Docket: L-2019-3010267

PUC – Proposed Rulemaking Chapter 59 Comments By

Michael Perlow Jr, PE (http://perlowmp.com/)
Retired Principal Engineer/Owner
Engineering Knowledge Management LLC
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PITF - PA Pipeline Infrastructure Task Force Report – February 2016

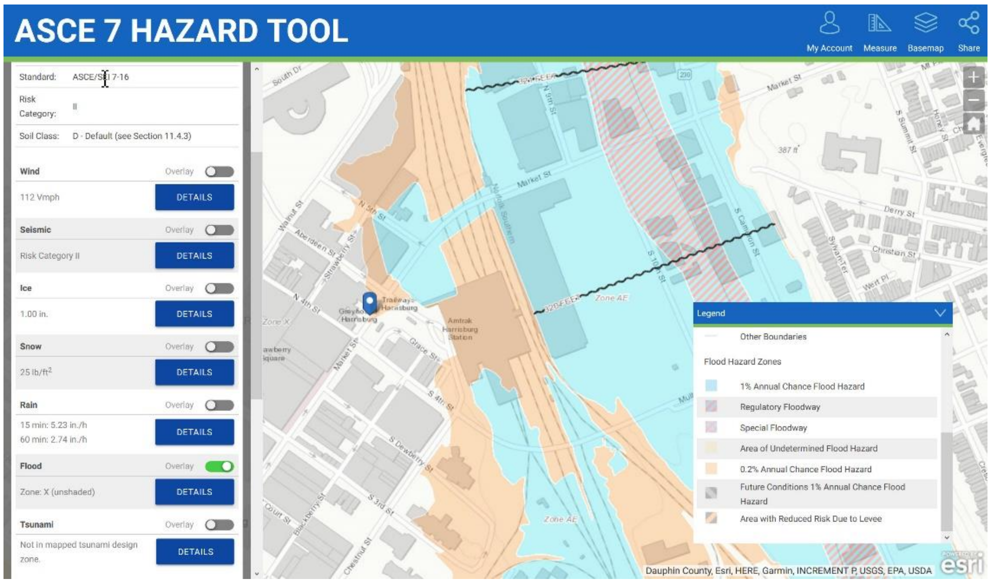
The Public Utility Commission (PUC) is authorized under the Pennsylvania Gas and Hazardous Liquids Pipelines Act to regulate pipeline operators in Pennsylvania consistent with federal pipeline safety standards. These safety standards apply to the design, installation, operation, inspection, testing, construction, extension, replacement and maintenance of pipeline facilities. The PUC also implements regulations related to gas service and facilities.

083019-Michael Perlow Jr - General Background Review Comments

1. Population in many areas of PA has as much as doubled since 1950 and is expected to continue increasing another 25% or more by 2050 resulting in extensive development and new infrastructure construction.
2. In our larger population centers, infrastructure more than 50-100 years old is aging and reaching its useful life.
3. Corresponding to the increase in population, there has been a continued increase in the frequency and intensity of extreme weather events most notably in the past 5 years.
4. The above factors have combined to greatly increase the risk of damage and/or failure of our municipal, transportation, energy, and telecommunications infrastructure particularly in areas prone to sinkholes, landslides, and flooding.
5. The close of proximity of the above infrastructure to each other poses a risk to all infrastructure in an area where an underground utility line failure occurs resulting in loss of support due to sinkhole formation, subsidence, and slope failures. In geohazard and environmentally sensitive areas, the risk greatly increases due to the combination of man’s activities, aging infrastructure, and extreme weather.
6. Local municipal-county governments, authorities, and transportation department personnel are the front-line defense for public safety and environmental protection.
7. Studies by the author based upon 40 years of case study failure analyses have established basic critical factors which combine to increase the risk of pipeline and underground utility safety. Advances in computer technology, GIS, and data mining can provide critical hazard assessments needed for emergency response-preparedness.

083019-Michael Perlow Jr – Chapter 59 Rulemaking Recommendations

It is recommended that the PUC consider the development of a Public Utility Commission Hazard Emergency Response-Preparedness Tool similar to the recently developed ASCE Hazard Tool which establishes the minimum hazard design loads for buildings and other structures – See Attached ASCE 7 Hazard Tool example for the Harrisburg Rachel Carson Office Building.



By developing a PA PUC Public Utilities Hazard Assessment– Emergency Response-Preparedness Tool, the PUC and PADEP can help enlist the cooperation and assistance of local municipalities, county and utility authorities to meet its mandated safety and environmental protection responsibilities A PA PUC Hazard Assessment Emergency Response-Preparedness Tool could become the focal point and key communication tool for the following PUC priorities:

1. Utility interactions with local government officials, including but not limited to such topics as emergency planning and emergency response coordination, periodic drills with utility/municipal coordination.

2. Requiring periodic public awareness meetings with municipal officials and the public.

3. Pennsylvania-specific enhancements to public utilities' public awareness programs pursuant to 49 CFR § 195.440 and API Recommended Practice 1162.

5. Enhancing transparency while protecting confidential infrastructure security information.

6. Regulation of construction techniques such as horizontal directional drilling.

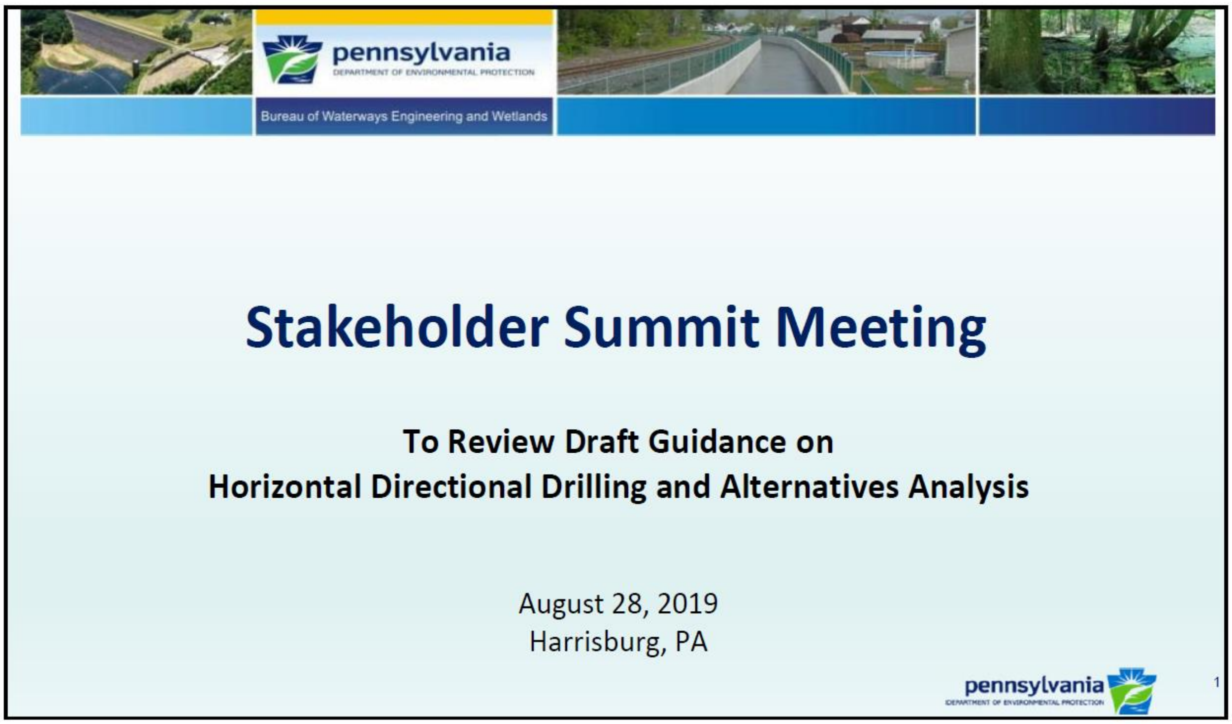
7. Accident and incident reporting criteria, notification criteria for reporting incidents or unusual events to local emergency officials.

8. Advance notification and/or Commission preapproval of major construction activities.

11. Protection of public-private water wells and supplies, wetlands, critical habitats, etc.

Hazard Assessment Emergency Response-Preparedness Tool Recommendations

It is recommended that the proposed Chapter 59 rulemaking process include development of a PUC Hazard Assessment Emergency Response-Preparedness Tool by convening Stakeholder Workgroup similar to the highly successful on-going PA DEP Horizontal Directional Drilling and Alternative Analysis group. The PUC Hazard Tool workgroup would review existing data availability, format and platform used to disseminate information. The PUC Hazard -Emergency Response Tool stakeholder group would be a joint effort with DEP to develop specific recommendations and road map to create the Hazard Tool along with possible user funding sources (subscriptions, project impact fees, etc.).



A copy of the PADEP August 28, 2019 Stakeholder Summit Summary presentation is attached to provide an understanding and insight as to how the stakeholder workgroup developed their respective Technical Guidance Documents.

Summary of MPerlowJr 08/30/19 Comment Document Attachments

A. ASCE 7 Hazard Tool Example – Harrisburg Rachel Carson Office Building Screen Shots

B. ASCE 7 Hazard Tool Example Report - Harrisburg Rachel Carson Office Building PDF

C. PADEP August 28, 2019 HDD & AA Stakeholder Workgroup Overview Presentation

D. Michael Perlow Jr, PE – 2019 CV, Biography, and Experience

E. Example Failure Case Study - 1990 Allentown North 5th Street Main Break-Gas Explosion

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APPENDIX A

ASCE 7 HAZARD TOOL EXAMPLE

RACHEL CARSON STATE OFFICE BUILDING

400 MARKET STREET

HARRISBURG, PA 17101

SCREEN SHOTS

ASCE AMERICAN SOCIETY OF CIVIL ENGINEERS

ASCE 7 Hazard Tool

ASCE 7 Hazard Tool is a web-based application that offers a better way to look up key design parameters specified by Standard ASCE 7. Its easy-to-use mapping features quickly retrieve your choice of hazard data, including:

- basic wind speed
- seismic accelerations
- flood zone and base flood elevation
- ground snow load
- rain load
- tsunami-load risk
- ice thickness with concurrent gust speed and temperature

Both individual and corporate subscriptions will be available.

https://asce7hazardtool.online/

ASCE 7 HAZARD TOOL

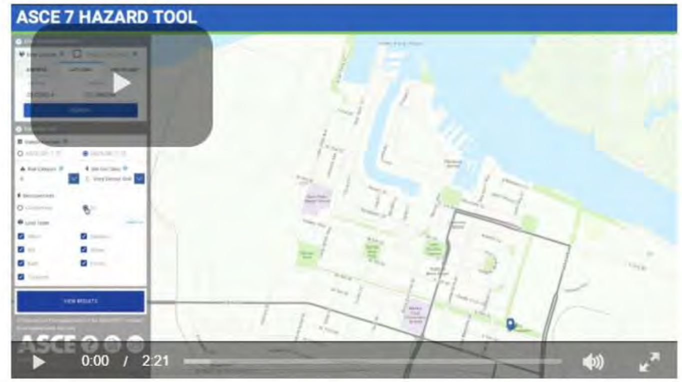
Easy-to-use mapping features offer a better way to look up key design parameters specified by Standard ASCE 7.

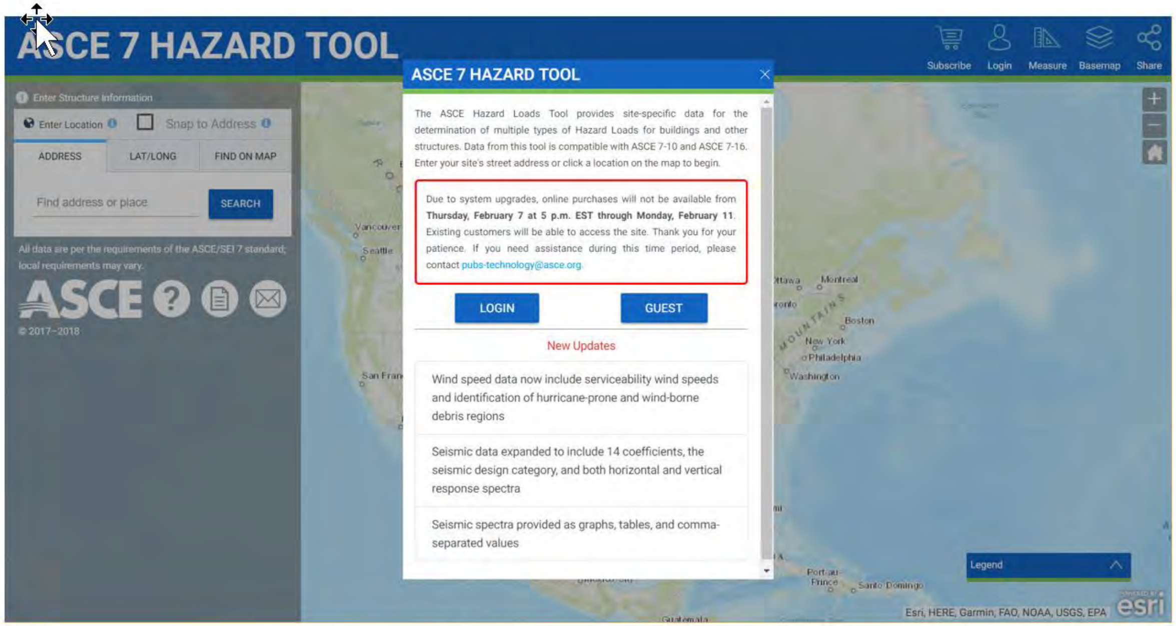
- *New:* Serviceability wind speeds now returned with site wind speed
- *New:* Seismic data expanded to include 14 coefficients, the seismic design category, and both horizontal and vertical response spectra
- Use site to pull precise hazard data for wind, seismic, flood, snow, rain, ice, and tsunami risk
- Generate a report showing hazard data for your location

New Product Upgrades Coming Soon!

- ASCE 7 Hazard Tool will identify hurricane-prone regions and wind-borne debris regions, as defined in ASCE 7-16, Chapter 26 and ASCE 7-10.

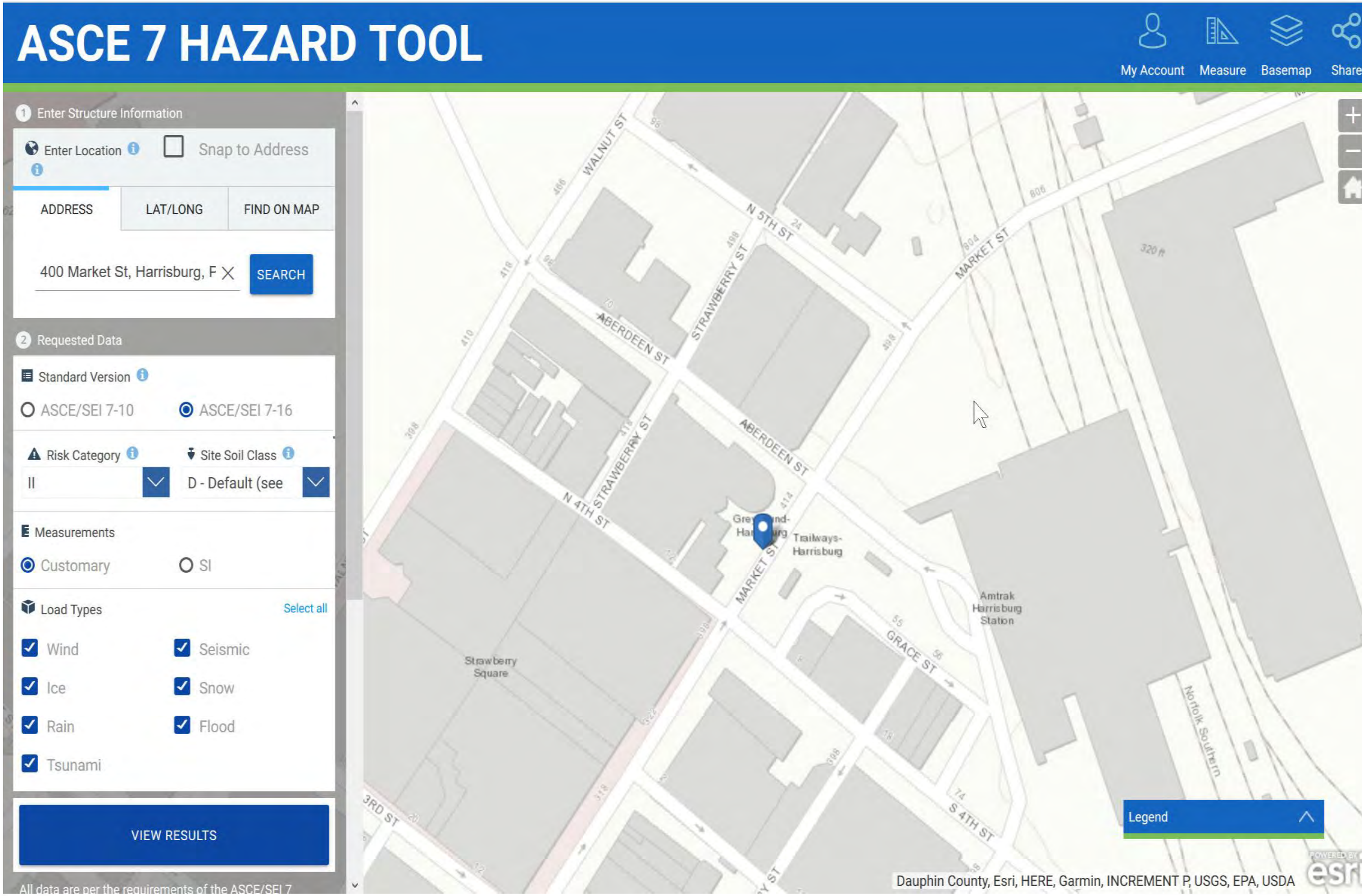
The ASCE 7 Hazard Tool **is now available.** Learn more about subscription options at asce7tools@asce.org.





https://asce7hazardtool.online/

Engineering Knowledge Management, LLC



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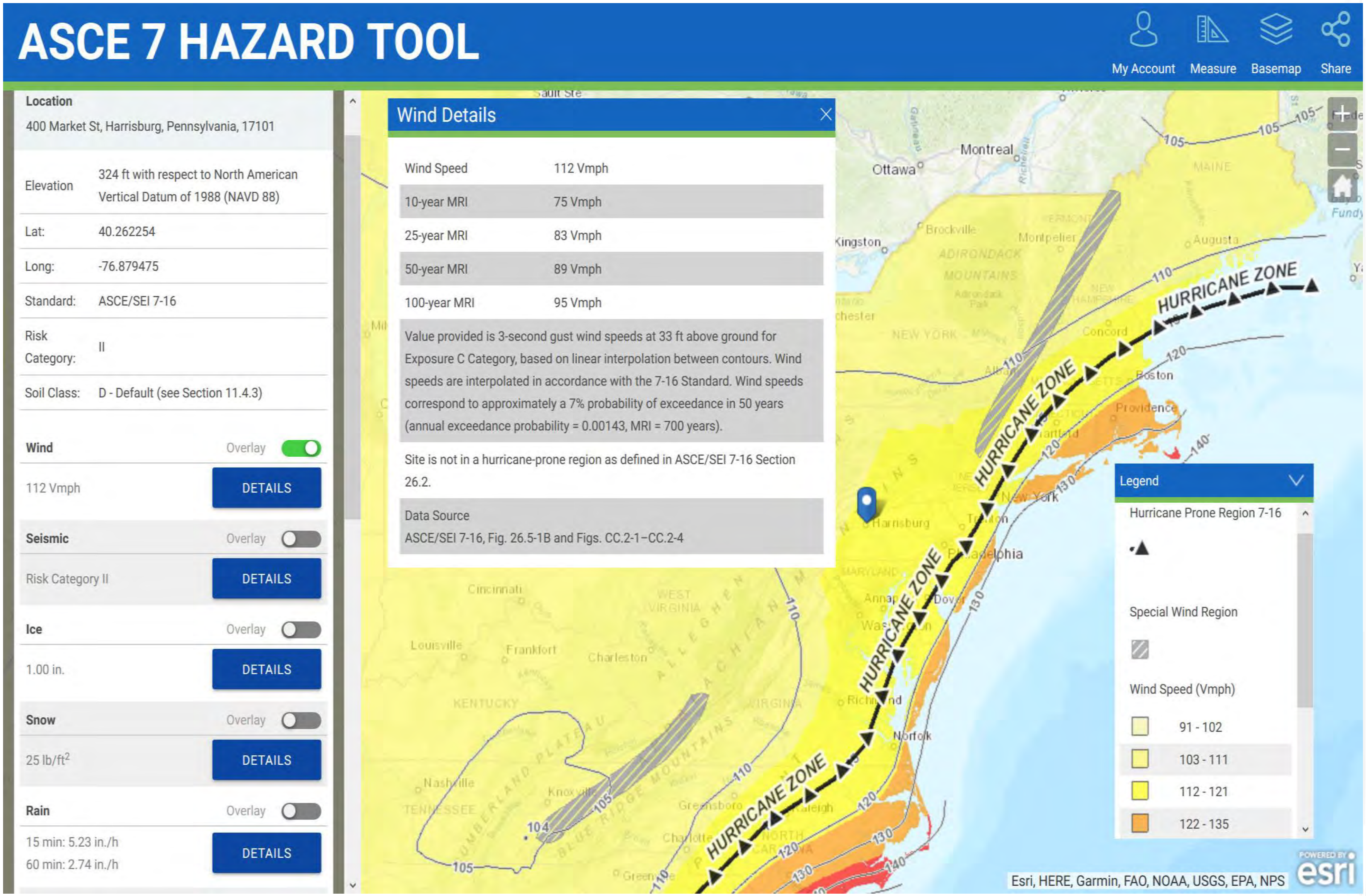

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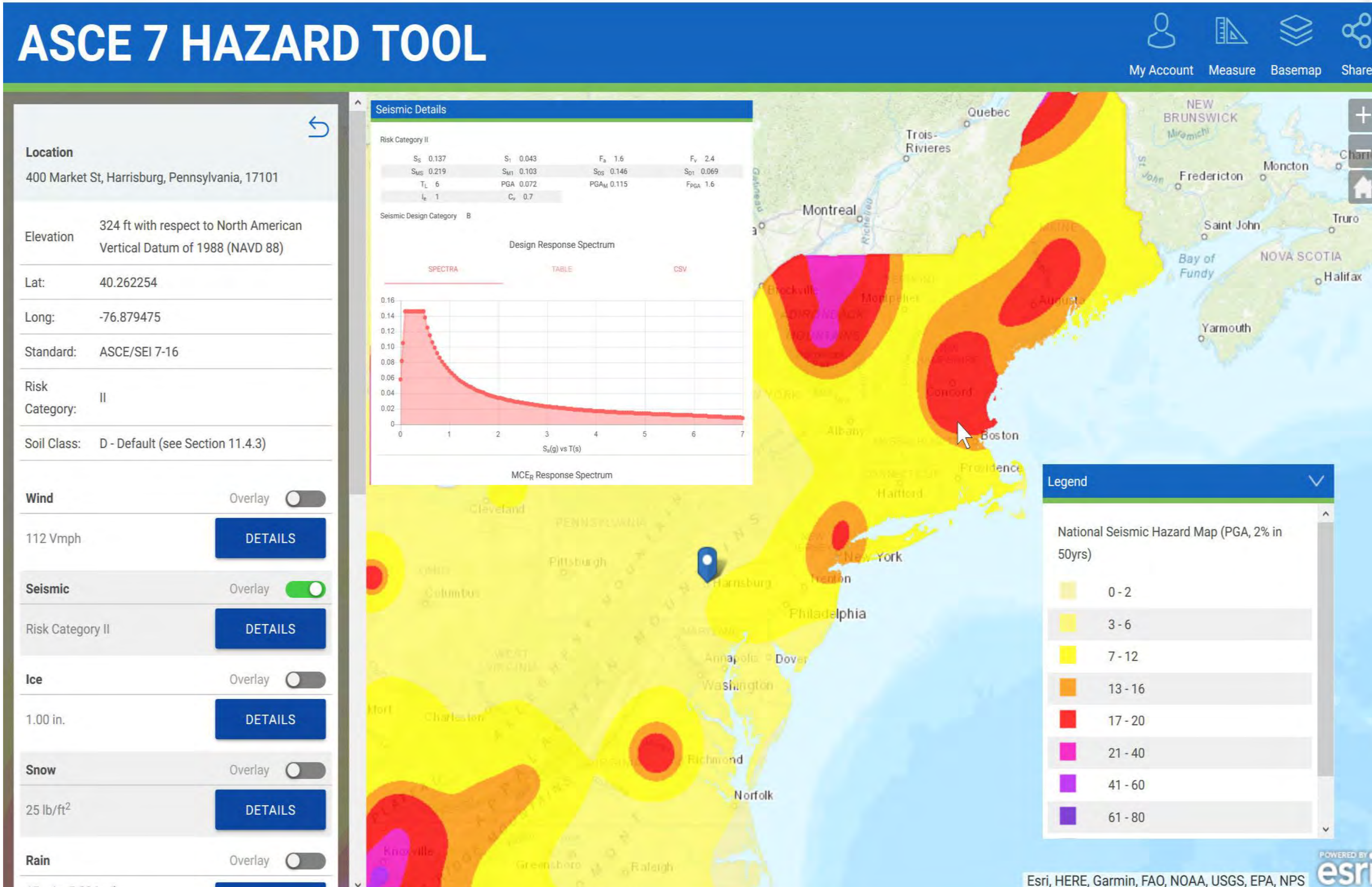
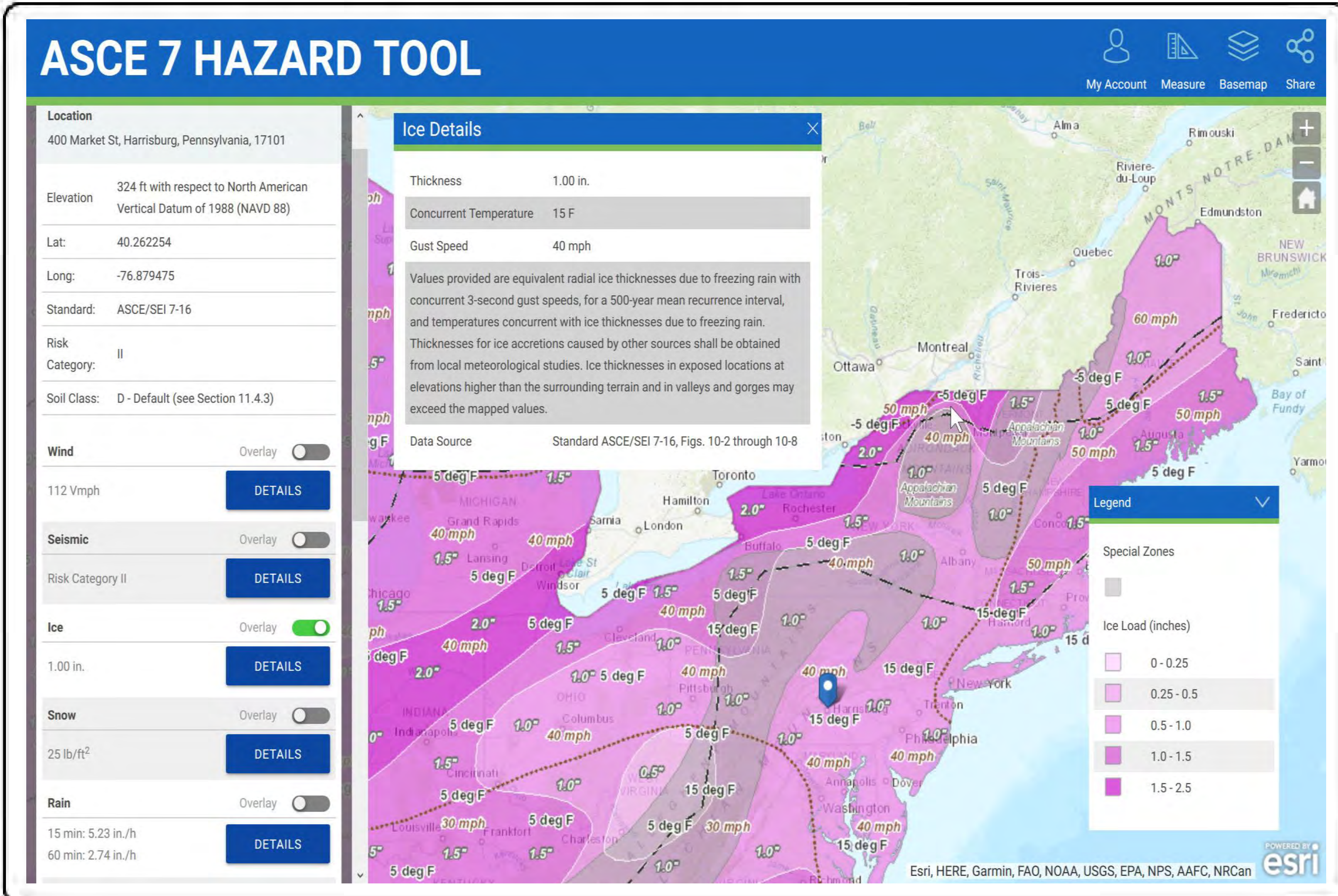
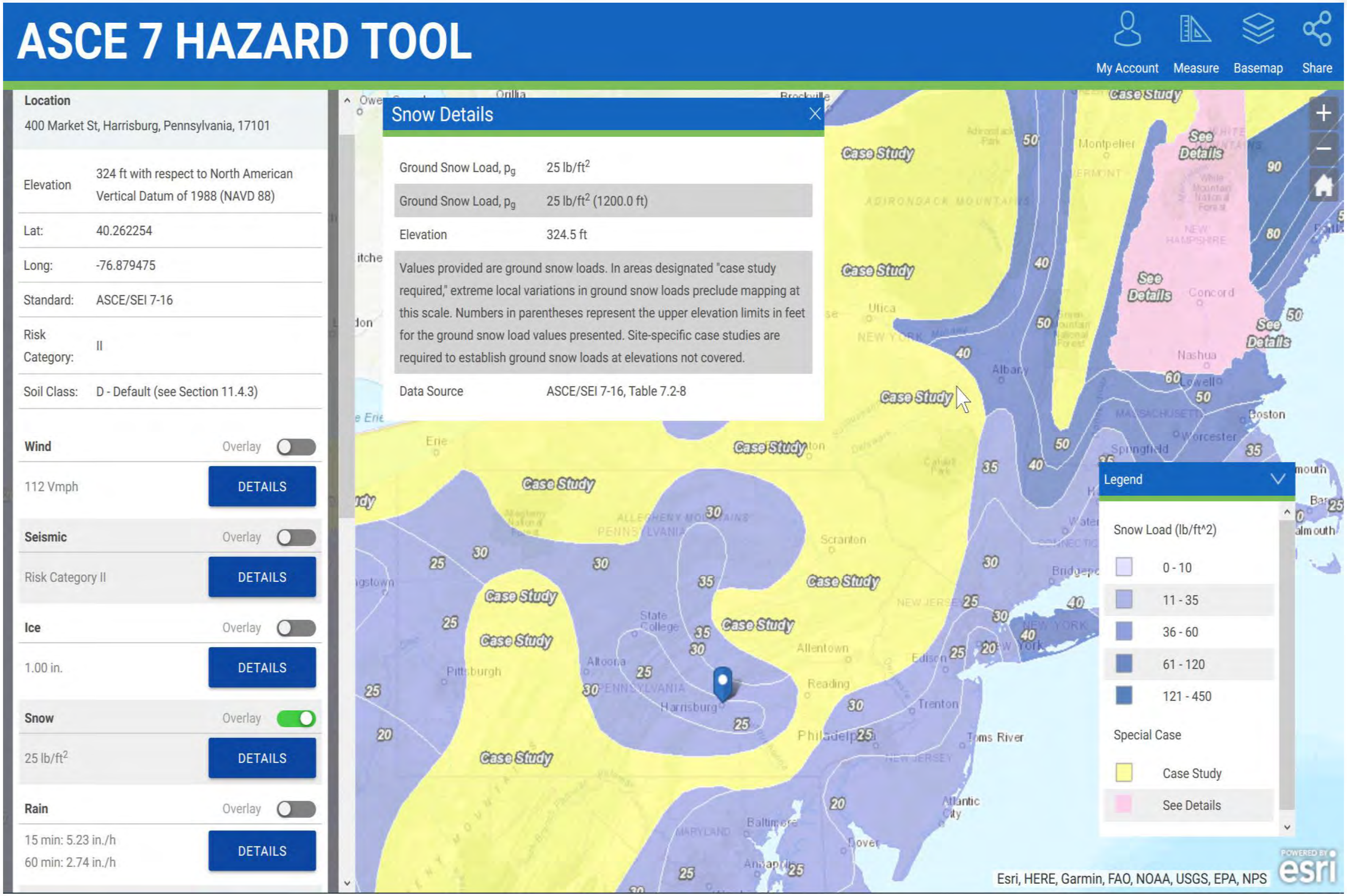
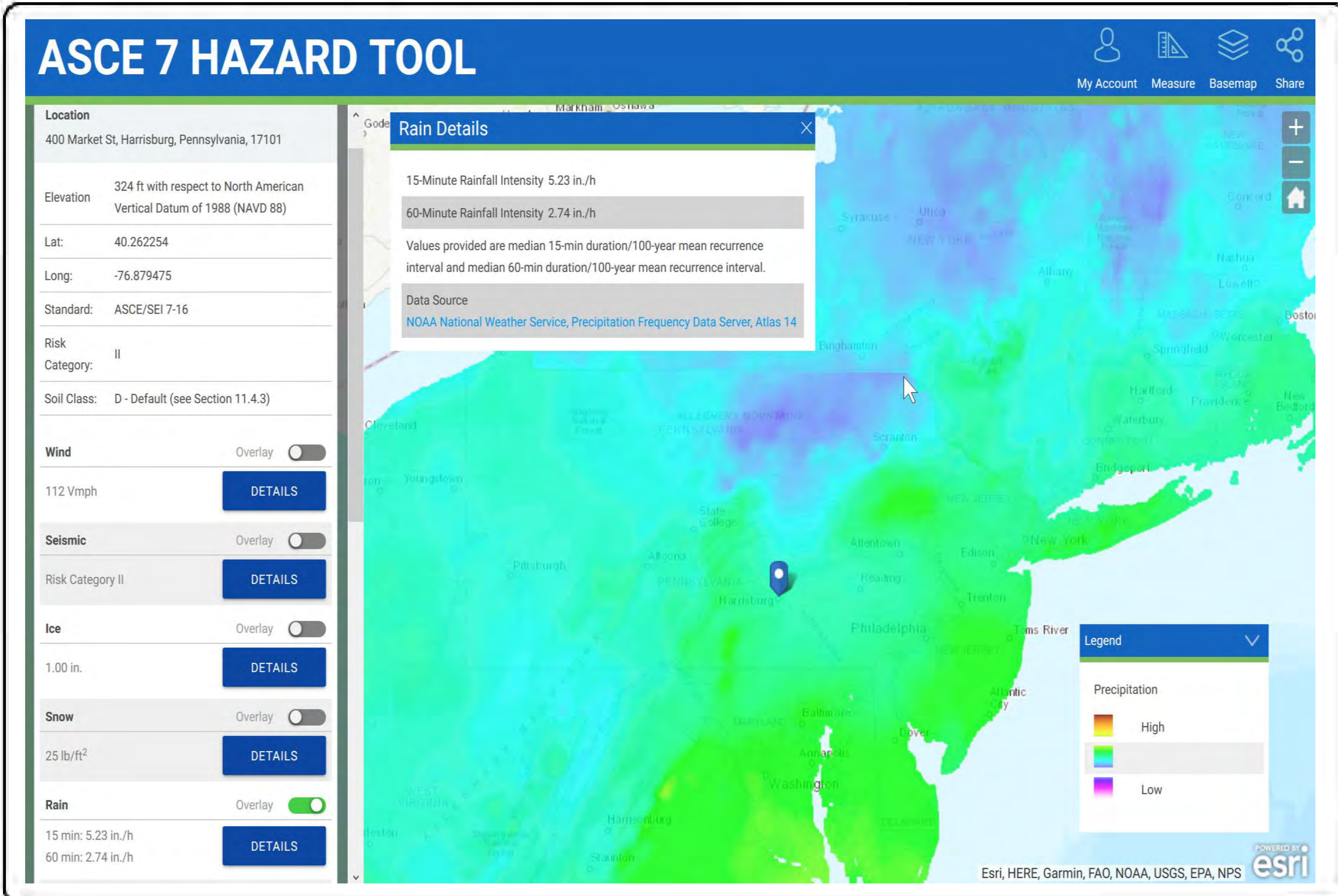



ASCE 7 HAZARD TOOL
My Account
Measure
Basemap
Share
Location
400 Market St, Harrisburg, Pennsylvania, 17101
Elevation
324 ft with respect to North American Vertical Datum of 1988 (NAVD 88)
Lat: 40.262254
Long: -76.879475
Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)
Wind
Overlay
112 Vmph
DETAILS
Seismic
Overlay
Risk Category II
DETAILS
Ice
Overlay
1.00 in.
DETAILS
Snow
Overlay
25 lb/ft²
DETAILS
Rain
Overlay
15 min: 5.23 in./h
60 min: 2.74 in./h
DETAILS
Ice Details
Thickness 1.00 in.
Concurrent Temperature 15 F
Gust Speed 40 mph
Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.
Data Source Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Legend
Special Zones
Ice Load (inches)
0 - 0.25
0.25 - 0.5
0.5 - 1.0
1.0 - 1.5
1.5 - 2.5
Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, AAFC, NRCan

Engineering Knowledge Management, LLC



Engineering Knowledge Management, LLC



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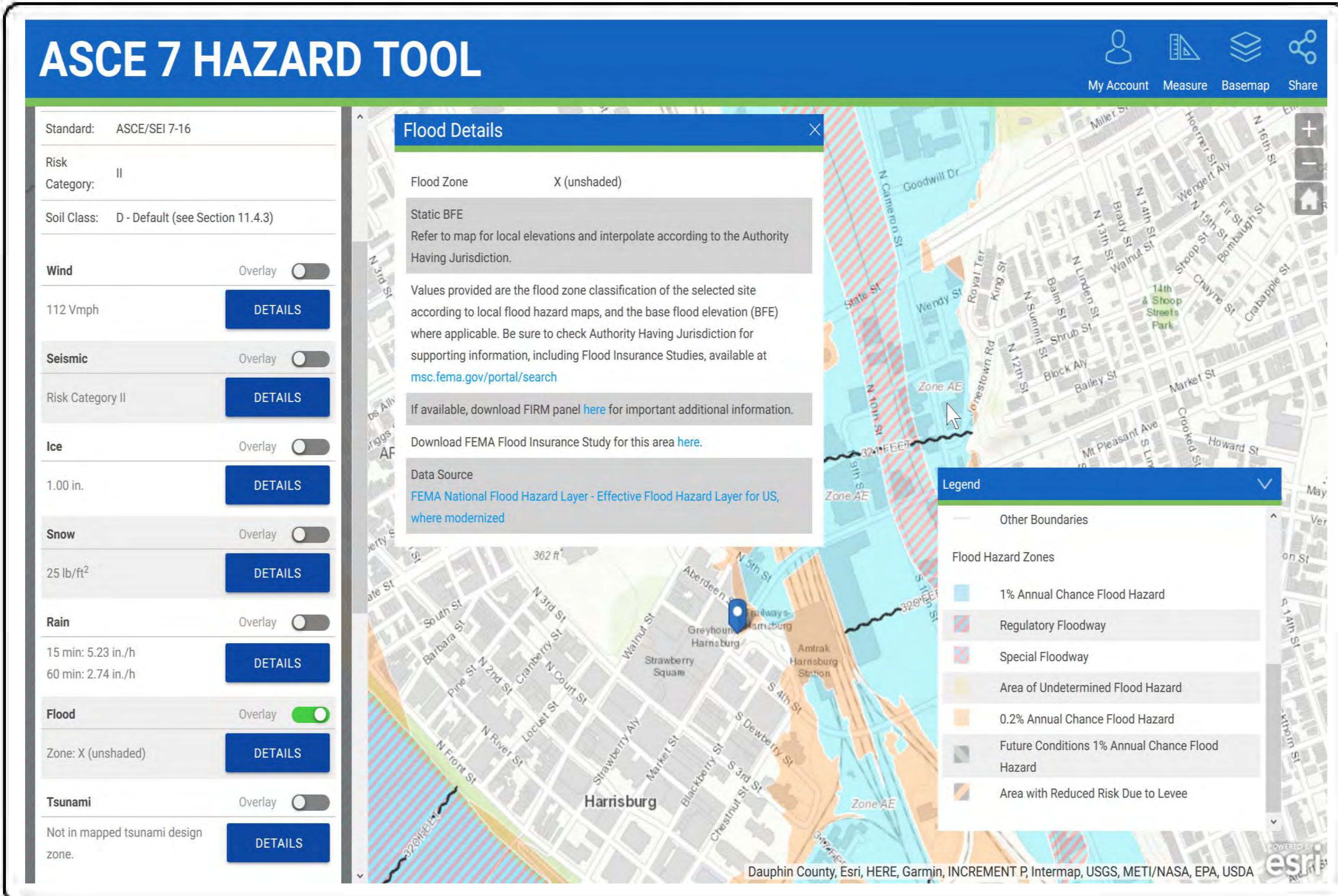

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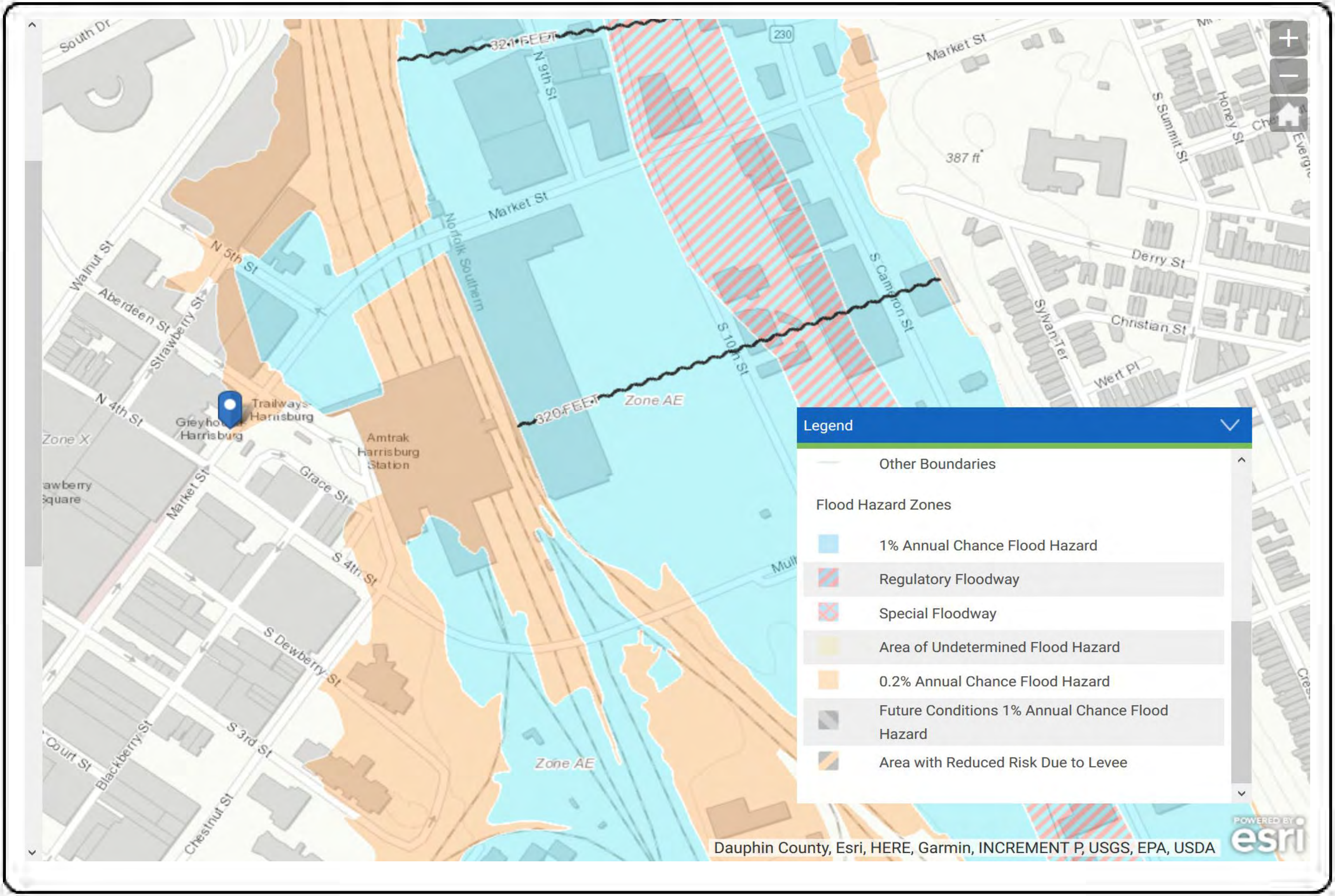


Engineering Knowledge Management, LLC

ASCE 7 Hazards Report

Address:
400 Market St
Harrisburg, Pennsylvania 17101

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Elevation: 324.5 ft (NAVD 88)
Latitude: 40.262254
Longitude: -76.879475

Wind

Results:

Wind Speed:	112 Vmph
10-year MRI	75 Vmph
25-year MRI	83 Vmph
50-year MRI	89 Vmph
100-year MRI	95 Vmph
Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4
Date Accessed:	Fri Aug 30 2019

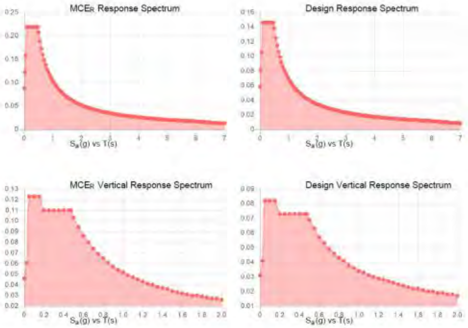
Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	0.137	S_{D1} :	0.069
S_1 :	0.043	T_L :	6
F_a :	1.6	PGA :	0.072
F_v :	2.4	PGA_M :	0.115
S_{MS} :	0.219	F_{PGA} :	1.6
S_{M1} :	0.103	I_e :	1
S_{DS} :	0.146	C_v :	0.7

Seismic Design Category B



Data Accessed: Fri Aug 30 2019

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	15 F
Gust Speed:	40 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Fri Aug 30 2019

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Snow

Results:

Ground Snow Load, p_g :	25 lb/ft^2
Elevation:	324.5 ft
Data Source:	ASCE/SEI 7-16, Table 7.2-8
Date Accessed:	Fri Aug 30 2019

Values provided are ground snow loads. In areas designated "case study required," extreme local variations in ground snow loads preclude mapping at this scale. Site-specific case studies are required to establish ground snow loads at elevations not covered.

Rain

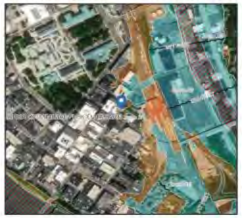
Results:

15-minute Precipitation Intensity:	5.23 in./h
60-minute Precipitation Intensity:	2.74 in./h
Data Source:	NOAA National Weather Service, Precipitation Frequency Data Server, Atlas 14 (https://www.nws.noaa.gov/oh/hdsc/)
Date Accessed:	Fri Aug 30 2019

Flood

Results:

Flood Zone Categorization:	X (unshaded)
Base Flood Elevation:	Refer to map for local elevations and interpolate according to the Authority Having Jurisdiction.
Data Source:	FEMA National Flood Hazard Layer - Effective Flood Hazard Layer for US, where modernized (https://msc.fema.gov/portal/search)
Date Accessed:	Fri Aug 30 2019
FIRM Panel:	If available, download FIRM panel here
Insurance Study Note:	Download FEMA Flood Insurance Study for this area here



Tsunami

Results:

Tsunami:	Not in mapped tsunami design zone.
Data Source:	ASCE Tsunami Design Geodatabase
Date Accessed:	Fri Aug 30 2019

REPORT SUMMARY

Wind

Wind Speed	112 Vmph
10-year MRI	75 Vmph
25-year MRI	83 Vmph
50-year MRI	89 Vmph
100-year MRI	95 Vmph

Seismic

SS	0.137
S1	0.043
Fa	1.6
Fv	2.4
SMS	0.219
SM1	0.103
SDS	0.146
SD1	0.069
TL	6
PGA	0.072
PGAM	0.115
FPGA	1.6
Ie	1
Cv	0.7
Seismic Design Category	B

Ice

Thickness	1.00 in.
Concurrent Temperature	15 F
Gust Speed	40 mph

Snow

Ground Snow Load, p_g	25 lb/ft^2
Ground Snow Load, p_g	25 lb/ft^2 (1200.0 ft)
Elevation	324.5 ft

Rain

15-Minute Rainfall Intensity	5.23 in./h
60-Minute Rainfall Intensity	2.74 in./h

Flood

Flood Zone	X (unshaded)
Static BFE	Refer to map for local elevations and interpolate according to the Authority Having Jurisdiction.

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APPENDIX B

ASCE 7 HAZARD TOOL EXAMPLE

RACHEL CARSON STATE OFFICE BUILDING

400 MARKET STREET

HARRISBURG, PA 17101

HAZARD REPORT

ASCE 7 Hazards Report

Address:
400 Market St
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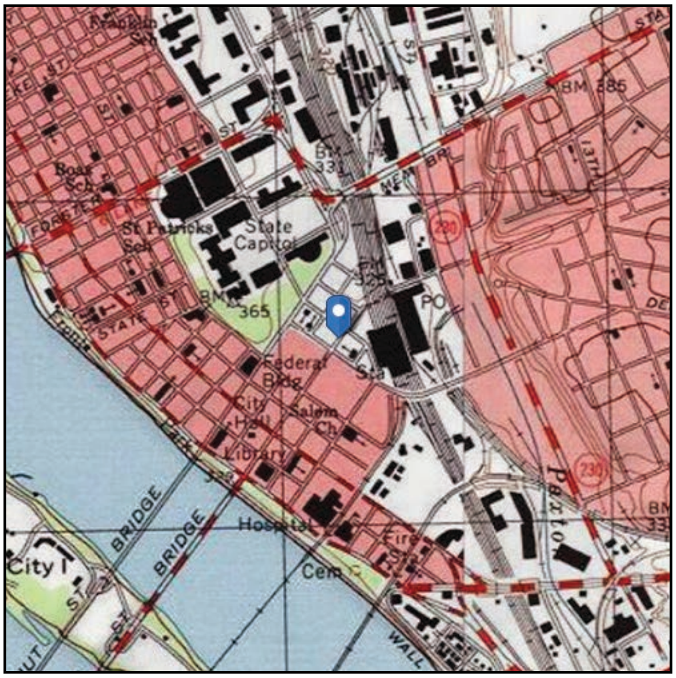

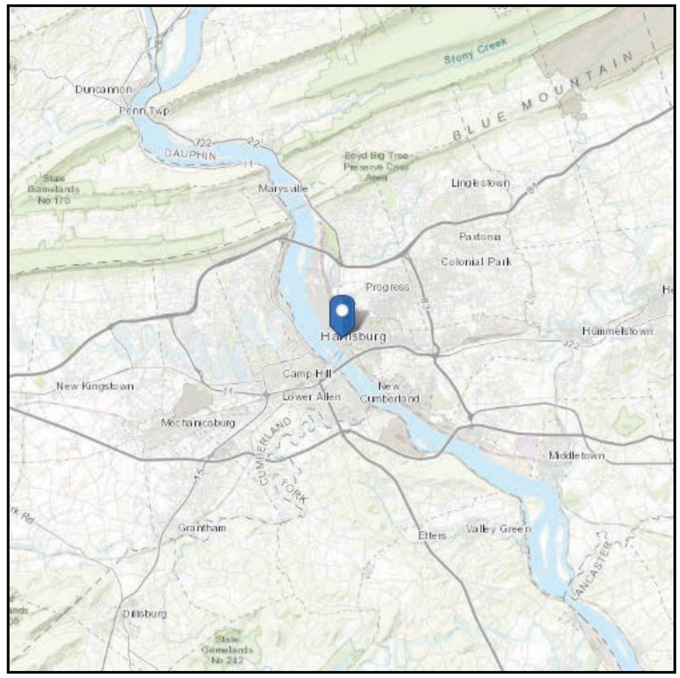

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100-year MRI	95 Vmph
Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4
Date Accessed:	Fri Aug 30 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

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Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

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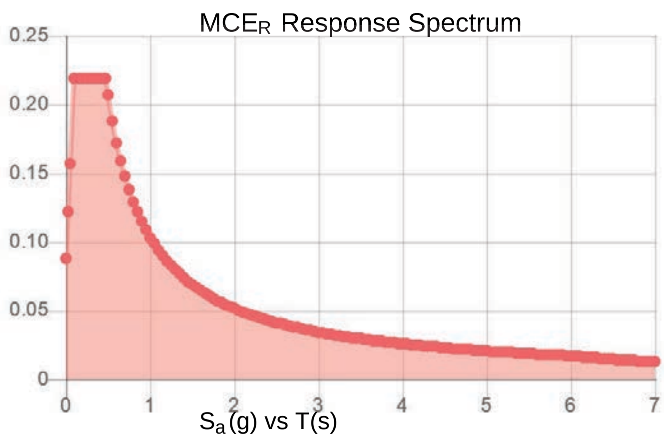

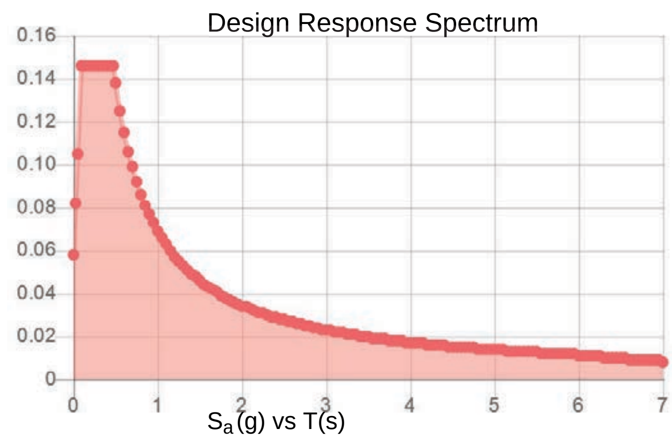

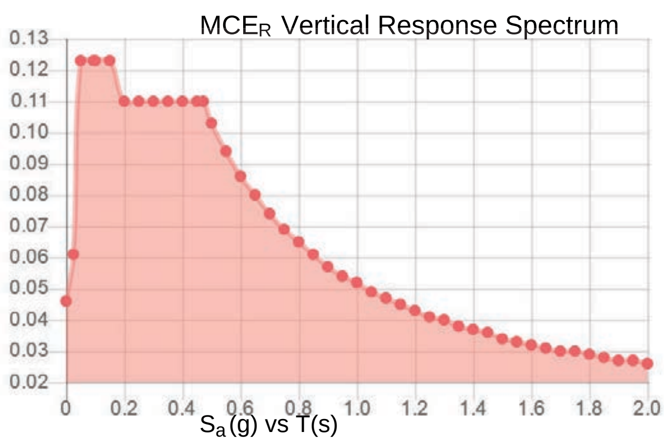

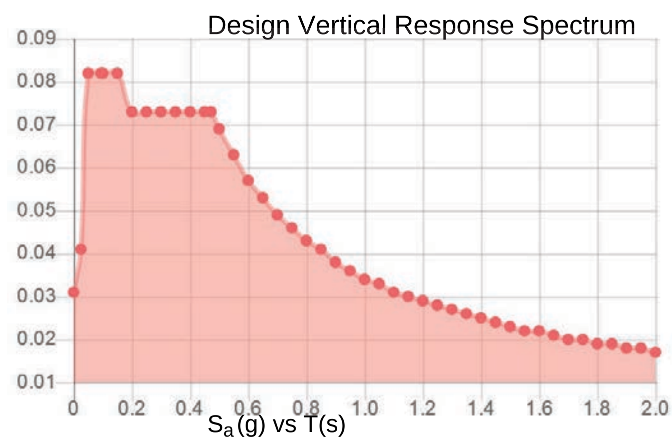

Data Accessed: Fri Aug 30 2019

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

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60-minute Precipitation Intensity: 2.74 in./h

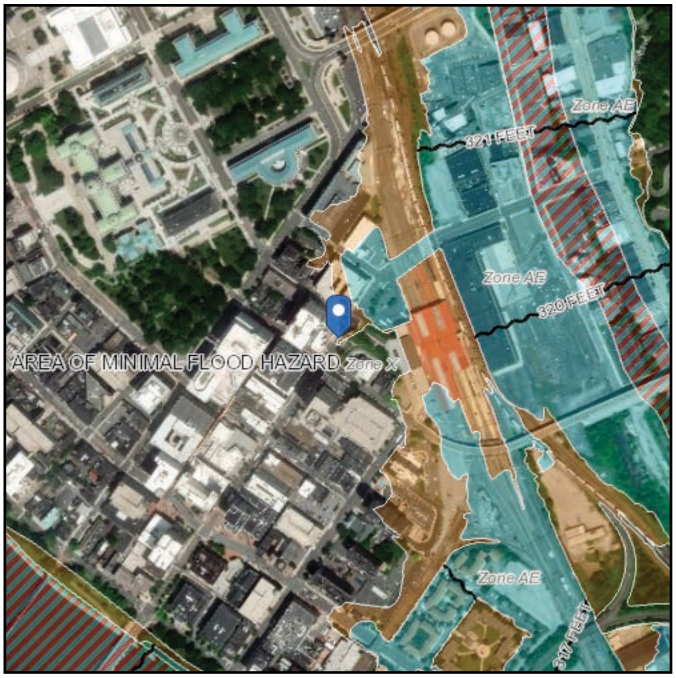
Data Source: NOAA National Weather Service, Precipitation Frequency Data Server, Atlas 14 (https://www.nws.noaa.gov/oh/hdsc/)

Date Accessed: Fri Aug 30 2019

Flood

Results:

Flood Zone Categorization:	X (unshaded)
Base Flood Elevation:	Refer to map for local elevations and interpolate according to the Authority Having Jurisdiction.
Data Source:	FEMA National Flood Hazard Layer - Effective Flood Hazard Layer for US, where modernized (https://msc.fema.gov/portal/search)
Date Accessed:	Fri Aug 30 2019
FIRM Panel:	If available, download FIRM panel here
Insurance Study Note:	Download FEMA Flood Insurance Study for this area here



Tsunami

Results:

Tsunami:	Not in mapped tsunami design zone.
Data Source:	ASCE Tsunami Design Geodatabase
Date Accessed:	Fri Aug 30 2019

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

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APPENDIX C

PADEP STAKEHOLDER WORKGROUP

HORIZONTAL DIRECTIONAL DRILLING

ALTERNATIVE ANALYSIS

DRAFT GUIDANCE DOCUMENT REVIEW

AUGUST 28, 2019 PRESENTATION

Stakeholder Summit Meeting

To Review Draft Guidance on
Horizontal Directional Drilling and Alternatives Analysis

August 28, 2019
Harrisburg, PA

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

1

Agenda

1. Introduction

2. Overview of the *'**Draft Trenchless Technology Technical Guidance Document'*** prepared by the Horizontal Directional Drilling Stakeholder Workgroup.

3. Overview of the ***'Draft Alternatives Analysis Technical Guidance Document'*** prepared by the Alternatives Analysis Stakeholder Workgroup.

4. Break for Lunch

5. Open Discussion

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

2

Introduction

- Settlement of litigation Clean Air Council, the Delaware Riverkeeper Network, and Mountain Watershed Association (Appellants) on July 26, 2018
- Part of that settlement, DEP committed to establishing workgroup(s) to potentially develop draft policy, procedure, and/or guidance documents.
- Guidance Document prognosis

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

3

Introduction

- Stakeholder Workgroup #1: ***Construction and Operation during Horizontal Directional Drilling (HDD).***

  Please note: HDD transitioned to Trenchless Technology as HDD was a limiting term.

- Stakeholder Workgroup #2 - ***Methodologies and Factors to Consider to complete Alternatives Analysis (AA) for Stream and Wetland Crossings per the Ch. 105 Regulations***.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

4

STAKEHOLDER GROUP #1

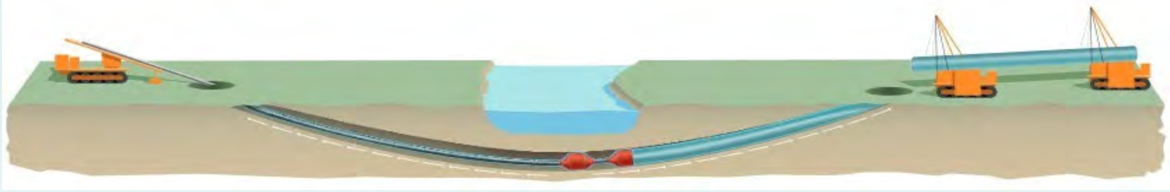
CONSTRUCTION AND OPERATION DURING HORIZONTAL DIRECTIONAL DRILLING

pennsylvania DEPARTMENT OF ENVIRONMENTAL PROTECTION

5

Horizontal Directional Drilling Stakeholder Workgroup

- **Charge of the Stakeholder workgroup:** *"Construction and Operation during Horizontal Directional Drilling (HDD)"*
- Stipulation states: *Enhanced Best Practices ("EBP") in the design and execution of HDDs and HDD Inadvertent Return Assessment, Preparedness, Prevention and Contingency Plans*
- HDD workgroup and the Trenchless Technology Technical Guidance Document



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- Site-specific geological, topographical, and hydrological analysis to be considered
- Type of analysis and documentation of adjacent features in the vicinity of the project footprint
- Potential impact of the planned activity on or from adjacent features.

ii. **HDD Construction and Operation**

a. Enhanced Best Practices ("EBP") in the design and execution of HDDs and HDD Inadvertent Return Assessment, Preparedness, Prevention and Contingency Plans ("HDD IR PPC Plan");

(1) The type of site-specific geological, topographical, and hydrological analysis to be considered, including, but not limited to past and current land use.

(2) The type of analysis and documentation of adjacent features in the vicinity of the project footprint and potential impact of the planned activity on or from adjacent features.

b. EBP for preventing and responding to IRs;

c. EBP for preventing and responding to hydrological impacts from IRs;

d. EBP for groundwater quality and quantity protection;

e. EBP for procedures to be used to identify water supplies in the vicinity of a proposed HDD beyond the use of the Pennsylvania Groundwater Information System; and

f. Recommendations for permittee to conduct water supply testing (quality and quantity) for landowners within the vicinity of an HDD.

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Horizontal Directional Drilling Stakeholder Workgroup

- Enhanced Best Practices for:
  - preventing and responding to IRs and
  - preventing and responding to hydrological impacts from IRs;
  - groundwater quality and quantity protection;
  - procedures to identify water supplies in the vicinity of a proposed HDD beyond the use of the Pennsylvania Groundwater Information System
- Recommendations for permittee to conduct water supply testing (quality and quantity) for landowners within the vicinity of an HDD.

ii. **HDD Construction and Operation**

a. Enhanced Best Practices ("EBP") in the design and execution of HDDs and HDD Inadvertent Return Assessment, Preparedness, Prevention and Contingency Plans ("HDD IR PPC Plan");

(1) The type of site-specific geological, topographical, and hydrological analysis to be considered, including, but not limited to past and current land use.

(2) The type of analysis and documentation of adjacent features in the vicinity of the project footprint and potential impact of the planned activity on or from adjacent features.

b. EBP for preventing and responding to IRs;

c. EBP for preventing and responding to hydrological impacts from IRs;

d. EBP for groundwater quality and quantity protection;

e. EBP for procedures to be used to identify water supplies in the vicinity of a proposed HDD beyond the use of the Pennsylvania Groundwater Information System; and

f. Recommendations for permittee to conduct water supply testing (quality and quantity) for landowners within the vicinity of an HDD.

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Horizontal Directional Drilling Stakeholder Workgroup

Appellant Representatives:

- **Gary Kribbs, P.G.,** PA State Licensed Geologist
- **Dr. Jay Parrish, P.G.,** PA State Licensed Geologist
- **Amy Parrish, E.H.S., P.G.**, Hydrogeologist
- **Michael Perlow Jr., P.E.**, Civil & Geotechnical Engineer
- **Rich Raiders**, Technical Expert

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Horizontal Directional Drilling Stakeholder Workgroup

Agency Representatives:

Department of Environmental Protection:

PA DEP

Bureau of Waterways Engineer

- **Ken Murin**
- **Sid Freyermuth**

Bureau of Oil and Gas

- **Joe Kelly**
- **Brian Bailey (Alternate)**

Regional Permit Coordination Office

- **Domenic Rocco**
- **Tiffany Landis**
- **Andrew Foley**
- **Rebecca Albert**

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Agency Representatives, cont.:

Pennsylvania Public Utility Commission (PUC):

- **Paul Metro,** Pipeline Safety Division
- **Robert Horensky**, Pipeline Safety Division

Federal Energy Regulatory Commission (FERC):

- **Anthony Rana** – Technical Lead
- **David Hanobic** (Alternate)
- **Andrea Jenson** (Alternate)

Pipeline and Hazardous Materials Safety Administration (PHMSA):

- **Zaid Obeidi**-Office of Pipeline Safety Engineering Division

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Industry Representatives:

Oil and Gas:

- **Webb Winston,** Williams Companies, Inc.
- **Will Ratcliffe** (Alternate), Williams Companies, Inc.
- **Steve Ladavat,** AECOM
- **Robert Marszalkowski,** (Alternate) AECOM
- **Larry Gremminger,** Energy Transfer Partners
- **Scott Wendling,** Geotech/Geology Expert, ARM Group, Inc.

HDD Operator/Driller

- **Alan Snider,** Otis Eastern Service, LLC

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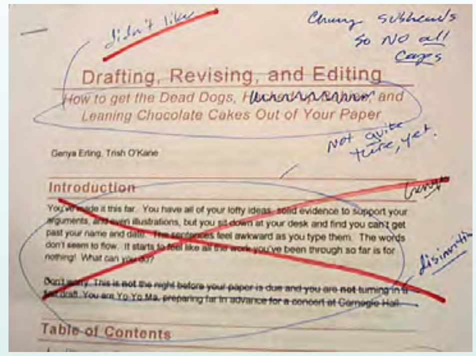
Horizontal Directional Drilling Stakeholder Workgroup

- Eight subgroups that focused on specific sections of the technical guidance.

- Status:
  - Preliminary Draft Review period is complete.
  - Currently in the Stakeholder draft review period which ends September 24, 2019.

- The following slide provides a generalized timeline this document will go through before a decision is made by the Department to publish this document.



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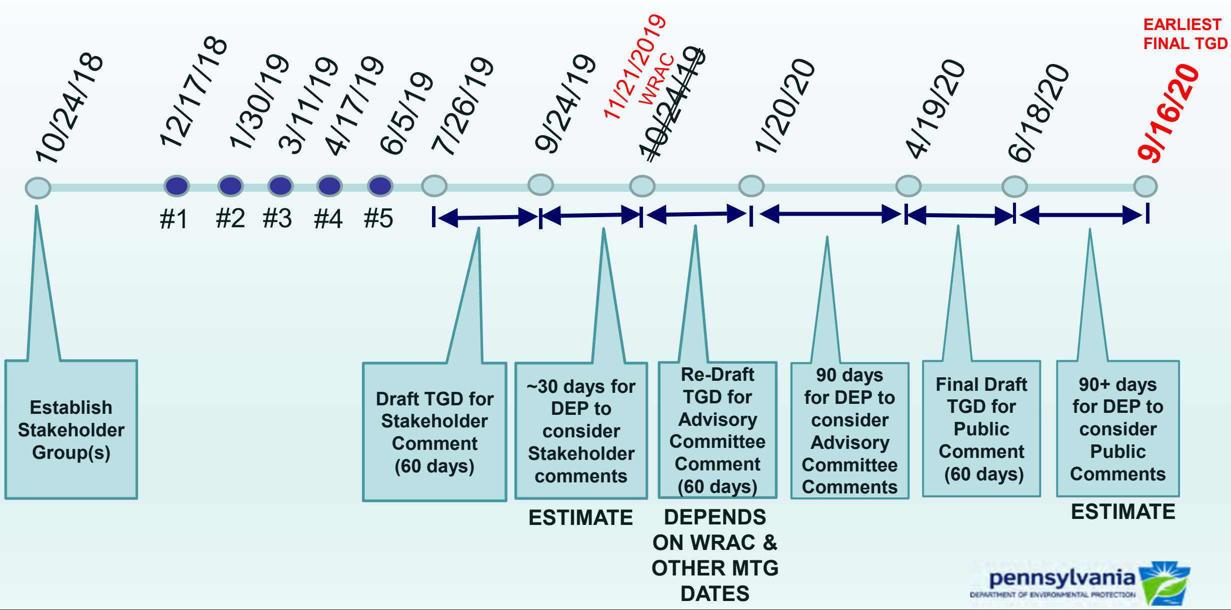
HDD - Timetables and Milestones



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Horizontal Directional Drilling Stakeholder Workgroup

Section 1. Preamble

A. Foreword/Executive Summary –
- policies, procedures, and best practices to aid in the prevention of adverse environmental impacts from construction utilizing trenchless technology.
- It is a road map for project proponents
- It outlines the steps and options to be considered when a project proponent, for any project (e.g., fiber optic, pipeline, etc.) proposes the use of a trenchless technology construction method
- It includes a suitability and feasibility analysis, as well as Environmental Considerations, a design and permitting section, and a construction and compliance section.

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Section 1. Preamble, cont. -

B. Disclaimer

C. Authority

D. Purpose

E. Scope

F. Definitions

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Section 2. Suitability, Feasibility, and Environmental Considerations

A. Proposed Alternative

B. Site Suitability Analysis – looks at the physical, technical, and geological constraints of the project.

1. Existing Surface Conditions – (e.g., Topography, Water resources, cultural, etc).
2. Subsurface Conditions – (e.g., geological conditions, soil interfaces and geological contacts, groundwater, existing utilities, such as cross bores, wells).
3. Field Exploration – "ground truthing". Geotech and Geophysical investigations and hydrogeologic investigations.

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Section 2. Suitability, Feasibility, and Environmental Considerations, cont.

C. Feasibility Analysis

D. Environmental Considerations

E. Conclusion

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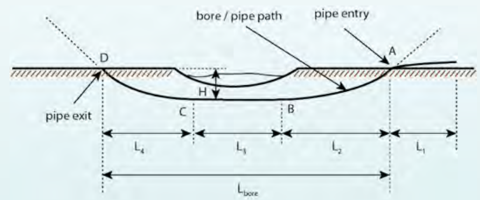
Horizontal Directional Drilling Stakeholder Workgroup

Section 3. Design and Permitting

A. Preferred Alternative

B. Design

1. Site Constraints and Topographic Considerations
2. Inadvertent Returns (IRs)
3. Hole Flush
4. Hole Stability
5. Failure Mode Contingency Planning
6. Water Supplies
7. Waters of the Commonwealth



C. Confirmation

D. Permitting

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Section 4. Construction and Compliance

A. Preparedness, Prevention, and Contingency (PPC) Plan

B. Personnel, Responsibilities, and Trainings

C. Preconstruction Activities

D. Drilling Fluid Management

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Section 4. Construction and Compliance, cont.

E. Inadvertent Return Minimization and Methodologies

1. Instrumentation
2. Fluid Circulation
3. Loss of Circulation

F. Inspection, Compliance, Monitoring, and Emergency Response

1. Inspection Protocols
2. Monitoring Protocols
3. Compliance
4. Emergency Response Planning

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Tables

Table 2.1	Recommended Data to Gather on Well Construction Details
Table 2.2	Drilling Procedures and Selected Data
Table 2.3	Recommended Geophysical Methods
Table 3.1	Pre-Construction Water Supply identification and Sampling
Table 3.2	Laboratory Analysis

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Table 3.1 Pre-Construction Water Supply Identification and Sampling	
1. Identify the location of the following*:	
a)	Private water supply within 450-ft, and in Karst, a Minimum of 1000-ft, of Trenchless centerline alignment.
b)	All public supply wells within 0.5-miles
c)	All surface water intakes within 1-mile downstream
d)	Any water supply deemed a potential consideration due to geologic structures
2. Scope of sampling - water quality and quantity	
3. Sampling Methodology	
a)	Purge water supply as close to the source as possible.
b)	Sample when field chemistry parameters stabilize (e.g., 3

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Appendices

A. Trenchless Technology Risk Evaluation
B. Data Resource List
C. Bore & HDD Flowchart
D. Instructions for Determining Public Water Supply Source Locations using eMapPA
E. Example Template for a PPC Plan – Simple and Complex Projects
F. Example Notification Letter and Well Construction Questionnaire
G. Example letter conveying water quality results and notification of EPA maximum contaminant Level (MCL) exceedances
H. Technical Guidance Document – Plan Submittal Checklist(s)

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Ap … tion

Trenchless Technology Risk Evaluation Checklist

Do any of your projects, crossings, or activities employ any Trenchless Technology (TT) methodology utilizing the following (Please check all that apply)?

Check here: ☐ Bore ☐ HDD ☐ Other TT: _____

☐Y ☐N ☐N/A	Is your Bore length ≥ 300'
☐Y ☐N ☐N/A	Is your Bore pit depth ≥ 20'
☐Y ☐N ☐N/A	Is your HDD Drilling Distance ≥ 2000'
☐Y ☐N	Are drilling fluids being used?
☐Y ☐N	Are you crossing an Aquatic Resource?
☐Y ☐N	Is your entry, exit, or ROW within 50 feet of an Aquatic Resource?
☐Y ☐N	Are you within 450 feet (1,000 feet in Karst) of a Water Supply?
☐Y ☐N	Are you within proximity to other utilities or other infrastructure?
☐Y ☐N	Are you crossing under an HQ or EV Resource?
☐Y ☐N	Are you working in areas of Karst, mines or other high-risk geology (e.g., several layers of geologic strata or a change in geology)? If yes, please briefly explain: _____

lvania

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Appendix E – Example Template for PPC Plan

- The example in the TGD is for complex (pipeline) projects
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Appendix H – TGD Plan Submittal Checklist

CONFIRMATION·OF·COMPLETION·OF·RISK·EVALUATION¶

¶

☐By· checking· this· box,· you· acknowledge· that· you· have· completed· the· risk· evaluation·in·**Appendix·A**·of·this·TGD,·and·that·your·project,·crossing,·or·activity· does· not· reach· the· high-risk· level,· per· **Appendix· A**· of· this· TGD.· You· are· only· expected·to·do·your·due·diligence·and·adhere·to·all·conditions·of·your·permit.·Use· the·TT·TGD·as·a·resource,·but·you·do·not·need·to·proceed·with·the·checklist·below.¶

¶

☐By·checking·this·box,·you·are·confirming·that·your·project·meets·the·high-risk· level,·per·**Appendix·A**·of·this·TGD·and·will·proceed·with·the·checklist·below.¶

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Appendix H – TGD Plan Submittal Checklist

B.·Suitability·Analysis¶

☐·I·acknowledge·that·I·have·read·and·understand·the·narrative·in·Section·2.·B.·Suitability· Analysis.¶

1.·Existing·Surface·Conditions¶

☐Topography¶

☐Waters·of·the·Commonwealth·¶

☐Manmade·features·¶

☐Cultural/Historical/Archaeological·features¶

☐Land·use·-·Historic·and·current.··¶

☐Geopolitical·boundaries·¶

☐Floodplains¶

¶

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HDD Guest Speakers

Appellant Representatives: **Rich Raiders**, Technical Expert

Industry Representatives: **Webb Winston,** Williams Companies, Inc.

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STAKEHOLDER GROUP #2

METHODS AND FACTORS TO CONSIDER TO COMPLETE ALTERNATIVES ANALYSIS

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Alternatives Analysis Stakeholder Workgroup

Stakeholder Workgroup #2 – ***Alternatives Analysis***

Stipulation of Settlement:

4. DEPARTMENT POLICY DEVELOPMENT

B. Policies, Procedures and Guidance

i. E&S Permits and Alternatives Analysis

i. E&S Permits and Alternatives Analysis

a. Categories of pipeline projects for which

(1) the Department will request that Applicants for Projects obtain Individual Erosion and Sediment Control Permits for a Project, and

(2) where public notice of the applications, and the opportunity for public comment will be provided by the Department as part of the permit application process.

b. The recommended methodology and factors to consider to complete an Alternatives Analysis under 25 Pa. Code § 105.13(e)(1)(viii).

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Alternatives Analysis Stakeholder Workgroup

Appellant Representatives:

- **Ankita Mandelia**, *Senior Scientist*, Chesapeake Bay Foundation
- **Faith Zerbe**, *Biologist*, Delaware Riverkeeper Network
- **Karl Koerner**, *Energy and Environmental Engineer*, Clean Air Council
- **Michele Adams, PE, LEED AP**, *Principal/Founder,* Meliora Design
- **Stephen Kunz**, *Senior Ecologist*, Schmid & Company, Inc.

CLEAN AIR COUNCIL

DELAWARE RIVERKEEPER NETWORK

Mountain Watershed Association YOUGHIOGHENY RIVERKEEPER

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Alternatives Analysis Stakeholder Workgroup

Industry Representatives:

Oil and Gas:

- **Peter Staudenmeier**, Civil & Environmental Consultants, Inc.
- **Jason Harkcom**, Markosky Inc. (alternate)

PennDOT:

- **Bryon Ruhl**
- **Mark Lombard** (alternate)

Transportation:

- **Donna Newell,** Newell, Tereska, & Mackay
- **Rachel Tereska** Newell, Tereska, & Mackay (alternate)

PA Homebuilders:

- **Keith Marshall**; **Greg Newell**, (alternate), NaveNewel

Consultant:

- **Scott Bush**, GHD Services

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Alternatives Analysis Stakeholder Workgroup

Agency Representatives:

DEP:

Bureau of Waterways Engineering
(Ch. 105 Program)

- **Ken Murin**
- **Sid Freyermuth**

Bureau of Clean Water
(Ch. 102 Program)

- **Nate Crawford**
- **Sean Furjanic** (alternate)

Bureau of Oil and Gas

- **Andy Klinger**
- **Joe Kelly** (alternate)

Regional Permit Coordination Office

- **Domenic Rocco**
- **Tiffany Landis**
- **Rebecca Dunlap**
- **Andrew Foley**

DEP Regional Office

- **Don Knorr**

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Alternatives Analysis Stakeholder Workgroup

Agency Representatives:

Pennsylvania Fish & Boat Commission - **Tom Shervinskie**

US Army Corp of Engineers - **Wade Chandler**

Department of Conservation and Natural Resources - **Nate Reagle**

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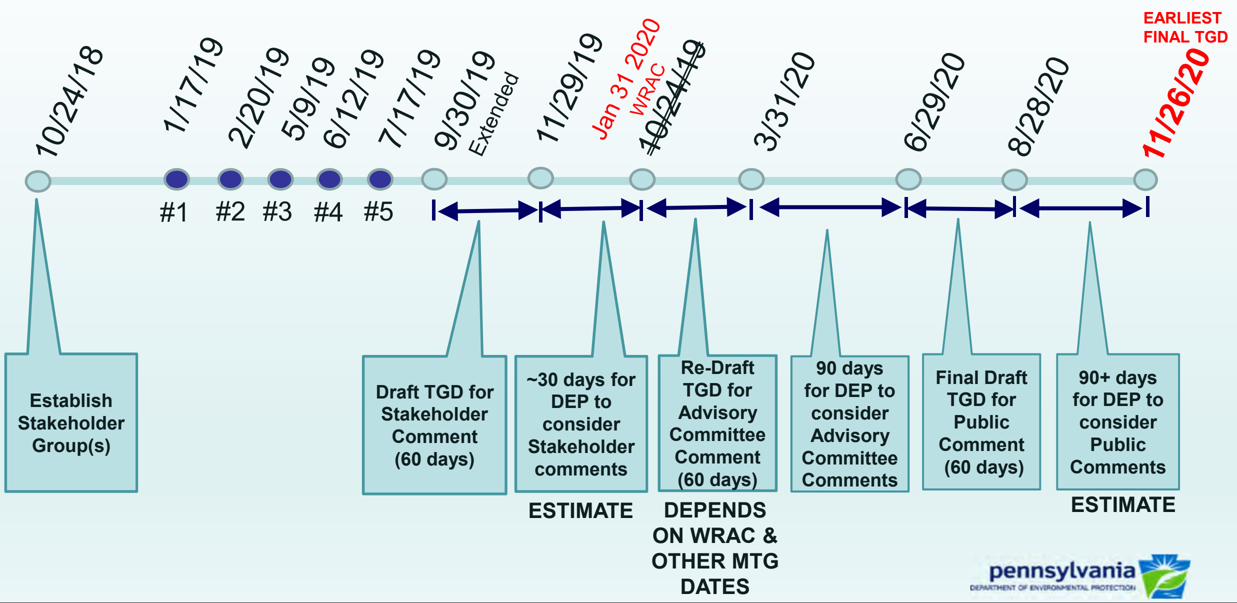
HDD - Timetables and Milestones



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Alternatives Analysis Stakeholder Workgroup

- **Learning to L.E.A.D Team** Project
  - November 2, 2005
  - *Implementation Guidance for Evaluating Practicable Alternatives to Proposed Non-Water Dependent Activities Impacting Wetlands*
- **Framework for the Alternatives Analysis Technical Guidance Document**

Water Obstruction & Encroachment Permit Application

Process Improvements

Learning to L.E.A.D Team Project

November 2, 2005

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Alternatives Analysis Stakeholder Workgroup

Preliminary Draft Version Rev. 8/20/2019 17:01:24

Table of Contents

Alternatives Analysis *Preliminary* Draft

- 32 pages
- 6 Appendices
- 7+ Subgroups

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Alternatives Analysis Stakeholder Workgroup

- **III. FOREWORD/EXECUTIVE SUMMARY**

Clean Streams Law (CSL) – 1937

Dam Safety and Encroachments Act (DSEA) - 1979

→ **Environmental Quality Board (EQB)** → **PA Code, Title 25 Chapter 105**

CSL & DSEA - grant EQB the power and duty to adopt regulations and standards that are necessary and proper to carry out their purposes →

Rules and Regulations that are adopted by the EQB are contained in PA Code, Title 25. Environmental Protection, Department of Environmental Protection, Chapter 105, Dam Safety and Waterway Management, which defines how DEP is to regulate water obstructions and encroachments

§105.13(e)(viii) - Alternatives Analysis

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“Alternatives Analysis regulatory language

- **§105.13(e)(viii) Alternative Analysis.** A detailed analysis of alternatives to the proposed action, including alternative locations, routings or designs to avoid or minimize adverse environmental impacts.

Regulations, by nature, contain general language because they are intended to apply to a variety of circumstances and situations. Similarly, the language in Chapter 105 relating to alternatives analysis was intentionally general because the analysis is very often project specific. This guidance

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Alternatives Analysis Stakeholder Workgroup

- **Alternatives Analysis regulatory language**

Review of Applications
  - **§105.14(b)(7) –** The extent to which a project is water dependent and thereby requires access or proximity to or siting within water to fulfill the basic purposes of the project. The dependency must be based on the demonstrated unavailability of any alternative location, route or design and the use of location, route or design to avoid or minimize the adverse impact of the dam, water obstruction or encroachment upon the environment and protect the public natural resources of this Commonwealth"

EV Wetlands
  - **§105.18a(a)(3)** – There is no practicable alternative to the proposed project that would not involve a wetland or that would have less effect on the wetland, and not have other significant adverse effects on the environment. An alternative is practicable if it available and capable of being carried out after taking to consideration construction cost, existing technology and logistics. An area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed to fulfill the basic purpose of the project shall be considered as a practicable alternative.

Other Wetlands
  - **§105.18a(b)(3)** – There is no practicable alternative to the proposed project that would not involve a wetland or that would have less adverse impact on the wetland, and that would not have other significant adverse effects on the environment. An alternative is practicable if it available and capable of being carried out after taking to consideration construction cost, existing technology and logistics. An area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed to fulfill the basic purpose of the project shall be considered as a practicable alternative.

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Alternatives Analysis Stakeholder Workgroup

IV. A. Alternatives Analysis Background

- The alternatives analysis is the project applicant's written documentation of efforts to avoid or minimize environmental impacts and to demonstrate to the Department that impacts from the proposed water obstruction(s) and encroachment(s) have been avoided and minimized to the greatest extent practicable
- Prepared by individuals with appropriate experience, training, local knowledge and familiarity with regulations
- An alternative is considered practicable if it is capable of being implemented after taking into consideration **cost**, **existing technology** and **logistics**
- Comparison to NEPA process

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Alternatives Analysis Stakeholder Workgroup

IV. B. Off-Site or Location Alternatives

- Sites both owned and not owned by the applicant need to be considered
- Includes those not presently owned by the applicant, which could reasonably be obtained, utilized, expanded, or managed to fulfill the basic purpose of the proposed project

Additional Factors
1. Utility Issues
a. Utility or infrastructure availability (e.g. public water, sewer)
b. Joint utility easements
c. Lack of ROW for collocation of utility lines
2. Rerouting, re-siting or relocating the project
a. Availability of other sites
b. Willingness of current owners to sell
c. Property rights/eminent domain
3. Site size (to meet project purpose) vs. parcel size
4. Physical site constraints (e.g. size, slope, floodplains, highly erodible soils, geologic/geotechnical concerns)
5. Constructability of project (as designed)
6. Operation and maintenance concerns
7. Demographics
8. Presence of wetland and stream resources
a. Resource size
b. Level of impact on resource.
c. Resource value
i. Special Protection
ii. Stream impairment
iii. T&E species
9. Public health and safety
10. Other environmental concerns (e.g. riparian forest, interior forest, prime agricultural lands, upland T/E species/habitat)
11. Local land use regulations (e.g. zoning, subdivision land development ordinances)
12. Historic resources
13. Parks and recreation
14. Cost concerns
15. Conformance with local watershed plans

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Alternatives Analysis Stakeholder Workgroup

Situations whereupon it may make sense to waive the information requirements for off-site alternatives

1. Projects that impact < 0.5 acres or less of ”other” wetlands AND
   – Expansion of an existing facility directly related to existing operations of that facility
   – Construction/expansion of a barn or other agricultural building located on an existing farm
   – Construction of single-family home where some upland exists, or expansion of a single-family home and its attendant features such as a driveway, garage or storage shed
   – Project that will provide significant economic, social or environmental benefits

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Alternatives Analysis Stakeholder Workgroup

Situations whereupon it may make sense to waive the information requirements for off-site alternatives

2. Temporary impacts of ancillary features of a project

3. Structures or activities that are a component of a larger project where impacts to aquatic resources are expected to recover either within 1 year of completion of the activity or within the following growing season

4. Projects that include cumulative wetland impacts less than 0.05 acres

5. Projects that are replacement of or maintenance to existing structures.

6. Projects that include the installation, enlargement, or expansion of a structure entirely within the footprint of an area previously-disturbed and presently-disturbed via a permitted activity

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IV. C. On-Site or Design Alternatives

1. The spatial requirements of the proposed project;

2. The project's purpose and need, and how the purpose relates to placement or configuration;

3. Efforts to reduce the scope of the proposed project;

4. The location of any existing infrastructure or natural features that may dictate the placement or configuration of the proposed project;

5. Site constraints including local zoning requirements and site access;

6. Standard engineering and safety practices.

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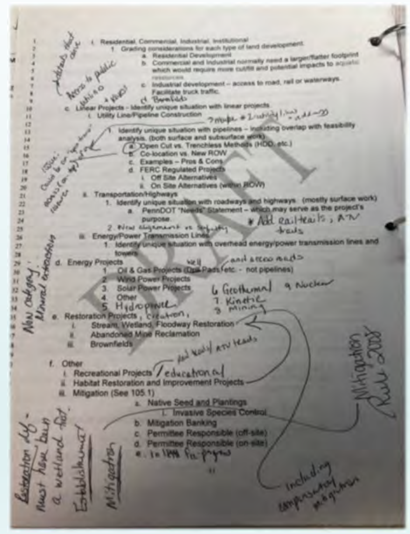
IV. D. Components of an Alternatives Analysis

1. Aquatic Resource Impact
2. Cost
3. Existing Technology
4. Environmental Policies and Best Management Practices


i. Residential, Commercial, Industrial, Institutional
1. Grading considerations for each type of land development
a. Residential Development
b. Commercial and Industrial normally need a larger/flatter footprint which would require more cut/fill and potential impacts to aquatic resources
c. Industrial development – access to road, rail or waterways. Facilitate truck traffic.
c. Linear Projects - Identify unique situation with linear projects
i. Utility Line/Pipeline Construction
1. Identify unique situation with pipelines – including overlap with feasibility analysis. (both surface and subsurface work)
a. Open Cut vs. Trenchless Methods (HDD, etc.)
b. Co-location vs. New ROW
c. Examples – Pros & Cons
d. FERC Regulated Projects
i. Off Site Alternatives
ii. On Site Alternatives (within ROW)
ii. Transportation/Highways
1. Identify unique situation with roadways and highways. (mostly surface work)
a. PennDOT "Needs" Statement – which may serve as the project's purpose
iii. Energy/Power Transmission Lines
1. Identify unique situation with overhead energy/power transmission lines and towers
d. Energy Projects
1. Oil & Gas Projects (Gas Pads, etc. - not pipelines)
2. Wind Power Projects
3. Solar Power Projects
4. Other
e. Restoration Projects
i. Stream, Wetland, Floodway Restoration
ii. Abandoned Mine Reclamation
iii. Brownfields
f. Other
i. Recreational Projects
ii. Habitat Restoration and Improvement Projects
iii. Mitigation (See 105.1)
a. Native Seed and Plantings
i. Invasive Species Control
b. Mitigation Banking
c. Permittee Responsible (off-site)
d. Permittee Responsible (on-site)

Alternatives Analysis Stakeholder Workgroup

V. Environmental and Project Specific Considerations

A. Land Development Projects

1. Residential Development
2. Commercial Development
3. Industrial Development
4. Institutional / Educational Development

Alternatives Analysis Stakeholder Workgroup

V. Environmental and Project Specific Considerations

B. Linear Projects

1. Pipelines, Utility Lines, and Energy and Power Transmission Lines
   a) Open Cut vs. Trenchless Method Technologies
   a) Special Protection Waters
   a) Right of Way Reduction and Best Management Practices
   a) Collocation Best Management Practices
   a) Multiple Resource Crossings Best Management Practices

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Alternatives Analysis Stakeholder Workgroup

V. Environmental and Project Specific Considerations

B. Linear Projects

2. FERC Regulated Projects
3. Other Linear Project Considerations

Table 2. Other Linear Project Considerations

Project Type	Ancillary Feature	Additional Considerations
Pipelines	Surface sites (excluding well pads)	Valve sites
		Meter stations
		Pig launcher and receiver locations
		Compressor stations
		Telecommunication towers
		Tap and city gate stations
	Access roads	Permanent access roads
		Temporary access roads
	Underground storage facilities and fields	Valve sites and meter stations
Utility projects	Buried cable (e.g. fiber optic, traditional telecommunication)	Junction boxes
	Sewer, water, and stormwater lines	Manholes
		Pump stations
		Meter stations
Energy and power transmission lines	Aboveground transmission lines	Towers and poles
	Belowground transmission lines	Junction Boxes

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V. Environmental and Project Specific Considerations

B. Transportation Projects

1. New Alignments and Facilities
2. Existing Alignments and Facilities
3. Bridge or Culvert Restoration or Replacement

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V. Environmental and Project Specific Considerations

D. Restoration and Pollution Abatement Projects

1. Aquatic Resource Restoration
2. Abandoned Mine Reclamation
3. Acid Mine Drainage or Other Drainage Treatment
4. Brownfields
5. Recreational Projects

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Alternatives Analysis Stakeholder Workgroup

VII. Appendices - Alternatives Analysis Process & Template of Items to Submit

2. Template of Items to Submit to the Department

- ☐ **Water Dependency / Purpose and Need Narrative** – This narrative should be contained within the project description. See Environmental Assessment Instructions.
- ☐ **Location or Off-Site Alternatives Narrative and Tables** – This narrative should include a discussion of environmental impacts and site constraints associated with each location alternative. The discussion should clearly explain why the proposed site was chosen and should include the reasons why it is impracticable to avoid impacts to the aquatic resource(s).
  - ☐ **Selected Location Description** – A detailed explanation of why he proposed site was chosen. This description should include the following:
    - ☐ **Aquatic Resource Impact(s) Description** - Impacts to aquatic resources should be detailed and quantified for the selected alternative. This effort should be completed for each sensitive resource as identified in §105.14b(5) as well as for every aquatic resource (in acres or linear feet, as appropriate) impacted by project. An analysis of resource type and impact type (e.g., temporary, permanent, direct, indirect) to each sensitive resource identified and aquatic resource is recommended. A Pre-application meeting with the Department is recommended and for unique sites or aquatic resources, a Preliminary Jurisdictional Determination is recommended.
    - ☐ **Other Environmental Considerations** – Environmental policies and other best management practices that influenced the selection of the chosen location.
    - ☐ **Future Impacts** - Potential future impacts, if applicable, of the chosen alternative location.
  - ☐ **Alternate Location(s) Description(s)** – Alternative locations should be described as necessary. If an alternative location has less environmental impacts than the chosen location, a detailed explanation that takes into consideration construction cost, existing technology, and logistics of why the alternative is not capable of being carried out should be provided.
- ☐ **Design or On-Site Alternatives Narrative and Tables** – This narrative should include a discussion of on-site avoidance and minimization efforts. This discussion should detail environmental impacts and site constraints associated with each design or on-site alternative. The discussion should clearly explain why the proposed alternative was chosen.
  - ☐ **Selected On-Site Alternative** - An explanation of why the proposed alternative was chosen.
    - ☐ **Aquatic Resource Impact(s) Description**- Impacts to aquatic resources should be detailed and quantified for the selected design or on-site alternative. This effort should be completed for each sensitive resource as identified in §105.14b(5) as well as for every aquatic resource (in acres or linear feet, as appropriate) impacted by project. An analysis of resource type and impact type (e.g., temporary, permanent, direct, indirect) to each sensitive resource identified and aquatic resource is recommended. A Pre-application meeting with the Department is recommended and for unique sites or aquatic resources, a Preliminary Jurisdictional Determination is recommended.
    - ☐ **Other Environmental Considerations** – Environmental policies and other best management practices that influenced the selection of the chosen location.
    - ☐ **Future Impacts** - Potential future impacts, if applicable, for each alternative
  - ☐ **Design or On-Site Alternatives Description** - Alternative locations should be described as necessary. If an alternative has less environmental impacts than the proposed alternative, a detailed explanation that takes into consideration construction cost, existing technology, and logistics of why the alternative is not capable of being carried out should be provided.
- ☐ **Alternative Location and Design Exhibits** – maps, drawings, standard details
  - ☐ **Location Maps** - Resource crossings, sensitive resources, and other pertinent information related to selection of the alternative should be included. If these files are subject to the "Protected Critical Infrastructure Information (PCII) Program" and not available to the public, appropriate documentation must be submitted to the Department in order to be labeled confidential.
    - ☐ **Selected location** - Aquatic resources within the selected location should be field verified or delineated by someone with expertise in delineating streams and wetlands. Wetlands should be delineated according the Army Corp of Engineers Wetlands Delineation Manual.
    - ☐ **Alternate locations** - Applicants may utilize remote sensing, digital geo-spatial data, geographic information systems (GIS), light detection and ranging (LiDAR), eMAP, and other similar available sources for evaluating alternatives. Field verification and delineations are recommended for off-site alternatives to the greatest extent practicable.
  - ☐ **Design Exhibits** - Drawings and/or maps for each alternative. These exhibits should include specific details of layout, design, and crossing methodologies.
- ☐ **Geospatial Data** (if available) - Geospatial data may include shapefiles or kmz. files of alternate and selected locations and resources. Flagging and geospatial marking (e.g., GPS marking) should be used to clearly mark and determine the locations of all aquatic resources.
- ☐ **Data Resources** – list of data resources analyzed
- ☐ **Summary Table** –See Appendix XX

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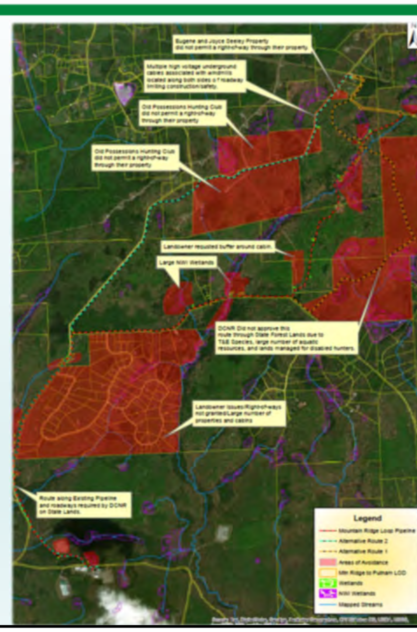
VII. Appendices

Table 3. Example Location Alternatives Summary Table

Alternatives ǂ	Description	Practicability Rationale*
Alternative # 1		
Alternative # 2		
Alternative # 3		

ǂ Additional alternatives summary rows should be added as necessary

* e.g. construction cost, existing technology, logistics and items listed in §105.14(b)



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Alternatives Analysis Stakeholder Workgroup

VII. Appendices

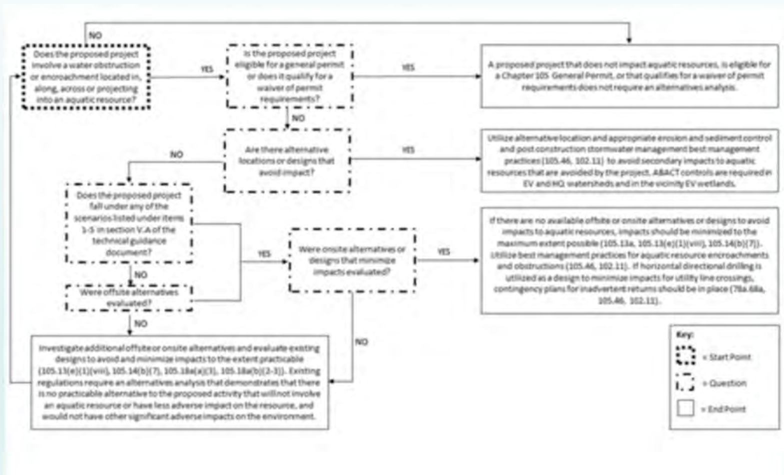
Table 4. Example Design Alternatives Summary Table

Resource Information					*Alternatives ǂ*								
Resource					Alternative #1			Alternative #2			Alternative #3		
Unique Resouce Identifier	*Aquatic Resource Type*	*Waters Name*	*PA Code Chapter 93 / 105 Designation †*	*Resource Narrative Description*	*Cumulative Resource Impact*	*Chosen Alternative?*	*Practicability Rationale**	*Cumulative Resource Impact*	*Chosen Alternative?*	*Practicability Rationale**	*Cumulative Resource Impact*	*Chosen Alternative?*	*Practicability Rationale**
ST023	*Perennial Stream*	*Adams Run*	*EV*	*pg. 13 EA*	*Bottom-less arch*			*20" Culvert*			*Bridge*		
					100 SF	*No*	*pg. 3 Alt Analysis*	*110 SF*	*Yes*	*pg. 3 Alt Analysis*	*60 SF*	*No*	*Cost; pg 13 Alt Analysis*
W-001	PFO Wetland	-	Other	pg. 27 EA	*Open-Cut Trench*			*Conventional Bore Trenchless Technology*			*HDD Trenchless Technology*		
					250 SF	*Yes*	*pg. 3 Alt Analysis*	*25 SF*	*No*	*Unsuitable geology; Pg 3 Alt*	*25 SF*	*No*	*Cost; pg 5 Alt Analysis*

ǂ Additional alternatives summary columns should be added as necessary
† Stream designation per Chapter 93, Wetland designation per Chapter 105
* e.g. construction cost, existing technology, logistics and items listed in §105.14(b)

Alternatives Analysis Stakeholder Workgroup

VII. Appendices – Flowchart for Evaluating Project Alternatives



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Horizontal Directional Drilling Stakeholder Workgroup

HDD Guest Speakers

Appellant Representatives:

Karl Koerner, *Energy and Environmental Engineer*, Clean Air Council

Industry Representatives:

Peter Staudenmeier, Civil & Environmental Consultants , Inc.

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Stakeholder Workgroup Questions and Discussion

PA DEP

PFBC

Open Discussion

Following Break for Lunch from 1-3pm

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Docket: L-2019-3010267

PUC – Proposed Rulemaking Chapter 59 Comments By

Michael Perlow Jr, PE (http://perlowmp.com/)
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Mobile: 267-664-3250 - Email: mike@perlowmp.com

APPENDIX D

MICHAEL PERLOW JR, PE

2019 CV-BIOGRAPHY-EXPERIENCE

MICHAEL PERLOW JR., P.E. – 2019 BIOGRAPHY

Michael Perlow Jr., P.E. is a retired civil & geotechnical engineer with more than 45 years of experience in engineering geology, geotechnical engineering and failure investigations. He is a registered professional engineer and a graduate of Lehigh University with a BSCE and MSCE degree. He is also the author of some 35 technical publications and has presented at numerous conferences, seminars, and meetings.

Mike has extensive foundation failure assessment-repair experience associated with major sinkhole stabilization projects, utility main breaks and geo-environmental hazard triggered failures. He has directed geologic, geophysical, groundwater quality, and geotechnical investigations for such major projects as the $100 million AT&T Solid State Technology Center, Interstate 78 through the Schantz Spring Aquifer in Lehigh County PA, Knoll International Assembly-Shipping Facility in East Greenville PA, the Lehigh Valley Regional Postal Facility as well stabilization of the Vera Cruz Road, Macungie, Tatamy Road Bridge major sinkhole collapses and numerous utility main break-building sinkhole collapses.

As Northeast Regional Manager for GeoStructures of Purcellville VA, Mike provided specialized ground improvement services using the Geopier Rammed Aggregate Pier, newly developed Impact Pier-Grouted Impact Pier, and prototype Geo-Concrete Column Systems. He also provided dynamic compaction services using the track-hoe mounted intelligent Rapid Impact Compaction (RIC) system for projects in his PA, NJ, NY and DE territory.

Mike also has extensive previous North American and International marine geotechnical experience with coastal and offshore projects including regional sewer systems, power plants, numerous outfall-intake pipelines, geohazards surveys and offshore platform siting.

Mike has extensive marine geotechnical experience with coastal, offshore and university research projects. He participated in the 1976 USGS (AMCOR) Atlantic Margin Coring Project and the Lehigh University Marine Geotechnical Laboratory (MGL) Office of Naval Research program to develop three geotechnical test areas for the US Navy using the ALVIN-DEEP QUEST deep diving submersibles and a tethered test platform.

Mike lead the development of a Multi-In-Situ Testing System (MITS) operated from a Vibrocore rig which was used on the San Francisco Sewer Outfall Project (SWOOP) and the James H. Campbell Power Plant Lake Michigan 18-ft. diameter steel multiplate cooling water intake pipe and dual 10-ft. diameter concrete cylinder discharge pipelines. Mike also directed development of a Suitcase In Situ Cone System for geotechnical investigations in conjunction with Standard Penetration Testing using a hollow-stem rotary auger drilling and sampling rig.

Mike retired from full-time consulting in January 2016 and continues to work part-time in retirement providing expert witness services and failure investigation consulting. He also provides continuing education seminars and webinars on Foundation Damage Assessment & Repair and is completing a 3-year applied research effort on Drilled Foundation Limit State Pile Capacity Verification along with a book on Geo-Environmental Hazard Risk Mitigation (GEHARM).

Most recently, Mike was a PADEP Trenchless Technology Stakeholder Expert for the development of a Horizontal Directional Drilling (HDD) Technical Guidance Document for Pennsylvania oil, gas, and hazardous materials pipelines.

Starting in October 2019, Mike will provide a series of 1hr introductory free seminars and webinars through his company EKMLLC - Engineering Knowledge Management LLC as well as half-day and full-day hazard assessment-risk mitigation training seminars and webinars to government, industry, engineers, architects, contractors, facility-construction managers, and developers. Below is a partial list of the EKMLLC Seminar-Webinar-Training Sessions that are being be provided:

- *REPORT CARD EVALUATIONS (new)*
- *GEOLOGIC HAZARDS-EXTREME WEATHER*
- *INFRASTRUCTURE CONDITION ASSESSMENT*
- *INFRASTRUCTURE FAILURE INVESTIGATIONS*
- *REGIONAL INFRASTRUCTURE PLANNING & INVESTMENT*
- *FOUNDATION DESIGN, DAMAGE ASSESSMENT AND REPAIR*
- *GEO-ENVIRONMENTAL HAZARD ASSESSMENT & RISK MITIGATION*

PROFESSIONAL HISTORY:

EKMLLC Training Seminars-Webinars: 2019 - Present
Educational Webinars & Seminars: 2016 - Present
Owner: 2010 - Present (Engineering Knowledge Management LLC)
Principal Engineer: 2010 - 2015 (Engineering Knowledge Management LLC)
Adjunct Lecturer-Visiting Research Engineer: 2009-2010 (CEE Lehigh University)
Danbro Distributors Engineering Consultant: 2008-2011 (MichaelPerlowJr.Com)
Northeast Regional Manager: 2003 to 2008 (GeoStructures Inc., Purcellville, VA)
Senior Geotechnical Engineer: 2001 to 2003 (Pennoni Associates, Bethlehem, PA)
Deputy Public Works Director: 1997 to 2001(City of Bethlehem, Whitemarsh Twp.)
Geotechnical Engineering Principal: 1980 to 1996 (VFC Inc. & MPJR Associates)
Marine Geotechnical Engineer: 1974 to 1980 (Dames & Moore & Woodward Clyde)
Research Assistant: 1972 to 1974 (Lehigh University Marine Geotechnical Laboratory)
Internship: 1972 (NAS Ocean Affairs Board & NAE Marine Board MUA Study-Workshop)

EDUCATION:

Lehigh University, Master of Science, Civil Engineering, 1974
Lehigh University, Bachelor of Science, Civil Engineering, 1972

REGISTRATION: Professional Engineer, Pennsylvania 1979 - Present, PE-028560-E

GOVERNMENT: Upper Montgomery Joint Sewer Authority Board 2009 and 2018-2019

ASSOCIATIONS: ASTM D18, Geo-Institute, Deep Foundations Institute, CGS, and AEG

Docket: L-2019-3010267

PUC – Proposed Rulemaking Chapter 59 Comments By

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Retired Principal Engineer/Owner
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443 Main Street, East Greenville PA 18041-13003,
Mobile: 267-664-3250 - Email: mike@perlowmp.com

APPENDIX E

EXAMPLE UTILITY FAILURE CASE STUDY

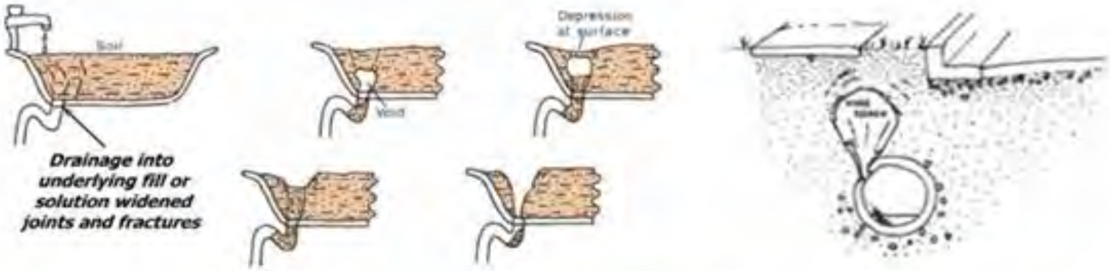
1990 NORTH FIFTH STREET

MAIN BREAK-GAS EXPLOSION

ALLENTOWN, PA

THE PROBLEM – AGING UTILITIES

- *Loss of Support*
  - *Excavation*
  - *Soil Settlement*
  - *Subsurface Erosion*
  - *Sinkholes, Voids*
- *External Loading*
  - *Structure Loading*
  - *Impact Loading*
  - *Blast Vibration*
  - *Frost Loading*
  - *Earthquakes*
- *Corrosion*
  - *Internal*
  - *External*
- *Scour & Erosion*
- *Internal Pressure*
  - *High Pressure*
  - *Cyclic Loading*



NORTH 5TH – ALLENTOWN PA

Gas explosion kills woman, levels Allentown row homes

Seven others were injured; one 'critical'

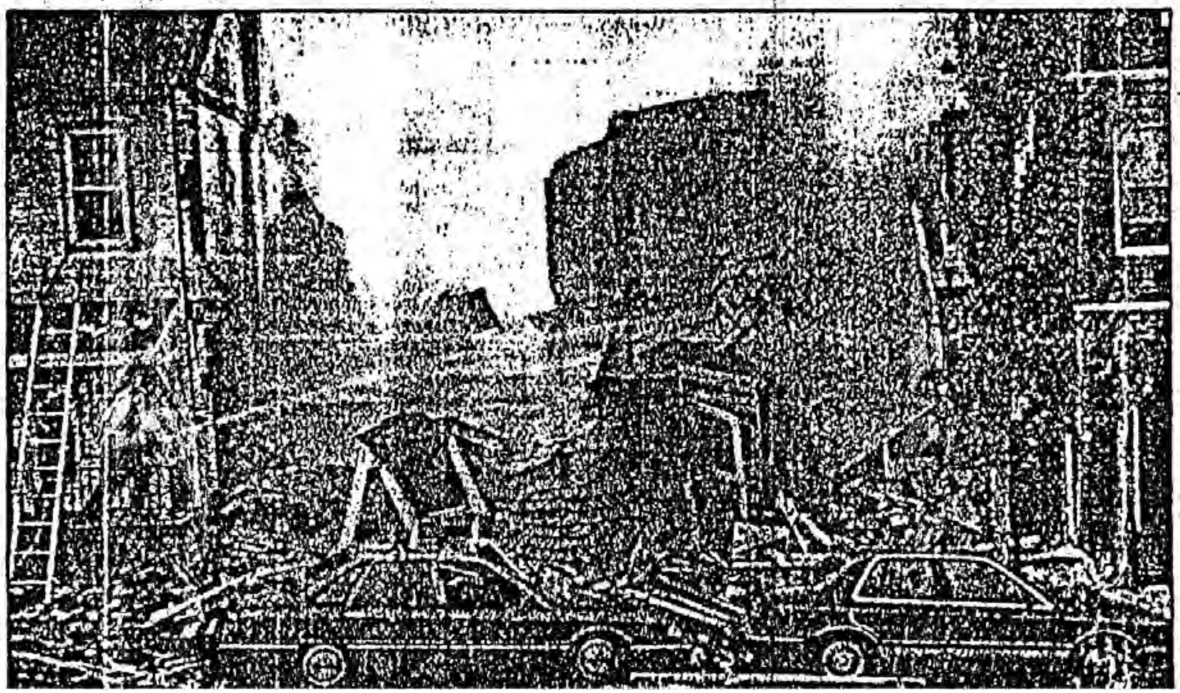
[illegible]RISTIN CASLER
[illegible] Morning Call

[illegible]ormer Lehigh County Prison corrections officer was killed yesterday in an early morning gas explosion and fire that leveled her Allentown house and destroyed the adjacent row home of a city police officer.

The body of Diane Lazer, 44, was discovered in the charred rubble at 6:35 p.m., 13[illegible] hours after the blast tore through her 423 N. 5th St. residence.

At least seven other people were injured, including two Allentown firefighters and Lazer's roommate, Helene Parker, who was thrown by the blast from the front of the home into a parked car on the opposite side of the street. The firefighters were treated for minor injuries, and Parker remained in critical condition at Lehigh Valley Hospital Center with burns over 25

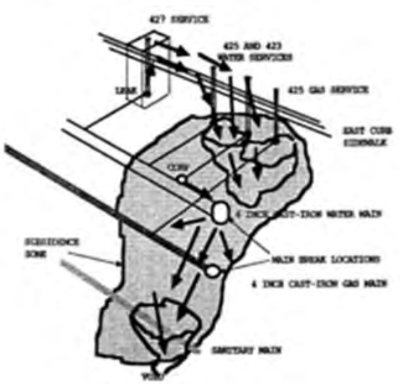
[illegible]

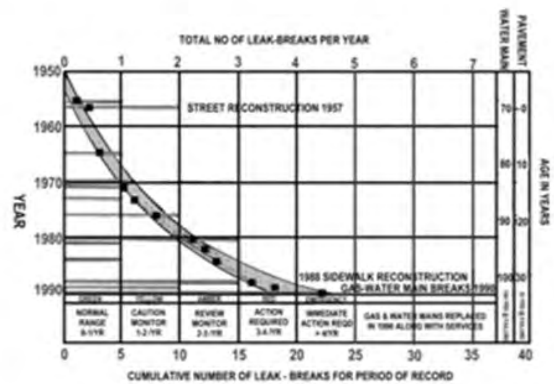


An Allentown firefighter hoses down the remains of two homes destroyed in an early morning explosion and fire that killed one person and injured at least seven. The homes are at 423 and 421 N. 5th St.

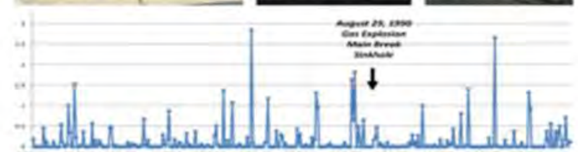
NORTH 5TH – ALLENTOWN PA

NTSB Pipe Material Testing - Corrosion

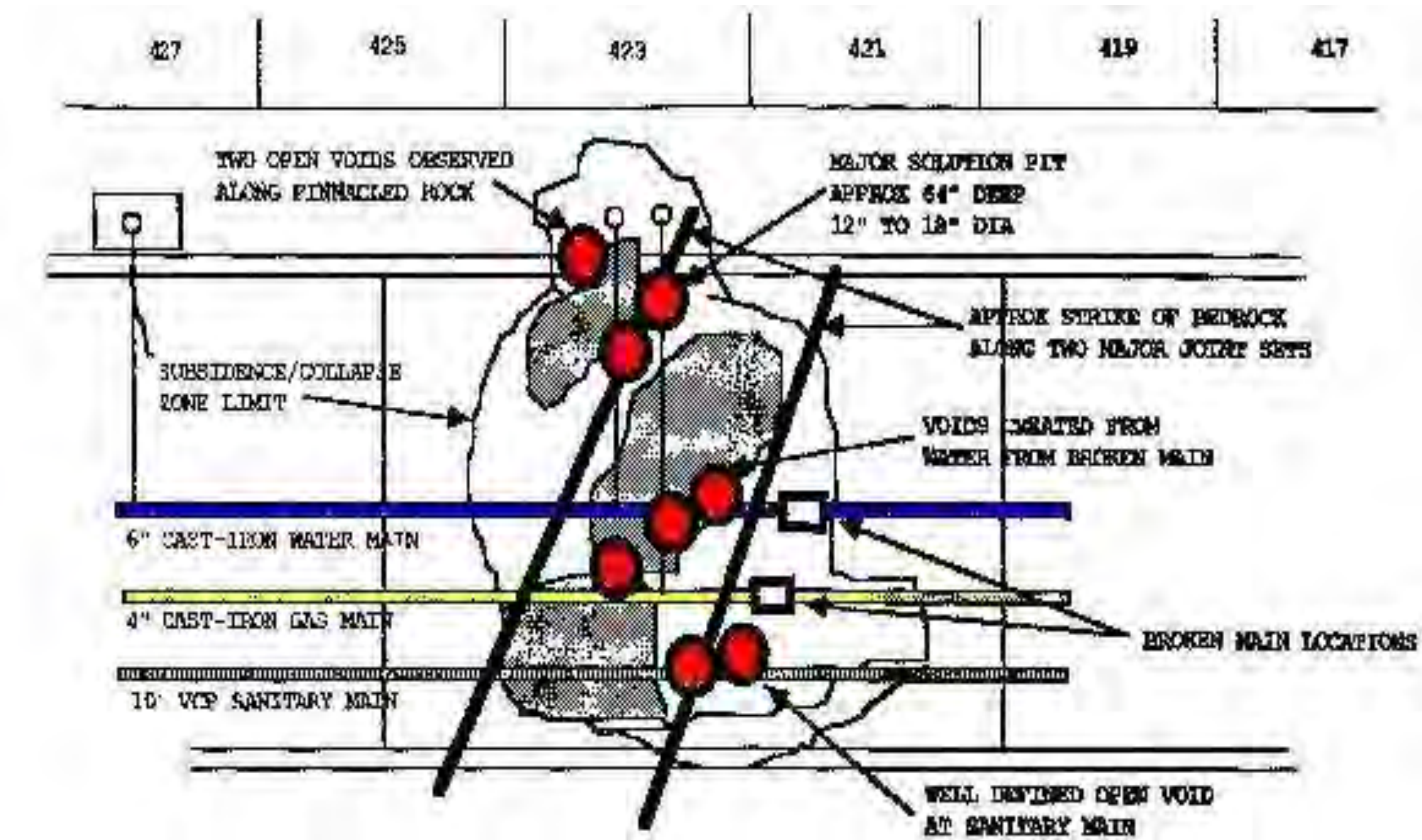




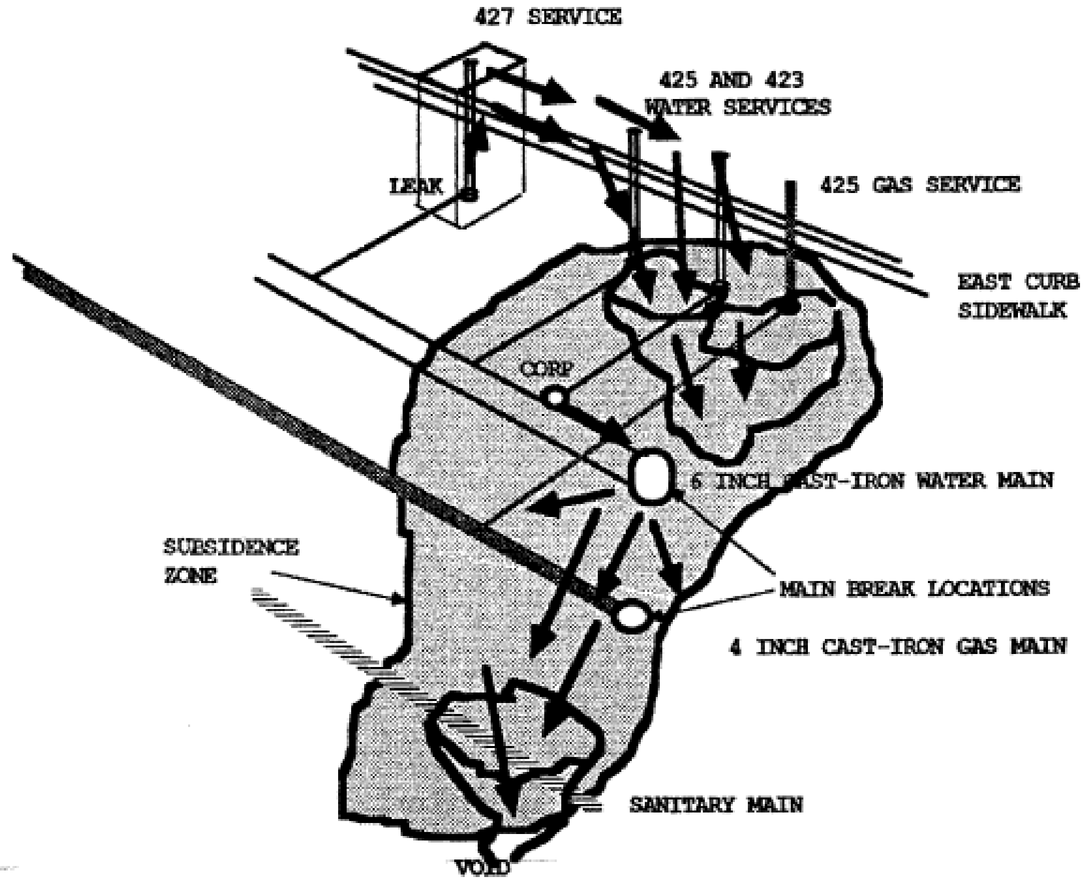
Pavement Cracks & Precipitation



NORTH 5TH – ALLENTOWN PA



POSTULATED N 5TH MAIN BREAK CAUSE

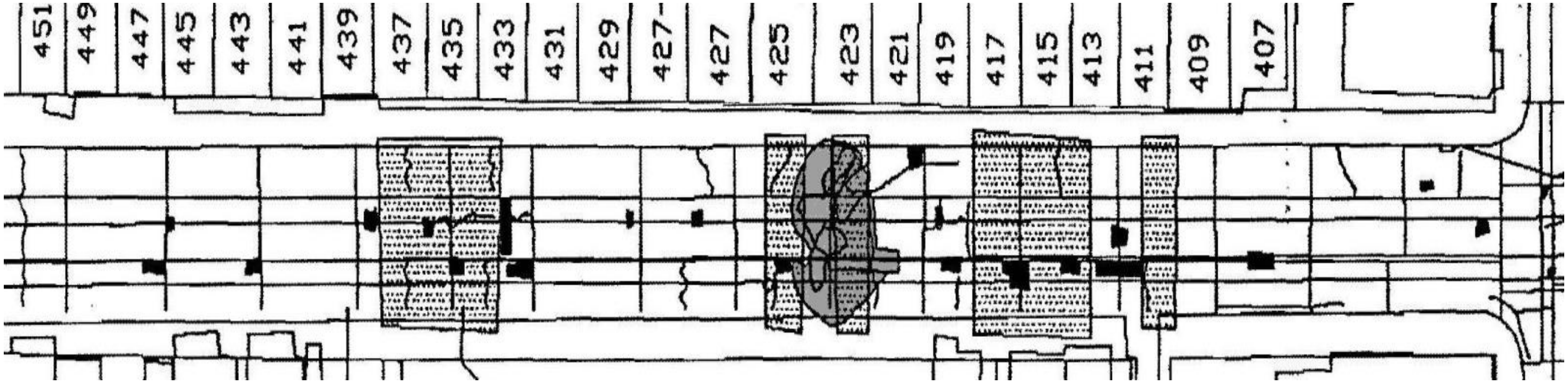


POSTULATED MAINBREAK CAUSE

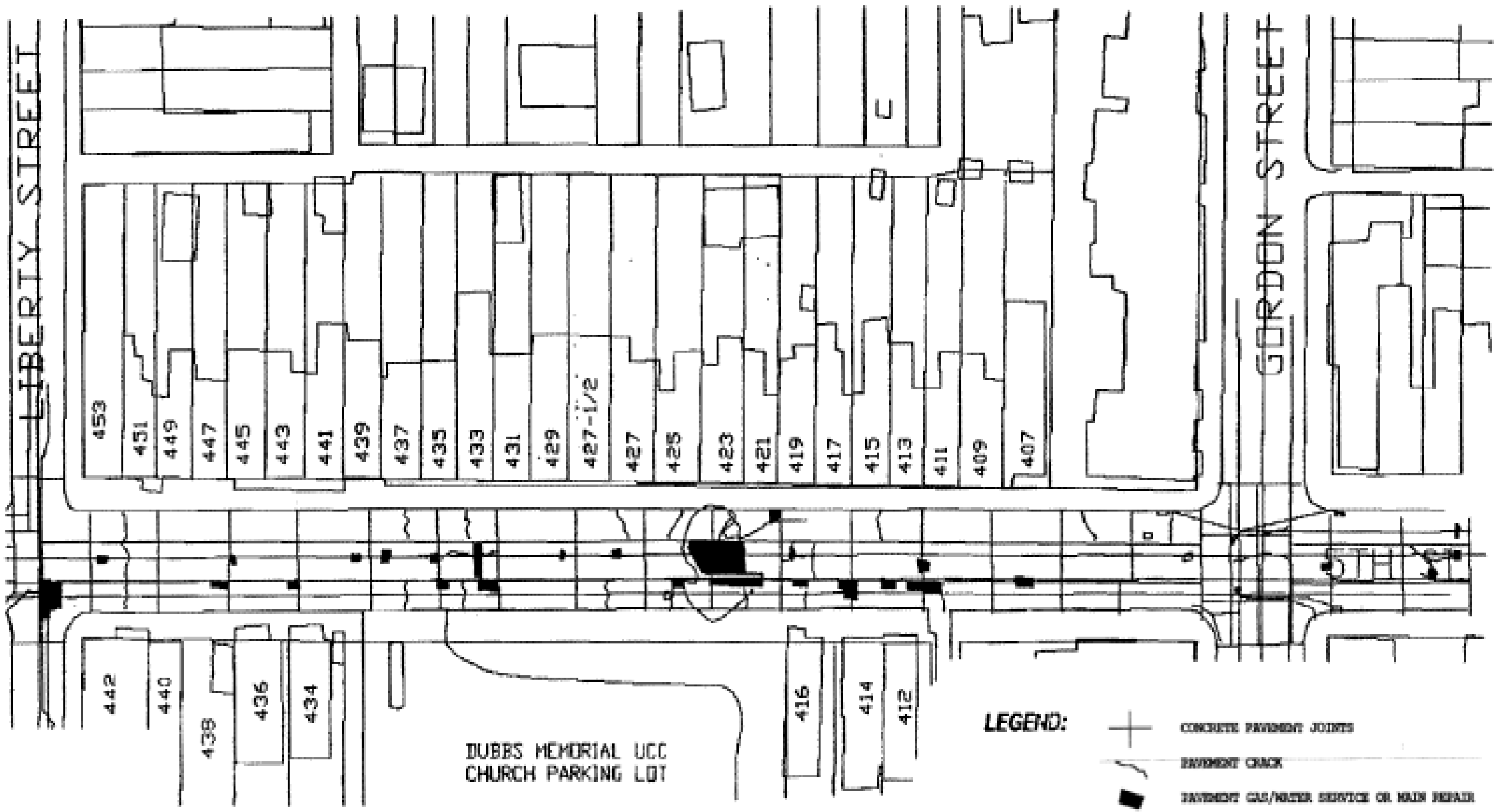
1. HARD/SOFT PAVEMENT SUBGRADE SUPPORT RESULTS IN CRACKING OF CONCRETE PAVEMENT
2. SURFACE WATER BEGINS TO MIGRATE OVER TIME INTO CRACKS SOFTENING RESIDUAL SOILS
3. SLIGHT SUBSIDENCE OCCURS IN SOLUTION ZONES
4. SUBSIDENCE AT LEAD JOINT AT CURB BOX/CORP RESULTS IN LEAK/BREAK OF WATER SERVICES OVER THE PAST 35YEARS WHICH FURTHER DESTABILIZE SUPPORTING SOILS IN PINNACLED ROCK AREAS
5. WATER SERVICE LEAK OCCURS AT 427 ON 8/28/90 MIGRATING WATER FOLLOWS SIDEWALK/CURB
6. RELEASED WATER ENTERS BEDROCK SOLUTION ZONE RESULTING IN SUBSIDENCE OF SUPPORTING SOILS FOR 425 & 423 GAS/WATER LATERALS
7. FURTHER LEAKS OCCUR IN 423 LATERALS ON 8/29 RESULTING IN A MAJOR LEAK OF GAS AND WATER
8. GAS EXPLOSION OCCURS BREAKING LATERALS/MAIN
9. ONCE WATER MAIN BREAKS, SUBSURFACE EROSION OF SUPPORTING SOILS OCCURS BY ENTRY OF RELEASED WATER INTO UNDERLYING SOIL AND ROCK VOIDS
10. SANITARY MAIN SUBSIDES/GAS MAIN IS BROKEN
11. SUBSURFACE EROSION CONTINUES UNTIL MAIN IS SHUT OFF RESULTING IN MAJOR GROUND LOSS AND SUBSIDENCE

UTILITY RISK INDICATORS

- Pavement cracking was an early indicator of subsurface erosion and subsidence
- The increasing number of water service leak-break frequency was a secondary warning
- The presence of suspected solution weathering zones identified where a failure could occur

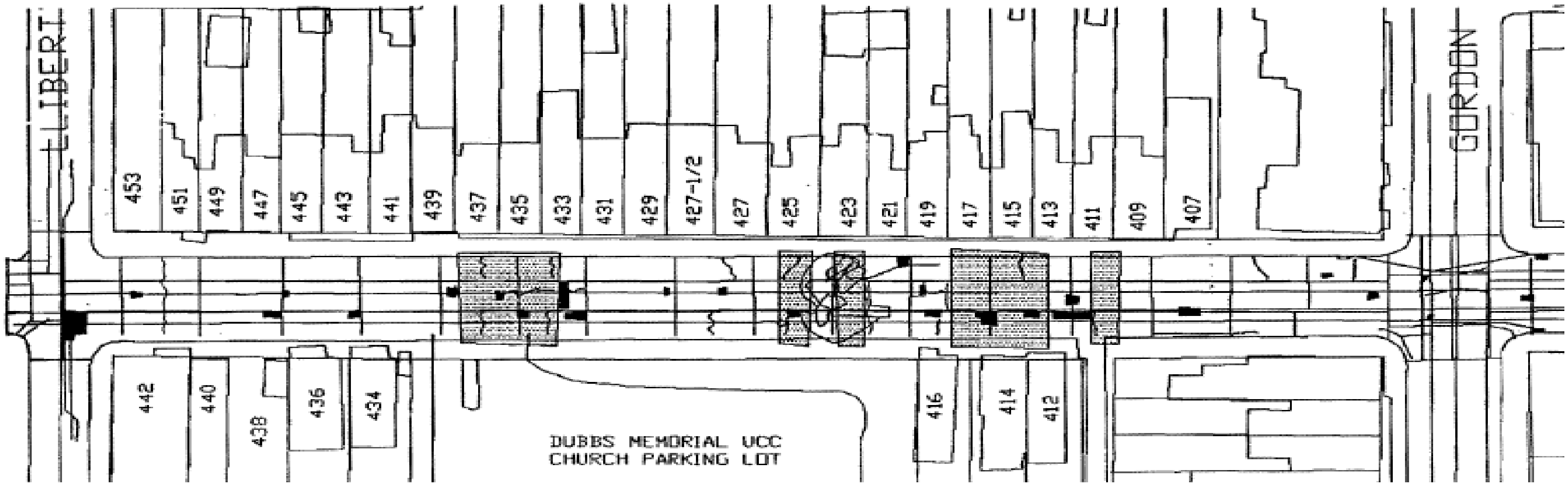


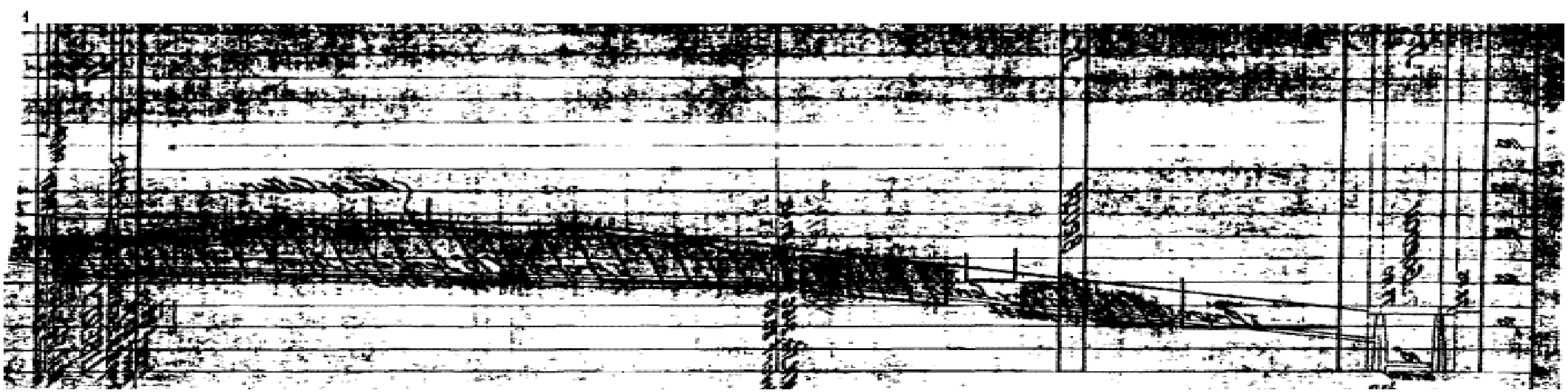
PAVEMENT CRACKING INDICATORS



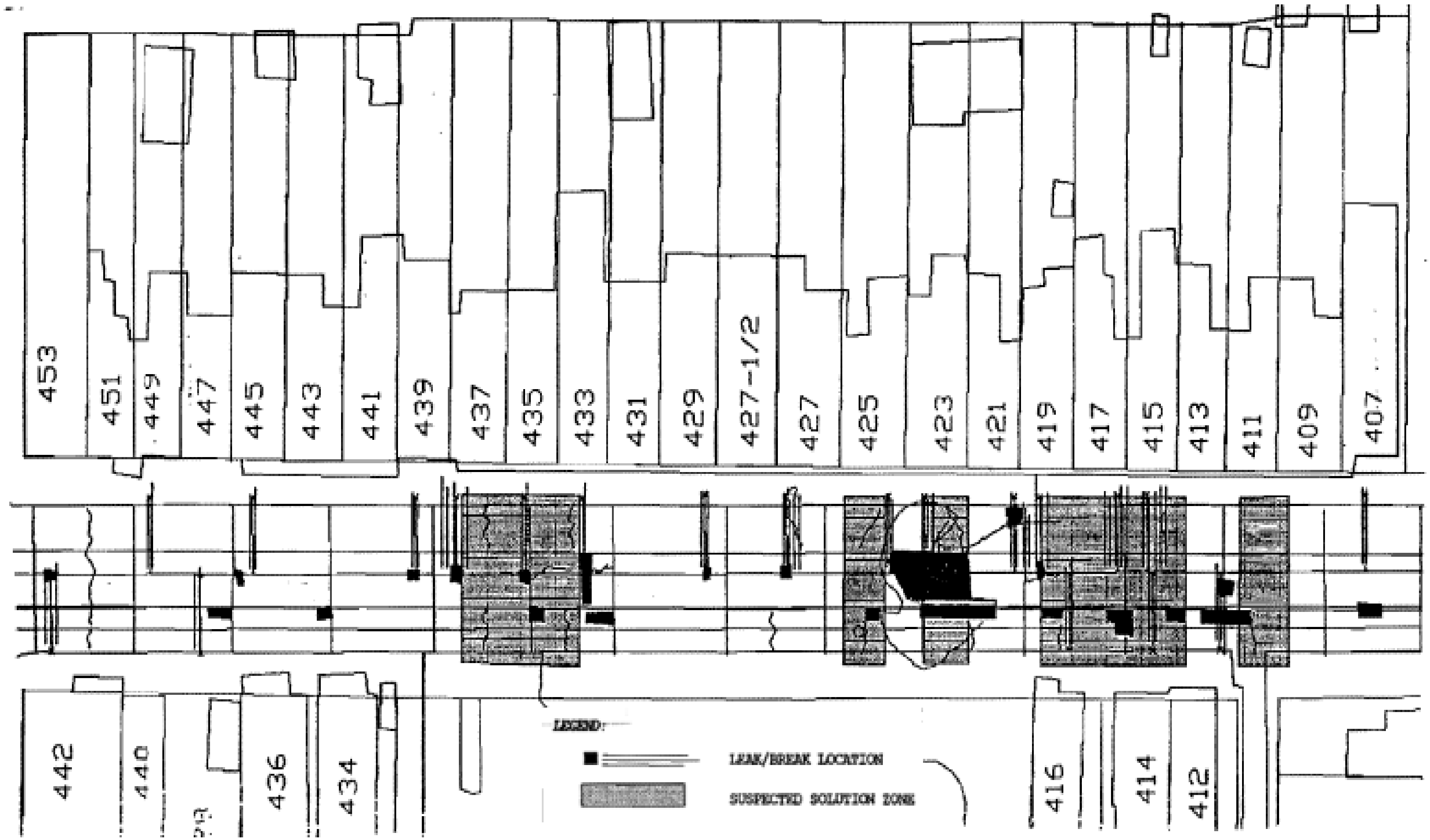
PAVEMENT CRACKING INDICATORS

SANITARY LIMESTONE BEDROCK PROFILE





UTILITY-LEAK BREAK INDICATORS



UTILITY LEAK-BREAK DATA

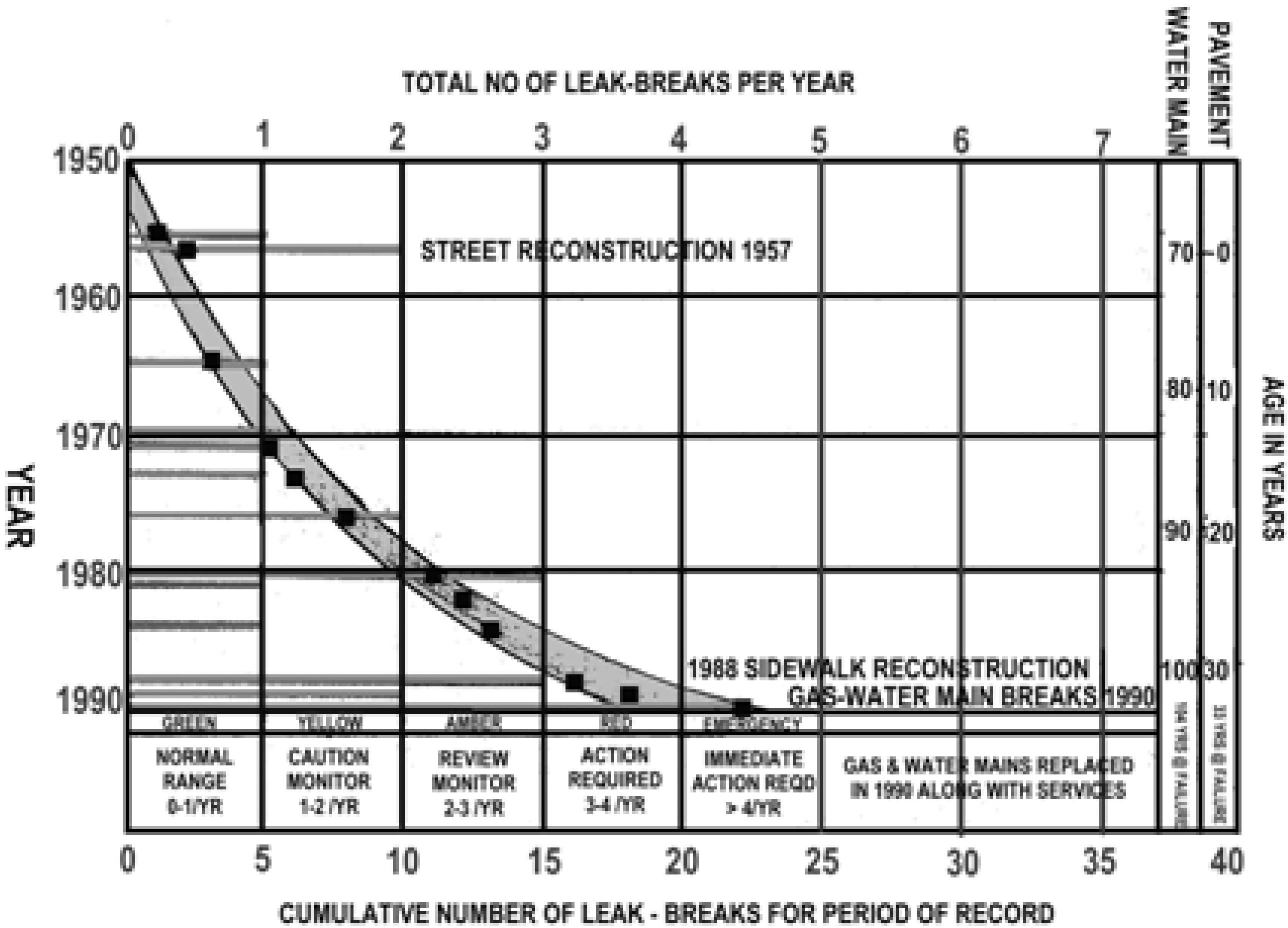
Table 1. Leak-Break Chronology

Year	Location	Date	Component	Cumulative Leak-Breaks
1956	416	6/28/56	Corp	1
1957	414	7/16/57	Corp, pipe	2
	Street Reconstructed			
1965	412	9/17/65	Curb Box	3
1970	445	3/04/70	Corp	4
1971	429	10/13/70	Curb Box, pipe	5
1973	427	5/04/73	Corp	6
1976	425	2/09/76	Curb Box	7
	433	3/19/76	Corp	8
1980	435	5/28/80	Corp	9
	419	11/10/80	Corp – Joint	10
	449	11/15/80	Curb Box	11
1982	407	4/05/82	Corp	12
1984	442	9/26/84	Corp	13
1988	5th & Liberty West	8/18/88	Valve	14
	421	11/15/88	Curb Box	15
	437	11/30/88	Corp	16
1989	415	2/14/89	Corp	17
	417	2/14/89	Corp	18
1990	427	8/28/90	Curb Box	19
	423	8/29/90	Curb Box, Corp	20, 21
	Water-Gas Main Break	8/29/90	Main	22
	StreetCollapse-Explosion	8/29/90	Street	
	421, 423, 425 Damage	8/29/90	Property	
	Summary	Corp Joint	Curb Box	Main-Valve
15	Solution Zones – 170lf	9	5	1
7	Shallow Rock – 330 lf	4	2	1
22	Total	13	7	2

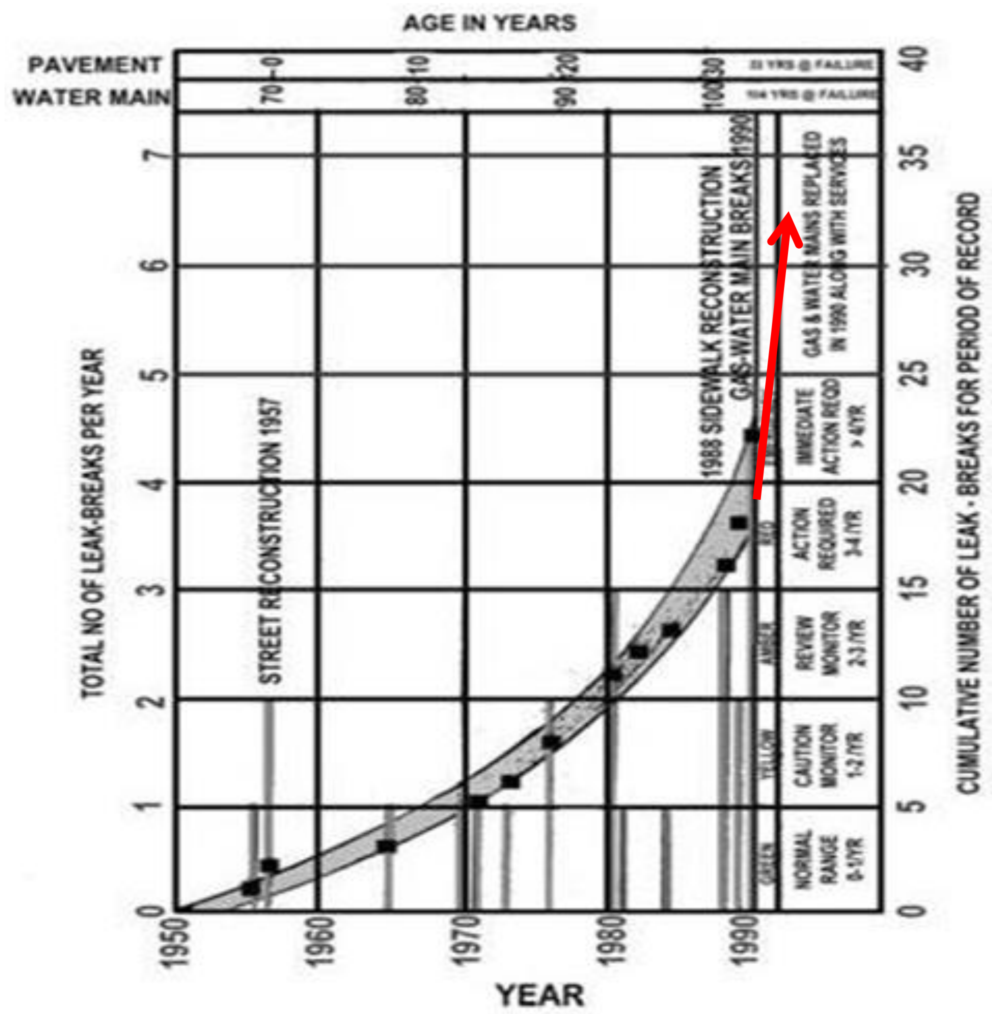
Table 2. Leak-Break Analyses

Item	Leak-Break Comparison	Analyses	Breaks Per Block Per YR
1.	Overall Break Rate	Services	
	Total Per Block	20	
	Total Per Block Per YR	20/1/33	0.60
	Total – Solution Zones	13	
	Total Per Block	13/170/lf = 38 per blk	38* (4 Times)
	Total Per Block Per YR	38/blk/33 =	1.2
	Total – Shallow Rock	6	
	Total per Block	6/330 lf = 9 per blk	9*
	Total Per Block Per YR	9/blk/33 =	0.3
2.	Main-Valve Breaks	2	
	Total per Block	2/33 =	0.1
3.	Service Breaks	20	
		Corporations = 13	
		Curb Boxes = 7	
4.	Rate of Growth	Age of Pipe	
	1959 - 1969	80 yrs	0.10
	1970 - 1979	90 yrs	0.50
	1980 – 1989	100 yrs	1.0
	1990 – 1999 (projected)	> 100 yrs	4.0
5.	Estimated Useful Life	80 to 90 years	
		100 Years	Increase 5 fold
			In Leak-Break
			Rate after 90yrs
NOTE:	(*) Solution Zone		

UTILITY LEAK-BREAK-AGE ANALYSIS



UTILITY RISK ASSESSMENT MODEL



LEAK-BREAK PER BLOCK

Urgent Action

Action Required

Monitor

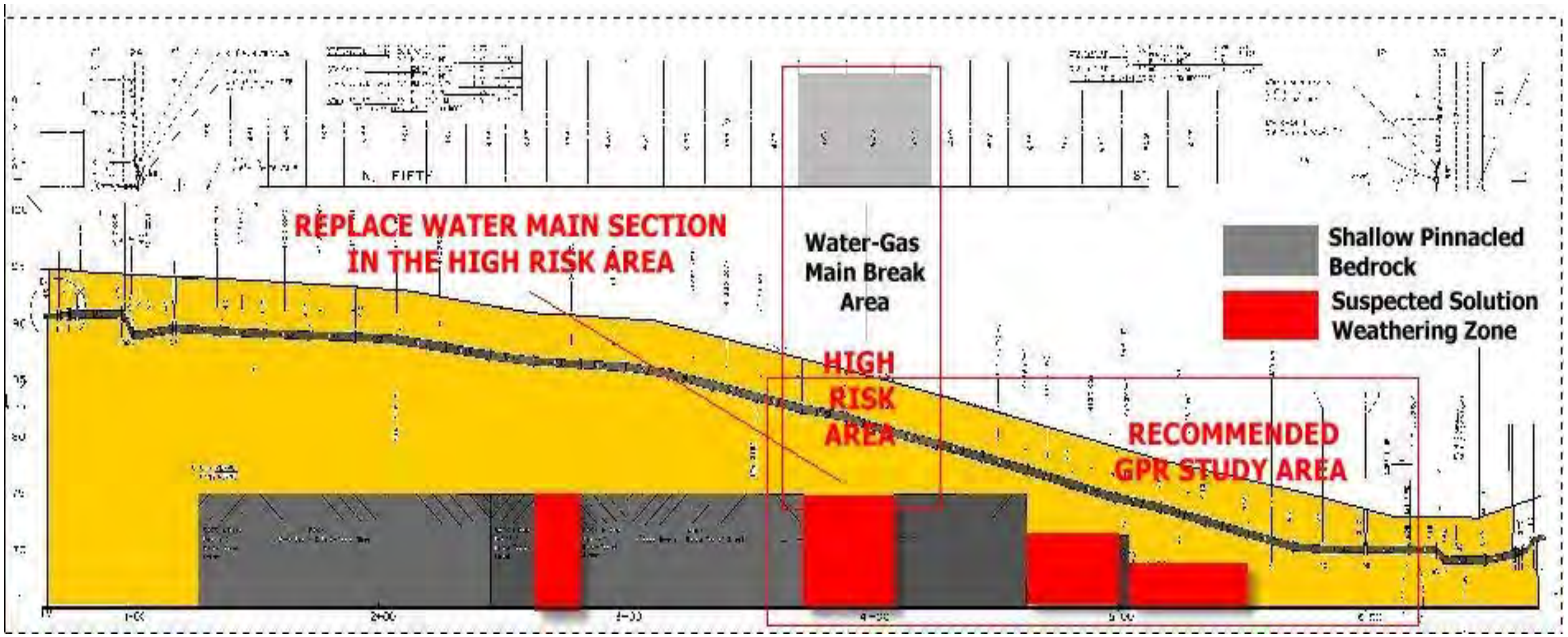
Caution

Normal

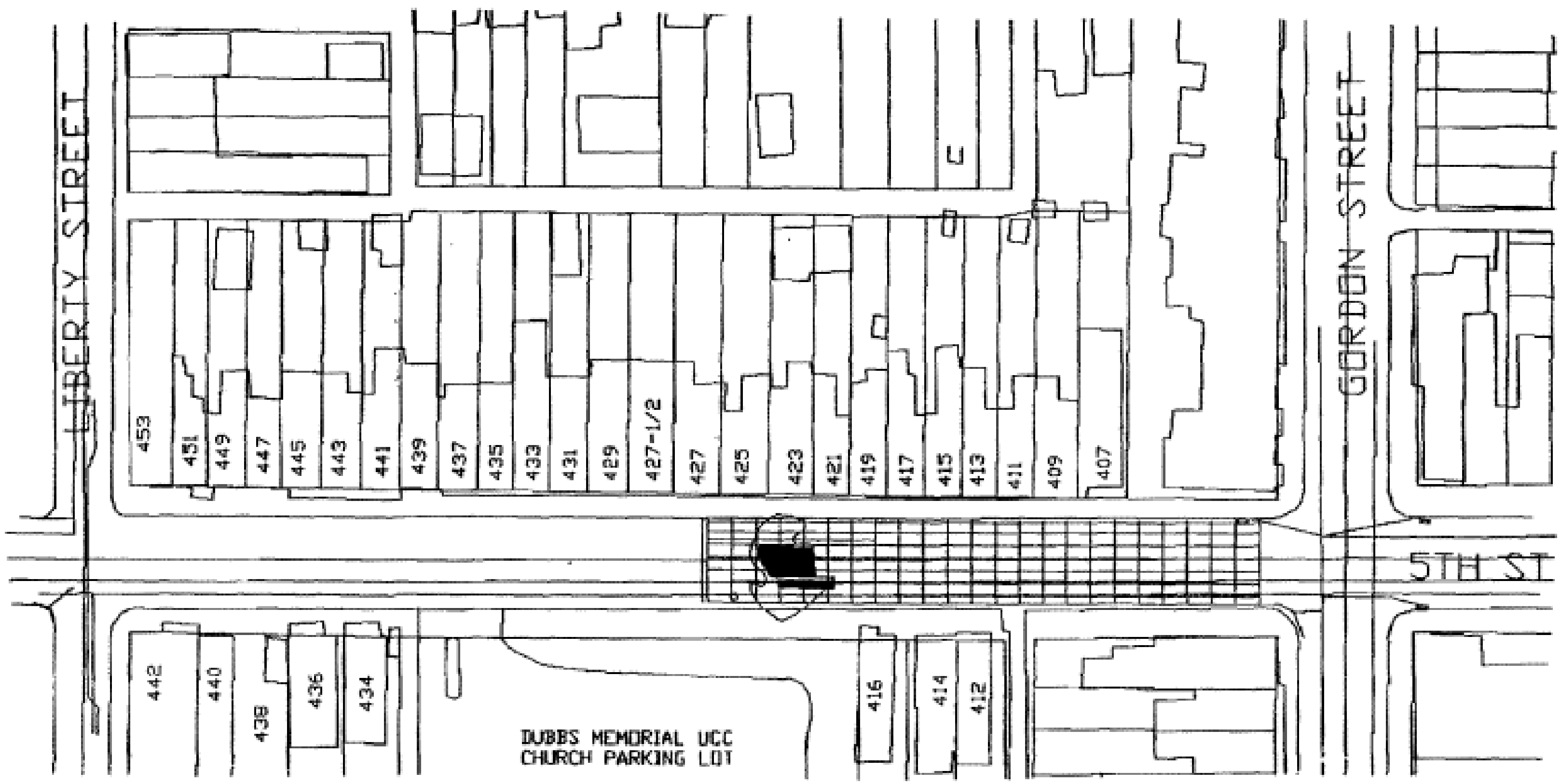
ACTION LEVEL

RECOMMENDED REMEDIAL ACTION

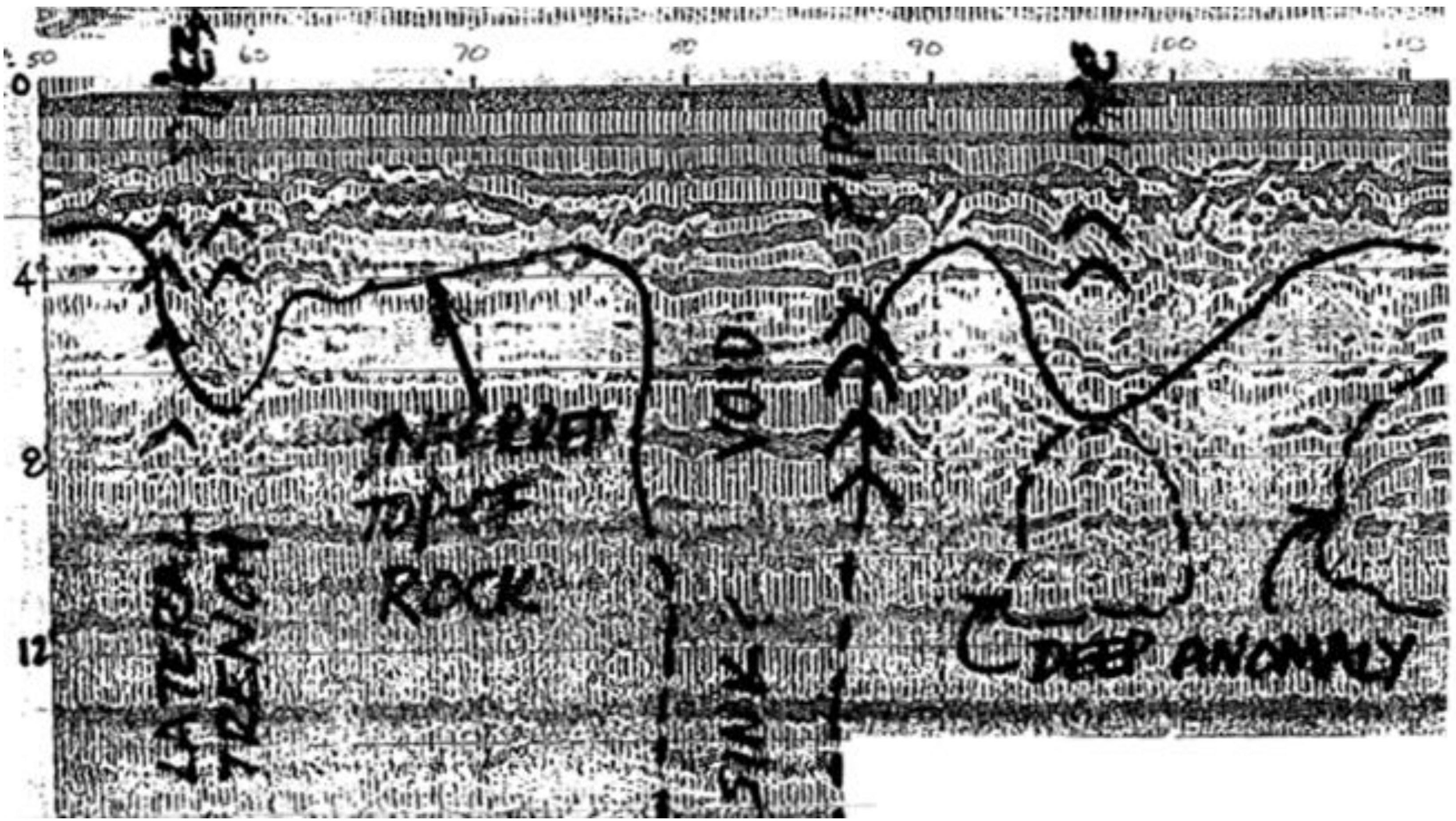
- Conduct a GPR Survey to confirm the location of solution weathered high risk areas
- Replace the water main in the high risk areas



GROUND PROBING RADAR SURVEY



GROUND PROBING RADAR SURVEY



SUMMARY & CONCLUSIONS

- Migration of surface water from deteriorating pavements, sidewalks, and curbs into residual soils can result in slow subsurface erosion of soil into the underlying bedrock resulting in subsidence.
- Subsidence of soil supporting utilities can cause utility leaks or even main breaks that can result in rapid subsurface erosion, significant ground loss, and the formation of a sinkhole.
- A Simple Utility Risk Assessment Model has been developed which could help identify potential high-risk utility areas.

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Retired Principal Engineer - Owner

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