

# BASE YEAR 2017 EMISSIONS INVENTORY - 2015 OZONE STANDARD & COVID-19 IMPACT ON AIR QUALITY

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# Base Year 2017 Emissions Inventory - 2015 Ozone Standard

- Current ozone standard was published in 2015 – 70 parts per billion (ppb)
- Washington region - Nonattainment Area for 2015 ozone standard (70 ppb)
- Levels of nonattainment depend on ozone levels
  - Marginal, Moderate, Serious, Extreme
- Washington region - **Marginal** Ozone Nonattainment Area
- **Attainment deadline – August 3, 2021** (Attainment to be based on 2018-2020 data)
- Requirements for Marginal Ozone NAA - Submission of a comprehensive Base Year emissions inventory to EPA by August 3, 2020
- Base Year selected in coordination with EPA – 2017

# Ground-level Ozone Health & Environmental Effects

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- Difficulty breathing, shortness of breath
- Aggravates coughing and/or chest pain
- Can trigger asthma attacks
- Respiratory infection
- Repeated exposure can result in chronic damage to the lungs
- Sensitive populations: children, older adults, people with asthma, and people who are active outdoors, especially outdoor workers
- Environmental Effects
  - Damage to crops, forests, and vegetation
  - Damage to building materials, rubber, and paint

# Ozone Monitor Map

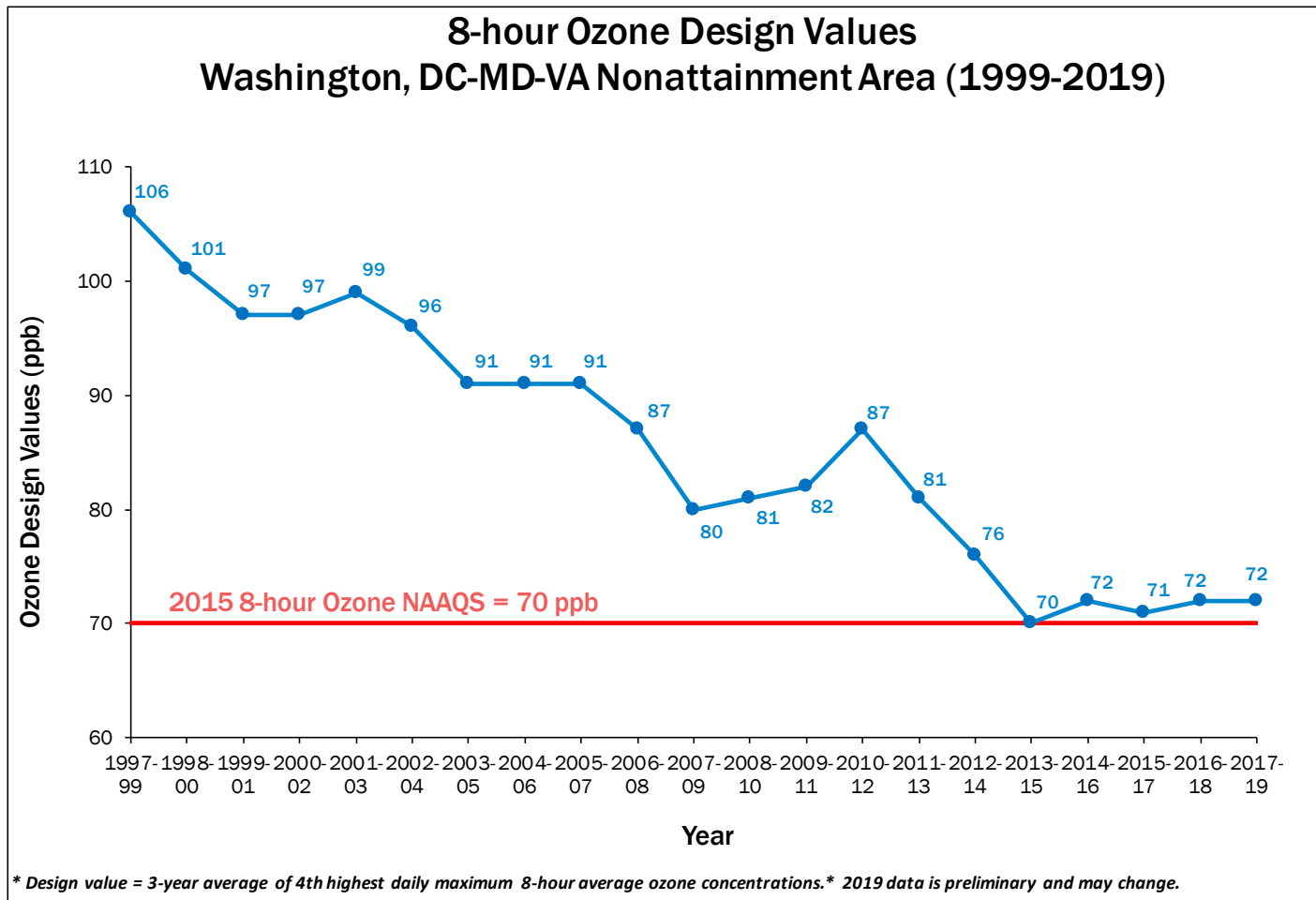
## Metropolitan Washington Ozone Monitors

Washington, DC, MD, VA



Note: State air agencies in the District of Columbia, Maryland, and Virginia monitor and provide air pollutant data for the Washington region. EPA also operates a monitor in Beltsville, MD.

# Ozone Design Value Trend



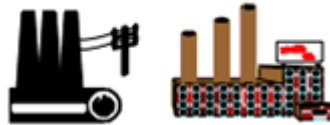
\* 2019 data is draft.



# Overview - BY 2017 Emissions Inventory

- Emission Sources

- Point



- Area



- Nonroad



- On-Road



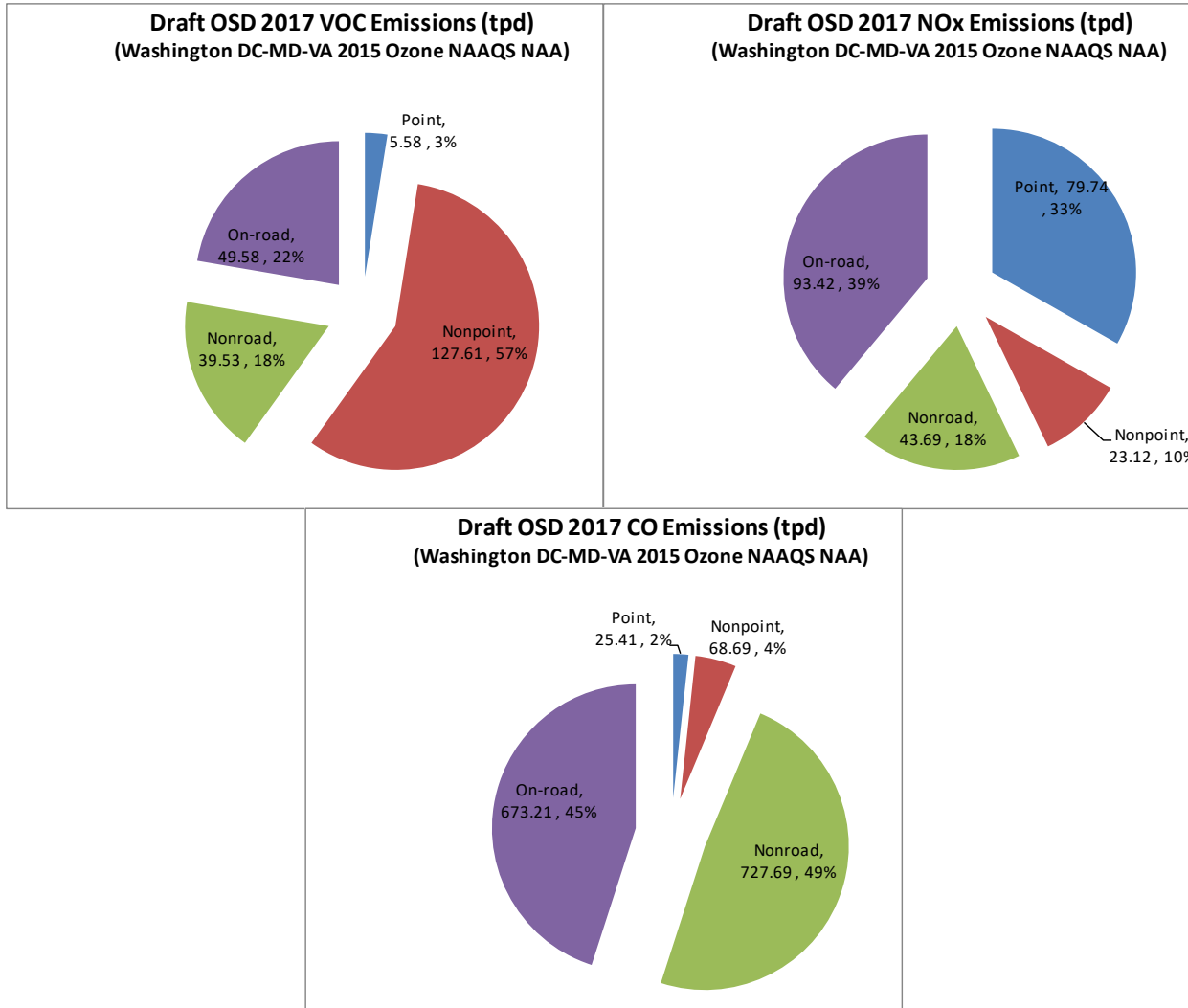
# Emission Period & Pollutants

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- **Emission Period: Average ozone season day emission in 2017**
- **Pollutants**
  - **VOC and NOx (Required) – These are precursors for ozone**
  - **Carbon Monoxide (CO) – Not required, but added to the inventory document keeping in mind uses in future air quality plans (e.g. ozone redesignation request/maintenance plan)**



# Emission by Source





# Timeline – BY2017 Emissions Inventory

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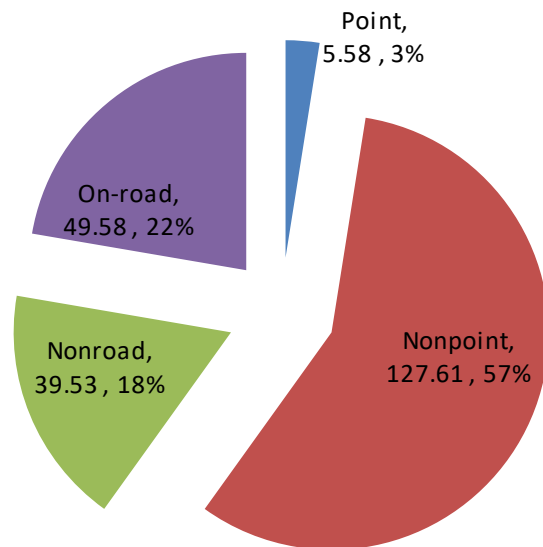
- MWAQC-TAC recommended MWAQC to approve inventory for public comment and hearing (PH&C) process: February 11
- States requested to EPA for providing comments on inventory before PH&C process by February 21
- EPA provided a comment on February 21
- MWAQC approved for PH&C process: May 18
- Public comment period: March 3–Ongoing
- MWAQC-TAC approves response to comments: May 12
- MWAQC authorizes MWAQC-Executive Committee to approve final inventory document for EPA submittal: May 27
- State air agencies submit BY2017 inventory to EPA by August 3

# COVID-19 & AIR QUALITY

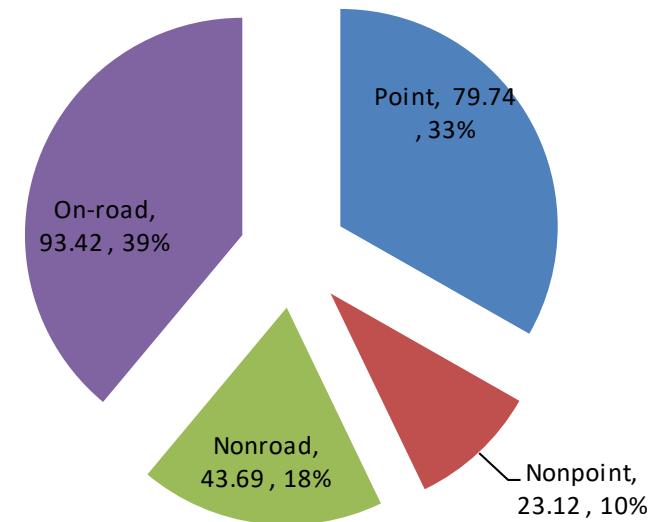
- COVID-19 virus has affected how educational institutions, offices, businesses, and governments operate across the country and in the Washington region since early March.
- Students are being taught online.
- Employees are teleworking where possible.
- As a result, public and private transportation has been affected quite significantly. This has resulted in significant reduction in traffic in the region.
- There has also been impact on the energy and fuel consumption in the region due to office and business closures and people teleworking/staying at home.

# Emission by Source

**Draft OSD 2017 VOC Emissions (tpd)**  
(Washington DC-MD-VA 2015 Ozone NAAQS NAA)



**Draft OSD 2017 NOx Emissions (tpd)**  
(Washington DC-MD-VA 2015 Ozone NAAQS NAA)

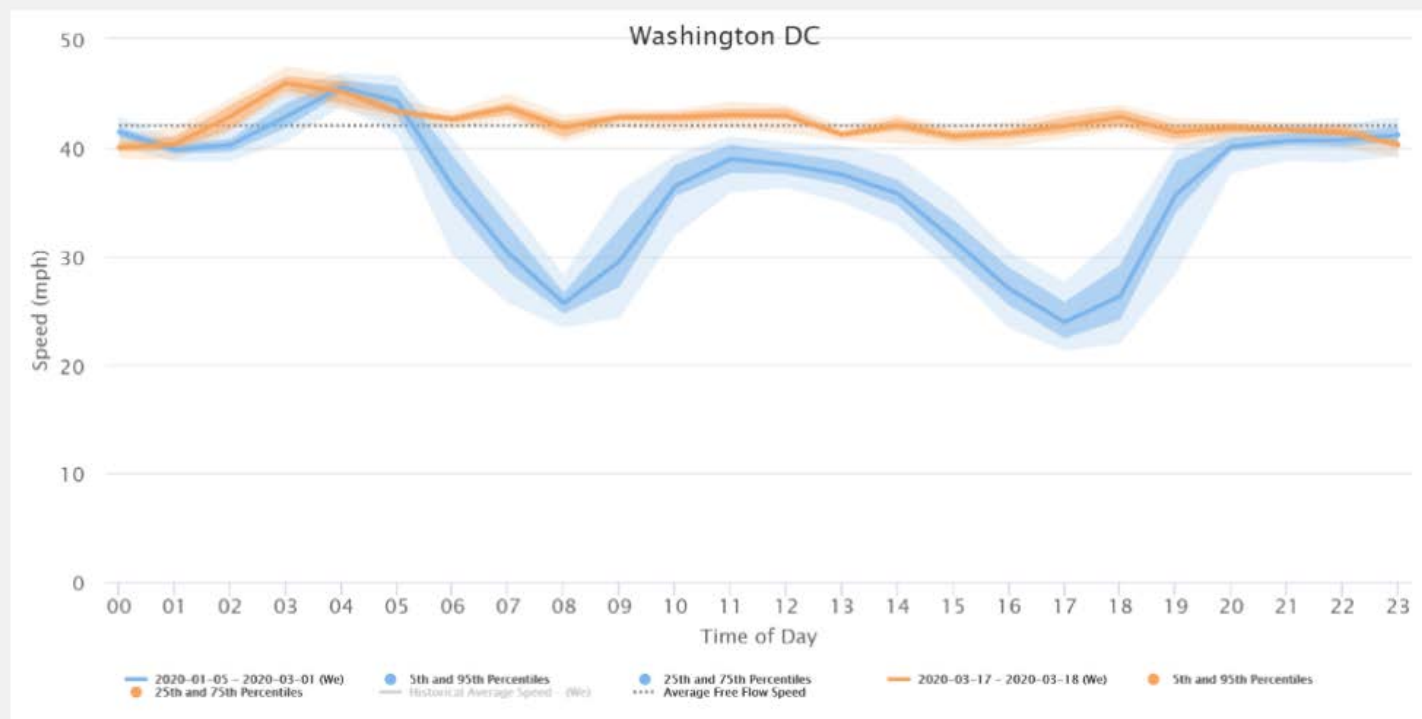


- Since COVID-19 has affected operation of all sources, emissions have been affected accordingly.

# IMPACT ON ON-ROAD SECTOR

## Washington DC

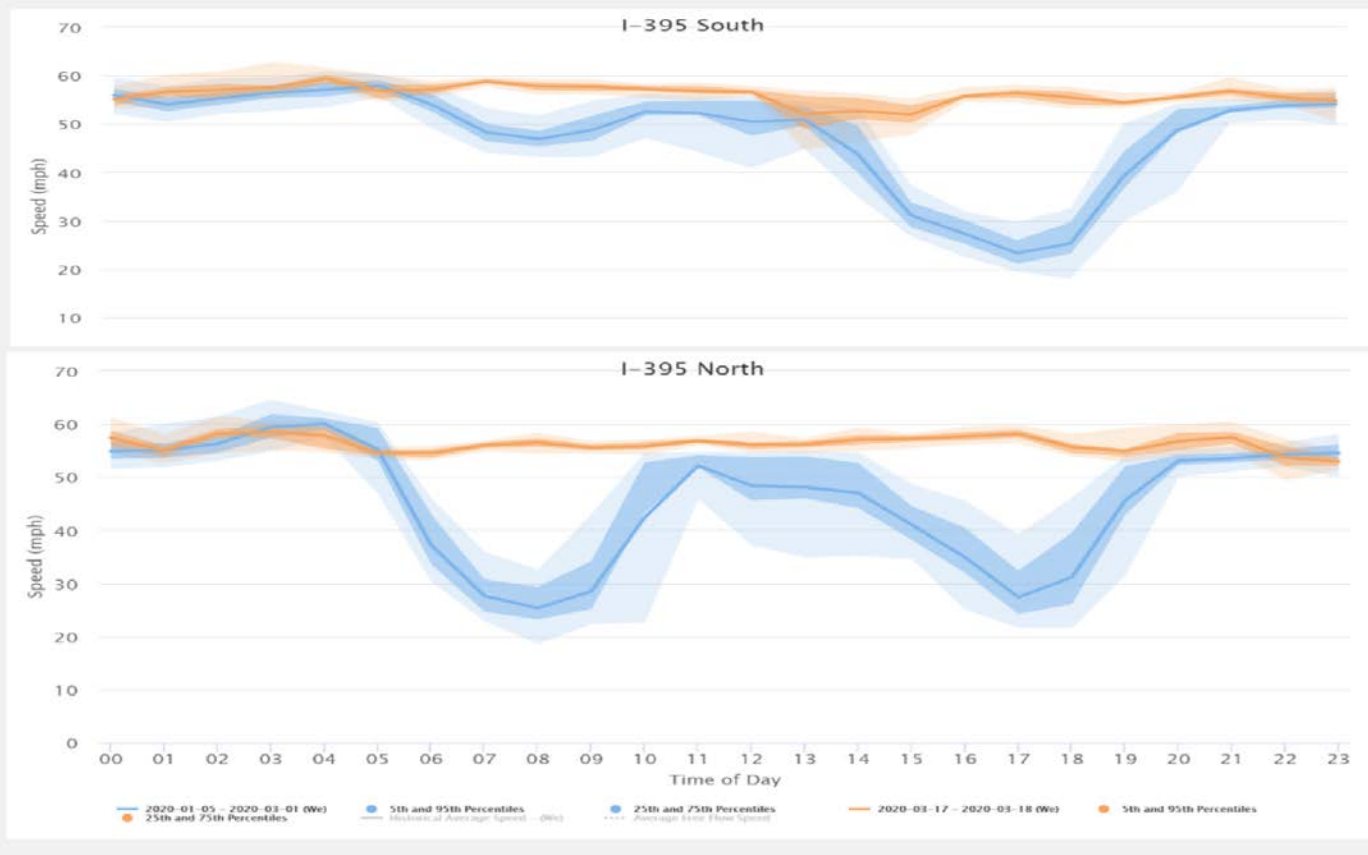
Similar to Boston, Washington DC is achieved free-flow travel speeds for all hours of Wednesday. For morning drivers, this equates to speed increases of up to 16 MPH faster than average and 17 MPH faster for the morning and afternoon rush hours, respectively.



- Source: INRIX

# IMPACT ON ON-ROAD SECTOR

Extending the analysis of travel speeds to major corridors in Washington DC, travelers on I-395 did not experience congestion conditions for an hour traveling northbound or southbound. Southbound travelers saw morning speed increases of 11 MPH and afternoon increases of 23 MPH. Northbound drivers saw a remarkable increase of up to 21 MPH on average for both morning and afternoon.

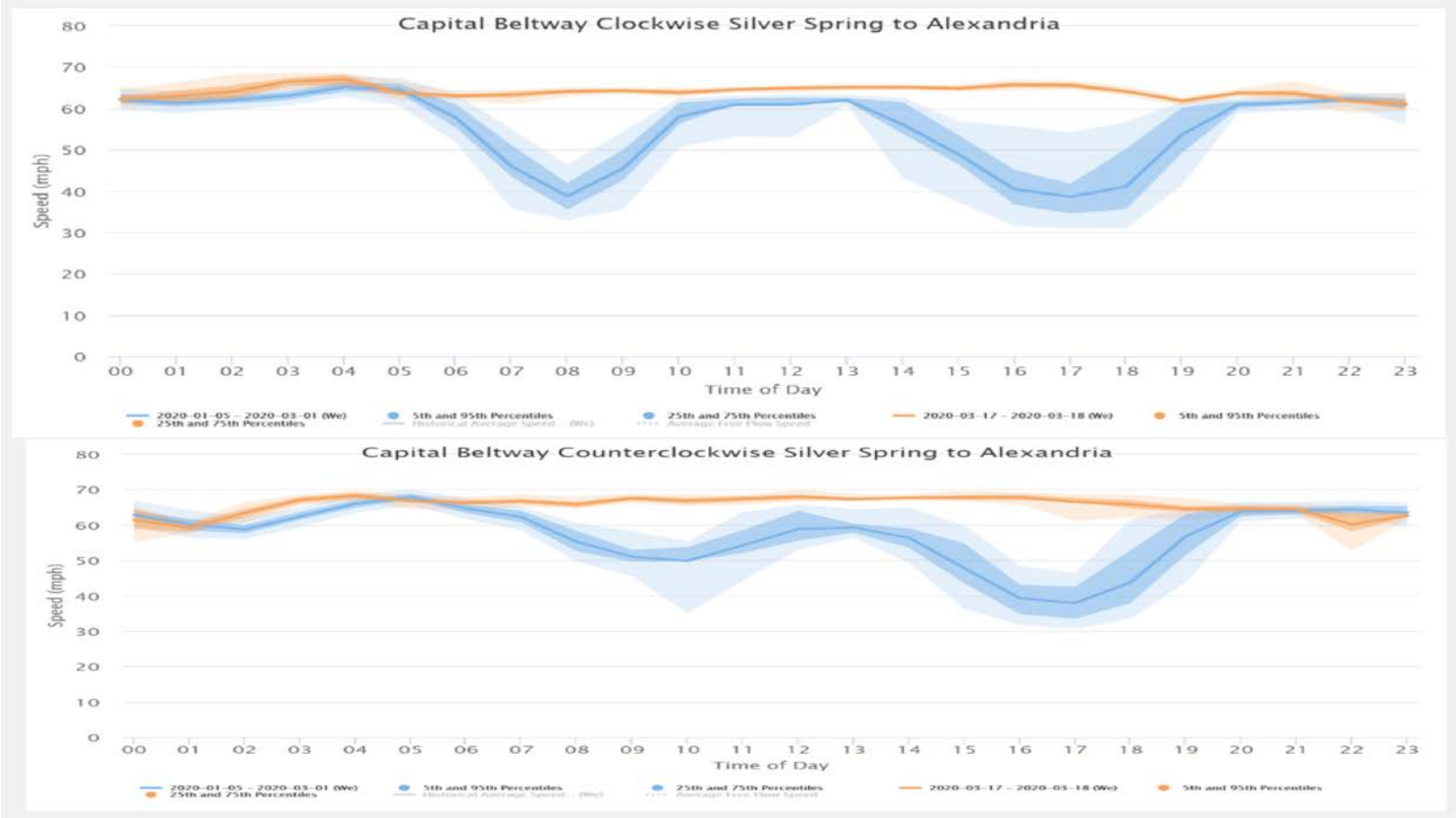


- Source: INRIX



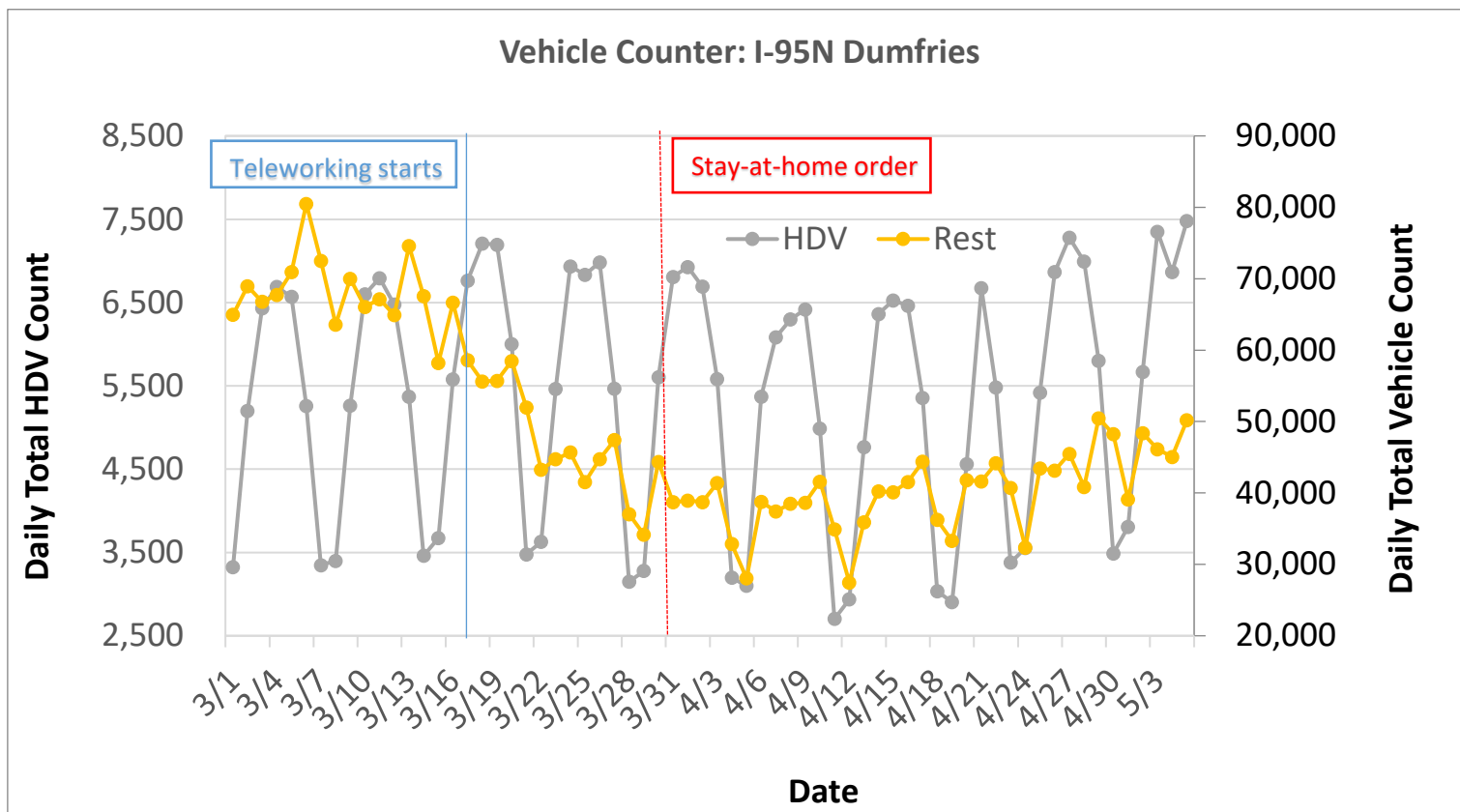
# IMPACT ON ON-ROAD SECTOR

The Intramural Beltway also recorded congestion free conditions going both clockwise and counterclockwise between Silver Spring and Alexandria. The morning and afternoon running clockwise saw speed increases of 23 and 27 MPH, while counterclockwise saw increases of 17 and 28 MPH.



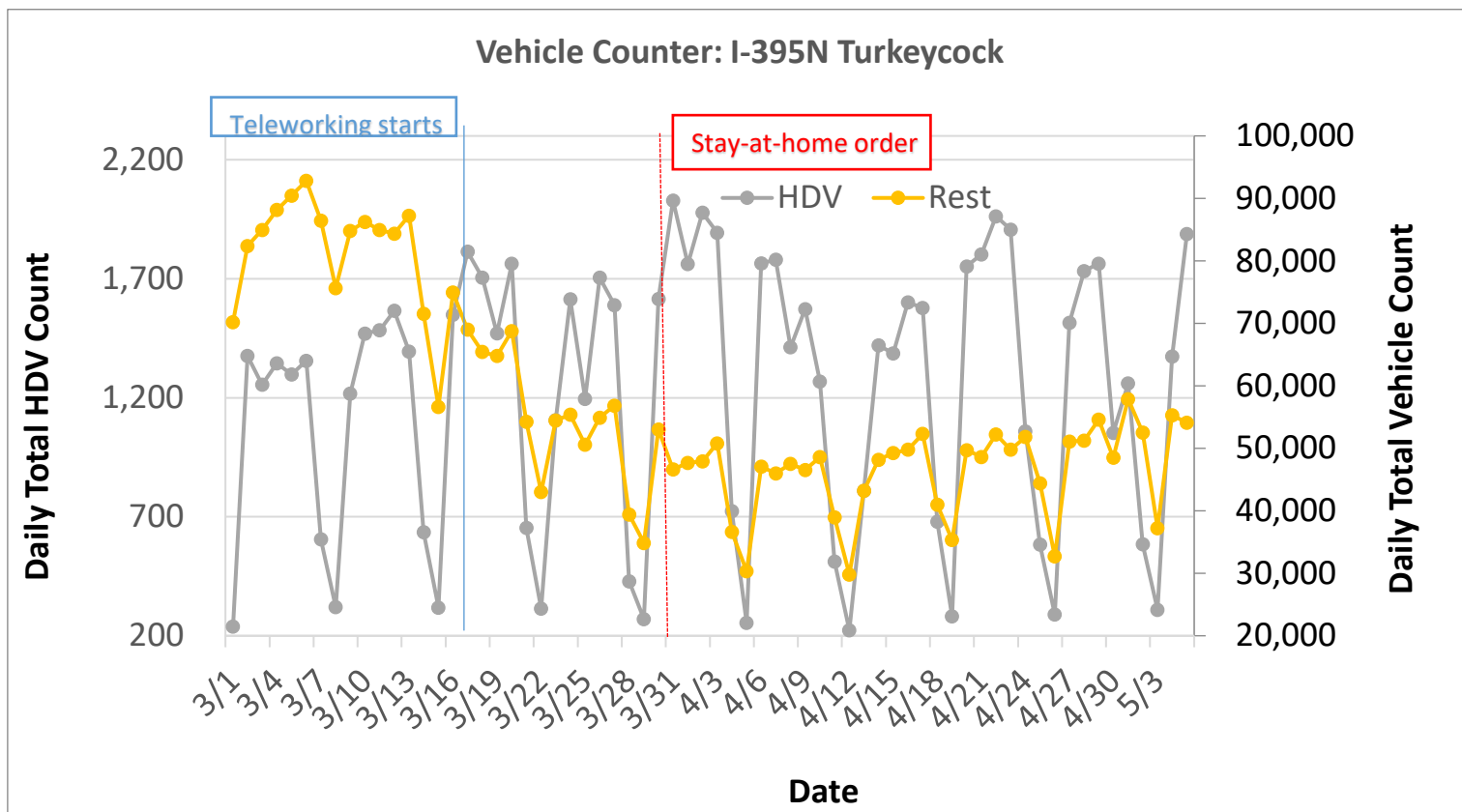
- Source: INRIX

# IMPACT ON ON-ROAD SECTOR



- Both heavy-duty and other vehicle traffic seem to be increasing after a decrease during the early to mid April. Source: VDOT

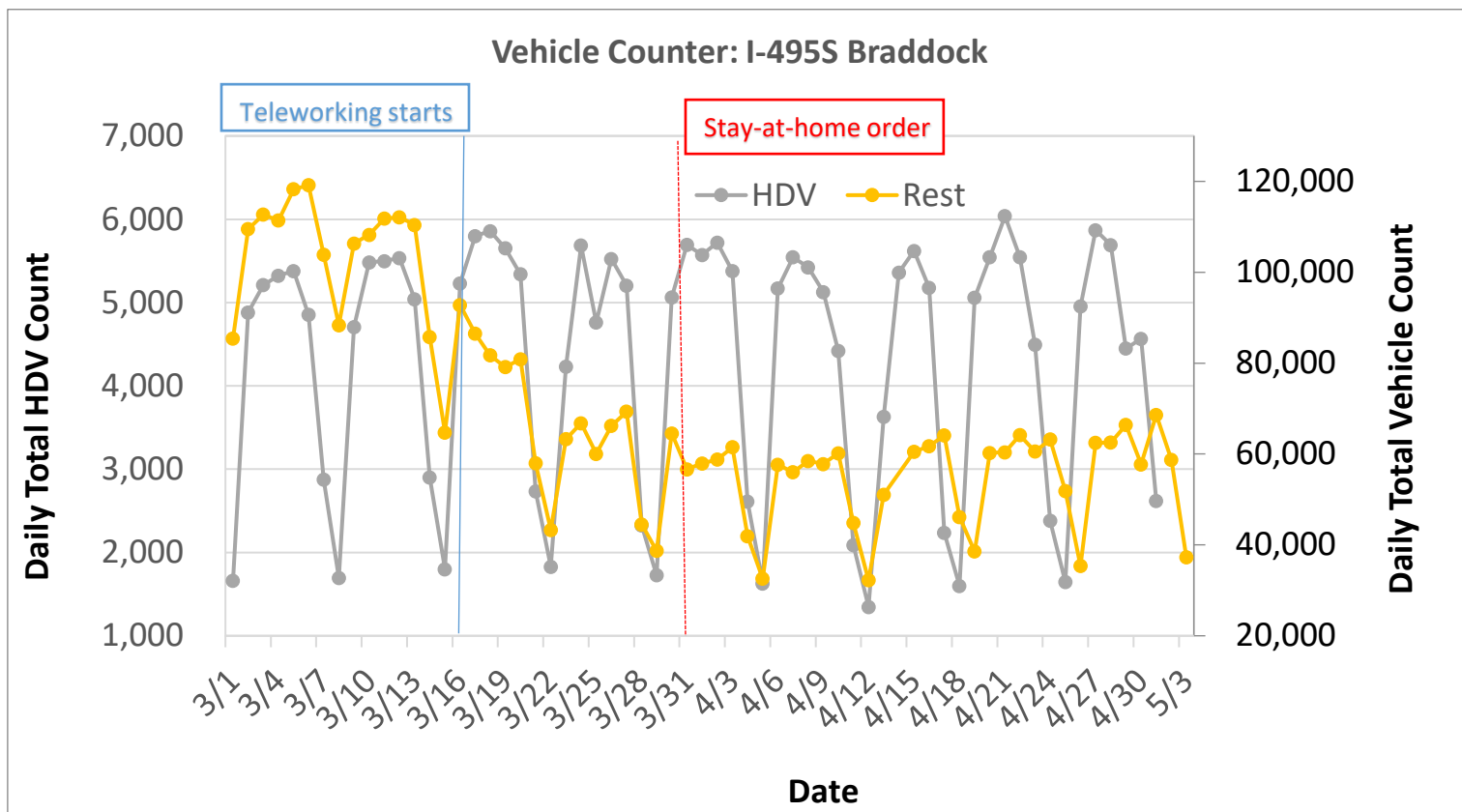
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# IMPACT ON ON-ROAD SECTOR

## Daily Volume for Northern Virginia - Wednesday

	03/18/20	03/25/20	04/01/20	04/08/20	04/15/20	04/22/20	04/29/20
Observed Volume	1,249K	926K	883K	888K	870K	949K	1,004K
% Change from 2019	-29.0%	-47.4%	-50.9%	-50.7%	-48.6%	-44.8%	-42.5%
# of Links Reporting	55	55	55	55	52	52	54

Select District: Northern Virginia

Day of Week: Wednesday

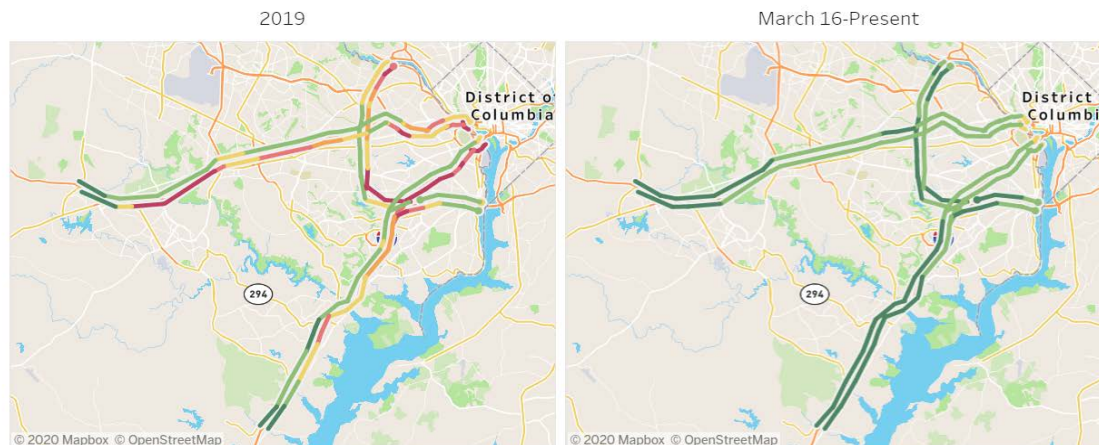
Select Hour: 8

Average Daily Vehicle Hours of Delay - Wednesday

	2019	3/18/2020	3/25/2020	4/1/2020	4/8/2020	4/15/2020	4/22/2020
I-66	12,300	200	100	0	0	0	100
I-95	11,500	1,300	200	0	0	600	1,200
I-395	2,100	0	0	0	0	0	100
I-495	8,000	0	0	0	0	0	0
<b>Grand Total</b>	<b>33,900</b>	<b>1,500</b>	<b>300</b>	<b>0</b>	<b>100</b>	<b>600</b>	<b>1,300</b>

- <25 mph
- 25-35 mph
- 35-45 mph
- 45-55 mph
- 55-65 mph
- >65 mph

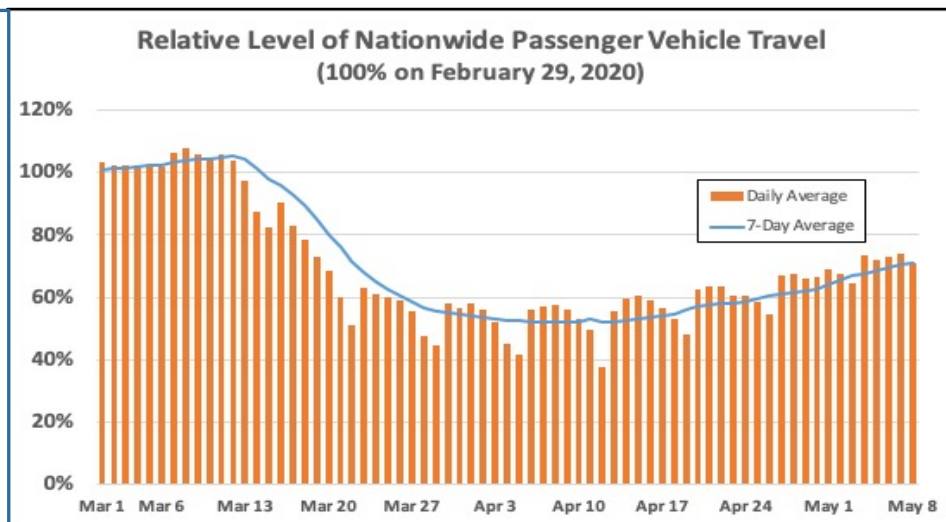
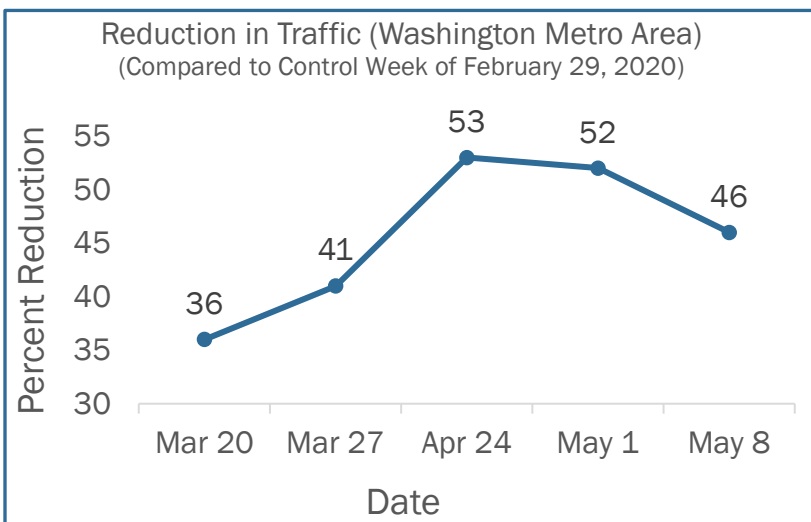
Speed Comparison on Wednesdays at 8:00



- Traffic count shows downward trend in northern Virginia. Much less congestion now. Source: VDOT

# IMPACT ON ON-ROAD SECTOR

- On-Road Sector



Sources:

- A. Washington metro area chart is based on data extracted from INRIX U.S. National Traffic Volume Synopsis Issues #1(Table 1), #2(Table3), #6, #7, and #8
- B. Nationwide travel chart - [INRIX U.S. National Traffic Volume Synopsis Issue #8 \(May 2 – May 8, 2020\)](#)



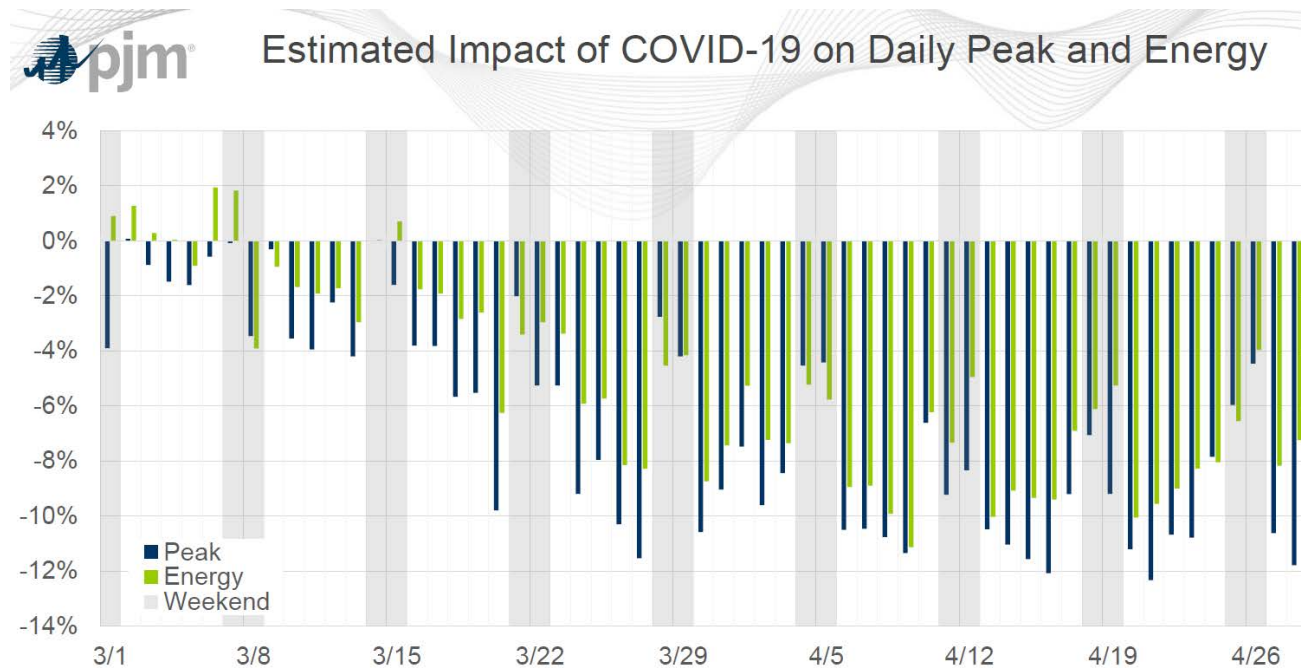
# IMPACT ON NONROAD SECTOR

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- Data showing change in emissions is not available for this sector yet.
- However, emissions can be expected to decline similar to other sectors as activities related to nonroad sources (e.g., construction, commercial, industrial, aircraft, railroad, etc) have also declined.

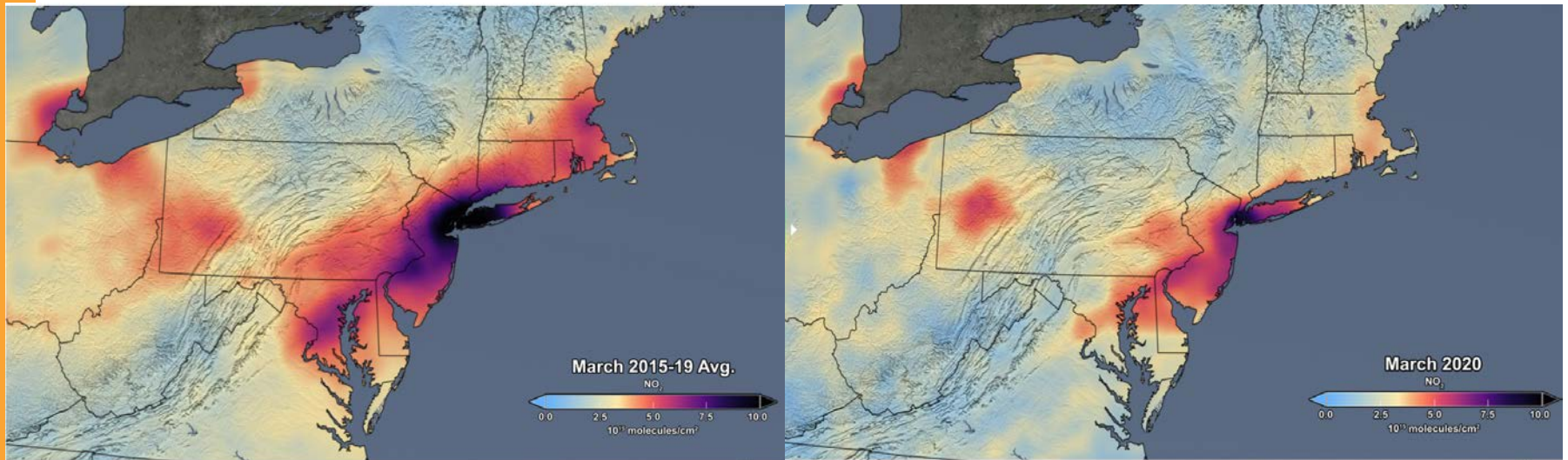
# IMPACT ON POINT & NON-POINT SECTORS (Energy Consumption)

- There has also been impact on the energy consumption in the region due to office and business closures and people teleworking/staying at home.
- Electricity consumption data, in general shows downward trend.



- Source: PJM Report “Estimated Impact of COVID19”, May 5, 2020

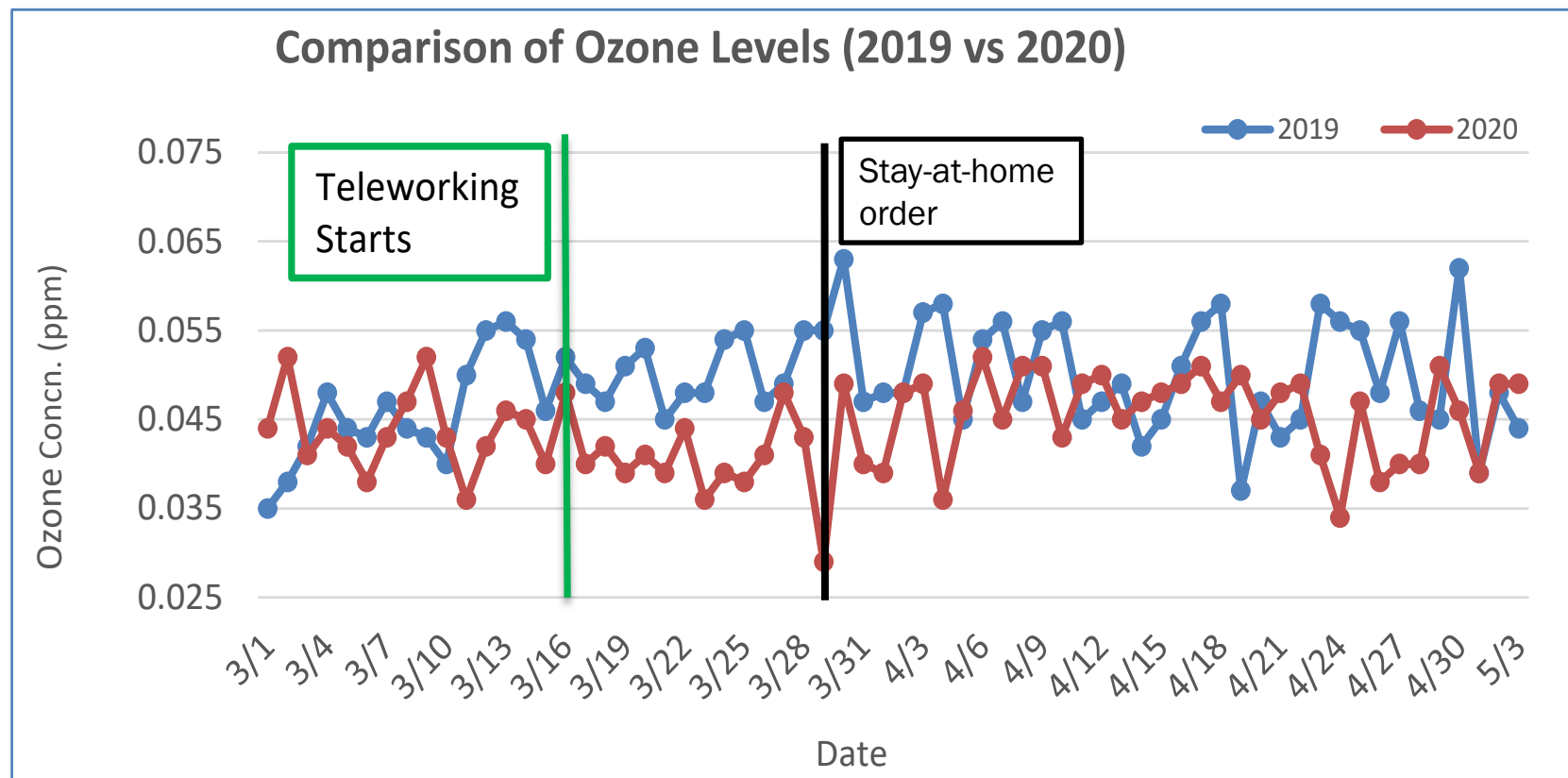
# SATELLITE NO<sub>2</sub> DATA TREND



- Decline visible in NO<sub>2</sub> levels in March 2020 compared to March 2015-2019 average.
- NASA cautions that “Further analysis is required to rigorously quantify the amount of the change in NO<sub>2</sub> levels associated with changes in pollutant emissions versus natural variations in weather.”
- Source – NASA (<https://airquality.gsfc.nasa.gov/>)

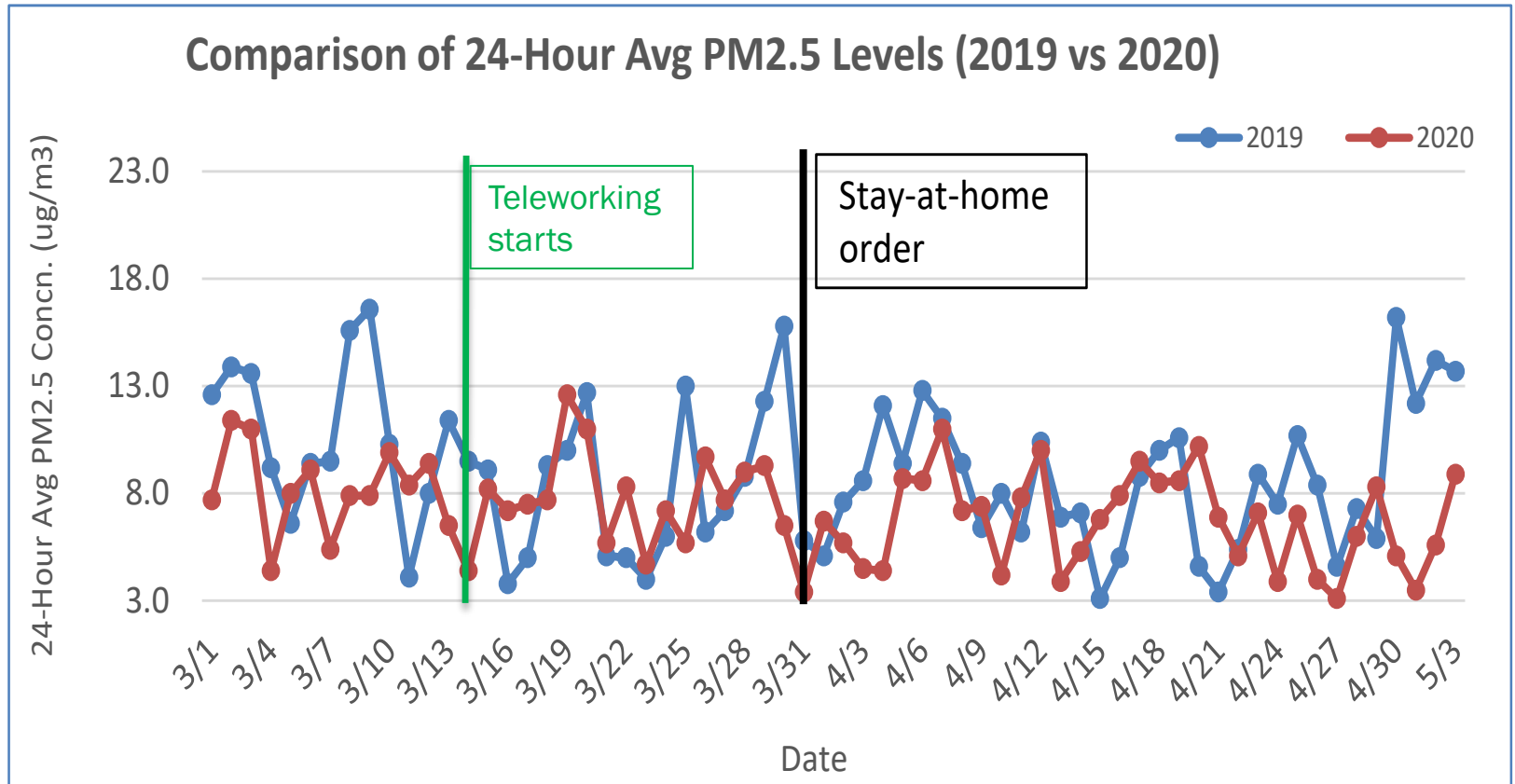


# COVID-19 & OZONE LEVELS



- Draft 2020 ozone levels mostly lower compared to 2019 both before and after lockdown. Role of weather needs to be studied.

# COVID-19 & PM2.5 LEVELS



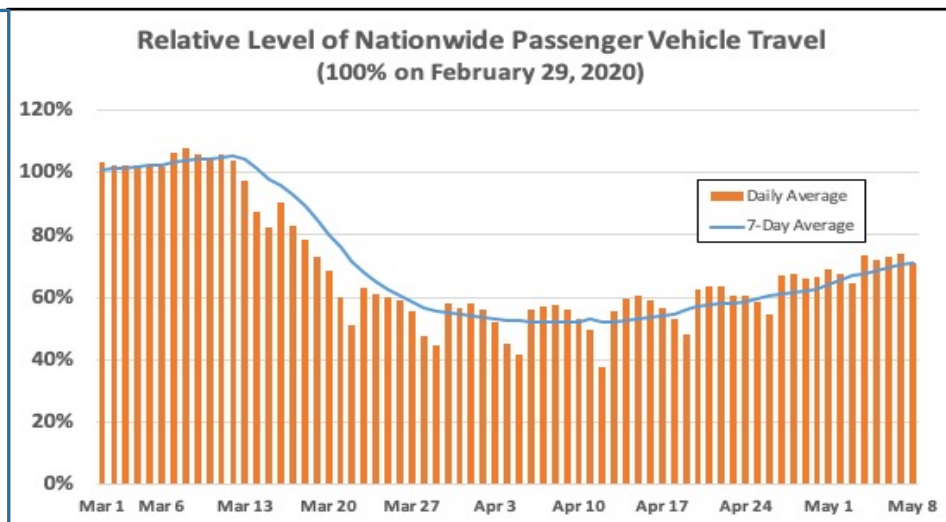
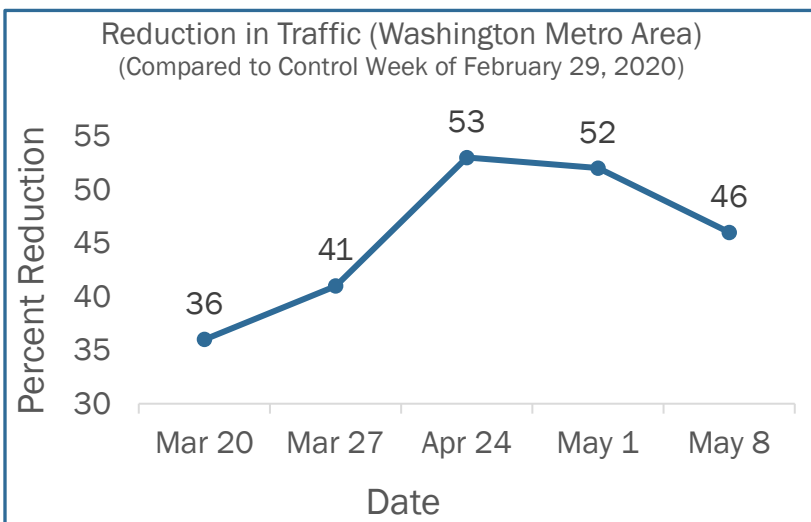
- Draft 2020 PM2.5 levels generally lower. Role of weather needs to be studied.





# IMPACT ON GREENHOUSE GAS EMISSIONS

- On-Road Sector



Sources:

- A. Washington metro area chart is based on data extracted from INRIX U.S. National Traffic Volume Synopsis Issues #1(Table 1), #2(Table3), #6, #7, and #8
- B. Nationwide travel chart - [INRIX U.S. National Traffic Volume Synopsis Issue #8 \(May 2 – May 8, 2020\)](#)



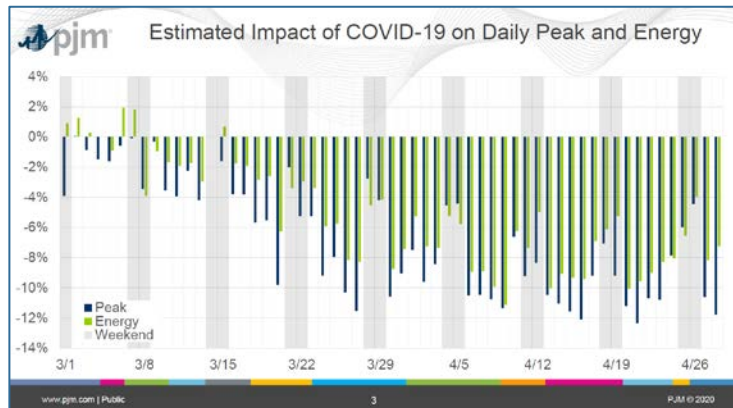
# IMPACT ON GREENHOUSE GAS EMISSIONS

- On-Road Sector
  - Assume 40% average weekly reduction in traffic volume in the metropolitan Washington region during the period of shutdown (March 20 - June 19 – 25% of the year)
  - Assume 2020 BAU on-road sector emissions = 20,515,631 MtCO<sub>2</sub>e
  - Reduction = Annual emissions x 40% x 25%
  - Reduction = 2,051,963 MtCO<sub>2</sub>e

BAU emissions from COG BAU projections revised May 2020

# IMPACT ON GREENHOUSE GAS EMISSIONS

- Electric Generation



**Observations**

- Impact of COVID on load
  - Since March 24, weekday peaks have come in 10% less (~9,000 MW) than what we would have anticipated.
    - Weekday peak impacts have ranged from 6.6% to 12.3%
  - Energy has tended to be less affected, with the average reduction since March 24<sup>th</sup> being 7.5%.
  - Weekends seem to have been impacted by less.

- Source: PJM Report “Estimated Impact of COVID19”, May 5, 2020

# IMPACT ON GREENHOUSE GAS EMISSIONS

- Electric Generation

- Assume 7.5% average daily reduction in electricity use in the PJM is equivalent to the drop in the metropolitan Washington region during the period of shutdown (March 20 - June 19 – 25% of the year)
- Assume 2020 BAU electric sector emissions = 23,174,811 MtCO<sub>2</sub>e
- Reduction = Annual emissions x 7.5% x 25%
- Reduction = 434,572 MtCO<sub>2</sub>e

BAU emissions from COG BAU projections revised May 2020

# IMPACT ON GREENHOUSE GAS EMISSIONS

- Commercial Aviation



- Source: Flightradar24.com, Latest News, May 12, 2020



# IMPACT ON GREENHOUSE GAS EMISSIONS

- Commercial Aviation
  - 7-day average number of commercial flights (worldwide)
    - March 7 = 103,987; May 11 = 32,198
    - Percent drop = 69%
  - Assume 69% average daily reduction in 7-day average of flights during the period of shutdown (March 20 - June 19 – 25% of the year)
  - Assume 2020 BAU aircraft sector emissions = 2,193,230 MtCO<sub>2</sub>e
  - Reduction = Annual emissions x 69% x 25%
  - Reduction = 378,332 MtCO<sub>2</sub>e

BAU emissions from COG BAU projections revised May 2020

# IMPACT ON GREENHOUSE GAS EMISSIONS

- Assume No Changes in sectors
  - Stationary building fuel combustion
  - Rail transportation
  - Off-road vehicles
  - Water and wastewater
  - Agriculture
  - Solid waste
  - Process and fugitive emissions



# IMPACT ON GREENHOUSE GAS EMISSIONS

- Transportation + Electric Generation + Aviation
  - Reduction =  $2,051,963 + 434,572 + 378,332 = 2,864,876$  MtCO<sub>2</sub>e
  - Assume 2020 BAU total emissions = 63,275,113 MtCO<sub>2</sub>e
  - Annual Reductions of BAU GHG emissions = 4.5%

BAU emissions from COG BAU projections revised May 2020



# CONCLUSIONS

- Ozone and PM2.5 levels in general seem lower after COVID-19 lockdown though it is too early to tell if all of that is happening due to lower emissions. Role of weather needs to be investigated to determine how much that is affecting pollutant levels.
- Ozone is generally low in March and April as weather is generally not very conducive for ozone formation in those months.
- Air quality impact of lockdown is expected to be more visible in summer, if it gets extended to those months.
- GHG emissions in general lower by an estimated 4.5%.