Draft Environmental Impact Statement for the Noble Ball Hill Windpark Towns of Villenova and Hanover

Chautauqua County, New York

September 2008 • Volume I

Prepared for:

Noble Ball Hill Windpark, LLC
P.O. Box 72
7294 Centerville Road
Bliss, N.Y. 14024

Prepared by:

ecology and environment, inc.
International Specialists in the Environment

Draft
Environmental Impact Statement for the Noble Ball Hill Windpark

Towns of Villenova and Hanover
Chautauqua County, New York

Volume I

September 2008

Prepared for:

Noble Ball Hill Windpark, LLC
P.O. Box 72
7294 Centerville Road
Bliss, New York 14024

Prepared by:

ECOLOGY AND ENVIRONMENT, INC.
368 Pleasant View Drive
Lancaster, New York 14086

Table of Contents

Section **Page**

Volume I

Table of Contents (cont.)

Section **Page**

Table of Contents (cont.)

Section **Page**

Table of Contents (cont.)

Section **Page**

Table of Contents (cont.)

Section **Page**

Appendix

Section **Page**

Volume II

Volume III

List of Tables

Table **Page**

List of Tables (cont.)

List of Figures

List of Abbreviations and Acronyms

AADT	average annual daily traffic
agl	above ground level
AM	amplitude modulation
AMSL	above mean sea level
ANSI	American National Standards Institute
APE	area of potential effect
arl	above radar level
ASCE	American Society of Civil Engineers
ATV	all-terrain vehicle
AV	assessed value
BBA	Breeding Bird Atlas
BBRA	Bird and Bat Risk Assessment
BCI	Bat Conservation International
BMP	best management practice
BOS	Buffalo Ornithological Society
BTS	bulk transmission system
BWEC	Bats and Wind Energy Cooperative
CBC	Christmas Bird Count
CO_2	carbon dioxide
CPCN	Certificate of Public Convenience and Necessity
cy	cubic yards
°F	degrees Fahrenheit
dBA	A-weighted decibel level
dBC	C-weighted decibel level
DEIS	Draft Environmental Impact Statement
DHS	(United States) Department of Homeland Security
DOD	(United States) Department of Defense
DOE	(United States) Department of Energy
DSB	direct satellite broadcast
E & E	Ecology and Environment, Inc.
EAP	Emergency Action Plan
ECL	Environmental Conservation Law
EIS	Environmental Impact Statement
EMI	electromagnetic interference
EMR	Experience Modification Rate
EPA	(United States) Environmental Protection Agency
ERP	Emergency Response Plan
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission

List of Abbreviations and Acronyms (cont.)

FM	frequency modulation
GAO	(United States) Government Accountability Office
GE	General Electric
GHz	gigahertz
GWh	gigawatthour
Hessler	Hessler Associates, Inc.
HMANA	Hawk Migration Association of North America
HSP	Health and Safety Plan
HSE	health, safety, and environment
HSEMS	Health, Safety, and Environmental Management System
Hz	Hertz
IEC	International Electrotechnical Commission
IRAC	Interdepartment Radio Advisory Committee
ISMP	Invasive Species Management Plan
KLW	KLW Group of Buffalo, New York
km	kilometers
km/hr	kilometers per hour
kV	kilovolt
kWh	kilowatt hour
Leq	equivalent sound level
LMR	land mobile radio
$\mu g/m^3$	micrograms per cubic meter
m/s	meters per second
MDS	map documented structures
MHz	megahertz
MLA	Mechanical Load Analysis
mph	miles per hour
MSDS	material safety data sheet
MTS	modular tower system
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEC	National Electric Code
NEPNOC	Noble Environmental Power National Operations Center
NFPA	National Fire Protection Agency
NHP	(New York State) Natural Heritage Program
NHPA	National Historic Preservation Act
NM	nautical mile
NOAA	National Oceanic and Atmospheric Administration
Noble	Noble Ball Hill Windpark, LLC
NOI	Notice of Intent
NO_x	nitrogen oxides
NO_2	nitrogen dioxide
NRE	National Register Eligible
NRHP	National Register of Historic Places
NRC	National Research Council
NRCS	National Resource Conservation Service
NRL	National Register Listed

List of Abbreviations and Acronyms (cont.)

NTIA	National Telecommunications and Information Administration
NWCC	National Wind Coordinating Committee
NWI	National Wetland Inventory
NYCRR	New York Code of Rules and Regulations
NYISO	New York Independent System Operator
NYPA	New York Power Authority
NYS	New York State
NYSDAM	New York State Department of Agriculture and Markets
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
NYSERDA	New York State Energy Research and Development Authority
NYSHPO	New York State Historic Preservation Office
O_3	ozone
OPGW	optical ground wire
OSHA	Occupational Safety and Health Administration
OS/OW	oversize/overweight
O&M	operation and maintenance
Panamerican	Panamerican Consultants, Inc.
Pb	lead
PCS	personal communication system
PILOT	payments in lieu of taxes
PM	particulate matter
PSC	Public Service Commission
ROW	right-of-way
RPS	Renewable Portfolio Standard
Saratoga	Saratoga Associates, Landscape Architects, Architects, Engineers, and Planners, P.C.
SCADA	supervisory control and data acquisition
SEQRA	New York State Environmental Quality Review Act
SO_2	sulfur dioxide
SPDES	State Pollutant Discharge Elimination System
SPL	sound pressure level
SRIS	System Reliability Impact Study
SSURGO	Soil Survey Geographic
SUNY	State University of New York
SWPPP	Storm Water Pollution Prevention Plan
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VRA	Visual Resources Assessment
WECS	Wind Energy Conversion Systems
WEST	Western EcoSystems Technology, Inc.
WMA	wildlife management area
WNS	white nose syndrome
Woodlot	Woodlot Alternatives, Inc.
ZVI	zone of visual influence

Executive Summary

ES 1 Introduction and Project Description

This Draft Environmental Impact Statement (DEIS) describes the potential impacts and mitigation associated with the construction and operation of the proposed Noble Ball Hill Windpark (the Project). The Windpark will be located in the Towns of Villenova and Hanover, Chautauqua County, New York, and will produce approximately up to 90.0 megawatts (MW) of power from a renewable resource. The Project will consist of the following:

- Installation and operation of 60 1.5-MW wind turbines (49 turbines will be located in the Town of Villenova and 11 in the Town of Hanover) within an approximately 13,658-acre Project Area;

- Construction and use of approximately 16 miles of new access roads (13 in the Town of Villenova and three in the Town of Hanover) that will connect each wind turbine to a Town or County roadway;

- Construction and use of an electrical collection system consisting of approximately 23.8 miles of underground lines (18.7 miles in the Town of Villenova and 5.1 in the Town of Hanover) and 174 feet of overhead lines (Town of Villenova). Where possible, lines will be installed along the new access roads and existing roads. Approximately 8.5 miles will be installed within new right-of-way (ROW) over private lands (7.3 miles in the Town of Villenova and 1.2 miles in the Town of Hanover);

- Construction and use of a new substation (Hanover substation) within the Project Area in the Town of Hanover that will tie into a new 115-kilovolt (kV) transmission line. The substation footprint will be approximately 200 by 300 feet. The substation will be located on and have direct access to Hurlbert Road;

- Construction and use of a switchyard within the Project Area in the Town of Hanover. The switchyard footprint will be approximately 300 by 500 feet. The switchyard will be located on and have direct access to Bennett State Road (County Route 85);

- Construction and use of a 6-mile overhead 115-kV transmission line, sited entirely within the Town of Hanover to transfer the energy from the new substation to the new switchyard. The proposed switchyard will provide connection to existing 230-kV National Grid transmission line which provides access to the grid;

- Use of 28 acres on-site for equipment laydown areas to provide storage for materials, such as overhead poles, rods, ring forms, and other construction materials. The on-site laydown areas will also provide space for Noble and its contractors' construction trailers and parking for construction crews who will be bused to the work sites; and

- Construction and use of an operations and maintenance (O&M) facility on approximately 5 acres within the Project Area. The O&M building footprint will be approximately 50 feet by 100 feet.

A petition for a Certificate of Public Convenience and Necessity (CPCN) will be filed for the Project, pursuant to Section 68 of the New York State (NYS) Public Service Law.

ES 2 Project Alternatives

During Project design, Noble considered alternative Project sizes, turbine technologies, Project location and road and interconnect designs, as well as a no-build alternative. The Project Site was selected through a systematic process that considered:

- Location of wind resources in NYS;

- Availability of existing roads and utility interconnections with adequate capacity in proximity to the locations with the most promising wind resources;

- Availability of land with landowners willing to sign easements for their property;

- Community support;

- Presence of environmental constraints including visual and noise impacts, impacts on wetlands and streams, and important wildlife habitat; and

- Presence of land use constraints including zoning and building restrictions and landowner restrictions.

ES 3 Potential Project Impacts and Mitigation

Resource-specific impacts that may potentially be associated with the Project were evaluated during the DEIS process. Existing conditions were evaluated relative to critical environmental resources, communication signals, traffic and transportation, land use, socioeconomics, and cultural resources. When potential impacts were identified, every effort was made to avoid them through modifications to the Project design. When impacts could not be avoided, they were minimized to the extent practicable and mitigation strategies were developed, if necessary. Potential impacts were evaluated with respect to the following resource/receptor areas:

Wetlands

Project facilities were sited to minimize or avoid wetland impacts to the greatest extent practicable; however, some limited disturbance to wetlands will occur. Construction of the Project will result in temporary disturbance of 15.87 acres of wetlands, of which approximately 0.33 acres will be permanently impacted by placement of fill. Approximately 0.32 acres of permanently impacted wetlands is under federal jurisdiction. Construction of the Project will result in minimal impacts to one New York State Department of Environmental Conservation (NYSDEC) wetland associated with installation of electric utility poles. Additionally, operation of Project facilities will result in the permanent conversion of 2.67 acres of state jurisdictional forested wetland to shrub-scrub or emergent wetland due to periodic removal of woody vegetation adjacent to access roads and within collection system corridors.

For those wetland impacts that cannot be avoided, mitigation will be completed as a condition of wetland disturbance permits that will be required prior to construction. Consistent with United States Army Corps of Engineers (USACE) and NYSDEC guidance, wetland impacts will be offset through wetland creation and/or enhancement of previously existing wetlands and the mitigation area will be hydrologically connected to waters of the United States. Noble has provided a Conceptual Wetland Mitigation Plan (see Appendix I) that takes into account the permanent and temporary loss of wetland functions and values provided by the impacted wetlands. A final mitigation plan will be developed in conjunction with NYSDEC and the USACE as part of the permitting process.

Upland Vegetation

Primary impacts on upland vegetation will include the removal of existing vegetation through minimal clearing of forested, shrub-scrub, and herbaceous vegetation as part of construction activities. Permanent impacts will include removal of upland vegetation at the turbine pedestal, crane pad, and permanent access roads. The remainder of the Project footprint will be allowed to naturally revegetate, although it will be subject to periodic removal of woody vegetation to maintain an herbaceous or scrub-shrub state, especially adjacent to access roads and within the collection system corridor.

To minimize impacts on vegetation, facilities have been sited, to the extent practicable, within previously disturbed areas, such as reverting farm fields, and along existing farm roads and areas where recent logging has occurred. Where possible, access roads and collection systems have been located within areas with minimal tree growth, such as edges of active/inactive farm fields, or collocated with existing logging roads. Where construction activities will require the removal of any trees of economic value, landowners will be compensated in accordance with their individual easement agreements.

Wildlife

No significant impacts to wildlife species are expected as a result of construction or operation of the Project. Most species present within the Project Area are expected to avoid areas during active construction periods. Because only limited use of the Project Area is anticipated by endangered, threatened, and special concern species, no impacts are expected as a result of construction or operation of the Project. Indirect impacts on wildlife will occur as a result of habitat alteration. The indirect loss of habitat will be minimal as compared to available habitat in the Project Area. Impacts on fish and wildlife will be minimized through the implementation of best management practices (BMPs) to stabilize the ground surface and allow for successful revegetation following construction of the Project.

The impacts to habitat are consistent with activities and conditions that regularly occur throughout the Project Area, such as ground disturbance, mowing of vegetation, access road use associated with farming activities, and tree removal and access road use associated with logging activities. No mitigation is proposed.

Birds and Bats

Construction-related activities (e.g., clearing for road construction, infrastructure construction, equipment noise, and increased vehicle traffic) can potentially impact birds and bats. Displacement from habitat is the primary concern with construction-related impacts. However, potential impacts from construction are generally only temporary in nature. If construction takes place in suitable nesting habitat for endangered or threatened species in the spring to early summer – during breeding season – the work area will be surveyed by an environmental monitor in advance of construction. With implementation of monitoring activities, no significant adverse impacts from construction on threatened or endangered species are anticipated.

Operation of wind turbines can potentially impact birds and bats through collisions with rotors and towers, displacement from habitat, or influence on migration, etc. There is a low risk of any substantial negative impact on habitat through loss, degradation, or displacement of breeding birds. No significant adverse impacts on breeding bird populations are anticipated from operation of the Project. Collisions are typically the primary concern with operation-related impacts. Potential impacts can vary among different bird and bat populations and groups. It is likely that nocturnal migrant passerines will make up the majority of bird kills. However, the potential mortality risk to migrant passerines is considered low-to-moderate based on the Project location, the passage rate and altitude data from the radar study (and other regional radar studies), and the avoidance behavior of passerines typically exhibited at wind energy facilities. It is anticipated that the bird fatality rates for the Project will be within the range of the National Wind Coordinating Committee (NWCC) eastern average and the 2006 Maple Ridge post-construction bird fatality results. This prediction is based on the results of the bird studies, literature review, and because there are no features in the Project Area that attract or concentrate large numbers of migrating birds. Consequently, no biologically significant adverse impacts are anticipated for any species.

It is anticipated that bat fatality rates for the Project will be within the range of the NWCC national average and the 2006 Maple Ridge post-construction weekly bat fatality results. This prediction is based on the results of the bat studies that do not show an abundance of migratory bats and because there are no features in the Project Area that attract or concentrate large numbers of bats; however, post-construction mortality is often unpredictable. Any impacts will likely be distributed among several species.

The potential for significant bird and bat impacts was taken into account in the siting of the Project. Impacts will be further minimized through the use of turbines equipped with slow-blinking lights to reduce the potential attraction to nocturnally migrating birds under adverse weather conditions. Furthermore, modern turbines (i.e., solid tubular structures) will be installed that are designed to prevent birds from perching or nesting on them. No guy wires will be required for these turbines.

Post-construction mortality monitoring will be implemented by Noble to evaluate the actual impacts of the Project on birds and bats. Based on real-time, site-specific data collected during post-construction mortality monitoring, Noble will coordinate closely with NYSDEC to identify and assess potential mitigation strategies that can be implemented to reduce potentially significant adverse impacts, if any. This management approach will allow mitigation measures to be developed/modified during the course of Windpark operation that are responsive to site-specific conditions and to the growing and evolving database of information regarding bird/bat interactions with turbines.

Agricultural Lands

Potential permanent impacts of the Project on agricultural lands include the loss, by conversion to non-agricultural uses, of prime farmland soils or soils of statewide importance. The Project facilities will impact approximately 13.5 acres of prime farmland (8.5 in Villenova and five in Hanover) and 24 acres of soils of statewide importance (19.5 in Villenova and 4.5 in Hanover). This is significantly less than 1% of those soils in Chautauqua County and less than 0.5% of the soils in the Project Area. Other impacts, such as topsoil mixing, erosion and sedimentation, introduction of stones and rocks on and into surface soils, and soil compaction will be minimized through mitigation measures including development and implementation of BMPs and a Stormwater Pollution Prevention Plan (SWPPP). Impacts to agricultural lands will be minimized by restricting Project equipment to the construction ROW. Overall the Project should benefit the agricultural landowners who have elected to have Project facilities located on their land. The minimal loss of productive agricultural land will be offset by the financial benefits the landowners will obtain from payments they will receive from Noble for their participation in the Project. In some instances these payments may help to keep smaller farming operations viable and agricultural land being sold off for non agricultural uses.

Turbines located on active farms were sited, to the extent practicable, to be consistent with the Towns' design standards for agricultural mitigation set forth the local laws and with New York State Department of Agriculture and Markets (NYSDAM) siting recommendations and guidelines. Input from the landowners was also considered to avoid or minimize impacts to current and future farm operations. To the extent practicable, roads and interconnects were located on the edge of agricultural land to minimize impact on agricultural operations. Underground collection lines located away from access roadways will be buried at an appropriate depth to further minimize impacts to farming practices.

Forested Lands

The impacts to forestland are considered permanent because the clearing and the periodic maintenance to control woody vegetation surrounding the turbines, access roads, and electrical collection lines will result in the permanent conversion of forestland to other vegetative communities (i.e., successional shrubland, old field).

In forested areas, facilities have been sited, to the extent practicable, within previously disturbed areas, such as along existing logging roads and areas where recent logging has occurred. This is intended to minimize the clear cutting of trees. Where the removal of any trees of economic value is necessary, landowners will be compensated based on their individual easement agreements. Road and collection line corridors located within forested areas will be periodically maintained to prevent reestablishment of trees to provide adequate overhead clearance for safe access, leaving these corridors in an herbaceous or successional shrubland state.

Visual Resources

Based on an evaluation of the aesthetic resources, land uses, potential users and their activities, and visual simulations, it is apparent that the Project will change the visible landscape of the region and create a distinct visual aspect. The turbines will be unique and prominent visible features of the landscape from many locations. Federal Aviation Administration (FAA)-required lighting on the turbines will be visible from many viewpoints within the Project Area. Shadows from the turbines will fall on some residences.

To minimize visual impacts, towers will be tubular style to minimize textural contrast; white or off-white, as per FAA guidelines; and where specifications permit, will have non-specular paint to minimize reflected glare. Turbines will maintain a minimum setback from residential structures. Such separation of uses assures maximum screening benefit of existing woodland vegetation, where such exists, and minimizes the potential extended duration shadow flicker on nearby residences. Mitigation measures will be taken on a case-by-case basis where shadow flicker or other adverse visual impacts pose a significant problem for a landowner in accordance with the Complaint Resolution Process. A Historic Resource Impacts Plan has been developed as indirect mitigation to offset visual impacts on potentially historic structures.

Sound

Noise from construction activities associated with the Project is likely to temporarily constitute a moderate unavoidable impact at some homes in the Project Area. Because construction activities will move from place to place around the Project Site, it is unlikely that there will be significant impacts at any single receptor for an extended period of time. The predicted sound pressure levels indicate that operational Project noise might be audible at homes in the vicinity of the Project, but the Project will comply with the local noise requirements for wind farms. Construction activities will generally occur between the hours of 7:00 a.m. and 7:00 p.m. in order to minimize and avoid unnecessary impacts to the community from construction noise.

Transportation

Traffic associated with the construction of the Project will consist of delivery vehicles for turbine components, materials associated with turbine site construction and assembly, and personal vehicles for workers. Delivery vehicles will range in size from oversized load tractor-trailers (used to deliver tower sections, turbine nacelle, rotor blades, and cranes) to smaller vehicles, such as dump trucks, concrete trucks, fuel delivery trucks, mechanics vans, and pickup trucks. Personnel vehicles will consist of automobiles and light trucks. Some improvements to local roads and expansion of intersection will be required to facilitate the turning radii of oversize/overweight vehicles. Oversized construction vehicles could cause minor delays, but these are unlikely to be significant, given the relatively low traffic volume.

Construction vehicle traffic of construction personnel and non-restricted loads will generally be limited to the hours of 7:00 a.m. to 7:00 p.m. Noble will enter into road-use agreements with the Towns that will designate approved construction transportation routes and commit the cost of both improvements and repairs to these routes to Noble’s account. The process of creating a road use agreement will enable the Towns and municipalities’ plans for scheduled paving and resurfacing to be coordinated with improvements and repairs by Noble.

Socioeconomics

Project construction may have short-term impacts on local lodging. The Project is not expected to have a long-term impact on housing and population in the region. The sales data for existing wind farm markets indicate there is no influence on property values attributed to wind farm construction. Average sale prices have, on the whole, increased, indicating that the existence of wind farms has not diminished real property values.

Construction of the Project will create an increase in local economic activity, including purchases of thousands of room-nights at local motels/hotels, automotive fuel, meals, and other items. The Project will extensively utilize and support providers of local services, suppliers, and area manufacturers during construction and operation of the Project.

Noble anticipates entering into a payment-in-lieu-of-taxes (PILOT) agreement for the Project with Chautauqua County Industrial Development Agency, as well as Host Community Agreements under which annual payments will be made to the Towns of Villenova and Hanover for local needs. These payments will result in a significant increase in local revenue for the taxing authorities.

Cultural Resources

No prehistoric or historic archaeological sites were identified during the site investigations; as such, no archaeological resources will be impacted by construction or operation of the Project. In the event of an unanticipated discovery of archaeological resources during construction, Noble will stop work immediately in the vicinity of the find and contact the New York State Historic Preservation Office (NYSHPO).

The Project will not directly impact architectural resources (i.e., demolition of any National Register Eligible [NRE] buildings). While there is some potential for visual and noise impacts to structures potentially eligible for the National Register of Historic Places (NRHP) due to construction activities, it is unlikely that these impacts will be significant due to their temporary nature. Operation of the Project will have a visual effect on 167 properties located within the visual area of potential effect (APE): none that are listed, nine that are eligible, and 158 that are potentially eligible for listing on the NRHP.

Because NRE properties are within the visual APE, indirect mitigation for visual impacts will be required. Noble has developed a Historic Resource Impacts Mitigation Plan that identifies specific strategies that can help preserve historical resources in the affected communities and make them accessible to local residents and visitors. The final mitigation plan will be approved by the NYSHPO prior to construction.

ES 4 Cumulative Impacts

An analysis was conducted to determine whether the potential cumulative impacts that may arise from interactions between the impacts of the Project and the impacts of one other proposed wind power project in the area are significant. The construction of multiple wind power projects will result in localized impacts to wildlife, wetlands, agricultural lands and forest lands; however, neither the individual Project impacts nor the cumulative impact from other proposed projects are expected to be significant. Other proposed projects analyzed for potential cumulative impacts include the existing Steel Winds project in Lackawanna (Erie County), Horizon’s New Grange and Pomfret windfarms in the neighboring Towns of Arkwright and Pomfret in Chautauqua County and Babcock & Brown’s proposed Ripley-Westfield and State Line Projects. Short-term, cumulative impacts on noise and transportation may result if the Projects are constructed during the same time period; however, these impacts are expected to be temporary. The potential for slight long-term increases in cumulative visual impacts at limited locations in the region, including historic properties, and risks to birds and bats were also identified. None of these impacts were determined to be significant. Cumulatively, construction and operation of the wind power projects will have significant long-term beneficial effects on the use and conservation of energy resources.

ES 5 Project Benefits

The Noble Ball Hill Windpark will generate electricity, using no fuels or water and with zero emissions or waste discharge, and provide it to the New York Independent System Operator (NYISO) grid using wind, a renewable resource. The Project will have capacity sufficient to generate approximately 90.0 MW of power that will help to meet New York State's Renewable Portfolio Standard (RPS) and fill the need for a more diverse national energy portfolio that would include a higher percentage of energy generated while utilizing renewable resources.

Local economic benefits of the Project will include:

- Temporary and permanent employment;
- Increased commerce in the Town from spending by Project employees, suppliers, easement holders, and local merchants;
- An increased flow of revenue to the County, Towns, and school districts through PILOT payments and other municipal payments;
- An increased flow of revenue to landowners through easement agreements; and
- Increased economic diversification.

Construction of the Project will result in the direct employment of up to 185 electrical workers, crane operators, equipment operators, carpenters, and other construction workers (with a total estimated payroll and benefits of $7.7 million), and create 200 additional direct, indirect, and induced jobs countywide (with a total estimated payroll and benefits of $5.2 million). A significant percentage of the construction workers employed during the construction period will be hired from within the local community to the extent that qualified workers are available. Personnel specially trained in specific procedures for wind turbine construction will be brought in and temporarily housed in the area during the construction phase of the Project.

During plant operation, the Project will employ approximately eight workers: skilled operators (six), management (one), and administrative personnel (one), with a total estimated payroll and benefits of $450,000 and create an estimated 16 more direct, indirect, and induced jobs countywide (with a total estimated payroll and benefits of $439,000). To the extent practicable, local labor will be used to fill these positions to maximize the benefit to the local community. It is anticipated that individuals in the local community would be trained to complete the necessary tasks, and current residents would fill the majority of these jobs. The exception would be any specialized wind farm managers where an individual would need to be brought to the Project Area if there was no one qualified within the community. This, or any, increase in the local population would be negligible.

The Project will spend a total of about $26.9 million countywide during construction. Total economic benefits during construction are estimated at $42.7 million, including payrolls, supplies, materials, hotel stays, meals, and economic multiplier effects. During plant operation, the Project will spend an estimated $1.7 million annually, exclusive of taxes. Total annual economic benefits during operation are estimated at about $3.1 million (including PILOT payments) including payrolls, supplies, materials, Windpark easement payments, and economic multiplier effects. Total countywide economic benefits, based upon regional multipliers applied to direct Project expenditures in original capital investment and ongoing operational expense, are estimated to be about $128 million over 20 years.

The Project will extensively utilize and support providers of local services, suppliers, and area manufacturers during both construction and operation. In addition, the PILOT payments and Host Community Agreement payments made by Noble to both Towns and other taxing authorities will result in significant increase in local revenue for the taxing authorities.

The Project will assist in the revitalization of the local economy by providing steady income through easement payments to participating landowners. Most of the landowners are farmers, and the additional income from these payments is expected to help stabilize their income and provide some relief from the cash-flow fluctuations that are inherent in the agricultural industry.

Additional value to the local economy will result from increased diversification of the county and state economic bases. Economic diversification ensures greater stability of the economy by minimizing financial high and low cycles associated with a specific industry. This effect is particularly important in rural areas, where more goods and services are imported and more dollars leave the region.

All of the foregoing benefits will be provided without any corresponding increased burden on local schools and other public services.

1 Description of the Proposed Action

1.1 Description of the Proposed Action

1.1.1 Project Overview and Definitions

Noble Ball Hill Windpark, LLC (Noble) is proposing to construct and operate a wind energy facility (Project) in the Towns of Villenova and Hanover (Chautauqua County), located in Western New York State (NYS) (see Figure 1.1-1). The Project consists of generation and transmission components (see Figure 1.1-2).

More specifically, the Project will include the following:

- Installation and operation of 60 wind turbines (49 in the Town of Villenova and 11 in the Town of Hanover) with a capacity of 90 megawatts (MW) within an approximate 13,658-acre Project Area in the Towns of Villenova and Hanover (see Figure 1.1-2).

- Construction and use of approximately 16 miles of access roads (13 miles in the Town of Villenova and 3 miles in the Town of Hanover) that will connect each wind turbine to a town or county roadway to allow equipment and vehicle access for construction and subsequent maintenance of the facilities as well as emergency services, if needed. After construction, the 35-foot access road will be scaled back to 16 feet, allowing Noble to use the existing roadway for maintenance and operational purposes; and

- Construction and use of an electrical collection system that will allow delivery of electricity to a new substation to be constructed in the Town of Hanover. Where practical, the electrical collection system will be installed underground along the same right-of-way (ROW) corridor as the access roads. A total of 23.8 miles of collection lines (including underground collection lines collocated with access roads) will be installed (18.7 miles in the Town of Villenova and 5.1 miles in the Town of Hanover). Approximately 8.5 miles will be installed within new ROWs over private lands between turbines (7.3 miles in the Town of Villenova and 1.2 miles in the Town of Hanover). As currently designed, nearly the entire the collection system will be installed underground. A total of 174 feet (0.03 miles) of overhead collection lines will be installed in the Town of Villenova. No overhead collection line will be required in the Town of Hanover.

- Construction and use of a new substation (Hanover substation) within the Project Area in the Town of Hanover that will tie into a new 115-kilovolt (kV) transmission line. The substation footprint will be approximately 200 by 300 feet. The substation will be located on and have direct access to Hurlbert Road.

- Construction and use of a switchyard within the Project Area in the Town of Hanover. The switchyard footprint will be approximately 300 by 500 feet. The switchyard will be located on and have direct access to Bennett State Road (County Route 85).

- Construction and use of a 6-mile overhead 115 kV transmission line, sited within the Town of Hanover, to transfer the energy from the new substation to the new switchyard. The proposed switchyard will provide a connection to the existing 230 kV National Grid transmission line that provides access to the grid.

Turbine Description

The wind turbines that will be installed at the Project will be the General Electric (GE) 1.5 sle model, an 80-meter high, modular tower system (MTS), T-flange wind turbine generator[1]. The turbine is a three-bladed, upwind, horizontal-axis wind turbine with a rotor diameter of 253 feet (77 meters). The blades will be approximately 136 feet (41 meters) from the ground. The nacelle is located at the top of each tower and contains the electrical generating equipment. The turbine rotor and nacelle are mounted on top of a tubular tower, giving a rotor hub height of 263 feet (80 meters) (see Figure 1.1-3). The maximum height for the turbine is 389 feet (118.5 meters) when a rotor blade is at the top of its rotation. Once installed, each wind turbine will occupy a round, slightly exposed base approximately 18 feet (5.5 meters) in diameter.

Definitions

The following terms are used throughout this document to describe the proposed action.

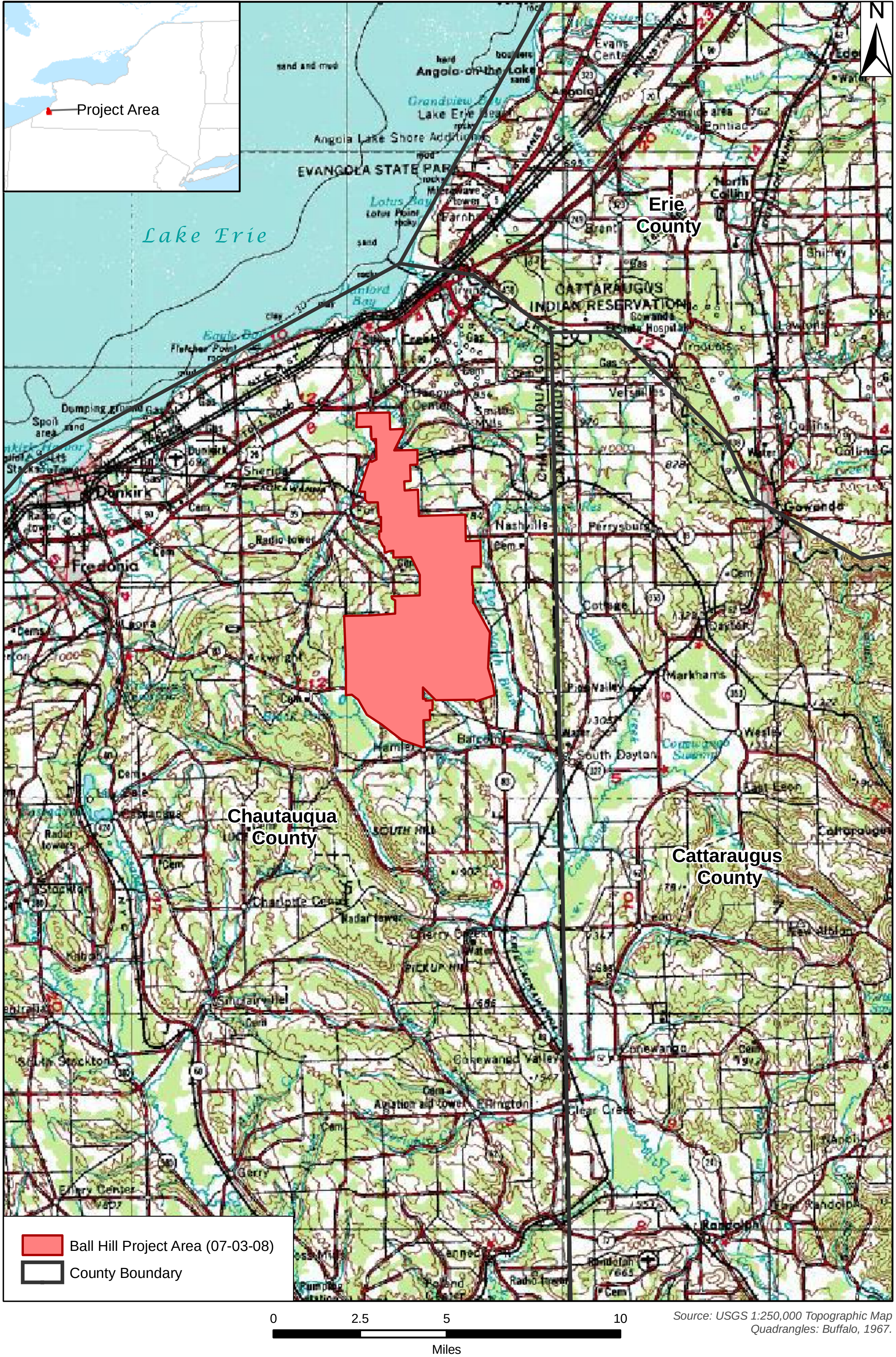
- **Project.** "Project" refers to all activities involved in the construction and operation of the windpark described above and all components thereof, including but not limited to wind turbines (including blades, towers, pads, and foundations); electrical transmission and collection lines and poles; trenches; access roads; and related structures.

- **Project Area.** The Project Area is denoted by the outer boundary of the geographic area that includes all turbine sites, access roads, transmission line and collection system components, substation, and switchyard.

---

[1] GE's 1.5 SLE model can produce 1.5 megawatts. The SLE model uses a 77-meter-diameter rotor. "MTS" designates the type of tower configuration; a T-flange is the type of flange used to connect the tower directly to the foundation.

\L:\Buffalo\Noble_Wind\2008_NOBLE_SITES\Maps\Villenova\PDFs\DEIS\July2008\Project_Area.mxd



🟥 Ball Hill Project Area (07-03-08)
☐ County Boundary

Source: USGS 1:250,000 Topographic Map Quadrangles: Buffalo, 1967.

Figure 1.1-1   General Project Area
Noble Ball Hill Windpark

Project #002270.NP32
L:\Buffalo\Noble_Wind\2008_NOBLE_SITES\Maps\Villenova\MXDs\DEIS\July_2008\Project_Facilities.mxd 07/03/2008

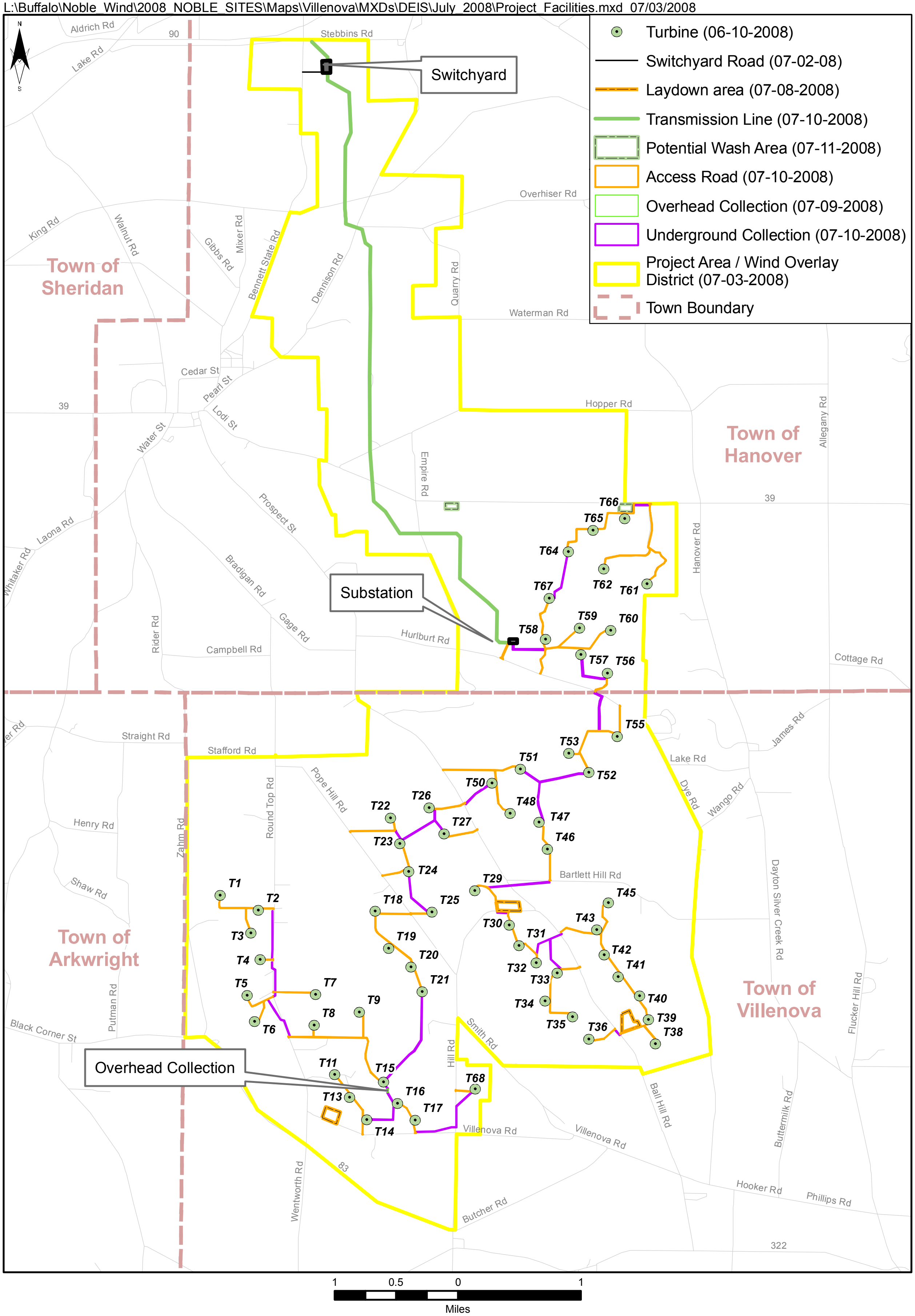
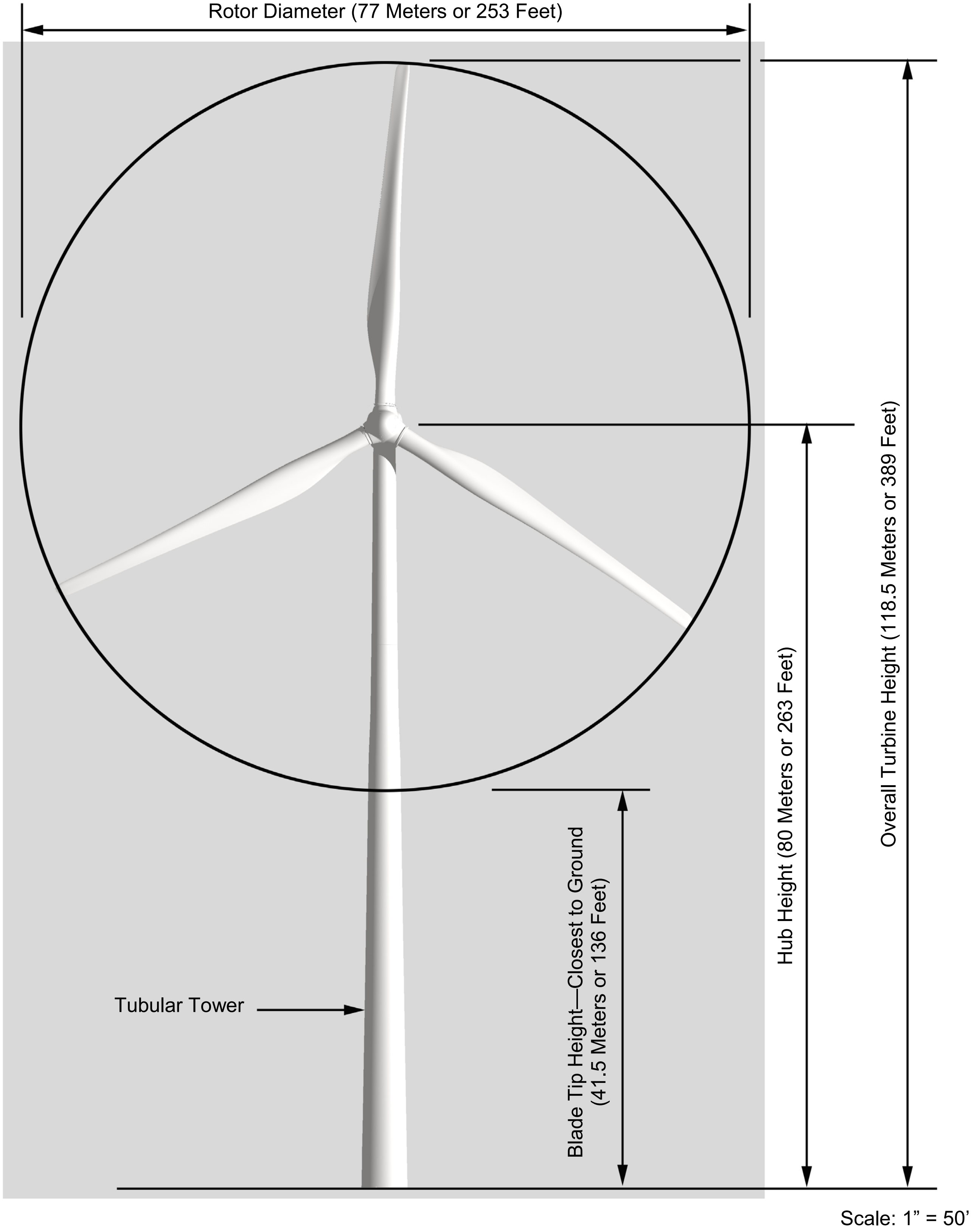


Figure 1.1-2 Noble Ball Hill Project Facilities
Noble Ball Hill Windpark



Noble ENVIRONMENTAL POWER

Figure 1.1-3 Generalized Wind Turbine Layout—GE 1.5SLE

SARATOGA ASSOCIATES

- **Wind Overlay District.** The Wind Overlay District is defined by the 2007 Town of Villenova Local Law 1 as a zoning district that encompasses part or parts of one or more underlying districts and that establishes requirements for wind energy facilities. For this project, the term “Wind Overlay District” is synonymous with “Project Area.”

- **Project Site.** The Project Site contains all parcels of the Project Area that have the potential to be permanently or temporarily disturbed as a result of the construction or operation of Project facilities (including wind turbines, electrical collection and transmission lines, utility trenches, utility poles, access roads, staging areas, and other related structures). Noble has obtained property interests or is in the process of finalizing negotiations for all parcels that will host Project components or for which a setback waiver within the Project Site is required.

- **Turbine Cluster.** A turbine cluster is one or more wind turbines in geographic proximity that are served by a single system of access roads and collection lines.

- **Turbine Site.** The turbine site is a maximum of a 300 by 300 square foot staging area used during construction of wind turbines, including a foundation for that structure, a gravel crane pad, and the surrounding construction/maintenance area. Within the 300 by 300 square foot staging area, an approximately 200 by 200 square foot area will be cleared and graded to a slope of 5% or less to facilitate the layout of turbine components. Disturbance outside of this 200 by 200 square foot area will generally be limited to selective tree cutting necessary for rotor assembly and storage of excess topsoil, subsoil, or woody material, including roots, logs, and/or wood chips. The turbine site refers to the total area associated with each turbine that will experience temporary impacts during construction, as described. Once installed, permanent impacts at each turbine site will include a 120-foot by 40-foot gravel crane pad, which will be left in place post-construction, and each wind turbine will permanently occupy a round, slightly exposed base approximately 18 feet in diameter.

1.1.2 Project Area Description

Noble considered the location of the Project within an area of approximately 13,658 acres in the Towns of Villenova and Hanover (Chautauqua County), New York. Land uses within the Project Area are predominantly a mixture of forested (approximately 7,244 acres) and agricultural (approximately 5,510 acres) land. Additional acreage consists of wetlands, roads and other paved surfaces, scattered residences, buildings, and open water features such as farm ponds. (Wetland delineations in the Project Area are described in Section 2.7, Wetlands: Environmental Setting, and Appendix G.) The principal agricultural enterprise is dairy farming. Corn and hay are the main crops, but some small grain is grown. The northern portion of the Project Area in the Town of Hanover includes vineyards and orchards. Most of the natural stands are represented by mixed hardwoods dominated by sugar maple, red oak, black cherry, white ash, and American beech. Current and historic silviculture is evident throughout the Project Area.

1.1.3 Project Site Description

The Project Site consists of approximately 5,569 acres (approximately 3,669 acres in Villenova and 1,900 acres in Hanover) within the approximate 13,658-acre Project Area. The Project Site includes the maximum 60-foot ROW (40-foot ROW in wetland and stream crossing areas) for 16 miles of roads and adjacent electrical collection lines (236 acres); the turbine sites (126 acres); the collection system ROW (28 acres); the transmission line (73 acres); 20 acres of equipment laydown area; and 5 acres for the operations and maintenance building site.

1.1.4 Turbine Clusters

The Project Site has been further divided into turbine clusters that are served by a series of access roads and an electrical collection system consisting of multiple circuits. Each cluster is identified by the primary access road to the turbine grouping (i.e., Cluster 1 is served by Access Road 1). The clusters are noted on Figure 1.1-2 and are identified in Table 1.1-1.

Table 1.1-1 Turbine Clusters

Cluster Number	Turbine Numbers Included in the Cluster	Access Road Serving the Cluster	Municipality
Cluster 1	Turbines T1, T2, and T3	1	Town of Villenova
Cluster 2	Turbines T4	2	Town of Villenova
Cluster 3	Turbines T5 and T6	3	Town of Villenova
Cluster 4	Turbines T7	4	Town of Villenova
Cluster 5	Turbine T8, T9, and T10	5	Town of Villenova
Cluster 6	Turbines T11, T13, and T14	6	Town of Villenova
Cluster 7	Turbines T16 and T17	7	Town of Villenova
Cluster 8	Turbine 68	8	Town of Villenova
Cluster 9	Turbines T18, T19, T20, and T21	9	Town of Villenova
Cluster 10	Turbines T25	10	Town of Villenova
Cluster 11	Turbines T23 and T24	11	Town of Villenova
Cluster 12	Turbines T22	12	Town of Villenova
Cluster 13	Turbine T26	13	Town of Villenova
Cluster 14	Turbine T27	14	Town of Villenova
Cluster 15	Turbine T29	15	Town of Villenova
Cluster 16	Turbines T30, T31, and T32	16	Town of Villenova
Cluster 17	Turbines T33, T34, and T35	17	Town of Villenova
Cluster 18	Turbines T36	18	Town of Villenova
Cluster 19	Turbine T38	19	Town of Villenova
Cluster 20	Turbines T39, T40, T41, T42, T43, and T45	20	Town of Villenova
Cluster 21	Turbines T46 and T47	21	Town of Villenova
Cluster 22	Turbines T48, T50, and T51	22	Town of Villenova
Cluster 23	Turbines T52, T53, and T55	23	Town of Villenova

Table 1.1-1 Turbine Clusters

Cluster Number	Turbine Numbers Included in the Cluster	Access Road Serving the Cluster	Municipality
Cluster 24	Turbines T56	24	Town of Hanover
Cluster 25	Turbines T57, T58, T59, T60, and T67	25	Town of Hanover
Cluster 26	Turbines T64, T65, and T66	26	Town of Hanover
Cluster 27	Turbines T61 and T62	27	Town of Hanover

1.2 Detailed Description of the Proposed Action

1.2.1 Project Description

Appendix A includes engineering details for the Project Site including the locations of turbines, access roads, transmission line, and electrical components. Construction of the Project is expected to begin in March 2009 and end in November 2009; however, weather and other factors may increase construction duration to 12 months and/or delay the start of construction.

Selection of the various Project components were based on several factors, including experience of the manufacturer, engineer, or vendor and suitability of the specific component to this geographic location and wind resource.

Turbine Description

As discussed in Section 1.1, the wind turbines that will be installed at the Noble Ball Hill Windpark will be General Electric (GE) 1.5-megawatt (MW), 80-meter, modular tower system (MTS) sle, T-Flange wind turbine generators. The turbine consists of a three-blade rotor 77 meters in diameter and centered 80 meters aboveground. The maximum height of each turbine will be 389 feet when the rotor blade is at the top of its rotation, and each with an approximate 18-foot diameter, slightly exposed concrete foundation. Each turbine included within the Project will have a nominal output of 1.5 MW. These turbines are the same model as those which Noble has constructed at other sites in northern and western New York State (NYS). There are other sites currently under development by Noble utilizing the same model turbine. This turbine is well suited to the wind resource characteristics of New York and has been successfully implemented by Noble at other New York projects. As a result, Noble has established a long-term relationship with General Electric (GE) that guaranteed access to turbines for this project which allows for construction to begin as soon as all approvals are received. Appendix A includes the drawings, specifications, and power curves of these turbines.

Power from the turbines is fed through a breaker panel at the turbine base inside the tower and is interconnected to a pad-mounted step-up transformer that steps the voltage from 575 volts as generated by the turbine to 34,500 volts (34.5 kilovolts [kV]). The pad-mounted transformers are located near the base of each tower and are interconnected on the high voltage side to underground cables that connect the turbines together electrically.

The turbines will require lighting in accordance with Federal Aviation Administration (FAA) standards to avoid hazards to aviation. Aviation warning lights will be limited to the minimum required by the FAA (e.g., if allowed by the FAA, lights will be installed on turbines around the Project perimeter, and those within the perimeter will be spaced a half mile apart, rather than on all structures). There will be no lights during the day. There will be red flashing lights during the night designed at a minimum intensity and duration of time with an illumination pattern that will primarily be directed upward, as suggested by the FAA (see Sections 2.13, Visual Resources: Environmental Setting, and 2.14, Visual Resources: Impacts and Mitigation).

Collection System Description

The Project requires approximately 23.8 miles of underground electric power lines (18.7 miles in the Town of Villenova and 5.1 miles in the Town of Hanover) installed in trenches and about 174 feet (.03 miles) of overhead 34.5 kV electrical power lines in the Town of Villenova to collect the power from the padmount transformers and transfer it to the proposed substation in the Town of Hanover. The underground portion of the collection system will be installed in a trench that is typically 54 inches (4.5 feet) to 66 inches (5.5 feet) deep and generally runs parallel to the Project's roadways in order to reduce disturbances to additional ground. In locations where two or more sets of underground lines converge, pad-mounted junction terminals will be utilized to tie the lines together into one or more sets of larger feeder conductors. There will be one overhead portion (approximately 174 feet) of the collection line which will be installed on 45-to-55-foot wooden utility poles similar to existing utility poles in the area. This section of overhead collection line will not be visible from the road at any location.

The overall electrical system will be designed and constructed in accordance with the guidelines of the New York State Building Code, the Institute of Electrical and Electronics Engineers, the National Electric Safety Code, the National Electrical Code (NEC), the National Fire Protection Agency (NFPA), the New York State Power Authority (NYPA), and overall good utility practice.

Transmission Line Description

The Project requires approximately 6 miles of new 115-kV electrical transmission lines to transfer the power from a new electrical substation in Hanover to a new switchyard in the Town of Hanover adjacent to the 230-kV National Grid Dunkirk-Gardenville Line. The new transmission line will be placed on 73 single pole structures within a 100-foot wide right-of-way (ROW). The poles will range between 65 and 75 feet in height, and spans between poles will generally be 420 feet but may be as much as 550 feet or as little as 240 feet, as a result of alignment, topography, or sensitive area avoidance. The transmission facility has sufficient capacity to transfer the electricity generated by the Project. The System Reliability Impact Study (SRIS) has been completed and was approved by the New York Independent System Operator (NYISO) on June 19, 2008. No system upgrades were identified.

Access Road Description

The Project requires construction and use of approximately 16 miles of access roads (13 miles in the Town of Villenova and 3 miles in the Town of Hanover) that will connect each wind turbine to a Town or County roadway. These roads will be gravel-based, designed to meet the specific load-bearing requirements of trucks transporting concrete, aggregate, and turbine components to the turbine sites. Construction of the 35-foot temporary access roads will require a 60-foot construction ROW. After construction, the 35-foot temporary access roads will be scaled back to a 16-foot operational width allowing Noble to use the existing roadway for maintenance and operational purposes, as well as access by emergency services, if needed.

The Transportation Haul Route Study (see Appendix N) evaluates the potential routing for the delivery of turbine components and identifies where temporary roadway improvements would be required at certain intersections to accommodate the turning requirements of trucks carrying oversize loads. The direction of travel on local roads was carefully considered to minimize the extent of temporary construction required at intersections within the Project Area. After the Project has been constructed, the intersections will be restored to their original condition including traffic sign replacement and roadway resurfacing, if necessary. Specific intersection drawings can be found in Appendix A of the Transportation Haul Route Study (see Appendix N).

Substation and Switchyard Description

A new substation and switchyard will be constructed as part of the Project and will both be located in the Town of Hanover. The main function of the substation is to step up the voltage transported through the collection lines from 34.5 kV to 115 kV. The basic elements of the substation are a control house, a main transformer, outdoor circuit breakers, capacitor banks, relaying equipment, high voltage bus work, metal clad switchgear, steel support structures, an underground grounding grid, and overhead lightning suppression conductors.

The transmission line will transmit the power to the new switchyard to be built by Noble in the Town of Hanover and will connect the power to the existing electrical grid. The basic elements of the switchyard are a control house, outdoor circuit breakers, capacitor banks, relaying equipment, high voltage bus work, steel support structures, an underground grounding grid, and overhead lightning suppression conductors.

All of the main outdoor electrical equipment and control houses will be installed on concrete foundations that are designed for the soil conditions at the substation and switchyard sites.

1.2.2 Construction Overview

Turbine Installation

Generally, all components of the Project will be installed in the same manner. A maximum 300 by 300-foot temporary staging area will be utilized at each turbine location for laying out equipment, turbine rotor assembly, and stockpiling topsoil. Within the 300 by 300-foot square staging area, generally a 200 by 200-foot square area will be cleared and graded to a slope of 5% or less to facilitate the layout of turbine components. Disturbance outside of this 200 by 200-foot square area will generally be limited to tree cutting necessary for rotor assembly and storage of excess topsoil, subsoil, or woody material including stumps, roots, logs, and/or wood chips. This area may be further minimized to avoid impacts to wetlands and other sensitive resources.

Within the maximum 300 by 300-foot turbine staging area, a gravel crane pad, typically 120 by 40 feet with a slope of 1% or less in all directions, will be installed. The crane pad is used to support the crane as it lifts turbine components to their upright and installed positions. After turbine installation is completed, the crane pad will remain in place for future turbine maintenance. Pad-mounted transformers will be situated at each turbine site so that there are at least 6 feet of clearance between the transformer and any other component. The transformers will be installed in accordance with industry standards.

Each wind turbine will permanently occupy a round, slightly exposed base approximately 18 feet in diameter. Preparation of each turbine site for installation of the foundations will involve excavation of surface materials. Extra care will be used to ensure that topsoil and subgrade materials are kept separated and stockpiled to guarantee the land is returned to its original use. Dewatering is not expected to be required, but will be used where required to maintain the strength of the subsurface load-bearing materials. If bedrock is encountered during excavation activities, an excavator with a large rock bucket will be used or, in locations where the bedrock is more concentrated with depth, an excavator equipped with a hydraulic/pneumatic breaker or rock grinder may be used. Noble does not expect that blasting will be necessary for the Project. In the event that blasting becomes necessary, a detailed blasting plan will be prepared and submitted to the authority having jurisdiction and copied to the Towns of Villenova and Hanover, the Chautauqua County Emergency Services Coordinator, and the Chautauqua County Department of Health for their review (see Section 2.27, Description of the Proposed Construction Plan, for additional discussion on the blasting plan).

During the Project construction phase, the large turbine components (i.e., tower sections, nacelle, and rotor blades), will be transported from GE vendors of Ports of Import and delivered directly to site. Along the Off-Site Haul Route (see Appendix N), an approximately 3-acre off-site equipment staging area will be located along Route 39 near the intersection with Empire Road in the Town of Hanover. This area will be used as temporary short-term staging for verification of match marking, a quality receipt inspection, washing[2], and any necessary rigging adjustments prior to site delivery. Materials, such as cable reels, padmount transformers, and 34.5-kV junction boxes, will be delivered from off-site secured storage directly to site-specific locations to support specific scheduled construction activities. Specific equipment and materials will be delivered to designated turbine sites. Each turbine site will serve as the heavy lift staging area for the erection of that specific turbine.

A total of 28 acres of on-site laydown will also provide storage for materials such as overhead poles, rods, ring forms and other construction materials. The proposed locations of the laydown facilities are depicted on Figure 1.1-2; however, the final locations are subject to change based on landowner consent. The final locations will be identified in the Final Environmental Impact Statement and will avoid impacts to wetlands and archaeological resources. If sited in active agricultural lands, Noble will, to the extent practicable, be consistent with New York State Department of Agriculture and Markets (NYSDAM) guidelines for agricultural mitigation for windpower projects (see Appendix B). Input from landowners will be considered to avoid or minimize impacts to current or future farm operations as a result of laydown areas. The on-site laydown areas will also provide space for Noble and its contractors' construction trailers and parking for construction crews who will be bused to the work sites. Others, including dedicated support staff, quality inspectors, and field engineers, will park off the public roads in designated areas, such as access roads and turbine sites, as needed. Necessary building permits required for placement of construction trailers will be obtained prior to installation.

Collection System Installation

Underground collection lines will be used for the majority of the main collection system. Underground collection lines will be installed, to the extent possible, within the maximum 60-foot ROW area of temporary road disturbance. In areas where underground collection lines will not be installed adjacent to an access road, the ROW width will range between 22 feet where one circuit is installed and up to 50 feet where four circuits will be installed in parallel.

Underground collection lines will be installed via direct burial using either a trenching machine or a track hoe. The cables will generally be buried in a trench to a depth of 4.5 feet. Where multiple circuits are installed parallel to each other, a separation of approximately 8 feet is required between each trench. In the unlikely event that bedrock is encountered within the trench depth during installation, alternatives such as ripping or blasting will be evaluated. Blasting will not proceed until full approvals from the authority having jurisdiction have been obtained.

---

[2] In accordance with the State Pollutant Discharge Elimination System (SPDES) permit, washing will be conducted with water only. No detergents, solvents, or other additives will be used. A separate SPDES permit is required for such activities.

Construction of underground collection lines in narrow trenches in wetlands will not create an impervious boundary; therefore, will not cause any alteration in the subsurface hydrology of wetlands. However, where necessary, trench plugs will be used to prevent migration of water out of the wetland. Pre-existing contours will be restored after the trench is backfilled and the area is revegetated. No permanent filling of wetlands will occur in association with underground collection lines.

Underground collection lines will be installed via trenching at stream crossings. Streams that are not naturally dry at the time of crossing will be temporarily dammed, with the water pumped around the construction area to allow collection lines to be installed in dry conditions. The equipment that will be used to install the collection lines cuts a trench, places the cable, and backfills the trench in a single pass, thereby reducing the duration of stream disturbance.

While the majority of the collection system will consist of underground collection lines, overhead collection lines will be utilized where it is necessary to cross an existing road, along existing roadways, and wherever necessary to minimize environmental impacts in sensitive areas, such as wetlands. Installation of overhead lines will require a 25-foot ROW, where located adjacent to existing roadways, or 35 feet in other areas. The ROW will be cleared of any trees and large woody vegetation that may pose a hazard to the line. Where overhead lines are located adjacent to existing roadways, installation will take place from the edge of the road and the poles will generally be located 10 feet from the road shoulder.

Transmission Line Installation

The transmission portion of the Project includes a new 6-mile overhead transmission line. A 100-foot ROW will be required; all forested areas within the 100-foot ROW will be cleared to avoid interference with transmission lines. During construction, any portion of the ROW may be utilized in upland areas, but equipment travel will generally be limited to a 30-foot travel corridor, where practicable, and temporary 70-foot by 100-foot workspaces at pole locations. If wetland areas are encountered along the transmission ROW, wetland mats will be used within a 30-foot corridor immediately adjacent to the transmission line to accommodate equipment travel. Temporary workspaces at pole locations within wetlands will be reduced to an area 30-foot by 70-foot required for drilling operations.

Construction of the proposed transmission line will occur in four general phases: ROW clearing and preparation, assembly of single-pole structures, stringing of the conductors, and, finally, cleanup and restoration.

The entire ROW width (100 feet) will be cleared of trees and maintained in an herbaceous or shrub/scrub state to provide appropriate transmission system clearance and maintain a reliable operating environment for the transmission line. In areas where woody vegetation needs to be removed from wetlands within the 100-foot ROW, it will be cut by hand and equipment used for removal will be positioned outside of the wetland boundary or on mats located within a 30-foot wide construction corridor immediately adjacent to the transmission line. Tree stumps will be left intact except where necessary for pole installation or where they pose a safety related construction constraint (such as within travel paths). In these areas stumps will be removed and disposed of in approved upland, non active agricultural locations.

Wood single poles will be installed to support the conductors. A crew will transport the poles, along with insulators and insulator hardware, to each pole location on the ROW. A drill rig or auger will be used to drill holes for the transmission poles to the required depth. The poles will be lifted individually and set in place by a crane or large forklift. Braces and davit arms will be individually hoisted and framed to the poles. The insulators, clamps, travelers, and other associated hardware will be installed on the pole.

Access Road Construction

Access roads will have a temporary width of 35 feet during construction. The temporary access road will be installed within a maximum 60-foot construction ROW (40 feet in wetlands) that will serve as extra work space to allow for construction of the temporary access road, storage of topsoil, and safe passage of equipment. When collocated with an access road, collection lines will be installed within the 60-foot construction ROW. Roads will be maintained at a permanent width of 16 feet for operation and maintenance of the turbines after the construction phase is complete. Where the roads are maintained above the existing ground grade an approximate 2-foot embankment is required on each side of the road to accommodate the final 16-foot surface. Conservatively, a 20-foot permanent width will be used for all calculations.

The remainder of the construction ROW will be allowed to naturally revegetate. Natural revegetation of the construction ROW is likely to result in the establishment of native plants, due to existing seed banks and adjacent plant communities. An annual rye seed or mulch will be used to temporarily stabilize the soil. If necessary, supplemental seeding/mulching will take place on an as-needed basis. In areas adjacent to agricultural fields, plans for revegetation or seeding/mulching will be discussed with individual farmers so that the re-establishment of vegetation complements each farmer’s operation. Periodic removal of woody vegetation will be required to maintain an herbaceous or successional shrub state composed of native species.

The access roads for the Project are gravel roads designed to bear the weight of truck traffic transporting concrete, gravel, and turbine components to the wind turbine sites over the life of the Project. These access roads will also support any emergency or fire service equipment that may need access to the site. The required gravel road base section will be constructed using site-specific geotechnical information considering the load-bearing requirements of construction traffic and equipment delivery. The gravel roads will be constructed on suitable, undisturbed native soil. Geotextile fabric, or a comparable product, will be used to separate the native soil/fill from the base material to prevent fine soil particles from migrating into the gravel base material and to preserve road base integrity.

Roads will be constructed with culverts as needed to maintain a water table elevation below the base material to ensure roadbed stability. Roadside ditches will be constructed as dictated by the terrain to convey stormwater runoff away from the roadways. To prevent access by the general public, construction/access roads will be gated where they intersect public roads.

Substation and Switchyard Construction

The switchyard will be designed in accordance with National Grid standards and with the Northeast Power Coordinating Council Criteria for Bulk Power Stations and criteria set for by Homeland Security. The construction of these facilities involves grading, construction of foundations for the transformers, steel work, breakers, control house, and other outdoor equipment; the erection and placement of the steel work and all outdoor equipment; and electrical work for all the required terminations. All excavation, trenching, and electrical system construction work will be done in accordance with the Project Storm Water Pollution Prevention Plan (SWPPP), attached as Appendix E. Prior to construction, site-specific SWPPPs will be submitted to the New York State Department of Environmental Conservation (NYSDEC), as required. Construction work will require the use of bulldozers, a drill rig and concrete trucks, a trencher, a back-hoe, front end loaders, dump trucks, transportation trucks for the materials, boom trucks and cranes, and man-lift bucket trucks. The footprint for the substation will be approximately 200 by 300 feet (1.4 acres) and the footprint for the switchyard will be approximately 300 by 500 feet (3.4 acres).

Environmental Monitoring

Construction activities will be monitored to ensure compliance with applicable permit conditions, the SWPPP, and best management practices (BMPs). To facilitate this, Noble will create a project-specific Environmental Monitoring Plan (see Section 2.27, Description of the Proposed Construction Plan, and Appendix I for more details). The plan will contain permit conditions and other commitments required of Noble during the Environmental Impact Statement (EIS) process including those associated with wetland and stream disturbance, vegetation removal, invasive species control, stormwater management, erosion control, and agricultural impacts. Noble will retain an Environmental Monitor(s) whose duties will include coordination of environmental monitoring activities, documentation, and implementation of mitigation activities as they are conducted, and preparation of a final report available to the Town of Villenova, the Town of Hanover, and involved and interested agencies as needed and/or requested. The Environmental Monitor will have full stop-work authority.

Safety

Prior to the start of construction and pursuant to applicable laws and regulations, a risk analysis will be completed to address any construction risks that are identified. These risks are incorporated into the Emergency Response Plan (ERP) which is included in Appendix R. The ERP identifies all required actions and resources required, and will confirm availability and proper training for construction phase risks. This plan details the actions to be taken by the site manager and staff should an emergency or fire occur and it sets forth the lines of communication in the event of a fire or other emergency. The ERP is included in Appendix R and will be updated with the most current information prior to construction.

In addition, Noble maintains a Health, Safety and Environmental Management System (see Appendix R) program which summarizes the procedures to be implemented on a Noble project.

1.2.3 Operation and Maintenance

The turbines are designed and anticipated to be operable 365 days a year and 24 hours a day. Downtime for preventive maintenance and/or malfunctions may reduce operating hours. The turbines will generate electricity only during times of sufficient wind.

Noble plans to operate the Project with eight full-time employees. Six of these employees will perform routine, preventative maintenance and unplanned work on the turbines under an operations and maintenance contract. A facility manager and an administrative assistant will be responsible for all operations and maintenance of the site, including administration and direction of turbine maintenance, technical oversight as required by the manufacturer, and operational coordination with both the utility grid system and local landowners. Large repair tasks will be accomplished using both Project employees and contractors. Noble will construct an operations and maintenance (O&M) facility on approximately 5 acres within the Project Area, which would house these activities. The O&M building will be approximately 50 feet by 100 feet (see Appendix A). The O&M facility may be constructed within one of the laydown areas depicted on Figure 1.1-2 however, the final location is subject to change based on landowner consent. The final location will be identified in the Final EIS and will avoid impacts to wetlands and archaeological resources.

The operational staff will maintain the turbines, including routine maintenance, long-term maintenance, and emergency work. Routine maintenance for the turbines will include testing lubricants for contaminants, changing lubricants, calibrating and testing electronic systems, and tightening bolts and components. Routine maintenance is generally completed on a scheduled basis by climbing the tower using the internal ladder and doing the work with normal hand tools and electrical testing equipment. Long-term maintenance may include replacement/rebuilding and cleaning larger components, such as generators and gearboxes, testing electrical components, and refurbishing blades. In all cases, the facility staff will be responsible for facilitating the needed repair either through internal resources or with the aid of additional contractor support. In the event that temporary impacts are required for future maintenance, Noble will obtain necessary permits from the United States Army Corps of Engineers (USACE) and NYSDEC on an as-needed basis.

Emergency work also may be required as the result of a system or component failure. Certain unplanned work, such as blade repairs or repairs to other large components, may require the use of a crane to complete the work.

It is expected that the Project will require only minimal use of herbicides to control vegetation along access roads, turbine maintenance areas, or electrical collection ROWs. Generally these areas are not expected to promote vegetation growth because of the use of geotextile fabric and gravel construction and the periodic use of the access roads by vehicles. If the use of herbicides becomes necessary to control vegetation, application will be performed by a certified contractor and in accordance with all applicable regulations and BMPs. The natural vegetative conditions will be preserved to the maximum extent practicable throughout the Project Area and no sites will be maintained devoid of vegetation. Maintenance of all cleared areas and periodic removal of vegetation will consist of trimming trees and clearing undesirable vegetation by side trimming, cutting, and mowing to: 1) control re-sprouting of undesirable tall growing species to maintain safe clearance within wire security zones; 2) remove vine growth from poles; 3) clear access paths to overhead equipment; 4) protect underground collection lines from root damage; and 5) maintain erosion and sediment control devices. In some cases, spot control of invasive species might be required. Maintenance of clearance distances around aboveground electrical lines will be limited to a minimum of a 5-foot radius around conductors as recommended by the manufacturer's specifications, as necessary, to prevent interference with power cables.

Any and/or all materials used during the inspection and maintenance of Project equipment will follow a strict material safety data sheet (MSDS) program and, when required, will include documented, dedicated control of excess materials as well as off-site disposal of waste materials at licensed facilities with an emphasis on recycling whenever possible.

1.3 Project Alternatives

This section discusses Project alternatives and describes the process used to select the Project Site and the locations of all Project facilities within the Project Area. The alternatives evaluated in this section include: the no-build alternative; alternative project location and design; alternative Project and turbine sizes; and alternative turbine technologies. The Project Area was selected through a systematic process that considered (1) the location of wind resources in New York State (NYS); (2) the availability of existing roads and utility interconnections; (3) the availability of land with landowners willing to sign easements for their property; (4) community support; (5) the presence of environmental constraints, including visual and noise impacts, impacts on wetlands and streams, and important wildlife habitat; and (6) the presence of land use constraints including zoning and building restrictions. The selection process was designed to facilitate the evaluation of different potential project sites and turbine locations as Noble obtained property rights within a preferred project area sufficient to develop a wind energy facility.

1.3.1 Project Alternatives Evaluated

No-Build Alternative

The no-build alternative assumes that the Project would not be built. Selection of the no-build alternative would preclude the development of a windpark in an area with favorable wind resources and infrastructure to support such a project. Wind-powered electricity generation presents a no-air emissions alternative to fuel-based resources. In the northeastern United States, viable wind energy project sites are limited and those that do exist are primarily located in areas that will have similar social and environmental concerns. Therefore, the selection of the no-build alternative would continue the reliance in the northeast predominantly on non-renewable energy resources (e.g., fossil fuels and nuclear materials). Energy production with such non-renewable sources results in severe direct and indirect adverse environmental impacts (e.g., air emissions, water consumption, toxic effluents and thermal emissions, by-product wastes, significant infrastructure needs and related land use impacts, visual impacts, noise impacts, traffic impacts, and health impacts), and socioeconomic effects (e.g., decreased energy diversity and reliability, fluctuating and increased consumer costs, and uncertainties regarding the ability to meet increasing energy demands).

Furthermore, the benefits of the addition of approximately 90.0 MW of clean, renewable electric energy to the power grid would be lost. Electric generation by fossil fuel-fired facilities presents serious consequences in the form of, among other things, air emissions (i.e., carbon dioxide, sulfur dioxide, nitrogen oxides, particulate matter, and mercury). The adverse environmental and health effects of air emissions from combustion of fossil fuels are well-documented and include global warming, acid rain, smog, respiratory health effects, and significant long-term impacts on wildlife. Air emissions and global warming have been cited as serious concerns for bird populations in North America in *A Birdwatcher's Guide to Global Warming* (Price and Glick 2004). This guide advocates renewable energy sources such as wind to help slow global warming and reduce the threat it poses to people and wildlife.

Beyond air emissions, fossil fuel-fired facilities have other significant environmental impacts. These include, among others, massive water withdrawals/consumption for cooling (which entrain and impinge fish), the release of toxic effluents resulting from plant operations, thermal releases (when cooling waters are returned to the water body from which they were withdrawn), and visual impacts resulting from the facilities' structure and vapor/steam plume. To the extent that new technologies are required under the Clean Water Act to reduce water withdrawals, such technologies have their own attendant adverse environmental impacts (e.g., construction and maintenance of massive structures in water bodies, thereby causing long-term habitat disturbance). In any event, even with modern pollution control devices, significant adverse impacts remain. The cumulative effect of the operation of many fossil fuel power plants continues to pose an environmental threat that will only worsen with continued and expanded usage necessary to meet the ever-increasing demand for energy.

Beyond environmental impacts, fossil fuel power plant facilities also have significant adverse socioeconomic effects. Strict air emissions regulations and control measures, along with other environmental requirements to permit new or re-powered fossil fueled facilities, have increased the capital and operating costs of power plants and the ultimate cost of electricity for the consumer.

Further, the infrastructure required for efficient energy distribution is in some instances lacking, leading to price fluctuations and unreliability of energy supply. For example, although natural gas is heralded as the cleanest of the fossil fuels, it nonetheless has substantial drawbacks, both socioeconomic and environmental. Natural gas is transported through a network of pipelines throughout the country, but this network is not always capable of transporting the required gas to various regions. This results in significant price swings and increased costs to consumers due to supply and demand forces. In extreme instances, supply disruptions may force use of dirtier fuels such as fuel oil.[3] In addition, natural gas facilities suffer from many of the same adverse environmental impacts as do coal-fired and oil-fired plants, particularly with respect to water withdrawals, thermal releases, and visual impacts. Thus, fossil fuel-fired facilities, which depend on non-renewable resources, have undeniable and well-defined significant environmental and social costs.

Nuclear facilities pose their own unique set of dangers, including the disposal of radioactive waste (high-level and low-level), impacts on the marine environment from thermal water discharge, and the potential danger of a catastrophic radioactive release as the result of an accident or act of terrorism. Moreover, the stigma associated with, and public perception of, nuclear facilities (both the power plants themselves and radioactive waste disposal sites) render the siting of any new facilities difficult.

In marked contrast, according to the National Renewable Energy Laboratory, wind energy has the following characteristics: 1) economically competitive; 2) a valuable crop of the future for farmers and ranchers; 3) unlike most other electricity generation sources, wind turbines do not consume water; 4) an indigenous, homegrown energy source that contributes to national security; 5) inexhaustible and infinitely renewable; 6) has many environmental benefits; 7) reduces the risk associated with volatile fossil fuel prices; 8) the fuel of today and tomorrow; and 9) can be used in a variety of applications (United States Department of Energy 2005). Wind projects do, however, require appropriate wind resources, and they are generally distributed over a larger land area than fossil fuel facilities. These characteristics make rural areas appropriate for wind project development. Rural areas often are used for farming or logging, and wind energy facilities are wholly compatible with these two land uses. They do not require the Project sponsor to take control of land; instead, an easement is signed and the land remains the property of the rural landowner. Thus, revenues are paid to the landowner, and these

---

[3] Diversity in the mix of energy sources that supply our electricity can help reduce price fluctuations for the consumer.

monies help sustain economic vitality in the rural area (United States Department of Energy 2003). In addition to easement payments to private landowners, the Project is expected to make significant payments in lieu of taxes (PILOT) and other payments to local taxing jurisdictions, and make road improvements as a result of construction and post-construction remediation. The no-build alternative would deprive the rural area of this direct economic benefit as well as preclude development of an environmentally benign and beneficial energy production technology.

Both the United States' and New York's energy policies explicitly recognize the need to supplement non-renewable energy production resources with renewable energy resources. In 2008, the United States Department of Energy (DoE) developed a plan for wind energy to provide 20% of United States electricity by 2030. The New York State Energy Plan increases the state's use of electricity from wind from 10% by 2000 to 15% by 2020. Thus, they encourage development of renewable sources and support renewable sources as a vital part of the local and national long-term energy strategy (e.g., New York State Energy Planning Board 2002; New York State Public Service Commission 2006).

This Project utilizes a renewable resource, is environmentally benign compared to fossil fuel-fired and nuclear-powered facilities, and is environmentally and socio-economically beneficial (both locally and globally). Due to continued improvements in renewable energy technology, a commercial-sized wind farm, such as the Project, can generate electricity that is competitive with electricity produced from fossil fuels and can do so with significantly lower impact on the overall environment than comparable conventional non-renewable energy projects. The Project is consistent with the long-term energy goals of both the United States and the state of New York. Finally, to the extent that the Project may displace more environmentally harmful means of energy production, it would actually create environmental benefits (including for avian species and other wildlife).

If the No-Build alternative were selected, the economic benefits of the Project would not be realized, including revenues to local taxing jurisdictions, lease revenues for participating landowners, income from operation and maintenance jobs, payments to Project neighbors, and income from construction jobs. The Project, as proposed, will add up to 90.0 MW of electricity from a renewable resource to the New York State Energy Portfolio. If this alternative were selected, the state's energy portfolio would not add this additional renewable capacity.

If the No-Build alternative were selected, the temporary and permanent environmental impacts from construction and operation would not be realized. This includes the potential impacts to the natural environment, such as soils, water quality, wetlands, wildlife habitat, and birds and bats. Overall, the Project will result in the disturbance of approximately 349 acres of land during construction including the permanent conversion of 58 acres (approximately 40 acres in the Town of Villenova and approximately 18 acres in the Town of Hanover) of land for Project facilities, such as turbine pedestals, access roads, turbine crane pads and the substation and switchyard. The remaining 291 acres of land will be restored to pre-construction conditions. Minimal grading will be required to the turbine sites to level off the areas; however, these alterations will not change the overall topography of the Project Area.

Construction practices, including the building of access roads, installation of turbines, and placement of electrical collection and transmission lines, may impact the condition of groundwater and surface water resources, and ultimately, water quality, through ground disturbance and runoff.

If the No-Build alternative were selected, 16 acres of wetlands would not be disturbed during construction, including less than one half acre permanently impacted by placement of fill. Approximately 5 acres of forested wetland would not be permanently converted to shrub/scrub or emergent wetland as a result of periodic removal of woody vegetation adjacent to access roads and within collection and transmission line corridors.

Selection of the No-Build alternative would prevent a loss of upland vegetation including the removal of existing vegetation, which provides habitat for various wildlife species through minimal clearing of forested, shrub/scrub, and herbaceous vegetation as part of construction activities. Construction-related activities (e.g., clearing for road construction, infrastructure construction, equipment noise, and increased vehicle traffic) can potentially impact birds and bats by causing temporary displacement from habitat.

If the Project were not constructed, the potential impacts to birds and bats through collisions with the turbine blades and towers, overhead collection lines, or transmission lines, displacement from habitat, or influence on migration would be avoided.

Other impacts that would be prevented include visual resources, noise, communication signals, traffic and transportation, land use, socioeconomics, and cultural resources. These impacts are offset by the benefits described above. Environmental impacts are discussed in detail in Section 2, Environmental Setting and Impacts, and its subsections.

Alternative Project Location and Design

Beginning in 2004, Noble undertook a statewide study to identify potential commercial-scale wind generating project areas. Numerous potential project areas were identified in northern and western NYS. The potential areas were evaluated using the following criteria:

- **Availability of sufficient wind resources.** Wind turbines must be sited in locations where there is sufficient wind flow of adequate speeds and duration. Potential project sites were evaluated using topographic maps and the New York State Wind Resource Map produced by TrueWind™ in 2001 and updated in 2005. Generally, wind speeds averaging at least 7.5 meters per second (m/s) are needed for commercial wind energy project viability.

- **Proximity to existing roads and transmission lines.** Accessibility to an existing utility system to deliver the power generated into the energy grid is a key consideration for wind project siting. Use of existing transmission facilities minimizes environmental impacts associated with construction of new power transmission facilities, which would include clearing ROW and other construction impacts.

- **Availability of contiguous land.** Large, sparsely settled parcels require fewer easements and less encroachment on residential uses. Farmland is particularly important to project development because it offers large amounts of contiguous land. Wind turbines are generally compatible with agricultural practices. Project facilities preclude agricultural production or development on a small portion of each parcel, but generally do not impact land use in the areas adjacent to the turbines or access roads or impede future development on the surrounding land.

Northeastern Chautauqua County was identified as an area with considerable potential for project development. Further analysis of these criteria found the Towns of Villenova and Hanover particularly favorable for wind energy development. Through extensive computer analysis, wind resources in this area were determined to be more favorable in this area than in other areas of Chautauqua County.

The National Grid 230-kV Dunkirk-Gardenville transmission line that runs through the Town of Hanover makes electrical transmission possible in this area. The Noble Ball Hill Windpark transmission line will pass through a new switchyard in the Town of Hanover and connect to the existing National Grid electric line. The availability and proximity of this high-voltage transmission line also enhances the efficiency of the Project, versus delivery at lower voltage, by reducing transmission line "losses."

The Project Area is accessible via NYS Route 39, NYS Route 72, NYS Route 85, NYS Route 93, and NYS Route 83. Transportation in and through Chautauqua County and the Towns of Villenova and Hanover is provided by a well-developed system of local and county roads. The roads are generally suitable for delivery of the equipment and materials needed to construct and maintain the Project, though some improvements may be necessary. The Project Area also includes many existing farm and logging roads. Improving these existing roads for Project access will minimize the disturbance of additional areas for new roads.

The Project Area is primarily comprised of privately owned lands. Many of the properties are large parcels that are currently or were formerly used for farming activities and have a low population density, making them attractive for wind energy development. Large, sparsely settled parcels require fewer easements and less encroachment on residential uses. As stated previously, the presence of agricultural lands is important to wind farms because of their compatibility.

Once a potential Project Area was identified, members of the Noble Project team met with landowners and residents of the community in 2006 and 2007 to determine whether there would be sufficient participation of landowners to develop a viable project. As a result of these discussions and meetings, the Project team determined that there was sufficient support to proceed with development of a wind project. Noble then sought voluntary agreements with landowners for development on their respective property. The Project Site is limited to those locations where Noble was able to enter into the voluntary landowner agreements.

After the potential Project Area was identified based on the above criteria and community outreach was conducted, preliminary analysis of the Project Area was conducted in 2006 to identify any environmental and land use constraints in the Project Area that had the potential to prevent project development (Fatal Flaw Analysis). The specific issues addressed in the Fatal Flaw Analysis included:

- Geology and soils;
- Water resources;
- Wetlands;
- Threatened and endangered species;
- Bird and bat issues;
- Traffic and transportation;
- Land use;
- Environmental justice issues;
- Cultural resources; and
- Visual impacts.

No fatal flaws were identified during this analysis.

Once it was determined that the Project Area satisfied the preliminary screening criteria, the wind resources were further verified through the installation and operation of meteorological towers within the Project Area to collect site-specific data. These data were compared to the NYS Wind Resource Map and modeled to predict electrical production from each potential turbine location.

Noble obtained agreements with landowners within the Project Area that would allow for the construction of turbines, access roads, substation, switchyard, collection lines, and other Project facilities on their property. The Project Site was not finalized until a sufficient number of landowner agreements were in place to site all of the Project facilities.

When land acquisition activities were completed, an “area constraints map” was developed to determine where turbines, access roads, substation, switchyard and collection system components, and other Project facilities could be located. The first step in this design process was to determine turbine locations. Areas were eliminated from consideration as turbine locations if located on a NYSDEC or NWI-mapped wetland or in an area that appeared to be “wet,” based on a review of soils mapping and or a site investigation. Areas were also eliminated from consideration if they were located:

- Within a legally required setback distance established by relevant local law from a road, residence, or structure;
- Where legally mandated, sound pressure levels would be exceeded as in the case of a residence, school, church, library, hospital, or park;
- In proximity to an airport based on Federal Aviation Administration (FAA) and other applicable requirements; or
- Within a microwave or other radiowave pathway.

Data on the mapped constraints were entered into Windfarmer, a turbine siting modeling program, to determine optimum turbine locations within the Project Area. In addition to the mapped constraints, the Windfarmer model takes into account meteorological data and noise calculations to optimize turbine locations and turbine efficiency within a given area. The turbine locations identified within the Project Area using the Windfarmer program were field-verified to ensure that:

- Impacts on wetlands and other environmentally sensitive areas were avoided to the extent practical;
- Landowner concerns were addressed;
- Setback requirements were met; and
- Engineering constraints, such as steep slopes, were minimized.

Adjustments were made and modeling was repeated until preliminary turbine sites were optimized.

Once turbine locations were selected, access roads and collection lines were sited to minimize impacts to wetlands and other sensitive environmental features, maximize use of existing road and transmission infrastructure, avoid engineering constraints such as steep slopes, and meet the approval of individual landowners.

Noble utilized specific criteria for the preliminary siting of collection/distribution lines. “First order” criteria for collection line routing were: (1) shortening the length of circuits to minimize electrical losses and visual and other environmental impacts; (2) availability of property rights; and (3) absence of environmental constraints. Once preliminary collection/distribution routes were identified, the advantages and disadvantages of overhead versus underground collection lines for each segment of the line were considered. Both overhead and underground installations have the potential to impact streams and wetlands. Impacts can be minimized by using various construction techniques, some of which are directional drilling, maintaining buried cable depths in agricultural areas coordinated with landowner operations, and by strategic pole placements. After careful analysis, a primarily underground approach was selected in order to minimize visual impacts to the greatest extent possible. One location was selected for a short overhead crossing in order to avoid impacts to a perennial stream and avoid steep terrain.

Access roads have been sited in accordance with the New York State Department of Agriculture and Markets (NYSDAM) guidelines wherever practicable to minimize loss of agricultural land and impacts on farming operations. In addition, Noble reviewed the location of project facilities with NYSDAM representative Michael Saviola on July 22, 2008.

During the process of field-verifying the proposed turbine locations, access roads, electrical collection, and transmission line placement were also considered. In the interest of minimizing impacts, every effort was made to minimize the number of access road/interconnection systems needed. Each system was designed to:

- Collocate electrical lines and roads within the same corridor, where possible;
- Optimize the use of previously disturbed areas, such as farmlands and roads; and
- Avoid or minimize crossing wetlands and streams.

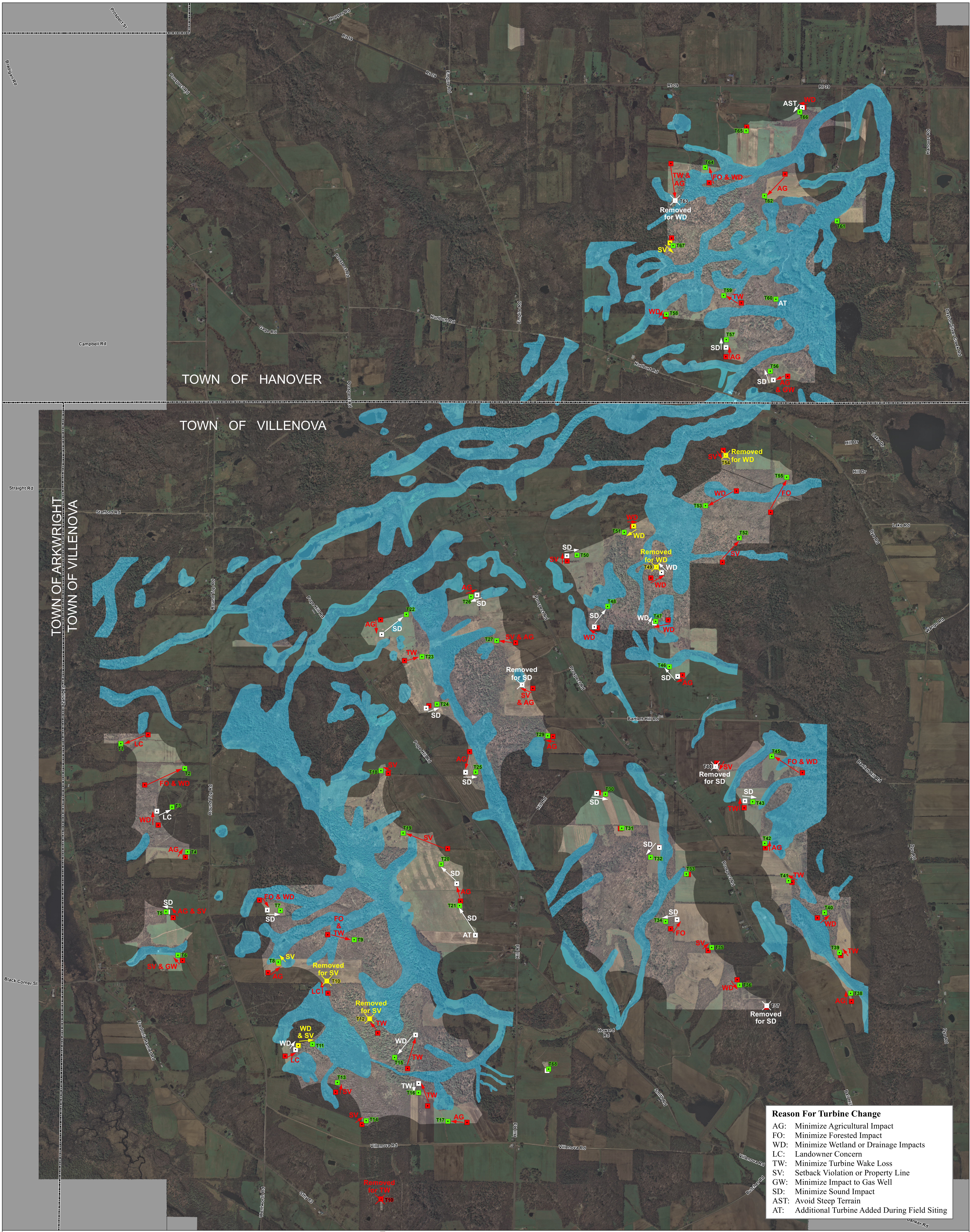
Once a route was selected based on these primary criteria, a secondary analysis was performed to determine whether the proposed route had any engineering constraints. Where avoidance of agricultural fields was not practical due to other engineering and/or environmental constraints, appropriate placement of access roads, turbines and the collection system was determined in consultation with the individual landowners and the NYSDAM “Guidelines for Agricultural Mitigation for Windpower Projects,” so as to minimize agricultural impact (see Appendix B).

Final Project Design

Care was taken to choose a project design that would minimize impact to the use of active agricultural lands. Facilities were carefully sited to minimize impacts to agricultural land in consultation with NYSDAM and NYSDAM Guidelines for Agricultural Mitigation for Windpower projects. In addition, landowner concerns, current land use practices, and the Towns' agricultural mitigation standards were considered and are also reflected in the proposed layout of facilities. In accordance with NYSDAM guidance, turbines and access roads located on active farms were placed on the edge of agricultural fields to the greatest extent possible without increasing impacts on wetlands. This minimizes the loss of agricultural land and use of wooded areas. To the extent practical, roads and interconnects were located on the edge of agricultural land to minimize impacts on agricultural operations, including reducing the incidence of crossing drain tiles.

The design and layout of the Project components has been continuously evaluated since the decision was made to pursue a project in the Towns of Villenova and Hanover. Since that time, various turbine totals and layouts were evaluated in an attempt to maximize energy efficiency while minimizing adverse environmental impacts. The Project layout, as proposed, has been engineered to capture the area's high wind energy resource while minimizing wake effects on downwind turbines. A micro-siting map (Figure 1.3-1) depicts the alternative turbine locations that were considered within the Project Area. The original computer-generated optimal siting plan for the turbines was modified based on landowner agreements/considerations and the protection of sensitive resources, such as wetlands, wildlife habitat, and productive agricultural land. The final proposed location of turbines and associated facilities reflects input and guidance received from landowners and Project consultants focusing on noise, land use, and ecological impacts. The proposed layout results in a balance of energy production, environmental protection, and community involvement. Relocation of any single turbine would have a ripple effect, in that the location of all other turbines would have to be re-examined and some possibly changed in order to maintain an efficient and workable Project design. Therefore, reduction of environmental impacts in one location could result in increased impacts in another location and/or reduced power generation. In the case of visual impact, removal, or relocation of one or two individual turbines from a 60-turbine layout is unlikely to result in a significant change in Project visibility and visual impact from most locations.

Each of the proposed turbines has been located outside the boundaries of wetlands. The majority of impacts on wetlands and streams in the current proposed layout result from the need to cross wetlands and streams with access roads and/or collection lines. If the Project layout were to be modified to eliminate all impacts on wetlands, other adverse environmental impacts may occur. Examples of increased impacts include the additional lengths of roads and collection lines that would be required to avoid all wetlands. For every foot of road increased, there would be an increase of up to 60 square feet of disturbance to forest, farmland, and/or wildlife habitat. Each additional mile of road would add approximately 7 acres of soil and vegetation disturbance. The proposed layout avoids impacts on wetlands to the maximum extent possible without a major increase in the length of the roads. In addition to the increased length of roads within the Project Area, layout changes to further reduce wetland impacts would require the construction



Reason For Turbine Change

AG: Minimize Agricultural Impact
FO: Minimize Forested Impact
WD: Minimize Wetland or Drainage Impacts
LC: Landowner Concern
TW: Minimize Turbine Wake Loss
SV: Setback Violation or Property Line
GW: Minimize Impact to Gas Well
SD: Minimize Sound Impact
AST: Avoid Steep Terrain
AT: Additional Turbine Added During Field Siting

Figure 1.3-1 Alternative Analysis Micro-Siting Map
Preliminary Windfarmer November 21, 2007 Layout to Final DEIS Layout June 10, 2008
(Including Initial Field Sited April 9, 2008 Layout and Revised Field Sited Layout May 1, 2008)
Noble Ball Hill Wind Park, Chautauqua County, NY

🟥 Preliminary Windfarmer Turbines - November 21st, 2007
☐ Field Sited Turbines - April 9th, 2008
🟨 Revised Field Sited Turbines - May 1st, 2008
🟩 Final DEIS Turbines - June 10th, 2008

▨ Windfarmer Exclusion Zone - November 15th, 2007
🟦 Wetland Exclusion Zone - March 28th, 2008
☐ Town Boundaries

Orthophotography Source: MJ Harden, 2007.

0 750 1,500 Feet

Ball_Hill_Micrositing3_090208.mxd

of additional road entrances at existing public roads to access some turbines that would be otherwise inaccessible due to small wetlands or streams. This would create additional visual impacts on the rural character of the area due to the numerous entrance roads cutting into forests and open spaces and would create additional traffic impacts in the areas and general inconveniences for the people living in the area. The proposed design has as many as seven turbines along one access road with a single entrance from a public road. Relocating the roads to totally avoid wetlands would increase the construction activity that would be visible from public roads. During the siting process proposed roadways were modified to minimize impacts to wetlands, use existing access routes in order to minimize forest fragmentation, complement existing land uses, and avoid cultural resources (see Figure 1.3-2).

As designed, the Project maximizes energy efficiency while minimizing environmental impacts. Consequently, alternative Project designs likely to pose equal or greater risk of adverse environmental impacts while yielding equal or less electrical output were rejected.

A further discussion of the evaluation process to site roads and electrical collection and transmission lines to minimize impacts on wetlands and proposed mitigation strategies is presented in Section 2.8, Wetlands: Impacts and Mitigation, and Appendices G and I.

Smaller Project Size

Noble considered reducing the size of the Project by using a smaller number of turbines. However, reducing the Project’s size would reduce its energy portfolio, environmental, and economic benefits. A smaller project would also be less financially viable.

A project consisting of fewer turbines would reduce the localized environmental impacts only marginally. The footprint and visibility of the project would be slightly reduced, thereby also reducing the amount of disturbed forest land, vegetation, and wetlands. Visually, a reduction in the number of turbines may provide a minimal benefit at a particular receptor, but it would do little to change the overall impact of the Project on the regional landscape. Thus, the reduction of the size of the Project would only marginally change its aesthetic profile. Given the minimal impacts to forest land, vegetation, and wetlands of the Project as proposed, as well as the marginal change in the aesthetic profile of the project if smaller, the smaller project alternative does not warrant the loss of generating capacity and related social and economic benefits.

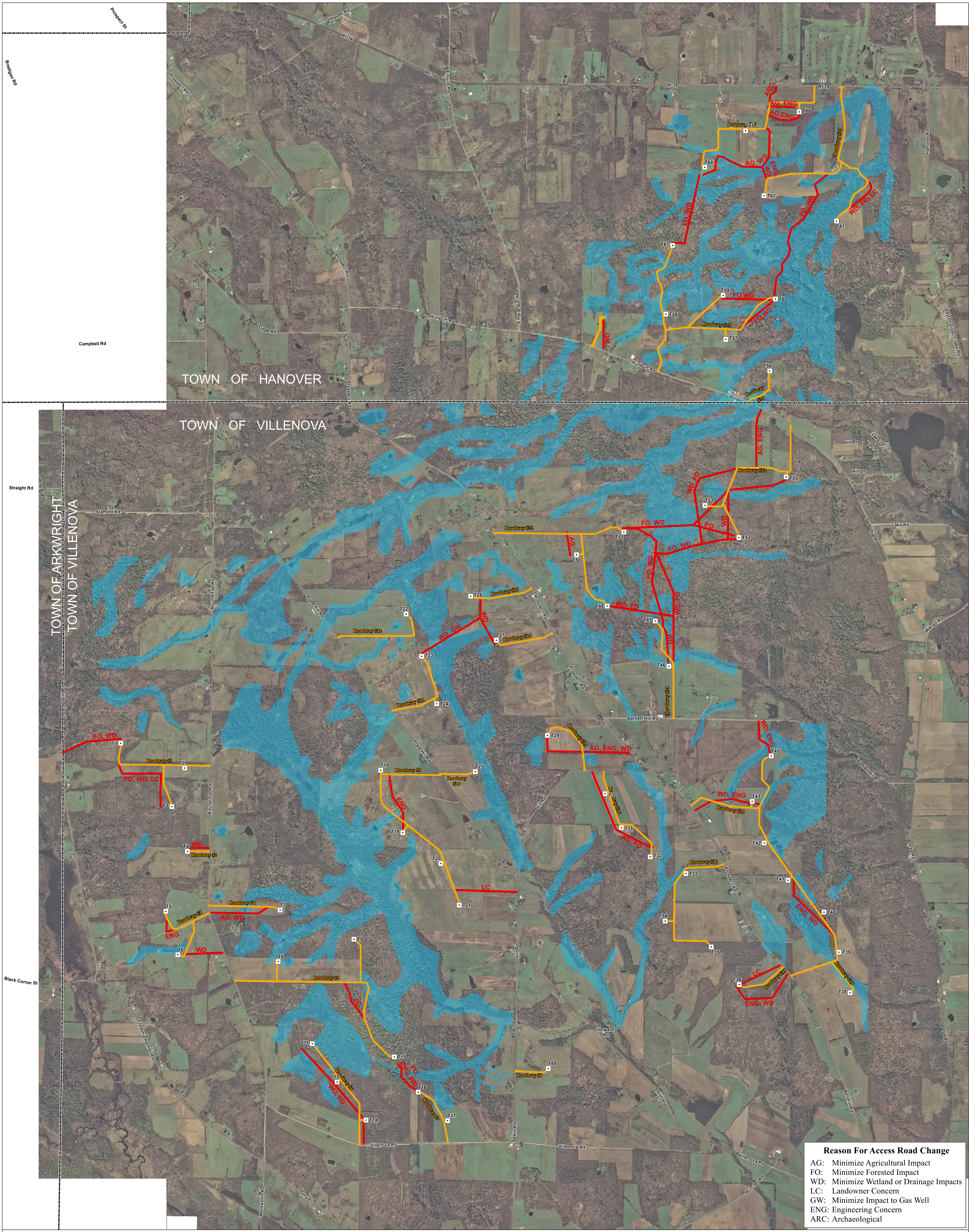
With regard to economic optimization, wind generating projects have certain fixed costs that are relatively independent of the size of the facility. Some of these costs have to do with Project infrastructure. The substation, switchyard, and transmission line, while indeed smaller, utilizing smaller transformers and switching equipment for example, are not proportionately less expensive. Generally, a useful technique to determine an approximate reduction in the cost of project infrastructure facilities is to use the ratio of the installed capacity to the 0.6 power times the cost of the known project facility. Other costs which are more nearly absolutely fixed are project "soft costs," such as construction overheads including mobilization and demobilization costs, costs of field delineation and environmental, archeological and architectural studies, preparation of Environmental Impact Statements, legal fees, and financing costs. The financial viability of a project depends on its ability to recover these fixed costs by maximizing electricity generation.

Prices for electricity produced by the Project are based on the cost to generate electricity. As a fuel-free energy resource, the Project's main costs are fixed capital costs. To be competitive with other wind projects and other sources of electrical energy, the capital and other fixed costs per kilowatt-hour (kWh) output must be reduced as much as possible by maximizing Project output. Some smaller wind energy projects that have been built have been made possible only because of large financial grants. Reducing Project output without a corresponding reduction in fixed costs will create a negative impact on its overall financial viability and discourage investment. In fact, the cost of borrowed and equity funds to finance the Project will likely be higher because the reduced spread between the cost of production and the retail price of electricity would produce diminished cash flows and decreased security to lenders and equity investors; additionally the best lending rates and lowest equity return demands are offered on larger loans and investments – a smaller project would be disadvantaged in accessing these capital markets. Because most of the fixed costs of a larger wind project would be borne by a smaller facility, the only significant cost savings from a downsized project would be the avoided cost of turbines. Since the fixed costs of the Project comprise a large portion of the construction and operational costs, it is important that the Project be large enough to produce adequate energy to become attractive to power purchasers and investors.

The Project has been sized to maximize its output to defray its fixed costs, maximize its environmental benefits through the production of clean energy, and maximize local economic benefits through landowner easement payments, PILOT, and other direct and indirect local economic benefits, all while minimizing environmental and other impacts on the Project Site. A smaller project would produce fewer global benefits (i.e., clean energy, emissions reductions, and reductions in fossil fuel use). A smaller project would also be contrary to the state's goals of increasing the use of renewable sources of electricity to the same extent as the Project that has been proposed. In order to meet the state's goal that 25% of its electrical supply comes from renewable sources by 2013, the state must encourage the development of large-scale projects.

Alternative Turbine Selection

The commercial wind industry has moved toward the use of larger wind turbine generators. This is because they are more cost-effective than smaller machines since energy capture increases more rapidly with rotor diameter than costs increase with rotor diameter. Further, the rotor is centered at higher elevations



Reason For Access Road Change

AG:	Minimize Agricultural Impact
FO:	Minimize Forested Impact
WD:	Minimize Wetland or Drainage Impacts
LC:	Landowner Concern
GW:	Minimize Impact to Gas Well
ENG:	Engineering Concern
ARC:	Archaeological

Figure 1-3.2 Alternative Analysis Access Road Map

Preliminary Access Roads March 4, 2008 to Final DEIS Layout July 23, 2008

Noble Ball Hill Wind Park, Chautauqua County, NY

Access Roads - July 23rd, 2008	🟦 Wetland Exclusion Zone - March 28th, 2008
Modified Access Roads	Town Boundaries
▪ Final DEIS Turbines - June 10th, 2008	

aboveground where winds are stronger. For land-based use, the industry has developed turbines with generating capacities in the range of 1.5 MW to approximately 3 MW. Smaller turbines are available; however, more turbines would be required to produce comparable amounts of power from smaller turbines. To maintain an equivalent level of power generation within a given project, more of the smaller turbines would be required. This would increase temporary and permanent disturbance of soils, vegetation, and water resources as the number of towers and the length of required access roads and interconnections increases. Potential operational impacts (e.g., noise and avian mortality) would also likely increase with a larger number of smaller machines. In terms of visibility and visual impact, while smaller turbines might be marginally less visible, higher blade rotation rate, higher density, and greater numbers could actually increase the Project's visual impact. Use of a shorter tower would also substantially increase the cost of turbine maintenance due to higher wind turbulence in the blade area and this would increase the cost of turbine maintenance.

While larger and smaller turbines were an option, ultimately, Noble chose to continue to use GE 1.5 MW turbines. Noble uses this same turbine model for the Noble Bliss and Noble Wethersfield Windparks in Wyoming and Allegany counties as well as sites in northern New York State and Michigan. The continued use by Noble of GE 1.5 turbines was ultimately selected for several reasons: they are among the quietest operating machines, the GE Company is financially strong and fully capable of standing behind its equipment, the turbines incorporate state-of-the-art operating features, and GE and Noble management personnel have a long and positive working relationship.

The GE 1.5sle wind turbine is offered in North America with two hub heights (the center of the rotor), 65 meters and 80 meters above ground. Hub heights of 100 meters are available in Europe from GE and turbines with hub heights of greater than 100 meters are available in North America from manufactures other than GE.

Wind speed increases with height above ground. The rate of increase per meter of elevation is greatest near the ground and lessens with elevation above ground. A wind turbine therefore would appear to be most economical with the tallest structure possible. However, there is a substantial cost to reach the higher hub heights. Not only is there a greater investment in tower steel, but the foundation requirements multiply as well compared to shorter towers. Thus, there is an optimum height where the reach for higher wind resources is worth the added investment. Beyond this height, the increase of wind speed with height is insufficient to justify the investment.

There is a further consideration in areas where substantial trees occur, as in this Project area. Trees are a source of turbulence. Turbulence puts variable loads on the machinery and too much turbulence can significantly increase maintenance costs. Fortunately, turbulence decreases with height above ground. Much like wind speed, the rate of decrease of turbulence is greatest near the ground and lessens at higher elevations above ground. Again, this results in an optimization where added hub height reduces maintenance costs, but beyond a certain height, the reduction in maintenance costs does not justify the cost of a further increase in height. Noble has determined that the 80 meter hub height is the most economical GE model choice considering issues of energy productivity and maintenance costs versus capital cost.

1.4 Project Purpose, Needs, and Benefits

1.4.1 Project Purpose and Need

The Noble Ball Hill Windpark will use wind, a renewable resource, to generate electricity and avoid the use of any fuels or water and will produce zero emissions or waste discharge. This electricity will be provided to the New York Independent System Operator (NYISO) grid for distribution to meet consumer demand. The Project will have capacity sufficient to generate approximately 90 megawatts (MW) of power to the NYISO grid, contribute to the achievement of New York State's Renewable Portfolio Standard (RPS), and fill the need for a diverse national energy portfolio that includes a higher percentage of energy generated from renewable resources. Renewable energy projects reduce reliance on both domestic and foreign fossil fuel resources and diversify the range of resources used to produce the electricity necessary to meet state and national electrical needs. In addition, during operation renewable energy projects avoid air emissions from fossil fuel combustion commonly used for electrical generation. These emissions are detrimental to air quality and have been documented to adversely affect human health.

1.4.2 Effects on Use and Conservation of Energy Resources

The New York State Energy Plan sets a stated goal of increasing the share of renewable energy as a percentage of statewide primary use 50% by 2020 (up from 10% in 2000 to 15% in 2020). The State Energy Plan reports that at the end of 2005, the renewable energy share was at 10%. The State Energy Plan sets forth the following policy recommendations in achieving 15% use from renewable resources by 2020 (NYSERDA 2002):

- The state should competitively solicit 60 to 120 MW of renewable electricity generation to meet the requirement of Executive Order No. 111, which requires up to 10% of state facilities' electricity be provided from renewable resources by 2005 and 20% by 2010.

- The New York Power Authority (NYPA) should competitively solicit bids for long-term contracts for the purchase of 100 MW of electricity capacity from renewable energy sources. In addition, NYPA should increase its annual investment in energy efficiency by 25% and continue to cooperate with New York State Energy Research and Development Authority (NYSERDA) and the Long Island Power Authority in program offerings and delivery.

The Noble Ball Hill Windpark helps achieve the State Energy Plan's goal of increasing the share of renewable energy use in the New York. NYSERDA reported in 2007 that the total renewable capacity supported by the RPS program since its inception could approach 1,162 MW by the fall of 2008. It is estimated that this renewable capacity could generate more than $720 million of in-state economic benefits over a 20-year period, excluding the impact of any economic roll-over multipliers or energy price suppression effects (NYSERDA 2007). In addition to the economic benefits, this renewable capacity will provide added environmental benefits, by avoiding increases of nitrogen oxides, sulfur oxides, and carbon dioxide.

New York State's Energy Plan is considered to be among the most aggressive in the nation and is consistent with the National Energy Policy, which states that the United States has the technology needed to meet our principal energy challenges including:

- Promoting energy conservation;
- Repairing and modernizing our energy infrastructure; and
- Increasing our energy supplies in ways that protect and improve our environment.

Renewable and alternative energy supplies help diversify our energy portfolio and result in few adverse environmental impacts. The current contribution of renewable and alternative energy resources to the state and the national total electricity supply is relatively small; however, the renewable and alternative energy sectors are growing. Continued growth of renewable and alternative energy is vital to delivering clean energy to fuel our future economic growth. To stimulate investment in renewable energy production, the federal government provides tax incentives for the development and use of renewable energy technologies[4].

1.4.3 Project Benefits

The construction and operation of the Project will result in positive environmental, economic, and energy benefits.

The Project would result in the addition of approximately 90 MW of clean, renewable electric energy to the power grid with no air emissions. Ninety MW is enough power to provide electricity to 30,000 homes (AWEA 2007). In comparison, the addition of 90 MW of electric generation by fossil fuel-fired facilities (i.e., natural gas or coal) presents serious consequences in the form of, among other things, air emissions (i.e., carbon dioxide, sulfur dioxide, nitrogen oxides, particulate matter, and mercury). The adverse environmental and health effects of air emissions from combustion of fossil fuels are well-documented and include global warming, acid rain, smog, respiratory health effects, and significant long-term impacts on wildlife.

---

[4] The renewable Electricity Production Tax Credit provides a tax credit for each kWh of energy produced by eligible renewable generators including wind. The tax credit was originally established under the authority provided in 26 U.S.C §45 and was renewed in the Energy Policy Act of 2005, §1301. However, this credit is set to expire at the end of 2008 if it is not renewed.

Local economic benefits of the Project will include:

- Temporary and permanent employment;
- Increased commerce in the Towns due to spending by project employees, suppliers, and local merchants;
- An increased flow of revenue to the county, Towns, and school districts through payment in lieu of taxes (PILOT) payments;
- An increased flow of revenue to landowners through easement agreements; and
- Increased economic diversification.

Construction of the Project will result in the direct employment of approximately 185 electrical workers, crane operators, equipment operators, carpenters, iron workers, riggers, laborers, and other construction workers (with a total estimated payroll and benefits of $7.7 million) and create approximately 200 additional direct, indirect, and induced jobs countywide (with a total estimated payroll and benefits of $5.2 million). A significant percentage of the construction workers employed during the construction period will be hired from within the local community to the extent that qualified workers are available. Personnel specially trained in specific procedures for wind turbine construction will be brought in and temporarily housed in the area during the construction phase of the Project.

During plant operations the Project will employ approximately eight workers: skilled operators (six), management (one), and administrative personnel (one), with a total estimated payroll and benefits of $450,000. Operation of the project is estimated to create 16 more direct, indirect, and induced jobs countywide (with a total estimated payroll and benefits of $439,000).

The Project will spend a total of about $26.9 million countywide during construction. Total economic benefits during construction are estimated at $42.7 million, including payrolls, supplies, materials, hotel stays, meals, and economic multiplier effects. During plant operation, the Project will spend an estimated $1.7 million annually, exclusive of property taxes. Total annual economic benefits during operation are estimated at about $3.1 million (including PILOTs), including payrolls, supplies, materials, windpark easement payments, and economic multiplier effects. Total countywide economic benefits, based upon regional multipliers applied to direct Project expenditures in original capital investment and ongoing operational expense, are estimated to be about $128 million over 20 years.

The Project will extensively utilize and support providers of local services, suppliers, and area manufacturers during both construction and operation.

Noble has proposed to provide payments to both Towns and other taxing authorities in the form of a PILOT program and host community agreements. These payments will result in a significant increase in local revenue for the taxing authorities. Significantly, the Project will not place additional demands for services upon the local municipalities or school districts.

The Project will assist in the revitalization of the local economy by providing steady income through easement payments to farmers and other landowners. Many of the landowners are farmers and the additional income from annual lease payments is expected to help stabilize their income and provide some relief from the cash-flow fluctuations inherent to the agricultural industry.

Additional value to the local economy will result from increased diversification of the county and state economic bases. Economic diversification ensures greater stability of the economy by minimizing financial high and low cycles associated with a specific industry. This effect is particularly important in rural areas, where more goods and services are imported and more dollars leave the region.

1.4.4 Growth Inducing Aspects of Action

While the Project will create temporary construction and new permanent jobs and provide a new revenue source for the county and Towns, as well as multiplier effects, it is not anticipated to lead to significant new growth (i.e., residential, commercial, or industrial) in the Towns of Villenova and Hanover or the surrounding areas. In the short-term, there will be some minor growth inducing aspects related to the Project. Temporary employment opportunities (approximately 185) will exist for area residents and other workers during the construction phase. Local commercial establishments may experience increased sales as a result of the Project and the presence of these workers for an extended period of time. In the long-term, employment opportunities will be available for approximately eight workers for the operation and maintenance of the turbines and associated facilities. Noble anticipates technicians would be hired locally to the greatest extent practicable, who will be trained to operate and maintain wind turbines. As a result, no new residential growth is expected from the Project.

The roadway network will not be significantly altered, with the exception of several intersections whose widths will be modified to accommodate large vehicle turning radii. These intersection improvements are not designed to increase traffic capacity or facilitate growth and will be returned to their original condition following construction. The Project does not include any new public utility infrastructure improvements, such as water or wastewater systems, which would enhance capacity or facilitate residential or industrial growth. Commercial growth will be limited to those businesses which supply site maintenance, vehicle maintenance, and general mechanical and office supplies to the Project operation and maintenance (O&M) facility.

Power generated by the Project will be supplied to the NYISO bulk transmission system (BTS) and not to individual retail customers. As mentioned previously, the presence of wind turbines may help maintain the agricultural character of the area by providing active farms a secondary source of income through easement payments. The additional income from annual lease payments is expected to help stabilize their income and provide some relief from the cash-flow fluctuations inherent to the agricultural industry.

1.4.5 Irreversible and Irretrievable Commitments of Resources

The proposed Project, like any land development project, will require the irreversible and irretrievable commitment of certain human, material, environmental, and financial resources. However, the commitment of these resources is expected to be offset by the benefits accruing from construction and operation of the Project.

Human and financial resources have been and will continue to be expended by Noble, various New York State agencies, Chautauqua County, and the Towns of Villenova and Hanover for the planning and review of the Project. Noble has entered into an escrow agreement with the Town of Villenova to cover third-party costs incurred by the Town in its capacity as Lead Agency in the SEQRA review process.

The Project requires the commitment of land for the life of the Project. Five thousand, five hundred sixty-nine acres (approximately 3,669 acres in Villenova and 1,900 acres in Hanover) within the 13,658-acre Project Area will be under agreement for development of the Project; however, a small percentage of that will be committed for the actual footprint. While the majority of the land under agreement can continue with existing land uses once the Project is operational, the actual locations of the turbines, access roads, substation, switchyard, and O&M facility would not be available for other purposes for the life of the Project. In accordance with the decommissioning plan described in Section 2.28 and Appendix Q, the turbines will be removed at the end of their useful life and the land may be reclaimed for other uses. The commitment of this land to the Project would be neither irreversible nor irretrievable. It is possible that after the end of the useful life (approximately 20 years or more), the turbines can be replaced with newer, technologically advanced, and more efficient turbines.

During the life of the Project, surface drainage patterns may be altered due to the addition of impervious surfaces, such as turbine pedestals, a substation, a switchyard, and an O&M facility. Noble will restore the ground surface to pre-existing grade to the extent practicable through the Project post-construction restoration plan. Temporary loss of habitat could result in a temporary displacement of plants and animals. Any impacts to wildlife will be minimized to the greatest extent practicable and will be monitored and mitigated as appropriate based on post-construction monitoring and agency requirements.

Construction materials and building supplies will be committed to the Project. The use of these materials, such as gravel, concrete, steel, etc., represents a long-term commitment of these resources which would not be available for other projects. Some of these materials may be reusable and recycled after Project decommissioning; however, many of the concrete foundations will not be recycled, but will be left in place below 3 feet.

Energy resources would be irretrievably committed to the Project, during both the construction and operation of the Project. Fuel, lubricants, and electricity will be required during site preparation and turbine construction activities for the operation of the various types of construction equipment and vehicles, and for the transportation of workers and materials to the construction sites. The primary energy source needed to operate the facility is abundant and renewable. The conventional energy resources used to construct and operate the Project would be minor compared to the clean, renewable energy generated by the Project.

1.5 Table of Required Permits and Consultations

Table 1.5-1 indicates each permit that Noble Ball Hill Windpark, LLC has or will apply for in order to construct and operate the Project. Copies of agency correspondence are included in Appendix C. Pertinent files from the New York State Environmental Quality Review Act (SEQRA) process are included in Appendix D.

Table 1.5-1 Required Permits and Consultations

Permit or Consultation Required	Agency
Zoning Amendment to Create a Wind Overlay District	Villenova Town Board
Special Use Permit	
Town Road Use Agreement	
Host Community Agreement	
Building Permits	Villenova Code Enforcement Officer or Town Designated Consultant
Zoning Permit	
Special Use Permit	Hanover Town Board
Town Road Use Agreement	
Host Community Agreement	
Building Permits	Hanover Code Enforcement Officer or Town Designated Consultant
GML §239-m Referral	Chautauqua County Planning Board
County Road Use Agreement	Chautauqua County Department of Public Facilities (DPF) Administrator
Payment in Lieu of Taxes (PILOT) Agreement Approval	Chautauqua County Industrial Development Agency (CCIDA)
Article 15 – Stream Disturbance Permit	New York State Department of Conservation
Article 24 – Freshwater Wetlands Permit	
Section 401: Water Quality Certification	

Table 1.5-1 Required Permits and Consultations

Permit or Consultation Required	Agency
Article 17 – State Pollutant Discharge Elimination System – General Permit for Stormwater Discharges from Construction Activity	
Consultation	New York State Department of Agriculture and Markets
State Road Use Permits	New York State Department of Transportation
Consultation	New York State Office of Parks, Recreation and Historic Preservation
Section 68 Certificate of Public Convenience and Necessity	New York State Public Service Commission
Determination of No Hazard to Air Navigation with Approved Lighting Plan	Federal Aviation Administration
Section 404: Waters of the United States, Individual Wetland Certification	United States Army Corps of Engineers
Consultation	United States Fish and Wildlife Service

2 Environmental Setting and Impacts

2.1 Geology: Environmental Setting

This section provides a general overview of the geology and topography within the Project Area.

2.1.1 Regional Geology and Topography

The Project Area, as defined in Section 1.1, Description of the Proposed Action, is located in northeast Chautauqua County. The Project Area is located in the Appalachian Uplands Physiographic Province), adjacent to the boundary with the Central (Erie/Ontario) Lowland Physiographic Province. The boundary of the two provinces is marked by the location of the escarpment. The escarpment is characterized by distinct shifts in topography, up to 1,500 feet in the northeast portion of Chautauqua County (Muller 1963). Shale formations in the Appalachian Uplands Physiographic Province were deeply dissected by erosion before and during glaciation. A cover of glacial debris, however, moderates the relief of the region, resulting in rolling to flat topography in the lowland areas and flat-bottomed, partially filled valleys between highlands in the plateaus, uplands, and mountainous areas to the east. The Erie-Ontario Lowlands typically consist of broad lowlands that were inundated by freshwater lakes post-glaciation (New York State Museum 1991 and Olcott 1995).

The Appalachian Uplands in this region were developed on flat-lying fragmented rocks of the Late Devonian Period (more than 350 million years ago) that were glaciated several times during the Pleistocene Epoch (between approximately 1.6 million and 10,000 years ago). This characteristic sets this region apart from other sections of the Appalachian Uplands Physiographic Province, which did not experience the extensive and repeated glaciation that caused scour and deep valley fills in the region (Tesmer 1963). The elevation differences between the valley streams and upland areas in this region of the Province can be more than 1,000 feet in some areas, but typically even out to low elevations throughout much of the Erie-Ontario Lowland province (USGS 2005).

The bedrock in the region mostly comprises shale layers, with interspersed layers of siltstone, but some areas in Chautauqua County are primarily composed of siltstone (Tesmer 1963). The bedrock geology of northeastern Chautauqua County consists of typically southerly-shifted shale formations separated by local structures, including glacial moraines and drumlins (New York State Museum 1991).

Known as the Canadaway group, these bedrock layers span New York from Lake Erie to the southern-central portion of the state (New York State Museum 1991). Seven different members of the Canadaway group are exposed in bedrock outcrops that are visible in Chautauqua County near the escarpment and in stream channels, particularly Walnut Creek, northwest of the Project Area (Tesmer 1963). Bedrock outcroppings occur wherever the surface erosion of the land intersects the gently dipping layers of bedrock (USGS 2005).

Unconsolidated stratified glacial till overlies the bedrock in the region and forms areas of rolling, hummocky topography. Glacial geomorphologic features include end moraines (mixed soil types deposited at the leading edge of a glacier), ground moraines (mixed soil types deposited beneath a glacier), recessional moraines (mixed soil types deposited as the glacier recedes) and drumlins (long, low finger-shaped hills made of glacial till) (USGS 2005). There are also dissected portions of plateaus that consist of gravel alluvium, more recent deposits than those left during glaciation (Muller 1963). Typically, till is compact and relatively impermeable, which allows for the development of upland wetlands in surface depressions and small, perched water-bearing zones (generally less than 2 feet thick) in sand/gravel-rich lenses above the water table. However, fractures in the clay matrix may be present, which would allow migration of groundwater. Glacial outwash containing coarse to fine gravel and sand occurs to a lesser extent. Thickness of the unconsolidated materials that overlie the bedrock ranges from 0 to more than 1,000 feet (Muller 1963).

2.1.2 Project Area Geology and Topography

The Project Area is located in the Towns of Villenova and Hanover in northeastern Chautauqua County. Figure 2.1-1 shows the Project Area on a United States Geological Survey (USGS) Quadrangle Map. Within the Project Area, elevations range from approximately 787 feet to 1,740 feet above mean sea level (amsl).

The topography in the northeastern part of the county, where the Project Area is located, consists of a plateau dissected by streams. The Project Area is composed primarily of locations of glacial till and moraine deposits that have resulted in hummocky areas with interspersed saturated and upland areas. The Project Area also has some areas of lacustrine and kame deposits (sand and gravel deposits from glacial meltwater) and undifferentiated stratified drift and bedrock outcroppings near stream beds and banks (New York State Museum 1991). The surficial and bedrock geology of the Project Area are similar to those of northeastern Chautauqua County, described in Section 2.1.1. The bedrock geology in the Project Area is predominately horizontal beds of shale under glacial deposits. These late-Devonian era rocks are soft and thin and dip slightly southward. The Project Area has layers of Gowanda and Westfield shales but is predominantly composed of Northeast shales (New York State Museum 1991). The glacial drift material overlain upon the bedrock ranges from being completely eroded in outcrop areas near stream channels to very deep in valleys (Muller 1963).

As part of the final Project design, detailed geotechnical investigations will be performed at each turbine location. These investigations will be provided to the towns, if required, prior to the issuance of any building permits. These investigations may include the following:

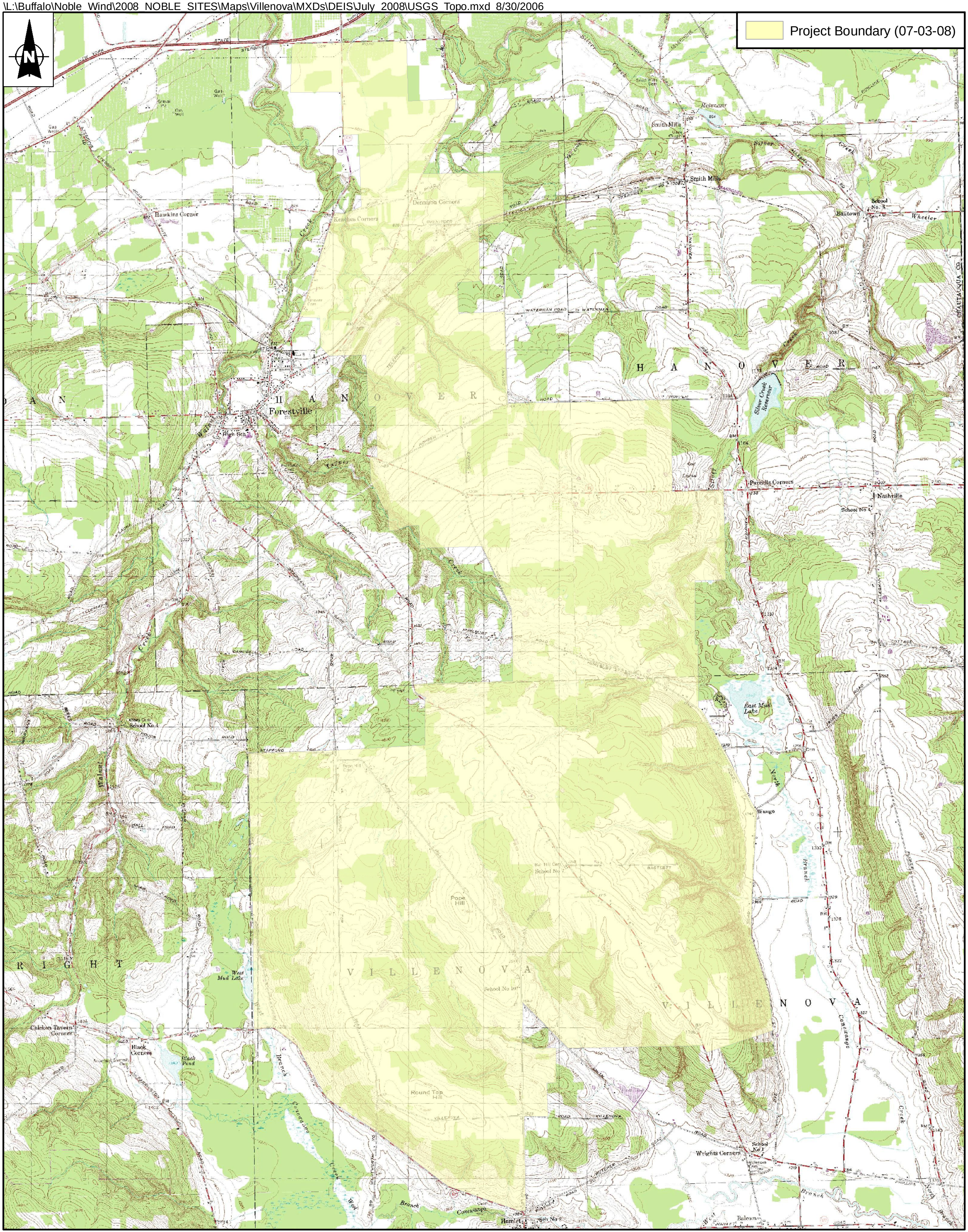
- **Sampling and Standard Penetration Testing.** Borings will be advanced at selected turbine locations. Borings will be extended to a depth of approximately 50 feet, auger refusal, or as directed by the geotechnical engineer. Split-spoon samples will be collected continuously to a depth of 16 feet and at 5-foot intervals thereafter or at changes in soil strata. If refusal is encountered prior to obtaining the target depth, a minimum 5-foot length of 3-inch diameter core will be obtained of the material below the point of refusal.
- **Seismic Testing.** Multi-channel analysis of shear waves will be performed at selected turbine locations to determine the shear wave velocity of the soil and foundation soil stiffness parameters. The potential earthquake hazards for the region will be accounted for in the design of the anchoring system for the towers as required by the New York State Building Code.
- **Piezometers or Temporary Observation Wells.** If shallow groundwater conditions are inferred by the borings, piezometers or temporary observation wells will be installed at selected locations to monitor groundwater levels.
- **Soil Samples.** Bulk samples will be collected from auger cuttings, split-spoon sampling, and/or test pit excavations of the various soil types that are encountered and index property testing will be performed.
- **Soil Resistivity and Thermal Conductivity Testing.** Soil resistivity and thermal conductivity testing shall be performed as directed by the electrical designer.

2.1.3 Seismic Activity

According to the USGS, which maintains records extending back to 1638, no significant earthquake epicenters have been recorded within 50 miles of the Project Area, which is located within a low-activity seismic region. No earthquake epicenters with a magnitude of 6.0 or greater have been recorded within 100 miles of the Project Area (USGS 2008a). In addition, no significant tectonic or quaternary faults have been mapped in Chautauqua County, and there are no known active faults (i.e., younger than 1.6 million years) in this region (USGS 2008a).

The USGS provides an Earthquake Hazards Program, which estimates the level of seismic activity probable for any area within the continental United States. The USGS Earthquake Hazards Program indicates a 2% chance for the occurrence of a peak ground acceleration of 8g to10g (the maximum acceleration experienced by the earth during the course of the earthquake motion) in the vicinity of the Project Area (USGS 2008a). Therefore, although only a low potential for significant seismic activity exists, it will be accounted for as part of the foundation design.

© Ecology & Environment, Inc. GIS Department Project #00227.NP20.02.02
\L:\Buffalo\Noble_Wind\2008_NOBLE_SITES\Maps\Villenova\MXDs\DEIS\July_2008\USGS_Topo.mxd 8/30/2006



Source: USGS Cherry Creek Quad, 1990; USGS Forestville Quad, 1990; USGS Perrysburg Quad, 1990; USGS Hamlet Quad, 1990.

Figure 2.1-1 USGS Topographic Map Noble Ball Hill Windpark

2.2 Geology: Impacts and Mitigation

This section provides information on the potential impacts and mitigation related to geologic resources at the Project Area. Potential impacts on geology and topography from construction operations and potential Project-related risks from seismic activity in the region, once the Project begins operating, are evaluated here.

2.2.1 Construction Impacts

Construction of the Project is not expected to affect regional geology and topography because the spatial scale of the Project is much smaller than the regional scale. Minor alterations to the turbine sites to level off the area will be required; however, these alterations will not change the overall topography of the Project Area.

Construction of the Project will affect portions of the Project Site geology and topography in the following situations:

- Surface soils will be compacted during construction of the turbines, crane pads, and support structures (i.e., access roads and underground power lines). Soil compaction is discussed in detail in Section 2.4, Soils: Impacts and Mitigation.

- Local topography around the turbine sites and roads may be changed to accommodate the requirements to construct and operate the turbines and roads. Specific grading practices are discussed in detail in Section 2.27, Description of the Proposed Construction Plan.

- If shallow bedrock is encountered during construction, it will be excavated and returned to the excavation or trenches as described in Section 2.4.3. Blasting during construction is not anticipated; however, if blasting should become necessary, it will not proceed until full approvals have been obtained from the authority having jurisdiction (see Section 2.27, Description of the Proposed Construction Plan, for a discussion of blasting requirements).

Geology and topography impacts related to steep slopes and the presence of shallow bedrock, as inferred from the United States Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database soil characteristics, are included in Table 2.4-1.

2.2.2 Project Facility Impacts

As described in Section 2.1.3, the United States Geological Survey (USGS) states that no significant earthquake epicenters have been recorded within 50 miles of the Project Area, which is located within a low-activity seismic region. No earthquake epicenters with a magnitude of 6.0 or greater have been recorded within 100 miles of the Project Area (USGS 2008a). No significant tectonic or quaternary faults have been mapped in Chautauqua County, and there are no known active faults (i.e., younger than 1.6 million years) in this region (USGS 2008a). The

USGS has recently developed an Earthquake Hazards Program, which estimates the level of seismic activity probable for any area within the continental United States. The Project Site location (latitude and longitude) was entered into the USGS Earthquake Hazards Program, and the results indicated the area has an extremely low potential for significant seismic activity (USGS 2006).

Although the risk of seismic activity adversely affecting the Project Area is relatively low, the potential for a significant seismic event will be accounted for in the design of the facility. Similarly, the potential earthquake hazards for the region will be accounted for in the design of the anchoring system for the towers.

Wind turbine tower foundation designs will include seismic loading per applicable sections of the Building Code of New York State, namely, Sections 1614 through 1622, and the American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures (ASCE 7-05), whichever is more stringent. There is no evidence of seismic activity having caused catastrophic failure of any wind facility that meets the standards of the New York State Building Code.

2.2.3 Mitigation

The Towns of Villenova and Hanover have passed local laws regulating wind farm development to protect the public health, safety, and welfare of the town residents. The turbine setback requirements are intended to, among other things, protect the public from a tower collapse regardless of its cause, seismic or otherwise (see Section 2.23, Land Use: Environmental Setting, for a description of required setbacks for both towns, and Figure 2.23-2). As per the applicable town laws, proposed tower locations will be set back from private residences, other permanent structures, and roads at a distance greater than the maximum height of the tower to ensure that, in the unlikely event of structure failure due to significant seismic activity, damage to other structures will not occur (Table 2.2-1). Similarly, the potential earthquake hazards for the region will be accounted for in the design of the anchoring system for the towers as required by the New York State Building Code.

Table 2.2-1 Summary of Setbacks Required by Local Wind Laws

Required Distance From Turbine (feet)		
Villenova	**Hanover**	**Feature**
500	--	Nearest property line
500	500	Nearest public road
1,000	--	Nearest off-site residence existing at the time of application, measured from the exterior of the residence
100	100	From state-identified wetlands
500	--	Gas wells unless waived by property owner
--	500	Nearest site boundary property line, right-of-way, easements, and power lines
--	1,000	Nearest off site residence, school, church, or historic structure existing at the time of application, measured from the exterior of such structure
--	500	Gas wells and electric or gas distribution lines unless waived by property owner and utility owner

2.3 Soils: Environmental Setting

This section provides a general description of soil characteristics found in the Project Area based on Natural Resource Conservation Service (NRCS) soil type descriptions.

2.3.1 Project Area Soils Description

The soils in the Project Area formed from unconsolidated glacial till derived mainly from shale, siltstone, and sandstone. In general, the soils are moderately deep to very deep and somewhat poorly drained to well drained and contain areas with a very gradual slope. Predominant soil series in the Project Area include the Chautauqua, Busti, Fremont, Valois, Erie, Langford, Schuyler, Hornell, Chenango, Niagara, Orpark, and Ashville series, comprising almost 90% of the soils at the site (USDA 2005b).

Table 2.3-1 identifies the soil series and associated characteristics of each soil series within the Project Area (see the Soil Survey Geographic [SSURGO] Database [USDA 2005a]). The characteristics evaluated to describe the Project Area include farmland class, slope, drainage class, hydric rating, and minimum water table depth. The particular characteristics are reviewed since they indicate which soils may be problematic for such issues as compaction from equipment during construction and loss of farmland areas during operation of the Project.

2.3.2 Turbine Site Soil Types

The soils underlying each turbine site were determined using the SSURGO 2005 database (USDA 2005a), which contains detailed soils data for Chautauqua County. The data are presented as a map displaying all soils types in the Project Area (see Figure 2.3-1). Prior to construction, Noble will conduct geotechnical studies to determine the site-specific soil make-up at each turbine site; the components of the geotechnical studies are outlined in Section 2.1, Geology: Environmental Setting.

2.3.3 Agricultural Land

Agricultural activity within the Project Area includes pasture land, hay, row crops, and vineyards. The 13,658-acre Project Area includes approximately 5,682 acres of agricultural land use based on cover types and represents approximately 42% of the Project Area.

The Project Area lies within two Chautauqua County agricultural districts: Agricultural District 5 (CHAT005) and Agricultural District 10 (CHAT010) together encompass approximately 12,574 acres of the Project Area. Agricultural District 5 covers approximately 4,906 acres in the Town of Hanover and Agricultural District 10 covers approximately 7,668 acres in the Town of Villenova. Figure 2.3-2 displays the Project Area within the present agricultural districts.

Agricultural districts are often created based on the presence of prime farmland and soils of statewide importance (NYSDAM 2006). Soils identified as prime farmland or soils of statewide importance are recognized as having the greatest productivity for crop growth. Prime farmlands and soils of statewide importance are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. Approximately 2,277 acres (17%) of soils in the Project Area are considered prime farmland soils (1,529 acres in Villenova and 748 acres in Hanover). Approximately 5,914 acres (43%) of soils in the Project Area are considered soils of statewide importance (3,900 acres in Villenova and 2,014 acres in Hanover).

2.3.4 Steep Slopes and Drainage Characteristics

As shown in Table 2.3-1, approximately 1,101 acres (8%) of the soils in the Project Area have steep slopes (greater than 15%) (862 acres in Villenova and 239 acres in Hanover). Areas with steep slopes in the Project Area may be of concern if they are cleared of vegetation during construction activities, these areas may be subject to severe erosion during storm events. In addition, steep slopes may affect Project activities by limiting the delivery and use of heavy equipment. Furthermore, construction activities at these locations may be more involved since topography may need to be altered. Where practical, Project components were sited to avoid steep slopes that can potentially cause problems during construction.

As shown in Table 2.3-1, approximately 819 acres (6 %) of the soils in the Project Area are characterized as poorly or very poorly drained soils (515 acres in Villenova and 304 acres in Hanover). Soil drainage characteristics may also be a concern since soils with poor drainage can result in areas of ponding or significant water buildup during storm events. This can cause problems during construction with equipment access and increased rutting potential in soils that are saturated.

Table 2.3-1 Major Characteristics of Soils Found in the Project Area

Soil Series	Farmland Class	% Slope	Drainage	Water Table Depth (cm) – Annual Minimum	Hydric	Acres
Alden mucky silt loam	Not prime farmland	3	Very poorly drained	0	All hydric	137.88
Ashville silt loam	Farmland of statewide importance	3	Poorly drained	15	All hydric	285.54
Barcelona silt loam, 0 to 3% slopes	Prime farmland if drained	3	Somewhat poorly drained	31	Not hydric	138.74
Barcelona silt loam, 3 to 8% slopes	Prime farmland if drained	8	Somewhat poorly drained	31	Not hydric	53.94
Busti silt loam, 0 to 3% slopes	Prime farmland if drained	3	Somewhat poorly drained	31	Not hydric	286.04
Busti silt loam, 3 to 8% slopes	Prime farmland if drained	8	Somewhat poorly drained	31	Not hydric	1756.49
Busti silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Somewhat poorly drained	31	Not hydric	28.01
Canandaigua silt loam, loamy substratum	Farmland of statewide importance	3	Very poorly drained	0	All hydric	117.49
Carlisle muck	Not prime farmland	2	Very poorly drained	0	All hydric	2.94
Chadakoin silt loam, 3 to 8% slopes	All areas are prime farmland	8	Well drained	0	Not hydric	12.73
Chadakoin silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Well drained	0	Not hydric	26.25
Chadakoin silt loam, 15 to 25% slopes	Not prime farmland	25	Well drained	0	Not hydric	61.66
Chadakoin silt loam, 25 to 35% slopes	Not prime farmland	35	Well drained	0	Not hydric	50.64
Chadakoin silt loam, 35 to 50% slopes	Not prime farmland	50	Well drained	0	Not hydric	30.10
Chautauqua silt loam, 3 to 8% slopes	All areas are prime farmland	8	Moderately well drained	54	Not hydric	1397.72
Chautauqua silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Moderately well drained	54	Not hydric	1114.26
Chautauqua silt loam, 15 to 25% slopes	Not prime farmland	25	Moderately well drained	54	Not hydric	39.50
Chenango channery loam, fan, 0 to 3%	All areas are prime farmland	3	Well drained	137	Not hydric	19.45
Chenango channery loam, fan, 3 to 8%	All areas are prime farmland	8	Well drained	137	Not hydric	123.40
Chenango gravelly loam, 0 to 3% slopes	All areas are prime farmland	3	Well drained	0	Not hydric	185.42
Chenango gravelly loam, 3 to 8% slopes	All areas are prime farmland	8	Well drained	0	Not hydric	109.89

Table 2.3-1 Major Characteristics of Soils Found in the Project Area

Soil Series	Farmland Class	% Slope	Drainage	Water Table Depth (cm) – Annual Minimum	Hydric	Acres
Chenango gravelly loam, 8 to 15% slopes	Farmland of statewide importance	15	Well drained	0	Not hydric	47.67
Churchville silt loam, 0 to 3% slopes	Prime farmland if drained	3	Somewhat poorly drained	31	Not hydric	9.50
Collamer silt loam, 3 to 8% slopes	All areas are prime farmland	8	Moderately well drained	54	Not hydric	16.13
Collamer silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Moderately well drained	54	Not hydric	14.05
Dalton silt loam, 0 to 3% slopes	Farmland of statewide importance	3	Somewhat poorly drained	31	Not hydric	55.49
Dalton silt loam, 3 to 8% slopes	Farmland of statewide importance	8	Somewhat poorly drained	31	Not hydric	10.14
Darien silt loam, 0 to 3% slopes	Prime farmland if drained	3	Somewhat poorly drained	23	Not hydric	38.41
Darien silt loam, 3 to 8% slopes	Prime farmland if drained	8	Somewhat poorly drained	23	Not hydric	24.48
Elnora fine sandy loam, 0 to 3% slopes	All areas are prime farmland	3	Moderately well drained	54	Not hydric	3.07
Elnora fine sandy loam, 3 to 8% slopes	All areas are prime farmland	8	Moderately well drained	54	Not hydric	6.49
Erie silt loam, 0 to 3% slopes	Farmland of statewide importance	3	Somewhat poorly drained	31	Not hydric	102.29
Erie silt loam, 3 to 8% slopes	Farmland of statewide importance	8	Somewhat poorly drained	31	Not hydric	722.55
Fluvaquents-Udifluvents complex, frequently flooded	Not prime farmland	3	Poorly drained	0	All hydric	217.61
Fremont silt loam, 0 to 3% slopes	Prime farmland if drained	3	Somewhat poorly drained	31	Not hydric	681.11
Fremont silt loam, 3 to 8% slopes	Farmland of statewide importance	8	Somewhat poorly drained	31	Not hydric	1445.44
Fremont silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Somewhat poorly drained	31	Not hydric	181.98

Table 2.3-1 Major Characteristics of Soils Found in the Project Area

Soil Series	Farmland Class	% Slope	Drainage	Water Table Depth (cm) – Annual Minimum	Hydric	Acres
Fremont silt loam, 15 to 25% slopes	Not prime farmland	25	Somewhat poorly drained	31	Not hydric	32.03
Halsey mucky silt loam	Not prime farmland	8	Very poorly drained	8	All hydric	2.38
Hornell silt loam, 0 to 3% slopes	Prime farmland if drained	3	Somewhat poorly drained	31	Not hydric	15.03
Hornell silt loam, 3 to 8% slopes	Farmland of statewide importance	8	Somewhat poorly drained	31	Not hydric	307.58
Hornell silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Somewhat poorly drained	31	Not hydric	33.84
Hornell silt loam, 15 to 25% slopes	Not prime farmland	25	Somewhat poorly drained	31	Not hydric	149.30
Langford silt loam, 3 to 8% slopes	Farmland of statewide importance	8	Well drained	54	Not hydric	470.70
Langford silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Well drained	54	Not hydric	265.62
Middlebury silt loam	All areas are prime farmland	3	Moderately well drained	38	Not hydric	14.60
Minoa fine sandy loam	Prime farmland if drained	8	Somewhat poorly drained	31	Not hydric	0.10
Niagara silt loam, 0 to 3% slopes, loamy substratum	Prime farmland if drained	3	Somewhat poorly drained	31	Not hydric	398.53
Niagara silt loam, 3 to 8% slopes, loamy substratum	Prime farmland if drained	8	Somewhat poorly drained	31	Not hydric	50.40
Orpark silt loam, 0 to 3% slopes	Prime farmland if drained	3	Somewhat poorly drained	31	Not hydric	140.71
Orpark silt loam, 3 to 8% slopes	Prime farmland if drained	8	Somewhat poorly drained	31	Not hydric	173.24
Orpark silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Somewhat poorly drained	31	Not hydric	17.46
Palms muck	Not prime farmland	6	Very poorly drained	0	All hydric	7.17
Pompton silt loam	All areas are prime farmland	8	Moderately well drained	46	Not hydric	24.72

Table 2.3-1 Major Characteristics of Soils Found in the Project Area

Soil Series	Farmland Class	% Slope	Drainage	Water Table Depth (cm) – Annual Minimum	Hydric	Acres
Raynham silt loam, 0 to 3% slopes	Prime farmland if drained	3	Somewhat poorly drained	38	Not hydric	9.82
Red Hook silt loam	Prime farmland if drained	8	Somewhat poorly drained	31	Not hydric	63.47
Rhinebeck silt loam, 0 to 3% slopes	Prime farmland if drained	3	Somewhat poorly drained	31	Not hydric	1.67
Rock outcrop-Manlius complex, 35 to 70% slopes	Not prime farmland	70	Not applicable	0	Not hydric	39.60
Saprists and Aquents, ponded	Not prime farmland	3	Very poorly drained	0	All hydric	32.11
Schuyler silt loam, 3 to 8% slopes	All areas are prime farmland	8	Moderately well drained	54	Not hydric	84.91
Schuyler silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Moderately well drained	54	Not hydric	160.01
Schuyler silt loam, 15 to 25% slopes	Not prime farmland	25	Moderately well drained	54	Not hydric	408.88
Schuyler silt loam, 25 to 35% slopes	Not prime farmland	35	Moderately well drained	54	Not hydric	2.06
Schuyler silt loam, 35 to 50% slopes	Not prime farmland	50	Moderately well drained	54	Not hydric	15.81
Swormville silt loam	Prime farmland if drained	3	Somewhat poorly drained	31	Not hydric	53.80
Towerville silt loam, 3 to 8% slopes	All areas are prime farmland	8	Moderately well drained	54	Not hydric	9.90
Towerville silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Moderately well drained	54	Not hydric	5.51
Towerville silt loam, 25 to 35% slopes	Not prime farmland	35	Moderately well drained	54	Not hydric	44.51
Towerville silt loam, 35 to 50% slopes	Not prime farmland	50	Moderately well drained	54	Not hydric	85.76
Unadilla silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Well drained	0	Not hydric	7.92
Valois gravelly silt loam, 3 to 8% slopes	All areas are prime farmland	8	Well drained	0	Not hydric	268.30

Table 2.3-1 Major Characteristics of Soils Found in the Project Area

Soil Series	Farmland Class	% Slope	Drainage	Water Table Depth (cm) – Annual Minimum	Hydric	Acres
Valois gravelly silt loam, 8 to 15% slopes	Farmland of statewide importance	15	Well drained	0	Not hydric	60.69
Valois gravelly silt loam, 15 to 25% slopes	Not prime farmland	25	Well drained	0	Not hydric	69.66
Valois gravelly silt loam, 25 to 35% slopes	Not prime farmland	35	Well drained	0	Not hydric	32.26
Valois gravelly silt loam, 35 to 50% slopes	Not prime farmland	50	Well drained	0	Not hydric	38.48
Valois gravelly silt loam, rolling	Farmland of statewide importance	15	Well drained	0	Not hydric	433.16
Water	Not prime farmland	0		0		56.32
Wayland silt loam	Not prime farmland	3	Poorly drained	0	All hydric	15.52

Note: Acreages listed in the table are based on individual parcel data that has been combined for purposes of calculation.

[1] Soils data taken from SSURGO Database (USDA 2005).

2.4 Soils: Impacts and Mitigation

This section describes the potential impacts of the Project on soil resources and agricultural productivity and the mitigation measures that will be implemented during construction and operation to avoid or minimize impacts on these resources. Construction activities, such as clearing and grading, trenching and excavation, movement of heavy equipment, and cleanup, may affect soils and agricultural productivity. Potential impacts from construction at the Project Site may occur and include: erosion; soil compaction, damage to soil structure resulting from construction equipment traffic; and the introduction of stones or rocks from shallow bedrock areas into the topsoil. Overall, the Project will result in the disturbance of approximately 382 acres of land during construction including the permanent conversion of 63 acres (approximately 40 acres in the Town of Villenova, approximately 18 acres in the Town of Hanover, and 5 acres of disturbance in a to be determined location for the Operations and Maintenance (O&M) facility) of land for Project facilities, such as turbine pedestals, access roads, turbine crane pads and the power substation and switchyard. The remaining 319 acres of land will be restored to pre-construction conditions.

2.4.1 Construction Impacts

To estimate areas of potential impact from the construction of the Project, the Chautauqua County Soil Survey and the United States Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database were reviewed to identify the soil series within the Project Site and to provide more detailed information on potential soil and agricultural productivity-related impacts at each turbine, access road, and associated collection system.

Overall, construction of the Project will disturb less than 3% of the Project Area. See Table 2.4-1 for the complete construction impact summary listed by soil component. Construction will disturb approximately 122 acres (or 0.9% of the Project Area) of soils at turbine locations; approximately 121 acres (or 0.9% of the Project Area) for roads including the maximum 60-foot construction corridor; approximately 28 acres (or 0.2% of the Project Area) for collection systems; approximately 28 acres for equipment laydown areas (or 0.2% of the Project Area); and approximately 78 acres (or 0.5% of the Project Area) for the transmission system, including the substation and switchyard. In addition, a 5-acre O&M facility will be constructed; however, the final location is subject to landowner consent. The final location and impacts will be identified in the Final Environmental Impact Statement (FEIS). Approximately 319 acres of the 382 acres of soils disturbed during construction will be restored to pre-existing conditions after construction is completed. The remaining 63 acres (or less than 0.5% of the Project Area) will be permanently impacted by Project facilities as described in Section 2.4.2.

Temporary construction impacts may include erosion, soil compaction, and the introduction of large stones and rocks into surface soil layers. Short-term increases in erosion can occur as a result of the removal of vegetation during clearing and grading activities and the subsequent exposure of topsoil to precipitation and high winds. In addition, in areas where vegetation is slow to reestablish, the potential for erosion is increased. Increased erosion of upland soils is of special concern adjacent to wetlands and waterbodies, where sedimentation into these sensitive resources may occur.

Soil erosion potential is influenced, in part, by its grain size, slope, and drainage characteristics. Typically, soils found on level to nearly level landscapes that are coarse-grained in texture and well-drained have the lowest erosion potential. In comparison, soils found in sloping areas where fine-grained textures predominate and are poorly drained, tend to exhibit the highest erosion potential.

Active agricultural lands crossed by the Project will be temporarily impacted by construction activities associated with the development of access roads, installation of turbines (staging area), and installation of underground and overhead collection and transmission lines. Active agricultural lands crossed by the Project will be permanently impacted by the installation of access roads, turbines, and electrical equipment. As a result of these Project-related activities, some crop loss and interruption of grazing lands will be realized. However, most of the loss will be temporary as the Project workspace, outside the permanent rights-of-way, will be restored to pre-existing conditions after construction (see Section 2.4.3).

Rutting and compaction of agricultural soils may result from the passage of heavy equipment and construction vehicle traffic in the proposed construction areas. These impacts are of particular concern in cultivated fields and may be more likely to occur where soils are poorly drained. Soils with the potential for compaction or rutting resulting from heavy equipment passage were identified through published County Soil Survey information as well as the USDA SSURGO database, where engineering/construction limitations for a given soil type are provided. As identified in Table 2.4-1, approximately 252 acres of soils proposed for disturbance within the Project Area are prone to compaction or rutting.

Current agricultural production may also be hampered by the introduction of stones or rocks, greater than 4 inches in diameter, into a soils surface layer. Subsurface rock fragments and stones may be encountered during grading, trenching, and excavation operations. Following decompaction, rocks 4 inches in diameter and larger that are introduced during grading or trenching will be removed from the surface of the subsoil prior to replacement of the topsoil. Excavation of shallow bedrock during construction could also introduce rock fragments and stones into an agricultural fields topsoil layer. As further indicated in Table 2.4-1, approximately 92.84 acres of proposed facility areas may encounter soils with shallow bedrock.

Soil contamination as a result of minor spills or leaks of lubricants and fuels used in the construction process may also occur. If a spill does occur, spill reporting and initial notification requirements from New York State Department of Environmental Conservation (NYSDEC) Technical Field Guidance will be followed (http://www.dec.ny.gov/docs/remediation_hudson_pdf/1x1.pdf). Procedures for waste management and spill prevention are included in Appendix E and will be undertaken in accordance with Occupational Safety and Health Administration (OSHA) and state requirements, and implemented through the Emergency Response Plan (ERP), which is part of Appendix R.

Blasting of shallow bedrock for construction purposes could also impact soil integrity. Blasting during construction is not anticipated; however, if blasting should become necessary, it will not proceed until full approvals have been obtained from the authority having jurisdiction. Section 2.27, Description of the Proposed Construction Plan, provides a description of the blasting requirements.

2.4.2 Project Facility Impacts

Potential impact from Project facilities were calculated based on the final components and impact parameters for the Project Area. Overall, the proposed Project will permanently impact approximately 58 acres (or 0.4%) of the Project Area. Table 2.4-1 provides a complete acreage impact summary, listed by soil component, associated with the Project Area.

Overall, project facilities will permanently impact approximately 8 acres (or 0.06%) of soils at turbine locations, approximately 44 acres (or less than 0.4%) of soils for access roads, and approximately 6 acres (less than 0.05%) of soils for the substation and switchyard within the Project Area. Negligible permanent impacts to soils are associated with pole placement for the overhead collection and transmission systems. Underground collection will result in no permanent impacts to soils.

The potential for permanent impacts associated with Project-related facilities on agricultural lands will include production losses associated with conversion to nonagricultural uses of prime farmland soils or soils of statewide importance, and the loss of land within agricultural districts. Other impacts, such as subsoil/topsoil mixing, erosion and sedimentation, introduction of stones and rocks into surface soils, and compaction, also can affect the long-term productivity of agricultural lands in the Project Site.

Prime farmland soils and soils of statewide importance that may be permanently impacted by the Project facilities are indicated in Table 2.4-1. Project facilities will impact approximately 16 acres of prime farmland (less than 0.7% of prime farmland soils in the Project Area) and 24 acres of soils of statewide importance (0.4%of soils of statewide importance in the Project Area).

For the Town of Villenova, Project facilities will permanently impact approximately 8.5 acres of prime farmland and approximately 19.5 acres of soils of statewide importance. Project facilities in the Town of Hanover will impact approximately 7.5 acres of prime farmland and 4.5 acres of soils of statewide importance. The total acreage of prime farmland and statewide important soils that will be permanently impacted by conversion to nonagricultural uses is minimal and will not significantly affect these soil resources in the Towns and county.

As noted in Section 2.3.3, the Project requires the acquisition of land rights for farmland within two state-certified agricultural districts: Chautauqua County Districts 5 and 10 (see Figure 2.3-2). The agricultural districts in this region encompass almost the entire Project Area, including forested areas and other areas not suitable for farming. Regardless, many soils in this district are designated as prime farmland or soils of statewide importance and the removal of significant portions of these areas from use may impact the farming community in a given area. Even though the majority of the Project is proposed within existing agricultural districts, a very small percentage of soils considered prime farmland or soils of statewide importance, as noted above, will be impacted by the Project.

2.4.3 Mitigation

Construction impacts will be confined to the Project Site and, upon completion, restoration will be performed on the Project Site to preclude any long-term effects. Approximately 85% of soils disturbed during construction within the Project Area will be restored to pre-existing conditions. This is based on the restoration of 319 acres of the 377-acre disturbance area.

Agricultural Lands

As previously discussed under Section 1.3, Project Alternatives, Noble undertook an extensive multi-phased siting process to minimize impacts to agricultural lands and other sensitive environmental resources. The Project will not involve the granting of public funds; accordingly, the New York State Department of Agriculture and Markets (NYSDAM) does not require submittal of a Notice of Intent (NOI) to construct in an agricultural district. Noble has nonetheless initiated consultations with NYSDAM to discuss proposed locations of wind turbines, access roads, electrical collection, and transmission systems. Restoration and mitigation of agricultural lands will be conducted in accordance with NYSDAM guidelines for agricultural mitigation for wind power projects to the extent practicable. Appendix B contains a copy of the most current guidelines, revised by NYSDAM in January 2008.

Turbines located on active farms were sited, to the extent practicable, to be consistent with NYSDAM guidelines for agricultural mitigation for windpower projects (see Appendix B). To the extent practicable, roads and interconnects were located on the edge of agricultural land to minimize impact on agricultural operations. Underground collection lines located away from access roadways will be buried at a depth of at least 4.5 feet in agricultural lands (see Appendix A drawing BH-E-SK5) to further minimize post-construction impacts to farming practices.

Noble will continue to coordinate with NYSDAM on an appropriate post-construction monitoring plan to ensure that the NYSDAM guidelines are met. The Town of Villenova local law governing wind energy facilities requires that any construction or ground disturbance involving agricultural land shall be done in accordance with NYSDAM guidelines. Active agricultural areas that are temporarily or permanently disturbed by construction will be monitored for two years following the completion of initial restoration. During the monitoring period, an Environmental Monitor versed in agricultural operations will be retained by Noble to identify and make recommendations regarding unforeseen Project-related impacts to active agricultural lands that are found in need of further mitigation measures. General conditions to be monitored include compaction testing, crop productivity, and condition and function of drainage features.

Impacts to agricultural lands will be minimized by restricting Project equipment and access to the approved construction rights-of-way (ROWs). In addition, soil compaction and mixing of subsoils with the topsoil layer can affect long-term farmland productivity. To minimize these impacts to active agricultural fields, the construction contractor will strip topsoil from the Project workspace and stockpile all topsoil separately from excavated subsoil material in windrows adjacent to the workspace to minimize topsoil handling. Measures that will be implemented to reduce soil compaction within active agricultural lands will include restrictions on traffic and load placements when conditions of extreme wetness are encountered and until suitable soil moisture conditions are restored. Following the completion of construction operations, all temporarily disturbed areas located within active agricultural lands will be decompacted to a minimum depth of 18 inches using a deep ripper, subsoiler, or heavy-duty chisel plow, in accordance with NYSDAM guidelines. In addition, due to the potential for adverse impacts to turbine grounding wires, underground collection cables and the compacted structural fill on top of the foundation, no subsoil decompaction will be performed within a 35-foot radius from the outside edge of each turbine base. However, non-compacted topsoil will be placed on top of the subsoil. If long term crop loss occurs as a result of this design, Noble will compensate the landowner according to existing agreements.

Decompaction of the Project workspace will be under the direction of the independent Environmental Monitor and verified by use of a soil penetrometer. Noble will avoid decompaction during or after periods of heavy precipitation. Noble will address soil elasticity conditions on a case-by-case basis as part of Noble's Environmental Monitoring Plan (see Appendix I) and in accordance with landowner and NYSDAM recommendations in order to ensure effective soil decompaction. Any decompaction activities conducted after October 1 will be coordinated with NYSDAM.

On agricultural land, blasted or excavated bedrock, boulders, and concentrations of excavated stone or rock materials will not be returned to the excavation or trenches any closer than 24 inches from the exposed work surface of the stripped portion of the ROW. The remainder of the backfill will be limited to suitable subsoil material, backfilled up to the top of the exposed work surface. Excess waste rock/stone materials will be removed and disposed of from active agricultural areas.

Restoration of all agricultural land and pasture will be coordinated with the affected landowners of the Project and will be in accordance with NYSDAM guidelines, including those in the *Seeding, Fertilizing, and Lime Recommendations for Gas Pipeline, Right-of-Way Restoration in Farmlands* (Rev. 6/15/2005). Although these recommendations were originally developed or intended for natural gas pipeline ROW projects, the same agronomic principles apply to the farmland restoration for wind power projects. Noble will continue to coordinate with NYSDAM throughout the design, construction, and operation phases of the Project. Any seed mixes or soil amendments used in disturbed areas will be approved by the landowner and will meet or exceed any recognized standards. In addition, Noble will ensure that only endophyte-free varieties are used. Additional temporary fencing, as required for coordinating livestock exclusions, will be placed in accordance with landowner requirements. If necessary, alternative grazing plans will be coordinated between Noble, the individual landowner, and the appropriate Town. Noble will ensure that the integrity of any fencing or watering systems within or adjacent to their ROW is maintained. The Environmental Monitor will check the fencing integrity on a weekly basis at minimum. Additionally, if necessary, alternative grazing plans will be coordinated between Noble and the individual landowner.

Erosion Control

Soil erosion and off-site sedimentation will be minimized through the implementation of erosion control measures to reduce unnecessary impacts and to comply with the appropriate regulations. Best management practices (BMPs) will be implemented in conjunction with applicable guidelines (e.g., NYSDAM guidelines and Storm Water Pollution Prevention Plan [SWPPP] requirements). These BMPs will be managed in the SWPPP for the Project and will be included and submitted in an NOI for Construction Activities prior to construction as required by the New York State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities. The SWPPP will be filed with the Towns a minimum of five days prior to the commencement of construction. A description of stormwater pollution prevention measures that serve as the basis for the site-specific SWPPP is provided in Appendix E. Temporary erosion controls, including interceptor diversions and sediment filter devices (e.g., hay bales and silt fences), will be installed prior to initial ground disturbance. As required, temporary trench plugs will be installed immediately following trench excavation for cabling and mulch or erosion control fabrics (e.g., jute netting) may be used on critical slopes or areas to control erosion. During construction, Noble will monitor the effectiveness of temporary erosion control devices in accordance with the SWPPP and Noble’s Environmental Monitoring Plan (see Appendix I). Temporary erosion control devices will be monitored on a weekly basis (at a minimum) and after rain events as instructed in the New York State Standards and Specifications for Sediment and Erosion Control, per the SPDES General Permit for Stormwater Discharges from Construction Activities and the SWPPP, to ensure proper functioning. Temporary erosion control structures will be maintained until the affected areas are successfully stabilized. Following successful revegetation of construction areas, temporary erosion control devices will be removed.

In areas in or adjacent to agricultural fields, pursuant to the SWPPP plans for revegetation or seeding/mulching will be coordinated with individual farmers so that the re-establishment of vegetation complements each farmer's operation. Restoration activities in these areas will be conducted in accordance with NYSDAM guidelines. Mitigation measures will be applied to all disturbed areas and maintained as necessary to prevent soil erosion and sedimentation during the life of the Project. Prior to construction, Noble will document areas within the Project Site that currently have erosion and sedimentation issues so that the adequacy of restoration efforts and site drainage design can be evaluated after construction. Many of the farm road improvements will correct existing deficiencies. Adequate preconstruction documentation will help determine whether erosion and sedimentation issues resulted from the Project.

Topsoil and Subsoil

Soil impacts, such as loss of organic matter, topsoil-subsoil mixing, deterioration of soil structure, and soil settling or slumping, will be minimized (to the maximum extent possible) by use of protective measures. These measures include ensuring that topsoil-subsoil mixing does not occur and that compaction and other construction-related impacts are avoided or mitigated.

Upland and agricultural topsoil will be stockpiled adjacent to the project workspace no less than 50 feet from any wetland or waterbody boundary. All upland and agricultural topsoil stockpiles will have silt fencing properly installed around the perimeter of their toe-of-slope to prevent sedimentation off site. When topsoil stockpiles are left to "over winter" (prior to final restoration operations), each stockpile will be hydroseeded with an annual rye-grass and a suitable hydromulch prior to the on-set of winter weather.

In areas where wetland soils are encountered, all wetland topsoil will be stockpiled separate from upland/agricultural topsoil, and placed adjacent to the wetland from which it was removed. These stockpiles will be placed no less than 50 feet from any wetland or waterbody boundary. All wetland topsoil stockpiles will be silt fenced around the toe-of-slope perimeter and plainly identified as "Wetland Topsoil." Wetland topsoil will be replaced into the wetland from which it was removed as soon as practical after the completion of major construction operations (e.g., turbine placement, trenching) on an access road.

All excavated subsoil material will be stockpiled separate from all topsoils and adjacent to the Project workspace, no less than 50 feet from any wetland/waterbody boundary. Topsoil will be removed from all areas where subsoil will be stockpiled.

Topsoil will be replaced to original depth, and the original contours will be reestablished to the maximum extent possible. In active agricultural lands where the topsoil has been stripped, soil decompaction will be conducted prior to topsoil replacement as per NYSDAM guidelines to minimize trench settling. Noble will backfill the trench with select material followed by the native soil. Subsoil decompaction and topsoil replacement will be avoided during and after periods of heavy precipitation. Following decompaction, rocks 4 inches in diameter and larger will be removed from the surface of the subsoil prior to replacement of the topsoil. If the excavated materials are not suitable for use as backfill around turbine pads and roadway areas, soil of similar texture may be imported. The unsuitable soils will then be removed from the Project Area and disposed of in accordance with all applicable permit requirements. For active agricultural lands, any imported topsoil will be selected in consultation with the affected landowner. If rutting occurs in agricultural fields during construction, either topsoil stripping or heavy timber matting will be employed to prevent the mixing of subsoil and topsoil.

Noble will dewater all excavations and trenches prior to backfilling. The SWPPP for construction, which will be submitted to the Towns and prepared in accordance with NYSDEC SPDES requirements, will address dewatering of trenches and excavations when groundwater is encountered.

Drainage

Noble has and will continue to coordinate with individual landowners to determine locations of all known drain tile within the areas disturbed by the Project. This information will be provided to the installation contractors prior to the commencement of construction. Noble will coordinate with the Chautauqua County Soil and Water Conservation District to determine if there are any records for the affected properties. If subsurface drainage tiles are encountered during construction, they will be restored in accordance with the drain tile repair specifications provided in Appendix F. Other potential drainage impacts that may occur include changes to the natural drainage ways of agricultural lands. Noble will mitigate these potential impacts by implementing subsurface intercept drain lines and ditch plugs and, where necessary, culverts and ford crossings to maintain natural drainage patterns. In addition, where Project roads are constructed or existing roads are improved, design of these roadways will include drainage systems. New subsurface drain lines will meet or exceed the condition of existing installed structures and will be installed in coordination with the affected landowner. Prior to replacement, the condition, size, and integrity of the drain tile will be noted to ensure appropriate replacement occurs. Measures that will be taken to avoid or minimize impacts or damage to surface drainage features are discussed in Section 2.6, Water Quality: Impacts and Mitigation.

Other Mitigation

Noble will require contractors to use BMPs for handling materials to help prevent spills. If a fuel or lubricating oil spill occurs, it will be cleaned up immediately by removing and properly disposing of any contaminated soils pursuant to applicable regulatory requirements. Procedures for prevention and response to spills during construction are a component of the SWPPP. Response procedures in the event of a spill are also described in the Ball Hill Emergency Response Plan in Appendix R.

For the duration of the Project, a complaint hotline will be established to address and resolve landowner complaints from Project construction or operation. Noble will work with an agriculture/soil conservation specialist, as required, to address and remediate any complaints received involving soils in agricultural areas.

Table 2.4-1 Potential Soil Impacts Based on Soil Attributes and Project Component

Project Component	Total Impact	High Erosion Potential	High Compaction Potential	Poor Drainage	Shallow Bedrock	Slope >15%	Prime Farmland	Statewide Importance
Construction Impacts (Acres)								
Turbines (including staging area)	122	0.23	83.72	1.23	19.95	1.00	37.25	54.42
Collection System	28	0.26	23.74	1.19	0.69	0.26	5.33	11.99
Access Roads[1]	121	4.54	81.15	2.13	20.44	1.74	28.85	57.61
Transmission[2]	78	24.93	46.20	4.24	41.28	2.85	12.41	21.78
Laydown Areas	28	2.35	17.43	1.26	10.48	0	3.63	20.51
O&M Facility	5	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total acres all construction impacts	**382**	**32.31**	**252.24**	**10.05**	**92.84**	**5.85**	**87.47**	**166.31**
Project Facility Impacts (Acres)								
Turbines[3]	8	0.01	5.10	0.19	1.53	0.01	2.38	3.70
Collection System	0	0	0	0	0	0	0	0
Access Roads[1]	44	1.40	26.93	0.77	7.54	0.63	10.93	20.08
Transmission[2]	6	1.83	3.15	0	0	0	2.60	0
Laydown Areas	0	0	0	0	0	0	0	0
O&M Facility	5	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total acres all permanent facilities	**63**	**3.24**	**35.18**	**0.96**	**9.07**	**0.64**	**15.91**	**23.78**
Total acres with temporary soil impact[4]	**319**	**29.07**	**217.06**	**9.09**	**83.77**	**5.21**	**71.56**	**142.53**

Notes:

[1] Construction impacts based on a maximum 60-foot construction (40 feet at wetland and stream crossings) ROW; project facility impacts are based on 16-foot permanent access roads.

[2] Temporary impacts based on a maximum 100 foot transmission construction ROW and impacts associated with the power substation and switchyard; project facility impacts based on footprint of the power substation and switchyard.

[3] Project facility impacts based on turbine base (18 feet in diameter) and permanent turbine crane pad (120 foot by 40 foot disturbance area).

[4] Temporary impact to soils equals the construction impact minus the permanent facility impacts. The construction impact includes all soil impacted during construction which is inclusive of temporary and permanent impacts.

Key:

TBD = To be determined. The final location of the 5-acre O&M Facility is subject to landowner consent and has not been determined at this time. The final location and impacts will be identified in the Final EIS.

2.5 Water Quality: Environmental Setting

2.5.1 Groundwater

Site-specific features including the location of potential groundwater resources, the direction of groundwater flow, and depth to groundwater have been identified based on desktop resources. This information has been used to characterize the groundwater conditions within the Project Area.

Residential Wells and Aquifers

The majority of residences in the Project Area use groundwater wells as their primary source of potable water. The Town of Villenova does not offer a municipal water supply in the Project Area. The Town of Hanover's Water Districts service populated villages (Forestville, Silver Creek, and Irving), but not rural areas within the Town (EPA 2008a). While some residences on the outskirts of municipal supply areas in the Project Area may receive water from a municipal source, the Project Area in general is rural and does not receive this service. The groundwater supply for private wells in the Project Area is likely from minor unconsolidated sand and gravel aquifers of alluvial and glacial origin, which are characterized by the United States Geological Survey (USGS) as minor aquifers comprised of other rocks (USGS 2008b). There are no identified sole source, primary, or principle aquifers underlying the Project Area.

Depth to Groundwater

Based on data gathered from the soils database, Soil Survey Geographic (SSURGO), the annual minimum water table depth in the Project Area ranges from the surface to 4.5 feet below surface. These reported depths are annual minimum depths; year round data indicates that water levels are typically deeper than 4.5 feet.

The New York State Department of Environmental Conservation (NYSDEC) maintains an online database of water well data that includes six groundwater wells in the Town of Villenova and four groundwater wells in the Town of Hanover that are located in or near the Project Area. Water depths recorded for these wells range from 2 to 17 feet (NYSDEC 2008a). This information will be verified during engineering and geotechnical surveys prior to turbine foundation construction.

2.5.2 Surface Water

The Project Area is located within the Chautauqua-Conneaut and Conewango watersheds. The watershed boundary locations in relation to Project facilities are depicted in Figure 6 of Appendix G. The Chautauqua-Conneaut watershed drains generally northwest to Lake Erie. The Conewango watershed generally drains south along Conewango Creek before reaching the Allegheny River. The Chautauqua-Conneaut and Conewango watersheds have been designated as Category II watersheds by the New York Unified Watershed Assessment Program. Category II watersheds are defined as those currently meeting water quality goals (NYSDEC 2008b). No waterbodies within the Project Area are listed on the New

York State Section 303(d) List of Impaired Waters and no impaired waters or priority listed waters are located within the Project Area.

2.5.2.1 New York State Department of Environmental Conservation (NYSDEC) Stream Classification and Projected Streams

Multiple streams were identified and delineated during surveys within the Project Area. Table 2.5-1 provides descriptions of all perennial, intermittent, and ephemeral streams that were identified during these surveys. The streams range from well-defined stream channels to poorly defined headwater channels. The locations of these streams are depicted in relation to Project facilities in Figure 6 in Appendix G.

NYSDEC stream classification data were reviewed to determine whether streams in the Project Area are protected by New York State under Article 15 of the Environmental Conservation Law (ECL). NYSDEC uses a stream classification system in order to identify the value and uses of watercourses in the state. A protected stream is any stream or particular portion of a stream for which any of the following classifications or standards have been adopted by the Department or any of its predecessors: AA, AA(t), A, A(t), B, B(t) or C(t). Streams designated (t) (trout) also include those more specifically designated as (ts) (trout spawning). Disturbance to the bed or banks of protected streams requires a permit under Article 15 of the New York State ECL.

The majority of the watercourses mapped within the Project Area are identified as Class C and Class A, with some Class C(t) streams. Class C streams support fishing, fish propagation, and primary and secondary contact recreation. Class C(t) streams support the same uses and are designated to support trout populations. Class A streams are assigned to waters used as a source of water supply for drinking, culinary, or food processing purposes; primary and secondary contact recreation; and fishing (NYSDEC 2008c).

2.5.2.2 Watersheds

The southern half of the Project Area lies within the Conewango watershed and drains south into the Allegheny River via unnamed tributaries of North Branch Conewango Creek and West Branch Conewango Creek. The southeastern portion of the Project Area drains to North Branch Conewango Creek and the southwestern portion of the Project Area drains to West Branch Conewango Creek. The confluence of North Branch and West Branch occurs south of the Project Area where the stream becomes Conewango Creek. Conewango Creek flows south and flows through a man-made drainage ditch before crossing the Pennsylvania line and reaching the Allegheny River.

The northern half of the Project Area lies within the Chautauqua-Conneaut Watershed, and drains north into Lake Erie. A small portion of this watershed drains to Tupper Creek, which drains to Walnut Creek in the Village of Forestville. The Tupper Creek watershed overlaps with a small portion of the northwestern section of the Project Area, but is primarily located outside of the Project Area, where it drains north to Walnut Creek, which continues north into Lake Erie. The Walnut Creek watershed encompasses the northwestern portion of the Project Area. The headwaters of Silver Creek are located in northeastern portions of the generation and transmission portions of the Project Area. Silver Creek flows northwest, through two drinking water reservoirs (Upper Silver Creek Reservoir and Lower Silver Creek Reservoir), before converging with Walnut Creek just before draining to Lake Erie. The majority of the stream features in the Project Area that drain to Silver Creek are located upstream of the Upper Silver Creek Reservoir. Throughout the Project Area there are 57 unnamed tributaries to North Branch Conewango, West Branch Conewango Creek, Tupper Creek, Walnut Creek, and Silver Creek; 27 are Class C streams, seven are Class C(t) streams, and 23 are Class A streams.

2.5.2.3 Surface Water Use

Surface water features in the survey corridor are utilized for public drinking water, recreational, wildlife, and agricultural purposes.

The Class A streams in the Project Area are those tributaries to Silver Creek. Upper and Lower Silver Creek reservoirs are the source of drinking water for Hanover Water Districts No. 1 and No. 2 in the Village of Silver Creek, approximately 5 miles north of the Project Area (EPA 2008a). The tributaries to Silver Creek in the generation portion of the Project Area drain to the Upper Silver Creek Drinking Water Reservoir, just east of the Project Area. The tributaries to Silver Creek in the transmission portion enter Silver Creek below the Lower Silver Creek Reservoir location.

Perennial streams that have been classified as Class C streams in the vicinity of the Project Area may provide fishing opportunities for the public. According to NYSDEC, public fishing right easements are accessible at various locations along some of the unnamed tributaries within the Project Area. Public access is available along West Branch Conewango Creek and steelhead (trout) fishing is available with owners' permission along segments classified as C(t) on Walnut Creek and Silver Creek. These creeks lie primarily outside of the Project Area (NYSDEC 2008c and 2008d). Some of the streams within the Project Area are tributary to these systems (see Table 2.5-1 for stream connections).

All of the streams within the Project Area may be used to some extent by wildlife and livestock as a source of drinking water. However many of the streams in the Project Area, including protected streams designated as Class C(t) and A are intermittent or ephemeral; therefore, water availability is intermittent and may be present only during periods of continuous or heavy precipitation or during the snowmelt period in the spring. The conditions in these intermittent streams are generally unsuitable for fish species. However, amphibians and macroinvertebrates are likely to inhabit intermittent streams when water is present.

Man-made ponds are scattered throughout the Project Area. Ponds vary in size, but are typically less than 1.0 acre with depths ranging from 2 to 10 feet. Man-made ponds used for agricultural purposes are located in farm fields, and recreational ponds are located in open forested residential areas and private camping areas. Wildlife may also utilize these resources. See Section 2.9, Biological Resources: Environmental Setting, for a discussion of wildlife and aquatic habitat.

2.5.3 Storm Water Runoff

The Project Area consists of a mix of predominantly forested land and agricultural lands crossed by local, state, and county roads. Throughout most of the Project Area, storm water infiltrates naturally through soils, except on impermeable areas, such as paved roads. During heavy precipitation events (e.g., one- or 25-year storm events), storm water falling on the soil surface may saturate the soil and subsequently may run off into the numerous naturally occurring and man-made drainage channels in the area. Storm water runoff can pick up debris, chemicals, dirt, and other pollutants. These drainage channels typically connect to the wetlands or small-unnamed intermittent streams in the Project Area. Along some roads, drainage ditches have been installed to collect storm water runoff from the road surface and direct it to existing natural drainage channels or streams. Some roads or road segments in the Project Area lack significant drainage ditches; in this case, storm water runoff from the road surface simply empties off the road edge via overland flow.

Table 2.5-1 Stream Characteristics, Noble Ball Hill Windpark, Generation Portion

Cluster ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow	NYSDEC Classification	Connection
Streams Identified During Surveys Within the Project Area								
1	S81	0-3	2	5	Silt/Clay	Perennial	C	Unnamed tributary to West Branch Conewango Creek
1	S83	3-6	3	12 to 15	Gravel	Perennial	C	Unnamed tributary to West Branch Conewango Creek
1	S86	3 to 6	3	30 to 40	Silt/Clay	Perennial	C	Unnamed tributary to West Branch Conewango Creek
3	S75	0 to 3	2	3	Gravel	Intermittent	C	Unnamed tributary to West Branch Conewango Creek
4	S92	0 to 3	2	3	Silt/Clay	Perennial	C	Unnamed tributary to West Branch Conewango Creek
5	S98	3-6	2	12	Gravel	Perennial	C	Unnamed tributary to West Branch Conewango Creek
6	S101	0 to 3	2	4 to 6	Silt/Clay	Perennial	C	Unnamed tributary to West Branch Conewango Creek
7	S1535	0 to 3	1 to 3	5	Gravel/Silt/Clay	Ephemeral	C	Unnamed tributary to West Branch Conewango Creek
Collection between 5 and 7	S602	0 to 3	3 to 10	5 to 20	Gravel/Silt/Clay	Perennial	C	Unnamed tributary to West Branch Conewango Creek
Collection between 7 and 9	S598	0 to 3	10	10	Bedrock/Gravel	Perennial	C	Unnamed tributary to West Branch Conewango Creek

Table 2.5-1 Stream Characteristics, Noble Ball Hill Windpark, Generation Portion

Cluster ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow	NYSDEC Classification	Connection
13	S526	0 to 3	4	7	Gravel	Perennial	C	Unnamed tributary to West Branch Conewango Creek
15	S1501	3 to 6	2 to 5	5 to 15	Bedrock/Gravel/Cobble	Intermittent	C	Unnamed tributary to West Branch Conewango Creek
17	S1509	0 to 6	0	8	Gravel/Cobble	Intermittent	C	Unnamed tributary to West Branch Conewango Creek
17	S1514	0 to 3	2 to 8	5 to 12	Gravel/Silt/Clay/Cobble	Perennial	C	Unnamed tributary to West Branch Conewango Creek
Collection between 16 and 19	S530	0 to 3	1 to 3	1 to 4	Silt/Clay	Intermittent	C	Unnamed tributary to West Branch Conewango Creek
19	S533	0 to 3	2.5 to 6	2 to 5	Silt/Clay	Perennial	C	Unnamed tributary to West Branch Conewango Creek
19	S44	0 to 3	18 (inches)	4 to 6	Gravel	Intermittent	C	Unnamed tributary to North Branch Conewango Creek
19	S46	0 to 3	4 to 5	10 to 12	Gravel	Perennial	C	Unnamed tributary to North Branch Conewango Creek
20	S534	0 to 3	1	12	Gravel/Silt/Clay	Perennial	C	Unnamed tributary to North Branch Conewango Creek
21	S1000	0 to 3	4 to 5	6 to 8	Gravel	Perennial	A[1]	Unnamed tributary to Silver Creek
21	S1002	0 to 3	1 to 2	12 to 15	Silt/Clay	Perennial	A[1]	Unnamed tributary to Silver Creek
21	S7	0 to 3	1	1 to 1.5	Gravel/Silt/Clay	Ephemeral	A[1]	Unnamed tributary to Silver Creek

Table 2.5-1 Stream Characteristics, Noble Ball Hill Windpark, Generation Portion

Cluster ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow	NYSDEC Classification	Connection
21	S9	3 to 6	4	6 to 8	Gravel	Perennial	C	Unnamed tributary to North Branch Conewango Creek
21	S16	0 to 3	2	4	Gravel	Intermittent	A[1]	Unnamed tributary to Silver Creek
21	S31	0 to 3	1 to 2	2 to 4	Gravel/Cobble	Perennial	C	Unnamed tributary to North Branch Conewango Creek
21	S123	0 to 3	1 to 3	2 to 5	Gravel/Silt/Clay	Perennial	A[1]	Unnamed tributary to Silver Creek
Collection between 21, 22 and 23	S22	0 to 3	2	3	Silt	Perennial	A[1]	Unnamed tributary to Silver Creek
Collection between 21 and 23	S1001a	0 to 3	1.5	2 to 3	Gravel/Sand/Silt/Clay	Intermittent	A[1]	Unnamed tributary to Silver Creek
23 and Collection between 21 and 23	S1001/S551	0 to 3	4 to 6	7 to 10	Gravel/Silt/Clay/Cobble	Perennial	A[1]	Unnamed tributary to Silver Creek
25	S583	0 to 3	4 to 5	5 to 6	Gravel/Sand/Silt/Clay	Intermittent	A	Unnamed tributary to Silver Creek
25	S592	0 to 3	3 to 6	7 to 9	Silt/Clay	Perennial	A	Unnamed tributary to Silver Creek
25	S592A	0 to 3	0.5 to 1	2 to 8	Gravel/Silt/Clay	Intermittent	A	Unnamed tributary to Silver Creek
25	S594	0 to 6	1 to 2	4 to 5	Gravel/Silt/Clay/Cobble	Intermittent	A	Unnamed tributary to Silver Creek
25	S543	3 to 6	1 to 3	2 to 10	Gravel/Silt./Clay,	Ephemeral	A	Unnamed tributary to Silver Creek
25	S132	0 to 3	2 to 3	3 to 4	Gravel	Intermittent	A	Unnamed tributary to Silver Creek

Table 2.5-1 Stream Characteristics, Noble Ball Hill Windpark, Generation Portion

Cluster ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow	NYSDEC Classification	Connection
25	S576	0 to 3	2 to 6	2 to 8	Gravel, Sand	Perennial	A	Unnamed tributary to Silver Creek
26	S1526	0 to 3	1 to 3	4 to 10	Gravel/Silt/Clay/Cobble	Intermittent	A	Unnamed tributary to Silver Creek
26	S568	0 to 3	2 to 5	8 to 10	Silt/Clay	Perennial	A	Unnamed tributary to Silver Creek
25 and 27	S591	0 to 3	1 to 4	1 to 5	Gravel/Silt/Clay	Intermittent	A	Unnamed tributary to Silver Creek
27	S1519	0 to 3	4 to 6	6 to 8	Gravel/Silt/Clay	Perennial	A	Unnamed tributary to Silver Creek
27	S1520	0 to 3	7 to 12	7 to 12	Gravel	Perennial	A	Unnamed tributary to Silver Creek
Collection between 24 and 25	S561	0 to 3	1 to 3	6 to 9	Silt/Clay	Perennial	A	Unnamed tributary to Silver Creek
Collection between 24 and 25	S564	0 to 3	1 to 3	4 to 6	Silt/Clay/Gravel	Ephemeral	A	Unnamed tributary to Silver Creek
Collection between 25 and substation	S577	0 to 3	2 to 6	2 to 8	Gravel, Sand	Perennial	A	Unnamed tributary to Silver Creek
Transmission between substation and Empire Road	S108	0 to 3	1 to 2	1 to 2	Silt/Clay	Perennial	C	Unnamed Tributary to Tupper Creek
Transmission between substation and Empire Road	S607	0 to 3	2	2	Silt/Clay	Perennial	C[1]	Unnamed Tributary to Walnut Creek
Transmission between substation and Empire Road	S607a	0 to 3	2	4 to 6	Gravel/Sand/Silt/Clay	Perennial	C[1]	Unnamed Tributary to Walnut Creek

Table 2.5-1 Stream Characteristics, Noble Ball Hill Windpark, Generation Portion

Cluster ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow	NYSDEC Classification	Connection
Transmission between Hopper Road and Route 89	S2000	3 to 6	2	5	Gravel	Intermittent	C	Unnamed Tributary to Walnut Creek
Transmission between Hopper Road and Route 89	S103	3 to 6+	10	25	Bedrock	Perennial	C	Unnamed Tributary to Walnut Creek
Transmission between Hopper Road and Route 89	S50	6+	12 to 16	25	Bedrock	Perennial	C	Unnamed Tributary to Walnut Creek
Transmission between Hopper Road and Route 89	S1014	0 to 3	3	6	Bedrock	Perennial	C(t)	Unnamed Tributary to Walnut Creek
Transmission between Hopper Road and Route 89	S1014a	0 to 3	1	4	Gravel	Intermittent	C(t)	Unnamed Tributary to Walnut Creek
Transmission between Hopper Road and Route 89	S54	6+	2	5 to 7	Silt/Clay	Perennial	C(t)[1]	Unnamed Tributary to Walnut Creek
Transmission between Hopper Road and Route 89	S54a	6+	2	2 to 4	Silt/Clay	Intermittent	C(t)[1]	Unnamed Tributary to Walnut Creek
Transmission between Route 89 and King Road	S56	0 to 3	3	5	Silt/Clay	Perennial	C(t)[1]	Unnamed Tributary to Walnut Creek

Table 2.5-1 Stream Characteristics, Noble Ball Hill Windpark, Generation Portion

Cluster ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow	NYSDEC Classification	Connection
Transmission between Route 89 and King Road	S56a	3 to 6	20	25	Silt/Clay	Perennial	C(t)[1]	Unnamed Tributary to Walnut Creek
Transmission between King Road and Route 85	S60	0 to 3	6	8 to 10	Silt/Clay	Perennial	C(t)[1]	Unnamed Tributary to Silver Creek

Notes:

[1] These stream classifications were inferred from NYCRR Chapter X.

[2] Stream flow regimes are based on the following definitions:

Perennial: The stream flow is evident throughout the year, in most years.

Intermittent: The stream channel contains flowing water for at least three months, but does not flow throughout the year, in most years.

Ephemeral: The stream channel contains flowing water for less than three months of the year, in most years.

2.6 Water Quality: Impacts and Mitigation

This section addresses possible impacts on groundwater and surface water resulting from construction and operation of the Project. Construction practices, including the building of access roads, installation of turbines, and placement of electrical collection and transmission lines, may impact the condition of groundwater and surface water resources and, ultimately, water quality. Long-term impacts on surface water quality are expected to be minimal, as project facilities were sited to avoid impacts to water resources and were located in previously disturbed areas to the extent practicable. Noble will minimize any potential construction impacts to surface or groundwater quality through the implementation of best management practices (BMPs). These measures are discussed in Section 2.6.3.

2.6.1 Construction Impacts

Groundwater

Construction of the Project is not expected to significantly impact groundwater within or outside of the Project Area. It is possible that shallow groundwater may be encountered during excavation or that other localized groundwater flow disruptions may take place down gradient of the turbine foundations. However, should this effect occur, it is anticipated that preconstruction groundwater conditions will restore themselves as groundwater fills in behind the turbine foundations. Any soil compaction that takes place during construction is not expected to extend to the water table; therefore, groundwater movement will not be disrupted by any compaction that takes place. Compaction could potentially result in less groundwater infiltration in affected areas; however, the total area where compaction could potentially take place (approximately 252 acres according to Table 2.4-1 of the DEIS) in comparison with the amount of pervious surface that readily allows infiltration to groundwater in the Project Area is minor and not expected to cause any changes in regional groundwater table levels or quality. Construction of the Project may increase the potential for introduction of pollutants to groundwater if spills of petroleum or other chemicals were to occur. Noble will implement a site-specific Storm Water Pollution Prevention Plan (SWPPP) in accordance with New York State Department of Environmental Conservation (NYSDEC) regulations. The SWPPP will contain a spill prevention and control plan. Spill prevention measures to be implemented during construction are discussed in Section 2.6.3.

Construction of the Project is not expected to impact private or public drinking sources within or outside of the Project Site. Typically, drinking water wells, such as those used by residents in the Project Area are designed to withdraw water from deep aquifers, which will utilize a deeper source of groundwater that will not be encountered during construction. If areas of shallow groundwater exist in the vicinity of turbines, they will be identified during site-specific detailed foundation engineering investigations performed in conjunction with the foundation design process and addressed in the design plans. Noble will use BMPs to prevent any impacts to groundwater as described in Appendix E, Stormwater Pollution Prevention Measures, and will be further identified and clarified in the Stormwater Pollution Prevention Plan (SWPPP) to be prepared prior to construction activities. Perched water areas, if encountered, will be documented and the resulting information will be made available to the Towns, as required by applicable laws. Components of the engineering evaluation (geotechnical study) are listed in Section 2.1, Geology: Environmental Setting. Potential for groundwater contamination and the implementation of BMPs to control concrete washout areas, storage of fuel and other chemicals and a spill prevention plan will be included in the SWPPP. Construction BMPs are further discussed in Section 2.6.3.

Surface Water

Stream crossings have been avoided during the facility siting process to the greatest extent practicable. No streams will be impacted by construction of the turbines. Due to the location and number of streams in the Project Area and the linear nature of Project facilities, it will be necessary to cross streams for installation of access roads, collection lines, and transmission lines. Typical design drawings of stream crossings during construction are shown as part of Appendix A: Construction Drawings, Specifications, and Engineering Standards. As specific crossings are regulated by the United States Army Corps of Engineers (USACE) and NYSDEC, Noble will develop refined stream crossing methods, as appropriate, with these agencies as part of the permitting process required by these agencies. Final crossing designs will be provided to the Towns as part of that review, as discussed in Section 2.6.3.

A total of 36 streams will be crossed by Project facilities. A total of 24 streams will be crossed by the generation portion of the Project: 17 streams will be crossed by access roads (Streams S83, S92, S101, S533, S534, S31, S16, S1002, S132, S576, S592, S592a, S577, S568, S591, S1519, and S1520); and seven streams will be crossed by underground collection lines (Streams S598, S22, S1001/S551, S1001a, S561, S564 and S577 [Stream S577 is crossed in two locations, once for an access road and again for underground collection]). Thirteen streams will be crossed by the transmission line (Streams S50, S54, S54a, S56, S56a, S60, S103, S108, S607, S607a, S1014, S1014a, and S2000).

Within the generation portion of the Project, and as previously described, temporary access roads located within sensitive resources will be installed within a narrowed 40-foot-wide construction right-of-way (ROW) (see Section 1.2, Detailed Description of the Proposed Action). Culverts of an appropriate type and size to maintain sufficient flow will be used where access roads cross streams. When collocated with the access road, the collection line will be installed within this construction ROW approximately 4.5 feet below the stream bed. In areas where the collection line cannot be collocated with the access roads, the collection lines will be installed within a 22- to 50-foot ROW, depending on the number of circuits and the method used for crossing (i.e., underground or overhead). Underground collection lines will be installed via trenching of the streams; however, impacts will be minimal since trenching will take place under dry conditions. Streams that are not naturally dry at the time of crossing will be temporarily dammed, with the water pumped around the construction area to allow collection lines to be installed in dry conditions. The equipment that will be used to install the collection lines cuts a trench, places the cable, and backfills the trench in a single pass, thereby reducing the duration of stream disturbance. Table 2.6-1 identifies streams that will be crossed by the access roads and the collection system within the Project Site and the associated construction impact. No streams will be impacted by turbines.

Stream crossings will be avoided during transmission facility construction to the greatest extent practicable. Construction of the transmission line requires the clearing of woody vegetation from a 100-foot permanent ROW to facilitate installation of the transmission line and avoid interference with vegetation once the lines are installed. All streams located within the transmission line ROW will be crossed by overhead electrical transmission lines. Due to the location and number of streams along the transmission line, it will be necessary to cross streams during construction. Stream crossings will be limited to a 30-foot temporary construction corridor. Temporary construction impacts will be minimized by using temporary bridges or wetland mats for equipment crossings; however, some minor impacts may occur within the 30-foot travel corridor. Any vegetation impeding equipment access will be hand cleared in the vicinity of streams. No permanent impacts to streams are expected due to construction and operation of the Transmission Line. Clearing of vegetation along crossed streams may cause disturbance to streams; however, stumps will be left in place to minimize erosion and sedimentation and to facilitate natural revegetation once construction is complete. Temporary culverts may be used for equipment stream crossings, but will be removed following construction of the transmission line. Table 2.6-2 identifies streams that will be crossed by the Transmission Line.

Construction of the Project will result in minor, short-term impacts on the streams crossed. These impacts could occur as a result of in-stream construction activities or construction on slopes adjacent to stream channels. Clearing and grading of stream banks, in-stream trenching, trench dewatering, and backfilling could result in modification of aquatic habitat, increased sedimentation, turbidity, decreased dissolved oxygen concentrations, releases of chemical and nutrient pollutants contained in stream sediments, and introduction of chemical contaminants, such as fuel and lubricants, from possible spills. In general, these impacts will be limited to the period of in-stream construction and conditions are expected to return to normal shortly after completion of activities.

Protected Streams

Twenty-two of the streams crossed by the Project have been classified as protected streams by NYSDEC and are associated with installation of access roads, underground collection, and the transmission line. Of these protected streams, ten are crossed by access roads, four are crossed by underground collection lines, one (1) is crossed in two separate locations by an access road and underground collection, and seven are crossed by the transmission line. Streams S16, S1002, S132, S576, S591, S592, S592A, S568, S1519, and S1520 are crossed by access roads and are all designated as Class A. Streams S22, S1001, S561, and S564 are crossed by underground collection and are all designated as Class A. Stream S577 is crossed by an access road and underground collection line in separate locations and is designated as Class A. Streams S54, S54a, S56, S56a, S60, S1014, and S1014a are crossed by the Transmission Line and are all designated as Class C(t). NYSDEC stream classifications are described in Section 2.5.2.1, NYSDEC Stream Classification and Protected Streams. No protected streams will be impacted by turbines. Each crossing of a protected stream is subject to NYSDEC permitting under Article 15 of the New York State (NYS) Environmental Conservation Law. Stream impacts are also subject to USACE permitting in conjunction with wetland permitting discussed in Section 2.8, Wetlands: Impacts and Mitigation.

Stormwater

Construction of the Project could impact the quality of stormwater runoff. Indirect impacts to surface waters could potentially result from construction activities including minor increases in sedimentation and turbidity caused by increased surface runoff from disturbed areas and the release of pollutants or hazardous materials in the event of a spill during construction. See Section 2.6.3 for a full discussion on mitigation of potential impacts to stormwater from construction.

2.6.2 Project Facility Impacts

Groundwater

Project facilities are not expected to have any permanent impacts on groundwater within the Project Site since the Project will only add small areas of impervious surface (approximately 0.35 acres of impervious surface from the turbine pedestals and .25 acres for the Operations and Maintenance (O&M) facility footprint) to the Project Area. The effect on groundwater recharge will, therefore, be negligible. The potential for pollutants to enter the groundwater from spills of petroleum and other chemicals during operation will be minimized through the continued implementation of BMPs and spill prevention measures set forth in the SWPPP during construction of the Project and maintenance activities. Implementation of these measures is expected to result in the avoidance of impacts to groundwater and private residential drinking water wells within or outside the Project Site. See Section 2.6.3 for a full discussion of the proposed mitigation measures.

Surface Water

No significant impacts are expected to streams in the Project Area resulting from the operation of Project facilities. After construction is complete, temporary access roads will be reduced to 16-foot permanent access roads. Permanent culverts will be installed in access roads at stream crossings and maintained as necessary; there will be a total of 17 stream crossings by access roads. The presence of underground and overhead electrical collection and transmission lines will have no impact on stream ecology or function; impacts to riparian vegetation to maintain the collection ROW may be necessary during operation; however stream banks will remain vegetated in an herbaceous or scrub shrub state.

Protected Streams

Project facilities are not expected to result in any significant impacts to protected streams. After construction is complete, temporary access roads will be reduced to 16-foot permanent access roads. Permanent culverts will be installed in access roads at stream crossings and maintained as necessary; there will be a total of 11 protected stream crossings by access roads. The presence of the transmission line and underground and overhead electrical collection lines will have no impact on stream ecology or function; impacts to riparian vegetation to maintain the collection ROW may be necessary during operation; however stream banks will remain vegetated in an herbaceous or scrub shrub state. Turbines will not impact any protected stream.

Stormwater

No significant increase in impervious surface will result from the Project facilities. Tower pedestals will add a total of 0.55 acres of impervious surface to the 13,658-acre Project Area. Therefore, no significant changes to stormwater runoff volumes are anticipated. The access roads, turbine sites, and substation and switchyard footprints will be gravel-based, which will allow stormwater to continue to infiltrate into the soil.

2.6.3 Mitigation

Several measures will be implemented to ensure surface water quality protection, including the SWPPP and environmental monitoring. The SWPPP will require the use of sediment and erosion control measures and BMPs during construction. Typical stormwater pollution prevention measures will be implemented via the SWPPP and are identified in Appendix E. A site-specific SWPPP will be prepared and filed prior to the issuance of Building Permits. Environmental monitoring of the site will occur during construction and site restoration in accordance with Noble’s construction plan (see Section 2.27, Description of the Proposed Construction Plan, and Appendix I) and the SWPPP. The Environmental Monitoring Plan will contain permit conditions and other commitments made by Noble during the Project permitting, including those associated with stream disturbance, stormwater management, and erosion control.

The SWPPP will encompass all requirements set forth by the NYSDEC State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities and will include an erosion and sediment control plan, measures for post-construction runoff control as required, and a spill prevention plan. Furthermore, during construction sediment and erosion control devices will be monitored weekly at a minimum, (twice weekly when more than 5 acres is disturbed at one time) and after precipitation events as per SPDES regulations and the NYSDEC Standards and Specification for Sediment and Erosion Control. In addition, the Town of Hanover local law requires that the SWPPP include pre-construction and post-construction drainage calculations that show a zero increase in runoff. The SWPPP will be submitted to the Towns prior to construction.

BMPs that will be used during construction to prevent excess stormwater runoff from the construction areas are described in general in Appendix E, Stormwater Pollution Prevention Measures. Site-specific BMPs will be implemented prior to construction and described in more detail in the SWPPP, when developed. The SWPPP will address BMPs that will take place on site to prevent spills and, in the event of a spill, response procedures that will minimize groundwater and surface water impacts. Any spillage of fuels, waste oils, other petroleum products, or hazardous materials in proximity to waterbodies shall be reported to NYSDEC’s Spill Hotline (1-800-457-7362) within 2 hours. Any increase in stormwater discharges resulting directly from the construction of the Project will be documented in the SWPPP and permitted through an SPDES General Permit for Stormwater Discharges from Construction Activities. Furthermore, measures will be taken to maintain the site with BMPs for post-construction runoff control, as required, to ensure that all new facilities consistent with the operation of the Project do not create any additional stormwater runoff than was generated during pre-construction conditions.

Groundwater impacts will be minimized through SWPPP implementation. All surface soils that are temporarily compacted will be de-compacted and/or mitigated as described in Section 2.27, Description of the Proposed Construction Plan. Subsoil within approximately 35 feet of the turbine base will remain compacted, as this provides additional structural stability over the foundation. However, the topsoil placed within this 35-foot radius will be decompacted. Instances of soil compaction will be minimized through the SWPPPs BMPs, including the segregation of subsoil and topsoil, use of geotextiles to prevent compaction, and soil compaction mitigation where appropriate. Similar activities in wetlands, if encountered, will be governed by NYSDEC and USACE permits.

If shallow groundwater enters the excavation areas during turbine foundation placement, it may be pumped out during installation of the foundation. Any groundwater that is pumped out of a foundation excavation will be discharged to an area (approved by the landowner) that will either direct the flow toward existing waterbodies or temporarily retain the water until it can infiltrate back into the ground. Specific details relating to the pumping of groundwater will be included in the SWPPP. Temporary sediment traps or the controlled release of water over vegetated areas will be utilized during construction to intercept and manage sediment-laden runoff from dewatering of turbine foundations. Based on engineering designs contained in the SWPPP, the control practices will retain the runoff and allow sediment to settle prior to discharge. For dewatering practices, the sediment traps shall be placed adjacent to the turbine foundations, with the outlet discharging to a swale, a ditch, or vegetated areas.

Surface water impacts have been minimized by siting Project components away from surface water resources to the greatest extent practicable. Alternatives considered in the siting process, which resulted in the stream crossings as presented in the DEIS will be discussed in detail for each stream in the Joint Wetland Permit Application upon submittal of the application to NYSDEC and the USACE. However, it will be necessary to cross streams for installation of access roads and collection lines. During construction, appropriate erosion/sediment control measures (e.g., silt fences or straw bale dikes or other stormwater control measures) will be used to limit the area of impact to surface waters in accordance with USACE and NYSDEC permit requirements. Any sediment runoff or increased turbidity to surface waters as a result of construction will be minimal as a result. Any construction activities occurring within 50 feet of protected stream banks will be conducted in accordance with NYSDEC permit requirements. Other measures that will be implemented to minimize impacts to streams during construction include:

- In trout streams, all in-stream work, as well as any work that may result in the suspension of sediment shall not occur during the trout spawning and incubation period commencing October 1 and ending April 30, unless prior approval is obtained by NYSDEC;

- Clearing of existing vegetation will be limited to the material which poses a hazard or hindrance to construction. Snags which provide shelter in streams for fish will not be disturbed unless they cause serious obstructions, scouring, or erosion. Trees will not be felled into any stream or onto the immediate stream bank;

- Where necessary, appropriately sized culverts will be installed to meet hydraulic capacity and structural integrity criteria;

- There will be no widening or constriction of the stream channel bed through the road crossing, and no berms will be constructed on the stream banks;

- If culverts with bottoms are to be used and will be permanent, including round culverts, they will be installed so that at least 20% of the culvert’s height is embedded below the existing stream bed at the outlet end of the culvert. The streambed material that is excavated to accommodate culvert placement will then be spread evenly on the bottom of the new culvert. If it is not practical to spread streambed material throughout the entire bottom of the new culvert, material will be spread in the culvert at the inlet and outlet ends gradually up to streambed elevation to promote natural deposition. Culverts with bottoms, including round culverts, will not be used if the streambed is bedrock;

- Access road shoulders within 50 feet of the culvert will be adequately protected with riprap or seeded and mulched within seven days of completion of the temporary and permanent culvert crossing. Shoulders sloped steeper than 1 foot vertically to 3 feet horizontally will be protected with clean rock riprap 6 inches in diameter or larger. Mitigation of stream disturbances within 50 feet of protected streams will be coordinated with the applicable agencies (i.e., NYSDEC and the USACE);

- During periods of work activity, flow immediately downstream of the work site will approximate flow immediately upstream of the work site;
- Where streams with flow at the time of construction will be crossed, dam and pump procedures will be followed to control water adjacent to the work area; and
- Additional recommendations identified by NYSDEC or USACE during the permitting process.

Access roads and collection lines have been collocated with existing stream crossings whenever possible to avoid creating new disturbances across these resources. Project facilities have been collocated with existing disturbed areas where possible (including existing farming and logging roads and all-terrain vehicle [ATV] trails), in an effort to minimize impacts and improve these areas. In most cases, only minor improvements, such as replacing culverts, will be required.

Overhead and underground collection lines and overhead transmission lines will be installed across streams. To minimize impacts, wetland mats will be used to bridge streams to prevent impacts associated with equipment crossing. Any in-stream disturbance, such as trenching, will take place during dry conditions to minimize downstream impacts. If water is present at the time of crossing, Noble will dewater the area using a dam and pump crossing to minimize stream impacts. To further minimize impacts to streams, the trench will be opened, installation accomplished, and backfilled in one continuous operation, thus limiting the duration of in-stream work. Poles for overhead collection lines will be placed as far away from riparian areas as possible to avoid or minimize any disturbance to streams. Woody vegetation along the stream bank will be cut in some places, but stumps will be left in place to protect against erosion. Stream crossings will be engineered, designed, and installed to maintain sufficient flow during construction in accordance with applicable regulations. These methods will be provided to the Towns via the Joint Wetland Permit Application upon submittal of the application to NYSDEC and the USACE.

Table 2.6-1 Stream Impacts, Ball Hill Windpark, Generation Portion

Project Component	Stream ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow Type[2]	NYSDEC Classification	Length of Stream within the Construction ROW (feet)	Length of Stream within the Permanent Disturbance Corridor (feet)
Cluster 1 (T1, T2, T3)										
Access Road	S83	Unnamed tributary to West Branch Conewango Creek	3 to 6	3	12 to 15	Gravel	Perennial	C	61.87	30.94
Cluster 2 (T4): No Streams										
Cluster 3 (T5, T6): No Impacted Streams										
Cluster 4 (T7)										
Access Road	S92	Unnamed tributary to West Branch Conewango Creek	0 to 3	2	3	Silt/Clay	Perennial	C	40.33	20.01
Cluster 5 (T8, T9, T15): No Impacted Streams										
Cluster 6 (T11, T13, T14)										
Access Road	S101	Unnamed tributary to West Branch Conewango Creek	0 to 3	2	4 to 6	Silt/Clay	Perennial	C	40.02	20.01
Cluster 7 (T16, T17): No Impacted Streams										
Cluster 8 (T68): No Streams										
Cluster 9 (T18, T19, T20, T21): No Streams										
Collection between Cluster 5 and Cluster 7: No Impacted Streams										

Table 2.6-1 Stream Impacts, Ball Hill Windpark, Generation Portion

Project Component	Stream ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow Type[2]	NYSDEC Classification	Length of Stream within the Construction ROW (feet)	Length of Stream within the Permanent Disturbance Corridor (feet)
Collection between Cluster 7 and Cluster 9										
Underground Collection Line	S598	Unnamed tributary to West Branch Conewango Creek	0 to 3	10	10	Bedrock, Gravel	Perennial	C	52.44	NA
Cluster 10 (T25) – No Stream Impacts										
Cluster 11 (T23 and T24) - No Streams										
Cluster 12 (T22) – No Streams										
Cluster 13 (T26) – No Streams										
Cluster 14 (T27) – No Streams										
Cluster 15 (T29) – No Impacted Streams										
Cluster 16 (T30, T31 and T32) – No Streams										
Cluster 17 (T33, T34 and T35) – No Impacted Streams										
Cluster 18 (T36) – No Streams										
Cluster 19 (T38)										
Access Road	S533	Unnamed tributary to West Branch Conewango Creek	0 to 3	2.5 to 6	2-5	Silt/Clay	Perennial	C	178.70	24.60
Cluster 20 (T39, T40, T41, T42, T43, T45)										
Access Road	S534	Unnamed tributary to North Branch Conewango Creek	0 to 3	1	12	Gravel, Silt/Clay	Perennial	C	59.07	20.03

Table 2.6-1 Stream Impacts, Ball Hill Windpark, Generation Portion

Project Component	Stream ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow Type[2]	NYSDEC Classification	Length of Stream within the Construction ROW (feet)	Length of Stream within the Permanent Disturbance Corridor (feet)
Cluster 21 (T46, T47)										
Access Road	S31	Unnamed tributary to North Branch Conewango Creek	0 to 3	1 to 2	2 to 4	Gravel, large flat stone	Perennial	C	45.70	24.86
Access Road	S16	Unnamed tributary to Silver Creek	0 to 3	2	4	Gravel	Intermittent	A[1]	60.72	21.31
Access Road	S1002	Unnamed tributary to Silver Creek	0 to 3	1 to 2	12 to 15	Silt/clay	Perennial	A[1]	44.51	23.86
Cluster 22 (T48, T50, T51) – No Stream Impacts										
Cluster 23 (T52, T53, T55) – No Stream Impacts										
Collection between Clusters 21, 22 and 23										
Underground Collection Line	S22	Unnamed tributary to Silver Creek	0 to 3	2	3	Silty with other sediments	Perennial	A[1]	32.26	NA
Collection between Clusters 21 and 23										
Underground Collection Line	S1001/S551	Unnamed tributary to Silver Creek	0 to 3	4 to 6	7 to 10	Gravel, Silt/Clay, Cobble	Perennial	A[1]	50.53	NA
Underground Collection Line	S1001a	Unnamed tributary to Silver Creek	0 to 3	18	2 to 3	Gravel, Sand, Silt/Clay	Intermittent	A[1]	13.85	NA
Cluster 24 (T56) – No Stream Impacts										
Cluster 25 (T57, T58, T59, T60, T67)										
Access Road	S132	Unnamed tributary to Silver Creek	0 to 3	2 to 3	3 to 4	Gravel	Intermittent	A	58.03	26.43

Table 2.6-1 Stream Impacts, Ball Hill Windpark, Generation Portion

Project Component	Stream ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow Type[2]	NYSDEC Classification	Length of Stream within the Construction ROW (feet)	Length of Stream within the Permanent Disturbance Corridor (feet)
Access Road	S591	Unnamed tributary to Silver Creek	0 to 3	1 to 4	1 to 5	Gravel, Silt/Clay, Vegetation	Intermittent	A	102.36	26.79
Access Road	S576	Unnamed tributary to Silver Creek	0 to 3	2 to 6	2 to 8	Gravel, Sand	Perennial	A	83.45	25.57
Access Road	S592	Unnamed tributary to Silver Creek	0 to 3	3 to 6	7 to 9	Silt/Clay	Perennial	A	40.83	20.53
Access Road	S592A	Unnamed tributary to Silver Creek	0 to 3	0.5 to 1	2 to 8	Gravel/Silt/Clay	Intermittent	A	24.51	24.94
Access Road	S577 (See also Collection between Cluster 25 and Substation)	Unnamed tributary to Silver Creek	0 to 3	2 to 6	2 to 8	Gravel, Sand	Perennial	A	73.75	23.90
Cluster 26 (T64, T65, T66)										
Access Road	S568	Unnamed tributary to Silver Creek	0 to 3	2 to 5	8 to 10	Silt/Clay	Perennial	A	50.06	20.23
Cluster 27 (T61, T62)										
Access Road	S1519	Unnamed tributary to Silver Creek	0 to 3	4 to 6	6 to 8	Gravel, Silt/Clay	Perennial	A	42.23	20.01
Access Road	S1520	Unnamed tributary to Silver Creek	0 to 3	7 to 12	7 to 12	Gravel	Perennial	A	72.16	20.96

Table 2.6-1 Stream Impacts, Ball Hill Windpark, Generation Portion

Project Component	Stream ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow Type[2]	NYSDEC Classification	Length of Stream within the Construction ROW (feet)	Length of Stream within the Permanent Disturbance Corridor (feet)
Collection between Cluster 24 and Cluster 25										
Underground Collection	S561	Unnamed tributary to Silver Creek	0 to 3	1 to 3	6 to 9	Silt/Clay, muddy bottom	Perennial	A	50.29	NA
Underground Collection	S564	Unnamed tributary to Silver Creek	0 to 3	1 to 3	4 to 6	Silt/Clay, rounded rocks	Ephemeral	A	68.25	NA
Collection between Cluster 25 and Substation										
Underground Collection Line	S577 (See also Cluster 25)	Unnamed tributary to Silver Creek	0 to 3	2 to 6	2 to 8	Gravel, Sand	Perennial	A	155.5	NA

Notes:

[1] These stream classifications were inferred from NYCRR Chapter X

[2] Stream flow classifications are based on the following definitions:

Perennial Flow – The stream flow is evident throughout the year, in most years.

Intermittent Flow – The stream channel contains flowing water for at least three months but does not flow throughout the year, in most years.

Ephemeral Flow – The stream channel contains flowing water for less than three months of the year, in most years.

Table 2.6-2 Stream Impacts, Ball Hill Windpark, Transmission Line

Stream ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow Type²	NYSDEC Classification	Length of Stream Within 30-foot Wide Temporary Construction Corridor (feet)	Length of Stream Within the 100-foot Permanent ROW (feet)
Sector F Transmission Line									
S50	Unnamed tributary to Walnut Creek	6+	12 to 16	25	Bedrock	Perennial	C	32.63	119.50
S54	Unnamed tributary to Walnut Creek	6+	2	5 to 7	Gravel, Sand, Silt/Clay	Perennial	C(T)¹	89.83	319.32
S54a	Unnamed tributary to Walnut Creek	6+	2	2 to 4	Silt/Clay	Intermittent	C(T)¹	6.68	72.48
S56	Unnamed tributary to Walnut Creek	0 to 3	3	5	Silt/Clay	Perennial	C(T)¹	85.53	441.87
S56a	Unnamed tributary to Walnut Creek	3 to 6	20	25	Silt/Clay	Perennial	C(T)¹	31.51	103.13
S60	Unnamed tributary to Silver Creek	0 to 3	6	8 to 10	Silt/Clay	Perennial	C(T)¹	56.29	213.27
S103	Unnamed tributary to Walnut Creek	3 to 6+	10	25	Bedrock	Perennial	C	30.13	110.69
S108	Unnamed tributary to Tupper Creek	0 to 3	1 to 2	1 to 2	Silt/Clay	Perennial	C	37.37	155.77
S607	Unnamed tributary to Walnut Creek	0 to 3	2	2	Silt/Clay	Perennial	C¹	30.04	100.86

Table 2.6-2 Stream Impacts, Ball Hill Windpark, Transmission Line

Stream ID	Stream Name	Bank Height (feet)	Width of Water (feet)	Bank to Bank Width (feet)	Substrate	Flow Type[2]	NYSDEC Classification	Length of Stream Within 30-foot Wide Temporary Construction Corridor (feet)	Length of Stream Within the 100-foot Permanent ROW (feet)
S607a	Unnamed tributary to Walnut Creek	0 to 3	2	4 to 6	Gravel	Perennial	C[1]	35.96	110.07
S1014	Unnamed tributary to Walnut Creek	0 to 3	3	6	Bedrock	Perennial	C(T)	37.63	115.35
S1014a	Unnamed tributary to Walnut Creek	0 to 3	1	4	Gravel	Intermittent	C(T)	11.44	124.82
S2000	Unnamed tributary to Walnut Creek	3 to 6	2	5	Gravel	Intermittent	C	129.49	224.40

Notes:

[1] These stream classifications were inferred from NYCRR Chapter X.

[2] Stream flow classifications are based on the following definitions:

Perennial Flow – The stream flow is evident throughout the year, in most years.

Intermittent Flow – The stream channel contains flowing water for at least three months but does not flow throughout the year, in most years.

Ephemeral Flow – The stream channel contains flowing water for less than three months of the year, in most years.

2.7 Wetlands: Environmental Setting

A study was conducted to determine the extent and quality of existing wetlands within the Project Area that could potentially be impacted by the Project. The study consisted of a desktop review of existing wetland location information and mapping available from the New York State Department of Environmental Conservation (NYSDEC) Freshwater Wetland and National Wetland Inventory (NWI) maps, among others, and a wetland delineation survey conducted specifically for the Project.

The desktop review indicated that wetlands under state and federal jurisdiction were likely to exist within the Project Area. Based on the results of the desktop review, field reconnaissance-level surveys were conducted in these areas to develop general siting constraints or exclusion zones. Additional reconnaissance-level surveys were conducted during the siting process to field verify specific wetland boundaries. Detailed wetland delineations were conducted within a defined survey corridor based on preliminary siting of facilities. The survey corridor generally included a 200- to 300-foot corridor centered on linear facilities, such as access roads and collection lines, and a circular area with a 250-foot radius surrounding each proposed turbine. In some areas, survey boundaries were restricted or expanded (i.e., restricted due to property access or expanded to ensure that regulated buffers adjacent to NYSDEC wetlands were identified). The goal of the delineation effort was to identify and document wetlands that could potentially be temporarily or permanently disturbed as a result of construction or operation of the proposed facilities within the Project Area. This information was then used to adjust the turbine sites, access roads, electrical collection, and transmission to avoid and minimize impacts to wetlands to the extent practicable. The wetland delineations took place within the approximately 1,310-acre survey corridor and resulted in the delineation of 237 wetlands, totaling approximately 93.7 acres in the Project Area. Final determinations of jurisdiction will be made by the regulatory agencies, such as NYSDEC and United States Army Corps of Engineers (USACE), subsequent to their field review of the documentation that is included in this Draft Environmental Impact Statement (DEIS). This information will be included in the Joint Application to NYSDEC and USACE.

This section provides a summary of the number, acreage, and potential federal and state jurisdiction of existing wetlands delineated within the survey corridor in the Project Area. Section 2.8, Wetlands: Impacts and Mitigation, discusses the wetlands that may be impacted temporarily or permanently by the Project. More detailed discussions of the flora and fauna of the wetland habitats within the Project Area are summarized in Section 2.9, Biological Resources: Environmental Setting. Streams and other surface waterbodies identified during the field investigation are discussed in Section 2.5, Water Quality: Environmental Setting, and Section 2.6, Water Quality: Impacts and Mitigation. A more detailed discussion of the existing conditions for wetlands and waterbodies is included in the Wetland and Waterbodies Report included as Appendix G.

2.7.1 Preliminary Data Review

Prior to conducting wetland delineations, information sources were reviewed to determine if wetland and stream resources were likely to be present in the Project Area, including aerial photographs of the Project Area (see Figure 3 in Appendix G), United States Geological Survey (USGS) 7.5-Minute Series topographic maps (see Figure 4 in Appendix G), United States Fish and Wildlife Service (USFWS) NWI maps (see Figure 5 in Appendix G), NYSDEC Freshwater Wetlands maps (see Figure 5 in Appendix G), and Chautauqua County soil surveys (see Figure 7 in Appendix G).

Review of the available information sources indicated that wetland and stream resources were likely to be present in the Project Area. USGS topographic maps, aerial photographs and NWI maps indicated the approximate locations of wetlands and streams in the Project Area. The NYSDEC freshwater wetlands maps depicted seven state regulated wetlands in the Project Area. In addition, the Chautauqua Soil Survey indicated the presence of hydric soils and soils with potential hydric inclusions, which could support wetland development, throughout the Project Area. Based on the results of the desktop review, it was determined that field surveys would be required to define the extent of wetlands in the Project Area.

Federally Regulated Wetlands

Section 404 of the Clean Water Act authorizes the USACE to issue permits regulating the discharge of dredged or fill materials into the waters of the United States, including wetlands. There is no minimum size for wetlands to be regulated under federal jurisdiction; however, wetlands that do not have a hydrological connection to or significant nexus with waters of the United States may not be subject to federal jurisdiction. The USACE reviews wetlands and streams in relation to their surroundings to determine whether they have direct connections to traditional navigable waterways or have important functions that have a substantial affect on the chemical, physical or biological integrity of a traditional navigable water. A traditional navigable water is a water subject to the ebb and flow of the tide or a waterbody used or potentially used to transport interstate or foreign commerce. There are no regulatory maps identifying federally jurisdictional wetlands. While existing map resources provide an overview of wetlands that may occur within the Project Area, the boundaries of federally jurisdictional wetlands must typically be determined through field delineation and the USACE must review the wetlands to determine jurisdiction.

State-Regulated Wetlands

Under Article 24 of the New York State Environmental Conservation Law (ECL), New York State (NYS) regulates wetlands that exceed 12.4 acres (5 hectares) in size, or have unusual local importance. In addition to the actual wetland resource, NYSDEC also regulates a 100-foot upland buffer area (Adjacent Area [AA]) surrounding each regulated wetland to protect the wetland. Work within either state-regulated wetlands or the regulated adjacent area requires a permit from NYSDEC.

Noble consulted with NYSDEC regarding locally significant habitat communities and utilized NYSDEC mapped regulated wetland layers for preliminary review of state regulated wetlands or sensitive habitats. The NYSDEC Natural Heritage Program (NHP) has identified a wetland of unusual local importance along the southwest border of the Project Area during the preliminary consultation. This area is classified as a rich hardwood hemlock peat swamp and is also designated as a NYSDEC wetland, Wetland FO-1.

Based on analysis of NYSDEC mapping, seven state-regulated wetlands (totaling approximately 249.1 acres) lie within the Project Area. However, through careful siting, Noble was able to avoid siting the Project in proximity to the NHP designated wetland of unusual local importance and all but two mapped NYSDEC wetlands. Table 2.7-1 provides a summary of NYSDEC-mapped wetlands within the Project Area and the associated wetlands that were delineated in the field.

Data provided by NYSDEC indicates that the wetlands within the Project Area range from Class I to Class III wetlands. According to NYSDEC, Class I wetlands provide the highest function and greatest benefit of all NYSDEC classified wetlands and are afforded the greatest amount of protection. Impacts on Class I wetlands are permitted, but only if it is determined that the proposed activity satisfies a compelling economic or social need that clearly and substantially outweighs the loss of or detriment to the benefit(s) of the Class I wetland. Class II wetlands provide important wetland benefits, the loss of which is acceptable only in very limited circumstances. Impacts on these wetlands are permitted but only if it is determined that the proposed activity satisfies a pressing economic or social need that clearly outweighs the loss of or detriment to the benefit(s) of the Class II wetland. Class III wetlands supply wetland benefits, the loss of which is acceptable only after the exercise of caution and discernment.

2.7.2 Field Delineation

Detailed wetland delineations were conducted in the survey corridor for the Project Area in spring 2008. Each delineated wetland was assigned a general cover type classification based on the Cowardin Classification System (i.e., Palustrine Forested Broad-leaved Deciduous [PFO], Palustrine Forested Broad-leaved Deciduous/Needle-leaved Deciduous [PFO 1/4], Palustrine Shrub/Scrub [PSS], and Palustrine Emergent [PEM]). Appendix G contains the Wetland and Waterbodies Report completed for the Project Area. Table 4 and 5 in Appendix G provide summaries of each delineated wetland, vegetative cover type, and hydrologic connection to waters of the United States, NYSDEC jurisdictional status, and additional comments regarding the existing conditions at each wetland. The delineation report also includes mapping that depicts the delineated wetlands in relation to the Project facilities.

Project Area

Two hundred thirty-seven (237) wetlands (i.e., areas with hydrophytic vegetation, hydric soils, and wetland hydrology) were delineated within the survey corridor in the Project Area. Two hundred one (201) delineated wetlands have an obvious connection to waters of the United States and may be subject to federal regulation. The remaining 36 wetlands had no apparent connection to waters of the United States. Two delineated wetlands correspond to NYSDEC wetland SC-12 (Wetland W110 and W111) and seven delineated wetlands correspond to or are in close proximity to mapped NYSDEC wetland SC-13 (Wetland W59, W60, W61, W62, W63, W64, and W65). Based on field review, coupled with review of USGS topographic mapping and aerial photography, Wetland W104 extends beyond the delineated survey corridor and may encompass sufficient acreage to fall under the jurisdiction of NYSDEC. This determination would be made by NYSDEC subsequent to field review. Table 2.7-2 provides a summary of the number and acreage of delineated wetlands broken down by vegetative cover type and likely federal and state jurisdictional status. Field verifications by USACE and NYSDEC staff are pending and jurisdictional determinations will be made by each agency subsequent to verifications.

Table 2.7-1 Mapped NYSDEC Wetlands in the Project Area, Noble Ball Hill Windpark

NYSDEC Wetland ID	Class	Delineated Wetland ID
FO-1	I	No portion delineated; no facilities in the vicinity
FO-11	II	No portion delineated; no facilities in the vicinity
FO-12	II	No portion delineated; no facilities in the vicinity
PE-5	III	No portion delineated; no facilities in the vicinity
PE-7	II	No portion delineated; no facilities in the vicinity
SC-12	II	W110 and W111
SC-13	III	W59, W60, W61, W62, W63, W64 and W65

Table 2.7-2 Delineated Wetland Summary – Project Area, Noble Ball Hill Windpark

Wetland Community Type	Acreage of Wetland Delineated (No. of Wetlands Delineated)	Acreage of Wetlands With Apparent Connection to Waters of the United States Potentially Under Federal Jurisdiction[1] (No. of Wetlands With Apparent Connection to Waters of the United States)	Acreage of Wetlands With No Apparent Connection to Waters of the United States[2] (No. of Wetlands With No Apparent Connection to Waters of the United States)	Acreage of Wetlands Under the Jurisdiction of NYSDEC[3] (No. of Wetlands Under NYSDEC Jurisdiction)
PFO	11.62 (25)	11.28 (22)	0.34 (3)	3.63 (3)
PFO1/4	9.57 (17)	9.57 (17)	NA	NA
PEM/PSS/PFO	8.78 (7)	8.78 (7)	NA	3.92 (2)
PSS/PFO	4.73 (6)	4.72 (6)	NA	0.99 (1)
PEM/PFO	2.86 (6)	2.86 (6)	NA	NA
PEM/PFO1/4	5.31 (4)	3.65 (2)	1.66 (2)	1.43 (1)
PEM/PSS	17.98 (35)	17.71 (32)	0.27 (3)	NA
PSS	3.33 (11)	3.28 (10)	0.06 (1)	0.08 (1)
PEM	29.50 (126)	27.80 (99)	1.69 (27)	10.32 (2)
Total Wetlands Delineated Within the Survey Corridor	**(237)**	**(201)**	**(36)**	**(10)**
Total Acreage of Delineated Wetlands Within the Survey Corridor	**93.68**	**89.66**	**4.02**	**20.37**

Notes:

[1] Includes wetlands for which a surface water connection to waters of the United States was identified during field surveys. These wetlands may be determined to be federally jurisdictional. The jurisdictional determination will be made by the USACE.

[2] Includes wetlands for which no apparent surface water connection to waters of the United States was identified during field surveys. These wetlands may not be federally jurisdictional. The jurisdictional determination will be made by the USACE.

[3] Includes delineated wetlands that overlap/correspond with NYSDEC mapped freshwater wetlands that are assumed to be under the jurisdiction of the state. This also includes Wetland W104, that does not correspond with a NYSDEC mapped freshwater wetland, but is likely greater than 12.4 acres in size. The jurisdictional determination will be made by NYSDEC

Key:

NA = Not applicable.
NYSDEC = New York State Department of Environmental Conservation.

2.8 Wetlands: Impacts and Mitigation

This section discusses impacts to wetlands as a result of construction and operation of facilities within the Project Area. Project facilities have been sited to minimize or avoid wetland impacts to the greatest extent practicable, although to meet the Project objectives, some unavoidable wetland impacts will occur. Section 2.8.1 discusses impacts associated with construction of the Project, and Section 2.8.2 discusses impacts associated with operation of the Project. Section 2.8.3 provides a discussion of measures taken to avoid, minimize, and mitigate for unavoidable wetland impacts. A detailed description of wetlands within the Project Area is provided in the wetland delineation report in Appendix G. A detailed description of impacts to each wetland will be provided in the Joint Application for Permit to the United States Army Corps of Engineers (USACE) and New York State Department of Environmental Conservation (NYSDEC) for the Project.

Two hundred thirty seven wetlands, totaling approximately 93.7 acres were identified and delineated within the approximately 1,310-acre survey corridor of the Project Area. For the purposes of this discussion, federal jurisdiction is assumed for these wetlands if there is any evidence of a surface water connection to a waterbody that eventually flows into a traditional navigable waterway. State jurisdiction has been assumed if there is a surface water connection to a mapped NYSDEC Wetland or if the wetland is thought to exceed 12.4 acres in size based on field observation and desktop review of conditions outside of the survey corridor. Final jurisdictional determinations will be made by the USACE and NYSDEC subsequent to field verification.

Activities associated with construction and the operation of Project facilities within most of the delineated wetlands are subject to federal and/or state regulations. Noble will file appropriate permit applications with the USACE and NYSDEC. A summary of the USACE and NYSDEC regulations pertaining to wetlands is provided in Section 2.7, Wetlands: Environmental Setting.

The wetland impact discussion provided in this section is broken down by impacts during construction and impacts resulting from operation of the Project facilities. Construction disturbance includes all areas to be disturbed during construction activities; as such; they include all clearing, and impacts arising from, grading, placement of poles for overhead transmission, placement of wetland mats, and placement of fill. For the generation portion of the project, this includes the acreage of all wetlands that fall within the construction right of way (ROW). For the transmission portion of the Project, this includes the acreage of all wetlands that fall within the 100-foot-wide permanent ROW. For both the generation and transmission portions of the Project, construction disturbance equals the area of temporary impact, plus the area of permanent impact, plus the areas where clearing only will take place (T-line only).

Temporary impacts for the generation portion of the Project are defined as wetland impacts associated with filling or excavation activities where the Project Site will be restored to preconstruction contours and elevation. Temporary impacts for the transmission portion of the Project would be limited to temporary placement of wetland mats within a 30-foot-wide travel corridor to provide access across wetlands. (Temporary placement of wetland mats is considered a temporary impact by NYSDEC only. The USACE does not consider temporary placement of wetland mats as an impact.)

For the purposes of this discussion, permanent impacts for both generation and transmission refer to permanent placement of fill within wetlands that result in a loss of wetland acreage. Placement of fill includes placement of fill for permanent roadways and for placement of poles for overhead transmission lines. Permanent fill impacts will not result from turbine facilities or overhead/underground collection.

For the purposes of this discussion, clearing refers to clearing of vegetation within the construction ROW for overhead transmission lines with no other ground disturbance, placement of fill or placement of wetland mats. The discussion of clearing impacts is limited to the transmission portion of the Project because any clearing of vegetation within the generation portion of the project is also associated with ground disturbance and is included in the numbers reported for temporary impacts. For the transmission portion of the Project, clearing impacts reflect the portion of wetlands that fall within the permanent ROW, but that are not within the 30-foot-wide travel corridor.

Permanent forest conversion is used to indicate the permanent loss of forest cover in wetlands associated with clearing and vegetation removal in areas of temporary impact, and which will be maintained in a shrub or emergent condition during operation of the Project facilities. Wetlands with herbaceous or shrub cover that are cleared in association with construction are expected to return to pre-existing herbaceous or shrub state within weeks to months of construction. While conversion is recognized as a long-term project impact, it is distinguished from permanent impacts associated with fill to facilitate review and permitting of the Project. For the generation portion of the Project, this includes the acreages of all forested wetlands that fall within the construction ROW that will not be permanently filled (i.e., any forested wetland subjected to temporary disturbance during construction). Permanent conversion within the transmission portion includes all forested wetlands within the permanent ROW that will be permanently maintained to prevent reestablishment of trees.

Summary of Impacts

Construction of the Project (i.e., access roads, collection lines, transmission lines, and turbine sites) will result in construction disturbance to a total of 15.87 acres of wetlands, of which, approximately 0.33 acres will be permanently impacted by placement of fill and 6.54 acres of wetland will be temporarily impacted by grading, ground disturbance or placement of fill during construction and will be returned to preconstruction contours and allowed to revegetate to shrub/scrub or emergent cover. The remaining 9 acres of wetlands disturbed during construction will be cleared for operation of the transmission line. The majority of wetlands subject to clearing within the construction ROW are herbaceous and shrub/scrub wetlands, which are expected to quickly revert to their preconstruction conditions. Operation of the generation and transmission facilities will result in permanent conversion of 5.11 acres of forested wetland to shrub/scrub or emergent wetland as a result of periodic removal of woody vegetation adjacent to access roads and within collection and transmission line corridors. (Note: Wetland acreage impacted by permanent forest conversion includes some wetland acreages reported for clearing and some reported as temporary, and does not represent additional impact areas.) Total wetland impacts for the entire Project are listed in Table 2.8-1. Impacts to federally jurisdictional wetlands are broken down in Table 2.8-2. Impacts to State Jurisdictional Wetlands are presented in Table 2.8-3. Forest conversion impacts are listed in Table 2.8-4.

Of the 15.87 acres of wetlands disturbed during construction, 15.71 acres have been assumed to be federally jurisdictional. Of the 15.71 acres, 0.32 acres will be permanently impacted by placement of fill and 6.39 acres will be temporarily impacted by grading, ground disturbance, or placement of fill during construction and will be returned to preconstruction contours and allowed to revegetate to shrub/scrub or emergent cover. As such, these impacts are reported as temporary impacts. The remaining 9 acres of wetlands disturbed during construction will be subject to disturbance related to clearing within the construction ROW for the transmission line. Of the wetlands disturbed as a result of construction, operation of the Project facilities will result in permanent conversion of 5.11 acres of federally jurisdictional forested wetland to shrub/scrub or emergent wetland as a result of periodic removal of woody vegetation adjacent to access roads and within collection corridors.

Construction of the Project will result in disturbance to 6.62 acres of state-regulated wetlands. All state jurisdictional wetlands are a subset of federally jurisdictional wetlands. As such, impacts to state jurisdictional wetlands are included in, and are not additional to, the acreages reported as impacts to federally jurisdictional wetlands. Of the 6.62 acres, 1.80 acres of wetland will be temporarily impacted by grading, ground disturbance, or placement of fill during construction and will be returned to preconstruction contours and allowed to revegetate to shrub/scrub or emergent cover. As such, these impacts are reported as temporary impacts. The remaining 4.82 acres of wetlands disturbed during construction will be subject to disturbance related to clearing within the construction ROW for the transmission line. Construction of the Project will not result in any permanent impacts to state-regulated wetlands. Of the wetlands disturbed during construction, operation of the Project facilities will result in permanent conversion of 2.67 acres of state regulated forested wetland to shrub/scrub or emergent wetland as a result of periodic removal of woody vegetation within the transmission corridor. Impacts to state jurisdictional wetlands are broken down in Table 2.8-3. Forest conversion impacts are listed in Table 2.8-4.

2.8.1 Construction Impacts

During Project construction, wetlands will be disturbed to establish the construction ROW and to provide sufficient access to accommodate construction equipment and staging areas at each turbine location, access road, collection line, and transmission line, to safely and efficiently erect and construct the facilities. Disturbance to these areas during construction activities includes all temporary and permanent impacts related to grading and placement of fill, as well as disturbance associated with clearing. The majority of the wetlands disturbed during construction will be subjected only to clearing activities related to clearing within the permanent ROW along the transmission line to protect the transmission line from potential damage associated with trees falling on the line. Generally, wetlands impacted by grading or placement of fill will be returned to pre-construction contours. Such impacts are reported as temporary impacts. Tables 2.8-1 through 2.8-4 indicate construction impacts.

Turbines

Installation of turbine staging areas will result in unavoidable temporary wetland impacts associated with grading and removal of vegetation. Each turbine will require a maximum staging area of 300 by 300 feet to stage turbine parts and position construction equipment around the turbine site. Sufficient space is needed around the turbine base to maneuver equipment and avoid safety hazards for construction workers. The staging areas were sited and modified to avoid and minimize impacts to wetlands as much as possible, while still providing a safe and functional workspace to erect the towers. All staging area impacts were calculated for the entire staging area. While Noble successfully located all turbines outside of wetlands, wetlands were delineated within the staging areas.

Within the maximum 300 by 300-foot square staging area, generally a 200 by 200-foot square area will be cleared and graded to a slope of 5% or less to facilitate the layout of turbine components. Disturbance outside of this 200 by 200-foot square area will generally be limited to tree cutting necessary for rotor assembly and storage of excess topsoil, subsoil, or woody material including stumps, roots, logs, and/or wood chips. The site contours of the turbine staging areas have been designed to utilize the existing base contours rather than importing significant fill volumes. After construction, the wetland areas that have been disturbed will be restored to preexisting contours while maintaining the integrity of the turbine base. These areas will be allowed to revegetate to an emergent or scrub-shrub community.

Access Roads

Access roads were sited to avoid wetlands to the extent possible. However, construction of access roads for the Project will result in unavoidable temporary and permanent wetland impacts associated with grading and placement of fill. As a measure to minimize impacts to wetlands, Noble reduced the nominal ROW width from the 60 feet used outside of wetland areas to the 40-foot ROW proposed through wetlands. Thus, construction disturbance within wetlands will include the removal of vegetation and grading within a 40-foot construction ROW in wetlands to provide safe egress, and a temporary 35-foot-wide access road will be installed within the construction corridor. Culverts and fords will be installed during road construction in appropriate areas to maintain wetland hydrology while the roads are in place. Typical design drawings of these methods are included in Appendix A. Noble will require a permanent 16-foot access road to each turbine. (, An additional impact of 2-feet on either side of the road may be required in order to maintain a 2:1 sloped embankment in wetlands and other low-lying areas in order to maintain road stability.) After construction is completed, the additional road width required for construction will be removed, and the construction corridor will be restored to pre-construction contours and revegetated.

Underground Collection Lines

Construction of the Project will result in temporary wetland impacts associated with construction of underground collection lines. Construction disturbances within the underground electrical collection system corridors include the removal of forested and woody vegetation and trenching to install underground collection lines. These areas will be returned to preconstruction contours and will be allowed to revegetate to an emergent or scrub-shrub community. Where possible, the underground electrical collection lines will be installed immediately adjacent to the operational access roads. However, in areas where the collection lines cannot be installed adjacent to an access road (i.e., between clusters not connected by an access road), the lines will be installed within a corridor ranging between 22 feet wide for one circuit and up to 50 feet wide for four circuits. The lines will be placed inside a narrow trench with select bedding material (e.g., thermal sand) and then backfilled with native material. To the extent practicable, the narrow collection system trenches will not create an impervious boundary and, therefore, will not cause any alteration in the subsurface hydrology of wetlands. However, where necessary, trench plugs will be used to prevent migration of water out of the wetland. Pre-existing contours will be restored after the trench is backfilled and the area is revegetated. No permanent filling of wetlands will occur in association with underground collection lines.

Transmission Lines

Construction disturbances to wetlands located within the ROW for the Transmission Line include: the clearing of forested and woody vegetation; placement of wetland mats for equipment access; and placement of one pole for overhead transmission lines within a wetland. A 100-foot wide permanent ROW will be required for operation of the transmission line and will be cleared during construction. Equipment will operate on wetland mats within a 30-foot wide travel corridor adjacent to the transmission line centerline during construction. The mats will be removed and these wetlands will be returned to preconstruction contours and allowed to revegetate to an emergent or scrub-shrub community, following construction. Installation of one pole for the transmission line will result in de minimis impacts to the wetlands due to incidental displacement of soil during drilling for the pole and from permanent installation of the pole.

2.8.2 Project Facility Impacts

Project facilities will have minimal impacts on wetlands associated with operation of the Project. Permanent impacts on wetlands resulting from placement of fill for permanent access roads and from permanent placement of a pole for overhead transmission lines will have minimal permanent impacts on wetlands. Temporary wetland impacts associated with equipment access or excavation of underground facilities for repairs or maintenance during operation of the Project may occur. In the event that temporary impacts are required for future maintenance, Noble will obtain necessary permits from the USACE and NYSDEC on an as-needed basis. Finally, the operation of Project facilities will result in the permanent conversion of forested wetlands to shrub/scrub or emergent wetlands.

Turbines

Maintenance of the turbine staging areas during operation of the Project will require the permanent conversion of forested wetlands within the 200 by 200-foot clearing area to shrub/scrub or emergent wetlands. No permanent fill is required in conjunction with the turbines.

Access Roads

Noble will require a permanent 16-foot access road to each turbine. In wetlands and other low-lying areas, a 2-foot permanent shoulder on either side of the road may be required. All impact calculations have been based on a 20-foot wide permanent fill to account for road shoulders. The 40-foot-wide construction corridor for access roads will be maintained in an herbaceous or shrub/scrub state. As such, maintenance of the access road corridor will result in permanent conversion of forested wetlands.

Underground Collection Lines

There will be no permanent fill impacts on wetlands associated with underground collection. The construction corridor for underground collection will be maintained in an herbaceous or shrub/scrub state. As such, maintenance of the underground collection corridor will result in permanent conversion of forested wetlands.

Transmission Lines

Operation of Project facilities associated with Transmission will result in de minimis permanent impacts associated with the placement of one pole within a wetland for overhead transmission. Operation of Project facilities along the Transmission Line will require the permanent conversion of forested wetlands within the 100-foot ROW to shrub/scrub or emergent wetlands. Vegetation will be hand cleared and wetland mats will be used to avoid ground disturbance. The ROW will be maintained during operation of the Project to prevent re-establishment of trees. These areas will be periodically maintained to retain an herbaceous or shrub/scrub cover.

2.8.3 Mitigation

As part of the detailed alternatives analysis presented in Section 1.3, Project Alternatives, Noble completed an intensive multi-phased siting process considering factors that included topography, location of wetlands and other sensitive resources, availability of sufficient wind resources, proximity to existing roads and transmission lines, locations of residential dwellings, and landowner access agreements. Each of these factors imposed limitations on the amount of flexibility available during the turbine siting process. Once these factors were considered, turbines and ancillary facilities (i.e., roads and collection system) were sited to minimize environmental impacts. Where possible, Noble made every effort to collocate electrical lines and roads within the same corridor; optimize the use of previously disturbed areas, such as farmlands and roads; and avoid wetland and stream crossings. Despite an extensive effort to entirely avoid wetland impacts, because of other constraints and the linear nature of some Project components, it was not possible to design the Project without minimal impacts on wetlands while still meeting Project objectives. The process undertaken by Noble to minimize wetland impacts in the design of this Project is described below.

Minimization and Avoidance of Impacts through Wetland Study and Siting

A wetland study was conducted to determine the extent and quality of wetlands with the potential to be impacted by the Project. The wetland study consisted of a desktop review of existing wetland location information and mapping, reconnaissance level wetland surveys, and detailed wetland delineations. Each phase of the wetland study was used to refine siting for the Project facilities to minimize impacts to wetlands while balancing impacts to other resources.

The desktop review indicated that wetlands under state and federal jurisdiction were likely to exist within the Project Area. Based on the results of the desktop review, field reconnaissance-level surveys were conducted to develop general siting constraints. The general locations of large wetlands were identified, wetlands and streams were buffered, and these areas were blocked for consideration for turbine siting. Wetlands were considered along with other constraints and a preliminary turbine layout was developed.

A second round of reconnaissance-level wetland surveys was conducted based on the preliminary turbine layout. The primary purpose of the surveys was to refine the preliminary turbine locations to ensure that each site had sufficient space to locate the turbine and associated workspaces outside of wetlands. Additionally, preliminary access road routes were identified during this field effort. Project engineers conducted an initial desktop review of the preliminary access roads and a wetland delineation field survey corridor was established.

Detailed wetland delineations were conducted at the Project Site based on preliminary siting of facilities. The goal of the detailed wetland delineations was to identify and document wetlands that would potentially be temporarily or permanently disturbed as a result of construction or operation of the proposed facilities.

The Project Site, or survey corridor, generally included a 300-foot corridor centered on linear facilities and a circular area with a 250-foot radius around each turbine location. In some areas, the Project Site was restricted by property access or other factors, in other areas it was expanded (i.e., additional areas were examined to ensure that regulated buffers adjacent to NYSDEC regulated wetland were accounted for). The delineated wetland boundaries were added to facility mapping and used to further refine the location of turbine sites, roads, and electrical collection to avoid and minimize impacts to wetlands to the extent practicable.

Minimization of Impacts during Construction and Operation of the Project

Every effort was made to avoid wetlands with Project components, and all turbine structures were located outside of wetland boundaries. However, because of the linear nature of the access roads, electrical collection system lines, as well as various engineering constraints, wetland impacts were unavoidable. Access roadways and electrical collection facilities were collocated to the extent practicable to minimize wetland impacts. Additionally, impacts have been minimized by utilizing existing log roads, existing farm roads, and areas disturbed in association with silviculture activities and by utilizing the shortest crossing where possible.

Furthermore, the size of access road, collection and transmission line equipment access corridors within wetlands has been restricted to the width necessary to safely and effectively construct and transport equipment to the tower sites. The size and weight of the wind turbine components require a stable road surface free of obstructions, thus dictating the amount of woody vegetation that must be cleared and the size of the construction access roads. Roads will be gravel-based and will not require any impermeable top coating. Appropriately sized culverts will be used to maintain the hydrologic connectivity of the wetlands. Where possible, access road crossings have been collocated with existing crossings; therefore, the opportunity may exist to improve the connectivity of wetland areas where existing roads have not been adequately culverted or bridged.

During construction and restoration of the Project Site, best management practices (BMPs) will be implemented to minimize impacts to the wetland resource. These practices include: stripping and stockpiling the wetland topsoil separate from subsoil layers during grading operations; use of geotextile fabric and/or crossing mats to minimize soil compaction; and installation of appropriately designed fords or culverts to maintain wetland hydrology.

Noble will follow all NYSDEC and USACE permit requirements regarding restoration of wetland impacts. In areas where underground collection lines are not collocated with access roads, Noble will return these wetlands to preconstruction grades and allow for the natural recruitment of plants into the underground collection corridor.

An Invasive Species Management Plan (ISMP) will be developed in consultation with NYSDEC and the USACE prior to the onset of construction activities. A draft ISMP is included in Appendix I as part of the Environmental Monitoring Plan. The ISMP discusses measures to prevent the spread or introduction of invasive species into the Project Area, measures to control existing invasive communities within the Project Site, and long-term monitoring procedures.

Maintenance activities associated with Project facilities will include: routine maintenance of wind turbines; collection and transmission line service; selective vegetative pruning around facilities; and access road maintenance. No chemical treatment of invasive populations will be used within 100 feet of any wetland boundary.

Noble will utilize BMPs while installing underground collection cables. Trench plugs will be used, as appropriate, and installed immediately after cable laying and prior to trench backfilling, in order to maintain existing hydrological conditions.

Noble will implement a Stormwater Pollution Prevention Plan (SWPPP) in accordance with NYSDEC permit requirements, which will include an Erosion and Sediment Control Plan and BMPs designed to minimize impacts to those wetlands crossed. During construction operations through permitted wetland areas, BMPs such as silt fencing, straw bale barriers, or temporary rock sediment traps will be installed to minimize off-site migration of Project-related sediment. SWPPP measures proposed for the Project are provided under Appendix E.

Mitigation for Unavoidable Impacts

For those wetland impacts that cannot be avoided, Noble anticipates that mitigation will be required as a condition of the wetland disturbance permits that will be required prior to construction. Within the NYSDEC and USACE permitting requirements, compensatory mitigation can only be considered after the Project proponent demonstrates avoidance and minimization to the extent possible. A Conceptual Wetland Mitigation Plan is provided in Appendix I.

Based on USACE guidance, mitigation can be completed either financially, in the form of in-lieu-fee mitigation, land acquisition for preservation purposes, regional mitigation banking, or in the form of a specific wetland restoration, creation, or enhancement project developed in conjunction with the Project. Depending on agency input and local availability of existing mitigation opportunities, the mitigation may also take the form of a consolidated mitigation plan combining several of the available mitigation options.

Mitigation will be required for unavoidable, permanent fill impacts on regulated wetlands (wetland loss) and for loss of function associated with permanent conversion of forested wetlands (loss of wildlife habitat). The Conceptual Mitigation Plan, provided in Appendix I, takes into account the permanent and temporary loss of wetland functions and values provided by the impacted wetlands. The goal of the mitigation plan is to restore, create, and/or enhance wetland hydrology, and hydric soil conditions to adequately offset the loss of function and value to the jurisdictional wetlands on the site resulting from Project implementation. A final mitigation plan will be developed in conjunction with NYSDEC and the USACE as part of their permitting process. The final mitigation plan will take into account the site-specific cumulative loss of biological function provided by the impacted wetlands, as well as any identified public value.

Table 2.8-1 Total Wetland Impacts, Entire Project

	Construction Disturbance[1]	Temporary Impacts (Areas to be Restored to Preconstruction Contours following Construction)[2]	Permanent Impacts (Permanent Placement of Fill)[3]	Clearing[4]
Turbines	0.33	0.33	NA	NA
Access Roads	0.94	0.61	0.33	NA
Underground Collection	2.11	2.11	NA	NA
Overhead Collection	NA	NA	NA	NA
Transmission	12.49	3.49	0.0005	9.00
Total	**15.87**	**6.54**	**0.33**	**9.00**

Notes:

[1] Construction disturbance includes all areas to be disturbed during construction activities, as such, they include all impact related to clearing, grading, placement or poles for overhead transmission, placement of wetland mats, and placement of fill. For the generation portion of the Project, this includes the acreage of all wetlands that fall within the construction ROW. For the transmission portion of the Project, this includes the acreage of all wetlands that fall within the 100 foot wide permanent ROW.

[2] Temporary impacts for the generation portion of the Project are defined as wetland impacts associated with filling or excavation activities where the Project Site will be restored to preconstruction contours and elevation. Temporary impacts for the transmission portion of the Project Site are limited to temporary placement of wetland mats within a 30-foot wide travel corridor to provide access across wetlands.

[3] Permanent impacts for both the generation portion and transmission portion of the project refer to permanent placement of fill within wetlands that results in a loss of wetland acreage. Placement of fill includes placement of gravel fill for permanent roadways, and placement of poles for overhead collection or transmission lines.

[4] Clearing refers to clearing of vegetation within the construction ROW for overhead collection or transmission lines with no other ground disturbance. No clearing will occur within the generation portion of the Project. For the transmission portion of the Project this refers to wetlands within the permanent ROW that are not within the 30-foot-wide travel corridor.

Table 2.8-2 Impacts to Federally Jurisdictional Wetlands, Entire Project[5]

	Construction Disturbance[1]	Temporary Impacts (Areas to be Restored to Preconstruction Contours following Construction)[2]	Permanent Impacts (Permanent Placement of Fill)[3]	Clearing[4]
Turbines	0.29	0.29	NA	NA
Access Roads	0.93	0.61	0.32	NA
Underground Collection	2.00	2.00	NA	NA
Overhead Collection	NA	NA	NA	NA
Transmission	12.49	3.49	0.0005	9.00
Total	**15.71**	**6.39**	**0.32**	**9.00**

Notes:

[1] Construction disturbance includes all areas to be disturbed during construction activities, as such, they include all impact related to clearing, grading, placement or poles for overhead transmission, placement of wetland mats, and placement of fill. For the generation portion of the Project, this includes the acreage of all wetlands that fall within the construction ROW. For the transmission portion of the Project, this includes the acreage of all wetlands that fall within the 100-foot-wide permanent ROW.

[2] Temporary impacts for the generation portion of the Project are defined as wetland impacts associated with filling or excavation activities where the Project Site will be restored to preconstruction contours and elevation. Temporary impacts for the transmission portion of the Project Site are limited to temporary placement of wetland mats within a 30-foot-wide travel corridor to provide access across wetlands.

[3] Permanent impacts for both the generation portion and transmission portion of the project refer to permanent placement of fill within wetlands that results in a loss of wetland acreage. Placement of fill includes placement of gravel fill for permanent roadways, and placement of poles for overhead collection or transmission lines.

[4] Clearing refers to clearing of vegetation within the construction ROW for overhead collection or transmission lines with no other ground disturbance. No clearing will occur within the generation portion of the Project. For the transmission portion of the Project this refers to wetlands within the permanent ROW that are not within the 30 foot wide travel corridor.

[5] Federal Jurisdiction is assumed if there is any evidence of a surface water connection to a waterbody that eventually flows into a traditional navigable waterway. Final jurisdictional determination will be made by USACE subsequent to field verification.

Table 2.8-3 Impacts to State Jurisdictional Wetlands, Entire Project[5]

	Construction Disturbance[1]	Temporary Impacts (Areas to be Restored to Preconstruction Contours following Construction)[2]	Permanent Impacts (Permanent Placement of Fill)[3]	Clearing[4]
Turbines	NA	NA	NA	NA
Access Roads	NA	NA	NA	NA
Underground Collection	NA	NA	NA	NA
Overhead Collection	NA	NA	NA	NA
Transmission	6.62	1.80	0.0005	4.82
Total	**6.62**	**1.80**	**0.0005**	**4.82**

Notes:

[1] Construction disturbance includes all areas to be disturbed during construction activities, as such, they include all impact related to clearing, grading, placement or poles for overhead transmission, placement of wetland mats, and placement of fill. For the generation portion of the Project, this includes the acreage of all wetlands that fall within the construction ROW. For the transmission portion of the Project, this includes the acreage of all wetlands that fall within the 100 foot wide permanent ROW.

[2] Temporary impacts for the generation portion of the Project are defined as wetland impacts associated with filling or excavation activities where the Project Site will be restored to preconstruction contours and elevation. Temporary impacts for the transmission portion of the Project Site are limited to temporary placement of wetland mats within a 30-foot wide travel corridor to provide access across wetlands.

[3] Permanent impacts for both the generation portion and transmission portion of the project refer to permanent placement of fill within wetlands that results in a loss of wetland acreage. Placement of fill includes placement of gravel fill for permanent roadways, and placement of poles for overhead collection or transmission lines.

[4] Clearing refers to clearing of vegetation within the construction ROW for overhead collection or transmission lines with no other ground disturbance. No clearing will occur within the generation portion of the Project. For the transmission portion of the Project this refers to wetlands within the permanent ROW that are not within the 30 foot wide travel corridor.

[5] All state jurisdictional wetlands are a subset of federally jurisdictional wetlands. As such, impacts to state jurisdictional wetlands are included in, and are not additional to, the acreages reported as impacts to federally jurisdictional wetlands. State jurisdiction has been assumed if a field-delineated wetland corresponds to a mapped NYSDEC wetland based on map interpretation, has a surface water connection to a mapped NYSDEC Wetland or if the wetland is thought to exceed 12.4 acres in size. Final jurisdictional determination will be made by NYSDEC subsequent to field verification (Note: No wetlands under State jurisdiction were identified in the generation portion of the Project).

Table 2.8-4 Permanent Conversion of Forested Wetlands, Entire Project[1]

	Total Forested Wetland Conversion	Federally Jurisdictional Forested Wetland Conversion	State Jurisdictional Forested Wetland Conversion
Turbines	0.15	0.15	NA
Access Roads	0.18	0.18	NA
Underground Collection	1.11	1.11	NA
Overhead Collection	NA	NA	NA
Transmission	3.66	3.66	2.67
Total	**5.11**	**5.11**	**2.67**

Notes:

[1] Permanent forest conversion is used to indicate the permanent loss of forest cover in wetlands associated with clearing activities, and which will be maintained in a shrub/scrub or emergent condition during operation of Project facilities. It is determined by adding the forested wetland portion of wetland acreages reported for clearing and the forested wetland portion of the wetland acreages reported as temporary impact. It is the total forested wetland that will be permanent converted to herbaceous or shrub scrub communities. While conversion is recognized as a long term impact, it is distinguished from permanent impacts associated with fill to facilitate review and permitting of the Project. For the generation portion of the Project, this includes the acreages of all the forested wetlands within the construction ROW that will not be permanently filled. Permanent conversion within the transmission portion of the Project includes all forested wetlands within the permanent ROW that will be permanently maintained to prevent reestablishment of trees.

All state jurisdictional wetlands are a subset of federally jurisdictional wetlands. As such, impacts to state jurisdictional wetlands are included in, and are not additional to, the acreages reported as impacts to federally jurisdictional wetlands.

2.9 Biological Resources: Environmental Setting

This section provides an overview of upland (non-wetland) and wetland vegetative communities, aquatic habitat, and wildlife associated with these communities. A discussion of threatened and endangered plant and animal species is also provided.

General land use within the Project Area includes active and inactive agricultural land, forested areas, and residential areas (see Section 2.23, Land Use: Environmental Setting, for a detailed land use discussion). The general population pattern in the area is low-density rural residential, consisting of scattered residences along roads. Within the Project Area, active agricultural areas are used for row crops, field crops, pasture and vineyards; and inactive agricultural areas are in successional stages (progressive stages of re-growth), including old-field and shrub communities. The dominant communities are beech-maple mesic forest, successional northern hardwoods, hemlock-northern hardwoods, and agriculture. Current and historic timbering activities have been observed throughout the area.

The mosaic of uplands and wetlands within the Project Area offers a variety of habitats and ecozones beneficial to a broad wildlife assemblage. The community structure found within the Project Area is typical of other western New York areas with similar significant agricultural production, ranging from woodlots to old fields. Wildlife associated with these communities throughout the Project Area is typical of what would be found throughout much of western New York.

2.9.1 Vegetation

This section provides a discussion of existing vegetative communities and habitat conditions in the Project Area. Section 2.9.1.1 describes upland vegetative communities found in the Project Area. Section 2.9.1.2 discusses wetland and aquatic habitat. Section 2.9.1.3 discusses threatened and endangered plant species in the Project Area.

2.9.1.1 Upland Vegetative Communities

Vegetation cover types are presented on Figure 2.9-1, Ecological Communities. Two climax communities (stable, mature communities) are represented: beech-maple mesic forest and hemlock-northern hardwood forest. Most of the stands representing these climax communities are impacted to some degree by human disturbance, specifically silviculture. The remaining communities are in various stages of succession following agricultural or silvicultural disturbance.

Upland communities in the Project Area were categorized according to Edinger et al. (2002), which was developed as part of the Natural Heritage Program (NHP) to provide a standard classification system for environmental impact statements. The classification system in Edinger et al. (2002) incorporates the NHP’s global (G) and state (S) rarity ranking system, which was developed by The Nature Conservancy. The global rank reflects the rarity of the community throughout the world, and the state rank reflects its rarity within the state of New York. The system is based on a scale of 5 to 1, in which 5 represents secure habitats and 1 represents those that are most vulnerable. Global ranks for communities are not currently standardized by The Nature Conservancy, thus, the ranks listed in the community descriptions are estimated global ranks (Edinger et al. 2002).

Based on field observations, interpretation of aerial photographs, and the classification system presented in Edinger et al. (2002), seven general ecological communities were identified in the Project Area: beech-maple mesic forest, hemlock northern hardwood forest, successional northern hardwood forest, successional shrubland, successional old field, vineyards/tree farms and agriculture (row crops, field crops, and pastureland). Due to the likelihood of crop rotation and the indistinct differentiation between field crops and pastureland row crops, field crops, and pasturelands have been combined into a single category (agricultural) on Figure 2.9-1.

A detailed description of vegetation associated with each community type, as observed during field surveys in spring 2008, is provided below. Separate descriptions are provided for agriculture (crops) and agriculture (pastureland). To give a more complete overview of the communities, a list of typical wildlife associated with each community type is included in Section 2.9.2. A general discussion of land use and land cover is presented in Section 2.23, Land Use: Environmental Setting.

Beech-Maple Mesic Forest

Rank: (G4) (S4)
Status: Secure

Description. This hardwood forest occurs on moist, well-drained, acidic soils.

Distribution. Beech-maple mesic forest is found throughout the Project Area.

Vegetation.

- **Overstory:** Sugar maple (*Acer saccharum*) and American beech (*Fagus grandifolia*) are co-dominants, with black cherry (*Prunus serotina*) and white ash (*Fraxinus americana*) as common associate tree species. Less common tree species are green ash (*Fraxinus pennsylvanica*), eastern hop hornbeam (*Ostrya virginiana*), eastern hemlock (*Tsuga canadensis*), American elm (*Ulmus americana*), hawthorn (*Crataegus* spp.), shagbark hickory (*Carya ovata*), and red maple (*Acer rubrum*).

- **Understory/Shrub Layers:** The understory layer consists primarily of raspberry (*Rubus* spp.), witch hazel (*Hamamelis virginiana*), ironwood (*Carpinus caroliniana*), northern arrowwood (*Viburnum recognitum*), and eastern hop hornbeam.

- **Herbaceous Layers:** The herbaceous layer consists of wood fern (*Dryopteris* spp.), white wood aster (*Aster divaricatus*), blue cohosh (*Caulophyllum thalic-*

troides), Christmas fern (*Polystichum acrostichoides*), trout lily (*Erythronium americanum*), and mayapple (*Podophyllum peltatum*).

Hemlock-Northern Hardwood Forest

Rank: (G4) (G5) (S4)
Status: Secure

Description. This mixed forest type usually occurs on middle to lower slopes of ravines, on cool, mid-elevation slopes, and on moist, well-drained soils along the margins of swamps. A broadly defined community with many variations, hemlock is co-dominant with one to several hardwood species. In association with white pine, this is considered the ultimate climax community for most of western New York.

Distribution. Hemlock-northern hardwood forests occur in large tracts throughout the Project Area.

Vegetation.

- **Overstory:** Eastern hemlock is co-dominant with American beech, black cherry, yellow birch (*Betula alleghaniensis*), and red maple.

- **Understory/Shrub Layers:** The understory layer consists of striped maple (*Acer pensylvanicum*), spicebush (*Lindera benzoin*), eastern hop hornbeam, American elm, ironwood, witch hazel, and raspberry.

- **Herbaceous Layers:** The herbaceous layer consists of white wood aster and common wood fern (*Dryopteris intermedia*).

Successional Northern Hardwoods

Rank: (G5) (S5)
Status: Secure

Description. These hardwood or mixed forests occur on sites that have been cleared or otherwise disturbed. A broadly defined community dominated by light-requiring, wind-dispersed species, it is well adapted to disturbed conditions and characterized by early colonizing tree species. The shrub and herbaceous layer may still comprise species typical of successional old-field and shrubland communities. Successional hardwoods can follow any previously disturbed forest community.

Distribution. Successional northern hardwood forests occur throughout the Project Area where logging activities and prior clearing have impacted forest communities, where fields have historically been left to revert to forest, and along the edges of more mature forest. This community type is the most common forest type found throughout the Project Area.

Vegetation.

- **Overstory:** The overstory consists of red maple, trembling aspen (*Populus tremuloides*), black cherry, black walnut (*Juglans nigra*), hawthorn, crabapple (*Malus coronaria*), and green ash.
- **Understory/Shrub Layers:** This layer is composed of seedlings of the overstory tree species and successional old field communities including multiflora rose (*Rosa multiflora*), raspberry, and red maple.
- **Herbaceous Layers:** These layers are composed of seedlings of the overstory tree species and successional old field communities including strawberry (*Fragaria virginiana*), buttercup (*Ranunculus spp*.), Canada goldenrod (*Solidago canadensis*), and rough stemmed goldenrod (*Solidago rugosa*).

Successional Shrubland

Rank: (G4) (S4)
Status: Secure

Description. These communities occur on lands that were cleared or disturbed for agricultural, silvicultural, or development purposes but are no longer actively used. This habitat is generally a successional stage between successional old field and successional northern hardwood.

Distribution. Successional shrubland areas are scattered throughout the Project Area where agricultural land has been abandoned for three to five years.

Vegetation.

- **Overstory:** None.
- **Understory/Shrub Layers:** The understory consists predominantly of northern arrowwood, but also included are red maple, hawthorne, raspberry, multiflora rose, willow (*Salix* spp.), and honeysuckle.
- **Herbaceous Layers:** These layers are composed of blackberry, Canada goldenrod, bluegrasses (*Poa* spp.), orchard grass, strawberry, Queen Anne’s lace, meadowsweet, rough stem goldenrod, and dandelion.

Successional Old Field

Rank: (G4) (S4)
Status: Secure

Description. Forbs and grasses dominate this community. It occurs on lands that had been cleared and plowed for agriculture or development and have since been abandoned. This community has less than 50% shrub cover and quickly succeeds into successional shrubland and successional hardwoods.

Distribution. Successional old fields occur throughout the Project Area where agricultural land has typically been abandoned for fewer than three years.

Vegetation.

- **Overstory:** None.
- **Understory/Shrub Layers:** Understory species are primarily composed of northern arrowwood, red maple, raspberry, multiflora rose, honeysuckle (*Lonicera* spp.), and hawthorn.
- **Herbaceous Layers:** These layers are composed of blackberry (*Rubus* spp.), Canada goldenrod, orchard grass (*Dactylis glomerata*), reed canary grass (*Phalaris arundinacea)*, yarrow (*Achillea millefolium*), meadowsweet (*Spiraea latifolia*), strawberry, Queen Anne's lace (*Daucus carota*), hawkweeds (*Hieracium* spp.), buttercup, timothy (*Phleum pretense*), milkweed (*Asclepias* spp.), and dandelion (*Taraxacum officinale*).

Agriculture (Vineyard/Tree Farm)

Rank: (G5) (S5)
Status: Secure

Description. A stand of cultivated vines.

Distribution. A few vineyards occur in the northern portion of the Project Area.

Vegetation.

- **Overstory:** None.
- **Understory/Shrub Layers:** Various fruit crops, including grapes and raspberries.
- **Herbaceous Layers.** Ground cover dominated by grasses.

Agriculture (Cropland/Field Crops and Row Crops)

Rank: (G5) (S5)
Status: Secure

Description. An agricultural field planted with field crops or row crops. This community includes hayfields that are rotated to pasture.

Distribution. Cropland/field crops and row crops occur throughout the Project Area.

Vegetation.

- **Overstory:** None.
- **Understory/Shrub Layers:** None.
- **Herbaceous Layers:** Cropland was found to be dominated by dandelion, orchard grass, plantain (*Plantago* spp.), reed canary grass, white clover (*Trifolium repens*), red clover (*Trifolium pretense*), and timothy. Hay production is the primary agricultural use in the Project Area. Row crops include corn and soybeans.

Agriculture (Pastureland)

Rank: (G5) (S5)
Status: Secure

Description. Agricultural land permanently maintained (or recently abandoned) as pasture area for livestock. In most areas there is no clear delineation between pastureland and cropland/field crop as cattle are rotated throughout several fields. Shrub species occur in fields used primarily for pasture.

Distribution. Pasturelands are distributed throughout the Project Area.

Vegetation.

- **Overstory:** None.
- **Understory/Shrub Layers:** None.
- **Herbaceous Layers:** The herbaceous layer consists of Canada goldenrod, buttercup, white clover, red clover, orchard grass, English plantain (*Plantago lanceolata*), dandelion, and yarrow.

2.9.1.2 Wetland Vegetative Communities

Several wetland community types exist within the Project Area. Wetlands and waterbodies are discussed in Section 2.7, Wetlands: Environmental Setting, and a wetland delineation report is included as Appendix G. Based on field observations and the classification system presented in Edinger et al. (2002), seven general wetland communities were identified in the Project Area: deep emergent marsh, shallow emergent marsh, shrub swamp, red maple hardwood swamp, hemlock-hardwood swamp, rich hemlock-hardwood peat swamp, and artificial ponds.

Deep Emergent Marshes (Palustrine Emergent Wetland)

Rank: (G5) (S5)
Status: Secure

Description. According to Edinger et al. (2002), these marshes occur on mineral soil or fine-grained organic soils and have less than 50% canopy cover. These marshes have standing water that fluctuates seasonally, but is persistent with substrate that is almost always inundated.

Distribution. Some emergent wetlands with persistent inundation were scattered throughout the Survey Corridor.

Vegetation.

- **Overstory:** Trees found in surrounding forest communities may occur around the perimeter of the wetland, but are not included in the deep emergent marsh component of these wetlands.

- **Understory/Shrub Layers:** Hydrophytic understory or shrub species that were found to occur around the perimeter of the delineated deep emergent wetlands include American elm, green ash, northern arrowwood and willow species.

- **Herbaceous Layers:** Emergent hydrophytes found in deep emergent marshes included jewelweed (*Impatiens capensis*), larger blue flag (*Iris versicolor*), fox sedge (*Carex vulpinoidea*), shallow sedge (*Carex lurida*), rice cutgrass (*Leersia oryzoides*), spikerush (*Eleocharis* spp.), duckweed (*Lemna valdiviana*), and cattail (*Typha latifolia*).

Shallow Emergent Marshes (Palustrine Emergent Wetland)

Rank: (G5) (S5)
Status: Secure

Description. These marshes typically have greater than 50% cover and occur on saturated mineral soils or deep muck soils. They are rarely inundated, but almost always saturated, and are more well drained than deep emergent marshes. Standing water may disappear completely after the wet season.

Distribution. Shallow emergent marshes occur throughout the Project Area in shrub/scrub and successional fields and in openings in forested areas.

Vegetation.

- **Overstory:** Tree species may occur around the perimeter of the wetland, but do not occur within the wetland boundary.

- **Understory/Shrub Layers:** If present, shrubs or saplings occur in isolated patches or individuals and include northern arrowwood, meadow-sweet, and willow.

- **Herbaceous Layers:** Herbaceous species in these wetlands vary throughout the Survey Corridor with the following species commonly appearing as dominants or co-dominants: sensitive fern (*Onoclea sensibilis*), jewelweed, rough stemmed goldenrod, soft rush (*Juncus effuses*), fox sedge, fringed sedge (*Carex crinita*), shallow sedge, giant goldenrod (*Solidago gigantean*), false hellebore (*Veratrum viride*), woolgrass (*Scirpus cyperinus*), marsh marigold (*Caltha palustris*), horsetail (*Equestrium* spp.), and mannagrasses (*Glyceria sp*.).

Shrub Swamps (Palustrine Scrub-Shrub Wetland)

Rank: (G5) (S5)
Status: Secure

Description. These wetlands occur on mineral soil or muck and are variable in structure and distribution. They can be found lake and/or stream side, in transitional areas between forest and open land, and in isolated depressional areas.

Distribution. These wetlands are found throughout the Project Area typically along agricultural ditches or serving as stream riparian areas. These wetlands are also commonly found in conjunction with emergent and/or forested wetland areas as a component of wetlands with more than one vegetative community.

Vegetation.

- **Overstory:** Tree species may occur around the perimeter of the wetland but do not occur within the boundary of a shrub scrub wetland.

- **Understory/Shrub Layers:** The dominant shrub found on the Project Area was northern arrowwood. Less common shrub species included willow, dogwood (*Cornus spp*.), spicebush, and meadow-sweet.

- **Herbaceous Layers:** Herbaceous and emergent species are less dominant than shrub species and include mannagrasses, soft rush, and rough stemmed goldenrod.

Red Maple-Hardwood Swamp (Palustrine Broad Leaved Deciduous Forested Wetland)

Rank: (G5) (S4) (S5)
Status: Secure

Description. This wetland community is a hardwood swamp that occurs in poorly drained depressions, usually on inorganic soils. Red maple is either a dominant or co-dominant species in these swamps in the Project Area.

Distribution. Most forested wetland communities found within the Project Area are red maple-hardwood swamps. These communities occur in beech-maple, successional northern hardwood, and hemlock-northern hardwood forests throughout the Project Area.

Vegetation.

- **Overstory:** Red maple is usually the dominant species. Other co-dominants and common overstory trees include green ash, and American elm.
- **Understory/Shrub Layers:** The shrub layer, when present, is dominated by saplings of overstory species, northern arrowwood, and willow.
- **Herbaceous Layers:** Dominant species include jewelweed, sensitive fern, and fringe sedge. Other common species include false hellebore, manna-grasses, and other sedges (*Carex* spp.).

Hemlock-Hardwood Swamp (Palustrine Eastern Hemlock Forested Wetland)

Rank: (G4) (G5) (S4)
Status: Secure

Description. These closed canopy swamps occur on mineral soils and deep muck in depressions within hemlock-northern hardwood forests. They typically receive groundwater discharge and sometimes have no surface water connection. Species diversity is usually poor with few shrub and herbaceous species growing beneath the canopy.

Distribution. Hemlock-hardwood swamps were observed within hemlock-northern hardwood communities in the Project Area. These wetlands occurred in depressions and hummocky areas in higher elevations.

Vegetation.

- **Overstory:** Eastern hemlock is the dominant species in these wetlands. Common co-dominant species include yellow birch and red maple.
- **Understory/Shrub Layers:** The understory is composed primarily of saplings of overstory trees, spicebush and striped maple.
- **Herbaceous Layers:** Skunk cabbage (*Symplocarpus foetidus*) and wood fern are dominant. Ostrich fern (*Matteuccia struthiopteris*) is also common in canopy openings.

Rich Hemlock-Hardwood Peat Swamp (Palustrine Eastern Hemlock Forested wetland)

Rank: (G3) (G4) (S2) (S3)
Status: Unlisted

Description. A mixed swamp that occurs in depressions or concave slopes which receive groundwater discharge, typically in areas where the groundwater flows through calcareous gravels of glacial deposits.

Distribution. A portion of a mixed conifer and hardwood swamp is located in the southwest corner of the Project Area.

Vegetation.

- **Overstory**: Hemlock, red maple, yellow birch, black ash (*Fraxinus nigra*), tamarack (*Larix laricina*), white pine, smooth serviceberry (*Amelanchier arborea*), balsam fir (*Abies balsamea*), and northern white cedar (*Thuja occidentalis*).
- **Understory/Shrub layers**: Alder-leaf buckthorn (*Rhamnus alnifolia*), highbush blueberry (*Vaccinium corymbosum*), red osier dogwood (*Cornus sericea*), northern gooseberry (*Ribes hirtellum*), wild raisin (*Viburnum cassinoides*), virgin's bower (*Clematis virfiniana*), and dwarf raspberry (*Rubus pubescens*).
- **Herbaceous layers**: Sedges, manna grass, cinnamon fern, royal fern (*O. regalis*), sensitive fern, marsh marigold, golden ragwort (*Senecio aureus*), meadow-rue (*Thalictrum pubescens*), miterwort (*Mitella nuda*), starry Solomon's seal (*Smilacina stellata*), spreading goldenrod (*Solidago patula*), false hellebore, swamp thistle (*Cirsium muticum*), purple avens (*Geum rivale*), globeflower (*Trollius laxus*), and swamp saxifrage (*Saxifraga pensylvanica*).

Natural and Artificial Ponds (Lacustrine Emergent Wetland)

Rank: (G5) (S5)
Status: Secure

Description. Man-made ponds are constructed in farm fields, residential, or recreational properties for agricultural, recreational, or aesthetic purposes. They could potentially be stocked with fish and contain little or no aquatic vegetation. Natural ponds exist in both forests and fields.

Distribution. Ponds occur throughout the Project Area.

Vegetation.

- **Overstory:** There is no overstory vegetation.

- **Understory/Shrub Layers:** There is no understory/shrub vegetation.
- **Herbaceous Layers:** When vegetation is present it is typically in monotypic stands of aquatic plants, predominantly cattail.

A more detailed description of each individual wetland community and application of the Cowardin Classification System is provided in the Wetland Delineation Report (see Appendix G).

2.9.1.3 Threatened and Endangered Plant Species and Communities

The United States Fish and Wildlife Service (USFWS) and the New York State Department of Environmental Conservation's (NYSDEC) New York NHP were consulted to determine the potential occurrence of federally and state-listed endangered and threatened species and significant natural communities and habitats within the Project Area (see Appendix C). Federally listed threatened and endangered plant and animal species are protected by the Endangered Species Act of 1973, which is administered by the USFWS. State-listed threatened and endangered plant and animal species are protected by the New York State Environmental Conservation Law (ECL), Article 9 and Article 11, which is administered by NYSDEC.

The USFWS and the NHP provided data detailing the known occurrences of threatened and endangered plants, plant species of concern, and rare ecological communities within the Project Area. Existing databases track species that are protected by law as well as unprotected species that are identified as species of concern. The existing databases also track significant community assemblages. Although not specifically protected by law, these areas are recognized for their rare/unique features as well as their greater likelihood of providing habitat for protected species.

According to the USFWS, no federally threatened or endangered plant species are known to occur in the Project Area. In addition, no federally designated or proposed "critical habitat" exists within the Project Area.

Based on correspondence with the NHP, no state-listed or proposed endangered or threatened plant species or plant communities are known to occur within the Project Area. NHP did report the known occurrence of a threatened plant species, butterwort (*Pinguicula vulgaris*) in Walnut Creek Gorge, approximately 0.5 miles north of the Project Area, the location is shown in Appendix C, Agency Correspondence (Seoane 2008). Rich hemlock-hardwood swamp, a significant ecological community assemblage, was identified along the southwestern edge of the Project Area and a shrub swamp associated with East Mud Lake was also identified east of the Project Area Boundary (Seoane 2006 and 2008). Both communities are described in Section 2.9.1.2.

2.9.2 Aquatic Habitat

This section provides an overview of aquatic habitat within the Project Area. Numerous streams and ponds occur in many terrestrial communities throughout the Project Area. Detailed discussion of these waterbodies is presented in Section 2.5, Water Quality: Environmental Setting; Section 2.6, Water Quality: Impacts and Mitigation; and Appendix G. A brief discussion is included here to facilitate understanding of the general ecology of the Project Area.

As detailed in Section 2.5, Water Quality: Environmental Setting, numerous streams were delineated in the Project Area. These streams are associated with a variety of the habitat types discussed in Section 2.9.1.1. Most of the streams delineated were in forests, while some were in shrub-scrub fields or adjacent to agricultural fields. Streams observed in forests have riparian hardwood canopies in various stages of succession, while streams in shrub-scrub fields or adjacent to agricultural fields have low-growing vegetation and no overstory layer. Streams in both communities may have riparian herbaceous growth and are often hydrologically connected to wetlands. Wetlands often occur in the riparian zone. Most streams observed are perennial (stream flow is evident throughout the year) with some aquatic vegetation. Intermittent streams (stream channel contains flow for at least three months of the year, but does not flow year round) and ephemeral streams (stream channel contains flow for less than three months a year) were also observed in the Project Area. Where water was present, observed aquatic organisms included within the Project Area include minnows, mayflies, and a diversity of benthic macroinvertebrates keyed to stream substrate. Identified stream substrates include bedrock, cobble, gravel, sand, silt, and clay. Bank heights range from zero to greater than 6 feet and stream widths from bank to bank ranged from 0.5 to 40 feet.

Seven streams in the northern portion of the Project Area are classified as trout streams. A detailed discussion of trout and trout habitats is provided in Section 2.9.3.3. In some cases, a stream’s terrestrial location differed from its NYSDEC mapped location, and some mapped streams, including designated trout streams, do not have a defined bed and bank as far upstream as mapped. Further, two of the trout streams in the Project Area are classified as intermittent and may not support trout. A detailed discussion on streams can be found in Section 2.5, Water Quality: Environmental Setting.

Both natural and man-made ponds occur within the Project Area. These ponds vary in size but typically are less than an acre with depths ranging between 2 and 10 feet. Natural ponds exist in both forests and fields and, in some cases, result from beaver activity. Man-made ponds used for agricultural purposes are located in farm fields and recreational ponds are located in open or forested residential areas and private camping areas. Wildlife may also utilize these resources. These ponds typically contain minimal aquatic vegetation and do not typically occur within or adjacent to a wetland.

2.9.3 Wildlife

This section provides a discussion of existing conditions relating to wildlife in the Project Area. Section 2.9.3.1 lists common wildlife associated with each vegetative community found in the Project Area. Section 2.9.3.2 discusses threatened and endangered species in the Project Area, and Section 2.9.3.3 discusses wildlife of local significance.

2.9.3.1 Common Fish and Wildlife Species Associated with Vegetative Communities and Aquatic Habitat

The communities delineated and presented on Figure 2.9-1 are largely determined by the vegetative composition. Section 2.9.1.1 discusses the seven upland ecological communities in the Project Area, and Section 2.9.1.2 briefly discusses wetlands, with more detailed discussions provided in Appendix G. Typical fish and wildlife species are discussed in association with the upland communities, wetlands, and aquatic habitat. However, many species may have habitat requirements that overlap between community types or may have a respective habitat niche that comprises a small portion of the community. Birds and bats are discussed separately in Section 2.11, Bird and Bat Resources: Environmental Setting.

Table 2.9-1 identifies fauna common to each of the vegetative communities and habitats described in Sections 2.9.1 and 2.9.2, and Appendix G. Several species live adjacent to wetlands and utilize their resources, while other species are typical wetland inhabitants whose survival is dependent upon these communities.

2.9.3.2 Threatened and Endangered Animal Species and Communities

A consultation letter was sent to USFWS by Noble on September 18, 2006 and on May 19, 2008, seeking the agency's consultation to identify any federally-listed threatened and endangered species, significant or critical habitats, or other natural resource features of federal concern that would occur within the Project Area. No official response was received; however, as suggested by the USFWS in a letter dated September 17, 2007, to Noble, a county-level list of federally listed animal species was reviewed for this Project (Niver 2007). The Chautauqua County list identified the endangered clubshell (*Pleurobema clava*) and the candidate species rayed bean (*Villosa fabalis*) as occurring in Chautauqua County. Further consultation with the USFWS indicates that both species occur in the Allegheny River watershed in southern Chautauqua County; and there is no reason to believe that these species occur in the Lake Erie watershed (Niver 2008). While the Conewango watershed is within the Project Area and is tributary to the Allegheny River, the Project Area is located in northern Chautauqua County, outside of the known range of both the clubshell and rayed bean. The list also identifies that the Bald Eagle has been observed in Chautauqua County (USFWS 2008a). Although they are no longer protected by the federal Endangered Species Act (USFWS 2008a), Bald Eagles are still protected by the Bald and Golden Eagle Protection Act (see Appendix J for more detail).

The USFWS has expressed concern pertaining to the potential for windparks, in general, to impact migratory birds and threatened or endangered bats (such as the Indiana Bat [*Myotis sodalis*]). The potential occurrence of Indiana Bat is discussed in detail in Section 2.11, Bird and Bat Resources: Environmental Setting. An assessment of potential impacts on birds and bats is provided in Appendix J and in Section 2.12, Bird and Bat Resources: Impacts and Mitigation, of this report.

In addition to the standard analysis of project areas for potential occurrences of threatened or endangered plant and animal species, the NHP has developed specific criteria for wind power projects. NHP now reports all records of bird and bat species occurring within a 10-mile radius of identified project areas (Seoane 2006 and 2008). Records of bat colonies of concern occurring within a 40-mile radius are also reported.

Based on correspondence with the NHP (Seoane 2006 and 2008), state-listed endangered or threatened animal species that are known to occur within 10 miles of the Project Area include Henslow’s Sparrow (*Ammodramus henslowii*), Short-eared Owl (*Asio flammeus*), Northern Harrier (*Circus cyaneus*), Sedge Wren (*Cistothorus platensis*), and Bald Eagle (*Haliaeetus leucocephalus*). These bird species are discussed further in Section 2.11, Bird and Bat Resources: Environmental Setting, Section 2.12, Bird and Bat Resources: Impacts and Mitigation, and in Appendix J. No threatened or endangered bat species were specifically identified by the NHP.

No significant wildlife communities under federal or state protection were identified within the Project Area.

The NHP also identifies species of special concern which include species of fish and wildlife found by NYSDEC to be at risk of becoming either endangered or threatened in New York. Species of special concern do not qualify as either endangered or threatened, as defined in Part 182.2(g) and 182.2(h), at this time and are not subject to the provisions of Part 182. Species of special concern are listed in Part 182.6(c) for informational purposes only. The NHP identified one species of special concern, the Mountain Brook Lamprey (*Ichthyomyzon greeleyi*), the occurrence of which was documented outside the Project Area to the southeast in West Branch Conewango Creek (Seoane 2006). An additional bird species, Great Blue Heron (*Ardea herodias*) that is considered “protected” in New York State, was also identified outside the Project Area to the west in the Town of Arkwright.

2.9.3.3 Wildlife or Wildlife Communities of Local Significance

This section presents information on species that are not afforded federal or state protection, but are locally important resources or are species of special concern. These species include the white-tailed deer, black bear, trout, and herpetofauna (reptiles and amphibians).

White-Tailed Deer

The white-tailed deer is valued from a recreational standpoint. Despite having a wide-ranging habitat, dense conifer stands play an important role in deer biology, providing forage and cover during harsh winter conditions. In New York, deer may concentrate into 30% to 60% of their total habitat during mild winters, 13% of their total habitat during moderate winters, and 9.7% of their total habitat during severe winters (Fried et al. 1977). Deer wintering concentration areas are general areas where deer congregate during harsh winter conditions. These areas typically contain a significant coniferous component that offers cover from winter weather. The hemlock-hardwood mixed forest communities likely provide protection for deer throughout the Project Area during the hardest parts of the winter. They may also be observed in agricultural areas, successional areas, and beech-maple mesic forests.

Black Bear

Historically, there have been three areas in New York State that were considered Core Bear Ranges: the Adirondack Range, the Catskill Range, and the Allegany Range (NYSDEC 2007a). In the past 30 years, their range has expanded in New York State, particularly in the southern portion of the state. Due to this expansion, there are now two black bear ranges: northern (Adirondacks) and southern (Allegany and Catskill ranges expanded and combined) (NYSDEC 2007). These ranges are described as areas sustaining viable black bear populations within their natural habitat. Although black bears were not commonly found in the Project Area historically (prior to 1995), the Project Area is now located just outside the edge of the recently expanded Southern Black Bear Range (NYSDEC 2007).

Black bears are opportunistic omnivores adapted for living on fruits, nuts, insects, and other small items that are easily digestible and low in cellulose. They prefer forested areas with small clearings and dense understory. Water must be readily available and well distributed throughout their range. For this reason, wetland and riparian habitats are usually associated with suitable bear habitats (Rogers and Allen 1987). Although bears are typically found in large, contiguous forests, they will utilize open and developed areas where thick cover is readily available (NYSDEC 2007).

Based on these habitat requirements and preferences, the majority of the Project Area can be considered viable black bear habitat. The Project Area contains several large forested areas that potentially provide adequate cover requirements for black bear. Raspberry, blackberry, and apple trees are common in the reverting fields and recently logged forested areas, providing ample food. Evidence of black bears was observed during initial field work in fall 2007 in the Project Area; a landowner reported a recent black bear siting and black bear scat was observed by field teams.

Trout

Similar to the white-tailed deer, trout are valued from a recreational standpoint. Trout can live in habitats ranging from cool clear streams to large lakes. They generally feed on insects and plankton, and older trout may eat small fish (NYSDEC 2008c). Within the Project Area, there are seven trout streams and no streams classified as trout spawning streams by NYSDEC. However, two of the trout streams in the Project Area were classified as intermittent during the course of field surveys, and may not support trout. Section 2.5, Water Quality: Environmental Setting, includes a discussion of NYSDEC stream classifications.

Herpetofauna

There is concern nationwide about the status of reptile and amphibian populations (also known as herpetofauna or herps) as their absence from a habitat is usually an early indicator of environmental stress. Herps are usually the first species to be affected by environmental changes. In response to a general nationwide decline in these species, New York State has established the Herp Atlas Project, which documents the location of reptile and amphibian populations statewide from 1990 to 1998 (NYSDEC 1998). The use of this data is cautioned by NYSDEC for environmental review purposes, but nonetheless gives a general idea of the herp species present within the Project Area. The Atlas Project identifies 27 species of reptiles and amphibians in the vicinity of the Project Area; these species are identified in Table 2.9-2.

Table 2.9-1 Common Wildlife Species Associated with Vegetative Communities and Aquatic Habitat

Beech-Maple Mesic Forest
Bats (*Lasiurus/Myotis* spp.), black bear (*Ursus americanus*), eastern chipmunk (*Tamias striatus*), flying squirrel (*Glaucomys* sp.), gray squirrel (*Sciurus carolinensis*), opossum (*Didelphis virginiana*), porcupine (*Erethizon dorsatum*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*). Also American toad (*Bufo americanus*), dusky salamander (*Desmognathus* spp.), mole salamander (*Ambystoma* spp.), red eft-phase of red-spotted newt (*Notophthalmus viridescens viridescens*), and woodland salamander (*Plethodon* spp.)
Hemlock-Northern Hardwood Forest
Bats, black bear, eastern chipmunk, flying squirrel, gray fox (*Urocyon cinereoargenteus*), gray squirrel, opossum, porcupine, raccoon, red squirrel (*Tamiassciurus hudsonicus*), and white-tailed deer. Also, American toad, dusky and woodland salamander, and red eft-phase of red-spotted newt.
Successional Northern Hardwood Forest
Black bear, eastern chipmunk, eastern cottontail (*Sylvilagus floridanus*), gray fox, gray squirrel, opossum, porcupine, Red Bat (*Lasiurus borealis*), red squirrel, and striped skunk (*Mephitis mephitis*). Also, northern redback salamander (*Plethodon cinereus*) and northern spring salamander (*Gyrinophilus porphyriticus porphyriticus*).
Successional Old Field
Eastern cottontail, gray fox, hairy-tailed mole (*Parascalops breweri*), least shrew (*Cryptotis parva*), meadow vole (*Microtus pennsylvanicus*), raccoon, red fox (*Vulpes vulpes*), striped skunk, white-tailed deer, and woodchuck (*Marmota monax*).
Successional Shrubland
Eastern cottontail, gray fox, hairy-tailed mole, least shrew, meadow vole, raccoon, red fox, striped skunk, and white-tailed deer.
Agriculture (Cropland/Field Crops, Row Crops, Pastureland and Vineyards)
Big Brown Bat (*Eptesicus fuscus*), coyote (*Canis latrans*), eastern cottontail, Hoary Bat (*Lasiurus cinereus*), red fox, striped skunk, white-tailed deer, and woodchuck.
Wetland Vegetative Communities
Beaver (*Castor canadensis*), muskrat (*Ondatra zibethicas*), star-nosed mole (*Condylura ristata*), and water shrew (*Sorex palustris*). Also, mole salamanders, northern water snake (*Nerodia sipedon*), and various frog, salamander, toad and turtle species (see Table 2.9-2 for specific amphibian and reptile species documented in or near the Project Area).
Aquatic Habitats
Mink (*Mustela vison*), painted turtle (*Chrysemys picta*), snapping turtle (*Chelydra serpentina*), red-spotted newt, and various frogs and toads (see Table 2.9-2 for specific amphibian and reptile species documented in or near the Project Area). Macroinvertebrates and small, warm-water fish species, including blacknose dace (*Rhinichthys atratulus*), creek chub (*Semotilus atromaculatus*), darters (*Etheostoma* spp.), and fathead minnow (*Pimephales promelas*). In addition, trout species may occur in some portions of the Project Area. Class C(t) streams have the potential to contain cold water fish species including brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), and rainbow trout (*Oncorhynchus mykiss*).

Source: NYSDEC 1998, DeGraaf and Yamasaki 2001, Chambers 1983.

Table 2.9-2 New York State Amphibian and Reptile Atlas 1990-1998 Species Present in the Vicinity of the Project Area Based on the Online Interim Report (NYSDEC 1998)

Salamanders	
Spotted salamander	*Ambystoma maculatum*
Red-spotted newt	*Notophthalmus viridescens*
Norther dusky salamander	*Desmognathus fuscus*
Allegheny Mountain dusky salamander	*Desmognathus ochrophaeus*
Northern redback salamander	*Plethodon cinereus*
Northern slimy salamander	*Plethodon glutinosus*
Spring salamander	*Gyrinophilus porphyriticus*
Northern two-lined salamander	*Eurycea bislineata*
Toads and Frogs	
American toad	*Bufo americanus*
Fowler's toad	*Bufo fowleri*
Gray treefrog	*Hyla versicolor*
Spring peeper	*Pseudacris crucifer*
Bullfrog	*Rana catesbeiana*
Green frog	*Rana clamitans*
Northern leopard frog	*Rana pipiens*
Pickerel frog	*Rana palustris*
Lizards and Snakes	
Northern water snake	*Nerodia sipedon*
Northern brown snake	*Storeria dekayi*
Common garter snake	*Thamnophis sirtalis*
Eastern ribbon snake	*Thamnophis sauritus*
Northern ringneck snake	*Diadophis punctatus edwardsii*
Black rat snake	*Elaphe o. obsoleta*
Eastern milk snake	*Lampropeltis t. triangulum*
Turtles	
Common snapping turtle	*Chelydra s. serpentina*
Painted turtle	*Chrysemys picta*
Blanding's turtle	*Emydoidea blandingii*
Eastern spiny softshell	*Apalone s. spinifera*

© Ecology & Environment, Inc. GIS Department Project #
L:\Buffalo\Noble_Wind\2008_NOBLE_SITES\Maps\Villenova\MXDs\DEIS\July2008\eco_communitie.mxd 07/11/2008

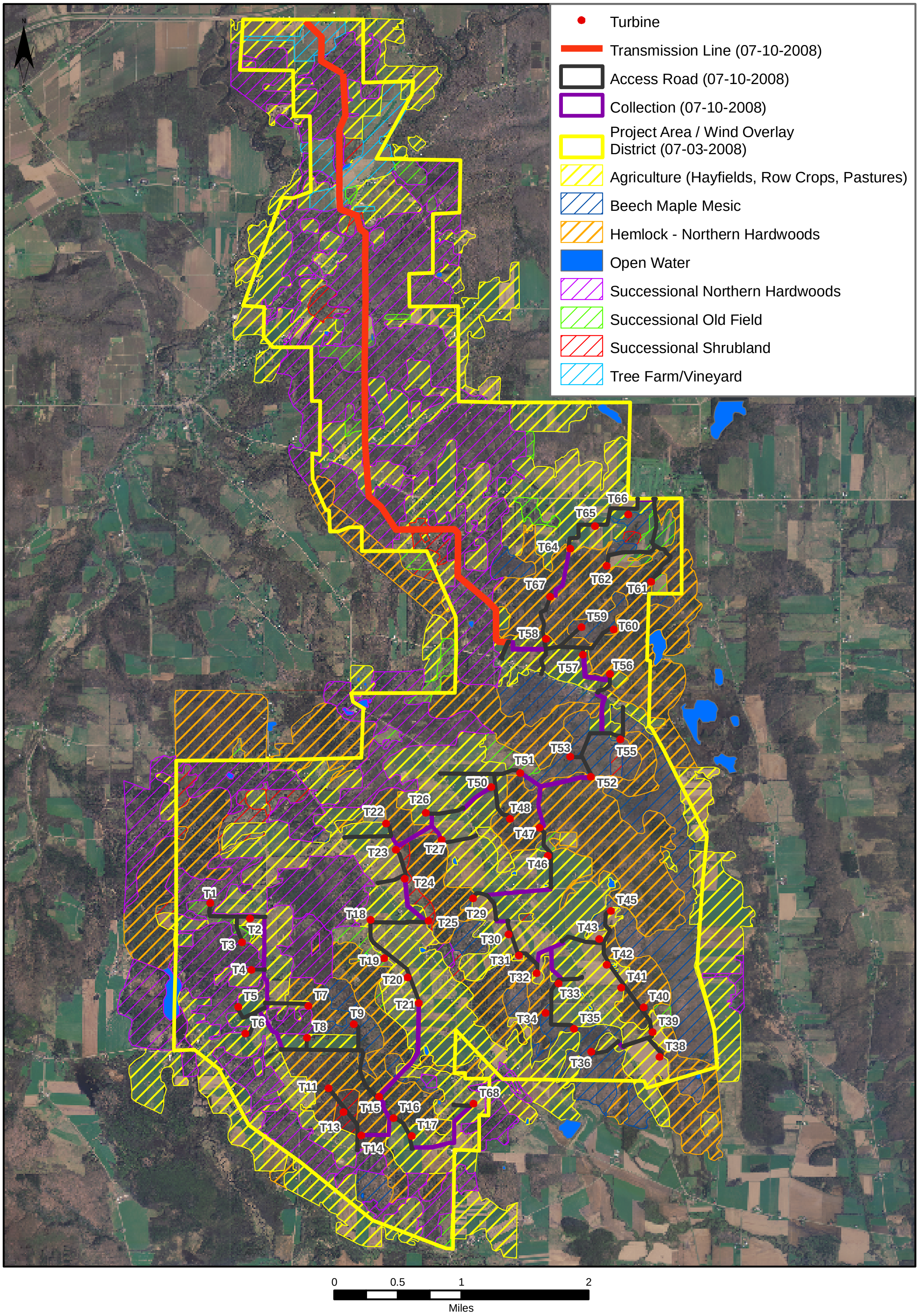


Figure 2.9-1 Ecological Communities
Noble Ball Hill Windpark

2.10 Biological Resources: Impacts and Mitigation

This section discusses impacts to biological resources as a result of construction and operation of the Noble Ball Hill Windpark. Where feasible, Noble has sited Project facilities to minimize fragmentation of forested habitat and avoid wetlands and aquatic habitat, thereby minimizing the potential for impacts to wildlife. Efforts to avoid, minimize, and mitigate impacts to biological resources are addressed in Section 2.10.3. Impacts to birds and bats are discussed in Section 2.12, Bird and Bat Resources: Impacts and Mitigation, and impacts to wetlands and waterbodies are discussed in Section 2.8, Wetlands: Impacts and Mitigation.

2.10.1 Construction Impacts

Upland Vegetation

Primary impacts on biological resources will result from temporary and permanent loss of habitat due to construction activities. During construction there will be a loss of upland vegetation including the removal of existing vegetation through minimal clearing of forested, shrub/scrub, and herbaceous vegetation as part of construction activities. Table 2.10-1 provides construction impact acreages by facility on each of the upland eco-community types described in Section 2.9, Biological Resources: Environmental Setting. The common wildlife species associated with various vegetative communities is provided in Table 2.9-1 in Section 2.9, Biological Resources: Environmental Setting. Secondary effects may include increased soil erosion, which may result in the localized reduction of available wildlife habitat. Clearing and grading associated with Project construction has the potential to result in mobilization of soil once the vegetation has been removed. Soil mobilization will be most problematic on slopes, which are more susceptible to erosion. These potential impacts are most likely to occur in conjunction with access roads and the collection system since the turbine sites will be located on relatively level ground. Impacts to soils and resulting mitigation strategies are further discussed in Section 2.4, Soils: Impacts and Mitigation.

Construction of the Project will result in a localized reduction in the amount of available forest habitat. Based on field surveys, the largest percentage of forested vegetation impacted by the Project is successional northern hardwood forest (approximately 52 acres). Other forest communities affected include hemlock-northern hardwood forest (approximately 45 acres) and beech maple mesic forest (approximately 26 acres). Permanent conversion of forested habitat and disturbance of other eco-communities (including successional shrubland and old field) are provided in Table 2.10-1. Habitat fragmentation as a result of project construction will be minimized by utilizing existing corridors to the extent practicable (e.g. existing farm and logging roads). The reduction in the amount of forested habitat and the extent of habitat fragmentation within the Project Site is minor in comparison with the overall acreage of forested land located in the Project Area (these three forest types comprise approximately 7,400 acres and approximately 123 acres or 1.7% of the forested communities in the Project Area will be impacted). Furthermore, this reduction is generally consistent with tree loss that occurs due to logging activities and maintenance of logging roads in these areas.

The existing mosaic of land uses within the region, including agricultural lands and early successional stages of forest land, indicate that disturbance is a common occurrence in this landscape.

Other upland communities impacted by Project facilities include agricultural land (cropland/field crops, row crops, pastureland, and vineyards) [approximately 210 acres] and to a lesser extent, successional old fields and shrubland (totaling approximately 31 acres). These communities are routinely subjected to disturbance or have been subjected to past disturbance and are a result of re-vegetation following disturbance.

Wetlands and Aquatic Habitat

Impacts from construction on aquatic and wetland communities are discussed in Section 2.6, Water Quality: Impacts and Mitigation; Section 2.8, Wetlands: Impacts and Mitigation; and Appendix G. Among the impacts discussed, soil erosion may result in the transfer of sediment off the construction area to adjacent waterbodies, which may cause turbid waters and act to fill wetlands or embed stream substrate. These potential impacts could affect the quality of habitat for aquatic wildlife. A stormwater pollution prevention plan (SWPPP) will be developed for the site and implemented to reduce impacts from sedimentation and erosion during construction. Best management practices (BMPs) that will be included in the SWPPP are described in Appendix E, Stormwater Pollution Prevention Measures.

Threatened and Endangered Plant Species

No threatened or endangered vegetation or communities were identified within the Project Area during the field survey efforts. A rich hemlock-hardwood peat swamp was identified in the southwestern corner of the Project Area by the New York State Department of Environmental Conservation (NYSDEC) as a significant ecological community assemblage; however, this ecological community will not be impacted by the Project as no Project facilities are sited in the vicinity of this resource. Therefore, no impacts on threatened and endangered plant species are expected as a result of construction of the Project.

Common Wildlife

Most wildlife species are not expected to experience significant direct impacts as a result of construction of the Project and are expected to avoid the Project Site during the active construction period. Wildlife species common to the eco-communities identified in the Project Area are listed in Table 2.9-1 and the extent that these species are present at the Project Site during construction activities will vary. The two most prevalent upland eco-communities are successional northern hardwood forest and agricultural. Successional northern hardwood forest habitat supports black bear, eastern chipmunk, eastern cottontail, gray fox, gray squirrel, opossum, porcupine, red bat, red squirrel, and striped skunk. Agricultural land generally supports big brown bat, coyote, eastern cottontail, hoary bat, red fox, striped skunk, white-tailed deer, and woodchuck. Some limited mortality may occur to less mobile species in upland vegetative communities during the course of construction, including small mammals that may not have time to escape areas of disturbance. This may also include nocturnal species that roost in trees during the day when construction activities take place. The same could be expected for common wildlife species that inhabit agricultural fields and lands in various stages of succession; while most species will relocate to avoid construction impacts, construction may inadvertently impact ground dwelling or burrowing wildlife. Table 2.10-1 provides construction impact acreages by facility on each of the upland eco-community types, described in Section 2.9, Biological Resources: Existing Conditions, that are utilized by the common wildlife species in Table 2.9-1. Further impacts to bird and bat species from construction activities are discussed in Section 2.12, Bird and Bat Resources: Impacts and Mitigation.

Indirect impacts on wildlife will also occur as a result of habitat alteration in association with construction of the Project; however, these impacts are not expected to be significant. For example, within the Project Area, there are approximately 7,400 acres of forested eco-communities. Impacts to forested areas from the Project are expected to total 123 acres, or less than 1.7 % of the forested areas in the Project Area. In addition, these localized impacts on habitat are consistent with activities and conditions that regularly occur throughout the Project Area such as ground disturbance and tree removal associated with farming and logging activities. Some areas will be subject to permanent forest conversion in order to operate facilities and keep clear rights of way (ROWs) for collection and transmission lines as indicated in Table 2.10-1. Most areas with permanent forest conversion will be allowed to revegetate to an herbaceous or scrub-shrub condition as indicated by those forested areas to be restored after construction. It is anticipated that wildlife in the Project Area are accustomed to disturbance of this nature and will either relocate to other adjacent suitable habitat or, upon cessation of construction, make use of areas temporarily disturbed, as revegetation takes place.

Threatened and Endangered Wildlife Species and Species of Special Concern

Based on consultation with the United States Fish and Wildlife Service (USFWS) and the New York State Natural Heritage Program (NHP), except for transient individuals, there are no non-bird species that are listed as threatened and endangered and may potentially occur in the Project Area. Therefore, no impacts on non-bird threatened and endangered animal species are expected as a result of construction of the Project. Potential impacts on bird and bat species are discussed in Section 2.12, Bird and Bat Resources: Impacts and Mitigation.

Species of Local Significance

White-tailed Deer and Black Bear. Direct impacts to white-tailed deer and black bear as a result of construction of the Project will be temporary and limited to discouraging use of the areas where construction occurs. Although the Project will result in the removal of forested habitat, the clearing required for construction and operation of Project facilities will result in new understory growth and additional herbaceous/scrub-shrub habitats. Depending on species composition of the regrowth, these habitats could provide new foraging areas for both deer and bear.

Deer typically congregate in the hemlock hardwood mixed forests during the hardest part of the winter. Construction of the Project will result in both permanent impacts to and permanent forest conversion of hemlock-hardwood forest throughout the Project Area; however, the reduction in the amount of hemlock-hardwood forest habitat within the Project Site is not significant in comparison with the overall acreage of hemlock-hardwood forested land located in the Project Area. Therefore, the Project is not likely to impact deer wintering concentration areas. Further, deer have adapted to disturbance of this nature and will either relocate to other adjacent suitable habitat or make use of areas temporarily disturbed as revegetation takes place after construction is completed.

The Project Area is just outside the Southern Black Bear Range (NYSDEC 2007); however, there is evidence that black bear occur within the Project Area. Construction of the Project is not expected to significantly affect black bears. Black bears can adapt to changing habitat conditions and have the ability to temporarily relocate to adjacent suitable habitat. Thus, any individual bears will likely tend to avoid the Project Site during construction activities.

Trout. Construction of the generation portion of the Project (turbines, access roads and the collection system) will not impact trout streams. The transmission line will cross seven designated trout streams (Class C(t) streams): Streams S54, S54a, S56, S56a, S60, S1014, and S1014a, which are all unnamed tributaries to Walnut Creek. Due to the overhead nature of the transmission line, impacts associated with crossing are expected to be minimal, although clearing of the ROW for the transmission line will remove minor lengths of riparian vegetation that provide shading and shelter of these streams. However, stumps will be left in place to facilitate natural revegetation of the right of way (ROW). Additionally, no trees will be felled into streams or stream banks. Noble will implement a SWPPP in conformance with the NYSDEC State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities to avoid or minimize runoff and erosion. This and other mitigation measures are described in Section 2.6, Water Quality: Impacts and Mitigation and Section 2.10.3. Any construction or disturbance in or near protected streams must be permitted through NYSDEC and the USACE. The conditions contained within the permits issued by the agencies will serve to further protect these important natural resources.

Herpetofauna. Construction of access roads, the collection system, and transmission will impact wetlands that may provide habitat for herpetofauna (amphibian and reptile species). Noble will work closely with NYSDEC to minimize and/or avoid impacts to vernal pools or other wetland communities that provide habitat for herpetofauna species. Construction methods in wetlands are further discussed in Section 2.8.3 and will be fully addressed in the Joint Permit Application to be submitted to NYSDEC and the USACE. Maintaining water quality during construction in an effort to provide sufficient habitat for these species will be addressed through the SWPPP during construction. Measures such as perimeter sediment and erosion controls will be used to protect standing bodies of water, wetlands, and streams and other potential herpetofauna habitat during construction.

2.10.2 Project Facility Impacts

Upland Vegetation

Permanent impacts on upland vegetation, which provides habitat for wildlife, will result from ongoing maintenance of the turbine sites, electrical collection and transmission system, and access road ROWs during operation of the facility. Vegetation will be permanently removed from the location of the turbine pedestal, turbine crane pad, and 16-foot-wide permanent access road. The remainder of the Project footprint (approximately 291 acres) will be allowed to naturally revegetate, although it will be subject to periodic removal of woody vegetation to maintain an herbaceous or scrub-shrub state, especially adjacent to access roads and within collection and transmission system corridors. The degree of impact is dependent on the type and amount of vegetation to be cleared, the rate of revegetation, and the frequency of maintenance (clearing/mowing) during operation of the Project.

Noble does not expect to use herbicides or pesticides to control vegetation or pests along access roads and turbine maintenance areas. Generally, these areas are not expected to promote vegetation growth because of the use of geotextile fabric and gravel construction, as well as the periodic use of the access roads by vehicles. In some cases, herbicidal spot control of upland invasive species might be required along access roads and turbine maintenance areas. If herbicide use should become necessary, Noble will comply with applicable laws and BMPs.

Wetlands and Aquatic Habitat

Impacts on aquatic and wetland communities are discussed in Section 2.6, Water Quality: Impacts and Mitigation; and Section 2.8, Wetlands: Impacts and Mitigation.

Threatened and Endangered Plant Species

No threatened or endangered vegetation or plant communities were identified within the Project Site through consultation with the USFWS and NHP, or during the field survey efforts. A rich hemlock-hardwood peat swamp was identified in the southwestern corner of the Project Area by NYSDEC as a significant ecological community assemblage; however, this ecological community will not be impacted by the Project as no Project facilities are sited in the vicinity of this resource. Therefore, no impacts on threatened and endangered plant species are expected as a result of construction of the Project.

Common Wildlife

Significant impacts on most wildlife species are not expected as a result of operation of the Project. Maintenance of vegetation from access road shoulders, collection and transmission ROWs in an herbaceous or shrub scrub state, could have impacts on less mobile species, including ground dwelling and burrowing mammals that could potentially be impacted by vehicle traffic used to access areas in need of vegetative maintenance or nocturnal species that roost in trees during the day when maintenance activities would take place. As recognized from other active wind power projects throughout the United States, operation of the Windpark does have the potential to impact birds and bats. These potential impacts are discussed in Section 2.12, Bird and Bat Resources: Impacts and Mitigation.

The Project facilities are expected to result in minimal loss of habitat as compared with available habitat in the Project Area and region. In addition, the impacts on habitat are consistent with activities and conditions that regularly occur throughout the Project Area such as mowing of vegetation, access-road use associated with farming and logging activities, and tree removal. It is anticipated that wildlife in the Project Area are accustomed to disturbance of this nature and will either relocate to other adjacent suitable habitat, or adapt to post-construction site conditions. Conditions of available habitat will improve after construction is complete and areas are allowed to naturally revegetate.

Threatened and Endangered Wildlife Species

Based on consultation with the NHP, except for transient individuals, no non-bird threatened or endangered animal species or communities were identified as occurring within the Project Area. The endangered clubshell and special concern rayed bean have been identified by the USFWS as occurring within Chautauqua County, but based on direct consultation with USFWS, these species have not been identified specifically within the Project Area. Therefore, no impacts on non-bird threatened and endangered animal species or their potential habitat is expected as a result of operation of the Project. Potential impacts on threatened and endangered bird and bat species, including agency notification procedures if these species are found, are discussed in Section 2.12, Bird and Bat Resources: Impacts and Mitigation.

Species of Local Significance

Operation and maintenance of the Project facilities may slightly increase vehicle traffic within deer wintering areas when access roads traverse through northern hemlock hardwood forests. However, use of the access roads will be infrequent and consistent with current winter use levels throughout the area (i.e., snowmobile trails, logging activities). Further, access road, and collection and transmission line ROWs may provide corridors for movement of deer and additional edge habitat for foraging. Edge habitat refers to the transitional area between two habitat types (in this case forest habitat and emergent or shrub-scrub habitat) and is utilized by deer for feeding and traveling. Operation and maintenance of the Project facilities is also unlikely to have an impact on black bears. The Project Area is just outside the Southern Black Bear Range (NYSDEC 2007); however, there is evidence that black bear occur within the Project Area. Bears are adapted to wide range of habitat types and likely range over a relatively large area, with the Project Area comprising only a small portion of their range. While the operation of the Project may slightly increase traffic and human presence in areas where only minimal disturbance occurs, deer and bears would be expected to avoid direct interaction with humans. Operation and maintenance of Project facilities is unlikely to impact trout and herpetofauna as full restoration of temporarily disturbed wetlands and waterbodies will take place post-construction.

2.10.3 Mitigation

The overall impact of the Project on vegetation, wildlife, and wildlife habitat is anticipated to be minimal due to careful site planning. To minimize impacts on vegetation, aquatic habitat, and fish and wildlife, facilities have been sited, to the extent practicable, within previously disturbed areas, such as reverting farm fields and along existing farm roads and successional hardwood forests, where previous disturbance has occurred. Where possible, the access roads, collection system, and transmission line have been located within areas with minimal tree growth, such as edges of active/inactive farm fields, or collocated with existing logging roads.

After initial siting of the facilities, the locations of Project components were modified based on field surveys to avoid wetlands and other high quality habitats to the greatest extent practicable. In many cases, turbines, access roads, collection and transmission lines were relocated or eliminated to reduce impacts primarily to forested habitat and wetland communities (see Section 2.8, Wetlands: Impacts and Mitigation). Few modifications were needed after initial siting because experience from prior projects allowed the avoidance of wetlands and other areas and habitats of concern to the greatest extent possible during the initial planning stages.

The Project layout has been designed to protect existing habitat by minimizing clear cutting of trees and, where possible, collocating roads, collection and transmission lines with existing logging roads and trails. In addition, temporary and permanent access roads have been located along hedge rows (within the agricultural fields) wherever feasible. Where construction activities will require the removal of any trees of economic value, landowners will be compensated in accordance with their individual easement agreements. In many cases these existing logging roads and trails have not been adequately maintained and may adversely impact streams and aquatic habitat, by directly routing through these features. Improvements to existing crossings by including culverts at stream crossings to accommodate access roads will improve water quality for trout and other aquatic species. Additionally, these access roads may provide alternative routes for all-terrain vehicle (ATVs) and other vehicles that may otherwise use off-road areas.

When construction is complete restoration of all areas that do not require permanent facilities will take place in accordance with Section 2.27.8 of the DEIS. An invasive species management plan has also been developed (see Appendix I) and will be implemented to establish revegetation by native, non-invasive species in areas disturbed by construction of the windpark.

Impacts on fish and wildlife will be further minimized through the implementation of BMPs. Erosion control structures will be utilized to prevent an off-site migration of soil and minimize impacts to fish and aquatic species. Silt fencing will be installed along the construction ROW in all areas adjacent to wetlands, in accordance with the SWPPP. BMPs that will be used during construction to prevent excess stormwater runoff from the construction areas will be via the SWPPP as discussed in Section 2.6, Water Quality: Impacts and Mitigation. Clearing of natural vegetation adjacent to streams will be limited to the material which poses a hazard or hindrance to construction or Project facilities. Snags which provide shelter in streams for fish will not be disturbed unless they cause serious obstructions, scouring, or erosion. Trees will not be felled into any stream or onto the immediate stream bank. All in-stream work, as well as any work that may result in the suspension of sediment, shall not occur during the trout spawning and incubation period commencing October 1 and ending April 30, unless prior approval is obtained by NYSDEC. These and additional mitigation measures to protect water quality and wetlands are discussed in Section 2.6, Water Quality: Impacts and Mitigation, and Section 2.8, Wetlands: Impacts and Mitigation. Crossing methods and any other impacts to protected streams and wetlands are subject to approval by NYSDEC and the USACE.

Table 2.10-1 Project Eco-Community Impacts

Eco-Community Type	Construction Impacts [Acres]	Project Facility Impacts (Permanent Impacts) [Acres]	Areas To Be Restored After Construction (Temporary Impacts) [Acres]	Permanent Conversion Of Forested Eco-Communities[1]
Turbines[2]				
Agriculture	69.74	4.78	64.96	NA
Tree Farm/Vineyard	NA	NA	NA	NA
Successional Old Field	6.69	0.40	6.29	NA
Successional Shrubland	4.71	0.21	4.50	NA
Beech-Maple Mesic	15.98	1.01	14.97	15.98
Hemlock-Northern Hardwoods	21.39	1.40	19.99	21.39
Successional Northern Hardwoods	2.90	0.16	2.74	2.90
Access Roads[3]				
Agriculture	82.41	28.24	54.17	NA
Tree Farm/Vineyard	1.47	0.66	0.81	NA
Successional Old Field	8.19	2.48	5.71	NA
Successional Shrubland	2.68	1.14	1.54	NA
Beech-Maple Mesic	9.17	3.92	5.25	9.17
Hemlock-Northern Hardwoods	17.16	7.11	10.05	17.16
Successional Northern Hardwoods	1.58	1.09	0.49	1.58
Collection Line[4]				
Agriculture	19.06	0	19.06	NA
Tree Farm/Vineyard	NA	NA	NA	NA
Successional Old Field	0.10	0	0.10	NA
Successional Shrubland	1.38	0	1.38	NA
Beech-Maple Mesic	0.98	0	0.98	0.98
Hemlock-Northern Hardwoods	6.30	0	6.30	6.30
Successional Northern Hardwoods	0.09	0	0.09	0.09
Laydown Areas				
Agriculture	27.60	NA	27.60	NA
Tree Farm/Vineyard	NA	NA	NA	NA
Successional Old Field	NA	NA	NA	NA
Successional Shrubland	0.21	NA	0.21	NA
Beech-Maple Mesic	NA	NA	NA	NA
Hemlock-Northern Hardwoods	0.11	NA	0.11	0.11
Successional Northern Hardwoods	NA	NA	NA	NA
Transmission Line[5]				
Agriculture	11.06	1.31	9.75	NA
Tree Farm/Vineyard	7.16	4.21	2.95	NA
Successional Old Field	3.12	0	3.12	NA
Successional Shrubland	3.35	0	3.35	NA
Beech-Maple Mesic	0	0	NA	NA
Hemlock-Northern Hardwoods	0.29	0	0.29	0.29
Successional Northern Hardwoods	47.16	0	47.16	47.16

Table 2.10-1 Project Eco-Community Impacts

Eco-Community Type	Construction Impacts [Acres]	Project Facility Impacts (Permanent Impacts) [Acres]	Areas To Be Restored After Construction (Temporary Impacts) [Acres]	Permanent Conversion Of Forested Eco-Communities[1]
Total Disturbance from All Project Components				
Agriculture	209.87	34.32	147.95	NA
Tree Farm/Vineyard	8.59	4.87	3.72	NA
Successional Old Field	18.09	2.88	15.21	NA
Successional Shrubland	12.33	1.35	10.98	NA
Beech-Maple Mesic	26.12	4.92	21.20	26.12
Hemlock-Northern Hardwoods	45.25	8.51	36.74	45.25
Successional Northern Hardwoods	51.73	1.25	50.48	51.73

Notes:

[1] Permanent conversion of forested areas accounts for permanent impact and areas that were previously forested that will be maintained in an herbaceous or scrub shrub condition during operation.

[2] Construction impacts from turbines include the entire turbine staging area. Permanent impacts are based on the turbine base (18 feet in diameter) and permanent turbine crane pad (120 x 40 foot disturbance area).

[3] Construction impacts based on a maximum 60 foot construction (40 foot at wetland and stream crossings) ROW; project facility impacts are based on 16 foot permanent access roads.

[4] Construction impacts based on collection line ROW. Permanent impacts are limited to pole placement for overhead collection, which is considered negligible.

[5] Construction impacts for transmission are based on the 100 foot ROW needed for construction and installation of transmission line poles. Permanent impacts are associated with the footprint of the substation and switchyard. Impacts from pole placement are considered negligible.

Forested and agricultural eco-community acreages do not coincide exactly with forested and agricultural land uses presented in Sections 2.23 and 2.24 of this DEIS. Land use data was derived from the USGS Land Use/Land Cover dataset; while the acreages of ecocommunities are defined based on field visits and aerial interpretation.

2.11 Bird and Bat Resources: Environmental Setting

A Bird and Bat Risk Assessment (BBRA) was prepared as part of the Draft Environmental Impact Statement (DEIS) for this Project. That document, which is included as Appendix J, provides a detailed discussion of existing conditions for bird and bat resources in the Project Area and an assessment of the potential risks to these important resources. The discussions presented in this section and Section 2.12, Bird and Bat Resources: Impacts and Mitigation, summarize the information presented in Appendix J and the supporting field studies.

2.11.1 Birds

2.11.1.1 Seasonal Bird Overview

Migrating Birds (Spring and Fall)

The primary bird migration seasons in the Project Area are spring and fall. Typical of New York State (NYS) and the northeast in general, the migrations of certain bird groups are as follows:

- Raptors (e.g., hawks, falcons, eagles, and vultures) migrate primarily between mid-March and mid-May and then between September and early November. Some individuals migrate in the months just outside of the durations indicated above;
- Passerines (i.e., songbirds) primarily migrate between mid-April through May and between late August through October. Some individuals migrate in the months just outside of the durations indicated above; and
- Waterbirds (e.g., waterfowl, herons, and shorebirds) migrate primarily between March and mid-May and then between September and mid-November. Some individuals migrate in the months just outside of the durations indicated above.

Raptors

Raptor migration areas in NYS are well documented and locations where large numbers (thousands to tens of thousands) of migrating raptors occur are already known. There are 13 sites in NYS that regularly report results to the Hawk Migration Association of North America (HMANA) database (HawkCount 2007). Most of these prime raptor migration locations are along the Great Lakes (in spring) and in the lower Hudson Valley (in fall). In spring, raptor migration is concentrated along the southern shores of the Great Lakes as raptors avoid crossing large bodies of water. Migratory raptors are also found in concentrated numbers along prominent ridgelines.

There is one raptor monitoring location (i.e., “hawk watch”) in Chautauqua County in the Town of Ripley approximately 24 miles southwest of the Project Area, and there is one located near the Lake Erie shoreline in Town of Hamburg, approximately 23 miles northwest of the Project Area, where thousands of raptors are tallied each spring (Zalles and Bildstein 2000; HawkCount 2007). As the Project Area is not immediately proximate to the shorelines of the Great Lakes, large bodies of water, or lengthy ridgelines, raptor migration in the Project Area is diffuse and without regularly occurring concentration points.

There are no geographical or topographical features in the Project Area that attract or concentrate large numbers of migrating raptors. The closest is the Portage Escarpment which is located adjacent to the northwest portion of the Project Area. Raptors concentrate along the lake side of this escarpment during the spring months as they migrate to their northern breeding areas. The concentration of raptors along the Portage Escarpment is greatest where the escarpment is closer to Lake Erie, such as near the Ripley Hawk Watch (approximately 2.5 miles from the shore). The Portage Escarpment is located approximately 7 miles from the shore in the vicinity of the Project Area.

Migratory raptor surveys were conducted in the Project Area during fall 2006, spring 2007, and spring 2008. Three surveys were conducted in fall 2006. During these three surveys, a total of 94 raptors of eight species were identified, 59 of which were considered to be migrants. The migratory passage rate was 2.8 raptors per observer hour. No regional hawk watches are conducted in the fall; therefore, no comparison could be made for the migratory passage rate between the Project Area and the regional hawk watches. Nine raptor surveys were conducted during the spring of 2007 and 2008. A total of 671 raptors of 12 species were identified during these surveys, 332 of which were considered to be migrants (see Table 3-9 and Table E-1 in Appendix J). The migratory passage rate was 5.3 raptors per observer hour. For comparison, counts conducted on the same nine days at two hawk watches located near Lake Erie had considerably higher concentrations of migratory raptors. At the Hamburg Hawk Watch, over the same nine survey days, 4,083 raptors were tallied with a passage rate of 65.6 raptors/hour (HawkCount 2007, 2008). At the Ripley Hawk Watch over the same nine survey days, 7,947 raptors were tallied with a passage rate of 135.9 raptors/hour (HawkCount 2007, 2008).

The findings from the 2007 and 2008 spring migratory raptor surveys are consistent with the knowledge of spring raptor migration in New York State and the nearby studies conducted at the New Grange Wind Farm Project Area, which had an overall passage rate of 4.4 raptors/hour (Kerns et al. 2008), as the birds concentrate in higher numbers along the Great Lakes and are relatively diffuse elsewhere. There is no evidence of a pronounced spring migratory raptor corridor in the Project Area (see Appendix J).

Passerines

Unlike most migrating raptors, migrating passerines (i.e., songbirds) do not generally migrate along shorelines to avoid crossing large bodies of water or migrate in concentrated numbers along ridgelines. However, they do concentrate in stopover points following nocturnal migration. These stopover points are often along geographical or topographical features (i.e., shorelines of large lakes or oceans) or isolated patches of habitat. No features that would attract or concentrate migrating passerines in greater numbers than elsewhere in the region were identified in the vicinity of the Project Area. As such, passerine migration in the Project Area is typically diffuse over a broad front.

Data from nocturnal radar studies and migratory bird surveys were used to characterize passerine passage in the area. Project-specific nocturnal radar studies were conducted by Noble in the Project Area in fall 2006 and spring 2007. In fall 2006, the mean passage rate was 189 targets per kilometer per hour (targets/km/hr) with a mean flight altitude of 353 meters and an average flight direction of 216 degrees (approximately southwest) (Woodlot 2008a). Approximately 9% of the targets flew below an altitude of 120 meters. In spring 2007, the mean passage rate was 419 targets/km/hr with a mean flight altitude of 493 meters and an average flight direction of nine degrees (approximately north) (Woodlot 2008b). Approximately 3% of the targets flew below an altitude of 120 meters. A discussion of the results is provided in Section 2.11.1.2 and Appendix J. One nocturnal radar study in proximity to the Project Area was conducted previously (i.e., a Western EcoSystems Technology, Inc. [WEST] study in Arkwright, Chautauqua County in spring and fall 2007). During spring 2007, the mean passage rate was 175 targets/km/hr when the radar was in the horizontal mode and 635 targets/km/hr when the radar was in the vertical mode (Kerns et al. 2008). The mean flight altitude was 450 meters above radar level (arl), with an average flight direction of 18 degrees (approximately northeast). Thirteen percent of the targets in the spring flew below an altitude of 125 meters. In the fall, a mean passage rate of 112 targets/km/hr was documented when the radar was in the horizontal mode and a mean passage rate of 178 targets/km/hr when the radar was in the vertical mode (Kerns et al. 2008). Mean flight altitude was 458 meters with an average flight direction of 208 degrees (approximately southwest). Ten percent of the targets flew below an altitude of 125 meters.

Spring migratory bird surveys were conducted by Noble at 28 points in the Project Area on May 11 and 22, 2007, and at 33 points in the Project Area on May 6 and 16, 2008. A total of 1,624 birds of 90 species were identified in the 2007 surveys. The most numerous species recorded in 2007 were Red-winged Blackbird (261 birds), American Crow (125 birds) and Bobolink (99 birds). In 2008, a total of 1,603 birds of 75 species were identified. The most numerous species recorded in 2008 were Red-winged Blackbird (239 birds), American Crow (139 birds), and American Robin (135 birds). The species observed were all expected based on the habitat, location, and time of year and the findings were consistent with the existing knowledge of the bird resources in the region (see Appendix J).

Waterbirds

There are no large waterbodies or extensive wetlands with open water in the Project Area to attract significant numbers of waterbirds (i.e., waterfowl or shorebirds) during migration. Other than some small inland lakes and reservoirs (e.g., East Mud Lake, West Mud Lake, Silver Creek reservoir) that attract lesser numbers of migrant waterfowl in the general vicinity of the Project Area, Lake Flavia, a quarry reservoir in the Town of Dayton, approximately 5 miles east of the Project Area occasionally attracts large numbers of waterfowl as does Chautauqua Lake located 20 miles southwest. Lake Erie also attracts large numbers of migrant waterfowl, approximately 7 miles from the Project Area at the closest point. There is no strong passage of waterbirds in or near the Project Area, primarily because the habitat in the Project Area is unsuitable for large numbers of birds and the lack of large water bodies in the Project Area.

Breeding Birds (Late Spring and Summer)

Late spring and summer is the primary season for avian breeding in the Project Area. Breeding activity in and/or near the Project Area has been documented by the NYS Breeding Bird Atlas projects and the North American Breeding Bird Survey (see Appendix J). Noble also conducted breeding bird surveys in the Project Area in June 2007 and June 2008. In 2007, two breeding bird surveys were conducted. The first was conducted on June 11, 2007, at 13 points and was repeated 15 days later on June 26, 2007. In 2008, one breeding bird survey was conducted at 26 points over two consecutive days (June 11 and June 12, 2008). A total of 609 birds of 68 species were identified during the two surveys in 2007. In 2008, 653 birds of 72 species were identified across the 26 survey points. The findings from the breeding bird surveys are consistent with the existing knowledge of the bird resources in the region (see Appendix J). Typical for Chautauqua County, a good diversity of breeding species is associated with the area, primarily in forested areas. No threatened or endangered species were identified during Noble’s breeding bird surveys; only one state species of special concern, Grasshopper Sparrow, was detected.

Wintering Birds

Large concentrations of birds do not winter in the Project Area and diversity is low because of the harsh climate and lack of sufficient food sources. Most species present in other seasons (e.g., warblers, flycatchers, and thrushes) migrate south for the winter, leaving only year-round species that are not seasonally displaced (e.g., Great Horned Owl and Pileated Woodpecker) and some species (e.g., American Tree Sparrow and Rough-legged Hawk) that travel south from more northern climates to winter in western New York. Regional CBC data provide an overview of species that would be anticipated to occur in the Project Area during the winter (see Appendix J).

2.11.1.2 Nocturnal Radar and Visual Study

Woodlot Alternatives, Inc. (Woodlot) conducted a nocturnal radar and visual study between September 1 and October 15, 2006, and between April 15 and May 31, 2007, to analyze the spring and fall nocturnal migration of birds and bats over the Project Area. The results of the study, including nocturnal radar passage rates, flight altitude, flight direction, and visual findings, are summarized in this section and provided in Appendix J in further detail.

Nocturnal Radar

Passage Rates. Nocturnal radar observations indicate that passage rates in fall 2006 were 189 ± 21 targets per kilometer per hour (km/hr). Nocturnal passage rates were highly variable from night to night, ranging from 16 ± 3 to 604 ± 77 targets/km/hr. Nocturnal radar observations indicate that passage rates in spring 2007 were 419 ± 40 targets/km/hr. Nocturnal passage rates were highly variable from night to night, ranging from 22 ± 7 to 1,190 ± 94 targets/km/hr. Passage rates had some variation throughout the night during both the spring and fall studies – in both fall and spring the lowest mean rates occurred during the first hour of sampling and near sunrise, whereas, the highest rates occurred near the third through fifth hour of sampling in the fall and the third through seventh hour of sampling in the spring. The overall mean passage rate of 189 targets/km/hr in fall was low to average compared to the 64 to 732 targets/km/hr documented during similar radar studies conducted in NYS. The spring passage rate of 419 targets/km/hr was higher than average but well within the 41 to 509 targets/km/hr range documented during similar radar studies in the northeast (see Appendix J). These mean passage rates are indicative of the general broad front nocturnal bird migration that occurs in most of New York State.

Flight Altitude. The mean nocturnal flight altitude based on vertical radar sampling <4,921 feet (1,500) meters above ground level (agl) in fall 2006 was 1,157 ± 39 feet (353 ± 12 meters) agl, with a range among nights of 748 to 1,674 feet (228 to 510 meters) agl. The mean nocturnal flight altitude based on vertical radar sampling <4,921 feet (1,500 meters) agl in spring 2007 was 1,619 ± 93 feet (493 ± 28 meters) agl, with a range among nights of 581 to 3,009 feet (177 to 917 meters) agl. The spring and fall results are similar, and they are consistent with similar radar studies conducted in New York State (see Appendix J) and existing literature regarding the flight of nocturnal migrants (Kerlinger 1989; Mabee et al. 2006a, b; Smithsonian Migratory Center 2006). Similar radar studies conducted in New York State have shown ranges of mean flight altitudes from 333 to 664 meters in the fall and 291 to 609 meters in the spring. Mean flight altitudes were variable throughout the study periods. There was no significant pattern as to the timing of the lowest altitudes. Approximately 9% of all nocturnal targets in fall 2006 and approximately 3% of all nocturnal targets in spring 2007 flew below 394 feet (120 meters) agl, a close approximation to the maximum turbine height. These percentages are consistent with similar radar studies conducted in New York State which have documented a range of 2 to 13% of targets in the fall and 3 to 25% of targets in the spring flying below 125 meters (see Appendix J). The mean flight altitudes were 768 feet (235 meters) and 1,230 feet (375 meters) higher than the maximum turbine height (389 feet/118.5 meters) for fall 2006 and spring 2007, respectively; therefore, the majority of migration occurs well above the height of the proposed turbines.

Flight Direction. The mean flight direction of targets observed on radar was 216 degrees in fall and 9 degrees in spring. This indicates that the predominant flight direction was southwesterly in fall and northerly in spring, which is consistent with the expected seasonal migration flight directions.

Nighttime Visual Study

Based on visual sampling via ceilometer observations to an approximate altitude of 120 meters (394 feet) agl, a total of 31 birds and 12 bats were observed in the fall during 313 five-minute observations and four birds and 13 bats in the spring during 157 five-minute observations.

Woodlot also calculated the percentage of birds and bats detected with the radar based on flight behavior. To distinguish birds from bats, flight behavior across the radar screen was noted where erratic flight behavior indicated bats and linear movement indicated either birds or bats. From this coarse level analysis, 95% of targets were birds, 3% were bats, and 2% were insects in the fall. In the spring, 96% of targets were birds, 2% were bats, and 2% were insects.

2.11.1.3 Bird Species Identified and Review of Federally- and State-listed Species

During the bird surveys and other activities in the Project Area, a total of 125 species were identified in the Project Area (see Table 2.11-1).

NYSDEC maintains a list of bird species that are considered endangered (nine species), threatened (10 species), or of special concern (19 species) within NYS, inclusive of several federally listed species. Information was reviewed from various sources, including field surveys, Breeding Bird Atlas (BBA) projects, *The Kingbird*, a publication of the New York State Ornithological Association, and the Buffalo Ornithological Society (BOS) database of avian records dating back to 1964 to determine the potential occurrence of endangered, threatened, or special concern species in the Project Area (see Appendix J).

No federally listed and 13 state-endangered, threatened, or special concern species have been documented in the Project Area or vicinity in recent years, including:

- **Golden Eagle (state-endangered):** It is considered extirpated as a breeder in NYS, but is a rare migrant over the Project Area. Two migrants were observed during raptor surveys on March 30, 2008 and April 7, 2008 (see Appendix J of the DEIS).

- **Short-eared Owl (state-endangered):** It is a very rare breeder in western New York. There are no records of breeding in Chautauqua County. As evidenced by Fredonia-Dunkirk and Jamestown CBC data, it occasionally winters in the county and may occur in the Project Area. As reported by the Natural Heritage Program (NHP), this species was observed in the Town of Sheridan in Chautauqua County near the Dunkirk Airport (Seoane 2006, 2008). Two were observed in December of 1991 in Hanover (BOS 2006).

- **Bald Eagle (state-threatened):** It was recently de-listed by the United States Fish and Wildlife Service (USFWS) (USFWS 2007) but remains classified as threatened in NYS. Although they are no longer protected by the federal Endangered Species Act, Bald Eagles are still protected by the Bald and Golden Eagle Protection Act (see Appendix J). It is increasing in population in New York and throughout its range. It occurs as a migrant and transient over the Project Area. The location/habitat within Project Area is not ideal for breeding; however, there are several known nesting areas within 10 miles of the Project Area. Ecology and Environment, Inc. (E & E) observed four individuals during spring raptor surveys on April 23 and 30, 2007, and April 7, 2008.

- **Northern Harrier (state-threatened):** It has bred in a number of locations in Chautauqua County. It was listed as a possible breeder in one atlas block in or near the Project Area during the 2000-2005 BBA. E & E staff observed this species within the Project Area on several occasions during spring and fall raptor surveys and spring migratory bird surveys.

- **Sedge Wren (state-threatened):** There are no records of occurrence in the Project Area, although some potentially suitable habitat is present. As reported by the NHP, this species was observed in the Town of Sheridan in Chautauqua County. Typical breeding habitat consists of moist sedge meadows, commonly with grasses and scattered shrubs (Andrle and Carroll 1988).

- **Henslow's Sparrow (state-threatened):** The NHP reported that this species was observed in the Town of Arkwright, Chautauqua County (Seoane 2006, 2008). Although they were not detected during the 2000-2005 BBA, they were listed as probable breeders in block 1570C and possible breeders in blocks 1569A and 1570D during the 1980-1985 BBA. There is some potentially suitable habitat in the Project Area. Two were observed in Hanover in April 1972 and two were observed in Hanover in July 1987. E & E conducted targeted searches in the Project Area but did not find this species in May or June 2007 or 2008.

- **Common Loon (special concern):** It is likely an uncommon migrant over the Project Area. One was observed migrating during E & E spring raptor surveys on April 23, 2007. The location/habitat in the Project Area is not suitable for breeding.

- **Osprey (special concern):** It is a migrant and transient over the Project Area. E & E observed this species several times during the spring 2007 and 2008 raptor surveys. The location/habitat within the Project Area is not suitable for breeding.

- **Sharp-shinned Hawk (special concern):** It is considered fairly common in Chautauqua County. The location/habitat in the Project Area is suitable for breeding. One was observed in the Project Area on October 5, 2006, during fall raptor surveys and was thought to be a migrant; seven were observed on April 23, 2007, and one was observed on May 6, 2008, during spring raptor surveys and were thought to be migrants because of their flight patterns and time of year.

- **Cooper's Hawk (special concern):** It is considered fairly common in Chautauqua County. Location/habitat in the Project Area is suitable for breeding. It was considered a possible breeder in BBA block 1569A. Three were observed during 2006 fall raptor surveys, and four were observed during 2007 spring raptor surveys.

- **Red-shouldered Hawk (special concern):** It is considered fairly common in Chautauqua County. It was considered a possible breeder in BBA block 1570A. E & E observed six on October 5, 2006, during fall raptor surveys in the Project Area, and one on April 23, 2007, during spring raptor surveys.

- **Horned Lark (special concern):** It is a regular, often common, species in winter throughout NYS. It likely breeds in low numbers in plowed fields within and near the Project Area. It was listed as a probable breeder in BBA block 1569A. E & E observed several of them as flyovers during spring 2008 raptor surveys.

- **Grasshopper Sparrow (special concern):** Location/habitat in the Project Area is suitable for breeding. During E & E breeding bird surveys one was detected on June 11, 2007 and one was detected on June 11, 2008.

Several state-listed species (Upland Sandpiper [threatened], Northern Goshawk [special concern], Red-headed Woodpecker [special concern], Golden-winged Warbler [special concern], Cerulean Warbler [special concern], Yellow-breasted Chat [special concern], and Vesper Sparrow [special concern]) have been observed in nearby towns or counties and/or the habitat is suitable for breeding, but none were observed in the Project Area. Upland Sandpiper (threatened) has bred in Chautauqua County historically, but no birds were observed when targeted searches were conducted for this species. Peregrine Falcon (endangered) and Common Nighthawk (special concern) likely migrate through the Project Area on occasion.

2.11.2 Bats

2.11.2.1 Regional Overview

Very limited information specific to the Project Area was identified during the literature review and migratory bat corridors are poorly known. Nine species of bats have been identified as potentially utilizing the various landscapes found in the state of New York (see Appendix J). This section discusses general bat ecology and habitat preference for bat species found in NYS.

Habitats utilized by bat species with the potential to be present in the Project Area include wetlands, agricultural and reverting fields, forests, and cities with a variety of micro-habitats used for foraging, roosting, and maternity roosting. Bats thrive in these various habitats as they are proficient predators of insect populations. Generally bats are solitary outside of mating, hibernation periods, and rearing of young, although some colonial roosting does occur. The most common species of bats (e.g., Little Brown Bat, Big Brown Bat, Eastern Pipistrelle, and Eastern Red Bat) have adapted to a multitude of habitat types including human-altered landscapes. As such, these species are assumed to utilize the Project Area.

The remaining bat species tend to be found only in densely forested stands and are not expected to be found regularly in the Project Area. The Indiana Bat, which is federally protected, and the Eastern Small-footed Myotis, a state species of concern, have not been identified in the Project Area and are not expected to be present.

Specialized habitats required for bats include winter hibernacula, where bat species congregate during hibernation periods (November through March). Identified hibernacula include limestone caves, old mines, and old well shafts. Most bats require a moderated constant temperature and humidity provided by the hibernacula to survive over the winter. Measures have been taken by state and federal agencies in the last decade to protect important bat hibernacula habitats, as any disturbances during critical hibernation periods can be detrimental to large populations of bats, as well as individual bat species. Bats return in fall to established hibernacula. Some New York bats migrate relatively short distances to these hibernacula. Some bats winter in small hibernacula near their summer roosting areas, while other bats migrate farther south to warmer climates with shorter periods of hibernation and available foraging sources.

Summer roosts are generally daytime or nighttime roosts, where bats will spend the entire day resting and/or portions of the night resting. Daytime roosts for New York bats can vary and include buildings, exfoliating bark, tree cavities, rock piles, and caves depending on species-specific preferences. No roosting areas were identified in the Project Area during site visits or as indicated in the literature.

No threatened or endangered bat species were identified within or within the vicinity of the Project Area by the NHP (Seoane 2006, 2008). No Indiana Bat hibernacula have been identified in western New York (USFWS 2007b). The closest known Indiana Bat hibernacula to the Project Area are located in Onondaga County located approximately 90 miles east and Jefferson County approximately 120 miles northeast. Outside of New York, there are also known Indiana Bat hibernacula that are located in central and southern Pennsylvania, which are a similar distance away as Onondaga County, New York (see Appendix J).

A mysterious illness, termed white-nose syndrome (WNS), has led to thousands of bat deaths in the northeastern United States since early 2007. First discovered near Albany, New York in February 2007, WNS has now been confirmed at over 25 caves and mines in New York, Vermont, Massachusetts, and Connecticut (U.S.

Geological Survey National Wildlife Health Center 2008). WNS may also be present in Pennsylvania, but has not yet been confirmed (USFWS 2008b). WNS has not been documented in western New York. Bats affected by WNS typically have a white fungus encircling their nose. It is currently unknown whether the fungus is the cause of WNS or whether it is simply an indicator of poor overall health. Bats affected by WNS are commonly emaciated and have little or no body fat. Affected bat species include the federally endangered Indiana Bat, Eastern Pipistrelle, Northern Long-eared Bat, Small-footed Bat, and Little Brown Bat. Little Brown Bats, the most common hibernating species in New York, have sustained the largest number of deaths (USGS 2008b).

2.11.2.2 Bat Habitat Surveys

Habitat surveys of the Project Area were conducted during various visits in fall 2006, spring 2007, and spring 2008. Surveys identified no major rock outcroppings, cave dwellings, or hibernacula where bats may roost within the Project Area. Based on the mosaic of habitat types found throughout the Project Area, suitable habitat was identified for the most common bat species that would be expected to occur in the Project Area. Acoustical monitoring surveys (see Section 2.11.2.3) confirmed their presence in the Project Area.

No suitable hibernacula were identified within the Project Area. Based on the known locations of Indiana Bat hibernacula, and the distance that separates the hibernacula from the Project Area (greater than 90 miles), occurrence or migration through the Project Area is unlikely.

2.11.2.3 Acoustical Monitoring for Bats

Woodlot Alternatives, Inc. (Woodlot) conducted an acoustical monitoring study in the spring and fall of 2007. The results of their study, including mean detection rate, and species composition, are summarized in this section. The full reports prepared by Woodlot are included in Appendix J.

Spring 2007 Study

Two detectors were deployed at different heights on a meteorological (met) tower in the Project Area from the night of March 28 to the night of May 30, 2007, yielding a total of 86 detector-nights of recordings (32 nights from the high detector and 54 nights from the low detector). The met tower was located in an open agricultural field with some nearby woodlands. A total of 78 bat call sequences were recorded during the spring sampling. The mean detection rate of both detectors was 0.9 call sequences per detector-night. Many more call sequences were recorded by the lower detector (74 call sequences), which was 20 meters (66 feet) above the ground, than by the upper detector (four call sequences), which was 40 meters (132 feet) above the ground. The lower detector was operational for more nights than the higher detector (54 nights of data vs. 32 nights of data), but even on nights when both detectors were functioning, the low detector recorded more call sequences than the high detector. The number of call sequences varied considerably from night to night (see Appendix J). In general, the most calls were recorded over a few nights in late April and early May. At the low detector, the maximum number of call sequences occurred on May 8 and 9, 2007, when 13 call sequences were recorded on each night, and at the high detector, the maximum number of call sequences occurred on May 15, 2007, when two call sequences were recorded.

A large proportion (45% or 35 calls) of the call sequences were identified simply as “unknown” due to poor call quality or too few call pulses on which to base identification. Most of these (94 % or 32 of the 35 unidentifiable calls) were high frequency calls, indicating that they may have been myotids or bats in the Eastern Red Bat/Eastern Pipistrelle guild. Of the call sequences that could be identified (55% or 43 calls) based on good call quality and a sufficient number of call pulses, approximately 33% were myotids and 22% belonged to the “Big Brown” guild which includes Big Brown Bat, Silver-haired Bat, and Hoary Bat. Several of the recorded call sequences were distinct enough to identify to species, rather than just to guild. Two bat species were identified in this manner during the spring surveys, including the Big Brown Bat (two calls) and the Silver-haired Bat (one call). The call sequences in the myotid group could not be identified to species because the call sequences were too indistinct, and the other calls in the Big Brown guild were either that of the Big Brown Bat or Silver-haired Bat, but definitely not from the Hoary Bat. Both species identified are found throughout New York State. The survey results (detections and species) were generally consistent, although slightly higher, than similar studies conducted in the spring in agricultural habitat in the northeast.

Fall 2007 Study

Detectors were deployed at the same heights and on the same met tower used during the spring 2007 study. Surveys were conducted from the night of July 30 to the night of October 14, 2007, yielding a total of 154 detector-nights of recordings (77 detector-nights at the low detector and 77 detector-nights at the high detector). A total of 541 bat call sequences were recorded during the fall sampling. The mean detection rate for both detectors was 3.5 call sequences per detector-night. Both detectors recorded a similar number of call sequences, with the low detector (295 calls) recording a few more calls than the high detector (246 calls). The number of call sequences varied and no calls were detected on a number of nights toward the end of the sampling period; consequently, no seasonal trends were observed. At the high detector, the maximum number of call sequences occurred on August 29, 2007, when 22 call sequences were recorded, and at the low detector, the maximum number of call sequences occurred on September 21, 2007, when 20 call sequences were recorded.

The highest proportion (54% or 291 calls) of the recorded call sequences were labeled as unknown due to short call sequences, poor call signature formation, or static interference. More low frequency calls (62% or 85 calls) were recorded than high frequency calls (38% or 52 calls); the low frequency calls are characteristic of the Big Brown guild. The composition of bat call sequences were 197 (36%) in the Big Brown guild, 27 (5%) in the Eastern Red Bat/Eastern Pipistrelle guild, and 26 (5%) in the Myotis guild. Several of the recorded call sequences were distinct enough to identify to species, rather than just to guild. Five bat species were identified in this manner during the spring surveys, including the Silver-haired Bat (52 calls), Hoary Bat (30 calls), Eastern Red Bat (19 calls), Big Brown Bat (one call), and Eastern Pipistrelle (one call). The call sequences in the myotid group could not be identified to species, because the call sequences were too indistinct. All of the species identified are found throughout NYS. The survey results (detections and species) were generally consistent with similar studies conducted in the fall in agricultural habitat in the northeast; although a wide range of detection rates have been reported for agricultural land.

The detection rates in spring 2007 were lower than in fall 2007 at this site, which was anticipated as bat activity is often greater in the late-summer and fall, based on previous studies conducted in the northeast due to recruitment to the population (e.g., young born in the spring).

Table 2.11-1 Bird Species Identified during E & E Surveys and Site Work in the Ball Hill Project Area

Common Name[1]		
Canada Goose	Acadian Flycatcher	Nashville Warbler
Wood Duck	Alder Flycatcher	Yellow Warbler
Mallard	Willow Flycatcher	Chestnut-sided Warbler
Ring-necked Duck	Least Flycatcher	Magnolia Warbler
Bufflehead	Eastern Phoebe	Black-throated Blue Warbler
Ring-necked Pheasant	Great Crested Flycatcher	Yellow-rumped Warbler
Ruffed Grouse	Eastern Kingbird	Black-throated Green Warbler
Wild Turkey	Northern Shrike	Blackburnian Warbler
Common Loon (SC)	Blue-headed Vireo	Pine Warbler
Great Blue Heron	Warbling Vireo	Palm Warbler
Turkey Vulture	Red-eyed Vireo	Bay-breasted Warbler
Osprey (SC)	Blue Jay	Black-and-white Warbler
Bald Eagle (T)	American Crow	American Redstart
Northern Harrier (T)	Common Raven	Ovenbird
Sharp-shinned Hawk (SC)	Horned Lark (SC)	Mourning Warbler
Cooper's Hawk (SC)	Purple Martin	Common Yellowthroat
Red-shouldered Hawk (SC)	Tree Swallow	Hooded Warbler
Broad-winged Hawk	Northern Rough-winged Swallow	Scarlet Tanager
Red-tailed Hawk	Barn Swallow	Eastern Towhee
Rough-legged Hawk	Black-capped Chickadee	Chipping Sparrow
Golden Eagle (E)	Tufted Titmouse	Field Sparrow
American Kestrel	Red-breasted Nuthatch	Savannah Sparrow
Merlin	White-breasted Nuthatch	Grasshopper Sparrow (SC)
Killdeer	Brown Creeper	Song Sparrow
Solitary Sandpiper	House Wren	Swamp Sparrow
Spotted Sandpiper	Winter Wren	White-crowned Sparrow
American Woodcock	Golden-crowned Kinglet	Dark-eyed Junco
Ring-billed Gull	Ruby-crowned Kinglet	Snow Bunting
Rock Pigeon	Blue-gray Gnatcatcher	Northern Cardinal
Mourning Dove	Eastern Bluebird	Rose-breasted Grosbeak
Black-billed Cuckoo	Veery	Indigo Bunting
Yellow-billed Cuckoo	Swainson's Thrush	Bobolink
Barred Owl	Hermit Thrush	Red-winged Blackbird
Ruby-throated Hummingbird	Wood Thrush	Eastern Meadowlark
Belted Kingfisher	American Robin	Common Grackle
Red-bellied Woodpecker	Gray Catbird	Brown-headed Cowbird
Yellow-bellied Sapsucker	Northern Mockingbird	Baltimore Oriole
Downy Woodpecker	Brown Thrasher	Purple Finch
Hairy Woodpecker	European Starling	House Finch
Northern Flicker	American Pipit	American Goldfinch
Pileated Woodpecker	Cedar Waxwing	House Sparrow
Eastern Wood-Pewee	Blue-winged Warbler	

Note:

[1] Endangered (E) and threatened (T) species and species of special concern (SC) are noted with parenthesis after the common name.

Table 2.11-2 Bat Species Identified during Acoustical Monitoring in the Ball Hill Project Area

Common Name[1]	Scientific Name	Average Body Size (inches)	Preferred Habitats		Abundance
			Summer	Winter	
Big Brown Bat	*Eptesicus fuscus*	3.4-5.4	Tree cavities, exfoliating bark, urban structures	Regional hibernacula, buildings, urban structure	Common
Silver-haired Bat	*Lasionycteris noctivagans*	3.6-4.6	Tree cavities, exfoliating bark in coniferous forested stands, and rock crevices	Migrates outside region?	Uncommon (abundance uncertain)
Eastern Red Bat	*Lasiurus borealis*	3.6-4.6	Dense riparian tree foliage	Migrates outside region?	Uncommon (abundance uncertain in New York); most common tree roosting bat
Hoary Bat	*Lasiurus cinereus*	5.1-5.9	Tree foliage	Migrates outside region?	Uncommon (abundance uncertain)
Eastern Pipistrelle	*Pipistrellus subflavus*	3.0-3.6	Tree foliage, leaf litter	Regional hibernacula	Uncommon to common
Myotid species[2]		varies	Varies	Regional hibernacula	varies

Source: Curtis and Sullivan 2001, Williams et al. 2002, Bat Conservation International 2007.

Notes:

[1] State-endangered (E) and threatened (T) species and species of special concern (SC) are noted with parenthesis after the common name.

[2] Myotid bat species call sequences were identified during acoustical monitoring; however, the call sequence identifications could not be distinguished to species. There are four Myotid bat species that occur in New York State including the Little Brown Bat (most common), Eastern Small-footed Myotis (uncommon; State species of special concern); Indiana Bat (uncommon; Federally- and State-endangered); and Northern Myotis (uncommon to common).

2.12 Bird and Bat Resources: Impacts and Mitigation

2.12.1 Wind Energy and Bird and Bat Issues

Air emissions and global climate change have been cited as serious concerns for North American bird populations (see *A Birdwatcher's Guide to Global Warming by the National Wildlife Federation and American Bird Conservancy* [Price and Glick 2004]). Increased renewable energy use has been cited as one way to slow the rate of climate change and reduce air emissions associated with the increased demand for new energy generation.

In November 2004, the National Wind Coordinating Committee (NWCC), a consortium of consumer groups, economic development organizations, electric power, environmental organizations, federal government, green power, state government, tribal governments, and the wind industry, issued the second edition of a fact sheet, "Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions" (NWCC 2004). The following, taken from the fact sheet, is part of an overview on the status of bird and bat issues at wind energy facilities that aptly describes the current understanding of the issues:

- Wind energy's ability to generate electricity without many of the environmental impacts associated with other energy sources (air pollution, water pollution, mercury emissions, and greenhouse gas emissions associated with global climate change) can significantly benefit birds, bats, and many other plant and animal species. However, the direct and indirect local and cumulative impacts of wind plants on birds and bats continue to be an issue.

The positives must be balanced against adverse impacts such as bird and bat collisions and habitat loss, degradation, or displacement that are also attributable to some wind farms. However, the results from numerous studies indicate that while avian mortality can be attributed to wind farms the mortality rates are low, especially compared to other sources of bird mortality (NWCC 2004; GAO 2005):

- In a September 2005 report to congressional requesters, the United States Government Accountability Office (GAO) reviewed the impacts on wildlife from wind power. The GAO report concluded that outside of the Altamont site in northern California, the research to date has not shown bird kills in alarming numbers (GAO 2005). The GAO review of post-construction mortality studies found that bird fatalities ranged from 0 to 7.28 birds per turbine per year.

- The 2004 NWCC fact sheet shows that an average of 2.3 birds per turbine per year (3.1 birds per megawatt [MW] per year) are killed at facilities outside of California. For eastern wind farms, the average was 4.3 birds per turbine per year (3.0 birds per MW per year) based on only two studies. No wind energy facilities in New York State were included in the NWCC compilation. However, there have been several studies conducted since the time of the NWCC fact sheet including two years of study within New York State (Maple Ridge Wind Power Project, Lewis County, New York) with above average bird fatality rates. During a 2006 post-construction study at the Maple Ridge facility, fatality estimates varied based on survey durations with 9.59 incidents/turbine (daily surveys), 4.47 incidents/turbine (every three-day surveys), and 3.13 incidents/turbine (weekly surveys) (Jain et al. 2007). Weekly surveys conducted in 2007 at the Maple Ridge facility documented a bird fatality estimate of 5.67 incidents/turbine (Jain et al. 2008).

The research regarding impacts to bats from wind turbines is much more limited. Collisions involving bats are typically on the same order as expected for birds with 3.4 bat kills per turbine per year (4.6 bats per MW per year) as national average from the NWCC fact sheet (NWCC 2004). However, much higher rates (15.3 to 41.1 bats per MW per year) were found during some studies in the Appalachian Mountains and at other locations in recent years (GAO 2005, NRC 2007). The significance of localized bat mortality from collisions on a population as a whole is largely not understood, and current research is aimed at addressing this issue. The Bats and Wind Energy Cooperative (BWEC), an alliance of state and federal agencies, the wind industry, academic institutions, and non-governmental organizations, is currently researching the interactions of bats and wind turbines with the intent to develop solutions for wind farm siting that will minimize or prevent bat mortality from wind turbines. To date, there has been no confirmed correlation between habitat availability and specific atmospheric or season conditions that result in increased bat mortality, although preliminary data seem to indicate that mortalities occur during periods of lower wind speed and that temperature, precipitation, and humidity may also be contributors. No known collisions of federally endangered or threatened bat species have been documented in conjunction with wind turbines (NRC 2007).

A Bird and Bat Risk Assessment (BBRA) that evaluates the project-specific risk to birds and bats due to the construction of the proposed facility prepared by E & E is presented as Appendix J. The information from the BBRA is summarized in this section.

2.12.2 Construction Impacts

Construction-related activities (e.g., clearing for road construction, infrastructure construction, equipment noise, and increased vehicle traffic) can potentially impact birds and bats by causing temporary displacement from habitat. Because these impacts are generally only temporary in nature, impacts on bird and bat populations are not significant.

2.12.2.1 Potential Impacts on Migratory Birds

Significant adverse impacts on migratory bird populations including raptors, passerines, and waterbirds are not expected as a result of construction of the Project. The Project Area is not located along a major migratory corridor for birds. Most species are expected to avoid the area of construction during construction activities.

2.12.2.2 Potential Impacts on Breeding Birds

Breeding bird populations are not expected to be significantly and/or adversely affected by construction of the Project. If construction begins before the breeding season, it is anticipated that breeding birds will likely avoid areas during the active construction period. If construction begins during the breeding season, breeding birds that have been exposed to similar disturbance such as farming and logging, and are accustomed to disruption of this nature will remain in the area while others will likely relocate to other adjacent suitable habitat, if available. Incidental loss of some nests, eggs, and/or young is possible when construction (e.g., land clearing) is conducted during the breeding season. Indirect impacts on breeding birds will occur as a result of habitat alteration during construction of the Project; however, these impacts are not expected to be significant because they are temporary and mostly reversible. In addition, other suitable habitat that will not be disturbed exists in the Project Area. The potential for habitat loss has been minimized through site planning (i.e., the placement of turbines in agricultural areas where possible). Outside of temporary localized construction disturbance, no significant adverse impacts on breeding birds are anticipated.

2.12.2.3 Potential Impacts on Threatened and Endangered Species

Based on consultation with the United States Fish and Wildlife Service (USFWS), the Bald Eagle was identified as occurring in Chautauqua County, which although no longer protected under the Endangered Species Act (ESA) is federally protected under the Bald and Golden Eagle Protection Act. The New York State Natural Heritage Program (NHP) did not identify any threatened or endangered species within the Project Area (Seoane 2006, 2008). The NHP identified five state-listed and one protected bird species within 10 miles of the Project Area: Great Blue Heron, Bald Eagle, Short-eared Owl, Sedge Wren, Henslow's Sparrow, and Northern Harrier (Seoane 2008). The Short-eared Owl is a state-listed endangered species, while the Bald Eagle, Sedge Wren, Henslow's Sparrow, and Northern Harrier are state-listed threatened species. Great Blue Heron was identified by the NHP due to the Project Area's proximity to a rookery. During field surveys one state-endangered species (Golden Eagle), two state-threatened species (Bald Eagle and Northern Harrier) and seven state special concern species (Common Loon, Osprey, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered Hawk, Horned Lark, and Grasshopper Sparrow) were observed in the Project Area; all in low numbers.

Based on surveys and observations of existing habitat in the Project Area, only limited use of the Project Area is anticipated by endangered, threatened, and special concern species during construction. Most occurrences would likely be related to migration or transient (i.e., limited) use. Species which may breed in the Project Area are likely to occur in very low numbers and the potential for impacts during construction will be minimized by the use of environmental monitors and adaptive management strategies. Of the listed species mentioned previously in this section, disruption during construction (e.g., land clearing) in the breeding season could potentially affect Northern Harrier, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered Hawk, and Grasshopper Sparrow because those are the listed species most likely to breed within the Project Area. It is anticipated that environmental monitoring in grasslands habitat (Northern Harrier and Grasshopper Sparrow) and forested areas (Sharp-shinned Hawk, Cooper's Hawk, and Red-shouldered Hawk) will identify nesting areas and reduce any potential impacts during construction. Transient and/or migratory use by the other listed species is not expected to result in adverse impacts during construction.

If construction takes place in suitable nesting habitat for endangered or threatened species in the spring to early summer – during breeding season – the work area will be surveyed and cleared by an Environmental Monitor in advance of construction as per Noble's Environmental Monitoring Plan. If nesting threatened or endangered species are found in the immediate proximity of a construction area, Noble will coordinate with the USFWS and/or New York State Department of Environmental Conservation (NYSDEC) to identify potential impacts, evaluate options, and develop a mitigation plan to address site-specific occurrences of species of concern. Measures that may be implemented will depend on the proximity to construction, the construction activities involved, the species involved, the date, the stage of the breeding season, and other potential factors (e.g., hay mowing). It is possible that measures may include delaying construction until the young have fledged from the nest or continual monitoring during the initial construction period to ensure the birds are not impacted. With implementation of monitoring activities, no significant adverse impacts from construction on threatened or endangered species are anticipated.

2.12.2.4 Potential Impacts on Bats

Significant adverse impacts on bat populations are not expected during construction of the Project. There is a potential for indirect impacts on bats as a result of habitat alteration or loss in association with construction of the Project; however, these impacts are not expected to have a significant adverse affect on bat populations. Potential construction impacts on habitat would be caused by ground disturbance and tree removal activities that are also associated with farming and logging activities that are common to the area. It is anticipated that bats in the Project Area would return to temporarily disturbed areas upon completion of construction.

2.12.3 Project Facility Impacts

Operation of the wind turbines can potentially impact birds and bats through collisions with the turbine blades and towers, overhead collection lines, or transmission lines, displacement from habitat, or influence on migration, etc. Collisions are typically the primary concern with operation-related impacts. Potential impacts can vary among different bird and bat populations and groups.

2.12.3.1 Potential Impacts on Migratory Birds

The dynamics of migration and the potential impacts from the operation of wind turbines differ among groups of birds. Therefore, this section contains separate discussions of the potential impacts on the migration of raptors, passerines, and waterbirds. The majority of passerines migrate during the night while raptors migrate almost exclusively during the day. Waterbirds migrate during the day and night (Richardson 1998).

Raptors

Raptor migration is diffuse in the region away from the Great Lakes shorelines and the nearest proposed turbine location is approximately 9 miles from the Lake Erie shoreline. There are no geographical or topographical features in the Project Area that attract or concentrate migrating raptors. No concentrated flight paths were identified in either spring or fall and the findings were consistent with the existing knowledge of the bird resources in the region. Therefore, low numbers of migrant raptors are anticipated in the Project Area.

As raptor use in the Project Area is low and the likelihood of turbine avoidance is high, the potential for impacts is very low. No biologically significant adverse impacts on migrant raptors are anticipated from operation of the Project.

Passerines

There are no geographical or topographical features in the Project Area that attract or concentrate nocturnal migrant passerines. The Project Area is not immediately proximate to any large water bodies where nocturnal migrants tend to concentrate at stopover areas. Outside of such concentration areas, passerine migration is typically diffuse over a broad front. Results of the nocturnal radar study are generally consistent with this assessment. The migratory passage rates over the Project Area in fall 2006 were below average and in spring 2007 were above average but both were within the values of studies conducted at other locations (see Appendix J).

The mean flight altitudes were 768 feet (235 meters) and 1,230 feet (375 meters) higher than the maximum turbine height in fall 2006 and spring 2007, respectively; therefore, the majority of nocturnal migration occurs well above the height of the proposed turbines. The mean flight altitude in spring and fall were similar to each other and were similar to other locations in the eastern United States where similar studies have been conducted. Approximately 9% of all nocturnal targets in fall 2006 and approximately 3% of all nocturnal targets in spring 2007 flew below 120 meters (394 feet) above ground level (agl), a close approximation to the maximum turbine height. These findings are within the range of results from other radar studies in the northeast United States.

There are conditions when nocturnal migrants will be more susceptible to collision. There is an increase for potential impacts when adverse weather conditions cause birds to fly at lower altitudes. Studies have shown that bird collisions with communication and television towers (much taller than wind turbines) are increased during low cloud ceilings, heavy fog, and precipitation.

It is likely that nocturnal migrant passerines will make up the majority of the bird kills from the Project, based on data collected from post-construction mortality studies at wind farms, communication towers, and buildings. However, there have been no documented large-fatality events of nocturnal migrants at wind energy facilities, with the largest limited to 27 songbirds at a floodlit substation and nearby turbines in West Virginia on a night with heavy fog (NWCC 2004). The potential mortality risk to migrant passerines is considered low based on the Project location, the passage rate and altitude data from the radar studies (and other regional radar studies), the avoidance behavior of passerines exhibited at wind energy facilities, and as demonstrated by the fatality rates from post-construction monitoring at regional wind energy facilities. No biologically significant adverse impacts are anticipated for any species from operation of the Project.

Waterbirds

The Project Area is not located in an area where there are large numbers of migratory waterbirds or local movements of waterbirds. Post-construction studies at existing wind energy facilities have shown that waterfowl are less susceptible to collision than other species groups (Erickson et al. 2002; BirdLife International 2003). Therefore, the potential risk for waterbird mortality from the Project is estimated to be very low.

2.12.3.2 Potential Impacts on Breeding Birds

Given the various habitats in the Project Area and site geography, there is a fairly high diversity of breeding species; however, many turbines (e.g., approximately 66%) will be sited in agricultural fields and open areas which already have a relatively low species diversity and density. There is a significant degree of habitat fragmentation already in the Project Area. By minimizing the Project footprint near wetlands and mature forests, potential impacts on resident birds have been reduced.

Much of the Project will be constructed in agricultural areas and along edges of young woodland areas, and breeding birds in these habitats may demonstrate temporary displacement. Most breeding birds are anticipated to habituate to the turbines and long-term displacement will be minimal. Grassland-nesting species may not habituate to the turbines as much as species in other habitats, although displacement may be limited to the immediate area (e.g., surrounding field) of each turbine depending on a site-specific basis as per turbine location, habitat, size of field, hay mowing, and pesticide practices. Any potential impacts to grassland-nesting species are anticipated to be much less than the impacts from existing widespread hay mowing and pesticide practices in the same area.

Project facility construction in wooded areas will result in some forest fragmentation and negatively impact some forest-dwelling species (i.e., Wood Thrush, Ovenbird); however, there are not any extensive forest tracts in the Project Area and fragmentation is already prevalent. Some avian species (i.e., Indigo Bunting, Mourning Warbler) may benefit from fragmentation. Long-term displacement in wooded areas is unlikely as breeding species are anticipated to habituate to the turbines.

There is a low risk of any substantial negative impact on habitat through loss, degradation, or displacement of breeding birds. No significant adverse impacts on breeding birds are anticipated from operation of the Project.

2.12.3.3 Potential Impacts on Threatened and Endangered Bird Species

Based on consultation with the USFWS, the Bald Eagle was identified as occurring in Chautauqua County, which although no longer protected under the ESA is federally protected under the Bald and Golden Eagle Protection Act. The NHP did not identify any threatened or endangered species within the Project Area (Seoane 2006, 2008). The NHP identified six state-listed bird species within 10 miles of the Project Area: Great Blue Heron, Bald Eagle, Short-eared Owl, Sedge Wren, Henslow's Sparrow, and Northern Harrier (Seoane 2008). The Short-eared Owl is a state-listed endangered species, while the Bald Eagle, Sedge Wren, Henslow's Sparrow, and Northern Harrier are state-listed threatened species. Great Blue Heron was identified by the NHP due to the Project Area's proximity to a rookery.

During field surveys, one state-endangered species (Golden Eagle), two state-threatened species (Bald Eagle and Northern Harrier), and seven state special concern species (Common Loon, Osprey, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered Hawk, Horned Lark, and Grasshopper Sparrow) were observed in the Project Area; all in low numbers. Because only limited use of the Project Area by endangered, threatened, and special concern species is anticipated no significant adverse impacts to these species are expected during operations. The potential impacts on these species and those additional species listed by USFWS and NYSDEC on the NHP reports (i.e., Great Blue Heron, Short-eared Owl, Sedge Wren, and Henslow's Sparrow) within 10 miles of the Project Area are discussed below.

Two migrant Golden Eagles were observed in the Project Area by Ecology and Environment, Inc. (E & E) staff during the spring raptor surveys on March 30 and April 7, 2008. There is no suitable habitat for breeding in the Project Area and there are no active nests in New York State (NYSDEC 2007c). There are no activities pertinent to the life cycle of the Golden Eagle that would regularly bring it to the Project Area except as a rare migrant or an occasional transient. With such low utilization of the Project Area, the potential direct mortality or injury of eagles colliding with wind turbines is considered remote. Similarly, as there is not suitable breeding habitat in the Project Area, the potential for harassment, displacement, or habitat impacts are also remote. Therefore, any potential adverse impacts to Golden Eagle are considered remote.

Two Bald Eagles were observed by E & E staff in the Project Area during spring raptor surveys in 2007 (one migrant on April 23, 2007, and one local bird on April 30, 2007). Two Bald Eagles were also observed during 2008 spring raptor surveys (one migrant and one local bird, both on April 7, 2008). Habitat within the Project Area is not suitable for breeding; however, several nesting areas have been identified within 10 miles of the Project Area, including one nest just east of the Project Area at Lake Flavia in the Town of Dayton. Foraging potential for Bald Eagles within the Project Area is considered low given the absence of any large bodies of water in the Project Area. Based on suitable foraging habitat and relative proximity to the nearest nesting locations, Bald Eagles may visit East Mud Lake and West Mud Lake, which are both adjacent to the Project Area. Coming from the nearest nesting locations, the eagles could reach these small lakes without crossing the Project Area. There are no activities pertinent to the life cycle of the Bald Eagle that would regularly bring it to the Project Area except as a migrant or a transient. As such, the potential for direct mortality or injury to Bald Eagles from colliding with wind turbines is low. Similarly, the potential for harassment, displacement, or habitat impacts are also low. Therefore, any potential adverse impacts to Bald Eagle are considered low.

E & E staff observed Northern Harriers in the Project Area on several occasions during spring and fall raptor surveys and spring migratory surveys. It has bred in a number of locations in Chautauqua County and is a regular occurrence in many other areas of New York State. It is a confirmed or suspected breeder in or near the Project Area. Various wetland and upland habitats, including cattail marshes, wet meadows, and hayfields, are used for nesting. Unlike most raptors, it is a ground nester. It is highly visible in all seasons and has a large hunting range (Andrle and Carroll 1988). Because there is ample suitable nesting habitat in and near the Project Area, the potential risk of displacement is low. Very low Northern Harrier mortality has been documented from wind turbines, even at sites that have relatively high use by this species (Erickson et al. 2002). It is anticipated that local Northern Harriers will habituate to the presence of wind turbines; however, the collision risk is considered low-to-moderate because of the species' frequency of occurrence in the Project Area.

Short-eared Owl has been listed by NHP as occurring in the Town of Sheridan in Chautauqua County. This location is assumed to be a wintering location rather than a breeding area, because this species is a very rare breeder in western New York and no breeding has been documented in Chautauqua County. In addition to the NHP listing, two Short-eared Owls were observed in Hanover, New York, in 1991. This species is categorized as endangered in New York State primarily because of its rare breeding status and decline in population. Although breeding Short-eared Owls are very rare in western New York, wintering Short-eared Owls are regular. Suitable habitat occurs throughout much of Chautauqua County, including the Project Area, for wintering Short-eared Owls. Short-eared Owls have been observed in five out of 35 years during the Dunkirk-Fredonia Christmas Bird County (CBC) and seven out of 66 years during the Jamestown CBC. Although this species was not observed during field surveys, it is suspected that a few birds may forage in the Project Area in some winters. The potential impact to this species is considered low.

Sedge Wren has been identified by NHP as occurring in the Town of Sheridan in Chautauqua County. Typical breeding habitat consists of moist sedge meadows, commonly with grasses and scattered shrubs (Andrle and Carroll 1988). This elusive species is unpredictable, as it often does not reappear from year to year in the same breeding location. Habitat is often temporary and replaced through plant succession (Andrle and Carroll 1988). The Sedge Wren is secretive and spends most of its time near the ground, with limited flights just above the vegetation. The potential risk of collision is considered remote and the potential risk of displacement is considered very low because suitable habitat will not be altered and the unpredictable nature of its breeding.

Henslow's Sparrow has been identified by NHP as occurring in the Town of Arkwright, Chautauqua County, approximately 6 miles west of the Project Area. Typical breeding habitat consists of wet grasslands with tall, dense vegetation and thick litter (Herkert et al. 2002). The Henslow's Sparrow is secretive, singing from inconspicuous perches on low forbs, shrubs, or grasses. The potential risk of collision is considered remote and the potential risk of displacement is considered very low because suitable habitat will not be altered.

The Great Blue Heron has been identified by NHP because a rookery with more than 50 nests per year has been observed at Dibble Hill/Farrington Hollow in the Town of Arkwright, Chautauqua County, approximately 2 miles west of the Project Area. While not a federal or state-listed endangered or threatened species, the Great Blue Heron is protected by the federal Migratory Bird Treaty Act. The Great Blue Heron typically nests in colonies, usually near water; and is primarily a fish eater, wading along the shorelines of marshes, lakes, and rivers (Butler 1992). There are numerous foraging areas near the heronry including the Canadaway Creek Wildlife Management Area (WMA), Canadaway Creek and multiple tributaries, Black Pond, West Mud Lake, Fredonia Reservoir, Cassadaga Lake, and various other streams and tributaries. There are relatively few creeks and ponds within the Project Area, although herons could traverse the Project Area if they wanted to forage at East Mud Lake, Silver Creek Reservoir, or the north branch of Conewango Creek, all located east or northeast of the Project Area. While it is not a state- or federally listed species, Noble's environmental monitoring program (see Section 2.27, Description of the Proposed Construction Plan, and Appendix I) would determine if they are present during the construction year in close proximity to construction and will be handled accordingly. Herons have not been prone to collisions with wind turbines and given their size, they would be easier to find than smaller birds, such as passerines during post-construction mortality studies. In a review of bird collisions at wind facilities (Erickson et al. 2001) based on 31 studies, 78% of the carcasses found (outside of California) were passerines and only 3.3% were waterbirds (National Research Council 2007). The potential risks of collision and displacement is considered low as there is little suitable breeding or foraging habitat in the Project Area.

Species of special concern are those that warrant attention and consideration because they are extremely uncommon in New York or have highly specific habitat requirements and deserve careful monitoring. Although rare, current information does not justify listing these species are either endangered or threatened. They are not warranted the same legal protection as those species which are listed as endangered or threatened. All of the species of special concern (Common Loon, Osprey, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered Hawk, Horned Lark, and Grasshopper Sparrow) were detected in very low numbers. Of these seven species, Common Loon and Osprey do not breed in the Project Area while the other five species may breed in low numbers in the Project Area. The potential risks of collision and displacement are considered remote for each of these species.

Only limited use of the Project Area is anticipated by endangered, threatened, and special concern bird species; therefore, the overall risk to threatened and endangered bird species from operation of the Project is considered low. Impacts to listed bird species will be identified during the post-construction study for bird and bat mortality monitoring.

2.12.3.4 Potential Impacts on Bats

Based on the habitat within the Project Area, acoustical monitoring studies performed in and near the Project Area, and the limited post-construction data associated with other similar projects, the potential for significant adverse impacts on bats from operation of the Project is considered moderate as uncertainty still remains regarding the affect of wind farms on bats. A primary reason for uncertainty is that pre-construction bat studies have not been effective at indicating post-construction impacts at many sites, including the Maple Ridge site in New York State. The greatest concern for potential adverse impacts would be to transient individuals, especially tree-roosting bat species (Hoary Bat, Eastern Red Bat, and Silver-haired Bat) colliding with wind turbines. Preliminary data collected at sites in the eastern United States as well as the Canadian prairie seem to indicate that these species are susceptible to collisions with wind turbines. It is anticipated that there would be much lower risk to the resident/summering populations occurring in the Project Area than to migrants because collisions with tree-roosting migrating species have exceeded those of other bat species (e.g., 151 of 203 total dead bats found during the 2007 post-construction study at Maple Ridge were of the three tree-roosting bat species mentioned above [Jain et al. 2008]). As the population sizes and trends of most bats in New York State are unknown, it is uncertain what level of impact is made from wind projects, especially in light of the even greater mortality risk from white-nose syndrome (WNS). However, it should be noted that WNS has yet to be documented in western New York and, therefore, at this time, is not expected to impact local bat populations at this time.

There are increasing concerns about the cumulative impacts of bat fatalities to specific species as the number of wind projects increase and data from ongoing mortality studies are made publicly available. Only with implementation of long-term monitoring protocols and continued research by BWEC and others would the significance of potential cumulative impacts on bat populations be assessable.

2.12.3.5 Potential Impacts on Threatened and Endangered Bat Species

Within NYS, the federally endangered Indiana Bat is known to winter in isolated hibernacula mostly within the eastern portion of the state. The closest known Indiana Bat hibernacula to the Project Area are located in Onondaga County approximately 90 miles east and Jefferson County approximately 120 miles northeast. Outside of New York, there are also known Indiana Bat hibernacula that are located in central and southern Pennsylvania, which are a similar distance away as Onondaga County, New York (see Appendix J). Based on the known locations of hibernacula and maternity colonies in New York State, and no previous documentation of this species in western New York, it is unlikely that Indiana Bats would be found residing or migrating in the Project Area, and, therefore, any potential impacts are considered remote.

2.12.3.6 Bird and Bat Fatality Approximations

It is anticipated that the bird fatality rates for the Project will be within the range of the NWCC eastern average (4.3 birds/turbine/year) and 2006 daily Maple Ridge results (9.59 birds per turbine per survey season) (Jain et al. 2007). This prediction is based on the results of the bird studies, literature review, and because there are no features in the Project Area that attract or concentrate large numbers of migrating birds. The potential number of fatalities for the Project was estimated by multiplying the fatality rates for bird kills with the proposed number of turbines (see Table 2.12-1). For this approximation, the NWCC eastern average was used as a lower bound and the 2006 Maple Ridge daily results were used as an upper bound. The NWCC eastern average is only based on two studies, and it is anticipated that sites in the eastern United States will have higher avian fatality rates than sites in the western and central United States. The 2006 Maple Ridge daily and three-day bird fatality rates were higher than the NWCC eastern average (and also the 2007 Maple Ridge rates) but may have resulted from more thorough surveys, among many other possible site-specific variations.

It is anticipated that the bat fatality rates for the Project will be at or above the NWCC national average (3.4 bats per turbine per year). Because the NWCC national average does not feature many eastern United States sites, where bat kills have been more numerous, or recent studies where more thorough search methodologies have revealed increased fatality rates (i.e., 2006-2007 surveys at Maple Ridge), it is reasonable to anticipate that fatality rates greater than the NWCC national average might occur. Similar to the estimates of bird fatalities, the NWCC national average (3.4 bats per turbine per year) was used as the lower bound while the 2006 daily rate at Maple Ridge (24.5 bats per turbine per survey season) was used as the upper bound (see Table 2.12-2).

The bird and bat fatality rates discussed above are only estimates. There can be considerable variation in fatality rates, especially for bats. The actual number of bird and bat fatalities can only be determined with post-construction mortality studies; however, this estimate allows an evaluation of the potential impacts.

2.12.4 Mitigation

2.12.4.1 Siting Approach

The primary mitigation measure to avoid or reduce potentially significant bird and bat impacts was Noble's approach to siting. Initially, a study was conducted to identify whether the Project Area held any potential issues related to birds and bats, among many other categories, that could result in unfavorable impacts. In the siting phase, Noble selected available and appropriate locations for turbines that minimized potential impacts on wetlands, habitat, and land use. Noble has also sited the Project in an area that avoids landscape features that attract raptors and migrating birds. These considerations will minimize potential impacts on birds and bats. See Section 1.3, Project Alternatives, for details on the siting approach and Project alternatives.

2.12.4.2 Lighting and Structural Mitigation

During nights of inclement weather and/or poor visibility, passerines may fly at lower altitudes and may be attracted to lights, especially steady (i.e., not blinking) lights. While the reasons for this attraction to lights are not certain, they coincide with evidence from tall structures (e.g., communication/television towers and buildings) that events of increased bird collisions occur on nights with poor visibility at structures with steady light. In order to reduce this potential, Noble will avoid using steady burning lights.

In addition, Noble will:

- Provide the minimum allowable lighting and off-cycle as per Federal Aviation Administration (FAA) requirements;
- Avoid using flood lights at any structures on site or steady light sources near the turbines, lighting at the substation will be down firing and motion activated and task oriented;
- Jacket and insulate all overhead collection line conductors; all power carrying hardware for the overhead electrical collection lines will be covered; and
- Install modern turbines (i.e., solid tubular structures) that are designed to prevent birds from perching or nesting on them. No guy wires will be required for these turbines.

2.12.4.3 Post-construction Monitoring

Post-construction mortality monitoring will be implemented by Noble to evaluate the actual impacts of the Project on birds and bats. This will help assess the significance of the impacts and, potentially, what the weather or environmental conditions or other circumstances are that contribute to such impacts. Based on real-time, site-specific data collected during the post-construction mortality monitoring, Noble will coordinate closely with NYSDEC to identify and assess potential mitigation strategies that can be implemented to reduce potentially significant adverse impacts, if any. This approach will allow mitigation measures to be developed/modified during the course of Windpark operation that are responsive to site-specific conditions and to the growing and evolving database of information regarding bird/bat interactions with turbines. Noble's work plan for proposed post-construction bird and bat mortality studies is included in Appendix J. The work plan methodology is consistent with previous work plans that Noble has developed through coordination and cooperation with NYSDEC.

Table 2.12-1 Approximate Number of Bird Fatalities for Project

Project	Number of Turbines	Lower Bound: Approximate Bird Fatalities Per Year Based on NWCC Eastern Average Rate[1]	Upper Bound: Approximate Bird Fatalities Per Year Based on 2006 Maple Ridge Daily Rate[2]
Noble Ball Hill	60	258	576

Notes:

[1] 4.3 birds/turbine/year (NWCC 2004).

[2] 9.59 birds/turbine/survey season (Jain et al. 2007).

Table 2.12-2 Approximate Number of Bat Fatalities for Project

Project	Number of Turbines	Lower Bound: Approximate Bat Fatalities Per Year Based on NWCC National Average Rate[1]	Upper Bound: Approximate Bat Fatalities Per Year Based on 2006 Maple Ridge Daily Rate[2]
Noble Ball Hill	60	204	1,470

Notes:

[1] 3.4 bats/turbine/year (low = 0.7; high = 47) (NWCC 2004).

[2] 24.5 bats/turbine/survey season (Jain et al. 2007).

2.13 Visual Resources: Environmental Setting

To address issues of potential visual impacts associated with the Project, Noble retained the services of Saratoga Associates, Landscape Architects, Architects, Engineers, and Planners, P.C. (Saratoga) to conduct a visual resources assessment (VRA). The purpose of this VRA is to identify potential visual and aesthetic impacts and to provide an objective assessment of the visual character of the Project, using standard accepted methodologies of visual assessment. A detailed discussion of existing visual resources and the VRA prepared by Saratoga is provided in Appendix K.

Methodology

Consistent with standard VRA practice, the existing landscape character/visual setting of the Project Area were defined to establish the baseline visual condition from which visual change due to the Project can be evaluated. In addition sensitive aesthetic resources were identified to establish priority places from which further analysis of potential visual impact could be conducted.

Consistent with the New York State Department of Environmental Conservation (NYSDEC) Visual Policy, the study area generally extends to a 5-mile radius from the outermost turbines (hereafter referred to as the “5-mile study area”). Beyond this distance it is assumed that natural conditions of atmospheric and linear perspective will significantly offset most visual impacts. However, considering the scale of the Project and recognizing the proposed wind turbines will, at times, be visible at distances greater than 5 miles, consideration was also given to resources of high cultural or scenic importance that are located beyond the typical 5-mile radius. These visually sensitive resources outside of the 5-mile study area are identified and discussed in further detail later in this section.

Each inventoried visual resource was evaluated to determine whether a visual impact might exist. Generally, this consisted of reviewing viewshed maps, aerial photos, and field observations to determine whether individual resources would have a view of the Proposed Project. Because the viewshed map identifies the geographic area within which one or more of the proposed turbines could theoretically be visible, but does not specify which of the 60 turbines evaluated would be within view, it is not readily feasible to field confirm viewshed accuracy. While it is common practice to field confirm viewshed maps prepared for a single study point through the use of balloon study or more intuitive means, the inability to field confirm viewshed accuracy is unique to analysis of multiple point projects covering a large geographic area, such as wind energy projects.

On April 30, 2008, and July 17, 2008, a field crew drove public roads and visited most of the potentially affected visual resources within the 5-mile APE (as determined through viewshed mapping) to document existing visibility in the direction of the Project. Prior to the field observation, the coordinates of all proposed turbines were pre-programmed into a handheld geographic positioning system (GPS) unit as a “waypoint.” The GPS waypoint direction indicator (arrow pointing along calculated bearing) was used to determine the appropriate bearing to a desired turbine or grouping of turbines. Based on the bearing, the observer was able to determine whether an unobstructed line-of-sight to the turbine or group of turbines was available.

There are many factors which affect visual impacts. The VRA characterizes these factors into four distinct elements: landscape units, viewer/user groups, distance zones, and duration/frequency/circumstances of view. Each element is further categorized to demonstrate the distinctive qualities that affect how a visual feature, such as a structure, is perceived by a viewer.

Landscape units are areas with common characteristics of landform, water resources, vegetation, land use, and land use intensity. A landscape unit is a relatively homogenous, unified landscape of visual character. Landscape units are established to provide a framework for comparing and prioritizing the differing visual quality and sensitivity of visual resources in the study area. Examples of landscape units include: Village Center; Rural Hamlet; Rural Agricultural; and Forest Land.

Viewers engaged in different activities, while in the same landscape unit, are likely to perceive their surroundings differently. Viewer groups include local residents; through travelers; recreational viewers; and tourists. The differentiation of viewer groups assists in understanding the sensitivity and probable reaction of potential observers to visual change resulting from the Project.

Distance affects the apparent size and degree of contrast between an object and its surroundings. Distance is discussed in terms of distance zones (e.g., foreground [0 to 0.5 mile], middleground [0.5 to 3.0 miles], and background [3.5 miles to horizon]). The VRA utilizes distance zones established by the United States Forest Service and reiterated by the NYSDEC Visual Policy. A more detailed description of each distance zone is provided in Appendix K.

The analysis of a viewer's experience must include the distinction between stationary and moving observers. The length of time and the circumstances under which a view is encountered is influential in characterizing the importance of a particular view. For example, stationary viewers have a higher potential for understanding the elements of a view than do moving viewers.

Visual Character

The Project Area is surrounded by rolling hills comprised of agriculture and forested land within the Towns of Villenova and Hanover, Chautauqua County. The visual character of the landscape is defined by the patterns, form, and scale relationships created by lines, colors, and textures. The visible pattern found within the Project Area can best be described as representative of the agricultural landscape typical of the region. Given the predominately rural nature of the study area, visible colors are natural, muted shades of green, brown, gray, and other earth tones. When viewed from a distance, vegetated hillsides maintain a rather uniform and unbroken blending of colors, which tend to fade with hazing of atmospheric conditions. The often steep, rolling topography creates a sinuous naturalistic form.

With the exception of the more developed villages and hamlets, built features typically include low-density single-family residential structures and farmsteads.

Major roadways in or near the Project Area from which the Project would be visible are typically two-lane asphalt roadways. The primary roadways that bisect the Project Area are New York State (NYS) Routes 39, 83, and 322. Several county designated routes, town roads, and seasonal roadways traverse the Project Area. A section of the NYS Thruway (I-90) is located within the northwest portion of the 5-mile study area.

Criteria for Selection of Visually Sensitive Resources

Because it is not practical to evaluate every conceivable location where the Project might be visible, it is accepted visual assessment practice to limit detailed evaluation of aesthetic impact to locations generally considered by society, through regulatory designation or policy, to be of cultural and/or aesthetic importance. The visually sensitive resources include:

- Resources of statewide significance (as required by the NYSDEC Visual Policy);
- Resources of local interest – places of local sensitivity or high intensity of use; and
- Other places for analysis including locations not rising to the threshold of statewide significance or local interest have been included to represent isolated pockets of visibility along sparsely populated rural roadways; most selected based on field observation of open vistas.

Visually sensitive resources are also chosen and evaluated based upon how the resources are used by residents and visitors. As such, user groups within the 5-mile study area were identified to assist in understanding the sensitivity and probably reaction of potential observers to visual change resulting from the proposed Project.

Inventory of Visually Sensitive Resources

Resources of statewide significance, resources of local interest, and other places for analysis were identified though a review of published maps and other paper documents, online research, and an extensive windshield survey of publicly accessible locations. For this analysis, 55 visual resource locations were identified within the 5-mile study area. These include recreational and tourist resources (e.g., parks, campgrounds, trails); highway corridors/roadside receptors; and residential and community resources (i.e., hamlets and schools). In addition to inventoried resources within the 5-mile study area, a number of visually sensitive resources outside the study area were also identified. They include:

- Hatch Creek State Forest (Towns of Gerry and Ellington; located 9.3 miles from the closest proposed turbine);
- Harris Hill State Forest (Towns of Gerry and Ellington; located 9.5 miles from the closest proposed turbine);
- Zoar Valley Multiple Use Area (Towns of Collins, Persia and Otto; located 9.6 miles from the closest proposed turbine);
- Evangola State Park (Town of Brant; located 9.9 miles from the closest proposed turbine);
- Seaway Trail (located 6.6 miles from the closest proposed turbine); and
- Lake Erie (located 7.1 miles from the closest proposed turbine).

All of the visual resources and their locations are identified in the VRA in Table 5 and Figures 1 and 2 (see Appendix K).

Resources of Statewide Significance

Within the 5-mile study area, no resource listed on the State and National Register of Historic Places (NRHP) was identified. Panamerican Consultants, Inc. (Panamerican) concurrently conducted an evaluation of historically significant resources within 5 miles of the Project Area, and this research is documented in Appendix S and discussed in Section 2.30, Cultural Resources: Environmental Setting, and Section 2.31, Cultural Resources: Impacts and Mitigation. Panamerican identified eight structures eligible for listing on the NRHP and 138 structures potentially eligible for listing.

Other resources of statewide significance within the 5-mile study area include a state forest and one wildlife management area (WMA). The Boutwell Hill State Forest consists of 2,964 acres of protected forest with numerous multi-use trails, wildlife viewing opportunities, and serves as a significant resource for deer hunting. The Canadaway Creek WMA includes 2,160 acres of forest and is intended to provide prime habitat for ruffed grouse. In addition to preservation efforts, the forest provides numerous recreational opportunities including hiking, snowmobiling, and bicycling.

A portion of the Earl Cardot Eastside Overland Trail is also within the 5-mile study area. The trail offers hiking and biking opportunities to users and is comprised of 19 miles of trail extending from Twenty-Eighth Road in the Town of Gerry at the southernmost end, and terminates in the Town of Arkwright to the north. Roughly eight of the trail’s 19 miles are within the study area. Snowmobile trails are present throughout the 5-mile study area on public/private land or along roadways/seasonal roads. State-sponsored snowmobile trails that bisect the area include, but are not limited to, C1, C1A, C1B, and C4.

Resources of Local Interest

Municipal parks, recreational, and open space resources include the Town of Hanover Park and various community playgrounds and athletic fields found within the Villages of Forestville and South Dayton.

User Groups

User groups identified within the 5-mile study area include local residents and workers, through-travelers, recreational users, and tourists. This portion of NYS is quite rural with a very small population. Based on the 2000 census, the population in the Town of Villenova is 1,121 with a density of 31 persons per square mile. The Town of Hanover has a population of 7,638 with a density of 152 persons per square mile. Visitors to the area are primarily traveling through on existing roads and highways or engaged in recreational activities, such as hiking, hunting, camping, biking, horseback riding, fishing, and snowmobiling. Other passive outdoor pursuits such as bird watching or a leisurely drive through the rural landscape are also common.

2.14 Visual Resources: Impacts and Mitigation

As described in Section 2.13, Visual Resources: Environmental Setting, Saratoga Associates, Landscape Architects, Architects, Engineers, and Planners, P.C. (Saratoga) was hired by Noble to conduct a Visual Resource Assessment (VRA) for the Project (see Appendix K). By their very nature, modern wind farms are large and highly visible facilities. The need to position these tall moving structures on hilltops and ridgelines cannot be readily avoided. The siting of wind turbines within a rural agricultural area provides increased opportunity for potentially discordant views both near and far. While the use of mitigation techniques will help minimize adverse visual impacts, the construction of the Project will be an undeniable visual presence on the landscape.

This section includes a discussion of potential viewshed impacts associated with the construction and operation; potential nighttime visibility and shadow flicker impacts associated with the operation of the Project; and the efforts that have been made in the design of the Project to mitigate visual impacts. Section 3, Cumulative Impacts and Benefits: Windpark and Regional Development, discusses cumulative visual impacts resulting from this Project and other proposed projects in the vicinity of the Project Area.

2.14.1 Construction Impacts

Construction of the Project will require use of large cranes and other construction vehicles, which will be visible from locations in and around the Project Area. Components will be delivered in sections via large semi-trucks. However, the construction period is expected to be relatively short. As such, construction-related visual impacts will be brief and are not expected to result in adverse prolonged visual impacts to area residents or visitors.

2.14.2 Project Facility Impacts

Visual Character

The Project involves the erection of 60 turbines and their associated infrastructure (electrical collection and transmission components and facilities). When visible, the well-defined vertical form of turbines on the horizon introduces a contrasting and distinct perpendicular element into the landscape. The proposed turbines will be the tallest visible elements within view and will be disproportionate to other elements on the regional landscape. The distribution of turbines across an extended area will result in the Project being perceived as a highly dominant visual element. The moderately paced sweeping rotation of the turbine blades will heighten the conspicuity of the turbines; no matter the degree of visibility.

The white or off-white color of the proposed turbine tower, nacelle, and blades will be most often viewed against the background sky. Under these conditions the turbines would be compatible with the hue, saturation, and brightness of the background sky and distant elements of the natural landscape under most conditions. Color contrast will decrease with increasing distance and/or periods of increased atmospheric haze or precipitation.

Where practical, collection lines will be buried along access road rights-of-way (ROWs); however, the Project will require a small portion of overhead collection line (174 feet or .03 miles). In addition, it will be necessary to construct 6 miles of transmission line on 73 new poles. The proposed transmission line will be placed on monopole wood laminated structures varying in height from 55.5 and 75 feet; all but two poles will be between 65.5 and 74 feet high.

Visibility Analysis

The first step in identifying potentially affected visual resources is the determination of whether the Project is likely to be visible from a given location. For this purpose, viewshed maps were prepared to identify the geographic areas where there is a relatively high probability that some portion of the Project would be visible.

A viewshed map was prepared defining the areas where a varying number of turbines (i.e., 1 to 5, 6 to 10, 11 to 15, 16 to 20, 21 to 35, 36 to 50, and 51 to 60) would be visible because of the screening effect caused by intervening topography (see Figure 1 in the VRA provided in Appendix K). This treeless condition analysis is used to identify the maximum potential geographic area where further investigation is appropriate. A second map was prepared illustrating the probable screening effect of existing mature (40-foot) vegetation (see Figure 2 in the VRA provided in Appendix K). This vegetated condition viewshed, although not considered absolutely definitive, acceptably identifies the geographic area within which one would expect to be substantially screened by intervening forest vegetation in both leaf-on and leaf-off seasons. Viewshed areas are further quantified to illustrate the number of turbines that may be visible from any given area.

Viewshed maps incorporating tree cover (see Figure 2 of Appendix K) clearly indicate that one or more of the proposed turbines will be visible from approximately 29% of the 5-mile study area. In the remaining 71% of the 5-mile study area, no turbines are expected to be visible. Turbines will be most visible in the cleared agricultural uplands with vistas in the direction of turbine groupings.

The vegetated viewshed map indicates some turbines will be visible from the Villages of South Dayton and Forestville, as well as many of the hamlets throughout the study area. Field confirmation determined that views within these communities will be partially screened by the prevalence of mature street trees, site landscaping, and one and two story residential and commercial structures. Although filtered or framed views are likely to be visible through foreground vegetation and buildings, these views were found from mostly limited locations. Direct and, in some cases, open views are more prevalent on the outskirts of a community, where localized residential and commercial structures, street trees, and site landscaping are less likely to provide a visual barrier.

Turbines generally will not be visible from the backside of the many hills in the study area and within ravines found throughout the 5-mile study area. Where topography is oriented toward turbine groupings, forest cover commonly prevents distant views. Turbines will be visible from many roadways where roadside vegetation is lacking including: the New York State (NYS) Thruway (I-90); NYS Routes 39, 83, and 322; County Routes 93 and 87; North and South Hill Road; Pope Hill Road; Round Top Road; Aldrich Hill Road; Hanover Road; and Flucker Hill Road. Many of these views may be long distant (background view), fleeting as viewers pass in vehicles, or short in duration. Areas along NYS Route 83, County Route 87, Bartlett Hill Road, North and South Hill Road, and other roads in these areas will experience a high degree of visibility. Residents and visitors driving in the area will regularly encounter proximate views of one or more turbines within the foreground and near-middleground distances (e.g., 0.5 to 1.5 miles); the distance where the visual contrast of the turbines will be greatest. Within such close proximity, turbines frequently appear and disappear behind intervening foreground landforms and vegetation as viewers move about the Project Area.

Viewshed maps identifying the area within a 3-mile radius of the transmission line where some portion of the proposed transmission line is visible based on topography and/or vegetation are included as Figures C2 and C3 of Appendix K. One or more of the 73 proposed transmission structures are expected to be visible from approximately 22% of the 3-mile radius. Visibility will be most common from properties adjacent or in close proximity to the proposed transmission line, as well as areas to the north, east, and west. Transmission structures will also be visible in agricultural uplands with cleared lands and downslope vistas in the direction of the proposed transmission line.

Open views of the proposed transmission line will be available from many roadways where roadside vegetation is lacking including: the NYS Thruway (I-90); Hanover Road; CR 89; Bennett State Road (CR 85); and King Road. As with the turbines, views from vehicles will typically be short in duration. The proposed transmission line will also bisect five roadways including NYS 39. Proposed transmission structures will be located in close proximity and on both sides of these roadways. Viewers near the proposed transmission line will notice that structures will frequently appear and disappear behind intervening foreground landform and vegetation as they move about the study area.

Topographic viewshed mapping (see Figure C2, Appendix K) indicates potential transmission line visibility in the Villages of Forestville and Silver Creek. However, based on vegetated viewshed mapping (see Figure C3, Appendix K), it is anticipated that visibility would be substantially reduced in the villages by screening (e.g., structures and localize vegetation). Photo simulations from locations near the transmission line demonstrate the generally low/slim profile of the proposed structures. Based on the low/slim profile at close proximity, the relatively long distances between the villages and the proposed transmission line will further reduce transmission line visibility.

Photo simulations were prepared to indicate how the proposed transmission line would appear in the landscape. All photo simulations are presented in Appendix C of the VRA (see Appendix K).

Visually Sensitive Resources

As discussed in Section 2.13, Visual Resources: Environmental Setting, 55 visual resources were identified within the 5-mile study area. The resources include recreational resources, roads, communities, and schools. Of the original 55 visual resources, 15 would theoretically be screened from the Project by existing vegetation. These resources include Hill Side Acres (Western New York Land Conservancy), Arkwright Hills Campground, Woodside Country Campground, Village of Forestville Park, Walnut Falls (Forestville), Creek Road (Hanover), Hamlet of Arkwright, Hamlet of Griswold, Hamlet of Cottage, Hamlet of Balltown, Hamlet of Dennison Corners, Hamlet of Keaches Corners, Hamlet of West Perrysburg, Forestville Central School Complex, and the Village of Forestville. Table 6 of the VRA in Appendix K summarizes the factors that affect visual impact (e.g., landscape unit, viewer group, distance zone, and duration/frequency/circumstances of view) for each visual resource determined to have a potential view of the Project within the 5-mile study area. For each visual resource, the impact (approximate number of visible turbines) is also disclosed in Table 6 of the VRA in Appendix K. Visibility will be most common in the rural agricultural landscape unit. Multiple turbine visibility will be most common with local residents and workers. Of the 55 visual resources, only seven are considered to be in the foreground distance zone. In the middeground (26 visual resources), visual detail is reduced, although distinct patterns and colors may still be evident. Viewers from middleground distances recognize surface features such as tree stands, building clusters, and small landforms. In the background distance zone (22 visual resources), landscape elements lose detail and become less distinct. Atmospheric perspective changes colors to blue-grays, while surface characteristics are lost. In general, more turbines will be visible by a moving viewer.

In addition, resources were identified outside of the 5-mile study area. Based on results determined through the use of vegetated viewshed data, all will have minimal visibility of the Project.

Resources of Statewide Significance and National Register of Historic Places

Viewshed analysis and field investigations were performed to determine if visual resources of statewide significance (e.g., state forest land) will be significantly affected by the Project. In general, they will not. When project structures are visible from a significant resource it is usually along the perimeter of the property. Table 6 of Appendix K provides a summary of potential visibility from all identified visual resources.

Viewshed analysis and field investigation determined that the visual resources of Statewide Significance, Boutwell Hill State Forest and Canadaway Creek WMA, would not be significantly affected by the proposed Project (see simulation A11 and A12 in Appendix K).

There are no National Register Listed (NRL) properties with the 5-mile APE. However according to the Panamerican Architectural Survey, portions of the project may be visible from eight previously determined NRE properties and 138 other potentially eligible properties within a 5-mile radius of the turbines and a 3-mile radius of the transmission line. See Table 6.1 of Appendix S and Section 2.31, Cultural Resources: Impacts and Mitigation, for a listing of previously determined and potential NRE properties and associated impacts.

It is likely that the Project will be visible from significant resources outside of the 5-mile study area, from locations such as Evangola State Park, Harris Hill State Forest, Zoar Valley Multiple Use Area, Hatch Creek State Forest, and the Seaway Trail (Route 5). These views will generally be screened by topography and vegetation, and/or diminished due to distance and atmospheric conditions. Hatch Creek State Forest has no potential for visibility. Harris Hill State Forest has less than 1% visibility, Zoar Valley Multiple Use Area 3%, and Evangola State Park 7%. The Seaway Trail (NYS Route 5) runs along the shore of Lake Erie, with viewer attention focused on the lake; however, views of the Project will be apparent along portions of the road, particularly in the vicinity of and within the village of Silver Creek.

The most significant visual impacts to significant resources will be to: historic properties on ridges, cemeteries, historic properties within Villenova and Hanover, historic properties along major thoroughfares in the area, and at historic crossroads communities.

Resources of Local Interest

Because of the number, scale, and geographic distribution of the proposed turbines, some portions of the Project will be visible from places of local interest that do not necessarily meet the broader statewide threshold for visual significance. Most commonly affected views are along various state and county highways.

Views were found along portions of NYS Routes 39, 83, and 322. Several county and Town roads will have views of the proposed turbines at varying distances. Most local parks, residential neighborhoods in the Villages of South Dayton and Forestville, and the hamlets where the prevalence of mature street trees and site landscaping combined with significant topographical changes, one- and two-story residential, and in some cases commercial structures substantially limit or screen distant views. Viewshed and field analysis determined that the Project would be visible from the Overland Trail and Tri-County Country Club (see simulation A7 in Appendix K). Numerous state, county, and local roads will have views of one or more turbines across agricultural lands. For many visitors, the scenic value of the drive is an important part of their trip.

Affected Viewers

The 5-mile study area is generally rural. The population of the Town of Villenova is only 1,121 while the population of the Town of Hanover is 7,638. These towns have a population density of 31 and 155 persons per square mile, respectively. This compares with a population density of 132 persons per square mile for Chautauqua County, and 402 persons per square mile for NYS as a whole. Likewise, many of the highways within the study area are relatively lightly traveled. NYS Route 39 has an average annual daily traffic (AADT) volume of less than 3,000 vehicles between U.S. Route 20 (outside the 5-mile study area) and County Route 141. While the Project will be frequently visible to local residents, workers and through travelers, the total number of potentially affected viewers within the study area is relatively small when compared to other regions of NYS. In addition, the number of recreational users affected by the Project will also be relatively small.

Recreational hikers and golfers will have views of the Project. Hunters and snowmobile riders on private lands will likely view turbines across open agricultural fields and may view individual turbines in close proximity.

While some visitors may believe wind turbines are an unacceptable disturbance to an attractive agricultural landscape, others may find the presence of a large clean, renewable energy project an interesting and exciting part of their touring experience.

Photo Simulations

To demonstrate how the actual turbines will appear within the 5-mile study area from a variety of representative distances and locations, 14 locations were identified for simulations. Table 7 of the VRA (see Appendix K) provides a listing of key receptors that were selected for photo simulations. The map ID corresponds to Figures 1 and 2 of the VRA provided in Appendix K. The specific locations of these simulations were chosen for their relevance to the factors affecting visual impact (viewer/user groups, landscape units, distance zones, duration/frequency, and circumstances of view). Because the visibility of wind turbines will most commonly affect local residents from rural homes and during daily travel along local roads, and most open vistas of the Project typically occur along roadways, views selected for photo simulation favor such views even though the number of viewers will not be large. The appearance of the turbines is based on the specifications of GE 1.5-megawatt (MW) turbines with 263-foot (80–meter) high towers and 253-foot (77-meter) rotor diameter (123-foot long blades). The turbine model was constructed so that the apex of the blade is 389 feet above ground elevation. The detailed methodology and actual photo simulations can be found in the VRA provided in Appendix K.

The photo simulations demonstrate that the introduction of large, man-made structures creates a visible disruption of the existing landscape. The prominent hills and forests in the study area will minimize the visual impact of the wind turbines (see Figure A12 of Appendix K). In more level areas, the proposed turbines will be the tallest visible elements within view and will be disproportionate to other elements in the immediate landscape (see Figures A3 and A7 of Appendix K). Given the rolling hills in the study area, distribution of turbines across an extended area will minimize a disproportionate amount of turbines visible from any single point (see Figures A6, A12, and A15 of Appendix K).

Project Visibility (Lighting)

As previously stated, the turbines will be compatible with the hue, saturation, and brightness of the background sky and distant elements of the natural landscape under most conditions. In accordance with Federal Aviation Administration (FAA) guidance, turbines must be illuminated at night for aviation safety. According to the FAA, daytime lighting of the turbines is generally not necessary when the facilities are white in color; however, the magnitude of the impact on nighttime visibility will depend on how many lighted turbines are visible at a specific location and existing ambient lighting conditions present within the view. Local residents quietly enjoying the rural nighttime setting will likely be more affected by this condition than would motorists traveling thorough the area after dark. These are federally mandated safety features and cannot be omitted or reduced.

The FAA guidance recommends lighting at the outermost turbines in the linear string, as well as on interior turbines of a maximum gap between lit turbines of no more than 0.5 mile (2,640 feet). Based on these guidelines, approximately 34 of the proposed turbines will be illuminated at night for aviation safety. In accordance with FAA guidance, lighting is expected to be slow flashing L-864 red lights. The FAA recommends red light emitting diode or rapid discharge style L-864 fixtures to minimize impacts on neighboring communities, as the fixtures' exposure time is minimal, thus creating less of a nuisance. All light fixtures within the wind farm must flash in unison, thus delineating the wind farm as one large obstruction to pilots.[5] A lighting plan is included in Appendix K.

A viewshed map was created to assist in evaluating potential nighttime visibility (see Figure 3 in the VRA provided in Appendix K). This map was created using the same methodology as described above. However, the map was created using the approximate height (265 feet) of the FAA required strobe lights as the control point for the 34 turbines identified in the preliminary lighting plan prepared by Noble. In addition, the viewshed map took into account the screening potential of intervening topography and vegetation.

The viewshed map clearly indicates that one or more of the 34 proposed lights will be visible from approximately 25% of the 5-mile study area. Visibility will be most evident in the agricultural uplands from cleared lands with downslope vistas in the direction of the Project, participating Project properties with lit turbines, from sections of the Villages of Forestville and South Dayton, hamlets such as Hamlet, Balcom, Balcom Corners, Skunks Corner, Cottage, and Black Corners,

---

[5] It is anticipated that there will only be one (1) FAA required light at each lit turbine.

and along roadways, such as the NYS Thruway (I-90); NYS Routes 39, 83, and 322; Prospect Road, Round Top Road; Pope Hill Road; South Hill Road; Flucker Hill Road; and Dye Road. The night lighting of the Project will be similar in character to the lighting on existing communication towers seen within the study area. While aviation obstruction lighting is relatively low intensity and will not create atmospheric illumination (sky glow), 34 red lights flashing in unison at close range or in the distance from any given location will be conspicuous and somewhat discordant with the current dark nighttime conditions.

Shadow Flicker

Wind turbines can cause a flickering effect when the rotating turbine blades cast shadows that move across the ground and nearby structures. This can cause a disturbance within structures when the repeating pattern of light and shadow falls across the windows of buildings; particularly when occupants are trying to read or watch television. The effect, known as shadow flicker, is most conspicuous when windows face a rotating wind turbine and when the sun is low in the sky (e.g., shortly after sunrise or shortly before sunset). Because of constantly changing solar aspect and azimuth, shadows will be cast on specific days of the year and will pass a stationary receptor relatively quickly. Shadow flicker will not be an everyday event or be of extended duration when it does occur. For receptors located to the west of a turbine, a residence is more likely to fall within the shadow zone shortly after sunrise when affected residents are typically asleep with shades drawn. For receptors located to the east of a turbine, a residence is more likely to fall within the shadow zone area shortly before sunset.

There are no applicable federal, state, or local regulations or guidelines that establish a required degree of shadow flicker impact on a potential receptor for this Project. The methodology used for the shadow flicker study is discussed in detail in the Shadow Flicker Analysis provided in Appendix K. The analysis conservatively evaluated receptors within 900 meters, or approximately 2,950 feet of the turbines. This distance exceeds the generally accepted 10 times the rotor diameter study area. A distance of 770 meters was exceeded in order to evaluate the potential shadow flicker on receptors that were in close proximity to this limit. The analysis also includes the effect of topography on potential shadow area. Table 8 in the Shadow Flicker Analysis, provided in Appendix K, summarizes the maximum number of potential hours per year that is expected for each shadow receptor (residence) that has visibility of the Project. It should be mentioned that the maximum potential hours per day, in theory, could occur only once or a few times per year and would not be a daily occurrence.

Based on the analysis, the following impacts are expected for the 157 residences identified within 2,950 feet of a turbine:

- 37 residences will be impacted less than 2 hours per year;
- 63 residences will be impacted 2 to 10 hours per year;

- 30 residences will be impacted 10 to 20 hours per year;
- 16 residences will be impacted 20 to 30 hours per year;
- 11 residences will be impacted greater than 30 hours per year;
- Those receptors located to the east of a proposed turbine will most likely experience shadow flicker during the morning hours, generally within an hour or two of sunrise; and
- For those receptors west of a proposed turbine, shadow flicker will generally occur prior to sunset.

2.14.3 Mitigation

The Project design has been continuously evaluated and the proposed location of turbines reflects guidance from landowners, agencies, local authorities, and Project consultants. By their very nature, modern wind power projects are large and highly visible facilities. The need to position wind turbines on hilltops and ridgelines cannot be readily avoided because those are the areas where the wind resources are the best. Given the scale of projects and character of the community, overall visual impacts could not be noticeably reduced through the relocation of individual turbines. Turbines have been sited at a minimum setback from residential structures as required by local laws in order to reduce impacts on individual receptors. Such separation of uses assures maximum screening benefit of existing woodland vegetation where such exists, and minimizes the potential for extended duration shadow flicker on nearby residences. Furthermore, Noble has entered into or is currently negotiating easement agreements with all property owners that will host turbines in order to compensate for potential impacts from development of the Project.

To minimize visual impacts, certain aspects were included in the professional design of the turbines. Tubular style towers have been specifically selected, instead of skeletal (or lattice) frame towers, to minimize textural contrast and provide a more simple visually appealing form. While the FAA mandates that white or light gray be used for aviation safety, these colors are also well suited to minimize visual contrast with the background sky. The wind turbines for this Project will be painted white or off-white. Where specifications permit, non-specular paint will be used on all outside surfaces to minimize reflected glare.

How a landscape and structures in the landscape are constructed and maintained have aesthetic implications to the long-term visual character of a project. Roads have been designed to generally follow topographic contours to minimize cut and fill and will be located in agricultural lands to the greatest extent possible to minimize vegetative cuts. Noble places a high priority on facility maintenance, not only for operational purposes, but for aesthetic appearance as well. Recognizing that its public image will be directly linked to the outward appearance of its facilities and desire to be a welcomed member of the community, Noble will implement a strict policy of maintenance, including materials and practices that ensure a clean and well-maintained appearance over the full life of the facility. In the event visibility of the proposed substation, switchyard and operations/maintenance buildings are clearly visible from the public ROW and is of concern to the community, perimeter plantings may be used to further minimize visibility of these structures.

Noble has developed a complete Decommissioning Plan which is included in Appendix Q of this Draft Environmental Impact Statement (DEIS) to address the removal of turbines when the Project is taken out of service. The Decommissioning Plan includes detailed cost estimates for the removal of all turbine components to a depth of 36-inches including the tower, nacelle, concrete foundations, electrical components, and maintenance roads. The plan also describes the specific steps that will be taken in removing the turbine, including the tower, nacelle, gravel crane pads, maintenance roads, transformer, and other electrical components. Restoration of the areas after removal will include revegetation to return the area to as near its present condition as possible.

Noble has consulted with Town officials to solicit views with regard to proposed indirect offset measures regarding impacts to historic structures (see the Proposed Historical Resource Impacts Mitigation Plan [Draft] in Appendix S). Noble recognizes that local community input is vital to the success of any offset strategy; as such, Noble has already begun a dialogue regarding historic resources with local officials, including Town Supervisors. Noble will also consult with local historians, interested Town Council members, and local organizations. A Historic Resource Mitigation Plan will be developed and submitted to the New York State Historic Preservation Office (NYSHPO) for review and approval prior to construction.

There are no regulations or guidelines that establish an acceptable degree of shadow-flicker impact on a potential receptor. Based on the limited number of hours any structure may be impacted, shadow flicker is not expected to create an adverse impact on most nearby residential dwellings. For residences where shadow flicker is greatest, this impact might be considered an annoyance by some, and unnoticed by others. For those that find the shadow flicker an annoyance, mitigation of the disturbance within a specific room may be implemented by the use of window shades. Any additional mitigation measures will be taken on a case-by-case basis where shadow flicker or other adverse visual impacts pose a significant problem for a landowner in accordance with the Complaint Resolution Process.

2.15 Sound: Environmental Setting

Hessler Associates, Inc. (Hessler) was retained by Noble to evaluate potential noise impacts from the operation of the proposed Noble Ball Hill Windpark on residents and other sensitive receptors in the vicinity of the Project Area. The full noise impact assessment can be found in Appendix L. A summary of the existing environmental setting with respect to sound is provided below.

2.15.1 Background Sound Level Survey

A sound level survey was completed to determine what background sound levels are present at the nearest potentially sensitive receptors under wintertime, leaf-off conditions (when environmental sound levels are typically at a minimum). In an effort to evaluate existing background sound levels over this fairly large area, six monitoring stations were selected to cover the Project Site in a reasonably uniform manner. It was not practical to measure background sound levels at every house potentially affected by an extensive project such as this – nor was it necessary because rural areas that are remote from any major sources of man-made noise generally experience similar natural background sound levels over wide areas. Each measurement position is described in Appendix L. Sound levels were measured in consecutive 10-minute intervals over a two-week period from March 26 to April 8, 2008. A regression analysis of the data was conducted to determine the typical (L_{eq}) and worst-case (L90) background sound levels. With a wind speed of 6 meters per second (m/s), the L_{eq} is 43 A-weighted decibels (dBA) and the L90 is 32 dBA. L_{eq} is the typical sound level most likely to be observed at any given moment and the L90 sound level is the quietest level that might be briefly observed over a 10-minute period and represents a “worst-case” scenario sound level from a noise impact perspective.

2.15.2 Regulatory Standards/Guidance

Two primary metrics were used to determine if any adverse environmental impacts might result from the Project. The first are the regulatory noise limits established by the Wind Energy Facility Laws of the Towns of Villenova and Hanover; the second is a set of noise assessment guidelines developed by the New York State Department of Environmental Conservation (NYSDEC).

2.15.2.1 Local Regulatory Noise Limits

The Towns of Villenova and Hanover adopted regulations that restrict noise related to wind energy facilities. For noise limits, the requirements are the same in both laws, except where noted below in parentheses. §690.13 of the Town of Villenova Wind Energy Facility Law states that:

> The statistical sound pressure level generated by a wind energy conversion system (WECS) shall not exceed L_{10} - 50 dBA measured at the closest exterior wall of any residence existing at the time of completing the SEQRA review of the application. If the ambient sound pressure level exceeds 50 dBA (48 dBA in proposed Hanover law), the standard shall be ambient dBA plus 5

> dBA. Independent certification shall be provided before and after construction demonstrating compliance with this requirement.
>
> In the event audible noise due to WECS operations contains a steady pure tone, such as a whine, screech, or hum, the standards for audible noise set forth in the paragraph above shall be reduced by 5 dBA. A pure tone is defined to exist if one-third octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels of the two contiguous one third octave bands by 5 dBA for center frequencies for 500 Hertz (Hz) and above, by 8 dBA for center frequencies between 160 Hz and 400 Hz, or by 15 dBA for center frequencies less than or equal to 125 Hz.
>
> In the event the ambient noise level (exclusive of the development in question) exceeds the applicable standard given above, the applicable standard shall be adjusted so as to equal the ambient noise level. The ambient noise level shall be expressed in terms of the highest whole number sound pressure level in dBA, which is exceeded for more than 5 minutes per hour. Ambient noise levels shall be measured at the exterior of existing residences. Ambient noise level measurement techniques shall employ all practical means of reducing the effect of wind generated noise at the microphone. Ambient noise level measurements may be performed when wind velocities at the proposed project site are sufficient to allow wind turbine operation, provided that the wind velocity does not exceed 30 miles per hour (mph) at the ambient noise measurement location.

In the event the noise levels resulting from a WECS exceeds noise criteria established in the local law, Noble will either obtain an easement from the affected landowner or seek a waiver from such requirements by the appropriate Town Board in accordance with the laws.

There are no other county, state, or federal rules or regulations regarding sound emissions that apply to the Project; however, NYSDEC has developed guidelines for assessing noise impacts which are described in Section 2.15.2.2.

2.15.2.2 NYSDEC Guidelines

In the Program Policy *Assessing and Mitigating Noise Impacts* published by NYSDEC (2001), a methodology is described for evaluating potential community impacts from any new noise source. As opposed to an absolute noise limit, the NYSDEC method is fundamentally based on the perceptibility of the new source above the existing background sound level at the nearest residences, or other potentially sensitive receptor locations, such as schools or churches.

It is a well established fact for a new broadband, atonal noise source (and also with a frequency spectrum similar to that of the background), such as a wind turbine, that a cumulative increase in the total sound level of about 5 or 6 dBA at a given point of interest is required before the new sound begins to be clearly perceptible or noticeable to most people. Cumulative increases of between 3 and 5 dBA are generally regarded as negligible or hardly audible. Lower sound levels from the new source are completely "buried" in the existing background sound level and are totally inaudible. The specific language relating to these perceptibility thresholds in NYSDEC's program policy (Section V B (7)c) is as follows:

> Increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive receptors are present. Sound pressure increases of more than 6 dB may require closer analysis of impact potential depending on existing SPL's [sound pressure levels] and the character of surrounding land use and receptors.

According to this policy, a cumulative increase in the total ambient sound level of 6 dBA or less is unlikely to constitute an adverse community impact. From a practical standpoint, this threshold means that noise from the Project could exceed the existing background level by up to 5 dBA. For example, a background sound level of 40 dBA plus a Project-only level of 45 dBA would equal a new total level of 46 dBA, or 6 dBA above the original level.

The program policy outlines an incremental approach towards evaluating cumulative increases and potential impacts. Once the background sound level is established by means of a field survey, a First Level Noise Impact Evaluation is carried out where noise from the future Project is modeled in an extremely simple and conservative manner considering only the reduction in sound level with distance in accordance with the inverse square law. All other natural forms of sound propagation loss, such as from intervening terrain, vegetation, etc., are ignored and the ground surface is assumed to be completely reflective as though it were the surface of a large, placid lake. The purpose of this first level analysis is to simply identify the area, defined by the 6 dBA cumulative increase contour line that needs to be examined in greater detail to see if any sensitive receptors are present.

If any residences or other potentially sensitive receptors are identified as being within the area of potential concern a Second Level Noise Impact Evaluation noise modeling study would be carried out realistically considering all normal sound propagation loss mechanisms (in addition to pure distance losses). In this case, any receptors outside the 6 dBA cumulative increase contour are considered to have a low probability of disturbance, while any receptors inside the contour might be adversely impacted and some form of mitigation should be investigated. The modeling analysis discussed in Section 2.16, Sound: Impacts and Mitigation, begins with a Second Level Impact Evaluation analysis.

2.16 Sound: Impacts and Mitigation

An evaluation of the potential operational noise impacts from the Project on residents in the vicinity of the Project Area began with the background sound level survey described in Section 2.15, Sound: Environmental Setting. The evaluation was completed using a computer modeling analysis of turbine sound levels based on the design of the Project. The model was used to predict the sound level contours associated with the Project over the Project Area and an analysis was performed first to determine if the Project will be in compliance with sound limits prescribed by the adopted Town of Villenova and the proposed Hanover Wind Energy Facility Laws. The model was also used to determine what, if any, adverse impacts might result to any residents that will be able to hear the turbines above the pre-existing background levels. The results of this assessment are presented in detail in Appendix L and are summarized below.

An evaluation was also conducted to evaluate impacts that may be encountered during construction. This analysis was performed using typical noise levels for construction equipment as reported in the *Power Plant Construction Noise Guide* (Empire State Electric Energy Research Corp. 1977).

2.16.1 Construction Impacts

Noise from construction activities associated with the Project is likely to cause minor, temporary impacts at a number of locations in the Project Area. Because construction activities will be constantly moving from place to place around the Project Area, it is unlikely that there will be significant impacts at any single receptor for an extended period of time. In general, the maximum potential noise impact at any single residence might be analogous to a few days to a few weeks of repair or repaving work occurring on a nearby road or to the sound of machinery operating on a nearby farm. At residences that are more than 1,000 feet from the turbine location (the minimum setback requirement for an off-site residence), the sounds from Project construction are likely to be faintly perceived and characterized as far off noise of diesel-powered earthmoving equipment characterized by such things as irregular engine revs, back up alarms, gravel dumping, and the clanking of metal tracks.

Construction of the Project is anticipated to consist of several principal activities: access road construction and electrical tie-in line trenching; site preparation and foundation installation at each turbine site; material and subassembly delivery; and erection. The sound levels expected for each phase of construction are shown in Table 2.16-1. The sound levels shown can be compared to local regulatory noise limits that impose a threshold of L_{10} - 50 A-weighted decibel level (dBA) at the nearest receptor. An L_{10} – 50 dBA indicates that in any hour of the day 50 dBA can be equaled or exceeded only 10% of the time, or for 6 minutes. The table also identifies the maximum total sound level that might temporarily occur at the closest non-participating residences (at least 1,000 feet away) and the distance from a specific construction site at which its sound level would drop to 40 dBA. 40 dBA is generally considered as the sound level in a library.

As Table 2.16-1 indicates, depending on the particular activity, sounds from construction equipment have the potential to exceed 50 dBA at distances of up to 5,500 feet. It is not anticipated that any exceedance will be for more than 6 minutes in an hour at any receptor. Sound levels up to 63 dBA may temporarily occur at homes 1,000 feet from the turbine construction sites. Such levels would not generally be considered acceptable on a permanent basis or outside of normal daytime working hours (when all Project construction is planned), but as a temporary, daytime occurrence, construction noise of this magnitude may go unnoticed by many in the Project Area. For others, Project construction noise may be considered an unavoidable minor and temporary impact.

Sound levels of up to 80 dBA are only likely to occur at, or within 200 feet of any specific construction site. Consequently, construction activities at the site of each turbine will result in sound levels that are substantially below 80 dBA at any homes due to the setback distance of at least 1,000 feet. There may be some cases, however, where road construction or trenching operations occur closer to homes, and a short-term sound level of 80 dBA or more is theoretically possible. During much of the construction phase, the generated noise should be similar to the agricultural activities that occur in the Project Area.

Noise from the very small amount of daily vehicular traffic to and from the Project Site during construction is expected to be negligible in magnitude relative to normal traffic levels (even given the rural nature of the roads in the Project Area). It will also be temporary in duration at any given location and will be limited normal daytime work hours.

2.16.2 Operational Impacts

2.16.2.1 Noise Model Results and Impact Assessment

No significant or sustained adverse sound impact is expected at any home or other receptor in the Project vicinity. This subsection describes how operating noise levels at receptors were calculated, the assessment criteria against which noise modeling results were evaluated, and the results of the noise impact analysis.

Turbine Noise Level

The sound power level produced by the General Electric (GE) 1.5sle wind turbine as a function of wind speed is known from field tests carried out by independent acoustical engineers for GE in accordance with the International Electrotechnical Commission (IEC) 61400-11 (see Appendix L, Reference 1). The values are reported in a document entitled “Technical Documentation, Wind Turbine Generator System GE 1.5sl/sle 50 & 60 Hz,” *Noise Emission Characteristics* (see Appendix L, Reference 7). Sound power level is based on the measured sound pressure level at a given point and effective radiating surface, or wave front area at that point. Knowledge of the sound power level allows the sound pressure level (SPL) of the source, the quantity perceived by the ear and measured with instruments, to be determined at any point.

The noise output of the GE 1.5sle turbine varies with wind speed. As shown in Table 2.16-2, for an 80-meter hub height, as is planned for this Project, the following sound power levels at the turbine tower are published as a function of wind speed at the standardized measurement height of 10 meters.

As seen in the table, the highest sound level of <104.0 dBA occurs at a wind speed of 7 meters per second (m/s). This sound level and the associated octave band frequency sound levels in Table 2.16-3 were used in the analysis. Using the design sound power level spectrum in Table 3.3.2, a worst-case sound level contour plot for the site was calculated using the Cadna/A®, version 3.5 noise modeling program developed by DataKustik, GmbH (Munich). This software enables the Project and its surroundings, including terrain features, to be realistically modeled in three-dimensions. In this case, the topography has been incorporated into the model because it is fairly significant. Each turbine is represented as a point noise source at a height of 80 meters above the local ground surface (design hub height).

A somewhat conservative ground absorption coefficient of 0.5 was used in the model since all of the intervening ground between the turbines and potentially sensitive receptors essentially consists of open farm fields, pasture land, or wooded areas. Although wind direction effects can be modeled with this software, to be conservative the noise level from each turbine was assumed to be the downwind sound level in all directions simultaneously. This approach yielded a contour plot that essentially shows the maximum possible sound level at any given point

At the risk of significantly overestimating potential Project sound levels, the various conservative assumptions in the modeling analysis have been applied to ensure that Project noise does not exceed predicted levels under most normal conditions and also to allow some design margin for times when atmospheric conditions may favor noise propagation relative to average conditions, such as at night and during temperature inversions. Sound levels that are lower than those predicted in the modeling plots are expected to occur almost all of the time. The model represents a theoretical worst-case condition at any given receptor point.

2.16.2.2 Assessment Criteria

There are several metrics against which the predicted noise from the Project were compared to determine if any adverse environmental impacts might occur. The first of these measures is the local regulatory noise limit; the second is a set of noise assessment guidelines published by the New York State Department of Environmental Conservation (NYSDEC). Each of these criteria is described in Section 2.15, Sound: Environmental Setting, and has been applied to the noise modeling results detailed in Appendix L and is summarized below.

Preliminary noise modeling indicated that the potential for community noise impacts exists with this Project. This early modeling work essentially performed the function of the First Level Noise Impact Assessment in the NYSDEC assessment procedure and made it clear that a Second Level assessment was necessary because nominal increases of 6 dBA or more were evident at a number of residences. The Second Level noise model considered the actual circumstances of the site including any attenuation that might be afforded by such factors as terrain, vegetation, or man-made barriers.

The overall results of the Second Level model are shown in Plots 1 through 3 where the outer-most sound level contour is associated with a specific limit or threshold. These plots illustrate Project-only sound levels at participating and non-participating houses that might occur under the conservative assumptions described above.

Comparison to Local Regulatory Limits

In Plot 1 (see Appendix L) the sound emissions of the Project are shown out to the Villenova local law noise limit of 50 dBA. This figure clearly illustrates that all residences are well outside of this sound contour and that a Project-only sound level of 50 dBA or more will not occur at any homes within the Project Area as required by the Villenova law. Plot 2 shows the project sound level out to a level of 48 dBA, which represents the 6 dBA cumulative increase threshold recommended by the NYSDEC and proposed Hanover Local Law, based on the measured average (L_{eq}) sound level during a 6 m/s wind (43 dBA). This plot represents the impact most likely to be observed at any given moment relative to the "typical" background level. As with the previous plot, all homes are well beyond the 48 dBA threshold line.

Comparison to NYSDEC Guidance

The Second Level modeling showed that noise impacts might occur (i.e., where an increase of 6 dBA or more might occur), at least intermittently, at most of the houses in the immediate Project Area and that a certain percentage of residents may find Project noise annoying, particularly during certain atmospheric and seasonal conditions that favor sound propagation. As described in Section 2.15, Sound: Environmental Setting, the circumstances required for the worst-case L90 would occur only intermittently at best under conservative assumptions. In this latter scenario a significant number of homes fall within an area where an adverse impact is possible, meaning that project noise will, at least some of the time under these conservative model assumptions, be clearly noticeable in excess of the standards over a fairly wide area. Project audibility may be particularly pronounced at the houses along Dye Road at the base of Ball Hill in the southeastern corner near Turbines 38 through 40. This location is somewhat sheltered from the prevailing southwesterly wind, which may lead to relatively low levels of background noise during fairly windy conditions. A Project-only sound level of 39 dBA at these homes may be noticeable if background levels are unusually low.

2.16.2.3 Tonal Noise

The limited frequency resolution of the octave band power level spectrum for the GE 1.5sle wind turbine does not provide any significant information as to whether the turbine noise is tonal or not. A finer 1/3 octave band, or better, spectrum is needed to see if any prominent discrete tones exist. A plot of the 1/3 octave spectrum published by GE for this model turbine during a 7 m/s wind indicates that the expected turbine noise is distinctly broadband in nature (i.e., evenly distributed over the audible frequency spectrum). Therefore, tonal noise is not expected to be an issue during Project operations.

2.16.2.4 Transmission Line

Transmission lines can produce sound via corona discharge, which is ionization of the air surrounding a high-voltage conductor. Corona discharge from moderate voltage transmission lines, even under humid or wet conditions, is generally very low in magnitude and normally only audible directly under the lines or just beyond the right-of-way (ROW) boundaries. Moreover, it is usually only noticeable under very calm and still conditions and not when the wind blows and the background sound level is raised by the natural sound of tree rustle. Any complaints as a result of corona discharge will be investigated and addressed as part of the complaint resolution process developed between the Town of Hanover and Noble.

2.16.2.5 Low Frequency Noise

Modern wind turbines of the type proposed for this Project do not generate low frequency or infrasonic noise to any significant extent and no such impact of any kind is expected. Early wind turbines with the blades downwind of the support tower were prone to producing a periodic thumping noise each time a blade passed the tower wake – but this effect no long exists with the upwind blade arrangement used today.

A study has been recently completed by Sondergaard (Appendix L, Reference 12) with the specific objective of determining whether large wind turbines produce significant low frequency noise. The results of testing associated with the study showed that for a typical 1.5 MW turbine, its sound levels tapers down steadily in magnitude towards the low end of the frequency spectrum and that the sound energy below about 40 Hertz (Hz) is actually comparable to the sound energy in the natural rural environment where the measurements were made.

Another measure of low frequency noise is the “C-weighted sound level” (dBC), which does not substantially suppress the lower frequencies to the extent A-weighting does. Because of this characteristic, C-weighted sound levels are most commonly used to measure and evaluate noise sources that produce significant amounts of low frequency noise, like combustion turbines.

The maximum predicted C-weighted sound level for any residence near the site area is 62 dBC. This level is well below the threshold of perception; therefore, no adverse impact is expected at any receptors from low frequency noise. The minimum threshold of perception per the American National Standards Institute (ANSI) is 75 dBC.

2.16.3 Mitigation

Potential impacts from noise were considered and avoided to the extent possible during the Project design and turbine site selection processes and through the development of responsible construction schedules. The Project Site was selected through a systematic process that considered the presence of environmental constraints including noise impacts. During the consideration of alternative Project designs (discussed in more detail in Section 1.3, Project Alternatives), areas were eliminated from consideration as turbine sites if they were located too close to a residence to comply with Town noise requirements. The final proposed location of turbines and associated facilities reflects input and guidance received from landowners and Project consultants focusing on noise impacts.

Impacts from noise were considered during initial turbine model selection by Noble. Economies of scale dictate that the largest proven turbines that meet the regulatory requirements and fully utilize the available wind resource should be selected for the Project. GE 1.5sle turbines are used by Noble since they meet these criteria and are among the quietest operating machines currently available.

In advance of construction start-up, Noble will place notification as required by the Towns in the local newspapers no later than 10 days prior to the start of construction. Construction activities will be confined to normal daytime hours (7:00 a.m. and 7:00 p.m.) in order to minimize and avoid unnecessary impacts to the community from construction noise. If any construction activity is required outside of these hours, Noble will coordinate with the Towns prior to conducting such activities.

For the duration of the Project, an on-site contact person will be identified to address and resolve landowner complaints related to Project construction or operation, including any issues involving impacts from noise. Noble will work with a specialist, as required, to address and remediate any problems which shall be documented through the complaint resolution process.

In order to insure that a Project-only sound level of 50 dBA or 48 dBA or more will not occur at any homes within the Project Area as required by the Villenova (adopted) and Hanover (proposed) laws respectively, Noble will fund periodic post-construction noise testing by a qualified independent third-party acoustical measurement consultant, upon request of the Town Boards.

Table 2.16-1 Construction Equipment Sound Levels by Phase

Equipment Description	Typical Sound Level at 50 feet, dBA (Ref. 6)	Estimated Maximum Total Level at 50 feet per Phase, dBA[1]	Maximum Sound Level at a Setback Distance of 1,000 feet, dBA	Distance until Sound Level Decreases to 40 dBA, feet
Road Construction and Electrical Line Trenching				
Dozer, 250 to 700 hp	88	92	63	5,500
Front-end loader, 300 to 750 hp	88	92	63	5,500
Grader, 13 to 16-foot blade	85	92	63	5,500
Excavator	86	92	63	5,500
Foundation Work, Concrete Pouring				
Piling auger	88	88	59	4,200
Concrete pump, 150 cu yd/hr	84	88	59	4,200
Material and Subassembly Delivery				
Off-highway hauler, 115-ton	90	90	61	4,800
Flatbed truck	87	90	61	4,800
Erection				
Mobile crane, 75-ton	85	85	56	3,400

Note:

[1] Not all vehicles are likely to be in simultaneous operation. Maximum level based on reasonable expectation of simultaneous vehicle use.

Key:

cu/yd/hr = Cubic yard per hour.
dBA = A-weighted decibel.
hp = Horsepower.

Table 2.16-2 GE 1.5sle Sound Power Levels vs. Wind Speed

Wind Speed at 10-Meter Height, m/s	Sound Power Level, dBA re 1 pW
3 (Cut In)	< 96
4	<96
5	99.1
6	103.0
7 to Cut Out	< 104.0

Key:

dBA = A-weighted decibel.
m/s = Meters per second.
pW = Picowatt.

Table 2.16-3 GE 1.5sle Sound Power Level Spectrum during a 7 m/s Wind and Estimated Design Level Spectrum at 6 m/s

Octave Band Center Frequency, Hz	63	125	250	500	1k	2k	4k	8k	dBA
Sound Power Level, dB re 1 pW	111.3	110.1	105.8	101.8	97.9	93.3	86.3	79.2	104.0
Estimated Lw at 6 m/s, dB re 1 pW – **Design Level**	**110.4**	**109.2**	**104.9**	**100.9**	**97.0**	**92.4**	**85.4**	**78.3**	**103.0**

Key:
dB = Decibel.
dBA = A-weighted decibel.
Hz = Hertz.
m/s = Meters per second.

2.17 Climate and Air Quality: Environmental Setting

2.17.1 Climate

The Project Area is located in the Western Plateau, which extends from the eastern Finger Lakes across the hills of southwestern New York State (NYS) to the narrow lake plain bordering Lake Erie. The annual average maximum temperature of the Project Area is approximately 56 degrees Fahrenheit (°F), with an annual average minimum temperature of 34.5°F. In January, the average maximum temperature is 30°F, with an average minimum temperature of 12.6°F. Summer daytime temperatures are usually in the upper 70s. The region has average accumulations of about 31 inches of rainfall annually. The bulk of the winter precipitation in the region comes as snow. Annual average snowfall ranges between 80 and 160 inches; some elevated locations may receive more than 200 inches of snow in a given year (National Weather Service 2006). Topography, elevation, and proximity to large bodies of water result in a great variation of snowfall even within relatively short distances. The average length of the freeze-free season in New York NYS varies from 100 to 150 days (New York State Climate Office 2006).

2.17.2 Air Quality

Air emissions created within the Project Area are primarily related to farm operations, vehicular travel, and manufacturing. Emissions are typically produced from vehicle exhaust and dust from unpaved road surfaces; routine odors are typically associated with farming practices. None of these significantly affect local air quality. The largest source of emissions in the county is Dunkirk Power LLC, which operates a 600-megawatt (MW) coal burning electric power plant in Dunkirk, about 10 miles west of the Project Area. State lawsuits and regulatory actions have required the control and reduction of emissions from the Dunkirk plant in recent years (NYSDEC 2005). However, despite new emission controls, emissions of nitrogen oxides (NO_x) have increased at the plant between 2006 and 2007 (EPA 2008b).

The Clean Air Act designates six pollutants as criteria pollutants, for which National Ambient Air Quality Standards (NAAQS) have been promulgated to protect public health and welfare. The six criteria pollutants are particulate matter, (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and ozone (O_3). Areas that do not meet NAAQSs are designated as “nonattainment” for that criteria pollutant. Chautauqua County has been in nonattainment for the 8-hour ozone standard since its promulgation in 2004, and is in attainment for all other criteria pollutants (EPA 2008c).

Air quality data for NYS are collected and published by the New York State Department of Environmental Conservation (NYSDEC) Division of Air Resources. There are two ambient air quality monitoring stations in Chautauqua County: one in Dunkirk, approximately 10 miles west of the Project Area; and another in Westfield, approximately 24 miles southwest of the Project Area.

Chautauqua County, as measured at Dunkirk, experienced violations of the 8-hour ozone standard of 0.084 micrograms/cubic meter (µg/m^3) on six days in 2007. In addition, the August 2 value was the third highest recorded concentration in the state in 2007. According to the Scorecard Pollution Information Site, Chautauqua County is rated the ninth worst county in New York State, based on the health risk related to criteria pollutants (Scorecard 2008).

Tables 2.17-1 through 2.17-3 show nationwide emissions of carbon dioxide (CO_2), SO_2, and NO_x. CO_2 is the leading greenhouse gas associated with global warming. SO_2 is the leading precursor of acid rain with the largest source from fuel combustion. NO_x is another acid rain precursor and the leading component of smog with the leading source from motor vehicle use. The fossil fuel combustion for electricity generation in New York State contributes to these harmful pollutant emissions and affects air quality statewide.

In comparison, Table 2.17-4 shows statewide 2006 emissions of CO_2 (the leading greenhouse gas associated with global warming) from the generation of electricity from coal, natural gas, oil, and wind in NYS. If 90 MW of generation capacity were added to the current system by other means, such as fossil fuel combustion, similar harmful emissions would result.

Table 2.17-5 shows statewide 2006 SO_2 emissions (the leading precursor of acid rain) from the generation of electricity from coal, natural gas, oil, and wind in NYS.

Table 2.17-6 shows statewide 2006 NO_x emissions (another acid rain precursor and the leading component of smog and ozone) from the generation of electricity from coal, natural gas, oil, and wind in NYS.

Table 2.17-1 Carbon Dioxide Emissions from Fossil Fuel Combustion in the United States[1]

Fuel	CO_2 Emitted Per kWh Generated (in pounds)	kWh Generated 2004 (billions)	CO_2 Emitted Total Generation (billion pounds)
Coal	2.13	1.978	4,213
Natural Gas	1.03	709	730
Oil	1.56	99.9	156

Source: USDOE 2005.

Key:
CO_2 = Carbon dioxide.
kWh = Kilowatt hours.

Table 2.17-2 Sulfur Dioxide Emissions from Fossil Fuel Combustion in the United States[1]

Fuel	SO_2 Emitted Per kWh Generated (in pounds)	kWh Generated 2004 (billions)	SO_2 Emitted Total Generation (million pounds)
Coal	0.0134	1.978	26,505
Natural Gas	0.000007	709	5
Oil	0.0112	99.9	1,119

Source: USDOE 2005.

Key:
SO_2 = Sulfur dioxide.
kWh = Kilowatt hours.

Table 2.17-3 Nitrogen Oxide Emissions from Fossil Fuel Combustion in the United States[1]

Fuel	NO_x Emitted Per kWh Generated (in pounds)	kWh Generated 2004 (billions)	NO_x Emitted Total Generation (million pounds)
Coal	0.0076	1,978	15,033
Natural Gas	0.0018	709	1,276
Oil	0.0021	99.9	210

Source: USDOE 2005.

Key:
NO_X = Nitrogen oxide.
kWh = Kilowatt hours.

Table 2.17-4 Carbon Dioxide Emissions From Fossil Fuel Power Generation in New York State

Fuel	CO_2 Emitted Per kWh Generated[1] (in pounds)	kWh Generated In New York, 2006[2] (millions)	CO_2 Emitted from NYS Power Generation (tons)
Coal	2.13	21,185	22,562,025
Natural Gas	1.03	41,250	21,243,750
Oil	1.56	6,816	5,316,480
Wind	0	518	0

Notes:

[1] USDOE 2005.

[2] NYSERDA 2008.

Key:

CO_2 = Carbon dioxide.
kWh = Kilowatthours.

Table 2.17-5 Sulfur Dioxide Emissions from Fossil Fuel Power Generation in New York State

Fuel	SO_2 Emitted Per kWh Generated[1] (in pounds)	kWh Generated In New York, 2006[2] (millions)	SO_2 Emitted from NYS Power Generation (tons)
Coal	0.0134	21,185	141,939.50
Natural Gas	0.000007	41,250	144.38
Oil	0.0112	6,816	38,169.60
Wind	0	518	0

Notes:

[1] USDOE 2005.

[2] NYSERDA 2008.

Key:

kWh = Kilowatt hours.
SO_2 = Sulfur dioxide.

Table 2.17-6 Nitrogen Oxide Emissions from Fossil Fuel Generation in New York State

Fuel	NO_x Emitted Per kWh Generated[1] (in pounds)	kWh Generated In New York, 2006[2] (millions)	NO_x Emitted from NYS Power Generation (tons)
Coal	0.0076	21,185	80,503.00
Natural Gas	0.0018	41,250	37,125.00
Oil	0.0021	6,816	7,156.80
Wind	0	518	0

Notes:

[1] USDOE 2005.

[2] NYSERDA 2008.

Key:

kWh = Kilowatt hours.
NO_X = Nitrogen oxide.

2.18 Climate and Air Quality: Impacts and Mitigation

The United States Department of Energy (DOE) and the New York State (NYS) Public Service Commission (PSC) have mandated that renewable energy sources, such as wind turbines, provide an increasing percentage of the nation's electricity in the coming years. Meaningful development of renewable wind energy can reduce reliance on fossil fuel combustion and nuclear fission facilities to meet growing demand for electricity. To the extent non-fuel renewable energy resources, such as wind powered generators, substitute for fuel based technologies to meet electricity demand, their operation can displace air pollutants and greenhouse gasses associated with fossil fuel combustion or nuclear power facilities. A positive impact of this Project is that it will not degrade air quality, will contribute to efforts to meet federal and state air quality objectives, and will provide an environmentally friendly and renewable energy source to help meet the public's growing energy needs.

2.18.1 Construction Impacts

Minor, temporary adverse impacts on air quality are anticipated during site preparation and construction. The operation of construction equipment and vehicles will produce emissions from engine exhaust and fugitive dust generation during travel on unpaved roads and construction activities. These emissions will be minor, temporary, and distributed throughout the Project Site and, therefore, will not result in significant impacts on air quality.

2.18.2 Project Facility Impacts

Operation of the Project is expected to have a beneficial impact on air quality by producing electricity without emitting any harmful chemicals into the environment. Electric generation by fossil fuel-fired facilities contributes to serious environmental and health problems from carbon dioxide (CO_2), sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulate matter, and mercury emissions.

In the year 2006, about 162,234 million kilowatthours, or gigawatthours (GWh) of electricity were generated in NYS. Forty-two percent of that electricity was produced by fossil fuel-fired generating plants in the state: 25% came from natural gas, 13% from coal, and 4% from oil (NYSERDA 2008). Wind power provided 0.3%, or 518 GWhs of New York's power in 2006, over five times the 101 GWhs it provided in 2005.

The adverse environmental and health effects of air emissions from combustion of fossil fuels are well documented and include global warming, acid rain, smog, respiratory health effects, and significant long-term impacts on wildlife. Air emissions and global warming have been cited as serious concerns for bird populations in North America in *A Birdwatcher's Guide to Global Warming* (Price and Glick 2004). Wind energy's most important environmental benefit is its complete lack of the emissions of both air pollutants and greenhouse gases that are associated with conventional fuel-based methods of generating electricity. Moreover, the development of wind-generated electricity to meet ever increasing consumer demand can reduce the need for fossil fuel-based sources and their associated emissions.

As compared to the development of a fossil fueled electric generating plant of similar size, the Project will have a significant long-term beneficial impact on local and regional air quality and climate by producing electricity without contributing any emissions to the atmosphere.

2.18.3 Mitigation

Best management practices (BMPs) will be followed during site preparation and construction to control fugitive dust emissions. Construction activities will be monitored by Noble's independent Environment Monitor to ensure compliance with BMPs and all applicable permits and related conditions and agreements. Noble will stabilize exposed stockpiles and wet down open soil surfaces as necessary to prevent significant off-site dust impacts. To further control fugitive dust emissions and for safety reasons, the travel speed of vehicles will be reduced to a maximum of 15 miles per hour (mph) on unpaved surfaces during construction and subsequent operation of the facility. Water trucks will be used to control dust on the private access roads and public roadways within the Project Area during dry periods and construction equipment will arrive at the site clean.

2.19 Communication Signal Study: Environmental Setting

Wind turbines, if not properly sited, have the potential to cause interference, such as signal obstruction, attenuation, or other signal alteration, to some types of communication systems. To evaluate the potential for the Project to impact existing communication signals, Noble contracted Comsearch to conduct an analysis of the existing communications signals in and near the Project Area and the potential impacts to those signals.

For the purpose of evaluating the interaction of wind turbines and communication signals, microwave signals in the Project Area may be classified into two groups: those with narrow targeted paths of definable dimensions and those with broadcast (omnidirectional or partially directional) characteristics. Due to their restricted pathway, the narrow beam signals are more susceptible to interference from an object, such as a wind turbine blade, placed in their path. This type of signal is present at higher frequencies, namely 940 megahertz (MHz) to 23 gigahertz (GHz).

Narrow Beam Microwaves

Noble engaged Comsearch of Ashburn, Virginia to identify Federal Communications Commission (FCC)-licensed transmitters and repeaters whose definable paths crossed through the area planned for wind turbine development. Thirteen microwave paths were identified that intersect the Project Area. Noble took this information into account during windpark design. An exclusion corridor was established for each pathway based on the beam’s dimension and location. Figure 2.19-1 demonstrates that no turbines were sited within that corridor. The microwave signals’ exclusion corridors are displayed in Comsearch’s report (see Appendix M).

The Comsearch report does not address narrow beam microwaves associated with existing transmitters operated by departments of the United States government as these transmitters are not subject to FCC licensing and, therefore, are not visible in the public record. Acting through the Department of Commerce National Telecommunications and Information Administration (NTIA), Noble advised federal government agencies of the planned wind turbine development area in a letter dated May 2, 2008 (see Appendix M). This action allows government agencies to identify particular transmitters or respond with any concerns over interference with their non-licensed installations, such as National Oceanic and Atmospheric Administration (NOAA) Doppler radar. A response has not been received from NTIA at the time of the drafting of this Draft Environmental Impact Statement (DEIS).

The NTIA review process includes some government-operated radar sites, but does not include those radar sites operated by the Federal Aviation Administration (FAA), the United States Department of Defense (DOD), or the United States Department of Homeland Security (DHS). The FAA conducts its own review of radar obstruction when wind turbines are registered with them in the process of seeking a “Determination of No Hazard.” As required, Noble will submit a Notice of Proposed Construction to the FAA for review. During the review process, the FAA also circulates the application data to the DOD and the DHS, which will have an opportunity to provide determination of potential interference or obstruction prior to construction.

Broadcast Microwaves

Because of the spreading or omnidirectional nature of broadcast microwaves, it is not possible to select wind turbine locations that avoid their paths. However, the spreading nature of broadcast microwaves also means that the influence of potential obstructions is diminished. Consideration of the influence on specific types of broadcast communication signals is discussed below and in Section 2.20, Communication Signals: Impacts and Mitigation.

AM/FM Radio

Two licensed amplitude modulation (AM) radio broadcast transmitters were identified within a 10-mile search radius of the center of the Project Area. Both entries were for the same station (WDOE) that operates at two different transmission powers (1 kilowatt [kW] for day-time and 500 watts for night-time operations). Comsearch identified 15 frequency modulation (FM) radio transmitters within the 10-mile search radius. The stations are listed in Comsearch's report included in Appendix M. One of the FM stations is a full-power station (> 10 kW); three are medium-power stations (1 kW to 10 kW); two are low-power FM stations (100 W to 1 kW); and the remaining stations are all very low-power (< 100 W).

Television

The stations that will most likely produce broadcast coverage to the Chautauqua County area, including the Project Area, will be those stations at a distance of 40 miles or less. In this range, there are 39 stations with license records (37 in the United States and two in Canada). Of the 37 United States stations, only 20 are presently broadcasting. Four of the stations are full-power analog stations and four are full-power digital stations. There are 12 low-power translators broadcasting. Two of the translators are operating on a special transmit authority. All the translators operate with limited coverage.

The number of off-air television broadcasts available to local communities is limited since there are only four-full power analog and digital United States channels available and one Canadian full-power analog channel. There are 12 translators available, but they are low power stations with limited coverage and programming. Based on the low number of United States stations in the area, it is not expected that the off-air television stations available in the area are the primary mode of television services for the local communities. Because of this, television cable service, where available, and/or direct satellite broadcast (DSB) are probably the dominant delivery mode of television service to the proposed wind facility's surrounding communities.

A full Comsearch report on Villenova and Hanover area television coverage is included in Appendix M.

Land Mobile Radio (LMR)

Comsearch identified 237 land mobile radio (LMR) licenses in and around the Project Area out to a distance of 20 miles. These sites are listed in the Comsearch report shown in Appendix M.

Mobile Phones

Four cellular and six personal communication system (PCS) operating licenses were identified in the Project Area (see Appendix M). The details regarding coverage areas of these systems are proprietary and not available in the public record.

© Ecology & Environment, Inc. GIS Department   Project #002270.NP32
L:\Buffalo\Noble_Wind\2008_NOBLE_SITES\Maps\Villenova\MXDs\DEIS\July_2008\microwave.mxd 07/03/2008

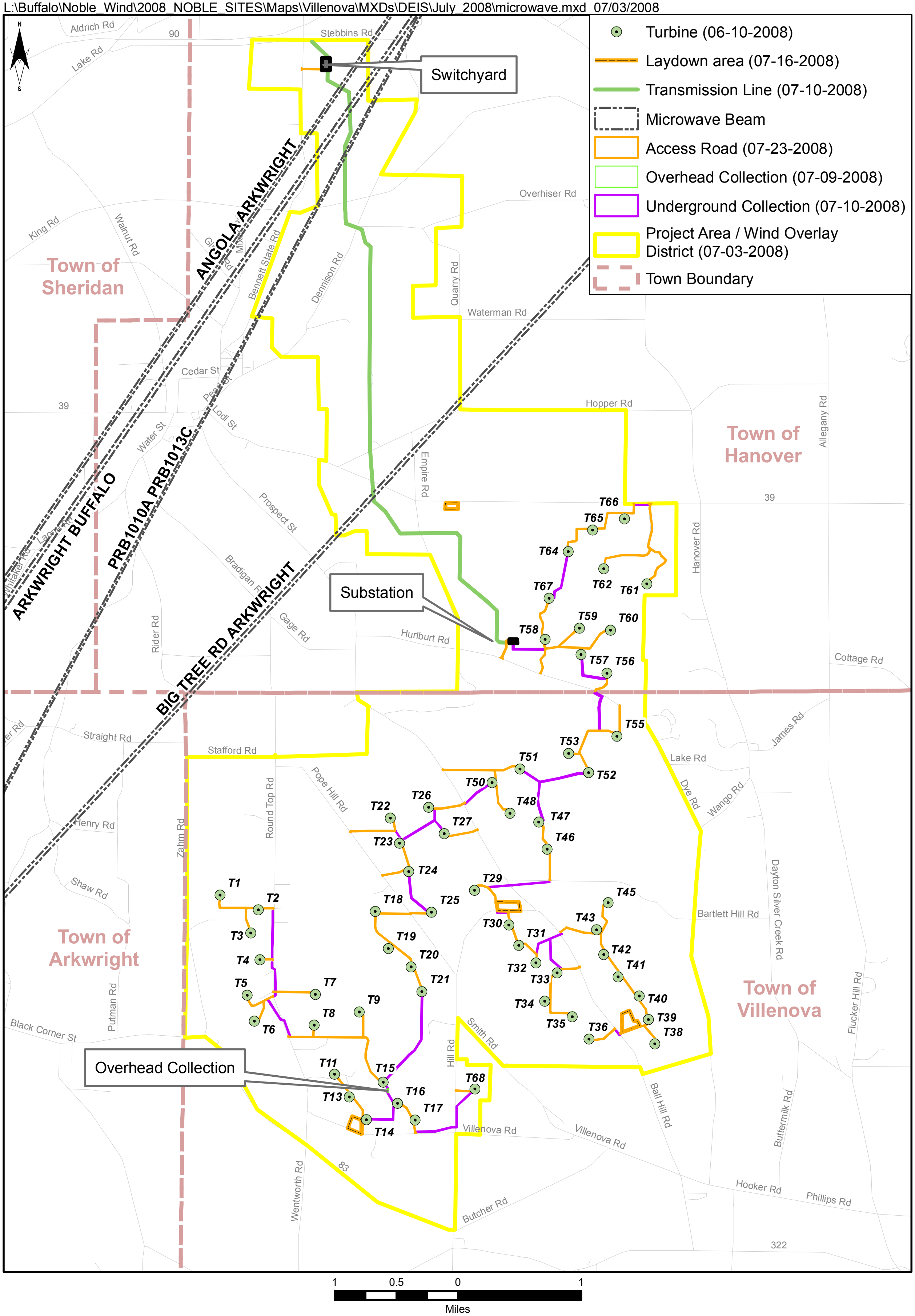


Figure 2.19-1   Exclusion Corridors and Noble Ball Hill Windpark Project Facilities

2.20 Communication Signals: Impacts and Mitigation

Wind turbines, if not properly sited, have the potential to cause interference, such as signal obstruction, attenuation, or other signal alteration to some types of communication systems. For the proposed Project, no impacts are expected to Federal Communications Commission (FCC)-licensed transmitters and receivers, television coverage, frequency modulation (FM) radio transmissions, amplitude modulation (AM) radio transmissions, or land mobile radio (LMR) and cellular and/or personal communication systems (PCSs). The potential for interference with or obstruction of non-licensed transmitters and receivers (e.g., those operated by the Federal Aviation Administration [FAA], United States Department of Defense [DOD], or United States Department of Homeland Security [DHS]) will be evaluated by the FAA. Noble has submitted an application for a “Determination of No Hazard” to the FAA. Operational impacts are described in Section 2.20.2 and mitigation or avoidance of these impacts is described in Section 2.20.3.

2.20.1 Construction Impacts

Construction of the Project will not result in impacts to communication signals in the Project Area.

2.20.2 Project Facility Impacts

It is not anticipated that television coverage from terrestrial stations will be altered in the Chautauqua County area due to the presence of wind turbines at the Ball Hill Project site. If impacts were to occur, the extent of the impact will depend on the relative location of the television transmission antennas, wind turbines, and reception point. Such impacts have occurred at other locations in the country where wind energy turbines have been installed. The effects are video ghosting, signal attenuation, and an effect called “shimmering.” Mitigation of these potential impacts is discussed in Section 2.20.3.

According to the Comsearch Communication Signal Study in Appendix M, there are two FM stations within 4 miles of the center of the Project Area. The FM station (W203AW, Forestville, New York) listed at a separation distance of 2.68 miles was found to be within 0.5 miles of two planned turbines. The station does not have an operation license there, but holds a permit to construct. Field investigations in July 2008 showed that there was no station transmitter located at the coordinates listed in the station’s construction permit application, and it could not be confirmed whether the plans to construct will ultimately be carried out. In any event, the construction permit states that the height of the station antenna would be 27 meters above ground level. The turbine blades are centered at a height of 80 meters with a radius of 38.5 meters. When the blade tip is at its lowest point, it will be 41.5 meters above ground level. Therefore, the turbine blades will clear the FM station broadcast signal by 14.5 meters. The second FM station identified has the same call letters (W203AW) and is located outside of the Project Area in Fredonia with a separation distance of 3.66 miles. This station is very low-power and will be separated from the wind turbines by 0.5 miles and will not have their operation affected.

All of the other FM stations are located at distances greater than 7.13 kilometers (4.43 miles) from the center of the Project Area. At these distances, the wind turbine effects to the FM coverage for all of these stations will be very minimal to non-existent. No problems are expected for the coverage of the full-power and medium-power FM stations near the Project Area because the separation distances from the proposed wind turbines are so great. Audio signals from AM broadcast can interact with wind turbines at close range (1 to 3 km [.62 to 1.86 miles]). However, the two AM transmitters (same station) identified by Comsearch were approximately 10 miles from the center of the Project Area.

The Interdepartment Radio Advisory Committee (IRAC) of the National Telecommunications and Information Administration (NTIA) was notified of the Project in order to allow government operators of communication devices (not licensed by FCC) to comment on the project. The NTIA has not yet responded. The response will be provided in the Final Environmental Impact Statement (FEIS).

The frequencies of operation of LMR repeaters are generally unaffected by the presence of wind turbines. Very little, if any, change in the coverage of the repeaters will occur when the wind turbines are installed. However, if there is a reported change in coverage, it can be easily corrected by repositioning the affected repeater, or by adding a repeater to the LMR system at locations within the wind facility. Repeater antennas can be installed on utility, meteorological, or turbine towers in the wind facility, if needed.

Telephone communications in the cellular and PCS frequency bands are unaffected by the presence of wind turbines. This is not only because of the frequencies used, but because cell communications are designed to function as a system, passing the signal to a different cell if it is weakened at the first. Cellular and PCS frequency bands are unaffected by the presence of wind turbines because the blockage caused by wind turbines is not destructive to the propagation of signals in these frequency bands. Local obstacles are also generally not a limiting factor for cellular communication frequencies because other cellular sites provide an alternative signal. If a cellular system or PCS operator finds that their coverage has been compromised by the presence of wind turbines, coverage can be restored by adding an additional cell or an additional sector antenna to an existing cell.

Transmitters operated by some departments of the United States government are not visible in the public record. Because obstruction or interference with government-operated radar may compromise homeland defense and security, the FAA circulates an applicant’s Notice of Proposed Construction to the DHS and DOD for review prior to approval. The FAA application has been submitted for this Project. Specific impacts, if any, will be identified in connection with the FAA’s review.

2.20.3 Mitigation

Noble will be able to avoid interference with most communication signals for the following reasons:

- The careful positioning of the turbine towers with respect to the beam patterns of microwave links avoids interference with narrow beam microwave transmissions (see Figure 2.19-1);
- The separation distance between planned turbine towers and AM radio transmission antennas is great enough so that no alteration of radio coverage in the area will occur;
- For the two FM broadcasters located within 4 miles of the Project Area, if losses of range were experienced due to signal attenuation, it could be recouped by raising the existing broadcast antenna height, adding signal repeater antenna(s), or simply increasing broadcasting power. Any of these mitigations would require license modifications through the FCC. Noble will contact the affected FM station managers to open discussion for specific mitigation needs within the licensed broadcast range; and
- No discernible change in operation will occur to LMR, cellular and/or PCSs because of the nature of their operation and the frequency bands of operation.

However, if there is a reported change in LMR coverage, the change can be easily corrected by repositioning the affected repeater, or by adding a repeater to the LMR system. If a cellular system or PCS operator finds that their coverage has been compromised by the presence of wind turbines, coverage can be restored by adding an additional cell or an additional sector antenna to an existing cell. Submission of claims for signal interference by turbines will be accepted up to one year after tower commissioning, utilizing the complaint resolution procedure. The initial validity of claims will be evaluated by line of sight analysis of the communication tower, turbine tower, and receptor.

After construction, Noble will confirm and address on-site television reception interference issues on a case-by-case basis utilizing the complaint resolution procedure. Television reception from cable and satellite providers may be offered as an alternative for those homes whose television reception from terrestrial stations is found to be degraded.

Noble has filed for a “No Hazard Determination” by submitting a Notice of Proposed Construction (FAA Form 7460-1) on August 8, 2008, containing the turbine latitude/longitude, ground elevation, and turbine height. If any of the proposed turbines are anticipated to interfere with security surveillance government radar, or should any other unforeseen impacts be identified during FAA review, Noble’s application for FAA No Hazard Determination would be rejected. In this event, Noble will remove, modify, or reposition turbines and the Project will be reviewed again by the FAA. There is some possibility that this triggers an iterative process as Noble revisits any new environmental impacts that result.

Table 2.20-1 Existing Communication Signal Devices within the Project Area[2]

Signal Type	Call Signal	Approximate Distance to Nearest Turbine	Anticipated Impact
Private Land Mobile Radio	WPUT964-Forestville	1.74 mile (T67)	No impact
Commercial Land Mobile Tower	NEXTEL WIP LICENSE CORP	0.56 mile (T58)	No impact
FM Tower (not constructed)	Forestville-W203AW	0.3 mile (T30)	No impact

Notes:

[1] See Section 2.20.2.

[2] Comsearch used a larger study area in their analysis. This table reflects the actual towers within the Project Area.

2.21 Traffic and Transportation: Environmental Setting

This section summarizes two reports that comprise the Transportation Plan for the Project: the Transportation Haul Route Study prepared by ESS Group, Inc.; and an Area Study Report prepared by Aviation Systems, Inc. (see Appendix N).

Recognizing that points of origin for wind turbine components will not be known until approximately six months prior to construction, the Transportation Haul Route Study evaluates potential routing for delivering wind turbine components (blades, tower sections, hubs, nacelles, and transformers) to the Project construction areas and identifies where temporary road widening may be required at intersections throughout the Project Area, where temporary or permanent drainage improvements may be required, where stopping sight distances are adequate or inadequate, and where existing bridge structures may need to be reinforced during construction mobilization and wind turbine transport to complete the Project.

The Area Study Report contains an analysis of the air space in the Project Area to identify and avoid protected airspace such as airport take-off and landing corridors in locating individual turbines.

Ground Transportation

Chautauqua County is served by an extensive transportation network that contains a mix of federal, state, and county roads. The major transportation route in the area is Interstate 90, which is a high volume east-west limited access highway crossing the northern portion of the county. The primary roadways in the vicinity of the Project Area that could potentially be used to access the site include U.S. Route 20, U.S. Route 62, New York State (NYS) Route 39, NYS Route 60, and NYS Route 83. These major roadways are typically two-lane paved roadways. Table 2.21-1 provides a description of the existing road system within the Project Area.

Within the Project Area, construction and delivery vehicles are anticipated to travel over select public roadways, as well as new private access roads constructed specifically to access turbine sites. As part of the Transportation Haul Route Study, the local area road network was inspected to determine suitability for oversize/overweight special hauling vehicles that will be needed to transport wind turbine components to the project and how best to access the Project Area. Because the points of origin of the turbine components will not be determined until about six months prior to construction it became necessary to study off-site haul routes from the north, east, south, and west. Preferred haul routes from each direction were identified and transportation constraints and construction upgrades associated with each preferred alternative were identified. Figures 2.21-1 and 2.21-2 illustrate the potential off-site haul routes and Project Area roadways to be utilized during construction of the Windpark. Appendix D of the Transportation Haul Route Study contains detailed maps (maps 1 through 5) for the preferred haul routes as well as the various alternatives.

The Transportation Haul Route Study includes a review of existing roadway widths, stopping sight distances, drainage structures, bridges, intersection geometry, and roadway alignments. In general, the state highways and local county and town roads are all two-lane roads with sufficient travel land width and paved shoulder width to sustain oversize turbine loads without encroachment into the opposing traffic lane. The state highway pavement surfaces are in very good condition and the local county and town roads are in generally good condition with the exception of Round Top Road which was reported to be in poor condition. In general, the travel speed approaching the intersections within the Project Area was slow enough not to create an unsafe stopping distance in the event that a vehicle had to stop quickly. Only one intersection (East Lake Road and CR 93) was identified to have a horizontal sight distance that may be less than the distance required to stop under normal conditions traveling at 50 to 60 mph. Drainage structures such as pipe culverts and concrete box culverts were located and measured along all roads in the Project Area. Pipe diameters, pipe materials, box culvert dimensions, and depth of cover were measured and are included in Appendix B of the Transportation Haul Route Study. No overhead bridges were identified along the routes included in the off-site route alternatives or within the Project Area. Several small culvert bridges over small streams were identified as well as several major bridges along waterbodies along off-site routes, and three culvert bridges and three steel stringer beam bridges were identified in the Project Area. The particular intersections in need of some temporary widening in order to accommodate oversize turbine loads are discussed in Section 2.22, Traffic and Transportation: Impacts and Mitigation.

Traffic

The community within the vicinity of the Project Area is characterized as rural/agricultural. New York State Department of Transportation (NYSDOT) road use information for Route 39, the preferred access point to the project, indicates that local road traffic is well below average traffic counts for state and county roadways in the area. Route 39 has an annual average daily traffic (AADT) volume of 3,240 from Route 20 to County Route 141 in Forestville and 2,020 from County Route 141 in Forestville to the Cattaraugus County Line (an average AADT of 2,630). In comparison, Route 60, which is the major north-south thoroughfare in the county, has an average AADT of 12,716 and Route 20, which traverses the northern portion of the county from east to west, has an average AADT of 7,878.

Air Transportation

Prior to locating individual turbines, Noble commissioned Aviation Systems, Inc., to conduct an Area Study Report of the air space in the Project Area. The study was based on a 5.05 by 5.48-mile search area centered over the Project Area, which included the Towns of Villenova and Hanover. The purpose of the study was to identify and avoid protected airspace, such as airport take-off and landing corridors. The nearest public use airfield to the Project Area is the Chautauqua County/Dunkirk Airport (DKK). The center of the search area utilized by Aviation Systems is approximately 8.16 nautical miles (NM) (9.4 miles) from the runway. The nearest point of the search area to the runway is 4.54 NM (5.22 miles).

The Chautauqua County/Dunkirk Airport has 34 aircraft based on the field, mostly single-engine planes. The airport averages 103 operations per day (AirNav 2008), with 67% of traffic consisting of local general aviation; 27% transient general aviation; 5% air taxi; and 1% military. The study also included an analysis of local elevation. The Area Study Report is included in Appendix N.

Table 2.21-1 Road System Within the Project Area

Road Name	Town	Jurisdiction	Description	Condition/ Comments
Route 39	Hanover	State	Paved 30 to 36 feet wide 4 to 6-foot gravel shoulders	Very good
Route 83	Villenova	State	Paved 30 feet wide 4 to 6-foot gravel shoulders	Very good
County Route 72	Villenova	County	Paved 22 feet wide 4 to 8-foot gravel shoulders	Good. Weight limit 6 tons
County Route 93	Hanover/ Villenova	County	Paved 24 feet wide 4 to 8-foot gravel shoulders	Good
Buttermilk Road (CR 91)	Villenova	County	Paved 22 feet wide 4 to 8-foot gravel shoulders	Good
Balcom Cross Road (CR 87)	Villenova	County	Paved 22 feet wide 4 to 8-foot gravel shoulders	Good
Ball Hill Road (CR 87)	Villenova	County	Paved 22 feet wide 4-foot gravel shoulders	Good
Empire Road	Hanover	Town	Paved 20 feet wide 5-foot gravel shoulders	Fair-good
Hurlbert Road	Hanover	Town	Paved 20 feet wide 3 to 6 foot gravel shoulders	Fair-good
Dye Road	Villenova	Town	Paved 20 feet wide 5-foot gravel shoulders	Fair
East Lake Road	Villenova	Town	Gravel 24 feet wide 4 to 6-foot grass shoulder	Good
Smith Road	Villenova	Town	Paved 20 feet wide 5-foot gravel shoulders	Fair-good
North Hill Road	Villenova	Town	Paved 20 feet wide 5-foot gravel shoulders	Fair-good
Pope Hill Road	Villenova	Town	Paved 20 feet wide 5-foot gravel shoulders	Fair-good
Round Top Road	Villenova	Town	Paved 20 feet wide 5-foot gravel shoulders	Poor-fair
Villenova Road	Villenova	Town	Gravel 22 feet wide 4-foot grass shoulders	Good-very good
Bartlett Hill Road	Villenova	Town	Gravel 22 feet wide 4-foot grass shoulders	Good. Dead end
Prospect Road	Hanover	Town	Paved 20 feet wide 5-foot gravel shoulders	Fair-good

© Ecology & Environment, Inc. GIS Department Project #002270.NP32
L:\Buffalo\Noble_Wind\2008_NOBLE_SITES\Maps\Villenova\MXDs\DEIS\July_2008\haul_routes.mxd 07/03/2008

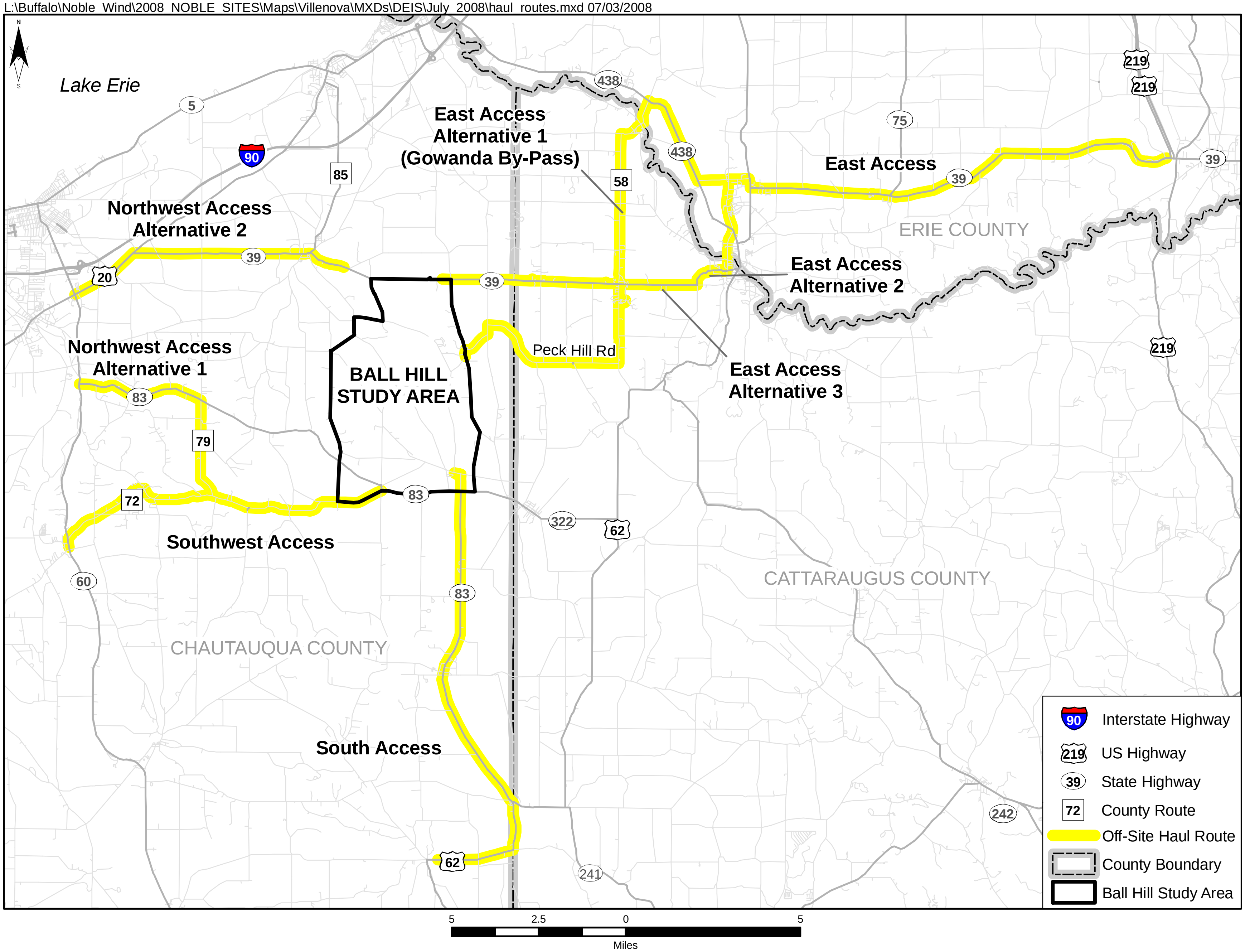


Figure 2.21-1 Potential Off-Site Haul Route Roadways
To be Utilized During Construction
Noble Ball Hill Windpark

© Ecology & Environment, Inc. GIS Department   Project #002270.NP32
L:\Buffalo\Noble_Wind\2008_NOBLE_SITES\Maps\Villenova\MXDs\DEIS\July_2008\project_roadways.mxd 07/03/2008

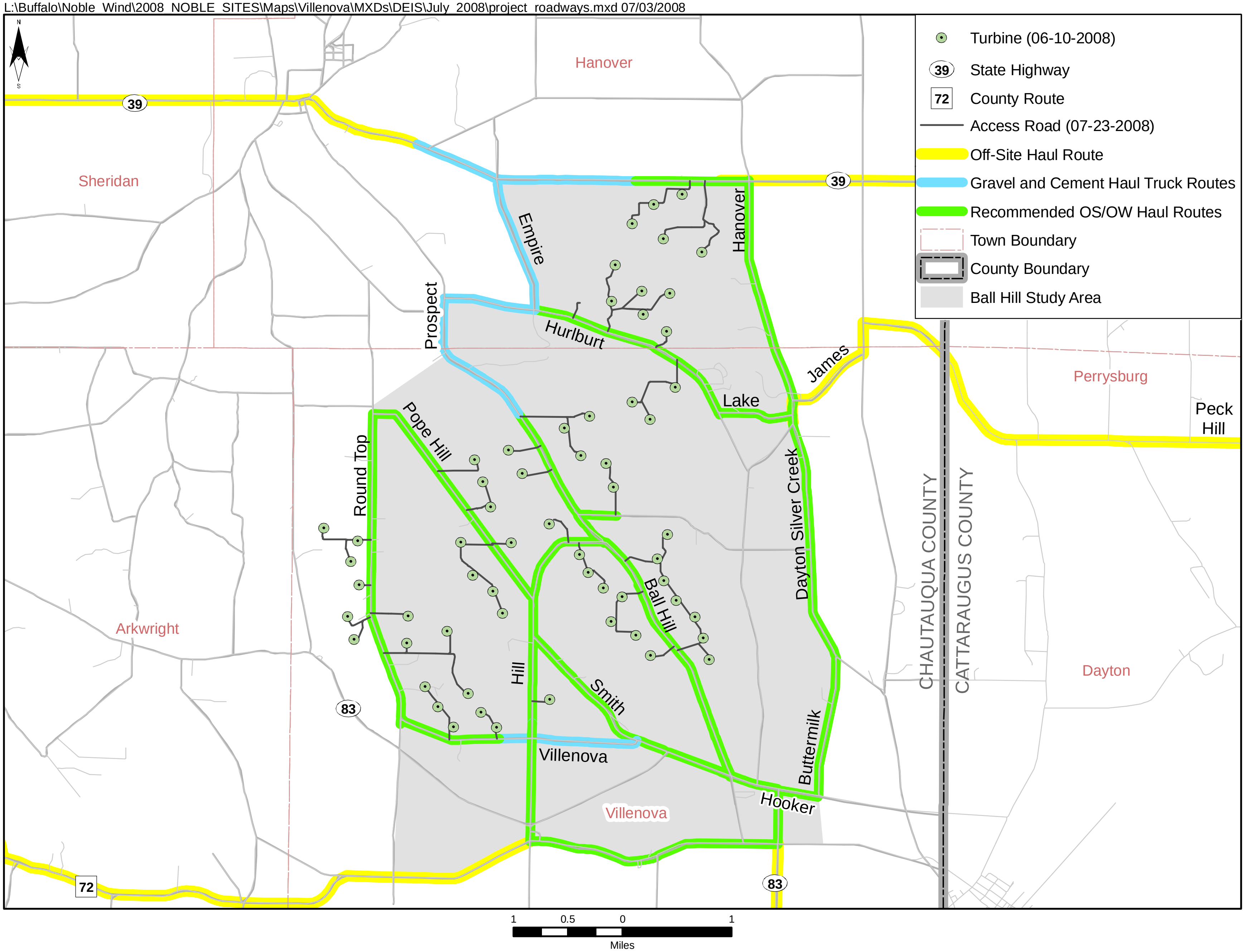


Figure 2.21-2 Project Area Roadways to be Utilized During Construction Noble Ball Hill Windpark

2.22 Traffic and Transportation: Impacts and Mitigation

This section summarizes potential traffic and transportation impacts and associated mitigation measures detailed in the Transportation Plan, which consists of a Transportation Haul Route Study and Area Study Report (see Appendix N). The purpose of the Transportation Haul Route Study was to analyze impacts and present recommendations for improvements necessary to accommodate oversize vehicle turning movements at local road intersections. These intersections were selected for analysis after consideration was given to incline limitations and structural load ratings. The Area Study Report considers airspace in the Project Area to identify and avoid protected airspace, such as airport take-off and landing corridors, in siting individual turbines.

In general, the traffic volume on the roads that provide access to the Project Area is less than other major roadways in the area. The increase in traffic due to construction-related activities is not expected to significantly impact the overall usage of major public roads in the areas and, as such, only minimal limited duration delays to local traffic are expected during construction of the Project. No impacts are anticipated during operations. This section evaluates potential impacts to the primary ground and air travel routes during the construction and operation of Project facilities. Measures to minimize or mitigate impacts are discussed in Section 2.22.3. Cumulative impacts of the Project and the proposed New Grange Windpark project in the Town of Arkwright to the west are discussed in more detail in Section 3, Cumulative Impacts and Benefits: Windpark and Regional Development.

With respect to air transportation utilizing the Chautauqua County/Dunkirk Airport, protected airspace is located in Sector A in the northwest corner of the study area. As discussed in Section 2.21, Traffic and Transportation: Environmental Setting, Aviation Systems, Inc., conducted the initial Area Study Report, followed by a supplemental report re-evaluating Sector A in greater detail. Both documents are included as part of Appendix N.

2.22.1 Construction Impacts

Traffic associated with the construction of the Project will consist of delivery vehicles for turbine components, materials associated with turbine site construction and assembly, and personal vehicles for workers. Delivery vehicles will range in size from oversized load tractor-trailers (used to deliver tower sections, turbine nacelle, rotor blades, and cranes) to smaller vehicles, such as dump trucks, concrete trucks, fuel delivery trucks, mechanics vans, and pickup trucks. Personnel vehicles will consist of automobiles and light trucks.

It is estimated that between 410 and 500 oversize/overweight (OS/OW) inbound loads will be required to deliver turbine components to the Project Area. Many of the trailer configurations can be reduced in length after delivery is made so that when leaving the Project Area, their length and weight will be greatly reduced making it easier and quicker to exit. For construction of the 60-turbine Windpark, estimates of special hauling permit vehicles with scheduled deliveries are provided as follows:

- 60 tower bases (80-meter) delivery vehicles;
- 60 tower mid-sections (80-meter) delivery vehicles;
- 60 tower tops (80-meter) delivery vehicles;
- 60 nacelle delivery vehicles;
- 90 blade delivery vehicles;
- 60 hub assembly delivery vehicles;
- Two substation transformer delivery vehicles; and
- 19 crane (500-ton) delivery vehicles.

Some improvements to local roads and expansion of intersection turns will be required to facilitate the use of OS/OW vehicles.

Small construction vehicles, such as pickup trucks, concrete trucks, dump trucks and work vans, will be used on a regular basis during the construction period to deliver supplies, personnel, and other Project necessities. Suppliers for the Project will use the most direct route to the Project Site. Construction vehicles will not have difficulty reaching the Project Site using any local roads and will comply with all Town, county, and state ordinances; however, the heavy volume of dump trucks and concrete trucks that will be experienced during construction may slow traffic on some routes during work hours and may result in some damage to road surfaces. Concrete trucks are expected to be the heaviest of these small construction vehicles, requiring a road capable of safely handling a vehicle with a gross weight of approximately 80,000 pounds (40 tons).

It is estimated that between 10,056 and 12,382 gravel and cement loads will be required for the Project. For purposes of the calculations, it is assumed that all gravel and cement loads will be leaving the Project Area empty. For construction of the Project, the estimated gravel and cement truck trips are as follows:

- 358 to 417 truckloads to remove unsuitable soils to support road and foundation building;
- 5,478 to 6,391 gravel trucks for 35-foot temporary access road at 14 to 12 cubic yards (CY) each;
- 2,700 to 3,750 gravel trucks for removal of temporary access road width (19 feet); and

- 1,520 to 1,824 cement trucks for turbine foundations at 12 CY to 10 CY for each cement load.

Oversized construction vehicles could cause minor delays, but these are unlikely to be significant, given the relatively low traffic volume. Impacts to the local traffic and transportation during construction may include:

- Temporary delays associated with construction at some intersections to facilitate the turning radius of OS/OW vehicle;
- Temporary traffic delays at intersections and on small roads (behind slow-moving or parked trucks);
- Temporary traffic delays at intersections resulting from increased stopping distances required for trucks to safely negotiate turns;
- Damage to road surface, especially during rainy periods in the spring and fall; and
- Creation of noise and dust from the passage of large construction vehicles.

As part of the project approval process, Noble will enter into road use agreements with the Towns that will require Noble to perform pre-construction inspections of all roads that will be used for transportation and equipment delivery for the Project. The pre-construction inspection will result in a pre-construction survey report that will evaluate road features, such as embankments, guard rails, and culvert pipe conditions and a detailed photographic survey of the Haul Route network immediately prior to construction. It will also identify utility lines that need to be raised to accommodate passage of the delivery vehicles and their loads.

The road use agreement will designate approved routes and commit the cost of both improvements and repairs to Noble’s account. General types of improvement and repairs may include repaving, patching, shoulder repair, and culvert repair. Noble will have an obligation to perform any upgrades to the roadways and permanent structures that will be required to allow passage of the aforementioned loads, and will have an obligation to maintain the roads in a safe and passable condition throughout the construction period. At the completion of construction Noble will return the roadways used for construction of the Windpark to pre-construction conditions.

The only intersection that was identified within the Project Area where the horizontal site distance (at 50 to 60 mph) may be less than 525 feet is East Lake Road at CR 93. Just south of this intersection is a 1,300-foot horizontal curve. For vehicles traveling north on CR 93, the sight distance to the East Lake Road intersection is approximately 530 feet. Care shall be taken to use police and pilot cards to safely warn motorists in advance of the intersection while OS/OW transport vehicles are moving through the intersection.

Air Transportation

Construction of the Project will have no impact on air transportation in the area.

2.22.2 Project Operation Impacts

Vehicle Traffic

No road traffic impacts are expected once the project becomes operational. A limited number of light trucks will occasionally access the Project Site for service and maintenance of the facilities; however, existing road traffic is light.

Air Transportation

A study was completed to identify protected airspace, such as airport take-off and landing lanes, in the vicinity of the Project Area (see Appendix N). The study confirmed that a 420-foot structure could be sited anywhere within the Project Area boundary without impacting air transportation corridors except in Sector A in the northwest corner of the study area. Sector A is a 40:1 slope surface of the Runway 15 turning departure which rises from 1,610 feet above mean sea level (AMSL) to 1,800 feet AMSL. The turbines utilized for this Project are 389 feet (80 meters) above ground level when the blade is at its highest point. Noble will submit the final turbine locations as part of the Notice of Proposed Construction to the Federal Aviation Administration (FAA) for approval prior to construction.

The FAA requires nighttime lighting of the perimeter turbines in a cluster, as well as on some interior turbines, to provide warning to pilots. An FAA Lighting Plan has been prepared for the Project and is provided in Appendix K. Based on FAA guidelines, approximately 24 of the proposed turbines will be illuminated at night for aviation safety. The lighting will be slow flashing red lights. All FAA lighting within the Windpark is required to flash in unison, thus delineating the Windpark as one large obstruction to pilots. According to the FAA, daytime lighting of the wind turbines, in general, is not necessary. Due to their solid (nonskeletal) construction, as well as their moving characteristics, the turbines themselves provide sufficient warning to pilots during all daytime conditions. The visibility of turbines during the daytime and nighttime is discussed in Section 2.14, Visual Resources: Impacts and Mitigation.

2.22.3 Mitigation

Vehicle Traffic

Construction vehicle traffic, with the exception of commuting vehicles carrying Project personnel to and from the job site, will be limited to the hours of 7:00 a.m. to 7:00 p.m. Deliveries of equipment along bus routes will be coordinated with the school districts to avoid disruption of bus services.

If circumstances require that oversized construction vehicles utilize the complete road width, appropriate measures will be taken (e.g., flagging) to safely stop traffic temporarily (typically less than 5 minutes) on affected roads. Noble will coordinate traffic safety measures with the Towns, county, and New York State Department of Transportation (NYSDOT).

Additional mitigation techniques will be implemented to minimize impacts on homes, schools, and businesses:

- To the extent practicable, planned haul routes will avoid more densely occupied locales;
- Scheduled transport vehicles will be confined to the approved travel routes;
- To the extent practicable, equipment transport and heavy construction traffic will be set up on a one-way travel pattern through the Project Area to minimize the possibility of two-way construction traffic interferences;
- OS/OW equipment delivery schedules will avoid periods of school bus activity along affected routes;
- Parking at the turbine construction sites will be restricted to company vehicles. Centralized parking will be provided at the staging areas identified in Figure 1.2-2 and at other sites to be determined and provided by the individual contractors. A shuttle service for laborers and contractors will connect these parking areas with the active turbine sites. In addition, limited parking will be available on the individual access roads constructed as part of the Project;
- Gravel drive-offs from site access roads will serve to remove much of the tire mud from vehicles leaving the construction areas; mechanical street sweepers will be deployed as required to remove mud from local streets when it accumulates;
- Water trucks will be used to control dust during dry periods;
- Local emergency response units will be updated weekly with the location of construction activities and with the schedule/routing for relocating equipment (cranes) which might block travel on local roads; and
- Mandatory safety orientation for contractors and employees shall include discussion of vehicle safety concerns.
- Flags, signs, and flagmen will be used during construction where necessary for safe travel. In addition site specific traffic safety plans will be developed with the NYSDOT and Chautauqua County for access roads within their respective jurisdiction.

- Use of police or pilot cars to safely warn motorists in advance of an intersection with a bad horizontal site distance while OS/OW equipment delivery vehicles are moving through the intersection.

The Transportation Haul Route Study makes observations and recommendations about the structural capacity of state and local roadways in the Project Area, though these must be verified by NYSDOT and surveyors (see Section 22.2.4). Off-site haul routes were observed to generally be of sufficient width and condition, and the number of drainage structures, railroad crossings, bridges (over-and underpasses), and deficient intersection geometry and roadway alignment were identified. On-site haul routes were observed to have sufficient capacity and varying condition. One location with a steep grade was identified within the on-site haul route. Steep grades are road grades steeper than 10%, which make turbine transport difficult without another vehicle to assist in the move. North Hill Road, 0.45 miles north of Villenova Road, in the Town of Villenova has a grade of -11.4% in the northbound direction.

The Transportation Haul Route Study identified seven intersections within the off-site haul route study area and 16 intersections within the on-site (local roads) haul route that require temporary widening to accommodate oversize turbine loads as they make their way to the individual turbine construction sites within the Project Area. The intersection improvements for these locations are shown in Appendix A of the Transportation Haul Route Study. Typically, the proposed intersection improvements include traffic sign removal, compacted gravel widening, drainage ditch filling and/or drainage pipe culvert extensions. Once the gravel widening has been constructed, traffic signs are reset to their original location on portable or removable posts to they can be easily moved when oversize loads pass through the intersection. When Project construction is complete, the intersections will be restored to their original condition and the disturbed areas will be reseeded as required.

Final equipment routes will be provided to the Towns, associated highway superintendents and the Towns’ engineers prior to completion of the road use agreement to be established between Noble and Towns of Villenova and Hanover and Chautauqua County.

Agencies and organizations that will provide vehicle routing information are identified in Appendix N. Prior to Project execution, interested parties may obtain vehicle routing information from the following sources:

- In Appendix N of this Draft Environmental Impact Statement (DEIS), on file at the Villenova Town Hall and Hanover Town Hall;

- The Noble Environmental Power corporate Web site (www.noblepower.com); and

- A toll-free telephone number, will be established for public information and for complaint reporting. This number will be published in the local newspapers prior to construction.

Air Transportation

An FAA Lighting Plan was prepared by Aviation Systems, Inc., to identify turbines within the Project Site that will be illuminated at night (see Appendix K). FAA approval of this plan will be obtained prior to construction. While the air transportation study (see Appendix N) was designed to avoid impacts to protected airspace, the FAA lighting plan was prepared to minimize risk of collision with passing aircraft (see Appendix K). Specifically, the minimum number required low-intensity flashing red lights will be used, in accordance with FAA, to minimize impacts on the local community. The lighting plan calls for the lighting of 34 out of the 60 turbines (56%).

2.22.4 NYSDOT Special Haul Permits

Because Noble will use public highways under the jurisdiction of NYSDOT for oversize/overweight vehicles transporting wind turbine components, Special Hauling Permits from that agency will be required for each oversize/overweight load. Additional mitigation may also be required by NYSDOT concerning equipment movements on roads under NYSDOT jurisdiction. In the NYSDOT permitting process, a final route survey will be developed prior to construction that identifies road improvements necessary to accommodate delivery and construction vehicles when rerouting is impractical. These improvements commonly include widening of narrow roads, rounding of corners at intersections, and reinforcing crossings at culverts and bridges. Route structural conditions, including road bearing capacity, bridge crossings/bridge conditions, and culvert crossings/culvert conditions will be assessed by NYSDOT as well as a qualified transportation logistical planner as transport details are developed. This assessment will include an inventory of the number of bridge and culvert crossings, including those represented in access roads and will identify appropriate mitigation measures. Additionally, there may be a need for the installation of temporary culvert extensions for use during construction to accommodate road widening. Any potential wetland impacts will be addressed in the Joint Wetland Permit Application or in the respective road entrance permits as necessary (state, county, and Towns).

Overhead wires, such as telephone, electric, Internet cables, and fiber optic cables will be evaluated by an experienced New York State surveyor to verify the vertical clearance of overhead wires along the off-site routes during the Special Hauling Permit application process.

Physical characteristics of bridges, such as allowable weight loads, bridge type, and condition will be determined by the NYSDOT Structures Division during the actual Special Hauling Permit application process. The route surveyor will submit a route plan to NYSDOT for review and NYSDOT will query the NYSDOT geographic information system database for a bridge report to identify potential bridge-related problems along the route.

2.23 Land Use: Environmental Setting

Land use information is described in terms of regional and local land use trends, local community facilities, and local zoning ordinances and comprehensive land use planning documents that apply to the construction and operation of the Noble Ball Hill Windpark.

2.23.1 Regional Land Use Patterns

The Project is located in portions of the Towns of Villenova and Hanover in Chautauqua County in western New York State (NYS). These communities are generally rural and characterized by agricultural uses, forested land, and rural-residential uses. The Town of Hanover includes the more developed villages of Forestville and Silver Creek as well as the hamlets of Balltown, Hanford Bay, Hanover Center, Irving, Keaches Corners, Nashville, Parcells Corner, Smith Mills, and Sunset Bay. The Town of Villenova contains the hamlets of Balcom, Balcom Corners, Hamlet, Skunks Corners, and Wango. Built features in both Towns typically include low-density single-family residential structures and farmsteads. The more concentrated areas of residential and commercial development are along major roadways such as NYS Route 39, NYS Route 83, NYS Route 93, and NYS Route 322.

2.23.2 Project Area Land Use

Land use was evaluated using information gained during field reviews, interpretation of United States Geological Survey (USGS) Land Use/Land Cover base maps, aerial photography and Town maps. Table 2.23-1 and Figure 2.23-1 illustrate land use within the vicinity of the Project Area based on the USGS Land Use/Land Cover data.

The approximately 13,658-acre Project Area is characterized primarily by a combination of forested land (approximately 7,576 acres) and agricultural (approximately 5,682 acres), with the remaining acreage consisting of wetlands, residential, and roads and other paved surfaces. Section 2.7, Wetlands: Environmental Setting, provides a summary of the acreage of wetlands that were field-delineated within the survey corridor, which is defined as 200 to 300 feet centered on linear facilities and a circular area with a 250-foot radius surrounding each proposed turbine. Section 2.8, Wetlands: Impacts and Mitigation, discusses the acreage of wetlands that will be impacted by the Project. Agriculture within the Project Area consists of a mixture of hay production and pasture, with some interspersed row cropping. Corn is the main row crop in the area, followed by soy beans. There are vineyards located in the northern part of the Project Area in the Town of Hanover. No active sugar maple production facilities were identified in the area. There was evidence of historic logging activities in the Project Area.

The agricultural land is scattered throughout the Project Area. Portions of the Project Area fall within New York State Department of Agriculture and Markets (NYSDAM) Chautauqua County Districts 5 and 10 (see Section 2.3, Soils: Environmental Setting, and Section 2.4, Soils: Impacts and Mitigation, for discussion and a map of agricultural districts and NYSDAM consultation).

Forested land accounts for approximately 53% of the Project Area. The forested land in the Project Area consists of a mixture of northern hardwoods, beech/maple mesic forests, and red maple/hemlock forests. The composition and frequency of the forest communities have been estimated based on tree species observed during field surveys within the Project Area, and interpretation of aerial photography. These communities are discussed in more detail in Section 2.9, Biological Resources: Environmental Setting.

Residential development within and adjacent to the Project Area is typical of rural areas, with residences and farms clustered at crossroad hamlets, located on individual agricultural properties, or situated along state, county, and local roadways. Residential use in the Project Area is primarily active farmsteads.

The land use/land cover analysis is based on the best available data, which was verified through field visits and review of aerial photography. These field visits were conducted multiple times for basic land use verification, wetland delineations, visual impact assessments, historic structures, discussions with landowners for turbine siting and design, and housing/structure identification/verification.

Community Facilities

As a whole, Chautauqua County is served by a full range of community facilities and services. Local services, such as emergency response services (fire protection and ambulance), utilities, and health care facilities, are considered adequate to serve the rural community where the Project Area is located. Fire response is provided by Hanover and Cherry Creek Volunteer Fire Departments. These fire companies have ambulance service with basic life support capabilities. The Brooks Memorial Hospital is located about 15 miles northeast of the Project Area in Dunkirk and WCA Hospital is located in Jamestown approximately 25 miles south of the Project Area. Police services are provided by the NYS Police and the Chautauqua County Sheriff. Section 2.29, Health and Safety, and Appendix R provide contact information for these entities and the specific actions to be taken in the event of an emergency. The Town of Villenova is served by Forestville and Pine Valley Central School Districts and the Town of Hanover is served by the Silver Creek Central School District.

2.23.3 Local Land Use Plans, Zoning and Laws

Both the Town of Villenova and Town of Hanover control development through zoning ordinances. The Towns have adopted Local Laws regulating wind farm development, which supplement the zoning regulations. The Villenova Town Board adopted a local law in 2007 regulating wind farm development and the Hanover Town Board adopted a similar local law in 2008 to update its existing zoning law. This Draft Environmental Impact Statement (DEIS) addresses setback, noise and other requirements of the Villenova wind law and the updated Hanover wind law. Copies of the Wind Energy Facilities Law of Town of Villenova (Local Law No. 1 of 2007) and the Wind Energy Conversion Systems (WECS) Law of the Town of Hanover (2008) are provided in Appendix O.

The Towns' wind laws are similar to those being adopted by other towns throughout NYS. Each law would require submittal of an application for a special use permit and for creation of a Wind Overlay Zone to the Town Boards for review and approval and requires full compliance with the NYS Environmental Quality Review Act (SEQRA). Additionally, the laws establish design requirements including setbacks, spacing and density, structure, clearance, access and safety, lightning, access roads, electrical wires, lighting, buildings and outdoor storage, aesthetics and visual assessment, signs, agricultural mitigation, noise, insurance, shadow flicker, ice and blade throw, catastrophic tower failure, electromagnetic interference (EMI), and height limitation. Figures 2.23-2 and 2.23-3 illustrate setbacks established in accordance with the Villenova and Hanover Town Laws.

Town of Villenova

Development in the Town of Villenova is controlled through existing zoning regulations. The zoning regulations and zoning districts were developed in accordance with a comprehensive plan for the municipality. The Zoning Law of the Town of Villenova (1997) divides the Town into the following districts: Agricultural/Residential (ARI), Transition (T) and Industrial Park "Floating" (IP). Portions of the Project Area are classified as Transitional (T) district. On April 11, 2007, the Town Board approved Local Law No. 1 of 2007: Wind Energy Facilities Law of the Town of Villenova, with final adoption on June 13, 2007. The purpose of this local law is to promote the effective and efficient use of the Town's wind energy resource through WECS and to regulate the placement of such systems so that the public health, safety, and welfare will not be jeopardized. The law states that a WECS shall be setback from site boundaries, measured from the center of the WECS, as follows:

- 500 feet from the nearest site boundary property line, except the setback shall be 500 feet where the boundary is state, county, town, or village-owned property (§690.12.E.1);
- 500 feet from the nearest public road (§690.12.E.2);
- 1,000 feet from the nearest off-site residence existing at the time of application, measured from the exterior of such residence (§690.12.E.3);
- 100 feet from state-identified wetlands. This distance may be adjusted to be greater or lesser at the discretion of the reviewing body, based on topography, land cover, land uses, and other factors that influence flight patterns of resident birds (§690.12.E.4); and
- 500 feet from gas wells, unless waived in writing by the property owner (§690.12.E.1).

Additionally, applicants must provide a shadow flicker study, visual impact assessment, fire protection and emergency response plan, created in consultation with the fire department(s) having jurisdiction over the proposed Wind Overlay District, noise analysis, property value analysis, and electromagnetic interference assessment. The Villenova local law also states that the statistical sound pressure level generated by a WECS shall not exceed L10-50 A-weighted decibels (dBA) measured at the closest exterior wall of any residence existing at the time of completing the SEQRA review of the application (§690.12.A).

In the event the noise levels resulting from a WECS exceed the criteria, or a setback requirement is not met, a waiver may be granted from such requirement by the Town Board if written consent from the affected property owners has been obtained stating that they are aware of the WECS and the noise and/or setback limitations and that they wish to be part of the site and that consent is granted to: (1) allow noise levels to exceed the maximum limits otherwise allowed or (2) allow setbacks less than required (§690.13.A.1). If consent is given, a waiver is not necessary.

To advise all subsequent owners of the burdened property, the consent, in the form required for an easement, has been recorded in the County Clerk's Office describing the benefited and burdened properties. Such easements shall be permanent and may not be revoked without the consent of the Town Board, which consent shall be granted upon either the completion of the decommissioning of the benefited WECS in accordance with Article II, or the acquisition of the burdened parcel by the owner of the benefited parcel or the WECS (§690.13.2).

Town of Hanover

In 1998, the Town of Hanover adopted the "Town of Hanover Zoning Laws." The ordinance divides the Town into six zoning districts: A-1 Agricultural and Residential District; R-1 Residential District (Hanford Bay); R-2 Residential and Recreational District (Sunset Bay); R-3 Residential and Recreational District (Hamlet of Irving); B-1 Business District; and I Light Industry District. The portion of the Project Area located in the Town of Hanover is located within an A-1 Agricultural and Residential District.

The Hanover Town Board passed a local law in July 2008 to update its regulations for WECSs in the town. The intent of the law is to accommodate the necessary infrastructure for the provision of utility scale and small wind-powered electricity generation so that they may be developed in a manner compatible with the general health, welfare, and safety of the public. It is also intended to address the visual, aesthetic, and land use compatibility aspects of WECS.

According to the law, WECS would be permitted in the Wind Overlay/District Zone, which may be created in the Agricultural Residential (A-1) District, upon issuance by the Town Board of a Special Use Permit. Each WECS in the Town of Hanover shall be set back (as measured from the center of the WECS) a minimum distance of:

- 500 feet from the nearest Site boundary property line, right-of-way, easements, and power lines and 500 feet where the boundary is with state, county, town, or village-owned property (Section 1606.2.a);
- 500 feet from the nearest public road (Section 1606.2.b);
- 1,000 feet from the nearest off site residence, school, church, or historic structure existing at the time of application, as measured to the exterior of such structure (Section 1606.2.c.);
- 100 feet from state identified wetlands. This distance may be adjusted to be greater at the discretion of the reviewing body, based on topography, land cover, land uses, and other factors that influence flight patterns of resident birds (Section 1606.2.d.);
- 500 feet from gas wells, electric or gas distribution lines unless waived in writing by the property owner and well owner or applicable utility owner (Section 1606.2.e.).

The Hanover local law also states that the statistical sound pressure level generated by a WECS in Hanover shall not exceed L_{10} - 50 dBA measured at any off-site residence existing at the time the application. If the ambient sound pressure level exceeds 48 dBA, the standard shall be ambient dBA plus 5 dBA. Independent certification shall be provided before and after construction demonstrating compliance with this requirement. Additional discussion of the local regulatory noise limits are discussed in greater detail in Section 2.15, Sound: Environmental Setting; Section 2.16, Sound: Impacts and Mitigation; and Appendix L, Noise Impact Assessment.

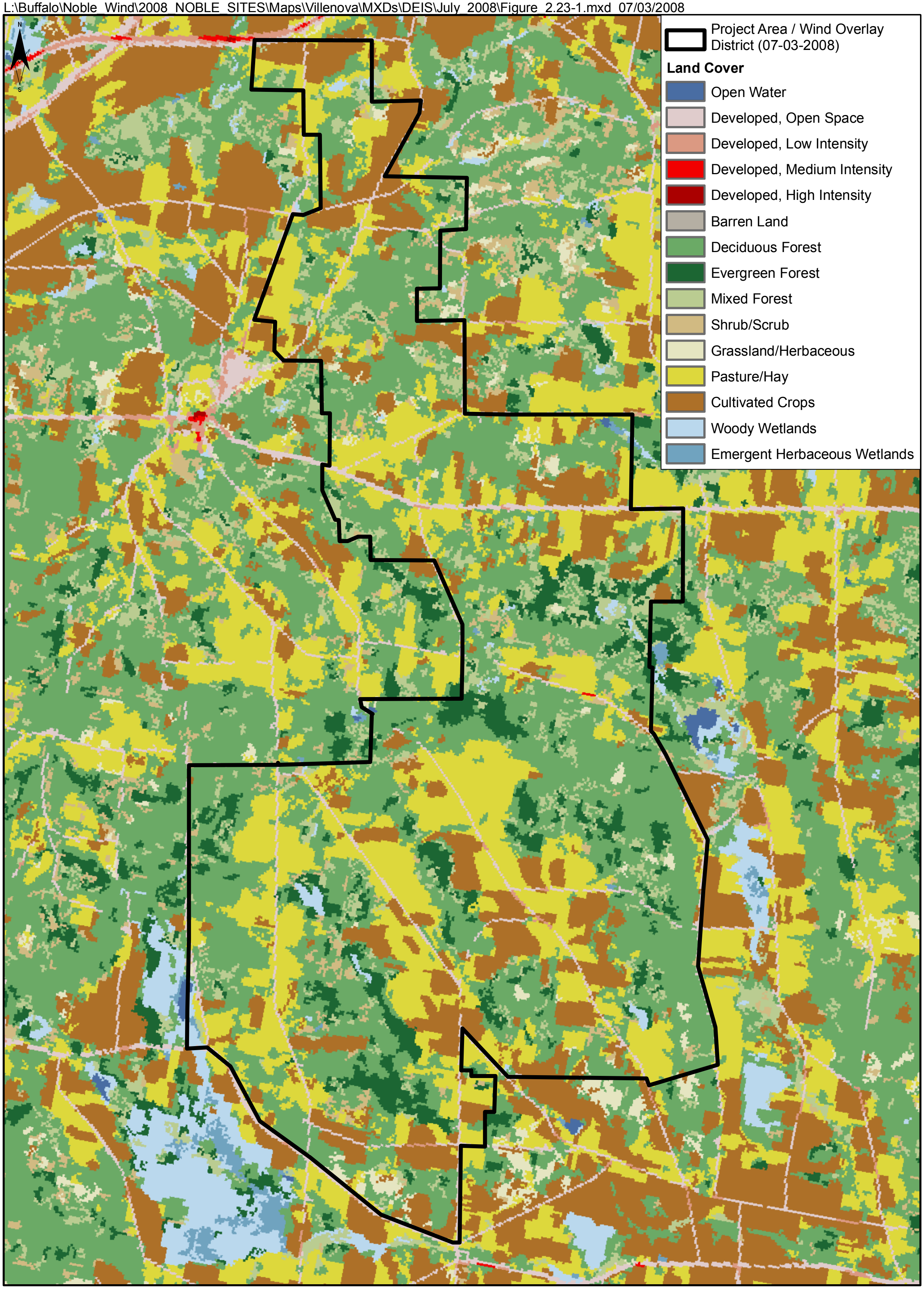
In addition, the Town of Hanover law requires specific emergency shutdown and safety procedures. The emergency shutdown procedures for power generation units are established by the original equipment manufacturer turbine supplier, in this case GE Energy, and are controlled remotely through the windpark Supervisory Control and Data Acquisition (SCADA) system. The emergency shutdown procedures will be reviewed by the Hanover Town Board, and made available to agencies as required by the Town Law.

Table 2.23-1 Project Land Use/Land Cover Acreages

Land Use/Land Cover	Town of Villenova	Town of Hanover	Total
Agricultural	3,460	2,235	**5,695**
Forested	4,733	2,843	**7,576**
Developed	220	160	**380**
Open Water	4	3	**6**
Total	**8,417**	**5,241**	**13,658**

Source: USGS Land Use/Land Cover data, 2001

© Ecology & Environment, Inc. GIS Department Project #002270.NP32
L:\Buffalo\Noble_Wind\2008_NOBLE_SITES\Maps\Villenova\MXDs\DEIS\July_2008\Figure_2.23-1.mxd 07/03/2008



Source: National Land Cover Dataset, USGS, 2001

Figure 2.23-1 Project Area and Land Use
Ball Hill Windpark

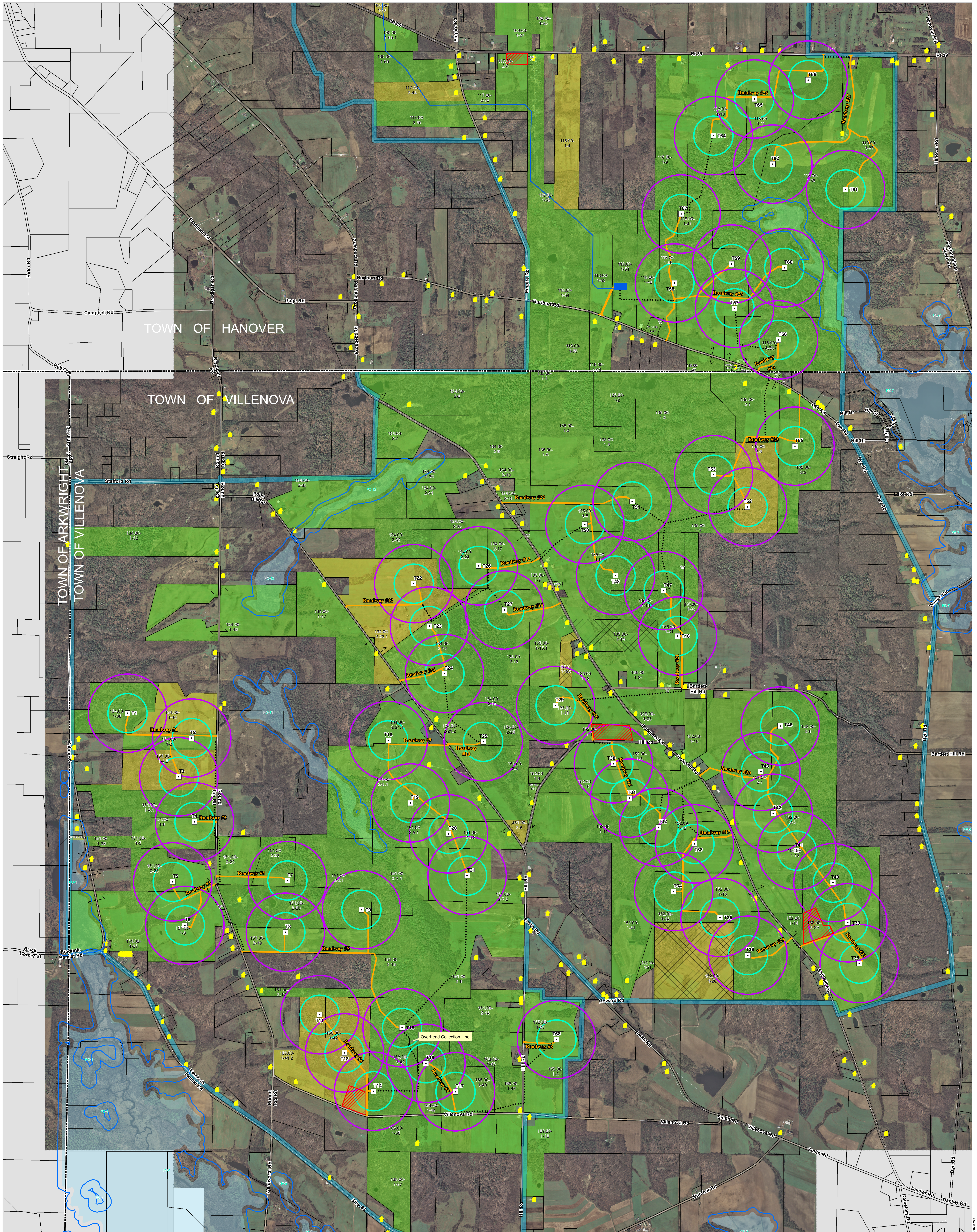


Figure 2.23-2 Setback Map
Ball Hill Windpark
Towns of Villenova & Hanover, Chautauqua County, NY

▣ Turbines 6/10/08
■ Substation
■ Switchyard
▨ Laydown Yards

Parcel Status
🟩 Signed
▩ Signed - BORDER
☐ All Other Parcels
🟨 Negotiating
▩ Negotiating - BORDER

● Residences
○ 500' from turbines
○ 1000' from turbines

Town Boundaries
Transmission Line
Access Roads

Project Area/Wind Overlay District 7/3/08
NYSDEC Wetlands with 100' Setback

Collection System
Overhead
Underground

Disclaimer:
The information contained herein was developed for the benefit of the residents of Chautauqua County, and is provided "as is." Chautauqua County makes no warranties or guarantees, express or implied, including warranties of title, non-infringement, merchantability or fitness for a particular purpose, concerning this information. Although the data/information being provided has been produced and processed from sources believed to be reliable, no warranty is made regarding accuracy, completeness, legality, reliability or usefulness of any such information. The user specifically acknowledges that Chautauqua County is not liable in any way with respect to the user's use of any such information, and that the risk from any use of any of the information found in this application rests entirely with the user. The data contained in these shapefiles in no way should be considered equivalent to land surveys.

While Chautauqua County endeavors to include reliable data for reference, conceptual planning and presentation purposes, the maps and information herein provided are not intended for and should not be used to establish boundary lines, locations, or to provide any other information needed for any purpose for which engineered drawings or plans, or surveys are required by law, required by any legal document or needed to assure accuracy and/or that certain standards are met.

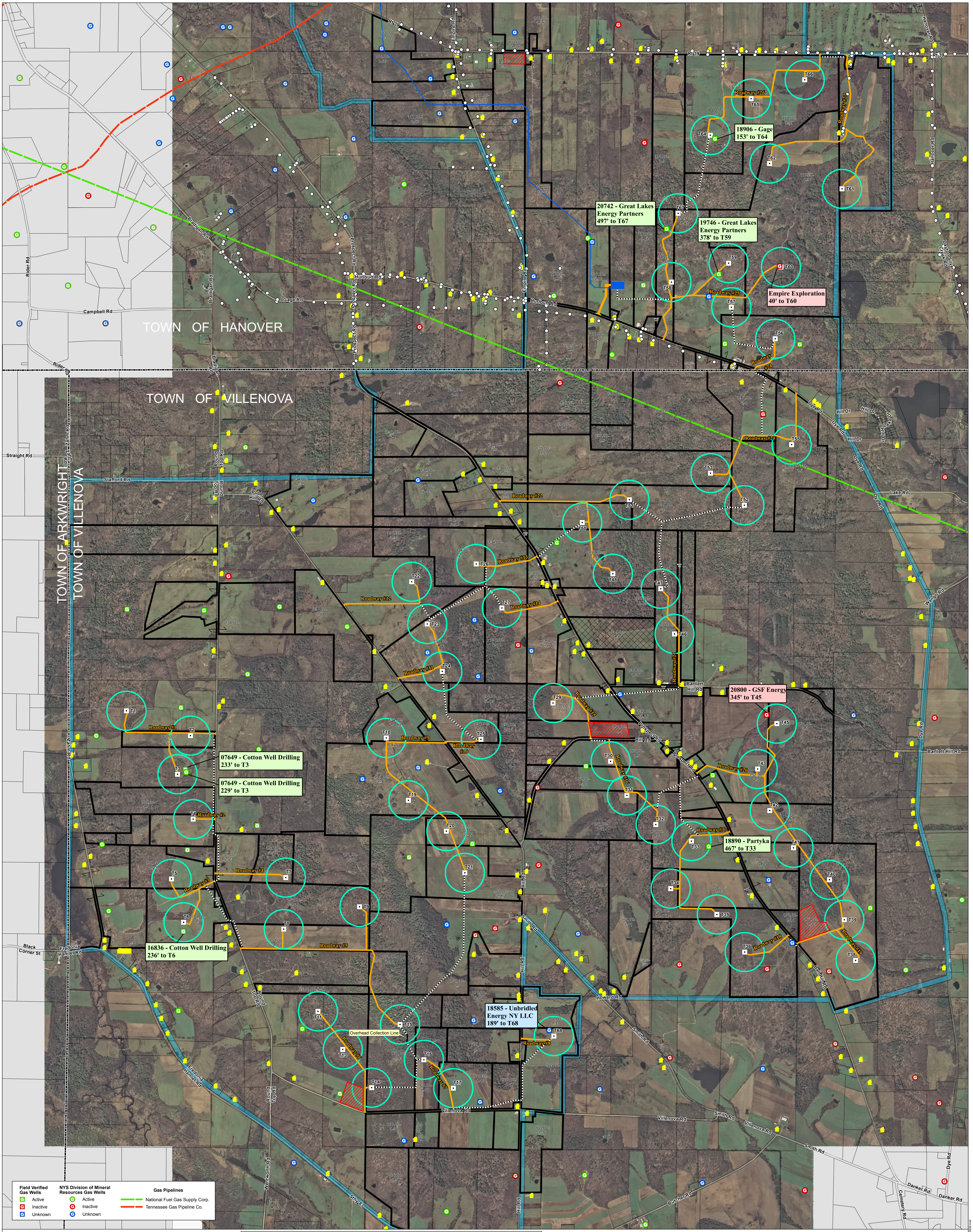
Assessment information in the Property Parcel layer was loaded from assessor's files dated July 1, 2006.

Orthophotography Source: MJ Harden, 2007.

0 750 1,500 Feet

Noble ENVIRONMENTAL POWER
DMJM HARRIS | AECOM

Ball_Hill_DEIS_Setback_091608.mxd



18906 - Gage
153' to T64

20742 - Great Lakes
Energy Partners
497' to T67

19746 - Great Lakes
Energy Partners
378' to T59

Empire Exploration
40' to T60

20800 - GSF Energy
345' to T45

07649 - Cotton Well Drilling
233' to T3

07649 - Cotton Well Drilling
229' to T3

18890 - Partyka
467' to T33

16836 - Cotton Well Drilling
236' to T6

18585 - Unbridled
Energy NY LLC
189' to T68

Figure 2.23-3 Setbacks from Utilities
Ball Hill Windpark
Towns of Villenova & Hanover, Chautauqua County, NY

Disclaimer:
The information contained herein was developed for the benefit of the residents of Chautauqua County, and is provided "as is." Chautauqua County makes no warranties or guarantees, express or implied, including warranties of title, non-infringement, merchantability or fitness for a particular purpose, concerning this information. Although the data/information being provided has been produced and processed from sources believed to be reliable, no warranty is made regarding accuracy, completeness, legality, reliability or usefulness of any such information. The user specifically acknowledges that Chautauqua County is not liable in any way with respect to the user's use of any such information, and that the risk from any use of any of the information found in this application rests entirely with the user. The data contained in these shapefiles in no way should be considered equivalent to land surveys.

While Chautauqua County endeavors to include reliable data for reference, conceptual planning and presentation purposes, the maps and information herein provided are not intended for and should not be used to establish boundary lines, locations, or to provide any other information needed for any purpose for which engineered drawings or plans, or surveys are required by law, required by any legal document or needed to assure accuracy and/or that certain standards are met.

Assessment information in the Property Parcel layer was loaded from assessor's files dated July 1, 2006.

Orthophotography Source: MJ Harden, 2007.

Noble ENVIRONMENTAL POWER
DMJM HARRIS | AECOM

2.24 Land Use: Impacts and Mitigation

This section describes the potential impacts that construction and operation of the Project will have on land use within the Project Site and potential mitigation measures. Overall, the Project is generally compatible with local and regional land use, as it will not preclude existing uses or interfere with planned future uses outside of the established Project Area. The Project will result in site-specific temporary/construction-related impacts as well as permanent operations-related impacts as discussed below and turbines will alter the visual landscape in the community. Construction impacts will be temporary. It is estimated that it will take about two years until temporary access roads and other construction related land disturbances revert back to preconstruction conditions. "Permanent" impacts resulting from conversion of natural areas to built facilities and the conversion of one vegetative community to another will exist for the life of the Project (20 years) but it expected that, absent other intervening factors, that there will be a return to preconstruction conditions after decommissioning. Table 2.24-1 presents a summary of the construction and operation impacts of the Project on current land use/land cover at the Project Site.

2.24.1 Construction Impacts

Project Site Land Use

Activities associated with construction of turbines, access roads, and electrical collection lines will result in temporary impacts to agricultural land and open space and permanent impacts to forestland. Impacts to forestland are considered permanent because the clearing and the periodic maintenance to control woody vegetation surrounding the turbines, access roads, and electrical collection lines will result in the permanent conversion of forestland to other vegetative communities (i.e., successional shrubland and old field). Locations of the Project facilities were chosen in large part to minimize the loss of active agricultural land and the interference with active farm operations and other environmental resources.

Construction activities (i.e., staging areas, access roads, collection line rights-of-way [ROWs], transmission line ROW, substation, and switchyard) will temporarily impact a total of approximately 215 acres of agricultural land (145 acres in the Town of Villenova and 70 acres in the Town of Hanover), 8 acres of developed/open space (6 acres in Villenova and 2 acres in Hanover), and permanently impact 126 acres of forested land (64 acres in the Town of Villenova and 62 acres in the Town of Hanover) (see Table 2.24-1).

Turbines

A maximum 300 by 300-foot staging area will be utilized at each turbine location for laying out equipment, turbine rotor assembly, and stockpiling topsoil. Within the 300 by 300-foot staging area, an approximate 200 by 200-foot area will be cleared and graded to a slope of 5% or less to facilitate the layout of turbine components. Disturbance outside of this 200 by 200-foot area will generally be limited to tree cutting necessary for rotor assembly and storage for excess topsoil, subsoil, or woody material including roots, logs, and/or wood chips. In some instances the maximum 300 by 300-foot staging area has been reduced to minimize impacts to wetlands. This reduction in staging area size at certain turbines is reflected in the impact calculations.

Construction within the turbine staging area will result in the temporary disturbance of approximately 75 acres of agricultural land (61 acres in Villenova and 14 acres in Hanover) and the permanent conversion of 46 acres of forested lands (38 acres in Villenova and 8 acres in Hanover). Other than the turbine pedestals, transformers and the turbine crane pads, disturbed areas within the staging area will be restored with subsoil and stockpiled topsoil.

Access Roads

Temporary 35-foot access roads will be installed within a maximum 60-foot-wide construction ROW (40 feet in wetlands), as described in Section 1.2, Detailed Description of the Proposed Action. After construction is complete, the width of these roads will be reduced to 16 feet. Access road construction will result in the impacts to approximately 88 acres of agricultural land (70 acres in Villenova and 18 acres in Hanover) and the permanent loss of 31 acres of agricultural land (25 acres in Villenova and 6 acres in Hanover). Agricultural land disturbed by temporary access roads will be restored following construction, as a result of the removal of the temporary road width and restoration of temporary work areas. Access road construction will result in the permanent loss of 28 acres of forested land (18 acres in Villenova and 10 acres in Hanover). The forested land cleared on each side of a temporary access road will result in the permanent conversion to other vegetation communities (i.e., successional shrubland, old field).

Collection System

Impacts resulting from the underground sections of the collection system installation will generally be temporary in nature and will result in the disturbance of approximately 8 acres of forest (6.5 acres in Villenova and 1.5 acres in Hanover), 18 acres of agricultural lands (14 acres in Villenova and 4 acres in Hanover) and 2 acres of developed/open space (approximately 2 acres in Villenova and less than 0.5 acres in Hanover). Nearly the entire collection system (99.9%) will be buried underground within the construction corridor, at a minimum depth of 4 feet below the subsurface in agricultural lands. Where underground collection lines are not installed along access roads, a temporary ROW will be cleared of vegetation. The width of the collection line ROW varies from 22 to 50 feet, depending on the number of collection line circuits installed. Following installation of collection lines within agricultural fields, normal farming operations and practices will be allowed to continue; therefore, future agricultural usage will not be permanently impacted by construction and operation of the collection line. However, installation of the collection lines will result in the permanent conversion of forest land to other vegetation communities (i.e., successional shrubland, old field). Construction of these lines underground lines will not result in any significant permanent impacts and will not impede future development on the surrounding land.

There will be a short (174-foot) overhead collection segment in the Town of Villenova between Turbines 15 and 16. (Figure 1.1-2 in Section 1.1, Description of the Proposed Action, indicates where this segment of overhead collection line will be installed.) The 35-foot overhead collection ROW will permanently impact 0.14 acres of forested land.

The collection system will tie into a new substation in the Town of Hanover which will transfer the energy to the existing transmission line also located in the Town of Hanover to the north of the Project Site. The substation and its associated access road will impact 0.8 acres of forest and 0.5 acres of agricultural land.

Transmission Line

A 6-mile overhead transmission line will travel from the substation to a new switchyard located in the Town of Hanover. The entire transmission line is located in the Town of Hanover. The new switchyard to be built by Noble will connect the power to the existing electrical grid. The impacts associated with the switchyard footprint will be approximately 4.2 acres of agricultural land, with all required clearing or grading occurring within this footprint. This entire switchyard footprint is located on cultivated agricultural land resulting in the permanent conversion of agricultural land to developed land. Construction of the Transmission Line will result in the permanent disturbance of approximately 41 acres of forest and temporary disturbance of 30 acres of agricultural lands and 1.5 acres of developed/open space.

Temporary disturbance of soils may occur during construction of the transmission line. Following installation of transmission structures and conductors, top soils will be graded and restored to original contours in the spring if necessary to allow planting of crops. Landowners will be compensated for any unavoidable impacts to soils, lost crops or farming activities that may occur as a result of construction.

Community Facilities

Construction of the Project will not result in temporary or permanent impact on any community facilities. Local services such as emergency response services, utilities, healthcare facilities, school districts, and police services will not be impacted. Deliveries along school bus routes will be coordinated with the school districts to avoid any disruption of bus services. Local emergency response units and police will be updated weekly with the location of construction activities and with the schedule/routing for relocating equipment (cranes) which may delay travel on local roads.

Local Land Use Plans, Zoning and Laws

Construction of the Project will not impact local land use plans, zoning, or laws. Construction activities will be conducted in accordance with the design and siting requirements of the local wind energy facility laws of each Town in the Project Area. The necessary approvals will be obtained from each Town prior to construction.

2.24.2 Project Facility Impacts

Project Site Land Use

Permanent impacts to agricultural lands resulting from the Project Facilities will be the turbine areas (crane pad and clear zone) and permanent access roads. The turbine staging areas, access roads, and collection lines will permanently impact forested areas. A relatively small amount of developed/open space (<1 acre) would be permanently impacted by permanent access roads and collection lines. Project facilities will preclude agricultural production or development on a small portion of each parcel, but will generally not impact land use in the areas adjacent to the turbines or impede future development on the surrounding land. Occasional maintenance and repair activities will not interfere with ongoing farming and forest operations. Impacts related to the clearing of forested areas are considered permanent because once cleared these areas will be maintained in an herbaceous or successional shrubland state to allow for future maintenance of the facilities and to ensure the integrity of the collection system.

The Project is compatible with land use patterns within the Towns of Villenova and Hanover. The Project will be located on private land in rural areas dominated by forest and active agricultural land. Project components will be sited in accordance with local setback requirements and no public or recreational facilities will be impacted. The positive economic impact of the Windpark on the viability of individual farms and the community as a whole should help stabilize the current character of the community as it will add jobs and provide financial support to farmers who may be less likely to sell off acreage for residential or commercial development in an economic downturn.

Turbines

The turbine sites will result in approximately 56 acres of permanent disturbance. The turbines (crane pads and clear zones) will permanently impact 9 acres of agricultural land (7 acres in Villenova and 2 acres in Hanover). The 47 acres of forestland (39 acres in Villenova and 8 acres in Hanover) cleared for the turbine staging area is considered a permanent impact as the periodic maintenance to control woody vegetation surrounding the turbines will result in the permanent conversion of forest land to other vegetation communities (i.e., successional shrubland, old field). As discussed in the previous subsection, other disturbed areas at each turbine site will be restored with subsoil and stockpiled topsoil and allowed to revegetate naturally. Restoration of all agricultural land and pasture will be in accordance with the New York State Department of Agriculture and Markets (NYSDAM) guidelines and will be coordinated with the affected landowner and will meet or exceed all recognized standards. All other areas will be stabilized and allowed to naturally revegetate.

Access Roads

Approximately 32 acres of agricultural land (25 acres in Villenova and 7 acres in Hanover), 28 acres of forested land (18 acres in Villenova and 10 acres in Hanover) and less than 1 acre of developed/open space will be impacted by permanent access roads. Agricultural production and development will be precluded in the areas occupied by the 16-foot wide permanent road, but land use in the areas adjacent to the road will not be impacted. The 16-foot wide road calculations reflect a 2-foot area on each side of the road (20 feet total) for where an access road is built above grade. The ROW within forested areas will be periodically maintained to prevent reestablishment of trees or provide adequate overhead clearance for safe access, leaving these corridors in an herbaceous or successional shrubland state.

Collection System

Operation and maintenance of the collection system will not significantly impact land uses within the Project Area. Operation and maintenance of the collection system consists primarily of vegetation management and occasional repairs. There will be no permanent impacts to agricultural land uses. Maintenance of the collection ROW will result in permanent conversion of approximately 9 acres of forestland (7 acres in Villenova and 2 acres in Hanover). The ROW will be allowed to naturally revegetate; however, occasional removal of woody vegetation will be required for line safety. These areas will be maintained largely in an herbaceous state.

Transmission Line

Operation and maintenance of the overhead transmission line will not significantly impact land uses within the Project Area. Operation and maintenance of the transmission line consists primarily of vegetation management and occasional repairs. There will be no permanent impacts to agricultural land uses. Maintenance of the transmission ROW will result in permanent conversion of approximately 41 acres of forestland in the Town of Hanover. The ROW will be allowed to naturally revegetate; however, occasional removal of woody vegetation will be required for line safety. These areas will be maintained largely in an herbaceous state.

Community Facilities

Operation of the Project will provide a significant new revenue source for the Towns of Villenova and Hanover, Chautauqua County, and the local school districts, through payments in lieu of taxes (PILOT) payments and host community agreements. A detailed discussion of PILOT Payments and host community agreements is provided in Section 2.26, Socioeconomics: Impacts and Mitigation.

Local Land Use Plans, Zoning, and Laws

Villenova. Forty-nine turbines will be constructed within the Town of Villenova. The Town of Villenova does not have an existing or proposed master plan, but regulates development through zoning regulations. The Project has been designed in accordance with the requirements of the Villenova Local Law No. 1 of 2007, which allow for development of wind energy conversion devices/farms upon obtaining a site plan approval and a license from the Town Board. A copy of the local law is provided in Appendix O and summarized in Section 2.23, Land Use:

Environmental Setting. The Project has been designed to comply with all the design, setback, and safety standards set forth in this law.

An application for a license for the project was submitted to the Villenova Town Board on May 20, 2008. Wind energy easements either have been granted by or are currently being negotiated with each participating landowner and adjacent property owners whose property may be affected by the placement of turbines. Under these easement agreements, landowners are compensated for the Project's use of their land (see Section 2.26, Socioeconomics: Impacts and Mitigation).

Hanover. Operation of the Project within the Town of Hanover (11 turbines) is consistent with the Town of Hanover Zoning Ordinance and the requirements of the local law updating the regulations for wind energy conversion systems (WECS) in the Town. A copy of the local law is provided in Appendix O and summarized in Section 2.23, Land Use: Environmental Setting.

Wind energy easements have been granted by or are currently being negotiated with each participating landowner and adjacent property owners whose property may be affected by the placement of turbines. Under these easement agreements, landowners are compensated for the Project's use of their land (see Section 2.26, Socioeconomics: Impacts and Mitigation).

Future Land Use. While significant residential, commercial, and industrial development is not planned for the area, the Project will not preclude future development activities and may actually assist in the success of various local businesses, as more services are required by people operating, maintaining, and visiting the Project. Property owners who will have turbines on their properties are aware of the setback requirements of the Project. Minimal limitations are imposed on future development activities. The Project will not inhibit future land uses that are similar to current uses.

2.24.3 Mitigation

As discussed in Section 1.3, Project Alternatives, of this Draft Environmental Impact Statement (DEIS), the Project Area was selected through a systematic process that considered availability of sufficient wind resources; the availability of existing roads and utility interconnections; the availability of land with landowners willing to sign easements for their property; community support; the presence of environmental constraints, including visual and noise impacts and impacts on wetlands, streams, agricultural lands and important wildlife areas; and the presence of land use constraints including zoning and building restrictions. Since Project components have been sited in accordance with local setback requirements, the Project is generally compatible with, or will not preclude, existing and planned uses.

On agricultural land, all construction activities will be conducted in accordance with NYSDAM Agricultural Mitigation for Windpower Projects to the extent practicable (see Appendix B), and the local requirements for agricultural mitigation. These guidelines and requirements provide guidance for the avoidance of impacts, the implementation of mitigation, and restoration of agricultural assets. Consistent with these guidelines and requirements, a maximum 60-foot-wide construction corridor is utilized to accommodate stockpiling of topsoil, installation of collection system components, and the 35-foot-wide temporary roadway. This road width is supported by NYSDAM because it eliminates the need to park construction vehicles on cropland and/or pastures and eliminates the potential for disturbance in areas that would otherwise be undisturbed by construction activities. The extended temporary width of the road and construction ROW will be restored per NYSDAM guidelines to the extent practicable.

In addition, the roadways have been located, to the extent practical, along edges of the agricultural fields to further minimize and mitigate impacts to farming activities during construction and operation of the facility. More detailed mitigation measures for agricultural areas are discussed in Section 2.4, Soils: Impacts and Mitigation.

Full compliance with the local laws regulating the development of wind power facilities will reduce the impacts on agricultural land use. The local laws regulating wind energy facilities have specific agricultural mitigation measures based on the NYSDAM guidelines which include locating structures along field edges where possible, locating access roads along ridge tops, avoid dividing larger fields into smaller fields, and avoidance and maintenance of all existing drainage and erosion control structures.

In forested areas, facilities have been sited, to the extent practicable, within previously disturbed areas such as along existing logging roads and areas where recent logging has occurred. This is intended to minimize the clear cutting of trees. Where the removal of any trees of economic value is necessary, landowners will be compensated based on their individual easement agreements. Road and collection line corridors located within forested areas will be periodically maintained to prevent reestablishment of trees to provide adequate overhead clearance for safe access, leaving these corridors in an herbaceous or successional shrubland state. More detailed mitigation measures for forested areas are discussed in Section 2.10, Biological Resources: Impacts and Mitigation.

Table 2.24-1 Project Land Use Impacts

Land Use/ Land Cover	Construction Impacts [acres]	Project Facility Impacts (Permanent Impacts) [acres]	Areas to be Restored to Existing Condition After Construction (Temporary Impacts) [acres]
Turbines			
Agricultural [1]	75.11	8.39	66.72
Forested [2]	46.3	46.3	0
Developed [3]	0	0	0
Access Road			
Agricultural	88.3	31.29	57.01
Forested	28.38	28.38	0
Developed	4.04	0.74	3.3
Collection System			
Agricultural	16.83	0	16.83
Forested	9.09	9.09	0
Developed	2.09	0	2.09
Transmission Line			
Agricultural	30.26	0	30.26
Forested	40.62	40.62	0
Developed	1.55	0	1.55
Total			
Agricultural	215.21	39.68	175.53
Forested	125.2	125.20	0
Developed	7.68	0.74	6.94

Notes:

[1] Includes Grassland/Herbaceous land use category.

[2] Includes Successional Shrubland and Woody Wetlands land use categories.

[3] Includes Low Intensity and open space categories.

2.25 Socioeconomics: Environmental Setting

Socioeconomic information is described in terms of population, economy and employment, community facilities and services, and taxes.

2.25.1 Population and Housing

The proposed Project Area is in the Towns of Villenova and Hanover in Chautauqua County. Chautauqua County has two major population centers, the City of Jamestown in the southern part of the county and the combined area which includes the City of Dunkirk and Village of Fredonia in the northern part of the county. Jamestown is located approximately 20 miles south of the Project Area and had a 2000 population of 31,730. The Dunkirk/Fredonia area with a combined 2000 population of 23,837, is located approximately 9 miles west of the Project Area. According to the 2000 Census, Chautauqua County had a total population of 139,750, which represents a 1.5% decrease between 1990 and 2000. The 2007 United States Census population estimate for Chautauqua County is 133,945, a 4.2% decrease from 2000. Chautauqua County, as a whole, has a population density of about 132 persons and 61 housing units per square mile. In 2000, the Town of Villenova had a population of 1,121 persons, with about 31 persons and 14 housing units per square mile. The 2006 estimate for Villenova is 1,139, a slight increase. In 2000, the Town of Hanover had a population of 7,638 persons, with about 152 persons and 71 housing units per square mile. The 2006 population estimate is 7,422, a slight decrease.

There are a number of hotels/motels located within 60 miles of the Project Area in the nearby municipalities of Fredonia, Dunkirk, Jamestown, and Buffalo, New York (see Figure 2.25-1). Approximately 200 guest rooms are available in Dunkirk/Fredonia, more than 400 in Jamestown, and more than 1,350 rooms in downtown Buffalo, with nearly 3,000 beds including suburban locations outside of the city. The vacancy rates of these hotels vary from season to season, with higher vacancy rates in the winter and lower vacancy rates in the summer months.

2.25.2 Property Values

In 2000, the median value of owner-occupied units in the Town of Villenova ($64,200) was comparable to the median values in Chautauqua County ($64,000). Median housing values for the Town of Hanover ($68,600) were slightly higher than the Town of Villenova and Chautauqua County median values. These median values are considerably lower than the median value for the state of New York as a whole, which was $148,700 in 2000.

2.25.3 Economy and Employment

The majority of Chautauqua County's employment is associated with education, health, social services, and manufacturing, followed by retail trade. Major public sector employers include Chautauqua County, local school districts, and State University of New York (SUNY) College at Fredonia. The county's major private sector employers include WCA Hospital; Bush Industries; The Resource Center; Cummins, Inc.; The Heritage Group; Carriage House Companies; Cliffstar Corporation; and Walmart. The majority of the manufacturing is located in the southern portion of the county, near Jamestown. Though agriculture accounts for a small percentage of employment in the county (<2%), the industry is a significant contributor to the economy, particularly dairy and grape farming. Chautauqua County had the highest market value of agricultural products sold in the entire state at nearly $100 million (USDA 2002). According to the New York State Department of Labor, Division of Research and Statistics, the unemployment rate in April 2008 for Chautauqua County was 5.0%.

Educational, health, and social services sector is the top industry in the Town of Villenova and Town of Hanover, followed by manufacturing. 12.4% of the workforce in the Town of Villenova is employed in agriculture and forestry, where only 2.7% are employed in this industry in the Town of Hanover.

Median household income for Chautauqua County was estimated at $33,458. For the Towns of Villenova and Hanover, median household incomes were $35,208 and $37,567, respectively.

2.25.4 Municipal Budgets and Taxes

The adopted 2008 Chautauqua County Budget is approximately $201 million. Tax revenues in the Project Area accrue from both sales taxes and real property taxes. A total sales tax of 7.75% is levied on purchases in Chautauqua County. New York State retains 4% and Chautauqua County retains the balance, which is distributed among the various towns. Estimated sales tax revenues for 2008 are approximately $21 million.

Residents in the area surrounding the Project Area are subject to several local taxes, depending on where they live. These include a county tax, Town tax (both Villenova and Hanover), a school tax (Forestville Central School District, Pine Valley Central School District, Silver Creek Central School District, or Gowanda Central School District), and user fees. Table 2.25-1 indicates the local tax rates typical for the Project Area. The total assessed value (AV) tax rate for services (general fund, highway, and fire protection) is approximately $10.05 per $1,000 of assessed value in the Town of Villenova (NYSORPS 2008). The rate for the Town of Hanover $2.49 per $1,000 is of assessed value for services (i.e., general fund, highway, and fire protection) and $3.03 per $1,000 of assessed value in the Town of Hanover in a village area.

For the year ending December 31, 2006, Chautauqua County total revenue received was approximately $229 million from all sources. The county expenditures over the same time period totaled $231 million, resulting in a deficit of about $2 million.

The local tax base for the Towns of Villenova and Hanover is derived primarily from real property taxes. Other major contributors to the local tax base are sales taxes, licensing and fees, and intergovernmental transfers. Table 2.25-2 provides a detailed description of where the Towns' tax revenues were allocated for fiscal year 2006. A breakdown of the Towns' expenditures is presented in Table 2.25-3.

The Project Area encompasses several school districts. The boundaries for the Forestville, Pine Valley, Silver Creek, and Gowanda Central School Districts do not necessarily follow the typical municipal boundaries of the Towns. Where local residents live determines what school tax rate they pay and, in turn, the school that any children in the household attend. It should be noted that the Gowanda Central School District is located primarily in Cattaraugus County, but includes a small portion of the Town of Hanover in Chautauqua County.

The Forestville Central School District had a budget of $7.9 million in the 2004-2005 school year, of which approximately $2.2 million came from local revenues. The Silver Creek Central School District had a budget of $17 million in the 2004-2005 school year, of which approximately $4.3 came from local revenues. The Gowanda Central School district had a budget of $20.5 million for the 2004-2005 school year, of which approximately $5.2 million came from local revenues. For the 2004-2005 school year, the Pine Valley Central School District had a budget of $11.4 million. Of this, approximately $2.5 million came from local revenue (primarily real property taxes), with the difference coming from state and federal aid (National Center for Education Statistics 2008).

The New York State Department of Education produces report cards on school districts that include fiscal spending by school district across the state. The most recent information available was for the 2005-2006 school year. Forestville Central School District total expenditures per pupil were $12,068, below the average New York State public school expenditure level of $15,035. Pine Valley School District spends $15,278 per pupil, slightly more than the state average. Silver Creek Central School District spends $13,539 per pupil, about $1,500 less than the state average. Gowanda Central School District spends $13,658, about $1,400 less than the state average. The Forestville, Pine Valley, Silver Creek, and Gowanda Central School Districts are all classified as “high need/resource rural,” with per pupil expenditures for general education and special education expenditures falling below the average spending for a similar district group. This indicates that the districts have high student needs in relation to district resource capacity.

2.25.5 Environmental Justice

According to the New York State Department of Environmental Conservation (NYSDEC) Commissioner Policy 29 (the Policy) on Environmental Justice and Permitting, a potential environmental justice area is defined as a minority or low-income community that bears a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies (NYSDEC 2004).

The Policy expands upon Executive Order 12898, issued by President Clinton on February 11, 1994, which requires that impacts on minority or low-income populations are accounted for when preparing environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by federal agencies.

The Policy defines a minority population as a group of individuals that are identified or recognized as African-American, Asian American/Pacific Islander, American Indian, or Hispanic. Hispanic refers to ethnicity and language, not race. A minority community exists where a census block group, or multiple census block groups has a minority population equal to or greater than 51.1% in urban areas or 33.8% in rural areas. The Project Area meets NYSDEC's definition of a rural area. General racial/ethnic statistics for Chautauqua County include 6.0% minority and 4.2% Hispanic. For the Project Area, Town of Villenova has approximately 2.1% minority and 1.1% Hispanic and the Town of Hanover, approximately 3.2% minority and 1.7% Hispanic (United States Census Bureau 2008). Both Towns' minority populations are below the county population, and far below the NYSDEC rural threshold. Therefore, the Project Area is not considered an Environmental Justice area with respect to race.

A low-income population is defined as a group of individuals having an annual income that is less than the poverty threshold established by the United States Census Bureau. A low-income community is a census block group, or area with multiple census block groups, having a low-income population equal to or greater than 23.6% of the total population. General poverty statistics include a 13.8% below poverty level in Chautauqua County. The Project Area falls within two Census Tracts: CT 352 and CT 361. For Census Tracts 352 and 361 in the Project Area, there are approximately 9.4% and 11.6% below poverty level, respectively (United States Census Bureau 2008). The average poverty rate of these impacted census tracts is 10.5% which is well below the established threshold. Therefore, the Project Area is not considered an Environmental Justice area with respect to income.

Table 2.25-1 Property Tax Rates

2007	Category	Tax Rate (per $1,000)
Town of Villenova	Services: general fund, fire, highway	10.05
	Chautauqua County programs	9.79
	Forestville and Pine Valley Central School Districts*	19.22 and 24.18
Town of Hanover	Services: general fund, fire, highway	2.49
	Chautauqua County programs	9.04
	Forestville, Gowanda, and Silver Creek Central School Districts[1]	17.78, 20.68, and 18.32

Source: State of New York, Office of the State Comptroller, Division of Municipal Affairs 2008.

Note:
[1] Based on the 2007-2008 school year.

Table 2.25-2 Revenue for the Towns of Villenova and Hanover

Fiscal Year 2006	Town of Villenova	Town of Hanover
Real Property Taxes	$342,150	$1,264,958
Sales Tax	$151,670	$711,413
State Aid	$84,686	$358,658
Other Government	$0	$0
Interest Earnings	$9,512	$187,892
Other Revenue	$12,944	$1,056,034
Total Revenues	**$604,007**	**$3,610,064**

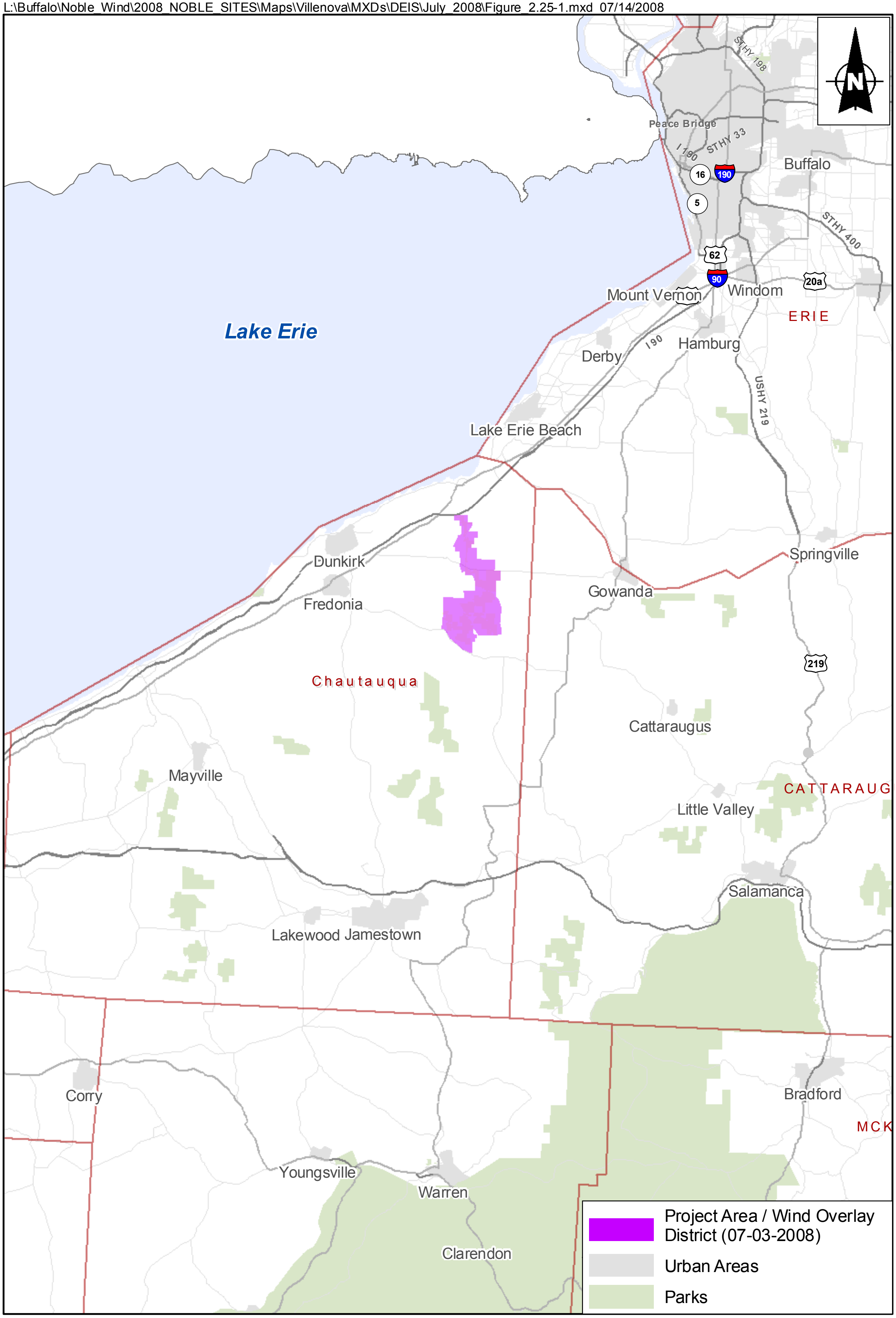
Source: State of New York, Office of the State Comptroller, Financial Data for Local Governments, 2008.

Table 2.25-3 Expenditures for the Towns of Villenova and Hanover

Fiscal Year 2006	Town of Villenova	Town of Hanover
General Government	$147,543	$715,194
Education	$0.0	$0.0
Transportation	$563,212	$1,123,370
Police/Fire/Public Safety	$5,449	$571,204
Health	$654	$11,145
Community Services	$635	$132
Economic Assistance	$200	$1,875
Culture/Recreation	$1,551	$2,076,128
Total Expenditures	**$734,207**	**$4,827,027**

Source: State of New York, Office of the State Comptroller, Financial Data for Local Governments, 2008.

© Ecology & Environment, Inc. GIS Department Project #
L:\Buffalo\Noble_Wind\2008_NOBLE_SITES\Maps\Villenova\MXDs\DEIS\July_2008\Figure_2.25-1.mxd 07/14/2008



Source: ESRI, 2001

Figure 2.25-1 Communities with Potential Lodging in the Vicinity of Noble Ball Hill Project Area

0 5 10 20
Miles

2.26 Socioeconomics: Impacts and Mitigation

Development of the Project will have a positive impact on the local economy through the creation of new temporary and permanent jobs, payment of payments in lieu of taxes (PILOT), and host community revenues by the Project sponsor to local taxing entities, payment of easement revenues to local landowners, and increased economic activity.

2.26.1 Construction Impacts

Population and Housing

The Project may result in short-term impacts to local lodging. It is estimated that during the nine to 12-month construction period there will be a temporary influx of construction workers to the area surrounding the Project Site. The number of construction workers for the Project is expected to be about 185. Local contractors and labor will be utilized to the extent practicable to maximize the benefit to the community, and these individuals will commute to the Project Site. Construction workers from outside the Project Area for the construction phase of the Project will likely temporarily reside in motels/hotels in larger population centers in the vicinity of the Project Area, including Dunkirk, Fredonia, Jamestown, and Buffalo. Noble will communicate with local merchants about needs for lodging and other services during construction; however, given the hotel capacity in the nearby municipalities, it is not expected that the demand for temporary lodging from out-of-town laborers will have a negative impact on local lodging capacity.

Local Economy

Construction of the Project will create a short-term increase in local economic activity, including purchases of thousands of room-nights at local motels/hotels, automotive fuel, meals, and other items. The Project will spend a total of approximately $26.9 million countywide during construction. Total economic benefits during construction are estimated at $42.7 million, including payrolls, supplies, materials, hotel stays, meals, and economic multiplier effects. The Project will extensively utilize and support providers of local services, suppliers, and area manufacturers during construction.

Employment

Construction of the Project will result in the direct employment of up to 185 electrical workers, crane operators, equipment operators, carpenters, and other construction workers (with a total estimated payroll and benefits of $7.7 million), and create an estimated 200 additional direct, indirect, and induced jobs countywide (with a total estimated payroll and benefits of $5.5 million).

A significant percentage of the construction workers employed during the construction period will be hired from within the local community to the extent that qualified workers are available. Personnel specially trained in specific procedures for wind turbine construction will be brought in and temporarily housed in the area during the construction phase of the Project.

Environmental Justice

Environmental justice screening was conducted for the Project Area as described in Section 2.25, Socioeconomics: Environmental Setting. The Project Area does not meet the screening criteria for a minority community defined in the New York State Department of Environmental Conservation NYSDEC Environmental Justice Policy. Minorities comprise significantly less than 33.8% of the total population within the Project Area. The poverty rate of Chautauqua County and the affected census tracts are lower than the NYSDEC threshold of 23.59%; therefore, the Project Area does not meet the screening criteria for a low-income community. As such, the Noble Ball Hill Windpark Project Area is not considered an environmental justice community. Therefore, there will be no impacts on an environmental justice community as a result of construction of the Project.

2.26.2 Project Facility Impacts

Population and Housing

The Project is not expected to have a long-term impact on housing and population in the Towns of Villenova or Hanover. Operational employees would likely reside locally, which would require housing units in vicinity of the Project Area. However, based on the existing housing stock and vacancy rates in both Towns and the surrounding towns, there would be an adequate number of housing units available for purchase or rent. While this represents a potential positive economic impact, long-term employment associated with the Project is not enough to have a significant impact on local population or housing.

Local Economy

During operation, the Project will spend an estimated $1.7 million annually, exclusive of property taxes. This is a significant addition of dollars into the local economy on a yearly basis over the life of the Project. Total annual economic benefits during operation are estimated at about $3.1 million (including PILOT payments) including: payrolls, supplies, materials, Windpark easement payments, and economic multiplier effects. Specifically, it is anticipated based on Noble projects elsewhere in New York State that the PILOT and Host Community payments together will provide a total of more than $8,000 per installed Megawatt to the local economy. The final amount and ratio of division between the PILOT and Host Community payments will be determined during negotiations with the Chautauqua County Industrial Development Agency. Total countywide economic benefits, based upon regional multipliers applied to direct Project expenditures in original capital investment and ongoing operational expense are estimated to be about $128 million over 20 years. The Project will extensively utilize and support providers of local services, suppliers, and area manufacturers during operations. The utilization of local firms contributes to increased economic activity in the region. This direct contribution to the economy is significant for a county experiencing population decline. This increase economic activity will help to offset the impact of a declining tax base and the resultant increased taxes imposed on the remaining population.

The operation of the project will likely have minimal impact on tourism in the area. Tourism in the area is limited to recreational uses, such as hunting and fishing, and those uses are not expected to increase or decline as a result of the operation of the Project.

Employment

During operation, the Project will employ approximately six skilled operators, one manager, and one administrative assistant (with a total estimated payroll and benefits of $450,000) and create an estimated 16 more direct, indirect, and induced jobs countywide (with a total estimated payroll and benefits of $439,000). It is anticipated that individuals in the local community would be trained to complete the necessary tasks, and current residents would fill the majority of these jobs. The exception would be any specialized wind energy facility managers where an individual would need to be brought to the Project Area if there was no one qualified within the community. This or any project related increase in the local population would be negligible.

Municipal Budgets and Taxes

Operation of the Project will result in a new revenue source for the Towns, Chautauqua County, and the local school districts through PILOT payments. PILOT payments will minimize the need for property tax increases otherwise imposed on individual landowners. These payments will increase Town, County, and local school district budgets and likely expand or improve current services without increasing the tax burden on local residents.

The Project will not cause any impacts on school district capacity as no additional students are expected to enroll as a result of the Project. School district budgets will receive a new revenue source offering the schools the opportunity to improve facilities or services without an associated tax increase. As described in the previous section, the Forestville, Pine Valley, Silver Creek, and Gowanda Central Schools Districts are classified as “high need/resource rural” districts with per pupil expenditures below that of similar districts in the state. This additional revenue source will assist these districts in addressing their students’ needs in relation to their available resources.

There will be no negative financial impact to the municipal budgets as a result of reviewing the applications or administering permits as the local laws require Noble to pay all associated consultant fees for the review of the Project. In addition, the Towns will receive direct revenue from host community payments, increasing the respective municipal budgets. This additional revenue will allow the Towns to balance their budgets or expend funds on projects or services they would be unlikely to without a tax increase, as the local tax base is derived primarily from real property taxes. In fiscal year 2006, both Towns operated with a budget deficit.

In general, existing emergency response, fire, and police capabilities are adequate and can serve the Project Area during construction and operation. Site-specific risks will be assessed prior to the start of construction pursuant to applicable laws and regulations and the Emergency Response Plan (ERP) will be refined and further developed as new risks are identified.

Residential Property Values

The impacts of wind turbines on residential property values is a concern often raised by property owners in or near proposed wind farm projects. Isolating the potential impact of a single variable, such as the presence of a local wind farm, is difficult. Besides the current land use and structural conditions, property value is influenced by many external factors, such as social trends, economic trends, governmental controls, and regulations and environmental conditions. Noble retained an independent consultant, the KLW Group of Buffalo, New York (KLW) to prepare an analysis of the potential impact of turbine sites on property values in the proposed Project Area. The KLW Group report is attached to this Draft Environmental Impact Statement (DEIS) in Appendix P.

KLW evaluated residential sales data within an approximate 5-square-mile area surrounding four existing wind farms located in New York State. Two of the wind farms are located in Madison County (central New York) and the other two are located in Wyoming County (western New York). Three of these wind farms have been operational for over five years. Additionally, the recently completed Noble Bliss Windpark was analyzed, but due to its recent completion date (spring 2008), only limited sales data were available. The surrounding land uses at each wind farm in the study are similar to the land use in the Project Area (i.e., predominately agricultural, forested, and interspersed with low-density residential development).

Two types of analysis were used to determine if wind farms impact local residential real estate values. A relative comparison qualitative analysis was used to compare sales five years prior to the construction of the respective wind farms to sales five years subsequent to the construction and operation of the wind farm. A paired sales analysis was used to compare sales and re-sales of the same property before and after the construction of the respective wind farms.

KLW found no conclusive evidence which would indicate any actual or potential negative impact on residential real estate values in the market area analyzed due being in to proximity to or in the viewshed of a proposed or operational wind farm. The sales data and studies performed on the respective comparable wind farms show no evidence indicating that these facilities have had a detrimental effect on real property values. Each of the studies concluded that prices continued to increase within the respective sub markets after construction and the ongoing operation of the facility. Additionally, sales and re-sales of the same property within the respective submarkets indicate that the majority of the properties were unaffected by the existence of the wind farm. The sale data indicated increases in property values consistent with typical market fluctuations. This conclusion is consistent with much of the quantitative research available on wind farm effects on property value. It is concluded that no broad based value effects have occurred in similar market areas where wind farms have been developed (KLW 2008).

Environmental Justice

The Project Area is not considered an environmental justice community. Therefore, there will be no negative impacts on an environmental justice community as a result of operation of the Project.

2.26.3 Mitigation

In order to mitigate any potential impacts on the local population and housing, local contractors and labor will be utilized to the extent practicable. In addition, Noble will communicate with local merchants about needs for lodging and other services during construction in order to properly prepare for any periods with a high number of out-of-town workers.

With respect to the local economy, Noble will utilize local services, supplies, and manufacturers to the greatest extent possible during Project construction and operations to pass on the maximum financial benefit to the community as possible.

PILOT and host community payments will be provided to the local municipalities and school districts in order to mitigate environmental and other related impacts which result from the Project. These payments will be negotiated with the County Industrial Development Agency and the Towns.

2.27 Description of the Proposed Construction Plan

2.27.1 Construction-Related Approvals and Schedule

Construction of the Project is expected to begin in March 2009 and end in November 2009 (see Figure 2.27-1), weather and other factors may increase construction duration to 12 months. Noble will ensure that all necessary permits and approvals are obtained prior to the start of construction. Of note:

- Construction will be monitored by Noble personnel, Noble's independent Environmental Monitor and the Towns' environmental inspectors to ensure that all construction is conducted in accordance with federal, state, and local permits and conditions, agreements, and regulations.

- All stream and wetland crossings will be performed in accordance with the requirements of permits issued by the New York State Department of Environmental Conservation (NYSDEC) and the United States Army Corps of Engineers (USACE).

- Activities within active agricultural fields will be conducted in accordance with New York State Department of Agriculture and Markets (NYSDAM) guidelines to the greatest extent practicable and in accordance with Town approvals and landowner input.

- A site-specific Stormwater Pollution Prevention Plan (SWPPP) will be prepared and implemented prior to construction and individual Notices of Intent for construction will be filed in accordance with the NYSDEC State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity requirements. A description of stormwater pollution prevention measures that will serve as a basis for creation of a site-specific SWPPP is provided in Appendix E. The SWPPP will be submitted to the Towns for review prior to the issuance of building permits.

- Noble will enter into Road Use Agreements with the Towns of Villenova and Hanover and Chautauqua County and obtain permits from the New York State Department of Transportation (NYSDOT) to allow improvements and modifications to existing roads and rights-of-way (ROWs) prior to the start of construction.

- Noble will obtain building permits as required and submit entranceway, roadway, and gate details as a component of this permit application process (see Appendix A for preliminary plans). Final engineering plans that include parcel boundaries and road and utility ROWs verified by licensed surveyors will be provided prior to issuance of building permits.

- Noble, or its contractors, will coordinate with "Dig Safely New York" and the respective gas utility companies to determine the locations of all active gas lines and wells within the Project Site. Appropriate setbacks and crossing procedures will effectively minimize risks of interference. Where encroachments are necessary, Noble will follow the applicable utility company's encroachment policies.

2.27.2 Construction-Related Transportation

As described in Section 2.22, Traffic and Transportation: Impacts and Mitigation, and in Appendix N, the Project construction activities will utilize the existing major transportation network present in the Project Area that includes town, county, and state roads. The state roads planned to be utilized for this Project include New York State (NYS) Routes 39, 83, 20, and 62. The county roadways to be utilized for this Project include County Routes 72, 93, 91, and 87. Local area roads include Buttermilk Road, Balcom Cross Road, Ball Hill Road, Empire Road, Hurlbert Road, Dye Road, East Lake Road, Smith Road, North Hill Road, Pope Hill Road, Round Top Road, Villenova Road, Bartlett Hill Road, and Prospect Road.

The nature of the communities in the Project Area is characterized as rural and agricultural. Tables 7a through 7e of Appendix N indicate that each state and county highway mentioned above has more than adequate available capacity for the delivery of turbine components and other construction-related traffic. Available highway capacity is not a limiting factor in the selection of potential haul routes for the Project.

During construction, the large turbine components, which include the tower sections, nacelle, and rotor blades, will be transported from General Electric (GE) vendors or from a port of import directly to specific turbine sites for final quality inspections, staging, and erection. Along the off-site haul route (see Appendix N), an approximately 3-acre lay-down area will be used as temporary staging for verification of match marking, a quality receipt inspection, rinsing and any necessary rigging adjustments prior to site delivery. Turbine components will be rinsed with water only and no detergents, solvents, or other additives will be used. The proposed location for this lay-down area is depicted on Figure 1.1-2 along NYS Route 39 near the intersection with Empire Road in the Town of Hanover; however, the final location is subject to change based on landowner consent. Materials such as cable reels, pad mount transformers, overhead collection and transmission line poles, and 34.5-kilovolt (kV) junction boxes will be delivered from off-site secured storage directly to site-specific locations to support specific scheduled construction activities.

All off-site storage locations will be identified prior to the submittal of a Final Environmental Impact Statement (FEIS), issuance of building permits, and finalization of any Road Use Agreements.

2.27.3 Construction of Access Roads

New access roads will be built to a temporary width of up to 35 feet for use during construction. The access roads will be constructed to accommodate heavy loads and the movement of equipment to support erection of the turbines (see Appendix A). Once construction is completed, the 35-foot width (required for movement of cranes) will be reduced to an approximate 16-foot operational width (necessary for safe passage of opposing vehicles) for the operation and maintenance of the Project. All excavated materials will be disposed of at appropriate, licensed, or registered facilities. All access roads will be gravel-based, designed to meet the specific load-bearing requirements of trucks transporting concrete, aggregate, and turbine components to the turbine sites. The required gravel road base section necessary to meet load-bearing requirements consists of a 6-inch finish course of crushed gravel over an 8-inch base course of compacted bank-run gravel or equivalent construction material based on locally available materials and practices. Where unsuitable soils or high water tables are present the road composition may be altered in order to provide sufficient load bearing capacity. The materials used will meet NYSDOT specifications. The gravel roads will be constructed on suitable native fill. Geotextile fabric, or similar material, will be used to separate the native fill from the base material to prevent fine soil particles from migrating into the gravel base material and to preserve road base integrity.

Roads will be constructed with culverts, as needed, to maintain a water table elevation below the base material to ensure roadbed stability. Roadside ditches will be constructed as dictated by the terrain to convey storm water runoff from the roadways. To identify work areas, promote safety, and limit access by the general public, a temporary construction gate will be installed across access entrance roads near where these entrance roads intersect with public roads, and in other areas as requested by the individual landowners. These temporary gates will be well marked in accordance with established Occupational Safety and Health Administration (OSHA) standards with high reflective warning signs. Location and type of permanent gating will be coordinated with the individual landowners.

The portion of the access road that interfaces with a municipal (i.e., town, county, state) road will be designed to the standards and criteria set forth by the municipality. The need for and sizing of culverts for access road entrances will be determined in coordination with the applicable agency. Access roads will be designed to minimize adverse affects (e.g., ponding water, increased runoff) to the intersecting roadway.

2.27.4 Installation of Turbines

In preparation for the installation of each turbine, a 300 by 300-foot square will be utilized at each turbine location for laying out equipment, turbine rotor assembly, and temporary stockpile storage. Within the 300 by 300-foot square staging area, an approximately 200 by 200-foot square area will be cleared and graded to a slope of 5% or less (see Appendix A). Disturbance outside of this 200 by 200-foot square area will generally be limited to tree cutting necessary for rotor assembly and storage of excess topsoil, subsoil, or woody material including roots, logs, and/or wood chips. Roots, logs, and wood chips that are unwanted by the landowner will be removed and disposed of by Noble prior to restoration activities at appropriate, licensed, or registered facilities. In order to preserve its integrity and prevent mixing with subgrade material, topsoil will be stockpiled on topsoil. In areas where subsoil will be stockpiled, either the topsoil will be removed or it will be separated from the topsoil by a layer of geotextile fabric. All such stockpile areas would be subject to restoration upon completion.

After site preparation and grading is completed the foundation work commences with excavation of the foundation. Excavation of surface materials will be completed with extra care to ensure that topsoil and subgrade materials are segregated and stockpiled separately for use in restoring the construction site once turbine erection is completed. .Based on the desktop geotechnical review, Noble does not expect that blasting will be necessary for the Project. In the unlikely event that blasting becomes necessary, a detailed blasting plan will be prepared and submitted to the authority having jurisdiction and copied to the Towns of Villenova and Hanover, the Chautauqua County Emergency Services Director, and the Chautauqua County Department of Health for their review. The blasting plan will include, at a minimum, the requirements as set forth in Occupational Safety and Health Administration Standard 1910.109 and other applicable NYS standards. No activities requiring blasting will proceed until full approvals have been obtained.

Upon completion of excavation the process of pouring the foundation begins. If the native subgrade material is found to be sufficient, the base excavated foundation hole is compacted to the specification of the turbine foundation design. If the subgrade material is found to be unsuitable either, suitable material will be brought to the site or an alternative foundation design may be used to provide sufficient structural support for the turbine. Dewatering of the excavated hole will be used where necessary to provide dry conditions for pouring the foundation components. Details and control measures for excavations and dewatering will be included in the site-specific SWPPP. Once the excavated area is prepared, an initial thin layer of concrete, also known as a mud mat, is poured to provide a solid and level work surface to construction the foundation upon. Next the rebar foundation frame is constructed. Once the rebar has been assembled the concreted is poured for the foundation. After the foundation concrete has cured the pedestal, the portion of the foundation that the turbine is bolted to, is poured. Finally, after the concrete has been given sufficient cure time and has been checked for quality assurance purposes, the entire foundation is backfilled with native material and proof-rolled to provide the specified compacted over the foundation.

To accommodate heavy lift crane stability, a gravel crane pad generally 120 by 40 feet may be installed in areas where an acceptable compaction result can not be reached. This specific crane pad will be installed with a slope of 1% or less in all directions utilizing structural fill. After each turbine has been installed, all disturbed areas within the turbine staging area will be restored with subsoil and stockpiled topsoil, with the exception of the crane pad, which may remain in place for future maintenance of the turbine. All foundations and underground infrastructure will be in place for the life of the Project (see Appendix A). The pad-mounted transformers located at each turbine site will be situated so that there is at least 6 feet of clearance between the transformer and any other Project components. Once installed, all Project components will be fixed in place.

2.27.5 Installation of Collection System Components

The electrical power generated by the turbines in both Towns is transformed and collected through a network of underground and overhead cables terminating at the proposed Hanover substation (see Appendix A). Power from each turbine is fed through a breaker panel inside the turbine base section through cables placed in an engineered duct bank to a pad-mounted transformer, which will be installed in accordance with National Electrical Code (NEC) (NFPA70) standards. The transformers raise the voltage generated by the turbine from 575 volts to 34,500 volts (34.5 kilovolts [kV]) to permit efficient transport of the power to the substation. The transformers are interconnected through a collection system consisting of both underground cables and aboveground power lines on wooden poles that will connect all of the turbines together electrically (see Appendix A). The underground cables will be installed in a trench that is typically 54 inches (4 feet 6 inches) deep. Where possible, the collection system has been located adjacent to access roads and existing roadways to minimize ground disturbance. However, location of existing utilities and availability of Project participants necessitates the creation of some new utility corridors. Approximately 23.8 miles of underground collection and 174 feet (.03 miles) of overhead electrical collection will be installed.

The majority of the collection system, as currently designed, will be installed underground. Depending on the number of parallel circuits, the use of underground lines will necessitate larger ROW widths than overhead lines. The ROW width for the underground collection system will range between 22 feet for areas where one circuit is installed and 50 feet where four circuits are installed in parallel. The lines will be installed via direct burial. At this time, Noble anticipates using open cuts to cross existing roadways. These cuts will be restored in accordance with applicable Town and county regulations and detailed in the appropriate Town or county road use agreement. Installation and backfilling of collection line trenches will take place in one single pass; excavated areas will be backfilled with the native soil on top of approximately 30 inches of select backfill material.

As currently planned, overhead collection will only be used in a few select areas to avoid drainage and wetland features or other areas where burial of collection lines is problematic from an engineering standpoint. A drill rig or auger will be used to drill holes for the collection line poles to the required depth. The poles will be lifted individually and set in place by a crane or large forklift.

The electrical collection system will be constructed in accordance with the Guidelines of the Institute of Electrical and Electronics Engineers, the National Electrical Safety Code, the National Fire Protection Agency (NFPA), and New York Power Authority (NYPA) requirements.

2.27.6 Installation of Transmission Line

The substation in the Town of Hanover will be connected to a switchyard also in the Town of Hanover via approximately 6 miles of new overhead 115-kV transmission line. The transmission line will be located within a 100-foot cleared ROW and will consist of a single three-phase circuit designed with 477 KCML aluminum conductor, steel reinforced (ACSR) 26/7 stranding “Hawk” conductor wire for each phase. These conductors are mounted on steel davit arms attached to the tangent structures with supplemental steel brackets down to the angle structures. The conductors are arranged in a vertical configuration on one side of the supporting structures. Porcelain ball and socket suspension insulators are used to insulate the conductor wires at the attachment points. One optical ground wire (OPGW) will be installed on the top of the structures for shielding and communications. The OPGW will be a 48-fiber optic cable within three stainless-steel tubes wrapped inside aluminum alloy and aluminum clad steel wires. Vibration dampers will be installed in each span of all conductor and OPGW wires.

Except as noted, the engineered support structures consist of freestanding tapered rectangular laminated wood poles. These freestanding structures will be provided by Laminated Wood Systems, Inc. The heights of the structures vary from 65 feet to 75 feet. Heights were established to provide necessary ground clearances in accordance with National Electrical Safety Code requirements. All poles are directly embedded in the ground. To facilitate installation, corrugated steel pipes are used to stabilize the augured holes. The ancillary space between the pole and the corrugated pipe is backfilled with compacted granular fill.

The transmission ROW will be cleared of all forested vegetation. Within jurisdictional wetlands, vegetation will be cleared by hand and either left in place or removed by hand in accordance with final permit conditions. A temporary 30-foot wide travel corridor will be established within the cleared ROW for construction access. Where the transmission line ROW crosses wetlands or streams, temporary access will be limited to the minimum width necessary and timber mats will be used to eliminate the need for fill materials or grading.

Permanent access to the Transmission Line will be provided by intersecting local roads (Empire Road, NYS Route 39, Hopper Road, Dennison Road, King Road, and County Route 85/Bennett State Road).

Noble will enter into a maintenance contract/agreement with a reputable contractor normally employed in vegetation maintenance to support appropriate clearances from conductors and other sensitive areas associated with collection/distribution systems.

2.27.7 Construction Monitoring

Construction activities will be monitored to ensure compliance with applicable permits and related conditions, agreements, the SWPPP, and best management practices (BMPs). Noble’s Environmental Monitoring Plan will contain permit conditions and other commitments made by Noble during the New York State Environmental Quality Review Act (SEQRA) review and agency permit review processes and related agreements, including those associated with wetland and stream disturbance, vegetation removal, storm water management, erosion control, and agricultural impacts. Noble will retain an independent Environmental Monitor whose duties will include coordination of environmental monitoring activities, documentation, and implementation of mitigation activities as they are conducted, and preparation of a final report for submission to the Towns of Villenova and Hanover as well as other involved and interested parties. The Environmental Monitor will have full stop work authority. A draft Environmental Monitoring Plan can be found in Appendix I. Oversight by Noble's Environmental Monitor, along with consultation with NYSDAM, will ensure that all construction occurs in a fashion that preserves the integrity of the agricultural land. In addition, Noble will invite NYSDAM representatives to all contractor kick-off meetings in order to discuss any issues that may arise during construction.

Noble's construction contractors will establish and use concrete batch plants that will be in compliance with all applicable statues, regulations, and ordinances. Concrete trucks will use approved wash out basins to clean excess concrete from chutes and exterior portions of the truck prior to traveling on public roads. These wash areas will be located within the disturbed construction ROW and will be designed to prevent runoff from leaving the containment area. Concrete wash out placement will be approved by the Environmental Monitor prior to use to ensure that these operations will comply with the applicable environmental standards. If dewatering is required prior to pouring of concrete, the dewatering and discharge thereof would follow the detailed erosion and sediment control plans included in the SWPPP.

If construction takes place in suitable nesting habitat for endangered or threatened avian species in the spring to early summer (during breeding season), the work area will be surveyed by an Environmental Monitor in advance of construction. If nesting threatened or endangered bird species are found in the immediate proximity of a construction area, Noble will coordinate with the United States Fish and Wildlife Service (USFWS) and/or NYSDEC to develop a mitigation plan to address site-specific occurrences of species of concern. Measures that may be implemented include delaying construction until the young have fledged from the nest or continual monitoring during the initial construction period to ensure that the birds are not impacted. Avoidance of construction in environmentally sensitive areas during specific time frames, such as spawning season in trout streams, will be coordinated with the applicable permits and/or agencies.

2.27.8 Post-Construction Restoration

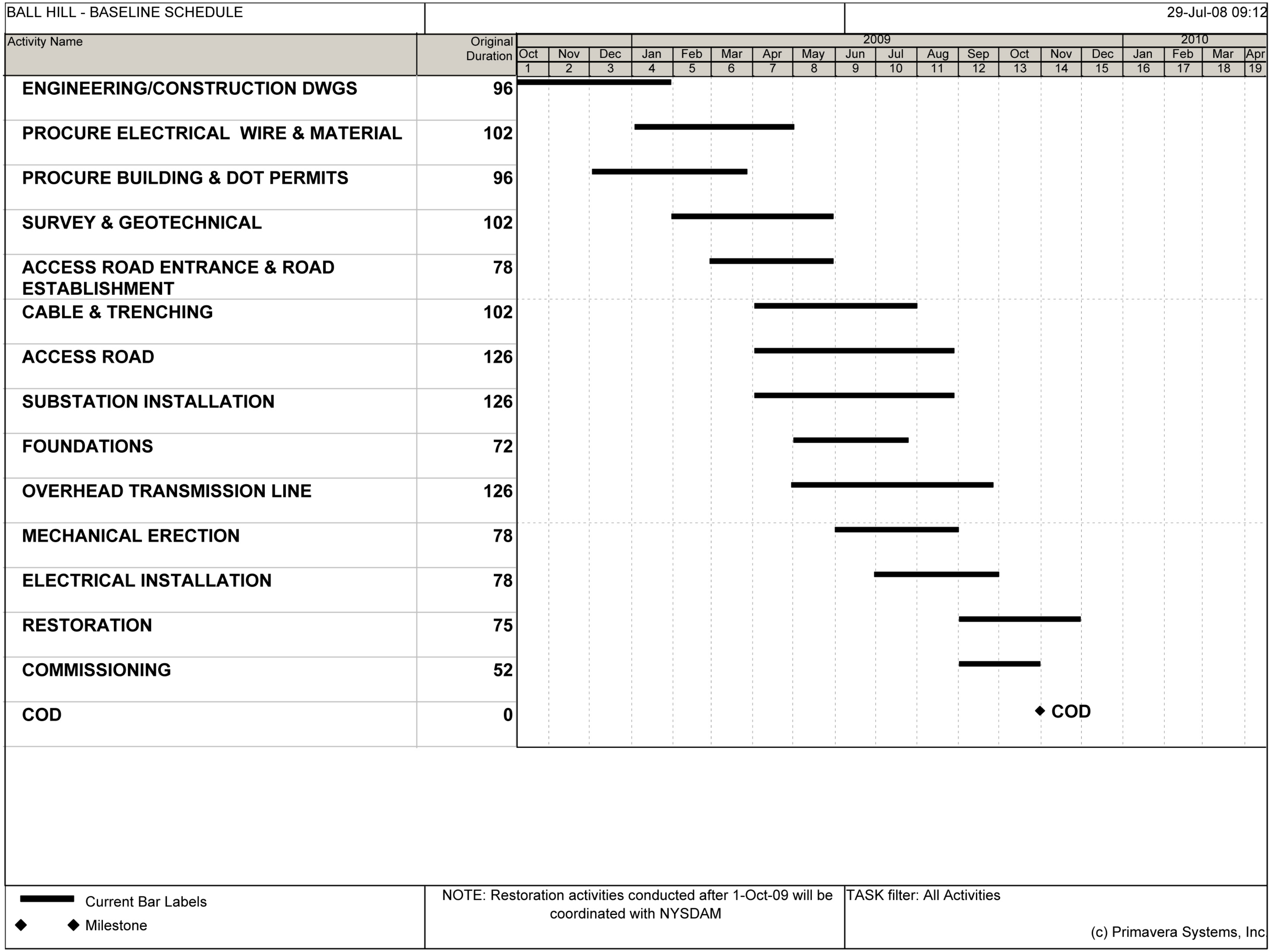
Temporary impacts during construction include clearing of vegetation, grading, and temporary sidecasting of soils and other construction materials. Immediately following the completion of construction activities at each site, restoration activities will begin. In non-agricultural uplands, the ROW will be temporarily stabilized with annual rye seed or mulch and be allowed to naturally revegetate, although it will be subject to periodic removal of woody vegetation to maintain an herbaceous or successional shrub state composed of native species. Natural revegetation of the construction ROW is likely to result in the establishment of naturally occurring native plants, due to existing seed banks and adjacent plant communities. Areas will be monitored by the Environmental Monitor to ensure that adequate vegetative growth occurs and if not, supplemental seeding/mulching will take place on an as-needed basis. All plans for revegetation or seeding/mulching will be discussed with individual landowners.

It is recognized that active measures including reseeding or replanting of native species may be required to facilitate the restoration of some wetlands temporarily impacted by construction activities. Specific revegetation measures in wetlands, including invasive species controls will be monitored in accordance with wetland permit directives. Noble will adhere to those conditions.

In areas in or adjacent to agricultural fields, Noble will develop all restoration in accordance with all applicable guidelines. Restoration of all agricultural land and pasture will be in accordance with NYSDAM guidelines and will be coordinated with the affected landowners. Any seed mixes used in these areas will be approved by the landowner and will meet or exceed any recognized standards. In addition, Noble will ensure that only endophyte-free varieties are used within areas used as horse pastures. Additional temporary fencing, as required for coordinating livestock exclusions, will be placed in accordance with landowner requirements. NYSDAM guidelines discourage restoration after October 1, however, favorable weather conditions may allow for restoration to continue after this date. Any restoration of agricultural fields after October 1 will be coordinated with NYSDAM. Oversight by Noble’s Environmental Monitor, along with consultation with NYSDAM, will ensure that restoration efforts occur in a fashion that re-establishes the integrity of the agricultural land. In addition, Noble will consult with NYSDAM representatives order to discuss any issues that may arise during restoration.

Roadways damaged during construction of the Windpark will be restored in accordance with the approved road use agreements.

It is the responsibility of the Environmental Monitor to ensure that all environmental restoration activities are properly implemented in accordance with all federal, state, and local conditions. The Environmental Monitor will prepare inspection reports that document compliance and noncompliance situations where remedial is required. Upon completion of construction and restoration at the Project Site, the Environmental Monitor will be required a complete a Post-Construction Report. This report will be provided to all interested agencies including the Towns, NYSDEC, the USACE, and NYSDAM.


BALL HILL - BASELINE SCHEDULE

29-Jul-08 09:12

Activity Name	Original Duration
ENGINEERING/CONSTRUCTION DWGS	96
PROCURE ELECTRICAL WIRE & MATERIAL	102
PROCURE BUILDING & DOT PERMITS	96
SURVEY & GEOTECHNICAL	102
ACCESS ROAD ENTRANCE & ROAD ESTABLISHMENT	78
CABLE & TRENCHING	102
ACCESS ROAD	126
SUBSTATION INSTALLATION	126
FOUNDATIONS	72
OVERHEAD TRANSMISSION LINE	126
MECHANICAL ERECTION	78
ELECTRICAL INSTALLATION	78
RESTORATION	75
COMMISSIONING	52
COD	0

▬ Current Bar Labels

◆ ◆ Milestone

NOTE: Restoration activities conducted after 1-Oct-09 will be coordinated with NYSDAM

TASK filter: All Activities

(c) Primavera Systems, Inc.

Figure 2.27-1 Ball Hill Baseline Schedule

2.28 Decommissioning

The easement agreements that Noble has entered into with property owners require that all aboveground machinery, equipment, property, and fixtures be removed from the property within six months after the end of the turbine's operation. The Town of Villenova requires that a decommissioning plan be prepared prior to issuance of a wind energy permit or special use permit to operate. In addition, the Town of Hanover is proposing to adopt a revised Wind Energy law that would also require a decommissioning plan. The Decommissioning Plan developed by Noble is provided as Appendix Q of this Draft Environmental Impact Statement (DEIS) to facilitate removal of any turbine and associated Noble-owned facilities at the end of a turbine's useful economic life.

The expected useful physical life of the primary Project components is approximately 20 years. The wind turbines could conceivably be repaired indefinitely to extend their useful life; however, economic obsolescence resulting from advancements in technology within this period of time may well make earlier replacement of the turbines desirable. The wind resource is not expected to change much over time and is expected to maintain its value as competing sources of energy continue to be more costly. Thus, the wind turbines would most likely be maintained or replaced as economics dictate. If it were desirable to relocate turbines for any reason, Noble is aware that any affected individual turbine would need to be re-permitted and will obtain any necessary easements agreements that may be required.

Decommissioning work will be performed in accordance with all federal, state, and local requirements and the appropriate permits will be obtained prior to conducting decommissioning activities. Permitting requirements for decommissioning activities are expected to be similar to those required for construction and operation. In the event that decommissioning activities are not addressed by existing permits, appropriate permits will be obtained. Waste materials will be disposed of at licensed facilities with an emphasis on recycling whenever possible.

The Decommissioning Plan for the Project includes detailed descriptions and cost estimates for the removal of all turbine components to a minimum depth of 48 inches in agricultural lands in accordance with New York State Department of Agriculture and Markets (NYSDAM) guidelines, and 36 inches in all other areas as required by the Town of Villenova and Town of Hanover local laws, including the tower, nacelle, concrete foundations, gravel crane pads, electrical components, transformers, maintenance roads, and substation components. Revegetation of the disturbed portions of the Project Area is part of the overall restoration of the area during the decommissioning process. These activities will be conducted in the same manner as previously described for restoring areas temporarily impacted during construction in Section 2.27, Description of the Proposed Construction Plan.

The turbine-removal cost analysis estimates the resale value (i.e., salvage and scrap) of the turbine components as well as the cost of removing them. Noble proposes to provide a surety bond or equivalent financial security instrument from a licensed New York State financial institution (Removal Security) in the approximate amount of $13,830 per turbine prior to construction of the Project, according to the estimated decommissioning cost for the Project based on 2005-2008 average salvage values and projected labor rates (see Appendix Q). Noble contracted LVI Services, the nation's largest remediation and facility services firm, to carefully study the decommissioning costs for this facility. Pursuant to the applicable local laws, the specific form of security for decommissioning will be resolved in consultation with the Towns of Villenova and Hanover as part of the permitting process. The decommissioning costs will be annually re-estimated by a licensed engineer as required by local laws, in order to keep costs current and the amount of the security funds shall be adjusted accordingly.

2.29 Health and Safety

This section describes existing emergency services in the vicinity of the Project Area, health and safety planning for the construction, operation, and maintenance of the Project, and other safety considerations. Noble is committed to providing and maintaining a healthy and safe working environment, as well as minimizing any potential risk to the public during construction and operation of the Project. The success of health and safety planning is dependent on implementation at every level throughout the organization and all personnel engaged on the Project. Noble's Health, Safety, and Environmental Management System (HSEMS) and Project-specific Emergency Response Plan are provided in Appendix R. Specific accident/incident prevention policies have been developed in these plans to maintain the health and safety of workers and protect private and public property. Both of these plans will be continuously updated with the most current information prior to construction. In addition, Noble will coordinate with utility companies to avoid any risk associated with construction near natural gas lines or wells. The actions to be taken in the event of the discovery of natural gas are outlined below.

2.29.1 Emergency Services

The Chautauqua County Emergency Services Department coordinates the fire, emergency medical, and transportation services in cooperation with local volunteer fire departments. Access to Emergency Services is available 24 hours per day, seven days per week through the Chautauqua County 9-1-1 Center. Brooks Memorial Hospital is located about 15 miles from the Project Site to the northwest in Dunkirk and the WCA Hospital is located about 25 miles from the Project Site to the south in Jamestown. Fire response for the Project Area is supported by the Hanover, Forestville, South Dayton, and Cherry Creek volunteer fire departments. The South Dayton Fire Department is located in Cattaraugus County, but provides mutual aid to emergencies in Chautauqua County.

In general, the existing emergency response capabilities are adequate to provide any ambulatory, paramedic or fire response services that may be necessary during construction and operation of the Project. Specialized services associated with high angle rescue will be provided by Noble. Noble will meet with local emergency personnel to provide training and review site-specific risks prior to the start of construction. The Project's Emergency Response Plan (ERP) will be refined as new risks are identified.

2.29.2 Health and Safety Planning

The development and implementation of plans for the safe design, construction, and operation of all Project facilities is integral to Project operations. The Noble management team is committed to a healthy and safe working environment. The success of the HSEMS depends on its implementation at every level throughout the organization and all personnel engaged on the Project. The implementation of the HSEMS is an ongoing process, from the first design effort through procurement to construction and operations and was established to provide awareness and participation by all persons. Maintaining the health and safety of workers and the protection of property will be achieved through adherence to the following accident/incident prevention policies:

- Minimizing unsafe conditions;
- Minimizing unsafe acts by providing competent supervision to ensure workers use proper techniques and methods;
- Taking advantage of every opportunity to correct unsafe acts or conditions before an injury occurs; and
- Implementing procedures to prevent any abuse via filing of false claims of injury or illness.

The HSEMS (see Appendix R) outlines the roles and responsibilities of each position in the organizational structure, such as the Noble Project Manager, Construction Manager, Project Health, Safety, and Environment (HSE) Superintendent as well as the subcontractor Site Safety Representative (where required) and supervisors.

The HSEMS provides requirements for pre-construction safety meeting with subcontractors, site safety orientation, safety meetings, HSE investigations and incident reporting, monthly statistics reporting, inspections, enforcement, and communications. The HSEMS includes a detailed Employee Safety Handbook, which defines actions that may lead to termination of employment, banning from client/owner facilities, or other disciplinary measures, and drug and alcohol abuse policy.

A Project-specific ERP has been developed which identifies local emergency response contacts and procedures. The ERP provides general policies for pre-emergency planning, employee roles and responsibilities, communication resources, responsible organizations (i.e., emergency response units), internal and external alerting, actions to be taken during an emergency, evacuation, disposal of contaminants and debris, site restoration and remediation, post-incident evaluation, training, and practice drills. The ERP included in Appendix R will be updated with the most current information prior to construction.

2.29.3 Fire Safety Planning

The Project HSP incorporates fire safety planning consistent with Noble standard practices used in its other facilities to ensure that fire safety planning is incorporated into the design, construction, and operation of all facilities (see Appendix R).

The turbines will be located on a parcel of open land that occupies a minimum of approximately 1 acre. Overhead collection line poles will be located in cleared and maintained rights-of-way (ROWs). The open land will be free of significant regeneration, thus minimizing the potential spread of a fire should one start. Significant regeneration will be avoided by regular maintenance, which will consist of trimming of trees and clearing of undesirable vegetation by side trimming, cutting, and mowing.

The fire protection features of the turbines include components within the nacelle that monitor bearing, oil, and nacelle temperatures. These components will be connected to the turbine supervisory control and data acquisition (SCADA) system. The SCADA system will monitor sensor temperatures and automatically shut the turbine down and send an alarm to the control room if predetermined set points are exceeded. In addition to the monitoring system, each nacelle and each service vehicle is equipped with a fire extinguisher.

Beyond the physical fire protection components of the facility, the operations staff will develop a site-specific ERP prior to the start of construction. This plan will detail the actions to be taken by the site manager and staff should an emergency or fire occur. The ERP will be coordinated with the local fire departments and emergency response organizations and will set forth the lines of communication in the event of a fire or other emergency. A more detailed discussion of the ERP is provided in Section 2.29, Health and Safety, and a draft ERP is included in Appendix R.

2.29.4 Gas Well Safety Planning

The Project Site contains several public and private natural gas lines and wells. Prior to final design and construction, Noble will coordinate with “Dig Safely New York” and the respective gas utility companies to determine the locations of all active gas lines and wells within the Project Site. Gas companies are being consulted to establish appropriate setbacks and crossing procedures to effectively minimize risks of interference. Where encroachments are necessary, Noble will follow the applicable company’s encroachment policies. During construction, no gas line will be crossed without it first being exposed to confirm its depth.

In addition to natural gas line and wells, propane and acetylene will be stored and used at the construction site. The HMEMS includes safety and handling procedures for cylinders and tanks used on site during constructions. These measures include appropriate tagging, placement on a solid base eliminating direct contact with the ground, and minimum distances from any buildings and combustible materials (25 feet for 1,000 gallon tanks).

If a gas leak is reported during construction, the area will be restricted and the presence or absence of gas will be confirmed. When necessary, gas detection instruments will be used to conduct a thorough inspection for the presence of gas, personnel will take the following action:

1. Shut off the source of gas; notify the utility, if applicable;

2. Continue to restrict the area until the origin of the gas is established and it is safe to lift the restriction;

3. Initiate repairs to stop leakage; and

4. Keep the utility notified of conditions and actions taken.

2.29.5 Design Requirements

The electrical power generated by the wind turbines is transformed and collected through a network of underground and overhead cables that all terminate at the proposed Hanover substation. Power from the turbines is fed through a breaker panel at the turbine base inside the tower and is interconnected to a pad-mounted step-up transformer that steps the voltage up to 34.5 kilovolts (kV). The pad transformers are located near the base of the towers and are interconnected on the high side to underground cables that connect all of the turbines together electrically. The underground cables are installed in a trench that is typically 4.5 to 5.5 feet deep. The underground collection cables feed to larger feeder lines that run to the main substation. In locations where two or more sets of underground lines converge, pad-mounted, three-way junction terminals will be used to tie the lines together into one or more sets of larger feeder conductors. The overall electrical system will be designed and constructed in accordance with the Guidelines of the National Electric Code (NEC), the National Fire Protection Agency (NFPA), and the host utility (New York Power Authority [NYPA]) requirements.

The turbines will be located on a parcel of cleared land that will occupy a minimum of approximately 1.0 acre. The cleared land will be free of combustible materials during construction, thus minimizing the potential spread of a fire, should one start.

The fire protection features of the turbine include components within the nacelle that monitor bearing, oil, and nacelle temperatures. These components will be connected to the turbine SCADA system. The SCADA system will monitor these temperatures and automatically shut the turbine down and send an alarm to the control room if predetermined set points are exceeded. In addition to the monitoring system, each nacelle and each service vehicle is equipped with a fire extinguisher.

The Town of Villenova local law requires that turbines include the following safety measures:

- Each wind energy conversion system (WECS) shall be equipped with both manual and automatic controls to limit the rotational speed of the rotor blade so it does not exceed the design limits of the rotor;

- If the property owner submits a written request that fencing be required, a 6-foot-high fence with a locking portal shall be required to enclose each tower or group of towers. The color and type of fencing for each WECS installation shall be determined on the basis of individual applications as safety needs dictate;

- Appropriate warning signs shall be posted. At least one sign shall be posted at the base of the tower warning of electrical shock or high voltage. A sign shall be posted on the entry area of fence around each tower or group of towers and any building (or on the tower or building if there is no fence), containing emergency contact information, including a local telephone number with 24-hour, seven days per week coverage. The Town Board may require additional signs based on safety needs;

- No climbing pegs or tower ladders shall be located closer than 12 feet to the ground level at the base of the structure for freestanding single pole;

- The minimum distance between the ground and any part of the rotor or blade system shall be 20 feet;

- WECS shall be designed to prevent unauthorized external access to electrical and mechanical components and shall have access doors that are kept securely locked; and

- Accurate maps of the underground facilities shall be filed with the Town and with “Dig Safely New York” or its successor.

The Town of Hanover local law requires that turbines include the following emergency shutdown and safety measures:

- Procedures acceptable to the Hanover Town Board for emergency shutdown of power generation unit shall be established and available with local agencies as required by the Town;

- No tower or facility shall exhibit any signs or advertising. Applicant shall post an emergency telephone number so that the appropriate people may be contacted should any wind energy-deriving tower need immediate attention;

- No WECS shall be permitted that lack an automatic braking, governing, or feathering system to prevent uncontrolled rotation, over speeding, and excessive pressure on the tower structure, rotor blades, and turbine components;

- The safety of the design of all conversion systems shall be certified by a licensed professional engineer experienced in WECS. The standard for certification shall be good engineering practices and shall conform to New York State’s officially adopted building and electrical codes; and

- The minimum distance between the ground and any part of the rotor blade shall be 30 feet.

Noble will comply with all of these requirements.

The wind industry designs wind turbine systems in accordance with International Electrotechnical Commission (IEC) standards. IEC is an internationally recognized organization that prepares and publishes standards for electrical related equipment systems. The General Electric (GE) 1.5 sle wind turbine system to be used for the project is designed in accordance with these standards and GE has obtained a Statement of Compliance certifying its design is in conformance with the IEC standards. This Statement of Compliance has been issued by Germanischer-LLoyd AG, an internationally recognized testing and certification organization. A copy of this statement is included in Appendix R. Prior to financing and construction of the Project, GE will produce a Mechanical Loads Analysis that uses site-specific data and loads analyses to confirm that the site specific conditions do not result in any exceedance of extreme or fatigue loads on the wind turbine which would violate the conditions the turbine was designed to withstand.

2.29.6 Ice Shed

While ice shed has emerged as a public concern associated with wind energy facility safety in cold weather climates, the proper siting and adherence to setback requirements and safety procedures minimize any potential risk to the public. Ice shed, or throw, is caused by the buildup of ice on the turbine’s blades and can occur under certain conditions. This generally takes place when a stationary blade accumulates ice followed by an increase in temperature which causes the ice on the rotor blades to thaw. If the blades are stationary, the ice will fall near the turbine base, but once the blades begin to rotate, ice fragments on the blade may be thrown under certain wind speeds and directions.

When temperatures are below or just above freezing, the risk of ice buildup exists and can occur as result of two types of events, riming and freezing rain. The remainder of this section acknowledges this risk and presents the prevention measures to be taken to effectively minimize risks to safety if icing were to occur.

The setbacks included in the Town wind laws require a 1,000-foot setback from the nearest off-site residence and 500 feet from the nearest public road. According to the American Wind Energy Association, setbacks similar to those required by the Towns are sufficient to protect against danger to the public (AWEA 2006).

In addition, potential safety concerns as a result of ice shed are considered low, as the Project is located on private property and access by the general public is restricted. As a result, incidents from ice shed will be prevented. The operations staff working in and around the turbines may be at risk of ice shed from the blades if they are beneath the blades when icing conditions exist; however, the staff generally will be trained in recognizing this condition and have specific protocols to follow if they are working when such conditions exist. These protocols include contacting Noble Environmental Power National Operations Center (NEPNOC) to determine if an icing event has occurred based on turbine out-put and wind speed, visual inspection for ice, restricting individuals from within 300 feet of an operating iced turbine, tower entry out from underneath the turbine rotor (If the rotor is over the tower door, it must be remotely yawed so that the rotor is not directly over the tower entry.) and parking company vehicles a safe distance away.

In addition, ice buildup slows a turbine's rotation which can be sensed by the turbine's control system. The plant operators have a standard operating procedure that requires them to closely monitor turbine performance vs. wind speed (anemometers are heated so icing is not an issue for them) when icing conditions could exist based on weather forecasts. If performance is below normal, the operators can initiate shut downs pending confirmation of a hazard to human safety.

Academic research and risk analyses have been conducted on the subject of ice shed and throw, primarily in Europe. The general conclusion is that wind turbines should not cause risks as they are normally set back from residences and roadways and that the hypothetical risk of being struck by ice is small. Smaller ice fragments produce less aerodynamic drag and thus increase the throwing distance. Large and long ice fragments experience more drag and will hit the ground closer to the turbine. A simplified empirical equation was introduced to represent the overall risk area for an operating turbine (Seifert et al. 2003).

$$d = (D + H) * 1.5$$

d = maximum throwing distance in meters
D = rotor diameter in meters
H = hub height in meters

This simplified equation is a rough estimate and assists in siting turbine locations near residences or roads and the associated risk. Based on this equation, the maximum risk area for ice throw is estimated to be approximately 775 feet (236 meters) horizontal displacement from the 80-meter turbines. However, the actual throwing distance of the ice fragments will vary based on many variables not included in this calculation, including rotor azimuth, rotor speed, local radius, ice fragment size and weight, and the wind speed.

Published literature by Seifert et al. (2003) reports typical drag coefficients for ice particles at 1.2 based on wind tunnel testing. In the throw calculations, a conservative 1.0 drag coefficient and a maximum wind speed of 18 m/s (40 mph) is used. The report describes observed ice fragment throws based on data from several test sites at various locations in Europe and wind tunnel simulations, the longest of which was slightly less than 410 feet (125 meters). The comparison between calculations and an inquiry among operators of wind turbines has shown hypothetical calculations to be conservative (Seifert et al. 2003).

In 2007, Garrad Hassan and Partners, Ltd. developed risk assessment recommendations for the Canadian Wind Energy Association. The example calculations were designed to represent a typical wind farm project in rural southern Ontario, a climate similar to that of the Ball Hill Project Area. The calculated risk associated with an ice throw event striking a fixed dwelling located 300 meters (984 feet) from a turbine was calculated to be 0.000002 strikes per year, equivalent to 1 strike per 500,000 years. The probability of a vehicle being struck while traveling on a public roadway located 200 meters (656 feet) from a turbine is 0.0000038 strikes per year, equivalent to one vehicle strike per 260,000 years. The probability of an individual being struck within 300 meters (984 feet) of a turbine is even smaller, 0.000000007 strikes per year, or one strike in 137,500,000 years (Garrad Hassan 2007). In comparison, the average annual per capita lightning strike rate in the United States is approximately one in 600,000, which is significantly higher than the probability of an individual being struck by ice thrown from an operating wind turbine.

2.29.7 Blade Throw

Blade throw is the structural failure of one or more parts of the wind turbine. Turbine failure is very rare and can be attributed to improper design, manufacturing defects, extreme weather events, or the wrong application of technology (Garrad Hassan Canada, Inc. 2007). Proper turbine selection, inspection, maintenance, and operation combined with setbacks from houses, roads, and other structures effectively eliminate the risk to public safety. Some instances of turbine failure have been documented in older turbine models which have resulted in a blade or portion of a blade being thrown from the nacelle while the turbine is operational. This safety concern has been virtually eliminated with the advancement of design utilized in modern turbines and through constant monitoring and automatic operational adjustments. Once constructed, the Noble Ball Hill Windpark, like Noble’s other windparks, will be constantly monitored through a SCADA system which can alert staff before an incident occurs.

Additionally, according to General Electric, manufacturer of the 1.5-megawatt (MW) sle turbine (model selected for the Ball Hill Project), of the 5,000 to 6,000 GE 1.5MW sle models in circulation throughout the world, no cases of blade throw have occurred.

The primary safety measure employed to avoid the risk of damage from a blade failure event are the establishment of safety setbacks from residences, property lines, roads, and other permanent structures as required by the Town of Villenova and Town of Hanover. Also, the Project is located on private property and access by the general public is restricted.

In addition, Noble has incorporated the following strategies to prevent the possibility of blade failure.

Compliance with IEC Testing Standards

Usage of the General Electric 1.5sle Wind Turbine is certified by GL (Germanischer Lloyd) to comply with international industry (IEC) standards. IEC testing standards include both fatigue and maximum-strength testing. The fatigue testing typically includes long duration testing of continuously cycling the load on the blade. Similarly the extreme load test is usually a test to failure, and it mimics the specified extreme load.

Regular Inspection and Maintenance programs

The blade manufacturing industry follows rigorous quality plans and standards that are reinforced by the turbine manufacturer's quality inspection. As with all types of important machinery and components, all components are inspected regularly for safe and reliable operations. Additionally, Noble regularly maintains and supervises all wind turbines throughout all our windparks.

Automatic Blade Pitch Adjustments

Extreme weather events are subject to occur and as such blade failure could occur due to an extreme storm such as tornado or hurricane. In the event of this occurring, General Electric turbine blade pitch will automatically adjust and the machine will stop. Additionally the mechanical brake will be activated to block the rotor in place minimizing the potential of blade failure. Lastly, the turbine is equipped with vibration sensors capable of detecting and reacting to any imbalance in the blades and shutting down the turbine, if necessary.

Mechanical Load Analysis (MLA)

Blade failure sometimes occurs when an inappropriate turbine model is selected for a site. In order to avoid this, turbine manufacturers analyze the wind data of the chosen site and confirm that the selected wind turbine model is sufficient. GE defines the results of this analysis as the Mechanical Load Analysis (MLA). Essentially the MLA is an extreme and fatigue load analysis based on wind data provided to GE. Once analyzed, GE confirms whether the selected model is suitable for the site based on IEC standards.

2.29.8 Other Safety Considerations

Stray Voltage

In a 1998 report, the Science Advisors to the Minnesota Public Utilities Commission (Staehle et al. 1998) define stray voltage as "the difference in voltage measured between two surfaces that may be contacted simultaneously by a person or animal (typically less than 10 volts). Sources of AC stray voltage are neutral-to-earth voltages resulting from normal current flow on a resistive neutral system. Stray voltage may be enhanced by poor electrical connections, deteriorated insulation, or faulty equipment."

Effects of stray voltage in livestock have been extensively researched and although conflicting information exists on this topic, scientific studies have failed to show that adverse health effects are directly associated with the low level of currents associated with stray voltage (Staehle et al. 1998). Farm animal exposures and their effects are the main focus of much of the research on the topic; however, some studies on human exposure are also included. Although both humans and animals can experience voltage gradients, livestock have a higher likelihood of stray voltage exposure than humans given their confinement, lack of protective barrier (e.g., boots and gloves) and physiology. Physiologically, dairy cows have a lower resistance to electric current flow than humans (Peterson 2008). According to the Wisconsin Public Service Commission (PSC), stray voltage is often not noticeable to humans (Wisconsin PSC 2004). Under normal conditions, farmers are less likely to be affected by stray voltage than their animals (Hultgren 1990). The electrical distribution system of the Ball Hill Windpark will be designed and constructed to be in accordance with all applicable electrical codes (i.e. NEC, NFPA, and NYPA requirements). Therefore, the electrical distribution is not anticipated to contribute to or cause stray voltage.

The facility will have a continuous grounding system installed that will tie each turbine independently into the grounding loop that will include grounding transformers eliminating any potential hazard that stray voltage created by the Project may pose to persons or livestock. In addition to having a site-specific grounding system, the power distribution system for the Project will be buried with a minimum of 46 inches of cover and the pad-mounted transformers will be encased in a base frame and is not connected to the local electrical distribution lines that service residences, barns, and other structures. The electrical distribution system and all conductors will be inspected before installation, after installation and prior to energization of the Windpark for any faults or potential future problem areas. Underground and overhead electric cables will be designed in accordance with standard utility specifications and will have appropriate shielding and insulation.

Electric and Magnetic Fields (EMF)

Electric and magnetic fields (EMF) is a term that describes electric and magnetic fields associated with the flow of electricity through power lines, wiring in buildings, and electrical appliances. The electric field is produced by stationary charges, and the magnetic field by moving charges (currents). These physical fields can potentially affect the behavior of charged objects in the vicinity of the field. The strength of EMF falls rapidly as one moves away from the source. At the frequencies used in the electric power industry, the evidence for adverse health effects associated with exposure to EMF is limited. New York State has established limits for magnetic field strength of 200 milligauss at the edge of the right of way. The Project will be engineered to meet or exceed New York State EMF Standards.

Implantable medical devices, such as pacemakers, have been associated with electromagnetic interference (EMI) problems. EMI can cause inappropriate triggering of a device or inhibit the device from responding appropriately. Transmission lines are only one of a number of external EMI sources. Other sources of EMI include cellular phones, vehicle security systems, slot machines, car engines, and high voltage electrical systems and devices. All pacemaker patients are informed of potential problems associated with exposure to EMI and must adjust their behavior accordingly. Moving away from a source is a standard response to the effects of exposure to EMI. Patients can shield themselves from EMI with a vehicle or building (Wisconsin PSC 2004).

Lightning

Lightning, if it strikes a turbine, will dissipate to the ground through the lightning protection system. Each turbine blade is equipped with a small conductor located at the tip of the blade. This sensor is connected to the grounding grid surrounding the turbine foundation. All lightning strikes will travel directly to the ground and will not affect the turbine or the surroundings. Noble's existing windparks in northern and western New York have incurred several lightning strikes with little or no effect. In addition weather conditions including severe thunderstorms and lightning are remotely monitored by Noble Environmental Power National Operations Center (NEPNOC) using a software provided by Vaisala, which alerts Noble operations staff of potentially hazardous working conditions. Operations staff will not work "up-tower" if lightning storms are detected in the area.

2.30 Cultural Resources: Environmental Setting

As part of the cultural resources investigation, Panamerican Consultants, Inc. (Panamerican) was contracted by Noble to conduct an architectural survey and a Phase I cultural resources study for the Project. These studies were performed in order to identify known and potential cultural resources in the vicinity of the Project Area in accordance with the New York State Historic Preservation Office (NYSHPO) Guidelines for Wind Farm Development Cultural Resources Survey Work (NYSHPO 2006), National Historic Preservation Act (NHPA), New York State Historic Preservation Act, and all relevant state and federal legislation. The methodology for these studies was approved by NYSHPO prior to commencement of the investigations (see Appendix C, Agency Correspondence). The known and potential cultural resources identified by the Panamerican studies are summarized below. The full reports are included in Appendices S and T.

2.30.1 Architectural Resources

The purpose of the architectural study was to identify properties, districts, and sites that are listed or may be eligible for listing on the National Register of Historic Places (NRHP) within the Project Area and a visual area of potential effect (APE) around the Project components. For this investigation, the visual APE is defined as the area from which the proposed undertaking may be visible within a 5-mile distance from the perimeter edge of the turbines within and within a 3-mile distance along the transmission line. The visual APE and survey methodology were established in consultation with NYSHPO based on the Guidelines for Wind Farm Development Cultural Resources Survey Work (see Appendix C, Agency Correspondence), the NHPA, the New York State Historic Preservation Act, and all relevant state and federal legislation.

Prior to initiation of the architectural survey, New York State and National Register of Historic Places (S/NRHP) files were reviewed to identify previously recorded historic and architectural resources within the Project Area and visual APE. A viewshed analysis map (or zone of visual influence [ZVI]) was developed to determine where turbines and transmission line would be visible in the visual APE, based solely on topography (see Figure 1-2 of Appendix S). Buildings and districts in the APE and the positive ZVI (i.e., one or more turbines could be viewed from the location) were then reviewed and surveyed to identify properties, sites, or districts that are already listed, or possibly eligible for listing on the S/NRHP. Local sources, references, and historic maps were consulted to formulate a historic context of the region in order to supplement National Register Eligible (NRE) evaluations. In some cases, additional information about specific buildings or farm complexes was supplied by the owner of the property or other interested/informed residents of the community. A detailed discussion of the methodology used for the study is provided in Appendix S.

All properties were reviewed against the positive ZVI and included in the documentation provided to NYSHPO to provide a complete list of properties already listed on the NRHP and known and possibly NRE sites. A total of 146 individual properties, including cemeteries and other structures, are documented in the report. Eight of these properties have already been determined eligible for listing to the NRHP by NYSHPO and no properties are listed on the NRHP. One hundred thirty-eight individual structures, inclusive of one proposed 14-property historic district, are recommended as possibly NRE and are currently being evaluated. Farm complexes with numerous farm buildings or features are considered as one property. All of the properties documented are located in Chautauqua and Cattaraugus counties.

The architectural survey was submitted to NYSHPO in August 2008.

2.30.2 Archaeological Resources

A Phase I investigation was conducted to determine if any previously recorded or yet unidentified documented archaeological resources are present within the Project Area. The investigation included archival, documentary, and historic map research, a site file and literature search, the examination of properties listed in the S/NRHP, an intensive walkover reconnaissance, photographic documentation of conditions, and shovel testing throughout the archaeological APE associated with construction of the Project as required by the NYSHPO Windfarm Guidelines (2006). At the time of study, the archaeological APE included the following components of the Project: 66 turbines, 18.5 miles of access roads, 5.9 miles of transmission lines, 7.5 miles of collection lines in new rights-of-way, laydown areas, and operation and maintenance (O&M) building locations for a total archaeological APE of 411 acres.[6] Following NYSHPO Guidelines (2006), the APE was broken into environmental zones (summits, knolls, and ridges; saddles between knolls and ridges; near stream headwaters, banks, and ridges; and near bogs, swamps, ponds at stream headwater on saddles between knolls and ridges). The number of shovel tests was divided between these zones according to the percentage of area each zone encompassed within the APE. Any previously identified archaeological site(s) and map documented structures (MDS) were included in the Phase IB testing. Shovel tests were conducted at approximately 16-foot (5-meter) intervals.

The work plan for field investigations was submitted to and approved by NYSHPO in April 2008. Project design changes following submission and approval of the original work plan resulted in the APE increasing by 20 acres. An addendum Phase I report accounting for the change will be submitted to NYSHPO in fall 2008 (see Appendix C). The original testing strategy conducted in the spring of 2008 included a total of 6,587 shovel tests throughout the APE. Photographs of the field investigation are presented in the Phase 1AB Cultural Resources Investigation Report found in Appendix T.

---

[6] Since the Phase I investigation was conducted, the Project was altered to include 60 turbines, 16 miles of access roads, 6 miles of transmission line, and 8.5 miles of collection in new ROW, of which 7.9 miles are considered within the APE that does not overlap with the APE of other project components. An additional 314 shovel tests will be needed to account for Project design changes and will be included in an addendum to the Phase I investigation.

2.30.2.1 Known Prehistoric Resources

Four prehistoric sites were identified within one mile of the Project Area. The closest site, UB 2217 (Villenova 3), is an unidentified prehistoric site comprising four chert flakes and two chert chunks, located about 614 feet (187 meters) south, southwest of the proposed location of a turbine. The Project Area is most comparable to the interfluves environmental zone, which is not particularly sensitive for large prehistoric sites. This region is considered generally sensitive for small seasonal camps and processing stations. Habitation of this area was likely influenced by seasonality. Sensitivity for burials is generally low because the larger settlements (e.g., base camps, villages) are more likely found in the valleys. However, knolls in the uplands may be sensitive.

2.30.2.2 Known Historic Resources

The review of known archaeological sites for the Project Area did not identify any sites within or within one mile of the Project Area. The Project Area and its surroundings have been historically used for agriculture. The proposed turbine locations are generally set in agricultural fields (e.g., pasture, crop) well behind locations of existing and map-documented farmsteads. Sensitivity for historic middens is considered moderate to low. Some historic farmsteads may be crossed by proposed access roads and collection lines that follow existing roads, which raises the likelihood that some cross or closely pass historic farmsteads. Areas considered sensitive for historic sites are in proximity to map documented structure (MDS) locations. Appendix T identifies 20 MDS locations within or in proximity (<100 meters) to the APE. None of the MDSs are at or near the proposed turbine locations. Three MDSs are at or near locations proposed for access roads.

2.30.2.3 Phase 1AB Survey Results

Following the NYSHPO Guidelines for Wind Farm Development Cultural Resources Survey Work, a total of 6,587 shovel tests were dug within the designated 16 proposed turbine locations, twenty 328-foot (100-meter) long segments of proposed access roads and utility roads, and one 328-foot (100-meter) long segment of proposed overhead transmission line. Two historic residential sites were identified in proximity to proposed access roads and collection lines, consisting of extant stone foundations. A low-to-moderate frequency of associated ceramic and glassware artifacts were found in shovel tests dug in proximity of the foundations. Project realignments were made to avoid impacting the two sites and no additional work will be required at these locations.

Modern or historic ceramics or glass was also identified at scattered locations but these finds were determined to be isolated with no historic significance and no further work was recommended.

Two isolated prehistoric lithic flakes were found (one each at Turbines 41 and 42) but close-interval testing surrounding each find spot was negative with no additional materials found. The two finds are considered isolated finds with no associated sites present in the APE. Although insufficient data is available to apply these results to the local habitat/environmental zone model, these results appear to support general assertions that the upland environment of this region was not favored for habitation by prehistoric populations.

The Phase I cultural resources study was submitted to NYSHPO in August 2008. In addition, consultation request letters were submitted to the Seneca Nation of Indians (Seneca Nation), Tonawanda Band of Seneca Indians, and the Tuscarora Nation on April 4, 2008. No responses have been received. The Phase I cultural resources study was submitted to the Seneca Nation, Tonawanda Band, and Tuscarora Nation in August 2008.

2.31 Cultural Resources: Impacts and Mitigation

As described in Section 2.30, Cultural Resources: Environmental Setting, Panamerican Consultants, Inc. (Panamerican) was contracted by Noble to complete an architectural survey of the 5-mile Area of Potential Effect (APE) around Project components and conduct a Phase I cultural resources investigation for the proposed Noble Ball Hill Windpark. These studies were performed to identify known and potential cultural resources within the Project Area and to assess the potential for Project components to impact these resources. The potential impacts to cultural resources identified during the architectural survey of the visual APE (5 mile radius from the turbines and 3 miles from the transmission line), the Phase I cultural resources investigation, and proposed mitigation measures are summarized below. A more complete discussion is presented in the Panamerican reports provided in Appendices S and T. The architectural survey and Phase I cultural resources study will be submitted to the New York State Historic Preservation Office (NYSHPO) in August 2008.

Eight individual properties in the APE are currently listed as eligible for listing on the National Register of Historic Places (NRHP). No properties within the APE are already listed on the NRHP as historic properties. Based on the Ball Hill architectural survey an additional 138 properties in the APE are being recommended by Pan American as potentially National Register Eligible (NRE) for the first time, including one proposed 14-property historic district in the Village of South Dayton. Should NYSHPO determine that these or any additional structures within the 5-mile APE are eligible for the NRHP, further consultation and documentation of the potential impacts may be required. A draft Historic Resource Impacts Mitigation Plan has been prepared and is provided in Appendix S.

2.31.1 Construction Impacts

Architectural Resources

Construction of the Project will not directly impact architectural resources (i.e., demolition of any NRE buildings). As presented in Appendix S, no NRHP listed, eligible or potentially eligible structures or buildings will be demolished or physically altered in connection with the Project. There is some potential for visual and noise impacts from construction at structures potentially eligible for NRHP listing; however, these impacts will not be significant due to their temporary nature. (See discussions of visual and noise impacts during construction in Section 2.14, Visual Resources: Impacts and Mitigation, and Section 2.16, Sound: Impacts and Mitigation, respectively.)

Archaeological Resources

No archaeological resources will be impacted by construction of the Project. Two stray prehistoric artifacts were documented and two historic archaeological sites were identified in the Project Area during the site investigations. These sites are outside of the area that will be disturbed.

As indicated in Appendix T, the results of the archaeological investigation indicate that the upland environment of this region was not favored for habitation by prehistoric populations. The two stray prehistoric finds were isolated and likely the byproduct of tool finishing done by a small hunting or gathering expedition in the uplands. The two historic archaeological sites consist of two extant stone foundations from the late nineteenth century that were possibly inhabited in the early twentieth century. Project realignments were made to avoid impacting these two sites and no additional work will be required at these locations. Additional discussion of prehistoric and historic conclusions is in Section 5 of Appendix T, Archaeological Report.

In the event of an unanticipated discovery of archaeological resources during construction, Noble will stop work immediately in the vicinity of the find and contact NYSHPO. The nature and extent of the resource will be assessed by Noble's archaeological consultant, Panamerican. A Plan for Unanticipated Discoveries is provided in Appendix T.

2.31.2 Project Facility Impacts

Architectural Resources

Operation of the Project will have a visual effect on a number of properties that are eligible or potentially eligible for listing in the NRHP. There are 146 properties located within the visual APE: eight that are eligible, and 138 that were identified by Panamerican as potentially eligible for listing on the NRHP.

Determining the actual impact of the Noble facilities on such properties is difficult for a number of reasons. First, modern intrusions may have already compromised the viewshed of some historical settings. Though existing modern visual intrusions, such as telephone poles, electrical distribution lines, and silos, are relatively small compared to the 389-foot (118.5-meter) high wind turbines they have impacted the rural setting in which the rural ostensibly vernacular architecture exists.

In addition, because the zone of visual influence (ZVI) is topography-based and does not include vegetative cover, it likely overestimates the number of visible turbines and the area from which they can be seen. The actual impacts to these resources will vary with the surrounding topography, distance from the turbines and transmission lines, existing landscaping and vegetation, and surrounding land uses and will not be fully understood until the Project is constructed.

While there may be some screening afforded by mature tress, shrubbery, and other plantings during the growing season, the prominent features of the turbines will be visible or partly visible from listed or NRE properties of concern during the periods of dormancy. The data provided by ZVI analysis and mapping suggest that turbines are likely to be visible from many of these properties. A Zoned Relative Visibility Assessment has been performed for the project by Panamerican Consultants, Inc. The study employs a distance–zone concept, based on procedures developed by the United States Forest Service, to assist in evaluating the visual impact of the Project. In this framework, the Project viewshed is divided into zones of relative visibility based on geographical distance: foreground (0 to 0.5 miles); middle ground (0.5 to 3.0 miles); and background (3.0 miles to horizon). Of the 146 identified NRE or potentially NRE structures, 85 are located within the APE of the turbines. The turbines are located in the foreground of seven of these structures where the sense of form, line, color, and textural contrast with the surrounding landscape is highest. The visual impact is likely to be considered the greatest at a foreground distance. The turbines are located in the middle ground of 30 structures and in the background of 48 structures.

Based solely on topographic viewshed analysis, all 60 turbines may be visible from two individual properties: 675 Route 39, located in the Town of Hanover and Weaver Cemetery on Center Road in the Town of Arkwright. The property at 675 Route 39, an active farmhouse and barn complex, is recommended possibly NRE. At least half of the turbines (30) or more may be visible from 78 properties (see Table 6.1 in Appendix S). In addition, the Federal Aviation Administration (FAA)-required lighting on some turbines will also be visible from many locations.

The Project will likely change the visible landscape of the region and create a distinct visual aspect. The most significant visual impacts will be on open farming land (rural agricultural landscapes), and any of the following that have open/clear views of the wind farm: historic properties on ridges, cemeteries, historic properties within Villenova and Hanover, historic properties along major thoroughfares in the area, and at historic crossroads communities. For a more detailed discussion of visual impacts, refer to Section 2.14, Visual Resources: Impacts and Mitigation, and Appendix K.

Archaeological Resources

Two stray prehistoric finds and two historic sites were documented in the Project Area. The Project Area is not particularly sensitive for large prehistoric sites as described in Section 2.31.1 and the artifacts found lacked both integrity and historical context. Project facilities were realigned to avoid the prehistoric and the historic sites that were identified during archaeological surveys. As such, operation and maintenance of the Project will not impact any archaeological resources.

2.31.3 Mitigation

Architectural Resources

Noble has initiated a consultation with NYSHPO pursuant to Section 106 of the National Historic Preservation Act (NHPA) and Article 14 of the New York Parks, Recreation, and Historic Preservation Law. As part of this consultation, Noble may be required to mitigate adverse visual affects to NRE and National Register Listed (NRL) properties. Because National Register properties are within the ZVI, it is anticipated that mitigation for visual impacts will be required. As part of the consultation process, the NYSHPO will approve an appropriate combination of mitigative actions, which Noble will be required to implement.

Proposed mitigative strategies are included in the Architectural Survey Report and included in Appendix S, and include the following:

- Professional design and siting;
- Maintenance;
- Surveys;
- Monetary contributions;
- Heritage tourism;
- Educational activities; and
- Historic activities.

Based on these mitigative strategies, Noble has developed a Historic Resource Impacts Mitigation Plan that is provided in Appendix S. Due to the size of the wind turbines and the geographical extent of the Windpark, direct mitigation through plantings and screenings is generally not considered viable. Most of the inventoried structures that are determined NRE are such because they embody the distinct characteristics of a type, period, or method of construction. They may also be part of a rural landscape or historic district. It is in these contexts where adverse visual impacts are most likely to occur because, in these cases, the environmental setting provides added significance to these resources. At the same time, these entities have generally large geographic extents which result in even greater difficulty when considering direct mitigation measures. In some cases, direct mitigation measures, such as tree planting and screening, may actually provide a source of negative visual effects. For example, a rural agricultural landscape may be characterized by open space and cultivated fields. The introduction of rows of tall trees may actually be more intrusive than the background visual impact of the Windpark itself. In addition, moving tower locations will not significantly minimize impacts due to their general placement throughout the landscape. Based on these conditions, direct mitigation will have little affect toward actually mitigating impacts from the proposed Project, therefore, the Plan proposes a candidate list of “indirect mitigation” projects to address the Town of Villenova’s and the Town of Hanover’s preferences for mitigation. Noble has conducted meetings with Town officials in both Villenova and Hanover to solicit the Towns’ views with regard to indirect mitigation measures. Based on the host communities’ expression of local needs and interest, Noble has developed a list of candidate projects. These include:

- Renovation of a mid-nineteenth century Greek Revival farm house;
- Renovation of late nineteenth century schoolhouse;

- Renovation of a very early twentieth century commercial building; and/or
- Renovation of a simple Vernacular mid-nineteenth century building.

Noble recognizes that local community input is vital to the success of any mitigation strategy; as such, Noble has already begun a dialogue regarding historic resource mitigation with local officials, including Town Supervisors. Noble will also consult with local organizations, local historians, and interested Town Board members. The proposed candidate project will consist of the acquisition and period-authentic renovation of the building to be used by the host communities as a repository for historic records, documents, photos, artifacts, etc., to provide office and work space for Town Historians, and to provide a venue for community gatherings. Noble has engaged a local real estate broker to assist in acquiring an appropriate property and has proposed a budget of $300,000 for the selected project.

The draft mitigation plan will be submitted to NYSHPO for review once NYSHPO makes a determination of impact. Once a specific project is selected, a final mitigation plan with site-specific construction details will be submitted. The selection of the project and the details of the plan will be based on ongoing consultation and will be approved prior to construction.

Archaeological Resources

No mitigation strategies are necessary for the Project, since no archaeological resources will be impacted during the construction and operation of the Project. An addendum to the Phase I Cultural Resources Investigation will be completed for the additional 20 acres of APE, submitted to NYSHPO, and included in the FEIS.

3 Cumulative Impacts and Benefits: Windpark and Regional Development

Consistent with the mandate of the New York State Environmental Quality Review Act (SEQRA), this Draft Environmental Impact Statement (DEIS) analyzes cumulative impacts where such impacts are "applicable and significant" (6 New York Codes, Rules, and Regulations [NYCRR] 617.9). Cumulative impacts are defined herein as two or more individual environmental effects, which, when taken together, may become environmentally significant or may compound or increase other environmental effects. Cumulative impacts are most likely to occur when a proposed action is related to actions that could occur in the same or an overlapping geographic location and at the same or a similar time.

3.1 Study Area

This section addresses the potential cumulative impacts that may arise from the combined impacts of the Project and other currently operating and proposed wind power projects in the region (northern Chautauqua County, western Cattaraugus County, and southern Erie County) (see Figures 3-1 and 3-2). For the purposes of this analysis it was assumed that projects that are located in close geographic proximity to the Ball Hill Project would generally have a greater potential to contribute to a cumulative impact than those farther away and the potential contribution would vary depending on the resource area evaluated. For example, noise from a project located several miles away would not contribute to a cumulative impact, but that same project may have a cumulative visual impact. During this cumulative impact analysis an evaluation of each proposed project within the region was completed to determine the potential for impact within each resource area. The level of analysis that could be completed was limited by the public information available for a given project.

The nearest operating wind power facility is Steel Winds, located along the shores of Lake Erie in Lackawanna, Erie County, New York, approximately 25 miles northeast of the Ball Hill Project Area. The Project consists of eight, 2.5-megawatt (MW) turbines.

The closest proposed project to Ball Hill is Horizon Energy's New Grange Windfarm (New Grange) which is under development to the west of the Noble Ball Hill Project Area in the Towns of Arkwright and Pomfret. The distance between the closest turbines of the Project and the New Grange Windfarm is approximately 1 mile. According to the DEIS prepared for the proposed New Grange project, the project consists of up to 47 1.8-MW turbines which are similar in height and appearance to the turbines Noble intends to use at the Project. Due to their proximity, construction of both the proposed New Grange project and the Noble Ball Hill Project has the potential to increase certain environmental impacts of the other. The New Grange DEIS is available online at http://www.newgrangewind.com.

Across Chautauqua County, several other wind power projects are in the early planning and development phases. Table 3.1-1 identifies the proposed production (in MW) at each proposed wind power project in the region that is listed in the Queue of Interconnection Requests maintained by the New York State Independent System Operator (NYISO) on their Web site, http://www.nyiso.com, and the current status of development. The review and approval status of these projects is highly variable, ranging from preliminary site investigations to those with completed System Reliability Impact Studies (SRIS), a requirement of the NYISO. Projects are reviewed by NYISO in three main phases: submittal of an interconnection request, preparation of an optional feasibility study, and completion of an SRIS. It is reasonable to assume that wind power projects with SRISs in-progress and with upcoming proposed operation dates, may be considered proposed or future projects for the purposes of cumulative impact analysis.

Because only limited information is publicly available for most of the projects listed in the NYISO Queue, including the proposed Pomfret Windfarm, assumptions on the project's potential impacts were based on the known impacts of similar sized projects in the area. For the Pomfret Windfarm and other projects in the NYISO Queue for which the number of turbines being proposed is unlisted, an assumption was made based on the proposed MW available in the NYISO Queue. (e.g., for Pomfret 73.5 MW would equate to up to 49 1.5-MW turbines).

We also assumed that the proposed New Grange Windfarm will be approved and constructed as proposed in the DEIS. As a result, there is potential that the construction schedule for New Grange could overlap with construction of the Ball Hill Windpark, but the construction schedule for the Pomfret project will not.

3.2 Wetlands

Existing New York State Department of Environmental Conservation (NYSDEC) and National Wetland Inventory (NWI) wetland mapping show a significant distribution of wetlands in the area surrounding the Ball Hill Windpark with most watersheds ultimately draining to Lake Erie or to the Allegheny River. New Grange is the only proposed project with publicly available wetland information. Impacts to wetlands resulting from all other existing and proposed wind projects will likely be in different watersheds and, therefore, will not result in cumulative hydrologic impacts as wetland impacts are typically considered on a watershed basis by regulatory agencies. Only the New Grange project will be quantifiably analyzed for cumulative wetland impacts.

Table 3.1-1 Local Wind Power Projects in Comparison to Ball Hill Windpark

Wind Power Project Name	MW	Date of Interconnection Request	Distance to Ball Hill Project Area	Proposed In-Service Date	Interconnection	Status
Horizon New Grange	79.9	7/21/05	1 mile	12/2008	Dunkirk-Falconer 115-kV	Facilities Study Pending
Horizon Pomfret	73.5	3/27/08	12 miles	12/2010	Dunkirk-Falconer 115-kV	Feasibility Study Pending
Ripley-Westfield Wind (Babcock & Brown)	124.8	8/14/07	25 miles	12/2007	Ripley-Dunkirk 230-kV	System Reliability Impact Study Pending
State Line Wind (Babcock & Brown)	124.8	12/20/07	30 miles	12/2010	Ripley-Dunkirk 230-kV	Feasibility Study in Progress
Concord Wind (Babcock & Brown)	101.2	2/28/08	Location information is not public	9/2011	Ripley-Dunkirk 230-kV	Feasibility Study Pending

Source: NYISO Queue, July 2008.

Key:
kV = Kilovolt.
MW = Megawatt.

As described in Section 2.8, Wetlands: Impacts and Mitigation, Noble sited the Project largely to avoid significant wetland impact. Due to the overall distribution of wetlands in the Project Area, complete avoidance of wetland resources was not feasible. As a result, during construction of Noble's Ball Hill Windpark, 6.54 acres of temporary wetland impact from ground disturbance will take place; however, these areas will be returned to pre-construction contours following construction activities. Upon completion of construction there will be 0.33 acres of permanent wetland impacts and 5.13 acres of permanent conversion of forested wetland to shrub/scrub or emergent wetland. However, to compensate for the long-term impacts resulting from wetland acreage losses, Noble has developed a Conceptual Compensatory Wetland Mitigation Plan, which is provided in Appendix I. A final mitigation plan will be developed as part of the United States Army Corps of Engineers (USACE) and NYSDEC permitting process and will incorporate agency input and site-specific mitigation plans.

Complete avoidance of wetlands is not feasible at the New Grange project, and is likely not feasible at the Pomfret project for the same reasons identified above. As such, wetlands will likely be disturbed during construction of these projects to provide sufficient access to accommodate construction equipment and staging areas at various turbine locations, access roads, and collection lines, to safely and efficiently erect and construct the facilities. Impacts during construction include all temporary and permanent impacts related to clearing, grading, and placing fill. Construction of the New Grange project will result in approximately 13.6 acres of impact, of which approximately 11.9 acres will be restored to pre-existing conditions. The remaining 1.6 acres of wetlands will be permanently impacted by placement of fill for access roads. However, as discussed in greater detail below, this permanent loss of wetlands will be mitigated for in accordance with state and federal permits. The amount of construction-related and permanent wetland impact at the proposed Pomfret project is unknown, but has been assumed to be similar to New Grange due to project proximity and similar project size.

Project facilities at each wind power project will have minimal individual impacts on wetlands. The Ball Hill project contributes a small portion (0.33 acres) to the approximately 2 acres of known combined permanent wetland impacts. Maintenance activities associated with the operation of the projects may result in the conversion of forested wetlands to shrub-scrub or emergent wetlands as a result of periodic removal of woody vegetation that may interfere with the operation of the facilities at each wind power project.

Although minor, localized, and temporary impacts to wetland function and values may result within each individual project area, no significant adverse cumulative impacts are expected because any localized wetland impacts will be offset by mitigation that will enhance wetland values within each individual project area. In accordance with NYSDEC and USACE regulations, developers of any wind power project in the region are required to avoid, minimize, and mitigate for wetland impacts. The USACE and NYSDEC typically require greater than a one-to-one mitigation ratio for permanent loss of wetlands. Mitigation for wetland impacts may result in a net increase in wetland acreage in the region.

3.3 Wildlife

Except for transient individuals, it would be uncommon for non-bird and non-bat resident wildlife in the region to travel many miles from the Project Area. In addition, because of their distance from the Ball Hill Project, other wind power facilities in the region will not result in continuous tracts of habitat alteration with the Project Area. The nearest operating wind power facility is the Steel Winds facility located along the shores of Lake Erie in Lackawanna, approximately 25 miles northwest of the Project. Steel Winds was built on a Brownfield site with limited habitat for wildlife; habitat impacts to other distant sites are expected to be localized and will not pose any cumulative impact with the Project. At other proposed wind power facilities in the region, it is expected that there will be small areas of localized habitat alteration similar to those at the Project, with much of that habitat restored after the completion of construction. Based on proximity, only New Grange and Pomfret have the potential to contribute to cumulative wildlife impacts, with the exception of threatened and endangered species. These species require special consideration. See Section 3.5 for a discussion of cumulative threatened and endangered species impacts.

Construction of multiple wind power projects will result in localized habitat alterations; however, neither the individual project impacts nor the cumulative impact from the New Grange and Pomfret projects are expected to be significant. Most species are expected to avoid the project sites during the active construction period. Since it is possible that New Grange and Ball Hill Project construction schedules will overlap, a larger temporary area of habitat disturbance may occur. During the course of construction of each project, some limited mortality may occur to less mobile species. Indirect impacts on wildlife will also occur as a result of habitat alteration in association with construction of the projects; however, these impacts are not expected to be significant. Construction of the Projects will result in a localized reduction in the amount of available forest habitat. Based on field surveys, approximately 122 acres of forest habitat will be impacted. The largest percentage of forested vegetation impacted by Ball Hill is successional northern hardwood forest (approximately 51 acres). Other forest communities affected at Ball Hill include hemlock-northern hardwood forest (approximately 45 acres) and beech maple mesic forest (approximately 26 acres). The reduction in the amount of forested habitat within the Ball Hill Project Site is minor in comparison with the overall acreage of forested land located in the Project Area (these three forest types comprise approximately 7,400 acres and approximately 122 acres or 1.6% of the forested communities in the Project Area will be impacted). Two hundred two acres of upland communities will be temporarily impacted by Ball Hill Project facilities including agricultural land (cropland/field crops, row crops, pastureland, and vineyards [approximately 182 acres]) and to a lesser extent, successional old fields, and shrubland (totaling approximately 20 acres). These communities are routinely subjected to disturbance or have been subjected to past disturbance and are a result of re-vegetation following disturbance. Wildlife will likely relocate to adjacent suitable habitat during construction or, upon cessation of construction, make use of areas temporarily disturbed, as revegetation takes place.

Construction of New Grange will result in permanent impact to 102.2 acres of forest and 68.8 acres of cropland, pastures, and hayfields. Relative to the overall Project Area, this amounts to less than 1% of available habitat. Impacts to wildlife habitat at the Pomfret project can reasonably be expected to be similar and impact only a small percentage of available forested and other habitat within the defined project areas, due to the similarities in Project components and siting strategies at projects of this nature. Cumulative habitat loss will result in an even smaller proportion when considering the percentage of habitat loss within the region.

Cumulatively, the three wind power projects will result in minimal loss of habitat within the respective project areas as well as compared with available habitat within the region. Further, the Ball Hill Project can reasonably be considered to contribute to only a third of the projected habitat loss. In addition, the impacts on habitat are consistent with activities and conditions that regularly occur throughout the region as a result of normal farming and timber activities. It is anticipated that wildlife in the vicinity of the proposed projects will either relocate to other adjacent suitable habitat. Once the Ball Hill, New Grange, and Pomfret projects are in operation, it is anticipated that wildlife will make use of areas that were temporarily disturbed during construction.

3.4 Birds and Bats

There is a potential for bird and bat impacts from other wind projects in the region to be cumulative if multiple projects are located within the same migratory corridor or within a common local bird movement area. As such, cumulative impacts associated with all of the proposed projects in the region including the proposed Ripley-Westfield and State Line projects and the existing Steel Winds project that are greater than 20 miles away from the Ball Hill Project were evaluated as they relate to birds and bats.

Construction-related activities at each project (e.g., clearing for road construction, infrastructure construction, equipment noise, and increased vehicle traffic) can potentially impact birds and bats by causing temporary displacement from habitat. Because these impacts are generally temporary in nature and will be limited at any one location, potentially cumulative construction impacts to bird and bat populations are not expected to be significant as a result of these projects.

The potential cumulative impacts of the operation of the New Grange and Pomfret projects in the vicinity of the Project Area, and the proposed Ripley Westfield and State Line Windfarms and existing Steel Winds project were assessed in the BBRA using approximate fatality rates from post-construction studies conducted in the northeast (see Section 2.12, Bird and Bat Resources: Impacts and Mitigation, and Appendix J, for an explanation of the fatality rate approximations). An approximate range of bird fatalities for the Project was identified by multiplying the National Wind Coordinating Committee (NWCC) eastern average and 2006 Maple Ridge daily survey fatality rates for bird kills with the proposed number of turbines (see Table 3.4-1). Likewise, an approximate number of bat fatalities for the Project was identified by multiplying the NWCC national average and 2006 Maple Ridge daily survey bat fatality rates with the proposed number of turbines (see Table 3.4-2).

Tables 3.4-1 and 3.4-2 only present estimates of fatalities based on national averages and surveys conducted at an existing windfarm in upstate New York. Furthermore, the available data indicates that there can be considerable variation in fatality rates, especially for bats from turbine to turbine and project to project. More information on available data is discussed in Appendix J, Bird and Bat Risk Assessment. The number of bird and bat fatalities for a particular facility will be determined with post-construction mortality studies; however, this estimate allows an evaluation of the potential cumulative impacts.

Table 3.4-1 Approximate Regional Number of Bird Fatalities

Project	Number of Turbines	Approximate Bird Fatalities Per Year Based on NWCC Eastern Average Rate[1]	Approximate Bird Fatalities Per Year Based on 2006 Maple Ridge Daily Survey Rate[2]
Noble Ball Hill	**60**	**258**	**576**
Horizon New Grange	47	202	451
Horizon Pomfret	49[3]	211	471
Babcock & Brown – Ripley-Westfield Wind Farm	79	340	758
Babcock & Brown – State Line Wind	79[4]	340	758
Steel Winds (existing)	8	35	77
Total	**313**	**1,386**	**3,091**

Notes:

[1] 4.3 birds/turbine/year (NWCC 2004).

[2] 9.59 birds/turbine/survey season (Jain et al. 2007).

[3] Project information is not publicly available, 49 turbines are assumed based on 1.5-MW turbines and the publicly available proposed MW of the Horizon Pomfret project.

[4] Number of turbines estimated based on 124.8 MW (same as Ripley-Westfield). This may change based on final turbine selection.

Table 3.4-2 Approximate Regional Number of Bat Fatalities

Project	Number of Turbines	Approximate Bat Fatalities Per Year Based on NWCC National Average Rate[1]	Approximate Bat Fatalities Per Year Based on 2006 Maple Ridge Weekly Survey Rate[2]
Noble Ball Hill	**60**	**204**	**1,470**
Horizon New Grange	47	160	1,152
Horizon Pomfret	49[3]	167	1,201
Babcock & Brown – Ripley-Westfield Wind Farm	79	269	1,936
Babcock & Brown – State Line Wind	79[4]	269	1,936
Steel Winds (existing)	8	28	196
Total	**322**	**1,097**	**7,891**

Notes:

[1] 3.4 bats/turbine/year (low = 0.7; high = 47) (NWCC 2004).

[2] 24.5 bats/turbine/survey season (Jain et al. 2007).

[3] Project information is not publicly available, 49 turbines are assumed based on 1.5-MW turbines and the publicly available proposed MW of the Horizon Pomfret project.

[4] Number of turbines estimated based on 124.8 MW (same as Ripley-Westfield). This may change based on final turbine selection.

The cumulative loss of approximately 1,400 to 3,000 birds per year is not considered to be biologically significant, considering the size of the populations and losses due to other sources of bird mortality. The United States Fish and Wildlife Service (USFWS) estimates that a minimum of 10 billion birds breed in North America (USFWS 2002). There are many widespread sources of bird mortality. However, it is challenging to compare predicted mortality from a proposed wind site to other sources of mortality, because it is only a prediction and local mortality rates from other sources are rarely quantified to allow comparison. On a national scale, the annual bird mortality associated with wind energy facilities (estimated at 33,000 birds per year in 2002) (USFWS 2002) is slight compared to other sources of mortality, such as:

- Vehicles (60 million or more deaths per year);
- Building windows (97 million to 976 million deaths per year);
- Power and transmission lines (conservatively tens of thousands deaths per year, possibly closer to 174 million deaths per year);
- Communication towers (conservatively 4 to 5 million deaths per year, possibly closer to 40 to 50 million deaths per year);
- Electrocution (estimated tens of thousands per year), pesticides (at least 72 million deaths annually, likely far more);
- Oil spills (hundreds of thousands of deaths per year);

- Oil and wastewater pits (up to two million deaths per year);
- Cats (hundreds of millions of deaths per year);
- Agricultural practices (i.e., hay mowing, pesticides) (at least 72 million); and
- Hunting (up to 120 million deaths per year) (Gill 1995; Erickson et al. 2001; USFWS 2002).

These sources of mortality are also present within the Project Area.

In addition, the bird kills that occur would be from many different species. Nocturnal migrant passerines, if present in the area, will likely make up the majority of bird kills. This is of concern because of the potential of Neotropical migrant species, many of which are considered in decline, to be among the fatalities. However, these are also among the species that are most harmed by global warming and air pollution (Price and Glick 2004).

At the present time, there is no evidence to conclude whether the cumulative annual loss of approximately 1,100 to 7,900 bats (as estimated for wind energy facilities) is biologically significant. However, there are ongoing bat mortality studies to determine the overall effects on bat populations. There are increasing concerns about the cumulative impacts of bat fatalities to specific species due to the spreading of White Nose Syndrome, due to the increasing number of wind projects and the fact that bats continue to be found during mortality studies at newly constructed wind sites. As the population sizes and trends of most bats in New York State are unknown, it is uncertain what level of impact is made from wind projects alone. While bird species populations have been studied and estimated, we are not aware of similar studies for bats and estimates for bat populations are not available and/or are highly uncertain. Even with this limited current state of knowledge on bat populations and migration, some researchers have expressed concern that there is the potential for significant cumulative population impacts to bats (Kunz et al. 2007; Arnett et al. 2008). Only after construction and operation of several wind projects in the northeast and implementation of long-term monitoring protocols would the significance of potential cumulative impacts be assessable. However, in order to reasonably analyze potential cumulative impacts to bats for this Project, available national data and 2006 survey data from the Maple Ridge Windfarm in New York State were utilized.

Post-construction monitoring programs have been established at each of Noble’s wind power projects to determine if bird and/or bat collision fatalities occur as a result of project operation, if so, the rate of mortality. Other wind projects will develop similar monitoring programs. These data will be correlated with pre-construction data, including radar data, to determine whether the mortality rates are consistent with the identified impacts. This information can also be used to develop possible means of mitigation. Information from these studies will also be a valuable resource for wildlife agencies and will provide needed data that can be used to assess the siting of future wind power projects.

As per the discussion on cumulative habitat impacts in the Section 3.3, the cumulative decrease in habitat availability resulting from the proposed wind power projects is not expected to have a significant impact on birds and bats in the region.

3.5 Threatened and Endangered Species

All projects in the region were included in the threatened and endangered species cumulative impacts evaluation because the presence of threatened and endangered species is likely similar at all proposed sites in the region.

Based on consultation with the United States Fish and Wildlife Service (USFWS) and New York State National Heritage Program (NHP), except for transient individuals, no threatened or endangered species or communities were identified within the Ball Hill Project Area (see section 2.9, Biological Resources: Environmental Setting).

During field surveys, one state-endangered species (Golden Eagle), two state-threatened species (Bald Eagle and Northern Harrier); and seven state species of special concern (Common Loon, Osprey, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered Hawk, Horned Lark, and Grasshopper Sparrow), were observed in the Project Area; all in low numbers. The only non-bird species that are listed as threatened and endangered and may potentially occur in the Project Area are the endangered clubshell and special concern rayed bean, both mollusks. Both of these species are freshwater mussels that have been found in the Lake Erie area. These species are listed county-wide on USFWS's Web site. There has been no indication from the USFWS that these species occur within the Project Area. As such, cumulative impacts to these populations will not be experienced. Only limited use of the Project Area is anticipated by endangered, threatened, and special concern species during construction as most of any occurrences would be related to migration or transient (i.e., limited) use. Therefore, no significant adverse impacts on these species are expected during construction. In addition, no critical habitat for any threatened or endangered species were identified within the Project Area. As a result, no impacts to such habitat will occur. An Environmental Monitor will survey the work area for active nests if construction takes place in suitable nesting habitat for endangered or threatened bird species in the spring or early summer (breeding season).

As part of the DEIS prepared for the New Grange project, both the USFWS and NHP were consulted, and except for transient individuals, no threatened or endangered species or significant communities were identified within the Project Area (Tetra Tech 2007). No critical habitat for such species was identified in the Project Area. Similar species occurring in the vicinity of the Project were identified as occurring in the vicinity of the New Grange project. Northern Harrier, Coopers Hawk, and Red-shouldered Hawk were all observed at the New Grange project site during avian surveys. Due to the proximity of the Pomfret project to the New Grange project, it can be considered likely that the USFWS and NHP will identify similar species as occurring in the vicinity of the Ball Hill Project Area. If additional threatened or endangered species are identified at Pomfret that were not identified as part of the consultation process for Ball Hill and New Grange, they would likely be site-specific species and would not experience cumulative impacts from the construction of the Ball Hill Windpark or New Grange projects. No threatened and endangered species information was available for the other projects in the region. Steel Winds was built on a Brownfield site with limited habitat for wildlife, therefore, the presence of threatened and endangered species is unlikely.

Little to no use of these areas is anticipated by federally endangered, threatened, and special concern species; therefore, the potential cumulative risk to federally threatened and endangered species from both construction and operation of multiple windparks is considered low.

3.6 Visual

The topography and vegetation at the Project Area and the surrounding region are such that visual impacts from other proposed projects in the region would be significantly shielded from most viewpoints. The farther one travels from a windpark, the more diminished the impacts and visual influence of the Project become. The dominance of the Ball Hill Windpark on the landscape will either be diminished to a distant background view as one travels further from the Project Area or, in most cases, will not be visible at all. As such, cumulative impacts are considered only for those projects within a 20-mile radius from the Ball Hill Project Area.

Noble retained the services of Saratoga Associates, Landscape Architects, Architects, Engineers, and Planners, P.C. (Saratoga) to evaluate the potential cumulative impact of the Ball Hill Windpark along with the proposed New Grange project to the regional viewshed within and outside of the Project's 5-mile study area.

No cumulative visual impacts are expected during construction of the wind power projects due to the distance between the projects (1 mile between the nearest turbines). Construction of each wind power project will require use of mobile cranes and other large construction vehicles. Components will be delivered in sections via large semi-trucks. However, the construction period is expected to be relatively short (approximately nine to 12 months). As such, construction-related visual impacts at any given receptor location will be brief and are not expected to result in adverse prolonged visual impacts to area residents or visitors. As previously stated, the construction schedule for the New Grange Windpark may overlap with the Ball Hill Windpark; however, as identified in Table 3.1-1, these projects are located at a sufficient distance apart to not contribute to cumulative visual impacts during construction. The Pomfret Windpark will almost certainly be on a different construction schedule due to its current stage of development in comparison to Ball Hill and New Grange.

Cumulative visual impacts may occur during operation of the multiple wind power projects. The proposed New Grange project is comprised of 47, 410-foot tall vertical structures distributed throughout the landscape; topped with large rotating blades. For the purposes of this analysis, the Pomfret Project is assumed to be comprised of 49, 389-foot-tall 1.5-MW turbines. The introduction of such clearly man-made and kinetic structures creates an obvious disruption of the rolling agricultural landscape of the 5-mile study area. However, the white or off-white colors of the turbines will be highly compatible with the hue, saturation, and brightness of the background sky and distant elements of the natural landscape. Furthermore, the tubular style towers at each wind power project have been specifically selected to minimize textural contrast and provide a more simple visually appealing form.

To assess the cumulative visual impacts resulting from operation, a series of viewshed maps were created to show where there was a possibility to see both the New Grange and Ball Hill turbines from locations within the Ball Hill Windpark's 5-mile study area. The Pomfret Project was not considered in this analysis, as the location of proposed turbines was not (and still is not) known at the time the analysis was conducted. The viewshed mapping process is discussed in Section 2.13, Visual Resources: Environmental Setting. A cumulative viewshed map is provided as Figure B1 of Appendix B of the Visual Resource Assessment (VRA) (see Appendix K). Theoretically, one or more turbines would be visible from approximately 35% of the entire 5-mile Ball Hill study area (comprised of 100,022 acres).

To demonstrate how the actual turbines will appear within the study area, two locations, Prospect Road in the Town of Villenova (VP #2) and Route 83 in the Town of Arkwright (VP #33), were identified for photo simulations to represent the most likely locations where both windparks will be visible. The simulations are provided as Figures B2-a through B3-d of Appendix B of the VRA (see Appendix K).

Based on an evaluation of the aesthetic resources, land uses, users groups, and visual simulations, it is apparent that each project will change the visible landscape of the region and create a distinct visual aspect. Although there will be an increase in the number of locations in the area where one or more turbines can be seen, it is unlikely that the quality of the view will change if multiple turbines are visible. Generally, visibility of the projects may be found on higher elevations along road corridors or open agricultural lands. The cumulative impact of the projects is highly variable depending on: the number of turbines constructed; the proximity of the turbines to the viewer, whether the viewer is stationary or moving; and the landscape setting.

Cumulative shadow flicker will not result from operation of the wind power projects and the Project. The New Grange windpark is located at a far enough distance to not contribute to cumulative shadow flicker. It is generally accepted that shadow flicker will have no affect on properties at a distance farther than 10 turbine rotor diameters (approximately 2,625 feet from turbines in the Ball Hill Windpark and approximately 2,950 feet for the New Grange Windpark). Beyond this distance a person should not perceive a wind turbine to be intercepting sunlight, but rather as an object with the sun behind it; thus, the intensity of the blade shadow is considered negligible at distances beyond 2,625 feet from a turbine on the Ball Hill Windpark. The distance between the closest turbines on the Ball Hill Windpark and New Grange windfarm is approximately 1 mile (5,280 feet). The location of turbines at the Pomfret project, approximately 12 miles from the Ball Hill Project Area, is unknown; as such, the incidence of shadow flicker at that site is also unknown. It can be assumed that no cumulative shadow flicker impacts will result from the operation of the Pomfret Windfarm based on the distance of Pomfret from the Ball Hill Project Area.

Cumulative visual impacts from aviation safety lighting placed on turbines are anticipated in the same geographic areas as the viewshed for the turbines. The more turbines that are visible from a location will generally result in more turbines with safety lighting being visible from that same location. However, not all turbines proposed for the Ball Hill and New Grange projects will have safety lighting. The cumulative impact is highly variable depending on the final number of turbines with lighting. Factors affecting visual impact may include: the proximity of the turbines to the viewer, whether the viewer is stationary or moving; and the landscape setting. The lighting plan as part of the DEIS for New Grange proposes lights on 21 of the 47 turbines. Thirty-four of the 60 proposed turbines as part of the Ball Hill Windpark will have simultaneously flashing red lights. Pomfret will also be required to light turbines at night for aviation safety purposes.

3.7 Sound

Because sound impacts are limited by the distance sound travels, only the New Grange project has the potential to contribute to a cumulative sound impact during construction and operation of the projects. Pomfret was considered in this analysis, but based on distance from the Ball Hill Project Area, it is not likely to contribute to cumulative sound impacts. Construction of the Ball Hill Windpark and the New Grange Windpark will contribute minimal noise impacts in the vicinity of the respective project areas. Any noise impacts resulting from construction of the projects would be considered localized and temporary in nature. The anticipated construction periods of New Grange and Ball Hill could potentially overlap. However, given the distance between the projects, cumulative construction noise impacts are not expected. The distance between the closest turbines on the Ball Hill and New Grange windparks is approximately 1 mile (5,280 feet). The Pomfret Windpark will almost certainly be on a different construction schedule due to its current stage of development in comparison to Ball Hill and New Grange.

Operational noise impacts will be localized in the area of the proposed turbines at each wind power project. The New Grange Windpark Project Area is located immediately west of the Ball Hill Windpark. The predicted noise contours for the two projects based on a worst-case L90 background level with an omnidirectional 6 meters per second (m/s) wind do not overlap. Appendix L and the DEIS for New Grange illustrate the predicted contours. The Pomfret Windpark can be assumed to emit similar noise levels.

3.8 Traffic and Transportation

Roads in the vicinity of the projects will experience increased traffic volumes during the construction of each project due to equipment and material deliveries. Because the Pomfret Windfarm and other currently proposed projects in the region will almost certainly be on a different construction schedule due to their current stage of development, only the New Grange project, which is on a similar construction schedule, has the potential to contribute to cumulative traffic and transportation impacts.

No major or extended road closures or improvements are expected to be required to construct any of the projects. Minor intersection improvements will be required to accommodate the turning radii of oversize trucks. Because there is currently little or no congestion on the roads in the Project Area, it is expected that increased traffic volumes from both projects will result in minimal delay for local traffic.

Potential impacts during construction for each project will include damage to area roads and bridges. However, this will only be significant if the projects are constructed simultaneously and if the same haul routes are used. Roadway repairs as a result of damage incurred by Project construction activity will be coordinated through road-use agreements with the Towns and the County. The process of creating a road use agreement will allow the Towns' plans for scheduled paving and resurfacing to be coordinated with improvements and repairs by the wind power projects' developers.

If construction of New Grange Windpark ultimately overlaps with construction of the Ball Hill Windpark, any cumulative impacts will be temporary and short-term in nature. Based on current proposed haul routes, the haul routes for New Grange and Ball Hill Projects may overlap. The proposed haul route for the New Grange project is Route 83 from New York State (NYS) Route 60. The Transportation Haul Route Study (see Appendix N) indicates that the preferred off-site route to the Ball Hill Project Area is the Northwest Access Alternative 2 route (NYS Route 39 from NYS Route 20 from the west). Northwest Access Alternative 1 is the same haul route proposed for the New Grange windpark. If Alternative 2 is ultimately selected, there will be potential overlap in the use of portions of Route 60.

In addition, delivery routes may change during the design and construction preparation. In the event that simultaneous hauling of equipment occurs in the area, Noble would re-evaluate roadway conditions and make appropriate modifications. In the New York State Department of Transportation (NYSDOT) permitting process, a final route survey will be developed that identifies road improvements necessary to accommodate delivery and construction vehicles when re-routing is impractical. This final plan is also coordinated with road-use agreements between the Towns and the County.

As previously stated, existing road traffic within Chautauqua County is below capacity and existing traffic conditions are light. A limited number of light trucks will occasionally access the facilities for service and maintenance; therefore, operation of the projects is not expected to have permanent impacts on local traffic and transportation.

3.9 Land Use

Based on proximity, only the New Grange and Pomfret projects have the potential to contribute to land use impacts. Impact from the other projects in the region will be localized and will not have a synergistic or region-wide cumulative impact with the proposed Ball Hill Windpark. Activities associated with Ball Hill, New Grange, and Pomfret will result in temporary and permanent impacts to land use, primarily conversion from one land use to another.

Impacts will be greater during construction due to the need to build wider temporary access roads to support construction vehicles. Impacts will be reduced during operation when the width of these roads is reduced. For each project, locations of the turbines were chosen in large part to minimize the loss of active agricultural land and the interference with farm operations and other environmental resources.

Although, by their nature, each project will significantly change the appearance of the landscape, the projects are generally consistent with land use patterns within the region and there is not expected to be a significant cumulative increase in the overall land use impact due to the operation of the projects. Land use in the region is described as rural-agricultural. The regional rural character is generally defined by its wide open agricultural parcels and limited residential density due to the presence of farms. The projects are located entirely on private lands in areas dominated by active agricultural and forested lands. Therefore, impacts to residential, commercial, and recreational land use have been avoided.

The proposed projects are compatible with agricultural land use, which dominates the region. Chautauqua County is comprised of approximately 255,896 acres of agricultural land, which represents approximately 38% of the county (Fedstats 2008). The total acreage of farmland that will be permanently impacted by conversion to nonagricultural uses for Ball Hill and New Grange is approximately 109 acres (40 for Ball Hill and 69 for New Grange). The permanent impact from

Pomfret is unknown, but can be assumed to result in a similar acreage of permanent agricultural impact as the other sites. Regardless, cumulative loss of farmland will not significantly affect the total acreage of farmland in the region. Furthermore, while the impacts to land use generally occur on agricultural lands, agricultural activities on the individual farms will be allowed to continue in the future.

Full compliance with the local laws regulating the development of wind power facilities will ensure that cumulative impacts on land use are minimal. The Town laws regulating wind energy facilities have specific agricultural mitigation measures based on New York State Department of Agriculture and Markets (NYSDAM) guidelines, which include location of structures along field edges where possible, location of access roads along ridge tops, avoidance of dividing large fields into smaller fields, and avoidance and maintenance of all existing drainage and erosion control structures.

3.10 Socioeconomics

None of the projects in the region are expected to adversely impact housing and population. It is likely that motels/hotels in larger population centers, such as Dunkirk-Fredonia, Jamestown, and Buffalo, will be able to absorb the temporary influx of construction workers to the area, even if Ball Hill and New Grange are constructed simultaneously. The hotels and motels will profit from extended construction worker stays during the construction period of each project. The length of time that these profits will be realized increases when considering the cumulative benefit of construction of multiple wind projects in the area. During construction of the projects, the local economy will experience several significant cumulative benefits from construction including an increase in local economic activity and purchases of automotive fuel, meals, and other items.

The sales data collected in existing wind farm markets indicate that the construction and operation of wind power projects has no influence on property values (see Section 2.26, Socioeconomics: Impacts and Mitigation, and Appendix P). Furthermore, the projects will have a positive long-term cumulative impact on the local economy in the form of payments in lieu of taxes (PILOTs) to local municipalities, license agreements with host communities, and lease revenues to participating landowners.

3.11 Cultural Resources

The construction and operation of the Ball Hill Windpark will not have any impacts on archaeological resources in the Project Area. Since there will be no Project-specific impacts, there is no potential for contribution to cumulative archaeological impacts of the other proposed wind power projects in the region.

Based on the conservative 20-mile radius developed for cumulative visual impacts, those projects within that radius (New Grange and Pomfret) would contribute to cumulative impacts on architectural resources. Construction of the Ball

Hill Windpark will not have any direct impacts on architectural resources (i.e., demolition of any National Register Listed [NRL] listed or National Register Eligible [NRE] buildings) and no direct impacts have been identified in connection with the New Grange project. There is, however, a potential for each of the proposed projects in the region to have visual and noise impacts on structures potentially eligible for the National Register of Historic Places (NRHP) due to construction activities. It is unlikely that these impacts will be significant due to their temporary nature. (See discussions of visual and noise impacts during construction in Section 2.14, Visual Resources: Impacts and Mitigation, and 2.16, Sound: Impacts and Mitigation, respectively.) Architectural and archaeological data on Pomfret is not available for analysis. Therefore, the quantitative analysis of cumulative impacts of proposed projects in the region on historic architectural resources was limited to New Grange, based on the availability of detailed project information.

Operation of all three wind power projects with the 20-mile cumulative visual impact area will result in visual impacts on NRE and NRL properties within the region. Noble's archaeological and architectural resource consultants, Panamerican, identified eight NRE and 138 potentially eligible structures within the 5-mile Noble Ball Windpark study area. Within the 5-mile APE for New Grange, five NRL and 35 NRE were identified. One or more turbines may be visible from most of the structures. The visual impacts on these NRE structures resulting from the operation of the other projects will be additive in the sense that more turbines are potentially visible from each property. The impact will vary depending on the number of turbines from each project that may be visible from a given property. The cumulative impacts to these resources will be reduced by a number of factors including topography, distance from the turbines, existing landscaping and vegetation, and surrounding land uses. Mitigation will be required as a condition of the construction of each of the projects to offset these impacts.

3.12 Environmental Benefits

Construction and operation of all of the proposed projects in the region will have significant long-term beneficial effects on the use and conservation of energy resources. The construction and operation of the wind power projects in Chautauqua County clearly contributes to New York State's Renewable Portfolio Standard Policy, which calls for an increase in renewable energy used in the state to 25% by the year 2013 (NYPSC 2006). Collectively, the projects will have a nameplate capacity of 175 MW of electricity from a renewable resource without any fossil-fuel emissions. Increased production of renewable energy is expected to be part of the solution to reduce the use of polluting sources of energy thus reducing the negative impacts of global climate change and air emissions on people and wildlife.

4

List of Preparers

Table 4-1 List of Preparers, DEIS for the Noble Ball Hill Windpark

Preparer	Address	Primary Contact	Phone	Email Address
Noble Environmental Power, LLC	7294 Centerville Road P.O. Box 72 Bliss, NY 14024	Kristin Hawley Lael Eason	585-322-7675	hawleyk@noblepower.com; easonl@noblepower.com
Ecology and Environment, Inc.	368 Pleasant View Drive Lancaster, NY 14086	Cory Zahm Joe Forti	716-684-8060	czahm@ene.com; jforti@ene.com
DMJM Harris, Inc.	605 3rd Avenue New York, NY 10158	Joanna Wasserman	212-973-2900	joanna.wasserman@dmjmharris.com
Klauk, Lloyd and Wilhelm, Inc.	247 Cayuga Rd Buffalo, NY 14225	Darrell Lloyd, Jr.	716-632-2100	klwgroup@klwgroup.com
Panamerican Consultants, Inc.	2390 Clinton Street Buffalo, NY 14227	Michael Cinquino	716-821-1650	mcinquino@panamconsultants.com
Careba Power Engineers, LLC	400 Blue Hill Drive, Suite 190 Westwood, MA 02090	Jim Harrington	781-915-0015	jimharrington@carebapower.com
Hessler Associates, Inc.	3862 Clifton Manor Place, Suite B Haymarket, VA 20169	David Hessler	703-753-1602	davidhessler@earthlink.net
Saratoga Associates	5701 East Circle Drive #186 Cicero, NY 13039	John Guariglia	315-288-4286	jguariglia@saratogaassociates.com
ESS Group, Inc.	888 Worcester Street, Suite 240 Wellesley, MA 02482	Roger Hill	781-489-1154	rhill@essgroup.com
Alaska Biological Research, Inc.	P.O. Box 249 Forest Grove, OR 97116	Todd Mabee	503-359-7525	tmabee@abrinc.com
Woodlot Alternatives, Inc. (now Stantec)	30 Park Drive Topsham, ME 04086	Joy Prescott	207-729-1199	jprescott@stantec.com
LVI Environmental Services Inc.	120 Elmgrove Park, Rochester, NY 14624	Sean Miller	585-458-3570	SMiller@lviservices.com
Comsearch	19700 Janelia Farms Blvd Ashburn, VA 20147	Lester Polisky	703-726-5500	lpolisky@comsearch.com

5

References

AirNav 2008, Web site, http://www.airnav.com, accessed July 2008.

American Wind Energy Association (AWEA) 2007, Windpower Today Fact Sheet, available at http://www.awea.org/pubs/factsheets/WindPowerToday_2007.pdf, accessed July 2008.

___________, 2006, Windpower Myths vs. Facts, available at http://www.awea.org/pubs/factsheets/050629_Myths_vs_Facts_Fact_Sheet.pdf, accessed September 2007.

Andrle, R. and J. Carroll, 1988, The Atlas of Breeding Birds in New York State, Cornell University Press, Ithaca, New York.

Arnett, E. B., W. K. Brown, W. P. Erickson, J. K. Fiedler, B. L. Hamilton, T. H. Henry, A. Jain, G. D. Johnson, J. Kerns, R. R. Koford, C. P. Nicholson, T. J. O'Connell, M. D. Piorkowski, R. D. Tankersley, Jr., 2008, Patterns of Bat Fatalities at Wind Energy Facilities in North America, *Journal of Wildlife Management*, 72(1): 61-78.

Bat Conservation International (BCI), 2008, Web site was reviewed for specific information regarding the status and research of bats in the New York State and the region, available at http://www.batcon.org/home/default.asp, accessed June 2008.

BirdLife International, on behalf of the Bern Convention (BirdLife), 2003, R. H. W. Langston and J. D. Pullan, editors, Windfarms and Birds: An analysis of the effects of windfarms on birds, and guidance on environmental assessment criteria and site selection issues, Convention of the Conservation of European Wildlife and Natural Habitats, Standing Committee, 23rd Meeting, Strasbourg; 1-4 December 2003, T-PVS/Inf (2003) 12.

Buffalo Ornithological Society (BOS), 2006, Database of sightings, Buffalo Ornithological Society, Inc., Buffalo, New York.

Butler, Robert W. 1992. Great Blue Heron (Ardea herodias), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/025.

Chambers, R. E., 1983, *Integrating timber and wildlife management handbook*, State University of New York and the New York State Department of Environmental Conservation.

Curtis, P. D. and K. L. Sullivan, 2001, Wildlife Management Fact Sheet Series: Bats. Cornell Cooperative Extension, Ithaca, New York.

DeGraaf, R. M. and M. Yamasaki, 2001, *New England Wildlife: Habitat, natural history, and distribution*, University Press of New England, Hanover, New Hampshire.

Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors), 2002, *Ecological Communities of New York State*, Second Edition, A revised and expanded edition of Carol Reschke's *Ecological Communities of New York State* (Draft for review), New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, New York.

Empire State Electric Energy Research Corp, 1977, *Power Plant Construction Noise Guide.*

Erickson W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, K. Sernka, 2002, *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*, prepared for Bonneville Power Administration, 124 p.

Erickson, W., G. Johnson, M. Strickland, K. Sernka, and R. Good, (at WEST, Inc.), 2001, *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*, a guidance document for National Wind Coordinating Committee (NWCC), Washington, D.C.

Fedstats, 2008, Chautauqua County Statistics, available at http://www.fedstats.gov/qf/states/36/36013.html, accessed June 2008.

Fried, E., L. Gridley, and S. Zeh, 1977, *Identifying Significant Habitats in New York*, New York State Department of Environmental Conservation, Wildlife Habitat Section, Albany, New York.

Garrad Hassan Canada Inc., 2007, Recommendations for risk assessment of ice throw and blade failure in Ontario, available at http://www.canwea.ca/images/uploads/File/GH-RiskAssessment-38079or01a(1).pdf, accessed July 2008.

Gill, F. B., 1995, *Ornithology*, Second Edition, W. H. Freeman and Company, New York.

HawkCount, 2008, HawkCount: A project of the Hawk Migration Association of North America, available at http://www.hawkcount.org, accessed June 2008.

__________, 2007, HawkCount: A project of the Hawk Migration Association of North America, available at http://www.hawkcount.org, accessed June 2008.

Hultgren, J. 1990. Small electric currents affecting farm animals and man: a review with special reference to stray voltage. II. Physiological effects and the concept of stress. Veterinary Research Communications 14(4).

Jain et al., 2008, Annual Report for the Maple Ridge Wind Power Project Post-construction Bird and Bat Fatality Study – 2007. Report prepared for PPM Energy and Horizon Energy and Technical Advisory Committee for the Maple Ridge Project Study, May 2008.

Jain, A., P. Kerlinger, R. Curry, and L. Slobodnik, 2007, Annual Report for the Maple Ridge Wind Power Project Postconstruction Bird and Bat Fatality Study - 2006. Report prepared for PPM Energy and Horizon Energy and Technical Advisory Committee for the Maple Ridge Project Study, May 2007.

Kerns, J., D. P. Young, C. S. Nations, and V. K. Poulton, 2008, Avian and Bat Studies for the Proposed New Grange Wind Project, Chautauqua County, New York, Final report prepared by WEST, Inc. for New Grange Wind Farm LLC.

Kerlinger, 1989, *Flight Strategies of Migrating Hawks*, University of Chicago Press, Chicago, Illinois.

Klauk, Lloyd & Wilhelm, Inc. (KLW), 2008, *Real Estate Consulting Report of Influence on Wind Farms on Residential Real Estate Values, Proposed Noble Ball Hill Windpark, Towns of Villenova and Hanover, Chautauqua County, New York*, prepared by Darrel R. Lloyd, Jr., Klauk, Lloyd & Wilhelm, Inc., 247 Cayuga Road, Buffalo, New York 14225.

Kunz, T. H., E. B. Arnett, W. P. Erickson, A. R. Hoar, G. D. Johnson, R. P. Larkin, M. D. Strickland, R. W. Thresher, and M. D. Tuttle, 2007, Ecological Impacts of Wind Energy Development on Bats: Questions, Research Needs, and Hypotheses, *Front Ecol Environ* 5(6): 315-324.

Mabee et al., 2006a, A radar and visual study of nocturnal bird and bat migration at the proposed Centerville and Wethersfield windparks, New York, spring 2006. Report prepared for E & E and Noble Environmental Power L.L.C., July 2006.

Mabee et al., 2006b, A radar and visual study of nocturnal bird and bat migration at the proposed Centerville and Wethersfield windparks, New York, fall 2006. Report prepared for E & E and Noble Environmental Power L.L.C., December 2006.

Muller, E. H., 1963, Geology of Chautauqua County, New York Part II: Pleistocene Geology, *New York State Museum and Science Survey Bulletin 392*, http://nysl.nysed.gov/uhtbin/cgisirsi/20080528014922/SIRSI/0/518/0/bulletin/Content/1?new_gateway_db=HYPERION&user_id=CATALOG, accessed May 2008.

National Center for Education Statistics, 2008, “District Information,” available at http://nces.ed.gov/globallocator/, accessed September 2007.

National Research Council (NRC), 2007, Environmental Impacts of Wind-energy Projects. Committee on Environmental Impacts of Wind Energy Projects Board on Environmental Studies and Toxicology, Division on Earth and Life Studies. National Academies Press, Washington, D.C.

National Weather Service, 2006, Annual Average Snowfall, available at http://www.erh.noaa.gov/buf/spotters/totalsnow.htm, accessed May 2008.

National Wind Coordinating Committee (NWCC), 2004, *Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions*, National Wind Coordinating Committee.

New York Independent System Operator (NYISO), 2008, NYISO queue of Interconnect Requests as of 7/1/2008, available at http://www.nyiso.com/public/webdocs/services/planning/nyiso_interconnection_queue/nyiso_interconnection_queue.pdf, accessed July 2008.

New York State Climate Office, 2006, “The Climate of New York,” Ithaca, New York: Department of Earth and Atmospheric Sciences, Cornell University, available at http://nysc.eas.cornell.edu/, accessed May 2008.

New York State Department of Agriculture and Markets (NYSDAM), 2006, Agricultural Districts, available at http://www.agmkt.state.ny.us/AP/agservices/agdistricts.html, accessed May 2008.

New York State Department of Environmental Conservation (NYSDEC), 2008a, Well Water Information-Search Wizard, http://www.dec.ny.gov/cfmx/extapps/WaterWell/index.cfm, June 3, 2008.

___________, 2008b, Part 701: Classifications-Surface Waters and Ground Waters. http://www.dec.ny.gov/regs/4592.html#15991, June 3, 2008.

___________, 2008c, PFR on Selected Waters in New York: Waters with Public Fishing Rights.http://www.dec.ny.gov/outdoor/9924.html, June 4, 2008.

___________, 2008d, Steelhead streams in Western New York, http://www.dec.ny.gov/outdoor/32426.html, July 1, 2008.

___________, 2008e, New York State Breeding Bird Atlas 2000-2005, Website accessed at http://www.dec.state.ny.us/website/dfwmr/wildlife/bba/index.html in June 2008.

___________, 2007a, Black Bears in New York: Natural History, Range, and Interactions with People, Second Addition available at http://www.dec.ny.gov/docs/wildlife_pdf/BBNaturalhistory.pdf, accessed June 2008.

___________, 2007b, Indiana Bat Fact Sheet, Web site accessed at http://www.dec.ny.gov/animals/6972.html, in July 2007.

___________, 2005, "New York State's Largest Coal Plants to Slash Pollution Levels," *Environment DEC*, February 2005.

___________, 2004, Web site, http://www.dec.ny.gov/environmentdec/25450.html, accessed May 2008.

___________, 2001, Program Policy, *Assessing and Mitigating Noise Impacts* published by NYSDEC.

___________, 1998, Herp Atlas Project, Available online at http://www.dec.ny.gov/public/7140.html, accessed June 2008.

New York State Energy Planning Board, 2002, *2002 New York State Energy Plan and Final Environmental Impact Statement,* Albany, New York.

New York State Energy Research and Development Agency (NYSERDA), 2008, Patterns and Trends: New York State Energy Profiles, 1992-2006, January 2008, available at http://www.nyserda.org/publications/Patterns%20&%20Trends%20Final%20-%20web.pdf, accessed June 2008.

___________, 2007, New York's Continued Commitment to Clean, Renewable Energy Could Foster $1.4 billion of Investments in New York (Press Release), April 19, 2007, available at http://www3.dps.state.ny.us/pscweb/WebFileRoom.nsf/0/8F923D3AC3D762F5852572C200678A9C/$File/pr07033.pdf?OpenElement, accessed June 2008.

__________, 2002, *2002 State Energy Plan and Final Environmental Impact Statement.* pg. 3-106, available at http://www.nyserda.org/Energy_Information/energy_state_plan.asp, accessed September 2007.

New York State Historic Preservation Office (NYSHPO), 2006, *Guidelines for Wind Farm Development Cultural Resources Survey Work.*

New York State Museum, 1991, GIS Data, available at http://www.nysm.nysed.gov/gis/, accessed May 2008.

New York State Office of Real Property Services (NYSORPS), New York State Office of Real Property Services, 2008, NYS ORPS Municipal Profile, available at http://www.orps.state.ny.us/MuniPro/.

New York State Public Service Commission (NYPSC), 2006, Retail Renewable Portfolio Standard, available at http://www.dps.state.ny.us/03e0188.htm, accessed June 2008.

Niver, R. A., 2008, personal communication, telephone message on September 12, 2008, from Ms. Robin Niver, USFWS, to Ms. Joanna Craigmile, Ecology and Environment, Inc., Lancaster, New York.

__________, 2007, personal communication, letter dated September 17, 2007, from Ms. Robyn A. Niver, Endangered Species Biologist, U.S. Fish and Wildlife Service, Cortland, New York, to Ms. Christine Sousa, Ecology and Environment, Inc., Lancaster, New York.

Olcott, Perry G., 1995, USGS groundwater atlas of the United States: Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont. HA 730-M. http://capp.water.usgs.gov/gwa/ch_m/index.html Accessed May 2008.

Peterson, Richard, 2008, “Reduce the Risk of Stray Voltage,” *Northeast Dairy-Business • PRO-DAIRY*, pgs. 39-40.

Price, J. and P. Glick, 2004, *A Birdwatcher’s Guide to Global Warming*, The National Wildlife Federation and American Bird Conservancy.

Wisconsin Public Service Commission (PSC), 2004, “Environmental Impacts of Transmission Lines,” Public Service Commission, Madison, Wisconsin.

Richardson, J. W., 1998, *Bird Migration and Wind Turbines: Migration Timing, Flight Behavior, and Collision Risk*, proceedings from the National Avian-Wind Power Planning Meeting III.

Rogers, L. L., and Arthur W. Allen, 1987, Habitat suitability index models: black bear, Upper Great Lakes Region, National Ecology Center, United States Fish and Wildlife Service, *Biol. Rep*., Vol. 82, No. 10, p. 144.

Scorecard Pollution Information Site (Scorecard), 2008, retrieved June 2, 2008 from http://www.scorecard.org/env-releases/cap/rank-counties-risk.tcl?fips_state_code=36.

Seoane, T., 2008, Letter dated June 3, 2008, from Ms. Tara Seoane, Information Services, New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, New York, to Ms. Laurie Weaver, Ecology and Environment, Inc., Lancaster, New York.

__________, 2006, Letter dated October 17, 2006, from Ms. Tara Seoane, Information Services, New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, New York, to Ms. Christine Sousa, Ecology and Environment, Inc., Lancaster, New York.

Siefert, H., A. Westerhellweg, J. Kröning, 2003, Risk analysis of ice throw from wind turbines, Paper presented at BOREAS VI, 9 to 11 April 2003, Pyhä, Finland.

Smithsonian National Zoological Park Migratory Bird Center (Smithsonian Migratory Bird Center), 2006, Fact Sheets: Neotropical Migratory Bird Basics, available at http://nationalzoo.si.edu/ConservationAndScience/MigratoryBirds/Fact_Sheets/default.dfm?fxsht=9, accessed September 2007.

Staehle, R. W., L. E. Anderson, H. E. Dzuik, D. Hird, A. R. Liboff, C. Polk, J. L. Richardson, L. E. Stetson, P. J. Hoben, R. C. Hendrickson, 1998, Research Findings and Recommendations Regarding Claims of Possible Effects of Currents in the, Earth on Dairy Cow Health and Milk Production: Final report of the science advisors to the Minnesota Public Utilities Commission.

State of New York Office of State Comptroller (OCS), 2008, Division of Municipal Affairs, State of New York, Office of the State Comptroller, Division of Local Government Services and Economic Development - Financial Data for Local Governments, 2008, available at http://www.osc.state.ny.us/localgov/datanstat/findata/index_choice.htm, accessed June 2008.

Tesmer, Irving, 1963, Geology of Chautauqua County, New York, Part I: Stratigraphy and Paleontology. *New York State Museum and Science Survey Bulletin 391*. http://nysl.nysed.gov/uhtbin/cgisirsi/20080528014922/SIRSI/0/518/0/bulletin/Content/1?new_gateway_db=HYPERION&user_id=CATALOG Accessed May 2008.

Tetra Tech, 2007, Draft Environmental Impact Statement for Horizon New Grange Wind Farm, available at http://www.newgrangewind.com, accessed May 2008.

United States Census Bureau, 2008, *American FactFinder*, available at http://factfinder.census.gov/home/saff/main.html?_lang=en, Accessed June 2008.

United States Department of Agriculture (USDA), 2005a, Natural Resource Conservation Service, Soil Survey Geographic (SSURGO) Database - Soil Data Mart, available at http://www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/, accessed May 2008.

___________, 2005b, Official Soil Series Descriptions-Soil Survey Division, Available online at http://soils.usda.gov/technical/classification/osd/index.html, accessed May 2008.

___________, 2002, 2002 Census of Agriculture, County Level Data, available at http://www.nass.usda.gov/census/census02/volume1/ny/st36_2_001_001.pdf, accessed May 2008.

United States Department of Energy (USDOE), 2005, EIA *Electric Power Monthly*, February 10, 2005.

___________, 2003, Energy Efficiency and Renewable Energy, Wind Energy Provisions in the 2002 Farm Bill, available at http://www.eere.energy.gov/windandhydro/windpoweringamerica/ag_farm_bill.asp, accessed September 2007

United States Environmental Protection Agency (EPA), 2008a, Safe Drinking Water Information System, http://oaspub.epa.gov/enviro/sdw_query_v2.get_list?wsys_name=&fac_search=fac_beginning&fac_county=Chautauqua&pop_serv=500&pop_serv=3300&pop_serv=10000&pop_serv=100000&pop_serv=100001&sys_status=active&fac_state=NY&page=1, accessed June 3, 2008.

___________, 2008b, "Nonattainment Status for Each County by Year," March 12, 2008, retrieved June 2, 2008 from http://www.epa.gov/oar/oaqps/greenbk/anay.html.

___________, 2008c, "EPA Clean Air Market Data and Maps." Retrieved June 2, 2008 from http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard&EQW_datasetSelection.

United States Government Accountability Office (GAO), 2005, Wind Power: Impacts on Wildlife and Government Responsibilities for Regulating Development and Protecting Wildlife, a report to Congressional Requesters, GAO-05-906, September 2005.

United States Fish and Wildlife Service (USFWS), 2008a, Northeast Region, Ecological Services, New York Field Office Endangered Species, available at http://www.fws.gov/northeast/nyfo/es/section7.htm, accessed in May 2008.

___________, 2008b, The White-Nose Syndrome Mystery: Something is Killing Our Bats, website accessed at http://www.fws.gov/northeast/white_nose.html, in July 2008.

____________, 2007a, Northeast Region, Ecological Services, New York Field Office Endangered Species, website accessed at http://www.fws.gov/northeast/nyfo/es/section7.htm, in September 2007.

___________, 2007b, Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision, Fort Snelling, Minnesota, U.S. Department of Interior, Fish and Wildlife Service, Region 3, 260 pp.

____________, 2002, Migratory Bird Mortality: Many Human-Caused Threats Afflict our Bird Populations, USFWS fact sheet, January 2002.

United States Geological Survey (USGS), 2008a. "Earthquake Hazards Program," Regional Information, New York State Earthquake Information. http://earthquake.usgs.gov/regional/states.php?regionID=32&region=New%20York Accessed April 2008

___________, 2008b, Aquifer Basics, http://capp.water.usgs.gov/aquiferBasics/index.html, accessed June 3, 2008.

___________, 2005, *Sand and Gravel Aquifers of Alluvial and Glacial Origin*, available at http://capp.water.usgs.gov/aquiferBasics/sandgravel.html, accessed September 2007.

U.S. Geological Survey National Wildlife Health Center, 2008, White-Nose Syndrome (WNS), website accessed at http://www.nwhc.usgs.gov/disease_information/white-nose_syndrome/, in July 2008.

Williams, K., R. Mies, D. Stokes, and L. Stokes, 2002, *Stokes Beginner's Guide to Bats*. Little, Brown, and Company, Boston, Massachusetts.

Woodlot Alternatives, Inc. (Woodlot), 2008a, Fall 2006 Radar Surveys at the Proposed Ball Hill Windpark in Villenova and Hanover, New York. Prepared for Noble Environmental Power, LLC and Ecology and Environment, Inc., January 2008.

__________, 2008b, A Spring 2007 Radar, Visual, and Acoustical Survey of Bird and Bat Migration at the Proposed Ball Hill Windpark in Villenova and Hanover, New York. Prepared for Noble Environmental Power, LLC and Ecology and Environment, Inc., July 2008.

Zalles and Bildstein, 2000, Raptor watch: A global directory of raptor migration sites, BirdLife International, Cambridge, United Kingdom and Hawk Mountain Sanctuary, Kempton, Pennsylvania, BirdLife Conservation Series No. 9.

A

Construction Drawings, Specifications, and Engineering Standards

General Notes

GENERAL NOTES

1. UNLESS OTHERWISE SPECIFIED BY INDIVIDUAL LANDOWNERS, THE CONTRACTOR SHALL INSTALL TEMPORARY ACCESS GATES A MINIMUM OF 50' OFF OF THE EXISTING STATE, COUNTY, AND TOWN ROADS TO CONTROL CONSTRUCTION, LIMIT SITE ACCESS, AND PROVIDE SECURITY TO THE GENERAL PUBLIC. TEMPORARY GATE TYPE AND LOCATION AS PER THE ENGINEER AND NOBLE ENVIRONMENTAL POWER.

2. THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT THE EXISTING CONDITIONS SHOWN ON THE CONTRACT DOCUMENTS MAY VARY FROM ACTUAL SITE CONDITIONS. TOPOGRAPHICAL AND SUBSOIL INVESTIGATIONS TO VERIFY EXISTING FIELD CONDITIONS PRIOR TO BEGINNING CONSTRUCTION IS THE RESPONSIBILITY OF THE CONTRACTOR.

3. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE LAYOUT DIMENSIONS SHOWN ON THE PLANS AND STAKE OUT THE PROJECT TO THE SATISFACTION OF THE DESIGNATED NOBLE ENVIRONMENTAL POWER SITE REPRESENTATIVE. THE OWNER WILL PROVIDE BASELINE SURVEY INFORMATION AND ELEVATION POINTS.

4. CONTRACTOR PERSONNEL, EQUIPMENT AND MATERIALS ARE NOT ALLOWED OUTSIDE THE ESTABLISHED AREAS DEFINED BY THE DESIGNATED NOBLE ENVIRONMENTAL POWER SITE REPRESENTATIVE. ALL AREAS DISTURBED BY THE CONTRACTOR WITHOUT AUTHORIZATION BY THE DESIGNATED NOBLE ENVIRONMENTAL POWER SITE REPRESENTATIVE SHALL BE RESTORED BY THE CONTRACTOR AT HIS/HER OWN EXPENSE.

5. ALL PROPOSED ENTRANCE ROADWAY CONSTRUCTION, INCLUDING DRAINAGE AND EROSION/SEDIMENT CONTROL WORK, SHALL CONFORM TO THE LATEST SPECIFICATIONS AND STANDARDS OF OSHA, MUTCD, ASHTO, NYSDOT, AND ASTM.

6. REMOVE ALL TREES, STUMPS AND OTHER VEGETATION THAT CONFLICTS WITH PROPOSED GRADING AT THE DIRECTION OF THE DESIGNATED NOBLE ENVIRONMENTAL POWER SITE REPRESENTATIVE.

7. TOPOGRAPHIC MAPPING IS BASED ON HORIZONTAL DATUM NAD 83 (94) NEW YORK STATE PLANE WEST ZONE – U.S. FOOT.

8. THE CONTRACTOR SHALL GRADE THE PROPOSED ROADWAYS AND CONFORM TO THE DESIGN AS SHOWN ON THE ROADWAY PLANS AND STANDARD DETAILS.

9. ROADWAY CENTERLINES AND PROPERTY LINES ARE BASED ON DELINEATED CORRIDORS DETERMINED FROM LANDOWNERS PREFERENCE, AVOIDANCE OF SENSITIVE NATURAL AREAS AND ENGINEERING JUDGMENT AS DISCUSSED WITH NOBLE ENVIRONMENTAL POWER, L.L.C. AND RECEIVED IN FEBRUARY 2008.

10. THE LOCATION OF EXISTING UNDERGROUND AND OVERHEAD UTILITIES ARE APPROXIMATE AND ARE NOT NECESSARILY COMPLETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING EXACT LOCATIONS OF ALL UTILITIES BEFORE COMMENCING EXCAVATION. PRIOR TO ANY EXCAVATION, THE CONTRACTOR IS TO CONTACT 'DIG SAFE NY' AT TELEPHONE NUMBER 1-800-962-7962 TO COORDINATE ANY AND ALL UTILITY WORK. THE CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES AND HAVE THEM FIELD MARK ALL UTILITIES IN THE AREA OF CONSTRUCTION. HAND EXCAVATION SHALL BE EMPLOYED NEAR EXISTING UTILITIES. IF THE AFFECTED COMPANIES SO INDICATE, WORK SHALL NOT PROGRESS UNLESS THEIR INSPECTORS ARE PRESENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF ALL UTILITIES.

11. THE PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS. PROPOSED DEVIATIONS FROM THE APPROVED PLANS AND SPECIFICATIONS OTHER THAN MINOR FIELD CHANGES MUST BE SUBMITTED TO THE ENGINEER IN WRITING FOR REVIEW AND APPROVAL. NO CHANGES SHALL BE MADE WITHOUT PROPER AUTHORIZATION FROM THE ENGINEER AND/OR NOBLE ENVIRONMENTAL SITE REPRESENTATIVE.

12. THE ALLOWABLE TOLERANCES FROM FINISH GRADE AND ELEVATIONS SHOWN ON THE DRAWINGS SHALL BE:
    1. TO THE NEAREST 0.01 FOOT, PLUS OR MINUS WHEN SHOWN IN HUNDREDTHS OF A FOOT
    2. TO THE NEAREST 0.05 FOOT, PLUS OR MINUS WHEN SHOWN IN TENTHS OF A FOOT
    3. TO THE NEAREST 0.2 FOOT, PLUS OR MINUS WHEN SHOWN IN FEET.

13. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION PROCEDURES FROM START TO FINISH WITH ALL APPROPRIATE PUBLIC AGENCIES, ANY UTILITY COMPANY AND OTHER PRIVATE CONTRACTOR(S) THAT MAY BE WORKING IN THE PROJECT AREA AND SHALL ADVISE THE ENGINEER IMMEDIATELY OF ANY PROBLEMS ENCOUNTERED DURING CONSTRUCTION.

14. ALL DEBRIS SHALL BE DISPOSED OFF SITE AT LOCATION(S) PROVIDED BY THE CONTRACTOR.

15. CONTRACTOR SHALL SCHEDULE ALL OPERATIONS SUCH THAT INTERRUPTION OF PUBLIC SERVICES IS MINIMIZED AND SHALL BE RESPONSIBLE FOR RESTORATION OF ANY DISRUPTED SERVICES OR FACILITIES.

16. THE CONTRACTOR SHALL RESTORE THE PROJECT SITE TO THE SAME OR SUPERIOR CONDITION WHICH EXISTED PRIOR TO CONSTRUCTION.

17. NO CONSTRUCTION SHALL BEGIN UNTIL ALL NECESSARY PERMITS AND APPROVALS HAVE BEEN RECEIVED.

18. CERTIFIED AS-BUILT RECORD DRAWINGS WILL BE PROVIDED BY NOBLE ENVIRONMENTAL POWER AND SUBMITTED TO THE TOWN ENGINEER WITHIN 45 DAYS OF COMPLETION OF CONSTRUCTION FOR THE FINAL 16' WIDE MAINTENANCE ACCESS ROADWAY.

19. NO EQUIPMENT, MATERIAL AND/OR PRIVATE VEHICLES SHALL BE STORED OVERNIGHT WITHIN 30 FEET OF THE ROADWAY TRAVEL LANES.

EXCAVATION NOTES

20. EXCESS SUBSOIL THAT IS NOT TO BE REUSED ON SITE SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR AND DISPOSED OF IN ACCORDANCE WITH NEW YORK STATE ENVIRONMENTAL STANDARDS AND APPROVED DOCUMENTED LOCATION BY THE DESIGNATED NOBLE ENVIRONMENTAL POWER SITE REPRESENTATIVE.

21. UNDER NO CONDITION SHALL EXCESS SOIL BE USED TO FILL WETLANDS AND UNDER NO CIRCUMSTANCE WILL CONTRACTOR PERSONNEL, MATERIAL, AND EQUIPMENT BE ALLOWED OUTSIDE THE ESTABLISHED LIMITS OF WORK AS DEFINED BY THE DESIGNATED NOBLE ENVIRONMENTAL POWER SITE REPRESENTATIVE.

22. EXCESS TOPSOIL SHALL REMAIN ON SITE AT A STOCKPILED AREA DETERMINED BY THE DESIGNATED NOBLE ENVIRONMENTAL POWER SITE REPRESENTATIVE AT THE END OF THE PROJECT.

23. TOPSOIL AND SUBSOIL SHALL NOT BE MIXED. TOPSOIL THAT IS MIXED WITH UNSUITABLE SOIL WILL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

24. THE DEPTH OF THE EXISTING TOPSOIL HAS BEEN FOUND TO VARY FROM 6 TO 18 INCHES.

ROADWAY NOTES:

25. MODIFICATIONS TO ROADWAY DESIGN MAY BE REQUIRED TO MATCH FIELD CONDITIONS.

26. MAINTAIN EXISTING DRAINAGE COURSE ALONG ALL STATE, COUNTY, AND TOWN ROADS.

27. TOPSOIL MUST BE STOCKPILED IN AREAS APPROVED BY THE NOBLE ENVIRONMENTAL SITE REPRESENTATIVE.

28. THE CONTRACTOR SHALL MAINTAIN ALL STABILIZED CONSTRUCTION ENTRANCEWAYS. THE PURPOSE OF A STABILIZED CONSTRUCTION ENTRANCEWAY IS TO REDUCE OR ELIMINATE THE TRACKING OF SEDIMENT ONTO PUBLIC RIGHTS OF WAY OR STREETS. SEE DETAIL ON SD-3. REFER TO THE APPROVED BALL HILL WIND FARM SWPPP FOR STONE DEPTH AND FINAL LOCATION.

29. A 30' WASH AREA SHALL BE PROVIDED. ADDITIONAL GRADING MAY BE REQUIRED TO PROVIDE WASHING AREAS. REFER TO THE APPROVED BALL HILL WINDPARK SWAPP.

30. ALL PROPOSED DRAINAGE PIPES HAVE BEEN DESIGNED BY THE ENGINEER WITH SUFFICIENT CAPACITY TO CARRY PEAK FLOWS GENERATED BY A STORM EVENT UP TO THE 10 YEAR STORM. ALTERNATIVE WAYS OF CONVEYING DITCH FLOW ACROSS CONSTRUCTION ENTRANCES MAY BE DESIGNED BY THE CONTRACTOR WITH THE APPROVAL OF THE ENGINEER PRIOR TO CONSTRUCTION.

31. THE CONTRACTOR SHALL GRADE TO PREPARE ORIGINAL SUBGRADE FOR PLACEMENT OF A MINIMUM OF 12" (SECTION 304) AGGREGATE ROADWAY ON TENSAR BX1200 (OR APPROVED EQUAL) MATERIAL. THE AGGREGATE SHALL MEET THE EDGE OF EXISTING PAVEMENT. ADDITIONAL AGGREGATE MATERIAL MAY BE REQUIRED BASED ON SUBGRADE STABILITY, AND LESS AGGREGATE MAY BE REQUIRED IF ROCK LEDGE IS ENCOUNTERED. REFER TO SPECIFICATION 304-3.02

32. IF PROOF ROLLING IS NECESSARY, THE SUBGRADE SHALL BE PROOF ROLLED ACCORDING TO NEW YORK STATE DEPARTMENT OF TRANSPORTATION SPECIFICATION SECTION 203-3.13 AND 203-3.14.

33. IF COMPACTION IS NECESSARY, THE SUBGRADE SHALL BE COMPACTED ACCORDING TO SPECIFICATION SECTION 203-3.12.

34. THE CONTRACTOR SHALL IDENTIFY AREAS WHERE RUTTING AND SOIL SETTLEMENT/HEAVING HAVE TAKEN PLACE UNDER THE WEIGHT OF CONSTRUCTION EQUIPMENT. THE CONTRACTOR SHALL NOTIFY THE NOBLE ENVIRONMENTAL SITE REPRESENTATIVE AND PLACE AN ADDITIONAL 6" OF AGGREGATE ON ROADWAY, OR SUBMIT A METHOD OF STABILIZATION TO THE NOBLE ENVIRONMENTAL SITE REPRESENTATIVE FOR APPROVAL.

35. GEOTEXTILE SEPARATOR TO BE USED TO PREVENT MIXING OF AGGREGATE WITH ROADWAY SUBGRADE WHERE REQUIRED. ALL GEOTEXTILE SEPARATOR LOCATIONS TO BE APPROVED BY THE ENGINEER.

36. GEOGRID TO BE TENSAR GEOGRID MODEL BX1200 OR APPROVED EQUAL.

37. ADDITIONAL EXCAVATION IN ADDITION TO THE TOPSOIL REMOVAL MAY BE REQUIRED IN CUT SECTIONS IN ORDER TO PROVIDE THE REQUIRED ROADWAY AGGREGATE DEPTHS.

38. REMOVAL OF UNSUITABLE MATERIALS: AFTER THE COMPLETION OF CLEARING AND GRUBBING, THE CONTRACTOR SHALL REMOVE ANY TOPSOILS AND SOD FROM THE SUBGRADE. UNSUITABLE MATERIALS OTHER THAN SOD AND TOPSOIL SHALL BE REMOVED TO A DEPTH OF ONE FOOT +/- BELOW THE BOTTOM OF SUBGRADE.

DRAINAGE NOTES:

39. EACH DRAINAGE DITCH SHALL BE RE-SHAPED AFTER THE PROPOSED ENTRANCE ROADWAY IS CONSTRUCTED AS REQUIRED BY THE ENGINEER TO PROVIDE A SMOOTH FLOW TRANSITION THROUGH THE PROJECT AREA.

40. CONTRACTOR SHALL NOT EXCEED THE MAXIMUM 3% CROSS SLOPE ALONG THE PROPOSED ENTRANCE ROADWAY TO PROVIDE ADEQUATE DRAINAGE SURFACE FLOW OFF THE ROADWAY. FINAL CROSS SLOPES SHALL BE APPROVED BY THE ENGINEER.

41. EXISTING DRAINAGE DITCHES SHALL BE REGRADED TO ATTAIN POSITIVE DRAINAGE FLOW AS REQUIRED AND AS DIRECTED BY THE ENGINEER.

42. ALL ARCH AND ROUND PIPES SHALL BE CONTECH SMOOTH COR CMP OR APPROVED EQUAL.

43. IN AREAS WHERE THE GROUNDWATER TABLE IS NEAR THE SUBGRADE, THE CONTRACTOR SHALL PROVIDE MEANS AND METHODS TO LOWER THE GROUNDWATER. THE MEANS AND METHODS SHALL AVOID DISTURBING AND UNDERMINING THE SUBGRADE.

EROSION CONTROL STAGING NOTES

44. THE PARAMETERS OF THE SWPPP AND WETLANDS PERMIT WILL DICTATE THE MEASUREMENTS OF CONTROL THAT THE CONTRACTOR WILL UTILIZE FOR THIS CONTRACT. SWPPP AND WETLAND PERMITS SHALL BE PROVIDED BY NOBLE ENVIRONMENTAL POWER.

MAINTENANCE AND PROTECTION OF TRAFFIC NOTES

45. ALL MAINTENANCE AND PROTECTION OF TRAFFIC SHALL BE IN ACCORDANCE WITH THE NEW YORK STATE D.O.T. MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. CONTRACTOR SHALL DEVELOP AND FOLLOW MAINTENANCE AND PROTECTION OF TRAFFIC DEVICES PROCEDURES WITH TOWN HIGHWAY SUPERVISOR DIRECTION AND GUIDELINES SHOWN ON DRAWING NUMBER MPT-1.

TURBINE STAGING AREA NOTES

46. ALL TURBINE STAGING AREAS SHALL BE A MAXIMUM OF 300' x 300' SQUARE. THE PURPOSE OF THIS AREA IS FOR LAYING OUT EQUIPMENT, TURBINE ROTOR ASSEMBLY, AND STOCKPILING TOPSOIL.

47. WITHIN THE 300' x 300' STAGING AREA, AN APPROXIMATELY 200' x 200' SQUARE AREA WILL BE CLEARED AND GRADED TO A SLOPE OF 5% OR LESS TO FACILITATE THE LAYOUT OF TURBINE COMPONENTS. DISTURBANCE OUTSIDE OF THIS 200' x 200' SQUARE AREA WILL GENERALLY BE LIMITED TO SELECTIVE TREE CUTTING NECESSARY FOR ROTOR ASSEMBLY AND STORAGE OF EXCESS TOPSOIL, SUBSOIL OR WOODY MATERIAL INCLUDING ROOTS, LOGS, AND/OR WOOD CHIPS.

48. THE TURBINE STAGING AREA SHALL BE GRADED TO FACILITATE DRAINAGE AND PREVENT PONDING.

49. CRANE PADS SHALL BE 120' x 40'.

50. CRANE PAD LOCATIONS INDICATED ON THE PLANS ARE APPROXIMATE. FINAL CRANE PAD DESIGN AND LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR FOR APPROVAL BY THE DESIGNATED NOBLE SITE REPRESENTATIVE BASED ON FIELD CONDITIONS.

ABBREVIATIONS

ELEV. – ELEVATION
PRC. – POINT OF REVERSE CURVE
TYP. – TYPICAL
L – LEFT
R – RIGHT
PT – POINT OF TANGENT
PCC – POINT OF COMPOUND CURVE
PC – POINT OF CURVE
R.O.W. – RIGHT OF WAY
V.C. – VERTICAL CURVE
CL – CLASS
STA. – STATION
N – NORTH
S – SOUTH
E – EAST
W – WEST
TEMP. – TEMPORARY
BLDG. – BUILDING
RDWY. – ROADWAY
INV. – INVERT
EXIST. – EXISTING
NO. – NUMBER
PGL – PROFILE GRADE LINE
PI – POINT OF INTERSECTION
MAX – MAXIMUM
MIN – MINIMUM
CMP – CORRUGATED METAL PIPE
DIA – DIAMETER
LF – LINEAR FEET
INV – INVERT ELEVATION
TYP – TYPICAL
℄ – CENTER LINE

NOT FOR CONSTRUCTION

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..		
-										

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

GENERAL NOTES

SCALE
AS SHOWN
DRAWING
GN-1
REV

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

INDEX

SHEET	DESCRIPTION	DRAWING NUMBER	SUBMITTAL DATE				
			ORIGINAL	REV. A	REV. B	REV. C	REV. D
1	GENERAL NOTES	GN–1	7–21–08				
2	DRAWING INDEX	DI–1	7–21–08				
3	LOCATION PLAN – SHEET 1 OF 5	LP–1	7–21–08				
4	LOCATION PLAN – SHEET 2 OF 5	LP–2	7–21–08				
5	LOCATION PLAN – SHEET 3 OF 5	LP–3	7–21–08				
6	LOCATION PLAN – SHEET 4 OF 5	LP–4	7–21–08				
7	LOCATION PLAN – SHEET 5 OF 5	LP–5	7–21–08				
8	SITE PLAN–ROADWAY 1 – SHEET 1 OF 4	RP–1–1	7–21–08				
9	SITE PLAN–ROADWAY 1 – SHEET 2 OF 4	RP–1–2	7–21–08				
10	SITE PLAN–ROADWAY 1 – SHEET 3 OF 4	RP–1–3	7–21–08				
11	SITE PLAN–ROADWAY 1 – SHEET 4 OF 4	RP–1–4	7–21–08				
12	SITE PLAN–ROADWAY 2 – SHEET 1 OF 1	RP–2–1	7–21–08				
13	SITE PLAN–ROADWAY 3 – SHEET 1 OF 3	RP–3–1	7–21–08				
14	SITE PLAN–ROADWAY 3 – SHEET 2 OF 3	RP–3–2	7–21–08				
15	SITE PLAN–ROADWAY 3 – SHEET 3 OF 3	RP–3–3	7–21–08				
16	SITE PLAN–ROADWAY 4 – SHEET 1 OF 2	RP–4–1	7–21–08				
17	SITE PLAN–ROADWAY 4 – SHEET 2 OF 2	RP–4–2	7–21–08				
18	SITE PLAN–ROADWAY 5 – SHEET 1 OF 7	RP–5–1	7–21–08				
19	SITE PLAN–ROADWAY 5 – SHEET 2 OF 7	RP–5–2	7–21–08				
20	SITE PLAN–ROADWAY 5 – SHEET 3 OF 7	RP–5–3	7–21–08				
21	SITE PLAN–ROADWAY 5 – SHEET 4 OF 7	RP–5–4	7–21–08				
22	SITE PLAN–ROADWAY 5 – SHEET 5 OF 7	RP–5–5	7–21–08				
23	SITE PLAN–ROADWAY 5 – SHEET 6 OF 7	RP–5–6	7–21–08				
24	SITE PLAN–ROADWAY 5 – SHEET 7 OF 7	RP–5–7	7–21–08				
25	SITE PLAN–ROADWAY 6 – SHEET 1 OF 3	RP–6–1	7–21–08				
26	SITE PLAN–ROADWAY 6 – SHEET 2 OF 3	RP–6–2	7–21–08				
27	SITE PLAN–ROADWAY 6 – SHEET 3 OF 3	RP–6–3	7–21–08				
28	SITE PLAN–ROADWAY 7 – SHEET 1 OF 2	RP–7–1	7–21–08				
29	SITE PLAN–ROADWAY 7 – SHEET 2 OF 2	RP–7–2	7–21–08				
30	SITE PLAN–ROADWAY 8 – SHEET 1 OF 1	RP–8–1	7–21–08				
31	SITE PLAN–ROADWAY 9 – SHEET 1 OF 6	RP–9–1	7–21–08				
32	SITE PLAN–ROADWAY 9 – SHEET 2 OF 6	RP–9–2	7–21–08				
33	SITE PLAN–ROADWAY 9 – SHEET 3 OF 6	RP–9–3	7–21–08				
34	SITE PLAN–ROADWAY 9 – SHEET 4 OF 6	RP–9–4	7–21–08				
35	SITE PLAN–ROADWAY 9 – SHEET 5 OF 6	RP–9–5	7–21–08				
36	SITE PLAN–ROADWAY 9 – SHEET 6 OF 6	RP–9–6	7–21–08				
37	SITE PLAN–ROADWAY 10 – SHEET 1 OF 1	RP–10–1	7–21–08				
38	SITE PLAN–ROADWAY 11 – SHEET 1 OF 3	RP–11–1	7–21–08				
39	SITE PLAN–ROADWAY 11 – SHEET 2 OF 3	RP–11–2	7–21–08				
40	SITE PLAN–ROADWAY 11 – SHEET 3 OF 3	RP–11–3	7–21–08				
41	SITE PLAN–ROADWAY 12 – SHEET 1 OF 2	RP–12–1	7–21–08				
42	SITE PLAN–ROADWAY 12 – SHEET 2 OF 2	RP–12–2	7–21–08				
43	SITE PLAN–ROADWAY 13 – SHEET 1 OF 2	RP–13–1	7–21–08				
44	SITE PLAN–ROADWAY 13 – SHEET 2 OF 2	RP–13–2	7–21–08				
45	SITE PLAN–ROADWAY 14 – SHEET 1 OF 2	RP–14–1	7–21–08				
46	SITE PLAN–ROADWAY 14 – SHEET 2 OF 2	RP–14–2	7–21–08				
47	SITE PLAN–ROADWAY 15 – SHEET 1 OF 2	RP–15–1	7–21–08				
48	SITE PLAN–ROADWAY 15 – SHEET 2 OF 2	RP–15–2	7–21–08				
49	SITE PLAN–ROADWAY 16 – SHEET 1 OF 3	RP–16–1	7–21–08				
50	SITE PLAN–ROADWAY 16 – SHEET 2 OF 3	RP–16–2	7–21–08				
51	SITE PLAN–ROADWAY 16 – SHEET 3 OF 3	RP–16–3	7–21–08				
52	SITE PLAN–ROADWAY 17 – SHEET 1 OF 4	RP–17–1	7–21–08				
53	SITE PLAN–ROADWAY 17 – SHEET 2 OF 4	RP–17–2	7–21–08				
54	SITE PLAN–ROADWAY 17 – SHEET 3 OF 4	RP–17–3	7–21–08				
55	SITE PLAN–ROADWAY 17 – SHEET 4 OF 4	RP–17–4	7–21–08				
56	SITE PLAN–ROADWAY 18 – SHEET 1 OF 2	RP–18–1	7–21–08				
57	SITE PLAN–ROADWAY 18 – SHEET 2 OF 2	RP–18–2	7–21–08				
58	SITE PLAN–ROADWAY 19 – SHEET 1 OF 3	RP–19–1	7–21–08				
59	SITE PLAN–ROADWAY 19 – SHEET 2 OF 3	RP–19–2	7–21–08				
60	SITE PLAN–ROADWAY 19 – SHEET 3 OF 3	RP–19–3	7–21–08				
61	SITE PLAN–ROADWAY 20 – SHEET 1 OF 6	RP–20–1	7–21–08				
62	SITE PLAN–ROADWAY 20 – SHEET 2 OF 6	RP–20–2	7–21–08				
63	SITE PLAN–ROADWAY 20 – SHEET 3 OF 6	RP–20–3	7–21–08				
64	SITE PLAN–ROADWAY 20 – SHEET 4 OF 6	RP–20–4	7–21–08				
65	SITE PLAN–ROADWAY 20 – SHEET 5 OF 6	RP–20–5	7–21–08				
66	SITE PLAN–ROADWAY 20 – SHEET 6 OF 6	RP–20–6	7–21–08				
67	SITE PLAN–ROADWAY 21 – SHEET 1 OF 3	RP–21–1	7–21–08				
68	SITE PLAN–ROADWAY 21 – SHEET 2 OF 3	RP–21–2	7–21–08				
69	SITE PLAN–ROADWAY 21 – SHEET 3 OF 3	RP–21–3	7–21–08				
70	SITE PLAN–ROADWAY 22 – SHEET 1 OF 5	RP–22–1	7–21–08				
71	SITE PLAN–ROADWAY 22 – SHEET 2 OF 5	RP–22–2	7–21–08				
72	SITE PLAN–ROADWAY 22 – SHEET 3 OF 5	RP–22–3	7–21–08				
73	SITE PLAN–ROADWAY 22 – SHEET 4 OF 5	RP–22–4	7–21–08				
74	SITE PLAN–ROADWAY 22 – SHEET 5 OF 5	RP–22–5	7–21–08				
75	SITE PLAN–ROADWAY 23 – SHEET 1 OF 5	RP–23–1	7–21–08				
76	SITE PLAN–ROADWAY 23 – SHEET 2 OF 5	RP–23–2	7–21–08				
77	SITE PLAN–ROADWAY 23 – SHEET 3 OF 5	RP–23–3	7–21–08				
78	SITE PLAN–ROADWAY 23 – SHEET 4 OF 5	RP–23–4	7–21–08				
79	SITE PLAN–ROADWAY 23 – SHEET 5 OF 5	RP–23–5	7–21–08				

INDEX

SHEET	DESCRIPTION	DRAWING NUMBER	SUBMITTAL DATE				
			ORIGINAL	REV. A	REV. B	REV. C	REV. D
80	SITE PLAN–ROADWAY 24 – SHEET 1 OF 1	RP–24–1	7–21–08				
81	SITE PLAN–ROADWAY 25 – SHEET 1 OF 7	RP–25–1	7–21–08				
82	SITE PLAN–ROADWAY 25 – SHEET 2 OF 7	RP–25–2	7–21–08				
83	SITE PLAN–ROADWAY 25 – SHEET 3 OF 7	RP–25–3	7–21–08				
84	SITE PLAN–ROADWAY 25 – SHEET 4 OF 7	RP–25–4	7–21–08				
85	SITE PLAN–ROADWAY 25 – SHEET 5 OF 7	RP–25–5	7–21–08				
86	SITE PLAN–ROADWAY 25 – SHEET 6 OF 7	RP–25–6	7–21–08				
87	SITE PLAN–ROADWAY 25 – SHEET 7 OF 7	RP–25–7	7–21–08				
88	SITE PLAN–ROADWAY 26 – SHEET 1 OF 5	RP–26–1	7–21–08				
89	SITE PLAN–ROADWAY 26 – SHEET 2 OF 5	RP–26–2	7–21–08				
90	SITE PLAN–ROADWAY 26 – SHEET 3 OF 5	RP–26–3	7–21–08				
91	SITE PLAN–ROADWAY 26 – SHEET 4 OF 5	RP–26–4	7–21–08				
92	SITE PLAN–ROADWAY 26 – SHEET 5 OF 5	RP–26–5	7–21–08				
93	SITE PLAN–ROADWAY 27 – SHEET 1 OF 6	RP–27–1	7–21–08				
94	SITE PLAN–ROADWAY 27 – SHEET 2 OF 6	RP–27–2	7–21–08				
95	SITE PLAN–ROADWAY 27 – SHEET 3 OF 6	RP–27–3	7–21–08				
96	SITE PLAN–ROADWAY 27 – SHEET 4 OF 6	RP–27–4	7–21–08				
97	SITE PLAN–ROADWAY 27 – SHEET 5 OF 6	RP–27–5	7–21–08				
98	SITE PLAN–ROADWAY 27 – SHEET 6 OF 6	RP–27–6	7–21–08				
99	SITE PLAN–SWITCHYARD – SHEET 1 OF 1	RP–SW–1	7–21–08				
100	SITE PLAN–SUBSTATION – SHEET 1 OF 1	RP–SR–1	7–21–08				
101	MAINTENANCE & PROTECTION OF TRAFFIC – 1	MPT–1	7–21–08				
102	ROADWAY SITE DETAILS – 1	SD–1	7–21–08				
103	ROADWAY SITE DETAILS – 2	SD–2	7–21–08				
104	ROADWAY SITE DETAILS – 3	SD–3	7–21–08				
105	ROADWAY SITE DETAILS – 4	SD–4	7–21–08				
106	ROADWAY SITE DETAILS – 5	SD–5	7–21–08				
107	ROADWAY SITE DETAILS – 6	SD–6	7–21–08				
108	ROADWAY SITE DETAILS – 7	SD–7	7–21–08				
109	ROADWAY SITE DETAILS – 8	SD–8	7–21–08				
110	ROADWAY SITE DETAILS – 9	SD–9	7–21–08				
111	ROADWAY SITE DETAILS – 10	SD–10	7–21–08				

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
–								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

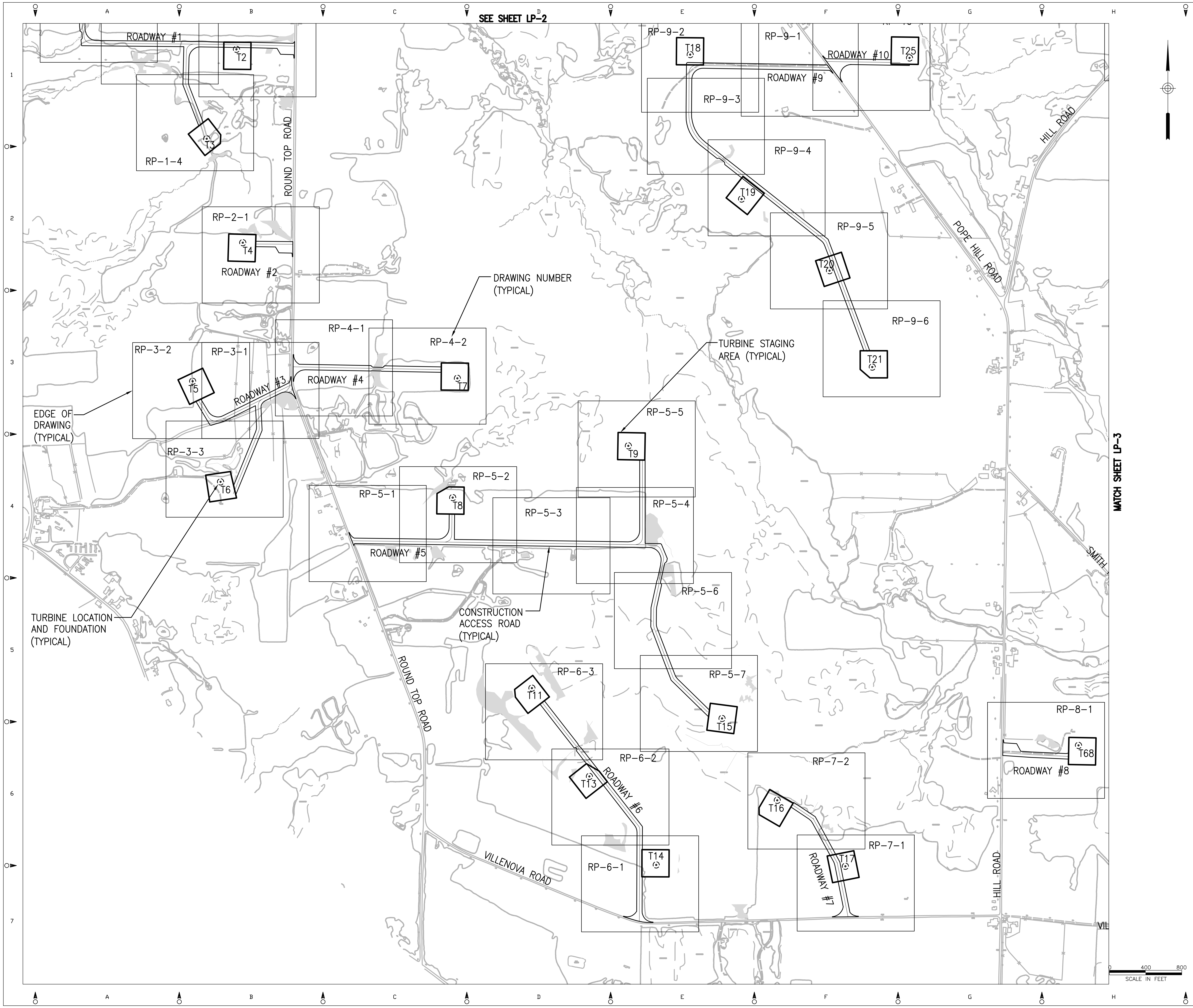
BALL HILL WINDPARK PROJECT

DRAWING INDEX

SCALE
AS SHOWN
DRAWING
DI–1
REV

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

Locational Plans



NOT FOR CONSTRUCTION

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..		
DRAWN BY J. DAHZY								
CHECKED BY C. BLANCHETTE								
RESP. ENGR. J. WASSERMAN								
CHIEF DISC. ENGR. T. ELSROTH								
PROJECT MANAGER M. PACY								

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

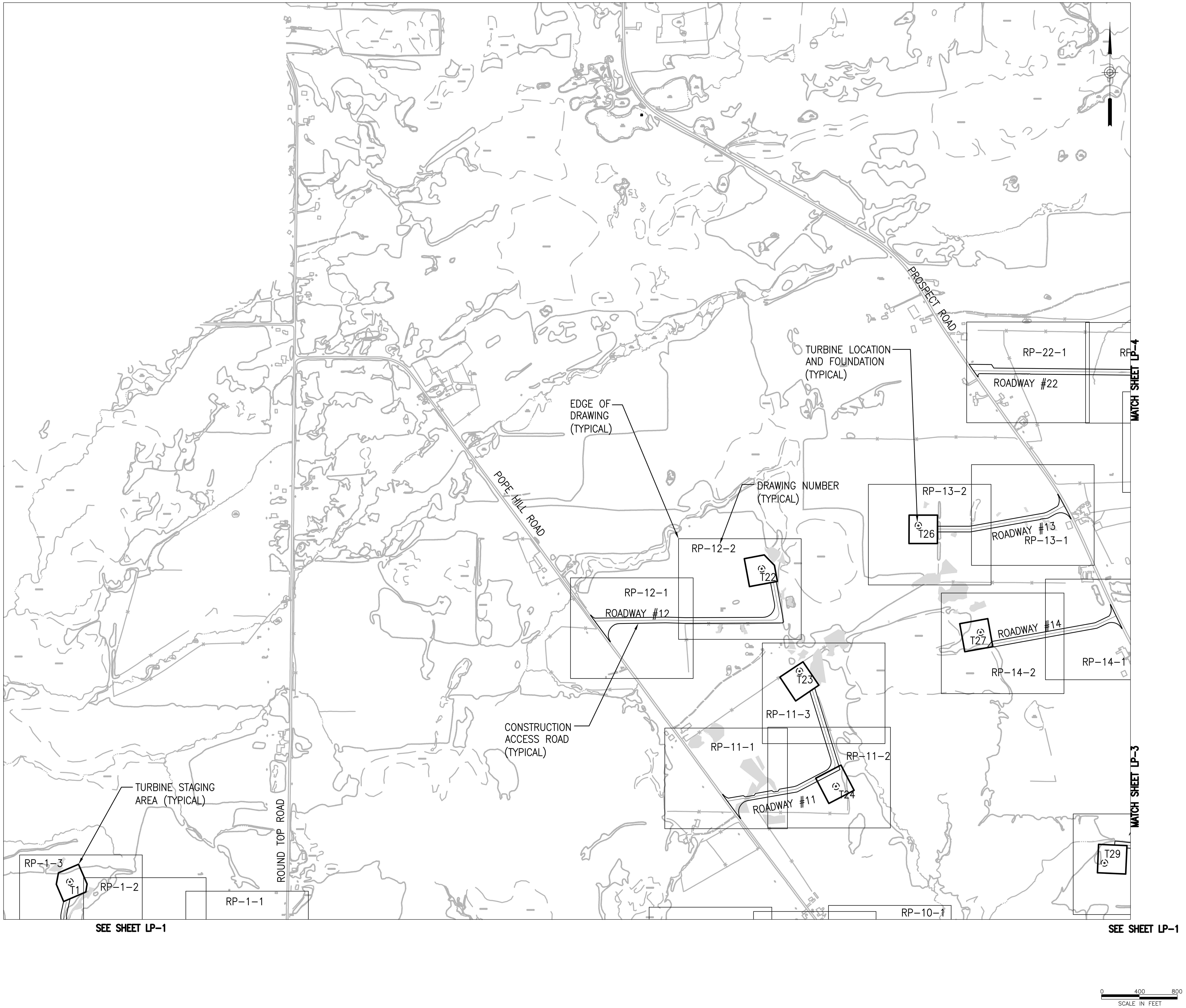
LOCATION PLAN
SHEET 1 OF 5

SCALE
AS SHOWN

DRAWING
LP-1
REV

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC

NOT FOR CONSTRUCTION



PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
J. DAHZY
CHECKED BY
C. BLANCHETTE
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT. | NO.

BALL HILL WINDPARK PROJECT

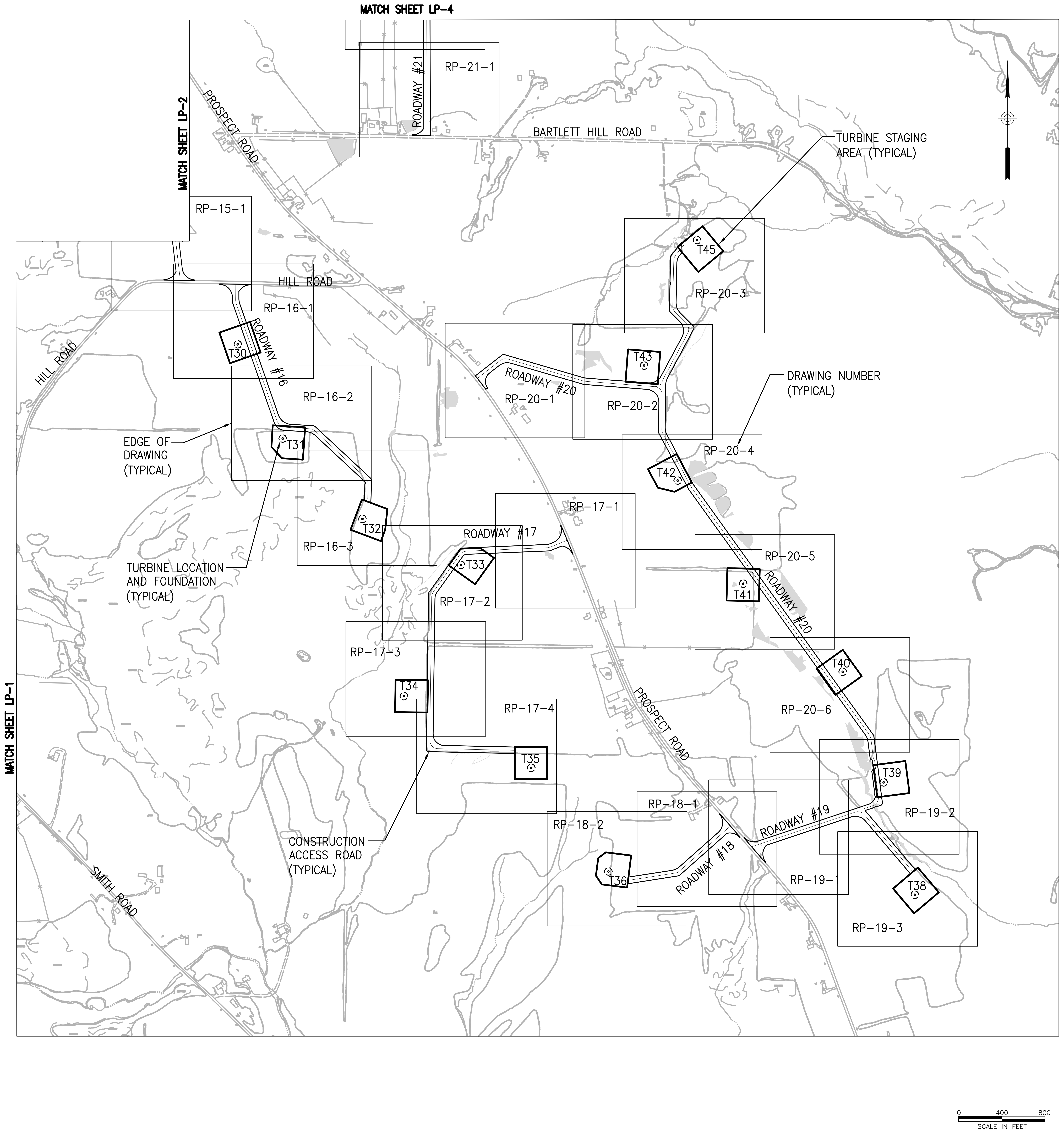
LOCATION PLAN
SHEET 2 OF 5

SCALE
AS SHOWN

DRAWING
LP-2
REV

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION



PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY J. DAHZY
CHECKED BY C. BLANCHETTE
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

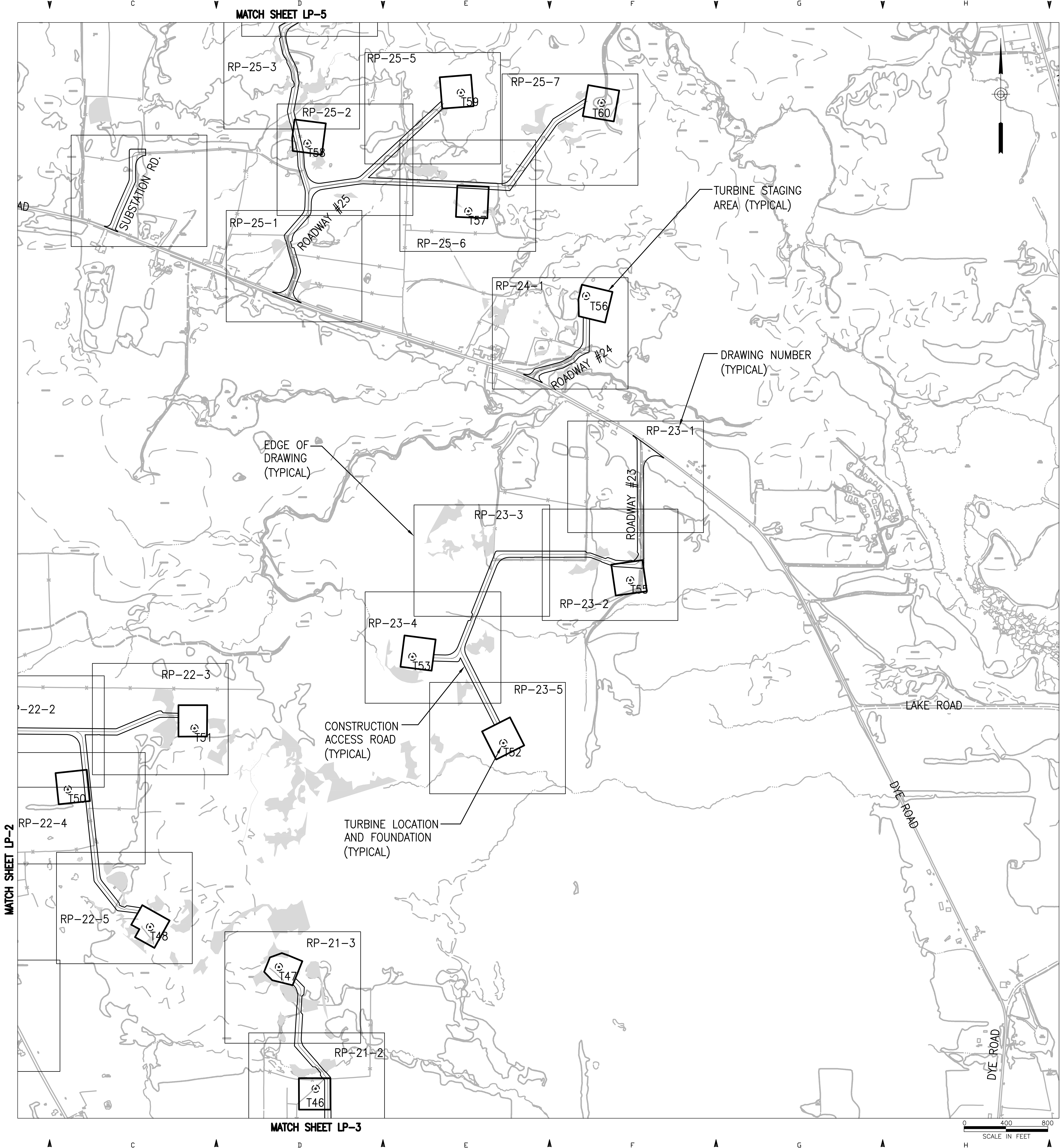
DEPT.
NO.

BALL HILL WINDPARK PROJECT

LOCATION PLAN
SHEET 3 OF 5

SCALE AS SHOWN
DRAWING LP-3
REV

ARCH HVAC I & C ELECT MECH CIVIL STRUC ARCH HVAC I & C ELECT MECH CIVIL STRUC ARCH HVAC I & C ELECT MECH CIVIL STRUC ARCH HVAC I & C ELECT MECH CIVIL STRUC ARCH HVAC I & C ELECT MECH CIVIL STRUC ARCH HVAC I & C ELECT MECH CIVIL STRUC ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY J. DAHZY
CHECKED BY C. BLANCHETTE
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

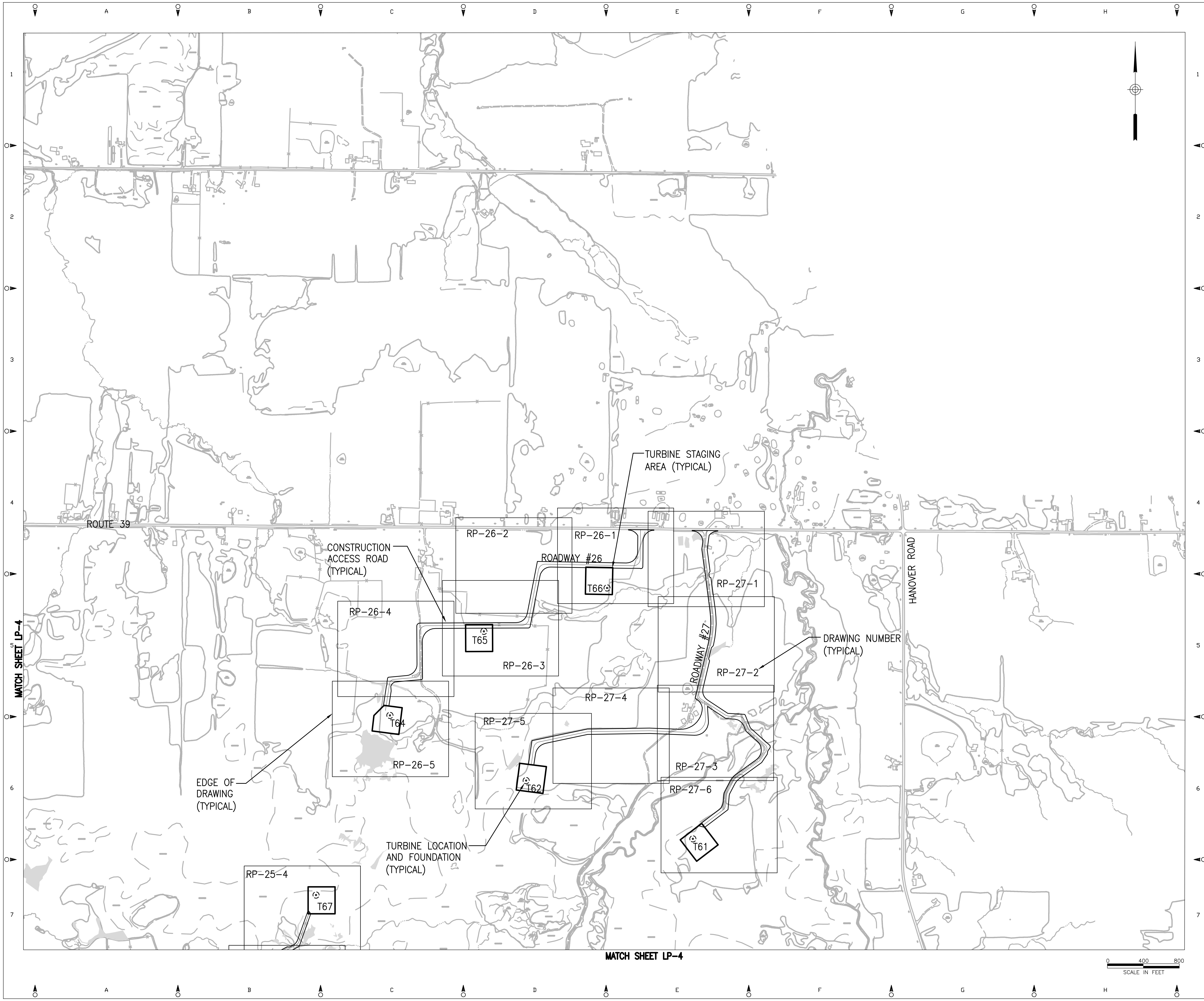
BALL HILL WINDPARK PROJECT

LOCATION PLAN
SHEET 4 OF 5

SCALE AS SHOWN
DRAWING LP-4
REV

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION



PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

DRAWN BY
J. DAHZY

CHECKED BY
C. BLANCHETTE

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE

Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

LOCATION PLAN
SHEET 5 OF 5

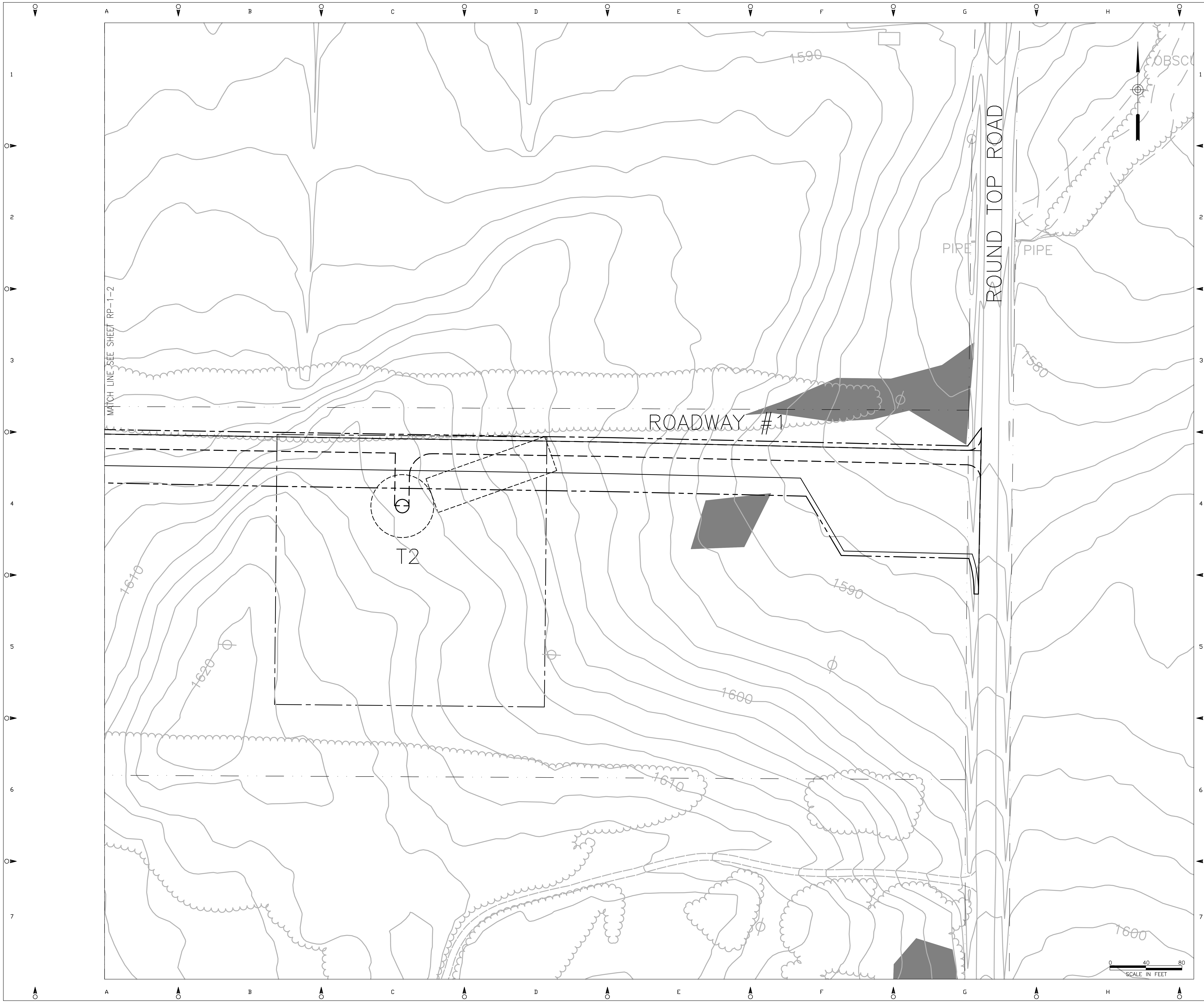
SCALE
AS SHOWN

DRAWING
LP-5

REV

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

Roadway Plans



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 1, SHT. 1 OF 4

SCALE
AS SHOWN

DRAWING
RP-1-1

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

0 40 80
SCALE IN FEET

NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- ——— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- — · · — PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ▨ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

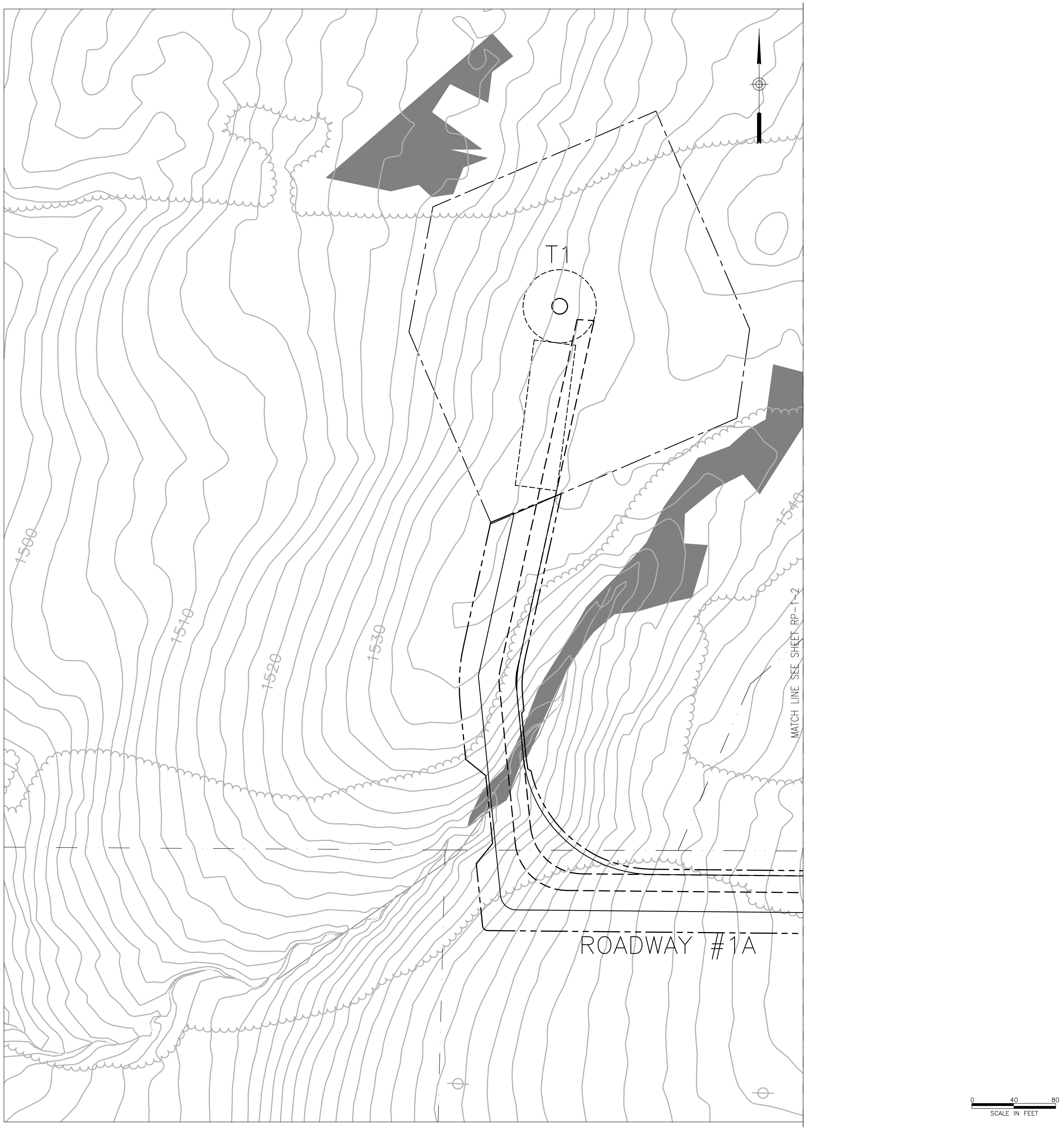
SITE PLAN
ROADWAY 1, SHT. 2 OF 4

SCALE
AS SHOWN

DRAWING
RP-1-2

REV
–

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- ▨ WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

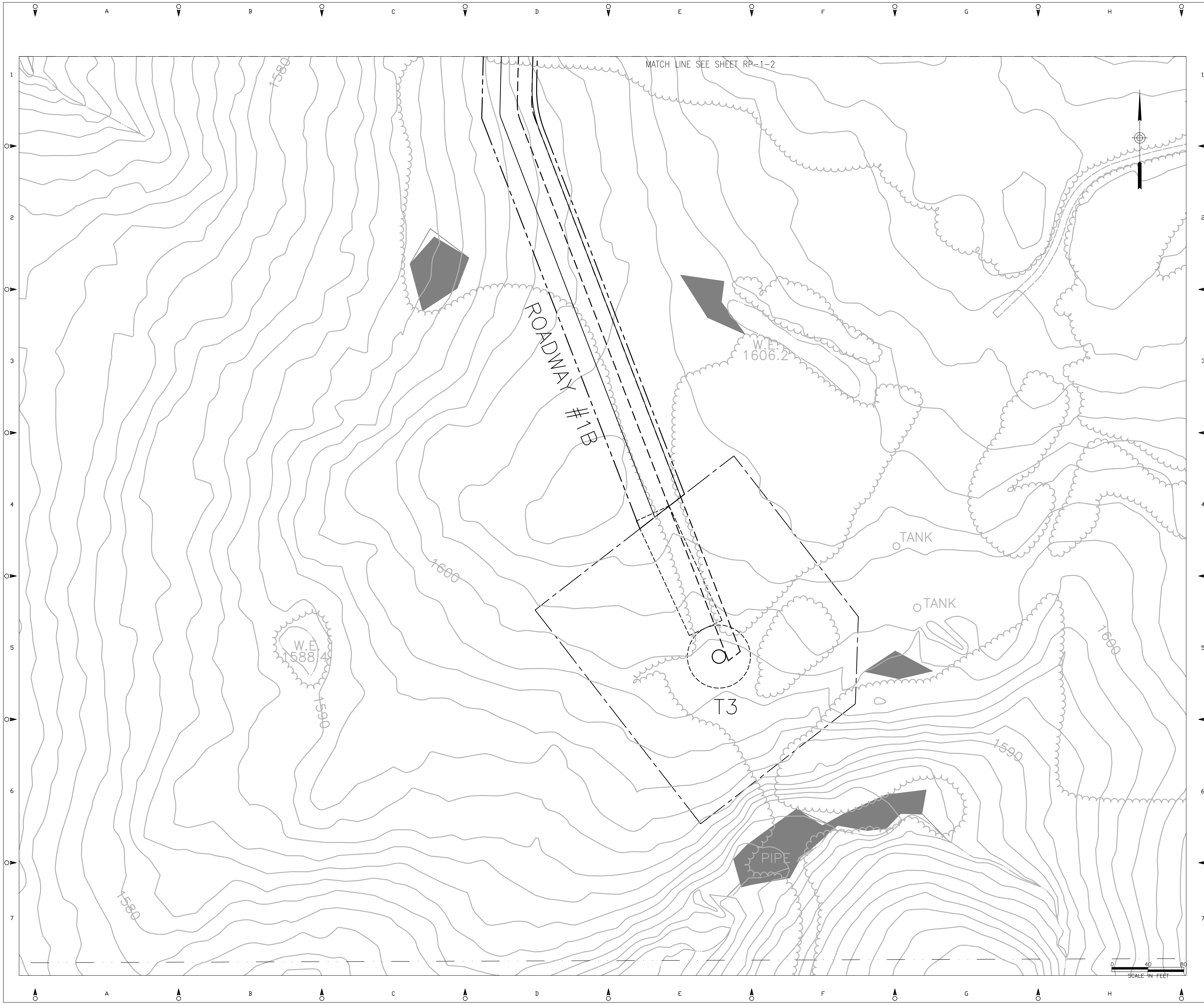
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 1, SHT. 3 OF 4

SCALE
AS SHOWN

DRAWING
RP-1-3

REV
—



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·— LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- CRANE PAD
- ▨ WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

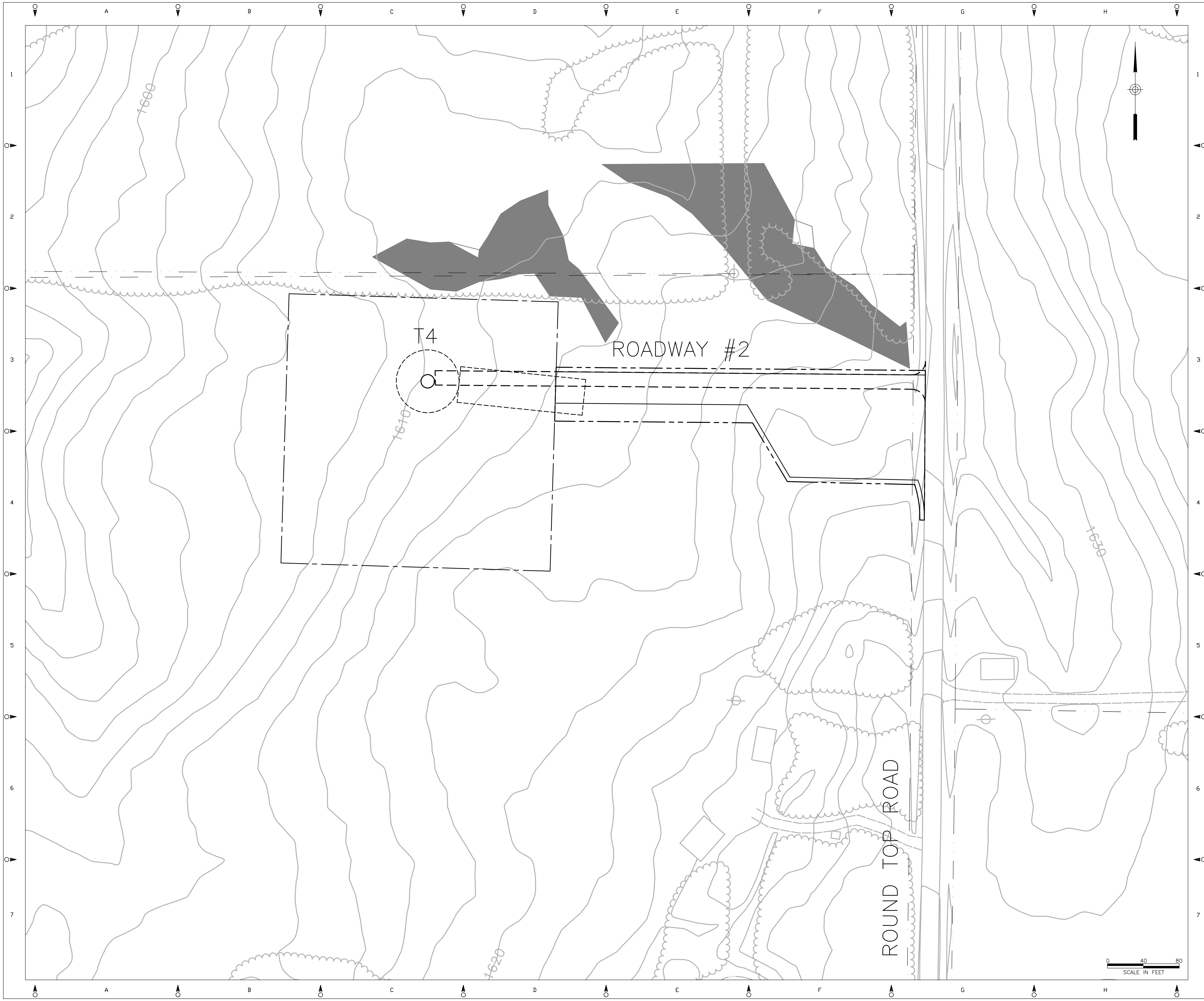
DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 1, SHT. 4 OF 4

SCALE AS SHOWN
DRAWING RP-1-4
REV —

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
——	35 FOOT TEMPORARY CONSTRUCTION ROAD
— - —	LIMIT OF DISTURBANCE
— · —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
▭	CRANE PAD
▬	WETLANDS
▭	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 2, SHT. 1 OF 1

SCALE
AS SHOWN

DRAWING
RP-2-1

REV
—

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ■ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 3, SHT. 1 OF 3

SCALE
AS SHOWN

DRAWING
RP-3-1

REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- — - — LIMIT OF DISTURBANCE
- — · — PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ☐ CRANE PAD
- ▨ WETLANDS
- ☐ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 3, SHT. 2 OF 3

SCALE
AS SHOWN

DRAWING
RP-3-2

REV
—

NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·— LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ▨ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 3, SHT. 3 OF 3

SCALE
AS SHOWN

DRAWING
RP-3-3

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- ▨ WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

DRAWN | CHECKED | RESP.ENGR. | CH.DISC.ENG. | PROJ. MGR..

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

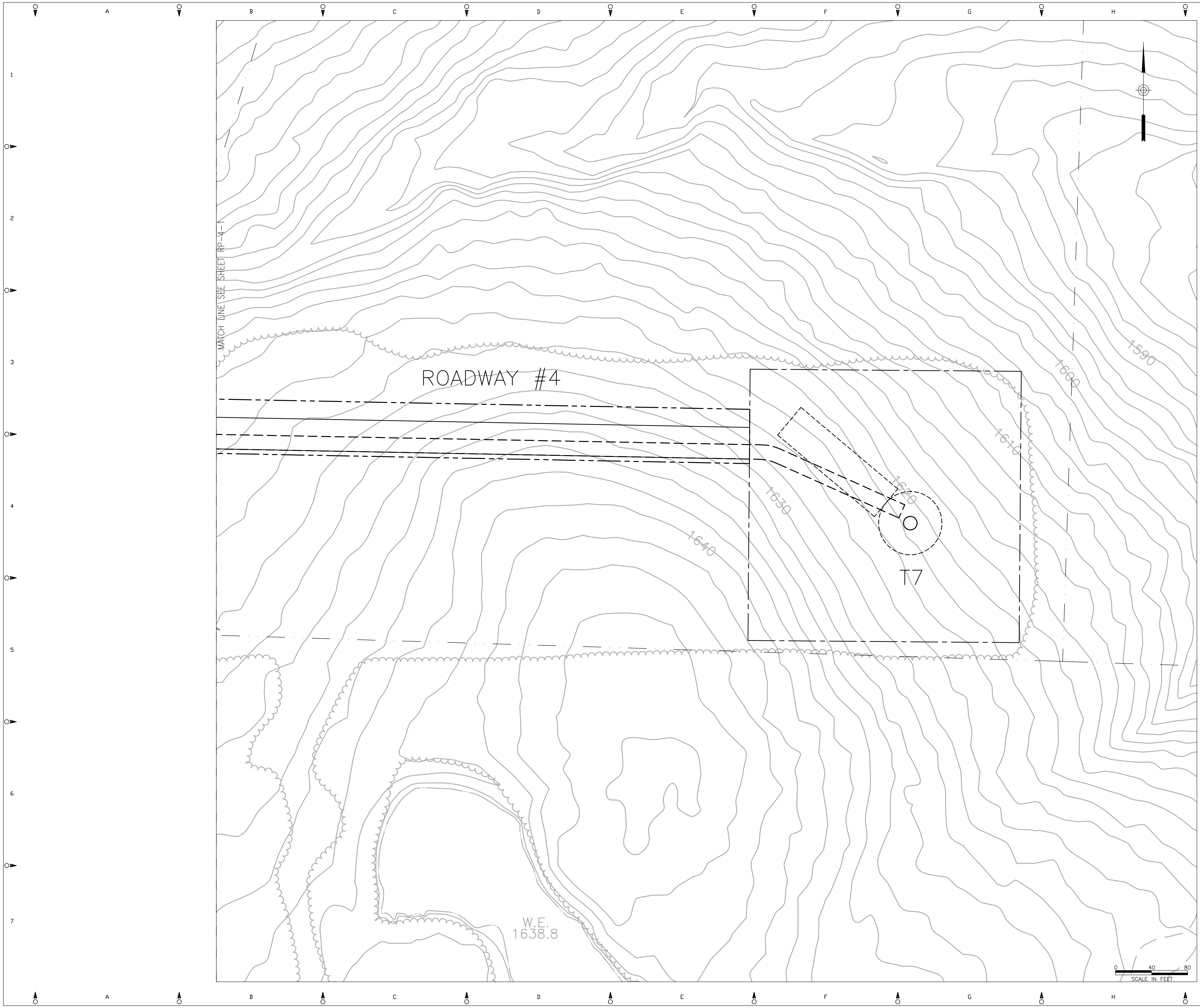
SITE PLAN
ROADWAY 4, SHT. 1 OF 2

SCALE
AS SHOWN

DRAWING
RP-4-1

REV
—

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC



NOT FOR CONSTRUCTION

LEGEND

16 FOOT PERMANENT ACCESS ROAD
35 FOOT TEMPORARY CONSTRUCTION ROAD
LIMIT OF DISTURBANCE
PROPERTY LINE
UTILITY POLE
TURBINE FOUNDATION
TURBINE PEDESTAL
CRANE PAD
WETLANDS
TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

DRAWN | CHECKED | RESP.ENGR. | CH.DISC.ENG. | PROJ. MGR..

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 4, SHT. 2 OF 2

SCALE
AS SHOWN

DRAWING
RP-4-2

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION

LEGEND

- — — — 16 FOOT PERMANENT ACCESS ROAD
- ——— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- —··—·· PROPERTY LINE
- ⌀ UTILITY POLE
- ◌ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ▨ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

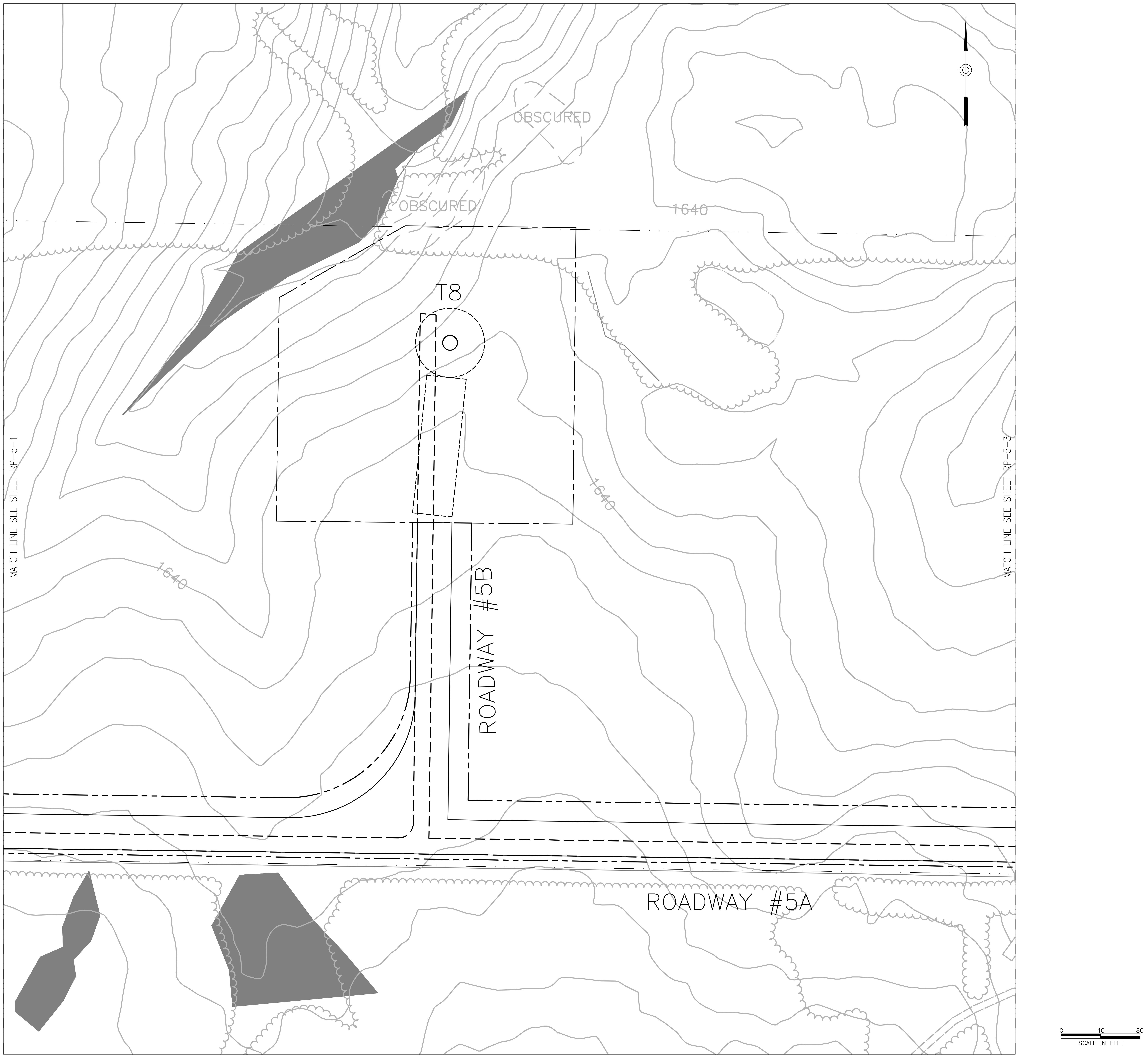
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 5, SHT. 1 OF 7

SCALE
AS SHOWN

DRAWING
RP-5-1
REV
—

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- — · — LIMIT OF DISTURBANCE
- — · · — PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ▰ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

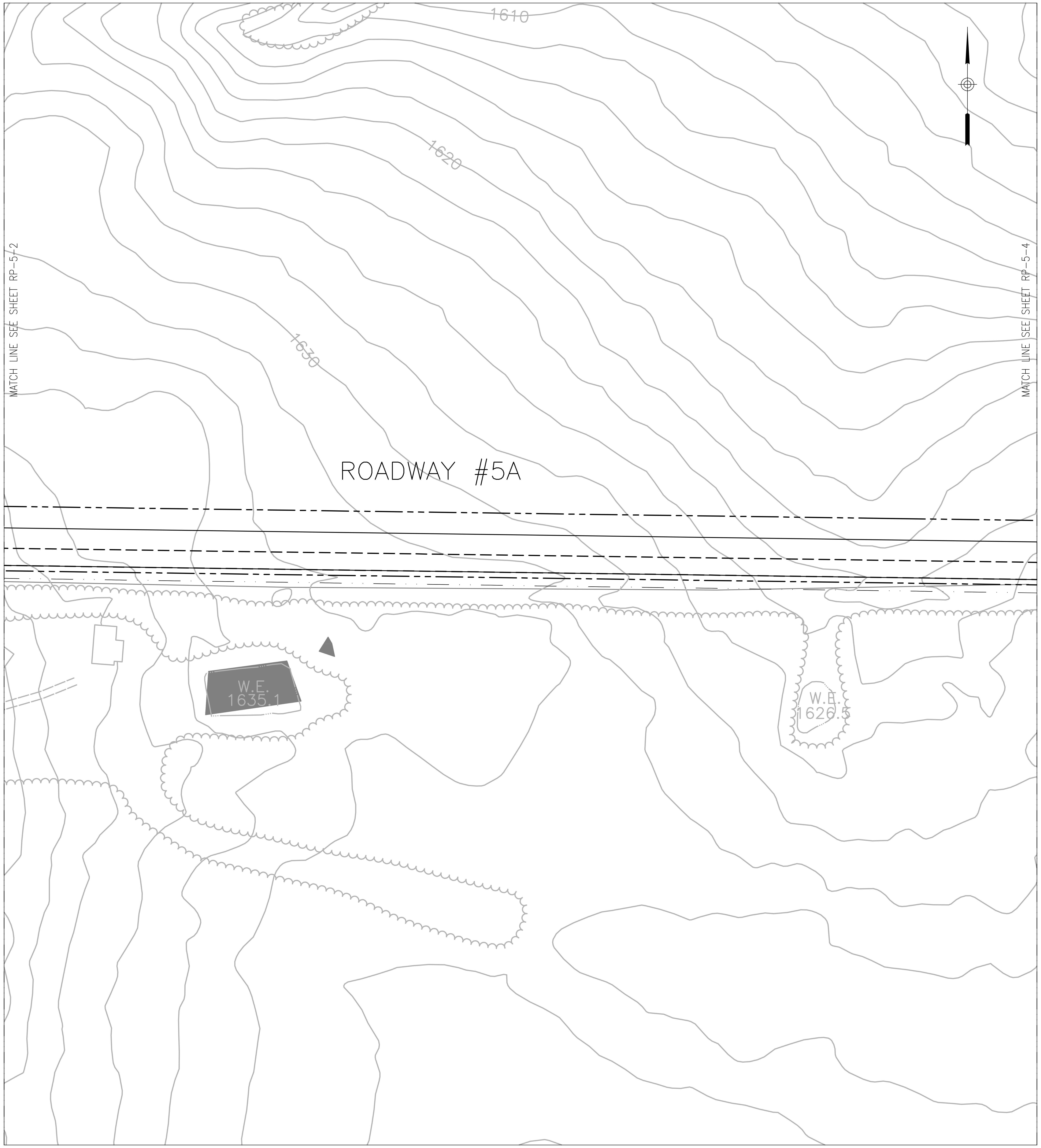
SITE PLAN
ROADWAY 5 SHT. 2 OF 7

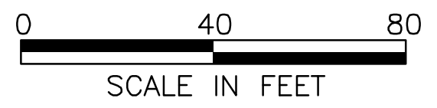
SCALE
AS SHOWN

DRAWING
RP-5-2

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC





NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—·—	LIMIT OF DISTURBANCE
—··—	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
☐	CRANE PAD
▨	WETLANDS
☐	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DRAWN | CHECKED | RESP.ENGR. | CH.DISC.ENG. | PROJ. MGR..

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 5, SHT. 3 OF 7

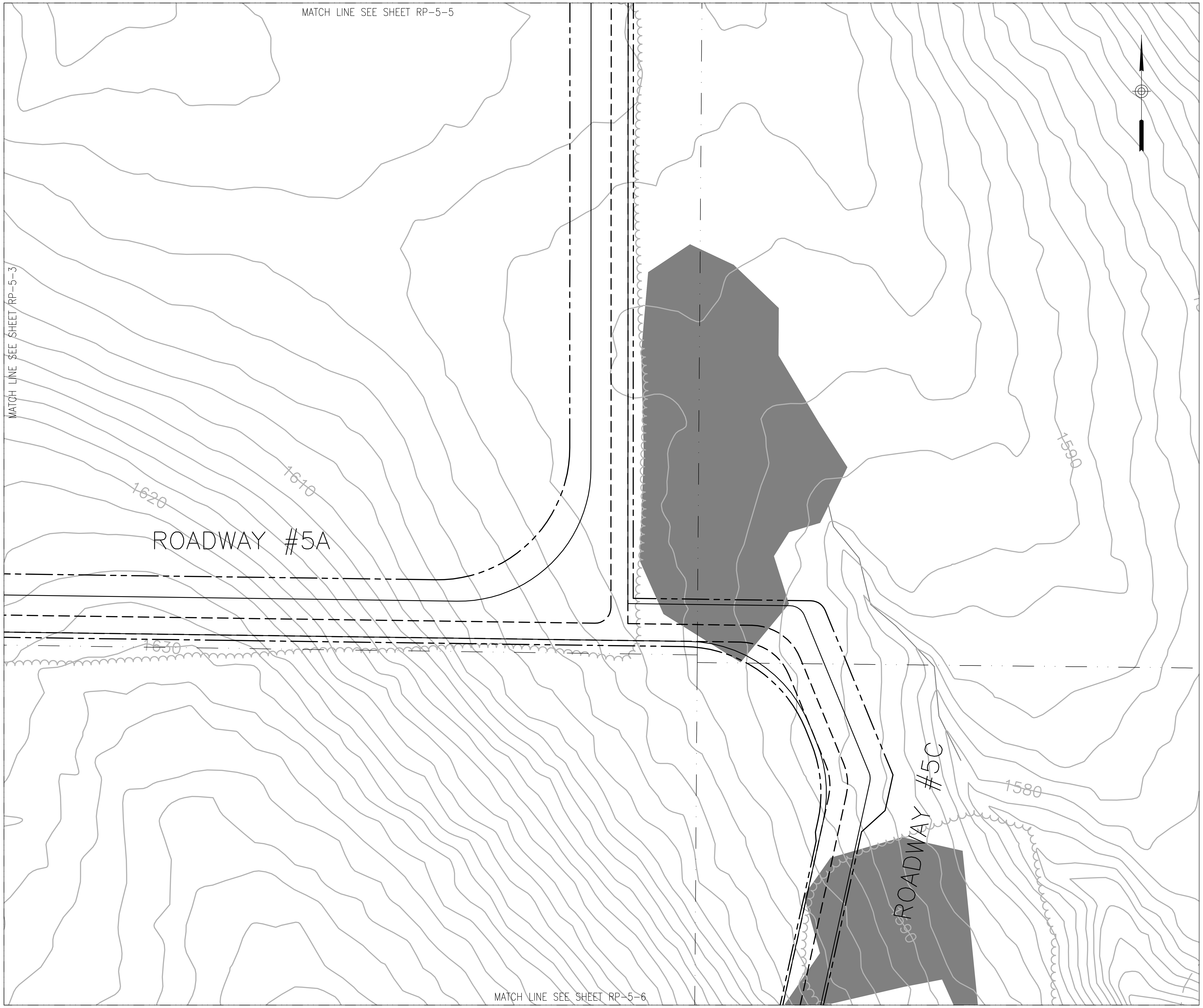
SCALE
AS SHOWN

DRAWING
RP-5-3

REV
–

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC
ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC
ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC
ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC
ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC
ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC
ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC

NOT FOR CONSTRUCTION



0 40 80
SCALE IN FEET

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—·—	LIMIT OF DISTURBANCE
— · · —	PROPERTY LINE
⌀	UTILITY POLE
◌	TURBINE FOUNDATION
○	TURBINE PEDESTAL
▭	CRANE PAD
▨	WETLANDS
▭	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DRAWN | CHECKED | RESP.ENGR. | CH.DISC.ENG. | PROJ. MGR..

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

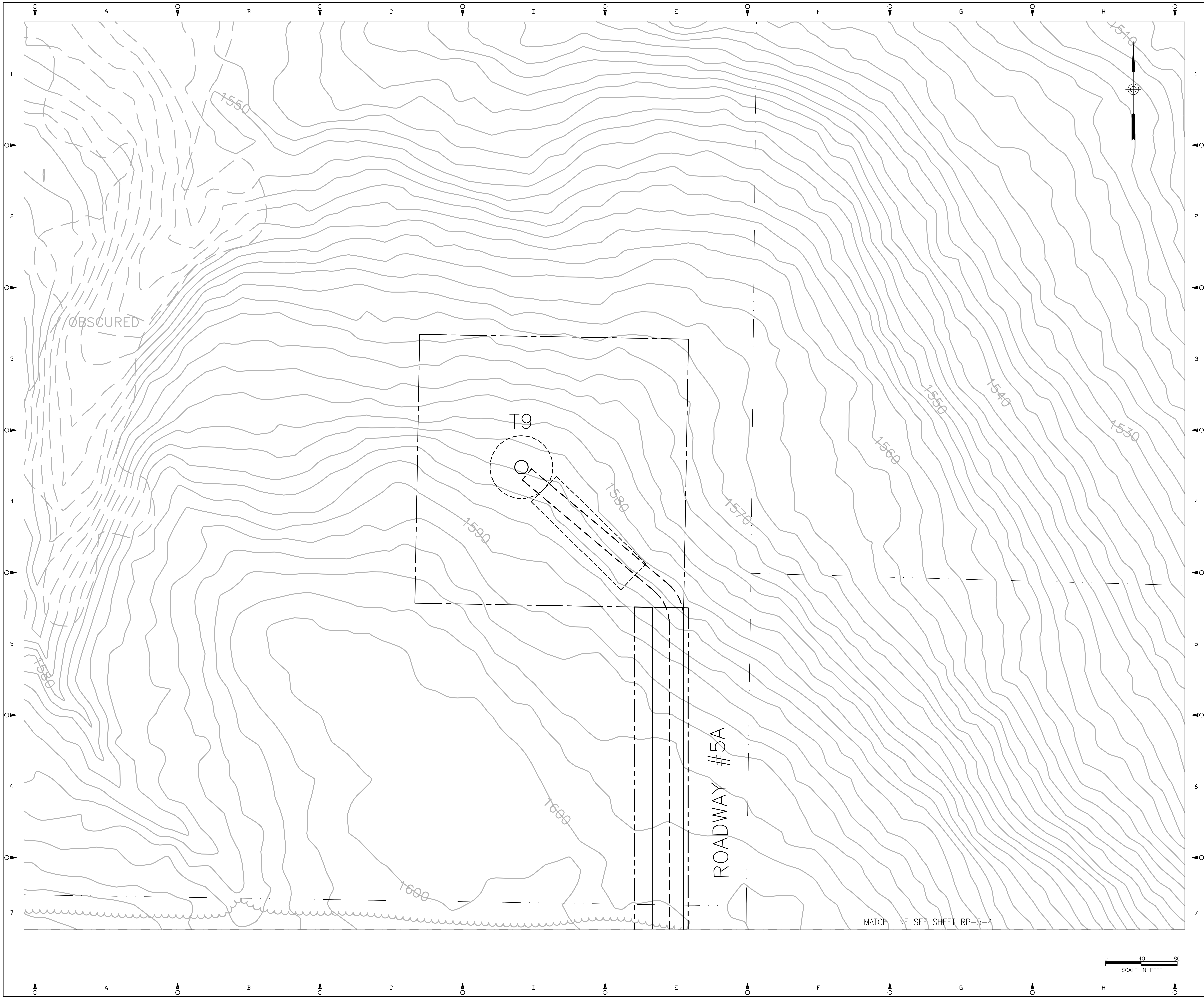
DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 5, SHT. 4 OF 7

SCALE
AS SHOWN

DRAWING
RP-5-4
REV
–



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- ─── 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- —··— PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ▨ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 5, SHT. 5 OF 7

SCALE
AS SHOWN

DRAWING
RP-5-5

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION

0 40 80
SCALE IN FEET

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
— - — -	LIMIT OF DISTURBANCE
— - - —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
▭	CRANE PAD
▨	WETLANDS
▭	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

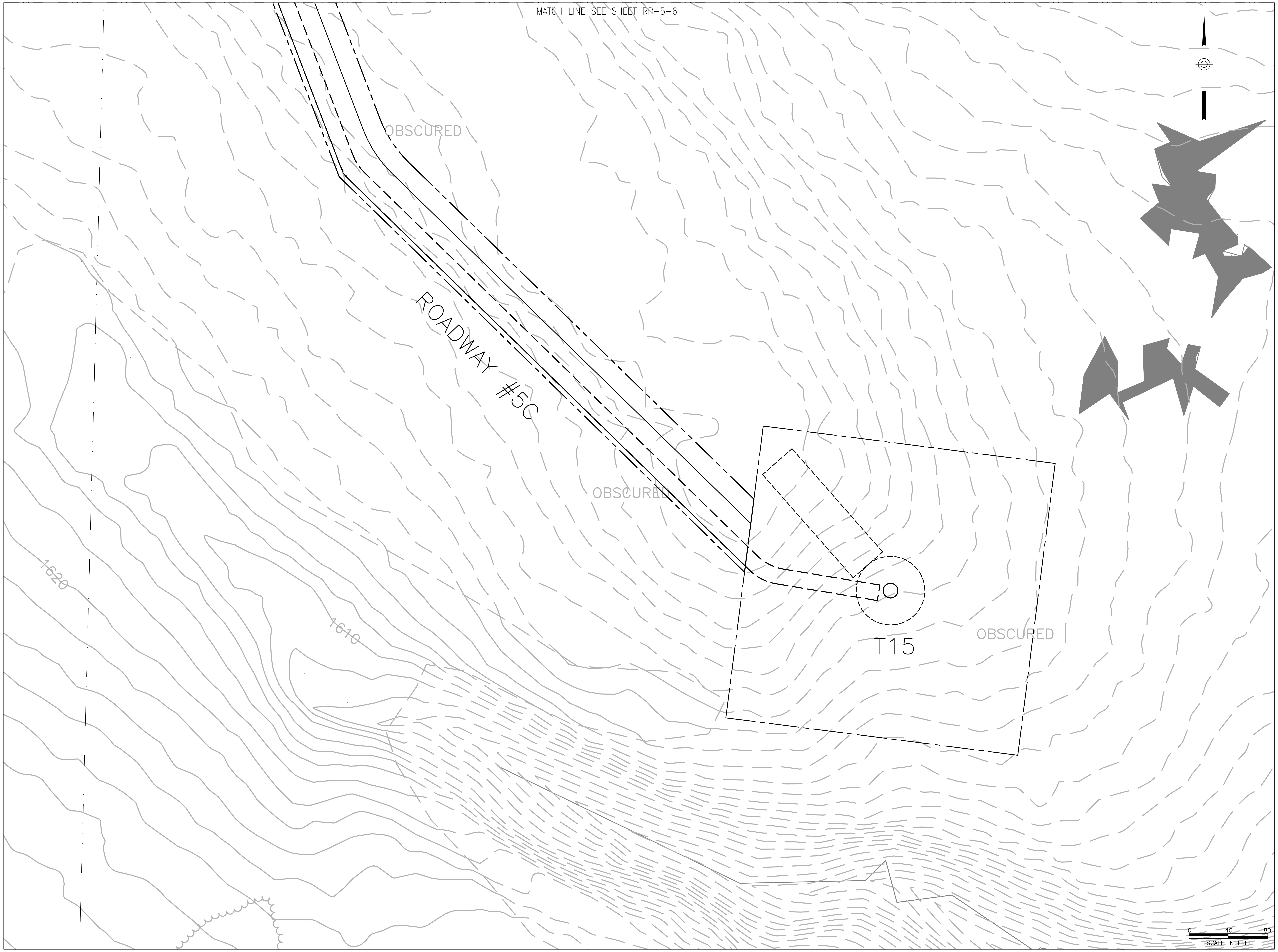
SITE PLAN
ROADWAY 5, SHT. 6 OF 7

SCALE
AS SHOWN

DRAWING
RP-5-6

REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

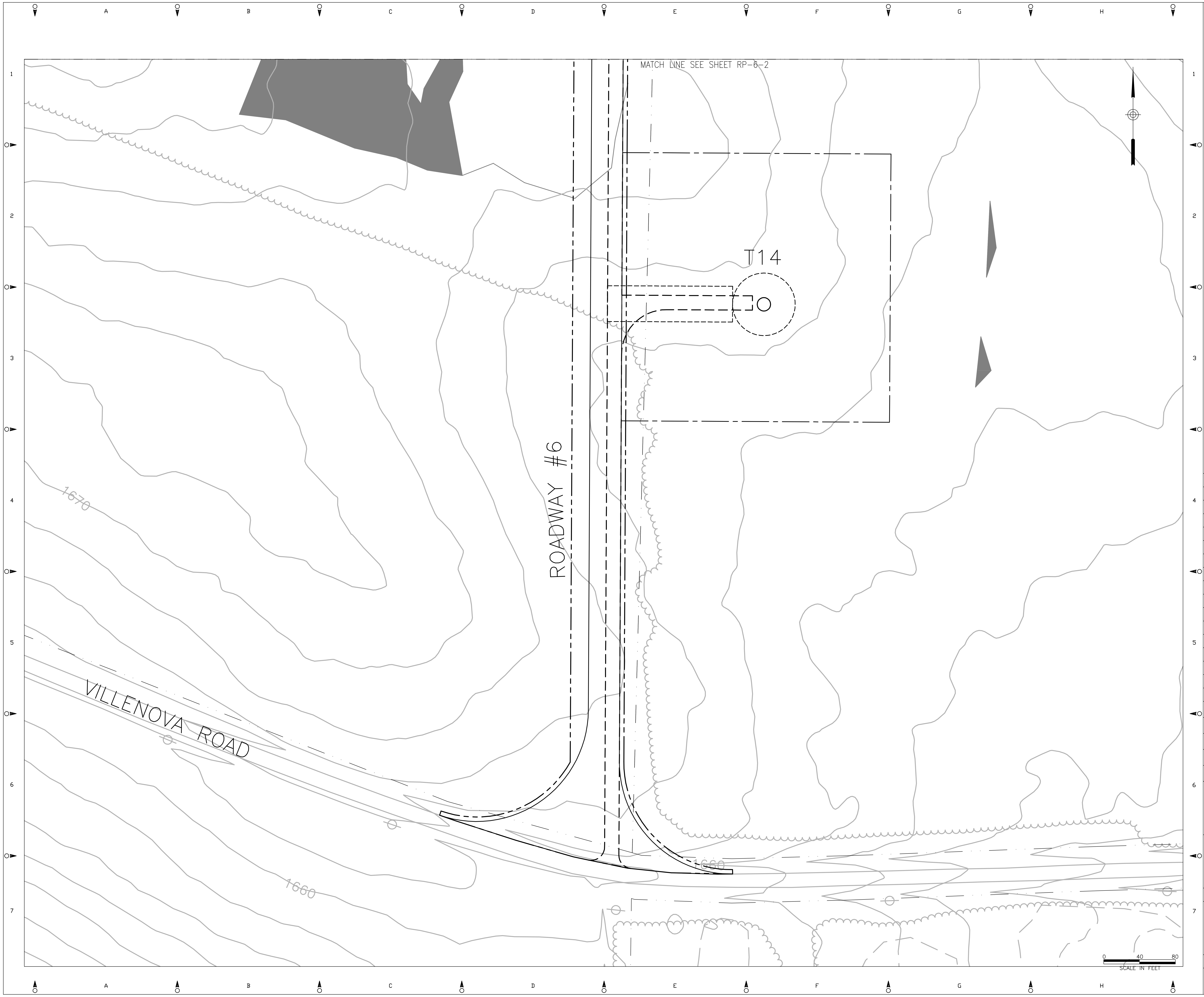
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 5, SHT. 7 OF 7

SCALE AS SHOWN

DRAWING RP-5-7
REV —

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 6, SHT. 1 OF 3

SCALE
AS SHOWN

DRAWING
RP-6-1

REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- — - — LIMIT OF DISTURBANCE
- — · — PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ☐ CRANE PAD
- ▨ WETLANDS
- ☐ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

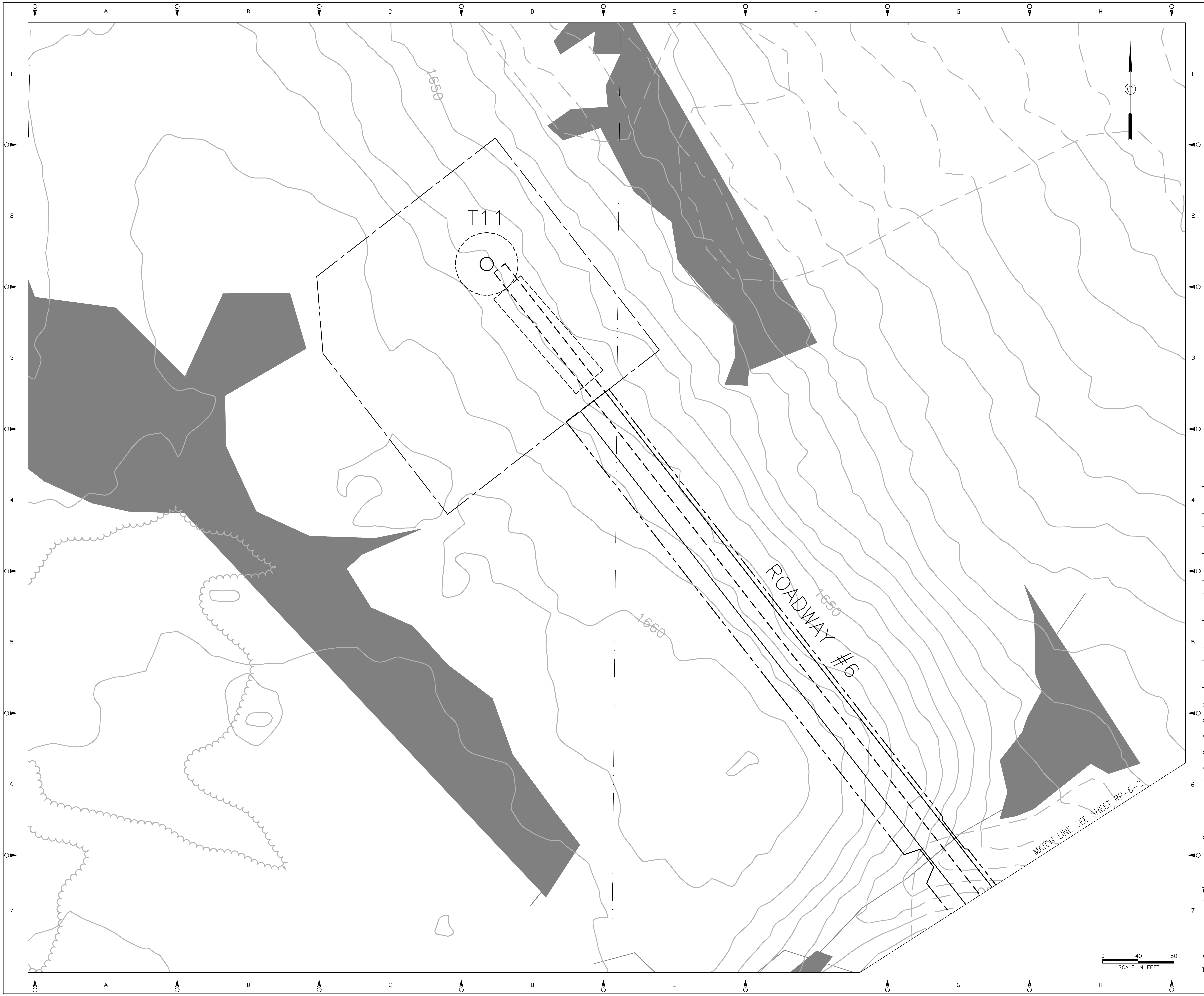
SITE PLAN
ROADWAY 6, SHT. 2 OF 3

SCALE
AS SHOWN

DRAWING
RP-6-2

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

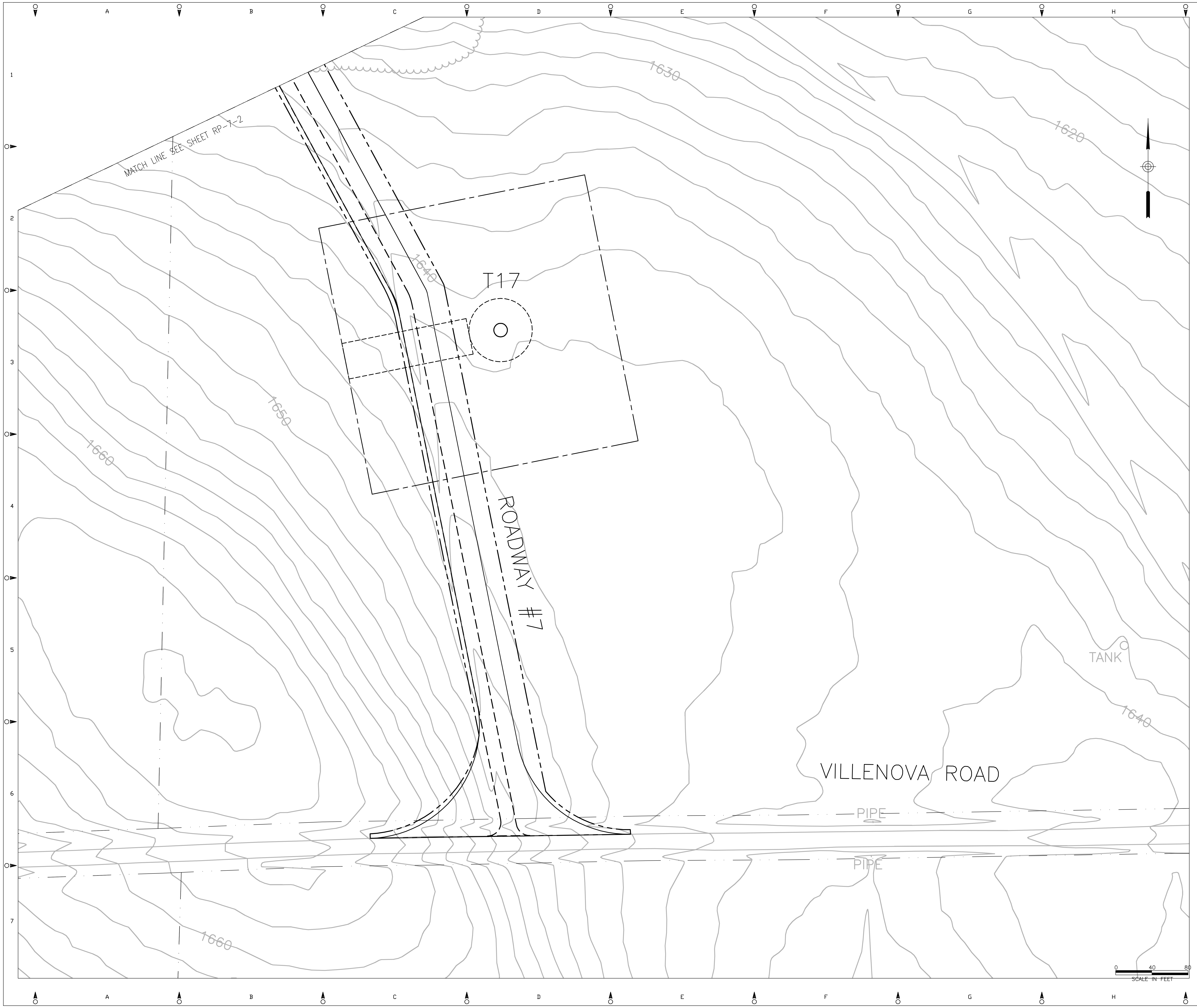
SITE PLAN
ROADWAY 6, SHT. 3 OF 3

SCALE
AS SHOWN

DRAWING
RP-6-3

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

16 FOOT PERMANENT ACCESS ROAD
35 FOOT TEMPORARY CONSTRUCTION ROAD
LIMIT OF DISTURBANCE
PROPERTY LINE
UTILITY POLE
TURBINE FOUNDATION
TURBINE PEDESTAL
CRANE PAD
WETLANDS
TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DRAWN | CHECKED | RESP.ENGR. | CH.DISC.ENG. | PROJ. MGR..

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

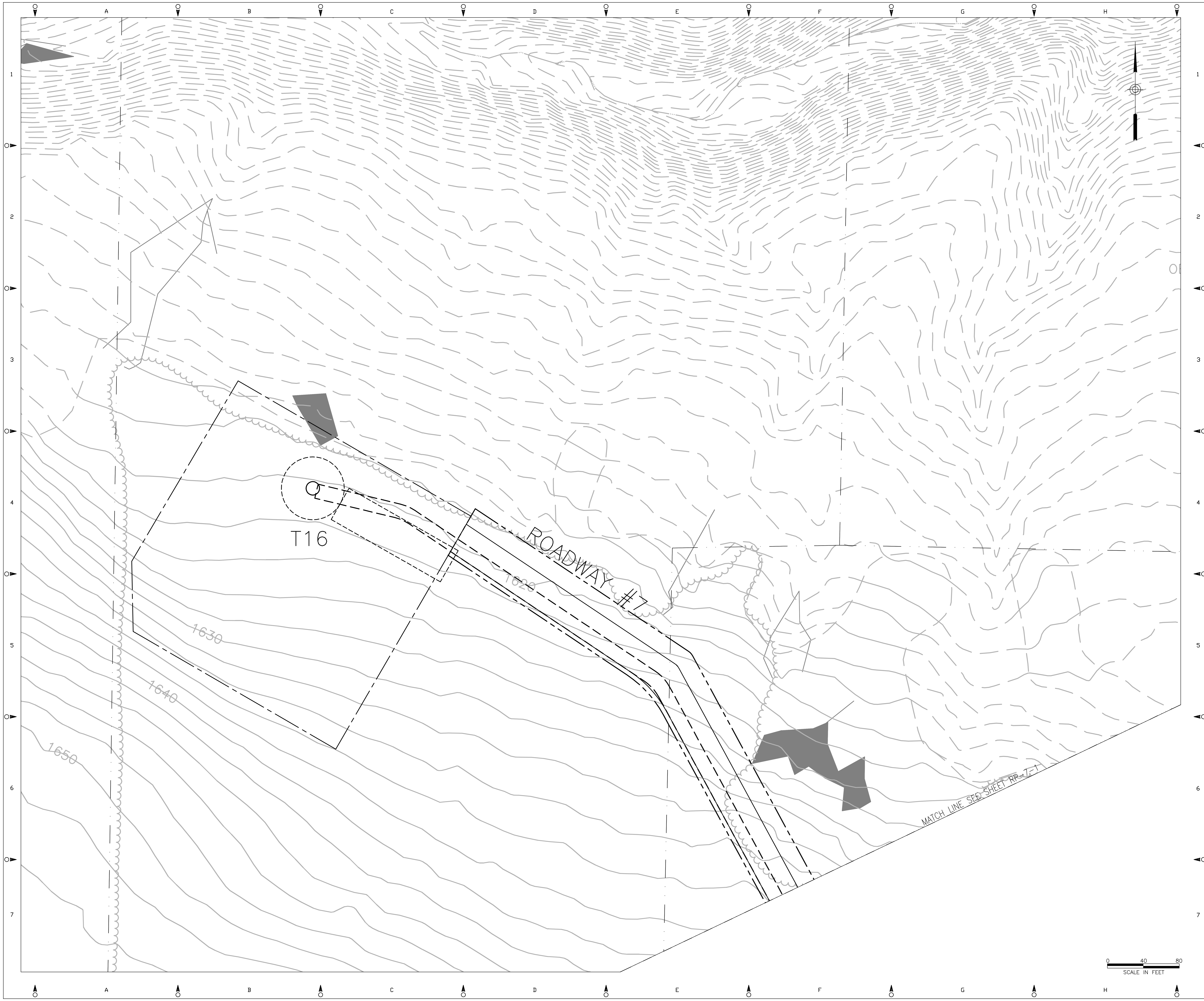
SITE PLAN
ROADWAY 7, SHT. 1 OF 2

SCALE
AS SHOWN

DRAWING
RP-7-1

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- —··— PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ▨ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..		
-										

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 7, SHT. 2 OF 2

SCALE
AS SHOWN

DRAWING
RP-7-2

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

16 FOOT PERMANENT ACCESS ROAD
35 FOOT TEMPORARY CONSTRUCTION ROAD
LIMIT OF DISTURBANCE
PROPERTY LINE
UTILITY POLE
TURBINE FOUNDATION
TURBINE PEDESTAL
CRANE PAD
WETLANDS
TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

DRAWN | CHECKED | RESP.ENGR. | CH.DISC.ENG. | PROJ. MGR..

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

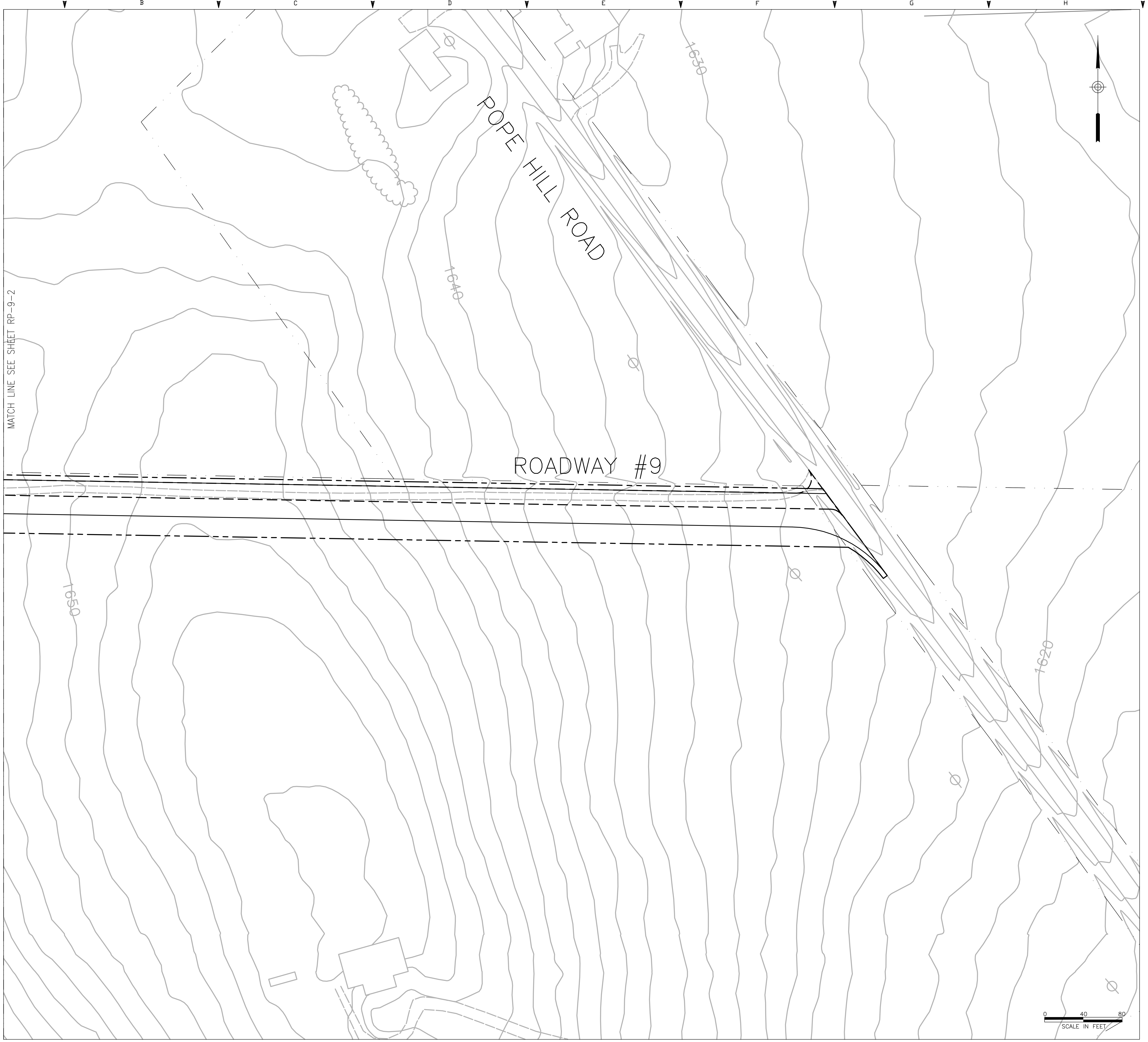
SITE PLAN
ROADWAY 8, SHT. 1 OF 1

SCALE
AS SHOWN

DRAWING
RP-8-1

REV
–

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC



NOT FOR CONSTRUCTION

LEGEND

- — — — 16 FOOT PERMANENT ACCESS ROAD
- ——— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- — · — LIMIT OF DISTURBANCE
- — · · — PROPERTY LINE
- ⌀ UTILITY POLE
- ○ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ▨ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

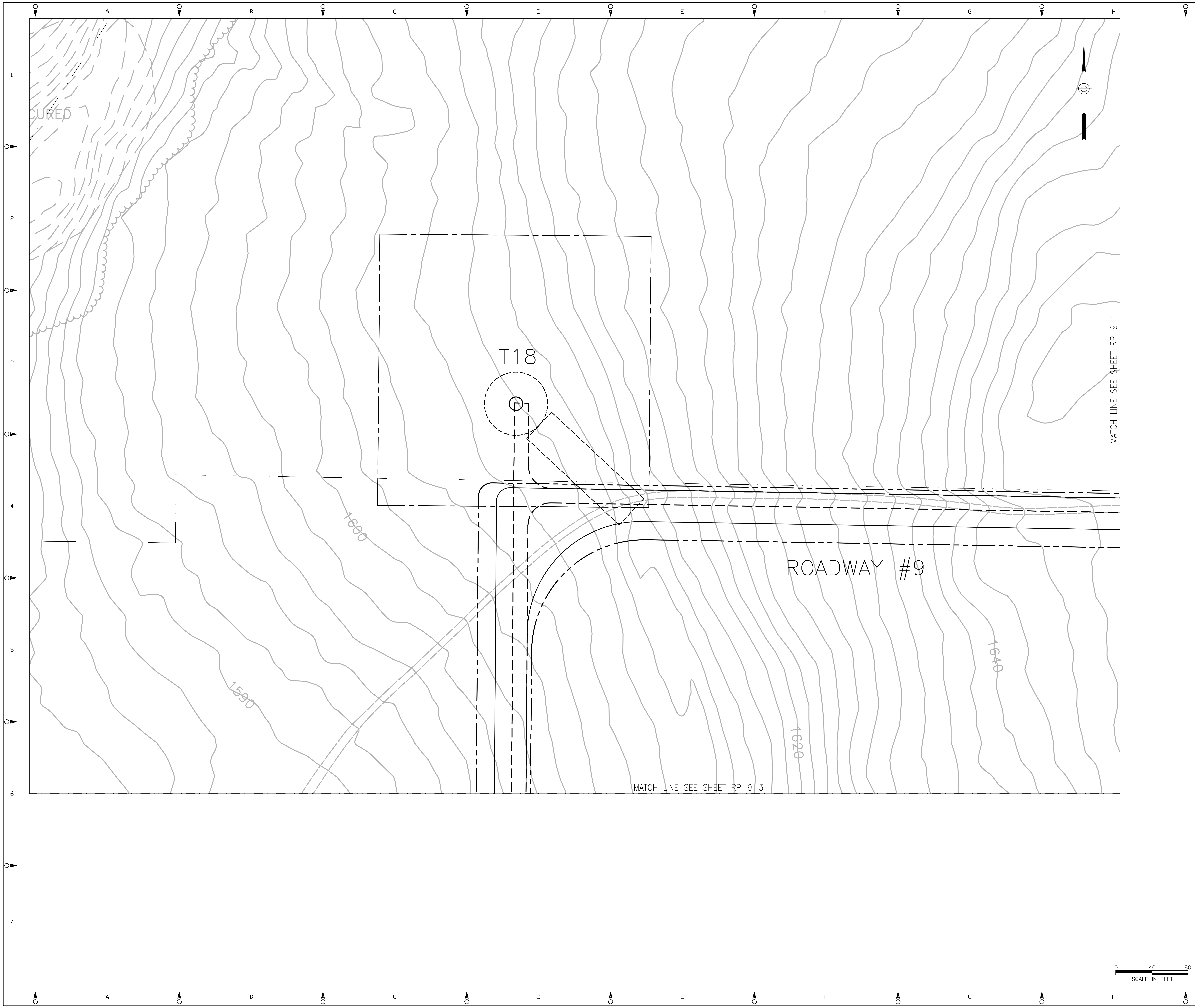
DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 9, SHT. 1 OF 6

SCALE AS SHOWN
DRAWING RP-9-1
REV -

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·— LIMIT OF DISTURBANCE
- —··— PROPERTY LINE
- ⌀ UTILITY POLE
- ◌ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ▨ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 9, SHT. 2 OF 6

SCALE
AS SHOWN

DRAWING
RP-9-2

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- ── 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·— LIMIT OF DISTURBANCE
- PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ⬚ CRANE PAD
- ▨ WETLANDS
- ⬚ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE

Noble ENVIRONMENTAL POWER

DEPT.

NO.

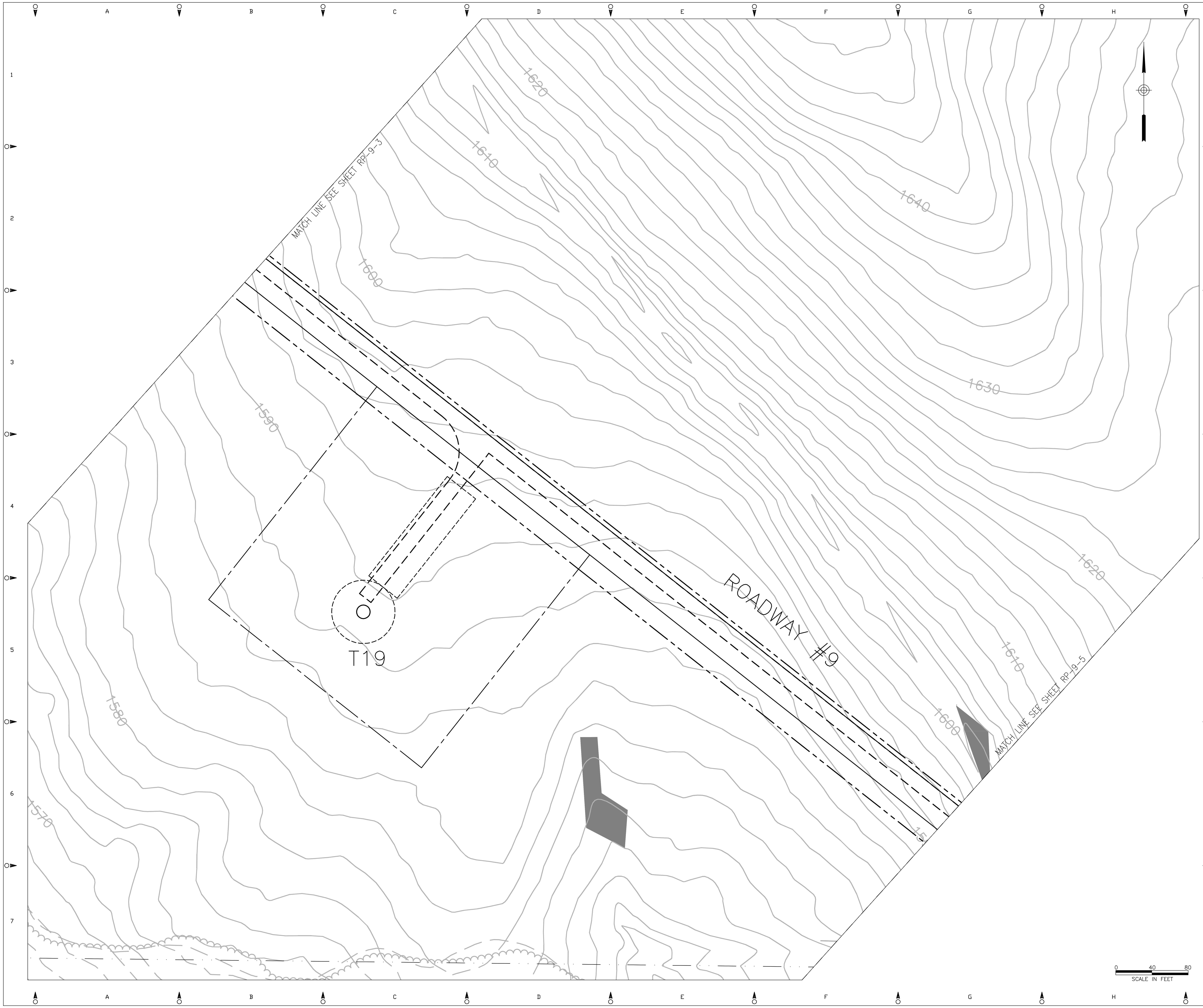
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 9, SHT. 3 OF 6

SCALE
AS SHOWN

DRAWING
RP-9-3

REV
—



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- — · — PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ⬚ CRANE PAD
- ▨ WETLANDS
- ⬚ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 9, SHT. 4 OF 6

SCALE
AS SHOWN

DRAWING
RP-9-4

REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

— —	16 FOOT PERMANENT ACCESS ROAD
——	35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—	LIMIT OF DISTURBANCE
—··—	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
▭	CRANE PAD
▨	WETLANDS
☐	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

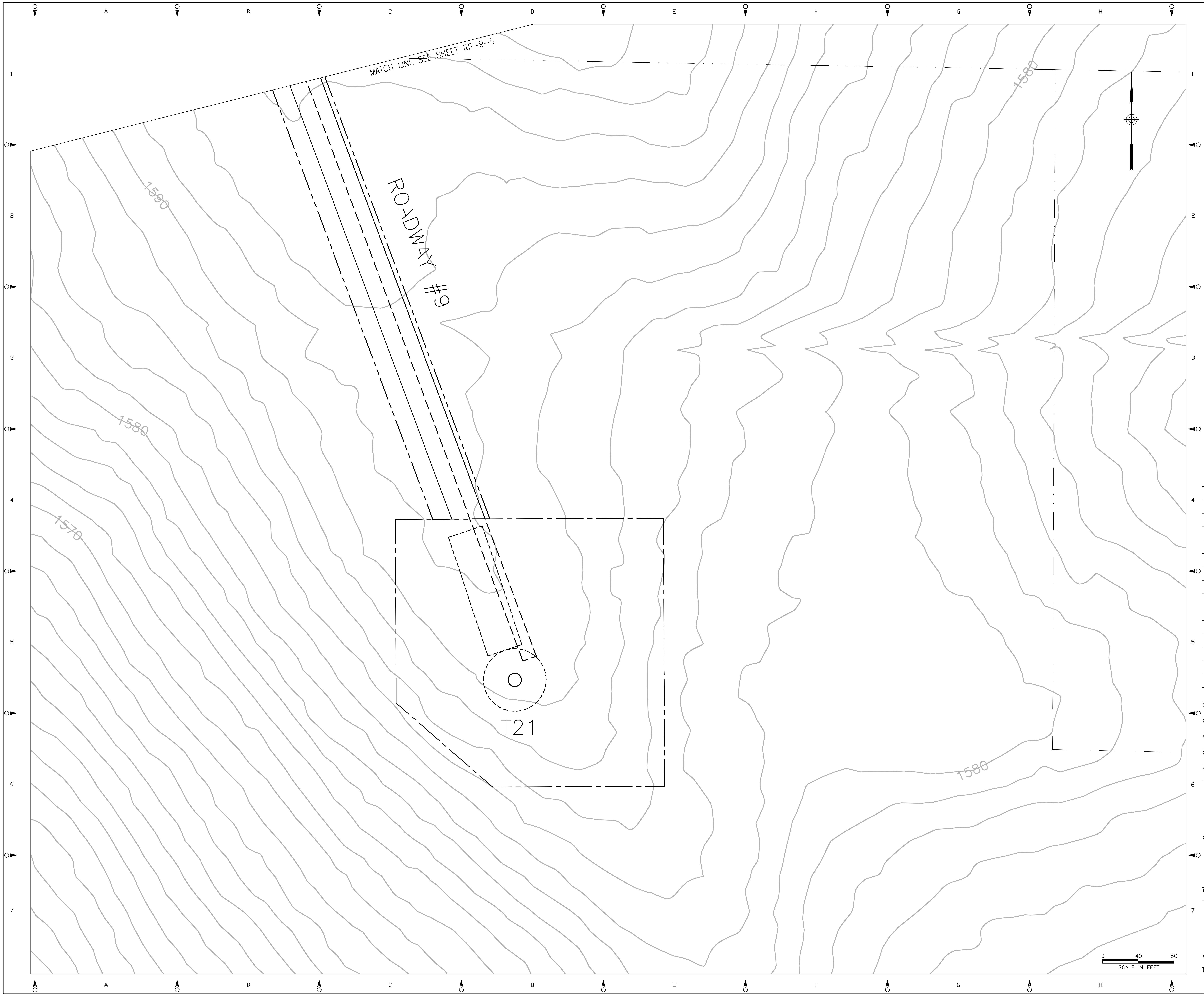
SITE PLAN
ROADWAY 9, SHT. 5 OF 6

SCALE
AS SHOWN

DRAWING
RP-9-5

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- ——— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- —··— PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ⬚ CRANE PAD
- ▰ WETLANDS
- ⬚ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

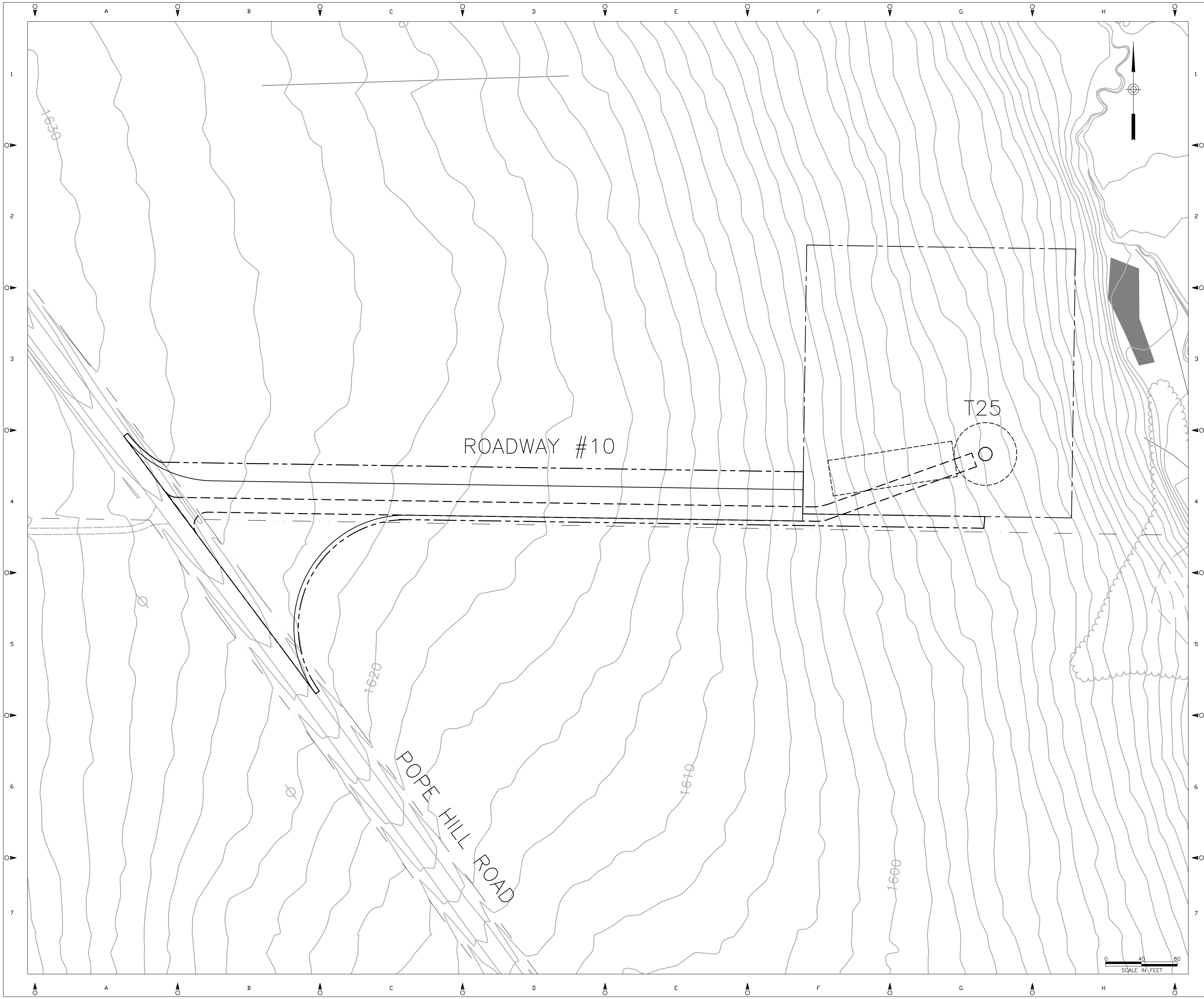
SITE PLAN
ROADWAY 9, SHT. 6 OF 6

SCALE
AS SHOWN

DRAWING
RP-9-6

REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

16 FOOT PERMANENT ACCESS ROAD
35 FOOT TEMPORARY CONSTRUCTION ROAD
LIMIT OF DISTURBANCE
PROPERTY LINE
UTILITY POLE
TURBINE FOUNDATION
TURBINE PEDESTAL
CRANE PAD
▨ WETLANDS
TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DRAWN | CHECKED | RESP.ENGR. | CH.DISC.ENG. | PROJ. MGR..

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 10, SHT. 1 OF 1

SCALE
AS SHOWN

DRAWING
RP-10-1

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- — - - — LIMIT OF DISTURBANCE
- — · — PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ☐ CRANE PAD
- ▨ WETLANDS
- ☐ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

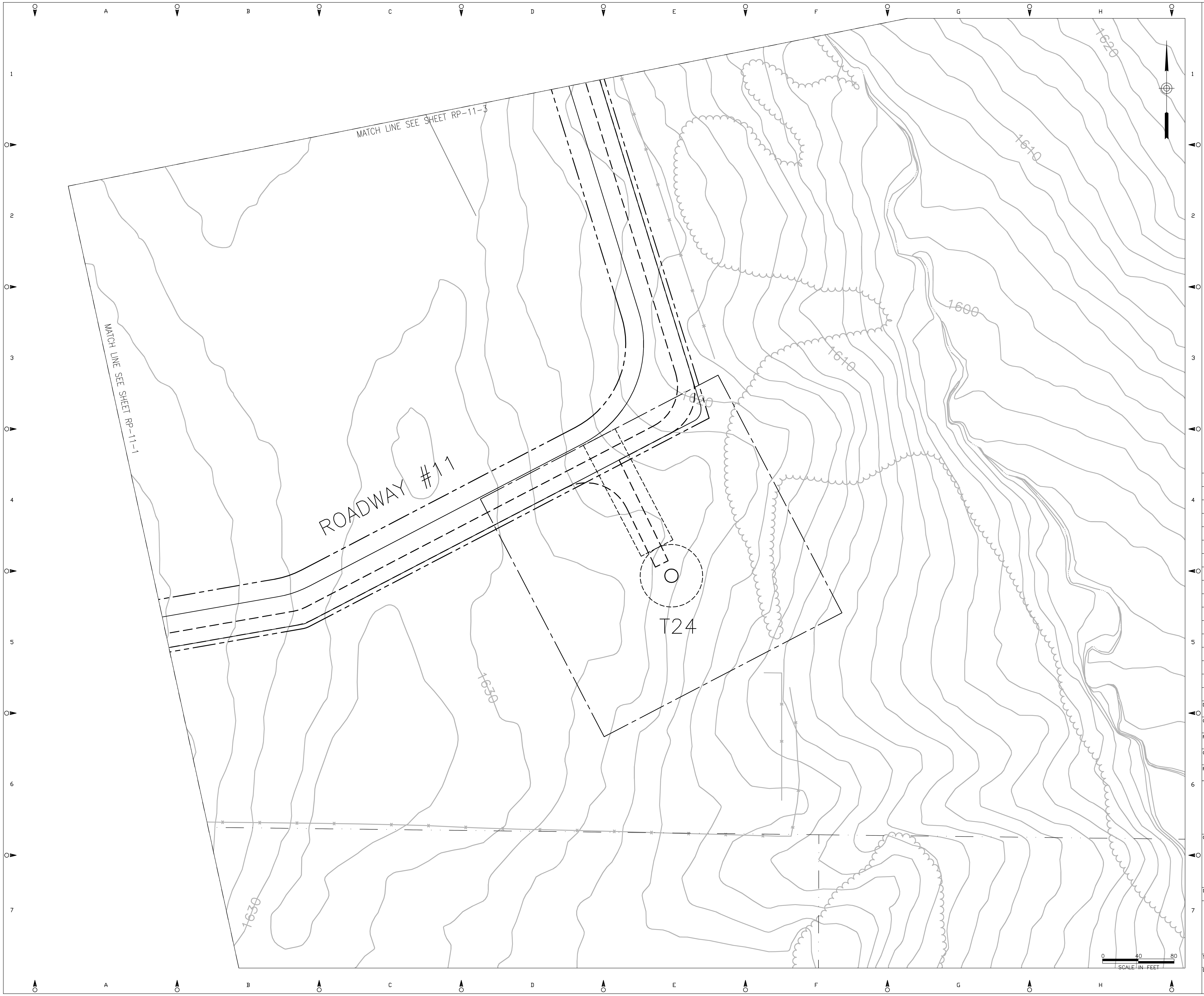
SITE PLAN
ROADWAY 11, SHT. 1 OF 3

SCALE
AS SHOWN

DRAWING
RP-11-1

REV
–

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC



NOT FOR CONSTRUCTION

LEGEND

— — — 16 FOOT PERMANENT ACCESS ROAD
——— 35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—·— LIMIT OF DISTURBANCE
— · · — PROPERTY LINE
ø UTILITY POLE
◯ TURBINE FOUNDATION
○ TURBINE PEDESTAL
▭ CRANE PAD
▬ WETLANDS
▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP. ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

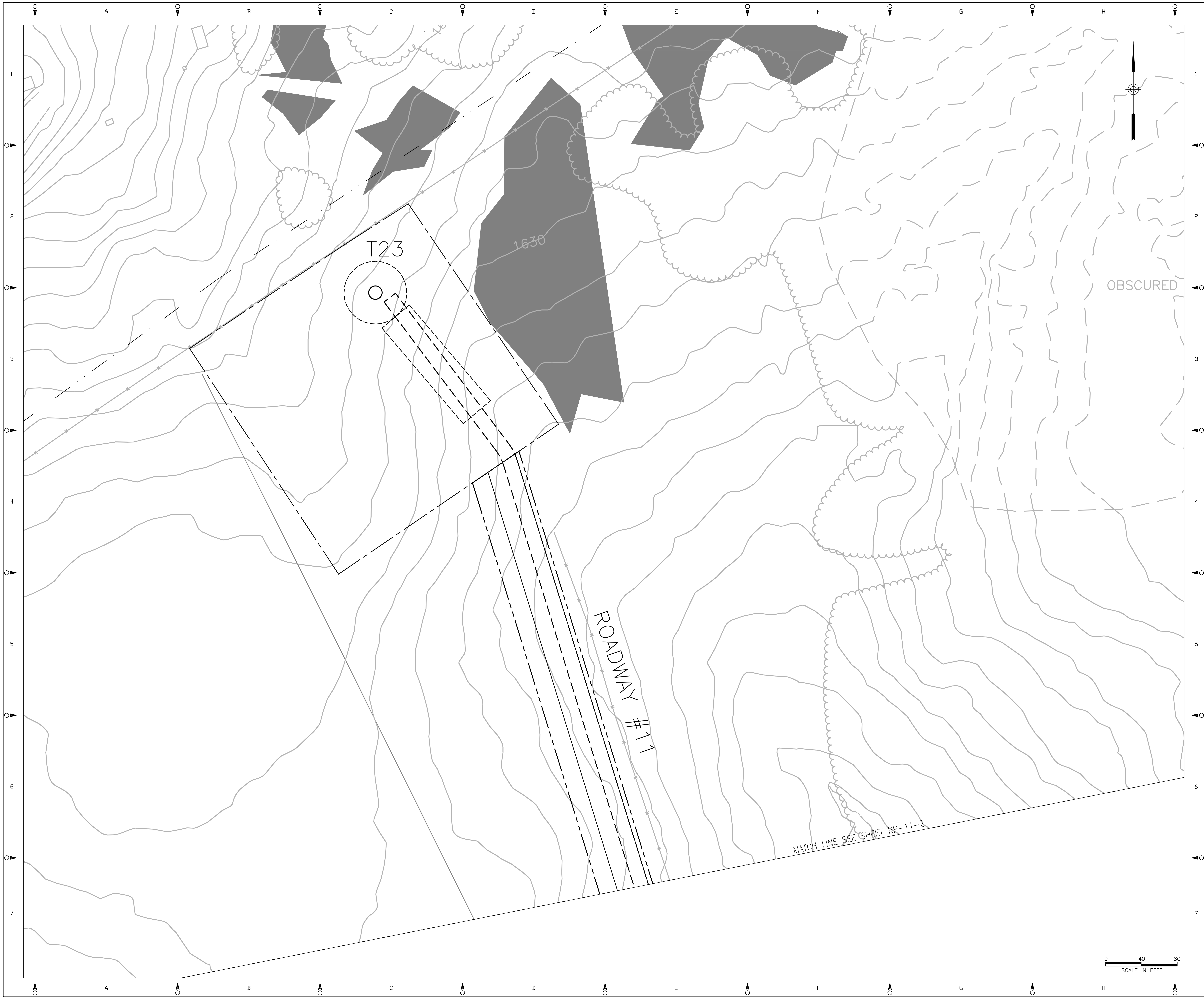
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 11, SHT. 2 OF 3

SCALE AS SHOWN

DRAWING RP-11-2
REV -

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

16 FOOT PERMANENT ACCESS ROAD
35 FOOT TEMPORARY CONSTRUCTION ROAD
LIMIT OF DISTURBANCE
PROPERTY LINE
UTILITY POLE
TURBINE FOUNDATION
TURBINE PEDESTAL
CRANE PAD
WETLANDS
TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR..
-							

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

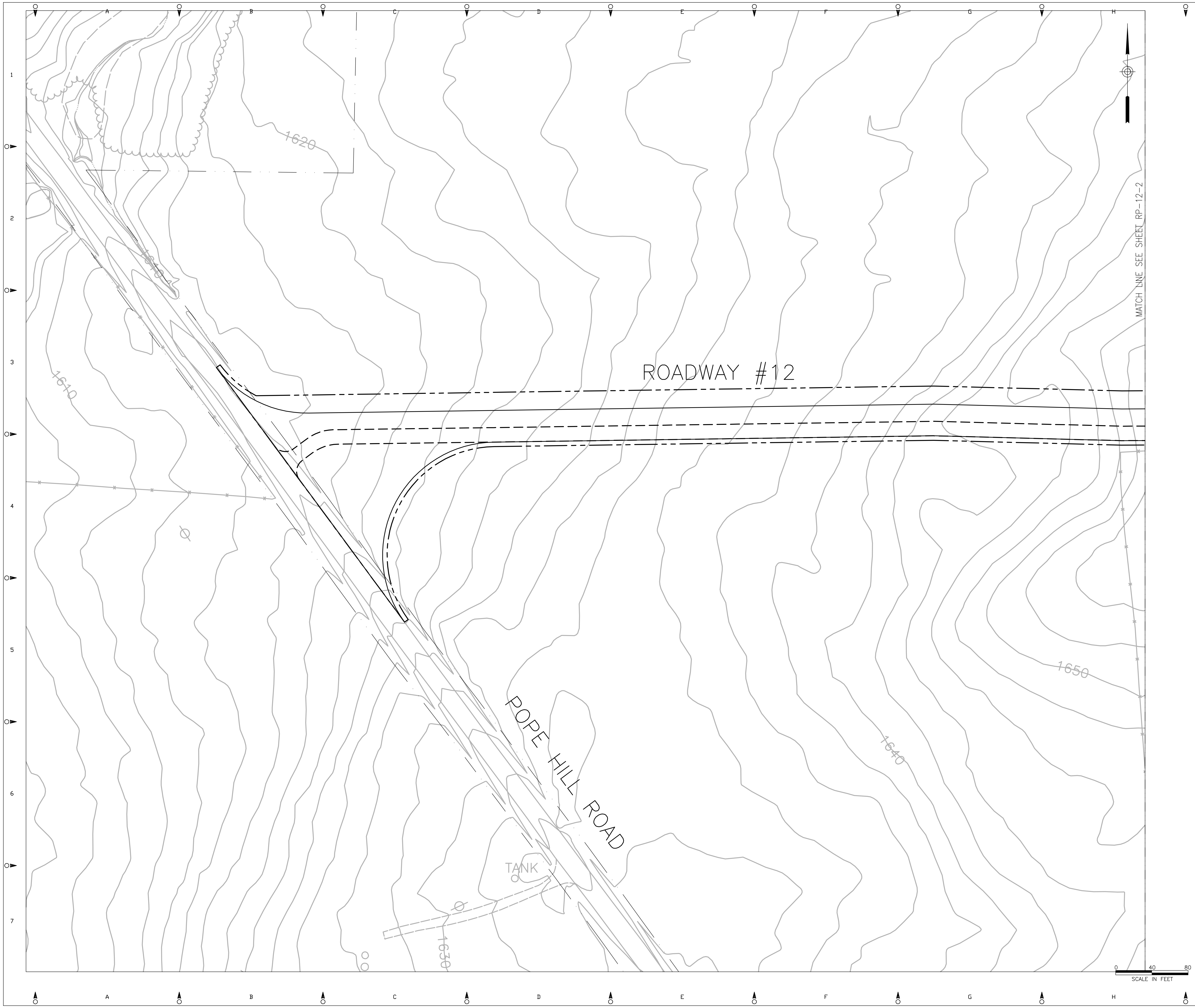
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 11, SHT. 3 OF 3

SCALE AS SHOWN

DRAWING RP-11-3
REV –

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- ▨ WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP. ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

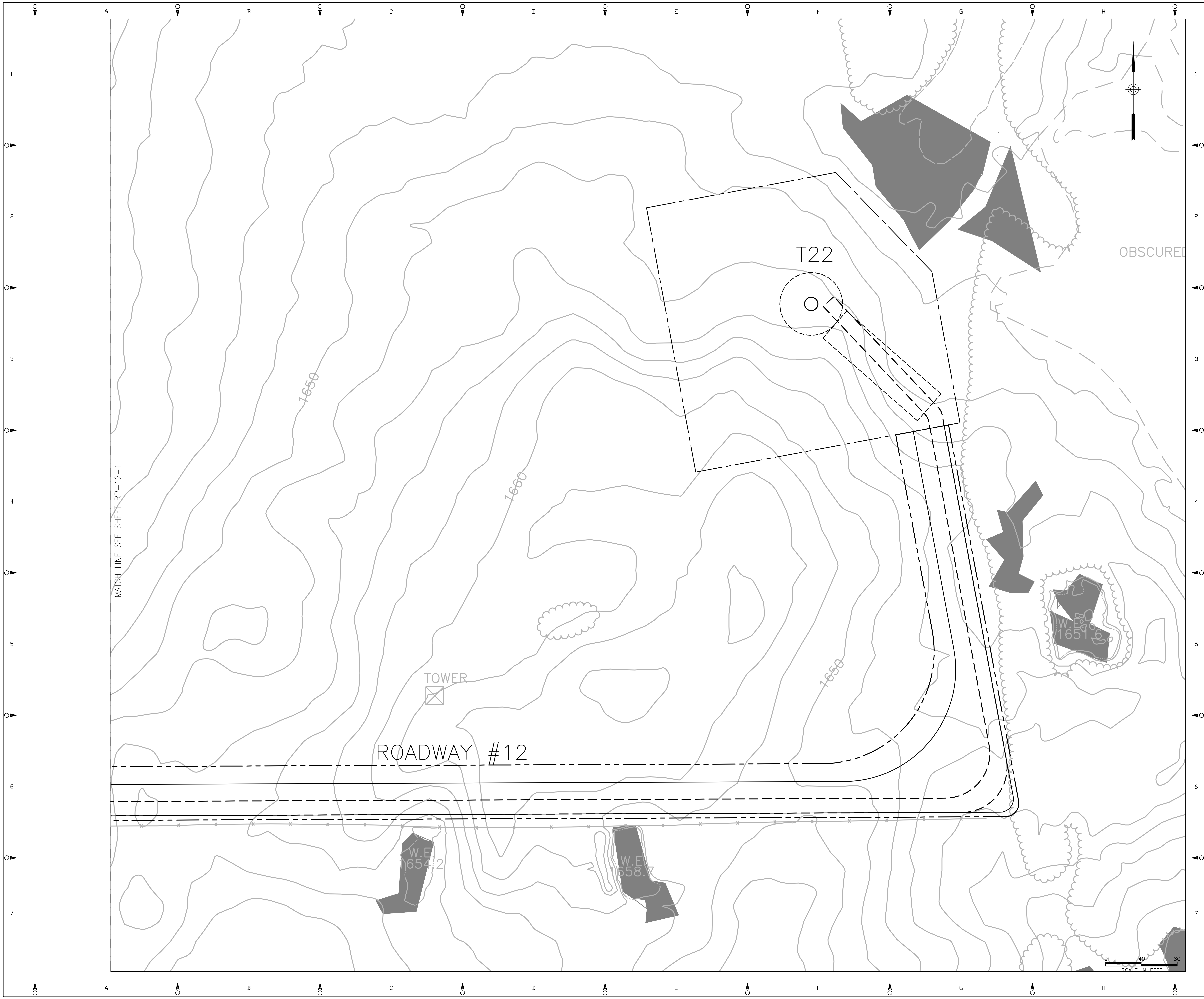
SITE PLAN
ROADWAY 12, SHT. 1 OF 2

SCALE
AS SHOWN

DRAWING
RP-12-1

REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

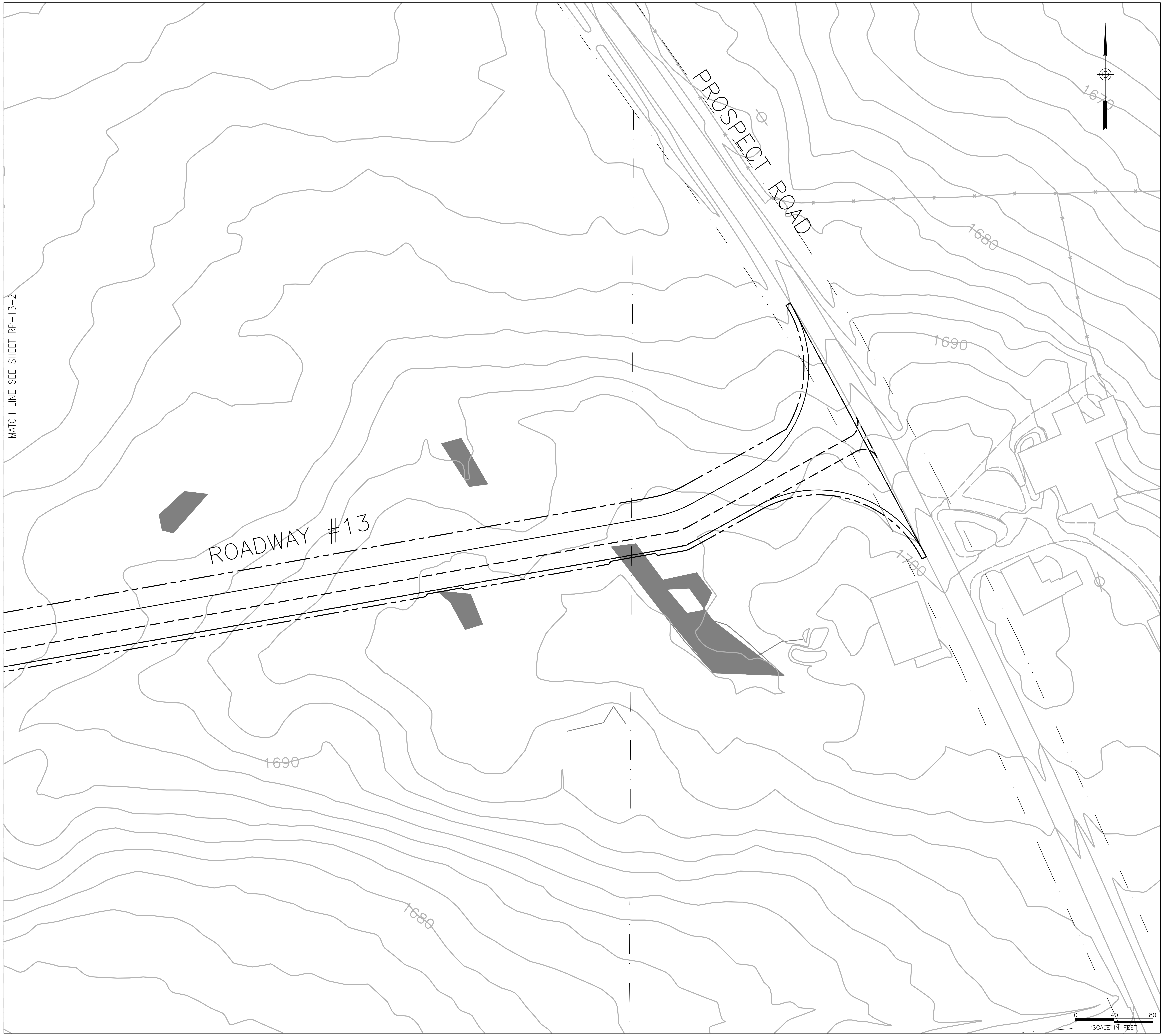
SITE PLAN
ROADWAY 12, SHT. 2 OF 2

SCALE
AS SHOWN

DRAWING
RP-12-2

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

— — — 16 FOOT PERMANENT ACCESS ROAD
——— 35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—·— LIMIT OF DISTURBANCE
— · — PROPERTY LINE
⌀ UTILITY POLE
◯ TURBINE FOUNDATION
○ TURBINE PEDESTAL
▭ CRANE PAD
▨ WETLANDS
▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

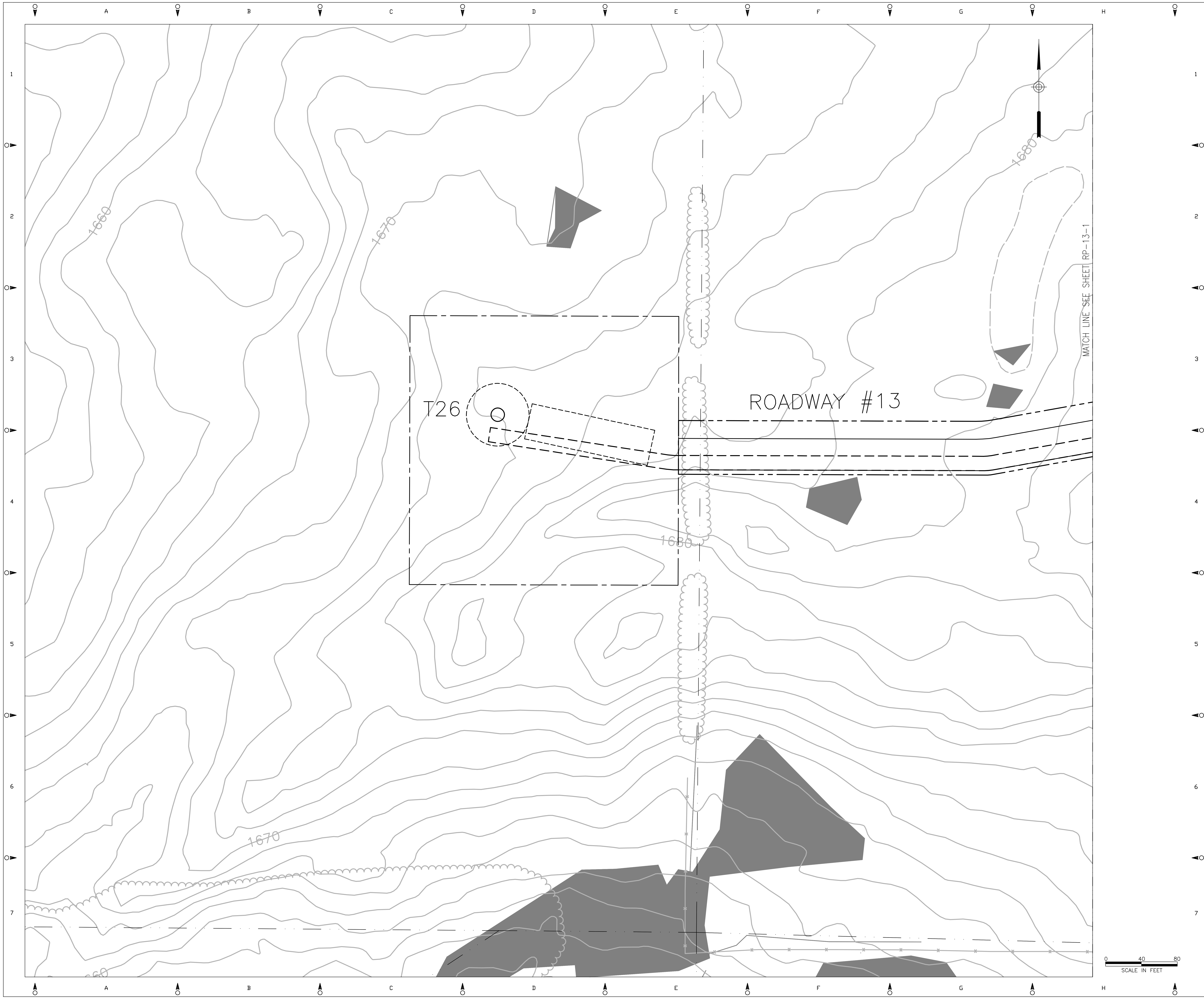
SITE PLAN
ROADWAY 13, SHT. 1 OF 2

SCALE
AS SHOWN

DRAWING
RP-13-1

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..		
-										

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

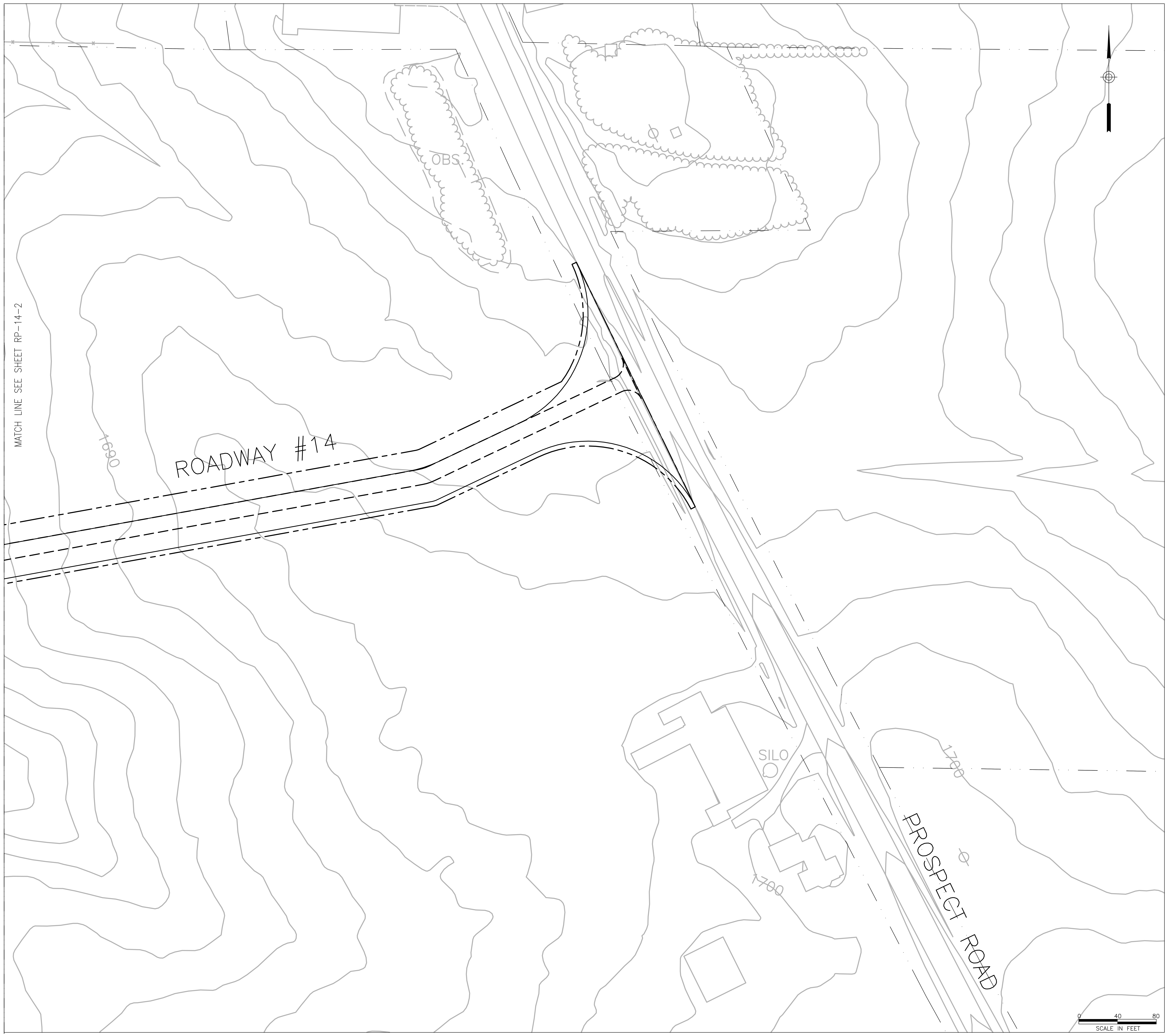
SITE PLAN
ROADWAY 13, SHT. 2 OF 2

SCALE
AS SHOWN

DRAWING
RP-13-2

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- ▨ WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

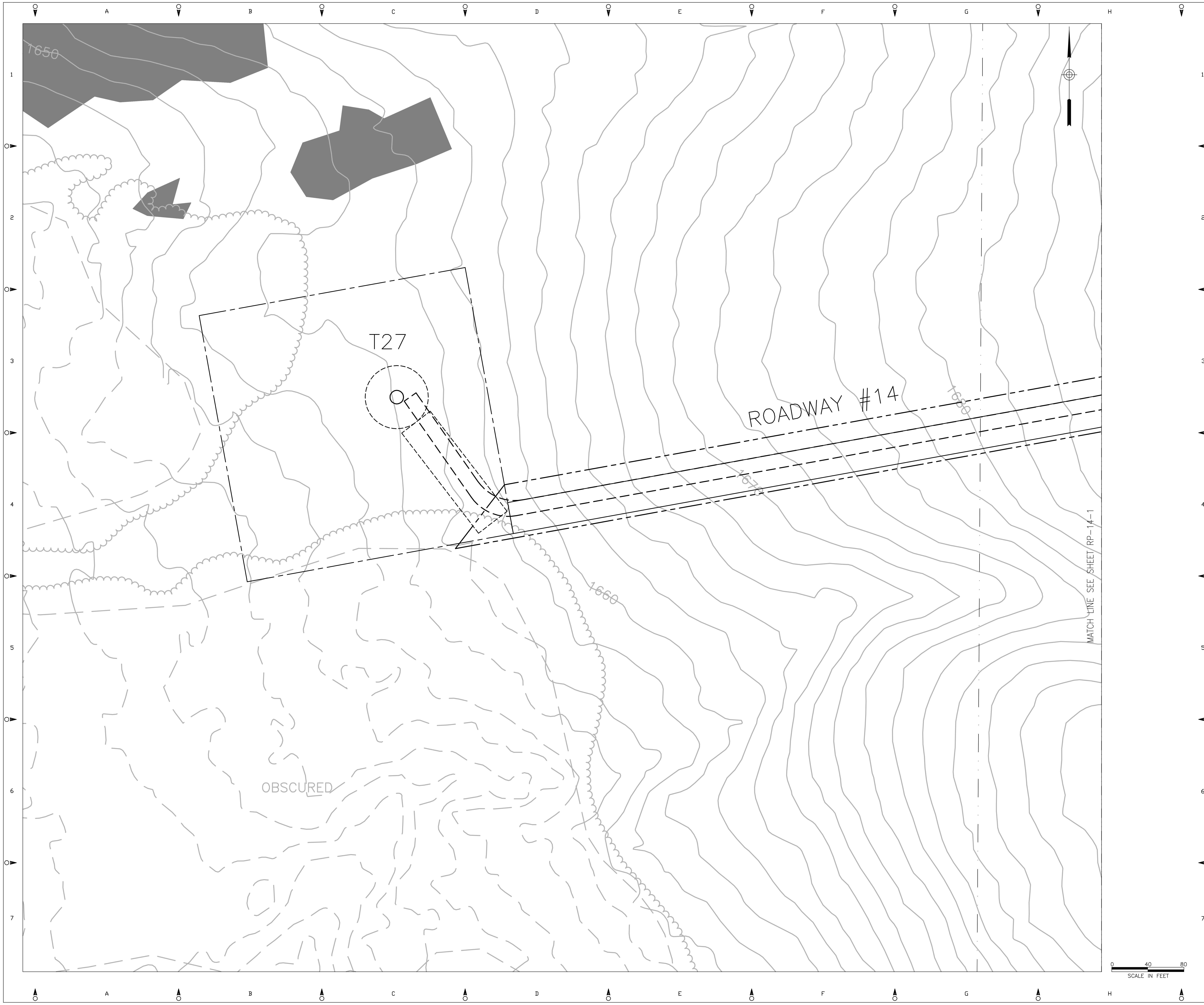
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 14, SHT. 1 OF 2

SCALE AS SHOWN

DRAWING RP-14-1
REV –

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC



NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—·—	LIMIT OF DISTURBANCE
— · · —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
▭	CRANE PAD
▨	WETLANDS
▭	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 14, SHT. 2 OF 2

SCALE
AS SHOWN

DRAWING
RP-14-2

REV
–

NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- — - - — LIMIT OF DISTURBANCE
- — · — PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ■ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

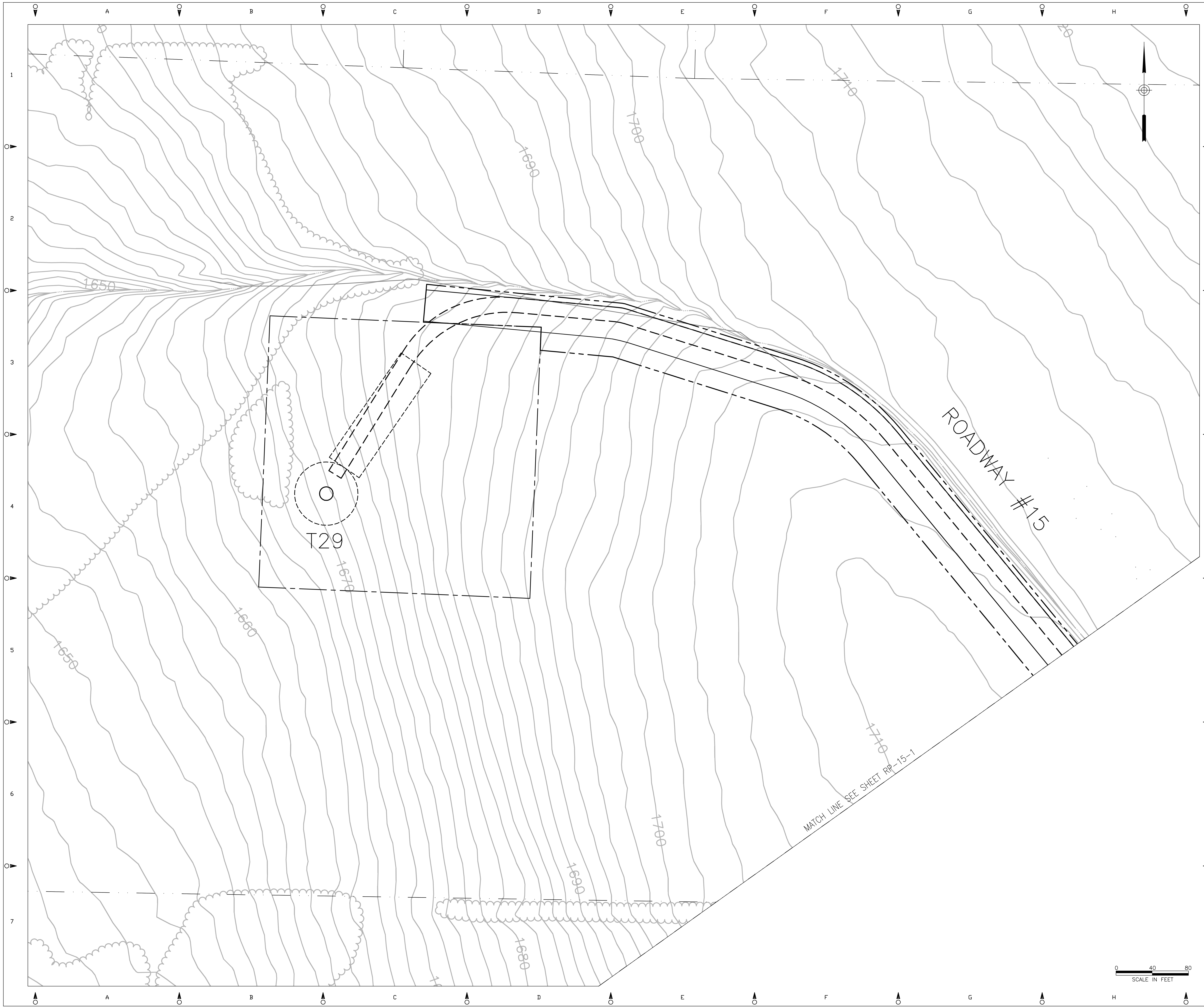
SITE PLAN
ROADWAY 15, SHT. 1 OF 2

SCALE
AS SHOWN

DRAWING
RP-15-1

REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

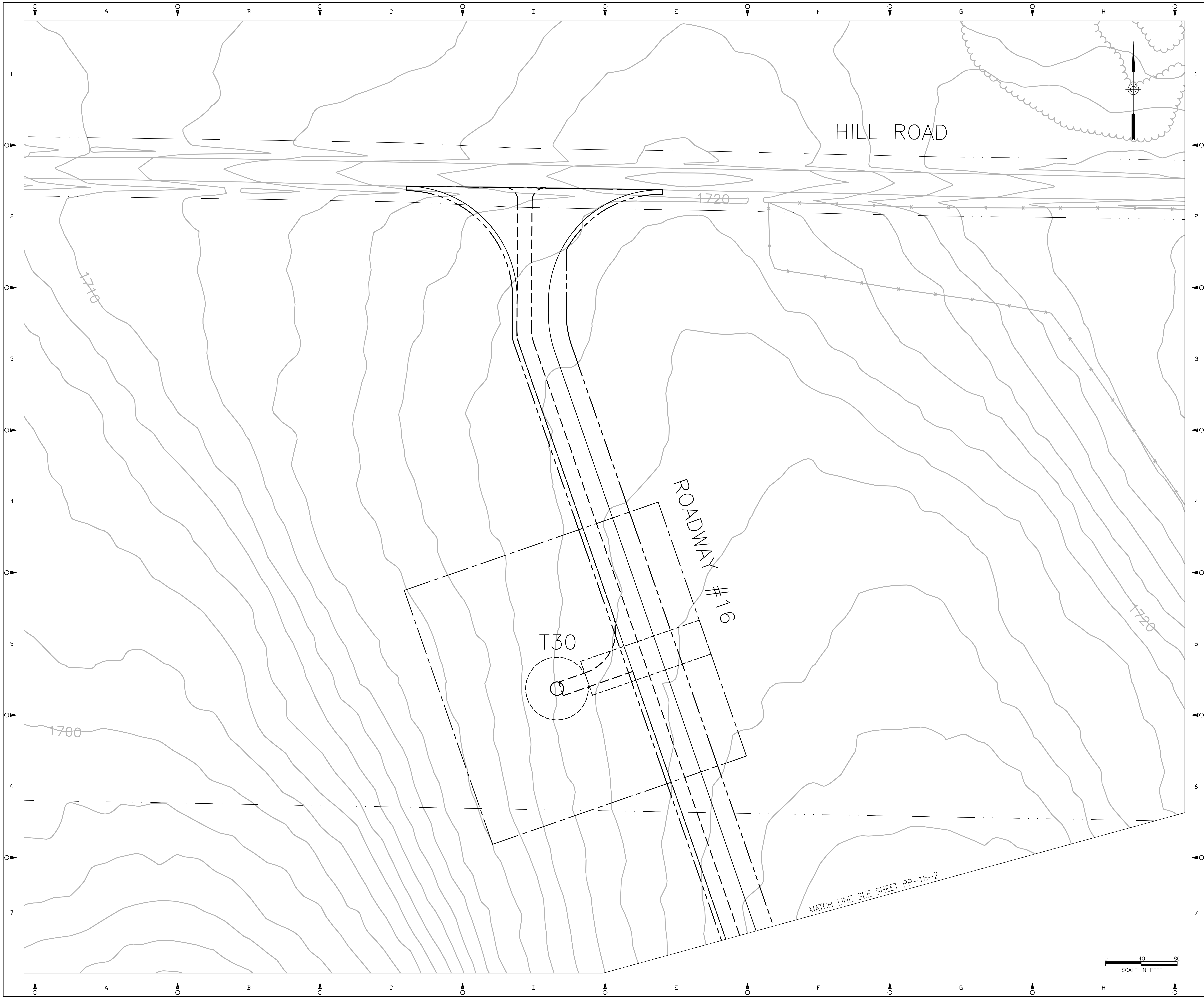
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 15, SHT. 2 OF 2

SCALE
AS SHOWN

DRAWING
RP-15-2

REV
–



NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
— - —	LIMIT OF DISTURBANCE
— · · —	PROPERTY LINE
ø	UTILITY POLE
◌	TURBINE FOUNDATION
○	TURBINE PEDESTAL
⬚	CRANE PAD
▨	WETLANDS
⬚	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 16, SHT. 1 OF 3

SCALE
AS SHOWN

DRAWING
RP-16-1

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
— - — -	LIMIT OF DISTURBANCE
— · · —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
▭	CRANE PAD
▨	WETLANDS
▭	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DRAWN | CHECKED | RESP.ENGR. | CH.DISC.ENG. | PROJ. MGR..

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

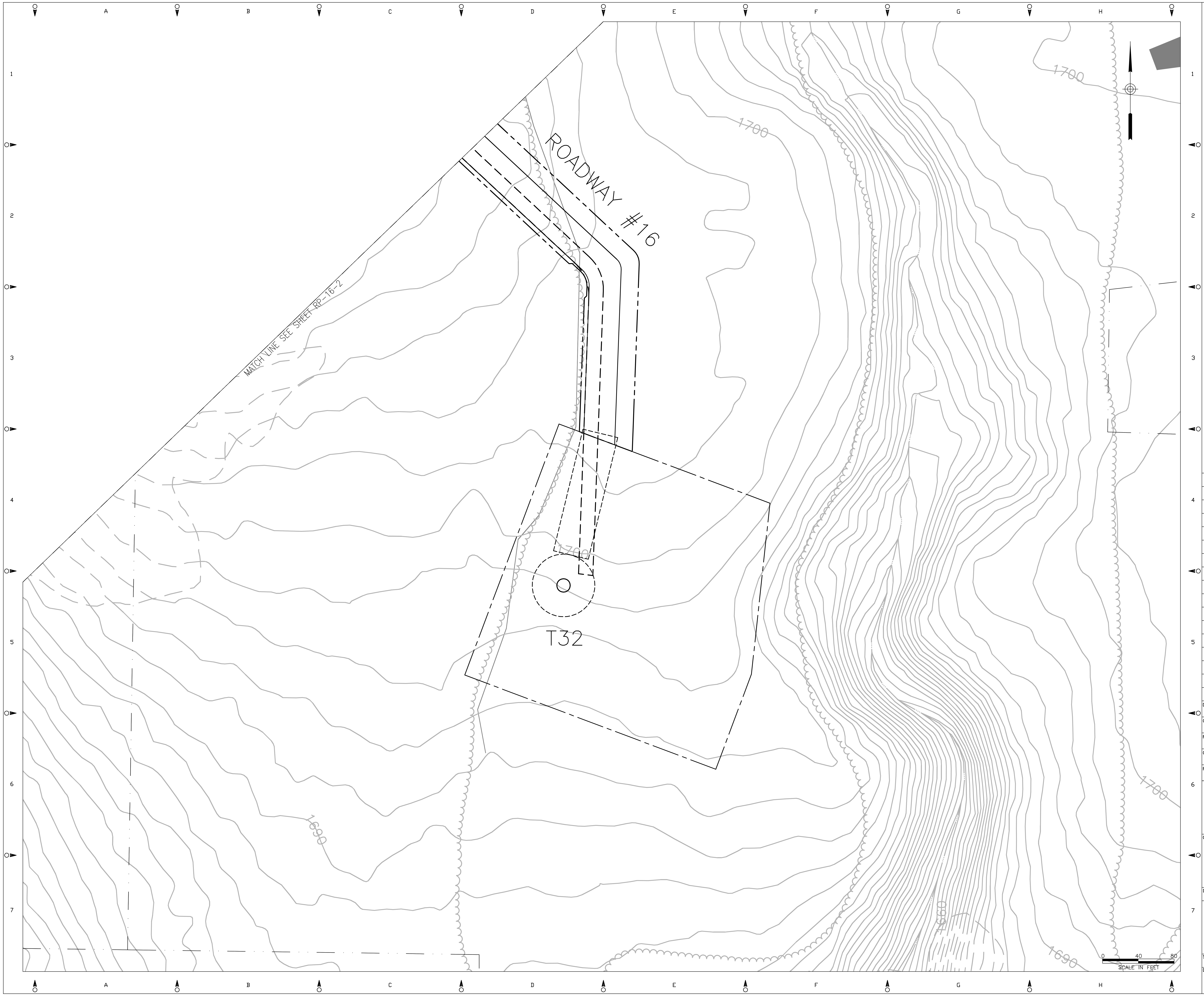
SITE PLAN
ROADWAY 16, SHT. 2 OF 3

SCALE
AS SHOWN

DRAWING
RP-16-2

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

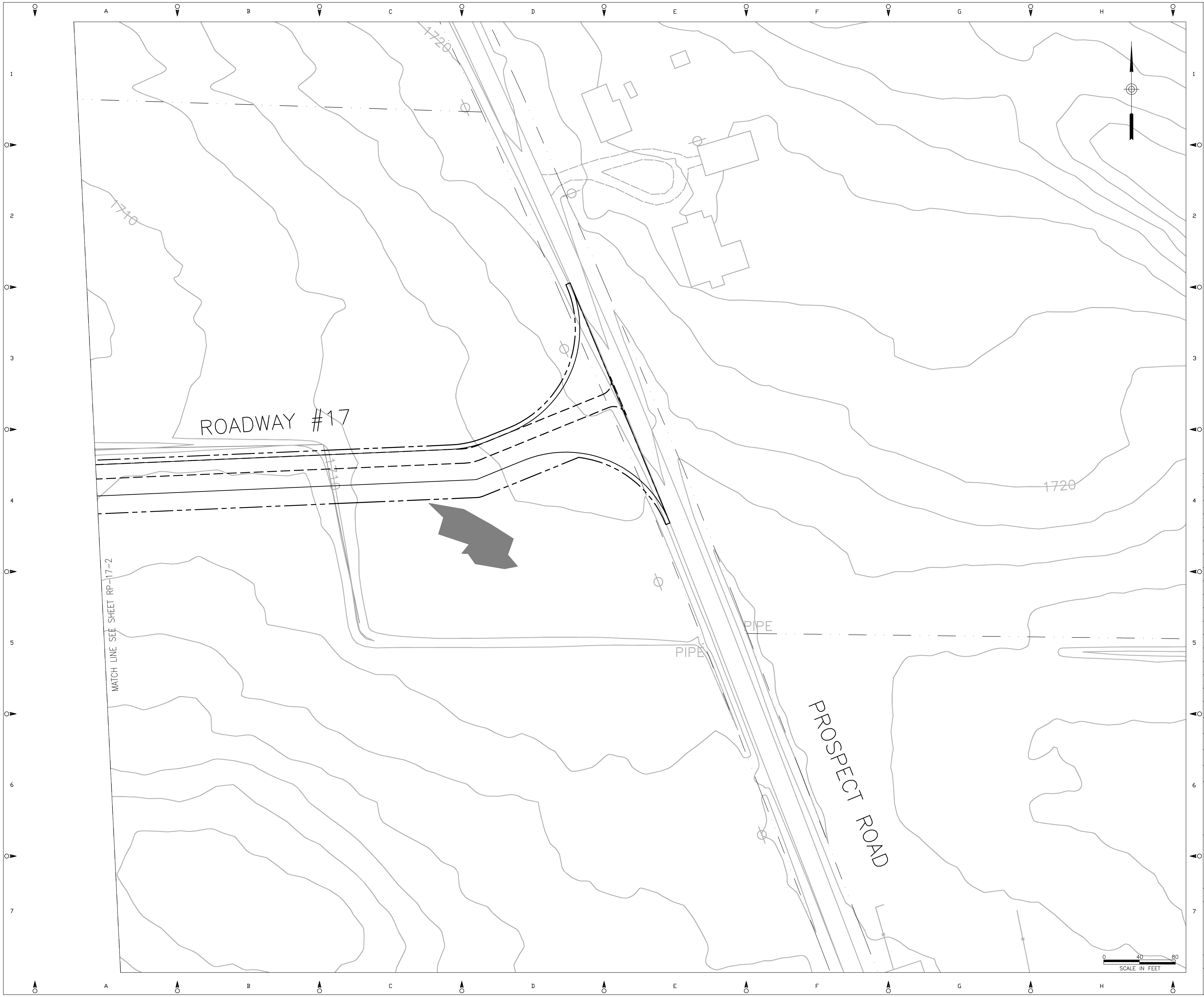
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 16, SHT. 3 OF 3

SCALE
AS SHOWN

DRAWING
RP-16-3

REV
—



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP. ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 17 SHT. 1 OF 4

SCALE
AS SHOWN

DRAWING
RP-17-1

REV
-

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

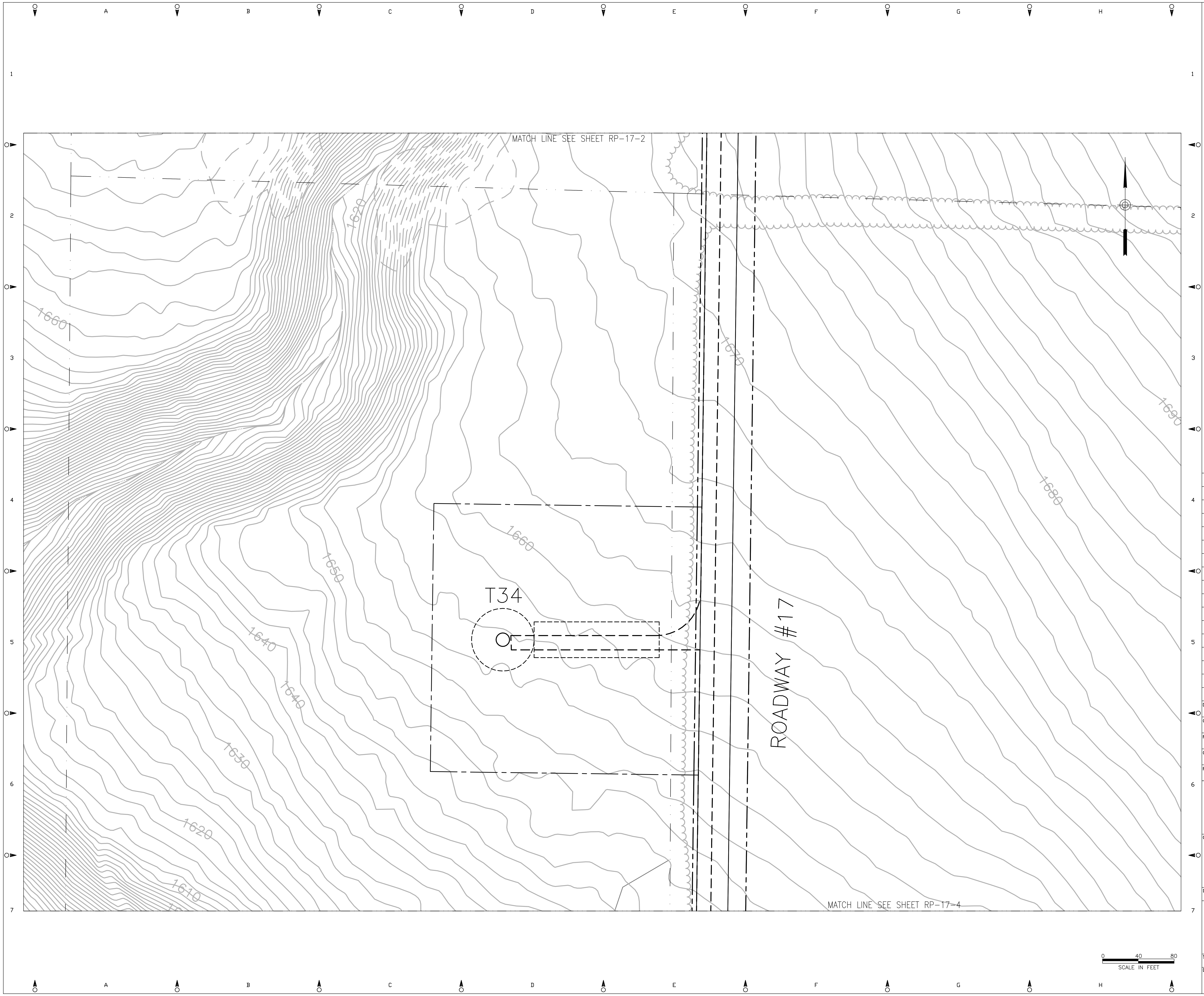
SITE PLAN
ROADWAY 17, SHT. 2 OF 4

SCALE
AS SHOWN

DRAWING
RP-17-2

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

— — — 16 FOOT PERMANENT ACCESS ROAD

——— 35 FOOT TEMPORARY CONSTRUCTION ROAD

—·—·— LIMIT OF DISTURBANCE

— · — PROPERTY LINE

ø UTILITY POLE

◯ TURBINE FOUNDATION

○ TURBINE PEDESTAL

▭ CRANE PAD

▨ WETLANDS

▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 17, SHT. 3 OF 4

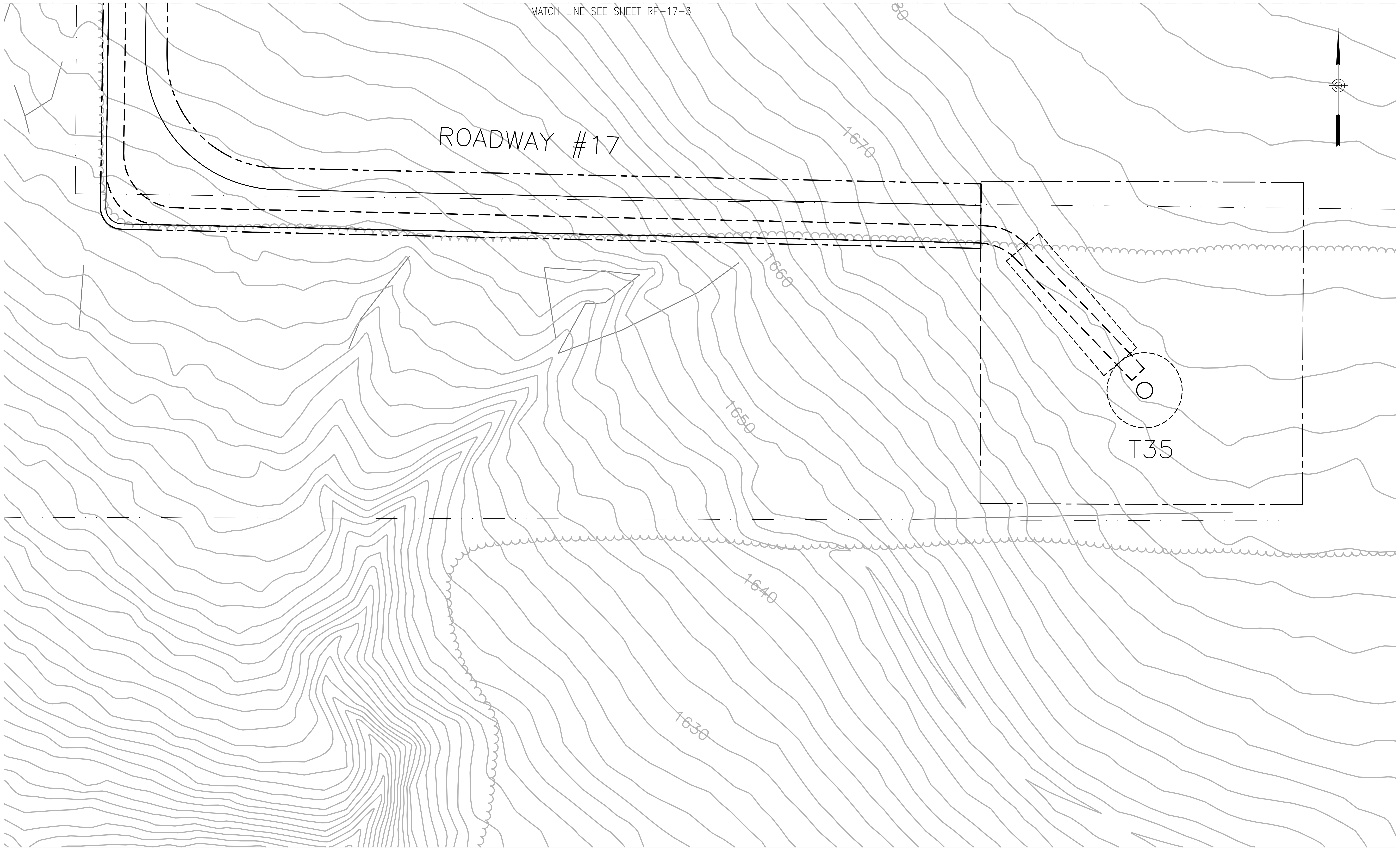
SCALE AS SHOWN

DRAWING RP-17-3

REV —

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION



LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 17, SHT. 4 OF 4

0 40 80
SCALE IN FEET

SCALE AS SHOWN
DRAWING RP-17-4
REV –

ARCH HVAC I & C ELECT MECH CIVIL STRUC △

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

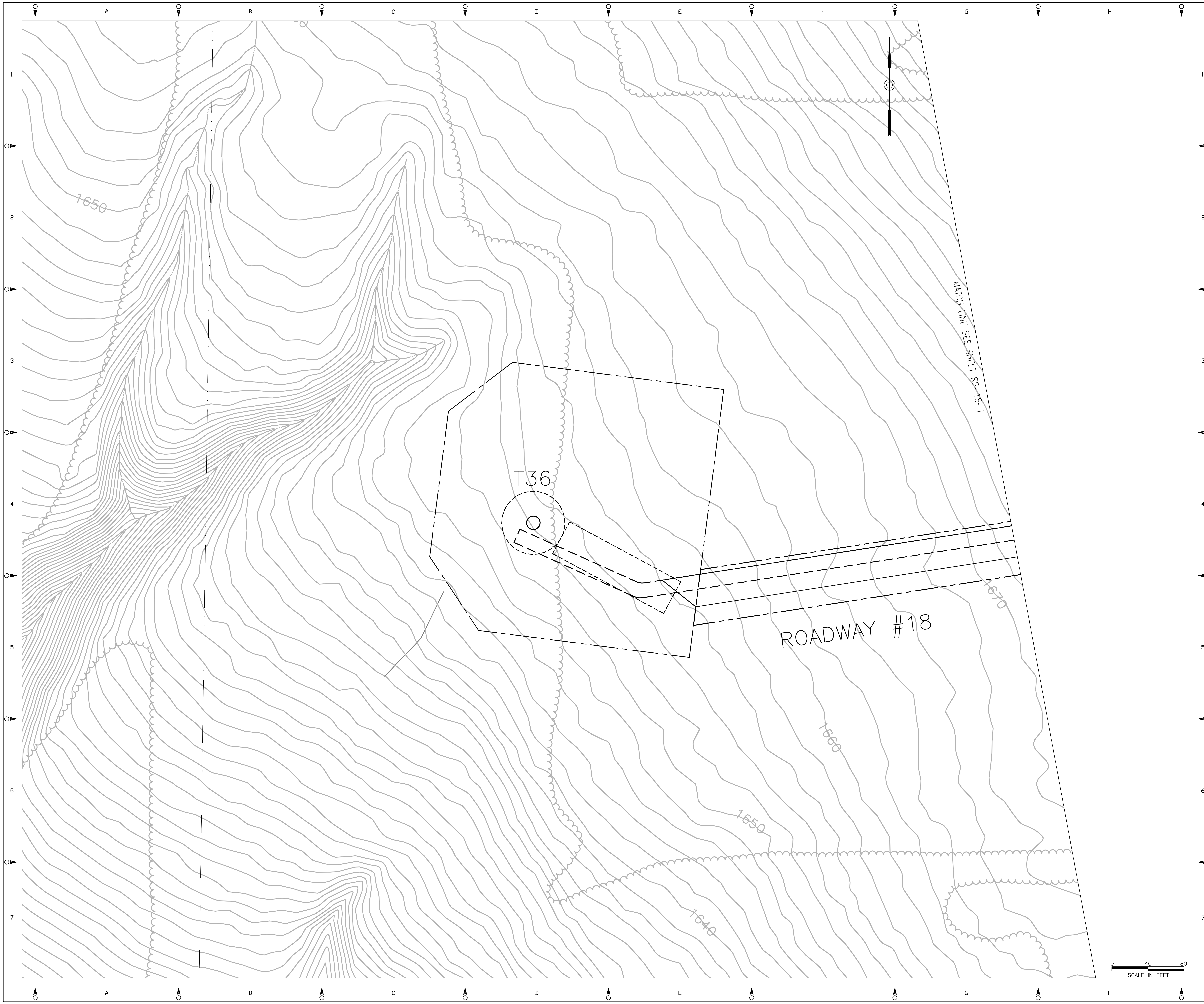
SITE PLAN
ROADWAY 18, SHT. 1 OF 2

SCALE
AS SHOWN

DRAWING
RP-18-1

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

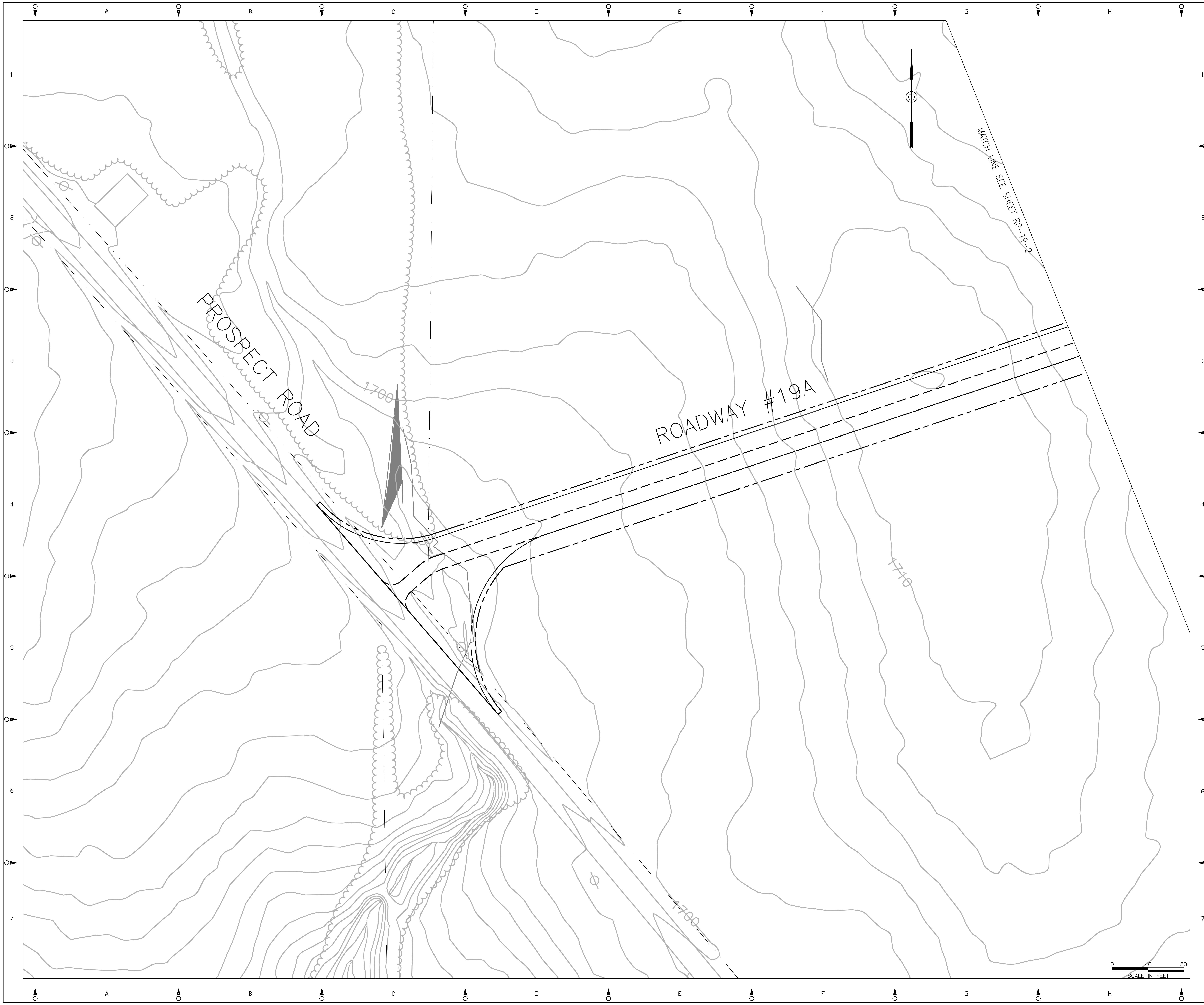
SITE PLAN
ROADWAY 18, SHT. 2 OF 2

SCALE
AS SHOWN

DRAWING
RP-18-2

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

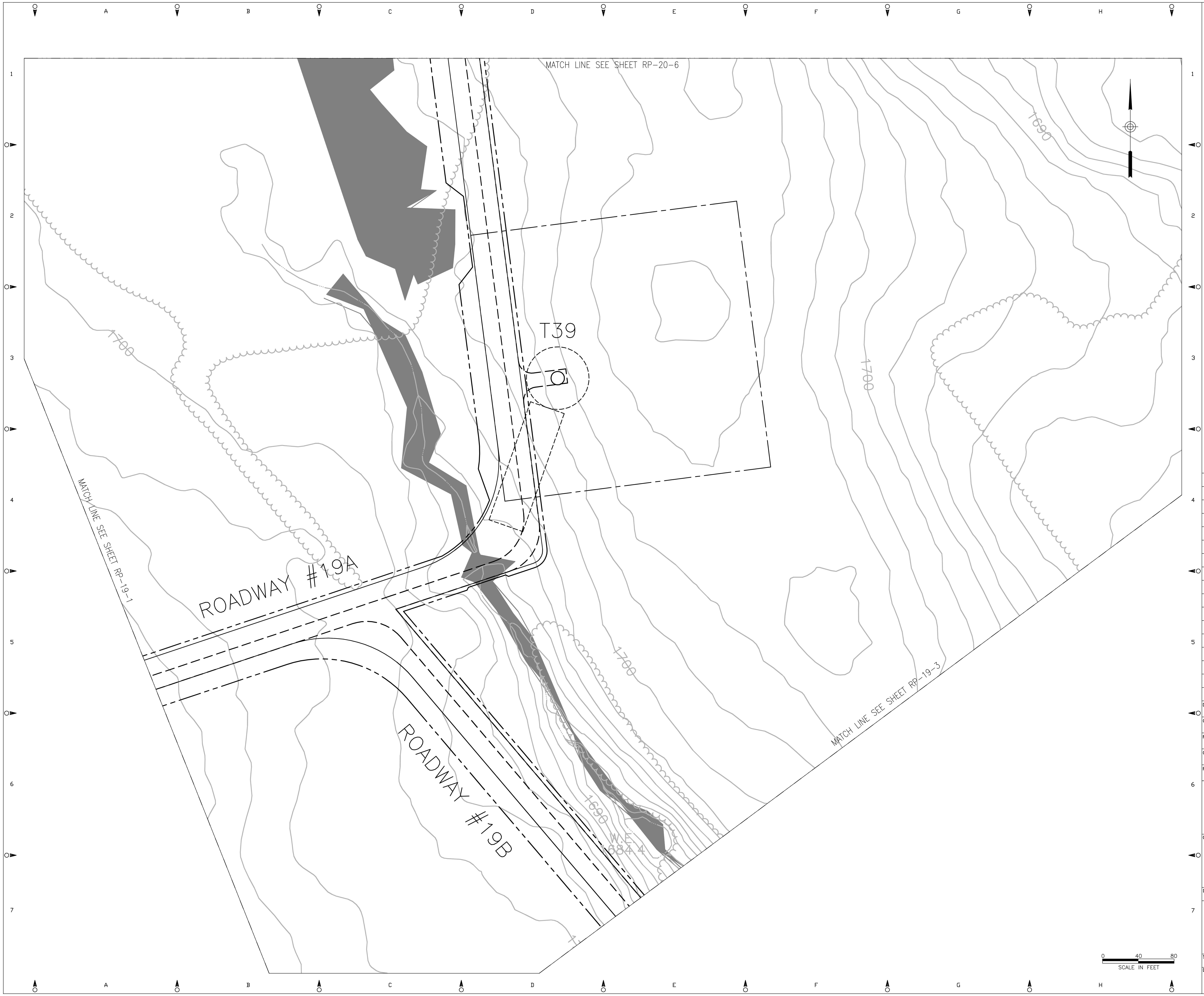
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 19, SHT. 1 OF 3

SCALE
AS SHOWN

DRAWING
RP-19-1
REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ■ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 19, SHT. 2 OF 3

SCALE AS SHOWN
DRAWING RP-19-2
REV –

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
— - —	LIMIT OF DISTURBANCE
— · · —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
☐	CRANE PAD
▨	WETLANDS
☐	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER
DEPT.
NO.
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 19, SHT. 3 OF 3

SCALE
AS SHOWN
DRAWING
RP-19-3
REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

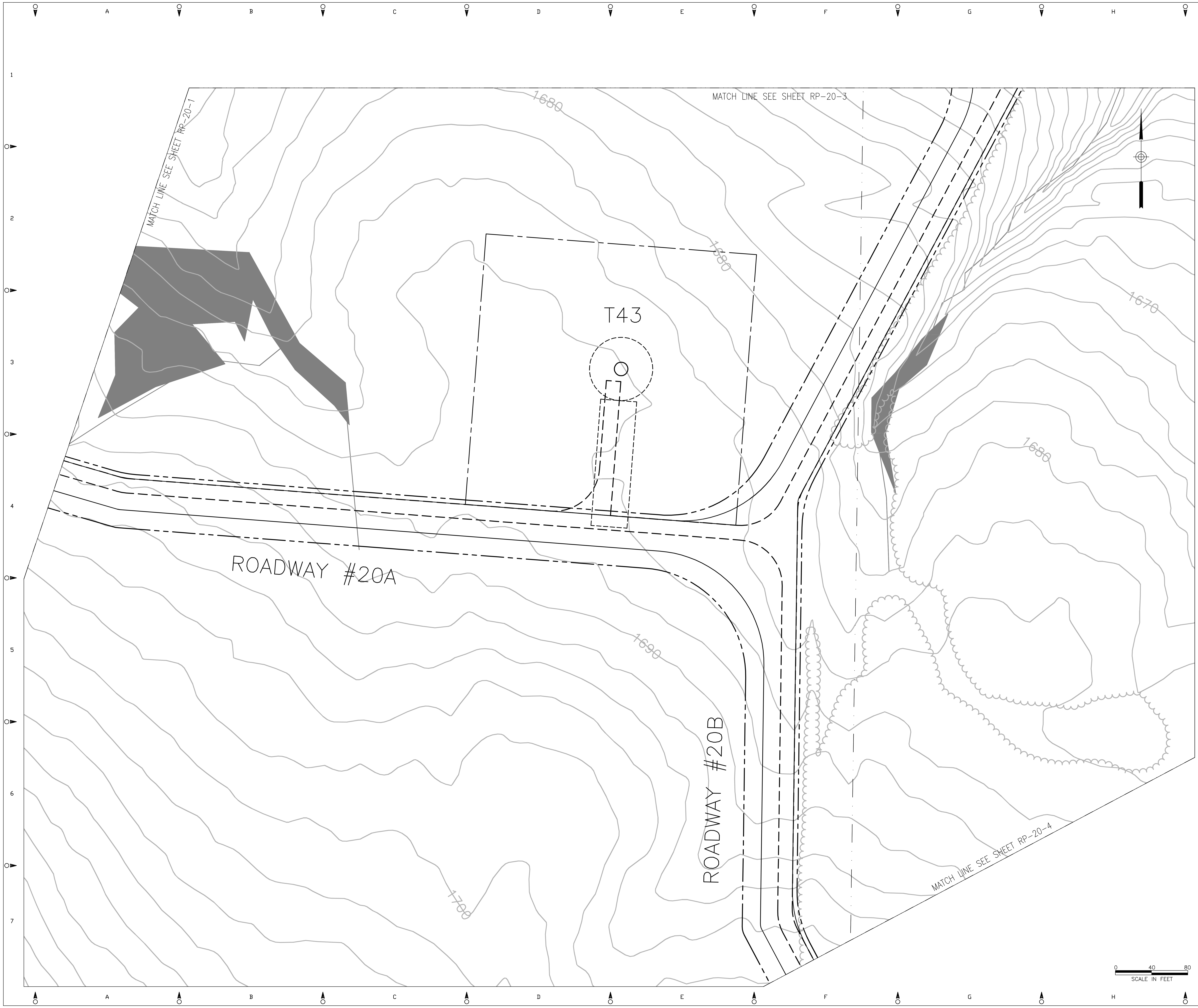
SITE PLAN
ROADWAY 20, SHT. 1 OF 6

SCALE
AS SHOWN

DRAWING
RP-20-1

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- ▨ WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

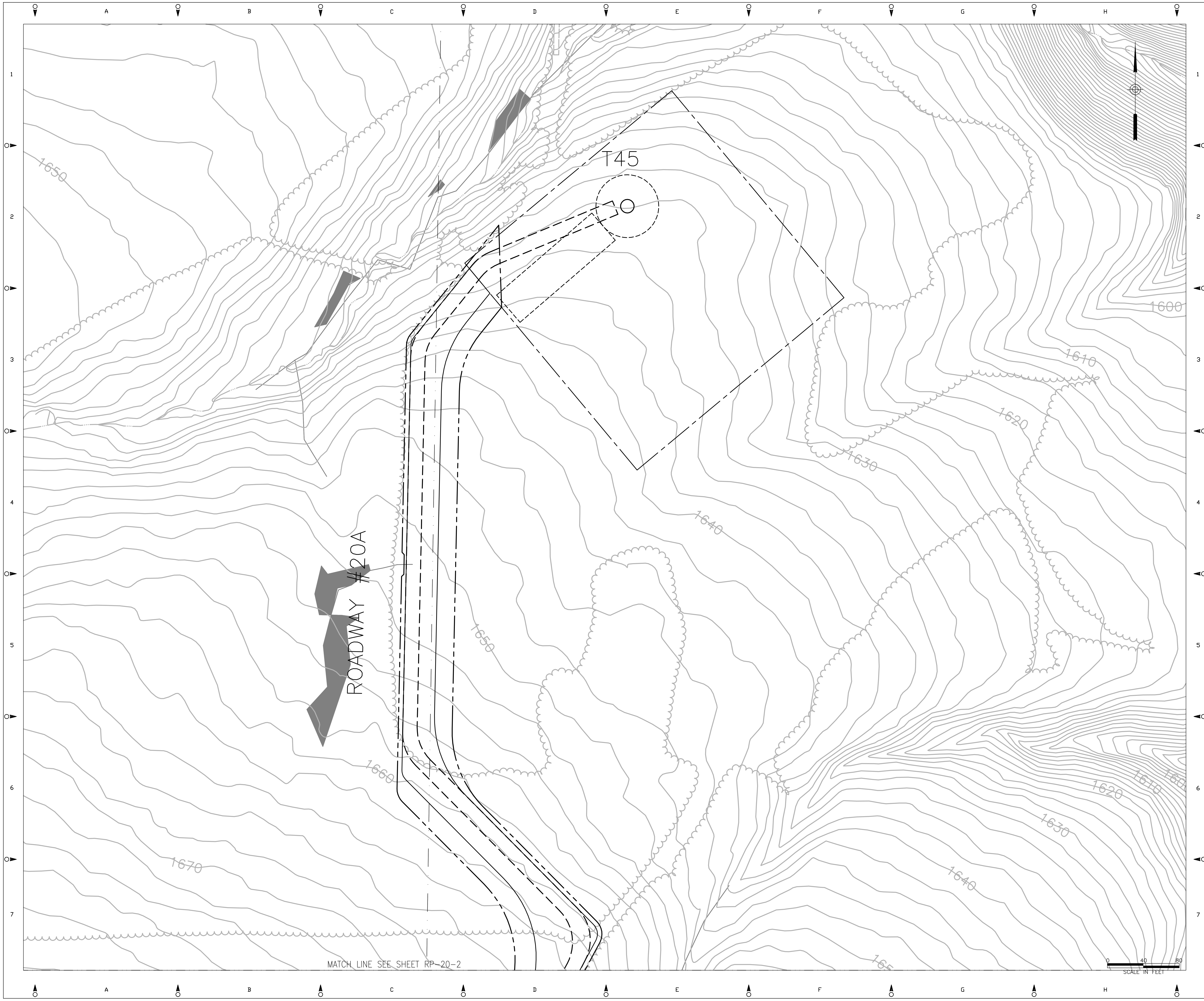
CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 20, SHT. 2 OF 6

SCALE AS SHOWN
DRAWING RP-20-2
REV –



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- ▨ WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 20, SHT. 3 OF 6

SCALE
AS SHOWN

DRAWING
RP-20-3

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE

Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 20, SHT. 4 OF 6

SCALE
AS SHOWN

DRAWING
RP-20-4

REV
—

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC

NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—·—	LIMIT OF DISTURBANCE
—·· —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
▭	CRANE PAD
▨	WETLANDS
☐	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 20, SHT. 5 OF 6

SCALE
AS SHOWN

DRAWING
RP-20-5

REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 20, SHT. 6 OF 6

SCALE
AS SHOWN

DRAWING
RP-20-6

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
— - - —	LIMIT OF DISTURBANCE
— · · —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
☐	CRANE PAD
▨	WETLANDS
☐	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 21, SHT. 1 OF 3

SCALE
AS SHOWN

DRAWING
RP-21-1

REV
–

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 21, SHT. 2 OF 3

SCALE
AS SHOWN

DRAWING
RP-21-2

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- ○ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- CRANE PAD
- ▮ WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

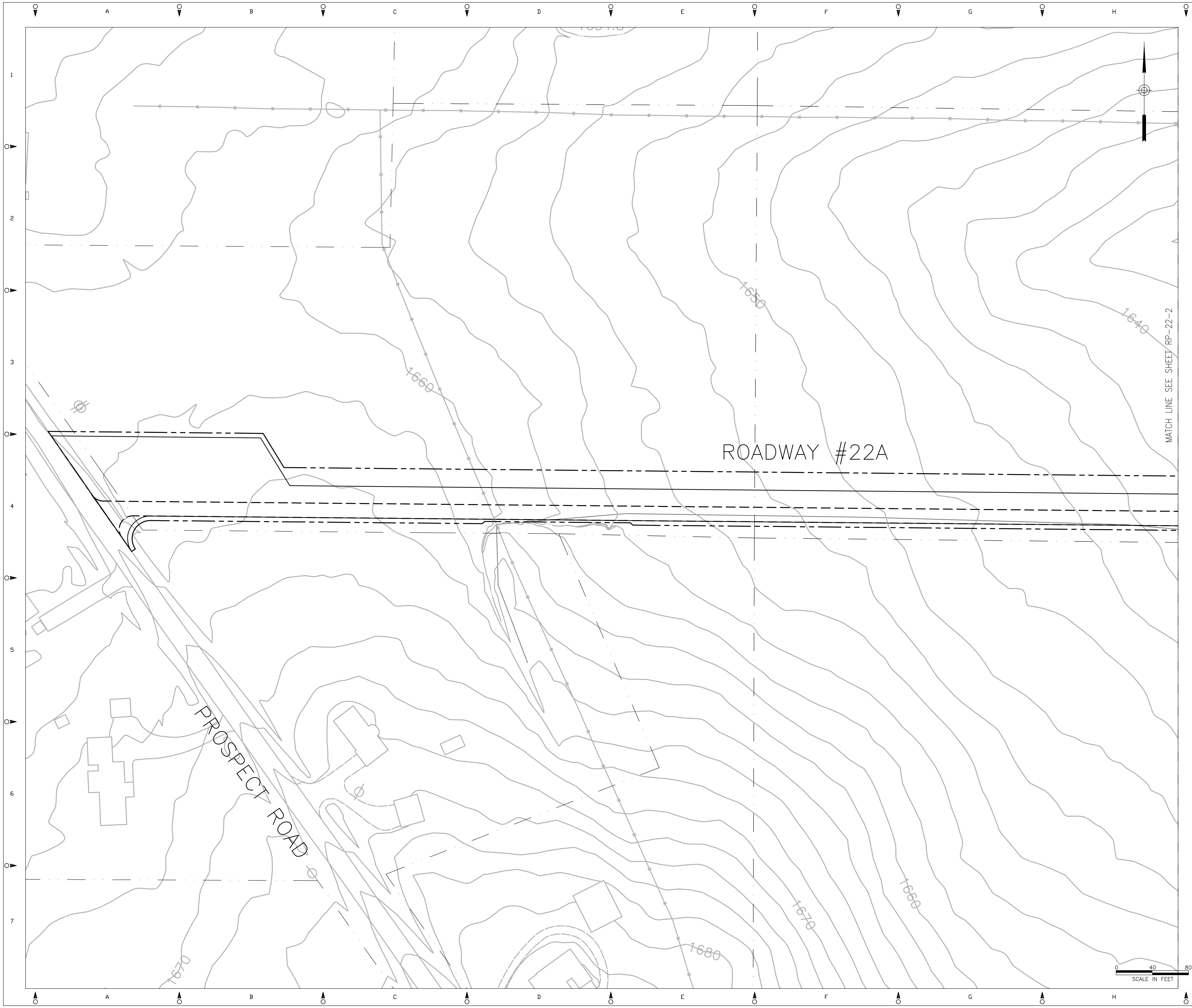
SITE PLAN
ROADWAY 21, SHT. 3 OF 3

SCALE
AS SHOWN

DRAWING
RP-21-3

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- — · — LIMIT OF DISTURBANCE
- — · · — PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ☐ CRANE PAD
- ▨ WETLANDS
- ☐ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

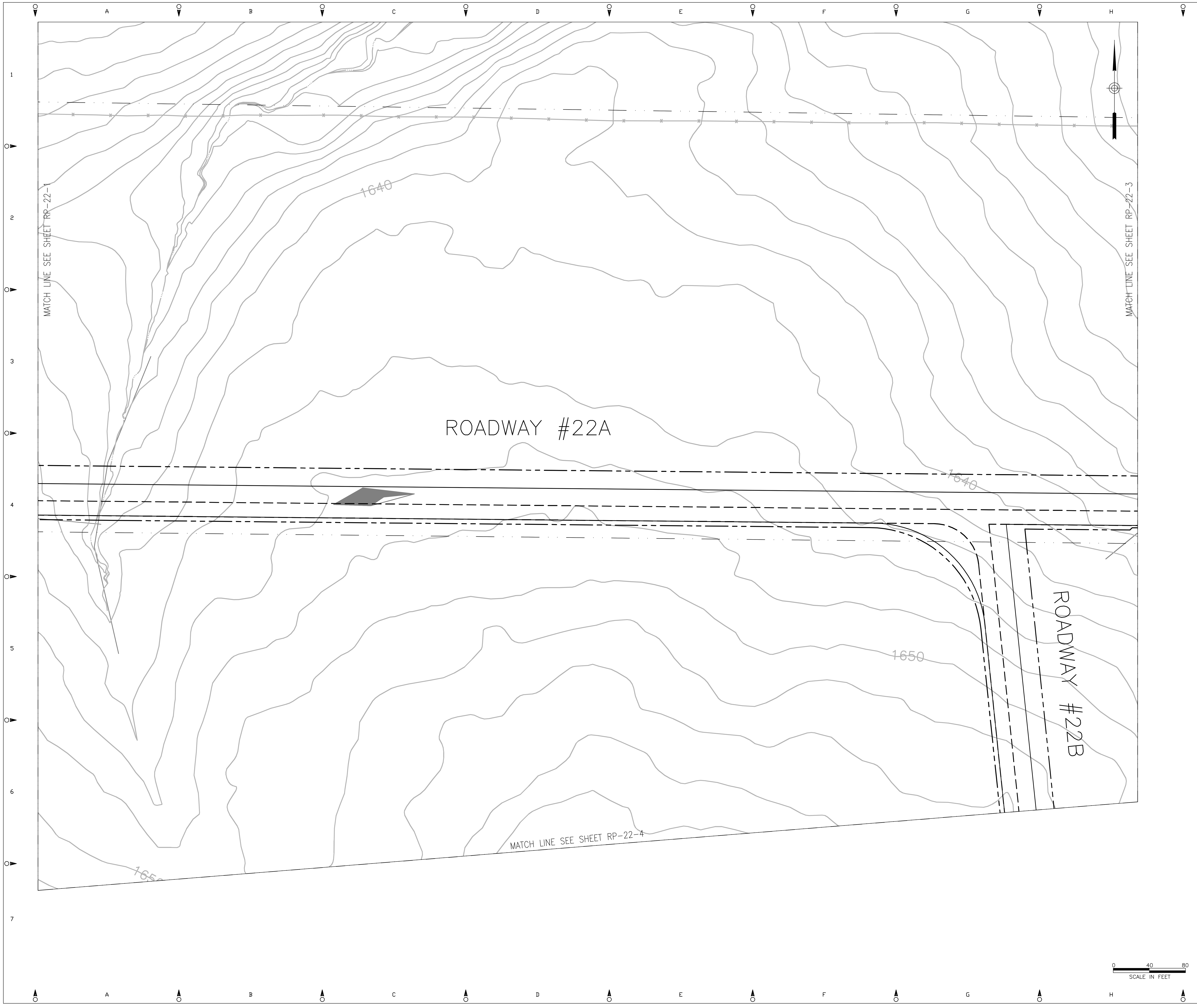
SITE PLAN
ROADWAY 22, SHT. 1 OF 5

SCALE
AS SHOWN

DRAWING
RP-22-1

REV
–

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC △ ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC △ ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC △ ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC △ ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC △ ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC △ ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC



NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—·—	LIMIT OF DISTURBANCE
— · · —	PROPERTY LINE
⌀	UTILITY POLE
◌	TURBINE FOUNDATION
○	TURBINE PEDESTAL
⬚	CRANE PAD
▰	WETLANDS
⬚	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 22, SHT. 2 OF 5

SCALE
AS SHOWN

DRAWING
RP-22-2

REV
-

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION
-		

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DRAWN | CHECKED | RESP.ENGR. | CH.DISC.ENG. | PROJ. MGR..

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 22, SHT. 3 OF 5

SCALE
AS SHOWN

DRAWING
RP-22-3

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·— LIMIT OF DISTURBANCE
- —··— PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ■ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 22, SHT. 4 OF 5

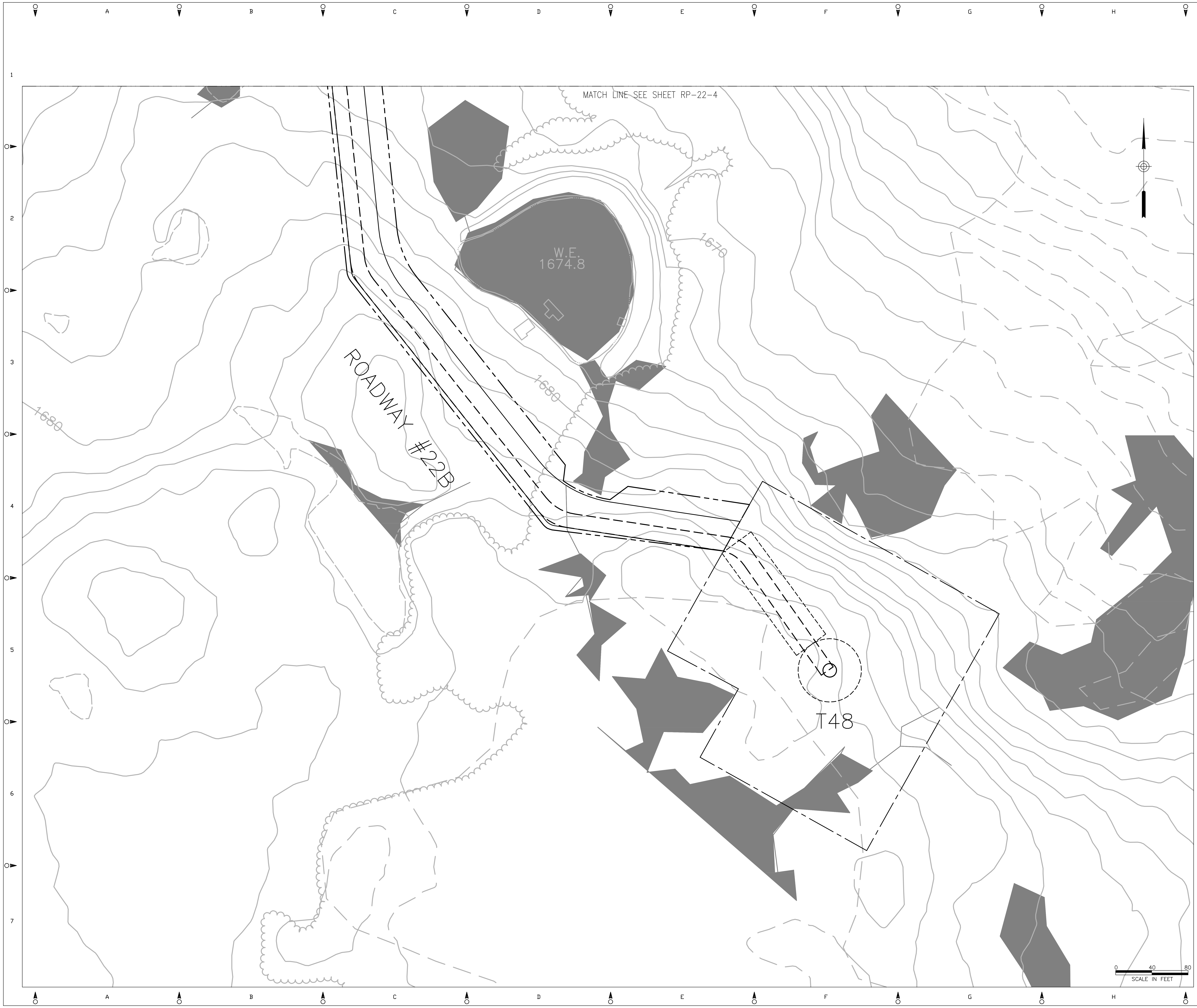
SCALE
AS SHOWN

DRAWING
RP-22-4

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION



LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—·—	LIMIT OF DISTURBANCE
— · —	PROPERTY LINE
⌀	UTILITY POLE
◌	TURBINE FOUNDATION
○	TURBINE PEDESTAL
⬚	CRANE PAD
▬	WETLANDS
⬚	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.

NO.

BALL HILL WINDPARK PROJECT

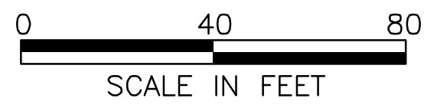
SITE PLAN
ROADWAY 22, SHT. 5 OF 5

SCALE
AS SHOWN

DRAWING
RP-22-5

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 23, SHT. 1 OF 5

SCALE
AS SHOWN

DRAWING
RP-23-1

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

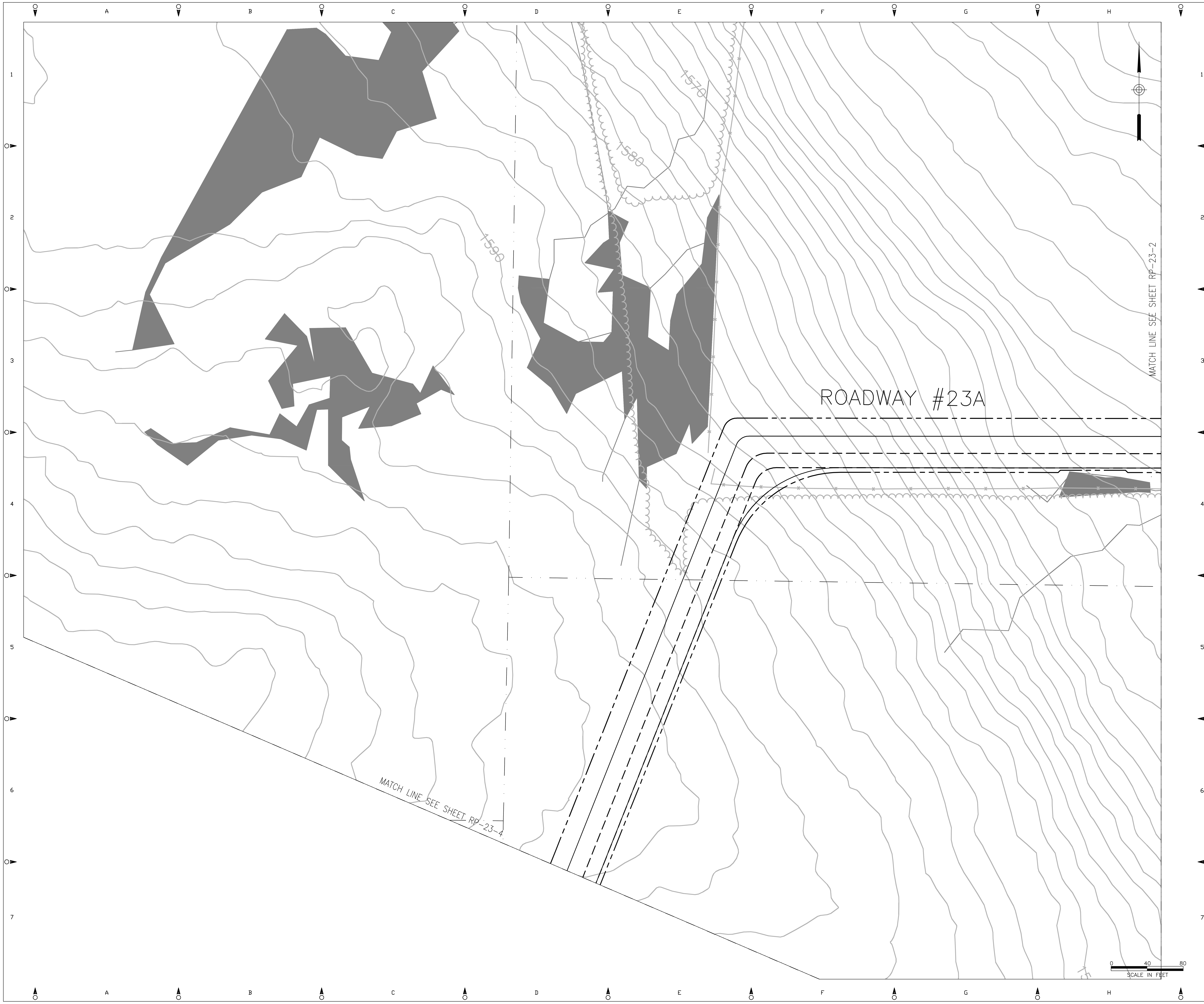
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 23, SHT. 2 OF 5

SCALE
AS SHOWN

DRAWING
RP-23-2

REV
–



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- —··— PROPERTY LINE
- ⌀ UTILITY POLE
- ◌ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ⬚ CRANE PAD
- ■ WETLANDS
- ⬚ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

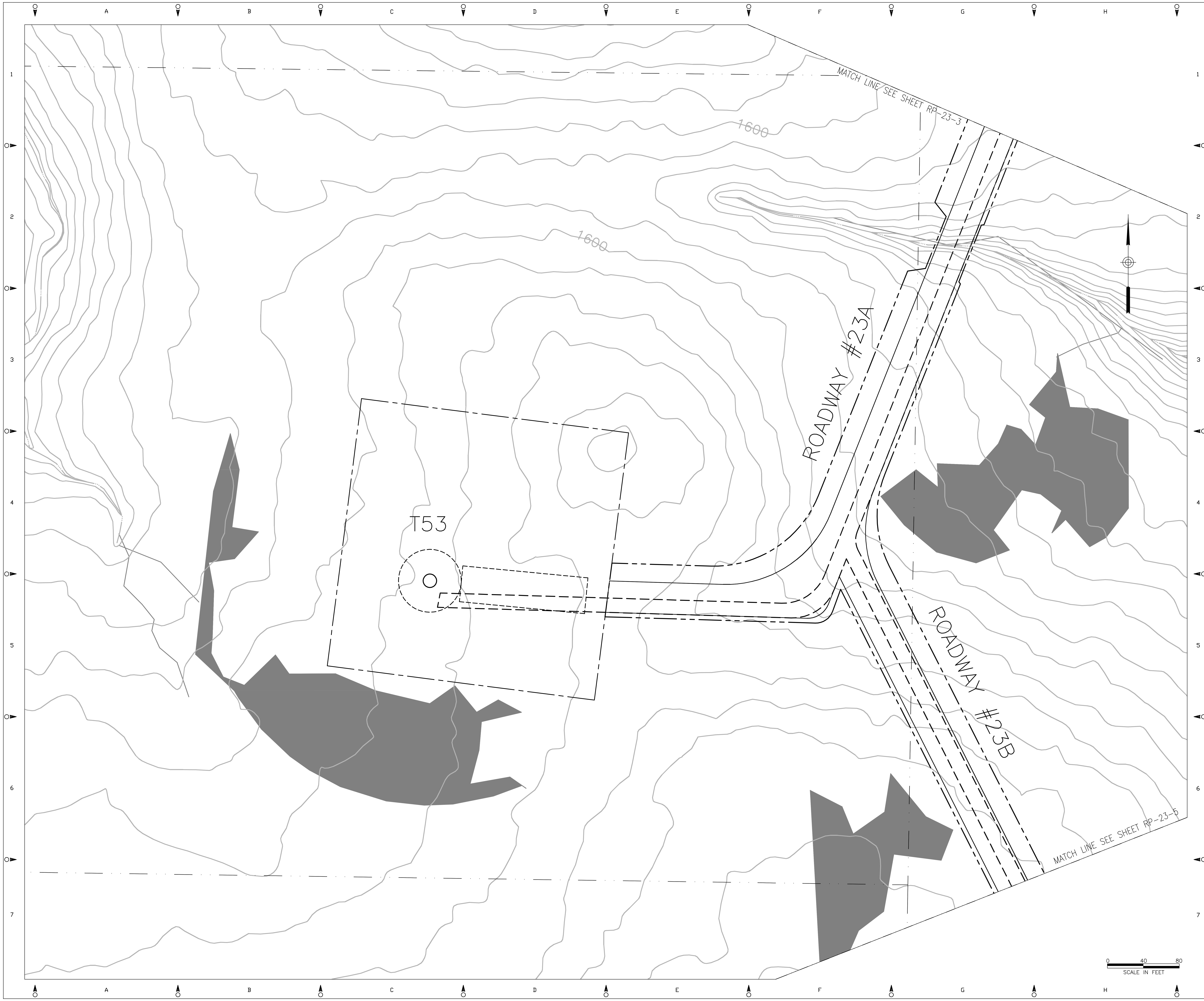
SITE PLAN
ROADWAY 23, SHT. 3 OF 5

SCALE
AS SHOWN

DRAWING
RP-23-3

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

— —	16 FOOT PERMANENT ACCESS ROAD
——	35 FOOT TEMPORARY CONSTRUCTION ROAD
— - —	LIMIT OF DISTURBANCE
- · -	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
▭	CRANE PAD
■	WETLANDS
▭	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

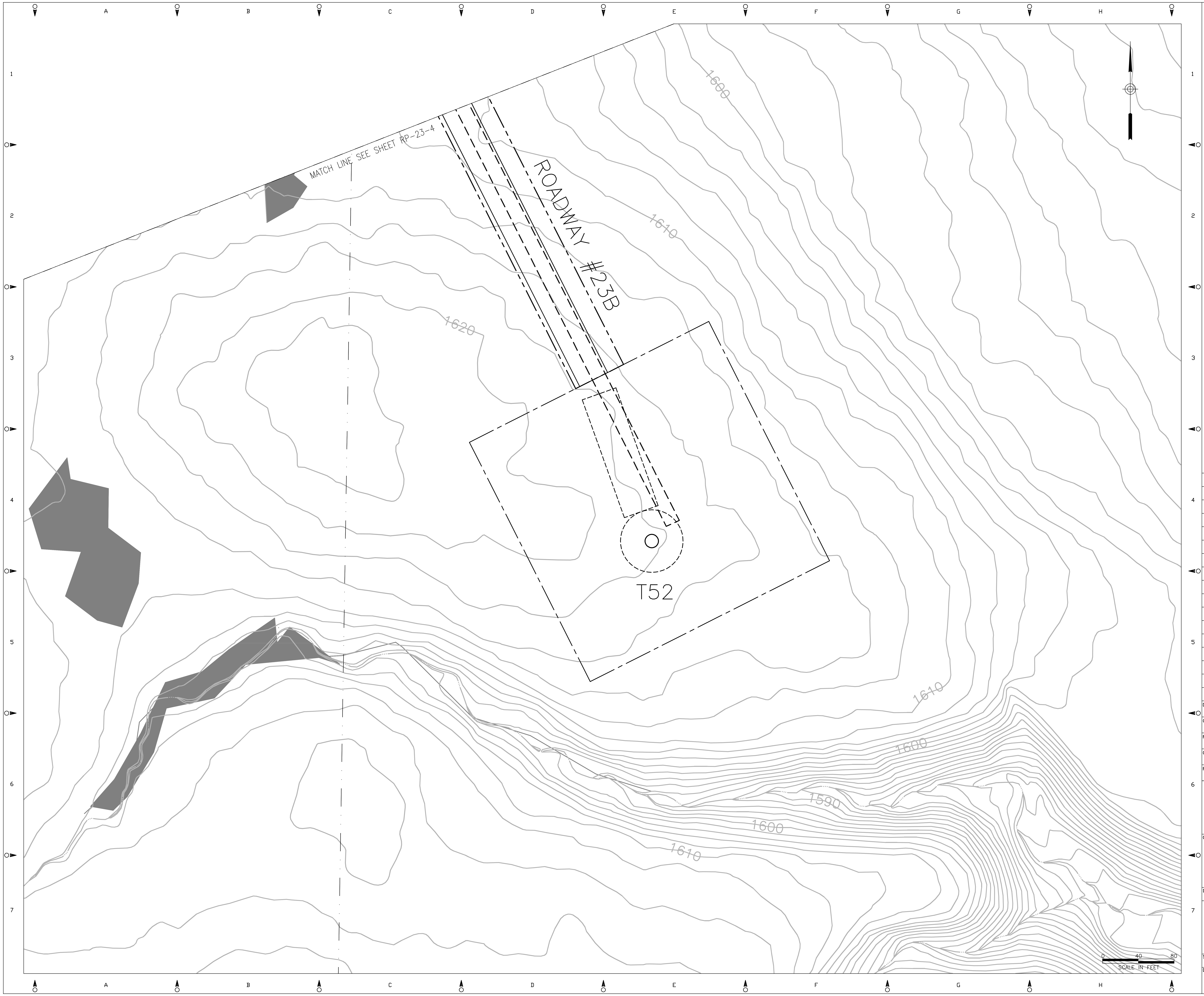
DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 23, SHT. 4 OF 5

SCALE AS SHOWN
DRAWING RP-23-4
REV —

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—·—	LIMIT OF DISTURBANCE
— · —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
⬚	CRANE PAD
▨	WETLANDS
⬚	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

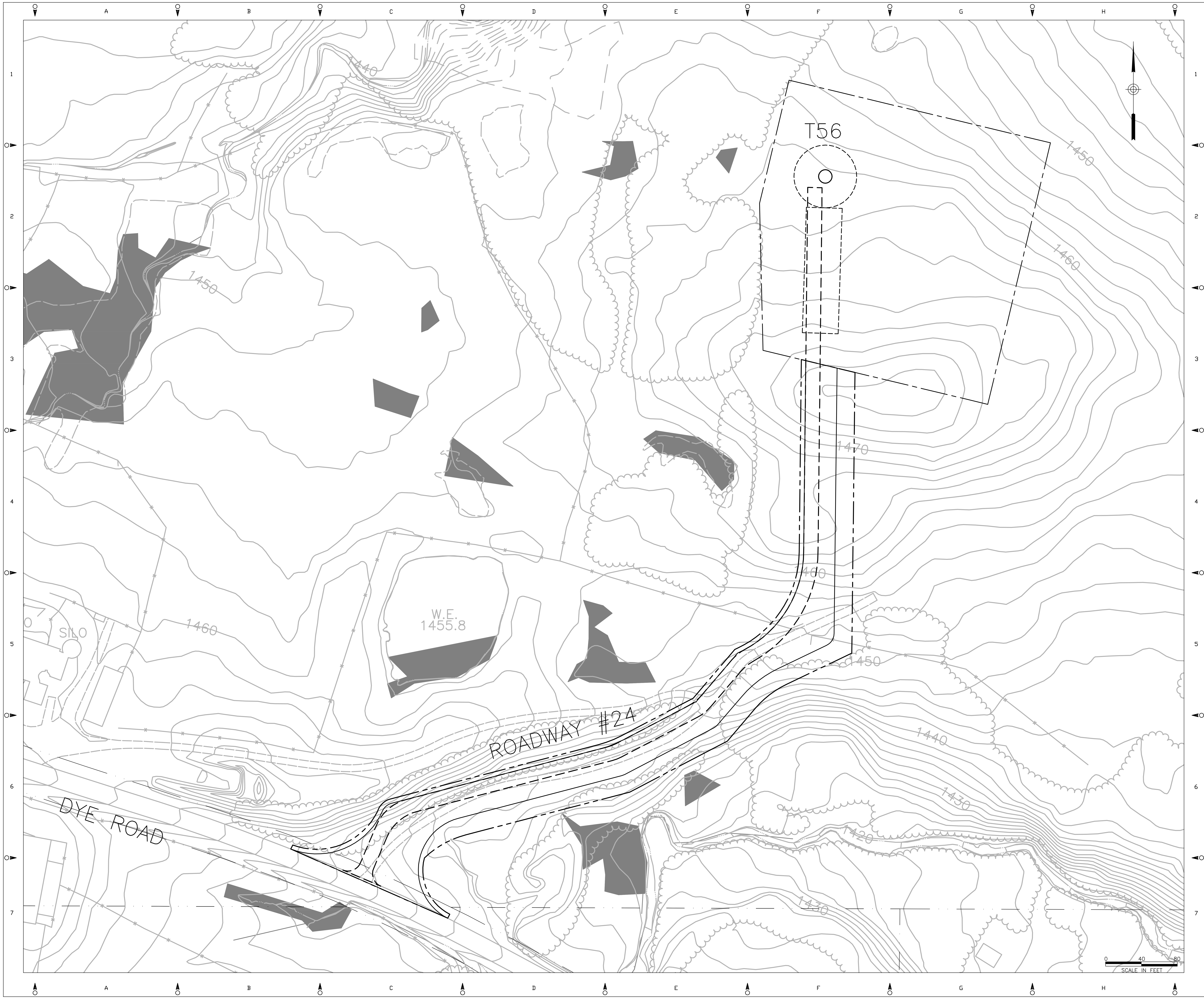
SITE PLAN
ROADWAY 23, SHT. 5 OF 5

SCALE
AS SHOWN

DRAWING
RP-23-5

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

16 FOOT PERMANENT ACCESS ROAD

35 FOOT TEMPORARY CONSTRUCTION ROAD

LIMIT OF DISTURBANCE

PROPERTY LINE

UTILITY POLE

TURBINE FOUNDATION

TURBINE PEDESTAL

CRANE PAD

WETLANDS

TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.

NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 24, SHT. 1 OF 1

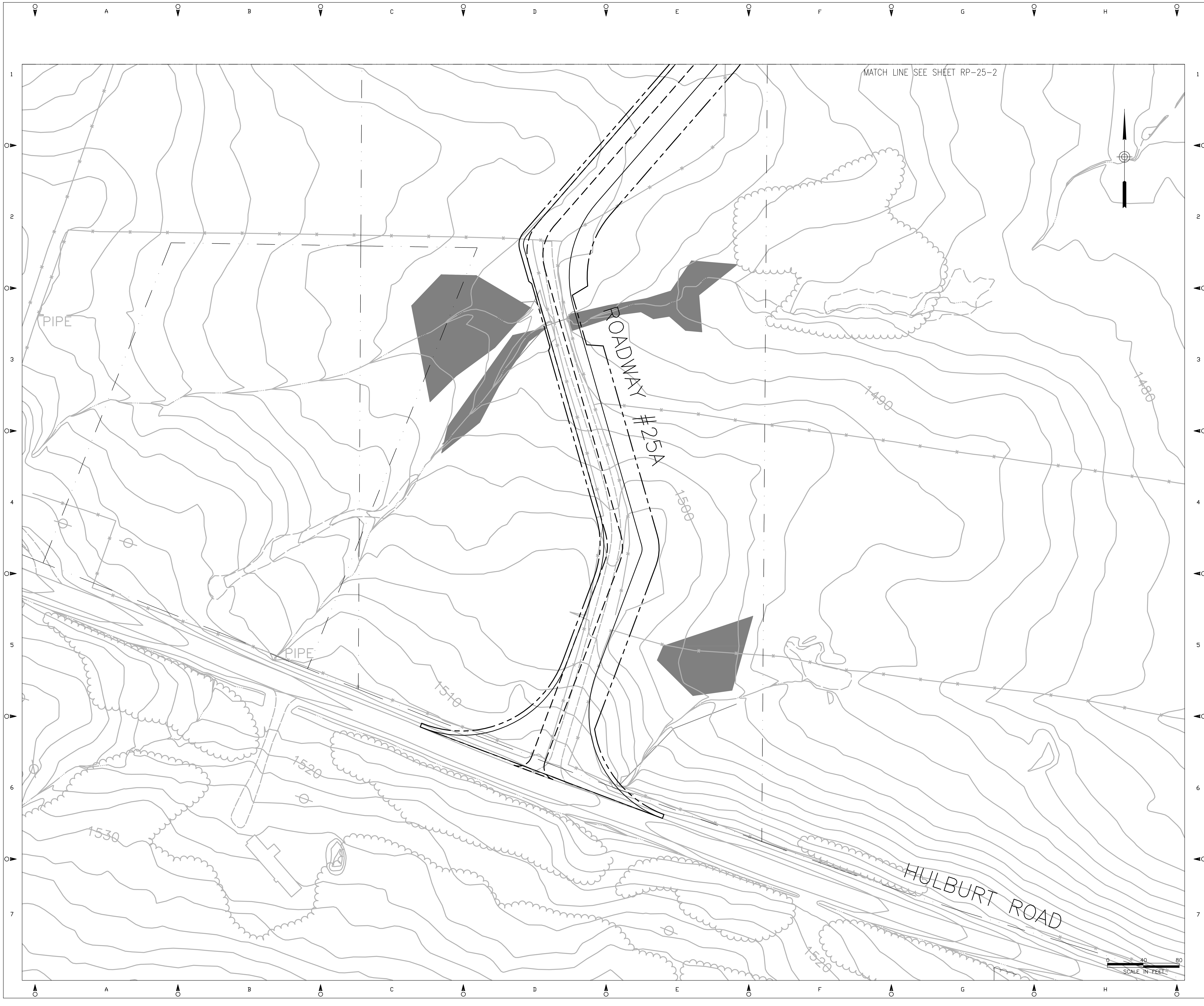
SCALE
AS SHOWN

DRAWING
RP-24-1

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION



LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- CRANE PAD
- ▨ WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 25, SHT. 1 OF 7

SCALE
AS SHOWN

DRAWING
RP-25-1

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

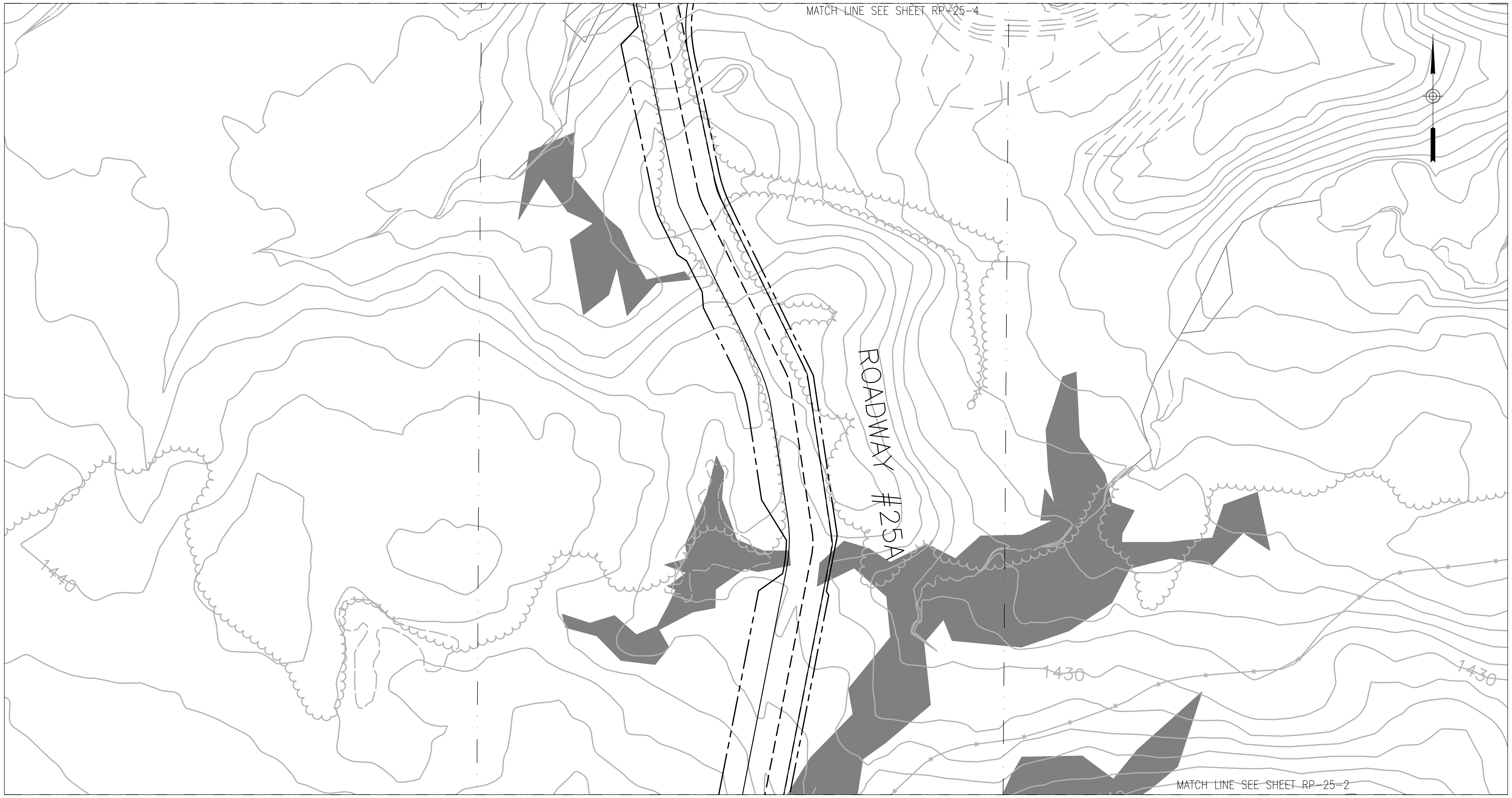
SITE PLAN
ROADWAY 25, SHT. 2 OF 7

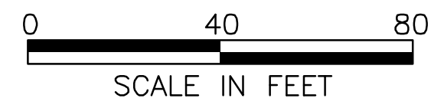
SCALE
AS SHOWN

DRAWING
RP-25-2

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC





NOT FOR CONSTRUCTION

LEGEND

- — — — 16 FOOT PERMANENT ACCESS ROAD
- ——— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- ○ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- CRANE PAD
- ▨ WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

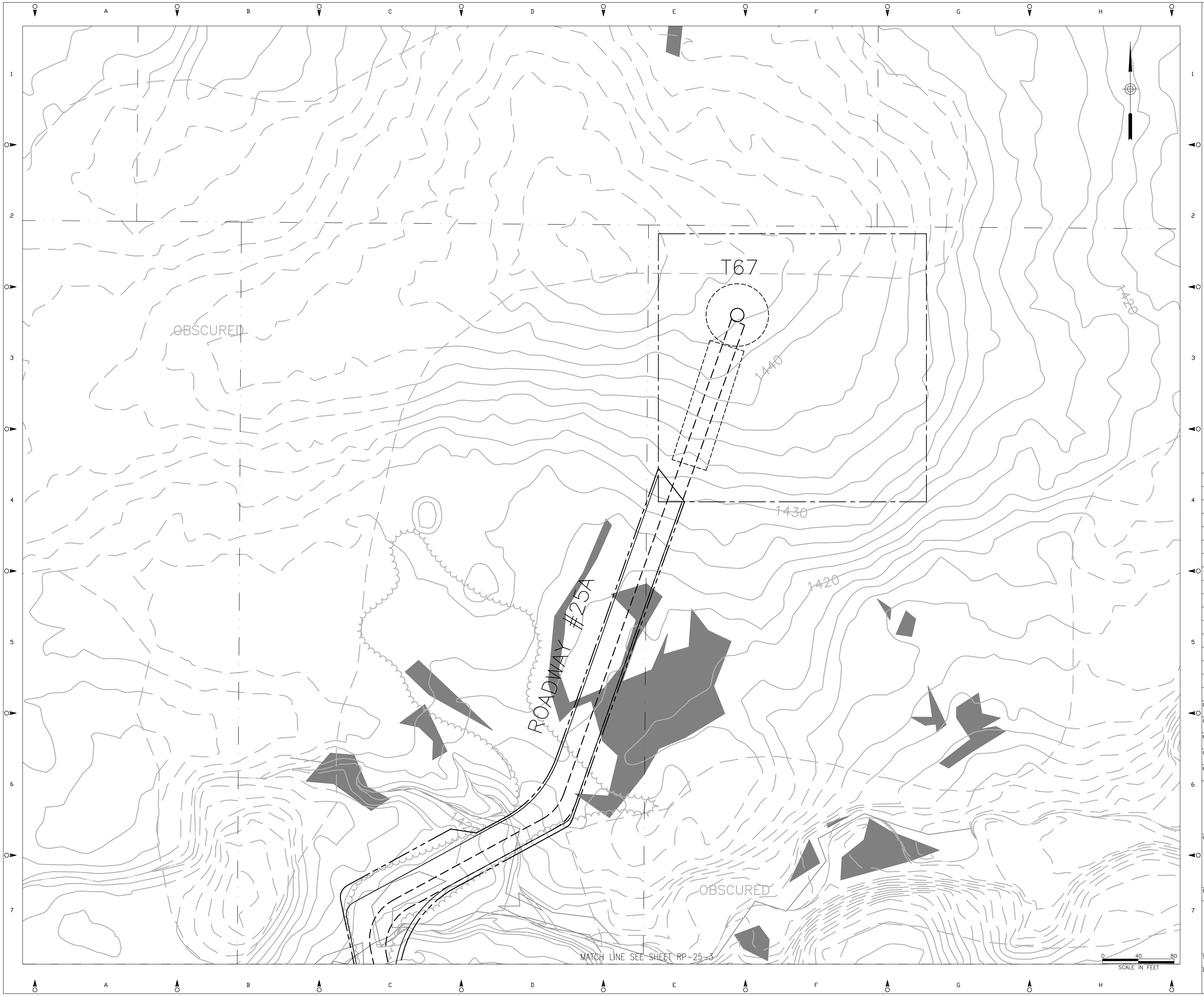
SITE PLAN
ROADWAY 25, SHT. 3 OF 7

SCALE
AS SHOWN

DRAWING
RP-25-3

REV
–

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

16 FOOT PERMANENT ACCESS ROAD
35 FOOT TEMPORARY CONSTRUCTION ROAD
LIMIT OF DISTURBANCE
PROPERTY LINE
UTILITY POLE
TURBINE FOUNDATION
TURBINE PEDESTAL
CRANE PAD
WETLANDS
TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

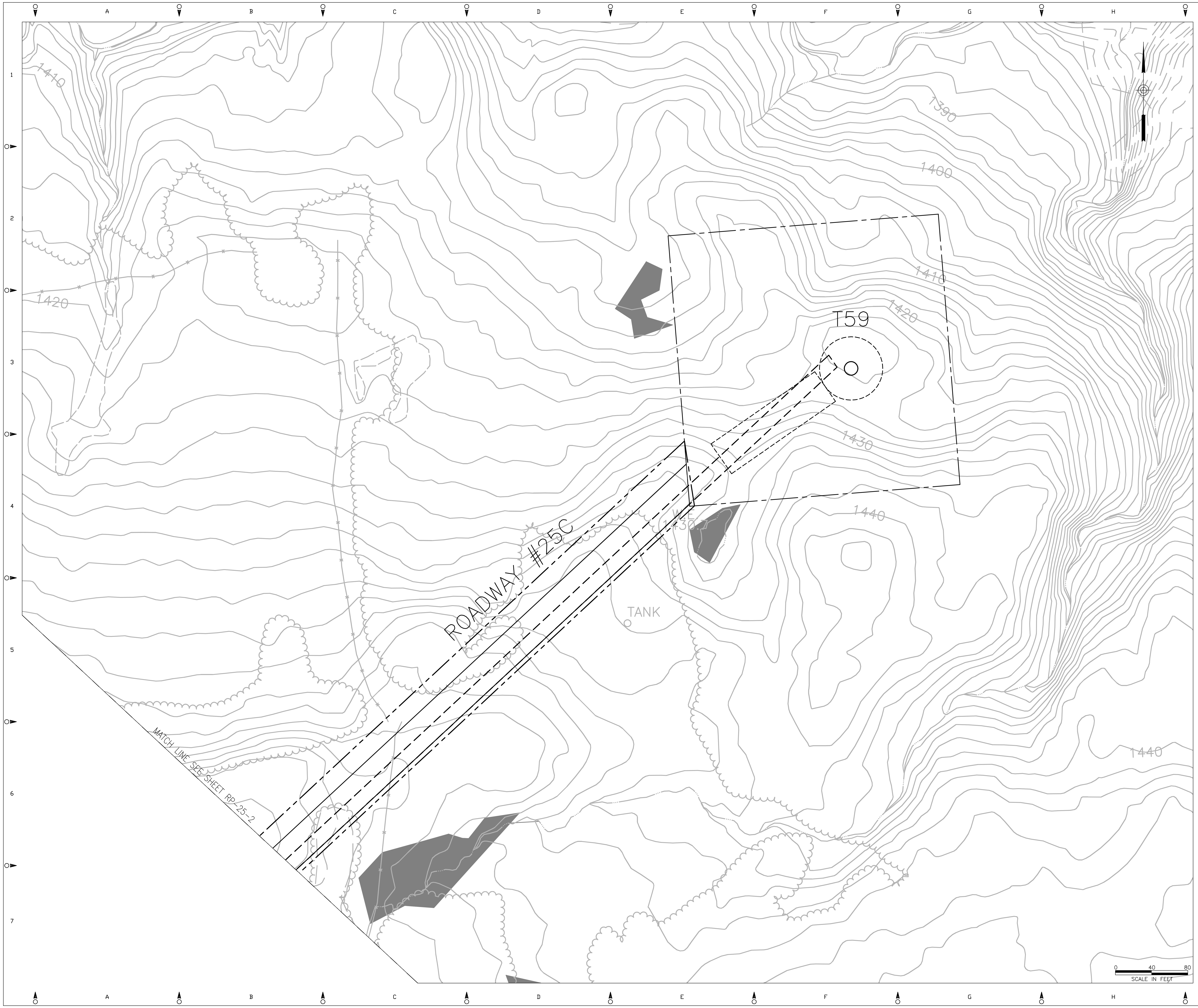
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 25, SHT. 4 OF 7

SCALE
AS SHOWN

DRAWING
RP-25-4
REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

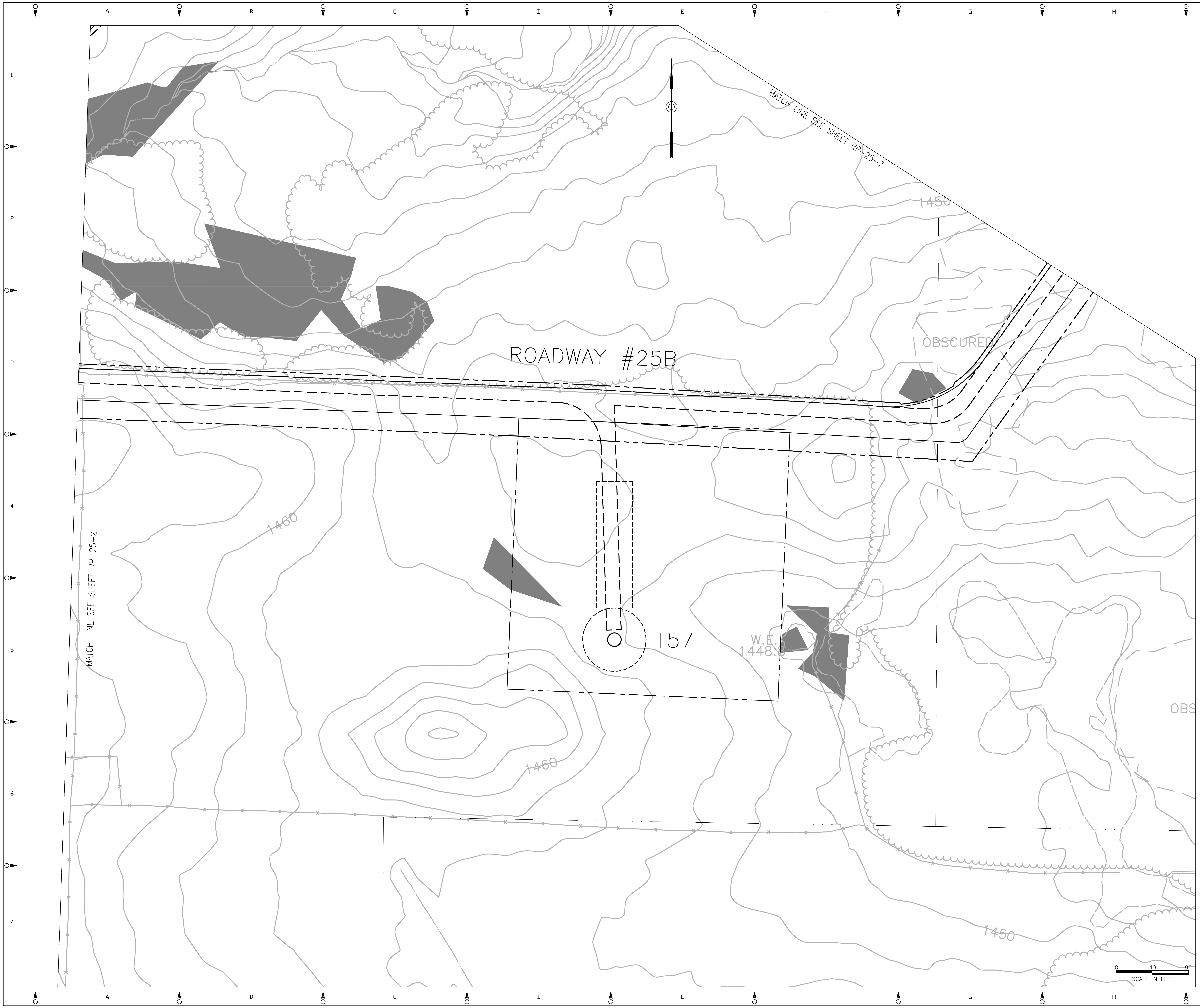
SITE PLAN
ROADWAY 25, SHT. 5 OF 7

SCALE
AS SHOWN

DRAWING
RP-25-5

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

- – – 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- –·–· LIMIT OF DISTURBANCE
- –··– PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ⬚ CRANE PAD
- ▰ WETLANDS
- ⬚ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 25, SHT. 6 OF 7

SCALE
AS SHOWN

DRAWING
RP-25-6

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
— - - —	LIMIT OF DISTURBANCE
— - —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
⬚	CRANE PAD
▮	WETLANDS
⬚	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 25, SHT. 7 OF 7

SCALE
AS SHOWN

DRAWING
RP-25-7

REV
–

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION

LEGEND

- — — — 16 FOOT PERMANENT ACCESS ROAD
- ——— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —-—-— LIMIT OF DISTURBANCE
- — · — PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ▨ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

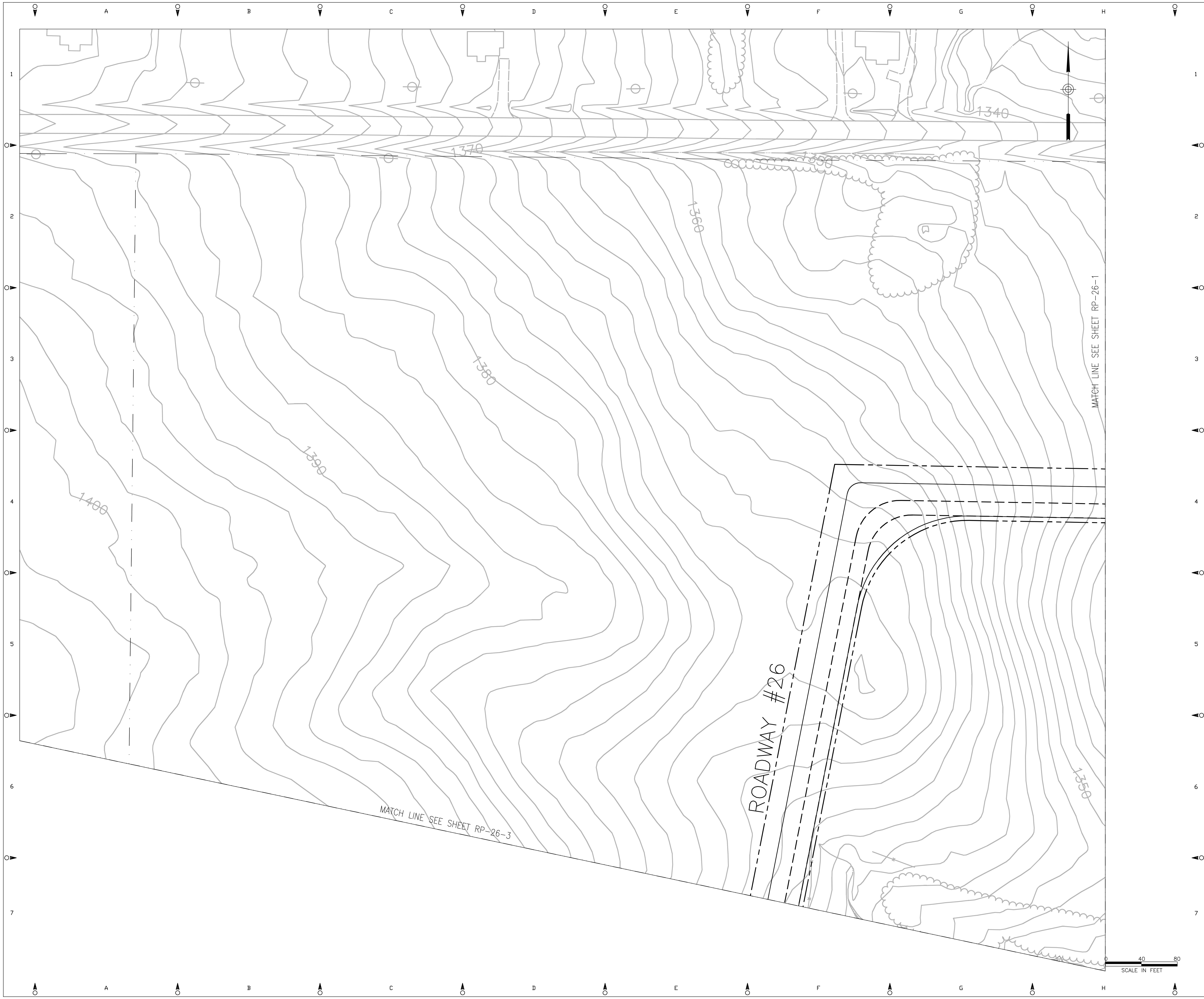
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 26, SHT. 1 OF 5

SCALE
AS SHOWN

DRAWING
RP-26-1

REV
–



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

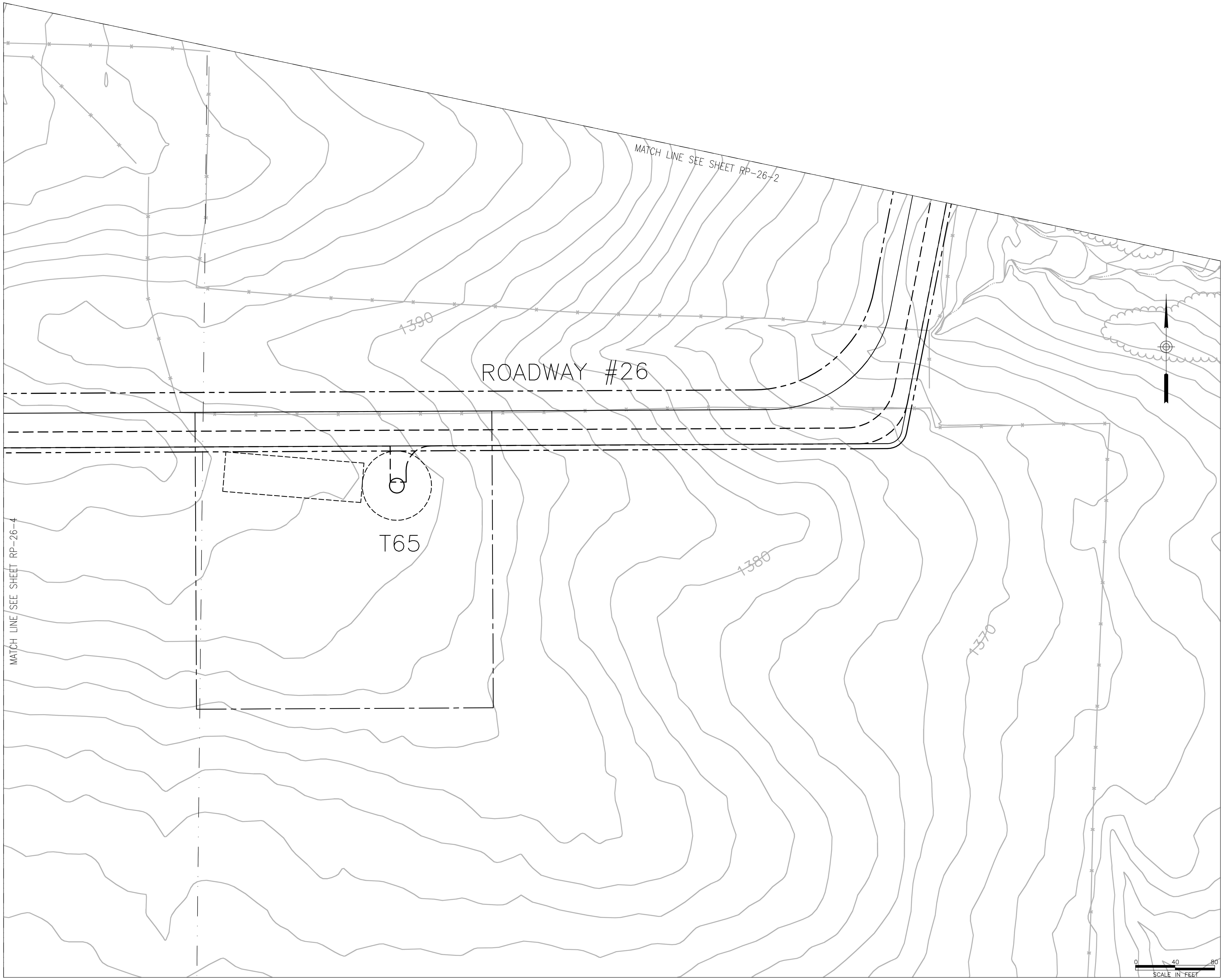
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 26, SHT. 2 OF 5

SCALE AS SHOWN
DRAWING RP-26-2
REV –

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR
CONSTRUCTION



LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- ―― 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- ―·― PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ▭ CRANE PAD
- ▰ WETLANDS
- ▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

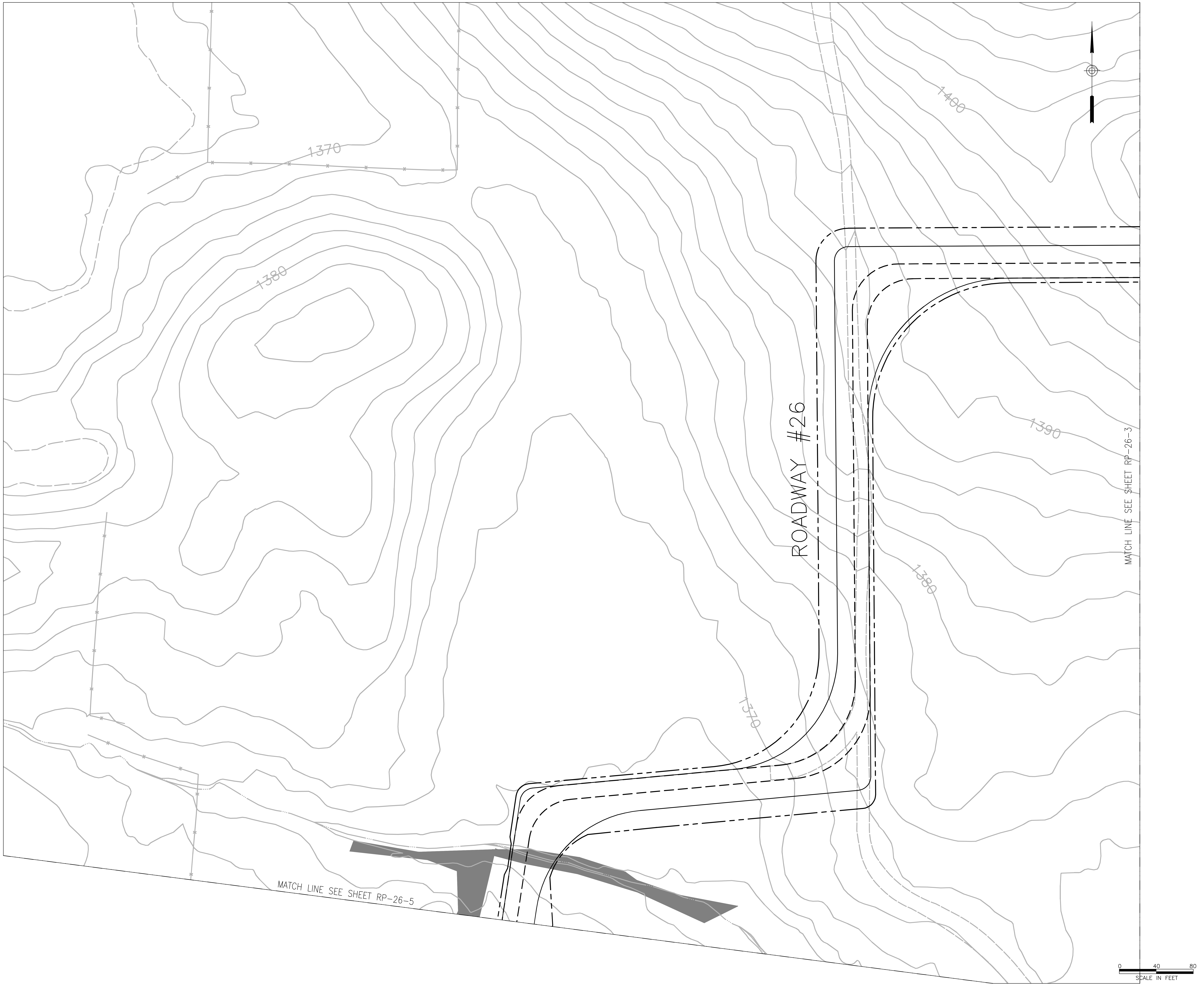
BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 26, SHT. 3 OF 5

SCALE
AS SHOWN

DRAWING
RP-26-3

REV
–



NOT FOR CONSTRUCTION

LEGEND

- — — 16 FOOT PERMANENT ACCESS ROAD
- —— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- —·· PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ☐ CRANE PAD
- ▨ WETLANDS
- ☐ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

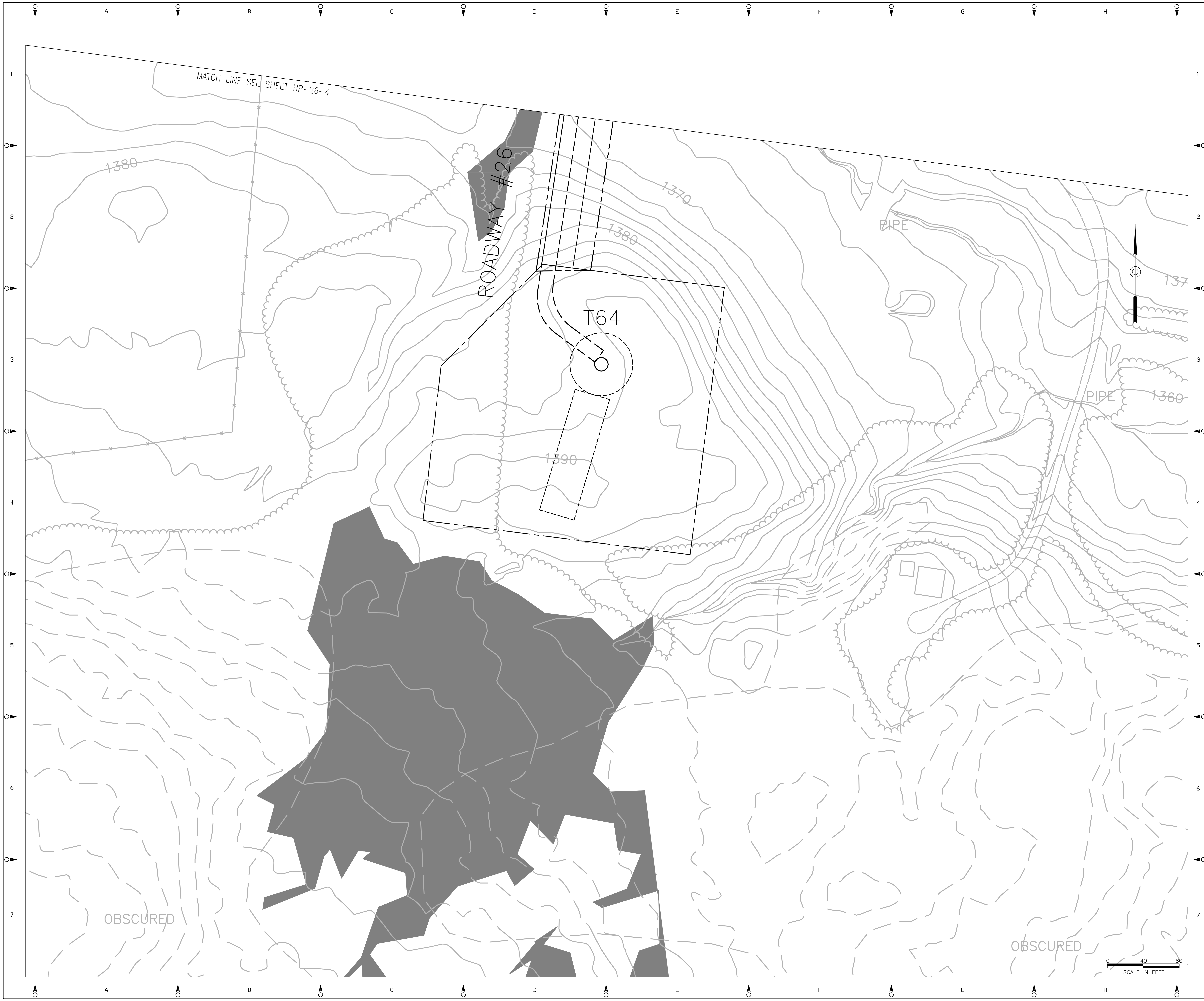
SITE PLAN
ROADWAY 26, SHT. 4 OF 5

SCALE
AS SHOWN

DRAWING
RP-26-4

REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC



NOT FOR CONSTRUCTION

LEGEND

— — — 16 FOOT PERMANENT ACCESS ROAD

——— 35 FOOT TEMPORARY CONSTRUCTION ROAD

—·—·— LIMIT OF DISTURBANCE

—··— PROPERTY LINE

⌀ UTILITY POLE

◯ TURBINE FOUNDATION

○ TURBINE PEDESTAL

▭ CRANE PAD

▆ WETLANDS

▭ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

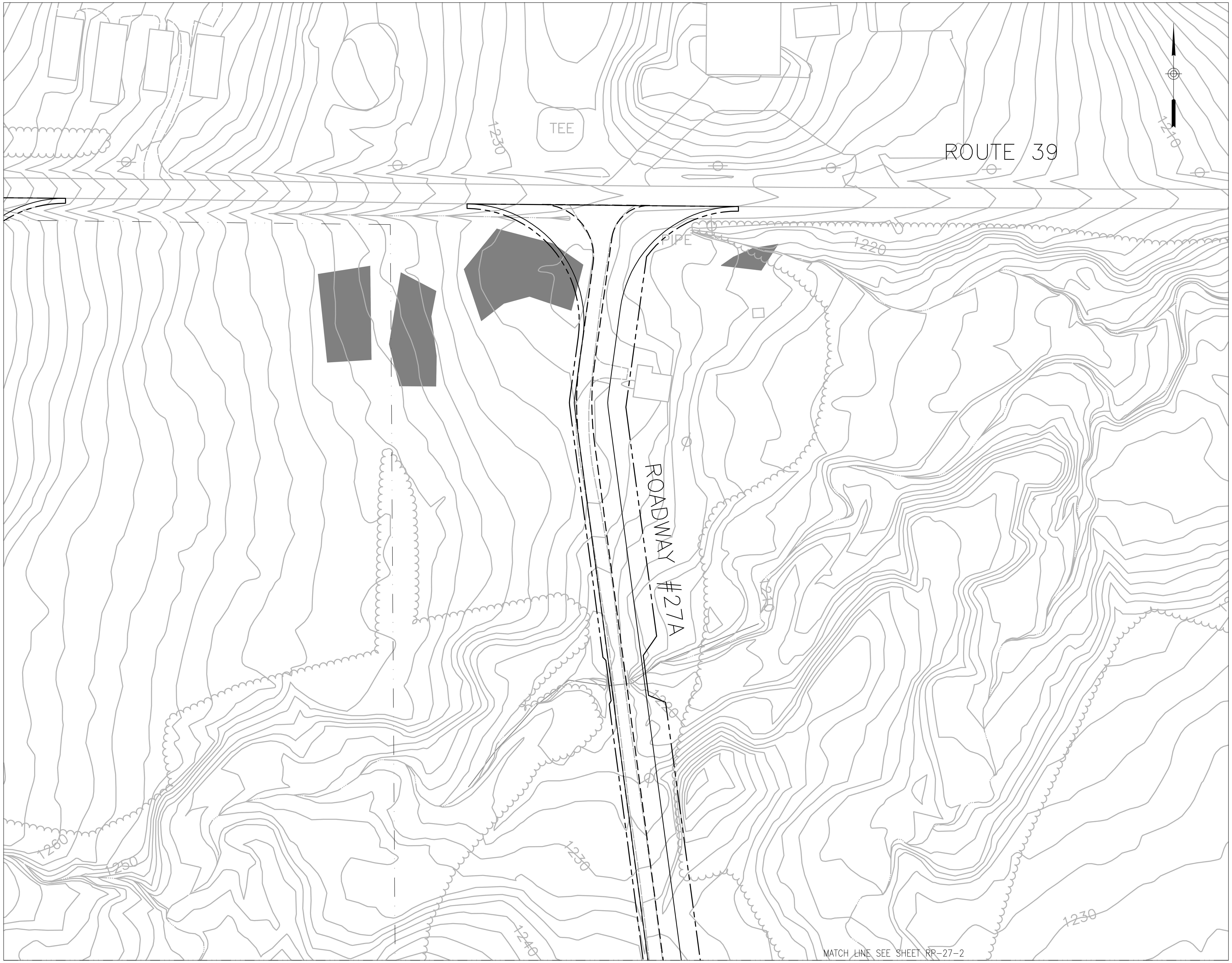
SITE PLAN
ROADWAY 26, SHT. 5 OF 5

SCALE
AS SHOWN

DRAWING
RP-26-5

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 27, SHT. 1 OF 6

SCALE
AS SHOWN

DRAWING
RP-27-1

REV
–

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

- — — — 16 FOOT PERMANENT ACCESS ROAD
- ——— 35 FOOT TEMPORARY CONSTRUCTION ROAD
- —·—·— LIMIT OF DISTURBANCE
- — · — PROPERTY LINE
- ⌀ UTILITY POLE
- ◯ TURBINE FOUNDATION
- ○ TURBINE PEDESTAL
- ☐ CRANE PAD
- ▨ WETLANDS
- ☐ TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

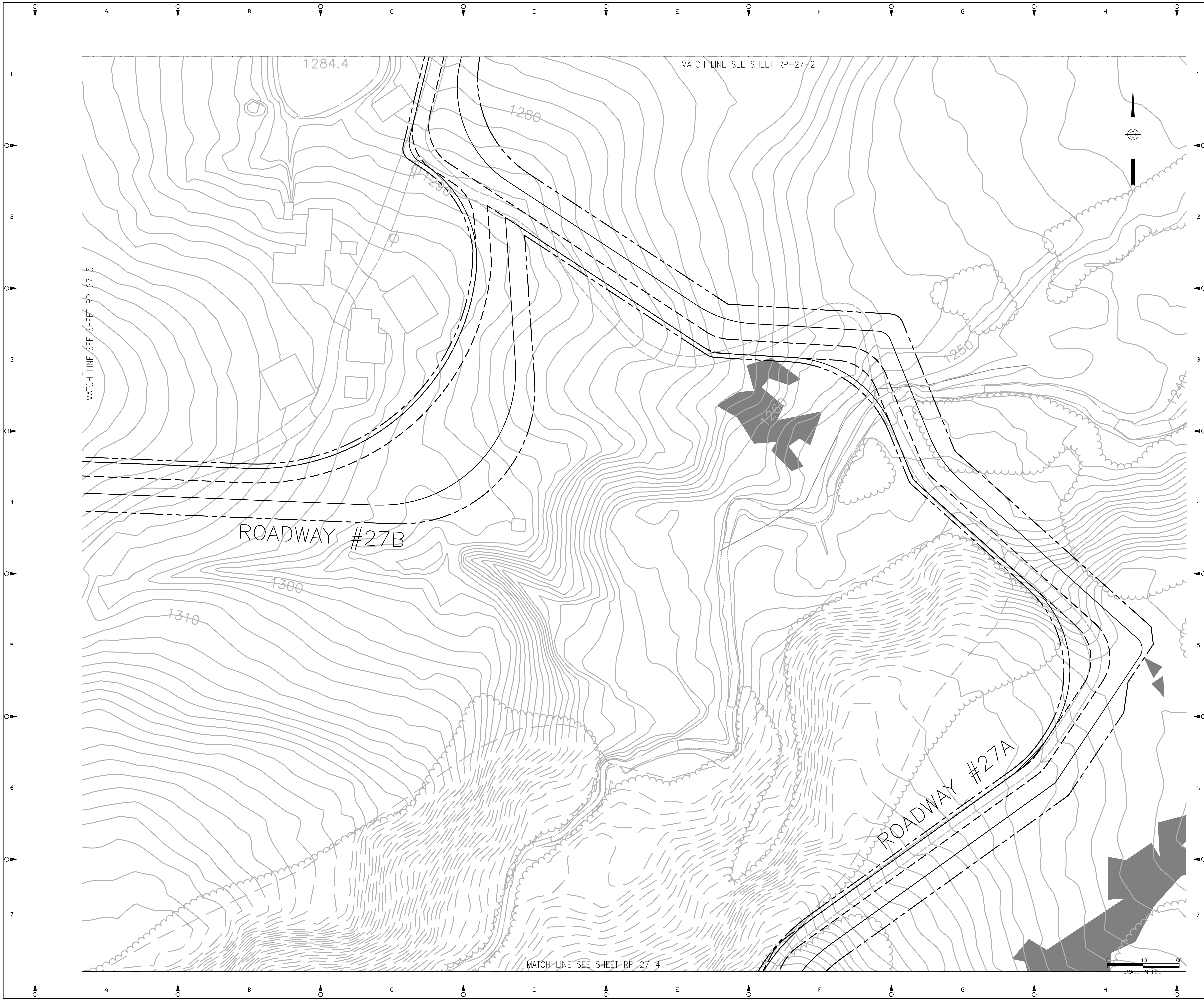
SITE PLAN
ROADWAY 27, SHT. 2 OF 6

SCALE
AS SHOWN

DRAWING
RP-27-2

REV
—

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC



NOT FOR
CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
— - —	LIMIT OF DISTURBANCE
— - - —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
⬚	CRANE PAD
■	WETLANDS
☐	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

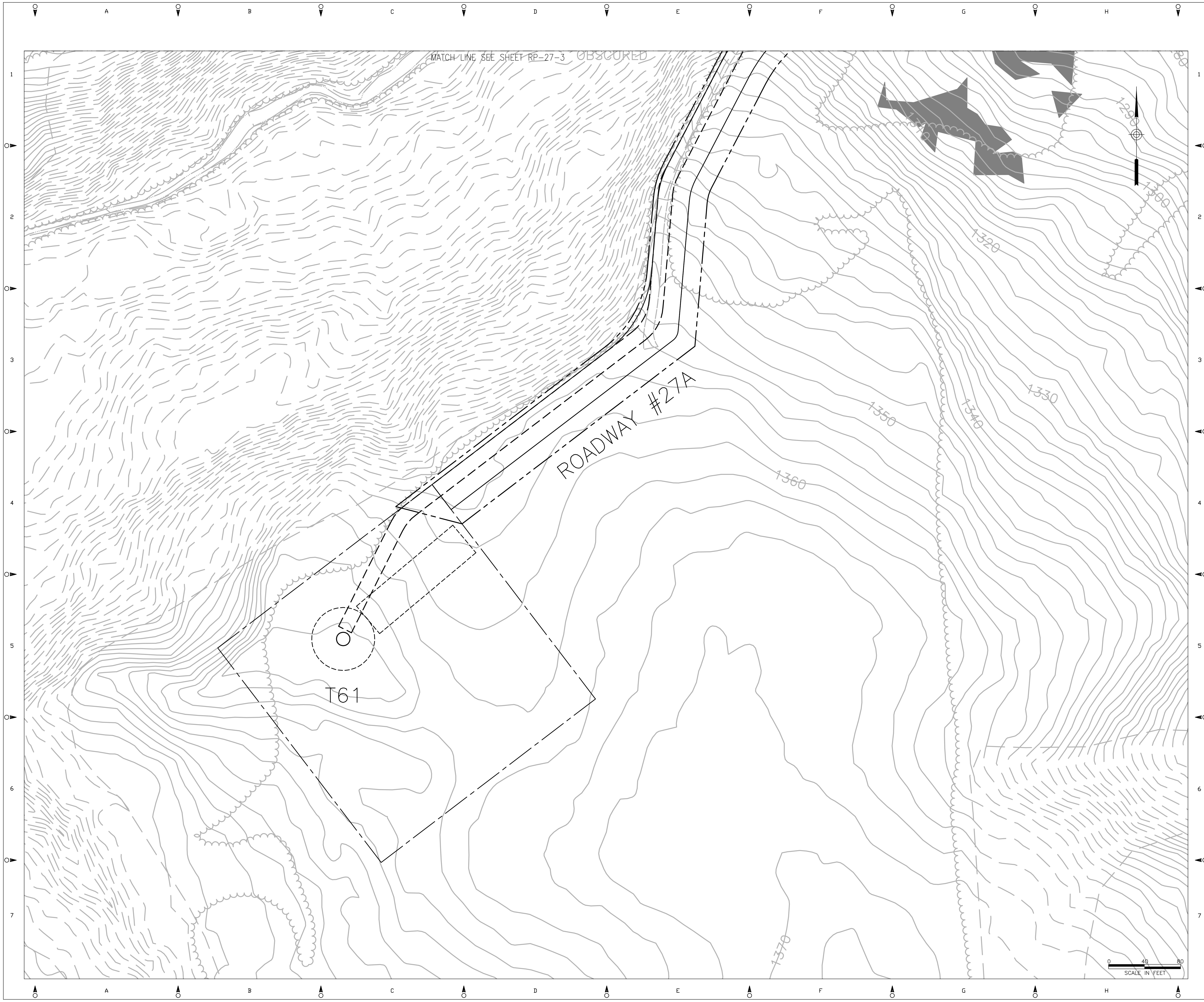
SITE PLAN
ROADWAY 27, SHT. 3 OF 6

SCALE
AS SHOWN

DRAWING
RP-27-3

REV
—

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
—·—·—	LIMIT OF DISTURBANCE
— —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
▭	CRANE PAD
▬	WETLANDS
▭	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

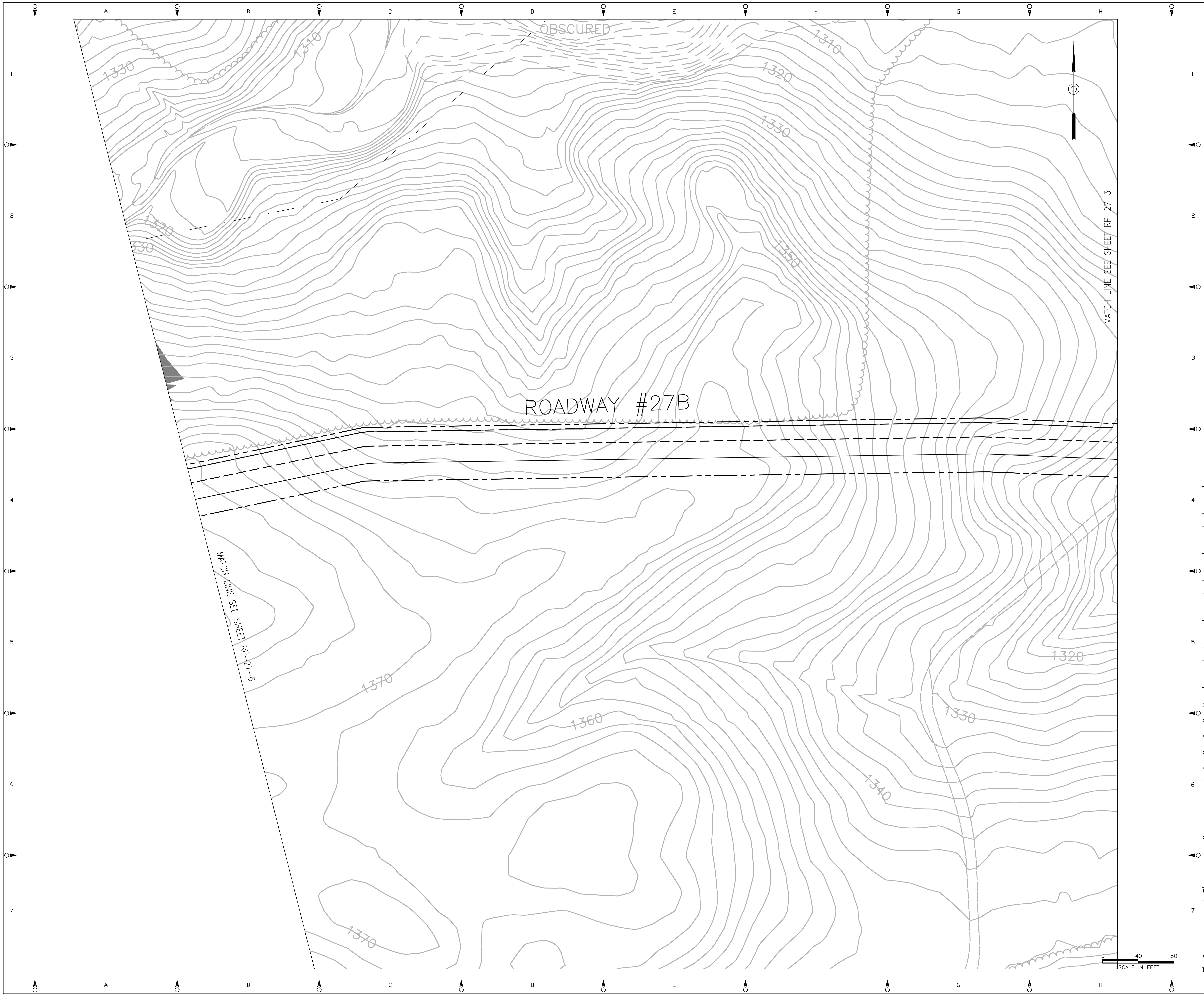
DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 27, SHT. 4 OF 6

SCALE AS SHOWN
DRAWING RP-27-4
REV –

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOT FOR CONSTRUCTION

LEGEND

- 16 FOOT PERMANENT ACCESS ROAD
- 35 FOOT TEMPORARY CONSTRUCTION ROAD
- LIMIT OF DISTURBANCE
- PROPERTY LINE
- UTILITY POLE
- TURBINE FOUNDATION
- TURBINE PEDESTAL
- CRANE PAD
- WETLANDS
- TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 27, SHT. 5 OF 6

SCALE
AS SHOWN

DRAWING
RP-27-5

REV
—

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC

NOT FOR CONSTRUCTION

LEGEND

— — —	16 FOOT PERMANENT ACCESS ROAD
———	35 FOOT TEMPORARY CONSTRUCTION ROAD
— - - —	LIMIT OF DISTURBANCE
— · —	PROPERTY LINE
⌀	UTILITY POLE
◯	TURBINE FOUNDATION
○	TURBINE PEDESTAL
▭	CRANE PAD
▨	WETLANDS
▭	TURBINE STAGING AREA

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN
ROADWAY 27, SHT. 6 OF 6

SCALE
AS SHOWN

DRAWING
RP-27-6

REV
–

Roadway Site Details

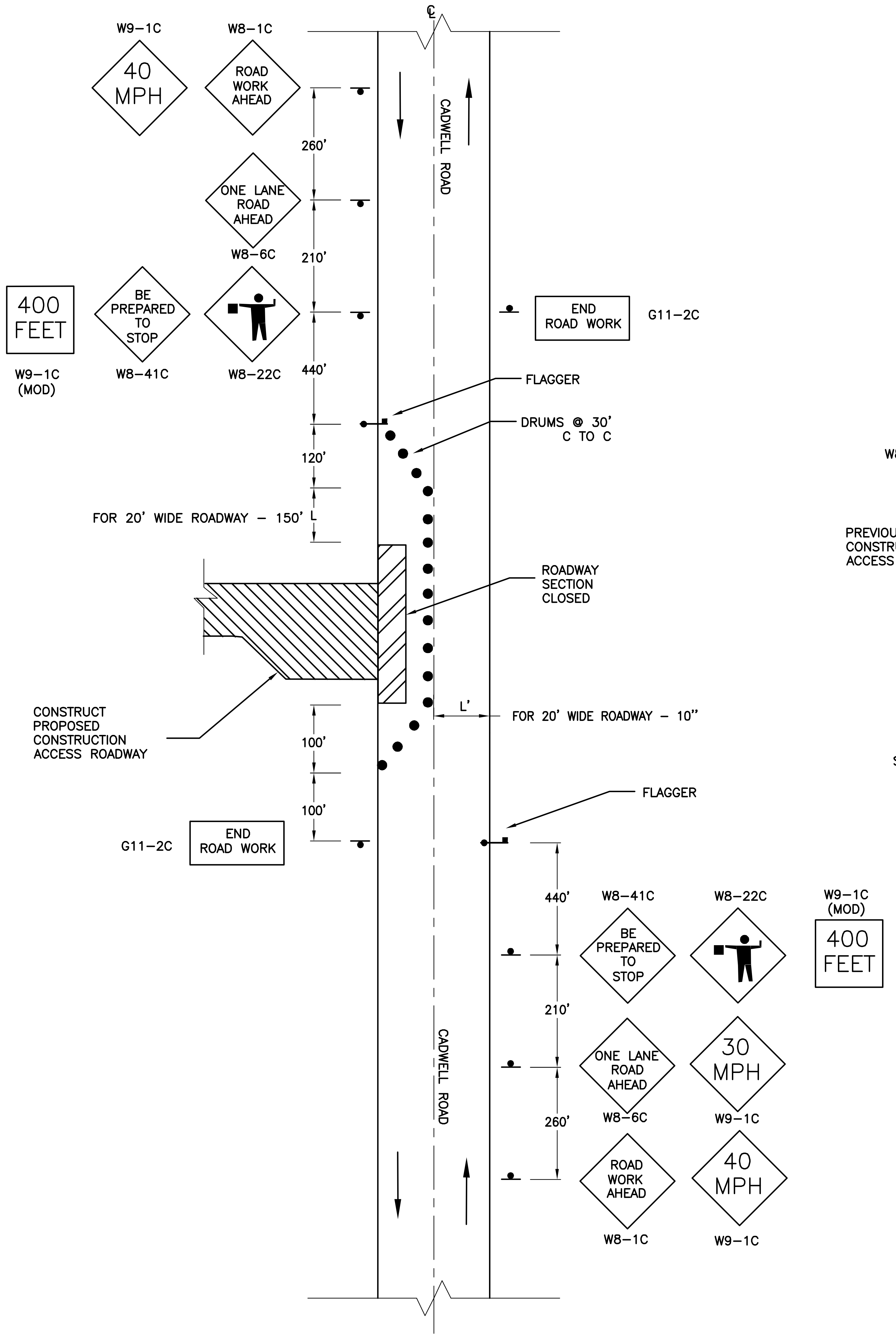
NOT FOR CONSTRUCTION

MAINTENANCE AND PROTECTION OF TRAFFIC NOTES:

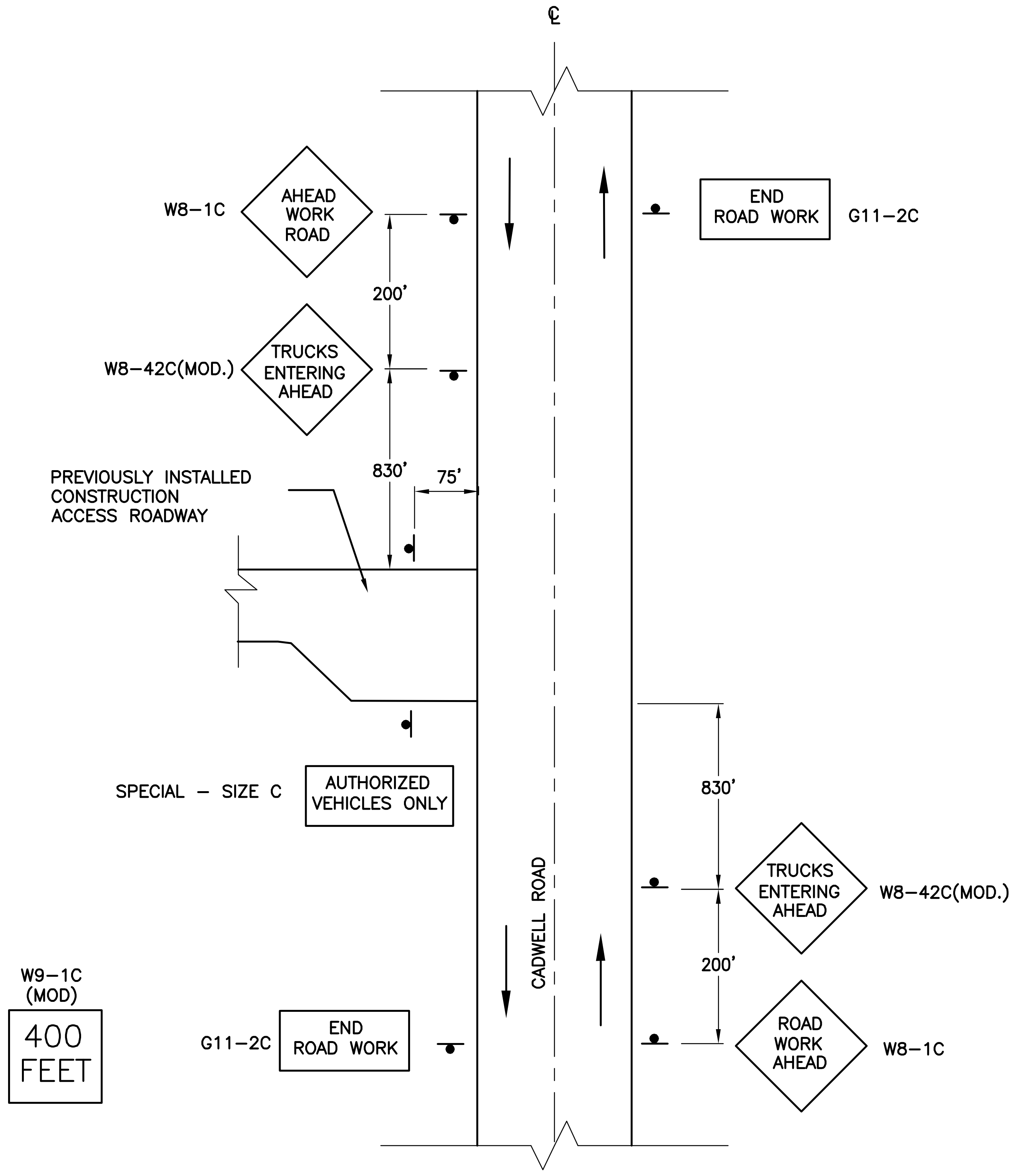
1. MAINTENANCE AND PROTECTION OF TRAFFIC SCHEMES SHALL BE IN ACCORDANCE WITH THE PLANS, THE OFFICIAL COMPILATION OF CODES, RULES AND REGULATIONS OF THE STATE OF NEW YORK (NYCRR) VOLUMES 17B (HEREAFTER REFERRED TO AS THE NYSMUTCD OR SIMPLY THE MUTCD) FIGURES 302–8 AND OTHER FIGURES OF PART 302 AS ORDERED BY THE ENGINEER.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MAINTENANCE AND PROTECTION OF TRAFFIC. MAINTENANCE OF TRAFFIC SCHEMES SHALL BE IN ACCORDANCE WITH THE PLANS, THE NYSMUTCD AND AS APPROVED OR DIRECTED BY THE ENGINEER. TRAFFIC SCHEMES SHOWN ON THE PLANS OR IN THE NYSMUTCD ARE CONSIDERED MINIMUM REQUIREMENTS. THE ENGINEER MAY ORDER ADDITIONAL SIGNS, FLAGGERS, CONES, DRUMS, REFLECTORIZATION ETC., IF HE/SHE DEEMS IT NECESSARY AT NO ADDITIONAL COST. PAYMENT FOR ALL SUCH WORK SHALL BE INCLUDED IN THE ITEMS FOR MAINTENANCE AND PROTECTION OF TRAFFIC OR CONSTRUCTION SIGNS AS APPROPRIATE.
3. THE CONTRACTOR MAY SUBMIT REVISIONS TO THIS PLAN AT NO COST FOR APPROVAL.
4. PRIOR TO PLACING TRAFFIC ON NEWLY CONSTRUCTED COUNTY/TOWN ROADS, CONSTRUCTION OF THOSE ROADS IS TO BE TOTALLY COMPLETED, INCLUDING ALL ASPECTS OF THE ROADWAY; TRAVEL LANES, SHOULDERS, SIGNS, PAVEMENT MARKINGS, GUIDERAIL, ETC.
5. THE CONTRACTOR IS NOTIFIED THAT DAYTIME LANE CLOSURES WILL BE PERMITTED BETWEEN THE HOURS OF 7:30 AM AND 3:30 PM MONDAY THROUGH FRIDAY. NIGHTTIME LANE CLOSURES AND WEEKEND LANE CLOSURES ARE NOT ALLOWED.
6. TEMPORARY LANE CLOSURE DESIGNED FOR A 55 MPH DESIGN SPEED.
7. WHENEVER MAINTENANCE AND PROTECTION OF TRAFFIC SCHEMES PROVIDING FOR ONE–LANE ROAD OPERATION ARE IN EFFECT, THE CONTRACTOR SHALL POSITION FLAGGERS AT THE LIMITS OF THE ONE–LANE ROAD OPERATION, AT ALL CROSS STREETS WITHIN THE ONE–LANE ROAD OPERATION, AT MAJOR DRIVEWAYS AND SUCH OTHER LOCATIONS AS REQUIRED BY THE ENGINEER TO CONTROL TRAFFIC. FLAGGERS SHALL BE EQUIPPED WITH TWO–WAY RADIOS, IN ACCORDANCE WITH SUBSECTION 301.9(C)4 OF THE MUTCD, WHERE IN THE OPINION OF THE ENGINEER THE USAGE OF SUCH RADIOS IS NECESSARY TO CONTROL TRAFFIC. SUCH RADIOS SHALL HAVE SUFFICIENT TRANSMITTING POWER TO REACH ALL POINTS WITHIN THE LENGTH OF THE ONE–WAY ROAD OPERATION. PAYMENT FOR THE USE OF SUCH RADIOS SHALL BE INCLUDED IN THE BASIC MAINTENANCE AND PROTECTION OF TRAFFIC ITEM.
8. WHEN CONES AND DRUMS ARE USED IN CONTROLLING THE MOVEMENT THROUGH WORK AREAS, THE CONTRACTOR SHALL TAKE STEPS AS NECESSARY TO PREVENT THE CONES/DRUMS FROM BEING BLOWN OVER OR DISPLACED BY PASSING VEHICLES.
9. ALONG THE ONE–WAY TRAVEL ROUTE THE CONTRACTOR'S RESPONSIBILITY IS LIMITED TO THE PLACEMENT, MAINTENANCE AND REMOVAL OF ADVANCE SIGNS AND DEVICES AND A DAILY PATROL TO MAKE SURE THEY ARE IN GOOD CONDITION. WHEN THE ONE–WAY OPERATION IS NOT IN EFFECT, THE CONTRACTOR SHALL IMMEDIATELY MOVE, REMOVE OR TEMPORARILY COVER ALL ADVANCE ONE–WAY OPERATION SIGNS TO REFLECT ACTUAL TWO–WAY TRAVEL CONDITIONS.
10. VARIOUS MAINTENANCE AND CONSTRUCTION SIGNS SPECIFIED IN PART 238 OF THE MUTCD ARE AVAILABLE IN THE STANDARD DIAMOND SHAPE AND AN ALTERNATIVE RECTANGLE SHAPE. WHENEVER SUCH SIGNS ARE INCLUDED IN THIS CONTRACT, THE DIAMOND SHAPE SIGN SHALL BE USED DESPITE OTHER INDICATIONS IN SECTION 238.1(b).
11. THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 230.3 OF THE MUTCD WHICH REQUIRES THAT WITH THE EXCEPTION OF THE RAILROAD ADVANCE WARNING SIGNS, WARNING SIGNS USED IN CONJUNCTION WITH WORK ZONE ACTIVITIES SHOULD HAVE ORANGE BACKGROUNDS.
12. IN ADDITION TO THE SIGNING SHOWN ON THE PLANS, THE CONTRACTOR SHALL ERECT W8–1C "ROAD WORK AHEAD" SIGNS AT INTERSECTING CROSS STREETS WITHIN THE CONTRACT LIMITS. PAYMENT OF THESE SIGNS WILL BE MADE UNDER THE ITEM FOR CONSTRUCTION SIGNS.
13. THE CONTRACTOR'S ATTENTION IS DIRECTED TO SUBSECTION 619–3.02 AND 645–3.17 OF THE STANDARD SPECIFICATIONS. EXISTING TRAFFIC SIGNS AND CONSTRUCTION SIGNS WITHIN THE WORK AREA WHICH ARE NO LONGER NEEDED, EVEN TEMPORARILY, OR CONFLICTING, INAPPROPRIATE OR CONFUSING, SHALL BE REMOVED (SUBJECT TO THE APPROVAL OF THE ENGINEER) OR SHALL BE COVERED COMPLETELY WITH AN OPAQUE MATERIAL. THE COST OF THIS WORK SHALL BE INCLUDED IN THE PRICE BID FOR THE MAINTENANCE AND PROTECTION OF TRAFFIC ITEM.

ENTRANCE ROADWAY CONSTRUCTION SEQUENCING:

1. INSTALL TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AS INDICATED IN THE SWPPP.
2. INSTALL TEMPORARY CONSTRUCTION MAINTENANCE PROTECTION OF TRAFFIC DEVICES ALONG EXISTING STATE/COUNTY ROAD.
3. CLEAR/GRUB PROPOSED ENTRANCE ROADWAY AREA.
4. REMOVE EXISTING TOP SOIL WITHIN PROPOSED ACCESS ROADWAY EXCAVATION LIMITS AND STOCK PILE TOP SOIL WHERE INDICATED ON THE PLANS AND AS DIRECTED BY ENGINEER.
5. MODIFY THE EXISTING ROAD–SIDE DITCH AND ASSOCIATED DRAINAGE PATH FEATURES AS SHOWN ALONG EXISTING STATE/COUNTY ROAD.
6. INSTALL THE TEMPORARY ACCESS ROADWAY AS INDICATED ON THE PLANS.
7. INSTALL TEMPORARY CONSTRUCTION ROAD GATE.
8. REMOVE TEMPORARY CONSTRUCTION MAINTENANCE PROTECTION OF TRAFFIC DEVICES ALONG EXISTING STATE/COUNTY ROAD. INSTALL LONG TERM TEMPORARY MAINTENANCE AND PROTECTION OF TRAFFIC DEVICES ALONG EXISTING STATE/COUNTY AS SHOWN.



DETAIL: TEMPORARY CONSTRUCTION TRAFFIC CONTROL FOR ONE–LANE SECTIONS ON TWO–LANE TWO–WAY HIGHWAYS
NOT TO SCALE



DETAIL: LONG TERM TRAFFIC CONTROL FOR TWO–WAY HIGHWAYS ADJACENT TO ACCESS ROADWAYS
NOT TO SCALE

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

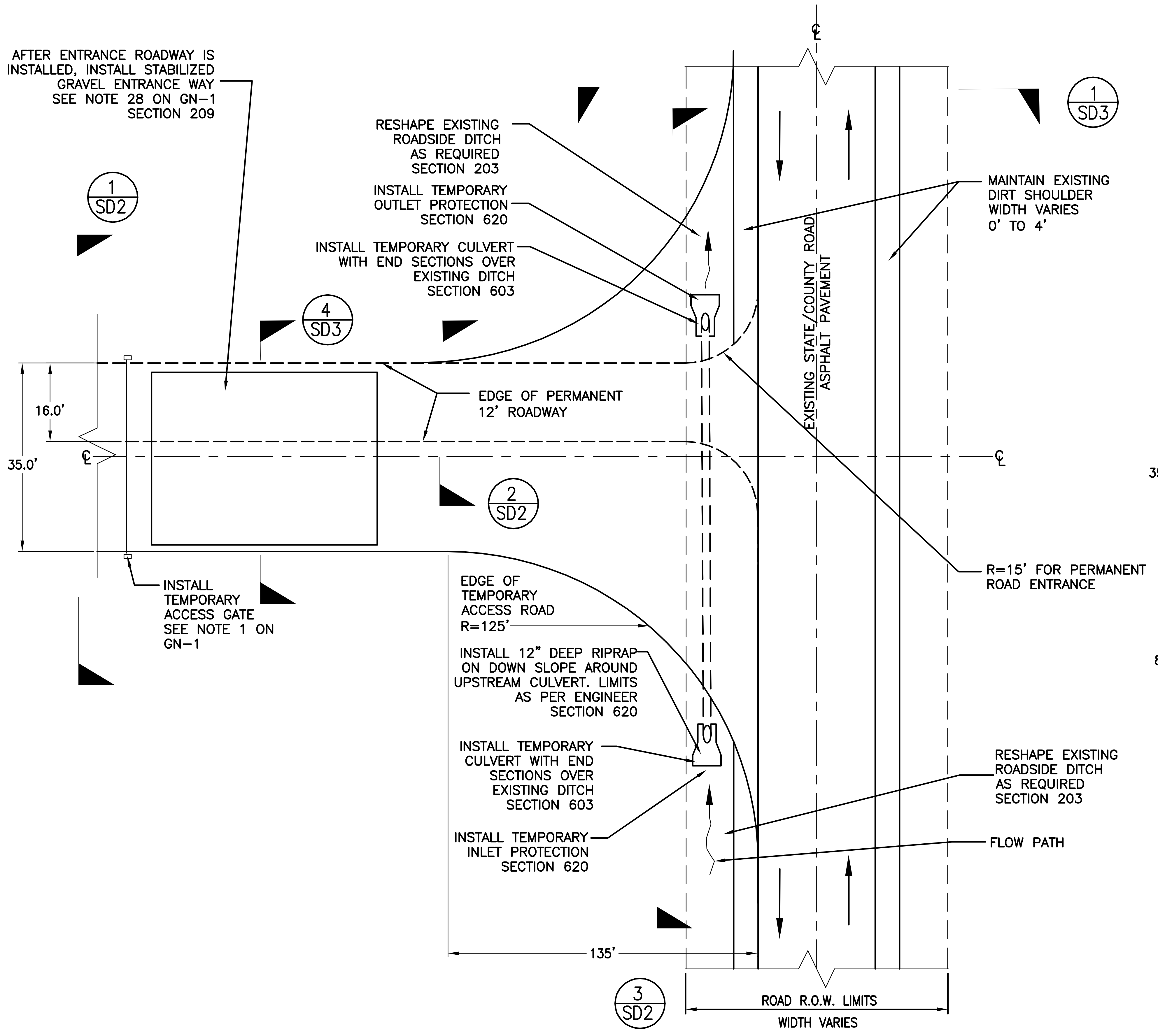
DEPT.
NO.

BALL HILL WINDPARK PROJECT

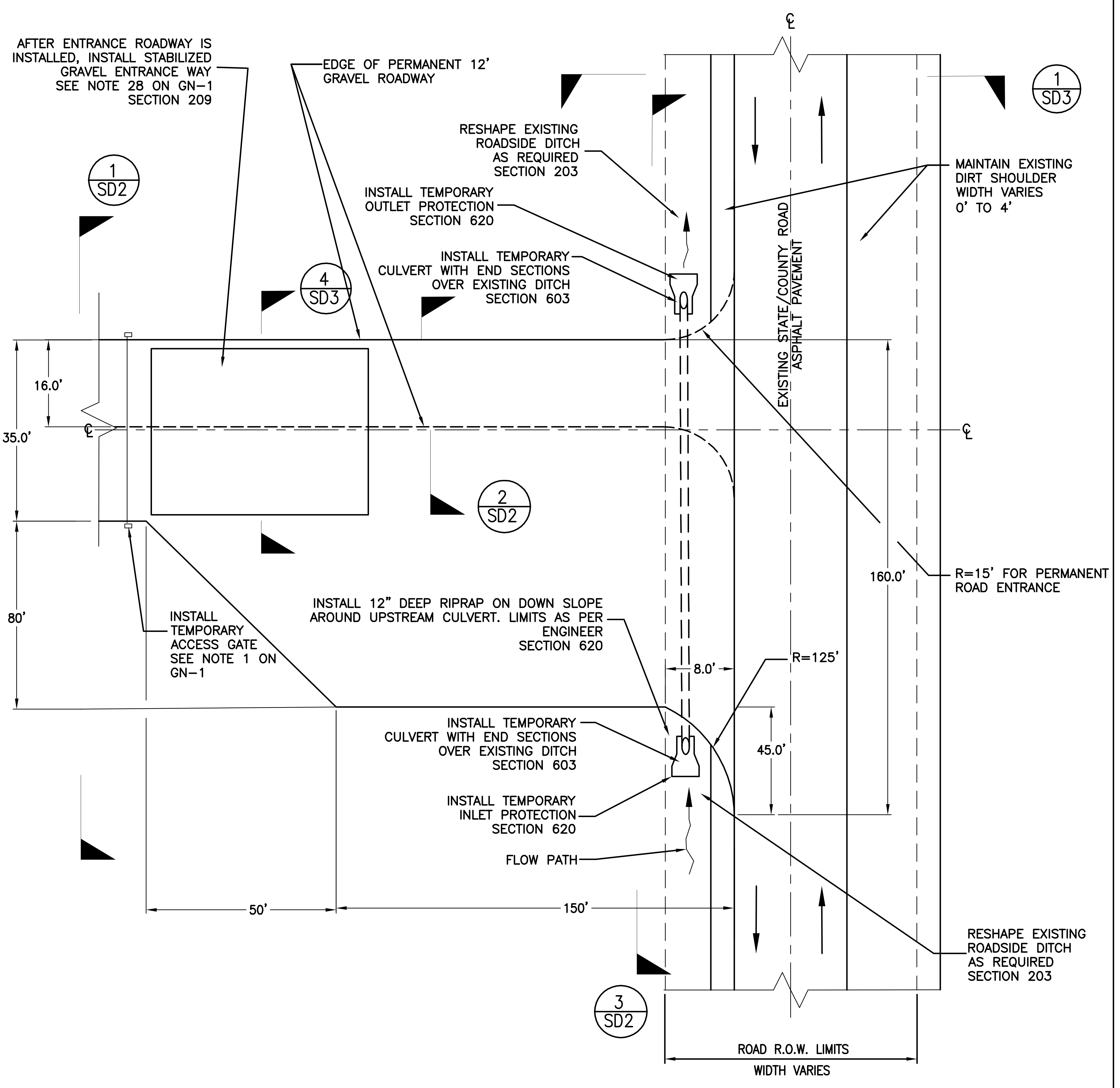
MAINTENANCE & PROTECTION OF TRAFFIC– 1

SCALE
AS SHOWN
DRAWING
MPT–1
REV

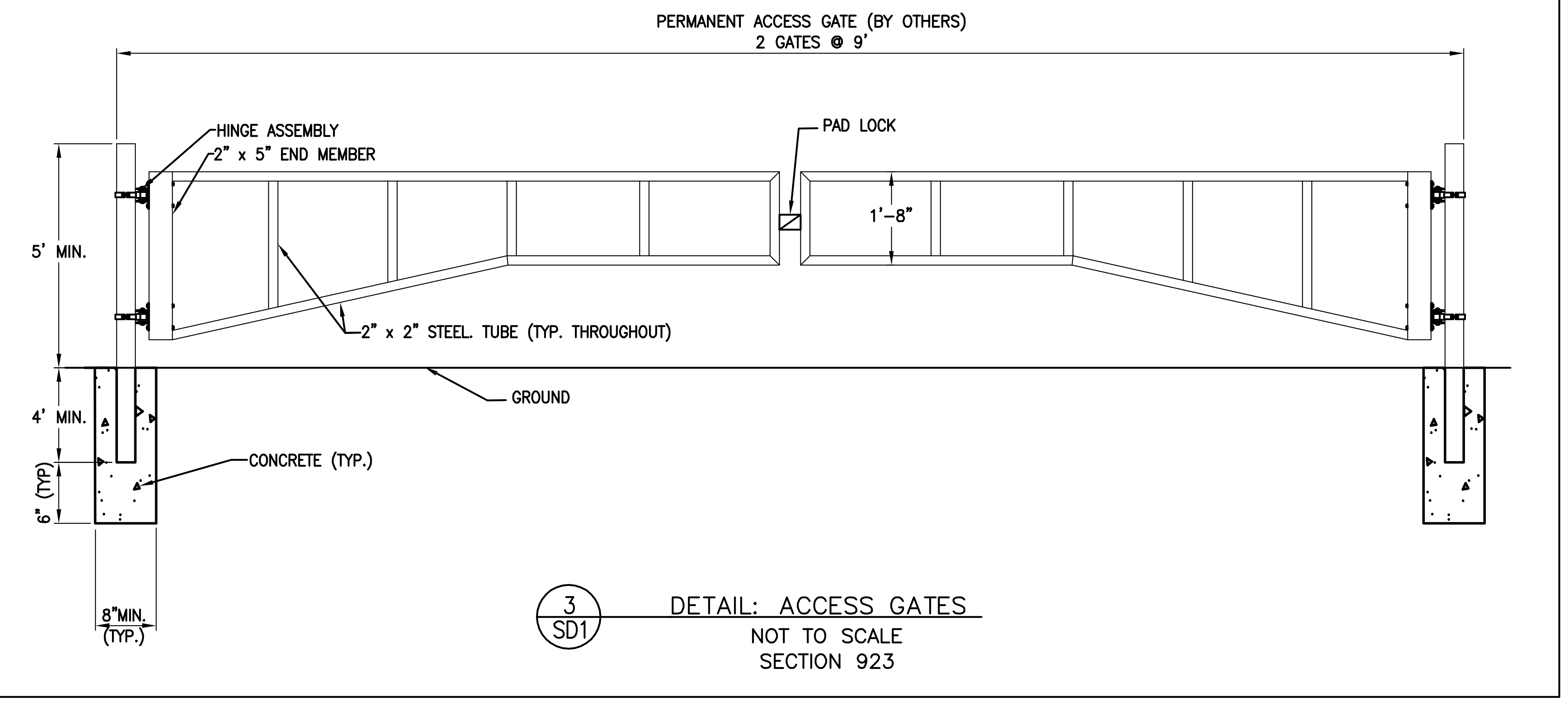
NOT FOR
CONSTRUCTION



1 SD1 DETAIL: PROPOSED ROADWAY ENTRANCE
NOT TO SCALE



2 SD1 DETAIL: PROPOSED ROADWAY REVERSE ENTRANCE
NOT TO SCALE



3 SD1 DETAIL: ACCESS GATES
NOT TO SCALE
SECTION 923

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

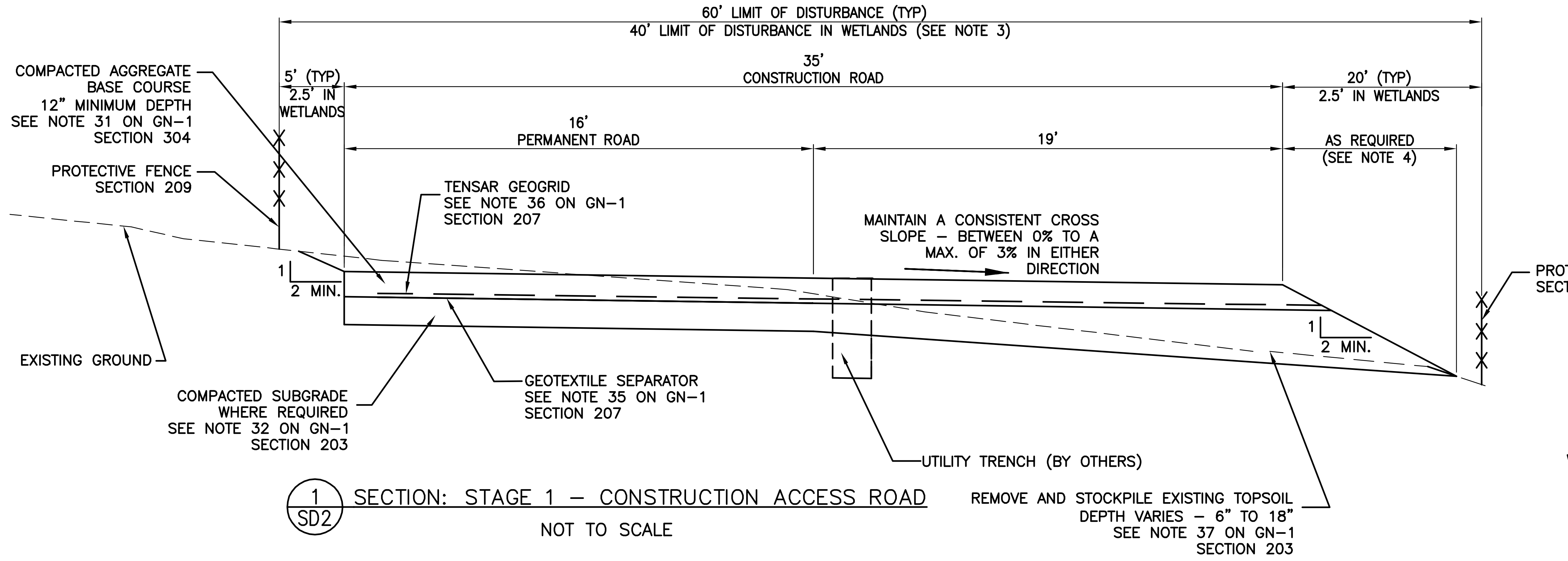
BALL HILL WINDPARK PROJECT

ROADWAY SITE DETAILS–1

SCALE
AS SHOWN
DRAWING
SD–1
REV

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC

NOT FOR CONSTRUCTION

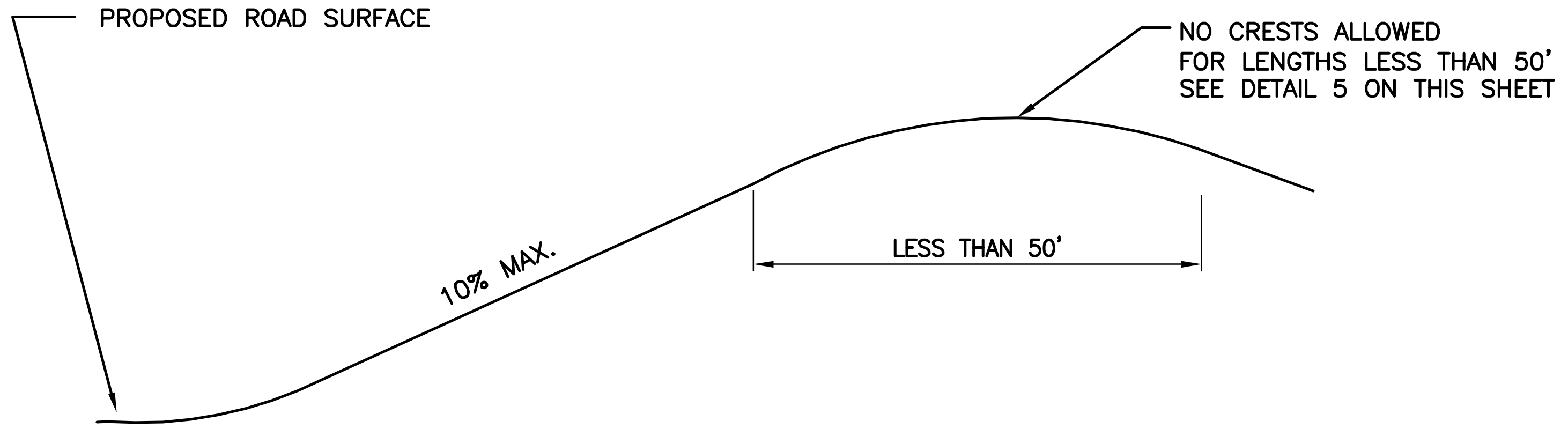


1/SD2 SECTION: STAGE 1 - CONSTRUCTION ACCESS ROAD

NOT TO SCALE

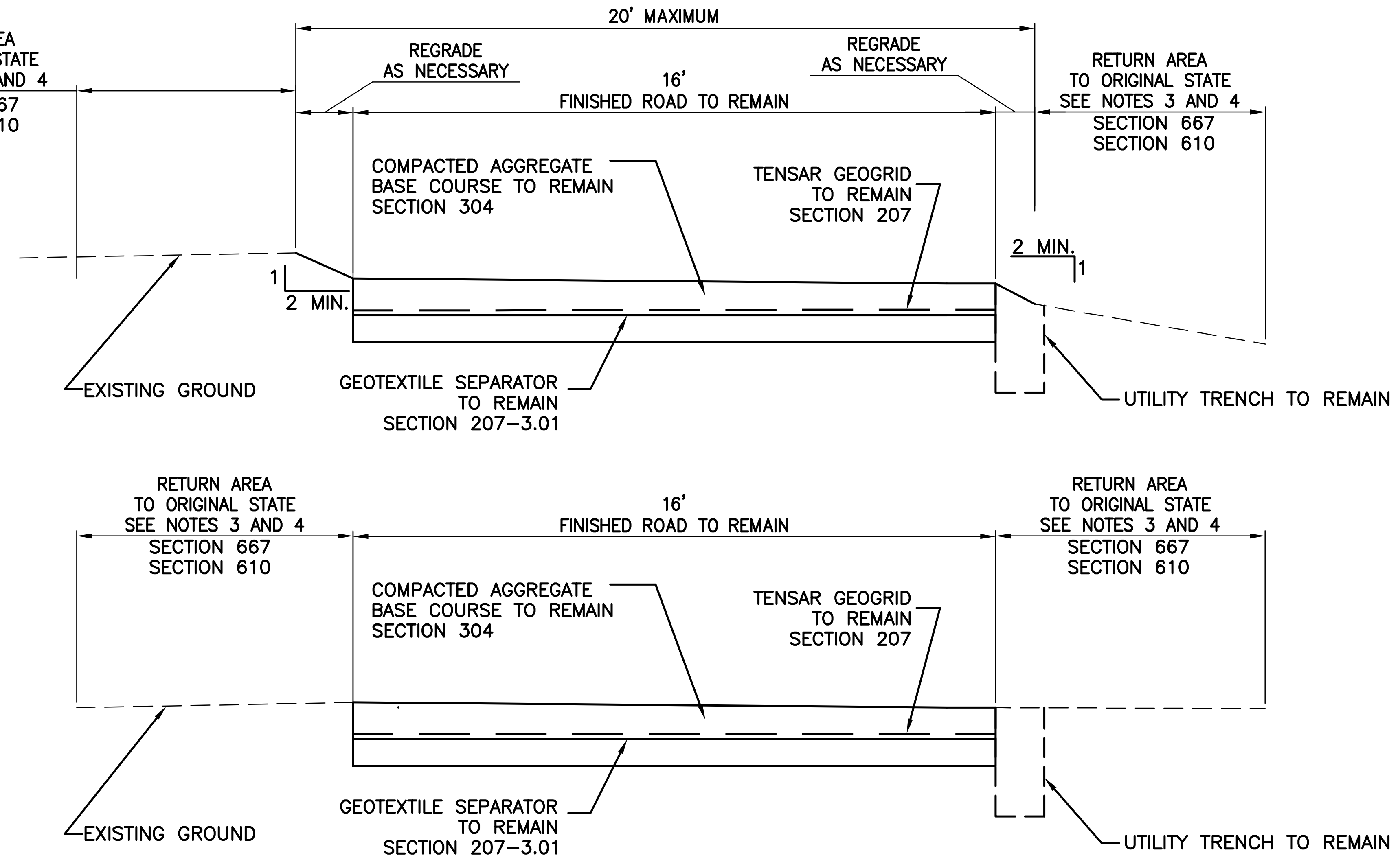
NOTES:

1. CLEARING AND GRUBBING REQUIRED FOR THE ENTIRE 60' WIDTH OF ROW, EXCEPT IN AREAS OF WETLANDS WHERE DISTURBANCE IS LIMITED TO 40'
2. REMOVE AND STOCKPILE ALL TOPSOIL THAT IS WITHIN THE LIMITS OF GRADING.
3. IN AREAS WHERE THERE IS AN IMPACT TO STREAMS AND/OR EXISTING WETLANDS, THE AREAS OF DISTURBANCE, WHERE POSSIBLE, WILL BE REDUCED TO 2.5' ON EACH SIDE OF THE CONSTRUCTION ROAD. THIS CREATES A CORRIDOR WITH A TOTAL DISTURBANCE WIDTH OF 40'.
4. 2:1 SIDESLOPES SHALL BE DESIGNED TO ACCOMMODATE CONSTRUCTION TRAFFIC WITHIN THE FULL 32' WIDTH OF ROADWAY.
5. CULVERT PIPE SHALL BE PLACED UNDER THE 35' CONSTRUCTION ACCESS ROADWAY AS DESIGNED BY THE ENGINEER. UPON THE COMPLETION OF CONSTRUCTION, THE CULVERT SHALL BE CUT SHORTER IN LENGTH TO ACCOMMODATE THE 16' PERMANENT ROADWAY. A NEW END SECTION SHALL BE PLACED ON THE MODIFIED SIDE.
6. SILT FENCE, DRAINAGE DITCHES, AND ALL SOIL EROSION AND SEDIMENT CONTROL DEVICES IN THE PROJECT AREA SHALL BE INSTALLED ACCORDING TO THE ALLEGANY SWPPP.



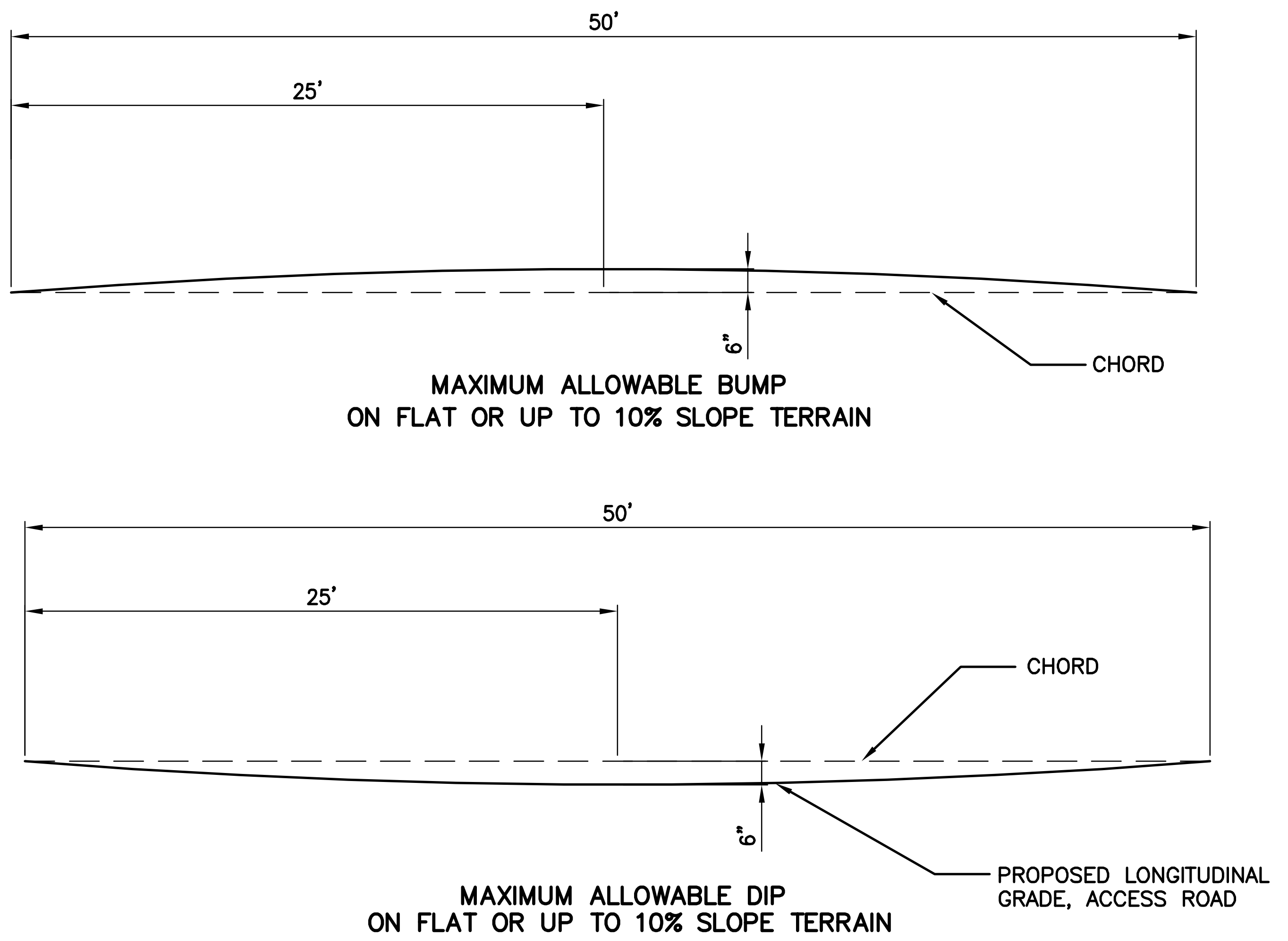
4/SD2 DETAIL : TYPICAL ROAD ALLOWABLE VEHICLE GRADES

NOT TO SCALE



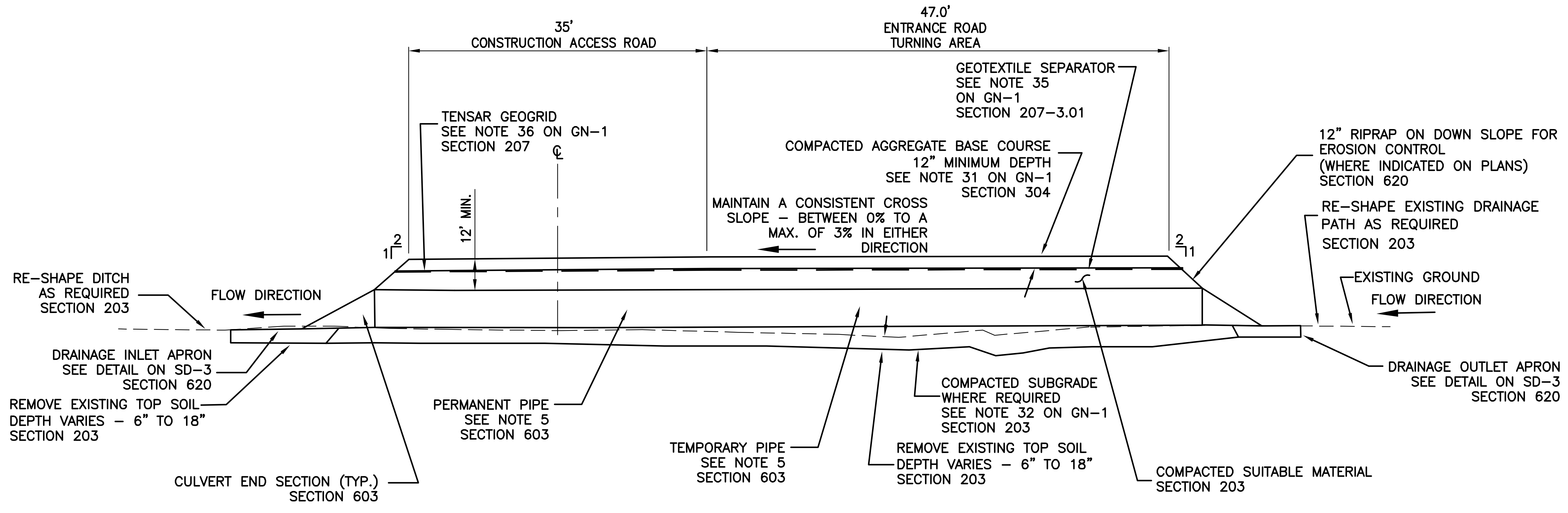
2/SD2 SECTION: STAGE 2 - FINAL ACCESS ROAD OPTIONS

NOT TO SCALE



5/SD2 DETAIL : TYPICAL ROAD ALLOWABLE BUMPS AND DIPS

NOT TO SCALE



3/SD2 SECTION: ACCESS ROADWAY ENTRANCE

NOT TO SCALE

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

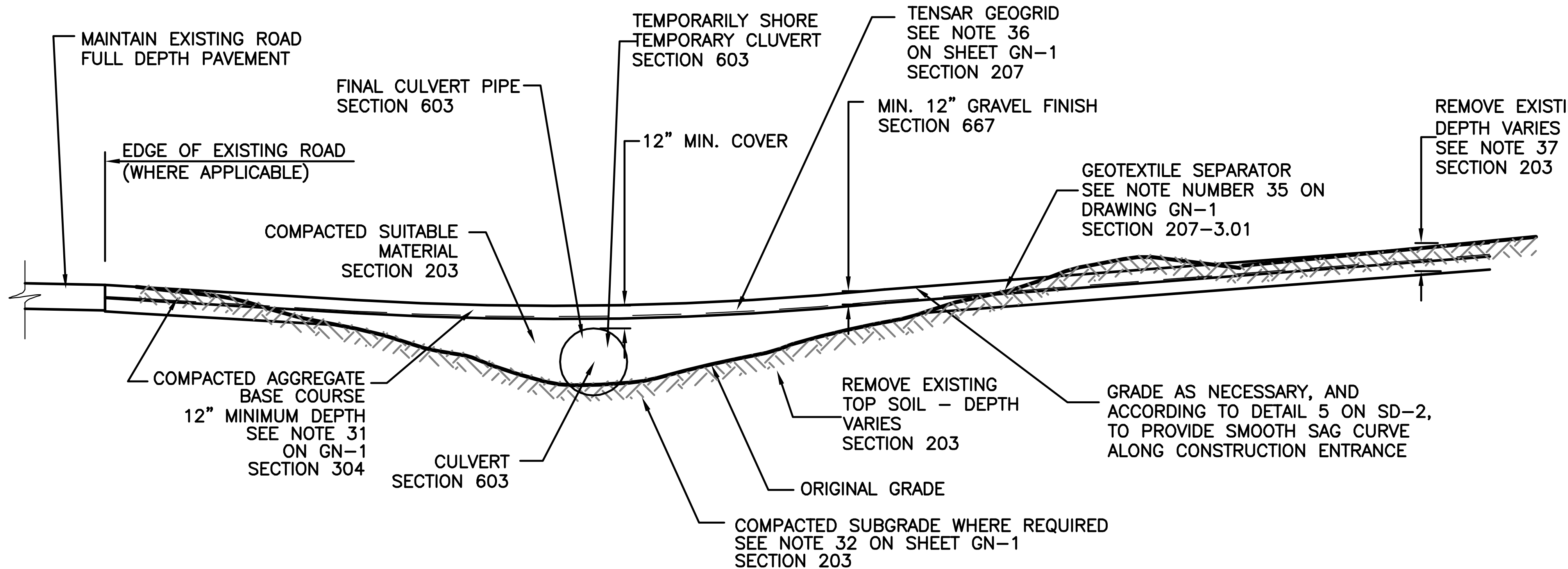
DEPT.
NO.

BALL HILL WINDPARK PROJECT

ROADWAY SITE DETAILS-2

SCALE AS SHOWN
DRAWING SD-2
REV

ARCH HVAC I & C ELECT MECH CIVIL STRUC
ARCH HVAC I & C ELECT MECH CIVIL STRUC
ARCH HVAC I & C ELECT MECH CIVIL STRUC
ARCH HVAC I & C ELECT MECH CIVIL STRUC
ARCH HVAC I & C ELECT MECH CIVIL STRUC
ARCH HVAC I & C ELECT MECH CIVIL STRUC
ARCH HVAC I & C ELECT MECH CIVIL STRUC

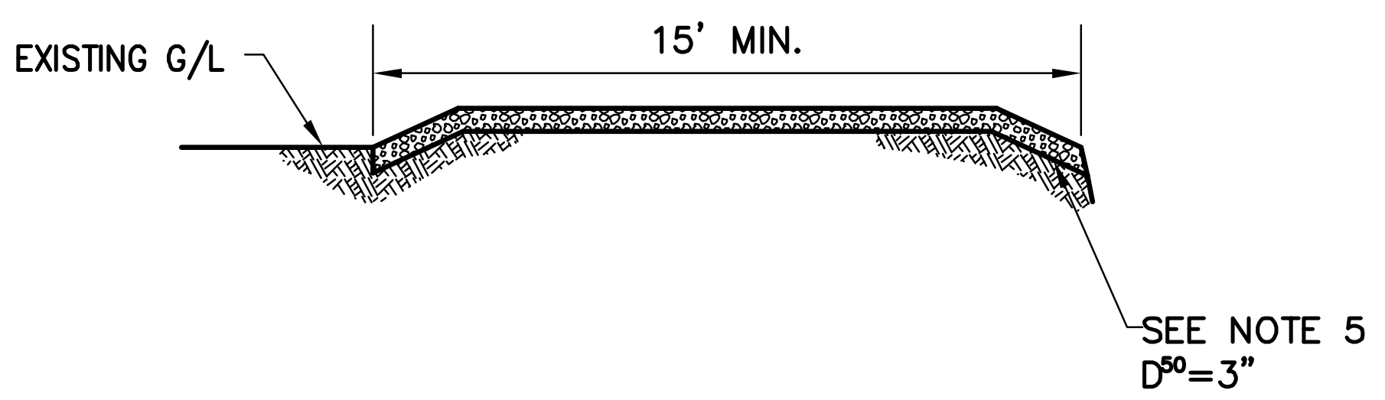


1 SD3 PROFILE: PROFILE ALONG CULVERTS

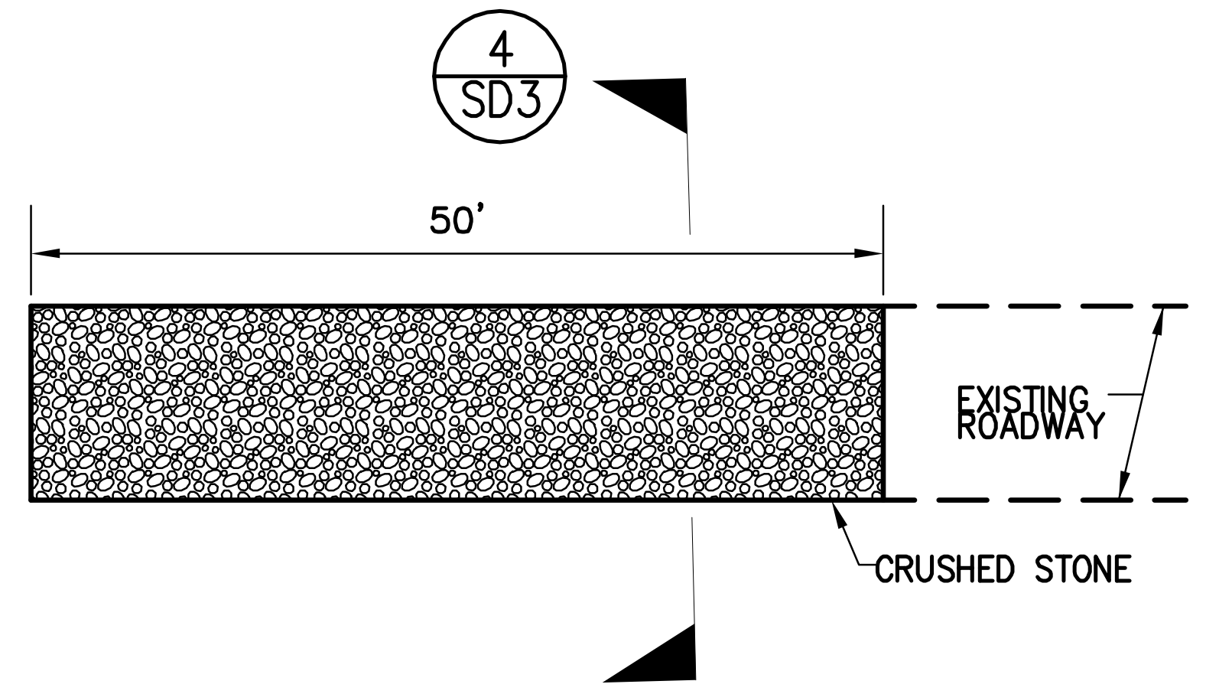
NOT TO SCALE

NOTES:

1. LOCATION OF DRAINAGE CULVERTS SHOWN ON THE SITE PLANS ARE BASED ON EXISTING CONTOURS AND POTENTIAL DRAINAGE PATHS. LOCATION OF ALL PROPOSED DRAINAGE CULVERTS ARE TO BE FIELD DETERMINED BASED ON ACTUAL FIELD CONDITIONS INCLUDING EXISTING GRADES.
2. CONSTRUCT CULVERTS UNDER CONSTRUCTION ACCESS ROAD AT INTERSECTIONS WITH STATE, COUNTY, AND TOWN ROADWAYS AS SHOWN ON CONSTRUCTION PLAN.
3. MAINTAIN MINIMUM COVER OF 12" ON ALL CULVERTS. CONTRACTOR SHALL VERIFY WITH MANUFACTURER THE MINIMUM REQUIRED COVER ON ALL CULVERT PRIOR TO INSTALLATION.



4 SD3 SECTION: STABILIZED CONSTRUCTION ENTRANCEWAY



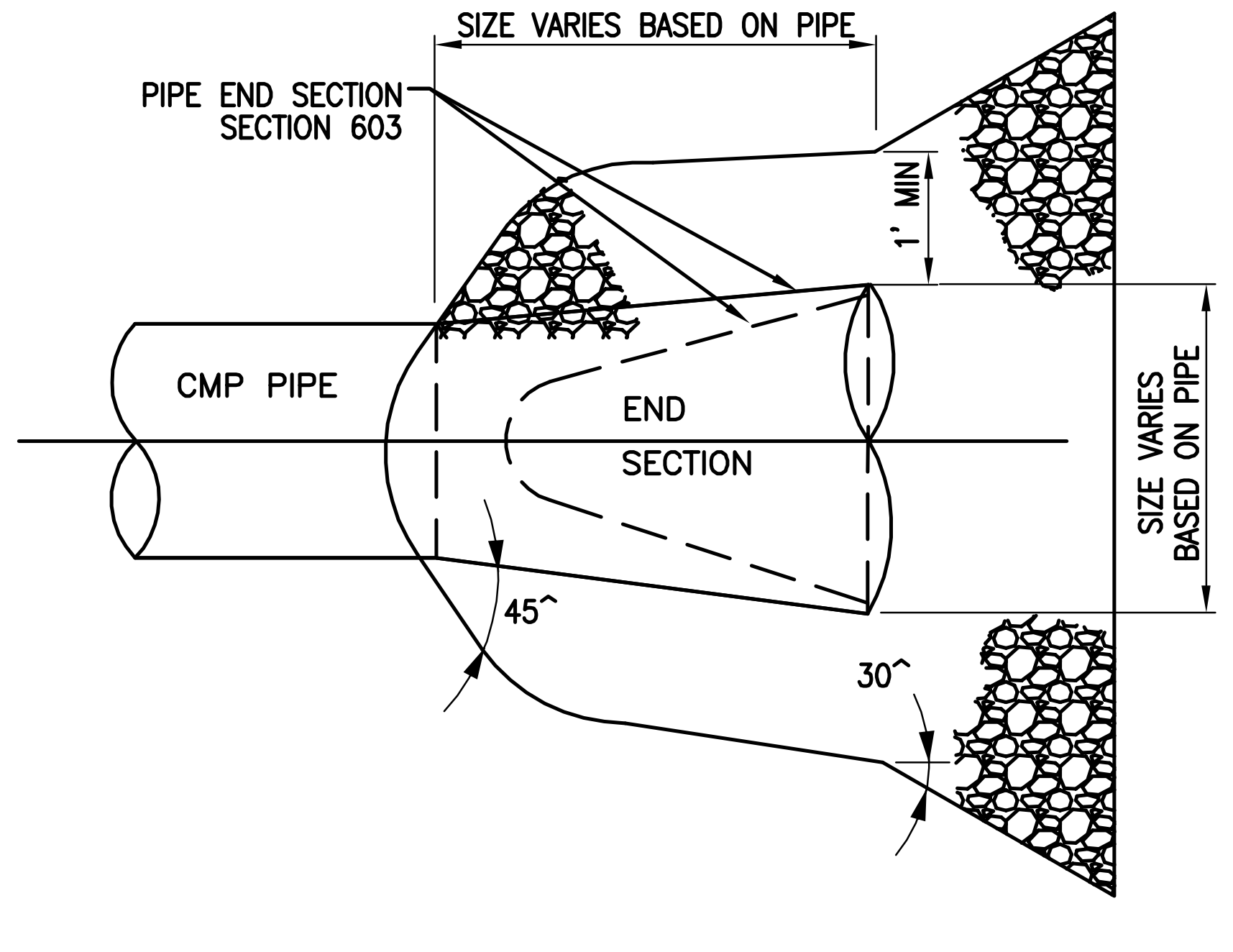
5 SD3 DETAIL: STABILIZED CONSTRUCTION ENTRANCEWAY

NOT TO SCALE

SECTION 209

STABILIZED CONSTRUCTION ENTRANCEWAY NOTES:

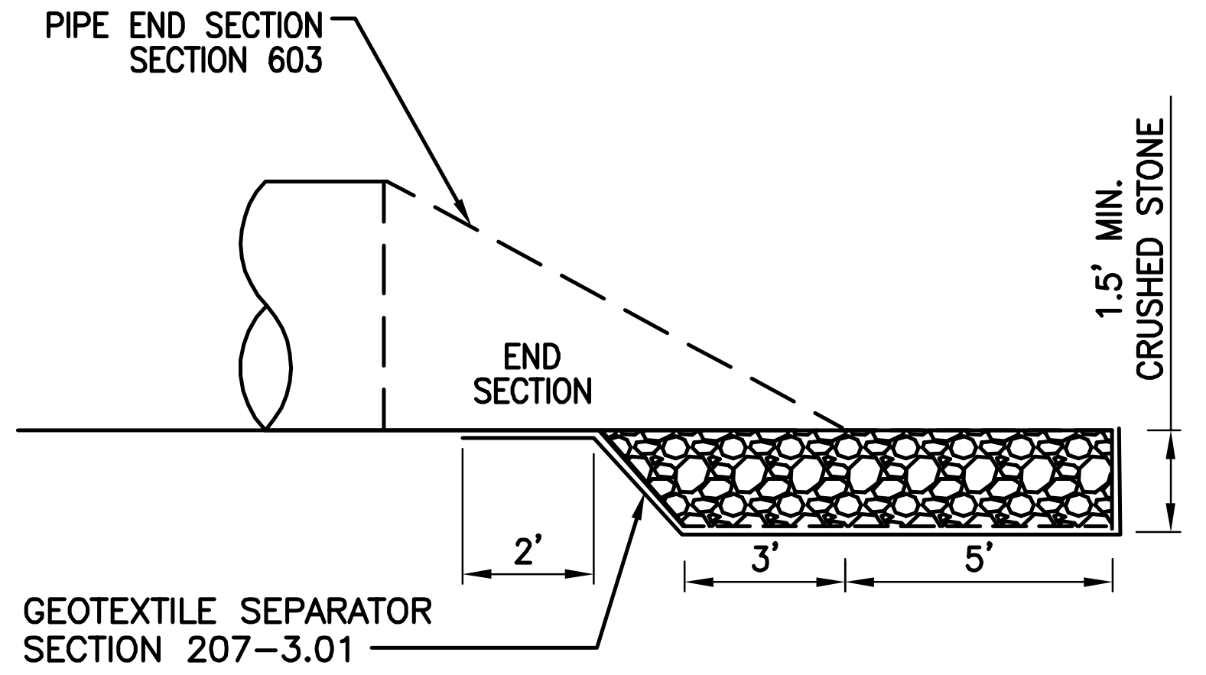
1. PLACE CONSTRUCTION ENTRANCE AT LOCATIONS APPROVED BY NOBLE ENVIRONMENTAL POWER, AS APPROVED BY THE ENGINEER.
2. THE THICKNESS OF THE CONSTRUCTION ENTRANCE SHALL NOT BE LESS THAN 8".
3. THE CONSTRUCTION ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF SEDIMENT ONTO THE PAVEMENT. THIS REQUIRES PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURE USED TO TRAP SEDIMENT.
4. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO THE ROADWAY SHALL BE REMOVED.
5. USE MIRAFI 600X OR APPROVED EQUAL UNDER ROCK CONSTRUCTION ENTRANCE.



2 SD3 DETAIL: DRAINAGE INLET/OUTLET APRON PLAN VIEW

NOT TO SCALE

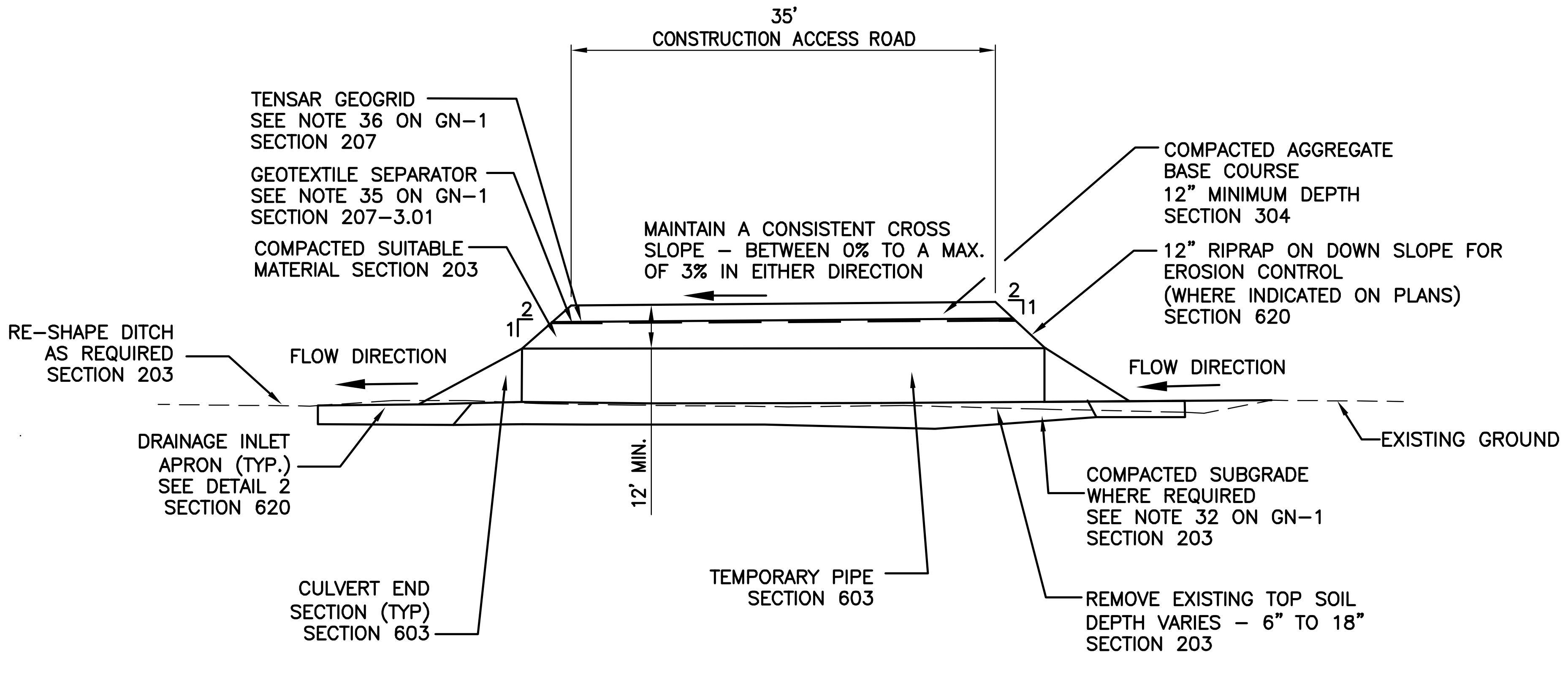
SECTION 620.1



6 SD3 DETAIL: DRAINAGE OUTLET/INLET APRON ELEVATION VIEW

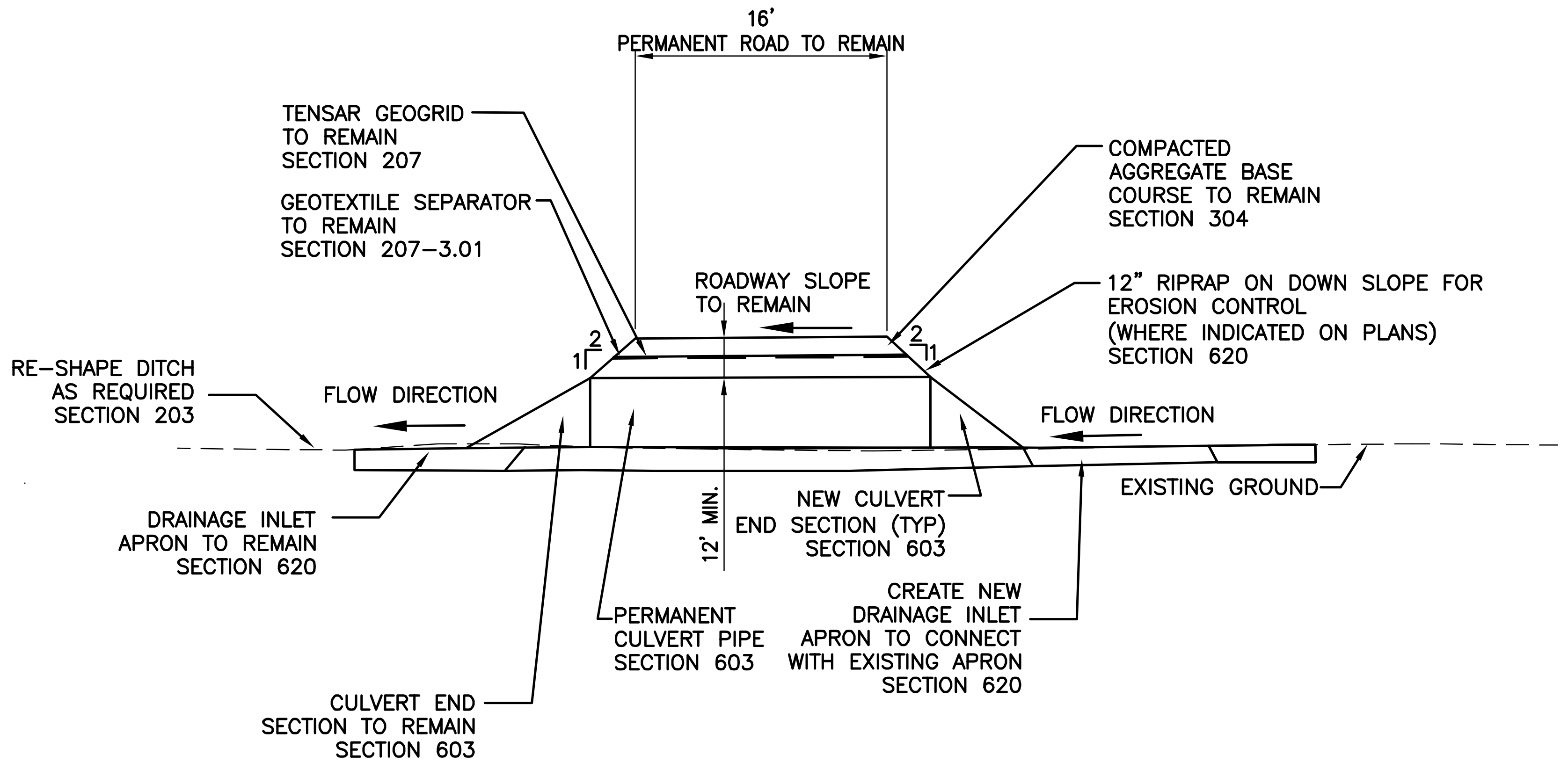
NOT TO SCALE

SECTION 620.1



3 SD3 SECTIONS: STAGE 1 - CONSTRUCTION ACCESS ROAD FOR STREAM CROSSING CULVERT

NOT TO SCALE



7 SD3 SECTIONS: STAGE 2 - FINAL ACCESS ROAD FOR STREAM CROSSING CULVERT

NOT TO SCALE

NOT FOR CONSTRUCTION

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

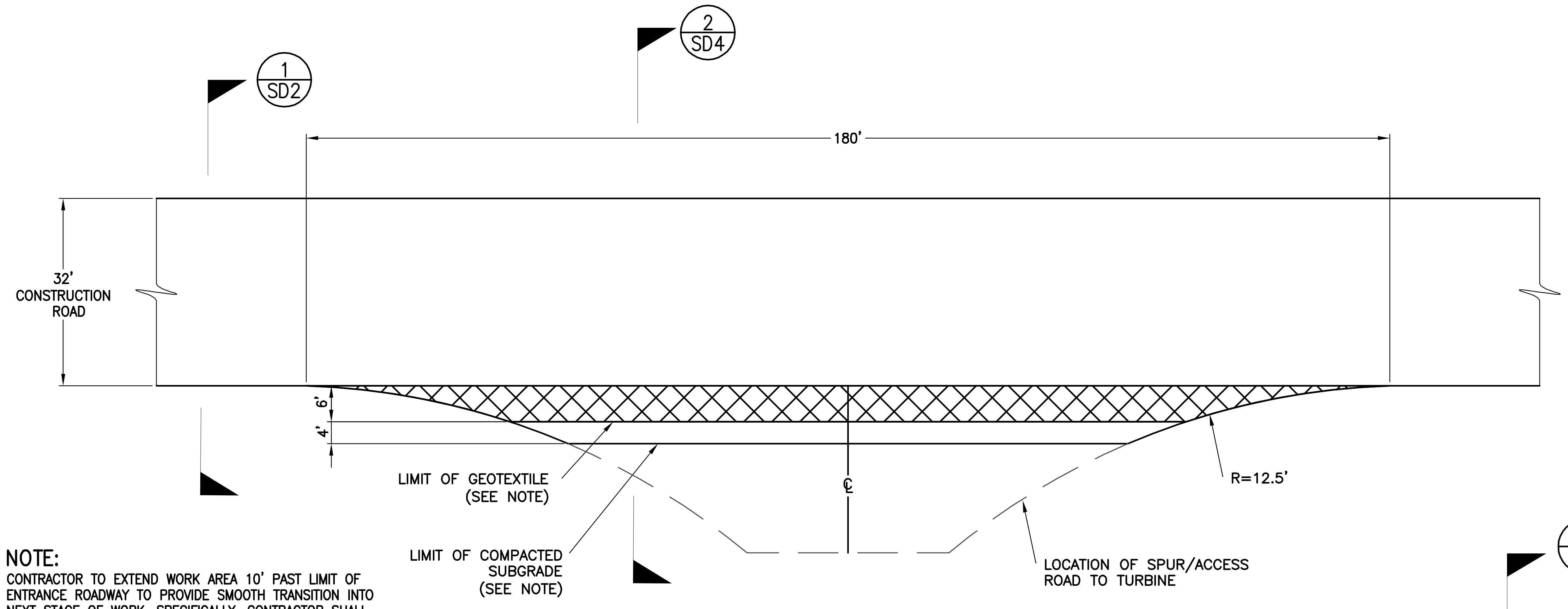
BALL HILL WINDPARK PROJECT

ROADWAY SITE DETAILS-3

SCALE
AS SHOWN

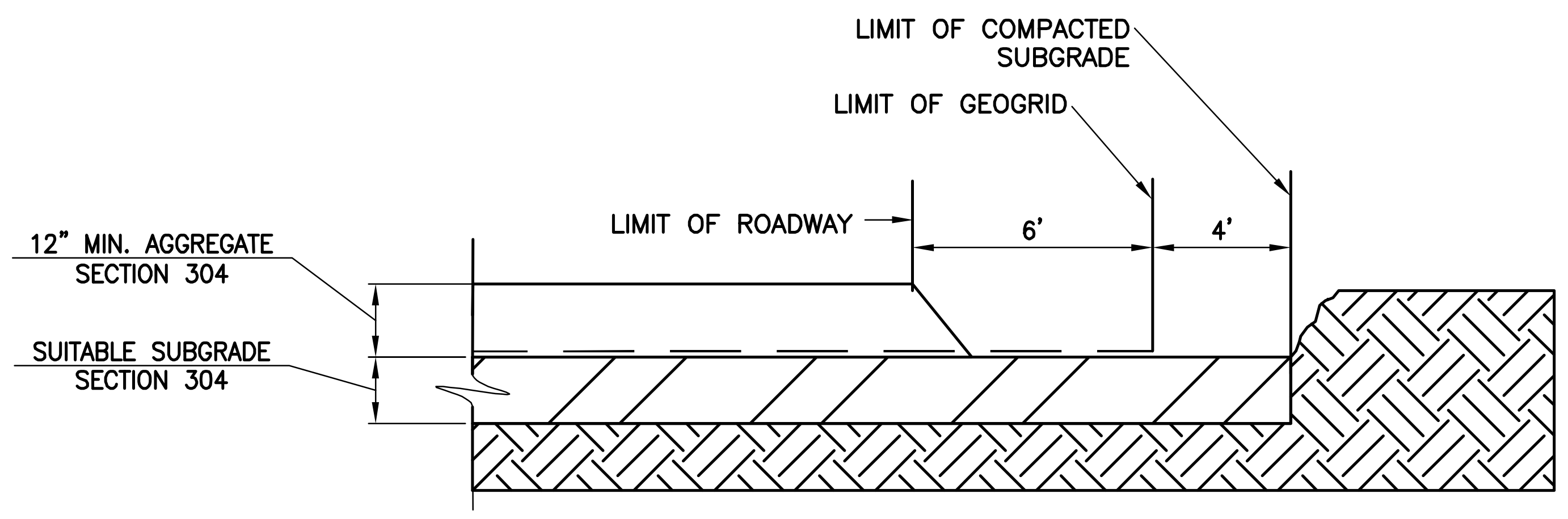
DRAWING
SD-3
REV

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

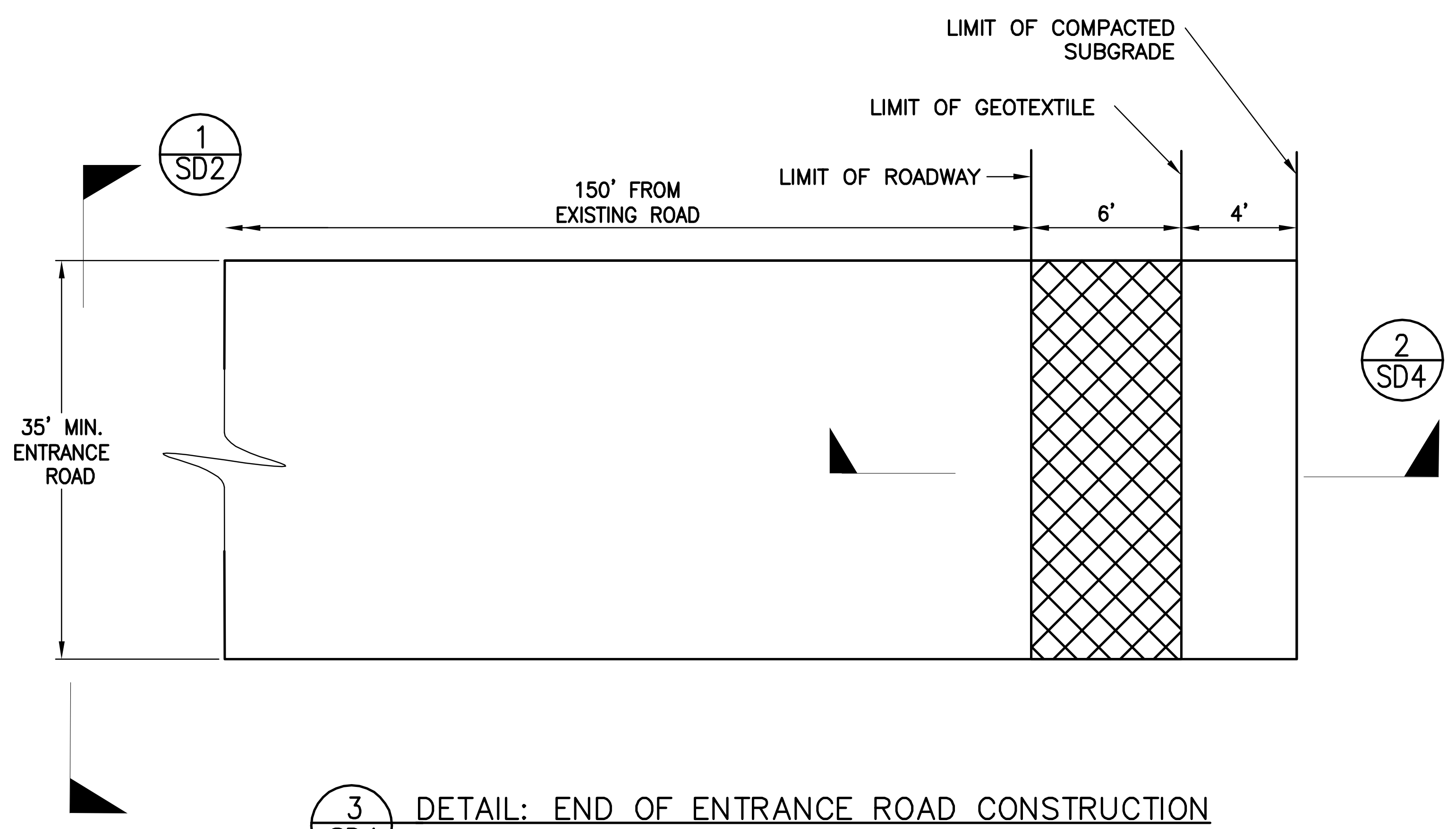


NOTE:
CONTRACTOR TO EXTEND WORK AREA 10' PAST LIMIT OF ENTRANCE ROADWAY TO PROVIDE SMOOTH TRANSITION INTO NEXT STAGE OF WORK. SPECIFICALLY, CONTRACTOR SHALL COMPACT SUBGRADE AT FULL WIDTH AND DEPTH FOR 10' BEYOND ENTRANCE ROADWAY. IN ADDITION, CONTRACTOR SHALL LAY AN ADDITONAL 6' OF GEOTEXTILE, AT FULL WIDTH OF GRAVEL ROAD.

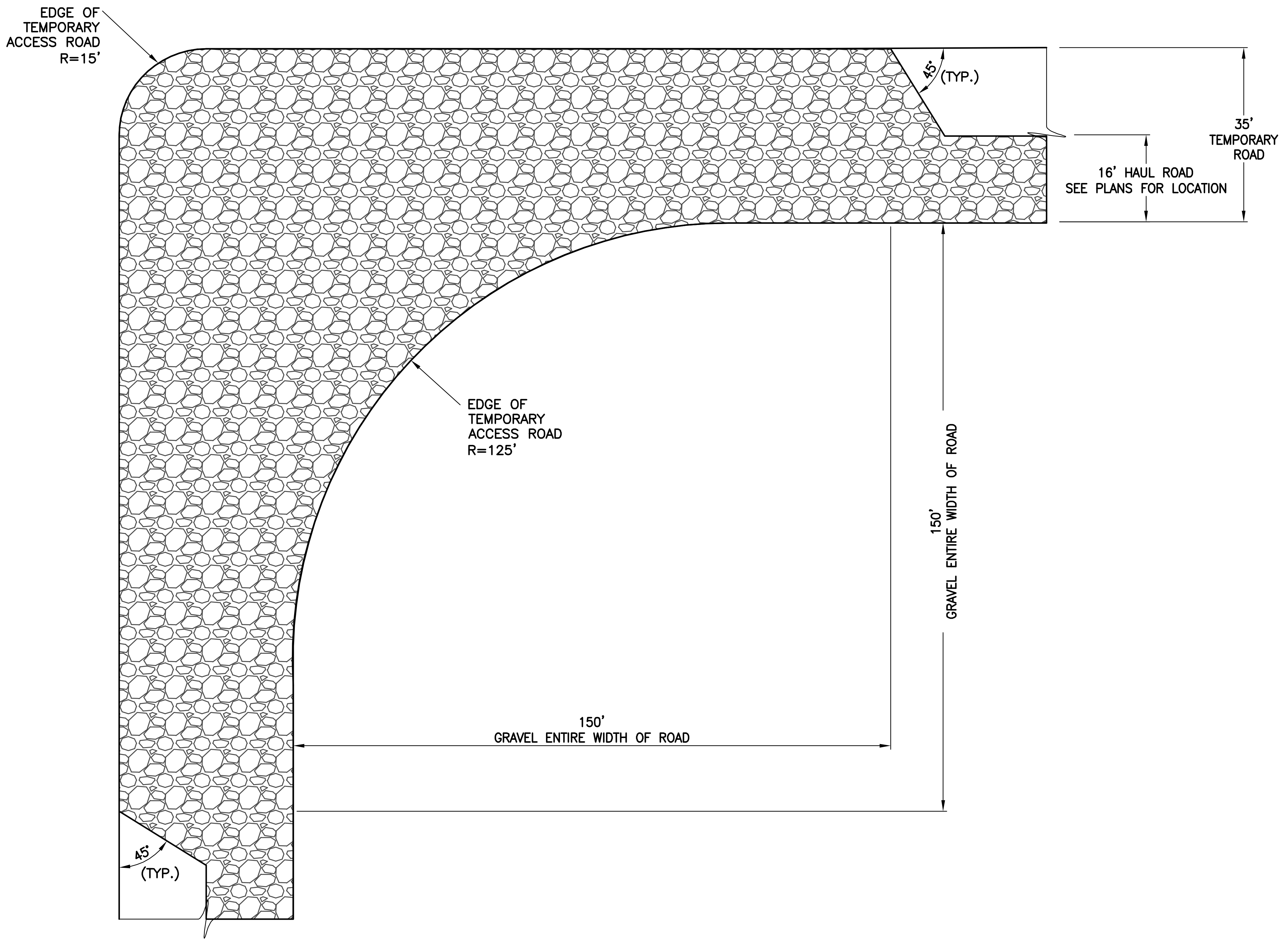
1 SD4 PLAN VIEW: ROAD CONSTRUCTION AT SPUR
NOT TO SCALE



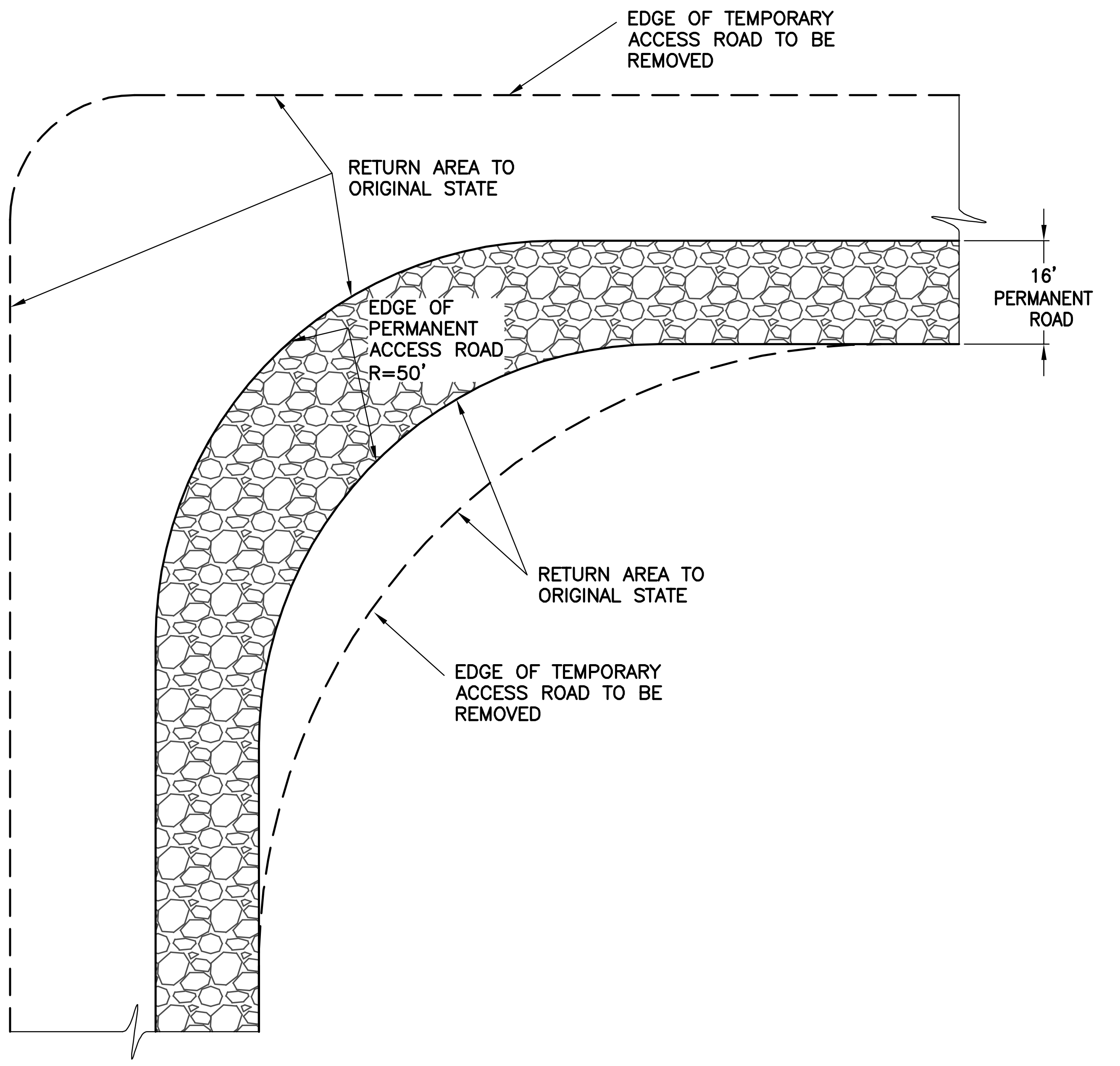
2 SD4 SECTION: END OF ROAD TREATMENT
NOT TO SCALE



3 SD4 DETAIL: END OF ENTRANCE ROAD CONSTRUCTION
NOT TO SCALE
SECTION 209-2.06



4 SD4 PLAN VIEW: ROAD CONSTRUCTION AT TURN
NOT TO SCALE



5 SD4 PLAN VIEW: FINAL ACCESS ROAD AT TURN
NOT TO SCALE

NOT FOR CONSTRUCTION

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY C. BLANCHETTE
CHECKED BY N. PAGAN
RESP. ENGR. J. WASSERMAN
CHIEF DISC. ENGR. T. ELSROTH
PROJECT MANAGER M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

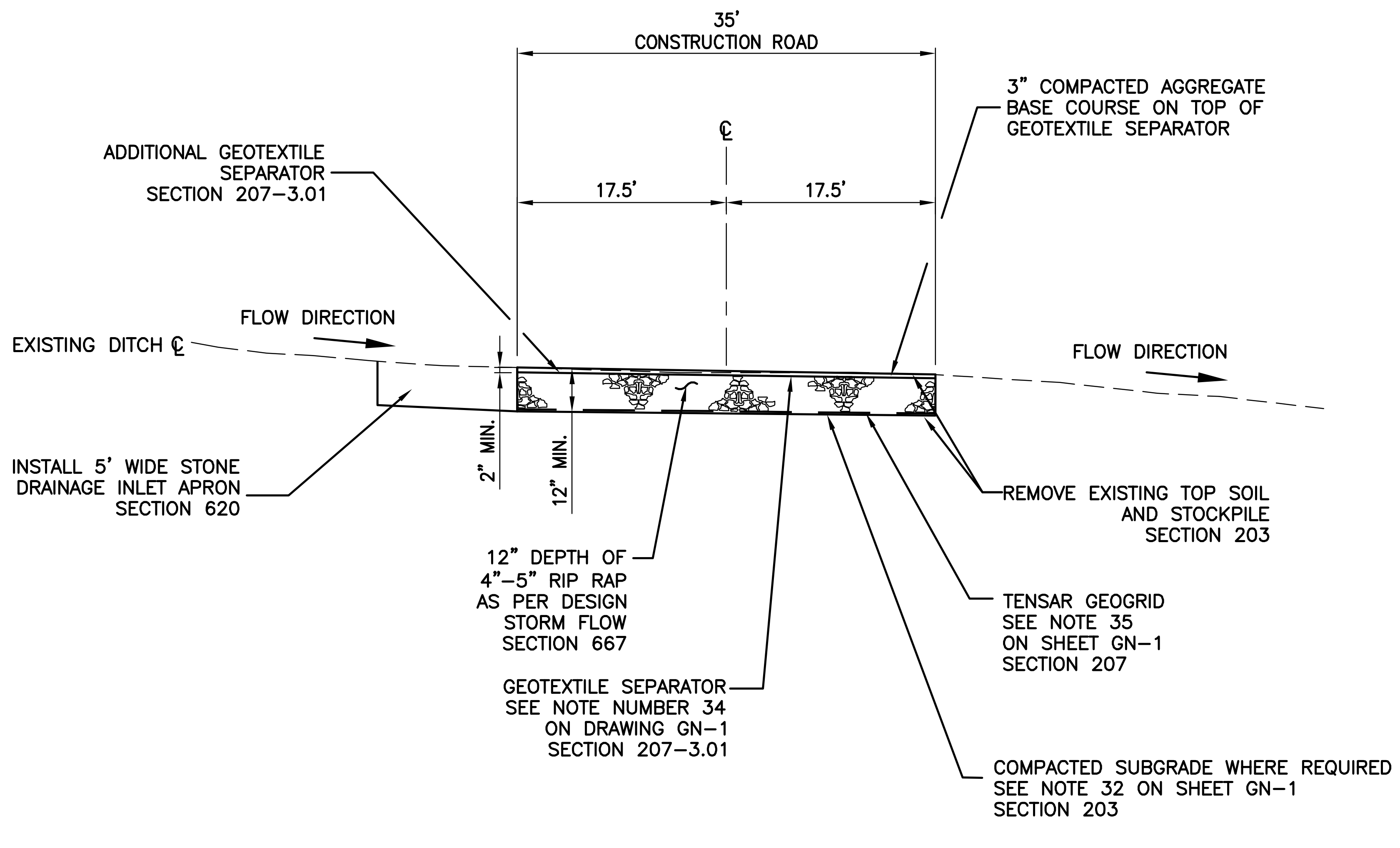
DEPT.
NO.

BALL HILL WINDPARK PROJECT

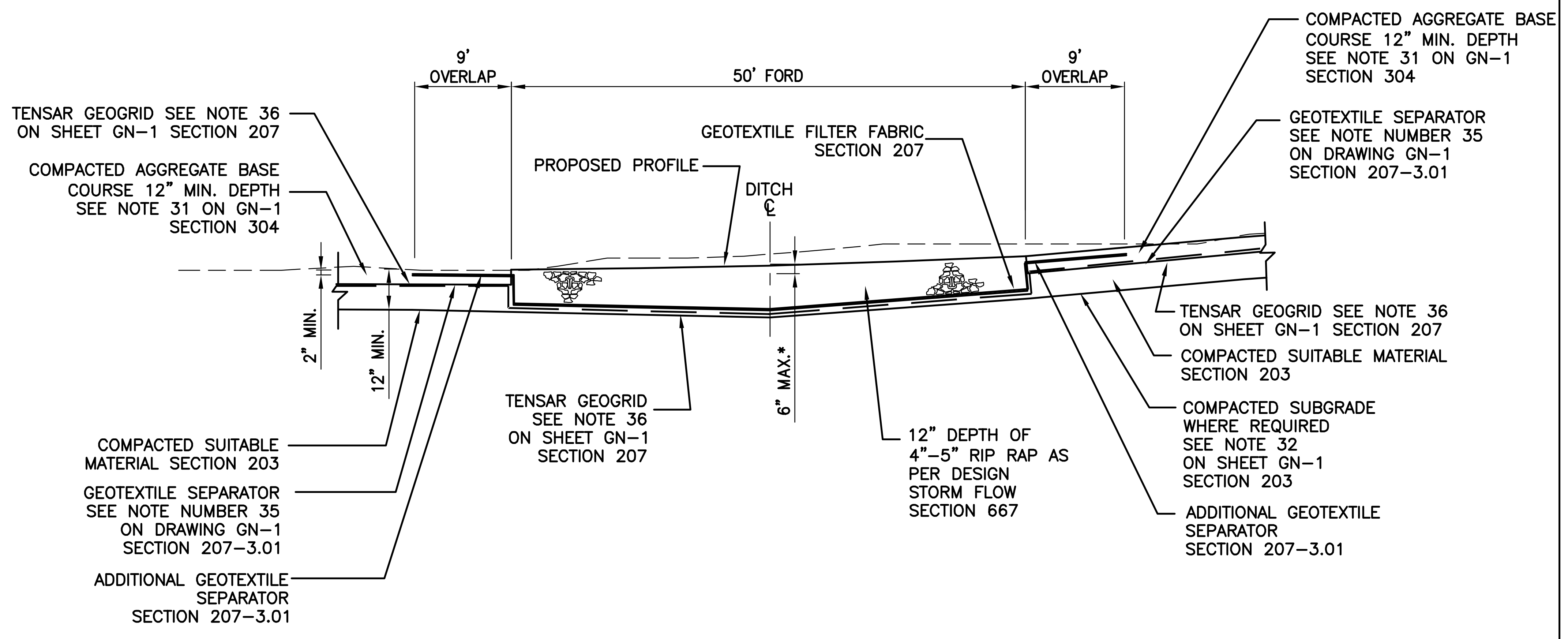
ROADWAY SITE DETAILS-4

SCALE AS SHOWN
DRAWING SD-4
REV

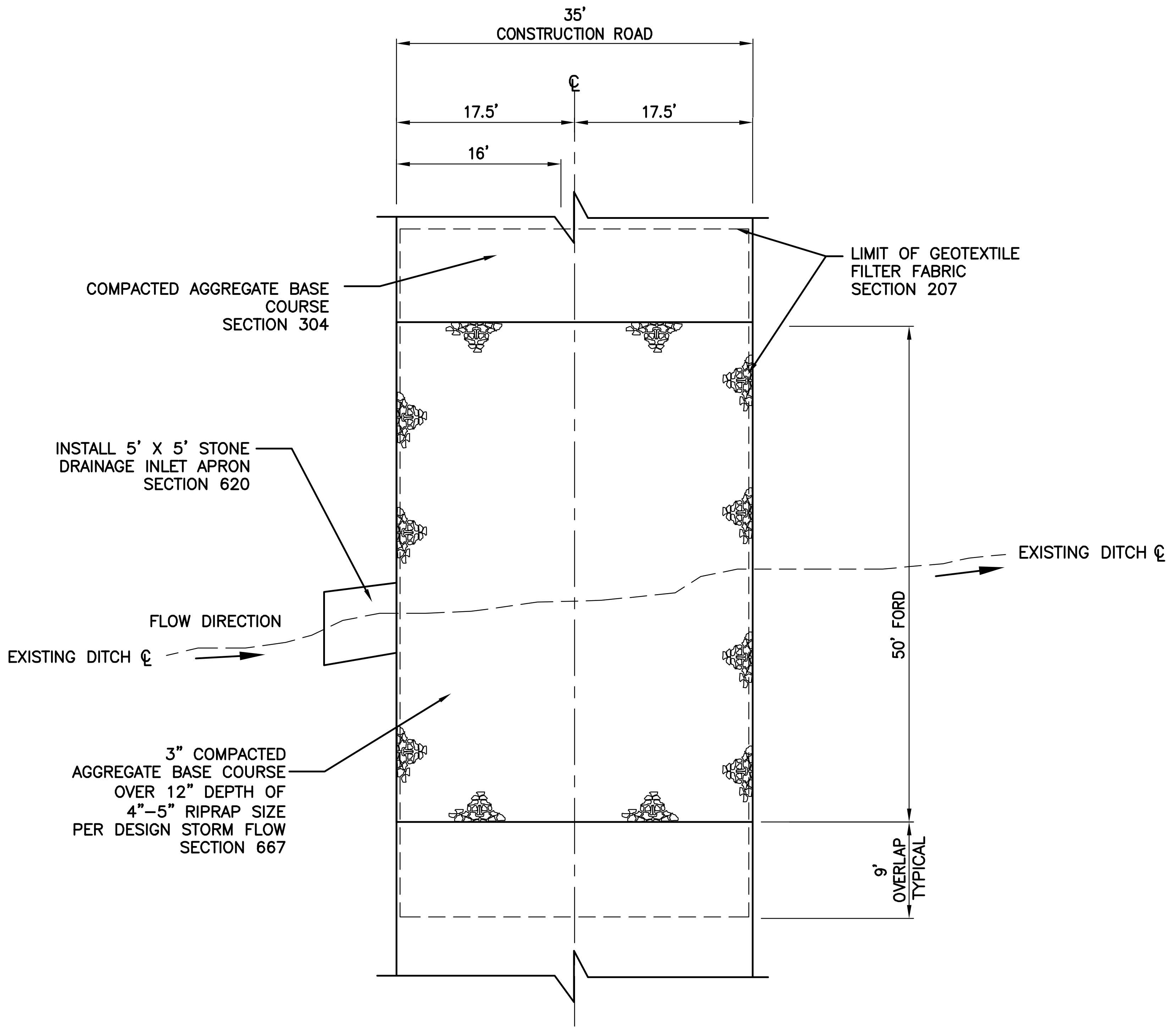
NOT FOR CONSTRUCTION



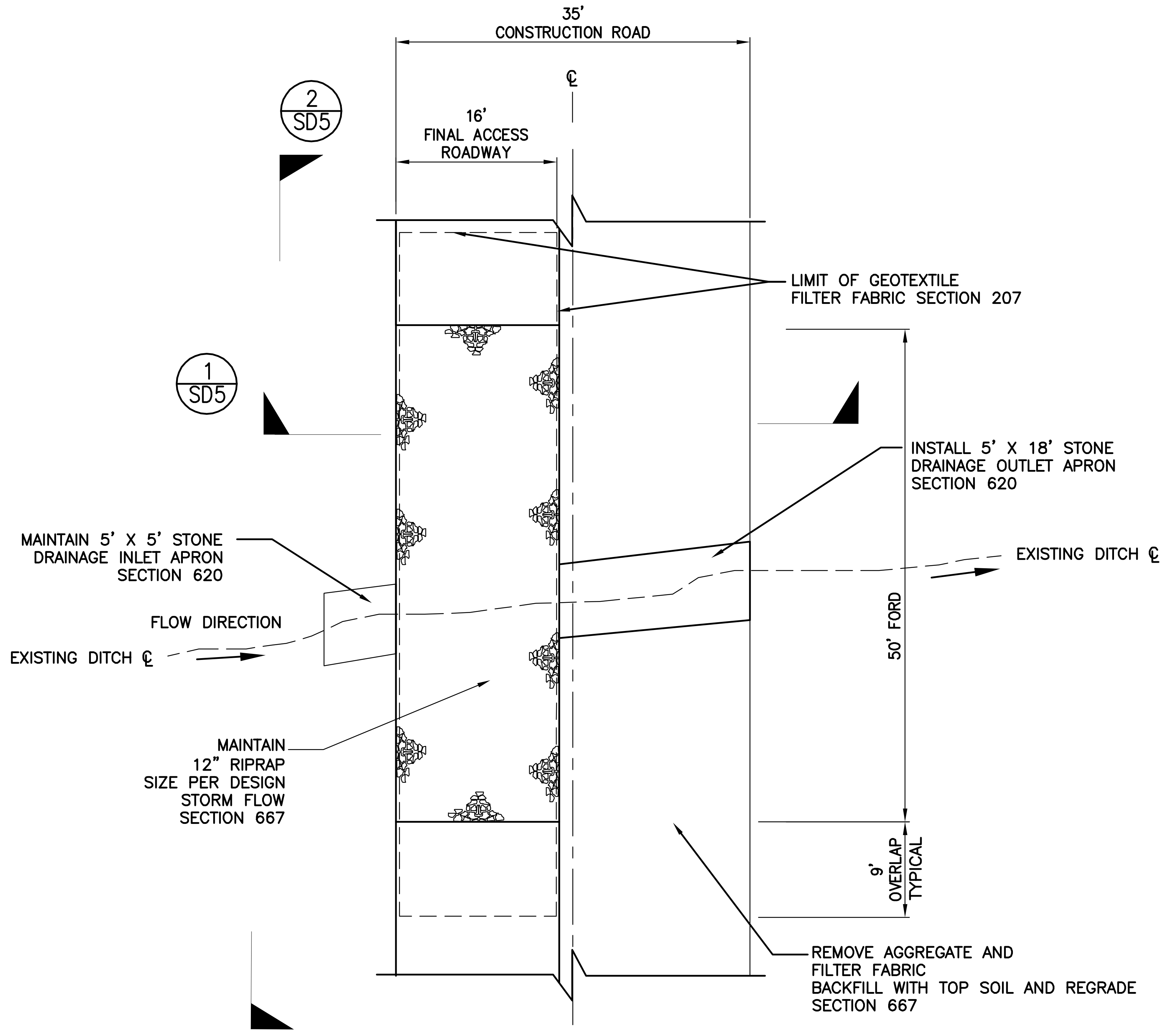
1/SD5 SECTION: PROPOSED FORD AT CENTERLINE OF DITCH
TEMPORARY ACCESS ROADWAY SHOWN
NOT TO SCALE



2/SD5 SECTION: PROPOSED FORD AT CENTERLINE OF ROADWAY
NOT TO SCALE



3/SD5 PLAN: PROPOSED FORD
CONSTRUCTION ROADWAY SHOWN
NOT TO SCALE



4/SD5 PLAN: PROPOSED FORD
FINAL ACCESS ROADWAY SHOWN
NOT TO SCALE

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
-							

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

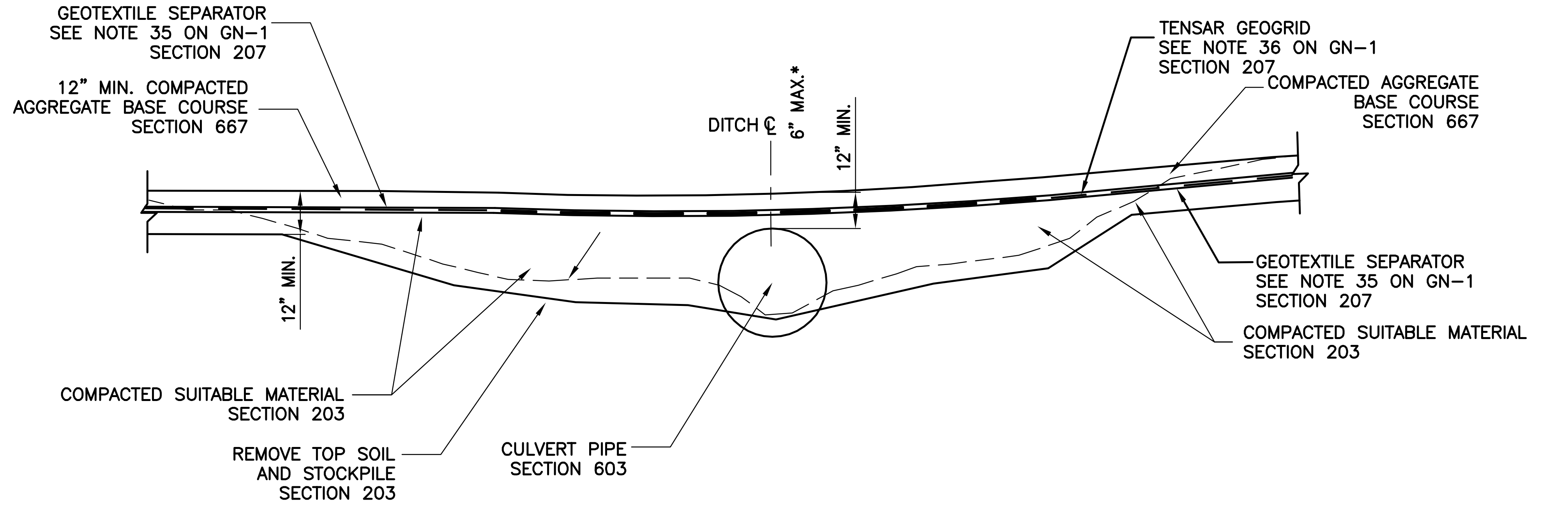
CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

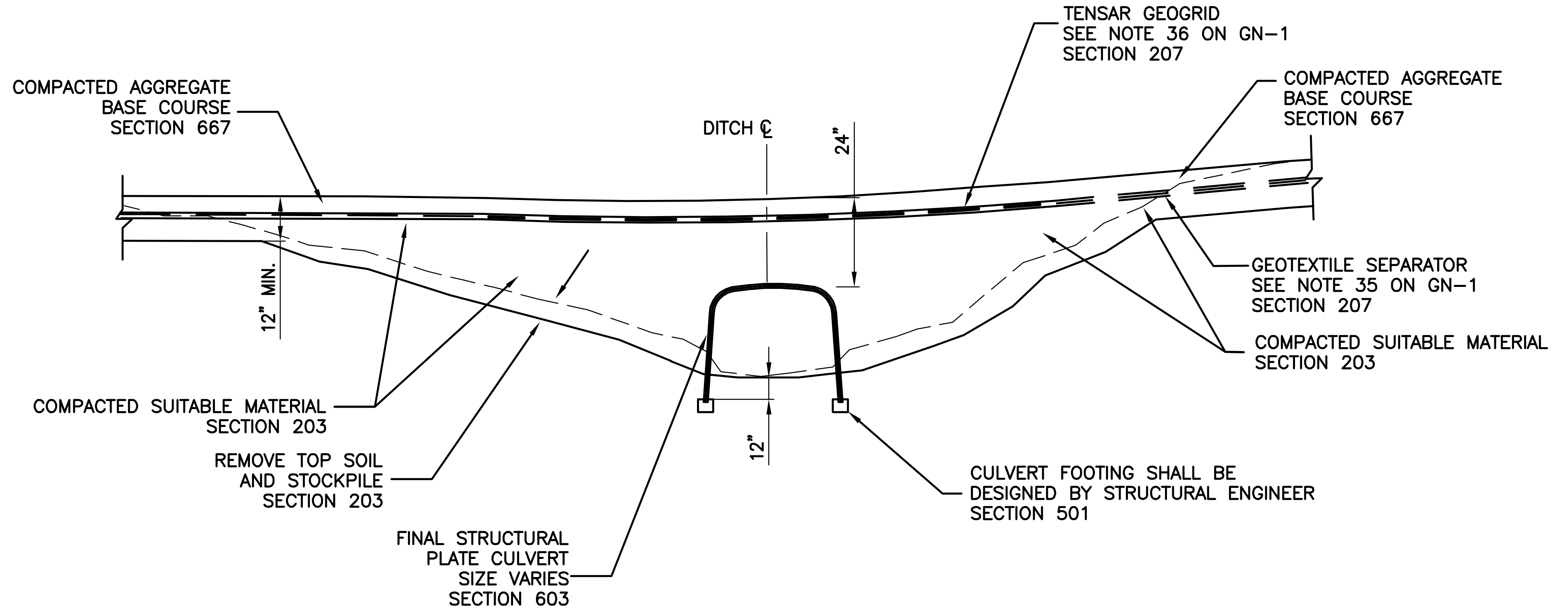
ROADWAY SITE DETAILS- 5

SCALE
AS SHOWN
DRAWING
SD-5
REV



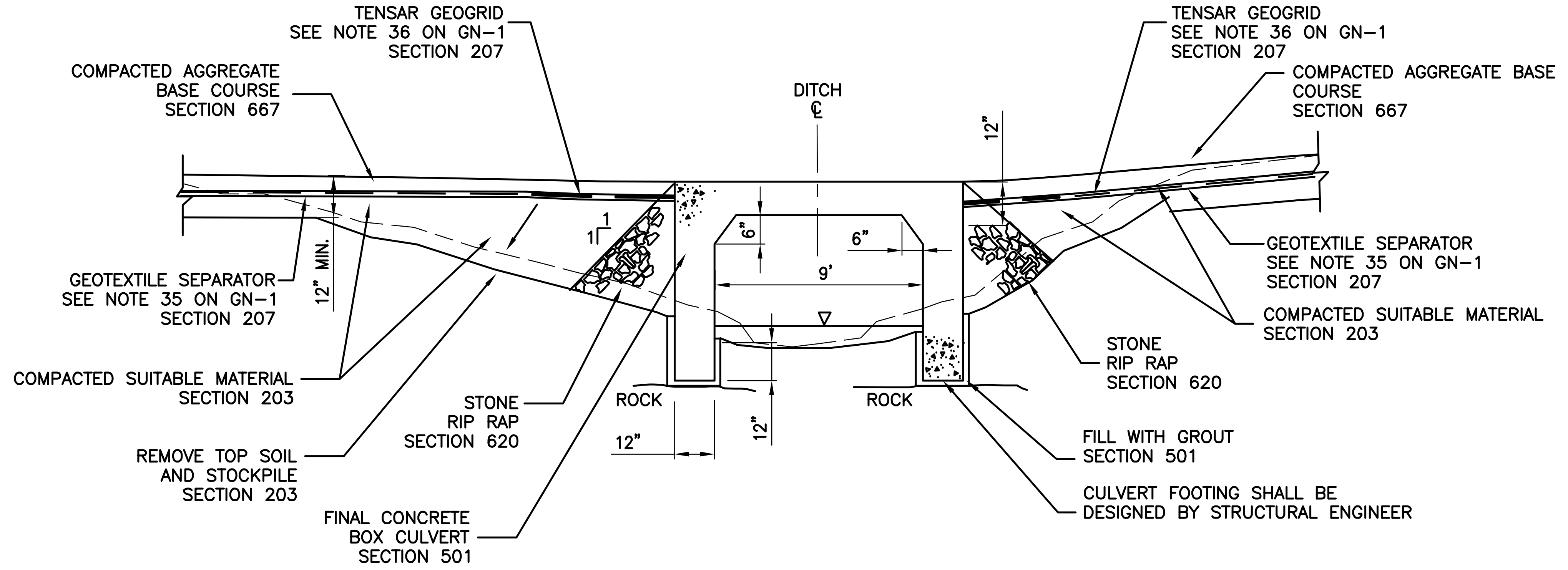
1/SD6 PROFILE: CULVERT ALONG CENTERLINE OF ROADWAY

NOT TO SCALE



2/SD6 PROFILE: STRUCTURAL PLATE BOX CULVERT ALONG CENTERLINE OF ROADWAY

NOT TO SCALE



3/SD6 PROFILE: CONCRETE BOX CULVERT ALONG CENTERLINE OF ROADWAY

NOT TO SCALE

CULVERT CONSTRUCTION SEQUENCING:

1. INSTALL TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AS INDICATED ON SD-8.
2. CLEAR/GRUB PROPOSED CONSTRUCTION ROAD AND CULVERT AREA.
3. REMOVE EXISTING TOP SOIL WITHIN PROPOSED ROADWAY AND CULVERT LIMITS AND STOCK PILE TOP SOIL IN DESIGNATED AREAS.
4. INSTALL THE PROPOSED 35' WIDE CONSTRUCTION ACCESS ROADWAY CULVERT WITH SIZE BASED ON 10 YEAR STORM.
5. INSTALL CULVERT END SECTIONS TO THE TEMPORARY PIPE AND THE DRAINAGE APRONS AND UP-STREAM RIP RAP BANK PROTECTION.
6. INSTALL THE TEMPORARY CONSTRUCTION ACCESS ROADWAY.
7. UPON COMPLETION OF THE ERECTION OF THE WIND TURBINES, REMOVE SECTIONS OF THE 35' TEMPORARY ROADWAY LEAVING THE FINAL 16' ACCESS ROADWAY IN TACT.
8. REMOVE THE TEMPORARY CULVERT END SECTION. SAWCUT THE CULVERT AND REDUCE TO NECESSARY SIZE IN LENGTH.
9. INSTALL FINAL CULVERT END SECTIONS AND ADDITIONAL DRAINAGE APRON.
10. RE-SHAPE/REGRADE STREAM DITCH AND ADJACENT AREA.
11. REMOVE TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES.

NOT FOR
CONSTRUCTION

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

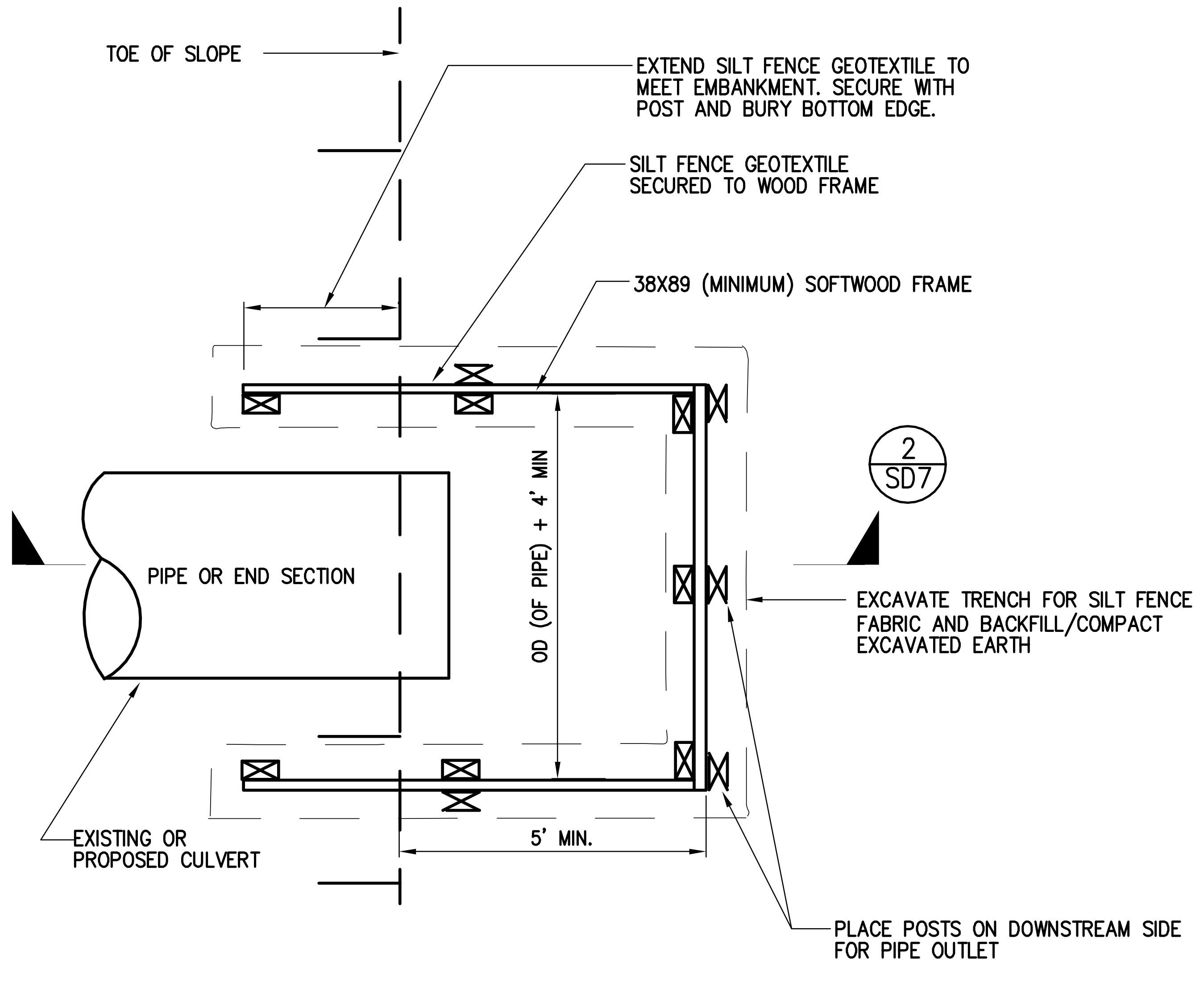
BALL HILL WINDPARK PROJECT

ROADWAY SITE DETAILS-
6

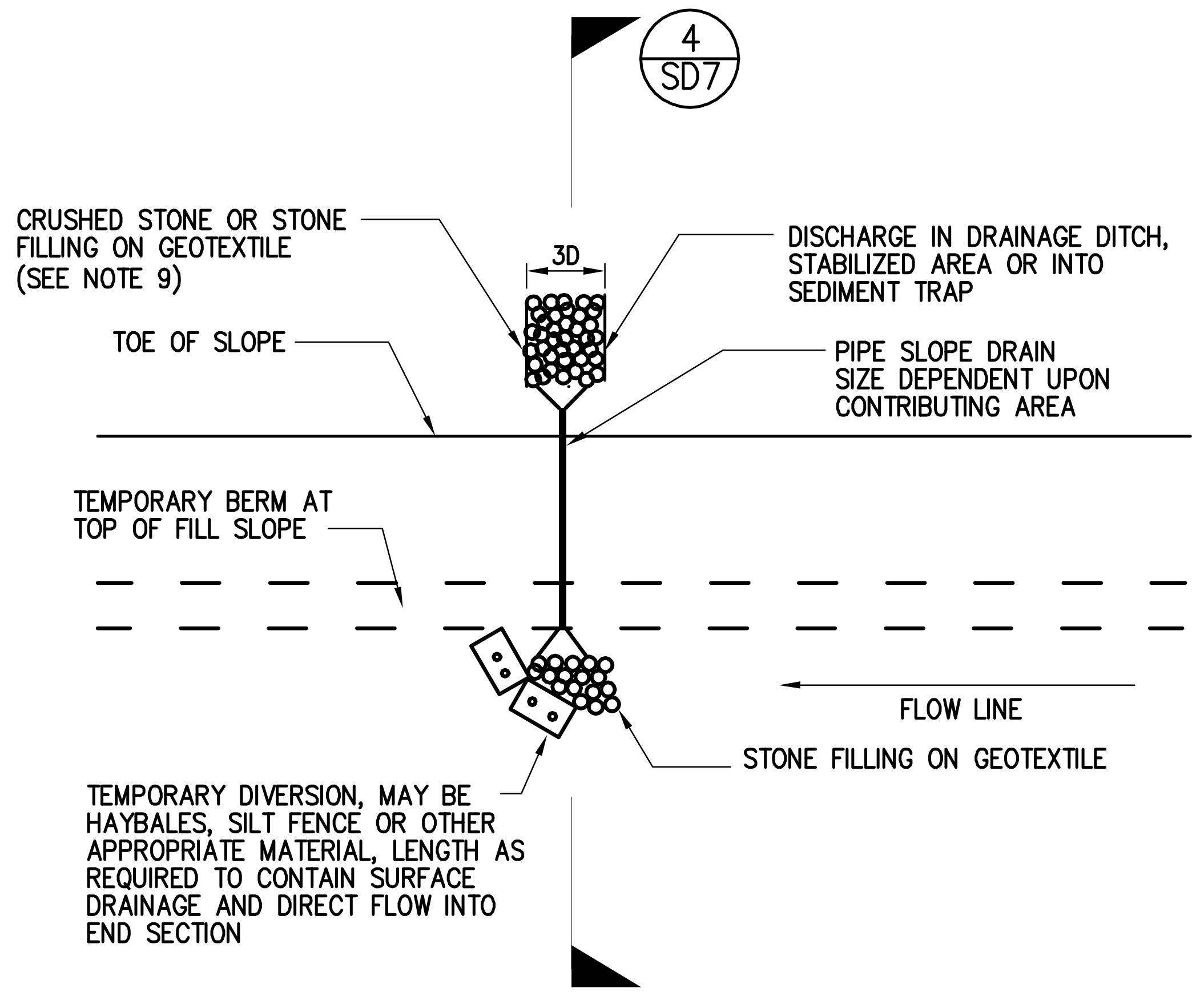
SCALE
AS SHOWN
DRAWING
SD-6
REV

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC

NOT FOR CONSTRUCTION



1/SD7 PLAN: PIPE INLET/OUTLET PROTECTION – TEMPORARY
NOT TO SCALE



3/SD7 PLAN: PIPE SLOPE DRAIN – TEMPORARY
NOT TO SCALE

APPLICATION NOTES:

A. PIPE INLET OR OUTLET PROTECTION SHALL NOT BE USED IN OR ACROSS A FLOWING DRAINAGE CHANNEL.

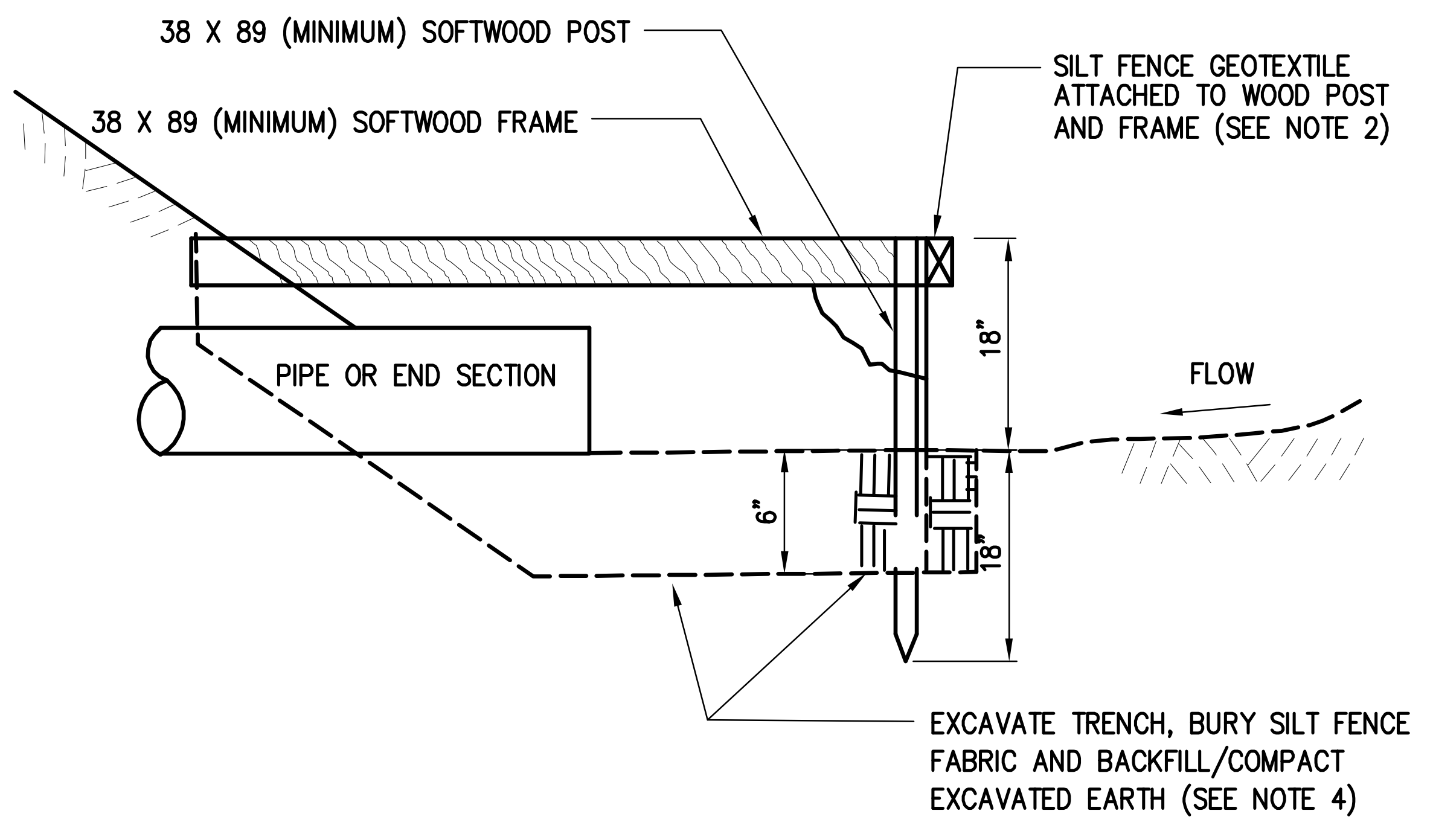
B. SILT FENCE PIPE OUTLET PROTECTION SHALL BE INSTALLED IN THE SAME MANNER AS THE INLET PROTECTION, EXCEPT THAT THE FABRIC SHALL BE INSTALLED ON THE UPSTREAM SIDE OF THE POSTS.

C. THE PURPOSE OF A PIPE SLOPE DRAIN IS TO PREVENT EROSION OF EMBANKMENT OR OTHER SIDE SLOPES BY TRANSPORTING CLEAN WATER THROUGH A PIPE FROM A HIGHER ELEVATION TO A LOWER ELEVATION.

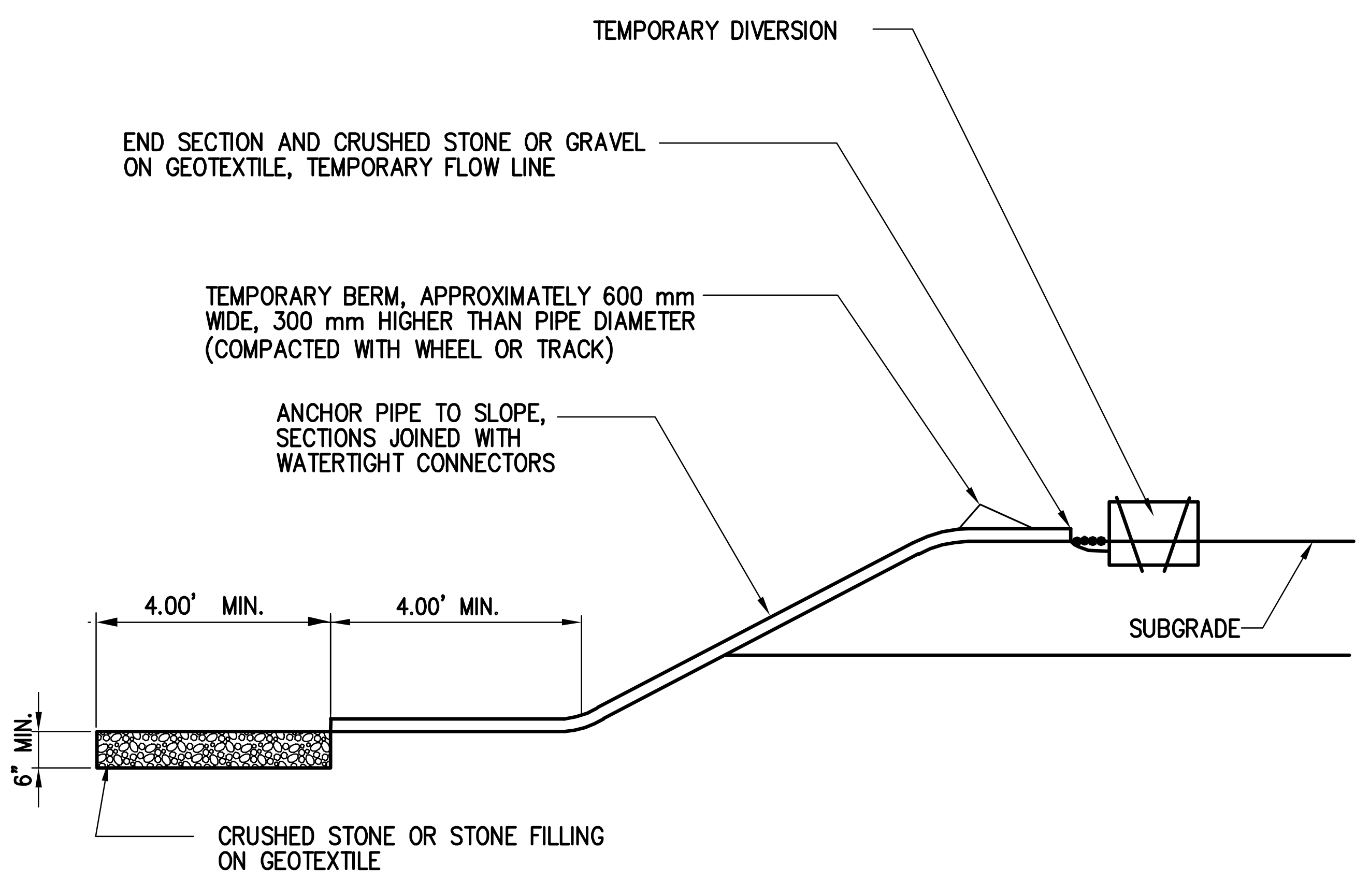
NOTES:

1. APPROVED SILT FENCE GEOTEXTILES ARE LISTED ON THE DEPARTMENTS APPROVED LIST.
2. GEOTEXTILE SHALL BE CUT FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS. IF JOINTS ARE NECESSARY THEY WILL BE OVERLAPPED TO THE NEXT POST.
3. SPACE POSTS EVENLY AROUND INLET WITH A MAXIMUM SPACING OF 3' DRIVE POSTS 450 mm MINIMUM INTO GROUND. WIRE MESH MAY BE REQUIRED BEHIND GEOTEXTILE TO PROVIDE SUPPORT.
4. SILT FENCE GEOTEXTILE SHALL BE EMBEDDED 6" BELOW GROUND AND BACKFILLED. GEOTEXTILE SHALL BE SECURELY FASTENED TO POSTS AND FRAME. COST FOR INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR ITEM.
5. MEASURES SHALL BE INSPECTED EVERY SEVEN (7) CALENDAR DAYS, AFTER EACH RAINFALL OF 0.5" OR MORE WITHIN A 12 HOUR PERIOD, OR DAILY DURING PROLONGED RAINFALL. MEASURES SHALL BE CLEANED AND REPAIRED AS REQUIRED.
6. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATION REACHES ONE-HALF OF THE MEASURE HEIGHT. SEDIMENT SHALL BE DISPOSED OF AS UNSUITABLE MATERIAL.
7. GRADING, EXCAVATION, END SECTION, HAY BALES OR OTHER WORK REQUIRED TO INSTALL THE PIPE SLOPE DRAIN SHALL BE INCLUDED IN THE UNIT PRICE BID.
8. PIPE MAY BE CORRUGATED PLASTIC PIPE OR CORRUGATED METAL PIPE (CMP) OR OTHER MATERIAL AT THE CONTRACTOR'S OPTION. THE PIPE SHALL HAVE WATERTIGHT CONNECTING BANDS OR FLANGE CONNECTIONS.
9. CRUSHED STONE OR STONE FILLING FOR THE PIPE SLOPE DRAIN SHALL MEET THE REQUIREMENTS OF LIGHT STONE FILLING ON FIGURE 620-1. GEOTEXTILE BEDDING SHALL MEET THE REQUIREMENTS OF 207-02 MATERIALS, GEOTEXTILE BEDDING.
10. DRAINAGE AREAS

PIPE SLOPE DRAINS		MAX DRAINAGE AREA (ACRES)
01	6"	0.25
02	8"	0.37
03	12"	0.50
04	15"	1.00
05	18"	1.50
06	24"	3.75
07	30"	5.00



2/SD7 ELEVATION: PIPE INLET/OUTLET PROTECTION – TEMPORARY
NOT TO SCALE



4/SD7 PROFILE: PIPE SLOPE DRAIN – TEMPORARY
NOT TO SCALE

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

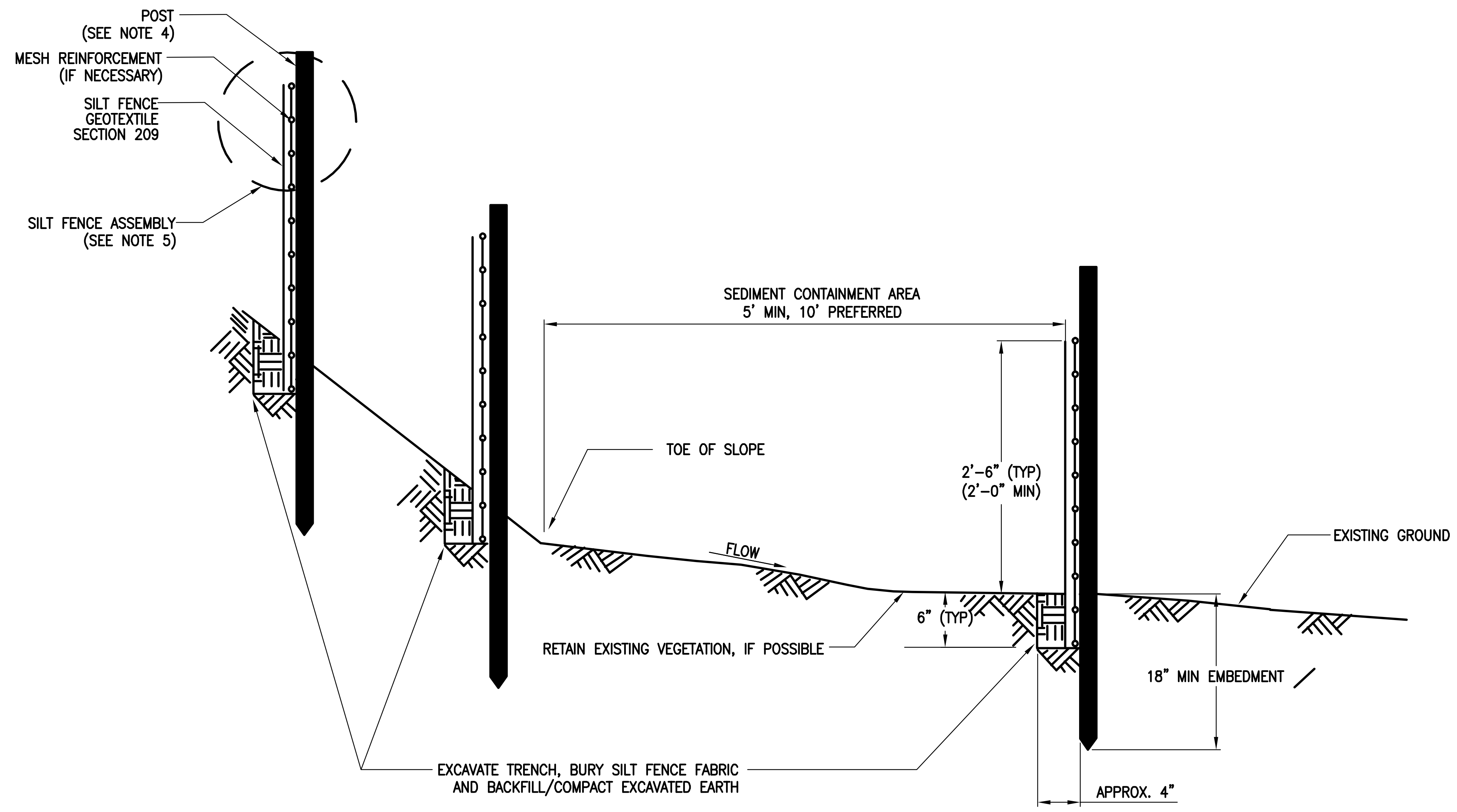
BALL HILL WINDPARK PROJECT

ROADWAY SITE DETAILS-7

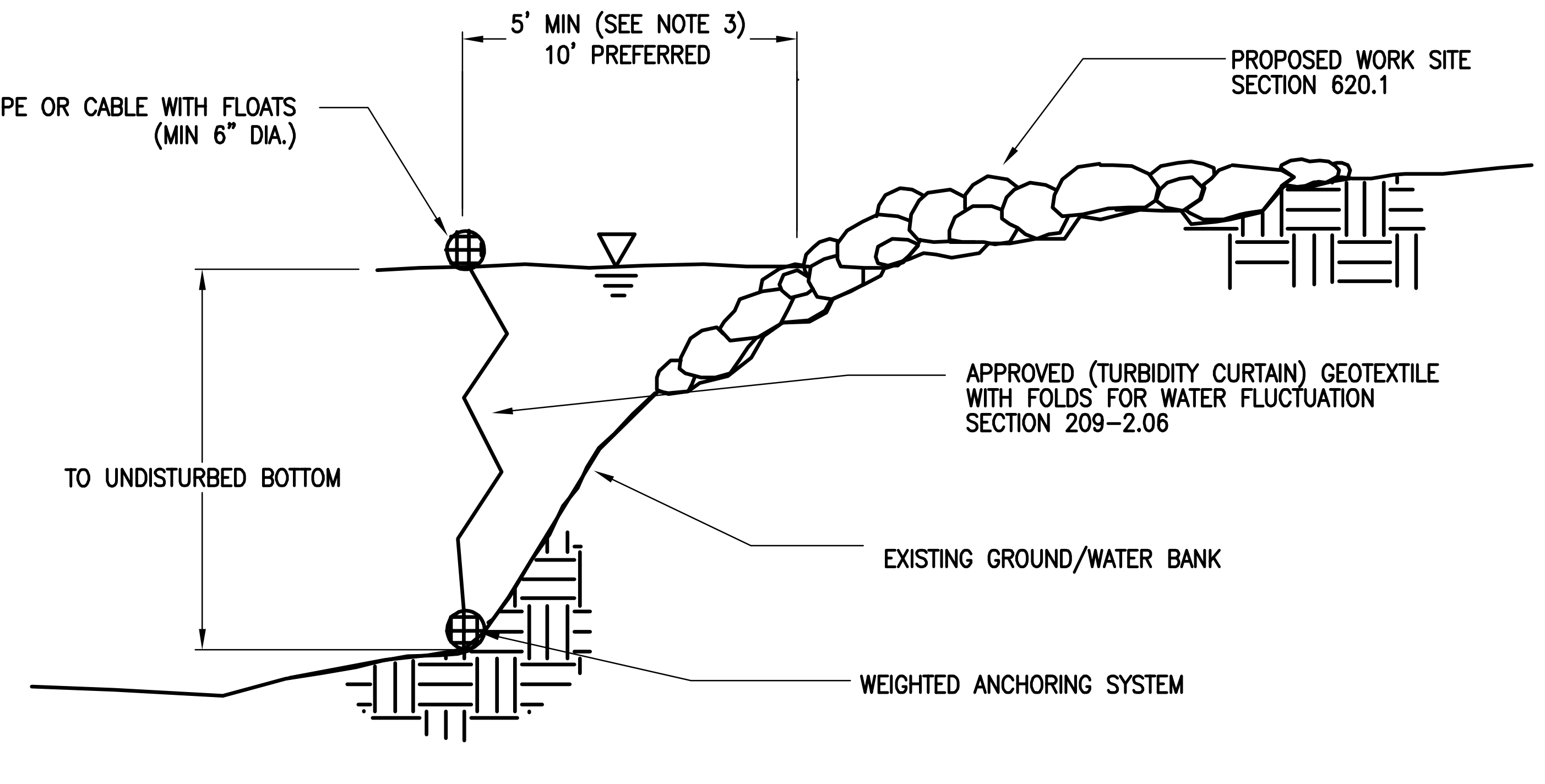
SCALE
AS SHOWN

DRAWING
SD-7
REV

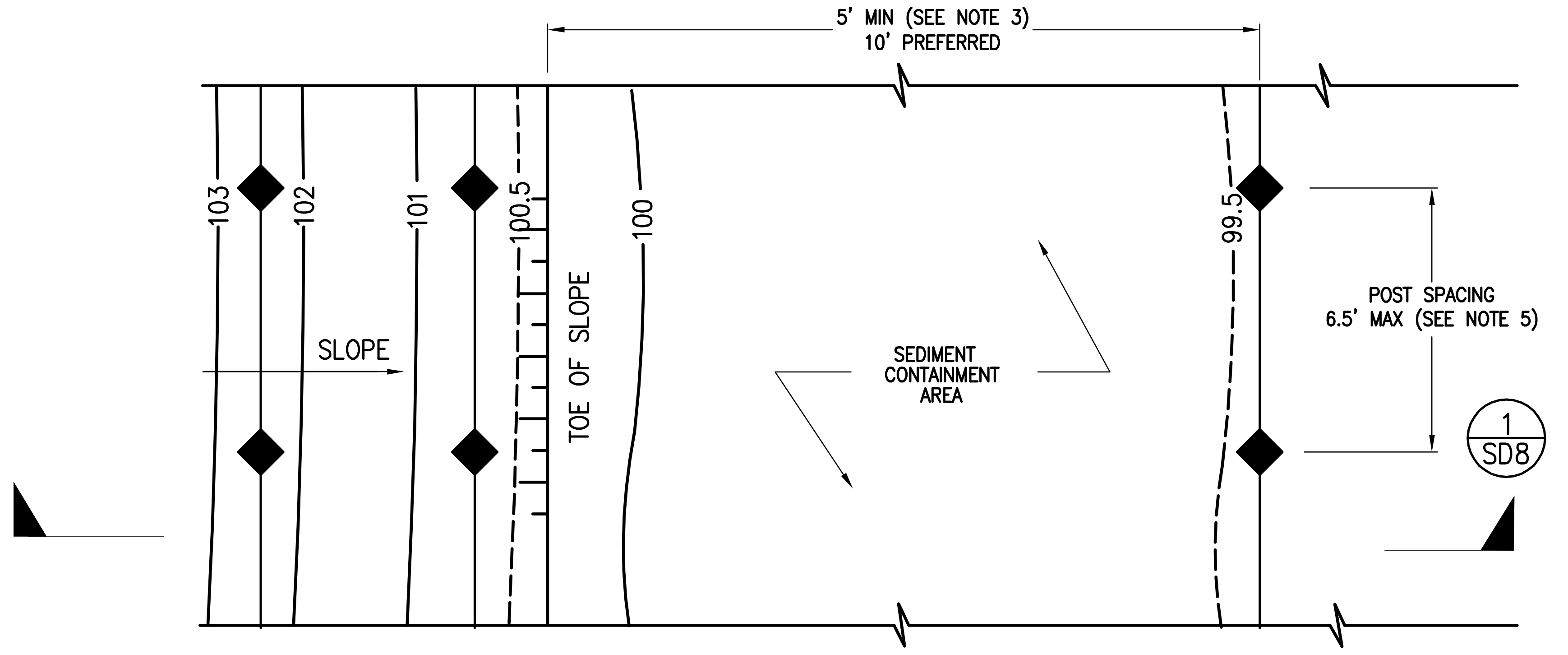
NOT FOR CONSTRUCTION

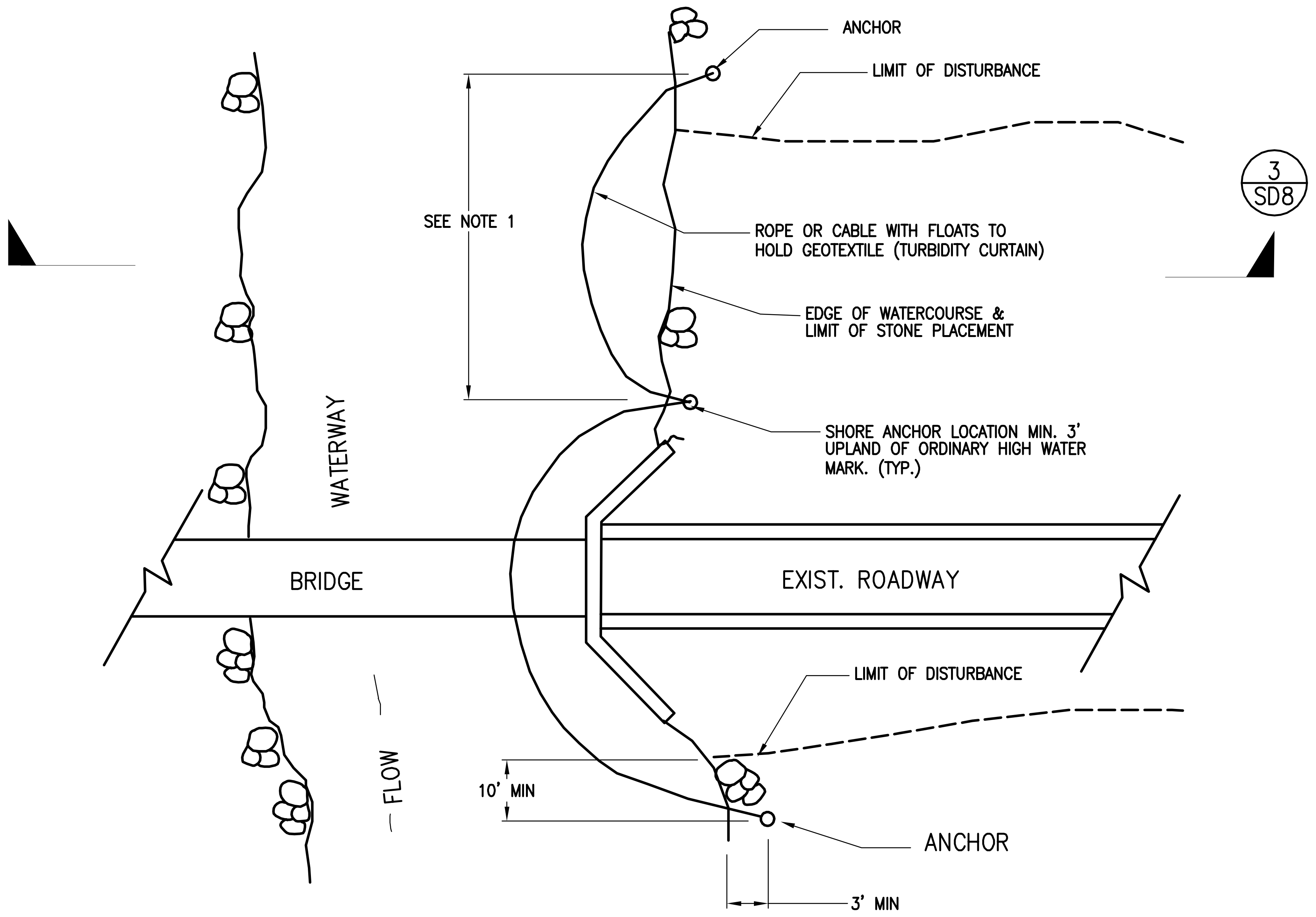


1/SD8 SECTION: SILT FENCE PROFILE
NOT TO SCALE



3/SD8 SECTION: TURBIDITY CURTAIN
NOT TO SCALE





2/SD8 DETAIL: TEMPORARY SILT FENCE
NOT TO SCALE
SECTION 209-2.07

4/SD8 TURBIDITY CURTAIN – TEMPORARY
NOT TO SCALE
SECTION 209-2.06

SILT FENCE NOTES:

1. SILT FENCE, AND ALL SOIL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSTALLED ACCORDING TO THE BALL HILL SWPPP.
2. SILT FENCE SHALL BE INSTALLED ON A LINE OF EQUAL ELEVATION (CONTOUR). IT MAY BE INSTALLED AT INTERMEDIATE POINTS UP SLOPES AS WELL AS AT THE BOTTOM, AS SHOWN IN THE DETAIL.
3. SILT FENCE SHALL NOT BE USED IN OR ACROSS A FLOWING NATURAL CHANNEL.
4. SILT FENCE SHALL BE PLACED A MINIMUM OF 5' FROM TOE OF SLOPE, 10' PREFERRED, TO PROVIDE ADEQUATE AREA FOR SEDIMENT STORAGE AND FACILITATE MAINTENANCE OF SEDIMENT CONTAINMENT AREA. SILT FENCE MAY NOT BE REQUIRED IN ALL SLOPED AREAS, AND OTHER SEDIMENT CONTROL DEVICES CAN BE USED WITH THE PERMISSION OF THE NOBLE ENVIRONMENTAL POWER SITE REPRESENTATIVE.
5. POSTS MAY BE 1.25"x1.25" (MINIMUM) HARDWOOD, 1.5"x3.5" (MINIMUM) SOFTWOOD, OR 1.3lb/ft (MIN.) STEEL. SPACING FOR THE PROVIDED SILT FENCE SHALL BE AS DESIGNATED ON THE DEPARTMENT APPROVED LIST FOR SILT FENCE.
6. SILT FENCE ASSEMBLIES ARE LISTED ON THE CONTRACTOR'S APPROVED LIST. ASSEMBLIES MAY HAVE 4 FT. OR 6.5 FT. POST SPACING, AND MAY OR MAY NOT HAVE MESH REINFORCEMENT, AS PER APPROVED LIST.
7. THE BOTTOM EDGE OF SILT FENCE SHALL BE BURIED A MINIMUM OF 6" BELOW GROUND. THE FENCE SHALL BE INSTALLED WITH THE POSTS ON THE DOWNSTREAM SIDE OF THE FABRIC.
8. MEASURES SHALL BE INSPECTED EVERY SEVEN (7) CALENDAR DAYS, AFTER EACH RAINFALL OF 0.5 INCH INCH OR MORE WITHIN A 12 HOUR PERIOD, OR DAILY DURING PROLONGED RAINFALL. MEASURES SHALL BE CLEANED AND REPAIRED AS REQUIRED.
9. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATION REACHES ONE-HALF OF THE MEASURE HEIGHT. SEDIMENT SHALL BE DISPOSED OF AS UNSUITABLE MATERIAL.
10. CONTRACTOR SHALL PROTECT EXISTING VEGETATION IN AREAS DESIGNATED AS VEGETATIVE FILTER STRIPS. CONTRACTOR SHALL NOT STORE ANY EQUIPMENT OR MATERIALS IN AREA DESIGNATED AS VEGETATIVE FILTER STRIPS
11. MAXIMUM DRAINAGE AREA TRIBUTARY TO 100' OF SILT FENCE SHALL BE 0.5 ACRE.
12. INSTALLATION, I.E. EXCAVATION, BACKFILL, COMPACTION, OF SILT FENCE SHALL BE INCLUDED IN UNIT PRICE BID FOR ITEM.

TURBIDITY CURTAIN NOTES:

1. TURBIDITY CURTAIN SHALL NOT BE PLACED ACROSS A FLOWING WATERWAY, OR IN A WATERWAY WITH STREAM VELOCITIES GREATER THAN 100 FT/MIN..
2. CONCENTRATED FLOW OUTLETS SUCH AS CULVERT OUTLETS, DITCHES, ETC. SHALL NOT BE LOCATED BEHIND TURBIDITY CURTAIN.
3. THE DETAIL DEPICTS WORK AT A BRIDGE LOCATION, BUT TURBIDITY CURTAIN MAY BE APPLIED AT OTHER LOCATIONS.
4. TURBIDITY CURTAIN SHALL BE A MAXIMUM OF 100 FT LONG FOR EACH SECTION OF CURTAIN REQUIRED. LAST SECTION SHALL TERMINATE 10 FT BEYOND THE LIMIT OF DISTURBANCE.
5. THE TURBIDITY CURTAIN SHALL BE PLACED AS CLOSE TO THE WORK AS POSSIBLE WITHOUT INTERFERING WITH CONSTRUCTION OPERATIONS.
6. THE CONTRACTOR SHALL CONTINUALLY MONITOR THE INSTALLATION, TAKING INTO ACCOUNT WEATHER PATTERNS AND PREVAILING WIND DIRECTIONS THAT MAY AFFECT WATER LEVELS, VELOCITY AND MOVEMENT OF THE TURBIDITY CURTAIN.
7. THE TURBIDITY CURTAIN SHALL BE REMOVED BY PULLING TOWARD THE SHORE TO MINIMIZE ESCAPE OF SEDIMENTS INTO THE WATERWAY.
8. THE WEIGHTED ANCHOR SYSTEM SHALL BE A TYPE THAT ALLOWS THE CURTAIN TO CONFORM TO THE CONTOUR OF THE BOTTOM ON THE WATERWAY.

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

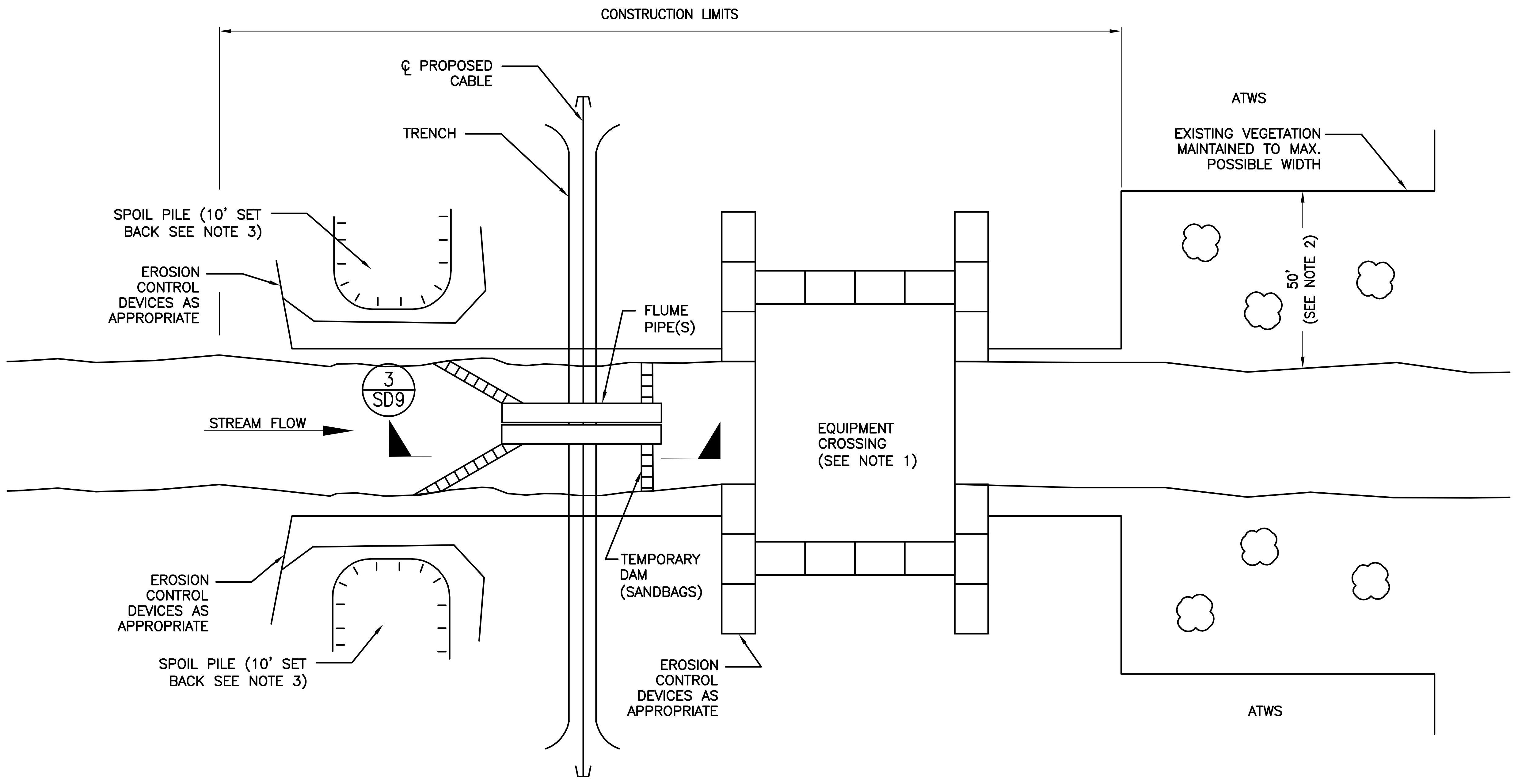
BALL HILL WINDPARK PROJECT

ROADWAY SITE DETAILS-8

SCALE
AS SHOWN

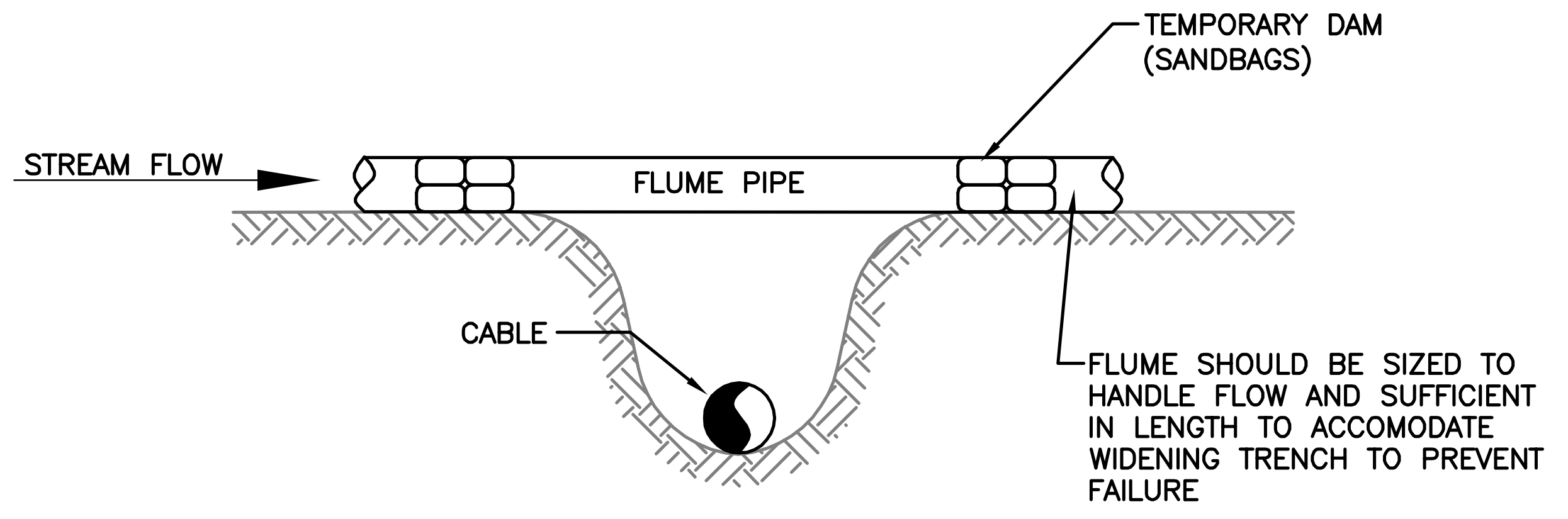
DRAWING
SD-8
REV

NOT FOR CONSTRUCTION



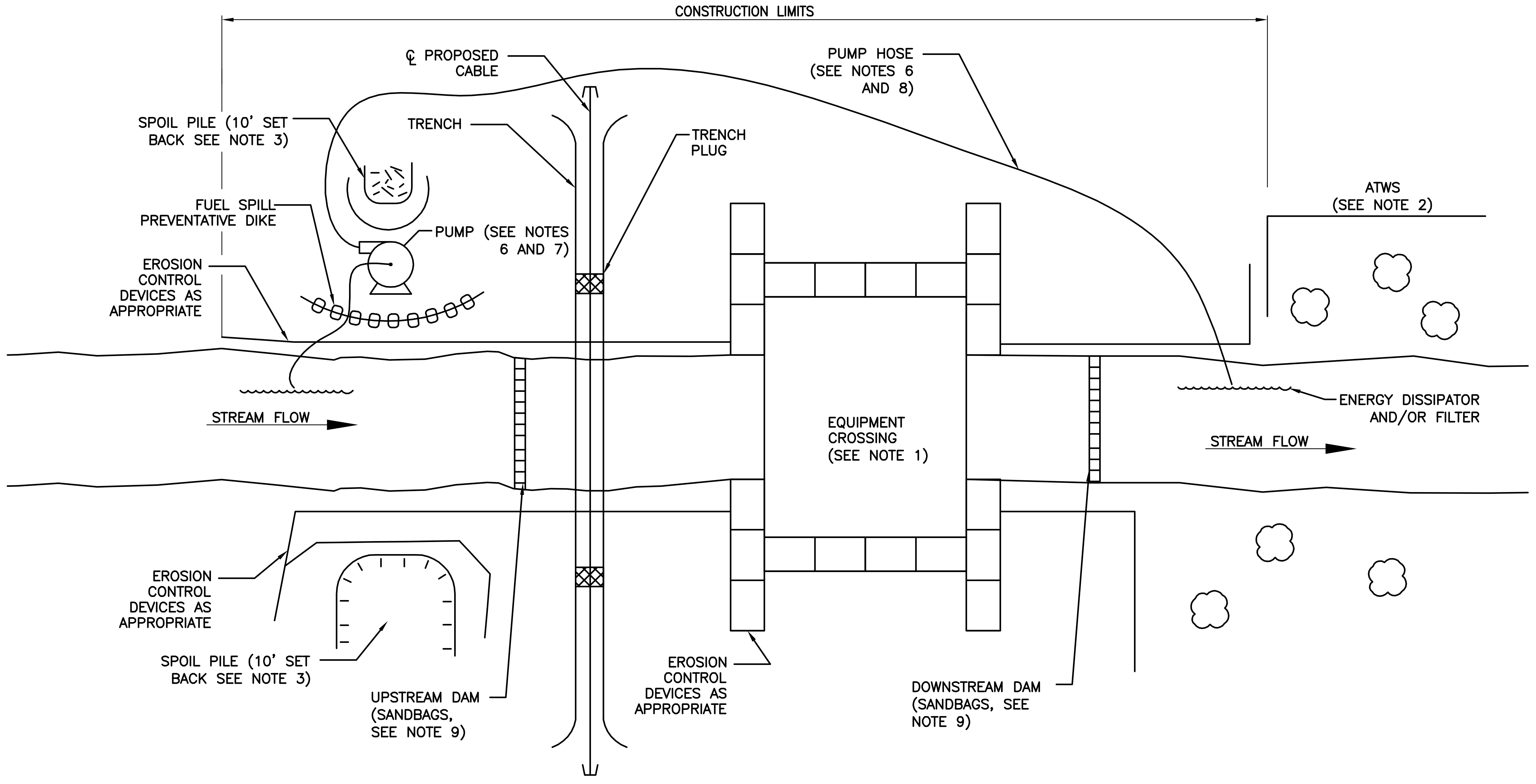
1 SD9 DRY WATERBODY CROSSING: TRENCH FLUMING

NOT TO SCALE



2 SD9 CROSS SECTION: TRENCH FLUMING

NOT TO SCALE



3 SD9 DRY WATERBODY CROSSING: PUMP-AROUND

NOT TO SCALE

NOTES:

1. EQUIPMENT CROSSINGS, WHERE NECCESSARY, SHALL BE DESIGNED BY THE ENGINEER AND BE IN ACCORDANCE WITH THE BALL HILL SWPPP.
2. THE REQUIRED SETBACK FOR ATWS IS 50' FROM TOP OF BANK.
3. THE MINIMUM REQUIRED SETBACK FOR A SPOIL PILE IS 10' FROM THE TOP OF BANK.
4. EQUIPMENT CROSSINGS SHALL REMAIN IN PLACE UNTIL THE COMPLETION OF FINAL RESTORATION. SOME CROSSINGS ARE PERMANENT TO ALLOW FUTURE ACCESS TO TURBINES.
5. STRAW BALES OR EQUIVALENT SEDIMENT BARRIERS WILL BE PLACED AT THE EDGE OF EQUIPMENT BRIDGE AT THE END OF THE WORK DAY TO PREVENT EROSION BUT WILL BE REMOVED DURING CONSTRUCTION ACTIVITY.
6. SET UP PUMP AND HOSE AS SHOWN, OR USE OTHER PRACTICAL ALTERNATIVES. PUMP SHOULD HAVE TWICE THE PUMPING CAPACITY OF MAXIMUM ANTICIPATED FLOW.
7. CONTRACTOR TO ENSURE A SUFFICIENT NUMBER OF ACTIVE AND BACKUP PUMPS TO MAINTAIN CAPACITY OF THE STREAM FLOW AT ALL TIMES.
8. ALL INTAKE HOSES WILL BE SCREENED
9. DISMANTLE DOWNSTREAM DAM, THEN UPSTREAM DAM. KEEP PUMP RUNNING TO MAINTAIN STREAM FLOW.

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

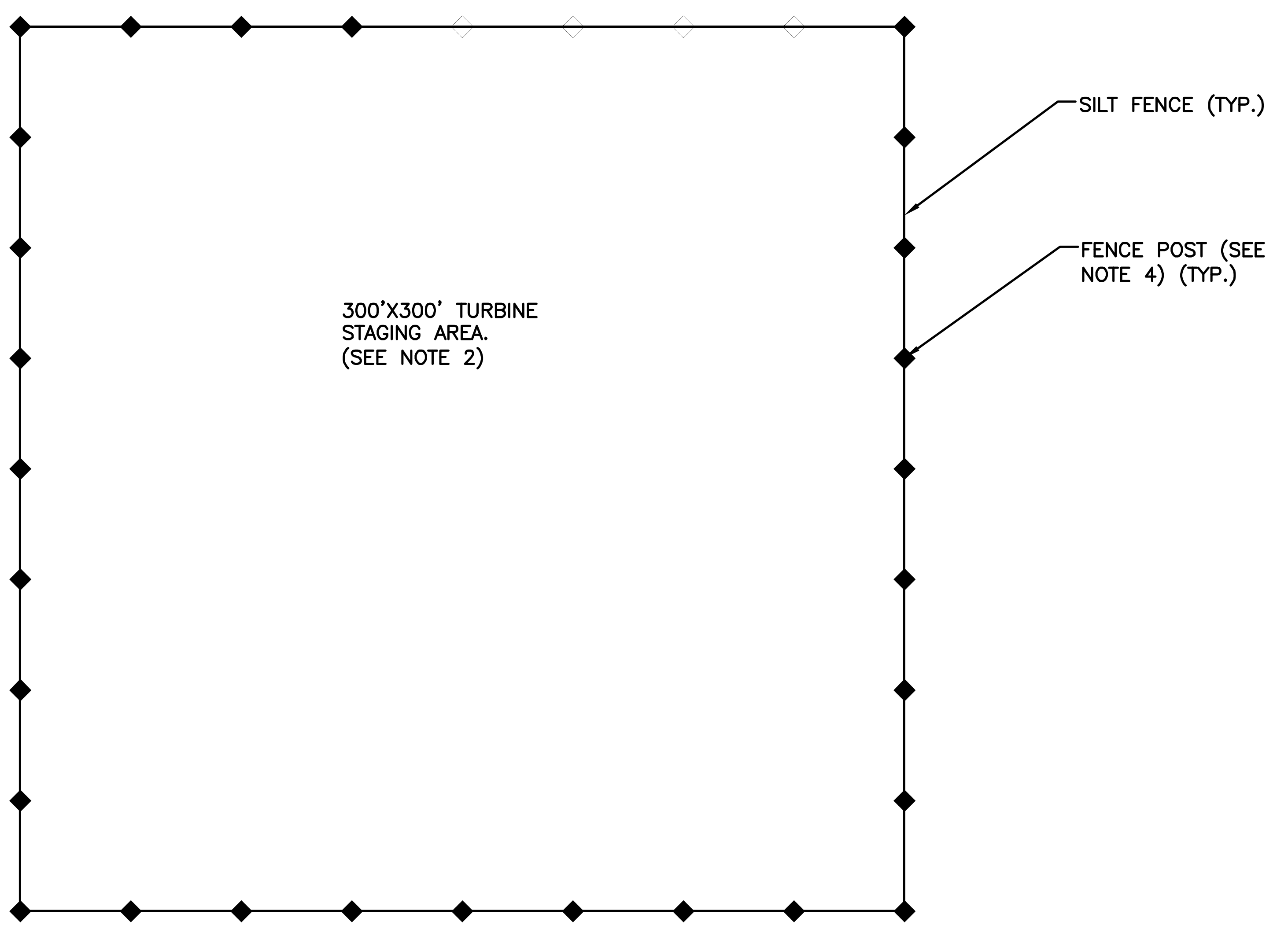
BALL HILL WINDPARK PROJECT

ROADWAY SITE DETAILS-9

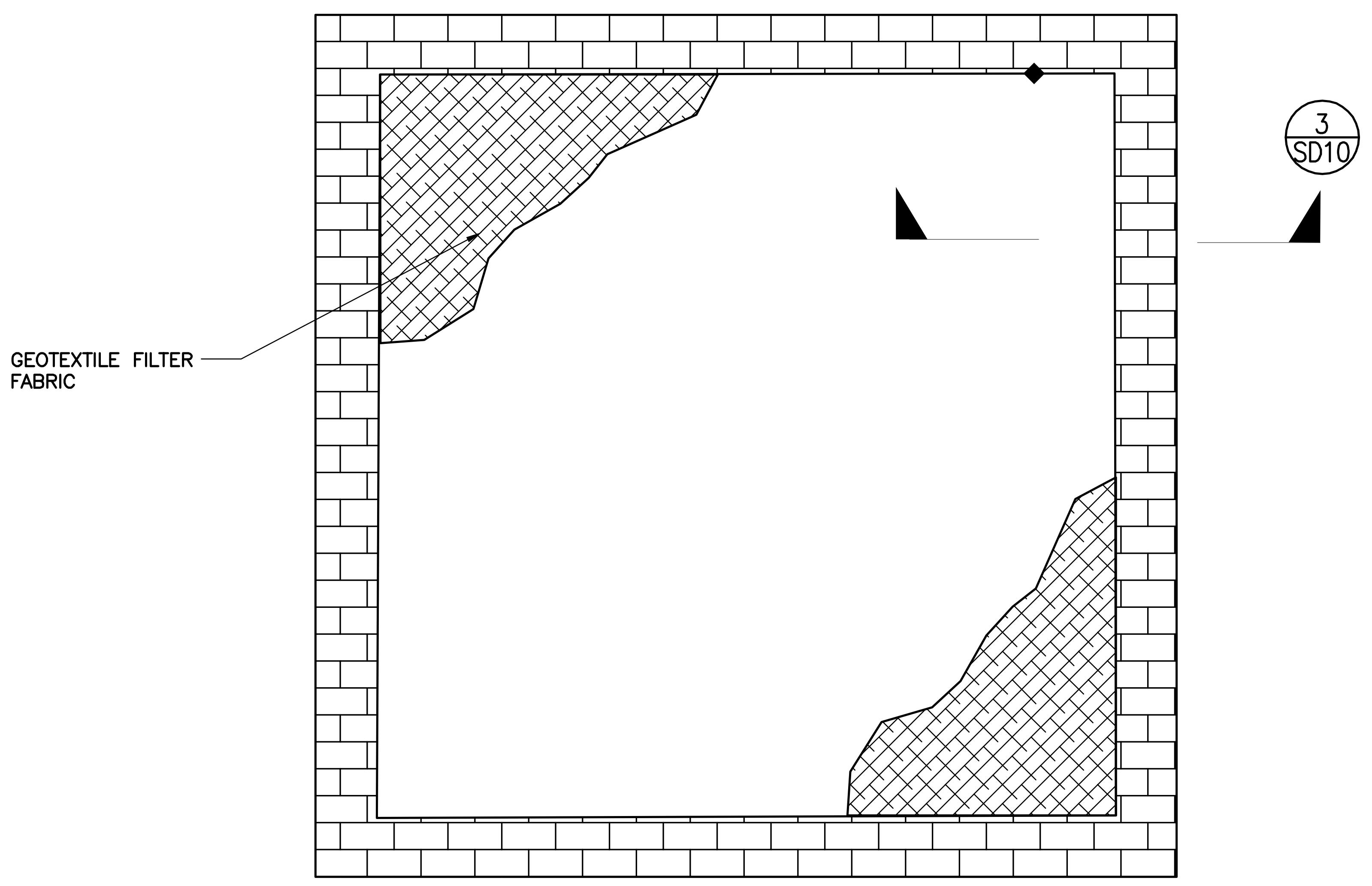
SCALE
AS SHOWN

DRAWING
SD-9
REV

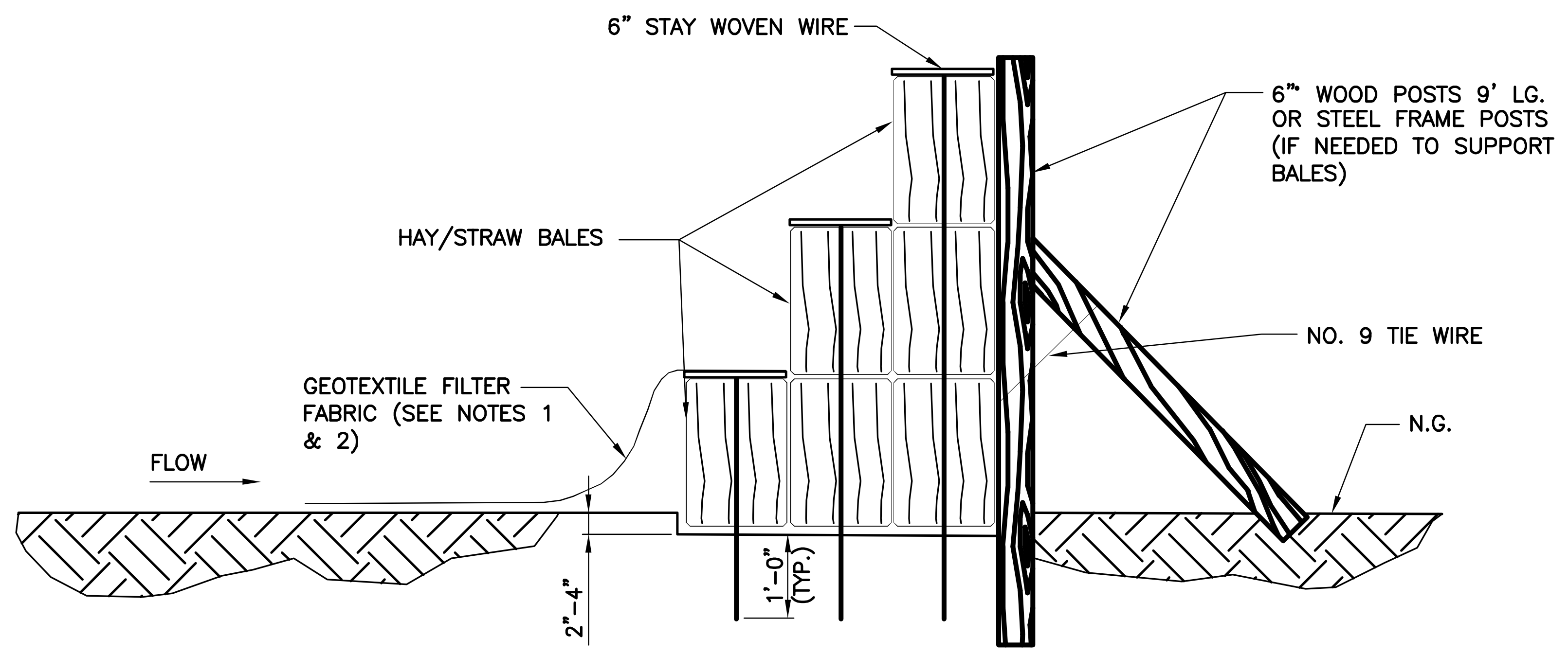
NOT FOR CONSTRUCTION



1 SD10 SILT FENCE AT TURBINE SITES
NOT TO SCALE



2 SD10 PLAN: DRAINAGE BASIN
NOT TO SCALE



3 SD10 SECTION: DRAINAGE BASIN
NOT TO SCALE

SILT FENCE NOTES:

1. SILT FENCE, OR OTHER APPROVED BARRIER SHALL BE INSTALLED SURROUNDING THE ENTIRE TURBINE STAGING AREA TO PREVENT SEDIMENT FROM RUNNING INTO OR OUT OF THE SITE.
2. IN CASES WHERE ACCESS ROADWAY INTERFERES WITH PLACEMENT OF SILT FENCE, PLACE SILT FENCE ON EDGE OF DISTURBED AREA ON OPPOSITE SIDE OF ACCESS ROAD.
3. SILT FENCE SHALL NOT BE USED IN OR ACROSS A FLOWING NATURAL CHANNEL.
4. SILT FENCE SHALL BE PLACED A MINIMUM OF 5' FROM TOE OF SLOPE, 10' PREFERRED, TO PROVIDE ADEQUATE AREA FOR SEDIMENT STORAGE AND FACILITATE MAINTENANCE OF SEDIMENT CONTAINMENT AREA.
5. POSTS MAY BE 1.25"x1.25" (MINIMUM) HARDWOOD
6.

   RCEMENT, AS PER APPROVED LIST.
7. THE BOTTOM EDGE OF SILT FENCE SHALL BE BURIED A MINIMUM OF 6" BELOW GROUND. THE FENCE SHALL BE INSTALLED WITH THE POSTS ON THE DOWNSTREAM SIDE OF THE FABRIC.
8. MEASURES SHALL BE INSPECTED EVERY SEVEN (7) CALENDAR DAYS, AFTER EACH RAINFALL OF 0.5 INCH INCH OR MORE WITHIN A 12 HOUR PERIOD, OR DAILY DURING PROLONGED RAINFALL. MEASURES SHALL BE CLEANED AND REPAIRED AS REQUIRED.
9. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATION REACHES ONE–HALF OF THE MEASURE HEIGHT. SEDIMENT SHALL BE DISPOSED OF AS UNSUITABLE MATERIAL.
10. CONTRACTOR SHALL PROTECT EXISTING VEGETATION IN AREAS DESIGNATED AS VEGETATIVE FILTER STRIPS. CONTRACTOR SHALL NOT STORE ANY EQUIPMENT OR MATERIALS IN AREA DESIGNATED AS VEGETATIVE FILTER STRIPS
11. MAXIMUM DRAINAGE AREA TRIBUTARY TO 100' OF SILT FENCE SHALL BE 0.5 ACRE.
12. INSTALLATION, I.E. EXCAVATION, BACKFILL, COMPACTION, OF SILT FENCE SHALL BE INCLUDED IN UNIT PRICE BID FOR ITEM.
13. THE TURBINE STAGING AREA SHALL BE GRADED TO FACILITATE DRAINAGE AND PREVENT PONDING.

DRAINAGE BASIN NOTES:

1. SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE HEIGHT OF THE FILTERS.
2. DISCHARGE STRUCTURE TO BE UNDERLAIN WITH GEOTEXTILE FABRIC.
3. DO NOT DISCHARGE INTO STATE–DESIGNATED EXCEPTIONAL VALUE WATERS, WATERBODIES WHICH PROVIDE HABITAT FOR FEDERALLY LISTED THREATENED SPECIES, OR WATERBODIES DESIGNATED AS PUBLIC WATER SUPPLIES, UNLESS APPROPRIATE FEDERAL, STATE, AND LOCAL PERMITTING AGENCIES GRANT WRITTEN PERMISSION. ALL DEWATERING ACTIVITIES SHALL BE CONDUCTED IN COMPLIANCE WITH CURRENT DRAINAGE LAWS, LOCAL ORDINANCES RELATING TO SUCH ACTIVITIES, AND THE PROVISIONS OF THE CLEAN WATER ACT.
4. WATER SHALL BE DISCHARGED IN AN UPLAND AREA SO ANY SEDIMENT, STONES, AND SILT–LADEN WATER WILL NOT DEPOSIT MATERIAL IN A SENSITIVE AREA ADVERSELY IMPACTING THE HYDROLOGY OR PLANT COMMUNITIES. THE CONTRACTOR SHOULD HAVE SUFFICIENT INTAKE OR OUTLET HOSE (250 – 350 FEET) TO REACH THE NEAREST APPROPRIATE UPLAND AREA.
5. RAINWATER OR GROUNDWATER THAT COLLECTS IN THE EXCAVATIONS WILL BE PUMPED ONTO A WELL–VEGETATED AREA THAT WILL PREVENT THE WATER FROM RETURNING TO THE RIGHT–OF–WAY, OR INTO A FILTER BAG OR A SETTLING BASIN CONSTRUCTED OF STRAW BALES WHEN ADEQUATE VEGETATION IS ABSENT OR WHEN IN THE VICINITY OF A WETLAND OR WATERBODY.
6. ADDITIONAL SEDIMENT BARRIERS OR SIMILAR EROSION CONTROL MEASURES MAY BE USED AS NECESSARY TO DIVERT THE FLOW OF PUMPED WATER.
7. TO MINIMIZE THE EXTRACTION OF SILT OR SEDIMENT FROM THE TRENCH THE INTAKE SHALL BE PREVENTED FROM TOUCHING THE BOTTOM OR SIDE OF THE TRENCH. A FLOTATION DEVICE OR A SUPPORT SHALL BE ATTACHED TO THE INTAKE OF THE SUCTION LINE TO PREVENT SUCKING UP SOIL AND OTHER DEBRIS FROM THE TRENCH.
8. ALL STRUCTURES SHALL BE LOCATED IN A STABILIZED AND VEGETATED AREA WITH A MINIMUM BUFFER WIDTH OF 100–FOOT BETWEEN IT AND ANY ADJACENT WATER BODY OR WETLAND AREA. SEDIMENT BARRIERS OR SIMILAR EROSION CONTROL MEASURES WILL BE INSTALLED IF AN ADEQUATE BUFFER IS NOT AVAILABLE.
9. DEWATERING ACTIVITIES SHALL NOT DEPOSIT GRAVEL, SEDIMENT (MUD) OR OTHER DEBRIS IN FIELDS, PASTURES, OR WATERCOURSES.
10. DEWATERING SHALL BE MONITORED AND STOPPED, IF NECESSARY, TO CORRECT CONDITIONS AND PRACTICES THAT DO NOT COMPLY WITH THIS BEST MANAGEMENT PRACTICE.

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
-								

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

ROADWAY SITE DETAILS– 10

SCALE
AS SHOWN

DRAWING
SD–10
REV

Collection Alignment

NOTES:

1.

LEGEND

──── – OVERHEAD CABLE
– – – – UNDERGROUND CABLE
○ – POLE RISER

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
B	07/31/08	REVISED LAYOUT	JM	JH	–	NG	–
A	06/24/08	PROGRESS	JM	–	–	–	–

DRAWN BY
J. McCORMACK

CHECKED BY
–

RESP. ENGR.
–

CHIEF DISC. ENGR.
NS GHANTOUS

PROJECT MANAGER
–

PRELIMINARY
NOT FOR
CONSTRUCTION

REPLACE WITH ENGINEERS
STAMP AT CONSTRUCTION
AND/OR FABRICATION ISSUE
IF REQUIRED BY PROJECT
ADMINISTRATION MANUAL

Careba Mott
MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

THIS DRAWING HAS BEEN CREATED FOR CAREBA POWER ENGINEERS, PC .

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.
ELECTRICAL

NO.
0704506

BALL HILL WINDPARK
COLLECTOR SYSTEM
PLAN

SCALE
1"=600'-0"

DATE CREATED
05/08/08

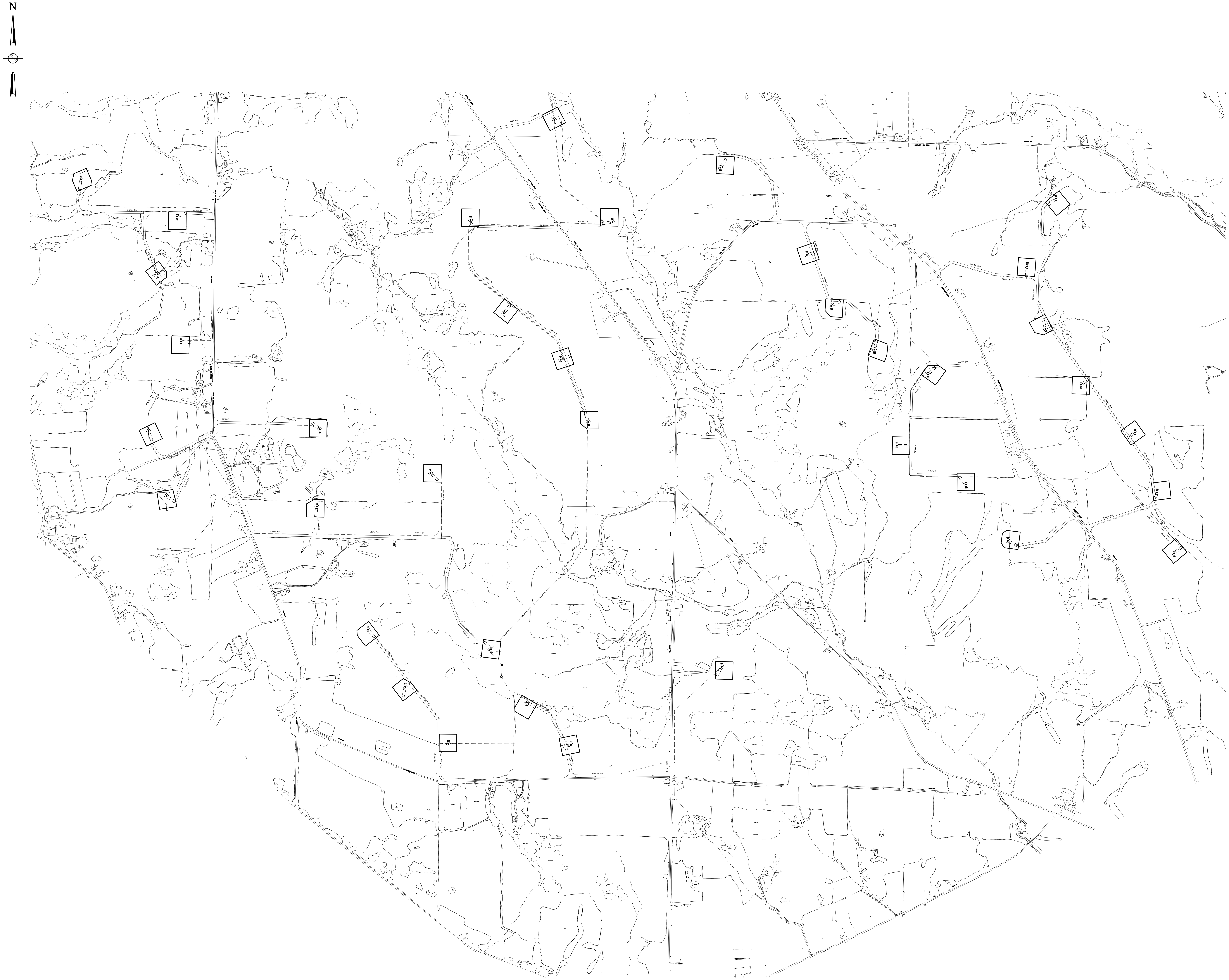
SIZE
E

DRAWING NO.
BH-E-102-SH1

REV.
B

NOTES:

1.



LEGEND

- OVERHEAD CABLE
- UNDERGROUND CABLE
- POLE RISER

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
B	07/31/08	REVISED LAYOUT	JM	JH	-	NG	-
A	06/24/08	PROGRESS	JM	-	-	-	-

DRAWN BY
J. McCORMACK

CHECKED BY
–

RESP. ENGR.
–

CHIEF DISC. ENGR.
NS GHANTOUS

PROJECT MANAGER
–

PRELIMINARY
NOT FOR
CONSTRUCTION

REPLACE WITH ENGINEERS
STAMP AT CONSTRUCTION
AND/OR FABRICATION ISSUE
IF REQUIRED BY PROJECT
ADMINISTRATION MANUAL

Careba Mott
MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

THIS DRAWING HAS BEEN CREATED FOR CAREBA POWER ENGINEERS, PC .

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT. ELECTRICAL

NO. 0704506

BALL HILL WINDPARK
COLLECTOR SYSTEM
PLAN

SCALE 1"=600"–0"

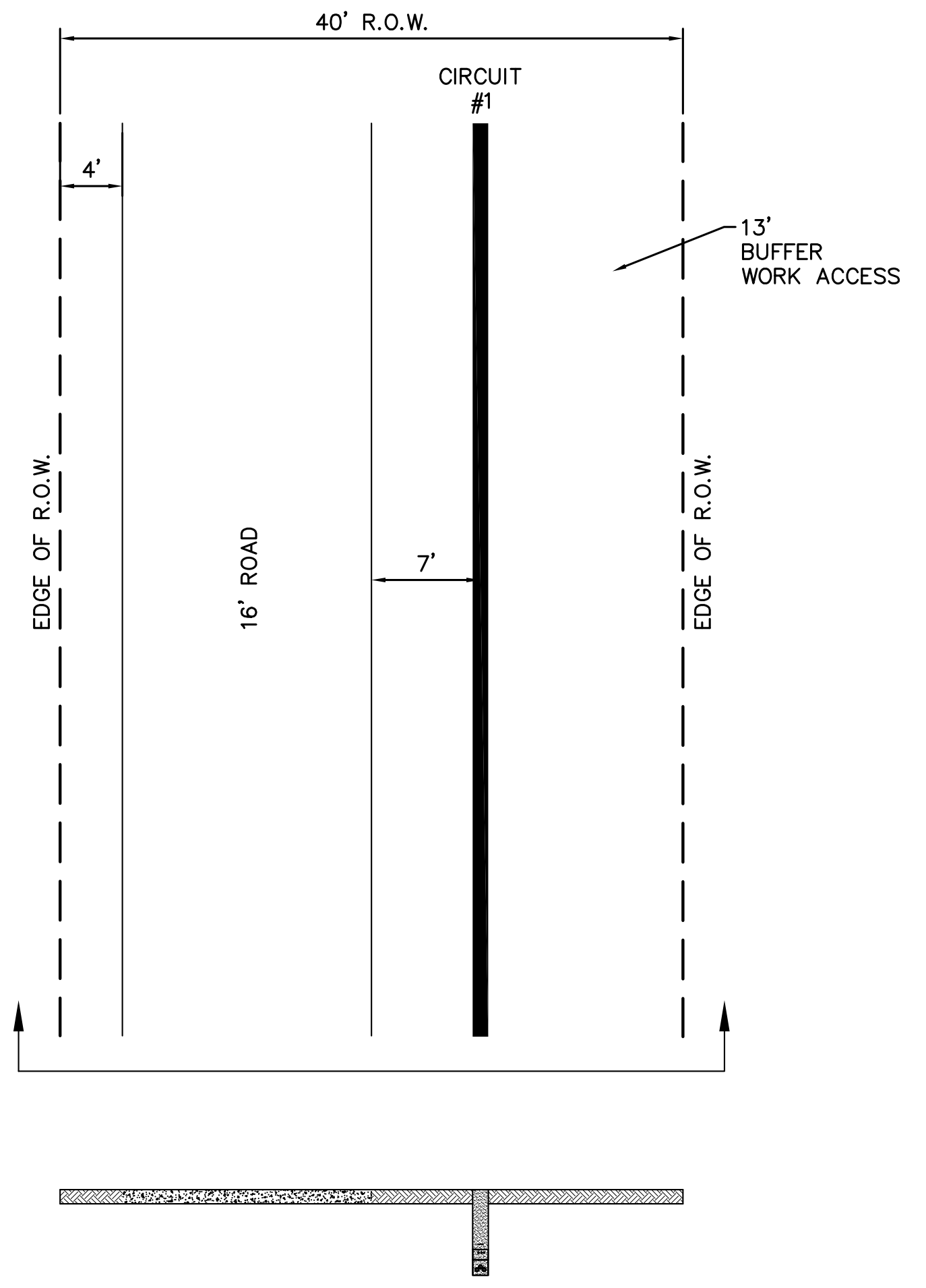
DATE CREATED 05/08/08

SIZE E

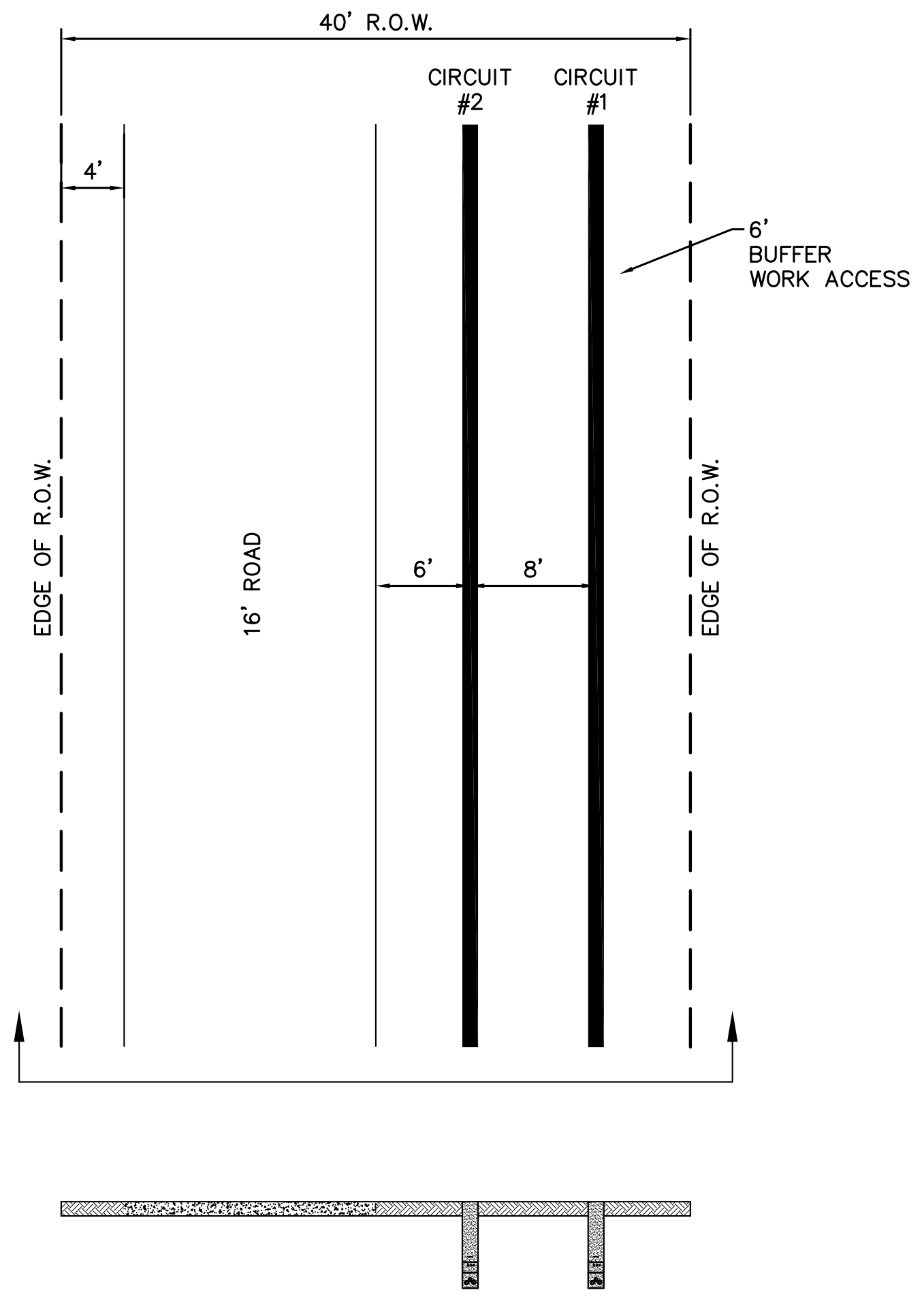
DRAWING NO. BH–E–102–SH2

REV. B

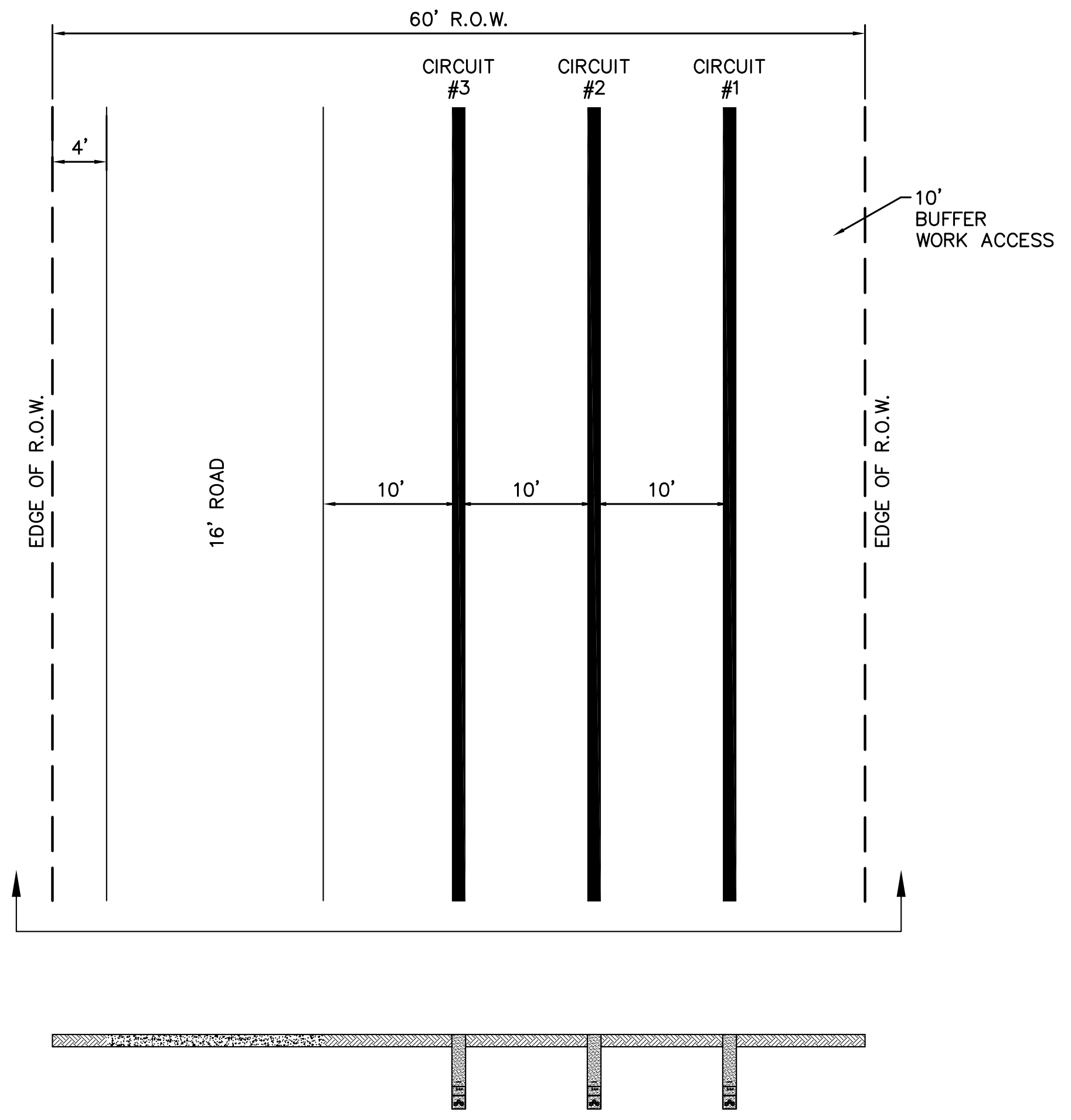
Underground Collection Schematic



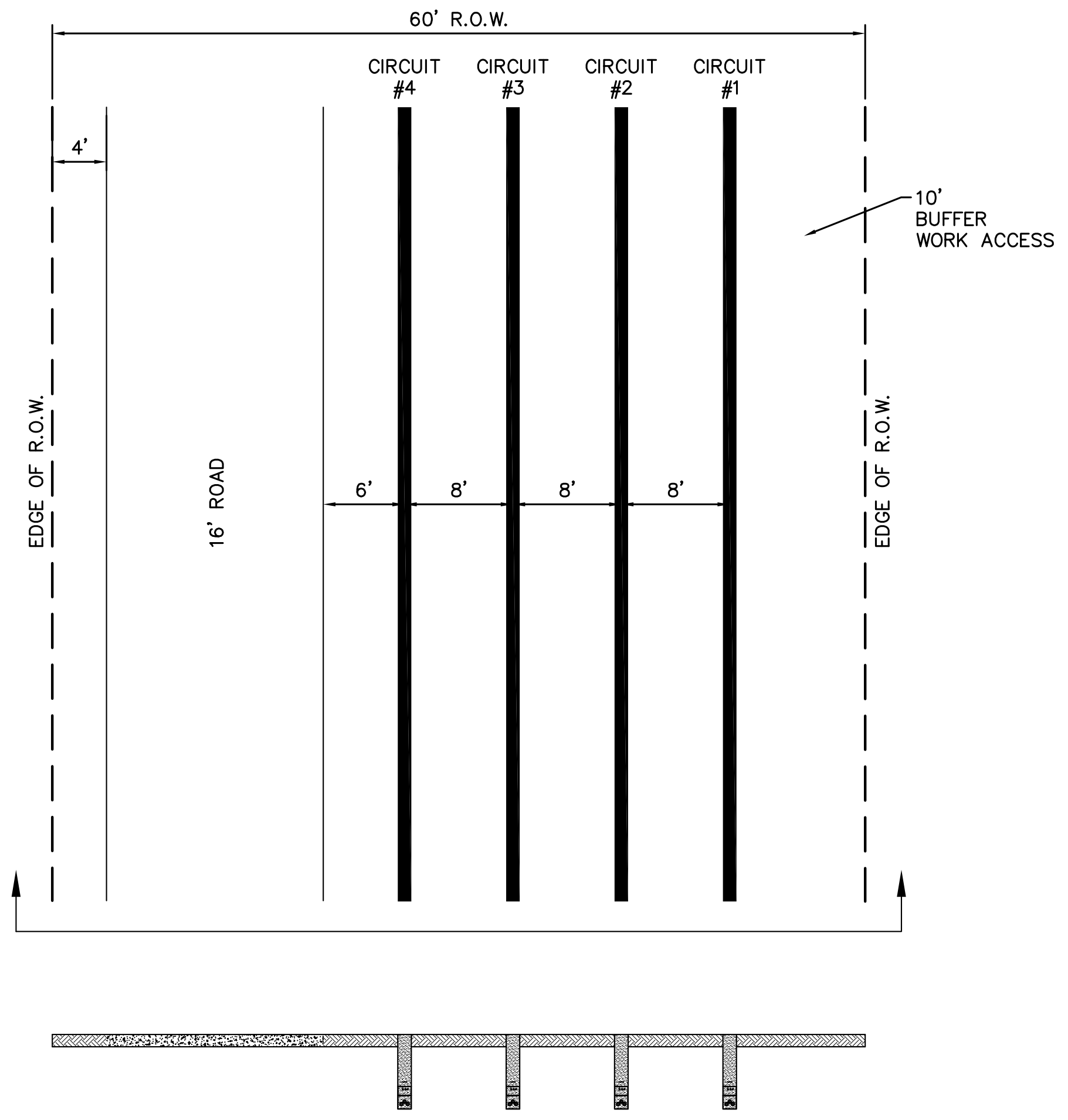
1 CIRCUIT
16' ROAD & 40' R.O.W.



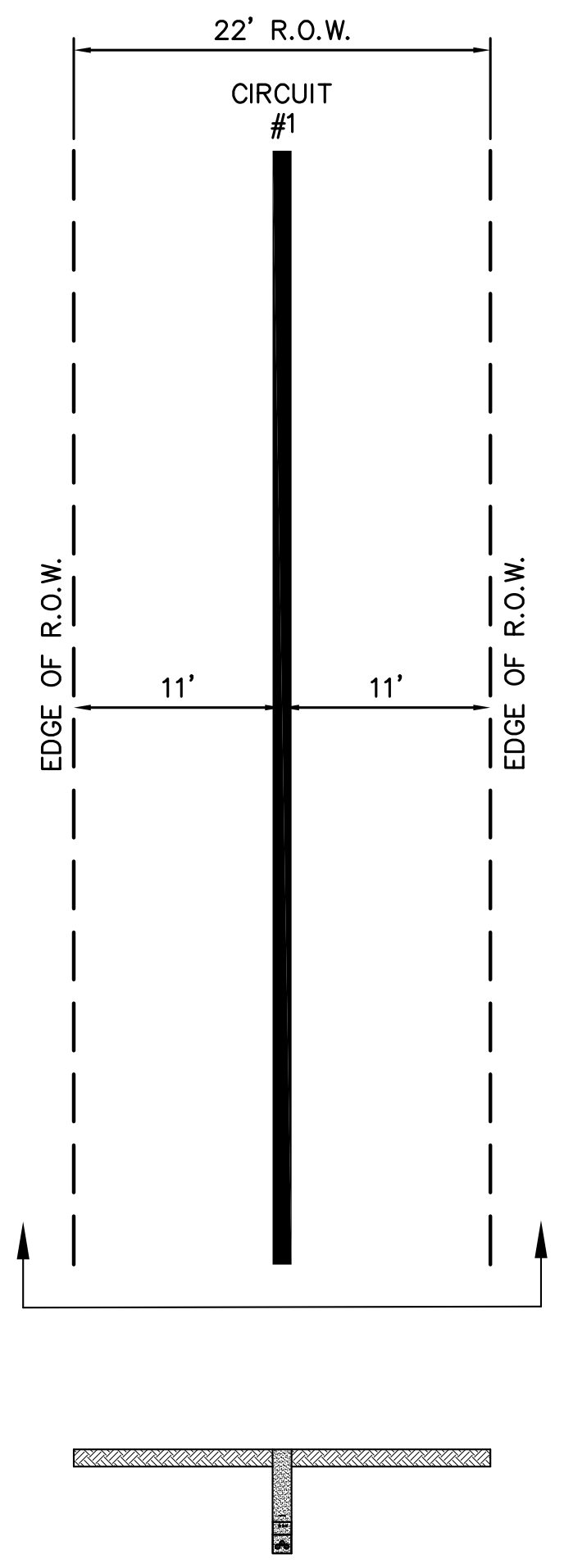
2 CIRCUITS
16' ROAD & 40' R.O.W.



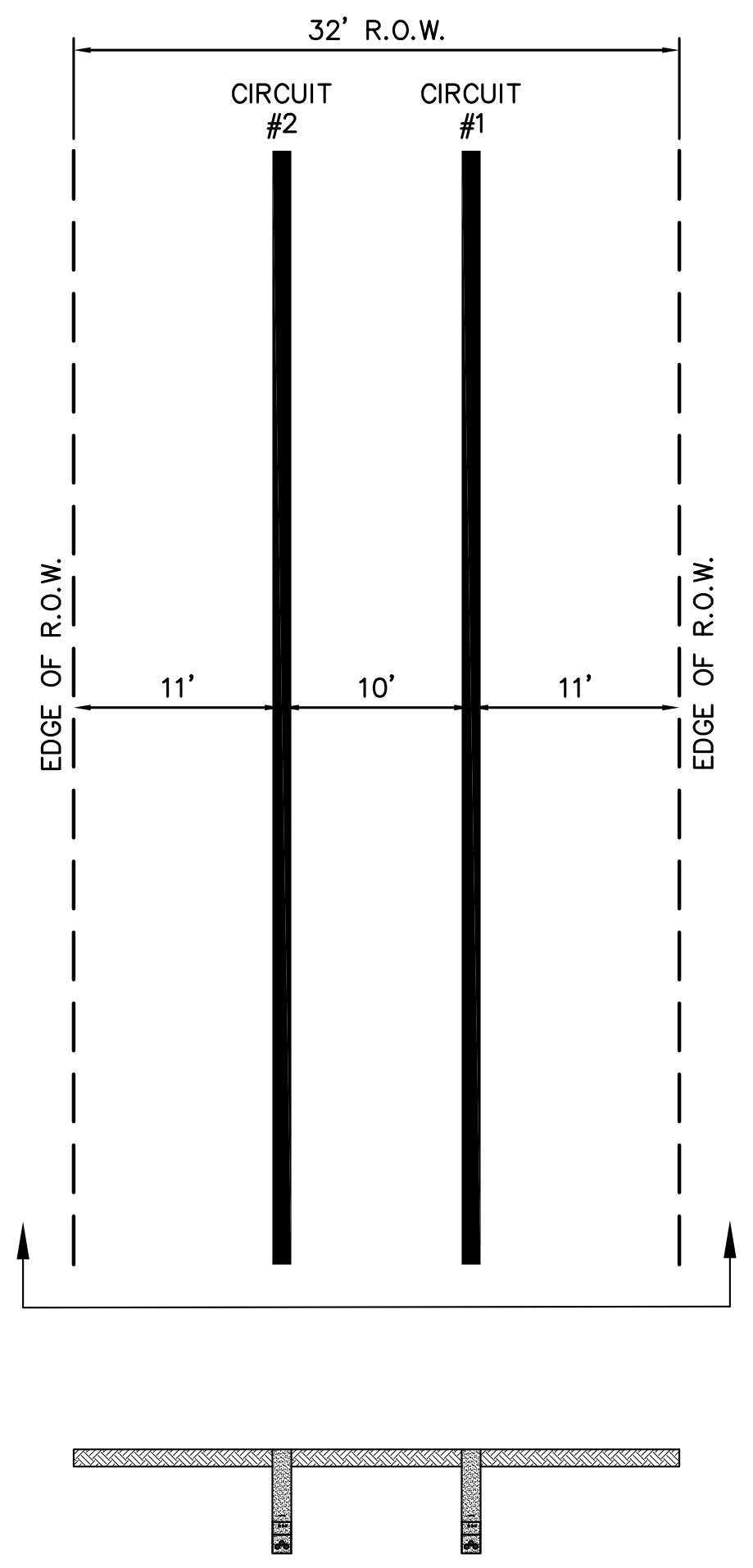
3 CIRCUITS
16' ROAD & 60' R.O.W.



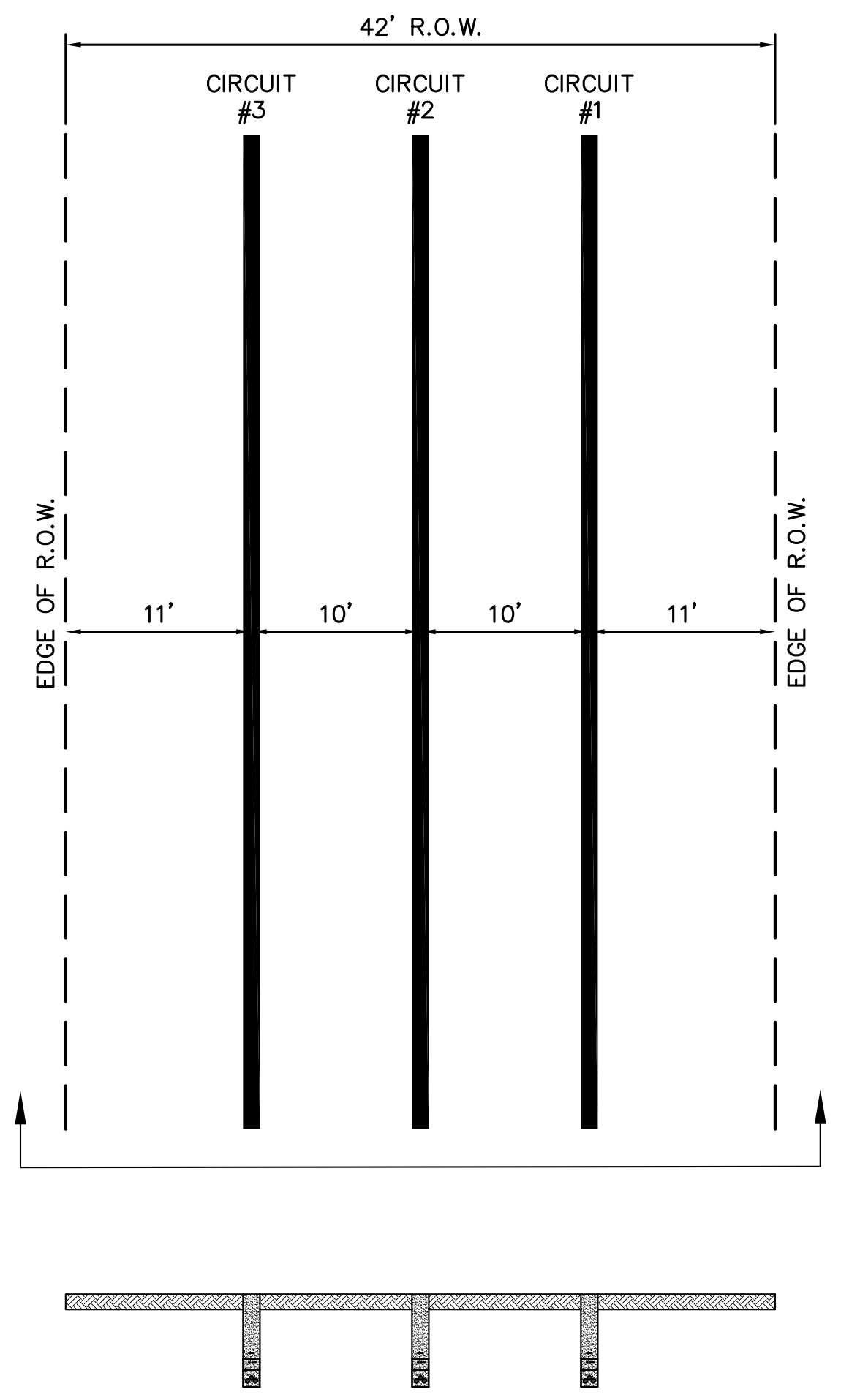
4 CIRCUITS
16' ROAD & 60' R.O.W.



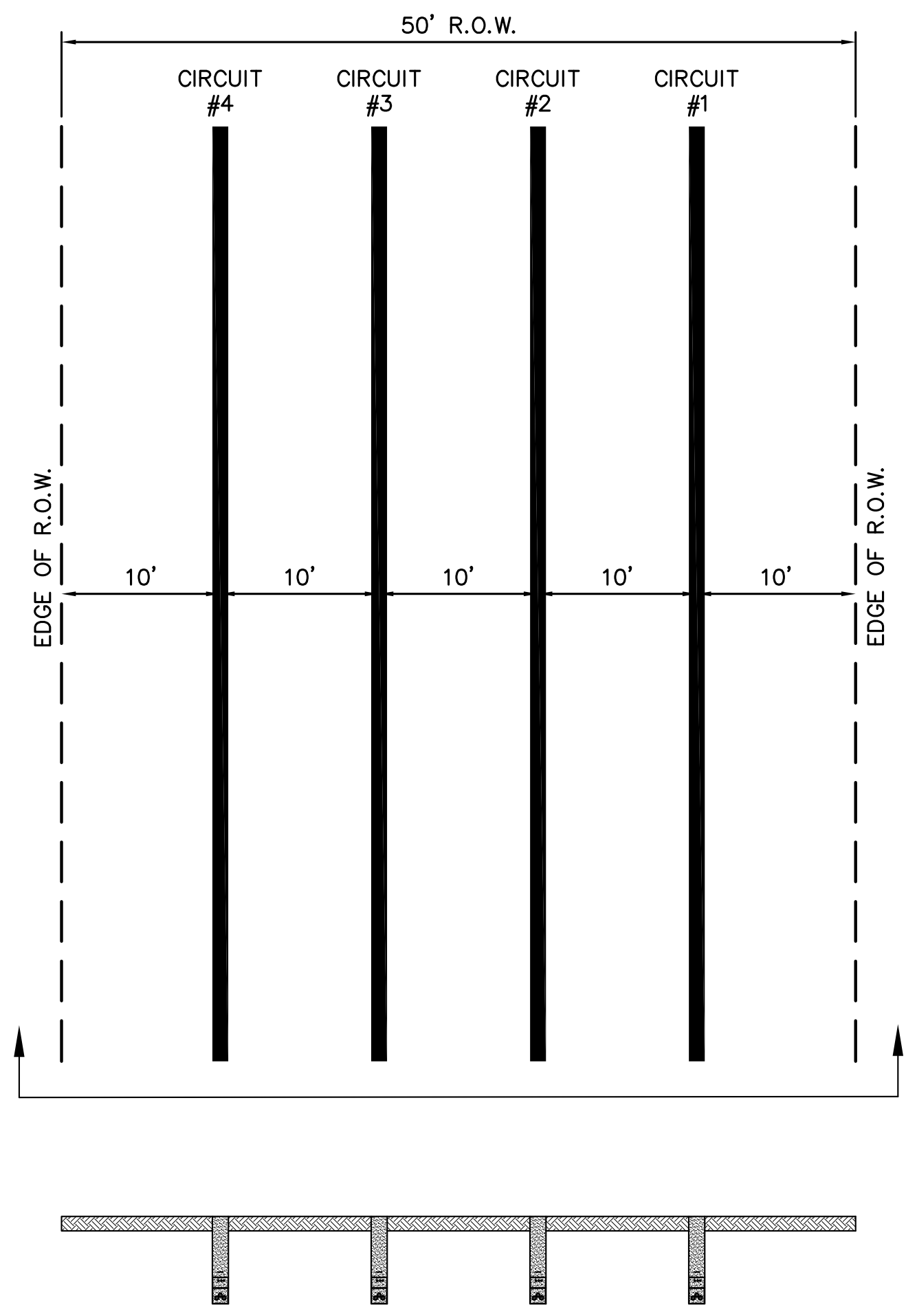
1 CIRCUIT
22' R.O.W.



2 CIRCUITS
32' R.O.W.



3 CIRCUITS
42' R.O.W.



4 CIRCUITS
50' R.O.W.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
B	7/14/08	UPDATED 3 CIRCUIT TO SHOW 60' R.O.W	JM	JH	JH	NSG	–
A	7/10/08	FOR REVIEW	JM	JH	JH	NSG	–

DRAWN BY
J McCORMACK

CHECKED BY
J HARRINGTON

RESP. ENGR.
J HARRINGTON

CHIEF DISC. ENGR.
NS GHANTOUS

PROJECT MANAGER
–

PRELIMINARY
NOT FOR
CONSTRUCTION
REPLACE WITH ENGINEERS
STAMP AT CONSTRUCTION
AND/OR FABRICATION ISSUE
IF REQUIRED BY PROJECT
ADMINISTRATION MANUAL

Careba Mott
MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

THIS DRAWING HAS BEEN CREATED FOR CAREBA POWER ENGINEERS, PC .

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.
ELECTRICAL

NO.
0704506

NOBLE BALL HILL WINDPARK
TYPICAL UNDERGROUND
TRENCH ALIGNMENT

SCALE
N.T.S.

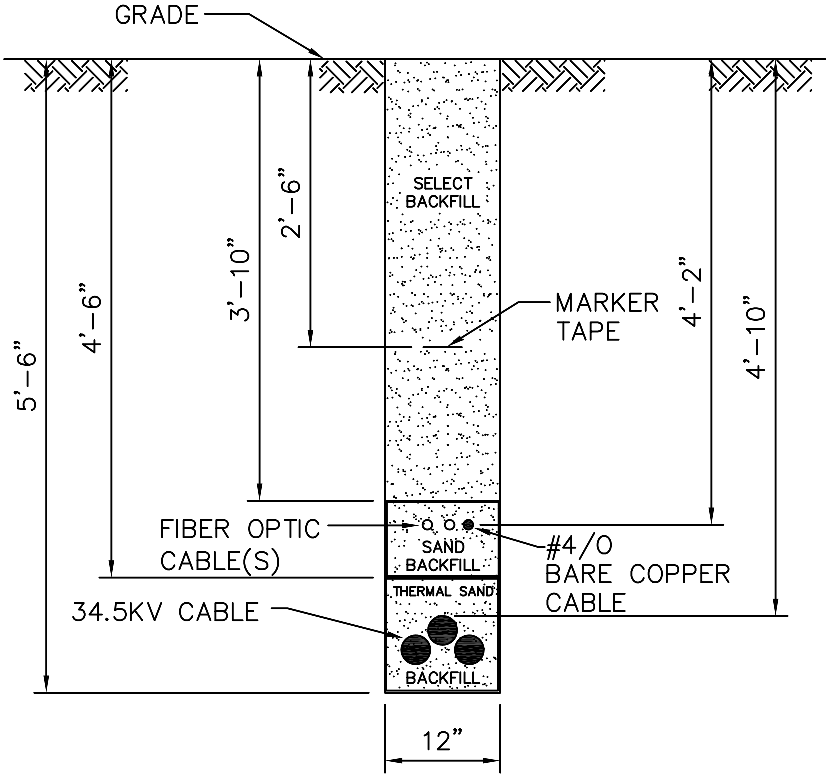
DATE CREATED
07/07/08

SIZE
E

DRAWING NO.
BH–E–103

REV.
B

Trenching



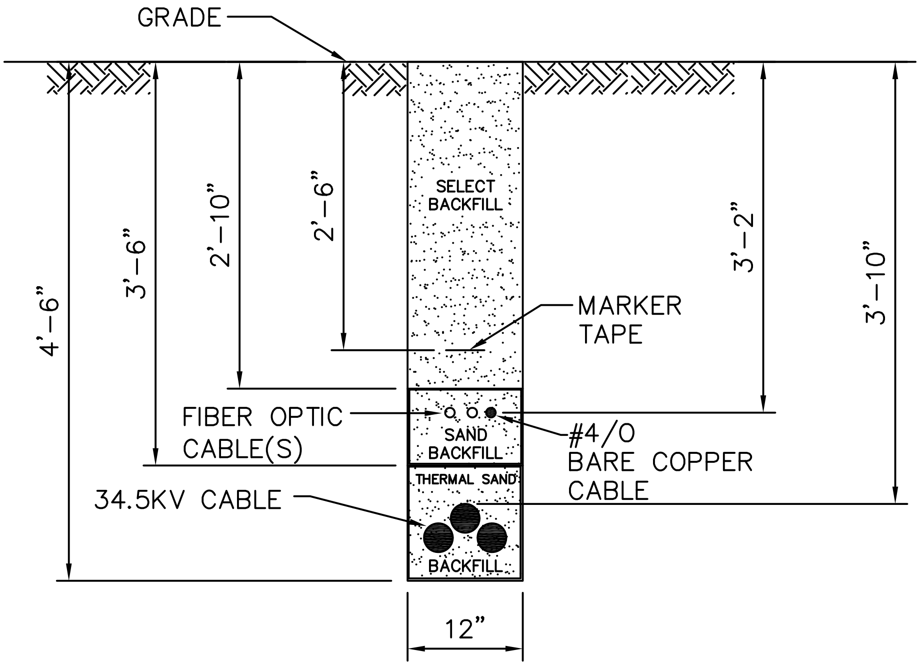
TYPICAL 5'-6" TRENCH CROSS SECTION SINGLE CIRCUIT

Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

NOBLE BALL HILL WINDPARK
34.5KV & FIBER OPTIC CABLES
CROSS SECTION OF
UNDERGROUND TRENCH

SCALE	DEPT.	NO.	DATE CREATED
N.T.S.	ELEC	0704506	07/09/08

DATE ISSUED	DRAWING NO.	REV
07/10/08	BH-E-SK5	A



TYPICAL 4'-6" TRENCH CROSS SECTION SINGLE CIRCUIT

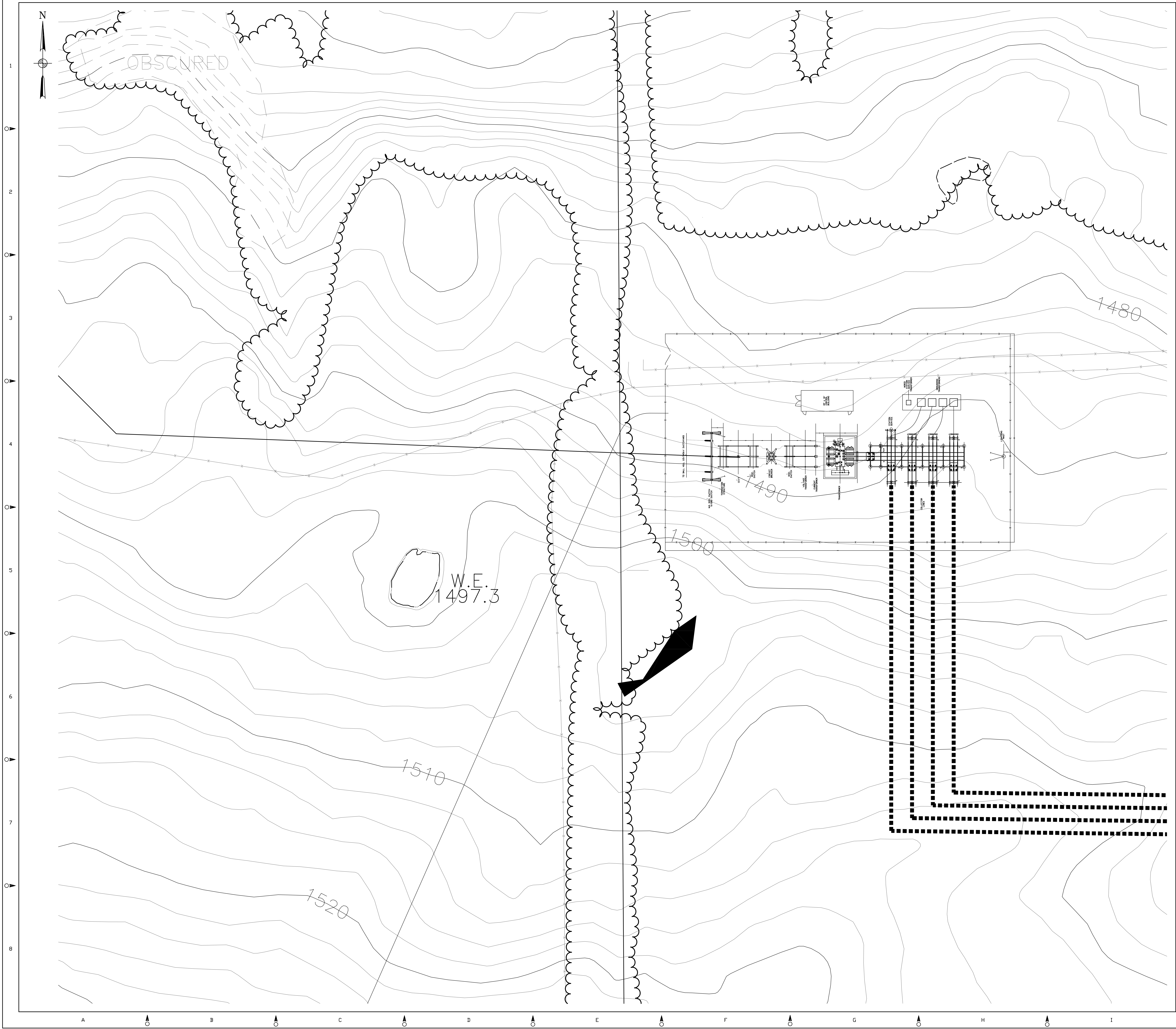
Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

NOBLE BALL HILL WINDPARK
34.5KV & FIBER OPTIC CABLES
CROSS SECTION OF
UNDERGROUND TRENCH

SCALE	DEPT.	NO.	DATE CREATED
N.T.S.	ELEC	0704506	07/09/08

DATE ISSUED	DRAWING NO.	REV
07/10/08	BH-E-SK6	A

Substation



NOTES:

1.

LEGEND

- - - - – UNDERGROUND CABLE

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
A	7/16/08	FOR REVIEW	JM	JH	–	NG	–

DRAWN BY
J. McCORMACK

CHECKED BY
–

RESP. ENGR.
–

CHIEF DISC. ENGR.
NS GHANTOUS

PROJECT MANAGER
–

PRELIMINARY
NOT FOR
CONSTRUCTION
REPLACE WITH ENGINEERS
STAMP AT CONSTRUCTION
AND/OR FABRICATION ISSUE
IF REQUIRED BY PROJECT
ADMINISTRATION MANUAL

Careba Mott
MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

THIS DRAWING HAS BEEN CREATED FOR CAREBA POWER ENGINEERS, PC.

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT. ELECTRICAL

NO. 0704506

BALL HILL WINDPARK
SUBSTATION
SITE PLAN

SCALE 1"=25'-0"

DATE CREATED 07/16/08

SIZE E

DRAWING NO. BH-E-304

REV. A

NOT FOR CONSTRUCTION

LEGEND

- — — 35 FOOT PERMANENT ACCESS ROAD
- — · — LIMIT OF DISTURBANCE
- — · · — UTILITY POLE
- ⌀ PROPERTY LINE

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE
CHECKED BY
N. PAGAN
RESP. ENGR.
J. WASSERMAN
CHIEF DISC. ENGR.
T. ELSROTH
PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN SUBSTATION
SHT. 1 OF 1

SCALE
AS SHOWN

DRAWING
RP–SR–1

REV
—

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC

Switchyard

NOTES:

1.

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR.
A	7/16/08	FOR REVIEW	JM	JH	–	NG	–

DRAWN BY
J. McCORMACK

CHECKED BY
–

RESP. ENGR.
–

CHIEF DISC. ENGR.
NS GHANTOUS

PROJECT MANAGER
–

PRELIMINARY
NOT FOR
CONSTRUCTION
REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION ISSUE IF REQUIRED BY PROJECT ADMINISTRATION MANUAL

Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

THIS DRAWING HAS BEEN CREATED FOR CAREBA POWER ENGINEERS, PC .

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.
ELECTRICAL

NO.
0704506

BALL HILL WINDPARK
SWITCHYARD
SITE PLAN

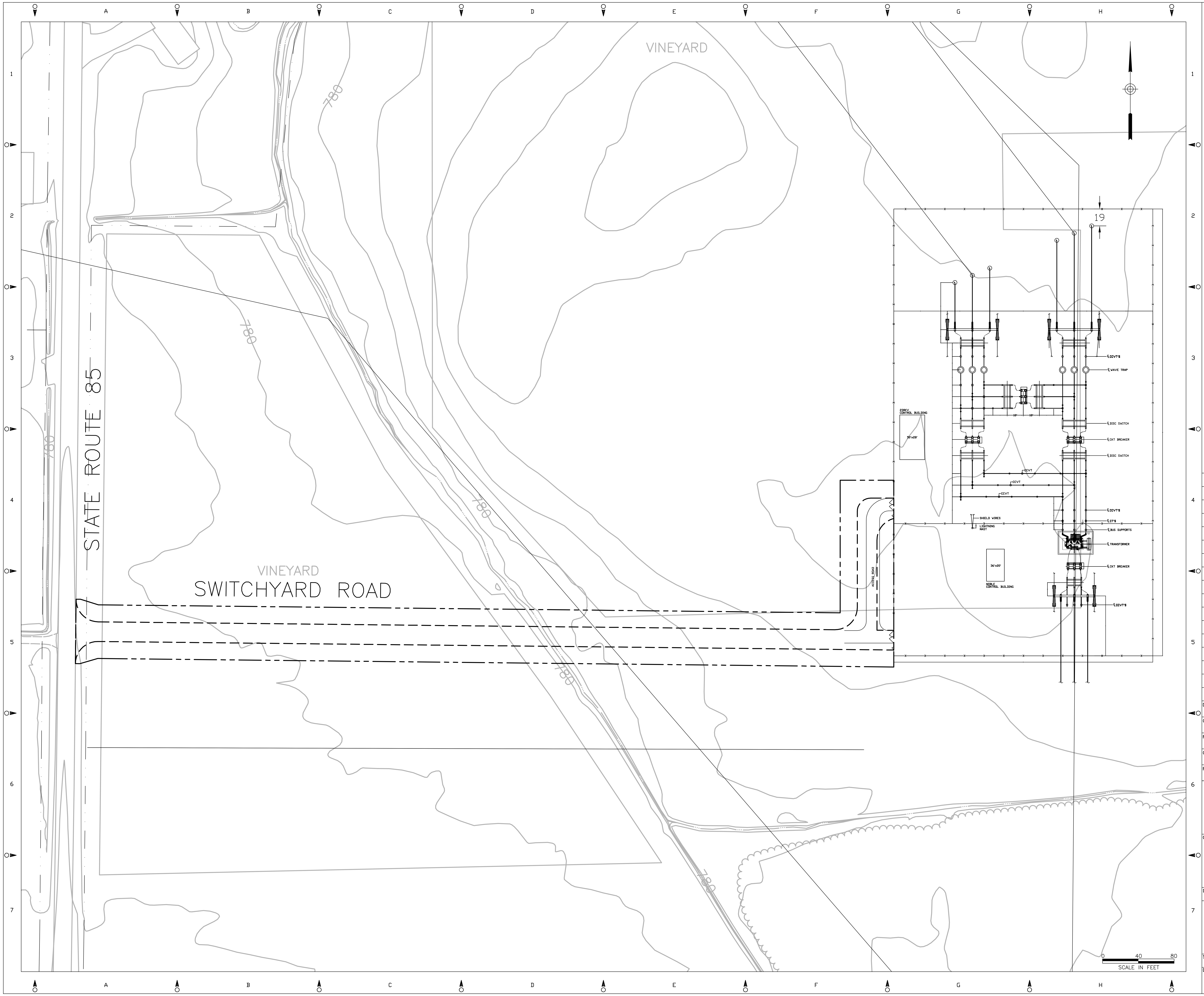
SCALE
1"=50'–0"

DATE CREATED
05/08/08

SIZE
E

DRAWING NO.
BH–E–504

REV.
A



NOT FOR CONSTRUCTION

LEGEND

— — —	22 FOOT PERMANENT ACCESS ROAD
— - - —	LIMIT OF DISTURBANCE
— · · —	PROPERTY LINE

PRELIMINARY PLANS
07-21-08

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..	
-									

DRAWN BY
C. BLANCHETTE

CHECKED BY
N. PAGAN

RESP. ENGR.
J. WASSERMAN

CHIEF DISC. ENGR.
T. ELSROTH

PROJECT MANAGER
M. PACY

DMJM HARRIS | AECOM

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
NO.

BALL HILL WINDPARK PROJECT

SITE PLAN SWITCHYARD
SHT. 1 OF 1

SCALE
AS SHOWN

DRAWING
RP-SY-1

REV
—

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC

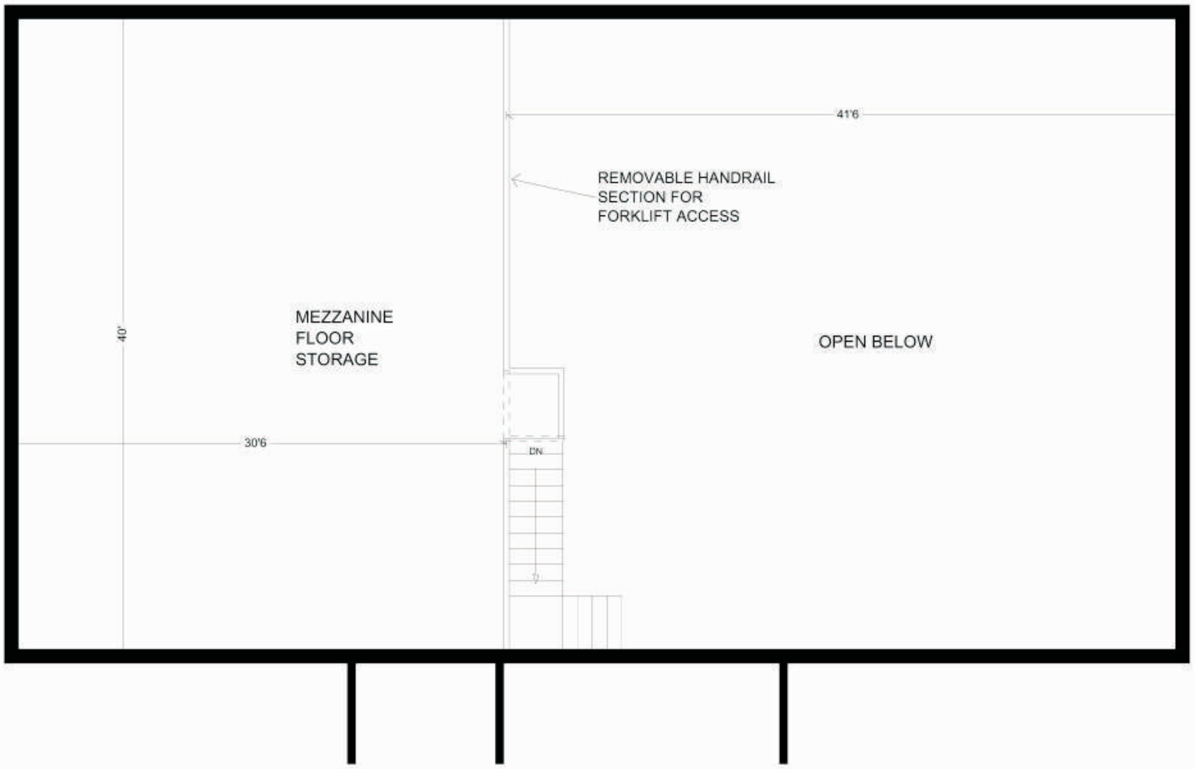
Operation and Maintenance Facility

O&M BLDG FLOOR PLAN

Noble
ENVIRONMENTAL POWER

O&M BUILDING ISOMETRIC DRAWING

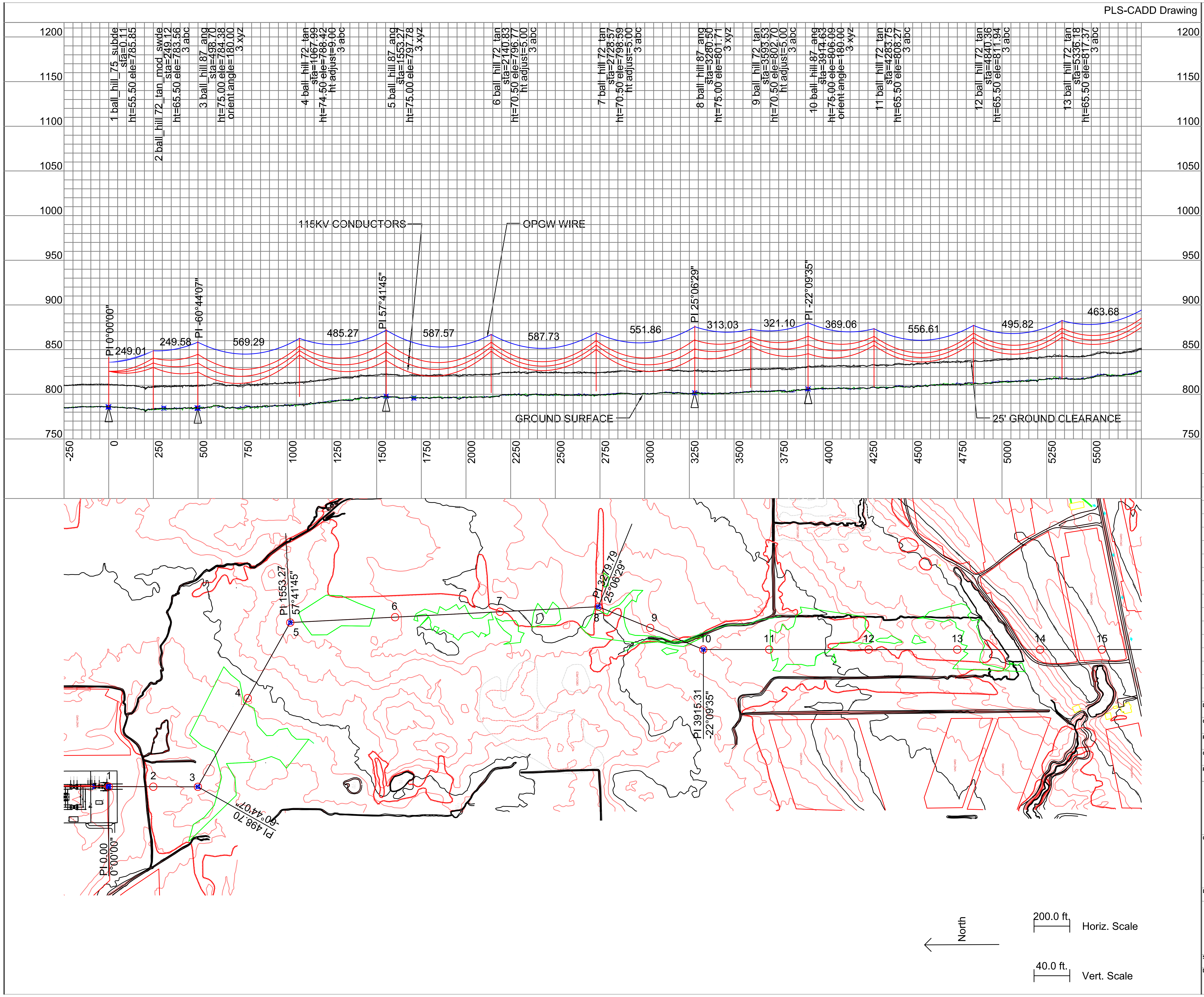
Noble ENVIRONMENTAL POWER



O&M BUILDING MEZZANINE FLOOR PLAN

Noble
ENVIRONMENTAL POWER

Transmission Line



NOTES:

1. 115KV CONDUCTOR:
   477ACSR HAWK 26/7.
   SHOWN AT 260°F
2. SHIELD WIRE:
   BRUGG OPEW 27AY/59ACS.
   SHOWN AT 120°F

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
B	07/11/08	CLIENT REVIEW	KMC	BB	NSG		NSG	
A	07/11/08	CLIENT REVIEW	KMC	BB	NSG		NSG	

DRAWN BY
K. CAISSIE

CHECKED BY

RESP. ENGR.
J. HARRINGTON

CHIEF DISC. ENGR.
N. GHANTOUS

PROJECT MANAGER
N. GHANTOUS

PRELIMINARY
NOT FOR
CONSTRUCTION

REPLACE WITH ENGINEERS
STAMP AT CONSTRUCTION
AND/OR FABRICATION ISSUE
IF REQUIRED BY PROJECT
ADMINISTRATION MANUAL

Careba Mott
MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.
TRANSMISSION

NO.
070308

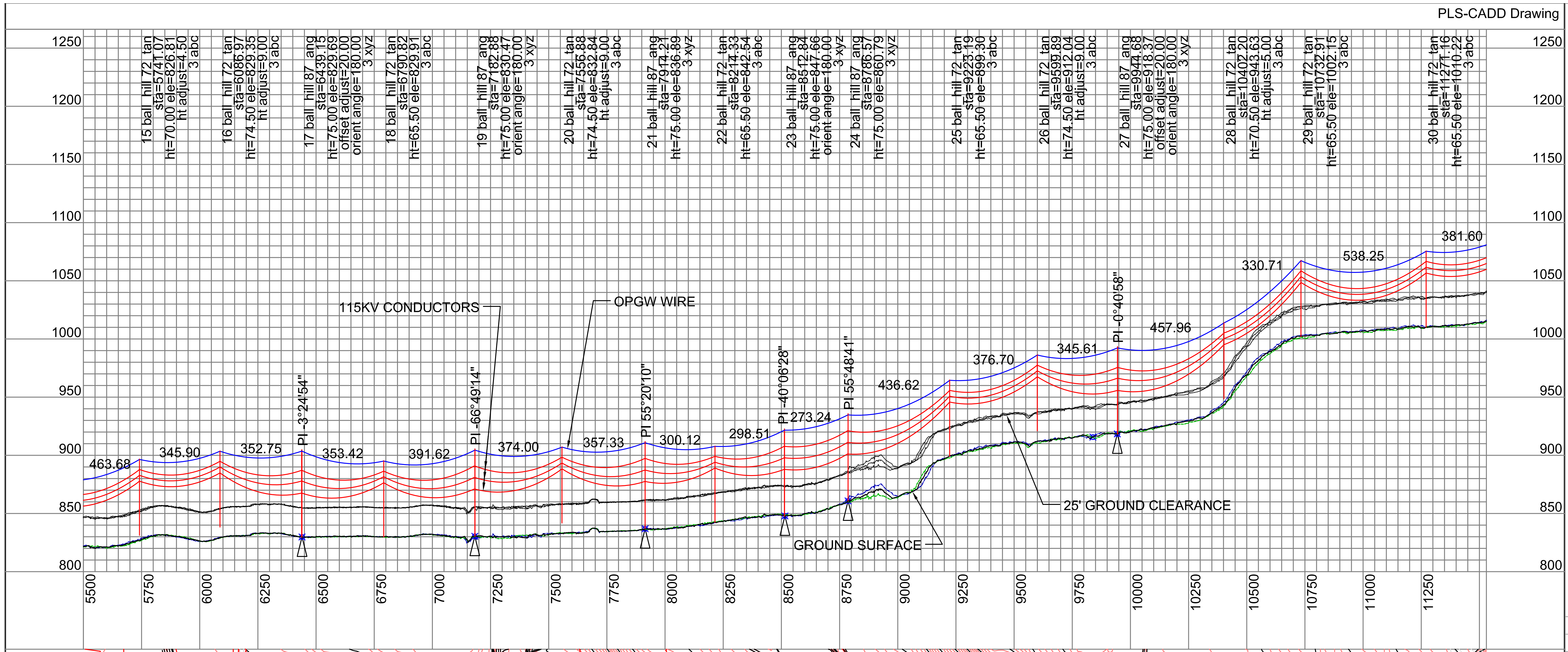
NOBLE BALL HILL WINDPARK
115KV TRANSMISSION LINE PLAN & PROFILE

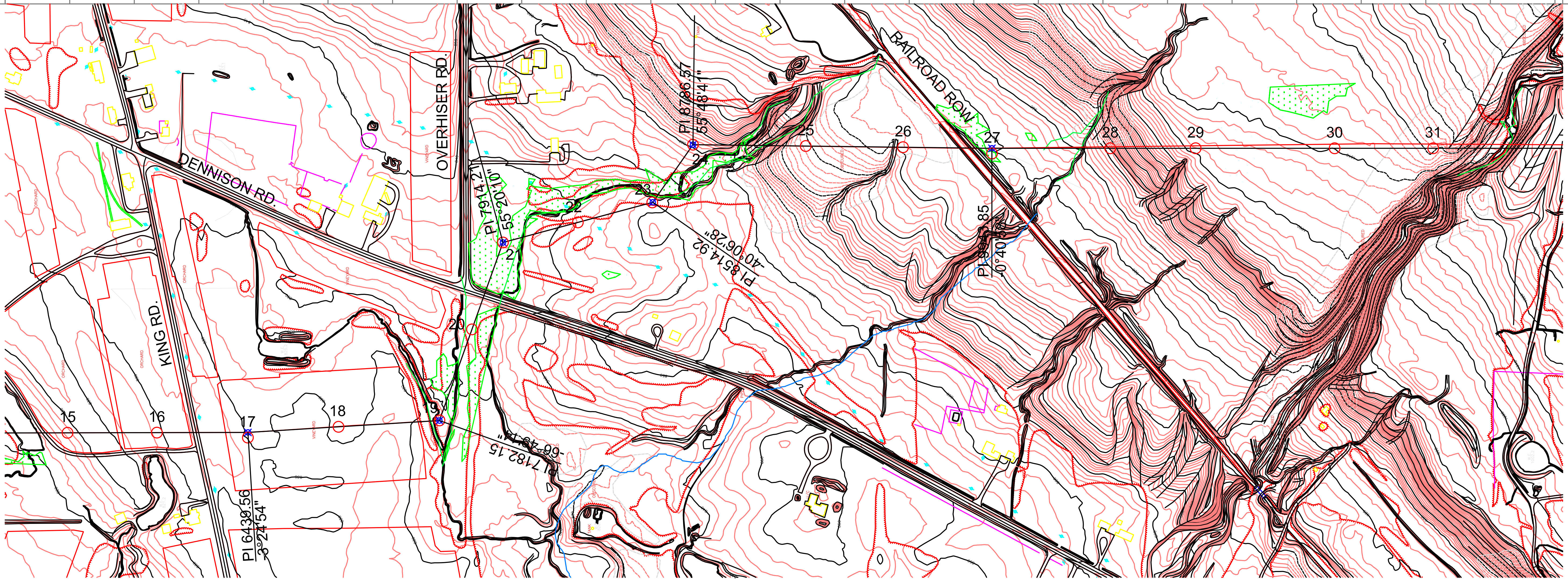
SCALE
AS NOTED

DRAWING
BH-T-301 SH.1

REV
B

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC





North

200.0 ft. Horiz. Scale

40.0 ft. Vert. Scale

NOTES:

1. 115KV CONDUCTOR:
   477ACSR HAWK 26/7.
   SHOWN AT 260°F

2. SHIELD WIRE:
   BRUGG OPEW 27AY/59ACS.
   SHOWN AT 120°F

REV	DATE	DESCRIPTION	DRAWN / CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR..
B	07/11/08	CLIENT REVIEW	KMC BB	NSG	NSG	
A	07/11/08	CLIENT REVIEW	KMC BB	NSG	NSG	

DRAWN BY
K. CAISSIE

CHECKED BY

RESP. ENGR.
J. HARRINGTON

CHIEF DISC. ENGR.
N. GHANTOUS

PROJECT MANAGER
N. GHANTOUS

PRELIMINARY
NOT FOR
CONSTRUCTION

REPLACE WITH ENGINEERS
STAMP AT CONSTRUCTION
AND/OR FABRICATION ISSUE
IF REQUIRED BY PROJECT
ADMINISTRATION MANUAL

Careba Mott
MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

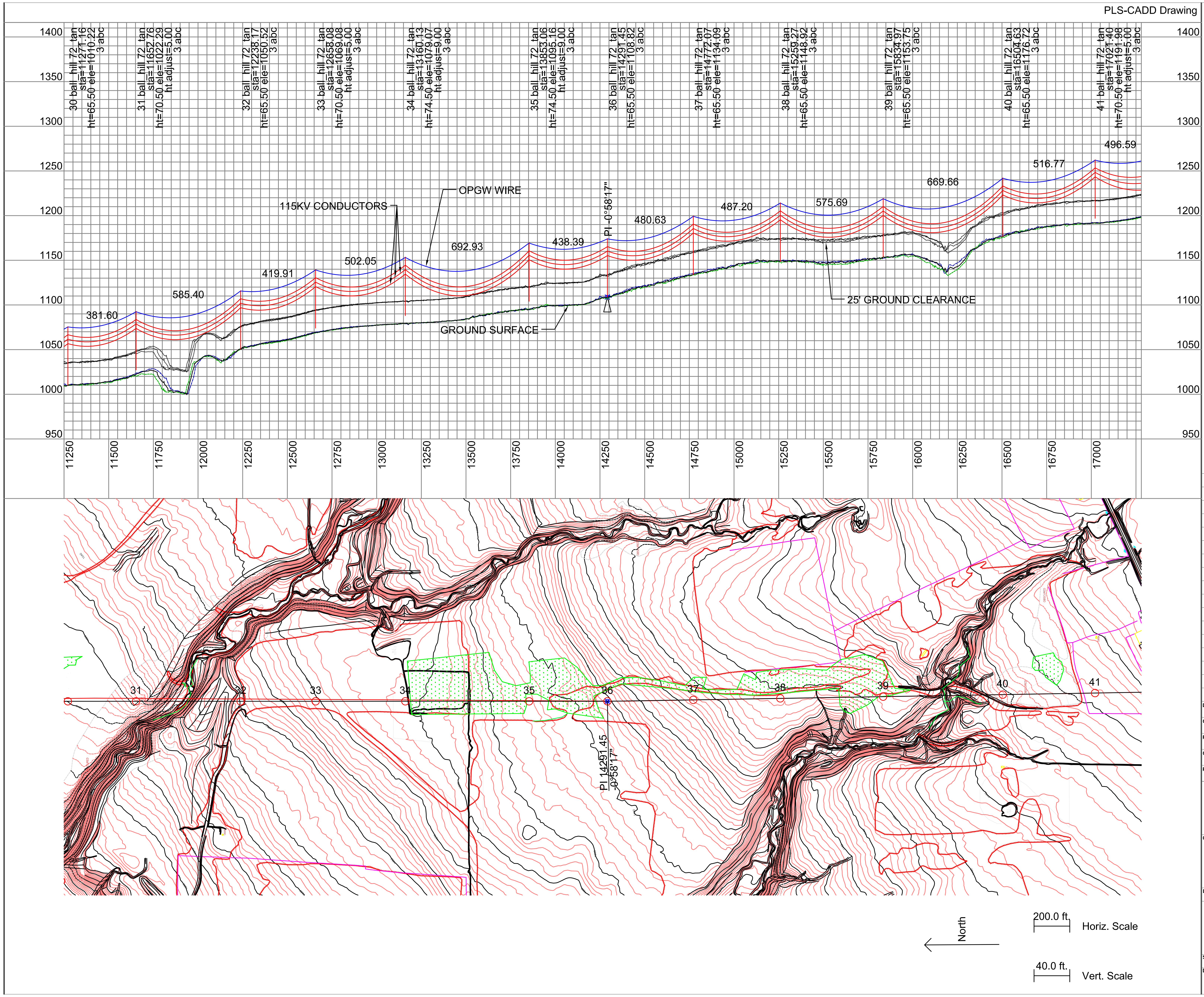
DEPT. TRANSMISSION
NO. 070308

NOBLE BALL HILL WINDPARK
115KV TRANSMISSION LINE PLAN & PROFILE

SCALE AS NOTED

DRAWING BH-T-301 SH.2
REV B

ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC | △ | ARCH | HVAC | I & C | ELECT | MECH | CIVIL | STRUC



NOTES:

1. 115KV CONDUCTOR:
   477ACSR HAWK 26/7.
   SHOWN AT 260°F

2. SHIELD WIRE:
   BRUGG OPEW 27AY/59ACS.
   SHOWN AT 120°F

REV	DATE	DESCRIPTION	DRAWN / CHECKED	RESP.ENGR. / CH.DISC.ENG.	PROJ. MGR..
B	07/11/08	CLIENT REVIEW	KMC / BB	NSG	NSG
A	07/11/08	CLIENT REVIEW	KMC / BB	NSG	NSG

DRAWN BY K. CAISSIE

CHECKED BY

RESP. ENGR. J. HARRINGTON

CHIEF DISC. ENGR. N. GHANTOUS

PROJECT MANAGER N. GHANTOUS

PRELIMINARY
NOT FOR
CONSTRUCTION

REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION ISSUE IF REQUIRED BY PROJECT ADMINISTRATION MANUAL

Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT. TRANSMISSION

NO. 070308

NOBLE BALL HILL WINDPARK

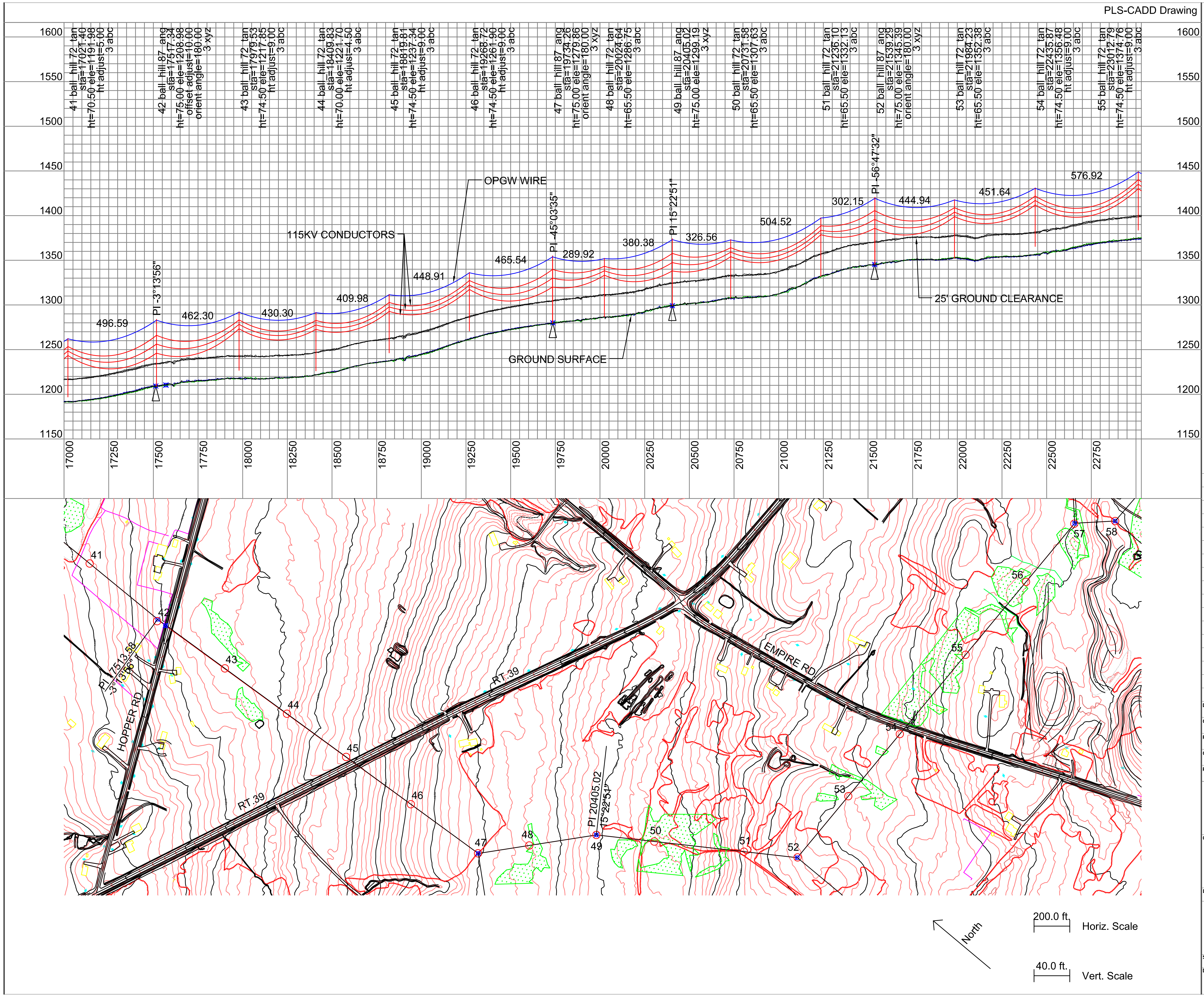
115KV TRANSMISSION LINE PLAN & PROFILE

SCALE AS NOTED

DRAWING BH-T-301 SH.3

REV B

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOTES:

1. 115KV CONDUCTOR:
   477ACSR HAWK 26/7.
   SHOWN AT 260°F

2. SHIELD WIRE:
   BRUGG OPEW 27AY/59ACS.
   SHOWN AT 120°F

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR..
B	07/11/08	CLIENT REVIEW	KMC	BB	NSG	NSG	
A	07/11/08	CLIENT REVIEW	KMC	BB	NSG	NSG	

DRAWN BY
K. CAISSIE

CHECKED BY

RESP. ENGR.
J. HARRINGTON

CHIEF DISC. ENGR.
N. GHANTOUS

PROJECT MANAGER
N. GHANTOUS

PRELIMINARY
NOT FOR
CONSTRUCTION

REPLACE WITH ENGINEERS
STAMP AT CONSTRUCTION
AND/OR FABRICATION ISSUE
IF REQUIRED BY PROJECT
ADMINISTRATION MANUAL

Careba Mott
MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
TRANSMISSION

NO.
070308

NOBLE BALL HILL WINDPARK

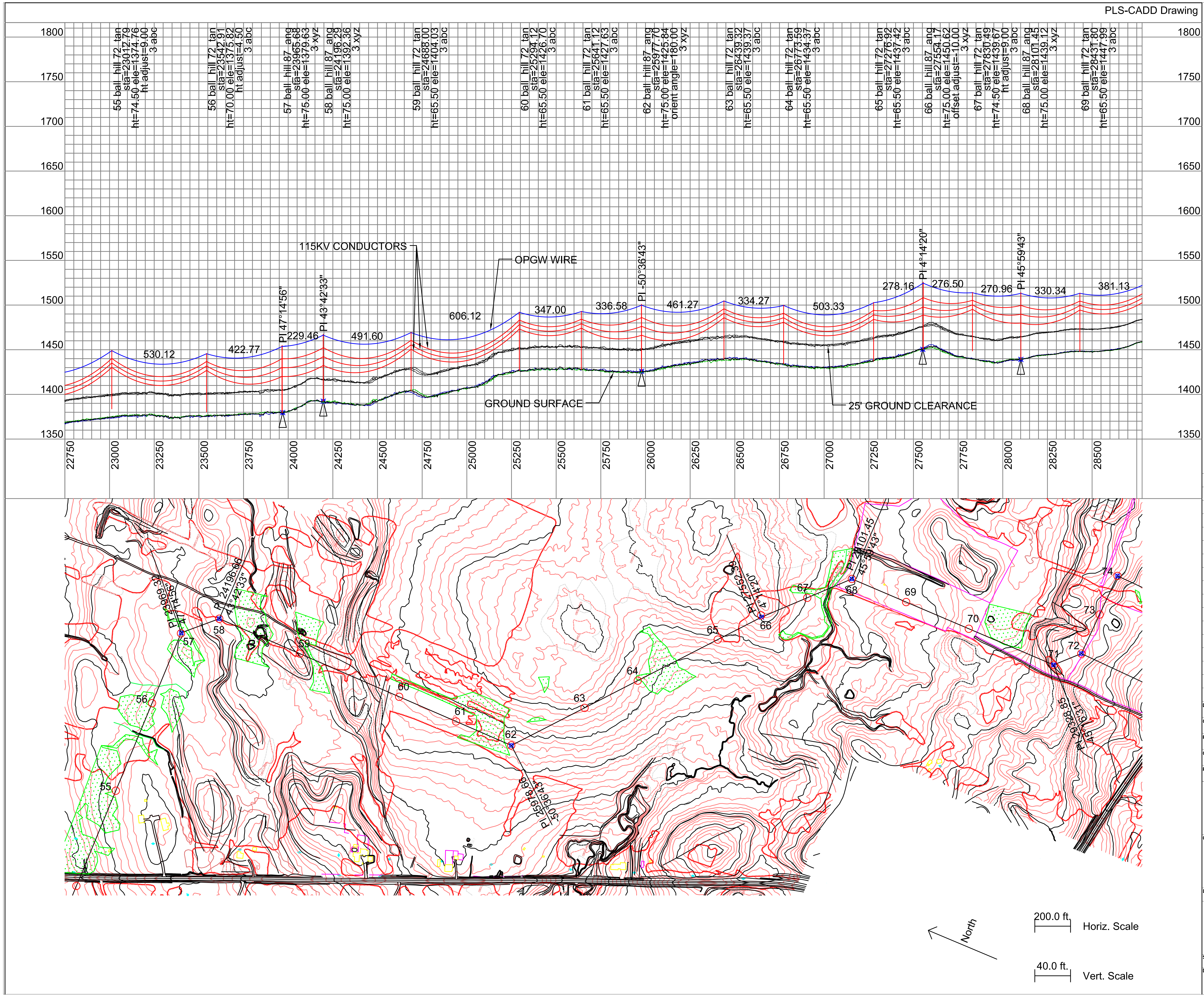
115KV TRANSMISSION LINE PLAN & PROFILE

SCALE
AS NOTED

DRAWING
BH-T-301 SH.4

REV
B

ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC	△	ARCH	HVAC	I & C	ELECT	MECH	CIVIL	STRUC



NOTES:

1. 115KV CONDUCTOR:
   477ACSR HAWK 26/7.
   SHOWN AT 260°F

2. SHIELD WIRE:
   BRUGG OPEW 27AY/59ACS.
   SHOWN AT 120°F

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.		PROJ. MGR..
B	07/11/08	CLIENT REVIEW	KMC BB		NSG		NSG	
A	07/11/08	CLIENT REVIEW	KMC BB		NSG		NSG	

DRAWN BY
K. CAISSIE

CHECKED BY

RESP. ENGR.
J. HARRINGTON

CHIEF DISC. ENGR.
N. GHANTOUS

PROJECT MANAGER
N. GHANTOUS

PRELIMINARY
NOT FOR
CONSTRUCTION

REPLACE WITH ENGINEERS
STAMP AT CONSTRUCTION
AND/OR FABRICATION ISSUE
IF REQUIRED BY PROJECT
ADMINISTRATION MANUAL

Careba Mott
MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

CLIENT/PROJECT TITLE

Noble
ENVIRONMENTAL POWER

DEPT.
TRANSMISSION

NO.
070308

NOBLE BALL HILL WINDPARK

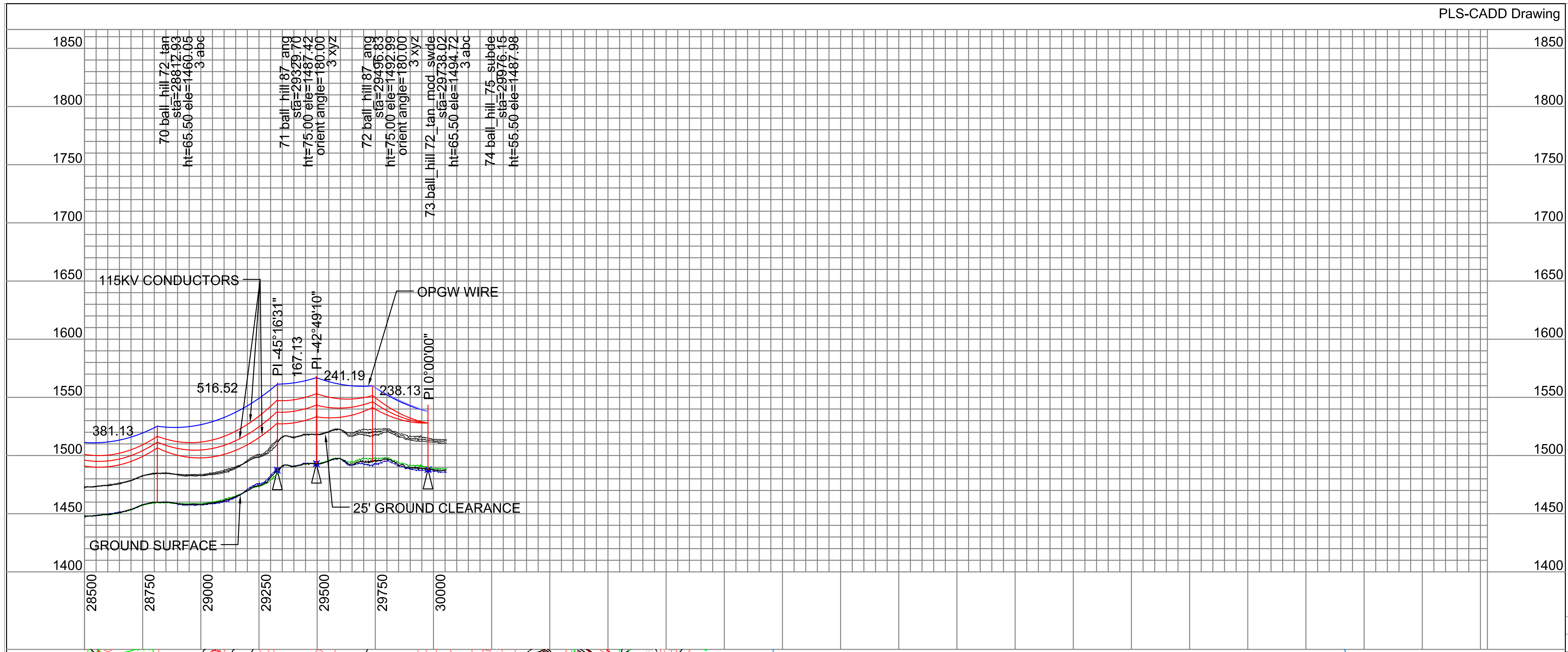
115KV TRANSMISSION LINE PLAN & PROFILE

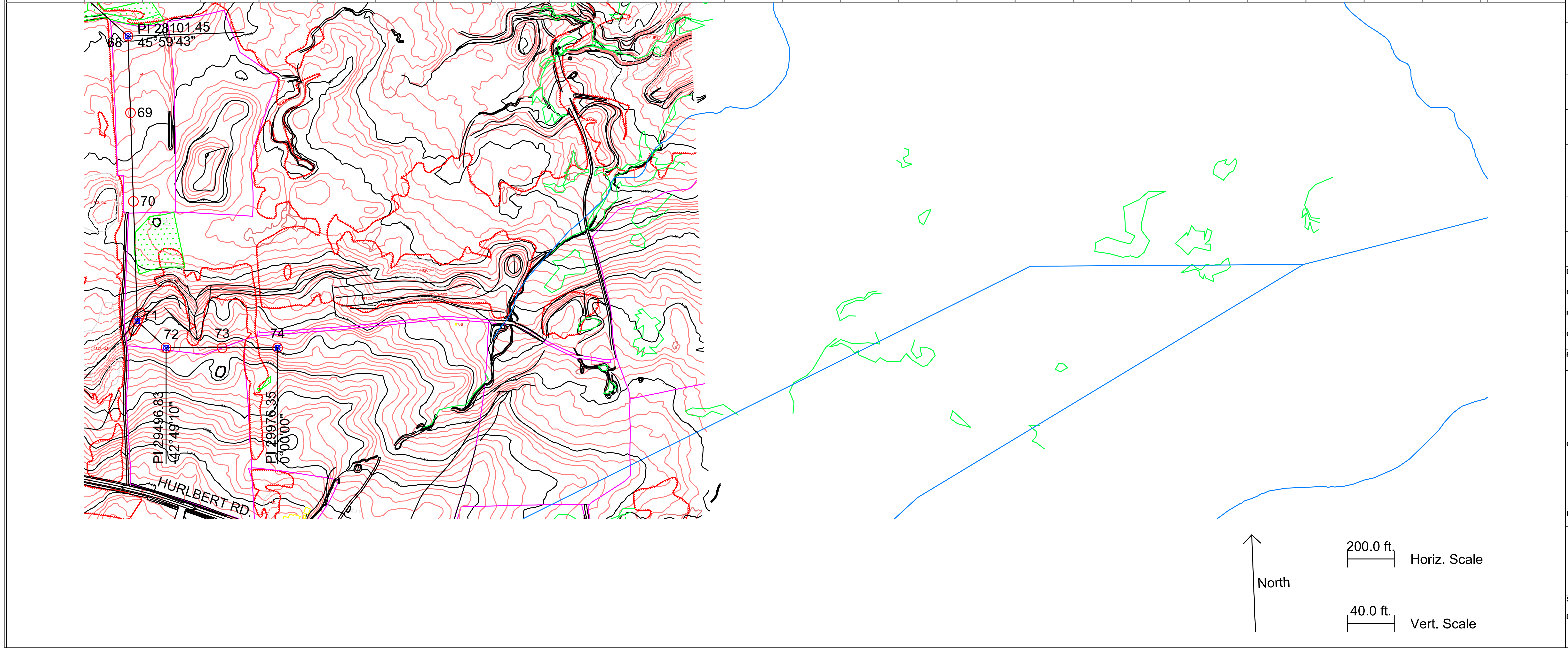
SCALE
AS NOTED

DRAWING
BH-T-301 SH.5

REV
B

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC





NOTES:

1. 115KV CONDUCTOR:
   477ACSR HAWK 26/7.
   SHOWN AT 260°F

2. SHIELD WIRE:
   BRUGG OPEW 27AY/59ACS.
   SHOWN AT 120°F

REV	DATE	DESCRIPTION	DRAWN	CHECKED	RESP.ENGR.	CH.DISC.ENG.	PROJ. MGR..
B	07/11/08	CLIENT REVIEW	KMC	BB	NSG	NSG	
A	07/11/08	CLIENT REVIEW	KMC	BB	NSG	NSG	

DRAWN BY
K. CAISSIE

CHECKED BY

RESP. ENGR.
J. HARRINGTON

CHIEF DISC. ENGR.
N. GHANTOUS

PROJECT MANAGER
N. GHANTOUS

PRELIMINARY
NOT FOR
CONSTRUCTION

REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION ISSUE IF REQUIRED BY PROJECT ADMINISTRATION MANUAL

Careba Mott MacDonald
400 BLUE HILL DRIVE, WESTWOOD, MA 02090
www.carebapower.com; www.mottmac.com

CLIENT/PROJECT TITLE
Noble
ENVIRONMENTAL POWER

DEPT.
TRANSMISSION

NO.
070308

NOBLE BALL HILL WINDPARK

115KV TRANSMISSION LINE PLAN & PROFILE

SCALE
AS NOTED

DRAWING
BH-T-301 SH.6

REV
B

ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC △ ARCH HVAC I & C ELECT MECH CIVIL STRUC