UTILITY SAFETY & DESIGN, INC.

DIMP and SHRIMP

Consultation
Expert advice to your natural gas questions
- Compliance & Records
- Plan Development
- Public Awareness
- Drug & Alcohol
- Operator Qualification

Engineering
Operations-ready engineering and design support
- Pipelines
- Regulator Stations
- Odorization Systems
- Cathodic Protection

Construction
Specialized pipeline & utility construction experience
- Tapping & Stopping
- Directional Boring
- System Installation
- Welding

Operations
Complete, custom system or pipeline operation
- Operator of Record
- Surveys
- Maintenance
- Testing

GIS Services
ESRI GIS Based Compliance Tool set for Natural Gas
- Easy Access Mapping
- Real Time Tracking
- Perform and Record
- Fully Supported

Corrosion
Operations-ready engineering and design support
- Design
- Installation
- Maintenance
- ECDA

Odorization
Chevron Phillips blends available all across the Midwest:
- Bulk Deliveries
- Closed Loop Trucks
- Qualified Deliveries
- Field Maintenance

Your Full-Spectrum Natural Gas Solutions Provider

Olney, IL	**Belleville, IL**
Unionville, MO	**Kirksville, MO**
Wichita, KS	**Shelbyville, KY**
Pittsboro, IN	**Princeton, MN**

Products and Partnerships

Paradigm

192 GIS®

Chevron Phillips Chemical Company

UCI TESTING

esri Partner Network Bronze

Energy Worldnet

DIMP

- Distribution Integrity Management Plan
  - Subpart P – Gas Distribution Pipeline Integrity Management (IM)
  - Sections 192.1001 – 192.1015
    - 192.1007
    - Knowledge
    - Identify Threats
    - Evaluate and Rank Risk
    - Identify and implement measures to address risks
    - Measure performance, monitor results, and evaluate effectiveness
    - Periodic Evaluation and Improvement
    - Report Results

SHRIMP

- Simple, Handy, **Risk-Based** Integrity Management Plan
  - APGA/SIF program to build DIMP plans
  - Uses a risk based algorithm to determine risk ranking of system threats

DIMP Plan – Knowledge of System

- What records are involved with your DIMP Plan?… EVERYTHING!!!
  - A system's DIMP requires input of all data, for every section of pipe, every piece of equipment and all maintenance tasks performed.
- What if I don't have any as-builts for my system?
- What if I lost all my records in a flood/fire last year?
- What if the superintendent who worked on the system just retired?
- The most important element of an accurate DIMP plan is accurate leak and system data.
- GARBAGE IN = GARBAGE OUT
- How is system data being collected and stored?

DIMP Plan – Knowledge of System

- Collecting data for the entire system can be overwhelming.
  - How accurate is your Annual DOT report?
    - Miles of Main/Number of Services
    - Material of Main and Services
    - Size of Main and Services
  - How accurate is your leak data?
    - Are leaks attributed to the proper cause?
    - Are leaks being sub-categorized?
    - Are **ALL** your leaks being recorded?
  - Do you have accurate data on equipment and joining methods in your System?
    - Regulators/Relief Valves
    - Main Line Valves – Welded/Flanged – Steel/Cast Iron
    - Steel Compression Couplings

DIMP Plan – Knowledge of System

- Once we have collected the data on the system, we need to put it to good use.
- SHRIMP
  - SHRIMP is a good tool, but it is only helpful when used correctly.
  - Accurate data entry is key to an accurate plan.
- How do we store data?
  - Housing data in a centralized location will help ease the suffering of data entry.
  - BACKUP!BACKUP!BACKUP!!!

What Do We Get Out of SHRIMP?

- Identify Threats
- Evaluate and Rank Risk
- Identify and implement measures to address risks
- Measure performance, monitor results, and evaluate effectiveness
- Periodic Evaluation and Improvement
- Report Results

- Full DIMP Plan - 150 – 200 pages!!!
- Chapter 1 through 11.1 – DIMP Plan – What you did, What you WILL do, and How you did it.
- Chapter 11.2 & 11.3 – Lists of Answers and Data Sources from SHRIMP
- Chapter 11.4 – SHRIMP Process Description – Algorithm Explanation

Chapter 3 – Knowledge of System

- This Plan was developed based on the design, construction, operation and maintenance records of the Utility, including: incident and leak history, corrosion control records, continuing surveillance records, patrolling records, maintenance history, and excavation damage experience and PHMSA advisory bulletins, as well as the judgment and knowledge of the Utility employees (SME) and USDI (Other SME) as subject matter expert. All PHMSA advisory bulletins were reviewed during the data collection process. Paper copies of records are located at the Utility office. A list of the records used can be found in Chapter 8 of this Plan. The previous five years of records were used to help develop this plan. The previous five years of records were used to enter the data requested by the SHRIMP program. All readily available records of original construction and maintenance of the system were used to help develop this plan along with the knowledge of failures in the system occurring prior to the previous five years. The specific elements of knowledge of the infrastructure used to evaluate each threat and prioritize risks are listed in Chapter 4, *THREAT ASSESSMENT*, Chapter 5, *RISK EVALUATION AND PRIORITIZATION* and Section 11.2, "LIST OF ANSWERS AND DATA SOURCES FROM SHRIMP™ INTERVIEWS" of this Plan.

Chapter 3 – Knowledge of System

- *The Gas Leak and Repair Report will be completed for every leak found in the system, with the exception of in-building leaks. See section 13 of the O&M Manual for the leak management program.*

- *A Main or Service Line Installation Form, found in the O&M manual, will be completed when new piping is installed.*

- *Gaps in knowledge exist throughout the system. The Utility will fill gaps in system knowledge by completing a Main/Service Inspection Form, found in Appendix B, when a gas main or service is exposed. The inspection form shall be completed to the best of the ability of the employee. The Utility will also track their leaks and threats using the DIMP Leak Tracking and Annual Review Form, found in Appendix B. The purpose and appropriate use of the forms associated with this plan will be discussed with all employees.*

Identifying Threats

- Threats identified by previous leaks
- Threats identified by potential leak risk
- Threats identified by potential operation risk

Leak Cause Table		
Corrosion	Atmospheric Corrosion	
Corrosion	External Corrosion	
Corrosion	Internal Corrosion	
Equipment Malfunction	Below Ground Valve	
Equipment Malfunction	Steel Compression Coupling	
Equipment Malfunction	Regulator/Relief Failure	
Equipment Malfunction	Residential Regulator Failure	
Equipment Malfunction	Other, Specify Below	
Incorrect Operations	Failure to Follow Procedure	
Incorrect Operations	Inadequate Procedure	
Incorrect Operations	Workmanship Defects	
Material, Weld, or Joint Failure	Manufacturing Defects	
Material, Weld, or Joint Failure	Weld/Joint	
Material, Weld, or Joint Failure	Other, Specify Below	
Natural Forces	Icing of Regulator	
Natural Forces	Natural Disaster	
Natural Forces	Severe Weather	
Natural Forces	Soil Subsidence	
Natural Forces	Other, Specify Below	
Other Outside Forces	Vehicular Damage	
Other Outside Forces	External Loading	
Other Outside Forces	Vandalism Damage	
Excavation Damage	Blasting Damage	
Excavation Damage	Crew or Contractor Damage	
Excavation Damage	Third Party Damage	
Meter Set Fitting Leak	Repaired by Tightening or Greasing	
Meter Set Fitting Leak	Repaired by Replacing Fitting	
Other	Specify Below	

Identifying Threats

- Is historical leak data accurately categorized?
- Is current leak data accurately categorized?

LEAK CAUSE CLASSIFICATIONS

CORROSION: Leak resulting from a hole in the pipe or other component that galvanic, bacterial, chemical, stray current, or other corrosive action causes. A corrosion release or failure is not limited to a hole in the pipe or other piece of equipment. If the bonnet or packing gland on a valve or flange on piping deteriorates or becomes loose and leaks due to corrosion and failure of bolts, it is classified as Corrosion.

NATURAL FORCES: Leak caused by outside forces attributable to causes NOT involving humans, such as earth movement, earthquakes, landslides, subsidence, heavy rains/floods, lightning, temperature, thermal stress, frozen components, high winds (including damage caused by impact from objects blown by wind), or other similar natural causes. Lightning includes both damage and/or fire caused by a direct lightning strike and damage and/or fire as a secondary effect from a lightning strike in the area. An example of such a secondary effect would be a forest fire started by lightning that results in damage to a gas distribution system asset which results in an incident.

EXCAVATION: Leak resulting directly from excavation damage by operator's personnel (oftentimes referred to as "first party" excavation damage) or by the operator's contractor (oftentimes referred to as "second party" excavation damage) or by people or contractors not associated with the operator (oftentimes referred to as "third party" excavation damage). Also, this section includes a release or failure determined to have resulted from previous damage due to excavation activity. For damage from outside forces OTHER than excavation which results in a release, use Natural Force Damage or Other Outside Force, as appropriate.

OTHER OUTSIDE FORCE DAMAGE: Heavy Industrial, Man-made or Other Fire/Explosion as Primary Cause of Incident (unless the fire was caused by natural forces, in which case the leak should be classified Natural Forces. Forest fires that are caused by human activity and result in a release should be reported as Other Outside Force). Damage by Car, Truck, or Other Motorized Vehicle/Equipment NOT Engaged in Excavation. Other motorized vehicles/equipment includes tractors, mowers, backhoes, bulldozers and other tracked vehicles, and heavy equipment that can move. Leaks resulting from vehicular traffic loading or other contact (except report as "Excavation Damage" if the activity involved digging, drilling, boring, grading, cultivation or similar activities. Damage by Boats, Barges, Drilling Rigs, or Other Maritime Equipment or Vessels so long as those activities are not excavation activities. If those activities are excavation activities such as dredging or bank stabilization or renewal, the leak repair should be reported as "Excavation Damage". Previous Mechanical Damage NOT Related to Excavation. A leak caused by damage that occurred at some time prior to the release that was apparently NOT related to excavation activities, and would include prior outside force damage of an unknown nature, prior natural force damage, prior damage from other outside forces, and any other previous mechanical damage other than that which was apparently related to prior excavation. Leaks resulting from previous damage sustained during construction, installation, or fabrication of the pipe, weld, or joint from which the release eventually occurred are to be reported under "Pipe, Weld, or Joint Failure". Leaks resulting from previous damage sustained as a result of excavation activities should be reported under "Excavation Damage" unless due to corrosion in which case it should be reported as a corrosion leak. Intentional Damage/Vandalism means willful or malicious destruction of the operator's pipeline facility or equipment. This category would include pranks, systematic damage inflicted to harass the operator, motor vehicle damage that was inflicted intentionally, and a variety of other intentional acts.

PIPE, WELD, OR JOINT FAILURE: Leak resulting from a material defect within the pipe, component or joint due to faulty manufacturing procedures, design defects, or in-service stresses such as vibration, fatigue and environmental cracking. Material defect means an inherent flaw in the material or weld that occurred in the manufacture or at a point prior to construction, fabrication or installation. Design defect means an aspect inherent in a component to which a subsequent failure has been attributed that is not associated with errors in installation, i.e., is not a construction defect. This could include, for example, errors in engineering design. Fitting means a device, usually metal, for joining lengths of pipe into various piping systems. It includes couplings, ells, tees, crosses, reducers, unions, caps and plugs. Any leak that is associated with a component or process that joins pipe such as threaded connections, flanges, mechanical couplings, welds, and pipe fusions that leak as a result from poor construction should be classified as "Incorrect Operation". Leaks resulting from failure of original sound material from force applied during construction that caused a dent, gouge, excessive stress, or other defect, including leaks due to faulty vehicle bends, faulty field welds, and damage sustained in transportation to the construction or fabrication site that eventually resulted in a leak, should be reported as "Pipe, Weld or Joint Failure".

EQUIPMENT FAILURE: Leak caused by malfunctions of control and relief equipment including regulators, valves, meters, compressors, or other instrumentation or functional equipment. Failures may be from threaded components, Flanges, collars, couplings and broken or cracked components, or from O- Ring failures, Gasket failures, seal failures, and failures in packing or similar leaks. Leaks caused by overpressurization resulting from malfunction of control or alarm device; relief valve malfunction; and valves failing to open or close on command; or valves which opened or closed when not commanded to do so. If overpressurization or some other aspect of this incident was caused by incorrect operation, the incident should be reported under "Incorrect Operation."

INCORRECT OPERATIONS: Leak resulting from inadequate procedures or safety practices, or failure to follow correct procedures, or other operator error. It includes leaks due to improper valve selection or operation, inadvertent overpressurization, or improper selection or installation of equipment. It includes a leak resulting from the unintentional ignition of the transported gas during a welding or maintenance activity.

OTHER CAUSE: leak resulting from any other cause not attributable to the above causes. A best effort should be made to assign a specific leak cause before choosing the Other cause category. An operator replacing a bare steel pipeline with a history of external corrosion leaks without visual observation of the actual leak, may form a hypothesis based on available information that the leak was caused by external corrosion and assign the Corrosion cause category to the leak.

Chapter 5 – Risk Evaluation and Prioritization

- RANK indicates the final relative risk rank after review and validation by the Utility. The Utility verified the risk rankings based on knowledge of the system. Including using system records and knowledge gathered by working on the system. Although the leak history of a threat is considered, greater priority (or higher rank) is given to threats with a greater risk of creating hazardous leaks.

Threat: Excavation > Third Party Damages
Section: Third Party
Description: Third Party Damage

Rank	Shrimp Rank	Relative Risk Score	Probability Score	Leak Cause Factor Score	Incident Probability Factor
1	3	8.15	5.15	1.15	1.25

Ranked here, in part, for the following reasons:
Greater chance of creating class 1 leaks.

Chapter 6 – Additional/Accelerated Measures to Reduce Risk

The following lists the additional/accelerated actions that will be taken and describes the part of the Utility to which each applies to address the priority risks described in the previous section of this Plan. Further details can be found in Section 11.1, "IMPLEMENTATION PLAN". The Utility determined the accelerated actions based on tasks currently being completed above and beyond part 192 and the need to reduce the frequency high risk threats. Additional/accelerated actions will be required on all threats with history of widespread non-hazardous leaks, hazardous leaks, or a greater chance of creating a hazardous leak.

Section: Third Party

Threat: Excavation > Third Party Damages

Description: Third Party Damage

For Excavation > Third Party Damages on the Third Party section, the system will:

Conduct pre-construction meetings.

Monitor/audit excavation activity.

Chapter 7 – Measure Performance, Monitor Results and Evaluate Effectiveness

The Utility will keep records of the following performance measures:

1. The number of hazardous leaks either eliminated or repaired, categorized by cause;
2. The number of excavation damages;
3. The number of excavation tickets received;
4. The number of leaks either eliminated or repaired, categorized by cause; and
5. The number of hazardous leaks either eliminated or repaired, categorized by material.
6. Any additional measures the operator determines are needed to evaluate the effectiveness of the IM program in controlling each identified threat.

- Each performance measure listed above will be monitored each year when preparing the federal DOT form F7100-1.1. The data will be collected for each performance measure by reviewing the forms specified in chapter 8.

- The baseline for each performance measure will be the average amount of all leaks (hazardous and non-hazardous) per year and will be determined using leak data from the previous 5 years of the plan re-evaluation. Baselines will not change in the time period between plan re-evaluation. The baseline for each performance measure above is listed below:

    1. The baselines for all causes other than those listed in 7.3 are 0.
    2. Baseline of 0.8
    3. Baseline of 537
    4. These baselines for all causes other than those listed in 7.3 are 0.
    5. The baselines for hazardous leaks categorized by materials are: steel 0.4, plastic 0.2.
    6. Baselines are listed in 7.3.

An increase of 2 leaks above the baseline in any category listed above (except for threats listed in 7.3) will warrant re-evaluation of the performance measures and risk reducing activities.

Chapter 7 – Measure Performance, Monitor Results and Evaluate Effectiveness

The baseline for each performance measure will be the average amount of all leaks (hazardous and non-hazardous) per year and will be determined using leak data from the previous 5 years of the plan re-evaluation. Baselines will not change in the time period between plan re-evaluation. The baseline for each threat requiring additional actions is listed below:

1. Third Party Damage: 0.8 leaks due to third party damage per year. An increase of more than 2 leaks per year will warrant re-evaluation of the performance measures.
2. External Corrosion: 1.0 leaks due to external corrosion per year. An increase of more than 2 leaks per year will warrant re-evaluation of the performance measures.
3. Cast Iron Plug Valves: 0.8 leaks due to malfunctioning Cast Iron Plug Valves per year. An increase of 2 or more leaks above the baseline in a calendar year will warrant re-evaluation of the performance measures.

Chapter 8 – Periodic Evaluation and Improvement

The Utility will conduct a complete re-evaluation of this Plan no less than Every Three (3) Years, prior to the end of the calendar year of the third year.

PLAN RE-EVALUATION

Re-evaluation of the Plan will also occur when changes occur on the system that may significantly change the risk of failure, including but not limited to:

- Completion of any additional actions listed in Chapter 6, *ADDITIONAL/ACCELERATED MEASURES TO ADDRESS RISKS* of this Plan,
- A review of performance measures concludes that a change of approach is warranted.

ANNUAL REVIEW

An annual review of this plan will be completed the gas superintendent using the DIMP Leak Tracking and Annual Review-1901 by reviewing all of the records for the year listed below and determining if any changes will need to be made to the plan for such reasons as; new information acquired in the field or through a record audit, increase in frequency of failures with current threats, or a new threat being identified.

Chapter 11.1 – Implementation Plan

2. The following Performance Measures:

For **Excavation > Third Party Damages** on the **Third Party** the system will:

- Track the frequency of these failures.
- The System will implement as follows: Gas foreman will track these failures using the DIMP Leak Tracking Spreadsheet.

3. Additional/Accelerated Actions included in this DIMP plan:

For **Excavation > Third Party Damages** on **Third Party** the system will:

- Conduct pre-construction meetings.
- The System will implement as follows: Pre-construction meetings will be held when gas facilities are to be uncovered. Gas foreman is responsible.
- Monitor/audit excavation activity.
- The System will implement as follows: Excavation activity will be monitored when gas facilities are to be uncovered. Gas foreman is responsible.

Leak Tracking

Cause of Leak	Leaks 2018 Mains Non Hazard	Leaks 2018 Mains Hazardous	Leaks 2018 Services Non Hazard	Leaks 2018 Services Hazardous	Leaks 2019 Mains Non Hazard	Leaks 2019 Mains Hazardous	Leaks 2019 Services Non Hazard	Leaks 2019 Services Hazardous	Leaks 2020 Mains Non Hazard	Leaks 2020 Mains Hazardous	Leaks 2020 Services Non Hazard	Leaks 2020 Services Hazardous	Leaks 2021 Mains Non Hazard	Leaks 2021 Mains Hazardous	Leaks 2021 Services Non Hazard	Leaks 2021 Services Hazardous	Leaks 2022 Mains Non Hazard	Leaks 2022 Mains Hazardous	Leaks 2022 Services Non Hazard	Leaks 2022 Services Hazardous
Corrosion Leaks																				
Atmospheric																				
External																				
Internal																				
Natural Forces Leaks																				
Icing of Regulator																				
Natural Disasters																				
Severe Weather																				
Soil Subsidence																				
If other, specify below																				
Other Outside Force Leaks																				
Vehicular Damage																				
External Loading Damage																				
Vandalism Damage																				
Pipe, Weld, or Joint Failure Leaks (specify cause below)																				
Equipment Malfunction Leaks																				
Below Ground Valves																				
Steel Compression Coupling failures																				
Regulator/Relief failure																				
Residential Regulator Failure																				
If other, specify below																				
Incorrect Operations Leaks (specify below)																				
Other Threats Leaks (specify below)																				
Excavation Damages (NOT Only Leaks)	Did not cause leak	Caused leak	Did not cause leak	Caused leak	Did not cause leak	Caused leak	Did not cause leak	Caused leak	Did not cause leak	Caused leak	Did not cause leak	Caused leak	Did not cause leak	Caused leak	Did not cause leak	Caused leak	Did not cause leak	Caused leak	Did not cause leak	Caused leak
Total Excavation Tickets																				
Crew or Contractor Damage																				
Third Party Damage																				
Blasting Damage																				
Concentrated Damage																				
Total Meter Set Fitting Leaks																				
Repaired by Tightening or Greasing																				
Repaired by Replacing Fitting																				
Total Number of EFVs Installed in the System																				
Total Number of Manual Shut Off Valves Installed in the System																				
Number of known system leaks at end of year sheduled for repair																				

Threat	Baseline
Corrosion Leaks	
Atmospheric	0
External	0
Internal	0
Natural Forces Leaks	
Icing of Regulator	0
Natural Disasters	0
Severe Weather	0
Soil Subsidence	0
If other, specify below	
	0
Other Outside Force Leaks	
Vehicular Damage	0
External Loading Damage	0
Vandalism Damage	0
Pipe, Weld, or Joint Failure Leaks (specify cause below)	
	0
	0
	0
Equipment Malfunction Leaks	
Below Ground Valves	0
Steel Compression Coupling failures	0
Regulator/Relief failure	0
Residential Regulator Failure	0
If other, specify below	
	0
Incorrect Operations Leaks (specify below)	
	0
Other Threats Leaks (specify below)	
	0
Excavation Damages (NOT Only Leaks)	
Total Excavation Tickets	0
Crew or Contractor Damage	0
Third Party Damage	0
Blasting Damage	0
Concentrated Damage	0
Total Meter Set Fitting Leaks	
Repaired by Tightening or Greasing	0
Repaired by Replacing Fitting	0

Threat Tracking

Mandatory Data

Number	Data Discription	Baseline	2018	Baseline Exceeded	2019	Baseline Exceeded	2020	Baseline Exceeded	2021	Baseline Exceeded	2022	Baseline Exceeded
1	Number of Hazardous Leaks Eliminated or Repaired, categorized by cause	See Threat table below										
2	Number of Excavation Damages											
3	Number of Excavation Tickets											
4	Number of leaks repaired, categorized by cause	See Threat table below										
5	Number of hazardous leaks repaired, categorized by material											
	Steel											
	Plastic											
6	Number of leaks caused by specific threats	See Threat table below										

Threats

All Leaks(Hazardous and Non-Hazardous) for Each Threat were used to calculate baseline

Risk Rank	Threat Discription	Baseline	2018	Baseline Exceeded	2019	Baseline Exceeded	2020	Baseline Exceeded	2021	Baseline Exceeded	2022	Baseline Exceeded
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												

DIMP Mapping

Details | Add | Edit | Basemap

About | Content | Legend

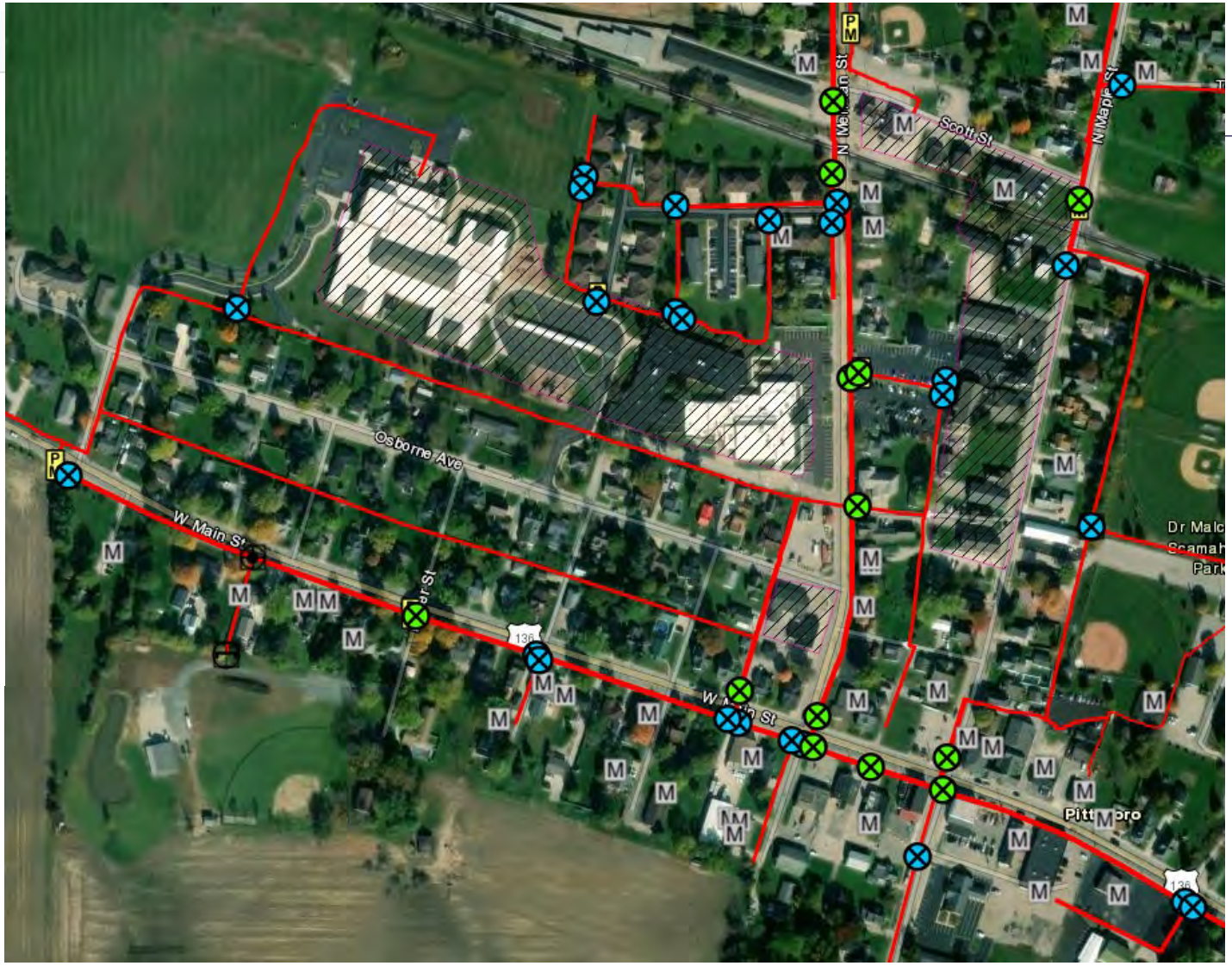
Legend

High Population Area

Known Pipe or Component Deficiency

Pipe and Component Information Unknown

Pipe and Component Information Known



Questions?


Asking
dumb questions
is easier than
correcting dumb
mistakes