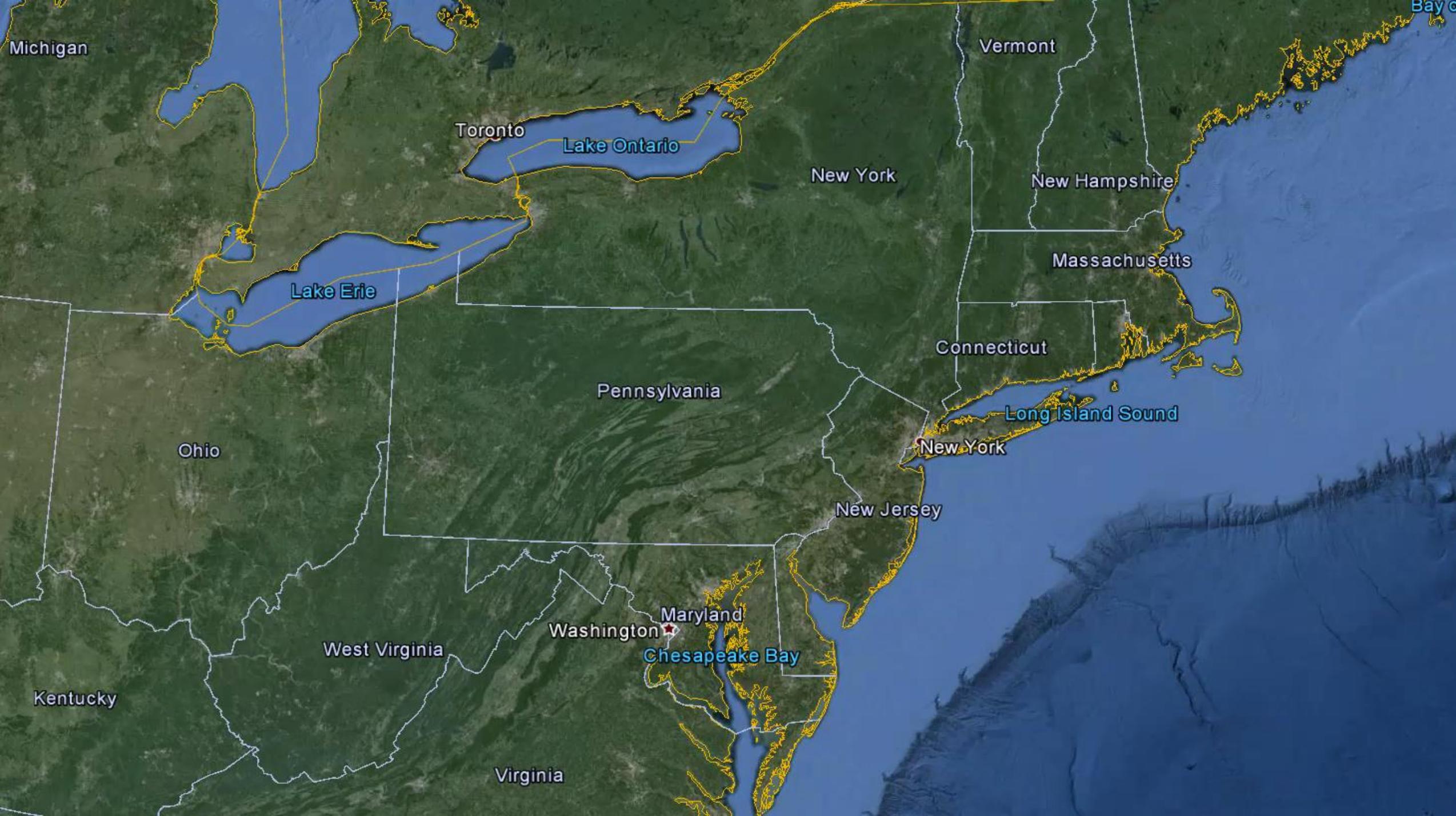


Cold Weather Hydrostatic Testing

-William Karr

Summary Overview

- Project Background
- Technical Overview
 - Documentation
 - Project Specifics
- Hydrostatic Testing
 - Weather Impacts
 - Issues
 - Lessons Learned
- Schedule and Cost Implications



Michigan

Vermont

Toronto

Lake Ontario

New York

New Hampshire

Lake Erie

Massachusetts

Ohio

Pennsylvania

Connecticut

Long Island Sound

New Jersey

New York

Kentucky

West Virginia

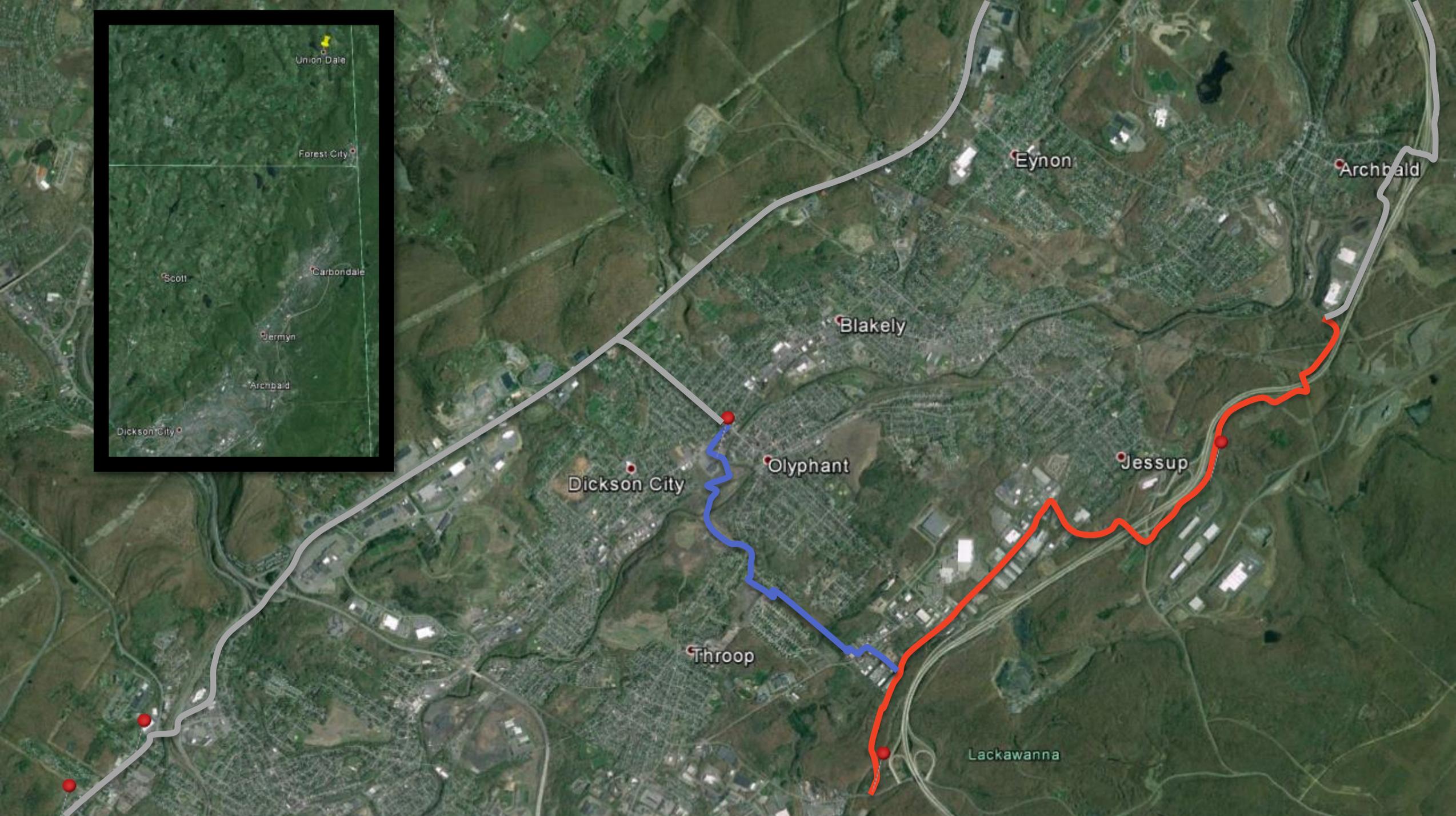
Maryland

Washington

Chesapeake Bay

Virginia

Bay o





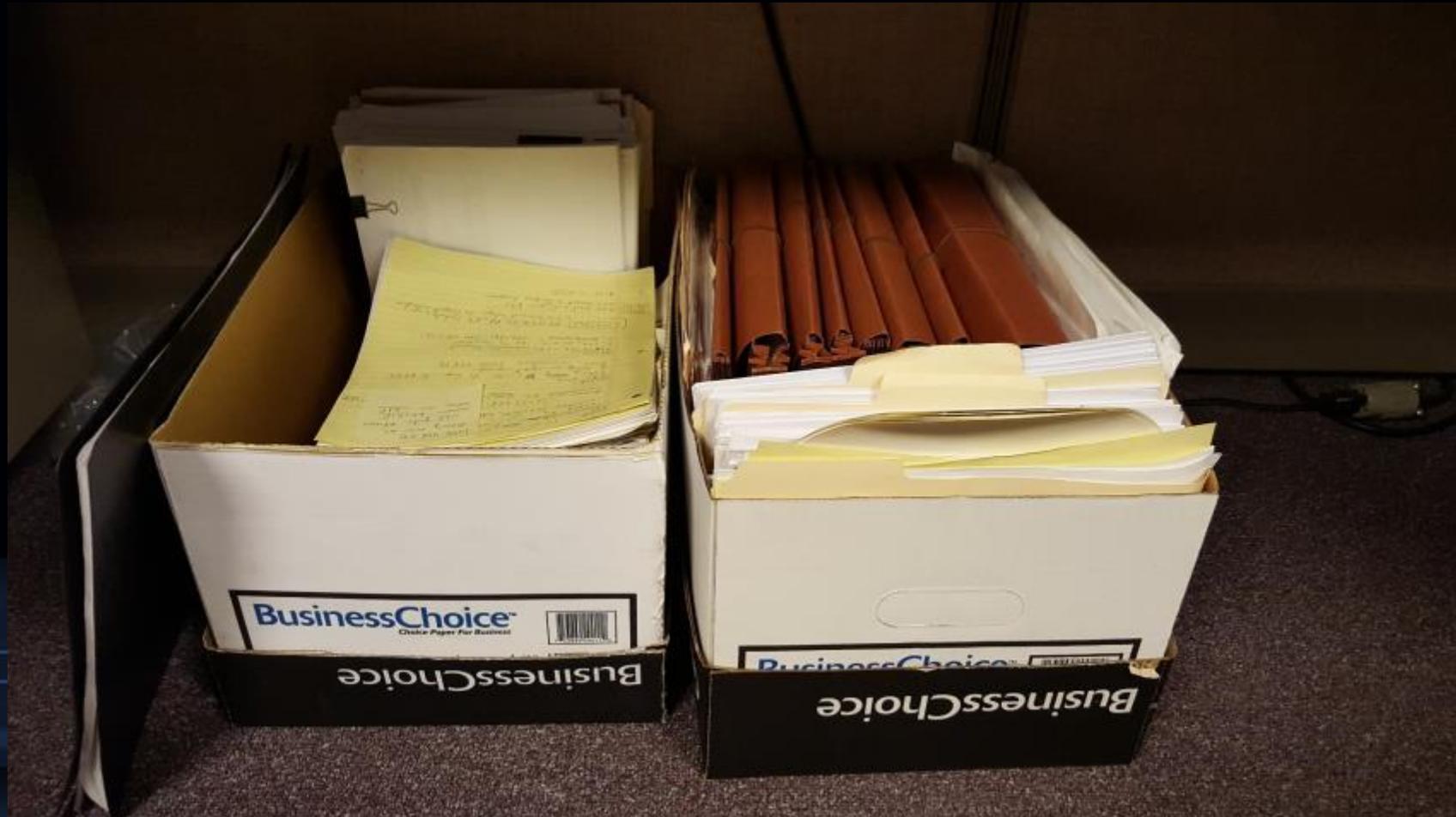
7:54

OUTSIDE

-8°F

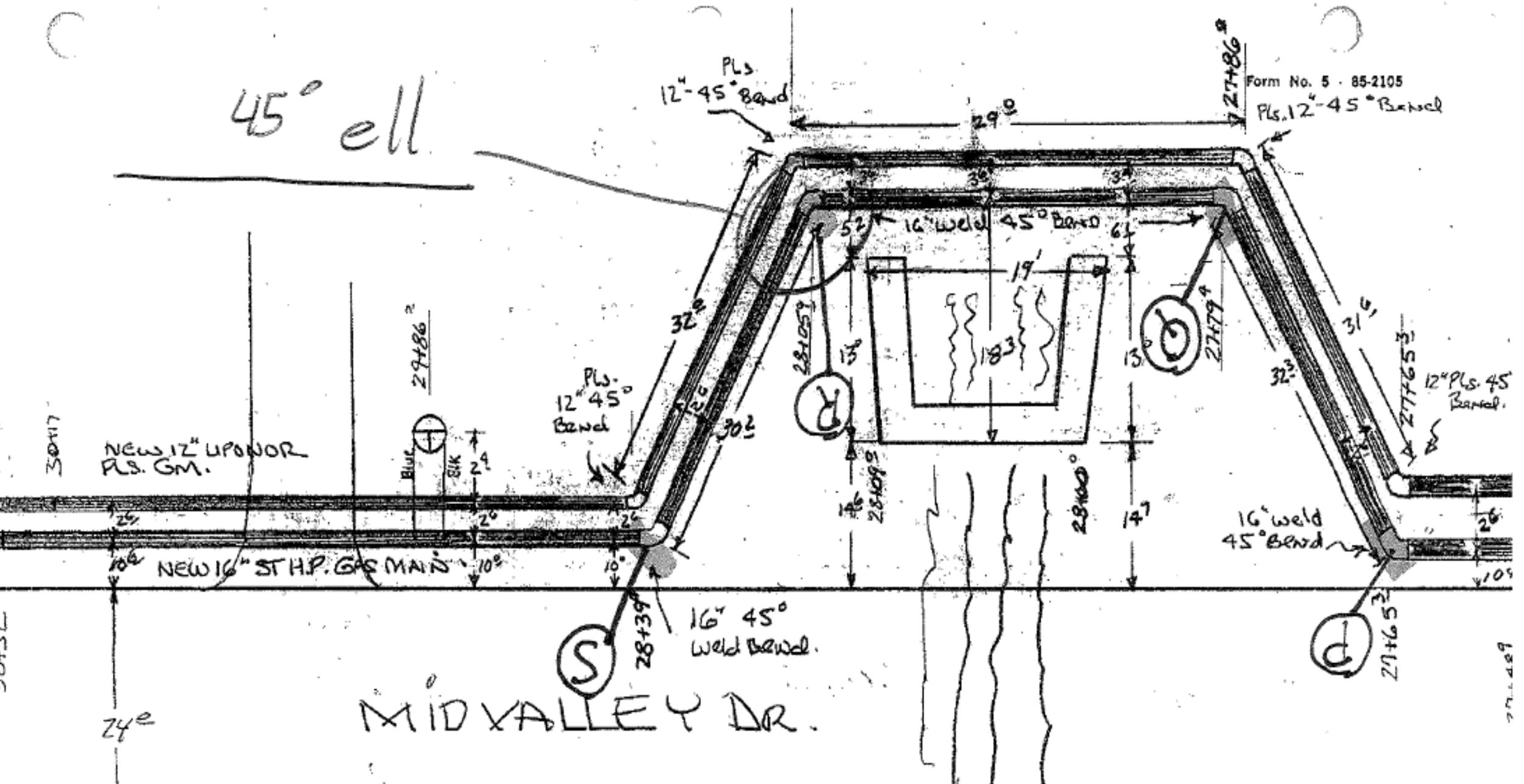
PASS
AIR BA

Technical Overview



45° ell

Form No. 5 - 85-2105
Pls. 12" 45° Bend



30417

NEW 12" UPONOR
PLS. GM.

27486²



24'
20'

12" PLS.
45° Bend

12" PLS.
45° Bend

32'

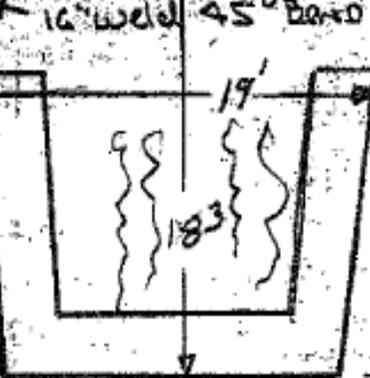
30'



28105⁹

28109⁹

52'



16" weld 45° Bend

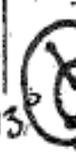
19'

56'

28100⁰

13'

14'

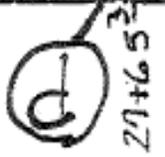


27479⁴

16" weld
45° Bend

31'

32'



27465³

12" PLS. 45°
Bend.

27765³

10'

MID VALLEY DR.

24'

27465³



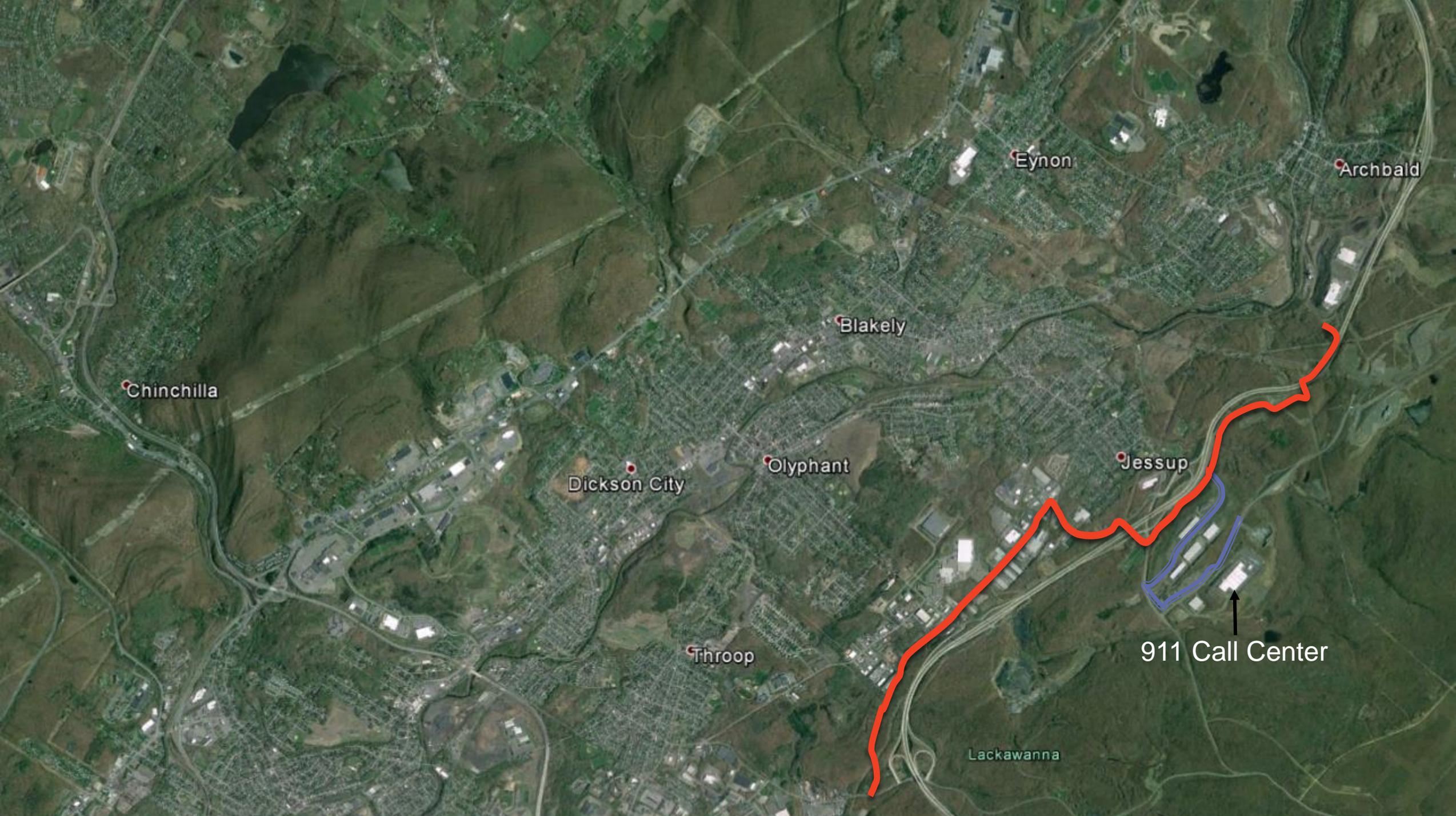
16

50H 20

KRY 50



2013.11.22



Chinchilla

Dickson City

Throop

Olyphant

Blakely

Eynon

Archbald

Jessup

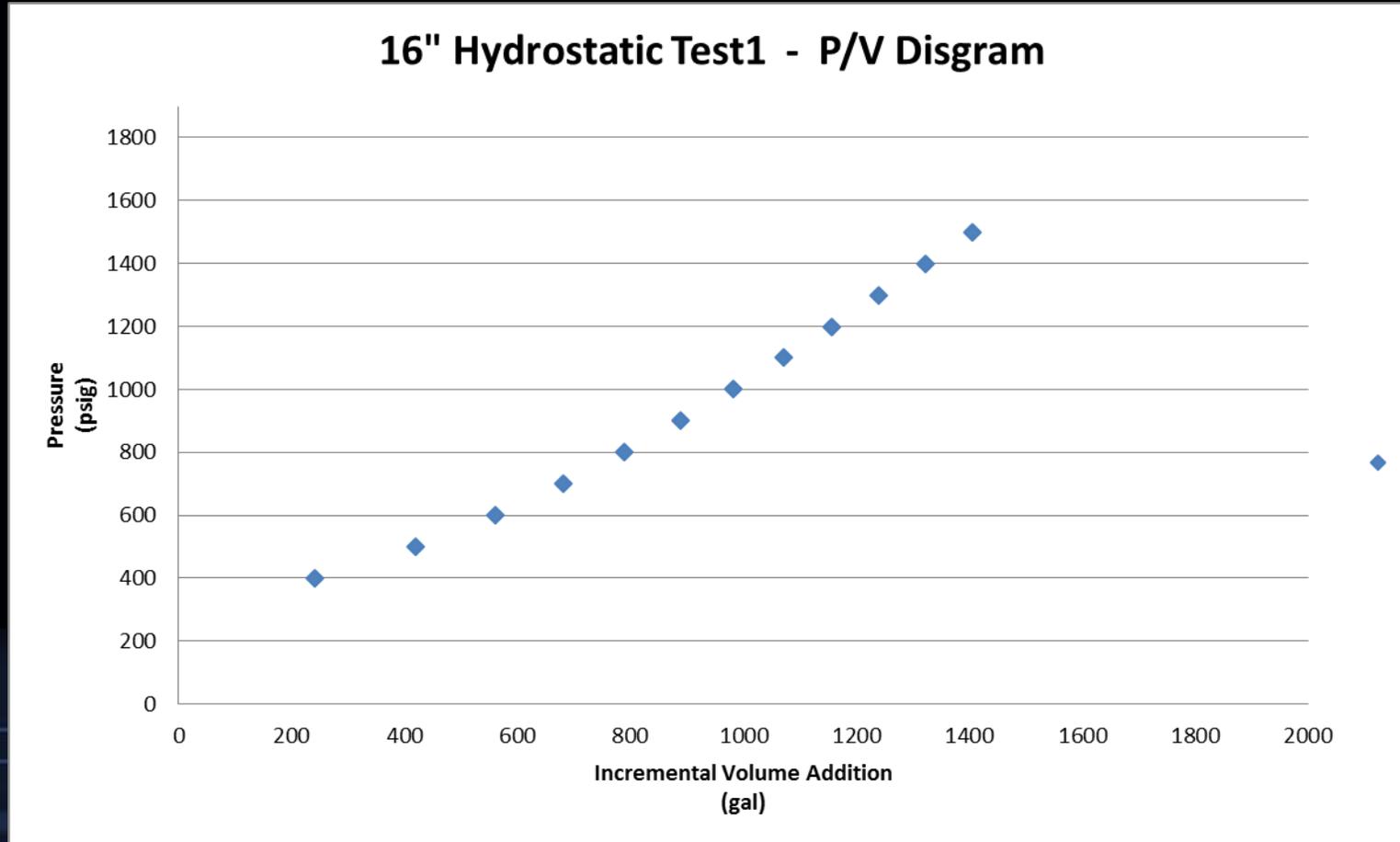
Lackawanna

911 Call Center



2013.12.27

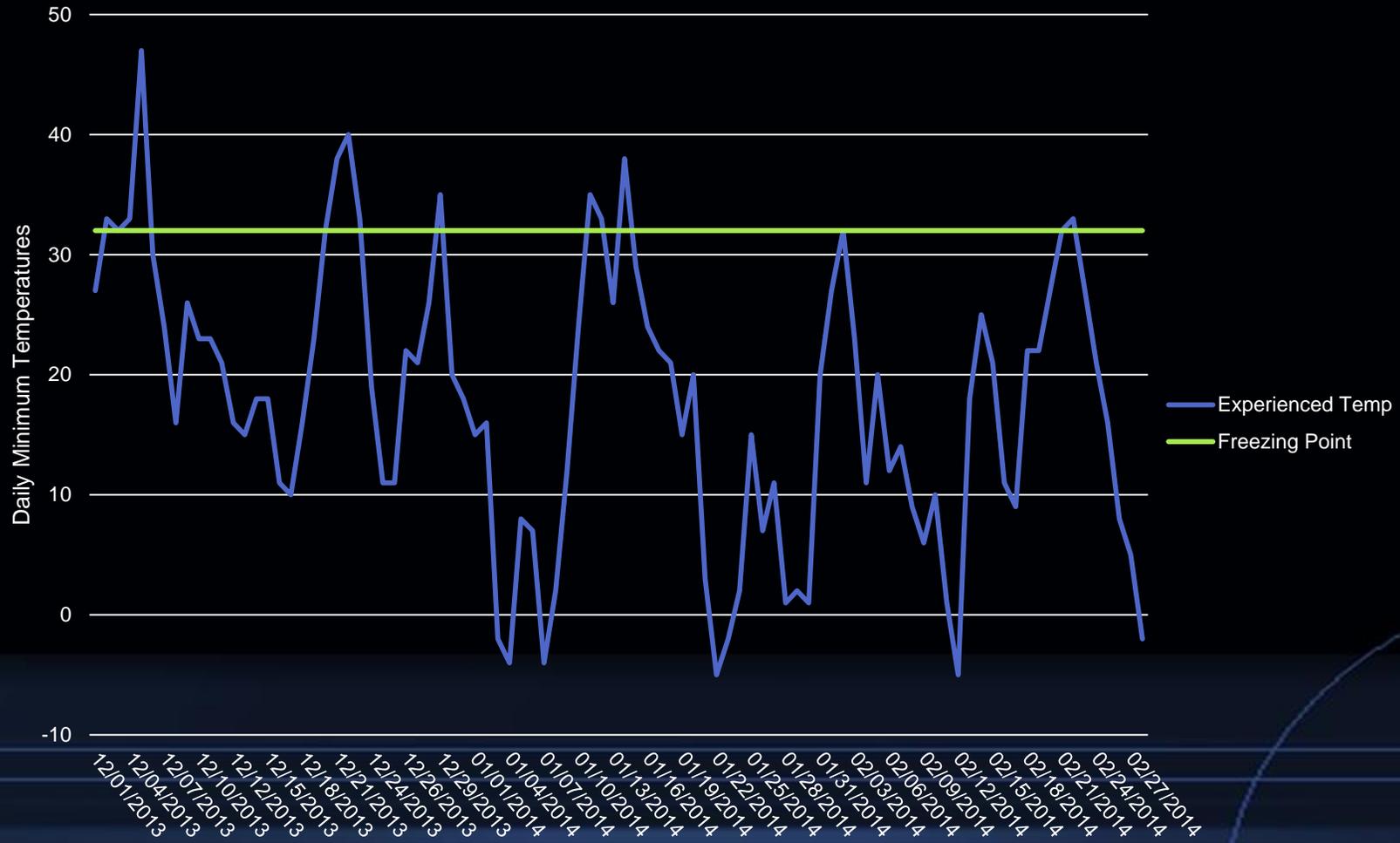
Hydrostatic Testing



Testing Specifics

- 3 separate hydrostatic pressure tests
- Minimum test pressure – 1755psig (94% SMYS)
- 330,000 gallons of water required
- Dewatering – Pigging & ~~methanol~~ dry air
- Water Sourced – Local municipal facilities
- Water Disposal – Local water treatment facility

Minimum Daily Temperatures Through Testing Period





2013.12.31





Dewatering Process

- 1Run - Push Double Dish Poly Pig Out of 16" Main – 75%
- 1Run - Brush Pig - 75%
- 3Runs - Cupped Pig - 90%
- 4Runs - Foam Disk Pig Train - 95%
- 10Runs - 2lb Swab Pig Train - 98%
- 1Run - Brush Pig - 98%
- 10Runs - 2lb Swab Pig Train - 99%
- 1Run - Methanol Train 40gal - 99.9%
- 1Run - Brush Pig - 99.9%
- 3Runs - Swab Pig Train - 99.99% (less than 1/4" penetration)
- Dreger Tube Sample
- Turn and Grease Every Valve





Chinchilla

Dickson City

Throop

Olyphant

Blakely

Eynon

Archbald

Jessup

Lackawanna

The Unseen Issues

- Improper use of Dreger tubed
- Normal air compressor
- 1/4" penetration does not mean dry

- Low velocity conditions – 26hr exposure
- Meter sets exposed to extremely cold air



KOMATSU

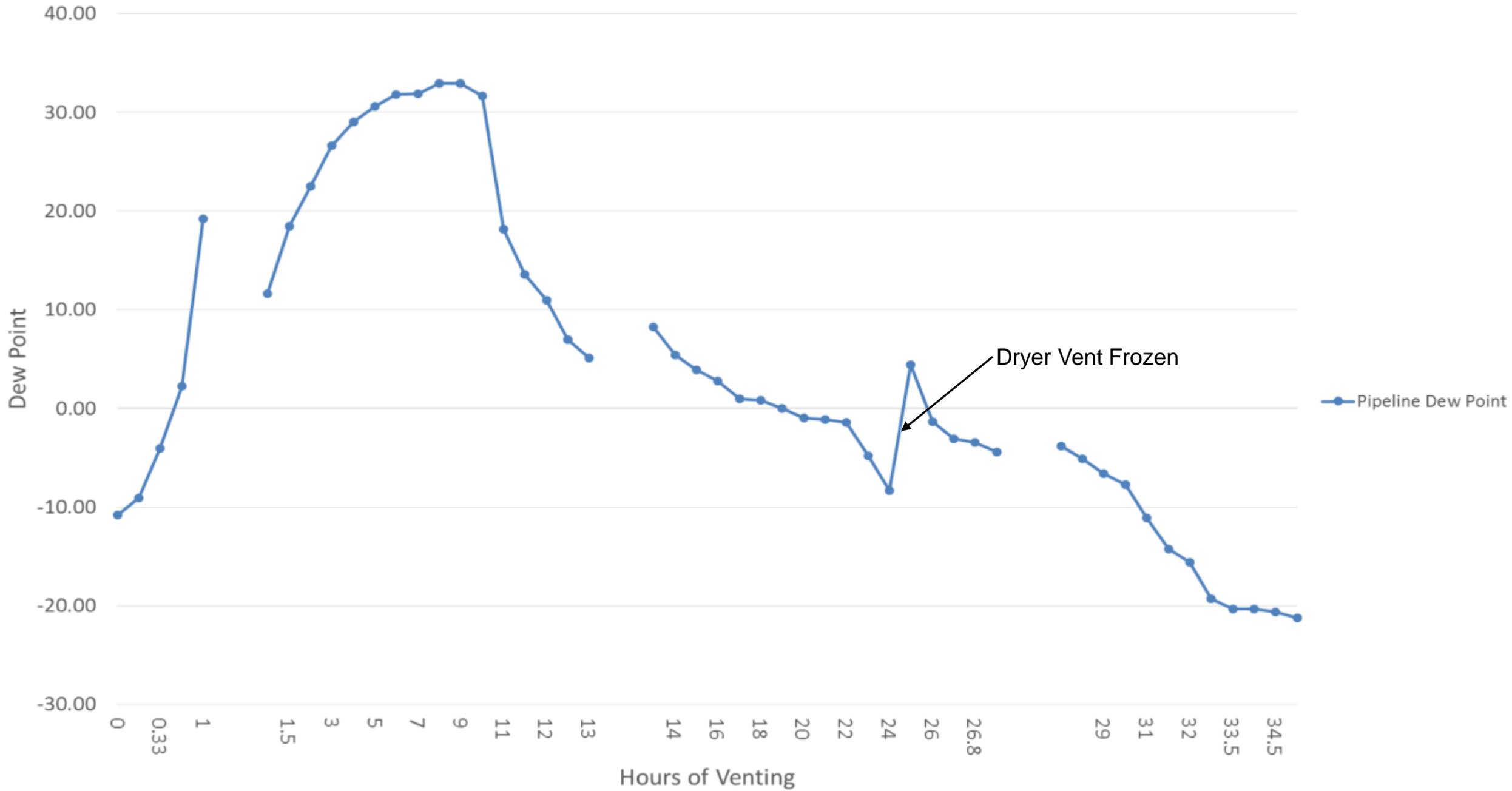
A

1-2

HW613-07

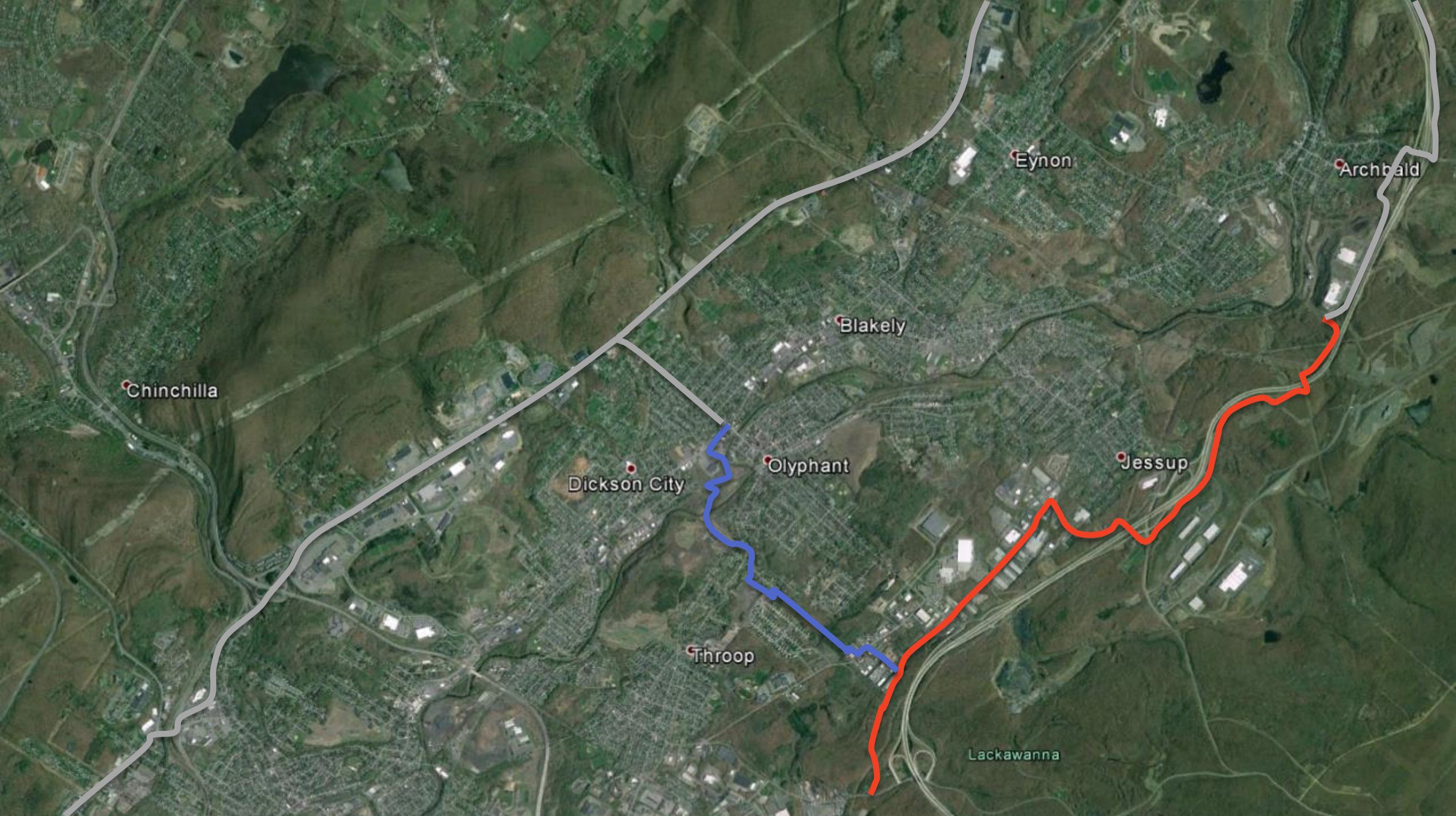
HYDRO-TANK

Pipeline Dew Point (°F) Relative To Hours of Drying)









Chinchilla

Dickson City

Throop

Olyphant

Blakely

Eynon

Archbald

Jessup

Lackawanna

Cold Weather Impacts - Time

- Waiting for weather, 1st hydrotest – 6days
- Constructing heated enclosures – 3days
- Cold weather and snow downtime – 14days
- Insufficient dewatering, 1st hydrotest – 35days

- Total lost time – 58days

Cold Weather Impacts - Money

- Change orders attributable to weather – \$300,000
- Supply optimization opportunity cost - \$4,000/day
- Incremental inspection and overheads - \$50,000

- Total estimated cost of weather delays - \$600,000