Gas Transmission and Distribution Planning Manual

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Table of Contents

1. Introduction

The purpose of this planning manual is to provide guidance in identifying Transmission and Distribution (T&D) improvements to ensure safe, reliable, cost effective, natural gas service. This planning manual provides the foundation for Gas System Planning (GSP) engineers to:

- Objectively identify the need for T&D main and service improvements
- Serve as a guide to solution development
- Assist in prioritizing budget recommendations
- Maintain a consistent approach between operating companies

This planning manual facilitates the identification of developing problems and ensures that plans adequately address gas service requirements.

When performing studies on the New York jurisdictional transmission and distribution systems the New York Codes, Rules and Regulations (NYCRR) Part 255, United States Department of Transportation (USDOT's) Pipeline and Hazardous Materials Safety Administration (PHMSA), and NYSEG and RG&E's: Transmission Integrity Management Plan (IMP), Distribution Integrity Management Plan (DIMP) and Sections 1 – 11 of the Gas Operating and Maintenance Procedures Manual will be used as applicable.

These criteria will be utilized when performing planning studies on the Iberdrola USA (IUSA) transmission and distribution systems for New York State Electric & Gas (NYSEG) and Rochester Gas & Electric (RG&E).

The short-term T&D-planning horizon is based upon the time necessary to implement a solution, typically eighteen to twenty-four months. Since many solutions to T&D system problems require modification or additions to regulator stations and transmission/distribution lines, GSP will focus on a five-year planning horizon to ensure proper coordination with long lead time projects. In addition to the five-year planning horizon, a conceptual ten-year outlook and plan will be developed to guide overall improvements and gas distribution strategies. GSP uses a holistic approach to project planning to assess solutions when addressing a specific gas system issues. This approach to solution development includes review of the transmission/ distribution systems including gate and regulator stations, mains and system operation to provide adequate system pressure and flows. Some of the information that goes into solution develop includes: existing and future known loads, growth potential, current and predicted gas system pressures, system operations, asset condition and age. Multiple alternatives to system issues are developed as feasible in an effort to determine a cost effect, viable solution.

Failure to meet any one design criteria may justify the need for system improvement. Some criteria, such as those dealing with safety, require a more immediate response, and will take priority over other problems that may be deferred. GSP must evaluate each proposed project against the planning criteria and establish its priority.

Gas System Planning will perform an annual review of this manual and modify or amend as needed.

Gas Transmission and Distribution Planning Manual

This manual is broken down into the following subject areas:

- **Chapter 1 – Introduction**
  Provides an introduction to the need for and uses of this document.

- **Chapter 2 – Description of the IUSA Gas Transmission and Distribution System**
  Provides a description of the transmission and distribution system in each New York Operating Companies (Opcos) in IUSA, NYSEG and RG&E.

- **Chapter 3 – Tools**
  Provides a description of the tools available to assist in the transmission/distribution system analyses.

- **Chapter 4 – Gas Transmission and Distribution System Reliability Analysis**
  Provides definitions of system reliability criteria and solutions for improving system performance.

- **Chapter 5 – Gas Transmission and Distribution System Design Criteria**
  Provides acceptable equipment, load, and operating limits of the transmission and distribution systems.

- **Chapter 6 – IUSA Investment Categories**
  Provides the types of gas system capital projects by IUSA Investment Planning (IP) project investment categories.

- **Chapter 7- Project Prioritization Method for IUSA Gas Projects**
  Provides a definition of the methodology used to prioritize and recommend gas projects.

- **Chapter 8 – Capital Budget Process**
  Provides the current IUSA budget process and improvements to that process that are in progress.

2. Description of the IUSA New York Gas Transmission and Distribution Systems

NYSEG is an electric and gas delivery company located across New York State. NYSEG serves approximately 848,000 electric customers and 261,000 natural gas customers across more than 40% of New York as of 2012. NYSEG operates both transmission and distribution natural gas systems. Department of Transportation (DOT) transmission piping consists of three (3) NYSEG pipelines, commonly referred to as: Royalton, Arcadia and Seneca Interconnect lines. The Royalton and Arcadia gas transmission system's are supplied by Empire Pipeline, while Seneca Interconnect is supplied by Columbia Transmission. The 20.2 miles of NYSEG's DOT transmission gas mains are subject to the requirements of the Transmission Integrity Management Plan (IMP). Royalton and Arcadia, approximately 15.4 miles of transmission gas mains, were constructed in the early to mid 1990's. The Seneca Interconnect transmission main, approximately 4.8 miles, was completed in 2014. All transmission mains are cathodically protected steel construction and operate at 38.5% specified minimum yield strength (SMYS). Class location is primarily either Class 1 or Class 2 although all pipelines were designed and constructed to meet Class 3 requirements. Local natural gas production facilities also provide gas into the NYSEG distribution system.

RG&E is an electric and gas delivery company serving a nine-county region centered on the City of Rochester in Upstate New York. Customers served include approximately 600,000 electric customers and 303,000 natural gas customers as of 2012. RG&E operates both transmission and distribution natural gas systems. DOT transmission piping consists of seven RG&E pipelines referred to as the Certified Mains (CM) lines. RG&E's gas transmission system is supplied at three gate stations by Dominion and the Empire Pipeline. The 106 miles of DOT transmission gas mains are subject to the requirements of IMP. The 106 miles were constructed between the years of 1950 and 1992. They are of cathodically protected steel construction and operate between 21% and 38.5% SMYS. Class locations consist of Class 1, Class 2 or Class 3. No Class 4 locations are present in the Rochester and surrounding areas. All pipelines were designed and constructed to meet Class 3 requirements. Local natural gas production facilities also provide gas into the RG&E distribution system.

There is one existing interconnect between the two companies. This interconnect is located at the intersection of Canandaigua Road and Gananda Parkway at RG&E regulator station 485. The connection is between NYSEG's 45 psig Geneva system and RG&E's 60 psig Walworth system (DE60 R432 Walworth). RG&E feeds NYSEG at this location to reinforce low system operating pressures at this end of the NYSEG system.

The table below summarizes NYSEG and RG&E's gate and regulator stations and includes number of local production tap connections.

NYSEG and RG&E Summary of Stations and Local Production Gas Supply Points

	RG&E		NYSEG	
Description	Gate Station (POD)	Regulator Station	Gate Station (POD)	Regulator Station
DOT Transmission Outlet > 20% SMYS, >=125 PSIG	3	none	2	none
Non DOT Transmission Outlet < 20% SMYS, >=125 PSIG	0	3	19	18
Medium Pressure Stations Outlet < 125 PSIG > 60 PSIG	2	9	12	15
Low Pressure Stations Outlet <= 60 PSIG	5	285	31	462
Farm Taps	none	16	none	60
Local Producer	3	NA	2	NA

NYSEG - Summary of System Design by Operating Pressure as of 2013

Maximum Operating Pressure	Miles of Main
Low-Pressure (<=1 psig)	753.49
Medium Pressure – (2 psig to 15 psig)	160.89
Medium Pressure – (>15 psig and < 60 psig)	3,264.08
High Pressure – (>60 psig and <124.9 psig)	426.86
Non DOT Transmission* - (>125 psig)	144.27
DOT Transmission** (>125 psig)	15.4

RG&E - Summary of System Design by Operating Pressure as of 2013

Maximum Operating Pressure	Miles of Main
Low-Pressure (<=1 psig)	167.62
Medium Pressure – (2 psig to 15 psig)	1,133.60
Medium Pressure – (>15 psig and < 60 psig)	3,373.91
High Pressure – (>60 psig and <124.9 psig)	73.36
Non DOT Transmission* - (>125 psig)	150.18
DOT Transmission** (>125 psig)	106

*NYS Part 255 designates pipeline operating at greater than 125 psig be treated as if it were DOT pipeline.

** DOT transmission pipeline typically operates at any pressure that results in greater than 20% SMYS.

2.1 Definitions

2.1.1 Main – Gas pipeline located on a public or private right-of-way which is generally available or used to transport gas to more than one (1) service line.

2.1.2 Service Line – Piping, including associated metering and pressure reducing appurtenances, that transports gas below grade from a main to the first accessible fitting inside the wall of a customer's building when a meter is located within the building; if a meter is located at the outside of the building, the service line is deemed terminated at the outside of the building foundation wall.

2.1.3 Public Right-of-Way – The property limits of any street, avenue, road or other way (other than a limited access thoroughfare) that is for any highway purpose under the jurisdiction of the State of New York or the legislative body of any country, city, town or village and is open to the public use.

2.1.4 Transmission Pipeline - -means a pipeline, other than a gathering line, that (regardless of pressure):

(a) Transports gas from a gathering line or storage facility to a distribution center, storage facility, or large volume customer that is not downstream from a distribution center;

(b) Operates at a hoop stress of 20 percent or more of SMYS; or

(c) Transports gas within a storage field. A large volume customer may receive similar volumes of gas as a distribution center, and includes factories, power plants, and institutional users of gas.

2.1.4.1 NYS Code identifies that distribution pipelines operating at or above 125 psig maximum operating pressure be designed and operated in accordance with DOT transmission pipelines although they do not meet the Federal, Title 49 Part 192 definition of transmission pipeline.

2.1.5 Distribution Pipeline - Pipeline other than a gathering or transmission pipeline, operating up to and including 124.9 psig maximum operating pressure.

2.1.6 High Pressure Distribution System - A distribution system in which the gas pressure from the main must be reduced before delivery to a customer.

2.1.7 Low Pressure Distribution System - A distribution system in which the gas pressure in the main is substantially the same as the pressure provided to a customer, typically inches water column (WC).

2.1.8 Gate Station or Point of Delivery - Location where gas enters NYSEG's or RG&E's transmission systems from a supplier or shipper of natural gas.

2.1.9 Regulator Station - A pressure regulating device with a medium pressure outlet having more than ten residential gas customers or serving a combination of residential, commercial and industrial gas customers.

2.1.10 Farm Tap or Field Regulator - A pressure regulating device with a medium pressure outlet serving between two (2) and ten (10) residential gas customers. A farm tap or field regulator cannot serve commercial or industrial gas customers. A farm tap or field regulator is defined in NYSEG and RG&E Gas Operating and Maintenance Manual, Procedure 7.400 (Field Regulator Inspection).

2.1.11 Maximum Allowable Operating Pressure (MAOP) - The pressure a main is rated and designed to operate at. MAOP is defined as the maximum pressure a pipeline or segment of a pipeline may be operated as allowed by a successful pressure test.

2.1.12 Winter Set Point Pressure - The actual operating set point pressure of the regulator in the winter.

2.1.13 Summer Set Point Pressure - The actual operating set point pressure of the regulator in the summer.

2.1.14 Active Corrosion - Three main corrosion leaks of any combination of Type 1, 2A, 2 and 3 leaks occurring within a 500 foot pipe segment during a period of three consecutive years.

2.1.15 General Corrosion - Pitting so closely grouped as to affect the overall strength of the pipe.

2.1.16 Normal Operating Conditions - Normal conditions are present during "all pipelines and equipment in" periods meaning that pipelines and associated facilities working in normal operating conditions. Normal conditions include extremes of customer loads, scheduled low pressure conditions, peak shaving and "not dispatched" conditions. While this condition may not be the most common in terms of operating time, it serves as a benchmark which to measure other conditions.

2.1.17 Abnormal Operating Conditions - Federal Title 49 Part 192.605 & 195.402 define Abnormal Operating Conditions (AOC) as, "A condition identified by the operator that may indicate a malfunction of a component or deviation from normal operations that may indicate a condition exceeding design limits, or result in a hazard to persons, property or the environment." An AOC is the result of performing a task and not the reason the task is being performed. The following terms describe abnormal operating conditions:

1**. Over Pressure** – pressure that exceeds the MAOP of the gas system.

2. **Inadequate Pressure** – pressure that falls below the normal operating requirements of the gas system.

3. **Unintentional Ignition** – the uncontrolled ignition of gas.

4. **Explosion** – the rapid uncontrolled ignition of natural gas.

5. **Component Failure** – failure of a component of the pipeline to perform in the manner for which it was designed.

6. **Damage to Facility –** any damage to a pipeline component.

7. **Improper Odorization –** excessive or inadequate odorization of a gas system.

8. **Escaping/Blowing Gas –** any unplanned, uncontrolled escape of gas.

2.1.18 Non-Heating Season Load - NYSEG's and RG&E's transmission and distribution systems are designed to perform with process related, or non-heat related, loads from commercial and industrial customers. These loads are not dependent on cold weather and are referred to as base loads. Moderate temperature areas with strong base loads – large industries using consistent quantities of gas for instance – have minimal seasonal fluctuations in gas usage.

2.1.19 Heating Season Load - Heating season load is applied during the fall, winter, and spring months to residential and/or commercial and industrial customers during cold weather. In areas with severe winters and a predominance of space heating, seasonal fluctuations in gas loads are significant.

NYSEG's tariff does account for interruptible service rates in some divisions. Commercial and industrial customers that utilize these rates may be required to use an alternate fuel during times of peak system use. Distribution mains with excess capacity can be filled or "packed" during low demands for use during peak hours. Companies with access to gas storage facilities can draw gas from storage to help supplement the system. All of these alternatives along with weather forecasts require close attention by Gas Control personnel during times of peak usage.

2.1.20 Location Class - an onshore area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. Class location units are categorized as Class 1 through 4. Class 1 locations are more rural, and Class 4 locations are more urban.

2.1.21 Pipeline - all parts of physical facilities through which gas moves in transportation, including pipe, valves, fittings, flanges (including bolting and gaskets), regulators, pressure vessels, pulsation dampeners, relief valves, and other appurtenances attached to pipe, compressor units, metering stations, regulator stations, and fabricated assemblies. Included within this definition are gas transmission and gathering lines, transporting gas from production facilities to onshore locations and gas storage equipment of the closed pipe type, which is fabricated or forged from pipe or fabricated from pipe and fittings.

2.1.22 Pipeline Facility - means new and existing pipelines, rights-of-way, and any equipment, facility, or building used in the transportation of gas or in the treatment of gas during the course of transportation.

2.1.23 Specified Minimum Yield Strength (SMYS) - expressed in pounds per square inch, is the minimum yield strength of the steel in pipe as required by the pipe product specifications.

2.1.23.1 SMYS - means specified minimum yield strength is:

(1) For steel pipe manufactured in accordance with a listed specification, the yield strength specified as a minimum in that specification; or

(2) For steel pipe manufactured in accordance with an unknown or unlisted specification, the yield strength determined in accordance with 255.107(b) or § 192.107(b).

2.1.24 Transmission System - one or more segments of pipeline usually interconnected to form a network, which transports gas from a gathering system, the outlet of a gas processing plant, or a storage field to a high- or low-pressure distribution system, a large-volume customer, or another storage field.

2.1.25 Heating Degree Day (HDD) – HDD is a measurement designed to reflect the demand for energy needed to heat a building. It is derived from measurements of outside air temperature. It is the number of degrees that a day's average temperature is below 65^{o} Fahrenheit, the temperature below which buildings need to be heated. To calculate HDD, take the average of a day's high and low temperatures and subtract from 65. If the value is less than or equal to zero, that day has zero HDD. But if the value is positive, that number represents the number of HDD on that day. For example, if the day's average temperature is 50^{o} F, its HDD is 15.

3. Tools

3.1 SynerGEE

SynerGEE is a transmission and distribution system hydraulic modeling tool, part of Stoner Software, which is widely used by utilities for simulations. It models gas parameters on transmission and distribution networks and allows the engineer to simulate existing or future conditions and predict the effect of changes. This is the principal analytical tool utilized at NYSEG and RG&E for system safety, reliability and improvements or changes to system conditions due to maintenance and emergency situations.

NYSEG has been performing network analysis with SynerGEE since 1994 while RG&E began in 2009. SynerGEE offers integration of data and reference layer with the Geographic Information System (GIS), an enhanced graphical user interface, seamless integration from transmission to low pressure distribution and regulator station modeling/capacity monitoring. Models are created using data from the companies' GIS systems, SAP Customer Care and Service (CCS) systems (billing), weather and regulator station databases. The integration of the systems utilizes Stoner software modules named Model Builder and the Customer Management Module (CMM). Updated information on piping, services, valves, regulator stations and customers is transferred to these models, and stored in the GIS and SynerGEE.

The HDD for each region is coordinated with the Gas Supply Department for consistency between Gas Supply plans and engineering simulations. Utilizing a set of design criteria as guidelines for recommendations, as discussed later in Section 5 of this manual, the models provide information on potential problematic areas of inadequate pressure or limited regulator capacity at design peak conditions across the transmission and distribution systems. Recommendations for corrective action are organized into projects and forwarded to Gas Delivery Engineering for design and construction implementation.

The input data files from GIS are imported into the SynerGEE software and combined with equipment database information to create a model representing the network to be studied. The software includes a regression analysis of load data which allows input of data taken from metering points and any other points available and distributes MSCFH (Thousand Standard Cubic Feet per Hour) for each load point which will let the network analysis results match the metered data. Five years worth of data are taken to identify any outlier year for data integrity. The result is a complete network model that can simulate peak loading conditions for any time of year.

The SynerGEE models will be updated and verified on an annual basis. Depending on the area and region within New York State, Gas System Planning's design peak temperature ranges from 70 to 85 Heating Degree Day (HDD). The following Design Day HDD criterion are used:-

- Plattsburgh = 85 HDD
- Lowville (Part of Norwich system) = 85 HDD
- Binghamton Area = 75 HDD
- Rochester (RG&E) Area = 75 HDD
- Lockport Area = 75 HDD

- Walden/Goshen/Brewster = 70 HDD
- Auburn and Geneva = 75 HDD

Gas System Planning is responsible for annually building and maintaining the SynerGEE hydraulic models in accordance with Gas Operating and Maintenance Manual Procedure 8.650 (Map and Record Maintenance). Models for each division will be built, tested and validated against a representative day from the previous winter season. Once the model is verified to acceptable tolerances (generally 10% for system pressures and flows), it will be adjusted to an equivalent HDD as listed above.

SynerGEE is used in transmission and distribution planning to evaluate the following:

- Minimum and maximum total load values, load-pressure situations and test potential solutions
- Gate and regulator station and pipeline capacity
- Facilitate load balancing and system constraint analysis
- Effects of large load additions or changes
- Alternative proposals for system expansion or upgrades
- Support provided to Gas Operations and Gas Supply for planned maintenance work
- Support Gas Operations and Gas Supply for emergency situations
- Maintain adequate system pressure

3.2 Customer Management Module (CMM)

Input data for SynerGEE analysis is provided by the Customer Management Module. This application takes data from the GIS system, SAP, and other data sources and produces customer data files in a SynerGEE compatible format.

3.3 GIS Network Data

This supplies the physical layout and connectivity of the network elements. It includes all major customer loads on nodes, the length and construction characteristics of the connecting pipe segments where equivalent loads are placed and the location of services, valves, regulator stations and customers. When information is available it also includes sizes/settings of these facilities.

3.4 Load Data

This provides load on all appropriate pipe elements and nodes. For telemetered customers with (daily) demand metering, actual demand values are supplied on the nodes. For the remaining customers, the extract application estimates un-diversified demand load by applying appropriate factors to the MSCFH usage values. At present, choices for demand include summer and winter peak estimates. Predictive studies use total connected load for commercial and industrial customers and may allow 80% diversity for residential customers.

3.5 Regulator Station Analysis (RSA)

RSA is a stand alone SynerGEE module for transmission and distribution regulator station sizing. RSA calculates the relief capacity of the regulator station for over pressure protection and the regulator capacity under peak loading conditions. The relief device is sized to have

sufficient relief capacity for a single regulator failure. Gas System Planning performs station analysis utilizing RSA. Over pressure protection devices have a maximum set pressure in accordance with Gas Operating and Maintenance Manual Procedure 7.450 (District Regulator Inspection).

3.6 GasCalc

GasCalc is a modeling tool for sizing mains and services. Gas System Planning and Gas Design & Delivery use this tool to confirm main extensions sizes and service sizes. It takes into account the loads and pressures of the pipe or regulator to size them appropriately. GasCalc assists in the designing of main and service pipe sizes, regulator size, and estimated pressure drop in the transmission and distribution systems.

3.7 Regulator Operational Database (REGOP)

Gas System Planning created the REGOP, a Microsoft Access database of all gate stations, regulator station and farm taps equipment and operating parameters including: MAOP, systems, set point pressures, etc. REGOP was created for and used by RG&E since 2003 and created for and used by NYSEG since 2013. Gas System Planning prioritizes regulator station work for both Opco's utilizing a Health Index Methodology created in REGOP.

3.8 Area Isolation Module (AIM)

AIM is a SynerGEE module for valve sectionalizing and area isolation in the event of an emergency or planned maintenance work. AIM may be implemented and used in the future to assist with determining valve sections.

3.9 Vendor Equipment Sizing Software

This is software utilized for sizing regulator station equipment.

3.10 Telog Remote Terminal Units

Gas System Planning, in conjunction with Gas Technical Services Research and Development (R&D), implemented a project in 2014 to install approximately 200 Telog Remote Terminal Units (RTU). Each self-contained unit consists of a pressure transducer, cellular modem, and lithium ion battery. The units continually record pressure, and transmit the data to a secured server daily. Additionally, each unit was programmed with site specific alarming conditions that are generally directed to GFO Gas Supervisors.

Gas System Planning strategy located these units throughout the gas systems to monitor and collect pressure data for hydraulic model verification, calibration, system improvement planning and to reconcile predicted pressures with actual pressure for new growth/load.

4. IUSA Gas Transmission and Distribution System Reliability Analysis

The transmission and distribution systems may be susceptible to facilities being removed from service due to any of the ASME B31.8S threat categories listed in Table 1 or for maintenance due to growth, emergency, and asset condition issues such as aging of facilities and equipment. Overall asset condition may increase or decrease the potential for these types of failures while good asset condition reduces the potential risk. Therefore, asset condition is considered as part of all proposed solutions and resultant projects. Transmission and distribution system reliability analysis considers the age and condition of assets and identifies replacements and reinforcements that will allow the transmission and distribution systems to operate under normal operating conditions during non-heating and heating seasonal loads. In addition, system reliability analyses are performed for emergency situations and planned maintenance conditions at reduced load levels.

	ASME B31.8S-2001 Threat Categories
	(a) Time Dependent
1	(1) External Corrosion
2	(2) Internal Corrosion
3	(3) Stress Corrosion Cracking
	(b) Static or Resident
4	(1) Manufacturing Related Defects • Defective Pipe Seam • Defective Pipe
5	(2) Welding / Fabrication Related • Defective Pipe Girth Weld • Defective Fabrication Weld • Wrinkle Bend or Buckle • Stripped Threads / Broken Pipe / Coupling Failure
6	(3) Equipment Failures • Gasket O-ring failure • Control / Relief Equipment Malfunction • Seal / Pump Packing Failure • Miscellaneous
	(c) Time Independent
7	(1) Third Party / Mechanical Damage • Damage by 1st, 2nd,or 3rd Parties • Previously Damaged Pipe • Vandalism
8	(2) Incorrect Operations – Human Error • Incorrect Operations
9	(3) Weather Related and Outside Force • Cold Weather • Lightning • Heavy Rains or Floods • Earth Movements

Table 1 – ASME Threat Categories

4.1 Maintain Adequate System Pressures

Gas System Planning provides high-low pressure data for residential, commercial and industrial new loads. The Commercial & Industrial (C&I) metering group utilizes this information for sizing the meters and regulators of C&I customers.

For proposed system pressure changes Gas System Planning provides proposed new pressure data to C&I group for verification purposes, such as for system upgrading or downrating of MAOP.

Gas System Planning provides guidance (winter and summer set point pressures) to Gas Control and Gas Operations in order to maintain adequate system pressures from the Gate Station/Point of Delivery (POD) to the customers' meters in accordance with Section 5 of this manual. Actual system pressures, when available from SCADA, endpoint recorders, charts and temporary field recorders, are used to verify the SynerGEE models and are compared to actual conditions.

Gas System Planning reviews information from Corrosion Engineering, highway projects (municipalities), Gas Field Operations, and new loads for potential system impacts and opportunities to make system capacity improvements.

When appropriate, Gas System Planning will look at low pressure systems for conversion to medium pressure system thereby eliminating operations and maintenance costs of some regulator stations and improving overall system reliability and pressures.

Infrastructure and growth projects are developed by Gas System Planning with input from Gas Design & Delivery and Gas Field Operations to restore operating pressures to 70% of MAOP in areas of gas load growth. Gas systems that operate at less than 70% of MAOP on the design day have limited capacity to serve new gas load. Systems that may operate at less than 50% of MAOP are considered for reinforcement regardless of new load growth to achieve 70% operating pressure on the design day. New customers that adversely impact gas pressure and ability to serve other customers may be responsible for the cost of system infrastructure improvements required as discussed in Section 6 of this manual.

Gas System Planning performs an annual review of minimum pressures on each system and monitors the changes for trends and evidence of demand growth.. This is essential in the development and prioritization of infrastructure projects.

4.2 Maximum Allowable Operating Pressure (MAOP)

MAOP is the safest operating pressure for which the pipeline or system shall operate in order to meet customer demands. MAOP is also the safest operating pressure at which the gas mains, services and station equipment are designed for. MAOP records are verified and maintained in Gas System Planning as detailed in the NYSEG/RG&E Operating and Maintenance Manual, Procedure 6.200 (Upgrading/Conversions).

4.3 Over Pressure Protection

Over pressure protection devices are sized and installed to maintain downstream pipeline system

integrity and safety. Relief valves or monitor regulators are utilized and tested annually by Gas Field Operations to determine if they are in proper working condition. If they are not in proper working condition or found improperly sized for current system operations, Gas System Planning makes recommendations for replacement. Gas System Planning also annually reviews over pressure protection devices for sufficient over pressure capacity in accordance with NYSEG/RG&E Operating and Maintenance Manual, Procedure 6.200 (Maintaining MAOP).

4.4 Monitoring and Controlling System Pressures and Flows

Along with MAOP and set point pressures, Gas System Planning provides predicted pipeline capacities and gate/regulator station flows and pressures to Gas Control and Gas Supply. This information is supplied for operations and maintenance activities on NYSEG and RG&E systems as well as requests by others to temporarily modify our operations while maintaining system reliability, load balance and system supply operating constraints.

4.5 System Looping

Gas System Planning will analyze systems and mains for looping in order to improve system reliability, future capacity and growth where necessary. Larger systems should have adequate large diameter pipe referred to as feeder mains or beltlines. Feeder mains and beltlines are medium pressure mains above 60 psig and less than 125 psig. Existing large dead end systems or large dead end portions of system will be analyzed for elimination or reinforcement when economically viable. Multiple feed systems are preferred to single feed systems, meaning more than one regulator and/or gate station should feed a system for reliability. If feasible, smaller systems will have looping at the street level to provide reliability. Eliminating dead end systems by looping mains also improves the overall odorant levels and allows Gas Operations and Gas Control the ability for flow shifting between regulator stations to improve odorant levels during low flow conditions.

4.6 Redundancy

All gate stations shall have dual regulator runs designed for full capacity on each run. This will provide Gas Operations redundancy in the event of an emergency or planned routine maintenance. All new district regulator stations shall have dual regulator runs. Farm taps will have single run capacity for two to ten residential customers; a bypass should be considered for maintenance and reliability purposes. If greater than ten residential customers or any commercial/industrial customer is anticipated in the future, then a district regulator station shall be constructed. Gate station and regulator station design are in accordance with IUSA construction standards.

4.7 Station Reliability

Heaters: Gate Stations or Points of Delivery (PODs) and regulator stations will have gas heating equipment installed to prevent regulator and tubing freeze ups. In line heating equipment shall be installed for pressure drops across regulating equipment greater than 300 psig. For pressure drops less than 300 psig, regulator pilot heaters may be sufficient. The industry standard for outlet gas temperature is 40 degrees Fahrenheit.

Filtration: Filters or strainers are installed at all gate stations and district regulating stations to remove dirt, debris and liquids that may be present in the mains.

Back-up Generator: Installed at all critical Gate Stations or Points of Delivery to maintain reliable delivery of gas to downstream systems.

4.8 Integrity Management

Gas Technical Services (Corrosion Engineering) will provide information and recommendations regarding transmission and distribution pipeline system asset condition and risk to Gas System Planning based upon IMP and DIMP data analysis. Gas System Planning will then propose replacements and system improvements that incorporate this information from Corrosion Engineering. Corrosion projects may involve replacements of equipment in the statutory and asset condition project categories described in Section 6 of this manual.

4.9 Odorization

Gas System Planning sizes odorization equipment for expected design day hourly flow conditions and for total annual flow. Odorizers shall be dual pump to maintain safety and system integrity.

Gas System Planning provides guidance to Gas Operations for sniff test locations as requested. Gas System Planning will utilize the SynerGEE models to identify endpoint locations and points of no flow that may require verification by Gas Field Operations for adequate odorant levels. Odorization is performed in accordance with NYSEG/RG&E Operating and Maintenance Manual, Procedure 8.200 (Odorization of Gas).

4.10 System Constraint Analysis

Natural gas T&D systems experience restrictions in pressure, flow and capacity induced by physical, contractual and operational limitations. These limitations are referred to as system constraints. Gas System Planning utilizes the SynerGEE hydraulic models to simulate and determine system constraints. Supply and system capacity constraint studies particularly benefit Gas Supply and Gas Control in the day-to-day nomination and operation of the gas systems.

5. Gas Transmission and Distribution System Design Criteria

5.1 System Pressures and Flows

For system modeling criteria and when to request a hydraulic analysis from Gas System Planning please see Appendix 1. Appendix 1 explains what hydraulic design parameters and conditions are applied. Appendix 1 also explains how and when Gas Design & Delivery, Gas Supply and Operations should request hydraulic studies or system pressure and flow verification from Gas System Planning including what information should be supplied with the study request.

The decision to upgrade or bring medium pressure into an area currently served by low pressure is based on the following criteria:

- System integrity and asset condition including cathodic protection status and history;
- Regulator stations having poor equipment performance due to low flows and condition of regulator station and associated equipment;
- Mitigation of dead ends in low pressure system(s);
- Not creating isolations in multi-feed system(s);
- Operations and maintenance (O&M) costs of upgrading versus capital cost of replacement.

If portions of a low pressure are replaced, priority is given to bringing medium pressure to the area. Medium pressure may be provided by replacing the existing low pressure mains with new medium pressure mains. If a portion of the existing mains in the low pressure system can be uprated to medium pressure, this may also be undertaken as part of the project. The work associated with system upgrading is an O&M cost. If low pressure is replaced with low pressure, consideration and design conditions will facilitate future upgrading to medium pressure. Upgrades are performed in accordance with NYSEG/RG&E Operating and Maintenance Manual, Procedures 6.150 (Low and Medium Pressure Upgrades) and 6.175 (High Pressure Upgrades).

Gas System Planning annually tracks gas system end points in the hydraulic models. Trending this information allows system planning to monitor the impacts of system improvements, growth, and capacity. This information is compared to existing end point monitoring field devices including chart recorders, electronic recorders and Telog RTU's.

Gas System Planning uses this data/information to recommend future reinforcements and provide high-low pressure data for residential and commercial-industrial meter sets. Gas System Planning also uses temporary end point chart or electronic recorders for emergency or future planning purposes to verify actual operating pressures in comparison to SynerGEE predicted system pressures.

5.2 Pipeline Design

- Steel pipelines are designed to Class 3 requirements for Class 1, 2 or 3 locations as a conservative measure to minimize operational risk in accordance with NYSEG and RG&E construction standard 32.01 and 16NYSCRR 255.5. When designed as such, changes in Class location due to increases in population will not require rework due to insufficient design factors.

- Additional considerations for pipeline design are:
  - Flange class suitable for the MAOP, and
  - Design temperature for pipeline gas 40-100 degrees F.
- See also Appendix 1

5.3 Station Capacity

- Regulators are sized to meet demand plus a minimum 20% or expected growth, whichever is greater. Gas System Planning designs the regulation stations to handle current load and predicted future growth for proper sizing and efficient operation of the stations. Stations are designed to handle concurrent demand and ensure operating in the best range of pressure, e.g. reduced regulator cage size now for current load with ability to increase cage size in the future to accommodate load growth.
- Load growth potential is evaluated by information as available:
  New subdivisions
  New C&I load requests
  Marketing department input

5.4 Equipment Selection and Sizing

- All equipment shall be sized for winter peak hour conditions, and equipment shall be designed for adequate performance during summer conditions
- Generally, regulators are sized to operate within 20% - 80% of its maximum capacity. Optimum regulator size is approximately 50 % of capacity range for new stations. The regulators can operate in the 20 - 80% capacity range, but 50% provides the best operation of the regulator. If the regulator serves an area of growth, the regulator will be sized at the lower end of the new capacity to provide room for that load growth. In areas of limited growth, the regulator will be sized in the 50% - 80% capacity range.
- Regulators and station piping will be designed to minimize pressure drop from inlet to outlet.
- Stations will be designed to minimize noise. The noise guideline is less than 85 dbA:
  - To minimize noise impacts the first option is in the regulator selection itself. Thicker wall pipes, acoustical insulation wrap for pipes, or installation underground and acoustical walls in the regulator building are options to reduce noise impacts. Landscaping and fencing are also considered for gate and regulator station designs.
- Minimize pipeline velocity:
  - Stations will be designed to minimize the velocity of gas through the station piping and equipment. Generally, lower velocities reduce the risk of pipe wear and turbulence for control line connections resulting in better control readings and operations, and reduced noise. The design velocity guideline is 100 feet/second in ideal situations but not to exceed a maximum of 150 feet/second.
- Standardized regulators to minimize spare parts inventory, improve training and IUSA station reliability
  - Mooney, Grove, and Pietro regulators are the current design standard for regulators.

- Filtration is installed at stations to protect pipeline and system integrity. Gas Field Operations (GFOs) input is solicited by Gas System Planning to assist in determining strainer and filter needs based on GFOs's experience with debris and liquids in the gas mains.
    - Strainers are installed at stations with inlet pressures greater than 60 psig. Typically these stations are fed by transmission mains which experience less construction than distribution mains. Less construction results in less debris potential. Strainers do not typically capture materials as small as filters, but capture larger debris. Standard strainer mesh is 40.
    - Strainers or filters are installed at stations with inlet pressures from 15-60 psig.
    - Filters are installed for all low pressure systems.
- NYSEG and RG&E provide odorization at Gate Stations and PODs to meet distribution odorization level requirements. Standard odorizers include:
    - YZ System for large volume stations,
    - Zeck for low volume stations,
    - Wick or By-pass type odorizer for very low volume stations such as farm taps/field regulators, and
    - Odorant tanks are sized based on annual station gas flow volume.
- Heater equipment is installed at stations based on inlet pressures and flow. Joules-Thompson effect is 7 degrees drop in gas temperature for every 100 psig reduction in gas pressure.
    - In line heating equipment should be installed for pressure drops across regulating equipment greater than 300 psig. For pressure drops less than 300 psig, regulator pilot heaters may be sufficient. A pilot heater is a small heater unit that heats the inlet supply gas to the regulator pilot. The regulator pilot controls the main body of the regulator.
    - Stations are also designed to Electrical Classification, Class 1 Div 2 requirements.

5.5 Modernization/Automation

Automation includes four general items: remotely operated valves; gate and regulator station remote operation control and monitoring; gas system endpoint monitoring; and SCADA system hardware and software. Remote operation valves (ROVs) will be selectively installed on both transmission and distribution systems to provide quick emergency response for system hardening without the need for dispatch of field personnel. Gate and regulator station automation includes some research and development projects for new use of technology and existing technology for remote of operations of the stations and trouble shooting, reducing field personnel callouts and improving response times. RTUs and endpoint monitoring devices provide live system operation information to better respond to system conditions and improve the quality and calibration of the hydraulic models of the system. SCADA is the remote operating system used by the Energy Control Center to monitor and operate the transmission and distribution systems.

Gas System Planning obtains input from Gas Field Operations and Gas Control to develop the concept layout and recommendation of SCADA equipment and locations.

5.6 Normal Operating Pressures

The pressures associated with transmission pipelines range between 125 psig and 1,440 psig MAOP at the supplier. The NYSEG and RG&E transmission pipelines operate at MAOPs up to 1,100 psig.

The company gas distribution systems consist of networks of piping that carry the gas from various sources of supply; e.g. transmission pipelines or gas storage facilities to the customers. The pressure ranges associated with distribution pipelines are 8 inches water column up to and including 124.9 psig MAOP at both RG&E and NYSEG.

5.7 Mains and Services

The gas main sizes for NYSEG and RG&E transmission systems and distribution pipelines operating at greater than 125 psig range from 6 inches (") to 30" in diameter and distribution systems range from 1" to 20". NYSEG and RG&E use steel pipe for transmission and distribution pipelines operating at greater than 125 psig. Steel and plastic mains or services are designed in accordance with NYSEG/RG&E Construction Standards & Installation Manual Sections:

- 32.01 Steel Pipe Design
- 32.05 Handling Steel Pipe
- 32.06 Handling Plastic Pipe
- 32.10 Paralleling High Voltage Transmission Lines

All new steel transmissions pipelines and distribution pipelines operating at greater than 125 psig pipelines are cathodically protected. Existing steel distribution mains may be cast iron (RG&E only), bare steel - unprotected, bare steel - cathodically protected, wrapped steel - unprotected, wrapped steel - cathodically protected or polyethylene (PE). New installations of pipeline shall be of steel or PE suitable for the MAOP of the system.

Both companies replace a minimum of 24 miles of leak prone mains annually as required by rate cases 09-G-0716 (NYSEG) and 09-G-0718 (RG&E). NYSEG replaces a minimum of 1,200 leak prone services annually and RG&E replaces a minimum of 1,000 leak prone services annually. Both leak prone services replacement programs are also required by the respective rate cases. Leak prone is defined in Appendix 3.

For distribution systems, Medium Density Polyethylene (MDPE) plastic pipe is used for mains and services operating at pressures less than 60 psig. High Density Polyethylene (HDPE) is used for mains operating at pressure between 60 psig and 124 psig. This is in accordance with NYSEG/RG&E Operating and Maintenance Manual, Procedure 6.125 (MAOP for Steel and Plastic Pipelines). Steel pipe may be used for bridge, highway crossings and for projects using pipe sizes greater than and equal to 12". Steel pipe is more economical than MDPE in 12" diameter and larger piping for medium pressure installations.

5.8 Valve Sectionalizing

Critical valves are defined in NYSEG/RG&E Operating and Maintenance Manual, Procedure 7.500 (Transmission and Critical Valve Inspection). The condition and functionality of critical valves is important to the integrity and operation of the gas distribution system in particular for emergency shutdown of a section of the system. Gas System Planning supports Gas Division

Engineering and Gas Division Operations in determining which valves are critical to meet section 4.4.2 of Procedure 7.500. GIS and SynerGEE models are used to assist in determining customer counts and functionality of the gas distribution system with the critical valves.

5.9 Regulators

When gas is transferred from the supply company transmission lines operating up to 1,440 psig MAOP to company distribution systems, pressure reductions are made at the Gate Stations or PODs. Whenever gas is fed from a network operated at a higher pressure to one operated at a lower pressure, a pressure regulator station is installed between the two systems to perform the pressure reduction. The pressure at the station outlet is a preset constant value, and may be remotely controlled. Design of regulator and gate stations and their associated equipment is detailed in the new NYSEG/RG&E Construction Standards & Installation Manual, Sections 50 (Distribution Regulator Stations) and 55 (Gate Stations).

The decision for installing a farm tap/field regulator station or district regulator station is made after consulting Marketing, Gas Field Operations and Gas Design & Delivery. If a commercial customer may be served or if future load growth indicates a potential for more than 10 residential customers, then a district regulator station must be constructed. All distribution regulator stations are or will be dual run when replaced and each regulator is sized to handle the entire anticipated load as discussed in Section 5.4 of this manual.

The station inlet and outlet pressure information is required to properly size the regulator equipment. Minimum inlet pressure to the station is required for sizing the regulators to satisfy the peak hourly demand. Maximum inlet pressure is used to determine the required class of flanges and regulators and for sizing of the over pressure protection equipment. The maximum inlet pressure is the inlet system's MAOP. The outlet pressure (regulator set point) of a station is determined by the operational requirements of the downstream facilities and downstream system demand. The specifications indicate the winter and summer set point pressures.

The regulator sense (control) lines are located a minimum of eight to ten pipe diameters downstream of the regulator and a minimum of twelve inches upstream of any geometric pipe changes (i.e. reducers, elbows, non full port ball valves) that may create turbulence. The regulator sense (control) lines are protected from anticipated causes of damage and are designed and installed to prevent damage to any sense (control) line from making both the regulator and the over pressure device inoperative. Each regulator has a sense (control) line and tap. All pilot and diaphragm vents are installed to prevent blockage. The regulator sense (control) lines are installed between the regulator and downstream block valve to determine regulator performance and obtain a regulator lock-up during the annual regulator station inspection.

5.10 Over Pressure Protection

Per Rules and Regulations of the State of New York (NYCRR) the following are the criteria for over pressure protection.

The relief device is installed a minimum of 50 feet from the regulator device in accordance with Rules and Regulations of the State of New York (NYCRR) section 255-199 (b) 1.

Regulator stations placed in service prior to June 1st, 1989, were not required to have the relief device or monitor regulator separated (50 feet spacing). In many cases they are likely to be in the same building, vault or fenced area as the control regulator. If the station was installed and placed in service after June 1st, 1989, the relief device or monitor regulator must remain separated (50 feet or 25 feet if a PSC Waiver was originally obtained) during a rebuild.

SET PRESSURES FOR OVER PRESSURE PROTECTION DEVICES

Operating Range	**Maximum Over Pressure Protection Set Pressure**
MAOP 4 to 14 inches WC	1 PSIG / 28 inches WC*
MAOP 0.5 PSIG to 12 PSIG	MAOP Plus 50%*
MAOP over 12 PSIG but less than 60	MAOP Plus 6 PSIG*
MAOP over 60 PSIG	MAOP Plus 10%*

*Unless network analysis indicates a lower over pressure setting is required. SynerGEE Regulator Station Analysis (RSA) calculates the relief setting for over pressure protection devices in accordance with Gas Operating and Maintenance Manual Procedures. All distribution and field regulator stations have a relief capacity ratio (ratio of total relief capacity and total MAOP capacity) greater than 1. For low pressure distribution stations less than or equal to 1 psig, the maximum relief setting is 1 psig and maximum calculated emergency pressure is less than 1.5 psig and not exceed 2 psig.

The relief device is sized to have sufficient relief capacity for a single regulator failure. Gas System Planning performs station analysis utilizing RSA software. Additional software such as GasCalc and manufacturer specific software is also utilized for sizing the regulators.

5.11 Relief Valves

Relief valves are designed primarily to provide over pressure protection at outlets of regulators. The purpose of relief valves is to prevent over-pressuring the downstream system in the event the regulator fails open. If the pressure of gas in the line exceeds the setting on the relief valve, the relief valve opens and will vent gas to the atmosphere. When the pressure returns to the set point of the relief valve the valve closes.

All isolation valves installed ahead of a relief valve are locked in the open position.

5.12 Monitor Regulators

Monitor regulators are another over pressure protection device, located inline either upstream or downstream of the working regulator. The monitor takes over the pressure reduction if the working regulator fails. The monitor regulator will comply with the set pressure for over pressure protection. A monitor/working regulator arrangement is not required to have RSA analysis performed for capacity ratio. However, monitor regulators must be sized to handle the

demand design capacity. In the case of working regulator failure, the monitor regulator will take over set pressure slightly higher than the working regulator within code requirements and must be sized to handle the peak hour demand. RSA uses a factor of 0.70 (70%) to adjust for the reduced capacity. Sense lines will be designed the same as mentioned previously in the regulator section. Additional real estate space may be required to accommodate the monitor set design and installation.

5.13 Monitor Regulators with Relief Valves

This kind of regulator station is a combination of working regulator and monitor regulator installed close together with a relief valve installed 50 feet away from the working regulator/monitor regulator in accordance with PSC requirements. The relief valve and monitor regulator are sized for sufficient capacity for over pressure protection in accordance with NYSEG/RG&E Construction Standards & Installation Manual Sections 50 District Regulator Stations and 55 Gate Stations. The benefit of this arrangement is that monitor regulator will act as a primary over pressure protection device eliminating venting of gas to the atmosphere from the relief device. This supports the EPA's STAR program and Greenhouse Gas Emissions Prevention.

The typical practice in RG&E and NYSEG is to put this kind of arrangement in large regulator stations. However, a typical installation in small and medium stations is a working regulator with a relief device, monitor or valve. Typically small/medium regulator stations are less than 500 mscfh and larger regulator stations are more than 500 mscfh.

5.14 Odorization

All gas transported in NYSEG and RG&E transmission and distribution mains shall be adequately odorized to render it readily detectable by the public and employees of the operator at all gas concentrations of one tenth of the Lower Explosive Limit (LEL) and above in accordance with Rules and Regulations of the State of New York (NYCRR) section 255-625 (b). One tenth of the LEL is equal to 0.5 percent gas in air. The odorant is not deleterious to persons, materials, or pipe. The products of combustion from the odorant are not toxic when breathed nor corrosive or harmful to those materials to which the products of combustion will be exposed. The odorant is not soluble in water to an extent greater than 2.5 parts to 100 parts by weight. The odorant is a mercaptan blend for liquid injection equipment. Odorization is performed in accordance with NYSEG/RG&E Operations and Maintenance Manual, Procedure 8.200 (Odorization of Gas).

At the Point of Delivery (POD) or Gate Station, gas is odorized because the gas delivered by the supply company is only to interstate transmission required levels. For public safety, Local Distribution Companies (LDCs) are required to odorize gas at delivery levels. Gas System Planning will size the odorization equipment in accordance to Regulations of the State of New York (NYCRR) section 255-625 (b) for the design day flow condition.

Gas System Planning is also involved in supporting evaluation and design of supplemental odorization of weekly odorized areas and supporting Gas Operations with any odor fade issues. Gas System Planning also supports Gas Design & Delivery for installation and odorization of new significant lengths of pipes and large diameter of pipes greater than a mile and greater than 6". Currently, Gas Technical Institute (GTI) is developing guidelines for odor fade and pickling

of new pipeline installation issues. In the future, these guidelines may be incorporated as part of NYSEG and RG&E procedures.

5.15 Heaters

The incoming gas from suppliers is usually heated at the PODs or gate stations when pressure is reduced by 300 psig or more as described above. The 300 psig drop is based on the AGA Gas Measurement Manual and NYSEG/RG&E field experience. Gas temperature drops approximately 7 degrees for every 100 psig reduction in pressure. If the gas is not heated, freeze-ups may occur causing regulator failure. A pilot heater is used for heating the regulator pilot for pressure drops less than 300 psig. Typically for a pressure differential of 300 psig or more, an inline heater such as a water bath heater, catalytic heater (Bruest Hot Cat) or Cold Weather Technologies (CWT) is typically used. Conventional water bath heaters are older technologies that use glycol/water solution that must be heated all the time. CWT is a modern type of water bath technology that uses less glycol/water solution and uses less energy to increase efficiency heating the gas. Hot Cat heaters eliminate use of glycol completely, minimize noise, are more efficient, and have no stack, and lower operations and maintenance costs than water bath technologies. Hot Cat heaters however have a higher capital cost of installation which also impacts the value of property assessment for municipal tax purposes. These efficiencies and capital and O&M costs are considered by Gas System Planning in specifying new heater equipment.

5.16 Remotely Operated Valves (ROVs)

NYSEG and RG&E propose to provide ROVs to the transmission and distribution gas mains. Valves may be used to isolate sections of pipeline and regulator station feed points in the event of catastrophic leaks, failure or emergencies. Normally, gas operating personnel need to be sent to locate and operate a manual valve. However, some valves can not be operated from remote locations. Remotely operated valves (ROVs) are electronically wired and controlled from a control center and allow the valve to be operated remotely rather than by dispatching personnel. This allows for a much quicker isolation and reduces the risk of natural gas leakage, loss of life and property damage.

ROVs are also part of the storm hardening plan for the gas distribution systems. Generally, when flooding is initially expected to occur, County emergency services operations personnel order home evacuations and request the utility to turn off gas service as customers are vacating their homes. In some instances the flood waters rise so rapidly that there is not enough time to turn off each individual home before the flood waters become too high to safely work. The installation of remote operated control valves would allow multiple homes to be isolated quicker, resulting in improved safety by reducing the potential for explosion and any uncontrolled blowing gas.

5.17 Hardening the System Against Natural Disasters

Recently some of the communities served by NYSEG and RG&E have been repeatedly damaged by the recent storms (Sandy/Irene/Lee). NYSEG and RG&E are taking effective and efficient measures to harden their system against natural disasters such as flooding in the future. These include:

- As part of project planning criteria, low pressure systems are considered for conversion to medium pressure when replacements are made. In 100 year flood prone areas, pressure conversions will be given high priority and made at the time of main replacement where feasible. This measure will reduce the likelihood of water intrusion into gas mains during flooding and reduce annual O&M costs as medium to low pressure regulator stations are removed from service.
- Addition of new looping in existing distribution systems will be considered as part of project planning criteria to improve reliability in areas that may be impacted by flooding. Loops may include installation of valves (manual or ROV) to operate the new sections of the system while protecting from flood water intrusion.
- Valve locations on the gas systems will be reviewed and additional critical valves installed where necessary to facilitate shut-off of mains and services located in 100 year flood prone areas.
- In addition, ROVs will be planned and located for areas on both the transmission and distribution systems in flood prone areas where flood levels may rise quickly or be difficult to access during a flood event. This will allow remote shut down of flood risk facilities before and during an event. ROVs will be also included at regulator stations located in or near flood areas.
- If an existing regulator station is located in a flood area it will be prioritized for relocation as feasible. Vent stacks on regulator stations will also be extended to above know flood level elevations. Installing these valves above flood levels reduces the possibility of them being affected by flooding.

6. IUSA Investment Categories

Gas System Planning categorizes projects into IUSA Investment Planning's (IP) investment reasons of: mandatory compliance, system capacity, reliability risk, group initiatives, efficiency, asset condition replacement and strategic. Automation projects are included as part of regulator and gate station projects that may be driven by any of IP's investment reasons. Damage projects are performed on a high priority, emergent basis and are generally covered by minor budget line items (projects less than $100,000 in cost). Should a damage project emerge with a cost greater than $100,000 it typically will receive high priority and be included in the current budget year with identification of offsetting capital funds to accommodate the project. If funds are not available in the current year, the project will be added to the following year as a high priority asset condition project. The projects identified by Gas System Planning are included in the upcoming years' capital budgets by IP and the projects are forwarded to the Delivery and Design groups within Gas Engineering for design and construction.

Mandatory compliance projects may include rate case requirements such as leak-prone main and service replacements, replacement and relocation of facilities in conflict with proposed municipal road projects in compliance with terms and conditions of public right-of-ways permits, and customer driven main extensions and services in accordance with tariffs. System capacity needs are determined by material condition and system operations such as pipeline operating pressure and regulator equipment performance under peak and low flow demand. Reliability risk entails continuity and quality of service to meet service targets. Group initiatives projects accommodate increases in natural gas demand due to identified and confirmed new customers. Efficiency may result in improvements in the delivery of energy and business processes. Asset condition replacements are determined from age, type of material, inspection reports, and input from Gas Field Operations regarding observations made during various maintenance activities. Risks may include leak history, probability of inadequate operating pressure, potential loss of service, migration of gas leak, and proximity of public buildings to the gas facility.

6.1 Mandatory Compliance Projects

6.1.1 Rate Case Mandated Projects

Both NYSEG and RG&E are required to replace 24 miles of leak prone mains each calendar year in accordance with rate cases 09-G-0716 and 09-G-0718 respectively. Those rate cases also include requirements to replace 1,200 leak prone services for NYSEG and 1,000 leak prone services for RG&E each calendar year. These rate case requirements fulfill a portion of asset condition replacement projects.

Leak prone main replacements are prioritized using a risk based methodology based on leak history and other system conditions documented in the Distribution Integrity Management Plan (DIMP). The draft definition of leak prone mains and services is contained in Appendix 3. The definition for leak prone is being developed by Gas Technical Services and may be contained in DIMP and IMP or in a construction standard as determined by Gas Technical Services.

6.1.2 Tariff Required Projects

Tariff required projects include a portion of new mains and services to customers. In accordance with NYSEG's tariff, Public Service Commission 90, and RG&E's tariff, Public Service Commission 16, both companies are required to provide 100 feet of new gas main and 100 feet of new service to new customers at the companies' costs. The cost of facilities beyond those lengths is the customers' responsibility. Gas System Planning receives new service requests from Marketing, Customer Service, and Gas Design & Delivery Engineering for residential, commercial and industrial loads. Gas System Planning hydraulically models the gas distribution system to determine if the existing system has the capacity to serve the new load. Tariff required main and service extensions fulfill a portion of growth related projects and may fulfill infrastructure project needs as well as follows.

If the existing system does not have sufficient capacity to serve the new load, Gas System Planning evaluates both maintenance and/or capital improvements necessary, to serve that load. Gas System Planning then works with Gas Design & Delivery Engineering to develop cost estimates for those improvements. Gas System Planning coordinates with Rates and Regulatory and Marketing Departments regarding the customer's potential responsibility for portions of the cost of the infrastructure improvement when applicable. The cost of these improvements, future operation and maintenance of those improvements, the customer's forecasted total gas loads, and tariff required allocation of gas main and service, are used to determine if a customer contribution is necessary and what, if any, amount the customer must contribute in accordance with tariff for the proposed improvements. This type of project also classifies as a growth project.

Gas meters are replaced or installed for a number of reasons which are included as part of the tariff requirements to serve customers. The customer may increase or decrease their demands for gas usage, requiring a different capacity rating on the gas meter. The New York Public Service Commission also requires testing samples of the meter population in accordance with NYCRR Part 226. Various meters are exchanged every year for those programs. These meter projects fulfill a portion of growth and asset condition related projects.

6.1.3 Municipal Driven Projects

NYSEG and RG&E must replace gas mains and services that are in conflict with proposed street reconstruction and maintenance projects in accordance with the terms and conditions of permits to occupy public right-of-ways. Some of these mains and services may be considered leak prone and count toward the annual rate case requirements described above. In addition, the gas system is evaluated prior to the municipal project to determine if there are synergies to combine an infrastructure or asset condition related project with municipal construction. If an infrastructure or asset condition need is identified within the project limits of the municipal project, the need for that project is evaluated for inclusion with the municipal project. Both companies work with municipalities to replace the mains and services prior to the municipal construction to reduce conflicts, potential excavation damages, and unscheduled interruptions to customer service. Gas mains are generally relocated behind curb lines whenever feasible to facilitate safe construction and future maintenance and operations. As described, a municipal project may also fulfill a portion of required, infrastructure and/or asset condition related projects.

6.1.4 Service Meter Replacement Projects

Meter replacements are undertaken for a variety of reasons including stopped or dead registers on the meter, gas leaks at the meter, damage, or meter read inaccuracy. Meter replacements are handled by the Meter Service group under Customer Service. Gas System Planning submits a budget line item in the capital budget for meter installs and replacements, annually, based on input from the Meter Service group. Older meter styles did not compensate for temperature change because the meters were installed inside buildings. All new meters provide temperature compensation and are installed outside buildings to improve safety and operations. In addition, meter replacements are moved from inside to outside for the majority of installations as feasible. In accordance with Rules and Regulations of the State of New York 16 NYCRR Section 226, IUSA has a testing program for installed gas meters to verify accuracy. Service meters that eventually show signs of inaccuracy or wear are put into a remediation or retirement program. In the past, service regulators which contained liquid mercury were removed as part of NYSEG and RG&E meter replacement programs. If a mercury containing meter is discovered still in service it is replaced. Meter replacements are also incorporated with the replacement of leak prone services and moving meters outside. The Meter Service group manages and runs these programs.

6.2 System Capacity Projects

Pressure improvements are considered for areas operating below 70% of MAOP and based on load growth. Within capacity improvement projects, need is prioritized based on operating pressure, growth, new customer identification, asset condition, and reliability of the system such as looped versus single feeds and dead-end portions of systems, and number of customers served. Long range system capacity projects that are outside the current budget planning cycle, more than two years out, are prioritized in accordance with the methodology in Appendix 2.

6.2.1 Pressure Improvements Projects

NYSEG and RG&E have telemetric equipment located throughout the gas transmission and distribution systems. This equipment and system pressures are remotely monitored and controlled by Gas Control. Gas Control notifies Gas Field Operations and Gas System Planning of any abnormal and low pressure readings. Gas System Planning reviews this information and evaluates if a potential system improvement project(s) is necessary. Additional pressure recording devices may be installed to verify system operating pressures as requested by Gas System Planning.

Regulator stations also have pressure recording charts. Regulator station charts are reviewed by Gas Field Operations and any abnormal pressure readings are also forwarded to Gas System Planning for review and potential system improvements.

6.2.2 Gate and Regulator Stations Projects

Criteria for gate and regulator station replacements are based on station condition, performance and existing design standards. Station conditions may include replacement of underground vaults, doors, pipe and stack corrosion, odorizers, filters, and other associated equipment. Performance criteria include poor regulator, monitor and relief operation, and station capacity issues due to system changes. Stations may no longer operate correctly due to addition or reduction to system load due to customer changes and capital projects for replacement or

extension of facilities. Station replacements modernize the design and equipment to current standards, improving crew safety and improving station reliability by installing dual run stations. High priority is given to stations with obsolete equipment, where repair parts are not available.

6.2.3 Main Replacements and Extensions Projects

Gas System Planning uses SynerGEE to evaluate areas of growth and low operating pressure risk in the NYSEG and RG&E systems. Where design day operating pressures are predicted to be less than 70% of MAOP, infrastructure improvements are considered to improve operating pressures. Actual field pressure measurements may be used to verify SynerGEE predicted low pressures below MAOP.

6.3 Reliability Risk Projects

Projects under this classification generally include those that fall under the IUSA planning criteria and do not fall under the Rules and Regulations of the State of New York (NYCRR)– generally transmission, distribution, and services. Examples of programs and projects under this category include improvements to worst performing gas systems, transmission, distribution, and regulator station hardening, gas quality, and gas system operating pressure. Gas quality includes projects or programs proposed to correct or maintain gas composition levels and moisture content to meet guidelines. These projects associated with gas quality include work on distribution, transmission, and regulator station facilities and is responsive to, low pressure systems, high pressure systems, or inadequate pressure. Gas system operating pressure includes projects or programs to correct or maintain operating pressures on design day conditions to meet IUSA planning criteria. The projects associated with gas system operating pressure include work on distribution, transmission, regulator and gate station facilities and is responsive to improving pressure conditions and gas supply.

6.4 Group Initiatives Projects

Group initiatives projects are undertaken to accommodate a specific new customer, group of customers, or increase in load for an existing customer. As described above, a portion of these projects are required by the 100 foot tariff allowance per customer of new main. Group initiatives projects may include main extensions, replacements, reinforcements, and regulator station work as required to serve the new loads. Rates and Regulatory determine, based on input from Gas System Planning and Marketing, if there will be a cost share for any infrastructure improvements needed between the customer and the company and what that cost share will be. NYSEG and RG&E use 70% of MAOP as the design criteria for needing infrastructure improvements to maintain safe and reliable service. If SynerGEE predicts the existing system to operate between 50% and 70% of MAOP on the design day, thrn an improvement may be required if the new load drops the predicted pressure more than 10%. If the existing system operates at 50% of MAOP or less, no drop is allowed on the existing system without reinforcement to maintain a minimum of 50% predicted pressure on the design day.

6.5 Efficiency Projects

Projects primarily focused on improving the efficiency of business operations either through the direct reduction of costs, improvement of operational output or quality. Examples of projects in this category include automation through technologies, business process improvements, and system operability improvements.

Required justification for projects in this category must include a well documented business case including quantitative assessment of costs and benefits, including net present value and internal rate of return analysis.

6.6 Asset Condition Replacement Projects

Asset condition projects to reduce the probability and consequences of potential failures or potential safety issues. Asset conditions are reported through annual inspections such as valve and regulator station inspections, maintenance activities, and other daily operations that may discover or observe equipment in poor condition or not operating properly. Improving asset conditions improves safe and reliable operation of the gas system. As mentioned above, a portion of statutory projects address asset conditions through leak prone main and service replacements and municipal driven projects.

6.6.1 Regulator Stations and Associated Equipment Projects

Regulator stations and equipment replacements, including odorizers and heaters, and upgrades are prioritized in a database that assigns a health index score to the facilities. The database is in use at RG&E and in development for NYSEG. The health index allows the companies to prioritize within the regulator and gate station asset category for needed improvements. Equipment may be identified in poor condition for example corrosion, poor function for example regulators that have become over or under sized due to changes in load, or obsolete without replacement parts due to age and changes in technology.

6.6.2 Main and Service Replacement Projects

The IMP and DIMP evaluate risk applicable issues on the gas transmission and distribution systems for mains and services. Conditions identified by those plans are input from Corrosion Engineering to Gas System Planning to develop projects to address the asset condition issue with replacement or modification to existing facilities as necessary.

6.6.3 Low Pressure Main Replacements Projects

One type of asset condition project may also provide system infrastructure benefit. Low pressure main replacements, which may be cast iron or steel mains, are grouped into projects to reduce and eliminate the low pressure systems by replacement with medium pressure. This improves gas pressure to the area, reduces the size of the main installed, and may provide the opportunity to remove regulator stations from service. In the case of cast iron mains for RG&E, based on risk, special consideration is given to large diameter medium pressure cast iron mains (greater than 8” in diameter) and small diameter (less than 6” in diameter) low pressure cast iron mains located near schools, hospitals, nursing homes, or other public buildings. These cast iron mains are prioritized based on their age, condition, and associated leak history and status. There are no cast iron mains at NYSEG.

6.7 Strategic Projects

Projects in this category could include the support of new technologies, franchise expansion, green initiatives, improvements beyond mandatory compliance in areas such as environmental and safety, and system reliability improvements beyond regulatory requirements to improve customer service.

7. Project Prioritization Method for IUSA Gas Projects

Gas System Planning prioritizes projects using IUSA Investment Planning's (IP's) investment reasons of: mandatory compliance, system capacity, reliability risk, group initiatives, efficiency, asset condition replacement and strategic. Mandatory compliance and carryover projects, projects currently under design or construction, receive the highest priority. Group initiatives projects where a known customer is identified receive the second highest priority. System capacity, reliability risk, asset condition replacement and strategic get the third priority.

Infrastructure projects may include system capacity and reliability risk projects. Gas System Planning developed a prioritization methodology specific to these projects based on a scoring system that takes into consideration the safety and security risks, system reliability, type and number of customers affected, operating flexibility, maintenance impacts, system efficiency and area load growth. This priorization method is included in Appendix 2 .

This methodology enables Gas System Planning to prioritize and rank all types of gas projects to achieve mandatory compliance requirements from multiple agencies and effectively use capital funds to achieve corporate goals to fund projects needed for various investment reasons.

8. Capital Budget Process

Gas System Planning is responsible for the development of the capital budget including all replacements and infrastructure improvements to Investment Planning (IP). Gas System Planning coordinates recommendations and requests for capital projects from Gas Design & Delivery, Corrosion Engineering, Gas Field Operations, and Gas Supply. Gas System Planning is developing proposed projects and programs for the short term (i.e. one and two years forward) and longer term ranges, up to 5 years, and 5-10 years. These projects are submitted to IP through the annual budget development process. The annual budget process and timeline are determined by IP.

There are capital budget line items in the minors cost categories (individual projects with capital costs less than $200,000) allocated for tariff-driven new customer work or growth projects, including main extensions and new services. Minor cost categories also include municipal driven projects, main replacements, service replacements, and meter work. The budget line items for minor cost categories are based on historical expenditures, business conditions, current economic trends, and adjusted for inflation.

REFERENCES

Rules and Regulations of the State of New York (NYCRR) sections 255, 261
NYSEG/RG&E Transmission Integrity Management Plan (IMP)
NYSEG/RG&E Distribution Integrity Management Plan (DIMP)
NYSEG/RG&E Construction Standards & Installation Manual Section 31.10 (Corrosion: Coatings)
NYSEG/RG&E Construction Standards & Installation Manual Section 32.01(Steel Pipe Design)
NYSEG/RG&E Construction Standards & Installation Manual Section 32.02 (Plastic Pipe Design)
NYSEG/RG&E Construction Standards & Installation Manual Section 32.03 (Mains –General)
NYSEG/RG&E Construction Standards & Installation Manual Section 32.04 (Services – General)
NYSEG/RG&E Construction Standards & Installation Manual Section 35.05 (Installation Considerations)
NYSEG/RG&E Operating and Maintenance Manual Procedure 6.125 (MAOP for Steel and Plastic Pipelines)
NYSEG/RG&E Operating and Maintenance Manual Procedure 6.150 (Low and Medium Pressure Upgrades)
NYSEG/RG&E Operating and Maintenance Manual Procedure 6.175 (High Pressure Upgrades)
NYSEG/RG&E Operating and Maintenance Manual Procedure 6.200 (Maintaining MAOP)
NYSEG/RG&E Operating and Maintenance Manual Procedure 7.400 (Field Regulator Inspection)
NYSEG/RG&E Operating and Maintenance Manual Procedure 7.450 (District Regulator Inspection)
NYSEG/RG&E Operating and Maintenance Manual Procedure 7.500 (Transmission and Critical Valve Inspection)
NYSEG/RG&E Operating and Maintenance Manual Procedure 8.200 (Odorization of Gas)

Future sections currently in development:
NYSEG/RG&E Construction Standards & Installation Manual Section 50.01 (Distribution Regulator Stations)
NYSEG/RG&E Construction Standards & Installation Manual Section 50.02 (Gate Stations)

APPENDIX 1 - Gas Network Analysis Design Criteria

Network analysis requirements vary for low, medium, and high-pressure systems. A Low Pressure (LP) system operates at a maximum of 1 psig. A Medium Pressure (MP) system operates between 2 and 124 psig (pounds square inch gauge), and a High Pressure (HP) or Transmission Line system operates at 125 psig and higher.

The guidelines Gas System Planning uses to size replacement and extension projects or to add additional load include:

- Model demand based on a system design peak hour @ 70 to 85 HDD
- No greater than a 10.0% pressure drop across a section of gas main or service piping
- The absolute minimum pressure in an LP system is 5" WC
- No greater than a 30% pressure drop is allowed across newly designed gas systems at design temperatures
- No greater than a 50% pressure drop across existing MP or HP gas systems at design temperatures
- No greater than incremental drop across expansion projects where the existing MP or HP gas systems are already at 40-50% pressure drop at design temperatures

When to Request a Network Analysis Study?

A Network Analysis shall be requested for all gas main replacement and extension projects to 5 or more residential customers.

A Network Analysis shall be requested for load changes as follows:

- Any load changes equal to or greater than 0.5 Thousand Standard Cubic Feet per Hour (MSCFH) on a LP system require network analysis studies.
- Any load changes on a MP or HP system equal or greater than 5.0 MSCFH or, for elevated pressure requests of 2 psig and higher, require network analysis studies.
- Gas main or service work to commercial customers larger than a typical restaurant where the operating pressure is less than 75% of MAOP on design day as predicted by SynerGEE.
- Gas main or service work to all industrial customers where the operating pressure is less than 75% of MAOP on design day as predicted by SynerGEE.

Note: The meter lab shall be notified of the new load and pressures at the site for sizing of the customer's regulation and metering.

A Network Analysis shall be requested for changes in regulator stations as follows:

- Changes in regulator station equipment,
- Changes in regulator station set points, or
- Changes in safety relief valves and set points.

New LP services are designed with a maximum drop of 0.5" WC. New MP and HP services are designed with a maximum of 0.5 psig. In an emergency, if Gas System Planning is not available to size a replacement, the pipe section should be replaced size for size.

Necessary Information for a Detailed Network Analysis

1. Quad or Map number (screenshot from the GIS)
2. Location: Address info / Intersections / Main number (NYSEG only)
3. Customer load - MSCFH (Firm, Interruptible as coincident peak)
4. Known operating pressures
5. Description of proposed work - what is being removed / installed.
6. Proposed pipe sizes and types desired for analysis
7. Footages
8. Known field conditions or routing

How to Request a Network Analysis

When planning the above changes contact Gas System Planning by e-mail and request a Network Analysis informing them of the information aforementioned above. Gas System Planning will perform the network analysis and reply with recommendations for system modifications. Please always provide a response requested by date in your request.

Performing a network analysis prior to construction will ensure that maximum benefit is obtained, and that potential problems related to present conditions, and future growth, are minimized.

Typical Studies provided by the Gas System Planning

1. Bypass sizing – determine size needed
2. Construction – simulate temporary looping and stop-offs
3. Emergency drills
4. System survival times – line pack
5. Dig-ins – Calculate quantities of lost gas for billing (procedure in place)
6. Local production calculations
7. Water problems – determine direction of flow to correct the problem
8. Pipe size changes, removal, replacements or looping
9. Valve closings for maintenance and sectionalizing
10. Direction of gas flow at different time of the year
11. Regulator and relief valve sizing
12. System capacity planning and system improvement
13. Service sizing on complex loop systems

Gas Transmission and Distribution Planning Manual

List of Studies Performed by Gas System Planning

1. Division annual system planning meetings
2. Load additions
3. Main extensions
4. Main leakage replacement sizing
5. Bare steel and cast iron retirement & replacement sizing
6. Local production (ability to take gas in Summer, Winter, Fall and Spring)
7. Alternative pipeline supply
8. By-pass sizing studies for construction
9. Construction studies for tie-overs and valve repairs
10. Critical valve isolation studies (impact of isolating part of the system)
11. Customer regulator set design
12. Regulator station design and capacity monitoring
13. Regulator station safety relief analysis
14. Lost gas caused by dig-ins
15. Direction of gas flow
16. Emergency drills
17. Major project analysis
18. Sizing for new franchise areas
19. Pressure concerns
20. Relines
21. Service sizing (looped systems only)
22. Pressure upgrades (low to medium)
23. Maximum system capacity for long term growth
24. Transmission pigging
25. Water problems in low pressure system
26. Elevated pressure requests
27. Contingency and reliability studies (survival times/line pack)
28. Interruptible customer studies
29. Municipal and state interference/paving projects
30. Tracking of gas sources (supply tracing within the piping network)
31. Functional Obsolescence
32. System & Operational Constraint Analysis
33. Regulator bypass/shutdowns

APPENDIX 2 - Gas System Reinforcements

Prioritization Criteria Worksheet

Safety / Security Risk *(Wt. 15)*

Actual or Perceived Risk to Public

10 Condition is cause for immediate concern with the highest level of risk to public
8 Condition represents a potential problem with a large degree of risk to public
4 Condition represents a potential problem with a low degree of risk to public
1 Condition is cause for concern with low risk to public

System Reliability *(Wt. 15)*

Single Failure Criteria:

10 Single failure of active component (i.e. regulator) affects > 600 customers
8 Single failure of passive component (i.e. pipe) affects > 600 customers
6 Single failure of active component (i.e. regulator) affects < 600 customers
5 Single failure of passive component (i.e. pipe) affects < 600 customers

Third Party / Environmental Damage Risk:

10 Mains exposed or near surface < 1 ft cover
5 Mains > 1 foot cover, but less than normal installation depth < 36 inches covers
0 Mains at or near normal installation depth (> 36 inches cover)

Type and Number of Customers Affected *(Wt. 15)*

Factors related to the types and number of customers affected by the reinforcement activity or potential negative effects if not completed; included sensitivity to interruption of service to major commercial, industrial and residential customers.

Number of customers affected

10 Over 3000 Customers
9 2000 to 3000 Customers
8 2000 to 2000 Customers
7 100 to 1000 Customers
6 50 to 100 Customers
5 1 to 50 Customers

Type of customers affected

10 Critical Facilities: Hospitals / Large Medical facilities, RG&E Facilities (Ginna, Emergency Restoration Facilities), Government Agencies, Communication facilities, Large Water Treatment facilities

8 Government Public Administration facilities, Life Sustaining customers, Small Waste Water Treatment facilities, Food distribution centers, Schools

7 Dairy and food processing facilities, Large businesses and media facilities, Health Support customers

4 Commercial / Industrial business clusters

Operating Flexibility *(Wt. 10)*

Operational Flexibility:

10 Eliminate need for outages or special operating procedures when performing gas procedures

8 Improve load shifting capability

5 Improve equipment availability for maintenance and/or reduce valving operations

3 Improve real-time system status information to holding authorities

Maintenance Impacts *(Wt. 10)*

Unprotected Steel

10 Wrought iron/odd size unprotected steel

8 Bare unprotected steel (prior to 1940)

6 Bare unprotected steel (prior to 1950)
Unprotected wrapped steel (generally prior to 1969)

Cast Iron

10 History of a break or graphitization

8 Extensive joint leak history

6 Evidence of joint leak history

4 Pipe in good condition

Regulator

10 Obsolete equipment

5 At 50% of useful life

System Efficiency and Area Load Growth *(Wt. 10)*

Distribution System Load Relief:

10 System Pressure drop under peak conditions exceeds 70%

8 System Pressure drop under peak conditions exceeds 60%

6 System Pressure drop under peak conditions exceeds 50%

4 System Pressure drop under peak conditions exceeds 40%
2 System Pressure drop under peak conditions exceeds 20%

Feeder Main System Load Relief:

10 System Pressure drop under peak conditions exceeds 40%
8 System Pressure drop under peak conditions exceeds 35%
6 System Pressure drop under peak conditions exceeds 30%
4 System Pressure drop under peak conditions exceeds 25%
2 System Pressure drop under peak conditions exceeds 20%

Transmission System Load Relief:

10 System Pressure drop under peak conditions exceeds 40%
8 System Pressure drop under peak conditions exceeds 35%
6 System Pressure drop under peak conditions exceeds 30%
4 System Pressure drop under peak conditions exceeds 25%
2 System Pressure drop under peak conditions exceeds 20%

Regulator station Load Relief:

10 Load exceeds regulator capacity at peak load conditions and loads are increasing in the system (short term growth)
9 Load equals regulator capacity at peak load conditions and loads are increasing in the system (short term growth)
8 Load equals regulator capacity at peak load conditions
6 Load is greater than 80% of regulator capacity at peak load conditions and loads are increasing in the system (short term growth)
4 Load is greater than 80% of regulator capacity at peak load conditions

APPENDIX 3 - Leak Prone Definition

Material

- Cast iron mains
- Wrought iron mains
- Bare steel or ductile iron mains
- Any main that is made out of a material that the industry has identified as failure prone such as but not limited to Aldyl-A plastic, Century plastic 3306, or Red Thread Fiberglass

Construction/Mill Defects

- Any main built with poor construction/welding techniques that may cause failure or leakage
- Any gas main installed prior to Jan 1, 1951
- Any steel main with longitudinal seam integrity issues
- Any steel main that is ineffectively wrapped

External Forces

- Mains subject to washout that may cause leakage or failure
- Mains subject to other external forces that may cause leakage or failure
- Proximity to ongoing construction activity where new external forces may be applied

Corrosion

- Mains defined as active corrosion in accordance with O&M procedure 4.150
- Coated but unprotected steel mains
- Mains under the Cathodic Protection program with a poor corrosion history

IMP (Integrity Management Programs – Distribution and/or Transmission)

- Mains with a leak history or pending leaks as determined by Corrosion Engineering
- Any main ranked at a high risk in accordance with either Integrity Program
- Any main with a number of fittings that have a known leak history in other installations/areas
- Any other main deemed as “leak prone” by Corrosion Engineering SME’s

Code Issues

- Any main not meeting the minimum code depth requirement in accordance with 255.327 that is potentially subject to third party damage
- Any main built with pipe not meeting the standard to which it was built prior to construction (ASTM D2513 for plastic or API 5L for steel) where as the factory/mill defect may cause leakage on the pipeline, joints, or mechanical fittings
- Any main not meeting the design or construction requirements in accordance with the code at the time to which it was built to.

Gas Transmission and Distribution System Five Year Investment Plan

Prepared by: Gas System Planning
June 2015
Revision 2

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Gas Transmission and Distribution System
Five Year Investment Plan

This plan provides an overview of New York State Electric & Gas Corporation's ("NYSEG") and Rochester Gas and Electric Corporation's ("RG&E" and together with NYSEG, the "Companies") five year gas capital investment plan. This document will be updated annually. It is intended to be used in conjunction with the "Gas Transmission and Distribution Planning Manual" ("Planning Manual"). The Planning Manual describes Iberdrola USA's ("IUSA") gas transmission and distribution system design criteria, investment categories, and the project prioritization method used for IUSA gas projects.

This Gas Transmission and Distribution System Five Year Investment Plan ("Investment Plan") is comprised of the following sections:

Section 1 of this plan describes gas objectives and strategies to address the IUSA Investment Planning ("IP") project categories.
Section 2 describes how the status of gas projects impacts the project's priority and inclusion in annual capital budget development.
Section 3 contains gas system planning study reports and/or Capital Project Models ("CPMs") for infrastructure, growth, and other projects that are not mandatory for compliance.

There are two appendices in this Investment Plan. Appendix A contains five year proposed project lists for both Companies. The projects in Appendix A will be prioritized by Gas System Planning on an annual basis as part of the IUSA capital budget process. Appendix B contains the infrastructure project rating worksheets. Appendix B supports ranking projects in the infrastructure project category. Both the IUSA capital budget process and the infrastructure project rating worksheets are described in the Planning Manual.

All gas facility projects address safe and reliable service for our customers, employees, contractors and the public. Projects are developed and chosen to be the most cost effective and effective solutions to meet corporate objectives. Whenever possible, projects fulfill more than one IP objective such as safety, reliability, meeting a statutory requirement, system capacity or growth need, etc. The following discussion of project categories is updated in this revision to reflect IP's February 25, 2013, categories. The IP investment categories remain unchanged. The discussion is in order of IP's priorities, highest to lowest:

1. IUSA Investment Planning Project Categories
   a. Mandatory Compliance

      The primary objectives of mandatory compliance projects that include statutory or required by regulation projects are to avoid fines or penalties and maintain positive working relationships with regulatory and government agencies and departments. Mandatory compliance projects are undertaken to fulfill federal and state regulations, rate case requirements, tariffs to serve new and existing customers, terms and conditions of permits to occupy public right-of-way (municipal driven projects), and new or replacement service meters. The strategy for undertaking these projects is to develop the most cost effective alternative to meet the requirement(s) and include the project in the appropriate year's capital and operations and maintenance ("O&M") budgets. Mandatory

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Gas Transmission and Distribution System
Five Year Investment Plan

compliance projects receive the highest priority during budget development. The capital budget is proposed to include, at a minimum, all mandatory projects. Whenever possible, mandatory projects are planned to achieve additional benefits such as improvements in asset condition, system capacity, and reliability, etc.

b. System Capacity

The objective of system capacity projects is to address areas where system operating pressures on the design day are calculated below 70% of the system's maximum allowable operating pressure ("MAOP") and improve the design day pressure to at least 70% of MAOP thereby improving safety and reliability and accommodating load growth. System capacity projects include: pressure improvements; gate and regulator stations; main replacements and extensions. These projects are for areas of development and growth to accommodate incremental background load increases not generally attributable to one known customer.

The strategies to include these projects in annual budgets involves ranking the projects relative to each other for both NYSEG and RG&E as described in the Planning Manual and contained in Appendix B of this IP. Gas System Planning will review gas systems models in SynerGEE annually for low pressure and develop projects as necessary to mitigate pressure issues and weakening trends. The highest ranked system capacity projects are added to the annual budget as feasible within the constraints of the annual budget target set by IP after statutory and carry over projects are included in the budget. If a system capacity project has sufficient economic value on its own as determined by a Net Present Value analysis, the project may be submitted to management requesting additional capital funds for the project.

c. Reliability Risk

The objective of reliability risk projects is to reduce the probability of customer outages due to failure of any portion of the gas delivery system, including: gate and regulator stations; transmission and distribution mains and valves; services; and communication devices such as SCADA and remote telemetry units ("RTUs"). Reliability risk projects include storm hardening efforts improving the resiliency of the gas system against flooding and natural events. Storm hardening projects may include, for example: automation; communication; valve installation or remote operation; looping of mains; relocation of facilities; low to medium pressure conversions and raising vent stacks. Reliability risk projects may also address system operations and age or obsolescence of equipment. System operations projects may include, for example: automation and modernization of facilities; replacement of equipment that has become functionally obsolete and replacement or repair parts are either not available or in short supply; and communication devices including SCADA and RTUs. The objective of the application of technology in these projects is to reduce likelihood or duration of customer outage.

d. Group Initiatives

Group initiatives include projects in support of IUSA group strategies and are approved by the CEO or IUSA board. For example, these projects may include new or modified

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Gas Transmission and Distribution System
Five Year Investment Plan

infrastructure to improve gas supply or remove supply constraints, reducing cost of gas supply to customers. Group initiatives also include expansion of gas facilities to serve new customers throughout the state, lowering customers' cost of energy. Growth projects are planned and designed for the most cost effective solution to bring natural gas service to new franchise areas, new customers in existing franchise areas, and connection of local natural gas production. Customer driven projects that include facilities necessary to serve new load must meet IUSA's required rate of return. If the rate of return will not be achieved based on the customers' use of natural gas, the customer(s) may be required to make an upfront Contribution in Aid of Construction or make surcharge payments to achieve the required rate of return. Locally produced natural gas is connected to NYSEG's and RG&E's facilities when requested, contracted and paid for by the local producer. Local production is connected in accordance with NYSEG and RG&E specifications.

e. Efficiency
Objectives of efficiency projects are to reduce operational costs. Projects may include capital improvements to computer hardware and software to improve gas system engineering, control or operations and automation. Objectives of efficiency projects are to reduce O&M costs while improving system control and operation and efficiency. Efficiency and automation projects generally involve gate or regulator station equipment and system control projects such as SCADA and RTU improvements. Many of these projects may be accommodated during the replacement of stations due to asset condition.

f. Asset Condition Replacement
The objective of asset condition projects is to reduce or eliminate possible system failures and risk due to age, deterioration, or obsolescence that are not addressed as part of statutory or reliability risk projects. The strategy for improving asset condition includes annual evaluation of gas facilities to develop recommendations for replacement of infrastructure that generates the most risk. Gate and regulator stations are reviewed and prioritized by Gas System Planning and mains and services are reviewed and prioritized by Technical Services through the Integrity Management Plan ("IMP") and Distribution Integrity Management Plan ("DIMP"). Asset condition projects include gate and regulator station equipment, transmission and distribution mains, and services. These gas facility categories are separate budget line items for tracking and prioritization purposes.

g. Strategic
Strategic projects specifically address other business objectives and must have approved business cases. Current gas 5-10 year proposed projects are accommodated in the above previous categories.

2. Project Status – This section is updated in this revision to reflect the implementation of project management through Gas Delivery as a new group in addition to Gas Design.
   a. New Project
   A new project is a project that has not incurred project specific capital expenditures. Gas system planning is complete and rough order of magnitude ("ROM") cost estimates are

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Gas Transmission and Distribution System
Five Year Investment Plan

prepared. Internal staff time spent developing the project is charged to the appropriate gas engineering capital cost collector. New projects that are included in the upcoming annual budget are forwarded from Gas System Planning to Gas Delivery. Gas Delivery submits the Project Budget Authorization Forms ("PBAF") to IP for approval. When approvals are complete, IP assigns the projects a WBS identifier. Gas Design then creates the Work Orders ("WOs") and begins design work. New projects are prioritized by IP category as described in the Planning Manual.

b. Carry Over Project
A carry over project is a project that has incurred project specific capital expenditures. The carry over project is generally in progress with Gas Design. The project may be in any status of engineering design, procurement, or construction. A carry over project is scored higher in priority as described in the Planning Manual. Generally, a carry over project will receive priority after mandatory compliance projects. The carry over status of a project recognizes the importance of following through with on-going projects that continue to meet corporate objectives.

3. Gas System Planning Study Reports and Appendices are filed electronically in this folder:

V:\Teams\Energy Systems Support\Planning-Operations\Gas System Improvements\5 and 10 Year Plans

Appendix A is filed in a subfolder for 2015 rate case testimony.

System Planning Study Report

NYSEG
Project: Bradley Farms Gate Station Rebuild Project, Elmira NY

1. Main Target:

This is a reliability risk project to rebuild the existing Bradley Farms Gate Station located in Southport, NY.

2. Description:

Rebuild and replace the existing Bradley Farms Gate Station #520012 on the existing property. Install new pressure regulation, a new relief valve, piping, new inlet and outlet valves, SCADA equipment, odorization, building upgrades, site and security improvements.

3. Driver

This project improves reliability of the NYSEG Elmira Division as well as addresses the asset condition of the existing Bradley Farms Gate Station by rebuilding this station in accordance with IUSA's Gas System Manual planning and design criteria. This gate station is one of the primary feeds to the NYSEG Elmira Division supplied by Corning Natural Gas. Bradley Farms provides approximately 50% of the gas supply during the winter peak conditions and slightly higher in the summer months. The Bradley Farms regulation and control are deteriorated and experiencing increasing equipment maintenance contributing to reduced reliability of this station.

4. Other Alternatives Considered

Alternative #1 – Consideration was given to a partial rebuild of this gate station. Installation of new regulators, inlet and outlet valves, controls and odorization. This alternative is not feasible to construct and add new equipment without rebuilding piping runs inside and outside the building limits while maintaining flow at the station. Therefore, alternative #1 is not feasible.

Alternative #2 – Consideration was given to do no improvements to the station and continue to maintain the gate station in its current deteriorated condition. The annual associated O&M costs would continue to increase and further decrease reliability. Therefore, alternative #2 is not acceptable.

5. Customer Benefits

The rebuild of the existing Bradley Farms Gate Station will improve system reliability of the 55 psig system and would be designed and constructed to monitor and control natural gas flow for NYSEG's customers. The gate station will improve system reliability affecting approximately 14,000 customers of the Elmira Division. They include residential, commercial, and industrial customers. Also noise attenuation will be provided at the new station benefiting the residential properties adjacent to the gate station and NYSEG employees.

6. Cost and Avoided Costs

The estimated cost for the project is $3,300,000.

7. Maps

Please see attached.

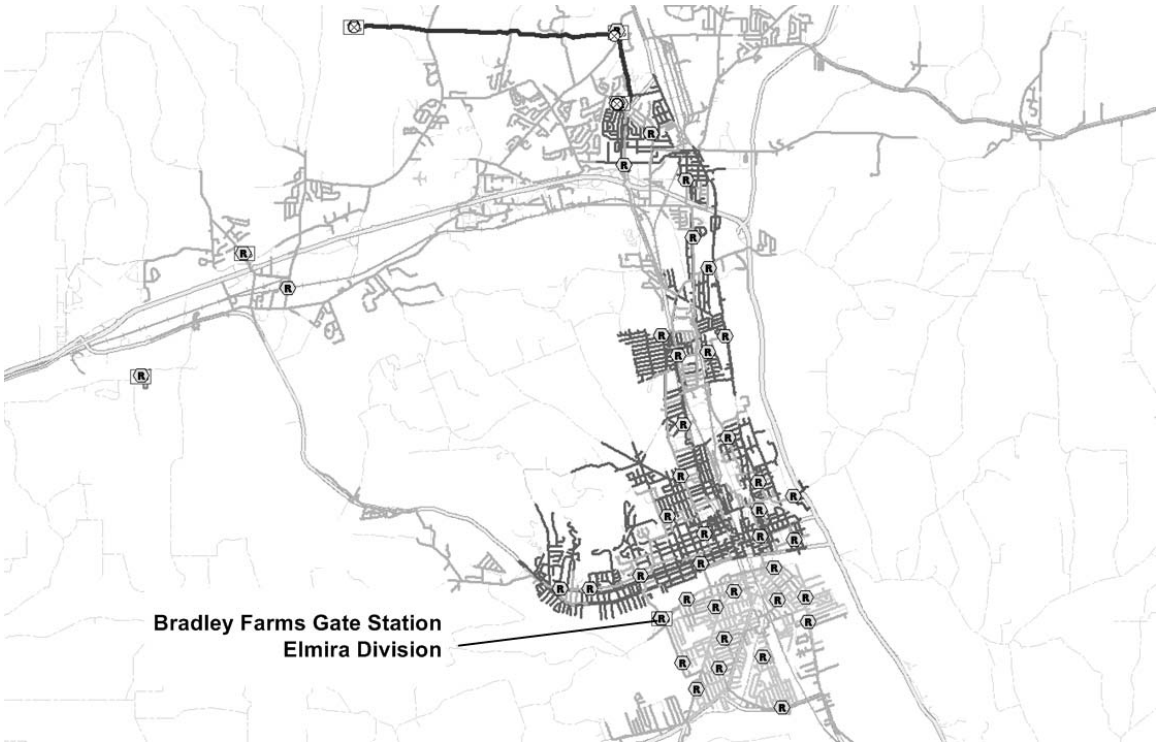
PROJECT SUMMARY

Rochester Gas & Electric

1.	Project	Bradley Farms Gate Station Rebuild Project
2.	Identification	R-xx-xxx
3.	Description:	Install new regulation, a new relief valve, piping, new inlet and outlet valves, SCADA equipment, odorization and building upgrades within the existing site.

4.	Main Project Identification:	R-xx-xxx
5.	Municipality:	Town of Southport, NY (Elmira Division)
6.	Total Cost ($000)	3,300
7.	2013 Budget ($000)	0
8.	2014 Budget ($000)	0
9.	2015 Budget ($000)	0
10.	2016 Budget ($000)	100
11.	2017 Budget ($000)	3,200
12.	Kind of Facility:	Gate Station Rebuild
13.	Pressure:	Inlet Pressure 124 psig, Outlet pressure 55 psig
14.	Investment Reason:	Reliability and Asset Condition
16.	Submitted by:	David Dobrzynski

Map for Project Scope



System Planning Study Report

NYSEG
Project: DeRuyter Transmission Replacement, Town of Norwich to Town of Oneonta, NY

1. Main Target:

This reliability risk project addresses system capacity and asset condition. The projects replaces approximately 25 miles of 8" 298 psig MAOP coated steel gas transmission gas mains with 10" coated steel piping.

The existing 8" pipeline poses pipe material failure risk. There have been material deteriorations in these sections of the existing 8" coated steel gas transmission gas main CM52 from the upstream regulation station at East River Road, 1st stage RS 230083 in Norwich to the existing 8" coated steel gas transmission gas main CM53 going downstream to Winney Hill Road 1st stage RS230072 in Oneonta. The replacement with 10" pipeline will mitigate risk considered applicable by Distribution Integrity Management Program (DIMP) and increase downstream supply capacity and operating pressure thereby eliminating the need to utilize the compressor located in Norwich.

2. Description

This project will replace approximately 25 miles of 1953 vintage 8" 298 psig coated steel gas transmission gas mains with 10" in 4 phases over 4 to 5 years depending on available capital.

3. Driver

The main was installed in 1953 and has exceeded its design life of 50 years with a construction score of 5 i.e. pre-1960 construction. There are weld seam failures discovered in early 1990s which resulted in gas leakage and numerous locations have been exposed by washout/erosion of the soil surrounding the pipeline. In accordance with the DIMP and with the IUSA's Gas System Planning Manual criteria, the Company considers that the threats applicable to the DeRuyter pipeline specifically include external corrosion, natural forces, material/weld/joint failure and outside forces. Scoring was based upon condition information obtained through historical operational records and NYSEG Subject Matter Expert ("SME") knowledge of repair, maintenance and mitigative actions taken to correct deficient conditions. The Specified Minimum Yield Strength ("SMYS") score is 2 which means that the SYMS is between 10% and 20% and that this pipeline falls under the requirements of DIMP. The records score is 4 meaning that major records are missing. SME's identified that due to the age of the pipe, records supporting construction activities maintained by today's standards and regulations are not consistently available. The unknown nature of materials of construction and/or construction practices utilized is also a consideration with the DIMP. This segment of DeRuyter transmission gas main is undersized and needs to be increased to 10-inch to achieve adequate inlet pressure at the easternmost end, Winney Hill regulator station RS230072, in

Oneonta without the Norwich Compressor operating. Interruptible customers on this section of DeRuyter are experiencing increasing interruptions due to load growth and cold weather conditions.

The DeRuyter transmission main lacks capacity to supply the Winney Hill 1st stage regulator station in Oneonta in accordance with IUSA's Gas System Planning Manual design criteria. The increase in capacity will eliminate the need to utilize the compressor located in Norwich. If the compressor is still run, the replacement increases capacity by approximately 590 mcfh or 38% above existing capacity. This part of DeRuyter transmission gas main is undersized and needs to be replaced with 10-inch to achieve adequate inlet pressure at the easternmost end Winney Hill regulator station RS230072 in Oneonta (see system pressure maps below).

4. Other Alternatives Considered

The Constitution Pipeline may provide other opportunities besides replacement of the DeRuyter transmission main. Those opportunities may include maintaining the DeRuyter main at a lower MAOP and distribution level SMYS and pressure. The gas supply currently fed by DeRuyter could be supported by interconnect to the Constitution pipeline. At this time Constitution is still in the concept and planning stages of design and experiencing on-going delays and complications obtaining permitting and other necessary approvals. Therefore, alternatives that consider Constitution were eliminated. Should Constitution be approved, the direct replacement of DeRuyter could be modified.

DeRuyter pipeline repair/rehabilitation was not considered a viable alternative to replacement. The basis for not rehabilitating includes: weld seam and construction practices at the time of construction that do not meet present day API welding standards, construction records and documentation were not required or maintained from the time of construction and general construction practice of the period do not meet present day regulatory requirements. In addition, system pressure and load require a larger pipe diameter than the existing pipeline to meet applicable IUSA's Gas System Planning Manual criteria.

5. Customer Benefits

The replacement with 10-inch pipeline will significantly reduce pipe material failure risk and eliminate the need to utilize the compressor located in Norwich and better accommodate the existing 7,000 and expected future customer load demand, allowing NYSEG to maintain adequate system pressure on the design day.

6. Cost and Avoided Costs

The estimated cost for the DeRuyter Transmission Replacement project is $49,500,000.

7. Maps

Please see attached.

PROJECT SUMMARY

New York State Electric & Gas

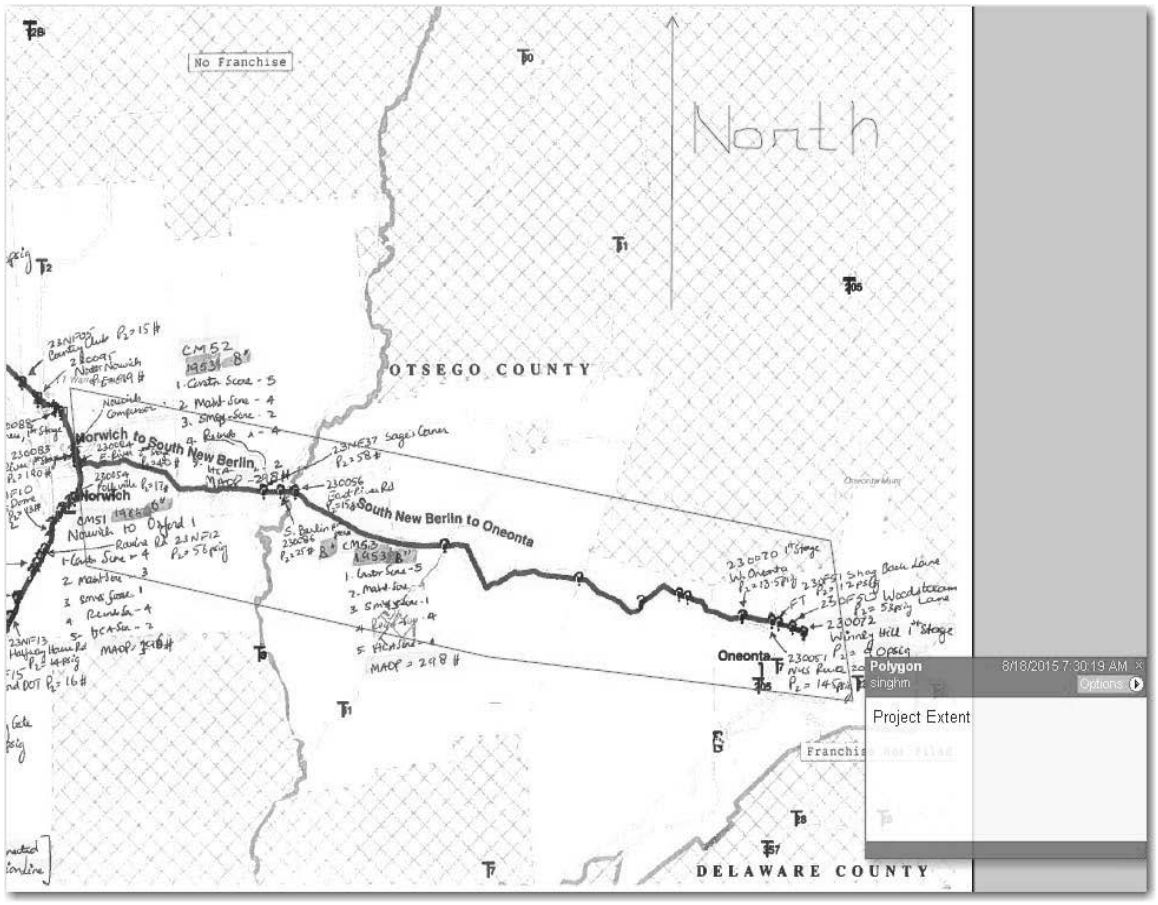
1. Project Identification: DeRuyter Transmission Replacement R-xx-xxx
2. Description: Replace approximately 25 miles of 8" 298 psig coated steel gas transmission gas mains with 10" in 4 phases over 4-5 years.

4. Main Project Identification: R-xx-xxx
5. Municipality: Norwich and Oneonta, NY
6. Total Cost ($000) 49,500
7. 2016 Budget ($000) 0
8. 2017 Budget ($000) 500
9. 2018 Budget ($000) 15,000
10. 2019 Budget ($000) 17,000
11. 2020 Budget ($000) 17,000
12. Kind of Facility: Transmission Gas Mains
13. Pressure: High Pressure, 298 psig
14. Investment Reason: System Capacity
16. Submitted by: Moses Singh

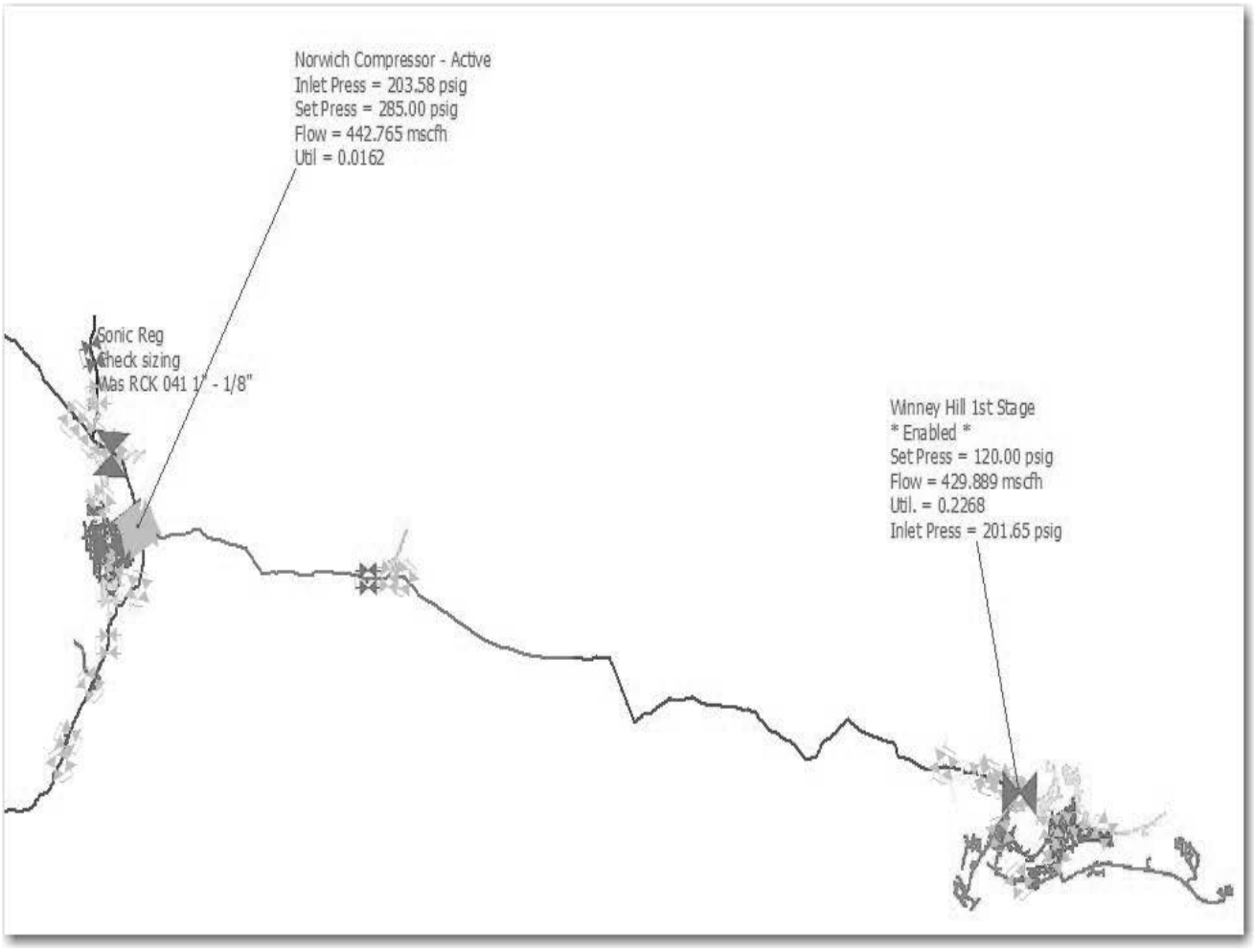
Information to prioritize the Projects

The new 10-inch pipeline will reduce the system failure risk and the increase in capacity will eliminate the need to utilize the compressor located in Norwich. If the compressor is still run, the replacement increases capacity by approximately 590 mcfh or 38% above existing capacity. If we do not finish the project by 2020 then the 3,500 customers in Oneonta will not be adequately served.

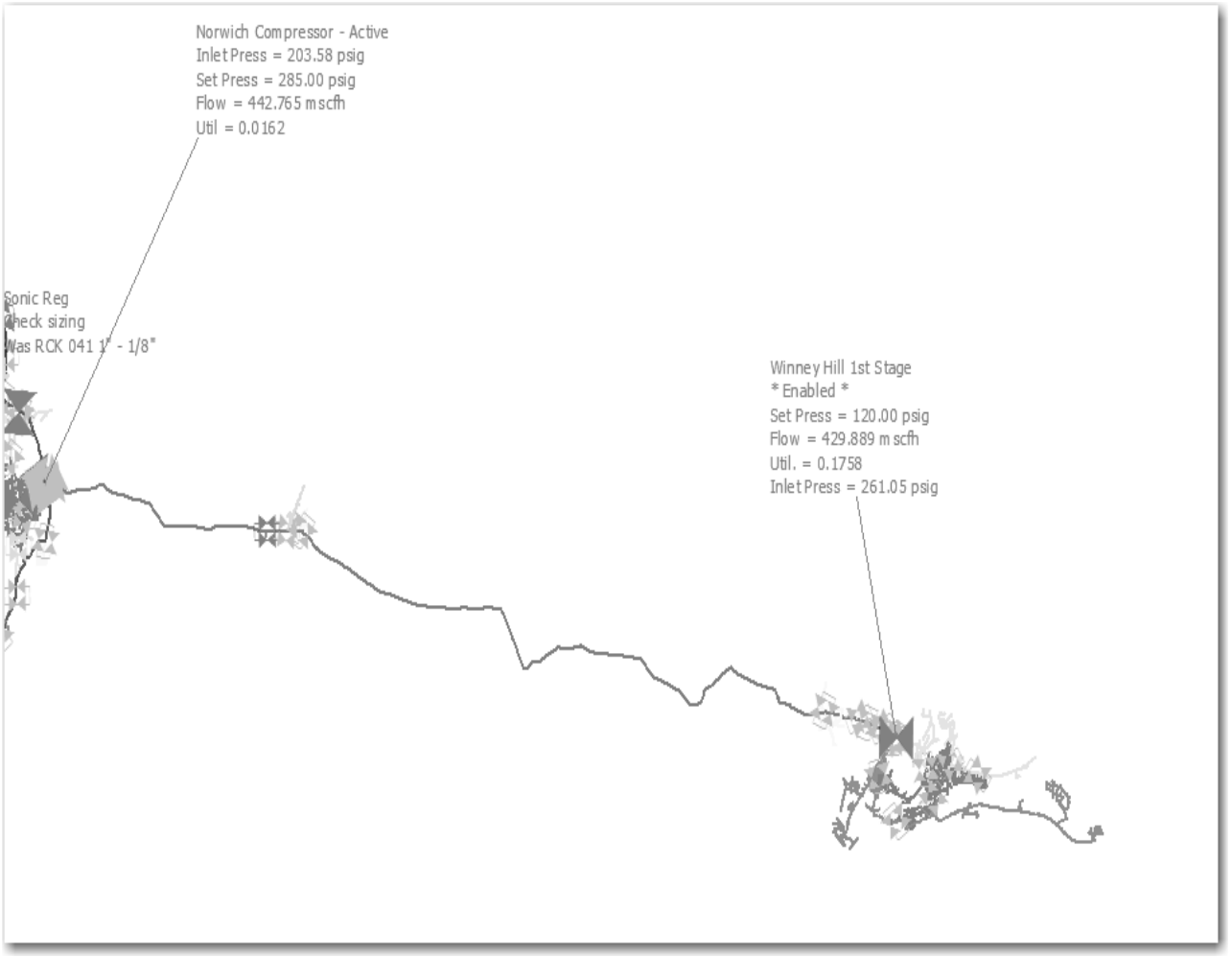
Map for Project Scope



System Pressure Before Improvement on Design Day



System Pressure After Improvement on Design Day



BUSINESS CASE ADDENDUM (optional) — Iberdrola USA Capital Project Model (v11.3)

Project number and title:	**NYSEG-14-xx Phelps South Transmission Replacement**
Company name:	**New York State Electric & Gas**
Estimated project life (years):	**70**

ADDITIONAL INFORMATION THAT SUPPORTS THE BUSINESS CASE FOR THE PROJECT:

This project will also enable marketers to purchase and nominate gas between two (2) different, competing suppliers: Dominion Transmission Inc. (Millard Tap) and Tennessee Gas Pipeline Inc. (Phelps Tap South).

The existing 10" steel transmission main is wrapped and cathodically protected, however the pipe is 1948 vintage (65 years old).

From a system reliability standpoint, Phelps Tap South is the only single-run, high pressure [greater than 124 PSIG] regulator station in IUSA.

ALTERNATIVES — Iberdrola USA Capital Project Model (v11.3)

Project number and title: **NYSEG-14-xx Phelps South Transmission Replacement**
Company name: **New York State Electric & Gas**
Estimated project life (years): **70**

ALTERNATIVES TO THE PROJECT AND WHY THEY WERE REJECTED:

	Alternative Considered	Reason for Rejecting Alternative in Favor of Proposed Project
1	Install 10" main instead of 12"	Increasing the size from 10" to 12" provides enough capacity so that, under emergency or operational conditions, the system can be fed from only one source, either Millard or Phelps South. Replacement with 10" does not achieve this goal.
2	Connect to RGE CM1 Transmission Line at Tyre Station, construct new regulator station (reduce pressure from 250 PSIG to 203 PSIG), install 19,600 feet of new 12" steel Main to NYSEG Bridgeport Station (Seneca Falls).	There is no apparent savings in permits, land acquisition and regulator station construction. There is a 20% reduction in pipe footage. There would be an approximate, realized savings of $1.2M. However, this alternative does not address the 25,000 feet of existing 1940's vintage 10" steel pipe. This alternative also does not address the Packwood Valve operational issues nor does it allow two different suppliers of gas.
3		
4		

GENERAL INFORMATION — Iberdrola USA Capital Project Model (v11.3)

Purpose of worksheet: input general information associated with the project.

Budget year:	2016
Company name:	New York State Electric & Gas
Project title:	Phelps South Transmission Replacement
Project number:	NYSEG-14-xx
Project classification:	Non-load, gas
Project location:	NY
Year project fully in-service:	2018
Estimated project life (years):	70
Salvage value at project end ($000):	

Project description:

Project proposal is to rebuild the Phelps Tap (South) Regulator Station and replace approximately 25,000 feet of 10" steel main with 12" steel main that will operate at 203 PSIG [IUSA Transmission; to operate at less than 20% SMYS].

Project justification:

The purpose of the project is upgrade the operating pressure from the Phelps South Tap from 162 PSIG to 203 PSIG. This will increase reliability to the Geneva System during peak demand usage [winter] by eliminating the operational practice of seasonally opening/closing the Packwood Valve. Currently, during peak demand usage, Gas Field Operations (GFO) and Energy Control Center (ECC) operate the Geneva System by closing the Packwood Valve, which eliminates the flow of gas from Phelps Tap South to Border City. Under this scenario, the sole flow of gas to Border City is via the Millard Tap, which operates at 203 PSIG. During off peak demand usage [summer], GFO and ECC reduce the pressure at Millard Tap from 203 PSIG to 162 PSIG and open the Packwood Valve, allowing gas to flow from either source to Border City. During peak demand usage, the Millard Tap is the only source (County House Road withstanding) feeding gas to Border City. Border City is the major hub for the: City of Geneva, Village of Waterloo, Village of Seneca Falls, Town of Romulus, Village of Penn Yan, Village of Dresden, among others. This accounts for approximately 17,000 NYSEG gas customers.

Submitted by:	Brian Jacobs
Project sponsor:	Gregory George

PROJECT RATING INPUTS — Iberdrola USA Capital Project Model (v11.3)

Purpose of worksheet: input ratings to reflect importance of each criteria in determining need for the project.

Project number and title: **NYSEG-14-xx Phelps South Transmission Replacement**
Company name: **New York State Electric & Gas**
Estimated project life (years): **70**

IMPORTANT NOTE: If any "**MUST-DO**" box is checked, do not assign ratings for any of the criteria.

CRITERIA	CHECK IF 'MUST-DO'	RATING	RATIONALE FOR RATING OR 'MUST DO' DESIGNATION (be specific)
Safety		None	
Quality of service		Very high	The rebuild and upgrade of the Phelps Tap South station and delivery pressure will provide significant system reliablitly by allowing a second gas source into Border City during peak demand. The project will better accommodate existing and expected future customer
Regulatory / statutory		None	
Revenue enhancing		None	
Efficiency / cost reduction		High	The project will eliminate the need for ECC to monitor system pressures in regards to the Packwood Valve; it will eliminate the need to GFO to open/close the valve, adjust Phelps South Tap and Millard Tap setpoints, twice annually.
Environmental / permitting		None	
Other business requirements		Very high	The project will allow marketers to purchase gas between two, competing suppliers.
TOTAL WEIGHTED RATING		**2.00**	

Phelps (South) Transmission Main Replacement Project

From Phelps Tap (South) to Packwood Valve:	Existing Infrastructure			Proposed Infrastructure		
	Length:	23800	LF	Length:	23800	LF
	Diameter:	10	inch	Diameter:	12	inch
	Vintage:	1948		Vintage:	201X	
	MAOP:	162	psig	MAOP:	203	psig

Proposed Improvements/Results	Normal Operations (Design Day)		Scenario 1: Millard Tap OFF (Design Day)		Additional Capacity at Border City (Maintain End Point Pressure)
Location/Condition	Current	With Proposed Phelps Imp.	Current	With Proposed Phelps Imp.	With Proposed Phelps Imp.
Phelps South Flow (MCFh)	0	811	n/a	1729	899
Phelps South Outlet Pressure (psig)	162	203	n/a	203	203
Millard Flow (MCFh)	1790	999	n/a	0.9	1168
Millard Outlet Pressure (psig)	203	200	n/a	165.75	200
Border City Inlet Pressure (psig)	172	180.25	n/a	149.96	173
Transmission End Point (Seneca Falls) Pressure (psig)	169.15	177.23	n/a	146.33	170
Transmission End Point (% MAOP)	83%	87%	n/a	72%	84%
					275 MCFH, Additional Capacity at Border City
					15% % Capcity over present day peak hour Q

With the Proposed Improvements, the Phelps Tap (South) Station can support the entire Geneva South System while maintaining 70% MAOP in accordance with the IUSA Gas Planning Manual.

System Planning Study Report

NYSEG
Project: Port Dickinson Gas Pipeline Loop Extension and Towpath Road Gas Regulator Station Installation, Town of Fenton Binghamton, NY, Towns of Port Dickinson and Fenton, Binghamton, NY

1. Main Target:

This system capacity project proposes the installation of 12,000 feet of 8-inch wrapped steel 124 psig gas main and a new 25 psig MAOP regulator station that will facilitate more efficient distribution through the medium pressure distribution pressure system and help compensate for recent and future increases in customer load demands.

2. Description

This proposed 8-inch 124 psig pipeline will feed a new regulator station to provide a two-way feed into the Chenango Bridge/Front Street 25 psig system. This proposed 12,000 feet of 124 psig 8-inch wrapped steel pipeline from the Port Dickinson Point of Delivery (POD) north to the Chenango River. This project will be undertaken over a three-year period with the tie-in and Towpath Road regulator station in the Village of Chenango Bridge to be completed in the third year.

3. Driver

The project addresses insufficient existing system capacity to serve new load while maintaining 70% of system MAOP on design day in accordance with IUSA's Gas System Planning Manual criteria. This will both supplement the current supply point at Hinman's Corners Station and provide a secondary feed to ensure system reliability in the event of failure of one station. This pipeline will provide a two-way feed to supplement the current supply point at Hinman's Corners Station and provide a loop feed to the 25 psig distribution system in the Town of Chenango Bridge/Front Street. This new pipeline will raise the inlet pressures at Hinman's Corners from 84 to 98 psig and will raise the low pressure point in the 20 psig system from 14 to 18 psig on peak day (see system pressure maps below).

4. Other Alternatives Considered

The installment of 6-inch 124 psig wrapped steel gas mains was studied and analyzed in order to potentially reduce the project cost. The pressure drop using the 6-inch 124 psig wrapped steel main was 25% with existing load compared to the pressure drop of only 1.4% using the 8-inch 124 psig wrapped steel gas main. Hence the 6-inch 124 psig wrapped steel was insufficient.

5. Customer Benefits

The project will accommodate existing and expected customer load demand, allowing NYSEG to maintain adequate system pressure and meet NYSEG's obligation to serve new customers in the existing franchise area. 5,500 existing

customers and future customers will benefit from this increase in ability to serve new load.

6. Cost and Avoided Costs

The estimated cost for the Port Dickinson Gas Pipeline Loop Extension System Improvement project and Towpath Road Gas Regulator Station Installation is $4,435,000. Although infrastructure projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

Please see attached.

PROJECT SUMMARY

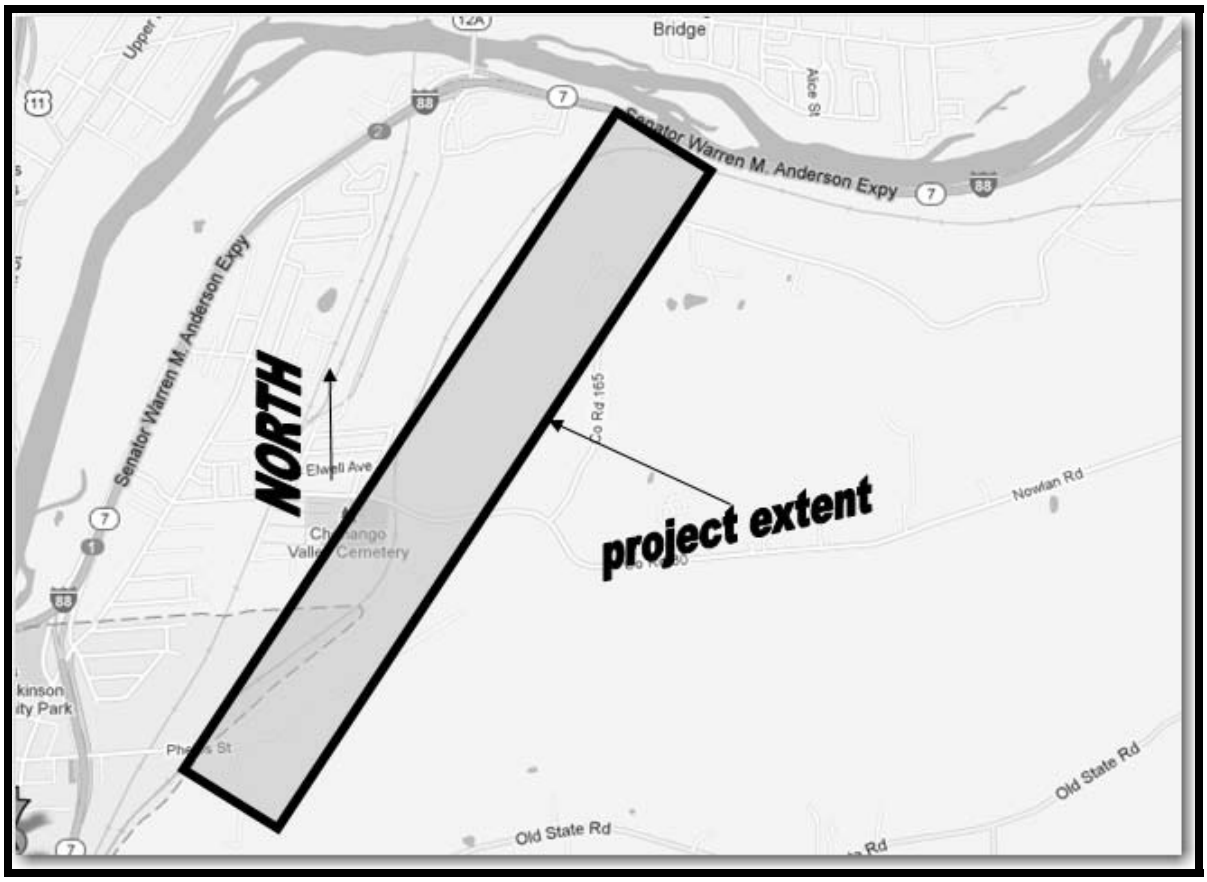
New York State Electric & Gas

1.	Project	Port Dickinson Gas Pipeline Loop Extension and Towpath Road Gas Regulator Station Installation
2.	Identification	R-xx-xxx
3.	Description:	12,000 feet of 8-inch 124 psig wrapped steel gas mains along the Delaware and Hudson Railroad ROW and a 25 Psig MAOP Regulator Station at Chenango Bridge to meet existing and future customer need for loads.
4.	Main Project Identification:	R-xx-xxx
5.	Municipality:	Town of Chenango and Village of Chenango Bridge, NY
6.	Total Cost ($000)	4,435
7.	2016 Budget ($000)	100,000
8.	2017 Budget ($000)	1,370,000
9.	2018 Budget ($000)	1,508,000
10.	2019 Budget ($000)	1,508,000
11.	Kind of Facility:	Distribution Gas Mains
12.	Pressure:	Medium Pressure 20 psig to 124 psig
13.	Investment Reason:	System Capacity
14.	Submitted by:	Michael Harvey

Information to prioritize the Projects

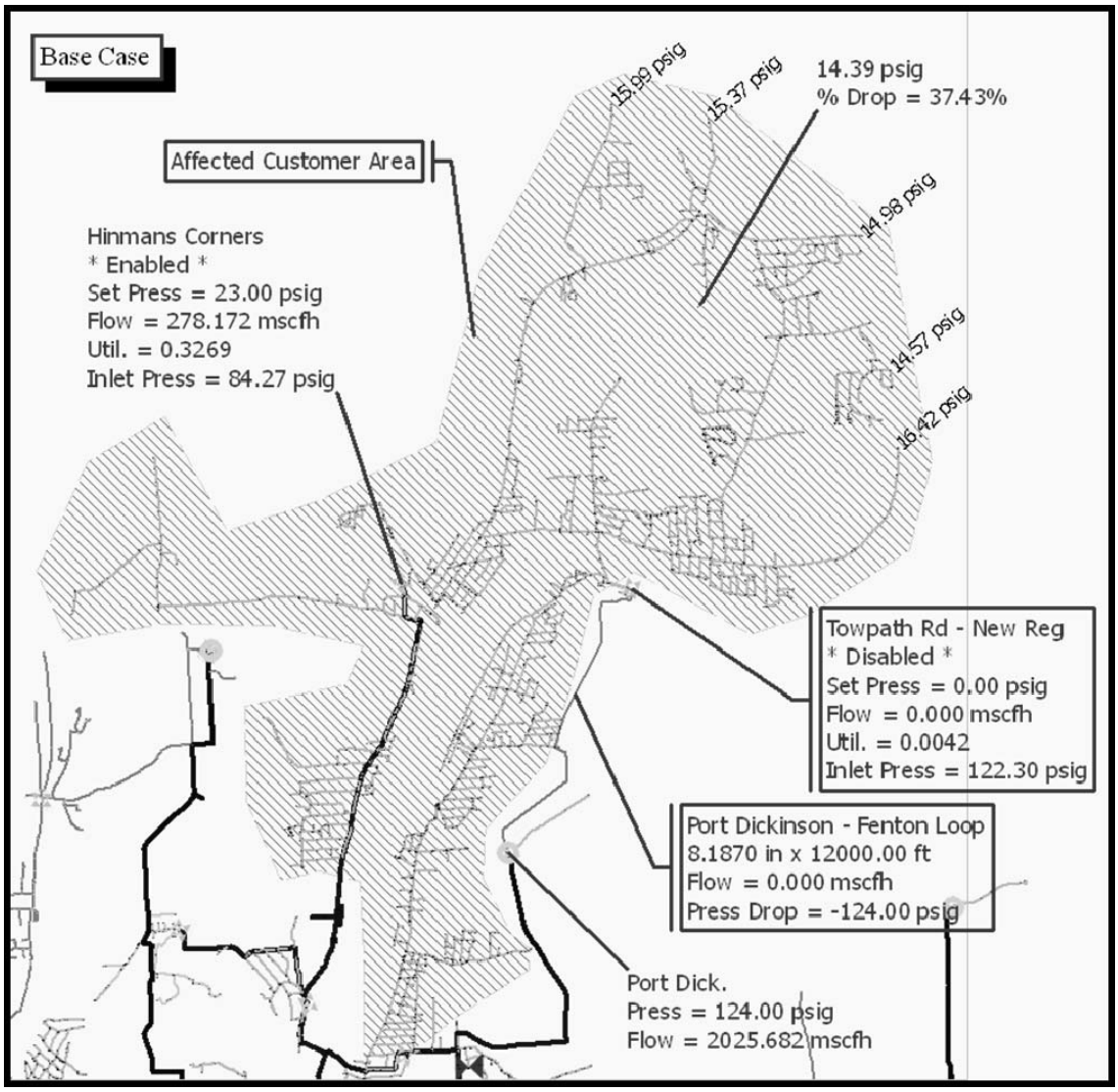
This system capacity project will improve system pressure for an area affecting residential, commercial, and industrial customers.

Map for Project Scope



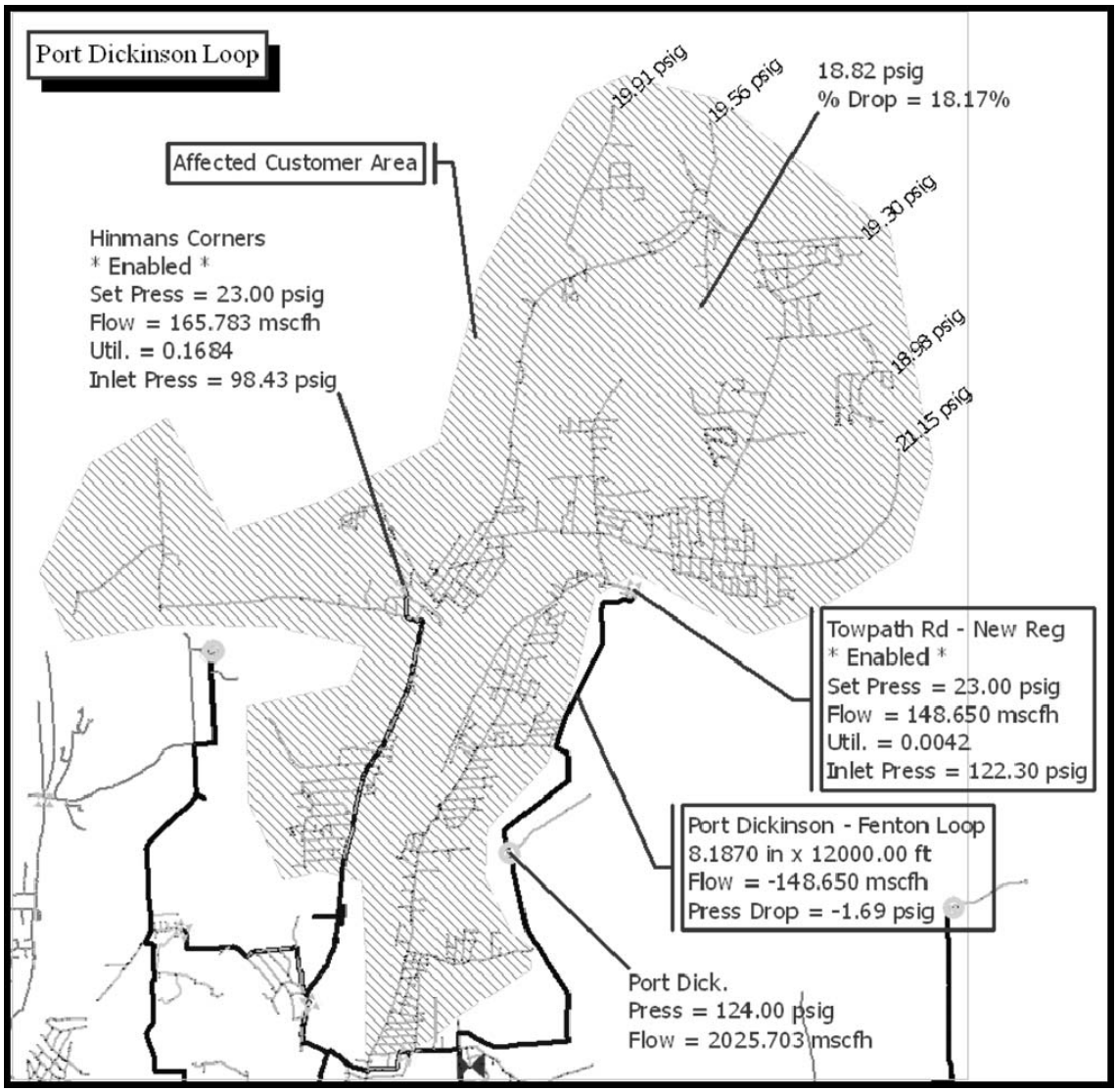
System Pressure Before Improvement on Design Day

Blue = 124 psig MAOP system; Green = 25 psig MAOP system



System Pressure After Improvement on Design Day

Blue = 124 psig MAOP system; Green = 25 psig MAOP system



System Planning Study Report

NYSEG
Project: Gas Pipeline Susquehanna River Bore Extension Project Town of Vestal and Village of Johnson City, Binghamton, NY

1. Main Target:

This system capacity project proposes 10-inch 124 psig wrapped steel gas main that will help provide sufficient capacity to serve new loads in the Town of Vestal and Village of Johnson City, Binghamton.

2. Description

This proposed 7,000 feet of 10-inch wrapped steel gas main at 124 psig MAOP pressure pipeline will extend from Main Street at Riverside Drive (Johnson City) south of Boland Road then under the Susquehanna River to Old Mill Road and then will tie into the existing 8-inch wrapped steel 124 psig pipeline located on the south side of the river in the Town of Vestal. This proposed 7,000 feet of 124 psig 10-inch wrapped steel gas main will support pressures in the existing system.

3. Driver

This system capacity project addresses insufficient existing capacity to serve new load and maintain 70% of system MAOP (87 psig out of 124 psig) on the design day in accordance with IUSA's Gas System Planning Manual criteria. The proposed connection will raise the inlet pressure at the Old Vestal Road Regulator Station from 64 psig to 91 psig on the design day (see system pressure maps below). This will increase reliability and support load growth on to the south side of the river, including expansions load growth at Binghamton University.

4. Other Alternatives Considered

The installment of the 8-inch 124 psig wrapped steel gas mains was studied and analyzed in order to reduce the project cost. The pressure drop using 8-inch 124 psig wrapped steel main was appreciable with existing loads compared to the pressure drop using the 10-inch 124 psig wrapped steel gas main. The other alternative examined was feeding the new regulator station solely from the Bunn Hill 124 Psig SUNY gas main. NYSEG could not secure budget dollars in year 2012 for the installation and in early 2013 the road was paved. The Town will not permit NYSEG to excavate in the pavement for at least 10 years (excavation moratorium). The long term plan is to loop the three 124 psig feeds on the south side of the river. These 124 psig gas mains are fed from Westover, Twist Run, and Union Center (Boswell Hill) Points of Delivery (PODs).

5. Customer Benefits

The project will accommodate existing and expected customer load demand, allowing NYSEG to maintain adequate system pressure and meet NYSEG's obligation to serve new customers in the existing franchise area. 11,000 existing customers and future customers will benefit from this increase in ability to serve new load.

6. Cost and Avoided Costs

The estimated cost for the Gas Pipeline Susquehanna River Bore Extension Project Town of Vestal and Village of Johnson City, Binghamton, NY is $1,350,000. Although infrastructure projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

Please see below.

PROJECT SUMMARY

New York State Electric & Gas

1. Project Gas Pipeline Susquehanna River Bore Extension Project Town of Vestal and Village of Johnson City, Binghamton, NY

2. Identification R-xx-xxx

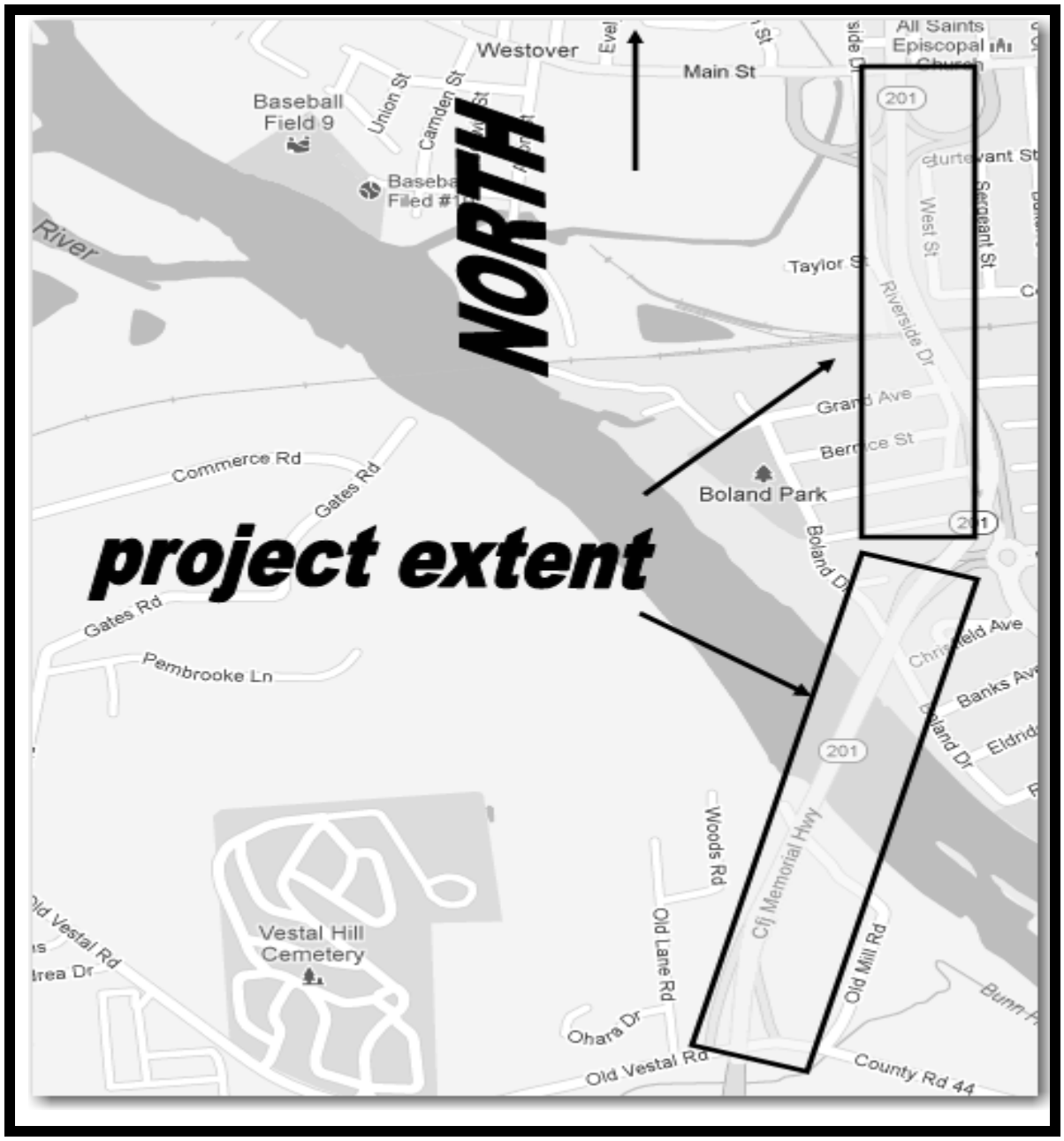
3. Description: 7,000 feet of 10-inch 124 psig steel gas main to serve new load and maintain system pressure.

4. Main Project Identification:	R-xx-xxx
5. Municipality:	Town of Vestal and Village of Johnson City, Binghamton, NY
6. Total Cost ($000)	1,350
7. 2013 Budget ($000)	0
8. 2014 Budget ($000)	0
9. 2015 Budget ($000)	0
10. 2016 Budget ($000)	1,350
11. 2017 Budget ($000)	0
12. Kind of Facility:	Distribution Gas Mains
13. Pressure:	Medium Pressure, 124 psig
14. Investment Reason:	System Capacity
16. Submitted by:	Mike Harvey

Information to prioritize the Projects

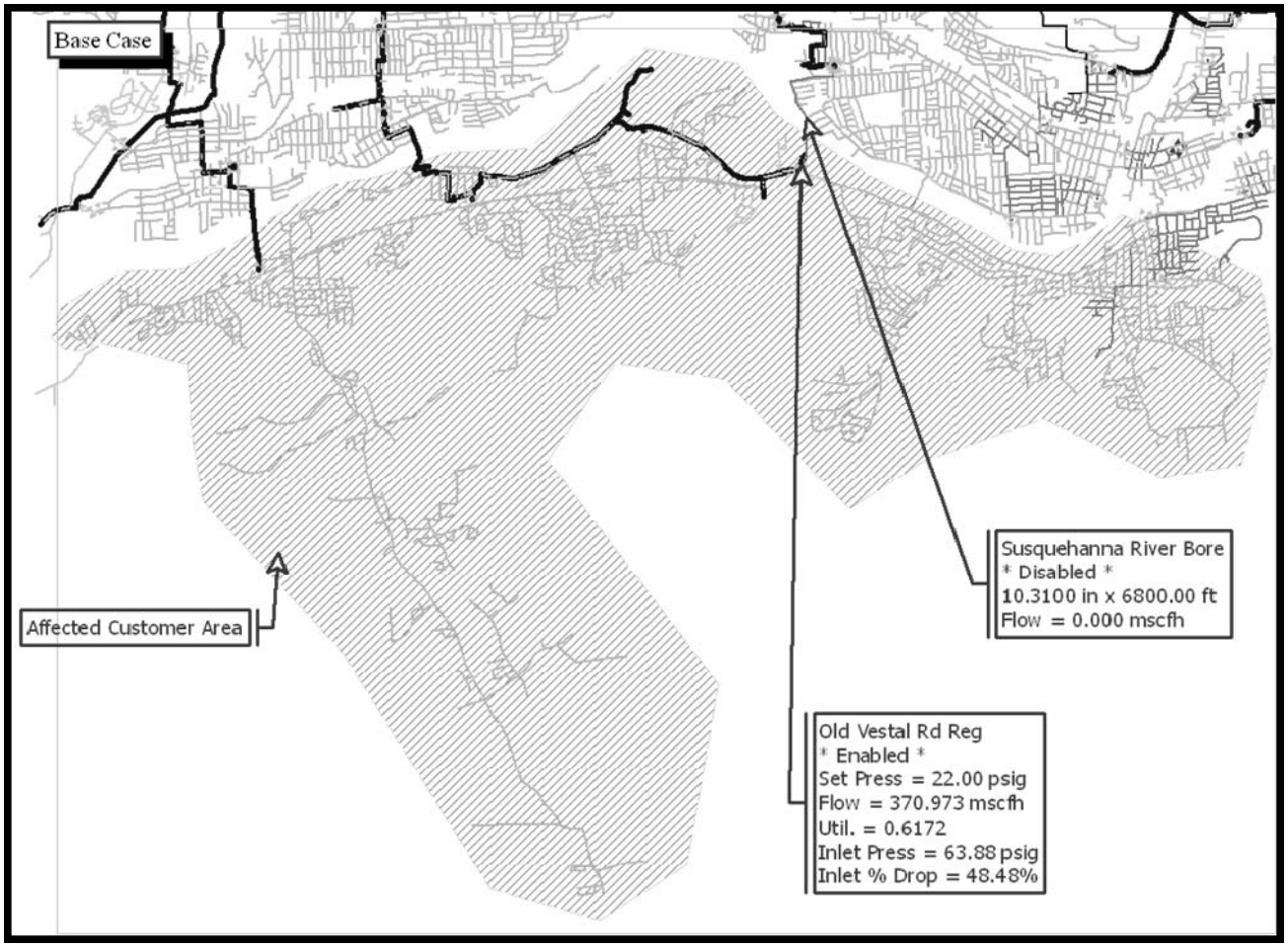
This system capacity project will improve system pressure for an area affecting residential, commercial, and industrial customers.

Map for Project Scope



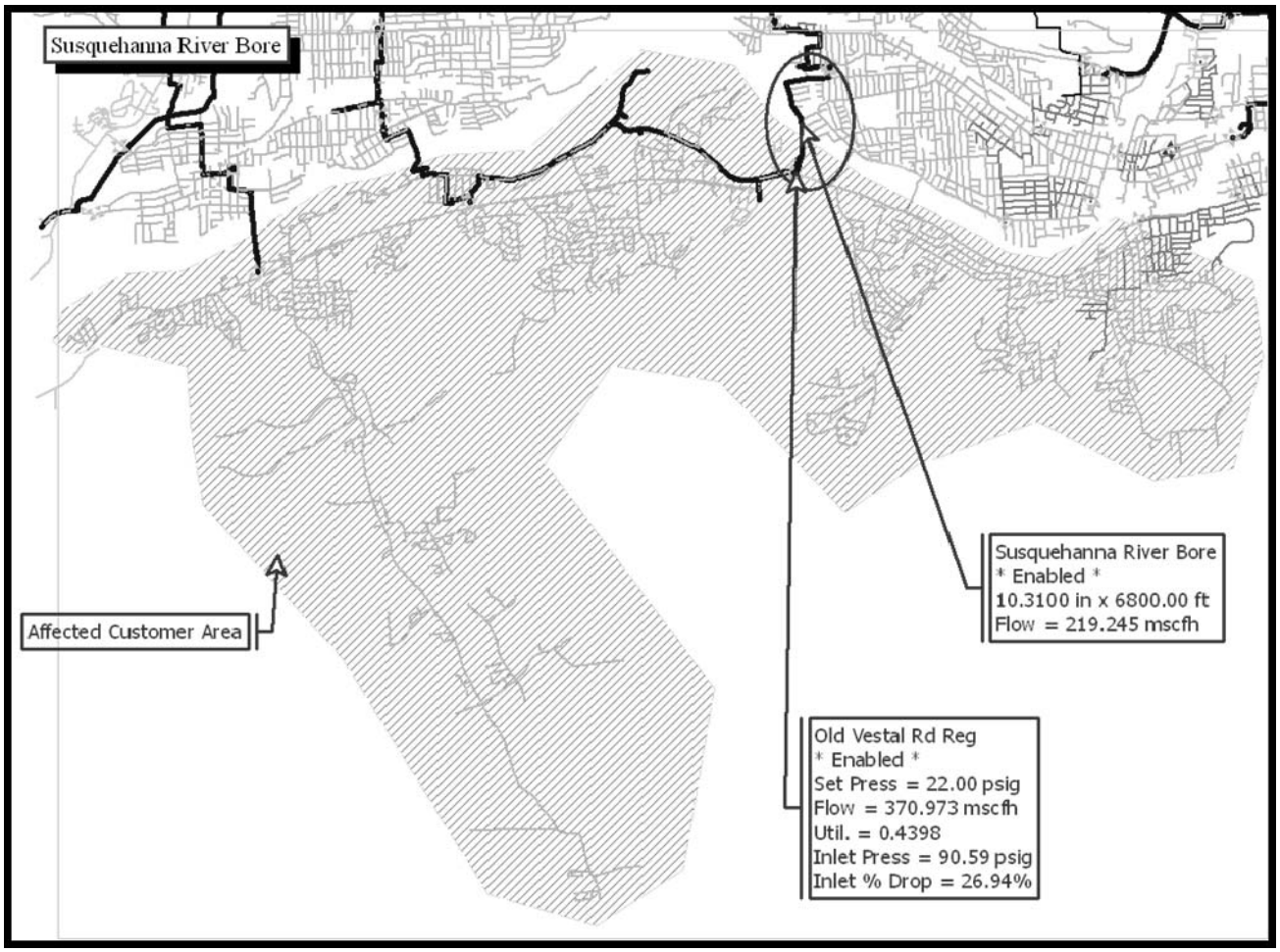
System Pressure Before Improvement on Design Day

Blue = 124 psig MAOP system; Green = 25 psig MAOP system



System Pressure After Improvement on Design Day

Blue = 124 psig MAOP system; Green = 25 psig MAOP system



ALTERNATIVES — Iberdrola USA Capital Project Model (v11.3)

Project number and title: **NYSEG-14-xx Vienna Rd Macedon Feeder Main Replacement**
Company name: **New York State Electric & Gas**
Estimated project life (years): **70**

ALTERNATIVES TO THE PROJECT AND WHY THEY WERE REJECTED:

	Alternative Considered	Reason for Rejecting Alternative in Favor of Proposed Project
1	Install12" main instead of 10" main	Increasing an additional pipe size did not resulted in marginal increases in pressure and capacity. 10" main is sufficient for existing design day conditions and future growth.
2	Replace a different portion of the feeder main that is located further downstream.	This is approximately 12,000 linear of 6" steel main. Replacing this portion does not increase the pressure at the end of the system above 70% MAOP and has no impact on the upstream portion of the Feeder Main.
3	Do nothing (avoided cost)	The estimated cost for the Vienna Road Macedon Feeer Main replacement is $7,100,000. Although infrastructure projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.
4		

GENERAL INFORMATION — Iberdrola USA Capital Project Model (v11.3)

Purpose of worksheet: input general information associated with the project.

Budget year:	2016
Company name:	New York State Electric & Gas
Project title:	Vienna Rd Macedon Feeder Main Replacement
Project number:	NYSEG-14-xx
Project classification:	Non-load, gas
Project location:	NY
Year project fully in-service:	2018
Estimated project life (years):	70
Salvage value at project end ($000):	

Project description:

Project proposal is to replace approximately 39,500 feet of 8" steel feeder main with 10" steel main at 124 psig.

Project justification:

The purpose of this system capacity project is to increase pressure along the Vienna Road-to-Macedon 124 psig feeder main to serve new load and while maintaining 70% of system MAOP (87 psig out of 124 psig) on the design day in accordance with IUSA's Gas System Planning Manual planning and design criteria. The existing system is below 50% of maximum operating pressure on design day at the Quaker Road Regulator Station (Macedon). The system is experiencing growth and lacks capacity to support additional load. The downstream system, the Macedon 45 psig MAOP system, has been supplemented by an emergency interconnect with RG&E since 2008 to maintain system pressures during peak usage periods. This system capacity improvement project will increase reliability and capacity to the following NYSEG municipalities: Newark, Manchester, Palmyra, Macedon.

The project will accommodate existing and expected customer load demand, allowing NYSEG to maintain adequate system pressure and meet NYSEG's obligation to serve new customers in existing franchise area. Approximately 4,000 existing customers, and future potential customers, will benefit from this increase in reliability and ability to serve new load.

Submitted by:	Brian Jacobs
Project sponsor:	Gregory George

PROJECT RATING INPUTS — Iberdrola USA Capital Project Model (v11.3)

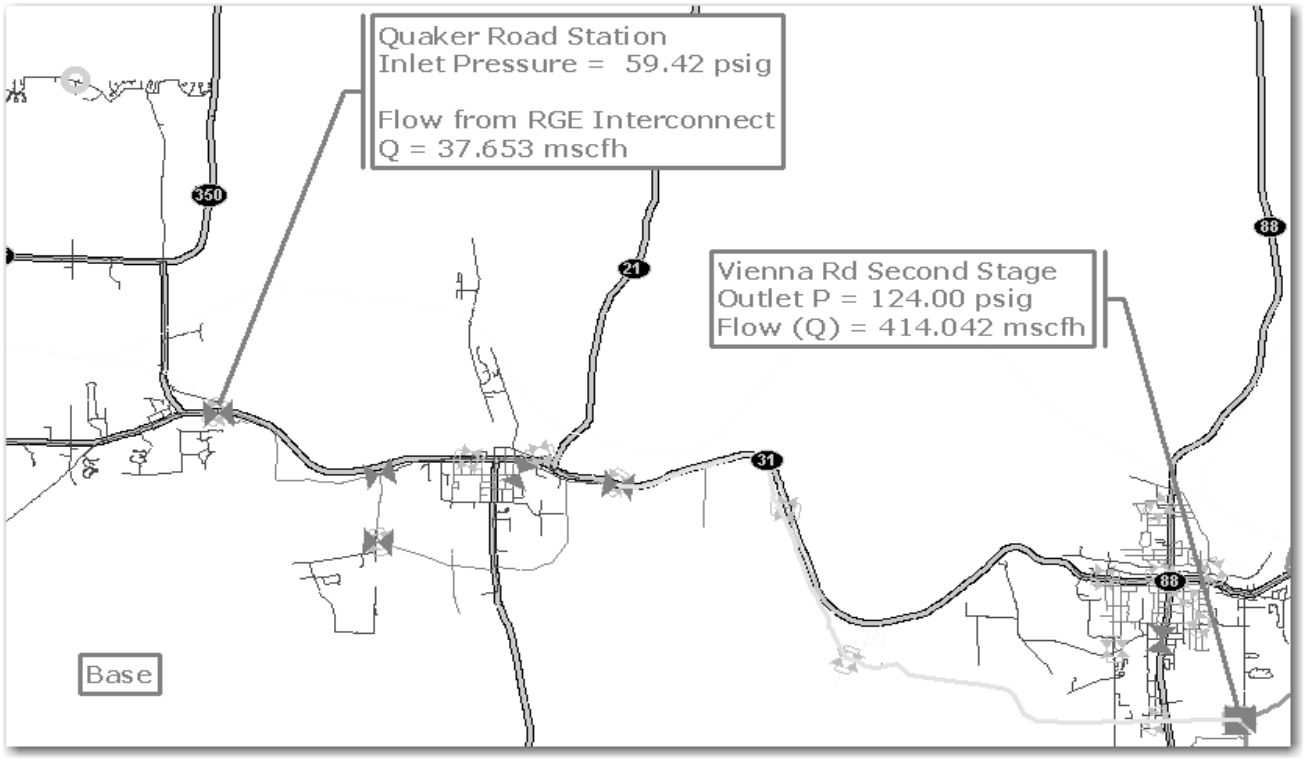
Purpose of worksheet: input ratings to reflect importance of each criteria in determining need for the project.

Project number and title: **NYSEG-14-xx Vienna Rd Macedon Feeder Main Replacement**
Company name: **New York State Electric & Gas**
Estimated project life (years): **70**

IMPORTANT NOTE: If any "**MUST-DO**" box is checked, do not assign ratings for any of the criteria.

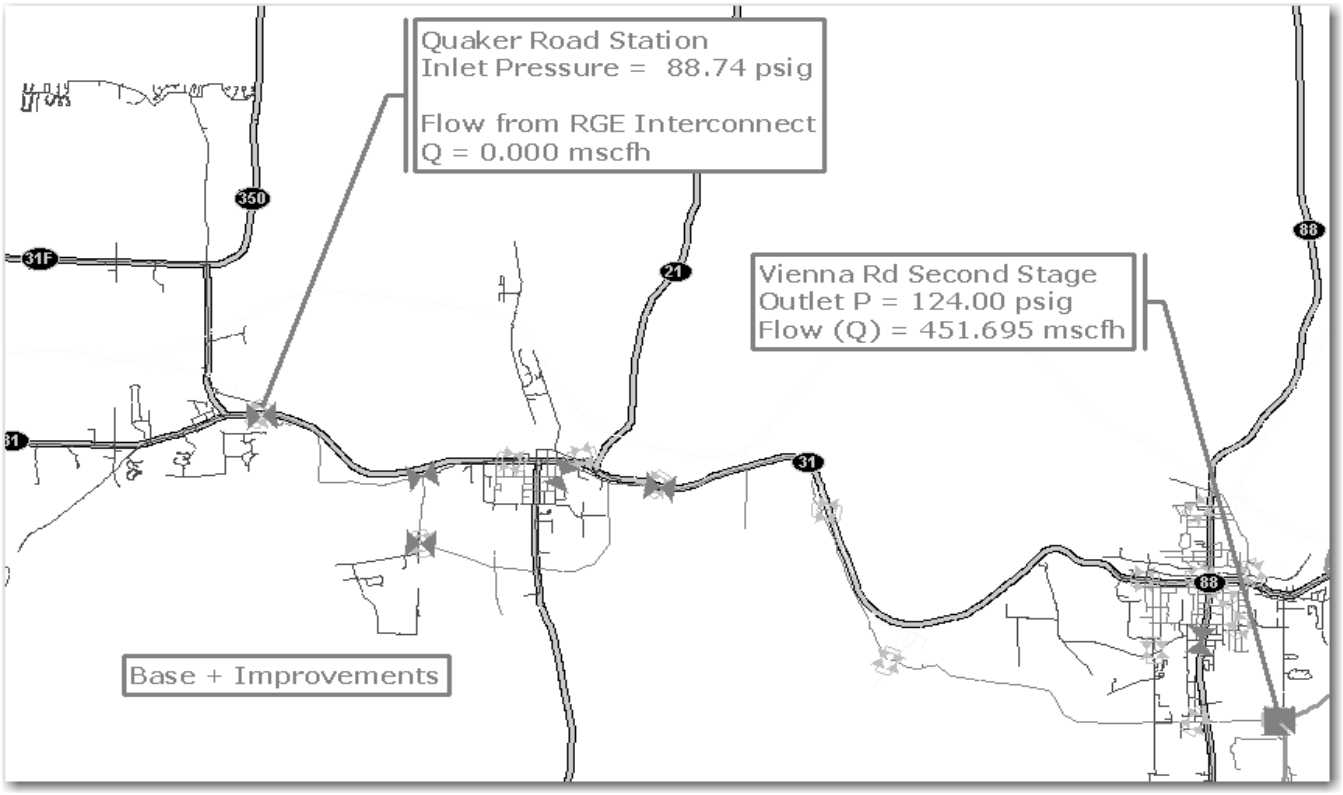
CRITERIA	CHECK IF 'MUST-DO'	RATING	RATIONALE FOR RATING OR 'MUST DO' DESIGNATION (be specific)
Safety		None	
Quality of service		Very high	The project increases system pressure for the design day from below 50% MAOP to a level above 70% MAOP.
Regulatory / statutory		None	
Revenue enhancing		Very low	Currently the Macedon 45 psig system cannot connect additional load due to pressure concerns (<50% of MAOP on design day).
Efficiency / cost reduction		None	
Environmental / permitting		None	
Other business requirements		None	
TOTAL WEIGHTED RATING		**0.86**	

System Pressure Before Improvement on Design Day



Red Main: 124 psig MAOP
Blue Main: Medium Pressure (15 psig to 51 psig) MAOP
Red highlighted Main (Cyan on map): 124 psig MAOP (8" Steel)

System Pressure After Improvement on Design Day



Red Main: 124 psig MAOP
Blue Main: Medium Pressure (15 psig to 51 psig) MAOP

System Planning Study Report

RG&E
Project: CM1 Gas Main Replacement Wheatland Center Rd to Humphrey Rd, Replace Gas Main, Roch

1. Main Target:

This reliability risk project will replace the CM1 20" 1951 gas transmission main with a new 24" wrapped steel gas transmission pipeline from Wheatland Center Rd to Humphrey Rd. The existing 250 psig pressure system has an end point pressure of only 70% of system maximum allowable operating pressure (MAOP) at the inlet of the Buffalo Road distribution regulator station. The new pipeline will be constructed to operate at a MAOP of 330 psig. This project will increase the current system operating pressure from 250 to 330 psig, which will increase inlet station pressure and capacity to the Buffalo Road regulator station.

The Buffalo Road Regulator Station is a major distribution location in the Rochester District feeding 4 systems: SF115 Mt Read Blvd, SF180 CM1B, MF120 Western Monroe, and the MF99 East Station systems. 70% MAOP at the inlet to Buffalo Road is insufficient to feed these 4 systems for the design hour. The area served by this station has been experiencing significant load growth due to customer requests for CNG fleet fueling stations, coal conversion, and other residential and commercial growth.

The CM1 replacement will tie-in to the new CM5 pipeline at Humphrey Rd and operate with a MAOP of 330 psig. This will create a new dual supply 330 psig operating system from the Caledonia Gate Station to the New Empire West Chili Gate Station and CM5 at a MAOP of 330 psig which will increase the 330 psig gas supply to the Buffalo Road distribution regulator station improving system reliability.

Under peak hour design day conditions the pressure to the Buffalo Road distribution regulator station will increase from 180 psig to 305 psig. Capacity on the RG&E Transmission system will increase by approximately 30%. This will support long term natural gas load growth throughout a majority of the Rochester District distribution systems as described above.

2. Description

The existing 20" steel gas transmission main from Wheatland Center Rd to Humphrey Rd will be replaced with 24" steel gas pipe to operate at a maximum allowable operating pressure of 330 psig. The 24" pipeline will be designed for less than 20% SMYS.

The new 24" pipeline will tie into the new Empire West Chili 16 Gate Station and CM5 at Humphrey Rd. The entire project will be completed in the Towns of Chili, Gates, and Wheatland, NY.

This is an Article VII project with engineering proposed to begin in 2017.

3. Driver

This section of CM1 transmission pipeline was built in 1951 construction that is at 19.0% SMYS and non-piggable. The new transmission pipeline will be constructed to less than 20% SMYS and also be piggable. This project will maintain pipeline safety by reducing operating pressures to less than 20% SMYS and replacing pipeline sections in accordance with Integrity Management requirements. The project also improves overall transmission and feeder system reliability and system pressures at major distribution regulating stations in accordance with RGE's Gas System Planning Manual criteria, including: Buffalo Rd Regulator Station, RS 320 Whalen Rd, RS 319 Salt Rd, RS 468 Browncroft Blvd, RS 470 Blossom Rd and RS 369 East Station.

This project will improve system supply and operating constraints on the Dominion Transmission Company (DTI) pipeline by allowing greater flexibility year round for system nominations between suppliers (Empire Pipeline and DTI). The supply constraints are the balance or percentage of gas that needs to be taken from each supplier to meet system demand and pressure on the design day and hour and during cold weather conditions. The overall transmission system capacity will increase by 30% accommodating long term load growth.

Historical records identified concerns with the girth welds on the 20" segment and did not meet the 1972 welding standard of API 1104. This concern was mitigated in 1972 by installation of weld reinforcements in identified areas. There is some risk that additional unacceptable welds may exist on the segment, which have not been inspected and where surrounding population density has increased since the investigation.

4. Other Alternatives Considered

Alternate locations and routes for the new 24 inch pipeline were considered and rejected due to the location of the new Empire West Chili Gate Station. Other routes would increase the overall pipeline length and have higher construction costs to tie-in to the new CM5 pipeline.

CM1 pipeline repair and MAOP increase is not considered a viable alternative to replacement. The basis for not repairing and uprating the CM1 pipeline to 330 psig includes: girth weld and construction practices at the time of construction do not meet present day API welding standards, girth weld location and inspection records were not required or maintained from the time of construction and general construction practice of the period do not meet present day regulatory requirements.

5. Customer Benefits

The installation of 24 inch wrapped steel gas transmission pipeline will better accommodate existing and expected future customer load demand, allow RG&E to maintain adequate system pressure at the Buffalo Rd regulator station which is the termination point of the CM1, CM4 and CM5 pipelines, while improving safety through replacement of the existing pipeline.

6. Cost and Avoided Costs

The estimated cost for the CM1 replacement project is $25,500,000.

7. Maps

Please see attached.

PROJECT SUMMARY

Rochester Gas & Electric

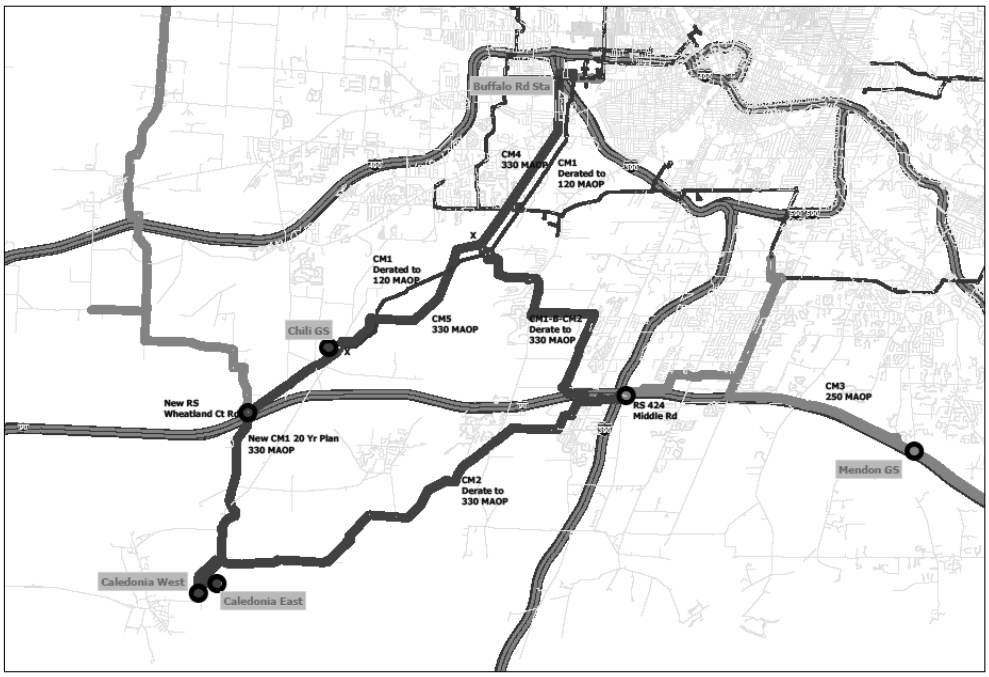
1. Project CM1 Replacement Wheatland Center Rd to Humphrey Rd, Replace Gas Main, Roch
2. Identification R-xx-xxx
3. Description: 35,000' of 24" wrapped steel gas transmission pipeline along Wheatland Center Rd to Humphrey Rd to replace existing 20" steel gas transmission pipeline.
4. Main Project Identification: R-xx-xxx
5. Municipality: Chili, Gates and Wheatland, NY (Rochester Central District)
6. Total Cost ($000) 25,500
7. 2017 Budget ($000) 500
8. 2018 Budget ($000) 5,000
9. 2019 Budget ($000) 10,000
10. 2020 Budget ($000) 10,000
12. Kind of Facility: Gas Transmission Pipeline
13. Pressure: High Pressure, 330 psig
14. Investment Reason: Reliability Risk (Asset Condition and System Capacity)
16. Submitted by: Frank Ferland

Information to prioritize the Projects

This project will improve system pressure for an area affecting approximately 50% of the Rochester District residential, commercial, and industrial customers.

Map for Project Scope

RGE Transmission System 5-10 Year Plan, 330 Option 20 Yr Plan



Model Name: RGE Transmission 5-10 Yr Plan Layout 330 Option 20 Yr Plan

SynerGEE Gas 4.4.0 (08 Jan 2009)

6/3/2015 9:17:04 AM

System Planning Study
Executive Summary

RG&E
Project: MF42 Henrietta System Improvements, 2 Phases

I. Summary

The MF 42 Henrietta System Infrastructure Improvements have been planned as two distribution main projects based on the following considerations: safety, constructability, project management, budget management, permitting, impact on communities and customers, and investment prioritization.

II. Description

The MF42 Henrietta System is located within Monroe County only, generally bordered by the town boundaries of Mendon, Brighton, Pittsford, Chili, and Rush. Due to recent residential, commercial, and industrial growth in this pressure system, system low points are found within the commercial areas of Henrietta as well as the most recent residential developments including Winfield Park (490 units), Graywood Meadows (150 lots), Queens Park (125 lots), Legacy at Erie Station (8 buildings), and Ward Hill (23 lots). The system low point is 26 psig (61% MAOP).

The MF42 Henrietta System Infrastructure Improvements includes the following 2 Phases:

A. MF 42 Henrietta: Brighton Henrietta Townline Rd Improvement, Install Gas Mains, Roch
B. MF 42 Henrietta: Thruway Park Drive, Install Gas Mains, Roch

For more detailed information about each project, refer to the individual Project Reports.

III. System Improvement Results

Table 1 illustrates the cumulative system pressure increases at various locations throughout the MF42 Henrietta System. The “Before” pressure represents current Design Day pressures. The “After” pressure represents the modeled Design Day pressures after all phases have been completed.

Table 1. Summary of Pressure Improvements for MF42 Henrietta system

Node	Description	Pressure with existing conditions (psig)	Pressure with Improvements (psig)
SynerGEE Gas 4.4.0: Facilities MF42 HENRIETTA: Brighton Henrietta Townline Rd			
BUDGET Node1284980	BJ's WHOLESALE CLUB + 3 anchor stores	32.4	35.0
BUDGET R02000052441375	CLAYTON ARMS APTS / WALMART / Sam's Club	32.1	34.8
BUDGET Node1277987	Chelsea Meadows Dr residential area	32.6	34.6
BUDGET Node1278275	Commerce Dr (commercial business block)	32.7	35.1
BUDGET R02000052444809	MONROE NEWPOWER CORP (@ Monroe Community College campus)	34.5	39.4
BUDGET Node1284967	Marketplace Mall	32.7	35.3
BUDGET Node1280514	Methodist Hill Dr (commercial business park)	32.8	35.1
BUDGET Node1285055	Metro Park (commercial area)	34.7	39.5
BUDGET Node1284984	Mushroom Blvd (RG&E facility and commercial area)	25.9	29.1
BUDGET Node1278305	Park Point @ RIT (residential and commercial mixed use area)	32.7	35.2
BUDGET Node1280641	SOUTHTOWN PLAZA (large commercial block)	32.7	35.3
BUDGET Node1278000	Summit Point Dr (6 hotels in area)	30.6	32.9
BUDGET Node1289650	Systems Dr @ East Henrietta Rd (west end of project scope)	34.8	39.7
BUDGET No157	Winfield Pk (mixed use development, potential for approximately 70 mcfh growth over 10+ years)	36.6	41.0
MF42 HENRIETTA: Thruway Park Dr			
BUDGET R02000058103011	COOPERVISION	25.4	35.1
BUDGET Node1922	Erie Station Village URD and Senior Apartments	25.0	34.7
BUDGET Node1277866	Wheeler Rd residential / apartments	27.4	35.3
BUDGET Node1276017	Improvement B (east end of improvement)	30.1	35.1
	Model State: Solved Generated on 9/23/2015 3:38:49 PM SynerGEE Gas 4.4.0: Facilities		
Note: 29.4 psig is 70% MAOP for this pressure system (42 psig maximum pressure)			

System Planning Study Report

RG&E
Project: MF42 HENRIETTA Brighton Henrietta Town Line Rd, Install Gas Mains, Roch

1. Main Target:

This system capacity project involves the installation of new gas mains on the MF42 Henrietta pressure system, along Brighton Henrietta Town Line Road will improve system pressure that is currently close to or below 50% of system MAOP, such that it will be increased to a level above 70% of system MAOP. The installation of 12" plastic gas mains will facilitate more efficient distribution through the MF42 Henrietta pressure system and help compensate for recent increases in customer load demand.

2. Description

New 12" plastic gas mains will be installed: 6420' along Brighton Henrietta Town Line Rd (Canal View Blvd to East Henrietta Rd). These new mains will strengthen existing looped feeds on the MF42 Henrietta gas pressure system, adjacent to the major commercial corridor for the immediate area. The project is located in the town of Henrietta, NY.

3. Driver

This project on the MF42 Henrietta gas pressure system is categorized as system capacity. This project has been identified to restore 70% of system MAOP (29.4 psig out of 42 psig) throughout the system on the design day in accordance with IUSA's Gas System Manual Planning criteria. The gas main sections of the MF42 Henrietta pressure system to be improved by this project are currently above 50% and below 70% MAOP. The project improves overall system pressure by increasing the maximum flow of gas adjacent to Jefferson Road (a major commercial corridor in the town of Henrietta). Existing mains are currently 4", 8", and 12" in diameter within the project scope.

4. Other Alternatives Considered

The existing gas system has experienced significant commercial and industrial growth over the past several years, resulting in areas of the pressure system operating at pressures below 70% MAOP but above 50% MAOP. Other areas of the pressure system have gas pressures below 50% MAOP for design day conditions. Safety issues and equipment problems are more frequent and a greater possibility at pressures below 50% of MAOP. Replacing the existing gas main with 12" pipe will increase system pressure so that pressure levels will be at or above 70% of system MAOP. This project will diminish the need to replace gas mains on NYSDOT roads (Jefferson Road, West Henrietta Rd, East Henrietta Rd), which is not preferable as these roads are heavily traveled and/or recently reconstructed by NYSDOT.

5. Customer Benefits

The installation of 12" plastic gas mains will improve system reliability, better accommodate existing and expected future customer load demand, and allow RG&E to maintain adequate system pressure through the whole pressure system. At least 1500 customers will benefit from this project.

6. Cost and Avoided Costs

The estimated cost for the MF42 HENRIETTA Brighton Henrietta Town Line Rd project is $1,100,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

Please see attached.

PROJECT SUMMARY

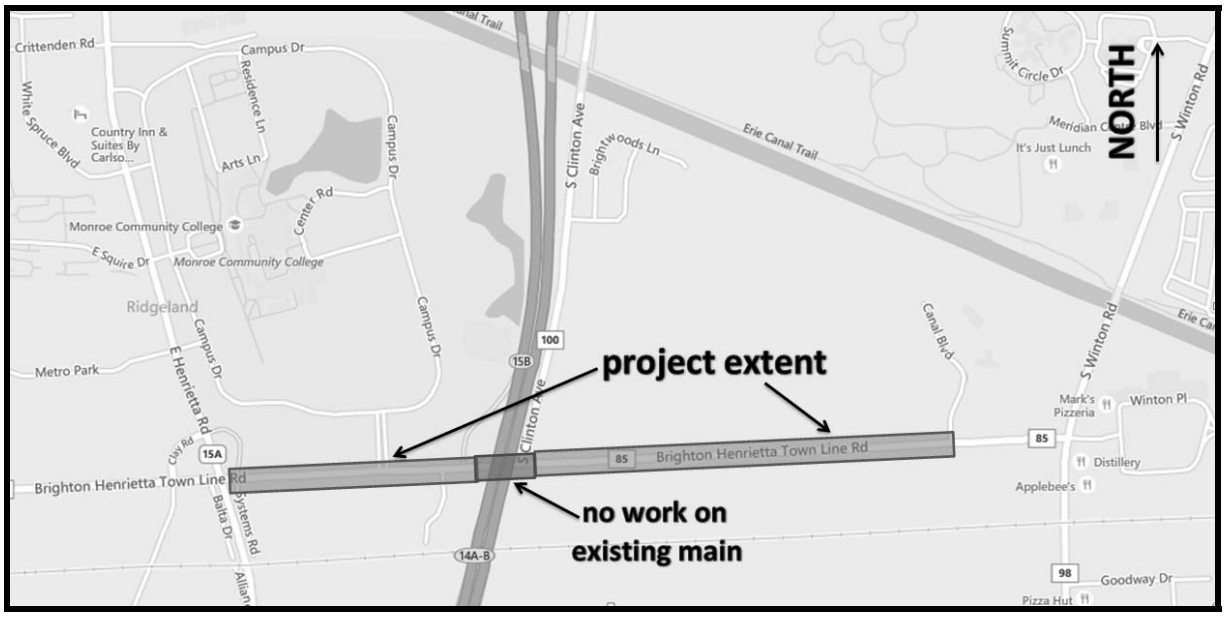
Rochester Gas & Electric

1.	Project	MF42 HENRIETTA Brighton Henrietta Town Line Rd Install Gas Mains, Roch
2.	Identification	R-xx-xxx
3.	Description:	6420' along Brighton Henrietta Town Line Rd (Canal View Blvd – 8" mains @ East Henrietta Rd); excludes existing 12" mains that cross I-390
4.	Main Project Identification:	R-xx-xxx
5.	Municipality:	Henrietta, NY (Rochester District)
6.	Total Cost ($000)	1100
7.	2016 Budget ($000)	0
8.	2017 Budget ($000)	1100
9.	2018 Budget ($000)	0
10.	2019 Budget ($000)	0
11.	2020 Budget ($000)	0
12.	Kind of Facility:	Distribution Gas Mains
13.	Pressure :	Medium Pressure, 42 psig
14.	Investment Reason:	System Capacity
16.	Submitted by:	Melissa Reese

Information to prioritize the Projects

This project will improve system pressure for an area affecting approximately 1500 residential, commercial, and industrial customers.

Map for Project Scope



System Planning Study Report

RG&E
Project: MF42 Henrietta Thruway Park Dr, Replace Gas Mains, Roch

1. Main Target:

This system capacity project involves the replacement of existing gas mains in the MF42 Henrietta gas pressure system along Thruway Park Drive. The project will eliminate limitations for existing and future residential, commercial, and industrial customers. The installation of 4" plastic gas mains will facilitate more efficient distribution through the MF42 Henrietta pressure system and compensate for recent increases in customer load demand.

2. Description

The existing 2" and 3" steel and plastic gas mains identified as segments A, B, and C on the map provided in this report will be replaced with 4350' of 4" plastic gas mains, along Thruway Park Drive, between the intersections with Erie Station Road and West Henrietta Road in the Town of Henrietta.

3. Driver

This project is categorized as system capacity. The completion of phase 3A and 3B of the MF42 Henrietta System Improvement Projects have improved gas pressure in the overall area, but not enough to support anticipated development along Thruway Park Dr specifically. The pressure in the gas mains associated with this improvement project is at 55% MAOP. Due to recent residential development installations, additional load requests, and reviews of current gas pressure levels, main replacements are necessary to restore 70% MAOP in this area of the MF42 Henrietta pressure system in accordance with IUSA's Gas System Planning Manual criteria (29.4 psig out of 42 psig). There are currently 8-10 empty lots that are zoned for commercial/industrial development along Thruway Park Dr, within the project scope. The developer of the industrial park is actively marketing those remaining lots. The gas mains to be replaced and/or installed will increase the system capacity enough to accommodate the expected gas load from businesses built on the 8-10 remaining lots. Studies of the MF42 gas pressure system, current system load capacity, and recent additional load requests from existing customers along Thruway Park Dr, demonstrate that RG&E needs to complete this phase in 2016 to meet customer demand. Construction on the remaining commercial/industrial lots along Thruway Park Drive is anticipated within five years.

4. Other Alternatives Considered

The replacement of the existing gas mains with the same diameter pipe, within the project scope could decrease project costs, but would not fulfill the need for pressure improvements throughout the MF42 Henrietta pressure system or for anticipated increases in customer load demand. Replacement of the existing 2" and 3" steel with 2" plastic would not facilitate the movement of sufficient gas through the MF42 Henrietta gas pressure system to maintain 70% MAOP.

5. Customer Benefits

The installation of 4" PE gas mains will improve system reliability, better accommodate existing and expected future customer load demand, and allow RG&E to maintain adequate system pressure through the whole pressure system. This project will benefit approximately 600 customers.

6. Cost and Avoided Costs

The estimated cost for the MF42 Henrietta Thruway Park Drive project is $280,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

Please see attached.

PROJECT SUMMARY

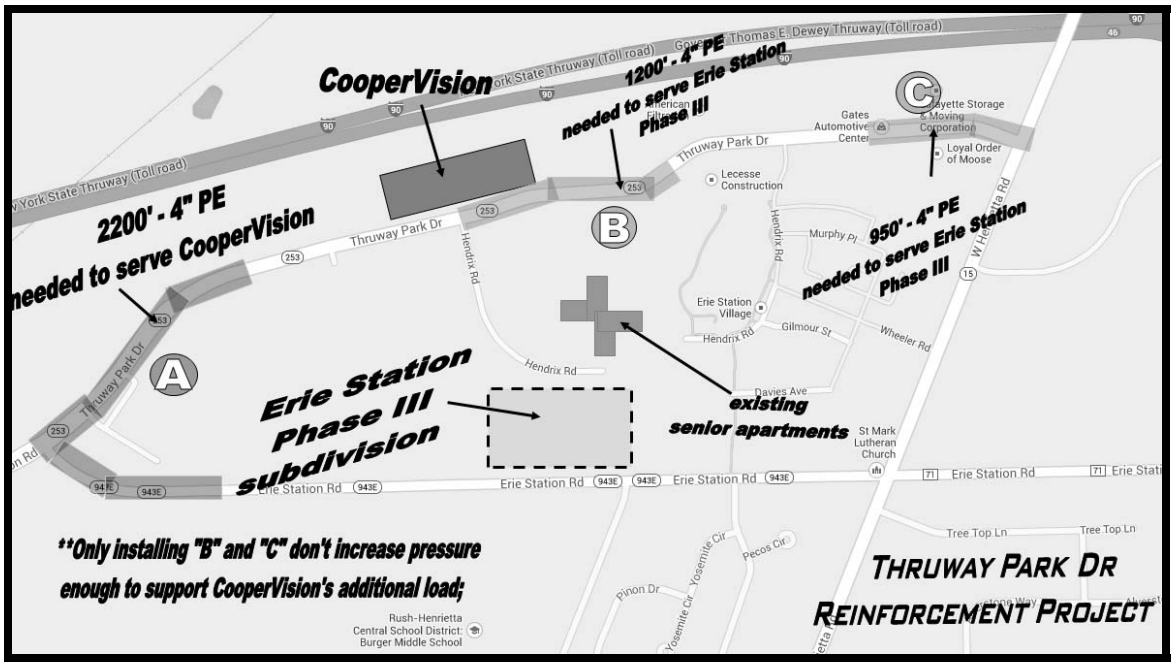
Rochester Gas & Electric

1. Project Identification: MF42 Henrietta Thruway Park Dr, Replace Gas Mains, Roch R-xx-xxx
2. Description: 4350' of 4" plastic gas mains along Thruway Park Dr to replace existing 2" and 3" steel and plastic mains.
3. Main Project Identification: R-xx-xxx
4. Municipality: Henrietta, NY (Rochester Central District)
5. Total Cost ($000): 280
6. 2016 Budget ($000): 280
7. 2017 Budget ($000): 0
8. 2018 Budget ($000): 0
9. 2019 Budget ($000): 0
10. 2020 Budget ($000): 0
11. Kind of Facility: Distribution Gas Mains
12. Pressure : Medium Pressure, 42 psig
13. Investment Reason: System Capacity
14. Submitted by: Melissa Reese

Information to prioritize the Projects

This project will improve system pressure for an area affecting approximately 600 residential, commercial, and industrial customers.

Map for Project Scope



System Planning Study
Executive Summary

RG&E
Project: MF60 Southeast System Improvements, 6 Phases

I. Summary

The MF 60 Southeast System Infrastructure Improvements have been planned in six (6) phases based on the following considerations: safety, constructability, project management, budget management, permitting, impact on communities and customers, and investment prioritization.

II. Description

The MF60 Southeast System is located within Ontario County only, contained entirely in the Town of Farmington and the Town and Village of Victor. Due to recent residential, commercial, and industrial growth on this pressure system, system low points are found within the commercial areas of Victor and Farmington as well as the most recent residential developments including Hickory Rise (200 lots), Creekwood Estates (20 lots), Auburn Meadows (350 lots), and The Estates at Beaver Creek (60 lots). The system low point is 33 psig (55% MAOP).

The MF60 Southeast System Infrastructure Improvements includes the following Phases:

A. MF60 Southeast: New Michigan Rd, Install Gas Mains, Roch (anticipated completion by year-end 2015)
B. MF60 Southeast: Collett Rd, Install Gas Mains, Roch (anticipated completion by year-end 2015)
C. MF60 Southeast: County Rd 41, Install Gas Mains, Roch
D. MF60 Southeast: Gillis Rd, Install Gas Mains, Roch
E. MF60 Southeast: Boughton Hill Rd, Install Gas Mains, Roch
F. MF60 Southeast: NYS Route 444, Install Gas Mains, Roch

For more detailed information about each project, refer to the individual Project Reports.

III. System Improvement Results

Table 1 illustrates the cumulative system pressure increases at various locations throughout the MF60 Southeast System. The “Before” pressure represents current Design Day pressures. The “After” pressure represents the modeled Design Day pressures after all phases have been completed.

Table 1. Summary of Pressure Improvements for MF42 Henrietta system

Node	Description	Pressure with existing conditions (psig)	Pressure with Improvements (psig)
SynerGEE Gas 4.4.0: Facilities			
MF60 SOUTHEAST Improvement Group			
Name	Description	Pressure	
MF60 SE Node1851	County Rd 41, east end of project	33.76	39.38
MF60 SE Node1849	Boughton Hill Rd, east end of project	38.89	40.53
MF60 SE Node1773	New Michigan Rd, east end of project	36.24	39.67
MF60 SE Node1328934	County Rd 8, north end of existing dead end main	33.85	39.13
MF60 SE Node1327820	Collett Rd, east end of project	36.57	41.51
MF60 SE Node1327596	Canandaigua Farmington TL Rd (3 residential developments)	36.25	39.62
MF60 SE Node1327188	Hunt's Mobile Home Park	40.77	42.15
MF60 SE Node1326522	Gillis Rd, east end of improvement	47.47	49.64
MF60 SE Node1325122	Brace Rd residential development	40.82	42.12
MF60 SE Node1323514	NYS Route 444, north end of project	39.99	40.85
MF60 SE Node1319238	Modock Rd & Rawson Rd residential development area	41.46	42.19
Model State: Solved			
Generated on 9/23/2015 3:38:49 PM			
SynerGEE Gas 4.4.0: Facilities			
Note: 42 psig is 70% for this pressure system (60 psig maximum pressure)			

System Planning Study
Executive Summary

RG&E
Project: MF 60 Northeast (MF60NE) System Improvements, Phases 1 -5

I. Summary

The MF 60 Northeast System Infrastructure Improvements have been planned in five (5) phases based on the following considerations: safety, constructability, project management, budget management, permitting, impact on communities and customers, and investment prioritization.

II. Description

The MF60NE System extends over two counties (Monroe and Wayne), from Irondequoit Bay (westerly boundary) to the easterly bounds of Wayne County. Due to the natural boundary of Lake Ontario to the north, the dead-end mains servicing the lakeshore represent the system low points. The northwesterly endpoint, located along Culver Road, has a current pressure of 39 PSI (65% MAOP). The northeasterly endpoint, located along Lake Road in Pultneyville, has a current pressure of 24 PSI (40% MAOP); this point is the lowest endpoint pressure in the Rochester District.

The MF60NE System Infrastructure Improvements includes the following Phases:

A. MF 60 Northeast System Improvement, Phase 1, Install Gas Main
B. MF 60 Northeast System Improvement, Phase 2 (Salt Road Corridor)
C. MF 60 Northeast System Improvement, Phase 3 (Rte 250 Corridor)
D. MF 60 Northeast System Improvement, Phase 4 (Carter Road Corridor)
E. MF 60 Northeast System Improvement, Phase 5 (Rte 250 Corridor)

For more detailed information about each phase, refer to the individual Project Reports.

III. System Improvement Results

Table 1 illustrates the cumulative system pressure increases at various locations throughout the MF 60 Northeast System. The “Before” pressure represents current Design Day pressures. The “After” pressure represents the modeled Design Day pressures after all phases have been completed.

SynerGEE Gas 4.4.0: NE 60 Improvement Report

1	2	3	4	5
			(Before)	(After)
	Name	**Description**	**Reference Pressure (psig)**	**Pressure (psig)**
1	Node1311046	Empire Blvd (ep)	36.47	42.70
2	Node1314561	Rte 404 @ Bay Rd	40.47	46.51
3	Node1318868	Five Mile Line Rd @ Rte 104	41.10	52.67
4	Node1321347	Shoemaker Rd @ Sherbourne Rd	38.35	46.44
5	Node1322146	Whitney Rd @ Turk Hill Rd	43.51	50.39
6	Node1322428	Rte 250 @ Rte 441	43.71	49.40
7	Node1322583	Whalen Rd @ Rte 250	43.77	50.78
8	Node1322639	Rte 250 @ Rte 286	37.81	58.06
9	Node1323109	Holt Rd @ Klem Rd	39.64	48.91
10	Node1327539	County Line Rd @ Boston Rd	34.02	47.64
11	Node1328645	Whitney Rd @ Lincoln Rd	46.96	59.49
12	Node1329265	Slocum Rd @ Willits Rd	34.85	44.02
13	Node1329531	Rte 104 @ Rte 350	40.27	46.57
14	Node1329569	Lake Rd @ Ontario Cnt Rd	39.18	45.73
15	Node1330561	Rte 21 @ Franklin Rd	52.09	53.64
16	Node1330750	Lake Rd @ Jay St	23.60	33.32
17	Node1330900	Ridge Rd @ Redman Rd	38.09	42.20
18	Node1331270	Rte 104 @ S Geneva Rd	52.67	53.57
19	Node1333739	Culver Rd @ 590	39.07	46.42
20	R_437_I	Penfiled Rd @ Poplar Dr	37.70	41.07

Model State: Solved

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SynerGEE Gas 4.4.0: NE 60 Improvement Report

Table 1

System Planning Study Report

RG&E
Project: MF 60 Northeast (MF60NE) System Improvement, Phase 1, Install Gas Main

1. Main Target:

The MF60NE System Improvement Project is a multi-phased system capacity project intended to increase pressures, capacity and reliability to meet the growth within the system and promote reliability to customers.

Phase 1 includes various gas main installations and replacements intended to eliminate dead-end gas mains and create looped piping sections that will increase capacity and pressures throughout the system. All of the work in Phase 1 is located within the Town of Webster and Town of Penfield.

2. Description

The MF60NE System extends over two counties (Monroe and Wayne), from Irondequoit Bay (westerly boundary) to the easterly bounds of Wayne County. Due to the natural boundary of Lake Ontario to the north, the dead-end mains servicing the lakeshore represent the system low points. The northwesterly endpoint, located along Culver Road, has a current pressure of 39 PSI (65% MAOP). The northeasterly endpoint, located along Lake Road in Pultneyville, has a current pressure of 24 PSI (40% MAOP); this point is also the entire RGE-Rochester endpoint in regards to pressure on 60 PSI systems.

The MF60NE System Improvements, Phase 1 includes the following:

A. Installation of approximately 9,700 linear feet of 8” diameter PE along portions of Klem Road, Phillips Road and Micheldean Drive.

B. Installation of approximately 1,700 linear feet of 4” diameter PE along County Line Road.

C. Installation of approximately 625 linear feet of 8” diameter PE, cross-lots between Ridge Road and Five Mile Line Road.

D. Installation of approximately 1,600 linear feet of 6” diameter PE along Plank Road.

E. Install approximately 975 linear feet of 4” diameter PE along Fairport Nine Mile Point Road.

3. Driver

For investment planning purposes, this project is categorized as a system capacity improvement. The MF60NE System has experienced significant growth within the past ten (10) years. According to the US Censes Bureau, between 2000 and 2010 the populations of the Town of Webster and the Town of Penfield

have grown approximately 12% and 5%, respectively. There have been significant, localized areas of growth and demand for natural gas, particularly along Ridge Road and Irondequoit Bay in Webster. The existing system is at 50% of maximum allowable operating pressure (MAOP) for the design day peak hour demand.

The above listed improvements, along with Phase 2 improvements, increase the pressure throughout the MF60NE system, to maintain a minimum of 50% of system MAOP in accordance with IUSA's Gas System Planning Manual criteria. The Pultneyville endpoint (Lake Road) increases from approximately 24 PSI to 31 PSI (from 40% MAOP to 51% MAOP); the pressure at the Culver Road endpoint increases from approximately 39 PSI to 47 PSI (from 65% MAOP to 78% MAOP).

Additionally, the improvements described above in Part A improve system reliability by completing a large-diameter (8"+) loop around the north end of the Village of Webster. This increases available capacity to the northerly and westerly portions of the MF60NE system.

4. Other Alternatives Considered

Gas System Planning reviewed numerous areas for pipeline system improvements, but few options eliminated dead-ends, looped piping segments and increased system pressures as cost-effectively as the selected alternatives. One alternative to create the large-diameter loop through the Village of Webster (similar to Part A above) is to install approximately 13,000 feet of 8" PE pipe along State Rte. 404 from Salt Road to Holt Road. This option was not further considered due to increased footage, cost and time associated with the NYS Department of Transportation (NYSDOT) highway permitting process, and the constraints associated with construction in the business district.

Due to the extensive amount of system improvements identified, the MF60NE System Improvement Project will be completed in phases. Phase 1 includes various gas main improvements to address system capacity concerns. Each phase will help to correct specific deficiencies within the system; while all phases combined will create a strong, healthy, viable gas system that can support current and future growth while maintaining company performance benchmarks and standards.

5. Customer Benefits

This project will better accommodate existing and expected future customer load demand and allow RG&E to maintain adequate system pressure through the MF60NE pressure system. Approximately 35,000+ existing customers, as well as future potential customers, will benefit from this increase in ability to serve new load.

6. Cost and Avoided Costs

The estimated cost for this phase of the MF60NE Improvement Project Phase 1 is $1,025,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

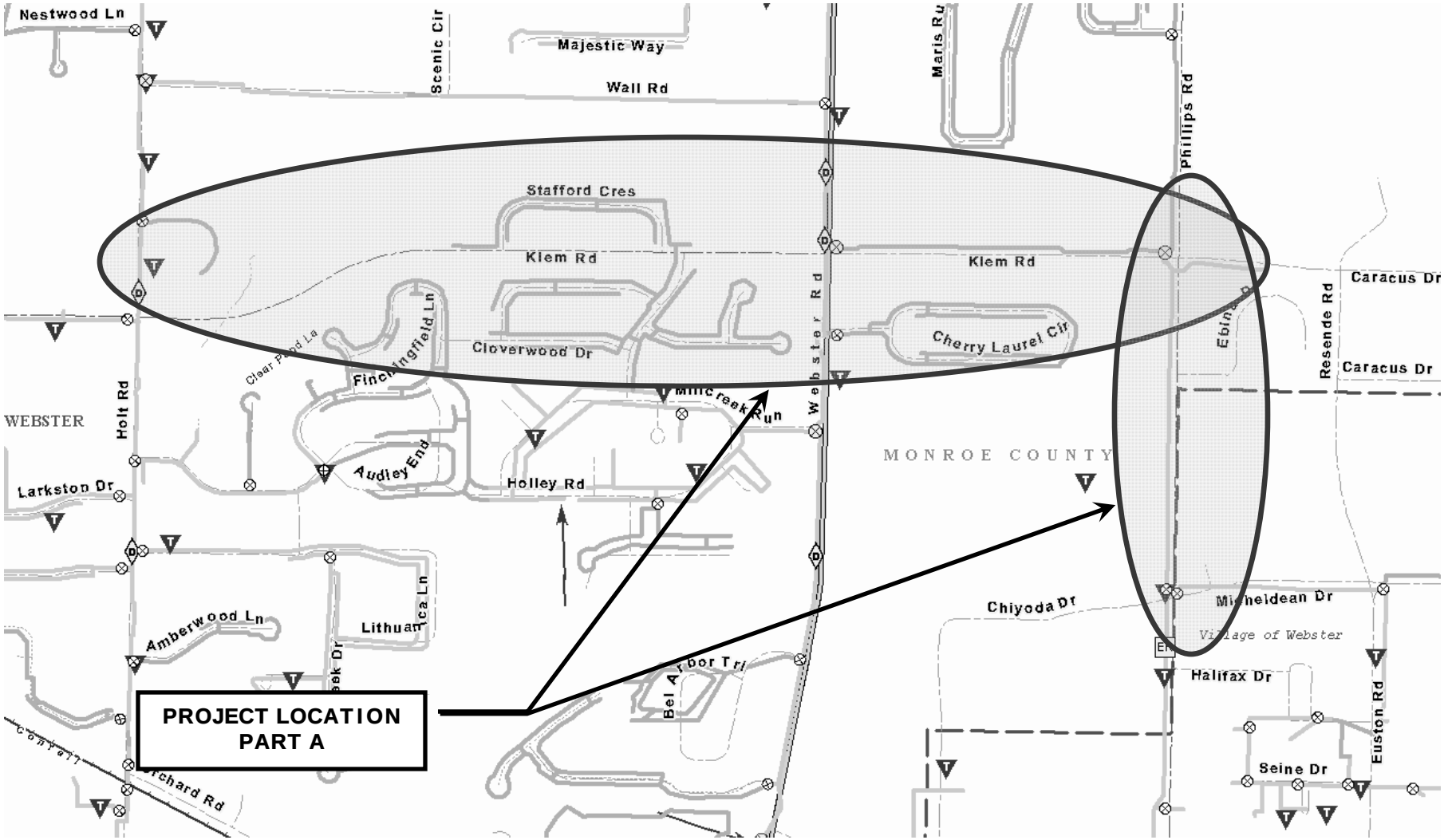
Please see attached.

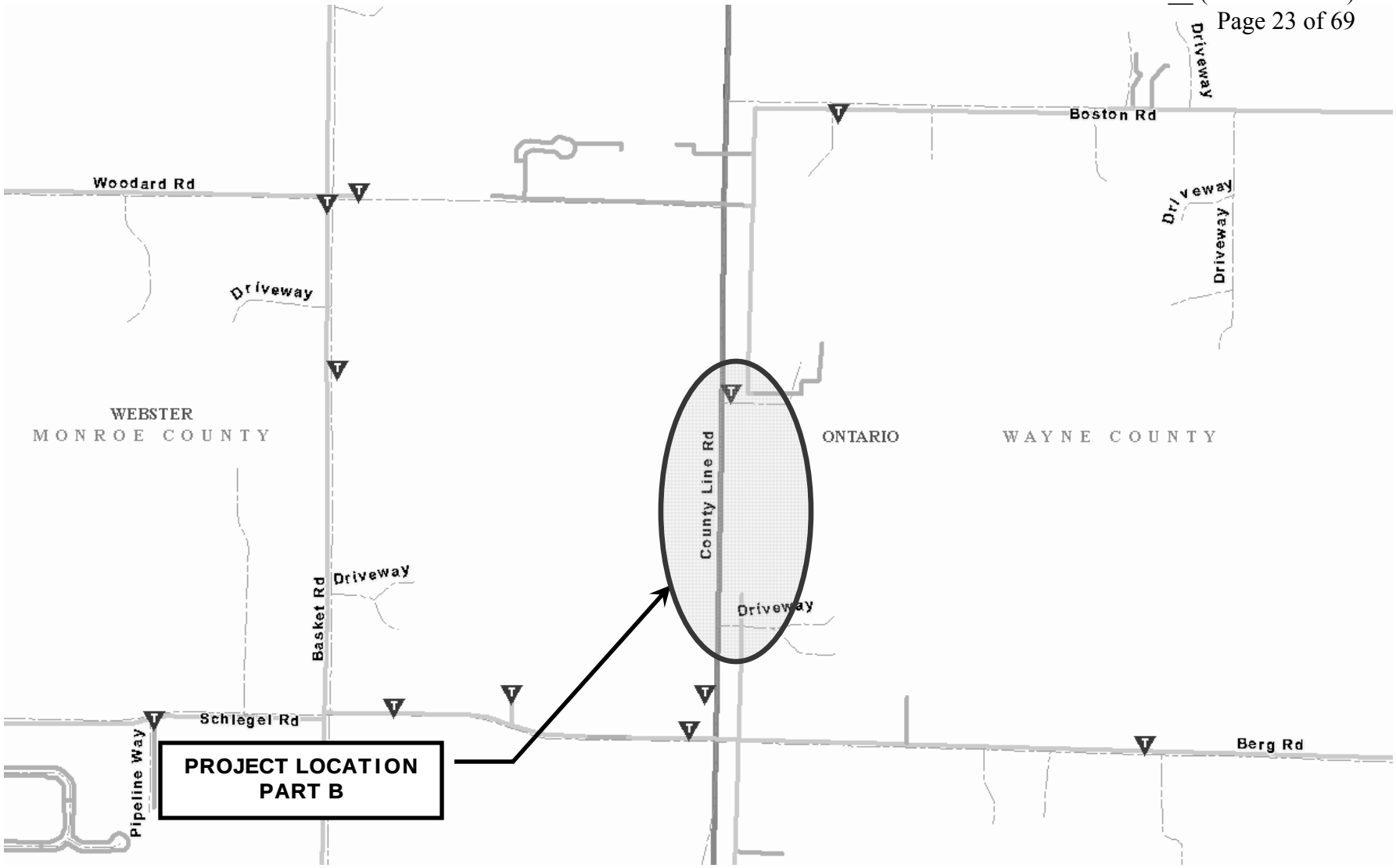
PROJECT SUMMARY

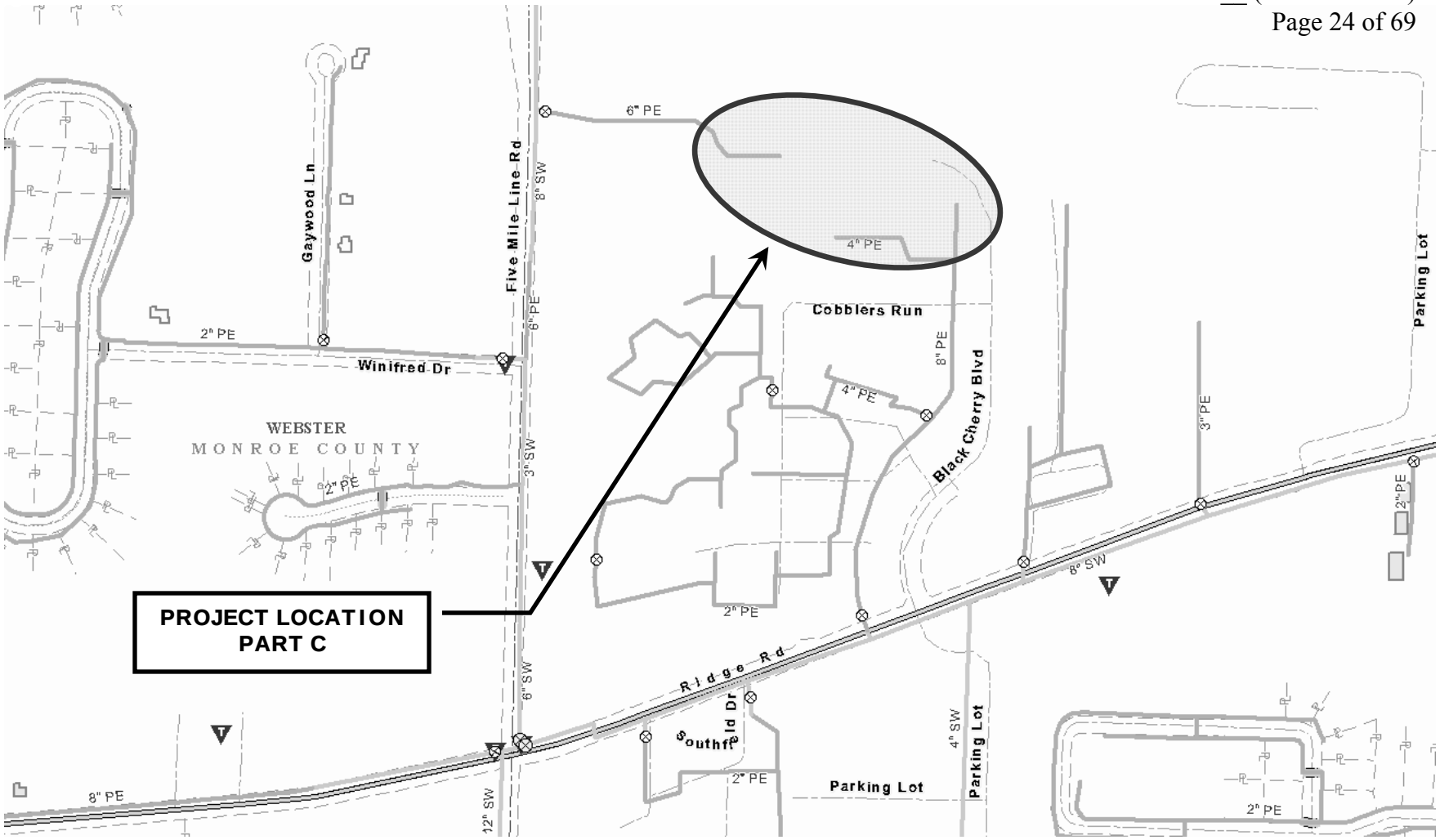
Rochester Gas & Electric

1.	Project:	MF60NE Improvement Project, Phase 1
2.	Identification:	PM Notification's 10100004350 & 10100402408
3.	Description:	Gas Main Installation – System Capacity
4.	Main Project Identification:	
5.	Municipality:	Webster, NY & Penfield, NY
6.	Total Cost ($000)	**1,025**
7.	2013 Budget ($000)	0
8.	2014 Budget ($000)	0
9.	2015 Budget ($000)	0
10.	2016 Budget ($000)	295
11.	2017 Budget ($000)	730
12.	2017 Budget ($000)	0
13.	Kind of Facility:	Distribution Gas Mains
14.	Pressure:	Medium Pressure, 60 psig
15.	Investment Reason:	System Capacity
16.	Submitted by:	Brian Jacobs

Maps: (Not to Scale)




Boston Rd
Driveway
Woodard Rd
Driveway
Driveway
Driveway
WEBSTER
MONROE COUNTY
ONTARIO
WAYNE COUNTY
County Line Rd
Basket Rd
Driveway
Driveway
Schlegel Rd
Pipeline Way
PROJECT LOCATION
PART B
Berg Rd


PROJECT LOCATION
PART C
Gaywood Ln
Five Mile Line Rd
Winifred Dr
WEBSTER
MONROE COUNTY
Cobblers Run
Black Cherry Blvd
Parking Lot
Ridge Rd
Southfield Dr
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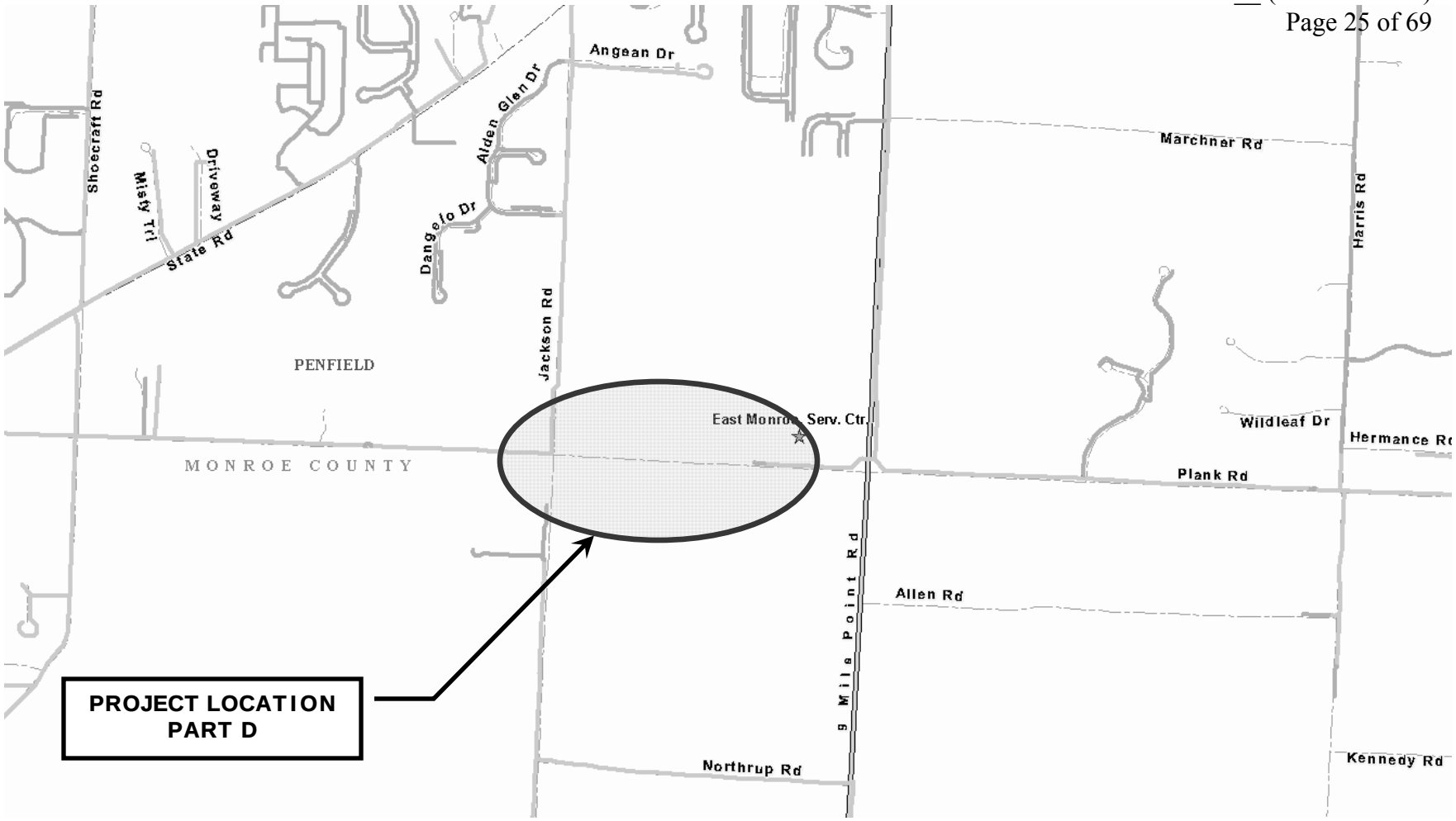
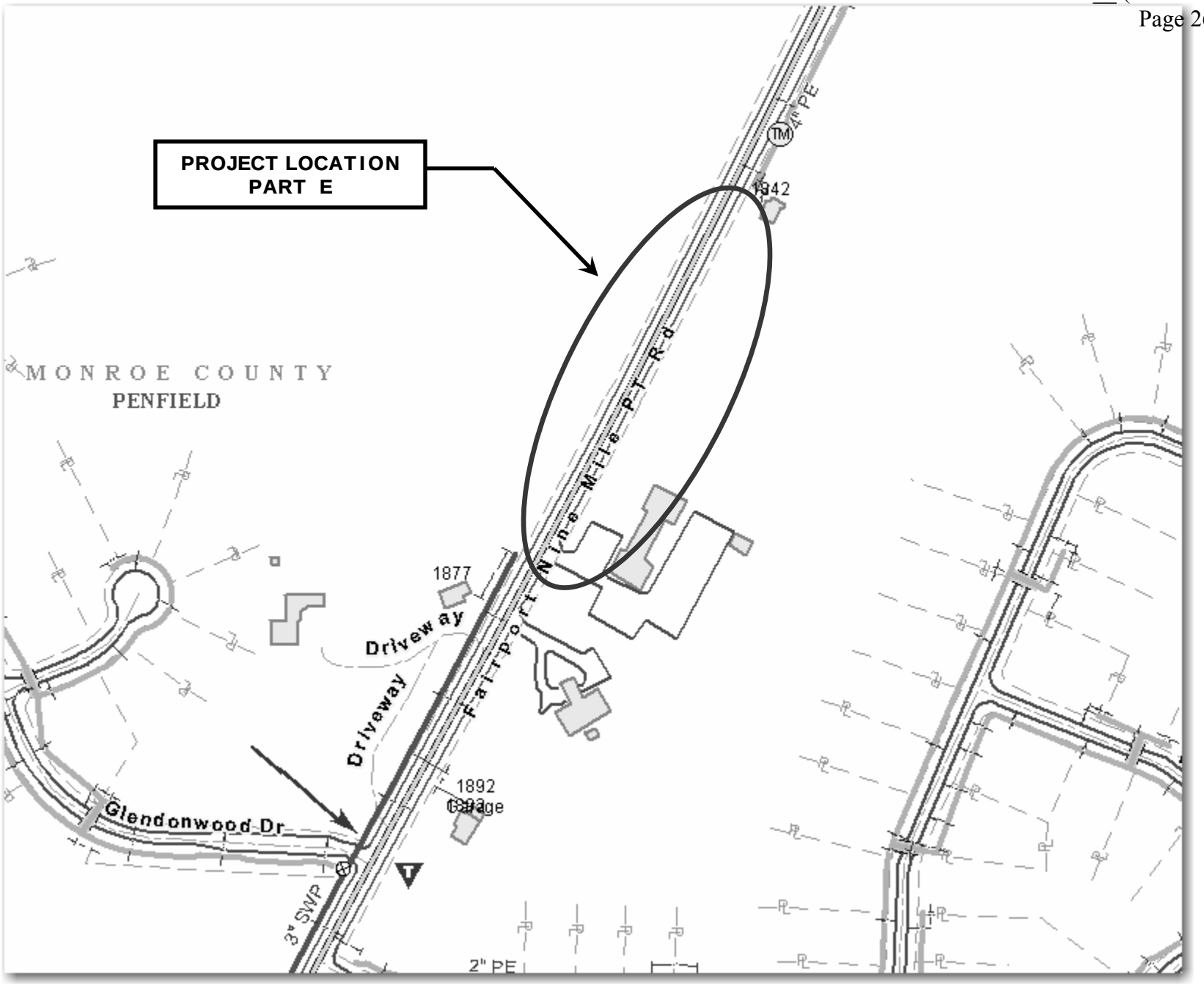
8" SW
2" PE
4" PE
3" SW
6" SW
8" PE
3" PE
4" SW
12" SW


Angean Dr
Alden Glen Dr
Shoecraft Rd
Misty Trl
Driveway
State Rd
Dangelo Dr
Jackson Rd
Marchner Rd
Harris Rd
PENFIELD
East Monroe Serv. Ctr.
Wildleaf Dr
Hermance Rd
MONROE COUNTY
Plank Rd
9 Mile Point Rd
Allen Rd
PROJECT LOCATION
PART D
Northrup Rd
Kennedy Rd


PROJECT LOCATION
PART E
MONROE COUNTY
PENFIELD
4" PE
1842
Nine Mile Point Rd
1877
Driveway
Driveway
Fairport
1892
Garage
Glendonwood Dr
3" SWP
2" PE

System Planning Study Report

RG&E
Project: MF 60 Northeast (MF60NE) System Improvement, Phase 2 (Salt Road Corridor)

1. Main Target:

The MF60NE System Improvement Project is a multi-phased system capacity project intended to increase system pressures, capacity and reliability to meet the growth within the system and promote reliability to customers.

Phase 2 includes various gas main installations and regulator replacements/rebuilds intended to increase capacity and pressures throughout the system. All of the work in Phase 2 is located within the Town of Webster.

2. Description

The MF60NE System extends over two counties (Monroe and Wayne), from Irondequoit Bay (westerly boundary) to the easterly bounds of Wayne County. Due to the natural boundary of Lake Ontario to the north, the dead-end mains servicing the lakeshore represent the system low points. The northwesterly endpoint, located along Culver Road, has a current pressure of 39 PSI (65% MAOP). The northeasterly endpoint, located along Lake Road in Pultneyville, has a current pressure of 24 PSI (40% MAOP); this point is the lowest endpoint pressure on a 60 PSI system in the Rochester District.

The MF60NE System Improvements, Phase 2 includes the following:

A. Installation of approximately 5,100 linear feet of 12" diameter steel pipe along Salt Road, from Ridge Road (NYS Rte. 404) to State Road, and approximately 3,500 linear feet of 8" diameter PE pipe on State Road, from Salt Road to Fawn Wood Drive.

B. Rebuild Regulator Stations (RS) 247 and 319. Cut-dead RS 448.

3. Driver

For investment planning purposes, this project is categorized as a system capacity improvement. The MF60NE System has experienced significant growth within the past ten (10) years. According to the US Censes Bureau, between 2000 and 2010 the populations of the Town of Webster and the Town of Penfield have grown approximately 12% and 5%, respectively. There have been significant, localized areas of growth and demand for natural gas, particularly along Ridge Road and Irondequoit Bay in Webster. The existing system is at 50% of maximum allowable operating pressure (MAOP) on for the design day peak hour demand.

The above listed improvements, along with Phase 1 and improvements, increase the pressure throughout the MF60NE system, to maintain a minimum of 50% of system MAOP in accordance with IUSA's Gas System Planning Manual criteria.

The Pultneyville endpoint (Lake Road) increases from approximately 24 PSI to 31 PSI (from 40% MAOP to 51% MAOP); the pressure at the Culver Road endpoint increases from approximately 39 PSI to 47 PSI (from 65% MOAP to 78% MOAP).

The current configuration and condition of RS247 and RS319 warrant improvements.

A. Regulator Station 247 (RS247)

This regulator station is located on the southeast corner of Salt Road and Ridge Road (NYS Rte. 404) and currently regulates from the MF120 Eastern Monroe System to the MF60NE System. Under peak operating conditions, this regulator station feeds approximately 600 MCF/hr of gas into the MF60 NE System (approximately 22% of the system load). The regulator station is in a deep vault (10'+) and is located directly adjacent to a residential driveway. Due to these factors, and in conjunction with Occupational Safety & Health Administration (OSHA) confined space regulations, this station presents difficulties for Gas Field Operations crews to perform routine inspections and work.

The branch and stack piping for the relief valve is insufficiently sized to provide proper relief; therefore it is not in compliance. The relief valve is located in northwest corner of the intersection. Further, the relief valve is located in a low-laying area and is frequently under-water, which is a reliability, operations, maintenance and corrosion concern.

B. Regulator Station 319 (RS319)

This regulator station is located on the southwest corner of Salt Road and State Road and currently regulates from the CM-3 TYRE250 System to the MF120 Eastern Monroe System. Under peak operating conditions, this regulator station feeds approximately 1,170 MCF/hr. of gas into the MF120 Eastern Monroe System, which acts as a feeder main for the MF60NE System. Because of this, this station is critical to both the MF120 Eastern Monroe System and the MF60NE System. However, this is worker-monitor single-run station. Similar to RS247, this station is located in a vault, and is susceptible to ground water infiltration and OSHA confined space regulations.

C. Proposed MF60NE Phase 2 Regulator Station Improvements

Relocate and Rebuild RS247 to the intersection of Salt Road and State Road (the new 12" main diameter steel main described above would operate at 60 PSI). Rebuild RS 247 and RS319 to be located in the same above-grade structure. The new main along State Road eliminates the need for regulator station 448.

4. Other Alternatives Considered

Gas System Planning reviewed numerous areas for the location of RS247 and RS319. The intersection of Salt Road and State Road is the preferred option for a number of factors including: its proximity to the CM-3 line; the limited number of highway features and residential structures; the availability of real estate; the cost-effectiveness to house the stations in the same building; and the ability to tie-in to the MF60NE gas main located on State Road.

Due to the extensive amount of system improvements identified, the MF60NE System Improvement Project will be completed in phases. Phase 2 includes various gas main improvements and regulator station improvements to address system capacity concerns and compliance issues. Each phase will help to correct specific deficiencies within the system; while all phases combined will create a safe and reliable gas distribution system that will support current and future load growth while maintaining company performance benchmarks and standards.

5. Customer Benefits

This project will better accommodate existing and expected future customer load demand and allow RG&E to maintain adequate system pressure through the MF60NE pressure system. Approximately 35,000+ existing customers, as well as future potential customers, will benefit from this increase in ability to serve new load.

6. Cost and Avoided Costs

The estimated cost for this phase of the MF60NE Improvement Project is $1,405,000. The distribution portion of the cost is approximately $1,105,000. The regulator station portion of the cost is approximately $300,000.

Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

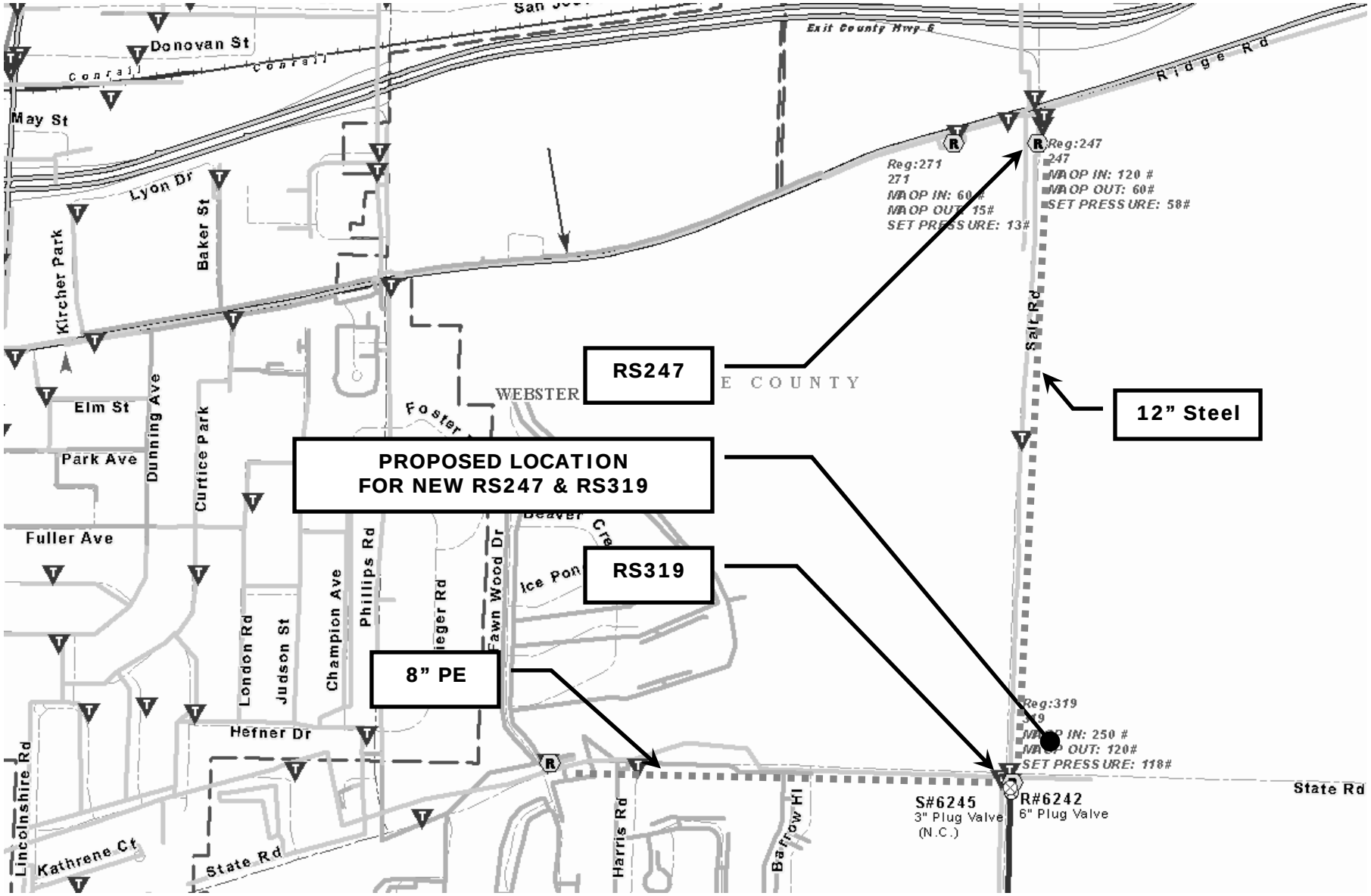
Please see attached.

PROJECT SUMMARY

Rochester Gas & Electric

1.	Project:	MF60NE Improvement Project, Phase 2 (Salt Road Corridor)
2.	Identification:	PM Notification 10100402499
3.	Description:	Gas Main Installation, Reg. Station Rebuild – System Capacity
4.	Main Project Identification:	
5.	Municipality:	Webster, NY
6.	Total Cost ($000)	**1,405**
7.	2013 Budget ($000)	0
8.	2014 Budget ($000)	0
9.	2015 Budget ($000)	0
10.	2016 Budget ($000)	1,405
11.	2017 Budget ($000)	0
12.	Kind of Facility:	Distribution Gas Mains
13.	Pressure:	250 psig, 120 psig, 60 psig
14.	Investment Reason:	System Capacity and Asset Condition
15.	Submitted by:	Brian Jacobs

Map: (Not to Scale)



System Planning Study Report

RG&E
Project: MF 60 Northeast (MF60NE) System Improvement, Phase 3 (Rte 250 Corridor)

1. Main Target:

The MF60NE System Improvement Project is a multi-phased system capacity project intended to increase pressures, capacity and reliability to meet the growth within the system and promote reliability to customers.

Phase 3 includes various gas main installations and regulator replacements/rebuilds intended to increase capacity and pressures throughout the system. All of the work in Phase 3 is located within the Town of Penfield.

2. Description

The MF60NE System extends over two counties (Monroe and Wayne), from Irondequoit Bay (westerly boundary) to the easterly bounds of Wayne County. Due to the natural boundary of Lake Ontario to the north, the dead-end mains servicing the lakeshore represent the system low points. The northwesterly endpoint, located along Culver Road, has a current pressure of 39 PSI (65% MAOP). The northeasterly endpoint, located along Lake Road in Pultneyville, has a current pressure of 24 PSI (40% MAOP); this point is the lowest endpoint pressure on a 60 PSI system in the Rochester District.

The MF60NE System Improvements, Phase 3 includes the following:

A. Relocate and rebuild Regulator Station RS298. New location to be at the intersection of Salt Road and Kennedy Road.
B. Installation of approximately 9,500 linear feet of 12" diameter steel main along Kennedy Road, Harris Road and Allen Road from the new regulator station listed in part A to NYS Rte 250.
C. Installation of approximately 9,800 linear feet of 8" PE main along NYS Rte 250 from Plank Road to NYS Rte. 286.
D. Installation of approximately 2,200 linear feet of 4" PE main along Harris Road from Kennedy Road to Penfield Center Road.
E. Installation of approximately 1,600 linear feet of 6" PE main along Whalen Road from Five Mile Line Road and Baird Road.
F. Rebuild Regulator Station RS244 and eliminate Regulator Station RS240.
G. Install 1,150 linear feet of 6" diameter PE main along Five Mile Road from NYS Rte 286 and Regulator Station RS414. Eliminate Regulator Station RS414.

3. Driver

For investment planning purposes, this project is categorized as a system capacity improvement. The MF60NE System has experienced significant growth

within the past ten (10) years. According to the US Censes Bureau, between 2000 and 2010 the populations of the Town of Webster and the Town of Penfield have grown approximately 12% and 5%, respectively. There have been significant, localized areas of growth and demand for natural gas, particularly along Ridge Road and Irondequoit Bay in Webster. The existing system is at 50% of maximum allowable operating pressure (MAOP) for the design day peak hour demand.

The above listed improvements, along with Phase 1 & 2 improvements, increase the pressure throughout the MF60NE system, to maintain a minimum of 50% of system MAOP in accordance with IUSA's Gas System Planning Manual criteria. The Pultneyville endpoint (Lake Road) increases from approximately 24 PSI to 31 PSI (from 40% MAOP to 51% MAOP); the pressure at the Culver Road endpoint increases from approximately 39 PSI to 47 PSI (from 65% MOAP to 78% MOAP).

The current configuration and condition of RS244 and RS240 warrant improvements.

A. Regulator Station 244 (RS244), Five Mile Line Road & Whalen Road

This regulator station is located on the southwest corner of Five Mile Line Road and Whalen Road. During routine inspections in May 2015, Gas Field Operations (GFO) crews discovered a leak. The source of the leak appears to be from the regulator pilot. The leak is classified as Type-II. Based on condition and location, it has the potential to develop into a Type-I leak. The regulator is obsolete equipment and there are no current parts to make possible necessary repairs. In addition, the following deficiencies are noted:

- The station was built in 1959 and is a single regulator run located in a below grade steel pit structure. The regulator is a Rockwell, Model 1001 HP and is obsolete. There are currently no spare parts available to repair the regulator/pilot.
- The regulator inlet and outlet piping is welded directly to the steel pit structure. There is notable external corrosion on the piping and regulator.
- The relief valve is located less than 50' from the regulator.
- The chart recorder (Bristol) is outdated.
- The fifty-foot inlet valve is located in the westbound travel lane of Whalen Road.

A joint decision between Engineering and GFO was made to shut-in the station until it can be rebuilt. The rebuild is slated for 2016.

B. Regulator Station 240 (RS240), Whalen & Baird

This regulator station is of the same vintage and style of RS244 and exhibits similar deficiencies. Both RS240 and RS244 rank high on the IUSA Regulator Station Health Index; indicative of their current condition. This project provides a 6" connecting main between the two stations along Whalen Road which allows RS240 to be eliminated from the system.

4. Other Alternatives Considered

Due to the extensive amount of system improvements identified, the MF60NE System Improvement Project will be completed in phases. Phase 3 includes various gas main improvements and regulator station improvements to address system capacity concerns and compliance issues. Each phase will help to correct specific deficiencies within the system; while all phases combined will create a strong, healthy, viable gas system that can support current and future growth while maintaining company performance benchmarks and standards.

5. Customer Benefits

This project will better accommodate existing and expected future customer load demand and allow RG&E to maintain adequate system pressure through the MF60NE pressure system. Approximately 35,000+ existing customers, as well as future potential customers, will benefit from this increase in ability to serve new load.

6. Cost and Avoided Costs

The estimated cost for this phase of the MF60NE Improvement Project is $2,585,000. The distribution portion of the cost is approximately $2,500,000. The regulator station portion of the cost is approximately $85,000.

Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

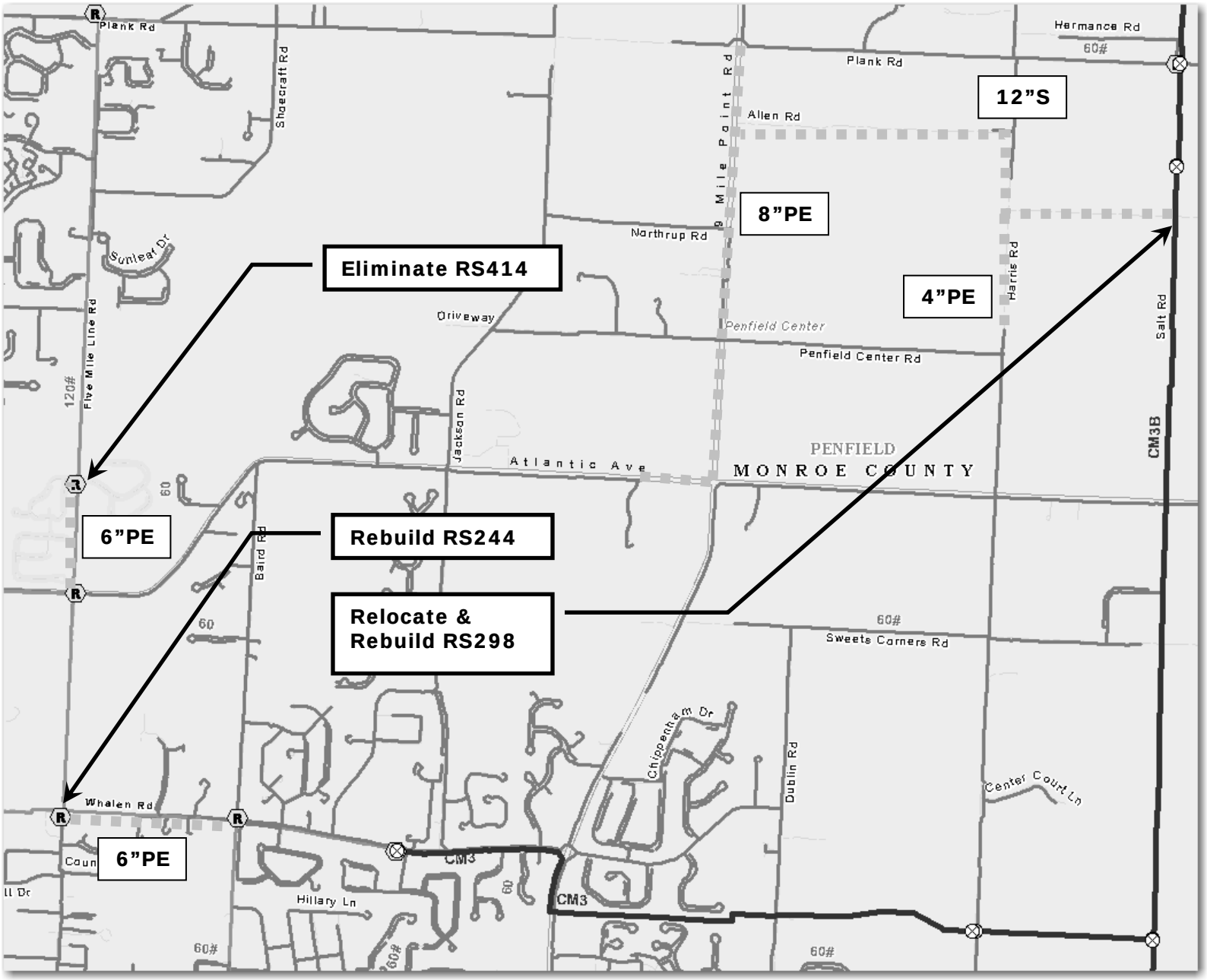
Please see attached.

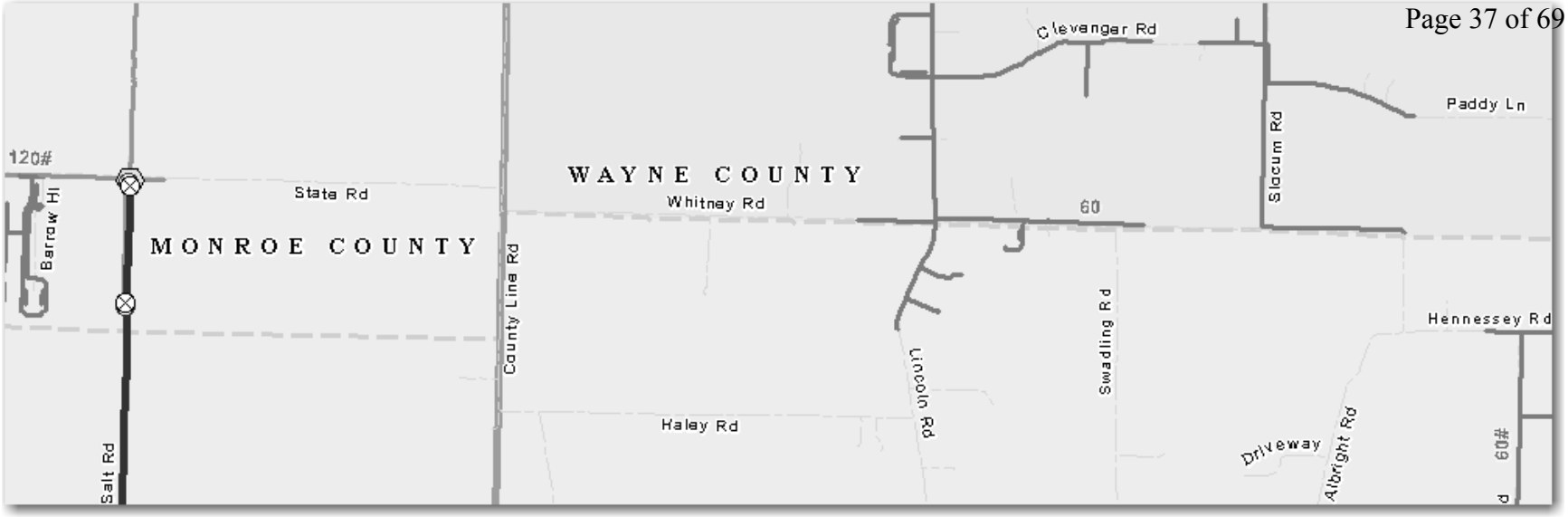
PROJECT SUMMARY

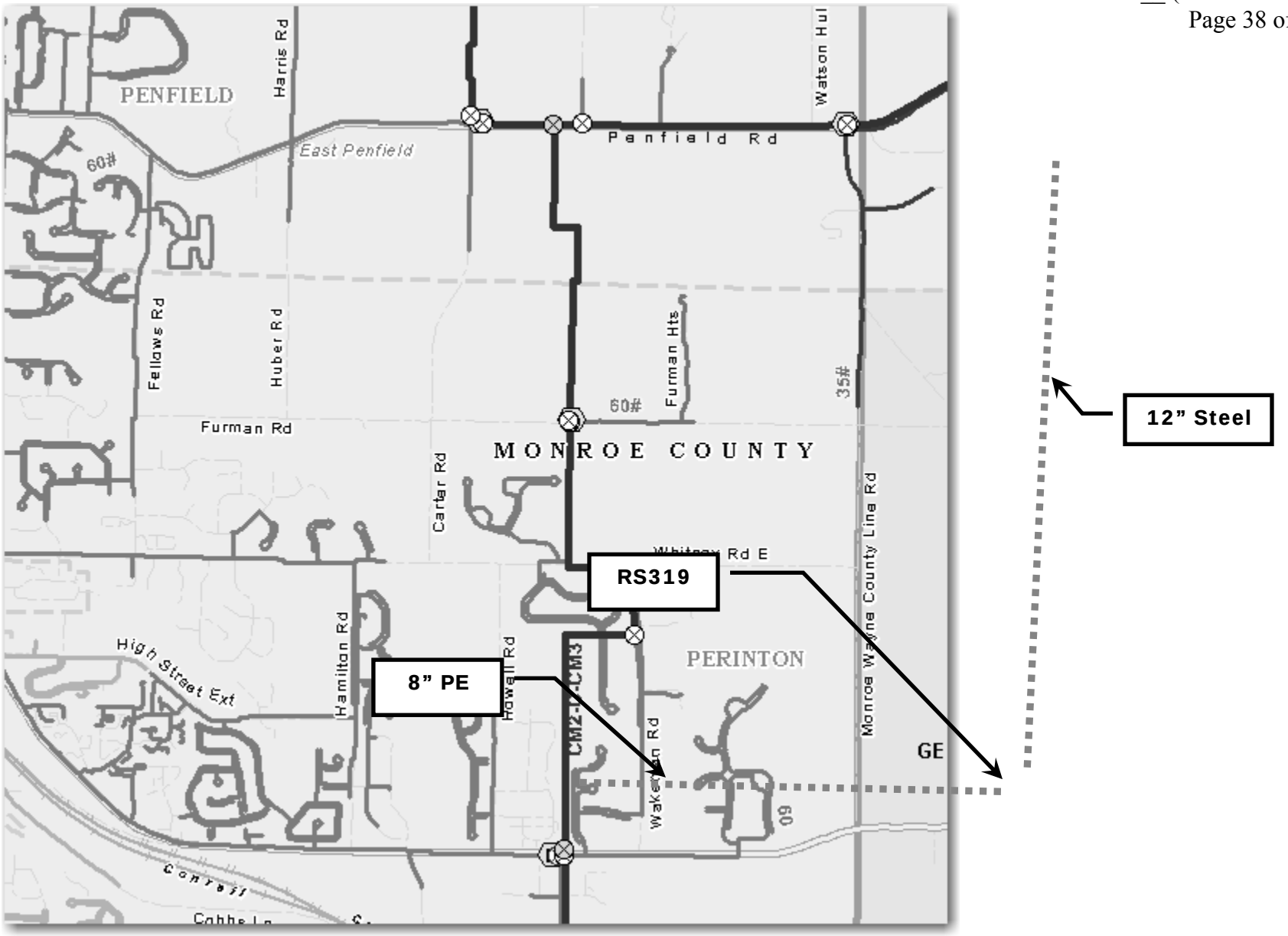
Rochester Gas & Electric

1.	Project:	MF60NE Improvement Project, Phase 3 (Rte 250 Corridor)
2.	Identification:	PM Notification #xxxxxxxxxxx
3.	Description:	Gas Main Installation, Reg. Station Rebuild – System Capacity
4.	Main Project Identification:	
5.	Municipality:	Penfield, NY
6.	Total Cost ($000)	**2,585**
7.	2013 Budget ($000)	0
8.	2014 Budget ($000)	0
9.	2015 Budget ($000)	0
10.	2016 Budget ($000)	0
11.	2017 Budget ($000)	2,585
12.	2018 Budget ($000)	0
13.	Kind of Facility:	Distribution Gas Mains
14.	Pressure:	250 psig, 120 psig, 60 psig
15.	Investment Reason:	System Capacity and Asset Condition
16.	Submitted by:	Brian Jacobs

Map: (Not to Scale)




120#
State Rd
Barrow Hl
MONROE COUNTY
Salt Rd
County Line Rd
WAYNE COUNTY
Whitney Rd
Haley Rd
Clevenger Rd
60
Lincoln Rd
Swadling Rd
Slocum Rd
Paddy Ln
Hennessey Rd
Driveway
Albright Rd
60#


PENFIELD
Harris Rd
East Penfield
Penfield Rd
Watson Hul
60#
Fellows Rd
Huber Rd
Furman Hts
35#
60#
Furman Rd
MONROE COUNTY
Carter Rd
Whitney Rd E
RS319
Hamilton Rd
8" PE
Howell Rd
CM2-CM3
PERINTON
High Street Ext
Monroe Wayne County Line Rd
GE
Conrail
12" Steel

System Planning Study Report

RG&E
Project: MF 60 Northeast (MF60NE) System Improvement, Phase 4 (Carter Road Corridor)

1. Main Target:

The MF60NE System Improvement Project is a multi-phased system capacity project intended to increase pressures, capacity and reliability to meet the growth within the system and promote reliability to customers.

Phase 4 includes various gas main installations and replacements intended to eliminate dead-end gas mains and create looped piping sections that will increase capacity and pressures throughout the system. All of the work in Phase 4 is located within the towns of Penfield and Perinton.

2. Description

The MF60NE System extends over two counties (Monroe and Wayne), from Irondequoit Bay (westerly boundary) to the easterly bounds of Wayne County. Due to the natural boundary of Lake Ontario to the north, the dead-end mains servicing the lakeshore represent the system low points. The northwesterly endpoint, located along Culver Road, has a current pressure of 39 PSI (65% MAOP). The northeasterly endpoint, located along Lake Road in Pultneyville, has a current pressure of 24 PSI (40% MAOP); this point is the lowest endpoint pressure on a 60 PSI system in the Rochester District.

The MF60NE System Improvements, Phase 4 includes the following:

A. Installation of approximately 5,800 linear feet of 6” diameter PE main along Carter Road from approximately 2,300 linear feet south of NYS Rte 441 (existing dead-end main) to Whitney Road East.

B. Installation of approximately 2,900 linear feet of 6” diameter PE main along Whitney Road East from Lanaray Park to Chadwick Manor.

C. Installation of approximately 1,800 linear feet of 6” diameter PE main along Howell Road from Whitney Road East to Princeton Lane.

D. Installation of approximately 2,500 linear feet of 6” diameter PE main along Furman Road from Carter Road to Regulator Station RS439 (Furman Road east of Carter Road).

E. Eliminate Regulator Station RS439.

3. Driver

For investment planning purposes, this project is categorized as a system capacity improvement. The MF60NE System has experienced significant growth

within the past ten (10) years. According to the US Censes Bureau, between 2000 and 2010 the populations of the Town of Webster and the Town of Penfield have grown approximately 12% and 5%, respectively. There have been significant, localized areas of growth and demand for natural gas, particularly along Ridge Road and Irondequoit Bay in Webster. The existing system is at 50% of maximum allowable operating pressure (MAOP) for the design day peak hour demand.

Phase 4 will loop five (5) dead-end mains and eliminate one (1) regulator station. This will increase pressure, system capacity and reliability in this portion of the MF60NE System while reducing long-term Operational and Maintenance costs associated with the regulator station. These infrastructure improvements will help to maintain a minimum of 50% of system MAOP in accordance with IUSA's Gas System Planning Manual criteria.

4. Other Alternatives Considered

Gas System Planning reviewed numerous areas for pipeline system improvements, but few options eliminated dead-ends, looped piping segments and increased system pressures as cost-effectively as the selected alternatives.

Due to the extensive amount of system improvements identified, the MF60NE System Improvement Project will be completed in phases. Phase 4 includes various gas main improvements and regulator station improvements to address system capacity concerns and compliance issues. Each phase will help to correct specific deficiencies within the system; while all phases combined will create a safe and reliable gas system that can support current and future growth while maintaining company performance benchmarks and standards.

5. Customer Benefits

This project will better accommodate existing and expected future customer load demand and allow RG&E to maintain adequate system pressure through the MF60NE pressure system. Approximately 35,000+ existing customers, as well as future potential customers, will benefit from this increase in ability to serve new load.

6. Cost and Avoided Costs

The estimated cost for this phase of the MF60NE Improvement Project is $800,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

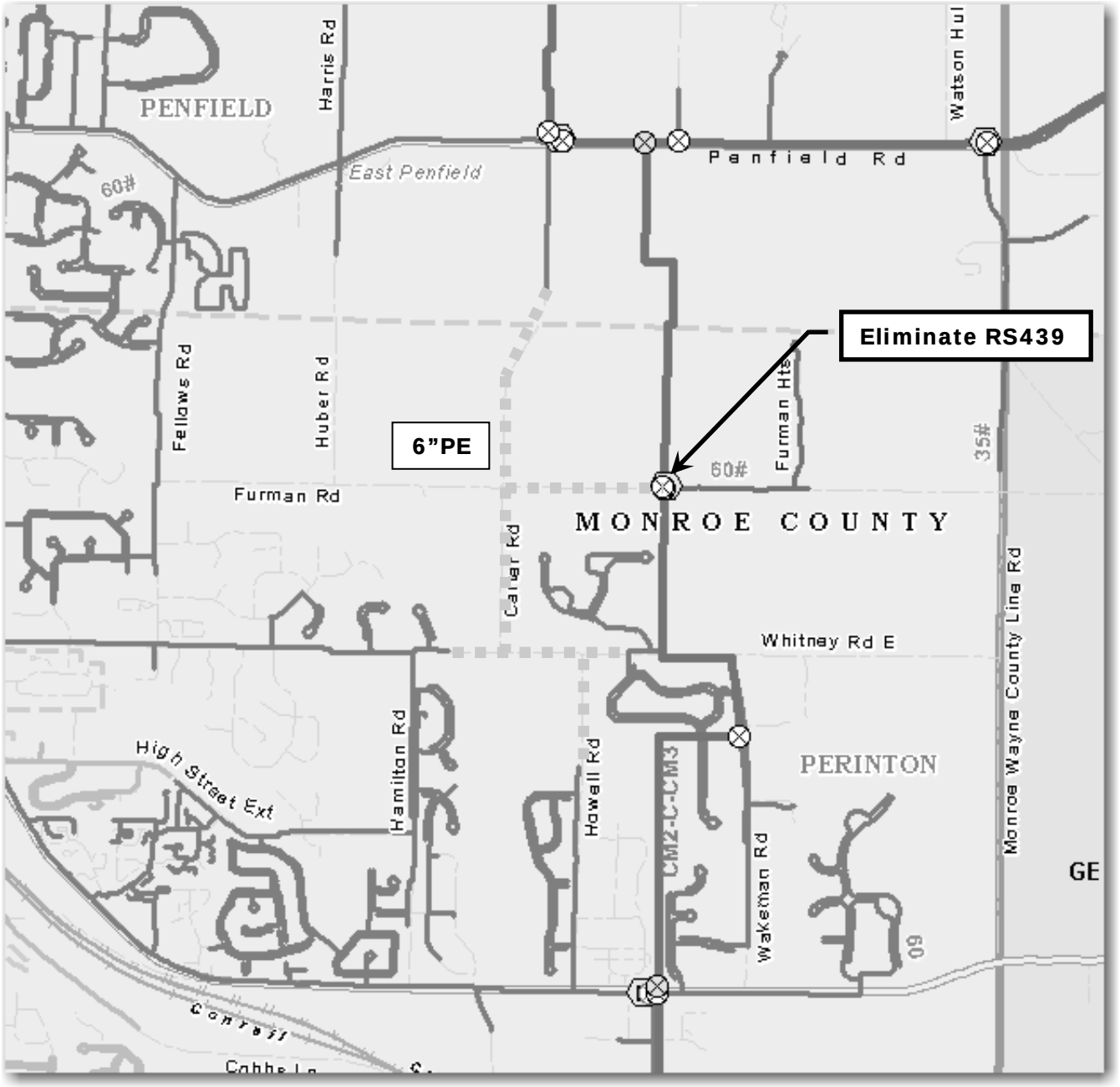
Please see attached.

PROJECT SUMMARY

Rochester Gas & Electric

1.	Project:	MF60NE Improvement Project, Phase 4 (Carter Road Corridor)
2.	Identification:	PM Notification #xxxxxxxxxxx
3.	Description:	Gas Main Installation, System Capacity
4.	Main Project Identification:	
5.	Municipality:	Penfield, Perinton, NY
6.	Total Cost ($000)	**800**
7.	2013 Budget ($000)	0
8.	2014 Budget ($000)	0
9.	2015 Budget ($000)	0
10.	2016 Budget ($000)	0
11.	2017 Budget ($000)	800
12.	2018 Budget ($000)	0
13.	Kind of Facility:	Distribution Gas Mains
14.	Pressure:	60 psig
15.	Investment Reason:	System Capacity
16.	Submitted by:	Brian Jacobs

Map: (Not to Scale)



System Planning Study Report

RG&E
Project: MF 60 Northeast (MF60NE) System Improvement, Phase 5 (Rte 250 Corridor)

1. Main Target:

The MF60NE System Improvement Project is a multi-phased system capacity project intended to increase pressures, capacity and reliability to meet the growth within the system and promote reliability to customers.

Phase 5 includes the installation of large diameter (12") gas mains intended to transport gas from the transmission system (CM3B) to the northerly portion of the MF60NE System. This project will increase capacity and pressures throughout the system. The work included in Phase 5 is located within the towns of Webster, Ontario and Walworth.

2. Description

The MF60NE System extends over two counties (Monroe and Wayne), from Irondequoit Bay (westerly boundary) to the easterly bounds of Wayne County. Due to the natural boundary of Lake Ontario to the north, the dead-end mains servicing the lakeshore represent the system low points. The northwesterly endpoint, located along Culver Road, has a current pressure of 39 PSI (65% MAOP). The northeasterly endpoint, located along Lake Road in Pultneyville, has a current pressure of 24 PSI (40% MAOP); this point is the lowest endpoint pressure on a 60 PSI system in the Rochester District.

The MF60NE System Improvements, Phase 5 includes the following:

A. Installation of approximately 6,800 linear feet of 12" diameter steel main along State Road from Salt Road to County Line Road. At Salt Road, this main will connect to the new regulator station (new RS319) included in Phase 2.

B. Installation of approximately 400 linear feet of 12" diameter steel main along County Line Road from State Road to Whitney Road.

C. Installation of approximately 7,800 linear feet of 12" diameter steel main along Whitney Road from County Line Road to Lincoln Road.

D. Installation of approximately 5,900 linear feet of 6" diameter PE main along Whitney Road from Lincoln Road to Slocum Road.

3. Driver

For investment planning purposes, this project is categorized as a system capacity improvement. The MF60NE System has experienced significant growth within the past ten (10) years. According to the US Censes Bureau, between 2000 and 2010 the populations of the Town of Webster and the Town of Penfield

have grown approximately 12% and 5%, respectively. There have been significant, localized areas of growth and demand for natural gas, particularly along Ridge Road and Irondequoit Bay in Webster. The existing system is at 50% of maximum allowable operating pressure (MAOP) for the design day peak hour demand.

The above listed improvements, along with the improvements detailed in Phase 1-4, increase the pressure throughout the MF60NE system, to maintain a minimum of 50% of system MAOP in accordance with IUSA's Gas System Planning Manual criteria. The Pultneyville endpoint (Lake Road) increases from approximately 24 PSI to 34 PSI (from 40% MAOP to 57% MAOP); the pressure at the Culver Road endpoint increases from approximately 39 PSI to 47 PSI (from 65% MOAP to 78% MOAP).

4. Other Alternatives Considered

Gas System Planning reviewed numerous areas for pipeline system improvements, but few options eliminated dead-ends, looped piping segments and increased system pressures as cost-effectively as the selected alternatives.

Due to the extensive amount of system improvements identified, the MF60NE System Improvement Project will be completed in phases. Each phase will help to correct specific deficiencies within the system; while all phases combined will create a safe and reliable gas system that can support current and future growth while maintaining company performance benchmarks and standards.

5. Customer Benefits

This project will better accommodate existing and expected future customer load demand and allow RG&E to maintain adequate system pressure through the MF60NE pressure system. Approximately 35,000+ existing customers, as well as future potential customers, will benefit from this increase in ability to serve new load.

6. Cost and Avoided Costs

The estimated cost for this phase of the MF60NE Improvement Project is $3,000,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

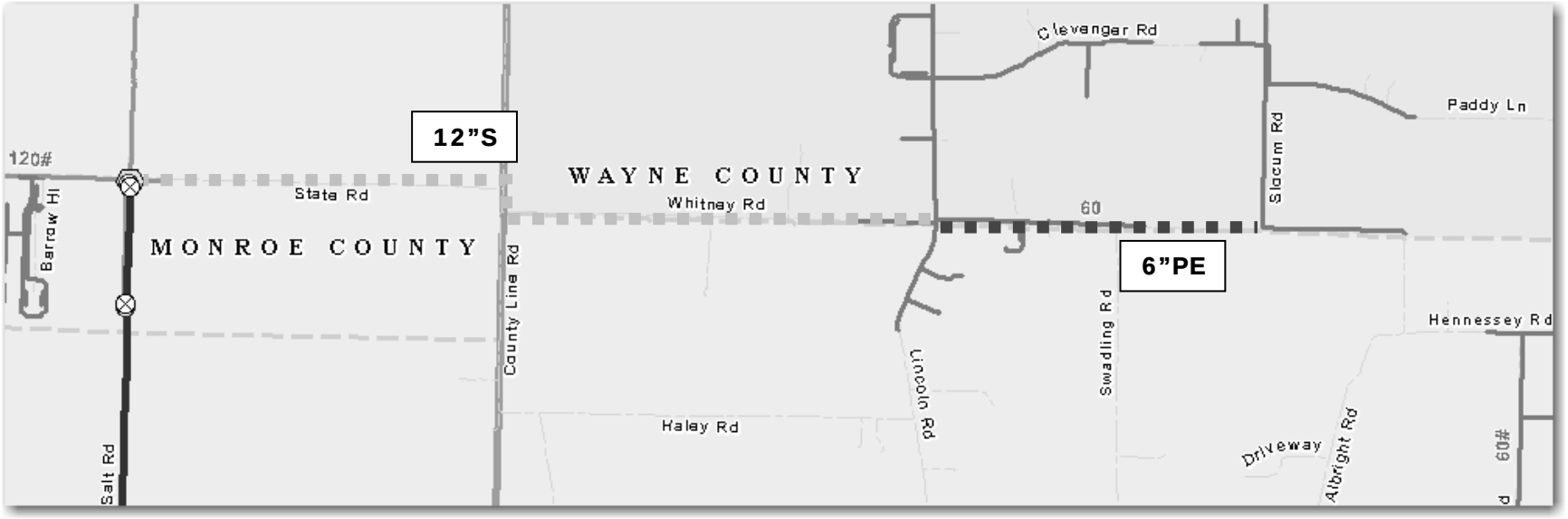
Please see attached.

PROJECT SUMMARY

Rochester Gas & Electric

1.	Project:	MF60NE Improvement Project, Phase 5 (State Road Corridor)
2.	Identification:	PM Notification #xxxxxxxxxxx
3.	Description:	Gas Main Installation – System Capacity
4.	Main Project Identification:	
5.	Municipality:	Webster, Ontario, Walworth
6.	Total Cost ($000)	**3,000**
7.	2013 Budget ($000)	0
8.	2014 Budget ($000)	0
9.	2015 Budget ($000)	0
10.	2016 Budget ($000)	0
11.	2017 Budget ($000)	3,000
12.	2018 Budget ($000)	0
13.	Kind of Facility:	Distribution Gas Mains
14.	Pressure:	60 psig
15.	Investment Reason:	System Capacity
16.	Submitted by:	Brian Jacobs

Map: (Not to Scale)



System Planning Study Report

RG&E
Project: MF60 Southeast: Boughton Hill Rd, Install Gas Mains, Roch

1. Main Target:

This system capacity project involves the installation of 13,000 feet of 6" plastic gas main, which is necessary to support identified load growth. The mains will also facilitate more efficient distribution of gas through the MF60 Southeast pressure system and help compensate for recent increases in customer load demand.

2. Description

Installation of 13,000 feet of 6" plastic gas main along Boughton Hill Rd (from NYS Route 444 east to New Michigan Rd) will support the construction of the following residential subdivisions: Auburn Meadows (469 units, 71 mcfh load), and Estates at Beaver Creek (63 units, 13 mcfh), and maintain sufficient pressure in the immediate area. The new plastic gas main will function at a maximum allowable operating pressure of 60 psig.

3. Driver

This system capacity project is located in the Town of Farmington, which is an area of active residential and commercial growth in the Greater Rochester, five-county area. Recent construction of large housing developments and commercial and industrial businesses have created pressure constraints for the MF60 Southeast pressure system to serve the increase in demand for natural gas. Areas of this system are at 37 psig on the design day for RG&E, which is between 50% MAOP and 70% MAOP. To improve pressure to 70% of system MAOP (42 psig out of 60 psig) in accordance with IUSA's Gas System Planning Manual, specific gas main segments must be replaced, and in other areas new gas mains must be installed to less-developed areas.

4. Other Alternatives Considered

No other viable alternative determined.

5. Customer Benefits

The installation of 6" plastic gas distribution main in the MF60 Southeast system will better accommodate existing and expected future customer load demand. More than 2,400 customers will benefit from this project.

6. Cost and Avoided Costs

The estimated cost for this replacement project is $900,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

Please see attached.

PROJECT SUMMARY

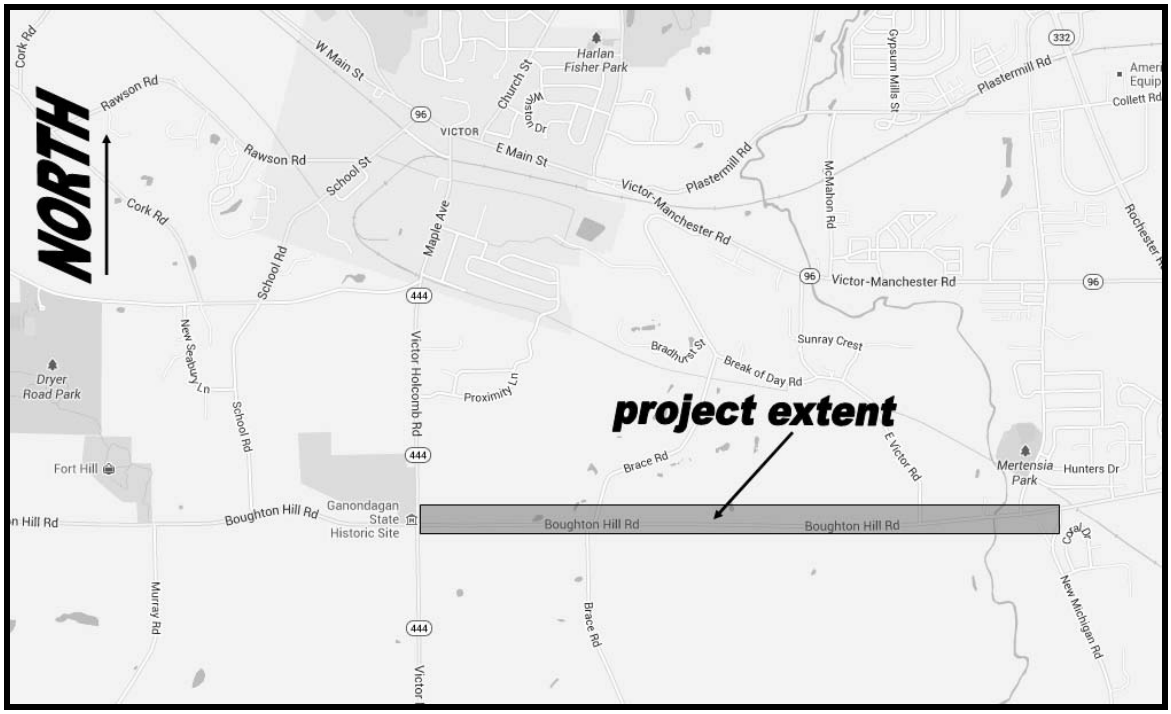
Rochester Gas & Electric

1. Project Identification: MF60 Southeast: Boughton Hill Rd, Install Gas Mains, Roch
2. PM Notification #xxxxxxxxx
3. Description: Install 13,000 feet of 6" plastic gas main
4. Main Project Identification: R-xx-xxx
5. Municipality: Town of Farmington (Rochester district)
6. Total Cost ($000) **900**
7. 2013 Budget ($000) 0
8. 2014 Budget ($000) 0
9. 2015 Budget ($000) 0
10. 2016 Budget ($000) 0
11. 2017 Budget ($000) 900
12. 2018 Budget ($000) 0
13. Kind of Facility: Distribution main
14. Pressure: Medium Pressure, 60 psig
15. Investment Reason: System Capacity
16. Submitted by: Melissa Reese

Information to prioritize the Projects

This project will help maintain existing system pressure for an area affecting approximately 2,400 residential, commercial, and industrial customers.

Map for Project Scope



System Planning Study Report

RG&E
Project: MF60 Southeast: Collett Road, Install Gas Mains, Roch

1. Main Target:

This system capacity project involves the installation of 3,700 feet of 6" plastic gas main, which is necessary to support recently infrastructure improvement plans and system reinforcement goals to handle identified load growth. The installation of 6" gas mains along Collett Rd (from NYS Route 332 east to Hook Rd) will improve system capacity. The mains will also facilitate more efficient distribution of gas through the MF60 Southeast pressure system and help compensate for recent increases in customer load demand.

2. Description

Installation of 3,700 feet of 6" plastic gas main will occur along Collett Rd (from NYS Route 332 east to Hook Rd) to support the construction of the Hickory Rise residential subdivision project that has 125 total units and a total load of 19 mcfh, and maintain sufficient pressure in the immediate area. The new plastic gas main will function at a maximum allowable operating pressure of 60 psig.

3. Driver

This system capacity project is located in the town of Farmington, which is one of the most likely locations for growth in the Greater Rochester, five-county area. Recent construction of large housing developments and commercial and industrial businesses have created pressure constraints for the MF60 Southeast pressure system. The gas mains associated with this project are currently operating at pressures between 50% MAOP and 70% MAOP. The new mains installed will improve the distribution of gas through the MF60 Southeast system enough so that 70% of system MAOP (42 psig out of 60 psig) can be maintained on RG&E's peak gas load design day, in accordance with RG&E's Gas System Planning Manual criteria. This project on the MF60 Southeast gas pressure system is categorized as Growth (as shown on the spreadsheet), as related to prioritization purposes. (See associated executive summary for additional related projects on the MF60 Southeast pressure system).

4. Other Alternatives Considered

No other viable alternative.

5. Customer Benefits

The installation of 6" plastic gas distribution main in the MF60 Southeast system will better accommodate existing and expected future customer load demand, allow RG&E to maintain adequate system pressure at the system endpoints, where gas pressure is at a minimum, 37 psig on a 60 psig pressure system. At least 600 customers will benefit from this project.

6. Cost and Avoided Costs

The estimated cost for this replacement project is $350,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

Please see attached.

PROJECT SUMMARY

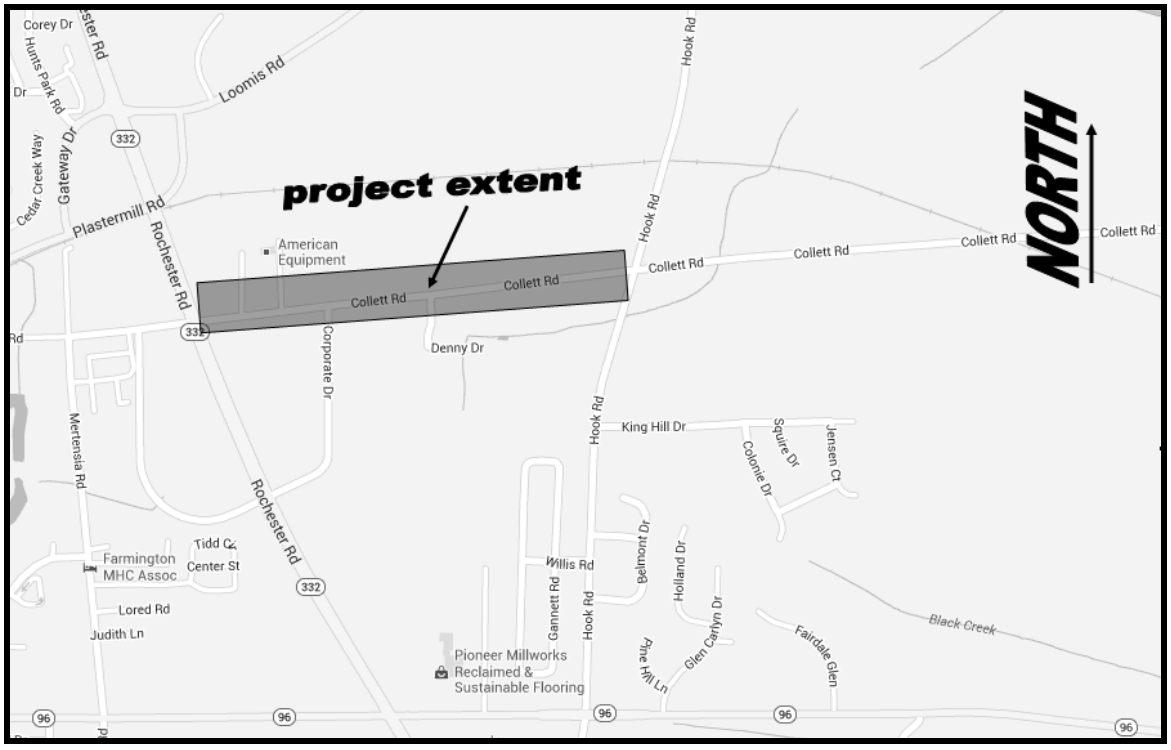
Rochester Gas & Electric

1. Project MF60 Southeast: Collett Rd, Install Gas Mains, Roch
2. Identification R-xx-xxx
3. Description: Install 3,700 feet of 6" plastic gas main
4. Main Project Identification: R-xx-xxx
5. Municipality: Town of Farmington (Rochester district)
6. Total Cost ($000) 350
7. 2013 Budget ($000) 0
8. 2014 Budget ($000) 350
9. 2015 Budget ($000) 0
10. 2016 Budget ($000) 0
11. 2017 Budget ($000) 0
12. Kind of Facility: Distribution main
13. Pressure: Medium Pressure, 60 psig
14. Investment Reason: System Capacity
16. Submitted by: Melissa Reese

Information to prioritize the Projects

This project will help maintain existing system pressure for an area affecting approximately 600 residential, commercial, and industrial customers.

Map for Project Scope



(See MF60 Southeast Executive Summary for more information on gas pressures near this project)

System Planning Study Report

RG&E
Project: MF60 Southeast System Improvements, County Road 41, Install Gas Mains, Roch

1. Main Target:

This system capacity project involves the installation of 2,500 feet of 4" plastic gas main. This is a system capacity improvement project that addresses infrastructure and system reinforcement goals to handle identified load growth. The installation of 4" gas mains on the MF60 Southeast gas pressure system along County Road 41 will improve system pressure and capacity. The new 4" plastic gas mains will facilitate more efficient distribution through the MF60 Southeast pressure system and help compensate for recent increases in customer load demand.

2. Description

New 4" gas distribution mains will be installed to operate at a maximum allowable operating pressure of 60 PSIG. The project consists of 2,500 feet of new 4" plastic gas main to be installed along County Road 41 from Wood Drive going west to connect with an existing 4" gas main at #5815 County Road 41.

3. Driver

This system capacity project involves the installation of new gas mains to provide reinforcement to gas pressures on the MF60 Southeast pressure system which has been and continues to be subject to industrial load expansion. This project on the MF60 Southeast gas pressure system is categorized as Infrastructure (as shown on the spreadsheet), as related to prioritization purposes. The gas mains associated with this project are currently operating at pressures between 50% MAOP and 70% MAOP. The new mains installed will improve the distribution of gas through the MF60 Southeast system enough so that 70% of system MAOP (42 psig out of 60 psig) can be maintained on RG&E's peak gas load design day, in accordance with RG&E's Gas System Planning Manual criteria. It improves overall system pressure by connecting existing 4" gas mains on County Road 41. (See associated executive summary for additional related projects on the MF60 Southeast pressure system).

4. Other Alternatives Considered

No other viable alternative.

5. Customer Benefits

The installation of 4" plastic gas distribution main in the MF60 Southeast system will better accommodate existing and expected future customer load demand, allow RG&E to maintain adequate system pressure at the system endpoints, where gas pressure is a minimum, 37 psig on a 60 psig pressure system. This project will benefit at least 850 customers.

6. Cost and Avoided Costs

The estimated cost for this replacement project is $150,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

Please see attached.

PROJECT SUMMARY

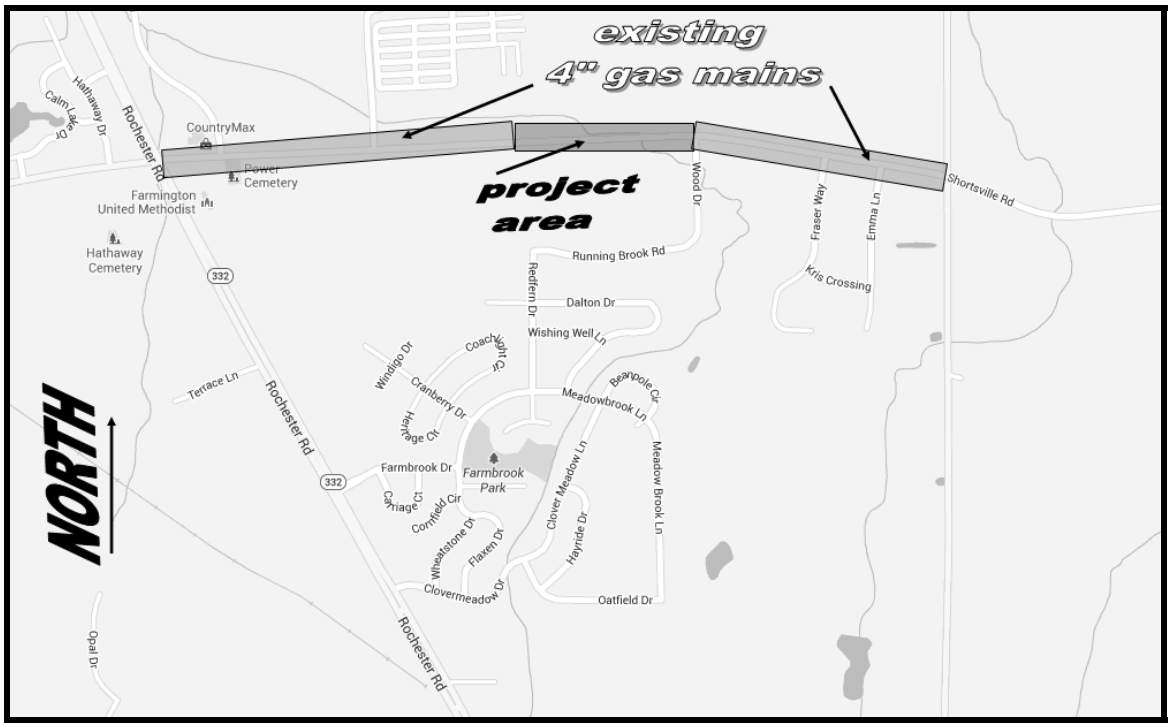
Rochester Gas & Electric

1. Project MF60 Southeast System Improvements, County Road 41, Install Gas Mains, Roch
2. Identification PM Notification 10100188941
3. Description: Install 2,500 feet of 4" plastic gas main.
4. Main Project Identification: R-xx-xxx
5. Municipality: Town of Farmington (Rochester district)
6. Total Cost ($000) **150**
7. 2013 Budget ($000) 0
8. 2014 Budget ($000) 0
9. 2015 Budget ($000) 0
10. 2016 Budget ($000) 150
11. 2017 Budget ($000) 0
12. Kind of Facility: Distribution main
13. Pressure: Medium Pressure, 60 psig
14. Investment Reason: System Capacity
16. Submitted by: Melissa Reese

Information to prioritize the Projects

This project will improve system pressure for an area affecting approximately 850 residential customers.

Map for Project Scope



(See the MF60 Southeast Executive Summary for more information on gas pressures near this project)

System Planning Study Report

RG&E
Project: MF60 Southeast System Improvements, Gillis Rd., Install Gas Mains, Rochester

1. Main Target:

This system capacity project involves the installation of 4,300 feet of 8" plastic gas main. This is a system capacity improvement project that addresses infrastructure and system reinforcement goals to handle identified load growth. The installation of 8" gas mains on the MF60 Southeast gas pressure system along Gillis Rd will improve system pressure and capacity. The new 8" plastic gas mains will facilitate more efficient distribution through the MF60 Southeast pressure system and help compensate for recent increases in customer load demand.

2. Description

New 8" gas distribution mains will be installed to operate at a maximum allowable operating pressure of 60 PSIG. The project consists of 4,300 feet of new 8" plastic gas main to be installed along Gillis Road from Blazey Road to Brownsville Road.

3. Driver

This system capacity project installs new gas mains to provide reinforcement to gas pressures on the MF60 Southeast pressure system which has been and continues to be subject to industrial and residential load expansion. This project on the MF60 Southeast gas pressure system is categorized as Infrastructure for prioritization purposes. The gas mains associated with this project are currently operating at gas pressures between 50% MAOP and 70% MAOP. This project has been identified as a system improvement plan to maintain 70% of system MAOP (42 psig out of 60 psig) in this area, on RG&E's peak gas load design day in accordance with RG&E's Gas System Planning Manual criteria. (See associated executive summary for additional related projects on the MF60 Southeast pressure system).

4. Other Alternatives Considered

No other viable alternative.

5. Customer Benefits

The installation of 8" plastic gas distribution main in the MF60 Southeast system will better accommodate existing and expected future customer load demand, allow RG&E to maintain adequate system pressure in the town of Victor and town of Farmington, at a southern boundary of the RG&E gas franchise. This project will benefit at least 3,000 customers.

6. Cost and Avoided Costs

The estimated cost for this replacement project is $425,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

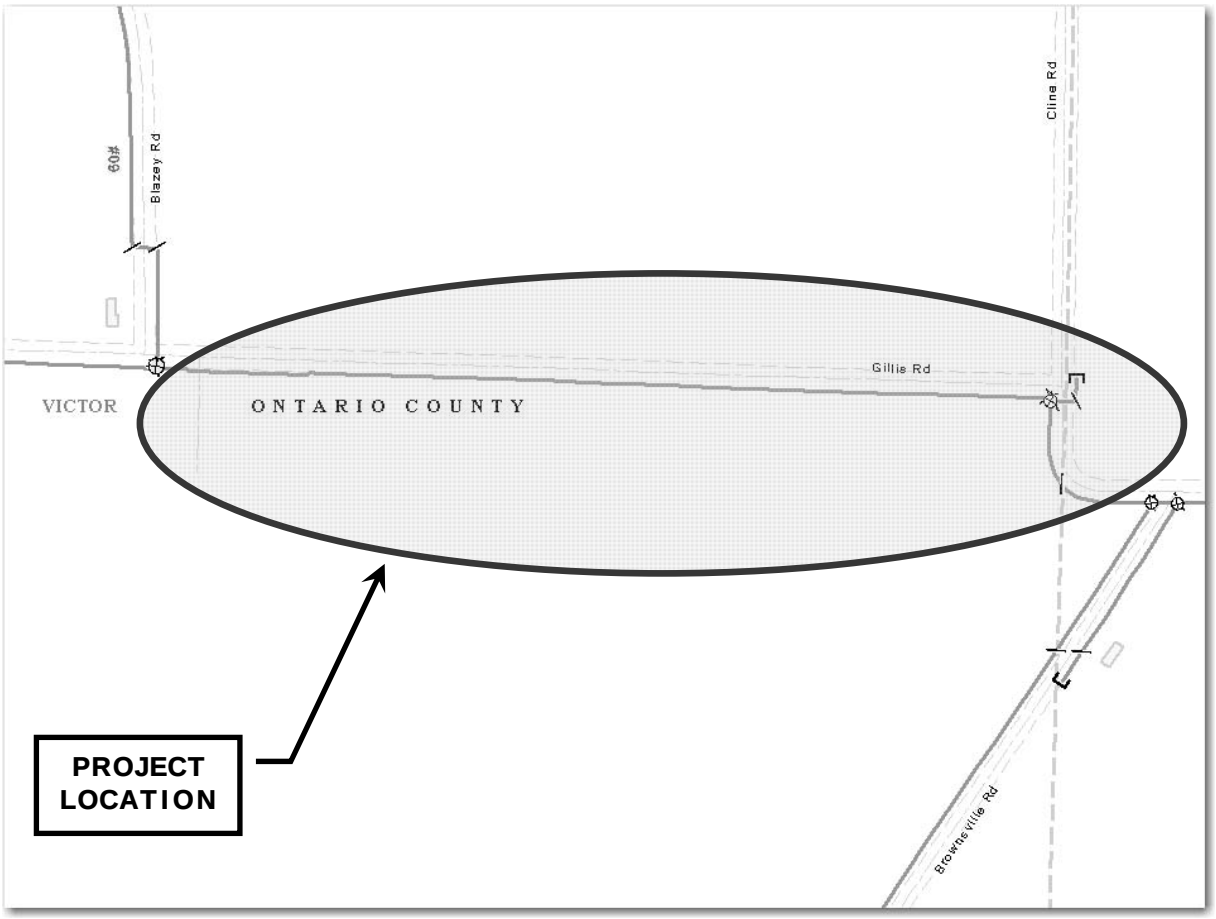
Please see attached.

PROJECT SUMMARY

Rochester Gas & Electric

1. Project MF60 Southeast System Improvements, Gillis Road, Install Gas Mains, Roch
2. Identification PM Notification 10100402433
3. Description: Install 4,300 feet of 4" plastic gas main.
4. Main Project Identification: R-xx-xxx
5. Municipality: Town of Victor & Town of Farmington (Rochester district)
6. Total Cost ($000) **425**
7. 2013 Budget ($000) 0
8. 2014 Budget ($000) 0
9. 2015 Budget ($000) 0
10. 2016 Budget ($000) 425
11. 2017 Budget ($000) 0
12. Kind of Facility: Distribution main
13. Pressure: Medium Pressure, 60 psig
14. Investment Reason: System Capacity
16. Submitted by: Brian Jacobs

Map for Project Scope



(See MF60 Southeast Executive Summary for additional details on gas pressure near this project)

System Planning Study Report

RG&E
Project: MF60 Southeast: New Michigan Rd, Install Gas Mains, Roch

1. Main Target:

This system capacity project involves the installation of 4,800 feet of 4" plastic gas main, which is necessary to support recently infrastructure improvement plans and system reinforcement goals to handle identified load growth. The location of the new gas mains will be from the intersection of New Michigan Rd and Canandaigua Farmington Townline Rd extending 2,600 feet north and 2,200 feet east to existing 4" plastic gas mains. The mains will also facilitate more efficient distribution of gas through the MF60 Southeast pressure system and help compensate for recent increases in customer load demand.

2. Description

Installation of 4,800 feet of 4" plastic gas main will begin at the intersection of New Michigan Rd and Canandaigua Farmington Townline Rd and extend to existing 4" plastic gas mains on both roads, to support the construction of large residential subdivision projects: Auburn Meadows (469 units, 71 mcfh load), and Estates at Beaver Creek (63 units, 13 mcfh), and maintain sufficient pressure in the immediate area. The new plastic gas main will function at a maximum allowable operating pressure of 60 psig.

3. Driver

This system capacity project is focused in the town of Farmington, which is one of the most likely locations for growth in the Greater Rochester, five-county area. Recent construction of large housing developments and commercial and industrial businesses have created pressure constraints for the MF60 Southeast pressure system. The gas mains associated with this project are currently operating at pressures between 50% MAOP and 70% MAOP. In order to increase existing pressure to 70% MAOP (42 psig out of 60 psig), this project will improve the distribution of gas through the pressure system such that 70% MAOP can be maintained on RG&E's peak gas load design day, in accordance with RG&E's Gas System Planning Manual criteria. This project on the MF60 Southeast gas pressure system is categorized as Growth (as shown on the spreadsheet), as related to prioritization purposes. (See associated executive summary for additional related projects on the MF60 Southeast pressure system).

4. Other Alternatives Considered

No other viable alternative.

5. Customer Benefits

The installation of 4" plastic gas distribution main in the MF60 Southeast system will better accommodate existing and expected future customer load

demand, allow RG&E to maintain adequate system pressure at the system endpoints, where pressure is a minimum. This project benefits at least 1,500 customers.

6. Cost and Avoided Costs

The estimated cost for this replacement project is $270,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

Please see attached.

PROJECT SUMMARY

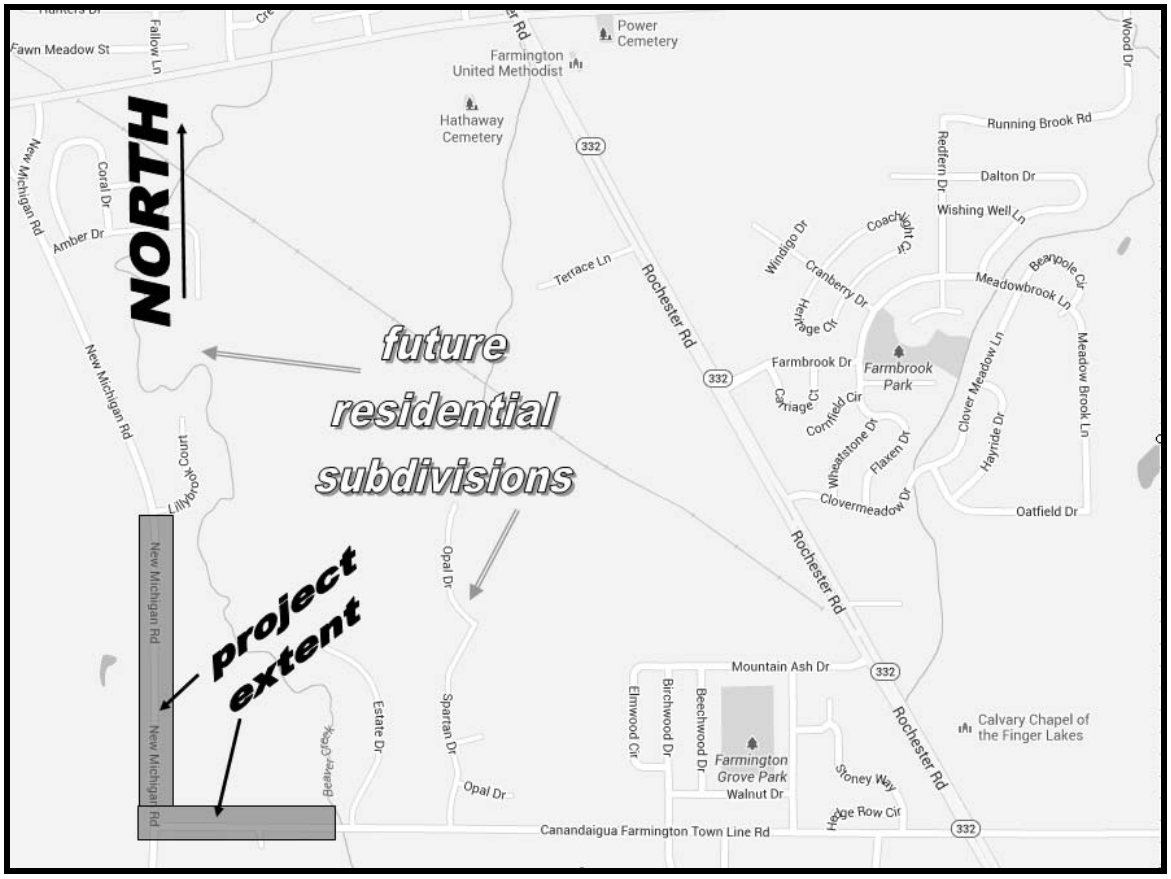
Rochester Gas & Electric

1. Project Identification: MF60 Southeast: New Michigan Rd, Install Gas Mains, Roch R-xx-xxx
2. Description: Install 4,800 feet of 4" plastic gas main
3. Main Project Identification: R-xx-xxx
4. Municipality: Town of Farmington (Rochester district)
5. Total Cost ($000): 270
6. 2013 Budget ($000): 0
7. 2014 Budget ($000): 270
8. 2015 Budget ($000): 0
9. 2016 Budget ($000): 0
10. 2017 Budget ($000): 0
11. Kind of Facility: Distribution main
12. Pressure: Medium Pressure, 60 psig
13. Investment Reason: System Capacity
14. Submitted by: Melissa Reese

Information to prioritize the Projects

This project will help maintain existing system pressure for an area affecting approximately 1500 residential, commercial, and industrial customers.

Map for Project Scope



(See MF60 Southeast Executive Summary for additional details on gas pressure near this project)

System Planning Study Report

RG&E
Project: MF60 Southeast: NYS Route 444, Install Gas Mains, Roch

1. Main Target:

This system capacity project involves the installation of 5,100 feet of 6" plastic gas main, which is necessary to support recent infrastructure improvement plans and system reinforcement goals to handle identified load growth. The installation of 6" gas mains along NYS Route 444 will improve system capacity. The mains will also facilitate more efficient distribution of gas through the MF60 Southeast pressure system and help compensate for recent increases in customer load demand.

2. Description

Installation of 5,100 feet of 6" plastic gas main along NYS Route 444 (from Dryer Rd south to Boughton Hill Rd) to support the construction of a large residential subdivision projects: Auburn Meadows (469 units, 71 mcfh load), and Estates at Beaver Creek (63 units, 13 mcfh), and maintain sufficient pressure in the immediate area. The new plastic gas main will function at a maximum allowable operating pressure of 60 psig.

3. Driver

This system capacity project is located in the town of Farmington is one of the most likely locations for growth in the Greater Rochester, five-county area. Recent construction of large housing developments and commercial and industrial businesses have created pressure constraints for the MF60 Southeast pressure system. The gas mains associated with this project are currently operating with pressures between 50% MAOP and 70% MAOP. The new mains installed will improve the distribution of gas through the MF60 Southeast system enough so that 70% of system MAOP (42 psig out of 60 psig) can be maintained on RG&E's peak gas load design day, in accordance with RG&E's Gas System Planning Manual criteria. This project on the MF60 Southeast gas pressure system is categorized as Growth (as shown on the spreadsheet), as related to prioritization purposes. (See associated executive summary for additional related projects on the MF60 Southeast pressure system).

4. Other Alternatives Considered

No other viable alternative.

5. Customer Benefits

The installation of 6" plastic gas distribution main in the MF60 Southeast system will better accommodate existing and expected future customer load demand, allow RG&E to maintain adequate system pressure at the system endpoints, where gas pressure is a minimum, 37 psig on a 60 psig pressure system. At least 2,400 customers will benefit from this project.

6. Cost and Avoided Costs

The estimated cost for this replacement project is $250,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

Please see attached.

PROJECT SUMMARY

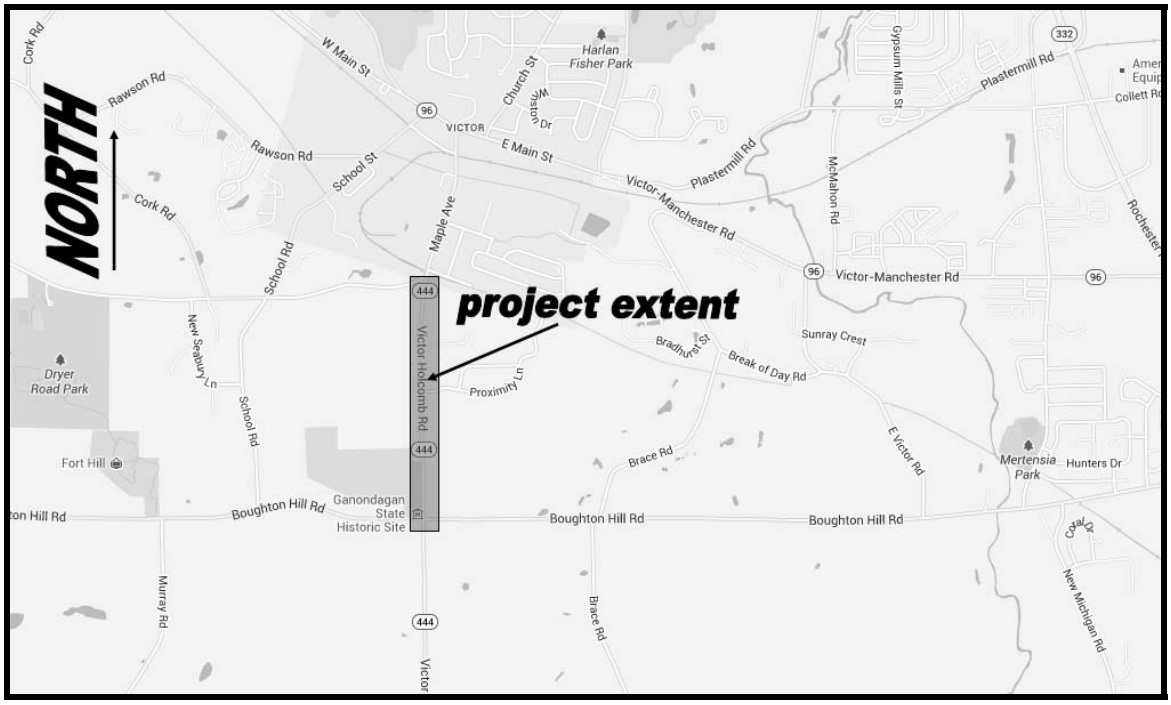
Rochester Gas & Electric

1. Project MF60 Southeast: NYS Route 444, Install Gas Mains, Roch
2. Identification PM Notification #xxxxxxxxxx
3. Description: Install 5,100 feet of 6" plastic gas main
4. Main Project Identification: R-xx-xxx
5. Municipality: Town of Farmington (Rochester district)
6. Total Cost ($000) **250**
7. 2013 Budget ($000) 0
8. 2014 Budget ($000) 0
9. 2015 Budget ($000) 0
10. 2016 Budget ($000) 0
11. 2017 Budget ($000) 250
12. 2018 Budget ($000) 0
13. Kind of Facility: Distribution main
14. Pressure: Medium Pressure, 60 psig
15. Investment Reason: System Capacity
16. Submitted by: Melissa Reese

Information to prioritize the Projects

This project will help maintain existing system pressure for an area affecting approximately 2,400 residential, commercial, and industrial customers.

Map for Project Scope



[synergee screenshots]

System Planning Study Report

RG&E
Project: SF115 R343 Mt Read, Replace Gas Mains, Roch

1. Main Target:

This system reinforcement project involves the replacement of existing 20" gas mains on the SF115 R343 Mt Read gas pressure system along Mt. Read Blvd and Driving Park Ave will improve system capacity at 115 and eventually 120 psig, and help maintain safe and adequate operation of 60 psig and 14 psig regulators fed by this pressure system. The installation of 20 and 24" steel gas mains will facilitate more efficient distribution through the MF42 Henrietta pressure system and help compensate for recent increases in customer load demand.

2. Description

The existing 20" steel gas mains along Buffalo Rd from the outlet of Regulator 343 to Mt Read Blvd, continuing north along Mt Read Blvd to the inlet of Regulator 341 will be replaced with 20" and 24" steel mains, with the requirement of providing enough gas to areas supported by the SF115 R343 Mt Read pressure system. The new steel mains will be installed behind-curb: 1,500' along Mt. Read Blvd and 3500' along Driving Park Blvd. This new pipe will allow gas to flow more efficiently throughout the 115 psig system. These new 115 psig gas mains will also be uprated to 120 psig, and connected to the MF120 Western Monroe pressure system, to provide more reliability to that system as well. The entire project will be completed in the town of Gates, NY, and the City of Rochester, NY.

3. Driver

This project is categorized as system capacity, as related to prioritization purposes. RG&E will replace and relocate the existing 20" steel gas mains with new 20" and 24" steel pipe to accommodate current customer load and future customer growth. This project will also help in maintaining safe operation of 60 psig and 14 psig pressure systems connected to the 115 psig pressure system currently. The mains replaced as part of this project will also be uprated to 120 psig, and will be tied in to the MF120 Western Monroe pressure system, extending the 120 psig pipe network, and improving reliability at 120 psig for RG&E. The scope and estimated costs for this project have been identified. (See system pressure maps at the conclusion of this report). The improvement project increases the pressure at the north end of the project by 16 psig (75 psig to 91 psig), and increases station capacity at regulator station 343, at Buffalo Road, by 219 mcfh.

4. Other Alternatives Considered

The replacement of the existing gas mains with the same diameter pipe, within the project scope could decrease project costs, but would not fulfill the need for pressure improvements throughout the SF115 R343 Mt Read pressure system or for anticipated increases in customer load demand. Due to past studies of this gas pressure system and current system load capacity, RG&E should begin work on this

project in 2016. Replacement of the existing 20" steel with only 20" steel or smaller diameter main would not facilitate the movement of enough gas through the gas pressure system to maintain 70% MAOP.

5. Customer Benefits

The installation of 20" and 24" steel gas mains will better accommodate existing and expected future customer load demand, allow RG&E to maintain adequate system pressure through the whole pressure system. The new mains installed will improve the distribution of gas through the SF115 MT READ pressure system enough so that 70% of system MAOP can be maintained on RG&E's peak gas load design day, in accordance with IUSA's Gas System Planning Manual criteria. It will also improve gas pressure at the inlet of downstream regulators that control 60 psig pressure systems (thus improving the performance of the regulator equipment due to the acceptable range of pressure in which the regulator will operate without issue). This project will benefit approximately 60,000 residential, commercial, and industrial customers.

6. Cost and Avoided Costs

The estimated cost for the SF115 R343 Mt Read project is $2,500,000. Although system capacity projects typically have negative net present values, they allow the company to continue to meet its obligation to serve new customers in the franchise while maintaining system pressures on the design day that are adequate for safe and reliable service at the customer meter.

7. Maps

Please see attached.

PROJECT SUMMARY

Rochester Gas & Electric

1. Project SF115 R343 Mt Read, Replace Gas Mains, Roch
2. Identification R-xx-xxx
3. Description: 5000' of 20" and 24" steel gas mains along Mt. Read Blvd and Driving Park Ave to replace existing 20" steel mains.
4. Main Project Identification: R-xx-xxx
5. Municipality: City of Rochester, NY (Rochester Central District) + Town of Gates
6. Total Cost ($000) 2500
7. 2016 Budget ($000) 250
8. 2017 Budget ($000) 2250
9. 2018 Budget ($000) 0
10. 2019 Budget ($000) 0

11. 2020 Budget ($000) 0

12. Kind of Facility: Distribution Gas Mains

13. Pressure : Medium Pressure, 115 psig

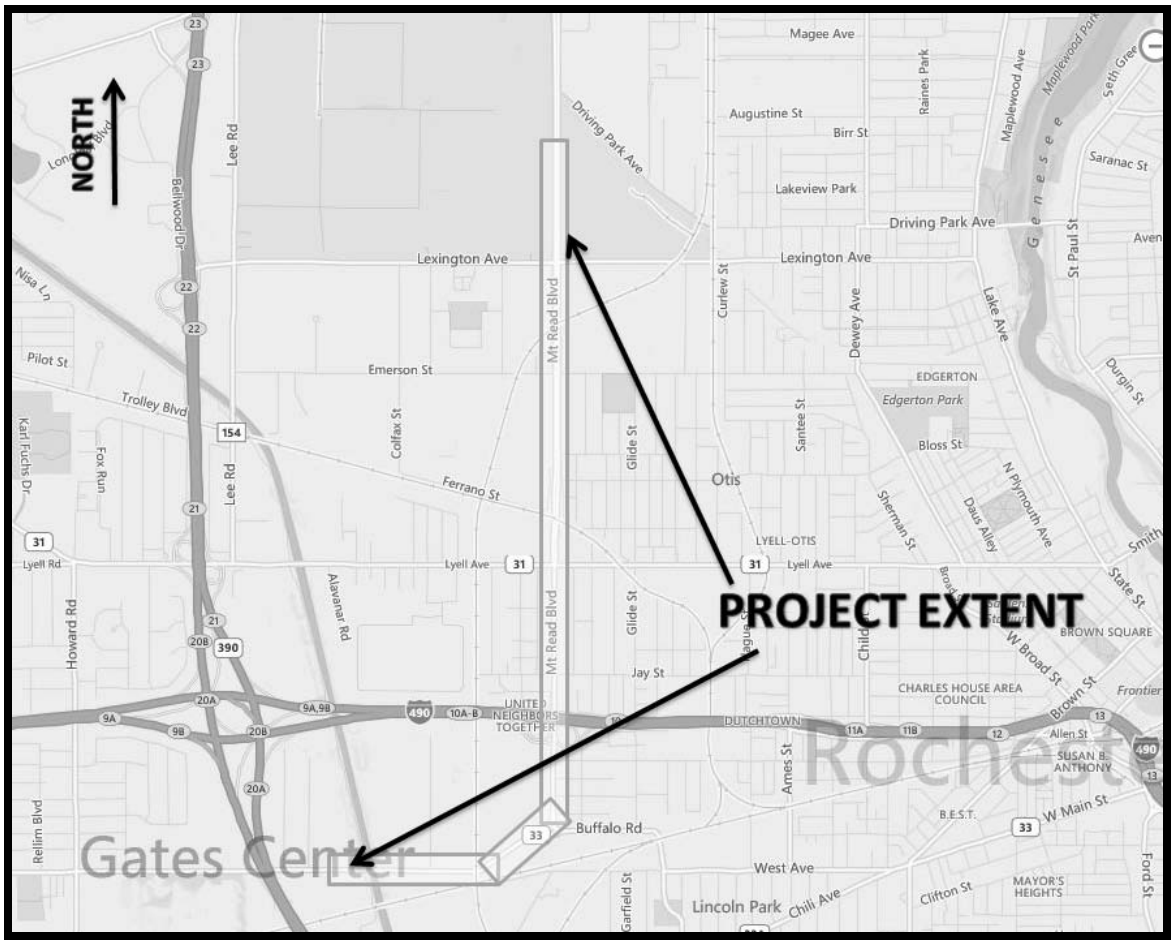
14. Investment Reason: Statutory, System Capacity

15. Submitted by: Melissa Reese

Information to prioritize the Projects

This project will improve system pressure for an area affecting approximately 60,000 residential, commercial, and industrial customers.

Map for Project Scope



SYNERGEE SCREENSHOTS

Figure 1. Existing RS 343 flow and end pressure at Vintage Lane (intersection with Mt. Read Blvd)

Figure 2. RS 343 flow and end pressure at Vintage Lane (intersection with Mt. Read Blvd) with improvement project

NEW YORK STATE OF OPPORTUNITY. Department of Public Service

3 Empire State Plaza, Albany, NY 12223-1350
www.dps.ny.gov

August 10, 2015

New York State Electric & Gas Corporation
Mark Marini
Attn: Regulatory Administration
89 East Avenue
Rochester, NY 14619

STATEMENT OF REVISED ASSESSMENT

This letter will provide a statement of your Company's Revised 2015-16 State Fiscal Year Assessment, consistent with Public Service Law Section 18-a.

The Department of Public Service is required to collect a Temporary State Energy and Utility Service Conservation Assessment* (Temporary Assessment), a General Assessment which supports the costs of the Department and an assessment for the New York State Energy Research and Development Authority (NYSERDA). The standard General Assessment is calculated using your company's adjusted intrastate revenues of $2,233,116,406 as reported for calendar year 2014 and the 2015-16 Enacted State Budget for the Public Service Department. The Temporary Assessment is equal to 1.00 percent of your annual intrastate operating revenues - including estimated energy supply company (ESCO) revenues, if applicable - minus the amount of the General Assessment. The NYSERDA Assessment, charged to Electric and Gas companies, is also calculated consistent with the 2015-16 Enacted State Budget. (A separate attachment is provided containing the Assessment calculations.)

The amounts shown on page two state the remaining owed Assessment payments due by September 10, 2015.

General/Temporary Assessment checks should be made payable to the Department of Public Service, and mailed to: **NYS DEPARTMENT OF PUBLIC SERVICE, UTILITY ACCOUNT, BOX 646, ALBANY, NEW YORK 12201.**

NYSERDA Assessment checks should be made payable to NYSERDA and mailed to: NYSERDA, Att: Jeffrey Pitkin, Treasurer, 17 Columbia Circle, Albany, NY 12203-6399. Please refer to the company code A-1005-1 on your check. If you prefer, you may now send your assessment payment electronically via ACH. If you would like to process your payment via ACH, please contact JoAnn Dollar via email at JoAnn.Dollar@dps.ny.gov or Jeffrey Pitkin for NYSERDA, (Jeff.Pitkin@nyserda.ny.gov).

*Public Service Law Section 18-a(6) (Chapter 59 of the Laws of 2009, Part NN; Chapter 59 of the Laws of 2013, Part BB; Chapter 57 of the Laws of 2014, Part S). The statute applies to electric, gas, steam, water, the Long Island Power Authority, and municipal electric and gas corporations.

NEW YORK STATE OF OPPORTUNITY. Department of Public Service

3 Empire State Plaza, Albany, NY 12223-1350
www.dps.ny.gov

August 10, 2015

Rochester Gas and Electric Corporation
Mark Marini
Attn: Regulatory Administration
89 East Avenue
Rochester, NY 14649

STATEMENT OF REVISED ASSESSMENT

This letter will provide a statement of your Company's Revised 2015-16 State Fiscal Year Assessment, consistent with Public Service Law Section 18-a.

The Department of Public Service is required to collect a Temporary State Energy and Utility Service Conservation Assessment* (Temporary Assessment), a General Assessment which supports the costs of the Department and an assessment for the New York State Energy Research and Development Authority (NYSERDA). The standard General Assessment is calculated using your company's adjusted intrastate revenues of $1,271,840,483 as reported for calendar year 2014 and the 2015-16 Enacted State Budget for the Public Service Department. The Temporary Assessment is equal to 1.00 percent of your annual intrastate operating revenues - including estimated energy supply company (ESCO) revenues, if applicable - minus the amount of the General Assessment. The NYSERDA Assessment, charged to Electric and Gas companies, is also calculated consistent with the 2015-16 Enacted State Budget. (A separate attachment is provided containing the Assessment calculations.)

The amounts shown on page two state the remaining owed Assessment payments due by September 10, 2015.

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*Public Service Law Section 18-a(6) (Chapter 59 of the Laws of 2009, Part NN; Chapter 59 of the Laws of 2013, Part BB; Chapter 57 of the Laws of 2014, Part S). The statute applies to electric, gas, steam, water, the Long Island Power Authority, and municipal electric and gas corporations.

2015-16 Revised Assessment Billing

August 10, 2015

Revised Assessment		
Standard General Assessment	$2,823,022.72	
NYSERDA Assessment	$1,231,474.75	
Temporary State Energy and Utility Service Conservation Assessment	$9,895,382.11	
Total Assessment		**$13,949,879.58**
Paid-to-Date		
Standard General Assessment	$1,472,810.55	
NYSERDA Assessment	$0.00	
Temporary State Energy and Utility Service Conservation Assessment	$4,938,239.32	
Total Paid-to-Date		$6,411,049.87
TOTAL ASSESSMENT PAYMENT NOW DUE		**$7,538,829.71**

Thank you for your timely consideration.

Sincerely,
Carol A. S. Gnacik
Director, Finance & Budget

Department of Public Service
Three Empire State Plaza, Albany, NY 12223

(518) 474-2516 | carol.gnacik@dps.ny.gov

www.dps.ny.gov

NEW YORK STATE DEPARTMENT OF PUBLIC SERVICE
DETAIL OF ASSESSMENT

Rochester Gas and Electric Corporation

	Assessment Type / Operations	2014 Assessable Intrastate Revenue	2015-16 Revised Assessment	Assessment Paid	Remaining Owed Assessment
TEMPORARY STATE ENERGY & UTILITY SERVICE CONSERVATION ASSESSMENT					
	Electric	$830,968,956	$6,465,241.08	$3,336,085.12	$3,129,155.96
	Gas	$440,871,527	$3,430,141.03	$1,602,154.20	$1,827,986.83
GENERAL					
	Electric	$830,968,956	$1,844,448.48	$994,974.33	$849,474.15
	Gas	$440,871,527	$978,574.24	$477,836.22	$500,738.02
ERDA					
	Electric		$715,496.60	$0.00	$715,496.60
	Gas		$515,978.15	$0.00	$515,978.15
Total			$13,949,879.58	$6,411,049.87	$7,538,829.71

Billing Calculation - Temporary State Energy and Utility Service Conservation Assessment

Public Service Law Section 18-a(6) (Chapter 59 of the Laws of 2009, Part NN; Chapter 59 of the Laws of 2013, Part BB; Chapter 57 of the Laws of 2014, Part S) established the Temporary State Energy and Utility Service Conservation Assessment (Temporary State Assessment). It imposes a charge of 1% on gross intrastate operating revenues (including estimated ESCO revenues if applicable), for electric, gas and water utilities derived in the last preceding calendar year, minus the amount of the General Assessment for the Department of Public Service costs for the corresponding state fiscal year (PSL - §18-a (1) and (2)). For the state fiscal year 2015-16, the Temporary State Assessment is calculated using revenues reported for the 2014 calendar year.

Billing Rate Calculation - General Assessment

The General assessment rate is calculated by dividing the total revised 2015-16 New York State utility regulatory costs defined by Section 18-a of the Public Service Law by total intrastate utility revenues from the 2014 calendar year. For this revised assessment billing, utility regulatory costs of $77,873,000 divided by the total reported intrastate revenues of $35,083,682,865, yielded a General Assessment rate of 0.002219635843239. Intrastate revenues for each utility are multiplied by this rate to calculate the corresponding individual assessments.

Billing Rate Calculation - Energy Research and Development Authority (ERDA) Assessment

The ERDA assessment rate is calculated by dividing the revised 2015-16 ERDA research costs by total intrastate gas and electric utility revenues consistent with Section 18-a of the Public Service Law. Each utility's intrastate revenues are multiplied by this rate to arive at an initial assessment amount. For this revised assessment billing, ERDA costs of $19,700,000, divided by total applicable intrastate revenues of $19,309,294,881, yielded a maximum assessment rate of .00559023773748.

2015-16 Revised Assessment Billing

August 10, 2015

Revised Assessment		
Standard General Assessment	$4,956,705.22	
NYSERDA Assessment	$2,115,284.15	
Temporary State Energy and Utility Service Conservation Assessment	$17,374,458.84	
Total Assessment		**$24,446,448.21**
Paid-to-Date		
Standard General Assessment	$2,334,791.87	
NYSERDA Assessment	$0.00	
Temporary State Energy and Utility Service Conservation Assessment	$7,828,407.36	
Total Paid-to-Date		$10,163,199.23
TOTAL ASSESSMENT PAYMENT NOW DUE		**$14,283,248.98**

Thank you for your timely consideration.

Sincerely,
Carol A. S. Gnacik
Director, Finance & Budget

Department of Public Service
Three Empire State Plaza, Albany, NY 12223

(518) 474-2516 | carol.gnacik@dps.ny.gov

www.dps.ny.gov

NEW YORK STATE DEPARTMENT OF PUBLIC SERVICE
DETAIL OF ASSESSMENT

New York State Electric & Gas Corporation

	Assessment Type / Operations	2014 Assessable Intrastate Revenue	2015-16 Revised Assessment	Assessment Paid	Remaining Owed Assessment
TEMPORARY STATE ENERGY & UTILITY SERVICE CONSERVATION ASSESSMENT					
	Electric	$1,719,949,103	$13,381,830.35	$5,939,925.54	$7,441,904.81
	Gas	$513,167,303	$3,992,628.49	$1,888,481.82	$2,104,146.67
GENERAL					
	Electric	$1,719,949,103	$3,817,660.68	$1,771,559.55	$2,046,101.13
	Gas	$513,167,303	$1,139,044.54	$563,232.32	$575,812.22
ERDA					
	Electric		$1,551,602.70	$0.00	$1,551,602.70
	Gas		$563,681.45	$0.00	$563,681.45
Total			$24,446,448.21	$10,163,199.23	$14,283,248.98

Billing Calculation - Temporary State Energy and Utility Service Conservation Assessment

Public Service Law Section 18-a(6) (Chapter 59 of the Laws of 2009, Part NN; Chapter 59 of the Laws of 2013, Part BB; Chapter 57 of the Laws of 2014, Part S) established the Temporary State Energy and Utility Service Conservation Assessment (Temporary State Assessment). It imposes a charge of 1% on gross intrastate operating revenues (including estimated ESCO revenues if applicable), for electric, gas and water utilities derived in the last preceding calendar year, minus the amount of the General Assessment for the Department of Public Service costs for the corresponding state fiscal year (PSL - §18-a (1) and (2)). For the state fiscal year 2015-16, the Temporary State Assessment is calculated using revenues reported for the 2014 calendar year.

Billing Rate Calculation - General Assessment

The General assessment rate is calculated by dividing the total revised 2015-16 New York State utility regulatory costs defined by Section 18-a of the Public Service Law by total intrastate utility revenues from the 2014 calendar year. For this revised assessment billing, utility regulatory costs of $77,873,000 divided by the total reported intrastate revenues of $35,083,682,865, yielded a General Assessment rate of 0.002219635843239. Intrastate revenues for each utility are multiplied by this rate to calculate the corresponding individual assessments.

Billing Rate Calculation - Energy Research and Development Authority (ERDA) Assessment

The ERDA assessment rate is calculated by dividing the revised 2015-16 ERDA research costs by total intrastate gas and electric utility revenues consistent with Section 18-a of the Public Service Law. Each utility's intrastate revenues are multiplied by this rate to arive at an initial assessment amount. For this revised assessment billing, ERDA costs of $19,700,000, divided by total applicable intrastate revenues of $19,309,294,881, yielded a maximum assessment rate of .00559023773748.

New York State Electric & Gas Corporation
Rochester Gas and Electric Corporation
Cases 15-E-0283, 15-E-0285, 15-G-0284, 15-G-0286

NYSEG and RG&E Electric and Gas Rate Cases

Request for Information

Requesting Party:	NYDPS Gas Safety Panel
Request No.:	NYRC-1264 (DPS-507)
Date of Request:	August 13, 2015
Response Due Date:	August 24, 2015
Date of Reply:	August 24, 2015
Witness:	Gas, Engineering Delivery and Operations
Subject:	Leak Prone Pipe Replacement Program; Meter Relocations; Leak Management; Active Meters; Plastic Fusion

Questions:

Leak Prone Pipe Replacement Program

1) How many leak prone services are remaining attached to each company's distribution system?
2) What is the historic average cost associated with service line replacements for the previous three calendar years (2012, 2013, and 2014)?

Meter Relocations

1) How many customer gas meters are located inside of structures, buildings, etc. per each company?
2) How many customer gas meters are located outside of structures, buildings, etc. per each company?
3) What is the average cost associated with relocating a customer gas meter from inside to outside of a structure, building, etc.?
4) How many customer gas meters located inside of structures, buildings, etc. are connected to leak prone services?

Leak Management

1) On average, how much cost is avoided to the rate payer for each type of leak repaired? The types of leaks are classified per 16 NYCRR Part 255 as Type 1, 2A, 2, and 3.
2) Please provide the analysis associate with determining the avoided cost for leaks repaired.

New York State Electric & Gas Corporation
Rochester Gas and Electric Corporation
Cases 15-E-0283, 15-E-0285, 15-G-0284, 15-G-0286

NYSEG and RG&E Electric and Gas Rate Cases

Request for Information

Active Meters without a Customer of Record (Soft-Off)

1) What is the average cost associated with discontinuing gas service to a meter located inside of structures, buildings, etc.?
2) What is the average cost associated with discontinuing gas service to a meter located outside of structures, buildings, etc.?
3) Please provide the total annual cost incurred per company for discontinuing gas service to a customer for each of the following calendar years: 2010, 2011, 2012, 2013, and 2014.
4) Please provide the annual gas usage for active meters without a customer of record for each of the following calendar years: 2010, 2011, 2012, 2013, and 2014.
5) Please provide the annual dollar amount lost associated with question #4 for each of the following calendar years: 2010, 2011, 2012, 2013, and 2014.

Plastic Fusion Order (Case 14-G-0212)

1) Please provide the total cost to date associated with the remediation efforts as directed by the Commission in Case 14-G-0212.

Response:

Leak Prone Pipe Replacement Program

1) The Companies estimate of the number of leak prone services remaining in the distribution system based on the 2014 DOT Distribution report by decade of installation and shown in the table below. The Companies identify leak prone based on the Distribution Integrity Management Plan.

2014 DOT Distribution Report Part B Section 4, Service Decade of Installation	NYSEG Number of Services	RG&E Number of Services
Unknown Year	26530	0
Pre 1940	1336	7988
1940-1949	613	1408
1950-1959	10440	21571
1960-1969	24057	52687
1970-1971	3044	8842

New York State Electric & Gas Corporation
Rochester Gas and Electric Corporation
Cases 15-E-0283, 15-E-0285, 15-G-0284, 15-G-0286

NYSEG and RG&E Electric and Gas Rate Cases

Request for Information

Total	66020	92496

2) Please see the response to NYRC-0710 (DPS-140).

Meter Relocations

1) There are 91,400 meters at NYSEG and 145,632 at RG&E located inside.

2) There are 188,593 meters at NYSEG and 170,392 at RG&E located outside.

3) This information is not available.

4) This information is not available.

Leak Management

1) NYSEG recently performed a Simulated Gas Leak Test and Economic Impact analysis and is in the process of finalizing the reports provided in Attachments 1-3. The Executive Summary of the report states: Speculation has existed on how much gas escapes from small leaks in natural gas pipelines and the economic impact. This simulated gas leak test actually measured gas volume losses as a function of pressure in a real pipeline. The economic study herein then relates this actual measured loss of the typical number of gas leaks to the cost of gas escaping annually and over a ten (10) year period if allowed to persist.

   The value of the gas lost from these presumed minor leaks equates to gas volume losses in thousands of cubic feet and is in the millions of dollars. A large portion of the annual "lost and unaccounted for" (LAUF) gas volume values finds that gas lost through pipeline leaks becomes a significant percentage.

   The combined RG&E and NYSEG LAUF in 2005 was 392,000 MCF. Assuming 1,000 leaks at each company and a typical leak profile, the impact of gas leaks would amount to 317,669 MCF or 81% of the LAUF or $2,382,515 annually.

   Additionally, as greenhouse gas (GHG) emissions continue to gain attention, repairing all leaks serves as another means to curb the carbon "foot print" methane gas releases imparts. Evaluating accelerated means of locating and repairing leaks has a potentially large impact and a potential carbon credit. IF carbon were to be valued at $30/ton, the 2005 GHG carbon equivalent of gas loss through leaks if repaired immediately would amount to 317,669MCF converting to 150,100 tons of carbon, amounting to potentially $4,502,935 in carbon credits.

New York State Electric & Gas Corporation
Rochester Gas and Electric Corporation
Cases 15-E-0283, 15-E-0285, 15-G-0284, 15-G-0286

NYSEG and RG&E Electric and Gas Rate Cases

Request for Information

The conclusion is to repair all leaks in a prioritized manor regardless of the type or classification of leak. Benefits are realized in safety, economics and environmental impact.

2) The avoided costs are associated with the reduction in gas losses as described in response 1 above.

Active Meters without a Customer of Record (Soft-Off)

1) On average, the labor cost associated with discontinuing a single gas service is $17. This cost assumes average task time of 12 minutes and average travel time of 7 minutes. This cost is for payroll only and does not include the cost of transportation.

2) The cost of discontinuing gas inside a building is generally the same as discontinuing outside of a building if access is gained on the first visit. If access is not available, additional correspondence with the customer and trips to the field are required. Since each situation is unique, an average amount is not available.

3) The table below shows costs to perform gas meter work for the years requested. The costs include both disconnect and reconnect of meters as the costs are only tracked at this level of detail. The costs below include both payroll and payroll overhead costs.

Gas Meter Work Cost	2014	2013	2012	2011	2010*
NYSEG	$718,540.50	$659,973.50	$699,409.73	$629,063.20	$619,912.61
RGE	$304,147.74	$208,791.00	$241,582.01	$256,859.49	$187,172.93
*Payroll overhead information not available					

4) Any consumption associated with meters with no customer of record is accounted for as "lost and unaccounted for" (LAUF) gas consumption. Specific gas usage by year is unavailable.

3) Because these are categorized as "inactive" there are no bills associated with these meters. We are unable to provide a dollar amount.

New York State Electric & Gas Corporation
Rochester Gas and Electric Corporation
Cases 15-E-0283, 15-E-0285, 15-G-0284, 15-G-0286

NYSEG and RG&E Electric and Gas Rate Cases

Request for Information

Plastic Fusion Order (Case 14-G-0212)
Seven NYSEG and RG&E employees requalified Company and Contractor employees on the hydraulic plastic fusion procedure at a total cost of $22,000.

A total of 374 miles of 6" and 8" plastic pipe was leak surveyed. Using an average cost of $40.00/mile, the estimated cost to date is $14,960.

NYSEG and RG&E employees with a combined total of 184 hours reviewed and selected the locations for the inspections. The total estimated cost to identify the number and location of plastic fusions to be inspected is $6,500.

The average cost to excavate and inspect plastic fusions at NYSEG locations is approximately $2,000 and the average cost per excavation and inspection at RG&E is approximately $3,000.

The total estimated NYSEG/RG&E cost to-date is $227,000 based upon completion of 100 fusion inspections.

Gas Engineering Evaluation

Simulated Gas Leak Test and Economic Impact

DESCRIPTION OF PROJECT This project evaluates the economic impact of gas loss through pipeline leaks. To produce real pipeline simulations, pipes with "leak" points were buried at normal pipeline depths in differing soil types to influence gas loss soil resistance.

The test was designed to include statistical significance; including consideration of measurement repeatability, accurate data collection methods, error consideration and data checks and balances.

The objectives of this project were to:

1) Measure the actual gas losses through a "leak" point under various influencing conditions.
2) Compare the measured test results to standard industry gas equations, validate and/or correct with factors revealed during this test.
3) Calculate the economic impact of gas loss from pipeline leaks, estimating the annual cost of allowing leaks to persist.
4) Estimate the impact of the annual "Lost and unaccounted for" (LAUF) percentage of pipeline leaks.

EXECUTIVE SUMMARY Speculation has existed on how much gas escapes from small leaks in natural gas pipelines and the economic impact. This simulated gas leak test actually measured gas volume losses as a function of pressure in a real pipeline. The economic study herein then relates this actual measured loss of the typical number of gas leaks to the cost of gas escaping annually and over a ten (10) year period if allowed to persist.

The value of the gas lost from these presumed minor leaks equates to gas volume losses in thousands of cubic feet and is in the millions of dollars. A large portion of the annual "Lost and unaccounted for" (LAUF) gas volume values finds that gas lost through pipeline leaks becomes a significant percentage.

The combined RGE and NYSEG LAUF in 2005 was 392,000MCF. Assuming 1,000 leaks at each company and a typical leak profile, the impact of gas leaks would amount to 317,669MCF or 81% of the LAUF or $2,382,515 annually.

Additionally, as green house gas (GHG) emissions continue to gain attention, repairing ALL leaks serves as another means to curb the carbon "foot print" methane gas releases imparts. Evaluating accelerated means of locating and repairing leaks has a potentially large impact based on a 21:1 ratio (methane to carbon dioxide, respectively) of harmful GHG release and a potential credit of $30/ton carbon. The 2005 GHG carbon equivalent of gas loss through leaks if repaired immediately would amount to 317,669MCF converting to 150,100 tons of carbon, amounting to potentially $4,502,935 in carbon credits.

The conclusion is to repair ALL leaks in a prioritized manor regardless of the type or classification of leak, in the most routine cases. Explore improved leak survey techniques and increase the frequency to find leaks as soon as possible. Benefits are realized in safety, economics and environmental impact.

CONTENT

LIST OF FIGURES

LIST OF ATTACHMENTS

1. BACKGROUND The typical natural gas transmission and distribution pipeline networks maintain very low leakage due to extensive survey and repair efforts. However, leaks persist and are revealed with every new survey. The immediate leak characterization of location, type and threat establishes and schedules remedial action. With rising gas prices it is imperative to understand what even the minor leaks cost in volume losses to determine immediacy of repair. No confirming test data existed to verify actual gas leak volume through small pipeline leak points. Close approximations can be calculated using accepted practice industry equations but may not be accurate for very small leak points. The need for a verification test of actual pipeline leakage at small leak points became apparent.

2. OBJECTIVES Develop a test to simulate pipeline leakage through controlled leak points. Compare test results with accepted industry equations to determine accuracy. Calculate the amount of gas loss volume annually based on the number of surveyed leaks and approximate leak point characteristics. Once a gas loss volume is determined, calculate the monetary value and consider altering pipeline operation and maintenance prioritization.

3. APPROACH The simulated gas leak test data was obtained by conducting actual controlled gas pipeline leakage with calibrated measurement instruments and specific pressure set points. This testing was conducted consistent with typical requirements of American Society for Testing and Materials (ASTM), although no specific ASTM documents are referenced or directly applicable.

4. RESULTS This test reveals the actual measured gas loss volumes as a function of varying pressure, leak size and soil condition. Theoretical gas loss equations provide close approximations to the actual gas loss but can be improved by factoring soil condition.

The actual test data are given in Attachment 2: Simulated Gas Leak Testing – Test Point Summary and Attachment 3: Simulated Gas Leak Testing – Test Points Data.

The standard industry gas loss equations tend to underestimate gas loss in porous soils and over estimate for heavy clay soils. Checks and balances of these results may be performed by comparing:

- Known leak numbers on record for a given year and the resulting gas volume loss
- Annual “LAUF” estimates

Calculating leak volume based on the known number of leaks on record must be a percentage of the “LAUF”.

5. SUMMARY Significant gas loss occurs with the collective impact of each pipeline leak point both in gas volume and monetary value. Consideration of immediate leak point repair becomes justified for typical leak points.

Attachment 1: Simulated Gas Leak Testing Economics illustrates the summary gas loss volume and monetary estimates based on annual leak survey reports and cost of gas.

6. TEST SITE ILLUSTRATION AND IMAGES

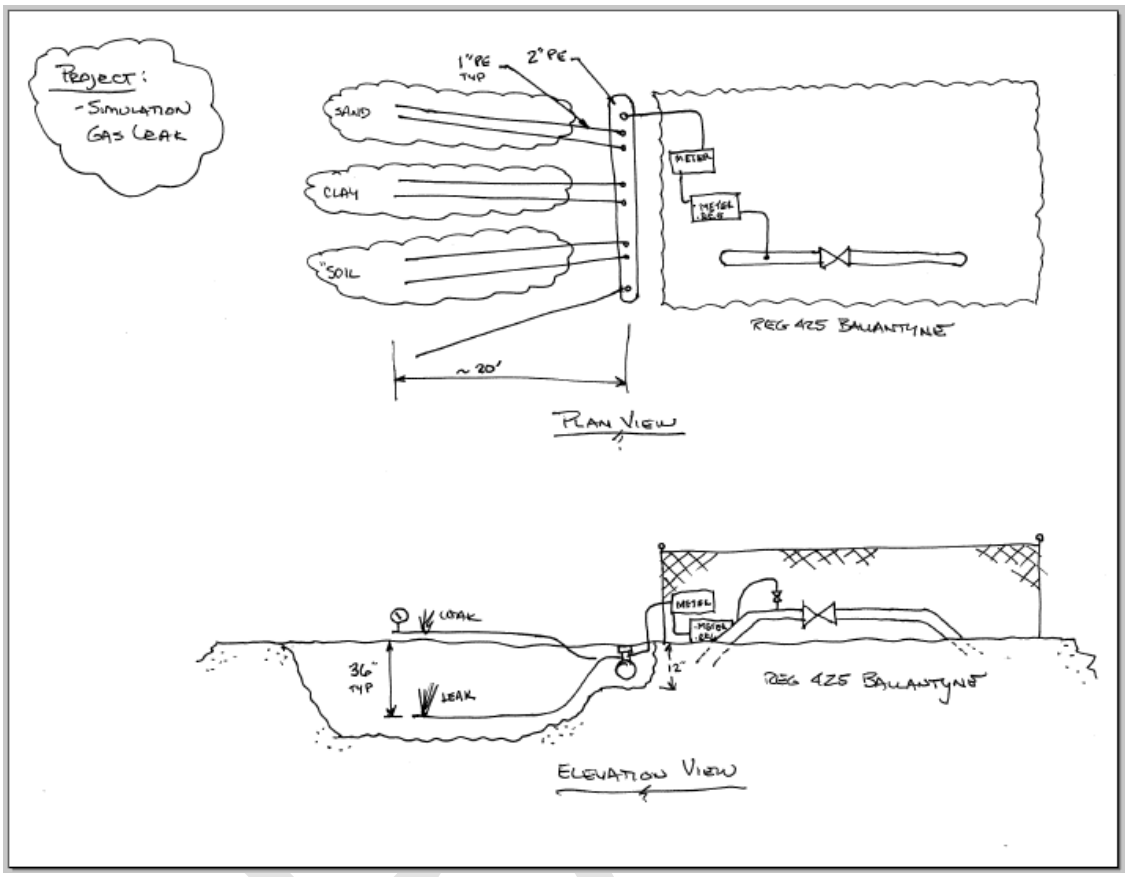
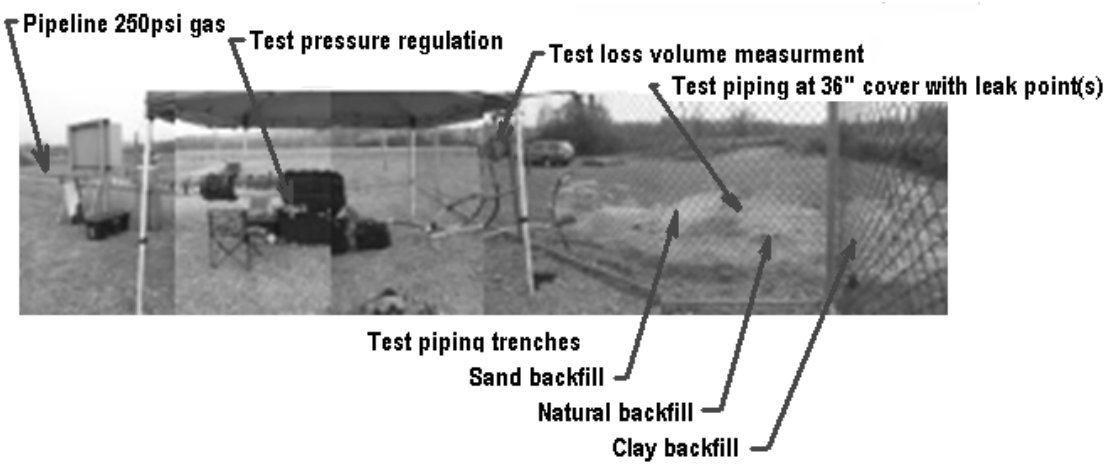


Figure 1 – Illustration of Simulated Gas Leak Test Field Configuration

IMAGES OF TEST SITE



Pressure gauges and digital recorders at piping endpoints

Leaks found during installation prior to repair and retest

Test data collection , pressure regulation, redundant flow measurement (digital, mechanical)

Figure 2 – Images of Simulated Gas Leak Test

7. DESCRIPTION OF TEST METHODS All test equipment were designed and selected based on an estimated maximum leak flow from the controlled leak points. This was to avoid fluid dynamic "choke flow" in any of the test apparatus, allowing the leak point full available flow capacity for an accurate reading.

Piping, tubing and meter(s) were selected based on pressure rating and flow measurement range. Redundant flow metering was installed to increase the confidence of the flow being recorded. A digital flow meter monitored and recorded all data, including measured flow, temperature and pipeline pressure for calibration to natural gas. A second mechanical flow meter in series to the digital flow meter monitored and recorded flows which were transferred onto test data sheets.

Three (3) trenches we prepared to install "leak" prepared pipe and three types of soil.

Test pipes all extended from a common 2" PE pipe header. Each trench had two (2) 1" PE pipes, one pipe with a 1/16" hole and the other with a 1/8" hole. Each pipe was capped and pressure tested and inspected for leaks prior to drilling the control hole "leak point".

The 1/16 inch and 1/8 inch controlled hole "leak point(s)" were drilled perpendicular to the pipe with drill bits measured and verified dimensionally. The "leak" holes were drilled straight through the pipe wall, no flare, minimal eccentricity and no countersink.

Each trench was backfilled by layering and tamping (compressing) specific soil. One trench was filled with sand, the second filled with natural soil (mostly clear dirt) and the third filled with heavy clay soil. Each trench was backfilled to a cover of 36 inches over the controlled "leak" prepared pipe.

Pressure gauges were extensively placed at each pressure regulated step on the pipeline as well as at the pipeline end point(s). Redundant pressure gauges were used to confirm data, similar to the flow metering. Digital pressure instrument data was recorded and manual pressure gauges were hand recorded onto test data sheets for comparison.

8. STATISTICAL SIGNIFICANCE OF DATA AND REPEATABILITY Each pressure point has tested for measured flow a minimum of three (3) times for observed statistical significance of data and repeatability.

9. MEASUREMENT ERROR CONSIDERATION Error and correction for error is incorporated into the test. Recognizing and accounting for error existing in metering and pressure measuring devises will reconcile interpretation on the data collected.

10. MEASUREMENT CHECKS AND BALANCES Every effort was put into place for a controlled test, including redundant measuring devises, multiple repeated test conditions and statistically bounding parameters. Percentage differences between measuring devises will be indicated on every data sheet. If the percentage differences were unacceptably greater than inherent error of the devices, then stopping or repeating the test point shall be conducted. The actual test data are given in Attachment 2: Simulated Gas Leak Testing – Test Point Summary and Attachment 3: Simulated Gas Leak Testing – Test Points Data.

11. INSTRUMENT CALIBRATION AND CERTIFICATION Each measuring device was calibrated and certified prior to the testing process. Attachment 4: Instrument Calibration and Certification, illustrates the calibration and certification of the measuring devises used during the test.

ATTACHMENTS

FALCP - Fix All Leak Classification Project

Base Evaluation - NYSEG/RGE Combined Utility Leaks

Input -

1) Leaks, Total: 1200

2) Soil Type:

	Percent:
Porous (sand, loam)	10%
Natural (clear dirt)	20%
Dense (clay)	70%

3) System Pressure

	Percent:
60psi	80%
<1psi	20%

4) Hole Size Typical

	Percent:
1/16 inch	100%
1/8 inch	0%

5) Energy Cost of Gas: $ 5.00 /Dtherm

6) "Lost and Unaccounted for" Gas, Annual
LAUF (DOT report) %: 1.500%

7) Total Annual Gas System Throughput
Flow, MMcf: 110,000.0

Results - Leak loss gas volume and costs

1) Leak Losses Annually: 1,322,547 Mcf/yr

2) Leak Cost Annually: $ 6,811,115 $/yr

3) Leak Cost PW (10yr): $ 40,934,803 PW = A (6.01, 10%, 10 year)

Comparisons - LAUF Gas Losses

1) LAUF: 1,650,000 Mcf/yr

2) Leak Losses Annually: 1,322,547 Mcf/yr

3) % LAUF f(leak): 80% of total LAUF

Considerations - GHG Emissions Sequestering through repairing gas leaks

1) Leak Losses Annually: 1,322,547 Mcf/yr

2) GHG CO2 Equivalent: 624,903 Ton/yr

3) Carbon Credit Potential: $ 18,747,099 $/yr

FALCP - Fix All Leak Classification Project

Base Evaluation - NYSEG/RGE Combined Utility Leaks

Input -

1) Leaks, Total = 1200

2) Soil Type: 100%
- Porous (sand, loam) 10%
- Natural (clear dirt) 20%
- Dense (clay) 70%

3) System Pressure 100%
- 60psi 80%
- <1psi 20%

4) Hole Size Typical 100%
- 1/16 inch 100%
- 1/8 inch 0%

5) Energy Cost of Gas $ 5.00 /Dtherm

6) "Lost and Unaccounted for" Gas, Annual
LAUF (DOT report) % 1.500%

7) Total Annual Gas System Throughput
Flow, MMCF 110,000

Soil Type	Sys Pres	Hole Size	Leakage (ft3/hr)	Annual Losses Leak Volume, ft3/yr	Input Leak/year	Hole Size	System Pressure	Soil Type	Calculation Leak Correct Mcf/yr	Energy Loss Dth/year	Cost $/year	Present Worth 10 year leak PW = A (6.01, 10%, 10 year)
Sand	60	1/16 inch	211.9	1,856,139	1200.0	100%	80%	10%	178,189	183,535.0	$ 917,675	$ 5,515,227
		1/8 inch	1017.6	8,914,176	1200.0	0%	80%	10%	-	-	$ -	$ -
	Low	1/16 inch	9.5	83,220	1200.0	100%	20%	10%	1,997	2,057.2	$ 10,286	$ 61,819
		1/8 inch	43.8	383,688	1200.0	0%	20%	10%	-	-	$ -	$ -
												$ -
Natural	60	1/16 inch	186.9	1,637,244	1200.0	100%	80%	20%	314,351	323,781.4	$ 1,618,907	$ 9,729,630
		1/8 inch	886.8	7,768,368	1200.0	0%	80%	20%	-	-	$ -	$ -
	Low	1/16 inch	4.3	37,668	1200.0	100%	20%	20%	1,808	1,862.3	$ 9,312	$ 55,962
		1/8 inch	20.9	183,084	1200.0	0%	20%	20%	-	-	$ -	$ -
												$ -
Clay	60	1/16 inch	138.8	1,215,888	1200.0	100%	80%	70%	817,077	841,589.0	$ 4,207,945	$ 25,289,751
		1/8 inch	577.9	5,062,404	1200.0	0%	80%	70%	-	-	$ -	$ -
	Low	1/16 inch	6.2	54,312	1200.0	100%	20%	70%	9,124	9,398.1	$ 46,991	$ 282,414
		1/8 inch	18.3	160,308	1200.0	0%	20%	70%	-	-	$ -	$ -
									1,322,547	1,362,223.1	$ 6,811,115	$ 40,934,803

Checks and Balances

Input		Calcualtion - Volume		Calcualtion - Value		Comparison		
Flow, BCF	LAUF	Annl Thru-put, Mcf	LAUF, Mcf	Annl Thru-put, $	LAUF, $	Leak Volume, Mcf	LAUF, Mcf	Leak % of LAUF
110	1.500%	110,000,000	1,650,000	$ 550,000,000	$ 8,250,000	1,322,547	1,650,000	80%

Green House Gas Evaluation (EPA STAR Program) and potential Carbon Credit for sequestering methane (or equivilent CO2)

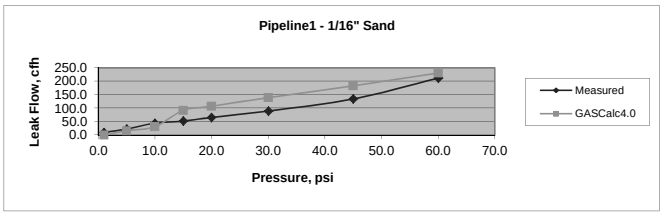
	Calculation			Sequestering
Leak Vol, MCF	Leak Wght lb/yr	Leak Wght ton/yr	CO2 Equivilent, ton/yr	Carbon Credit, $/yr
1,322,547	59,514,600	29,757	624,903	$ 18,747,099

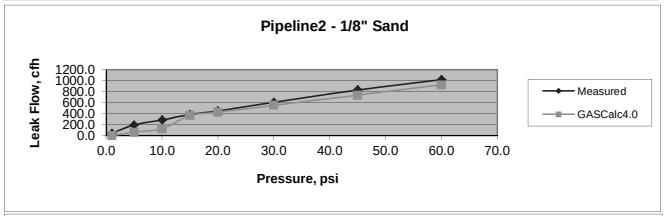
Simulated Gas Leak Testing

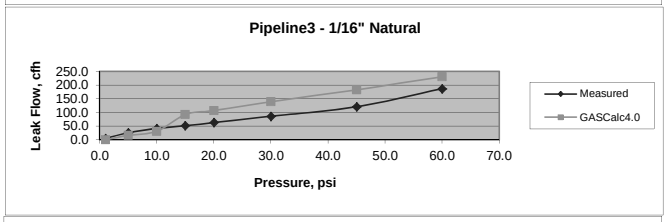
Test Point Summary

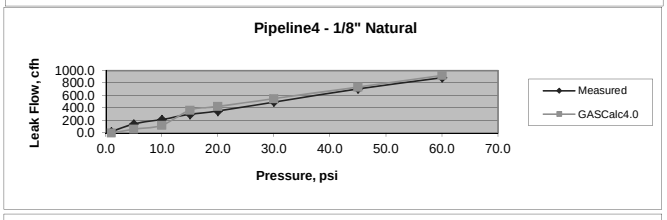
Toggle : 1 - GasCalc Estimated Flow
2 - Actual Field Test Flow

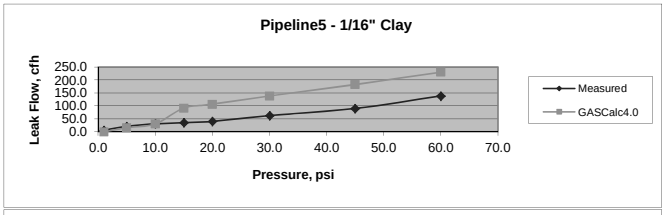
PipeLine Leak Point		Date	Leak Data Summary Test Pressure psi	Simulated Gas Leak Flow, cfh Measured	GASCalc4.0
Pipeline 1 - 1/16" Sand				Measured	GASCalc4.0
Actual	2	0.25psi data	1.0	9.5	0.0
Actual	2	5psi data	5.0	22.2	16.0
Actual	2	10psi data	10.0	44.5	31.0
Actual	2	15psi data	15.0	51.9	92.0
Actual	2	20psi data	20.0	65.7	107.0
Actual	2	30psi data	30.0	89.5	139.0
Actual	2	45psi data	45.0	134.0	183.0
Actual	2	60psi data	60.0	211.9	231.0
Pipeline 2 - 1/8" Sand				Measured	GASCalc4.0
Actual		0.25psi data	1.0	43.8	0.0
Actual		5psi data	5.0	195.5	62.0
Actual		10psi data	10.0	284.0	124.0
Actual		15psi data	15.0	383.5	365.0
Actual		20psi data	20.0	450.3	425.0
Actual		30psi data	30.0	606.0	551.0
Actual		45psi data	45.0	831.1	736.0
Actual		60psi data	60.0	1017.6	923.0
Pipeline 3 - 1/16" Natural				Measured	GASCalc4.0
Actual		0.25psi data	1.0	4.9	0.0
Actual		5psi data	5.0	25.4	16.0
Actual		10psi data	10.0	41.4	31.0
Actual		15psi data	15.0	51.1	92.0
Actual		20psi data	20.0	62.8	107.0
Actual		30psi data	30.0	86.1	139.0
Actual		45psi data	45.0	120.8	183.0
Actual		60psi data	60.0	186.9	231.0
Pipeline 4 - 1/8" Natural				Measured	GASCalc4.0
Actual		0.25psi data	1.0	20.9	0.0
Actual		5psi data	5.0	145.1	62.0
Actual		10psi data	10.0	216.8	124.0
Actual		15psi data	15.0	299.3	365.0
Actual		20psi data	20.0	351.2	425.0
Actual		30psi data	30.0	495.8	551.0
Actual		45psi data	45.0	706.1	736.0
Actual		60psi data	60.0	886.8	923.0
Pipeline 5 - 1/16" Clay				Measured	GASCalc4.0
Actual		0.25psi data	1.0	6.2	0.0
Actual		5psi data	5.0	21.2	16.0
Actual		10psi data	10.0	31.7	31.0
Actual		15psi data	15.0	35.5	92.0
Actual		20psi data	20.0	40.3	107.0
Actual		30psi data	30.0	63.0	139.0
Actual		45psi data	45.0	90.6	183.0
Actual		60psi data	60.0	138.8	231.0
Pipeline 6 - 1/8" Clay				Measured	GASCalc4.0
Actual		0.25psi data	1.0	18.3	0.0
Actual		5psi data	5.0	86.9	62.0
Actual		10psi data	10.0	131.1	124.0
Actual		15psi data	15.0	169.5	365.0
Actual		20psi data	20.0	198.1	425.0
Actual		30psi data	30.0	281.3	551.0
Actual		45psi data	45.0	417.4	736.0
Actual		60psi data	60.0	577.9	923.0

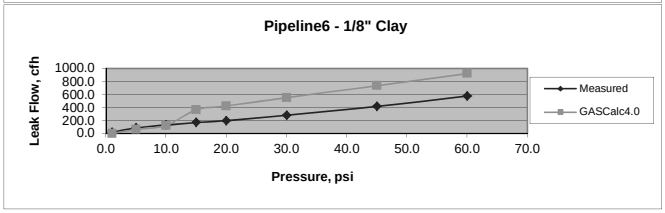








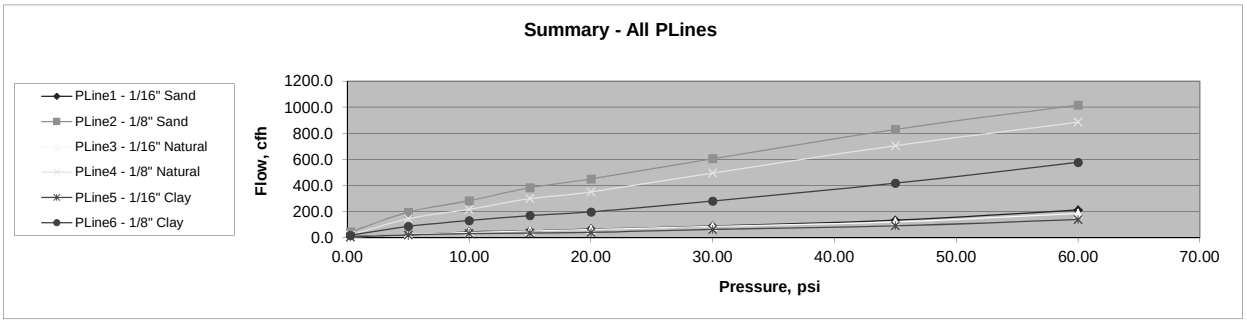


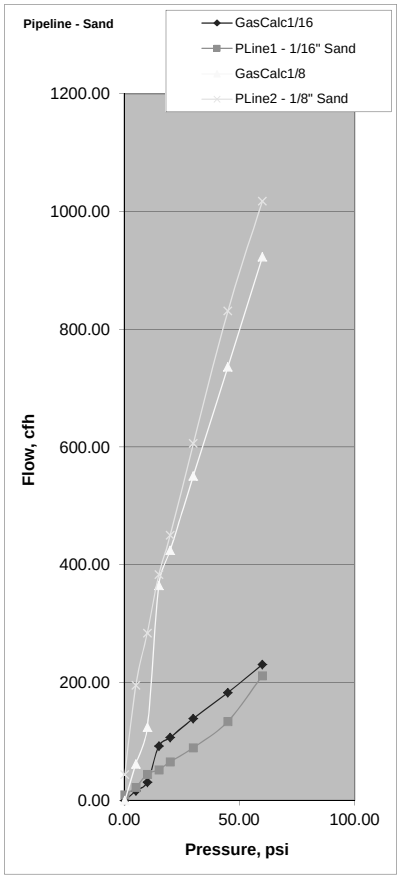


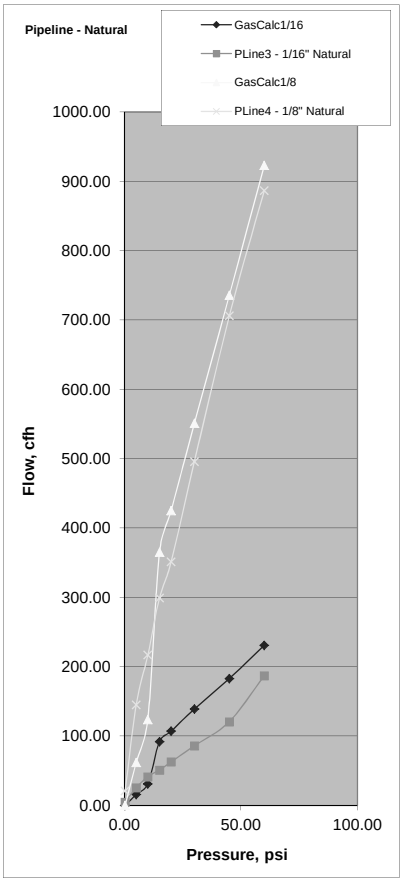
Simulated Gas Leak Testing

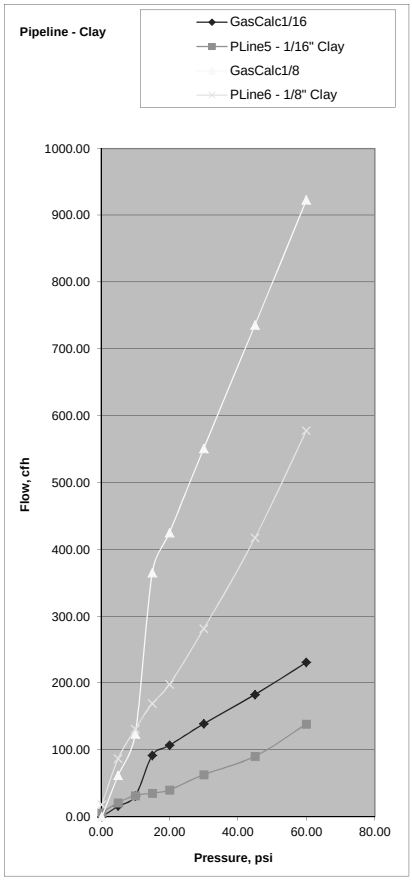
Test Point Summary

Summary	Leak Data Summary											
PipeLine	Test Pressure	Flow, Digital										
Leak Point Date	psi	cfh										
	G	PLine1 - 1/16" Sand	G	PLine2 - 1/8" Sand		G	PLine3 - 1/16" Natura	G	PLine4 - 1/8" Natural		G	PLine5 - 1/16" Clay	Ga	PLine6 - 1/8" Clay
0.25psi data	0.25	# 9.5	#	43.8	0.25	#	4.9	#	20.9	0.25	#	6.2	##	18.3
5psi data	5.0	# 22.2	#	195.5	5.0	#	25.4	#	145.1	5.0	#	21.2	##	86.9
10psi data	10.0	# 44.5	#	284.0	10.0	#	41.4	#	216.8	10.0	#	31.7	##	131.1
15psi data	15.0	# 51.9	#	383.5	15.0	#	51.1	#	299.3	15.0	#	35.5	##	169.5
20psi data	20.0	# 65.7	#	450.3	20.0	#	62.8	#	351.2	20.0	#	40.3	##	198.1
30psi data	30.0	# 89.5	#	606.0	30.0	#	86.1	#	495.8	30.0	#	63.0	##	281.3
45psi data	45.0	# 134.0	#	831.1	45.0	#	120.8	#	706.1	45.0	#	90.6	##	417.4
60psi data	60.0	# 211.9	#	1017.6	60.0	#	186.9	#	886.8	60.0	#	138.8	##	577.9





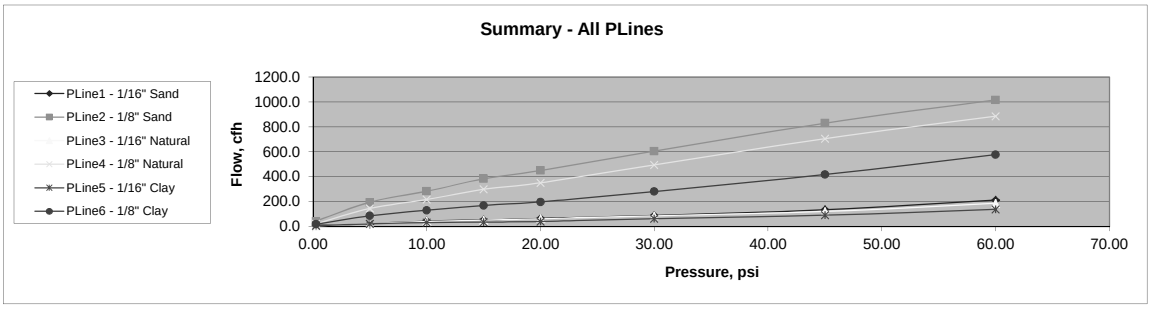


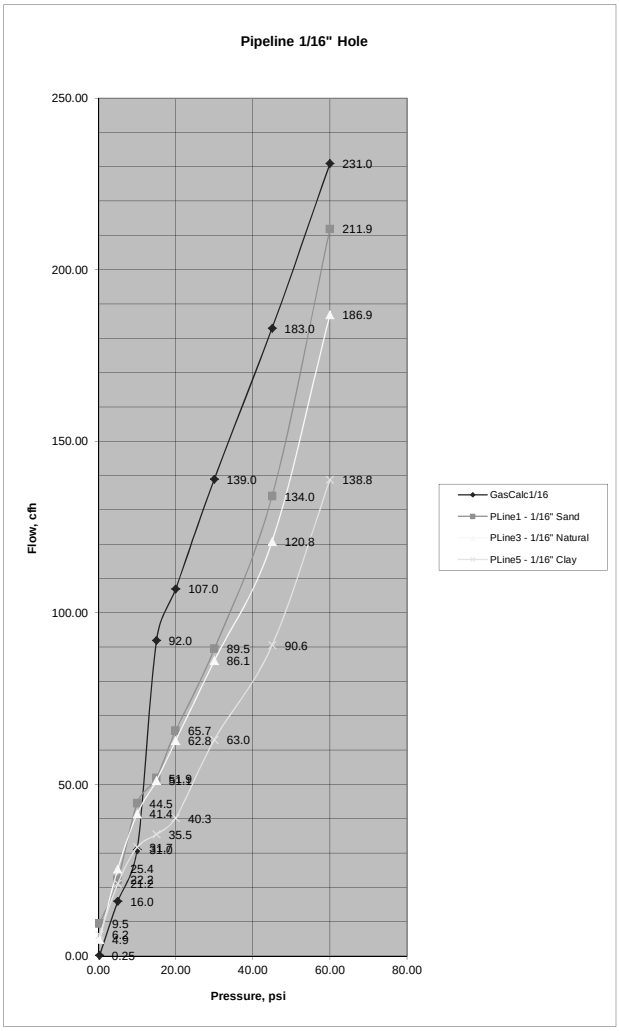


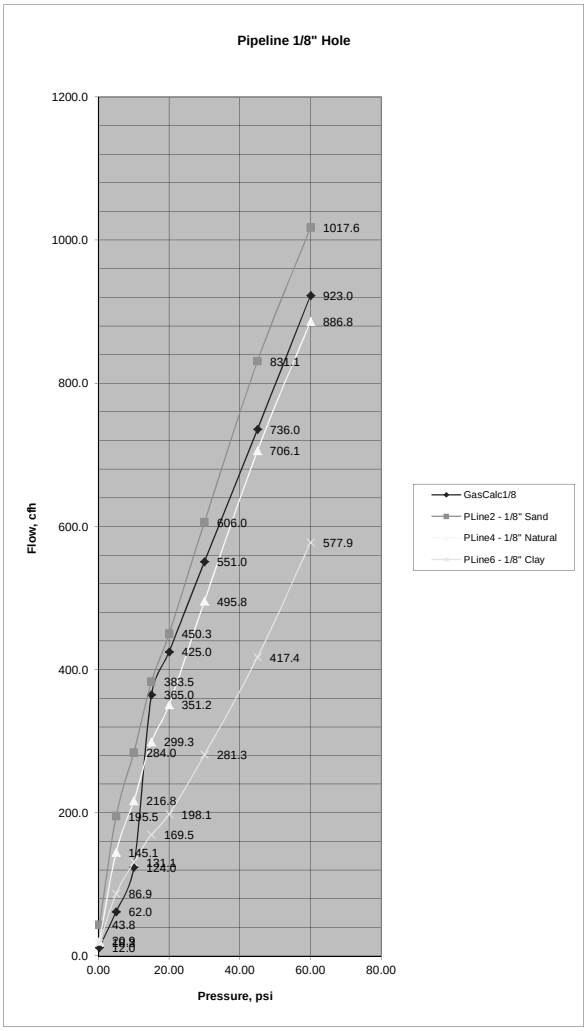
Simulated Gas Leak Testing

Test Point Summary

Summary PipeLine Leak Point	Date	Leak Data Summary Test Pressure psi		Flow, Digital cfh							
		GasCalc1/16	PLine1 - 1/16" Sar	PLine3 - 1/16" Natura	PLine5 - 1/16" Clay		GasCalc1/8	PLine2 - 1/8" Sanc	PLine4 - 1/8" Natural	PLine6 - 1/8" Clay	
0.25psi data	0.25	0.25	9.5	4.9	6.2	0.25	12.0	43.8	20.9	18.3	
5psi data	5.0	16.0	22.2	25.4	21.2	5.0	62.0	195.5	145.1	86.9	
10psi data	10.0	31.0	44.5	41.4	31.7	10.0	124.0	284.0	216.8	131.1	
15psi data	15.0	92.0	51.9	51.1	35.5	15.0	365.0	383.5	299.3	169.5	
20psi data	20.0	107.0	65.7	62.8	40.3	20.0	425.0	450.3	351.2	198.1	
30psi data	30.0	139.0	89.5	86.1	63.0	30.0	551.0	606.0	495.8	281.3	
45psi data	45.0	183.0	134.0	120.8	90.6	45.0	736.0	831.1	706.1	417.4	
60psi data	60.0	231.0	211.9	186.9	138.8	60.0	923.0	1017.6	886.8	577.9	







Simulated Gas Leak Testing
Economics

Cost of Gas =	$	7.50	Dtherm
Number of Leaks =		2,000	Total outstanding Count

Economics	Percent	Leak Count			Cost	Vol Loss, cf	
Leaks current, 1/16" Low =	49.5%	990	is costing	$	317,105	42,280,730	
Leaks current, 1/8" Low =	49.5%	990	is costing	$	1,360,030	181,337,352	
Leaks current, 1/16" 60psi =	0.5%	10	is costing	$	122,784	16,371,145	
Leaks current, 1/8" 60psi =	0.5%	10	is costing	$	582,596	77,679,412	
Total	100%	2,000		$	2,382,515	317,668,639	cf

10 Year Leak	
Value	
P/A= 6.01	
i=10%	
n=10 year	
(P/A, i, n)	
$	14,318,914

PipeLine Leak Point	Date	Leak Data Summary Test Pressure psi	Simulated Gas Leak Flow, cfh Measured	GASCalc4.0	Annual Leakage Hours/ Day	Days/ Year	Volume & Cost of Gas, Annual Volume cf	Energy Dtherm	Total Cost per Leak $
Pipeline 1 - 1/16" Sand			Measured	GASCalc4.0					
Actual	2	0.25psi data	0.25	9.5	0.0	24	365	82,840	83 $ 621.30
Actual	2	5psi data	5.0	22.2	16.0	24	365	194,895	195 $ 1,461.71
Actual	2	10psi data	10.0	44.5	31.0	24	365	389,842	390 $ 2,923.82
Actual	2	15psi data	15.0	51.9	92.0	24	365	454,754	455 $ 3,410.66
Actual	2	20psi data	20.0	65.7	107.0	24	365	575,403	575 $ 4,315.52
Actual	2	30psi data	30.0	89.5	139.0	24	365	784,219	784 $ 5,881.64
Actual	2	45psi data	45.0	134.0	183.0	24	365	1,174,008	1,174 $ 8,805.06
Actual	2	60psi data	60.0	211.9	231.0	24	365	1,856,139	1,856 $ 13,921.04
Pipeline 2 - 1/8" Sand			Measured	GASCalc4.0					
Actual		0.25psi data	0.25	43.8	0.0	24	365	383,377	383 $ 2,875.33
Actual		5psi data	5.0	195.5	62.0	24	365	1,712,288	1,712 $ 12,842.16
Actual		10psi data	10.0	284.0	124.0	24	365	2,487,565	2,488 $ 18,656.74
Actual		15psi data	15.0	383.5	365.0	24	365	3,359,611	3,360 $ 25,197.09
Actual		20psi data	20.0	450.3	425.0	24	365	3,944,295	3,944 $ 29,582.21
Actual		30psi data	30.0	606.0	551.0	24	365	5,308,557	5,309 $ 39,814.18
Actual		45psi data	45.0	831.1	736.0	24	365	7,280,705	7,281 $ 54,605.29
Actual		60psi data	60.0	1017.6	923.0	24	365	8,914,107	8,914 $ 66,855.80
Pipeline 3 - 1/16" Natural			Measured	GASCalc4.0					
Actual		0.25psi data	0.25	4.9	0.0	24	365	42,708	43 $ 320.31
Actual		5psi data	5.0	25.4	16.0	24	365	222,737	223 $ 1,670.52
Actual		10psi data	10.0	41.4	31.0	24	365	362,770	363 $ 2,720.77
Actual		15psi data	15.0	51.1	92.0	24	365	447,794	448 $ 3,358.45
Actual		20psi data	20.0	62.8	107.0	24	365	549,881	550 $ 4,124.11
Actual		30psi data	30.0	86.1	139.0	24	365	754,056	754 $ 5,655.42
Actual		45psi data	45.0	120.8	183.0	24	365	1,057,999	1,058 $ 7,934.99
Actual		60psi data	60.0	186.9	231.0	24	365	1,637,114	1,637 $ 12,278.36
Pipeline 4 - 1/8" Natural			Measured	GASCalc4.0					
Actual		0.25psi data	0.25	20.9	0.0	24	365	183,169	183 $ 1,373.77
Actual		5psi data	5.0	145.1	62.0	24	365	1,271,455	1,271 $ 9,535.91
Actual		10psi data	10.0	216.8	124.0	24	365	1,899,595	1,900 $ 14,246.96
Actual		15psi data	15.0	299.3	365.0	24	365	2,621,796	2,622 $ 19,663.47
Actual		20psi data	20.0	351.2	425.0	24	365	3,076,550	3,077 $ 23,074.13
Actual		30psi data	30.0	495.8	551.0	24	365	4,343,365	4,343 $ 32,575.24
Actual		45psi data	45.0	706.1	736.0	24	365	6,185,583	6,186 $ 46,391.87
Actual		60psi data	60.0	886.8	923.0	24	365	7,767,941	7,768 $ 58,259.56
Pipeline 5 - 1/16" Clay			Measured	GASCalc4.0					
Actual		0.25psi data	0.25	6.2	0.0	24	365	54,587	55 $ 409.40
Actual		5psi data	5.0	21.2	16.0	24	365	185,420	185 $ 1,390.65
Actual		10psi data	10.0	31.7	31.0	24	365	277,866	278 $ 2,084.00
Actual		15psi data	15.0	35.5	92.0	24	365	310,903	311 $ 2,331.77
Actual		20psi data	20.0	40.3	107.0	24	365	352,666	353 $ 2,645.00
Actual		30psi data	30.0	63.0	139.0	24	365	552,201	552 $ 4,141.51
Actual		45psi data	45.0	90.6	183.0	24	365	793,499	793 $ 5,951.25
Actual		60psi data	60.0	138.8	231.0	24	365	1,215,771	1,216 $ 9,118.28
Pipeline 6 - 1/8" Clay			Measured	GASCalc4.0					
Actual		0.25psi data	0.25	18.3	0.0	24	365	160,051	160 $ 1,200.38
Actual		5psi data	5.0	86.9	62.0	24	365	761,017	761 $ 5,707.63
Actual		10psi data	10.0	131.1	124.0	24	365	1,148,107	1,148 $ 8,610.80
Actual		15psi data	15.0	169.5	365.0	24	365	1,484,911	1,485 $ 11,136.83
Actual		20psi data	20.0	198.1	425.0	24	365	1,735,490	1,735 $ 13,016.17
Actual		30psi data	30.0	281.3	551.0	24	365	2,464,024	2,464 $ 18,480.18
Actual		45psi data	0.25	417.4	736.0	24	365	3,656,594	3,657 $ 27,424.45
Actual		60psi data	60.0	577.9	923.0	24	365	5,062,619	5,063 $ 37,969.64

Simulated Gas Leak Testing

Test Point 7 inch H2O
GASCalc4.0, 1/16", cfh =
GASCalc4.0, 1/8", cfh =

			Data Reading and Recorded							Calculation	
			Pressure, psi and Digital Flow, LPM								
PipeLine			Inside Box				Meter Set (Manometer)		End Point	Flow, digital measurment	
Leak Point	Date	Time	Pipeline	Flow	Reg1 high	Reg2 low	Pres, psi	Read	Pres, psi	LPM	CFH
Line 1 - 1/16" Sand											
Start	11/28/07	1:24:00 PM	210.0	0.0	115.0	75.0	60.0	0.25	---	0.0	0.0
			210.0	0.0	115.0	75.0	60.0	0.25	---	0.0	0.0
			210.0	0.0	115.0	75.0	60.0	0.25	---	0.0	0.0
Stop			210.0	0.0	115.0	75.0	60.0	0.25	---	0.0	0.0
Average											0.0
Line 2 - 1/8" Sand											
Start	11/28/07	1:18:00 PM	200.0	0.0	98.0	65.0	58.0	0.25	---	0.0	0.0
			200.0	0.0	98.0	65.0	58.0	0.25	---	0.0	0.0
			200.0	0.0	98.0	65.0	58.0	0.25	---	0.0	0.0
Stop			200.0	0.0	98.0	65.0	58.0	0.25	---	0.0	0.0
Average											0.0
Line 3 - 1/16" Natural											
Start	11/28/07	1:38:00 PM	210.0	0.0	115.0	75.0	60.5	0.25	---	0.0	0.0
			210.0	0.0	115.0	75.0	60.5	0.25	---	0.0	0.0
			210.0	0.0	115.0	75.0	60.5	0.25	---	0.0	0.0
Stop			210.0	0.0	115.0	75.0	60.5	0.25	---	0.0	0.0
Average											0.0
Line 4 - 1/8" Natural											
Start	11/28/07	1:50:00 PM	200.0	0.0	100.0	66.0	60.0	0.25	---	0.0	0.0
			200.0	0.0	100.0	66.0	60.0	0.25	---	0.0	0.0
			200.0	0.0	100.0	66.0	60.0	0.25	---	0.0	0.0
Stop			200.0	0.0	100.0	66.0	60.0	0.25	---	0.0	0.0
Average											0.0
Line 5 - 1/16" Clay											
Start	11/28/07	1:57:00 PM	210.0	0.0	115.0	76.0	60.5	0.25	---	0.0	0.0
			210.0	0.0	115.0	76.0	60.5	0.25	---	0.0	0.0
			210.0	0.0	115.0	76.0	60.5	0.25	---	0.0	0.0
Stop			210.0	0.0	115.0	76.0	60.5	0.25	---	0.0	0.0
Average											0.0
Line 6 - 1/8" Clay											
Start	11/28/07	2:15:00 PM	210.0	0.0	110.0	72.0	60.5	0.25	---	0.0	0.0
			210.0	0.0	110.0	72.0	60.5	0.25	---	0.0	0.0
			210.0	0.0	110.0	72.0	60.5	0.25	---	0.0	0.0
Stop			210.0	0.0	110.0	72.0	60.5	0.25	---	0.0	0.0
Average											0.0

		Data Read / Recorded		Calculation - Meter Read, cfh				Toggle	Compare - Flow digital vs meter read		
PipeLine		Meter Read	Revolution	Flow	Meter	Pressure	Flow	1- GasCalc	Digital	Difference	Difference
Leak Point	Date	Dial, ft3	Time, sec	Uncor, cfh	Pres, psi	CorFactor	Cor, cfh	2- Actual	cfh	digi - anal, cfh	digi - anal, %
Line 1 - 1/16" Sand											
	11/28/07	0.5	199	9.05	1	1.05	9.46		0.0	-9.46	#DIV/0!
Line 2 - 1/8" Sand											
	11/28/07	0.5	43	41.86	1	1.05	43.76		0.0	-43.76	#DIV/0!
Line 3 - 1/16" Natural											
	11/28/07	0.5	193	9.33	1	1.05	9.75		0.0	-9.75	#DIV/0!
Line 4 - 1/8" Natural											
	11/28/07	0.5	90	20.00	1	1.05	20.91		0.0	-20.91	#DIV/0!
Line 5 - 1/16" Clay											
	11/28/07	0.5	302	5.96	1	1.05	6.23		0.0	-6.23	#DIV/0!
Line 6 - 1/8" Clay											
	11/28/07	0.5	103	17.48	1	1.05	18.27		0.0	-18.27	#DIV/0!

Simulated Gas Leak Testing

Test Point 3psi
GASCalc4.0, 1/16", cfh =
GASCalc4.0, 1/8", cfh =

PipeLine Leak Point	Date	Time	Data Reading and Recorded: Pressure, psi and Digital Flow, LPM — Inside Box: Pipeline	Flow	Reg1 high	Reg2 low	Meter Set: Pres, psi	Read	End Point Pres, psi	Calculation: Flow, digital measurment LPM	CFH
Line 1 - 1/16" Sand											
Start				3.0					---	3.0	6.4
									---	0.0	0.0
									---	0.0	0.0
Stop									---	0.0	0.0
Average											1.6
Line 2 - 1/8" Sand											
Start				3.0					3.0	3.0	6.4
									3.0	0.0	0.0
									3.0	0.0	0.0
Stop									3.0	0.0	0.0
Average											1.6
Line 3 - 1/16" Natural											
Start				3.0					---	3.0	6.4
									---	0.0	0.0
									---	0.0	0.0
Stop									---	0.0	0.0
Average											1.6
Line 4 - 1/8" Natural											
Start				3.0					3.0	3.0	6.4
									3.0	0.0	0.0
									3.0	0.0	0.0
Stop									3.0	0.0	0.0
Average											1.6
Line 5 - 1/16" Clay											
Start				3.0					---	3.0	6.4
									---	0.0	0.0
									---	0.0	0.0
Stop									---	0.0	0.0
Average											1.6
Line 6 - 1/8" Clay											
Start				3.0					3.0	3.0	6.4
									3.0	0.0	0.0
									3.0	0.0	0.0
Stop									3.0	0.0	0.0
Average											1.6

PipeLine Leak Point	Date	Data Read / Recorded: Meter Read Dial, ft3	Revolution Time, sec	Calculation - Meter Read, cfh: Flow Uncor, cfh	Meter Pres, psi	Pressure CorFactor	Flow Cor, cfh	Toggle 1- GasCalc 2- Actual	#	Compare - Flow digital vs meter read: Digital cfh	Difference digi - anal, cfh	Difference digi - anal, %
Line 1 - 1/16" Sand												
		3	3	3600.00	3	1.18	#REF!				#REF!	#REF!
Line 2 - 1/8" Sand												
		3	3	3600.00	3	1.18	#REF!				#REF!	#REF!
Line 3 - 1/16" Natural												
		3	3	3600.00	3	1.18	#REF!				#REF!	#REF!
Line 4 - 1/8" Natural												
		3	3	3600.00	3	1.18	#REF!				#REF!	#REF!
Line 5 - 1/16" Clay												
		3	3	3600.00	3	1.18	#REF!				#REF!	#REF!
Line 6 - 1/8" Clay												
		3	3	3600.00	3	1.18	#REF!				#REF!	#REF!

Simulated Gas Leak Testing

Test Point 5psi — **Leakage Unaccounted, cfh = 0.4 cfh**

GASCalc4.0, 1/16", cfh = 16 — **Meter: AC-630 serial number 69090 / 06F936010**

GASCalc4.0, 1/8", cfh = 62

PipeLine Leak Point	Date	Time	Data Reading and Recorded: Pressure, psi and Digital Flow, LPM — Inside Box: Pipeline	Flow	Reg1 high	Reg2 low	Meter Set: Pres, psi	Read	End Point Pres, psi	Calculation: Flow, digital measurment LPM	CFH
Line 1 - 1/16" Sand											
Start	11/09/07	11:46:00 AM	220.0	10.0	95.0	61.0	5.5	---	---	10.0	21.2
			220.0	11.0	95.0	61.0	5.5	---	---	11.0	23.3
			220.0	10.0	95.0	61.0	5.5	---	---	10.0	21.2
Stop			220.0	11.0	95.0	61.0	5.5	---	---	11.0	23.3
Average											22.2
Line 2 - 1/8" Sand											
Start	11/09/07	11:19:00 AM	220.0	93.0	95.0	61.0	5.5	---	5.0	93.0	197.1
			220.0	92.0	95.0	61.0	5.5	---	5.0	92.0	194.9
			220.0	92.0	95.0	61.0	5.5	---	5.0	92.0	194.9
Stop			220.0	92.0	95.0	61.0	5.5	---	5.0	92.0	194.9
Average											195.5
Line 3 - 1/16" Natural											
Start	11/09/07	11:58:00 AM	220.0	23.0	95.0	61.0	5.5	---	---	23.0	48.7
			220.0	24.0	95.0	61.0	5.5	---	---	24.0	50.9
			220.0	24.0	95.0	61.0	5.5	---	---	24.0	50.9
Stop			220.0	25.0	95.0	61.0	5.5	---	---	25.0	53.0
Average											50.9
Line 4 - 1/8" Natural											
Start	11/09/07	12:09:00 PM	220.0	68.0	95.0	61.0	5.5	---	5.0	68.0	144.1
			220.0	68.0	95.0	61.0	5.5	---	5.0	68.0	144.1
			220.0	69.0	95.0	61.0	5.5	---	5.0	69.0	146.2
Stop			220.0	69.0	95.0	61.0	5.5	---	5.0	69.0	146.2
Average											145.1
Line 5 - 1/16" Clay											
Start	11/09/07	12:25:00 PM	220.0	Range	95.0	61.0	5.5	---	---	Range	#VALUE!
			220.0	Range	95.0	61.0	5.5	---	---	Range	#VALUE!
			220.0	Range	95.0	61.0	5.5	---	---	Range	#VALUE!
Stop			220.0	Range	95.0	61.0	5.5	---	---	Range	#VALUE!
Average											#VALUE!
Line 6 - 1/8" Clay											
Start	11/09/07	1:08:00 PM	220.0	39.0	95.0	61.0	5.5	---	5.0	39.0	82.6
			220.0	42.0	95.0	61.0	5.5	---	5.0	42.0	89.0
			220.0	43.0	95.0	61.0	5.5	---	5.0	43.0	91.1
Stop			220.0	40.0	95.0	61.0	5.5	---	5.0	40.0	84.8
Average											86.9

PipeLine Leak Point	Date	Data Read / Recorded: Meter Read Dial, ft3	Revolution Time, sec	Calculation - Meter Read, cfh: Flow Uncor, cfh	Meter Pres, psi	Pressure CorFactor	Flow Cor, cfh	Toggle 1- GasCalc 2- Actual	2	Compare - Flow digital vs meter read: Digital cfh	Difference digi - anal, cfh	Difference digi - anal, %
Line 1 - 1/16" Sand												
	11/09/07	0.5	80	22.50	5	1.32	29.63			22.2	-7.39	-33.2%
Line 2 - 1/8" Sand												
	11/09/07	2.0	50	144.00	5	1.32	189.65			195.5	5.81	3.0%
Line 3 - 1/16" Natural												
	11/09/07	0.5	44	40.91	5	1.32	53.88			50.9	-3.03	-6.0%
Line 4 - 1/8" Natural												
	11/09/07	2.0	64	112.50	5	1.32	148.17			145.1	-3.02	-2.1%
Line 5 - 1/16" Clay												
	11/09/07	0.5	112	16.07	5	1.32	21.17			Range	Range	Range
Line 6 - 1/8" Clay												
	11/09/07	2.0	108	66.67	5	1.32	87.80			86.9	-0.93	-1.1%

Simulated Gas Leak Testing

Test Point 10psi — **Leakage Unaccounted, cfh = 0.7cfh**
GASCalc4.0, 1/16", cfh = 31 — **Meter: AC-630 serial number 69090 / 06F936010**
GASCalc4.0, 1/8", cfh = 124

PipeLine Leak Point	Date	Time	Data Reading and Recorded: Pressure, psi and Digital Flow, LPM — Inside Box: Pipeline	Flow	Reg1 high	Reg2 low	Meter Set: Pres, psi	Read	End Point Pres, psi	Calculation: Flow, digital measurment LPM	CFH
Line 1 - 1/16" Sand											
Start	11/05/07	10:35 AM	220	20	95	62	12	000500	--	20	42.4
	11/05/07	10:44 AM	220	21	95	62	12	000500	--	21	44.5
Stop	11/05/07	10:52 AM	220	20	95	62	12	000500	--	20	42.4
Average											43.1
Line 2 - 1/8" Sand											
Start	11/05/07	9:54 AM	190	140	95	60	11	000400	10	140	296.6
	11/05/07	10:01 AM	190	141	95	60	11	000400	10	141	298.8
	11/05/07	10:10 AM	195	140	95	60	11	000400	10	140	296.6
Stop	11/05/07	10:20 AM	195	140	95	60	11	000400	10	140	296.6
Average											297.2
Line 3 - 1/16" Natural											
Start	11/05/07	11:34 AM	220	38	95	61	12	000500	--	38	80.5
	11/05/07	11:42 AM	220	39	95	61	12	000500	--	39	82.6
	11/05/07	11:48 AM	220	38	95	61	12	000500	--	38	80.5
Stop	11/05/07	11:55 AM	220	39	95	61	12	000500	--	39	82.6
Average											81.6
Line 4 - 1/8" Natural											
Start	11/05/07	11:05 AM	205	107	95	61	11	000500	10	107	226.7
	11/05/07	11:11 AM	205	106	95	61	11	000500	10	106	224.6
	11/05/07	11:21 AM	205	106	95	61	11	000500	10	106	224.6
Stop	11/05/07	11:25 AM	205	106	95	61	11	000500	10	106	224.6
Average											225.1
Line 5 - 1/16" Clay											
Start	11/05/07	12:26 PM	222	14	96	62	12	000600	--	14	29.7
	11/05/07	12:37 PM	222	15	96	62	12	000600	--	15	31.8
	11/05/07	12:45 PM	222	15	96	62	12	000600	--	15	31.8
Stop	11/05/07	12:46 PM	222	15	96	62	12	000600	--	15	31.8
Average											31.3
Line 6 - 1/8" Clay											
Start	11/05/07	12:02 PM	220	65	95	60	12	000600	10	65	137.7
	11/05/07	12:10 PM	220	64	95	60	12	000600	10	64	135.6
	11/05/07	12:17 PM	220	64	95	60	12	000600	10	64	135.6
Stop	11/05/07	12:23 PM	220	64	95	60	12	000600	10	64	135.6
Average											136.1

PipeLine Leak Point	Date	Data Read / Recorded: Meter Read Dial, ft3	Revelution Time, sec	Calculation - Meter Read, cfh: Flow Uncor, cfh	Meter Pres, psi	Pressure CorFactor	Flow Cor, cfh	Toggle 1- GasCalc 2- Actual	2	Compare - Flow digital vs meter read: Digital cfh	Difference digi - anal, cfh	Difference digi - anal, %
Line 1 - 1/16" Sand												
	11/05/07	0.5	67	26.87	10	1.66	44.50			43.1	-1.42	-3.3%
Line 2 - 1/8" Sand												
	11/05/07	2.0	42	171.43	10	1.66	283.97			297.2	13.20	4.4%
Line 3 - 1/16" Natural												
	11/05/07	0.5	36	50.00	10	1.66	82.82			81.6	-1.25	-1.5%
Line 4 - 1/8" Natural												
	11/05/07	2.0	55	130.91	10	1.66	216.85			225.1	8.28	3.7%
Line 5 - 1/16" Clay												
	11/05/07	0.5	94	19.15	10	1.66	31.72			31.3	-0.47	-1.5%
Line 6 - 1/8" Clay												
	11/05/07	2.0	91	79.12	10	1.66	131.06			136.1	5.08	3.7%

Simulated Gas Leak Testing

Test Point 15psi — **Leakage Unaccounted, cfh = 0.9 cfh**

GASCalc4.0, 1/16", cfh = 92 — **Meter: AC-630 serial number 69090 / 06F936010**

GASCalc4.0, 1/8", cfh = 365

PipeLine Leak Point	Date	Time	Data Reading and Recorded: Pressure, psi and Digital Flow, LPM — Inside Box: Pipeline	Flow	Reg1 high	Reg2 low	Meter Set: Pres, psi	Read	End Point Pres, psi	Calculation: Flow, digital measurment LPM	CFH
Line 1 - 1/16" Sand											
Start	11/19/07	1:45:00 PM	220.0	24.0	92.0	61.0	15.5	---	---	24.0	50.9
			220.0	25.0	92.0	61.0	15.5	---	---	25.0	53.0
			220.0	24.0	92.0	61.0	15.5	---	---	24.0	50.9
Stop			220.0	25.0	92.0	61.0	15.5	---	---	25.0	53.0
Average											51.9
Line 2 - 1/8" Sand											
Start	11/19/07	1:25:00 PM	220.0	181.0	92.0	61.0	15.5	---	15.0	181.0	383.5
			220.0	181.0	92.0	61.0	15.5	---	15.0	181.0	383.5
			220.0	181.0	92.0	61.0	15.5	---	15.0	181.0	383.5
Stop			220.0	181.0	92.0	61.0	15.5	---	15.0	181.0	383.5
Average											383.5
Line 3 - 1/16" Natural											
Start	11/19/07	1:52:00 PM	220.0	47.0	92.0	61.0	15.5	---	---	47.0	99.6
			220.0	48.0	92.0	61.0	15.5	---	---	48.0	101.7
			220.0	49.0	92.0	61.0	15.5	---	---	49.0	103.8
Stop			220.0	49.0	92.0	61.0	15.5	---	---	49.0	103.8
Average											102.2
Line 4 - 1/8" Natural											
Start	11/19/07	2:00:00 PM	220.0	141.0	92.0	61.0	15.5	---	15.0	141.0	298.8
			220.0	141.0	92.0	61.0	15.5	---	15.0	141.0	298.8
			220.0	142.0	92.0	61.0	15.5	---	15.0	142.0	300.9
Stop			220.0	141.0	92.0	61.0	15.5	---	15.0	141.0	298.8
Average											299.3
Line 5 - 1/16" Clay											
Start	11/19/07	2:09:00 PM	220.0	16.0	92.0	61.0	15.5	---	---	17.0	36.0
			220.0	16.0	92.0	61.0	15.5	---	---	17.0	36.0
			220.0	17.0	92.0	61.0	15.5	---	---	17.0	36.0
Stop			220.0	16.0	92.0	61.0	15.5	---	---	16.0	33.9
Average											35.5
Line 6 - 1/8" Clay											
Start	11/19/07	2:20:00 PM	220.0	79.0	92.0	61.0	15.5	---	15.0	79.0	167.4
			220.0	81.0	92.0	61.0	15.5	---	15.0	81.0	171.6
			220.0	80.0	92.0	61.0	15.5	---	15.0	80.0	169.5
Stop			220.0	80.0	92.0	61.0	15.5	---	15.0	80.0	169.5
Average											169.5

PipeLine Leak Point	Date	Data Read / Recorded: Meter Read Dial, ft3	Revolution Time, sec	Calculation - Meter Read, cfh: Flow Uncor, cfh	Meter Pres, psi	Pressure CorFactor	Flow Cor, cfh	Toggle 1- GasCalc 2- Actual	2	Compare - Flow digital vs meter read: Digital cfh	Difference digi - anal, cfh	Difference digi - anal, %
Line 1 - 1/16" Sand												
	11/19/07	0.5	65	27.69	15	2.00	55.27			51.9	-3.36	-6.5%
Line 2 - 1/8" Sand												
	11/19/07	2.0	40	180.00	15	2.00	359.27			383.5	24.25	6.3%
Line 3 - 1/16" Natural												
	11/19/07	0.5	35	51.43	15	2.00	102.65			102.2	-0.41	-0.4%
Line 4 - 1/8" Natural												
	11/19/07	2.0	51	141.18	15	2.00	281.78			299.3	17.51	5.9%
Line 5 - 1/16" Clay												
	11/19/07	0.5	83	21.69	15	2.00	43.29			35.5	-7.79	-22.0%
Line 6 - 1/8" Clay												
	11/19/07	2	86	83.72	15	2.00	167.10			169.5	2.41	1.4%

Simulated Gas Leak Testing

Test Point 20psi — **Leakage Unaccounted, cfh = 1.8 cfh**

GASCalc4.0, 1/16", cfh = 107 — **Meter: AC-630 serial number 69090 / 06F936010**

GASCalc4.0, 1/8", cfh = 425

PipeLine Leak Point	Date	Time	Data Reading and Recorded: Pressure, psi and Digital Flow, LPM — Inside Box: Pipeline	Flow	Reg1 high	Reg2 low	Meter Set: Pres, psi	Read	End Point Pres, psi	Calculation: Flow, digital measurment LPM	CFH
Line 1 - 1/16" Sand											
Start	11/19/07	2:50:00 PM	220.0	31.0	91.0	60.0	20.0	---	---	31.0	65.7
			220.0	30.0	91.0	60.0	20.0	---	---	30.0	63.6
			220.0	32.0	91.0	60.0	20.0	---	---	32.0	67.8
Stop			220.0	31.0	91.0	60.0	20.0	---	---	31.0	65.7
Average											65.7
Line 2 - 1/8" Sand											
Start	11/19/07	2:30:00 PM	220.0	212.0	91.0	60.0	20.0	---	20.0	212.0	449.2
			220.0	213.0	91.0	60.0	20.0	---	20.0	213.0	451.3
			220.0	212.0	91.0	60.0	20.0	---	20.0	212.0	449.2
Stop			220.0	213.0	91.0	60.0	20.0	---	20.0	213.0	451.3
Average											450.3
Line 3 - 1/16" Natural											
Start	11/19/07	3:00:00 PM	220.0	60.0	91.0	60.0	20.0	---	---	60.0	127.1
			220.0	59.0	91.0	60.0	20.0	---	---	59.0	125.0
			220.0	59.0	91.0	60.0	20.0	---	---	59.0	125.0
Stop			220.0	59.0	91.0	60.0	20.0	---	---	59.0	125.0
Average											125.5
Line 4 - 1/8" Natural											
Start	11/19/07	3:15:00 PM	220.0	166.0	91.0	60.0	20.0	---	20.0	166.0	351.7
			220.0	165.0	91.0	60.0	20.0	---	20.0	165.0	349.6
			220.0	166.0	91.0	60.0	20.0	---	20.0	166.0	351.7
Stop			220.0	166.0	91.0	60.0	20.0	---	20.0	166.0	351.7
Average											351.2
Line 5 - 1/16" Clay											
Start	11/19/07	3:25:00 PM	220.0	18.0	91.0	60.0	20.0	---	---	18.0	38.1
			220.0	19.0	91.0	60.0	20.0	---	---	19.0	40.3
			220.0	20.0	91.0	60.0	20.0	---	---	20.0	42.4
Stop			220.0	19.0	91.0	60.0	20.0	---	---	19.0	40.3
Average											40.3
Line 6 - 1/8" Clay											
Start	11/19/07	3:33:00 PM	220.0	93.0	91.0	60.0	20.0	---	20.0	93.0	197.1
			220.0	93.0	91.0	60.0	20.0	---	20.0	93.0	197.1
			220.0	94.0	91.0	60.0	20.0	---	20.0	94.0	199.2
Stop			220.0	94.0	91.0	60.0	20.0	---	20.0	94.0	199.2
Average											198.1

PipeLine Leak Point	Date	Data Read / Recorded: Meter Read Dial, ft3	Revolution Time, sec	Calculation - Meter Read, cfh: Flow Uncor, cfh	Meter Pres, psi	Pressure CorFactor	Flow Cor, cfh	Toggle 1- GasCalc 2- Actual	Compare - Flow digital vs meter read: Digital cfh	Difference digi - anal, cfh	Difference digi - anal, %
Line 1 - 1/16" Sand											
	11/19/07	0.5	61	29.51	20	2.34	68.91		65.7	-3.23	-4.9%
Line 2 - 1/8" Sand											
	11/19/07	2.0	39	184.62	20	2.34	431.15		450.3	19.12	4.2%
Line 3 - 1/16" Natural											
	11/19/07	0.5	34	52.94	20	2.34	123.64		125.5	1.91	1.5%
Line 4 - 1/8" Natural											
	11/19/07	2.0	48	150.00	20	2.34	350.31		351.2	0.90	0.3%
Line 5 - 1/16" Clay											
	11/19/07	0.5	84	21.43	20	2.34	50.04		40.3	-9.78	-24.3%
Line 6 - 1/8" Clay											
	11/19/07	2.0	84	85.71	20	2.34	200.17		198.1	-2.06	-1.0%

Simulated Gas Leak Testing

Test Point 30psi — **Leakage Unaccounted, cfh = 0.0**

GASCalc4.0, 1/16", cfh = 139 — **Meter: Root Meter 15C175 / SN 0734226**

GASCalc4.0, 1/8", cfh = 551

PipeLine Leak Point	Date	Time	Data Reading and Recorded: Pressure, psi and Digital Flow, LPM — Inside Box: Pipeline	Flow	Reg1 high	Reg2 low	Meter Set: Pres, psi	Read	End Point Pres, psi	Calculation: Flow, digital measurment LPM	CFH
Line 1 - 1/16" Sand											
Start	11/20/07	3:01:00 PM	220.0	42.0	91.0	62.0	31.0	---	---	42.0	89.0
		3:08:00 PM	220.0	43.0	91.0	62.0	31.0	---	---	43.0	91.1
		3:13:00 PM	220.0	42.0	91.0	62.0	31.0	---	---	42.0	89.0
Stop		3:19:00 PM	220.0	42.0	91.0	62.0	31.0	---	---	42.0	89.0
Average											89.5
Line 2 - 1/8" Sand											
Start	11/20/07	2:51:00 PM	220.0	285.0	91.0	62.0	31.0	---	30.0	285.0	603.9
		2:52:00 PM	220.0	288.0	91.0	62.0	31.0	---	30.0	288.0	610.2
		2:55:00 PM	220.0	286.0	91.0	62.0	31.0	---	30.0	286.0	606.0
Stop		2:58:00 PM	220.0	285.0	91.0	62.0	31.0	---	30.0	285.0	603.9
Average											606.0
Line 3 - 1/16" Natural											
Start	11/20/07	3:21:00 PM	220.0	81.0	91.0	62.0	31.0	---	---	81.0	171.6
		3:21:00 PM	220.0	82.0	91.0	62.0	31.0	---	---	82.0	173.7
		3:26:00 PM	220.0	81.0	91.0	62.0	31.0	---	---	81.0	171.6
Stop		3:28:00 PM	220.0	81.0	91.0	62.0	31.0	---	---	81.0	171.6
Average											172.2
Line 4 - 1/8" Natural											
Start	11/20/07	3:32:00 PM	220.0	232.0	91.0	62.0	31.0	---	30.0	232.0	491.6
		3:38:00 PM	220.0	237.0	91.0	62.0	31.0	---	30.0	237.0	502.2
		3:42:00 PM	220.0	235.0	91.0	62.0	31.0	---	30.0	235.0	497.9
Stop		3:44:00 PM	220.0	232.0	91.0	62.0	31.0	---	30.0	232.0	491.6
Average											495.8
Line 5 - 1/16" Clay											
Start	11/20/07	3:48:00 PM	220.0	29.0	91.0	62.0	31.0	---	---	29.0	61.4
		3:51:00 PM	220.0	29.0	91.0	62.0	31.0	---	---	29.0	61.4
		3:52:00 PM	220.0	30.0	91.0	62.0	31.0	---	---	30.0	63.6
Stop		3:54:00 PM	220.0	31.0	91.0	62.0	31.0	---	---	31.0	65.7
Average											63.0
Line 6 - 1/8" Clay											
Start	11/20/07	3:55:00 PM	220.0	132.0	91.0	62.0	31.0	---	30.0	132.0	279.7
		3:58:00 PM	220.0	133.0	91.0	62.0	31.0	---	30.0	133.0	281.8
		4:01:00 PM	220.0	133.0	91.0	62.0	31.0	---	30.0	133.0	281.8
Stop		4:02:00 PM	220.0	133.0	91.0	62.0	31.0	---	30.0	133.0	281.8
Average											281.3

PipeLine Leak Point	Date	Data Read / Recorded: Meter Read Dial, ft3	Revolution Time, sec	Calculation - Meter Read, cfh: Flow Uncor, cfh	Meter Pres, psi	Pressure CorFactor	Flow Cor, cfh	Toggle 1- GasCa 2- Actual	Compare - Flow digital vs meter read: Digital cfh	Difference digi - anal, cfh	Difference digi - anal, %
Line 1 - 1/16" Sand											
	11/20/07	2.3	298.0	27.79	30	3.01	83.75		89.5	5.77	6.4%
Line 2 - 1/8" Sand											
	11/20/07	10.0	191.0	188.48	30	3.01	568.13		606.0	37.87	6.2%
Line 3 - 1/16" Natural											
	11/20/07	2.5	162.0	55.56	30	3.01	167.46		172.2	4.70	2.7%
Line 4 - 1/8" Natural											
	11/20/07	8.0	187.0	154.01	30	3.01	464.23		495.8	31.59	6.4%
Line 5 - 1/16" Clay											
	11/20/07	1.0	173.0	20.81	30	3.01	62.72		63.0	0.31	0.5%
Line 6 - 1/8" Clay											
	11/20/07	4.5	181.0	89.50	30	3.01	269.78		281.3	11.50	4.1%

Simulated Gas Leak Testing

Test Point 45psi
GASCalc4.0, 1/16", cfh = 183
GASCalc4.0, 1/8", cfh = 736
Leakage Unaccounted, cfh = 0.0
Meter: Root Meter 15C175 / SN 0734226

PipeLine Leak Point	Date	Time	Data Reading and Recorded: Pressure, psi and Digital Flow, LPM — Inside Box: Pipeline	Flow	Reg1 high	Reg2 low	Meter Set: Pres, psi	Read	End Point Pres, psi	Calculation: Flow, digital measurment LPM	CFH
Line 1 - 1/16" Sand											
Start	11/20/07	4:12:00 PM	220.0	65.0	91.0	62.0	31.0	---	---	65.0	137.7
		4:16:00 PM	220.0	62.0	91.0	62.0	31.0	---	---	62.0	131.4
		4:18:00 PM	220.0	63.0	91.0	62.0	31.0	---	---	63.0	133.5
Stop		4:19:00 PM	220.0	63.0	91.0	62.0	31.0	---	---	63.0	133.5
Average											134.0
Line 2 - 1/8" Sand											
Start	11/20/07	4:22:00 PM	220.0	392.0	91.0	62.0	31.0	---	45.0	392.0	830.6
		4:25:00 PM	220.0	393.0	91.0	62.0	31.0	---	45.0	393.0	832.7
		4:28:00 PM	220.0	392.0	91.0	62.0	31.0	---	45.0	392.0	830.6
Stop		4:30:00 PM	220.0	392.0	91.0	62.0	31.0	---	45.0	392.0	830.6
Average											831.1
Line 3 - 1/16" Natural											
Start	11/20/07	4:44:00 PM	220.0	113.0	91.0	62.0	31.0	---	---	113.0	239.4
		4:46:00 PM	220.0	115.0	91.0	62.0	31.0	---	---	115.0	243.7
		4:48:00 PM	220.0	114.0	91.0	62.0	31.0	---	---	114.0	241.6
Stop		4:50:00 PM	220.0	114.0	91.0	62.0	31.0	---	---	114.0	241.6
Average											241.6
Line 4 - 1/8" Natural											
Start	11/20/07	4:34:00 PM	220.0	333.0	91.0	62.0	31.0	---	45.0	333.0	705.6
		4:38:00 PM	220.0	334.0	91.0	62.0	31.0	---	45.0	334.0	707.7
		4:41:00 PM	220.0	333.0	91.0	62.0	31.0	---	45.0	333.0	705.6
Stop		4:42:00 PM	220.0	333.0	91.0	62.0	31.0	---	45.0	333.0	705.6
Average											706.1
Line 5 - 1/16" Clay											
Start	11/20/07	5:07:00 PM	220.0	42.0	91.0	62.0	31.0	---	---	42.0	89.0
		5:09:00 PM	220.0	43.0	91.0	62.0	31.0	---	---	43.0	91.1
		5:11:00 PM	220.0	43.0	91.0	62.0	31.0	---	---	43.0	91.1
Stop		5:13:00 PM	220.0	43.0	91.0	62.0	31.0	---	---	43.0	91.1
Average											90.6
Line 6 - 1/8" Clay											
Start	11/20/07	4:52:00 PM	220.0	196.0	91.0	62.0	31.0	---	45.0	196.0	415.3
		4:54:00 PM	220.0	198.0	91.0	62.0	31.0	---	45.0	198.0	419.5
		4:56:00 PM	220.0	197.0	91.0	62.0	31.0	---	45.0	197.0	417.4
Stop		4:58:00 PM	220.0	197.0	91.0	62.0	31.0	---	45.0	197.0	417.4
Average											417.4

PipeLine Leak Point	Date	Data Read / Recorded: Meter Read Dial, ft3	Revolution Time, sec	Calculation - Meter Read, cfh: Flow Uncor, cfh	Meter Pres, psi	Pressure CorFactor	Flow Cor, cfh	Toggle 1- GasCalc 2- Actual	Compare - Flow digital vs meter read: Digital cfh	Difference digi - anal, cfh	Difference digi - anal, %
Line 1 - 1/16" Sand											
		1.5	163.0	33.13	45	4.03	133.59		134.0	0.42	0.3%
Line 2 - 1/8" Sand											
		9.3	168.0	199.29	45	4.03	803.64		831.1	27.49	3.3%
Line 3 - 1/16" Natural											
		4.0	241.0	59.75	45	4.03	240.95		241.6	0.60	0.2%
Line 4 - 1/8" Natural											
		9.3	204.0	164.12	45	4.03	661.82		706.1	44.30	6.3%
Line 5 - 1/16" Clay											
		1.0	160.0	22.50	45	4.03	90.73		90.6	-0.15	-0.2%
Line 6 - 1/8" Clay											
		3.7	135.0	98.67	45	4.03	397.88		417.4	19.54	4.7%

Simulated Gas Leak Testing

Test Point 60psi
GASCalc4.0, 1/16", cfh = 231
GASCalc4.0, 1/8", cfh = 923

Leakage Unaccounted, cfh = 0.0
Meter: Root Meter 15C175 / SN 0734226

PipeLine Leak Point	Date	Time	Data Reading and Recorded: Pressure, psi and Digital Flow, LPM — Inside Box: Pipeline	Flow	Reg1 high	Reg2 low	Meter Set: Pres, psi	Read	End Point Pres, psi	Calculation: Flow, digital measurment LPM	CFH
Line 1 - 1/16" Sand											
Start	11/28/07	10:36:00 AM	210.0	100.0	115.0	75.0	60.0	60.0	---	100.0	211.9
			210.0	100.0	115.0	75.0	60.0	60.0	---	100.0	211.9
			210.0	100.0	115.0	75.0	60.0	60.0	---	100.0	211.9
Stop			210.0	100.0	115.0	75.0	60.0	60.0	---	100.0	211.9
Average											211.9
Line 2 - 1/8" Sand											
Start	11/28/07	9:29:00 AM	200.0	480.0	98.0	65.0	58.0	57.5	60.0	480.0	1017.1
			200.0	479.0	98.0	65.0	58.0	57.5	60.0	479.0	1014.9
			200.0	482.0	98.0	65.0	58.0	57.5	60.0	482.0	1021.3
Stop			200.0	480.0	98.0	65.0	58.0	57.5	60.0	480.0	1017.1
Average											1017.6
Line 3 - 1/16" Natural											
Start	11/28/07	10:58:00 AM	210.0	100.0	115.0	75.0	60.5	---	---	100.0	211.9
			210.0	98.0	115.0	75.0	60.5	---	---	98.0	207.7
			210.0	97.0	115.0	75.0	60.5	---	---	97.0	205.5
Stop			210.0	97.0	115.0	75.0	60.5	---	---	97.0	205.5
Average											207.7
Line 4 - 1/8" Natural											
Start	11/28/07	9:55:00 AM	200.0	465.0	100.0	66.0	60.0	60.0	60.0	465.0	985.3
			200.0	465.0	100.0	66.0	60.0	60.0	60.0	465.0	985.3
			200.0	465.0	100.0	66.0	60.0	60.0	60.0	465.0	985.3
Stop			200.0	465.0	100.0	66.0	60.0	60.0	60.0	465.0	985.3
Average											985.3
Line 5 - 1/16" Clay											
Start	11/28/07	11:16:00 AM	210.0	67.0	115.0	76.0	60.5	---	---	67.0	142.0
			210.0	65.0	115.0	76.0	60.5	---	---	65.0	137.7
			210.0	65.0	115.0	76.0	60.5	---	---	65.0	137.7
Stop			210.0	65.0	115.0	76.0	60.5	---	---	65.0	137.7
Average											138.8
Line 6 - 1/8" Clay											
Start	11/28/07	10:11:00 AM	210.0	269.0	110.0	72.0	60.5	60.0	60.0	269.0	570.0
			210.0	274.0	110.0	72.0	60.5	60.0	60.0	274.0	580.6
			210.0	272.0	110.0	72.0	60.5	60.0	60.0	272.0	576.3
Stop			210.0	276.0	110.0	72.0	60.5	60.0	60.0	276.0	584.8
Average											577.9

PipeLine Leak Point	Date	Data Read / Recorded: Meter Read Dial, ft3	Revolution Time, sec	Calculation - Meter Read, cfh: Flow Uncor, cfh	Meter Pres, psi	Pressure CorFactor	Flow Cor, cfh	Toggle 1- GasCalc 2- Actual	Compare - Flow digital vs meter read: Digital cfh	Difference digi - anal, cfh	Difference digi - anal, %
Line 1 - 1/16" Sand											
	11/28/07	2.50	238	37.82	60	5.05	191.00		211.9	20.89	9.9%
Line 2 - 1/8" Sand											
	11/28/07	7	143	184.16	60	5.05	930.19		1017.6	87.40	8.6%
Line 3 - 1/16" Natural											
	11/28/07	2	211	37.54	60	5.05	189.59		207.7	18.06	8.7%
Line 4 - 1/8" Natural											
	11/28/07	8	148	182.43	60	5.05	921.45		985.3	63.83	6.5%
Line 5 - 1/16" Clay											
	11/28/07	1	144	25.00	60	5.05	126.27		138.8	12.51	9.0%
Line 6 - 1/8" Clay											
	11/28/07	4	148	104.38	60	5.05	527.23		577.9	50.69	8.8%

1. BASIC INFORMATION

PURPOSE: To clarify the criteria Gas Technical Services uses to classify mains as "leak prone"

SCOPE: Document contains the criteria NYSEG/RG&E use to classify mains as "leak prone" and the tracking requirements for leak prone main segments

RELATED DOCUMENTS:

- Leak Prone Main Criteria Background

DEFINITIONS:

ABBREVIATIONS:

- GTS: Gas Technical Services
- LPM: Leak Prone Main

Revision #	Date	Prepared by	Reviewed by	Approved by
3	5/22/15	Evan Sanford	Pete Leonard	Barry Kachmaryk

1.0 LEAK PRONE CATEGORIES

1.1 **Category A** mains are considered Leak Prone based on their basic properties regardless of damage or leak history.

1.1.1 Leak Prone designation is based on GIS data.

1.1.2 If GIS data is questionable, other sources of data may be used. (i.e. SAP data, as built maps, O&M Form 4150)

1.2 **Category B** mains may be Leak Prone if there is evidence of defects or other integrity issues apply. Technical Services and Division Engineering shall collaboratively identify supporting evidence and documentation.

1.2.1 The length of the segment shall be found with consideration to:

- Extent of damage or defect
- Likely extent of damage or defect beyond documented area

1.3 **Category C** mains are planned for an upgrade that are not Leak Prone in their current state, but may have attribute(s) that after an increase in MAOP result in a configuration that would be at risk for leakage.

2.0 CATEGORY A Mains

2.1 Vintage materials including, but not limited to:

2.1.1 Cast Iron

2.1.2 Wrought Iron

2.1.3 Bare Steel

2.1.4 Unprotected Steel (Pre 8/1/1971 without cathodic protection)

2.1.5 Aldyl-A PE

2.1.6 Red Thread Fiberglass

2.2 Early Material and/or Construction

2.2.1 Any main installed 1955 or prior*:*

2.3 Cathodically Protected Mains Not Monitored Annually

2.3.1 Short Sections (isolated sections <100') installed prior to 8/1/1971

3.0 CATEGORY B Main

3.1 Material Defects

3.1.1 Long Seam Issues

3.1.2 Any other material subject to advisory notice by PHMSA, NTSB, AEGIS, or NYPSC

3.2 Construction/Installation Defects

3.3 Loss of cover or clearance making the main vulnerable to 3rd party damage.

3.4 Mains subject to external forces including, but not limited to:

3.4.1 Shear loading including insufficient hanger support

3.4.2 Thrust loading including thermal expansion

3.4.3 Vehicle loading

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3.5 Cathodic Protection Issues
  3.5.1 Short Sections (isolated sections < 100') installed after 7/31/1971
3.6 Mains which have a risk ranking based on DIMP or TIMP threats
3.7 Other known system or segment Issues

4.0 CATEGORY C Mains

4.1 Mains installed prior to 1961 and planned for an upgrade are leak prone
4.2 Mains installed between 1961 and 8/1/1971 and planned for an upgrade may be leak prone

5.0 LEAK PRONE RANKING AND TRACKING

5.1 Gas Technical Services maintains Leak Prone Segment listing.
  5.1.1 Each segment is assigned a tracking number.
  5.1.2 Each segment is scored and ranked according to risk.
5.2 All Leak Prone Segments included in the leak prone main performance metric shall include Leak Prone tracking numbers.
  5.2.1 Exception: Miscellaneous segments of Category A mains that are less than 100 ft. (e.g.cross street tie in segments)

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