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CASE HISTORIES OF MINE SHAFT SUBSIDENCE OF ABANDONED COAL MINES IN THE RICHMOND TRASSIC BASIN, RICHMOND, VIRGINIA

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James Madison University

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Introduction

- Western Richmond Area in Chesterfield and Henrico Counties
- Richmond Triassic Basin
- First Mined Coal in New World

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Introduction

- Coal first discovered circa 1701 by Huguenot settlers on banks of James.
- Mining extended from 1700s to 1900s.
- Most mining occurred during mid 1800s.
- Mining operations range from “mom and pop” small-scale pits to large commercial production mines.
- Mining techniques and practices evolve with time.

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Introduction

- Much of the mining was undocumented.
- Lack of records concerning mined locations.
- Suburban sprawl encroached into previously mined areas in 1980s and 1990s and still continues.
- Abandoned mine features pose threat to public safety.

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Geology

- Triassic age rift basin
- Lenticular shaped
- Basin is about 30 mi long with maximum width of about 10 mi
- Bedrock is sandstone, siltstone, shale conglomerate and coal
- Mostly westward dipping beds
- Locally folded and faulted

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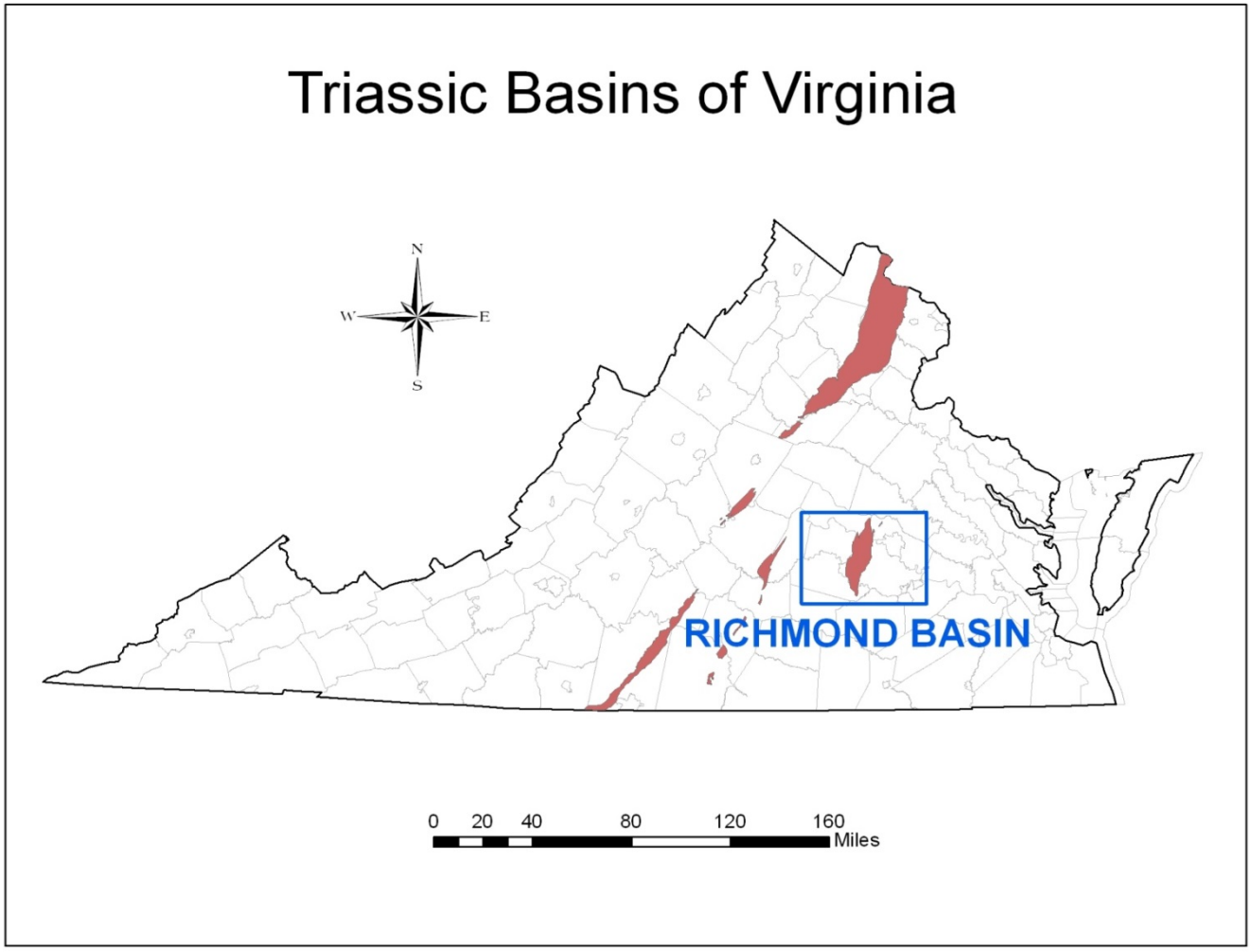
Geology



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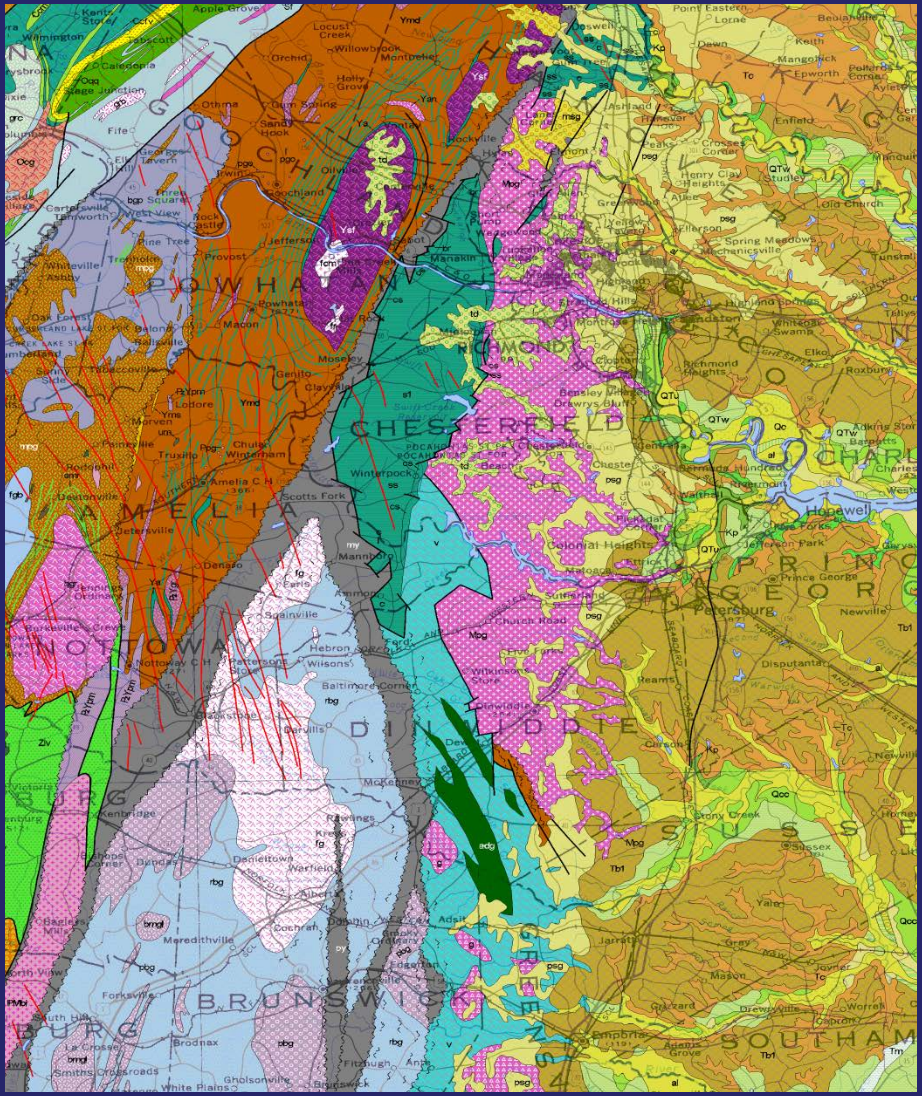
Geology



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Mining History

- Commercially mined from 1748 to 1927.
- Hundreds of drill holes, exploration pits, slopes, shafts and open pit mines.
- Multiple coal beds present. Thickness of beds ranges, but thickest is about 40 ft.
- Four dominant mining districts on eastern edge of basin where coal approaches surface.
- Type and size of mines vary significantly.

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Mining History

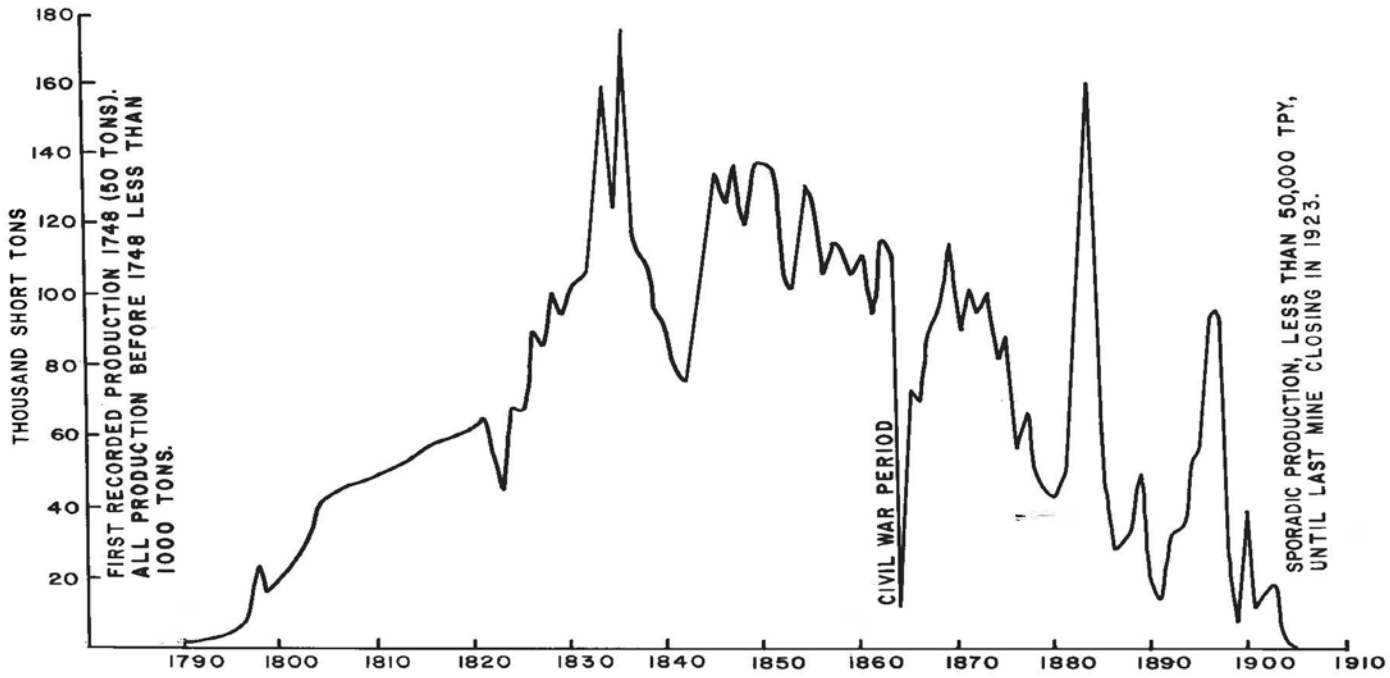

Figure 8. Coal production from the Richmond coalfield.

Mining History

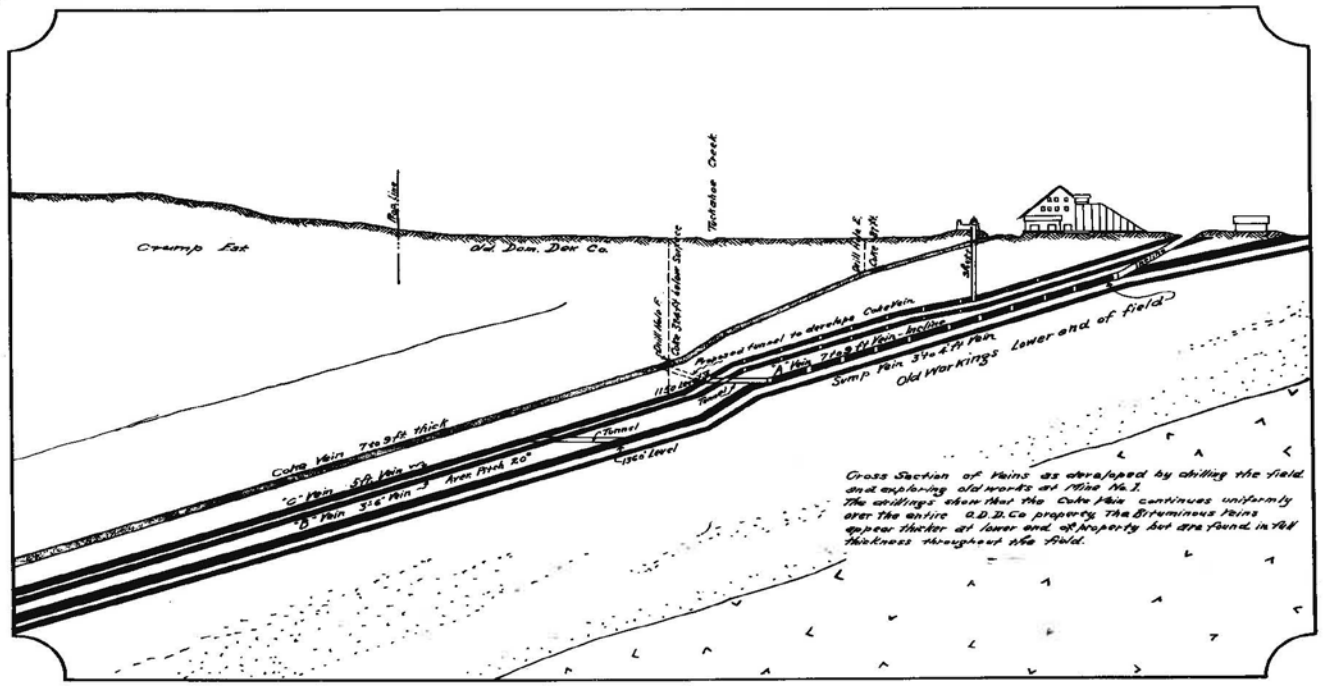

Figure 13. Cross section of the Coalbrook Slope.

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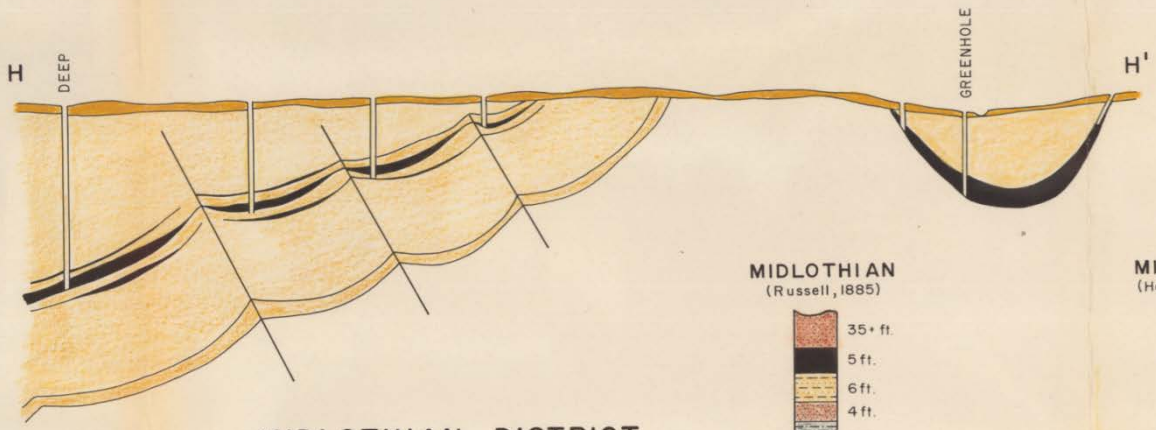

MIDLOTHIAN DISTRICT

(Shaler & Woodworth, 1898)

0 400 800 FEET

MIDLOTHIAN

(Russell, 1885)

35+ ft.
5 ft.
6 ft.
4 ft.
8 ft.
1 ft.
1 ft.
9 ft.
9 ft.
12 ft. with shale partings from 0.2 ft. to 2.0 ft.
10 ft.
14 ft. with shale partings
4 ft.

MIDLOTHIAN

(Heinrich, 1878)

35 ft.
5 ft. first seam - 3.5 ft. coal, 1.5 ft. shale
6 ft.
4 ft.
8 ft.
10 ft.
1 ft. second seam
9 ft.
9 ft.
12 ft. third seam with shale partings from 0.2 ft. to 2.0 ft.
10 ft.
14 ft. with shale partings
4 ft.
11 ft. with clay bloches

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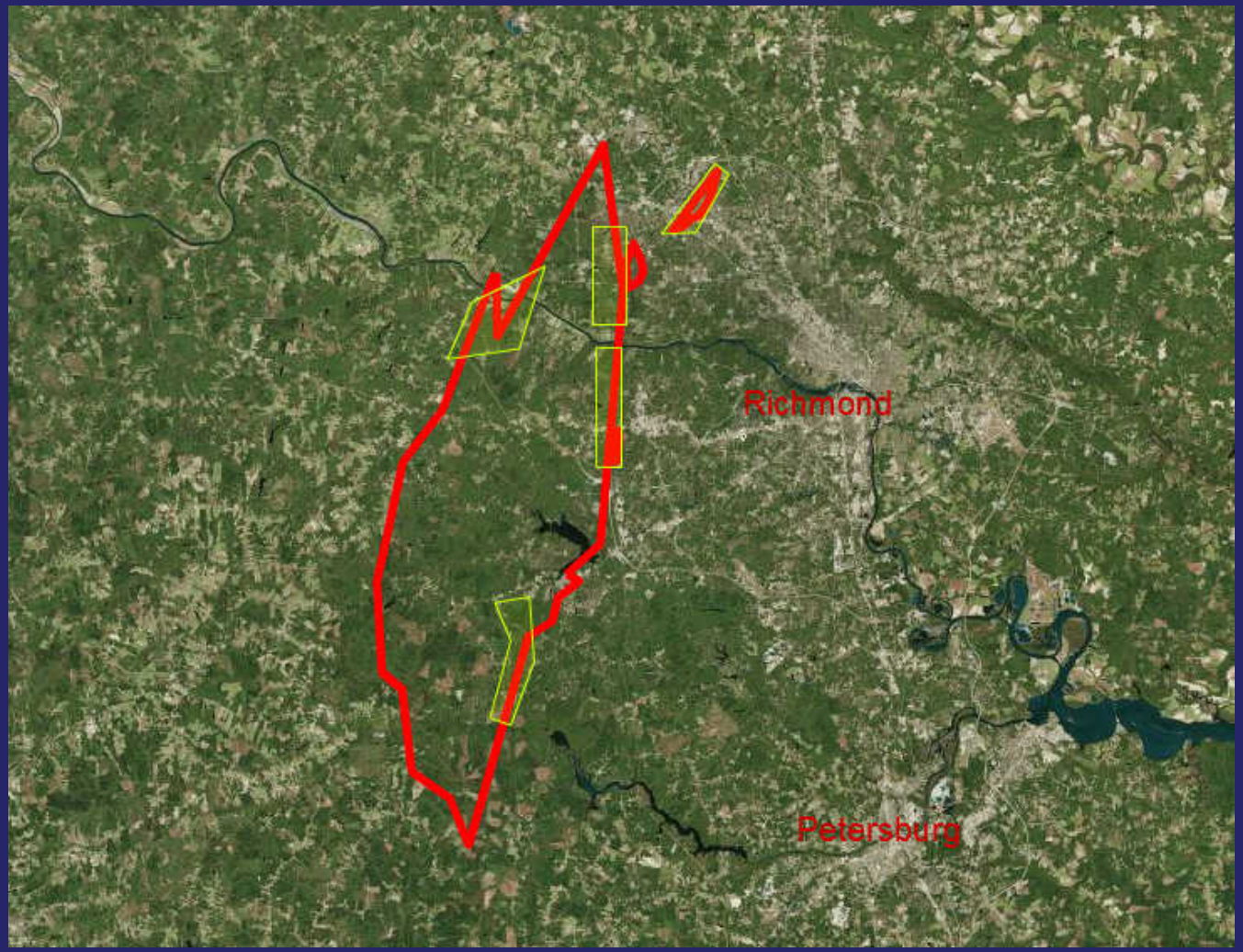
Suburban Development



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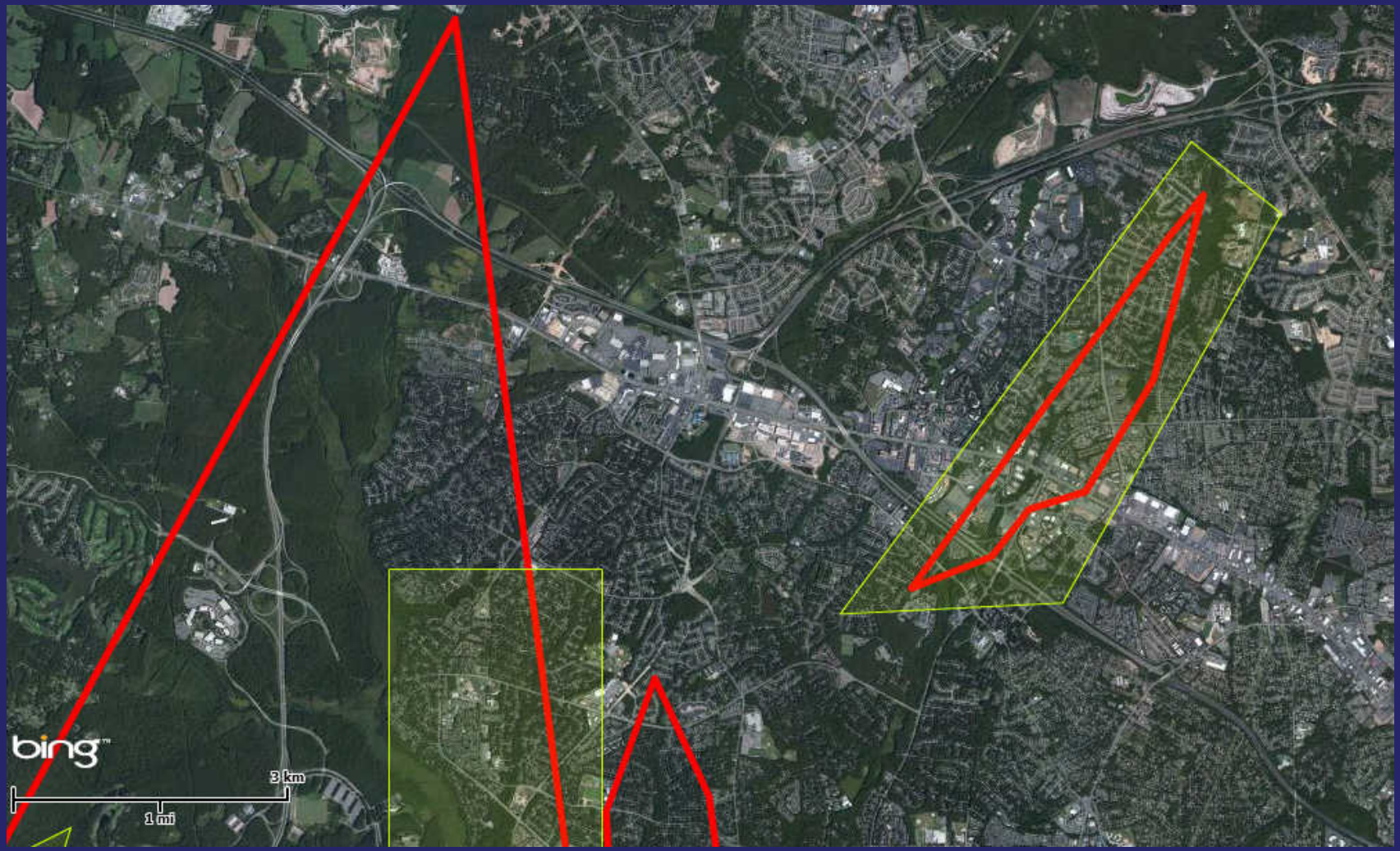
Suburban Development



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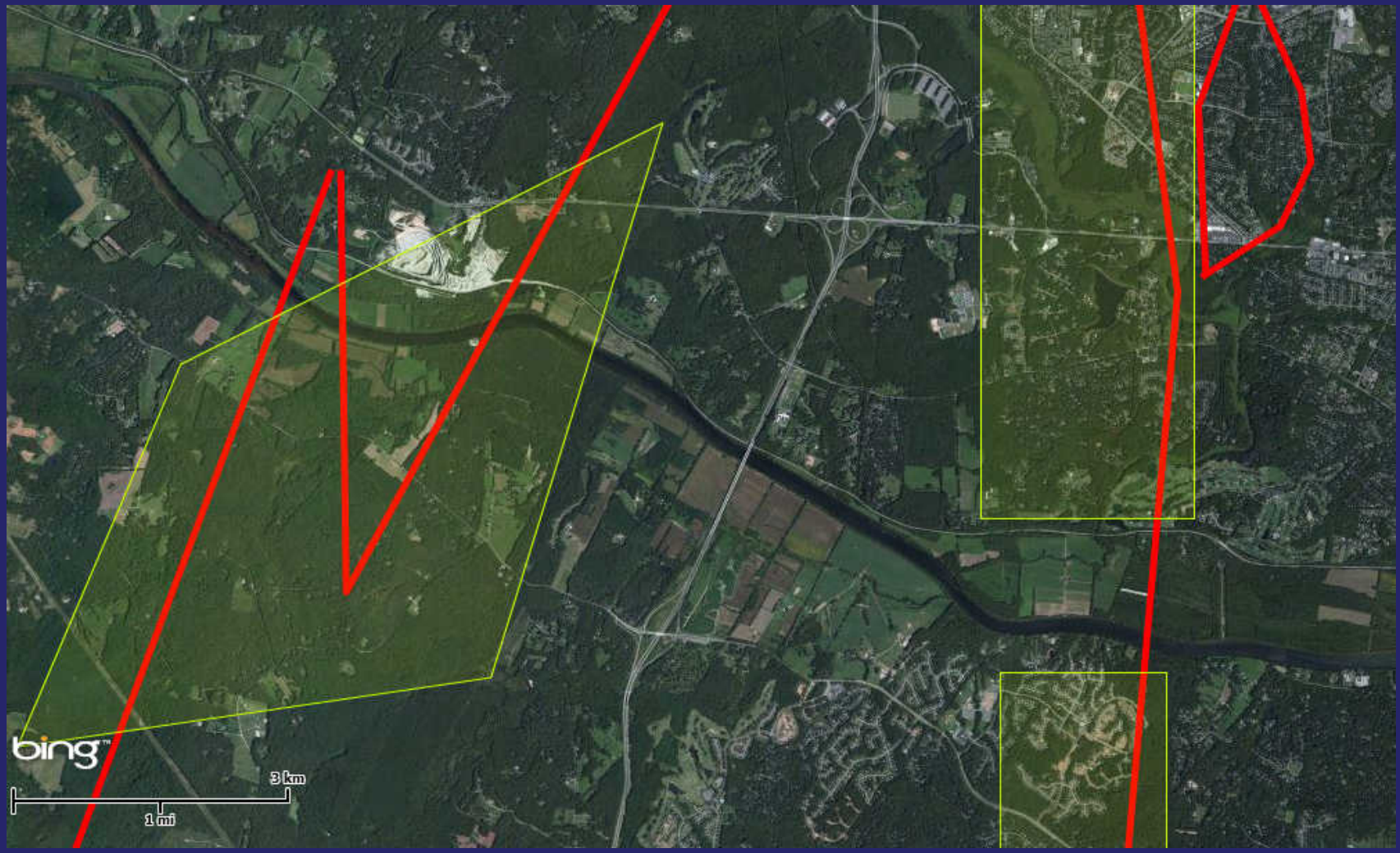
Suburban Development



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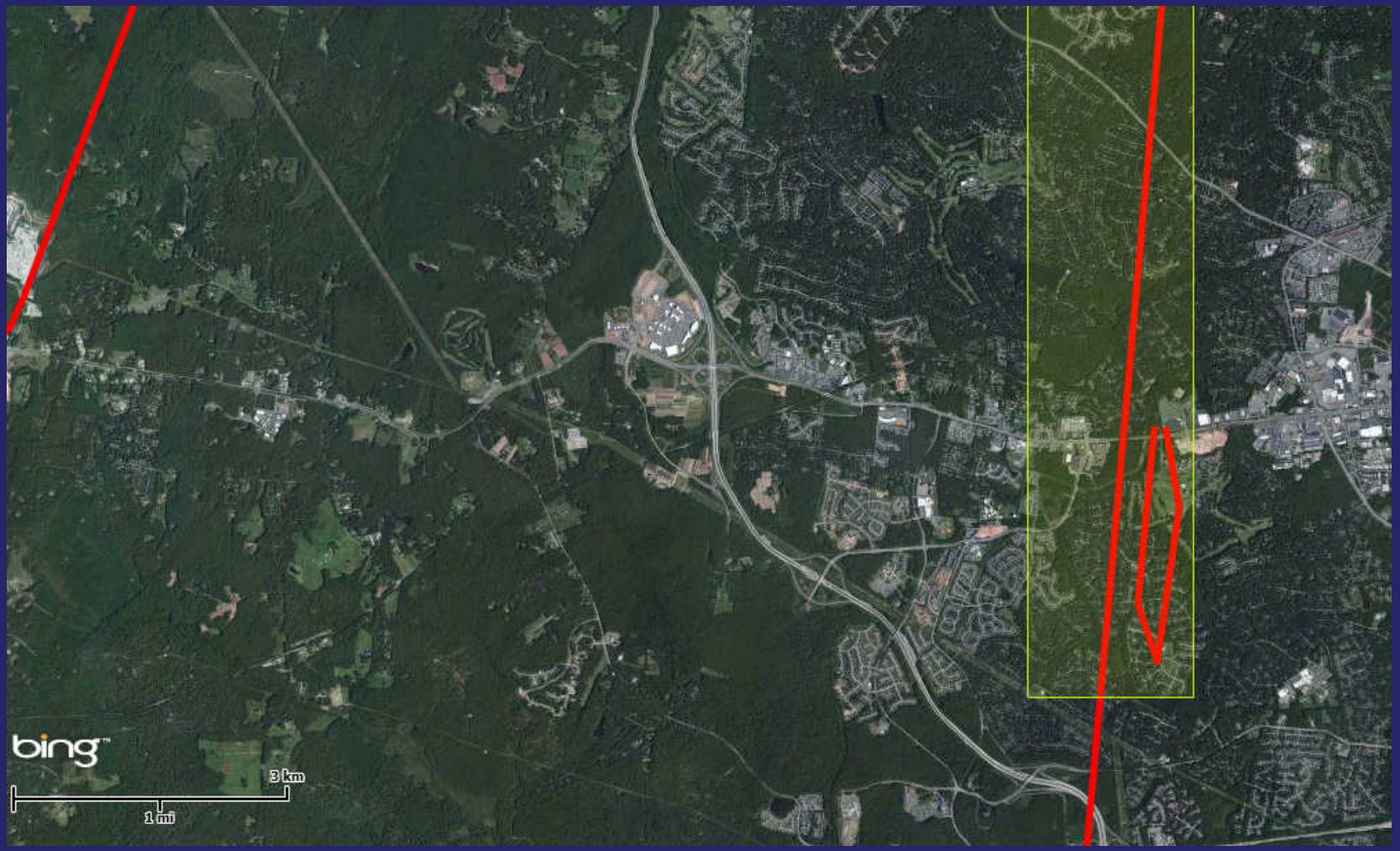
Suburban Development



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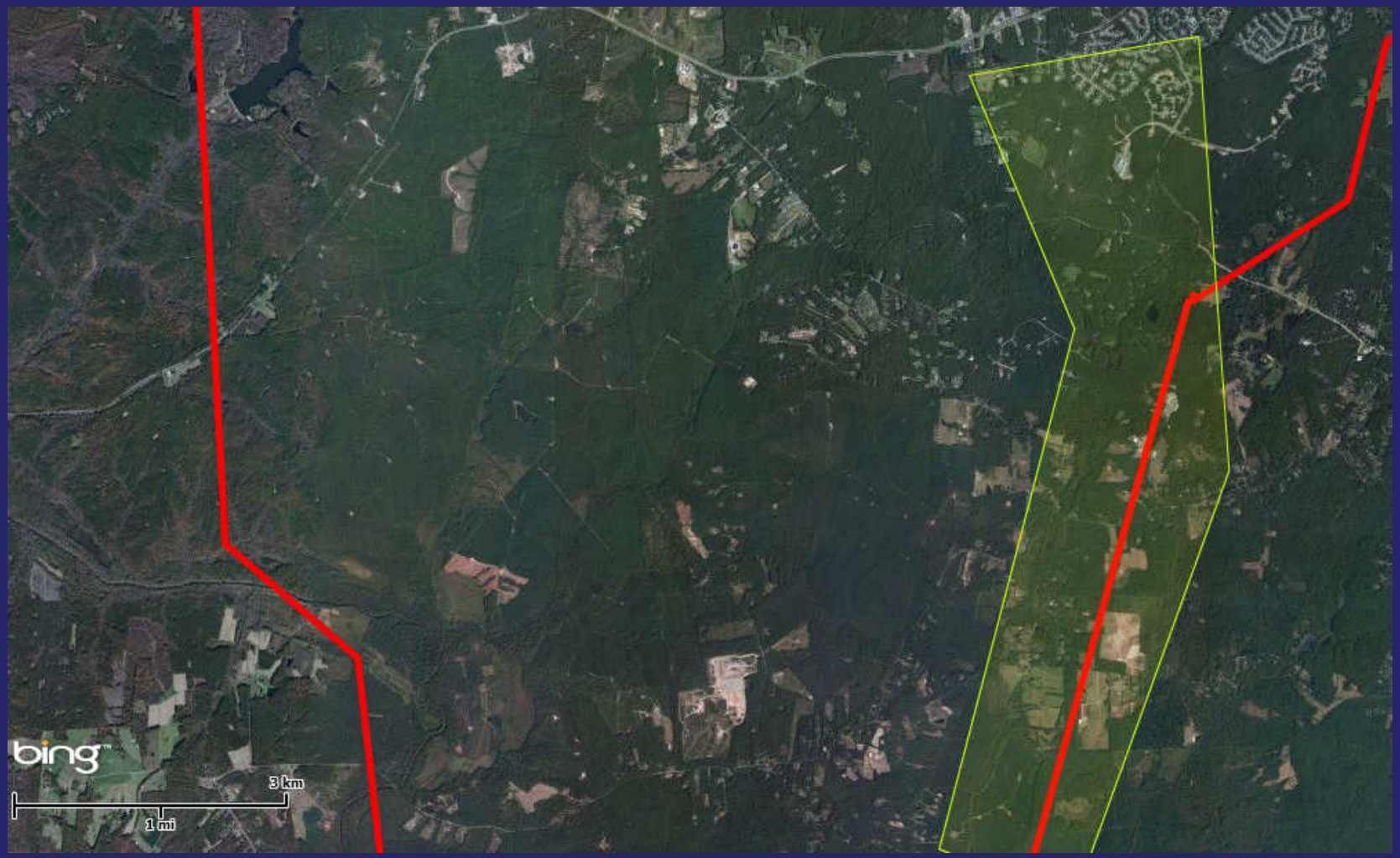
Suburban Development



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Case Histories – Chartstone Drive, Chesterfield County

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Case Histories – Broad Street Mini Storage, Henrico County

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Case Histories – Ashburg Drive, Henrico County

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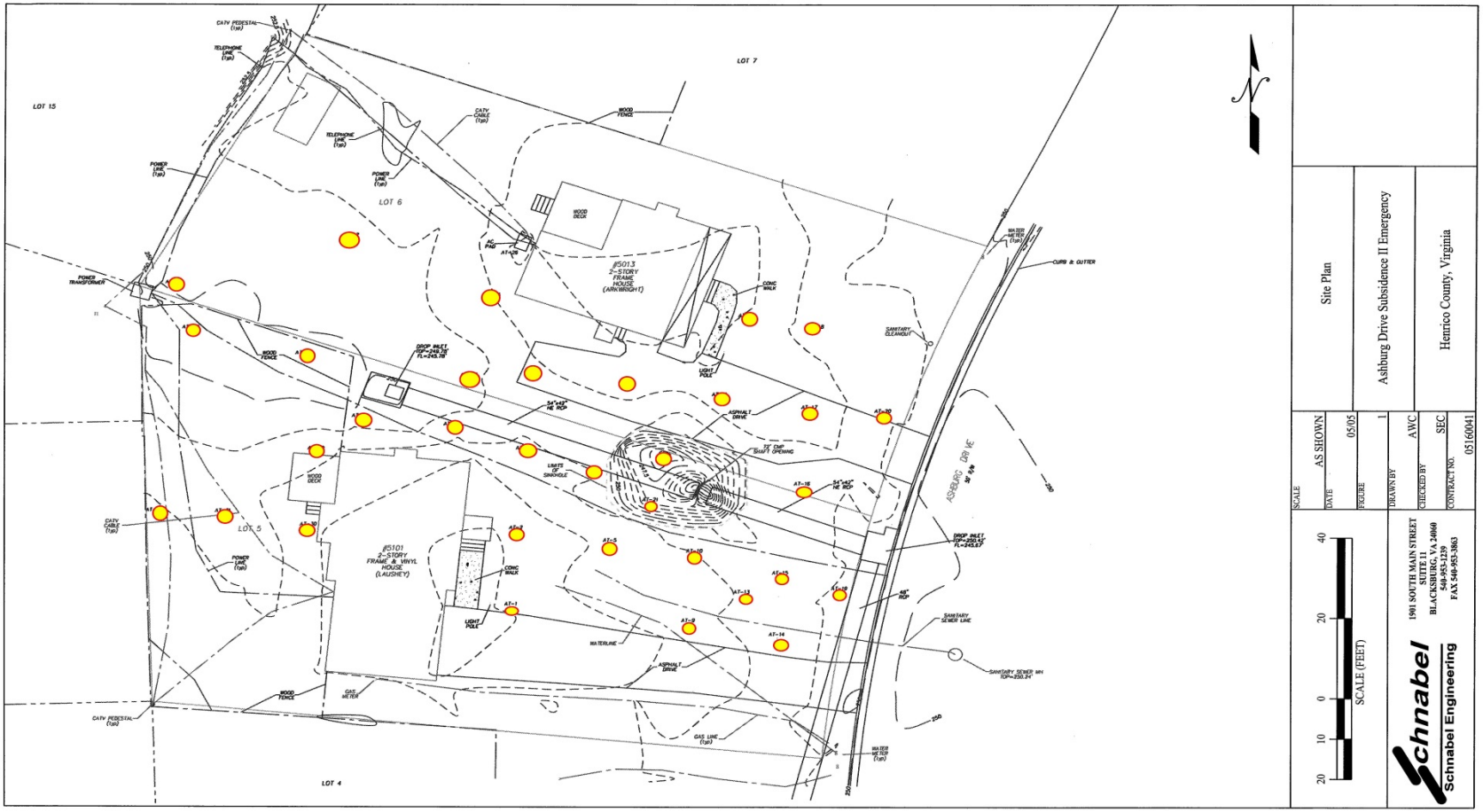

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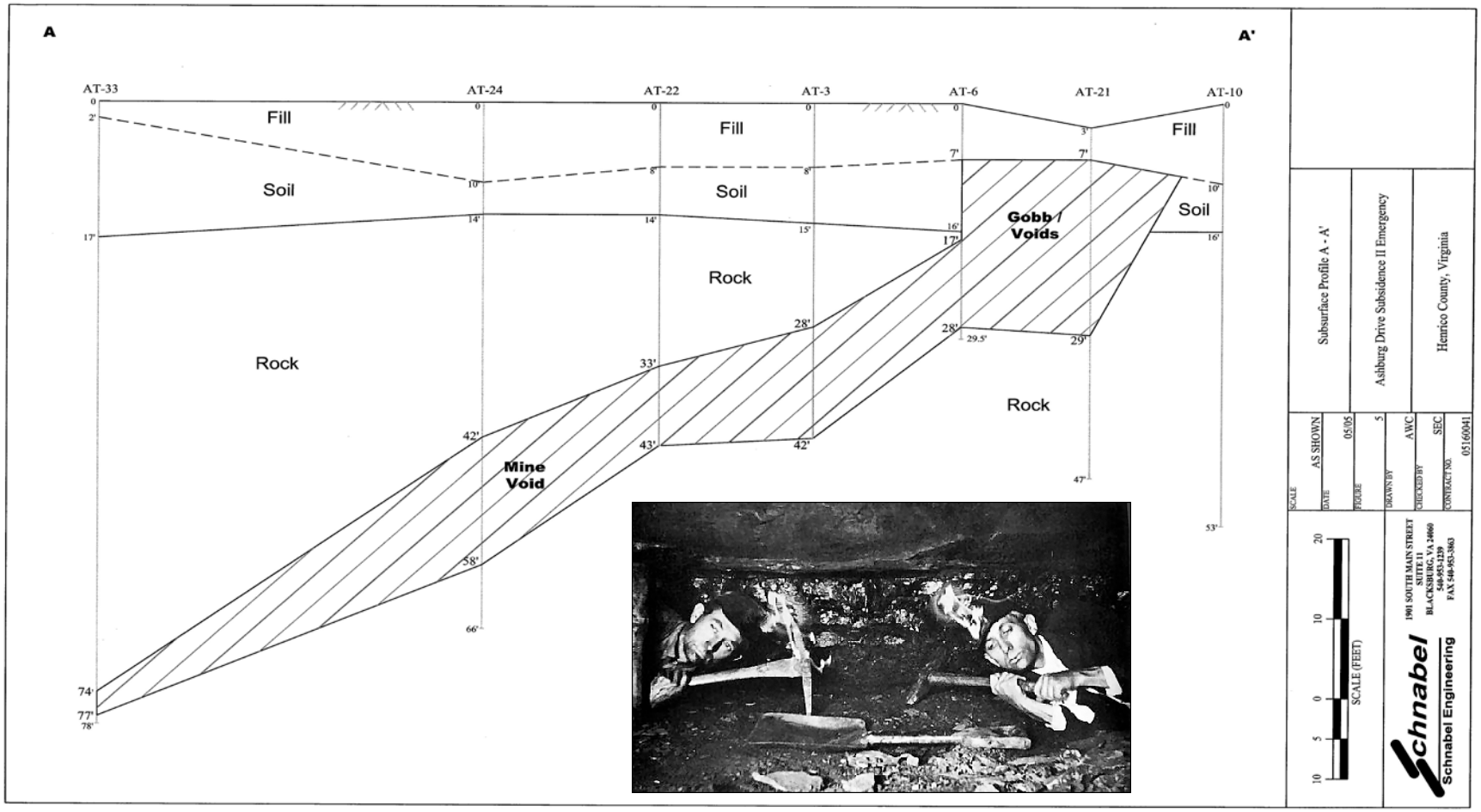

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Case Histories – Ashburg Drive, Henrico County

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Case Histories – Evansdale Road, Henrico County

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Case Histories – Evansdale Road, Henrico County

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Case Histories – Tarrington Subdivision, Chesterfield County

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Case Histories – Coalboro Road, Chesterfield County

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Grove Shaft - Midlothian Mines Park, Chesterfield

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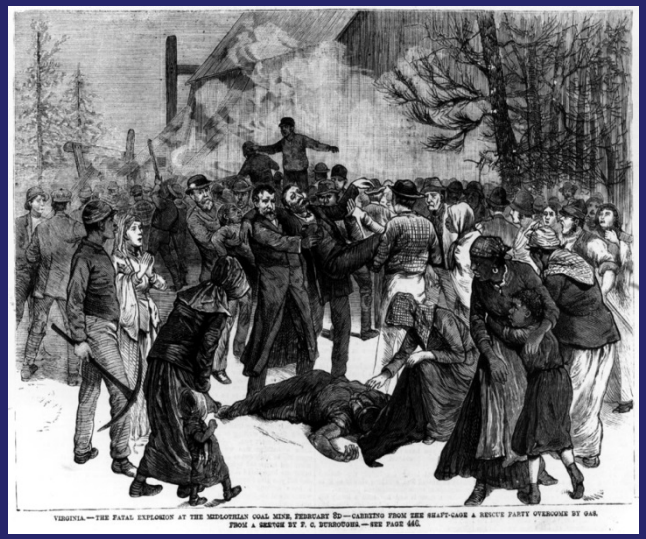
Grove Shaft - Midlothian Mines Park, Chesterfield



VIRGINIA.—THE FATAL EXPLOSION AT THE MIDLOTHIAN COAL MINE, PERSONS RE—CARRYING FROM THE SHAFT-CAGE A RESCUE PARTY OVERCOME BY GAS.
FROM A SKETCH BY F. C. DURBOROW.—SEE PAGE 446.

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Grove Shaft - Midlothian Mines Park, Chesterfield

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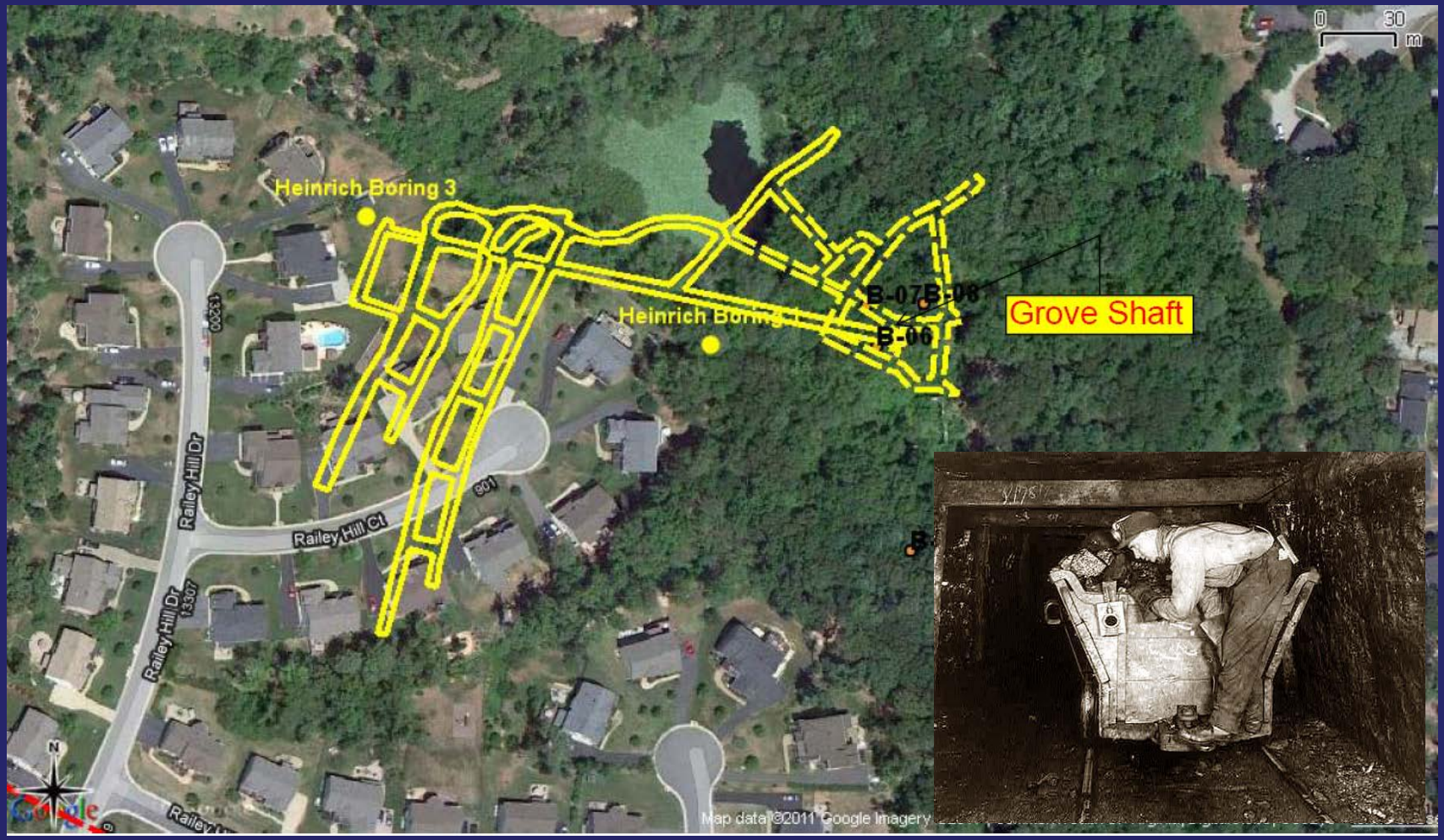

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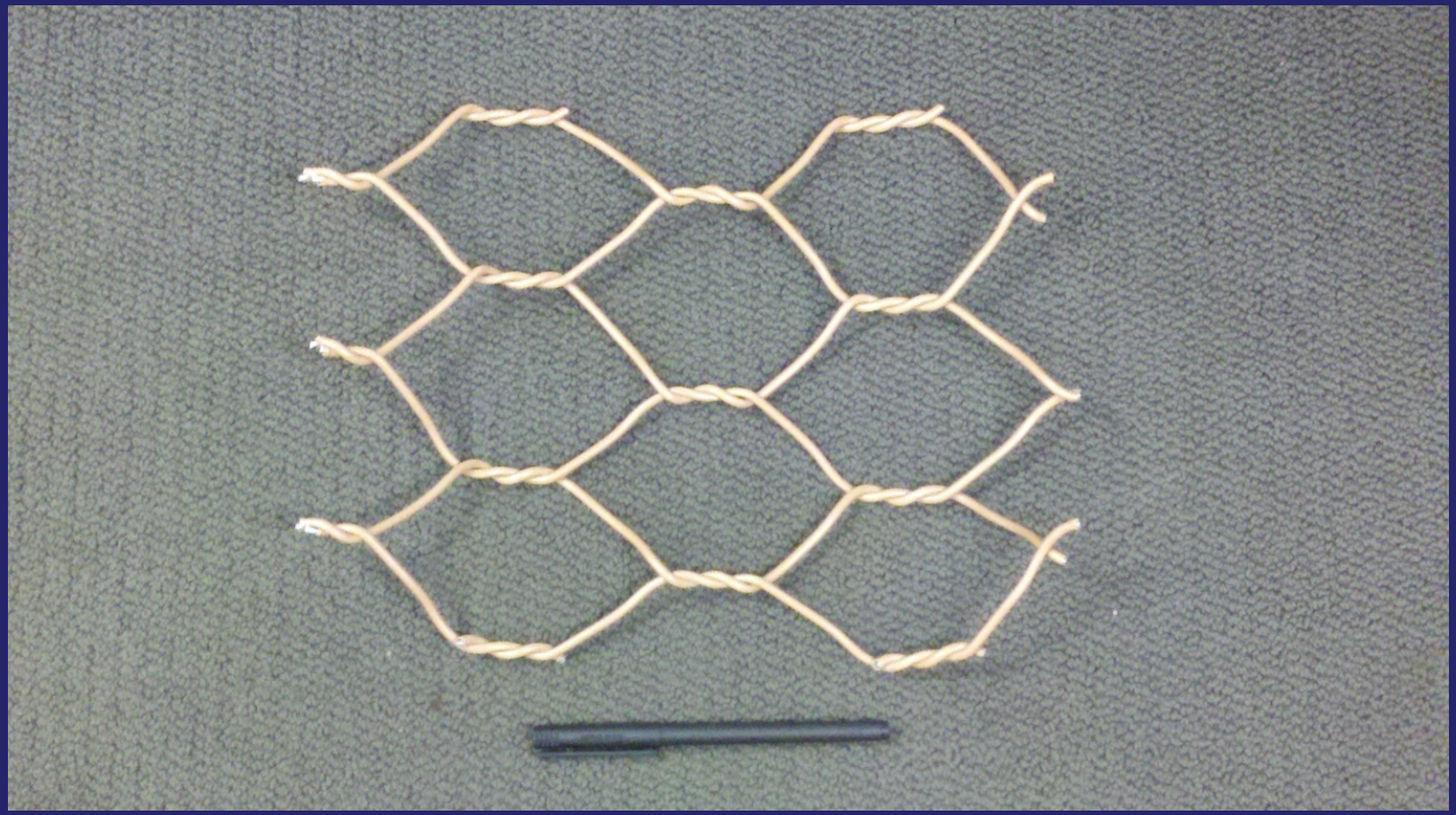
Grove Shaft - Midlothian Mines Park, Chesterfield



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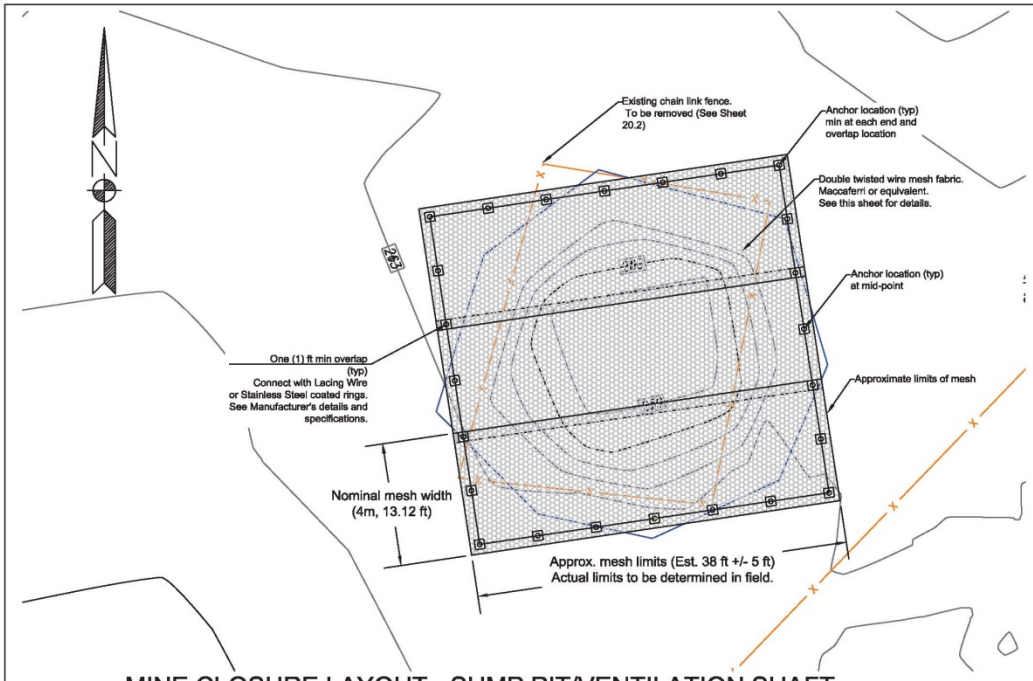
Grove Shaft - Midlothian Mines Park, Chesterfield



MINE CLOSURE LAYOUT - SUMP PIT/VENTILATION SHAFT

SCALE: 1" = 10'

10 5 0 5 10

APPROXIMATE GROVE SHAFT QUANTITIES:

1. APPROXIMATELY THREE (3) ROLLS OF 4m x 25 m ROLLS ARE ESTIMATED.
2. APPROXIMATELY 45 FEET IN LENGTH OF MESH IS ESTIMATED. (INCLUDING THE SPAN OF THE SHAFT AND DRAPE).
3. APPROXIMATELY 24 ANCHORAGE POINTS ARE ESTIMATED.

NOTE: QUANTITIES ARE GIVEN FOR INFORMATIONAL PURPOSES ONLY. CONTRACTOR IS RESPONSIBLE FOR ESTIMATING QUANTITIES FOR BID PURPOSES.

COMMONWEALTH OF VIRGINIA
CHADD W. YEATTS
Lic. No. 38293
2/13/13
PROFESSIONAL ENGINEER

CAUTION

THIS PROJECT REQUIRES CONSTRUCTION WORK OVER A HAZARDOUS AND UNPROTECTED MINE SHAFT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THOROUGHLY INVESTIGATING THE SITE CONDITIONS AND SCHEDULING EQUIPMENT, EQUIPMENT OPERATORS, OPERATIONS, PERSONNEL AND SAFETY PROCEDURES TO PREVENT ACCIDENTS AND INJURIES.

GENERAL NOTES:

1. THIS DRAWING SHOWS THE GENERAL SHAPE AND APPROXIMATE DIMENSIONS OF THE MINE SHAFT AND THE MESH CLOSURE LIMITS. USE THIS DRAWING AS A GUIDE FOR FIELD LAYOUT OF THE CLOSURE. FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.

2. ALL WORK SHALL BE DONE TO THE SATISFACTION OF THE ENGINEER.

3. ALL PERSONS WORKING WITHIN 10 FEET OF THE RIM OF THE SHAFT SHALL WEAR SAFETY HARNESSES AND SHALL BE TETHERED WITH A PERSONAL FALL ARREST SYSTEM TO A SECURE FIXTURE. FALL PROTECTION SHALL BE IN ACCORDANCE WITH OSHA REGULATIONS REGARDING FALL PROTECTION.

4. SEE SHEETS S2 AND S3 FOR CLOSURE DETAILS.

MESH NOTES:

1. CLOSURE SHALL UTILIZE MACCAFERRI GALVANIZED AND PVC COATED ROCKFALL PROTECTION NETTING OR EQUIVALENT.
   - -LENGTH = 25m, WIDTH = 4m, MESH TYPE 8X10-WIRE DIAMETER =2.7/3.7MM, GALMAC & PVC COATED
   - -MESH SHALL BE BROWN IN COLOR

2. MESH SHALL BE GALVANIZED, PVC COATED, HEXAGONAL, DOUBLE TWISTED 12 GAUGE STEEL WIRE, WITH A MAXIMUM OPENING OF 3.15 INCHES (80 mm).

3. THE MESH AND ASSOCIATED INFRASTRUCTURE REQUIRED (WIRE, CLAMPS, CLIPS, STEEL RINGS, LACING, ETC) SHALL BE INSTALLED TO THE MANUFACTURERS' SPECIFICATIONS AND AS SHOWN ON THESE PLANS.

Schnabel ENGINEERING	Midlothian Mines Park Mine Closure Grove Shaft Chesterfield County, VA	Sheet S1.2 Sump Pit/Vent. Shaft Closure Layout February 2013

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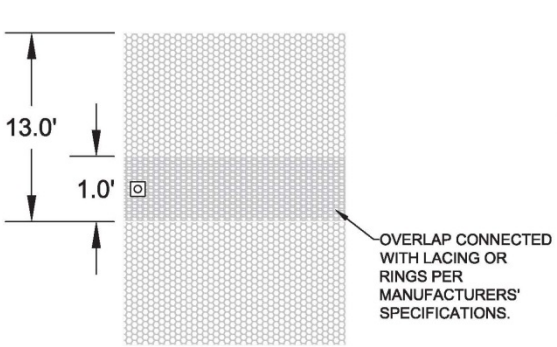
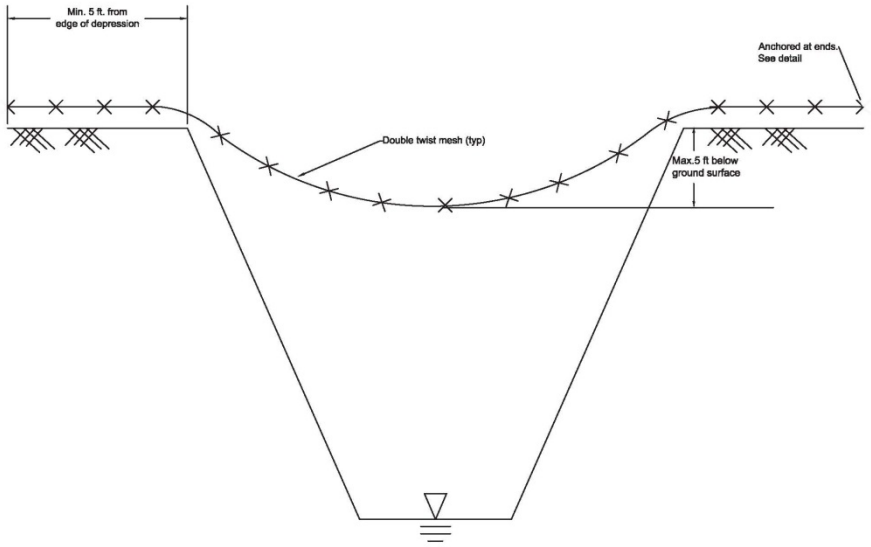
Grove Shaft - Midlothian Mines Park, Chesterfield



MESH OVERLAP DETAIL

SCALE: N.T.S.



SHAFT COVERAGE CROSS SECTION

SCALE: N.T.S.

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Schnabel ENGINEERING	Midlothian Mines Park Mine Closure Grove Shaft Chesterfield County, VA	Sheet S3.1 Details February 2013

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Case Histories - Reeds Branch, Polyurethane Foam, Southwest, VA

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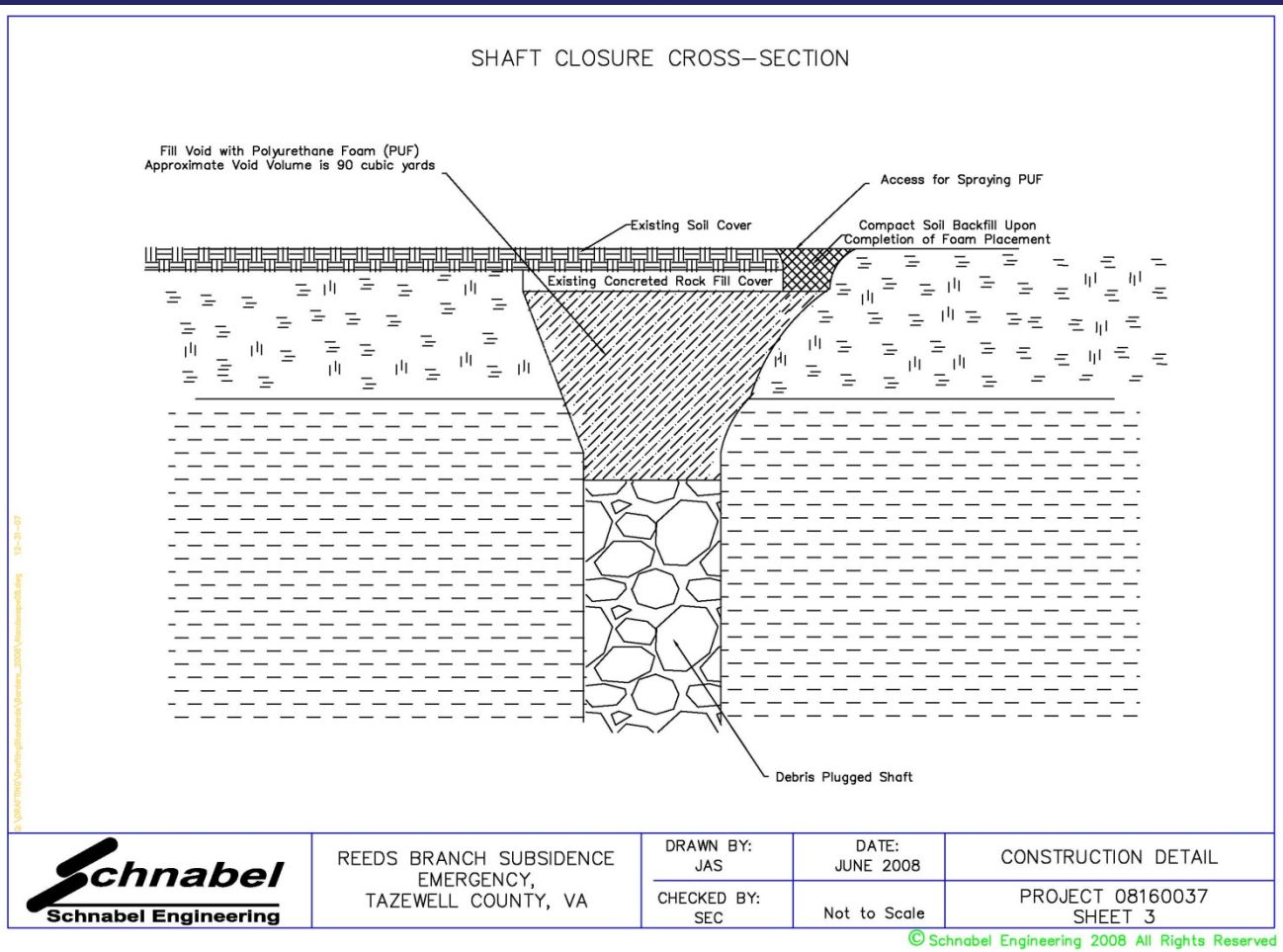
Case Histories - Reeds Branch, Polyurethane Foam, Southwest, VA



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Case Histories - Reeds Branch, Polyurethane Foam, Southwest, VA

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Thank You!

Questions?

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