

MEMORANDUM

Date: December 15, 2021

To: Lydia Lake, P.E. – Borrego

From: Matthew Van Wie, IE | Dan Berkowsky, P.E. – Creighton Manning Engineering

cc: Don Adams, P.E. – Creighton Manning Engineering

Project: Wind Transport Studies – 411 Reynolds Road, Fultonville, NY

Re: Field Visit Summary Memo

Creighton Manning Engineering (CM) was retained by Borrego Solar Systems (Borrego) to assess road conditions between a proposed wind turbine installation in Fultonville, New York and the proximate interstate highway. The address of record for this project is 411 Reynolds Road, Fultonville, New York. The purpose of this assessment was to develop and recommend feasible delivery routes for delivery of oversized turbines and other components. Delivery routes were selected to prioritize NY State roadways, avoid underpasses and overhead obstructions, and minimize acute angle turns. Two potential delivery route alternatives were identified using these criteria and with use of aerial- and street-level-imagery.

To confirm feasibility, identify potential road obstructions or features not readily apparent on satellite imagery, and document potential temporary roadway improvements and/or widening required to accommodate large delivery vehicles, a field visit was conducted by CM staff Engineers on December 10, 2021. The observations and data collected was then used to further analyze and refine the routing alternatives, confirm vehicle maneuverability, and provide Borrego with further insight into potential temporary improvements that would be required along each.

Delivery Vehicles

Borrego provided CM the dimensions of the various delivery vehicles to be used to transport turbine components to the site. The dimensions of the largest of these delivery vehicles are described and illustrated in Figure 1 below.

- Maximum Length – 267'
- Maximum Height – 15'-6"
- Maximum Width – 14'

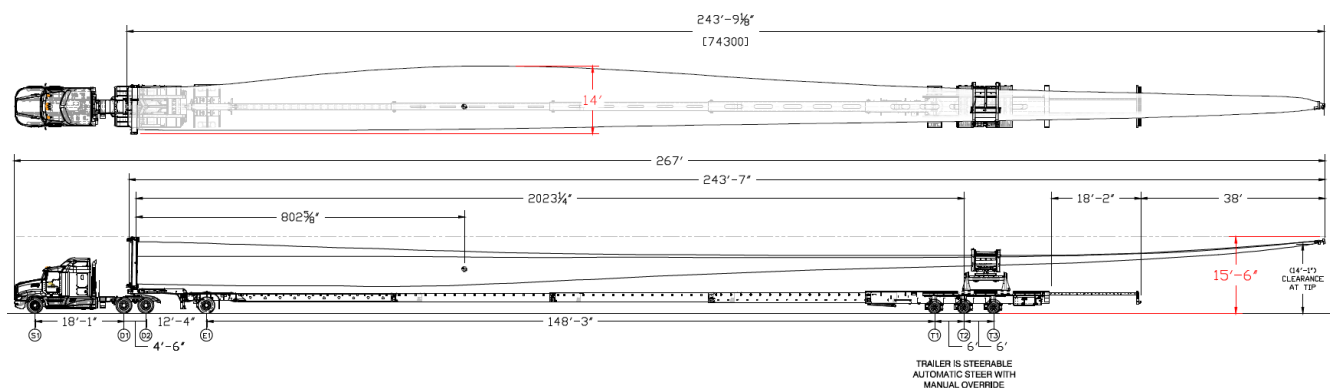


Figure 1 - Preliminary Delivery Vehicle and Largest Anticipated Delivery Load

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Based on the above delivery vehicle dimensions and CM's previous experience with turbine delivery vehicles, an assumed 165' inside turning radius and a 290' outside overhang radius was utilized to verify intersection geometry and any potential improvements needed. Above-ground street furniture and other obstructions located within the 290' outside radius may require temporary removal or relocation to provide necessary clearance of rigid-body turbines as the vehicle navigates through turns at intersections.

Routing Alternatives Evaluated

Prior to the field visit, two initial delivery route alternatives were developed for the delivery vehicles to access 411 Reynolds Road from Interstate I-90. The routes developed and evaluated during the field visit are as follows:

- A. I-90 Exit 28, to NY-920P eastbound, to NY-5S eastbound, to CR-164 southbound, to NY-161 westbound, to NY-30A southbound, to Reynolds Road
- B. I-90 Exit 27, to NY-30 southbound, to NY-161 westbound, to NY-30A southbound, to Reynolds Road

A map illustrating these route alternatives is attached to this memo for reference.

Field Visit Findings

Prior to the field visit, figures of each intersection along alternative delivery routes were created which overlaid the inside and outside turn radii. These figures were then referenced in the field to identify potential improvements or other obstructions that would need to be relocated or removed. The general roadway condition along each route was also evaluated to identify and avoid segments with significant asphalt deterioration, culverts, or other conditions that may be unfavorable to oversized and overweight vehicles. Further, existing utilities, roadside drainage and other potential conflicts visible during the field visit were noted. As shown in the attached figures and described below, both alternatives proposed would not require any roadway improvements or widening. There are limited locations and intersections at which some clearing beyond the edge of pavement may be required in order to accommodate the overhang of the delivery vehicles.

Alternative A: I-90 Exit 28 Alternative (Blue Route)

Alternative A utilizes I-90 Exit 28 from either the eastbound or westbound directions. From I-90 Exit 28, delivery vehicles would travel on NY-920P eastbound, to NY-5S eastbound, to CR-164 southbound, to NY-161 westbound, to NY-30A southbound, to 411 Reynolds Road. The field data collected for this alternative is shown in the attached intersection figures and the following items were identified:

Improvements Anticipated:

- In the attached intersection figure labeled B1, the southeast corner of the intersection of the I-90 Exit 28 and NY-920P will require some clearing beyond the edge of pavement in order to accommodate the overhang of the delivery vehicles. However, based on the data collected during the field visit to this intersection, it appears the only obstructions in this area are street signs which could be unbolted from their bases and temporarily removed to allow the delivery vehicle to traverse through the intersection. Temporary sign relocations in this area will be of minimal effort and would likely not pose complications towards obtaining approvals. Temporary sign removals are typically done just before the delivery vehicles travels through the intersection and reinstalled immediately after.

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- In the attached intersection figure labeled B4, the southwest corner of the intersection of NY-5S and CR-164 (Noeltner Road) may require some clearing beyond the edge of pavement in order to accommodate the overhang of the delivery vehicles. Field observations at this intersection indicates this clearing will only entail the removal of some tree branches from some trees near the intersection. Therefore, based on the above, it is anticipated that this tree trimming will be of minimal complications.
- In the attached intersection figure labeled B8/G8, the northeast corner of NY-30A and CR-121 (Reynolds Road) may require some clearing beyond the edge of pavement to accommodate the overhang of the delivery vehicles through this intersection. However, based on the data collected during the field visit to this intersection, it appears that a single stop sign is the only obstruction in this area. Temporary removal of this sign could be performed by unbolting the sign from its base. As with the example above, temporary removal of road control signage is a routine exercise and should not present a challenge towards approvals or route feasibility.

Other Notable Features:

- Just south of the intersection of NY-5S, a segment of CR-164 (Noeltner Road) enters a relatively long uphill incline. It is not anticipated that this incline will be of concern for delivery vehicles, but travel in this section may be slower than others.

Overall, routing alternative A appears to be feasible with no roadway widening required. Only temporary removal of road signage is anticipated at two intersections and one intersection will require light tree trimming to accommodate the overhang of delivery vehicles. These actions are anticipated to be of minimal complications and may be able to be completed just before the delivery vehicle travels through the intersection.

Alternative B: I-90 Exit 27 Alternative (Green Route)

Routing Alternative B utilizes I-90 Exit 27 from either the eastbound or westbound directions. From I-90 Exit 27, delivery vehicles would travel on NY-30 westbound, to NY-161 westbound, to NY-30A southbound, to Reynolds Road. The field data collected for this alternative is shown in the attached intersection figures and the following items were identified:

Improvements Anticipated:

- Except for the intersection of NY-30A and Reynolds Road, as shown on the attached figure labeled B8/G8 and as previously discussed above, no roadway widening or clearing beyond the edge of pavement would be required for this routing alternative.

Notable Features:

- The intersection of I-90 Exit 27 and NY-30 contains a traffic signal span wires that may require temporary raising as the delivery vehicle passes.

Overall, routing alternative B appears to be feasible with no roadway widening required. There is one intersection along this route that will require the temporary removal of signs in order to accommodate the overhang of delivery vehicles, however this action is anticipated to be of minimal complications and may be able to be completed just before the delivery vehicles travels through the intersection.

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Based on these findings, both alternative A and alternative B are feasible with light tree trimming and temporary sign removal, which is viewed as minimally complicated from a constructability standpoint. Therefore, the preferred alternative selected may not be a matter of the improvements needed, but may be a function of local input and the direction in which delivery vehicles will be coming from. As such, CM does not have a preference on which alternative is preferred.

Next Steps – Permitting and Coordination

The two routing alternatives include utilizing a variety of roadways that are each owned and maintained by different agencies. The tables below provides a summary of roadways utilized for each route and the agencies that own and maintain each roadway segment utilized. Overhead utilities and/or span wires may need to be temporarily relocated / removed in order to facilitate the transport of turbine components. This work may require work agreements and coordinating with the utilities impacted. Upon selection of the preferred routing alternative, further coordination will be required in order to determine the extent of permits and coordination actually required to facilitate the transport of turbine components.

Alternative A: I-90 Exit 28 Alternative (Blue Route)

<u>Road Name</u>	<u>Start Point</u>	<u>End Point</u>	<u>Maintenance Jurisdiction</u>
NY-920P (Riverside Road)	I-90 Exit 28	NY-5S	NYS Department of Transportation
NY-5S	NY-920P (Riverside Road)	CR-164 (Noeltner Road)	NYS Department of Transportation
CR-164 (Noeltner Road)	NY-5S	NY-161 (Mill Point Road)	Montgomery County
NY-161 (Mill Point Road)	CR-164 (Noeltner Road)	NY-30A (Oak Ridge Road)	NYS Department of Transportation
NY-30A (Oak Ridge Road)	NY-161 (Mill Point Road)	CR-121 (Reynolds Road)	NYS Department of Transportation
CR-121 (Reynolds Road)	NY-30A (Oak Ridge Road)	411 Reynolds Road	Montgomery County

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Alternative B: I-90 Exit 27 Alternative (Green Route)

<u>Road Name</u>	<u>Start Point</u>	<u>End Point</u>	<u>Maintenance Jurisdiction</u>
NY-30 (Minaville Road)	I-90 Exit 27	NY-161 (Mill Point Road)	NYS Department of Transportation
NY-161 (Mill Point Road)	NY-30 (Minaville Road)	NY-30A (Oak Ridge Road)	NYS Department of Transportation
NY-30A (Oak Ridge Road)	NY-161 (Mill Point Road)	CR-121 (Reynolds Road)	NYS Department of Transportation
CR-121 (Reynolds Road)	NY-30A (Oak Ridge Road)	411 Reynolds Road	Montgomery County

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LEGEND

- Route A
- Route B

ROUTE A (from I-90 WB or EB)


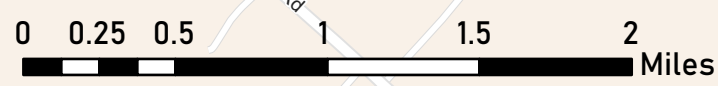
1. Take I-90 Exit 28 - NY 30A/Fultonville/Fonda
2. Turn right onto NY-920P/Riverside Dr
3. Turn left onto NY-5S
4. Turn right onto CR-164/Noeltner Rd
5. Turn right onto NY-161
6. Turn left onto NY-30A
7. Turn left onto Reynolds Rd


















ROUTE B (from I-90 WB or EB)

1. Take I-90 Exit 27 - NY-30/Amsterdam
2. Turn left onto NY-30/Minaville Rd
3. Continue onto NY-161/Mill Point Rd
4. Turn left onto NY-30A
5. Turn left onto Reynolds Rd

Truck Routing Exhibit
 411 Reynolds Rd, Fultonville, NY
 December 2021

Wind Transport Study
 Borrego Solar Systems
 CM Project No. 121-310

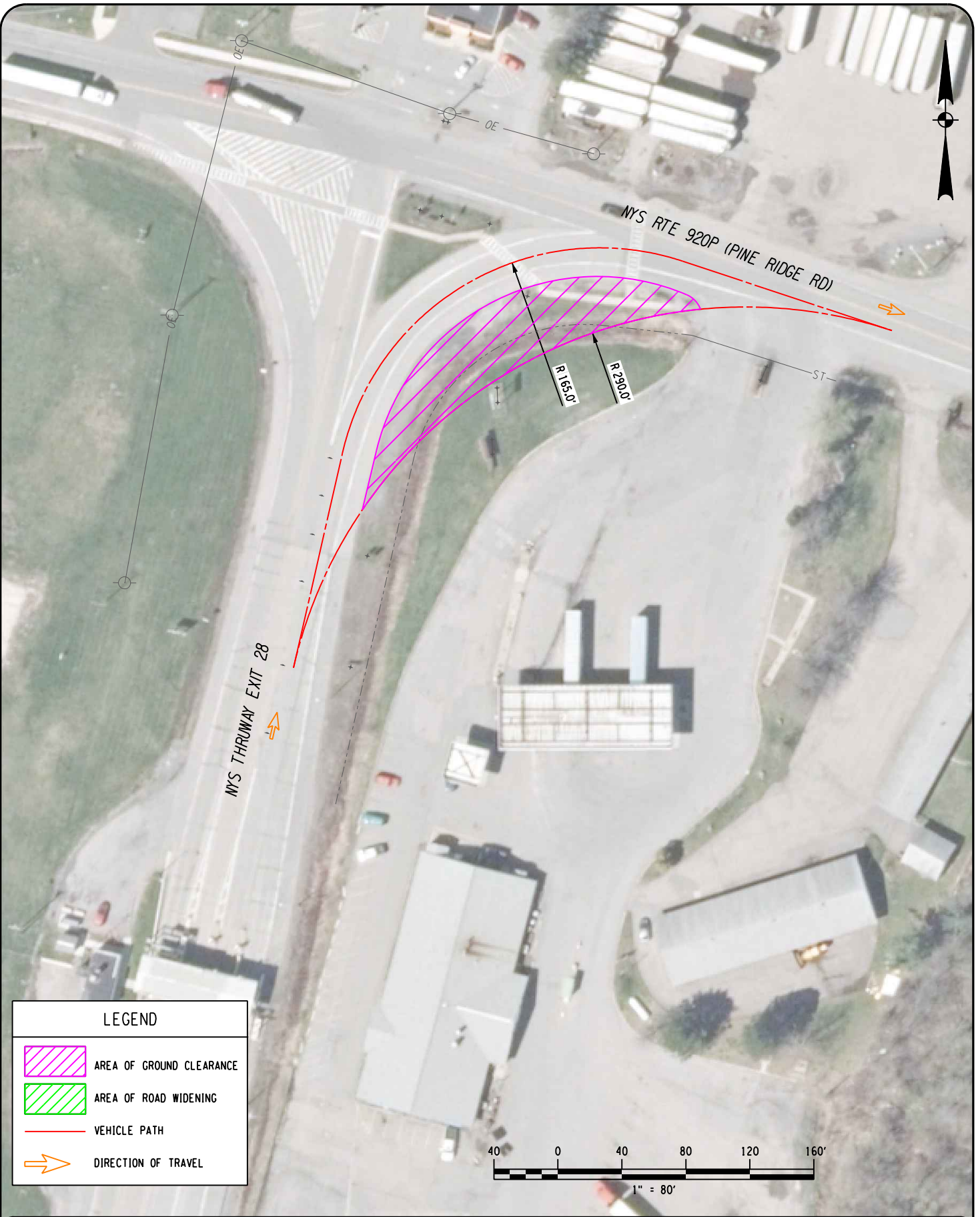
LEGEND		
	LTD	TREE, DECIDUOUS
	LSHD	SHRUB, DECIDUOUS
	LMB	MAILBOX
	S	SINGLE POST
	TCSP	SIGNAL POLE
	UGLM	GAS, LINE MARKER
	ULP	LIGHTING, POLE
	UP	POLE, WITH UTILITY
	UTP	TELEPHONE, PEDESTAL
	UWFH	WATER, FIRE HYDRANT
	DCP	CULVERT PIPE
	RGB	GUIDE RAIL, BOX BEAM
	UEO	ELECTRIC LINE, OVERHEAD
	UPGW	POLE, GUY WIRE
	LWS	WALL, STONE
	TCSW	SIGNAL, SPAN WIRE
	DD	DRAINAGE DITCH





LEGEND

BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY



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LEGEND	
	AREA OF GROUND CLEARANCE
	AREA OF ROAD WIDENING
	VEHICLE PATH
	DIRECTION OF TRAVEL

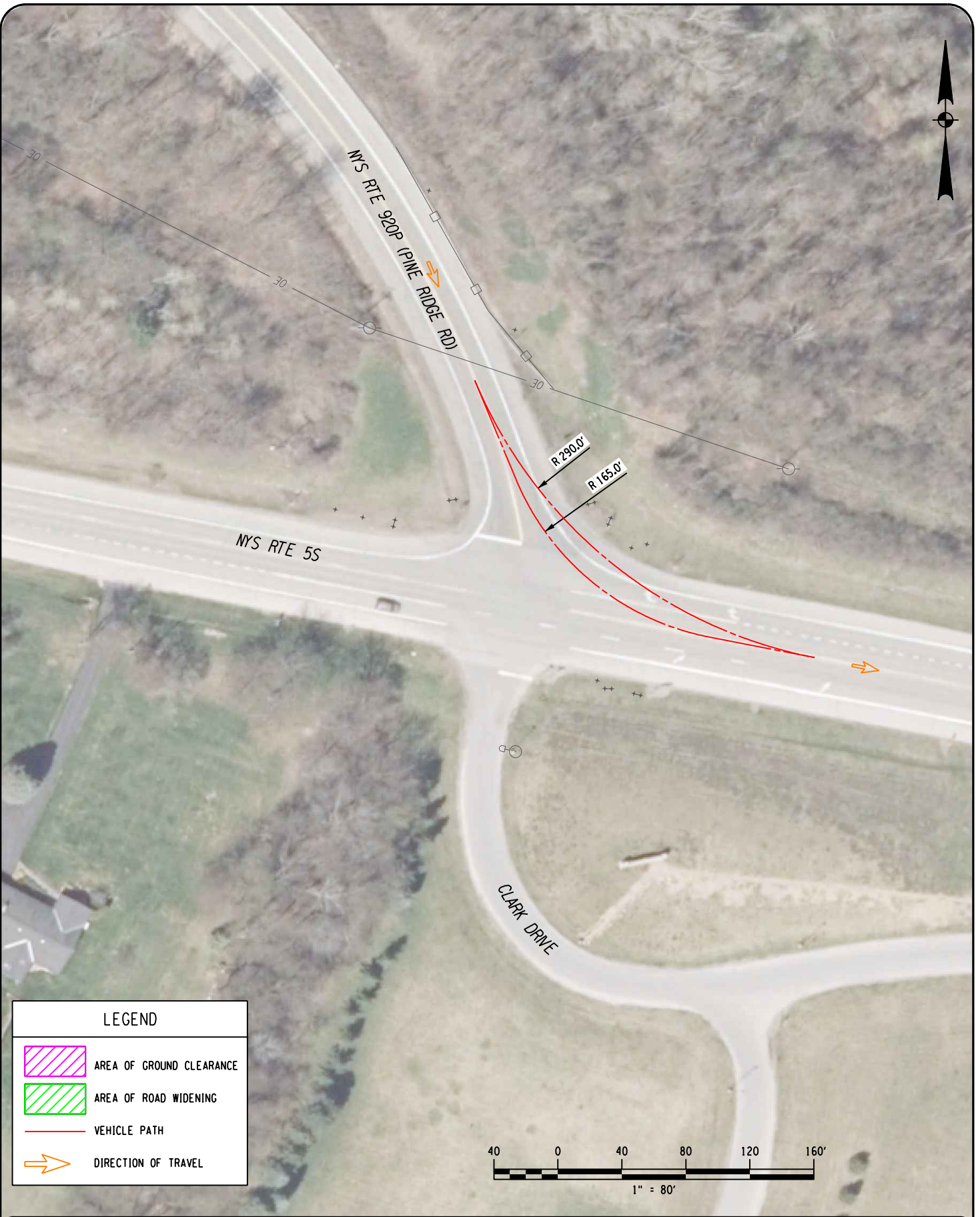
NYS ROUTE 920P (PINE RIDGE ROAD)
AT NYS THRUWAY EXIT 28

BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY



PROJECT: 121-310 DATE: 12/2021 FIGURE: B1

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NYS ROUTE 5S AT NYS RTE 920P
(PINE RIDGE RD) AND CLARK DRIVE





BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY

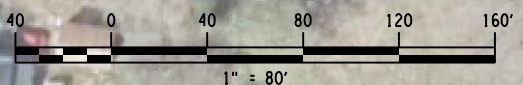


PROJECT: 121-310 DATE: 12/2021 FIGURE: B2



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LEGEND	
	AREA OF GROUND CLEARANCE
	AREA OF ROAD WIDENING
	VEHICLE PATH
	DIRECTION OF TRAVEL



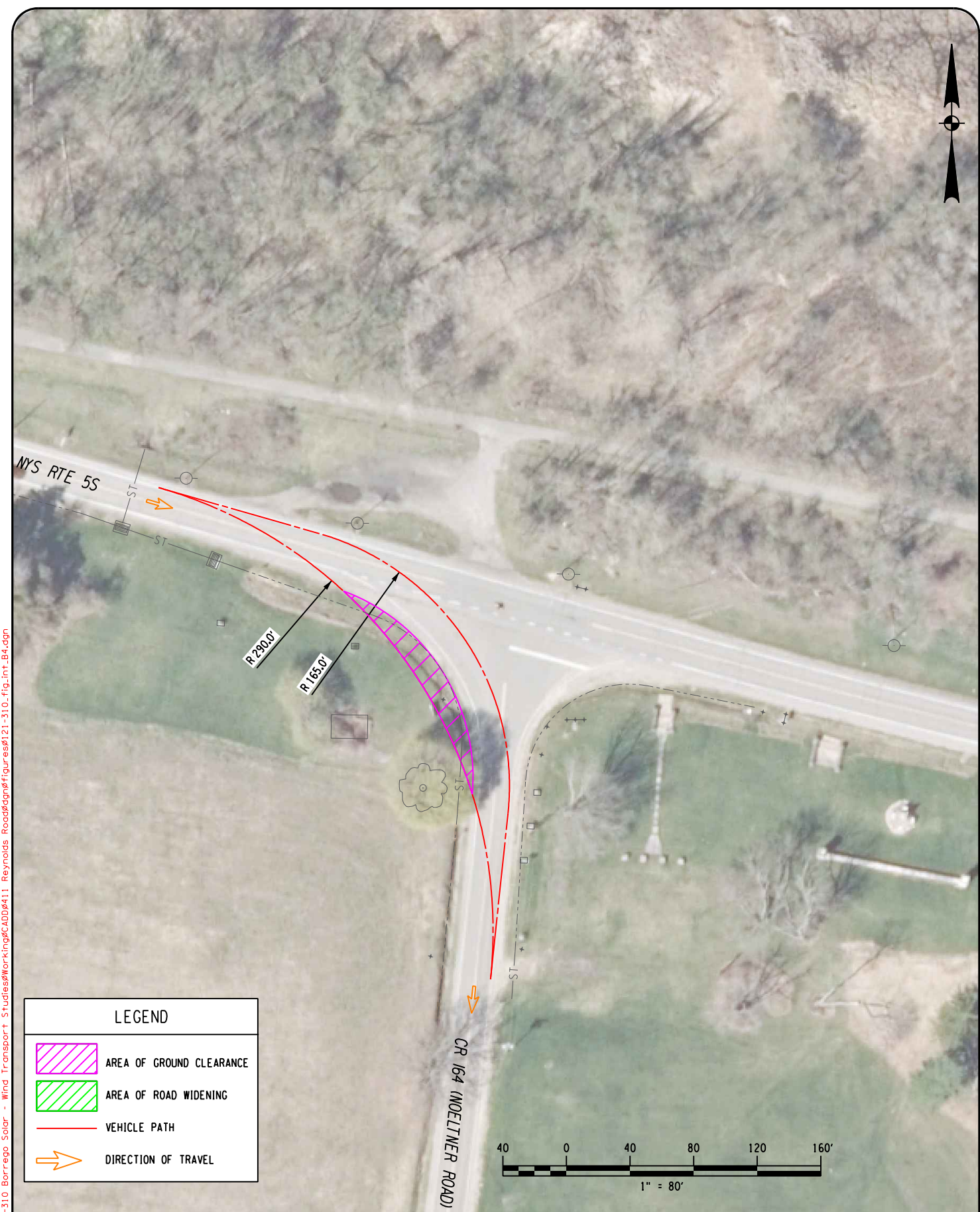
NYS ROUTE 5S AT CR 122
(AURIESVILLE RD)





BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY





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LEGEND	
	AREA OF GROUND CLEARANCE
	AREA OF ROAD WIDENING
	VEHICLE PATH
	DIRECTION OF TRAVEL

NYS ROUTE 5S AT CR 164 (NOELTNER ROAD)

BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY







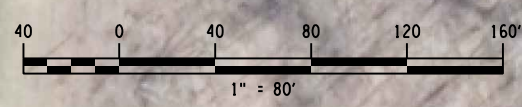


CR 164 (NOELTNER ROAD)

CR 120 (CO-DAUGH-RI-TY ROAD)

LEGEND

-  AREA OF GROUND CLEARANCE
-  AREA OF ROAD WIDENING
-  VEHICLE PATH
-  DIRECTION OF TRAVEL



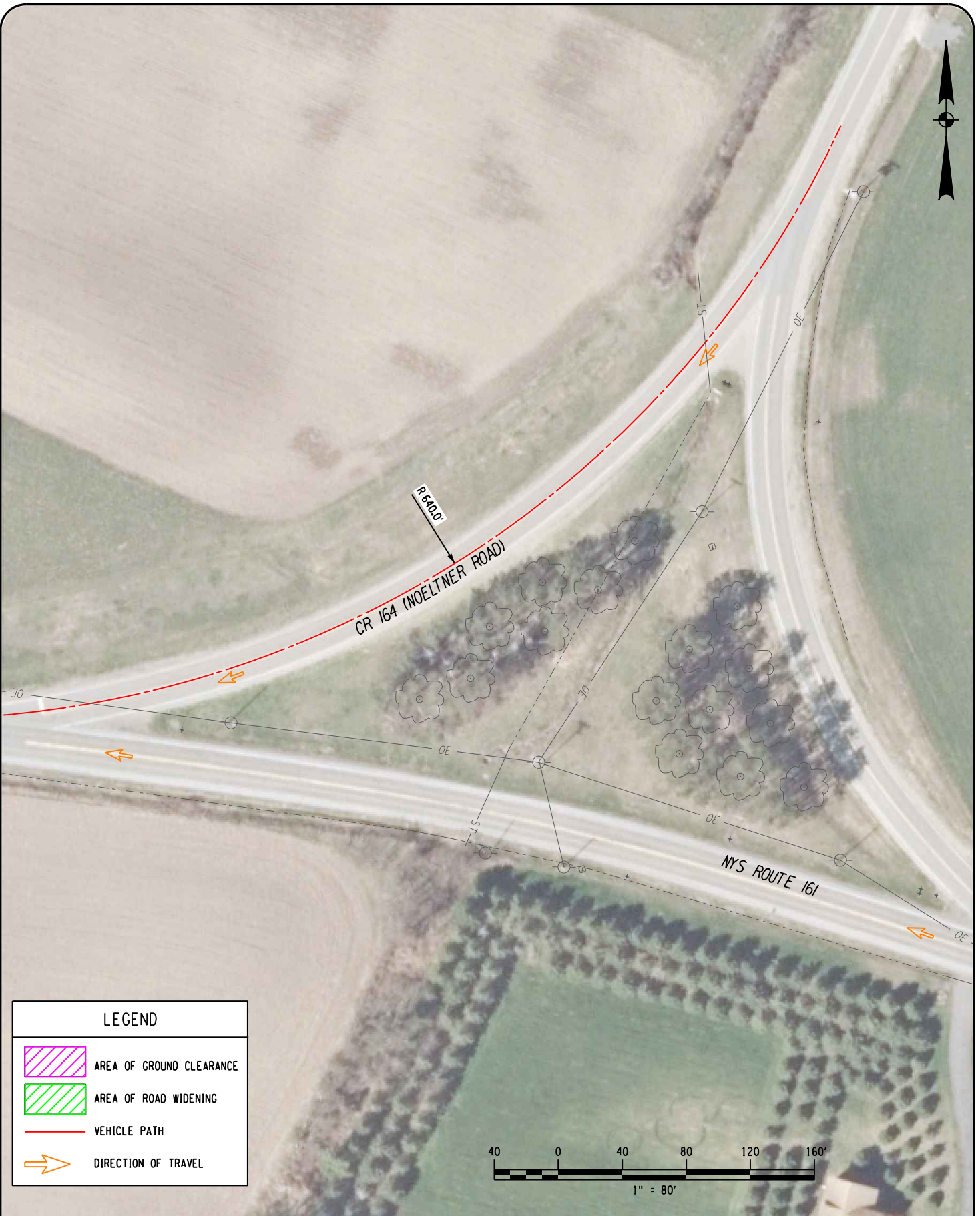
CR 164 (NOELTNER ROAD) AT
CR 120 (CO-DAUGH-RI-TY ROAD)





BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY

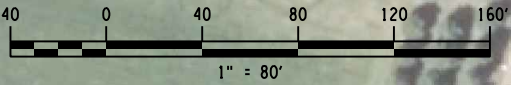


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LEGEND	
	AREA OF GROUND CLEARANCE
	AREA OF ROAD WIDENING
	VEHICLE PATH
	DIRECTION OF TRAVEL

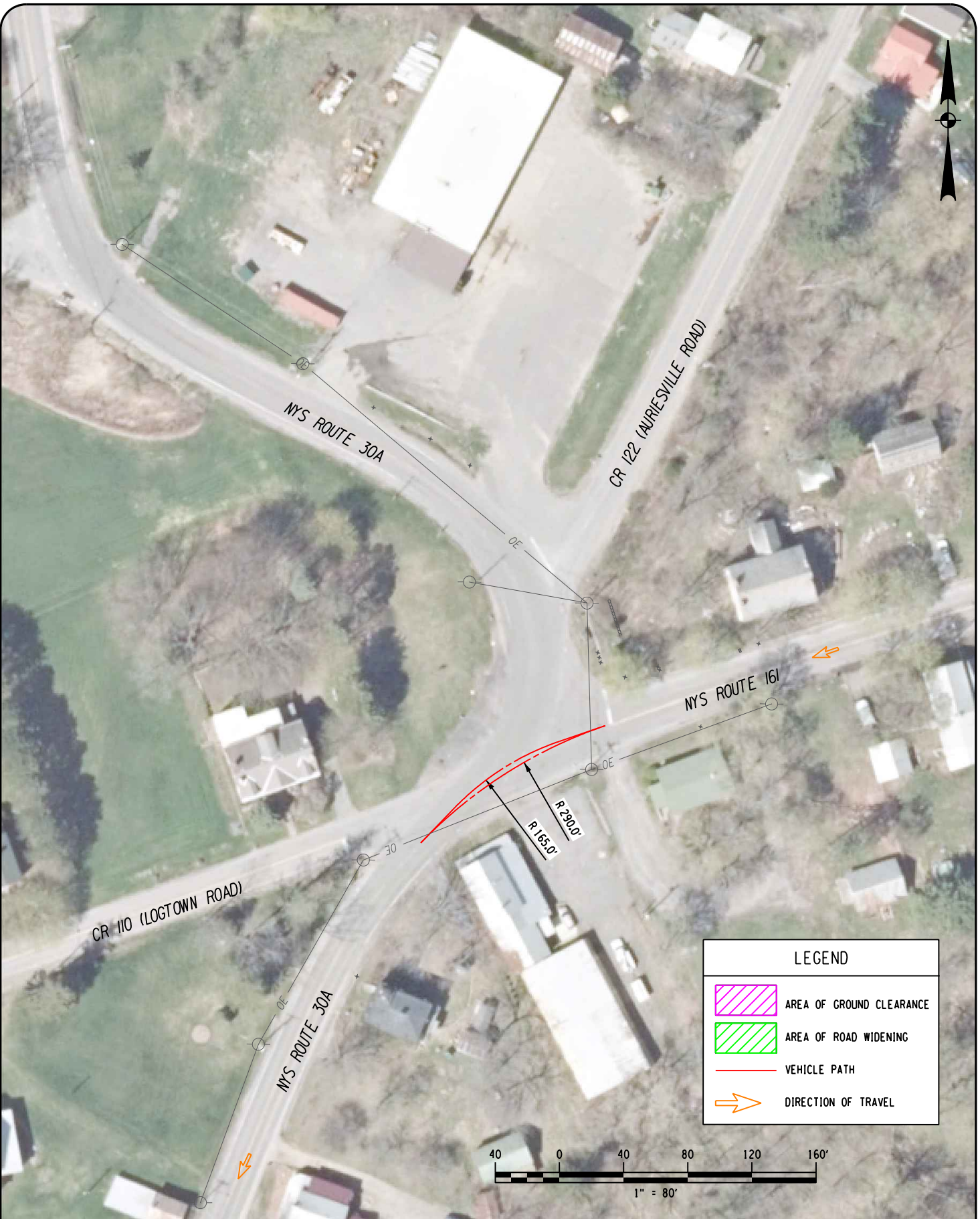


NYS ROUTE 161 AT CR 164 (NOELTNER ROAD)

BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY



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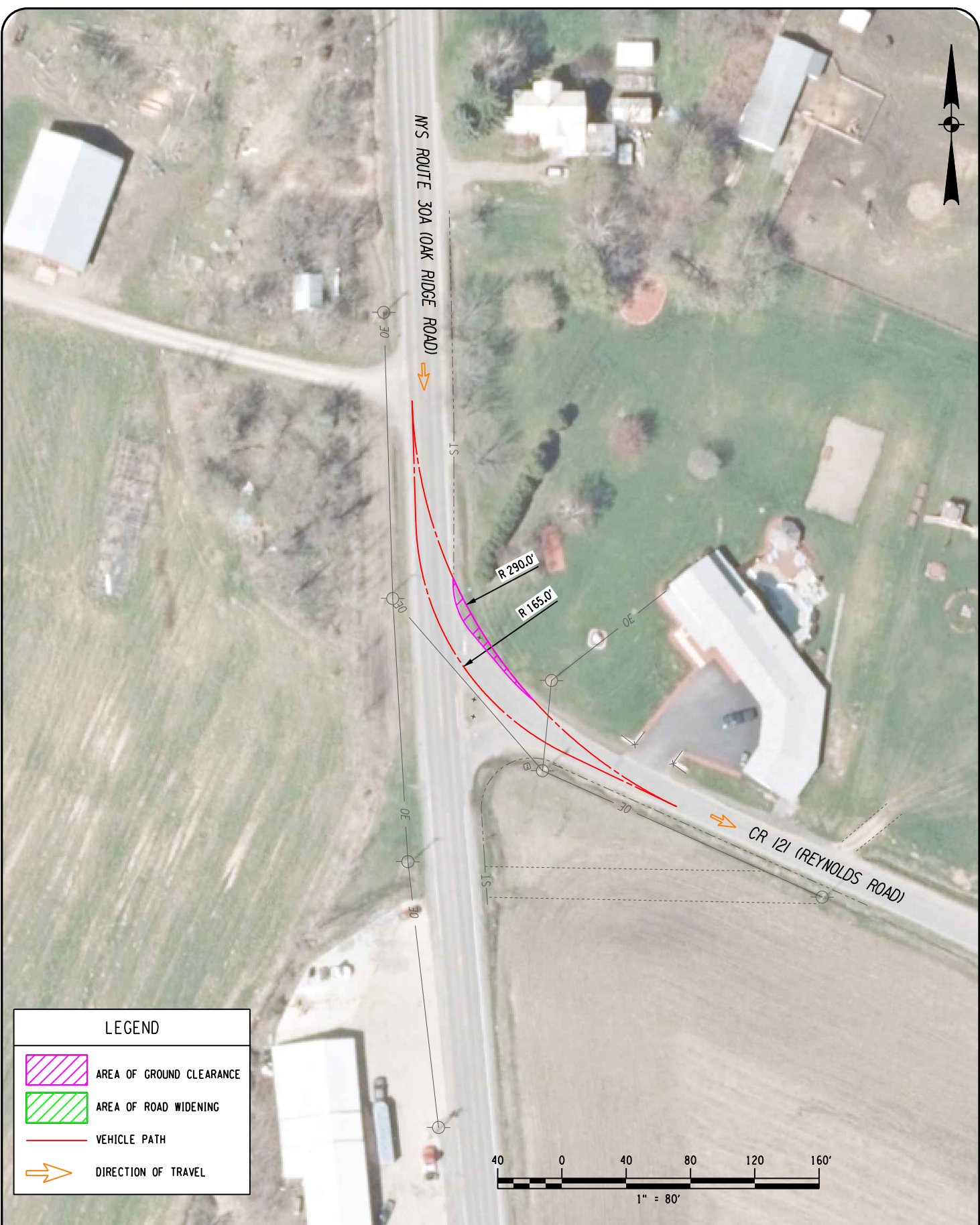
NYS ROUTE 30A AT NYS ROUTE 161,
CR 110 (LOGTOWN ROAD), AND CR 122 (AURIESVILLE ROAD)





BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY

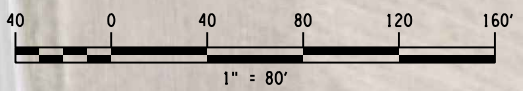


PROJECT: 121-310 DATE: 12/2021 FIGURE: B7/G7

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LEGEND	
	AREA OF GROUND CLEARANCE
	AREA OF ROAD WIDENING
	VEHICLE PATH
	DIRECTION OF TRAVEL

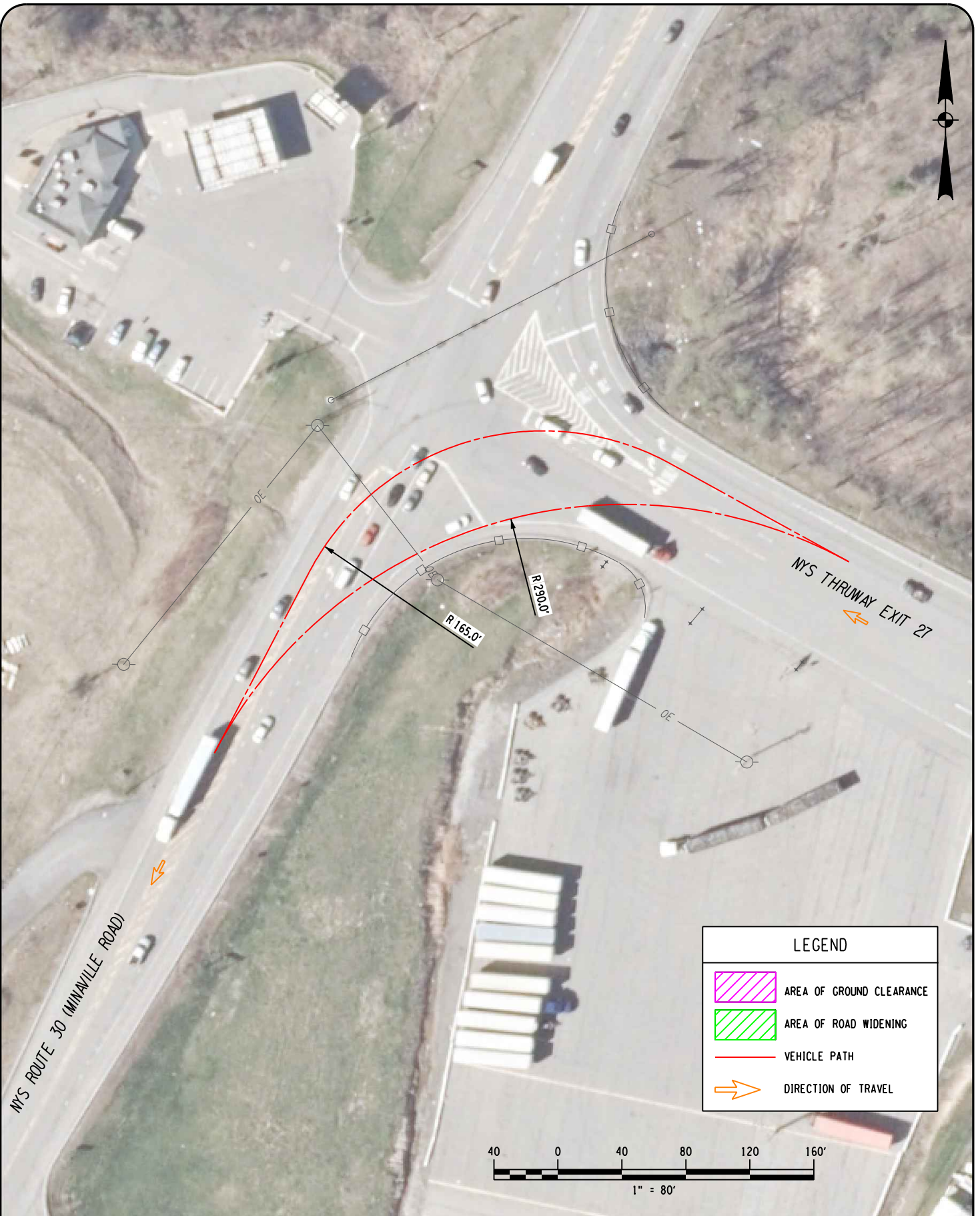


NYS ROUTE 30A (OAK RIDGE ROAD)
AT CR 121 (REYNOLDS ROAD)

BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY



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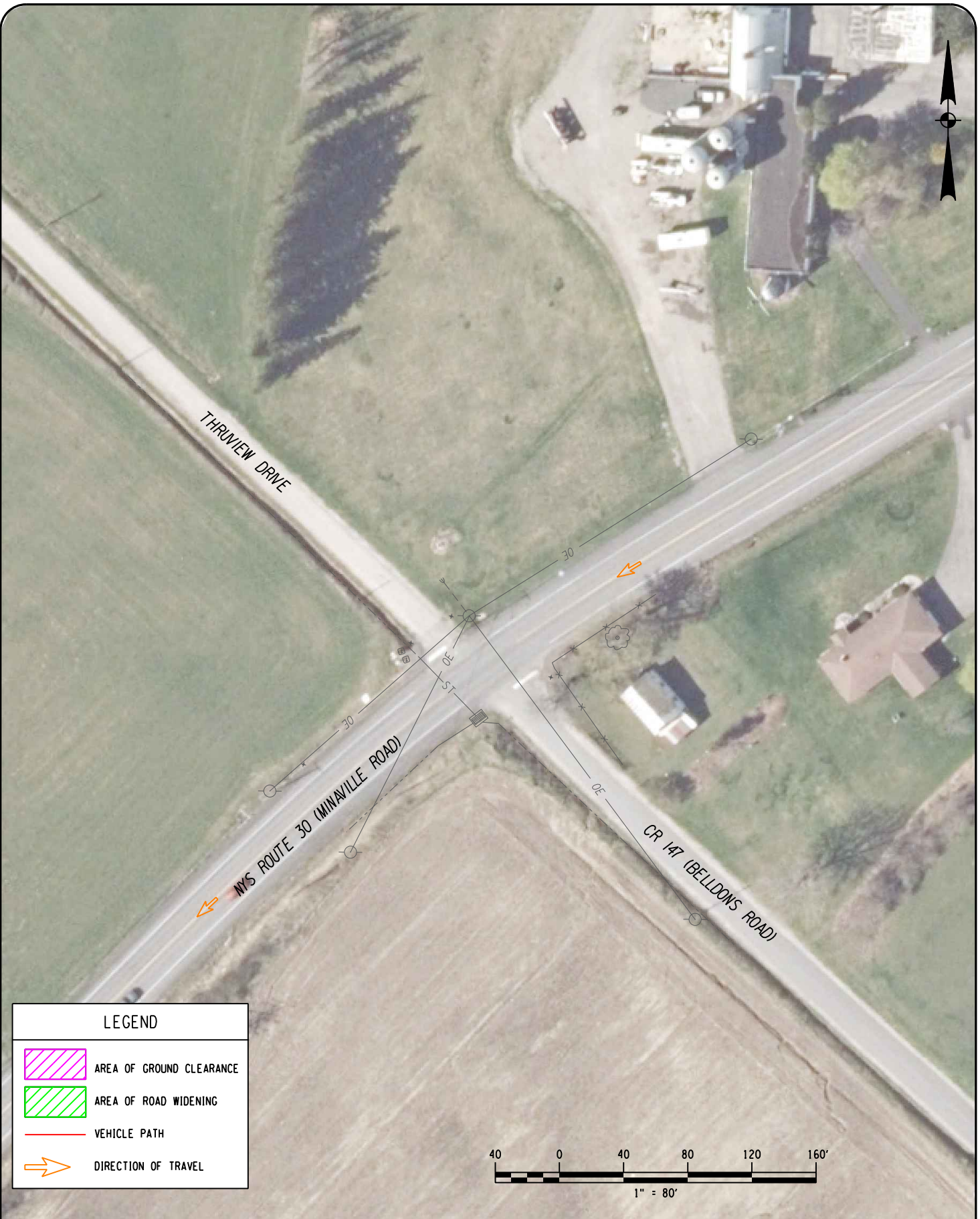






NYS ROUTE 30 (MINAVILLE ROAD) AT
NYS THRUWAY EXIT 27

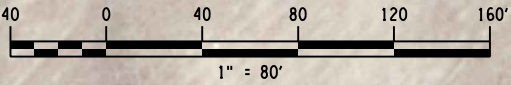
BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY

			
PROJECT:	121-310	DATE:	12/2021
FIGURE:	G1		

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LEGEND	
	AREA OF GROUND CLEARANCE
	AREA OF ROAD WIDENING
	VEHICLE PATH
	DIRECTION OF TRAVEL







NYS ROUTE 30 (MINAVILLE ROAD) AT
CR 147 (BELLDONS ROAD), AND THRUVIEW DRIVE

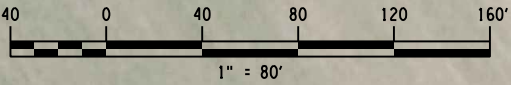
BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY



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LEGEND	
	AREA OF GROUND CLEARANCE
	AREA OF ROAD WIDENING
	VEHICLE PATH
	DIRECTION OF TRAVEL







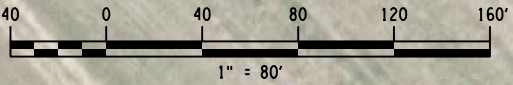
NYS ROUTE 30 AT NYS ROUTE 161

BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY

			
PROJECT:	121-310	DATE:	12/2021
FIGURE:	G3		



LEGEND	
	AREA OF GROUND CLEARANCE
	AREA OF ROAD WIDENING
	VEHICLE PATH
	DIRECTION OF TRAVEL







NYS ROUTE 161 AT CR 145 (FORT HUNTER ROAD)

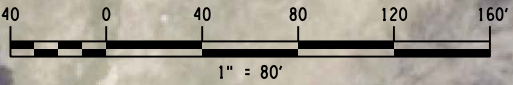
BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY

		
PROJECT: 121-310	DATE: 12/2021	FIGURE: G4



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LEGEND	
	AREA OF GROUND CLEARANCE
	AREA OF ROAD WIDENING
	VEHICLE PATH
	DIRECTION OF TRAVEL



NYS ROUTE 161 AT CR 143 (YOUNGS CORNERS ROAD)
AND DENICE ROAD

BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY

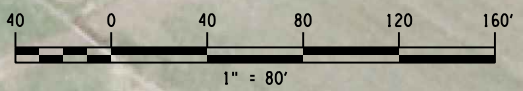


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LEGEND

- AREA OF GROUND CLEARANCE
- AREA OF ROAD WIDENING
- VEHICLE PATH
- DIRECTION OF TRAVEL



**NYS ROUTE 161 AT CR 120 (CO-DAUGH-RI-TY ROAD)
AND LANG DRIVE**

**BORREGO - WIND TURBINE ROUTING STUDY
411 REYNOLDS RD FULTONVILLE, NY**

