# U.S. Food and Drug Administration Headquarters Consolidation Master Plan Update

## Air and Noise Quality Technical Report

*Prepared for:*

**The U.S. General Services Administration**
**National Capital Region**

*In cooperation with:*

**The U.S. Food and Drug Administration**

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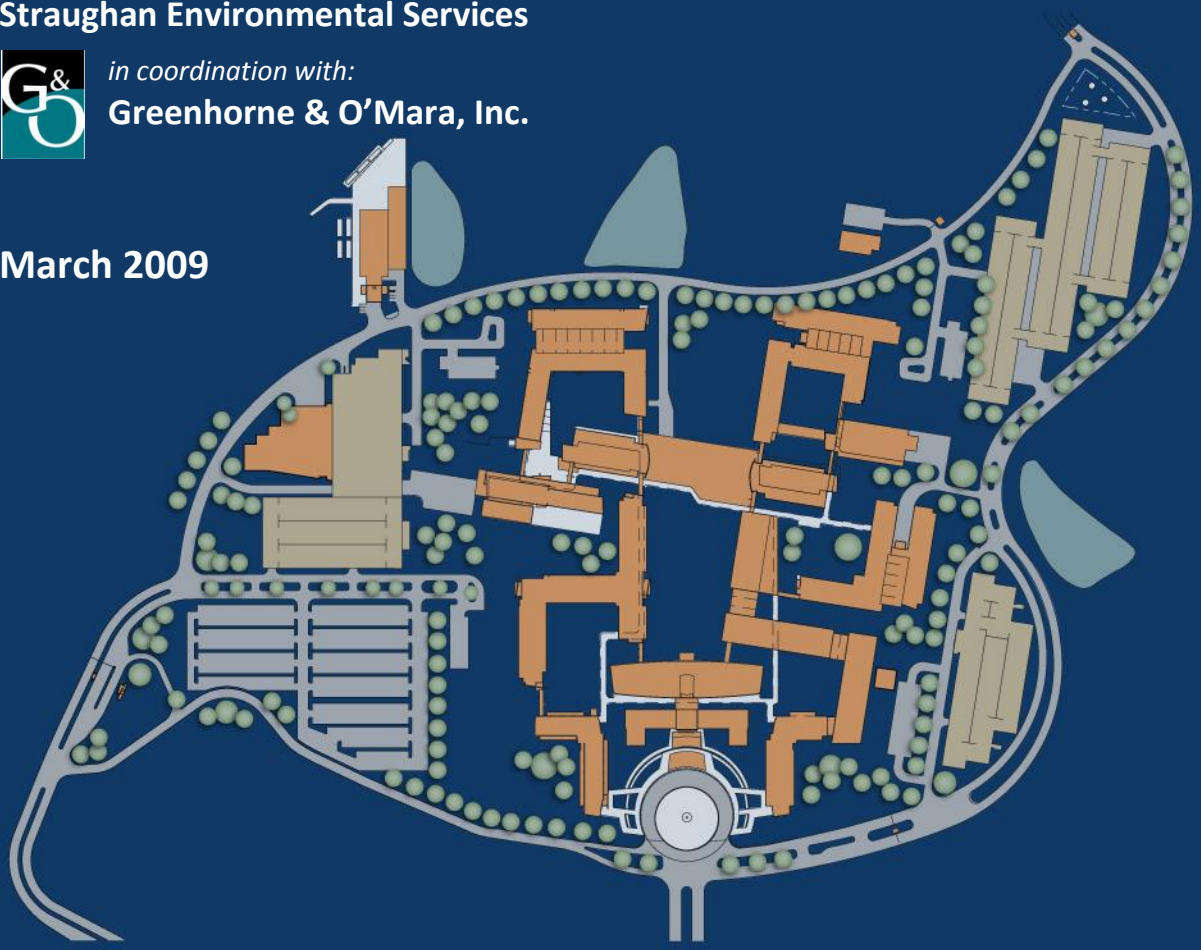

accommodating growth

protecting resources

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## *Introduction*

This air and noise quality technical report has been prepared by Straughan Environmental Services, Inc. for the General Services Administration (GSA) to assess and report potential noise and air quality impacts resulting from revisions to the U.S. Food and Drug Administration (FDA) Master Plan for the consolidation of their headquarters facilities at the Federal Research Center at White Oak (FRC). The results of the air and noise quality analyses are summarized in the Supplemental Environmental Impact Statement (SEIS) being prepared for the project.

GSA is proposing to update the FDA Headquarters Master Plan to accommodate an increase of 1,170 FDA employees to support new FDA programs. The project will involve the development of 1,254,922 additional gross square feet of office and laboratory space, construction of a fitness center, and expansion of the Central Utility Plant (CUP) to serve the FDA Campus. In addition, GSA plans to relocate the Child Care Center and the Broadcast Studio from the locations proposed in the 2006 FDA Headquarters Master Plan.

As mentioned, the update to the FDA Headquarters Master Plan would include the expansion of the CUP. This would include a 50,000 square foot building expansion and the addition of a thermal water storage tank to provide for utilities infrastructure needs for the increase in lab and office space at the FDA Campus. Two 15-Megawatt (MW) generators, five 1.980-ton chillers, a 300mbh (thousands of British Thermal Units) boiler, and eight additional cooling towers would be installed. (The 300-mbh boiler will not be needed if dual fuel generators are installed.) In addition, at full build-out of the FDA campus, a 6,000-kilowatt (KW) capacity steam turbine generator is anticipated to utilize waste heat.

The project alternative selection process is described fully in the SEIS and the alternatives are summarized below.

- **Alternative 1:** This is the "No Action" Alternative. Under this alternative, the FDA White Oak Consolidation would be executed according to the 2006 Master Plan, and development to accommodate new FDA programs or additional FDA employees and visitors would not occur.

- **Alternative 2: Dispersed Density Action Alternative** – Under this alternative, building heights would follow existing building heights, thereby keeping uniformity across the campus. This would allow for more dispersed density across the campus and allow for better interaction between FDA employees. This alternative would also add a northwest parking garage; a fitness center on the southern portion of the campus; relocation of the broadcast studio to the southeastern portion of the campus; relocation of the Child Care Center to the south side of the campus, and the central utility plant (CUP) would be expanded to the north of the existing CUP. A thermal water storage tank would be placed in the vicinity of the CUP expansion, the exact location has not been determined at this time.

- **Alternative 3: Southeast Quadrant Density Action Alternative** – Under this alternative, building heights would be greater than currently seen on the FRC, thereby allowing most of the density

to be in the southeastern portion of the campus. This alternative would also add a fitness center on the southern portion of the campus, relocation of the broadcast studio to the southeastern portion of the FDA Campus, relocation of the Child Care Center on the south side of the campus, and the CUP would be expanded north of the existing CUP. A thermal water storage tank would be placed in the vicinity of the CUP expansion, the exact location has not been determined at this time.

The noise and air quality analyses consider the potential effects of campus expansion on air- and noise-sensitive residential, institutional, and recreational facilities. The noise and mobile air quality analysis considers the effects of added commuter trips on area roadways to the air quality and noise environment. The stationary air analysis considers the effects of emissions from two different Master Plan development alternatives, each with three different options (referred to as Options A, B, and C) for the expansion of the Central Utility Plant, on these same facilities. The air quality analysis also considers the combined effects of emissions from all stationary and mobile sources on air-sensitive receptors. A qualitative analysis was conducted to identify whether noise-sensitive areas would be potentially impacted by stationary sources such as the CUP.

# 1 Air

## 1.1 Affected Environment

In accordance with guidelines set forth by 23 CFR Part 771, 49 CFR Part 622, the Clean Air Act (CAA U.S.C. Title 42, Chapter 85, 1970, as amended 1990), and the National Environmental Policy Act (NEPA), an air quality analysis is necessary to document existing air quality conditions in the vicinity of the FDA's White Oak Campus in Silver Spring, Maryland to evaluate potential changes that would be likely to occur as a result of development of the action alternatives. According to the Metropolitan Washington Council of Governments (MWCOG), existing air quality in the vicinity of the White Oak Campus, and in the region, is influenced primarily by transportation-related mobile sources (predominantly motor vehicle traffic on adjacent roadways).

### 1.1.1 National Ambient Air Quality Standards

Under the authority of the CAA, the U.S. Environmental Protection Agency (EPA) has developed National Ambient Air Quality Standards (NAAQS) for certain air pollutants (criteria pollutants) deemed harmful to public health and the environment. These criteria pollutants include: nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), carbon monoxide (CO), ozone ($O_3$), particulate matter ($PM_{2.5}$/$PM_{10}$), and lead (Pb). The concentration standards for each of these criteria pollutants are presented in Table 1-1.

**Table 1-1. National Ambient Air Quality Standards**

| | Primary Standards | | Secondary Standards | |
|---|---|---|---|---|
| **Pollutant** | **Level** | **Averaging Time** | **Level** | **Averaging Time** |
| Carbon Monoxide | 9 ppm (10 mg/m$^3$) | 8-hour [(1)] | None | |
| | 35 ppm (40 mg/m$^3$) | 1-hour [(1)] | | |
| Lead | 0.15 µg/m$^3$ [(2)] | Rolling 3-Month Average | Same as Primary | |
| | 1.5 µg/m$^3$ | Quarterly Average | Same as Primary | |
| Nitrogen Dioxide | 0.053 ppm (100 µg/m$^3$) | Annual (Arithmetic Mean) | Same as Primary | |
| Particulate Matter ($PM_{10}$) | 150 µg/m$^3$ | 24-hour [(3)] | Same as Primary | |
| Particulate Matter ($PM_{2.5}$) | 15.0 µg/m$^3$ | Annual [(4)] (Arithmetic Mean) | Same as Primary | |
| | 35 µg/m$^3$ | 24-hour [(5)] | Same as Primary | |
| Ozone | 0.075 ppm (2008 | 8-hour [(6)] | Same as Primary | |

**Table 1-1. National Ambient Air Quality Standards**

| | Primary Standards | | Secondary Standards | |
|---|---|---|---|---|
| **Pollutant** | **Level** | **Averaging Time** | **Level** | **Averaging Time** |
| | std) | | | |
| | 0.08 ppm (1997 std) | 8-hour [7] | Same as Primary | |
| | 0.12 ppm | 1-hour [8] (Applies only in limited areas) | Same as Primary | |
| Sulfur Dioxide | 0.03 ppm | Annual (Arithmetic Mean) | 0.5 ppm (1300 µg/m$^3$) | 3-hour [1] |
| | 0.14 ppm | 24-hour [1] | | |

Source: United States Environmental Protection Agency (www.epa.gov/air/criteria.html)

[1] Not to be exceeded more than once per year.
[2] Final rule signed October 15, 2008.
[3] Not to be exceeded more than once per year on average over 3 years.
[4] To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.
[5] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).
[6] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)
[7] (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
[8] (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1.
(b) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) Areas.

### *1.1.2 National Ambient Air Quality Standard Attainment Status*

Areas where concentrations of criteria pollutants are below the NAAQS are designated by EPA as being in “attainment” and areas where a criteria pollutant level exceeds the NAAQS are designated as being in “nonattainment.” Ozone ($O_3$) nonattainment areas are categorized based on the severity of pollution: marginal, moderate, serious, severe, or extreme. CO and $PM_{10}$ nonattainment areas are categorized as moderate or serious. The FDA White Oak Campus is located in Montgomery County, Maryland, which is designated as a non-attainment area for $PM_{2.5}$ and as a moderate non-attainment area for $O_3$ under the 8-hour standard.

MWCOG is the regional agency that prepares the State Implementation Plan (SIP), which documents how the Washington region will meet the NAAQS. The SIP provides an inventory of existing air emissions and accounts for planned projects within the region that have potential to increase pollutant emissions. The SIP accounts for general increases in vehicular travel throughout the region, as well as anticipated changes in land use and demographic/employment patterns.

## 1.2 Environmental Consequences

New development can affect air quality in three ways: 1) through airborne dust generated by the construction process; 2) by introducing new stationary sources of pollutants, such as power plants or heating plants and boilers for new buildings; and 3) through increasing vehicular traffic to the site, which raises vehicle emission levels near the site, and possibly in the region.

The purpose of this evaluation is to identify and quantify the potential direct, indirect and cumulative emissions related to the proposed development and operation of the Master Plan Update Alternatives as well as the 2006 Master Plan (No Action) Alternative. For this analysis, the emission inventories of mobile and stationary sources for each alternative were evaluated for conformity with the SIP for the Washington metropolitan region.

### 1.2.1 Background Levels of Criteria Pollutants

Under the 2006 Master Plan Alternative (Alternative 1), the FDA would continue its headquarters consolidation under its current Master Plan to achieve 4,735,012 gross square feet (GSF) of development to accommodate 7,719 employees. No new sources of stationary or mobile air emissions would be created. Therefore, there would be no direct, indirect, or cumulative impacts to air quality resulting from the 2006 Master Plan implementation. Although Alternative 1 would not induce additional air emissions, there would be traffic increases from predicted general growth in the community. The amount of traffic increase would vary depending on whether the Intercounty Connector (ICC) is constructed; therefore, the 2006 Master Plan Alternative was studied both with and without ICC-influenced traffic in the campus vicinity. These increases are reflected in the projected 2006 Master Plan alternative analysis results.

### 1.2.2 Proposed Action

The air quality analysis was performed in accordance with guidelines set forth by 23 CFR Part 771, 40 CFR Part 93, 49 CFR Part 622, the Clean Air Act (CAA), and the National Environmental Policy Act (NEPA), as they appropriately apply. The analysis addresses both mobile and stationary sources of air pollutant emissions. There are two Master Plan Update alternatives (Alternatives 2 and 3) that propose two different development configurations, each of which results in 5,989,934 GSF of development to serve an employee population of 8,889. These two alternatives have been paired with three options (A, B, and C) for expanding the quantities and types of gas turbines to be used in the CUP Expansion that serve the FDA White Oak Campus. The options include:

- Option A: 5-Megawatt Mercury 50 Gas Turbines
- Option B: One Mercury 50 Gas Turbine; two Taurus 70 Gas Turbines

- Option C: One Mercury 50 Gas Turbine; two Titan 130 Gas Turbines

In addition to these different scenarios for on campus development which affect the emissions of stationary air pollutant sources, the White Oak Consolidation project also includes traffic projections that vary depending on whether or not the project would go forward with the ICC in place. These varying traffic projections affect the analysis of mobile air emissions.

#### *1.2.2.1 Mobile Source Analysis*

This analysis evaluates the impact of emissions from mobile sources as a result of proposed Master Plan Update alternatives. These alternatives would increase daily traffic to and from the campus, both with and without the ICC coming online. Each alternative has identical traffic counts for "with ICC" and "without ICC" traffic. The analysis performed includes conformity of the anticipated increase in traffic with the SIP on a regional basis and the potential for localized CO emissions to violate the NAAQS concentration standards. Evaluations of the potential for localized $PM_{2.5}$ and Mobile Source Air Toxics (MSAT) impacts are also included.

##### *1.2.2.1.1 Conformity with the SIP and the Mobile Emission Budget*

As stated previously, Montgomery County, Maryland is in an area classified as non-attainment for $O_3$ and $PM_{2.5}$. The approved SIP for the region includes a mobile source emission budget for CO and the $O_3$ precursors – volatile organic compounds (VOC) and nitrogen oxides ($NO_x$), and a plan for achieving attainment. This budget was developed based on planned land uses and anticipated development within the region. Proposed projects within the region must not exceed the mobile source emissions budget outlined in the approved SIP. Proposed projects that do not exceed the emissions budget would be considered in conformity and would be approved for development. Conformity can also be demonstrated by showing that the proposed project was accounted for in the original development SIP emission budgets. Growth at the FDA White Oak Campus was accounted for in the Round 7 Cooperative Employment Forecasts prepared by the Maryland National Capital Parks and Planning Commission (MNCPPC) and MWCOG for the years 2000-2030. The Round 7.0 forecasts, which were used as the basis for the current SIP, accounted for 7720 personnel at the White Oak Campus by 2010 followed by relatively flat growth. This is a difference of 1,169 employees compared to that proposed under each Master Plan Update Alternative.

##### *1.2.2.1.2 Localized CO Emissions and NAAQS Concentrations*

The analysis of CO differs from the analysis of other criteria pollutants because it is localized and directly relates to traffic patterns that will be affected by future site development. This analysis was prepared in

accordance with guidance set forth by the U.S. Environmental Protection Agency (EPA) in *A Modeling Methodology for Predicting Pollutant Concentrations near Roadway Intersections* (EPA 1995).

The steps taken to perform this air quality analysis included the following:

- Identify the intersection near the FDA White Oak campus that would have the lowest Level of Service (LOS), the highest traffic volumes, and the closest proximity to air quality sensitive areas, thereby signifying the worst-case scenario to be evaluated;
- Identify air quality receptor locations based on project mapping that would be affected by the worst-case intersection scenario;
- Determine the background CO concentrations from nearest air quality monitoring station;
- Obtain the basic regional emission rates using MOBILE6 from MWCOG;
- Using CAL3QHC, calculate final CO concentrations for each air quality receptor in the worst-case alternative; and
- Compare final CO concentrations to the 1-hour and 8-hour NAAQS for CO to determine if any violations would occur.

The air quality receptors predict levels of CO at their particular location. According to the CAL3QHC Guideline for Modeling Carbon Monoxide from Roadway Intersections, air quality receptors should be located in:

- places of expected 1-hour and 8-hour maximum concentrations;
- places where the general public has continuous access (i.e. public sidewalks); and
- reasonable places, where reasonableness is defined in terms of proximity to the intersection, but not on the roadway itself.

*Worst Case Intersections*

Two intersections were identified as being possible worst-case scenarios for CO emissions under the Master Plan Update Alternatives. Using the above steps, it was determined that the intersection of US 29/Stewart Lane and US 29/Musgrove Road had similar Level of Service and traffic volumes. The Level of Service for both intersections was LOS F, which is considered failing. Both intersections also had unique air quality sensitive areas in close proximity (Julia Brown Montessori School at Stewart Lane/Milestone Drive, Arden Courts Assisted Living and Rehabilitation Center, and Musgrove Medical Arts Building at Musgrove Road).

Tables 1-2 and 1-3 show the levels of service and the traffic volumes for the intersections under the 2006 Master Plan Alternative with and without the construction of the ICC and the Master Plan Update Alternatives with and without the construction of the ICC.

**Table 1-2. Levels of Service by Alternative**

| | Musgrove Lane | | Stewart Lane | |
|---|---|---|---|---|
| | morning | evening | morning | evening |
| Alternative 1 - 2006 Master Plan without ICC | F[1] | F | F | F |
| Alternative 1 - 2006 Master Plan with ICC | F | F | F | F |
| Alternatives 2 and 3 – Action without ICC | F | F | F | F |
| Alternatives 2 and 3 - Action with ICC | F | F | F | F |

[1] According to the American Association of State Highway and Transportation Officials (AASHTO), Level of Service (A through F) describes flow characteristics at intersections, with A representing freeflow traffic and F representing severely congested traffic. LOS F indicates a long traffic delay (more than 80 seconds for a signalized intersection; more than 50 seconds in an unsignalized intersection).

**Table 1-3. Peak Hour Traffic Volume by Alternative**

| | Musgrove Lane | | Stewart Lane | |
|---|---|---|---|---|
| | morning | evening | morning | evening |
| Alternative 1 - 2006 Master Plan without ICC | 6,100 | 6,895 | 7,260 | 7,615 |
| Alternative 1 - 2006 Master Plan with ICC | 7,160 | 7,505 | 7,605 | 8,800 |
| Alternatives 2 and 3 – Action without ICC | 6,180 | 6,975 | 7,260 | 7,625 |
| Alternatives 2 and 3 - Action with ICC | 7,315 | 7,660 | 7,585 | 8,885 |

#### *1.2.2.1.3 Traffic Data*

The traffic data used for this air quality analysis included peak hour volumes and percent daily distributions represented as a diurnal traffic curve (i.e. traffic volumes over a 24-hour period). The diurnal curve was developed from 24-hour traffic counts on Maryland Route 650 and US 29, approximately 0.3 miles south of the Stewart Lane/US 29 intersection. The diurnal curve, or daily distribution percentages, is presented in Table 1-4. The projected peak hour traffic volumes at each intersection for both a.m. and p.m. are presented in Table 1-5 for Stewart Lane and Table 1-6 for Musgrove Road.

#### *1.2.2.1.4 Emission Factors*

Mobile source emission factors were obtained for use in the CAL3QHC CO prediction models using the EPA Mobile Source Emission Factors Model, MOBILE6 (v.12/13/02) which was released in October 2002. The emission rates associated with individual vehicles are influenced by factors such as ambient air temperature, engine temperature, operation mode, average speed, and maintenance. The average emission rate for a fleet of vehicles operating on a highway is further influenced by the composition of the fleet, vehicle type, and vehicle age. The fleet emission rate reflects changes in vehicle, engine, and emission control system technologies; changes in applicable regulations and emission standards; and

realistic driving patterns. Winter months are evaluated in the model because violations of the NAAQS for CO are more likely to occur in the colder months.

The assumptions and factors used for this project's MOBILE6 models were generated and obtained from the MWCOG air quality staff. MWCOG does not generate MOBILE6 output for every future year annually, and a current year 2012 output was unavailable. MOBILE6 outputs for years 2010 and 2020 were the nearest outputs available. Outputs for year 2012 were derived by interpolating rates from year 2010 and year 2020 MOBILE6 outputs. The interpolated rates were compared to the MOBILE6 Emission factors for the year 2010 to the interpolated rates. CAL3QHC air analysis models were run using both sets of emission factors. The 2010 MOBILE6 output rates resulted in slightly higher results from CAL3QHC. These higher results were used to reflect a worst case scenario.

Emission factors vary by traffic speed. The roadway speeds used to determine the emission factors for the free-flow traffic were 50 miles per hour (mph) on US 29, 25 mph on Musgrove Road, and 30 mph on Stewart Lane. One mile per hour was used for idling traffic. These speeds correlate to the following emission factors from MOBILE6 and were used for inputs into this CAL3QHC analysis; 3.6 for 50mph US 29, 2.9 for 25 and 30mph on Musgrove Road and Stewart Lane, and 12.1 for the idling traffic.

**Table 1-4. Diurnal Traffic Curve**

| Hour | % of Average Daily Traffic (ADT) | Ratio of Hour to Peak Hour |
|---|---|---|
| 12m - 1am | 0.8 | 0.137 |
| 1am-2am | 0.4 | 0.074 |
| 2am-3am | 0.3 | 0.056 |
| 3am-4am | 0.3 | 0.054 |
| 4am-5am | 0.8 | 0.137 |
| 5am-6am | 2.5 | 0.421 |
| 6am-7am | 5.5 | 0.941 |
| 7am-8am | 5.4 | 0.932 |
| **8am-9am Peak Morning Hour** | **5.8** | **1.000** |
| 9am-10am | 5.8 | 0.999 |
| 10am-11am | 4.7 | 0.811 |
| 11am-12n | 4.7 | 0.811 |
| 12n-1pm | 5.3 | 0.682 |
| 1pm-2pm | 5.2 | 0.667 |
| 2pm-3pm | 5.7 | 0.731 |
| 3pm-4pm | 6.5 | 0.842 |
| 4pm-5pm | 7.1 | 0.908 |
| **5pm-6pm Peak Evening Hour** | **7.8** | 1.000 |
| 6pm-7pm | 7.2 | 0.923 |
| 7pm-8pm | 5.4 | 0.698 |
| 8pm-9pm | 4.4 | 0.563 |
| 9pm-10pm | 3.9 | 0.504 |
| 10pm-11pm | 2.8 | 0.367 |

**Table 1-4. Diurnal Traffic Curve**

| Hour | % of Average Daily Traffic (ADT) | Ratio of Hour to Peak Hour |
|---|---|---|
| 11pm-12m | 1.6 | 0.210 |
| Source: Maryland State Highway Administration, Highway Information Services Division | | |

**Table 1-5. Projected Worst Case Peak Hour Traffic Volumes for US 29 at Stewart Lane – Action with ICC**

| Traffic Segment | morning | evening |
|---|---|---|
| Stewart Lane Eastbound Approach | 230 | 110 |
| Stewart Lane Eastbound Departure | 320 | 665 |
| Stewart Lane Westbound Approach | 95 | 85 |
| Stewart Lane Westbound Departure | 140 | 140 |
| US 29 Northbound Approach | 4150 | 4895 |
| US 29 Northbound Departure | 4045 | 4645 |
| US 29 Southbound Approach | 3110 | 3795 |
| US 29 Southbound Departure | 3080 | 3435 |

**Table 1-6. Projected Worst Case Peak Hour Traffic Volumes for US 29 at Musgrove Road – Action with ICC**

| Traffic Segment | morning | evening |
|---|---|---|
| Musgrove Drive Eastbound Approach | 110 | 495 |
| Musgrove Drive Eastbound Departure | 110 | 335 |
| Musgrove Drive Westbound Approach | 275 | 105 |
| Musgrove Drive Westbound Departure | 360 | 185 |
| US 29 Northbound Approach | 2585 | 4820 |
| US 29 Northbound Departure | 2440 | 4770 |
| US 29 Southbound Approach | 4345 | 2240 |
| US 29 Southbound Departure | 4415 | 2370 |

#### *1.2.2.1.5 CAL3QHC Analysis*

The mathematical model used to estimate future CO concentrations is the current version of the EPA's CAL3QHC dispersion model, released in June 1993. The CAL3QHC dispersion model is a microcomputer-based modeling methodology developed to predict the level of CO or other inert pollutant concentrations for motor vehicles traveling near roadway intersections.

The CAL3QHC program requires that roadways be modeled as segments known as links. Links can be either free-flow links for vehicles moving at a constant velocity or queue links for idling vehicles. Each can be one of four types of links based on the roadway geometry – at-grade, fill, bridge, or depressed. The required inputs for free-flow links are the endpoints, traffic volume, the emission factor, source

height, and mixing zone width. A queue link is defined as a straight segment of roadway with a constant width and emission source strength, where vehicles are idling for a specified period of time. Required inputs for queue links are the endpoints, approach traffic volume, emission factor, average cycle length, average red time length, number of travel lanes, clearance lost time, source height, signal type (pre-timed, actuated, or semi-actuated), and arrival rate.

CAL3QHC also requires the input of meteorological factors. These factors are average timing, surface roughness coefficient, settling velocity, deposition velocity, wind speed, mixing height, stability class, and wind angle range. The values used for these factors are summarized in Table 1-7.

**Table 1-7. CAL3QHC Input Assumptions**

| Input Variable | Assumption and/or Value |
|---|---|
| Averaging Time | 60 minutes |
| Background CO Concentrations (2006 Background concentration highest of second high readings of last three years) | 108 cm |
| Surface Roughness | 0 cm/s |
| Settling Velocity | 0 cm/s |
| Deposition Velocity | 0 m (at grade) |
| Source Height | 1 m for Pretimed |
| Signal Type | 142 s |
| Average Cycle Length | 38 s on US 29; 118 s on Stewart Lane and Musgrove Drive |
| Average Red Time Length | 4 s |
| Clearance Lost Time | 3 s (average progression) – default value |
| Arrival Rate | 1.0 m/s |
| Wind Speed | $0^{o}$ |
| Wind Direction | D(4) |
| Atmospheric Stability Class | 1000 m |
| Mixing Height | Y |
| Multiple Wind Directions | $5^{o}$ |
| Wind Direction Increment Angle | 0 |
| First Increment Multiplier | 72 |
| Last Incremental Multiplier | 60 minutes |

Air quality receptor locations represent sensitive air quality locations (i.e. areas where people are likely to be exposed to CO) within the study area. For this study, 18 receptor sites were identified at Musgrove Road and US 29, and 18 receptor sites at Stewart Lane (see Figure 1-1).

The maximum 1-hour CO concentrations were modeled using the morning and evening peak hour traffic volumes. The maximum 8-hour average CO concentration was determined by using the peak-hour traffic volumes and daily traffic distributions (diurnal curve), which were used to establish hourly traffic volumes. The hourly time segments were analyzed at each receptor to determine the CO concentrations. The highest eight consecutive hourly concentrations were averaged to obtain the 8-hour average CO concentration.

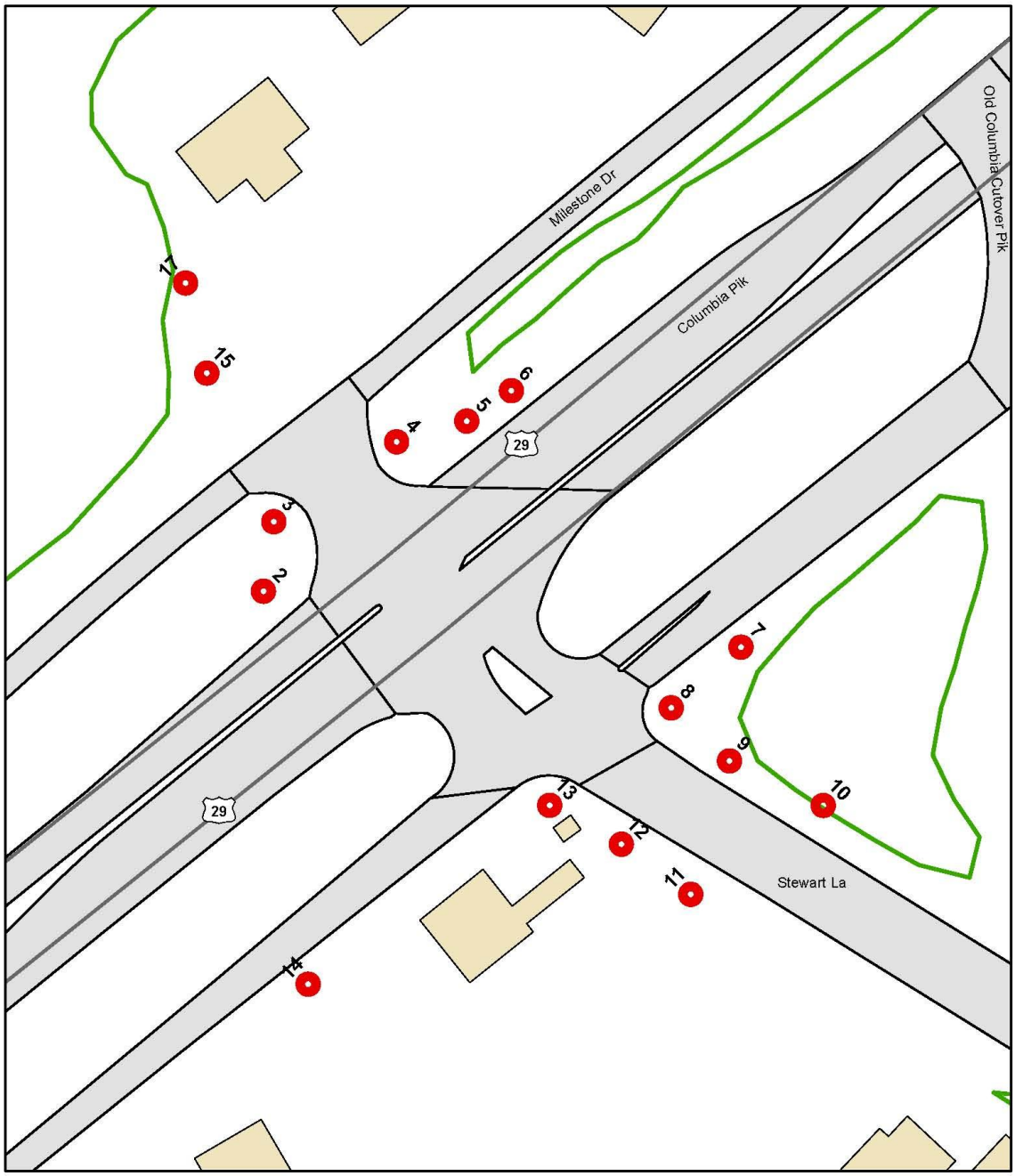


**Figure 1-1**
**Air Quality Receptor Locations**
**US 29/Stewart Ave Intersection**

White Oak Federal Center
US Food and Drug Administration

**Legend**
- Air Quality Receptors
- Buildings
- Roadways
- Tree Outlines

### *1.2.2.1.6 Analysis Results*

***Analysis Results for US 29 at Musgrove Drive***

Table 1-8 presents the results of the 1-hour analysis using projected a.m. and p.m. hourly peak traffic for at the US 29 and Musgrove Road intersection. For the projected hourly peak-traffic volume, results indicated the range of CO concentrations in the a.m. hour would be 4.3 to 5.1 ppm. The range of CO concentrations for the p.m. hour would be 4.3. to 5.2 ppm. Under the worst-case scenario, none of the CO concentrations for the peak morning and evening hours would exceed the NAAQS of 35 ppm.

**Table 1-8. Peak Hour Analysis for CO (in ppm) at Musgrove Lane and Route 29 Intersection.**

| | | 2006 Master Plan with ICC | | | | Action with ICC | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | morning Peak | | evening Peak | | morning Peak | | evening Peak | | | |
| Receptor | Background Concentration | CAL3QHC | Total | CAL3QHC | Total | CAL3QHC | Total | CAL3QHC | Total | S/NAAQS (ppm) | Violations |
| **1** | 4.0 | 0.3 | **4.3** | 0.3 | **4.3** | 0.3 | **4.3** | 0.3 | 4.3 | 35 | **No** |
| **2** | 4.0 | 0.4 | **4.4** | 0.3 | **4.3** | 0.4 | **4.4** | 0.3 | 4.3 | 35 | **No** |
| **3** | 4.0 | 0.6 | **4.6** | 0.4 | **4.4** | 0.6 | **4.6** | 0.5 | 4.5 | 35 | **No** |
| **4** | 4.0 | 1.0 | **5.0** | 0.7 | **4.7** | 1.1 | **5.1** | 0.8 | 4.8 | 35 | **No** |
| **5** | 4.0 | 0.4 | **4.4** | 0.3 | **4.3** | 0.5 | **4.5** | 0.4 | 4.4 | 35 | **No** |
| **6** | 4.0 | 0.7 | **4.7** | 0.6 | **4.6** | 0.7 | **4.7** | 0.6 | 4.6 | 35 | **No** |
| **7** | 4.0 | 0.9 | **4.9** | 1.2 | **5.2** | 0.9 | **4.9** | 1.2 | 5.2 | 35 | **No** |
| **8** | 4.0 | 0.7 | **4.7** | 1.2 | **5.1** | 0.7 | **4.7** | 1.2 | 5.2 | 35 | **No** |
| **9** | 4.0 | 0.6 | **4.6** | 0.7 | **4.7** | 0.7 | **4.7** | 0.7 | 4.7 | 35 | **No** |
| **10** | 4.0 | 0.6 | **4.6** | 0.5 | **4.5** | 0.6 | **4.6** | 0.5 | 4.5 | 35 | **No** |
| **11** | 4.0 | 0.4 | **4.4** | 0.4 | **4.4** | 0.4 | **4.4** | 0.4 | 4.4 | 35 | **No** |
| **12** | 4.0 | 0.4 | **4.4** | 0.5 | **4.5** | 0.4 | **4.4** | 0.5 | 4.5 | 35 | **No** |
| **13** | 4.0 | 0.7 | **4.7** | 0.7 | **4.7** | 0.7 | **4.7** | 0.7 | 4.7 | 35 | **No** |
| **14** | 4.0 | 0.7 | **4.7** | 0.9 | **4.9** | 0.7 | **4.7** | 0.9 | 4.9 | 35 | **No** |
| **15** | 4.0 | 0.7 | **4.7** | 1.0 | **5.0** | 0.7 | **4.7** | 1.0 | 5.0 | 35 | **No** |
| **16** | 4.0 | 0.3 | **4.3** | 0.3 | **4.3** | 0.3 | **4.3** | 0.3 | 4.3 | 35 | **No** |
| **17** | 4.0 | 0.3 | **4.3** | 0.4 | **4.4** | 0.3 | **4.3** | 0.4 | 4.4 | 35 | **No** |
| **18** | **4.0** | **0.2** | **4.2** | **0.2** | **4.2** | **0.2** | **4.2** | **0.2** | **4.2** | **35** | **No** |

Table 1-9 presents the results of the 8-hour analysis at the US 29 and Musgrove Lane intersection. The model results indicate for the peak 8-hour period, the range of the average CO concentrations would be 3.5 to 4.3. ppm. The maximum average concentration of CO would not exceed the 9 ppm NAAQS.

**Table 1-9. Projected 8-Hour Analysis Results (in ppm) for CO at Musgrove Lane, Action with ICC**

| Receptor | Background Concentration | 8-Hour Average | | S/NAAQS | Violation |
|---|---|---|---|---|---|
| | | CAL3QHC | Total | | |
| **1** | 3.3 | 0.3 | **3.6** | 9 | **No** |
| **2** | 3.3 | 0.3 | **3.6** | 9 | **No** |
| **3** | 3.3 | 0.4 | **3.7** | 9 | **No** |
| **4** | 3.3 | 0.8 | **4.1** | 9 | **No** |
| **5** | 3.3 | 0.3 | **3.6** | 9 | **No** |
| **6** | 3.3 | 0.5 | **3.8** | 9 | **No** |
| **7** | 3.3 | 1.0 | **4.3** | 9 | **No** |
| **8** | 3.3 | 0.9 | **4.2** | 9 | **No** |
| **9** | 3.3 | 0.6 | **3.9** | 9 | **No** |
| **10** | 3.3 | 0.5 | **3.8** | 9 | **No** |
| **11** | 3.3 | 0.3 | **3.6** | 9 | **No** |
| **12** | 3.3 | 0.4 | **3.7** | 9 | **No** |
| **13** | 3.3 | 0.5 | **3.8** | 9 | **No** |
| **14** | 3.3 | 0.7 | **4.0** | 9 | **No** |
| **15** | 3.3 | 0.7 | **4.0** | 9 | **No** |
| **16** | 3.3 | 0.3 | **3.6** | 9 | **No** |
| **17** | 3.3 | 0.3 | **3.6** | 9 | **No** |
| **18** | 3.3 | 0.2 | **3.5** | 9 | **No** |

***Analysis Results for US 29 at Stewart Lane***

Table 1-10 presents the results of the 1-hour analysis using projected a.m. and p.m. hourly peak traffic at the US 29 and Stewart Lane intersection. For the projected hourly peak-traffic volume, results indicated the range of CO concentrations in the a.m. hour would be 3.0 to 3.7 ppm. The range of CO concentrations for the p.m. hour would be 3.0 to 4.0 ppm. Under the worst-case scenario, none of the CO concentrations for the peak a.m. and p.m. hours would exceed the NAAQS of 35 ppm.

**Table 1-10. Peak Hour Analysis for CO (in ppm) at Stewart Lane and Route 29 Intersection.**

| | | 2006 Master Plan with ICC | | | | Action with ICC | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | morning Peak | | evening Peak | | morning Peak | | evening Peak | | | |
| Receptor | Background Concentration | CAL3QHC | Total | CAL3QHC | Total | CAL3QHC | Total | CAL3QHC | Total | S/NAAQS | Violations |
| **1** | 2.7 | 1.0 | **3.7** | 1.2 | **3.9** | 1.0 | **3.7** | 1.2 | **3.9** | 35 | **No** |
| **2** | 2.7 | 0.9 | **3.6** | 1.0 | **3.7** | 0.9 | **3.6** | 1.0 | **3.7** | 35 | **No** |
| **3** | 2.7 | 0.6 | **3.3** | 0.6 | **3.3** | 0.6 | **3.3** | 0.7 | **3.4** | 35 | **No** |
| **4** | 2.7 | 0.7 | **3.4** | 0.8 | **3.5** | 0.7 | **3.4** | 0.8 | **3.5** | 35 | **No** |
| **5** | 2.7 | 1.0 | **3.7** | 1.2 | **3.9** | 1.0 | **3.7** | 1.2 | **3.9** | 35 | **No** |
| **6** | 2.7 | 1.0 | **3.7** | 1.3 | **4.0** | 1.0 | **3.7** | 1.3 | **4.0** | 35 | **No** |
| **7** | 2.7 | 0.4 | **3.1** | 0.4 | **3.1** | 0.4 | **3.1** | 0.4 | **3.1** | 35 | **No** |
| **8** | 2.7 | 0.4 | **3.1** | 0.5 | **3.2** | 0.4 | **3.1** | 0.5 | **3.2** | 35 | **No** |
| **9** | 2.7 | 0.4 | **3.1** | 0.4 | **3.1** | 0.4 | **3.1** | 0.4 | **3.1** | 35 | **No** |
| **10** | 2.7 | 0.3 | **3.0** | 0.3 | **3.0** | 0.3 | **3.0** | 0.3 | **3.0** | 35 | **No** |
| **11** | 2.7 | 0.3 | **3.0** | 0.3 | **3.0** | 0.3 | **3.0** | 0.3 | **3.0** | 35 | **No** |
| **12** | 2.7 | 0.3 | **3.0** | 0.4 | **3.1** | 0.3 | **3.0** | 0.4 | **3.1** | 35 | **No** |
| **13** | 2.7 | 0.4 | **3.1** | 0.5 | **3.2** | 0.4 | **3.1** | 0.5 | **3.2** | 35 | **No** |
| **14** | 2.7 | 0.5 | **3.2** | 0.5 | **3.2** | 0.5 | **3.2** | 0.5 | **3.2** | 35 | **No** |
| **15** | 2.7 | 0.4 | **3.1** | 0.4 | **3.1** | 0.4 | **3.1** | 0.4 | **3.1** | 35 | **No** |
| **16** | 2.7 | 0.6 | **3.3** | 0.5 | **3.2** | 0.6 | **3.3** | 0.5 | **3.2** | 35 | **No** |
| **17** | **2.7** | **0.4** | **3.1** | **0.4** | **3.1** | **0.4** | **3.1** | **0.4** | **3.1** | **35** | **No** |

Table 1-11 presents the results of the 8-hour analysis at the US 29 and Stewart Lane intersection. The model results indicate for the peak 8-hour period, the range of the average CO concentrations would be 2.4 to 3.1 ppm. The maximum average concentration of CO would not exceed the 9 ppm NAAQS.

**Table 1-11. Projected 8-Hour Analysis Results for CO (in ppm) at Stewart Lane Action with ICC**

| Receptor | Background Concentration | 8-Hour Average | | S/NAAQS | Violation |
|---|---|---|---|---|---|
| | | CAL3QHC | Total | | |
| 1 | 2.1 | 0.9 | **3.0** | 9 | **No** |
| 2 | 2.1 | 0.8 | **2.9** | 9 | **No** |
| 3 | 2.1 | 0.6 | **2.7** | 9 | **No** |
| 4 | 2.1 | 0.7 | **2.8** | 9 | **No** |
| 5 | 2.1 | 1.0 | **3.1** | 9 | **No** |
| 6 | 2.1 | 1.0 | **3.1** | 9 | **No** |
| 7 | 2.1 | 0.4 | **2.5** | 9 | **No** |
| 8 | 2.1 | 0.4 | **2.5** | 9 | **No** |
| 9 | 2.1 | 0.3 | **2.4** | 9 | **No** |
| 10 | 2.1 | 0.3 | **2.4** | 9 | **No** |
| 11 | 2.1 | 0.3 | **2.4** | 9 | **No** |
| 12 | 2.1 | 0.3 | **2.4** | 9 | **No** |
| 13 | 2.1 | 0.4 | **2.5** | 9 | **No** |
| 14 | 2.1 | 0.4 | **2.5** | 9 | **No** |
| 15 | 2.1 | 0.4 | **2.5** | 9 | **No** |
| 16 | 2.1 | 0.5 | **2.6** | 9 | **No** |
| 17 | 2.1 | 0.3 | **2.4** | 9 | **No** |

#### *1.2.2.1.7. Mobile Source Air Toxic (MSAT) Analysis*

The Federal Highway Administration (FHWA) Interim Guidance on Air Toxic Analysis in NEPA Documents requires analysis of MSATs under specific conditions. The following language is taken from this guidance. The EPA has designated six prioritized MSATs, which are known or probable carcinogens or can cause chronic respiratory effects. The six prioritized MSATs are: Benzene; Acrolein; Formaldehyde; 1,3-Butadiene, Acetaldehyde; and Diesel Exhaust (Diesel Exhaust Gases and Diesel Particulate Matter). The FDA Headquarters Consolidation at White Oak would not increase capacity on local roadways and is not likely to meaningfully increase emissions of air pollutants. Therefore, the project would be considered a Project with Low Potential MSAT Effects.

***Unavailable Information for Project Specific MSAT Impact Analysis***

Included is a basic analysis of the likely MSAT emissions impacts of this project. However, available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with any of the Master Plan Update Alternatives. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information:

Evaluating the environmental and health impacts from MSAT on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSAT in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model – emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of evening under the conformity rule, EPA has identified problems with MOBILE 6.2 as an obstacle to quantitative analysis.

These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE 6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The NCHRP is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

### *Exposure Levels and Health Effects*

Even if emission levels and concentrations of MSAT could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude reaching meaningful conclusions

about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis. Research into the health impacts of MSAT is ongoing. For the different MSAT emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses. Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris. The following toxicity information for the six prioritized MSATs was taken from the IRIS database Weight of Evidence Characterization summaries. This information is taken verbatim from EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- **Benzene** is characterized as a known human carcinogen.
- The potential carcinogenicity of **acrolein** cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- **Formaldehyde** is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation.
- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.

- **Diesel exhaust (DE)** is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases. Diesel exhaust also represents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes -- particularly respiratory problems. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project

***Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of Impacts Based Upon Theoretical Approaches or Research Methods Generally Accepted in the Scientific Community***

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

### *Project Specific MSAT Discussion*

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSAT at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSAT, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the Master Plan Update Alternatives.

The qualitative assessment presented is derived in part from the FHWA study: *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives* found at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm

The FDA project falls into the category of a project that facilitates new development that may generate additional MSAT emissions from new trips, truck deliveries, and parked vehicles. Many of these activities will be attracted from elsewhere in the Washington DC metropolitan region. Thus, on a regional scale, there will be a minimal net change in emissions. Moreover, EPA regulations for vehicle engines and fuels will cause overall MSATs to decline significantly over the next 20 years. Even after accounting for a 64 percent increase in vehicles miles traveled (VMT), the Federal Highway Administration predicts MSATs will decline in the range of 57 percent to 87 percent, from 2000 to 2020, based on regulations now in effect, even with a projected 64 percent increase in VMT. This will both reduce the background level of MSATs as well as the possibility of even minor MSAT emissions from this project.

#### *1.2.2.1.7 Fine Particulate Matter ($PM_{2.5}$)*

The FDA White Oak Campus is located in a $PM_{2.5}$ nonattainment area. The area was designated as nonattainment on January 5, 2005 by EPA. This designation became effective on April 5, 2005, 90 days after EPA's published action in the Federal Register. Transportation conformity for the $PM_{2.5}$ standards applied on April 5, 2006, after the one-year grace period provided by the CAA.

Projects that require hotspot analysis for $PM_{2.5}$ are those projects that are Projects of Air Quality Concern as enumerated in 40CFR93.123 (b)(1) and restated below:

- New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;
- Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;
- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
- Projects in or affecting locations, areas, or categories of sites which are identified in the $PM_{10}$ or $PM_{2.5}$ applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The following analysis concerning $PM_{2.5}$ has been developed for the proposed project:

- The FDA White Oak Consolidation Project does not meet the criteria set forth in 40 CFR 93.123(b)(1) as amended to be considered a Project of Air Quality Concern primarily because the project does not include improvements to project area roadways or highways, and vehicles added to area roadways would primarily be gasoline rather than diesel powered vehicles.
- The FDA White Oak Consolidation Project does not have a significant increase in diesel vehicles due to construction of the project. In accordance with FHWA guidance, "40 CFR 93.123(b)(1)(i) should be interpreted as applying only to projects that would involve a significant increase in the number of diesel transit busses and diesel trucks on the facility". The percent of trucks is not expected to change between either of the Master Plan Update Alternatives and 2006 Master Plan conditions.

Based on the preceding review and analysis, it is determined that the FDA White Oak Consolidation Project, meets the CAA and 40 CFR 93.109 requirements. These requirements are met for particulate matter without a project-level hot-spot analysis, since the project has not been found not to be a Project of Air Quality Concern as defined under 40 CFR 93.123(b)(1). Since the project meets the CAA and 40 CFR 93.109 requirements, the project will not cause or contribute to a new violation of the $PM_{2.5}$ NAAQS, or increase the frequency or severity of a violation.

#### *1.2.2.2 Stationary Source Analysis*

Development of the FDA White Oak Campus under either of the Master Plan Update alternatives would increase energy demands and air pollutants emitted by on-site facilities required to accommodate the projected demand. Under the Proposed FDA Master Plan Update, the FDA Headquarters Campus at White Oak would be developed to include 5,989,934 square feet of new office and laboratory facilities. The existing CUP capacity is insufficient to serve the needs of the proposed development under either of the Master Plan Update alternatives. Therefore modifications to the system and increases in electrical generation, cooling, and heating, would be required.

The potential-to-emit (PTE) air emissions inventory was developed based on the assumption that each of the two Master Plan Update alternatives would include three possible options for the use of gas turbines within the CUP to accommodate energy demands of the campus. The estimated annual fuel usage was used to estimate expected maximum air pollutant emissions of nitrogen oxides ($NO_x$), carbon monoxide (CO), particulate matter ($PM_{10}$), fine particulate matter ($PM_{2.5}$), volatile organic compounds (VOC), and sulfur dioxide ($SO_2$).

The stationary source analyses (New Source Review Applicability, NAAQS Screening Modeling Assessment, and the Federal Conformity Analysis) address potential stationary source emissions related to the proposed facility development included in the FDA White Oak Campus Master Plan Update alternatives. The first analysis is to determine if any of the alternatives would be considered a new major source of emissions. The second analysis is to determine if any of the alternatives would create a

potential violation of the NAAQS. The third analysis is to determine if the alternatives would be in conformity with the SIP.

#### *1.2.2.2.1 New Source Review Applicability*

Under provisions of the CAA, proposed new construction of a major stationary source of air pollution or major modification to an existing stationary source of air pollution may require that a "major source" New Source Review (NSR) air pollution permit be obtained. Under the NSR regulations, permits for major sources located in attainment areas are referred to as Prevention of Significant Air Quality Deterioration (PSD) permits; while permits for major sources located in nonattainment areas are referred to as Non-Attainment Review (NAR) permits. Montgomery County, MD is located in a non-attainment area for $O_3$ (8 hour standard) and $PM_{2.5}$. Because oxides of nitrogen ($NO_x$) and volatile organic compounds (VOCs) are regulated as $O_3$ pre-cursor pollutants, the PTE emissions of these pollutants and other air pollutants associated with the combustion of natural gas were evaluated for each of the proposed alternatives to determine whether NSR major source permitting would be required. The PTE emissions for each applicable NSR regulated air pollutant for each Master Plan Update alternative was determined and compared to the NSR major source emission threshold. To determine the "major source" NSR emission threshold applicable to this project, it was estimated that the new boiler for each of the Master Plan Update Alternatives would require more than 250 million Btu per hour heat input. As a result, it was determined that the NSR "major source" threshold of 100 tons per year of any regulated NSR pollutant was applicable to this project.

Annual PTE emissions of each applicable regulated NSR pollutant for each Master Plan Update Alternative were assessed using either EPA AP-42 pollutant emissions factors for natural gas fired boilers with greater than 100 MMBtu/hr heat input or boiler specific emissions in the case of $NO_x$. In addition it was assumed that as the facility is within a non-attainment area for $NO_x$, that Selective Catalytic Reduction (SCR) would be applied, where applicable, as a control technology. Total $NO_x$ emissions for each option were provided by the GSA's energy consultant:

- Option A: 24.6 tons per year for five Mercury 50 turbines;
- Option B: 12.4 tons per year for one Mercury 50 turbine and two Taurus 70 turbines; and
- Option C: 18.8 tons per year for one Mercury 50 turbine and two Titan 130 turbines.

The standard AP-42 emission factors used to estimate CO, $SO_2$, and Particulate Matter emissions include:

- CO: 84 pounds per million standard cubic feet (lbs/mmscf)
- $SO_2$: 0.6 lbs/mmscf
- Particulate Matter: 7.6 lbs/mmscf.

The annual PTE emissions for applicable criteria air pollutants (tons/year) are presented in Table 1-12. Due to limitations in modeling capabilities for $PM_{2.5}$, and because $PM_{2.5}$ is a subset of $PM_{10}$, the reported $PM_{10}$ emission values represent both $PM_{2.5}$ and $PM_{10}$ emissions. Air emissions from mobile sources are excluded from NSR applicability.

**Table 1-12. Annual PTE Emissions for Applicable Criteria Pollutants (tons/yr)**

| Alternatives | $SO_2$ | $NO_x$ | CO | $PM_{10}$ | VOC |
|---|---|---|---|---|---|
| Alternative 1 | 3.5 | 32.5 | 54.9 | 28.9 | 12.5 |
| Alternative 2-A | 4.0 | 57.1 | **127.4** | 35.5 | 17.3 |
| Alternative 2-B | 4.0 | 44.9 | **123.6** | 35.1 | 17.0 |
| Alternative 2-C | 4.4 | 51.3 | **174.3** | 39.7 | 20.4 |
| Alternative 3-A | 4.0 | 57.1 | **127.4** | 35.5 | 17.3 |
| Alternative 3-B | 4.0 | 44.9 | **123.6** | 35.1 | 17.0 |
| Alternative 3-C | 4.4 | 51.3 | **174.3** | 39.7 | 20.4 |
| New Source Review Major Source Threshold | 100 | 100 | 100 | 100 | 100 |

As identified in Table 1-13, when compared to the 100 ton/year threshold, Master Plan Update Alternatives 2 and 3, with each of their CUP scenario options, are expected to exceed the major source NSR thresholds for CO. Therefore, the Master Plan Update Alternatives considered would be classified as a major source under the NSR regulations and therefore would potentially require a PSD permit. An NSR applicability analysis for the Master Plan Update Alternatives follows, examining the incremental increase of emissions as a result of the CUP expansion.

**Table 1-13. NSR Applicability for Annual PTE Emissions for Applicable Criteria Pollutants (tons/yr)**

| Alternatives | $SO_2$ | $NO_x$ | CO | $PM_{10}$ | VOC |
|---|---|---|---|---|---|
| Alternative 2-A | 0.5 | 24.6 | 72.5 | 6.6 | 4.8 |
| Alternative 2-B | 0.5 | 12.4 | 68.8 | 6.2 | 4.5 |
| Alternative 2-C | 0.9 | 18.8 | **119.4** | 10.8 | 7.8 |
| Alternative 3-A | 0.5 | 24.6 | 72.5 | 6.6 | 4.8 |
| Alternative 3-B | 0.5 | 12.4 | 68.8 | 6.2 | 4.5 |
| Alternative 3-C | 0.9 | 18.8 | **119.4** | 10.8 | 7.8 |
| New Source Review Significance Threshold | 40 | 25* | 100 | 15 | 25* |
| * standard is 25 tons/year as a result of ozone non-attainment status. | | | | | |

Table 1-13 demonstrates that for Master Plan Update Alternatives 2-C and 3-C, CO exceeds the New Source Review Significance Threshold and thus would be required to undergo a full NSR review. A full NSR review for CO, with accompanying Best Available Control Technology (BACT) determination and

NAAQS and PSD air quality modeling, would be conducted prior to construction, if final project design and equipment choice continue to indicate a significant finding. No other pollutant would be required to undergo this analysis in any alternative. The AP-42 pollutant emissions factors are conservative. GSA is working with its energy consultant to use the advanced technology to reduce emissions of criteria pollutants.

In addition, the Master Plan Update would require GSA to obtain a Title V operating permit (under Title V of the Clean Air Act) under Maryland's Part 70 Permit Program.

#### *1.2.2.2.2 NAAQS Screening Modeling Assessment*

The alternatives were assessed to determine whether the project would exceed the NAAQS. The EPA approved AERMOD model was used to perform the NAAQS screening modeling assessment. To perform the NAAQS screening modeling assessment, the PTE air emissions from the existing stacks associated with the central plant were modeled as individual point sources. For Alternatives 2 and 3, there were 3 options that included 3 to 5 additional gas turbine exhaust stacks. As part of this assessment, potential building downwash effects were also evaluated. Additionally, PTE emissions generated from vehicles using the above-ground parking garages for each Alternative were modeled as area sources. Maximum modeled impacts of each air pollutant were added to representative background ambient air quality data for $NO_x$, SO2, and $PM_{10}$ for the year 2004 and 2005 to determine compliance with corresponding NAAQS. The background ambient air quality data for CO was obtained by using the second-highest concentration data from the District of Columbia's monitoring stations since 2006. This urban monitor is considered to be a highly conservative observation for background concentrations. The results of this analysis each the Master Plan Update Alternative/CUP Option combination and the 2006 Master Plan (No Action) Alternative are presented in Tables 1-14 through 1-21. It should be noted that there is very little difference among each Alternative/Option combination from a NAAQS impact perspective, as the maximum impact results largely from the existing sources. There is no significant difference between the NAAQS impact of Update Alternatives 2 and 3, as the changes in structures and parking distribution did not play a role in the maximum NAAQS impacts.

**Table 1-14. NAAQS Compliance Summary - Alternative 2-A**

| Pollutant | Modeled Maximum Impacts (µg/m3) | | | | | Background (µg/m3) | Total Impact (µg/m3) | NAAQS (µg/m3) |
|---|---|---|---|---|---|---|---|---|
| | 1-Hour | 3-Hour | 8-Hour | 24-Hour | Annual | | | |
| $NO_x$ | - | - | - | - | 12.1 | 40 | 52.1 | **100** |
| CO | 307.5 | - | - | - | - | 4,029 | 4,338 | **40,000** |
| CO | - | - | 101.8 | - | - | 3,114 | 3,216 | **10,000** |
| $SO_2$ | - | 10.6 | - | - | - | 107 | 117.6 | **1300** |
| $SO_2$ | - | - | - | 3.4 | - | 43 | 46.4 | **365** |
| $SO_2$ | - | - | - | - | 0.85 | 16 | 16.85 | **80** |
| $PM_{10}$ | - | - | - | 3.6 | - | 64 | 67.6 | **150** |
| $PM_{10}$ | **-** | **-** | **-** | **-** | **0.79** | **32** | **32.79** | **50** |

**Table 1-15. NAAQS Compliance Summary – Alternative 2-B**

| Pollutant | Modeled Maximum Impacts (µg/m3) | | | | | Background (µg/m3) | Total Impact (µg/m3) | NAAQS (µg/m3) |
|---|---|---|---|---|---|---|---|---|
| | 1-Hour | 3-Hour | 8-Hour | 24-Hour | Annual | | | |
| $NO_x$ | - | - | - | - | 12.1 | 40 | 52.1 | **100** |
| CO | 307.5 | - | - | - | - | 4,029 | 4,338 | **40,000** |
| CO | - | - | 101.8 | - | - | 3,114 | 3,216 | **10,000** |
| $SO_2$ | - | 10.6 | - | - | - | 107 | 117.6 | **1300** |
| $SO_2$ | - | - | - | 3.4 | - | 43 | 46.4 | **365** |
| $SO_2$ | - | - | - | - | 0.85 | 16 | 16.85 | **80** |
| $PM_{10}$ | - | - | - | 3.5 | - | 64 | 67.5 | **150** |
| $PM_{10}$ | **-** | **-** | **-** | **-** | **0.77** | **32** | **32.77** | **50** |

**Table 1-16. NAAQS Compliance Summary - Alternative 2-C**

| Pollutant | Modeled Maximum Impacts (µg/m3) | | | | | Background (µg/m3) | Total Impact (µg/m3) | NAAQS (µg/m3) |
|---|---|---|---|---|---|---|---|---|
| | 1-Hour | 3-Hour | 8-Hour | 24-Hour | Annual | | | |
| $NO_x$ | - | - | - | - | 12.1 | 40 | 52.1 | **100** |
| CO | 307.6 | - | - | - | - | 4,029 | 4,338 | **40,000** |
| CO | - | - | 101.8 | - | - | 3,114 | 3,216 | **10,000** |
| $SO_2$ | - | 10.6 | - | - | - | 107 | 117.6 | **1300** |
| $SO_2$ | - | - | - | 3.4 | - | 43 | 46.4 | **365** |
| $SO_2$ | - | - | - | - | 0.85 | 16 | 16.85 | **80** |
| $PM_{10}$ | - | - | - | 3.6 | - | 64 | 67.6 | **150** |
| $PM_{10}$ | **-** | **-** | **-** | **-** | **0.78** | **32** | **32.78** | **50** |

**Table 1-17. NAAQS Compliance Summary - Alternative 1 (2006 Master Plan)**

| Pollutant | Modeled Maximum Impacts (µg/m3) | | | | | Background (µg/m3) | Total Impact (µg/m3) | NAAQS (µg/m3) |
|---|---|---|---|---|---|---|---|---|
| | 1-Hour | 3-Hour | 8-Hour | 24-Hour | Annual | | | |
| $NO_x$ | - | - | - | - | 12.1 | 40 | 52.1 | **100** |
| CO | 307.5 | - | - | - | - | 4,029 | 4,338 | **40,000** |
| CO | - | - | 85.0 | - | - | 3,114 | 3,199 | **10,000** |
| $SO_2$ | - | 8.3 | - | - | - | 107 | 115.3 | **1300** |
| $SO_2$ | - | - | - | 3.4 | - | 43 | 46.4 | **365** |
| $SO_2$ | - | - | - | - | 0.85 | 16 | 16.85 | **80** |
| $PM_{10}$ | - | - | - | 3.3 | - | 64 | 67.3 | **150** |
| $PM_{10}$ | **-** | **-** | **-** | **-** | **0.68** | **32** | **32.68** | **50** |

**Table 1-18. NAAQS Compliance Summary – Alternative 3 –A**

| Pollutant | Modeled Maximum Impacts (µg/m3) | | | | | Background (µg/m3) | Total Impact (µg/m3) | NAAQS (µg/m3) |
|---|---|---|---|---|---|---|---|---|
| | 1-Hour | 3-Hour | 8-Hour | 24-Hour | Annual | | | |
| $NO_x$ | - | - | - | - | 12.1 | 40 | 52.1 | **100** |
| CO | 307.5 | - | - | - | - | 4,029 | 4,338 | **40,000** |
| CO | - | - | 101.8 | - | - | 3,114 | 3,216 | **10,000** |
| $SO_2$ | - | 10.6 | - | - | - | 107 | 117.6 | **1300** |
| $SO_2$ | - | - | - | 3.4 | - | 43 | 46.4 | **365** |
| $SO_2$ | - | - | - | - | 0.85 | 16 | 16.85 | **80** |
| $PM_{10}$ | - | - | - | 3.6 | - | 64 | 67.6 | **150** |
| $PM_{10}$ | **-** | **-** | **-** | **-** | **0.79** | **32** | **32.79** | **50** |

**Table 1-19. NAAQS Compliance Summary - Alternative 3-B**

| Pollutant | Modeled Maximum Impacts (µg/m3) | | | | | Background (µg/m3) | Total Impact (µg/m3) | NAAQS (µg/m3) |
|---|---|---|---|---|---|---|---|---|
| | 1-Hour | 3-Hour | 8-Hour | 24-Hour | Annual | | | |
| $NO_x$ | - | - | - | - | 12.1 | 40 | 52.1 | **100** |
| CO | 307.5 | - | - | - | - | 4,029 | 4,338 | **40,000** |
| CO | - | - | 101.8 | - | - | 3,114 | 3,216 | **10,000** |
| $SO_2$ | - | 10.6 | - | - | - | 107 | 117.6 | **1300** |
| $SO_2$ | - | - | - | 3.4 | - | 43 | 46.4 | **365** |
| $SO_2$ | - | - | - | - | 0.85 | 16 | 16.85 | **80** |
| $PM_{10}$ | - | - | - | 3.6 | - | 64 | 67.6 | **150** |
| $PM_{10}$ | **-** | **-** | **-** | **-** | **0.79** | **32** | **32.79** | **50** |

**Table 1-20. NAAQS Compliance Summary - Alternative 3-C**

| Pollutant | Modeled Maximum Impacts (µg/m3) | | | | | Background (µg/m3) | Total Impact (µg/m3) | NAAQS (µg/m3) |
|---|---|---|---|---|---|---|---|---|
| | 1-Hour | 3-Hour | 8-Hour | 24-Hour | Annual | | | |
| $NO_x$ | - | - | - | - | 12.1 | 40 | 52.1 | **100** |
| CO | 307.6 | - | - | - | - | 4,029 | 4,338 | **40,000** |
| CO | - | - | 101.8 | - | - | 3,114 | 3,216 | **10,000** |
| $SO_2$ | - | 10.6 | - | - | - | 107 | 117.6 | **1300** |
| $SO_2$ | - | - | - | 3.4 | - | 43 | 46.4 | **365** |
| $SO_2$ | - | - | - | - | 0.85 | 16 | 16.85 | **80** |
| $PM_{10}$ | - | - | - | 3.6 | - | 64 | 67.6 | **150** |
| $PM_{10}$ | **-** | **-** | **-** | **-** | **0.78** | **32** | **32.78** | **50** |

All of the pollutant impacts associated with each of the Master Plan Update Alternatives would be below all applicable NAAQS. The CO hot spot receptors were also modeled and the impacts are shown in Table 1-21.

**Table 1-21. CO Hot Spot Receptors**

| Alternative | Modeled Maximum Impacts (µg/m³) | | Location (UTM Meters) | |
|---|---|---|---|---|
| | 1-Hour | 8-Hour | Easting | Northing |
| Alternative 1 | 78.4 (1.92 ppm) | 12.3 (0.30 ppm) | 328130.6 | 4323773.5 |
| Alternative 2-A | 91.4 (2.24 ppm) | 12.7 (0.31 ppm) | 328130.6 | 4323773.5 |
| Alternative 2-B | 91.4 (2.24 ppm) | 12.8 (0.31 ppm) | 328130.6 | 4323773.5 |
| Alternative 2-C | 91.4 (2.24 ppm) | 13.2 (0.32 ppm) | 328130.6 | 4323773.5 |
| Alternative 3-A | 79.5 (1.95 ppm) | 12.7 (0.31 ppm) | 328130.6 | 4323773.5 |
| Alternative 3-B | 79.5 (1.95 ppm) | 12.8 (0.31 ppm) | 328130.6 | 4323773.5 |
| Alternative 3-C | 79.7 (1.96 ppm) | 13.2 (0.32 ppm) | 328130.6 | 4323773.5 |

Each model run (one year of meteorological data) yielded a highest 2nd high receptor value (H2H). The highest of these five values (one per year of meteorological data) is shown in Tables 1-14 through 1-21.

#### *1.2.2.2.3 Federal Air Conformity Analysis*

Section 176(c) of the CAA prohibits Federal entities from taking actions in non-attainment or maintenance areas which do not conform to the State Implementation Plan (SIP) for the attainment and maintenance of the NAAQS. In November 1993, the EPA promulgated the General Conformity Regulations (58 FR 63214) to assure that Federal actions conform to the SIP. The Washington, DC area is classified as moderate nonattainment for the 8-hour $O_3$ NAAQS. Specifically, Section 51.853 (b)(1) of the General Conformity Regulations stipulates that a general conformity determination is required for moderate ozone nonattainment areas if VOC PTE emissions exceed 50 tons per year and $NO_x$ emissions exceed 100 tons per year.

The Washington, DC area has been classified as non-attainment for $PM_{2.5}$. Conformity regulations pertaining to $PM_{2.5}$ were released on July 17, 2006. Under that guidance, the emissions threshold of 100 tons a year for primary $PM_{2.5}$ should be used. Secondary $PM_{2.5}$ is evaluated using a standard for fine particulate precursors, and is shown in Table 1-20.

As demonstrated by Table 1-22, PTE emissions of all pollutants fall well below the emission thresholds. The PTE emissions of $PM_{2.5}$ reflect AP-42 emission factors that state that particulate combustion emissions from natural gas as assumed to be smaller than 1 micron, and thus all particulate emissions are in the $PM_{2.5}$ subgroup. As a result, a conformity determination is not required for any of the Master Plan Update Alternatives.

**Table 1-22. Annual PTE Emissions for Applicable Criteria Pollutants (tons/yr) for Additional Boiler Capacity**

| Alternative | $NO_x$ | VOC | $PM_{10}$ | $PM_{2.5}$ | $NO_x$ | VOC | $SO_2$ |
|---|---|---|---|---|---|---|---|
| Alternative 2-A | 24.6 | 4.8 | 6.6 | 6.6 | 24.6 | 4.8 | 0.5 |
| Alternative 2-B | 12.4 | 4.5 | 6.2 | 6.2 | 12.4 | 4.5 | 0.5 |
| Alternative 2-C | 18.8 | 7.8 | 10.8 | 10.8 | 18.8 | 7.8 | 0.9 |
| Alternative 3-A | 24.6 | 4.8 | 6.6 | 6.6 | 24.6 | 4.8 | 0.5 |
| Alternative 3-B | 12.4 | 4.5 | 6.2 | 6.2 | 12.4 | 4.5 | 0.5 |
| Alternative 3-C | 18.8 | 7.8 | 10.8 | 10.8 | 18.8 | 7.8 | 0.9 |
| General Conformity Regulations Emission Thresholds | 100 | 50 | 100 | 100 | 100 | 100 | 100 |

**Table 1-23. Projected 1-Hour Peak Analysis Results for CO (in ppm) at Hot Spot Receptor Locations, Musgrove Lane at US 29 Action With ICC**

| Alternative | Background Concentration | Stationary CO Output | morning | | evening | | S/NAAQS | Violation |
|---|---|---|---|---|---|---|---|---|
| | | | CAL3QHC | *TOTAL* | CAL3QHC | *TOTAL* | | |
| Alternative 1 | 4.0 | 0.069 | 0.6 | **4.67** | 0.5 | **4.57** | 35 ppm | No |
| Alternative 2-A | 4.0 | 0.080 | 0.6 | **4.68** | 0.5 | **4.58** | 35 ppm | No |
| Alternative 2-B | 4.0 | 0.080 | 0.6 | **4.68** | 0.5 | **4.58** | 35 ppm | No |
| Alternative 2-C | 4.0 | 0.080 | 0.6 | **4.68** | 0.5 | **4.58** | 35 ppm | No |
| Alternative 3-A | 4.0 | 0.070 | 0.6 | **4.67** | 0.5 | **4.57** | 35 ppm | No |
| Alternative 3-B | 4.0 | 0.070 | 0.6 | **4.67** | 0.5 | **4.57** | 35 ppm | No |
| Alternative 3-C | 4.0 | 0.070 | 0.6 | **4.67** | 0.5 | **4.57** | 35 ppm | No |

**Table 1-24. Projected 8-Hour Peak Analysis Results for CO (in ppm) at Hot Spot Receptor Locations, Musgrove Lane at US 29 With ICC**

| Alternative | Background Concentration | Stationary CO Output | 8-Hour Average | | S/NAAQS | Violation |
|---|---|---|---|---|---|---|
| | | | CAL3QHC | *TOTAL* | | |
| Alternative 1 | 3.3 | 0.011 | 0.5 | **3.81** | 9 ppm | No |
| Alternative 2-A | 3.3 | 0.011 | 0.5 | **3.81** | 9 ppm | No |
| Alternative 2-B | 3.3 | 0.011 | 0.5 | **3.81** | 9 ppm | No |
| Alternative 2-C | 3.3 | 0.012 | 0.5 | **3.82** | 9 ppm | No |
| Alternative 3-A | 3.3 | 0.011 | 0.5 | **3.81** | 9 ppm | No |
| Alternative 3-B | 3.3 | 0.011 | 0.5 | **3.81** | 9 ppm | No |
| Alternative 3-C | 3.3 | 0.012 | 0.5 | **3.82** | 9 ppm | No |

**Table 1-25. Projected 1-Hour Peak Analysis Results for CO (in ppm) at Hot Spot Receptor Locations, Stewart Lane at US 29 Action With ICC**

| Alternative | Background Concentration | Stationary CO Output | morning | | evening | | S/NAAQS | Violation |
|---|---|---|---|---|---|---|---|---|
| | | | CAL3QHC | *TOTAL* | CAL3QHC | *TOTAL* | | |
| Alternative 1 | 4.0 | 0.069 | 0.3 | **4.37** | 0.3 | **4.37** | 35 ppm | No |
| Alternative 2-A | 4.0 | 0.080 | 0.3 | **4.38** | 0.3 | **4.38** | 35 ppm | No |
| Alternative 2-B | 4.0 | 0.080 | 0.3 | **4.38** | 0.3 | **4.38** | 35 ppm | No |
| Alternative 2-C | 4.0 | 0.080 | 0.3 | **4.38** | 0.3 | **4.38** | 35 ppm | No |
| Alternative 3-A | 4.0 | 0.070 | 0.3 | **4.37** | 0.3 | **4.37** | 35 ppm | No |
| Alternative 3-B | 4.0 | 0.070 | 0.3 | **4.37** | 0.3 | **4.37** | 35 ppm | No |
| Alternative 3-C | 4.0 | 0.070 | 0.3 | **4.37** | 0.3 | **4.37** | 35 ppm | No |

**Table 1-26. Projected 8-Hour Peak Analysis Results for CO (in ppm) at Hot Spot Receptor Locations, Stewart Lane at US 29 With ICC**

| Alternative | Background Concentration | Stationary CO Output | 8-Hour Average | | S/NAAQS | Violation |
|---|---|---|---|---|---|---|
| | | | CAL3QHC | *TOTAL* | | |
| Alternative 1 | 3.3 | 0.011 | 0.3 | **3.61** | 9 ppm | No |
| Alternative 2-A | 3.3 | 0.011 | 0.3 | **3.61** | 9 ppm | No |
| Alternative 2-B | 3.3 | 0.011 | 0.3 | **3.61** | 9 ppm | No |
| Alternative 2-C | 3.3 | 0.012 | 0.3 | **3.62** | 9 ppm | No |
| Alternative 3-A | 3.3 | 0.011 | 0.3 | **3.61** | 9 ppm | No |
| Alternative 3-B | 3.3 | 0.011 | 0.3 | **3.61** | 9 ppm | No |
| Alternative 3-C | 3.3 | 0.012 | 0.3 | **3.62** | 9 ppm | No |

#### *1.2.2.2.4 Combined Mobile and Stationary Co Analysis*

CO emissions from stationary sources must be combined with mobile source CO emissions and CO background concentrations. The sum of these values must not exceed the NAAQS for the peak-hour or 8-hour emissions. As demonstrated by Tables 1-21 through 1-24, for the US 29/Stewart Lane intersection and the US 29/Musgrove Road intersection, emissions of CO for peak hour and 8-hour analysis fall below these emissions thresholds.

### *1.2.2.3 Direct Impacts*

Minor increases in emissions from mobile and stationary sources would occur as a result of the proposed development on the FDA White Oak Campus. Growth of employment from 7,719 employees to 8,889 employees is not yet accounted for in the SIP, but would be included in the next round of Cooperative Employment Forecasts prepared by MNCPPC and MWCOG. New Source Review indicates that under the stationary analysis, both Master Plan Update Alternatives would qualify as major sources under New Source Review. The NAAQS Screening Modeling Assessment indicates that all of the pollutant impacts associated with each of the Master Plan alternatives would be below all applicable NAAQS. The project meets $PM_{2.5}$ requirements without a project-level hot-spot analysis, since the project would not be considered a Project of Air Quality Concern as defined under 40 CFR 93.123(b)(1).

### *1.2.2.4 Temporary Construction Impacts*

Air quality may be temporarily impacted by construction activities. Fugitive dust would be generated during the demolition of existing structures, site grading, construction, wind erosion, and vehicular activities. Emissions from construction equipment including earth moving equipment, demolition equipment, and paving equipment, would generate VOCs and NOx. The intensity, duration, location, and type of construction activity would vary over time. These impacts could be considered significant, even on a temporary basis, if the local construction regulations and BMP control measures are not implemented. With the implementation of control measures, construction activities would be expected to have short-term, minor, adverse impact on air quality.

### *1.2.2.5 Indirect Impacts*

Air emissions associated with development on the FDA White Oak Campus are not anticipated to affect the overall health, welfare, or financial base of the communities within the vicinity of the campus. Therefore, no indirect impacts to air quality would occur under the development alternatives.

#### *1.2.2.6 Cumulative Impacts*

Past, present, and future development within the Washington DC metropolitan region will continue to produce additional traffic and new emission sources which would cumulatively affect air quality. Development of any of the Master Plan Update Alternatives would result in additional emissions. However, newer vehicles and building mechanical equipment operate with cleaner systems reducing the potential effect new sources of emissions would have on air quality.

#### *1.2.2.7 Mitigation Measures*

Short term construction impacts can be mitigated through the use of control measures including maintenance of emission controls on all construction equipment and covering/wetting exposed soils to reduce fugitive dust.

To further reduce $NO_x$ and $PM_{2.5}$ emissions from the proposed stationary sources beyond the already proposed SCR control technology for $NO_x$, the following control options can be instituted:

- limits on permitted hours of operation per year,
- incorporate control technology.

To further reduce stationary source CO emissions, the GSA will work with its energy consultant to refine the operating parameters of the equipment used to operate the CUP. The following control options can be instituted:

- limits on permitted hours of operations per year
- limits on annual fuel consumption
- equipment choice that would minimize CO impacts

It should be noted that any long term impacts within the region will also be offset by the advancement in automobile technology and Federal emission regulations and controls.

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# 2 Noise

## 2.1 Affected Environment

### 2.1.1 Noise Fundamentals

The purpose of the noise study is to determine whether the traffic generated by future development scenarios and reconfiguration of roads would cause the noise levels to approach or exceed the Federal Highway Administration (FHWA) Noise Abatement Criteria. In addition, the potential for noise generated by gas turbines within the proposed expansion of the Central Utility Plant and its impact on nearby residences and employees was considered.

The extent to which individuals are affected by noise is controlled by several factors, including:

- the duration and frequency of sound;
- the distance between the sound source and the receptor;
- the intervening natural or man-made barriers or structures; and
- the ambient environment.

The level of roadway traffic noise depends upon:

- the volume of traffic,
- the speed of traffic, and
- the number of trucks in the flow of traffic.

Generally, a combination of high traffic volumes and speeds results in high levels of traffic noise. The level of noise is also dependent on the percent of trucks in the vehicle mix. Vehicle noise is a combination of the noises produced by the engine, exhaust system, and tire-roadway interaction. For the purposes of traffic noise analyses, FHWA has established the following vehicle classifications: heavy trucks, medium trucks, automobiles, buses, and motorcycles. Heavy trucks, or vehicles having three or more axles, typically produce more noise than medium trucks, which have two axles and six wheels; medium trucks typically generate more noise than automobiles. Table 2-1 presents common noise sources and sound levels.

**Table 2-1. Common Sound Levels**

| Source | Sound Level (dB(A)) |
|---|---|
| Near large jet at takeoff | 140 |
| Air-raid siren | 130 |
| Threshold of pain | 120 |
| Thunder or sonic boom | 110 |
| Garbage or trailer truck at roadside | 100 |
| Power lawnmower at 5 feet | 90 |
| Alarm clock or vacuum cleaner | 80 |
| Freeway traffic at 50 feet | 70 |
| Conversational speech | 60 |
| Average residence | 50 |
| Bedroom* | 40 |
| Soft whisper at 15 feet | 30 |
| Rustle of leaves | 20 |
| Breathing | 10 |
| Threshold of hearing | 0 |

*includes HVAC system, conversation, walking, doors opening and closing

Traffic noise is measured and described in accordance with FHWA guidelines, which prescribe the use of equivalent sound levels, (Leq) as the primary descriptor for noise analysis. Leq is defined as the equivalent steady state sound level, which contains the same acoustic energy in a specified time period as the time-varying sound level during the same specified time period. The FHWA and every state's department of transportation use the Leq(h) (hourly equivalent sound level) descriptor to estimate the degree of nuisance or annoyance arising from changes in traffic noise. Because the principal noise-related concern raised by the proposed action is traffic-induced noise, the Leq(h) descriptor is used in this analysis. The unit of measure for Leq is the "A-weighted" decibel (dB(A)). The dB(A) scale de-emphasizes the very low and the very high frequencies and emphasizes the middle frequencies, thereby closely approximating the frequency response of the human ear.

Human ability to perceive change in noise levels varies widely from person to person, as do responses to perceived changes. Generally, a three dB(A) change in noise level would be barely perceptible to most listeners, whereas a ten dB(A) change is typically perceived as a doubling (or halving) of noise levels and is considered a substantial change. These thresholds (summarized in Table 2-2) permit direct estimation of an individual's probable perception of changes in noise levels.

**Table 2-2. Perceptions of Changes in Noise Levels**

| Change in dB(A) | Perception |
|---|---|
| 0 | Reference |
| 3 | Barely perceptible change |
| 5 | Readily perceptible change |
| 10 | Twice or half as loud |
| 20 | Four times or ¼ as loud |
| 40 | Eight times or 1/8 as loud |

Source: Federal Highway Administration, June 1995 (*Highway Traffic Noise Analysis and Abatement Policy and Guidance*)

The determination of traffic noise impacts is based on the relationship between the ambient noise levels, the predicted noise levels, and the established noise abatement criteria. The effects of highway traffic noise are based on criteria established by FHWA in Title 23 of the Code of Federal Regulations, Part 772 (23 CFR, Part 772) *Procedures for Abatement of Highway Traffic Noise and Construction Noise* and the Maryland State Highway Administration's *Sound Barrier Policy* (May 1998). The Federal Noise Abatement Criteria (NAC) are based on specific land use categories and are used to determine the need for studying noise abatement. Table 2-3 presents the land use categories and their noise impact levels. Noise-sensitive land uses surrounding the FDA White Oak Campus include residential and recreational areas that meet the standards of Land Use Activity Category B, which has a noise impact threshold of 67 dB(A). The NAC states that noise abatement must be considered when highway noise levels approach or exceed 67 dB(A).

**Table 2-3. Noise Abatement Criteria (NAC), 23 CFR, Part 772 - Hourly A-Weighted Sound Levels in Decibels (dB(A))[1]**

| Activity Category | $L_{eq}$ (h) | $L_{10}$(h) | Description of Activity Category |
|---|---|---|---|
| A | 57 (Exterior) | 60 (Exterior) | Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose |
| B | 67 (Exterior) | 70 (Exterior) | Picnic areas, recreational areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals |
| C | 72 (Exterior) | 75 (Exterior) | Developed lands, properties or activities not included in Categories A or B above |
| D | -- | -- | Undeveloped lands |
| E | 52 (Interior) | 55 (Interior) | Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums |

[1]Either $L_{eq}$(h) or $L_{10}$(h) (but not both) may be used on a project.

### *2.1.2 Study Area Noise Environment*

The study area is located within a suburban environment with noise sources typical for suburban areas. Common sources of community noise include roadway traffic, sirens from emergency vehicles, airplanes and other human and animal activities. Existing high traffic volumes and speeds on freeways and arterial roads in the study area contribute to the noise environment. The roadways with the highest volumes and speeds surrounding the FDA White Oak Campus include:

- I-495
- I-95
- US Route 29/ Columbia Pike,
- MD Route 650/ New Hampshire Avenue,
- MD Route 212/ Powder Mill Road,
- Cherry Hill Road,
- Fairland Road,
- Lockwood Drive, and
- Broadbirch Drive.

**Noise Sensitive Resources.** Existing noise-sensitive resources on the FDA White Oak Campus and within the area of traffic influence for the Master Plan Update alternatives include:

- residential areas adjacent to:
  - US Route 29/ Columbia Pike between Fairland Lockwood Drive and Fairland Avenue,
  - MD Route 650/ New Hampshire Avenue between US Route 29/ Columbia Pike and MD Route 212/ Powder Mill Road,
  - MD Route 212/ Powder Mill Road between MD Route 650/ New Hampshire Avenue and I-95,
  - Cherry Hill Road between US Route 29/ Columbia Pike and MD Route 212/ Powder Mill Road, and
  - Lockwood Drive between US Route 29/ Columbia Pike and US Route 650/ New Hampshire Avenue.
- Southeast Hebrew Congregation synagogue off of Lockwood Drive,
- Shaare Tefila Congregation synagogue on Lockwood Drive,
- Young Israel of White Oak Congregation synagogue on Burnt Mills Avenue,
- Unitarian Universalist Church of Silver Spring on New Hampshire Avenue,
- Episcopal Church of Our Saviour on Powder Mill Road
- Hillandale Baptist Church on Powder Mill Road,
- Paint Branch Unitarian Universalist Church on Powder Mill Road,
- St. Mark's Episcopal Church on Old Columbia Pike,
- Burnt Mills Elementary School off of Columbia Pike,
- High Point High School on Powder Mill Road, and
- Hillandale Park.

### *2.1.3 Noise Assessment Methods*

The goal of the qualitative noise analysis for this technical report was to identify whether noise-sensitive areas would be potentially impacted by project-related traffic increases on noise sensitive areas adjacent to the FDA White Oak Campus or by noise generated by the proposed expansion of the Central Utility Plant. In general, the Master Plan Update alternatives will alter traffic volumes and patterns, and this noise analysis will address the potential for those changes to exceed FHWA-established noise abatement criteria and Maryland State Highway Administration (SHA) Noise Abatement Policy criteria. Traffic volume data for the existing, 2006 Master Plan, and Master Plan Update alternatives were compared for all study area roadway segments to determine if noise-sensitive (primarily residential) areas would experience the growth in traffic volumes significant enough to result in traffic noise increases. Data was taken from intersection diagrams to determine the traffic volumes from the links between the intersections. Figure 2 shows the location of the intersections. See Appendix A for the Traffic Analysis Diagrams and the Traffic Analysis Summary Table.

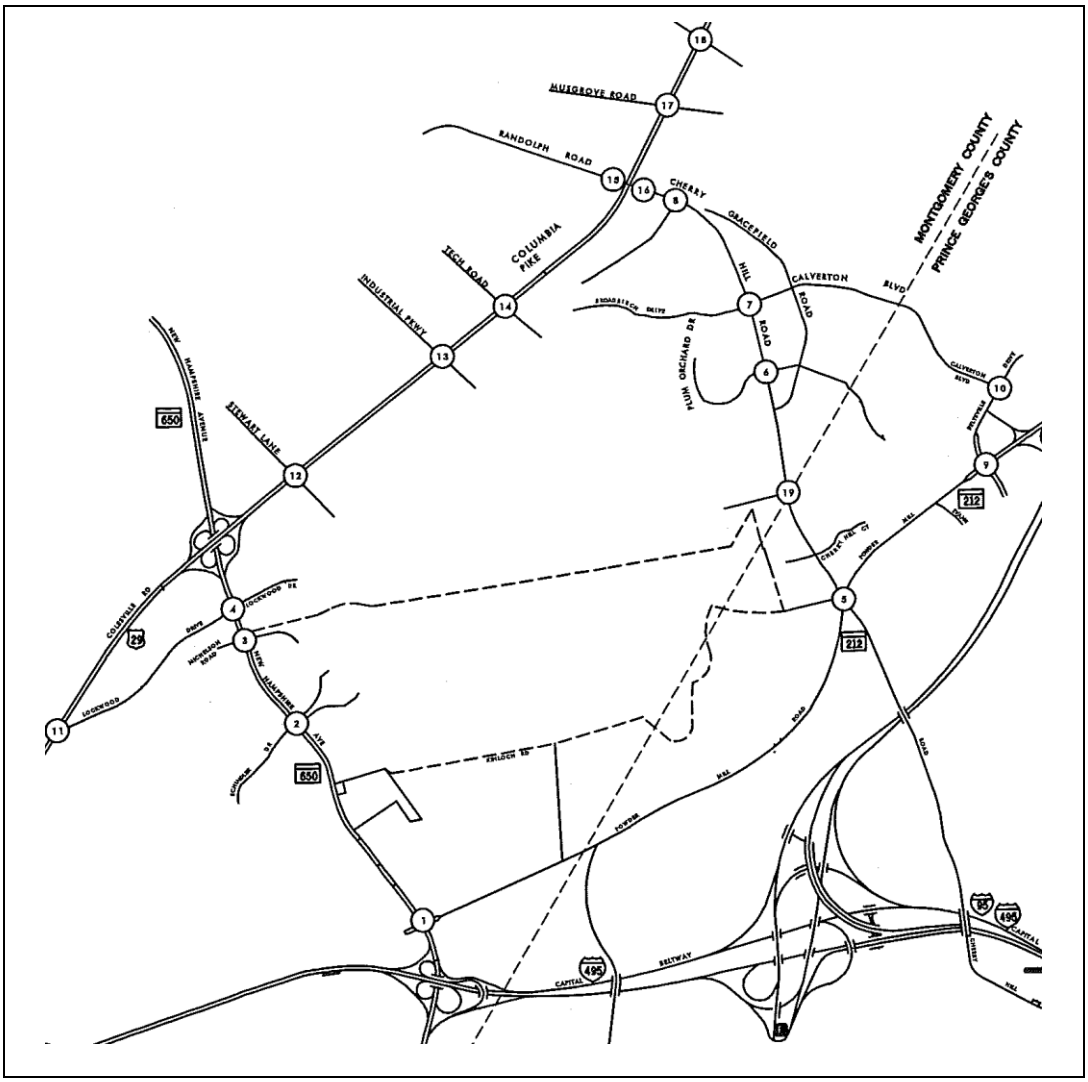


**Figure 2. Traffic Analysis Intersection Diagram Location Map.**

## 2.2 Environmental Consequences

### 2.2.1 2006 Master Plan Alternative (No Action): Direct, Indirect, and Cumulative Impacts

Under the 2006 Master Plan Alternative, the FDA consolidation on the FRC would continue. Buildings would continue to be grouped around the research and administrative functions with pedestrian scaled courtyards. The FDA would not generate additional traffic over the traffic levels studied in the 2005 Final EIS (GSA, 2005). Although the property would not induce additional traffic volumes on study area roadways, there would be traffic increases from predicted general growth in the community, including potential development of the ICC in the project vicinity. CUP expansions planned as part of the 2006 Master Plan would generate new noise impacts. These impacts would be mitigated through the use of acoustic blocks in the engine halls, sound attenuation walls, as necessary, around outside gas compressors and turbines, variable frequency drives to slow the fan speed in the cooling towers, and placement of turbines in cabinets. With these measures, the 2006 Master Plan Update would have minor, long-term, adverse impacts to noise levels.

### 2.2.2 Master Plan Update Alternatives

#### 2.2.2.1 Direct Impacts

Traffic associated with the FDA Master Plan Update Alternatives, overall, is anticipated to cause minor, likely imperceptible increases in noise. Traffic volume comparisons revealed that the Master Plan Update alternatives would result in increases over 2006 Master Plan traffic volumes up to 6.3 percent with the construction of the ICC and up to 7 percent without the construction of the ICC. With the construction of the ICC, the area of greatest forecast traffic increase is on MD 650 between the MD 650/ Michelson Road intersection and the MD 650/ Lockwood Drive intersection. Without the construction of the ICC, the area of greatest forecast traffic increase is on Lockwood Drive between US 29/ Colesville Road intersection and the MD 650/ Lockwood Drive intersection. Therefore, residential areas along these corridors, such as Burnt Mills Hills along Lockwood Drive, would be anticipated to experience the greatest increase in traffic noise levels. Other neighborhoods in the study area are closer to roadways with heavier traffic volumes (such as US 29 and MD 650) and therefore are louder overall than the Burnt Mills Hills area, but these areas will not experience as much proportional increase in traffic and will experience less increase in traffic noise.

A doubling of existing traffic volumes, of the same vehicle mix composition, would be necessary to result in a three decibel increase in noise levels, which is generally the smallest increment of noise increase or decrease that can be perceived by the human ear. As noted earlier, the traffic increases anticipated with development under the FDA Master Plan Update project would be much smaller than a doubling of traffic volumes – there would not be more than a seven percent increase in any area, which would result in noise increases of not more than a few tenths of a decibel anywhere in the study area.

Under the Master Plan Update alternatives an addition would be constructed in the vicinity of the CUP to house additional generating equipment. The addition of gas turbines related to CUP expansion has potential to result in noise increases that would affect employees on the campus and nearby residents. It is the intent of GSA to reduce any impacts associated with the CUP expansion at the source through

construction specifications and available technology. Cooling towers\ fans would include variable frequency drives to reduce noise, and new fans would have a different blade configuration that would reduce fan speed and thus noise. Some of the equipment being added would be moved inside the new CUP expansion to mitigate noise. The CUP expansion, like the existing CUP building would have acoustic blocks to mitigate noise from the generating equipment. Lastly, sound attenuation walls would be provided as necessary between the CUP and residential areas outside of the FDA Campus to mitigate noise impacts. The sound attenuation walls would be constructed to absorb or deflect noise upwards and away from residential areas. Wall design will be consistent with area architecture and designed to not impact the safe operation and maintenance of the CUP. Quantitative noise levels from the CUP cannot be determined until specific equipment and configurations are chosen, but the facility would be required to comply with the Montgomery County Noise Ordinance (Montgomery County Code, Chapter 31B). The noise control measures described above would be designed to ensure compliance with the Montgomery County ordinance. With these mitigation measures, the CUP expansion would have a moderate, long-term, direct, adverse impact to noise levels.

#### *2.2.2.2 Indirect Impacts*

The Master Plan Update Alternatives would result in negligible, direct, long-term increases in noise levels that would be imperceptible, or barely perceptible, to human ears. Because of the minor nature of impacts, noise increases associated with the project would not result in adverse indirect impacts.

#### *2.2.2.3 Cumulative Impacts*

Past, present, and future development within the Washington metropolitan region will continue to produce additional traffic and noise sources that will cumulatively affect noise levels. The minor increases in noise resulting from development associated with the FDA Master Plan Update would not be significant when combined with past and present development, creating imperceptible or barely perceptible increases in traffic noise in a suburban environment that already experiences varying noise levels. Future development projects have potential to generate additional traffic and other sources of noise. Traffic increases could result in higher noise levels that would cumulatively result in readily perceptible noise increases of three decibels or more for receptors that are adjacent to both the FDA White Oak Campus and other future development locations.

#### *2.2.2.4 Construction Noise*

Construction would be limited to the FDA White Oak Campus, and therefore, potential noise associated with the project would be limited to noise-sensitive areas on and adjacent to the campus. The following measures should be used to reduce construction noise. This list is not comprehensive and should be evaluated in detail once a development alternative is selected.

- All construction equipment powered by an internal combustion engine should be equipped with a properly maintained muffler.
- Air compressors should meet current US EPA noise emission standards.
- Newer model construction equipment should be used as much as possible since it is generally quieter than older equipment.

- Nighttime construction activities should be minimized.
- Portable noise barriers within the equipment area and around stationary noise sources should be established.
- Tools and equipment should be selected to minimize noise.

#### *2.2.2.5 Mitigation Measures*

Traffic noise mitigation measures were not considered for this project, as none of the Master Plan Update Alternatives considered for the FDA White Oak Consolidation Project result in noise impacts to noise-sensitive resources. The CUP would be required to comply with the Montgomery County Noise Ordinance that would include, if appropriate, the following:

- Variable frequency drives on cooling tower fans would be included.
- Include acoustic blocks in CUP expansion.
- Include variable frequency drives on new cooling towers.
- Sound attenuation walls would be provided.

Construction is limited to the FDA Campus and, therefore, potential noise associated with the project would be limited to noise-sensitive areas adjacent to the campus. The following measures should be used to reduce construction noise:

- All construction equipment powered by an internal combustion engine should be equipped with a properly maintained muffler.
- Air compressors should meet current EPA noise emission standards.
- Newer model construction equipment and tools should be used as much as possible since it is generally quieter than older equipment.
- Nighttime construction activities should be minimized.
- Portable noise barriers within the equipment area and around stationary noise sources should be established.

# 3 List of Preparers

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# 4 References

County Council for Montgomery County, Maryland. (enacted December 3, 1996). *Montgomery County Noise Ordinance.* Chapter 32, Laws of Montgomery County, 1996.

Greenhorne & O'Mara. (n.d.). *FDA Traffic Report.*

Kling Stubbins, in association with RTKL Associates, Inc. (August 2008). *FDA White Oak Implementation, 2008 Master Plan Options 1, 2, and 3*.

Kling Stubbins, in association with RTKL Associates, Inc. (May 2008). *FDA White Oak Master Plan Update*.

Maryland Department of the Environment. (n.d.) Title V Program Fact Sheet. Retrieved from http://www.mde.maryland.gov/Permits/AirManagementPermits/Title5/title5factsheet.asp

Metropolitan Washington Council of Governments (MWCOG). (2008). *Air Quality Conformity Analysis of the 2005 Update to the Constrained Long Range Plan (CLRP).*Metropolitan Washington Council of Governments. (2005). *FY 2006-2011 Transportation Improvement Program (TIP).*

Metropolitan Washington Council of Governments. (2008). *Plan to Improve Air Quality in the DC-MD-VA Region: State Implementation Plan (SIP) for Fine Particle ($PM_{2.5}$) Standards*. Publication No. 20087340. Retrieved from http://www.mwcog.org/ environment/air/SIP/.

Metropolitan Washington Council of Governments. (2005). *Round 7.0 Cooperative Forecasting: Employment Forecasts to 2030 by Traffic Analysis Zone* . Publication Number: 20088316.

Metropolitan Washington Council of Governments. (2007). *State Implementation Plan (SIP) for 8-hour Ozone Standard. Plan to Improve Air Quality in the DC-MD-VA Region.* Publication Number: 20077302. Retrieved from http://www.mwcog.org/ environment/air/SIP/.

U.S. Department of Transportation (DOT), Federal Highway Administration (FHWA). (1995). *Highway Traffic Noise Analysis and Abatement, Policy and Guidance*. U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.

USDOT, Federal Highway Administration. (February 3, 2006). *Interim Guidance on Air Toxic Analysis in NEPA Documents.* Memorandum to Division Administrators by Cynthia Banks, Associate Administrator for Planning, Environment and Realty.

USDOT, Federal Highway Administration. (1996). *Measurement of Highway-Related Noise FHWAPD-96-046.*

U.S. Environmental Protection Agency. 1995, *AP-42, Fifth Edition*, *Compilation of Air Emission Factors, Volume 1: Stationary Point and Area Sources*.

U. S .EPA. (February 2007). *Final Rule on Control of Emissions of Hazardous Air Pollutants from Mobile Sources (66 FR 17235).*

U.S. EPA. (1993). *CAL3QHC Dispersion Model.*

U.S. EPA. (1985). *Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations) Revised*. EPA-450:4-80-023R, June 1985.

U.S. EPA. (1990). *New Source Review Workshop Manual, Prevention of Significant Deterioration and Non attainment Area Permitting*.

U.S. EPA. (2008). *Procedures for determining localized CO, $PM_{10}$ and$PM_{2.5}$ concentrations (hot-spot analysis*). 40CFR93.123(b)(1).

U.S. EPA. (1993). *User's Guide to the Building Profile Input Program*. October 1993.

U.S. EPA. (1995). *Guideline for Modeling Carbon Monoxide from Roadway Intersection*.

U.S. EPA. (1995). *User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections*.

U.S. EPA. (2004). *User's Guide for the AMS/EPA Regulatory Model – AERMOD*. EPA-454/B-03-001.

U.S. EPA. (2004). *User's Guide for the AERMOD Terrain Preprocessor (AERMAP).* EPA-454/B-03-003.

U.S. EPA. (2004). User's *Guide for the AERMOD Meteorological Preprocessor (AERMET).* EPA-454/B-03-002.

U.S. EPA. (2005). 40 CFR Part 51, Appendix W, "Guideline on Air Quality Models (Revised)", November 9, 2005.

U.S. EPA. (2008). *AERSURFACE User's Guide, EPA-454/B-08-001*, January 2008.

U.S. Environmental Protection Agency (EPA). (2008). *The Green Book Nonattainment Areas For Criteria Pollutants*. Retrieved from http://www.epa.gov/oar/oaqps/greenbk/index.html

U.S. Environmental Protection Agency (EPA). (n.d.). Air Data: Access to Air Pollution Data. Retrieved from http://www.epa.gov/air/data/index.html

# *Appendix A*

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Table X.X Traffic Analysis Summary

| Roadway Link, Intersection No. to Intersection No. | Direction | AM/PM | With the Construction of the ICC | | | | | Without the Construction of the ICC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | No Build | | Build | | % Increase (Build-No Build)/ (No Build) | No Build | | Build | | % Increase (Build-No Build)/ (No Build) |
| | | | VPH | Total | VPH | Total | | | Total | | Total | |
| 1 - 2 | EB | AM | 2890 | 5150 | 2905 | 5335 | 3.6% | 2665 | 4880 | 2680 | 5120 | 4.9% |
| | WB | | 2260 | | 2430 | | | 2215 | | 2440 | | |
| | EB | PM | 2930 | 5120 | 3085 | 5290 | 3.3% | 2540 | 5200 | 2760 | 5440 | 4.6% |
| | WB | | 2190 | | 2205 | | | 2660 | | 2680 | | |
| 2 - 3 | EB | AM | 3190 | 5140 | 3295 | 5140 | 0.0% | 2895 | 4700 | 2985 | 4860 | 3.4% |
| | WB | | 1950 | | 1845 | | | 1805 | | 1875 | | |
| | EB | PM | 2585 | 5010 | 2635 | 5145 | 2.7% | 2105 | 4955 | 2175 | 5115 | 3.2% |
| | WB | | 2425 | | 2510 | | | 2850 | | 2940 | | |
| 3 - 4 | EB | AM | 3925 | 5515 | 4255 | 5860 | 6.3% | 3555 | 4960 | 3835 | 5260 | 6.0% |
| | WB | | 1590 | | 1605 | | | 1405 | | 1425 | | |
| | EB | PM | 2500 | 5725 | 2525 | 6065 | 5.9% | 2030 | 5660 | 2055 | 5960 | 5.3% |
| | WB | | 3225 | | 3540 | | | 3630 | | 3905 | | |
| 4 - 11 | NB | AM | 440 | 1005 | 475 | 1040 | 3.5% | 605 | 1210 | 685 | 1295 | 7.0% |
| | SB | | 565 | | 565 | | | 605 | | 610 | | |
| | NB | PM | 570 | 1015 | 575 | 1040 | 2.5% | 660 | 1160 | 670 | 1215 | 4.7% |
| | SB | | 445 | | 465 | | | 500 | | 545 | | |
| 1 - 5 | EB | AM | 670 | 1565 | 670 | 1575 | 0.6% | 700 | 1605 | 700 | 1605 | 0.0% |
| | WB | | 895 | | 905 | | | 905 | | 905 | | |
| | EB | PM | 1150 | 1880 | 1150 | 1880 | 0.0% | 1240 | 2020 | 1240 | 2020 | 0.0% |
| | WB | | 730 | | 730 | | | 780 | | 780 | | |
| 5 - 19 | WB | AM | 1475 | 3090 | 1565 | 3185 | 3.1% | 1830 | 3545 | 1910 | 3630 | 2.4% |
| | EB | | 1615 | | 1620 | | | 1715 | | 1720 | | |
| | WB | PM | 1055 | 2875 | 1065 | 2975 | 3.5% | 1385 | 3600 | 1390 | 3650 | 1.4% |
| | EB | | 1820 | | 1910 | | | 2215 | | 2260 | | |
| 5 - 9 | EB | AM | 1050 | 2740 | 1055 | 2825 | 3.1% | 1150 | 3080 | 1155 | 3130 | 1.6% |
| | WB | | 1690 | | 1770 | | | 1930 | | 1975 | | |
| | EB | PM | 1595 | 2485 | 1675 | 2575 | 3.6% | 1680 | 2760 | 1720 | 2805 | 1.6% |
| | WB | | 890 | | 900 | | | 1080 | | 1085 | | |
| 6 - 19 | WB | AM | 1315 | 2800 | 1330 | 2955 | 5.5% | 1695 | 3310 | 1705 | 3495 | 5.6% |
| | EB | | 1485 | | 1625 | | | 1615 | | 1790 | | |
| | WB | PM | 1280 | 2925 | 1410 | 3070 | 5.0% | 1635 | 3705 | 1805 | 3890 | 5.0% |
| | EB | | 1645 | | 1660 | | | 2070 | | 2085 | | |
| 6 - 7 | WB | AM | 950 | 2770 | 965 | 2925 | 5.6% | 1230 | 3150 | 1240 | 3335 | 5.9% |
| | EB | | 1820 | | 1960 | | | 1920 | | 2095 | | |
| | WB | PM | 1455 | 2775 | 1585 | 2920 | 5.2% | 1850 | 3465 | 2020 | 3650 | 5.3% |
| | EB | | 1320 | | 1335 | | | 1615 | | 1630 | | |
| 8 - 7 | WB | AM | 1510 | 3615 | 1525 | 3770 | 4.3% | 1840 | 3950 | 1850 | 4135 | 4.7% |
| | EB | | 2105 | | 2245 | | | 2110 | | 2285 | | |
| | WB | PM | 1850 | 3250 | 1980 | 3395 | 4.5% | 2365 | 4065 | 2535 | 4250 | 4.6% |
| | EB | | 1400 | | 1415 | | | 1700 | | 1715 | | |
| 8 - 16 | WB | AM | 1380 | 3880 | 1395 | 4035 | 4.0% | 1710 | 4215 | 1720 | 4400 | 4.4% |
| | EB | | 2500 | | 2640 | | | 2505 | | 2680 | | |
| | WB | PM | 1965 | 3330 | 2095 | 3475 | 4.4% | 2480 | 4125 | 2650 | 4310 | 4.5% |
| | EB | | 1365 | | 1380 | | | 1645 | | 1660 | | |
| 17 - 15/16 | NB | AM | 2575 | 6835 | 2585 | 6990 | 2.3% | 1635 | 5790 | 1640 | 5870 | 1.4% |
| | SB | | 4260 | | 4405 | | | 4155 | | 4230 | | |
| | NB | PM | 4680 | 7035 | 4820 | 7190 | 2.2% | 4380 | 6440 | 4455 | 6520 | 1.2% |
| | SB | | 2355 | | 2370 | | | 2060 | | 2065 | | |
| 17 - 18 | NB | AM | 2430 | 6630 | 2440 | 6785 | 2.3% | 1485 | 5580 | 1490 | 5660 | 1.4% |
| | SB | | 4200 | | 4345 | | | 4095 | | 4170 | | |
| | NB | PM | 4630 | 6855 | 4770 | 7010 | 2.3% | 4230 | 6155 | 4405 | 6335 | 2.9% |
| | SB | | 2225 | | 2240 | | | 1925 | | 1930 | | |
| 14 - 15/16 | NB | AM | 2305 | 5205 | 2305 | 5285 | 1.5% | 3530 | 5075 | 3540 | 5085 | 0.2% |
| | SB | | 2900 | | 2980 | | | 1545 | | 1545 | | |
| | NB | PM | 3750 | 5860 | 3830 | 5945 | 1.5% | 1870 | 4935 | 1870 | 4960 | 0.5% |
| | SB | | 2110 | | 2115 | | | 3065 | | 3090 | | |
| 14 - 13 | NB | AM | 3700 | 6445 | 3700 | 6705 | 4.0% | 2905 | 6250 | 2905 | 6260 | 0.2% |
| | SB | | 2745 | | 3005 | | | 3345 | | 3355 | | |
| | NB | PM | 4290 | 7700 | 4370 | 7785 | 1.1% | 3550 | 6485 | 3560 | 6495 | 0.2% |
| | SB | | 3410 | | 3415 | | | 2935 | | 2935 | | |
| 12 - 13 | NB | AM | 4045 | 7075 | 4045 | 7155 | 1.1% | 3045 | 6890 | 3045 | 6900 | 0.1% |
| | SB | | 3030 | | 3110 | | | 3845 | | 3855 | | |
| | NB | PM | 4565 | 8355 | 4645 | 8440 | 1.0% | 3840 | 7360 | 3850 | 7370 | 0.1% |
| | SB | | 3790 | | 3795 | | | 3520 | | 3520 | | |
| 12 - Rt650 | NB | AM | 4150 | 7150 | 4150 | 7230 | 1.1% | 3085 | 6845 | 3085 | 6855 | 0.1% |
| | SB | | 3000 | | 3080 | | | 3760 | | 3770 | | |
| | NB | PM | 4815 | 8245 | 4895 | 8330 | 1.0% | 3900 | 7095 | 3910 | 7105 | 0.1% |
| | SB | | 3430 | | 3435 | | | 3195 | | 3195 | | |
| 11 - Rt650 | NB | AM | 2635 | 5320 | 2670 | 5355 | 0.7% | 2375 | 5945 | 2455 | 6035 | 1.5% |
| | SB | | 2685 | | 2685 | | | 3570 | | 3580 | | |
| | NB | PM | 4205 | 7025 | 4205 | 7080 | 0.8% | 3555 | 6440 | 3560 | 6555 | 1.8% |
| | SB | | 2820 | | 2875 | | | 2885 | | 2995 | | |

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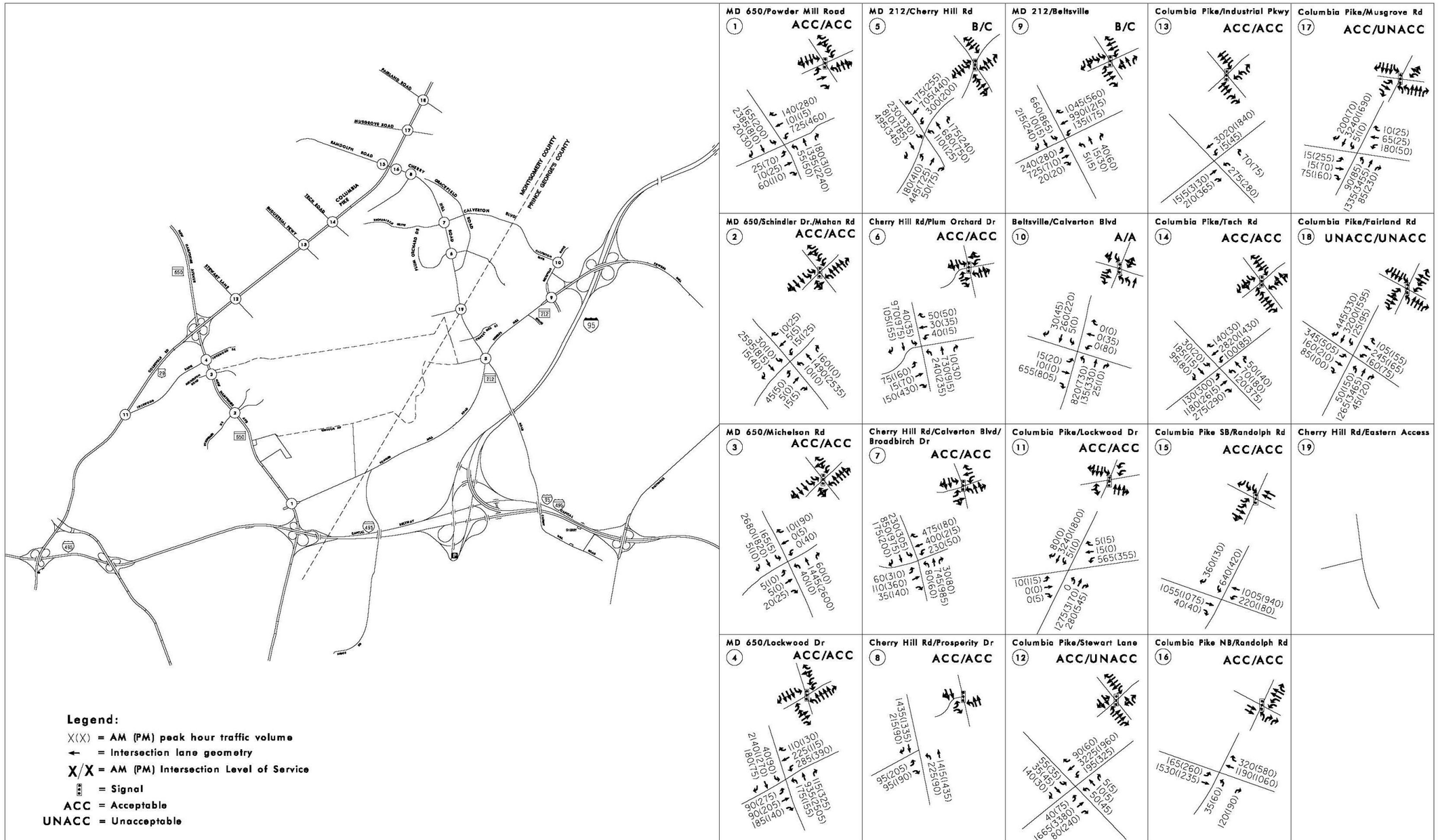


**Figure 2**
**Existing Traffic Volumes, Lane Geometries, & LOS Results**

ENGINEERING-PLANNING-EARTH SCIENCES-SURVEYING
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ROCKVILLE,MD-RALEIGH,NC-FREDERICKSBURG,VA-MECHANICSBURG,PA- ST. PETERSBURG,FL

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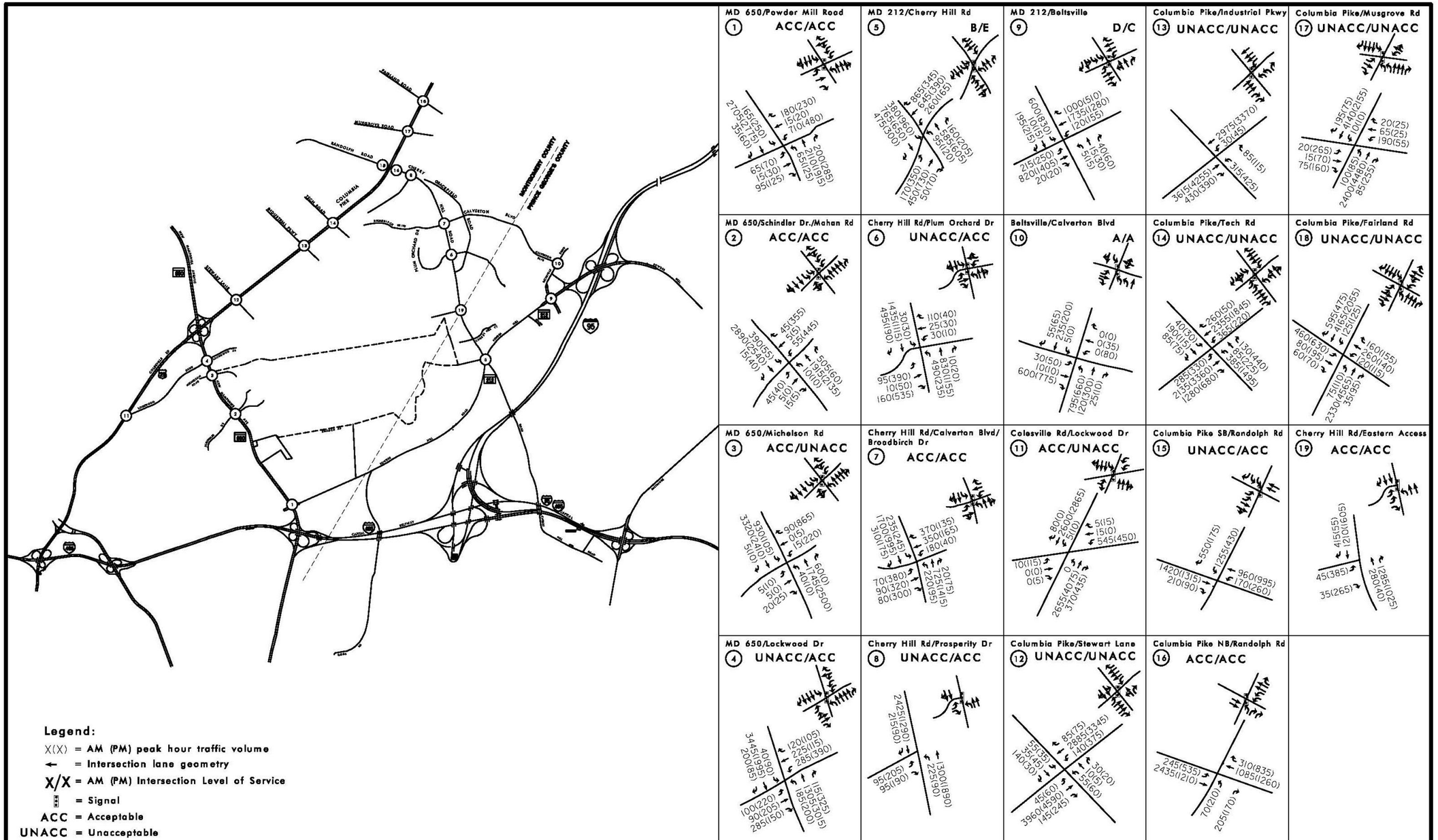


Figure 14
Action Traffic Volumes, Lane Geometries, & LOS Results (With ICC)

ENGINEERING-PLANNING-EARTH SCIENCES-SURVEYING
GREENHORNE & O'MARA, INC.
810 GLENEAGLES COURT, SUITE 106, BALTIMORE, MARYLAND 21286
(410) 583-6700
ANNAPOLIS,MD-BALTIMORE,MD-ATLANTA,GA-TAMPA,FL-FAIRFAX,VA-WEST PALM BEACH,FL
ROCKVILLE,MD-RALEIGH,NC-FREDERICKSBURG,VA-MECHANICSBURG,PA- ST. PETERSBURG,FL

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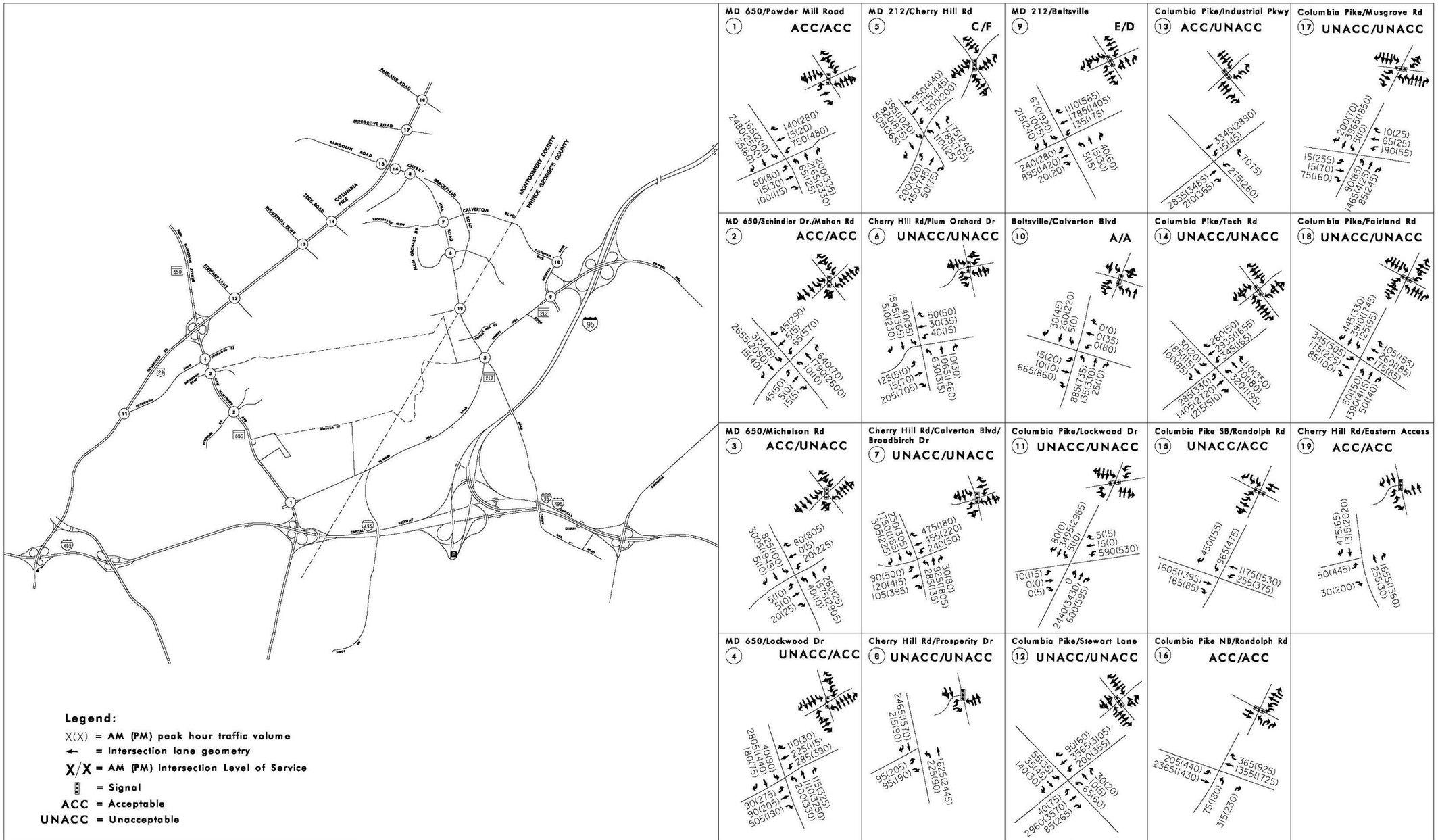


**Figure 13**
**Action Traffic Volumes, Lane Geometries, & LOS Results (Without ICC)**

ENGINEERING-PLANNING-EARTH SCIENCES-SURVEYING
GREENHORNE & O'MARA, INC.
810 GLENEAGLES COURT, SUITE 106, BALTIMORE, MARYLAND 21286
(410) 583-6700
ANNAPOLIS,MD-BALTIMORE,MD-ATLANTA,GA-TAMPA,FL-FAIRFAX,VA-WEST PALM BEACH,FL
ROCKVILLE,MD-RALEIGH,NC-FREDERICKSBURG,VA-MECHANICSBURG,PA- ST. PETERSBURG,FL

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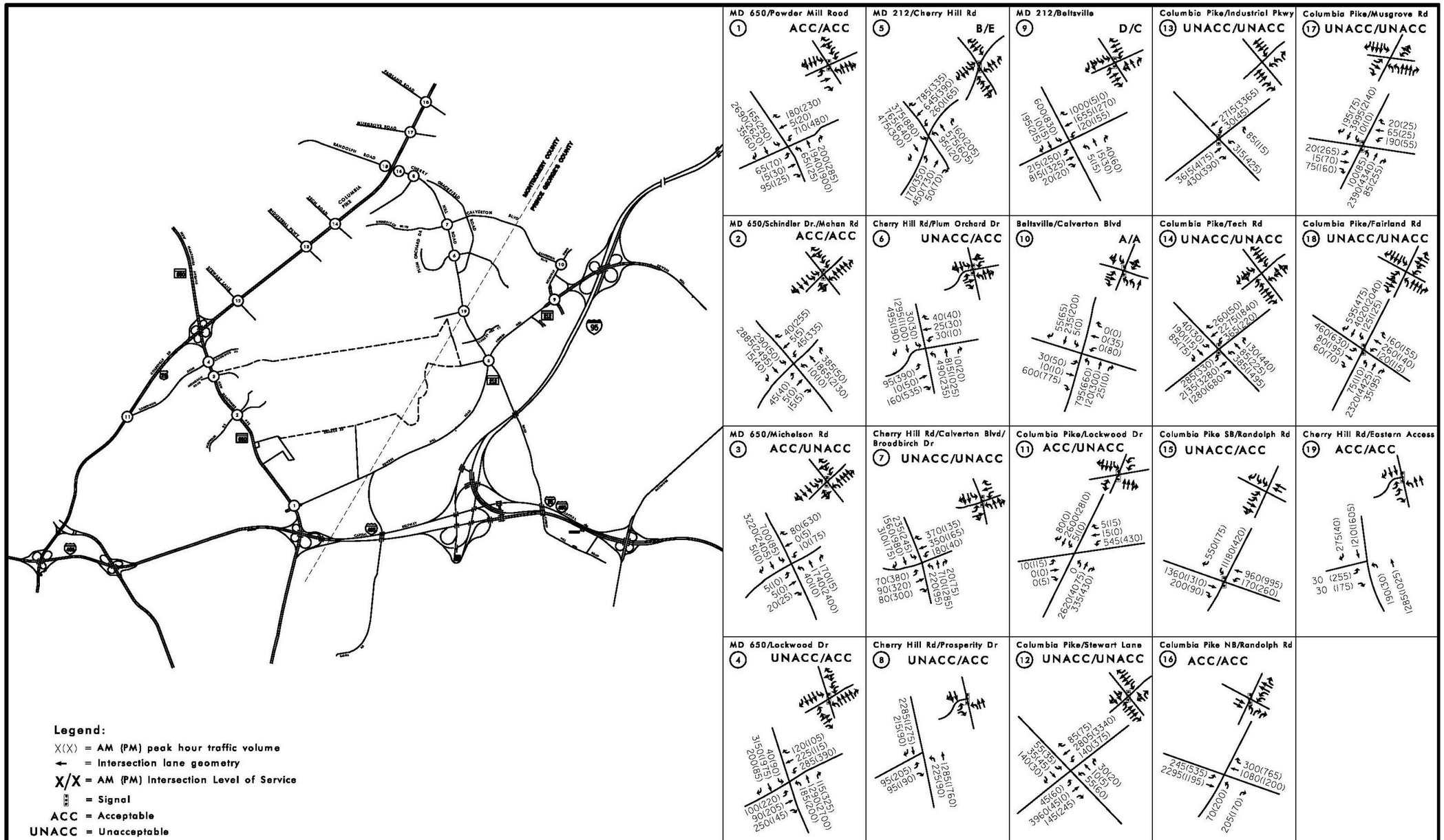


Figure 8
No Action Traffic Volumes, Lane Geometries, & LOS Results (With ICC)

ENGINEERING-PLANNING-EARTH SCIENCES-SURVEYING
GREENHORNE & O'MARA, INC.
810 GLENEAGLES COURT, SUITE 105, BALTIMORE, MARYLAND 21286
(410) 583-6700
ANNAPOLIS,MD-BALTIMORE,MD-ATLANTA,GA-TAMPA,FL-FAIRFAX,VA-WEST PALM BEACH,FL
ROCKVILLE,MD-RALEIGH,NC-FREDERICKSBURG,VA-MECHANICSBURG,PA- ST. PETERSBURG,FL

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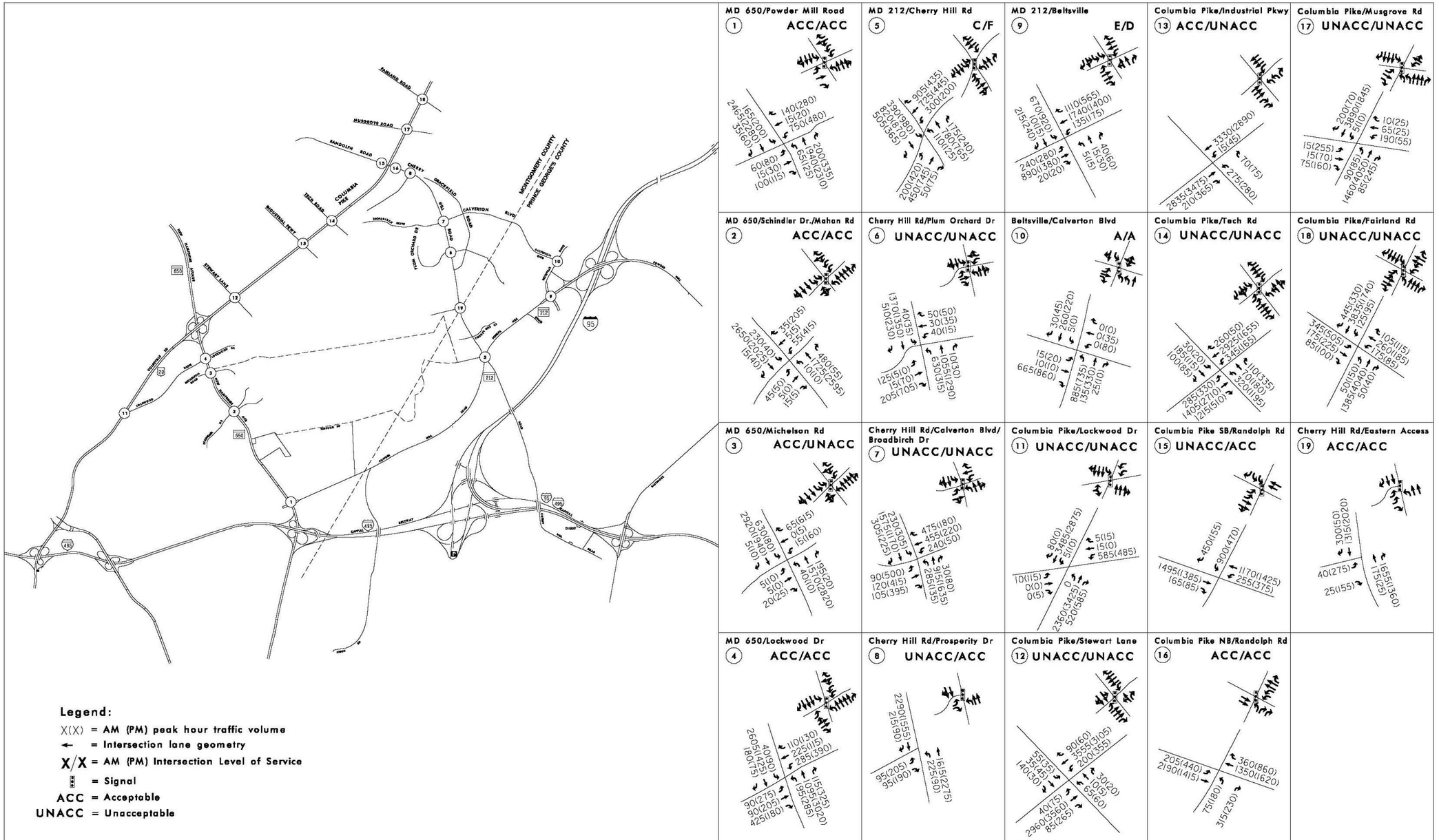


**Figure 7**
**No Action Traffic Volumes, Lane Geometries, & LOS Results (Without ICC)**

ENGINEERING–PLANNING–EARTH SCIENCES–SURVEYING
GREENHORNE & O'MARA, INC.
810 GLENEAGLES COURT, SUITE 106, BALTIMORE, MARYLAND 21286
(410) 583-6700
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ROCKVILLE,MD-RALEIGH,NC-FREDERICKSBURG,VA-MECHANICSBURG,PA- ST. PETERSBURG,FL

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