

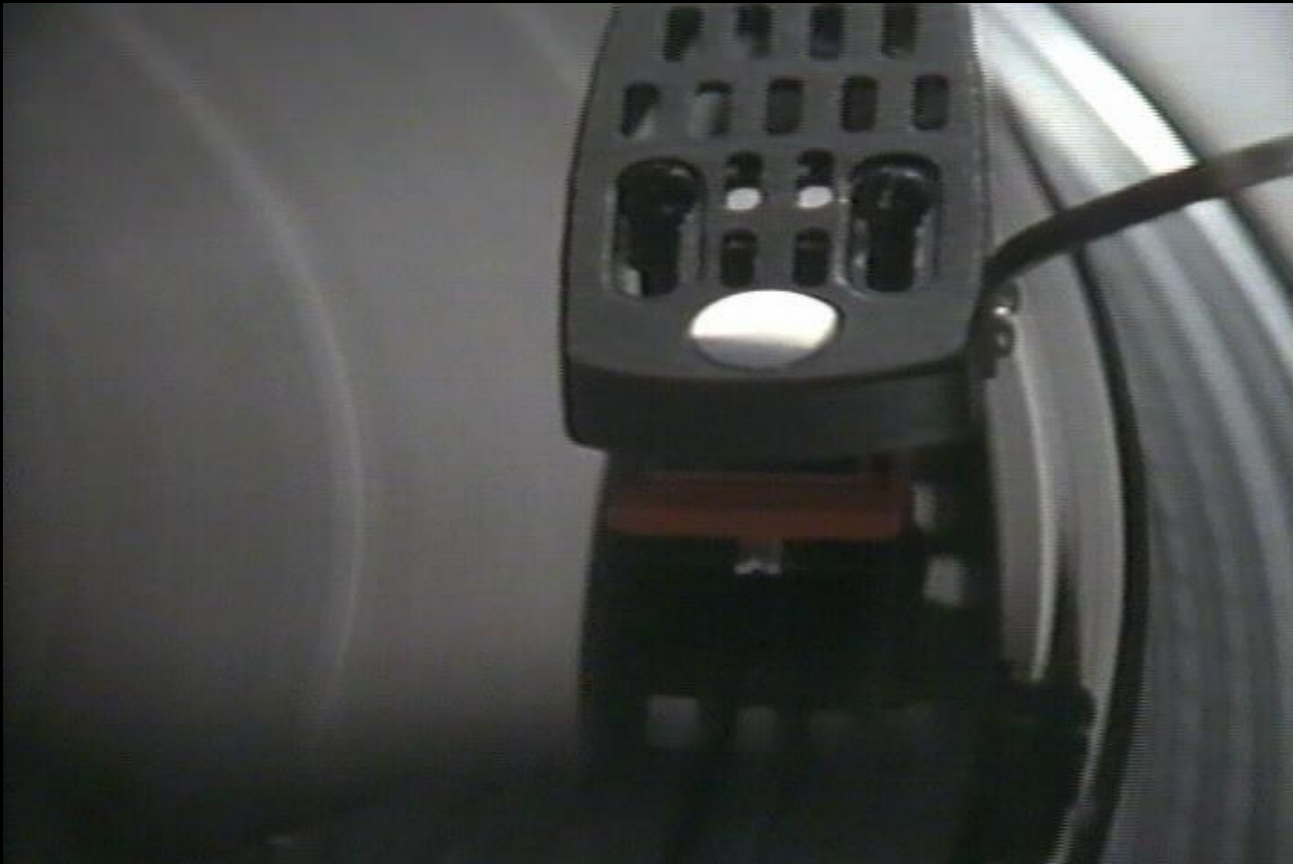


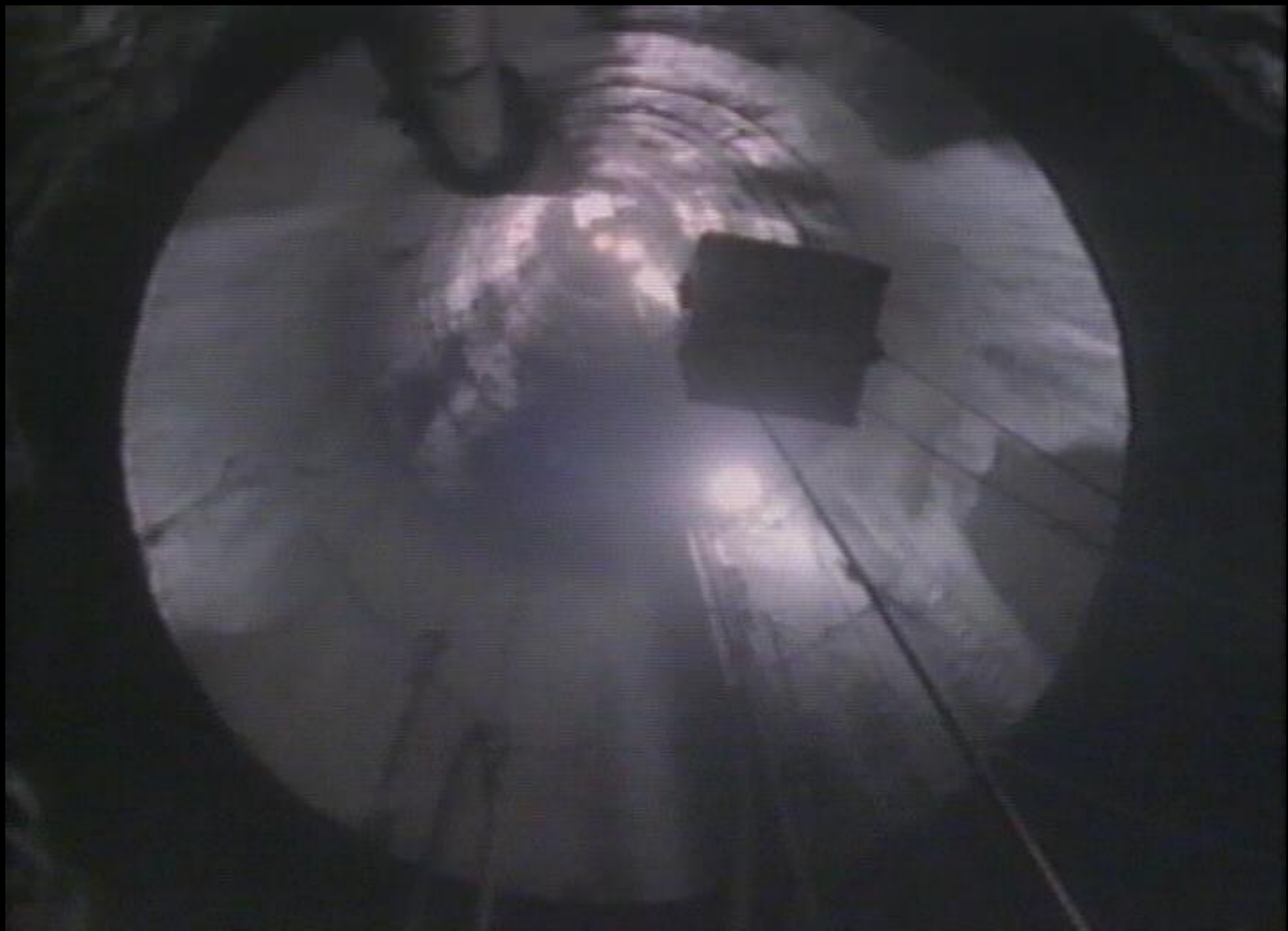
New York City Earthquakes Fact or Fiction

Charles Merguerian



New York City Earthquakes Fact or Fiction





**From: Earthquakes – The Terrible Truth
ABC World of Discovery, 1994**



A New York City Earthquake When Will it Happen Here?

1737

1783

1884

20??

EARLY MEDIAL ORDOVICIAN

(Early Chazyan)

PALEOGEOGRAPHY

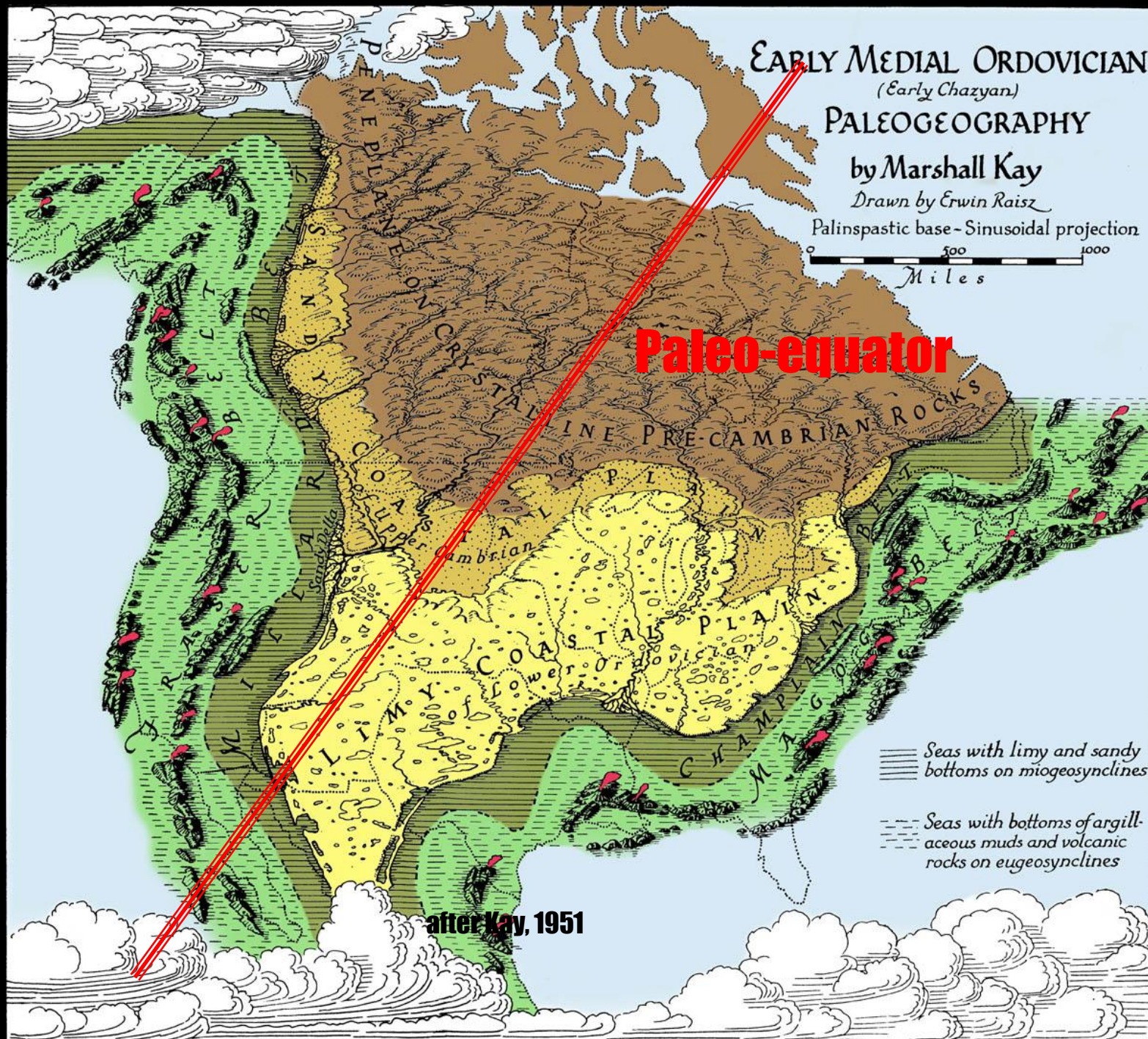
by Marshall Kay

Drawn by Erwin Raisz

Palinspastic base - Sinusoidal projection

0 500 1000
Miles

Paleo-equator



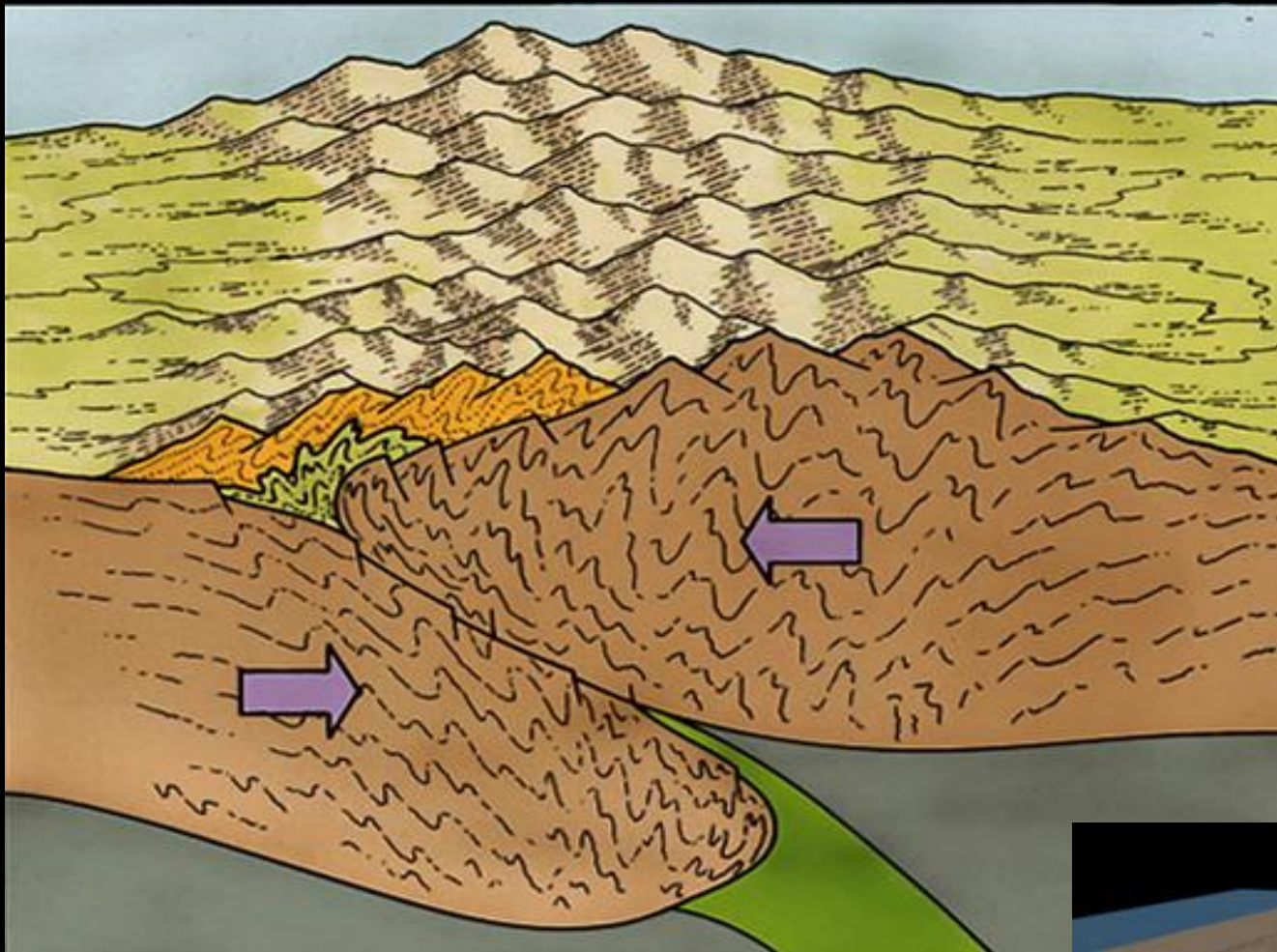
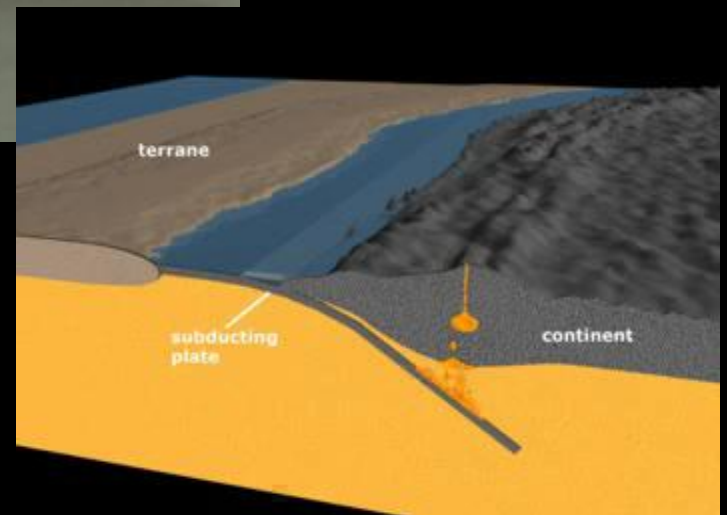
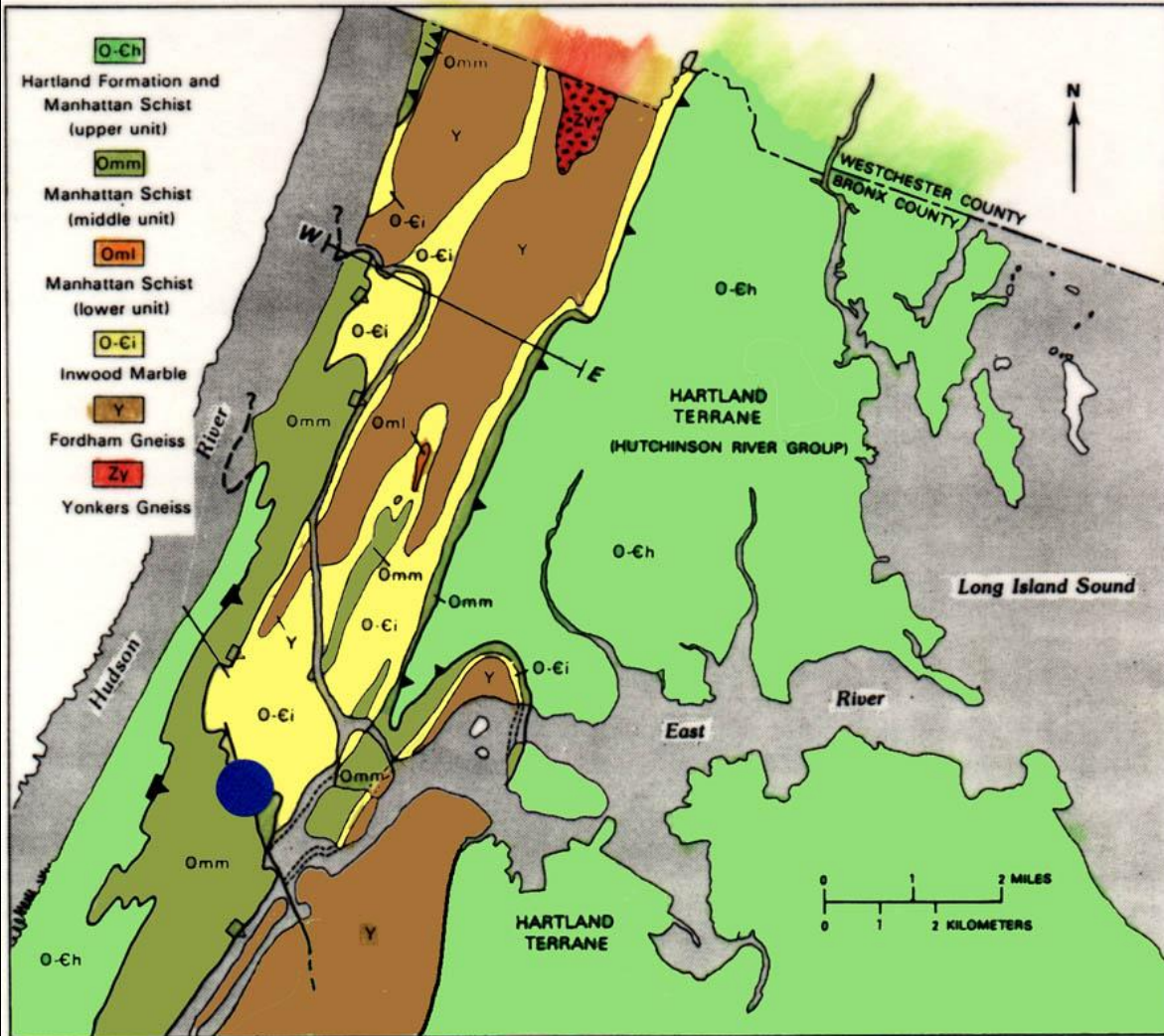
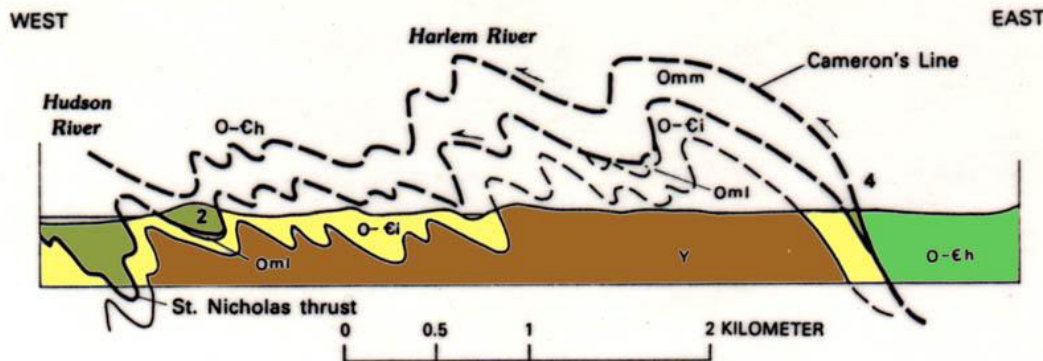
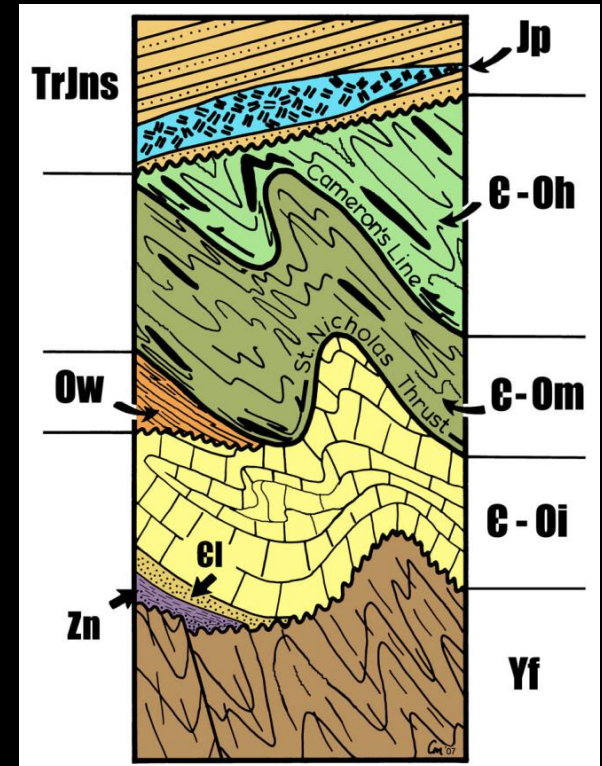


Plate Collisions





New York City



Merguerian, 2001

**Merguerian's Early
Field Work on
Manhattan
Island**

**In The Days
When He Was
Limber**

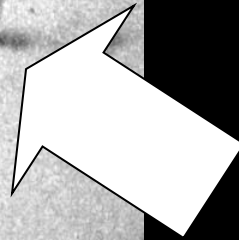






**Merguerian Has Spent
(Wasted?)**

**Most of his Career
Mapping the Surface
and Subsurface
Geology of NYC**



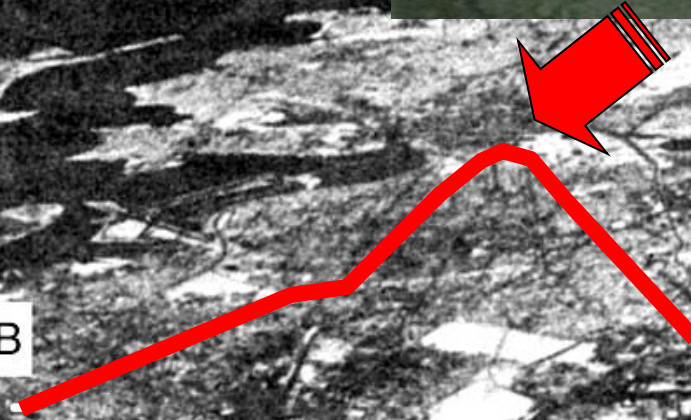
**Proper Field Attire
For NYC**

Long Island Sound



16B

19B





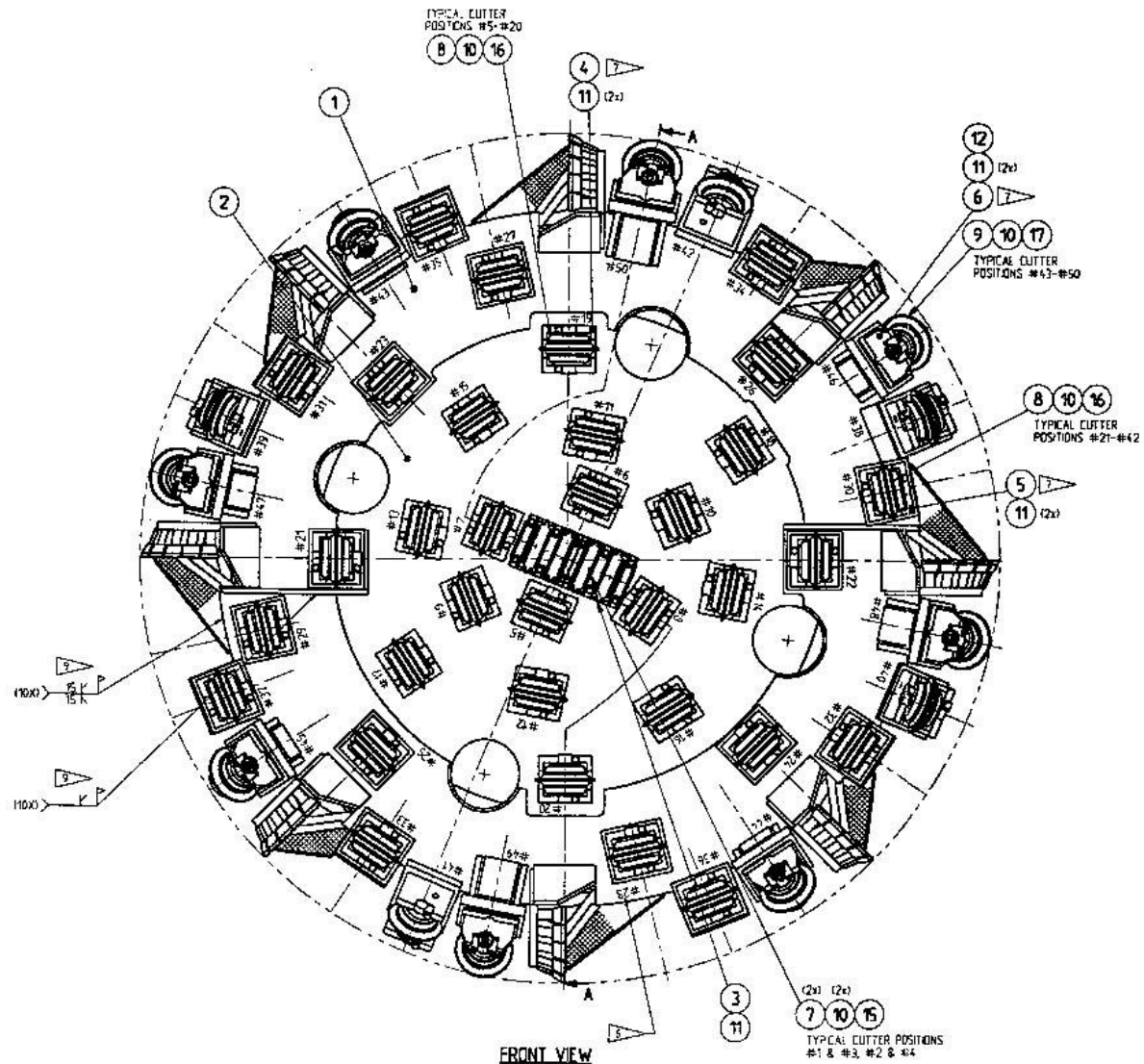
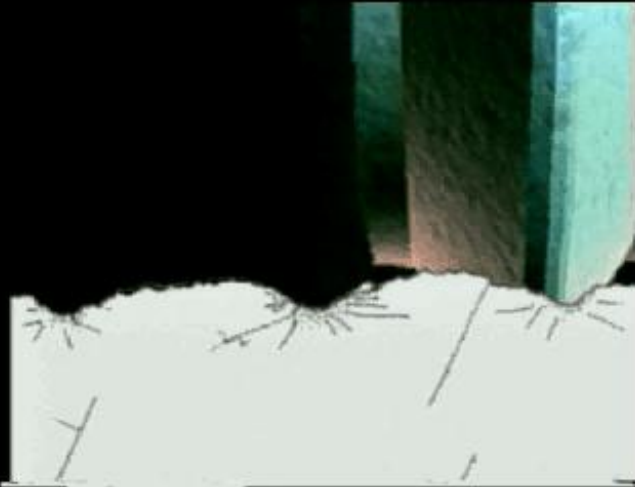
TBM-Bored Tunnel

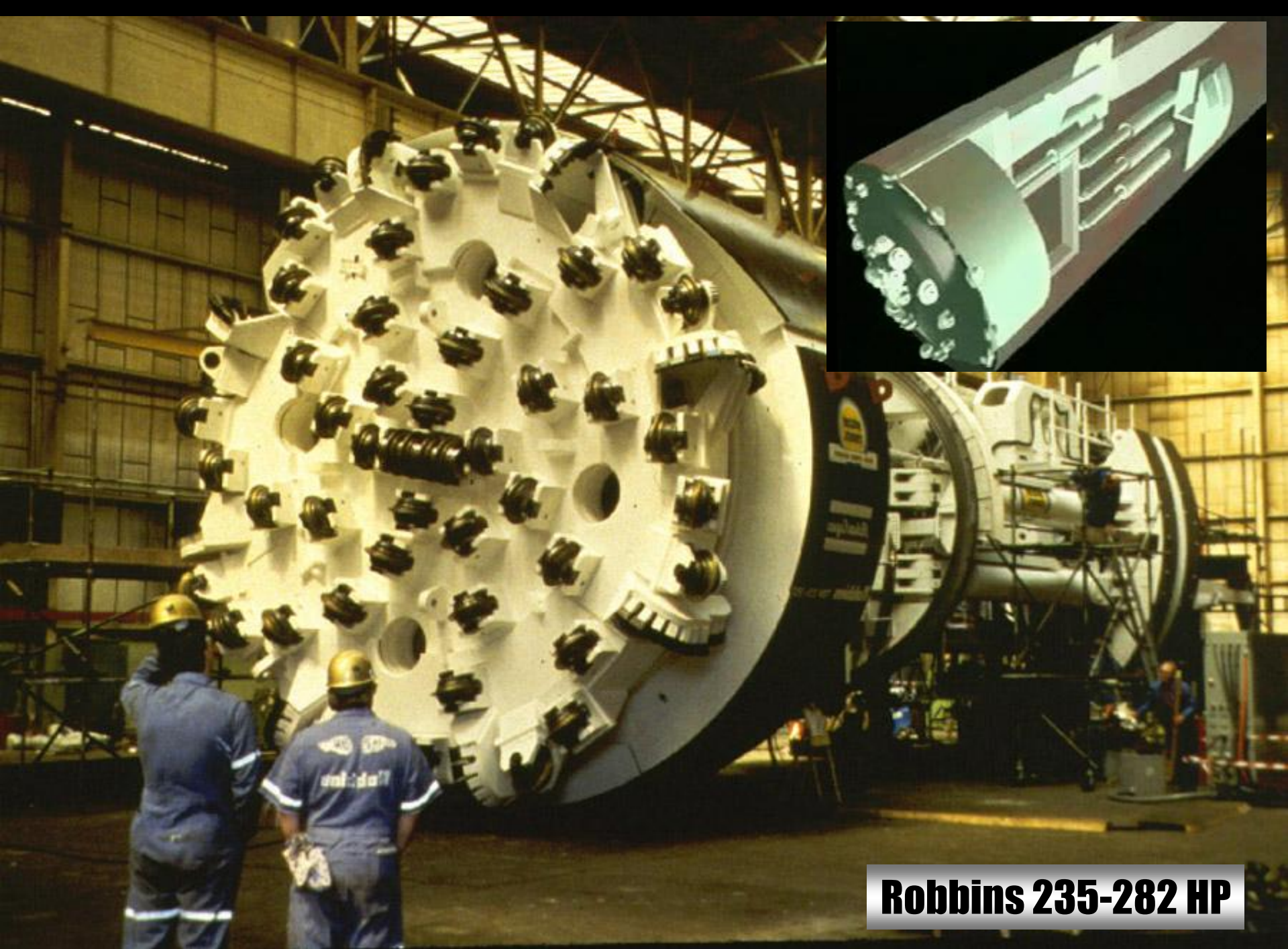


TBM-Bored Tunnel

Robbins 235-282 HP TBM







Robbins 235-282 HP



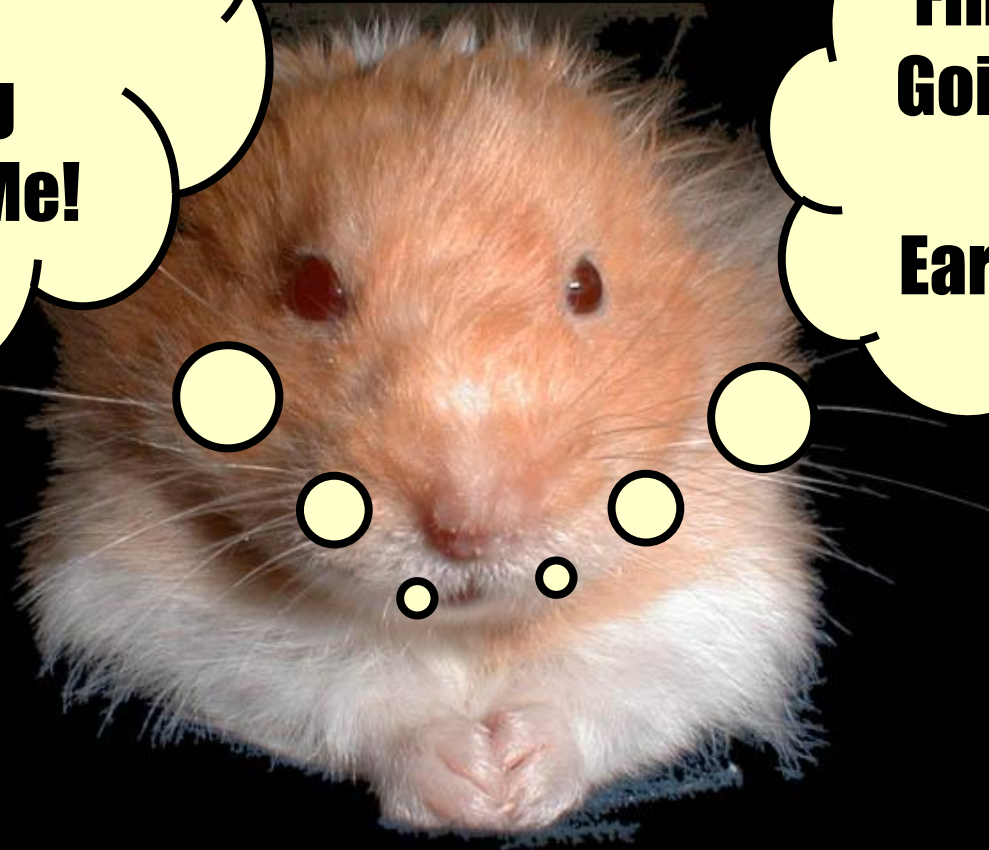
**Merguerian's Queens
Tunnel Field Office**



**Administrative
Assistant**

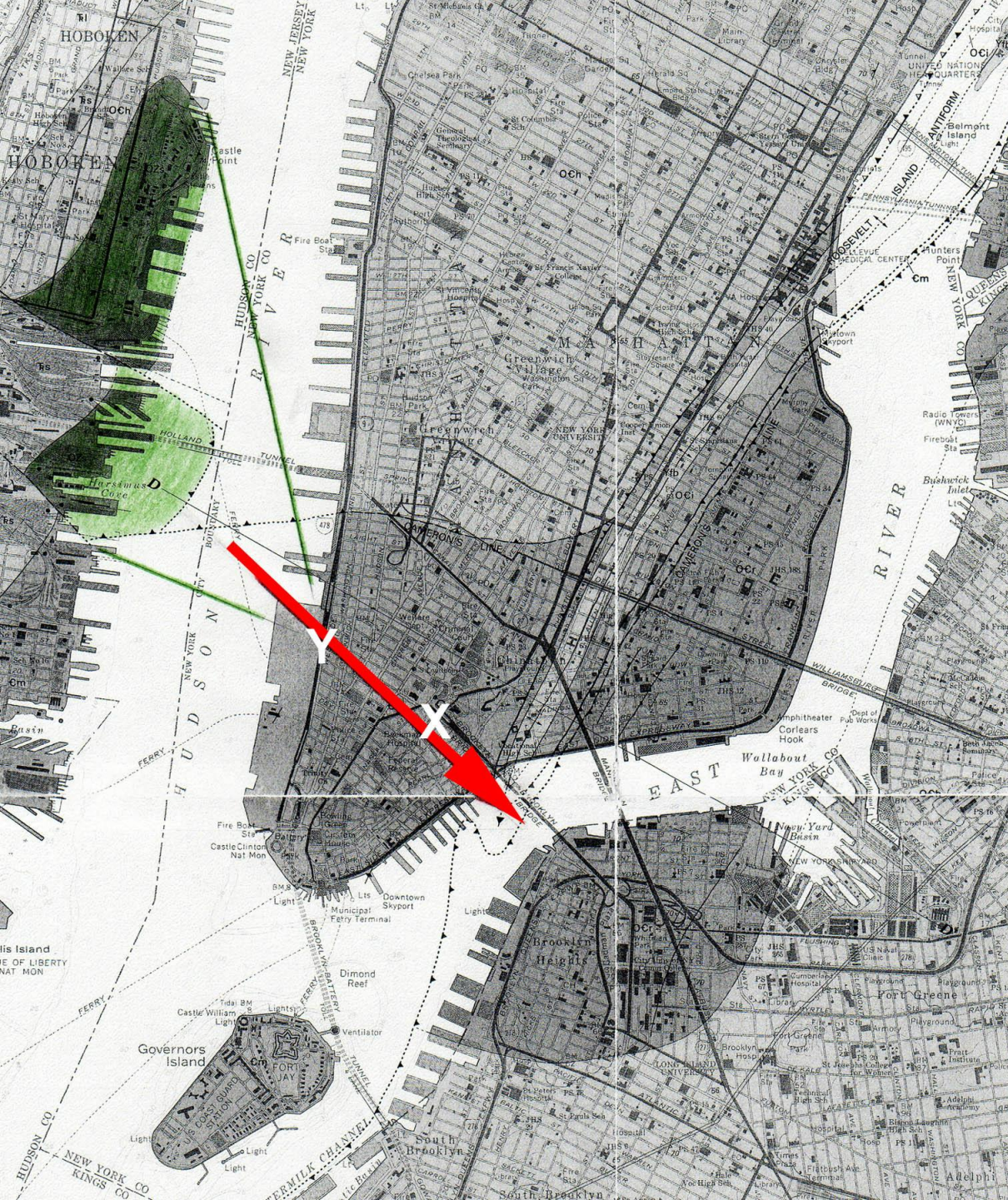
**Remember,
You're
Nothing
Without Me!**

**Finally, He's
Going to Talk
About
Earthquakes**









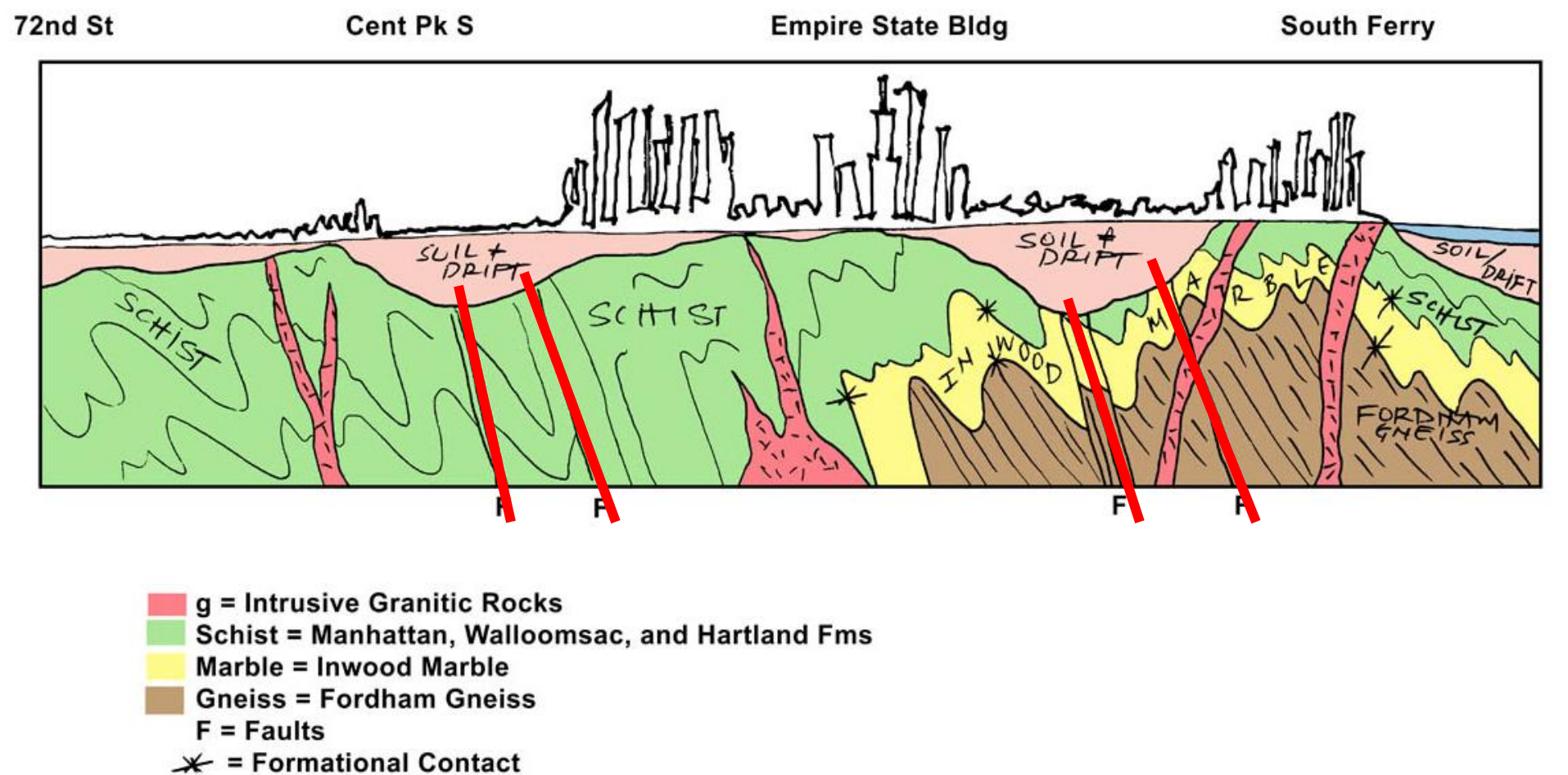
Buried Valley

**Carved By Old Glacier
Backfilled by Younger
Glaciers**

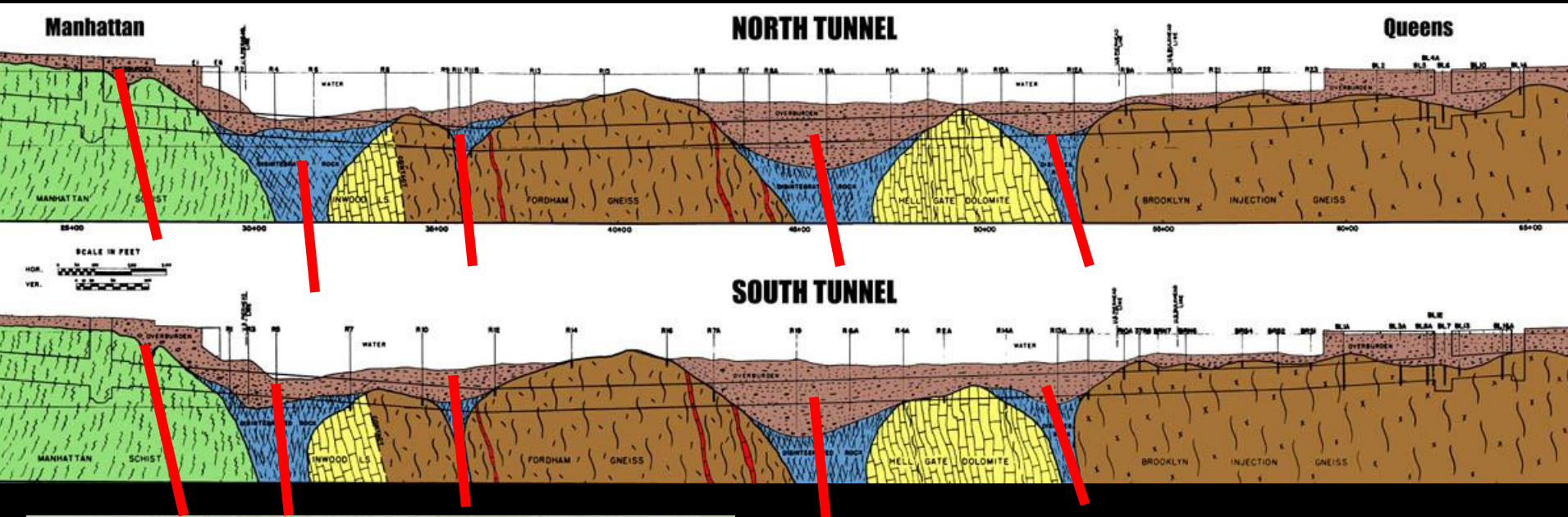
**Sites in Valley Contain
NJ Serpentinite in Till**



Longitudinal Profile - Manhattan



Queens Midtown Tunnel

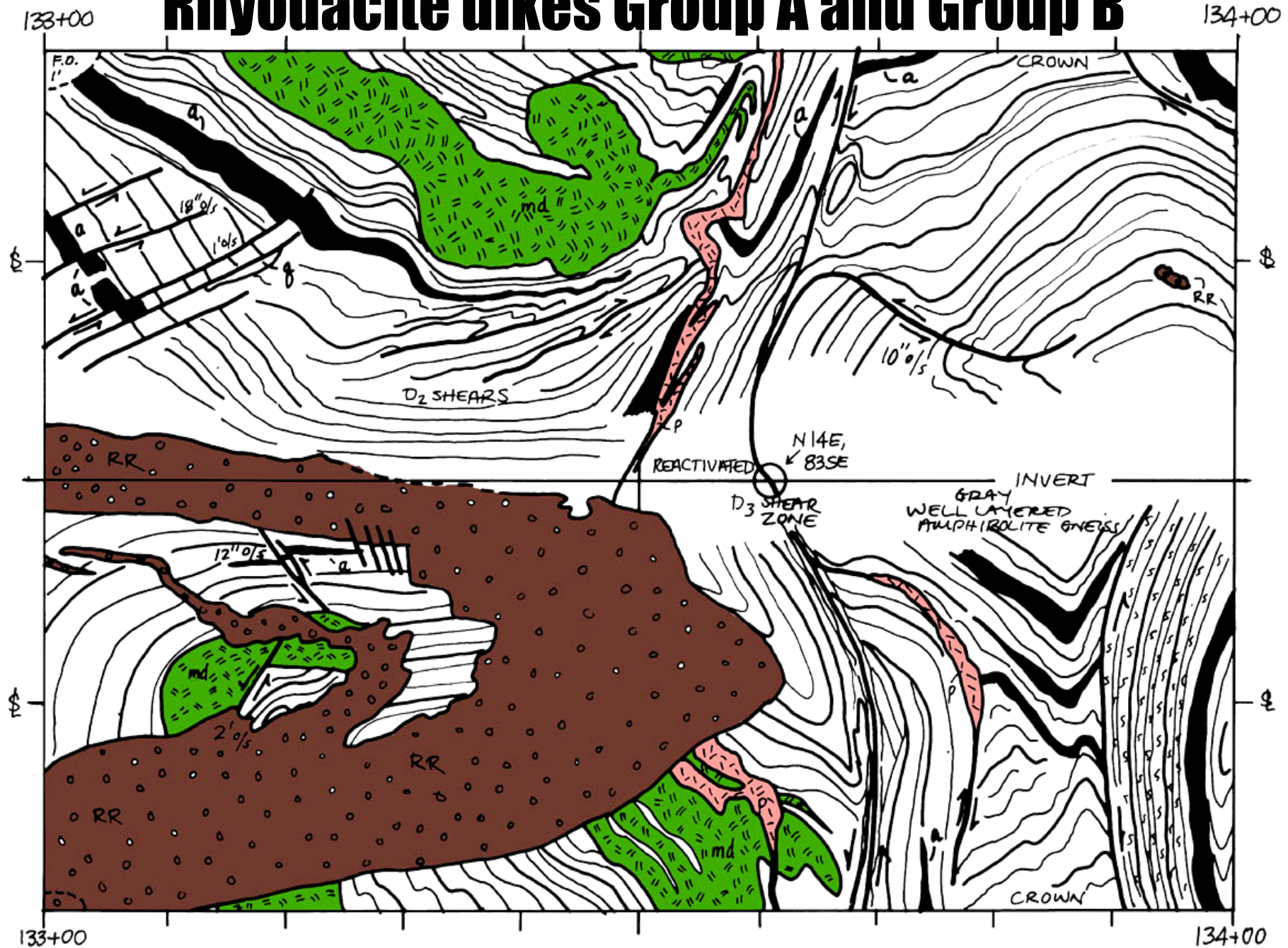


Built 1936-1940

**Older NE-Trending
Fault System**

after Berkey, 1948

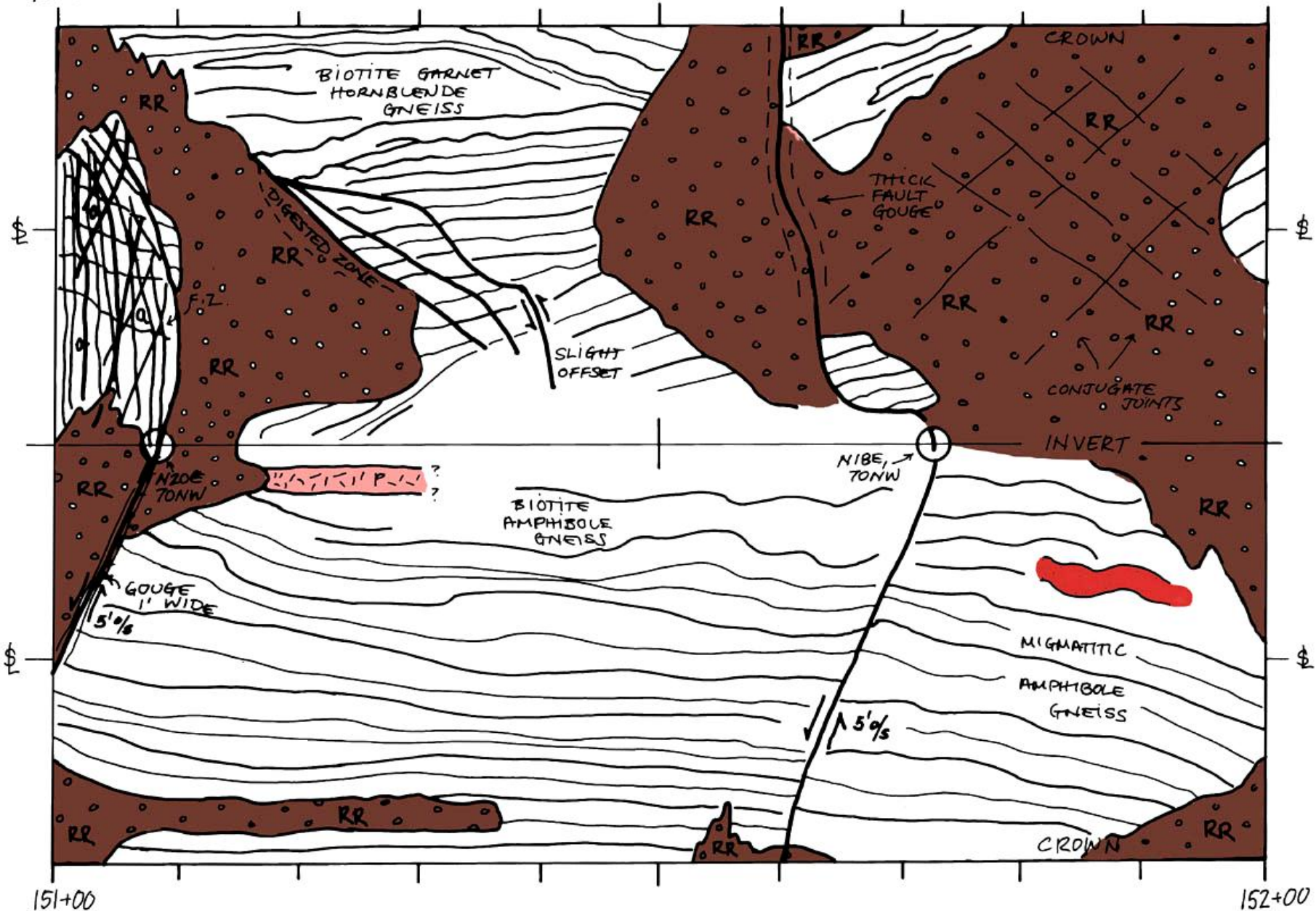
Rhyodacite dikes Group A and Group B



Group B Faults



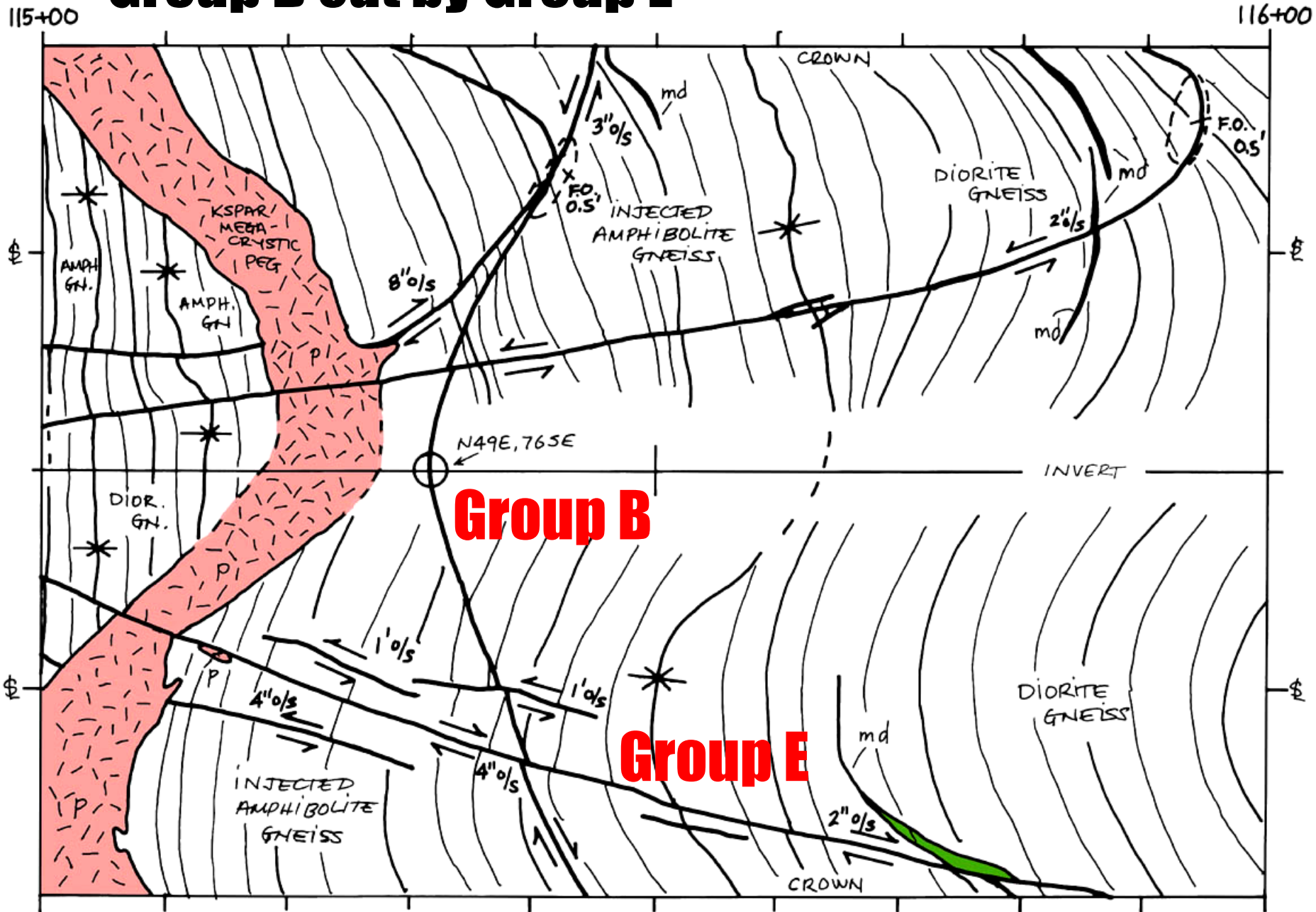
152+00



NNW-Trending Fault System of Group E

- NNW strike and steep dips**
- R/L and L/L strike-slip offset**
- Follow S_4 traces of open cross folds (F_4)**
- Commonly healed with quartz +/- pyrite**
- Youngest fault group – they cut all tunnel structures**
- Reactivate many older faults**
- Associated with areas of stress relief**
- Produced wet zones in areas of fault convergence**

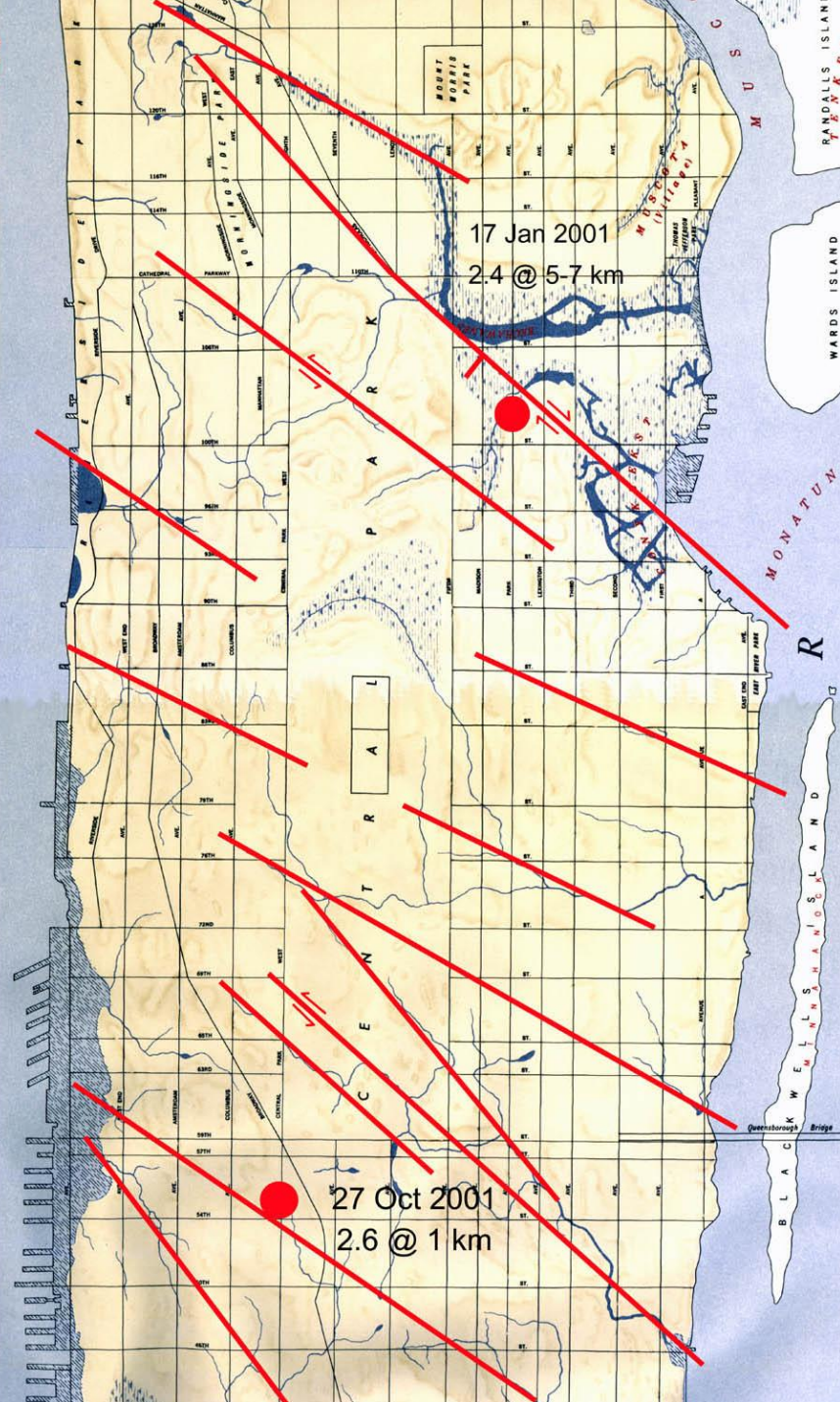
Group B cut by Group E



Crown Failure in Overstressed Rock

Queens Tunnel Sta. 253+40





**Manhattan
Schist**

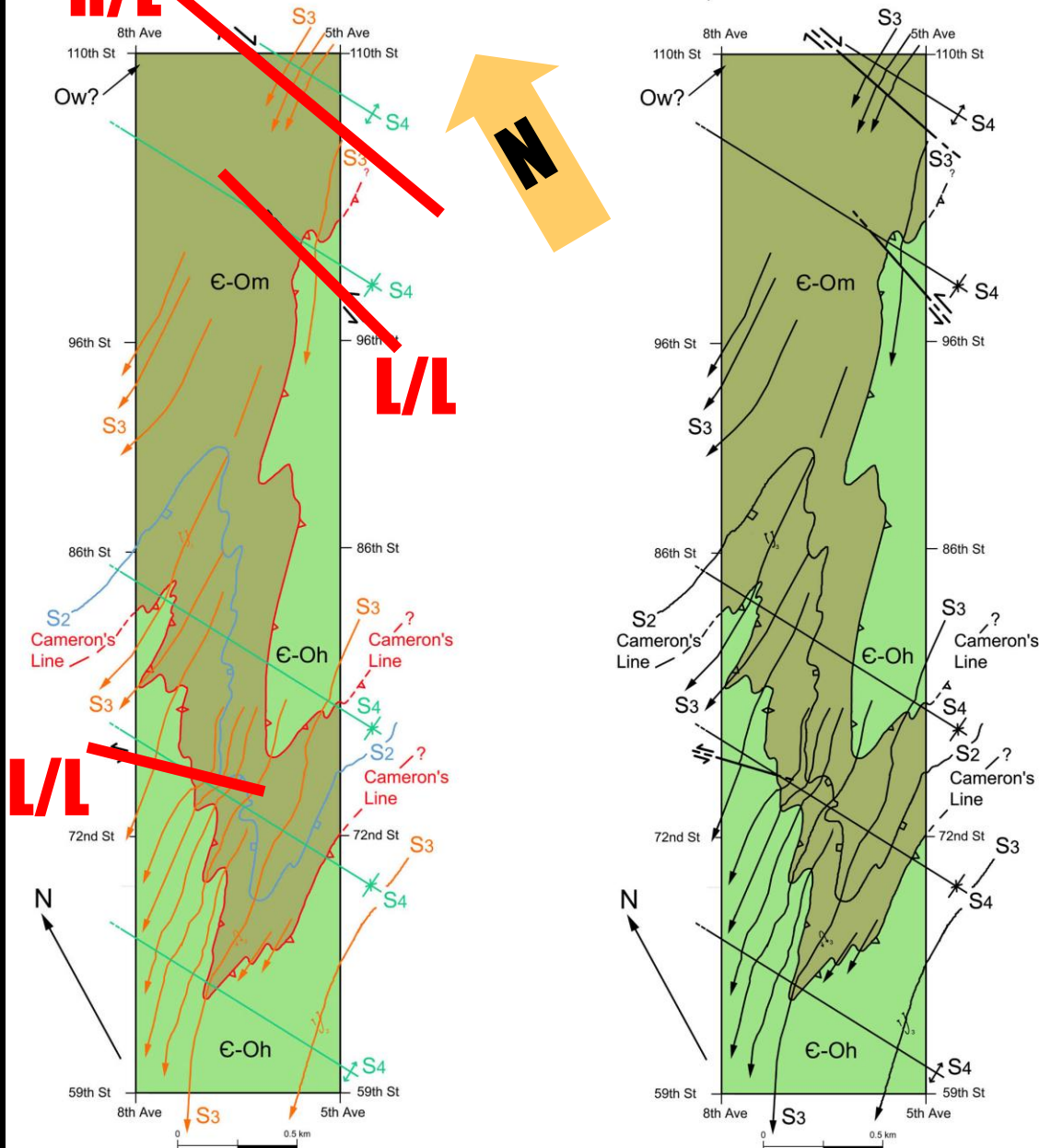
**Offsets F_3
Syncline**

N537

Group E - N12°W, L/L Fault



PRELIMINARY GEOLOGICAL MAP OF CENTRAL PARK, NYC



Group E Faults In Central Park

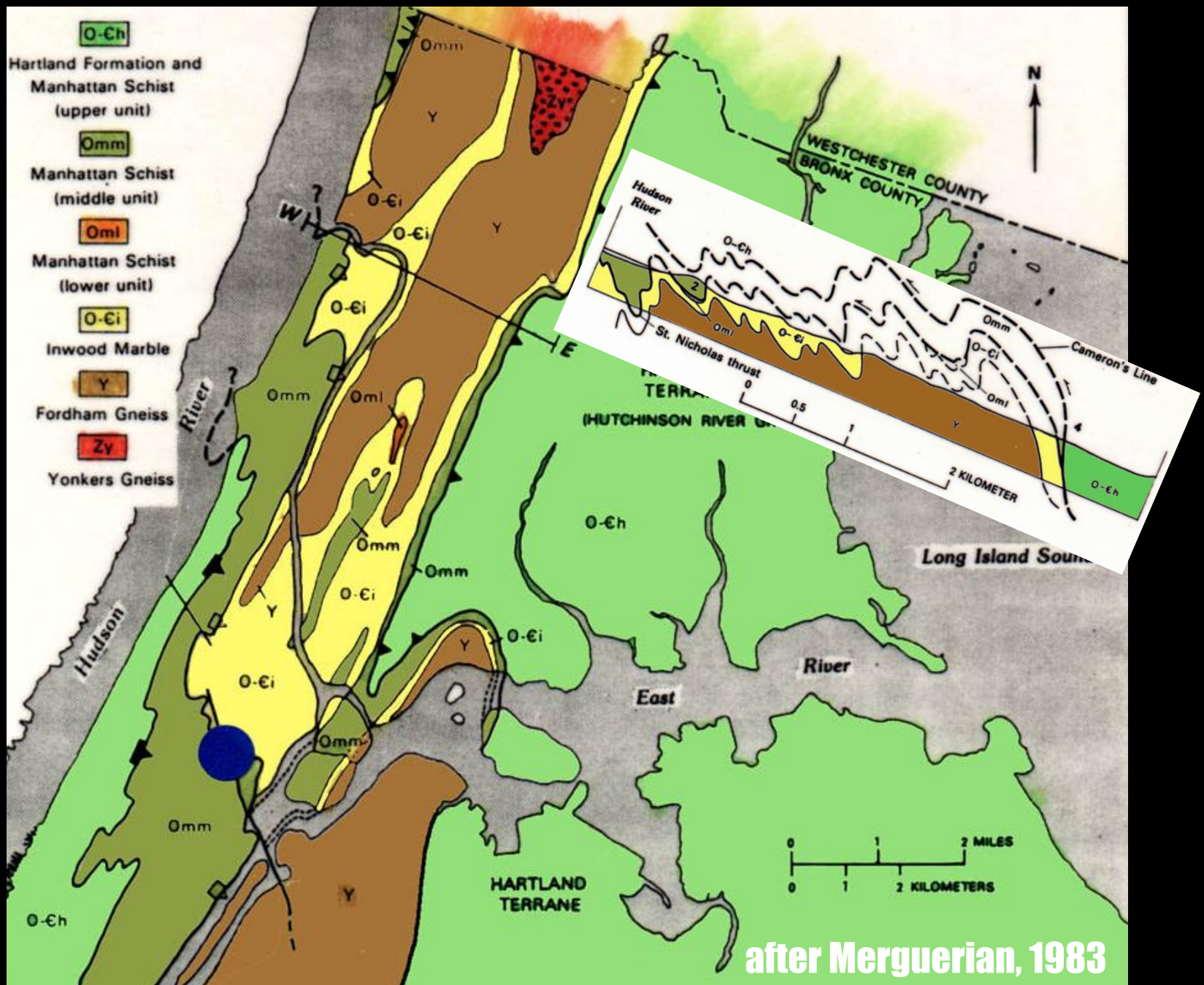
Basemap From
Merguerian and
Merguerian, 2004

Group E - N45°W, 80°S L/L Fault



N296 Hartland Fm

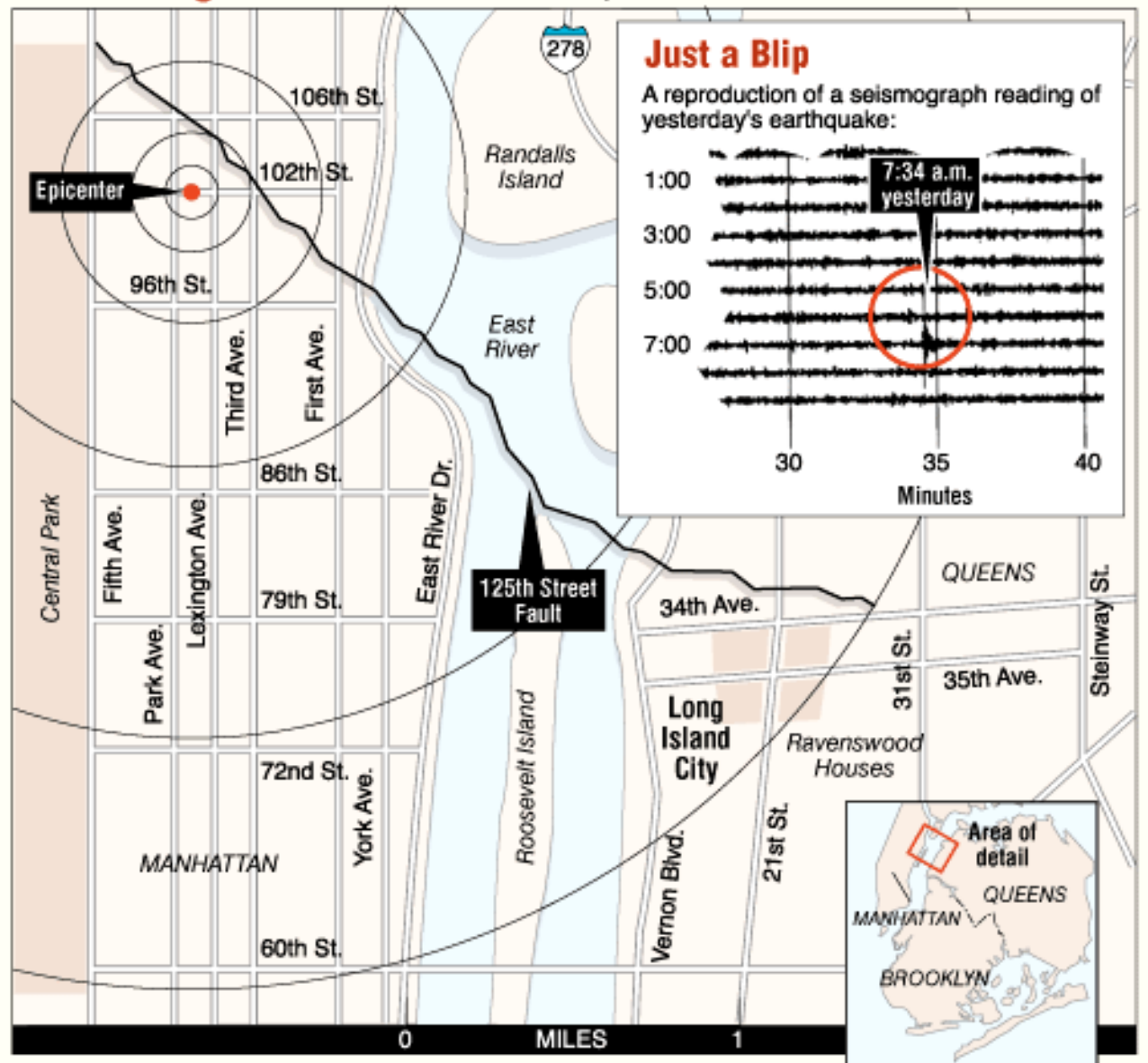




17 January 2001, M = 2.4

A Morning Jolt

The epicenter of yesterday's earthquake and a look at the 125th Street fault; believed to be where the quake occurred.



27 October 2001; M = 2.6



72nd St

Cent Pk S

Empire State Bldg

South Ferry

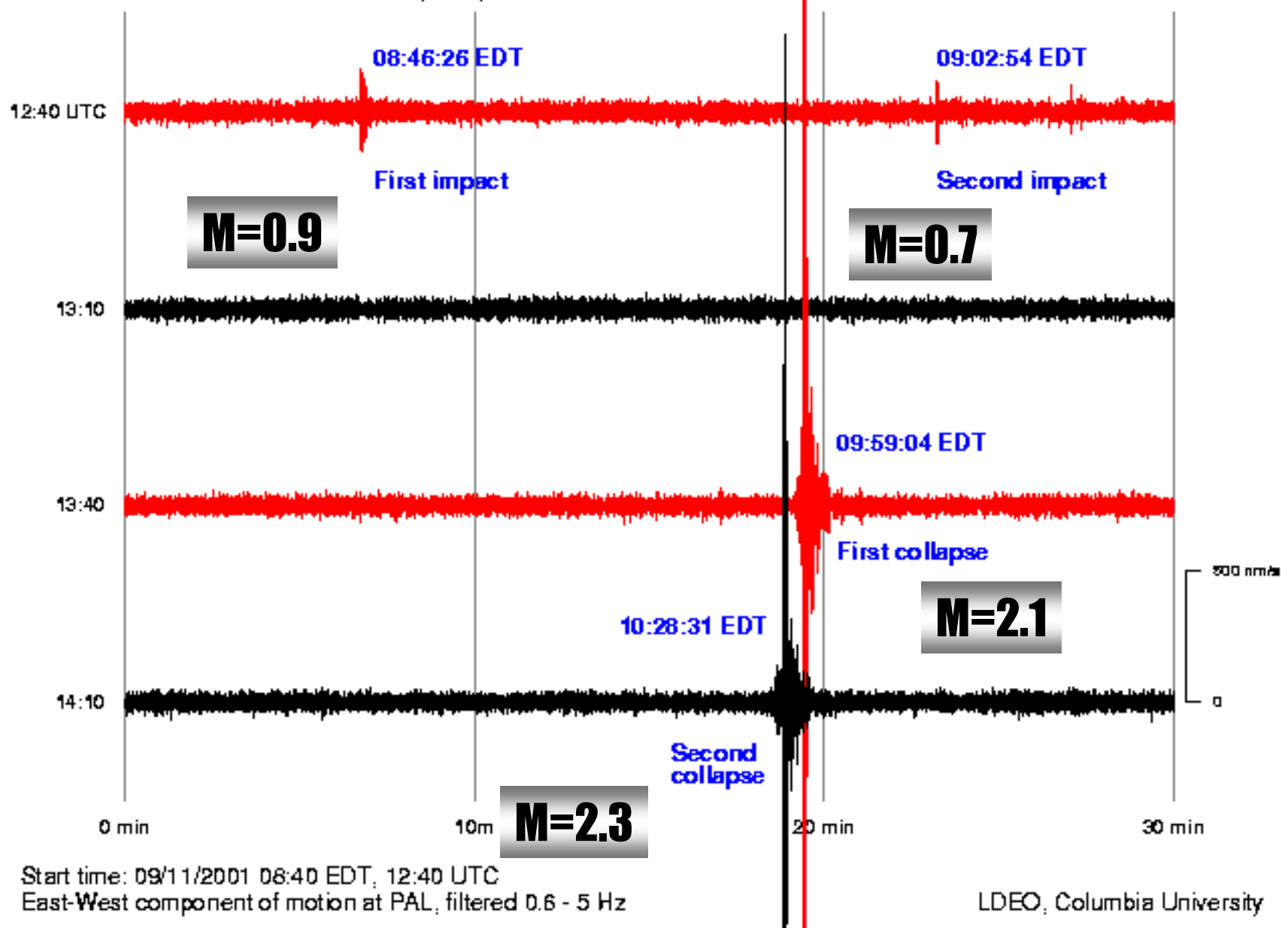


- g = Intrusive Granitic Rocks
- Schist = Manhattan, Wallomsac, and Hartland Fms
- Marble = Inwood Marble
- Gneiss = Fordham Gneiss
- F = Faults
- * = Formational Contact

11 Sept 2001



Seismic Record at Palisades, NY, 34 km North of the World Trade Center Disaster



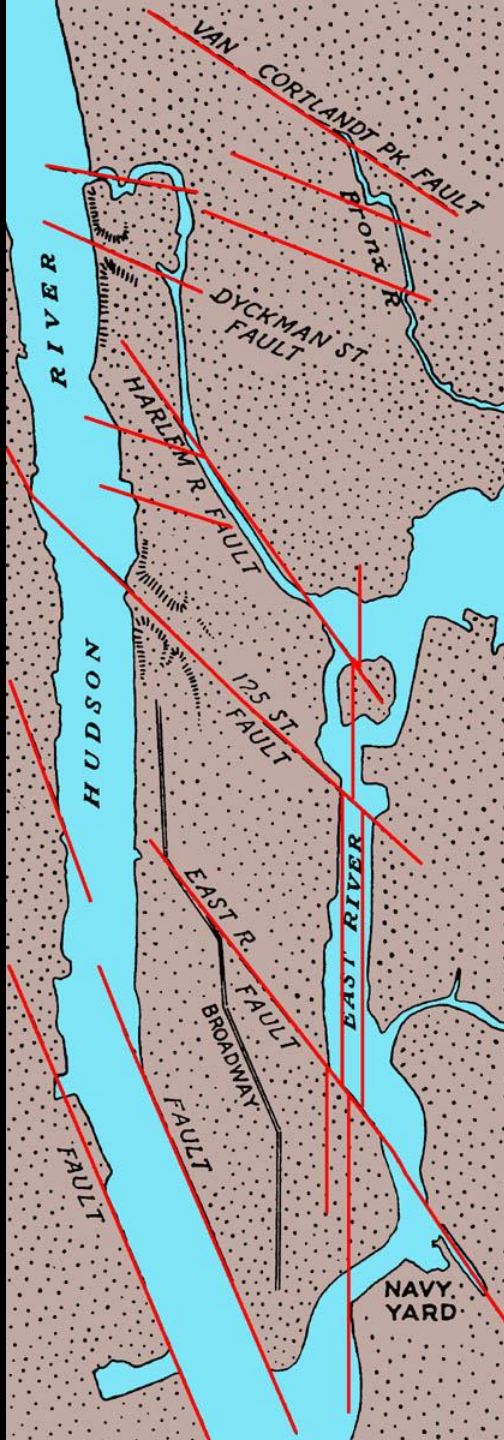


It's Not My Fault! He put me up to this!

125th Street Manhattanville Fault



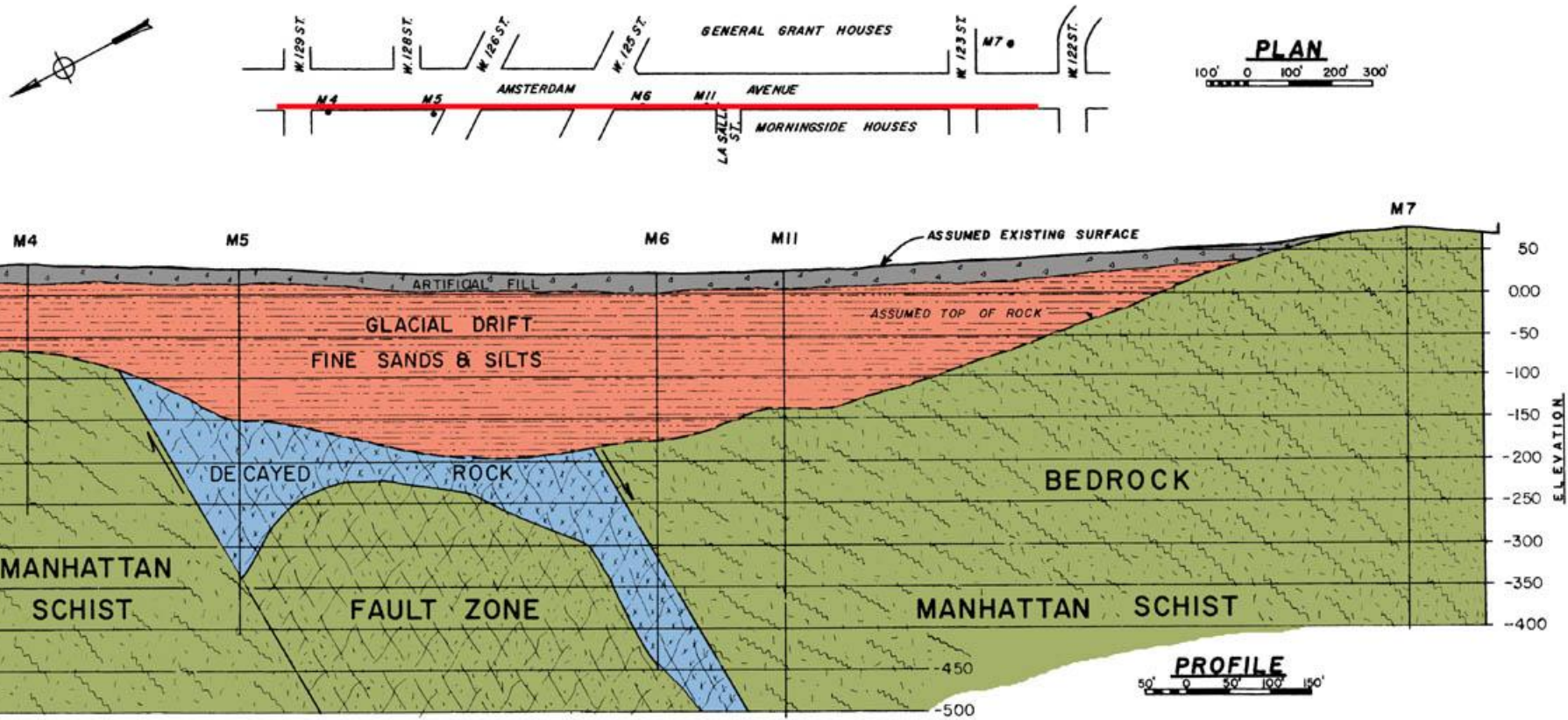
Group E Faults



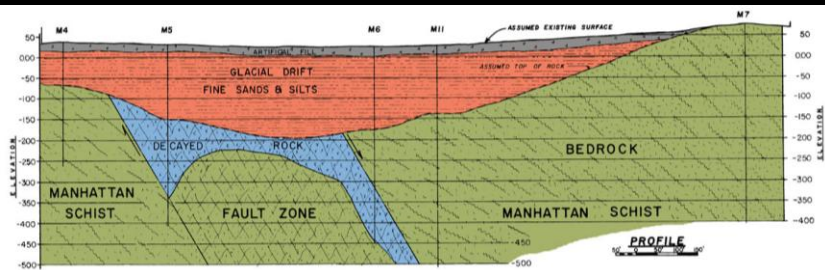


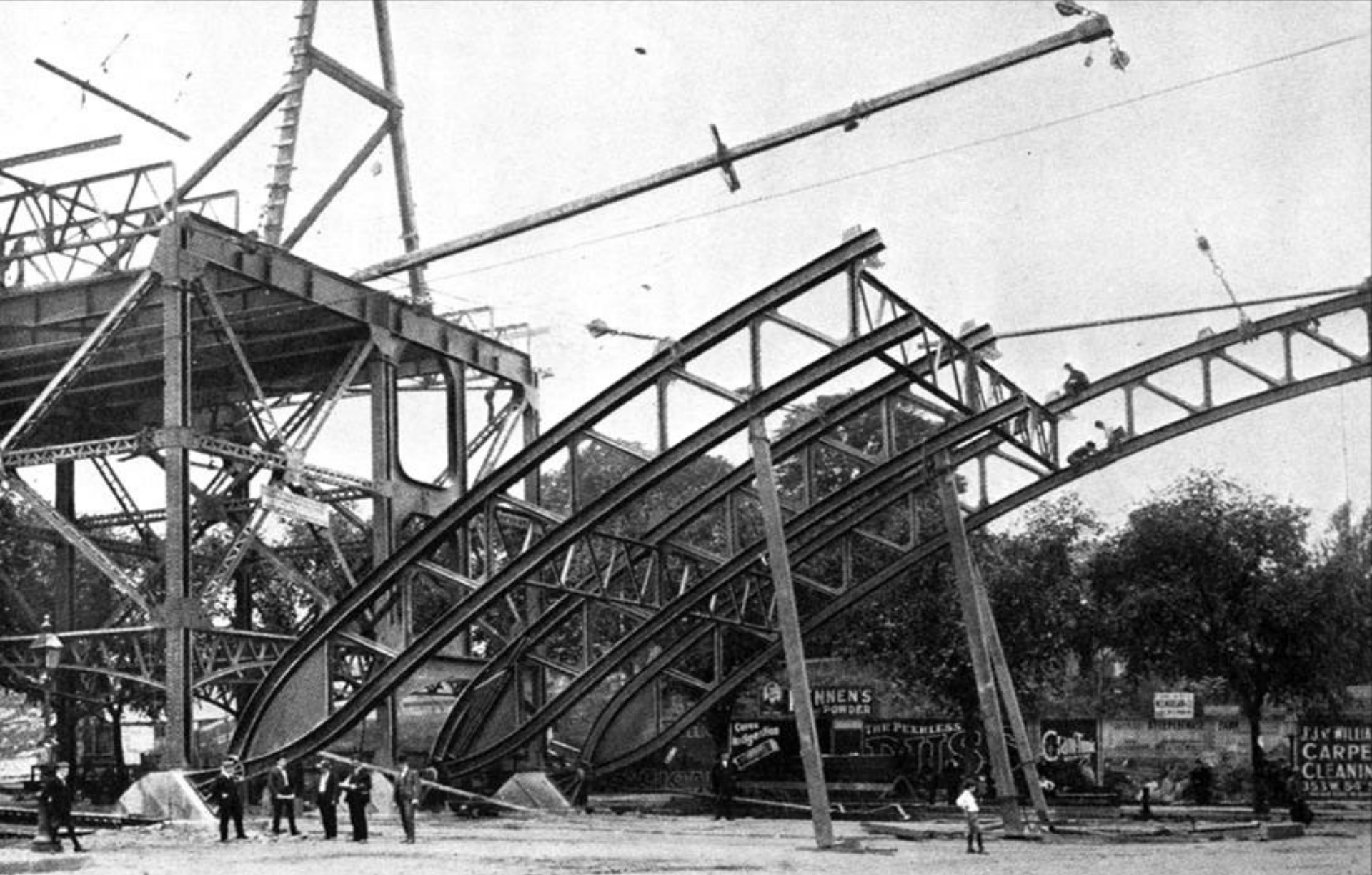
125th Street Fault, CT3, Stage 1

Manhattanville “125th Street” Fault

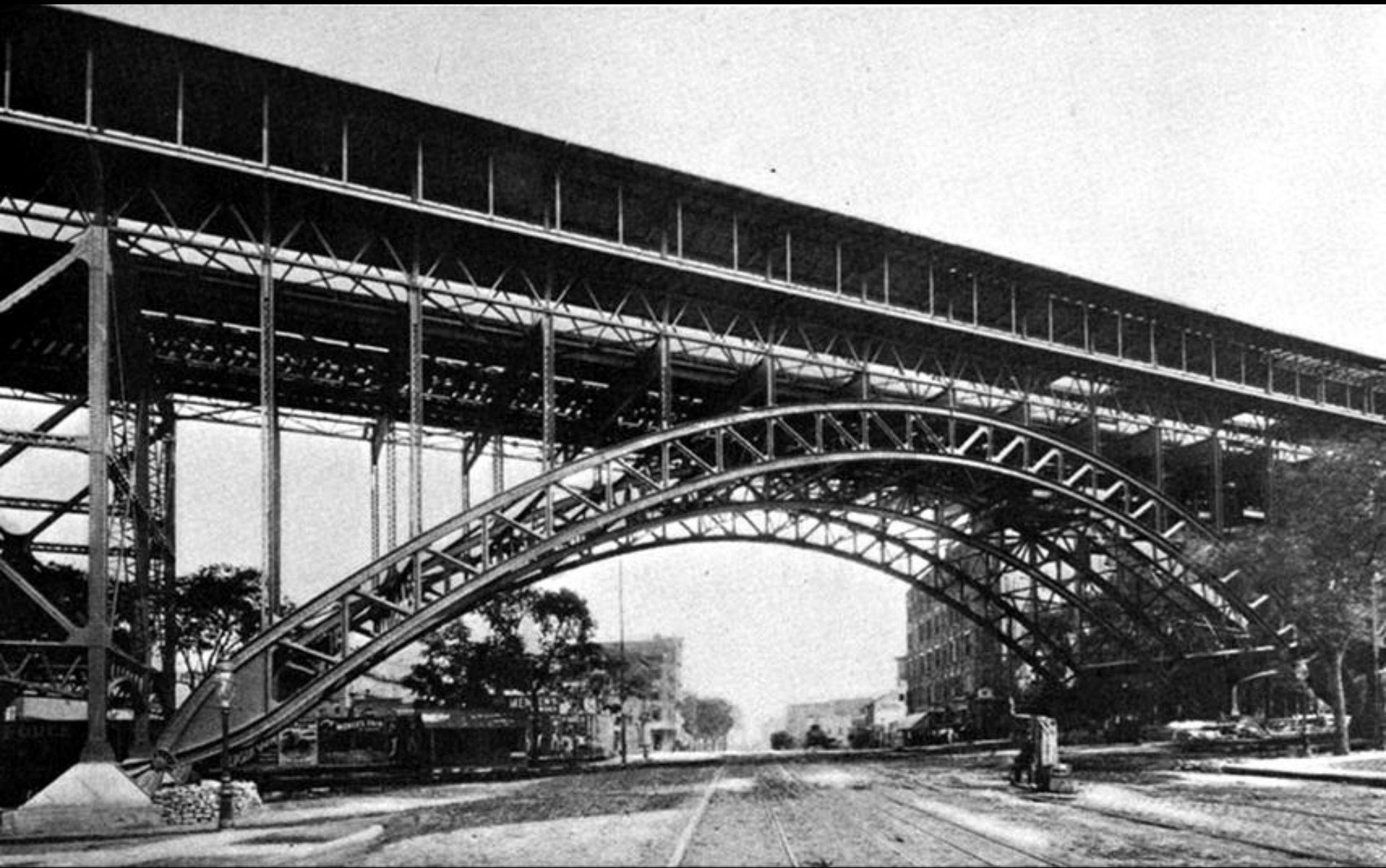


View North on Amsterdam Avenue into 125th Valley





Manhattanville Bridge Construction, circa 1908



Manhattanville Bridge, circa 1900





IRT 117th Street and Broadway







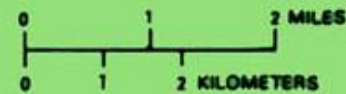
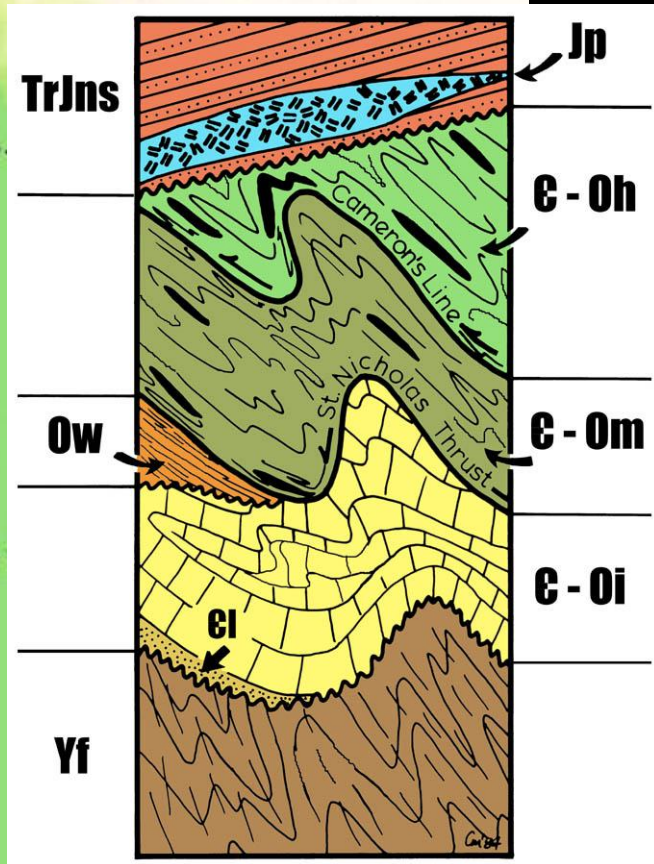
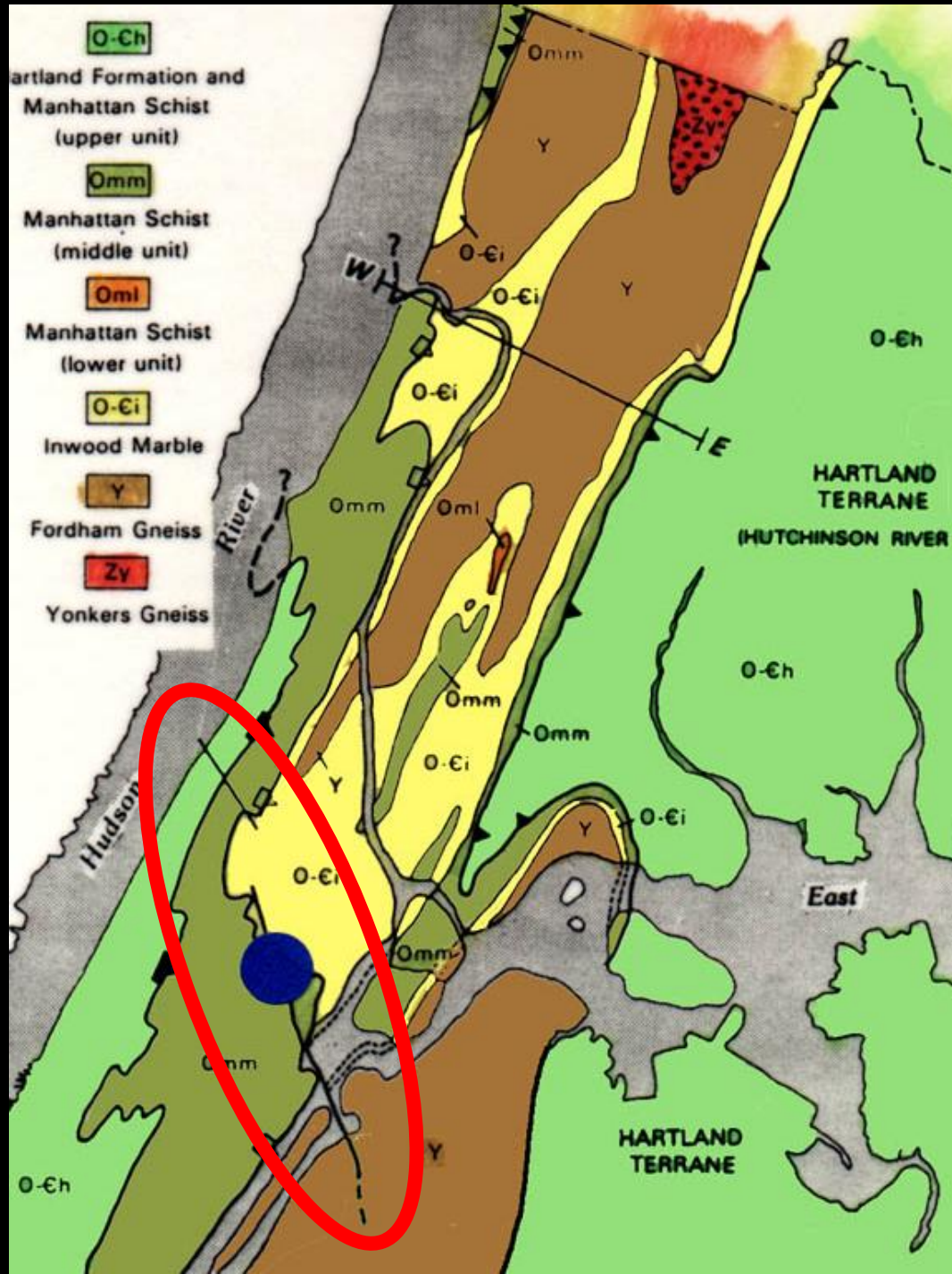


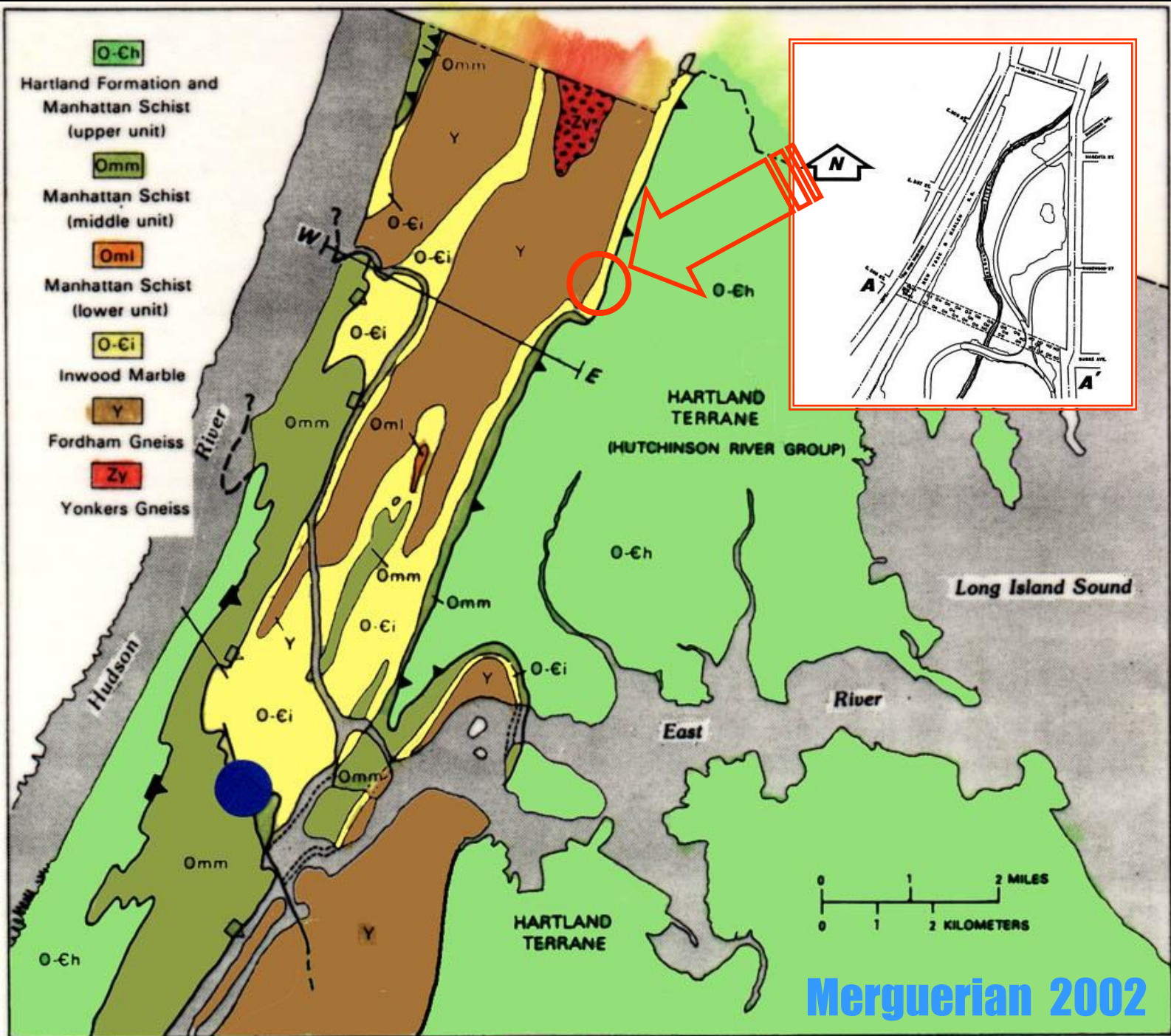
H&R BLOCK

3200 BROADWAY

Expect Fair

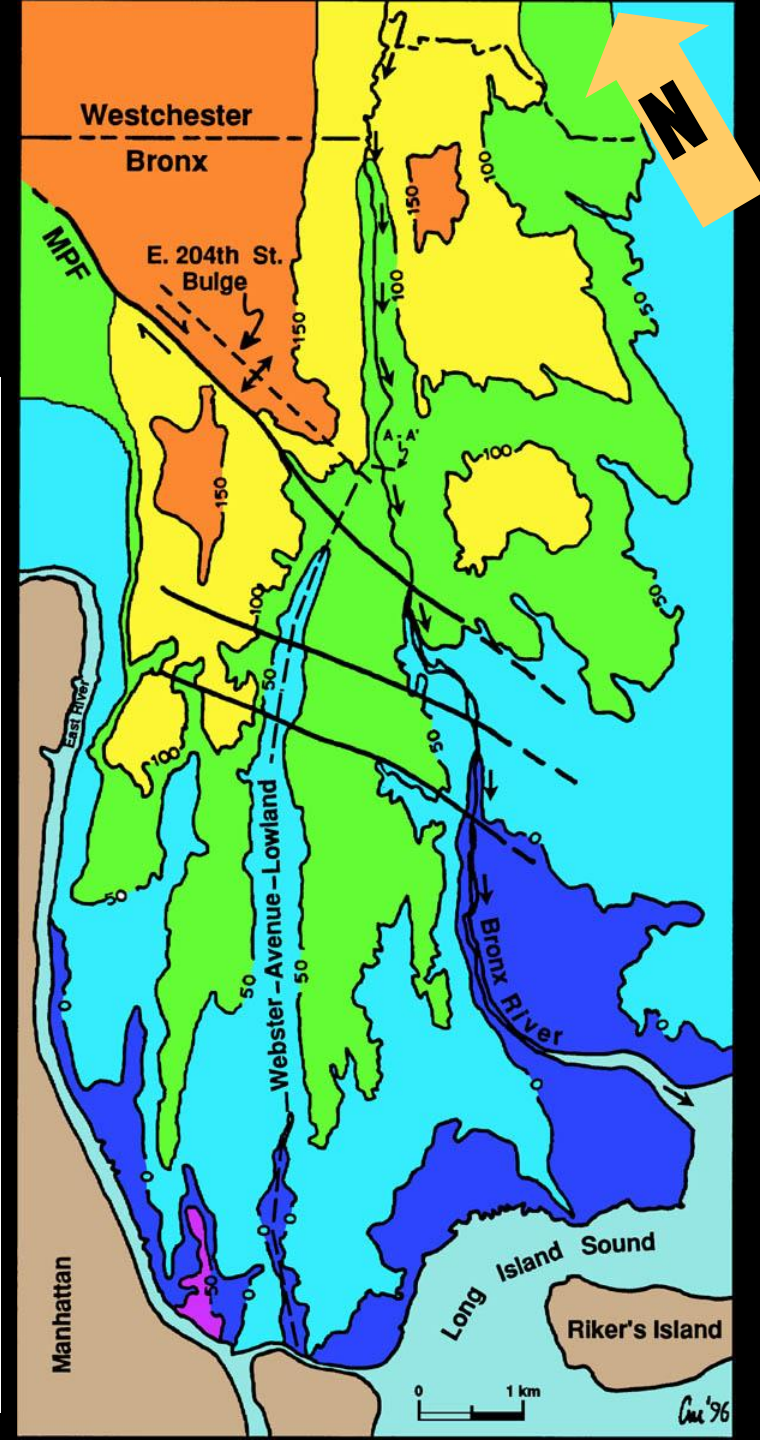
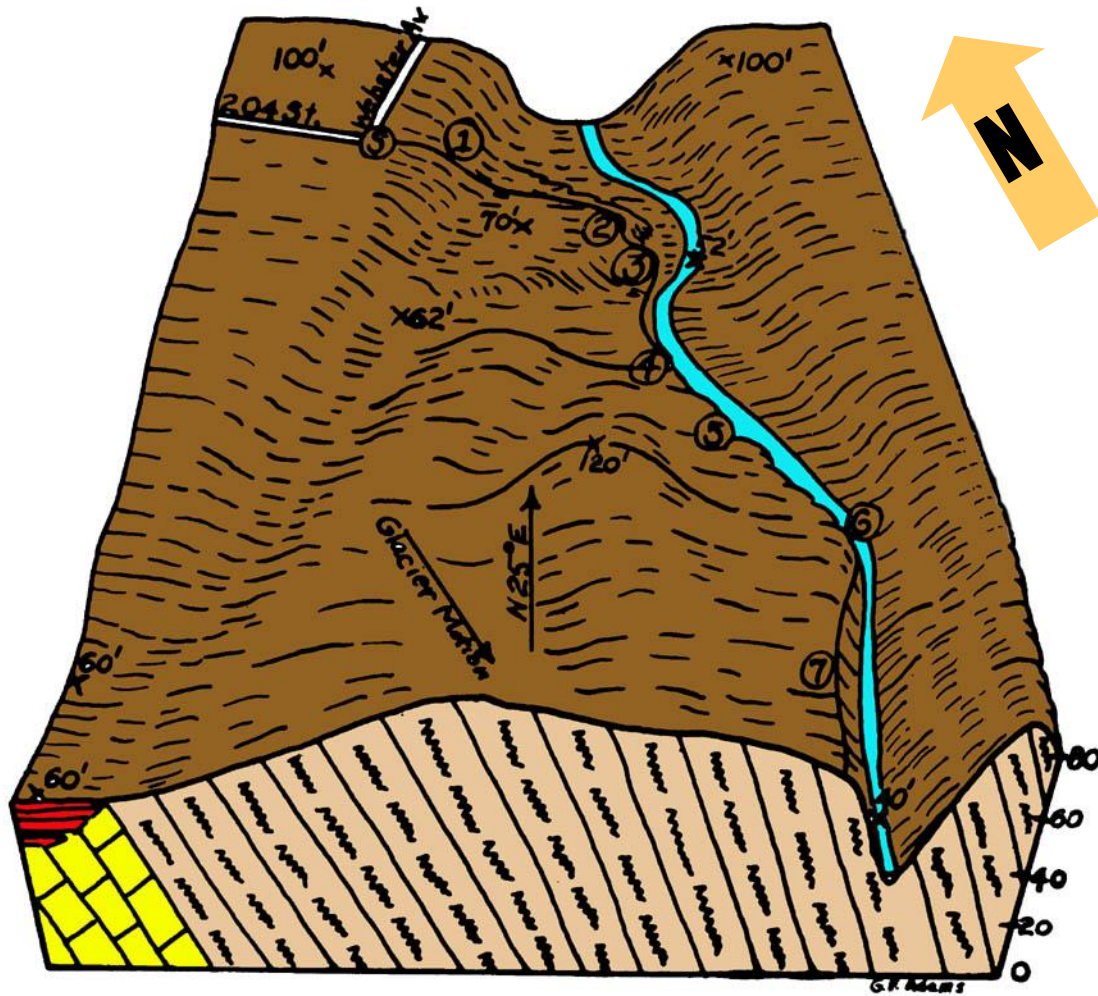






Merguerian 2002

Bronx River Drainage Anomaly

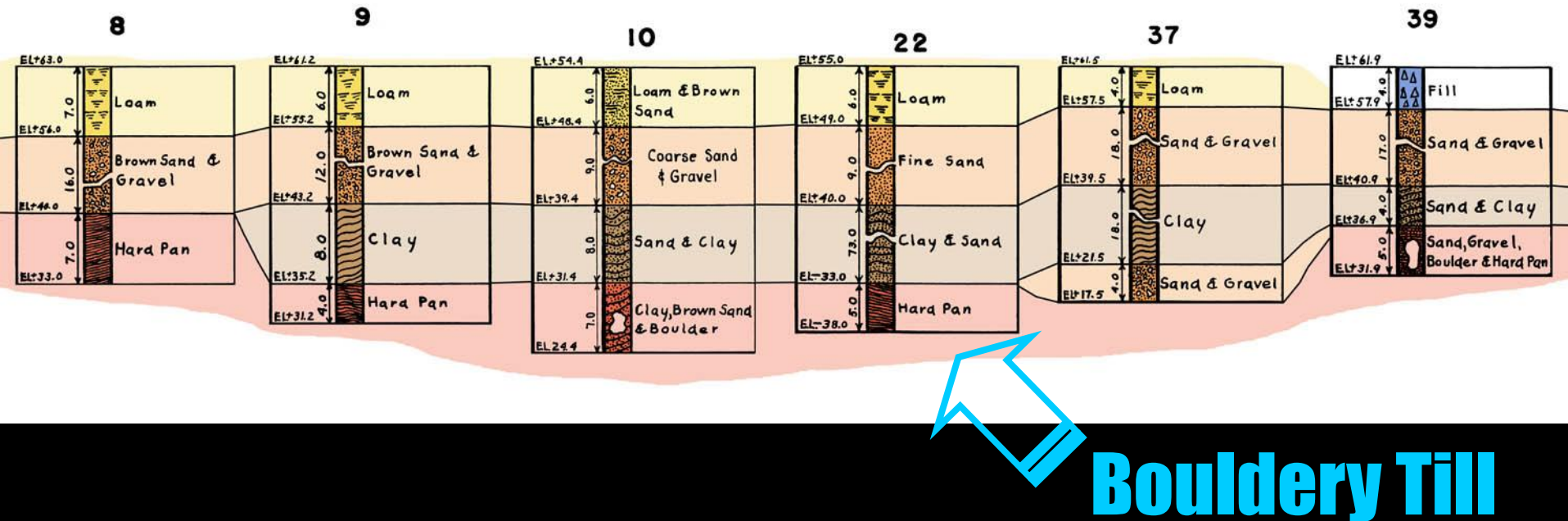




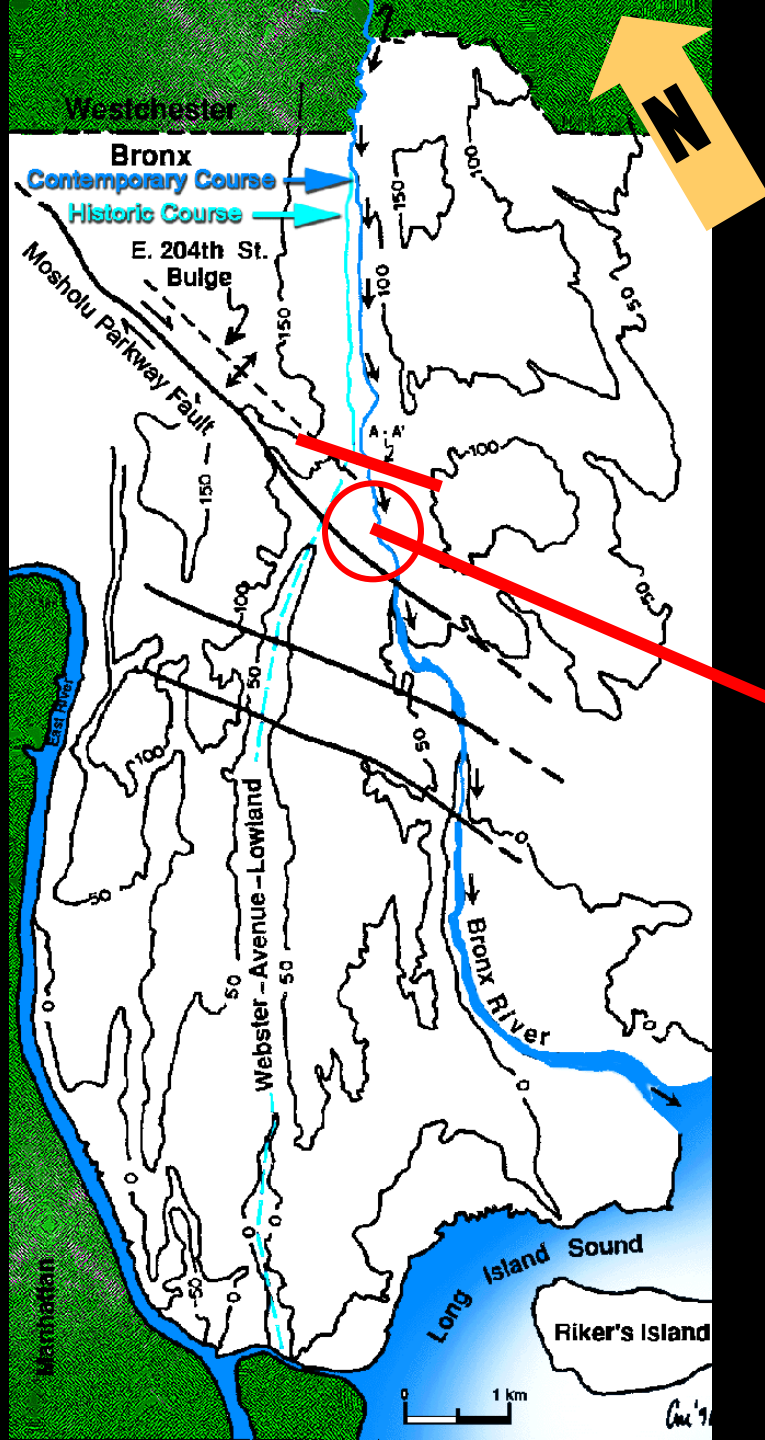
Joints

NW Joints, Mosholu Fault, Bronx, NY

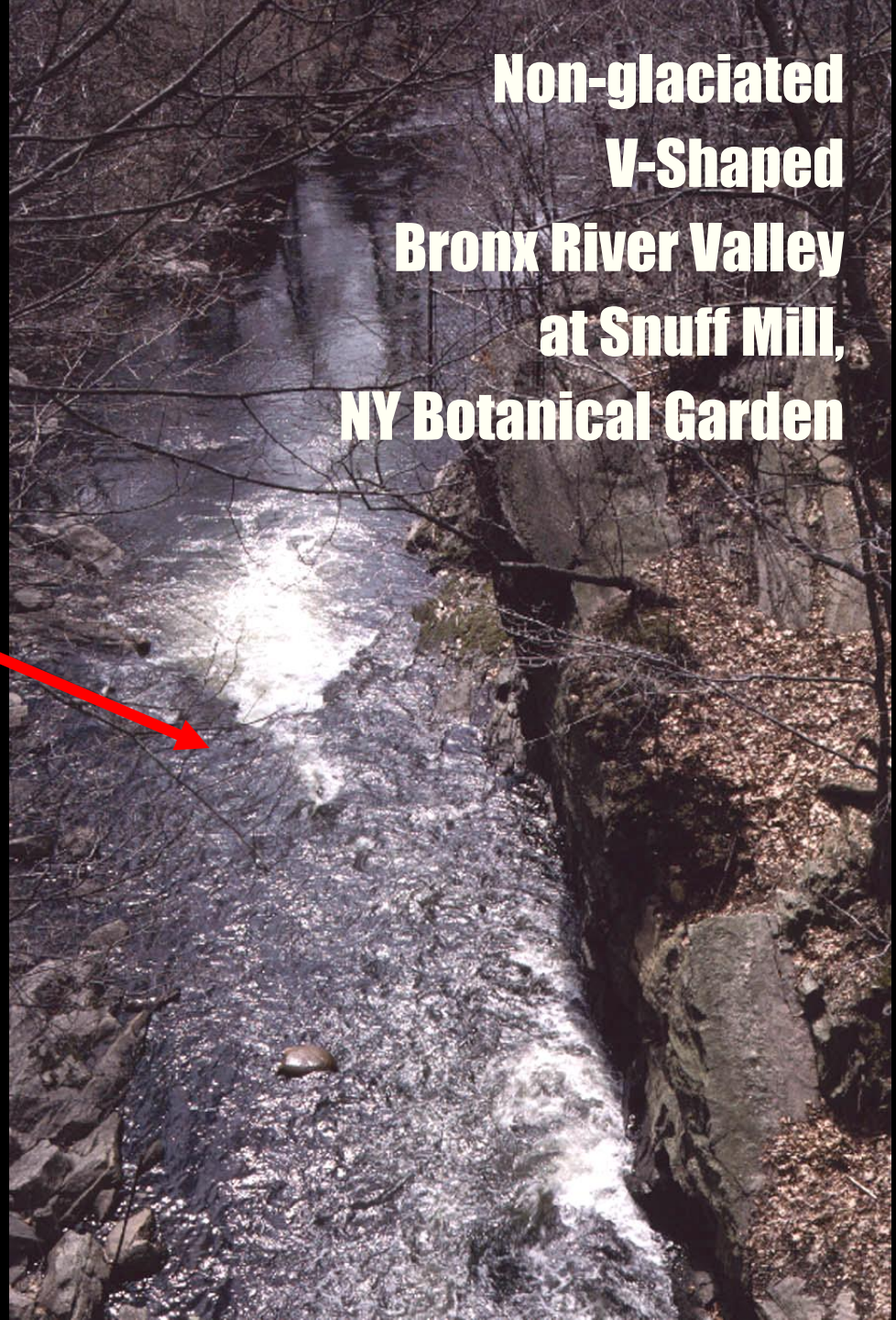
Burke Avenue Profile – Bronx WPA

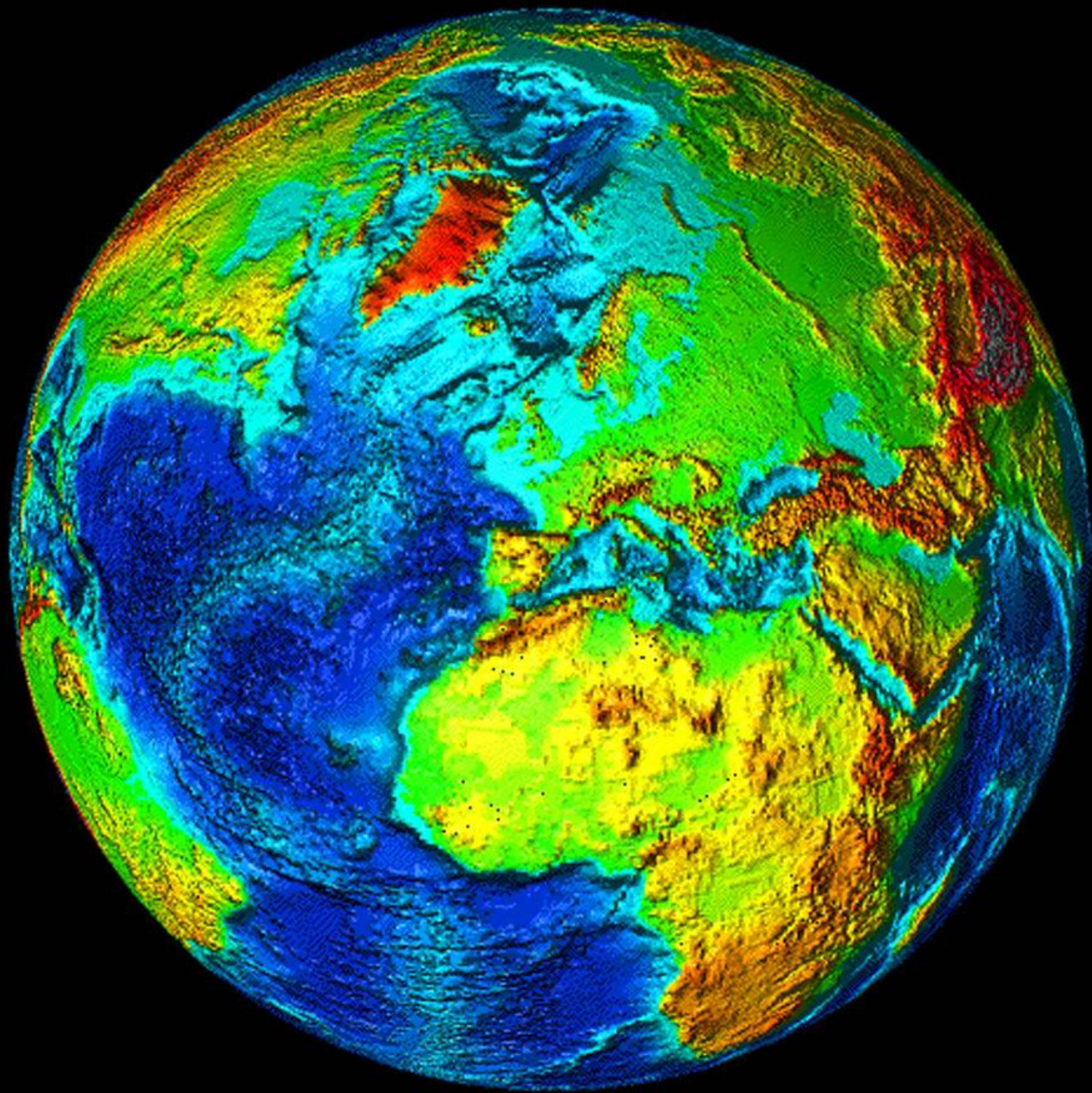


Stratified Lake Sediment Overlie Glacial Drift
Supports Hypothesis that Damming of Bronx River
was Post-Glacial

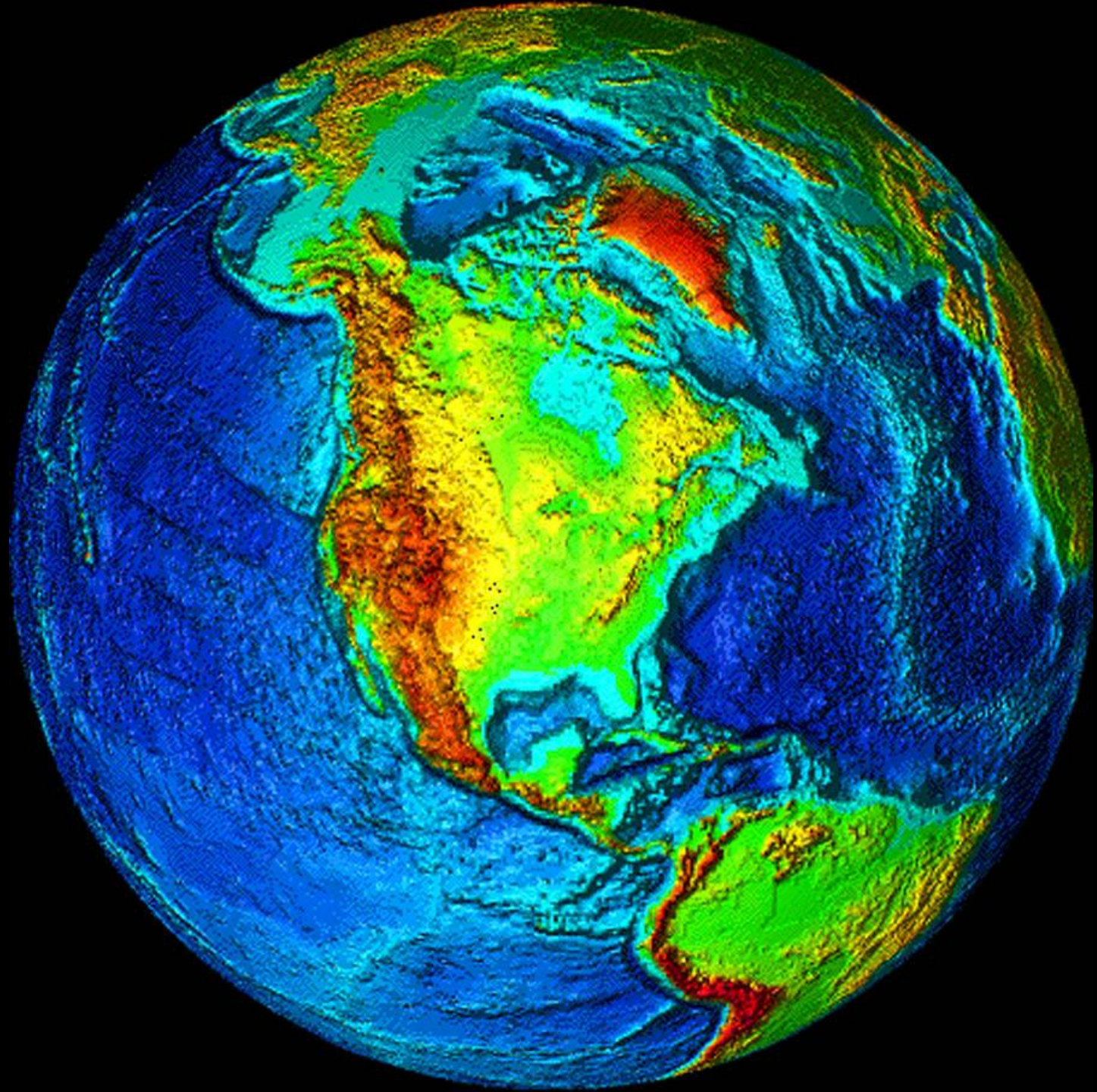


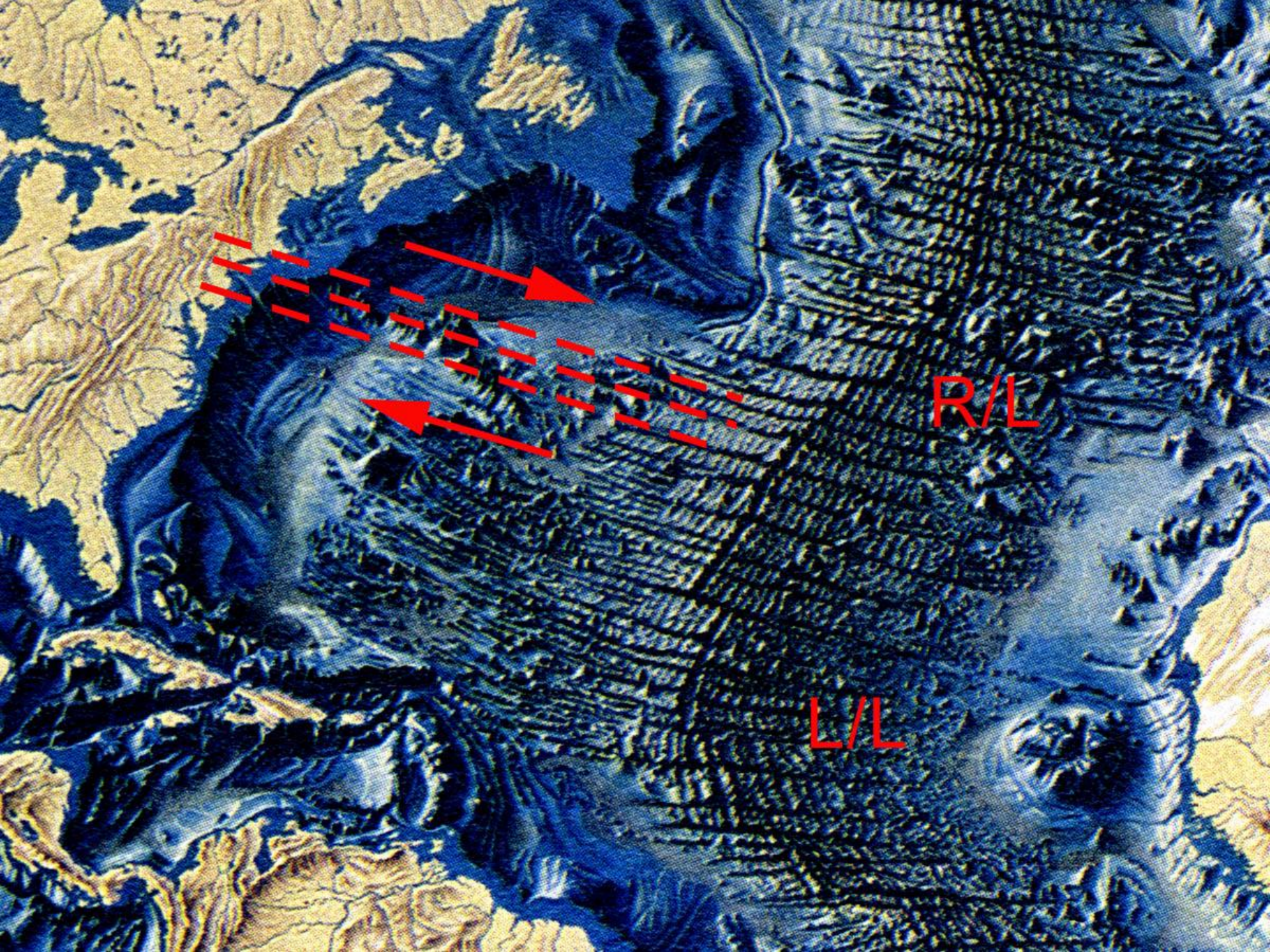
**Non-glaciated
V-Shaped
Bronx River Valley
at Snuff Mill,
NY Botanical Garden**











R/L

L/L



New York City Earthquake Can it Happen Here?

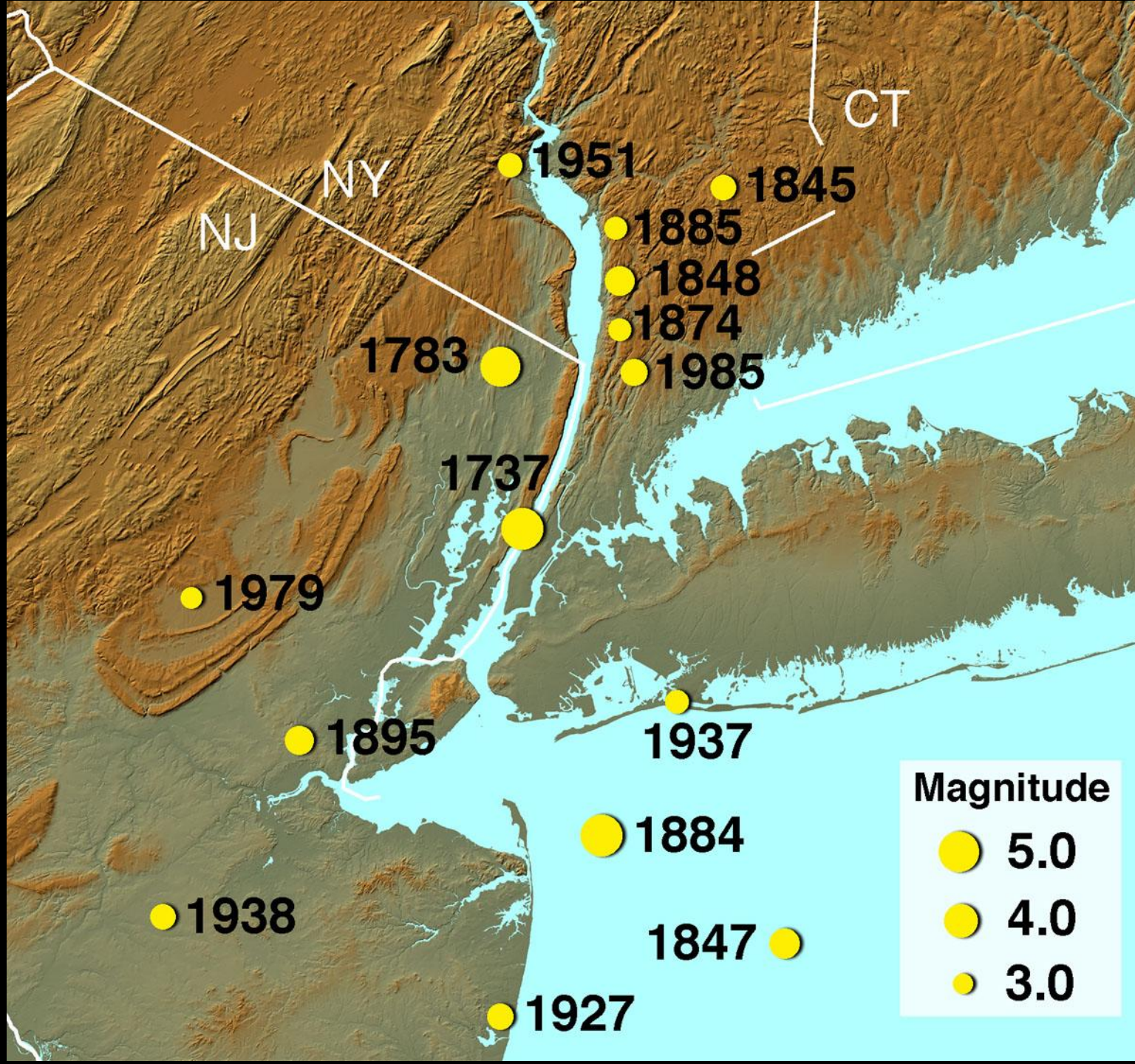
1737 **5.2**

1783 **4.9**

1884 **5.2**

20?? **?**







**How Well Will
NYC Withstand
A Moderate
Earthquake?**

How is NYC Built?

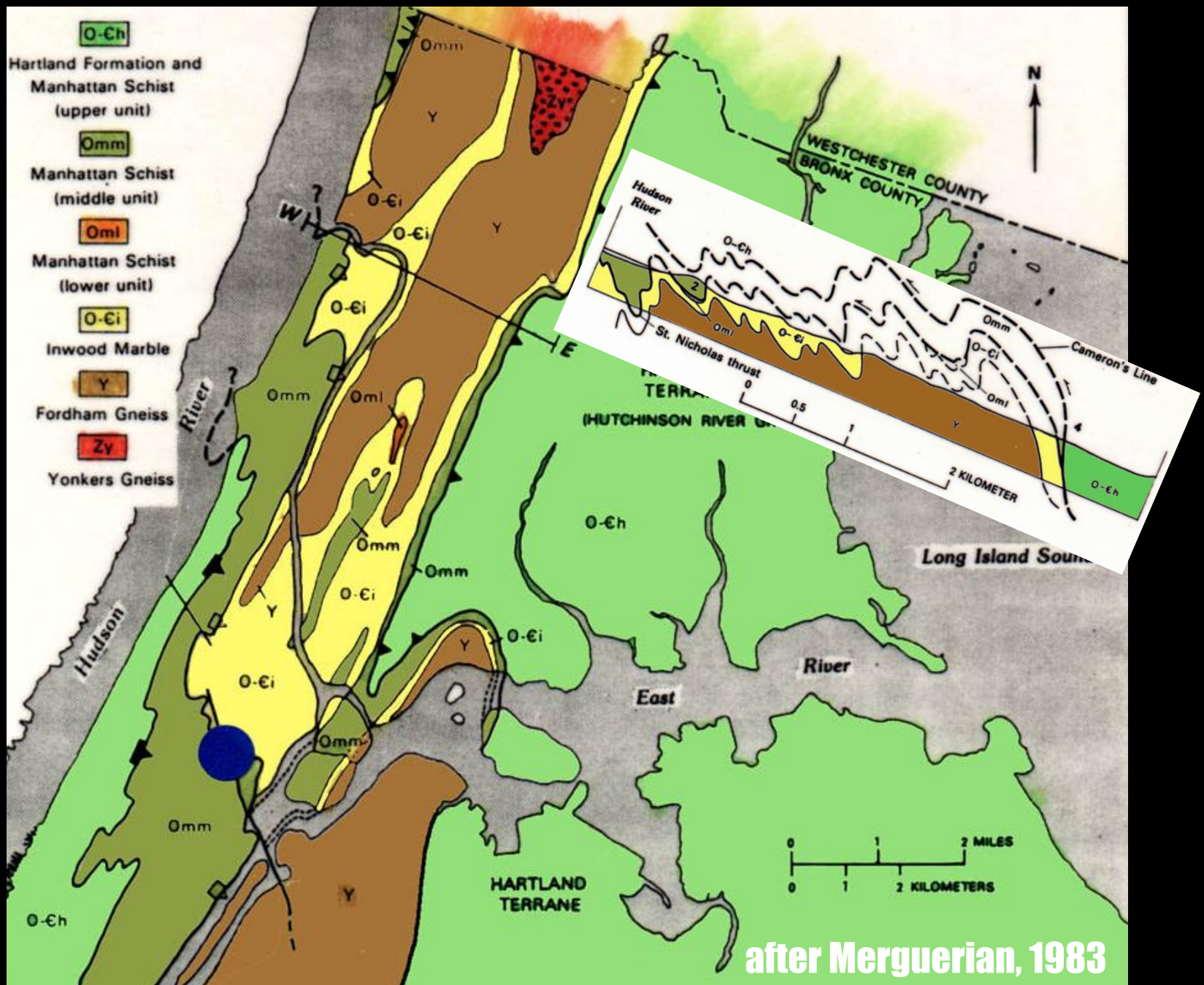


Download Geology Publications:
www.hofstra.edu
www.dukelabs.com

**What's That
Shaking
Going On?**

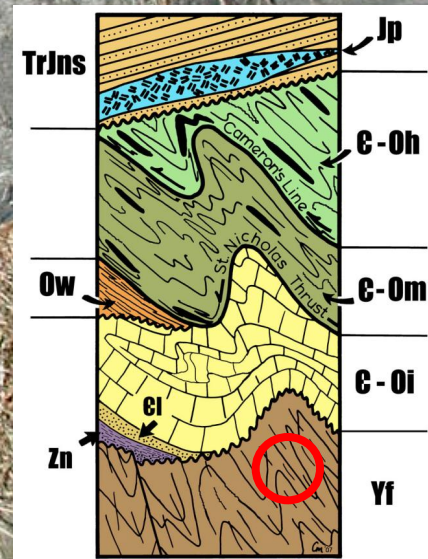


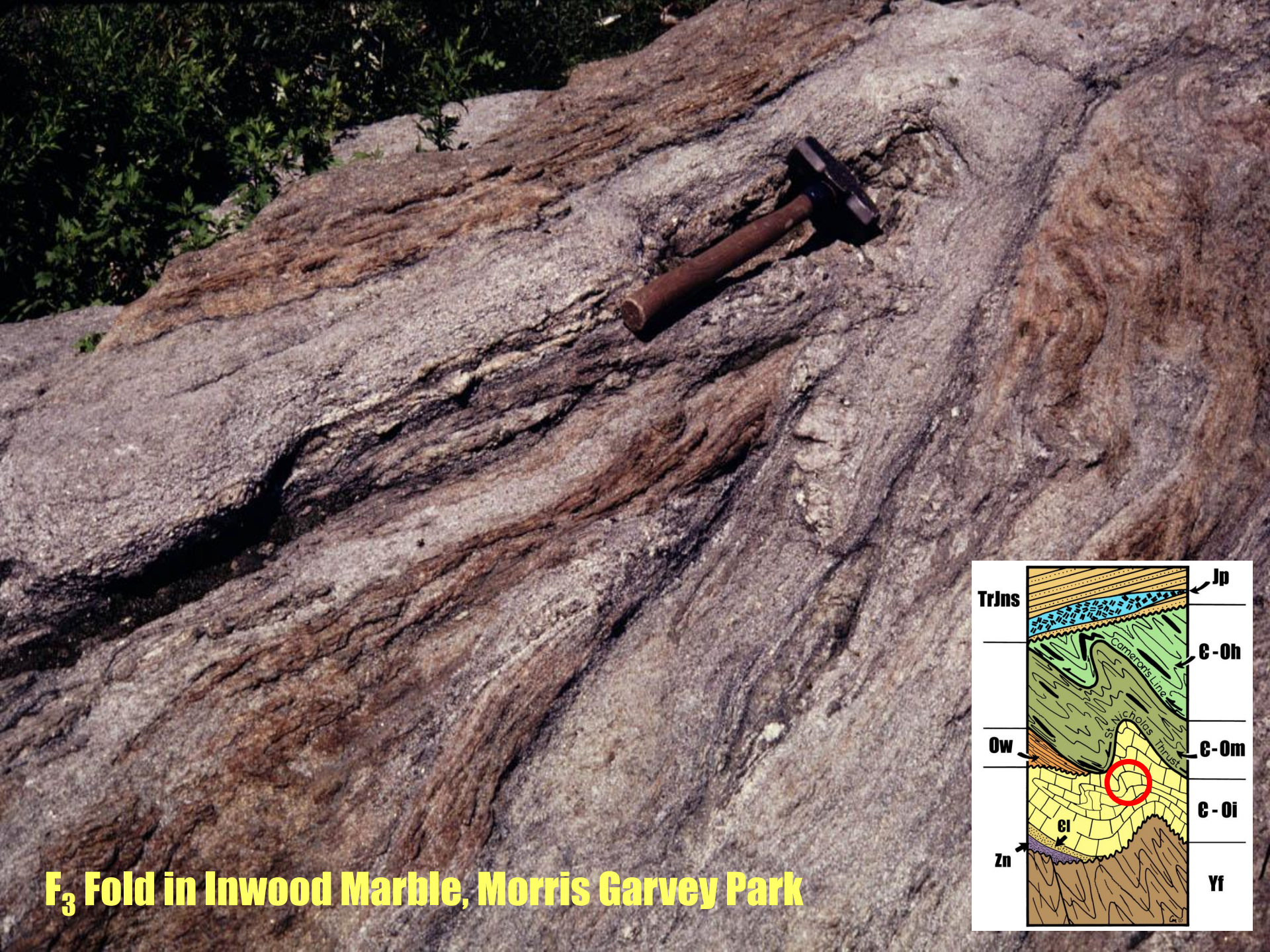
EXTRA SLIDES



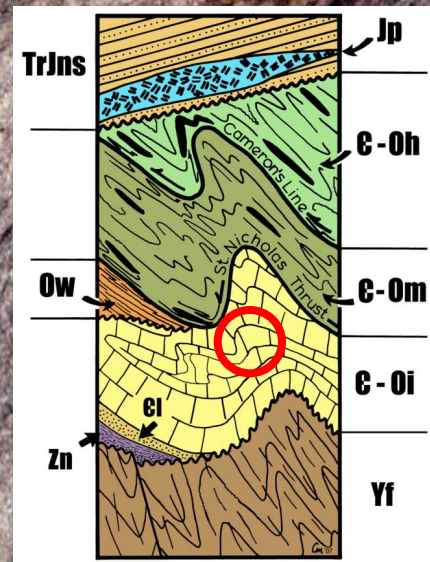


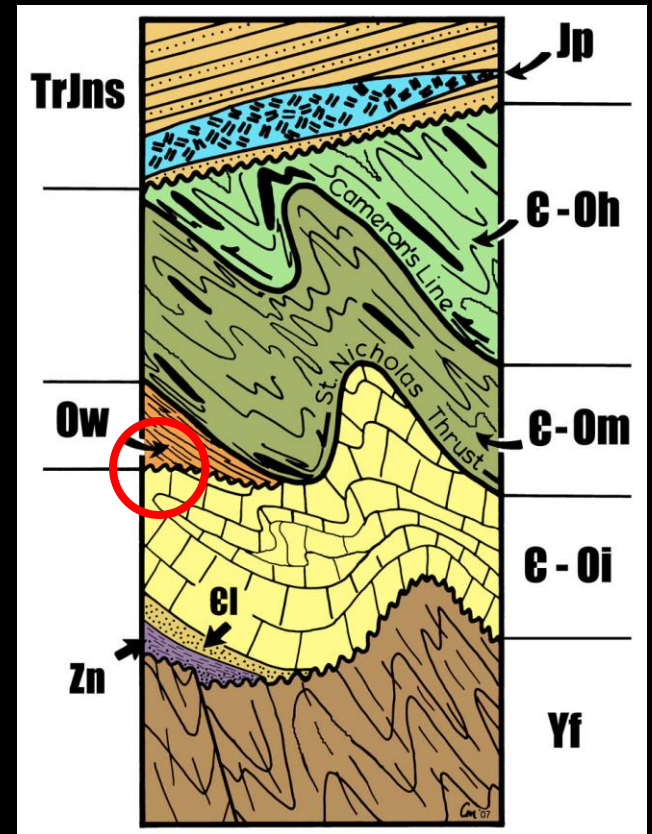
Fordham Gneiss, Echo Park





F₃ Fold in Inwood Marble, Morris Garvey Park

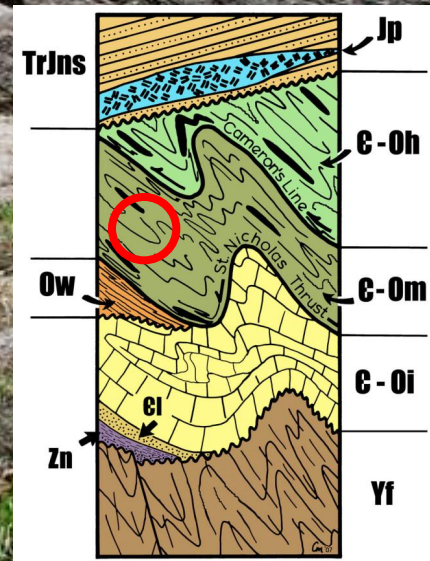




Walloomsac "Balmville" Contact, Grand Concourse, Bronx, NY

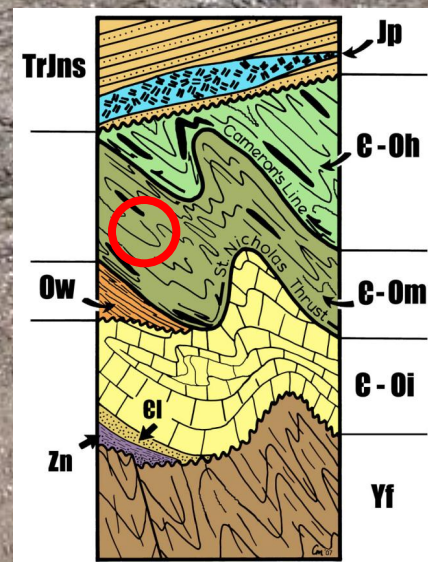


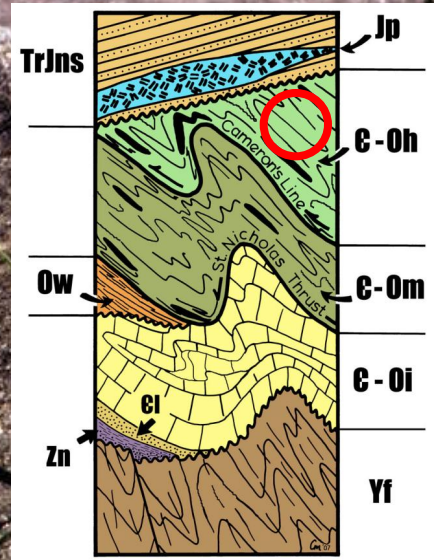
Manhattan Schist, Central Park



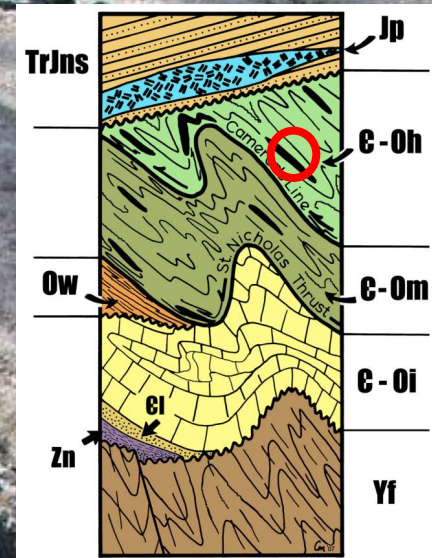


Retrograde Muscovite after Kyanite





Hartland Schist, Riverside Park



Hartland Amphibolite N567



