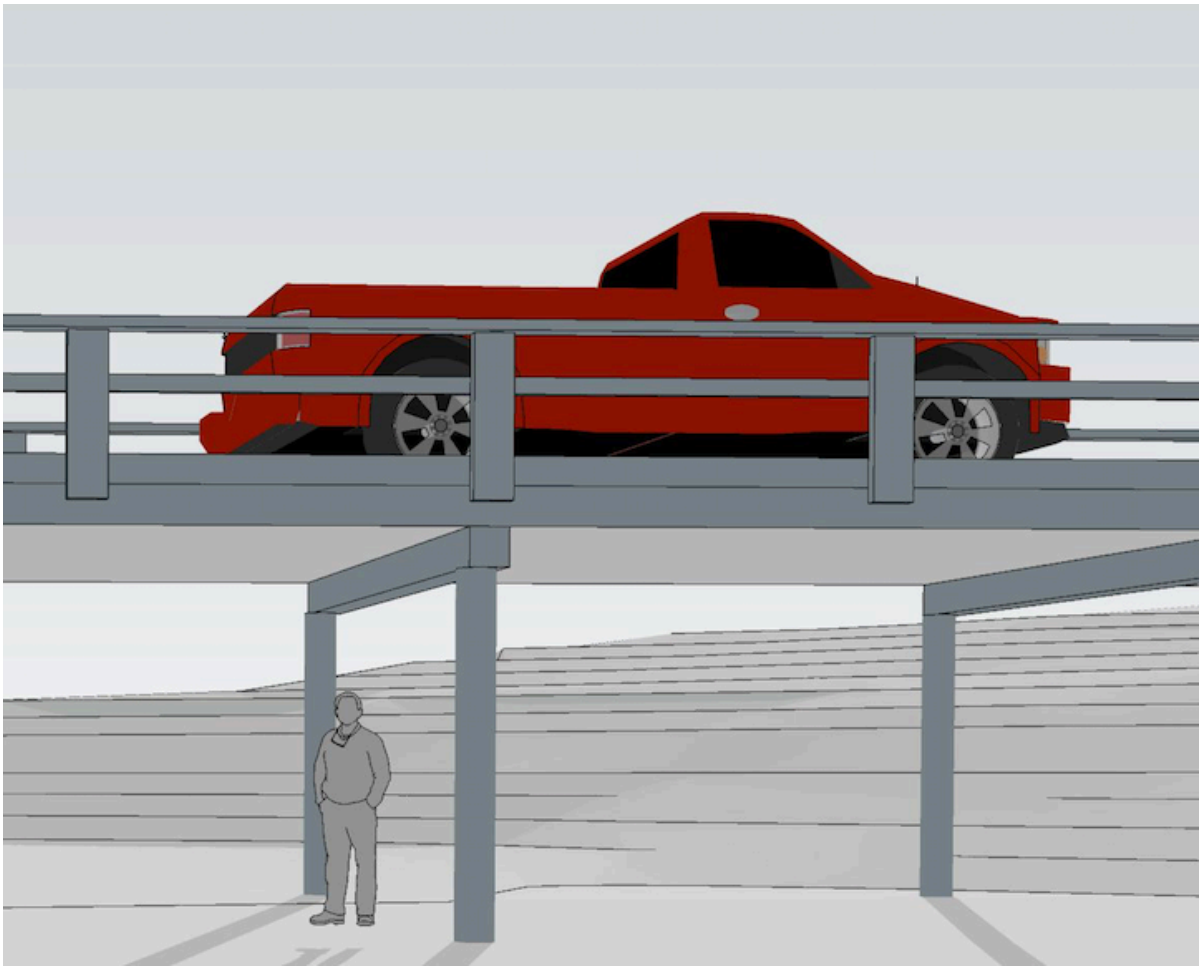
Squibnocket Committee
Town of Chilmark, MA 01742

Dear Jim and Squibnocket Committee Members:

We are writing to you and to the Committee to respond to several of the inaccuracies made by Haley and Aldrich in their 14 November memorandum because we want to be sure that our proposal is correctly understood.

But, before we respond to the five points in the Haley & Aldrich memorandum, we want to summarize the underlying problems with the Haley & Aldrich/Squibnocket Farm proposal:

1. **The bridge will degrade the natural beauty of the beach area:** The bridge will be the dominant feature of the beach due to its overall height and proximity to the shoreline. We are providing the visual representation[1] below to show the scale of the bridge and to respond to H&A's comment that we had misrepresented the dimensions of the bridge. Based on H&A technical documentation, the bridge will be 19' above sea level, which translates to a 'real' elevation of 15' above the actual terrain for most of the bridge's span from Squibnocket Road to Money Hill. More specifically, the 6' tall man in the illustration is on terrain that is 4' above sea level (4' of elevation). The bottom of the bridge deck is 3' above his head; it is an additional 2' to top of road deck; plus another 4' to top of railing for a total of 19'. Truck cab extends visual effect another 2 1/2' above the railing. The total distance from ground level to the top of the truck roof is 17½'.



2. **The bridge will become more dominant on the beach as the area erodes:** Our projected erosion rate of 2.3' per year moves the shoreline rapidly toward the bridge. As the shoreline gets closer, the bridge and its elevated traffic has more impact on anyone who is using the beach. The negative effect on the value of the beach is undeniable. In as few as 25 years, someone sitting on the beach could easily be leaning against the piling of the bridge.

3. **The bridge endpoints will last 35-40 years at most:** This means that the bridge and its conduits fail in 35 years. Extensions to the bridge will be required and the conduit system will need to be replaced well before the end of the bridge's 50-year life.

4. **The impact of the Haley & Aldrich plan on the beach itself is unclear at best, negative at worst:** We are aware of no commitments or plans to remove the revetments. In our joint technical meeting, the H&A team indicated that retaining these structures was critical to the longevity of the bridge. And he Town's consultants who presented in March recommended caution and thought that retaining certain portions of the revetments made sense. Either all of the revetments should be removed or all should be retained. Partial removal of the revetments will cause new problems, as the shoreline will become disfigured with a cove, areas of the beach will be blocked by the revetments, and portions of the beach will be continue to be unavailable for use at high tide.

5. **Haley & Aldrich proposal Is incomplete:** H&A has provided no maps or any data that would allow for an evaluation of their proposal *in this specific location.* They have not provided an erosion rate for the area, except for some long-term historical numbers from the Coastal Zone Management System. And, they have not provided any information on the plans for revetments or assumptions as to their future status, both of which are critical to understanding the longevity of the bridge and for assessing the impact of this project on the future of the shoreline and the beach. And, most importantly, they have not provided a site map showing the actual location of the proposed bridge. Claims have been made as to the longevity of the bridge but these cannot be supported because there are no data mapping the effects of erosion.

Response to Haley & Aldrich Nov 14th Memorandum

We have responded below to Haley and Aldrich's five points (November 14th memorandum) in detail. But, before doing so, we would like to point-out that their letter is prone to exaggeration and uses data in a way that is often misleading. Here are a few examples:

1. **Dune:** The dune is discussed in a confusing manner. We would refer H&A to material from the Office of Coastal Zone Management, which explains the behavior, functioning, and value of artificial dunes, along with their design and maintenance. A dune is a very simple and ageless concept. There is nothing mysterious about dunes or about the location that we are recommending for it.

   If H&A has not seen these materials, we refer them to:

   http://www.mass.gov/eea/docs/czm/stormsmart/properties/ssp-factsheet-1-dunes.pdf

   This is another helpful website with an excellent short and very excellent video clip on dunes (US Climate Resistance Tool Kit – NOAA):

   http://toolkit.climate.gov/taking-action/restoring-natural-dunes-enhance-coastal-protection

2. **Logistical 'externalities':** This refers to the trucking of material to the site. H&A states that we underestimated the amount of fill required for the dune. H&A pulled the 9000 cubic yards (CY) requirement from one of our earlier documents that included the fill for the parking lot. While our initial 'working' estimate for the dune alone was for 8000 CY, we settled with our team on 6500 CY for a variety of reasons – we separated the road from the dune and we redesigned the dune to reduce its mass (narrower and lower by 1.5'). As far as trucking estimates are concerned, H&A has created an exaggerated picture. If we use 6500 CY as the estimate for material and 20 CY per trip using the larger trucks referenced by H&A, the total number of trips to the site is 310, not 750 trips as quoted by H&A. Their number is more than 2x our estimate.

3. **Cost of material for the dune:** Another case of exaggeration involves the documentation provided by H&A on the cost of sand. They used slides from the Bureau of Ocean Energy Management (BOEM) that are not relevant to the question at hand. First, the subject of the BOEM slide is the cost of sand for beach nourishment and includes data on the cost benefits of sand mining. We are not quoting prices for sand because we are not proposing beach nourishment. Also, from a pure design perspective, it makes better sense to use a courser material for a dune, as opposed to sand, because a material such as gravel binds together and is more durable. Additionally, gravel is more compatible with the materials in the coastal banks on either side. We are sticking with our original cost estimate of $17/CY for gravel, delivered to the site. Also, H&A's use of pricing at $75/CY for sand is another example of exaggeration, given that the other three estimates for sand on the slide are between $37/CY and $43/CY but it's worse than that because they are also quoting the wrong material (we are proposing gravel).

What follows are the detailed responses to Haley and Aldrich's memorandum:

1. Roadway Along the Pond Route

During this initial design phase, our civil engineers have determined that a safe and convenient roadway in the proposed area along the back of the pond is feasible. If Squibnocket Farm decides to pursue this solution, the roadway can be fine tuned during the detailed design phase. There is available land that can be used to improve the various features of the roadway.

- **Roadway grades**: H&A indicated that some of the roadway grades are too steep. All grades are at or below Planning Board guidelines (10%). And, 7% - 8% is possible by tuning the slope in those rather short areas that are pointed-out by H&A.
- **90° turn off Squibnocket Road:** H&A thinks the turn-off angle from Squibnocket Road is too sharp. It should be noted that the turn-off above the proposed parking lot in our proposal is at an identical angle to the proposed turn-off in the H&A proposal for the bridge. There is available space to reduce the angle of our turn-off.
- **Sight lines and cars travelling in opposite direction:** Our proposal is for a single lane gravel road at a width consistent with Chilmark Planning Board guidelines and similar to the existing SFHA roadway from Money Hill to Squibnocket Farm. As a result, there will be only one car travelling in one direction at any given time. As for improving the safety of the roadway, there is available land in the area of the proposed roadway that can be used to optimize the design.
- **Surface flows, etc.:** H&A has indicated that we will need to raise the roadway to incorporate culverts. Culverts are part of the design and we see no issue incorporating them into the roadway. Culverts will not necessitate an increase in the elevation of the roadway itself. As for saturation, this has been discussed and technically reviewed and we understand the techniques available for ensuring a high quality, stable roadbed across that area. This is not an issue.
- **< 5,000 S.F. of fill:** We do not foresee any problems in meeting the < 5000 S.F. wetlands fill. This is a common goal and surveyors and construction engineers know how to achieve it.

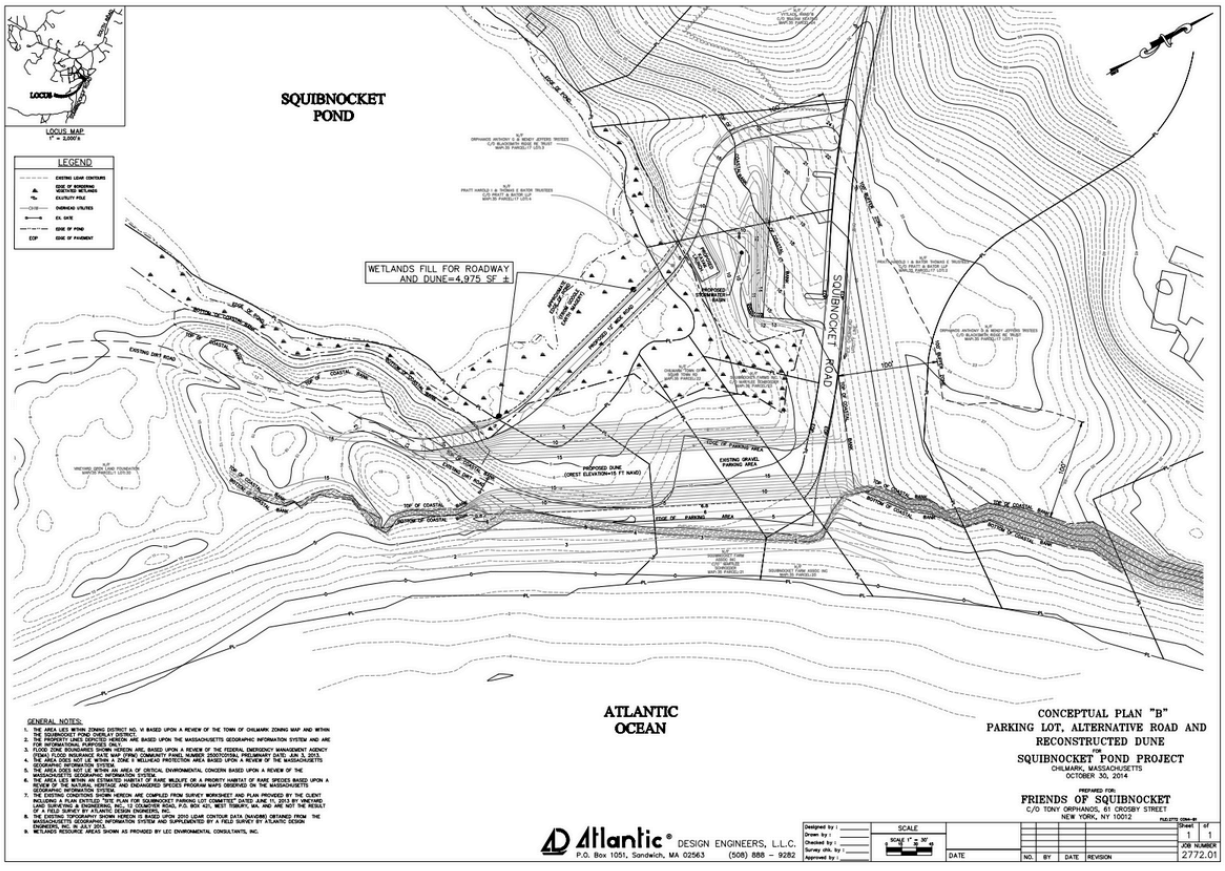
2. Dune

Our coastal engineer, John Ramsey has had extensive experience with this type of construction and followed best analytical and design practices. Rather than trying to sort through what was said at a technical meeting between the two teams, let's try to focus on the important elements of the dune proposal without losing sight of the simple, basic underlying principles:

- **Dunes migrate:** The combined effects of wind and waves (overwash) cause dunes to move. The same dynamics apply to an artificial dune. As the dune migrates, the wetland transitions to 'coastal dune'. This is a simple, undeniable fact of coastal science. The H&A memorandum implies that they do not accept this premise.
- **Dunes can be designed to withstand various storm forces:** The H&A memorandum ignores the fact that the entire roadway from Money Hill all the way to Squibnocket Farm is dependent on the capability of a dune or coastal bank to withstand storms and provide flood protection. If overwash occurs at the artificial dune, the same would apply to the bridge end-point at Money

Hill, and to the areas just beyond Money Hill. Most importantly, there is absolutely nothing that distinguishes the area where the dune will be located as a *unique* high impact area or *special* velocity zone. The point is that a big storm will have a similar effect on the coastal bank and dune from Stonewall Beach, all the way to Mussel Shoal. The dune should not be called out as a special case.

- **Revetments:** H&A does not address the effect of the removal of the causeway and Money Hill revetments. Removing the revetments will make the Money Hill area and bridge end-point vulnerable and this affects the viability of the bridge solution. Without the revetment in place, Money Hill will erode at the same rate as the rest of the area – 2.3' per year. There's a contradiction in the basic strategy. On the one hand, the bridge is supposedly beneficial because the rising ocean can run under the bridge in an impeded way, but, on the other hand, the revetments need to be retained to protect the bridge. H&A is silent on this point.
- **Overwash and the road:** The H&A statements are confusing. Our updated road location next to the pond eliminates much of the need for relocation of the roadway (see map below). Because the angle to the shoreline is oblique, this means that over time the road will be able to retain most of its initial position. The shoreline moves at 2.3' per year and this will affect the dune, but the road maintenance will be limited to the area that's on the dune itself and its intersection and run-up to the dune. Note that the bridge is not somehow immune from the same erosion. If we focus on the Money Hill section, with the revetment removed, the bridge will be out-of-business at that endpoint in 25 years, as the top of the bank will have passed under the bridge.



- **Accretion:** In saying that Squibnocket Farm cannot count on accretion to provide a base for dune migration, H&A has not taken the accretion evidence of since 1950 into consideration: 25,000 sq. ft. of accretion (more than ½ acre of sand, gravel, and cobble) at the east end of the pond. During that period, roughly 20% of the ½ acre accretion has transitioned from wetland to coastal dune (in the southern corner). This rate of accretion will continue and should accelerate due to the absence of the revetment, which has been preventing higher rates of accretion and the presence of a dune, which will supply sediments for the overwash to the wetlands.
- **Truckloads of material:** Our original estimate of 6500 cubic yards is accurate and is a good number to use at this stage of the process. Using an average of 20 cubic yards per load equates to 310 loads. Or 10 loads per day over a 31-day period. This could be accomplished in March-April with little disruption. This is actually a small shoreline restoration project, compared to others in New England.

3. Utilities

- **Utilities need to be installed by horizontal drilling for the bridge solution.** H&A does not favor horizontal drilling for the installation of conduits. We have a different position. Installing the conduits inside the concrete deck of the bridge in an area close to the shoreline in a velocity zone is risky. As soon as either end-point is washed out, the entire utility system will need to be replaced. The end-point is a single point of failure.
- **Utilities will be separated from the roadway for the dune & road solution:** An upland right-of-way for the utilities on the north side of the pond is available for the dune alternative.
- **Risk:** The biggest risk we foresee is not the ability to obtain approval for a permit, it's the failure of conduits installed on the bridge through a wash out of a bridge end-point.

4. Permitting

The Squibnocket Farm case for a permit rests on the notion that a bridge in this location is a reasonable alternative. We do not agree because of the bridge's poor longevity, negative impact on Chilmark's beach resources, and broader environmental impact.

We believe that the Conservation Commission has the discretion to approve the dune and road under 310 CMR 10.53(4)(b) or as a 'limited project'. The 5,000 square ft. of wetlands to be consumed by this project are marginal wetlands that were created by filling the pond with overwash. This area is a short-lived wetlands asset dominated by phragmites and will naturally lose its status as wetlands in the near future due to natural accretion from the ocean (overwash and wind erosion).

The more important permitting question that needs to be asked is 'What happens after the bridge end-points are washed-out?' At that time, there's no departure point on the north side from which to launch a bridge. Meanwhile, a road would still be viable.

5. Costs

We think that H&A has exaggerated the costs of the dune solution, especially in its use the Ocean Energy Management Data.

Initial cost of construction:

- **Costs of material for dune:** We are not proposing beach nourishment as indicated in the Haley and Aldrich material. And, the Town's geologists did not recommend this strategy for this beach. Our pricing is not for sand, which is scarce and more expensive. Instead, we are recommending gravel (concrete sand), which is both more durable for constructing a dune and more consistent with the material in the coastal banks on either side of the parking lot and causeway. The price is as quoted by two Vineyard contractors is $17.00 per cubic yard, delivered to the work site. This is a very different price than what was quoted by H&A - $75/cubic yard for sand (sand is required for beach nourishment, not for dune construction).

- **6500 yards estimate:** We will stick with this estimate. We have lowered the height of the dune by 1.5' to allow more overwash and to reduce the dune slope. And we have reduced the dune's width because we moved the roadway from the back of the dune to a better location. Our pricing for material at $110,000 should be solid.
- **Roadbed:** We will accept the H&A estimate of $75,000 for the roadway construction, although we do believe it's on the high side.
- **Wetlands mitigation:** Wetlands mitigation remains an open question. We do not have an estimate, as it may not be a requirement, but we will accept H&A's number. (H & A estimate is $50,000).
- **Direction drilling:** We find it very hard to believe that H&A would get a permit to attach the conduits to the bridge, as the end-points will not last more that 35 years. That being the case, horizontal drilling will be required whether a bridge or a dune ridge/road is built. We would want to budget only the incremental cost for the dune ridge/road utilities instead of bridge utilities, not the entire line item.
- **Engineering detailed design:** We agree that this should be included. The estimate is $30,000 from our civil engineering team. (H&A estimated $100,000 for detailed design). One point to keep in mind: we have already done a significant amount of engineering & design work. Detailed design includes:
    - Final Design – including test pits, final road design, final dune design, drainage design, erosion control design, replication area design, details, cross sections, plans for permitting and construction.
    - Permitting Assistance – technical support, no meetings.
    - Stakeout – limits of work, centerline, toe of slope, drainage, benchmarks, control points

- **Dune grass:** We do not know where the H&A estimate came from. There is no documentation. We will stick with our estimate of $22,000.
- **Revetments:** The removal of the revetments is not included in this estimate. This part of the project should be accounted for and budged separately.

	FOS	H&A	
Material for dune	$110,000	$675,000	H&A is quoting wrong material at inflated price
Roadbed	$75,000	$75,000	We accept H&A (we do not have detailed estimate
Dune planting	$25,000	$50,000	We have detailed estimate based on vol. of plants
Wetlands mitigation	$50,000	$50,000	We accept H&A (we do not have estimate)
Utilities	N.A.	N.A.	Utilities are required in either case
Revetment removal	N.A.	N.A.	Need to be removed in either case
Detailed design	$30,000	$100,000	We have detailed quote
Permitting	N.A.	N.A.	Required in either case
Total	$290,000	$950,000	H&A estimate is over $650,000 higher!

- **Outcome of costing comparison:** Even when we include new categories of cost and accept H&A's proposed costing for some of these categories, our cost only increases by $100,000 (from previous estimate of $190,000). And, the old estimate included a shorter and less expensive roadway. The primary reason for the big difference in costing is two fold: (1) H&A used an incorrect number for the materials estimate, (2) they quoted the wrong material, using an inflated price.

Maintenance costs:

In our initial presentation to the Committee, we indicated that the maintenance costs would total approximately $7,000/year. We have used our high estimate for material: replace ½ of the entire original dune volume every 15 years. Here are the estimates by line for 15 years:

Cost over 15 years		
Material (gravel)	$55,000	½ of original material every 15 years
Machine cost for dune	$20,000	
Road material	$7,000	
Road maintenance	$9,000	
Planting (dune grass)	$20,000	
Total	$111,000	
Cost per year	$7,400	H&A estimate is $60,000 per year!

- **50-year cost for dune and roadway:** At $7,400 per year or $370,000 for 50 years, plus initial build of $290,000, the total cost for 50 years is $660,000 or about $13,000 per year.

Comparison to bridge:

Making a comparison of the cost of the dune and road to the bridge is difficult for two reasons. First, we have no costing data for the bridge. But, based on our assessment of the life expectancy of the bridge (50 years) and the end-points (25 years), we can make some basic estimates of the relationship between first cost for the bridge and maintenance: we would expect maintenance to cost 50% of the original price of the bridge over the first 50 years, due to the need to extend it and to add protective abutments. Additionally, after 50 years, the entire investment is lost and Squibnocket Farm will need an entirely new access solution.

The interesting difference between these two solutions is that the bridge is a highly capital intensive approach that creates an expensive, front-end loaded, 'wasting asset' that declines in value to zero after 50 years. Meanwhile, the bridge also has a low annual maintenance profile except at the 25-year point in its life where a major upgrade is required. On the other hand, the dune and road solution is far less expensive to build with an annual maintenance cost that is low but possibly aggravating to some. *On the other hand, after 50 years, the dune and road solution is available for an additional 50+ years while the bridge is gone….*

Sincerely,

Wendy Jeffers and Tony Orphanos
Doug Liman
Charlie Parker

[1] Stephen Holt Architects (Manchester-by-the Sea, MA) developed this rendering, using technical documentation provided by Haley and Aldrich (bridge specifications) and topographical data provided by Atlantic Design Engineers. The rendering is proportionally to scale.