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**Subject** Virtual Weigh Stations (VWS) Feasibility Assessment and Recommendations for SR 7, SR 41, and SR 48 in Northern New Castle County, DE

**Attention** DelDOT: Silvana Croope, Stephanie Johnson, Drew Boyce  
DSP: Dan Parks

**From** Jacobs

**Date** November 7, 2018

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### **Background**

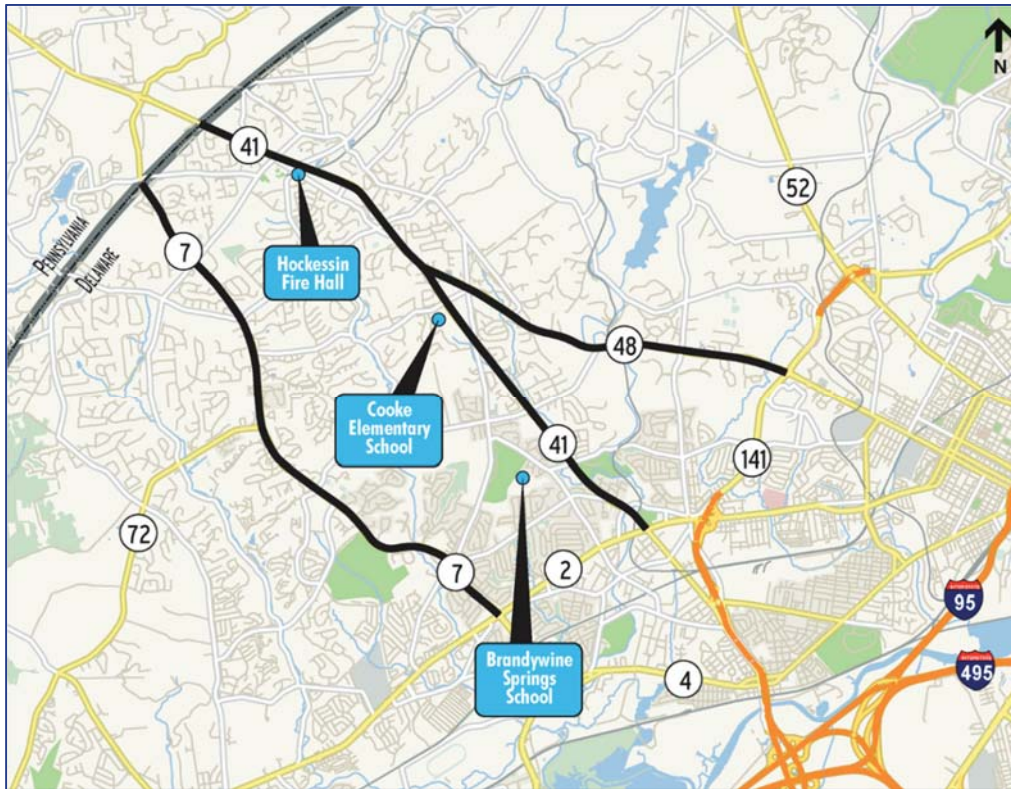
This memorandum summarizes the results of recent Virtual Weigh Station (VWS) field surveys to identify potentially feasible locations for VWS sites along SR 7, SR 41 and SR 48 in northern New Castle County, DE. The VWS field survey focused on these routes in response to a recommendation from a “Special Committee to Study and Make Recommendations Regarding Truck Traffic and Freight Movements along SR 41, SR 48 and SR 7” which was established per Senate Resolution No. 10 of the 149<sup>th</sup> General Assembly of the Delaware State Senate. The Special Committee was directed to study and make recommendations regarding:

1. How to reduce the number of trucks traveling along these roadways; and
2. Any improvements in engineering, infrastructure, education and enforcement that can improve the quality of life for those that live along these roadways.

The VWS feasibility assessment conducted by Jacobs addresses Special Committee Recommendation No. 17:

Perform a study to identify feasible locations to install fixed virtual WIM stations on SR 7, SR 41 and SR 48.

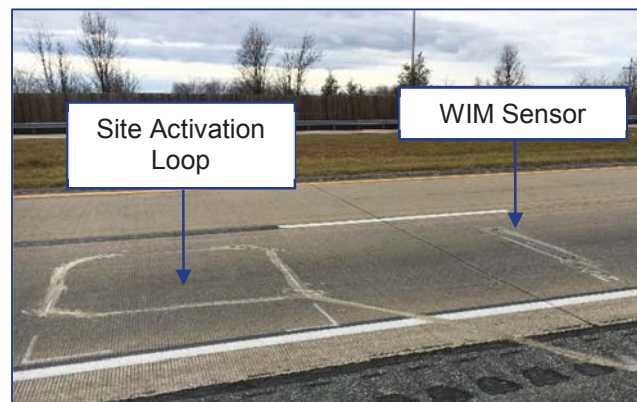
There are three (3) elements to a Virtual Weigh Station: (1) a VWS screening location, which includes all the equipment to weigh and screen the commercial vehicle; (2) a staging area, where weight enforcement officers can park and receive data from the site; and (3) a pull-off area, for weight enforcement officers to safely pull over the commercial vehicle and conduct an inspection. The VWS site is equipped with weigh-in-motion (WIM) sensors that weigh commercial vehicles while travelling along the roadway.



**Figure 1: Overview of SR 10 Study Area. SR 1, 41, and 48 are shown in black.**

The WIM sensors are placed in the pavement adjacent to a roadside pole with cameras and illuminators, and a cabinet with equipment necessary to power the site and communicate information to system users through the commercial vehicle enforcement software system. Cameras may include an overview camera to capture an image of the vehicle, a license plate reader (LPR) to capture the license plate number, and a USDOT number reader to capture the USDOT number on the side of the vehicle. This information can be utilized to gather information about commercial vehicle credentials and safety record.

The staging areas serve as a base of operations when weight enforcement officers receive information from the VWS site. The staging area needs to be close enough to the VWS site so that when an officer sees that a vehicle has been flagged for a violation, they can intercept the vehicle.



**Figure 2: Weigh-In-Motion sensors and loops installed on SR 1.**



**Figure 3: SR 1 VWS Pole**

There are currently two VWS sites deployed in the State of Delaware. The first site was built in Townsend, DE on US-13 NB approaching the Blackbird Weigh Station. The second site was built in Smyrna, DE on SR 1 NB. Both sites are fully installed and operational, utilizing the Blackbird Weigh Station as a pull-off area for these sites. There is a third site being built on Warwick Rd as part of the US-301 widening project that will utilize the Middletown Weigh Station as a pull-off area.

Preliminary field surveys were conducted on June 14<sup>th</sup>, 2018. The field surveys were conducted with the Delaware State Police (DSP) Sergeant Dan Parks, who currently leads the Commercial Vehicle Enforcement Unit (CVEU). The field surveys covered three areas: SR 7 NB & SB from the Pennsylvania/Delaware state line to the Pike Creek Shopping Center, SR 41 NB & SB from the state line to SR 48, and SR 48 NB & SB from SR 41 to Hercules Rd. Based

on our assessments of the route segments, we identified 3 locations for possible VWS sites. See Figure 4 below for an overview of the study area and VWS site locations identified through the survey.

The objective of the field surveys was to identify locations feasible for VWS sites. A feasible site location is one that is an area with smooth pavement along a flat, straight stretch of roadway where vehicles are likely to be traveling at a constant speed (not braking or accelerating before or after intersections, hills, etc.) and with adjacent property approximately 10 feet from the shoulder of the roadway for the placement of a VWS pole and roadside cabinet. A feasible site also requires access to power and communications, a suitable location downstream of the site for DSP staging area, and a suitable location to pull over the vehicle for official weighing and further inspection as warranted by the VWS screening information captured for the commercial vehicle.

Based on the preliminary field surveys, we identified three (3) locations that may be suitable for VWS sites: (1) On SR 7 SB, south of Southwood Estates; (2) On SR 41 NB, south of Coffee Run Shopping Center; and (3) On SR 41 SB, south of VFW Post 5892. During the preliminary survey we did not find an appropriate VWS Site location on SR 48. In discussion with Sgt. Parks, we resolved that a location north of the SR 41 and 48 split would be able to capture truck traffic traveling both routes. Both sites on SR 41 are north of the SR 41 and 48 split. A report on the preliminary field survey can be found in Attachment A.

On September 6, 2018 a follow up survey was conducted to more thoroughly evaluate the proposed sites identified in the preliminary survey. This walkthrough was also conducted with Sgt. Parks. With the guidance of Sgt. Parks, we were able to gather information about DSP staging and pull-off areas currently in use by officers. A summary of the field survey findings for

each location is provided below, and VWS Site Assessment Forms for each location are included as Attachment 2.

**Figure 4: VWS Site Assessment Area**



Source: ©2018 Google

### Key



VWS Site

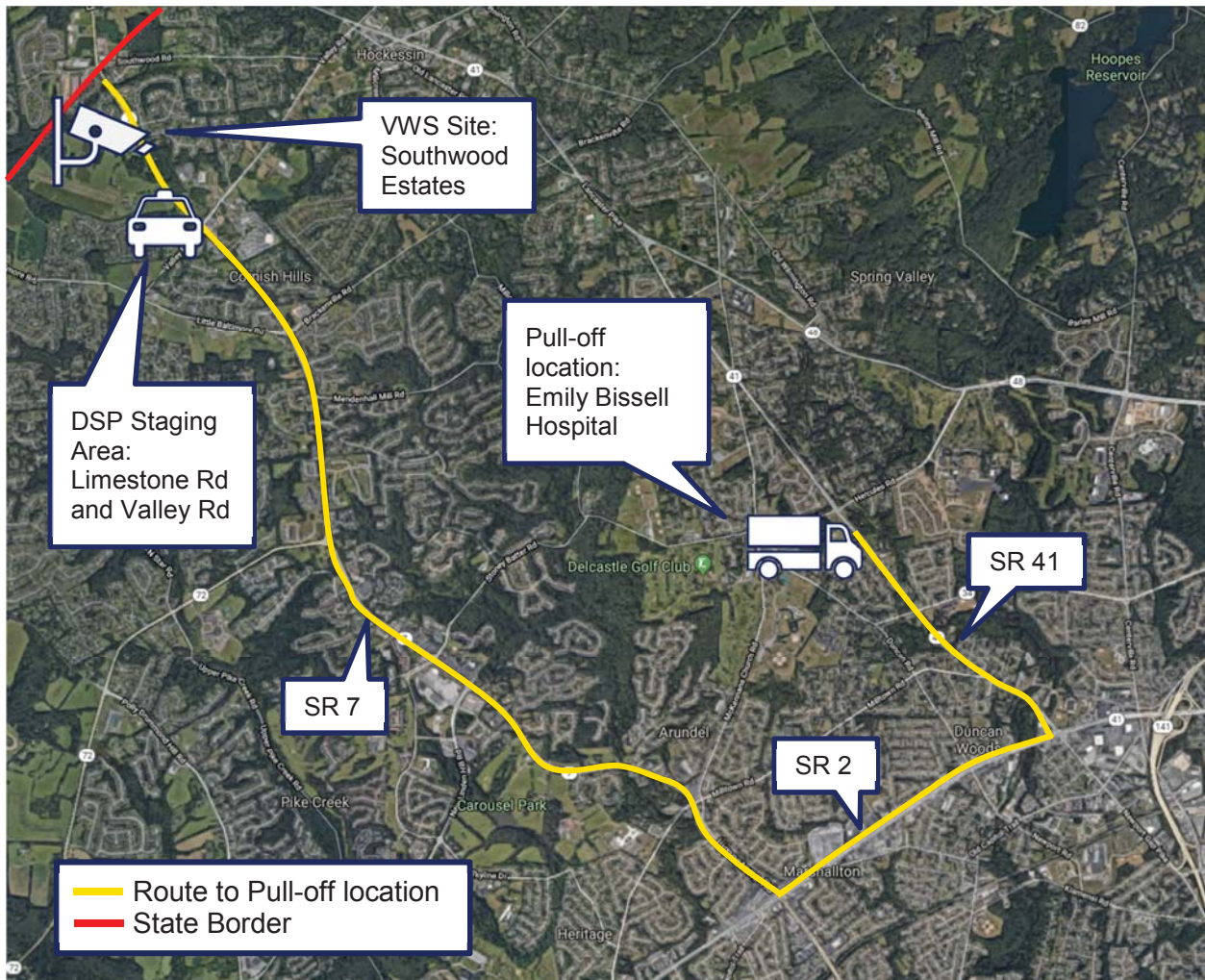


DSP Staging Area



Pull-off Area

### Site 1: SR 7 SB Limestone Road & Tims Lane



Source: ©2018 Google

#### 1) VWS Site Location – Southwood Estates

The site is located south of Limestone Road and Tims Lane, the entrance to the Southwood Estates housing complex. There is one lane in each direction at this location and the pavement condition is fair. The road is straight with a slight incline in the southbound direction. The lane width was measured to be 12 feet and the shoulder width measured at 9 feet at the site location. There is about 5 feet of clearing adjacent to the roadway. To provide adequate space for a cabinet and camera pole (or Portable VWS trailer) some bushes would need to be cleared and trees trimmed. Cell Service at the location was 2/4 bars LTE (AT&T). The posted speed limit at the location is 45 mph. There is no restricted speed limit for trucks.



**Figure 5: SR 7 SB south of Southwood Estates looking southbound.**

The closest intersection preceding the site is located about 1,200 feet north, at the Limestone Rd and Southwood Rd intersection. This is an adequate distance for trucks stopped at the intersection to be cruising at a constant speed once they reach the VWS site. Observation of trucks passing the site has confirmed that trucks are not slowing down or speeding up, unless there is traffic exiting from the Southwood Estates complex. Additionally, there is an existing traffic counter and cabinet across the road and this could be a source of power for the VWS site.

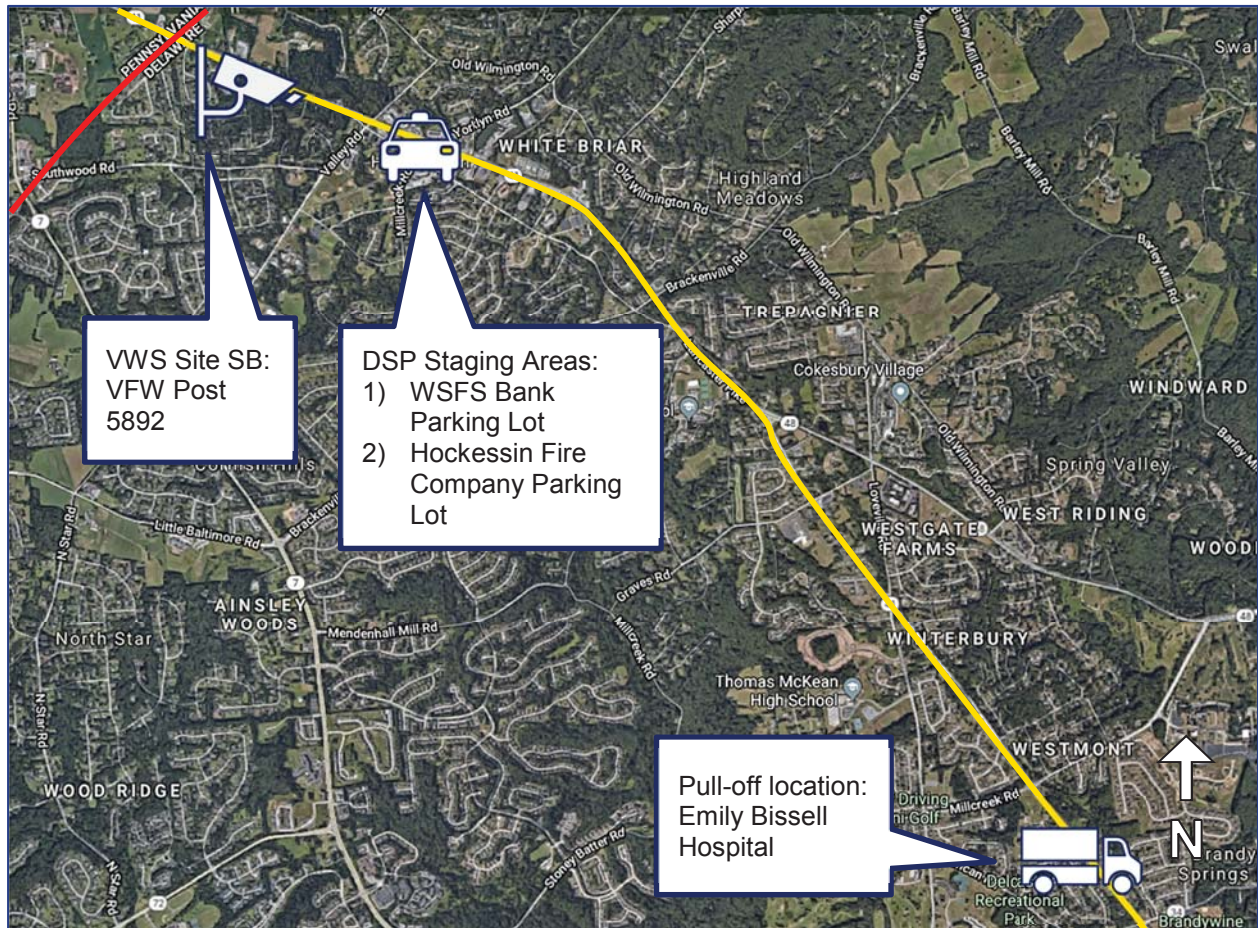
### 2) *DSP Staging Area – Valley Rd*

Sgt. Parks identified a DSP staging area in the shoulder north of the Limestone Rd and Valley Rd intersection. The staging area is approximately ½ mile south of the VWS location. It takes about 40 seconds to travel from the VWS site to the DSP staging area. This should give the system enough time to process data from the VWS site and communicate this information to DSP to make a pull over decision.

### 3) *Pull-Off Area – Emily Bissell Hospital*

Currently, there are no dedicated state-owned locations that are suitable for commercial motor vehicle enforcement on SR 7. However, the Emily Bissell Hospital is a state-owned property currently in use as a pull-off location on SR 41. The route to the pull-off area is marked in yellow in the Site 1 overview at the beginning of the section. As trucks pass the staging area, DSP can indicate to the driver to follow them to the appropriate pull-off location for inspection. The DSP will follow SR 7 Southbound to SR 2 Eastbound. Then they will take SR 2 East to SR 41 NB and pull-in to Emily Bissell Hospital. This route is a little over 9 miles and should take about 20 minutes without traffic. Other connections to SR 41 from SR 7 are residential roads not suitable for dedicated commercial vehicle use.

### Site 2: SR 41 SB Lancaster Pike and Wellington West Drive



Source: ©2018 Google

#### 1) VWS Site Location SB – VFW Post 5892

The site is located approximately 1,500 feet south of the Pennsylvania/Delaware border. There is one lane in each direction at this location and the pavement condition is fair. The road is straight with a slight decline in the southbound direction. The measured lane width is 11 feet and the measured shoulder width is 12 feet. There is a 15-foot clearing from edge of pavement adjacent to the roadway that would be adequate for a camera, pole and cabinet. Cellular service at the location was full LTE (AT&T). The posted speed limit is 45 mph and there is no restricted speed limit for trucks.



**Figure 6 SR 41 SB VWS site, south of VFW Post 5892 looking southbound.**

The site is located approximately 2,800 feet north of the Lancaster Pike and Valley Rd intersection. During the field survey, it was observed that this was an adequate distance from the intersection and trucks traveled at a constant speed. There is a utility pole next to the edge of right-of-way that could deliver power to the VWS site. However, the proximity to the power lines may be an issue when installing the site.

2) *DSP Staging Area – WSFS Bank and Hockessin Fire Company*

The SR 41 SB site utilizes the same DSP staging area along SR 41 as the NB site, the WSFS Bank and the Hockessin Fire Company. Both staging areas are near each other and about  $\frac{3}{4}$  miles from the VWS site. This gives the DSP about a minute from the commercial vehicle passing through the VWS site until they reach the staging area. This is enough time for the system to process data sent

from the VWS site and communicate information to DSP to make a pull-over decision.

3) *Pull-Off Area – Emily Bissell Hospital*

Enforcement officers currently utilize the abandon Emily Bissell Hospital as a pull-over location. Although this location is a about  $4\frac{1}{2}$  miles from the VWS site and  $3\frac{1}{2}$  miles from the staging area, Sgt. Parks explained that it's not uncommon for DSP to pull over trucks and instruct them to follow the officer for an extended period to an adequate inspection location.



### Site 3: SR 41 NB Lancaster Pike and Mitchell Rd



Source: ©2018 Google

#### 1) VWS Site Location NB – Coffee Run

The SR 41 NB site is located approximately 600 feet north of Lancaster Pike and Mitchell Rd, past the end of the existing guiderail, and just south of the Coffee Run Shopping Center. The site is one lane in each direction, however it is right after a merge in both directions. The site is also on a slight incline and horizontal curve. The lane width is measured to be 11 feet and the shoulder width is measured to be 13 feet. There is a small clearing about 9 feet in width from edge of pavement adjacent to the proposed area, however the clearing is on a hill. Additionally, there are existing DelDOT junction boxes in the clearing next to the site in DelDOT right-of-way. Cellular service at the location was 3/4 bars LTE (AT&T). The posted speed limit is 45 mph, however there's a sign at the location showing a reduced speed of 35 mph up ahead. There are no posted speed limit restrictions for trucks.



**Figure 7 SR 41 NB VWS site looking northbound toward Coffee Run Shopping Center.**

around to get to the pull-off location. However, after passing the staging area there is about a mile of roadway before the Pennsylvania border. Once trucks get over the border they are out of DSP jurisdiction.

2) *DSP Staging Area – WSFS Bank and Hockessin Fire Company*

Sgt. Parks identified two areas enforcement officers currently use as staging areas, the parking lot of WSFS Bank and the Hockessin Fire Company parking lot. Both locations are about  $\frac{3}{4}$  of a mile north of the VWS site. It will take a truck approximately 1 minute to pass the staging area after passing through the VWS site. A minute is more than enough time for the system to process the VWS data and provide data to DSP to make a pull-over decision.

3) *Pull-Off Area – Emily Bissell Hospital*

Enforcement officers currently utilize the abandon Emily Bissell Hospital as a pull-over location on SR 41. The location is over  $2\frac{1}{2}$  miles from the VWS site and  $3\frac{1}{2}$  miles from the staging area. DSP would need to pull the truck over and instruct them to turn

## **Recommendations**

**Based on a review of the objectives of the Special Committee, discussions with State Police, and the results of the field surveys conducted as part of this study, the preferred location for the VWS sites are at the locations identified herein on SR 7 SB and SR 41 SB.** These sites can utilize the Emily Bissell Hospital as a pull-off location for formal weighing and inspection, however this pull over area is located several miles from the VWS sites, which may limit the effectiveness of these proposed VWS site locations. To mitigate this, DelDOT is advised to explore the availability of other public properties, or purchase and develop a private property proximate to the proposed site locations that could be utilized as a pull-off area for DSP enforcement.

Through discussions with Sgt. Parks, it was concluded that locating VWS sites on each route in the same direction would be the preferred approach, as this would prevent CMV operators from switching routes to avoid being screened by the VWS site. Moreover, using SB sites near the Pennsylvania/Delaware border screens trucks entering the state and provides DSP with suitable locations for staging and pulling over the vehicle for official weighing and inspection.

The NB site on SR 41 has several deficiencies. About 400 feet upstream from the site is a merge from the turn off Mitchell Rd. Merging traffic is bound to cause traffic to slow approaching the site. Moreover, there is a reduced speed ahead sign at the VWS site location that could cause trucks to brake. Additionally, since the Pennsylvania/Delaware border is a mile up the road, DSP would have a limited amount of time to identify and pull over CMVs before they are out of their jurisdiction.

## **Other Considerations**

- **VWS Trailer**: DSP has a VWS trailer that could be utilized at the proposed locations in lieu of the construction and installation of a camera pole. The site would still require an in-pavement WIM scale and roadside cabinet for power, communications and roadside equipment. The use of the VWS trailer may require additional space adjacent to the roadway to provide ingress and egress to allow the DSP to park the trailer at the site. The proposed sites on SB 7 and SB 41 would likely be able to accommodate the trailer; however, the location on SR 41 NB would not be a feasible location for the trailer.
- **Pull-off Locations**: Apart from the Emily Bissell Hospital, all the pull-off locations currently utilized infrequently by the DSP in the study area are on privately owned property. To date, DSP has not received any complaints from the property owners regarding the use of their property for CMV screening. However, the deployment of the VWS sites and increased enforcement activity will likely result in more frequent use of private property for enforcement, which could result in complaints from property owners and restrictions on the use of these properties. The State could pursue formal agreements with the property owners to utilize their properties for enforcement. It is recommended

however, that the state explore existing state-owned property or pursue purchasing property to construct a dedicated pull-off area.

- Wide Shoulders: Both SR 41 NB and SR 41 SB sites have very wide shoulders. This provides the opportunity for trucks to avoid the WIM by riding in the extra wide shoulder. This could be mitigated by installing bollards at the edge of the shoulder to ensure that the commercial motor vehicles stay in the travel lane.

Attachment A:  
Preliminary VWS Field View Notes

## Field View Notes

### Deployment of Virtual Weigh Stations

Business Case Number / PPSID: 1301237

DelDOT Agreement Number: 1662

**Date of Meeting:** June 14, 2018, 8:30am-11:30am

**Conference Call Number:** N/A

**Notes Prepared By:** Kevin Needham

### 1. Objective of Field Views

Dan took us on a tour of SR-7, SR-41 and SR-48 near the Delaware-Pennsylvania border to explore potential locations for future Virtual Weigh Station (VWS) site/s that may help address truck traffic and freight movement concerns along the corridors previously listed.

### 2. Participants

<u>Invitees</u>	<u>Area</u>	<u>Att.</u> <u>(Y/N)</u>	<u>Invitees</u>	<u>Area</u>	<u>Att. (Y/N)</u>
Daniel Parks	DSP	Y			
Kevin Needham	Jacobs	Y			
Darren Black	Jacobs	Y			

### 3. Field View Notes

1. The group met at Churchman's Crossing to begin the field views. Dan escorted us through the project areas, beginning with SR-7, then to SR-41 and SR-48.
2. SR-7 Notes
  - a. There is both NB and SB truck activity, but a majority of the truck commerce is headed SB. This includes agricultural trucks heading SB to SR-1 from Lancaster and permit loads such as shed haulers coming from the Lancaster area.
  - b. There is a WIM/traffic counter on SR-7 SB, south of Brackenville Road, #8026. See if we can get traffic count and WIM data from this location.
  - c. Possible locations for VWS include the following:
    - i. SB, just south of Southwood Estates
    - ii. SB, before or after Valley Road

## Field View Notes

### Deployment of Virtual Weigh Stations

Business Case Number / PPSID: 1301237

DeIDOT Agreement Number: 1662

- iii. SB, before Hailey's Trail; the road is two lanes SB in this area so DeIDOT would need to add signage to restrict trucks to right lane for screening; also adjacent to residential property owners
3. SR-41 Notes
- a. There is both NB and SB truck activity. NB activity from Port of Wilmington includes fully loaded Chiquita and Dole trucks. DSP has found that NB trucks are sometimes running heavy. SB trucks heading to the Port are usually empty. There are also SB trucks coming from Quarry, but they generally have weight slips for their loads. DSP does not see a lot of SB weight violations; more weight issues going NB.
  - b. Possible locations for VWS include the following:
    - i. SB, just north of Arthur Drive and the VFW Post; there is a 12-foot shoulder with good pavement, slight uphill slope, no adjacent homeowner
    - ii. NB, north of Brackenville Road at top of hill before Coffee Run Shopping Center; there is a slight upslope and curve in the road at this location.
4. SR-48 Notes
- a. This corridor has less truck traffic than SR-7 and SR-41. SB truck traffic generally coming from SR-41 so a VWS SB on SR-41 would address overweight truck concerns on SR-48.
  - b. No VWS site locations identified on SR-48.
5. Miscellaneous
- a. After conducting the field views, we rode up I-95 NB to the DE-PA border then back SB on I-495. There is substantial truck traffic on I-495 SB in the area of Naaman's Road. There is a wide shoulder and the area is already used for enforcement. Would need to determine whether trucks could be restricted to right lane in this area (route is 3 lanes wide) for screening purposes. Pavement is old concrete pavement that would need to be smoothed to meet WIM performance requirements.
  - b. DSP noted that Route 40 at Elkton Road or Otts Chapel Road in Newark, DE may also be a good location for future VWS site.

## Field View Notes

**Deployment of Virtual Weigh Stations**  
Business Case Number / PPSID: 1301237  
DeIDOT Agreement Number: 1662

### 4. Action Items

<b>Action Item</b>	<b>Owner</b>	<b>Due Date</b>
Request WIM data for WIM #8026 from DeIDOT Traffic	Jacobs	June 29, 2018
Schedule detailed field views after narrowing down prospective site list	Jacobs	July 13, 2018

### 5. Next Field View

<i>Date:</i> TBD	<i>Time:</i> TBD	<i>Location:</i> TBD
<i>Agenda:</i>	Conduct detailed site feasibility assessments based on determination of preferred site location/s for VWS along the subject routes	



## Field View Notes

**Deployment of Virtual Weigh Stations**  
Business Case Number / PPSID: 1301237  
DelDOT Agreement Number: 1662

### 6. Site Images

*Location: Rt 7 SB – Valley Rd*



*Location: Rt 7 SB – Southwood Estates*



**Field View Notes**

**Deployment of Virtual Weigh Stations**

Business Case Number / PPSID: 1301237

DeIDOT Agreement Number: 1662

*Location: Rt 7 SB – Haileys Trail*



*Location: Rt 41 SB– VFW Post*



**Field View Notes**

**Deployment of Virtual Weigh Stations**

Business Case Number / PPSID: 1301237

DeIDOT Agreement Number: 1662

*Location: Rt 41 NB – Coffee Run Shopping Center*



Attachment B:  
VWS Site Assessment Forms

## Virtual Weigh Station Site Assessment Form

Date 9/6/18

Route and Direction SR 7 Southbound

County New Castle

Latitude 39.783422° Longitude -75.723039°

### WIM Location

#### Roadway characteristics

Pavement condition (New, Fair, Poor, Deficient)? Fair

Adequate road geometry (straight, level grade)? Straight and slight incline

Lane Width 12 ft Shoulder width 5 ft

#### Equipment

Is there an area adjacent to the shoulder for the cabinet, pole and foundation? Yes

Measured width of clearing from edge of pavement 5 ft

Cellphone service? 2 of 4 Bars LTE (AT&T)

#### Traffic

Posted Speed Limit 45 mph Posted Speed Limit for trucks N/A

Are there traffic signals or interchanges in the area of the VWS site that would cause trucks to slow down? No, the site is an adequate distance from an intersection.

### State Police Staging Area

Is there a location for Weight Enforcement Officers to park and process VWS site data? (If yes, provide a location description and approximate distance from the proposed VWS site) Yes. Along the Shoulder of Limestone Rd approaching Valley Rd. This location is about a 1/2 mile south of the proposed VWS location.

**Pull Off Location for Inspection**

Is there a dedicated location for the Weight Enforcement Officers to pull over commercial vehicles? (If yes, provide a location description and approximate distance from Staging Area) \_\_\_\_\_ No \_\_\_\_\_

Is there a private location that Weight Enforcement Officers can pull over commercial vehicles? (If yes, provide a location description and approximate distance from Staging Area) \_\_\_\_\_ Yes. The parking lots of the Lantana Shopping Center and Pike Creek Shopping Center. The Lantana Shopping Center is about a ½ mile south of the VWS Site and the Pike Creek Shopping Center is located about 3 miles from the DSP staging area.

## Virtual Weigh Station Site Assessment Form

Date 9/6/18

Route and Direction SR 41 Southbound

County New Castle

Latitude 39.792738° Longitude -75.709092°

### WIM Location

#### Roadway characteristics

Pavement condition (New, Fair, Poor, Deficient)? Fair

Adequate road geometry (straight, level grade)? Straight and level grade

Lane Width 11 ft Shoulder width 12 ft

#### Equipment

Is there an area adjacent to the shoulder that for the cabinet, pole and foundation? Yes

Measured width of clearing from edge of pavement 15 ft

Cellphone service? Full LTE (AT&T)

#### Traffic

Posted Speed Limit 45 mph Posted Speed Limit for trucks N/A

Are there traffic signals or interchanges in the area of the VWS site that would cause trucks to slow down? No, the site is an adequate distance from an intersection.

### State Police Staging Area

Is there a location for Weight Enforcement Officers to park and process VWS site data? (If yes, provide a location description and approximate distance from the proposed VWS site) Yes. WFSF Bank and Hockessin Fire Company parking lots. Both locations are about  $\frac{3}{4}$  miles south of the VWS site.

**Pull Off Location for Inspection**

Is there a dedicated location for the Weight Enforcement Officers to pull over commercial vehicles? (If yes, provide a location description and approximate distance from Staging Area) Yes. The Emily Bissell Hospital. The location is about 3 ½ miles south of the staging areas.

Is there a private location that Weight Enforcement Officers can pull over commercial vehicles? (If yes, provide a location description and approximate distance from Staging Area) No.



## Virtual Weigh Station Site Assessment Form

Date 9/6/18

Route and Direction SR 41 Northbound

County New Castle

Latitude 39.784371° Longitude -75.683746°

### WIM Location

#### Roadway characteristics

Pavement condition (New, Fair, Poor, Deficient)? Fair

Adequate road geometry (straight, level grade)? Curve, Uphill

Lane Width 11 ft Shoulder width 13 ft

#### Equipment

Is there an area adjacent to the shoulder that for the cabinet, pole and foundation? Yes, but on an incline.

Measured width of clearing from edge of pavement 9 ft

Cellphone service? 3 of 4 Bars LTE (AT&T)

#### Traffic

Posted Speed Limit 45 mph Posted Speed Limit for trucks N/A

Are there traffic signals or interchanges in the area of the VWS site that would cause trucks to slow down? No, however there is a reduced speed ahead sign with a posted speed limit of 35 mph.

### State Police Staging Area

Is there a location for Weight Enforcement Officers to park and process VWS site data? (If yes, provide a location description and approximate distance from the proposed VWS site) Yes. WFSF Bank and Hockessin Fire Company parking lots. Both locations are about 3/4 miles north of the VWS site.

**Pull Off Location for Inspection**

Is there a dedicated location for the Weight Enforcement Officers to pull over commercial vehicles? (If yes, provide a location description and approximate distance from Staging Area) Yes. The Emily Bissell Hospital. The location is about 3 ½ miles south of the staging areas.

Is there a private location that Weight Enforcement Officers can pull over commercial vehicles? (If yes, provide a location description and approximate distance from Staging Area) No.

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