FBI HQ Consolidation

GSA

FBI Headquarters
Consolidation

Appendix F: Air Quality Evaluation Technical Documentation

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Stationary Sources

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FBI HQ Campus- Natural Gas Boiler Emissions Based on CJIS

FY2013	
CJIS Annual Fuel Consumption	
Natural Gas (cf)	77,208,000
Building size- sf	500,000
natural gas cf per sf	154

Heating Value of natural gas- MMBTU/MMscf	1020
Annual Average MMBTU	393760.8
Ave. Annual Hourly Heat Input MMBTU	44.94986
Max Hourly Heat Input (MMBTU)*	89.89973
Max Hourly MMscf	0.088137

*Actual maximum capacity is not known, assumed 2x annual average

FBI HQ Campus- sf	2,500,000
FBI HQ Campus- natural gas cf	386,040,000
Converted MMscf	386.04

Annual Boiler Emissions

	Emission Factor (lbs/MMscf)	lbs/year	Tons Per Year	Emission Factor Source
CO	84	32,427	16.2	AP 42 Table 1.4-1.
VOC	5.5	2,123	1.1	AP-42 Table 1.4-2
NOx	50	19,302	9.7	AP 42 Table 1.4-1., assume low-NOx burners
PM	7.6	2,934	1.5	AP-42 Table 1.4-2
SO2	0.6	232	0.1	AP-42 Table 1.4-2
CO2	120,000	46,324,800	23,162.4	AP-42 Table 1.4-2
N2O	0.64	247	0.1	AP-42 Table 1.4-2, assume low-NOx burners
CH4	2.3	888	0.4	AP-42 Table 1.4-2
Total CO2e			23,211.6	

Short-Term Maximum Hourly Emissions

	(lbs/MMscf)	lbs/hour	grams/second
CO	84	7.403506849	0.932825
NOX	50	4.406849315	0.555253
PM	7.6	0.669841096	0.084398

Grams/lb	453.592

Diesel Backup Generator Emissions

AP 42 3.4 Large Stationary Diesel And All Stationary Dual-fuel Engines

Annual Fuel	3,357	gallons	(from JEH fuel consumption data)	137,381	BTU/gallon
	461188017	BTU			http://www.eia.gov/Energyexplained/?page=about_energy_units
	461.18802	MMBTU			

	Emission Factor lb/MMBtu	Annual lbs	Annual tons		
CO	0.85	392.0098145	0.1960		
NOx	3.2	1475.801654	0.7379		
PM	0.1	46.1188017	0.0231		
SO2	0.001515	0.698699846	0.0003	0.0015	percent sulfur

Greenhouse Gas Emissions from Building Electricity Consumption

JEH Existing

26,195.50	CO2e metric tons
0.0004321	metric tons per kwh
60,623,236	kwh
2,400,000	sf
25.259682	Kwh/sf

FBI HQ Campus- sf

2,500,000	sf
63,149,204	kwh
27,286.98	CO2e metric tons

Dispersion Modeling Assumptions- Greenbelt, Landover, and Springfield

For the preliminary dispersion modeling with AERMOD, it was assumed one exhaust stack for the boiler system would be located on the roof of the Central Utility Plant. The following stack parameters were used:

- Stack height (above grade) - 25.19 meters (13 meters above the utility plant roof).
- Stack Inside diameter- 0.5 meter
- Temperature- 293 (degrees K)
- Exit velocity- 1.0 meters/second

AERMOD requires meteorological data to analyze how parameters such as wind speed, direction, temperature and other factors affect the dispersion of air pollution. Five years of surface meteorological data from Dulles International Airport and upper air data from Sterling VA was preprocessed with AERMET. USGS land cover data was processed with AERSURFACE for input into AERMET.

USGS digital elevation data (1/3 arc-second National Elevation Dataset) was processed using AERMAP to define the ground elevation in the modeling domain, as well as the base elevation for receptors, buildings and sources.

In urban areas, AERMOD takes into account the urban heat island effects on dispersion. The urban dispersion option was utilized for all three sites and the urban area population input was based on the 2010 population of the Washington-Arlington-Alexandria, Metropolitan Statistical Area (5,582,000).

Receptors were placed along the fence line of the proposed FBI HQ campus and a grid of 440 off-site receptors with a spacing of approximately 160 meters were placed over the area within 1,500 meters of the central utility plant. Additional receptors were placed to ensure adequate coverage of sensitive receptors, such as residential areas, that are closest to each of the sites. A receptor height of 1.8 meters was used to reflect breathing height for ground-level receptors. The focus of the screening analysis was off-site impacts, therefore receptors were not placed within the site itself. Building fresh air intakes would be located away from areas potentially affected by boiler stack emissions, as determined by further detailed analysis to be completed once a preferred site is identified and designed.

The Building Profile Input Program (BPIP) program for the PRIME model (BPIPRM) was used to account for building downwash effects for the boiler stack. Major buildings such as the main office building, parking structures and the central utility plant were digitized based on the conceptual site layouts and building heights discussed in Chapter 2. The “buildable area” for the main building was used as proxy for the actual building footprint.

For NO2 analysis, the Ambient Ratio Method (ARM) was used to address NOx to NO2 conversion.

Background concentrations for PM2.5 and NO2 were obtained from EPA's AirData portal.[1] Table 1 summarizes the monitoring stations identified as most representative for each of the three sites.

[11] http://www.epa.gov/airdata/ad_maps.html

Table 1: Background Concentrations

Project Site	Selected Monitor for PM2.5	Selected Monitor for NO2	PM2.5- 24hr (98th Percentile) (µg/m3)			PM2.5- Annual Ave. (µg/m3)			NO2- 1hr (98th Percentile) (ppb)			NO2- Annual Average (ppb)		
			2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
Greenbelt and Landover	24-033-0030 Howard University, Beltsville 3.4 miles northeast of Greenbelt, 9 miles north of Landover	Same as PM2.5	25.1	21.3	22.5	11.3	9.5	9.9	35.7	36.7	39.2	8.7	8.0	7.9
Springfield	51-059-0030 Lee Park, Telegraph Rd. 4 miles to east	51-510-0021 Alexandria City 5.6 miles northeast	21.1	21.0	18.0	8.7	8.3	8.2	65.7*	63.7	56.4	15.5*	12.5	12.3

*2012 data for incomplete year at this monitor was not used.

Mobile Sources

Consideration of PM2.5 Hot-Spots Due to Project-Related Traffic Impacts

Although not subject to transportation conformity requirements, the transportation conformity regulations were used for NEPA purposes to determine if a $PM_{2.5}$ hot-spot analysis was necessary. The transportation conformity regulations are relevant to use for this purpose because they are intended to prevent violations of the National Ambient Air Quality Standards (NAAQS) or worsening of existing violations. A transportation project that is located in a "nonattainment" or "maintenance" area for PM_{10} or $PM_{2.5}$, and meets one of the following conditions, is referred to as a "project of local air quality concern", and requires a quantitative PM hotspot analysis under transportation conformity.

1. New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles; (40 CFR 93.123(b)(1)(i))
2. Projects affecting intersections that are at level of service (LOS) D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project; (40 CFR 93.123(b)(1)(ii))
3. New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location; (40 CFR 93.123(b)(1)(iii)).
4. Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; (40 CFR 93.123(b)(1)(iv)) and
5. Projects in or affecting locations, areas, or categories of sites which are identified in the PM_{10} or $PM_{2.5}$ applicable state implementation plan, as sites of violation or possible violation. (40 CFR 93.123(b)(1)(v))

The types of projects that would require PM hot-spot analysis were further clarified through a series of examples provided in the preamble of the March 2006 Final Rule.

Some examples of projects of local air quality concern that would be covered by 40 CFR 93.123(b)(1)(i) and (ii) are:

- a project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) and 8 percent or more of such AADT is diesel truck traffic;
- new exit ramps and other highway facility improvements to connect a highway or expressway to a major freight, bus, or intermodal terminal;
- expansion of an existing highway or other facility that affects a congested intersection (operated at LOS D, E, or F) that has a significant increase in the number of diesel trucks; and,
- similar highway projects that involve a significant increase in the number of diesel transit busses and/or diesel trucks.

The following are examples of projects that are not a local air quality concern under 40 CFR 93.123(b)(1)(i) and (ii):

- any new or expanded highway project that primarily services gasoline vehicle traffic (i.e., does not involve a significant number or increase in the number of diesel vehicles), including such projects involving congested intersections operating at LOS D, E, or F;
- an intersection channelization project or interchange configuration project that involves either turn lanes or slots, or lanes or movements that are physically separated. These kinds of projects improve freeway operations by smoothing traffic flow and vehicle speeds by improving weave and merge operations, which would not be expected to create or worsen PM NAAQS violations; and,
- intersection channelization projects, traffic circles or roundabouts, intersection signalization projects at individual intersections, and interchange reconfiguration projects that are designed to improve traffic flow and vehicle speeds, and do not involve any increases in idling. Thus, they would be expected to have a neutral or positive influence on PM emissions.

The proposed FBI HQ would involve heavy truck trips daily for deliveries. The remainder of traffic generation by employee and contractor commutes would be by gasoline vehicle traffic. Therefore, the project would not cause a significant increase in diesel truck traffic. The traffic mitigation measures include intersection channelization/traffic signal timing changes that would be expected to improve traffic flow and reduce idling.

The traffic analysis data was reviewed to identify the number of percentage of heavy vehicle volumes as shown in Table 2. For the intersections with the highest number of heavy vehicles, the heavy vehicle percentage in the peak hours was 4 percent or less, and the highest peak hour heavy vehicle volume was approximately 300. Based on this information, a determination was made that none of the site alternatives would adversely affect intersections with significant heavy vehicle volumes, nor result in adverse $PM_{2.5}$ concentrations within the vicinity of congested intersections.

Table 2: Intersections with highest peak hour heavy vehicle volumes

Site	Intersection with highest heavy vehicle volume	Heavy Vehicle Approach Volume	Total Approach Volume	Total Heavy Vehicle Percent
Greenbelt	60th Ave/Cherrywood Lane and Greenbelt Road (PM peak)	110	5,484	2.01%
Landover	Brightseat Road and MD 202	299	7,517	3.98%

	(Landover Road) (AM peak)			
Springfield	Fairfax County Parkway and I-95 (N) Ramp C & D/Loisdale Road (AM peak)	241	6,035	3.99%

Qualitative Microscale Evaluation of CO

Landover

Two intersections would be at LOS F in the Landover transportation study area with incorporation of traffic mitigation: Intersection #16, Martin Luther King Jr. Highway and Ardwick Ardmore Road in the AM peak hour and Intersection #12, Landover Road and St. Joseph's Drive/McCormick Drive in the PM peak hour. These intersections would also be at LOS F under the No-Action Alternative. FHWA's categorical hotspot finding for CO was based on modelling of LOS E conditions; therefore, LOS F is outside the range (more congested) than was assumed in the finding. However, the increase in CO emissions and concentrations from LOS E to LOS F was considered in the context of the following factors:

- Approach volumes at both intersections are substantially below the maximum modeled in the categorical finding (2,640 per approach). At Intersection #16 during the AM peak hour, approach volumes are 583 to 1,628, with the highest volume being the Martin Luther King Jr. Highway southbound approach. At Intersection #12 during the PM peak hour, approach volumes are 216 to 1,350, with the highest volume being the St. Joseph's Drive southbound approach. These volumes are more than 1,000 vehicles less than were assumed in the categorical finding.

- Background concentrations are substantially below the maximum assumed in the categorical finding. The maximum allowable 1-hour concentration is 29.5 ppm, the actual 1-hour concentration for the closest active monitor (2500 1st Street, NW AQS Site ID: 11-001-0043) in 2014 is 1.7 ppm. The District monitor in this location is located closer to the Landover site than other monitors within Prince George's County. The maximum allowable 8-hour concentration is 5.1 ppm, the actual concentration in 2014 was 1.5 ppm.

Springfield

All signalized intersections would operate at LOS D or better after taking into account traffic mitigation measures except for Intersection #21, Franconia- Springfield Parkway/Manchester

Boulevard and Beulah Street, which would operate at LOS E in the AM peak hour and LOS F in the PM peak hour. FHWA's categorical hotspot finding for CO was based on modelling of LOS E conditions; therefore, LOS F is outside the range (more congested) than was assumed in the finding. However, the increase in CO emissions and concentrations from LOS E to LOS F was considered in the context of the following factors:

- Approach volumes at both intersections are below the maximum modeled in the categorical finding (2,640 per approach). At Intersection #21 in the PM peak hour, approach volumes are 1,200 to 2,519, with the highest volume being the Franconia-Springfield Parkway eastbound approach. The Franconia-Springfield Parkway approach would operate at LOS E; the LOS F conditions would be on the lower volume Beulah Street northbound and southbound approaches. For three out of the four approaches, volumes are more than 1,000 vehicles less than were assumed in the categorical finding and the highest volume approach is also below 2,640.

- Background concentrations are substantially below the maximum assumed in the categorical finding. The maximum allowable 1-hour concentration is 1.7 ppm, the actual 1-hour concentration for the closest active monitor (3200 Colvin Street, Alexandria. AQS Site ID: 51-510-0021) in 2014 was 1.5 ppm. The maximum allowable 8-hour concentration is 5.1 ppm, the actual concentration in 2014 was 1.5 ppm.

MOVES2014 Modeling Methodology

The methodology used to determine an overall CO2e emission factor for the employee commute greenhouse gas emissions analysis is provided below.

Model Version

MOVES2014-20141021

Scale

Project-level, emission rates

Analysis Year

The analysis year of 2025 was selected to correspond to the closest year to the FBI HQ opening year that regional MOVES modeling inputs were available from MWCOG.

Time Period

The 7:00 AM hour in January was used a conservative assumption given that emissions are generally higher at cold temperatures.

Geographic Bounds

Separate runs were conducted for the District of Columbia, Prince George's County Maryland and Fairfax County, Virginia. An average of these three emission factors was used for all three sites to represent generic regional travel emissions rates.

Vehicles/Equipment

It was assumed employee commutes utilized passenger cars only and all of the available fuel types were selected for passenger cars (gasoline, diesel, electricity and E-85).

Road Type

The urban unrestricted access road type was selected (e.g. arterial with intersections). This is a conservative assumption because travel on urban unrestricted access (e.g. freeways) would account for a large portion of many commutes and would generally have a lower emission rate per vehicle-mile due to a smoother traffic flow.

Pollutants and Processes

CO2e and the necessary prerequisites to CO2e were selected.

General Output

Mass units were set to grams; energy units was set to joules; and distance units was set to miles.

Meteorological Inputs

Temperature and humidity data for January were obtained from MWCOG's regional MOVES modeling input data for each county.

Age Distribution

The age distribution was obtained from MWCOG's regional MOVES modeling input data for each county.

Fuel Parameters

Fuel supply/formulation input utilized the MOVES database default data for each county.

I/M Programs

I/M program input was obtained from MWCOG's regional MOVES modeling input data for each county.

Link-Level Inputs

A single link was included since the objective was to determine a generic emission factor rate. The link had an average speed of 35 mph and 100% of the volume consisted of passenger vehicles.

Greenhouse Gas Emissions from Employee Commutes (2025)

	Springfield	Landover	Greenbelt	JEH- No Action	Off-Site No Action
Total one-way VMT based on existing FBI employees	217,387	266,147	297,467	196,681	
Total one-way VMT average per employee	23.0282839	28.19353814	31.51133475	20.83485169	25.89200212
Total Future Employees (FBI plus 450 no-seat contractors)	11,505	11,505	11,505	5,045	6,460
Percent Driving Alone	0.3058	0.633	0.2967	0.135	0.342625
Number of Employees Driving Alone	3518.229	7282.665	3413.5335	681.075	2213.3575
Percent Carpool	0.11	0.1	0.11	0.085	0.10125
Number of Employees Using Carpool	1265.55	1150.5	1265.55	428.825	654.075
Number of Carpool Trips (One way, 3 people/vehicle)	421.85	383.5	421.85	142.9416667	218.025
Total VMT per Work Day (roundtrip)	181,467	432,273	241,716	34,337	125,907
Annual VMT (250 days)	45,366,629	108,068,158	60,429,027	8,584,133	31,476,680
Change from No Action	**5,305,816**	**68,007,345**	**20,368,214**		
				No Action Total	**40,060,813**
Annual CO2e- Metric Tons	11,541.0	27,491.8	15,372.7		10,191.2
CO2e Change from JEH No Action	1,349.8	17,300.6	5,181.5		
Percent Change	13.24%	169.76%	50.84%		

254.393 CO2e emission factor (grams/vehicle-mile)

Mobile Source Greenhouse Gas Emission Factor (2025, Jan, 7am)

County	2025 CO2E emission factor (grams/veh-mile)
DC	256.164
PG	259.631
FFX	247.384
Ave	**254.393**

Mileage Totals (one-way, per day)

Springfield	Landover	Greenbelt	JEH
217,387	266,147	297,467	196,681

* Assumes every employee drives, no alternative modes, no absence allowances
* Miles represent ONE-WAY trips
* There was no zipcode-mileage data available for 7% of employees. Those employees were added back with a weighted distribution amongst the zip codes for which we did have mileage data.

Travel Distances by Zip Code Used In VMT Calculation

ZIP	TAZ	Greenbelt	JEH	Landover	Springfield
20737	993	4.3	8.6	6.5	25.4
20742	916	3.6	9.1	8.6	22.8
20740	914	2.2	10.2	9.8	24
20722	958	7.3	6	6	19.7
20781	1030	7.1	7	5.8	22.7
20784	1010	9.1	9.3	3.8	24.3
20746	844	19.2	7.3	8.1	17.8
20747	1077	15.8	9.7	6.5	22
22742	3644	84.8	63.4	76.1	50.7
20708	1193	8	18.6	12.8	37.3
20771	1183	4.4	14.4	7.2	31.7
20769	1138	8.1	15.5	6.2	32.3
20720	1148	9.4	15.7	6.4	32.5
20721	1105	14.2	14.3	5.3	27.8
20744	772	29.2	15.9	20.5	17.3
20748	821	22.1	9.5	13.4	15.6
22207	1447	24.8	7.2	17.2	16.6
25442	3666	74.5	73	81.3	67.2
25438	3665	74.4	72.8	81.1	62.1
20735	1366	23.2	14.9	14.5	22
20762	1342	17.9	12.6	9.2	20.1
20623	1325	25.6	18.2	16.9	25.3
20608	1294	39.6	30.8	30.9	37.9
20613	1299	31.4	23.1	22.7	30.2
20745	791	23.5	7.2	14.8	12.4
20774	1248	13.8	12.9	5.3	23.6
20785	1016	11.8	9.1	2.4	23.9
20743	1064	14.4	7.7	4.8	21.1
20628	3400	81	72.7	72.3	78.5
20616	3140	43.4	30.2	34.7	31.6
20646	3147	42.8	29.6	34.1	31
20658	3129	45.9	32.6	37.2	34
20662	3117	56.9	43.6	48.2	45
20693	3121	53.1	39.8	44.4	41.2
20617	3212	41.3	33	32.6	38.9
20637	3207	43.2	34.9	34.5	40.7
20622	3218	48.1	39.8	39.4	45.7
20611	3228	47.5	40	38.8	41.4
20632	3227	49.5	42	40.8	43.4
20680	3399	81.4	73.1	72.8	79
20684	3398	80.9	72.6	72.2	78.4
21140	3112	21.4	23.5	14.2	40.2
20650	3409	67.4	59.1	58.7	65
20609	3342	62.5	54.2	53.8	60
20618	3335	63.7	55.4	55	61.2
20606	3336	65.9	57.6	57.3	63.5

20624	3344	55.6	47.3	47	53.2
20621	3346	56.8	48.5	48.1	54.4
20653	3396	75.5	67.2	66.8	73
20667	3390	72.5	64.2	63.8	70
21225	3078	26	36.7	30.9	55.4
20620	3383	68.8	60.5	60.1	66.4
21090	3030	22.3	33	27.2	51.7
21240	3036	22.1	32.8	27	51.5
22209	1475	15.2	3	12.9	12.7
21032	3054	32	34.1	24.8	50.8
21076	3028	19.2	29.9	24.1	48.6
21077	3028	19.2	29.9	24.1	48.6
21060	3074	27.7	43.9	34.6	60.6
20701	3025	14.3	24.9	19.1	43.6
21061	3037	23.7	40.8	31.5	57.5
21144	3038	22	39	29.8	55.7
21108	3056	24.8	37	27.8	53.7
21146	3059	28.2	40.5	31.2	57.2
20619	3382	66.2	57.9	57.5	63.7
20634	3391	72.7	64.4	64	70.3
20692	3403	75	66.7	66.3	72.5
20630	3402	76.3	68	67.6	73.9
20690	3404	76.5	68.2	67.8	74
21037	3098	28.8	30.9	21.6	41.8
21056	3083	34	50.5	41.2	67.2
20724	3024	12.3	23	17.2	41.7
20656	3343	57.7	49.4	49	55.3
20710	1028	6	6.8	4.6	23.5
21113	3050	18	26.1	16.8	42.8
20782	971	6.4	6.8	7.8	20.6
21114	3019	15.5	23.6	14.4	40.3
21054	3052	18.4	27.3	18.1	44
20659	3345	53.2	44.9	44.5	50.7
20636	3374	61.9	53.7	53.3	59.5
21012	3085	34.3	36.5	27.2	53.2
20706	1134	7.7	13.8	3.7	29.7
20778	3109	30.5	29.3	23.4	38.5
21402	3088	31.3	33.4	24.2	50.2
21409	3088	31.3	33.4	24.2	50.2
25414	3672	79.2	77.6	86	68.3
21158	3245	57.2	59.3	64	86.2
21797	2957	34.6	36.8	41.4	51.3
21102	3248	61.9	64	68.7	79.4
21074	3250	57.8	59.9	64.5	75.2
21157	3255	48.1	50.2	54.9	71.1
21048	3264	48.6	51.8	55.4	73.1
20763	3005	10.8	23.7	17.9	42.4

22204	1528	17.8	5.4	15.9	9.7
20783	919	4.8	8.8	14.5	22.6
20770	900	2	11.8	8.2	32.7
20705	889	4.3	15.3	11.6	36.1
20707	866	10.7	17.7	17.5	42
22201	1480	16.5	4.2	14.2	12.2
20712	953	7.7	5.7	7.5	19.5
20716	1219	17.9	20	10.8	36.8
20715	1160	12.9	19.2	9.9	36
22205	1431	19.6	7.3	17.3	11.4
22611	3656	85.4	65.1	92.1	64.6
22203	1410	18.6	6.4	16.3	9.8
21723	2960	32.8	30.8	39.6	45.3
21784	3270	39.1	42.2	45.8	56.3
21794	2961	31.4	34.6	38.2	47.9
21737	2952	26.9	29.1	33.7	43.5
21738	2952	26.9	29.1	33.7	43.5
20751	3106	31	29.2	22.1	38.4
21042	2980	26.9	30.1	33.7	47.1
22620	3655	85.2	71.2	81.2	69.7
21043	2968	26	33	32.8	57.3
20759	3015	19.4	23.2	26.2	40.6
21036	2953	29	32.1	35.7	45.6
21029	2951	27.7	30.9	34.5	45.5
21044	2982	21.5	24.7	28.3	37.7
21045	2986	20.3	27.3	27.1	51.6
21075	2999	21.9	28.8	25.1	49.6
21046	3012	19.8	22.9	26.6	36
20723	3011	15.2	22.2	22	46.5
20794	3004	13.7	25.8	20.1	44.6
20776	3114	26.2	24.3	16	37.8
20733	3107	32.9	31.2	24.1	40.3
20764	3107	32.9	31.2	24.1	40.3
20758	3105	31.3	29.5	22.4	38.7
20779	3105	31.3	29.5	22.4	38.7
21403	3099	30.1	32.2	23	49
20711	3116	24.7	23	15.9	32.2
20777	3017	22.1	24.1	28.9	40.5
21035	3113	22.2	24.3	15	35.7
20772	1268	22	18	13.3	27.1
22663	3654	84.3	70.3	80.3	68.8
20130	3661	80.6	66.7	76.7	65.2
20180	2248	55.7	52.1	62.5	47.7
22712	3646	67.8	53.9	71.6	46.2
20111	2643	46.2	32.2	45.4	21.1
21122	3079	32.4	48.8	39.6	65.6
21104	2965	34.2	37.4	41	52

20625	3220	60.1	52.6	51.4	54
20664	3220	60.1	52.6	51.4	54
20754	3302	28.9	27.1	20	36.3
20736	3311	33.4	31.7	24.5	40.8
20714	3321	35.1	33.3	26.2	42.5
20689	3310	35.7	33.9	26.8	43.1
20732	3310	35.7	33.9	26.8	43.1
20639	3315	39.2	37.5	30.4	46.7
20678	3291	45.8	44	36.9	51.1
20676	3333	48.6	46.9	39.8	56.1
20615	3334	52.5	50.8	43.7	60
20685	3326	54.2	52.4	45.3	61.6
20657	3327	57.9	56.2	49.1	65.4
20629	3325	62	60.2	53.1	66.2
20688	3325	62	60.2	53.1	66.2
20675	3148	42	28.8	33.4	30.2
20695	3170	37.1	32.2	28.4	33.6
22202	1501	16.3	4	14.5	11.8
22134	2816	59.1	37.8	50.4	25
20143	2518	52.3	38.4	48.4	36.9
22026	2808	54.5	33.1	45.8	20.4
22193	2738	50	28.6	41.3	15.9
20181	2444	52.5	38.3	51	25.6
20112	2698	56	34.6	47.3	21.9
22192	2671	47.9	26.5	39.2	13.7
20110	2628	49.4	35.5	46.5	22.2
20136	2570	50.8	36.8	46.8	35.3
20109	2541	45.9	31.9	41.9	30.4
20155	2498	49.9	36	46	34.5
20169	2476	55.8	41.9	51.9	40.4
20677	3124	47.3	34	38.6	35.4
20135	2161	69.1	70.2	80.2	68.7
20016	94	16.9	5.2	15.2	16.6
25443	3668	78.5	77	85.3	71.9
20176	2240	55	43.8	61.7	43.3
20115	3615	66.6	52.7	62.7	51.2
22639	3606	78.5	64.6	74.6	63.1
22643	3606	78.5	64.6	74.6	63.1
20137	3629	56.8	42.9	52.8	41.4
25430	3664	78	76.4	84.7	65.8
20187	3632	60.9	46.9	56.9	45.4
20012	118	11.4	6	12.9	18.7
20198	3625	59.3	45.3	55.3	43.8
20010	160	10.7	3	11.8	16.1
20009	178	11.8	2.2	11.2	14.7
20002	274	10.2	2.7	8.1	16.2
20020	351	15.5	5	8.5	17.9

22556	3468	60.6	39.2	51.9	26.4
22406	3456	74.8	53.5	66.2	40.7
22554	3491	64.5	43.1	55.8	30.4
22407	3549	77.7	56.3	69	43.6
22408	3583	82.2	60.8	73.5	48.1
22485	3420	64.8	57.4	56.1	59.5
22553	3556	86.1	64.8	77.4	52
22405	3518	73.4	52	64.7	39.3
22401	3438	75	53.7	66.3	40.9
22448	3423	58.9	51.4	50.2	64.4
20184	2164	78.5	64.5	74.5	63
20152	2392	42.1	28.2	38.2	22.5
20052	58	13.2	1.6	11.5	13
20166	2388	39.4	28.1	38.1	27.4
20006	33	13.2	1.2	11.2	13.2
20005	27	12.1	0.8	10.4	14.4
20036	43	12.3	1.5	11	14.1
20910	603	10.3	8.3	17.1	21.1
20902	565	10.7	11.9	17.5	29.2
20861	580	15.4	19.2	22.2	36.4
20868	580	15.4	19.2	22.2	36.4
20906	540	14.5	15.1	21.3	31
20879	510	22.8	26.8	29.6	34.3
20832	504	18.5	20.6	25.3	35
20882	493	25.8	29.4	32.6	37
20872	443	31.6	35.3	38.4	42.8
20877	513	24.8	23.2	31.5	30.8
20037	60	13.8	2	12.2	13
20817	656	17.6	12.3	24.4	19.8
20860	499	17.4	20.1	24.2	35.3
20839	440	36.1	31.6	42.9	39.2
20842	441	39.9	35.4	46.7	42.9
20837	395	32.5	26.3	39.2	33.8
20903	610	6.5	9.2	13.3	23
20818	648	19.1	10.4	25.9	18.7
20812	647	21.1	8.5	18.3	20.1
20816	647	21.1	8.5	18.3	20.1
20912	617	9.2	7	10.4	20.8
20833	500	20.1	23.8	26.8	37.8
20862	500	20.1	23.8	26.8	37.8
22734	3645	74.6	60.6	82.2	56.7
20119	3640	60.3	46.3	59.6	37.6
22728	3639	64	50	63.3	41.3
20186	3652	66	52.1	62.1	50.6
20001	191	11.2	1.5	9.9	15.2
20004	15	12.6	0.6	10.3	13.4
20057	66	14.2	3.6	13.3	14.6

20007	88	17.6	4.5	14.1	15.2
20008	149	15.4	3.7	13.5	15.8
20059	169	10.7	2	10.7	15.8
20064	226	9.1	4	9.4	17.8
20003	297	11.7	2.7	9.1	15.3
20374	364	15	3.3	9.4	15.1
20024	387	14.8	2.6	12.9	13.7
20319	388	17.1	2.5	11.5	14.3
20015	108	12.7	6.8	14.2	18.8
20011	131	11.9	4	11.6	17.8
20017	227	8.7	4.2	9.5	18
20018	235	8.5	4.4	7.8	18.2
20158	2227	54	43.6	53.6	43.1
20019	326	12.2	4.9	6.1	19.8
20032	390	18	5.4	12	15.6
20132	2215	62.7	47.2	57.2	46.7
20105	2404	49.6	35.7	45.7	34.2
20197	2219	59.6	46.4	66.4	45.9
20129	2238	51.6	41.2	51.2	40.7
20175	2426	50.3	39.7	49.7	34.1
20147	2340	40.9	30.5	40.5	32.6
20148	2307	45	33.1	43.1	33
20141	2187	60	49.6	59.6	49.1
20117	2433	59.5	45.6	55.6	39.9
20164	2369	35.2	24.8	34.8	24.3
20165	2354	37.1	26.7	36.7	26.2
22720	3643	84.3	63	75.7	50.2
20607	1392	31.3	18.1	22.6	19.5
25425	3673	75.2	73.7	82	58.2
25446	3663	78.7	77.2	85.5	70.7
21787	3235	72.4	70.8	79.1	78.4
22191	2772	46.4	25.1	37.7	12.3
22172	2721	56.9	35.6	48.3	22.8
22025	2721	56.9	35.6	48.3	22.8
22211	1487	15.3	3	13	11.4
22213	1439	26.9	9.1	19.1	14.1
20601	3174	35	26.7	26.3	32.9
20603	3192	34.7	26.1	26.1	27.5
21773	2847	63.3	61.8	70.1	69.3
21702	2844	54.3	52.8	61.1	60.3
21703	2940	51.3	49.8	58.1	57.3
21754	2903	39.4	37.9	46.2	45.4
21793	2879	56.3	54.7	63	62.3
21771	2895	38.8	47.2	45.6	54.8
21770	2905	36.8	41.4	43.5	48.9
21769	2823	57.5	56	64.3	63.5
21701	2918	51.9	50.3	58.6	57.9

21780	2850	71.4	69.9	78.2	77.4
21755	2941	54.1	52.6	60.9	60.1
21757	2864	61.6	60.1	68.4	67.6
21798	2875	57.1	55.5	63.8	63.1
21774	2883	48	46.4	54.8	54
20852	685	16.1	13.1	22.9	24.4
20602	3173	35.9	27.6	27.2	33.4
21704	2911	41.4	39.9	48.2	47.4
21788	2853	62.3	60.7	69.1	68.3
21727	2866	64.9	63.4	71.7	70.9
21778	2866	64.9	63.4	71.7	70.9
22046	1920	27.5	9.8	19.8	13
22067	1885	22.6	14.2	24.2	16.6
22101	1880	25	9.3	19.3	16
22180	1823	27.6	16.2	26.2	14.7
22027	1857	26	12.6	22.6	11.4
22102	1888	24.5	14.1	24.1	15.3
22066	1712	28.7	19.3	29.3	21.1
20041	1677	41.9	28	38	22.3
20170	1736	35.3	24.9	34.9	24.4
20190	1732	31.8	21.4	31.4	20.9
20120	1700	41.7	27.8	37.7	26.3
20171	1760	36.1	26.4	36.4	20.7
20192	1743	33.7	22.4	32.4	22.3
22033	1665	36.4	22.4	32.4	16.8
22124	1782	31.5	20.2	30.2	18.7
22181	1778	28.9	17.9	27.9	16.4
22041	1908	20.7	8.4	18.9	8.3
22042	1961	29.7	12	22	8.7
22031	1976	30.6	17	32.2	9.5
20191	1768	32.8	23	33	21.5
22312	2003	22.8	10.4	25.4	5.5
20194	1733	31.7	21.3	31.3	20.8
20151	1682	41.9	27.9	37.9	26.4
20121	1612	42.2	28.3	42.5	20.2
22044	1947	29.8	9.2	19.1	9.2
22003	1982	31.4	14	28.6	5.9
22303	2060	28.6	10.1	19.9	6.7
22306	2075	30.8	12.8	22.1	8
22150	2022	34.6	13.2	25.9	2
22309	2079	33.2	18.2	24.5	8.8
22307	2067	29.5	10.5	20.8	11.2
22151	1989	35.8	12.7	27.1	4.1
22079	2091	44.6	23.3	36	10.5
22060	2089	39.9	20.9	31.3	8.2
22015	2142	35.9	18.8	31.8	8.4
22032	2145	35.4	18.7	31.6	8.9

20124	1617	41.7	27.8	40.5	16.2
22310	2048	30.2	11.7	21.5	5.5
22153	2126	38.3	16.9	29.6	5.6
22030	1635	34.9	20.9	34.2	11.5
22039	2156	42.6	21.2	33.9	9.9
22152	2137	37.7	16.1	29.1	5.1
22043	1924	26.1	11.5	21.5	12.3
22308	2069	33.2	14.1	24.5	11.4
22315	2038	33.7	12.9	25	3.5
22182	1829	28.4	20	29.9	16.3
21401	3092	28.7	30.9	21.6	47.6
20670	3376	70.9	62.6	62.2	68.4
20755	3021	13.9	24.6	18.8	43.3
20144	3607	74.9	60.9	70.9	59.4
21776	3231	48.8	51	55.6	68.6
21791	2874	58.3	56.7	65.1	64.3
20838	437	36.9	35.3	43.6	42.9
21710	2945	46.4	44.8	53.1	52.4
21777	2947	45.4	41.8	52.2	49.3
21790	2947	45.4	41.8	52.2	49.3
21718	2822	60.4	58.9	67.2	66.4
21758	2822	60.4	58.9	67.2	66.4
21716	2820	59	57.4	65.7	65
20876	473	29.5	28	36.3	35.5
20841	434	32.6	31.1	39.4	38.6
20886	485	26.5	25	33.3	32.5
20878	758	25.5	23.4	32.2	30.9
20855	525	20.4	20.6	27.2	33.6
20850	725	21.2	19.6	27.9	27.2
20871	444	34.4	32.9	41.2	40.4
20874	419	29	27.4	35.7	35
20854	765	22.2	16	28.9	23.5
20895	679	13.3	10.5	20.1	24.4
20896	676	13.6	11.7	20.4	25.1
20815	636	13.6	7.5	20.4	22.4
20814	664	13.8	9.2	20.6	23.2
20904	573	9.6	13.4	16.4	26.4
20901	595	7.9	10.2	14.6	22.7
20866	585	10.9	16	17.7	29.1
20905	581	12.1	16.7	18.8	35.5
22305	1585	18.8	6.4	20.8	10
22304	1550	31	9	22.3	5.5
22301	1582	28.4	7.4	19.7	9.8
22206	1516	19.1	6.7	17.2	7.7
22311	1563	20.5	8.1	18.6	7.2
22314	1604	27.2	7.6	18.5	9.7
22302	1569	19.2	6.9	21.4	8.4

20853	533	16.6	16.7	23.4	29.6
20851	544	15.9	15.7	22.7	27.4

Construction Emissions

Construction Emissions Methodology

Construction activities would result in emissions of criteria pollutants through vehicle exhaust and fugitive dust over the approximately four- year construction period. Given that detailed construction methods and staging plans are not currently available, it is not possible to conduct a detailed construction emissions analysis specific to the proposed project. Instead, the overall order of magnitude of construction emissions that are likely to occur can be understood based on a review of the emissions analyses conducted for other projects of a similar scale and scope. After reviewing multiple potentially comparable projects, the selected comparison project for the purpose of direct construction equipment emissions is the U.S. Department of State's Foreign Affairs Security Training Center (FASTC) at Nottoway County, Virginia. The FASTC project as originally proposed involved 2.5 million GSF of building space, 1,070 staff and 8-10K trainees annually.1 The total building space to be constructed by the original FASTC project is the same as the total building space for the FBI Headquarters (approximately 2.5 million GSF). The FASTC EIS construction emissions methodologies included the NONROAD2008 model, MOVES2010, and AP-42.2 A detailed list of assumptions is provided in the FASTC air quality technical report.

The FASTC project was analyzed based on a seven year construction schedule (2014 through 2020). The total emissions from the 7 years of construction assumed for the FASTC project were be summed and divided by the four years of construction (2018 through 2022) proposed for the FBI Headquarters project to determine average annual emissions from construction equipment.

With respect to fugitive dust emissions, the FASTC project was not considered comparable because it involved the disturbance of over 1,100 acres, compared to less than 100 acres for any of the FBI Headquarters alternatives. Dust emissions are proportional to the surface area of soil exposed, therefore, the use of the FASTC emissions of dust for the FBI project would result in an unrealistically high level of impact. Therefore, a separate construction dust emissions analysis was completed for each of the sites.

Section 13.2.3 of AP-42 provides a conservative total suspended particulate (TSP) emission factor for heavy construction of 1.2 tons/acre/month or alternative methods addressing each component of the construction process separately (e.g. land clearing, bulldozing, scraping etc.).i The overall emission factor was used as the basis for estimating fugitive dust emissions because the currently available information on the construction process would not meet the data needs of the alternative methods.

[1] http://www.state.gov/recovery/fastc/z/
The project scope was eventually reduced, but the air quality analysis was prepared based on the initial (larger) project scope.
[22] http://www.state.gov/documents/organization/241089.pdf

The TSP emission factor was converted to a PM10 emission factor assuming 50% of the TSP consists of PM10 per AP-42 Section 13.2.5.3. PM2.5 was assumed to consist of 10% of PM10 dust.ii As construction is completed in each portion of the project site, stabilization measures will be implemented to control both dust and erosion/stormwater. The analysis conservatively assumed approximately 40% of each site would consist of uncovered/open soil at any given time. A 50% reduction in emissions was credited for commitment to dust control measures (e.g. watering during dry weather, covering trucks etc.).

Table 3

Construction Emissions- Greenbelt

	VOC (tons)	CO (tons)	NOx (tons)	SO2 (tons)	PM10 (tons)	PM2.5 (tons)
Total Construction Equipment Emissions (from FASTC EIS)	16.1	261.0	213.8	4.6	11.5	11.0
Annual Average Construction Equipment Emissions (over four years)	4.0	65.2	53.4	1.2	2.9	2.8
Annual Average Fugitive Dust emissions	--	--	--	--	47.5	4.8
Total Construction Emissions per year	4.0	65.2	53.4	1.2	50.4	7.6
General Conformity de minimis threshold (per year)	50	100	100	100	100	100

Table 4

Construction Emissions- Landover

	VOC (tons)	CO (tons)	NOx (tons)	SO2 (tons)	PM10 (tons)	PM2.5 (tons)
Total Construction Equipment Emissions (from FASTC EIS)	16.1	261.0	213.8	4.6	11.5	11.0
Annual Average Construction Equipment Emissions (over four years)	4.0	65.2	53.4	1.2	2.9	2.8
Annual Average Fugitive Dust emissions	--	--	--	--	115.2	11.5
Total Construction Emissions per year	4.0	65.2	53.4	1.2	118.1	14.3
General Conformity de minimis threshold (per year)	50	100	100	100	100	100

Table 5

Construction Emissions- Springfield

	VOC (tons)	CO (tons)	NOx (tons)	SO2 (tons)	PM10 (tons)	PM2.5 (tons)
Total Construction Equipment Emissions (from FASTC EIS)	16.1	261.0	213.8	4.6	11.5	11.0
Annual Average Construction Equipment Emissions (over four years)	4.0	65.2	53.4	1.2	2.9	2.8
Annual Average Fugitive Dust emissions	--	--	--	--	83.5	8.4
Total Construction Emissions per year	4.0	65.2	53.4	1.2	86.4	11.1
General Conformity de minimis threshold (per year)	50	100	100	100	100	100

[i] http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-3.pdf
[ii] http://www.epa.gov/ttnchie1/conference/ei14/session5/pace.pdf

Construction Emissions Calculations												
FASTC Construction Emissions					Total (Equipment + Fugitive Dust)			FASTC Fugitive Dust			FASTC Equipment -Only	
	VOC	CO	NOx	SO2	PM10	PM2.5		PM10	PM2.5		PM10	PM2.5
2014	2.93	36.34	35	0.77	148.11	16.53		146.1	14.61		2.01	1.92
2015	2.91	34.71	34.85	0.77	148.12	16.54		146.1	14.61		2.02	1.93
2016	3.49	54.44	44.82	0.97	153.83	17.5		151.4	15.14		2.43	2.36
2017	4.16	69.29	55.79	1.21	182.36	20.76		179.4	17.94		2.96	2.82
2018	1.27	35.44	21.01	0.44	34.25	4.29		33.3	3.33		0.95	0.96
2019	0.69	15.61	11.15	0.24	28.55	3.33		28	2.8		0.55	0.53
2020	0.69	15.12	11.13	0.24	28.54	3.32		28	2.8		0.54	0.52
Total	16.1	261.0	213.8	4.6	723.76	82.27					11.5	11.0
FBI Construction Emissions per year*												
	4.0	**65.2**	**53.4**	**1.2**							**2.9**	**2.8**
* Assuming four years of construction									**PM10 and PM2.5 Total for FBI HQ Construction**			
									Dust Greenbelt		47.5	4.8
									Greenbelt total		50.4	7.6
									Dust Landover		115.2	11.5
									Landover total		118.1	14.3
									Dust Springfield		83.5	8.4
									Springfield total		86.4	11.1

Fugitive Dust from Construction

From AP-42, Section 13.2.3 Heavy Construction Operations:
For construction activity operations:

TSP emissions= 1.2 tons/acre/month of activity
PM10 fraction- 0.5

PM10 Emission Factor 0.6 tons/acre/month

Uncontrolled PM10 7.2 tons/acre/year

	Greenbelt	Landover	Springfield
acres	33.0	80	58
40% uncovered at one time	13.2	32.0	23.2
Uncontrolled PM10 tons/year	95.0	230.4	167.0
Controlled PM10 tons/year	47.5	115.2	83.5
Controlled PM2.5	4.8	11.5	8.4