



Letter of Transmittal

To: _____ **Date:** _____

_____ **Project #:** _____
_____ **Project:** _____

We are sending you:

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The following items:

___ Prints ___ Sepias ___ Tracings ___ Reports ___ Shop Drawings ___ Original Drawings
___ Mylar ___ Linen ___ Specifications ___ Samples ___ Other

Description:

Remarks:

Signed: _____

Copy to: _____



October 17, 2022

Kenneth Buckland
Director of Planning and Community Development
Town of Wareham Planning Board
54 Marion Road
Wareham, MA 02571

***RE: Response to Charles Rowley's Peer Review Comments, October 3, 2022
91 and 101 Fearing Hill Road Solar Project – Wareham, MA
ADE Job #3055.02***

Dear Mr. Buckland:

This response letter addresses the comments made in Charles Rowley's Peer Review letter dated October 3, 2022, for the above-referenced project. Please note the peer review comments are italicized, and our responses follow in bold text:

Plans:

- 1. The plan set consists of nine sheets showing the project location and adjustments made in accordance with previous discussions with the applicant, Horsley-Witten and Atlantic Design.*

No response necessary.

- 2. The plan should show the proposed monitoring well that is to be located east of the access road near Fearing Hill Road. The two additional existing wells should be highlighted and with notations for all three wells indicating that they are to be protected and not disturbed.*

The three monitoring wells to be utilized in the future groundwater monitoring program have been called out on Sheet 5 of the revised site plans, including the 3rd one (MW #6) recently installed near Fearing Hill Road on 10/14/22.

- 3. If Mass DOT spec gravel is to be used on the access road commencing at Fearing Hill Road, it should be either 12" in total thickness, laid down in two lifts, or 8" of reclaimed asphalt as per MassDOT spec.*

The detail has been revised as requested on Sheet 8 of the revised site plans.

Construction Sequence/Phasing Schedule

1. *The schedule needs to include notations as to maintenance requirements at every level to protect against erosion of the site. It should include reference to immediate repairs as necessary as well as inspections for the access road, swales and riprap.*

The Construction Sequence/Phasing Schedule has been revised to address repairs, maintenance, re-seeding, and erosion protection as requested, and in addition, it now references the Erosion Control notes and Stormwater Operation and Maintenance notes that are on the site plans. These notes are on the site plans, Sheets 7 and 9.

2. *The seeding of temporary cover also should include references to maintenance and re-seeding as necessary while germination is taking place. Corrections to disturbed areas with appropriate stabilization such as bio-degradable or jute netting should be included as well.*

The Construction Sequence/Phasing Schedule has been revised to address repairs, maintenance, re-seeding, and erosion protection as requested, and in addition, it now references the Erosion Control notes and Stormwater Operation and Maintenance notes that are on the site plans. These notes are on the site plans, Sheets 7 and 9.

3. *There will be some disruption of the site even after temporary seeding has taken place, is well established and is stabilized. Once panel supports are in place, activity around them should be limited to minimize further disturbance. All disturbed areas due to installation activity should be re-loamed and seeded, and stabilized as necessary to prevent erosion.*

The Construction Sequence/Phasing Schedule has been revised to address repairs, maintenance, re-seeding, and erosion protection as requested, and in addition, it now references the Erosion Control notes and Stormwater Operation and Maintenance notes that are on the site plans. These notes are on the site plans, Sheets 7 and 9.

4. *The final seeding of the site should be monitored and maintained while germination is established. This may include activities described above to prevent erosion of the site.*

The schedule has been revised to address repairs, maintenance, re-seeding, and erosion protection and in addition, it now references the Erosion Control Notes and Stormwater Operation and Maintenance notes that are on the site plans, which also address these same issues.

Monitoring Wells

1. *The monitoring of the wells still needs to be established for frequency of observation, protection, and how reporting will be done.*

Refer to the attached final Fearing Hill Solar Monitoring Plan attached to the Horsley Witten Group's final report dated 10/17/22.

2. *Consideration needs to be given as to who will be in charge of making reports and alerting the appropriate authority in the case of dramatic changes in ground water levels, should they occur.*

Refer to the attached final Fearing Hill Solar Monitoring Plan attached to the Horsley Witten Group's final report dated 10/17/22.

3. *While it may not be possible to predict the immediate or significant impact that changes in ground water levels may have on the project site or the surrounding properties, it remains an important responsibility of the project developer and owner to maintain the property in good condition at all times.*

Understood and acknowledged by the applicant.

4. *The project proponent has volunteered to provide liability insurance that would cover the cost of off-site impacts that are attributable to on-site activity for the duration of the project. A draft liability policy should be provided to the Board for consideration and to legal counsel for review prior to final approval of the project.*

A certificate of Liability Insurance was provided by the applicant to the Planning Board on 10/3/22.

Decommissioning of the Project

1. *The decommissioning cost estimate for the project should be reviewed to be sure that it covers all aspects of returning the site to good condition subsequent to the removal of all project components. The Board may wish to consider including the planting of a limited number of trees over the disturbed site that include both pine and other species that were removed for construction. This would assist in returning the site over time to its pre-construction condition.*



*Kenneth Buckland
Director of Planning and Community Development
Town of Wareham Planning Board
Response to Charles Rowley's Peer Review Comments, October 3, 2022
91 and 101 Fearing Hill Road Solar Project – Wareham, MA
October 17, 2022 – Page 4*

The attached revised Solar Decommissioning Evaluation and Cost Estimate includes planting of trees as requested.

Please call us at (508) 888-9282 if you should have any questions.

Sincerely,

ATLANTIC DESIGN ENGINEERS, INC.

A handwritten signature in black ink, appearing to read 'Rich Tabaczynski', is written over the printed name.

Richard J. Tabaczynski, P.E.
Vice President

RJT/rp

CC: Charles Rowley
Wareham MA 3, LLC
Horsley Witten Group



October 17, 2022

Mr. Michael King, Chairman
Town of Wareham Planning Board
Town Hall
54 Marion Road
Wareham, MA 02571

Re: Review of Revised Documents – Proposed Fearing Hill Solar Facility
91 & 101 Fearing Hill Road, Wareham, MA

Dear Chairman King and Planning Board Members:

The Horsley Witten Group, Inc. (HW) is pleased to provide this letter discussing several iterations of revised plans and reports regarding the proposed solar facility on Fearing Hill in Wareham, Massachusetts (the Site) since the time of our previously submitted Hydrogeologic and Hydrologic Study (H&H Study) in May 2022. The solar facility is proposed by Wareham MA 3, LLC (the Applicant), with design materials submitted by the Applicant's engineer, Atlantic Design Engineers, Inc. (Atlantic). Please note that HW's review of the project has focused on big picture H&H concerns, and is not a detailed, regulatory compliance review. We understand that the Planning Board has received regulatory review from Charles Rowley, PE, PLS. We defer to Mr. Rowley for regulatory review items.

HW detailed the following recommendations in our May 2022 report. For further detail, see full report.

1. The rows of panels should be spaced farther apart to provide sufficient sunlight to the vegetation below.
2. The HydroCAD model should use the NOAA+ rainfall estimate (most conservative rainfall amounts currently available).
3. The HydroCAD model should accurately model the Time of Concentration and Curve Numbers for the proposed vegetation cover. Either the proposed vegetation and topsoil depths or modeled Curve Number should be updated to concur with each other.
4. The HydroCAD model should reflect the western railroad grade/drainage ditch and its assumed outlet culvert beneath Fearing Hill Road, or any other offsite areas.
5. The stormwater management should aim to reduce the stormwater runoff and infiltration on the southwest side of the site to mitigate impacts to neighboring properties. HW recommended trying to divert more runoff to the eastern side of the site.
6. The Applicant should propose on-site monitoring during and after construction to ensure the Site is stabilized.

Since the time of our May 2022 report there have been several rounds of revised document submittals from the Applicant with subsequent HW responses. Each of those submittal and response rounds is described in detail below. For each round *Italics font in the HW response indicates that the comment has been adequately addressed* and **bold font indicates that, at the time of that response round, further information or changes were requested.**

June Revisions

In June the Applicant provided an interim set of revised plans, stormwater calculations and other supporting documents as follows:

- Response to Recommendations from Horsley Witten Group, Inc. Hydrogeologic and Hydrologic Study, 91 & 101 Fearing Hill Road Solar Project, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated June 16, 2022 (4 pages).
- Response to Charles Rowley's Peer Review Comments, 91 & 101 Fearing Hill Road Solar Project, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated June 16, 2022 (10 pages).
- Stormwater Addendum 1, Fearing Hill Road Solar Project, 91 & 101 Fearing Hill Road, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated June 14, 2022 (109 pages).
- HydroCAD model "3055.01- FEARING HILL RD – PRE-REV2," prepared by Atlantic Design Engineers, Inc., received June 28, 2022.
- HydroCAD model "3055.01- FEARING HILL RD – POST-REV2," prepared by Atlantic Design Engineers, Inc., received June 28, 2022.
- HydroCAD model "3055.01- FEARING HILL RD – POST-TRENCH SIZING," prepared by Atlantic Design Engineers, Inc., received June 28, 2022.
- Grass Coverage Figure, prepared by Atlantic Design Engineers, Inc., dated June 14, 2022 (1 sheet).
- Solar Array Seeding Schedule and Protocols, Fearing Hill Road Solar Project, Wareham, Massachusetts, dated June 14, 2022.
- Site Development Plans, Fearing Hill Road Solar Project, 91 & 101 Fearing Hill Road, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated May 17, 2021 and revised June 14, 2022.

After review of the June 2022 plans and the reports provided in June, HW had the following assessment of the status of the recommendations (numbering remaining consistent with the above list) from our May 2022 H&H report. This assessment was conveyed to the Applicant and Atlantic through email and telephone conversations.

1. The panels were further spaced apart to provide 50% uncovered grass area across the whole site, not including drainage basins, the road, or equipment pads. *This recommendation has been addressed to HW satisfaction.*
2. The HydroCAD models were updated to use the NOAA+ rainfall amounts. *This recommendation has been addressed to HW satisfaction.*
3. The HydroCAD model Time of Concentration was updated to match HW's recommendations. The Applicant increased the topsoil requirements and grass cover to match the proposed Curve Number. *This recommendation has been addressed to HW satisfaction.*
4. The HydroCAD model now reflects the western side of the site more accurately. **However, HW recommends that the Applicant reduce the assumed storage volume of the ditch along the former railroad to accurately represent that only one side of the ditch appears to be connected to the single culvert identified as passing under Fearing Hill Road.**
5. The Applicant added a diversion swale to re-route more of the runoff away from the southwest corner and to the east side of the site. HW has the following recommendations on the diversion swale:
 - a. The Applicant has modeled the diversion swale in HydroCAD as a single section with a constant slope. **HW recommends modeling the sections of the swale with different slopes separately, to ensure that the areas with the shallowest slope have sufficient capacity and that the flow velocity in areas with steeper slope does not create erosive conditions.**
 - b. The diversion swale enters a pipe before it outlets into the Stormwater Basin. **The Applicant should provide pipe capacity calculations and erosion protection at both the upstream and downstream ends of the pipe.**
 - c. The detail for the diversion swale includes plastic-based erosion control blanket. **HW recommends switching this product to jute or another natural material that will biodegrade over time.**
6. The Applicant has noted that project will require a Stormwater Pollution Prevention Plan (SWPPP) for construction period monitoring and has agreed to provide construction and post-construction monitoring in consultation with HW and the Planning Board. The details of that monitoring plan to be determined prior to final approval. **HW notes that the Planning Board and/or Conservation Commission may include this in their conditions.**

HW also had the following new recommendations:

7. **The Applicant should provide sizing calculations for the scour pads at each outlet of the stormwater basins.**
8. **The Applicant should provide further detail about how the diversion swale will cross the access road.**

July Revisions

HW discussed the above concerns with Atlantic via email and during a phone call on July 5, 2022. In response, the Applicant provided further revised plans, stormwater calculations and other supporting documents on July 28, 2022 that included:

- Response to Charles Rowley's Peer Review Comments, 91 & 101 Fearing Hill Road Solar Project, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated July 26, 2022 (7 pages).
- Stormwater Addendum 2, Fearing Hill Road Solar Project, 91 & 101 Fearing Hill Road, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated July 18, 2022 (93 pages).
- Forebay Sizing Calculations, Fearing Hill Road Solar Project, Wareham, Massachusetts, dated July 26, 2022.
- Site Development Plans, Fearing Hill Road Solar Project, 91 & 101 Fearing Hill Road, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated May 17, 2021 and revised July 26, 2022.

After review of the July 2022 updated plans and reports, HW had the following updated assessment of the above recommendations. Previously resolved comments are not discussed for clarity.

1. *This comment was previously addressed.*
2. *This comment was previously addressed.*
3. *This comment was previously addressed.*
4. In the Post-Development HydroCAD model (REV3) the Applicant has updated the railroad grade storage to only include the area directly related to the single culvert. The Applicant has not provided the revised Pre-Development model. **The Applicant should confirm the storage area has been updated in both the Pre- and Post-Development models.**
5. The Applicant has made changes to the diversion swale.
 - a. In the revised HydroCAD model, the Applicant has reduced the slope to the minimum slope of the whole swale but is still modeling the swale as one item with a constant slope. While this change partially addresses the concerns about the areas with shallow slope, it does not address previous concerns about the areas with steeper slopes. **HW still recommends splitting the swale into multiple sections to more accurately model slope, velocity, and depth.**
 - b. The diversion swale ends before it reaches the stormwater basin, while the underlying 6-inch pipe in stone continues father down the hill to discharge at the stormwater basin. The Applicant has added a rip rap apron at both ends of the pipe to prevent erosion. It appears that the apron for the pipe may be undersized. **HW recommends the Applicant check sizing on the pipe apron and update**

both rip rap aprons to accommodate any changes to velocity based on HydroCAD changes suggested in 5.a. above.

- c. The Applicant has changed the erosion control matting to a biodegradable version. *This recommendation has been addressed to HW satisfaction.*
6. As previously noted, details of that monitoring plan are currently being discussed and will be determined prior to final approval. **HW notes that the Planning Board and/or Conservation Commission may include this in their conditions.**
7. The Applicant has provided calculations for the scour pool sizing. **HW requests that the Applicant provide the formulas that were used to calculate the scour pools. If necessary, the Applicant should update the scour pools to accommodate any changes to velocity based on HydroCAD changes suggested in 5.a. above.**
8. The Applicant has provided an additional detail for the diversion swale/trench crossing at the access road. The detail includes the underground trench, but the plans indicate that the berm and swale end before the road. HW is concerned that any flow in the swale (above the stone trench) will not cross the access road but will flow down the access road, back toward Fearing Hill Road. **HW recommends the Applicant provide further detail about this area to ensure that short-circuited overland flow down the access road does not occur.**

HW also had the following new recommendations:

9. The Applicant has proposed to pave the first 50 feet of the access road, per Charles Rowley's recommendation. HW notes that stormwater for the access road below the diversion swale crossing, and immediately surrounding area, is unmanaged outside of the addition of a stone swath on each side of the access road. It is unclear to what extent this proposed stone will capture and manage the road runoff and to what extent runoff may exit the site onto Fearing Hill Road. **HW recommends that this area be modeled as a separate drainage area with sufficient stormwater management practices to prevent any increase in runoff to Fearing Hill Road under proposed conditions.**
10. **As part of the SWPPP, the Applicant should ensure that until the site is stabilized, stormwater should not be directed to the final stormwater basins, as this will compromise their functionality long term.**

September 1st Revisions

HW discussed the above concerns with Atlantic via email and during an in-person meeting on August 16, 2022. In response, the Applicant provided further revised plans, stormwater calculations and other supporting documents on September 1, 2022 that included:

- Response to Recommendations from Horsley Witten Group, 91 & 101 Fearing Hill Road Solar Project, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated September 1, 2022 (4 pages).

- Stormwater Addendum 3, Fearing Hill Road Solar Project, 91 & 101 Fearing Hill Road, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated September 2, 2022 (161 pages).
- Additional swale calculations (1 page)
- Solar Array Seeding Schedule and Protocols and modified seed mix, Fearing Hill Road Solar Project, Wareham, Massachusetts, dated June 14, 2022, revised September 1, 2022.
- Site Development Plans, Fearing Hill Road Solar Project, 91 & 101 Fearing Hill Road, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated May 17, 2021 and revised September 2, 202 (9 sheets).
- Profile Cross-Section of Fearing Hill, Fearing Hill Road Solar Project, 91 & 101 Fearing Hill Road, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated May 17, 2021 and revised September 2, 2022 (1 sheet).
- HydroCAD model "3055.02-WITH ADDITIONAL SWALES," prepared by Atlantic Design Engineers, Inc., received September 1, 2022.
- Riprap Apron Design, Fearing Hill Road Solar Project, Wareham, Massachusetts, dated September 1, 2022.

The Applicant also provided the following:

- Revised stone trench detail (1 sheet)
- Drainage Easement Exhibit Plan, Fearing Hill Road Solar Project, 91 & 101 Fearing Hill Road, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated September 14, 2022 (1 sheet).

After review of the updated plans and reports, HW had the following updated assessment of the above recommendations. Previously resolved comments are not discussed for clarity.

1. *This comment was previously addressed.*
2. *This comment was previously addressed.*
3. *This comment was previously addressed.*
4. HW requested that the Applicant provide the updated the railroad grade storage to only include the area directly related to the single culvert in both the Pre- and Post-development models. The Applicant has shown the update in both models. *This recommendation has been addressed to HW satisfaction.*
5. Diversion Swale:
 - a. The Applicant has updated the swale modeling to multiple sections with different slopes. The swale conveys the 100-year storm without overtopping and provides a more accurate flow for the apron sizing. *This recommendation has been addressed to HW satisfaction.*
 - b. The diversion swale ends before it reaches the stormwater basin, while the underlying 6-inch pipe in stone continues father down the hill to discharge at the

stormwater basin. The Applicant has added a rip rap apron at both ends of the pipe to prevent erosion and updated the apron sizing. *This recommendation has been addressed to HW satisfaction.*

- c. *This comment was previously addressed.*
6. A proposed monitoring plan will be prepared by HW for Planning Board and Conservation Commission consideration.
 7. The Applicant has provided calculations for the scour pool sizing. **HW requests that the Applicant provide the formulas that were used to calculate the scour pools. If necessary, the Applicant should update the scour pools to accommodate any changes to velocity based on HydroCAD changes suggested in 5.a. above.**
 8. The Applicant has revised the grading and detail for the diversion swale/trench crossing at the road to provide a berm downgradient of the swale to prevent flow down the access road. *This recommendation has been addressed to HW satisfaction.*
 9. The Applicant has reduced the paved section of the access road from 50 to 30 feet. The Applicant regraded the area to provide a low point north of Fearing Hill Road to minimize any runoff and provided HydroCAD modeling for the stone swale to divert runoff to the east before it reaches Fearing Hill Road. The Applicant has provided a Drainage Easement Exhibit Plan, which provides a 20 ft wide corridor for flow along the existing swale on the north side of Fearing Hill Road. **While the Applicant has addressed the concerns about runoff reaching Fearing Hill Road, HW is concerned about erosion at the end of the stone swale. After discussion with the Applicant, HW recommends adding 1-2 check dams to the swale to slow flow and increasing the stone depth to provide potential for infiltration.**
 10. HW previously noted, that as part of the SWPPP, the Applicant should ensure that until the site is stabilized, stormwater should not be directed to the final stormwater basins, as this will compromise their functionality long term. The Applicant has noted that the basins will be used for temporary storage during construction and has provided a temporary riser to protect the outlet pipes during construction. The Applicant has stated that the temporary riser pipes and sediment in basins will be removed, and permanent flared ends and stone will be installed during Phase VIII of construction (see Sheet 9). *This recommendation has been addressed to HW satisfaction.*

September 30th Revisions

HW discussed the above concerns with Atlantic via email and telephone conversations. In response, the Applicant provided further revised plans, stormwater calculations and other supporting documents on September 30, 2022 that included:

- Site Development Plans, Fearing Hill Road Solar Project, 91 & 101 Fearing Hill Road, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated May 17, 2021 and revised September 29, 2022 (9 sheets).

- Response to Recommendations from Horsley Witten Group, 91 & 101 Fearing Hill Road Solar Project, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated September 1, 2022 (4 pages).
- Stormwater Addendum 3, Fearing Hill Road Solar Project, 91 & 101 Fearing Hill Road, Wareham, MA, prepared by Atlantic Design Engineers, Inc., dated September 2, 2022 (161 pages).
- Fearing Hill Road Solar Project Construction Sequence/ Phasing Schedule, dated September 29, 2022.
- Solar Array Seeding Schedule and Protocols, Fearing Hill Road Solar Project, Wareham, MA, Dated June 14, 2022 and revised September 28, 2022.

We have also reviewed:

- Letter from Charles Rowley, P.E., PLS to the Town of Wareham Planning Board, dated October 3, 2022, regarding the September 30, 2022 Atlantic submittal.

After review of the updated plans and reports, HW had the following updated assessment of the above recommendations. Previously resolved comments are not discussed for clarity.

1. *This comment was previously addressed.*
2. *This comment was previously addressed.*
3. *This comment was previously addressed.*
4. *This comment was previously addressed.*
5. *This comment was previously addressed.*
6. A proposed monitoring plan is attached with this letter for Planning Board and Conservation Commission consideration.
7. *This recommendation has been addressed to HW satisfaction.*
8. *This comment was previously addressed.*
9. The Applicant has reduced the paved section of the access road from 50 to 30 feet. The Applicant regraded the area to provide a low point north of Fearing Hill Road to minimize any run-on and provided HydroCAD modeling for the stone swale to divert runoff to the east before it reaches Fearing Hill Road. The Applicant has provided a Drainage Easement Exhibit Plan, which provides a 20 ft wide corridor for flow along the existing swale on the north side of Fearing Hill Road. **While the Applicant has addressed the concerns about runoff reaching Fearing Hill Road, HW is concerned about erosion at the end of the stone swale. After discussion with the Applicant, HW recommends adding 1-2 check dams to the swale to slow flow and increasing the stone depth to provide potential for infiltration. This recommendation has been addressed to HW satisfaction.**
10. *This comment was previously addressed.*

Additional discussion was also had with the Applicant with regards to the Site seeding plan and questions were received from the Planning Board regarding the appropriateness of the seeding plan for Site specific soil and topographic conditions. An HW botanist has reviewed the seeding plan dated September 28, 2022 and we agree that it satisfactorily addresses our comments. The initial cover mix is appropriate for short term stabilization and the final cover mix has an appropriate balance between providing ecological benefits while keeping the maximum growth height to three feet or less to avoid shading the solar panels. In response to Planning Board questions, this seed mix is appropriate for the soil and topographic conditions of the Site. The Planning Board also asked about the potential for the seed mix to have been treated with pesticides. Our understanding is that Ernst, proposed provider of the seed mix, does not treat any of their seed mixes with pesticides. **We recommend that the Applicant confirm with Ernst that the seed mix will not be treated with pesticides. We also recommend that a mid-summer maintenance mowing (at a 4-6" height) be conducted during the first growing season.** As most native plants do not produce much top growth during the first growing season, and the top growth that is produced tends to remain short/low to the ground, a maintenance mowing is an additional strategy to reduce weed pressure at the site.

Monitoring Plan

As requested by the Town and the Applicant, HW has drafted a proposed long term monitoring plan for the Site that is recommended in the event that the project is approved and moves forward through construction. That monitoring plan is attached to this letter. The monitoring plan focuses on three items: 1) construction period, site stabilization, runoff control, and erosion prevention and control; 2) longer term, post construction, site stabilization, runoff control, and erosion prevention and control; and 3) long term monitoring of groundwater levels in the vicinity of neighboring properties of concern. These three items have been the primary focus areas for HW review and comment to date.

There has also been significant discussion between the Planning Board, the Applicant, and HW regarding potential groundwater quality monitoring. The proposed project is not anticipated to degrade water quality for nearby private drinking water wells to any significant degree with regard to traditional water quality parameters (e.g., nutrients and petroleum-based compounds). However, there is always the potential for concern with emerging contaminants, such as per and polyfluoroalkyl substances (PFAS) whose impacts are an item of increasing societal concern. Monitoring for PFAS in groundwater is not included in the currently recommended monitoring program for several reasons:

- The Applicant has stated that the solar panels to be used will be PFAS free. While we can't speak to these solar panels specifically, to our knowledge some products in general that claim to be PFAS free are not always so. **We recommend that the Applicant provide to the Town appropriate documentation that the panels used are certified to be PFAS free.**
- While PFAS does not readily breakdown in the environment, it does tend to partially bind to organic material in soil. That, combined with the overall slow movement of groundwater, means that, even if PFAS were contributed to groundwater from the solar

panels, the likelihood of detecting that PFAS in downgradient monitoring wells would be low and the time required for any PFAS to reach those wells would be on the order of years.

- Monitoring for PFAS in stormwater runoff collected in Site detention basins would be a more direct method to monitor for potential PFAS contributions from the solar panels. However, PFAS is frequently present in precipitation itself so after the fact detection of PFAS in stormwater would not necessarily point to the panels themselves as the primary source without a rigorous pre and post panel installation data set for comparison.
- In addition, after the panels are installed the extent and nature of required corrective action would be difficult to define.

Owing to the above complications, a potential program was discussed of sampling the panels themselves for PFAS prior to installation. Such a program could be effective and relatively simple to implement if the panels to be used were manufactured in just a few batches from consistent materials over a short time frame at the same facility. That way a limited amount of sampling could be used to determine the presence of PFAS and a batch could be rejected before actual installation. However, we understand from the Applicant that the actual process of solar panel construction and delivery is unlikely to involve just a few such small batches. If panel sourcing is spread out over time from a large number of batches, implementation of a pre-installation PFAS sampling program would be both challenging and very expensive. We understand that the Applicant has proposed to post a bond that the Town may use to conduct some limited PFAS sampling if so desired. **We recommend that the Town coordinate with the Applicant to determine what, if any, PFAS sampling should be conducted based on anticipated solar panel construction and delivery details, and how the amount of any required bond.**

Recommended Conditions

Based on our understanding of the conditions offered by the Applicant to date, we recommend that at a minimum the following conditions be included with any Town approval of the project:

- The easement required for stormwater conveyance parallel to Fearing Hill Road and continued use of the MW-1 monitoring should be formally completed, registered, and included as a necessary component of the approval.
- The attached monitoring plan, or a comparable plan, should be required to be conducted.
- A bond or insurance coverage of appropriate value (to be determined by Town) be provided to cover any damage to private property that may occur as a result of hydrologic changes from the proposed Site development.
- Financial surety of some type, of Town selection, should be provided to cover Site decommissioning at the end of its use as a solar facility.
- If the Town desires PFAS sampling of some sort, a bond of appropriate value (to be determined by Town) should be provided to cover the cost of such a sampling program.

We appreciate the opportunity to provide these review comments on the subject site and are available to answer any questions.

Sincerely,

HORSLEY WITTEN GROUP, INC.

Neal M. Price
Principal Scientist

Attachments: Proposed Monitoring Plan

cc: Mr. Joseph Shanahan, Con Edison Clean Energy Businesses

Fearing Hill Solar Facility Monitoring Plan

This proposed monitoring plan includes three components:

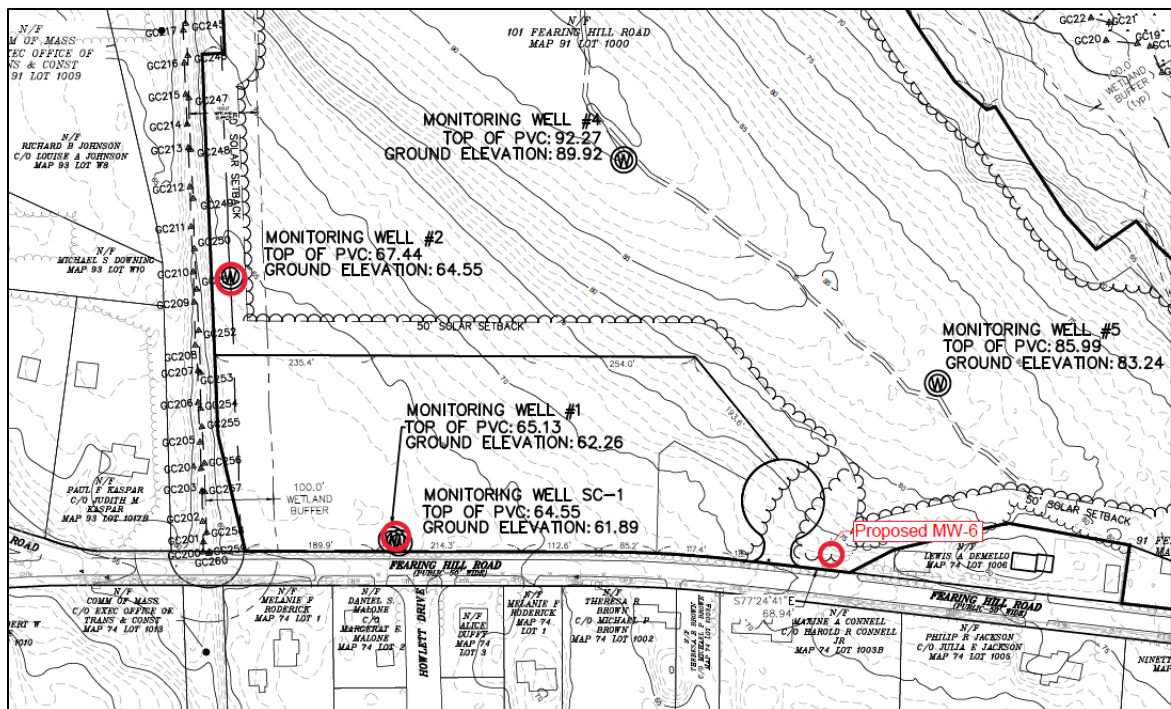
1. Construction Period Monitoring of Site: Intended to ensure all erosion and sediment control (ESC) measures are installed, maintained, and functioning properly, and that no flooding, sedimentation, or erosion impacts are occurring beyond the Site Limits of Work (LOW). This monitoring would occur during and immediately following construction until the Site has become stabilized. We understand that the anticipated construction will occur over a 6 to 9 month time period with the following approximate schedule:
 - a) For about 10 weeks at the start, the tree clearing zones will be sequenced and the temporary stormwater and stabilization features will be built;
 - b) The next few weeks will involve the installation of the posts for the panels;
 - c) The 10 weeks after that will be limited to hanging panels on the posts and wiring, which will involve no land disturbance;
 - d) Then the last few weeks will involve finalizing the stormwater features, loaming and seeding.

HW will conduct approximately up to 20 regularly scheduled inspections with submitted inspection reports over the anticipated 6–9-month construction period, and until initial site stabilization has occurred. Inspections will target steps a and d, above, when maximum site disturbance will occur, and at times following large storm events to the extent possible. The Site is proposed to be cleared and developed in five phases in order to avoid destabilizing the entire Site at once. Inspections will target key times during each construction phase, such as the installation of ESC measures, post phase clearing, and post phase stabilization.

2. Post-Construction Monitoring of Stormwater Management Systems: Intended to ensure the systems function as designed to control stormwater runoff on-Site without unwanted bypass of the stormwater systems or erosion impacts. This monitoring would occur following construction once final stormwater management measures have come online in order to demonstrate that the constructed facilities continue to function properly to prevent flooding, sedimentation, or erosion impacts.
 - a) Conduct approximately up to an additional 10 additional inspections over the two years following construction, or until the Site has become fully stabilized and its response to larger rain events (attempt to target rain events of 1-2 inches or greater) has been demonstrated. Inspections will target times following larger storm events to the extent possible.

3. Long-Term Groundwater Level Monitoring: to evaluate any potential increases of groundwater elevation impacting the closest neighboring homes proximal to the southwest area of the Site. Groundwater monitoring will occur in the three monitoring wells (MW-1, MW-2, and Proposed MW-6 shown in red on the Figure below). These are located proximally to the closest neighboring properties with the most potential to experience groundwater level changes. MW-1 and MW-2 are existing wells proximal to Fearing Hill Road and the railroad grade, respectively, near the southwestern corner of the Site. The other location is a proposed new well to be drilled specifically for this monitoring program. Proposed MW-6 will be located on the Applicant's leased property immediately east of the Site access road and north of Fearing Hill Road.

Groundwater levels will be evaluated relative to existing conditions under otherwise similar hydrologic conditions, as determined by comparison to the USGS Index Well (MA-LKW 14R), approximately 11 miles northwest from the Site in Lakeville.



- a) Applicant to hire a driller to install the new monitoring well discussed above. The well will consist of 2-inch diameter pvc installed with 10 feet of 10-slot screen straddling the water table (8 feet below the water table and 2 feet above). The screen will be backfilled with sand filter pack followed by native material above the screen. A bentonite seal will be placed in the well boring approximately 1-3 feet below ground surface with the surface completion consisting of a concrete pad with a stickup protective steel casing. The pvc well will have an expansion plug cap at the top and the steel casing will be equipped with a lock. The driller will develop the well upon completion to ensure good connection with the aquifer.
- b) The well should be installed at least 3 months prior to the onset of construction to allow for the collection of existing conditions background water level data. Existing, previously installed wells on Site shall remain in place in order to allow for evaluation of the water level relationships between the previously installed wells (and their historic data records) and the to-be-installed well.
- c) HW will survey the top of pvc elevation of the new well, install automated water level data loggers in each of the 3 long-term wells, and measure the depth to water in each of the 3 long-term wells at the time of logger installation in order to convert the logged water level readings to elevations in the NAVD88 vertical datum (feet).
- d) HW will visit the site approximately once every 3 months for the first 2 years, and once every 6 months for years 3-5, to manually measure the water elevation in each of the 3 long-term wells at that time and download the data loggers.
- e) Any existing wells that will be destroyed during construction shall be removed and properly disposed of.
- f) Water elevation data from the monitoring wells will be compared to the long-term historic record from USGS Index Well (MA-LKW 14R), approximately 11 miles northwest from the Site in Lakeville in order to establish a correlation between the hydrologic conditions at each Site well and the long-term historic record from the Index Well. In this way Site water level deviations from the expected pattern based on the USGS Index Well data can be identified and evaluated relative to potential impacts from Site development.
- g) Following each download of data logger data, HW will produce graphs of Site water levels relative to the USGS Index Well and submit to the Town the graphed data along with a brief memorandum discussing any relevant observations from the graph.
- h) The monitoring period may be extended for longer than 5 years at Town discretion pending the results of the initial 5-year monitoring period.

Mitigation:

The following mitigation responses shall be required of the Applicant:

1. ESC failures during and following construction that result in erosion, sedimentation, or other impactful conveyance of stormwater beyond the Site LOW shall be immediately corrected/ improved to prevent future occurrence. Town shall maintain the right to fine the Applicant or suspend the project if ESC issues are not addressed in a timely fashion.
2. Any observed post-construction failures of the long-term stormwater management system documented to have resulted in erosion, sedimentation, or other impactful conveyance of stormwater beyond the Site LOW shall be expediently corrected and/or improved to prevent future occurrence. Such corrective measures may include, but are not limited to, the need to redesign and reconstruct stormwater management features such as trenches, detention basins, scour pools, and level spreaders in order to adequately manage runoff on Site.
3. Any observed failures of the site seeding/vegetation shall be expediently corrected.
4. The Applicant shall assess and correct any damage to neighboring properties documented to have experienced significant inundation damage from significantly increased groundwater levels resulting from the construction of the subject solar facility (as documented to have occurred by the long-term monitoring program).
5. At all times during the Term of its Lease of the solar project site, the Owner of the solar project shall maintain in full force a commercial general liability insurance policy covering the Owner's operations, activities, and liabilities at the solar project site having, singly or in combination, limits not less than one million dollars (\$1,000,000) in the aggregate. Upon the Town of Wareham's request, the Owner shall provide the Town with a Certificate of Insurance evidencing that such insurance is in force.

**FEARING HILL ROAD SOLAR PROJECT
CONSTRUCTION SEQUENCE/PHASING SCHEDULE
October 14, 2022**

General: 1.) Refer to the Erosion Control Notes, Details, and Construction Period Stormwater Operation and Maintenance Schedule on the Site Plans for on-going maintenance requirements at every level to protect against erosion of the site.

PHASE I (Note: Monitoring wells to be installed and initial testing to be completed prior to Phase I – refer to Fearing Hill Solar Monitoring Plan)

AREAS INCLUDED:	<ul style="list-style-type: none"> ENTRANCE ACCESS ROAD TO SITE
	<ul style="list-style-type: none"> ON-SITE ACCESS ROAD TO STAGING AREA
	<ul style="list-style-type: none"> ON-SITE ACCESS ROAD TO BASIN 2
	<ul style="list-style-type: none"> BASIN 2
	<ul style="list-style-type: none"> STAGING AREA
WORK ITEMS INCLUDED:	<ul style="list-style-type: none"> CLEAR TREES ALONG THE OUTER PERIMETER OF PHASE I AND INSTALL PERIMETER EROSION CONTROL MEASURES
	<ul style="list-style-type: none"> <i>INSPECT EROSION CONTROL MEASURES PRIOR TO PROCEEDING AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> CLEAR TREES AND REMOVE STUMPS IN REMAINING AREA OF PHASE 1
	<ul style="list-style-type: none"> UTILIZE WOOD CHIPPINGS AS A TEMPORARY EROSION CONTROL MEASURE AS REQUIRED
	<ul style="list-style-type: none"> CONSTRUCT TRACKING PAD AT ENTRANCE TO SITE
	<ul style="list-style-type: none"> CONSTRUCT RIP-RAP APRON AND SWALE AT ENTRANCE NEAR FEARING HILL ROAD
	<ul style="list-style-type: none"> CONSTRUCT ACCESS ROADS INCLUDING CENTRAL ACCESS ROAD TO UPPER LIMIT OF PHASE I ADJACENT TO STAGING AREA
	<ul style="list-style-type: none"> <i>INSPECT ENTRANCE ROAD, RIP RAP APRON AND SWALE AND INTERNAL ACCESS ROADS AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> CONSTRUCT COMPACTED GRAVEL STAGING AREA
	<ul style="list-style-type: none"> CONSTRUCT BASIN 2, INCLUDING ROCK LINED SWALES LEADING INTO THE BASIN, OUTLET PIPES, FLARED ENDS, EMERGENCY SPILLWAYS, RIP-RAP APRONS, AND LEVEL SPREADERS, BUT DO NOT CONSTRUCT FLARED ENDS, ROCK LINED SWALES AND FOREBAYS WITHIN THE BASIN
	<ul style="list-style-type: none"> INSTALL TEMPORARY RISER PIPE AND STONE TO ESTABLISH BASIN 2 AS A TEMPORARY SEDIMENT BASIN

**FEARING HILL ROAD SOLAR PROJECT
CONSTRUCTION SEQUENCE/PHASING SCHEDULE**

October 14, 2022

	<ul style="list-style-type: none"> • <i>INSPECT BASIN 2 CONSTRUCTION AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> • LOAM AND SEED ALL DISTURBED AREAS. UTILIZE TEMPORARY COVER CROP PER SEEDING SCHEDULE ON BASIN FLOOR AND IN STAGING AREAS. UTILIZE PERMANENT SLOPE SEEDING MIXTURE ON ALL OTHER AREAS. MAINTAIN, REPAIR, AND RE-SEED AS NECESSARY THROUGHOUT CONSTRUCTION WHILE GERMINATION IS TAKING PLACE.
	<ul style="list-style-type: none"> • <i>INSPECT ALL PHASE I ITEMS PRIOR TO PROCEEDING WITH PHASE II AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
PHASE II	
AREAS INCLUDED:	<ul style="list-style-type: none"> • ON-SITE ACCESS ROAD AROUND ENTIRE PERIMETER FROM ENTRANCE ROAD TO BASIN 2
	<ul style="list-style-type: none"> • BASIN 1
	<ul style="list-style-type: none"> • BASIN 3
	<ul style="list-style-type: none"> • SCREENING PLANTINGS
WORK ITEMS INCLUDED:	<ul style="list-style-type: none"> • CLEAR TREES ALONG THE OUTER PERIMETER OF PHASE II AND INSTALL PERIMETER EROSION CONTROL MEASURES
	<ul style="list-style-type: none"> • <i>INSPECT EROSION CONTROL MEASURES PRIOR TO PROCEEDING AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> • CLEAR TREES AND REMOVE STUMPS IN REMAINING AREA OF PHASE II
	<ul style="list-style-type: none"> • UTILIZE WOOD CHIPPINGS AS A TEMPORARY EROSION CONTROL MEASURE AS REQUIRED
	<ul style="list-style-type: none"> • CONSTRUCT ACCESS ROADS
	<ul style="list-style-type: none"> • CONSTRUCT BASINS 1 AND 3, INCLUDING ROCK LINED SWALES LEADING INTO THE BASINS, OUTLET PIPES, FLARED ENDS, EMERGENCY SPILLWAY, RIP-RAP APRONS, AND LEVEL SPREADERS, BUT DO NOT CONSTRUCT FLARED ENDS, ROCK LINED SWALES AND FOREBAYS WITHIN THE BASINS
	<ul style="list-style-type: none"> • INSTALL TEMPORARY RISER PIPES AND STONE TO ESTABLISH BASINS 1 AND 3 AS TEMPORARY SEDIMENT BASINS (SEE DETAIL)

**FEARING HILL ROAD SOLAR PROJECT
CONSTRUCTION SEQUENCE/PHASING SCHEDULE**

October 14, 2022

	<ul style="list-style-type: none"> • <i>INSPECT ACCESS ROADS AND BASIN 1 AND 3 CONSTRUCTION AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> • INSTALL ALL SCREENING PLANTINGS
	<ul style="list-style-type: none"> • LOAM AND SEED ALL DISTURBED AREAS. UTILIZE TEMPORARY COVER CROP PER SEEDING SCHEDULE ON BASIN FLOORS. UTILIZE PERMANENT SLOPE SEEDING MIXTURE ON ALL OTHER AREAS. MAINTAIN, REPAIR, AND RE-SEED AS NECESSARY THROUGHOUT CONSTRUCTION WHILE GERMINATION IS TAKING PLACE.
	<ul style="list-style-type: none"> • <i>INSPECT ALL PHASE II ITEMS PRIOR TO PROCEEDING WITH PHASE III AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
PHASE III	
AREAS INCLUDED:	<ul style="list-style-type: none"> • MIDDLE/UPPER PORTION OF SITE, DOWN TO ELEVATION 88
WORK ITEMS INCLUDED:	<ul style="list-style-type: none"> • CLEAR TREES ALONG THE OUTER PERIMETER OF PHASE III AND INSTALL PERIMETER EROSION CONTROL MEASURES
	<ul style="list-style-type: none"> • <i>INSPECT EROSION CONTROL MEASURES PRIOR TO PROCEEDING AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> • CLEAR TREES AND REMOVE STUMPS IN REMAINING AREA OF PHASE III
	<ul style="list-style-type: none"> • UTILIZE WOOD CHIPPINGS AS A TEMPORARY EROSION CONTROL MEASURE AS REQUIRED
	<ul style="list-style-type: none"> • CONSTRUCT REMAINING CENTRAL ACCESS ROAD, INCLUDING COMPACTED GRAVEL PAD FOR ELECTRICAL/ESS EQUIPMENT.
	<ul style="list-style-type: none"> • <i>INSPECT ACCESS ROAD AND EQUIPMENT PADS AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> • LOAM AND SEED ALL DISTURBED AREAS. UTILIZE TEMPORARY COVER CROP PER SEEDING SCHEDULE. MAINTAIN, REPAIR, AND RE-SEED AS NECESSARY THROUGHOUT CONSTRUCTION WHILE GERMINATION IS TAKING PLACE.
	<ul style="list-style-type: none"> • <i>INSPECT ALL PHASE III ITEMS PRIOR TO PROCEEDING WITH PHASE IV AND IMMEDIATELY</i>

**FEARING HILL ROAD SOLAR PROJECT
CONSTRUCTION SEQUENCE/PHASING SCHEDULE**

October 14, 2022

	<i>ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
PHASE IV	
AREAS INCLUDED:	<ul style="list-style-type: none"> • PORTION OF SITE FROM ELEVATION 88 DOWN TO ELEVATION 82
WORK ITEMS INCLUDED:	<ul style="list-style-type: none"> • CLEAR TREES ALONG THE OUTER PERIMETER OF PHASE IV AND INSTALL PERIMETER EROSION CONTROL MEASURES
	<ul style="list-style-type: none"> • <i>INSPECT EROSION CONTROL MEASURES PRIOR TO PROCEEDING AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> • CLEAR TREES AND REMOVE STUMPS IN REMAINING AREA OF PHASE IV
	<ul style="list-style-type: none"> • UTILIZE WOOD CHIPPINGS AS A TEMPORARY EROSION CONTROL MEASURE AS REQUIRED
	<ul style="list-style-type: none"> • LOAM AND SEED ALL DISTURBED AREAS. UTILIZE TEMPORARY COVER CROP PER SEEDING SCHEDULE. MAINTAIN, REPAIR, AND RE-SEED AS NECESSARY THROUGHOUT CONSTRUCTION WHILE GERMINATION IS TAKING PLACE.
	<ul style="list-style-type: none"> • <i>INSPECT ALL PHASE IV ITEMS PRIOR TO PROCEEDING WITH PHASE V AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
PHASE V	
AREAS INCLUDED:	<ul style="list-style-type: none"> • REMAINING AREA OF SITE FROM ELEVATION 82 DOWN TO THE LIMITS OF PHASE I AND II
WORK ITEMS INCLUDED:	<ul style="list-style-type: none"> • CLEAR TREES ALONG THE OUTER PERIMETER OF PHASE IV AND INSTALL PERIMETER EROSION CONTROL MEASURES
	<ul style="list-style-type: none"> • <i>INSPECT EROSION CONTROL MEASURES PRIOR TO PROCEEDING AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> • CLEAR TREES AND REMOVE STUMPS IN REMAINING AREA OF PHASE IV
	<ul style="list-style-type: none"> • UTILIZE WOOD CHIPPINGS AS A TEMPORARY EROSION CONTROL MEASURE AS REQUIRED
	<ul style="list-style-type: none"> • LOAM AND SEED ALL DISTURBED AREAS. UTILIZE TEMPORARY COVER CROP PER SEEDING SCHEDULE. MAINTAIN, REPAIR, AND RE-SEED AS NECESSARY THROUGHOUT

**FEARING HILL ROAD SOLAR PROJECT
CONSTRUCTION SEQUENCE/PHASING SCHEDULE**

October 14, 2022

	CONSTRUCTION WHILE GERMINATION IS TAKING PLACE.
	<ul style="list-style-type: none"> • <i>INSPECT ALL PHASE V ITEMS PRIOR TO PROCEEDING WITH PHASE VI AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
PHASE VI	
AREAS INCLUDED:	<ul style="list-style-type: none"> • DIVERSION TRENCH/SWALE
WORK ITEMS INCLUDED:	<ul style="list-style-type: none"> • INSTALL DIVERSION TRENCH WITH BERM AND PERFORATED PIPE, INCLUDING CENTRAL ACCESS ROAD CROSSING, RIP-RAP APRONS, AND PIPE LEADING INTO BASIN 3, MINIMIZING DISTURBANCE AND DISRUPTION OF THE STABILIZED AREAS OF THE SITE.
	<ul style="list-style-type: none"> • <i>INSPECT DIVERSION TRENCH CONSTRUCTION AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> • ALL DISTURBED AREAS DUE TO INSTALLATION ACTIVITIES ARE TO BE IMMEDIATELY LOAMED AND SEEDED AND STABILIZED WITH BIODEGRADABLE JUTE MESH STYLE EROSION CONTROL MATTING OR SLOPE STABILIZATION FABRIC AS NECESSARY TO PREVENT EROSION.
PHASE VII	
AREAS INCLUDED:	<ul style="list-style-type: none"> • ENTIRE SITE
WORK ITEMS INCLUDED:	<ul style="list-style-type: none"> • INSTALL SOLAR ARRAYS, INCLUDING FOUNDATION AND RACKING SYSTEM, PANELS, ELECTRICAL INFRASTRUCTURE, AND EQUIPMENT, SOUND WALLS, AND PERIMETER FENCING, MINIMIZING DISTURBANCE AND DISRUPTION OF THE STABILIZED AREAS OF THE SITE.
	<ul style="list-style-type: none"> • <i>INSPECT SOLAR ARRAY CONSTRUCTION AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> • ALL DISTURBED AREAS DUE TO INSTALLATION ACTIVITIES ARE TO BE IMMEDIATELY LOAMED AND SEEDED AND STABILIZED WITH BIODEGRADABLE JUTE MESH STYLE EROSION CONTROL MATTING OR SLOPE STABILIZATION FABRIC AS NECESSARY TO PREVENT EROSION.

**FEARING HILL ROAD SOLAR PROJECT
CONSTRUCTION SEQUENCE/PHASING SCHEDULE
October 14, 2022**

PHASE VIII	
AREAS INCLUDED:	<ul style="list-style-type: none"> ALL RETENTION BASINS
WORK ITEMS INCLUDED:	<ul style="list-style-type: none"> REMOVE TEMPORARY RISER PIPES AND STONE, CLEAN OUT SEDIMENT AND FINAL GRADE BOTTOM OF BASIN
	<ul style="list-style-type: none"> INSTALL PERMANENT FLARED ENDS, RIP-RAP APRONS, STONE TRENCHES AND FOREBAYS MINIMIZING DISTURBANCE AND DISRUPTION OF THE STABILIZED AREAS OF THE SITE.
	<ul style="list-style-type: none"> <i>INSPECT BASIN CONSTRUCTION AND IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>
	<ul style="list-style-type: none"> LOAM AND SEED ALL DISTURBED AREAS. UTILIZE PERMANENT SEED MIXTURE
	<ul style="list-style-type: none"> ALL DISTURBED AREAS DUE TO INSTALLATION ACTIVITIES ARE TO BE IMMEDIATELY LOAMED AND SEEDED AND STABILIZED WITH BIODEGRADABLE JUTE MESH STYLE EROSION CONTROL MATTING OR SLOPE STABILIZATION FABRIC AS NECESSARY TO PREVENT EROSION.
PHASE IX	
AREAS INCLUDED:	<ul style="list-style-type: none"> ENTIRE SITE
WORK ITEMS INCLUDED:	<ul style="list-style-type: none"> REPAIR ACCESS ROADS AND OTHER AREAS OF THE SITE DISTURBED BY CONSTRUCTION
	<ul style="list-style-type: none"> COMPLETE FINAL SEEDING OF ARRAY AREA UTILIZING PERMANENT SEED MIX
	<ul style="list-style-type: none"> MONITOR AND MAINTAIN FINAL SEEDING OF THE SITE WHILE GERMINATION IS ESTABLISHED AND IMMEDIATELY REPAIR/RE-SEED AS NECESSARY.
	<ul style="list-style-type: none"> REMOVE PERIMETER EROSION CONTROL MEASURES WHEN AUTHORIZED BY THE TOWN
	<ul style="list-style-type: none"> <i>FINAL INSPECTION OF SITE CONSTRUCTION. IMMEDIATELY ADDRESS/REPAIR ANY ISSUES FOUND DURING THE INSPECTION.</i>

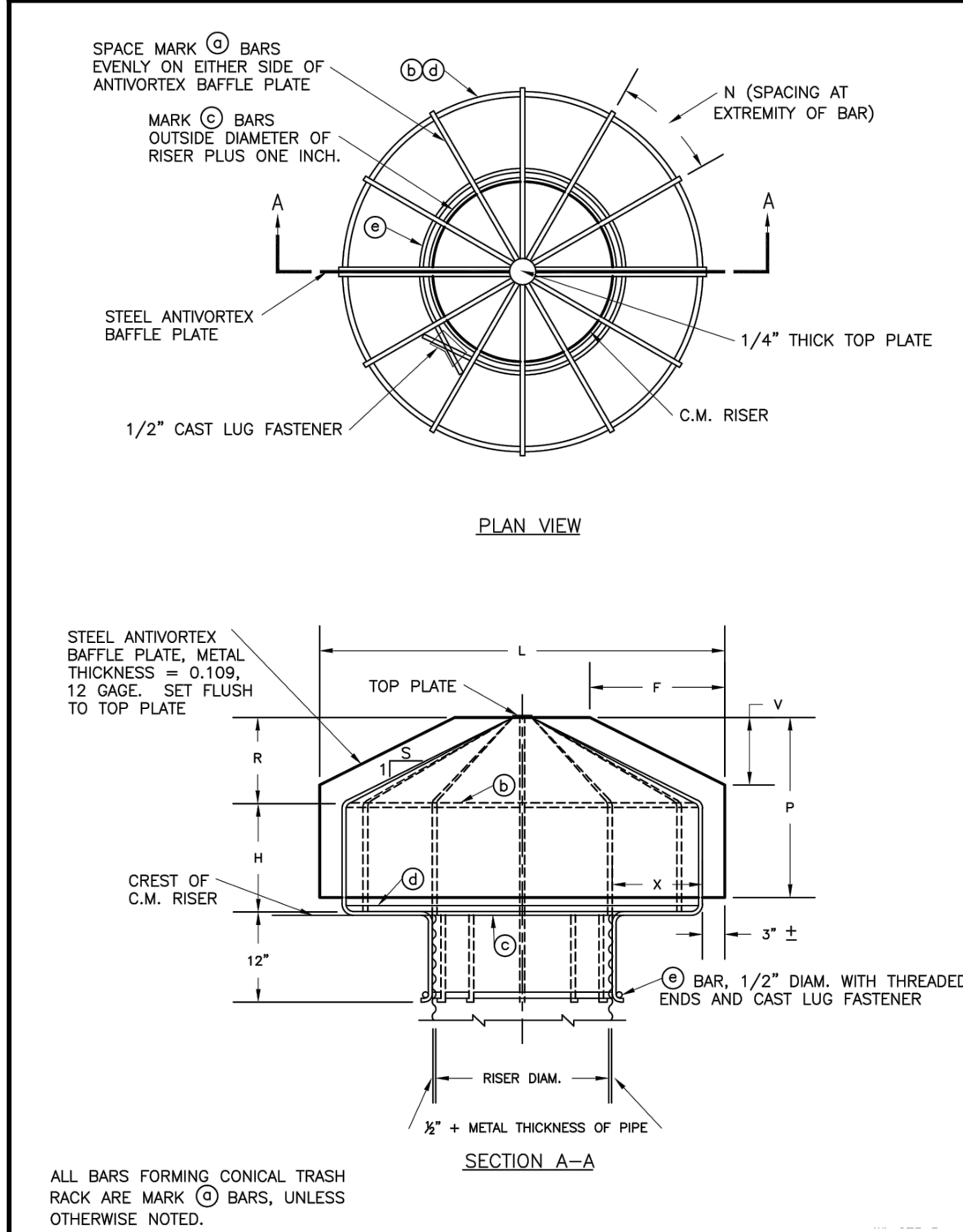
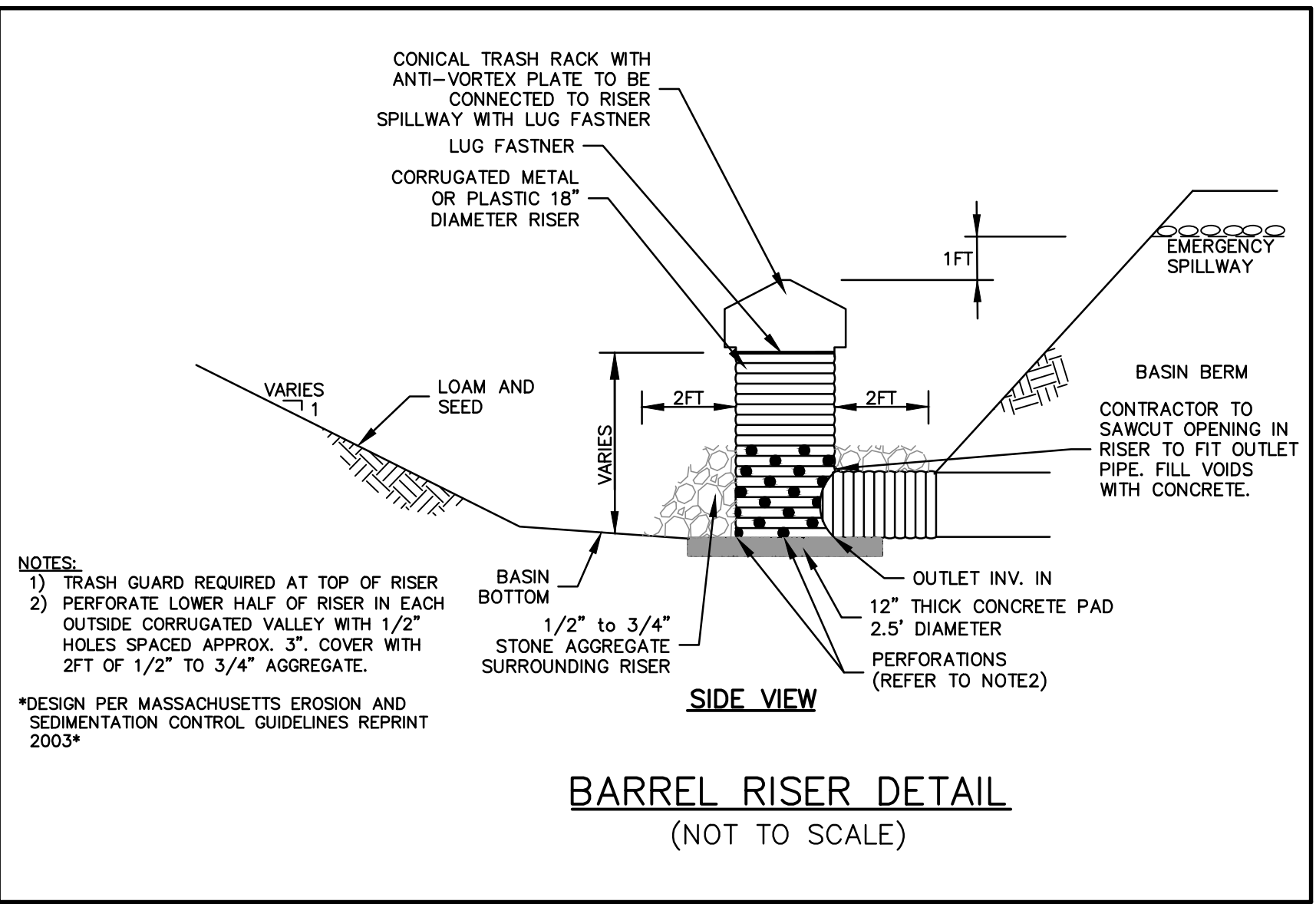
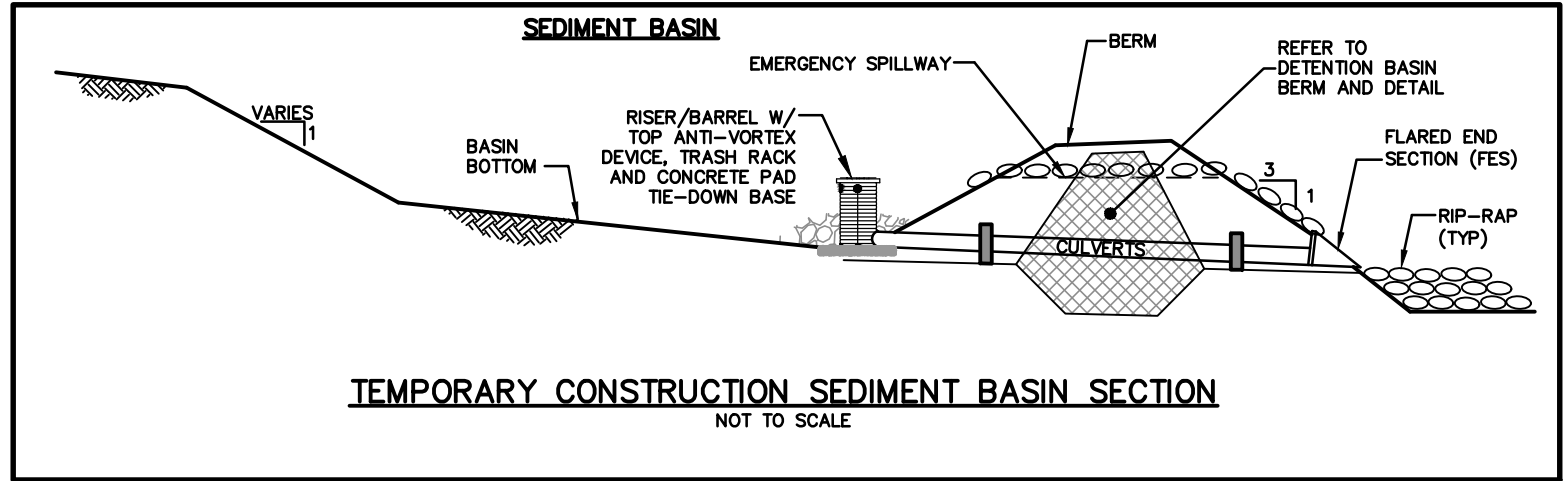
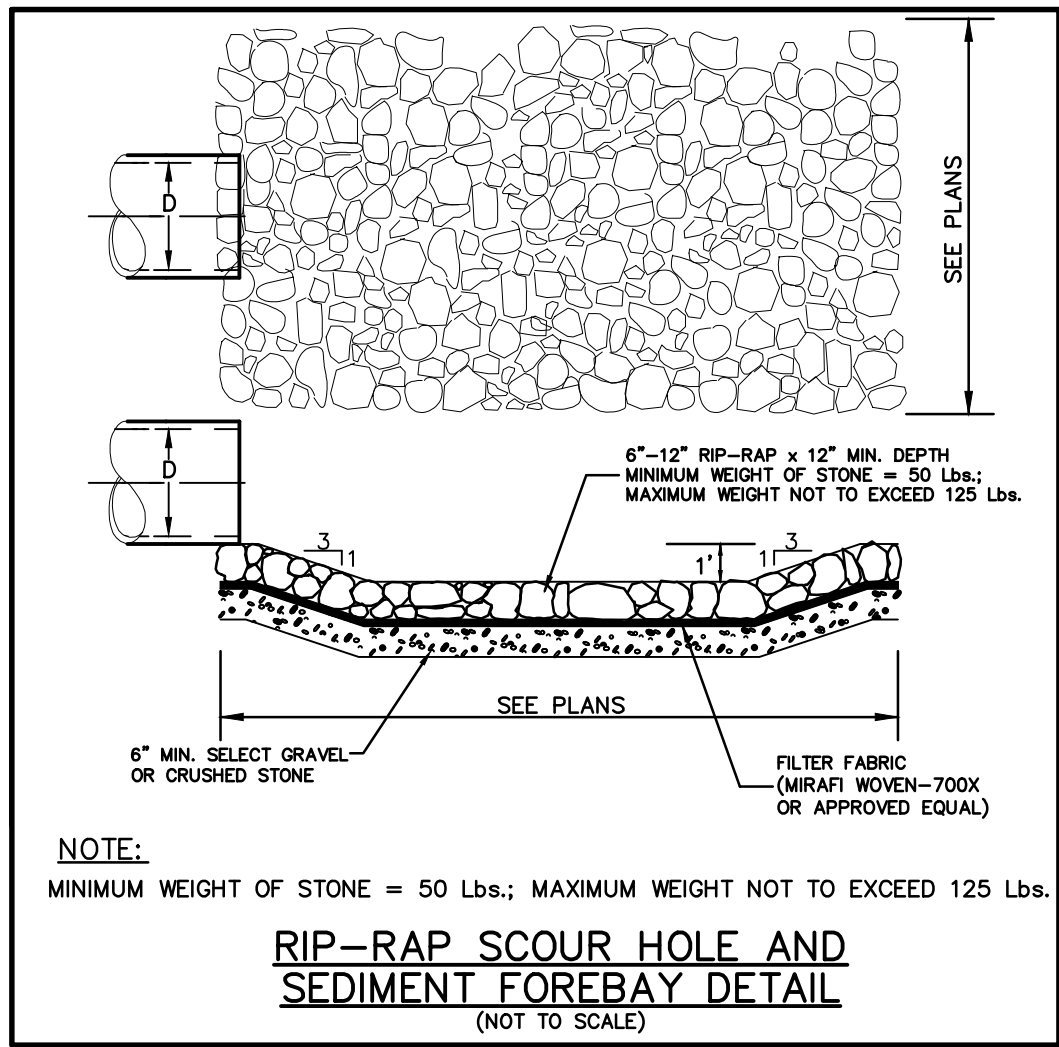
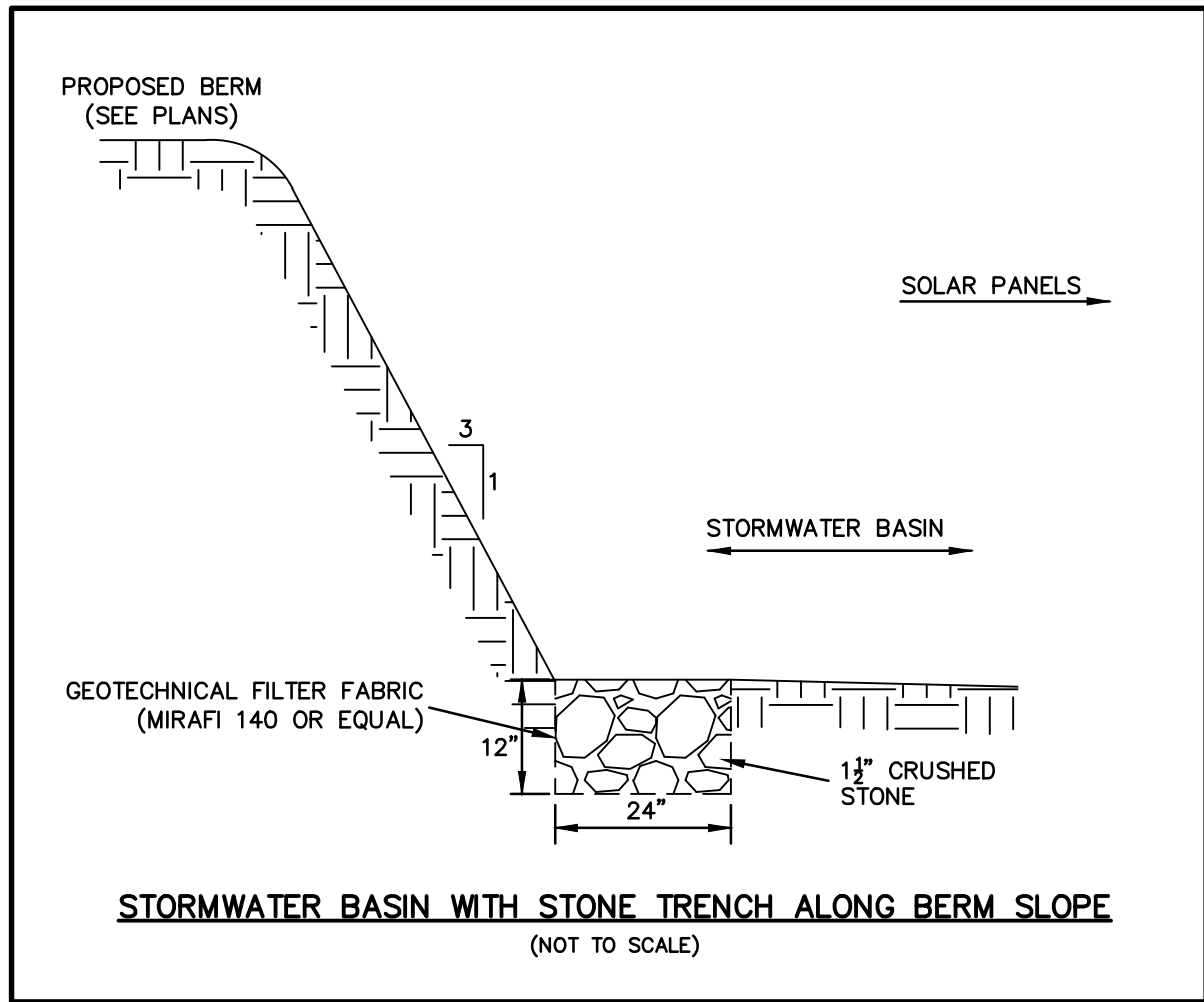
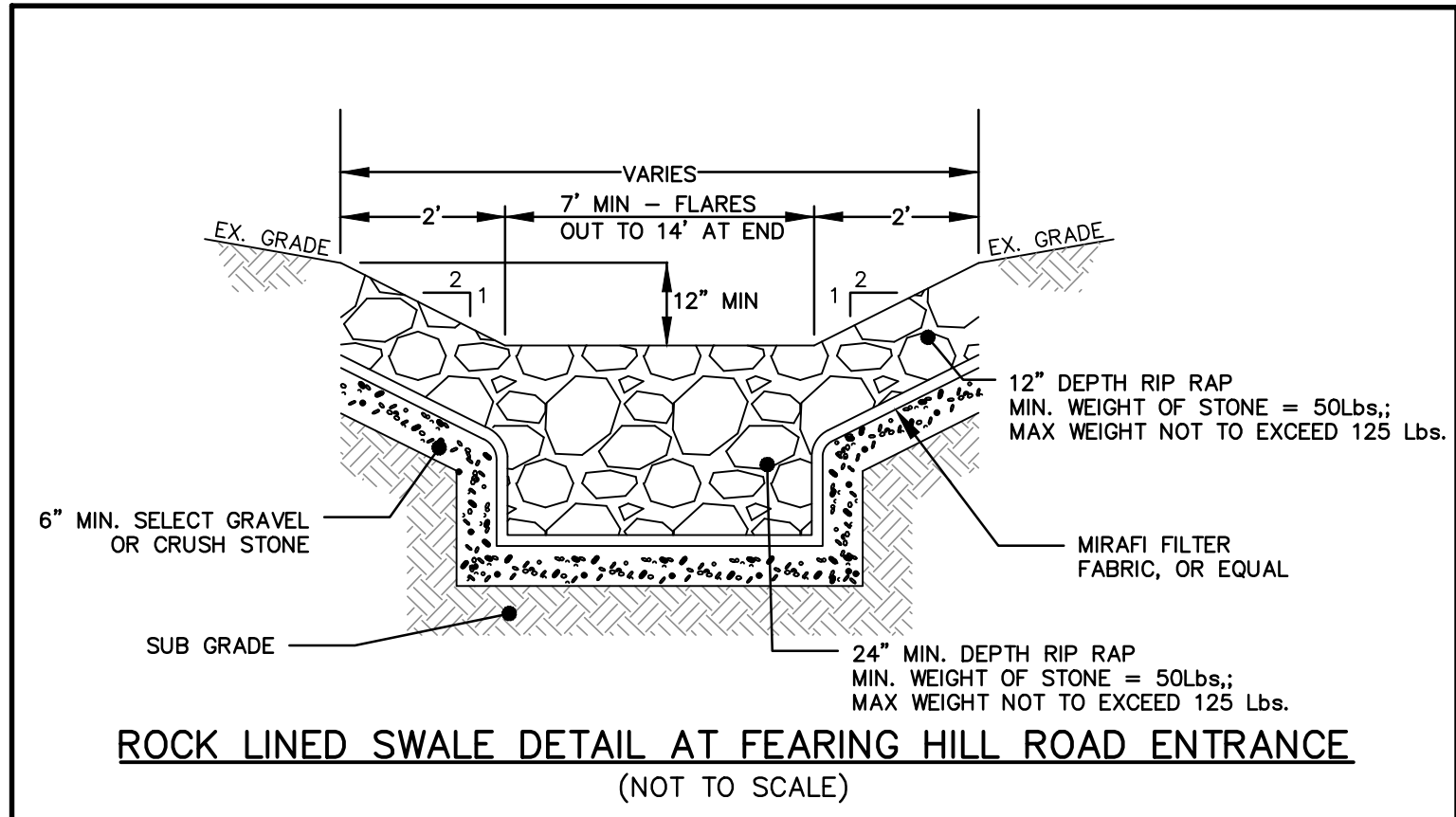
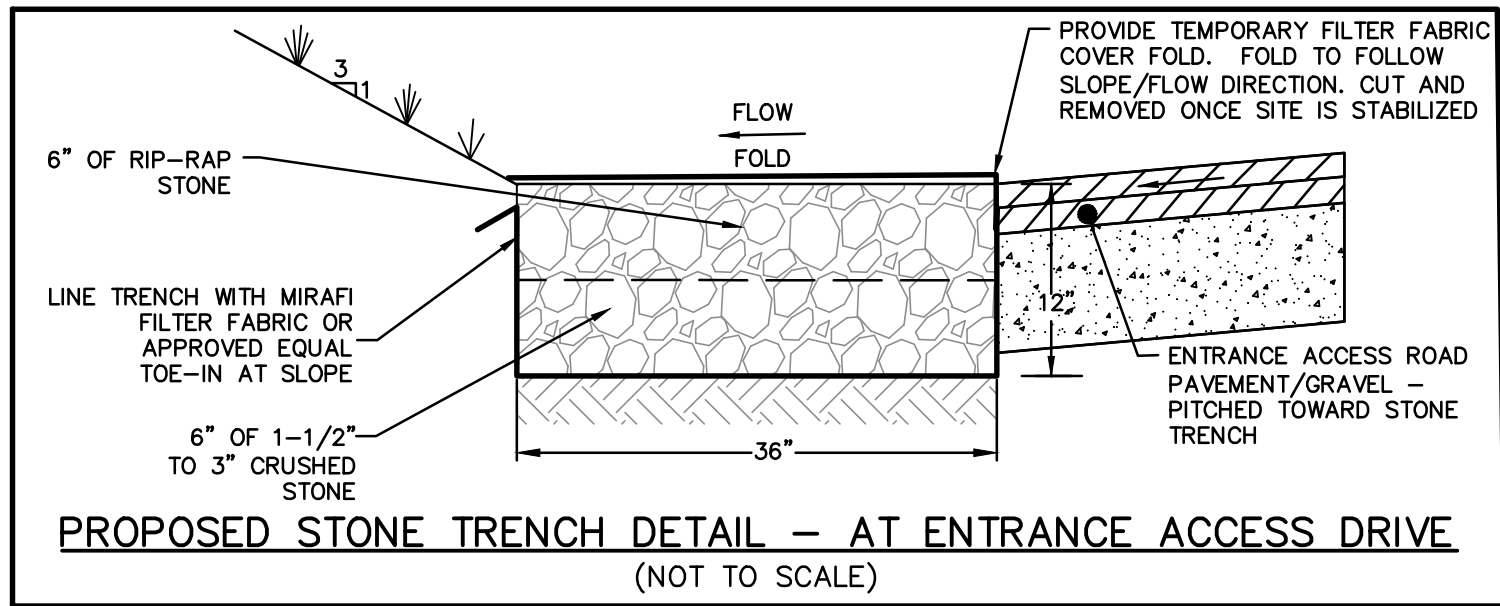
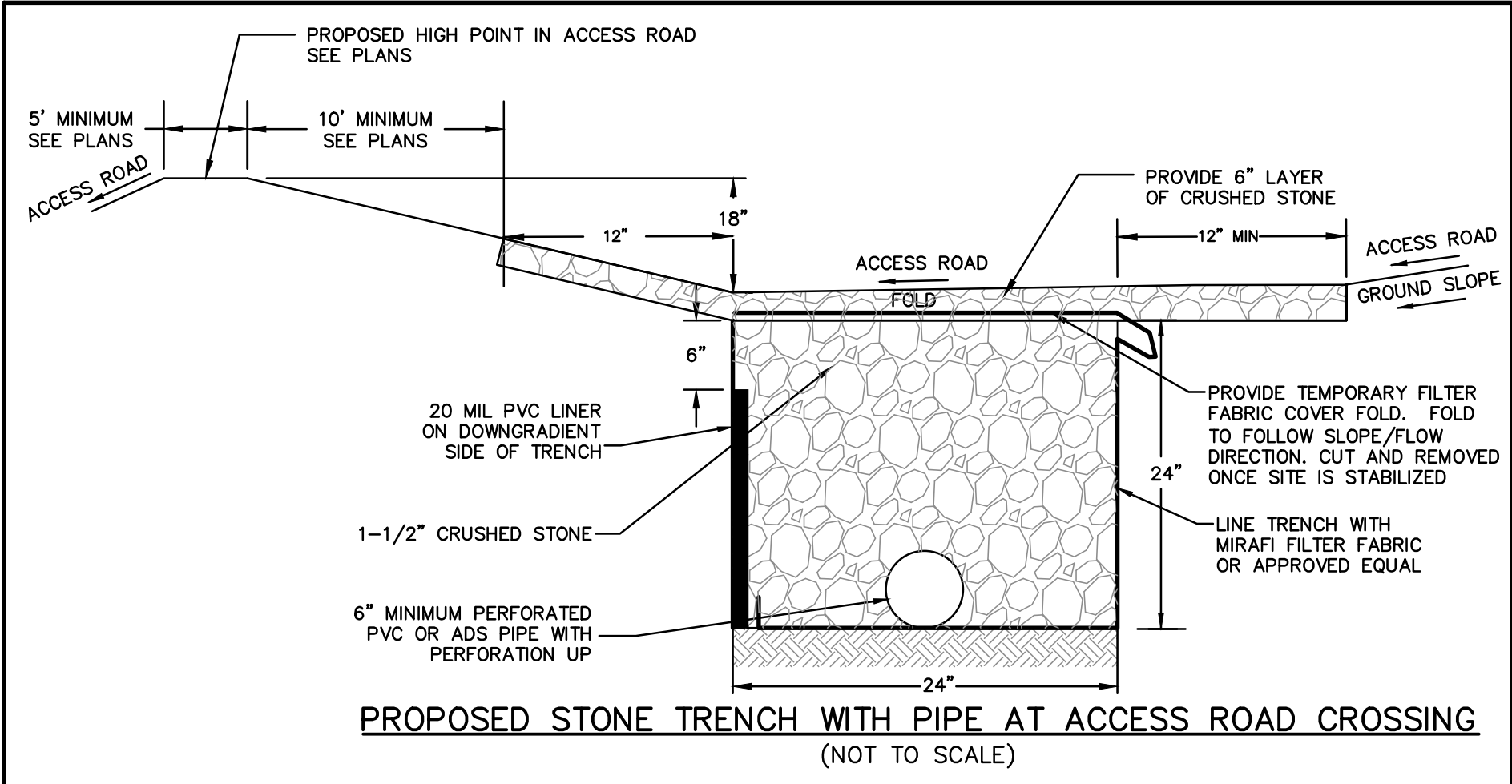
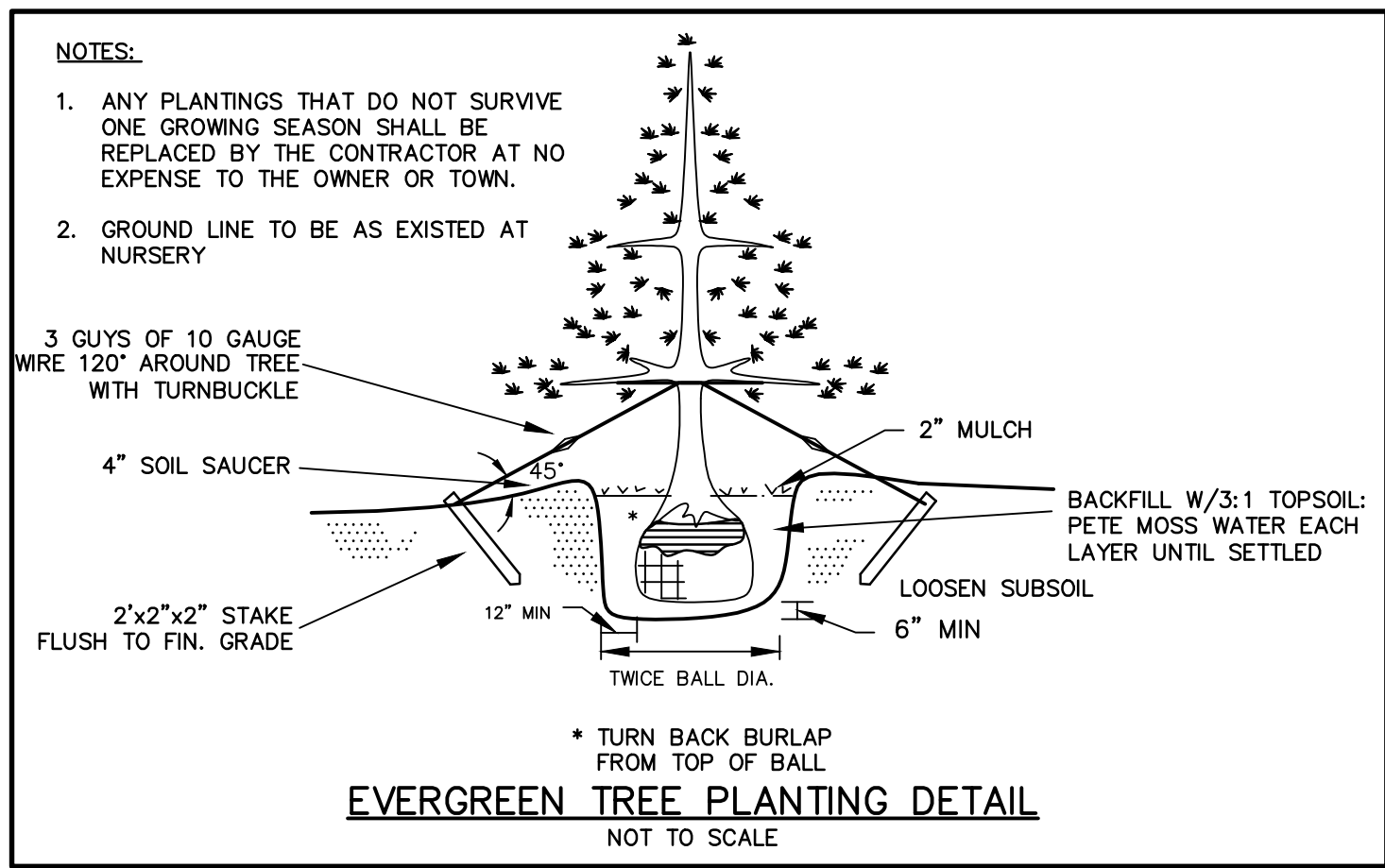
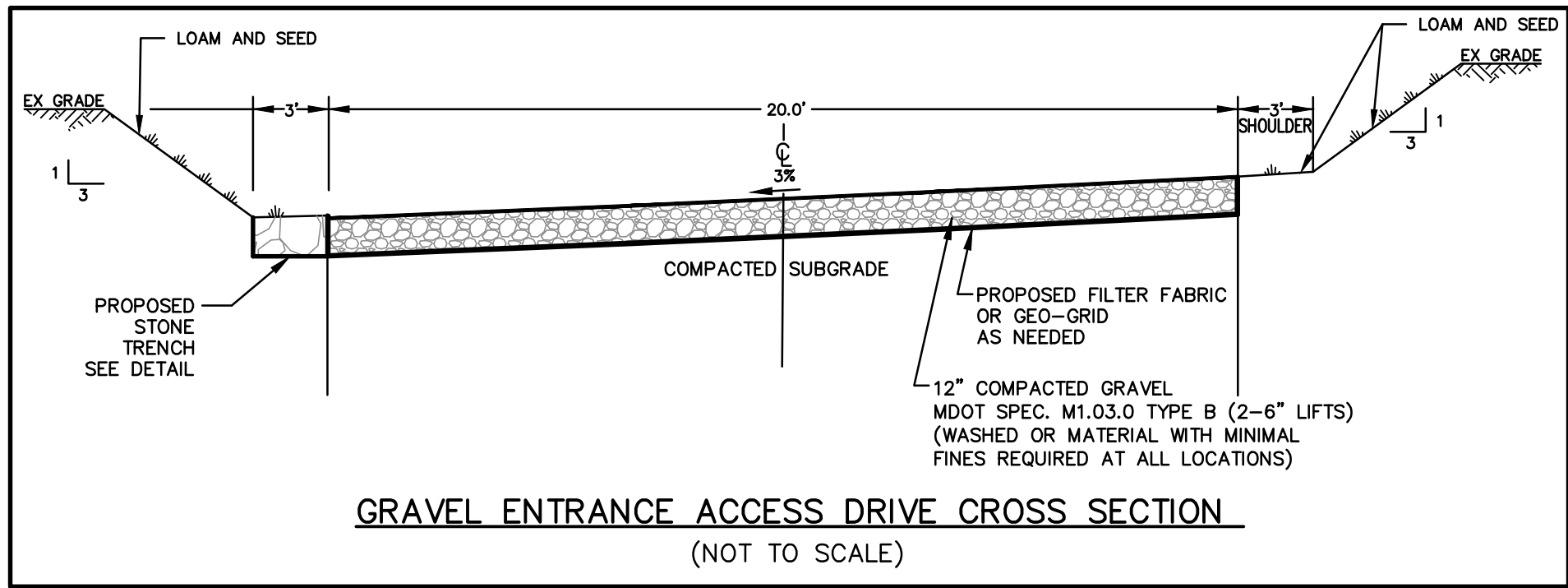
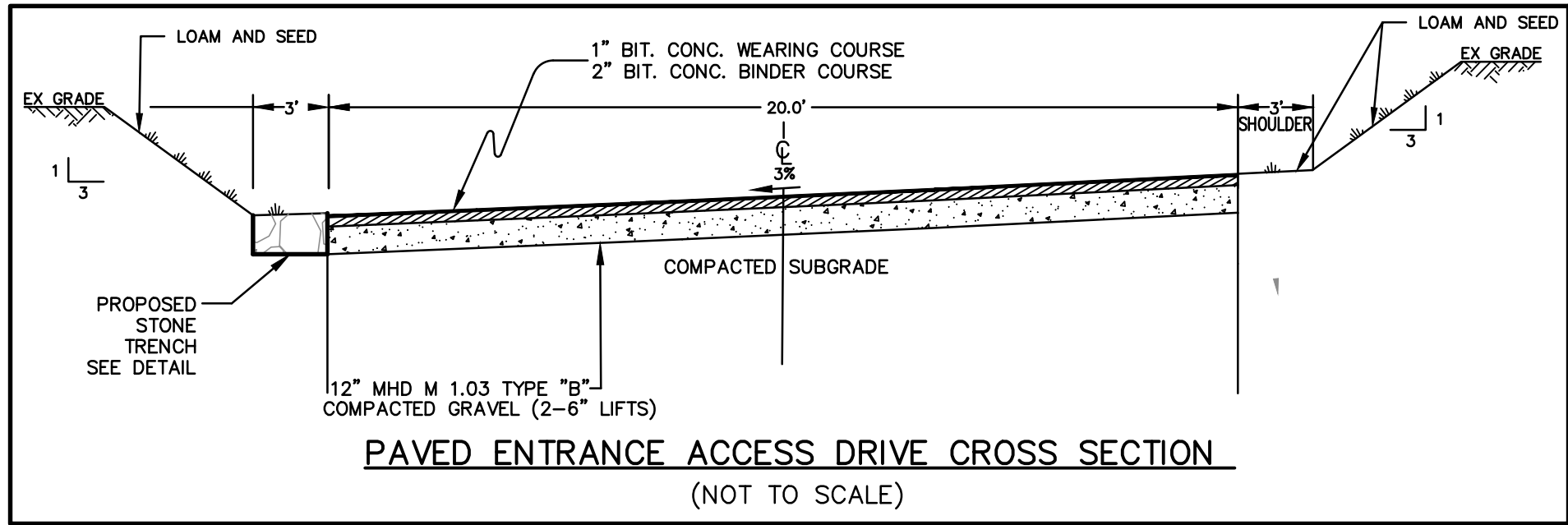
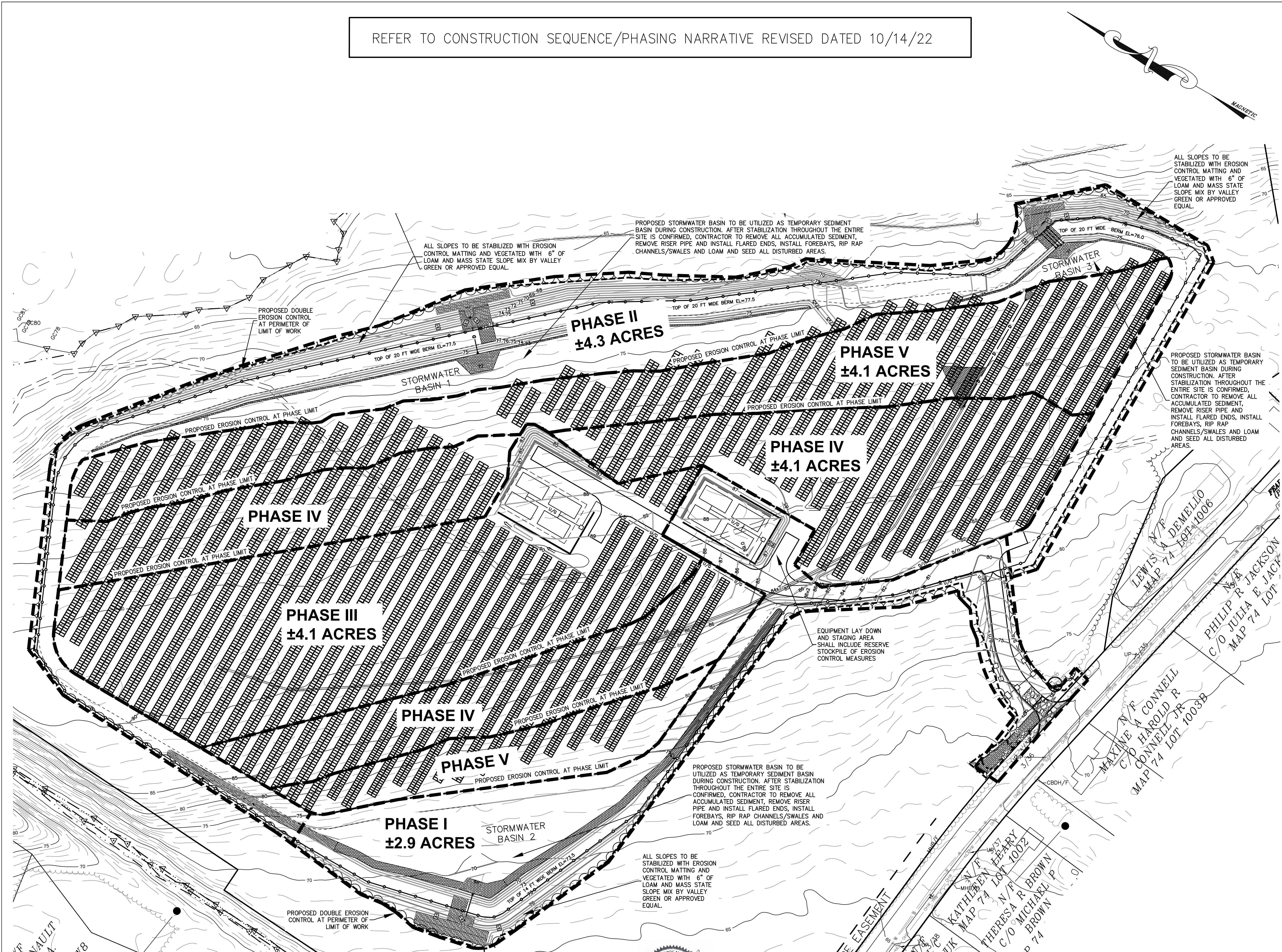


TABLE OF DIMENSIONS AND QUANTITIES													
BARS 5/8" DIAMETER													
H	R	X	Y	S	O	TOTAL LENGTH	NO. REQ'D	N	L	P	F	V	
INCHES	INCHES	INCHES	INCHES		INCHES			INCHES	INCHES	INCHES	INCHES	INCHES	
18" DIAMETER CORRUGATED METAL RISER													
9	14-1/8	6	14-1/8	1	20	4'	10	11-7/16	3'	21	8	8	
21" DIAMETER CORRUGATED METAL RISER													
12	9-1/4	9	18-1/2	2	20-5/8	4'	6-5/8"	12	12-3/8	4'	18	12	6
24" DIAMETER CORRUGATED METAL RISER													
15	11-3/8	12	22-3/4	2	25-3/8	5'	5-3/8"	12	14-13/16	4'-6"	24	18	9
30" DIAMETER CORRUGATED METAL RISER													
18	9-1/2	15	28-1/2	3	30	6' 4"	14	15-13/16	6'	24	21	7	
36" DIAMETER CORRUGATED METAL RISER													
21	12-1/2	21	37-5/8	3	39-1/2	7'10-1/2"	16	17-5/16	7'-6"	30	30	10	

TABLE OF DIMENSIONS AND QUANTITIES													
BARS 5/8" DIAMETER				BARS 5/8" DIAMETER				BARS 5/8" DIAMETER				TOP PLATE	
NO.	r	LENGTH	REQ'D	NO.	r	LENGTH	REQ'D	NO.	r	LENGTH	REQ'D	NO.	r
REQ'D	INCHES	INCHES		REQ'D	INCHES	INCHES		REQ'D	INCHES	INCHES		INCHES	INCHES
18" DIAMETER CORRUGATED METAL RISER													
2	14-5/16	46	1	10	62-10	1	14-5/16	92	1	10-1/4	73	3	
21" DIAMETER CORRUGATED METAL RISER													
2	18-13/16	60	1	11-1/2	72-1/4	1	18-13/16	120	1	11-3/4	82-1/2	3-1/2	
24" DIAMETER CORRUGATED METAL RISER													
2	23-5/16	74	1	13	81-8	1	23-5/16	148	1	13-1/4	91-1/2	3-1/2	
30" DIAMETER CORRUGATED METAL RISER													
2	29-5/16	93	1	16	100-1/2	1	29-5/16	186	1	16-1/4	111	4	
36" DIAMETER CORRUGATED METAL RISER													
2	38-3/8	121-1/2	1	19	119-5	1	38-3/8	243	1	19-1/4	129	4	

REFER TO CONSTRUCTION SEQUENCE/PHASING NARRATIVE REVISED DATED 10/14/22



EROSION CONTROL NOTES:

1. PRIOR TO COMMENCING SITE WORK OR EARTHWORK OPERATIONS, INSTALL EROSION CONTROL BARRIERS AND MAINTAIN THROUGHOUT CONSTRUCTION.
2. ALL EROSION CONTROL MEASURES SHALL MEET ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS, SPECIFICALLY THE 2022 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT FOR DISCHARGES FROM CONSTRUCTION ACTIVITIES (2022 CONSTRUCTION GENERAL PERMIT) AND THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION EROSION AND SEDIMENT CONTROL GUIDELINES.
3. ALL DISTURBED AREAS SHALL BE LOAMED AND SEEDED IMMEDIATELY UPON COMPLETION OF CONSTRUCTION (8" MINIMUM OF LOAM).
4. ALL MATERIALS AND STOCKPILES SHALL BE STORED ON LEVEL AREAS OUTSIDE OF ANY FLOOD ZONES, WETLANDS OR BUFFER ZONE AREAS. ALL STOCKPILES SHALL BE SURROUNDED BY HAY BALES, SHALL HAVE SIDE SLOPES NO GREATER THAN 3:1 AND SHALL BE SEEDED OR STABILIZED IF LEFT UNDISTURBED FOR TWO WEEKS OR MORE.
5. SEDIMENTATION CONTROL DEVICES AND EROSION CONTROL BARRIERS SHALL BE INSPECTED WEEKLY AND MAINTAINED AS NECESSARY THROUGHOUT ALL PHASES OF CONSTRUCTION AND PROMPTLY AFTER EACH RAINFALL.
6. ANY SLOPE STEEPER THAN A 3:1 SHALL BE EQUIPPED WITH JUTE MESH STYLE BIODEGRADABLE SLOPE STABILIZATION FABRIC OR JUTE MESH STYLE BIODEGRADABLE EROSION CONTROL MATTING.
7. ADDITIONAL EROSION CONTROL MEASURES SHALL BE INSTITUTED AS CONDITIONS WARRANT OR AS DIRECTED BY THE ENGINEER AND/OR THE TOWN.
8. AFTER TEMPORARY OR FINAL SEEDING, THE CONTRACTOR MUST IMMEDIATELY REPAIR OR RE-SEED AS NECESSARY WHILE GERMINATION IS TAKING PLACE ANY AREAS THAT DO NOT FULLY DEVELOP.
9. MATERIAL STOCKPILES SHALL NOT BE LOCATED WITHIN THE PATH OF EXISTING OR PROPOSED WATERCOURSES (BOTH TEMPORARY OR PERMANENT) OR THOSE AREAS SUBJECT TO STORM WATER FLOW.
10. SEDIMENT CONTROL DEVICES AND EROSION CONTROL BARRIERS MAY BE REMOVED ONLY AFTER THE SITE HAS BEEN STABILIZED AND RE-VEGETATED PER ESTABLISHED STANDARDS AND ONLY AFTER APPROVAL OF THE TOWN.
11. ALL DISTURBED OR EXPOSED AREAS SUBJECT TO EROSION, WHICH REMAIN DISTURBED BUT INACTIVE FOR AT LEAST FOURTEEN DAYS, SHALL REQUIRE TEMPORARY SEEDING IN ACCORDANCE WITH THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES. IN ALL CASES, STABILIZATION MEASURES SHALL BE IMPLEMENTED AS SOON AS POSSIBLE IN ACCORDANCE WITH THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES.
12. EARTHWORK ACTIVITY ON THE SITE SHALL BE DONE IN A MANNER SUCH THAT RUNOFF IS DIRECTED AWAY FROM ADJUTING STRUCTURES, PROPERTY, ETC.
13. THE CONTRACTOR SHALL KEEP ON SITE AT ALL TIMES ADDITIONAL HAY BALES AND EXTRA SITUATION FENCING FOR INSTALLATION AT THE DIRECTION OF THE ENGINEER OR THE TOWN TO MITIGATE ANY EMERGENCY CONTROL.
14. REFER TO CONSTRUCTION DETAILS FOR ADDITIONAL EROSION CONTROL MEASURES.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SITING, RELOCATION AND AUGMENTATION OF EROSION CONTROL DEVICES AS THE PROJECT PROGRESSES AND THE SITE DRAINAGE CONDITIONS CHANGE.
16. THE CONTRACTOR SHALL MINIMIZE THE AREA OF DISTURBED SOIL. EFFORTS SHALL BE MADE TO LIMIT THE TIME OF EXPOSURE OF DISTURBED AREAS.
17. ALL DISTURBED AREAS DUE TO INSTALLATION ACTIVITY ARE TO BE IMMEDIATELY REPAIRED, LOAMED AND RE-SEEDED, AND STABILIZED WITH BIODEGRADABLE JUTE MESH STYLE EROSION CONTROL MATTING OR SLOPE STABILIZATION FABRIC AS NECESSARY.
18. FINAL SEEDING OF THE SITE SHALL BE MONITORED AND MAINTAINED WHILE GERMINATION IS ESTABLISHED AND ANY AREAS THAT DO NOT DEVELOP ARE TO BE RE-SEALED AND STABILIZED WITH BIODEGRADABLE JUTE MESH STYLE EROSION CONTROL MATTING OR SLOPE STABILIZATION FABRIC AS NECESSARY.

DUST CONTROL NOTES:

1. THE CONTRACTOR SHALL TAKE STEPS TO MINIMIZE THE AMOUNT OF DUST GENERATED ON THE SITE AND ENSURE THE SITE IS IN CONFORMANCE WITH THE DEP AIR POLLUTION CONTROL REGULATIONS 310 CMR 7.09.
2. DUST CONTROL MEASURES SHOULD BE IMPLEMENTED AS NEEDED DURING ALL SITE GRADING ACTIVITIES AND PARTICULARLY DURING WINDY CONDITIONS.
3. WATER SHALL BE APPLIED UNTIL THE SURFACE IS WET AND REPEAT AS NEEDED. WATER SHALL BE APPLIED IN SUCH A MANNER SO THAT RUNOFF, CHANNELING, OR EROSION DOES NOT OCCUR.
4. OTHER POTENTIAL WETTING AND/OR DUST CONTROL AGENTS MAY BE PROPOSED FOR USE BY THE CONTRACTOR AND MUST BE APPROVED BY THE TOWN PRIOR TO USE ON SITE.
5. WHEEL AND TRUCK WASHES SHALL BE USED AT SITE EGRESS AS NEEDED.
6. ALL TRUCKS LEAVING THE SITE WHICH HAVE BEEN LOADED WITH SOIL OR DUST-PRODUCING MATERIAL SHALL BE TARPED IN ACCORDANCE WITH APPLICABLE REGULATIONS.
7. ALL PAVED SURFACES AND ROADWAYS (WITHIN 500 FEET OF THE SITE) ON WHICH EQUIPMENT AND TRUCK TRAFFIC ENTER AND LEAVE THE CONSTRUCTION AREA SHALL BE SWEEPED AND/OR WATERED AS NEEDED.
8. WIND SCREENS, WIND FENCES, SILT FENCE OR SIMILAR BARRIERS SHALL BE IMPLEMENTED AS NEEDED AND PLACED AT INTERVALS OF ABOUT 10 TO 15 TIMES THE BARRIER HEIGHT.
9. ALL CLEARING, GRADING, EARTHMOVING, AND EXCAVATING ACTIVITIES SHALL BE SUSPENDED DURING PERIODS OF SUSTAINED STRONG WINDS (HOURLY AVERAGE WIND SPEEDS OF 25 MPH OR GREATER).

STABILIZATION DEADLINES

(IN ACCORDANCE WITH THE EPA 2022 CONSTRUCTION GENERAL PERMIT)

- INITIATE THE INSTALLATION OF STABILIZATION MEASURES IMMEDIATELY IN ANY AREAS OF EXPOSED SOIL WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED OR WILL BE TEMPORARILY INACTIVE FOR 14 OR MORE CALENDAR DAYS; AND
- COMPLETE THE INSTALLATION OF STABILIZATION MEASURES AS SOON AS PRACTICABLE, BUT NO LATER THAN 14 CALENDAR DAYS AFTER STABILIZATION HAS BEEN INITIATED.

IF DISTURBANCE IS MORE THAN 5 ACRES AT A TIME:

- COMPLETE THE INSTALLATION OF STABILIZATION MEASURES AS SOON AS PRACTICABLE, BUT NO LATER THAN SEVEN (7) CALENDAR DAYS AFTER STABILIZATION HAS BEEN INITIATED.



SOLAR DECOMMISSIONING EVALUATION & COST ESTIMATE

Fearing Hill Road Solar Project

Wareham, Massachusetts

ADE Project 3055.02

May 17, 2021

Revised October 17, 2022

This Decommissioning Plan Evaluation has been prepared for the proposed Fearing Hill Road Solar Project located in Wareham, Massachusetts on behalf of Wareham MA 3, LLC. (the 'Proponent'). This evaluation has been prepared to estimate the costs to remove the physical components of the proposed project and restore the Site to a stable condition in accordance with Section 595 of the Wareham Zoning Bylaws. As per the Planning Board's recent request and the provisions of Section 595.3, this assessment now (i) includes "a mechanism for calculating and adjusting the increased value of the surety removal costs due to inflation," and (ii) does not account for salvage values associated with materials. Please note this evaluation has been completed based upon the plan entitled "Site Development Plans for Fearing Hill Road Solar Project" drafted by Atlantic Design Engineers Inc. (Atlantic) and dated September 29, 2022.

Upon abandonment or discontinuation of use, the owner shall be responsible for physical removal the Solar Facility following the date of abandonment or discontinuation of use. Based on design criteria at the Site, the definition of "physical removal" shall include, but not be limited to, the following:

1. Contact with local Electrical Distribution Company and schedule a date for shutdown and disconnection from the utility grid as well as provide notice to the Town of such.
2. Removal of the solar modules, perimeter fencing, supporting structures, foundations, electrical equipment, utility poles and electrical connections. All other equipment, equipment shelters and vaults, security barriers and appurtenant structures shall be removed from the Solar Facility site. Inverters, transformers and the switchgear will be removed from their concrete pads and the pads will be removed as well.
3. The removal of the solar racking post or screw-hole foundations will be completed in a manner that minimizes impacts to site stabilization. For planning purposes, Atlantic has provided separate costs estimates for the removal of only the above grade portions of the solar racking foundation and for the complete removal of all subsurface foundations. The method of foundation removal will be determined by the project proponent at the time of decommissioning.

4. Proper disposal of all solid or hazardous materials and wastes (if any) from the site in accordance with local and state solid/hazardous waste disposal regulations,
5. Restoration of the location of the Solar Facility site through the removal of all solar components and seeding of disturbed areas. This assessment assumes the gravel access drive and the detention basins may remain. Restoration will include the revegetation of the site with a limited number of native tree species (pine, black oak, red maple etc.).

Please refer to the Decommissioning Estimate Calculation Sheet attached as **Exhibit A** for an item-by-item breakdown of the costs associated with the decommissioning of the proposed Fearing Hill Road Solar Array. As per the Planning Boards request, the Salvage Estimate of materials or equipment of value has not been included within the attached calculations. Materials of potential salvage/reuse value include but are not limited to copper wiring, aluminum, and steel. Racking materials and fencing will be pulled from the ground, folded for transport and potentially sold to a scrap yard.

The facility owner will be responsible for all decommissioning costs and will obtain all permits or approvals required by the Town prior to commencing decommissioning work.

As shown on **Exhibit A**, the estimated decommissioning costs in Year 1 are \$195,200.00, assuming that solar racking foundations will be completely removed and, if it is determined that removing the racking foundations will destabilize the site, \$188,900.00, assuming that solar racking foundations will be removed to ground level. In order to meet the Financial Surety requirements of Section 595.3, the facility owner will post a Decommissioning Bond in an amount equivalent to 125 percent of the higher estimate (\$195,200.00) or \$244,000.00.

The estimated decommissioning costs shall be reviewed at five-year intervals and adjusted for actual inflation that may have occurred during the interval. For example, the dollar had an average inflation rate of 3.36% per year between 2017 and today, producing a cumulative price increase of 17.95% for the last five years. If the next five-year interval from 2022 to 2027 has the same cumulative 17.95% inflation rate, the Decommissioning Bond amount shall be increased by 17.95% ($\$244,000 \times .1795 = \$43,798.00$) in 2027 to \$287,800.00.

If, as a result of each five-year re-calculation, the estimated decommissioning costs increase, the facility owner will increase the Decommissioning Bond amount accordingly and provide the new Decommissioning Bond to the Town.

The facility owner will provide a Decommissioning Bond in the above-mentioned amount of \$287,800.00, in the form attached as **Exhibit B**, as a condition to receive the Building Permit.

*The dollar had an average inflation rate of 3.36% per year between 2017 and today, producing a cumulative price increase of 17.95%, or an average of approximately 3.4% per year for the last five years. The average rate of inflation shall be reviewed every five (5) years and the amount of the Bond shall be increased or decreased accordingly on each such 5th year anniversary date.

Please note that the method of foundation removal shall be determined by the project proponent at the time of decommissioning. The project company will provide a Decommissioning Bond, in the form attached, as a condition to receive the Building Permit.

Please feel free to reach me at (508) 888-9282 if you have any questions.

Very truly yours,

ATLANTIC DESIGN ENGINEERS, INC.

A handwritten signature in blue ink, appearing to read 'Richard J. Tabaczynski'.

Richard J. Tabaczynski, P.E.
Vice President

*The dollar had an average inflation rate of 3.36% per year between 2017 and today, producing a cumulative price increase of 17.95%, or an average of approximately 3.4% per year for the last five years. The average rate of inflation shall be reviewed every five (5) years and the amount of the Bond shall be increased or decreased accordingly on each such 5th year anniversary date.

DECOMMISSIONING ESTIMATE CALCULATION SHEET

Exhibit A

Fearing Hill Road Solar Project Decommissioning Estimate

Wareham, MA

May 17, 2021

Revised: October 17, 2022

System Information Summary

Total System Module Count	15500
Total System Inverter Count	~38
Racking Orientation	2 Up Vertical
Linear Feet of Racking	11620
Estimated Aluminum per Foot of Racking (lbs)	2
Estimated Steel Per Foot of Racking (lbs)	4.5
Estimated Length of Interconnection to Street (feet)	527
Anticipated Project Lifespan for Inflation Calculation (years)	25

Decommissioning Summary

Estimated Business Days to Demolish (8 Man Crew - Rate of 300 modules, 2 Inverters & 500 Linear Feet of Racking/Day)	46
Estimated Total Number of 40 Yard Dumpsters (400 Modules/2INV/Miscellaneous Debris Per Container)	39
Dumpster Disposal Cost (\$650 per Container)	\$ 25,350.00
Cost for Demolition Crew (\$225/Day/Member)	\$ 82,800.00
Heavy Equipment (\$950/Day)	\$ 43,700.00
Solar Racking Foundation & Utility Pole Removal - Assuming the complete removal of solar racking foundations - including subsurface (8 Man Crew/10 Days)	\$ 18,000.00
Solar Racking Foundation & Utility Pole Removal - Assuming racking foundation removal to ground level only - if site conditions necessitate (8 Man Crew/6.5 Days)	\$ 11,700.00
Perimeter Fencing - Including removal of footings for posts (\$1.50/foot for ±4,332 feet of fencing)	\$ 6,498.00
Estimated Mobilization & Site Repair - Includes revegetation of site with native tree species (10% of Costs)	\$ 18,804.80
Total Current Day Decommissioning Estimate - Assuming that solar racking foundations will be removed to ground level	\$ 188,852.80
Total Current Day Decommissioning Estimate - Assuming that solar racking foundations will be completely removed	\$ 195,152.80

DECOMMISSIONING BOND FORM

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, Wareham MA 3, LLC as Principal, and _____, licensed to do business in the State of _____, as Surety, are held and firmly bound unto the Town of Wareham, Massachusetts (Obligee), in the penal sum of Two Hundred Eighty-Seven Thousand Eight Hundred and Zero Cents (\$287,800.00), lawful money of the United States of America, for the payment of which sum, well and truly to be made, the Principal and Surety do bind themselves, their heirs, executors, administrators, and successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the above bounden Principal has entered into a certain written Contract with the above named Obligee entitled _____ effective the _____ day of _____, 2022 and terminating twenty-five (25) years after "Commercial Operation Date" _____, as defined in and more fully described in said Contract, which Contract is made a part hereof and incorporated herein by reference, except that nothing said therein shall alter, enlarge, expand or otherwise modify the term of the bond as set out below. Under said Contract, Principal is obligated to remove the Project from, and to restore, the Property as defined in Section ____ and to provide "Decommissioning Security" in accordance with the terms and conditions of Section _____ of the Contract.

NOW, THEREFORE, if Principal, its executors, administrators, successors and assigns shall promptly and faithfully perform the Contract according to the terms, stipulations and conditions of Section _____ of the Contract, then this obligation shall become null and void, otherwise to remain in full force and effect. Surety waives any right to receive any notice of any modifications or amendments to the Contract. This bond is executed by the Surety and accepted by the Obligee subject to the following express condition:

Notwithstanding the provisions of the Contract, the term of this bond shall apply from (first annual period) _____, 2022 until _____, 2047, and may be extended by the Surety by Continuation Certificate. However, neither nonrenewal by the Surety, nor the failure or inability of the Principal to file a replacement bond in the event of nonrenewal, shall itself constitute a loss to the Obligee recoverable under this bond or any renewal or continuation thereof, provided that the foregoing shall not relieve Principal of its obligation to furnish a replacement bond or other suitable "Decommissioning Security" in the event of nonrenewal, as set forth in the Contract, nor for any liabilities arising from its failure to do so. The liability of the Surety under this bond and all continuation certificates issued in connection therewith shall not be cumulative and shall in no event exceed the amount as set forth in this bond or in any additions, riders, or endorsements properly issued by the Surety as supplements thereto.

Sealed with our seals and dated this _____ day of _____ 2022.

(Principal) (Seal)

(Witness)

(Title)

(Surety)

(Attest)

(Attorney -in-Fact)