Exhibit O

Traffic/Route Study Report

TRAFFIC STUDY

NOTTINGHAM SOLAR PROJECT

HARRISON COUNTY, OHIO

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TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 PROJECT DESCRIPTION

Nottingham Solar LLC is proposing to develop, construct, and operate the 100-megawatts alternating current power (MWac) Nottingham Solar Project (Project), a PV solar energy generation facility in Harrison County, Ohio. The Project will include PV modules mounted on a racking system to maximize solar energy capture and electric generation of the array. The Project will connect to the regional transmission grid via AEP owned Nottingham 138 kV Substation. The purpose of the Project is to provide 100 MW of clean, cost-effective, renewable energy to the PJM Interconnection, LLC (PJM) transmission grid. The Project will generate electricity using virtually no fuels or water and with effectively zero air emissions and waste generation.

The project site is in Athens Township in Harrison County, Ohio, approximately 6.5 miles south of Cadiz, Ohio. SR 519 runs along the northern boundary of the project site. US 22 is located to the west and SR 149 is located to the east of the project. The location of the project is depicted as the red star in **Figure 1**.

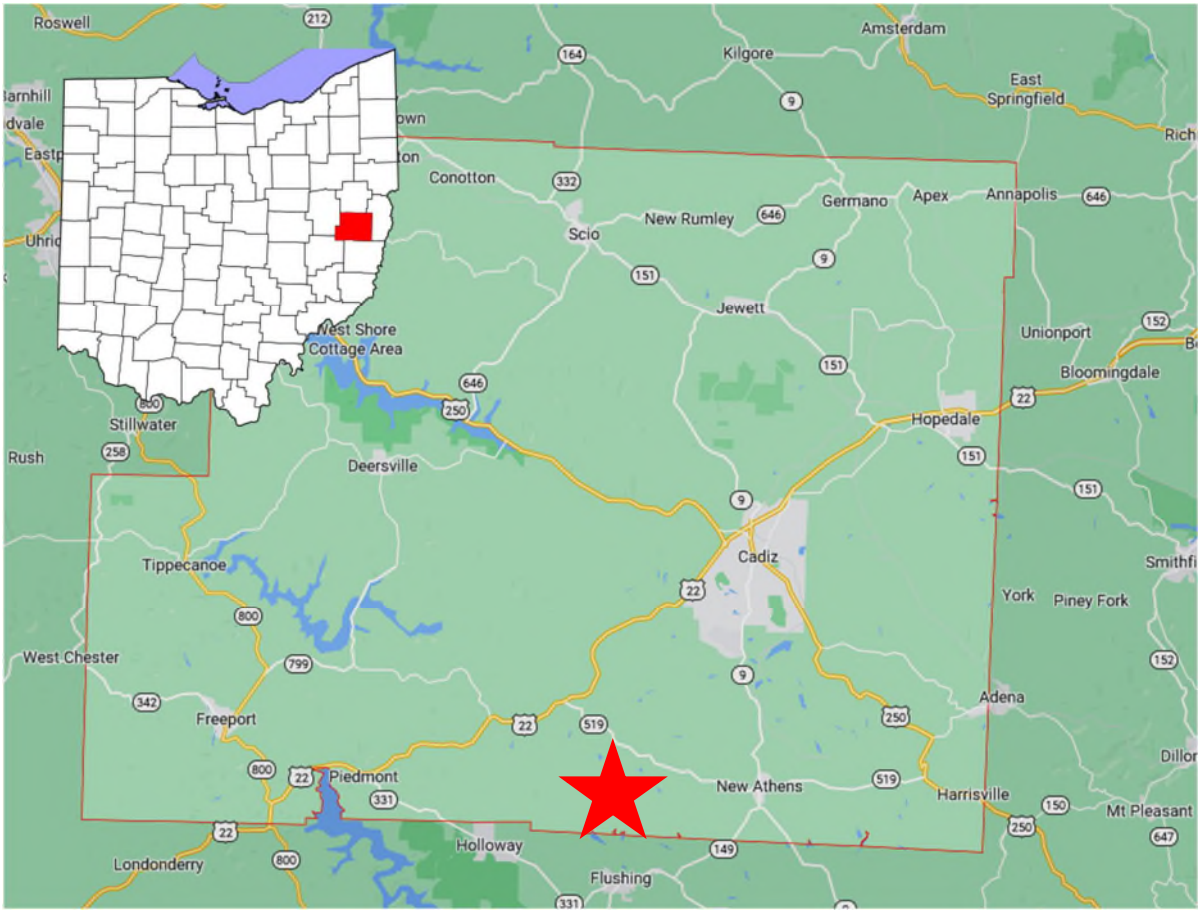


Figure 1 - Site Location

There are four locations where traffic can access the site. Access Points 1, 2, and 3 directly connect to SR 519 at existing access point locations. Access Points 1 and 2 are approximately 0.3 miles apart, and Access Points 2 and 3 are approximately 1.25 miles apart. Access Point 4 is a proposed, new connection to Jockey Hollow Road (TR 254). Traffic from the proposed Access Point 4 will turn left from the site to TR 254, then left on Cadiz Flushing Road (CR 29) to access SR 519. **Figure 2** depicts the proposed access points to the site.

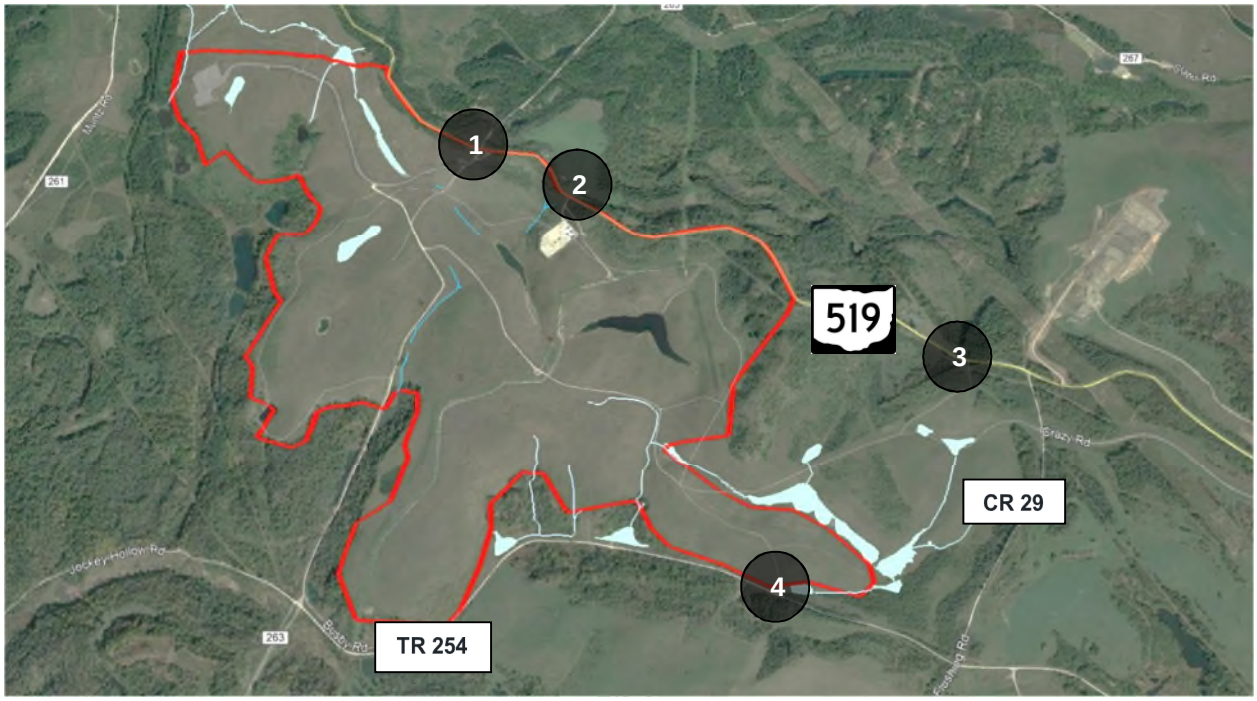


Figure 2 - Site Access Points

1.2 PURPOSE

The purpose of this traffic study is to provide supporting traffic information for a Certification and Public Need (Certification Application) to the Ohio Power Sitting Board (OPSB). This traffic study will project the traffic that will be generated during the construction phase and after construction for operational / maintenance activities. This study will identify and analyze routes that will likely be impacted by the projected traffic, as outlined in the Ohio Administrative Code (OAC) 4906-4-06F paragraphs 3 and 4. OAC 4906-4-06F (3) and (4) state the following:

OAC 4906-4-06F(3) –The applicant shall evaluate and describe the anticipated impact to roads and bridges associated with construction vehicles and equipment delivery. Describe measures that will be taken to improve inadequate roads and repair roads and bridges to at least the condition present prior to the project.

OAC 4906-4-06F(4) - The applicant shall list all transportation permits required for construction and operation of the project, and describe any necessary coordination with appropriate authorities for temporary or permanent road closures, lane closures, road access restrictions, and traffic control necessary for construction and operation of the proposed facility.

2 METHODOLOGY

2.1 PROJECTED TRAFFIC METHODOLOGY

This report analyzes potential impacts from traffic that will be generated during the construction and operational / maintenance phases of the project. The travel demand for each phase was determine by calculating the trips generated from work tasks and deliveries. The design vehicles associated with these trips were also identified to further evaluate the impact of this traffic to the existing roadway system. The project is expected to be constructed in 2023 and take approximately nine months to complete. A conservative planning horizon of 2026 (five years) was used to account for growth that may occur during construction of the project, and factor in unforeseen delays.

2.2 ROUTES INCLUDED IN THE STUDY

This study evaluates roadway segments that are likely to be used to access the site. It was assumed that traffic would use Interstates and Principal Arterial roadways to travel to the general project area. From there traffic would access the site from Major Collectors and Local Roadways.

The Ohio Department of Transportation (ODOT) classifies roadways as Arterials, Collectors and Local Roads. The primary function of Arterials is to provide mobility for large volumes of traffic and longer distances, Collectors provide a balance of both mobility and connectivity, and local roads focus on connectivity. More information on each roadway classification can be found in ODOT's publication, "ODOT Highway Function Classification System Concepts, Procedures and Instructions."

Principal Arterials were assumed to have adequate physical characteristics and capacity to accommodate traffic generated from the site. This study focuses on the roadways that connect the Principal Arterials and the project site, and includes SR 519 (from US 22 to SR 9), SR 9 (from I-70 to SR 519), CR 29 (from TR 254 to SR 519), and TR 254 (from the site to CR 29). These routes are highlighted in **Figure 3**.

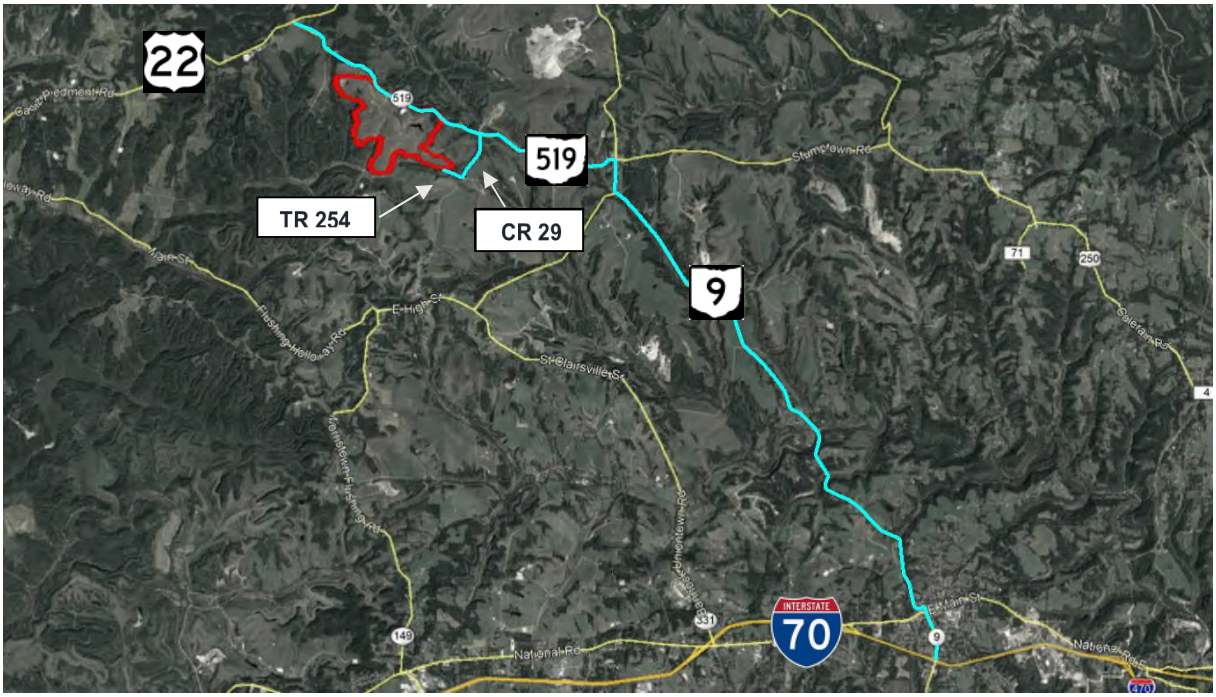


Figure 3 - Routes Included in the Study

3 CONSTRUCTION TRAVEL DEMAND

3.1 SCHEDULE / WORK TASKS

The construction phase of this project was assumed to last approximately nine (9) months and employ approximately 400 people. It was assumed all 400 people would be on site for the nine (9) month construction phase of this project.

Typical work tasks for solar farm construction are listed, below in general chronological order. However, many of these tasks can occur simultaneously.

1. Survey project site and set construction stakes
2. Install and maintain erosion and sediment control
3. Grade field office location and place aggregate
4. Deliver and install field office trailers
5. Grade staging areas and place aggregate surface
6. Improve public roads – if required / as needed
7. Construct internal access roads – grade and place aggregate
8. Erect security fencing – enclosing arrays and facilities
9. Place racking foundations
10. Assemble solar array racking
11. Mount PV modules
12. Connect DC wiring
13. Grade equipment pad areas
14. Construct foundations for equipment pads / skids
15. Place and connect inverter / transformer, electrical components and SCADA system
16. Trench Collector System (MVAC)
17. Grade substation area
18. Construct substation equipment and main power transformer foundations
19. Place substation aggregate
20. Install substation equipment
21. Connect substation to transmission line
22. Test and commission equipment
23. Remove field offices
24. Remove staging area security fences and aggregate
25. Restore, revegetate and remove temporary erosion and sediment control

3.2 CONSTRUCTION EQUIPMENT

Typical construction equipment and the corresponding vehicles needed to transport, deliver and remove the equipment from the site were identified. The list was based on equipment used for similar solar farm construction. A summary of expected equipment and corresponding transportation vehicles are shown in **Table 1**.

EQUIPMENT	TRANSPORTATION VEHICLE	COMMENTS
Survey / 2 Person Crew	Pickup Truck	One truck per crew
Bulldozers	Flat Bed Semi Trailer	Grading
Skid Steer – Fence Installer	Flat Bed Semi Trailer	Fence installation
Skid Steer – Aggregate Placement	Flat Bed Semi Trailer	Aggregate placement
Skid Steer – Racking Installation	Flat Bed Semi Trailer	Rack Installation
Solar Pile Driver	Flat Bed Semi Trailer	Pile Installation
Trencher Skid Steer Attachment	Flat Bed Semi Trailer	Trenching for collection lines and silt fencing
Crane	Crane	Construction of substation and substation interconnect transmission lines and installation of 32 inverters throughout the site
Lull	Lull	Handling materials
Water Trailer	Trailer Delivery	Compaction, dust control

Table 1 - Construction Equipment and Transportation Vehicles

3.3 MATERIALS

Typical materials and the corresponding vehicles needed to deliver materials to the site were identified. The list of was determined by reviewing materials used for similar solar farm construction. A summary of expected materials and corresponding transportation vehicles are shown in **Table 2**.

MATERIAL	TRANSPORTATION EQUIPMENT
Erosion Control and Revegetation Materials	Flat Bed Semi Trailer
Fencing Materials and Posts	Flat Bed Semi Trailer
Panels	Semi-Tractor Trailer
Racking Steel	Flat Bed Semi Trailer
Miscellaneous Racking Components	Box Truck
Inverters	Flat Bed Semi Trailer
Substation Transformers	Semi Flat Bed (Overweight)
Concrete (Foundations)	Cement Mixer
Aggregate (Roads, staging areas, substation)	Semi 18-Wheeler
Construction Trailers	Trailer + Delivery Semi
Miscellaneous conduit, wiring, connectors, combiner boxes	Box Truck
Sanitation	Trailer Delivery

Table 2 - Construction Materials and Transportation Vehicles

3.4 VEHICLE TYPES

Construction equipment and materials will be transported using vehicles such as flat bed semi-trailers, tractor-semi trailers, semi 18 wheelers, box trucks, cement mixers, and other miscellaneous trailer deliveries. Most of the vehicles used for transportation of construction equipment and materials will be of legal weight and dimensions. However, some oversize vehicles may be necessary for transportation of materials such as the flat bed semi needed to transport substation transformers.

4 EXISTING CONDITIONS OF THE PROJECT AREA

4.1 ROADWAY CLASSIFICATIONS

Roadway classifications of the routes within the study area were identified with roadway classification maps, obtained from ODOT's TIMS (Transportation Information Mapping System) website. These maps show that SR 519 and SR 9 are classified as major collectors. The primary function of collectors is to distribute traffic from arterial routes.

CR 29 and TR 256 are classified as local roadways. The primary function of local routes is to provide access to adjacent land uses. CR 29 and TR 256 have a smaller cross section than the state routes and are not currently paved.

Roadway classification maps for Harrison and Belmont counties is provided in **Appendix A**.

4.2 TRAFFIC VOLUME DATA

Existing traffic volume data was collected from ODOT's TIMS website for SR 519 and SR 9. To account for the reduced travel demand relating to COVID-19, 2019 traffic counts were used. Traffic counts were not available for CR 29 or TR 254. Traffic volumes on these routes vary greatly from day to day, based on the activity at the adjacent land use. A conservative estimate of 50 vehicles per day was assumed based on the adjacent land use and density of access spacing. Existing traffic volumes data is summarized in **Table 3**.

ROUTE	FROM	TO	EXISTING ADT
SR 519	US 22	SR 9	347
SR 9	SR 519	SR 149	4345
SR 9	SR 149	TR 10 (Maynard Rd)	2347
SR 9	TR 10 (Maynard Rd)	TR 56 (Vineyard Rd)	5395
SR 9 (Newel Ave)	TR 56 (Vineyard Rd)	SR 9 (S Marietta St)	5101
SR 9 (S Marietta St)	SR 9 (Newel Ave)	High Street	7285
SR 9 (S Marietta St)	High Street	I-70	8667
CR 29 (Cadiz Flushing Rd)	TR 254 (Jockey Hollow Rd)	SR 519	50
TR 254 (Jockey Hollow Rd)	Site	CR 29 (Cadiz Flushing Rd)	50

Table 3 - Existing Average Daily Traffic (ADT)

4.3 CRASH DATA

The crash history of routes within the study area was reviewed for the three-year period from 2017 through 2019. During this time there were a total of 158 crashes on SR 519 and SR 9. No crashes occurred on CR 29 or TR 254. Three of the crashes resulted in a serious injury, and no crashes resulted in a fatality. A summary of crashes by segment is provided in **Appendix B**.

SR 519 and SR 9 were also reviewed to identify segments that appear on ODOT's Safety Integrated Project (SIP) maps. These maps use high level crash data to highlight intersections and roadway segments with higher than expected crash frequencies based on traffic volumes and physical characteristics of the location. One segment appeared on this list:

SR 9 – This curved segment of roadway is located within Belmont County between milepoint 22.3 and 22.6. Within the curve, SR 9 intersects with Unity Church Road. Historic crash data for the three-year period from 2017 through 2019 was reviewed, yielding the following information:

- Six total crashes
    - 2 – Animal
    - 2 – Fixed Object (both in wet road conditions)
    - 1 – Sideswipe Passing
    - 1 – Overturning (Occurred while vehicle was making right turn onto Unity Church Road)
- No serious injuries or fatalities

There is an insufficient number of data points to discern a clear crash pattern in this location. This indicates that safety impacts from construction and operation traffic will be minimal.

4.4 SCHOOL BUS ROUTE INFORMATION AND MASS TRANSIT SYSTEMS

Per 2010 US Census, the site is within the Harrison Hills City School District, which includes Harrison Central Elementary and Harrison Central Jr./Sr. High School. The two schools share a campus on Huskies Way in Cadiz, Ohio. The project's impact on school transportation is expected to be minimal, because most of the deliveries and project traffic will occur outside of pick up and drop off time periods.

There are no rail or bus mass transit systems within the project area.

4.5 EMERGENCY SERVICE RESPONDER INFORMATION

The Harrison Community Hospital provides emergency medical services to the project area. This hospital is located at 951 E Market Street (US 250) in Cadiz, Ohio, approximately 6.5 miles northwest of the project area. The shortest route to the hospital is approximately 12 miles and includes driving northwest on SR 519 to US 22, northeast on US 22 to US 250, and southeast on US 250 through Cadiz.

The Cadiz fire station provides fire services to the project area. The first station is located approximately 6.5 miles northwest of the project area at 160 N Main Street (US 250) in Cadiz, Ohio. The shortest route to the fire station is approximately 10 miles and includes driving northwest on SR 519 to US 22, northeast on US 22 to US 250, and southeast on US 250 through Cadiz.

The project will incorporate an Emergency Response Plan. This plan will outline procedures for fire and emergency services, including locations of emergency equipment and procedures for fire, medical and weather-related emergencies. The project team will schedule regular meetings and provide training for the fire department and other emergency providers. All project components will meet state and federal fire codes.

5 POTENTIAL IMPACTS TO ROADWAYS

5.1 ANTICIPATED CONSTRUCTION TRAFFIC SOURCES

Traffic along roadways within the study area will temporarily increase during the construction phase of this project. Construction activities will generate traffic from sources such as daily workforce commuters, material deliveries, and equipment deliveries. Anticipated construction traffic sources were evaluated to determine how traffic will be distributed throughout the project area.

WORKFORCE

It is assumed that the construction workforce will commute from nearby towns and villages. A minimum of 80% of the workforce will reside in Ohio, per Ohio's Payment in leu of Taxes (PILOT) statute. To determine the distribution of workforce traffic, locations were assigned a proportion of the trips, based on the population and the proximity to the project site. The proportion of workers from Wheeling, West Virginia was capped at 20%, to comply with the PILOT statute.

All workers were assumed to generate two trips per day, one entering the site and one exiting the site. Most of the workforce will use Access Point 1 (70%). However, workers for the Substation and eastern array will utilize Access Point 3 (20%), and workers for the southern array will utilize the proposed Access Point 4 (10%). A summary of likely workforce housing locations is shown in **Table 4**.

CITY	POPULATION	PROXIMITY TO THE SITE	% OF WORKFORCE
Cadiz	3,165	8.3 miles	17%
Steubenville	17,988	33.3 miles	29%
Uhrichsville	5,384	30.8 miles	16%
St Clairsville	5,072	15.5 miles	18%
Wheeling	27,062	24.5 miles	20%

Table 4 - Workforce Housing Locations

CONSTRUCTION EQUIPMENT

The construction equipment that will be used for this project will be transported to the site on commercial delivery vehicles. One inbound and one outbound trip will be generated for each delivery, and one inbound and one outbound trip will be generated for each removal. All trips were assumed to originate and return to the same location. Additionally, trips were distributed amongst access points based on the proposed site layout. A summary of construction equipment, origin/destination information, Access Point distribution is provided in **Appendix C**.

CONSTRUCTION MATERIALS

Materials that will be used for this project will be transported to the site on commercial delivery vehicles, generating one inbound and one outbound trip. All trips were assumed to originate and return to the same location. Additionally, trips were distributed amongst access points based on the proposed site layout. A summary of construction materials, origin/destination information, Access Point distribution is provided in **Appendix C**.

5.2 PROJECTED CONSTRUCTION TRAFFIC

The volume of daily traffic generated during the construction phase of the site was calculated with a summation of the estimated trips generated by the workforce, equipment deliveries, and materials deliveries.

During construction, the site will temporarily generate approximately 850 trips per day, including 425 inbound and 425 outbound trips. These trips were distributed throughout the study area based on the distribution determined in Section 5.1, resulting in approximately 400 additional trips per day on the segment of SR 519 between the site and US 22, 450 additional trips per day on the segment of SR 519 between the site and SR 9 and along SR 9 to I-70, 35 additional trips per day on CR 29, and 35 additional trips per day on TR 254. Construction trips generated from workforce, equipment deliveries, and materials deliveries is in **Appendix D**.

Trips generated from the workforce account for the largest portion of construction traffic. The project is expected to employ approximately 400 people per day, based on comparisons to similar solar farm sites. By assuming two trips per day for each vehicle and 1.5 passengers per vehicle, the workforce will generate approximately 540 trips per day of light duty vehicles. Based on the layout of the site it was assumed that 70% of workers will use Access Point 1, 20% will use Access Point 3, and 10% will use the proposed Access Point 4.Workforce trips were routed through the study area based on probable routes to nearby housing, as discussed in Section 5.1.

Equipment and materials deliveries are expected to generate approximately 320 trips per day. These trips were distributed amongst the four access points, based on the layout of the site and the anticipated construction sequence. Aggregate and Hay deliveries represent the largest portion of these trips, accounting for 80 trips per day.

Figure 4 summarizes the estimated trips generated by construction traffic at each Access Point. Note that Access Point 4 is shown twice to illustrate how traffic is dispersed, once it reaches SR 519.

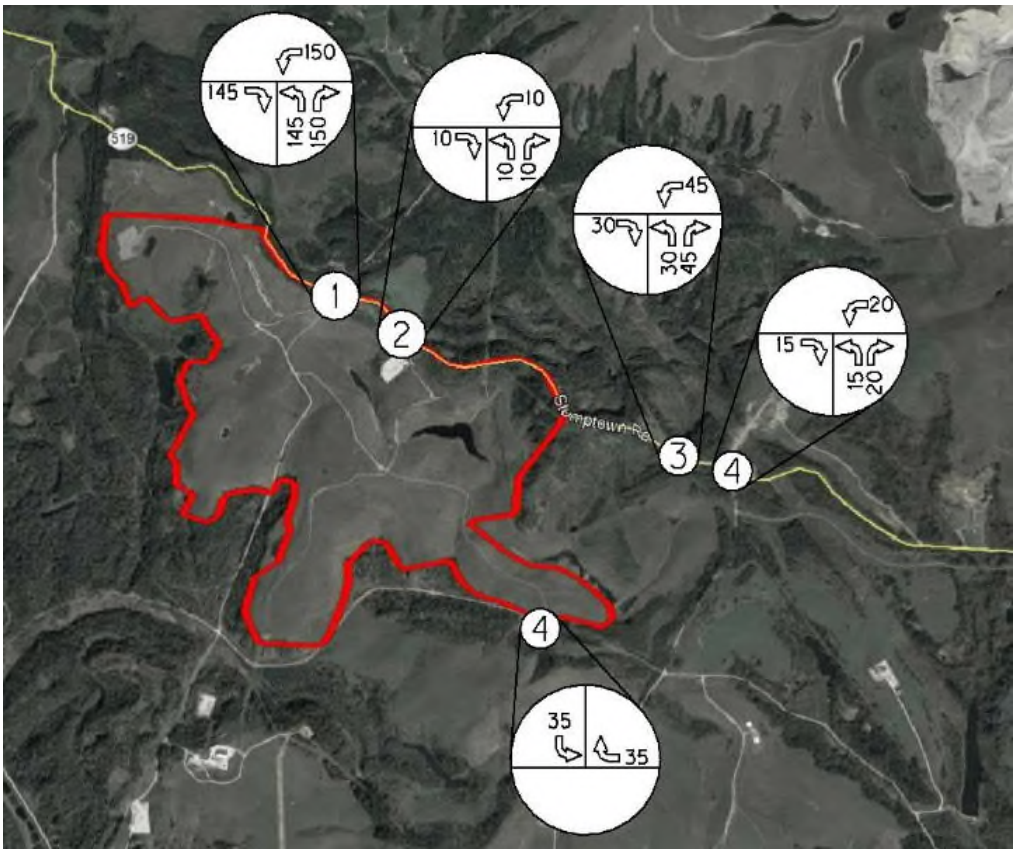


Figure 4 - Trips Generated from Construction Traffic

5.3 CAPACITY ANALYSIS

To analyze the impact of the construction traffic, a capacity analysis was completed for a No Build scenario and a Build scenario. The No Build scenario represents 2026 traffic conditions without the proposed site. The Build scenario represents 2026 traffic conditions during the construction phase of the proposed site. A conservative planning horizon of 2026 (five years) was used to account for growth of background traffic and unforeseen delays.

2026 NO BUILD TRAFFIC VOLUMES

Traffic volumes for the 2026 No Build scenario were developed by projecting the existing traffic volumes to 2026. A conservative growth rate of 2% was used, to account for traffic volume growth that may occur before and during construction. Design Hourly Volume was then calculated (DHV), which represents the 30th highest yearly hourly volume. The DHV for the No Build scenario was then determined by applying a K-factor and a directional factor to the 2026 estimated average daily traffic volumes. The K and directional factors are measured when gathering traffic volumes and was provided from ODOT's TIMS website.

2026 BUILD TRAFFIC VOLUMES

The DHV for the Build scenario was developed by adding the estimated volume of traffic during the construction phase of the project to the 2026 "No Build" volumes and applying the K and directional factors. The directional DHV for the 2026 "No Build" and the "2026" Build scenarios was then used to analyze the impact of the construction traffic on the roadway network within the study area.

LEVELS OF SERVICE AND V/C RATIOS

Levels of Service (LOS) and Volume to capacity ratios (V/C Ratios) for both scenarios were calculated using Highway Capacity Software version 7.9, two-lane module. LOS is a qualitative measure of traffic operations with a range from LOS A, free flowing, to LOS F, severe congestion **(Figure 5).** V/C ratios were also calculated using Highway Capacity Software, to estimate the change in density from the construction traffic. Highway Capacity Software Reports are in **Appendix E**.

A summary of DHV, LOS, and V/C Ratios for the 2026 Build and No Build scenarios are shown in **Table 5**. The construction traffic will slightly increase the traffic density on the roadway but will not have a significant impact on LOS. The largest increase in volume will occur on SR 519, between the site and US 22, since this is the most direct route to access the site.

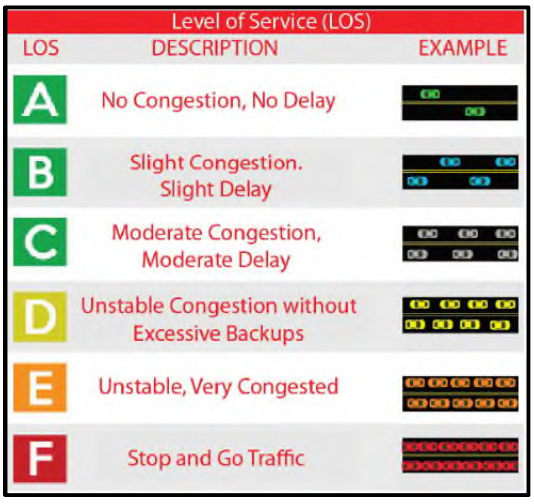


Figure 5 - Level of Service (LOS) Description

ROUTE	FROM	TO	2026 NO BUILD			2026 BUILD		
			DHV	LOS	V/C	DHV	LOS	V/C
SR 519	US 22	Site	20	A	1%	50	A	3%
SR 519	Site	SR9	20	A	1%	50	A	3%
SR 9	SR 519	SR 149	240	C	15%	270	C	17%
SR 9	SR 149	TR 10 (Maynard Rd)	130	A	8%	150	A	9%
SR 9	TR 10 (Maynard Rd)	TR 56 (Vineyard Rd)	360	C	23%	380	C	24%
SR 9 (Newel Ave)	TR 56 (Vineyard Rd)	SR 9 (S Marietta St)	290	B	18%	320	B	20%
SR 9 (Marietta St)	SR 9 (Newel Ave)	High St	470	D	29%	490	D	31%
SR 9 (Marietta St)	High St	I-70	530	D	34%	550	D	34%

Table 5 - 2026 Build and 2026 No Build DHV, LOS, and V/C

5.4 ESTIMATED OPERATIONAL AND MAINTENANCE TRAFFIC

After construction is complete, there will not be daily trips generated by the site. Maintenance activities will occur on a quarterly basis, and vegetation management will occur three times per year during the spring and summer months. These activities will produce very little traffic, with minimal impacts to the roadway network.

5.5 PHYSICAL ROADWAY CONDITIONS

Traffic generated from construction activities will temporarily increase the volume of commercial vehicles on the roadways within the study area. The physical condition of these routes influences their ability for to accommodate the additional commercial vehicles. This evaluation included a review of bridges, pavement conditions, overhead clearances, horizontal clearances, lane widths and shoulder widths.

BRIDGES

Existing conditions of bridges within the study area were evaluated by reviewing sufficiency ratings, general appraisals, and potential weight restrictions from ODOT's TIMS website. The sufficiency rating is a measure of adequacy for the bridge to meet the needs of the public. The lower the sufficiency rating of the bridge, the lower the ability of the bridge to meet the needs of the general public. Bridges with sufficiency ratings greater than 80 are generally not considered deficient. The sufficiency rating calculation includes the condition of the bridge, geometry of the bridge, the average daily traffic using the bridge, detour lengths, vertical and horizontal clearances, bridge capacity, and other factors. The sufficiency ratings of bridges within the study area are 89 or higher, which does not indicate a deficiency.

The general appraisal is a composite measure of the major structural items on the bridge such as beams, piers, and abutments. It is based on the existing condition of the bridge as compared to its as-built condition. The general appraisal is rated from 0-9, with ratings of 5 or more meaning the bridge is considered in acceptable condition. The general appraisal of bridges within the study area are all 5 or greater.

No weight restrictions were identified on any of the structures within the study area. A summary of bridge information within the study area is shown in **Table 6**.

Route	Bridge ID	Lane Width	Sufficiency Rating	General Appraisal	Weight Restriction	Location Information
SR 519	3402878	12’	95.8	9	No	SR 519 over Busby Road
SR 519	3402894	12’	89	5	No	SR 519 over Campbell Run
SR 9	3400107	12’	95.7	8	No	SR 9 over Misc. Branch of Campbell Run, Harrison Co
SR 9	3400042	11’	98.1	6	No	SR 9 over Misc. Branch of Campbell Run, Harrison Co
SR 9	0701270	11’	97.3	8	No	SR 9 over Misc. Branch of Campbell Run, Belmont Co
SR 9	0701246	11’	93.8	7	No	SR 9 over McCracken Run, Belmont Co
SR 9	0701211	11’	86.4	6	No	SR 9 over Wheeling Creek, Belmont Co
SR 9	0701181	12’	95.6	8	No	SR 9 over Pogue Run, Belmont Co
SR 9	0701157	10’	96.8	8	No	SR 9 over Misc. Branch of Jug Run, Belmont Co

Table 6 - Bridge Information

PAVEMENT CONDITIONS

Pavement Condition Ratings (PCR) from ODOT’s TIMS website were used to evaluate the condition of pavement along routes within the study area. The PCR is based on a visual inspection of the roadway and represent the composite effects of varying types of distress. PCR values range from 0 (Very Poor) to 100 (Very Good) with 100 representing no distress and 0 representing high levels of severe distress. A summary of PCR values for routes within the study area is shown in **Table 7**. On paved routes, values range from 63 (Fair to Poor) to 94 (Very Good).

CR 29 and TR 254 within the project area are unpaved, gravel routes. These routes are in moderate condition, with potholes and rutting present. Improvements to the base and/or the gravel layer may be needed to support the traffic from heavy vehicles during the construction of the project. Improvement and maintenance requirements will be coordinated with the County Engineer.

ROUTE	From	To	PCR
SR 519	US 22	SR 9	74 (Fair)
SR 9	SR 519	SR 149	94 (Very Good)
SR 9	SR 149	TR 10 (Maynard Rd)	76 (Good)
SR 9	TR 10 (Maynard Rd)	TR 56 (Vineyard Rd)	75 (Good)
SR 9 (Newel Ave)	TR 56 (Vineyard Rd)	SR 9 (S Marietta St)	76 (Good)
SR 9 (S Marietta St)	SR 9 (Newel Ave)	High Street	63 (Fair to Poor)
SR 9 (S Marietta St)	High Street	I-70	82 (Good)
CR 29 (Cadiz Flushing Rd)	TR 254 (Jockey Hollow Rd)	SR 519	Unpaved
TR 254 (Jockey Hollow Rd)	Site	CR 29 (Cadiz Flushing Rd)	Unpaved

Table 7 - Pavement Condition Rating (PCR) Values

VERTICAL CLEARANCES, HORIZONTAL CLEARANCES, LANE WIDTHS, AND SHOULDER WIDTHS

Vertical and horizontal clearances were reviewed along routes with no identified obstructions. Along the study routes there are no underpasses, and there are no marked clearance warnings. Horizontal clearances along routes did not extend far beyond the shoulder or guardrail, which is common on rural routes.

Lane and shoulder widths were measured along study routes. On state routes lane widths range from 10-12 feet, with minimal shoulders that range from one to four feet. On SR 9 through St. Clairsville, there is on-street parking adjacent to the through lanes. Lane widths on state routes within the study will accommodate vehicles of legal size.

The total width of CR 29 and TR 254 is 16 feet. Lane width is assumed to be eight feet in each direction in these locations, with no shoulders. The Federal Highway Administration's publication, "Gravel Roads Construction and Maintenance Guide" recommends 20 feet of roadway width for gravel roads that serve as industrial/commercial access. To accommodate the construction traffic the portion of CR 29 and TR 254 from SR 519 to the site should be widened from 16 feet to 20 feet, or as directed by the County Engineer.

The existing lane and shoulder widths for routes within the study area are provided in **Table 8**.

ROUTE	FROM	TO	LANE WIDTH	SHOULDER WIDTH
SR 519	US 22	SR 9	11'	1'
SR 9	SR 519	SR 149	10'	4'
SR 9	SR 149	TR 10 (Maynard Rd)	11'	1'
SR 9	TR 10 (Maynard Rd)	TR 56 (Vineyard Rd)	11'	1'
SR 9 (Newel Ave)	TR 56 (Vineyard Rd)	SR 9 (S Marietta St)	10'	2'
SR 9 (S Marietta St)	SR 9 (Newel Ave)	High Street	10'	Parking
SR 9 (S Marietta St)	High Street	I-70	11'	4'
CR 29 (Cadiz Flushing Rd)	TR 254 (Jockey Hollow Rd)	SR 519	8'	0'
TR 254 (Jockey Hollow Rd)	Site	CR 29 (Cadiz Flushing Rd)	8'	0'

Table 8 - Lane and Shoulder Widths

6 PERMITS AND AGREEMENTS

The contractor must obtain necessary permits from ODOT and the County Engineer, prior to construction of the site. The County Engineer may require a Road Use and Maintenance Agreement (RUMA) for construction activities. This agreement will include procedures for temporary road closures, lane closures, road access restrictions, and traffic control.

ODOT will require a Right-of-Way Permit that will includes Access Points 1-3 as well as any additional work that may be performed within the ODOT right-of-way, including work at the intersection of SR 519 and CR 29. ODOT will also require Utility Permits for locations where collection lines cross ODOT maintained routes. The proposed Access Point 4 on CR 254 (Jockey Hollow Rd) will require a permit from the County Engineer.

Special Hauling Permits will be required for vehicles that exceed legal dimensions or weights. Although most construction traffic will not exceed the legal size, the vehicle delivering the transformer may require this type of permit.

7 SUMMARY

This study shows that the impact from construction traffic will be temporary and minimal. Roadways within the project area have sufficient capacity to accommodate the traffic generated from construction of the site without degrading the levels of service of the roadway.

The state maintained roadways have the physical characteristics to accommodate construction traffic. However, CR 29 and TR 254 are gravel roadways that will need improvements to the subgrade and gravel layer to support the heavy vehicles expected during construction of the site. Additionally, these routes will need to be widened from 16 feet to 20 feet to meet guidance from the Federal Highway Administration on gravel roadways for industrial/commercial access. However, final roadway improvements will need to be coordinated with the County Engineer.

The contractor will need to obtain a Special Hauling Permit from ODOT for any overweight or oversized loads. All work will be coordinated and approved by the appropriate regulatory agency prior to construction.

This study was completed during the preliminary phases of the project. The site design will need to be completed to finalize all transportation related construction activities and vehicle characteristics. This information will be needed to complete permit applications and to execute a RUMA between the County Engineer and the Contractor.

APPENDIX A

ROADWAY CLASSIFICATION MAPS

Roadway Functional Classification 2018

County - Harrison

TIMS TRANSPORTATION INFORMATION MAPPING SYSTEM

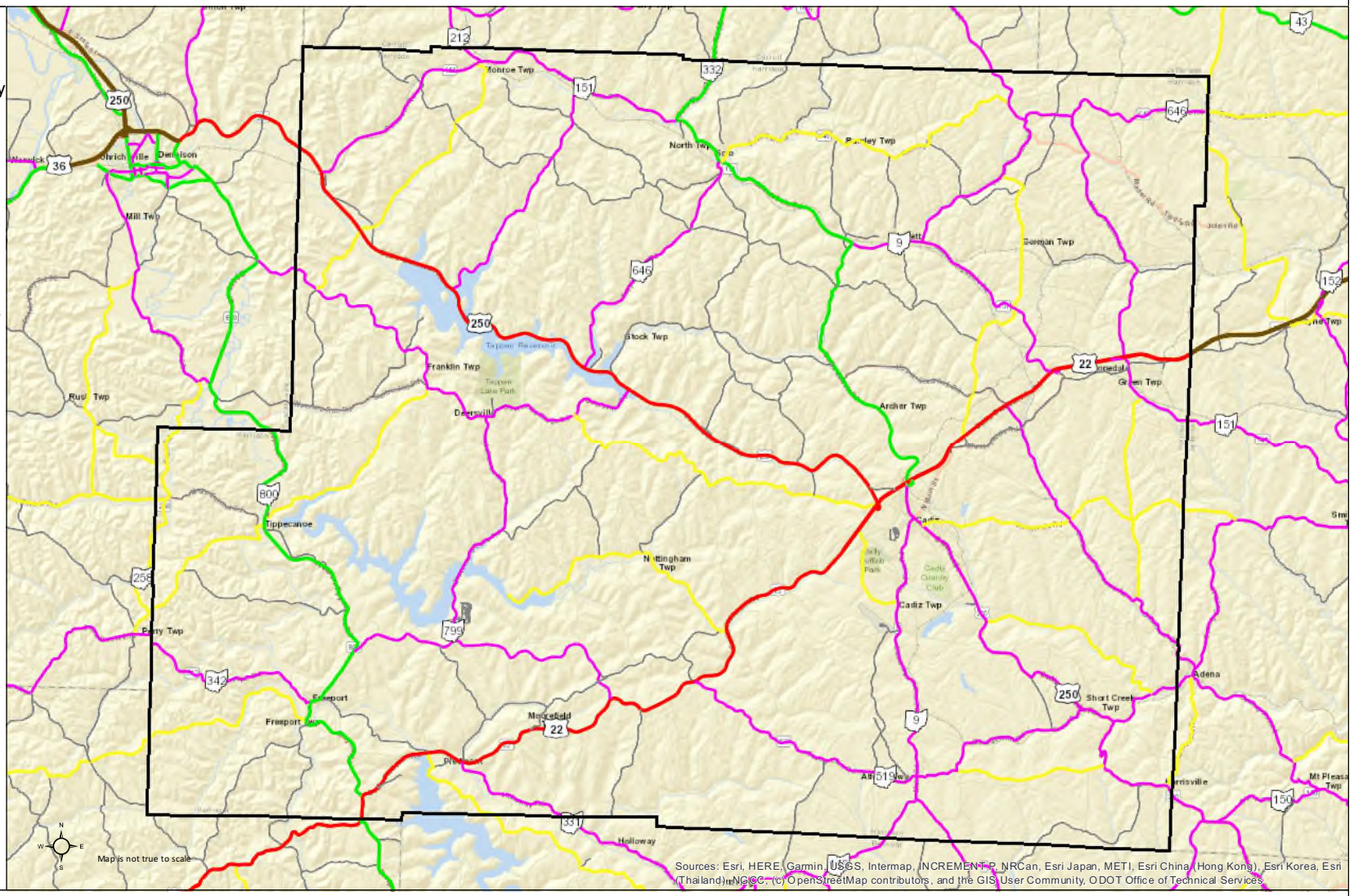
Legend

Functional Class

- 2 - Other Freeway and Expressway
- 3 - Principal Arterial
- 4 - Minor Arterial
- 5 - Major Collector
- 6 - Minor Collector
- 7 - Local

This map depicts the Roadway Functional Classifications as of January 1, 2018. Functional Classification is the grouping of roads, streets, and highways in a hierarchy based on the type of highway service they provide. Functional Classifications as defined by the Federal Highway Administration (FHWA) are as follows:

(01) Interstates
(02) Other Freeways or Expressways
(03) Other Principal Arterial Roads
(04) Minor Arterial Roads
(05) Major Collector Roads
(06) Minor Collector Roads
(07) Local Roads



Roadway Functional Classification 2018

County - Belmont

TIMS TRANSPORTATION INFORMATION MAPPING SYSTEM

Legend

Functional Class

- 1 - Interstate
- 2 - Other Freeway and Expressway
- 3 - Principal Arterial
- 4 - Minor Arterial
- 5 - Major Collector
- 6 - Minor Collector
- 7 - Local

This map depicts the Roadway Functional Classifications as of January 1, 2018. Functional Classification is the grouping of roads, streets, and highways in a hierarchy based on the type of highway service they provide. Functional Classifications as defined by the Federal Highway Administration (FHWA) are as follows:

(01) Interstates
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(03) Other Principal Arterial Roads
(04) Minor Arterial Roads
(05) Major Collector Roads
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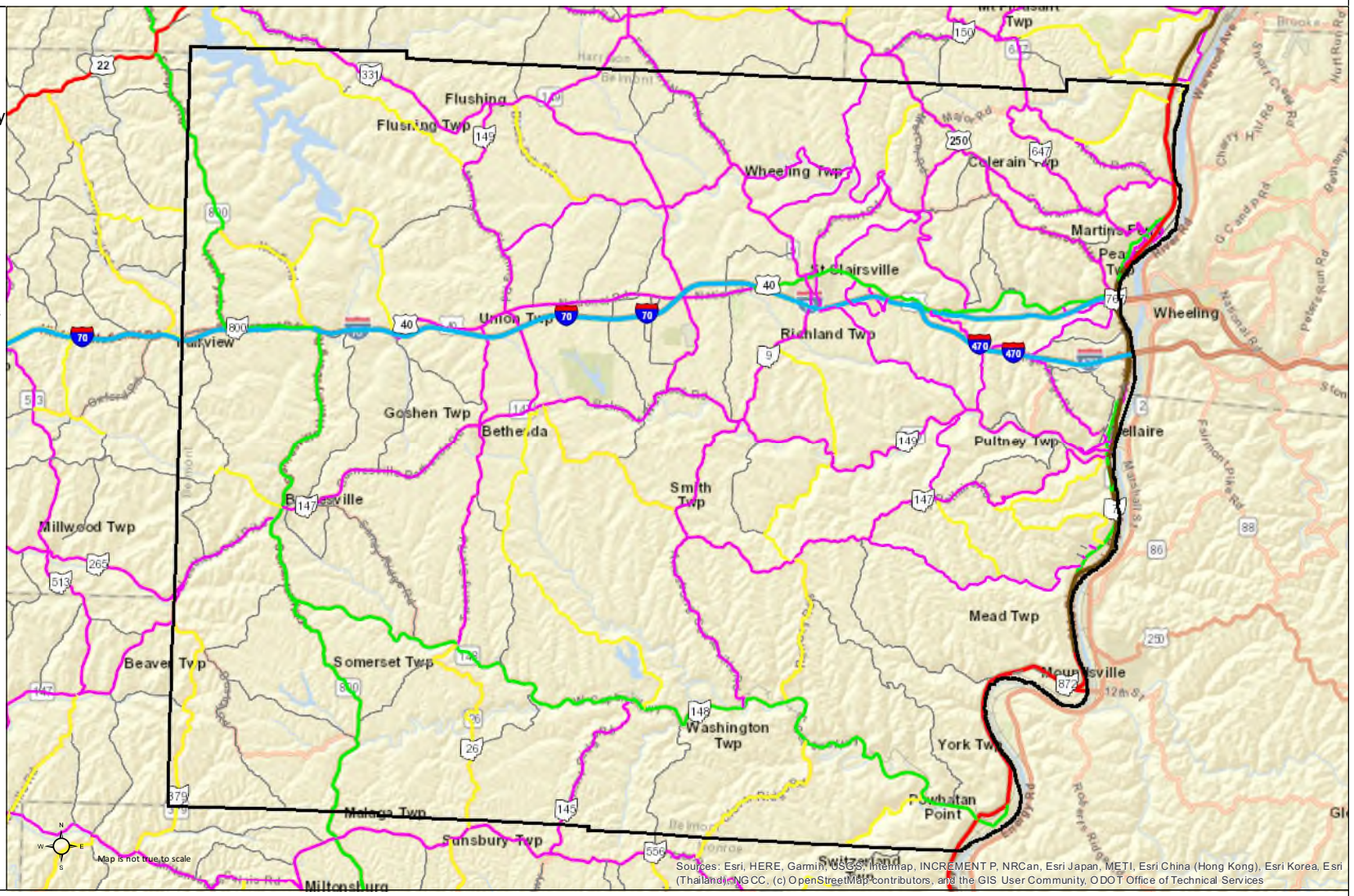
(07) Local Roads



APPENDIX B

SAFETY

ROUTE	FROM	TO	SEGMENT LENGTH (MILES)	TOTAL CRASHES	CRASHES WITH SERIOUS INJURY	CRASHES WITH FATALITY
SR 519	US 22	SR 9	0.4	4	0	0
SR 9	SR 519	SR 149	0.5	11	0	0
SR 9	SR 149	TR 10 (Maynard Rd)	5.5	67	0	0
SR 9	TR 10 (Maynard Rd)	TR 56 (Vineyard Rd)	2.9	11	0	0
SR 9 (Newel Ave)	TR 56 (Vineyard Rd)	SR 9 (S Marietta St)	0.8	18	0	0
SR 9 (S Marietta St)	SR 9 (Newel Ave)	High St	0.5	30	0	0
SR 9 (S Marietta St)	High St	I-70	0.4	17	0	0
CR 29 (Cadiz Flushing Rd)	TR 254 (Jockey Hollow Rd)	SR 519	0.5	0	0	0
TR 254 (Jockey Hollow Rd)	Site	CR 29 (Cadiz Flushing Rd)	0.8	0	0	0

APPENDIX C

CONSTRUCTION TRAFFIC DISTRIBUTION

ITEM	ORIGIN OF LOAD (N,S,E,W)	ENTRANCE			
		#1	#2	#3	#4
WORKFORCE					
Surveying	E	100%	0%	0%	0%
Personnel (400, 1 vehicle each, everyday)	N	70%	0%	20%	10%
EQUIPMENT					
Grading Equipment, Bulldozers	E	100%	0%	0%	0%
Skid Steer for Fence Installation (incl. air operated post driver)	E	70%	12%	12%	6%
Skid Steer for Aggregate Placement	E	70%	12%	12%	6%
Skid Steer for Racking Installation	E	70%	12%	12%	6%
Solar Pile Driver for Pile Installation	E	70%	12%	12%	6%
Trencher Skid Steer Attachment for Collection Lines and Silt Fencing	E	70%	12%	12%	6%
Crane	E	100%	0%	0%	0%
Lull	N	40%	20%	20%	20%
MATERIALS					
Hay for Revegetation (Assumes 500 acres need revegetating)	E	70%	12%	12%	6%
Grass Seed for Revegetation (Assumes 500 acres need revegetating)	E	70%	12%	12%	6%
Fencing (73,625 linear feet) Delivery	E	70%	12%	12%	6%
Fencing Posts (1 per 10 ft fence) Delivery	E	70%	12%	12%	6%
Silt Fence Materials (115,700 linear feet) Delivery	E	100%	0%	0%	0%
Hay Bales for Erosion Control	E	100%	0%	0%	0%
Panels	E	70%	12%	12%	6%
Racking Steel	E	70%	12%	12%	6%
Racking Components	E	70%	12%	12%	6%
Inverters	W	65%	13%	13%	9%
Substation Transformer	W	0%	0%	100%	0%
Concrete	N	0%	0%	100%	0%
Rocks/Substrate					
Laydown Areas	S	100%	0%	0%	0%
Existing Road Outside Array Area	S	70%	12%	12%	6%
Proposed Roadways within Array Area	S	70%	12%	12%	6%
Turnarounds	S	70%	12%	12%	6%
Equipment Pads	S	65%	13%	13%	9%
Entrances	S	70%	12%	12%	6%
Substation Area	S	0%	0%	100%	0%
Construction Trailers	N	40%	20%	20%	20%
Miscellaneous Conduit, Wiring, Connectors, Combiner Boxes	N	70%	12%	12%	6%
Water Trailer (2000 gallons)	N	100%	0%	0%	0%
Port-a-potty Deliveries	N	70%	12%	12%	6%
Port-a-potty Cleanings	N	70%	12%	12%	6%

APPENDIX D

TRIPS GENERATED DURING CONSTRUCTION

Item	Type of Vehicle	Qty/ Vehicle	# of Vehicles	Total # of Delivery Days	Total Inbound Trips	Outbound Trips	Weight per Item (lbs)	Load Weight/ Vehicle (lbs)	Empty Vehicle Weight (lbs)	Weight of Vehicle + Load (lbs)	Total Weight Impacting Site (tons)	Description
WORKFORCE												
Surveying	Pickup Truck	2	3	3	9	9	200	400	7,000	7,000	11	Three survey trucks for three days
Personnel	Pickup Truck	1.5	270	180	48600	48600	200	300	7,000	7,300	986	100% (400) on site every weekday for 9 months
		Total			48609	48609						
		Average per Weekday			270	270						
EQUIPMENT												
Grading Equipment, Bulldozers	Semi Flat Bed	1	1	1	2	2	18,000	18,000	30,000	48,000	24	Delivery of equipment
Skid Steer for Fence Installation (incl. air operated	Semi Flat Bed	3	2	1	4	4	6,000	18,000	30,000	48,000	48	Delivery of Skid Steers for Fencing; Skid Steer remains on site
Skid Steer for Aggregate Placement	Semi Flat Bed	3	2	1	4	4	6,000	18,000	30,000	48,000	48	Delivery of Skid Steers for Stone Spreading; Skid Steer remains on site for 1 month; then 2 trucks in 1 day for removal from site
Skid Steer for Racking Installation	Semi Flat Bed	3	2	1	4	4	6,000	18,000	30,000	48,000	48	Delivery of Skid Steers for Racking; Skid Steer remains on site for 5 months; then 2 trucks in 1 day for removal from site
Solar Pile Driver for Pile Installation	Semi Flat Bed	6	1	1	2	2	3,000	18,000	30,000	48,000	24	Delivery of equipment; Remains on site for 5 months; then 1 truck in 1 day for removal from site
Trencher Skid Steer Attachment for Collection Lines and Silt Fencing	Semi Flat Bed	6	1	1	2	2	900	5,400	30,000	35,400	18	Delivery of equipment; Remains on site for 5 months; then 1 truck in 1 day for removal from site
Crane	Crane	1	1	1	2	2		0	136,000	136,000	68	Lifting inverters from vehicle onto pad; will remain on site until 32 inverters are delivered
Lull	Lull	1	5	1	10	10	0	0	20,000	20,000	50	On site loading and unloading
		Total			30	30						
		Average per Weekday			6	6						
MATERIALS												
Hay for Revegetation (Assumes all 500 acres need revegetating)	Semi Flat Bed	1	50	1	50	50	40,000	40,000	30,000	70,000	1,750	Delivery of Materials; 2 tons of hay per acre times 500 acres = 1000 tons, 20 tons per vehicle times 5 vehicles
Grass Seed for Revegetation (Assumes all 500 acres need revegetating)	Semi Flat Bed	1	3	1	3	3	40,000	40,000	30,000	70,000	105	Delivery of Materials; 25 g per sq. meter times 4047 sqm per acre times 500 acres divided by 454 g per lb divided by 2000 lb per ton = 56 tons; 20 tons per vehicle time 3 vehicles
Fencing (73,625 linear feet) Delivery	Semi Flat Bed	1	5	1	5	5	40,500	40,500	30,000	70,500	176	Delivery of Fencing
Fencing Posts (1 per 10 ft fence) Delivery	Semi Flat Bed	3,680	2	1	2	2	9	33,120	30,000	63,120	63	Delivery of Fence Posts
Silt Fence Materials (115,700 linear feet) Delivery	Semi Flat Bed	1	2	1	2	2	14,463	14,463	30,000	44,463	44	Delivery of materials, 115,700 LF times 25 lb per 100 LF divided by 2000 lbs per ton = 14 tons
Hay Bales for Erosion Control	Semi Flat Bed	1	1	1	20	20	10,000	10,000	30,000	40,000	20	Delivery of Materials; 1 bale 16" x 22" x 44" weighs 100 lbs, assume 100 bales
Concrete	Cement Mixer	1	2	1	2	2	40,000	40,000	26,000	66,000	66	Concrete for on-site substation
Construction Trailers	Trailer + Delivery Semi	1	5	0	5	5	3,500	3,500	15,000	18,500	46	Construction offices; Office remains but semi used for delivery only
Water Trailer (2000 gallons)	Trailer Delivery	1	1	0	1	1	16,600	16,600	14,000	30,600	15	On-site water trailer for water use; trailer remains but truck for delivery only
		Total			**90**	**90**						
		Average per Delivery Day			**90**	**90**						
Inverters	Semi Flat Bed	1	32	0	32	32	80,000	80,000	35,000	115,000	1,840	Delivery of equipment; already arrive on concrete pad
		Total			**32**	**32**						
		Average per Delivery Day			**1**	**1**						
Miscellaneous Conduit, Wiring, Connectors, Combiner Boxes	Box Truck	1	50	0	50	50	10,000	10,000	15,000	25,000	625	Miscellaneous materials used for construction
		Total			**50**	**50**						
		Average per Delivery Day			**5**	**5**						
Port-a-potty Deliveries	Flat Bed Delivery Truck	6	7	0	54	54	200	1,200	15,000	16,200	54	Delivery of porta potties only
		Total			**54**	**54**						
		Average per Delivery Day			**8**	**8**						
Port-a-potty Cleanings	Water Truck	1	64	for 36 weeks	64	64	900	900	14,000	14,900	477	Cleanings once per week for 36 weeks
		Total			**64**	**64**						
		Average per Weekday			**1**	**1**						
Rocks/Substrate							CY	CY/Vehicle				(Days are cumulative. Only 20 trucks per any single day.)
Laydown Areas	Semi 18-wheeler		317	0	317	317	5,700	18	35,000	85,000	13,458	Rocks and substrate for on-site roads
Existing Road Outside Array Area	Semi 18-wheeler		193	0	193	193	3,470	18	35,000	85,000	8,193	Rocks and substrate for on-site roads
Proposed Roadways within Array Area	Semi 18-wheeler		1,741	0	1,741	1,741	31,330	18	35,000	85,000	73,974	Rocks and substrate for on-site roads
Turnarounds	Semi 18-wheeler		178	0	178	178	3,200	18	35,000	85,000	7,556	Rocks and substrate for on-site roads
Equipment Pads	Semi 18-wheeler		40	0	40	40	720	18	35,000	85,000	1,700	Rocks and substrate for on-site roads
Entrances	Semi 18-wheeler		21	0	21	21	380	18	35,000	85,000	897	Rocks and substrate for on-site roads
Substation Area	Semi 18-wheeler		91	0	91	91	1,640	18	35,000	85,000	3,872	Rocks and substrate for on-site roads
		Total			**2,580**	**2,580**						
		Average per Weekday			**20**	**20**						

Substation Transformer	Semi Flat Bed (Overweight/ Oversize)	1	1	0	1	1	80,000	80,000	35,000	115,000	58	Delivery of equipment
		Total			**1**	**1**						
		Average per Weekday			**1**	**1**						
Panels	Semi Tractor Trailer	672	417	0	417	417	40	26,880	35,000	61,880	12,902	Delivery of equipment
		Total			**417**	**417**						
		Average per Weekday			**8**	**8**						
Racking Steel	Semi Flat Bed	1	420	0	420	420	12,400	12,400	30,000	42,400	8,904	Delivery of equipment
		Total			**420**	**420**						
		Average per Weekday			**8**	**8**						
Racking Components	Box Truck		47	0	47	47		10,300	15,000	25,300	595	Delivery of equipment
		Total			**47**	**47**						
		Average per Weekday			**5**	**5**						
		Materials Total			**3723**	**3723**						
		Materials Average per Weekday			**146**	**146**						

APPENDIX E

HIGHWAY CAPACITY SOFTWARE REPORTS

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - No Build
Project Description	Nottingham Solar - SR 519 from US 22 to Site	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	55	Access Point Density, pts/mi	20.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	21	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	9.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.01

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.3
Speed Slope Coefficient	3.44905	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34697	PF Power Coefficient	0.74355
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.0
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	53.3

Vehicle Results

Average Speed, mi/h	53.3	Percent Followers, %	7.4
Segment Travel Time, minutes	1.13	Follower Density, followers/mi/ln	0.0
Vehicle LOS	A		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	3
Flow Rate Outside Lane, veh/h	21	Bicycle Effective Width, ft	23
Bicycle LOS Score	4.03	Bicycle Effective Speed Factor	4.79
Bicycle LOS	D		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	0.0	A

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - No Build
Project Description	Nottingham Solar - SR 519 from Site to SR 9	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	55	Access Point Density, pts/mi	20.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	21	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	9.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.01

Intermediate Results

Segment Vertical Class	2	Free-Flow Speed, mi/h	52.7
Speed Slope Coefficient	3.24077	Speed Power Coefficient	0.42669
PF Slope Coefficient	-1.39632	PF Power Coefficient	0.72550
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.0
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.7

Vehicle Results

Average Speed, mi/h	52.7	Percent Followers, %	8.2
Segment Travel Time, minutes	1.14	Follower Density, followers/mi/ln	0.0
Vehicle LOS	A		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	3
Flow Rate Outside Lane, veh/h	21	Bicycle Effective Width, ft	23
Bicycle LOS Score	4.03	Bicycle Effective Speed Factor	4.79
Bicycle LOS	D		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	0.0	A

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - No Build
Project Description	Nottingham Solar - SR 9 from SR 519 to SR 149	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	35	Access Point Density, pts/mi	54.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	255	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	10.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.15

Intermediate Results

Segment Vertical Class	2	Free-Flow Speed, mi/h	25.5
Speed Slope Coefficient	4.57452	Speed Power Coefficient	0.41622
PF Slope Coefficient	-1.45960	PF Power Coefficient	0.59969
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	5.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	23.4

Vehicle Results

Average Speed, mi/h	23.4	Percent Followers, %	47.5
Segment Travel Time, minutes	2.57	Follower Density, followers/mi/ln	5.2
Vehicle LOS	C		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	5
Flow Rate Outside Lane, veh/h	255	Bicycle Effective Width, ft	12
Bicycle LOS Score	6.32	Bicycle Effective Speed Factor	3.84
Bicycle LOS	F		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	5.2	C

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - No Build
Project Description	Nottingham Solar - SR 9 from SR 149 to TR 10	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	55	Access Point Density, pts/mi	15.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	138	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	8.50
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.08

Intermediate Results

Segment Vertical Class	2	Free-Flow Speed, mi/h	54.0
Speed Slope Coefficient	3.25952	Speed Power Coefficient	0.43334
PF Slope Coefficient	-1.38761	PF Power Coefficient	0.72910
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.7
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	53.2

Vehicle Results

Average Speed, mi/h	53.2	Percent Followers, %	28.0
Segment Travel Time, minutes	1.13	Follower Density, followers/mi/ln	0.7
Vehicle LOS	A		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	138	Bicycle Effective Width, ft	16
Bicycle LOS Score	5.81	Bicycle Effective Speed Factor	4.79
Bicycle LOS	F		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	0.7	A

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - No Build
Project Description	Nottingham Solar SR 9 from TR 10 to TR 56	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	40	Access Point Density, pts/mi	15.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	383	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	7.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.23

Intermediate Results

Segment Vertical Class	2	Free-Flow Speed, mi/h	37.5
Speed Slope Coefficient	3.59968	Speed Power Coefficient	0.41622
PF Slope Coefficient	-1.47239	PF Power Coefficient	0.66656
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	5.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	35.4

Vehicle Results

Average Speed, mi/h	35.4	Percent Followers, %	54.0
Segment Travel Time, minutes	1.70	Follower Density, followers/mi/ln	5.8
Vehicle LOS	C		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	383	Bicycle Effective Width, ft	12
Bicycle LOS Score	5.98	Bicycle Effective Speed Factor	4.17
Bicycle LOS	F		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	5.8	C

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - No Build
Project Description	Nottingham Solar - SR 9 from TR 56 to TR 9	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	2
Speed Limit, mi/h	35	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	309	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	7.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.18

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	33.2
Speed Slope Coefficient	2.35782	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.38196	PF Power Coefficient	0.66789
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	4.5
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	31.9

Vehicle Results

Average Speed, mi/h	31.9	Percent Followers, %	46.7
Segment Travel Time, minutes	1.88	Follower Density, followers/mi/ln	4.5
Vehicle LOS	B		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	309	Bicycle Effective Width, ft	12
Bicycle LOS Score	5.68	Bicycle Effective Speed Factor	3.84
Bicycle LOS	F		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	4.5	B

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - No Build
Project Description	Nottingham Solar - SR 9 from SR 9 to High Street	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	1
Speed Limit, mi/h	35	Access Point Density, pts/mi	50.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	500	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	5.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.29

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	25.0
Speed Slope Coefficient	1.91699	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.32111	PF Power Coefficient	0.62432
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	12.1
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	23.7

Vehicle Results

Average Speed, mi/h	23.7	Percent Followers, %	57.6
Segment Travel Time, minutes	2.53	Follower Density, followers/mi/ln	12.1
Vehicle LOS	D		

Bicycle Results

Percent Occupied Parking	50	Pavement Condition Rating	2
Flow Rate Outside Lane, veh/h	500	Bicycle Effective Width, ft	12
Bicycle LOS Score	6.73	Bicycle Effective Speed Factor	3.84
Bicycle LOS	F		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	12.1	D

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - No Build
Project Description	Nottingham Solar - SR 9 from High Street to I-70	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	35	Access Point Density, pts/mi	50.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	564	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	6.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.33

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	25.6
Speed Slope Coefficient	1.94770	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.32702	PF Power Coefficient	0.62769
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	14.1
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	24.2

Vehicle Results

Average Speed, mi/h	24.2	Percent Followers, %	60.4
Segment Travel Time, minutes	2.48	Follower Density, followers/mi/ln	14.1
Vehicle LOS	D		

Bicycle Results

Percent Occupied Parking	50	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	564	Bicycle Effective Width, ft	14
Bicycle LOS Score	5.45	Bicycle Effective Speed Factor	3.84
Bicycle LOS	E		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	14.1	D

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - Build
Project Description	Nottingham Solar - SR 519 from US 22 to Site	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	55	Access Point Density, pts/mi	20.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	53	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	9.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.03

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	53.3
Speed Slope Coefficient	3.44905	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34697	PF Power Coefficient	0.74355
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.1
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	53.3

Vehicle Results

Average Speed, mi/h	53.3	Percent Followers, %	14.1
Segment Travel Time, minutes	1.13	Follower Density, followers/mi/ln	0.1
Vehicle LOS	A		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	3
Flow Rate Outside Lane, veh/h	53	Bicycle Effective Width, ft	21
Bicycle LOS Score	4.94	Bicycle Effective Speed Factor	4.79
Bicycle LOS	E		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	0.1	A

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - Build
Project Description	Nottingham Solar - SR 519 from Site to SR 9	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	55	Access Point Density, pts/mi	20.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	53	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	9.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.03

Intermediate Results

Segment Vertical Class	2	Free-Flow Speed, mi/h	52.7
Speed Slope Coefficient	3.24077	Speed Power Coefficient	0.42669
PF Slope Coefficient	-1.39632	PF Power Coefficient	0.72550
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	52.7

Vehicle Results

Average Speed, mi/h	52.7	Percent Followers, %	15.3
Segment Travel Time, minutes	1.14	Follower Density, followers/mi/ln	0.2
Vehicle LOS	A		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	3
Flow Rate Outside Lane, veh/h	53	Bicycle Effective Width, ft	21
Bicycle LOS Score	4.94	Bicycle Effective Speed Factor	4.79
Bicycle LOS	E		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	0.2	A

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - Build
Project Description	Nottingham Solar - SR 9 from SR 519 to SR 149	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	35	Access Point Density, pts/mi	54.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	287	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	10.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.17

Intermediate Results

Segment Vertical Class	2	Free-Flow Speed, mi/h	25.5
Speed Slope Coefficient	4.57452	Speed Power Coefficient	0.41622
PF Slope Coefficient	-1.45960	PF Power Coefficient	0.59969
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	6.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	23.2

Vehicle Results

Average Speed, mi/h	23.2	Percent Followers, %	49.9
Segment Travel Time, minutes	2.59	Follower Density, followers/mi/ln	6.2
Vehicle LOS	C		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	5
Flow Rate Outside Lane, veh/h	287	Bicycle Effective Width, ft	12
Bicycle LOS Score	6.38	Bicycle Effective Speed Factor	3.84
Bicycle LOS	F		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	6.2	C

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - Build
Project Description	Nottingham Solar - SR 9 from SR 149 to TR 10	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	55	Access Point Density, pts/mi	15.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	160	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	8.50
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.09

Intermediate Results

Segment Vertical Class	2	Free-Flow Speed, mi/h	54.0
Speed Slope Coefficient	3.25952	Speed Power Coefficient	0.43334
PF Slope Coefficient	-1.38761	PF Power Coefficient	0.72910
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	0.9
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	53.1

Vehicle Results

Average Speed, mi/h	53.1	Percent Followers, %	30.5
Segment Travel Time, minutes	1.13	Follower Density, followers/mi/ln	0.9
Vehicle LOS	A		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	160	Bicycle Effective Width, ft	15
Bicycle LOS Score	6.04	Bicycle Effective Speed Factor	4.79
Bicycle LOS	F		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	0.9	A

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - Build
Project Description	Nottingham Solar - SR 9 from TR 10 to TR 56	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	40	Access Point Density, pts/mi	15.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	404	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	7.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.24

Intermediate Results

Segment Vertical Class	2	Free-Flow Speed, mi/h	37.5
Speed Slope Coefficient	3.59968	Speed Power Coefficient	0.41622
PF Slope Coefficient	-1.47239	PF Power Coefficient	0.66656
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	6.3
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	35.3

Vehicle Results

Average Speed, mi/h	35.3	Percent Followers, %	55.3
Segment Travel Time, minutes	1.70	Follower Density, followers/mi/ln	6.3
Vehicle LOS	C		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	404	Bicycle Effective Width, ft	12
Bicycle LOS Score	6.01	Bicycle Effective Speed Factor	4.17
Bicycle LOS	F		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	6.3	C

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - Build
Project Description	Nottingham Solar - SR 9 from TR 56 to SR 9	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	2
Speed Limit, mi/h	35	Access Point Density, pts/mi	10.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	340	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	7.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.20

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	33.2
Speed Slope Coefficient	2.35782	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.38196	PF Power Coefficient	0.66789
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	5.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	31.9

Vehicle Results

Average Speed, mi/h	31.9	Percent Followers, %	49.0
Segment Travel Time, minutes	1.88	Follower Density, followers/mi/ln	5.2
Vehicle LOS	C		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	340	Bicycle Effective Width, ft	12
Bicycle LOS Score	5.73	Bicycle Effective Speed Factor	3.84
Bicycle LOS	F		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	5.2	C

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - Build
Project Description	Nottingham Solar - SR 9 from SR 9 to High Street	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	10	Shoulder Width, ft	1
Speed Limit, mi/h	35	Access Point Density, pts/mi	50.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	521	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	5.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.31

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	25.0
Speed Slope Coefficient	1.91699	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.32111	PF Power Coefficient	0.62432
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	12.9
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	23.7

Vehicle Results

Average Speed, mi/h	23.7	Percent Followers, %	58.5
Segment Travel Time, minutes	2.53	Follower Density, followers/mi/ln	12.9
Vehicle LOS	D		

Bicycle Results

Percent Occupied Parking	50	Pavement Condition Rating	2
Flow Rate Outside Lane, veh/h	521	Bicycle Effective Width, ft	12
Bicycle LOS Score	6.75	Bicycle Effective Speed Factor	3.84
Bicycle LOS	F		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	12.9	D

HCS7 Two-Lane Highway Report

Project Information

Analyst	CRG	Date	6/21/2021
Agency	ODOT	Analysis Year	2026
Jurisdiction	Ohio	Time Period Analyzed	Design - Build
Project Description	Nottingham Solar - SR 9 from High Street to I-70	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	11	Shoulder Width, ft	1
Speed Limit, mi/h	35	Access Point Density, pts/mi	50.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	585	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	6.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.34

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	25.6
Speed Slope Coefficient	1.94770	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.32702	PF Power Coefficient	0.62769
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	14.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	24.2

Vehicle Results

Average Speed, mi/h	24.2	Percent Followers, %	61.2
Segment Travel Time, minutes	2.48	Follower Density, followers/mi/ln	14.8
Vehicle LOS	D		

Bicycle Results

Percent Occupied Parking	50	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	585	Bicycle Effective Width, ft	14
Bicycle LOS Score	5.47	Bicycle Effective Speed Factor	3.84
Bicycle LOS	E		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	14.8	D