



REVISED AGENDA

Town Council

February 2024 Work Session

February 20, 2024 | 3:30 PM

**Apex Town Hall | 73 Hunter Street, Apex, NC
3rd Floor Training Rooms A and B**

- 1. Call to Order | Pledge of Allegiance**
Mayor, Jacques K. Gilbert
- 2. ADDED – Wake County Farmland Preservation Program Presentation**
Mayor Jacques K. Gilbert, sponsor
Loren Hendrickson, Wake County Farmland Preservation Coordinator
Trevor Hyde, Wake County Cooperative Extension Agent for Local Food Systems
- 3. Town Facility Solar Study**
David Edwards, Senior Capital Projects Manager
Todd Hedrick, P.E., Electrical Engineer, Optima
- 4. Q & A**
- 5. Adjournment**

ANNOUNCEMENTS

Members of the public can access and view the meeting on the Town's YouTube Channel <https://www.youtube.com/c/TownofApexGov> or attend in-person.

Accommodation Statement: Anyone needing special accommodations to attend this meeting and/or if this information is needed in an alternative format, please contact the Town Clerk's Office. The Town Clerk is located at 73 Hunter Street in Apex Town Hall on the 2nd Floor, (email) allen.coleman@apexnc.org or (phone) 919-249-1260.

| Agenda Item | cover sheet

for consideration by the Apex Town Council

Item Type: WORK SESSION

Meeting Date: February 20, 2024

Item Details

Presenter(s): Mayor Jacques K. Gilbert, Sponsor
Loren Hendrickson, Wake County Farmland Preservation Coordinator, and,
Trevor Hyde, Wake County Cooperative Extension Agent for Local Food Systems

Department(s): Governing Body
Wake County Soil and Water
Wake County Cooperative Extension

Requested Motion

Receive as information a presentation on Wake County's Farmland Preservation Program.

Approval Recommended?

N/A

Item Details

In the last nine years, Wake County lost 22,964 acres of its farm and forest land - that's almost 20%. If the county continues at its current growth rate, all unprotected land will be developed in the next 25 to 50 years. A new Farmland Preservation Program aims to conserve Wake County's nearly 700 farms and help combat North Carolina's disappointing ranking as the second highest state in the nation for farmland loss.

Loren Hendrickson, Wake County Farmland Preservation Coordinator, and, Trevor Hyde, Wake County Cooperative Extension Agent for Local Food Systems, will present a PowerPoint presentation on the Farmland Preservation Program and highlight the success of the program over the last year.

For additional background, the Wake County Board of Commissioners enacted an ordinance entitled "Wake County Voluntary Agriculture District Ordinance" in 2016 to boost farmland preservation efforts. In July 2021, the North Carolina legislature expanded the County's statutory authority to adopt more comprehensive farmland protection measures (Senate Bill 605). Further, in 2022 the Wake County BOC approved the Farmland Preservation Ordinance, replacing the 2016 ordinance, which established our

new Farmland Preservation Program. The revised ordinance ensured that the County remained in compliance with changes to state statute but also gave us an opportunity to enhance our farmland preservation offerings.

This presentation aligns with Town's Strategic Goal of Environmental Leadership to further preserve natural resources and habitats.

Attachments

- Attachment A: Wake County Farmland Preservation Program PowerPoint Presentation
- Attachment B: Wake County Farmland Preservation Program Ordinance (Adopted June 21, 2022)
- Attachment C: Wake County Board of Commissioners Meeting Minute Excerpt from June 21, 2022
- Attachment D: Wake County Board of Commissioners PowerPoint Presentation from June 21, 2022
- Attachment E: Session Law 2021-78, Senate Bill 605, North Carolina Farm Act of 2021



Wake County Farmland Preservation Program

February 2024

Loren Hendrickson, Farmland Preservation
Coordinator



@wakegov    

wake.gov

Background

- **Wake County is one of the fastest growing counties in the nation and adds approximately 56 new residents per day.**
- **The recent 2040 Farms Under Threat Report from the American Farmland Trust shows NC as the #2 state in the country for projected farmland loss.**
- **Wake County is one of the 3 most heavily impacted counties in the state for projected farmland loss, losing nearly 23,000 acres of agricultural land in the last 10 years.**

The recent USDA Agricultural Census data just released for 2022 shows...



...Wake County has 642 farms, totaling 62,323 acres of land in farms.

2040 FUT Conversion for Wake County

**Better Built Cities =
31,949 acres converted**

**Business as Usual =
46,587 acres converted**

**Runaway Sprawl =
56,673 acres converted**



Wake County Farmland Preservation Program launched February 2023. ⁵

Wake Farmland Preservation Program

Program Offerings

- Voluntary Agricultural Districts (VAD)
- Enhanced Voluntary Agricultural Districts (EVAD)
- Conservation Easements (CEs)

Program Updates

- Two new program offerings – EVAD and CE
- New branding and communication.
- New full-time staff position
- Custom database to manage program enrollment



Voluntary Agricultural District

- Requires a revocable 10-year agreement with Wake County Agricultural Advisory Board.
- May renew for 10 years after initial period unless notice is given by landowner.
- May provide assessments for utilities provided by city or county be held in abeyance, with or without interest.



Enhanced Voluntary Agricultural District



- Requires a 10-year irrevocable agreement.
- Must be recorded on deed.
- May renew for 3 years after initial period unless notice is given by landowner.
- May provide assessments for utilities provided by city or county be held in abeyance, with or without interest.

Conservation Easement Program

- Places permanent protection on the land by eliminating future subdivision.
- Landowners can receive funding to compensate for the sale of development rights in conservation easement acquisition.
- Can include tax incentives and federal tax deductions.



Getting Serious about Conservation

- In March of 2023, Wake BOC approved the use of deferred tax dollars from PUV rollback to fund permanent conservation easements.
- \$4.2 million committed for farmland preservation largest in the state and southeast.
- All \$4.2 million has been either spent or allocated to future projects.



Two Successful Closings



Early Success



- Since the program was established in February 2023, our office has approved:
 - 1,376 acres of additional land for VAD (VAD total is 12,559 acres)
 - 128 acres of EVAD
 - 2 conservation easements totaling 246 acres
 - Submittal of 7 applications for future conservation easement funding

In Summary

Here's where we hope to go

Establish partnerships with Wake County municipalities to recognize our program offerings and allow the existence of VAD, EVAD and conservation easement options within municipal boundaries.

Here's how we hope to get there

Codify partnerships with Memorandum's of Understanding (or similar type of agreement) with municipalities detailing the approval of VAD, EVAD and conservation easement parcels to exist within municipal boundaries.



WAKE.GOV

WAKE COUNTY
FARMLAND PRESERVATION PROGRAM
ORDINANCE

WHEREAS, on December 5, 2016, the Wake County Board of Commissioners enacted an ordinance entitled, "WAKE COUNTY VOLUNTARY AGRICULTURAL DISTRICT ORDINANCE:" and

WHEREAS, the North Carolina legislature has expanded the County's statutory authority to adopt more comprehensive farmland protection measures; and

WHEREAS, the County desires, by and through this ordinance, to expand its existing farmland preservation program.

ARTICLE I
TITLE

An ordinance of the Board of County Commissioners of WAKE COUNTY, NORTH CAROLINA, entitled: WAKE COUNTY FARMLAND PRESERVATION PROGRAM ORDINANCE."

ARTICLE II
AUTHORITY AND PURPOSE

This Article is adopted pursuant to authority conferred by the North Carolina General Statutes ("NCGS") §§ 106-735 through 106-744 and Chapter 153A.

The purpose of this Article is to repeal and replace the "WAKE COUNTY VOLUNTARY AGRICULTURAL DISTRICT ORDINANCE" and to expand the County's farmland preservation program. It also serves to promote agricultural values and the general welfare of Wake County, and more specifically: to increase identity and pride in the agricultural community and its way of life; to encourage the economic and financial health of agriculture, horticulture and forestry; and to decrease the likelihood of legal disputes, such as nuisance actions between farm owners and their neighbors, and other negative impacts on properly managed farms.

ARTICLE III
DEFINITIONS

The following words, terms and phrases, when used in this Article, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Advisory Board means the County Agricultural Advisory Board created pursuant to NCGS §106-739 to carry out the duties set forth in Article IV of this ordinance.

Agricultural Conservation Easement (sometimes herein "ACE") shall have the meaning defined in NCGS §106-744(b).

Chairperson means chairperson of the Advisory Board.

Farmland Preservation Coordinator means Wake Soil and Water Staff person who supports the Agricultural Advisory Board.

Voluntary Agricultural District ("VAD"), shall have the meaning defined in NCGS §106-738.

Enhanced Voluntary Agricultural District ("EVAD") shall have the meaning defined in NCGS §106-743.1.

Board of Commissioners means the Wake County Board of Commissioners.

Conservation Agreement means conservation agreement as same is defined in NCGS §121-35(1).

Conservation Easement, for the purposes of this ordinance shall have the meaning as Agricultural Conservation Easement as set forth in NCGS §106-744, and to the extent not inconsistent with NCGS §106-744 generally means a written agreement between a landowner and a qualified conservation organization or public agency under which:

- The landowner agrees to keep the land available for agriculture and/or forestry and restrict subdivision or non-farm development and other uses that are incompatible with commercial agriculture and forestry; and
- The conservation organization or public agency is responsible for monitoring the easement to ensure the terms of the easement are met.

ARTICLE IV

AGRICULTURAL ADVISORY BOARD

(a) **Creation.** A County Agricultural Advisory Board, to consist of seven members appointed by the Board of Commissioners, is hereby established to implement the provisions of this Article.

(b) **Membership**

(1) **Requirements.** Requirements for membership shall be as follows:

- a. Each Advisory Board member shall be a Wake County resident.
- b. The majority of members shall be actively engaged in agriculture as defined in NCGS §106-581.1. Diversity of agricultural production will be considered when appointing Board members. This determination shall be made without reference to *ex officio* members.
- c. Members shall be selected for appointment by the Board of Commissioners from the names of individuals submitted to the Board of Commissioners by the Soil and Water Conservation District Board of Supervisors, the Wake County Office of the North Carolina Cooperative Extension Service, United States Natural Resource Conservation Service and United States Farm Service Agency Committee.
- d. Additional members may be appointed to the Advisory Board in an *ex officio* capacity from the Soil and Water Conservation District Board of Supervisors, the Wake County Office of North Carolina Cooperative Extension, USDA Natural Resource Conservation Service and United States Farm Service Agency, Triangle Land Conservancy or other agencies, as deemed necessary by the Board of Commissioners. Members serving in an *ex officio* capacity shall neither vote nor count toward quorum requirements.

- (2) Tenure. Members are to serve for terms of two years with a maximum service of three consecutive terms (six years) or a total of five terms (ten years) in any one appointed position.
- (3) Vacancies. Any vacancy on the Advisory Board is to be filled by the Board of Commissioners.
 - a. Removal. Any member of the Advisory Board may be removed by a majority vote of the Board of Commissioners. No cause for removal shall be required.

(c) Funding

- (1) Compensation. The per diem compensation, if any, of the members of the Advisory Board shall be fixed by the Board of Commissioners.
- (2) Appropriations for performance of duties. Funds may be appropriated by the Board of Commissioners to the Advisory Board to perform its duties. The Board of Commissioners may provide operating funds to Wake County Soil and Water Conservation District assisting the Advisory Board's needs.

(d) Procedure

- (1) Chairperson. The Advisory Board shall elect a chairperson and vice-chairperson each year at its first meeting of the fiscal year. The chairperson shall preside over all regular or special meetings of the Advisory Board. In the absence or disability of the chairperson, the vice-chairperson shall preside and shall have and exercise all the powers of the chairperson so absent or disabled. Additional officers may be elected as needed.
- (2) Jurisdiction and procedures; supplementary rules. The jurisdiction and procedures of the Advisory Board are set out in this Article, except that the Advisory Board may adopt supplementary rules of procedure not inconsistent with this Article or with other provisions of law.
- (3) Advisory Board year. The Advisory Board shall use the County fiscal year as its meeting year.
- (4) Meetings. Meetings of the Advisory Board shall be held at the call of the chairperson and at such other times as the Advisory Board in its rules of procedure may specify. A called meeting shall be held at least every three months. Meeting dates and times shall be posted no less than one week before the meeting by giving notice by an electronic mail or a mailed notification to each Advisory Board member, and by posting a copy of the notice on the principal bulletin board of the Advisory Board or at the door of its usual meeting room or on the building in an area accessible to the public. All meetings shall be open to the public.
- (5) Voting. The concurring vote of a majority of the members of the Advisory Board shall be necessary to reverse any order, requirement, decision, or determination of any administrative official or agency, to decide in favor of an applicant, or to pass upon any other matter on which it is required to act under this Article.
- (6) Duty to Vote. Once a meeting has been convened, every member, including the chairperson, must vote unless excused by a majority vote of those members present. A member who wishes to be excused from voting shall so inform the chairperson, who shall take a vote of the remaining members. The Advisory Board may excuse a member from voting, but only upon questions involving his/her own financial interest or his/her official conduct or on matters on which the member is prohibited from voting under NCGS §14-234. Refusal to vote (without just cause) shall be recorded as an affirmative vote.

- (7) Records. The Advisory Board, or its designee, shall keep minutes of the proceedings showing the vote of each member upon each question, or if absent or failing to vote, indicating such fact, and shall keep records of its examinations and other official actions, all of which shall be immediately filed in the Soil and Water Conservation District Office and shall be a public record.
- (8) Administrative services. The Advisory Board shall contract with the Soil and Water Conservation District office to serve the Advisory Board for recordkeeping, correspondence, application procedures under this Article and whatever other services the Advisory Board needs to complete its duties. The Farmland Preservation Coordinator will fulfill these and other appointed program duties.

(e) Duties

In accordance with the statutory duties set forth under G.S. § 106-739, the Advisory Board shall:

- (1) Review and approve or deny applications of landowners for enrollment of qualified farmland, horticultural land, or forestland in either VAD or EVAD
- (2) Make recommendations concerning the establishment and modification of VAD or EVAD or conservation easements;
- (3) Conduct public hearings on condemnations for qualifying farms in accordance with Article VIII of this ordinance;
- (4) Advise the Board of Commissioners on projects, programs, or issues affecting the agricultural economy and agricultural, horticultural or forestry activities within the County that will affect VAD and EVAD and conservation easements;
- (5) Review and make recommendations concerning proposed amendments to this Article;
- (6) Develop and maintain a Countywide farmland protection plan as defined in G.S. 106-744(e) for presentation to the Board of Commissioners;
- (7) Study additional methods of protection for farming, horticulture, forestry, and the attendant land base, and make recommendations to the Board of Commissioners;
- (8) Perform other agricultural, horticultural, and forestry-related tasks or duties assigned by the Board of Commissioners; and
- (9) Develop methodology for prioritization.

ARTICLE V CONSERVATION AGREEMENTS FOR VAD AND EVAD

For purposes of this program, "conservation agreement" is defined as a right, whether or not stated in the form of a restriction, reservation, covenant or condition, in any deed, will or other instrument executed by or on behalf of the owner of the land or improvement thereon or in any order of taking, appropriate to retaining land or water areas predominantly in their natural, scenic or open condition or in agricultural, horticultural, farming or forest use, to forbid or limit any or all of the following:

- (1) Construction or placing of buildings, roads, signs, billboards or other advertising, utilities or other structures on or above the ground;
- (2) Dumping or placing soil or other substance or material as landfill, or dumping or placing of trash, waste or unsightly or offensive materials;
- (3) Removal or destruction of trees, shrubs or other vegetation;
- (4) Excavation, dredging or removal of loam, peat, gravel, soil, rock, or other mineral substance in such manner as to affect the surface;
- (5) Surface use except for agricultural, farming, forest or outdoor recreational purposes or purposes permitting the land or water area to remain predominantly in its natural condition;
- (6) Activities detrimental to drainage, flood control, water conservation, erosion control or soil conservation; or
- (7) Other acts or uses detrimental to such retention of land or water areas.

None of the above limitations should be interpreted to prevent a landowner from conducting agricultural activities, including, but not limited to, the production of crops, forestry products, horticultural specialties, livestock, and livestock products. Associated uses allowable are sales and processing necessary and customarily incidental to the agricultural activities on-site which are in keeping with the purpose of the program.

ARTICLE VI
APPLICATION AND CERTIFICATION QUALIFYING FARMLAND IN A VAD OR EVAD

- (a) Requirements. To be eligible for certification the following requirements must be satisfied:
 - (1) Certification as qualifying farmland. To secure Wake County certification as a qualifying farmland ("Farm"), a Farm must be:
 - a. Real property that is used for bona fide farm purposes as that term is defined in G.S. 106-743.4(a) and GS 160D-903.
 - b. If highly erodible land exists on the Farm, it shall be managed in accordance with the Natural Resources Conservation Service erosion-control practices for highly erodible land.
 - c. The subject of a conservation agreement (VAD/EVAD) in accordance with NCGS §106-737 and NCGS §106-743.3 and as defined in G.S. 121-35 and Article V herein, between Wake County Soil and Water Conservation District and the owner of such land that prohibits nonfarm use or development of such land for a period of at least ten years, except for the creation of not more than three lots that meet applicable county and municipal zoning and subdivision regulations. The form of the conservation agreement shall be approved by the agricultural advisory board created under G.S. 106-739.
 - d. Located in the unincorporated area of Wake County, unless a municipality of the County has by resolution requested that this Article be applicable within that municipality and such request has been formally granted by Wake County.

- (2) A landowner, or landowners, may apply for certification of qualifying farmland for inclusion in either the Voluntary Agricultural District or the Enhanced Voluntary Agricultural District program. Such application must designate whether the application is for Voluntary Agricultural District status or Enhanced Voluntary Agricultural District status. The application shall be on forms provided by the Advisory Board or Farmland Preservation Coordinator.
 - a. A Conservation Agreement, as required by NCGS §106-737 and NCGS §106-743.3, and defined in NCGS §121-35, suited to district type (Voluntary Agricultural District or Enhanced Voluntary Agricultural District) designated by the landowner(s) to sustain, encourage, and promote agriculture, must be executed by the landowner(s) and be reviewed and approved by the Advisory Board. The Conservation Agreement for the Enhanced Voluntary Agricultural District must be recorded with the Wake County Register of Deeds as required pursuant to NCGS §121-41.
 - b. Requirements to participate are as follows:
 1. A VAD or EVAD shall consist of at least 5, 10, 20 acres engaged in horticulture, agriculture, or forestry, respectively or 5, 10, 20 contiguous acres of qualifying farmland owned by the identical deeded owner(s).
 2. An agreement to sustain, encourage and promote agriculture must be executed by the landowners in the VAD or EVAD with the County and EVAD shall be recorded therein.
 - c. Review Process:
 1. To secure Wake County certification as a qualifying farm, and if so desired by the applicant, as a VAD or EVAD, a landowner for such certification will apply to the Advisory Board. Application forms may be obtained from the Advisory Board or Farmland Preservation Coordinator.
 - i. Upon receipt of an application, the Farmland Preservation Coordinator will evaluate the application for eligibility.
- (3) Decision by the Advisory Board; notification of applicant. Within 120 days of receipt of the evaluations, the Advisory Board shall meet and render a decision regarding the application. The chairperson or designee shall notify the applicant by mail if the real property for which certification is sought satisfies the criteria established in subsection (a) of this section and if the land has been certified as qualifying farmland, and also as a VAD or EVAD, if application was so sought.
- (4) Appeal upon denial. If the application is denied by the Advisory Board, the applicant has 30 days to appeal the decision to the Board of Commissioners. Such appeal shall be presented in writing to the Clerk to the Board of Commissioners. The decision of the Board of Commissioners is final.
- (5) VAD or EVAD; marking on maps; public display. VAD or EVAD shall be marked on Wake County maps which shall be available for public inspection in the following County offices:
 - b. Wake County Register of Deeds;
 - c. Wake County Planning Department
 - d. Wake County Soil and Water Conservation District; and

- e. Any other office deemed necessary by the Advisory Board.
- (b) Encouragement of VAD or EVAD. The County may take such action as it deems appropriate through the Advisory Board or other body or individual to encourage the formation of VAD or EVAD and to further their purposes and objectives, including at a minimum a public information program to reasonably inform landowners of the farmland preservation program.

ARTICLE VII
REVOCATION, RENEWAL AND TRANSFER OF QUALIFYING FARMLAND IN A VAD OR EVAD

- (a) Transfer.
 - (1) Transfers of land in a Voluntary Agricultural District due to death of the landowner, sale, or gift shall not revoke the conservation agreement, if all new landowner(s) affirm the conservation agreement and affirm, on a supplemental application, updated information demonstrating that the enrolled land still qualifies for enrollment under Article VI(a). In the event that there are water or sewer assessments held in abeyance by this Article, and where the new owner(s) fail(s) to agree in writing to accept liability for those assessments when land is withdrawn either voluntarily or involuntarily from the VAD, the conservation agreement shall be revoked. Revocation shall be undertaken pursuant to the provisions of this Article.
 - (2) Transfers of land in an Enhanced Voluntary Agricultural District due to death of the landowner(s), sale, or gift shall not revoke the conservation agreement. The conservation agreement for the Enhanced Voluntary Agricultural District shall be binding upon all successors in interest to the landowner, except for successors in interest resulting from the exercise of rights under a security interest or lien that preceded the conservation agreement.
- (b) Renewal.
 - (1) VAD. Absent noncompliance by the landowner, neither the Advisory Board nor the Board of Commissioners shall fail to renew any conservation agreement for an additional ten years unless this Article or its authorizing legislation has been repealed.
 - (2) EVAD. A conservation agreement for the enhanced district shall be deemed automatically renewed for an additional term of three years in perpetuity, unless either the Advisory Board or the landowner gives written notice to the contrary prior to the termination date of the conservation agreement term.
- (c) Revocation.
 - (1) VAD. By providing 30 days' advance written notice to the Advisory Board, a majority percent of landowners of qualifying farmland within a VAD may revoke the conservation agreement or the Advisory Board may revoke the same conservation agreement based on noncompliance by the landowner, subject to the same provisions as contained in subsection Article VI(a) for appeal of denials. Such revocation shall result in loss of qualifying farm status and loss of eligibility to participate in a VAD. Absent noncompliance by the landowner, neither the Advisory Board nor the Board of Commissioners shall revoke any conservation agreement prior to its expiration. If the Advisory Board shall revoke the conservation agreement for cause, the landowner shall have the appeal rights set forth in subsection Article VI(a).

- (2) EVAD. Conservation agreements for land within enhanced districts are irrevocable for a period of ten years. Enforcement of the terms of the conservation agreement may be through an action for injunctive relief and/or damages in the General Courts of Justice for Wake County, North Carolina. The County may also terminate any benefits to the owner under this program either permanently or during the period of violation, as appropriate. If the Advisory Board shall revoke the conservation agreement for cause, the landowner shall have the appeal rights set forth in subsection Article VI(a). The right to terminate program benefits is in addition to any legal rights that the County may have under either this Article or the terms of the applicable conservation agreement. The County may seek costs of the action including reasonable attorney fees if such a provision is incorporated into the conservation agreement. A notice of revocation shall be recorded with Wake County Register of Deeds sufficient to provide notice that the land has been withdrawn from the Enhanced Voluntary Agricultural District program.

ARTICLE VIII
PUBLIC HEARINGS REGARDING CONDEMNATION

- (a) Purpose. Pursuant to G.S. 106-740, no state or local public agency or governmental unit may formally initiate any action to condemn any interest in qualifying farmland within a VAD or EVAD until such agency or unit has requested the Advisory Board to hold a public hearing on the proposed condemnation, this subsection provides for such hearings.
- (b) Procedure. The hearing procedure shall be as follows:
- (1) Time period. The total time period from the day that the request for a hearing has been received to the day that a final report is issued to the decision-making body or the agency proposing the condemnation, shall not exceed 30 days. Five days prior to holding a public meeting, the Advisory Board must publish notice of said public hearing in a newspaper of general circulation where the VAD or EVAD is located and post a copy of the notice by any electronic means. If the agency agrees to an extension, the agency and the Advisory Board shall mutually agree upon a schedule to be set forth in writing and made available to the public.
- (2) Review. The Advisory Board shall meet to review:
- a. If the need for the project has been satisfactorily established by the agency or unit of government involved, including a review of any fiscal impact analysis conducted by the agency involved; and
 - b. Whether there are alternatives to the proposed action that have less impact and are less destructive to the agricultural activities of the VAD or EVAD within which the proposed action is to take place.
- (3) Consultation. The Advisory Board shall consult with the Wake County Soil and Water Conservation District, Wake County Cooperative Extension Service, USDA Natural Resources Conservation Service, and may consult with any other individuals, agencies, or organizations, public or private, necessary to the Advisory Board's review of the proposed action. Land value will not be a factor in the selection between properties under consideration for the proposed action.
- (4) Report of findings. After a public hearing, the Advisory Board shall make a report containing its

findings and recommendations regarding the proposed action. The report shall be made available to the decision-making body of the agency proposing acquisition and the general public.

- (5) Formal initiation of condemnation. Pursuant to G.S. 106-740, no State or local public agency or governmental unit may formally initiate any action to condemn any interest in qualifying farmland within a voluntary agricultural district under this Part or an enhanced voluntary agricultural district until such agency has requested the Advisory Board to hold a public hearing on the proposed condemnation.

ARTICLE IX NOTICE OF PROXIMITY

- (a) Purpose. The purpose of this section is to help meet the needs of agriculture as an industry and prevent conflicts between VAD or EVAD participants and nonfarm landowners within one-half mile of the property line of any tract of land enrolled in a proximity VAD or EVAD.
- (b) VAD or EVAD established. The County has established VAD or EVAD for farmland preservation to protect and preserve agricultural lands and activities. These VAD or EVAD have been developed and mapped by the County to inform all purchasers of real property that certain agricultural activities, including, but not limited to, pesticide spraying, manure spreading, machinery operations, livestock operations, sawing, and similar activities may take place in these VAD or EVAD any time during the day or night. Maps and information on the location and establishment of these VAD or EVAD can be obtained from the Wake County Soil and Water Conservation office.
- (c) Notification generally. The Advisory Board, in cooperation with the County, shall provide notification to property owners, residents and other interested persons in and adjacent to any designated agricultural district. The purpose of such notification is to inform all current and potential residents and property owners in and adjacent to an agricultural district that farming and agricultural activities may take place in this VAD or EVAD any time during the day or night. These activities may include, but are not limited to pesticide spraying, manure spreading, machinery operations, livestock operations, sawing, and similar activities.
- (d) Limit of liability. In no event shall the County or any of its officers, employees, members of the Advisory Board, or agents be held liable in damages for any misfeasance, malfeasance, or nonfeasance occurring in good faith in connection with the duties or obligations imposed by this Article.
- (e) No cause of action. In no event shall any cause of action arise out of the failure of a person researching the title of a particular tract to report to any person the proximity of the tract to a qualifying farm or VAD or EVAD as defined in this Article.
- (f) Types of notification. Notification shall be provided as follows:
 - (1) Signs identifying approved VAD or EVAD may be placed along major roads, however, signs shall not be placed within the right-of-way of any state-maintained road.
 - (2) Maps identifying approved VAD or EVAD shall be provided to Wake County offices including: the Register of Deeds, Planning Department, the Soil and Water Conservation District office, and any other office or agency the Advisory Board deems necessary.
 - (3) The following notice, of a size and form suitable for posting, shall be posted and available for

public inspections in the Wake County Register of Deeds' office, and any other office or agency the Advisory Board deems necessary:

- (4) Geographic information system. Voluntary and Enhanced Voluntary Agricultural Districts shall be mapped in the County geographic information system with a one-half mile buffer from the property line.

ARTICLE X STATE AGENCY NOTIFICATION AND CONSULTATION

- (a) The Advisory Board, or its designee, may consult with the North Carolina Cooperative Extension office, the Soil and Water Conservation District office, the Natural Resources Conservation Service office, the North Carolina Department of Agriculture and Consumer Services, and with any other individual, agency, or organization the Advisory Board, or its designee, deems necessary to the proper conduct of its business.
- (b) A copy of this Article shall be sent to the Office of the North Carolina Commissioner of Agriculture and Consumer Services, the North Carolina Cooperative Extension office, and the Soil and Water Conservation District office after adoption. At least once a year the County shall submit a written report to the commissioner of agriculture and consumer services, including the status, progress and activities of the County's farmland preservation program, including VAD or EVAD information regarding:
 - (1) Number of landowners enrolled;
 - (2) Number of acres enrolled;
 - (3) Number of acres certified during the reporting period;
 - (4) Number of acres not certified during the reporting period;
 - (5) Number of acres for which applications are pending;
 - (6) Municipalities with which memorandums of understanding have been signed;
 - (7) Municipalities with which memorandums of understanding are no longer in effect;
 - (8) Municipalities that have adopted this Article for the purpose of the County enforcing this Article within their corporate boundaries;
 - (9) Copies of any amendments to this Article or memorandums of understanding signed with municipalities; and
 - (10) Any other information the Advisory Board deems useful.
- (c) Copies of the reports cited in subsection (b) of this section will be sent to:
 - (1) State department of transportation;

- (2) Secretary, state department of commerce;
- (3) Any other entities the Advisory Board, or its designee, deems appropriate.

ARTICLE XI
ADDITIONAL BENEFITS FOR EVAD

- (a) Land enrolled in the EVAD program is entitled to all of the benefits available under the VAD program, and to the following additional benefits:
 - (1) Sale of nonfarm products. Landowners participating in EVAD may receive up to 25 percent of gross sales from the sale of nonfarm products and still qualify as a bona fide farm that is exempt from County zoning regulations under G.S. 153A-340(b). A farmer seeking to benefit from this subsection shall have the burden of establishing that the property's sale of nonfarm products did not exceed 25 percent of its gross sales.
 - (2) Agricultural cost share program. Landowners participating in EVAD are eligible under G.S. 143-215.74(b) to receive the higher percentage of cost-share funds for the benefit of that farmland under the agriculture cost share program established pursuant to part 9 of Article 21 of chapter 143 of the General Statutes to benefit that farmland.
 - (3) Priority consideration. State departments, institutions, or agencies that award grants to farmers are encouraged to give priority consideration to landowners participating in EVAD.

ARTICLE XII
COUNTY LAND USE PLANNING

- (a) Duty of Advisory Board. It shall be the duty of the Advisory Board to advise the Board of Commissioners, or the agency or office to which the Board of Commissioners delegates authority to oversee County land use planning, on the status, progress, and activities of the County's Voluntary Agricultural District program and Enhanced Voluntary Agricultural District program and to also coordinate the formation and maintenance of VAD and EVAD with the County's land use planning activities and the County's land use plan.

ARTICLE XIII
AGRICULTURAL CONSERVATION EASEMENT PROGRAM

- (a) Purpose. The preservation of the County's best agricultural land in a manner that directs and accommodates growth and development is a high priority to the residents of the County. To this end the County establishes the following goals:
 - (1) To permanently protect and conserve those soils in the County best suited to agricultural uses;
 - (2) To identify and harmonize policies of government at all levels which may conflict with the goal

of protection of farmland;

- (3) To reduce land use conflicts between agricultural and other land uses; and
 - (4) To promote agriculture as an integral part of the County's economy.
- (b) Duties and responsibilities of the Advisory Board. The Advisory Board and Farmland Preservation Coordinator shall administer the Agricultural Conservation Easement Program within the farmland preservation program. The Wake Soil and Water Conservation District shall make recommendations to the Advisory Board on the selection of properties for purchase and/or donation of conservation easements. Subject to the availability of state and federal grant funding, the Wake Soil and Water Conservation District, with assistance from a private nonprofit conservation organization, may acquire or support the acquisition of agricultural conservation easements consistent with this ordinance.

ARTICLE XIV PURCHASE OF CONSERVATION EASEMENTS

- (a) General. Subject to the availability of funds, the Wake Soil and Water Conservation District may facilitate the purchase of conservation easements in agricultural and/or forestry lands. All applications for the purchase of conservation easements will be evaluated based upon a farmland preservation ranking system approved by the board. Applications will be ranked based upon various site factors. Conservation easements may be purchased in accordance with the ranking of farm properties and the availability of funding.
- (b) Description. The purchase of conservation easements is legally binding, restricting the owner and future owners to agricultural and/or forestry use of the land. The conservation easements will be held in public trust by a qualified conservation organization. Conservation easements will be in perpetuity and in compliance with the North Carolina Conservation and Historic Preservation Agreements Act and applicable federal and state tax laws.
- (c) Authority. Wake County Soil and Water Conservation District acts as a department of Wake County. Wake County gives Soil and Water Conservation District the authority to apply for grant funding on behalf of the County. Wake County gives the Soil and Water Conservation District director and designated staff signature authority on conservation easement applications and allows Soil and Water Conservation District to use Wake County's tax ID and DUNs number to apply for conservation easement grant funding on behalf of Wake County. Wake County gives the Wake County Soil and Water District authority to enter into cooperative agreements with the Triangle land Conservancy (TLC), United States Department of Agriculture Natural Resource Conservation Service (USDA NRCS), North Carolina Department of Agriculture and Consumer Sciences Agricultural Development & Farmland Preservation Trust Fund (NCDA&CS ADFP) or other agencies to facilitate easement purchase.
- (d) Minimum eligibility criteria. The agricultural and/or forestry land must be at least ten acres in size or contiguous to a ten-acre tract for which a perpetual conservation easement exists and be in agricultural and/or forestry use.
- (e) Application procedure. An application must be submitted to the Advisory Board or its designee.
- (f) Review and ranking of application. The applications will be ranked by the Farmland Preservation Coordinator or their designee. The Farmland Preservation Coordinator will rank each of the applications using a farmland preservation ranking system adopted by the Agricultural Advisory Board. After the

application has been ranked, the Farmland Preservation Coordinator will prioritize applications and make recommendations to the Advisory Board.

ARTICLE XV DONATION OF CONSERVATION EASEMENTS

- (a) General. The Wake Soil and Water Conservation District may accept a voluntary donation of conservation easements or work with partners to facilitate these donations
- (b) Description. The donation of conservation easements is legally binding, restricting the owner and future owners to agricultural and/or forestry use of the land. The conservation easements will be held in public trust by a qualified conservation organization. Conservation easements will be in perpetuity and in compliance with the North Carolina Conservation and Historic Preservation Agreements Act and applicable federal and state tax laws.
- (c) Minimum eligibility criteria. The agricultural and/or forestry land must be at least ten acres in size or contiguous to a ten-acre tract for which a perpetual conservation easement exists and be in agricultural and/or forestry use.
- (d) Application procedure. Guidance documents for donating conservation easements are housed at the Soil and Water Conservation District office. Upon contact by a landowner, a meeting will be set with the Farmland Preservation Coordinator and a member of the Advisory Board, or its designee, to discuss donation of conservation easements.
- (e) Review and ranking of applications. The applications will be ranked by the Farmland Preservation Coordinator or their designee. The Farmland Preservation Coordinator will rank each of the applications using the soil and site assessment criteria in the farmland preservation ranking system. After the application has been ranked, the Farmland Preservation Coordinator will prioritize applications and make recommendations to the Advisory Board.

ARTICLE XVI BASELINE DOCUMENTATION AND MONITORING

- (a) Baseline documentation purpose. This policy establishes the procedure for the collection, compilation, and storage of baseline documentation for conservation easements managed by Wake County Soil and Water Conservation District. The Soil and Water Conservation District must have baseline documentation for all properties it protects. This information establishes the condition of a property at the time of acquisition, allowing comparisons with findings during subsequent monitoring events. Such information is also required by the IRS for landowners seeking a federal income tax deduction for conservation easement donations. The Soil and Water Conservation District, or their designee, will collect this information for the conservation easement donor. Baseline documentation is important in defending conservation properties from threats, including conservation easement violations. The baseline documentation may be relied upon during litigation to establish the condition of a property prior to a conservation easement violation. The Soil and Water Conservation District, or their designee, will collect and store all baseline documentation for conservation easements in a manner that maximizes effectiveness for enforcement purposes.

- (1) Baseline data collection. The volume and specificity of the information included in the baseline documentation report may vary depending on the terms of the easement and the conservation objectives for the property. It is the Soil and Water Conservation District's policy that baseline data will be collected by staff, or their designee.

Baseline data collected during a site visit will generally include:

- a. Boundary photos, photos of special features, and photos of structures and other improvements and or human modifications
 - b. Global Positioning System (GPS) data and locations on a map of each photo, special feature, structure, and other improvements;
 - c. Other natural resource information documenting the conservation values of the site such as soil maps, land cover data, natural community descriptions, ecological data, and other relevant agricultural or forestry information.
- (2) A copy of the baseline documentation report shall be kept on file with the easement grantee and must be reviewed by the landowner prior to closing.
- (b) Monitoring purpose. To protect conservation values and maintain safety on its fee simple properties, Soil and Water Conservation District or their designee will conduct regular monitoring and maintain detailed records of inspections, problems on the property and actions taken to address such problems.
- (1) Monitoring personnel. Overall supervision of monitoring is the responsibility of the grantee but will be coordinated with the Farmland Preservation Coordinator
 - (2) Monitoring procedure. Comprehensive monitoring shall be performed at least annually, with additional monitoring visits and reports to be generated as needed.

ARTICLE XVII FARMLAND PRESERVATION RANKING SYSTEM

The farmland preservation ranking system will be used to rank, or prioritize, applications received from landowners seeking sale or donation of their conservation easements. The system can be used for evaluating conversion impact. Site and soil assessment criteria shall be maintained by the Advisory Board. The advisory board is responsible for developing and adopting a system to rank and evaluate projects.

ARTICLE XVIII LEGAL PROVISIONS

- (a) Severability. If any section, subsection, clause, phrase, or portion of this Article is for any reason found invalid or unconstitutional by any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Article.
- (b) Conflict with other ordinances and statutes. Whenever the provisions of this Article conflict with other



Meeting Minutes

Board of Commissioners

MEETING MINUTE EXCERPT ONLY

Tuesday, June 21, 2022

2:00 PM

Wake County Justice Center

Regular Meeting

Meeting Called to Order: Chair Sig Hutchinson

Chair Hutchinson called the meeting to order.

Pledge of Allegiance

Present: 7 - Chair Sig Hutchinson, Vice-Chair Shinica Thomas, Commissioner Vickie Adamson, Commissioner Matt Calabria, Commissioner Maria Cervania, Commissioner Susan Evans, and Commissioner James West

Staff present: David Ellis, County Manager; Scott Warren, County Attorney; Duane Holder, Deputy County Manager; Ashley Jacobs, Deputy County Manager; Denise Foreman, Assistant County Manager; Emily Lucas, Deputy County Manager; Yvonne Gilyard, Deputy Clerk to the Board; Toni Womack, Senior Executive Assistant; Ben Canada, Assistant to County Manager; Jose Cabanas, Chief Medical Officer; Dara Demi, Chief Communications Director; and Ellen Meder, Communications Consultant.

Others present: Portia Johnson, Senior Executive Assistant; Tanika Cooper, Senior Executive Assistant; Keith Lankford, Planner III; Todd Taylor, Debt Manager; John Roberson, Solid Waste Director; Dr. Scott Ralls, President, Wake Technical College; Teresa Furr, Wake Soil and Water Conservation Director; Scott Bledsoe, President, Blue Force Technologies.

Invocation: Commissioner Susan Evans

Items of Business

1. Approval of Agenda

Mr. Bledsoe named Boeing and others as competitors.

Vice-Chair Thomas moved, seconded by Commissioner Cervania, that the Board of Commissioners

1. hold a public hearing and approves a Business Development Grant Agreement with Blue Force Technologies subject to the terms and conditions acceptable to the County Attorney.

The motion carried by the following vote:

Aye: 7 - Chair Hutchinson, Vice-Chair Thomas, Commissioner Adamson, Commissioner Calabria, Commissioner Cervania, Commissioner Evans, and Commissioner West

17. Wake County Farmland Preservation Program Ordinance

Attachments:

Ms. Teresa Furr, Wake Soil and Water Conservation Director, shared the Farmland Preservation Ordinance.

She shared the purpose and goals of ordinance.

Purpose and Goals of Ordinance

- I. Repeal and replace the “Wake County Voluntary Agricultural District Ordinance” to expand the County’s farmland preservation program and comply with SB 605.
- II. Promote agricultural values and the general welfare of Wake County.
- III. Promote agriculture as an integral part of the County’s economy.
- IV. Increase the identity and pride in the agricultural community.
- V. Encourage the economic and financial health of agriculture, horticulture, and forestry.
- VI. Decrease the likelihood of legal disputes, such as nuisance actions between farm owners and their neighbors.

She shared board goals and fiscal impact.

Board Goals & Fiscal Impact

- This action supports Objective ES 3.3 - strengthen County services

and policies that support agribusinesses. Potential efforts include farmland preservation, next generation farming, and promoting local food systems and agritourism.

- The Wake County Farmland Preservation Program Ordinance was created by receiving feedback and input from multiple internal departments and external stakeholders.
- A recurring commitment of \$4,000 beginning in FY 2024.
 - Wake County Agricultural Advisory Board per diem
 - Signage for Enhanced Voluntary Agricultural Districts
 - Deed recording fees

She shared the Farmland Preservation Ordinance.

Farmland Preservation Ordinance

NEW Enhanced Voluntary Agricultural District Program (EVAD)

- Requires a 10-year irrevocable agreement.
- Must be recorded on deed.
- May renew for 3 years after initial period unless notice is given by landowner.
- May provide assessments for utilities provided by city or county be held in abeyance, with or without interest.

Additional benefits to landowners include:

- May receive up to 25 percent of its gross sales from the sale on non-farm products and still qualify as a bona fide farm that is exempt from zoning regulations under G.S. 153A-340(b).
- Eligible to receive higher percentage of cost share funds (90 percent) under the Wake Soil and Water Conservation District's Agricultural Cost Share Program.

NEW Agricultural Conservation Easement Program

- The Agricultural Advisory Board and Farmland Preservation Coordinator position will administer the new program as another voluntary option for landowners within the overall farmland preservation program.
- Staff will make recommendations to the Agricultural Advisory Board on selection of properties for donation of agricultural conservation easements or to seek state and federal grant funding for the purchase of agricultural conservation easements.
- The Soil and Water Conservation District in partnership with the Triangle Land Conservancy, may acquire agricultural conservation easements consistent with the new Farmland Preservation Ordinance.

She shared the summary.

Summary

The Wake County Voluntary Agricultural District Ordinance will be repealed and replaced with the Wake County Farmland Preservation Program Ordinance.

The new ordinance will:

- Meet the requirements of Senate Bill 605 adopted in July 2021.
- Add additional farmland protection programs:
 - Enhanced Voluntary Agricultural Districts (EVAD)
 - Agricultural Conservation Easement Program
- Support PLANWake goals of open space and farmland protection.
- Support BOC goal for economic strength through farmland protection, next generation farming, promoting local food systems and agritourism.

Vice-Chair asked for clarification referencing the advisory board.

Ms. Furr shared that the seven members are in place and they will move over to the Board of Commissioners appointments. They will serve two year terms, and recommendations will come from farm service agencies.

Commissioner Adamson shared comments about supporting farmers. She shared that the other 29 agencies have grants and asked the County Manager to share how this works and how it can help Wake County.

Ms. Furr shared that Soil and Water will be applying for grants in the future.

Manager Ellis shared that the item will be brought to a future committee meeting.

Chair Hutchinson shared comments about local farming and buying local.

Commissioner West moved, seconded by Commissioner Adamson, that the Board of Commissioners

1. adopt the new Wake County Farmland Preservation Program Ordinance that repeals and replaces the December 5, 2016, Wake County Voluntary Agricultural District Program Ordinance.

The motion carried by the following vote:

Aye: 7 - Chair Hutchinson, Vice-Chair Thomas, Commissioner Adamson, Commissioner Calabria, Commissioner Cervania, Commissioner Evans, and Commissioner West

Farmland Preservation Program Ordinance

June 13, 2022

Teresa Furr, Director
Wake Soil and Water Conservation

@wakegov    



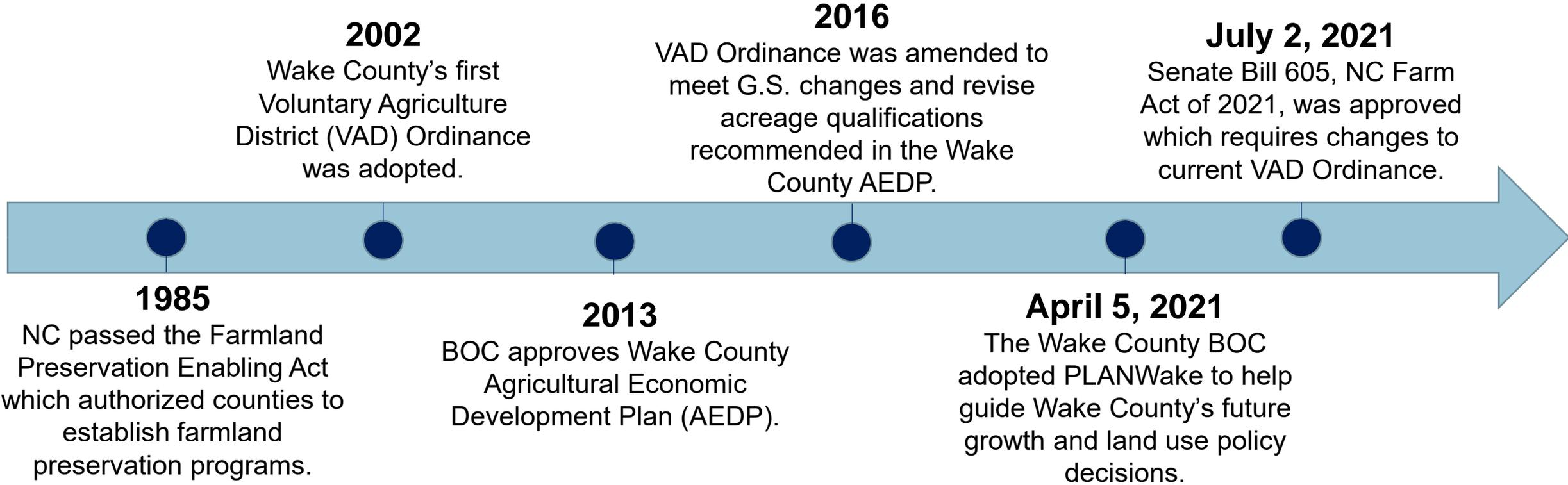
wakegov.com

Goal

Receive Board of Commissioners feedback and approval to prepare for a June 21, 2022, adoption of the amended Wake County Voluntary Agricultural District ordinance.



Background



Background



Over the next decade, Wake County is expected to add another 250,000 new residents.



Under current growth rates, 28,000 additional acres of new development could occur and all remaining unprotected land in the County could be converted to development within 25-50 years.



The response from residents and stakeholders through the PLANWake process identified the protection of natural areas, farms, forests, and meadows as the number one change they would like to see in the County.



PlanWake sets the goal to protect 30% (165,000 acres) of the County's land area as permanently protected.

Board Goals & Fiscal Impact

- This action supports Objective ES 3.3 – strengthen County services and policies that support agribusinesses. Potential efforts include farmland preservation, next generation farming, and promoting local food systems and agritourism.
- The Wake County Farmland Preservation Program Ordinance was created by receiving feedback and input from multiple internal departments and external stakeholders.
- A recurring commitment of \$4,000 beginning in FY 2024.
 - Wake County Agricultural Advisory Board per diem
 - Signage for Enhanced Voluntary Agricultural Districts
 - Deed recording fees

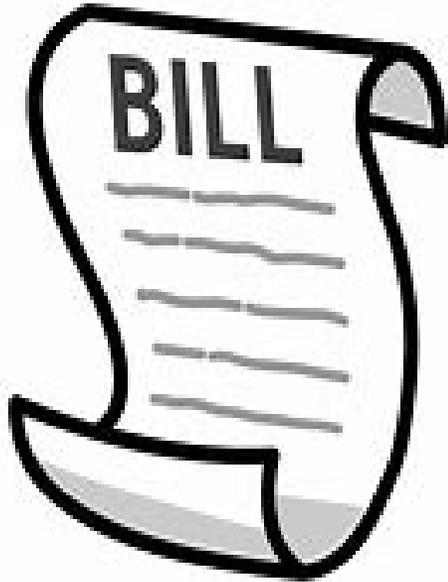
Purpose and Goals of Ordinance

- I. Repeal and replace the “Wake County Voluntary Agricultural District Ordinance” to expand the County’s farmland preservation program and comply with SB 605.
- II. Promote agricultural values and the general welfare of Wake County.
- III. Promote agriculture as an integral part of the County’s economy.
- IV. Increase the identity and pride in the agricultural community.
- V. Encourage the economic and financial health of agriculture, horticulture, and forestry.
- VI. Decrease the likelihood of legal disputes, such as nuisance actions between farm owners and their neighbors.



Farmland Preservation Ordinance

The modified ordinance reflects the necessary changes needed to comply with Senate Bill 605 requirements including:



1. Updating ordinance to require VAD/EVAD farms are used for bona fide farm purposes, as that term is defined in G.S. 106-743.4(a) and G.S. 160D-903.
2. The conservation agreement shall be approved by the agricultural advisory board.
3. Ensure that record notice mechanisms (GIS layer or deed notation) are measuring $\frac{1}{2}$ mile from the property lines of VADs/EVADs.
 - GIS map that provides reasonable notification for public searching a property that is within $\frac{1}{2}$ mile of a farm.
4. Clarifies that the Agricultural Advisory Board shall be organized and appointed by the Board of Commissioners.
5. Agricultural Advisory Board decisions are appealable to the Board of Commissioners.

Farmland Preservation Ordinance

Voluntary Agricultural District Program (VAD)

- Requires a 10-year agreement that is revocable with 30 days written notice to Agricultural Advisory Board.
- May renew for 10 years after initial period unless notice is given by landowner.
- May provide assessments for utilities provided by city or county be held in abeyance, with or without interest.

Additional benefits to landowners include:

- Recognition and public education about agriculture.
- Increased protection from nuisance suits.
- Receives additional bonus points on applications for cost share funds under the Wake Soil and Water Conservation District's Agricultural Cost Share Program ranking sheets.

Farmland Preservation Ordinance

NEW Enhanced Voluntary Agricultural District Program (EVAD)

- Requires a 10-year irrevocable agreement.
- Must be recorded on deed.
- May renew for 3 years after initial period unless notice is given by landowner.
- May provide assessments for utilities provided by city or county be held in abeyance, with or without interest.

Additional benefits to landowners include:

- May receive up to 25% of its gross sales from the sale on non-farm products and still qualify as a bona fide farm that is exempt from zoning regulations under G.S. 153A-340(b).
- Eligible to receive higher percentage of cost share funds (90%) under the Wake Soil and Water Conservation District's Agricultural Cost Share Program.

Farmland Preservation Ordinance

NEW Agricultural Conservation Easement Program

- **Definition of a Conservation Easement (CE):** A conservation easement is a written and recorded deed agreement between a landowner and a qualified conservation organization in which both parties agree to restrict development. These restrictions are designed to protect the conservation values of the property and the binding agreement stays with the property as it changes ownership.
- **Benefits of a Conservation Easement:**
 - Tax Benefits that may include: tax incentives, federal income tax reduction and estate tax deduction.
 - Protect farming and family heritage
 - Protect property from development pressure
 - Protect local food production and food resilience

Farmland Preservation Ordinance

NEW Agricultural Conservation Easement Program

Purpose: The preservation of the County's best agricultural land in a manner that directs and accommodates growth and development is a high priority for the residents of the county.

Goals of program:

1. Permanently protect soils in the County best suited for agricultural uses.
2. Identify and harmonize policies of government that may conflict with protection of farmland.
3. To reduce land use conflicts between agricultural and other land uses.
4. Promote agricultural as an integral part of the County's economy.

Farmland Preservation Ordinance

NEW Agricultural Conservation Easement Program

- The Agricultural Advisory Board and Farmland Preservation Coordinator position will administer the new program as another voluntary option for landowners within the overall farmland preservation program.
- Staff will make recommendations to the Agricultural Advisory Board on selection of properties for donation of agricultural conservation easements or to seek state and federal grant funding for the purchase of agricultural conservation easements.
- The Soil and Water Conservation District in partnership with the Triangle Land Conservancy, may acquire agricultural conservation easements consistent with the new Farmland Preservation Ordinance.

Summary

The Wake County Voluntary Agricultural District Ordinance will be repealed and replaced with the Wake County Farmland Preservation Program Ordinance.

The new ordinance will:

- Meet the requirements of Senate Bill 605 adopted in July 2021.
- Add additional farmland protection programs:
 - Enhanced Voluntary Agricultural Districts (EVAD)
 - Agricultural Conservation Easement Program
- Support PLANWake goals of open space and farmland protection.
- Support BOC goal for economic strength through farmland protection, next generation farming, promoting local food systems and agritourism.

Summary

- This ordinance was created through a collaborative effort by receiving feedback and input from multiple internal departments and external stakeholders.
- The Wake County Agricultural Advisory Board recommends the approval and adoption of the Wake County Farmland Preservation Program Ordinance.
- Today's goal is to receive Board of Commissioners feedback and approval to prepare for a June 21, 2022, adoption of the amended Wake County Voluntary Agricultural District Ordinance.



Questions?



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GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2021

SESSION LAW 2021-78
SENATE BILL 605

AN ACT TO MAKE VARIOUS CHANGES TO THE LAWS CONCERNING
AGRICULTURE AND FORESTRY.

The General Assembly of North Carolina enacts:

VOLUNTARY AGRICULTURAL DISTRICT TECHNICAL CHANGES

SECTION 1. Article 61 of Chapter 106 of the General Statutes reads as rewritten:

"Article 61.

"Agricultural Development and Preservation of Farmland.

...

"Part 2. Voluntary Agricultural Districts.

"§ 106-737. Qualifying farmland.

In order for farmland to qualify for inclusion in a voluntary agricultural district or an enhanced voluntary agricultural district under Part 1 or Part 2 of this Article, it must be real property that:

- (1) ~~Is engaged in agriculture as that word is defined in G.S. 106-581.1.~~ Is used for bona fide farm purposes, as that term is defined in G.S. 106-743.4(a) and G.S. 160D-903.
- (2) Repealed by Session Laws 2005-390, s. 11 effective September 13, 2005.
- (3) Is managed in accordance with the Soil Conservation Service defined erosion control practices that are addressed to highly erodible land; and
- (4) Is the subject of a conservation agreement, as defined in G.S. 121-35, between ~~the county~~ local government administering the voluntary agricultural district program and the owner of such land that prohibits nonfarm use or development of such land for a period of at least 10 years, except for the creation of not more than three lots that meet applicable county and municipal zoning and subdivision regulations. The form of the conservation agreement shall be approved by the agricultural advisory board created under G.S. 106-739.

"§ 106-737.1. Revocation of conservation agreement.

By written notice to the ~~county~~ local government administering the voluntary agricultural district program, the landowner may revoke this conservation agreement. Such revocation shall result in loss of qualifying farm status.

"§ 106-738. Voluntary agricultural districts.

- (a) An ordinance adopted under this Part shall provide:
 - (1) ~~For the establishment of voluntary agricultural districts consisting initially of at least the number of contiguous acres of agricultural land, and forestland or horticultural land that is part of a qualifying farm or the number of qualifying farms deemed appropriate by the governing board of the county or city adopting the ordinance;~~ upon the execution of a conservation agreement as provided in G.S. 106-737(4).



- (2) ~~For the formation of such districts upon the execution by the owners of the requisite acreage of an agreement to sustain agriculture in the district;~~
- (3) ~~That the form of this agreement must be reviewed and approved by an agricultural advisory board established under G.S. 106-739 or some other county board or official;~~
- (4) ~~That each such district have a representative on the agricultural advisory board established under G.S. 106-739.~~
- (5) The minimum size, including acreage; number of tracts; and appropriate proximity of multiple tracts of agricultural land, forestland, or horticultural land that may comprise a voluntary agricultural district.

(b) The purpose of such agricultural districts shall be to increase identity and pride in the agricultural community and its way of life and to ~~increase protection from nuisance suits~~ decrease the likelihood of legal disputes, such as nuisance actions between farm owners and their neighbors, and other negative impacts on properly managed farms. The county or city that adopted an ordinance under this Part may take such action as it deems appropriate to encourage the formation of such districts and to further their purposes and objectives.

(c) A county ordinance adopted pursuant to this Part is effective within the unincorporated areas of the county. A city ordinance adopted pursuant to this Part is effective within the corporate limits of the city. A city may amend its ordinances in accordance with G.S. 160A-383.2 with regard to agricultural districts within its planning jurisdiction.

"§ 106-739. Agricultural advisory board.

(a) An ordinance adopted under this Part or Part 3 of this Article shall provide for the establishment of an agricultural advisory board, organized and appointed ~~as the county or city that adopted the ordinance shall deem appropriate,~~ by the board of county commissioners or the city council adopting the ordinance. The county or city that adopted the ordinance may confer upon this advisory board authority to:

- (1) Review and make recommendations or decisions concerning the establishment and modification of agricultural ~~districts;~~ districts. The board of county commissioners or the city council may make decisions regarding the establishment and modification of voluntary agricultural districts or may delegate that authority to the agricultural advisory board. If the authority is delegated to the agricultural advisory board, the agricultural advisory board's decisions shall be appealable to the board of county commissioners or city council by an owner of land that has been denied enrollment in a voluntary agricultural district or has been removed from a voluntary agricultural district by the agricultural advisory board.
- (1a) Execute agreements with landowners necessary for enrollment of land in a voluntary agricultural district.
- (2) Review and make recommendations concerning any ordinance or amendment adopted or proposed for adoption under this Part or Part 3 of this ~~Article;~~ Article.
- (3) Hold public hearings on public projects likely to have an impact on agricultural operations, particularly if such projects involve condemnation of all or part of any qualifying ~~farm;~~ farm.
- (4) Advise the governing board of the county or city that adopted the ordinance on projects, programs, or issues affecting the agricultural economy or way of life within the ~~county;~~ county.
- (5) Perform other related tasks or duties assigned by the governing board of the county or city that adopted the ordinance.

(b) The members of the agricultural advisory board shall be chosen to provide the broadest possible representation of the geographical regions of the local government and to

represent, to the extent possible, all segments of agricultural production existing within the local government. A majority of the members of the agricultural advisory board shall be actively engaged in agriculture.

(c) The agricultural advisory board may, at the discretion of the board of county commissioners or the city council, utilize an existing local government agency for the purpose of administration, record keeping, and other related tasks or duties.

...

"§ 106-741. Record notice of proximity to farmlands.

(a) All counties shall require that land records include some form of notice reasonably calculated to alert a person researching the title of a particular tract that such tract is located within one-half mile of a ~~poultry, swine, or dairy qualifying farm or within 600 feet of any other qualifying farm or within one-half mile of a voluntary agricultural district.~~ the property line of any tract of land enrolled in a voluntary agricultural district.

...

"§ 106-743. Local ordinances.

A county or a city adopting an ordinance under this Part or Part 3 of this Article may consult with the North Carolina Commissioner of Agriculture or ~~his~~ the Commissioner's staff before adoption, and shall record the ordinance with the Commissioner's office after adoption. Thereafter, the county or city shall submit to the Commissioner at least once a year, a written report including the status, ~~progress~~ progress, number of enrolled farms and acres, and activities of its farmland preservation program under this Part or Part 3 of this Article.

"Part 3. Enhanced Voluntary Agricultural Districts.

"§ 106-743.1. Enhanced voluntary agricultural districts.

(a) A county or a municipality may adopt an ordinance establishing an enhanced voluntary agricultural district. An ordinance adopted pursuant to this Part shall provide:

- (1) For the establishment of an enhanced voluntary agricultural district that initially consists of at least the number of contiguous acres of agricultural land, and forestland and horticultural land that is part of a qualifying farm under G.S. 106-737 or the number of qualifying farms deemed appropriate by the governing board of the county or city adopting the ordinance.
- (2) For the formation of the enhanced voluntary agricultural district upon the execution of a conservation agreement, as defined in G.S. 121-35, that meets the condition set forth in G.S. 106-743.2 by the landowners of the requisite acreage to sustain agriculture in the enhanced voluntary agricultural district.
- (3) That the form of the agreement under subdivision (2) of this subsection be reviewed and approved by an agricultural advisory board established under G.S. 106-739, or other governing board of the county or city that adopted the ordinance.
- (4) ~~That each enhanced voluntary agricultural district have a representative on the agricultural advisory board established under G.S. 106-739.~~

(b) The purpose of establishing an enhanced voluntary agricultural district is to allow a county or a city to provide additional benefits to farmland beyond that available in a voluntary agricultural district established under Part 2 of this Article, when the owner of the farmland agrees to the condition imposed under G.S. 106-743.2. The county or city that adopted the ordinance may take any action it deems appropriate to encourage the formation of these districts and to further their purposes and objectives.

(c) A county ordinance adopted pursuant to this Part is effective within the unincorporated areas of the county. A city ordinance adopted pursuant to this Part is effective within the corporate limits of the city. A city may amend its ordinances in accordance with G.S. 160A-383.2 with regard to agricultural districts within its planning jurisdiction.

(d) A county or city ordinance adopted pursuant to this Part may be adopted simultaneously with the creation of a voluntary agricultural district pursuant to G.S. 106-738.
...."

ALLOW MAGISTRATES TO WAIVE TRIALS FOR STATE FOREST RULE OFFENSES

SECTION 2.(a) G.S. 7A-273 reads as rewritten:

"§ 7A-273. Powers of magistrates in infractions or criminal actions.

In criminal actions or infractions, any magistrate has power:

...

- (2) In misdemeanor or infraction cases involving alcohol offenses under Chapter 18B of the General Statutes, traffic offenses, hunting, fishing, State park and recreation area rule offenses under Chapters 113 and 143B of the General Statutes, State forest rule offenses under Articles 74 and 75 of Chapter 106 of the General Statutes, boating offenses under Chapter 75A of the General Statutes, open burning offenses under Article 78 of Chapter 106 of the General Statutes, and littering offenses under G.S. 14-399(c) and G.S. 14-399(c1), to accept written appearances, waivers of trial or hearing and pleas of guilty or admissions of responsibility, in accordance with the schedule of offenses and fines or penalties promulgated by the Conference of Chief District Judges pursuant to G.S. 7A-148, and in such cases, to enter judgment and collect the fines or penalties and costs;

...."

SECTION 2.(b) This section becomes effective December 1, 2021, and applies to offenses committed on or after that date.

EXEMPT CERTAIN FIRES FROM OPEN BURNING LAWS

SECTION 3.(a) G.S. 106-950 is amended by adding a new subsection to read:

"(a2) Except in cases where the Commissioner has prohibited all open burning during periods of hazardous forest fire conditions or during air pollution episodes declared pursuant to Article 21B of Chapter 143 of the General Statutes, this Article does not apply to any fires started, or caused to be started, for cooking, warming, or ceremonial events, if the fire is confined (i) within an enclosure from which burning material may not escape or (ii) within a protected area upon which a watch is being maintained and which is provided with adequate fire protection equipment."

SECTION 3.(b) This section becomes effective December 1, 2021, and applies to offenses committed on or after that date.

FOREST SERVICE OVERTIME MODIFICATION

SECTION 4.(a) G.S. 106-903 reads as rewritten:

"§ 106-903. Overtime compensation for forest fire fighting.

The Department shall, within funds appropriated to the Department, provide either monetary overtime compensation or compensatory leave at an hour-for-hour rate, at its discretion, to the professional-employees of the North Carolina Forest Service who are exempt from the Fair Labor Standards Act and involved in fighting forest fires-fires for overtime earned while conducting fire suppression duties as defined in G.S. 106-955. If the Department provides compensatory leave for overtime earned, it shall be provided in a manner consistent with the State's general compensatory time policy for exempt employees established by the Office of State Human Resources."

SECTION 4.(b) This section is effective when it becomes law and applies to overtime earned on or after that date.

INCREASE PUNISHMENT FOR TIMBER LARCENY AND INCREASE CIVIL PENALTIES FOR DAMAGING TIMBER OR AGRICULTURAL COMMODITIES

SECTION 5.(a) G.S. 14-135 reads as rewritten:

"§ 14-135. Cutting, injuring, or removing another's Larceny of timber.

(a) Offense. – Except as otherwise provided in subsection (b) of this section, a person commits the offense of larceny of timber if the person does any of the following:

- (1)** If any person not being the bona fide owner thereof, shall knowingly and willfully cut down, injure or remove any standing, growing or fallen tree or log off the property of another, the person shall be punished the same as in G.S. 14-72. Knowingly and willfully cuts down, injures, or removes any timber owned by another person, without the consent of the owner of the land or the owner of the timber, or without a lawful easement running with the land.
- (2)** Buys timber directly from the owner of the timber and fails to make payment in full to the owner by (i) the date specified in the written timber sales agreement or (ii) if there is no such agreement, 60 days from the date that the buyer removes the timber from the property.

(b) Exceptions. – The following are exceptions to the offense set forth in subsection (a) of this section:

(1) A person is not guilty of an offense under subdivision (1) of subsection (a) of this section if the person is an employee or agent of an electric power supplier, as defined in G.S. 62-133.8, and either of the following conditions is met:

- a.** The person believed in good faith that consent of the owner had been obtained prior to cutting down, injuring, or removing the timber.
- b.** The person believed in good faith that the cutting down, injuring, or removing of the timber was permitted by a utility easement or was necessary to remove a tree hazard. For purposes of this sub-subdivision, the term "tree hazard" includes a dead or dying tree, dead parts of a living tree, or an unstable living tree that is within striking distance of an electric transmission line, electric distribution line, or electric equipment and constitutes a hazard to the line or equipment in the event of a tree failure.

(2) A person is not guilty of an offense under subdivision (2) of subsection (a) of this section if either of the following conditions is met:

- a.** The person remitted payment in full within the time period set in subdivision (2) of subsection (a) of this section to a person he or she believed in good faith to be the rightful owner of the timber.
- b.** The person remitted payment in full to the owner of the timber within the 10-day period set forth in subsection (c) of this section.

(c) Prima Facie Evidence. – An owner of timber who does not receive payment in full within the time period set in subdivision (2) of subsection (a) of this section may notify the timber buyer in writing of the owner's demand for payment at the timber buyer's last known address by certified mail or by personal delivery. The timber buyer's failure to make payment in full within 10 days after the mailing or personal delivery authorized under this subsection shall constitute prima facie evidence of the timber buyer's intent to commit an offense under subdivision (2) of subsection (a) of this section.

(d) Penalty; Restitution. – A person who commits an offense under subsection (a) of this section is guilty of a Class G felony. Additionally, a defendant convicted of an offense under subsection (a) of this section shall be ordered to make restitution to the timber owner in an amount equal to either of the following:

- (1) Three times the value of the timber cut down, injured, or removed in violation of subdivision (1) of subsection (a) of this section.
- (2) Three times the value of the timber bought but not paid for in violation of subdivision (2) of subsection (a) of this section.

Restitution shall also include the cost incurred by the owner to determine the value of the timber. For purposes of subdivisions (1) and (2) of this subsection, "value of the timber" shall be based on the stumpage rate of the timber.

(e) Civil Remedies. – Nothing in this section shall affect any civil remedies available for a violation of subsection (a) of this section."

SECTION 5.(b) G.S. 1-539.1 reads as rewritten:

"§ 1-539.1. Damages for unlawful cutting, removal or burning of timber; misrepresentation of property lines.

(a) Any person, firm or corporation not being the bona fide owner thereof or agent of the owner who shall without the consent and permission of the bona fide owner enter upon the land of another and injure, cut or remove any valuable wood, timber, shrub or tree therefrom, shall be liable to the owner of said land for ~~double~~-triple the value of such wood, timber, shrubs or trees so injured, cut or removed.

(b) If any person, firm or corporation shall willfully and intentionally set on fire, or cause to be set on fire, in any manner whatever, any valuable wood, timber or trees on the lands of another, such person, firm or corporation shall be liable to the owner of said lands for ~~double~~-triple the value of such wood, timber or trees damaged or destroyed thereby.

...."

SECTION 5.(c) G.S. 1-539.2B reads as rewritten:

"§ 1-539.2B. ~~Double~~-Triple damages for injury to agricultural commodities or production systems; define value of agricultural commodities grown for educational, testing, or research purposes.

(a) Any person who unlawfully and willfully injures or destroys any other person's agricultural commodities or production system is liable to the owner for ~~double~~-triple the value of the commodities or production system injured or destroyed.

...."

SECTION 5.(d) Subsection (a) of this section becomes effective December 1, 2021, and applies to offenses committed on or after that date. Subsections (b) and (c) of this section become effective December 1, 2021, and apply to civil actions filed on or after that date.

REQUIRE TIMBER BUYERS AND TIMBER OPERATORS TO PROVIDE A WOOD LOAD TICKET TO SELLERS OF CERTAIN WOOD PRODUCTS

SECTION 6.(a) Article 22 of Chapter 14 of the General Statutes is amended by adding a new section to read:

"§ 14-135.1. Wood load tickets required for certain wood product sales; exceptions; penalties.

(a) Definition. – For purposes of this section, the term "wood product" means trees, timber, wood, or any combination thereof.

(b) Requirement. – Except as provided in this section, whenever a timber buyer or timber operator purchases wood product by the load directly from a timber grower or seller and the load is sold by weight, cord, or measure of board feet, the timber buyer or operator shall furnish the timber grower or seller, within 30 days of the completion of the wood product harvest, a separate, true, and accurate wood load ticket for each load of wood product removed from the timber grower's or seller's property. At a minimum, each wood load ticket shall include all of the following information provided by the timber grower or seller who sold the wood product:

- (1) The name of the timber grower or seller.
- (2) The county from which the wood product was severed.

- (3) The amount of wood product severed.
- (4) The date the wood product was delivered to the timber buyer or timber operator.
- (c) Applicability. – The provisions of this section do not apply to the following:
 - (1) The sale of wood for firewood only.
 - (2) A landowner harvesting and processing their own timber.
 - (3) Bulk or lump sum sales for an agreed total price for all timber purchased and sold in one transaction.
- (d) Punishment. – Any person who violates this section is guilty of a Class 2 misdemeanor."

SECTION 6.(b) This section becomes effective December 1, 2021, and applies to offenses committed on or after that date.

EXPAND THE LAWS ENFORCED BY DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES LAW ENFORCEMENT OFFICERS

SECTION 7.(a) G.S. 106-897 reads as rewritten:

"§ 106-897. Forest laws defined.

The forest laws consist ~~of~~ of all of the following:

- (1) ~~G.S. 14-136 to G.S. 14-140;~~ G.S. 14-135 to G.S. 14-140.1.
- (2) ~~Articles 74 through 84 of this Chapter;~~ Chapter.
- (3) ~~G.S. 77-13 and G.S. 77-14;~~ G.S. 77-14.
- (4) Other statutes enacted for the protection of forests and woodlands from fire, insects, or disease and concerning obstruction of streams and ditches in forests and ~~woodlands;~~ and woodlands.
- (5) Regulations and ordinances adopted under the authority of the above statutes."

SECTION 7.(b) This section becomes effective December 1, 2021, and applies to offenses committed on or after that date.

REQUIRE PRODUCTION OF ELECTRONIC RECORDS FOR DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES RECORD AUDITS

SECTION 8.(a) G.S. 106-92.8 reads as rewritten:

"§ 106-92.8. Tonnage fees: reporting system.

For the purpose of defraying expenses connected with the registration, inspection and analysis of the materials coming under this Article, each manufacturer or registrant shall pay to the Department of Agriculture and Consumer Services tonnage fees in addition to registration fees as follows: for agricultural liming material, fifty cents (50¢) per ton; for landplaster, fifty cents (50¢) per ton; excepting that these fees shall not apply to materials which are sold to fertilizer manufacturers for the sole purpose for use in the manufacture of fertilizer or to materials when sold in packages of 10 pounds or less.

Any manufacturer, importer, jobber, firm, corporation or person who distributes materials coming under this Article in this State shall make application for a permit to report the materials sold and pay the tonnage fees as set forth in this section.

The Commissioner of Agriculture shall grant such permits on the following conditions: The applicant's agreement ~~that he will to~~ keep such records as may be necessary to indicate accurately the tonnage of liming materials, etc., sold in the State and ~~his~~ the applicant's agreement for the Commissioner or ~~this~~ the Commissioner's authorized representative to examine such records to verify the tonnage statement. If the records are available electronically, the electronic records shall be made available to the Commissioner or the Commissioner's authorized representative. The registrant shall report quarterly and pay the applicable tonnage fees quarterly, on or before the tenth day of October, January, April, and July of each year. The report and payment shall cover the tonnage of liming materials, etc., sold during the preceding quarter. The report shall be

on forms furnished by the Commissioner. If the report is not filed and the tonnage fees paid by the last day of the month in which it is due, or if the report be false, the amount due shall bear a penalty of ten percent (10%) which shall be added to the tonnage fees due. If the report is not filed and the tonnage fees paid within 60 days of the date due, or if the report or tonnage be false, the Commissioner may revoke the permit and cancel the registration."

SECTION 8.(b) G.S. 106-277.12 reads as rewritten:

"§ 106-277.12. Records.

All persons transporting or delivering for transportation, selling, offering or exposing for sale agricultural or vegetable seeds if their name appears on the label shall keep for a period of two years a file sample and a complete record of such seed, including invoices showing lot number, kind and variety, origin, germination, purity, treatment, and the labeling of each lot. The Commissioner or ~~his~~ the Commissioner's duly authorized agents shall have the right to inspect such records in connection with the administration of this Article at any time during customary business hours. If the records are available electronically, the electronic records shall be made available to the Commissioner or the Commissioner's authorized representative."

SECTION 8.(c) G.S. 106-284.40(c)(2) reads as rewritten:

"(2) Keep such records as may be necessary or required by the Commissioner to indicate accurately the tonnage of commercial feed distributed in this State, and the Commissioner or ~~his~~ the Commissioner's duly designated agent shall have the right to examine such records during normal business hours, to verify statements of tonnage. If the records are available electronically, the electronic records shall be made available to the Commissioner or the Commissioner's authorized representative. Failure to make an accurate statement of tonnage or to pay the inspection fee or comply as provided herein shall constitute sufficient cause for the cancellation of all registrations on file for the distributor."

SECTION 8.(d) G.S. 106-671(b) reads as rewritten:

"(b) Reporting System. – Each manufacturer, importer, jobber, firm, corporation or person who distributes commercial fertilizers in this State shall make application to the Commissioner for a permit to report the tonnage of commercial fertilizer sold and shall pay to the North Carolina Department of Agriculture and Consumer Services an inspection fee of fifty cents (50¢) per ton. The Commissioner is authorized to require each such distributor to keep such records as may be necessary to indicate accurately the tonnage of commercial fertilizers sold in the State, and as are satisfactory to the Commissioner. Such records shall be available to the Commissioner, or ~~his~~ the Commissioner's duly authorized representative, at any and all reasonable hours for the purpose of making such examination as is necessary to verify the tonnage statement and the inspection fees paid. If the records are available electronically, the electronic records shall be made available to the Commissioner or the Commissioner's authorized representative. Each registrant shall report monthly the tonnage sold to non-registrants on forms furnished by the Commissioner. Such reports shall be made and inspection fees shall be due and payable monthly on the fifteenth of each month covering the tonnage and kind of commercial fertilizers sold during the past month. If the report is not filed and the inspection fee paid by the last day of the month it is due, the amount due shall bear a penalty of ten percent (10%), which shall be added to the inspection fee due. If the report is not filed and the inspection fee paid within 60 days of the date due, or if the report or tonnage be false, the Commissioner may revoke the permit."

TOBACCO TRUST FUND COMMISSION ADMIN EXPENSES

SECTION 9. G.S. 143-717(i) reads as rewritten:

"(i) Limit on Operating and Administrative Expenses. – All administrative expenses of the Commission shall be paid from the Fund. No more than ~~three hundred fifty thousand dollars (\$350,000)~~ three hundred seventy-five thousand dollars (\$375,000) may be used each fiscal year

for administrative and operating expenses of the Commission and its staff, provided that the Commission may annually adjust the administrative expense cap imposed by this subsection, so long as that any cap increase does not exceed the amount necessary to provide for statewide salary and benefit adjustments enacted by the General Assembly."

WORKERS' COMPENSATION DEFINITION CLARIFICATION

SECTION 10. G.S. 97-2 reads as rewritten:

"§ 97-2. Definitions.

When used in this Article, unless the context otherwise requires:

- (1) Employment. – The term "employment" includes employment by the State and all political subdivisions thereof, and all public and quasi-public corporations therein and all private employments in which three or more employees are regularly employed in the same business or establishment or in which one or more employees are employed in activities which involve the use or presence of radiation, except agriculture and domestic services, unless 10 or more full-time nonseasonal agricultural workers are regularly employed by the employer and an individual sawmill and logging operator with less than 10 employees, who saws and logs less than 60 days in any six consecutive months and whose principal business is unrelated to sawmilling or logging. For purposes of this section, "agriculture" has the same meaning as in G.S. 106-581.1.

...."

CREATE A NEW GENERAL PERMIT FOR FARMS WITH FARM DIGESTER SYSTEMS

SECTION 11.(a) G.S. 143-213 reads as rewritten:

"§ 143-213. Definitions.

Unless the context otherwise requires, the following terms as used in this Article and Articles 21A of this Chapter are defined as follows:

- ...
- (5a) The terms "animal waste" and "animal waste management system" have the same meaning as in G.S. 143-215.10B.

- ...
- (12a) The term "farm digester system" means a system, including all associated equipment and lagoon covers, by which gases are collected and processed from an animal waste management system for the digestion of animal biomass for use as a renewable energy resource. A farm digester system shall be considered an agricultural feedlot activity within the meaning of "animal operation" and shall also be considered a part of an "animal waste management system" as those terms are defined in G.S. 143-215.10B.

- (12b) The term "lagoon cover" means a structure or material that covers a lagoon receiving animal waste as part of an animal waste management system. For purposes of this subdivision, the term "lagoon" includes a lagoon as defined in G.S. 106-802(1) or a storage pond.

- ...
- (14a) The term "renewable animal biomass energy resource" means any renewable energy resource, as defined in G.S. 62-133.8(a)(8), that utilizes animal waste as a biomass resource, including a farm digester system.

...."

SECTION 11.(b) G.S. 143-215.10C reads as rewritten:

"§ 143-215.10C. Applications and permits.

(a) No person shall construct or operate an animal waste management system for an animal operation or operate an animal waste management system for a dry litter poultry facility that is required to be permitted under 40 Code of Federal Regulations § 122, as amended at 73 Federal Register 70418 (November 20, 2008), without first obtaining an individual permit or a general permit under this Article. The Commission shall develop a system of individual and general permits for animal operations and dry litter poultry facilities based on species, number of animals, and other relevant factors. The Commission shall develop a general permit for animal operations that includes authorization for the permittee to construct and operate a farm digester system. It is the intent of the General Assembly that most animal waste management systems be permitted under a general permit. The Commission, in its discretion, may require that an animal waste management ~~system~~ system, including an animal waste management system that utilizes a farm digester system, be permitted under an individual permit if the Commission determines that an individual permit is necessary to protect water quality, public health, or the environment. After the general permit for animal operations that includes authorization for the permittee to construct and operate a farm digester system has been issued, the decision to require an individual permit shall not be based solely on the fact that the animal waste management system utilizes a farm digester system. The owner or operator of an animal operation shall submit an application for a permit at least 180 days prior to construction of a new animal waste management system or expansion of an existing animal waste management system and shall obtain the permit prior to commencement of the construction or expansion. The owner or operator of a dry litter poultry facility that is required to be permitted under 40 Code of Federal Regulations § 122, as amended at 73 Federal Register 70418 (November 20, 2008), shall submit an application for a permit at least 180 days prior to operation of a new animal waste management system.

...

(c) The Commission shall act on a permit application as quickly as possible and may conduct any inquiry or investigation it considers necessary before acting on an application.

(c1) Failure of the Commission to make a final permitting decision involving a notice of intent for a certificate of coverage under a general permit for animal operations that includes authorization for the permittee to construct and operate a farm digester system within 90 days of the Commission's receipt of a completed notice of intent shall result in the deemed approval of coverage under the permit. If the Commission fails to act within 90 days of the Commission's receipt of a completed notice of intent, the permittee may request that the Commission provide written confirmation that the notice of intent is deemed approved. Failure to provide this written confirmation within 10 days of the request shall serve as a basis to seek a contested case hearing pursuant to Article 3 of Chapter 150B of the General Statutes. Unless all parties to the case agree otherwise in writing, the administrative law judge shall issue a final decision or order in the contested case no later than 120 days after its commencement pursuant to G.S. 150B-23; provided that, upon written request of the administrative law judge or any party to the hearing, the Chief Administrative Law Judge may extend this deadline for good cause shown, no more than two times, for not more than 30 days per extension. Upon review of a failure to act on a notice of intent, the administrative law judge may either (i) direct the Commission to issue a written certificate of coverage under the general permit or (ii) deny the petition.

...."

SECTION 11.(c) For purposes of this section, the following definitions apply:

- (1) "Certificate of coverage" means an approval granted to a person who meets the requirements of coverage under a general permit as provided in 15A NCAC 02T .0111 (Conditions for Issuing General Permits).
- (2) "Commission" means the Environmental Management Commission.
- (3) "Notice of intent" means a request for coverage under a general permit using forms approved by the Division of Water Resources of the Department of Environmental Quality.

SECTION 11.(d) The Commission shall immediately initiate the process of developing and issuing a general permit for animal operations that includes authorization for the permittee to construct and operate a farm digester system. In addition to conditions required to describe and authorize the construction, monitoring, and proper operation of farm digester systems, the general permit shall contain the same conditions that are included in the currently existing general permits for animal operations. The general permit shall become effective no later than 12 months after the effective date of this section and shall expire on the later of September 30, 2024, or the effective date of the next version of the currently existing general permit for animal operations.

SECTION 11.(e) Until the general permit issued under subsection (d) of this section becomes effective, any animal operation that holds a general or individual permit that (i) is in effect on the effective date of this section and (ii) authorizes the construction and operation of a farm digester system may construct and continue to operate the farm digester system as authorized by that permit. For any animal operation that holds a general or individual permit that is in effect on the effective date of this section, but that does not authorize the construction and operation of a farm digester system, an operator may submit a notice of intent to be covered under the general permit to be developed under subsection (d) of this section. If the submitted notice of intent is incomplete, the Commission shall notify the applicant of the deficiency in the notice of intent. When an operator submits a completed notice of intent, the Commission shall, within 90 days of receipt of the completed notice of intent, either issue a certificate of coverage allowing the operator to construct and operate the farm digester system or notify the operator of the basis for the denial of the certificate of coverage. If the Commission fails to take action on the notice of intent within 90 days, authorization to construct and operate a farm digester system under the existing general permit shall be deemed approved.

SECTION 11.(f) Nothing in this section shall apply to permits for facilities that are required to be permitted under 40 C.F.R. § 122, as amended at 73 Federal Register 70418 (November 20, 2008).

SECTION 11.(g) G.S. 106-806 reads as rewritten:

"§ 106-806. Construction or renovation of swine houses at preexisting swine farms.

(a) As used in this section, the following definitions apply:

- (1) "Farm digester system" means a farm digester system as defined in G.S. 143-213(12a).
- (2) "New swine farm" means any swine farm the operations of which were sited on or after October 1, 1995. "New swine farm" does not include any preexisting swine farm, even if a subsequent site evaluation is performed on or after October 1, 1995, at the preexisting swine farm.
- ~~(2)~~(3) "Preexisting swine farm" means any swine farm either the operations of which were begun prior to October 1, 1995, or the site evaluation of which was approved prior to October 1, 1995, by the Department of Environmental Quality under Part 1A of Article 21 of Chapter 143 of the General Statutes.
- ~~(3)~~(4) "Renovation or construction," "renovated or constructed," and any similar phrase mean any activity to renovate, construct, reconstruct, rebuild, modify, alter, change, restructure, upgrade, improve, enlarge, reduce, move, or otherwise perform construction work on a swine house that is a component of a swine farm.

...

(e) Notwithstanding any other provision of this Article, a farm digester system that is a component of a preexisting swine farm may be constructed or renovated if the construction or renovation of the farm digester system satisfies all of the following requirements:

- (1) The construction or renovation of the farm digester system does not result in an increase in the permitted capacity of the swine farm, as measured by the annual steady state live weight capacity of the swine farm.
- (2) The construction or renovation of the farm digester system does not result in requiring an increase in the total permitted capacity of the animal waste management system or systems located at the swine farm.
- (3) The construction or renovation of the farm digester system shall comply with the siting requirements set out in G.S. 106-803 to the maximum extent practicable. Except as provided in subsection (c) of this section, construction or renovation of the farm digester system shall not result in any portion of the constructed or renovated farm digester system being located closer to the building, property, or well that is the object of the siting requirement than any existing component of the animal waste management system that fails to meet the siting requirements of G.S. 106-803.
- (4) Renovation or construction of a farm digester system shall not be allowed in the 100-year floodplain."

SECTION 11.(h) G.S. 105-275(8) is amended by adding a new sub-subdivision to read:

"a2. Notwithstanding sub-subdivision a1. of this subdivision, sub-subdivision a. of this subdivision applies to a farm digester system as defined in G.S. 143-213(12a)."

SECTION 11.(i) This section is effective when it becomes law.

CLARIFY THE DURATION OF DRIVERS LICENSES FOR H-2A WORKERS

SECTION 12.(a) G.S. 20-7(f)(3) reads as rewritten:

- "(3) Duration of license for certain other drivers. – The durations listed in subdivisions (1), (2) and (2a) of this subsection are valid unless the Division determines that a license of shorter duration should be issued when the applicant holds valid documentation issued by, or under the authority of, the United States government that demonstrates the applicant's legal presence of limited duration in the United States. In no event shall a license of limited duration expire later than the expiration of the authorization for the applicant's legal presence in the United States. A drivers license issued to an H-2A worker expires three years after the date of issuance of the H-2A worker's visa; provided, if at any time during that three-year period an H-2A worker's visa duration is not extended by United States Citizenship and Immigration Services, the license expires on the date the H-2A worker's visa expires. For purposes of this subdivision, the term "H-2A worker" means a foreign worker who holds a valid H-2A visa pursuant to the Immigration and Nationality Act (8 U.S.C. § 1101(a)(15)(H)(ii)(a)) and who is legally residing in this State."

SECTION 12.(b) This section is effective when it becomes law and applies to applications for licenses submitted on or after that date.

AG COST SHARE TECHNICAL CORRECTION

SECTION 13A. G.S. 106-850(b)(2) reads as rewritten:

- "(2) The program shall ~~initially include the present 16 nutrient sensitive watershed counties and 17 additional counties.~~include the entire State."

SEVERABILITY CLAUSE AND EFFECTIVE DATE

SECTION 14.(a) If any provision of this act or the application thereof to any person or circumstances is held invalid, such invalidity shall not affect other provisions or applications

of this act that can be given effect without the invalid provision or application, and, to this end, the provisions of this act are declared to be severable.

SECTION 14.(b) Except as otherwise provided, this act is effective when it becomes law.

In the General Assembly read three times and ratified this the 30th day of June, 2021.

s/ Phil Berger
President Pro Tempore of the Senate

s/ Destin Hall
Presiding Officer of the House of Representatives

s/ Roy Cooper
Governor

Approved 12:05 p.m. this 2nd day of July, 2021

TOWN OF APEX FACILITY SOLAR FEASIBILITY REPORT

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Revision Table:

| Rev # | Description | Date |
|-------|-------------|------------|
| 0 | Final Draft | 6/01/2023 |
| 1 | Revision 1 | 8/08/2023 |
| 2 | Revision 2 | 8/30/2023 |
| 3 | Revision 3 | 01/08/2024 |
| 4 | Revision 4 | 01/30/2024 |

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A. REVISION DESCRIPTIONS:

The following table is a high-level summary list of changes from the last issuance.

| Revision | # | Change Description |
|----------|---|--|
| 1 | 1 | Added Field Report for all sites visited |
| | 2 | Added Helioscope production for #37, #38, based on provided design drawings |
| | 3 | Provided New evaluation columns for Annual production and \$/KW value |
| | 4 | Revised Evaluation recommendations to add if possible |
| | 5 | Provided New evaluation columns for Added value on resolved issues |
| | 6 | Revised Evaluation rankings |
| | 7 | Revised Evaluation Notes |
| | 8 | Revised Narrative with summary of new evaluations |
| | 9 | Revised Evaluation tab to equipment with added info for cost |
| 2 | 1 | Added Helioscope proposal sheets. This is for levelized cost which included financial factors |
| | 2 | Added levelized cost metrics |
| | 3 | Revised a couple utility rates for some projects |
| | 4 | Removed payback column |
| 3 | 1 | Reformatted Report – Revised Evaluation Methodology, Added consistent titles of project locations across all documents |
| | 2 | Added Structural ROM, and revised analysis |
| | 3 | Removed ROI, and re-evaluated based on Orientation for solar potential, Levelized cost, Age, Roof type |
| | 4 | Revised notes on evaluation |
| | 5 | Revised Helioscope modeling for 1,10,12,15,20,23,26,28,29,30,33,26,37,38 and removed 13,14 |
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1 Objective:

The purpose of this report is to help the Town of Apex (TOA) determine the feasibility of adding solar collection systems for multiple buildings in the town of Apex, NC. Unlike typical solar assessment reports that include financial analysis, the town of Apex owns the utility distribution; therefore, this report is based on the goal to maximize solar production for the Town of Apex and not necessarily for what makes sense for each individual building or location. This report will provide an in-depth analysis of each project building/ location. Supplemental information with all feasibility study deliverables is included in the appendix.

2 Existing information

The projects in consideration for this study are listed Table 1 and Table 2.

Projects shown in grey are new and in the construction process. #16 Pleasant Park is a general location and not an actual building. For this reason, it was removed. #17 Pleasant Park – Pump Station was removed because there was not really a building in this location either. It is a Utility area.

Table 1 provides the project address, size, roof type and approximate age. This information was provided by TOA. During the site visits we noticed a couple of differences. Those differences are listed below, and have been revised.

- #11 Lakepine Restroom, #21 Salem Pond Restroom had concrete roof
- #34 Chamber of Commerce had shingled tile roof
- #26 Senior Center had Metal roof.

Refer to:

[Attachment 1 – Field Survey](#)

Table 2 provides electrical information. This includes electrical service, meter, consumption usage (As provided by TOA from year 2022), and service rate (refer to list of assumptions).

All locations were in the TOA utility distribution network except for one, which is #27 Fire Station #2. This location is Duke Energy.

Table 1:
Town of Apex Facilities - Existing Facility Information

| # | FACILITY | ADDRESS | SIZE | BUILD YEAR | BUILDING AGE | ROOF AGE | ROOF TYPE | ROOF SIZE SQ. FT. | NOTES |
|----|--------------------------------------|-------------------------------|--------|-------------------------------|--------------|----------|-----------|-------------------|---|
| 1 | Parks/Rec Maint. Building | 2500 Evans Rd | 4,950 | 2014 | 8 | 8 | Metal | 6125 | |
| 2 | Seymour Fields Restroom/Shelter | 2500 Evans Rd | 624 | 2014 | 8 | 8 | Shingle | 2244 | |
| 3 | Nature Park Restroom /Shelter | 2600 Evans Rd | 900 | 2014 | 8 | 8 | Metal | 3065 | replace inverter |
| 4 | Nature Park Amphitheater | 2600 Evans Rd | 66 | 2014 | 8 | 8 | Metal | 1287 | |
| 5 | West St Shelter | 108 West St | | unknown | unknown | unknown | Shingle | 542 | |
| 6 | ACP Classroom/Restroom | 2200 Laura Duncan Rd | 2,500 | 1996? | 26 | 7-8? | Shingle | 2860 | |
| 7 | ACP Rear Restroom | 2200 Laura Duncan Rd | | 2007 | 5 | 2007 | Shingle | 676 | |
| 8 | ACP Small Shelter | 2200 Laura Duncan Rd | | unknown | unknown | unknown | Shingle | 1384 | |
| 9 | ACP Large Shelter | 2200 Laura Duncan Rd | | unknown | unknown | unknown | Shingle | 2490 | |
| 10 | Parks/Rec Maint. Building | 2200 Laura Duncan Rd | 1,698 | 2000 | 22 | 22 | Shingle | | |
| 11 | Lakepine Restroom | 1808 Lakepine Dr | 209 | 2016 | 8 | 8 | Concrete | 240 | |
| 12 | Kelly Rd Restroom/Shelter | 1609 Kelly Rd | 562 | 1996 | 26 | unknown | Shingle | 1035 | |
| 13 | Kelly Rd Shelter | 1609 Kelly Rd | | 1996 | 26 | unknown | Shingle | 466 | |
| 14 | Kelly Glen Shelter | 1701 Kelly Glen | | unknown | unknown | unknown | Metal | 410 | |
| 15 | Pleasant Park - Maintenance Building | 2241 Recreation Dr | 3,750 | Under Construction | New | New | SS metal | 4000 | Under construction at time of evaluation/site visit |
| 16 | Pleasant Park | 2200 Recreation Dr | NA | Under Construction | NA | NA | NA | NA | Removed |
| 17 | Pleasant Park - Pump Station | 2245 Recreation Dr | 347 | Under Construction | NA | NA | Shingle | 400 | Removed |
| 18 | Pleasant Park - Amenity Building | 2200 Recreation Dr | 3,864 | Under Construction | New | New | Shingle | 4000 | Under construction at time of evaluation/site visit |
| 19 | Pleasant Park - Shelter #2 | 2225 Recreation Dr | 2,864 | Under Construction | New | New | Shingle | 4000 | Under construction at time of evaluation/site visit |
| 20 | Pleasant Park - Signature Fieldhouse | 2211 Recreation Dr | 5,925 | Under Construction | New | New | SS Metal | 6000 | Under construction at time of evaluation/site visit |
| 21 | Salem Pond Restroom | 6112 Old Jenks Rd | 226 | 2022 | New | New | Concrete | 311 | |
| 22 | Seagroves Restroom/Shelter | 201 Parkfield Dr | 590 | 2012 | 10 | 10 | Shingle | 2222 | |
| 23 | Hunter St Restroom/shelter | 1250 Ambergate | 600 | 2012 | 10 | 10 | Shingle | 2198 | |
| 24 | Clairemont Shelter | 801 E Chatham St | | unknown | unknown | unknown | Shingle | 445 | |
| 25 | Sue Helton Gazebo | 703 Matney Lane | | unknown | unknown | unknown | Shingle | 320 | |
| 26 | Jaycee Park Restroom/Shelter | 451 NC Highway 55 | 453 | 1995? | 27 | unknown | Shingle | 1698 | |
| 27 | Fire Station # 2 | 3045 New Hill Holleman Rd. | 4,114 | 1996 | 24 | 24 | Metal | 5235 | |
| 28 | Electrical Main Office | 2850 Milano Ave | 21,000 | 2021 | 0 | 0 | Metal | 22665 | |
| 29 | Electrical Warehouse | 2850 Milano Ave | | 2021 | 0 | 0 | Metal | 12180 | |
| 30 | Electrical Covered Storage | 2850 Milano Ave | | 2021 | 0 | 0 | Metal | 5249 | |

| # | FACILITY | ADDRESS | SIZE | BUILD YEAR | BUILDING AGE | ROOF AGE | ROOF TYPE | ROOF SIZE SQ. FT. | NOTES |
|----|---|------------------|--------|--------------------|--------------|----------|----------------------|-------------------|--|
| 31 | Water Resources Meter Shop | 1705 Kelly Glen | | unknown | unknown | unknown | Shingle | | |
| 32 | Public Works Operations | 105 Upchurch St | 27,710 | 1997 | 23 | 23 | Metal | 28700 | replace inverter |
| 33 | Public Works Operations Covered Storage | 105 Upchurch St | | 1997 | 23 | 23 | Metal | 8227 | |
| 34 | Chamber of Commerce | 220 N Salem St | 2,486 | 1873 | 147 | 4 | Shingled Tile | 4100 | |
| 35 | Halle Cultural Arts Center | 237 N. Salem St | 10,354 | 2008 | 12 | 12 | Flat/Membrane | 6020 | |
| 36 | Senior Center | Hunter St | 30,000 | 2021 | 0 | 0 | Metal | 20837 | |
| 37 | Public Safety Station 6 | 1201 Wimberly Rd | 13,642 | Under Construction | New | New | Metal | 13642 | Solar Ready, Under construction at time of evaluation/site visit |
| 38 | Mason St Municipal Building | 322 N. Mason St | 14,688 | Under Construction | New | New | Flat(Membrane)/Metal | 6729/1000 | Solar Ready, Under construction at time of evaluation/site visit |

Table 2:
Town of Apex Facilities - Utility Information

| # | FACILITY | UTILITY TRANSFORMER | BUILDING SERVICE | METER # | PEAK DEMAND (KW) | MAX ANNUAL USAGE (KWH) | ELECTRICAL SERVICE | BASE CHARGE | ELECTRICAL RATE PER (KWH) | DEMAND CHARGE | NOTES |
|----|--------------------------------------|---------------------|--------------------------------|---------------|------------------|------------------------|-----------------------|-------------|---------------------------|---------------|---|
| 1 | Parks/Rec Maint. Building | Underground | 120/240V 1PH, 600A | 10261185 | 17.1 | 64,200 | Small General Service | \$ 27.00 | \$ 0.0966 | | |
| 2 | Seymour Fields Restroom/Shelter | Underground | 120/240V 1PH, 200A | 10271850 | 8.752 | 10,650 | Small General Service | \$ 27.00 | \$ 0.0966 | | |
| 3 | Nature Park Restroom /Shelter | Underground | 120/240V 1PH, 200A | 10038576 | 12.932 | 25,042 | Small General Service | \$ 27.00 | \$ 0.0966 | | Existing PV |
| 4 | Nature Park Amphitheater | Underground | (2) 120/240V 1PH, 200A | 15825638 | 1.752 | 4,391 | Small General Service | \$ 27.00 | \$ 0.0966 | | |
| 5 | West St Shelter | NA | None | NA | | | | | \$ 0.0966 | | |
| 6 | ACP Classroom/Restroom | Underground | 120/240V 1PH, 200A | 10271847 | 13.14 | 35,246 | Small General Service | \$ 27.00 | \$ 0.0966 | | |
| 7 | ACP Rear Restroom | Underground | 120/240V 1PH, 100A | 10278881 | 49 | 101,509 | Small General Service | \$ 27.00 | \$ 0.0966 | | Multiple Services |
| 8 | ACP Small Shelter | NA | No panel, Powered lights & rec | same as above | - | - | | | | | Multiple Services |
| 9 | ACP Large Shelter | NA | No panel, Powered lights & rec | same as above | - | - | | | | | Multiple Services |
| 10 | Parks/Rec Maint. Building | Overhead | 120/240V 1PH,200A | 10278863 | 15.656 | 43,017 | Small General Service | \$ 27.00 | \$ 0.0966 | | |
| 11 | Lakepine Restroom | Underground | 120/240V 1PH, 200A | 20170093 | 8.864 | 12,819 | Small General Service | \$ 27.00 | \$ 0.0966 | | |
| 12 | Kelly Rd Restroom/Shelter | Underground | 120/240V 1PH, 125A | 10261181 | 54.54 | 43,640 | Small General Service | \$ 27.00 | \$ 0.0966 | | |
| 13 | Kelly Rd Shelter | NA | None | NA | - | - | | | | | |
| 14 | Kelly Glen Shelter | NA | None | NA | - | - | | | | | |
| 15 | Pleasant Park - Maintenance Building | New (unknown) | | | | | | | | | Under construction at time of this report |
| 16 | Pleasant Park | NA | | | | | | | | | |
| 17 | Pleasant Park - Pump Station | NA | | | | | | | | | |
| 18 | Pleasant Park - Amenity Building | New (unknown) | | | | | | | | | Under construction at time of this report |
| 19 | Pleasant Park - Shelter #2 | New (unknown) | | | | | | | | | Under construction at time of this report |
| 20 | Pleasant Park - Signature Fieldhouse | New (unknown) | | | | | | | | | Under construction at time of this report |
| 21 | Salem Pond Restroom | Underground | 120/240V 1PH, 100A | 20023138 | 19.576 | 8,786 | Small General Service | \$ 27.00 | \$ 0.0966 | | |
| 22 | Seagroves Restroom/Shelter | Underground | 120/240V 1PH, | 12722375 | 10.832 | | Small General | \$ 27.00 | \$ 0.0966 | | |

| # | FACILITY | UTILITY TRANSFORMER | BUILDING SERVICE | METER # | PEAK DEMAND (KW) | MAX ANNUAL USAGE (KWH) | ELECTRICAL SERVICE | BASE CHARGE | ELECTRICAL RATE PER (KWH) | DEMAND CHARGE | NOTES |
|----|---|---------------------|--|---------------|------------------|------------------------|-------------------------------|-------------|---------------------------|---------------|---|
| | | | 200A | | | 30,472 | Service | | | | |
| 23 | Hunter St Restroom/shelter | Underground | 120/240V 1PH, 200A | 12722415 | 11.82 | 22,472 | Small General Service | \$ 27.00 | \$ 0.0966 | | |
| 24 | Clairemont Shelter | NA | None | NA | - | - | | | | | |
| 25 | Sue Helton Gazebo | NA | None | NA | - | - | | | | | |
| 26 | Jaycee Park Restroom/Shelter | Underground | 120/240V 1PH, 40A, No space left | 10038614 | 47.296 | 32,286 | Small General Service | \$ 27.00 | \$ 0.0966 | | Service Panel in sight of shelter |
| 27 | Fire Station # 2 | Overhead | 120/240V 1PH, 400A, Gen backed | 325393878 | 19 | 4,663 | Small General Service (large) | \$ 21.00 | \$ 0.12546 | | Duke Energy |
| 28 | Electrical Main Office | Underground | 120/208V 3PH, 1000A, Gen backed | 30906009 | 118.23 | 337,520 | Large General Service | \$ 350.00 | \$ 0.0451 | \$ 20.18 | Multiple Services |
| 29 | Electrical Warehouse | Underground | 120/208V 3PH, 500A, feed from main, Gen backed | same as above | - | - | | | | | Multiple Services |
| 30 | Electrical Covered Storage | Underground | 120/208V 3PH, 125A, feed from main, Gen backed | same as above | - | - | | | | | Multiple Services |
| 31 | Water Resources Meter Shop | Underground | 277/480V 3PH, 250A | | - | - | Large General Service | \$ 350.00 | \$ 0.0451 | \$ 20.18 | |
| 32 | Public Works Operations | Underground | 120/208V 3PH, 1200A | 10434375 | 117.28 | 215,600 | Large General Service | \$ 350.00 | \$ 0.0451 | \$ 20.18 | Existing PV |
| 33 | Public Works Operations Covered Storage | Underground | 277/480V 3PH, 400A | 10434405 | 36.7 | 64,300 | Medium General Service | \$ 90.00 | \$ 0.0788 | \$ 8.20 | |
| 34 | Chamber of Commerce | Overhead | 120/240V 1PH, 200A | 10271884 | 12.116 | 21,045 | Small General Service | \$ 27.00 | \$ 0.0966 | | Historical building, Special tile |
| 35 | Halle Cultural Arts Center | Overhead | 120/208V 3PH, 1200A | 10434352 | 97.76 | 310,560 | Large General Service | \$ 350.00 | \$ 0.0451 | \$ 20.18 | |
| 36 | Senior Center | Underground | 120/208V 3PH, 2000A | 19045451 | 83.85 | 236,630 | Large General Service | \$ 350.00 | \$ 0.0451 | \$ 20.18 | |
| 37 | Public Safety Station 6 | New (unknown) | | | | | | | | | Under construction at time of this report |
| 38 | Mason St Municipal Building | New (unknown) | | | | | | | | | Under construction at time of this report |

3 Methodology:

The Methodology approach for this study is based on a systematic process. The following is a summary of those processes with factors used.

3.1 Assumptions/Clarifications

The following assumptions and clarifications were used for the completion of this study.

- The electrical service rates for each facility are assumptions to help aid the energy savings from solar. We did not have actual rates structures for each facility.
- The approximate capital cost for solar is based on \$3/Watts (W) Direct Current (DC), which is an average cost of solar according to solar reviews. Actual cost will be dependent on location and system size among other factors.
- No solar incentives were considered.
- A few sites had tree and shading issues. It was assumed that if any project goes forward, they will evaluate the shading issues at that time. The solar modeling provided in the report for most all sites is an approximation and may be more than what should be installed if there are shading issues.
- Any issues such as roof replacement, shading, etc. would be resolved prior to installing solar.
- Structural analysis is based on 3 pounds (lbs)/square foot (sqft). This would be the approximate loading for a typical roof mounted solar system. Final determination would need to be based on actual design.
- Levelized cost (LCOE) = (Capital Costs + PV (Maintenance Costs)) / PV (Annuity Factor * Annual Energy Production)
 - Annuity Factor = $((1 - (1 + \text{Inflation Rate})^{-\text{Lifetime}}) / \text{Inflation Rate})$
 - Annual Energy Production = $(1 - \text{Performance Degradation})^t * \text{Annual Energy Production}$
 - Lifetime of system = 25 years (yrs)
 - Performance Degradation = 0.005
 - Inflation rate = 3%
 - Maintenance Cost = \$500

3.2 Evaluation – Site Investigation

Table 3 is the start of the evaluation process on the feasibility of adding solar. Based on the site visit and solar modeling software (Helioscope), we were able to determine that a few sites were not feasible. The first column provides this reference on if solar can be added. The sites that could not have solar included issues such as no power to connect solar, shading issues such as too many trees directly around structure, too small of structure or

roof issues that would prevent adding panels, or lack of building information. Notes shown on the table provide a summary for each site.

If solar could be added we included informational comments on how this would be connected, and if roof or tree issues should be resolved prior to adding.

3.3 Evaluation – Structural Analysis

Table 4 is the structural evaluation process on the feasibility of adding solar. Any projects that we could not add solar to based on Table 3 were removed for consideration of structural.

Table 4 includes comments from our site visits with the condition and type of structure. Based on our assumption of 3 lbs/sqft most all structures would be able to support the load. However, in some cases the deterioration to some of the structural elements was extreme and would need to be replaced prior to adding solar. Although this is a bit subjective when adding solar, it is important that the structure be in good condition for the lifetime of the solar system. Also included is a Rough Order of Magnitude (ROM) cost to address the structural deficiencies before adding solar.

3.4 Evaluation – Solar Analysis

Table 5 is the solar evaluation process on the feasibility of adding solar. Table 5 includes information from the helioscope modeling software. The information includes the racking type, production, capital cost and energy savings if we had existing consumption information. KW ac is the energy delivered to the grid. KW DC is the energy of the solar panel system. The difference between the AC and DC is solar clipping in which the DC is oversized. This maximizes the total solar gain vs equipment cost. Typical inverters can be oversized 150%, which is the case for most Fronius string inverters. In most cases the design was based on the largest footprint available for panel on the roof, this is outlined in blue. In some cases, panels were left out due to tree shading issues. For those reports notes were added to identify which sites had issues.

Refer to:

[Attachment 2- HelioScope Site Modeling](#)

3.5 Evaluation – Summary

Table 6 is the solar evaluation summary. This table provides some of the more important categories from the previous tables to evaluate. The evaluation is subjective, but if solar could be added, the client wanted to include and for us to provide a ranking for which project we thought should be the ones to pursue first. In most cases solar could be added; therefore, the information associated was included.

In addition, this study provides a ranking of each project, based on the merits of each location, solar potential, age, cost, roof and mounting type, and benefits, for consideration on adding solar. Any projects that had major structural issues based on Table 4 were not recommended for solar, and therefore were not ranked.

Table 3:
Town of Apex Facilities - Site Investigation

| # | FACILITY | CAN WE ADD SOLAR TO ROOF? (REFER TO HELIOSCOPE ANALYSIS) | SOLAR CONNECTION POINT | WOULD NEW/UPGRADED ELECTRICAL SERVICE BE REQUIRED? | WOULD NEW ROOF BE REQUIRED/ RECOMMENDED? | ARE TREES/ OBSTRUCTIONS AN ISSUE OF SHADING? | NOTES |
|----|--------------------------------------|--|------------------------|--|--|--|---|
| 1 | Parks/Rec Maint. Building | Yes | Panel | No | No | Yes | Has shading issues, Trees around building should be removed. |
| 2 | Seymour Fields Restroom/Shelter | Yes | Panel | No | Yes | No | Would need to upgrade shingled roof |
| 3 | Nature Park Restroom /Shelter | No | - | - | - | - | Has existing Solar and no other area is available. Areas that are available are not ideal |
| 4 | Nature Park Amphitheater | Yes | Panel | No | No | No | Building orientation is not ideal |
| 5 | West St Shelter | No | None | Yes | Yes | Yes | No power, covered by trees, small footprint for panels, and shingled roof, structural deterioration |
| 6 | ACP Classroom/Restroom | No | Panel | No | Yes | Yes | Covered by trees and on shingled roof, Roof areas for mounting and orientation is not practical |
| 7 | ACP Rear Restroom | No | Panel | No | Yes | Yes | Building orientation is not ideal, small footprint for panels and shingled roof |
| 8 | ACP Small Shelter | No | None | Yes | Yes | Yes | No power, covered by trees, and shingled roof, structural deterioration |
| 9 | ACP Large Shelter | No | None | Yes | Yes | Yes | No power, covered by trees, and shingled roof, structural deterioration |
| 10 | Parks/Rec Maint. Building | Yes | Panel | No | Yes | Yes | Covered by trees and on a shingled roof. Would be good if trees and roof were addressed. |
| 11 | Lakepine Restroom | No | Panel | No | No | Yes | Has shading issues, building orientation is not ideal, too small footprint for panels, and a concrete roof |
| 12 | Kelly Rd Restroom/Shelter | Yes | Panel | No | Yes | Yes | Has shading issues, building orientation is not ideal, and has shingled roof |
| 13 | Kelly Rd Shelter | No | XFM | Yes | Yes | No | No power, Require ductbank, and Shingled Roof, structural deterioration |
| 14 | Kelly Glen Shelter | No | XFM | Yes | No | No | No power, Require ductbank |
| 15 | Pleasant Park - Maintenance Building | Yes | Panel | No | No | Yes | No utility info, building orientation is not ideal, and shading is an issue. Under constructed at the time of this report |
| 16 | Pleasant Park | NA | NA | NA | NA | NA | |
| 17 | Pleasant Park - Pump Station | NA | NA | NA | NA | NA | |
| 18 | Pleasant Park - Amenity Building | NA | NA | NA | NA | NA | Under construction at the time of this report, No utility info, No building info, to perform layout |
| 19 | Pleasant Park - Shelter #2 | Yes | Panel | No | No | No | No utility info, New shingled roof, Under constructed at the time of this report |
| 20 | Pleasant Park - Signature Fieldhouse | Yes | Panel | No | No | No | No utility info, New metal Roof but Orientation would be on parking lot side Under constructed at the time of this report |
| 21 | Salem Pond Restroom | No | Panel | No | No | Yes | Has shading issues, building orientation is not ideal, too small footprint for panels, and a concrete roof |
| 22 | Seagroves Restroom/Shelter | Yes | Panel | No | Yes | No | Would need to upgrade shingled roof |
| 23 | Hunter St Restroom/shelter | Yes | Panel | No | Yes | Yes | Has minor shading issues, building orientation is not ideal, and Shingled Roof. Would need to upgrade shingled roof |

| # | FACILITY | CAN WE ADD SOLAR TO ROOF? (REFER TO HELIOSCOPE ANALYSIS) | SOLAR CONNECTION POINT | WOULD NEW/UPGRADED ELECTRICAL SERVICE BE REQUIRED? | WOULD NEW ROOF BE REQUIRED/ RECOMMENDED? | ARE TREES/ OBSTRUCTIONS AN ISSUE OF SHADING? | NOTES |
|----|---|--|-------------------------|--|--|--|--|
| 24 | Clairemont Shelter | No | None | Yes | Yes | Yes | No power, has shading issues, building orientation is not ideal, too small footprint for panels, and a shingled Roof |
| 25 | Sue Helton Gazebo | No | None | Yes | Yes | Yes | No power, has shading issues, building orientation is not ideal, too small footprint for panels, and a shingled Roof |
| 26 | Jaycee Park Restroom/Shelter | Yes | XFM | Yes | Yes | Yes | Has shading issues, building orientation is not ideal, would need to upgrade service or ductbank, and a shingled Roof. In addition, wood rot on building is significant. |
| 27 | Fire Station # 2 | Yes | Utility XFM, Gen backed | No | No | No | Building orientation is not ideal, would require ductbank to utility or work around Generator, No utility info, Duke only provided Total Annual Consumption and Peak |
| 28 | Electrical Main Office | Yes | Utility XFM, Gen backed | No | No | No | Front of Main Building is best but may not be allowed, and other building orientations are not ideal. If KW is higher than load we could not connect to panels because the site is generator backed up and panels would backfeed into gen. Would only recommend if KW is lower than load. service disconnect would need to be next to utility and ductbank would impact payback. |
| 29 | Electrical Warehouse | Yes | Utility XFM, Gen backed | No | No | No | Feed from Main office, building orientation is not ideal |
| 30 | Electrical Covered Storage | Yes | Utility XFM, Gen backed | No | No | No | Feed from Main office, building orientation is not ideal |
| 31 | Water Resources Meter Shop | Yes | Panel | No | Yes | Yes | No utility info, building orientation is not ideal, shingled roof, and shading is minor issue |
| 32 | Public Works Operations | Yes | Panel | No | No | Yes | Would only provide on main part, Shading is an issue with rest, Building Orientation is not ideal. Removing trees would help on parts of building |
| 33 | Public Works Operations Covered Storage | Yes | Panel | No | No | No | Building orientation is not ideal |
| 34 | Chamber of Commerce | No | Panel | No | No | No | Historical Building, building orientation is not ideal, and special Roof would not allow attachment of panels |
| 35 | Halle Cultural Arts Center | Yes | Panel | No | No | Yes | Would be a ballasted system and only a couple panels and would not off set much. Roof equipment has shading |
| 36 | Senior Center | Yes | Panel | No | No | No | Areas that are available are not ideal |
| 37 | Public Safety Station 6 | Yes | Panel | No | No | No | Under construction at the time of this report. Drawings were provided, No utility info |
| 38 | Mason St Municipal Building | Yes | Panel | No | No | No | Under construction at the time of this report. Drawings were provided, No utility info |

Table 4:
Town of Apex Facilities – Structural Analysis

| # | FACILITY | STRUCTURAL ROOF SYSTEM | STRUCTURAL CONDITION | WOULD STRUCTURAL BE IMPACTED IF SOLAR WAS ADDED? (BASED ON 3 LBS/SQFT OR LESS) | STRUCTURAL REQUIREMENTS FOR ADDED SOLAR | WILL STRUCTURE BE MAJOR OR MINOR? | POTENTIAL STRUCTURAL COST ESTIMATE FOR ADDITION OF SOLAR | STRUCTURAL NOTES |
|----|--------------------------------------|--|------------------------------------|--|--|-----------------------------------|--|--|
| 1 | Parks/Rec Maint. Building | Steel purlins with steel deck | Average | No | None | None | | |
| 2 | Seymour Fields Restroom/Shelter | Glulam Arches with T&G decking | Average | No | None | None | | |
| 4 | Nature Park Amphitheater | Glulam Beams with T&G decking | Average | No | None | None | | |
| 10 | Parks/Rec Maint. Building | Hard Ceiling No Attic Access - likely wood trusses with Plywood Deck | Can not be determined at this time | No | None | None | | |
| 12 | Kelly Rd Restroom/Shelter | Heavy Timber, Glulam arches with T&G decking | Visible deterioration | No | Replacement of deteriorated wood members | Major | \$10,000 | Major changes to the structure for solar is not likely. Do not recommend |
| 15 | Pleasant Park - Maintenance Building | Wood trusses with plywood deck | New | No | None | None | | |
| 19 | Pleasant Park - Shelter #2 | Heavy Timber with T&G decking | New | No | None | None | | |
| 20 | Pleasant Park - Signature Fieldhouse | | New | No | None | None | | |
| 22 | Seagroves Restroom/Shelter | Heavy Timber with T&G decking | Average | No | None | None | | |
| 23 | Hunter St Restroom/shelter | Heavy Timber with T&G decking | Old | No | None | None | | |
| 26 | Jaycee Park Restroom/Shelter | Heavy Timber with T&G decking | Visible deterioration | No | Replacement of deteriorated wood members | Major | \$10,000 | Major changes to the structure for solar is not likely. Do not recommend |
| 27 | Fire Station # 2 | PEMB with Steel purlins and steel deck | Average | No | None | None | | |
| 28 | Electrical Main Office | PEMB with Steel purlins and steel deck | Average | No | None | None | | |
| 29 | Electrical Warehouse | PEMB with Steel purlins and steel deck | Average | No | None | None | | |
| 30 | Electrical Covered Storage | PEMB with Steel purlins and steel deck | Average | No | None | None | | |

| # | FACILITY | STRUCTURAL ROOF SYSTEM | STRUCTURAL CONDITION | WOULD STRUCTURAL BE IMPACTED IF SOLAR WAS ADDED? (BASED ON 3 LBS/SQFT OR LESS) | STRUCTURAL REQUIREMENTS FOR ADDED SOLAR | WILL STRUCTURE BE MAJOR OR MINOR? | POTENTIAL STRUCTURAL COST ESTIMATE FOR ADDITION OF SOLAR | STRUCTURAL NOTES |
|----|---|--|------------------------------------|--|---|-----------------------------------|--|---|
| 31 | Water Resources Meter Shop | Hard Ceiling No Attic Access - likely wood trusses with Plywood Deck | Can not be determined at this time | No | None | None | | |
| 32 | Public Works Operations | PEMB with Steel joist and purlins and steel deck | Surface Rust Noted | No | None | None | | |
| 33 | Public Works Operations Covered Storage | PEMB with Steel purlins and steel deck | Average | No | None | None | | |
| 35 | Halle Cultural Arts Center | Steel joists with steel deck | Average | Yes | Additional miscellaneous steel and possible joist reinforcement likely required | Minor | \$15,000 | Ballasted System will likely be up to 7 lb/sqft |
| 36 | Senior Center | Steel joists with steel deck | Average | No | None | None | | |
| 37 | Public Safety Station 6 | Cold Formed Trusses w/ steel decking | New | No | None | None | | |
| 38 | Mason St Municipal Building | Steel joists with steel deck | New | No | None | None | | LM design the structure. Solar was included in design |

Table 5:
Town of Apex Facilities – Solar Analysis

| # | FACILITY | UTILITY PEAK (KW AC) | RACKING TYPE | SYSTEM SOLAR SIZE (KW AC) | SYSTEM SOLAR SIZE (KW DC) | LOAD RATIO | MAX ANNUAL PRODUCTION (MWH) | APPROXIMATE CAPITAL COST (\$) | 25YR LEVELIZED COST OF ENERGY (\$/KWHR) | ANNUAL ENERGY SAVINGS (\$) | NOTES |
|----|---|----------------------|--------------|---------------------------|---------------------------|------------|-----------------------------|-------------------------------|---|----------------------------|--|
| 1 | Parks/Rec Maint. Building | 17.1 | Flush | 9.1 | 11.6 | 1.27 | 15.9 | \$ 34,800.00 | 0.14 | \$ 1,535.94 | |
| 2 | Seymour Fields Restroom/Shelter | 8.752 | Flush | 3.8 | 4.9 | 1.29 | 6.9 | \$ 14,700.00 | 0.14 | \$ 666.54 | |
| 4 | Nature Park Amphitheater | 1.752 | Flush | 9.1 | 11.6 | 1.27 | 14.5 | \$ 34,800.00 | 0.16 | \$ 1,400.70 | |
| 10 | Parks/Rec Maint. Building | 15.656 | Flush | 2.7 | 3.4 | 1.26 | 4.7 | \$ 10,200.00 | 0.15 | \$ 454.02 | Additional Panels could be adding if shading was addressed |
| 12 | Kelly Rd Restroom/Shelter | 54.54 | Flush | 3.8 | 4.9 | 1.29 | 6.4 | \$ 14,700.00 | 0.15 | \$ 618.24 | Additional Panels could be adding if shading was addressed |
| 15 | Pleasant Park - Maintenance Building | 0 | Flush | 8.4 | 10.7 | 1.27 | 14 | \$ 32,100.00 | 0.15 | \$ - | No utility info for production savings |
| 19 | Pleasant Park - Shelter #2 | 0 | Flush | 9.1 | 11.6 | 1.27 | 12.4 | \$ 34,800.00 | 0.19 | \$ - | No utility info for production savings |
| 20 | Pleasant Park - Signature Fieldhouse | 0 | Flush | 11.4 | 14.6 | 1.28 | 19.9 | \$ 43,800.00 | 0.14 | \$ - | No utility info for production savings |
| 22 | Seagroves Restroom/Shelter | 10.832 | Flush | 5.7 | 7.3 | 1.28 | 10.3 | \$ 21,900.00 | 0.14 | \$ 994.98 | |
| 23 | Hunter St Restroom/shelter | 11.82 | Flush | 5.7 | 7.3 | 1.28 | 9.3 | \$ 21,900.00 | 0.16 | \$ 898.38 | |
| 26 | Jaycee Park Restroom/Shelter | 47.296 | Flush | 3.8 | 4.9 | 1.29 | 6.9 | \$ 14,700.00 | 0.14 | \$ 666.54 | Additional Panels could be adding if shading was addressed |
| 27 | Fire Station # 2 | 19 | Flush | 19.8 | 26.7 | 1.35 | 30.2 | \$ 80,100.00 | 0.17 | \$ 3,788.89 | |
| 28 | Electrical Main Office | 118.23 | Flush | 84.2 | 113.5 | 1.35 | 137.3 | \$ 340,500.00 | 0.16 | \$ 6,192.23 | |
| 29 | Electrical Warehouse | 0 | Flush | 48.6 | 65.5 | 1.35 | 66.1 | \$ 196,500.00 | 0.19 | \$ 2,981.11 | |
| 30 | Electrical Covered Storage | 0 | Flush | 23 | 31 | 1.35 | 35.3 | \$ 93,000.00 | 0.17 | \$ 1,592.03 | |
| 31 | Water Resources Meter Shop | 0 | Flush | 4.6 | 5.8 | 1.26 | 7.7 | \$ 17,400.00 | 0.15 | \$ 347.27 | |
| 32 | Public Works Operations | 117.28 | Flush | 46.4 | 62.6 | 1.35 | 80.8 | \$ 187,800.00 | 0.15 | \$ 3,644.08 | Additional Panels could be adding if shading was addressed |
| 33 | Public Works Operations Covered Storage | 36.7 | Flush | 37.8 | 50.9 | 1.35 | 62.6 | \$ 152,700.00 | 0.16 | \$ 4,932.88 | |
| 35 | Halle Cultural Arts Center | 97.76 | Ballasted | 2.5 | 3.4 | 1.36 | 4.5 | \$ 10,200.00 | 0.15 | \$ 202.95 | |
| 36 | Senior Center | 83.85 | Flush | 72 | 97 | 1.35 | 118 | \$ 291,000.00 | 0.16 | \$ 5,321.80 | |
| 37 | Public Safety Station 6 | 0 | Flush | 36.7 | 49.5 | 1.35 | 66.5 | \$ 148,500.00 | 0.15 | \$ - | No utility info for production savings |
| 38 | Mason St Municipal Building | 0 | Ballasted | 18.4 | 24.7 | 1.34 | 33 | \$ 74,100.00 | 0.15 | \$ - | No utility info for production savings |

Table 6:
Town of Apex Facilities – Summary

| # | FACILITY | IS SOLAR RECOMMENDED | APPROXIMATE SOLAR CAPITAL COST (\$) | STRUCTURAL COST | SYSTEM SOLAR SIZE (KW DC) | ROOF TYPE | ROOF AGE | SOLAR POTENTIAL | 25YR LEVELIZED COST OF ENERGY (\$/KWHR) | PROJECT RANKING (ORDER OF BEST JOB TO COMPLETE FIRST) | NOTES |
|----|---|----------------------|-------------------------------------|-----------------|---------------------------|----------------------|----------|-----------------|---|---|--|
| 1 | Parks/Rec Maint. Building | Yes | \$ 34,800.00 | \$ - | 11.6 | Metal | 8 | Satisfactory | \$ 0.14 | 6 | Tree shading issues |
| 2 | Seymour Fields Restroom/Shelter | Yes | \$ 14,700.00 | \$ - | 4.9 | Shingle | 8 | Satisfactory | \$ 0.14 | 7 | Roof may need replaced |
| 4 | Nature Park Amphitheater | Yes | \$ 34,800.00 | \$ - | 11.6 | Metal | 8 | Poor | \$ 0.16 | 16 | Bad Orientation and Tree shading issues |
| 10 | Parks/Rec Maint. Building | Yes | \$ 10,200.00 | \$ - | 3.4 | Shingle | 22 | Poor | \$ 0.15 | 18 | Tree shading issues, and roof needs replaced |
| 12 | Kelly Rd Restroom/Shelter | No | \$ 14,700.00 | \$ 10,000.00 | 4.9 | Shingle | unknown | Poor | \$ 0.15 | NA | Major Structural and roof would exceed solar gain, Tree shading issues |
| 15 | Pleasant Park - Maintenance Building | Yes | \$ 32,100.00 | \$ - | 10.7 | SS metal | New | Excellent | \$ 0.15 | 2 | |
| 19 | Pleasant Park - Shelter #2 | Yes | \$ 34,800.00 | \$ - | 11.6 | Shingle | New | Excellent | \$ 0.19 | 5 | |
| 20 | Pleasant Park - Signature Fieldhouse | Yes | \$ 43,800.00 | \$ - | 14.6 | SS Metal | New | Excellent | \$ 0.14 | 1 | |
| 22 | Seagroves Restroom/Shelter | Yes | \$ 21,900.00 | \$ - | 7.3 | Shingle | 10 | Excellent | \$ 0.14 | 4 | Roof may need replaced |
| 23 | Hunter St Restroom/shelter | Yes | \$ 21,900.00 | \$ - | 7.3 | Shingle | 10 | Satisfactory | \$ 0.16 | 12 | Roof may need replaced |
| 26 | Jaycee Park Restroom/Shelter | No | \$ 14,700.00 | \$ 10,000.00 | 4.9 | Shingle | unknown | Satisfactory | \$ 0.14 | NA | Major Structural and roof would exceed solar gain, Tree shading issues |
| 27 | Fire Station # 2 | Yes | \$ 80,100.00 | \$ - | 26.7 | Metal | 24 | Satisfactory | \$ 0.17 | 15 | Difficult Electrical Service connection |
| 28 | Electrical Main Office | Yes | \$ 340,500.00 | \$ - | 113.5 | Metal | 0 | Excellent | \$ 0.16 | 3 | Difficult Electrical Service connection |
| 29 | Electrical Warehouse | Yes | \$ 196,500.00 | \$ - | 65.5 | Metal | 0 | Satisfactory | \$ 0.19 | 8 | Difficult Electrical Service connection |
| 30 | Electrical Covered Storage | Yes | \$ 93,000.00 | \$ - | 31 | Metal | 0 | Satisfactory | \$ 0.17 | 9 | Difficult Electrical Service connection |
| 31 | Water Resources Meter Shop | Yes | \$ 17,400.00 | \$ - | 5.8 | Shingle | unknown | Poor | \$ 0.15 | 19 | Roof needs replaced, Tree shading issues |
| 32 | Public Works Operations | Yes | \$ 187,800.00 | \$ - | 62.6 | Metal | 23 | Poor | \$ 0.15 | 17 | Tree shading issues |
| 33 | Public Works Operations Covered Storage | Yes | \$ 152,700.00 | \$ - | 50.9 | Metal | 23 | Satisfactory | \$ 0.16 | 14 | |
| 35 | Halle Cultural Arts Center | No | \$ 10,200.00 | \$ 15,000.00 | 3.4 | Flat/Membrane | 12 | Poor | \$ 0.15 | NA | Structural cost and limited solar |
| 36 | Senior Center | Yes | \$ 291,000.00 | \$ - | 97 | Metal | 0 | Satisfactory | \$ 0.16 | 13 | |
| 37 | Public Safety Station 6 | Yes | \$ 148,500.00 | \$ - | 49.5 | Metal | New | Satisfactory | \$ 0.15 | 10 | |
| 38 | Mason St Municipal Building | Yes | \$ 74,100.00 | \$ - | 24.7 | Flat(Membrane)/Metal | New | Satisfactory | \$ 0.15 | 11 | |

4 Conclusion:

Table 7 – Ranking Summary is the final summary table sorted in the order of ranking for facility where solar is recommended. The information captured in this table is the main points of focus from Table 6.

The results of the report in this table indicate that solar can be added to most sites, the size of solar that can be added, major cost of adding, levelized cost of energy if added, and ranking of which projects would be best to add solar.

Ranking is subjective and is for information purposes only. Each project is different and should be reviewed individually before pursuing.

Table 7:
Town of Apex Facilities – Ranking Order

| # | FACILITY | APPROXIMATE SOLAR CAPITAL COST (\$) | STRUCTURAL COST | SYSTEM SOLAR SIZE (KW DC) | 25YR LEVELIZED COST OF ENERGY (\$/KWHR) | PROJECT RANKING (ORDER OF BEST JOB TO COMPLETE FIRST) | NOTES |
|----|---|-------------------------------------|---------------------|---------------------------|---|---|--|
| 20 | Pleasant Park - Signature Fieldhouse | \$ 43,800.00 | \$ - | 14.6 | \$ 0.14 | 1 | |
| 15 | Pleasant Park - Maintenance Building | \$ 32,100.00 | \$ - | 10.7 | \$ 0.15 | 2 | |
| 28 | Electrical Main Office | \$ 340,500.00 | \$ - | 113.5 | \$ 0.16 | 3 | Difficult Electrical Service connection |
| 22 | Seagroves Restroom/Shelter | \$ 21,900.00 | \$ - | 7.3 | \$ 0.14 | 4 | Roof may need replaced |
| 19 | Pleasant Park - Shelter #2 | \$ 34,800.00 | \$ - | 11.6 | \$ 0.19 | 5 | |
| 1 | Parks/Rec Maint. Building | \$ 34,800.00 | \$ - | 11.6 | \$ 0.14 | 6 | Tree shading issues |
| 2 | Seymour Fields Restroom/Shelter | \$ 14,700.00 | \$ - | 4.9 | \$ 0.14 | 7 | Roof may need replaced |
| 29 | Electrical Warehouse | \$ 196,500.00 | \$ - | 65.5 | \$ 0.19 | 8 | Difficult Electrical Service connection |
| 30 | Electrical Covered Storage | \$ 93,000.00 | \$ - | 31 | \$ 0.17 | 9 | Difficult Electrical Service connection |
| 37 | Public Safety Station 6 | \$ 148,500.00 | \$ - | 49.5 | \$ 0.15 | 10 | |
| 38 | Mason St Municipal Building | \$ 74,100.00 | \$ - | 24.7 | \$ 0.15 | 11 | |
| 23 | Hunter St Restroom/Shelter | \$ 21,900.00 | \$ - | 7.3 | \$ 0.16 | 12 | Roof may need replaced |
| 36 | Senior Center | \$ 291,000.00 | \$ - | 97 | \$ 0.16 | 13 | |
| 33 | Public Works Operations Covered Storage | \$ 152,700.00 | \$ - | 50.9 | \$ 0.16 | 14 | |
| 27 | Fire Station # 2 | \$ 80,100.00 | \$ - | 26.7 | \$ 0.17 | 15 | Difficult Electrical Service connection |
| 4 | Nature Park Amphitheater | \$ 34,800.00 | \$ - | 11.6 | \$ 0.16 | 16 | Bad Orientation and Tree shading issues |
| 32 | Public Works Operations | \$ 187,800.00 | \$ - | 62.6 | \$ 0.15 | 17 | Tree shading issues |
| 10 | Parks/Rec Maint. Building | \$ 10,200.00 | \$ - | 3.4 | \$ 0.15 | 18 | Tree shading issues, and roof needs replaced |
| 31 | Water Resources Meter Shop | \$ 17,400.00 | \$ - | 5.8 | \$ 0.15 | 19 | Roof needs replaced, Tree shading issues |
| 12 | Kelly Rd Restroom/Shelter | \$ 14,700.00 | \$ 10,000.00 | 4.9 | \$ 0.15 | NA | Major Structural and roof would exceed solar gain, Tree shading issues |
| 26 | Jaycee Park Restroom/Shelter | \$ 14,700.00 | \$ 10,000.00 | 4.9 | \$ 0.14 | NA | Major Structural and roof would exceed solar gain, Tree shading issues |
| 35 | Halle Cultural Arts Center | \$ 10,200.00 | \$ 15,000.00 | 3.4 | \$ 0.15 | NA | Structural cost and limited solar |
| | Total | \$ 1,870,200.00 | \$ 35,000.00 | 623.4 | \$ 0.16 (avg) | | |

5 References:

The following references were used in the compilation of this report.

| <u>Attachment/Forms</u> | <u>Page Referenced On:</u> |
|---|----------------------------|
| Attachment 1 – Field Survey | 4 |
| Attachment 2- HelioScope Site Modeling..... | 10 |

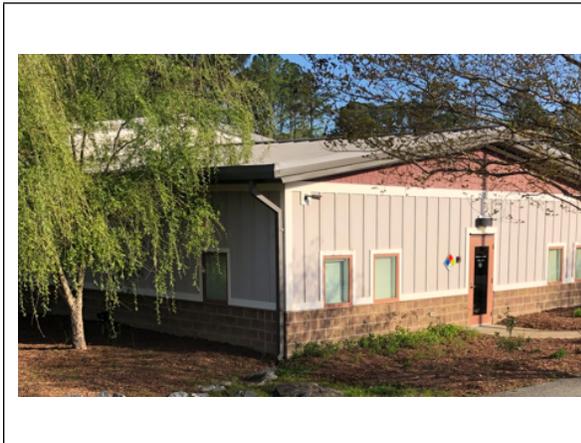
Field Report

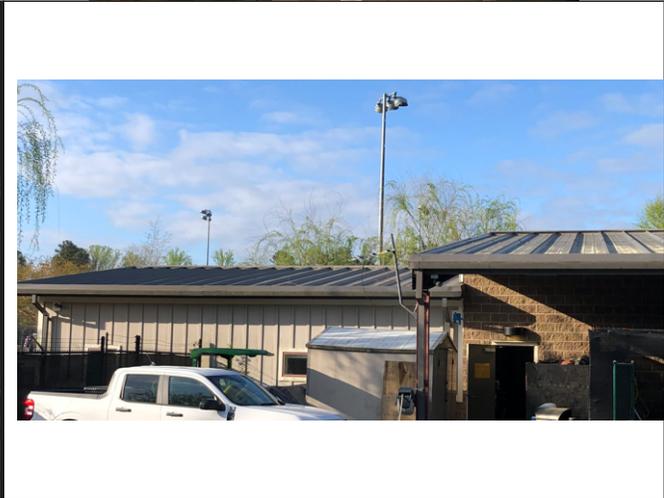
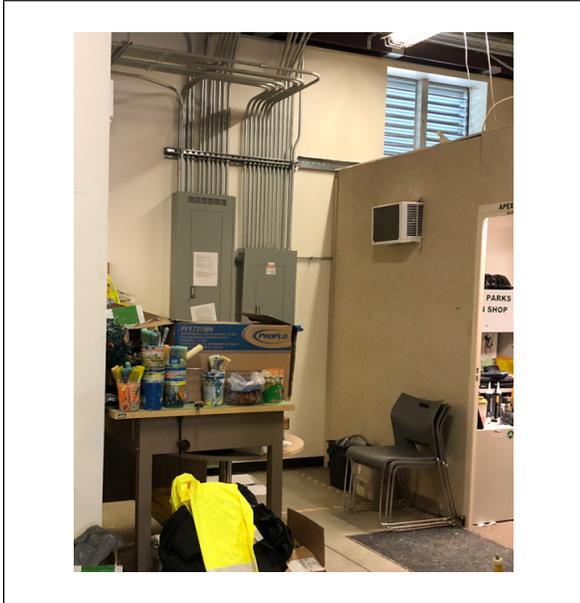
Project: Town of Apex Solar
Optima #: 22-0454
To: Daniel Edwards
Observation Date: 04-04-2023, 04-11-2023
Observation By: Todd Hedrick

Items detailed herein were observed, reviewed and/or discussed at the project site related to the project scope.

SITE NOTES:

1. Parks/Rec Maint. Building





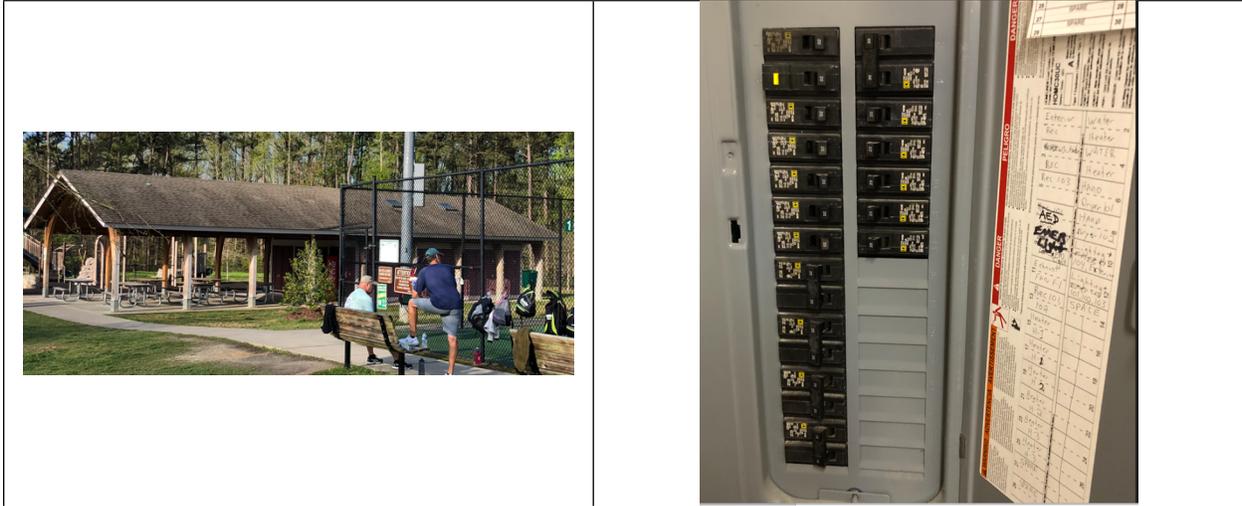
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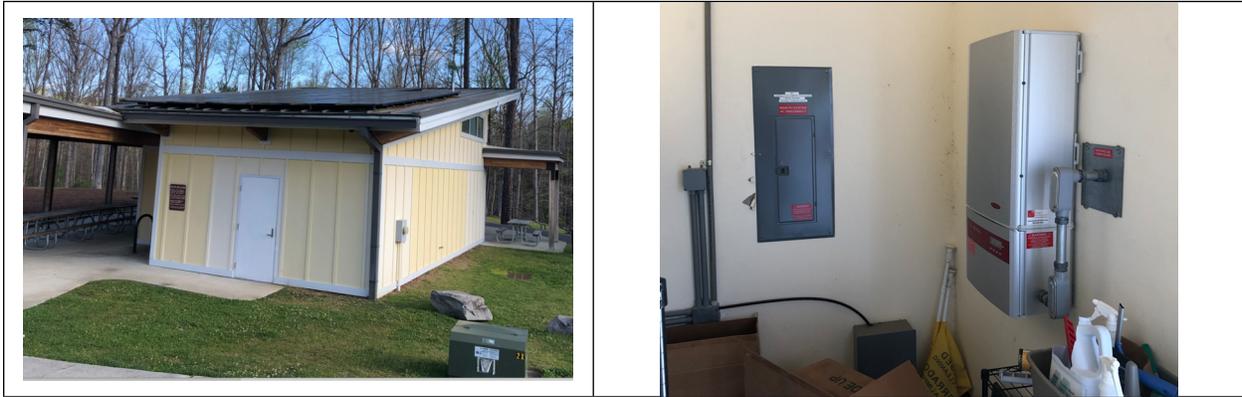
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2. Seymour Fields Restroom/shelter





3. Nature park Restroom /shelter





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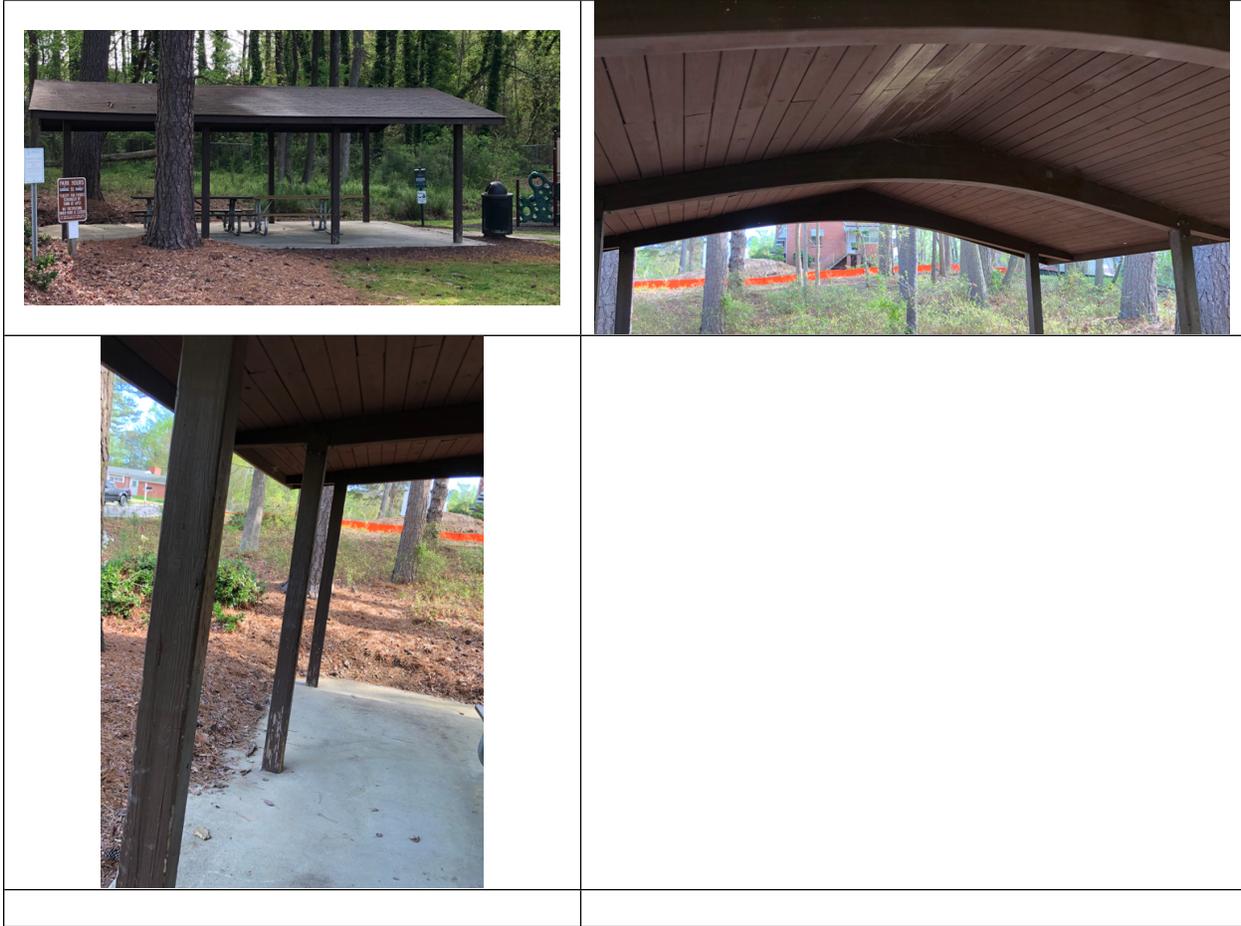
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4. Nature Park amphitheater



5. West street shelter



6. ACP Classroom/Restroom



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7. ACP rear restroom



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8. ACP small Shelter



9. ACP Large Shelter





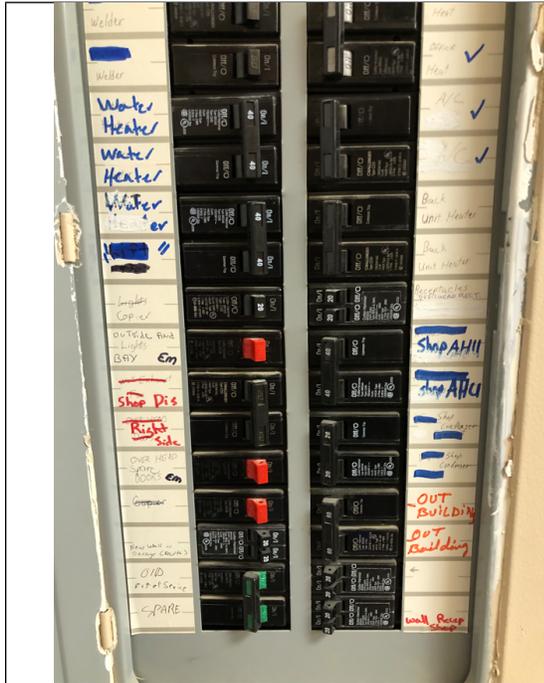
10. Parks/Rec Maint. Building



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11. Lakepine restroom



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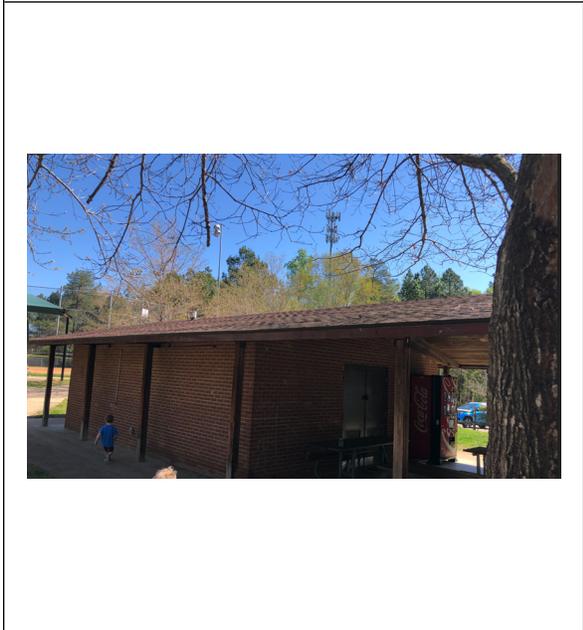
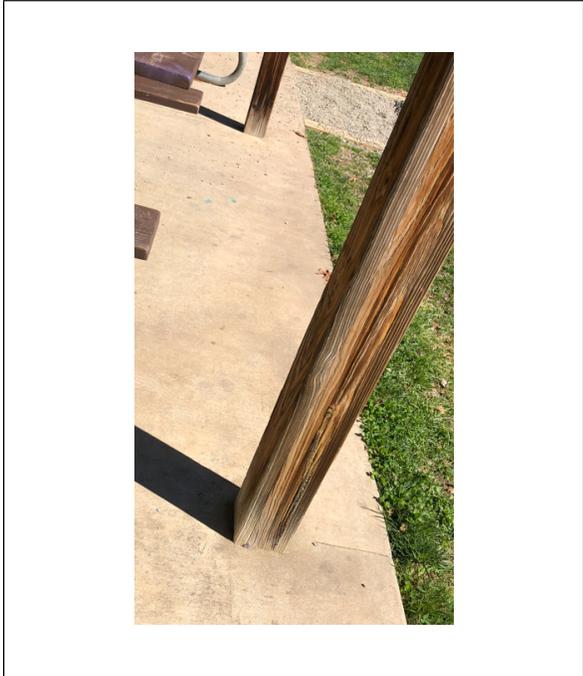
12. Kelly rd Restroom/shelter



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13. Kelly rd shelter



14. Kelly Glen shelter



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| | |
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| | |

15. Pleasant Park - Maintenance Building



16. Pleasant Park - NA

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17. Pleasant Park - Pump Station (can remove from List)

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18. Pleasant Park - Amenity Building - NA

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19. Pleasant Park - Shelter #2



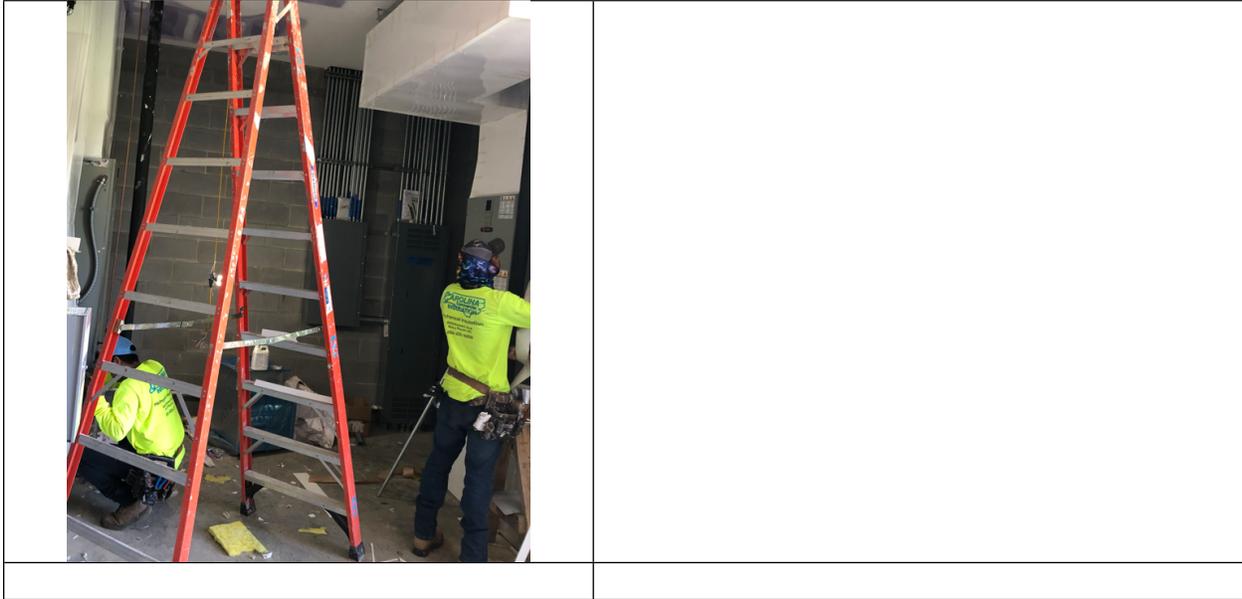
20. Pleasant Park - Signature Fieldhouse



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21. Salem Pond Restroom



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22. Seagroves Restroom/Shelter



23. Hunter street restroom/shelter



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24. Clairemont shelter



25. Sue Helton Gazebo



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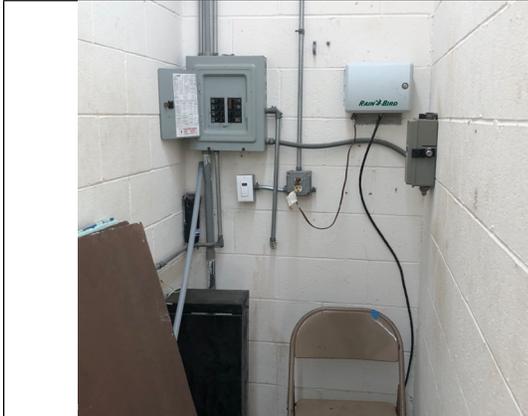
26. Jaycee Park Restroom/shelter



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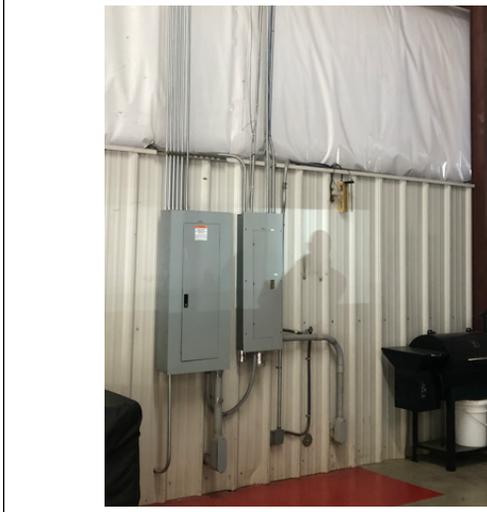
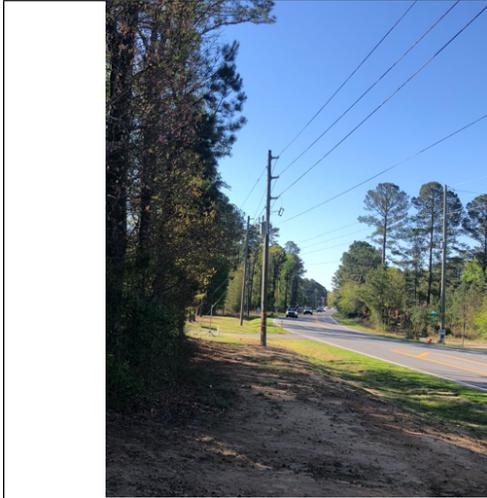
27. Fire Station # 2



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28. Electrical Main office



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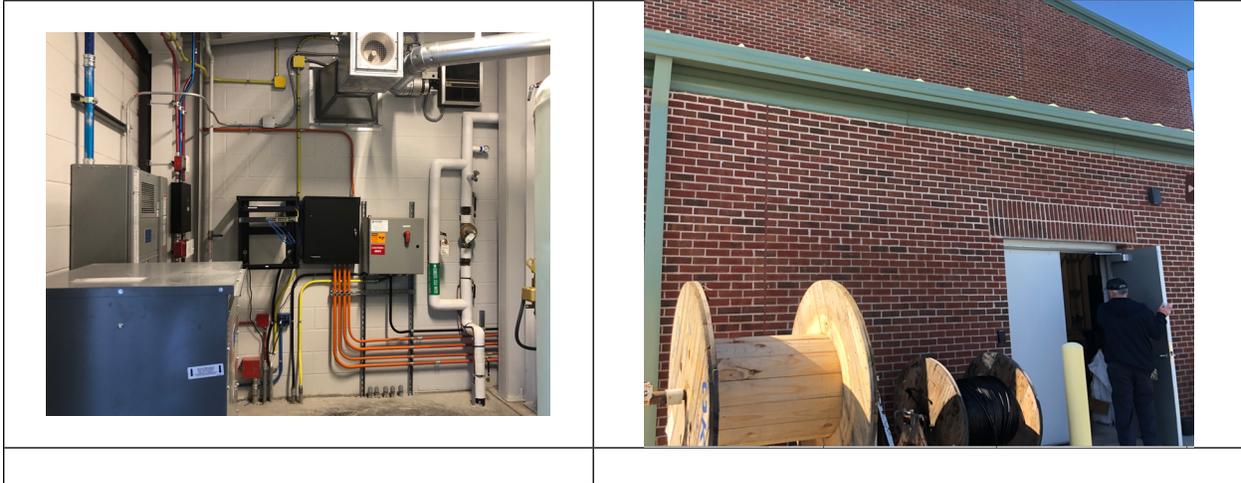
29. Electrical Warehouse



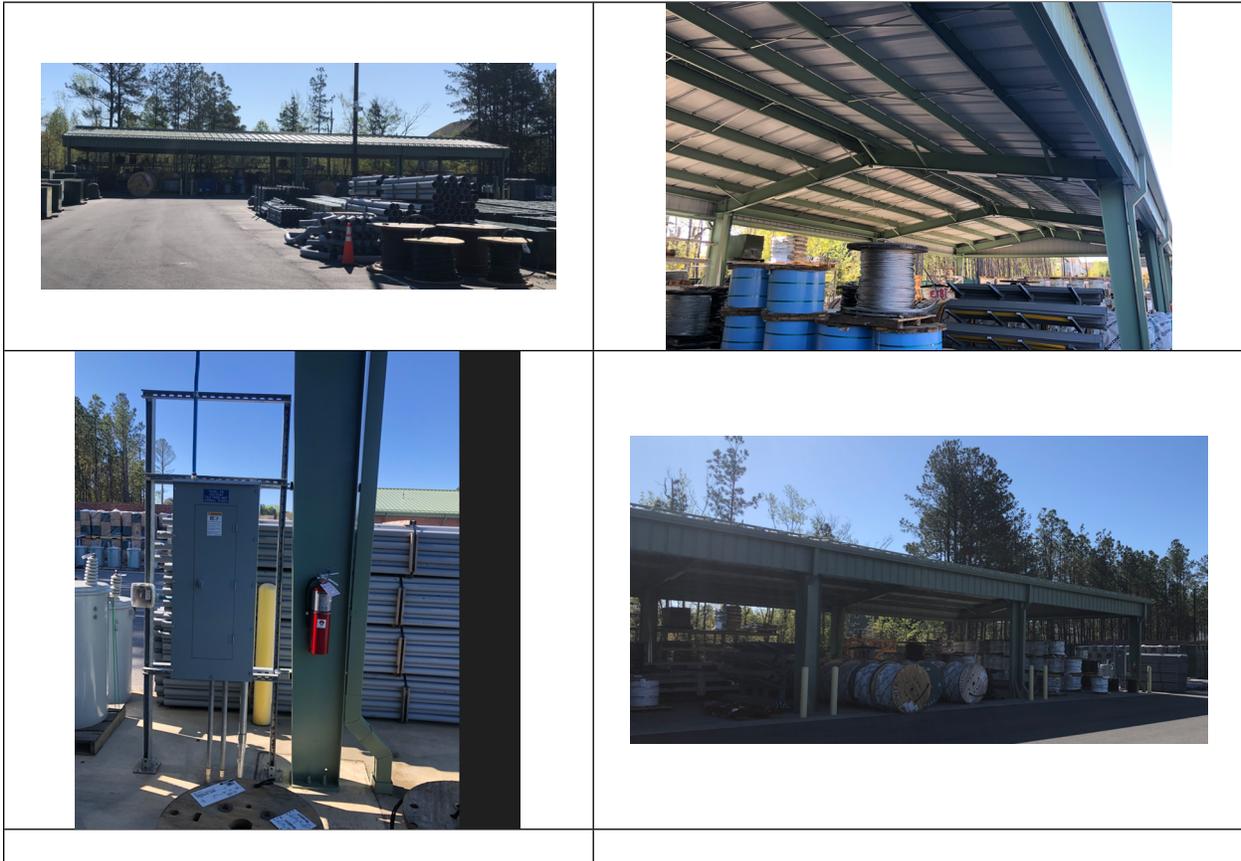
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30. Electrical covered storage



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31. Water Resources Meter Shop



32. Public Works Operations



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33. Public Works Operations Covered Storage



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34. Chamber of Commerce

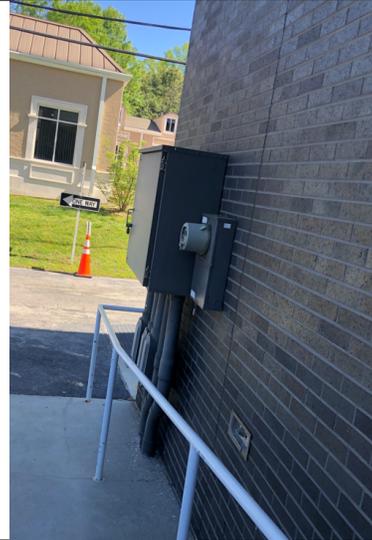


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35. Halle Cultural Arts Center



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36. Senior center



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37. Public Safety Station 6- NA

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38. Mason Street Municipal Building - NA

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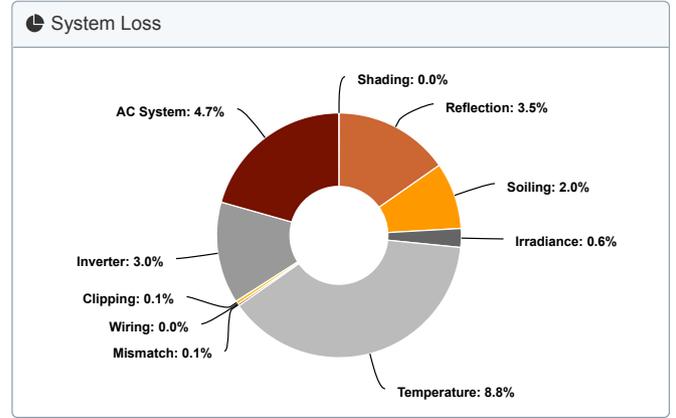
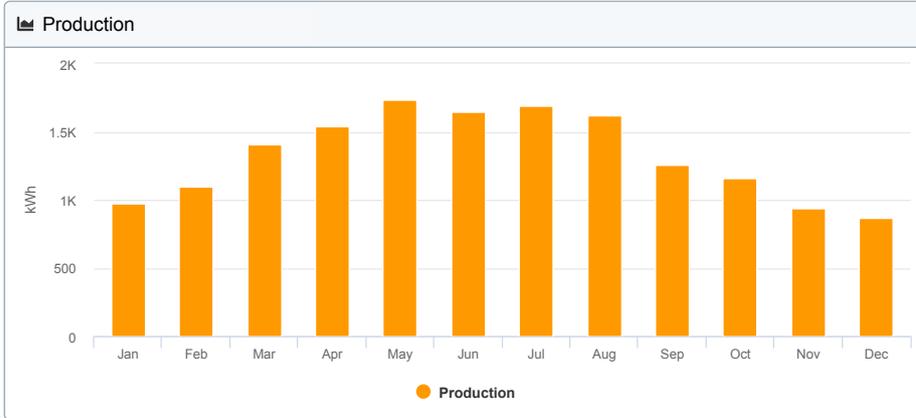
Solar Production Modeling

#1 - Parks/Rec Maint. Building

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|--|
| Address | Apex, NC, USA |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| AC interconnect | 240V 1-Phase |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 3 |
| Module DC Nameplate | 11.6 kW |
| Inverter AC Nameplate | 9.1 kW Load Ratio: 1.28 |
| Annual Production | 15.9 MWh |
| Performance Ratio | 79.3% |
| kWh/kWp | 1,369.2 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,727.6 | 6.5% |
| | Shaded Irradiance | 1,727.5 | -0.0% |
| | Irradiance After Reflection | 1,667.7 | -3.5% |
| | Irradiance After Soiling | 1,634.3 | -2.0% |
| | Total Collector Irradiance | 1,634.3 | 0.0% |
| Energy (kWh) | Nameplate | 19,040.0 | - |
| | Output at Irradiance Levels | 18,932.8 | -0.6% |
| | Output at Cell Temperature Derate | 17,272.8 | -8.8% |
| | Output After Mismatch | 17,261.2 | -0.1% |
| | Optimal DC Output | 17,261.2 | 0.0% |
| | Constrained DC Output | 17,245.6 | -0.1% |
| | Inverter Output | 16,720.0 | -3.0% |
| | Energy to Grid | 15,937.8 | -4.7% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 35.3°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|-------|------------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Inverter | IQ8H-240-72-2-US (240V) (Enphase) | | Spec Sheet | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 3 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 3 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 24 |
| TSM-DEG18MC.20(II) 485 | Modules | 24 |

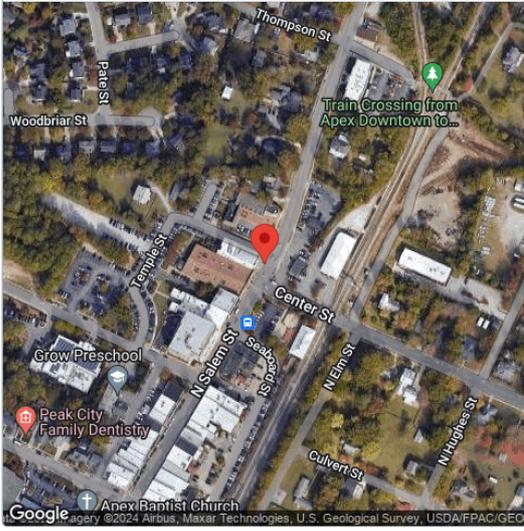
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 98.1 | 98.0 | 1,066.8 | 973.4 |
| February | 97.6 | 112.2 | 112.2 | 1,230.0 | 1,094.3 |
| March | 138.5 | 149.2 | 149.2 | 1,643.9 | 1,411.3 |
| April | 161.9 | 167.6 | 167.6 | 1,853.8 | 1,535.7 |
| May | 191.2 | 193.9 | 193.9 | 2,147.3 | 1,738.2 |
| June | 186.5 | 186.4 | 186.4 | 2,063.4 | 1,650.3 |
| July | 189.3 | 190.5 | 190.5 | 2,108.6 | 1,686.5 |
| August | 177.6 | 182.8 | 182.8 | 2,024.1 | 1,617.1 |
| September | 130.6 | 138.4 | 138.4 | 1,527.1 | 1,260.7 |
| October | 110.9 | 123.4 | 123.4 | 1,356.9 | 1,159.8 |
| November | 83.2 | 97.8 | 97.8 | 1,068.4 | 939.1 |
| December | 72.6 | 87.5 | 87.5 | 949.8 | 871.4 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 211° | 0.0 ft | 1x1 | 24 | 24 | 11.64 kW |

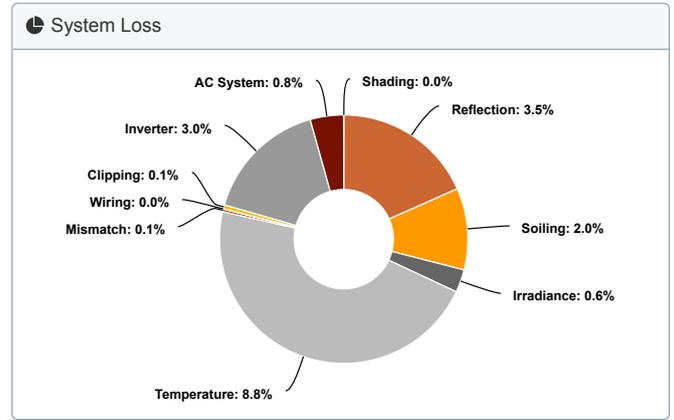
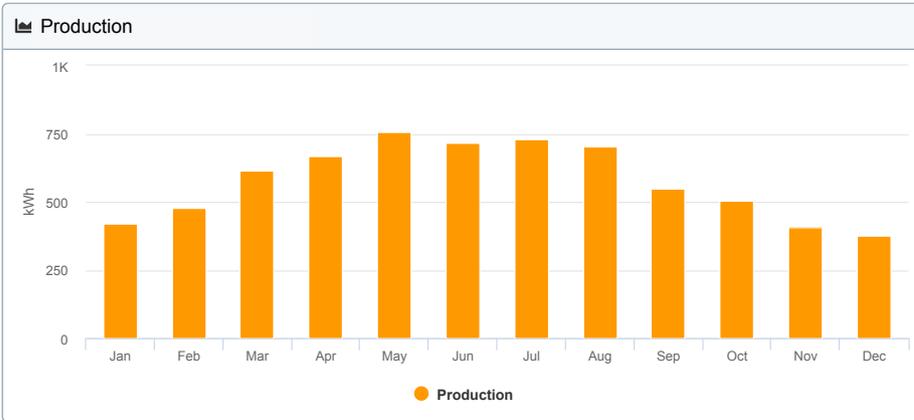
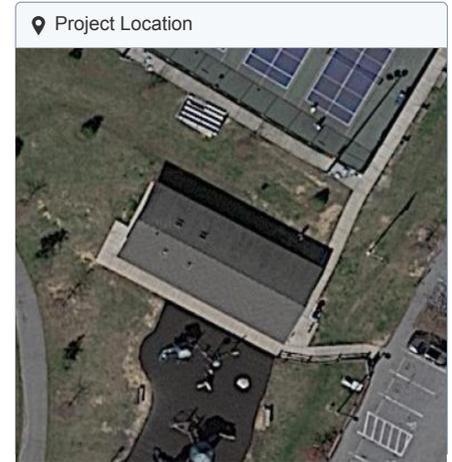
Solar Production Modeling

#2 - Seymour Fields Restroom/Shelter

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 4.9 kW |
| Inverter AC Nameplate | 3.8 kW Load Ratio: 1.28 |
| Annual Production | 6.9 MWh |
| Performance Ratio | 82.5% |
| kWh/kWp | 1,427.4 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 01cdf0a9bf-b216e26547-045d032121-2d323bdb61 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,730.8 | 6.7% |
| | Shaded Irradiance | 1,730.7 | -0.0% |
| | Irradiance After Reflection | 1,670.9 | -3.5% |
| | Irradiance After Soiling | 1,637.5 | -2.0% |
| | Total Collector Irradiance | 1,637.5 | 0.0% |
| Energy (kWh) | Nameplate | 7,950.2 | - |
| | Output at Irradiance Levels | 7,905.6 | -0.6% |
| | Output at Cell Temperature Derate | 7,211.8 | -8.8% |
| | Output After Mismatch | 7,207.0 | -0.1% |
| | Optimal DC Output | 7,207.0 | 0.0% |
| | Constrained DC Output | 7,199.6 | -0.1% |
| | Inverter Output | 6,980.2 | -3.0% |
| | Energy to Grid | 6,922.9 | -0.8% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | | 17.9°C |
| | Avg. Operating Cell Temp | | 35.3°C |
| Simulation Metrics | | | |
| | Operating Hours | | 4,664 |
| | Solved Hours | | 4,664 |
| | Pending Hours | | - |
| | Error Hours | | - |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|------------|------------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| Inverter | IQ8H-240-72-2-US (240V) (Enphase) | | Spec Sheet | | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 12 AWG (Copper) | AC Home Runs | 1 |
| 1 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 10 |
| TSM-DEG18MC.20(II) 485 | Modules | 10 |

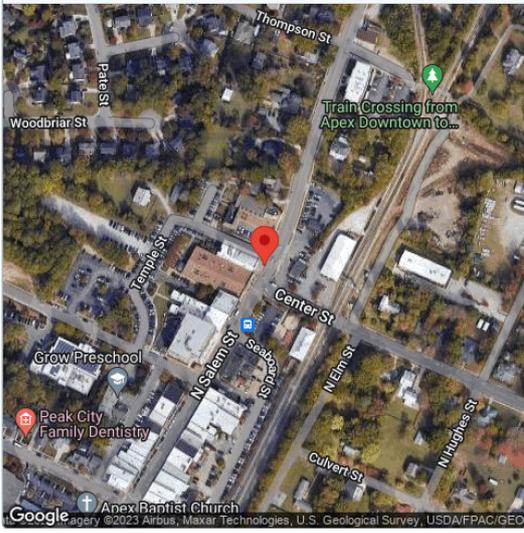
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 98.5 | 98.5 | 446.7 | 421.6 |
| February | 97.6 | 112.5 | 112.5 | 514.2 | 476.0 |
| March | 138.5 | 149.5 | 149.5 | 686.7 | 614.5 |
| April | 161.9 | 167.8 | 167.8 | 773.6 | 669.2 |
| May | 191.2 | 194.0 | 194.0 | 895.3 | 756.7 |
| June | 186.5 | 186.5 | 186.5 | 860.4 | 717.2 |
| July | 189.3 | 190.6 | 190.6 | 879.2 | 732.0 |
| August | 177.6 | 183.0 | 183.0 | 844.3 | 702.3 |
| September | 130.6 | 138.7 | 138.7 | 637.5 | 546.6 |
| October | 110.9 | 123.7 | 123.7 | 567.2 | 503.5 |
| November | 83.2 | 98.2 | 98.2 | 447.1 | 406.5 |
| December | 72.6 | 87.9 | 87.9 | 397.9 | 376.8 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|---------|
| Field Segment 2 | Flush Mount | Landscape (Horizontal) | 10° | 208° | 0.0 ft | 1x1 | 10 | 10 | 4.85 kW |

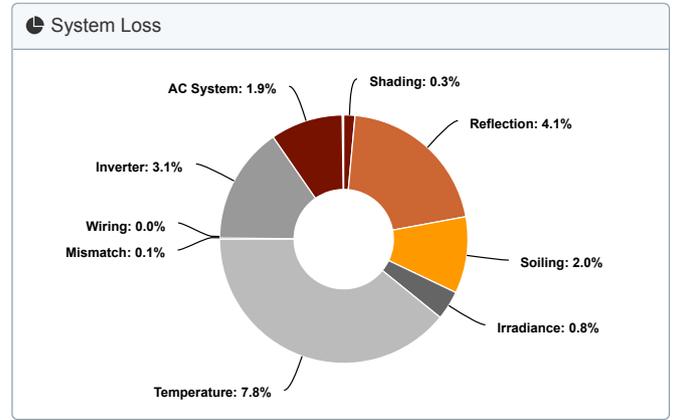
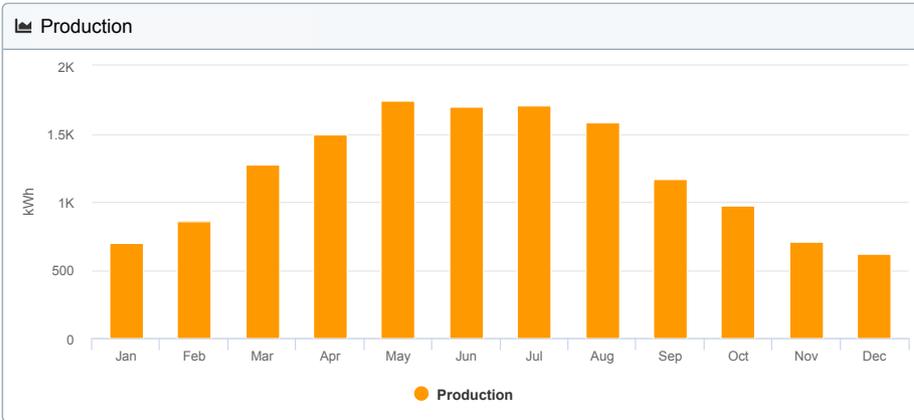
Solar Production Modeling

#4 - Nature Park Amphitheater

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 11.6 kW |
| Inverter AC Nameplate | 9.1 kW Load Ratio: 1.28 |
| Annual Production | 14.5 MWh |
| Performance Ratio | 81.5% |
| kWh/kWp | 1,248.7 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 06e23eb0f4-72263e3f06-e2a1d80076- cea972d4a8 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,531.5 | -5.6% |
| | Shaded Irradiance | 1,527.0 | -0.3% |
| | Irradiance After Reflection | 1,463.8 | -4.1% |
| | Irradiance After Soiling | 1,434.6 | -2.0% |
| | Total Collector Irradiance | 1,434.6 | 0.0% |
| Energy (kWh) | Nameplate | 16,713.0 | - |
| | Output at Irradiance Levels | 16,586.6 | -0.8% |
| | Output at Cell Temperature Derate | 15,284.9 | -7.8% |
| | Output After Mismatch | 15,274.9 | -0.1% |
| | Optimal DC Output | 15,274.9 | 0.0% |
| | Constrained DC Output | 15,280.8 | 0.0% |
| | Inverter Output | 14,814.6 | -3.1% |
| | Energy to Grid | 14,534.7 | -1.9% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 33.2°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|------------|------------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| Inverter | IQ8H-240-72-2-US (240V) (Enphase) | | Spec Sheet | | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 2 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 2 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 24 |
| TSM-DEG18MC.20(II) 485 | Modules | 24 |

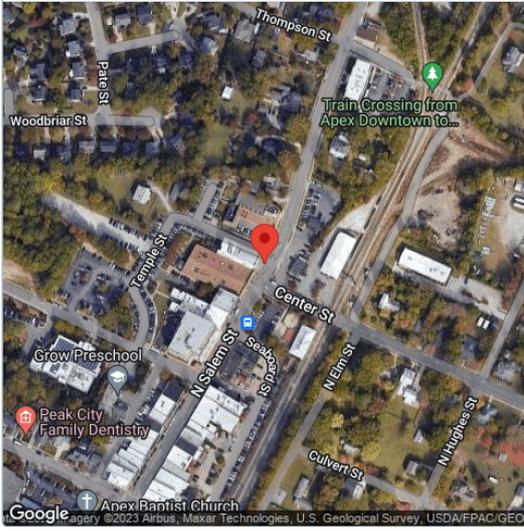
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 69.8 | 69.4 | 733.9 | 699.7 |
| February | 97.6 | 85.8 | 85.4 | 918.4 | 859.5 |
| March | 138.5 | 129.4 | 129.0 | 1,409.0 | 1,274.3 |
| April | 161.9 | 156.3 | 155.9 | 1,719.1 | 1,497.7 |
| May | 191.2 | 187.1 | 186.7 | 2,065.4 | 1,747.2 |
| June | 186.5 | 185.4 | 185.0 | 2,050.3 | 1,700.4 |
| July | 189.3 | 186.9 | 186.5 | 2,064.0 | 1,710.9 |
| August | 177.6 | 172.4 | 172.0 | 1,899.6 | 1,579.8 |
| September | 130.6 | 123.8 | 123.5 | 1,353.2 | 1,166.3 |
| October | 110.9 | 100.9 | 100.5 | 1,089.4 | 977.4 |
| November | 83.2 | 72.1 | 71.7 | 764.6 | 704.3 |
| December | 72.6 | 61.8 | 61.4 | 646.2 | 617.2 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 53° | 0.0 ft | 1x1 | 24 | 24 | 11.64 kW |

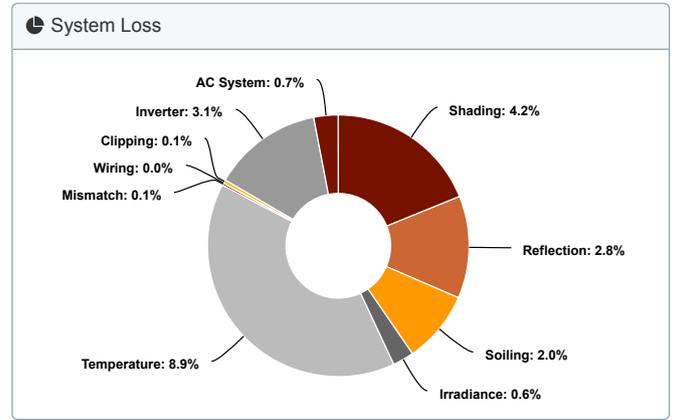
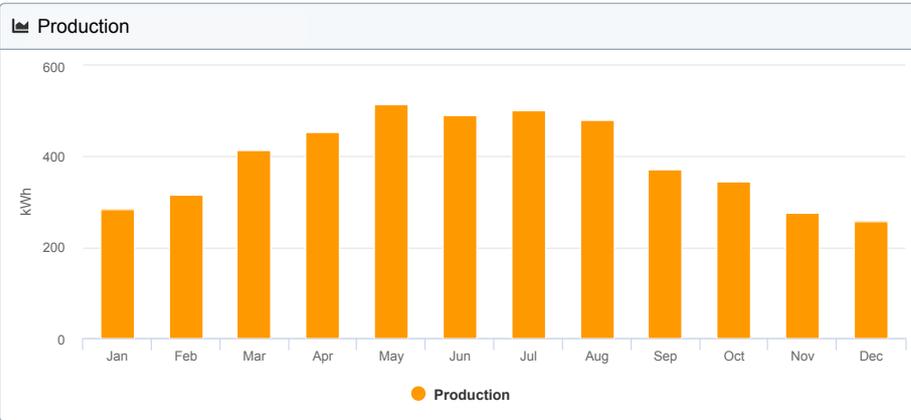
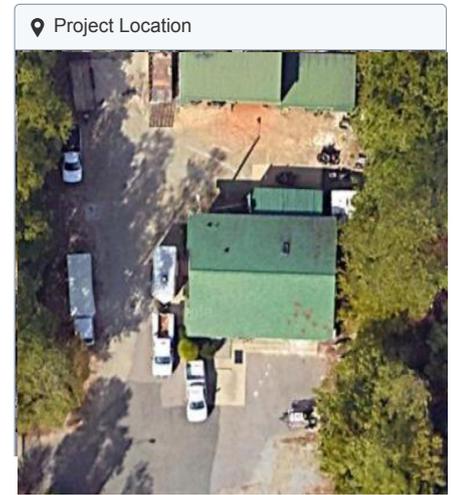
Solar Production Modeling

#10 - Parks/Rec Maint. Building

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex, NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a minute ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| AC interconnect | 240V 1-Phase |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 (copy) |
| Module DC Nameplate | 3.4 kW |
| Inverter AC Nameplate | 2.7 kW Load Ratio: 1.28 |
| Annual Production | 4.7 MWh |
| Performance Ratio | 79.5% |
| kWh/kWp | 1,385.8 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,744.1 | 7.5% |
| | Shaded Irradiance | 1,670.3 | -4.2% |
| | Irradiance After Reflection | 1,622.8 | -2.8% |
| | Irradiance After Soiling | 1,590.3 | -2.0% |
| | Total Collector Irradiance | 1,590.3 | -0.0% |
| Energy (kWh) | Nameplate | 5,403.9 | - |
| | Output at Irradiance Levels | 5,372.1 | -0.6% |
| | Output at Cell Temperature Derate | 4,893.9 | -8.9% |
| | Output After Mismatch | 4,890.6 | -0.1% |
| | Optimal DC Output | 4,890.6 | 0.0% |
| | Constrained DC Output | 4,886.0 | -0.1% |
| | Inverter Output | 4,736.8 | -3.1% |
| | Energy to Grid | 4,704.8 | -0.7% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | | 17.9°C |
| | Avg. Operating Cell Temp | | 34.8°C |
| Simulation Metrics | | | |
| | Operating Hours | | 4,664 |
| | Solved Hours | | 4,664 |
| | Pending Hours | | - |
| | Error Hours | | - |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|-------|------------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Inverter | IQ8H-240-72-2-US (240V) (Enphase) | | Spec Sheet | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 12 AWG (Copper) | AC Home Runs | 1 |
| 1 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 7 |
| TSM-DEG18MC.20(II) 485 | Modules | 7 |

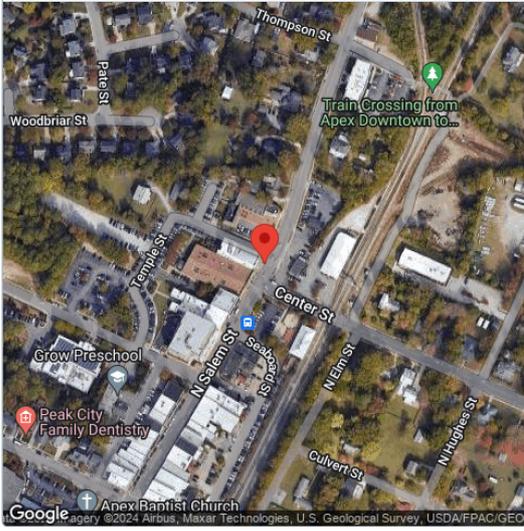
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 100.3 | 94.1 | 301.5 | 284.1 |
| February | 97.6 | 113.5 | 106.4 | 343.1 | 317.2 |
| March | 138.5 | 150.9 | 143.2 | 463.6 | 414.6 |
| April | 161.9 | 168.9 | 161.6 | 524.8 | 453.7 |
| May | 191.2 | 194.2 | 187.6 | 609.4 | 515.7 |
| June | 186.5 | 187.2 | 181.3 | 588.3 | 491.1 |
| July | 189.3 | 191.0 | 185.2 | 600.8 | 501.0 |
| August | 177.6 | 183.7 | 177.4 | 576.0 | 479.4 |
| September | 130.6 | 139.7 | 133.5 | 432.4 | 370.6 |
| October | 110.9 | 125.2 | 120.4 | 388.6 | 344.8 |
| November | 83.2 | 99.7 | 94.8 | 304.3 | 276.3 |
| December | 72.6 | 89.9 | 84.8 | 271.2 | 256.3 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|---------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 181° | 0.0 ft | 1x1 | 7 | 7 | 3.40 kW |

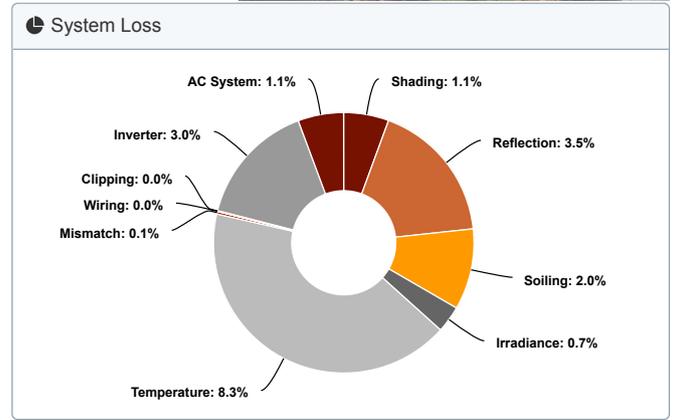
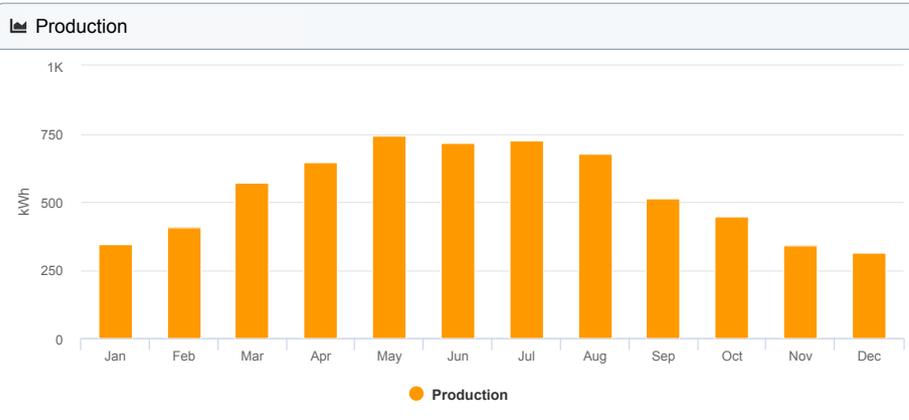
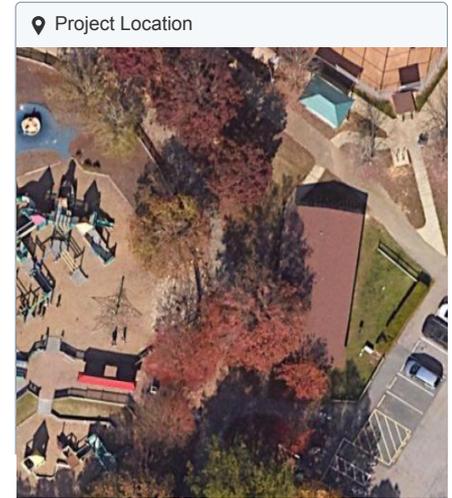
Solar Production Modeling

Town of Apex Solar Feasibility Report

#12 - Kelly Rd Restroom/Shelter

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 2 |
| Module DC Nameplate | 4.9 kW |
| Inverter AC Nameplate | 3.8 kW Load Ratio: 1.28 |
| Annual Production | 6.4 MWh |
| Performance Ratio | 81.7% |
| kWh/kWp | 1,329.7 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,628.4 | 0.4% |
| | Shaded Irradiance | 1,610.3 | -1.1% |
| | Irradiance After Reflection | 1,553.7 | -3.5% |
| | Irradiance After Soiling | 1,522.6 | -2.0% |
| | Total Collector Irradiance | 1,522.9 | 0.0% |
| Energy (kWh) | Nameplate | 7,393.5 | - |
| | Output at Irradiance Levels | 7,344.6 | -0.7% |
| | Output at Cell Temperature Derate | 6,733.6 | -8.3% |
| | Output After Mismatch | 6,729.2 | -0.1% |
| | Optimal DC Output | 6,729.2 | 0.0% |
| | Constrained DC Output | 6,727.9 | -0.0% |
| | Inverter Output | 6,522.7 | -3.0% |
| | Energy to Grid | 6,449.3 | -1.1% |
| Temperature Metrics | | | |
| Avg. Operating Ambient Temp | | 17.9°C | |
| Avg. Operating Cell Temp | | 34.1°C | |
| Simulation Metrics | | | |
| Operating Hours | | 4,664 | |
| Solved Hours | | 4,664 | |
| Pending Hours | | - | |
| Error Hours | | - | |

| Condition Set | | | | |
|------------------------------|--|--------------------------------------|------------------------------------|--------------------------|
| Description | Condition Set 1 | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | |
| Solar Angle Location | Meteo Lat/Lng | | | |
| Transposition Model | Perez Model | | | |
| Temperature Model | Sandia Model | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C |
| | Flush Mount | -2.81 | -0.05 | 0.0°C |
| | East-West | -3.56 | -0.08 | 3.0°C |
| | Carport | -3.56 | -0.08 | 3.0°C |
| Soiling (%) | J | F | M | A |
| | M | J | J | A |
| Irradiation Variance | S | O | N | D |
| | 2 | 2 | 2 | 2 |
| Cell Temperature Spread | 5.0% | | | |
| Module Binning Range | -2.5% to 2.5% | | | |
| AC System Derate | 0.50% | | | |
| Component Characterizations | Type | Component | Characterization | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | Spec Sheet Characterization,PAN | |
| Inverter | IQ8H-240-72-2-US (240V) (Enphase) | Spec Sheet | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 1 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 1 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 10 |
| TSM-DEG18MC.20(II) 485 | Modules | 10 |

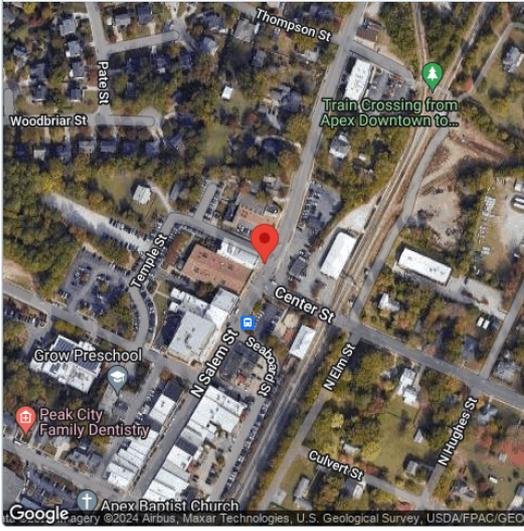
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 83.3 | 80.6 | 363.5 | 345.5 |
| February | 97.6 | 97.7 | 95.9 | 436.8 | 407.6 |
| March | 138.5 | 139.3 | 137.5 | 630.8 | 569.5 |
| April | 161.9 | 162.5 | 161.1 | 742.8 | 646.6 |
| May | 191.2 | 190.3 | 189.5 | 875.5 | 742.5 |
| June | 186.5 | 186.9 | 186.4 | 861.7 | 718.3 |
| July | 189.3 | 189.1 | 188.4 | 870.2 | 724.8 |
| August | 177.6 | 177.6 | 176.5 | 814.7 | 679.1 |
| September | 130.6 | 131.1 | 129.8 | 596.2 | 513.7 |
| October | 110.9 | 111.9 | 109.6 | 501.2 | 448.1 |
| November | 83.2 | 84.2 | 82.1 | 372.3 | 341.3 |
| December | 72.6 | 74.6 | 72.9 | 327.9 | 312.5 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|---------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 98° | 0.0 ft | 1x1 | 10 | 10 | 4.85 kW |

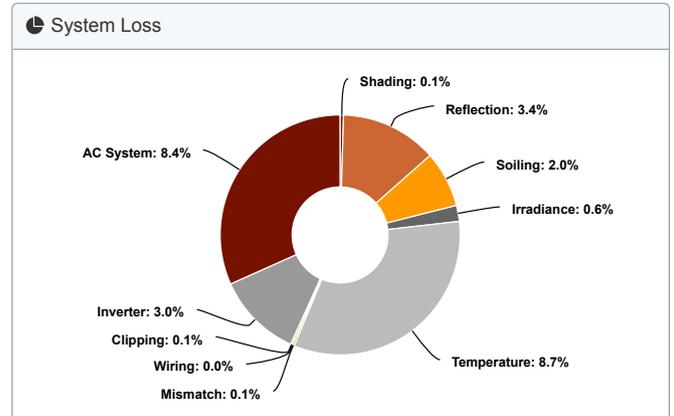
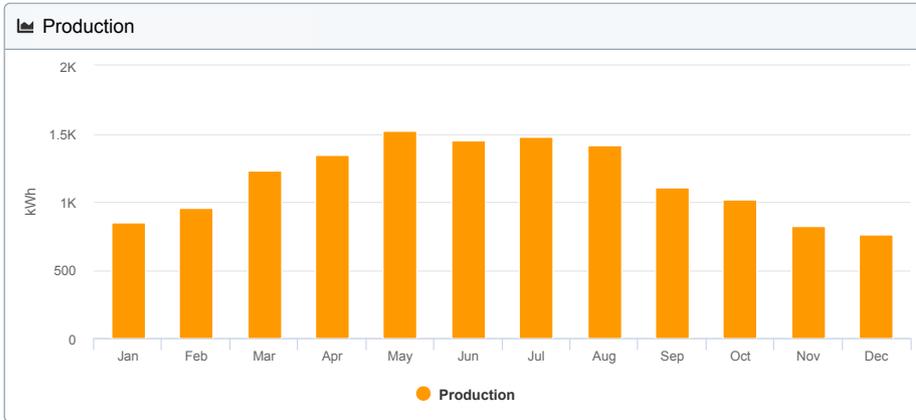
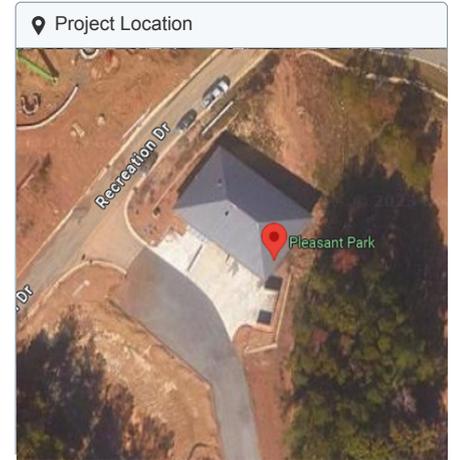
Solar Production Modeling

#15 - Pleasant Park - Maintenance Building

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 2 |
| Module DC Nameplate | 10.7 kW |
| Inverter AC Nameplate | 8.4 kW Load Ratio: 1.28 |
| Annual Production | 14.0 MWh |
| Performance Ratio | 76.1% |
| kWh/kWp | 1,309.6 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,720.4 | 6.1% |
| | Shaded Irradiance | 1,718.3 | -0.1% |
| | Irradiance After Reflection | 1,659.1 | -3.4% |
| | Irradiance After Soiling | 1,625.9 | -2.0% |
| | Total Collector Irradiance | 1,625.9 | 0.0% |
| Energy (kWh) | Nameplate | 17,360.8 | - |
| | Output at Irradiance Levels | 17,261.9 | -0.6% |
| | Output at Cell Temperature Derate | 15,752.8 | -8.7% |
| | Output After Mismatch | 15,742.3 | -0.1% |
| | Optimal DC Output | 15,742.3 | 0.0% |
| | Constrained DC Output | 15,731.0 | -0.1% |
| | Inverter Output | 15,251.7 | -3.0% |
| | Energy to Grid | 13,973.0 | -8.4% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 35.2°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|-------|---------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Inverter | IQ8H-240-72-2-US (240V) (Enphase) | | Spec Sheet | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 3 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 3 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 22 |
| TSM-DEG18MC.20(II) 485 | Modules | 22 |

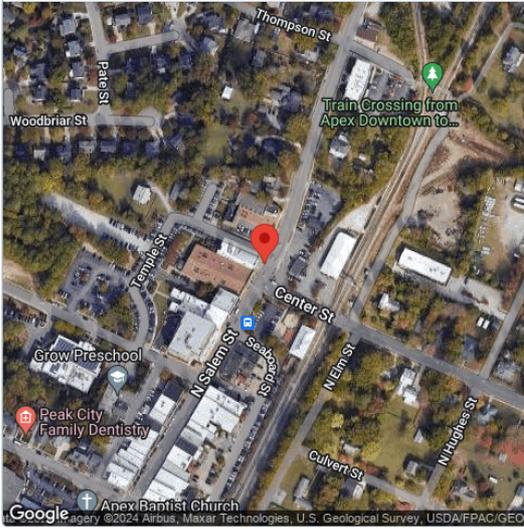
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 97.1 | 96.9 | 966.3 | 853.3 |
| February | 97.6 | 111.4 | 111.3 | 1,118.4 | 957.1 |
| March | 138.5 | 148.5 | 148.3 | 1,497.6 | 1,233.6 |
| April | 161.9 | 167.1 | 166.9 | 1,692.7 | 1,342.5 |
| May | 191.2 | 193.7 | 193.5 | 1,964.6 | 1,523.1 |
| June | 186.5 | 186.2 | 185.9 | 1,887.6 | 1,448.4 |
| July | 189.3 | 190.3 | 190.1 | 1,929.0 | 1,482.0 |
| August | 177.6 | 182.4 | 182.2 | 1,849.7 | 1,419.8 |
| September | 130.6 | 137.9 | 137.7 | 1,392.8 | 1,107.8 |
| October | 110.9 | 122.6 | 122.4 | 1,234.0 | 1,016.5 |
| November | 83.2 | 96.9 | 96.8 | 968.7 | 824.1 |
| December | 72.6 | 86.5 | 86.4 | 859.3 | 764.9 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 5 | Flush Mount | Landscape (Horizontal) | 10° | 217° | 0.0 ft | 1x1 | 22 | 22 | 10.67 kW |

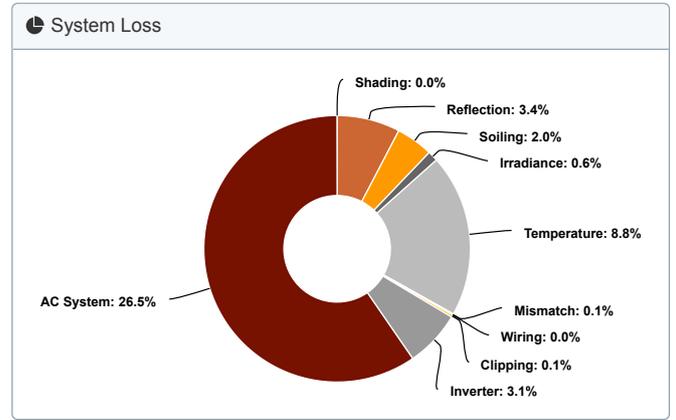
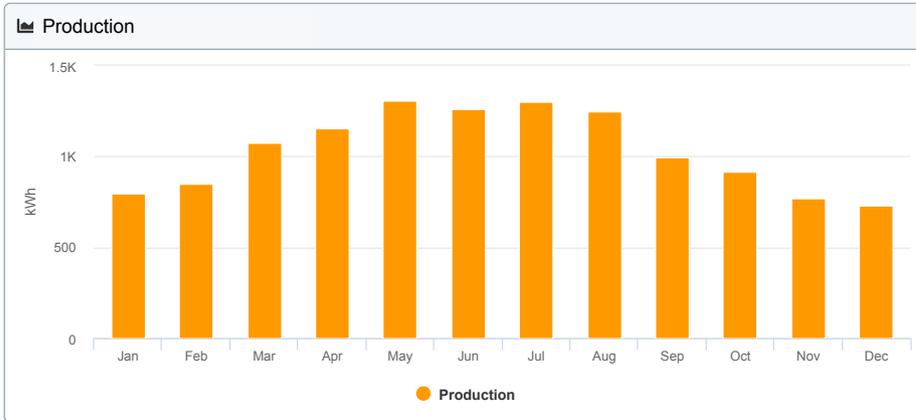
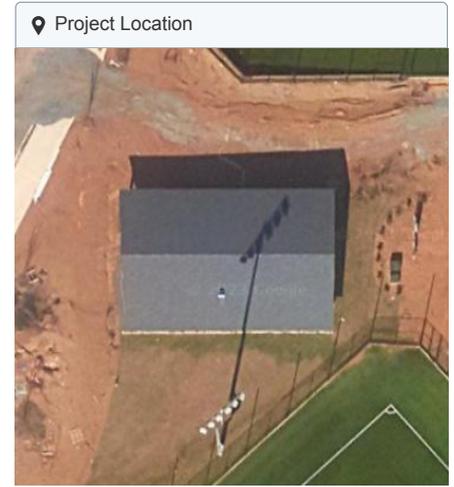
Solar Production Modeling

#19 - Pleasant Park - Shelter #2

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 3 |
| Module DC Nameplate | 11.6 kW |
| Inverter AC Nameplate | 9.1 kW Load Ratio: 1.28 |
| Annual Production | 12.4 MWh |
| Performance Ratio | 61.1% |
| kWh/kWp | 1,065.4 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 3393361079-e8bab1d590-d923baf568-b5452d22fc |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|---------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,744.1 | 7.5% |
| | Shaded Irradiance | 1,744.0 | -0.0% |
| | Irradiance After Reflection | 1,684.5 | -3.4% |
| | Irradiance After Soiling | 1,650.8 | -2.0% |
| | Total Collector Irradiance | 1,650.8 | 0.0% |
| Energy (kWh) | Nameplate | 19,231.9 | - |
| | Output at Irradiance Levels | 19,125.9 | -0.6% |
| | Output at Cell Temperature Derate | 17,444.8 | -8.8% |
| | Output After Mismatch | 17,433.1 | -0.1% |
| | Optimal DC Output | 17,433.1 | 0.0% |
| | Constrained DC Output | 17,412.2 | -0.1% |
| | Inverter Output | 16,881.0 | -3.1% |
| | Energy to Grid | 12,401.2 | -26.5% |
| Temperature Metrics | | | |
| Avg. Operating Ambient Temp | | 17.9°C | |
| Avg. Operating Cell Temp | | 35.5°C | |
| Simulation Metrics | | | |
| Operating Hours | | 4,664 | |
| Solved Hours | | 4,664 | |
| Pending Hours | | - | |
| Error Hours | | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|-------|------------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Inverter | IQ8H-240-72-2-US (240V) (Enphase) | | Spec Sheet | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 3 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 3 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 24 |
| TSM-DEG18MC.20(II) 485 | Modules | 24 |

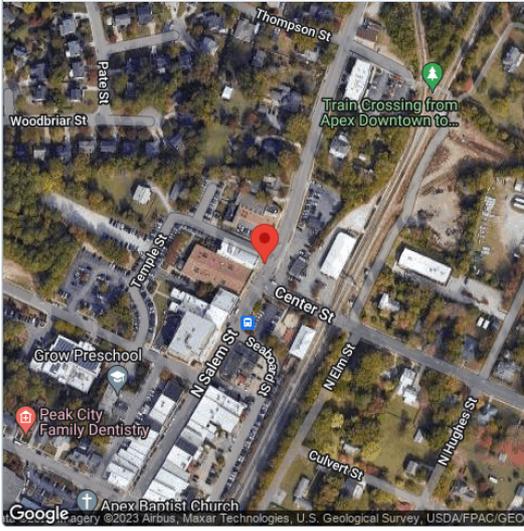
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 100.2 | 100.2 | 1,091.9 | 796.7 |
| February | 97.6 | 113.5 | 113.5 | 1,245.2 | 849.9 |
| March | 138.5 | 150.9 | 150.9 | 1,663.9 | 1,077.1 |
| April | 161.9 | 168.9 | 168.9 | 1,869.7 | 1,152.5 |
| May | 191.2 | 194.2 | 194.2 | 2,151.0 | 1,306.1 |
| June | 186.5 | 187.2 | 187.2 | 2,073.4 | 1,263.1 |
| July | 189.3 | 191.1 | 191.1 | 2,115.2 | 1,301.2 |
| August | 177.6 | 183.7 | 183.7 | 2,034.4 | 1,246.9 |
| September | 130.6 | 139.7 | 139.7 | 1,541.7 | 993.8 |
| October | 110.9 | 125.2 | 125.2 | 1,377.9 | 917.2 |
| November | 83.2 | 99.6 | 99.6 | 1,090.1 | 767.2 |
| December | 72.6 | 89.9 | 89.9 | 977.7 | 729.4 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 180° | 0.0 ft | 1x1 | 24 | 24 | 11.64 kW |

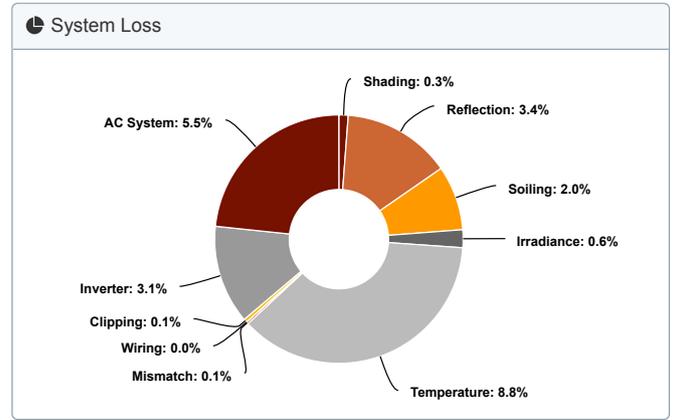
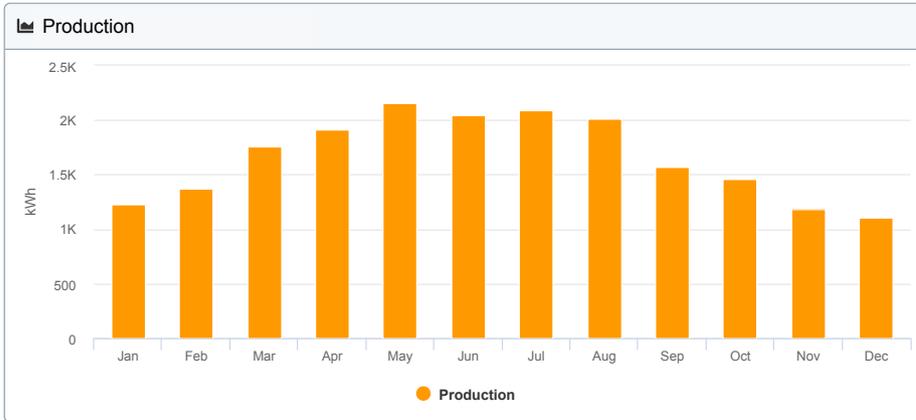
Solar Production Modeling

#20 - Pleasant Park - Signature Field House

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 4 |
| Module DC Nameplate | 14.6 kW |
| Inverter AC Nameplate | 11.4 kW Load Ratio: 1.28 |
| Annual Production | 19.9 MWh |
| Performance Ratio | 78.4% |
| kWh/kWp | 1,366.8 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,744.1 | 7.5% |
| | Shaded Irradiance | 1,739.1 | -0.3% |
| | Irradiance After Reflection | 1,680.6 | -3.4% |
| | Irradiance After Soiling | 1,647.0 | -2.0% |
| | Total Collector Irradiance | 1,647.0 | 0.0% |
| Energy (kWh) | Nameplate | 23,981.1 | - |
| | Output at Irradiance Levels | 23,848.7 | -0.6% |
| | Output at Cell Temperature Derate | 21,753.6 | -8.8% |
| | Output After Mismatch | 21,739.0 | -0.1% |
| | Optimal DC Output | 21,739.0 | 0.0% |
| | Constrained DC Output | 21,716.0 | -0.1% |
| | Inverter Output | 21,053.6 | -3.1% |
| | Energy to Grid | 19,886.7 | -5.5% |
| Temperature Metrics | | | |
| Avg. Operating Ambient Temp | | 17.9°C | |
| Avg. Operating Cell Temp | | 35.4°C | |
| Simulation Metrics | | | |
| Operating Hours | | 4,664 | |
| Solved Hours | | 4,664 | |
| Pending Hours | | - | |
| Error Hours | | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|------------|---------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| Inverter | IQ8H-240-72-2-US (240V) (Enphase) | | Spec Sheet | | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 3 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 3 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 30 |
| TSM-DEG18MC.20(II) 485 | Modules | 30 |

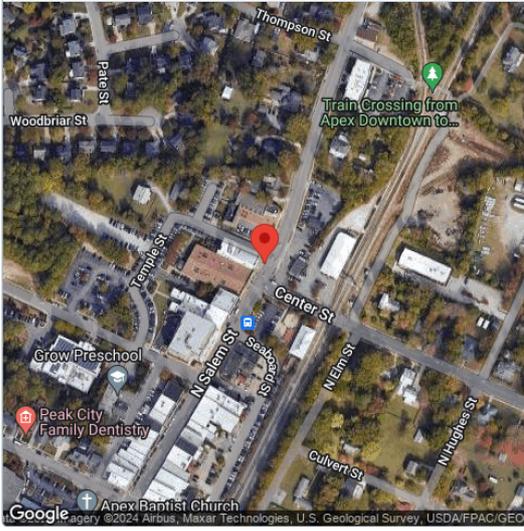
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 100.2 | 99.4 | 1,356.1 | 1,225.6 |
| February | 97.6 | 113.5 | 113.2 | 1,553.7 | 1,368.1 |
| March | 138.5 | 150.9 | 150.6 | 2,076.1 | 1,762.2 |
| April | 161.9 | 168.9 | 168.6 | 2,333.0 | 1,911.4 |
| May | 191.2 | 194.2 | 193.8 | 2,683.7 | 2,152.1 |
| June | 186.5 | 187.2 | 186.8 | 2,586.5 | 2,050.2 |
| July | 189.3 | 191.1 | 190.6 | 2,638.5 | 2,092.3 |
| August | 177.6 | 183.7 | 183.3 | 2,537.8 | 2,008.9 |
| September | 130.6 | 139.7 | 139.4 | 1,923.1 | 1,573.6 |
| October | 110.9 | 125.2 | 124.9 | 1,719.2 | 1,455.2 |
| November | 83.2 | 99.6 | 99.3 | 1,358.6 | 1,182.8 |
| December | 72.6 | 89.9 | 89.2 | 1,214.8 | 1,104.3 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|---------|
| Field Segment 2 | Flush Mount | Landscape (Horizontal) | 10° | 180° | 0.0 ft | 1x1 | 8 | 8 | 3.88 kW |
| Field Segment 3 | Flush Mount | Landscape (Horizontal) | 10° | 180° | 0.0 ft | 1x1 | 6 | 6 | 2.91 kW |
| Field Segment 4 | Flush Mount | Landscape (Horizontal) | 10° | 180° | 0.0 ft | 1x1 | 16 | 16 | 7.76 kW |

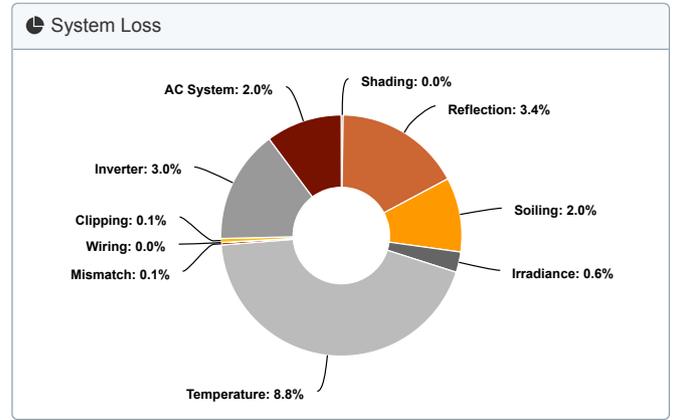
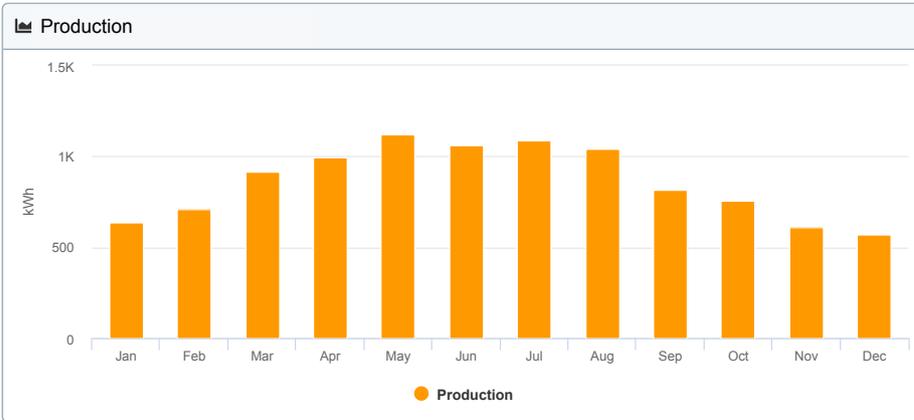
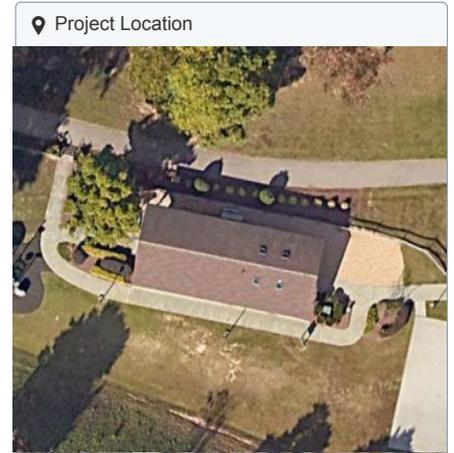
Solar Production Modeling

#22 - Seagroves Restroom/Shelter

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a minute ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 7.3 kW |
| Inverter AC Nameplate | 5.7 kW Load Ratio: 1.28 |
| Annual Production | 10.3 MWh |
| Performance Ratio | 81.4% |
| kWh/kWp | 1,419.1 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 01cdf0a9bf-b216e26547-045d032121-2d323bdb61 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,742.8 | 7.5% |
| | Shaded Irradiance | 1,742.0 | -0.0% |
| | Irradiance After Reflection | 1,682.6 | -3.4% |
| | Irradiance After Soiling | 1,649.0 | -2.0% |
| | Total Collector Irradiance | 1,648.9 | -0.0% |
| Energy (kWh) | Nameplate | 12,006.0 | - |
| | Output at Irradiance Levels | 11,939.8 | -0.6% |
| | Output at Cell Temperature Derate | 10,889.8 | -8.8% |
| | Output After Mismatch | 10,882.5 | -0.1% |
| | Optimal DC Output | 10,882.5 | 0.0% |
| | Constrained DC Output | 10,870.9 | -0.1% |
| | Inverter Output | 10,539.4 | -3.0% |
| | Energy to Grid | 10,323.6 | -2.0% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 35.4°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|-------|------------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Inverter | IQ8H-240-72-2-US (240V) (Enphase) | | Spec Sheet | | | | | | | | |

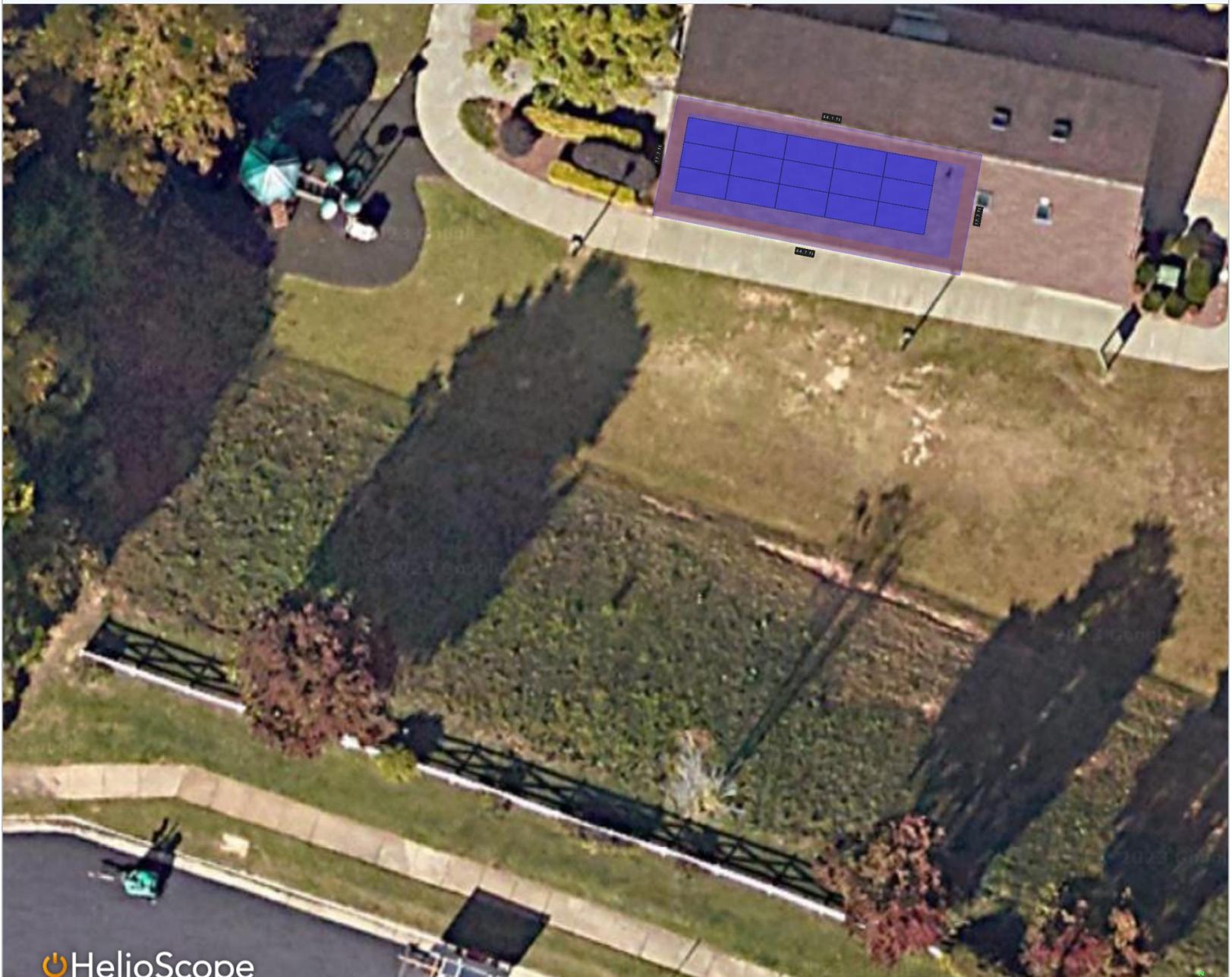
Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 2 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 2 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 15 |
| TSM-DEG18MC.20(II) 485 | Modules | 15 |

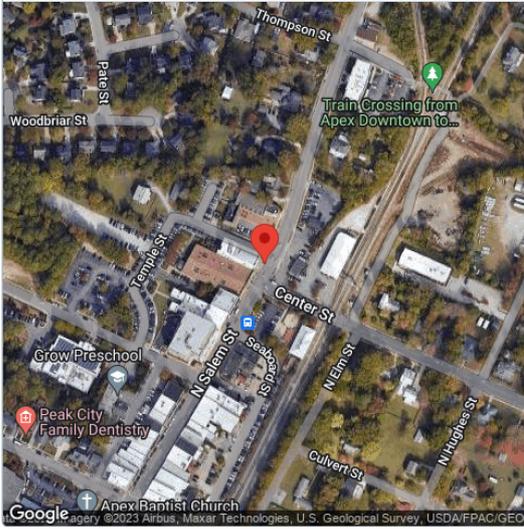
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 100.1 | 100.0 | 681.3 | 635.6 |
| February | 97.6 | 113.6 | 113.5 | 778.8 | 711.3 |
| March | 138.5 | 150.7 | 150.7 | 1,038.5 | 916.3 |
| April | 161.9 | 168.7 | 168.7 | 1,166.6 | 995.0 |
| May | 191.2 | 194.2 | 194.1 | 1,344.2 | 1,121.1 |
| June | 186.5 | 187.0 | 186.9 | 1,293.7 | 1,064.6 |
| July | 189.3 | 191.0 | 190.9 | 1,320.8 | 1,086.1 |
| August | 177.6 | 183.6 | 183.5 | 1,270.5 | 1,043.2 |
| September | 130.6 | 139.6 | 139.5 | 962.4 | 815.1 |
| October | 110.9 | 125.1 | 125.0 | 860.0 | 753.7 |
| November | 83.2 | 99.6 | 99.6 | 680.7 | 611.6 |
| December | 72.6 | 89.7 | 89.5 | 608.6 | 569.9 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|---------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 190° | 0.0 ft | 1x1 | 15 | 15 | 7.28 kW |

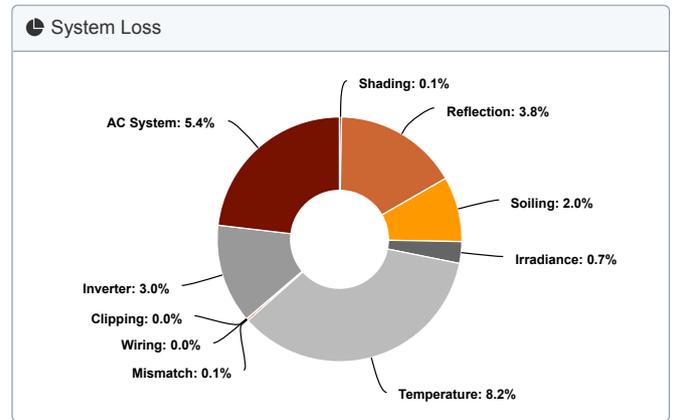
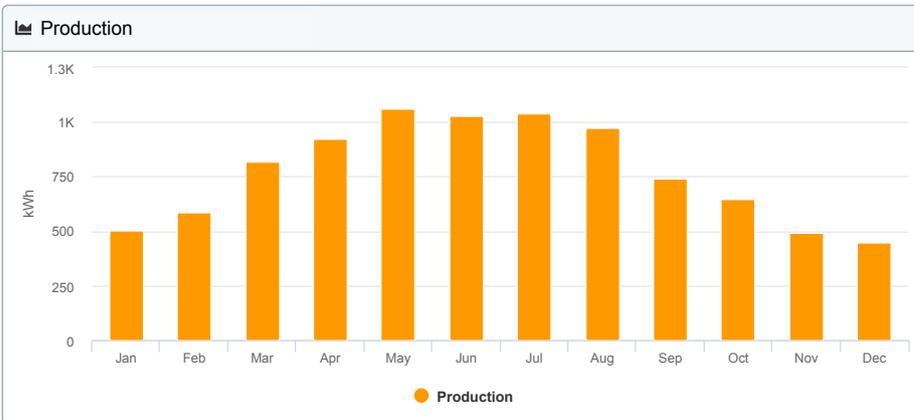
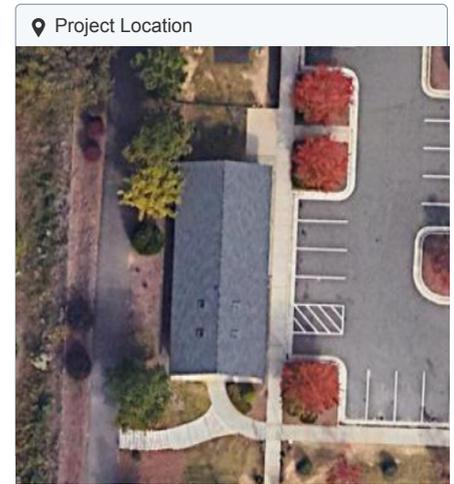
Solar Production Modeling

#23 - Hunter Street Restroom/Shelter

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 7.3 kW |
| Inverter AC Nameplate | 5.7 kW Load Ratio: 1.28 |
| Annual Production | 9.3 MWh |
| Performance Ratio | 78.8% |
| kWh/kWp | 1,272.2 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,614.9 | -0.4% |
| | Shaded Irradiance | 1,613.8 | -0.1% |
| | Irradiance After Reflection | 1,552.1 | -3.8% |
| | Irradiance After Soiling | 1,521.1 | -2.0% |
| | Total Collector Irradiance | 1,521.1 | -0.0% |
| Energy (kWh) | Nameplate | 11,074.9 | - |
| | Output at Irradiance Levels | 11,001.0 | -0.7% |
| | Output at Cell Temperature Derate | 10,097.0 | -8.2% |
| | Output After Mismatch | 10,090.4 | -0.1% |
| | Optimal DC Output | 10,090.4 | 0.0% |
| | Constrained DC Output | 10,090.1 | -0.0% |
| | Inverter Output | 9,782.4 | -3.0% |
| | Energy to Grid | 9,255.3 | -5.4% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | | 17.9°C |
| | Avg. Operating Cell Temp | | 34.1°C |
| Simulation Metrics | | | |
| | Operating Hours | | 4,664 |
| | Solved Hours | | 4,664 |
| | Pending Hours | | - |
| | Error Hours | | - |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|-------|---------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Inverter | IQ8H-240-72-2-US (240V) (Enphase) | | Spec Sheet | | | | | | | | |

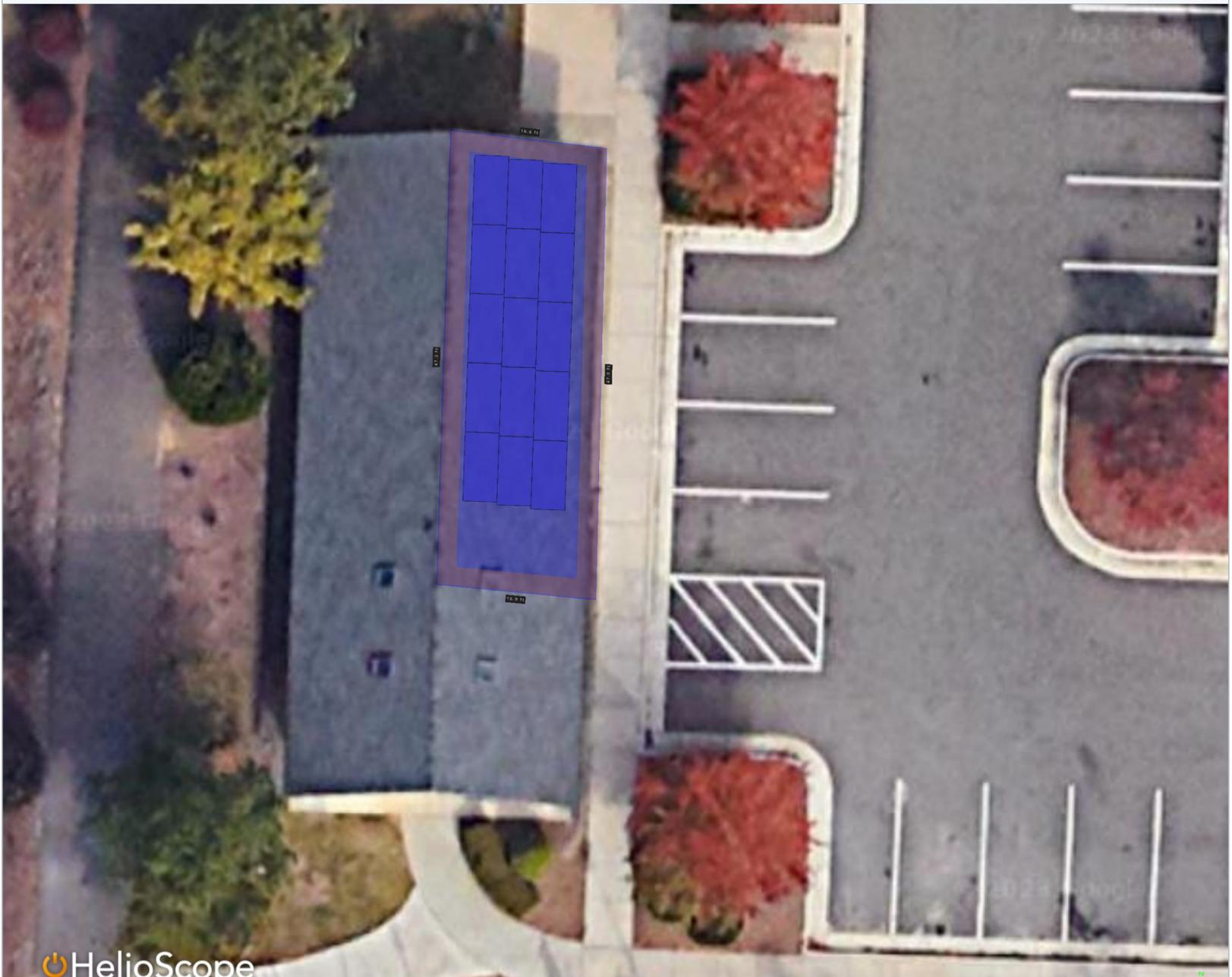
Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 2 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 2 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 15 |
| TSM-DEG18MC.20(II) 485 | Modules | 15 |

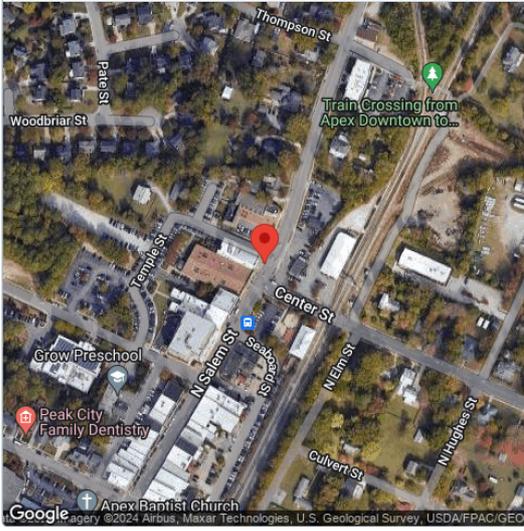
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 81.3 | 81.2 | 544.1 | 500.9 |
| February | 97.6 | 96.0 | 95.9 | 650.6 | 583.7 |
| March | 138.5 | 137.9 | 137.8 | 945.3 | 816.2 |
| April | 161.9 | 161.7 | 161.5 | 1,114.8 | 924.4 |
| May | 191.2 | 189.9 | 189.8 | 1,313.0 | 1,060.6 |
| June | 186.5 | 186.7 | 186.6 | 1,292.8 | 1,027.2 |
| July | 189.3 | 188.8 | 188.7 | 1,305.3 | 1,038.3 |
| August | 177.6 | 176.8 | 176.7 | 1,221.1 | 973.2 |
| September | 130.6 | 130.1 | 130.0 | 893.0 | 738.9 |
| October | 110.9 | 110.4 | 110.3 | 751.9 | 647.2 |
| November | 83.2 | 82.5 | 82.4 | 556.3 | 494.0 |
| December | 72.6 | 72.8 | 72.8 | 486.8 | 450.6 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|---------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 92° | 0.0 ft | 1x1 | 15 | 15 | 7.28 kW |

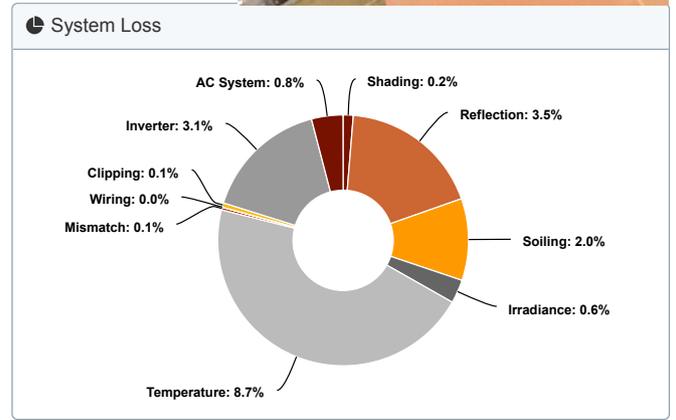
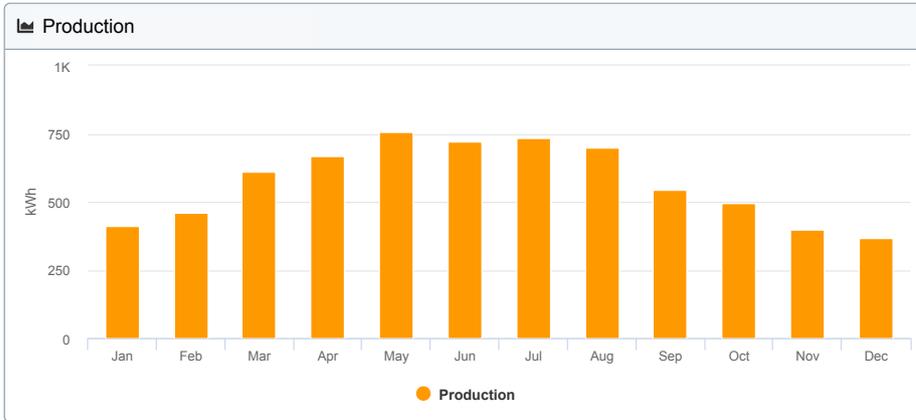
Solar Production Modeling

#26 - Jaycee Park Restroom/Shelter

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 4.9 kW |
| Inverter AC Nameplate | 3.8 kW Load Ratio: 1.28 |
| Annual Production | 6.9 MWh |
| Performance Ratio | 82.4% |
| kWh/kWp | 1,415.7 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,718.2 | 5.9% |
| | Shaded Irradiance | 1,714.0 | -0.2% |
| | Irradiance After Reflection | 1,654.6 | -3.5% |
| | Irradiance After Soiling | 1,621.5 | -2.0% |
| | Total Collector Irradiance | 1,621.4 | -0.0% |
| Energy (kWh) | Nameplate | 7,872.0 | - |
| | Output at Irradiance Levels | 7,826.7 | -0.6% |
| | Output at Cell Temperature Derate | 7,149.2 | -8.7% |
| | Output After Mismatch | 7,144.4 | -0.1% |
| | Optimal DC Output | 7,144.4 | 0.0% |
| | Constrained DC Output | 7,136.9 | -0.1% |
| | Inverter Output | 6,919.2 | -3.1% |
| | Energy to Grid | 6,866.0 | -0.8% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 35.1°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|------------------------------------|-------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | Characterization | | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | Spec Sheet Characterization,PAN | | | | | | | | | |
| | Inverter | IQ8H-240-72-2-US (240V) (Enphase) | Spec Sheet | | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 1 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 1 input AC Panels | AC Panels | 1 |
| IQ8H-240-72-2-US (240V) | Inverters | 10 |
| TSM-DEG18MC.20(II) 485 | Modules | 10 |

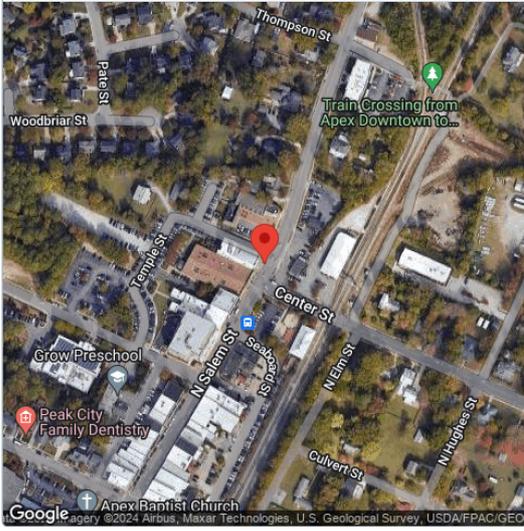
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 96.3 | 95.9 | 434.0 | 410.6 |
| February | 97.6 | 109.3 | 109.1 | 498.0 | 462.3 |
| March | 138.5 | 148.4 | 148.1 | 679.8 | 609.8 |
| April | 161.9 | 167.8 | 167.4 | 772.4 | 669.4 |
| May | 191.2 | 193.2 | 192.8 | 890.6 | 754.4 |
| June | 186.5 | 187.6 | 187.2 | 864.3 | 721.5 |
| July | 189.3 | 190.8 | 190.4 | 878.3 | 732.4 |
| August | 177.6 | 182.3 | 181.9 | 839.7 | 699.6 |
| September | 130.6 | 137.8 | 137.5 | 631.9 | 543.0 |
| October | 110.9 | 122.2 | 122.0 | 558.7 | 497.2 |
| November | 83.2 | 96.0 | 95.7 | 435.2 | 396.7 |
| December | 72.6 | 86.5 | 86.1 | 389.1 | 369.1 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|---------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 145° | 0.0 ft | 1x1 | 10 | 10 | 4.85 kW |

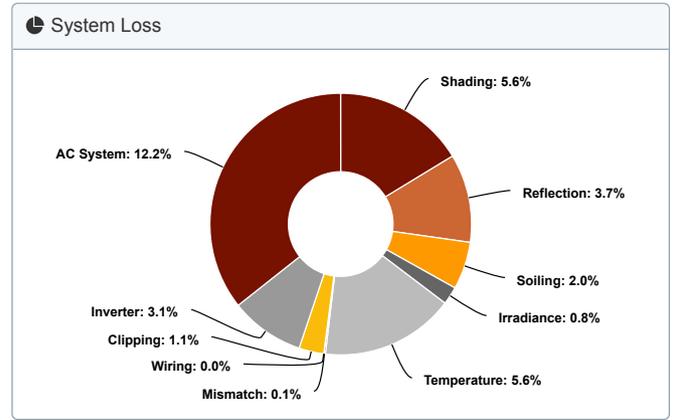
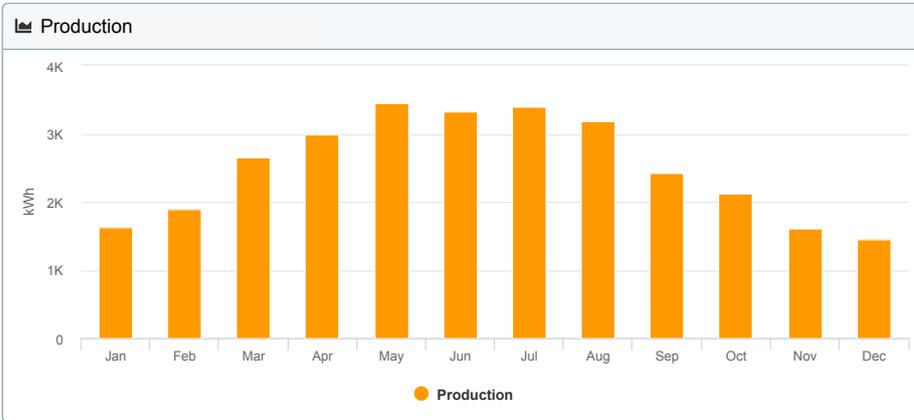
Solar Production Modeling

#27 - Fire Station # 2

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a minute ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 26.7 kW |
| Inverter AC Nameplate | 19.8 kW Load Ratio: 1.35 |
| Annual Production | 30.2 MWh |
| Performance Ratio | 70.3% |
| kWh/kWp | 1,130.8 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 01cdf0a9bf-b216e26547-045d032121-2d323bdb61 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|---------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,608.5 | -0.8% |
| | Shaded Irradiance | 1,519.1 | -5.6% |
| | Irradiance After Reflection | 1,462.4 | -3.7% |
| | Irradiance After Soiling | 1,433.2 | -2.0% |
| | Total Collector Irradiance | 1,433.9 | 0.0% |
| Energy (kWh) | Nameplate | 38,281.6 | - |
| | Output at Irradiance Levels | 37,992.2 | -0.8% |
| | Output at Cell Temperature Derate | 35,847.9 | -5.6% |
| | Output After Mismatch | 35,823.8 | -0.1% |
| | Optimal DC Output | 35,823.8 | 0.0% |
| | Constrained DC Output | 35,447.0 | -1.1% |
| | Inverter Output | 34,338.8 | -3.1% |
| | Energy to Grid | 30,163.5 | -12.2% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | | 17.9°C |
| | Avg. Operating Cell Temp | | 29.7°C |
| Simulation Metrics | | | |
| | Operating Hours | | 4,664 |
| | Solved Hours | | 4,664 |
| | Pending Hours | | - |
| | Error Hours | | - |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|------------|---------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| Inverter | IQ8H-208-72-2-US (2022) (Enphase) | | Spec Sheet | | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 4 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 4 input AC Panels | AC Panels | 1 |
| IQ8H-208-72-2-US (2022) | Inverters | 55 |
| TSM-DEG18MC.20(II) 485 | Modules | 55 |

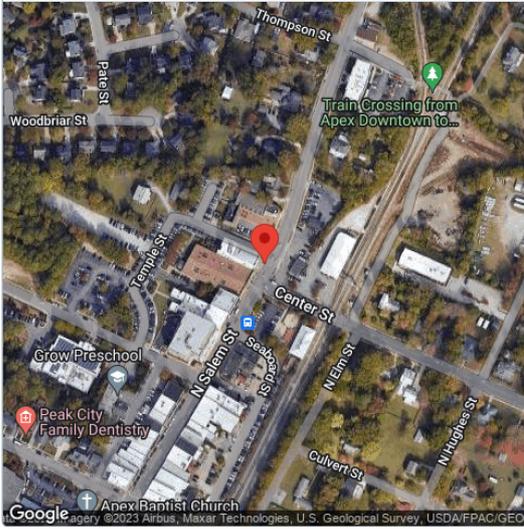
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 80.9 | 74.3 | 1,824.6 | 1,623.9 |
| February | 97.6 | 96.5 | 89.0 | 2,216.4 | 1,901.7 |
| March | 138.5 | 137.2 | 128.6 | 3,238.0 | 2,648.0 |
| April | 161.9 | 160.6 | 152.2 | 3,858.1 | 2,989.8 |
| May | 191.2 | 189.8 | 181.2 | 4,605.3 | 3,460.1 |
| June | 186.5 | 185.5 | 177.7 | 4,518.3 | 3,324.7 |
| July | 189.3 | 188.2 | 179.9 | 4,571.6 | 3,391.5 |
| August | 177.6 | 176.5 | 168.6 | 4,280.3 | 3,189.6 |
| September | 130.6 | 129.6 | 122.3 | 3,086.3 | 2,433.3 |
| October | 110.9 | 109.7 | 102.7 | 2,570.6 | 2,121.6 |
| November | 83.2 | 82.2 | 76.2 | 1,884.3 | 1,619.0 |
| December | 72.6 | 71.8 | 66.5 | 1,627.9 | 1,460.1 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 1 | Fixed Tilt | Landscape (Horizontal) | 10° | 245° | 0.0 ft | 1x1 | 25 | 25 | 12.13 kW |
| Field Segment 2 | Flush Mount | Landscape (Horizontal) | 10° | 65° | 0.0 ft | 1x1 | 30 | 30 | 14.55 kW |

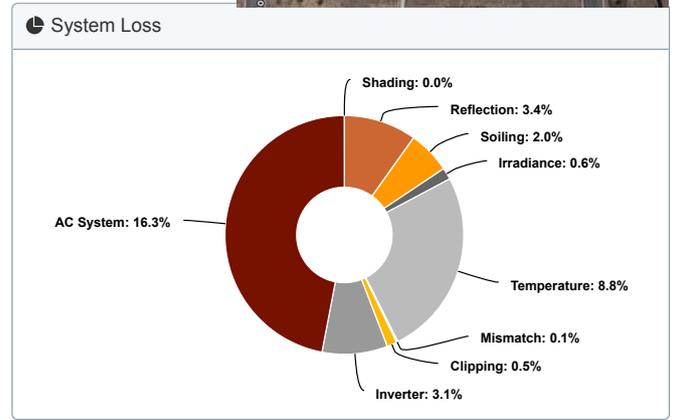
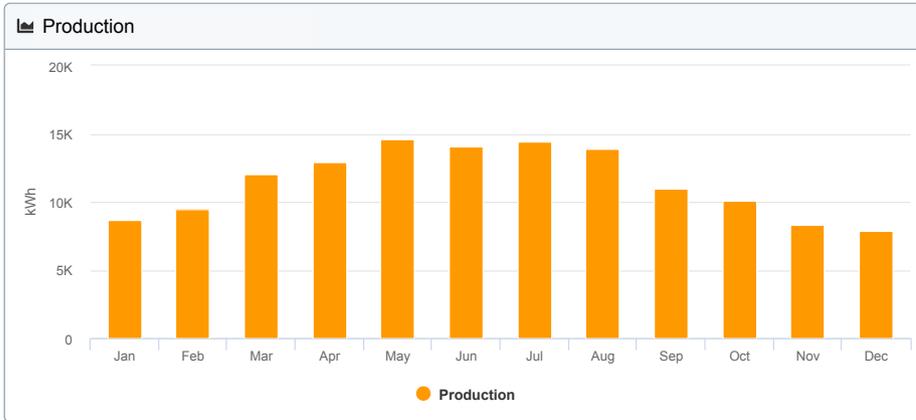
Solar Production Modeling

#28 - Electrical Main Office

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb 4 minutes ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 113.5 kW |
| Inverter AC Nameplate | 84.2 kW Load Ratio: 1.35 |
| Annual Production | 137.3 MWh |
| Performance Ratio | 69.4% |
| kWh/kWp | 1,209.6 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|------------------|---------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,744.1 | 7.5% |
| | Shaded Irradiance | 1,744.1 | -0.0% |
| | Irradiance After Reflection | 1,684.6 | -3.4% |
| | Irradiance After Soiling | 1,650.9 | -2.0% |
| | Total Collector Irradiance | 1,650.9 | 0.0% |
| Energy (kWh) | Nameplate | 187,497.3 | - |
| | Output at Irradiance Levels | 186,464.6 | -0.6% |
| | Output at Cell Temperature Derate | 170,071.1 | -8.8% |
| | Output After Mismatch | 169,957.1 | -0.1% |
| | Optimal DC Output | 169,957.1 | 0.0% |
| | Constrained DC Output | 169,150.5 | -0.5% |
| | Inverter Output | 163,972.0 | -3.1% |
| | Energy to Grid | 137,278.2 | -16.3% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 35.5°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|------------|------------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| Inverter | IQ8H-208-72-2-US (208V) (Enphase) | | Spec Sheet | | | | | | | | | |

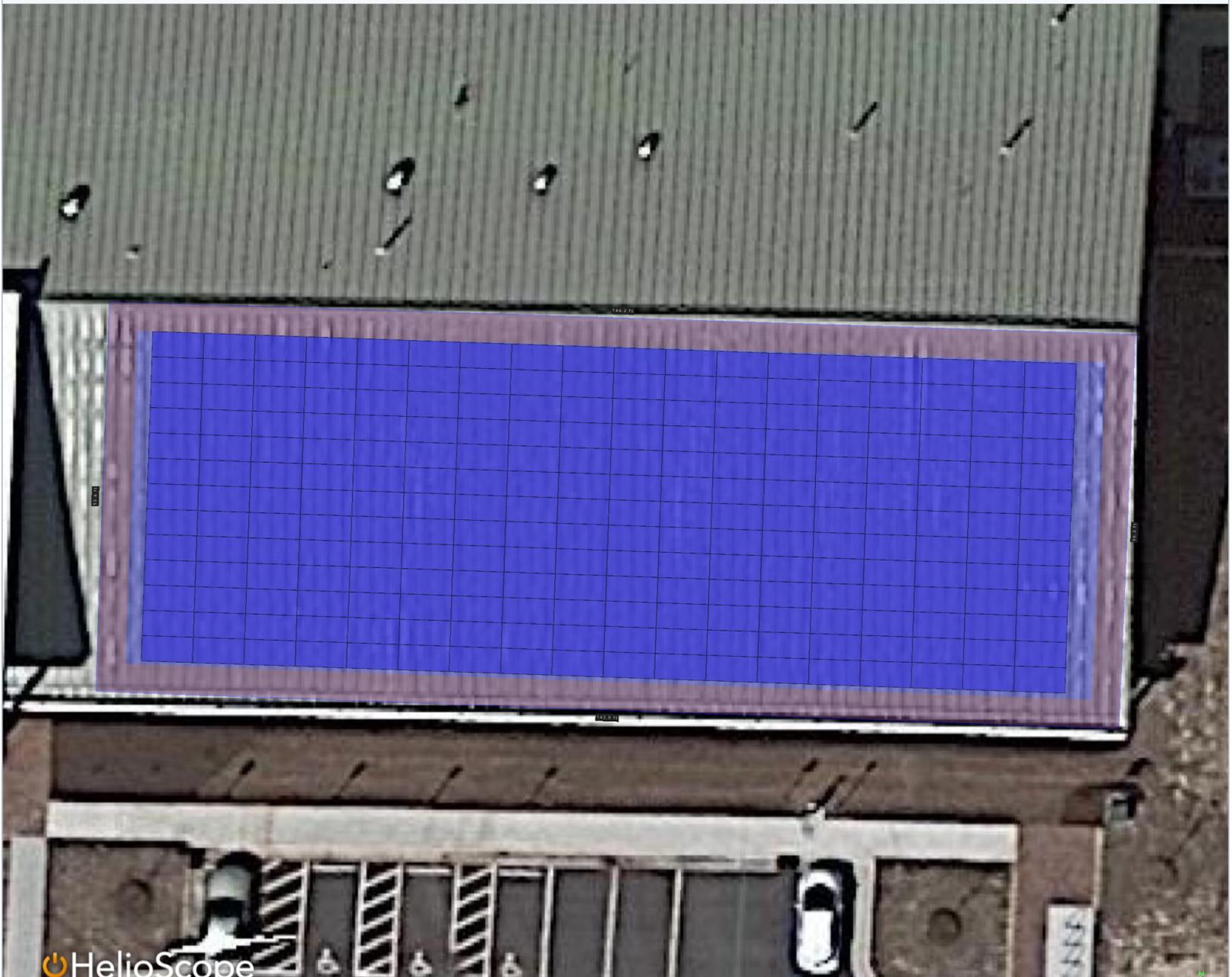
Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 15 |
| 12 AWG (Copper) | AC Home Runs | 3 |
| 5 input AC Panels | AC Panels | 3 |
| IQ8H-208-72-2-US (208V) | Inverters | 234 |
| TSM-DEG18MC.20(II) 485 | Modules | 234 |

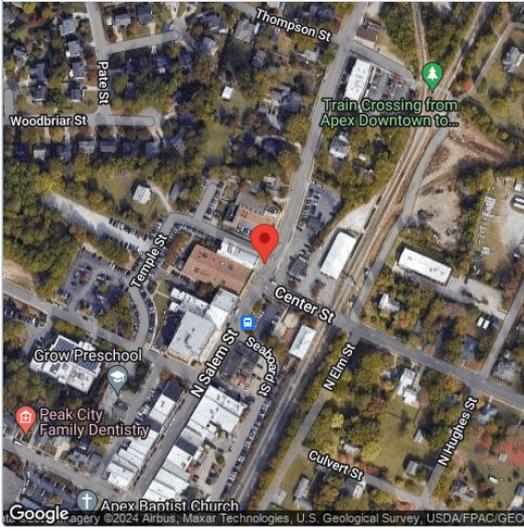
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 100.3 | 100.2 | 10,647.2 | 8,665.4 |
| February | 97.6 | 113.5 | 113.5 | 12,146.2 | 9,438.7 |
| March | 138.5 | 150.9 | 150.9 | 16,220.9 | 12,006.7 |
| April | 161.9 | 168.9 | 168.9 | 18,224.4 | 12,922.4 |
| May | 191.2 | 194.2 | 194.2 | 20,972.1 | 14,628.4 |
| June | 186.5 | 187.2 | 187.2 | 20,208.3 | 14,069.6 |
| July | 189.3 | 191.0 | 191.0 | 20,619.4 | 14,445.3 |
| August | 177.6 | 183.7 | 183.7 | 19,833.0 | 13,852.2 |
| September | 130.6 | 139.7 | 139.7 | 15,029.7 | 10,940.0 |
| October | 110.9 | 125.2 | 125.2 | 13,434.0 | 10,108.9 |
| November | 83.2 | 99.7 | 99.7 | 10,630.9 | 8,338.6 |
| December | 72.6 | 89.9 | 89.9 | 9,531.2 | 7,862.1 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|-----------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 182° | 0.0 ft | 1x1 | 234 | 234 | 113.49 kW |

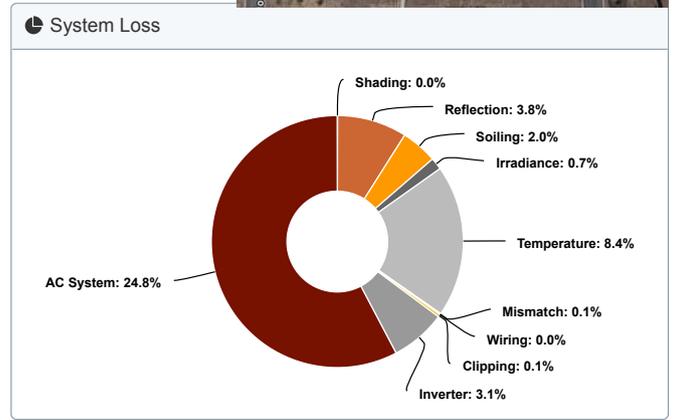
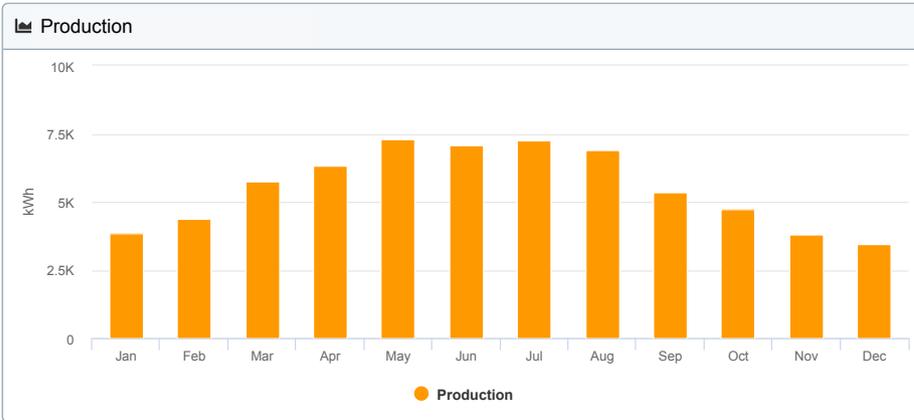
Solar Production Modeling

#29 - Electrical Warehouse

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 2 |
| Module DC Nameplate | 65.5 kW |
| Inverter AC Nameplate | 48.6 kW Load Ratio: 1.35 |
| Annual Production | 66.1 MWh |
| Performance Ratio | 62.5% |
| kWh/kWp | 1,010.3 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|---------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,617.7 | -0.3% |
| | Shaded Irradiance | 1,617.4 | -0.0% |
| | Irradiance After Reflection | 1,555.3 | -3.8% |
| | Irradiance After Soiling | 1,524.2 | -2.0% |
| | Total Collector Irradiance | 1,524.2 | 0.0% |
| Energy (kWh) | Nameplate | 99,875.4 | - |
| | Output at Irradiance Levels | 99,215.5 | -0.7% |
| | Output at Cell Temperature Derate | 90,901.1 | -8.4% |
| | Output After Mismatch | 90,841.2 | -0.1% |
| | Optimal DC Output | 90,841.2 | 0.0% |
| | Constrained DC Output | 90,708.3 | -0.1% |
| | Inverter Output | 87,941.4 | -3.1% |
| | Energy to Grid | 66,147.7 | -24.8% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 34.1°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|-------|------------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Inverter | IQ8H-208-72-2-US (208V) (Enphase) | | Spec Sheet | | | | | | | | |

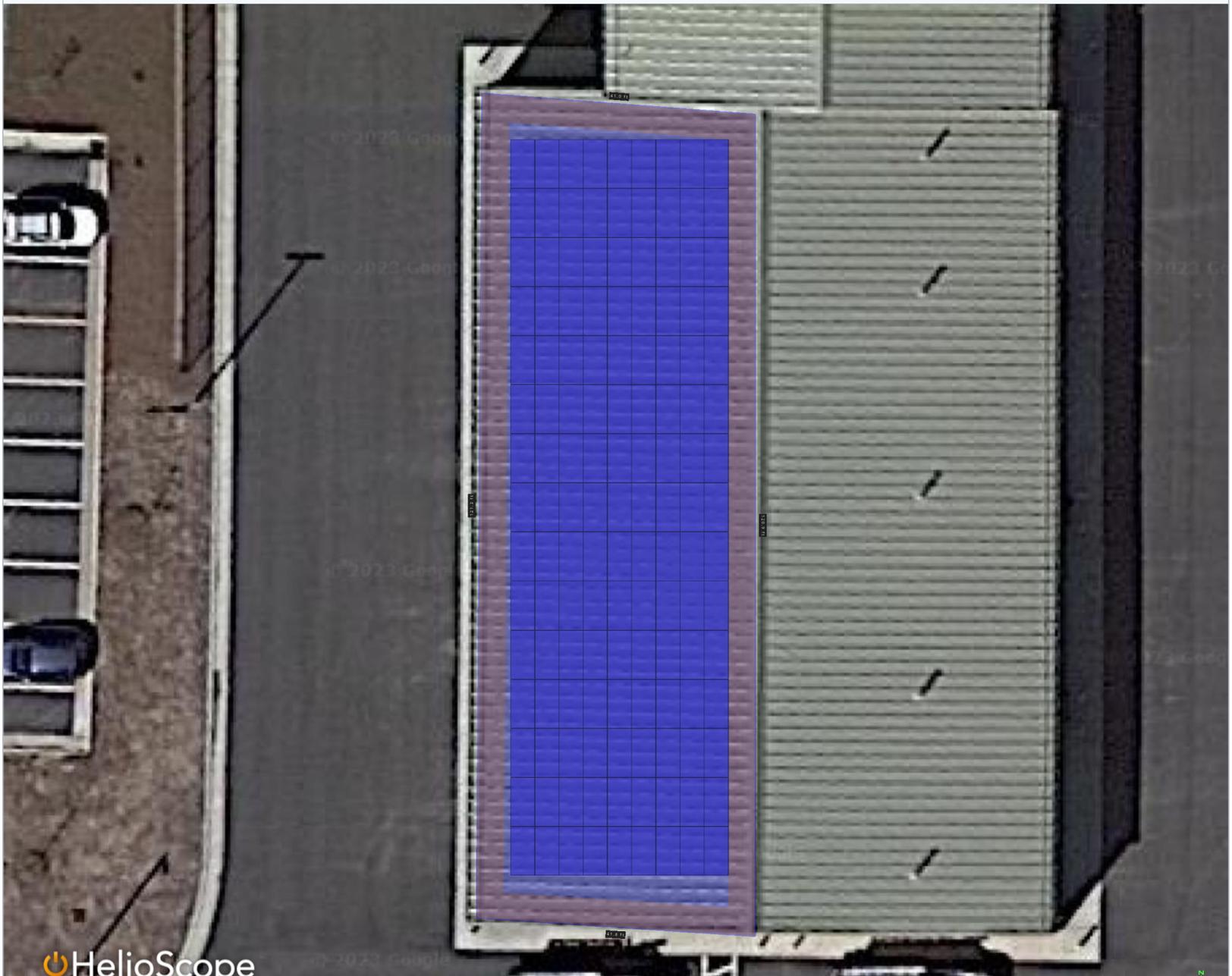
Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 9 |
| 12 AWG (Copper) | AC Home Runs | 2 |
| 4 input AC Panels | AC Panels | 1 |
| 5 input AC Panels | AC Panels | 1 |
| IQ8H-208-72-2-US (208V) | Inverters | 135 |
| TSM-DEG18MC.20(II) 485 | Modules | 135 |

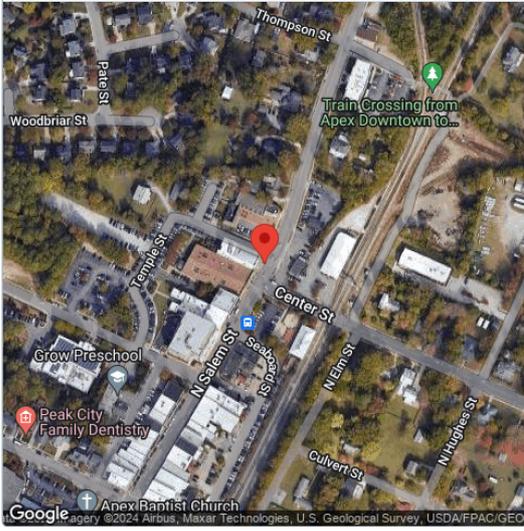
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 82.6 | 82.6 | 4,977.3 | 3,854.4 |
| February | 97.6 | 99.1 | 99.1 | 6,056.7 | 4,368.2 |
| March | 138.5 | 138.0 | 137.9 | 8,510.5 | 5,739.3 |
| April | 161.9 | 160.5 | 160.5 | 9,969.7 | 6,318.4 |
| May | 191.2 | 190.4 | 190.4 | 11,855.7 | 7,298.2 |
| June | 186.5 | 184.3 | 184.3 | 11,477.4 | 7,059.1 |
| July | 189.3 | 187.9 | 187.9 | 11,693.7 | 7,264.6 |
| August | 177.6 | 177.0 | 177.0 | 11,009.8 | 6,884.7 |
| September | 130.6 | 130.2 | 130.2 | 8,052.9 | 5,347.1 |
| October | 110.9 | 110.9 | 110.9 | 6,810.1 | 4,756.1 |
| November | 83.2 | 83.9 | 83.9 | 5,096.9 | 3,800.3 |
| December | 72.6 | 72.7 | 72.7 | 4,364.8 | 3,457.3 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 2 | Flush Mount | Landscape (Horizontal) | 10° | 270° | 0.0 ft | 1x1 | 135 | 135 | 65.48 kW |

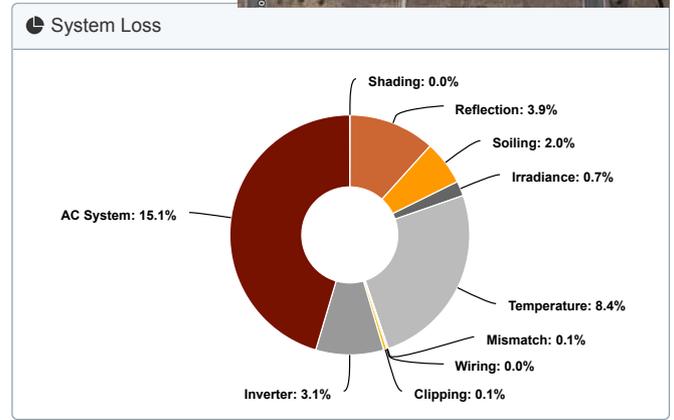
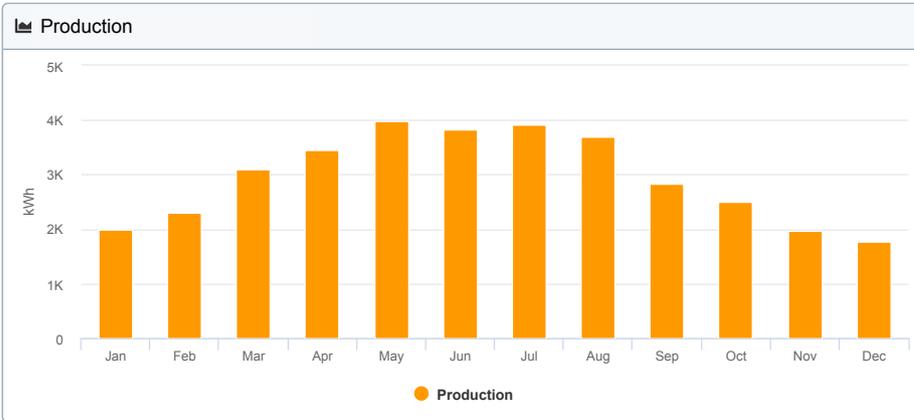
Solar Production Modeling

#30 - Electrical Covered Storage

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a minute ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 3 |
| Module DC Nameplate | 31.0 kW |
| Inverter AC Nameplate | 23.0 kW Load Ratio: 1.35 |
| Annual Production | 35.3 MWh |
| Performance Ratio | 70.5% |
| kWh/kWp | 1,138.1 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|---------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,615.4 | -0.4% |
| | Shaded Irradiance | 1,615.1 | -0.0% |
| | Irradiance After Reflection | 1,552.5 | -3.9% |
| | Irradiance After Soiling | 1,521.4 | -2.0% |
| | Total Collector Irradiance | 1,521.4 | 0.0% |
| Energy (kWh) | Nameplate | 47,265.3 | - |
| | Output at Irradiance Levels | 46,951.7 | -0.7% |
| | Output at Cell Temperature Derate | 43,022.7 | -8.4% |
| | Output After Mismatch | 42,994.4 | -0.1% |
| | Optimal DC Output | 42,994.4 | 0.0% |
| | Constrained DC Output | 42,933.1 | -0.1% |
| | Inverter Output | 41,623.5 | -3.1% |
| | Energy to Grid | 35,326.7 | -15.1% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 34.1°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|-------|------------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Inverter | IQ8H-208-72-2-US (208V) (Enphase) | | Spec Sheet | | | | | | | | |

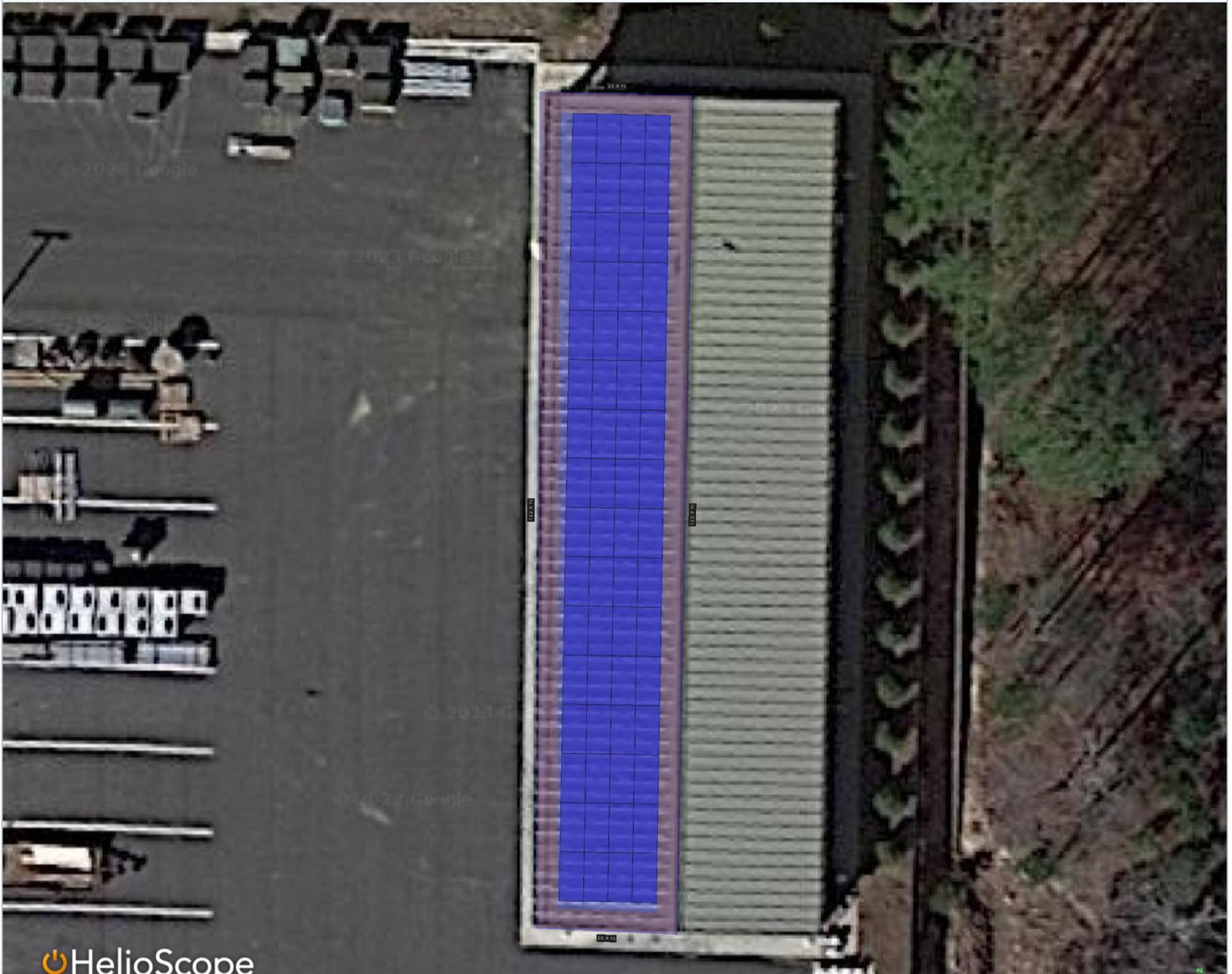
Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 4 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 4 input AC Panels | AC Panels | 1 |
| IQ8H-208-72-2-US (208V) | Inverters | 64 |
| TSM-DEG18MC.20(II) 485 | Modules | 64 |

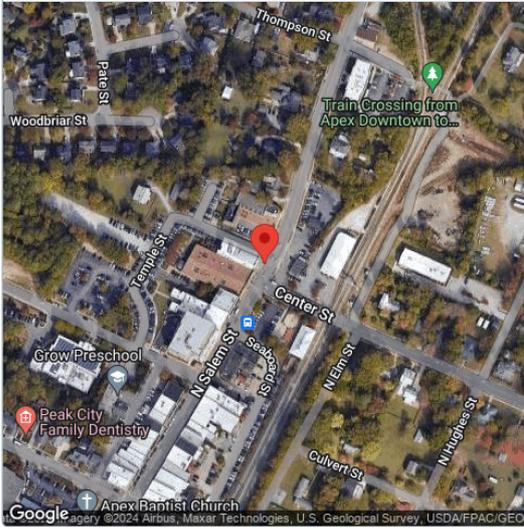
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 82.3 | 82.3 | 2,349.2 | 1,988.5 |
| February | 97.6 | 98.8 | 98.8 | 2,861.7 | 2,311.0 |
| March | 138.5 | 137.8 | 137.7 | 4,026.4 | 3,088.5 |
| April | 161.9 | 160.4 | 160.4 | 4,720.8 | 3,440.8 |
| May | 191.2 | 190.4 | 190.4 | 5,616.8 | 3,978.4 |
| June | 186.5 | 184.3 | 184.3 | 5,438.9 | 3,825.4 |
| July | 189.3 | 187.8 | 187.8 | 5,540.7 | 3,917.8 |
| August | 177.6 | 176.8 | 176.8 | 5,214.2 | 3,702.9 |
| September | 130.6 | 130.1 | 130.1 | 3,811.2 | 2,837.1 |
| October | 110.9 | 110.7 | 110.6 | 3,219.6 | 2,506.2 |
| November | 83.2 | 83.7 | 83.6 | 2,406.6 | 1,963.4 |
| December | 72.6 | 72.4 | 72.4 | 2,059.2 | 1,766.6 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 3 | Flush Mount | Landscape (Horizontal) | 10° | 271° | 0.0 ft | 1x1 | 64 | 64 | 31.04 kW |

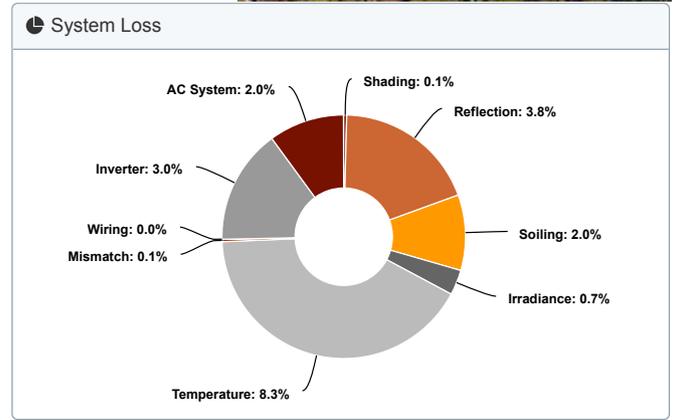
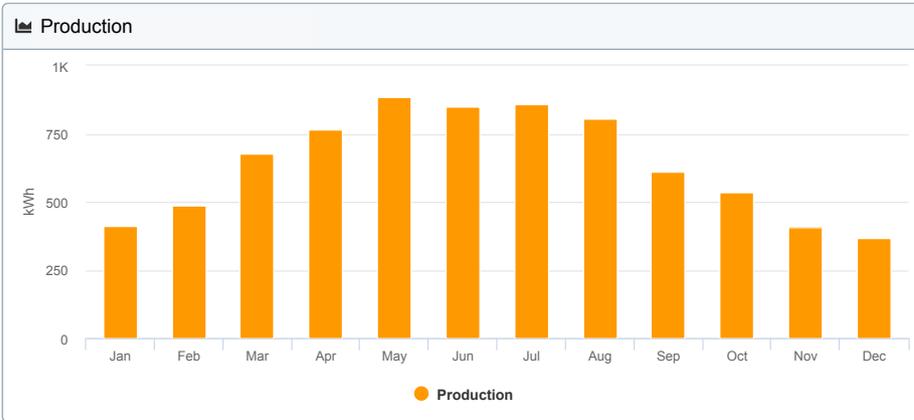
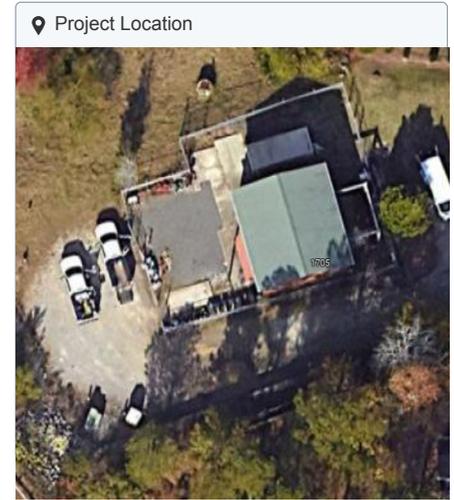
Solar Production Modeling

#31 - Water Resources Meter Shop

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex, NC, USA |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

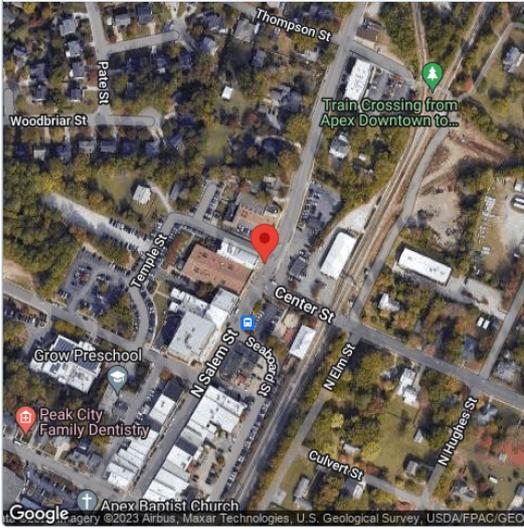
| System Metrics | |
|-----------------------|--|
| Design | Design 3 |
| Module DC Nameplate | 5.8 kW |
| Inverter AC Nameplate | 4.6 kW Load Ratio: 1.28 |
| Annual Production | 7.7 MWh |
| Performance Ratio | 81.5% |
| kWh/kWp | 1,316.1 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 3393361079-e8bab1d590-d923baf568-b5452d22fc |



| Annual Production | | | |
|----------------------------------|-------------------------------------|----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,614.0 | -0.5% |
| | Shaded Irradiance | 1,612.8 | -0.1% |
| | Irradiance After Reflection | 1,551.5 | -3.8% |
| | Irradiance After Soiling | 1,520.4 | -2.0% |
| | Total Collector Irradiance | 1,520.4 | -0.0% |
| Energy (kWh) | Nameplate | 8,854.7 | - |
| | Output at Irradiance Levels | 8,795.7 | -0.7% |
| | Output at Cell Temperature Derate | 8,066.8 | -8.3% |
| | Output After Mismatch | 8,061.5 | -0.1% |
| | Optimal DC Output | 8,061.5 | 0.0% |
| | Constrained DC Output | 8,061.8 | 0.0% |
| | Inverter Output | 7,816.1 | -3.0% |
| | Energy to Grid | 7,659.7 | -2.0% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | | 17.9°C |
| | Avg. Operating Cell Temp | | 34.1°C |
| Simulation Metrics | | | |
| | Operating Hours | | 4,664 |
| | Solved Hours | | 4,664 |
| | Pending Hours | | - |
| | Error Hours | | - |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|---------------------------------|--------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | Characterization | | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | Spec Sheet Characterization,PAN | | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | Spec Sheet Characterization,PAN | | | | | | | | | |
| Inverter | IQ8H-240-72-2-US (240V) (Enphase) | Spec Sheet | | | | | | | | | | |

Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|---------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 255° | 0.0 ft | 1x1 | 6 | 6 | 2.91 kW |
| Field Segment 2 | Flush Mount | Landscape (Horizontal) | 10° | 75° | 0.0 ft | 1x1 | 6 | 6 | 2.91 kW |

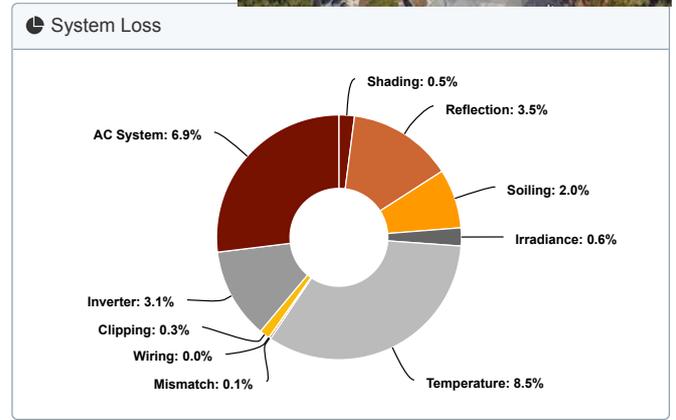
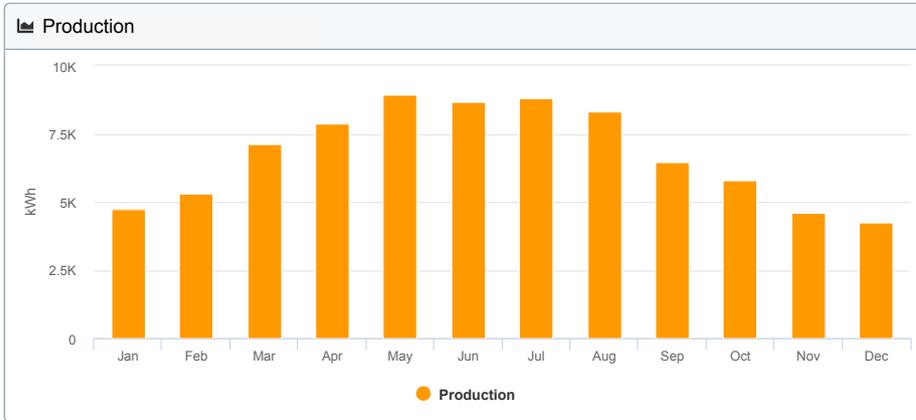
Solar Production Modeling

#32 - Public Works Operations

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb 3 months ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 62.6 kW |
| Inverter AC Nameplate | 46.4 kW Load Ratio: 1.35 |
| Annual Production | 80.8 MWh |
| Performance Ratio | 76.9% |
| kWh/kWp | 1,292.1 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 06e23eb0f4-72263ef06-e2a1d80076-cea972d4a8 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,679.6 | 3.6% |
| | Shaded Irradiance | 1,670.8 | -0.5% |
| | Irradiance After Reflection | 1,611.6 | -3.5% |
| | Irradiance After Soiling | 1,579.4 | -2.0% |
| | Total Collector Irradiance | 1,579.3 | -0.0% |
| Energy (kWh) | Nameplate | 98,882.4 | - |
| | Output at Irradiance Levels | 98,280.4 | -0.6% |
| | Output at Cell Temperature Derate | 89,922.9 | -8.5% |
| | Output After Mismatch | 89,863.3 | -0.1% |
| | Optimal DC Output | 89,863.3 | 0.0% |
| | Constrained DC Output | 89,552.7 | -0.3% |
| | Inverter Output | 86,813.7 | -3.1% |
| | Energy to Grid | 80,843.1 | -6.9% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 34.7°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|-------|---------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Inverter | IQ8H-208-72-2-US (208V) (Enphase) | | Spec Sheet | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 9 |
| 12 AWG (Copper) | AC Home Runs | 2 |
| 4 input AC Panels | AC Panels | 1 |
| 5 input AC Panels | AC Panels | 1 |
| IQ8H-208-72-2-US (208V) | Inverters | 129 |
| TSM-DEG18MC.20(II) 485 | Modules | 129 |

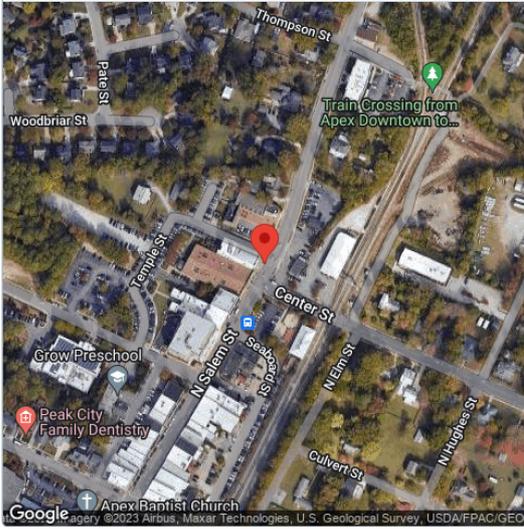
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 90.7 | 90.1 | 5,233.0 | 4,714.1 |
| February | 97.6 | 104.1 | 103.7 | 6,091.4 | 5,331.0 |
| March | 138.5 | 144.5 | 143.5 | 8,487.5 | 7,107.3 |
| April | 161.9 | 165.6 | 164.7 | 9,795.2 | 7,861.5 |
| May | 191.2 | 192.0 | 191.0 | 11,378.4 | 8,944.7 |
| June | 186.5 | 187.4 | 186.6 | 11,122.0 | 8,653.8 |
| July | 189.3 | 190.1 | 189.2 | 11,263.6 | 8,797.0 |
| August | 177.6 | 180.3 | 179.4 | 10,679.3 | 8,340.0 |
| September | 130.6 | 134.9 | 134.2 | 7,949.3 | 6,442.0 |
| October | 110.9 | 117.8 | 117.2 | 6,904.2 | 5,806.8 |
| November | 83.2 | 90.8 | 90.4 | 5,281.0 | 4,585.0 |
| December | 72.6 | 81.3 | 80.9 | 4,697.5 | 4,260.0 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 122° | 0.0 ft | 1x1 | 88 | 88 | 42.68 kW |
| Field Segment 2 | Flush Mount | Landscape (Horizontal) | 10° | 122° | 0.0 ft | 1x1 | 41 | 41 | 19.89 kW |
| Field Segment 3 | Flush Mount | Landscape (Horizontal) | 10° | 122° | 0.0 ft | 1x1 | 0 | 0 | 0.00 W |

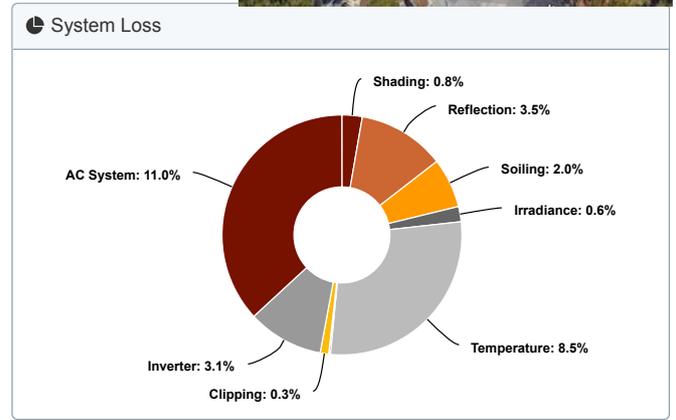
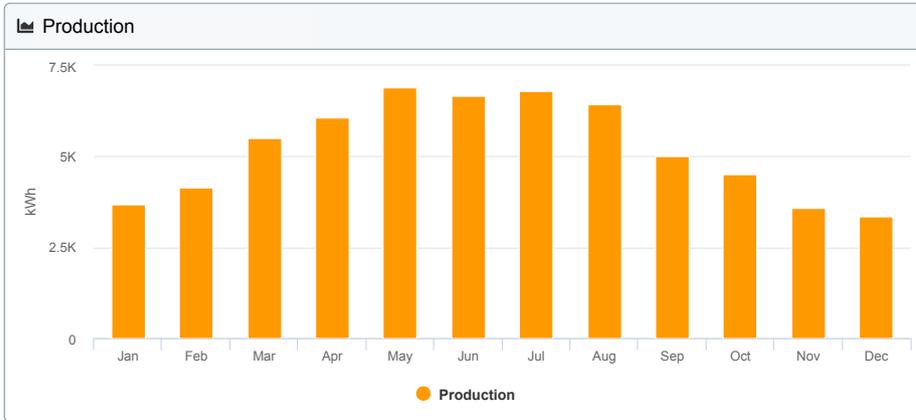
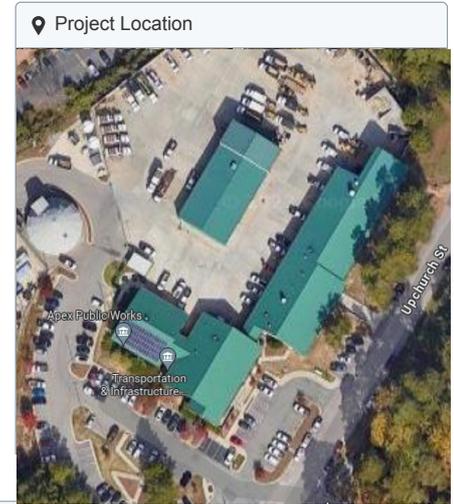
Solar Production Modeling

#33 - Public Works Operations Covered Storage

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb 3 minutes ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 50.9 kW |
| Inverter AC Nameplate | 37.8 kW Load Ratio: 1.35 |
| Annual Production | 62.6 MWh |
| Performance Ratio | 73.3% |
| kWh/kWp | 1,230.1 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|---------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,677.6 | 3.4% |
| | Shaded Irradiance | 1,663.9 | -0.8% |
| | Irradiance After Reflection | 1,605.2 | -3.5% |
| | Irradiance After Soiling | 1,573.1 | -2.0% |
| | Total Collector Irradiance | 1,573.2 | 0.0% |
| Energy (kWh) | Nameplate | 80,177.0 | - |
| | Output at Irradiance Levels | 79,682.5 | -0.6% |
| | Output at Cell Temperature Derate | 72,933.4 | -8.5% |
| | Output After Mismatch | 72,885.1 | -0.1% |
| | Optimal DC Output | 72,885.1 | 0.0% |
| | Constrained DC Output | 72,637.3 | -0.3% |
| | Inverter Output | 70,415.6 | -3.1% |
| | Energy to Grid | 62,644.8 | -11.0% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 34.6°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|------------|---------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| Inverter | IQ8H-208-72-2-US (208V) (Enphase) | | Spec Sheet | | | | | | | | | |

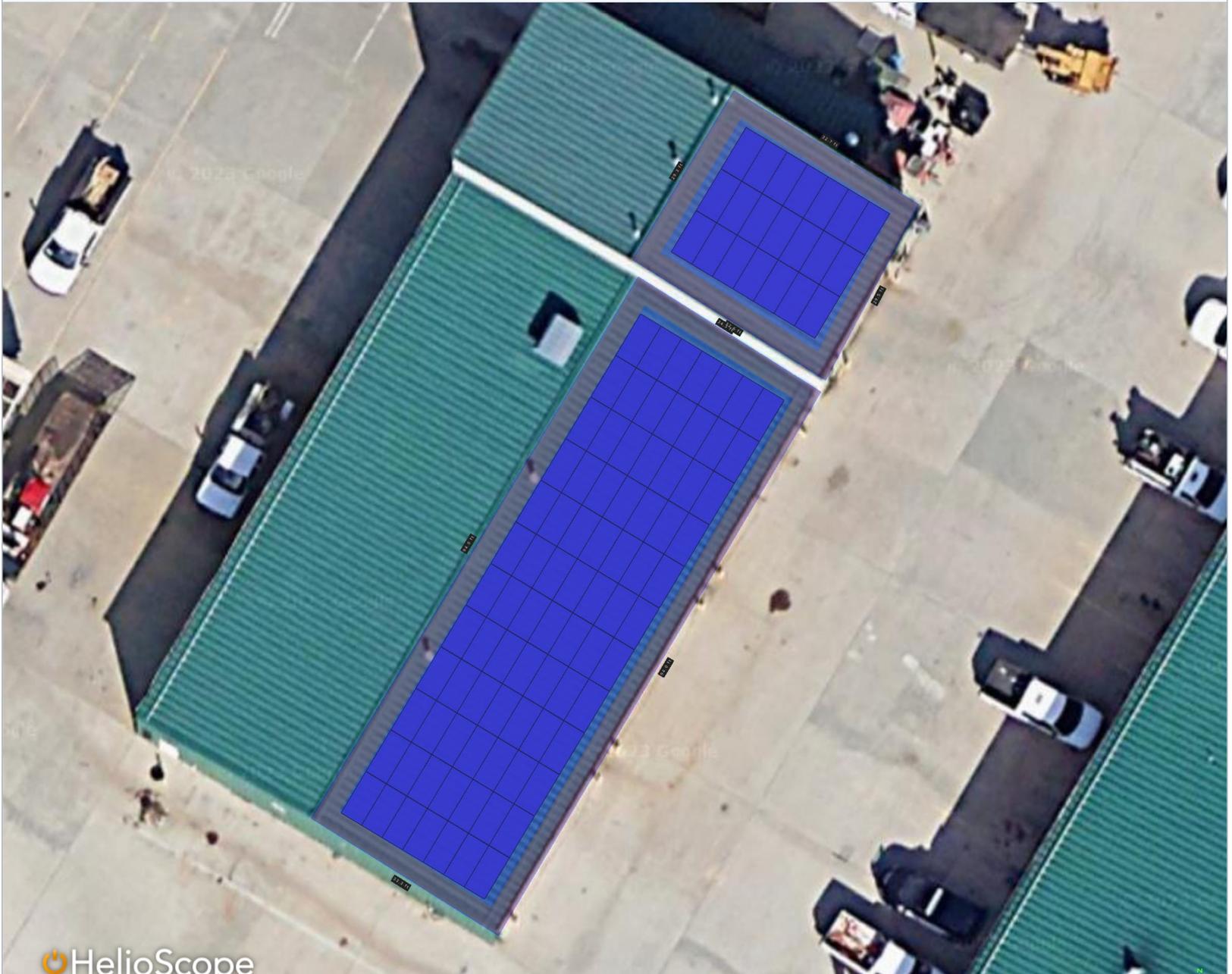
Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 7 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 7 input AC Panels | AC Panels | 1 |
| IQ8H-208-72-2-US (208V) | Inverters | 105 |
| TSM-DEG18MC.20(II) 485 | Modules | 105 |

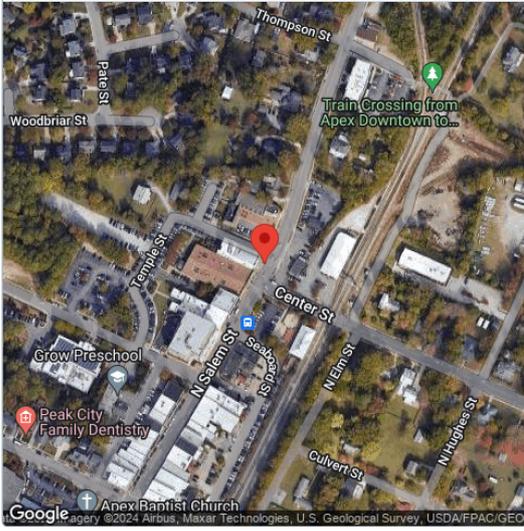
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 90.4 | 89.8 | 4,244.7 | 3,685.3 |
| February | 97.6 | 103.9 | 103.3 | 4,942.3 | 4,138.5 |
| March | 138.5 | 144.3 | 143.2 | 6,896.9 | 5,505.8 |
| April | 161.9 | 165.5 | 164.1 | 7,945.5 | 6,060.2 |
| May | 191.2 | 192.0 | 190.1 | 9,222.3 | 6,893.5 |
| June | 186.5 | 187.4 | 185.5 | 9,002.4 | 6,669.9 |
| July | 189.3 | 190.1 | 188.2 | 9,126.6 | 6,799.6 |
| August | 177.6 | 180.2 | 178.6 | 8,656.9 | 6,450.6 |
| September | 130.6 | 134.8 | 133.6 | 6,445.7 | 5,002.7 |
| October | 110.9 | 117.6 | 116.8 | 5,604.8 | 4,518.8 |
| November | 83.2 | 90.5 | 90.0 | 4,280.3 | 3,581.3 |
| December | 72.6 | 81.0 | 80.5 | 3,808.5 | 3,338.6 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 121° | 0.0 ft | 1x1 | 84 | 84 | 40.74 kW |
| Field Segment 2 | Flush Mount | Landscape (Horizontal) | 10° | 121° | 0.0 ft | 1x1 | 21 | 21 | 10.19 kW |

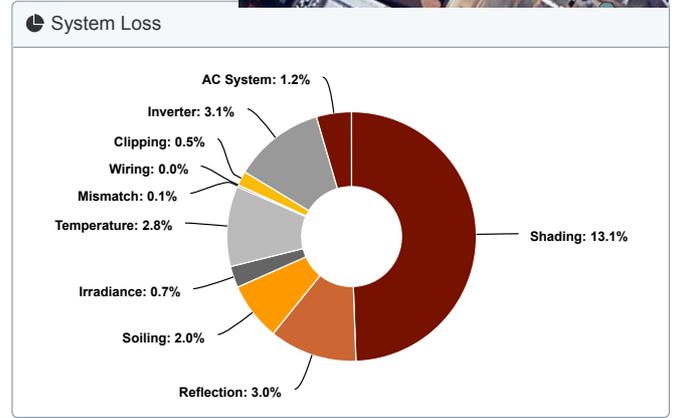
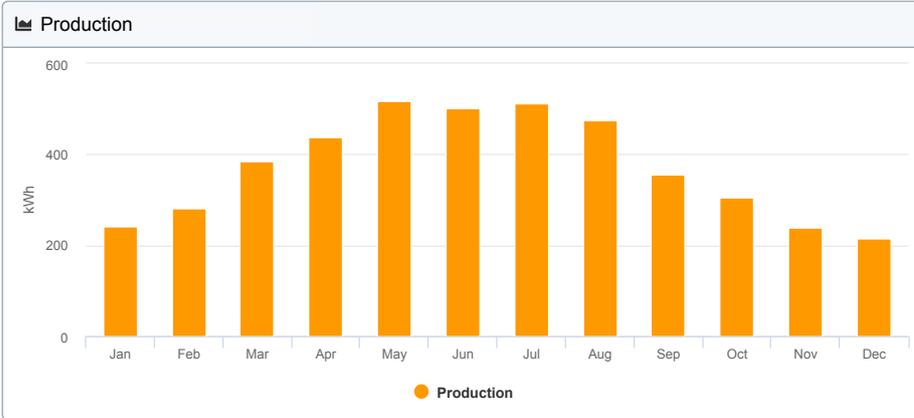
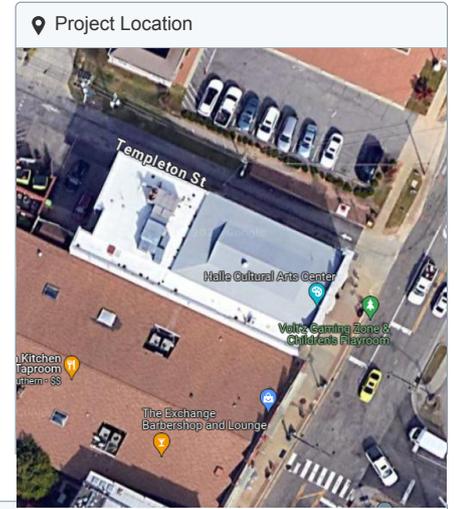
Solar Production Modeling

#35 - Halle Cultural Arts Center

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | Apex NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb 3 months ago |
| Location | (35.73265200000002, -78.85028559999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 3.4 kW |
| Inverter AC Nameplate | 2.5 kW Load Ratio: 1.35 |
| Annual Production | 4.5 MWh |
| Performance Ratio | 75.8% |
| kWh/kWp | 1,316.1 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 06e23eb0f4-72263ef06-e2a1d80076-cea972d4a8 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,736.2 | 7.0% |
| | Shaded Irradiance | 1,508.1 | -13.1% |
| | Irradiance After Reflection | 1,462.4 | -3.0% |
| | Irradiance After Soiling | 1,433.2 | -2.0% |
| | Total Collector Irradiance | 1,432.7 | -0.0% |
| Energy (kWh) | Nameplate | 4,865.1 | - |
| | Output at Irradiance Levels | 4,829.0 | -0.7% |
| | Output at Cell Temperature Derate | 4,695.5 | -2.8% |
| | Output After Mismatch | 4,692.2 | -0.1% |
| | Optimal DC Output | 4,692.2 | 0.0% |
| | Constrained DC Output | 4,669.0 | -0.5% |
| | Inverter Output | 4,522.7 | -3.1% |
| | Energy to Grid | 4,468.1 | -1.2% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | | 17.9°C |
| | Avg. Operating Cell Temp | | 25.2°C |
| Simulation Metrics | | | |
| | Operating Hours | | 4,664 |
| | Solved Hours | | 4,664 |
| | Pending Hours | | - |
| | Error Hours | | - |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|---------------------------------|-------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | Characterization | | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | Spec Sheet Characterization,PAN | | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | Spec Sheet Characterization,PAN | | | | | | | | | |
| Inverter | IQ8H-208-72-2-US (2022) (Enphase) | Spec Sheet | | | | | | | | | | |

Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 1 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 1 input AC Panels | AC Panels | 1 |
| IQ8H-208-72-2-US (2022) | Inverters | 7 |
| TSM-DEG18MC.20(II) 485 | Modules | 7 |

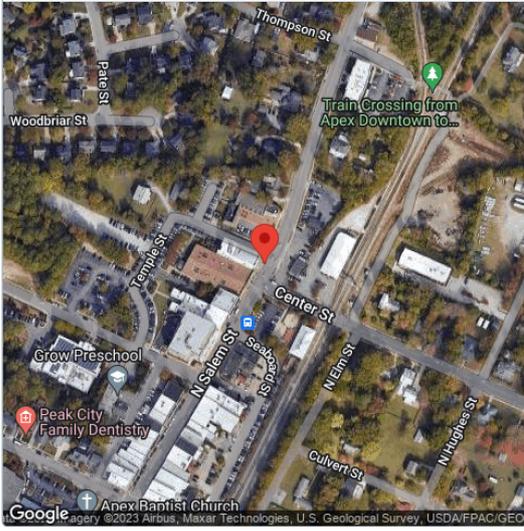
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 99.2 | 76.9 | 245.4 | 240.6 |
| February | 97.6 | 113.0 | 90.5 | 290.7 | 282.5 |
| March | 138.5 | 150.0 | 126.3 | 407.3 | 384.4 |
| April | 161.9 | 168.2 | 148.2 | 479.6 | 438.1 |
| May | 191.2 | 194.1 | 178.2 | 576.9 | 517.6 |
| June | 186.5 | 186.6 | 174.3 | 564.4 | 500.6 |
| July | 189.3 | 190.7 | 177.8 | 575.3 | 511.5 |
| August | 177.6 | 183.3 | 165.5 | 535.6 | 475.5 |
| September | 130.6 | 139.1 | 121.0 | 390.5 | 355.0 |
| October | 110.9 | 124.3 | 101.4 | 326.4 | 305.9 |
| November | 83.2 | 98.8 | 78.8 | 252.2 | 240.1 |
| December | 72.6 | 88.7 | 69.2 | 220.8 | 216.3 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|------------|------------------------|------|---------|------------------|------------|--------|---------|---------|
| Field Segment 1 | Fixed Tilt | Landscape (Horizontal) | 10° | 202° | 0.0 ft | 1x1 | 3 | 3 | 1.46 kW |
| Field Segment 2 | Fixed Tilt | Landscape (Horizontal) | 10° | 202° | 0.0 ft | 1x1 | 4 | 4 | 1.94 kW |

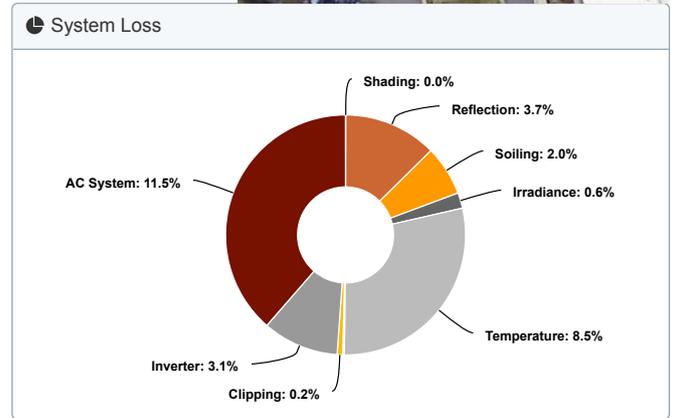
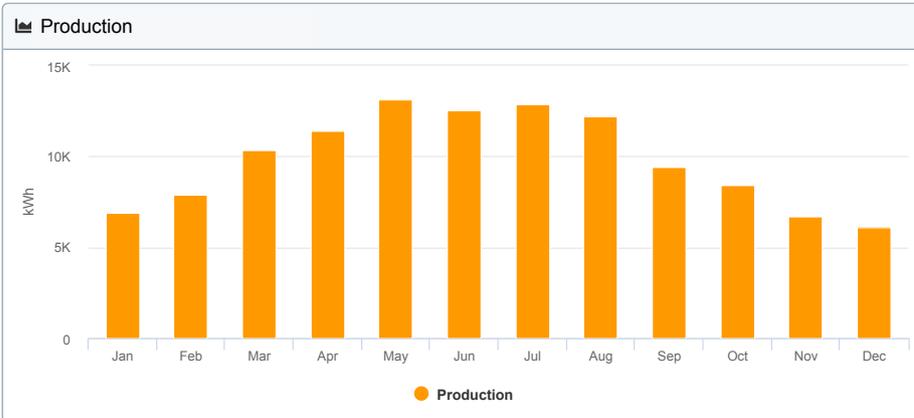
Solar Production Modeling

#36 - Senior center

Town of Apex Solar Feasibility Report

| Project Details | |
|----------------------|--|
| Address | Apex Town Hall, Hunter St, Apex, NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.7346365999999, -78.84687840000001) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|------------------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 97.0 kW |
| Inverter AC Nameplate | 72.0 kW Load Ratio: 1.35 |
| Annual Production | 118.1 MWh |
| Performance Ratio | 73.4% |
| kWh/kWp | 1,217.5 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|---------------------------------------|-------------------------------------|------------------|---------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,658.1 | 2.2% |
| | Shaded Irradiance | 1,657.8 | -0.0% |
| | Irradiance After Reflection | 1,596.0 | -3.7% |
| | Irradiance After Soiling | 1,564.1 | -2.0% |
| | Total Collector Irradiance | 1,564.1 | 0.0% |
| Energy (kWh) | Nameplate | 151,829.6 | - |
| | Output at Irradiance Levels | 150,883.9 | -0.6% |
| | Output at Cell Temperature Derate | 138,000.8 | -8.5% |
| | Output After Mismatch | 137,909.4 | -0.1% |
| | Optimal DC Output | 137,909.4 | 0.0% |
| | Constrained DC Output | 137,600.4 | -0.2% |
| | Energy to Grid | 118,101.9 | -11.5% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 34.6°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|-------------------------------------|--|--------------------------------------|------------------------------------|--------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | Characterization | | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | Spec Sheet Characterization,PAN | | | | | | | | | |
| | Inverter | IQ8H-208-72-2-US (208V) (Enphase) | Spec Sheet | | | | | | | | | |

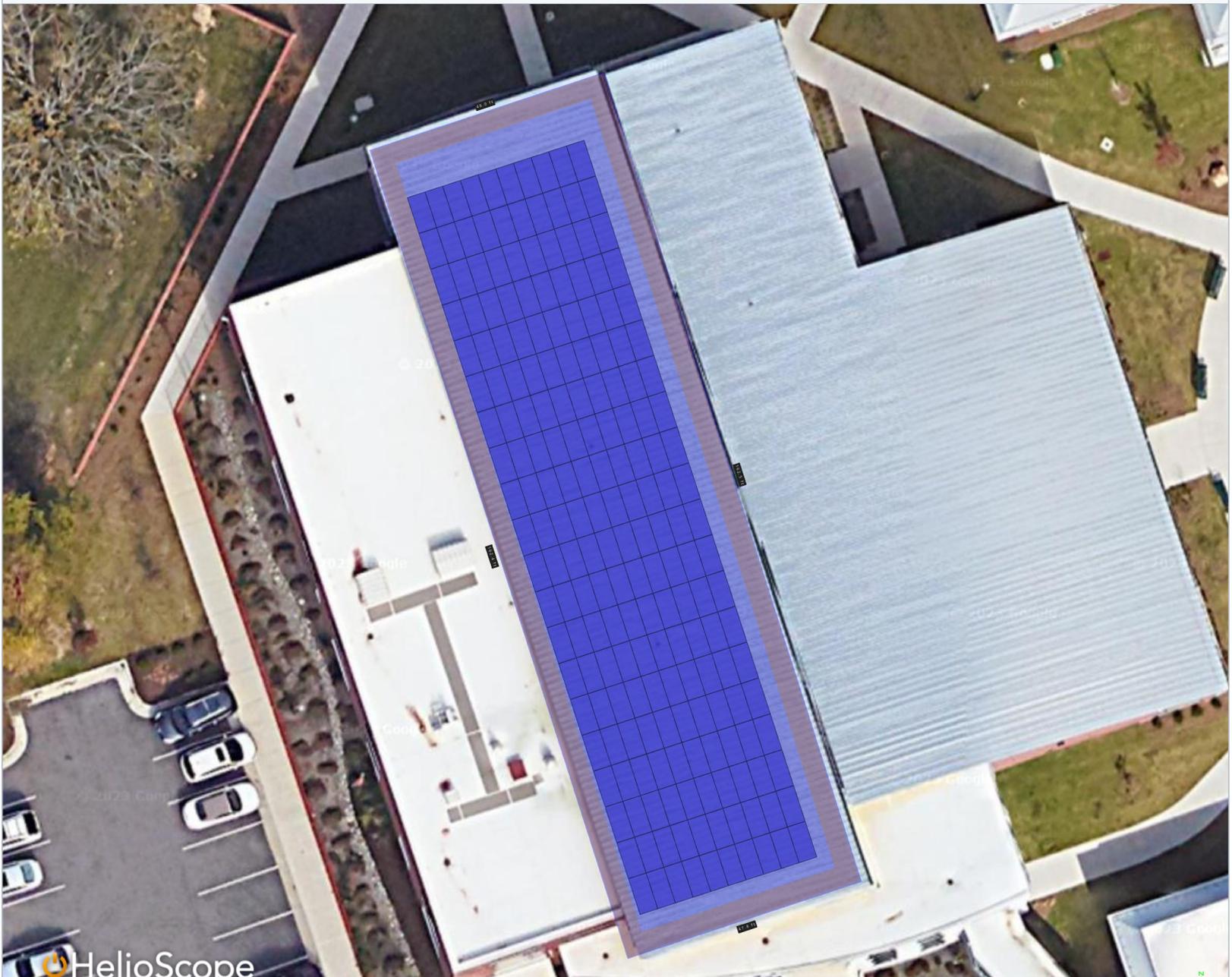
Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 13 |
| 12 AWG (Copper) | AC Home Runs | 2 |
| 6 input AC Panels | AC Panels | 1 |
| 7 input AC Panels | AC Panels | 1 |
| IQ8H-208-72-2-US (208V) | Inverters | 200 |
| TSM-DEG18MC.20(II) 485 | Modules | 200 |

Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 88.4 | 88.3 | 7,929.0 | 6,871.1 |
| February | 97.6 | 104.1 | 104.1 | 9,458.5 | 7,888.7 |
| March | 138.5 | 142.1 | 142.0 | 12,999.3 | 10,358.1 |
| April | 161.9 | 163.0 | 163.0 | 15,009.8 | 11,430.1 |
| May | 191.2 | 191.8 | 191.8 | 17,683.0 | 13,128.7 |
| June | 186.5 | 184.9 | 184.9 | 17,050.6 | 12,569.2 |
| July | 189.3 | 188.8 | 188.8 | 17,401.7 | 12,877.3 |
| August | 177.6 | 179.1 | 179.1 | 16,510.4 | 12,238.0 |
| September | 130.6 | 133.3 | 133.2 | 12,217.8 | 9,434.1 |
| October | 110.9 | 115.5 | 115.5 | 10,530.6 | 8,460.6 |
| November | 83.2 | 89.1 | 89.0 | 8,046.5 | 6,722.0 |
| December | 72.6 | 78.1 | 78.1 | 6,992.3 | 6,124.1 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 10° | 252° | 0.0 ft | 1x1 | 200 | 200 | 97.00 kW |

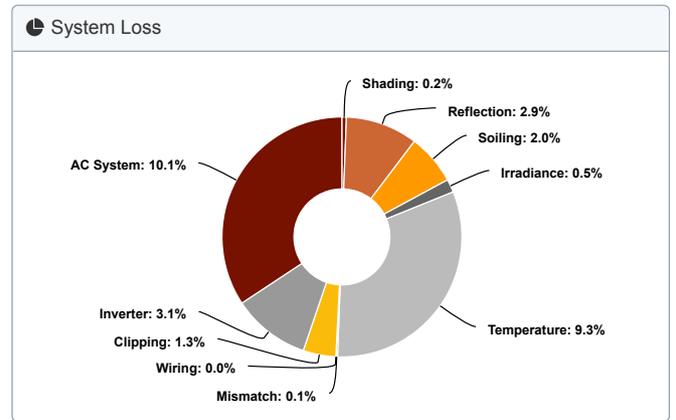
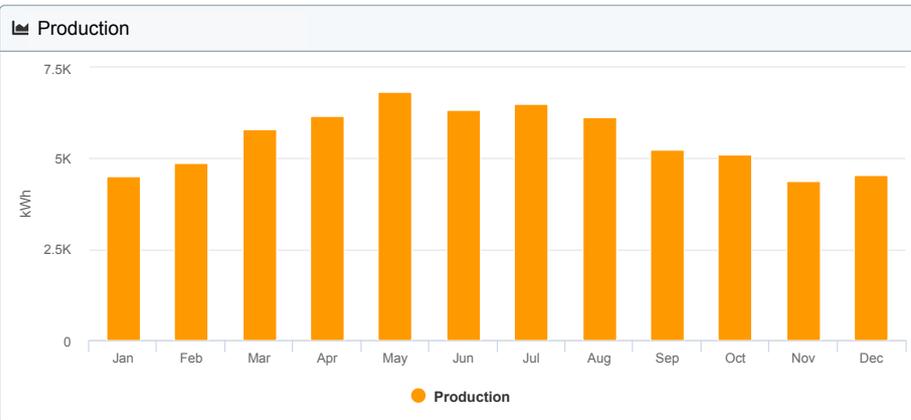
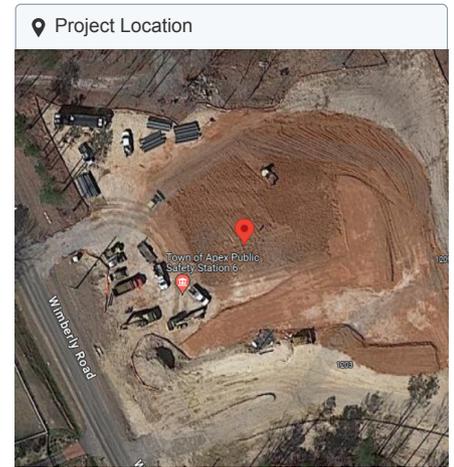
Solar Production Modeling

#37 - Public Safety Station 6

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|--|
| Address | Wimberly Road, Apex, NC |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.7527278999999, -78.9127611) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 49.5 kW |
| Inverter AC Nameplate | 36.7 kW Load Ratio: 1.35 |
| Annual Production | 66.5 MWh |
| Performance Ratio | 73.7% |
| kWh/kWp | 1,344.2 |
| Weather Dataset | TMY, 10km Grid (35.75,-78.95), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|---------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,619.6 | - |
| | POA Irradiance | 1,823.2 | 12.6% |
| | Shaded Irradiance | 1,820.0 | -0.2% |
| | Irradiance After Reflection | 1,767.9 | -2.9% |
| | Irradiance After Soiling | 1,732.5 | -2.0% |
| | Total Collector Irradiance | 1,732.5 | -0.0% |
| Energy (kWh) | Nameplate | 85,768.2 | - |
| | Output at Irradiance Levels | 85,325.4 | -0.5% |
| | Output at Cell Temperature Derate | 77,368.8 | -9.3% |
| | Output After Mismatch | 77,318.1 | -0.1% |
| | Optimal DC Output | 77,318.1 | 0.0% |
| | Constrained DC Output | 76,314.0 | -1.3% |
| | Inverter Output | 73,959.8 | -3.1% |
| | Energy to Grid | 66,499.9 | -10.1% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 18.1°C | |
| | Avg. Operating Cell Temp | 36.4°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,663 | |
| | Solved Hours | 4,663 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | | | | | | | | | | |
|------------------------------|--|--------------------------------------|------------|---------------------------------|---|---|---|---|---|---|---|---|
| Description | Condition Set 1 | | | | | | | | | | | |
| Weather Dataset | TMY10km Grid (35.75,-78.95)NREL(prospector) (download) | | | | | | | | | | | |
| Solar Angle Location | Meteo Lat/Lng | | | | | | | | | | | |
| Transposition Model | Perez Model | | | | | | | | | | | |
| Temperature Model | Sandia Model | | | | | | | | | | | |
| Temperature Model Parameters | Rack Type | a | b | Temperature Delta | | | | | | | | |
| | Fixed Tilt | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Flush Mount | -2.81 | -0.05 | 0.0°C | | | | | | | | |
| | East-West | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| | Carport | -3.56 | -0.08 | 3.0°C | | | | | | | | |
| Soiling (%) | J | F | M | A | M | J | J | A | S | O | N | D |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Irradiation Variance | 5.0% | | | | | | | | | | | |
| Cell Temperature Spread | 4.0°C | | | | | | | | | | | |
| Module Binning Range | -2.5% to 2.5% | | | | | | | | | | | |
| AC System Derate | 0.50% | | | | | | | | | | | |
| Component Characterizations | Type | Component | | Characterization | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | | Spec Sheet Characterization,PAN | | | | | | | | |
| Inverter | IQ8H-208-72-2-US (208V) (Enphase) | | Spec Sheet | | | | | | | | | |

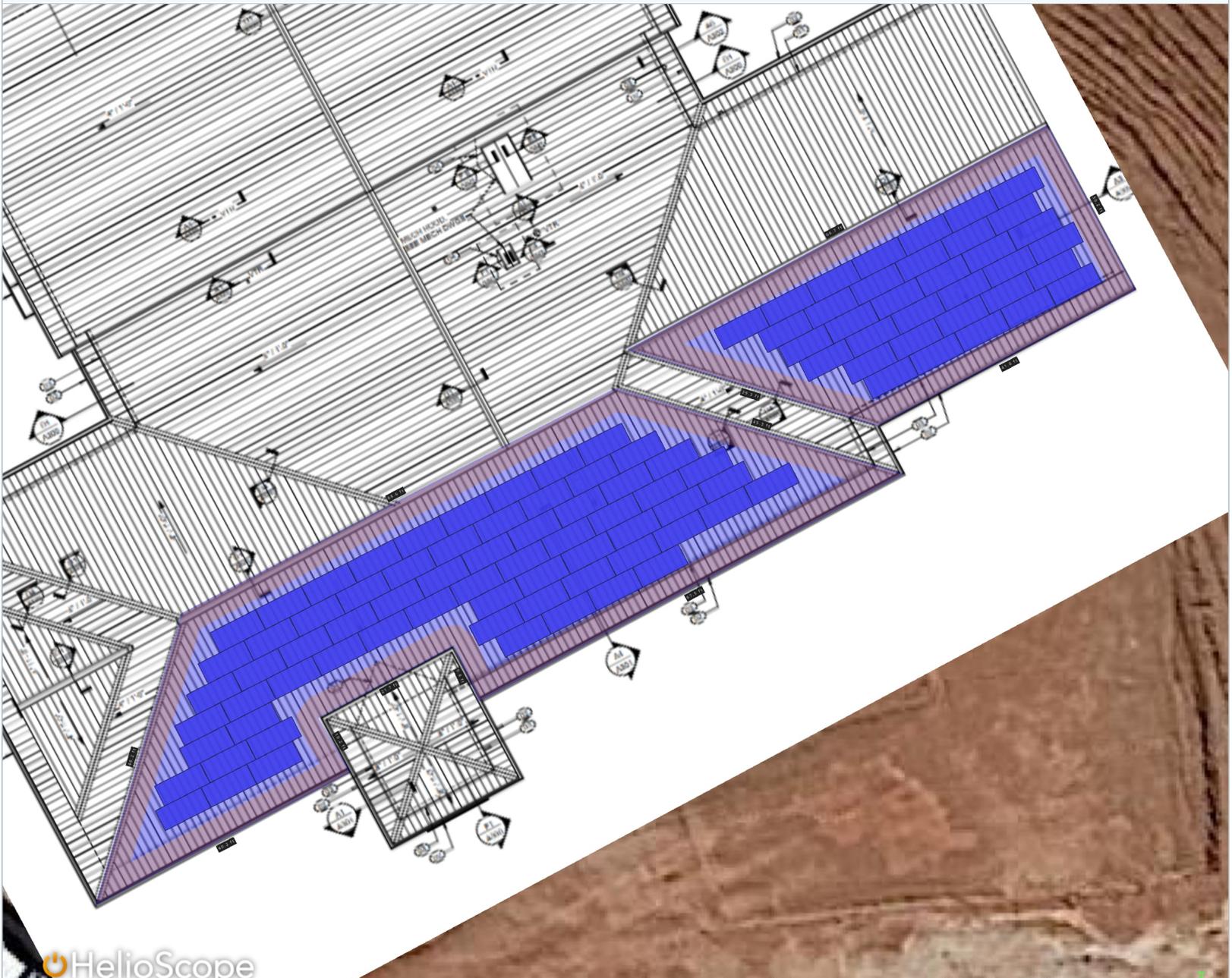
Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 7 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 7 input AC Panels | AC Panels | 1 |
| IQ8H-208-72-2-US (208V) | Inverters | 102 |
| TSM-DEG18MC.20(II) 485 | Modules | 102 |

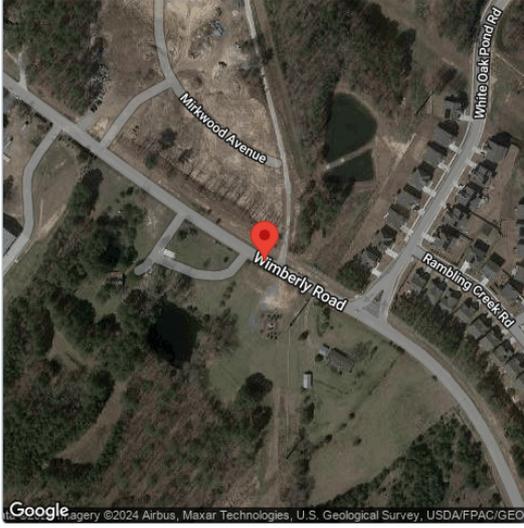
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 78.3 | 117.1 | 116.4 | 5,478.3 | 4,497.3 |
| February | 98.7 | 131.1 | 130.8 | 6,176.7 | 4,891.0 |
| March | 138.6 | 160.7 | 160.5 | 7,577.8 | 5,816.8 |
| April | 164.9 | 173.5 | 173.4 | 8,188.0 | 6,187.9 |
| May | 194.7 | 189.5 | 189.4 | 8,917.8 | 6,828.7 |
| June | 186.6 | 177.0 | 176.9 | 8,319.9 | 6,324.3 |
| July | 189.9 | 183.2 | 183.1 | 8,614.0 | 6,508.9 |
| August | 169.4 | 173.1 | 172.9 | 8,147.9 | 6,142.6 |
| September | 130.8 | 145.0 | 144.8 | 6,827.1 | 5,249.7 |
| October | 110.3 | 139.3 | 139.0 | 6,563.2 | 5,101.3 |
| November | 82.3 | 116.7 | 116.3 | 5,481.5 | 4,395.0 |
| December | 75.0 | 116.9 | 116.3 | 5,476.0 | 4,556.4 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 30° | 153° | 0.0 ft | 1x1 | 67 | 67 | 32.50 kW |
| Field Segment 2 | Flush Mount | Landscape (Horizontal) | 30° | 153° | 0.0 ft | 1x1 | 35 | 35 | 16.98 kW |

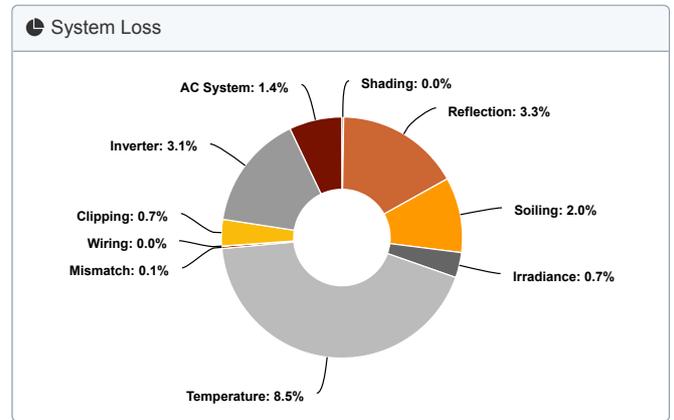
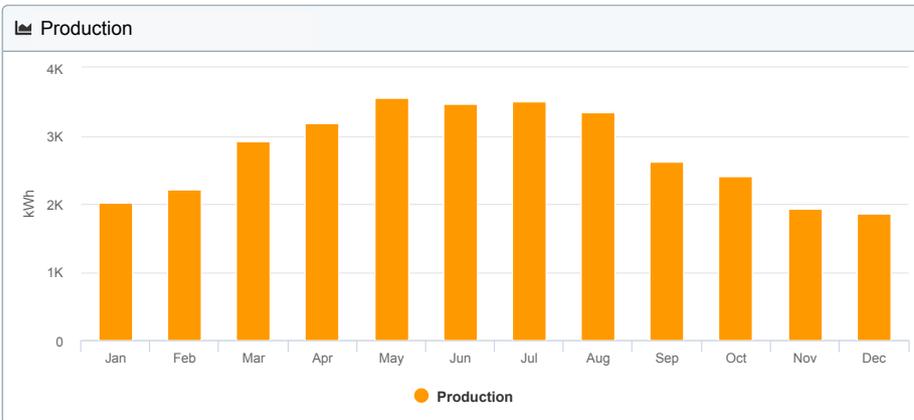
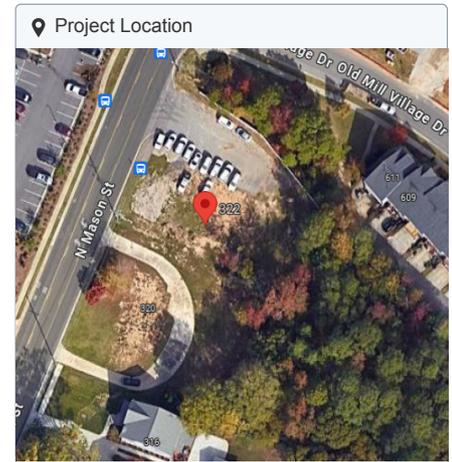
Solar Production Modeling

#38 - Mason Street Municipal Building

Town of Apex Solar Feasibility Report

| Project Details | |
|-----------------|---|
| Address | 322 N. MASON ST, APEX, NC 27502 |
| Owner | Jordan Holcomb |
| Last Modified | Jordan Holcomb a few seconds ago |
| Location | (35.732692600000014, -78.84529809999998) (GMT -5) |
| Profile | Default Commercial |

| System Metrics | |
|-----------------------|--|
| Design | Design 1 |
| Module DC Nameplate | 24.7 kW |
| Inverter AC Nameplate | 18.4 kW Load Ratio: 1.35 |
| Annual Production | 33.0 MWh |
| Performance Ratio | 81.7% |
| kWh/kWp | 1,335.1 |
| Weather Dataset | TMY, 10km grid (35.75,-78.85), NREL (prospector) |
| Simulator Version | 648e362559-5db1640b78-e5889ac7c0-7f135d0477 |



| Annual Production | | | |
|----------------------------------|-------------------------------------|-----------------|--------------|
| | Description | Output | % Delta |
| Irradiance (kWh/m ²) | Annual Global Horizontal Irradiance | 1,621.9 | - |
| | POA Irradiance | 1,634.7 | 0.8% |
| | Shaded Irradiance | 1,633.9 | -0.0% |
| | Irradiance After Reflection | 1,579.9 | -3.3% |
| | Irradiance After Soiling | 1,548.3 | -2.0% |
| | Total Collector Irradiance | 1,548.3 | 0.0% |
| Energy (kWh) | Nameplate | 38,331.6 | - |
| | Output at Irradiance Levels | 38,076.2 | -0.7% |
| | Output at Cell Temperature Derate | 34,821.3 | -8.5% |
| | Output After Mismatch | 34,798.2 | -0.1% |
| | Optimal DC Output | 34,798.2 | 0.0% |
| | Constrained DC Output | 34,553.4 | -0.7% |
| | Inverter Output | 33,492.2 | -3.1% |
| | Energy to Grid | 33,023.5 | -1.4% |
| Temperature Metrics | | | |
| | Avg. Operating Ambient Temp | 17.9°C | |
| | Avg. Operating Cell Temp | 34.3°C | |
| Simulation Metrics | | | |
| | Operating Hours | 4,664 | |
| | Solved Hours | 4,664 | |
| | Pending Hours | - | |
| | Error Hours | - | |

| Condition Set | | | |
|------------------------------|--|--------------------------------------|-------|
| Description | Condition Set 1 | | |
| Weather Dataset | TMY10km grid (35.75,-78.85)NREL(prospector) (download) | | |
| Solar Angle Location | Meteo Lat/Lng | | |
| Transposition Model | Perez Model | | |
| Temperature Model | Sandia Model | | |
| Temperature Model Parameters | Rack Type | a | b |
| | Fixed Tilt | -3.56 | -0.08 |
| | Flush Mount | -2.81 | -0.05 |
| | East-West | -3.56 | -0.08 |
| | Carport | -3.56 | -0.08 |
| Soiling (%) | Temperature Delta | | |
| | | J | F |
| Irradiation Variance | | M | A |
| | | M | J |
| Cell Temperature Spread | | J | A |
| | | S | O |
| Module Binning Range | | N | D |
| | | 2 | 2 |
| AC System Derate | | 2 | 2 |
| | | 2 | 2 |
| Component Characterizations | Type | Component | |
| | Module | TSM-DEG18MC.20(II) 485 (Trina Solar) | |
| | Inverter | IQ8H-208-72-2-US (208V) (Enphase) | |

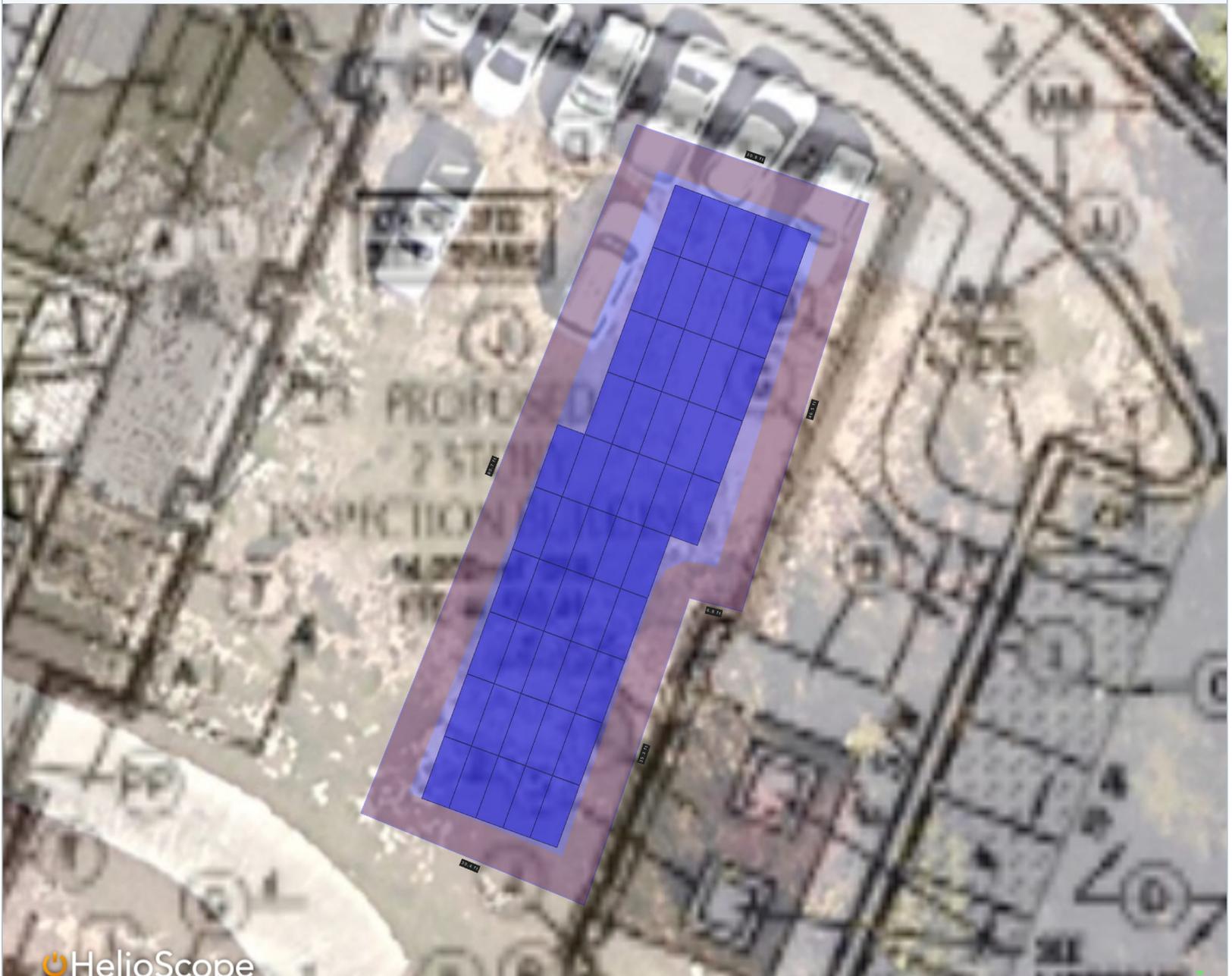
Design BOM

| Component | Type | Quantity |
|-------------------------|--------------|----------|
| 1/0 AWG (Aluminum) | AC Branches | 4 |
| 12 AWG (Copper) | AC Home Runs | 1 |
| 4 input AC Panels | AC Panels | 1 |
| IQ8H-208-72-2-US (208V) | Inverters | 51 |
| TSM-DEG18MC.20(II) 485 | Modules | 51 |

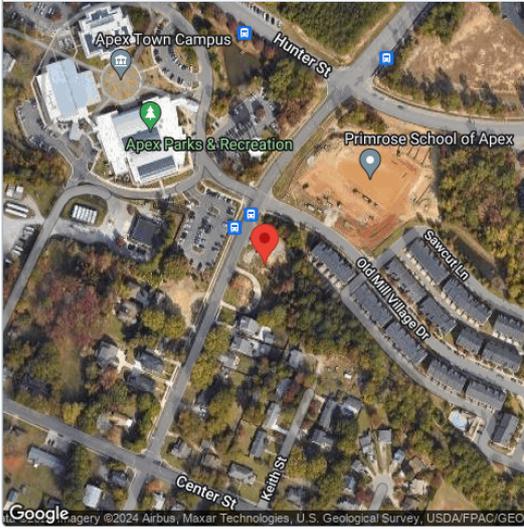
Monthly Shading

| Month | GHI (kWh/m ²) | POA (kWh/m ²) | Shaded (kWh/m ²) | Nameplate (kWh) | Grid (kWh) |
|-----------|---------------------------|---------------------------|------------------------------|-----------------|------------|
| January | 82.1 | 93.1 | 92.8 | 2,149.6 | 2,013.4 |
| February | 97.6 | 103.3 | 103.3 | 2,413.4 | 2,208.6 |
| March | 138.5 | 142.7 | 142.5 | 3,351.3 | 2,929.1 |
| April | 161.9 | 159.8 | 159.7 | 3,768.0 | 3,178.2 |
| May | 191.2 | 181.2 | 181.2 | 4,263.6 | 3,563.1 |
| June | 186.5 | 178.2 | 178.2 | 4,195.4 | 3,470.9 |
| July | 189.3 | 179.8 | 179.8 | 4,229.3 | 3,506.0 |
| August | 177.6 | 171.6 | 171.5 | 4,034.8 | 3,336.7 |
| September | 130.6 | 131.1 | 131.1 | 3,079.4 | 2,621.6 |
| October | 110.9 | 117.3 | 117.2 | 2,739.5 | 2,411.9 |
| November | 83.2 | 91.7 | 91.7 | 2,137.7 | 1,930.2 |
| December | 72.6 | 84.8 | 84.8 | 1,969.5 | 1,853.8 |

Design Render



Project Location



Design Wiring Zone

| Description | Combiner Poles | String Size | Stringing Strategy |
|-------------|----------------|-------------|--------------------|
| Wiring Zone | - | 1 - 1 | Along Racking |

Field Segments

| Description | Racking | Orientation | Tilt | Azimuth | Intrarow Spacing | Frame Size | Frames | Modules | Power |
|-----------------|-------------|------------------------|------|---------|------------------|------------|--------|---------|----------|
| Field Segment 1 | Flush Mount | Landscape (Horizontal) | 30° | 110° | 0.0 ft | 1x1 | 51 | 51 | 24.74 kW |