

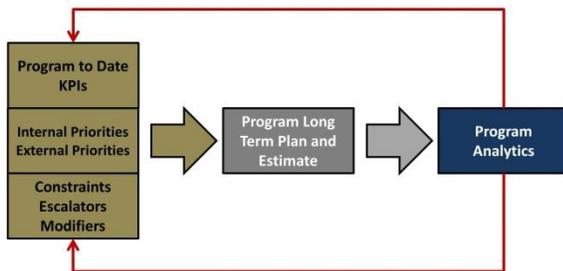
- Deep shoring associated with installations other than rail road crossings.
- Cost and schedule for any river crossings.

Inclusions

- Annual COSIPISE projects included as an annual Level of Effort (LOE) activity excluding cost and labor resources.
- Annual O&M included as an LOE activity, excluding cost and labor resources.
- PGL and Program Management Office Soft Costs included as an annual LOE activity. Other soft costs such as design and permits are tracked separately.
- Temporary restorations associated with specific events (winter slow down, Chicago Marathon, etc.,).
- Winter slowdown for main and service work from Dec 1 – March 31, including productivity adjustments.

Overview

Program Influences



Internal

Program

The program includes key components addressing Illinois Commerce Commission (ICC) safety related issues. These drivers are:

- Expansion of intra-station pipeline
- Replacement of low-pressure (LP) mains and associated service lines
- Replacement of medium-pressure (MP) cast-iron / ductile-iron (CI/DI) mains and associated service lines
- Retirement of MP to LP pressure regulator stations
- Installation of HP to MP pressure regulator stations
- Addition of new City Gate (gas measurement and pressure regulator) stations

In addition, unrepaired leaks, low pressure ‘islands’, inside meters and select damage prevention are considered when assessing the capital program.

Work within the capital program is executed through a combination of internal PGL resources such as engineering and gas workers (North, Central or South District) as well as outside parties (third party engineering consultants and construction firms).

Neighborhood Priority

Neighborhoods were ranked based on several key components. The criteria included CI/DI mains by size and age, unrepaired leaks, inside meters and vulnerable services. These were further adjusted to reflect a balanced workload in the various Districts to maximize replacement activities within the existing system.

Neighborhood location maps and a complete table of neighborhood priorities are included in Appendix A and B respectively. Select neighborhoods were combined with others for constructability purposes. The neighborhoods were further assessed for construction complexity based on the various Modifiers outlined later in this report. The target construction dates were adjusted to either level resources and maximize productivity. While a neighborhood may start earlier or later than originally conceived (neighborhood A will start in 2023 instead of 2024) the priority logic (ie, neighborhood A starts before neighborhood B) was not adjusted.

COSIPISE Projects

PGL may want or be required to relocate gas main facilities due to other infrastructure improvements, such as viaduct lowering, sewer and water improvements, redevelopment, etc. Whenever possible, PGL attempts to leverage COSIPISE projects to:

- Make system improvements.
- Replace mains in advance of moratorium of resurfaced streets.
- Share restoration costs.
- Minimize customer inconvenience.
- Reduce in 3rd party damage to gas mains.

External

Other Utilities

One of the other utilities in the City may initiate their own improvement project which impacts PGL. In such cases, PGL may accelerate or reprioritize specific projects to complete their required work in conjunction with the other utility. This work is typically performed as a COSIPISE project.

City of Chicago

Like the other utilities, the City may initiate an improvement project such as a resurfacing or system upgrade where it makes sense for PGL to reprioritize or accelerate a portion of their work to support the greater good of minimizing impact on the residence and stakeholders. Additionally, through City requirements, moratoriums on select projects may be in place on roads or hardscapes which have recently been complete.

Regulatory Agencies

Various regulatory agencies drive the direction of select aspects of the program based on Federal and State requirements in place governing the efficient, safe and reliable delivery of gas to the public.

Key Performance Indicators

Select Key Performance Indicators (KPIs) driving cost and schedule of the program are incorporated into the annual forecast. While the KPIs listed are not the completely exhaustive list of existing or to-go dashboard indicators to monitor the program, these were incorporated into the forecast. Over time, this list will be refined, with KPIs rolling on and off the list.

Item	Unit	Baseline	Criteria
Project Feasibility / Phasing	SPI ^a	New KPI	0.90 – 1.20
IR average review cycle	Days	30	20-45
3 rd Party Engineering Design	CPI ^a / SPI	New KPI	SPI:0.95 -1.05 CPI:0.95-1.05
EFP ^b approval average review cycle	Days	New KPI	20-45
Permit – average cycle	Days	5	5-15 days
Bid to NTP ^c – average cycle	SPI	New	.75 – 1.50
Line of Lay rework (capital projects)	% resubmitted	10%	10%
Main Installed	miles/wk/crew	.10	See Estimate
Services Installed	services/wk/crew	By Shop	See Est. Basis
Meters Installed	meters/wk/crew	By Shop	See Est. Basis
Restoration (intersections)	inter / wk / crew	1.2	
COR ^d / Hard Costs ^e	Percentage	15%	By Activity Type
Soft Cost ^f / Hard Cost	Percentage	16%	16%

- a) *Schedule Performance Index (SPI) and Cost Performance Index (CPI) are components of an Earned Value Management (EVM) System. The Schedule Performance Index is the relationship between the physical work actually accomplished and the authorized baseline budget. The SPI is calculated by dividing the Earned Value by the time phased Budget Value. The Cost Performance Index is the relationship between the physical work actually accomplished versus the costs expended to accomplish the work. The CPI is calculated by dividing the Earned Value by the Actual Cost.*
- b) *Existing Facility Protection (EFP) process is part of the OUC.*
- c) *Notice to Proceed (NTP) for construction.*
- d) *Change Order Request.*
- e) *Hard Costs are direct construction costs (material, labor, etc) of the program.*
- f) *Soft Cost are typically those cost typically incurred prior to construction such as professional services or oversight during the construction such as owner management or other program management fees.*

Constraints

Constraints are elements with limitations that affect the schedule and cost of specific activities and the program as a whole. The following are the major constraints included:

- Winter Slowdown – A significant portion of work on mains and services are slowed down during the winter season starting in December and extending through March.
- Trade Labor – Trade labor availability that may constrain critical program specific activities. Primary focus is on craft availability in Gas Workers Union - Chicago Local 18007 and Pipefitters Union Local 597.
- Weather - Meteorological events (rain, snow, etc.) that may impact select activities within the schedule. Basis for constraint parameters is the National Weather Service Weather Office

historic data for Chicago from 1964-2013¹ The chart below identifies adjustments built into the schedule to account for unusual events (ex., winter of 2013-2014):

Probability of Event	Snow			Both	Rain						Snow	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
> Avg	14%	16%	16%	14%	16%	18%	14%	16%	14%	16%	18%	18%
< Avg	16%	18%	10%	18%	20%	18%	14%	10%	4%	12%	24%	18%
Schedule Adjustment Parameters												
Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	3	3	3	3	3	2	2	2	2	3	2	3
Min	-3	-4	-2	-4	-3	-2	-2	-1	-1	-2	-3	-3

- Funding – Capital Construction Program spending was uncapped.
- City of Chicago Permitting – A number of permits are required for the complete installation and retirement of a section of pipe main. The chart below outlines select permits:

Permit Type	Criteria ^a	Valid for
Main Installation (inc. restoration)	per block	90 Days
Restoration (sod/asphalt)	per block	30 Days
Restoration (intersections)	per intersection	30 Days
Retirement – per block	per no. of openings (every 1,500 ft of retired main)	30 Days
IDOT	per impacted intersection	180 days

a) Cost varies per number, length and location of opening

- Gas cut-off policy - Peoples Gas and Light's policy is that no gas disconnects will be performed from November through April.
- On-going maintenance and emergency work – Emergency work and critical maintenance or compliance requirements impact availability of resources to perform select capital work.
- Qualified contractors – The number of available local contractors to perform this specialized work is limited.

Escalations

Escalations are changes in the cost of specific goods and services over the life of the program based on industry trends.

- Labor – Gas Workers Union, Chicago Local 18007's current contract² was used as a surrogate for all craft labor associated with the Capital Construction Program. Labor was escalated at 3.25% for 2016 and 3.50% for 2017 and 2018. Labor for the balance of the program was escalated at 3.25% and will be adjusted after the 2018 labor agreement is place.

¹ Data for analysis found at http://www.crh.noaa.gov/lot/?n=ord_rfd_monthly_yearly_normals. Annual snow and rain accumulations were assessed. Unusual event identified as anything outside a standard deviation of the rolling 50 year average.

² Contract located on the local's website at www.gasworkers.org.

Professional services (soft costs) were escalated at 3% per annum for the duration of the program, based on Bureau of Labor Statistics³ and Jacobs Engineering.

- Material – Material costs were evaluated based on Engineering News Record (ENR) US Historical Material Price Index from 1983 – 2012⁴. This is a composite of a variety of materials, many of which are not the primary components of the program. Over this 29 year period, material costs increased an average year over year (YoY) by 2.1%.

The Bureau of Labor Statistics Producer Price Index (BLS PPI) for Ready-Mix Concrete (NASIC 327320) was evaluated from a 25 year period between 1988 and 2013. Over that time, the average YoY increase was 3.0%.

Asphalt / PE Pipe (Petroleum) - The BLS PPI was evaluated for pricing volatility associated with petroleum based products used in the program. Data for plastic gas pipe and fittings (NASIC 326122) was limited to 2001-2011, with wide YoY swings (-18.5% to +19.0%). Over this short period, the average year over year change was -2.5%. For planning period 2016-2021, no change for PE pipe material will be incorporated into the analysis. Out years will include a 2% increase.

Asphalt paving material (NASIC 32412) was evaluated from 1988 – 2013. Several YoY spikes occurred in the 25 year evaluation period (19% and 22%). When removed, the average year over year increase averaged 2.9%, versus 4.3% when the aforementioned spikes are included.

The following weighted material escalation percentages were used.

Material	Percent Split of Material	Escalation	
		2016-2021	2021 - End
PE Pipe	18%	0.0%	2.0%
Asphalt	37%	2.9%	4.3%
Concrete	37%	3.0%	3.0%
Other	8%	2.1%	2.1%
Total (100%)	100%	2.4%	3.2%

This escalation is consistent with trends outlined in January 2014 Handy Whitman North Central Region update⁵.

Permanent material accounts for 52% of the Total Construction Cost (TCC) of the program, with the balance being labor, equipment and spoils.

- City of Chicago – A number of ordinances increased the overall cost and schedule of the program, including intersection paving and ADA ramp requirements. These increases are built into the capital cost budget for the respective project. No other changes are included.
- Premium / Shift differential –Work in the Central Business District (CBD) performed at off-peak hours and weekends to minimize impact on businesses and traffic.

³ On-line resources for the Bureau of Labor Statistics located at www.bls.gov in the Producer Price Index Industry Data query tool.

⁴ On-line resources for ENR located at www.enr.construction.com/economics/

⁵ Handy Whitman index is a nationally recognized aggregate indicator of regional utility construction costs.

Modifiers

Modifiers are specific characteristics adding to the complexity of a project that impact the overall cost and schedule.

- Roadway to Parkway Installation (line of lay) – Productivity and cost basis for a neighborhood was adjusted based on the estimated roadway to parkway ratio as compared to the Program-to-Date baseline information for completed neighborhoods. Higher roadway percentage increases cost and schedule.
- Rail Crossings⁶ (number of crossings, volume of traffic) – Significant lead time is required in coordinating with the railroads. These typically require additional right of access, off peak work hours and significant temporary excavation design that increase the cost and duration of these projects.
- Meter and Service Complexity – Productivity adjustment based on the key characteristics of the service / meter installation including:
 - Meter location - inside/outside
 - Meter location inside – basement or other location
 - Finished or unfinished basement
 - Size of meter
 - Single family or multi-family dwelling⁷
 - Age of facility⁸
- Residential / Commercial facilities (percentage)⁹ – Higher residential factors increase overall duration due to enhanced coordination and customer non-responsiveness on key activities requiring their authorization / approval. Cost and schedule increased due to multiple mobilization cycles.
- Arterial and Collector roads¹⁰ (percentage) – Arterial and Collector road percentage increases costs and duration due to additional permitting requirements (IDOT) and detailed maintenance of traffic issues, especially for detours.
- Road Moratorium¹¹ / Total Miles (percentage) – High percentages of moratorium projects require increased Ward coordination with the neighborhood and a premium cost for work prior to moratorium expiration. A moratorium factor of either: (a) current percentage, or; (b) average for City of Chicago (currently 36%) was applied to every neighborhood.

⁶ Volume of rail traffic (passenger and freight) found at www.cmap.illinois.gov/documents/

⁷ Based on information from the US Census Bureau found at www.factfinder2.census.gov

⁸ ibid

⁹ ibid

¹⁰ Information on Arterial and Collector roads found at www.gettingaroundillinois.com

¹¹ Based on City of Chicago information at www.cityofchicago.org

Program Baseline

Baseline Estimated Cost

The program estimated cost is \$8.9 billion broken down as follows:

Item	Est Cost*	Percent
High Pressure Lines	238.0	2.8%
Main Installation	2,381.5	26.9%
Services	871.9	9.8%
Meters	631.4	7.1%
Rail Crossings	81.5	0.9%
Intersection Restoration	1,882.4	21.2%
Permits	214.9	2.4%
Design	171.7	1.9%
Other Soft Costs	791.9	8.9%
Escalation	1,595.6	18.1%
Total	8,860.8	100.0%

* \$ x millions

The estimate is based upon the program quantities referenced on page 5 and unit rate detail outlined in Appendix D.

This is \$3.0 billion greater than the 2012 Five Year Construction Plan estimate as shown in Figure 1. Some of the major contributors to the change in price include intersection restoration (\$1.8B), an increase in the miles of main to install (\$270M) as well as increase in the number of meters (\$335M) and the corresponding escalation. A full reconciliation of the 2015 estimate can be found in Appendix E.

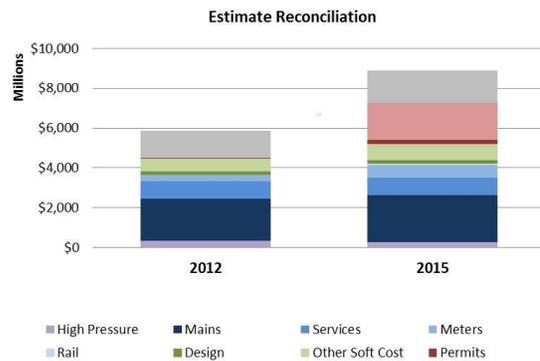


Figure 1

Baseline Schedule

The deterministic Baseline program schedule completion date is 2Q2032. This date was predicated on uncapped productivity for both main and meter installations, meaning the necessary resources to support the schedule will always be available (i.e. unlimited resources). The current completion date is based on an 11,000 item logic driven, resource loaded Primavera P6 schedule. Each neighborhood is independent of the others, meaning while each neighborhood will have logic ties to its respective activities, there are no interdependencies *between* specific neighborhoods and therefore no true 'critical path' for the schedule.

The required annual productivity requirements for meters, the installation driving the overall schedule, are shown in shown in Figure 2. This reflects a peak productivity of 58,200 meters in year 2026. Current productivity analysis can be found in the Resource Leveled Schedule section later in this report.

This is approximately 18 months longer than the previously estimated completion date of 4Q2030 outlined in the Five Year Construction Plan issued in 2012. That document assumed the defined quantity of mains, services and meters required for a given year would be complete in that given year with no carryover of in-progress work.

Select logic in the current schedule includes:

- Gassing of mains starts 10 days after the start of Main Installation (a start to start lag of 10 days – SS10)
- Service installation starts 10 days after the start of Gassing of Mains (SS10)
- Meter Installation starts 10 days after the start of Service Installation (SS10)
- 'In-Service' milestone for main installation is two weeks prior to main installation completion (finish to finish lag of -10 days - FF-10)
- 'In-Service' milestone for services is six weeks after service installation commences (SS30)

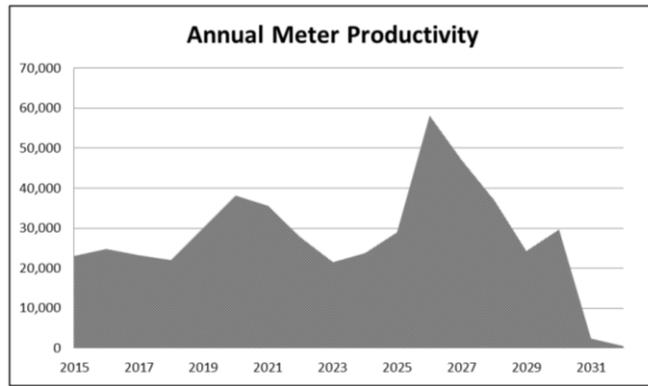


Figure 2

Appendix F includes a Summary Schedule (Level 1) depicting each neighborhood on a single line item. Appendix G includes a Detail Schedule (Level 2) showing the specific neighborhood activities for the entire program.

Baseline Annual Spend Plan

The time phased spend plan on the baseline estimate and schedule is shown in Figure 3 below. The average annual spend is ~\$455 million per year. The peak spend is ~\$790 million in year 2026, the lowest spend is ~\$280 million in year 2023, excluding the 6 months at the end of the program (2032).