Town of Plymouth
Finance Department

TO: Board of Selectmen and Advisory & Finance Committee
FROM: Lynne A. Barrett, Director of Finance
RE: **2016 Fall Town Meeting - Article 13 - Solar PILOTs**
DATE: September 9, 2016

Article 13 of the Spring 2013 Special Town Meeting authorized the Board of Selectmen to negotiate one or more agreements for payments-in-lieu-of-taxes (PILOT) pursuant to the provisions of M.G.L. Chapter 59, Section 38H(b), and Chapter 164, Section 1 for property relating to renewable energy generation facilities. The town has since entered into several PILOT agreements. Because of the state statute, communities are allowed to tax these facilities through a negotiated PILOT agreement.

A PILOT agreement can be beneficial to both the developer and the Town; some of the advantages are but not limited to:

Developer	Town
1. Set stream of payments known at the beginning of the project for cost evaluation or financing.	1. Set stream of payments for tax billing purposes based on an initial evaluation of cost for appraisal versus on an annual basis. Lowers our transaction cost by avoiding a 3 year certification / valuation appraisal.
	2. Because the facility is considered personal property the town could not perfect a lien like we can with real estate if it went unpaid. We would seek remedy under a violation of the contract terms.
	3. Removes the risk of disagreement of the value and potential for requests for abatement.
	4. Negotiated PILOTS with solar developers prompt development of renewable energy in the Town of Plymouth.

The following projects have submitted their required documentation to the Director of Assessing for review. The income approach was used to value the rates for the PILOTS. The terms of the agreements will be for 20 years and will include an annual escalator of 2.5%.

	LLC (or its affiliates, successors, or assignees)	Type & Size (more or less)	Location	Fee
A	Renewable Energy Development Partners	Ground 1.0	Map 97 Lot 10-2 Adjacent to airport	$13,500 per MWAC
B	Renewable Energy Development Partners	Ground 0.5	Map 99 Lot 1-C Off Federal Furnace Road	$13,500 per MWAC
C	*Withdrawn*			
D	46 Shops Plymouth Solar	Roof 1.11	Map 83 Lot 3C-3 46 Shops at 5 Way	$12,500 per MWDC
E	978 Solar Development	Ground 1.338	Map 114 Lot 5 9 River Run Way	$12,500 per MWDC
F	978 Solar Development	Ground 1.338	Map 114 Lots 7-2 & 7-8 5 River Run Way	$12,500 per MWDC
G	978 Solar Development	Ground 2.77	Map 115 Lot A-1 3 River Run Way	$12,500 per MWDC
H	978 Solar Development	Ground 1.32	Map 90 Lot 17-5 57 Black Cat Road	$12,500 per MWDC

A vote of Town Meeting is required to adopt the PILOT agreements. Your consideration and endorsement of this PILOT is appreciated. Thank you for your attention.

(A) (B)

Renewable Energy Development Partners

Map 97 Lot 10-2
Adjacent to airport

PROPOSED PILOT	
MW AC	1.0
$/MW	$13,500
2.5% escalator	
	PILOT
Year 1	13,500
Year 2	13,838
Year 3	14,183
Year 4	14,538
Year 5	14,901
Year 6	15,274
Year 7	15,656
Year 8	16,047
Year 9	16,448
Year 10	16,860
Year 11	17,281
Year 12	17,713
Year 13	18,156
Year 14	18,610
Year 15	19,075
Year 16	19,552
Year 17	20,041
Year 18	20,542
Year 19	21,055
Year 20	21,582
Total	344,853

Map 99 Lot 1C
Off Federal Furnace Road

PROPOSED PILOT	
MW AC	0.5
$/MW	$13,500
2.5% escalator	
	PILOT
Year 1	6,750
Year 2	6,919
Year 3	7,092
Year 4	7,269
Year 5	7,451
Year 6	7,637
Year 7	7,828
Year 8	8,024
Year 9	8,224
Year 10	8,430
Year 11	8,641
Year 12	8,857
Year 13	9,078
Year 14	9,305
Year 15	9,538
Year 16	9,776
Year 17	10,020
Year 18	10,271
Year 19	10,528
Year 20	10,791
Total	172,426

A

CARVER

TOWN LINE

TOWN LINE

12

17C

4

AP

MEADOW PARK ROAD

108

ROBERTS ROAD

SOUTH MEADOW ROAD

HAROLD'S WAY

Plymouth Municipal Airport

17A

16

13

15

14

RR

RESERVOIR

VILLAGE WAY

ROCKY NECK ROAD

1

Solar facility locus

10-2

11

10-1

FEDERAL FURNACE ROAD

5

6-7

BRIMMER ROAD

3A

2

5B

5C

5A

5-3

5-4

5-6

5-7

8A

6B-2

6B-1

6D

6-1

5-5

5-8

7

99

BRIMMER ROAD

CAROL BOULEVARD

LITTLE BABYS POND

SPRING POND

95

106

CANTERBURY DRIVE

NOTTINGHAM LANE

KINGS POND PLAIN ROAD

EUCLID'S WAY

96

DAVID LANE

BABYS POND

GRASSY WEST POND

R-2-3

92

SLY POND 2

JESTER WAY

KNIGHT AVENUE

KINGS POND

COLBY

POND

0 200 400 800 1,200 1,600 Feet

1 inch = 400 feet

Disclaimer
This map is to be used for assessing purposes only.
The Town of Plymouth makes no claims, no representations and no warranties, express or implied, concerning the validity (express or implied), the reliability or the accuracy of the GIS data and/or GIS products furnished by the Town, including the implied warranty of any fitness of such data.
Parcel lines are graphic representations only.
Prepared and maintained by the Plymouth Engineering Division.

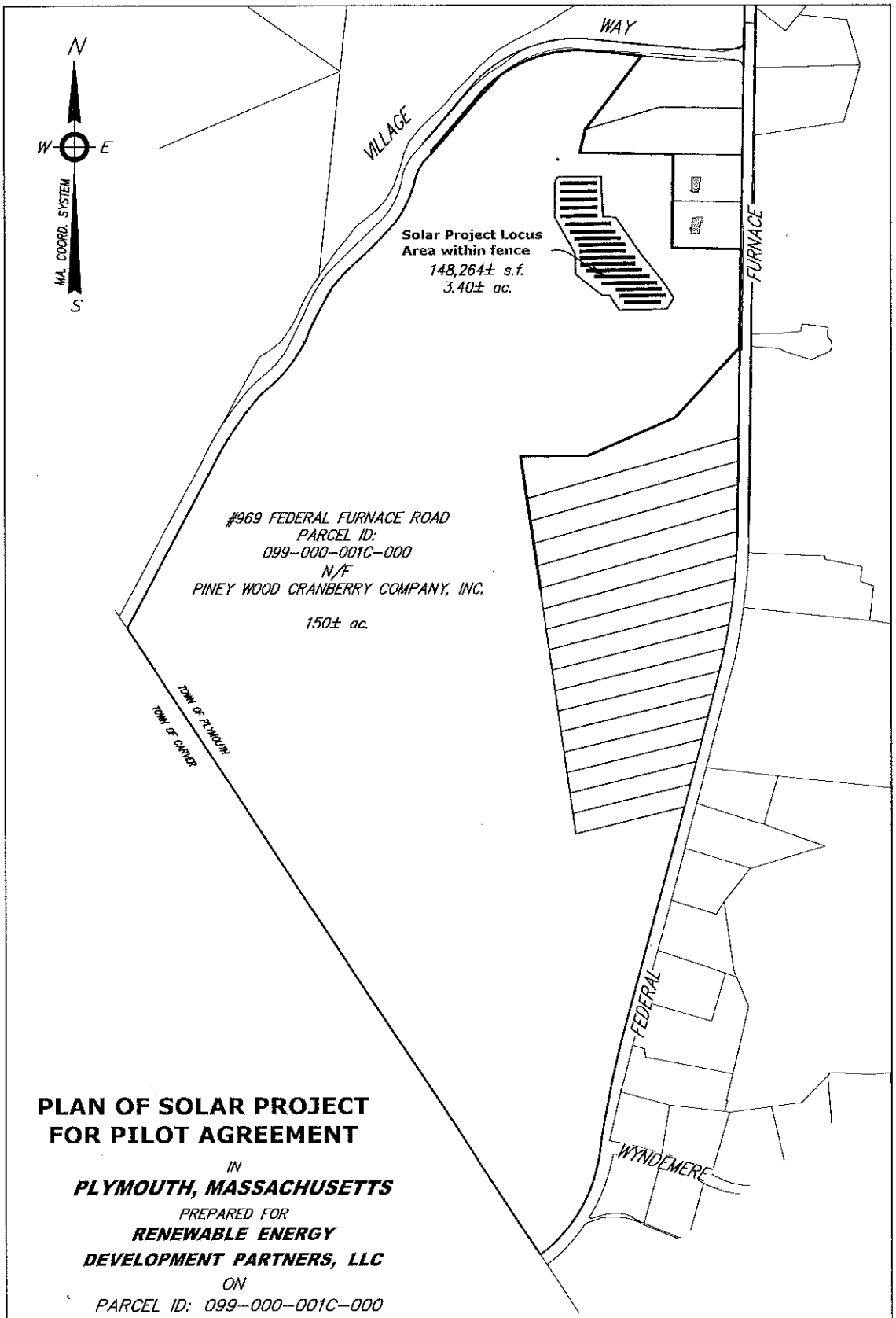
TOWN OF PLYMOUTH
ASSESSORS MAP

January 1, 2016

97

A

B



PLAN OF SOLAR PROJECT FOR PILOT AGREEMENT

IN

PLYMOUTH, MASSACHUSETTS

PREPARED FOR

RENEWABLE ENERGY DEVELOPMENT PARTNERS, LLC

ON

PARCEL ID: 099-000-001C-000
PINEY WOOD CRANBERRY COMPANY, INC.
OFF FEDERAL FURNACE ROAD
SCALE: 1"=400' *AUGUST 5, 2016*

FLAHERTY & STEFANI, INC.
67 SAMOSET STREET
PLYMOUTH, MASSACHUSETTS

0 400 800 1200
1 inch = 400 ft.

A+B

C

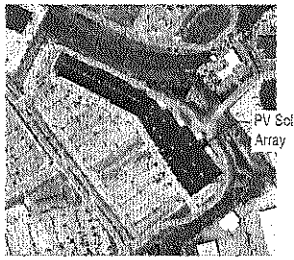
Withdrawn

D

Shops at 5 Way
46 Shops Plymouth Solar, LLC
083-000-003C-003

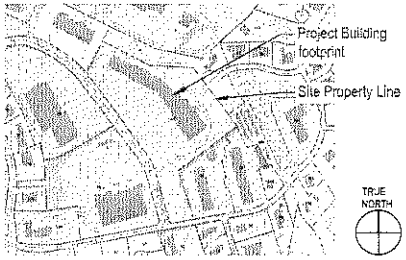
PROPOSED PILOT	
MW DC	1.11
$/MW	$12,500
2.5% escalator	
	PILOT
Year 1	13,875
Year 2	14,222
Year 3	14,577
Year 4	14,942
Year 5	15,315
Year 6	15,698
Year 7	16,091
Year 8	16,493
Year 9	16,905
Year 10	17,328
Year 11	17,761
Year 12	18,205
Year 13	18,660
Year 14	19,127
Year 15	19,605
Year 16	20,095
Year 17	20,598
Year 18	21,112
Year 19	21,640
Year 20	22,181
Total	354,432

D



TRUE NORTH

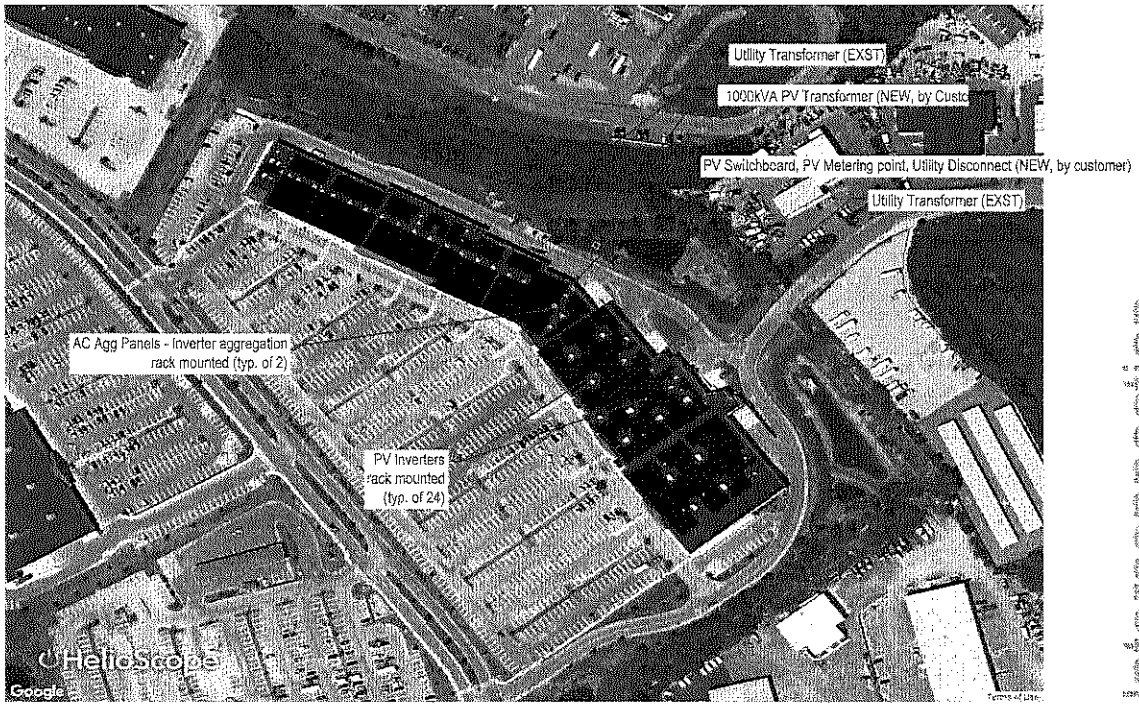
D1 SITE PLAN - PHOTO
Scale: NTS



TRUE NORTH

D2 SITE PLAN - PROPERTY LINES
Scale: NTS

PV SOLAR SYSTEM SUMMARY	
(TOTAL MODULE COUNT) MODULE MANF. & MODEL NUMBER / STC DC RATING	(3534) Tier One 315W
TOTAL STRINGS OF MODULES PER STRING	186 Strings of 19
PV ARRAY RACKING STYLE / MANUFACTURER AND MODEL	Ballasted Roof Mount / TBD
TOTAL STC DC SYSTEM SIZE	1113.21 kW DC 840 KW AC 1.325:1
(TOTAL INVERTER COUNT) INVERTER MANF. AND MODEL	(3) Solectria PVI 28TL (21) Solectria PVI 36TL
INVERTER CEC EFFICIENCY	98.0%
SITE LATITUDE	41° 51' 15.77" N
ARRAY AZIMUTH / MODULE TILT	26°/10°, 206°/10°, 232.7°/10°, 52.7°/10°
ASHRAE DESIGN TEMPERATURE EXTREME MIN. / 2% HIGH	-18°C/31°C
INTERCONNECTION VOLTAGE	480 VAC 3φ
INTERCONNECTION OCPD RATING	1200A (100% Rated)
INTERCONNECTION TYPE	New Service



A1 SITE PLAN
Scale: 1/64" = 1'-0"

TRUE NORTH

For Interconnection
Not For Construction

GENERAL SHEET NOTES

1. ALL DIMENSIONS ARE APPROXIMATE AND MUST BE FIELD VERIFIED.
2. ROOF MOUNTED SOLAR EQUIPMENT (INVERTERS AND DISCONNECTS) WILL BE ACCESSIBLE BY THE EXISTING BUILDING'S ROOF HATCH(S) OR BY LADDER.
3. CONDUIT ON THE ROOF WILL BE SUPPORTED BY A SUPPORT BLOCK ASSEMBLY SUCH AS CADDY BLOCK OR EQUIVALENT. ADDITIONAL RACKING MAY BE REQUIRED TO SUPPORT CANTILEVERED AND VERTICAL CONDUITS.
4. ALL CONDUIT SHALL BE MOUNTED AT A MINIMUM DISTANCE OF 3 1/2" OFF THE ROOF SURFACE, ANY STRAIGHT CONDUIT RUN GREATER THAN 27 FEET SHALL HAVE A 4 INCH EXPANSION JOINT. AN ADDITIONAL EXPANSION JOINT SHALL BE USED EVERY 100 FEET OF STRAIGHT CONDUIT RUNS. EXPANSION JOINTS IN THE CONDUIT RUN SHALL BE INSTALLED AT BUILDING EXPANSION JOINTS.
5. PULL BOXES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING NEC ARTICLES: 342.26 FOR IMC, 344.26 FOR RMC, 352.26 FOR PVC, 353.26 FOR HDPE, AND 358.26 FOR EMT CONDUIT.

SHEET KEYNOTES

CLEAN Footprint
Clean Footprint
405 Atlantis Rd Suite E115
Cape Canaveral, FL 32920
321.338.1947
www.clean-footprint.com

STAMP:

HAROLD HART, JR. ELECTRICAL
6-6-16

CLIENT: CLEAN FOOTPRINT

PROJECT: 46 SHOPS AT 5 WAY- EAST SOLAR PROJECT
1113.21 kW DC STC RATING
46 SHOPS AT 5 WAY
PLYMOUTH, MA 02360

MARK	DATE	DESCRIPTION	DRAWN	CHK'D
A	2015-12-17	PRICING	GBG	DSM

PROJECT NO:
PROJECT PHASE: PRICING
COPYRIGHT: PCL 2015
SCALE: AS NOTED
SHEET SIZE: ANSI D - 22X34
SHEET TITLE: SITE PLAN

WI101

(E)

Redbrook Solar Array 1 - 9 River Run Way
978 Solar Dev LLC
114-000-005-000

PROPOSED PILOT	
MW DC	1.338
$/MW	$12,500
2.5% escalator	
	PILOT
Year 1	16,725
Year 2	17,143
Year 3	17,572
Year 4	18,011
Year 5	18,461
Year 6	18,923
Year 7	19,396
Year 8	19,881
Year 9	20,378
Year 10	20,887
Year 11	21,409
Year 12	21,945
Year 13	22,493
Year 14	23,056
Year 15	23,632
Year 16	24,223
Year 17	24,828
Year 18	25,449
Year 19	26,085
Year 20	26,737
Total	427,234

(F)

Redbrook Solar Array 2 - 5 River Run Way
978 Solar Development LLC
Map 114 Lots 7 + 8

PROPOSED PILOT	
MW AC	1.338
$/MW	$12,500
2.5% escalator	
	PILOT
Year 1	16,725
Year 2	17,143
Year 3	17,572
Year 4	18,011
Year 5	18,461
Year 6	18,923
Year 7	19,396
Year 8	19,881
Year 9	20,378
Year 10	20,887
Year 11	21,409
Year 12	21,945
Year 13	22,493
Year 14	23,056
Year 15	23,632
Year 16	24,223
Year 17	24,828
Year 18	25,449
Year 19	26,085
Year 20	26,737
Total	427,234

(G)

Redbrook Solar Array 3 - 3 River Run Way
978 Solar Dev LLC
115-000-000A-001
ADM

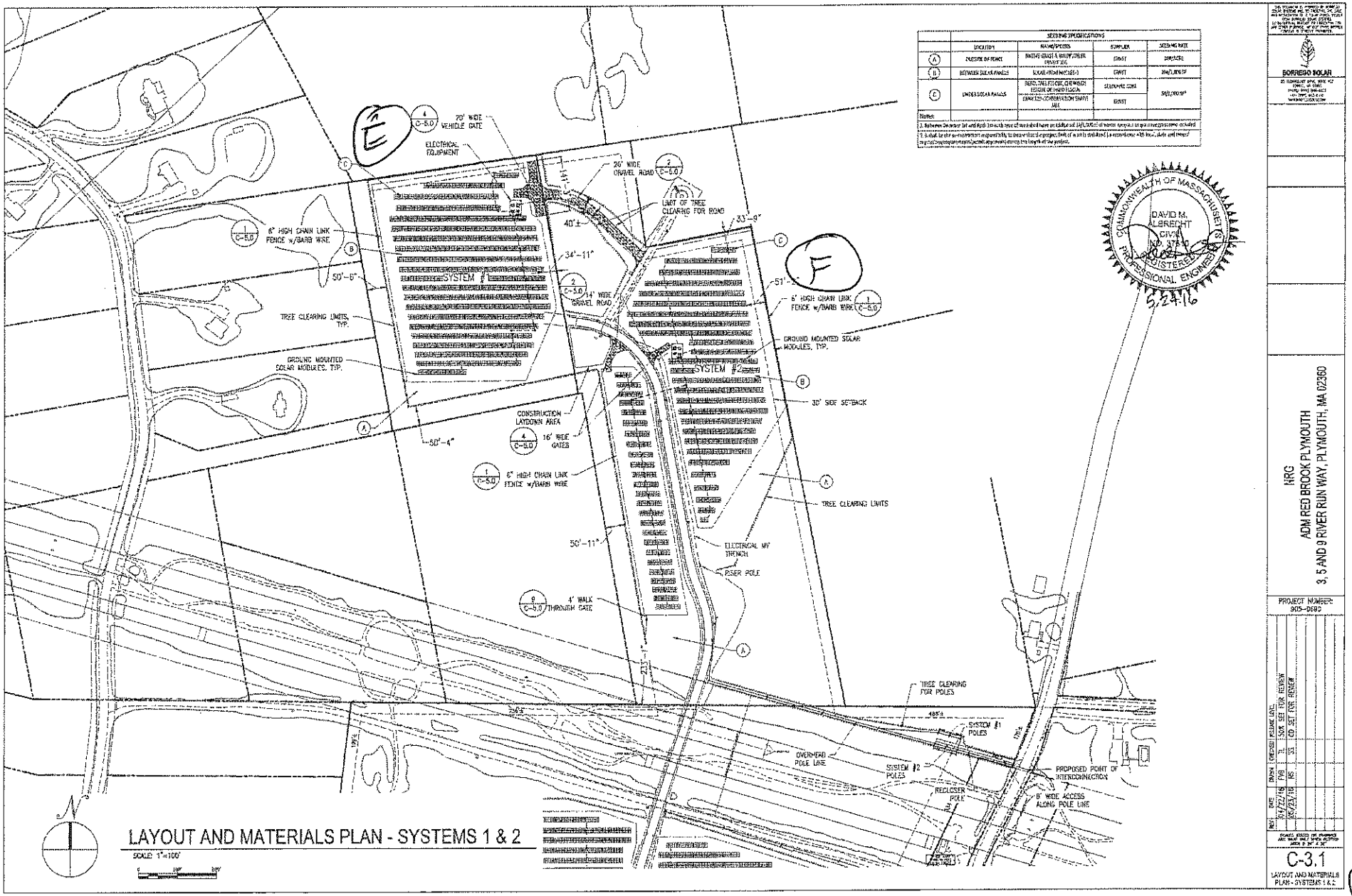
PROPOSED PILOT	
MW DC	2.77
$/MW	$12,500
2.5% escalator	
	PILOT
Year 1	34,625
Year 2	35,491
Year 3	36,378
Year 4	37,287
Year 5	38,220
Year 6	39,175
Year 7	40,154
Year 8	41,158
Year 9	42,187
Year 10	43,242
Year 11	44,323
Year 12	45,431
Year 13	46,567
Year 14	47,731
Year 15	48,924
Year 16	50,147
Year 17	51,401
Year 18	52,686
Year 19	54,003
Year 20	55,353
Total	884,484

(H)

57 Black Cat Road
Borrego Solar
978 Solar Development LLC
Map 90 lot 17-5

PROPOSED PILOT	
MW DC	1.32
$/MW	$12,500
2.5% escalator	
	PILOT
Year 1	16,250
Year 2	16,656
Year 3	17,073
Year 4	17,499
Year 5	17,937
Year 6	18,385
Year 7	18,845
Year 8	19,316
Year 9	19,799
Year 10	20,294
Year 11	20,801
Year 12	21,321
Year 13	21,854
Year 14	22,401
Year 15	22,961
Year 16	23,535
Year 17	24,123
Year 18	24,726
Year 19	25,344
Year 20	25,978
Total	415,101

E + F



BORREGO SOLAR

NRG
ADM RED BROOK PLYMOUTH
3, 5 AND 9 RIVER RUN WAY, PLYMOUTH, MA 02360

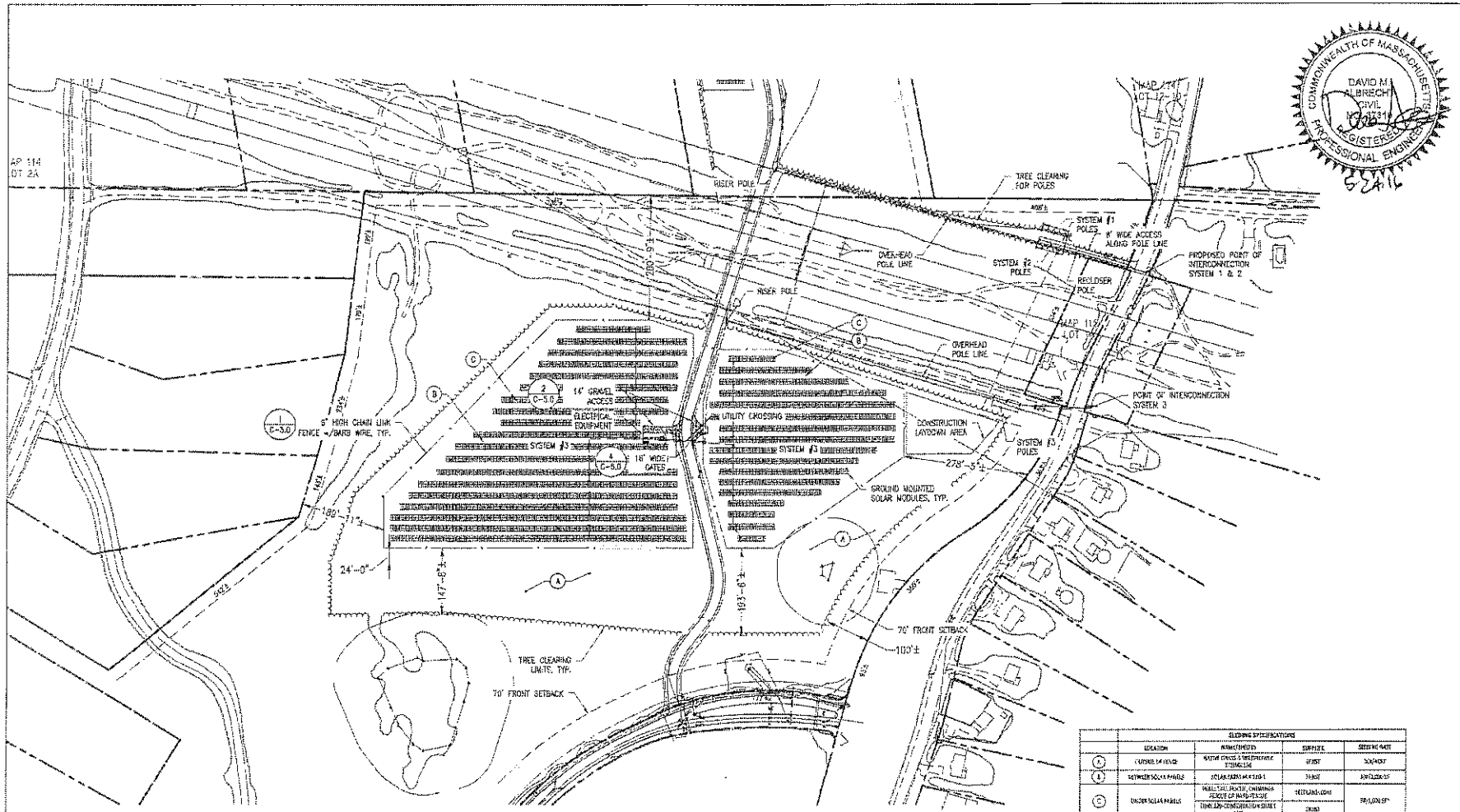
PROJECT NUMBER: 905-0680

REV	DATE	DRAWN	CHECKED	RELEASE LEVEL
	05/17/16	PVG	TL	50% SET FOR REVIEW
	05/23/16	NB	JS	CD SET FOR REVIEW

C-3.1
LAYOUT AND MATERIALS PLAN - SYSTEMS 1 & 2

E + F

G



	SEEDING SPECIFICATIONS			
	LOCATION	PLANT CHOICES	SURFACE	SEEDING RATE
A	CUTBACK LAYOUT	NATIVE GRASS & WILDFLOWER STANDARD	SEED	50#/ACRE
A	BETWEEN SOLAR PANELS	SOLAR FARM MIX #10-1	SEED	20#/ACRE
C	UNDER SOLAR PANELS	WILD TALL PRAIRIE, CHAMPIONS PERCUT OF WILD PLEASURE	SEED/SOD	50#/1,000 SF
		LINE-LIN-CONSERVATION-SUMMER MIX	SEED	
Notes:				

1. Between the shelter belt and the fence, type of seed and fertilizer or additional 50#/1,000 sq.ft. water conservation grass may be planted instead.
2. It shall be the contractor responsibility to ensure that the project area of work is kept in compliance with local, state and federal mandated dust control laws & regulations during the length of the project.

LAYOUT AND MATERIALS PLAN - SYSTEM 3

SCALE: 1"=100'

1 50' 100'

COMMONWEALTH OF MASSACHUSETTS
DAVID M. ALBRECHT
CIVIL
No. 45831
REGISTERED PROFESSIONAL ENGINEER
5-24-16

BORREGO SOLAR

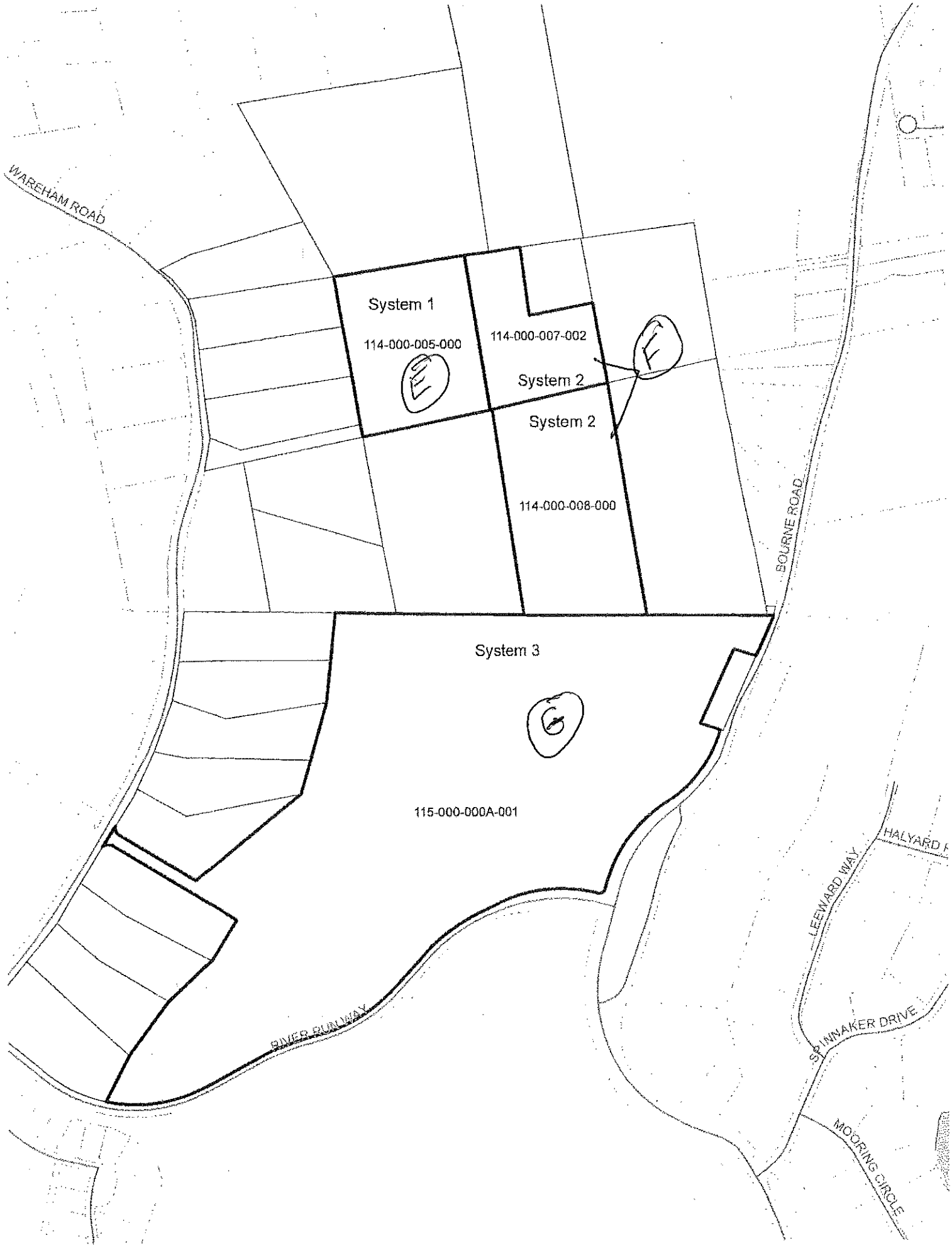
NRG
ADM RED BROOK PLYMOUTH
3, 5 AND 9 RIVER RUN WAY, PLYMOUTH, MA 02360

PROJECT NUMBER: SOS-0690

REV	DATE	DRAWN	DESIGNED	REVISIONS	INITIALS LOCAL
	05/27/16	FVB	TL	50% SET FOR REVIEW	
	05/23/16	RKS	SSS	CD SET FOR REVIEW	

C-3.2
LAYOUT AND MATERIALS PLAN - SYSTEM 3

G


WAREHAM ROAD
System 1
114-000-005-000
E
114-000-007-002
F
System 2
System 2
114-000-008-000
BOURNE ROAD
System 3
G
115-000-000A-001
LEEWARD WAY
HALYARD
SPINNAKER DRIVE
MOORING CIRCLE
RIVER RUNWAY

E-6

BLACK CAT ROAD

57 BLACK CAT ROAD, PLYMOUTH, MA 02360

1320.57 kW DC STC RATED SOLAR ELECTRIC SYSTEM

GENERAL NOTES

1. AS CONTAINED HEREIN, "CONTRACTOR" IS ASSUMED TO BE BORREGO SOLAR SYSTEMS, INC AND "SUBCONTRACTOR" IS BORREGO'S INSTALLATION SUBCONTRACTOR.
2. THESE NOTES SET MINIMUM STANDARDS FOR CONSTRUCTION. THE DRAWINGS GOVERN OVER THESE NOTES TO THE EXTENT SHOWN.
3. ALL WORK SHALL CONFORM TO THE MINIMUM STANDARDS OF THE FOLLOWING: LOCAL BUILDING CODE, LOCAL ELECTRICAL CODE, ANY OTHER REGULATING AGENCIES WHICH HAVE AUTHORITY OVER ANY PORTION OF THE WORK AND THOSE CODES AND STANDARDS LISTED IN THESE DRAWINGS AND IN THE SUBCONTRACTOR AGREEMENT.
4. EXCEPTIONS TO THE CONTRACT DOCUMENTS ARE PERMITTED ONLY WITH THE APPROVAL OF BORREGO.
5. COORDINATE THESE DRAWINGS WITH SPECIFICATIONS AND MANUFACTURER INSTALLATION AND OPERATION MANUALS AND NOTIFY BORREGO OF ANY DISCREPANCIES PRIOR TO BEGINNING WORK.
6. DRAWINGS HAVE BEEN DETAILED IN COMPLIANCE WITH U.L. LISTING REQUIREMENTS AND THE BUILDING CODE FOR THE MATERIALS SPECIFIED. IF AN ALTERNATE OR SUBSTITUTED MATERIAL IS ACCEPTED AS AN EQUAL BY BORREGO, THE SUBCONTRACTOR WILL ASSUME THE RESPONSIBILITY FOR WHATEVER CONSTRUCTION MODIFICATION AND/OR ADDITIONAL COST THAT IS REQUIRED BY REASON OF THIS ACCEPTANCE.
7. PRIOR TO THE COMMENCEMENT OF ANY WORK, EACH TRADE SHALL VERIFY EXISTING CONDITIONS AND NOTIFY BORREGO OF ANY DISCREPANCIES TO THAT WHICH IS SHOWN IN THESE DRAWINGS, INCLUDING BUT NOT LIMITED TO DIMENSIONS OF THE WORK AREA, STRUCTURE, EXISTING ELECTRICAL SERVICE, CONDUIT PATHS, OBSTRUCTIONS, ACCESSIBILITY ISSUES, AND WORKING CLEARANCES. ANY WORK PERFORMED IN CONFLICT WITH THE CONTRACT DOCUMENTS OR ANY CODE REQUIREMENTS SHALL BE CORRECTED BY THE SUBCONTRACTOR AT HIS OWN EXPENSE.
8. SUBCONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO BORREGO FOR APPROVAL PRIOR TO MAKING ANY CHANGES. APPROVED CHANGES REQUIRE A DRAWING REVISION TO MAINTAIN CONTROL OVER THE APPROVED DESIGN. DEVIATION FROM THESE PLANS PRIOR TO BORREGO APPROVAL PLACES ALL LIABILITY ON THE SUBCONTRACTOR.
9. UNLESS INDICATED AS EXISTING (E), ALL PROPOSED MATERIALS AND EQUIPMENT ARE NEW.
10. ALL ITEMS TO BE REMOVED AND RELOCATED OR REPLACED SHALL BE HANDLED WITH PROPER CARE AND STORED IN A SAFE PLACE TO PREVENT DAMAGE; OR BE REPLACED AT THE SUBCONTRACTOR'S EXPENSE.
11. ALL EQUIPMENT SHALL BE MOUNTED AS SHOWN. WHERE DETAILS ARE NOT PROVIDED, THE SUBCONTRACTOR SHALL USE DILIGENT EFFORTS TO MOUNT EQUIPMENT SUCH THAT IT WILL BE CLEAN, LEVEL AND SOLID.
12. ALL SURFACES SHALL BE PATCHED AND PAINTED AROUND NEW DEVICES AND EQUIPMENT TO MATCH EXISTING FINISHES.
13. ANY METAL SHAVINGS RESULTING FROM SITE WORK SHALL BE CLEANED FROM ROOF SURFACES, ENCLOSURES AND ANY ADDITIONAL AREAS WHERE OXIDIZED OR CONDUCTIVE METAL SHAVINGS MAY CAUSE RUST, ELECTRICAL SHORT CIRCUITS OR OTHER DAMAGE.
14. NO STRUCTURAL MEMBER SHALL BE DRILLED UNLESS SPECIFICALLY AUTHORIZED BY BORREGO.
15. SUBCONTRACTOR ACKNOWLEDGES THAT THE SYSTEM AS INDICATED ON THE PLANS REQUIRES ALL COMPONENTS TO BE INSTALLED TO PROPERLY RESIST WIND LOADS, SUCH AS BALLAST, WIND DEFLECTORS, ETC. IT IS THE RESPONSIBILITY OF THE SUBCONTRACTOR TO PROVIDE TEMPORARY MEANS TO RESIST WIND LOADS FOR ALL COMPONENTS NOT YET INSTALLED DURING AND AFTER REGULAR WORKING HOURS. THIS MAY INCLUDE TEMPORARY TIE DOWNS, COVERING, BALLAST OR ANY OTHER MEANS. DAMAGE TO ANY INSTALLED SYSTEM COMPONENT OR THE EXISTING FACILITY AS A RESULT OF THE UNFINISHED CONDITION NOT ADEQUATELY RESISTING WIND SHALL BE THE RESPONSIBILITY OF THE SUBCONTRACTOR TO REPAIR OR REPLACE AT THE SUBCONTRACTOR'S COST.
16. TREES MAY GROW DURING THE LIFE OF THE SYSTEM AND IMPACT THE PRODUCTION.

V.7

APPLICABLE CODES AND STANDARDS

2014 MASSACHUSETTS ELECTRICAL CODE 527 CMR12.00
MASSACHUSETTS BUILDING CODE 8TH EDITION
UL-1703 - SOLAR MODULES
UL-1741 - INVERTERS, COMBINER BOXES
UL-2703 - RACKING MOUNTING SYSTEMS AND CLAMPING DEVICES FOR PV MODULES

PROJECT SCOPE

THIS PROJECT CONSISTS OF THE INSTALLATION OF SOLAR MODULES PER THE SYSTEM DESCRIPTION, BELOW. THE MODULES WILL BE INSTALLED ON A GROUND MOUNTED RACKING SYSTEM. THE MODULES WILL BE WIRED IN SERIES STRINGS AND CONNECTED IN PARALLEL TO THE INVERTERS, WHICH CONVERT THE PHOTOVOLTAIC OUTPUT POWER FROM DC TO AC. THE SOLAR ELECTRIC SYSTEM WILL BE INTERCONNECTED WITH THE EXISTING SITE ELECTRICAL SYSTEM IN ACCORDANCE WITH THE APPLICABLE ELECTRIC CODE AND NSTAR REQUIREMENTS.

SYSTEM DESCRIPTION

SYSTEM SIZE (DC STC)	1320.57 kW	SYSTEM SIZE (AC)	998 kW
MODULES	(3364) LG ELECTRONICS LG365N2W-G4	CEC RATING	337.4 W
	(234) LG ELECTRONICS LG365N2W-B3	CEC RATING	333.6 W
MODULES PER STRING	18	# OF STRINGS	201
RACKING	RBI FIXED GROUND MOUNT	TILT ANGLE	20°
INVERTER(S)	(16) SUNGROW SG 60KU-M	CEC EFFICIENCY	98.5 %
INVERTER(S)	(1) SUNGROW SG 36KU-M1	CEC EFFICIENCY	98.0 %
AZIMUTH	180° (SOUTH = 180°)		

PROJECT DIRECTORY

OWNER
NRG

HOST
E.J. PONTIFF
ERIC PONTIFF
(508) 269-5452
125 BOW STREET
DUXBURY, MA 02332

AUTHORITY HAVING JURISDICTION
PAUL MCAULIFFE
BUILDING INSPECTOR
11 LINCOLN STREET
PLYMOUTH, MA 02360
(508)747-1620, EXT.109

UTILITY
NSTAR

PROJECT MANAGER
FIRM: BORREGO SOLAR
CONTACT: NED CHANEY
PHONE: (978) 513-2606

ASSISTANT PROJECT MANAGER
FIRM: BORREGO SOLAR
CONTACT: ERIN GRENIER
PHONE: (978)-221-3110

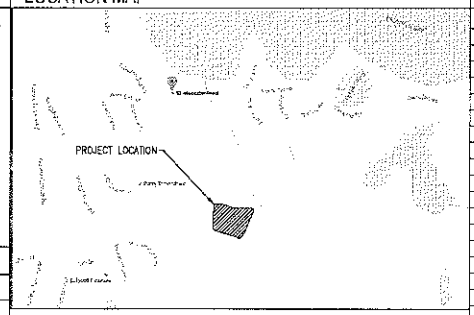
CIVIL ENGINEER
FIRM: BORREGO SOLAR
CONTACT: DEAN SMITH, P.E.
PHONE: (978)-221-3103

STRUCTURAL ENGINEER
FIRM: BORREGO SOLAR
CONTACT: MICHAEL MARTEL, P.E.
PHONE: (978)-226-8491

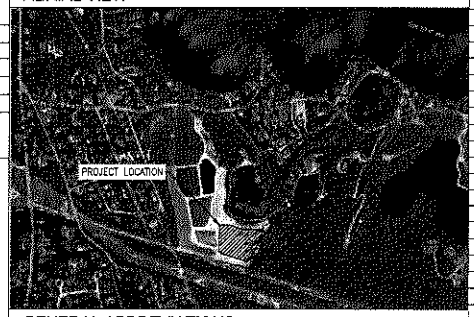
ELECTRICAL ENGINEER
FIRM: BORREGO SOLAR
CONTACT: CRAIG MUNGER, P.E.
PHONE: (978)-221-3104

DESIGN ENGINEER
FIRM: BORREGO SOLAR
CONTACT: BILL SANPHER
PHONE: (978)-513-2618

LOCATION MAP



AERIAL VIEW



GENERAL ABBREVIATIONS

(E)	EXISTING	NS	NORTH-SOUTH
AHJ	AUTHORITY HAVING JURISDICTION	NTS	NOT TO SCALE
AL	ALUMINUM	OAE	OR APPROVED EQUAL
APPROX	APPROXIMATE	OC	ON CENTER
ARY	ARRAY	OD	OUTSIDE DIAMETER
BLDG	BUILDING	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
BSS	BORREGO SOLAR SYSTEM		
CL	CENTERLINE	PV	PHOTOVOLTAIC
DAS	DATA ACQUISITION SYSTEM	PVC	POLY VINYL CHLORIDE
DIA	DIAMETER	SCH	SCHEDULE
DO	DITTO	SS	STAINLESS STEEL
EW	EAST-WEST	SSS	SOLAR SUPPORT STRUCTURE
FBO	FURNISHED BY OTHERS	STC	STANDARD TEST CONDITIONS
FF	FORWARD FACING	TBD	TO BE DETERMINED
GALV	GALVANIZED	TP	TAMPER PROOF
HDG	HOT DIP GALVANIZED	TYP	TYPICAL
HVAC	HEATING VENTILATION AND AIR CONDITIONING	UON	UNLESS OTHERWISE NOTED
		VIF	VERIFY IN FIELD
ID	INSIDE DIAMETER	WP	WEATHER PROOF
MFR	MANUFACTURER		
MOD	SOLAR MODULE		

REV 1.0

DRAWING LIST

SHEET NUMBER	SHEET TITLE
T-1	TITLE PAGE
CIVIL	
C-0.0	CIVIL NOTES
C-1.0	EXISTING CONDITIONS PLAN
C-1.1	EXISTING CONDITIONS-SITE
C-2.0	LAYOUT AND MATERIALS PLAN
C-3.0	FINAL GRADING AND STORMWATER PLAN
C-4.0	CIVIL DETAILS
C-4.1	CIVIL DETAILS
C-5.0	ASSENT AGREEMENT PLAN
C-5.1	ASSENT AGREEMENT DETAILS
STRUCTURAL	
S-0.0	STRUCTURAL NOTES
S-1.0	ARRAY LAYOUT PLAN
S-2.0	FOUNDATION LAYOUT PLAN
S-3.0	STRUCTURAL DETAILS
S-3.1	STRUCTURAL DETAILS
ELECTRICAL	
E-0.0	ELECTRICAL NOTES
E-0.1	ELECTRICAL SPECIFICATIONS
E-0.2	ELECTRICAL SPECIFICATIONS
E-1.0	ELECTRICAL SITE PLAN
E-1.1	PLAN DETAILS
E-2.0	DC SINGLE LINE DIAGRAM
E-2.1	AC SINGLE LINE DIAGRAM
E-2.2	DAS SINGLE LINE DIAGRAM
E-3.0	ELECTRICAL SCHEDULES
E-4.0	STRINGING PLAN
E-5.0	ELECTRICAL DETAILS
E-5.1	ELECTRICAL DETAILS
E-5.2	ELECTRICAL DETAILS
E-5.3	ELECTRICAL DETAILS
E-5.4	ELECTRICAL POLE DETAILS
E-5.5	ELECTRICAL POLE DETAILS
E-5.6	ELECTRICAL POLE DETAILS
E-6.0	PLACARDS
E-7.0	DATA SHEETS
E-7.1	DATA SHEETS

THIS DOCUMENT IS PROVIDED BY BORREGO SOLAR SYSTEMS INC. TO FACILITATE THE SALE AND INSTALLATION OF A SOLAR POWER SYSTEM FROM BORREGO SOLAR SYSTEMS. REPRODUCTION, RELEASE OR UTILIZATION FOR ANY OTHER PURPOSE, WITHOUT PRIOR WRITTEN CONSENT IS STRICTLY PROHIBITED.

BORREGO SOLAR
10 TECHNOLOGY DRIVE, SUITE 110
LOWELL, MA 01851
PHONE: (978) 256-6770
FAX: (978) 452-5738
INFO@BORREGOSOLAR.COM

PERMIT USE ONLY

nrg

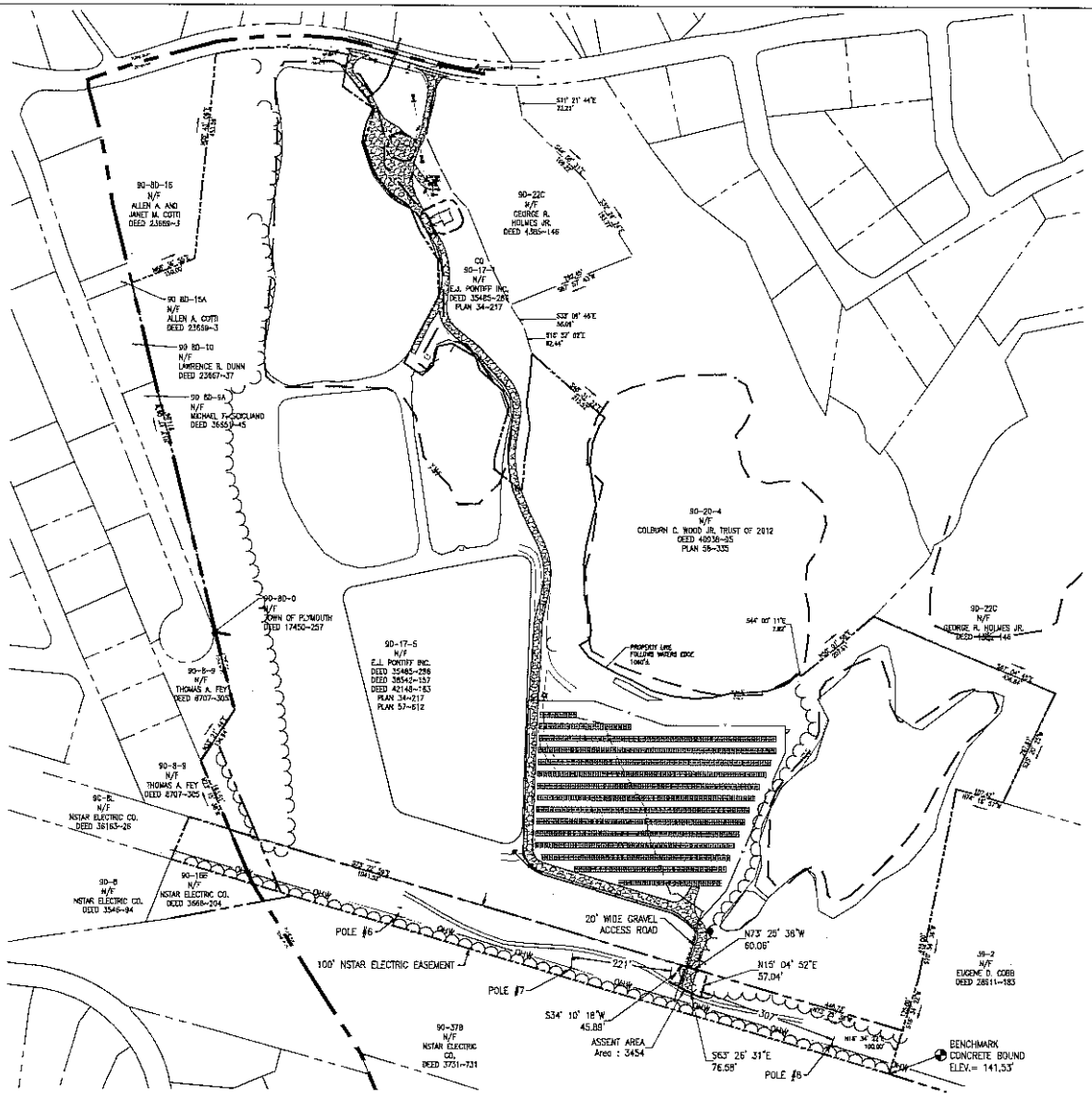
NRG
57 BLACK CAT ROAD
PLYMOUTH, MA 02360

PROJECT NUMBER: 905-0709

REV	DATE	DRAWN	CHECKED	RELEASE LEVEL
	08/03/16	SS	KL	SUBMIT FOR REVIEW
	08/29/16	LS	BL	CD - ISSUED FOR REVIEW

SCALE STATED ON DRAWINGS ARE VALID ONLY WHEN PLOTTED ARCH D 24" X 36"

T-1
TITLE PAGE



ASSENT AGREEMENT PLAN

SCALE: 1" = 120'

0 120' 240'

THE COMPANY IS PROVIDED BY BUSINESS SOLAR SYSTEMS INC. TO PERFORM THE SALE AND INSTALLATION OF A SOLAR POWER SYSTEM FROM BUSINESS SOLAR SYSTEMS REPRESENTATIVE. REFUSE OR UTILIZATION FOR ANY OTHER PURPOSE, EXCEPT WHICH SPECIFICALLY SERVICE IS STRICTLY PROHIBITED.

BUSINESS SOLAR

CHARLES W. SMITH
CIVIL
NO. 52126
REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS

08/30/2016

NRG
57 BLACK CAT ROAD
PLYMOUTH, MA 02360

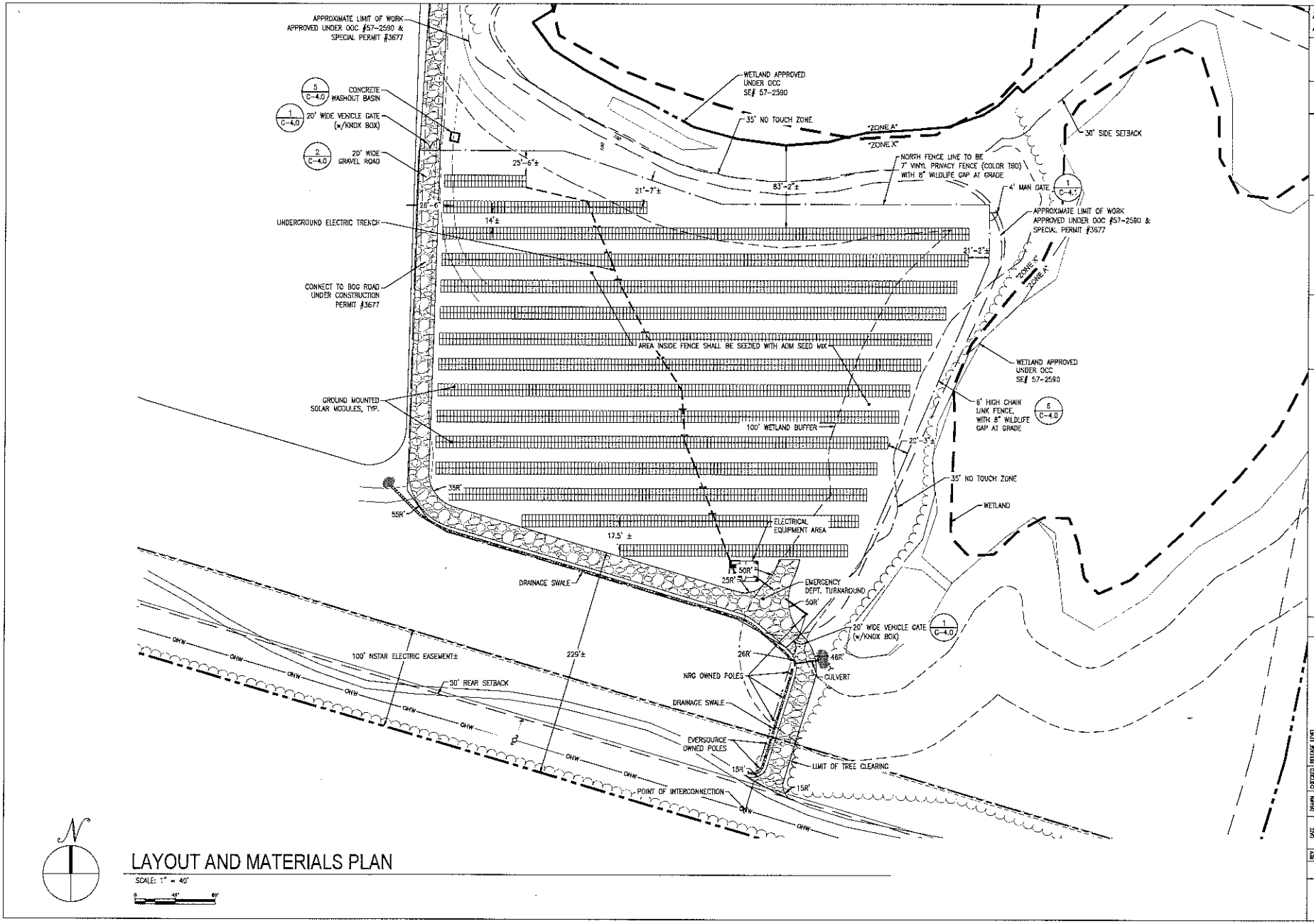
PROJECT NUMBER:
905-0709

REV	DATE	DRAWN	CHECKED	REVISION LEVEL
	07/26/16	BS	SL	ASSENT AGREEMENT

SCALES STATED ON DRAWINGS ARE VALID ONLY WHEN PLOTTED APPR: 8 24" X 36"

C-5.0
ASSENT AGREEMENT PLAN

F



LAYOUT AND MATERIALS PLAN

SCALE: 1" = 40'

BORREGO SOLAR

CHARLES D. SMITH CIVIL No 52336 REGISTERED PROFESSIONAL ENGINEER

08/30/2016

PERMIT USE ONLY

nrg

NRG
57 BLACK CAT ROAD
PLYMOUTH, MA 02360

PROJECT NUMBER: 905-0709

REV	DATE	DRAWN	CHECKED	RELEASE LEVEL
	08/03/16	SS	KL	50% SET
	08/29/16	LS	BL	CD - ISSUED FOR REVIEW

SCALES STATED ON DRAWINGS ARE VALID ONLY WHEN PLOTTED ARCH D 24" X 36"

C-2.0
LAYOUT AND MATERIALS PLAN

H

Valuation pages attached.

Bureau of Local Assessment
Informational Guideline Release (IGR) No. 98-403
September 1998

VALUATION AND TAXATION OF ELECTRIC GENERATING PROPERTY

Chapter 164 of the Acts of 1997
(Amending G.L. Ch. 59 §5(16)(3) and Adding G.L. Ch. 59 §38H)

This Informational Guideline Release (IGR) provides assessors and other local officials with information about the valuation and taxation of electric generating property as a result of the 1997 Electric Utility Restructuring Act.

Questions should be addressed to the Bureau of Local Assessment.

Topical Index Key :

Assessment Administration
Personal Property
Valuation

Distribution :

Assessors
Mayors/Selectmen
City/Town Councils

V. VALUATION

A. Data Collection

As of the assessment date, the assessors should collect the following data and information for each generating plant.

1. Physical Plant

Information about the physical plant may be obtained from the Form of List submitted by the owner. The list should include all property including property donated or given to the owner (Contribution in Aid of Construction), Construction Work in Progress (CWIP) and other unallocated plant. Descriptions and plans should be requested and obtained if the information on the list is insufficient to develop a detailed physical inventory of major plant components.

2. Plant Investment

Information about the dollars invested in the physical plant may be obtained by requesting the original and net book costs of the plant by year invested. This should include all direct and indirect costs associated with the plant. For plants existing before restructuring, the historical original cost, accumulated depreciation and net book cost will be found in the utility company FERC and DTE records. The new book cost of existing plants acquired in a deregulated market, as well as the original cost of new plants, may be obtained by requesting a return under G.L. Ch. 59 §§38D and 38F.

3. Plant Income and Expenses

Information about historic, current and future projected plant income and expenses should also be obtained by requesting a return under G.L. Ch. 59 §§38D and 38F. This information includes, but is not limited to:

- Annual net generation exclusive of plant use
- Annual availability including planned and unplanned outages (separately stated)
- Annual fuel, operating and maintenance costs
- Annual administrative and general costs
- Annual taxes
- Annual net additions to plant in service
- Annual working capital reserves
- Dedicated transmission expenses associated with the plant
- Avoided cost rates
- Fuel purchase and handling contracts
- Contracts or solicitations for purchase of capacity from plant.

In addition, information should be requested about the existence of any factors that will impair the operation or cost competitiveness of the plant and any planned capital improvements.

B. Valuation Approaches

Generating plants must now be valued using the same accepted appraisal methods: cost, market and income, that are used for other commercial and industrial properties subject to market forces.

Land at generating plant sites should be treated as industrial land and valued in the same manner as other such land.

1. Cost Approach

a. New Book Cost

For existing plants acquired by a generation company, the new book cost allocated by the company to the sale and acquisition may be an indicator of value and present cost to acquire the plant in a deregulated environment.

b. Original Cost

The original cost of the plant may be used where the plant is relatively new and any depreciation has not exceeded the appreciation of costs in the geographical area.

c. Reproduction Cost New Less Depreciation

The cost to reproduce the plant may be determined from various engineering cost estimating disciplines based on plans and specifications obtained from the facilities. Alternatively, the original costs of the plant may be trended to the present with generally accepted manuals or indexes such as the Handy-Whitman Index of Public Utility Construction Costs.

All forms of depreciation must be considered and allowances made not only for physical depreciation, but also technological and market changes that affect existing plants.

d. Replacement Cost New Less Depreciation

Replacement costs developed for an existing facility should consider the plant's intended use of duty cycle, fuel availability, transmission capacity and environmental limitations. The cost analysis will also require the engineering judgment of how new technology affects the existing property. The analysis should recognize that new technology or construction techniques may be more or less expensive than the existing facilities due to the impact of various factors.

All forms of depreciation must be considered and appropriate allowances made for physical depreciation and technological and market changes.

2. Market Approach

A comparable sales approach may used. Generating plant sales should be analyzed on a price per unit of capacity or generation basis. Historical, annual plant generation and capacity factors are indicators of the plant's cost competitiveness and should be analyzed to determine the plant's ranking within the marketplace. When comparing sales to the subject plant, any non-cash considerations that impact value should be identified and appropriate adjustments made. Additional adjustments may be required to take into consideration the variability of generating sources and fuel types.

3. Income Approach

Indicators of value may be developed either by direct capitalization (*i.e.*, using a single year's income) or yield capitalization (*i.e.*, using income over a period of time including reversion proceeds).

The gross income developed for the facility from the current wholesale market should consider the price of capacity, installed capacity, operable capability, 10 minute spinning reserve, 10-minute non-spinning reserve, 30-minute reserve and automatic generation control. Prices for each may vary, depending on the type of generating unit and time of day and year. When analyzing expenses, consideration should be given to the historic cost of operating the facility and future fuel prices.

Business income should be isolated from the gross income to determine the income attributable to the property. Property related expenses to be considered include, but are not limited to, site staff operations, site management, current and future fuel type, routine annual maintenance, operational costs such as chemicals, insurance, various regulatory and license fees, allowance for property taxes (as an expense or in the capitalization rate) and capital reserves and replacements for adequate project life.

#	Project	Location	Size	$ per MW	Acreage	Status	Parcel ID	TM	PILOT	FY2015	FY 2016	FY 2017
1	SunE Solar XV	30 Raffaele Rd	4.5 MWAC		40.6	Active-Complete	083-000-019E-000	Fall 2013 Art 12	Yes	59,640.00	61,131.00	62,659.00
2	EDF Lepomis Solar LLC	1249 R Old Sandwich Rd	4.26 MWAC		37.6	Active-Complete	062-000-001-020	Fall 2014 Art 12	Yes	54,000.00	55,350.00	56,733.75
3	Future Generation Wind. LLC	Head of the Bay Rd	8.0 MWAC	$14,000		Active - Complete	129-000-002A-001 129-000-006-000 129-000-003-000	April 2015 STM Aricle 6	Yes			112,000.00
4	MA Solar Highway LLC	Rt 3 Plymouth Exit 5 3 Long Pond Road	.5 MWAC	$12,500	3.43	Active - Complete	089-000-0PV-000	April 2016 STM Article 5	Yes			6,250.00
5	***Renewable Energy Dev Partners LLC***	***Off Herring Pond Rd***	***0.5 MWAC***	***$13,000***	***24.6***	***Active-Filing Phase I***	***056-000-047B-000***	***April 2015 TM Art 30***	***Yes***	-	-	-
6	***Cedarville Solar Phase II, LLC***	***Off Herring Pond Road***	***1.0 MWAC***	***$13,000***	***15.25***	***Phase II***	***056-000-057A-000***	***Fall 2015 Art 11***	***Yes***			
7	***Renewable Energy Dev Partners LLC***	***Off Herring Pond Road***	***1.0 MWAC***	***$13,000***		***Phase III***	***056-000-059.2-000***	***Fall 2015 Art 12***	***Yes***			
8	Renewable Energy Dev Partners LLC	Adjacent to Airport	1.0 MWAC	$13,500			097-000-010-002	Fall 2016 Art 13A				
9	Renewable Energy Dev Partners LLC	Off Federal Furnace Road	.5 MWAC	$13,500			099-000-001-00C	Fall 2016 Art 13B				
10	SunEdison Origination1	Off Kristin Road	4.0 MW					Fall 2016 Art 13C				
11	46 Shops Plymouth Solar, LLC	46 Shops at 5 Way	1.11 MWDC	$12,500			083-000-003C-003	Fall 2016 Art 13D				
12	978 Solar Development	9 River Run Way	1.338 MWDC	$12,500			114-000-005-000	Fall 2016 Art 13E				
13	978 Solar Development	5 River Run Way	1.338 MWDC	$12,500			114-000-007-000 & 114-000-008-000	Fall 2016 Art 13F				
14	978 Solar Development	3 River Run Way	2.777 MWDC	$12,500			115-000-000A-001	Fall 2016 Art 13G				
15	978 Solar Development	57 Black Cat Road	1.32 MWDC	$12,500			090-000-017-005	Fall 2016 Art 13H				
										113,640.00	116,481.00	237,642.75
	Environmental Fund - Special Act - Pending as of this date - What if became effective for FY2018 (5 year expiration date)								50%	of Annual Revenues		

FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
64,226.00	65,831.00	67,477.00	69,164.00	70,893.00	72,666.00	74,482.00	76,344.00	78,253.00	80,209.00	82,214.00	84,270.00	86,377.00
58,152.09	59,605.90	61,096.04	62,623.44	64,189.03	65,793.76	67,438.60	69,124.57	70,852.68	72,624.00	74,439.60	76,300.59	78,208.10
114,800.00	117,670.00	120,612.00	123,627.00	126,718.00	129,886.00	133,133.00	136,461.00	139,873.00	143,369.00	146,954.00	150,628.00	154,393.00
6,406.00	6,566.00	6,731.00	6,899.00	7,071.00	7,248.00	7,429.00	7,615.00	7,805.00	8,001.00	8,201.00	8,406.00	8,616.00
6,500.00	***6,663.00***	***6,829.00***	***7,000.00***	***7,175.00***	***7,354.00***	***7,538.00***	***7,726.00***	***7,920.00***	***8,118.00***	***8,321.00***	***8,529.00***	***8,742.00***
13,000.00	***13,325.00***	***13,658.00***	***14,000.00***	***14,350.00***	***14,708.00***	***15,076.00***	***15,453.00***	***15,839.00***	***16,235.00***	***16,641.00***	***17,057.00***	***17,484.00***
13,000.00	***13,325.00***	***13,658.00***	***14,000.00***	***14,350.00***	***14,708.00***	***15,076.00***	***15,453.00***	***15,839.00***	***16,235.00***	***16,641.00***	***17,057.00***	***17,484.00***
13,500.00	13,838.00	14,183.00	14,538.00	14,901.00	15,274.00	15,656.00	16,047.00	16,448.00	16,860.00	17,281.00	17,713.00	18,156.00
6,750.00	6,919.00	7,092.00	7,269.00	7,451.00	7,637.00	7,828.00	8,024.00	8,224.00	8,430.00	8,641.00	8,857.00	9,078.00
13,875.00	14,222.00	14,577.00	14,942.00	15,315.00	15,698.00	16,091.00	16,493.00	16,905.00	17,328.00	17,761.00	18,205.00	18,660.00
16,725.00	17,143.00	17,572.00	18,011.00	18,461.00	18,923.00	19,396.00	19,881.00	20,378.00	20,887.00	21,409.00	21,945.00	22,493.00
16,725.00	17,143.00	17,572.00	18,011.00	18,461.00	18,923.00	19,396.00	19,881.00	20,378.00	20,887.00	21,409.00	21,945.00	22,493.00
34,625.00	35,491.00	36,378.00	37,287.00	38,220.00	39,175.00	40,154.00	41,158.00	42,187.00	43,242.00	44,323.00	45,431.00	46,567.00
16,250.00	16,656.00	17,073.00	17,499.00	17,937.00	18,385.00	18,845.00	19,316.00	19,799.00	20,294.00	20,801.00	21,321.00	21,854.00
394,534.09	404,397.90	414,508.04	424,870.44	435,492.03	446,378.76	457,538.60	468,976.57	480,700.68	492,719.00	505,036.60	517,664.59	530,605.10
197,267.05	202,198.95	207,254.02	212,435.22	217,746.02	223,189.38	228,769.30	234,488.29	240,350.34	246,359.50	252,518.30	258,832.30	265,302.55
197,267.05	399,466.00	606,720.02	819,155.24	1,036,901.25	1,260,090.63	1,488,859.93	1,723,348.22	1,963,698.56	2,210,058.06	2,462,576.36	2,721,408.65	2,986,711.20

FY 2031	FY 2031	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037	FY 2038	FY 2039	Combined Total
88,536.00	90,749.00	93,018.00	95,343.00						1,523,482.00
80,163.30	82,167.39	84,221.57	86,327.11	88,485.29	90,697.42	92,964.86	95,288.98	97,671.20	1,844,519.27
158,253.00	162,209.00	166,265.00	170,421.00	174,682.00	179,049.00				2,861,003.00
8,831.00	9,052.00	9,278.00	9,510.00	9,748.00	9,992.00				159,655.00
8,960.00	***9,184.00***	***9,414.00***	***9,649.00***	***9,891.00***	***10,138.00***	***10,391.00***			***166,042.00***
17,921.00	***18,369.00***	***18,828.00***	***19,299.00***	***19,781.00***	***20,276.00***	***20,782.00***			***332,082.00***
17,921.00	***18,369.00***	***18,828.00***	***19,299.00***	***19,781.00***	***20,276.00***	***20,782.00***			***332,082.00***
18,610.00	19,075.00	19,552.00	20,041.00	20,542.00	21,055.00	21,582.00			344,852.00
9,305.00	9,538.00	9,776.00	10,020.00	10,271.00	10,528.00	10,791.00			172,429.00
									-
19,127.00	19,605.00	20,095.00	20,598.00	21,112.00	21,640.00	22,181.00			354,430.00
23,056.00	23,632.00	24,223.00	24,828.00	25,449.00	26,085.00	26,737.00			427,234.00
23,056.00	23,632.00	24,223.00	24,828.00	25,449.00	26,085.00	26,737.00			427,234.00
47,731.00	48,924.00	50,147.00	51,401.00	52,686.00	54,003.00	55,353.00			884,483.00
22,401.00	22,961.00	23,535.00	24,123.00	24,726.00	25,344.00	25,978.00			415,098.00
543,871.30	557,466.39	571,403.57	585,687.11	502,603.29	515,168.42	334,278.86	95,288.98	97,671.20	10,244,625.27
271,935.65	278,733.20	285,701.79	292,843.56	251,301.65	257,584.21	167,139.43	47,644.49	48,835.60	4,888,430.76
3,258,646.85	3,537,380.05	3,823,081.83	4,115,925.39	4,367,227.03	4,624,811.24	4,791,950.67	4,839,595.16	4,888,430.76	