

August 30, 2012

Craig Rennie, Compliance Supervisor
Alteration of Terrain Bureau
NH DES
29 Hazen Drive
PO Box 95
Concord, NH 03302-0095

RE: Revisions to Antrim Wind Energy Alteration of Terrain permit application,
No. 120131-015, and Section 401 WQ Certification Request

Craig:

As discussed, Antrim Wind Energy (AWE) may be adding a radar tower to the project site, pending approval of the system by the FAA.

The addition of the radar tower will change the total impervious area from the site from 500,940 square feet to 501,065 square feet, an increase of 125 square feet, and civil design plans are revised for sheets C-12, C-17, C-20, and G-3, which depict the details the radar tower and radar tower site. These changes will need to be reflected in the Alteration of Terrain permit application under 6.C. and 7., respectively.

The last revision to the Alteration of Terrain permit application, submitted August 6, 2012, increased the total area of disturbance from 2,522,124 square feet to 2,648,448 square feet, which will remain unchanged for addition of the radar tower. Due to the addition of 126,324 outlined in the August 6, 2012 submittal, the Alteration of Terrain fee will need to be supplemented with an additional \$500, which has been sent to you under separate cover, and a copy of that check is attached.

The 401 Water Quality Certification, under 2.6., also needs to be revised to reflect the change the total impervious area from 500,940 square feet to 501,065 square feet, an increase of 125 square feet.

The stormwater plans, specifically Sheets WS-2, WS-3, and SW-12, have been revised to reflect this change as well. Sheets WS-2 and WS-3 show the proposed location of the radar tower in relation to the watersheds and site soils respectively. Sheet SW-12 shows a more detailed view of the tower location relative to WTG-10. A Small Pervious Area buffer, labeled B-25, has been designed to meet the project Water Quality requirements for this new impervious area. A buffer design calculation sheet is included with this submittal.

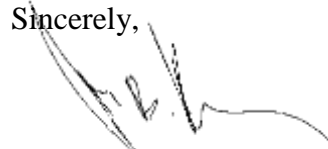
At your request, a grading plan for the proposed additional laydown yard is also being submitted at this time, and is sheet C-1A.

Finally, there are some corrections that we would like to make to the Wetlands Permit application first three pages and the Response to Env-Wt 302.04(a). Corrections to the application includes updating the Agent Information to include Dana Valteau, instead of Josh

Brown, and corrections to the wetlands impact table to reflect the correct total wetland impact amount, which is 9,755 square feet. The correction to the Response to Env-Wt 302.4(a) includes correcting the total wetland impact area to 9,755 square feet or 0.22 acres in a number of places in the text.

If you have any questions or comments, please let us know.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Kenworthy', written over a faint, illegible printed name.

John B. Kenworthy

Executive Officer

Antrim Wind Energy LLC

155 Fleet Street

Portsmouth, NH 03801-4050

Phone: 603-570-4842

Enclosure

Attachments

Antrim Wind Energy LLC
155 Fleet Street
Portsmouth, NH 03801
603-570-4842



001040
54-202/114

8/28/2012

DATE _____

PAY TO THE ORDER OF Treasurer State of New Hampshire

**500.00

\$

Five Hundred and 00/100*****

DOLLARS

State of New Hampshire Treasury
25 Capitol Street, Room 121
Concord, NH 03301

Memo

SEC Docket 2012-1 - AOT Permit Increase



[Handwritten signature]

AUTHORIZED SIGNATURE

⑈001040⑈ ⑆011402024⑆1010125354⑈

Antrim Wind Energy LLC
Treasurer State of New Hampshire

AOT Permit Fee increase

8/28/2012

001040
500.00

Centrix Checking SEC Docket 2012-1 - AOT Permit Increase

500.00

Antrim Wind Energy LLC
Treasurer State of New Hampshire

AOT Permit Fee increase

8/28/2012

001040
500.00

Centrix Checking SEC Docket 2012-1 - AOT Permit Increase

500.00



THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF ENVIRONMENTAL SERVICES
LAND RESOURCES MANAGEMENT
WETLANDS BUREAU

29 Hazen Drive, PO Box 95
Concord, NH 03302-0095

Phone: (603) 271-2147 Fax: (603) 271-6588

Website: <http://des.nh.gov/organization/divisions/water/wetlands/index.htm>

Permit Application Status: <http://des.nh.gov/onestop/index.htm>



WETLANDS PERMIT APPLICATION

Administrative Use Only	Administrative Use Only	Administrative Use Only	File Number:
			Check No.
			Amount:
			Initials:

1. REVIEW TIME AND IMPACT TYPE: Use Attachment "A" to determine review time and impact type.

☐ Expedited Review, Minimum Impact ☐ Standard Review, Minimum Impact ☒ Standard Review, Minor or Major Impact

2. PROJECT LOCATION:

ADDRESS: 354 Keene Rd.

TOWN/CITY: Antrim

TAX MAP: See attached.

BLOCK:

LOT: See attached.

UNIT:

LOCATION COORDINATES: N: 203,000 E: 890,000

☐ Latitude/Longitude ☐ UTM ☒ State Plane

3. PROPERTY OWNER INFORMATION:

NAME: See attached Exhibit 10.

EMAIL or FAX:

PHONE:

MAILING ADDRESS:

TOWN/CITY:

STATE:

ZIP CODE:

4. APPLICANT INFORMATION:

NAME: Antrim Wind Energy, LLC

EMAIL or FAX: generate@eolian-energy.com

PHONE: 603-570-4842

MAILING ADDRESS: 155 Fleet St.

TOWN/CITY: Portsmouth

STATE: NH

ZIP CODE: 03801-4050

5. AGENT INFORMATION:

NAME: Dana B. Valteau

COMPANY NAME: TRC

EMAIL or FAX: dvalteau@trcsolutions.com

PHONE: 207-620-3834 / 207-215-4582

MAILING ADDRESS: 14 Gabriel Drive

TOWN/CITY: Augusta

STATE: ME

ZIP CODE: 04330

6. CHECK BOX TO INDICATE APPLICABLE PROJECT TYPES:

- | | |
|---|--|
| <input type="checkbox"/> Excluding culverts and bridges, all work in the bed or bank of a lake/pond of which the property owner(s) listed on page 1 do NOT own the entire bed and banks of the lake/pond.

<input type="checkbox"/> Dock construction, maintenance, repair or replacement on a RIVER. | <input checked="" type="checkbox"/> Work in a wetland, stream, river (excluding docks on rivers), prime wetland, prime wetland buffer, tidal water, salt marsh, sand dune, tidal buffer zone or in a pond of which the entire bed and banks are owned by the property owner(s) listed on page 1.

<input checked="" type="checkbox"/> All culvert and bridge construction, maintenance, repair or replacement. |
|---|--|

7. PROJECT DESCRIPTION:

The proposed Antrim Wind Energy Project is a wind energy generation facility to be located in Antrim, New Hampshire. The project will include construction of ten (10) wind turbine generators, a substation, and associated access roads, crane pads, and stormwater management facilities. The proposed site is generally linear, running approximately north to south along the ridge top of Tuttle Hill and Willard Mountain and spanning several individually owned parcels. The site will be accessed from State Route 9 (Keene Road). Approximately 4.0 miles of gravel road will be constructed. Within the project area approximately 63 acres will be disturbed during construction. Following construction approximately 49.4 acres will be restored and revegetated including temporary works space, temporary laydown yards, roadway shoulders and side slopes, and much of the turbine construction pad area at tower locations. Approximately 11.5 acres will remain as permanently developed area including the access road, substation yard, crane pads, and tower foundations.

8. INDICATE AREA OF PROPOSED IMPACTS FOR EACH RESOURCE:

Resource:	Permanent Sq. Ft.	Permanent Lin. Ft.	Temporary Sq. Ft.	Temporary Lin. Ft.	After-the-fact Sq. Ft.	After-the-fact Lin. Ft.
Forested wetland	5,672	-		-		-
Scrub-shrub wetland	3,631	-		-		-
Emergent wetland		-		-		-
Wet meadow		-		-		-
Bog		-		-		-
Prime wetland		-		-		-
Prime wetland buffer		-		-		-
Docking structure		-		-		-
Tidal Buffer Zone		-		-		-
Tidal water		-		-		-
Salt Marsh		-		-		-
Sand dune		-		-		-
Intermittent Stream	156	156				
Perennial Stream	296	74				
River						

Lake						
Pond						
Other						
Total	9,755	230				

9 - 13. IF APPLICABLE, PROVIDE:

9. Cubic yards of proposed sand for beach replenishment: **NA**

10. Cubic yards of proposed dredge material for surface water dredge: **NA**

11. Contributing watershed size(s) of impacted stream(s) and river(s) (acres or square miles): **AN-29: 12.6 ac. AN-17:106.4 ac.**

12. U. S. Geological Survey Topographic Map Waterbody name: **North Branch River**

13. ONLY Required for docking structures	(a) Straight line distance pin to pin (lin. ft.)	(b) Actual natural navigable shoreline pin to pin (lin. ft.)	(a) + (b) / 2 = Shoreline Frontage (lin. ft.):

14. APPLICATION FEE:

☐ Minimum Impact, Expedited Review Application: Flat fee of \$ 200

- OR -

☒ Minimum, Minor or Major Impact, Standard Review Application: Complete calculation below

Total temporary and permanent impacts: _____ 9,755 sq. ft. X \$0.20 = _____ 1,951

Temporary Docking Structure: _____ sq. ft. X \$1.00 = _____

Permanent Docking Structure: _____ sq. ft. X \$2.00 = _____

Projects proposing shoreline structures add \$200 or NA = _____

Total = _____

The Application Fee is above calculated Total or \$200, whichever is greater = _____ 1,951

15. INDICATE RELATED FILE / APPROVAL NO. AND STATUS:

Existing Wetlands Bureau file no. this application is replacing: **No. 2012-00211**

Wetlands Bureau enforcement (subject and abutting properties):

Wetlands Bureau emergency authorization (subject property):

Wetlands Bureau denials (subject and abutting properties):

Wetlands Bureau withdrawals (subject and abutting properties):

Wetlands Bureau approvals (subject and abutting properties):

Shoreland Program waiver or permit:

Alteration of Terrain Bureau: **No. 120131-015**

Watershed Management Program:

Subsurface Systems Bureau: **No. 201200219**

Other NHDES Programs and Bureaus: **SEC No. 2012-001**

Response to Env-Wt 302.04(a)

(a) For any major or minor project, the applicant shall demonstrate by plan and example that the following factors have been considered in the project's design in assessing the impact of the proposed project to areas and environments under the department's jurisdiction:

(1) The need for the proposed impact;

Impacts to wetlands have been avoided and minimized to the greatest extent practical. Turbine, access road, substation, and collector system facilities have been carefully sited to meet design, operational, and safety needs while avoiding and minimizing impacts to natural resources, including wetlands.

Ten identified wetlands will be impacted either temporarily or permanently as a result of Project construction and operation. No jurisdictional vernal pools, or areas currently described as potential vernal pools will be impacted as a result of Project construction or operation. In total, approximately 0.22 acres (9,755 square feet) of wetland impact are expected to be incurred as a result of construction and operation of the proposed Project. This small amount of impact is the result of careful Project planning and design, which aimed to avoid and minimize impacts to these important resources. The direct wetland impacts are those which were deemed unavoidable during the Project planning process.

(2) The alternative proposed by the applicant is the one with the least impact to wetlands or surface waters on site;

During the development of the Project the AWE made significant efforts to avoid and minimize impact to wetlands and surface waters. Prior to siting of any facilities, AWE conducted a reconnaissance survey for sensitive resources, including wetlands, streams and natural communities. Once these areas were identified, facilities were sited and formal delineations were conducted. During detailed design of the facility, numerous revisions were made to the iterative Project layout design process to further reduce the level of impact of the Project. However, due to design and construction constraints of wind projects in New England, some level of wetland impact was unavoidable. AWE believes that the Project, as presented, represents the lowest possible degree of impact to wetlands and surface waters. For additional information on the alternatives evaluated for this Project, please refer to Section H of the SEC Application.

(3) The type and classification of the wetlands involved;

Detailed narrative descriptions of all identified wetland features relevant to the Project are provided in the full Wetland Delineation Report, which is provided in Exhibit 5 of this Wetlands Permit Application.

In general, wetlands within the Project area consist primarily of small forested wetlands that occur along skidder trails, in confined pockets in the regional bedrock, in saddle areas along the ridgeline, and in areas with poorly drained soils that support wetland vegetation. Streams within the Project area include unnamed perennial and intermittent streams which drain either to the north toward Route 9, or to the southeast into Gregg Lake. Because the proposed Project area is along a ridgeline and is moderately well drained, very few perennial streams occur. Observations in the field generally

suggest that rainfall and snow-melt quickly run off the ridge to lower elevations, without collecting volumes that fill natural depressions or create natural ponds.

A total of ten wetlands will be impacted by Project operation and development. Seven of these are palustarine forested wetlands (five PFO1 and two PFO4), and three are palustarine scrub-shrub wetlands (PSS1) in maintained electric transmission ROW and in a former gravel borrow pit. For detailed descriptions of these wetlands, please see the Supplemental Wetland Delineation Report, Exhibit 5 of this Application, Table 4-1.

- (4) *The relationship of the proposed wetlands to be impacted relative to nearby wetlands and surface waters;*

The locations of wetlands to be impacted relative to nearby wetlands and surface waters are illustrated in Appendix A, Figure 2 provided in the Supplemental Wetland Delineation Report, which is Exhibit 5 of this Application.

- (5) *The rarity of the wetland, surface water, sand dunes, or tidal buffer zone area;*

None of the wetlands or surface waters impacted by the Project is considered rare.

- (6) *The surface area of the wetlands that will be impacted;*

In total, approximately 0.22 acres (9,755 square feet) of wetland impact are expected to be incurred as a result of construction and operation of the proposed Project. Specific impacts to individual wetlands are described in Table 4-1 of the Supplemental Wetland Delineation Report, which is provided in Exhibit 5 of this Application.

- (7) *The impact on plants, fish and wildlife including, but not limited to:*

The Project does not expect to have an undue adverse impact on fish and wildlife species. A detailed discussion of the fish and wildlife impacts associated with the Project is included in Section I of the SEC Application and associated appendices.

- a. Rare, special concern species;
- b. State and federally listed threatened and endangered species;
- c. Species at the extremities of their ranges;
- d. Migratory fish and wildlife;
- e. Exemplary natural communities identified by the DRED-NHB; and
- f. Vernal pools.

- (8) *The impact of the proposed project on public commerce, navigation and recreation;*

A detailed discussion of impact of the Project on public commerce, navigation and recreation is included in Section J of the SEC Application.

- (9) *The extent to which a project interferes with the aesthetic interests of the general public. For example, where an applicant proposes the construction of a retaining wall on the bank of a lake, the applicant shall be required to indicate the type of material to be used and the effect of the construction of the wall on the view of other users of the lake;*

A detailed discussion of the aesthetic impact of the Project is included in Section I of the SEC Application and associated appendix. The Project does not anticipate having an undue adverse impact.

- (10) The extent to which a project interferes with or obstructs public rights of passage or access. For example, where the applicant proposes to construct a dock in a narrow channel, the applicant shall be required to document the extent to which the dock would block or interfere with the passage through this area;*

The Project is located entirely on private land and any land access is granted at the will of the landowners. The Project will limit access to their immediate project facilities and access to the remainder of the property will remain at the landowner's will. Please see Section J.1 of the SEC application for a further discussion of public rights of passage or access.

- (11) The impact upon abutting owners pursuant to RSA 482-A:11, II. For example, if an applicant is proposing to rip-rap a stream, the applicant shall be required to document the effect of such work on upstream and downstream abutting properties;*

No wetland impacts will occur within 20 feet of adjacent property boundaries. All abutting property owners will be notified of the proposed project in accordance with NHDES rules. Documentation of this notification is found in Exhibit 4.

- (12) The benefit of a project to the health, safety, and well being of the general public;*

Public health and safety impacts of the Project are discussed in Section I of the SEC Application.

- (13) The impact of a proposed project on quantity or quality of surface and ground water. For example, where an applicant proposes to fill wetlands the applicant shall be required to document the impact of the proposed fill on the amount of drainage entering the site versus the amount of drainage exiting the site and the difference in the quality of water entering and exiting the site;*

Due to the lack of groundwater resources on the site, this project is not expected to have any direct or indirect impacts on groundwater drinking resources. The AWE site does not have any aquifers on the project site and there are no source water protection and/or well head protection areas on or adjacent to the site. The closest public water supply well is 1.06 miles from the project development. The project does not propose to make large groundwater withdrawals and thus will have no effect on groundwater supply.

Most of the site is made up of stony soils that are relatively shallow in depth to bedrock, and observations in the field generally suggest that rainfall and snow melt in the spring quickly run off the ridge to lower elevations, without collecting volumes that fill natural depressions or create natural ponds. The small forested wetland areas on the site occur along skidder trails, confined pockets in the regional bedrock, and in saddle areas along the ridgeline. These type of soils limit the value of these wetlands for groundwater recharge. Additionally, wetlands with peaty, organic soils increase the retention time of water, slowing recharge.

The limited ability of the site wetlands to recharge groundwater combined with limited sources of potential project pollutants that would adversely affect the quality of the groundwater results in a very low potential for this project to adversely affect groundwater quality.

The majority of wetlands in the project are perched with shallow depths to bedrock or impervious soils and rely on precipitation, surface sheet flow, and shallow subsurface flows for maintenance of wetland hydrology. There are a few wetlands occurring along benches at the toe of steep slopes where the hydrology of the wetland relies primarily on the discharge of groundwater from breakout seeps. Because the project has minimal wetland impacts (0.22 acres of impact total in 10 distinct wetland areas) and proposes to maintain natural flow patterns to the extent practical, there should be minimal change in groundwater discharge patterns to wetlands.

The intent in the project development has been to minimize surface water and stormwater runoff impacts starting with the initial field survey work through the design phase and by implementing accepted erosion control and stormwater Best Management Practices (BMPs) during construction and operation of the facility. During the field survey portion of the project, areas of drainage including jurisdictional wetland and streams as well as non-jurisdictional drainage (to the extent possible) were mapped during field surveys. The design phase included maintaining natural drainage patterns where possible through the use of culverts and subsurface stone drainage ways (stone mattresses). During construction, field drainage conditions will be taken into consideration, and there will be flexibility to install appropriate measures to maintain drainage. Any runoff from the roads will be routed into undisturbed buffers to help maintain water quality and disperse and distribute water volumes to approximate pre-development flows.

Additional erosion control and stormwater BMPs to protect surface water quality during construction of this project have focused on control of erosion during construction through use of sediment barriers and the use of soil stabilization measures including erosion control blankets, spray-on polymer emulsions, and prompt stabilization of exposed surfaces. See the Civil Design Plans at Exhibit 7A of the SEC Application.

The proposed development will alter approximately 63 acres of land. In order to evaluate the project's effect on peak stormwater runoff rates, a hydrologic model was developed to evaluate the existing and proposed drainage conditions on the site. The results of the analyses indicate that there is no significant change in peak discharge rates between the pre- and post-development conditions for the 2, 10, and 50 year storm events (See the stormwater management plans included in the Alteration of Terrain permit application included as Appendix 2B of the SEC application).

(14) The potential of a proposed project to cause or increase flooding, erosion, or sedimentation;

The project has been designed in conformance with standard best management practices for wind park construction and stormwater management. Details of the stormwater management plans for the Project are included in the Alteration of Terrain permit application included as Appendix 2B of the SEC Application.

(15) The extent to which a project that is located in surface waters reflects or redirects current or wave energy which might cause damage or hazards;

This criterion typically applies to projects involving shoreline alterations. Since there are no large open bodies of water or flowing streams being affected by the Project, proposed redevelopment of the site will not redirect current or wave energy. Stream crossings have been designed in accordance with the *New Hampshire Stream Crossing Guidelines* to the extent practicable to minimize the potential for erosion resulting from new crossings.

(16) The cumulative impact that would result if all parties owning or abutting a portion of the affected wetland or wetland complex were also permitted alterations to the wetland proportional to the extent of their property rights. For example, an applicant who owns only a portion of a wetland shall document the applicant's percentage of ownership of that wetland and the percentage of that ownership that would be impacted;

AWE has leased approximately 1,854 acres of private land on seven parcels for the development of the Project. All wetlands that will be impacted by the Project are located entirely within these parcels.

(17) The impact of the proposed project on the values and functions of the total wetland or wetland complex;

The AWE project has been designed to avoid and minimize impacts on wetlands to the extent practicable. This started with desktop review of readily available information including USGS and NWI mapping to identify the field survey area. The initial assessment of the field survey corridor started with investigation for vernal pools as snow cover left the site and later for wetlands. As it was determined there would be wetland impacts and needs for changes in project alignment and design, additional survey area was added and investigated for natural resources. This is typical of an iterative process that continued throughout the period of resource delineation and civil design (May – October, 2011).

The total permanent impact to wetlands and surface water resources is approximately 0.22 acres. This wetland impact is only 0.3 percent of the land area to be disturbed by this project (63 acres).

The primary function of wetlands on the project site is wildlife habitat. The very small area of impact inherently limits the amount of impact to this function. Additionally the narrow, linear nature of these impacts (primarily from gravel roads) further limits impact to this function. The one perennial stream crossing has been designed with an open bottom arch culvert which will allow for maintenance of the natural substrates and unrestricted flows along the natural channel.

There are indirect impacts from road construction and a turbine pad to vernal pool terrestrial habitat (VP1, 2, 3, and 7), however these impacts are only to upland area and do not include any impact to the associated wetlands. It is not anticipated that these impacts will adversely affect the productivity of these pools. There is no direct impact to any of the vernal pool breeding habitats (depression). See the attached Vernal Pool Report at Exhibit 6 for additional information.

(18) The impact upon the value of the sites included in the latest published edition of the National Register of Natural Landmarks, or sites eligible for such publication;

An evaluation of the impact of the Project on historic sites is included in Section I and Appendices 9C and 9D of the SEC Application.

(19) The impact upon the value of areas named in acts of congress or presidential proclamations as national rivers, national wilderness areas, national lakeshores, and such areas as may be established under federal, state, or municipal laws for similar and related purposes such as estuarine and marine sanctuaries; and

No such areas have been identified within the Project area.

(20) The degree to which a project redirects water from one watershed to another.

The Project has been designed to minimize the impacts to hydrology on the site and minimize the interruption of the natural flow. Details of the design can be found in the Alteration of Terrain permit application included as Appendix 2B of the SEC Application.

BUFFER DESIGN CRITERIA (Env-Wq 1508.08)

Type

B-25 - Small Pervious Area Buffer

Enter the type of buffer (e.g., residential buffer) and the node name in the drainage analysis, if applicable

Yes	Yes/No	Is the buffer adjacent to the area that you are treating?	← yes
Yes	Yes/No	Does the runoff enter the buffer as sheet flow (naturally or with a level spreader?)	
No	Yes/No	Has a level spreader been provided?	
-	%F	% Forest (F) cover in the buffer (remaining assumed to be meadow (M)).	
100.0	%M	% Meadow cover in the buffer	
-	%A	Hydrologic soil group (HSG) <u>in buffer</u> (%A, %B, %C). Remaining assumed to be D soil	
-	%B		
100.0	%C		
-	%D		
15.0	%	Buffer Slope	← ≤ 15%

If a Residential or Small Pervious Area buffer is proposed:

No	Yes/No	Is the runoff from a single family or duplex residential lot?	← yes
10.0		L_{FP} = maximum flow path to the buffer	
0.01	ac	A = area draining to the buffer	
0.01	ac	A_{IMP} = impervious area draining to the buffer	
50.0	%	I = percent impervious area draining to the buffer	← ≤ 10%
TRUE		Option A check: $A_{IMP} \leq 1$ ac & $L_{FP} \leq 100'$	← yes for
FALSE		Option B check: $I \leq 10\%$ & $L_{FP} \leq 150'$	A or B
No		Level Spreader proposed? (Sheet flow without the aid of a LS)	← no
Good		Slope check	← ≤ 15%
60	feet	Buffer base length due to soil type (weighted based on HSG)	
30	feet	Buffer length adjustment due to steepness of buffer	
30	feet	Buffer length adjustment due to percent of meadow in buffer	
120	feet	Minimum buffer length required ¹	

If a Developed Area Buffer with a Level Spreader is proposed:

No		Level Spreader proposed?	← yes
	ac	A = Area draining to the buffer ²	
	ac	A_I = impervious area draining to the buffer ²	
-	%	Percent impervious of the area that is draining to the buffer	
Good		Slope check	← ≤ 15%
-	sf	Buffer base area due to soil type in the buffer (weighted based on HSG)	
-	sf	Buffer area adjustment due to impervious cover draining to buffer	
-	sf	Buffer area adjustment due to steepness of buffer	
-	sf	Buffer area adjustment due to percent of meadow in buffer	
-	sf	A_{MIN} = Minimum buffer area required	
	ft	L_{LS} = <u>total</u> length of level spreader(s) provided ³	
	ft	L_B = buffer length ⁴	
	sf	A_B = buffer area provided	← ≥ A_{MIN}

If a Roadway Buffer is proposed:

No	Yes/No	LS proposed? Roadway/shoulder must sheet directly to the buffer.	← no
	Yes/No	Do any other areas drain to the buffer (other than roadway & shoulder)?	← no
	Yes/No	Is the road parallel to the contours of the buffer slope?	← yes
Good		Natural slope check ⁵	← ≤ 20%
	feet	How much embankment slope counts toward the buffer? ⁶	← 0 - 20 feet
	Lane(s)	Number of travel lanes draining to the buffer	
20.0		Minimum buffer flow path (L_{MIN})	
	feet	Buffer flow path	← ≥ L_{MIN}

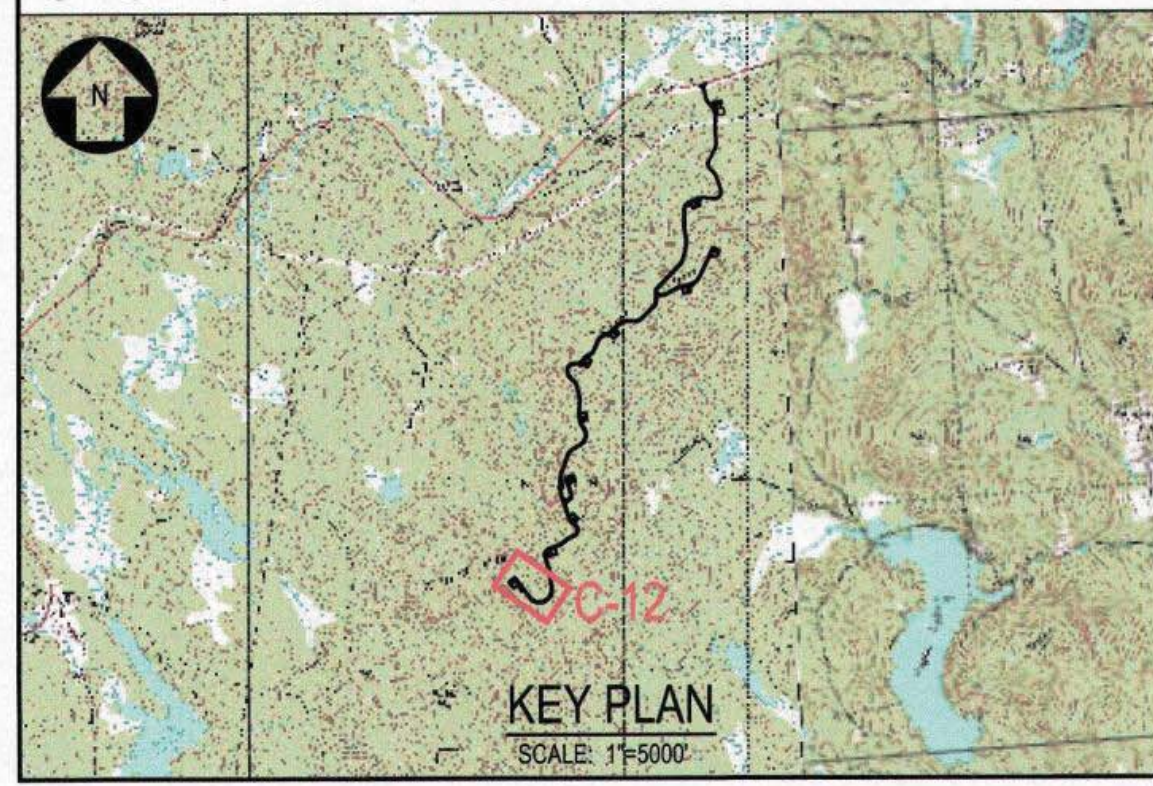
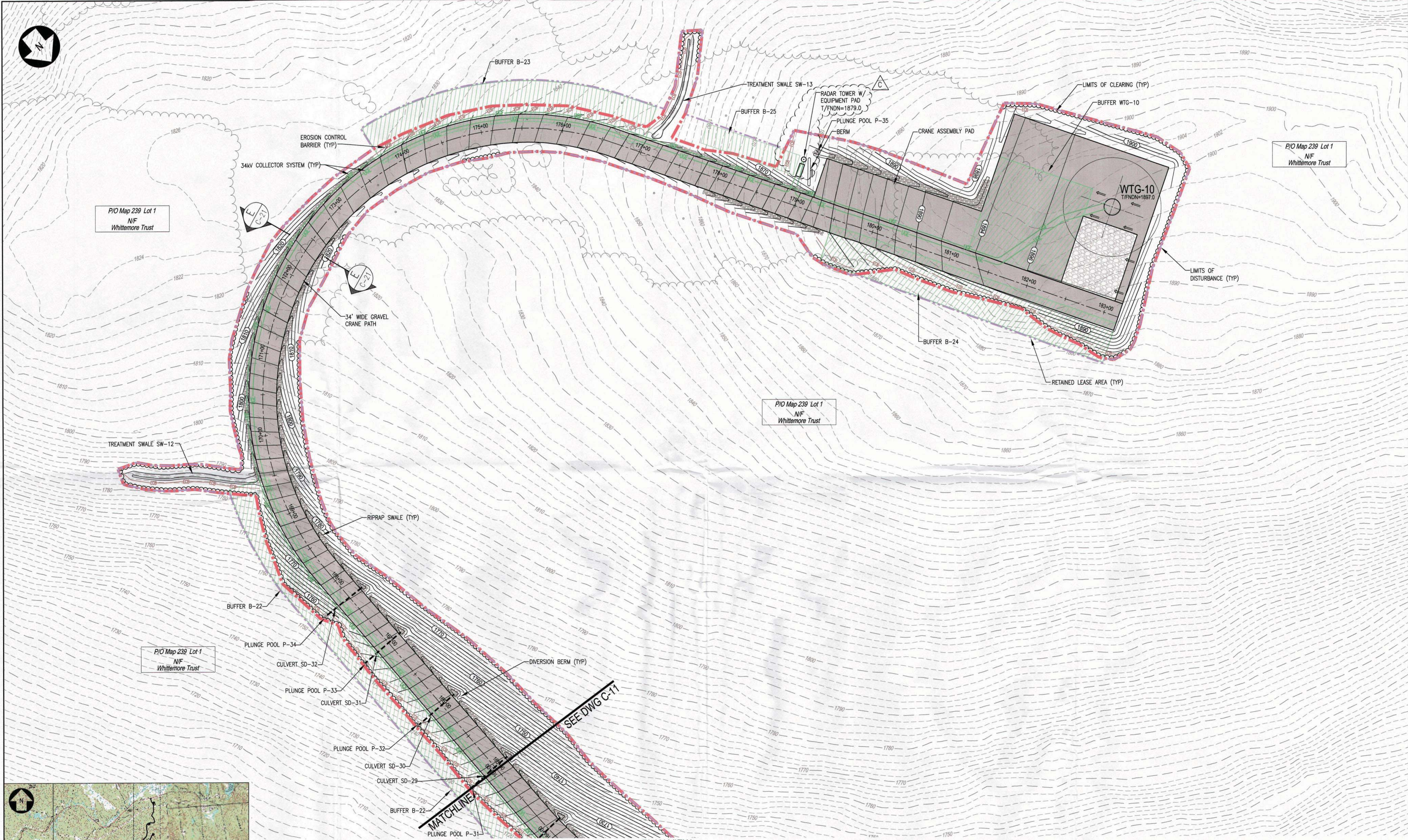
If a Ditch Turn Out Buffer is proposed:

No		Level Spreader proposed?	← yes
	feet	Level Spreader Length ⁷	
	Yes/No	Do any other areas drain to the buffer (other than roadway & shoulder)?	← no
	sf	Drainage Area to the ditch	← ≤ 6000 sf
Good		Slope check	← ≤ 15%
-	feet	Buffer base length due to soil type (weighted based on HSG)	
30	feet	Buffer length adjustment due to steepness of buffer	
30	feet	Buffer length adjustment due to percent of meadow in buffer	
60	feet	Minimum buffer length required ⁸	

1. Minimum buffer length is the total of the above three cells OR 45', whichever is greater.
2. If a detention structure is used upstream of the level spreader, the drainage area draining to the buffer shall considered equal to 1 acre of impervious area for every 1 cfs of peak 2-year, 24-hr outflow from the detention structure.
3. Minimum level spreader length is 20 feet and maximum is 50 feet. You may use multiple level spreaders if the stormwater is evenly distributed to them.
Example: $A_{MIN} = 6,000$ sf with a 100' buffer available. Therefore the LS lengths must total 60 feet (6,000 sf/100'); however LS lengths must be between 20' and 50' so one 60' long level spreader is not permitted. The design would have two LS, each 30'. As long as a collection basin is provided to evenly distribute the flow to the two level spreaders.
4. Minimum buffer length 50 feet.
5. If the slope is man-made, it must be 15% or flatter.
6. 20' (max) of the roadway embankment slope may count towards the buffer length if it is 3:1 or flatter.
7. Minimum level spreader length is 20 feet and maximum is 50 feet. You may use multiple level spreaders if the stormwater is evenly distributed to them. For example, you may have a total length of 100 feet for the level spreaders as long as you have two 50' level spreaders.
8. Minimum buffer length is the total of the above three cells OR 50', whichever is greater.

Designer's Notes:

A buffer length of 120 feet is provided.



- NOTES:**
1. SEE DRAWING G-2 FOR PROJECT NOTES, LEGEND, AND ABBREVIATIONS.
 2. SEE DRAWING G-3 FOR OVERALL PROJECT MAP AND OVERALL PROJECT DRAWING INDEX.
 3. SEE DRAWING C-24 FOR CULVERT, BUFFER, TREATMENT SWALE, LEVEL SPREADER AND PLUNGE POOL SCHEDULES.

PLAN VIEW
SCALE: 1"=50'

NOT FOR CONSTRUCTION

NO.	REVISION	DATE	BY	CK	P.E. STAMPED	P.E. No.
C	ADDED RADAR TOWER LOCATION	8/27/12	PMM	PGT	DTB	8105
B	ISSUED FOR PERMITTING	1/20/12	PMM	PGT	DTB	8105
A	ISSUED FOR CLIENT REVIEW	12/19/11	PMM	PGT		

STATE OF NEW HAMPSHIRE
DANIEL T. BUTLER
No. 8105
LICENSED PROFESSIONAL ENGINEER

8/23/12

CLIENT APPROVAL

APPROVED BY

COMPANY

DATE

TRC/PMI DESIGNED

TRC/KAV DRAWN

TRC/DTB CHECKED

APPROVED

REVIEWED

PLAN: MAIN ACCESS ROAD
STA 165+00 TO 183+20
ANTRIM WIND ENERGY, LLC
ANTRIM WINDPARK
NEW HAMPSHIRE

ANTRIM

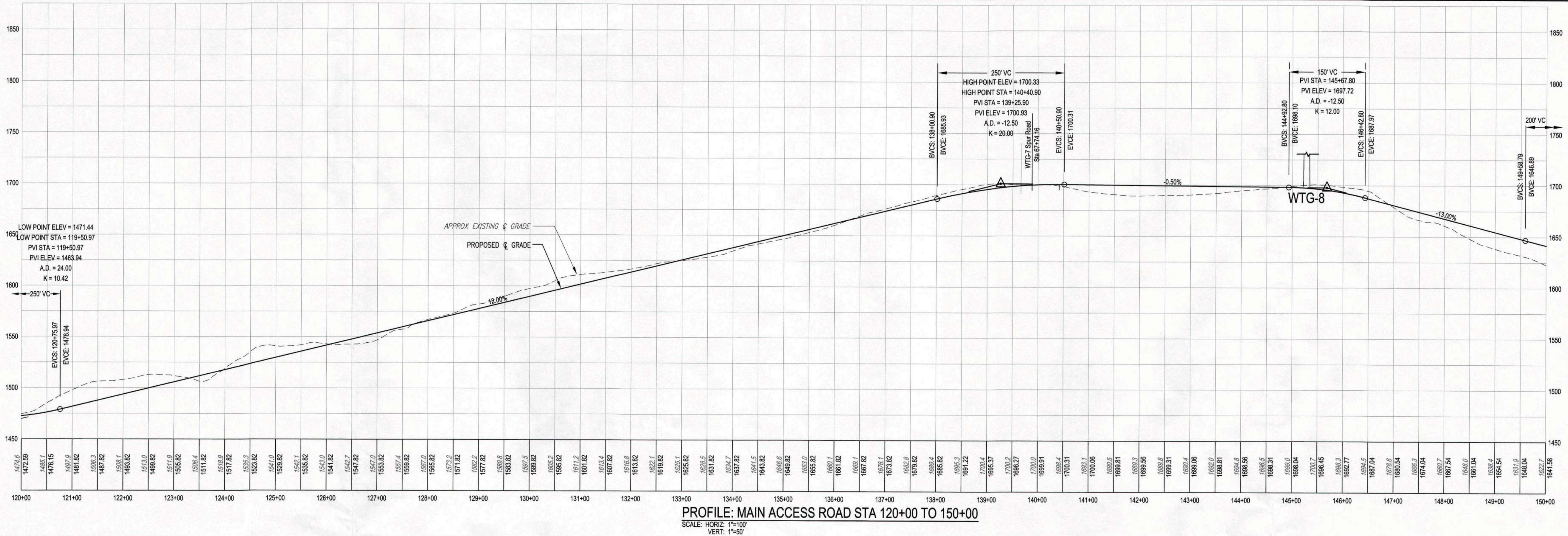
TRC

SCALE: AS NOTED

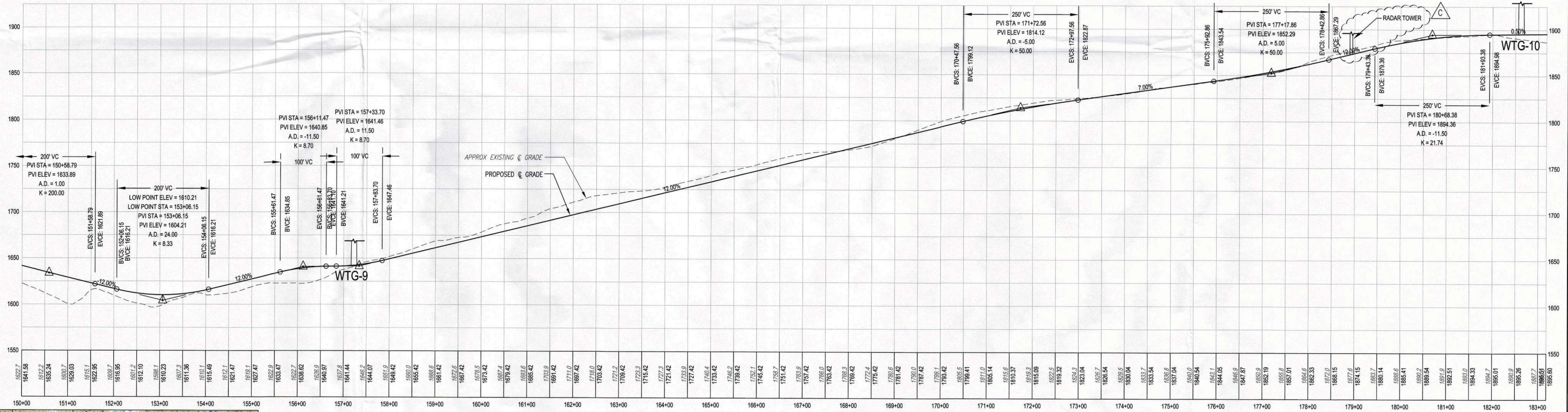
249 WESTERN AVENUE
AUGUSTA, ME 04330
PROJECT NO: 186317
DATE: 11-8-11

C-12

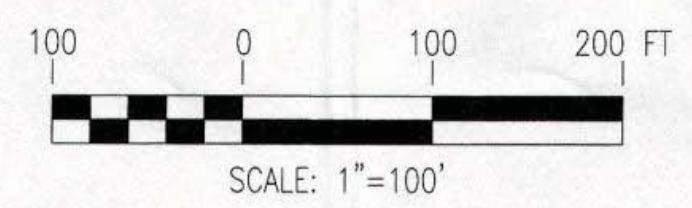
REV. C



PROFILE: MAIN ACCESS ROAD STA 120+00 TO 150+00
SCALE: HORIZ: 1"=100'
VERT: 1"=50'



PROFILE: MAIN ACCESS ROAD STA 150+00 TO 183+20
SCALE: HORIZ: 1"=100'
VERT: 1"=50'



- NOTES:**
- SEE DRAWING G-2 FOR PROJECT NOTES, LEGEND, AND ABBREVIATIONS.
 - SEE DRAWING G-3 FOR OVERALL PROJECT MAP AND OVERALL PROJECT DRAWING INDEX.
 - SEE DRAWING C-24 FOR CULVERT, BUFFER, TREATMENT SWALE, LEVEL SPREADER AND PLUNGE POOL SCHEDULES.

NOT FOR CONSTRUCTION

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
C	ADDED RADAR TOWER LOCATION	8/27/12	PMM	PGT	DTB	8105
B	ISSUED FOR PERMITTING	1/20/12	PMM	PGT	DTB	8105
A	ISSUED FOR CLIENT REVIEW	12/19/11	PMM	PGT		



CLIENT APPROVAL	TRC/PMM DESIGNED
APPROVED BY	TRC/KAV DRAWN
COMPANY	TRC/DTB CHECKED
DATE	APPROVED
	REVIEWED

PROFILE: MAIN ACCESS ROAD
STA 120+00 TO 183+20
ANTRIM WIND ENERGY, LLC
ANTRIM WINDPARK
NEW HAMPSHIRE

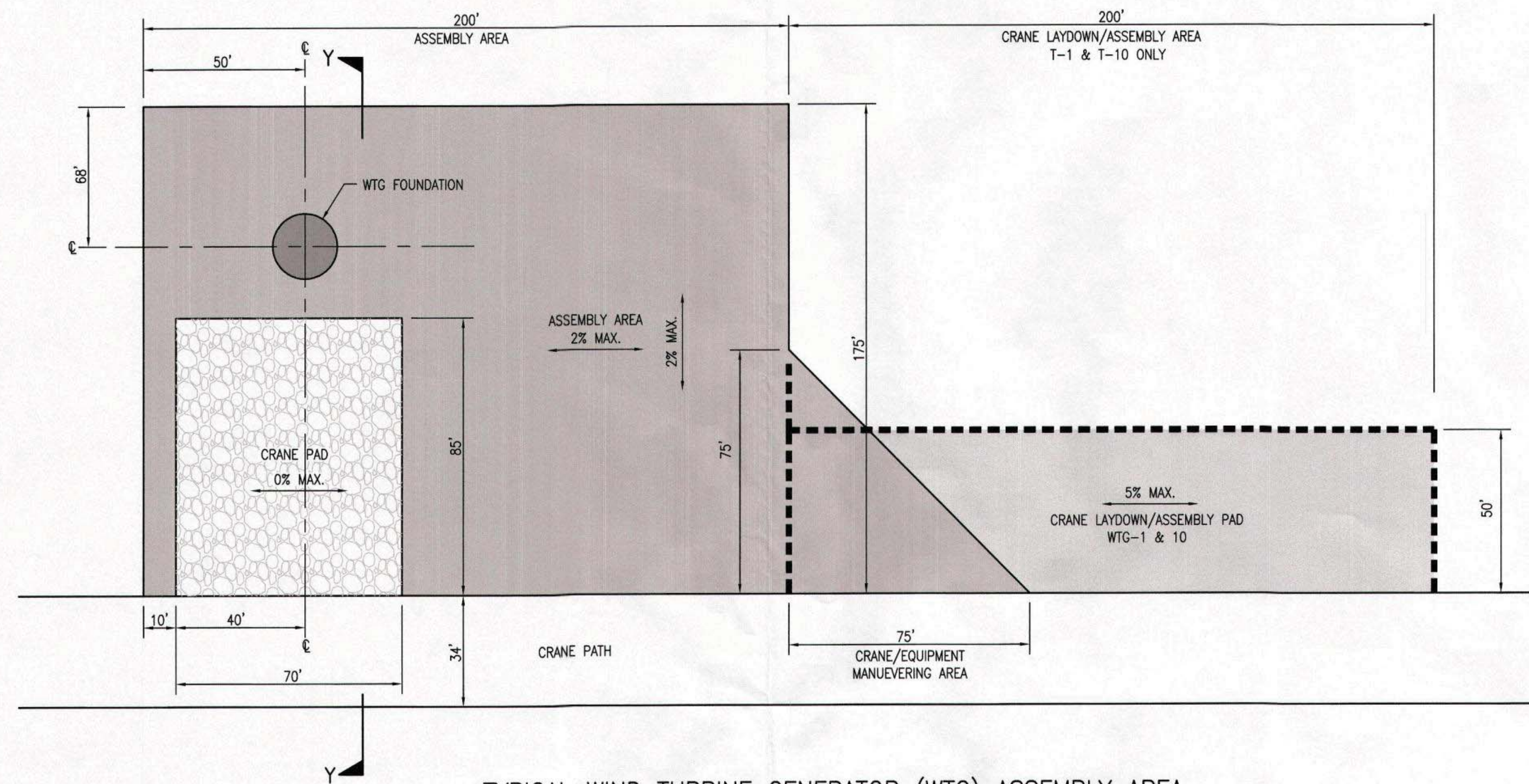
ANTRIM

TRC
SCALE: AS NOTED

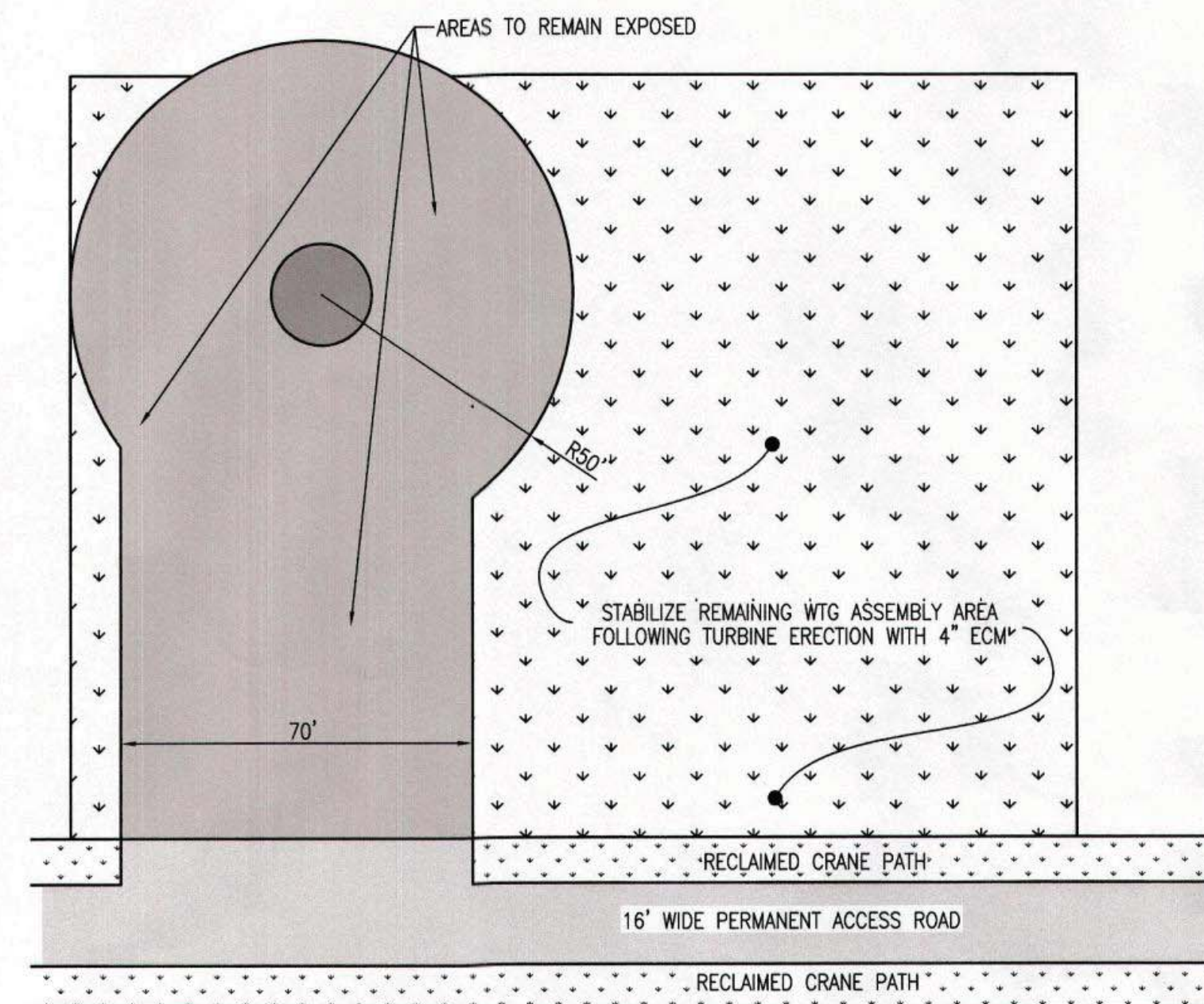
249 WESTERN AVENUE
AUGUSTA, ME 04330
PROJECT NO: 186317
DATE: 11-8-11

C-17

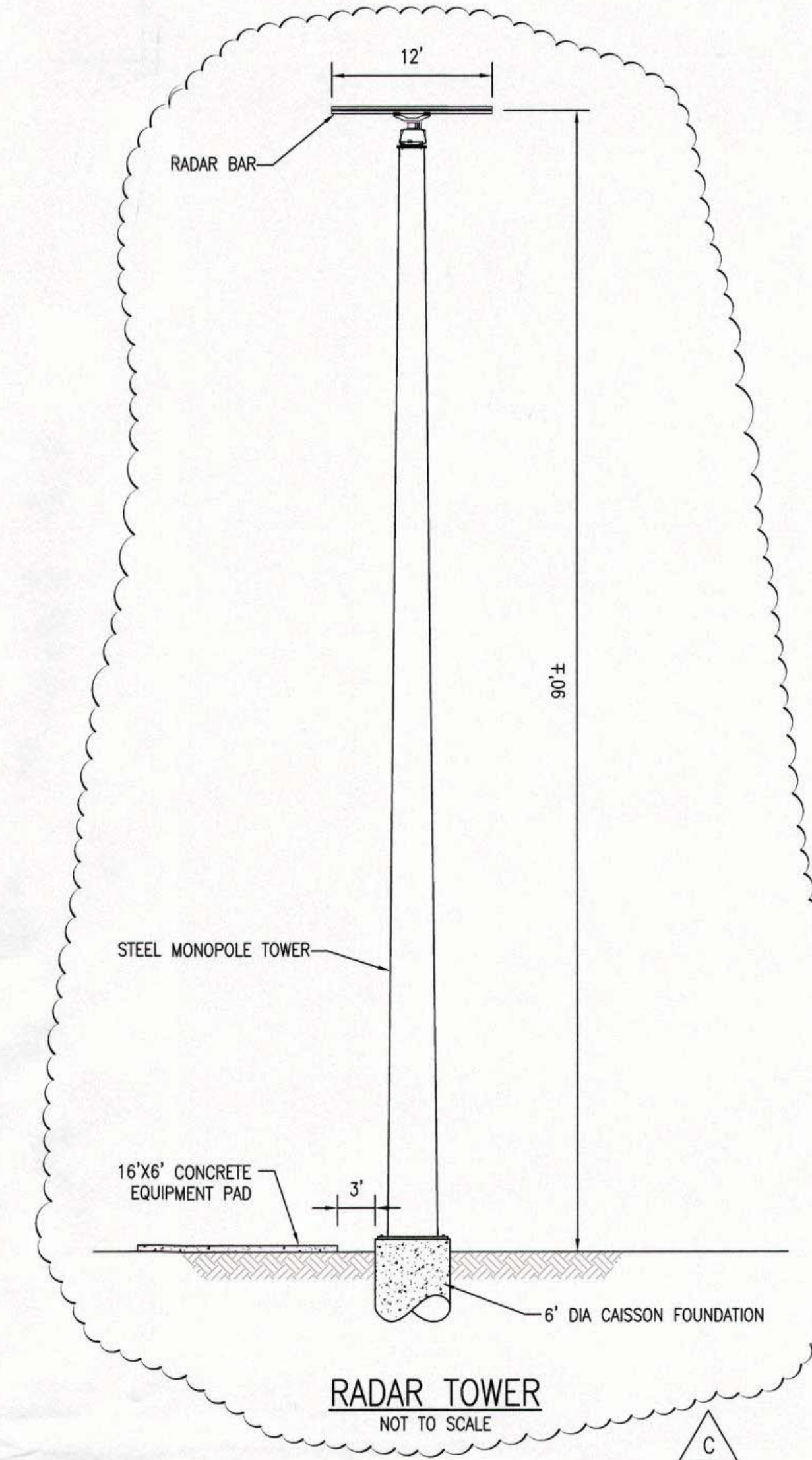
REV. C



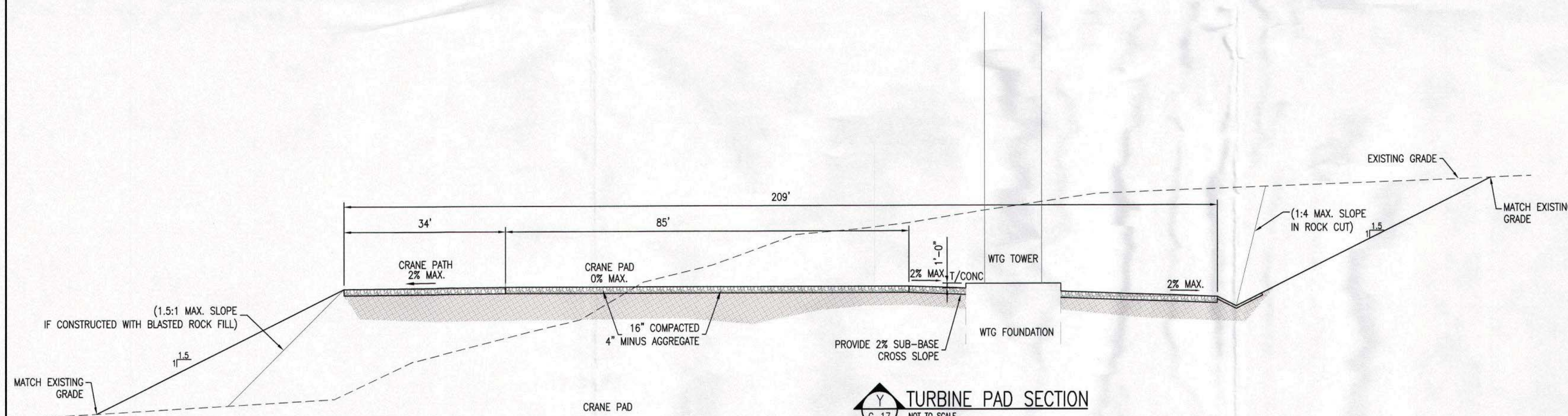
TYPICAL WIND TURBINE GENERATOR (WTG) ASSEMBLY AREA
NOT TO SCALE



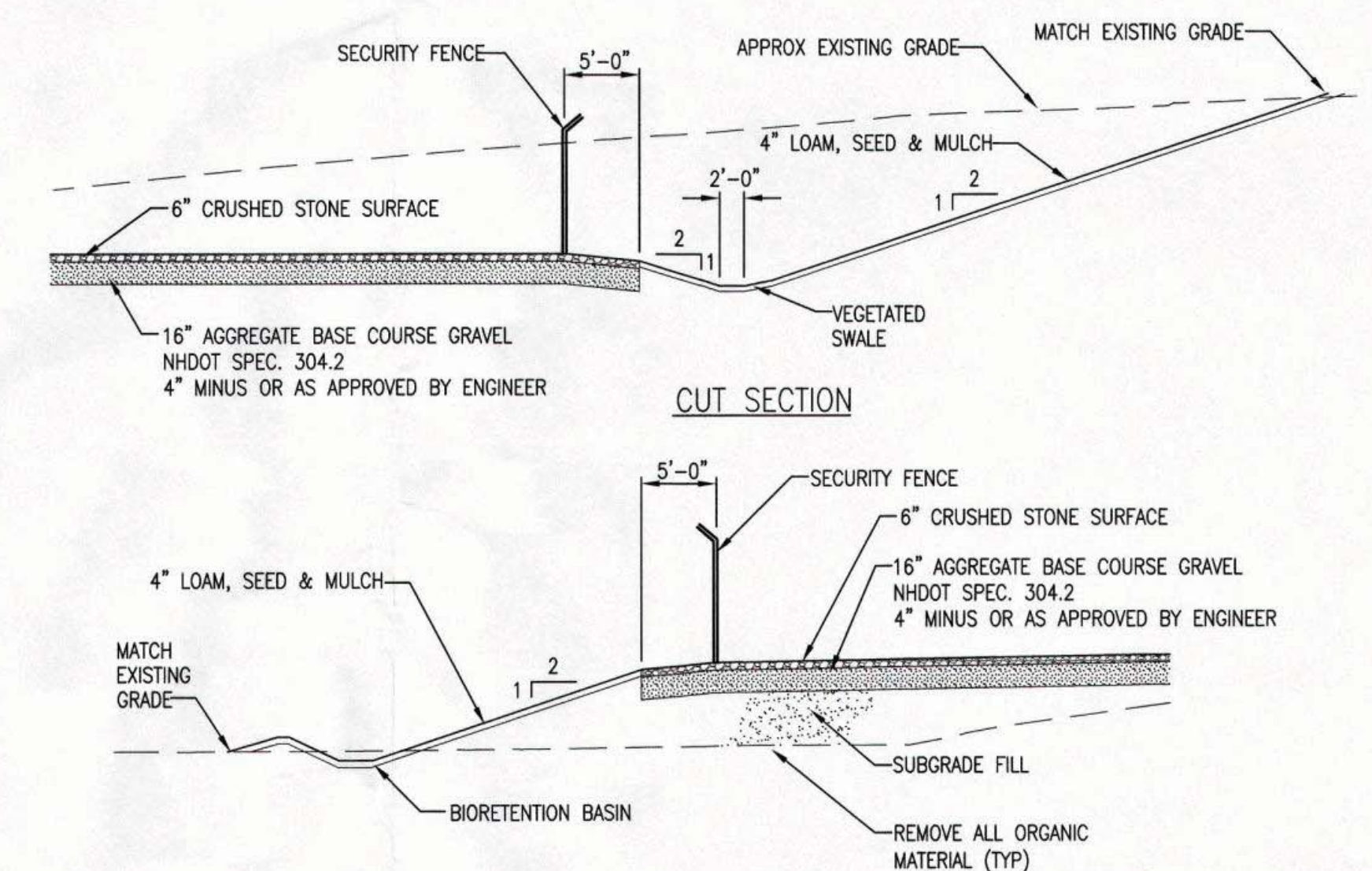
TYPICAL RECLAIMED ASSEMBLY AREA
NOT TO SCALE



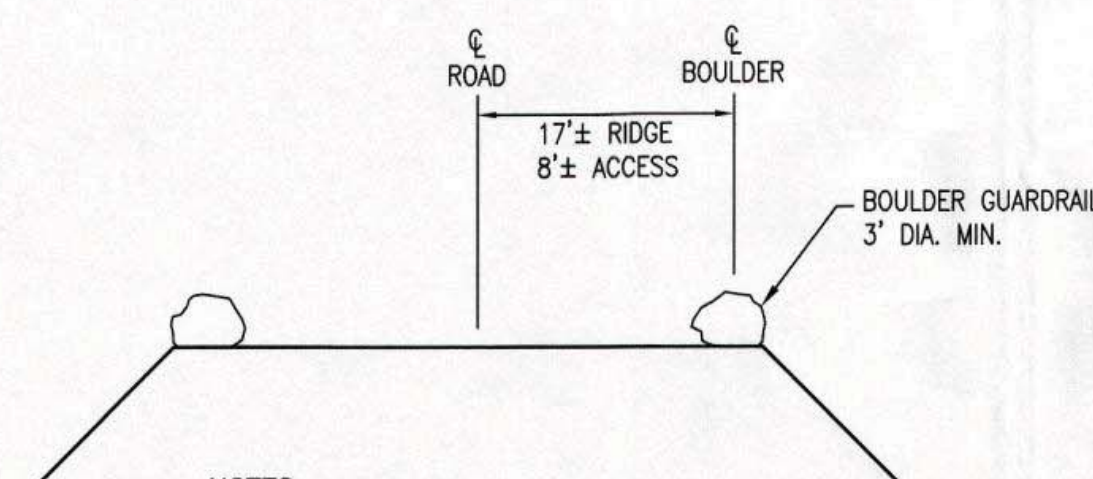
RADAR TOWER
NOT TO SCALE



TURBINE PAD SECTION
C-17 NOT TO SCALE



TYPICAL SUBSTATION SECTIONS
NOT TO SCALE



- NOTES**
1. INSTALL ROCK GUARDRAIL AT 10' INTERVALS.
 2. INSTALL ALONG ALL ACCESS AND CRANE PATH SECTIONS WITH FILL SLOPES EXCEEDING 6 FEET IN HEIGHT.

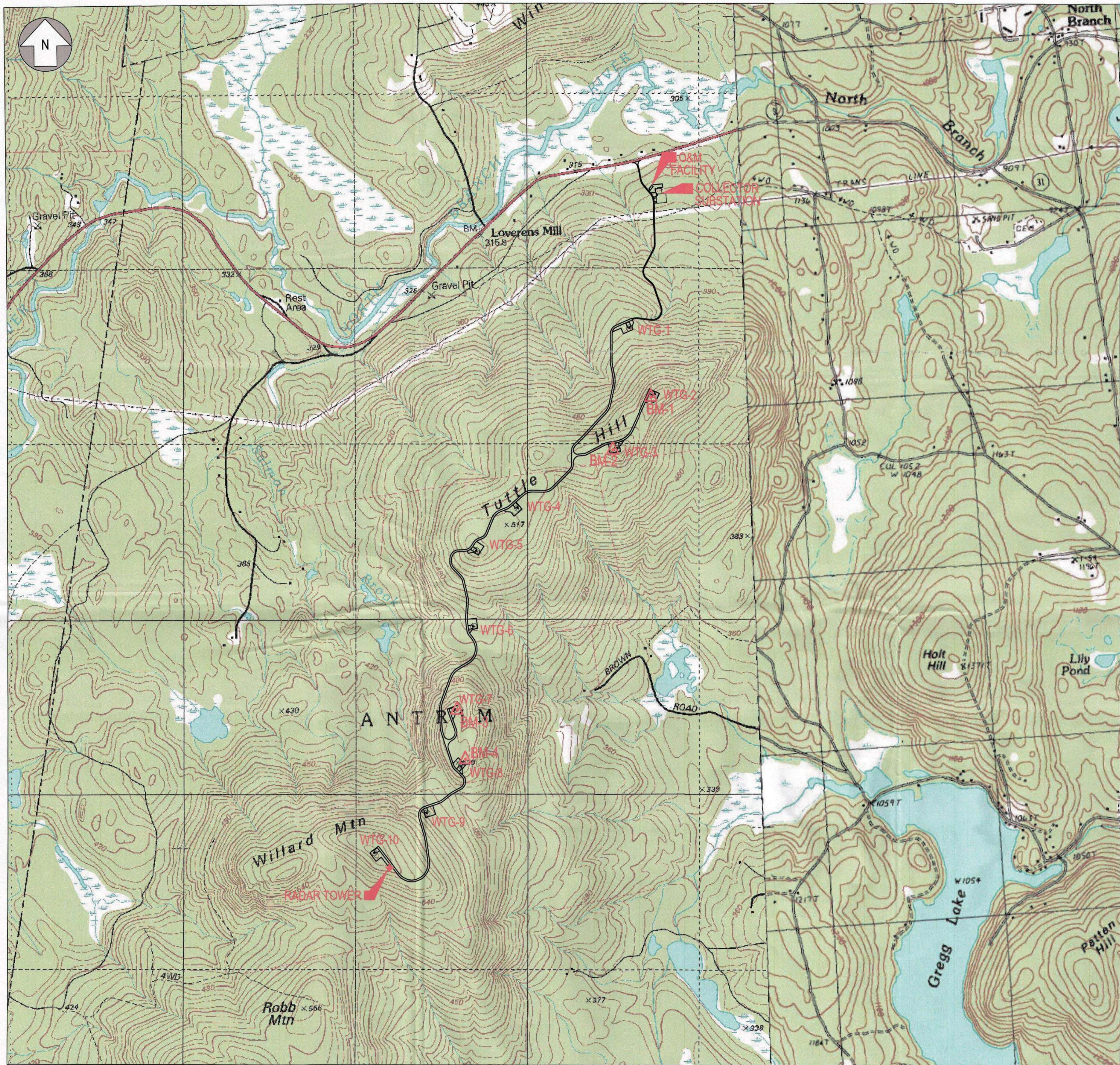
BOULDER GUARDRAIL
NOT TO SCALE

- NOTES:**
1. SEE DRAWING G-2 FOR PROJECT NOTES, LEGEND, AND ABBREVIATIONS.
 2. SEE DRAWING G-3 FOR OVERALL PROJECT MAP AND OVERALL PROJECT DRAWING INDEX.
 3. SEE DRAWING C-24 FOR CULVERT, BUFFER, TREATMENT SWALE, LEVEL SPREADER AND PLUNGE POOL SCHEDULES.

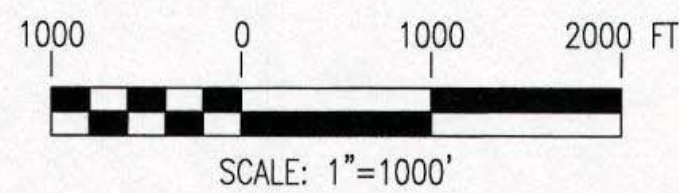
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
C	ADDED RADAR TOWER DETAIL	8/xx/12	PMM	PGT	DTB	8105
B	ISSUED FOR PERMITTING	1/20/12	PMM	PGT	DTB	8105
A	ISSUED FOR CLIENT REVIEW	12/19/11	PMM	PGT		

	CLIENT APPROVAL APPROVED BY _____ COMPANY _____ DATE _____	TRC/PMM DESIGNED TRC/KAV DRAWN TRC/DTB CHECKED APPROVED REVIEWED _____	CIVIL DETAILS II ANTRIM WIND ENERGY, LLC ANTRIM WINDPARK ANTRIM NEW HAMPSHIRE	TRC 249 WESTERN AVENUE AUGUSTA, ME 04330 PROJECT NO: 186317 SCALE: AS NOTED DATE: 11-8-11	C-20 REV. C
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OVERALL LOCATION MAP
SCALE: 1"=1000'



NOTES:
1. SEE DRAWING G-2 FOR PROJECT NOTES, LEGEND & ABBREVIATIONS.

NOT FOR CONSTRUCTION

DRAWING INDEX

G-1	TITLE SHEET	
G-2	PROJECT NOTES, LEGEND AND ABBREVIATIONS	
G-3	OVERALL LOCATION MAP & DRAWING INDEX	
C-1	PLAN: MAIN ACCESS ROAD	STA 0+00 TO 15+00
C-2	PLAN: MAIN ACCESS ROAD	STA 15+00 TO 30+00
C-3	PLAN: MAIN ACCESS ROAD	STA 30+00 TO 45+00
C-4	PLAN: MAIN ACCESS ROAD	STA 45+00 TO 60+00
C-5	PLAN: MAIN ACCESS ROAD	STA 60+00 TO 75+00
C-6	PLAN: MAIN ACCESS ROAD	STA 75+00 TO 90+00
C-7	PLAN: MAIN ACCESS ROAD	STA 90+00 TO 105+00
C-8	PLAN: MAIN ACCESS ROAD	STA 105+00 TO 120+00
C-9	PLAN: MAIN ACCESS ROAD	STA 120+00 TO 135+00
C-10	PLAN: MAIN ACCESS ROAD	STA 135+00 TO 150+00
C-11	PLAN: MAIN ACCESS ROAD	STA 150+00 TO 165+00
C-12	PLAN: MAIN ACCESS ROAD	STA 165+00 TO 183+20
C-13	PLAN: WTG-2 & 3 SPUR ROAD	STA 0+00 TO 15+00
C-14	PLAN: WTG-2 & 3 SPUR ROAD	STA 15+00 TO 21+30
C-15	PROFILE: MAIN ACCESS ROAD	STA 0+00 TO 60+00
C-16	PROFILE: MAIN ACCESS ROAD	STA 60+00 TO 120+00
C-17	PROFILE: MAIN ACCESS ROAD	STA 120+00 TO 183+20
C-18	PROFILES: WTG-2 & 3 AND WTG-7 SPUR ROADS	STA 0+00 TO 21+30 STA 0+00 7+65
C-19	CIVIL DETAILS I	
C-20	CIVIL DETAILS II	
C-21	CIVIL DETAILS III	
C-22	EROSION CONTROL NOTES & DETAILS I	
C-23	EROSION CONTROL NOTES & DETAILS II	
C-24	CULVERT / BUFFER / TREATMENT SWALE / LEVEL SPREADER / PLUNGE POOL SCHEDULES	
WS-1	PRE-DEVELOPMENT WATERSHED PLAN	
WS-2	POST-DEVELOPMENT WATERSHED PLAN	
WS-3	MEDIUM INTENSITY HYDROLOGIC SOIL GROUP PLAN	
SW-1	STORMWATER MANAGEMENT PLAN	STA 0+00 TO 15+00
SW-2	STORMWATER MANAGEMENT PLAN	STA 15+00 TO 30+00
SW-2A	STORMWATER MANAGEMENT PLAN	SUBCATCHMENT OVERVIEW
SW-3	STORMWATER MANAGEMENT PLAN	STA 30+00 TO 45+00
SW-4	STORMWATER MANAGEMENT PLAN	STA 45+00 TO 60+00
SW-5	STORMWATER MANAGEMENT PLAN	STA 60+00 TO 75+00
SW-6	STORMWATER MANAGEMENT PLAN	STA 75+00 TO 90+00
SW-7	STORMWATER MANAGEMENT PLAN	STA 90+00 TO 105+00
SW-8	STORMWATER MANAGEMENT PLAN	STA 105+00 TO 120+00
SW-9	STORMWATER MANAGEMENT PLAN	STA 120+00 TO 135+00
SW-10	STORMWATER MANAGEMENT PLAN	STA 135+00 TO 150+00
SW-11	STORMWATER MANAGEMENT PLAN	STA 150+00 TO 165+00
SW-12	STORMWATER MANAGEMENT PLAN	STA 165+00 TO 183+20
SW-13	STORMWATER MANAGEMENT PLAN	NORTH SPUR ROAD: STA 0+00 TO 15+00
SW-14	STORMWATER MANAGEMENT PLAN	NORTH SPUR ROAD: STA 15+00 TO 21+30

PROJECT BENCHMARKS

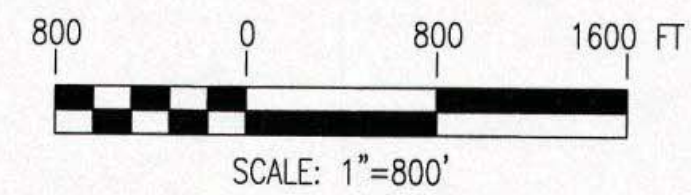
BM-1	12" SPIKE ELEV=1741.83
BM-2	12" SPIKE ELEV=1758.94
BM-3	12" SPIKE ELEV=1681.68
BM-4	12" SPIKE ELEV=1700.58

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
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A	ISSUED FOR CLIENT REVIEW	12/19/11	PMM	PGT		



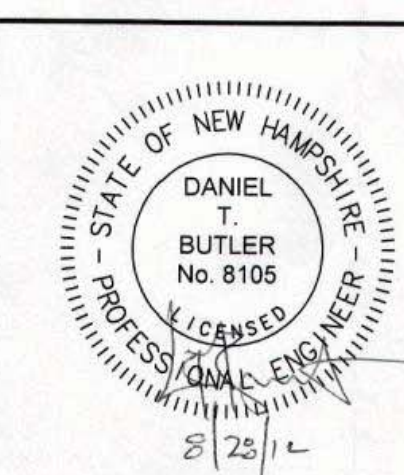
CLIENT APPROVAL	TRC/PMW DESIGNED
APPROVED BY	TRC/KAY DRAWN
COMPANY	TRC/DTB CHECKED
DATE	APPROVED
	REVIEWED

OVERALL LOCATION MAP & DRAWING INDEX ANTRIM WIND ENERGY, LLC ANTRIM WINDPARK NEW HAMPSHIRE	ANTRIM	TRC 249 WESTERN AVENUE AUGUSTA, ME 04330 PROJECT NO: 186317 DATE: 11-8-11	G-3	REV. C
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NOT FOR CONSTRUCTION

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
D	ADDED RADAR TOWER LOCATION	8/27/12	PMM	PGT	DBT	8105
C	REVISED PER DEC REVIEW COMMENTS	6/1/12	PMM	PGT	DBT	8105
B	ISSUED FOR PERMITTING	1/20/12	PMM	PGT	DBT	8105
A	ISSUED FOR CLIENT REVIEW	12/19/11	PMM	PGT		



CLIENT
APPROVAL

APPROVED BY

COMPANY

DATE

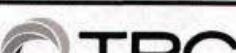
TRC/PMM
DESIGNED

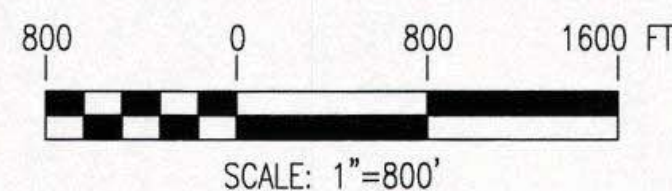
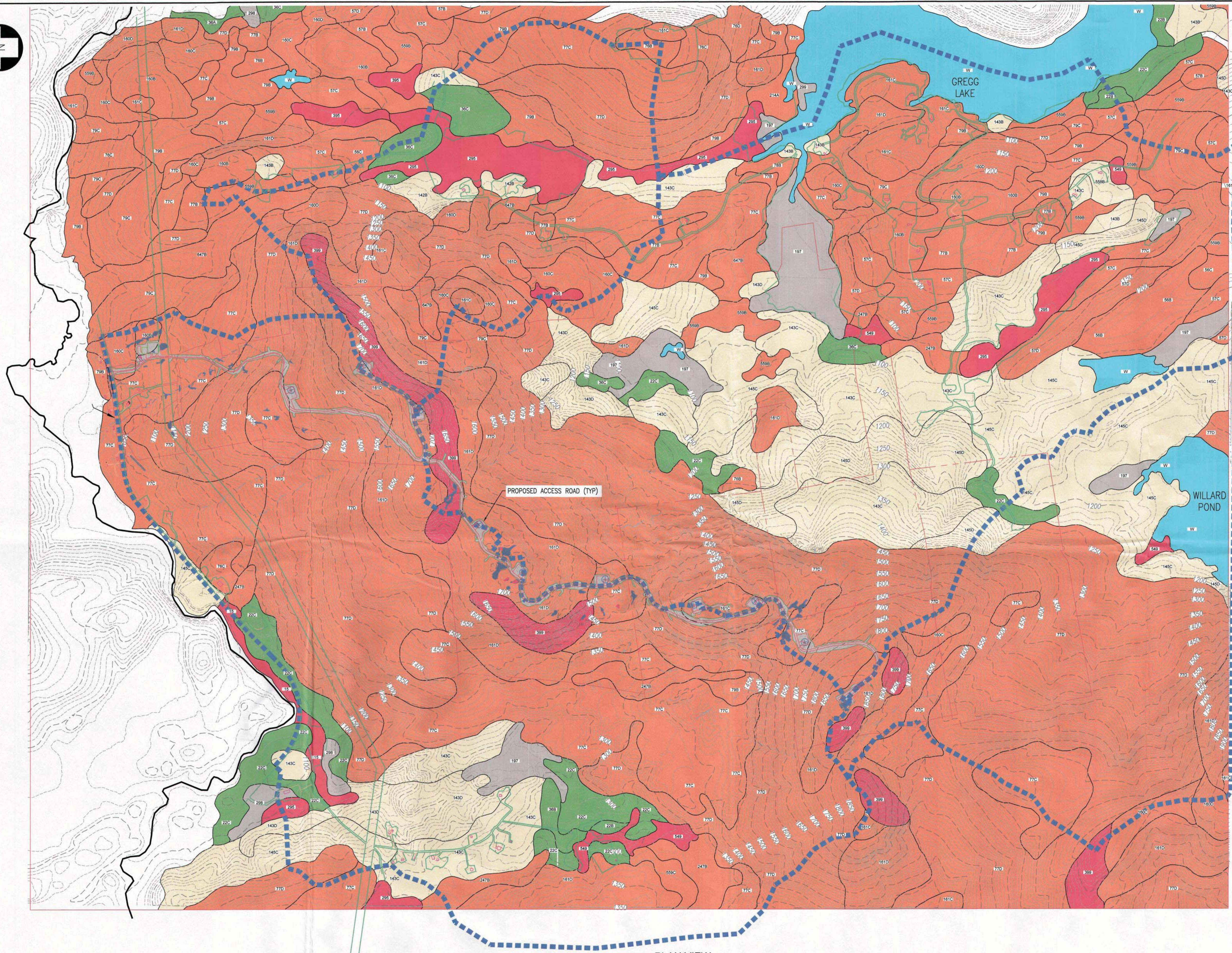
TRC/CMH
DRAWN

TRC/DTB
CHECKED

APPROVED

REVIEWED

POST-DEVELOPMENT WATERSHED PLAN ANTRIM WIND ENERGY, LLC ANTRIM WINDPARK		NEW HAMPSHIRE
ANTRIM		WS-2
 SCALE: AS NOTED	249 WESTERN AVENUE AUGUSTA, ME 04330 PROJECT NO: 186317	REV. D



PLAN VIEW
SCALE: 1"=800'

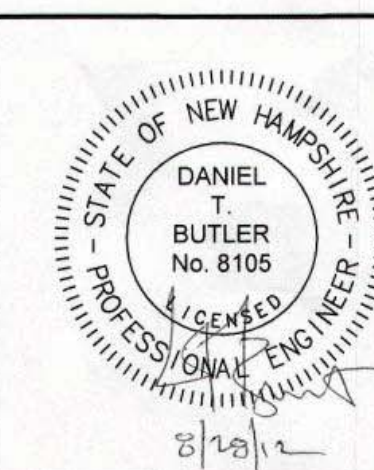
NOT FOR CONSTRUCTION

SOILS LEGEND			
ABBREV.	SOIL TYPE	SLOPE %	HSG
15	SEARSPORT MUCK	—	D
22B	COLTON LOAMY SAND	3 TO 8	A
22C	COLTON LOAMY SAND	8 TO 15	A
36A	ADAMS LOAMY SAND	0 TO 3	A
36B	ADAMS LOAMY SAND	3 TO 8	A
36C	ADAMS LOAMY SAND	8 TO 15	A
56B	BECKET FINE SANDY LOAM	3 TO 8	C
56C	BECKET FINE SANDY LOAM	8 TO 15	C
57B	BECKET STONY FINE SANDY LOAM	3 TO 8	C
57C	BECKET STONY FINE SANDY LOAM	3 TO 8	C
57D	BECKET STONY FINE SANDY LOAM	8 TO 15	C
76B	MARLOW LOAM	3 TO 8	C
76C	MARLOW LOAM	8 TO 15	C
76D	MARLOW LOAM	15 TO 25	C
77B	MARLOW STONY LOAM	3 TO 8	C
77C	MARLOW STONY LOAM	8 TO 15	C
77D	MARLOW STONY LOAM	15 TO 35	C
78B	PERU LOAM	3 TO 8	C
79B	PERU STONY LOAM	0 TO 8	C
79C	PERU STONY LOAM	8 TO 15	C
142B	MONADNOCK FINE SANDY LOAM	3 TO 8	B
143B	MONADNOCK STONY FINE SANDY LOAM	3 TO 8	B
143C	MONADNOCK STONY FINE SANDY LOAM	3 TO 8	B
143D	MONADNOCK STONY FINE SANDY LOAM	8 TO 15	B
145C	MONADNOCK VERY BOULDERY FINE SANDY LOAM	8 TO 15	B
145D	MONADNOCK VERY BOULDERY FINE SANDY LOAM	15 TO 35	B
160B	TUNBRIDGE-LYMAN-MONADNOCK COMPLEX, STONY	3 TO 8	C
160C	TUNBRIDGE-LYMAN-MONADNOCK COMPLEX, STONY	8 TO 15	C
160D	TUNBRIDGE-LYMAN-MONADNOCK COMPLEX, STONY	15 TO 25	C
161C	LYMAN-TUNBRIDGE ROCK OUTCROP COMPLEX	3 TO 15	C
161D	LYMAN-TUNBRIDGE ROCK OUTCROP COMPLEX	15 TO 35	C
197	BOROHENISTS, PONDED	—	—
214A	NAUMBERG FINE SANDY LOAM	0 TO 3	C
247B	LYME STONY LOAM	0 TO 5	C
295	GREENWOOD MUCK PEAT	—	D
298	GRAVEL PITS	—	—
299	UDORTHENTS	—	—
395	CHOCORUA MUCKY PEAT	—	D
399	ROCK OUTCROP	—	D
549	PEACHAM STONY MUCK	—	D
558B	SKERRY FINE SANDY LOAM	3 TO 8	C
558B	SKERRY STONY FINE SANDY LOAM	0 TO 8	C
559C	SKERRY STONY FINE SANDY LOAM	8 TO 15	C
647B	PILLSBURY STONY LOAM	0 TO 5	C
W	WATER	—	—

	HYDROLOGIC SOIL GROUP A
	HYDROLOGIC SOIL GROUP B
	HYDROLOGIC SOIL GROUP C
	HYDROLOGIC SOIL GROUP D
	HYDROLOGIC SOIL GROUP UNCLASSIFIED
	WATER

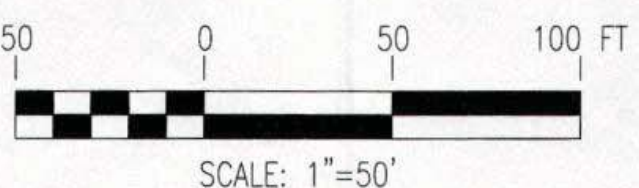
NOTE:
SOIL INFORMATION OBTAINED FROM NRCS MEDIUM INTENSITY
SOIL SURVEY OF HILLSBOROUGH COUNTY, NEW HAMPSHIRE
(WEB SOIL SURVEY).

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
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A	ISSUED FOR CLIENT REVIEW	12/19/11	PMM	PGT		



CLIENT APPROVAL	
APPROVED BY	TRC/PMC DESIGNED
DATE	TRC/CMH DRAWN
	TRC/DTB CHECKED
	APPROVED
	REVIEWED

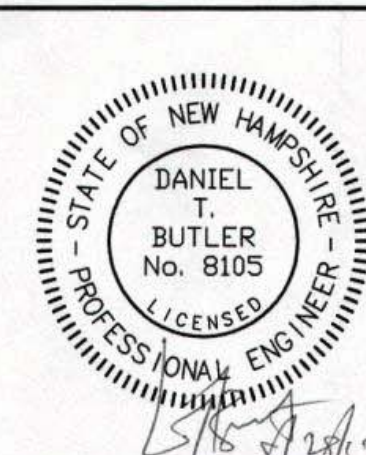
MEDIUM INTENSITY HYDROLOGIC SOIL GROUP PLAN	
ANTRIM WIND ENERGY, LLC	
ANTRIM WINDPARK	
ANTRIM	NEW HAMPSHIRE
	249 WESTERN AVENUE AUGUSTA, ME 04330 PROJECT NO: 186317 DATE: 11-7-11
SCALE: AS NOTED	WS-3
	REV. C



PLAN VIEW
SCALE: 1"=50'

NOT FOR CONSTRUCTION

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
C	ADDED RADAR TOWER LOCATION	8/27/12	PMM	PGT	DTB	8105
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CLIENT APPROVAL	
APPROVED BY	DATE
COMPANY	
TRC/PMC DESIGNED	
TRC/KAV DRAWN	
TRC/DTB CHECKED	
APPROVED	
REVIEWED	

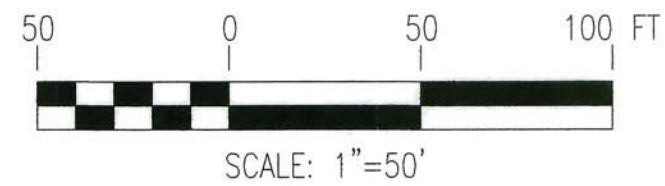
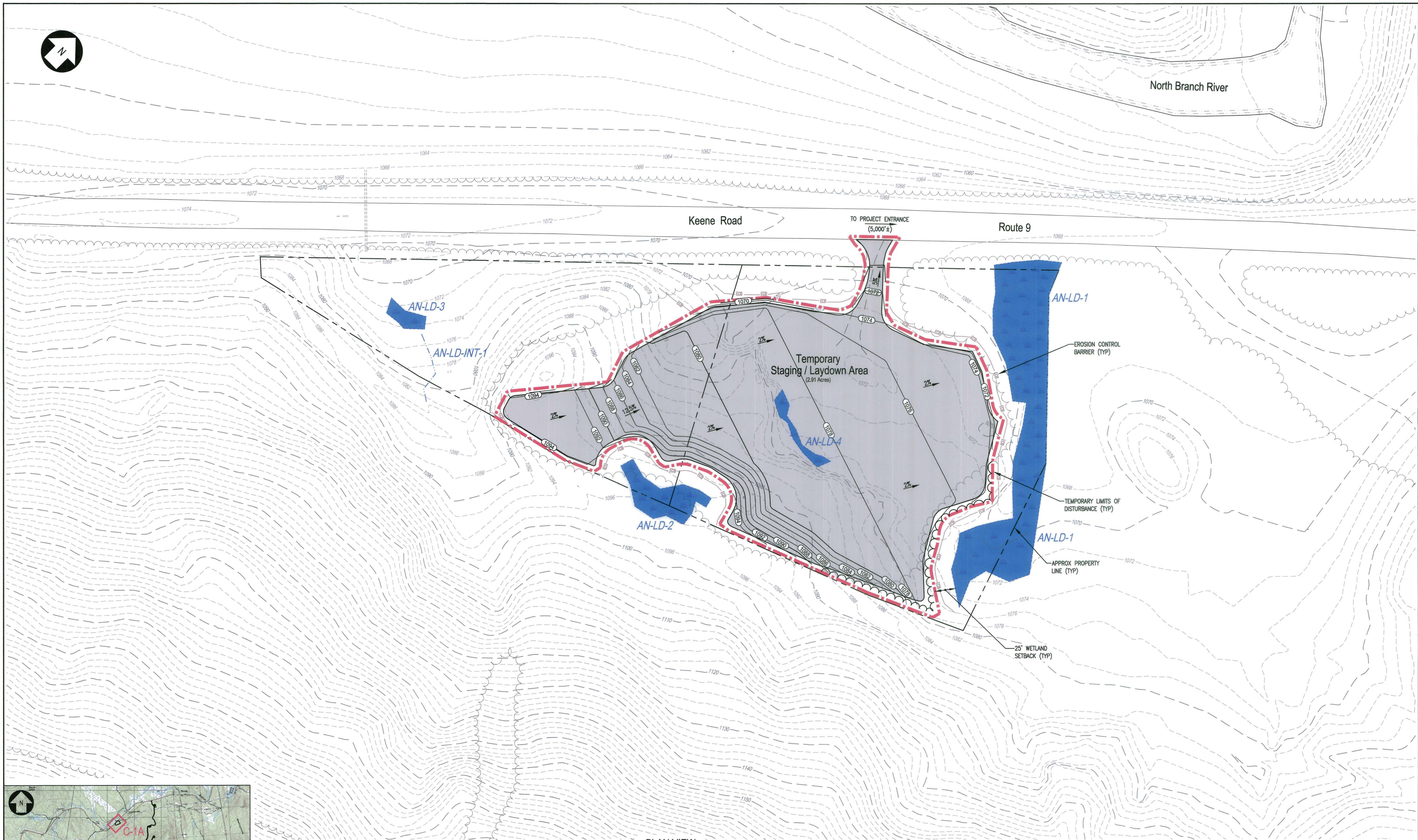
STORMWATER MANAGEMENT PLAN
STA 165+00 TO 183+20
ANTRIM WIND ENERGY, LLC
ANTRIM WINDPARK
NEW HAMPSHIRE

ANTRIM

TRC
249 WESTERN AVENUE
AUGUSTA, ME 04330
PROJECT NO: 186317
DATE: 11-8-11

SW-12

REV. C




NOTES:

1. SEE DRAWING G-2 FOR PROJECT NOTES, LEGEND, AND ABBREVIATIONS.
2. SEE DRAWING G-3 FOR OVERALL PROJECT MAP AND OVERALL PROJECT DRAWING INDEX.
3. SEE DRAWING C-24 FOR CULVERT, BUFFER, TREATMENT SWALE, LEVEL SPREADER AND PLUNGE POOL SCHEDULES.

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
A	ISSUED FOR CLIENT REVIEW	8/30/12	PMM	DTB		



CLIENT APPROVAL		TRC/PMM DESIGNED
_____ APPROVED BY		TRC/KAV DRAWN
_____ COMPANY		TRC/DTB CHECKED
_____ DATE		_____ APPROVED
		REVIEWE

PLAN: TEMPORARY STAGING/LAYDOWN AREA		
ANTRIM WIND ENERGY, LLC		
ANTRIM WINDPARK		
ANTRIM	NEW HAMPSHIRE	
 SCALE: AS NOTED	249 WESTERN AVENUE AUGUSTA, ME 04330 PROJECT NO: 186317 DATE: 11-8-11	C-1A REV. A