# PM 2.5 HOT SPOT ANALYSIS

## Knoxville Station Transit Center

WilburSmith ASSOCIATES

# The Team

- **Interagency Consultation Group (ICG)**
  - Federal Transit Authority (FTA)
  - Environmental Protection Agency (EPA) Region IV
  - Federal Highway Administration (FHWA)
  - Tennessee Department of Environment and Conservation (TDEC)
  - Knoxville Regional Transportation Planning Organization (TPO)
  - Tennessee Department of Transportation (TDOT)
  - Knox County Department of Air Quality Management
  - National Parks Service
  - Knoxville Public Building Authority (PBA)
- Client - City of Knoxville (Knoxville Area Transit)
- Consultant - Wilbur Smith Associates

# Overview

- Knoxville Area Transit (KAT)
- Project History
- Existing Facility
- The New Transit Center
- Knoxville Non-attainment Area
- PM 2.5 Determination
  - Methodology
  - Findings
- PM 2.5 Hot Spot Analysis
  - Methodology
  - Mitigation Measures

**PART I**

**PART II**

# Knoxville Area Transit

- Is the mass transit system for the City of Knoxville
- Served by 80 buses and 14 trolleys
- Carries around 3.2 million passengers per year

| KAT Bus Fleet Information | | | |
|---|---|---|---|
| **Bus Fleet** | **Manufacturer** | **Count** | **Fuel Used** |
| Trolleys | DUPONT/EBUS | 14 | 10 Biodiesel and 4 Electric |
| Para-Transit | Ford/Goshen/Braun/Dodge | 17 | Gasoline and Biodiesel |
| Neighborhood Circulator | Ford/ABI | 21 | Propane |
| Buses | Nova/Optima | 66 | Biodiesel |

# Project History

- Need for a permanent location
- Looked at 30 sites
- To Improve operational efficiency
- Future growth

# Existing KAT Transfer Facility

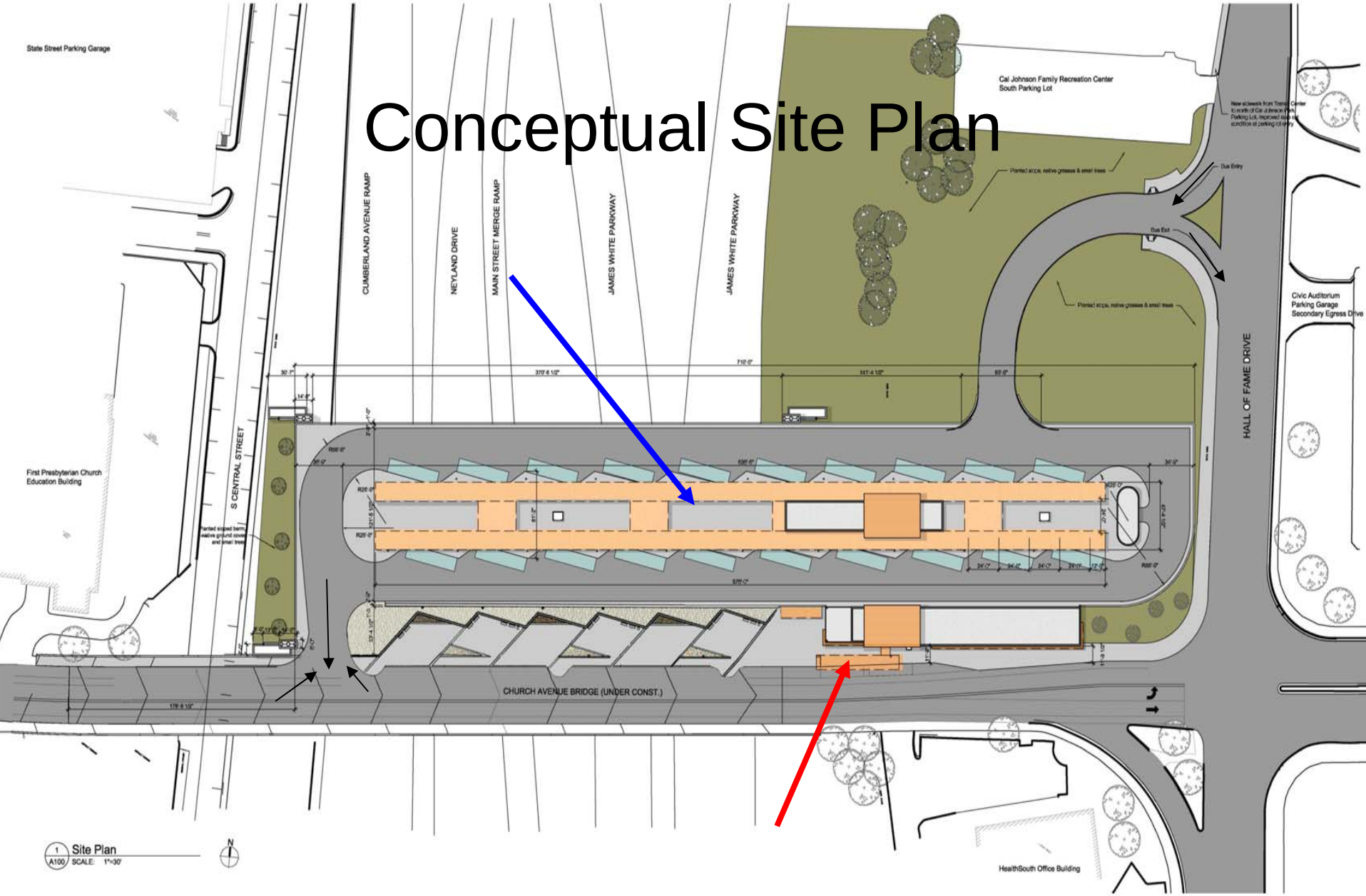
- 11 bus parking spaces
- Excessive Idling
- Long Queues
- Pedestrian/Passenger/Vehicle Conflicts
- No passenger parking spaces
- Traffic congestion on Main Street



# The New Transit Center

- Included in the TIP FY 2006-2008
- Total Cost-$27 million
- Mix of Federal, State, and local funds
- Facility Completion- Fall 2009
- Anticipated Opening Date- January 2010

# Conceptual Site Plan




**Knoxville Station Transit Center**
Knoxville, Tennessee

***Conceptual Site Plan***

Intermodal Associated Architects
Wilbur Smith Associates
with Von Grossman & Company

16. July 2007

# Artist's Rendering

**Knoxville Station Transit Center**
Knoxville, Tennessee

**A view from the south west corner looking north east along Church Avenue bridge**

Intermodal Associated Architects
a joint venture of BSP, Inc. and MHM Inc.
with Von Grossmann & Co.

12/06/2007

WilburSmith ASSOCIATES

# Key Features

- Saw Tooth Layout
- “Green” Building (LEED certified design)
- Safety
- Parking
- Digital Bus Arrival and Departure Signs
- Passenger Amenities
- KAT Customer Service and Offices
- Improved Pedestrian Facilities

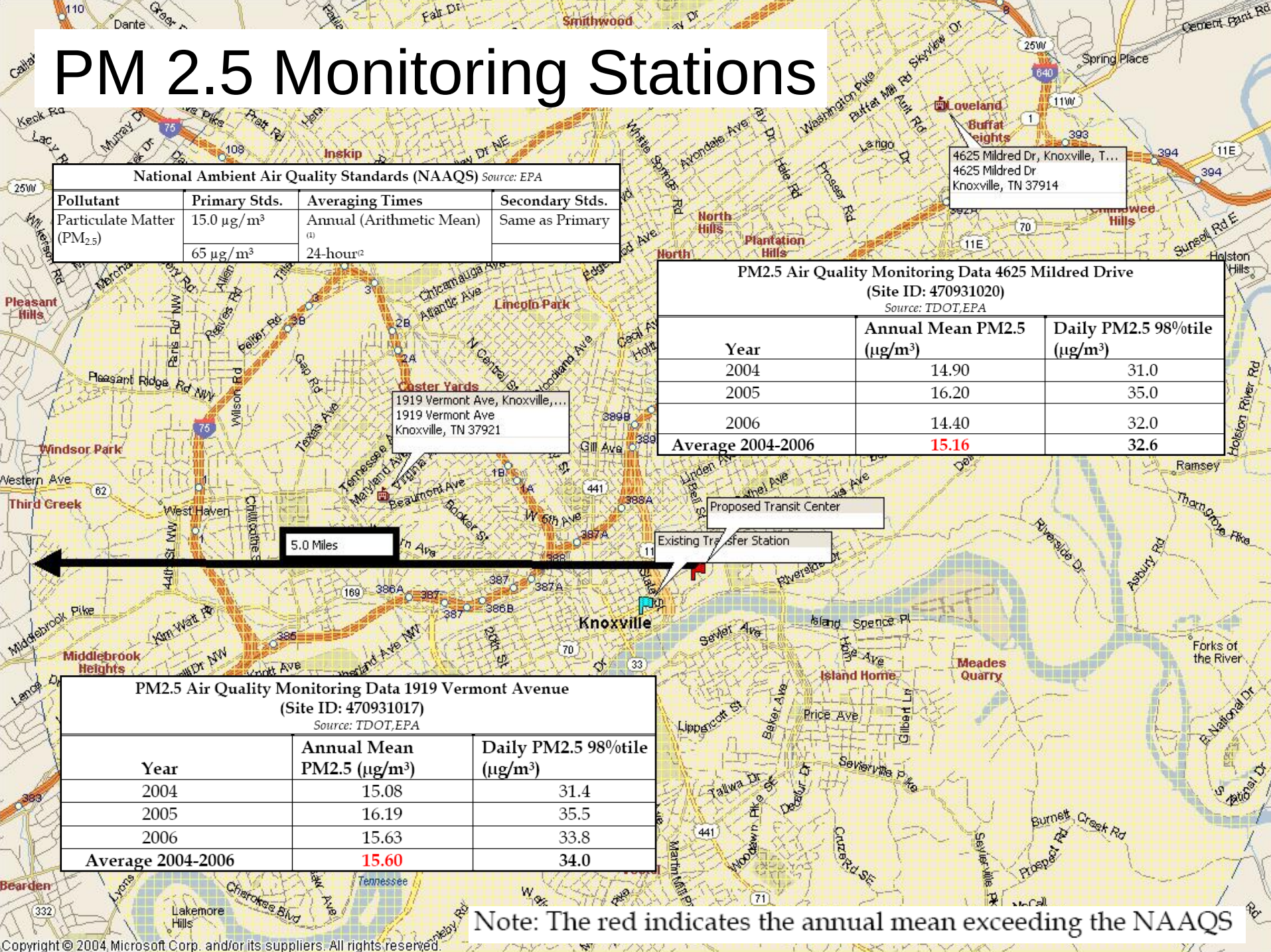
# Existing vs. Proposed

| Characteristics of Existing and Proposed Facilities | | |
|---|---|---|
| **Features** | **Existing** | **Proposed** |
| **Covered Shelters** | 6 | 20 |
| **Buses Accommodated** | 11 (Curbside) | 20 (Saw-toothed) |
| **Maximum Queue during peak hours** | 8 buses | All Vehicles Accommodated |
| **Passenger Waiting Area** | Curbside | Indoor Waiting Facility |
| **Passenger & Pedestrian Safety** | Vehicle Conflicts | No conflicts |
| **Customer Service** | Curbside | Indoor Facility |
| **Administrative Offices** | None | Indoor Facility |
| **On Site Parking** | None | Yes |
| **Land Use** | CBD | Spans over James White Parkway/ borders CBD |

# Knoxville Non-Attainment Area

- Non-attainment for:
  - Ozone (8-hour standard)
  - Fine Particulate Matter 2.5 (PM 2.5)
- Includes Knox, Blount, Anderson, and Loudon Counties and small portion of Roane County.

# PM 2.5 Monitoring Stations




| National Ambient Air Quality Standards (NAAQS) *Source: EPA* | | | |
|---|---|---|---|
| **Pollutant** | **Primary Stds.** | **Averaging Times** | **Secondary Stds.** |
| Particulate Matter ($PM_{2.5}$) | 15.0 µg/m³ | Annual (Arithmetic Mean) (1) | Same as Primary |
| | 65 µg/m³ | 24-hour(2) | |

**PM2.5 Air Quality Monitoring Data 4625 Mildred Drive (Site ID: 470931020)**
*Source: TDOT,EPA*

| Year | Annual Mean PM2.5 (µg/m³) | Daily PM2.5 98%tile (µg/m³) |
|---|---|---|
| 2004 | 14.90 | 31.0 |
| 2005 | 16.20 | 35.0 |
| 2006 | 14.40 | 32.0 |
| **Average 2004-2006** | **15.16** | **32.6** |

**PM2.5 Air Quality Monitoring Data 1919 Vermont Avenue (Site ID: 470931017)**
*Source: TDOT,EPA*

| Year | Annual Mean PM2.5 (µg/m³) | Daily PM2.5 98%tile (µg/m³) |
|---|---|---|
| 2004 | 15.08 | 31.4 |
| 2005 | 16.19 | 35.5 |
| 2006 | 15.63 | 33.8 |
| **Average 2004-2006** | **15.60** | **34.0** |

Note: The red indicates the annual mean exceeding the NAAQS

# Purpose and Need

- Transportation Conformity Requirements
- Regionally Significant Project
- Non-exempt
- Project located in a Non-attainment area
- Federal Funds

# PART I

## Conformity Determination

# Methodology

- Followed Georgia DOT format
- Six Conformity Question & Answer format
- Report included Carbon Monoxide (CO) Hot Spot Analysis & Mobile Air Toxics (MSATs)
- ICG Review
- Public Review and Comment

# Project Level Conformity Questions and Answers

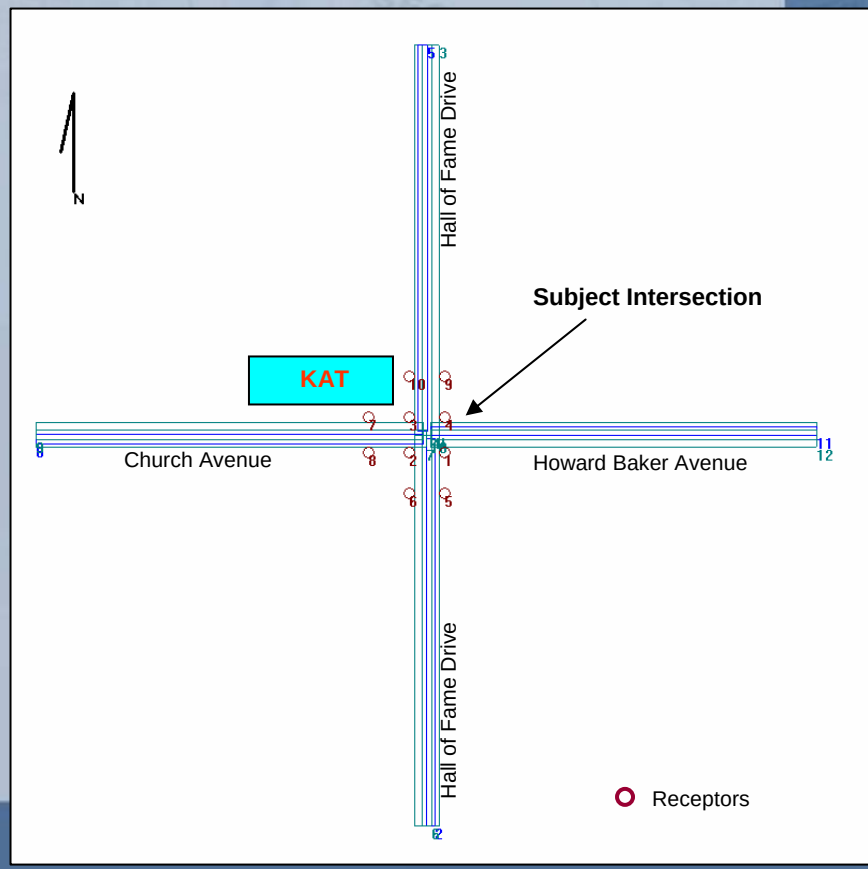
1. Is this project in a conforming plan? **YES**
2. Is the project on a expanded highway that serves more than 125,000 AADT and 8% or more diesel truck traffic? **NO**
3. Does the project construct exit ramps, connect a highway to a major freight, bus or intermodal terminal? **YES**
4. Does the project expand an existing highway or other facility that already has a congested intersection and will it result in an increase in number of diesel trucks? **NO**
5. Does the highway project involve a significant increase in transit buses or trucks? **NO**
6. Will this project cause or worsen an existing violation? **NO**

# Carbon Monoxide Hot Spot

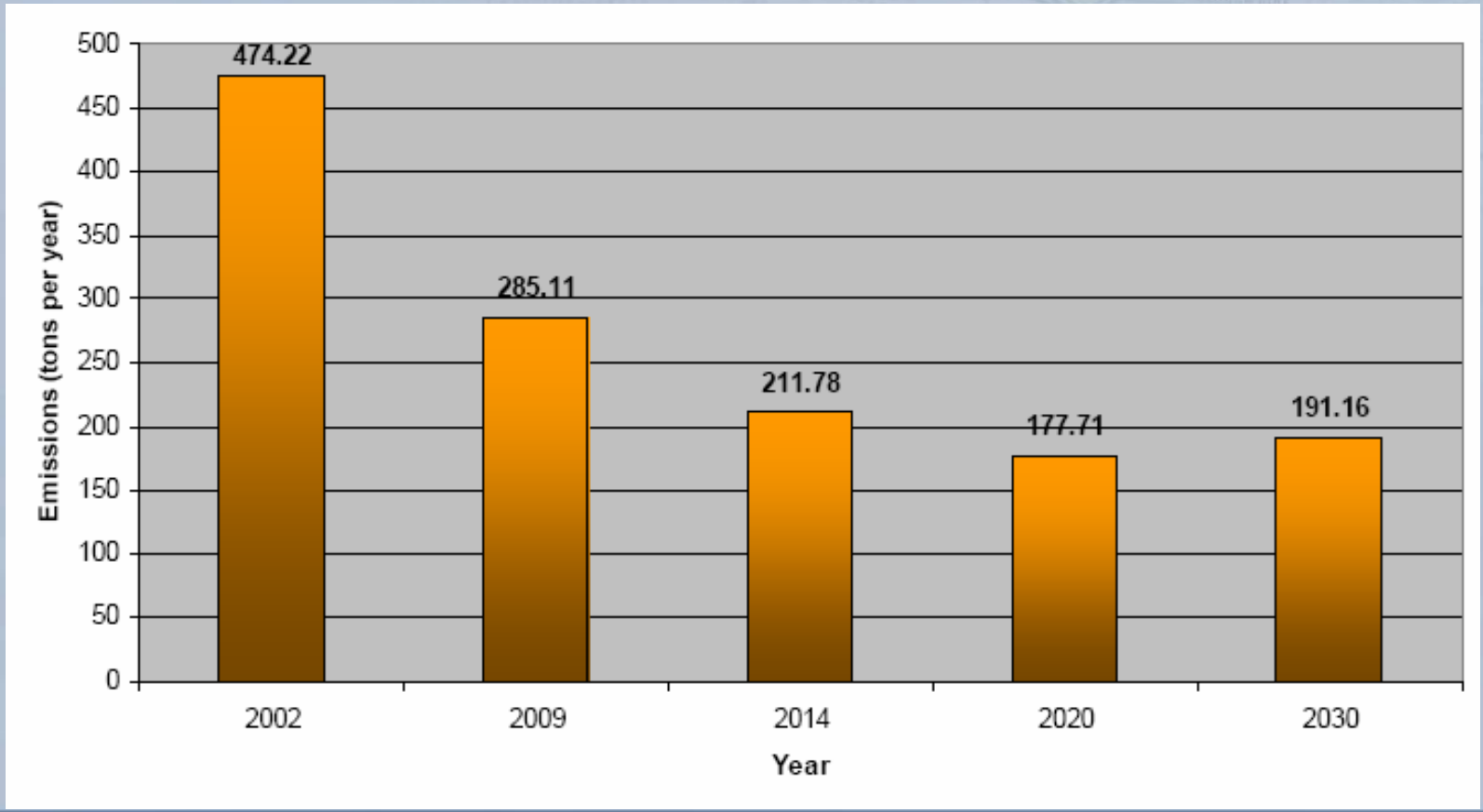
- MOBILE 6.2
- CALQ3HC

| Maximum Carbon Monoxide Concentration | | | |
|---|---|---|---|
| Condition | 1 HR CO (ppm) | 8 HR CO (ppm)* | Receptor |
| 2007 Existing | 1.2 | 0.96 | 4 |
| 2025 No-Build | 1.2 | 0.96 | 2 |
| 2025 Build | 1.2 | 0.96 | 2 |

- 1.2ppm < 35ppm 1 hr NAAQS
- 0.96ppm<9ppm 8 hr NAAQS



# On Road Mobile Source Direct PM 2.5 Emission Trend




***Source: Knoxville Regional TPO Conformity Determination Report 7/6/2006***

# Findings

- KAT service area – 5.2% of the non-attainment area
- Not a new facility; relocation of existing facility
- Does not cause or contribute to a new violation
- Does not increase the frequency of the severity
- Improved operational efficiency
- Not a significant contributor of diesel emissions- 20,000 diesel trucks on I-40 vs. 348 daily weekday transit trips
- TPO Conformity Determination Report indicates a 40 % drop in On-Road PM 2.5 emissions in 2009

# ICG Consultation

- Identified as a project of air quality concern as per 40 CFR 93.123(b)(1)
  - *(iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location*
- Hot Spot analysis required

# PART II

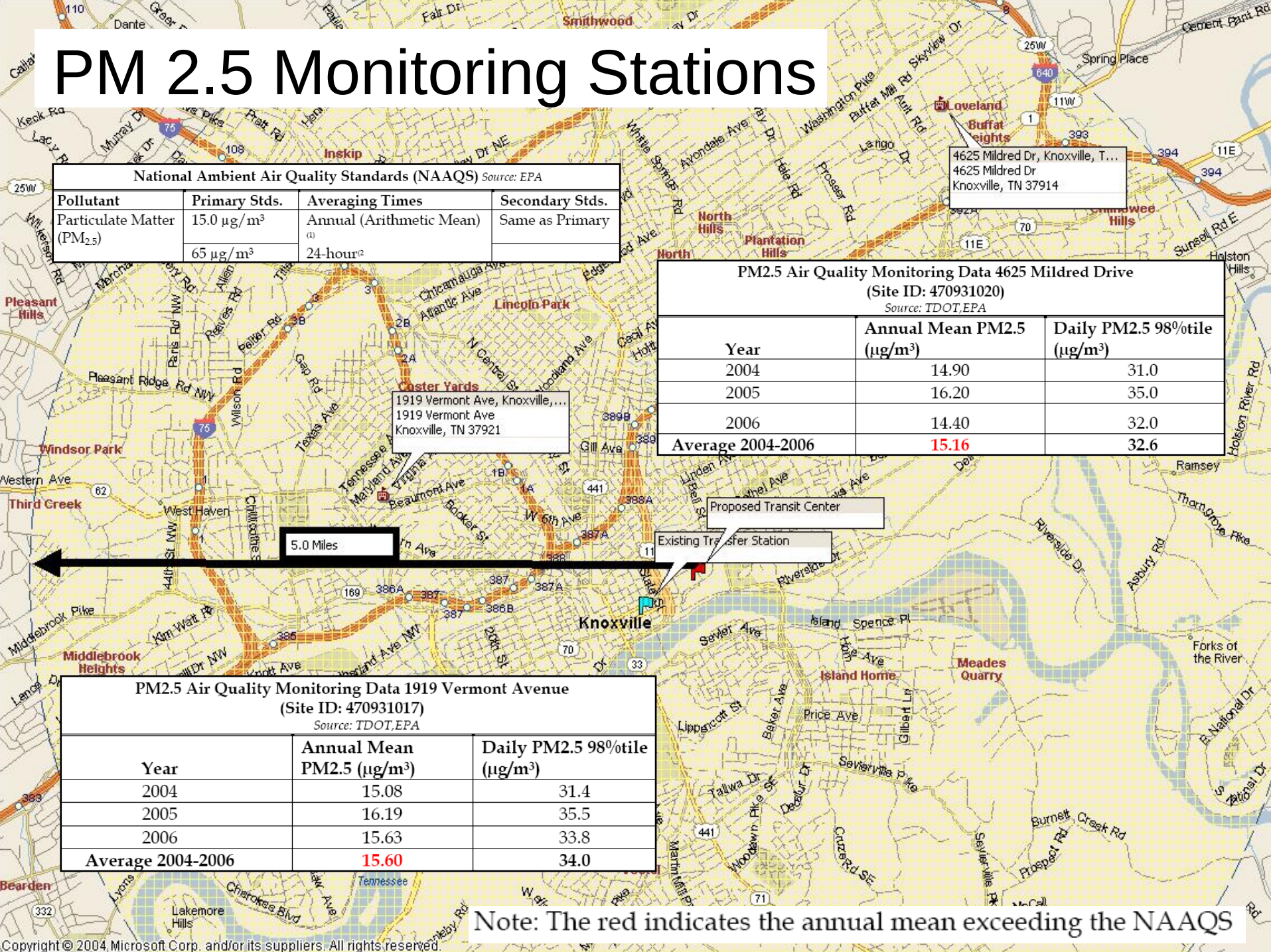
## PM 2.5 Hot Spot Analysis

WilburSmith ASSOCIATES

# Methodology

- Air Quality Monitoring Data
- Comparison of Existing & Proposed  Transit Operations
- Commitment from the project sponsor to implement Air Quality Mitigation Measures to minimize future PM 2.5 impacts
- ICG Review
- Public Review and Comment

# PM 2.5 Monitoring Stations

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# Existing vs. Proposed Operations

| Diesel Bus Idling Scenarios | | | | |
|---|---|---|---|---|
| | Existing Facility | | Proposed Facility | |
| | Weekday | Saturday | Weekday | Saturday |
| **Diesel Bus Trips** | 348 | 249 | 348 | 249 |
| **Max Idling time (per bus)** | 10 min | 10 min | 5 min | 5 min |
| **Average Idling time (per bus)** | 7 min | 7 min | 4 min | 4 min |
| **Total daily idling time** | 2436 min or 40.6 hours | 1743 min or 29.05 hours | 1392 min or 23.2 hours | 996 min or 16.6 hours |

- Idling Time reduction of 100 hours per week
- Reduced PM 2.5 emissions

# Mitigation Measures

1. Idling Reduction Policy
   - New Idling Limit - 5 minutes
   - Driver Education
   - Enforcement
   - Exception: Extreme weather conditions

# Mitigation Measures

2. Vehicle Replacement Schedule
   - Replace Model Year 1996-1999 buses by 2011
   - Congestion Mitigation and Air Quality (CMAQ) and Surface Transportation Program (STP) Funding requests already approved
   - Replace 6 buses in ’08, 4 each every year till 2011
   - New buses to meet EPA’s 2007 Diesel emission standards

# Mitigation Measures

## 3. Diesel Particulate Retrofits

Best Case

- Retrofit 28 MY 2002-2006 buses in 2008 using Grant Funds

Worst Case

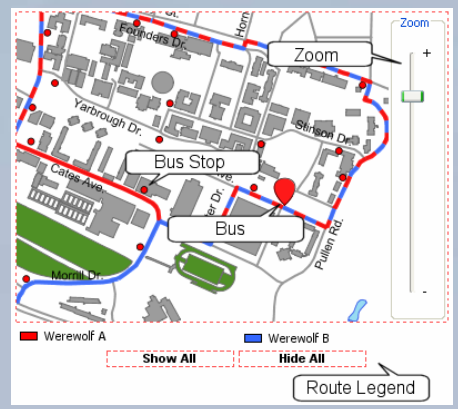
- Retrofit 9 buses each in 2008, 2009 and 10 in 2010 using FTA Section 5307 Annual Formula Funds

# Mitigation Measures

4. Continued use of Clean Fuels /Alternative Fuels
   - Currently uses B20 Biodiesel
   - Neighborhood service uses propane
   - Trolleys use B20 Biodiesel and Electric
   - KAT Supervisor Vehicle/Service Vehicle - Hybrid

# Mitigation Measures

5. Implement ITS Measures
   - Traffic Signal with preemption device at Church Avenue / Transit Center Access and Church Avenue / Hall of Fame Drive
   - Install Automatic Vehicle Locator
   - Install Message Boards




# Mitigation Measures

6. Minimize Construction Emission
   - Cover trucks hauling direct
   - Pave construction access roads
   - Apply soil binders to exposed piles of sand, dirt
   - Sweep adjacent and nearby streets
   - Install wheel washers for any equipment vehicle at site
   - Suspend grading and excavating when wind speeds > 25 mph
   - Ensure all vehicles have a valid operating permit from the Knox County Air Quality Management regulations

# Summary of Benefits

- Increased Passenger/Pedestrian Safety
- Increased Operational efficiency
- Eliminates congestion on Main Street
- Eliminates On Street Queuing (All buses accommodated)
- ITS measures (Transit priority)
- Reduced Idling Time (Idling Reduction Policy)
- Cleaner Fuels
- Bus Replacement & Diesel Retrofits – Cleaner Buses

**Reduced PM 2.5 Emissions**

# ICG Consultation

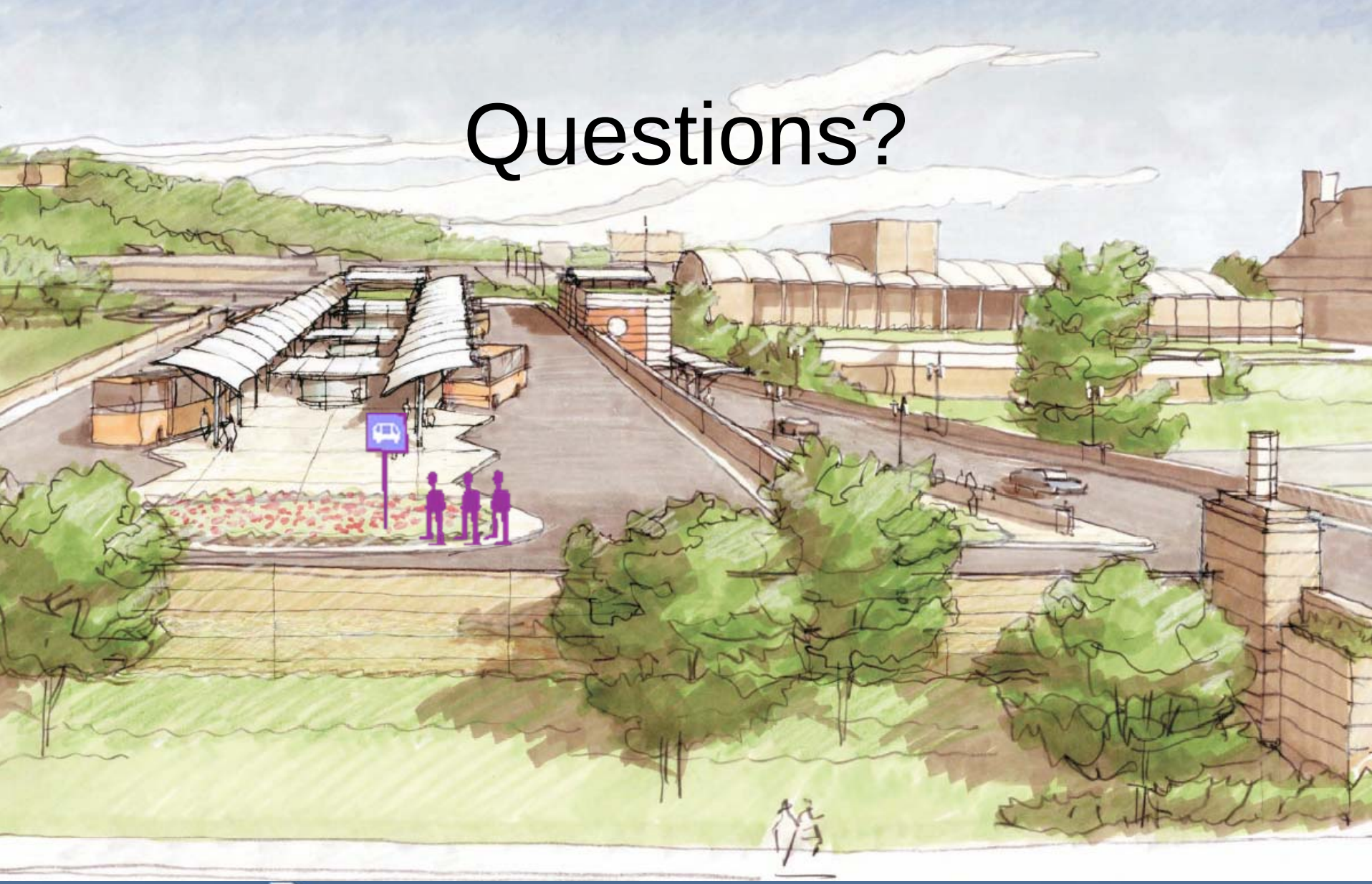
- ICG Concurs that the PM 2.5 qualitative Hot-Spot analysis for the Knoxville Transit Center meets the requirements of 40 CFR 93.123

- FTA approves Finding of No Significant Impact (FONSI); September 21, 2007

# FONSI (September 2007)

- *"I'm very pleased with the decision of the Federal Transit Administration and we're eager to get started making this much-talked about station into a reality," said **Mayor Bill Haslam**. "This new station is much-needed and it will serve our citizens very well for many years to come."*

# Questions?



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# More Questions?


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