01p/SheetReview/Select/H-P9Hav4-0c-3964 |
| HCA | H-P9Hav4-0c-3965 | http://gthou-aptbr01p/SheetReview/Select/H-P9Hav4-0c-3965 |
| HCA | H-P9Hav4-0c-4412 | http://gthou-aptbr01p/SheetReview/Select/H-P9Hav4-0c-4412 |
| HCA | H-P9Hav4-0d-3966 | http://gthou-aptbr01p/SheetReview/Select/H-P9Hav4-0d-3966 |
| HCA | H-P9Hav4-0d-4413 | http://gthou-aptbr01p/SheetReview/Select/H-P9Hav4-0d-4413 |
| Integrity Sheet | ICHAVEN-100-01 | http://gthou-aptbr01p/SheetReview/Select/ICHAVEN-100-01 |
| Integrity Sheet | ICHAVEN-200-01 | http://gthou-aptbr01p/SheetReview/Select/ICHAVEN-200-01 |
| Integrity Sheet | ICHAVEN-300-01 | http://gthou-aptbr01p/SheetReview/Select/ICHAVEN-300-01 |
| Integrity Sheet | ICHAVEN-400-01 | http://gthou-aptbr01p/SheetReview/Select/ICHAVEN-400-01 |
| Mainline Sheet | HAVEN-100-01 | http://gthou-aptbr01p/SheetReview/Select/HAVEN-100-01 |
| Mainline Sheet | HAVEN-200-01 | http://gthou-aptbr01p/SheetReview/Select/HAVEN-200-01 |
| Mainline Sheet | HAVEN-300-01 | http://gthou-aptbr01p/SheetReview/Select/HAVEN-300-01 |
| Mainline Sheet | HAVEN-400-01 | http://gthou-aptbr01p/SheetReview/Select/HAVEN-400-01 |



# GIS, ENGINEERING RECORDS, & AS-BUILTS

Feature Layers



# GIS, ENGINEERING RECORDS, & AS-BUILTS

Feature Layers

# GIS, ENGINEERING RECORDS, & AS-BUILTS

**Groups Continuous Tasks**

- Class Location Determination and MOC
- HCA Determination and MOC
- MAOP / MOP MOC
- DOT Annual Reports
- DOT NPMS Filings
- TX RRC Commission Reports
- T-4 Permits
- QA/QC, Scanning, Indexing, Post to FileNet Docs
- As-Builts from Projects
- Special Mapping Requests
- Application Development, Training, & Support
- Shallow Cover
- LPA – Low Potential Area
- River Crossing Approach
- River Crossing Underwater Inspection
- SCADA
- Risk Assessment
- Threat Assessment
- Alignment Sheets
- Pipeline Integrity Sheets

# GIS, ENGINEERING RECORDS, & AS-BUILTS

- **Internal Customers**
  - Operations Group
  - Pipeline Integrity
  - Corrosion Services
  - Environmental
  - Engineering Construction
  - ROW
  - EAM
  - Regulatory
  - Aerial Patrol
  - Legal
  - Fixed Assets
  - One Call & Damage Prevention
  - Tax
  - Emergency Response
  - Executive
- **External Customers**
  - Industry Groups & Industry Peers
  - DOT – PHMSA
  - Federal, State, Local Regulators
  - General Public
  - Emergency Responders

# GIS, ENGINEERING RECORDS, & AS-BUILTS

## Anomaly Metrics

**HCA Active**

| Database Name | System Name | Total Miles | Total Miles HCA | Total Miles Class1 | Total Miles Class2 | Total Miles Class3 | Total Miles Class4 |
|---|---|---|---|---|---|---|---|
| ETINTER | FEP | 185.20 | 3.50 | 93.70 | | 0.10 | |
| ETINTER | TW | 2559.00 | 27.70 | 1999.00 | | 31.30 | |
| ETINTER | Tiger | 196.50 | 1.50 | 193.10 | | | |
| ETINTRA | Chalkley Transmission Co | 27.80 | | 15.70 | | | |
| ETINTRA | Comanche Trail Pipeline LLC | 195.30 | | | | | |
| ETINTRA | FLG Oil LLC | 2.60 | | 2.60 | | | |
| ETLIQUID | Lonestar NGL Pipe Interstate | 1258.10 | 463.40 | | | | |
| ETLIQUID | Lonestar NGL Pipe Intrastate | 1292.00 | 276.90 | | | | |
| ETLIQUID | NGL Refinery Services | 100.70 | 473.20 | | | | |
| ETLIQUID | Regency Liquids PPL LLC | 18.40 | | | | | |
| ETLIQUID | Sunoco | 27.00 | | | | | |
| GISFGT | FGT | 5362.60 | 634.00 | 3572.70 | 639.30 | 1107.00 | |
| GISPE | PEPL | 6520.10 | 150.70 | 5794.50 | 341.90 | 291.70 | |
| GISSR | SEA ROBIN | 834.60 | | 804.60 | 1.60 | | |
| GISTG | DAPL-ETCO Operations Mgmt, LLC | 1891.50 | 555.20 | 487.50 | 30.80 | 0.90 | |
| GISTG | Panhandle Eastern Pipeline Co. | 0.30 | | 0.20 | | | |
| GISTG | Trunkline Gas Co, LLC | 2216.80 | 45.00 | 2054.20 | 137.50 | 51.80 | |

**Pipeline Integrity Activity Planner** Year: 2017

| | | Count | Miles | |
|---|---|---|---|---|
| Central | | | | |
| | ILI | 25 | 608 | Full Details |
| | Pressure Test | 11 | 189 | |
| Midwest | | | | |
| | ILI | 19 | 829 | Full Details |
| | Pressure Test | 2 | 0 | |
| South | | | | |
| | ILI | 2 | 154 | Full Details |
| Southeast | | | | |
| | ILI | 18 | 871 | Full Details |
| | Pressure Test | 20 | 204 | |
| Western | | | | |
| | ILI | 5 | 191 | Full Details |
| Total | | | | |
| | ILI | 69 | 2653 | Full Details |
| | Pressure Test | 33 | 393 | |

| | | Count | Miles | |
|---|---|---|---|---|
| ETINTRA | | | | |
| | ILI | 46 | 1154 | Full Details |
| | Pressure Test | 83 | 352 | |
| ETLIQUID Interstate | | | | |
| | ILI | 13 | 481 | Full Details |
| ETLIQUID Intrastate | | | | |
| | ILI | 9 | 128 | Full Details |
| Total | | | | |
| | ILI | 68 | 1763 | Full Details |
| | Pressure Test | 83 | 352 | |

**Anomaly Remediation and Response Totals**

Click on the results to see the details

| Anomalies | | HCA | | | All | | |
|---|---|---|---|---|---|---|---|
| | Response | Total | Remediated | Remaining | Total | Remediated | Remaining |
| ETINTER / TW | Monitored | 566 | 0 | 566 | 171208 | 4 | 171204 |
| ETINTER / TW | Scheduled | | | | 52 | 0 | 52 |
| | Response | Total | Remediated | Remaining | Total | Remediated | Remaining |
| ETINTRA / Energy Transfer Fuel, LP | Immediate | 1 | 0 | 1 | 4 | 3 | 1 |
| ETINTRA / Energy Transfer Fuel, LP | Monitored | 4125 | 0 | 4125 | 502445 | 3617 | 498828 |
| ETINTRA / Energy Transfer Fuel, LP | Scheduled | | | | 73 | 39 | 34 |
| | Response | Total | Remediated | Remaining | Total | Remediated | Remaining |
| ETINTRA / ETC Field Services LLC | Monitored | | | | 54528 | 0 | 54528 |
| ETINTRA / ETC Field Services LLC | Scheduled | | | | 4176 | 0 | 4176 |
| | Response | Total | Remediated | Remaining | Total | Remediated | Remaining |
| ETINTRA / ETC Katy Pipeline Ltd | Monitored | 24 | 0 | 24 | 1485 | 7 | 1478 |
| | Response | Total | Remediated | Remaining | Total | Remediated | Remaining |
| ETINTRA / ETC Northeast PL LLC | Monitored | | | | 8 | 0 | 8 |
| | Response | Total | Remediated | Remaining | Total | Remediated | Remaining |

# GIS, ENGINEERING RECORDS, & AS-BUILTS

- **LPA & As-Built Metrics**

ENERGY TRANSFER

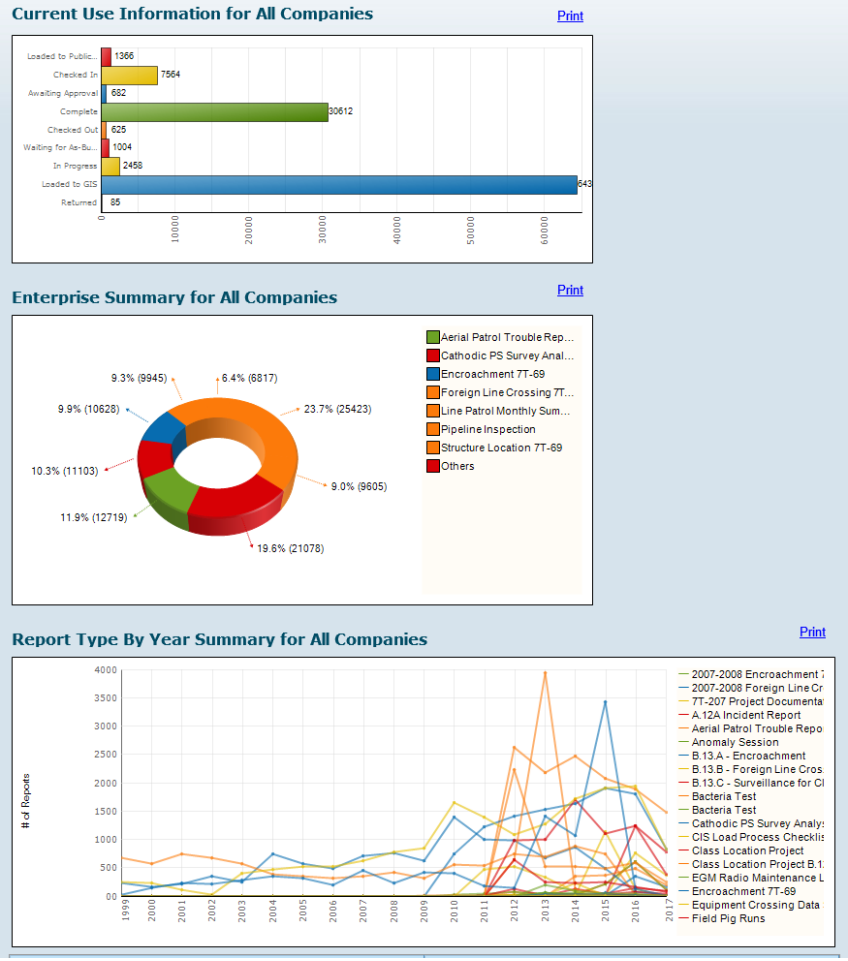
**LPA Dashboard**

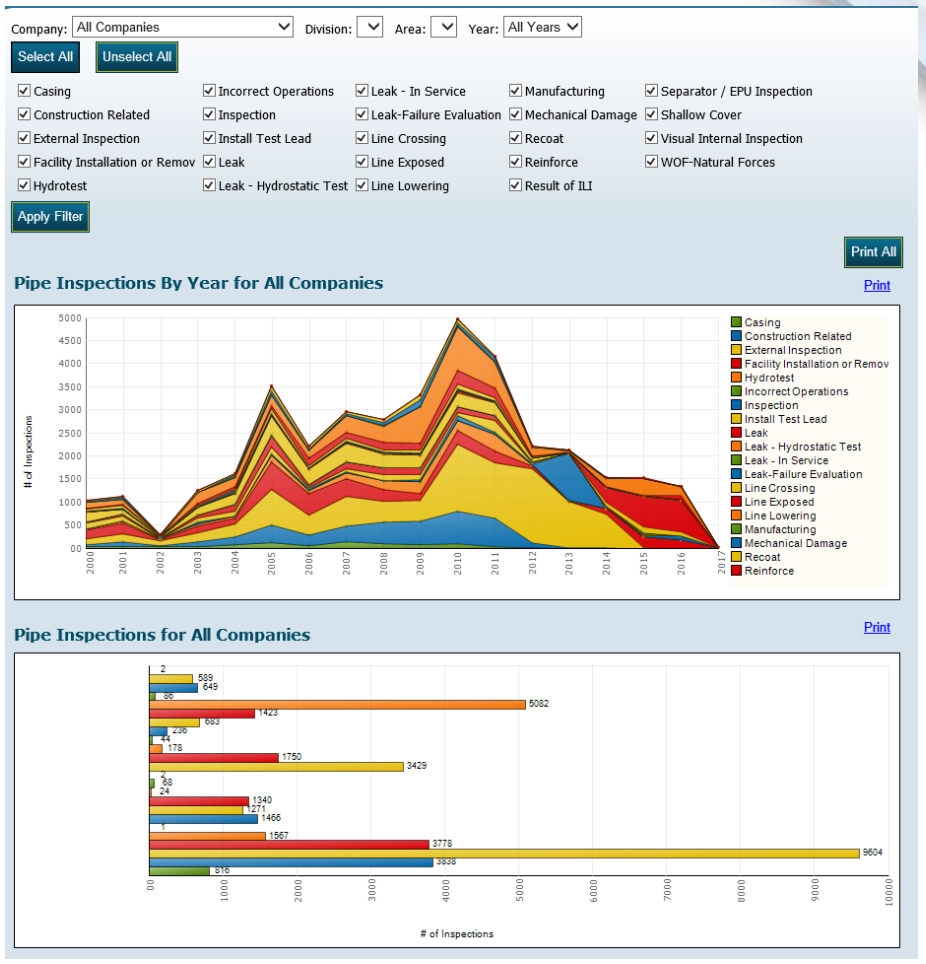
Pie Chart | Bar Chart

| | Projects Projected | | | Projects Received | | | | | Projects Completed | | | | | Projects In-House for Records QA/QC | | | | | Projects In-House Ready For As-Built or In Progress | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Company | Project Initiated Date Prior to 7/11/2015 | Project Initiated Date Post 7/11/2015 | Total Projected | Pipeline Initiated Date Prior to 7/11/2015 | Pipeline Initiated Date Post 7/11/2015 | Compression Initiated Date Prior to 7/11/2015 | Compression Initiated Date Post 7/11/2015 | Total Received | Pipeline Recieved Date Prior to 7/11/2015 | Pipeline Received Date Post 7/11/2015 | Compression Received Date Prior to 7/11/2015 | Compression Received Date Post 7/11/2015 | Total Completed | Pipeline Records In-House Prior to 7/11/2015 | Pipeline Records In-House Post 7/11/2015 | Compression Records In-House Prior to 7/11/2015 | Compression Records In-House Post to 7/11/2015 | Total Records In-House | Pipeline As-Built In-House Prior to 7/11/2015 | Pipeline As-Built In-House Post 7/11/2015 | Compression As-Built In-House Prior to 7/11/2015 | Compression As-Built In-House Post 7/11/2015 | Total As-builts In House | Total In-House |
| ETC Inter | 37 | 3 | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 8 | 1 | 14 | 1 | 24 | 26 |
| ETC Intra | 1336 | 250 | 1586 | 2 | 2 | 0 | 2 | 6 | 1 | 1 | 0 | 0 | 2 | 149 | 74 | 15 | 4 | 242 | 266 | 48 | 38 | 1 | 353 | 595 |
| ETC Liquids | 505 | 103 | 608 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 5 | 23 | 6 | 2 | 36 | 10 | 1 | 4 | 0 | 15 | 51 |
| FGT | 1189 | 254 | 1443 | 6 | 0 | 0 | 0 | 6 | 2 | 1 | 6 | 3 | 12 | 7 | 9 | 0 | 3 | 19 | 46 | 34 | 73 | 11 | 164 | 183 |
| Gulf States | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Panhandle | 1076 | 183 | 1259 | 1 | 1 | 1 | 0 | 3 | 4 | 10 | 3 | 1 | 18 | 21 | 17 | 4 | 7 | 49 | 4 | 1 | 19 | 8 | 32 | 81 |
| Regency Intra | 2165 | 78 | 2243 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 19 | 33 | 5 | 19 | 76 | 334 | 170 | 53 | 18 | 575 | 651 |
| Regency Liquids | 26 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 5 | 6 |
| Sea Robin | 68 | 9 | 77 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 3 | 1 | 3 | 0 | 0 | 4 | 1 | 0 | 1 | 1 | 3 | 7 |
| Trunkline | 655 | 76 | 731 | 1 | 3 | 1 | 0 | 5 | 7 | 11 | 2 | 0 | 20 | 5 | 4 | 13 | 7 | 29 | 0 | 3 | 9 | 3 | 15 | 44 |
| TW | 318 | 118 | 436 | 2 | 1 | 0 | 1 | 4 | 8 | 0 | 2 | 4 | 14 | 0 | 1 | 0 | 0 | 1 | 100 | 47 | 18 | 6 | 171 | 172 |
| Totals | 7377 | 1074 | 8451 | 16 | 11 | 2 | 3 | 32 | 24 | 24 | 13 | 8 | 69 | 209 | 166 | 43 | 42 | 460 | 770 | 306 | 231 | 50 | 1357 | 1817 |

# GIS, ENGINEERING RECORDS, & AS-BUILTS

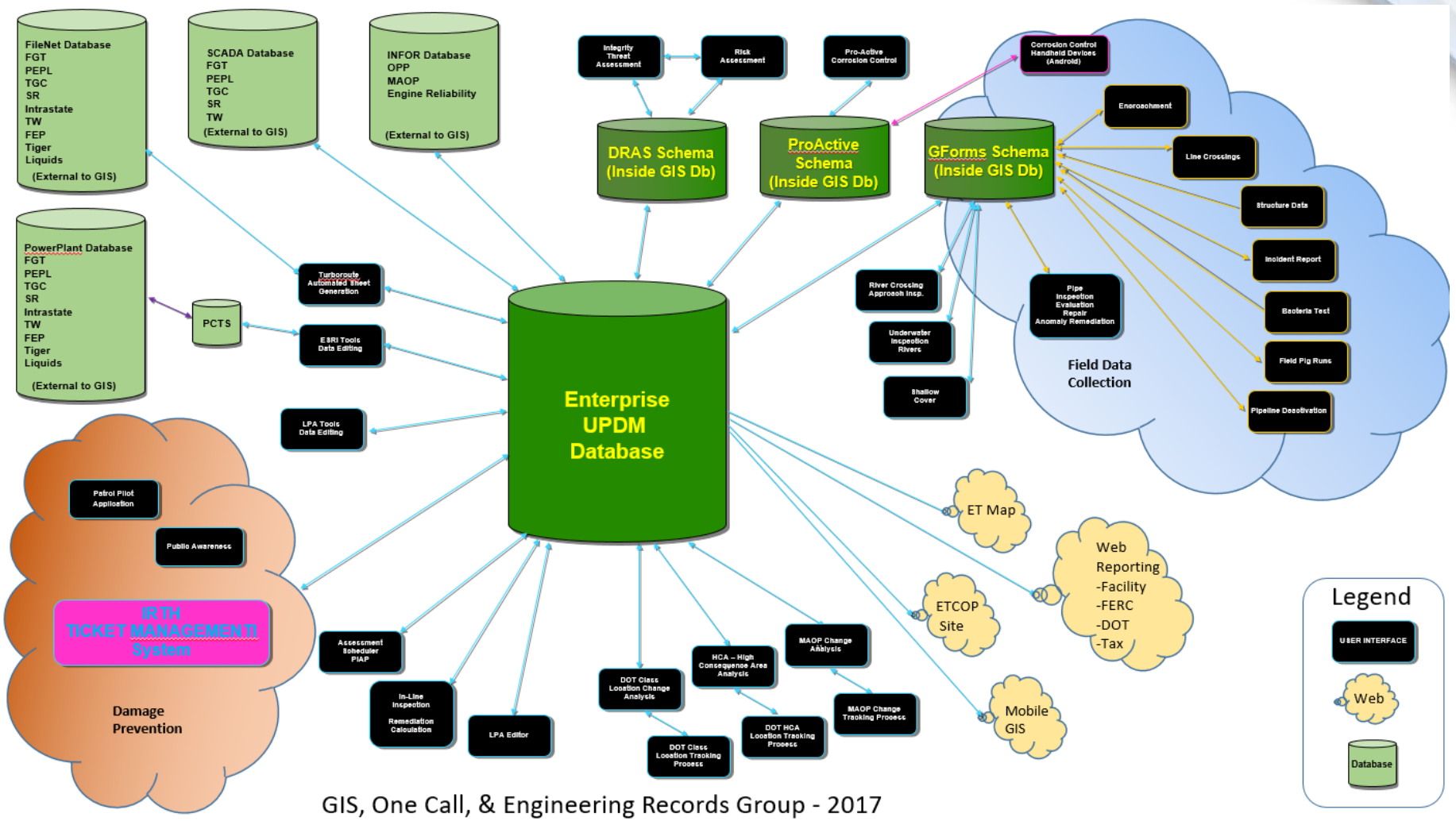
- **Mobile Forms & Pipe Inspection Metrics**



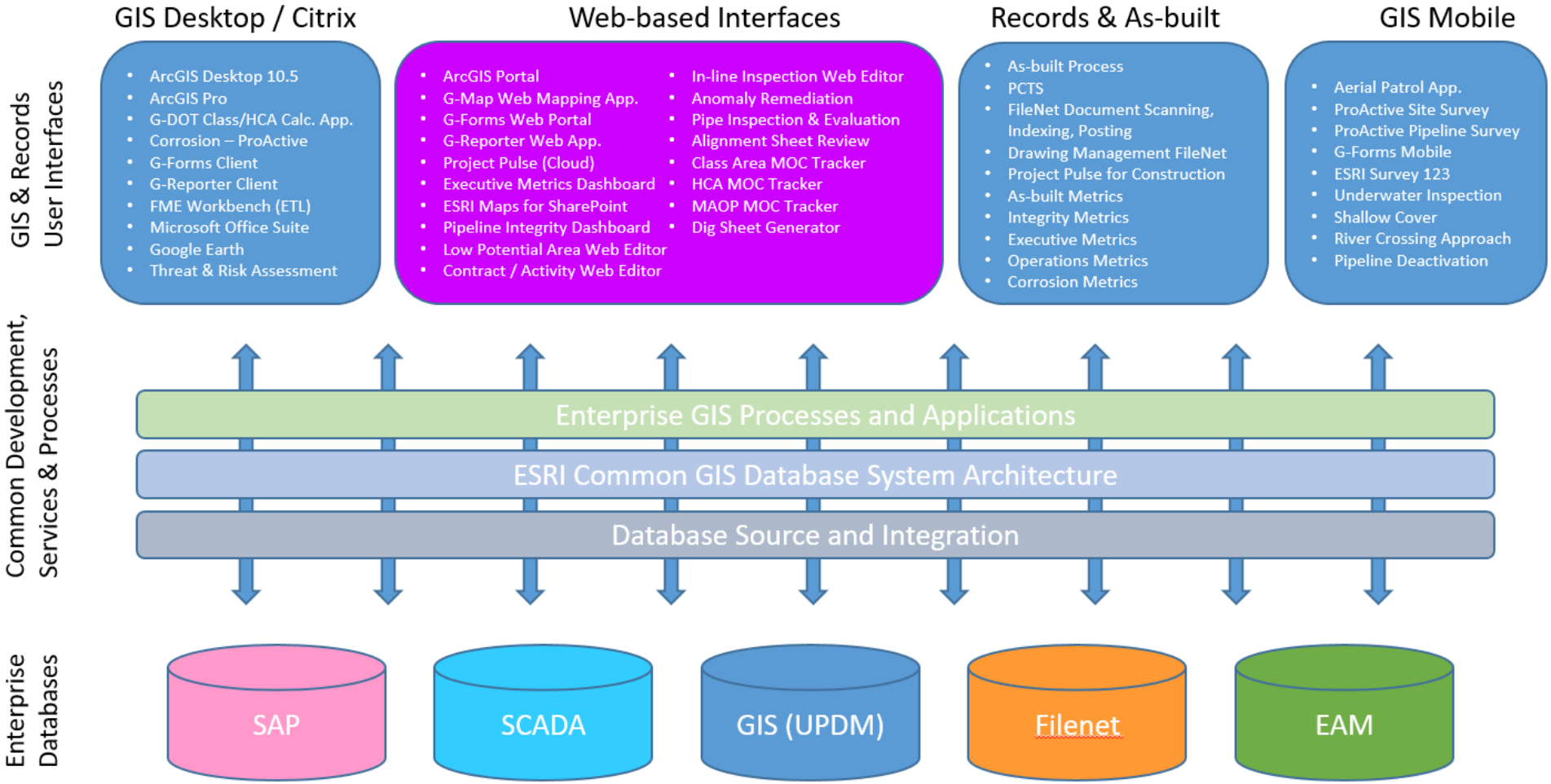
# GIS, ENGINEERING RECORDS, & AS-BUILTS

- **System Architecture**



# GIS, ENGINEERING RECORDS, & AS-BUILTS

- **System Architecture**



# GIS, ENGINEERING RECORDS, & AS-BUILTS

Summary & Lessons Learned

- A Few Challenges Remain – Infrastructure or Band Width within our Organization

- Certainly MORE Data Integration
  - Living Atlas Data
  - More Statistical Analysis

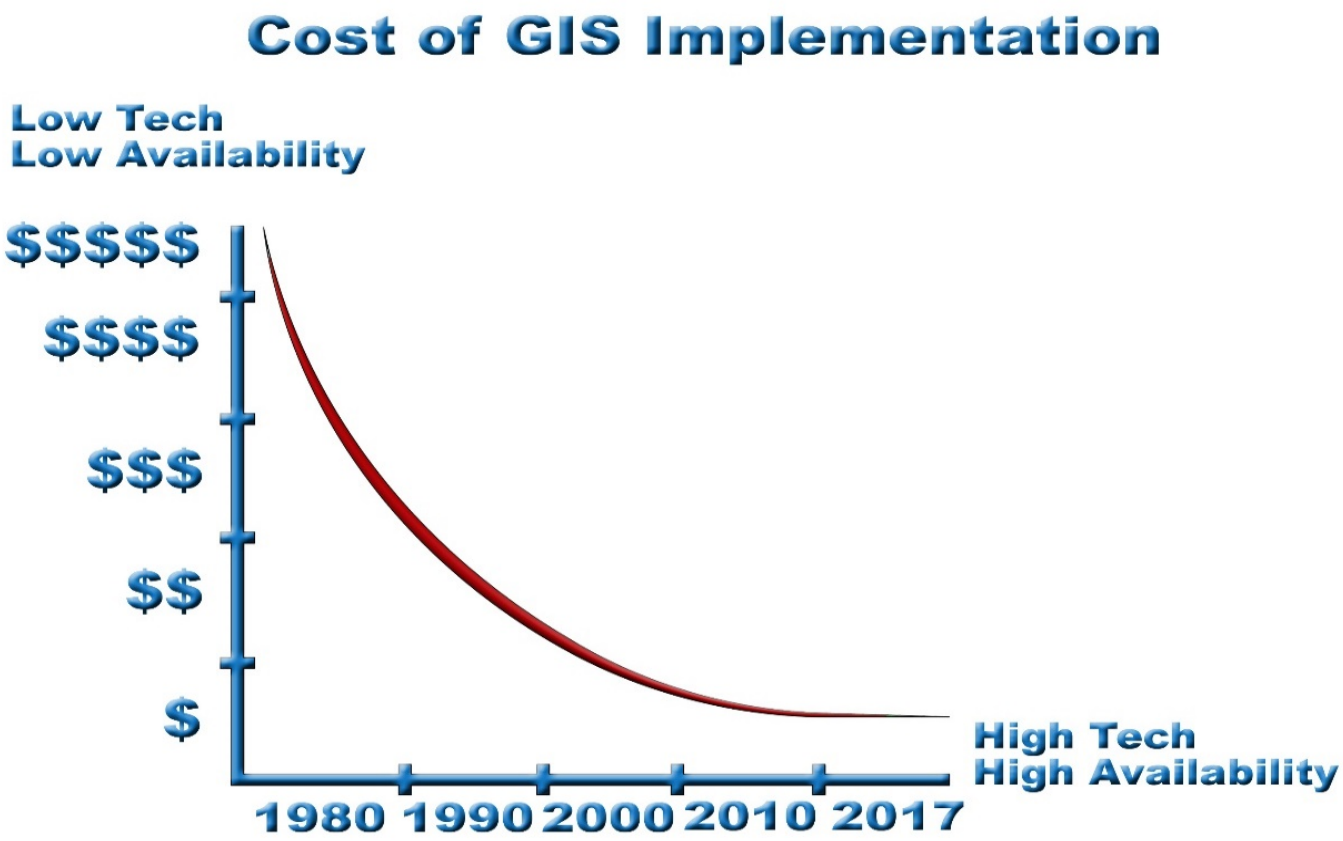
- VTC Challenges – Volume of Records is Amazing. Note, before any Code was written, the artisans who built these pipelines kept great records.

- Words Count –
  - Hierarchy is of the Utmost Important
    - How do we reference Data
    - What Are Features Called
    - How do We Communicate

# GIS, ENGINEERING RECORDS, & AS-BUILTS

Summary & Lessons Learned

- Great News – Cost is Coming Down!!!!



# GIS, ENGINEERING RECORDS, & AS-BUILTS

Summary & Lessons Learned

- Commitment to Continuous Improvement –
  - Study
  - Listen
  - Learn
  - Plan
  - Data Acquisition
  - Information Gathering
  - Think
  - Do
  - Solve
  - Test
  - Solve
  - Test
  - Study
  - Repeat

# CONTACT INFORMATION

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