Near-road Monitoring

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Ambient Air Monitoring Group

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Objectives

- Review CFR requirements
- Discuss forthcoming Technical Assistance Document
- Discuss Near-road NO2 pilot
- Provide an example version of the draft site selection process in action
- Wrap-up and take questions

Reviewing what's in the rule…

- 40 CFR Part 58 Appendix D and E have network design requirements and siting criteria, respectively (http://ecfr.gpoaccess.gov).
- Requirements based on CBSA populations (available from US Census Bureau [www.census.gov])
- Objectives are to monitor maximum NO2 concentrations in an area – with a component of the network design specifically focusing on mobile source impacts due to related exposure risks.
- Required near-road (NR) monitoring stations:
  - 1 NR site in CBSAs with populations ≥ 500,000
  - 2 NR sites in CBSAs with populations ≥ 2.5 million
  - 2 NR sites in CBSAs with one or more road segments having ≥250,000 Annual Average Daily Traffic (AADT)
- Estimated to require 127 sites in 103 CBSAs.

Monitor Location & Siting

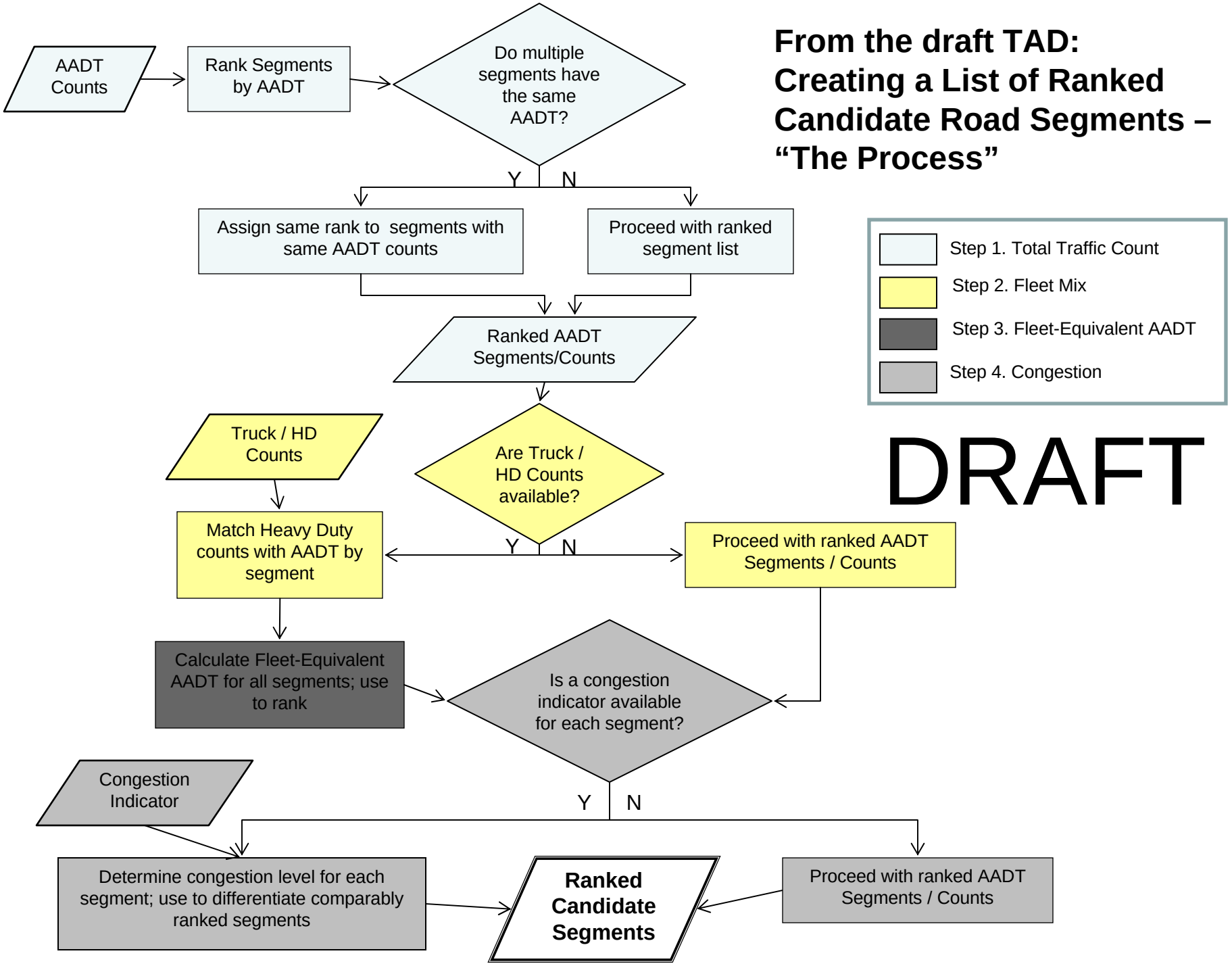
- Key passage from Appendix D: The near-road NO_2 monitoring stations shall be selected by ranking all road segments within a CBSA by AADT and then identifying a location or locations adjacent to those highest ranked road segments, considering fleet mix, roadway design, congestion patterns, terrain, and meteorology, where maximum hourly NO_2 concentrations are expected to occur…"

- Key passage from Appendix E: "In siting near-road NO_2 monitors as required in paragraph 4.3.2 of appendix D of this part, the monitor probe shall be as near as practicable to the outside nearest edge of the traffic lanes of the target road segment; but shall not be located at a distance greater than 50 meters, in the horizontal, from the outside nearest edge of the traffic lanes of the target road segment.

Near-road Monitoring Technical Assistance Document (TAD)

- In response to public response to the rule for further guidance on implementing the near-road NO_2 network, EPA committed to creating the near-road monitoring TAD.
- The TAD will provide a ‘cookbook’ suggesting concepts for use by State and Locals to implement the network in a way that meets the intentions and physical requirements of the NO_2 rulemaking.
- The TAD will also discuss the merits, methods, and approaches for making near-road NO_2 stations multi-pollutant monitoring stations.
- Draft version due May/June – specifically for review by CASAC-Ambient Air Monitoring and Methods Subcommittee.
- Final version expected Fall of 2011
- In addition to the TAD, some State and local agencies are conducting a near-road NO_2 pilot, collaborating with EPA…

From the draft TAD: Creating a List of Ranked Candidate Road Segments – "The Process"



Near-road NO_2 Pilot Study

The pilot is intended to:

1) Allow state and local air monitoring stakeholders to evaluate, improve, and document (with EPA) the near-road monitor siting process, and
2) Provide first-hand experience in the full installation of a near-road monitoring station to share with the air monitoring community.

- 5 Pilot CBSAs: Albuquerque, Baltimore, Boise, Miami, and Tampa
  - Pilot partners plan to conduct some passive monitoring at select roadside locations
  - Boise and Miami (Broward Co.) will install permanent near-road monitoring stations to further meet our second pilot objective
  - EPA plans to model select road segments

Near-road NO_2 Pilot Study (cont.)

- In the TAD we intend to discuss different approaches and methods for evaluating candidate near-road sites including: passive monitoring, periodic continuous (or saturation type) monitoring, mobile (on-road) monitoring, and modeling.

- EPA plans to utilize any information and experience gained in the pilot study to bolster TAD development.
  - In particular, we hope that information from the pilot can be used to compare the traffic data based selection "process" against passive NO_2 monitoring data and some AERMOD modeling results of individual road segments.

Case Study - Tampa

- The Tampa CBSA is comprised of 4 counties wrapped around the East, North, and Western sides of Tampa Bay, which includes the cities of Tampa and St. Petersburg.

- The Tampa CBSA has a population of approximately 2.7 million persons, and therefore will be required to operate 2 near-road NO_2 monitoring stations.

- There are three major interstates in the area:
  - I-75 running North-South (on the eastern fringes of Tampa)
  - I-4 running roughly East-West
  - I-275 which runs N-S through Tampa, across the bay to St. Pete, and continues south and east to rejoin I-75

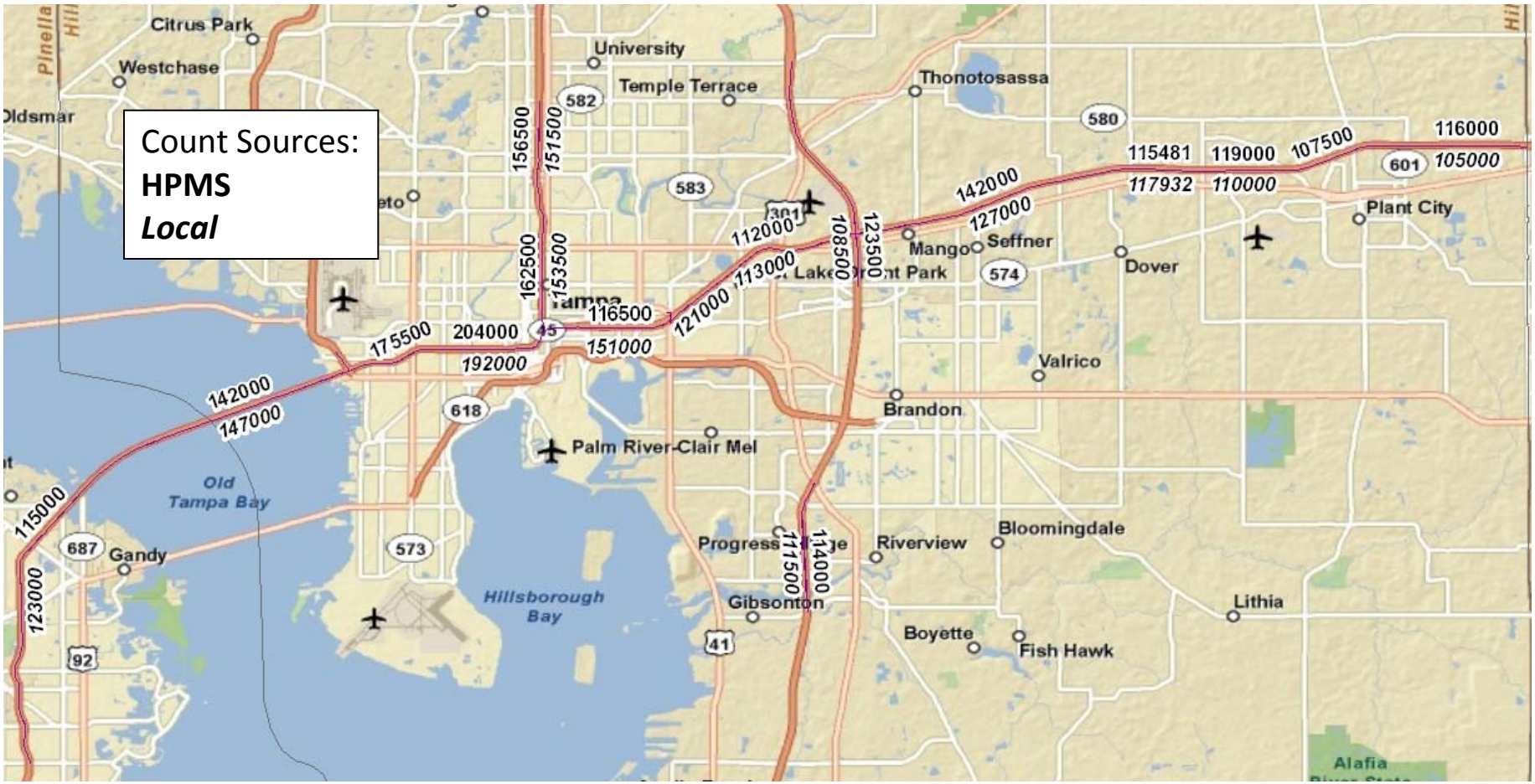
- We were able to compare HPMS data versus local FL DOT data in the following slides.

Case Study -Variables Presented

- For this example (Tampa CBSA), we are providing a list of the top ranked road segments (using available data) based on:
  - AADT (total traffic volume)
  - Heavy Duty(HD) vehicle counts (e.g. trucks/buses)
  - Estimate of congestion by calculating total AADT/# lanes on each road segment (akin to Level of Service [LOS] provided by DOTs)
  - Fleet Equivalent (FE) AADT – which accounts for AADT and fleet mix when data are available
    - FE AADT = (AADT – HD counts)+(HD counts * 10)
    - The “10” value in the equation is the Heavy Duty to Light Duty vehicle NOx emission ratio. This is based on an interpretation of NOx emission factors from EPA’s regulatory MOVES (MOtor Vehicle Emissions Simulator) model using national defaults

	HPMS	Florida DOT
Source	http://www.bts.gov/publications/national_transportation_atlas_database/2010/	http://www.dot.state.fl.us/planning/statistics/trafficdata/
Year	2008	2011
Highest AADT (Roadway)		
1st	204,000 (I-275)	192,000 (I-275)
2nd	201,000 (I-275 & ramp to I-4)	176,500 (I-275)
3rd	187,000 (I-275)	170,500 (I-275)
4th	175,500 (I-275)	169,000 (I-275 & ramp to I-4)
5th	172,500 (I-275)	167,000 (I-275)

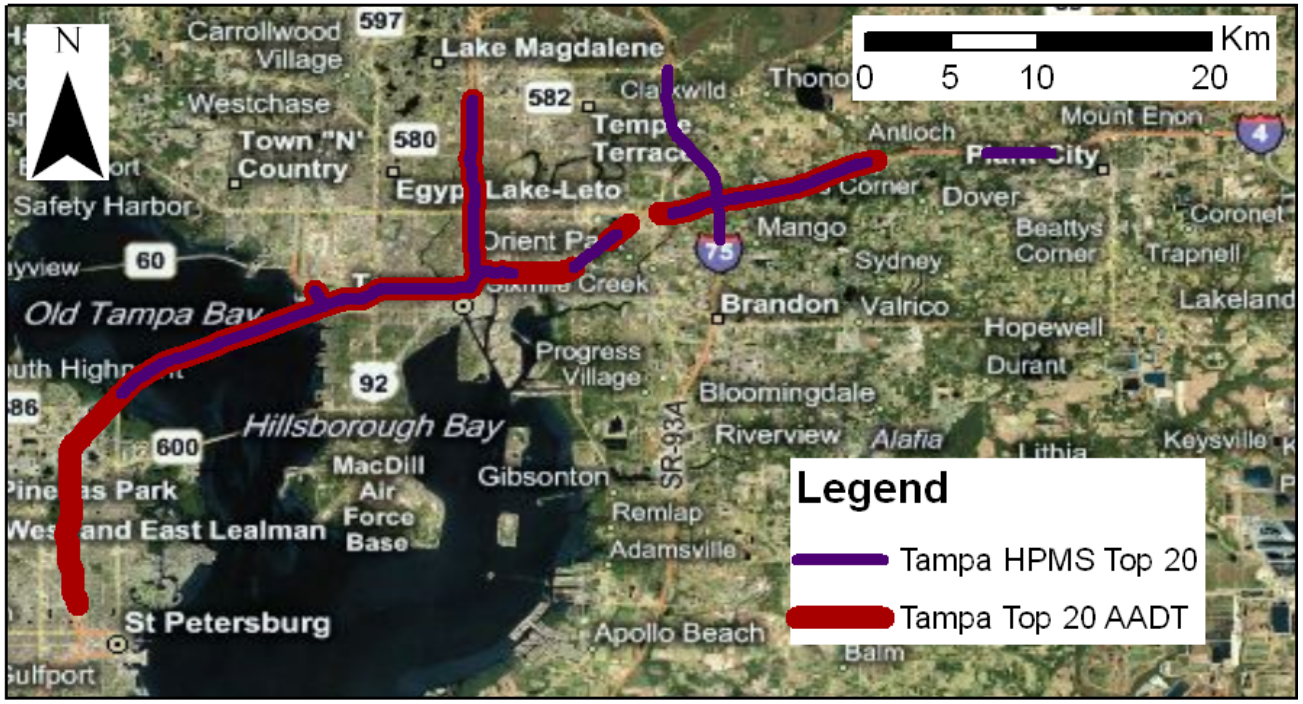
Example of Differences Between HPMS and Local Counts



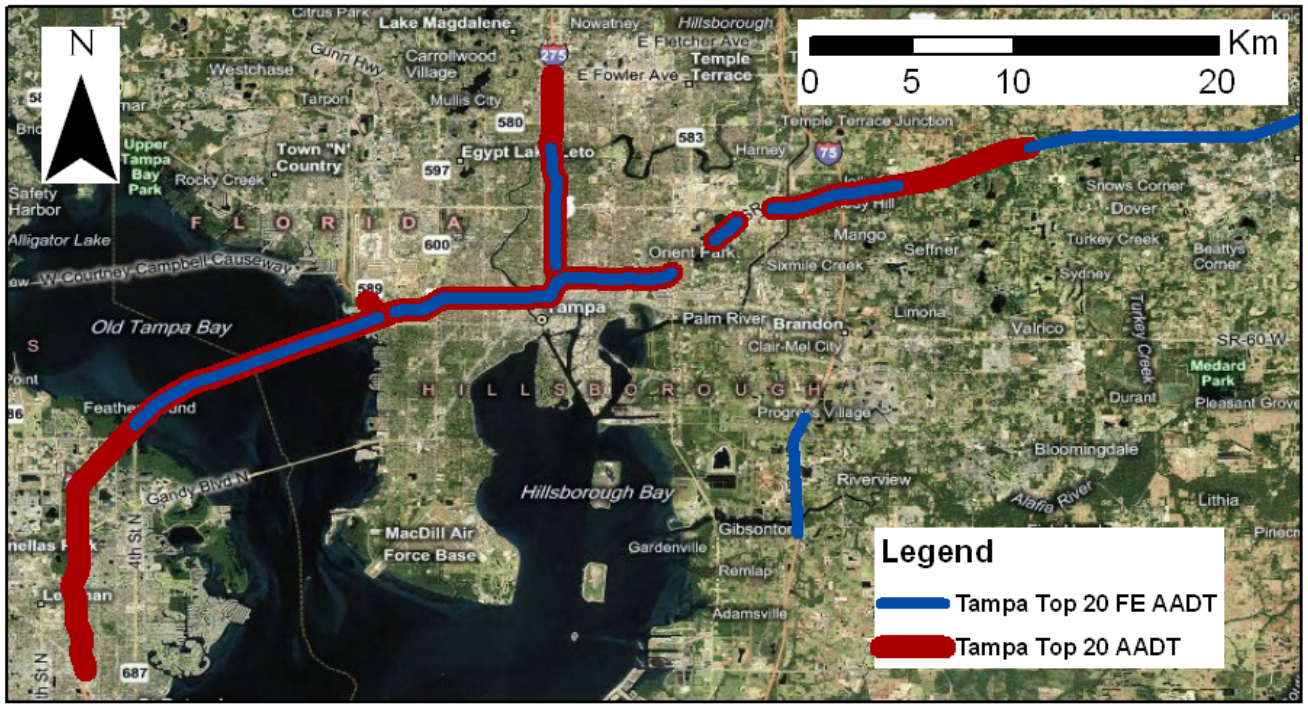
Tampa: Top 20 Fleet-Equivalent (FE) AADT Counts (Local Data)

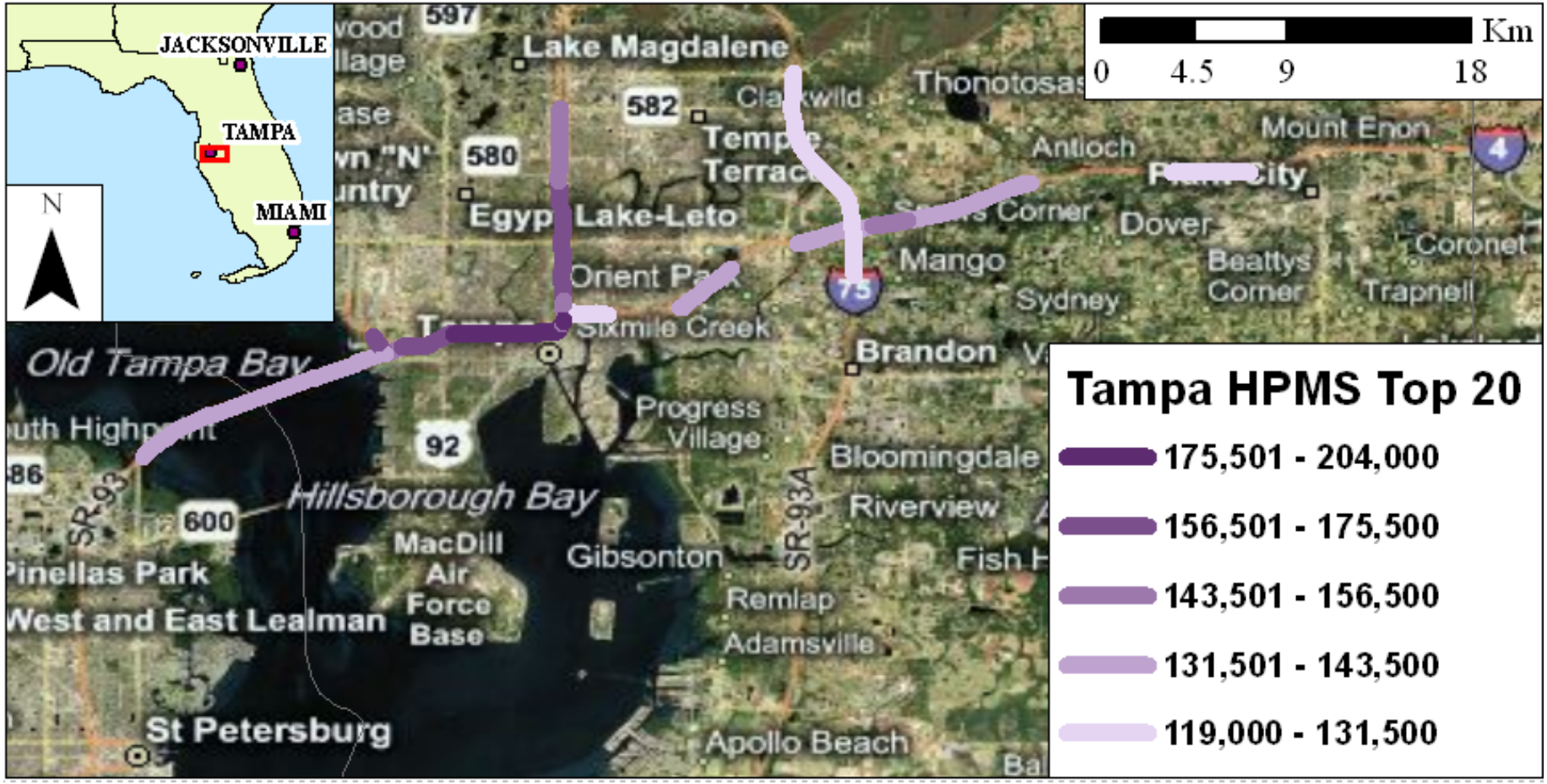
COSITE	Route	From	To	AADT Rank	AADT	Truck Rank	Truck AADT	AADT/Lane	FE AADT	FE AADT Rank
102028	I-4	10320000/10320001	Bridge No-100658	6	**164,000**	10	**12,251**	16,400	**274,259**	1
102016	I-275	Bridge No-100128	Bridge No-100110	1	**192,000**	27	**8,467**	19,200	**268,203**	2
100091	I-4	US 301 / SR 43	I-75/SR 93A	15	**136,500**	5	**14,073**	17,063	**263,157**	3
102026	I-4	Bridge No-100658	US 41/SR 599/50th St	13	**151,000**	11	**12,050**	18,875	**259,450**	4
105353	I-4	SR 93A/I-75	Mango Rd	15	**136,500**	6	**13,172**	22,750	**255,048**	5
105609	I-275	S600/U92/Dale Mabry	Bridge No-100128	3	**170,500**	25	**8,713**	21,313	**248,917**	6
100087	I-4	Bridge No-100599	S566/Thonotosassa Rd	25	**110,000**	3	**15,279**	13,750	**247,511**	7
100084	I-4	Bridge No-100607	Hills/Polk Co Line	28	**105,000**	1	**15,719**	17,500	**246,471**	8
102006	I-275	Sligh Ave	Bridge No-100219	5	**167,000**	26	**8,684**	27,833	**245,156**	9
102015	I-275	Bridge No-100138	10320000/10320001	4	**169,000**	29	**8,298**	12,071	**243,682**	10
102015	I-275	Bridge No-100110	Bridge No-100138	4	**169,000**	29	**8,298**	16,900	**243,682**	10
102009	I-275	Floribraska Ave	Bridge No-100203	8	**160,500**	21	**9,229**	20,063	**243,561**	11
102019	I-275	CR587/Westshore Blvd	Bridge No-100120	2	**176,500**	36	**7,413**	29,417	**243,217**	12
100112	I-4	Bridge No-100605	Bridge No-100607	29	**103,000**	3	**15,388**	17,167	**241,492**	13
102018	I-275	Bridge No-100120	S600/U92/Dale Mabry	7	**163,000**	32	**7,824**	20,375	**233,416**	14
100106	I-4	Mcintosh Rd	Bridge No-100599	22	**117,932**	8	**12,595**	19,655	**231,287**	15
150062	I-275	East End Br 150107	Bridge No-100115	14	**147,000**	22	**9,026**	18,375	**228,234**	16
150062	I-275	4th St N	End Bridge 150107	14	**147,000**	22	**9,026**	14,700	**228,234**	16
100086	I-4	S566/Thonotosassa Rd	Bridge No-100605	30	**98,000**	4	**14,396**	16,333	**227,564**	17
102007	I-275	SR 600 / Hills Ave	Sligh Ave	10	**156,500**	34	**7,669**	26,083	**225,521**	18
100146	I-75	GibsontonDr	SR 43 / US 301	24	**111,500**	9	**12,577**	11,150	**224,693**	19
102023	I-4	SR 574/ML King Blvd	Orient Rd	20	**122,000**	13	**11,236**	20,333	**223,124**	20
102008	I-275	Bridge No-100203	SR 600 / Hills Ave	11	**153,500**	33	**7,736**	25,583	**223,124**	20

National
Counts
vs.
Local Counts



Local Counts
vs.
Local FE AADT
Counts

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Hillsborough Bay
MacDill Air Force Base
Gibsonton
Remlap
Adamsville
Fish H
Pinellas Park
West and East Lealman
St Petersburg
Apollo Beach
Tampa HPMS Top 20
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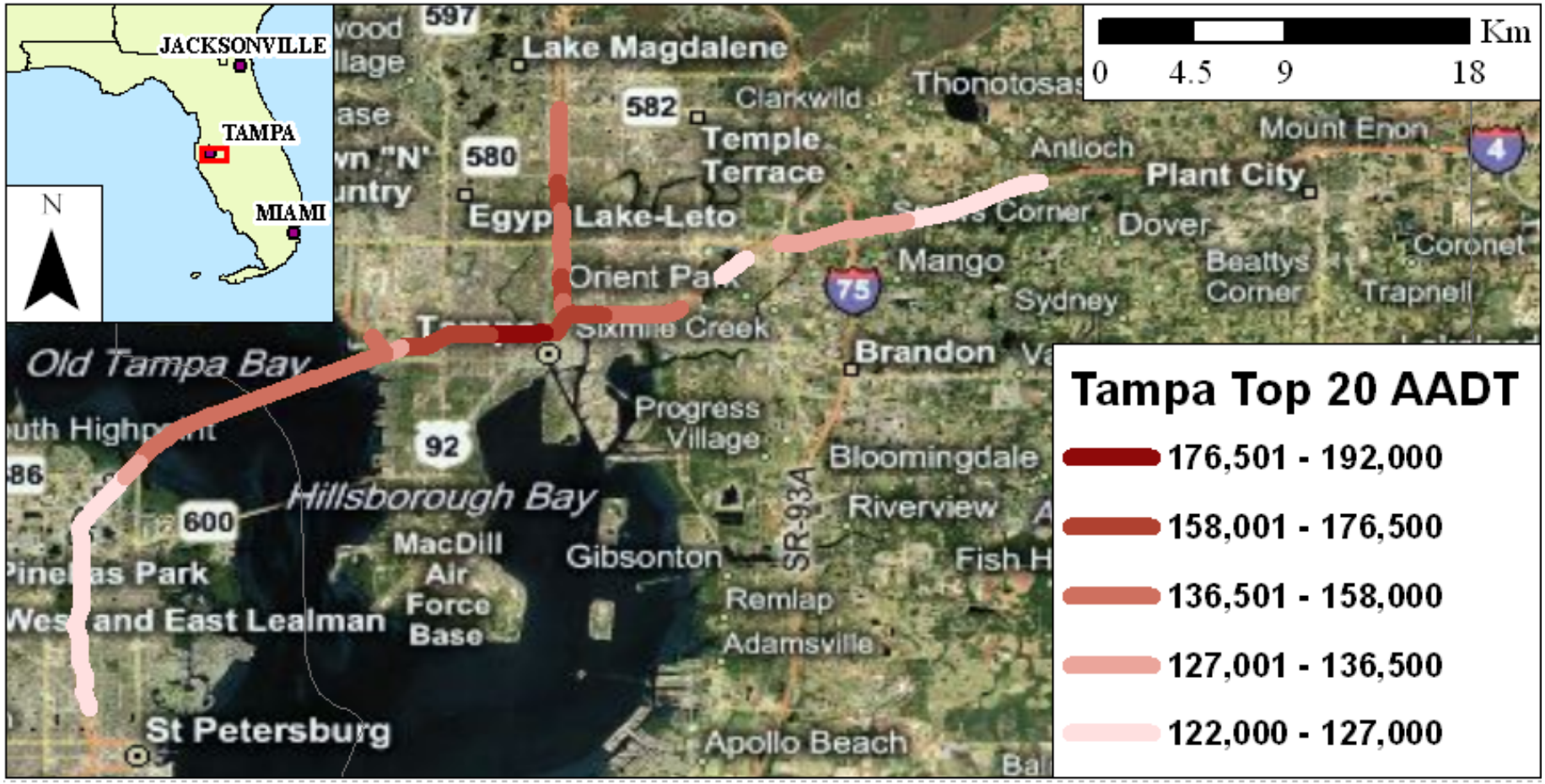
156,501 - 175,500
143,501 - 156,500
131,501 - 143,500
119,000 - 131,500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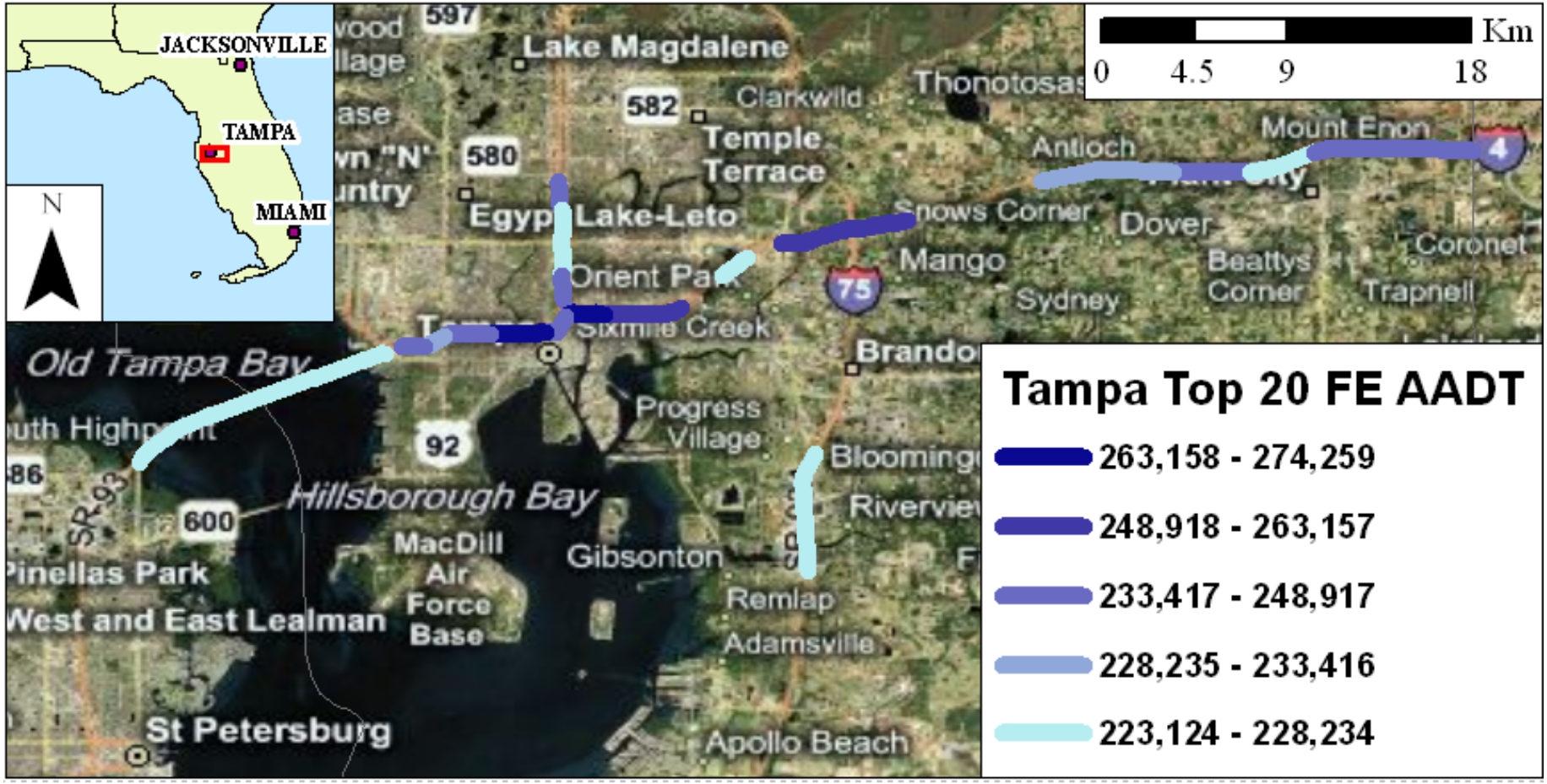
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St Petersburg
Apollo Beach
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Tampa Top 20 FE AADT
263,158 - 274,259
248,918 - 263,157
233,417 - 248,917
228,235 - 233,416
223,124 - 228,234

After ranking traffic data…

- Using the road segment lists generated by traffic data analysis, the next steps would be for a State or Local agency to begin road segment evaluation through reconnaissance.

- Reconnaissance objectives would relate to:
  - Roadway design (from the rule)
  - Terrain (from the rule)
  - Meteorology (from the rule)

  Plus:
  - Logistical (site placement) feasibility
  - Population exposure (as a secondary factor)

DRAFT Reconnaissance Objectives

- For a given road segment under consideration as a near-road NO_2 site, EPA expects state and locals should characterize or assess the following:
  - What kind of road is it? Specifically, is it a controlled access highway such as an interstate, freeway, toll-way, etc or an arterial type road.
  - Is there an interchange as part of or on the end of the segment?
  - Does the road have noise barriers along part or all of either side of the road?
  - What type of vegetation exists along side of the road? Would any existing vegetation inhibit siting for monitoring?
  - Is the target road segment at-grade, below or above grade, or lie in terrain that has a variety in relative elevations?
  - What type of roadway safety features are along side the target road? Examples would be guard rails, fencing, berms, etc.
  - How close are surrounding buildings, or other such non-road features, estimated to be from the edge of the target road?
  - Characterize the surrounding land use. Examples are residential, commercial, industrial, etc.
  - Population exposure – related to surrounding land use; how much near-road exposure is there along a segment, also, are there susceptible and vulnerable populations in the area?
  - Characterize the local meteorology that would be representative of a given road segment
  - Assess power availability in the area
  - Construction – Ongoing? In a DOT's (which they all typically have) near- and long-term plans, would a site be affected?
  - Intangibles – notes on a given road segment's candidacy to a permanent monitoring station.

Site Selection

- After any reconnaissance, EPA envisions states would have sufficient information to begin identifying viable near-road site locations, having considered all the factors in the rule.

- EPA also envisions that record-keeping of "the list" of road segments and subsequent reconnaissance would go a long way in providing rationale to Regions on why certain sites may or may not be chosen.

Wrap-up

- We hope the TAD will aid in streamlining the near-road implementation process, and facilitate network implementation in a similar fashion across the entire country.

- Look for your State and Local counterparts participating in the pilot study to present their experiences at upcoming conferences, particularly the 2011 Monitoring Conference – date/location TBD.

Questions?