Transportation Assessment Report for the Pine Grove Solar Project

Madison County, Kentucky

November 2022

Prepared for:

Pine Grove Solar, LLC.

Prepared by:

Tetra Tech, Inc.
4101 Cox Road, Suite 120
Glen Allen, VA 23060

TETRA TECH

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ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ADT	average daily traffic
HCM	Highway Capacity Manual, 6th Edition
HCS7	Highway Capacity Software version 7
ISD	Intersection Sight Distance
KYTC	Kentucky Transportation Cabinet
KRFDC	Kentucky River Foothills Development Council, Inc.
MWac	megawatts (alternating current)
O&M	operations and maintenance
Project Area	The 485.7 acres of privately-owned land where the proposed Project is located
Project	Pine Grove Solar Project
SSD	Stopping Sight Distance
vpd	vehicles per day
vph	vehicles per hour

1.0 EXECUTIVE SUMMARY

Pine Grove Solar, LLC., a subsidiary of The AES Corporation (AES), proposes to construct and operate Pine Grove Solar (Project), a solar photovoltaic power generation facility which will consist of up to 50 megawatt (MW) ground-mounted solar photovoltaic system, a substation and switchyard, and related interconnection and ancillary facilities located in Madison County, Kentucky. The proposed Project is located approximately 1.5 miles southeast of the unincorporated community of Bybee, Kentucky.

Tetra Tech has prepared the following transportation assessment for the Project. The Project area is comprised of approximately 486 acres and currently supports agricultural land. Access to the site parcels is provided via several agricultural access ways on Pine Grove Road.

A series of solar photovoltaic panels will be mounted on a racking system arranged in evenly spaced rows throughout the Project area. Power Conversion Stations (PCS) will be distributed throughout the Project area, comprised of one distribution transformer and a variable number of power inverters. This equipment will connect via underground electrical wiring with a Project substation and switchyard. The substation and switchyard will be located near the center of the Project area abutting an existing 161 kilovolt (kV) Kentucky Utilities transmission line. As part of the project, five driveways will be constructed on Pine Grove Road to provide temporary construction access and permanent operations and maintenance (O&M) access to the site from the public and private roadway network (a portion of Pine Grove Road is privately-owned).

As part of this assessment, Tetra Tech developed vehicle trip generation estimates associated with the project's anticipated peak construction workforce levels and reviewed them against existing traffic volumes and public transportation in the vicinity of the Project area. An evaluation of roadway capacity was conducted for KY 52, which is the primary roadway serving the site. The available sight distances at the five proposed site driveways were evaluated to ensure that minimum sight distance criteria as defined by American Association of State Highway and Transportation Officials (AASHTO)[1] is met.

The project is anticipated to generate approximately 380 vehicle trips on a typical weekday day with 114 vehicle trips occurring during the weekday morning (7AM to 9AM) and weekday evening (4PM to 6PM) commuter peak hours. This equates to approximately two new vehicle trips per minute during peak commuting hours. These estimates conservatively assume that all construction workers would arrive within the same hour and depart within the same hour. There are multiple routes connecting the site to the regional roadway system which would reduce impacts to any single roadway segment or intersection.

Peak construction activities are currently anticipated to occur for a period of approximately two to three months. The adjacent roadways are anticipated to have ample capacity to accommodate the temporary increase in daily and peak hour traffic during the peak construction activities and, by

[1] *A Policy on Geometric Design of Highways and Streets, 7th Edition* published by the American Association of State Highway and Transportation Officials (2018).

extension, the duration of construction. A review of available sight distance at the proposed site driveways indicate that adequate sight lines are anticipated to be provided.

2.0 PROJECT DESCRIPTION

The project calls for the construction of a proposed up to 50MWac solar photovoltaic power generation facility located on Pine Grove Road in Madison County, Kentucky. The Project area location in the context of the surrounding area roadways is shown in Figure 1.

The project parcels lie on the north and south sides of Pine Grove Road and currently support agricultural production. Access to the site is currently provided via several agricultural access ways on Pine Grove Road. As part of the project, five driveways will be constructed on Pine Grove Road to provide temporary construction access and permanent O&M access to the site from the public and private roadway network (a portion of Pine Grove Road is privately-owned). The existing structures on-site will be removed as part of this project.

2.1 Existing Traffic Volumes

Tetra Tech reviewed available Kentucky Transportation Cabinet (KYTC) traffic volume data[2] to establish historical daily traffic volumes in the vicinity of the Project area. The primary roadway leading to the site is KY 52, which is a rural minor arterial maintained by the KYTC. The site is also served by local roadways Brassfield Road and Pine Grove Road, which are under County jurisdiction, with the exception of the eastern terminus of Pine Grove Road, which is under private ownership.

Based on the most recent publicly available data from the KYTC Traffic Reporting System, the estimated Average Daily Traffic (ADT) volume on the primary roadway serving the site (KY 52) was 8,256 vehicles per day (vpd) in 2021. Traffic volume data for the County-owned roadways serving the site (Brassfield Road and Pine Grove Road) is not available. Traffic volume data that was used to support this assessment is provided in Appendix A.

2.2 Vehicle Trip Generation

The Project will consist of three phases: construction, O&M, and decommissioning. The highest volume of site-related trips will occur during the peak construction phase of the project. Therefore, the trip generation for the peak construction phase workforce levels were estimated for this assessment, along with an assessment of post-construction conditions.

Construction. Vehicle trip generation estimates for the project were developed based on anticipated construction operations for the project. Construction of the proposed solar facility is expected to include grading, panel installation, inspections, and equipment deliveries. It is anticipated that, at peak operations, the site could experience construction workforce levels of up to 114 construction workers at one time. Peak construction activities are currently anticipated to occur for a period of approximately two to three months. Construction hours of operation will be 6 AM to 6 PM with construction workers arriving prior to 6 AM and departing after 6 PM. Since the peak hours of the adjacent street traffic are expected to occur sometime during the peak commuting periods of 7 AM to 9 AM and 4 PM to 6 PM, it is expected that the majority of construction workers would arrive and

[2] Kentucky Transportation Cabinet Traffic Count Database, https://maps.kytc.ky.gov/trafficcounts/ (October 2022)

depart the site outside of the typical weekday morning and weekday evening commuter peak hours of the adjacent street.

However, to present a conservative assessment of potential traffic increases associated with the project, it is assumed that all construction workers would arrive during the weekday morning peak hour and depart during the weekday evening peak hour. The supporting trip generation calculations and assumptions for the proposed project's peak construction workforce levels are provided in Appendix B.

The Kentucky River Foothills Development Council, Inc. (KRFDC) operates public transit service in Madison County. KRFDC operates the Berea and Richmond transit lines (bus service) within Madison County from 8 am to 5 pm (Monday through Friday). KRFDC also operates the Madison County Connector bus line with limited service between 7 am and 4 pm (Monday through Friday). However, service is not provided in the vicinity of the Pine Grove Solar site. Public transportation information is provided in Appendix C. For the purposes of this assessment, it was assumed that no construction workers would use public transit to access the site.

It is anticipated that some construction workers would arrive and depart the site together (carpooling). For purposes of this assessment, it was assumed that 10 percent of the construction workers will carpool to travel to/from the site with two workers per vehicle. Table 1 presents a summary of the trip generation estimates for the proposed project's peak construction workforce activities.

Table 1 Trip Generation Summary – Peak Construction Period

	Project Trips			
Time Period/ Direction	**Workforce Trips[1]**	**Non-Heavy Vehicle Deliveries[2]**	**Heavy Vehicles[3]**	**Total**
Weekday AM Peak Hour				
Enter	108	1	2	111
Exit	0	1	2	3
Total	**108**	**2**	**4**	**114**
Weekday PM Peak Hour				
Enter	0	1	2	3
Exit	108	1	2	111
Total	**108**	**2**	**4**	**114**
Weekday Daily				
Enter	165	5	20	190
Exit	165	5	20	190
Total	**330**	**10**	**40**	**380**

1) Assumed 114 construction workers per day. Conservatively assumed trips overlap with adjacent street peaks.

2) Assumed 5 deliveries per day with 40 percent of trips occurring during peak hours.
3) Assumed 20 deliveries per day spread evenly throughout day.

As shown in Table 1, the peak construction activity for the proposed solar facility is expected to generate 380 new vehicle trips (190 entering and 190 exiting) on a typical weekday, with approximately 114 new vehicle trips (111 entering and 3 exiting) during the weekday morning peak hour and 114 new vehicle trips (3 entering and 111 exiting) during the weekday evening peak hour. As discussed in more detail in the following section, the adjacent roadways are anticipated to have ample capacity to accommodate the temporary increase in daily and peak hour traffic with the project estimated to generate approximately two additional trips per minute during peak hours. Additionally, there are multiple routes connecting the site to the regional roadway system thereby reducing impacts to any single roadway segment or intersection.

Post-Construction Conditions. Routine post-construction O&M activities at the site are not anticipated to result in a measurable increase in vehicle traffic. The number of maintenance workers traveling to the site is anticipated to be low and impacts to local traffic are not expected: the proposed solar facility will be unmanned during routine O&M and would only be inspected periodically. Therefore, the site is not expected to result in a noticeable increase to existing traffic under typical O&M conditions. Impacts resulting from decommissioning of the project are expected to be similar to or less than those experienced during construction.

3.0 Roadway Capacity

Tetra Tech conducted a capacity analysis of the primary roadway serving the site (KY 52). The analysis was conducted using Highway Capacity Software (HCS7) which uses Highway Capacity Manual (HCM) 6th Edition methodology for two lane highways. The analysis provides a level of service (LOS) designation based on the calculated follower density (followers/mile/lane) for the roadway segment analyzed. LOS results are given in letter grade designations from LOS A through LOS F. An LOS of D or better is typically considered acceptable. LOS E and LOS F indicate that a roadway segment may experience significant delays and congestion.

Based on KYTC traffic volume data, KY 52 experiences weekday peak hour flows of approximately 435 vehicles per hour (vph) in the dominant travel direction. Traffic volumes on KY 52 in the vicinity of Brassfield Road have generally experienced negligible growth over the past 10 years. Therefore, it was assumed that KY 52 would experience negligible growth from existing conditions through the Project's construction period.

KY 52 is a three-lane roadway through its intersection with Brassfield Road (two lanes in the northwestbound travel direction and one lane in the southeastbound travel direction). However, the roadway cross-section tapers down to two lanes (one lane in each direction) just north of the intersection. As a conservative measure, the capacity analysis was conducted assuming a two-lane configuration rather than a three-lane configuration for KY 52.

Additionally, while the Project area can be accessed by multiple roadways, to provide a conservative analysis, it was assumed that all construction-related traffic would use the same section of KY 52. Only the peak construction period was analyzed as it is the project phase that is anticipated to have the highest trip generation activity. However, the peak construction phase is only anticipated to occur over a two to three month period, with the remaining construction activity anticipated to experience fewer vehicle trips.

The HCS two-lane highway analysis results show that KY 52 is expected to operate with minimal delay at LOS C operations during the critical weekday peak hours. This indicates that KY 52 has ample capacity to support the peak construction activity associated with the proposed Pine Grove Solar project (typically, LOS D or better operations are considered acceptable). The HCS analysis worksheets are provided in Appendix D. Brassfield Road and Pine Grove Road are secondary local roadways and assumed to experience traffic volumes well below those observed on KY 52. Therefore, it is anticipated that these roadways will also have ample capacity to support the project.

4.0 Sight Distance Evaluation

Tetra Tech reviewed the available sight distance at the proposed site driveways on Pine Grove Road to ensure that safe and efficient access would be provided to the Project area. The available sight distance was determined in the field based on procedures outlined in *A Policy on Geometric Design of Highways and Streets*, published by the American Association of State Highway and Transportation Officials (AASHTO). Tetra Tech then compared the available sight distance at each proposed driveway to the minimum required Stopping Sight Distance (SSD) and minimum-recommended (desirable) Intersection Sight Distances (ISD) for the anticipated travel speeds for vehicles traveling past the site.

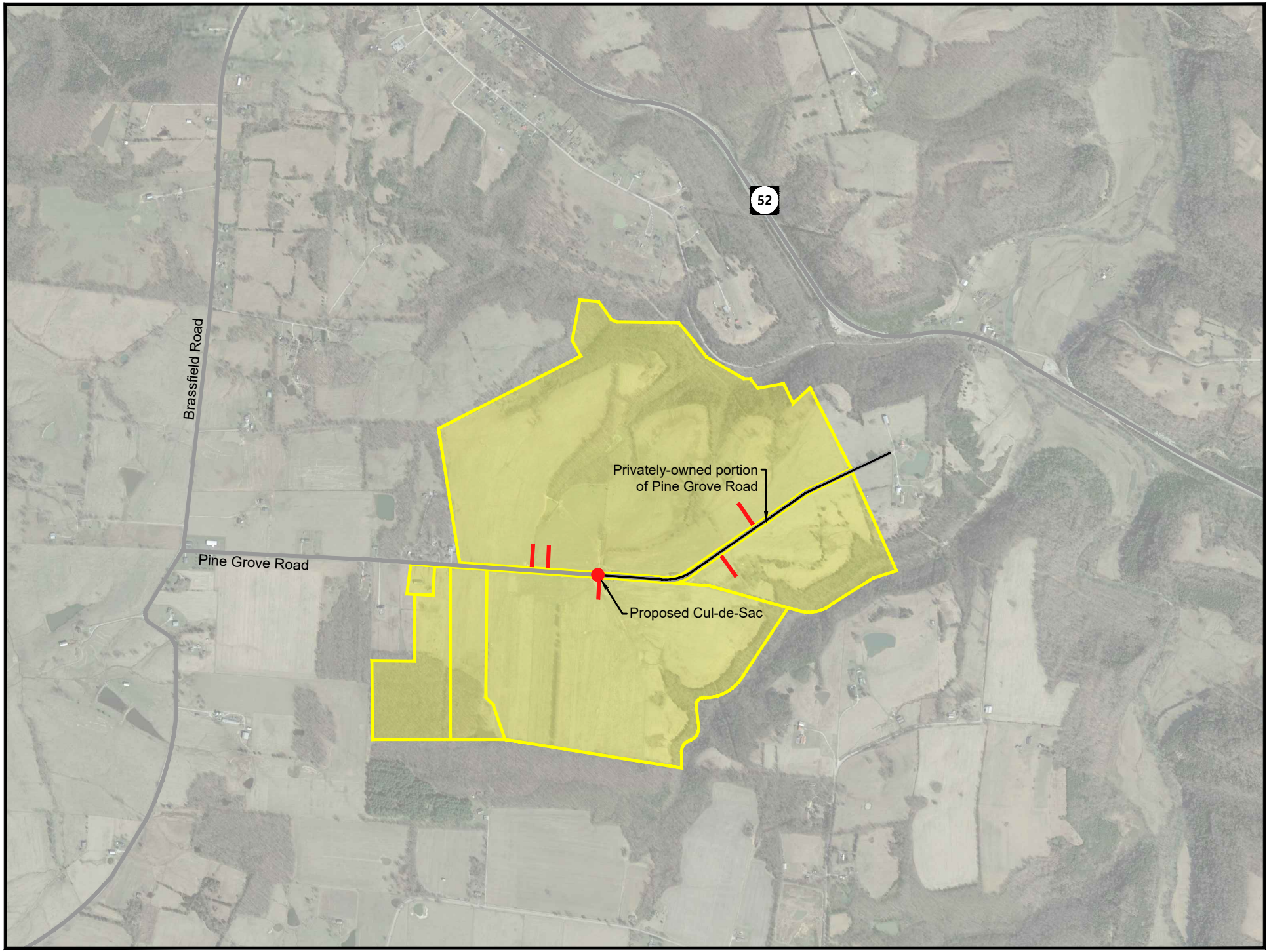
There is no posted speed limit on Pine Grove Road. A design speed of 55 miles per hour (mph) was used for analysis purposes. The AASHTO minimum required SSD and recommended (desirable) ISD for 55 mph are 495 feet and 610 feet, respectively. Based on a review of the survey data provided to Tetra Tech, the available sight distances exceed the AASHTO SSD and ISD criteria assuming the sight triangles will be kept clear of obstructions (e.g., vegetation, fencing, signage, on-site grading, structures, etc.). This indicates that motorists traveling at the design speed of 55 mph on Pine Grove Road would have sufficient view of the proposed driveways to either stop or adjust their speed, as appropriate, to react to turning movements to and from the proposed development and avoid potential collisions. This would also provide motorists waiting to exit the driveways with sufficient view of the intersecting roadway to decide when they can safely enter onto Pine Grove Road. The sight distance calculations are provided in Appendix E.

5.0 CONCLUSIONS

The peak construction workforce levels for the proposed up to 50MW solar photovoltaic power generation facility are expected to generate approximately 114 trips during the weekday morning peak hour and 114 trips during the weekday evening peak hour during peak construction workforce activity. This equates to approximately two new vehicle trips per minute during peak hours. Peak construction activities are currently anticipated to occur for a period of approximately two to three months. The remainder of the construction period is anticipated to generate fewer vehicle trips. These trip generation estimates are conservative as the majority of peak hour trips are likely to occur outside of the typical weekday commuter peak hours of the adjacent street traffic. Additionally, there are multiple routes connecting the site to the regional roadway system thereby reducing impacts to any single roadway segment or intersection.

As part of the project, five driveways will be constructed on Pine Grove Road to provide temporary construction access and permanent O&M access to the site from the public and private roadway network. A review of available sight distance at the proposed site driveways indicate that adequate sight lines are anticipated to be provided. The adjacent roadways are anticipated to have ample capacity to accommodate the temporary increase in daily and peak hour traffic. The Project will generate even less traffic post construction with only occasional routine inspection and maintenance of the solar panels and supporting equipment.

FIGURES



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LEGEND

PROJECT BOUNDARY

PROPOSED SITE DRIVEWAY

Pine Grove Solar Project
Madison County, Kentucky

SITE LOCATION

FIGURE

1

APPENDIX A: KYTC TRAFFIC VOLUME DATA

Historical Traffic Volume Summary

Station Details:

Sta ID:	076310
Sta Type:	Full Coverage
Map:	MapIt
District:	7
County:	Madison
Route:	076-KY-0052 -000
Route Desc:	IRVINE RD

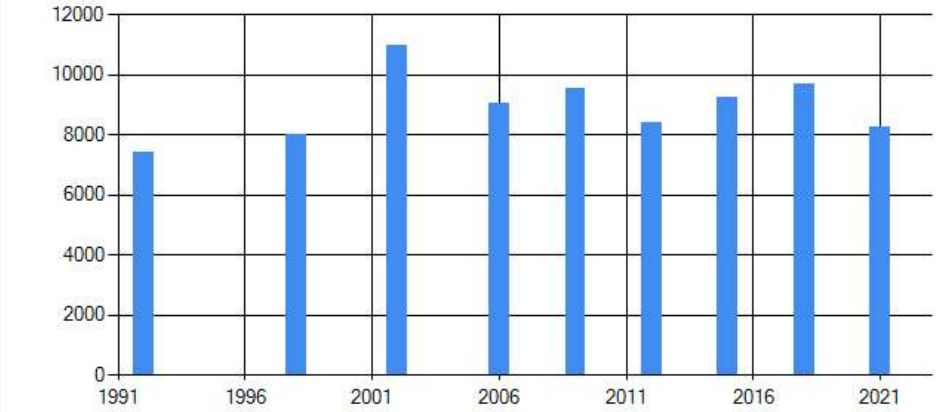
Begin MP:	19.62
Begin Desc:	BRUMSTARK ROAD/KY 977
End Mp:	22.7070
End Desc:	ESTILL COUNTY LINE
Impact Year:	
Year Added:	

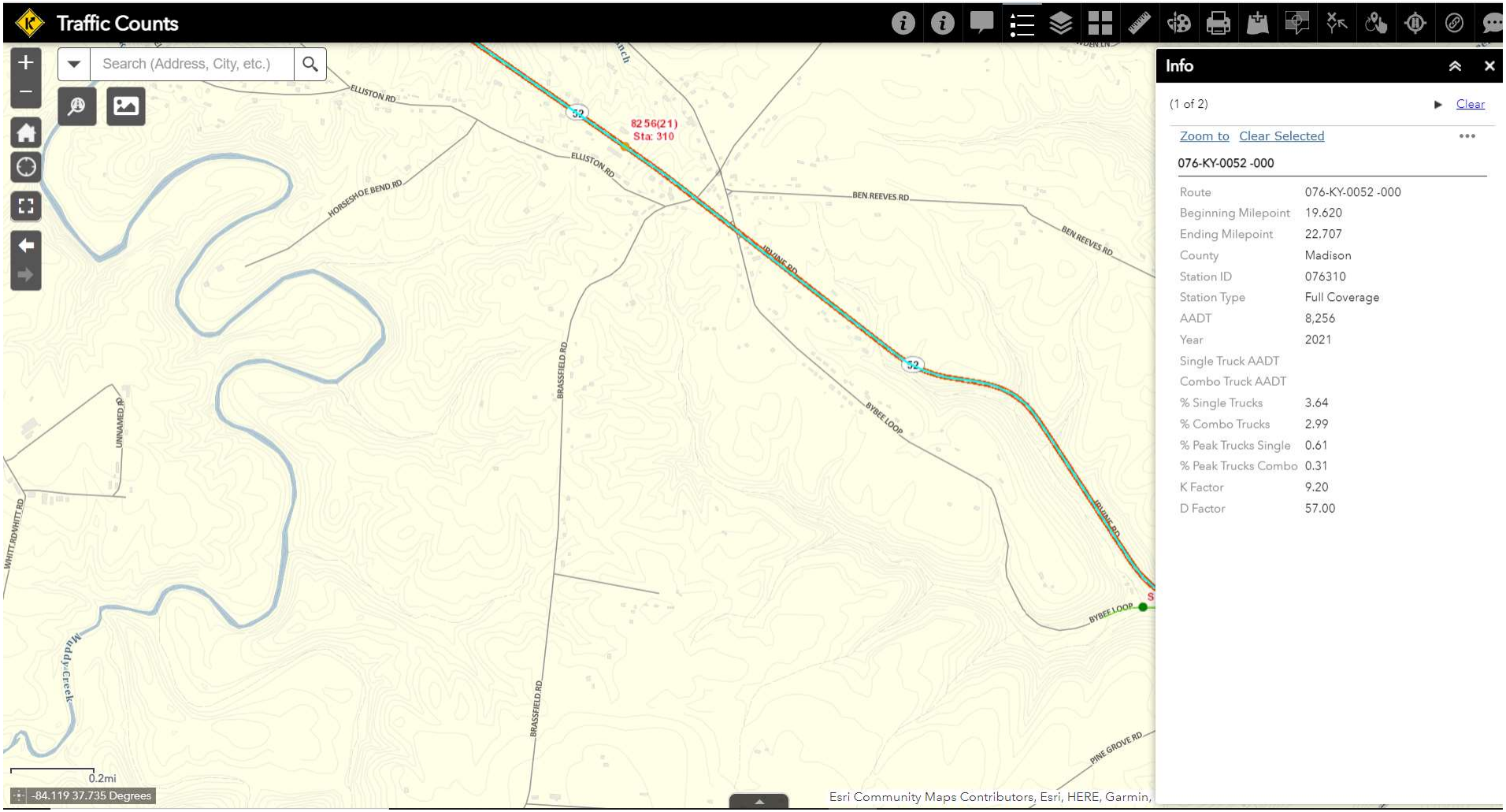
Newest Count:

AADT:	8256
Year:	2021
% Single:	3.64
% Combo:	2.9880
K Factor:	9.20
D Factor:	57

Definitions:
Sta. ID - Three digit county number + station number
MP - milepoint
Impact Year – year of significant change to traffic pattern within station segment
AADT – Annual Average Daily Traffic – the annualized average 24-hour volume of vehicles on a segment of roadway
% Single – single unit truck volume as a percentage of the AADT
% Combo – combination truck volume as a percentage of the AADT
K Factor – peak hour volume as a percentage of the AADT
D Factor – percentage of peak hour volume flowing in the peak direction

Year	AADT	Year	AADT	Year	AADT
2022		2012	8434	2002	11000
2021	8256	2011		2001	
2020		2010		2000	
2019		2009	9540	1999	
2018	9719	2008		1998	8020
2017		2007		1997	
2016		2006	9060	1996	
2015	9255	2005		1995	
2014		2004		1994	
2013		2003		1993	





Source: Kentucky Transportation Cabinet Traffic Count Database (Traffic Counts (ky.gov)

APPENDIX B: TRIP GENERATION CALCULATIONS

Peak Construction Workforce Trip Generation Calculations and Assumptions

Proposed Pine Grove Solar Facility - Madison County, KY

Construction Site Driveway Trips					
	Workforce Trips	Non-Heavy Vehicle Deliveries	Heavy Vehicle Deliveries	Total	CALCULATIONS
AM Peak Hour:					
Enter	108	1	2	111	(114 workers x 100% arrive x (100% - 10% carpool x 1 vehicle/2 carpool workers)) + (3 Delivery Vehicles arrive) = 111
Exit	0	1	2	3	(114 workers x 0% depart) + (3 Delivery Vehicles depart) = 3
Total	108	2	4	114	
PM Peak Hour:					
Enter	0	1	2	3	(114 workers x 0% arrive) + (3 Delivery Vehicles arrive) = 3
Exit	108	1	2	111	(114 workers x 100% depart x (100% - 10% carpool x 1 vehicle/2 carpool workers)) + (3 Delivery Vehicles depart) = 111
Total	108	2	4	114	
Weekday Daily:					
Enter	165	5	20	190	(114 workers x 100% arrive in AM x (100% - 10% carpool x 1 vehicle/2 carpool workers)) + (114 workers x 50% return from lunch/errands midday) + (25 Delivery Vehicles arrive) = 190
Exit	165	5	20	190	(85 workers x 100% depart in PM x (100% - 10% carpool x 1 vehicle/2 carpool workers)) + (85 workers x 50% leave for lunch/errands midday) + (25 Delivery Vehicles depart) = 190
Total	330	10	40	380	

Construction Assumption	AM Peak Hour	PM Peak Hour	Off-Peak	Notes
# of Peak Workers On-Site at One Time:	114	114	114	Assume 85 tradespeople per day
% Workers Arriving:	100%	0%	50%	Assumed hours of operation 7am-5pm (may be longer). Peak Hours of adjacent street traffic assumed to occur between is 7am-9am and 4pm-6pm. Therefore, the majority of construction worker traffic is likely to occur outside of the morning peak hour of adjacent street traffic and some may depart after the evening peak hour. However, as a conservative measure, assumed 100 percent of workers arrive after 7am and depart before 6pm. As a conservative measure, assumed half of workforce depart and return once during off-peak times. Assumed none of the workers get picked up/dropped off.
% Workers Departing:	0%	100%	50%	Assumed hours of operation 7am-5pm (may be longer). Peak Hours of adjacent street traffic assumed to occur between is 7am-9am and 4pm-6pm. Therefore, the majority of construction worker traffic is likely to occur outside of the morning peak hour of adjacent street traffic and some may depart after the evening peak hour. However, as a conservative measure, assumed 100 percent of workers arrive after 7am and depart before 6pm. As a conservative measure, assumed half of workforce depart and return once during off-peak times. Assumed none of the workers get picked up/dropped off.
% Carpool[1]:	10.0%	10.0%	0.0%	Assumed 10% carpooling during commuting
Carpool VOR[2]:	2.00	2.00	1.00	Assumed two workers per car during commuting
# Shuttle Trips:	0	0	0	Assumed all workers and deliveries will occur via the construction driveway; no laydown site is proposed
# Truck Deliveries:	2	2	16	Assumed worker hours of operation 7am-5pm and assumed 20 deliveries per day that would be distributed evenly throughout the day.
# Non-Truck Deliveries:	1	1	3	Occasionally, non-heavy vehicle deliveries will occur. For trip generation analysis purposes, assumed 5 deliveries per day. Conservatively assumed some occurs during peak hours of adjacent street traffic.

[1]Enter % per population - formulas above account for VOR

[2]VOR for carpoolers only

NOTE: Assumes a 50 MWac facility with a 9 month construction period including 2 to 3 months of ramp-up/ramp-down and 2 to 3 months of peak construction activity

Source: Tetra Tech

APPENDIX C: PUBLIC TRANSPORTATION INFORMATION

GENERAL TRANSIT INFORMATION

HOW TO RIDE THE BUS: The Berea Bus Service only stops at locations listed on the schedule. Plan your pickup according to times listed on the schedule and try to be early. Please notice that all times listed are DEPARTURE times and not arrival times. To utilize the bus service, stand at a bus stop and make sure you are visible to the driver. Have your fare or pass ready upon boarding the bus.

BUS PASSES: A bus pass is required to ride. Passes can be purchased on the bus or at the Foothills office, located at 309 Spangler Drive in Richmond, KY. Bus fare is $1 per rider. You must have the exact amount for your fare, as the driver does not make change. You may purchase one pass each day or save 30% and buy a bundle of 10 passes for $7! Each ticket is valid for one day only. Riders may use the ticket to get on/off the bus an unlimited number of times throughout the day. BCTC students ride free with valid ID, courtesy of Bluegrass Community & Technical College. Kids 8 and under always ride free.

OFF-ROUTE REQUESTS: The deviated-fixed route will deviate for the general public, with and without disabilities. Riders can request an off-route (stop that is not listed on the schedule) by calling dispatch 24-hours in advance. All off-route stops must be within ¾ mile of the existing route. *All requests are subject to availability.

SEAT BELT AND CHILD SAFETY POLICY: Kentucky State Law requires all riders to wear a seat belt at all times. Children under the age of eight (8), or who are less than fifty-seven (57) inches in height, MUST be secured in an appropriate child safety seat for their age, weight, and height. Additionally, all safety seats MUST be provided by and secured by the parent or legal guardian. Only children greater than fifty-seven (57) inches in height shall not be required to be secured in a child safety seat or booster.

GROCERIES: Three grocery/shopping bags are okay. Driver is not permitted to carry any passenger items.

Kentucky River Foothills Development Council, Inc.

CITY OF BEREA, KENTUCKY 1890

A service of the City of Winchester, Clark County Fiscal Court, and Kentucky River Foothills Development Council, Inc. Transportation is funded by the U.S. Department of Transportation and is passed through the Commonwealth of Kentucky Transportation Cabinet, Office of Transportation Delivery.

For more information, please visit our website or follow us on Facebook:
www.foothillscap.org facebook.com/FoothillsExpress

BEREA
TRANSIT SERVICE

SERVICE RUNS MONDAY THROUGH FRIDAY | 8A - 5P
EXCLUDES NATIONAL HOLIDAYS

60 MINUTE LOOP

SEE INSIDE FOR COMPLETE BUS SCHEDULE

SEE INSIDE FOR COMPLETE BUS SCHEDULE

BEREA BUS SERVICE DEPARTURE TIMES

BEREA BUS SERVICE DEPARTURE TIMES

STOP LOCATION	8:00A to 9:00A	9:00A to 10:00A	10:00A to 11:00A	11:00A to 12:00P	12:00P to 1:00P	1:00P to 2:00P	2:00P to 3:00P	3:00P to 4:00P	4:00P to 5:00P
Wal-Mart	8:00	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00
Goodwill	8:02	9:02	10:02	11:02	12:02	1:02	2:02	3:02	4:02
Hurley at Kaye	8:04	9:04	10:04	11:04	12:04	1:04	2:04	3:04	4:04
Lewis at Maple	8:05	9:05	10:05	11:05	12:05	1:05	2:05	3:05	4:05
Senior Center	8:08	9:08	10:08	11:08	12:08	1:08	2:08	3:08	4:08
Old Town (Broadway at Adams)	8:10	9:10	10:10	11:10	12:10	1:10	2:10	3:10	4:10
Boone Tavern/Union Church	8:13	9:13	10:13	11:13	12:13	1:13	2:13	3:13	4:13
Central at Prospect	8:14	9:14	10:14	11:14	12:14	1:14	2:14	3:14	4:14
Silver Creek Apartments	8:17	9:17	10:17	11:17	12:17	1:17	2:17	3:17	4:17
Center at Forest	8:19	9:19	10:19	11:19	12:19	1:19	2:19	3:19	4:19
Lorraine Ct at Chestnut	8:20	9:20	10:20	11:20	12:20	1:20	2:20	3:20	4:20
Joshua Cir at Hwy 1016	8:24	9:24	10:24	11:24	12:24	1:24	2:24	3:24	4:24
Layne Ct at Hwy 1016	8:25	9:25	10:25	11:25	12:25	1:25	2:25	3:25	4:25
Morgan Street	8:28	9:28	10:28	11:28	12:28	1:28	2:28	3:28	4:28
Save-a-Lot	8:31	9:31	10:31	11:31	12:31	1:31	2:31	3:31	4:31
Mini Mall	8:32	9:32	10:32	11:32	12:32	1:32	2:32	3:32	4:32
Glades Village	8:34	9:34	10:34	11:34	12:34	1:34	2:34	3:34	4:34
Post Office	8:35	9:35	10:35	11:35	12:35	1:35	2:35	3:35	4:35
Health Department	8:38	9:38	10:38	11:38	12:38	1:38	2:38	3:38	4:38
St. Joseph Berea	8:43	9:43	10:43	11:43	12:43	1:43	2:43	3:43	4:43
College Square/Boone Tavern	8:44	9:44	10:44	11:44	12:44	1:44	2:44	3:44	4:44
City Hall/Library	8:47	9:47	10:47	11:47	12:47	1:47	2:47	3:47	4:47
Brenwood St./Jill St. (Shops/Restaurants)	8:51	9:51	10:51	11:51	12:51	1:51	2:51	3:51	4:51

Please be advised, bus stop times listed on the schedule are departure times.
Bus arrival times will vary depending on traffic and weather conditions.

Stops that are not listed are considered off-routes. Off-routes must be within 3/4 mile from a bus stop and scheduled with dispatch (800-819-7083 or 859-624-3236) at least 24-hours in advance.

Madison County Connector

MADISON COUNTY
KENTUCKY

Madison County Connector Schedule	
7:00 a.m. - 7:30 a.m.	Pick up in Berea
7:30 a.m. - 8:00 a.m.	Drops off in Richmond
8:00 a.m. - 8:30 a.m.	Pick up in Richmond
8:30 a.m. - 9:00 a.m.	Drop off in Berea
9:00 a.m. - 9:30 a.m.	Pick up in Berea
9:30 a.m. - 10:00 a.m.	Drop off in Richmond
10:00 a.m. - 10:30 a.m.	Pick up in Richmond
10:30 a.m. - 11:00 a.m.	Drop off in Berea
11:00 a.m. - 11:30 a.m.	Pick up in Berea
11:30 a.m. - 12:00 p.m.	Drop off in Richmond
12:00 p.m. - 1:00 p.m.	Driver's Lunch Break
1:00 p.m. - 1:30 p.m.	Pick up in Berea
1:30 p.m.- 2:00 p.m.	Drop off in Richmond
2:00 p.m. - 2:30 p.m.	Pick up in Richmond
2:30 p.m. - 3:00 p.m.	Drop off in Berea
3:00 p.m. - 3:30 p.m.	Pick up in Berea
3:30 p.m. - 4:00 p.m.	Drop off in Richmond
4:00 p.m. - 4:30 p.m.	Pick up in Richmond
4:30 p.m. - 5:00 p.m.	Drop off in Berea

GENERAL TRANSIT INFORMATION

HOW TO RIDE THE BUS: The Richmond Transit Service only stops at locations listed on the schedule. Plan your pickup according to times listed on the schedule and try to be early. Please notice that all times listed are DEPARTURE times and not arrival times. To utilize the bus service, stand at a bus stop and make sure you are visible to the driver. Have your fare or pass ready upon boarding the bus.

BUS PASSES: A bus pass is required to ride the Richmond Transit Service. Passes can be purchased on the bus or at the Foothills office, located at 309 Spangler Drive in Richmond, KY. Bus fare is $1 per rider or $0.50 for college students with a valid ID. You must have the exact amount for your fare, as the driver does not make change. The EKU stop is for riders accessing or exiting Eastern Kentucky University's campus via transfer between City of Richmond and EKU buses. Fare is required to transfer from EKU bus to City bus. You may purchase one pass each day or save 30% and buy a bundle of 10 passes for $7! Kids 8 and under ride free. Riders may use their pass to get on/off at any stop for the date of purchase only.

OFF-ROUTE REQUESTS: The deviated-fixed route will deviate for the general public, with and without disabilities. Riders can request an off-route (stop that is not listed on the schedule) by calling dispatch 24-hours in advance. All off-route stops must be within ¾ mile of the existing route. *All requests are subject to availability.

SEAT BELT AND CHILD SAFETY POLICY: Kentucky State Law requires all riders to wear a seat belt at all times. Children under the age of eight (8), or who are less than fifty-seven (57) inches in height, MUST be secured in an appropriate child safety seat for their age, weight, and height. Additionally, all safety seats MUST be provided by and secured by the parent or legal guardian. Only children greater than fifty-seven (57) inches in height shall not be required to be secured in a child safety seat or booster.

GROCERIES: Three grocery/shopping bags are okay. Driver is not permitted to carry any passenger items.

Kentucky River Foothills Development Council, Inc.

CITY OF RICHMOND 1809

A service of the City of Richmond and Kentucky River Foothills Development Council, Inc. Transportation is funded by the U.S. Department of Transportation and is passed through the Commonwealth of Kentucky Transportation Cabinet, Office of Transportation Delivery.

For more information, please visit our website or follow us on Facebook:
www.foothillscap.org facebook.com/FoothillsExpress

RICHMOND
TRANSIT SERVICE

SERVICE RUNS MONDAY THROUGH FRIDAY | 8A - 5P

EXCLUDES NATIONAL HOLIDAYS

BUS A IS A 90 MINUTE LOOP

BUS B IS A 60 MINUTE LOOP

SEE INSIDE FOR COMPLETE BUS SCHEDULE

CALL 859.624.3236 OR
1.800.819.7083 TO SCHEDULE A RIDE.

RICHMOND TRANSIT BUS A DEPARTURE TIMES (RED)

BUS LEAVES EACH STOP AT TIMES LISTED ON THE SCHEDULE

STOP LOCATION	8:00A to 9:30A	9:30A to 11:00A	11:00A to 12:30P	12:30P to 2:00P	2:00P to 3:30P	3:30P to 5:00P
Meijer	8:00	9:30	11:00	12:30	2:00	3:30
Baptist Physicians Meridian Way	8:04	9:34	11:04	12:34	2:04	3:34
S. Killarney at Manna	8:07	9:37	11:07	12:37	2:07	3:37
Spangler Dr. at Foothills	8:09	9:39	11:09	12:39	2:09	3:39
Big Lots	8:11	9:41	11:11	12:41	2:11	3:41
Mahaffey at Dollar General	8:15	9:45	11:15	12:45	2:15	3:45
Baptist Health/EKU Vickers Lot	8:20	9:50	11:20	12:50	2:20	3:50
Walmart	8:40	10:10	11:40	1:10	2:40	4:10
Lexington Clinic/Kroger	8:44	10:14	11:44	1:14	2:44	4:14
White House Clinic	8:49	10:19	11:49	1:19	2:49	4:19
Holly Street	8:54	10:24	11:54	1:24	2:54	4:24
YMCA	8:56	10:26	11:56	1:26	2:56	4:26
Oakland at Linden	8:57	10:27	11:57	1:27	2:57	4:27
Smith Village	8:58	10:28	11:58	1:28	2:58	4:28
Cimarron at Powderhorn	9:00	10:30	12:00	1:30	3:00	4:30
Madison Towers	9:03	10:33	12:03	1:33	3:03	4:33
Irvine St. at City Hall	9:06	10:36	12:06	1:36	3:06	4:36
Richmond Manor	9:08	10:38	12:08	1:38	3:08	4:38
Turpin Drive	9:10	10:40	12:10	1:40	3:10	4:40
Robinson Terrace	9:11	10:41	12:11	1:41	3:11	4:41
Willis Manor	9:16	10:46	12:16	1:46	3:16	4:46
Madison Co. Public Library	9:18	10:48	12:18	1:48	3:18	4:48

BUS CONNECTION A TO B CONNECTION B TO A CONNECTION

RICHMOND TRANSIT BUS B DEPARTURE TIMES (BLUE)

BUS LEAVES EACH STOP AT TIMES LISTED ON THE SCHEDULE

STOP LOCATION	8:00A to 9:00A	9:00A to 10:00A	10:00A to 11:00A	11:00A to 12:00P	12:00P to 1:00P	1:00P to 2:00P	2:00P to 3:00P	3:00P to 4:00P	4:00P to 5:00P
N. Keeneland at Belmont	8:00	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00
Keystone at N. Keeneland	8:02	9:02	10:02	11:02	12:02	1:02	2:02	3:02	4:02
Keystone at Lexington Rd.	8:03	9:03	10:03	11:03	12:03	1:03	2:03	3:03	4:03
S. Keeneland Dr. Shops	8:05	9:05	10:05	11:05	12:05	1:05	2:05	3:05	4:05
Foxhaven Dr. at Foxhaven Ct.	8:10	9:10	10:10	11:10	12:10	1:10	2:10	3:10	4:10
Madison Co. Public Library	8:16	9:16	10:16	11:16	12:16	1:16	2:16	3:16	4:16
Irvine St. at City Hall	8:18	9:18	10:18	11:18	12:18	1:18	2:18	3:18	4:18
Pebblecreek Crossing	8:22	9:22	10:22	11:22	12:22	1:22	2:22	3:22	4:22
Health Department	8:24	9:24	10:24	11:24	12:24	1:24	2:24	3:24	4:24
Baptist Health/ EKU Vickers Lot	8:28	9:28	10:28	11:28	12:28	1:28	2:28	3:28	4:28
Walmart	8:42	9:42	10:42	11:42	12:42	1:42	2:42	3:42	4:42
Save-a-Lot	8:48	9:48	10:48	11:48	12:48	1:48	2:48	3:48	4:48
DCBS Office	8:50	9:50	10:50	11:50	12:50	1:50	2:50	3:50	4:50

BUS CONNECTION A TO B CONNECTION B TO A CONNECTION

APPENDIX D: HCS WORKSHEETS

HCS7 Two-Lane Highway Report

Project Information

Analyst	Tetra Tech	Date	11/11/2022
Agency		Analysis Year	2023
Jurisdiction	KYTC	Time Period Analyzed	Weekday Peak Hour
Project Description	Pine Grove Solar Project	Unit	United States Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	5280
Lane Width, ft	12	Shoulder Width, ft	6
Speed Limit, mi/h	55	Access Point Density, pts/mi	9.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	591	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.92	Total Trucks, %	6.50
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.35

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.2
Speed Slope Coefficient	3.82483	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.29488	PF Power Coefficient	0.76199
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	6.0
%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	-	-	57.4

Vehicle Results

Average Speed, mi/h	57.4	Percent Followers, %	58.0
Segment Travel Time, minutes	1.05	Follower Density, followers/mi/ln	6.0
Vehicle LOS	C		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	6.0	C

APPENDIX E: SIGHT DISTANCE CALCULATIONS

STOPPING SIGHT DISTANCE:

STOPPING SIGHT DISTANCE FROM EAST

Inputs

V=speed, mph		V=	55	**(Design Speed)**
G=percent of grade		G=	0	**(%)**
t=brake reaction time		t=	2.5	
a=deceleration rate, ft/sec^2		a=	11.2	

Calculations

Brake Reaction Distance	1.47Vt	202	feet
Braking Distance	$V^2/30((a/32.2)+G)$	289.9	feet
Stopping Sight Distance =	$1.47Vt + V^2/30[(a/32.2)+G]$	**495**	**feet**

STOPPING SIGHT DISTANCE FROM WEST

Inputs

V=speed, mph		V=	55	**(Design Speed)**
G=percent of grade		G=	0	**(%)**
t=brake reaction time		t=	2.5	
a=deceleration rate, ft/sec^2		a=	11.2	

Calculations

Brake Reaction Distance	1.47Vt	202	feet
Braking Distance	$V^2/30((a/32.2)+G)$	289.9	feet
Stopping Sight Distance =	$1.47Vt + V^2/30[(a/32.2)+G]$	**495**	**feet**

Source: *A Policy on Geometric Design of Highways and Streets, 2018, Seventh Edition,* prepared by AASHTO, p. 3-4 to 3-5.

INTERSECTION SIGHT DISTANCE:

INTERSECTION SIGHT DISTANCE - LEFT FROM MINOR APPROACH - TO THE EAST

Inputs

V= design speed, mph	V=	55	**(Design Speed)**
t=time gap for minor road vehicle to enter the major road	t=	7.50	**(choose value based on Table 1)**

Calculations

Int. Sight Distance =	1.47Vt	**610 feet**

Table 1 - Time Gap Factors

Design Vehicle	Time Gap[1], t (sec) for Grades </=3%	Grade of Minor Approach	Number of Additional Lanes to Cross	Adjusted Time Gap, t (sec)
passenger car	7.5	0%	0	7.50
single-unit truck	9.5	0%	0	9.50
combination truck	11.5	0%	0	11.50

INTERSECTION SIGHT DISTANCE - LEFT FROM MINOR APPROACH - TO THE WEST

Inputs

V= design speed, mph	V=	55	**(Design Speed)**
t=time gap for minor road vehicle to enter the major road	t=	7.50	**(choose value based on Table 1)**

Calculations

Int. Sight Distance =	1.47Vt	**610 feet**

Design Vehicle	Time Gap[1], t (sec) for Grades </=3%	Grade of Minor Approach	Number of Additional Lanes to Cross	Adjusted Time Gap, t (sec)
passenger car	7.5	0%	0	7.50
single-unit truck	9.5	0%	0	9.50
combination truck	11.5	0%	0	11.50

Notes:

1.Time Gap values are applicable for major roads with grades 3 percent or less and no median and a minor street approach with a grade of 3 percent or less. Otherwise, the table values should be adj

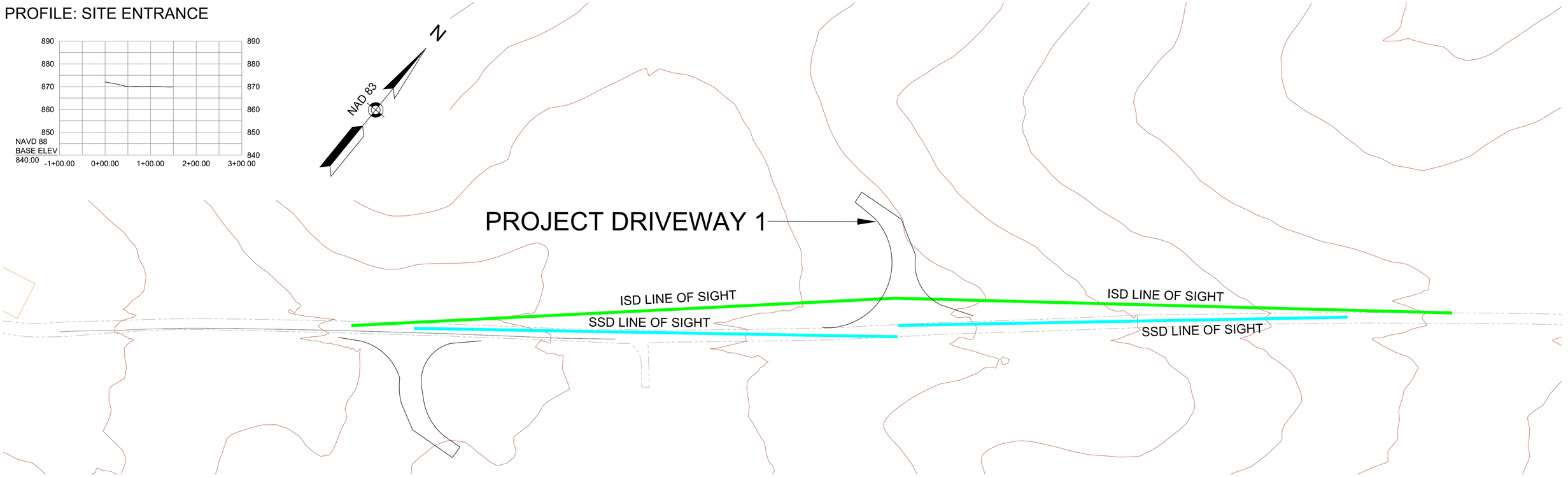
*If the minor street has an upward grade of more than 3 percent then add 0.2 sec. to t for each percent grade (including the first 3 percent).

**Increase t by 0.5 seconds (for passenger cars) or 0.7 seconds (for trucks) for every additional lane from the left, in excess of one, to be crossed by the turning vehicle.

***If the major approach is a divided highway with a median not wide enough to store the design vehicle, then the median width should be converted to equivalent lanes.

Source: *A Policy on Geometric Design of Highways and Streets, 2018, Seventh Edition,* prepared by AASHTO, p. 9-42 to 9-47.

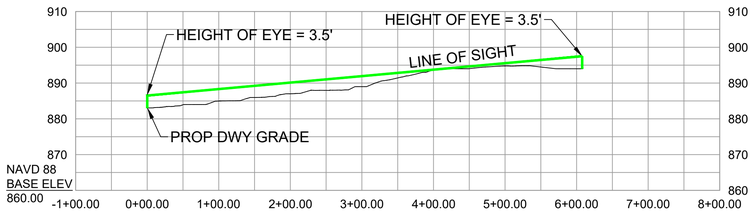
PROFILE: SITE ENTRANCE



0 50 100 150 200

SCALE: 1" = 50'

PROFILE: ISD TO/FROM EAST (610 FEET)



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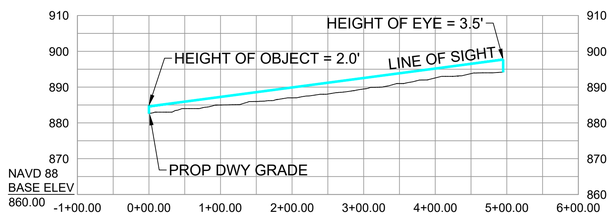

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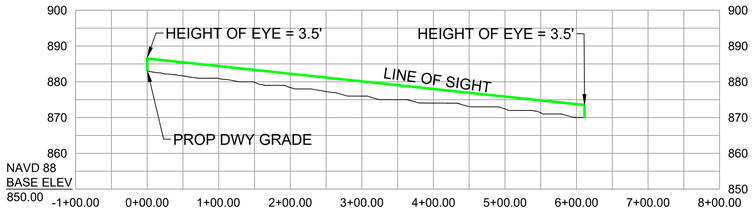

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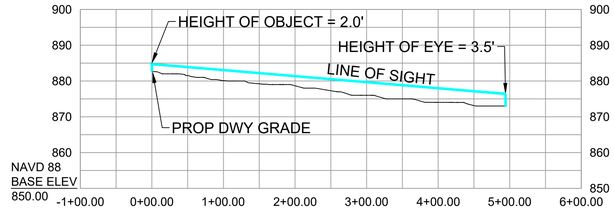

SSD AND ISD PLANS AND PROFILES
DRIVEWAY 1 AT PINE GROVE ROAD

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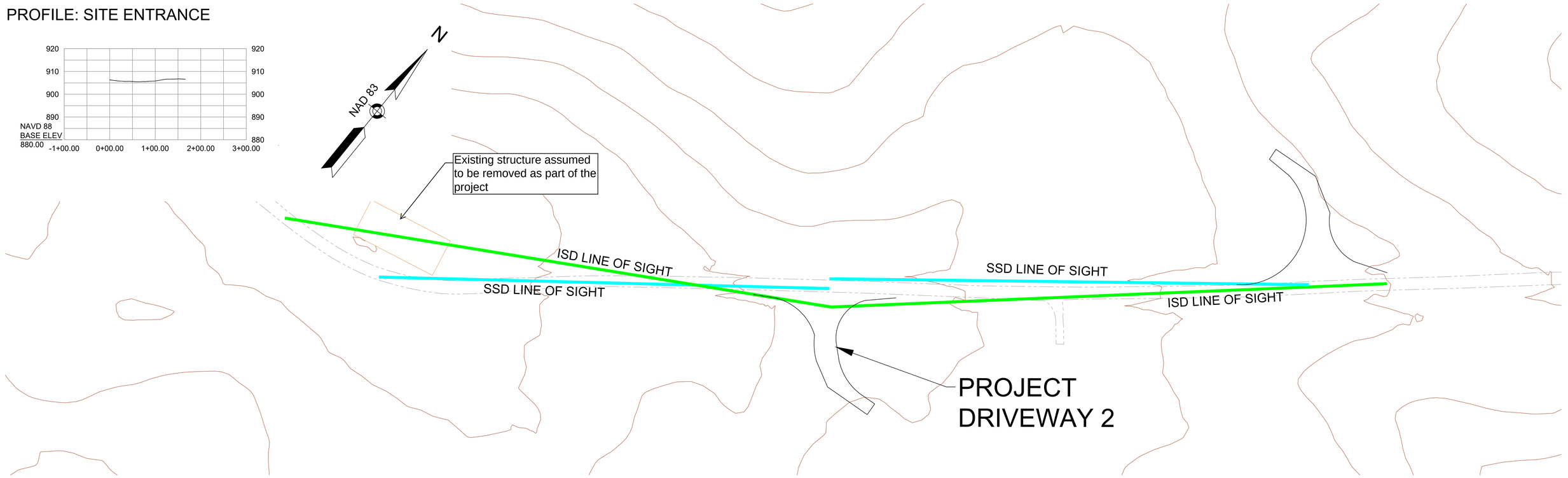
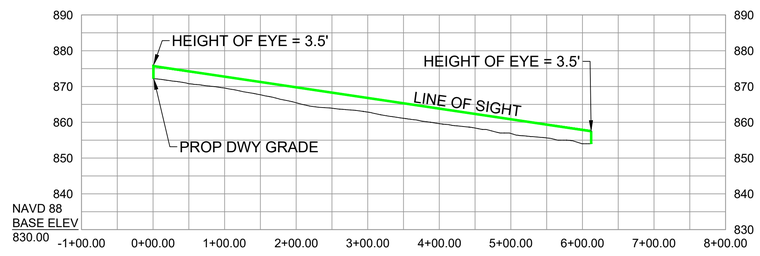
PROFILE: SITE ENTRANCE



0 50 100 150 200

SCALE: 1" = 50'

PROFILE: ISD TO/FROM WEST (610 FEET)



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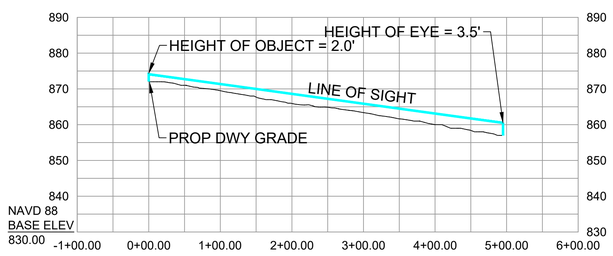

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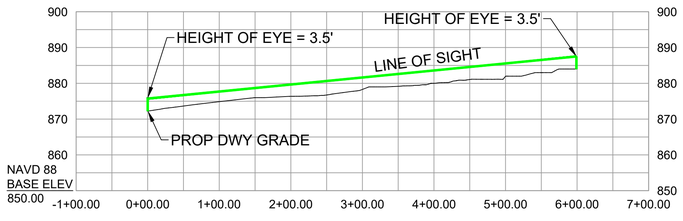

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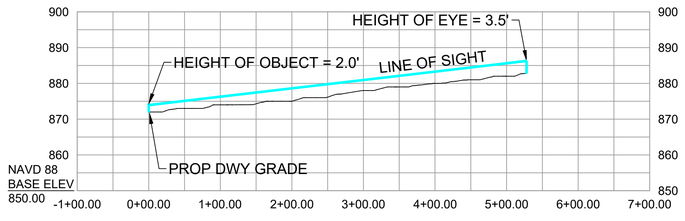

SSD AND ISD PLANS AND PROFILES
DRIVEWAY 2 AT PINE GROVE ROAD

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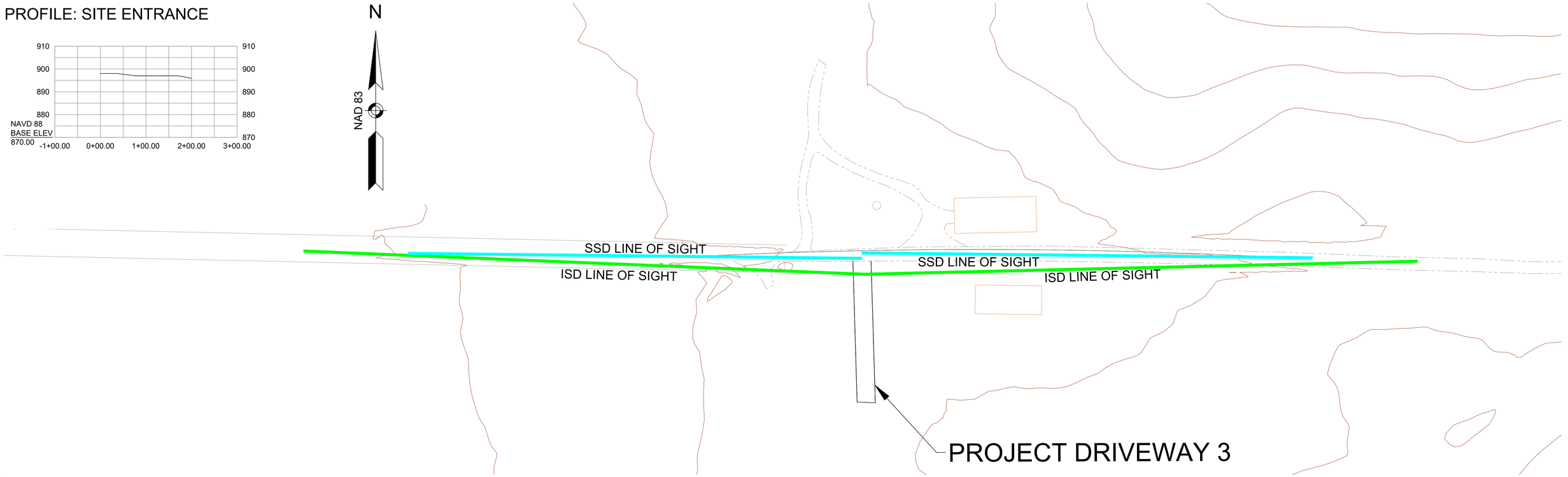
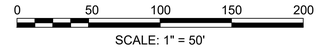
PROFILE: SITE ENTRANCE





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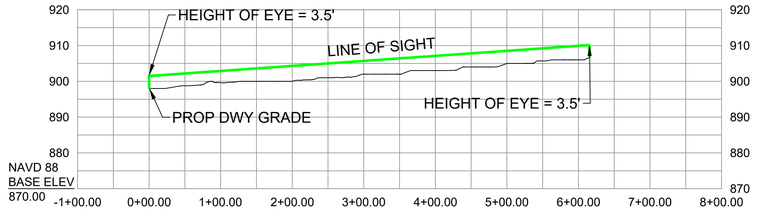

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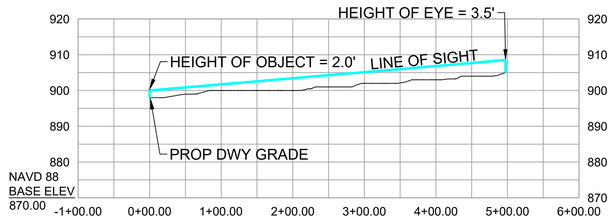

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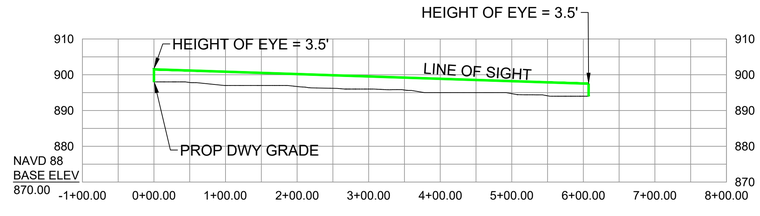

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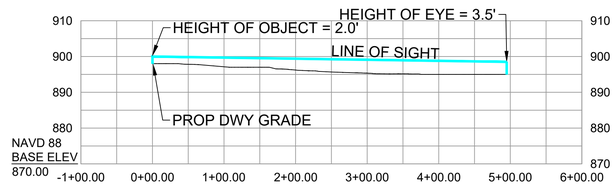

SSD AND ISD PLANS AND PROFILES
DRIVEWAY 3 AT PINE GROVE ROAD

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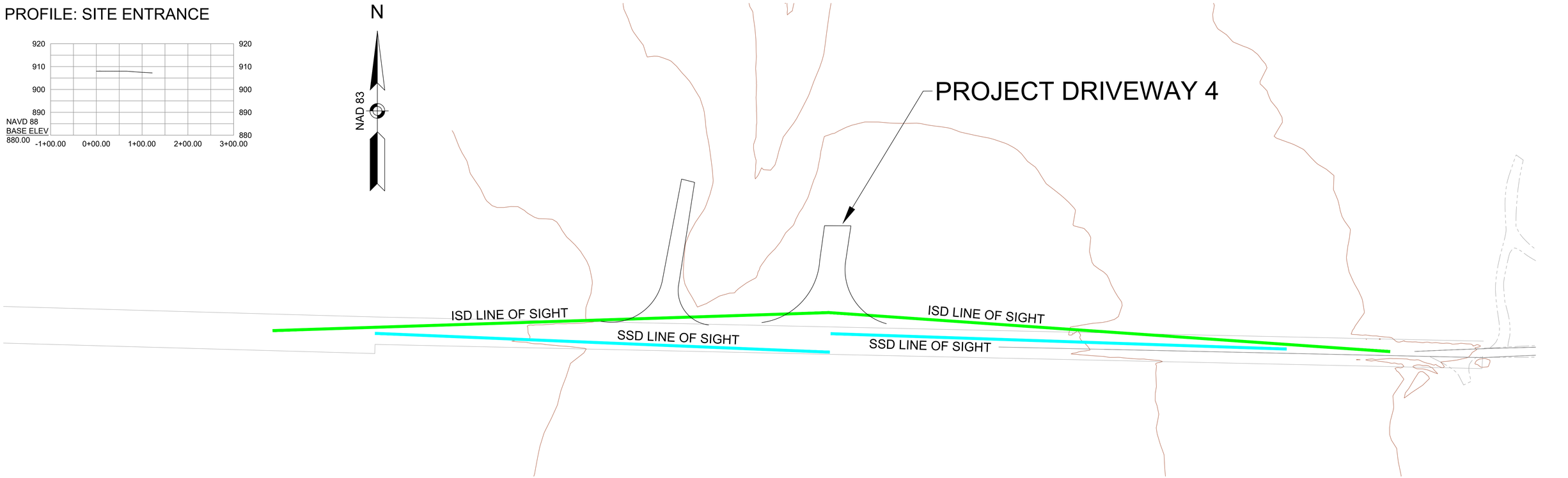
PROFILE: SITE ENTRANCE



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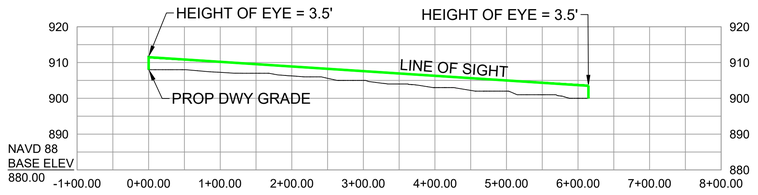

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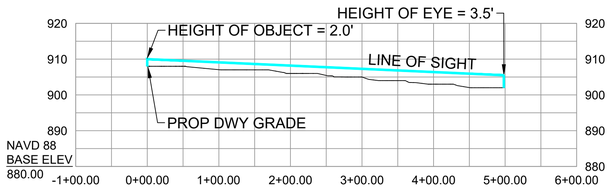

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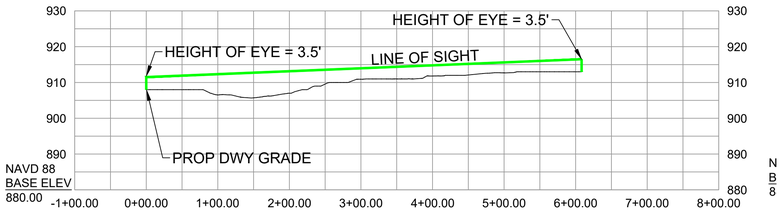

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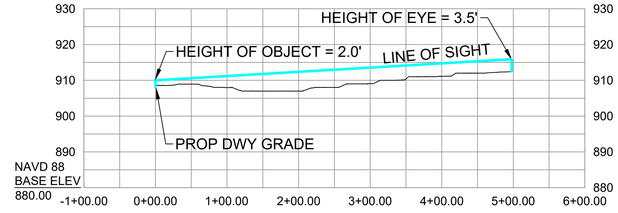
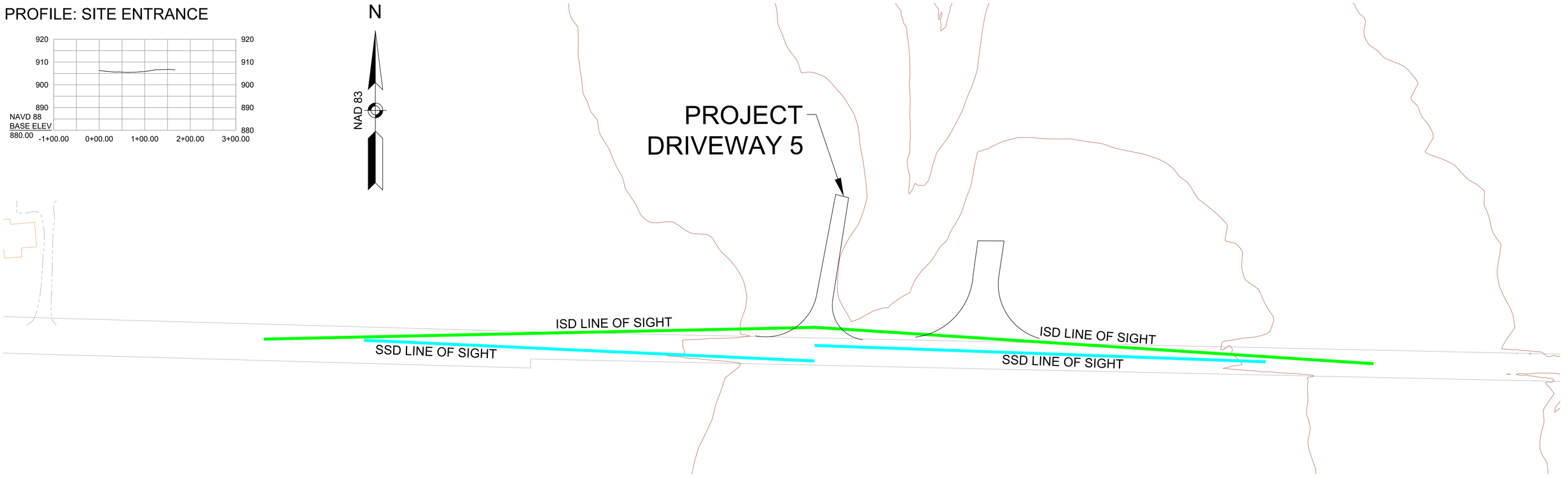


SSD AND ISD PLANS AND PROFILES
DRIVEWAY 4 AT PINE GROVE ROAD

DRAFT
FOR
REVIEW
ONLY

PROFILE: SITE ENTRANCE



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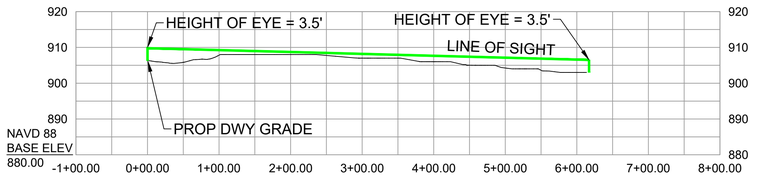

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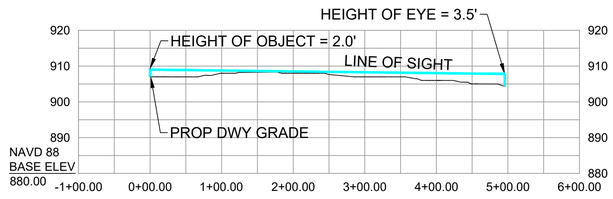

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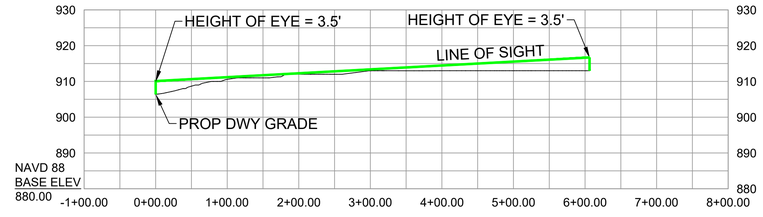

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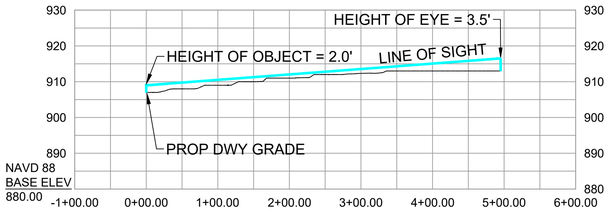

SSD AND ISD PLANS AND PROFILES
DRIVEWAY 5 AT PINE GROVE ROAD

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ONLY