

Philadelphia's Recent Building Collapses Causes and Prevention

Presented By

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Presented To

National Association of Women In Construction

2006 Region One Forum

Philadelphia, Pennsylvania



Background Overview

1. Unprecedented boom in Philadelphia building construction
 - Residential Town Houses (Row Houses)
 - Mid and High-Rise Condominiums
 - Private Developments / Smaller Developers
 - Smaller Contractors (Generals and Subcontractors)
2. Partial demolition of existing row houses and town houses
3. Increased incidents of damage or collapse to existing adjacent structures
4. City reaction

Background

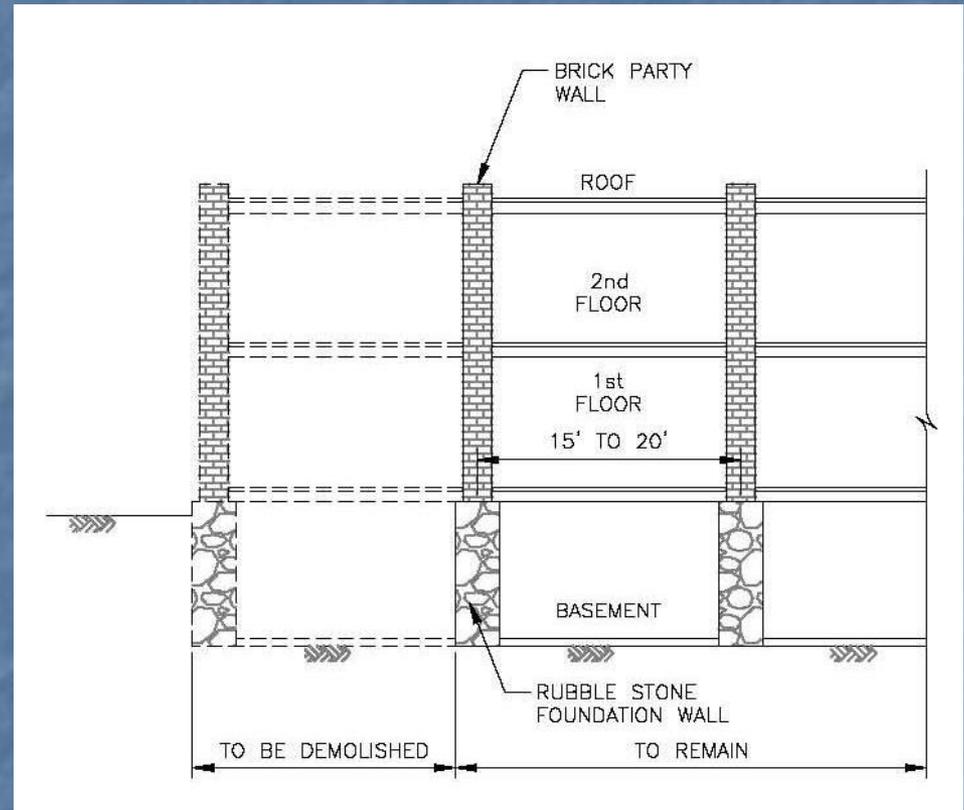
1. Booming Construction

- High Rise Condominiums
 - Larger projects
 - Larger developers
 - Larger contractors / subcontractors
 - Less problems
- Mid Rise Condominiums
 - Smaller projects
 - Smaller developers
 - Smaller contractors / subcontractors
 - More problems
- Residential Town Houses
 - Very small projects
 - Very small developers
 - Very small contractors / subcontractors
 - Many problems

Background

2. Partial Demolition

- Partial demolition of existing row or town houses
- Exposure of internal party wall
- Stucco coating provides no support



Background

3. Increased incidents of damage or collapse

Philadelphia Inquirer Story,
12/18/05

1900 Block of Spring Garden Street

A downside to Phila.'s development

Work on new houses is making others fall down.

By Jennifer Lin
INQUIRER STAFF WRITER

Bob Harvey no longer has a home. He used to live on the top floor of an apartment building he owned on the 1900 block of Spring Garden Street in Philadelphia.

But he's lost his building and all of his possessions — photos of grandchildren, an award from the emir of Kuwait, an Ed Rendell bobblehead doll. "I'm living like a vagabond," said the 54-year-old retired salesman.

A victim of a fire? An explosion? A flood? If only. Harvey's misfortune was living next door to a construction site.

The downside to all of the new houses going up in Philadelphia's tightly packed neighborhoods is all of the old houses next door that are falling down.

So far this year, seven adjacent older properties have been damaged or destroyed by excavation work, according to the city's Department of Licenses and Inspections (L&I). Last year, there was one.

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THE PHILADELPHIA INQUIRER

Sunday, December 18, 2005

A downside to development in Phila.

CONSTRUCTION from B1 sense," said Robert Solvibile, L&I commissioner.

With the rush in new-home construction, developers are combing the city for vacant land to convert into homes or apartments.

Fallow lots, wedged between existing old buildings, are giving way to foundations for new buildings.

And herein lies the risk: For a city as old as Philadelphia,

L&I now requires an engineer to OK a plan to ensure adjacent properties are safe.

many of those adjacent properties rest on foundations of layered fieldstone. In the L&I bulletin that went out this month, the department said that when rubble-

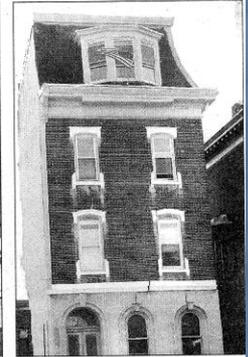
stone foundations of older buildings are exposed or undermined, they become "prone to sudden catastrophic failure."

That's what happened to Harvey's apartment house. And that's what Drew Dedo fears will happen to his townhouse.

Dedo, a lawyer, lives near 16th and South Streets. Several adjacent parcels are being developed into apartment and retail space by Universal Community Homes, a nonprofit



TOM GRALISH / Inquirer Staff Photographer



"They literally took my land. They're storing dirt on it," says Bob Harvey, left, standing where his house once stood in the 1900 block of Spring Garden Street. Builders digging to put up a condo building next door disturbed the foundation. Inspectors said the house had to be demolished because it was listing dangerously.

as an insured party with Universal's insurance carrier. He also wanted Universal to pay his en-

nounced the collapse of a deli on South Street. And in September, he read about Harvey's prob-

"presumes" that the workers disturbed the rubble-stone foundation of Harvey's 170-year-old, masonry mansion, which had

from the developer for his losses. "That building was for my retirement, and now it's gone," he said.

Spring Garden Contractors L.L.C. — for having foundation walls that "were not shored, braced or underpinned to en-

Background

3. Increased incidents of damage or collapse

Knocked out of a-line-ment



TOM GRALISH / Inquirer Staff Photographer

A utility pole was left teetering yesterday morning when the wall of a building collapsed on Fourth Street just north of Vine Street, spilling brickwork and other debris into the pole and across the road. Workers had been dismantling the building as part of a project to turn the eight-story building at left into condominiums. No one was injured.

- **Philadelphia Inquirer Story, 1/27/06**
- **300 Block of North 4th Street**

Background

3. Increased incidents of damage or collapse

Philadelphia Inquirer Story, 1/9/06

300 Block of Christian Street

'It was a rhythmic pop-pop-pop'

More neighbors of construction sites tell of foundations undermined, decks amputated.

By Jennifer Lin
INQUIRER STAFF WRITER

Say you're sitting in your car and get hit by another driver. What comes next is understood by both parties. You file an insurance claim and, more often than not, can be made whole.

Now imagine you're sitting in your Center City rowhouse, and it gets damaged by a contractor working next door.

Two words: Good luck.

The first person you may have to contact is a lawyer.

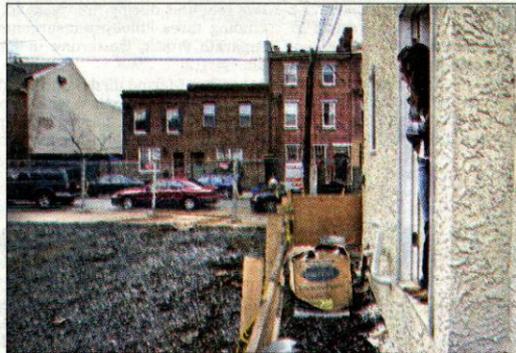
It's a rude awakening for homeowners and a predicament many more Center City residents are finding themselves in.

Last month, The Inquirer reported that with the downtown housing boom, damage to adjacent properties had increased. About a dozen homeowners replied with horror stories of their own.

The picture that emerges is of a frustrating, protracted, expensive process for re-creating the cost of property damage.

Many homeowners said their insurance did not cover damage caused by others, leaving them with no alternative but legal action.

"Why can't someone advocate on my behalf who I don't have to pay \$200 or



ERIC MENCHER / Inquirer Staff Photographer

Natalie Dardaris and Sean Graf opened their back door on Christian Street to find dirt sliding into a foundation dug next door. They called the city's Department of Licenses and Inspections. The developer had to stop building and fill in the hole.

\$300 an hour?" said David Chase, co-owner of a brick rowhouse in the 900 block of South Sixth Street in Queen Village.

Chase said a backyard wall, a 19th-century shed and a patio were damaged when a developer building 18 townhouses illegally dug too close to his property. A common alleyway used by neighbors also was destroyed.

The city's Department of Licenses and Inspections cited developer Gary Reisner of the Regis Group and said his company had to rectify the situation. Reisner did not return several phone calls seeking comment.

Nine months later, nothing has been done, Chase said, and he and his neighbor
See **DAMAGE** on A8

A8 B www.philly.com

THE PHILADEL



ERIC MENCHER / Inquirer Staff Photographer

Queen Village construction damaged the properties of Natalie Dardaris (second from left) and Matt and Debbie Moluf (second from right). The builder said he was not at fault but promised changes.

Construction damage falls between the cracks

Background

4. City Reaction

DEPARTMENT OF LICENSES AND INSPECTIONS CODE BULLETIN OF INFORMATION No. 0503		CODE OF GENERAL ORDINANCES OF THE CITY OF PHILADELPHIA TITLE 4 -- Building Construction and Occupancy Code
SUBJECT OF BULLETIN: EXCAVATIONS AND THE PROTECTION OF FOUNDATIONS		REFERENCE CODE SECTION(S): B-1803.1
ISSUED BY		
NAME: David J. Perri, P.E.	SIGNATURE:	ISSUE DATE December 2, 2005
TITLE: Chief Code Official		PAGE 1 OF 2

BACKGROUND

The City has recently experienced several building collapses attributed to builders digging basements and footings too close to existing buildings. In particular, many older buildings in Philadelphia are supported on rubble stone foundation walls with minimal or no spread footings below. When such walls are exposed or undermined they become unstable and are prone to sudden catastrophic failure. Building collapses have also been caused by property owners that attempt to increase the height of their basements by digging out the basement floor. Though the danger is most acute with rubble stone foundation walls, damage and failure can occur whenever structures are undermined, regardless of their age or condition. This Code Bulletin will set forth construction document requirements to aid in enforcing the code section that addresses this concern.

1. The construction documents include a detailed plan for protecting the footings and foundations of buildings and structures from settlement or lateral translation. This plan for protection of buildings must be designed by a registered professional engineer. ---- or ----

Background

4. City Reaction

DANGER

213
W

The Building located at _____ is in imminent danger of collapse.

The Building located at _____ is in imminent danger of collapse.

KEEP

YOU ARE HEREBY NOTIFIED THAT THE DEPARTMENT OF LICENSING AND INSPECTIONS HAS CONSIDERED THE SITUATION AT THE SUBJECT PREMISES AND DESIGNATED SAID PREMISES IMMINENTLY DANGEROUS WITHIN THE MEANING OF SECTION PM 308 OF THE PHILADELPHIA PROPERTY MAINTENANCE CODE. YOU ARE HEREBY ORDERED TO REPAIR AND STUCCO THE PARTY WALLS EXPOSED BY THE DEMOLITION IN ACCORDANCE WITH ALL PROVISIONS OF THE CODE, AND BILL THE OWNER FOR THE COSTS INCURRED. FAILURE TO PAY THE BILL WILL RESULT IN THE CITY FILING A LIEN IN THE AMOUNT AGAINST TITLE TO THE PREMISES. **THIS NOTICE IS FINAL.**

KEEP OUT

9.16.05

YOU ARE HEREBY NOTIFIED THAT THE DEPARTMENT OF LICENSING AND INSPECTIONS HAS CONSIDERED THE SITUATION AT THE SUBJECT PREMISES AND DESIGNATED SAID PREMISES IMMINENTLY DANGEROUS WITHIN THE MEANING OF SECTION PM 308 OF THE PHILADELPHIA PROPERTY MAINTENANCE CODE. YOU ARE HEREBY ORDERED TO REPAIR AND STUCCO THE PARTY WALLS EXPOSED BY THE DEMOLITION IN ACCORDANCE WITH ALL PROVISIONS OF THE CODE, AND BILL THE OWNER FOR THE COSTS INCURRED. FAILURE TO PAY THE BILL WILL RESULT IN THE CITY FILING A LIEN IN THE AMOUNT AGAINST TITLE TO THE PREMISES. **THIS NOTICE IS FINAL.**

DATE POSTED _____

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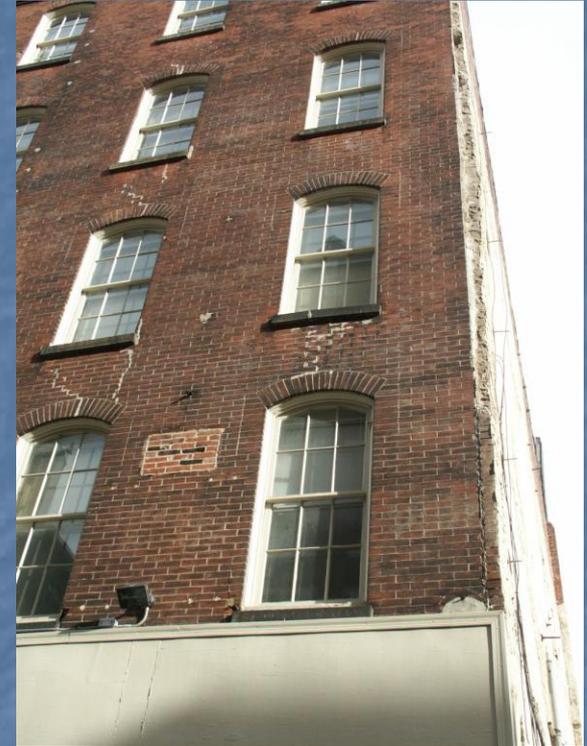
215-686-2582
MUNICIPAL SERVICES BUILDING
11TH FLOOR
PHILADELPHIA, PA 19102



Causes of Damages and Collapses

Overview

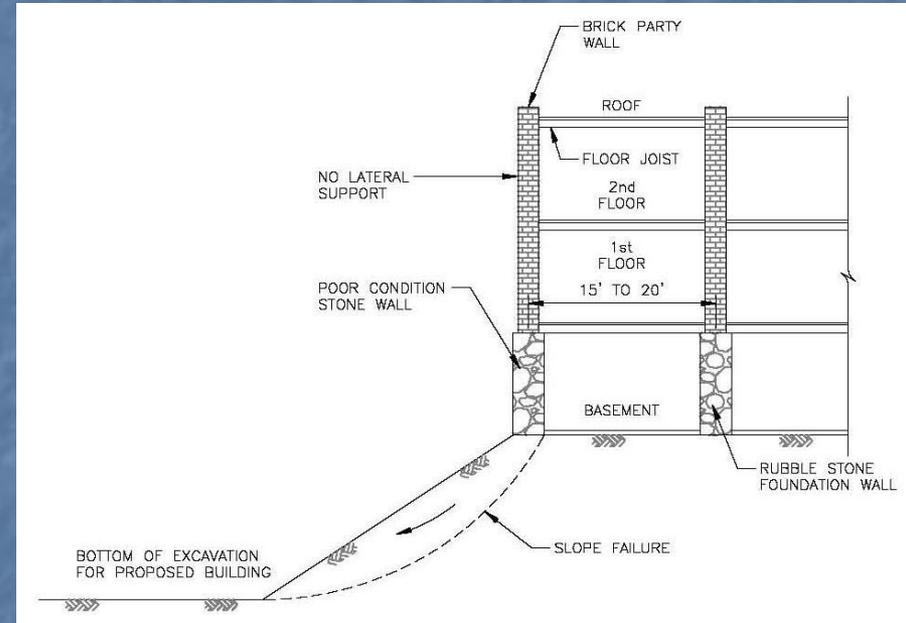
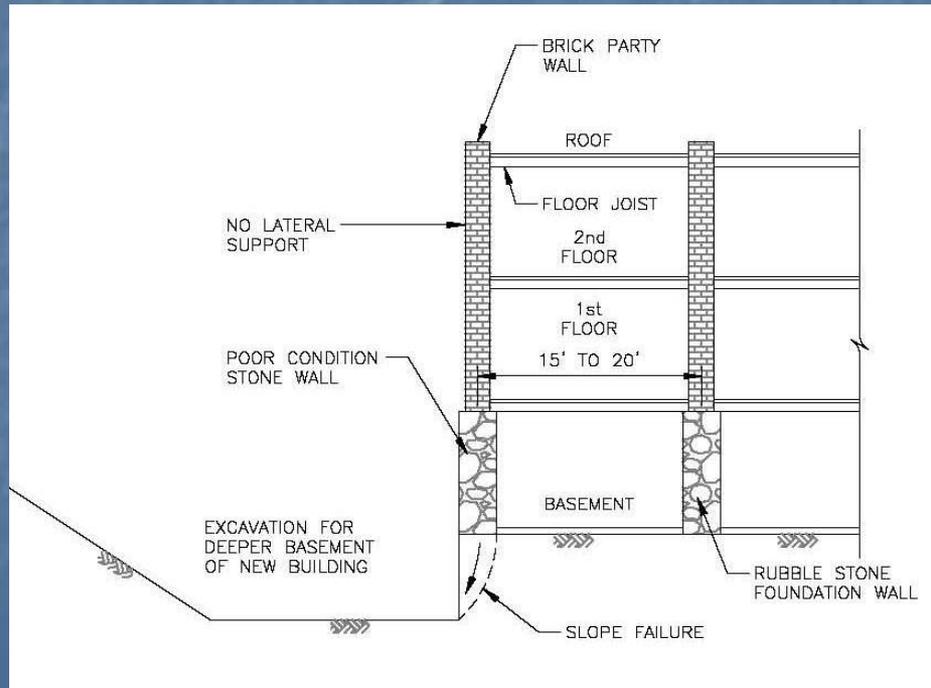
1. Vertical settlement of walls or foundations
2. Lateral movement of walls or foundations
3. Damage from construction equipment



Causes of Damages and Collapses

1. Vertical settlement of walls or foundations

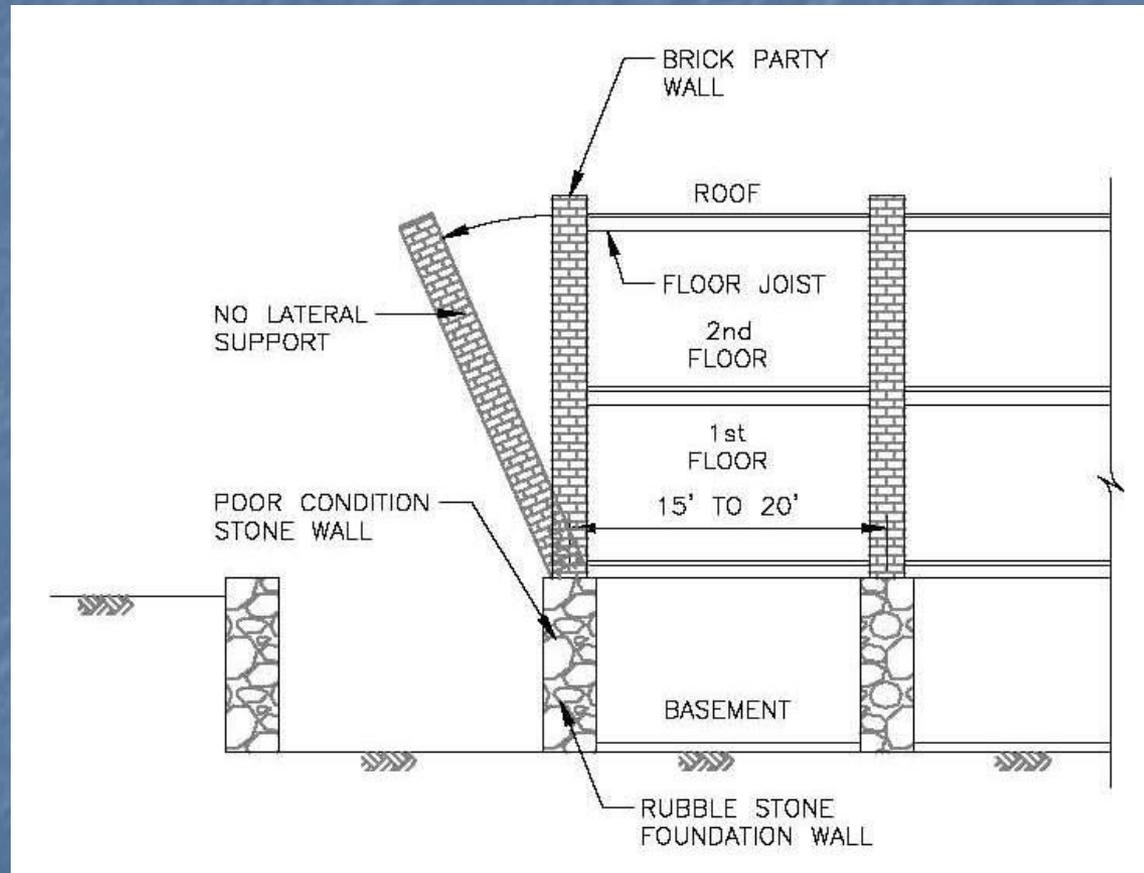
- **Undermining of structure**
- **Reduction of bearing capacity**



Causes of Damages and Collapses

2. Lateral movement of walls or foundations

- Wind induced
- Vibration induced



Causes of Damages and Collapses

3. Damage from construction equipment

Knocked out of a-line-ment



TOM GRALISH / Inquirer Staff Photographer

A utility pole was left teetering yesterday morning when the wall of a building collapsed on Fourth Street just north of Vine Street, spilling brickwork and other debris into the pole and across the road. Workers had been dismantling the building as part of a project to turn the eight-story building at left into condominiums. No one was injured.

- During demolition
- During excavation for new building
- During construction of new building

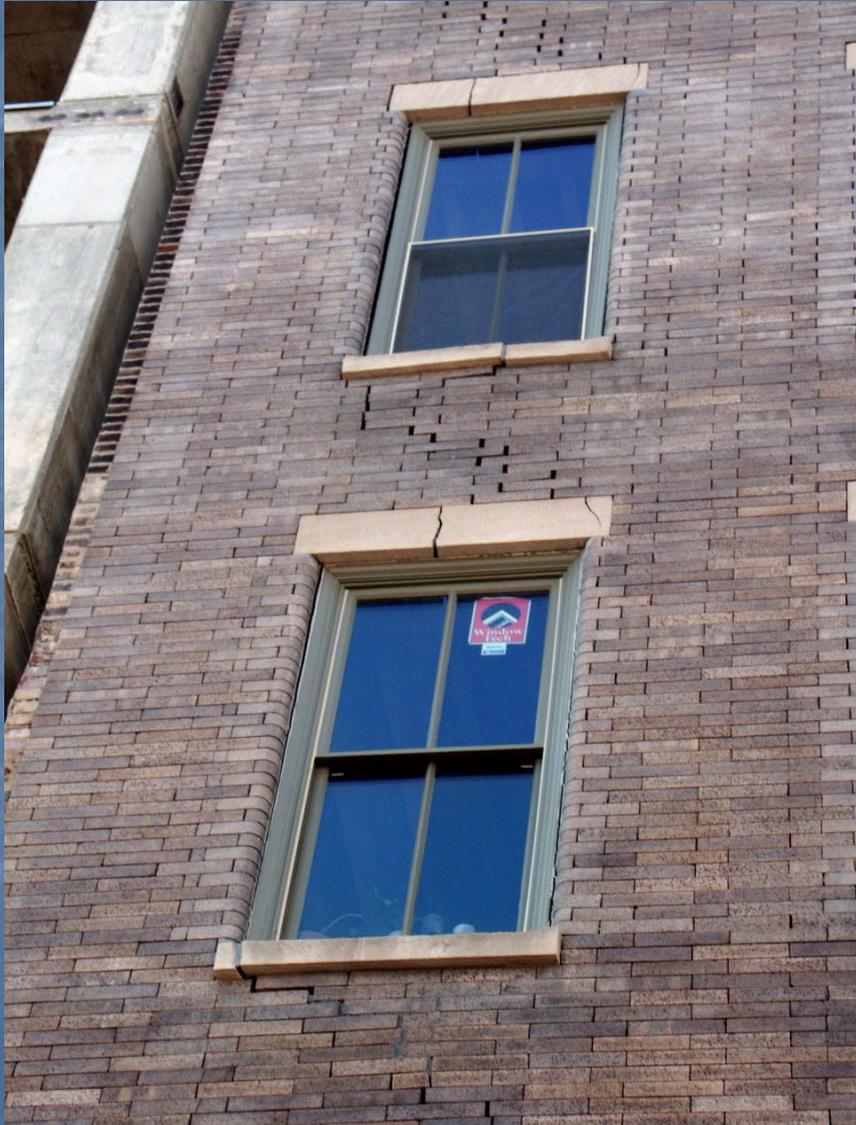
Examples of Exterior Damage



Examples of Damage



Examples of Exterior Damage



Examples of Interior Damage



Prevention of Damages and Collapses

- Secure sufficient construction funds
- Hire experienced architects and engineers
- Hire experienced contractors and subcontractors
- Implement proper sheeting, shoring, and underpinning measures

Prevention of Damages and Collapses Continued

- **Pre-construction Survey**
 - Photos
 - Video
 - Written
- **Construction Monitoring**
 - Vertical survey readings
 - Horizontal survey readings
 - Visual inspection



Requirements for a Successful Underpinning Operation

- Engage an engineer highly experienced in underpinning design
- Obtain City approval of underpinning design
- Make pre-bid, pre-design, & pre-construction site visits
- Engage a contractor highly experienced in underpinning
- Coordinate construction operations in field
- Make periodic site visits during underpinning work

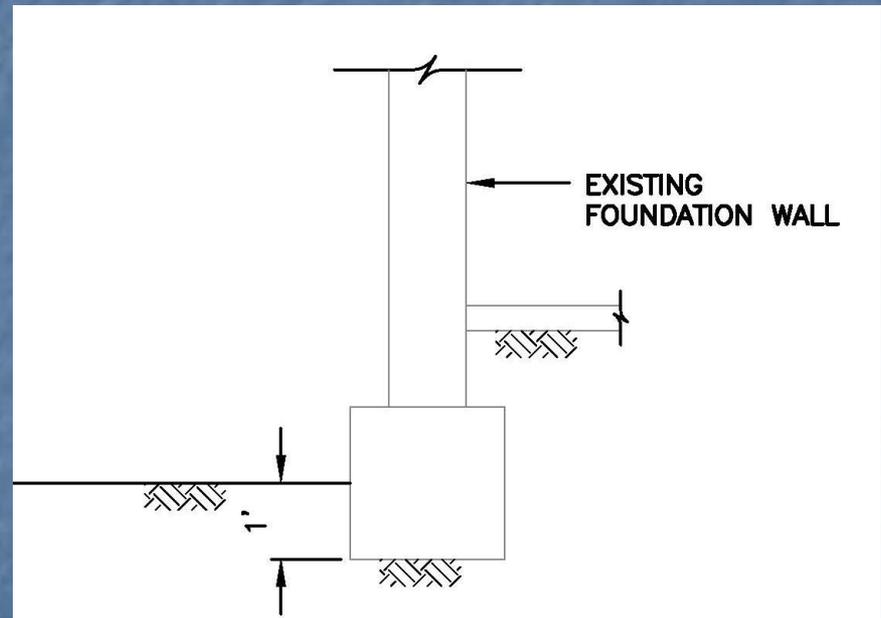
Underpinning Procedures & Details

- Establish survey monitoring controls



Underpinning Procedures & Details

- Excavate to \pm 1' above bottom of existing footing to be underpinned
- Monitor building for movements



Underpinning Procedures & Details

- Brace existing wall if required to prevent lateral movement



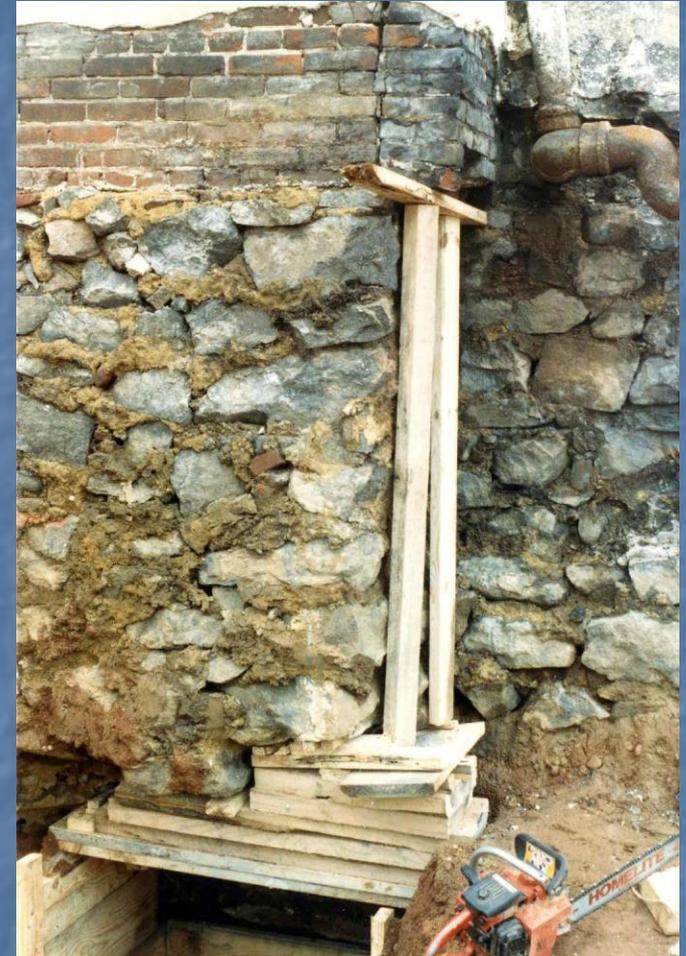
Underpinning Procedures & Details

- The infamous rubble stone foundation wall – up close & personal!



Underpinning Procedures & Details

- Poorly mortared or loose (dry) rubble stone walls are especially difficult, but not impossible, to underpin
- Not for the inexperienced!



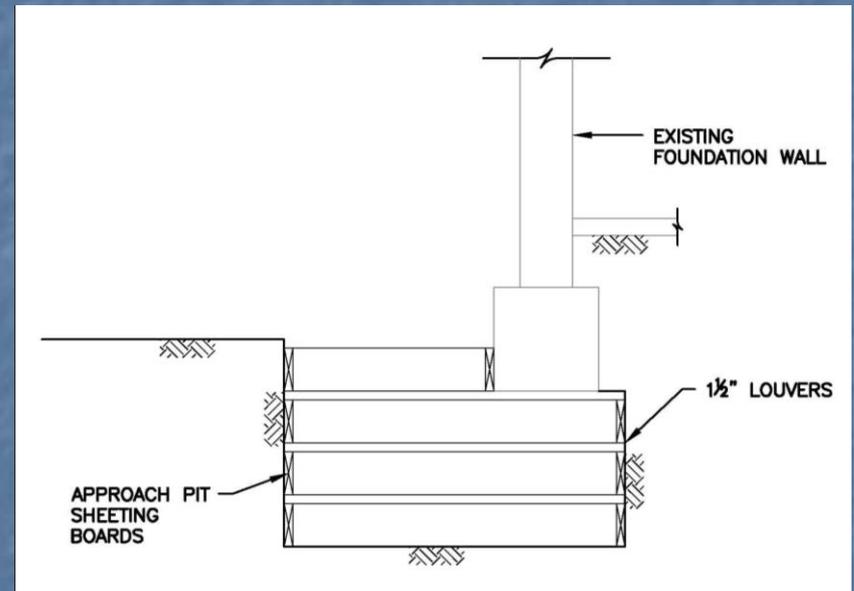
Underpinning Procedures & Details

- Layout underpinning piers & construction sequence



Underpinning Procedures & Details

- Excavate & shore underpinning pit approach hole



Underpinning Procedures & Details

- Excavate & shore pit to required depth



Underpinning Procedures & Details

- Excavate & shore pit to required depth



Underpinning Procedures & Details

- Excavate & shore pit to required depth

Looking down, man at bottom



Looking up at bottom of footing

Completed Underpinning

- Shallow, continuous, underpinning piers



Completed Underpinning

- Braced, intermittent, underpinning piers



Completed Underpinning

- Deep, tiedback, intermittent, underpinning piers



Completed Underpinning

- Deep, tiedback underpinning for building columns



Completed Underpinning

- Deep, tiedback, intermittent, underpinning piers



Conclusions

How to protect your construction project

- Secure sufficient construction funds
- Hire experienced architects and engineers
- Hire experienced contractors and subcontractors
- Implement proper sheeting, shoring, and underpinning measures
- Monitor the adjacent structures

Conclusions

How to Protect Your Home

Robert Solvibile, commissioner of the city's Department of Licenses and Inspections, said a homeowner should take these steps if someone started to dig next door:

- Call 215-686-2463 and file an official inquiry with L&I. Ask what specific precautions have been taken to protect your house. Solvibile said an inspector could explain those plans.
- Take photographs to document the condition of your home before and after excavation.
- Hire a home inspector before digging begins to document the condition of your house.

Thank You Questions?

