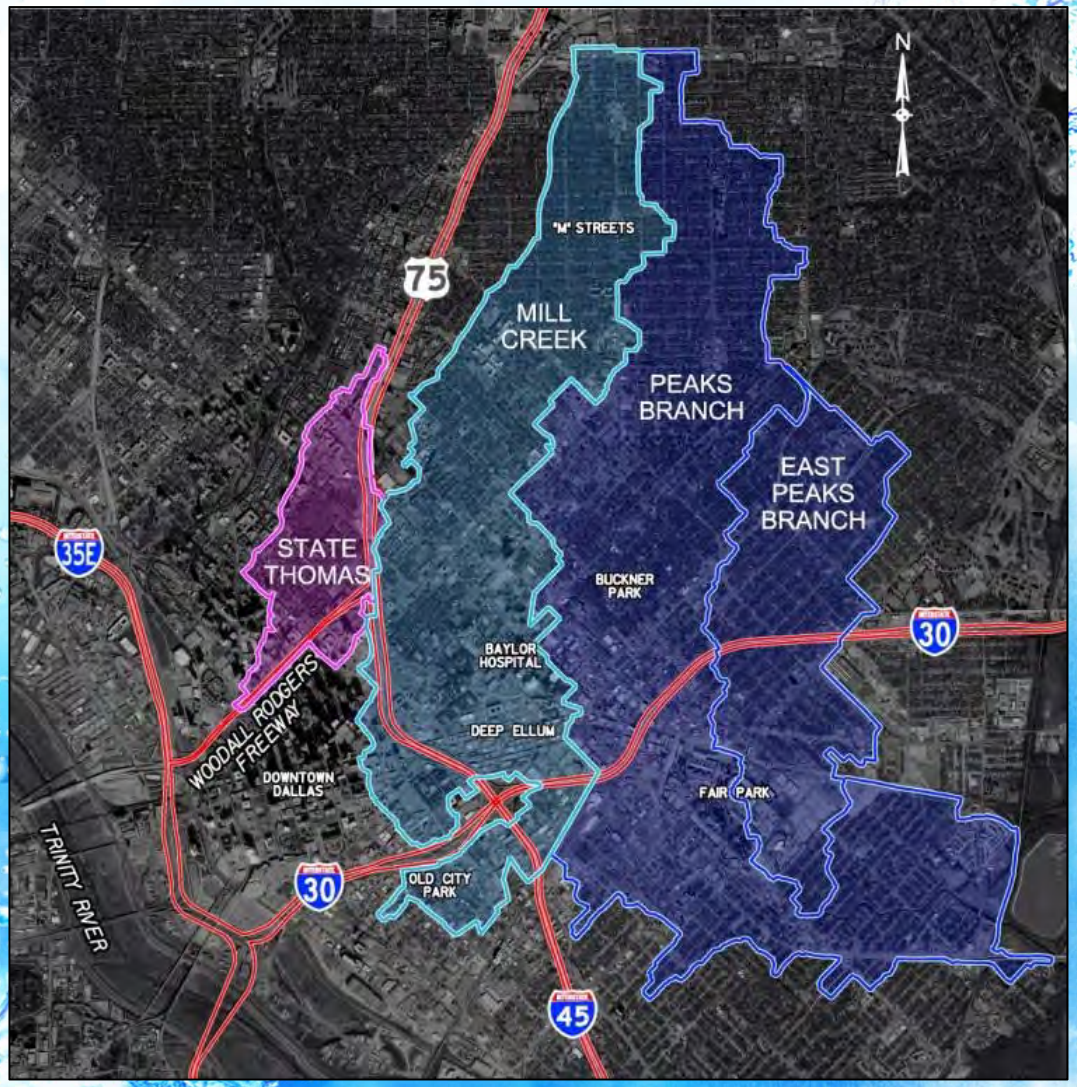
Mill Creek / Peaks Branch / State Thomas Drainage Relief Project
Dallas, Texas

Underground Construction Technology
International Conference & Exhibition
1 February 2017

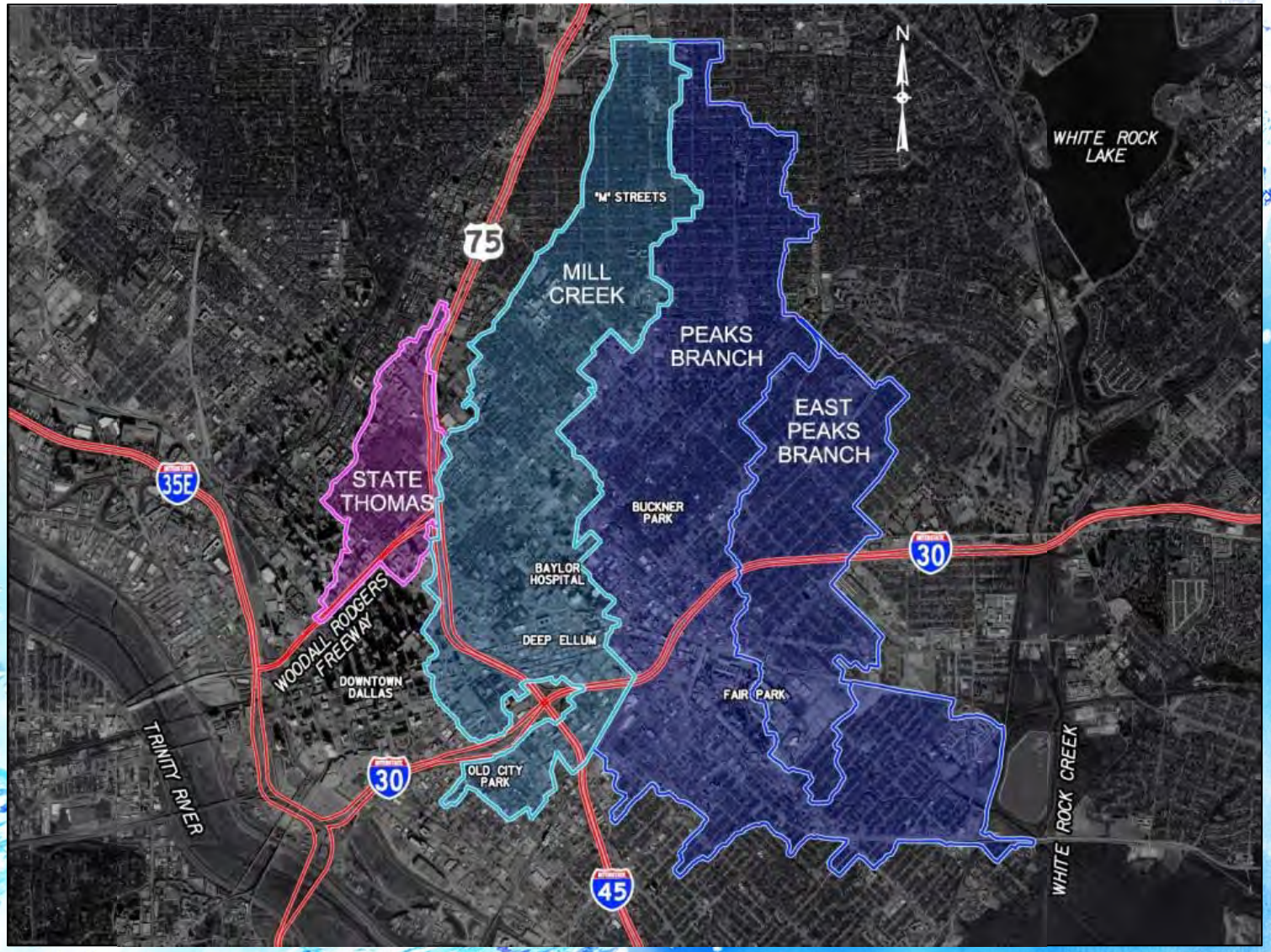
Todd Woodson, PE, LEED AP BD+C
Halff Associates, Inc.

Basin Characteristics

- Basin Area
  - State-Thomas: 450 acres
  - Mill Creek: 2,200 acres
  - Peaks Branch: 3,100 acres
  - East Peaks: 1,100 acres
- Land Uses
  - Upper Basin: Residential
  - Lower Basin: Commercial



Mill Creek, Peaks Branch and State Thomas Watersheds

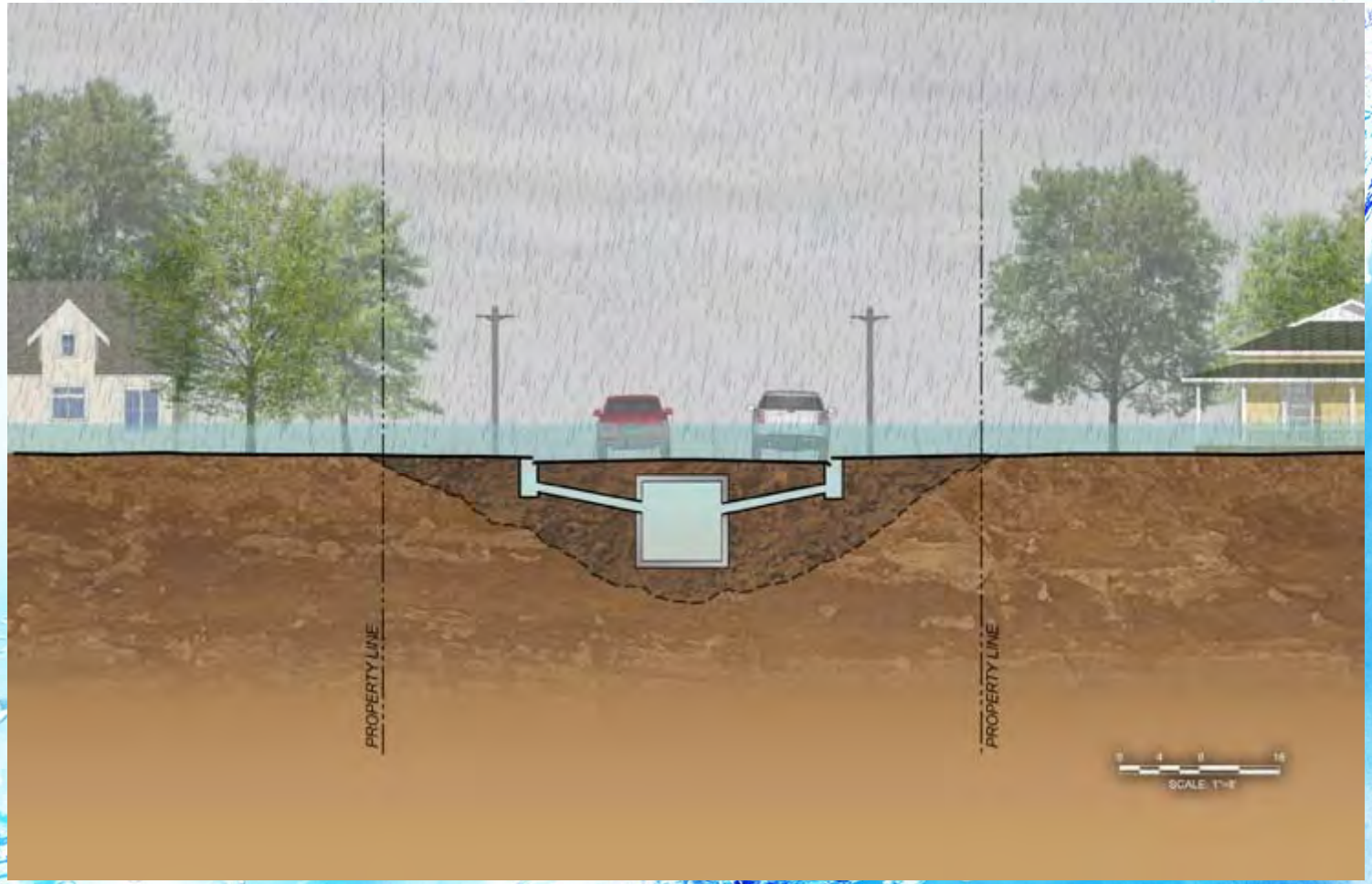


Mill Creek and Peaks Branch History

- Underground Storm Sewer Construction - 1930s
- May 1995 Flood
- March 2006 Flood
- September 2007 Flood

Mill Creek – Early 1900s

Undersized Storm Sewers



May 1995 Flood

Dallas Morning News Front Page May 7, 1995

- Flooding businesses and homes
- Baylor Emergency Room closed - flood damage $5M
- Old City Park
- Fair Park
- IH 30 closed due to high water

16 deaths blamed on storm

4 missing after floods; 100 hurt

By Randy Lee Loftis and Nora López
Staff Writers of The Dallas Morning News

The stunning violence of the latest spring storm to slam through the Dallas area became clear Saturday: At least 16 people were dead and as much as $450 million worth of property damaged after Friday night's rampage.

Among the victims of one of the area's deadliest, most destructive storms in history were five members of an Oak Cliff family who drowned when floodwaters washed away their car.

At least seven people drowned in other flooded areas. A lightning-caused fire killed a Dallas woman, and a lightning strike killed an Irving boy. Late Saturday, at least four people were missing and feared dead.

Late Saturday, searchers continued going through a

Please see 16 DEATHS on Page 29A.

911 response times criticized

By Nora López and Jason Sickles
Staff Writers of The Dallas Morning News

During Friday's devastating rains and hail, hundreds of motorists were stranded in city streets submerged under several feet of water. Roofs collapsed under the strain of heavy rain. Families watched in horror as loved ones were swept away in storm drains.

Nearly all turned to 911 for help. Many times, all they got was a busy signal.

City officials said the demand for city services was so great late Friday that the calls simply overloaded the 911 system, resulting in busy signals and delayed response times of up to an hour.

"We practice. We train. We study. And we prepare

Please see CALLERS on Page 28A.

The Dallas Morning News/ Michael Ainsworth

Paul Griffin on Saturday examines some of the damage inflicted on cars at Fair Park during Friday's storm.

Lives lost, families torn

Storm victims from all walks of life, neighborhoods

By Bill Minutaglio and Eric García
Staff Writers of The Dallas Morning News

The marauding storm knew no boundaries when it claimed its victims.

There was the elderly woman who quietly cared for the animals in her neighborhood. The teacher who had proudly posed for a recent photo with her young students. The family of five swept away as they headed for a restaurant.

One woman was saved from the flooding — only to be engulfed

Please see VICTIMS on Page 30A.

NORTH TEXAS STORMS

March 2006 Flood

- Widespread flooding throughout Dallas
- March 19th rainfall totals as high as 9.8” in Old East Dallas
- Extensive street, structure and vehicle flooding in East Dallas

Mill Creek Flooding – Baylor Hospital Area Flooding
March 19, 2006

Mill Creek Flooding – March 2006

Monticello Avenue – West of Greenville Avenue

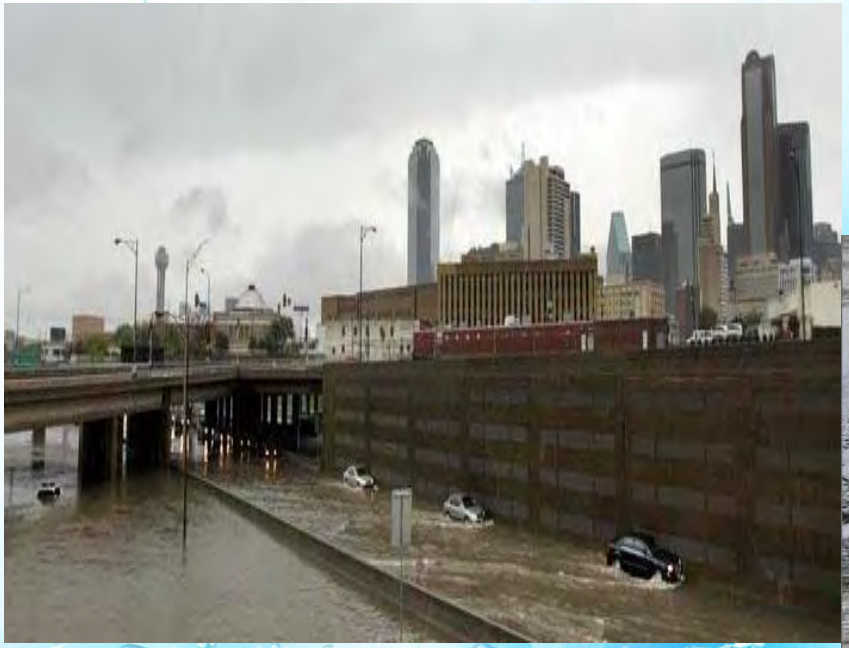
Peaks Branch Flooding – March 2006

Zaragoza Elementary Flooding

Peaks Branch Flooding – March 2006

Worth Street Flooding

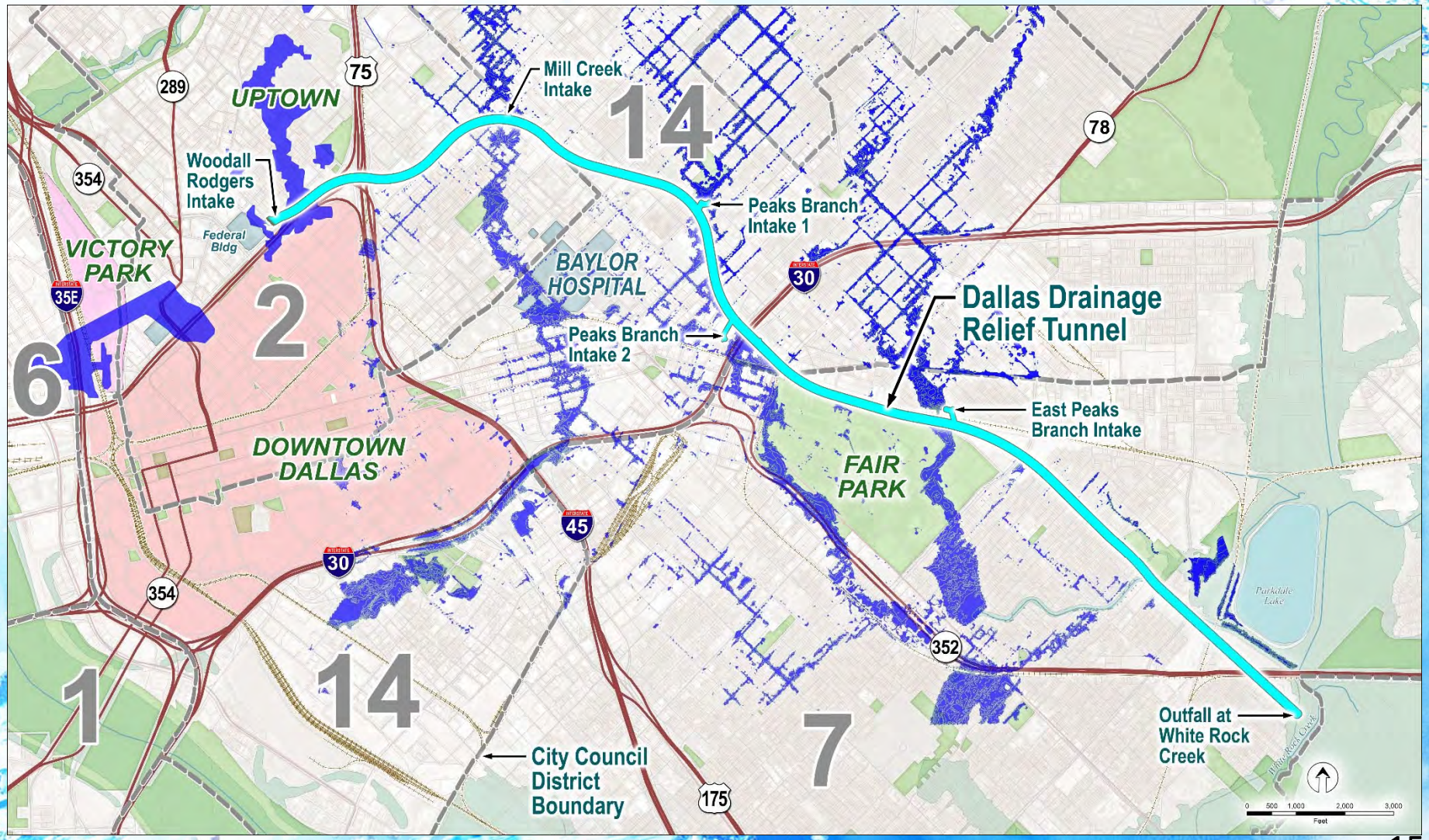
I-30 Flooding – March 2006



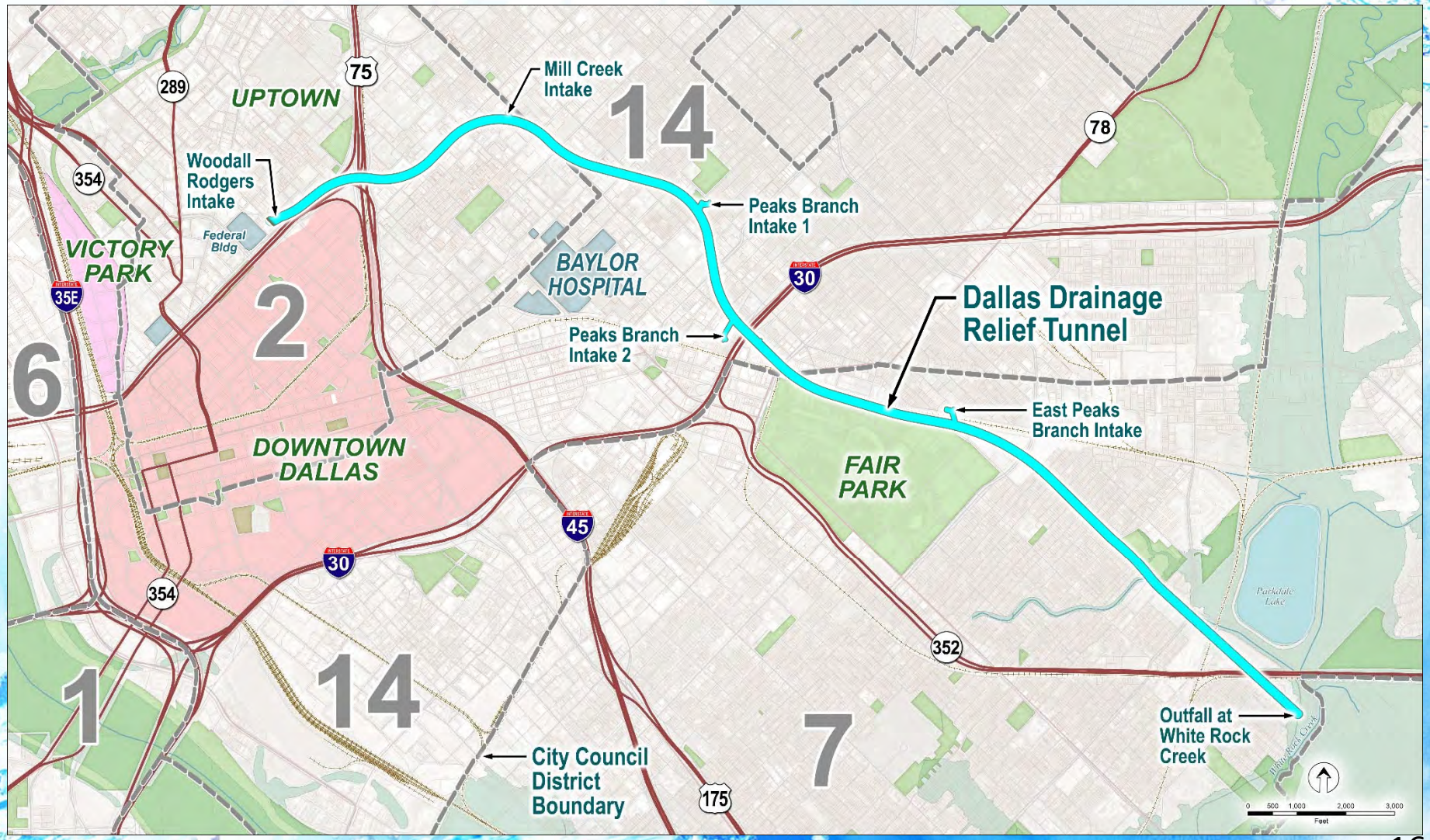
Severe Flooding

Severe Flooding

Areas Currently Subject to 100-Year Flooding in Mill Creek, Peaks Branch and State Thomas Watersheds



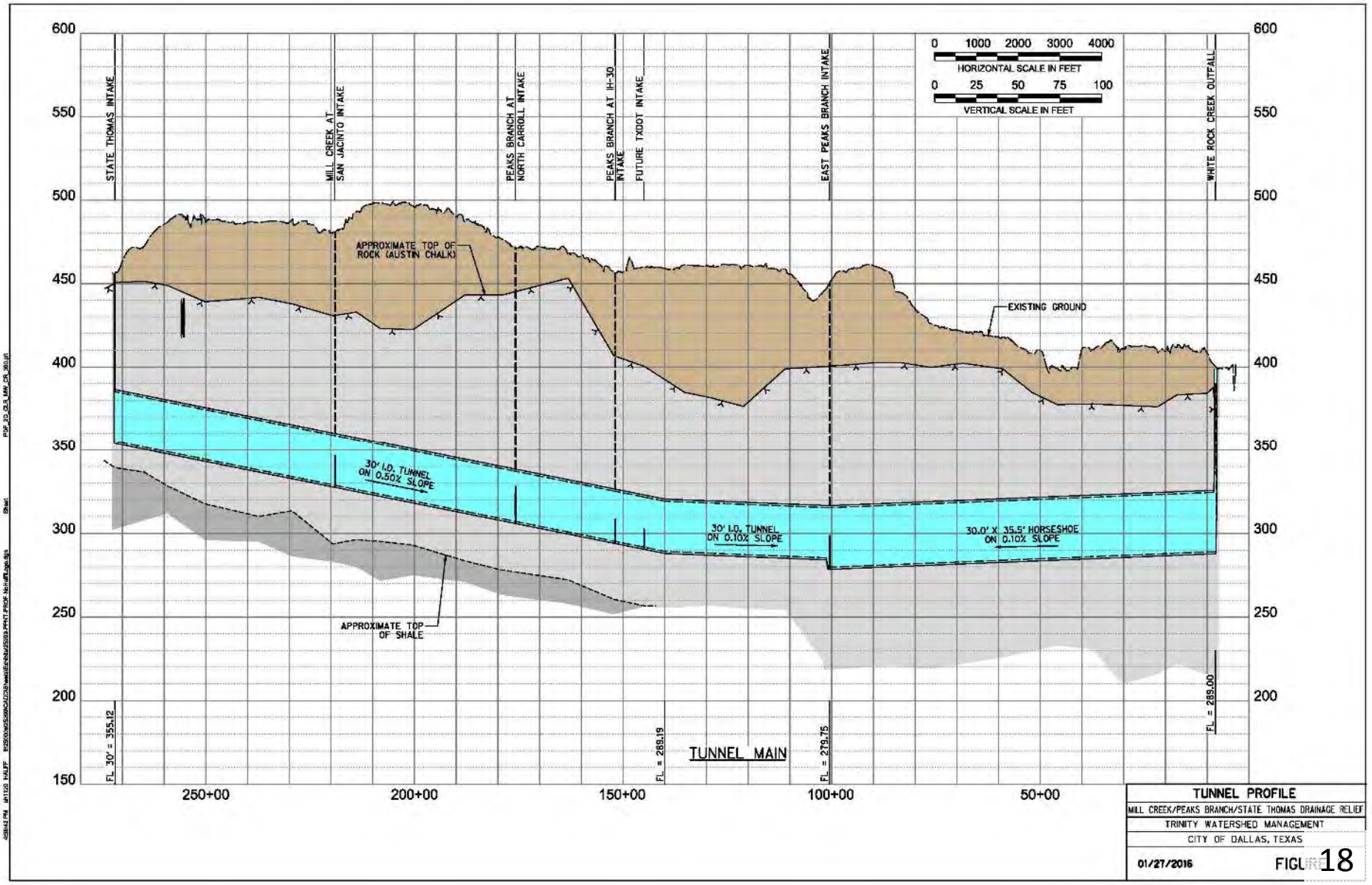
Mill Creek/Peaks Branch/State Thomas Drainage Relief Tunnel



Project Components

- Deep Tunnel
  - Length – 5 miles
  - Depth – 70 to 150 feet
  - Tunnel Sections: Excavated: 32.5-Foot diameter
    Finished: 30-Foot diameter
    Horseshoe: 35.5-Foot by 30-Foot (finished)
- Drop Structures / Tangential Inlet
  - Five Intake Sites
  - Surface Collection Systems
- Tunnel Outfall
- Dewatering Station

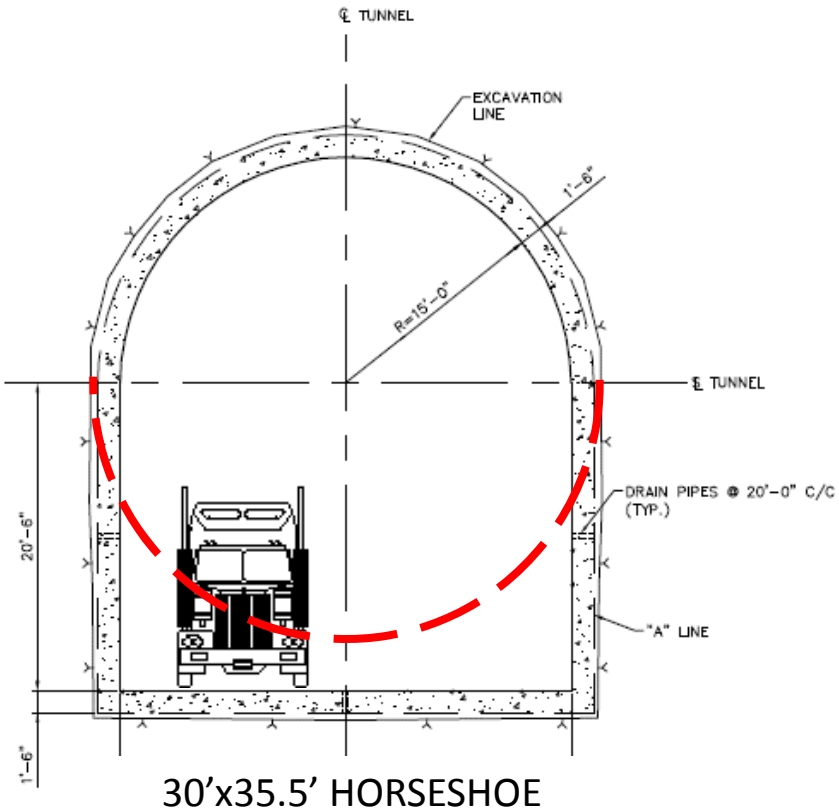
Tunnel Profile



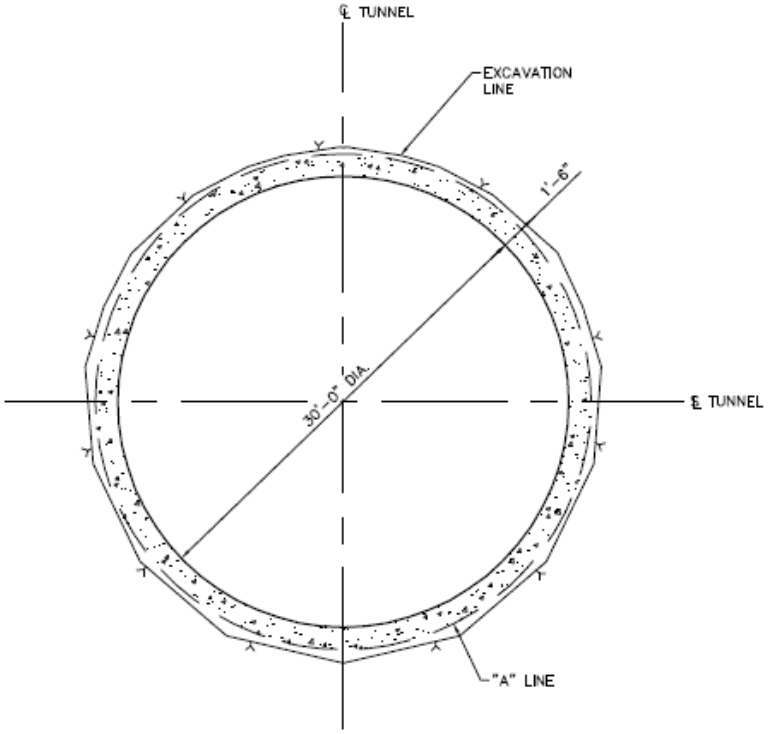
Drainage Relief Tunnel

http://voteyesdallas.com/press-room-images.html

Tunnel Sections



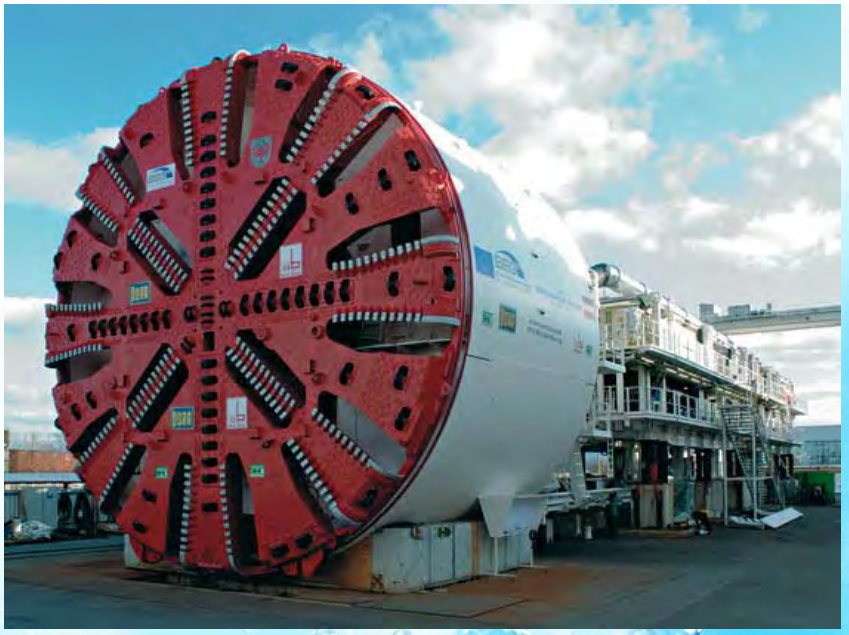
30'x35.5' HORSESHOE
MAIN TUNNEL SECTION
OUTFALL TO SITE A
(2 MILES)



30' CIRCULAR
MAIN TUNNEL SECTION
SITE A TO END
(3 MILES)

Tunnel Boring Machine (TBM)

Deep Tunnel Construction



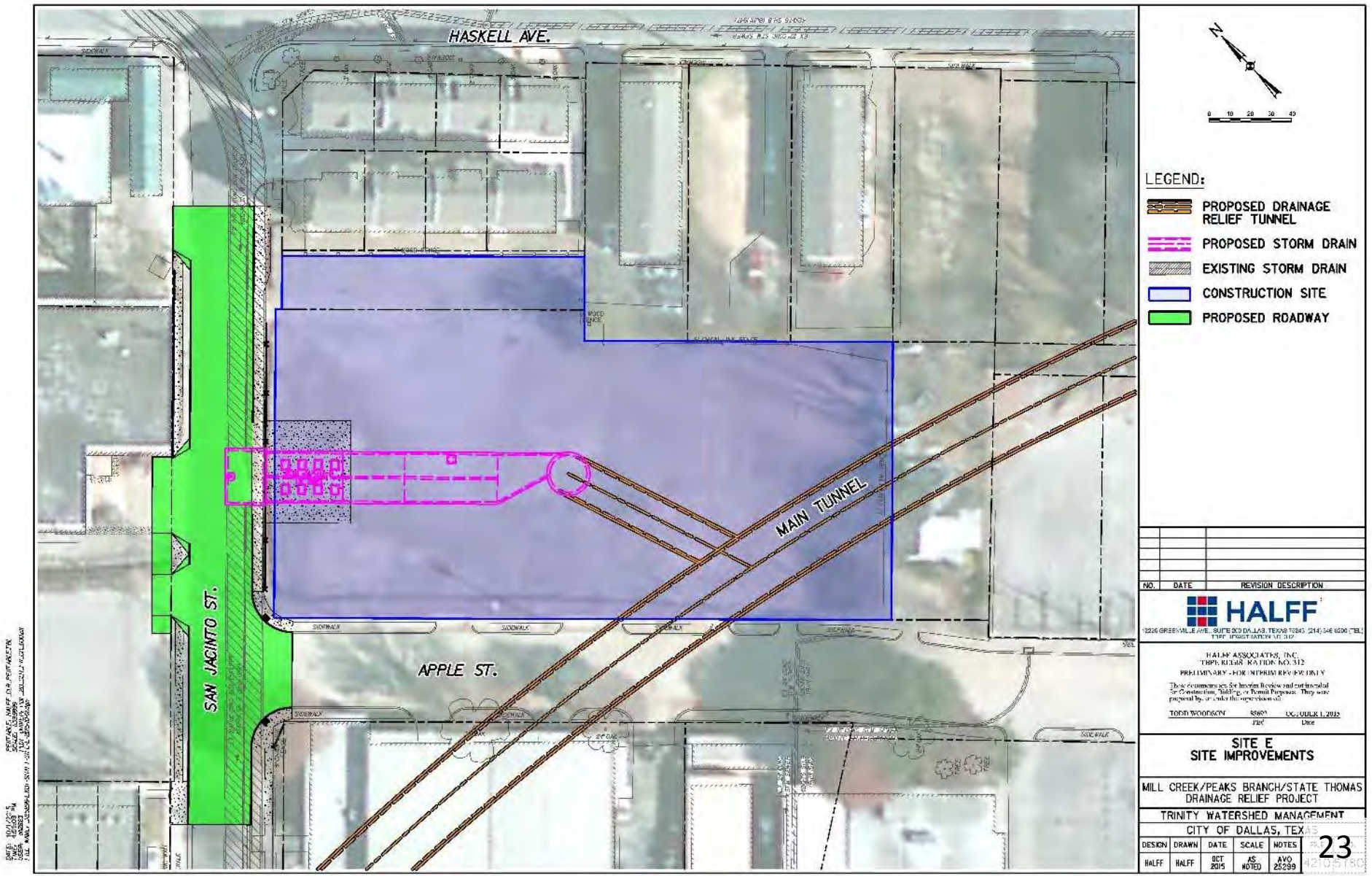
Tunnel Boring Machine (TBM)

Workers on a TBM after break-through

Advantages to tunneling:

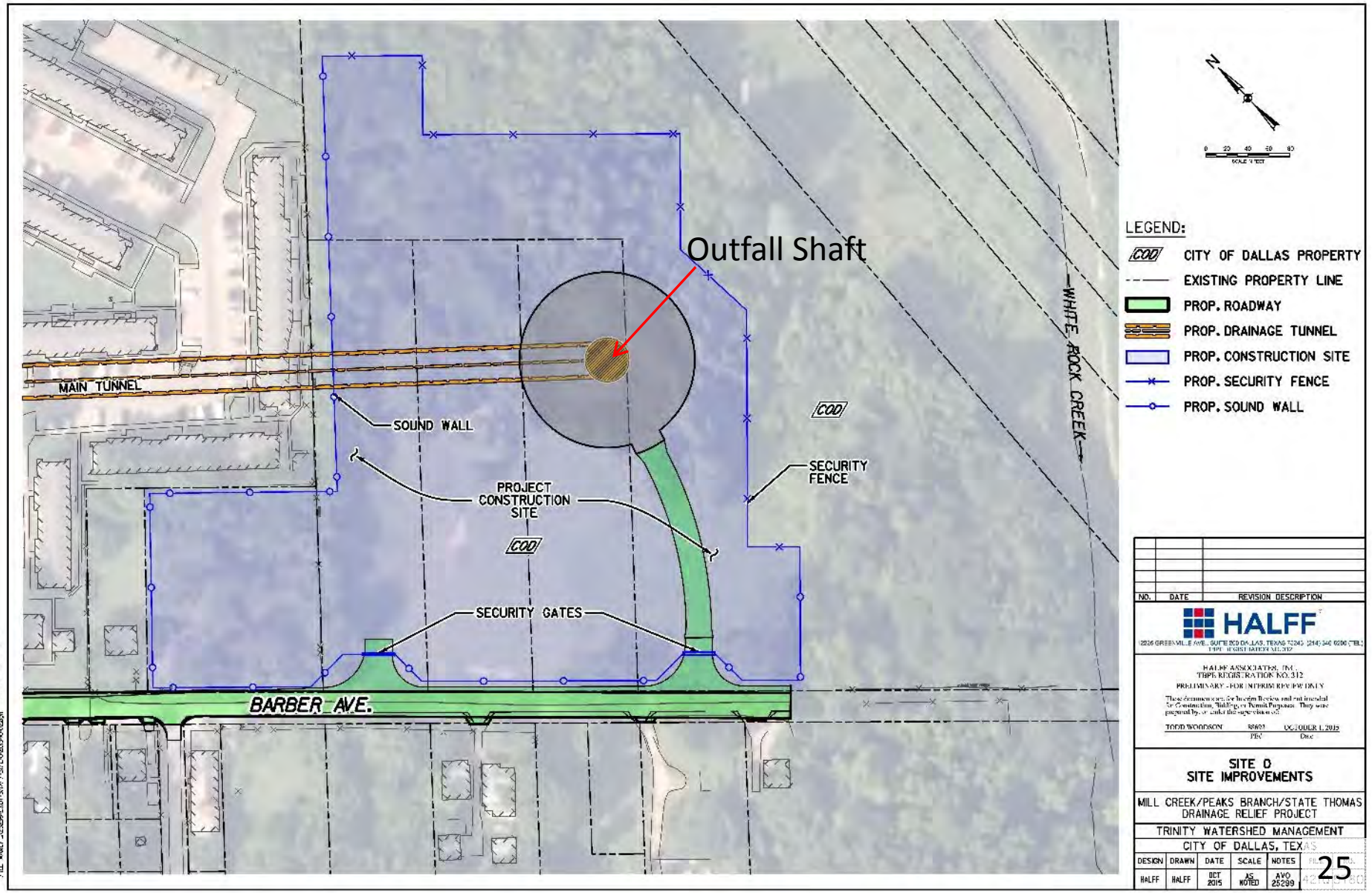
- Minimal utility relocation
- Reduced ROW acquisition
- Minimal street replacement
- Minimal traffic impacts

Intake Site

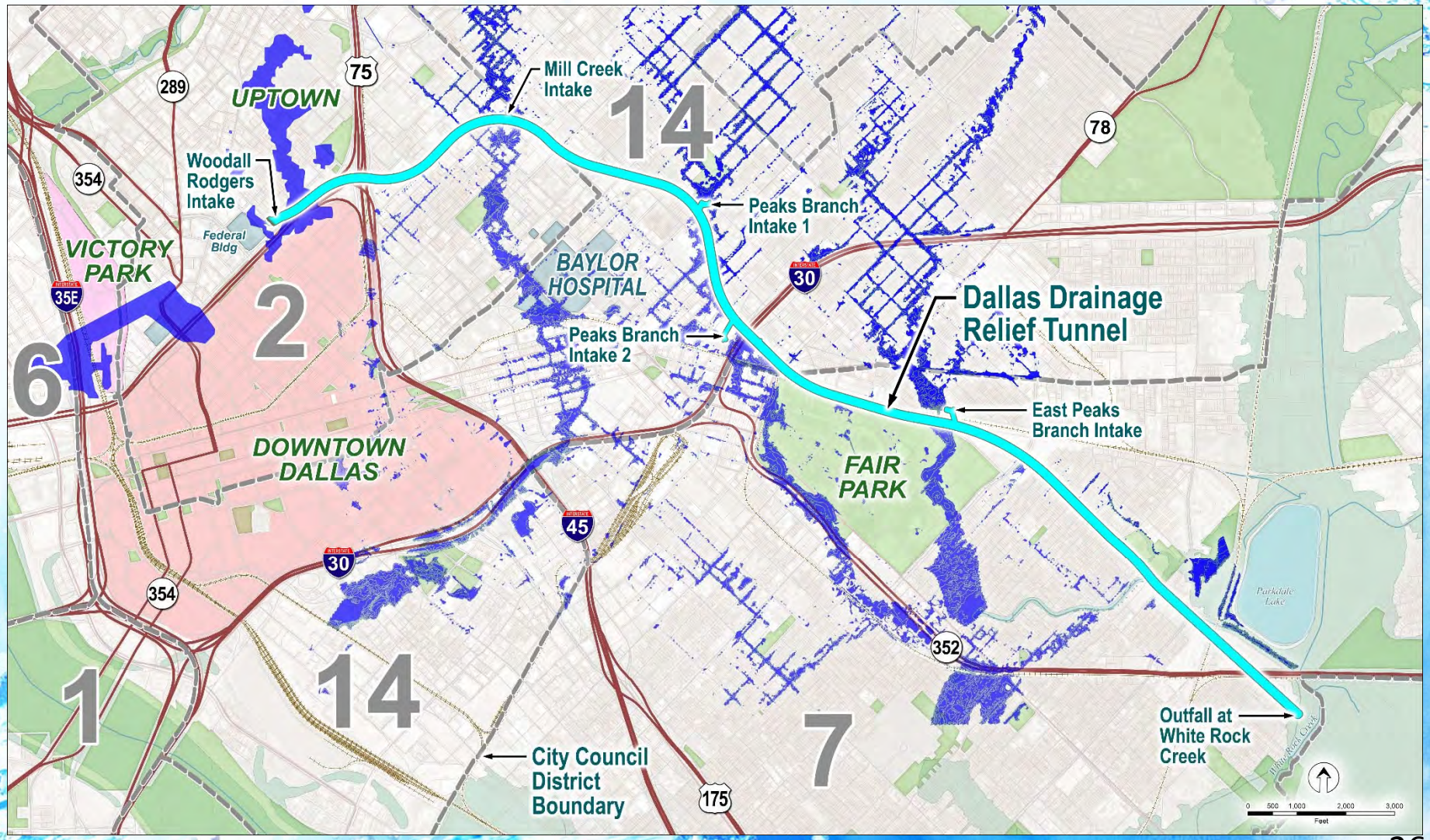

HASKELL AVE.
SAN JACINTO ST.
APPLE ST.
MAIN TUNNEL
LEGEND:
PROPOSED DRAINAGE RELIEF TUNNEL
PROPOSED STORM DRAIN
EXISTING STORM DRAIN
CONSTRUCTION SITE
PROPOSED ROADWAY
NO. DATE REVISION DESCRIPTION
HALFF
SITE E
SITE IMPROVEMENTS
MILL CREEK/PEAKS BRANCH/STATE THOMAS DRAINAGE RELIEF PROJECT
TRINITY WATERSHED MANAGEMENT
CITY OF DALLAS, TEXAS
DESIGN DRAWN DATE SCALE NOTES
HALFF HALFF OCT 2015 AS NOTED AVO 25299

Tunnel Lateral

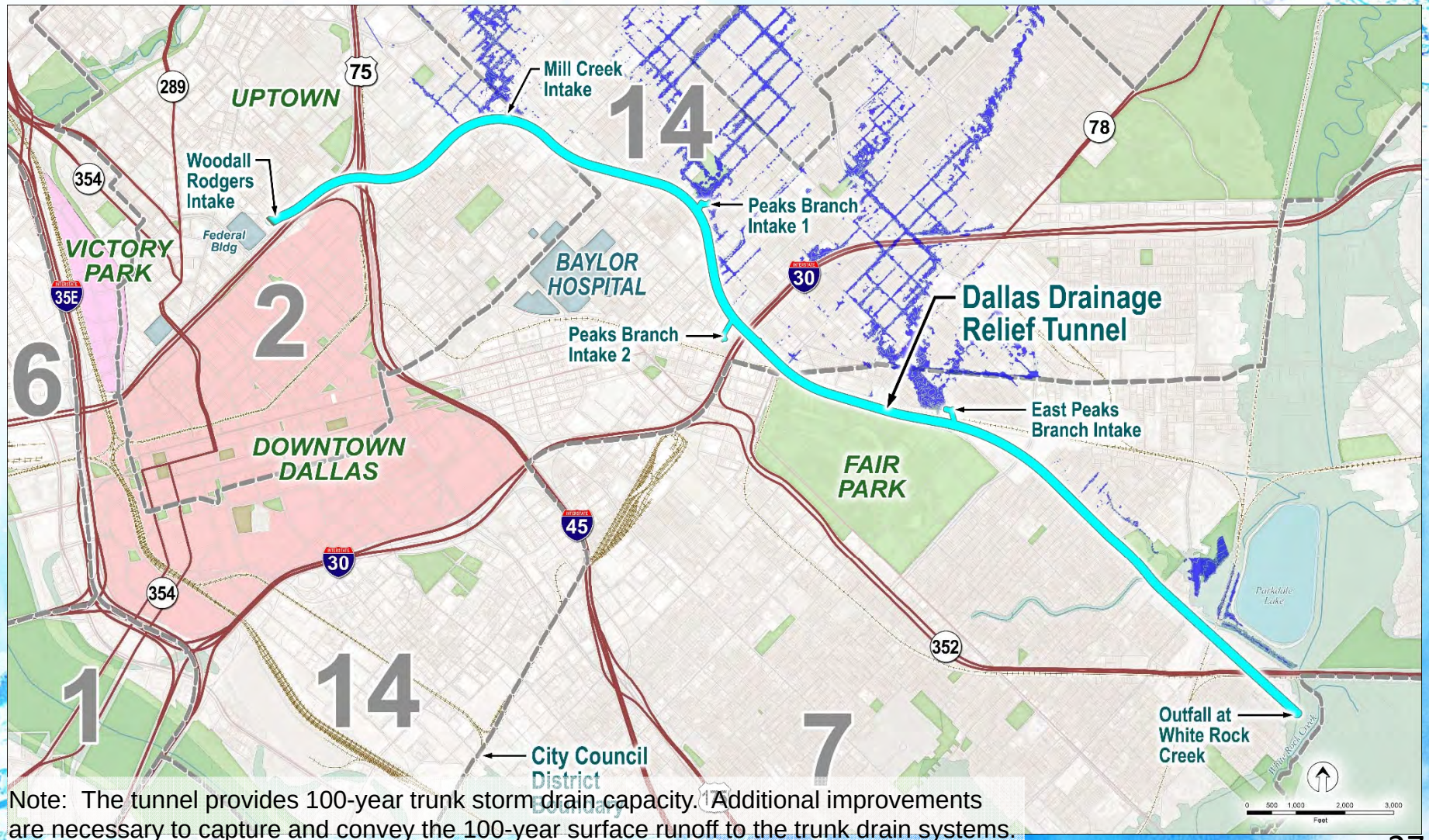
Outfall Site O



Areas Currently Subject to 100-Year Flooding in Mill Creek, Peaks Branch and State Thomas Watersheds



Flood Relief After Tunnel is Constructed



Note: The tunnel provides 100-year trunk storm drain capacity. Additional improvements are necessary to capture and convey the 100-year surface runoff to the trunk drain systems.

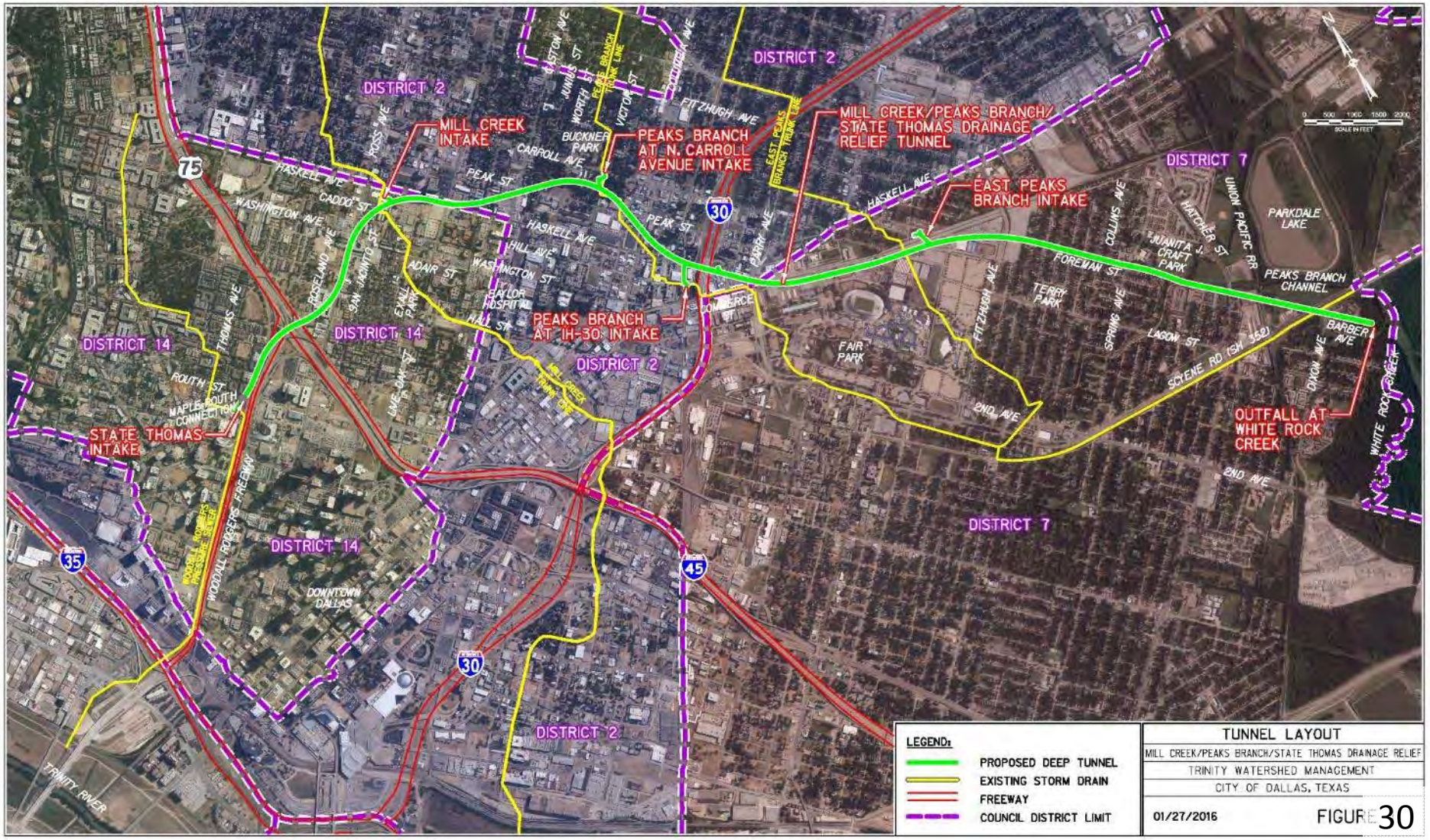
Mill Creek / Peaks Branch / State Thomas Drainage Relief Tunnel

- Protects a larger area sooner
- Addresses future IH-30 reconstruction
- Mines the tunnel in the Austin Chalk
- Reduces the construction cost for protecting State Thomas by approximately $50M

Disciplines Involved

- Hydrology and Hydraulics – Master Plans and Design Discharges
- Civil – Tunnel Construction Plans
- Structural – Tunnel, Shafts, Intakes and Outfall
- Survey – Project Control, Topographic Surveys, Aerial Survey and Boundary Surveys
- Environmental – Site Assessments, Wetland Delineations and Hazardous Material Reviews/Assessments
- Architectural – Tunnel Dewatering Station
- MEP – Tunnel Dewatering Station

Mill Creek / Peaks Branch / State Thomas Drainage Relief Tunnel



Mill Creek / Peaks Branch / State Thomas Drainage Relief Project
Dallas, Texas

Underground Construction Technology
International Conference & Exhibition
1 February 2017

Todd Woodson, PE, LEED AP BD+C
Halff Associates, Inc.