DEPLOYMENT OF ENERGY EFFICIENCY AND CLEAN ENERGY ON INDIANS LANDS

EASTERN BAND OF CHEROKEE INDIANS (EBCI)

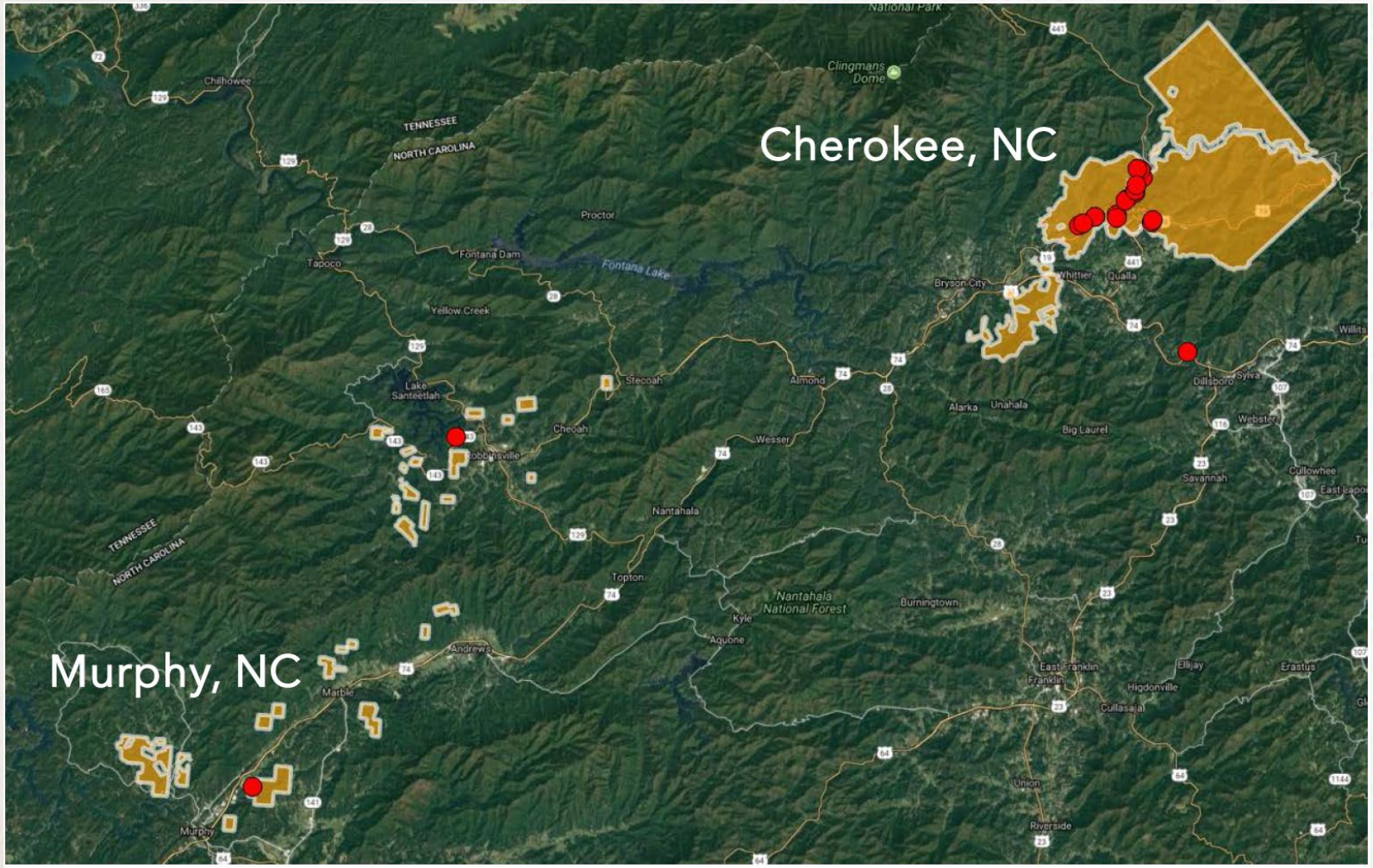
2018 DOE OFFICE OF INDIAN ENERGY ANNUAL PROGRAM REVIEW

JOEY OWLE, SECRETARY OF AGRICULTURE AND NATURAL RESOURCES, EBCI
CRAIG PLOMONDON, PROJECT EXECUTIVE, SIEMENS GOVERNMENT TECHNOLOGIES INC.
COL (RET.) DAVE MCNEIL, PRESIDENT & CEO, HANNAH SOLAR GOVERNMENT SERVICES

10th December 2018

OVERVIEW OF PRESENTATION

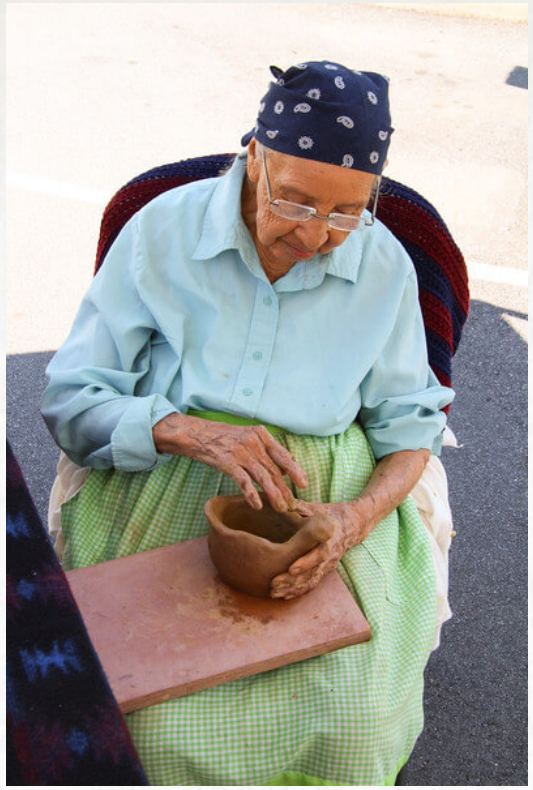
- About the Eastern Band of Cherokee Indians
- EBCI Energy Goals
- Goal and Objectives
- Deployment Location and Designs
- Construction Progress
- Project Summary



CHEROKEE, NC

- QUALLA BOUNDARY IS COMPRISED OF ~ 56,000 ACRES IN WESTERN NORTH CAROLINA
- MUCH OF BOUNDARY IS NEXT TO GREAT SMOKY MOUNTAIN NATIONAL PARK (GSMNP)
- DEEDED AND TRUST PARCELS LOCATED IN SURROUNDING COUNTIES
  - Additional ~4,000 acres
- NEARING 16,000 ENROLLED MEMBERS; ROUGHLY 7 – 8,000 LIVE ON QUALLA BOUNDARY

- To protect, preserve, and ensure the wise utilization of the limited natural resources located on Tribal Lands for the Cherokee people in the most efficient manner and in an effective way;
- That the natural beauty of Tribal lands and natural resources, which are the basis of our cultural and economic well-being, are preserved and protected;



- To identify opportunities for economic and community development for the Tribe that promote sustainable development;
- To identify energy cost savings opportunities for the Tribe.

TRIBAL COUNCIL RESOLUTION 636 (2007)

- Established Tribal Energy Goals
- Award DoE Tribal Energy Program "First Steps" grant awarded in 2007
- Strategic Energy Plan was generated in 2009

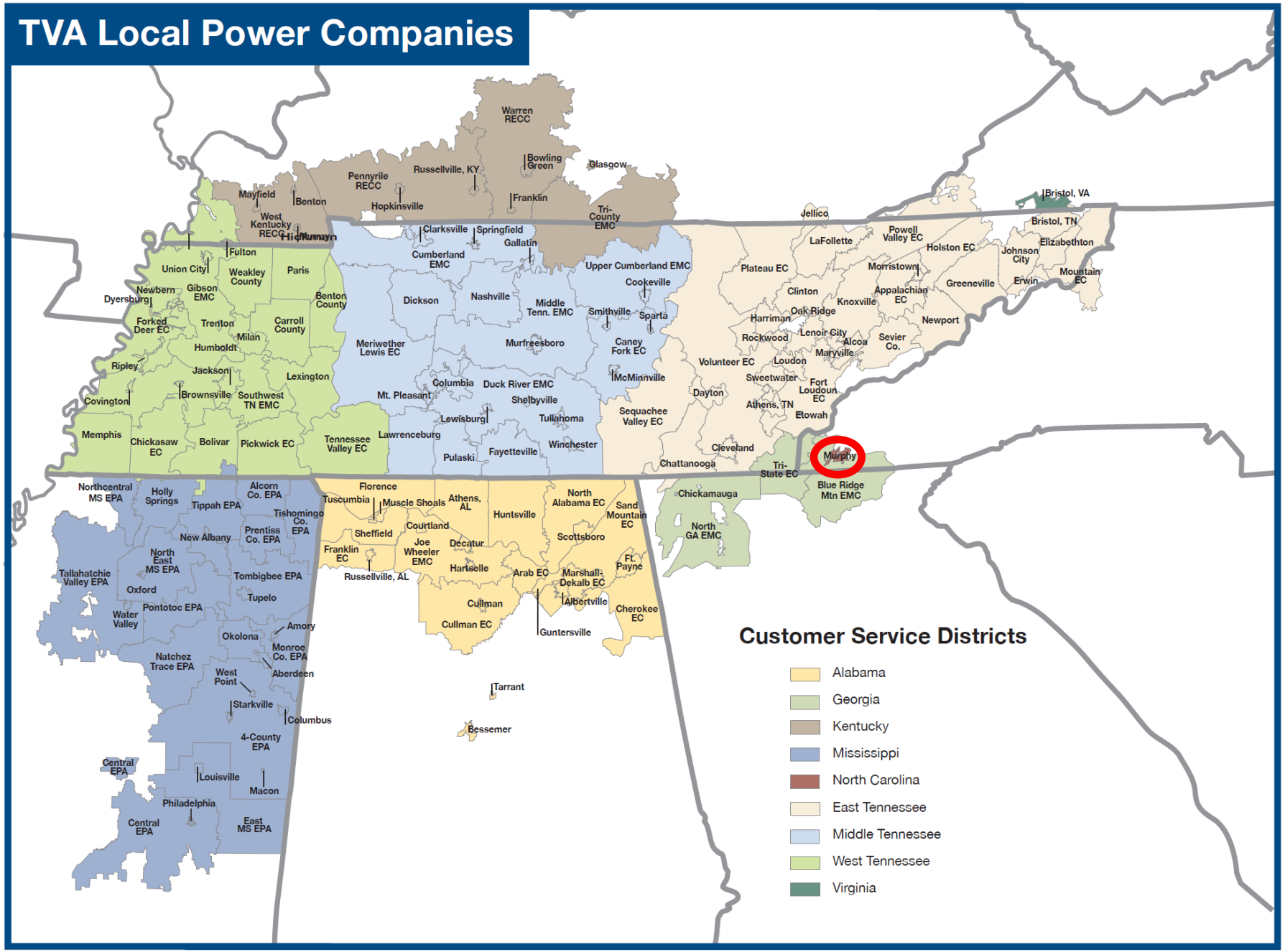
PROJECT OBJECTIVES

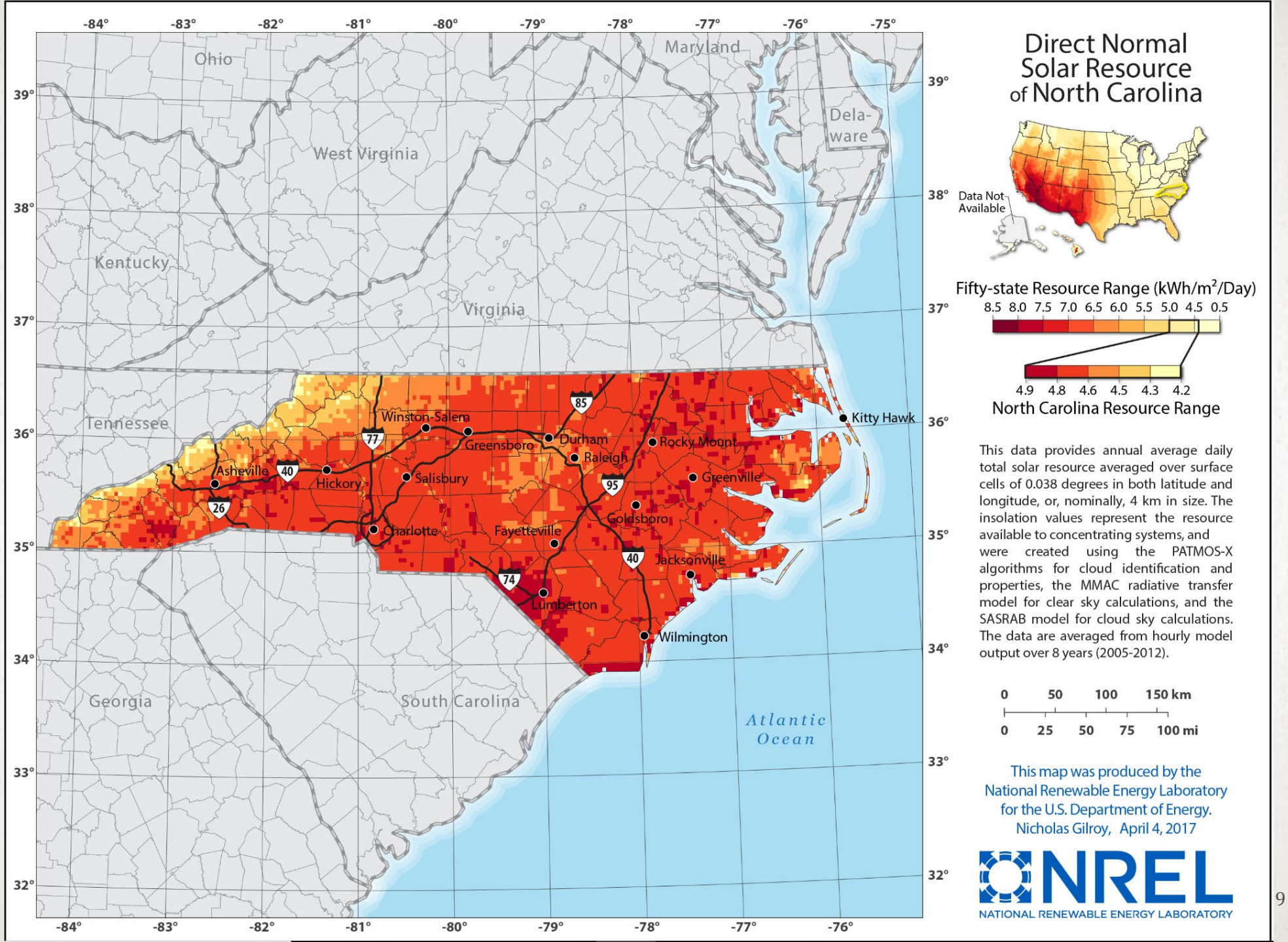
1) Promote Indian Tribal energy development, efficiency and use.
   - ❖ Reduction of energy consumption through the deployment of this solar PV array
2) Reduce or stabilize energy costs
   - ❖ Murphy Electric Power Board nearing capacity and reduction of EBCI needs would benefit expanding community
3) Enhance and strengthen Tribal energy and economics infrastructure related to natural resource development
   - ❖ Partnership with Siemens will provide training to EBCI enrolled members for the operation of the solar PV array, increasing skills and capacity of the Tribe
4) Bring electrical power and service to Indians lands
   - ❖ Solar array fosters renewable energy and aligns energy investment with EBCI long-term vision of energy independence
5) Support and promote EBCI participation in strategic energy initiatives
   - ❖ EBCI is embarking on energy independence and self-reliance goals that will diversify revenues resources and increase skill competencies of EBCI enrolled members by providing new job market opportunities

Cherokee River Valley Casino & Hotel

Opened in fall of 2015

TVA Local Power Companies




Direct Normal Solar Resource of North Carolina
Data Not Available
Fifty-state Resource Range (kWh/m²/Day)
8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 0.5
4.9 4.8 4.6 4.5 4.3 4.2
North Carolina Resource Range
This data provides annual average daily total solar resource averaged over surface cells of 0.038 degrees in both latitude and longitude, or, nominally, 4 km in size. The insolation values represent the resource available to concentrating systems, and were created using the PATMOS-X algorithms for cloud identification and properties, the MMAC radiative transfer model for clear sky calculations, and the SASRAB model for cloud sky calculations. The data are averaged from hourly model output over 8 years (2005-2012).
0 50 100 150 km
0 25 50 75 100 mi
This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy.
Nicholas Gilroy, April 4, 2017
NREL
NATIONAL RENEWABLE ENERGY LABORATORY
Ohio
Maryland
Dela-ware
West Virginia
Kentucky
Virginia
Tennessee
Georgia
South Carolina
Atlantic Ocean
Winston-Salem
Greensboro
Durham
Raleigh
Rocky Mount
Kitty Hawk
Asheville
Hickory
Salisbury
Greenville
Charlotte
Fayetteville
Goldsboro
Jacksonville
Lumberton
Wilmington
85
77
40
26
95
74
-84° -83° -82° -81° -80° -79° -78° -77° -76° -75°
39° 38° 37° 36° 35° 34° 33° 32°

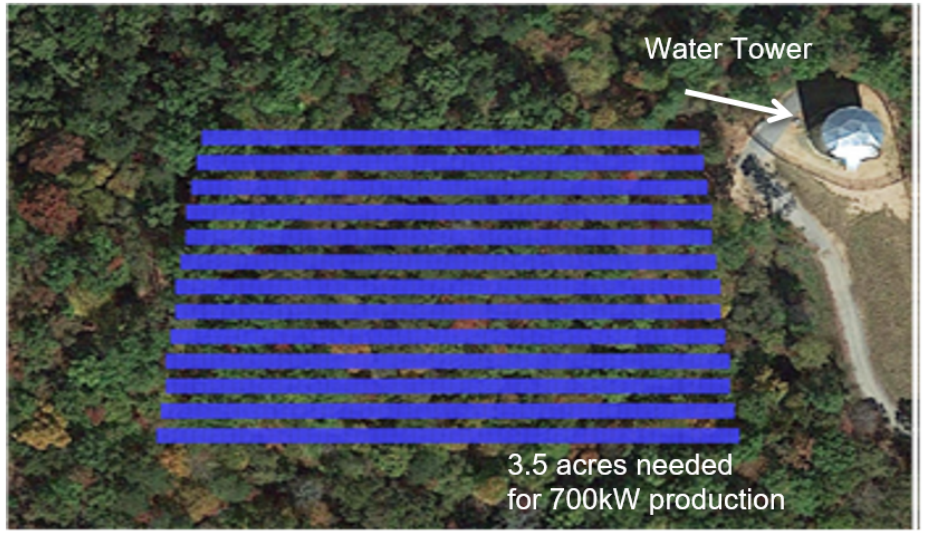
Deployment of Energy Efficiency and Clean Energy on Indian Lands- A Community Solar Project

Eastern Band of Cherokee Indians (EBCI)

Control Number: 1660-1525

Project Summary

Deploy a ground mounted solar PV array on the Murphy, NC reservation to generate 700 kilowatts of renewable energy. This community scale PV farm would supply power to four buildings totaling 155,352 sq. ft.: casino (110,400 sq. ft.), hotel (23,000 sq. ft.), and two administrative buildings (10,976 sq. ft. each). All power generated would be consumed onsite. Due to the site location's topography, civil work will be required to prepare the land for the PV panel installation. The rural utility company is nearing its generation capacity so this project will alleviate some of their electrical demand and will aid in their growth capabilities. More importantly, this green energy project will foster further economic, cultural and social opportunities and greater energy independence for the EBCI community, which aligns with the EBCI Strategic Energy Plan.



Key Personnel/Organizations

- Chris Greene - Technical POC
- Amanda Strohm & DeMakus Straton – Grants Office POCs
- Cameron Cooper – Commerce Division POC
- Siemens Government Technologies, Inc.- Partner for design and build, and training program

Budget and Timeline

Federal funds: $1.0M Cost-share: $1.0M Total: $2.0M

Key Milestones & Deliverables

Year 1:	Siemens to Design/Build Solar PV array, and train tribal members to install, operate and maintain system
Year 2:	Savings begin to be captured and tracked, and results shared with the community and school.

Project Outcomes

This system is expected to cost $2.0M and is projected to generate 1,007,340kWh with an annual savings of $99,122, based on a blended electrical rate of $0.0984/kWh. Assuming the $1.0M DoE grant, the tribe's simple payback is anticipated to be 10.1 years. This project will also include a community awareness communication plan and school education program to further promote energy conservation and the use of renewable energies. Additionally, tribal members will be trained to install, operate and maintain the system, and leverage these skills for future solar projects on tribal land or within the community.

A 700 kW solar PV project to foster economic, cultural and energy independence for the EBCI Tribe.

Baseline Energy

Siemens anticipates that no energy produced by the solar array will be consumed outside the campus. The energy baseline for the site is defined below in Table 2 and is based on the yearly electrical consumption of Harrah's Cherokee River Valley Casino Campus. The Casino's monthly demand averages 2,530 kW and has a daily average consumption of 31,391 kWh.

Table 2: Energy Baseline FY 2016

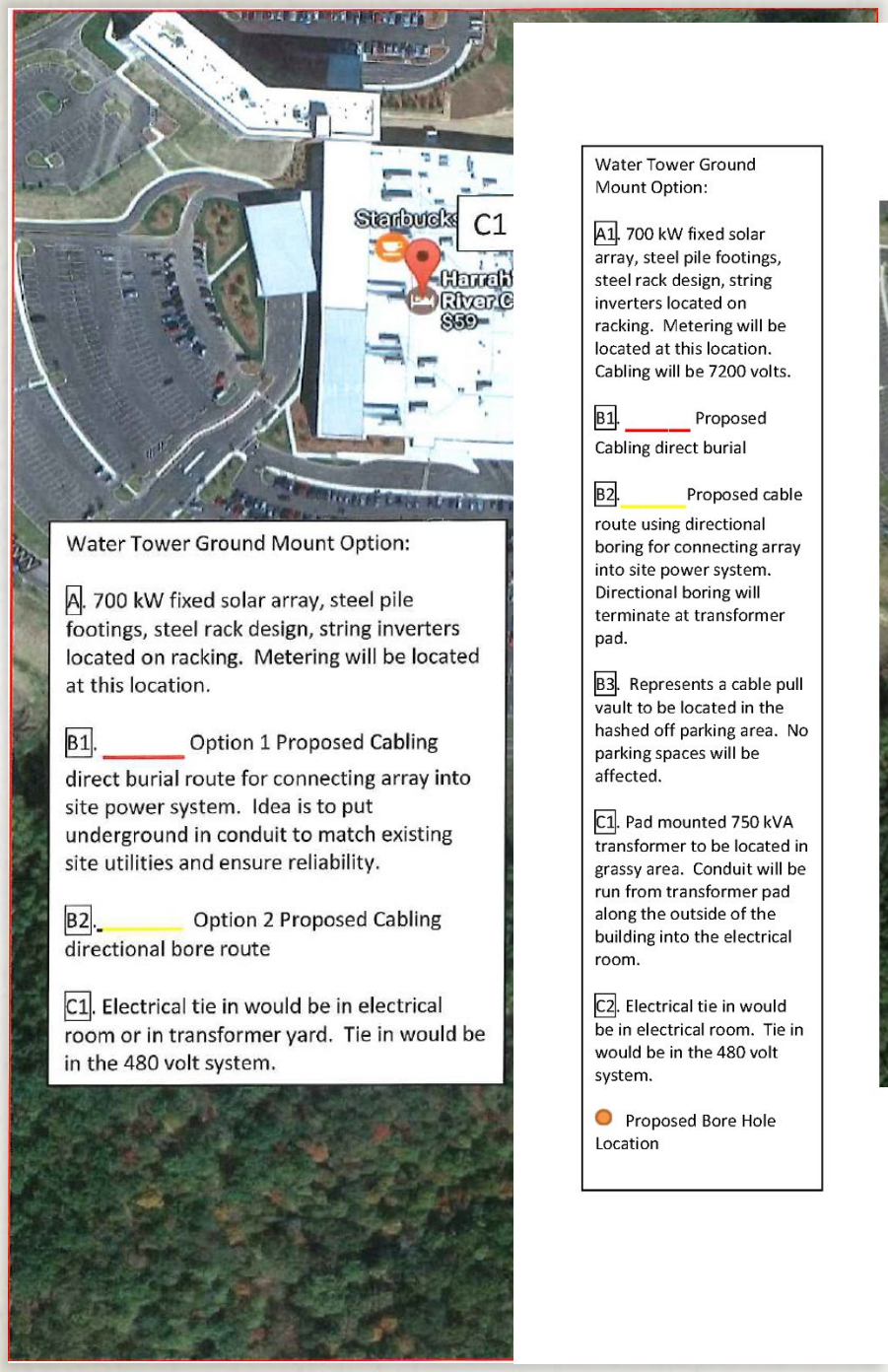
Usage Period	kWh Usage
Oct 01-31 2015	957,445
Nov 01-30 2015	861,914
Dec 01-31 2015	955,588
Jan 01-31 2016	872,910
Feb 01-29 2016	789,726
Mar 01-31 2016	843,732
Apr 01-30 2016	848,472
May 01-31 2016	953,865
Jun 01-30 2016	1,070,636
Jul 01-31 2016	1,167,548
Aug 01-31 2016	1,174,789
Sep 01-30, 2016	1,000,456
Total	**11,497,081**

Table 3: Summary of Baseline system size of 700 kW DC

	Baseline Energy (kWh/yr)	Electricity Savings (kWh/yr)	Electricity Savings Yr 1 ($/Yr)	Percentage Savings (%)
Solar Photovoltaic System	11,497,081*	1,019,870**	$100,355	8.9

* Baseline of FY16 Utility Usage

** Yearly production of solar array degrades at a 0.7% rate annually after year 1



Water Tower Ground Mount Option:

A1. 700 kW fixed solar array, steel pile footings, steel rack design, string inverters located on racking. Metering will be located at this location. Cabling will be 7200 volts.

B1. _____ Proposed Cabling direct burial

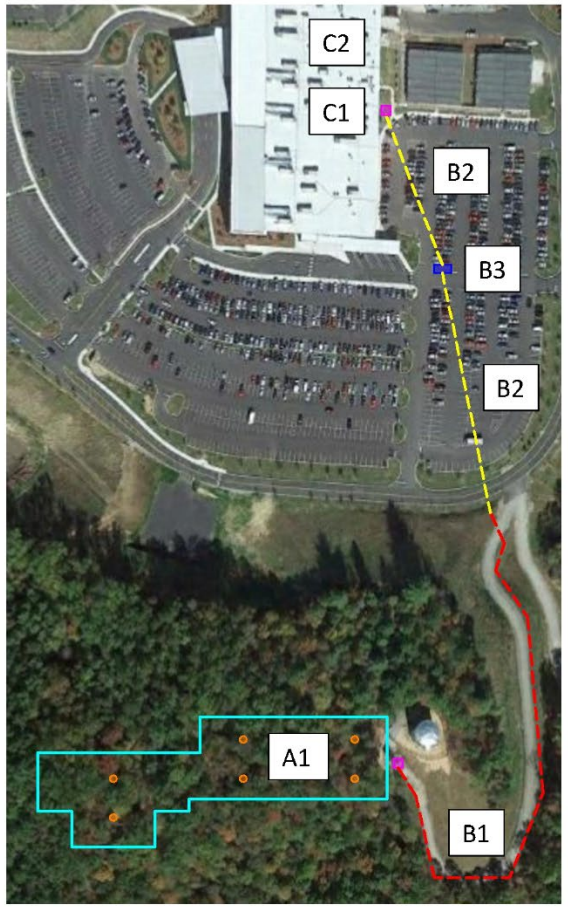
B2. _____ Proposed cable route using directional boring for connecting array into site power system. Directional boring will terminate at transformer pad.

B3. Represents a cable pull vault to be located in the hashed off parking area. No parking spaces will be affected.

C1. Pad mounted 750 kVA transformer to be located in grassy area. Conduit will be run from transformer pad along the outside of the building into the electrical room.

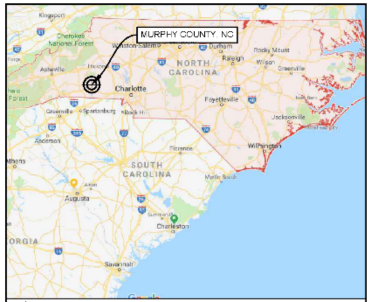
C2. Electrical tie in would be in electrical room. Tie in would be in the 480 volt system.

Proposed Bore Hole Location



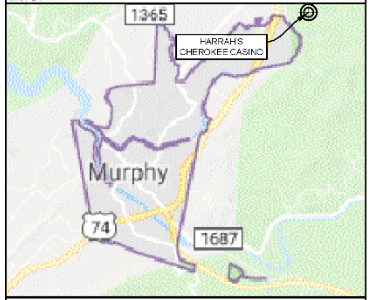
PROPOSED CABLING ROUTES TO SUBSTATION

- Exact route yet TBD (2017 Doe Presentation)
- Slight variance near site due shift in array location
- Issue was that the original location footprint crossed property boundary
  - Would have required additional surveying and 2nd round of TCGE approval



STATE of NORTH CAROLINA

COUNTY of MURPHY



CITY of MURPHY

1 PV-### **SITE PLAN**
SCALE: 1/64" = 1' - 0"

SOLAR PV SYSTEM OVERVIEW	
System Size (DC):	700.4 kW
System Size (AC):	550.0 kW
Array Tilt Angle:	20" Fixed
Array Azimuth (N=0°):	≈ 173°
Module Name:	SILFAB SLG-M340 (340W)
(#) of Modules:	2060
(#) Modules in Series:	(30) Strings of 18, (80) Strings of 19
(#) of Strings per Inverter:	(3) Inverters w/ Strings of 18, (8) Inverters w/ Strings of 19
(#) of Strings Total:	110
Inverter Name:	ABB TRIO-50-TL-OUTD-US-480
(#) of Inverters:	11

SIEMENS

HANNAH SOLAR GOVERNMENT SERVICES

1090 Jack Primus Rd
Charleston, SC 29492

CEO/PRESIDENT:
COL (RET) Dave McNeil
NABCEP Certified
PV Installer - 100414-003117

LEAD ENGINEER:
Jack Brandon
NABCEP Certified
PV Installer - 102415-012142

DESIGNER:
Andrew Slaw
Solar PV Designer

DRAFTER:
Gary Spruill
Solar PV Drafter

DRAWING STATE:
PRELIMINARY DESIGN NOT FOR CONSTRUCTION

REV	DATE	BY	REVISION DESCRIPTION	APRV'D
0	02/19/2018	A.SLAW	INITIAL DRAWING CREATION AND RELEASE	A.SLAW

SIEMENS GOVT. TECH
EBCI-Harrah's Cherokee Casino
777 Casino Parkway
Murphy, NC 29806
700kWDC Ground Mount Array
550kWAC Solar PV Generator
SHADE ANALYSIS

PROJECT NO: TBD

DRAWING NO: SK-20180219-1

SHEET NO:

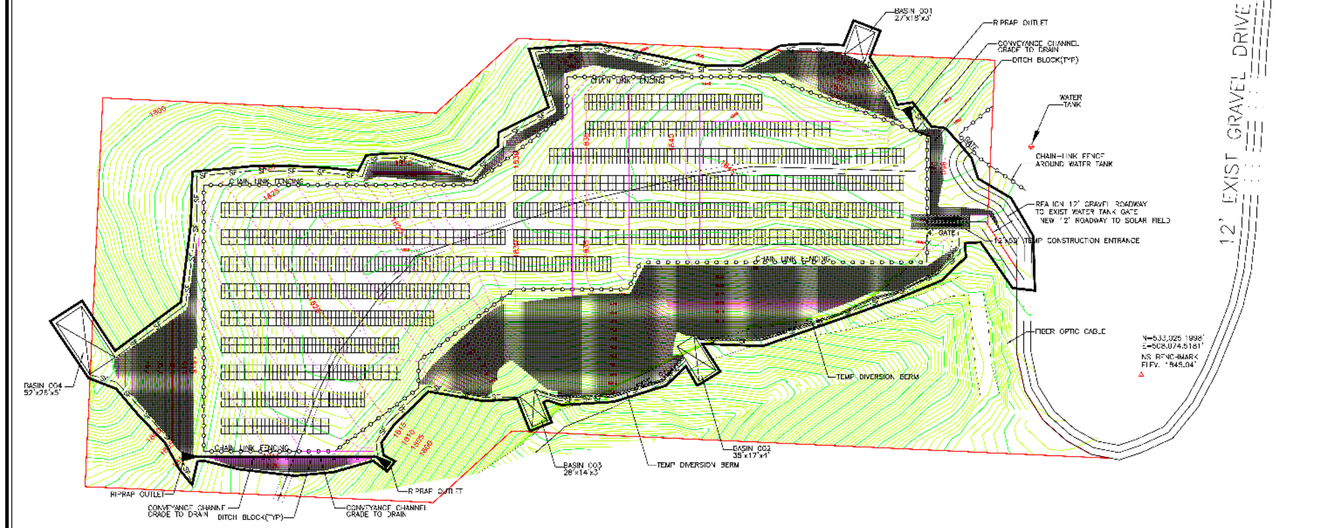
SHEET SIZE: ANSI-D / 22x34

SCALE: AS NOTED

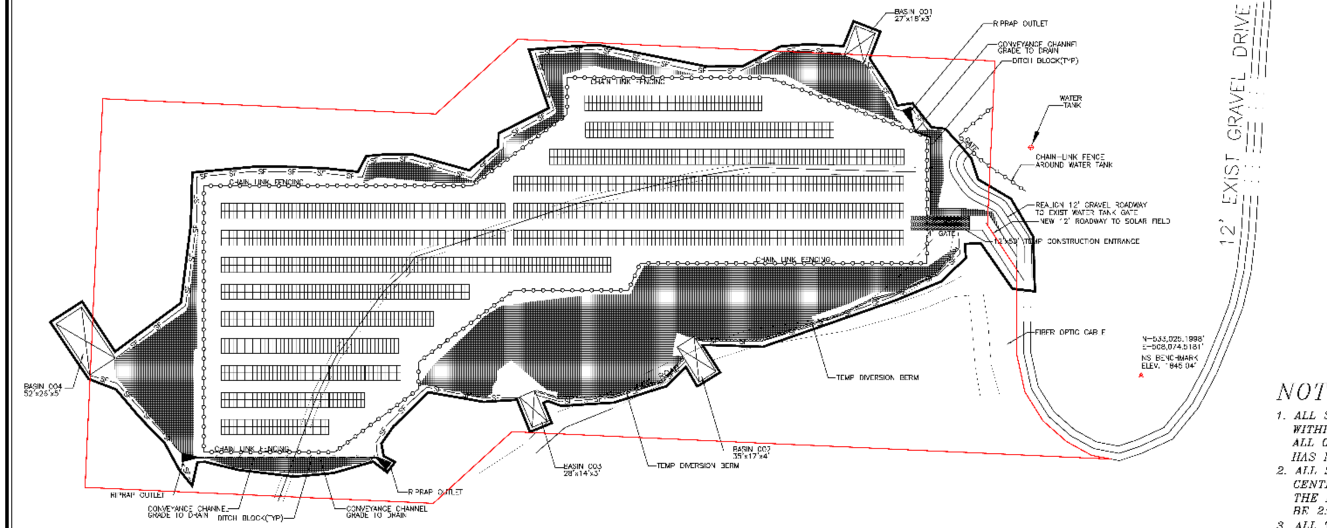
REVISION: 0

REVISION DATE: 02/19/2018

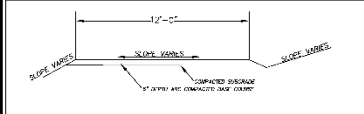
Erosion Control Plan



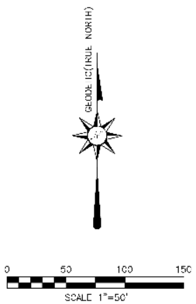
PROPOSED SOLAR SITE EROSION CONTROL PLAN
WITH CONTOURS



PROPOSED SOLAR SITE EROSION CONTROL PLAN
WITHOUT CONTOURS



TYPICAL SECTION
N.T.S.



SCALE 1"=50'

BASIN	C	I in/hr	A acres	Q10 cfs
001	.5	2.05	0.40	0.41
002	.5	2.05	0.65	1.67
003	.5	2.05	0.32	0.33
004	.5	2.05	1.90	1.95

LEGEND

- SEDIMENT BASIN
- —SF— WIRE BACKED SILT FENCE
- TEMP DIVERSION BERMS
- CONVEYANCE CHANNELS
- DITCH BLOCK
- AREA OF DISTURBANCE
- TEMP CONST ENTRANCE
- SLOPE MATTING
- RIPRAP OUTLET

SOILS: MOIST ORANGE TO RED FINE SANDY SILT (ML)

AREA OF DISTURBANCE: 3.91 ACRES

HYDRAULIC INFO: Q10 = 2.05 IN
FROM NOAA ATLAS 14 {COORDINATES(LAT 35.1128°, LONG -83.9920°)}

NOTES:

1. ALL SLOPES ARE TO BE HYDROSEEDED OR PLANTED IF DISTURBED WITHIN 15 WORKING DAYS OR 21 CALENDAR DAYS WHICHEVER IS SHORTER. ALL GRASSED SLOPES SHALL BE REHYDROSEEDED OR REPLANTED IF THE GRASS HAS NOT GROWN. 100% COVERAGE IS TO BE GUARANTEED.
2. ALL STORM WATER CONVEYANCE CHANNELS SHALL HAVE DITCH BLOCKS EVERY 20 FEET CENTER TO CENTER. ALL OUTLETS SHALL HAVE CLASS A RIPRAP OUTLET BLANKETS. THE RIPRAP BLANKETS SHALL HAVE FILTER FABRIC UNDER THE RIPRAP AND SHALL BE 2:1 LENGTH TO WIDTH OF THE CHANNEL WIDTHAND SHALL BE 12" DEEP.
3. ALL THE SEDIMENT BASINS ARE TO BE KEPT OPEN AND CLEANED OUT ONCE THEY HAVE BECOME HALF FULL OF SEDIMENT.
4. PONDS AND EROSION CONTROL CAN BE REMOVED ONCE FINAL GRADING AND PERMANENT VEGETATION IS ESTABLISHED.
5. EROSION CONTROL MEASURES ARE ONLY REQUIRED IN DISTURBED AREAS
6. ALL ROADWAYS ARE TO BE GRAVELED AFTER INSTALLATION OF UTILITIES OR ANY OTHER TYPE OF EARTH MOVING ACTIVITIES.
7. ALL SLOPE MATTING TO BE EXCELCIER TYPE MATTING OR EQUAL STAPLED IN PLACE.
8. ALL AREAS INSIDE THE FENCE AND THE 3' PERIMETER OUTSIDE OF THE FENCE SHALL BE GRASSED WITH A LOW GROWTH AND MAINTENANCE VEGITATION SUCH AS CLOVER OR ZOYSIA. ALL OTHER DISTURBED AREAS SHALL BE HYDROSEEDED AS AS PER THE GRASS CHARTS ON THE EROSION CONTROL STANDARD SHEET.
9. ALL SLOPE FILLS SHALL BE COMPACTED TO 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY(ASTM698).
10. IF DUST IS GENERATED BY CONSTRUCTION EQUIPMENT, THE SITE SHALL BE WATERED DOWN BY A WATER TRUCK TO CONTROL THE DUST.

TABLE OF EVENTS: NO. 1 — Proposed Plan — 24 JUN 2018 — KRA

APPROVALS: PROJECT MGR. KRA; DESIGNED BY KRA; DRAWN BY KRA; CHECKED BY KRA

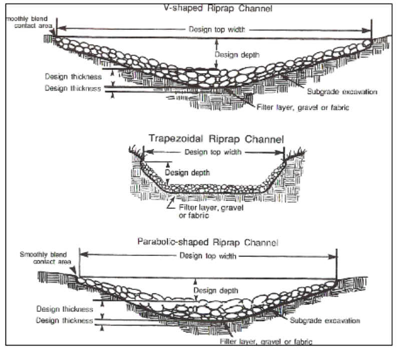
DATE: June 24, 2018

PREPARED BY
Alford Engineering, PLLP
"An Indian Owned Engineering Firm"
P. O. BOX 1930
MAGGIE VALLEY, NORTH CAROLINA 28751
PHONE No. 828 926 8211, CELL No. 506-3411
E-MAIL: alfordk1@bellsouth.net
WEB: www.alfordengineering.net
NC FIRM CERTIFICATION NO. P-0920

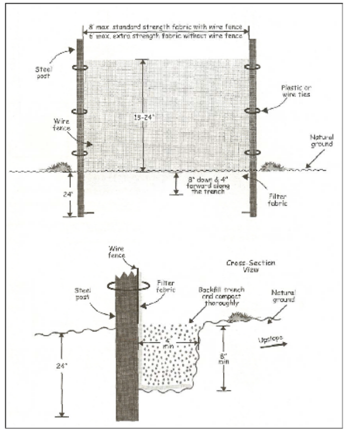
PROJECT: CHEROKEE COUNTY HARRAH'S SOLAR SITE
EASTERN BAND OF CHEROKEE INDIANS
MURPHY, NORTH CAROLINA

SHEET TITLE: EROSION CONTROL PLAN
JUNE 2018
SCALE: AS SHOWN

PROJECT NUMBER: 2018-15
SHEET: E 101



RIPRAP CHANNEL



SILT FENCE

Mulching Materials and Application Rates

Material	Rate Per Acre	Quality	Notes
Organic Mulches			
Straw	1-2 tons	Dry, unchopped, unweathered; avoid weeds.	Should come from wheat or oats; spread by hand or machine; must be tacked down.
Wood chips	5-6 tons	Air dry	Treat with 12 lbs nitrogen/ton. Apply with mulch blower, chip handler, or by hand. Not for use in fine turf.
Wood fiber	0.5-1 tons		Also referred to as wood cellulose. May be hydroseeded. Do not use in hot, dry weather.
Bark	35 cubic yards	Air dry, shredded or hammer-milled, or chips.	Apply with mulch blower, chip handler by hand. Do not use asphalt tack.
Corn stalks	4-6 tons	Cut or shredded in 4-6 in. lengths.	Apply with mulch blower or by hand. Not for use in fine turf.
Sericea lespedeza seed-bearing stems	1-3 tons	Green or dry; should contain mature seed.	
Nets and Mats[1]			
Jute net	Cover area	Heavy, uniform; woven of single jute yarn.	Withstands waterflow. Best when used with organic mulch.
Fiberglass net	Cover area		Withstands waterflow. Best when used with organic mulch.
Excelsior (wood fiber) mat	Cover area		Withstands waterflow.
Fiberglass roving	0.5-1 tons	Continuous fibers of drawn glass bound together with a non-toxic agent.	Apply with a compressed air ejector. Tack with emulsified asphalt at a rate of 25-35 gal/1000 sq ft.
Chemical Stabilizers[2]			
Aquatain Aerospray Curasol AK Petroset SB Terra Tack Crust 500 Genaqua 743 M-145	follow manufacturer's specifications		Not beneficial to plant growth.

[1]Refer to Practice No. 6.30, *Grass Lined Channels.*

[2]Use of trade names does not imply endorsement of product.

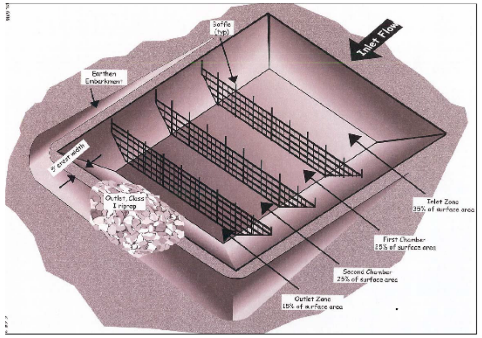
MULCHING RATES

Sizes for Riprap and Erosion Control Stone Specified by the N.C. Department of Transportation

Riprap Class 1	Riprap Class 2	Erosion Control Class A	Erosion Control Class B
5 to 200 lb	25 to 250 lb	2" to 6"	5" to 15"
30% shall weigh a minimum of 60 lbs each	60% shall weigh a minimum of 100 lb each		
No more than 10% shall weigh less than 15 lb each	No more than 5% shall weigh less than 60 lb each.	10% tolerance top and bottom sizes	
		Equally distributed, no gradation specified	Equally distributed, no gradation specified

source: North Carolina Aggregates Association.

RIPRAP SPECIFICATIONS



SEDIMENT TRAP BAFFLES

BASIN NO.	X DIMENSION (FT.)	Y DIMENSION (FT.)	Z DIMENSION (FT.)
001	27.00	18.00	3.00
002	35.00	17.00	4.00
003	28.00	14.00	3.00
004	52.00	25.00	5.00

SEDIMENT TRAP DIMENSIONS

SEDIMENT TRAP DIMENSIONS

TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT

Definition A graveled area or pad located at points where vehicles enter and leave a construction site.

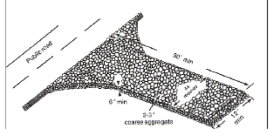
Purpose To provide a buffer area where vehicles can drop their mud and sediment to avoid transporting it onto public roads, to control erosion from surface runoff, and to help control dust.

Conditions Where Practice Applies Whenever traffic will be leaving a construction site and moving directly onto a public road or other paved off-site area. Construction plans should limit traffic to properly constructed entrances.

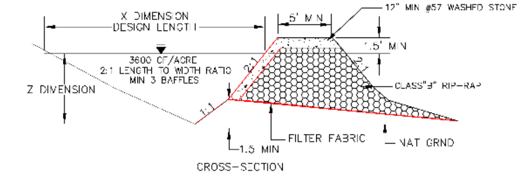
Design Criteria Aggregate Size—Use 2-3 inch washed stone.

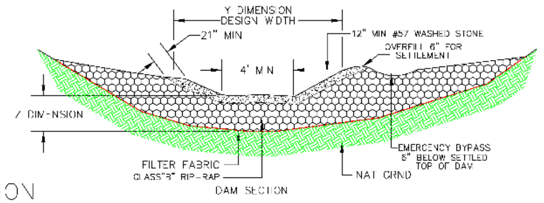
Dimensions of gravel pad—
Thickness: 6 inches minimum
Width: 12-ft minimum or full width at all points of the vehicular entrance and exit area, whichever is greater
Length: 50-ft minimum

Location—Locate construction entrances and exits to limit sediment from leaving the site and to provide for maximum utility by all construction vehicles (Figure 6.06a). Avoid steep grades and entrances at curves in public roads.

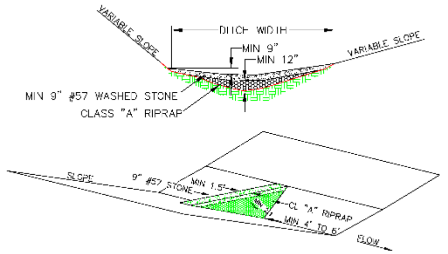


TEMPORARY CONSTRUCTION ENTRANCE

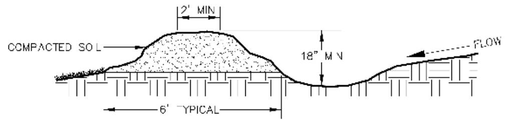




SEDIMENT BASINS



DITCH BLOCK



TEMPORARY DIVERSION BERMS

TEMPORARY SLOPE SEEDING

Temporary Seeding Recommendations for Fall

Seeding mixture

Species	Rate (lb/acre)
Rye (grain)	120

Seeding dates
Mountains—Aug. 15 - Dec. 15
Coastal Plain and Piedmont—Aug. 15 - Dec. 30

Soil amendments
Follow soil tests or apply 2,000 lb/acre ground agricultural limestone and 1,000 lb/acre 10-10-10 fertilizer.

Mulch
Apply 4,000 lb/acre straw. Anchor straw by tacking with asphalt, netting, or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

Maintenance
Repair and refertilize damaged areas immediately. Topdress with 50 lb/acre of nitrogen in March. If it is necessary to extend temporary cover beyond June 15, overseed with 50 lb/acre Kobe (Piedmont and Coastal Plain) or Korean (Mountains) lespedeza in late February or early March.

Temporary Seeding Recommendations for Summer

Seeding mixture

Species	Rate (lb/acre)
German millet	40

In the Piedmont and Mountains, a small-stemmed Sudangrass may be substituted at a rate of 50 lb/acre.

Seeding dates
Mountains—May 15 - Aug. 15
Piedmont—May 1 - Aug. 15
Coastal Plain—Apr. 15 - Aug. 15

Soil amendments
Follow recommendations of soil tests or apply 2,000 lb/acre ground agricultural limestone and 750 lb/acre 10-10-10 fertilizer.

Mulch
Apply 4,000 lb/acre straw. Anchor straw by tacking with asphalt, netting, or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

Maintenance
Refertilize if growth is not fully adequate. Reseed, refertilize and mulch immediately following erosion or other damage.

Recommendations for Late Winter and Early Spring

Seeding mixture

Species	Rate (lb/acre)
Rye (grain)	120
Annual lespedeza (Kobe in Piedmont and Coastal Plain, Korean in Mountains)	50

Omit annual lespedeza when duration of temporary cover is not to extend beyond June.

Seeding dates
Mountains—Above 2500 ft: Feb. 15 - May 15
Below 2500 ft: Feb. 1 - May 1
Piedmont—Jan. 1 - May 1
Coastal Plain—Dec. 1 - Apr. 15

Soil amendments
Follow recommendations of soil tests or apply 2,000 lb/acre ground agricultural limestone and 750 lb/acre 10-10-10 fertilizer.

Mulch
Apply 4,000 lb/acre straw. Anchor straw by tacking with asphalt, netting, or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

Maintenance
Refertilize if growth is not fully adequate. Reseed, refertilize and mulch immediately following erosion or other damage.

PERMANENT SLOPE SEEDING

Seeding No. 1M for: Steep Slopes, Average Soil; Low Maintenance

Seeding mixture

Species[1]	Rate (lb/acre)
Tall fescue	100
Sericea lespedeza	20
Korean lespedeza	10
Redtop	5
Kentucky bluegrass	5

Seeding note
After Aug. 1, use unscarified seed for sericea lespedeza.

Nurse plants
Between May 1 and Aug. 15 add 10 lb/acre German millet or 15 lb/acre Sudangrass. Prior to May 1 or after Aug. 15, add 40 lb/acre rye (grain). It may be beneficial to plant the grasses in late summer and overseed the lespedezas in March.

Seeding dates

	Best	Possible
Below 2500 ft:	Aug. 15 - Sept. 1 Mar. 1 - Apr. 1	July 25 - Sept. 15 Mar. 1 - May 10
Above 2500 ft:	July 25 - Aug. 15 Mar. 20 - Apr. 20	July 15 - Aug. 30 Mar. 5 - May 15

Complete seeding earlier in fall, and start later in spring on north- and east-facing slopes.

Soil amendments
Apply lime and fertilizer according to soil tests or apply 4,000 lb/acre ground agricultural limestone and 1,000 lb/acre 5-10-10 fertilizer.

Mulch
Apply 4,000-5,000 lb/acre grain straw or equivalent cover of another suitable mulching material. Anchor mulch by tacking with asphalt, roving, or netting. Netting is the preferred anchoring method on steep slopes.

Maintenance
Mow no more than once a year. Refertilize in the second year unless growth is fully adequate. Reseed, fertilize, and mulch damaged areas immediately.

[1]Refer to *Appendix 8.02* for botanical names.

Seeding No. 1P for: Steep Slopes or Poor Soils; Low Maintenance

Seeding mixture

Species[1]	Rate (lb/acre)
Tall fescue	100
Sericea lespedeza	30
Kobe lespedeza	10

Seeding notes
1. In Eastern Piedmont add 25 lb/acre Pensacola Bahiagrass or 10 lb/acre common Bermudagrass. Use common Bermudagrass only where it is unlikely to become a pest.
2. After Aug. 15 use unscarified sericea seed.
3. Where a neat appearance is desired, omit sericea and substitute 40 lb/acre Bahiagrass or 15 lb/acre Bermudagrass.
4. To extend spring seeding dates into June, add 15 lb/acre hulled Bermudagrass. However, it is preferable to seed temporary cover and seed fescue in Sept.

Nurse plants
Between May 1 and Aug. 15, add 10 lb/acre German millet or 15 lb/acre Sudangrass. Prior to May 1 or after Aug. 15, add 40 lb/acre rye (grain).

Seeding dates

	Best	Possible
Fall:	Aug. 25 - Sept.15	Aug. 20 - Oct. 25
Late winter:	Feb. 15 - Mar. 21	Feb. 1 - Apr. 15

Fall is best for tall fescue and late winter for lespedezas. Overseeding of Kobe lespedeza over fall-seeded tall fescue is very effective. Use unhulled Bermudagrass seed in fall.

Soil amendments
Apply lime and fertilizer according to soil tests, or apply 4,000 lb/acre ground agricultural limestone and 1,000 lb/acre 10-10-10 fertilizer.

Mulch
Apply 4,000-5,000 lb/acre grain straw, or equivalent cover of another suitable mulching material. Anchor mulch by tacking with asphalt, roving, or netting. Netting is the preferred anchoring method on steep slopes.

Maintenance
Refertilize in the second year unless growth is fully adequate. May be mowed once or twice a year, but mowing is not necessary. Reseed, fertilize, and mulch damaged areas immediately.

[1]Refer to *Appendix 8.02* for botanical names.

TABLE OF EVENTS

NO.	DESCRIPTION	DATE	BY
1	Erosion Control Standards	24 JUN 2018	KRA

APPROVALS
PROJECT P.E.: KRA
DESIGNED BY: KRA
DRAWN BY: KRA
CHECKED BY: KRA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22208 KEVIN R. ALFORD
DATE June 24, 2018

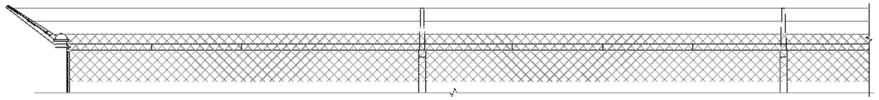
PREPARED BY
Alford Engineering, RLLP
"An Indian Owned Engineering Firm"
P O BOX 1930
MAGGIE VALLEY, NORTH CAROLINA 28751
PHONE No. 828-926-8341, CELL No. 506-3411
E-MAIL: alfordk1@bellsouth.net
WEB: www.alfordengineering.net
NC Firm Certification No. F-0920

PROJECT
CHEROKEE COUNTY
HARRAH'S SOLAR SITE
EASTERN BAND OF CHEROKEE INDIANS
MURPHY NORTH CAROLINA

SHEET TITLE
EROSION CONTROL PLAN STANDARD SHEET
SCALE: AS SHOWN JUNE 2018

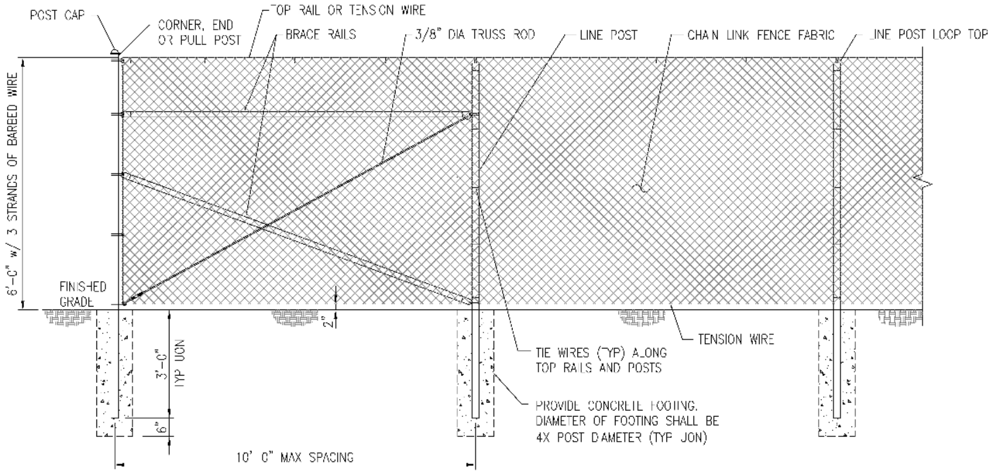
PROJECT NUMBER 2018-15

SHEET E-STD



TYPICAL 3 STRAND BARBED WIRE AND SINGLE EXTENSION ARM CONFIGURATION

NOT TO SCALE

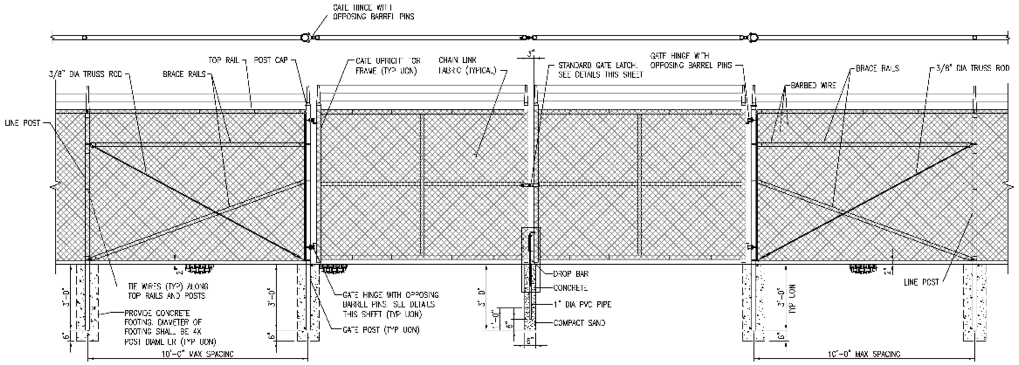


TYPICAL FENCE AND CORNER PANEL ELEVATION

NOT TO SCALE

GENERAL NOTES:

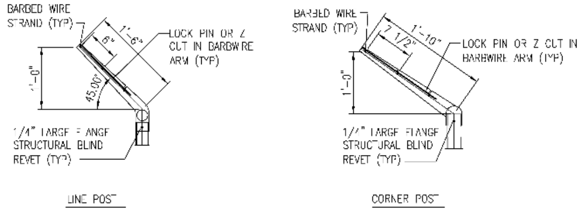
1. WELDED GATE FABRICATION IN ACCORDANCE WITH ASTM F900.
2. GATE FRAMEMEMBERRS TO BE SPACED NO GREATER THAN 8ft APRT VERTICALLY AND HORIZONTALLY.
3. APPLY ZINC RICH PAINT TO WELDE JOINTS.
4. GATES TO BE INSTALLED WITH POSITIVE LOCKING GATE LATCHES.
5. PROVIDE LOCKABLE DROP BARS AND GATE HOLDBACKS WITH DOUBLE GATES.
6. FENCE SHALL BE 6ft TALL WITH 3 STRANDS OF BARBED WIRE TO MEET MEC REQUIREMENTS.
7. FENCE DESIGN SHALL MEET ASTM F2611 AND F1712 REQUIREMENTS.
8. FENCE INSTALLATION SHALL MEET ASTM567 REQUIREMENTS.
9. CONCRETE SHALL BE A MINIMUM OF 2500psi COMPRESSIVE STRENGTH.
10. FENCE SHALL BE GROUNDED AT EVERY CHANGE IN DIRECTION AND NOT MORE THAN 160ft APART PER NEC REQUIREMENTS.
11. MINIMUM FENCING SETBACKS ARE AS FOLLOWS:
    - -10ft FROM ELECTRICAL EQUIPMENT WITH LIVE PARTS
    - -15ft INSIDE VEHICULAR ACCESS
    - - 3' FROM EXTERIOR MAINTENANCE ACCESS



TYPICAL DOUBLE SWING GATE

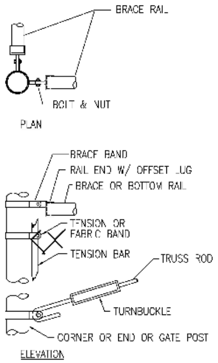
NOT TO SCALE

NOTE: BARBED WIRE IN ACCORDANCE WITH ASTM A121 AND F1665



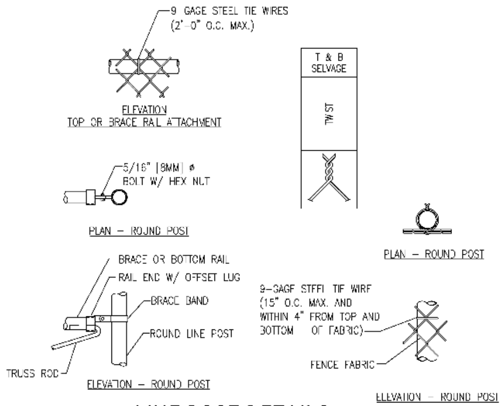
SINGLE EXTENSION ARM DETAILS

NOT TO SCALE



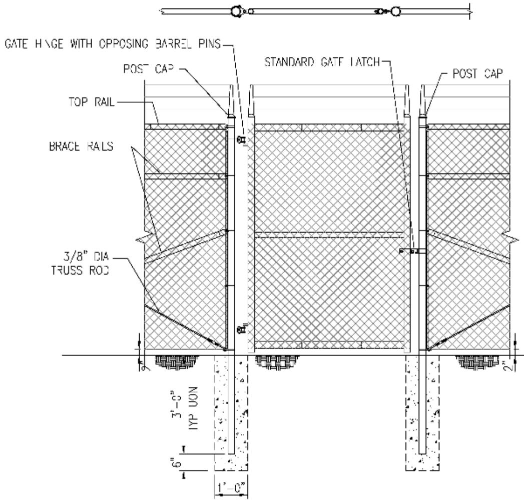
CORNER OR END POSTS

NOT TO SCALE



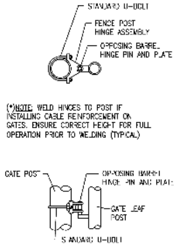
LINE POST DETAILS

NOT TO SCALE



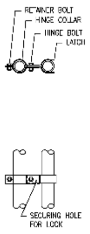
TYPICAL FENCE SINGLE SWING GATE

NOT TO SCALE



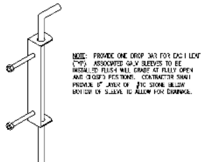
GATE HINGE DETAIL

NOT TO SCALE



GATE LATCH DETAIL

NOT TO SCALE



DETAIL DROP BAR

NOT TO SCALE

TABLE OF EVENTS			
NO.	DESCRIPTION	DATE	BY
1	Fencing Details	24 JUN 2018	KRA

APPROVALS: PROJECT NE: KRA; DESIGNED BY: KRA; DRAWN BY: KRA; CHECKED BY: KRA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22203 KEVIN R. ALFORD

DATE June 24, 2018

PREPARED BY

Alford Engineering, RLLP
"An Indian Owned Engineering Firm"
P. O. BOX 1930
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WEB: www.alfordengineering.net
NC FIRM CERTIFICATION NO. F-0920

PROJECT

CHEROKEE COUNTY HARRAH'S SOLAR SITE

EASTERN BAND OF CHEROKEE INDIANS

MURPHY NORTH CAROLINA

SHEET TITLE

FENCING DETAILS

JUNE 2018

SCALE: AS SHOWN

PROJECT NUMBER 2018-15

SHEET G-102

April 4th – Clearing trees on site

April 4th

May 29th

Groundbreaking held for solar farm at Valley River

GROUNDBREAKING: Tribal officials and project officials break ground on the new solar farm at Harrah's Cherokee Valley River Casino on Tuesday, May 29. Shown (left-right) are – Tribal Council Chairman Adam Wachacha, Painttown Rep. Tommye Saunooke, Painttown Rep. Lisa Taylor, Vice Chief Alan B. Ensley, Siemens Government Technologies Vice President for Automation and Service Sam Lewis, Harrah's Cherokee Valley River General Manager Lumpy Lambert, Principal Chief Richard G. Sneed, Wolftown Rep. Jeremy Wilson, Cherokee County – Snowbird Rep. Bucky Brown, Birdtown Rep. Boyd Owle, and EBCI Secretary of Agriculture and Natural Resources Joey Owle. (Photo courtesy of Office of the Principal Chief)

July 11th

July 11th


July 11th


July 30th


July 30th

July 30th

August 17th

September 25th

September 25th

October 29th

October 29th – Racking installation

October 29th – EBCI Project Management

October 29th – Shading issue

December 7th – Problem solved

December 7th

December 7th

Example of Output Dashboard

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

759 Metric Tons

Greenhouse gas emissions from

- **163** Passenger vehicles driven for one year -or-
- **1,860,305** Miles driven by an average passenger vehicle -or-
- **264** Tons of waste recycled instead of landfilled -or-
- **37.8** Garbage trucks of waste recycled instead of landfilled

Carbon sequestered by

- **19,670** tree seedlings grown for 10 years -or-
- **894** acres of U.S. forests in one year -or-
- **6.2** acres of U.S. forests preserved from conversion to cropland in one year

CO_2 emissions from

- **85,406** gallons of gasoline consumed -or-
- **830,421** Pounds of coal burned -or-
- **10** tanker trucks' worth of gasoline -or-
- **82** homes' energy use for one year -or-
- **0.192** Wind turbines running for a year -or-
- **114** homes' electricity use for one year -or-
- **4.1** railcars' worth of coal burned -or-
- **25,402** Incandescent lamps switched to LEDs -or-
- **1,757** barrels of oil consumed -or-
- **31,028** propane cylinders used for home barbeques -or-

PROJECT SUMMARY

- **Progress updates**
  - Deployment of 705 kW solar PV array **99%** complete
  - Full testing of system initiated, completed, commissioned on Dec. 5th
  - ROI → ~ 13 years
- **Challenges, Considerations, and Successes**
  - Site adjustment, Delayed designs / permitting, Weather
  - Permitting
    - EPA CGP: SWPPP
    - Section 7 of the ESA of 1973
      - Special Species Status: Indiana Bat & Northern Long-eared Bat (Myotis spp.)
    - Section 106 NHPA – "*no adverse effect on unidentified cultural resources*"
    - BIA Timber Permit
    - DOE – CatEx
    - Tribal Erosion Control Plan
  - **Communication, Professionalism**
- **Next steps**
  - Connect system to local fiber network for output monitoring
  - Conduct training for Harrahs and EBCI staff: a must prior to system power up
  - 3rd party commission testing
  - Produce PR video with stakeholders
  - Hold 2nd "official" ribbon cutting with stakeholders

ACKNOWLEDGEMENTS

- Cherokee Enterprises
- Alford Engineering
- All other contractors

Thank you! Questions?