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Landscape Architecture
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MILONE & MACBROOM®

December 3, 2013

Mr. Ernest Steinauer, Chairman
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

RE: Emergency Authorization Request
Baxter Road
Nantucket, Massachusetts
MMI #2967-11

Dear Chairman Steinauer and Members of the Conservation Commission :

As you know, Baxter Road has been the subject of a number of applications to your commission in recent years. In October 2013, the Town of Nantucket submitted a request to perform temporary stabilization at the toe of the slope between 85 and 107A Baxter Road using geotextile geotubes. That application was made as a "limited project" and that application has not been approved at this time. In lieu of that application, the town has elected to pursue a permit for stabilization of Baxter Road as an emergency project under 310 CMR 10.06 and Section 136-5 of the Nantucket Town Code. This letter includes a description of the emergency nature of the work to be performed and a summary of the proposed activity including construction methodology. Plans detailing the proposed work are appended.

Justification of Emergency

The town has been advised by Town Counsel that it is legally obligated to provide access to the properties on Baxter Road. Aside from the legal obligation, homes on Baxter Road north of Bayberry Lane have only one access point – Baxter Road. Baxter Road provides access for emergency services as well as water, sewer, and other utilities. If the bluff that supports Baxter Road fails, the roadway and utilities will be lost, preventing the town from providing safe drinking water and emergency services to the properties. *The ability of the town to provide safe drinking water and emergency services is critical to public health and safety of these residents.*

The town is simultaneously pursuing relocation of Baxter Road as a long-term solution to the bluff erosion. The stabilization proposed under this application is intended to be a temporary measure to maintain the existing roadway until such time as a new road can be designed and permitted.

Description of the Proposed Activity

This emergency action requests the installation of six tubes – two made of geosynthetic material and four made from jute – extending from 85 Baxter Road to approximately the middle of 105 Baxter Road. Project plans show the limits of the project and a cross section of the tubes. The following would be constructed under this emergency authorization:

1. Two geotextile tubes (geotubes) made from a woven polypropylene (PP) geotextile set with the bottom tube at elevation 0.0 mean low water (MLW). The top of the geotextile will be approximately at elevation 13.0 MLW.

2. Four jute tubes, each 3.5 feet high extending from elevation 13.0 MLW to elevation 27.0 MLW

3. A scour apron will be installed at elevation 0.0 MLW and will extend to elevation 27.0 MLW.

4. Sand for nourishment will be placed over the entire tube system to provide cover for the tubes and mitigation for the project.

5. Jute netting from elevation 27 to the top of the bluff

Project Monitoring: The project will be visually inspected monthly and following significant storm events throughout its life. The inspection will consist of:

1. Photodocumentation of the condition of the tubes and nourishment sand

2. Observation of the sacrificial sand layer and beach level in front of the seaward (i.e., bottom) geotube to determine if replenishment is needed

3. Identification of the location of any exposed geotextile or jute

4. Identification of any repair required to the geotextile or jute

5. Visual observation of the ends of the project to determine if flanking is occurring

Results of the inspection will be submitted in writing to the Town of Nantucket Public Works Director. If inspection reveals that repair work is needed, the Public Works Director will coordinate having this completed as soon as possible. The schedule of repair will be determined based upon the severity of the work required. For example, repair of torn geotextile will be completed as soon as the beach is accessible for such activity.

The project will be monitored as follows:

- Perform transect surveys in the locations previously monitored by Woods Hole Group each year in April and August. These will be conducted in the locations documented in the Notice of Intent (NOI) application filed for four geotextile tubes. Mapping of the locations will be provided in a postconstruction NOI submitted for this request.

- Perform additional transect survey at all locations noted as soon as possible following all significant Nor'easter storms.

- Survey the location of the top of the bank each year within the 1,500-foot project reach and for approximately 300 feet north and south of the project.

The monitoring data will be used to estimate the volume of nourishment sand remaining over the project area as well as the accretion of sand on downdrift beaches. Results of the monitoring will be compiled into an annual report in April of each year documenting the data collection and analysis and recommending a nourishment protocol. Analysis of the data is proposed as follows:

1. Review beach transect data to estimate accretion and erosion at each monitored transect.

2. Calculate accretion and erosion volumes at transect locations.

3. Compare top of bank locations and estimate bank retreat over the previous calendar year.

4. Calculate bank volume loss in the project area and 300 feet north and south.

5. Submit data and computations to the Conservation Commission for review with a recommendation for nourishment.

Mitigation Schedule: Sand mitigation will be at a rate of 22 cubic yards per linear foot in accordance with the following schedule:

1. Provide initial cover of 18 cubic yards per linear foot immediately following construction (December 2013). The reason for this is to provide the initial cover and to provide a large upfront volume of sand while observing how the entire system performs into the first months of installation.

2. January through March 2014: Provide the remaining four cubic yards per linear foot on an as-needed basis.

3. Annual in April starting in 2014: Provide additional sand to obtain a minimum of 12 cubic yards per linear foot of sand cover. Twelve cubic yards per linear foot is the minimum sand volume required to provide the desired two minimum feet of cover. If some portion of the previous year's sand is in place at the time of the April nourishment then the volume needed to get to 12 cubic yards per linear foot will be provided, with the remaining sand added in November. For example, if 10 cubic yards per linear foot of sand is needed in April to meet the 12 cubic yard minimum, then the remaining two cubic yards will be added in November instead of April.

4. Annually in November starting in 2014: Add an additional six cubic yards per linear foot ***plus*** any excess volume left over from April requirement. The reason for this is to ensure that the bulk of the mitigation volume is available in November for potential mobilization during winter storms.

5. Annually November through March: Add the remaining four cubic yards per linear foot on an as-needed basis, in accordance with the replenishment trigger presented in our November 12, 2013 letter. If the 22 cubic yards per linear foot volume is not placed in its entirety before March 1, the balance of the sand will be placed on March 1.

   End volumes will be replaced and nourished on the same schedule as outlined above.

Delivery tickets from sand supplier will be provided to the Conservation Commission through its agent to document the total volume of sand provided.

Construction Methodology: Construction of the tube system will be completed at the toe of the existing Sconset Bluff between 85 and 105 Baxter Road, with installation starting at the most endangered sections (based on distance of the edge of the bluff to the road) in case weather or other factors prevent full installation this season. The tubes will be filled in place with sand to the proper volume. Compacted sand backfill will be used behind each layer to provide a flat, stable bench for the next subsequent layer of geotube.

Construction will be completed as quickly as possible given the pending winter storm season. The following construction sequence is proposed for the work under this application:

1. The existing beach within the footprint of the bottom geotube and scour apron layer will be graded to elevation 0.0 MLW and to achieve a maximum 1.5% slope in any direction. Given the variations in the beach profile, this will require varying amounts of excavation along the beach as noted in the cross sections shown on the project plans.

2. Approximately five feet to the seaward side of the bottom geotube layer will be excavated to an elevation of 0.0 feet MLW for installation of the four-foot circumference anchor tube and attached scour apron. This section will then be backfilled to the original beach elevation.

3. The scour apron will be rolled out toward the bluff and the bottom geotube placed on top of the apron at the appropriate distance from the slope. The scour apron is delivered in 60-foot wide rolls and will be overlapped by 10 feet at the vertical seams.

4. Sand will be supplied by on-island sand pits, trucked to Baxter Road, and placed in slurry mixer at the top of the slope. Water to create the slurry will be obtained by pumping from the ocean.

5. The slurry will be pumped from the top of the bank through a six-inch diameter hose and into the geotubes on the beach. Sand will remain in the tubes, and clean water will filter through the membrane. The water will infiltrate through the beach.

6. The bottom geotube will be filled with the sand slurry mixture until the tube achieves the required volume and exterior dimensions.

7. The scour apron will then be pulled seaward over the top of the recently filled geotube. The area behind the geotube, between the tube and the bluff, will be backfilled and compacted with 12-inch lifts of clean sand fill. The fill will be installed to an elevation matching the top of the filled geotube.

8. The scour apron will then be pulled landward over the newly backfilled section, and the next geotube layer will be placed upon the scour apron. This next geotube layer will be staggered so to provide an effective slope of two horizontal to one vertical with the upper layer overlapping the previously placed geotube layer.

9. Steps 5 through 8 are repeated for the four jute tube layers.

10. Once all geotubes are filled, the entire structure will be covered with a clean sand fill. The sand cover will be a minimum of two feet in depth at a one vertical to 2.5 horizontal slope to meet the existing beach profile along the front of the geotube structure.

11. Following construction, the beach will be restored to its current elevation (if construction impacts necessitate repair) using beach sand from the site. No material from the on-island sand pits is expected to be used for postconstruction beach repair.

Construction Access: Equipment will access the beach from Hoicks Hollow. A long-armed excavator will be used along with a skid steer on the beach. Any fueling of these machines will happen in the Hoicks Hollow parking lot area. All other equipment will operate out of the staging area located at 99 and 101 Baxter Road.

Staging Area for Slurry Production: The lots at 99 and 101 Baxter Road including portions of the Baxter Road right-of-way will be used as a staging area for the construction. Vegetation will be removed from these lots in those areas where slurry sand will be delivered. This is necessary to ensure no grass or woody debris is mixed with the sand, which will result in clogging the slurry pumps. A 40 cubic yard roll-off dumpster will be used to mix the slurry, which will be approximately 80% water and 20% sand. An excavator will constantly feed sand into the gate end of the dumpster. Inside the dumpster will be an agitating pump that will create the slurry as it pumps the water at the same rate it is being delivered to the dumpster, down into the tubes via a six-inch hose.

The sand will be delivered to the staging area via standard 20 cubic yard dump trucks. They will dump just along the seaward side of the roadway creating a windrow, or continuous series of piles. A small bucket dozer will push the sand down to the excavator, which will constantly feed the slurry production. The roadway will be swept clean daily, and a police detail will be hired to manage any traffic impacts.

Haley & Aldrich has been consulted relative to the weight of the dumpster and the sand stockpiling that is proposed for this area and, so long as a minimum distance of 25 feet is maintained from the top of the bank, it has been determined a safe staging area.

The slurry will be delivered down the face of the bluff via a slurry hose, which will pump directly into the tubes. The water will leach from the geotubes as they fill with sand. A small berm will be constructed on the beach on the waterward side of the geotubes to prevent water from discharging down the beach unmitigated.

Template Sand Delivery: The staging area that was used for the slurry will later be used for the delivery of the sand template. For this phase of the work, the sand will be pushed over the top of the bluff with a dingo (a small hand operated, walk-behind dozer-style piece of equipment) or by a conveyor. Once the face of the bank is vegetated in spring 2014, future sand delivery will be accomplished through the use of three-foot diameter polyethylene pipes.

Once the sand is delivered to the geotubes below, a skid steer and/or a bucket dozer will work to spread the sand evenly over the entire system. These machines will not drive directly on top of

the geotubes until they have a sufficient sand cover, requiring the machines to work their way further outward from the central delivery point(s).

For future maintenance and nourishment sand deliveries, material will be delivered directly to the two end points as well as to some central locations. By delivering a volume of sand to the end points, a skid steer or bucket dozer will be able to build a ramp, similar to how the existing terraces are accessed. The sand would then be pushed inward from the end points until they get to more central delivery locations, at which point they will continue to push sand toward the middle. The bench on the top of the geotube system will be a minimum of 20-feet wide, easily facilitating this activity.

As part of the annual nourishment in the spring, sand will similarly be pushed down the face of the system with a grading technique until the system is again fully covered and the template is back to a one vertical: 2.5 horizontal slope.

Truck Traffic: Dump trucks with a 20-cubic-yard capacity will deliver compatible sand to the site from local pits(s). Given the volume of sand required and the capacity of the trucks, approximately 2,500 truck trips will be required to complete the project. Following construction, ongoing deliveries for nourishment will require fewer truck loads.

Very truly yours,

MILONE & MACBROOM, INC.

Nicolle E. Burnham, P.E., CFM
Principal

Enclosures - Project Plans

cc: Kara Buzanoski, Public Works Director

2967-11-d313-ltr.docx

BAXTER ROAD TEMPORARY STABILIZATION
HYBRID GEOTUBE APPLICATION NOI SUBMISSION

BAXTER ROAD
NANTUCKET, MASSACHUSETTS

DECEMBER 3, 2013

PROJECT SITE VICINITY MAP:

NOT TO SCALE

LOCATION MAP:

NOT TO SCALE

PREPARED FOR:

TOWN OF NANTUCKET
NANTUCKET, MASSACHUSETTS

LIST OF DRAWINGS

SHEET NO.	TITLE
1	TITLE SHEET
2	EXISTING CONDITIONS
3	GENERAL PLAN
4	TYPICAL CROSS SECTION
5	FLANKING DETAIL
6	CONSTRUCTION STAGING AREA
7-11	CROSS SECTIONS

PREPARED BY:

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One Financial Plaza
1350 Main Street, Suite 1012
Springfield, Massachusetts 01103
(413) 241-6920 Fax (413) 241-6911
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DESIGNER: MILONE & MACBROOM, INC.

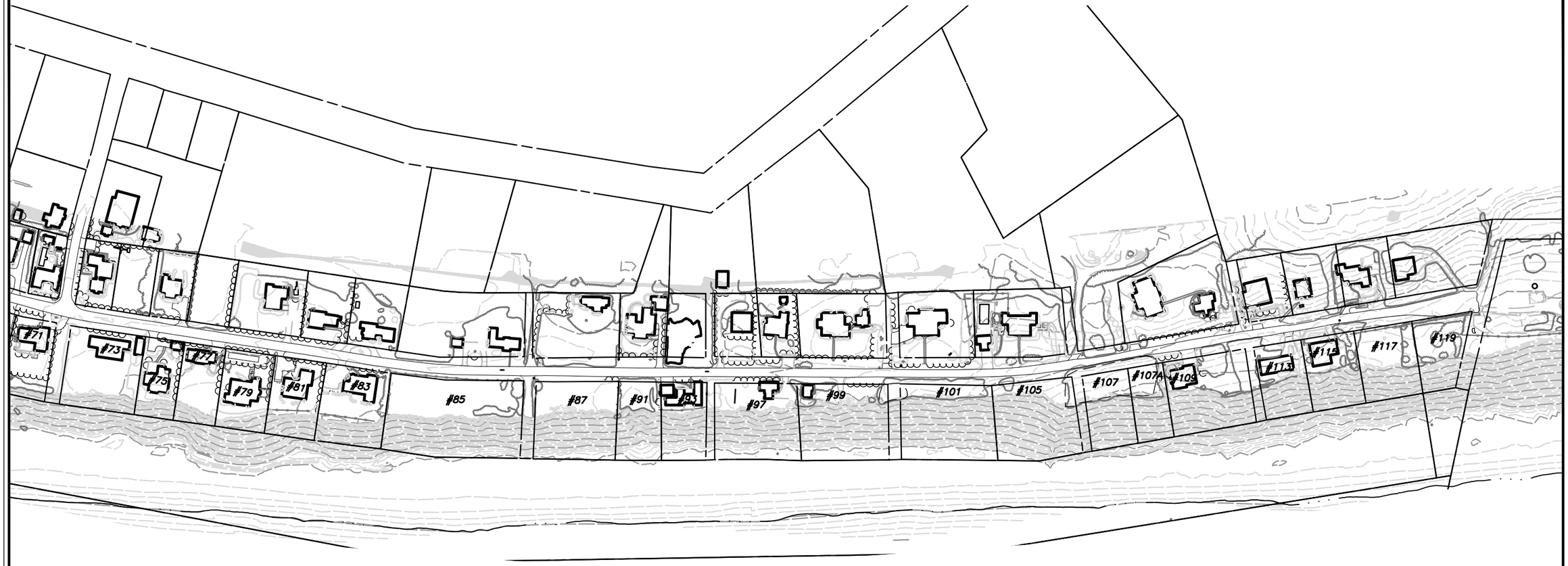
BY: James Macbroom

DATE: December 3, 2013

P.E. NO.: 43052

COMMONWEALTH OF MASSACHUSETTS
JAMES G. MacBROOM
CIVIL
NO. 43052
REGISTERED PROFESSIONAL ENGINEER

Milone & MacBroom, Inc. - 2013



ATLANTIC OCEAN

GENERAL NOTES

1. ALL ELEVATIONS ARE BASED ON MEAN LOW WATER DATUM (M.L.W.=0.0')
2. CONTOURS SHOWN IN 2 FOOT INTERVALS.
3. EXISTING TOPOGRAPHIC SURVEY INFORMATION SHOWN ON THIS PLAN TAKEN FROM A LIDAR SURVEY PROVIDED BY COL–EAST AND BLACKWELL & ASSOCIATES, INC. PERFORMED ON JULY 15, 2013, AND CAN ONLY REFLECT CONDITIONS AS THEY EXISTED AT THE TIME OF THE SURVEY.

0' 100' 200'
0 1/2" 1"

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REVISIONS

EXISTING CONDITIONS - TEMPORARY SLOPE STABILIZATION

BAXTER ROAD TEMPORARY STABILIZATION HYBRID
GEOTUBE APPLICATION NOI SUBMISSION

NANTUCKET, MASSACHUSETTS

RSD	SMW	NEB
DESIGNED	DRAWN	CHECKED

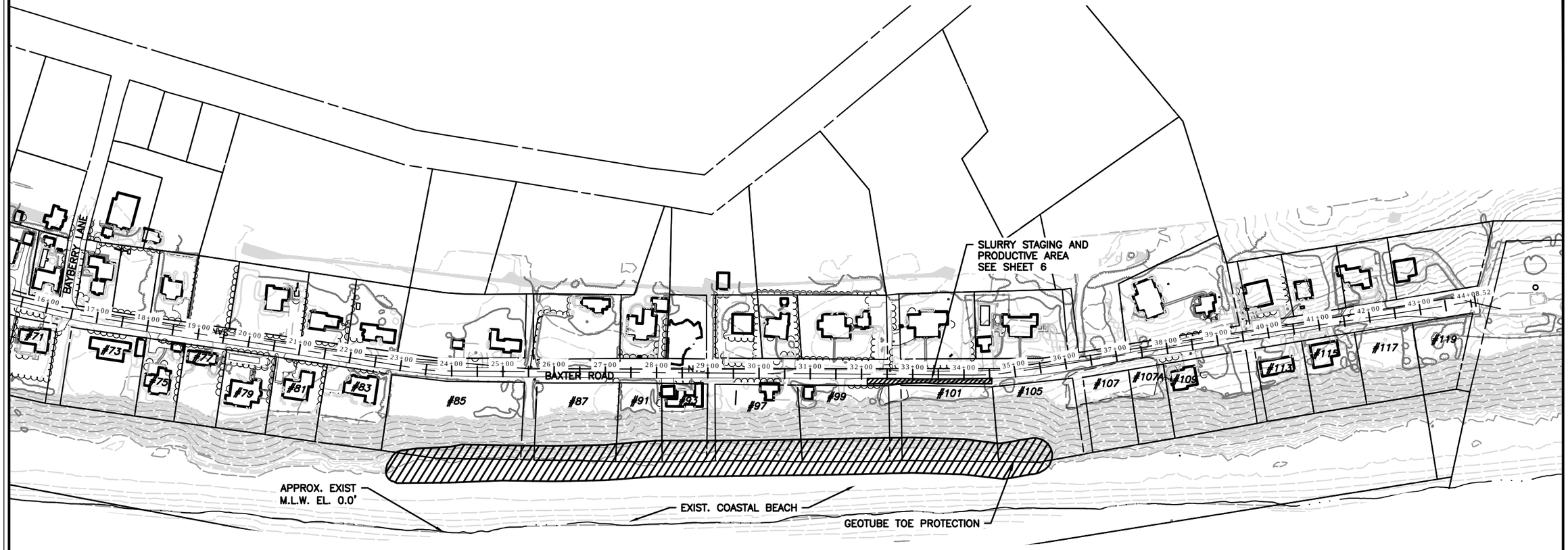
SCALE: 1" = 200'

DATE: DEC. 3, 2013

PROJECT NO.: 2967-11

SHEET NO.: 2 OF 11

SHEET NAME: EXIST



ATLANTIC OCEAN

NOTE:

LENGTH = 1,300 LF
AREA OF IMPACT = 89,142 SF

GENERAL NOTES

1. ALL ELEVATIONS ARE BASED ON MEAN LOW WATER DATUM (M.L.W.=0.0')
2. CONTOURS SHOWN IN 2 FOOT INTERVALS.
3. EXISTING TOPOGRAPHIC SURVEY INFORMATION SHOWN ON THIS PLAN TAKEN FROM A LIDAR SURVEY PROVIDED BY COL–EAST AND BLACKWELL & ASSOCIATES, INC. PERFORMED ON JULY 15, 2013, AND CAN ONLY REFLECT CONDITIONS AS THEY EXISTED AT THE TIME OF THE SURVEY.
4. LIMITS OF SAND COVER OVER THE GEOTEXTILE TUBES NOT SHOWN FOR CLARITY. FOR LIMITS SEE TYPICAL SECTION ON SHEET 4 AND CROSS SECTIONS SHEETS 7 THRU 11.
5. GEOTUBE LIMITS, ELEVATIONS AND SLOPE IS BASED ON DESIGN PROVIDED BY MACAFFERI AND OCEAN & COASTAL CONSULTANTS.

0' 100' 200'
0 1/2" 1"

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GENERAL PLAN - TEMPORARY SLOPE STABILIZATION

BAXTER ROAD TEMPORARY STABILIZATION HYBRID GEOTUBE APPLICATION NOI SUBMISSION

NANTUCKET, MASSACHUSETTS

RSD	SMW	NEB
DESIGNED	DRAWN	CHECKED

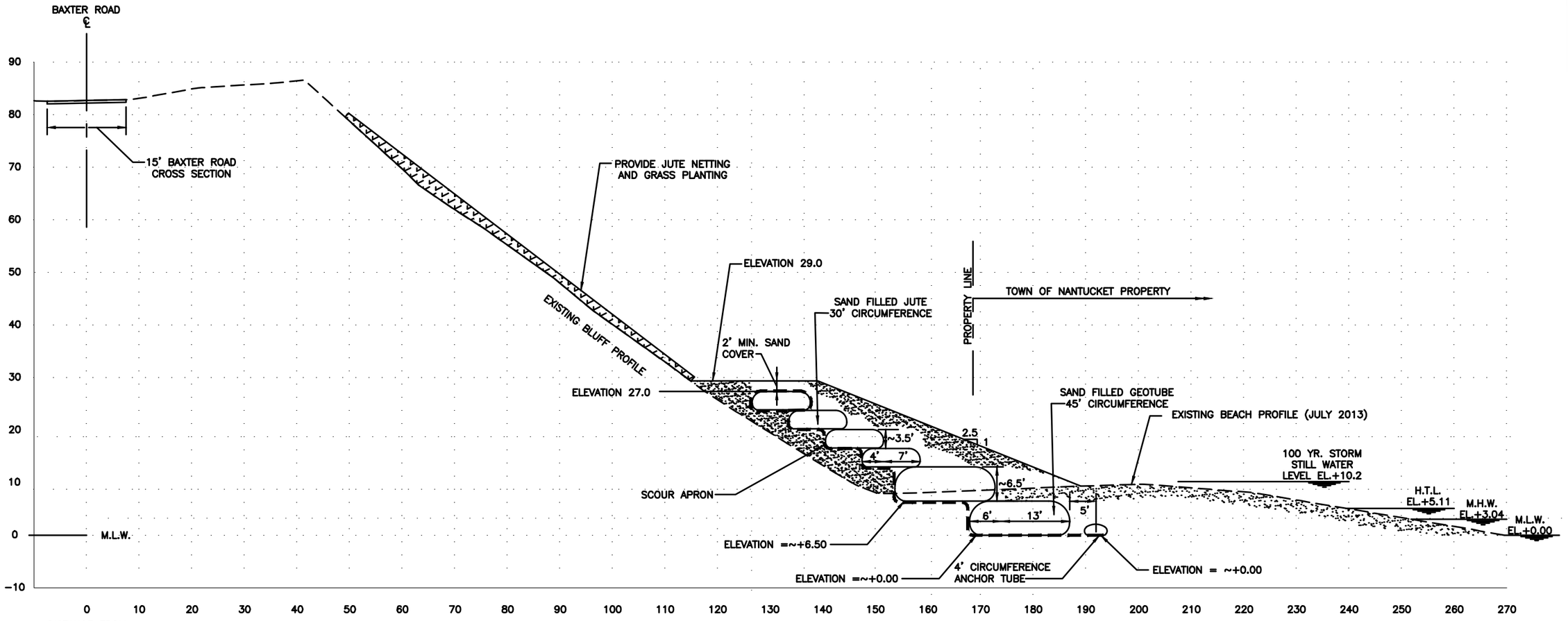
1" = 200'
SCALE

DEC. 3, 2013
DATE

2967-11
PROJECT NO.

3 OF 11
SHEET NO.

GEN
SHEET NAME



TYPICAL SECTION – GEOSYNTHETIC TUBES

GENERAL NOTES

1. THIS GEOTEXTILE TUBE SLOPE PROTECTION IS SUBMITTED FOR TEMPORARY SHORT–TERM STABILIZATION OF THE BLUFF ENVIRONMENT AND IS NOT INTENDED TO BE INSTALLED AS A PERMANENT STRUCTURE.
2. ALL ELEVATIONS ARE BASED ON MEAN LOW WATER DATUM (M.L.W.=0.0').
3. TUBES SHALL OVERLAP IN STEPPED LAYERS WITH THE WIDTH OVERLAPPED TO PROVIDE AN EFFECTIVE SLOPE OF 2:1 OR LESS.
4. SLOPE OF TUBE STACK SHALL NOT BE STEEPER THAN 1:2.
5. GEOTEXTILE TUBE FABRIC SHALL BE MACCAFERRI MACTUBE OS 500, OR APPROVED EQUAL, WITH EITHER A COMPOSITE OR SHROUD ATTACHED TO THE TOP OF THE GEOTEXTILE TUBE WHERE EXPOSED TO ELEMENTS.
6. SCOUR APRON SHALL BE APPROXIMATELY 60' WIDE SO AS TO EXTEND ALONG THE BOTTOM CONTOUR OF STACKED GEOTEXTILE TUBE CONFIGURATION.
7. SAND BACKFILL SHALL BE PLACED IN 12" LIFTS AND COMPACTED PRIOR TO PLACEMENT OF UPPER GEOTEXTILE TUBE LAYER, SO AS TO PROVIDE A FLAT STABLE BENCH FOUNDATION FOR THE TUBE INSTALLATION.
8. CONTRACTOR SHALL UTILIZE CONSTRUCTION TECHNIQUES WHICH ELIMINATE THE POSSIBILITY OF RIPPING/PUNCTURING TUBE SYSTEM.

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0' 10' 20'
0 1/2" 1"

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TYPICAL CROSS SECTION - TEMPORARY SLOPE STABILIZATION

BAXTER ROAD TEMPORARY STABILIZATION HYBRID
GEOTUBE APPLICATION NOI SUBMISSION

NANTUCKET, MASSACHUSETTS

RSD	SMW	NEB
DESIGNED	DRAWN	CHECKED

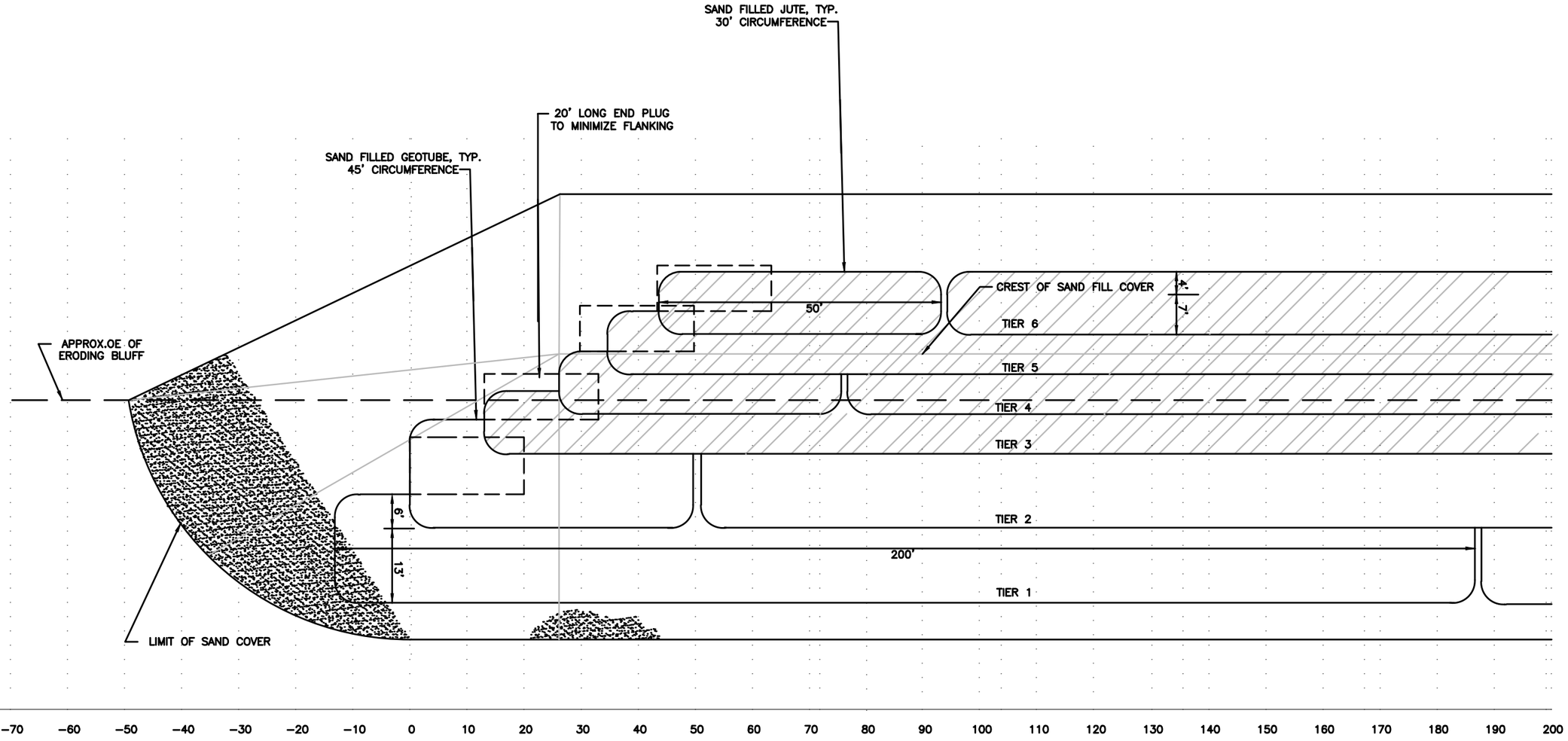
SCALE: HOR: 1"=20' VERT: 1"=20'

DATE: DEC. 3, 2013

PROJECT NO.: 2967-11

SHEET NO.: 4 OF 11

SHEET NAME: TYP



PLAN OF TYPICAL GEOTUBE TERMINAL END – GEOSYNTHETIC TUBES

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0' 10' 20'
0 1/2" 1"

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REVISIONS

DATE	REVISED DETAIL
11/19/2013	

TYPICAL FLANKING DETAIL - TEMPORARY SLOPE STABILIZATION

BAXTER ROAD TEMPORARY STABILIZATION HYBRID
GEOTUBE APPLICATION NOI SUBMISSION

NANTUCKET, MASSACHUSETTS

RSD	SMW	NEB
DESIGNED	DRAWN	CHECKED

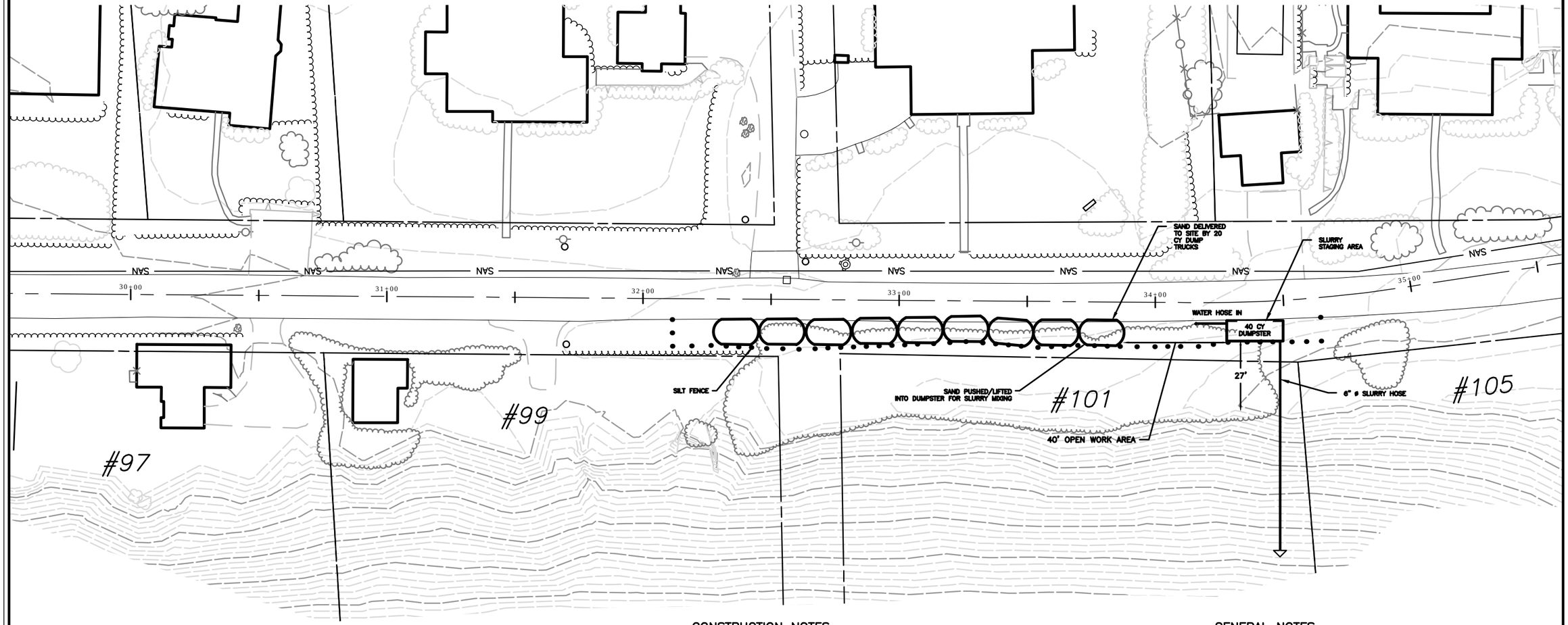
SCALE: HOR: 1"=20'
VERT: 1"=20'

DATE: DEC. 3, 2013

PROJECT NO.: 2967-11

SHEET NO.: 5 OF 11

SHEET NAME: TYP



CONSTRUCTION NOTES

1. INSTALL SILT FENCE 25' FROM TOP OF BANK
2. EXISTING VEGETATION IS TO BE REMOVED FROM THE WORK AREA
3. DUMPSTER AND STOCK PILES TO BE LOCATED 25' FROM TOP OF BANK
4. CONTRACTOR TO PROVIDE POLICE DETAIL OR OTHER TRAFFIC CONTROL DEVICE AS REQUIRED BY NANTUCKET DEPARTMENT OF PUBLIC WORKS

GENERAL NOTES

1. ALL ELEVATIONS ARE BASED ON MEAN LOW WATER DATUM (M.L.W.=0.0')
2. CONTOURS SHOWN IN 2 FOOT INTERVALS.
3. EXISTING TOPOGRAPHIC SURVEY INFORMATION SHOWN ON THIS PLAN TAKEN FROM A LIDAR SURVEY PROVIDED BY COL–EAST AND BLACKWELL & ASSOCIATES, INC. PERFORMED ON JULY 15, 2013, AND CAN ONLY REFLECT CONDITIONS AS THEY EXISTED AT THE TIME OF THE SURVEY.

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0 1/2" 1"

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STAGING PLAN - TEMPORARY SLOPE STABILIZATION

BAXTER ROAD TEMPORARY STABILIZATION HYBRID GEOTUBE APPLICATION NOI SUBMISSION

NANTUCKET, MASSACHUSETTS

RSD	SMW	NEB
DESIGNED	DRAWN	CHECKED

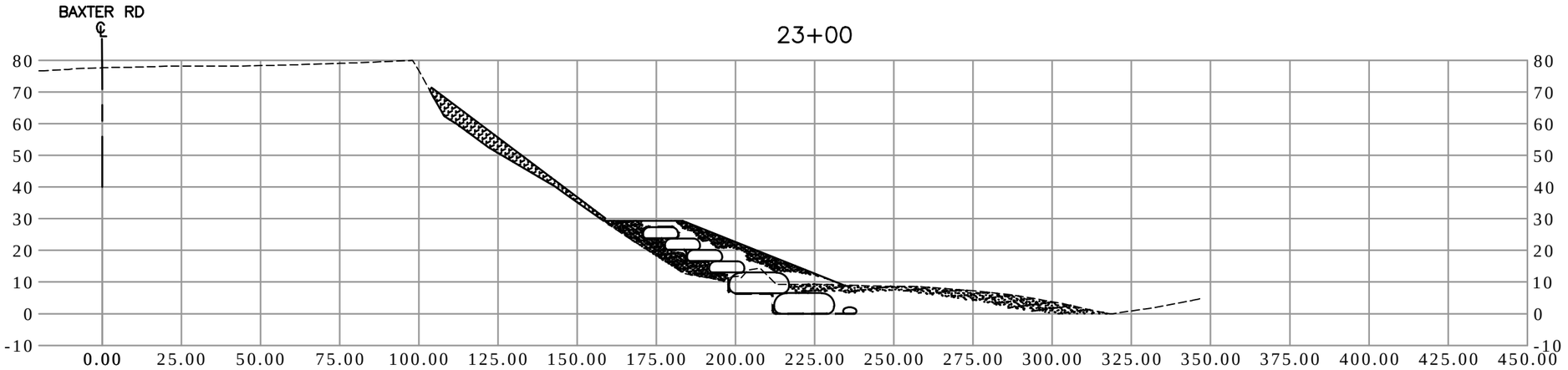
SCALE: 1" = 40'

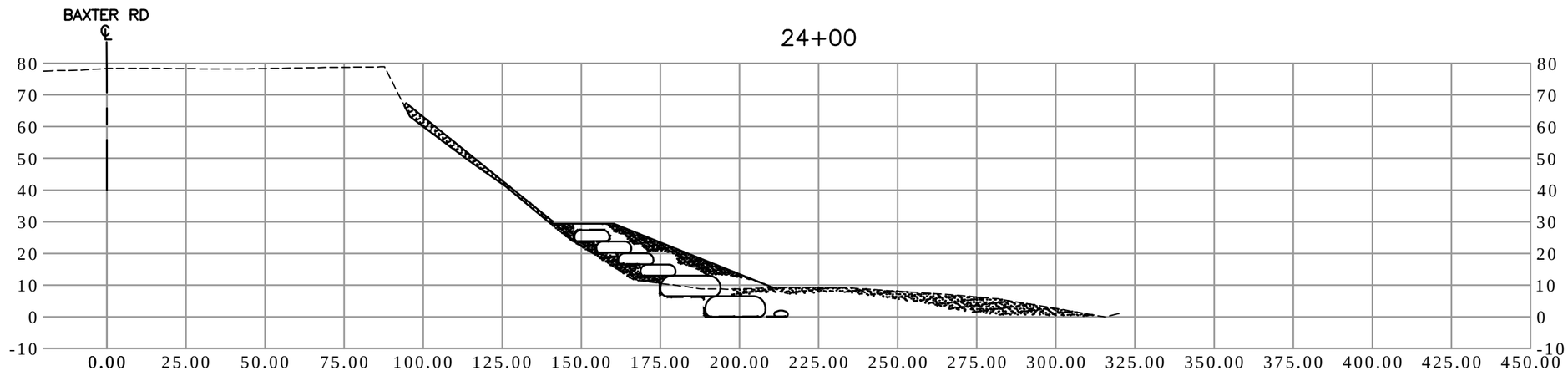
DATE: DEC. 3, 2013

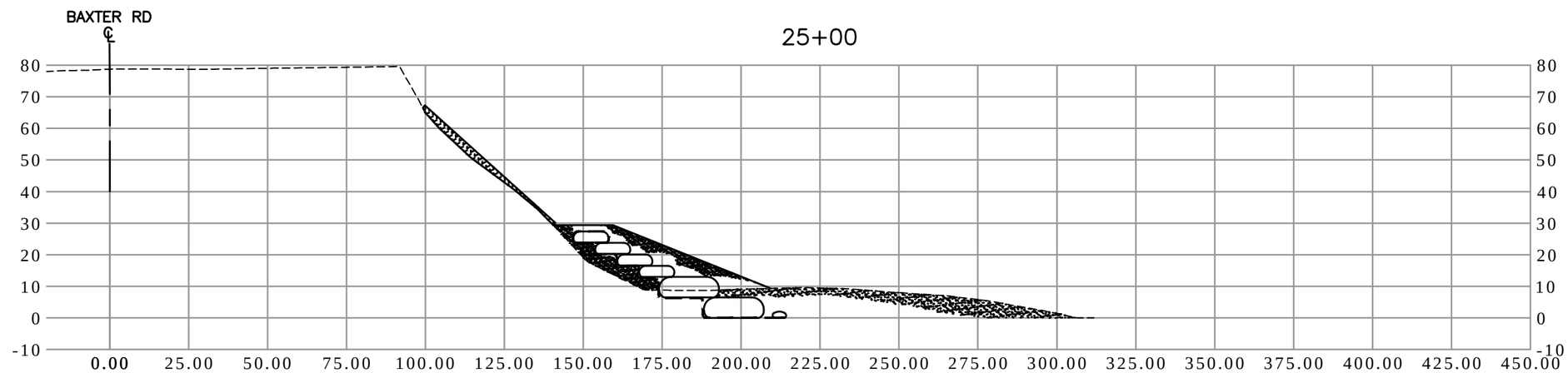
PROJECT NO.: 2967-11

SHEET NO.: 6 OF 11

SHEET NAME: STAGING







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CROSS SECTIONS - TEMPORARY SLOPE STABILIZATION

BAXTER ROAD TEMPORARY STABILIZATION HYBRID
GEOTUBE APPLICATION NOI SUBMISSION

NANTUCKET, MASSACHUSETTS

RSD	SMW	NEB
DESIGNED	DRAWN	CHECKED

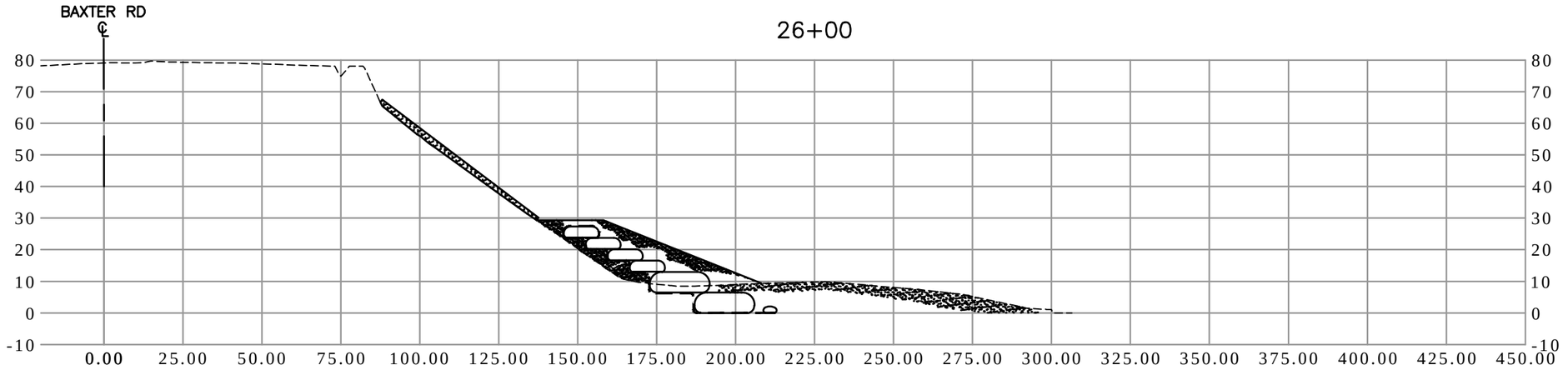
SCALE: HOR: 1"=40'
VERT: 1"=40'

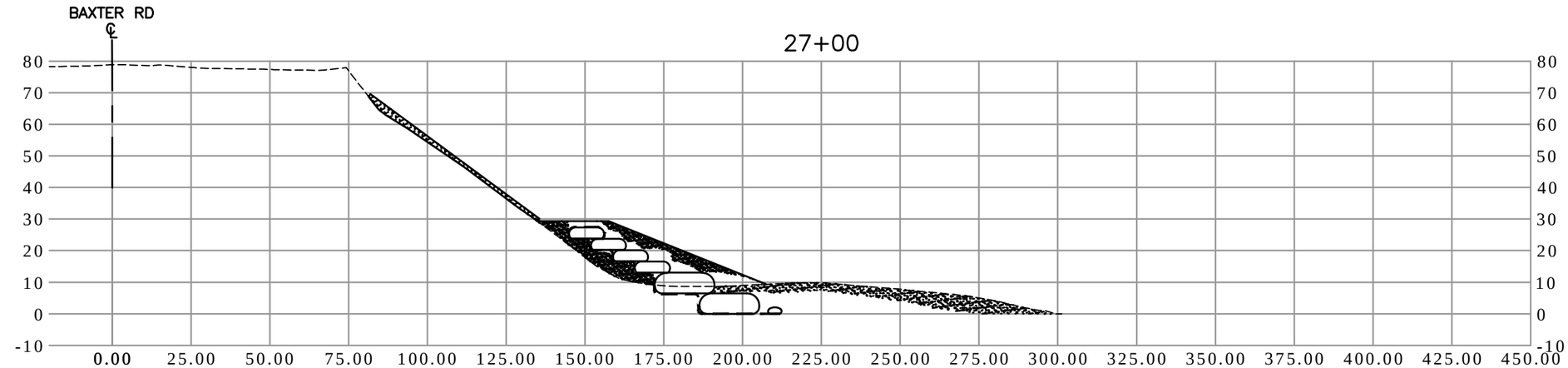
DATE: DEC. 3, 2013

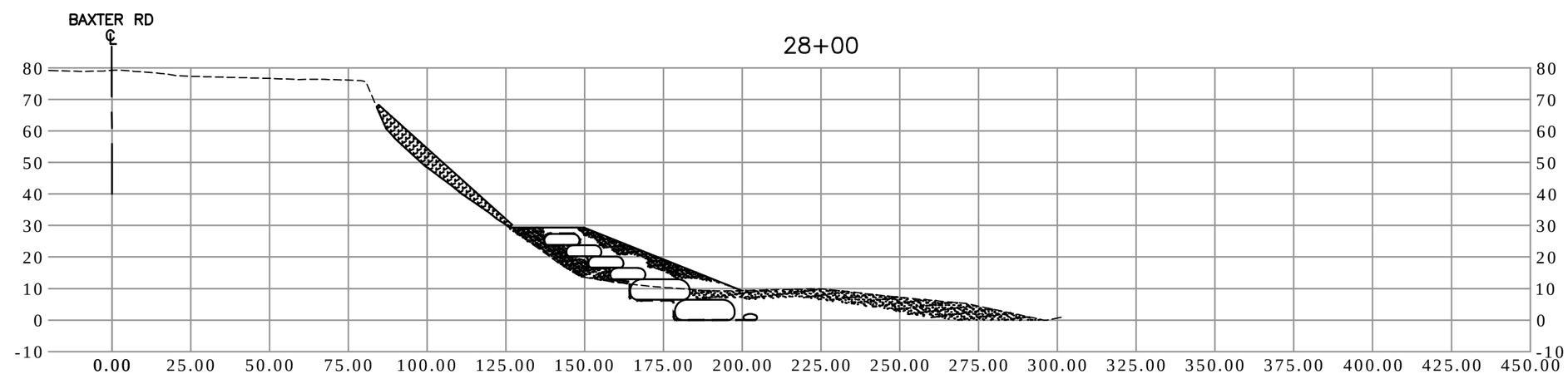
PROJECT NO.: 2967-11

SHEET NO.: 7 OF 11

SHEET NAME: X-SECTION







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CROSS SECTIONS - TEMPORARY SLOPE STABILIZATION

BAXTER ROAD TEMPORARY STABILIZATION HYBRID
GEOTUBE APPLICATION NOI SUBMISSION

NANTUCKET, MASSACHUSETTS

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DESIGNED	DRAWN	CHECKED

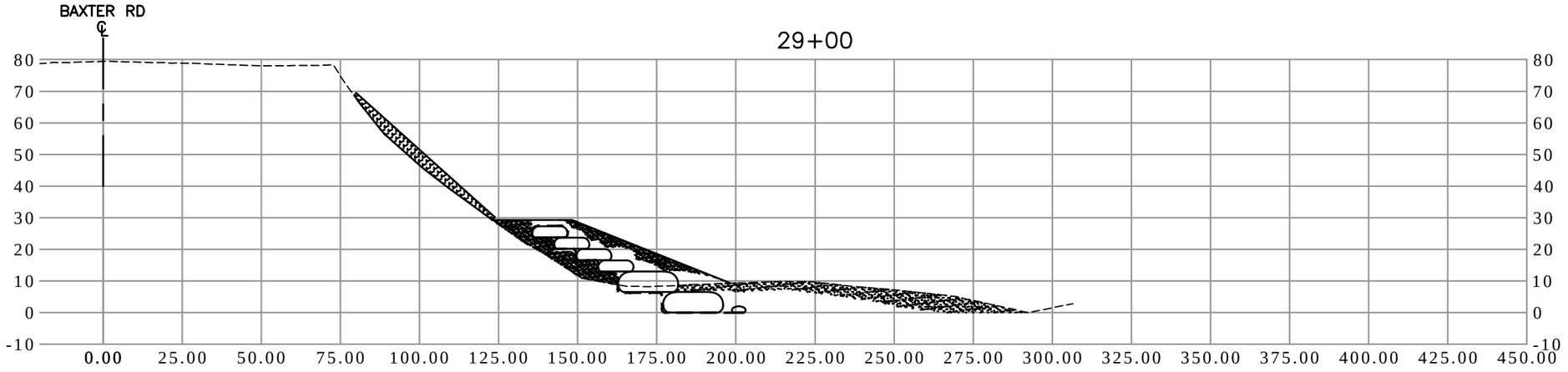
SCALE: HOR: 1"=40'
VERT: 1"=40'

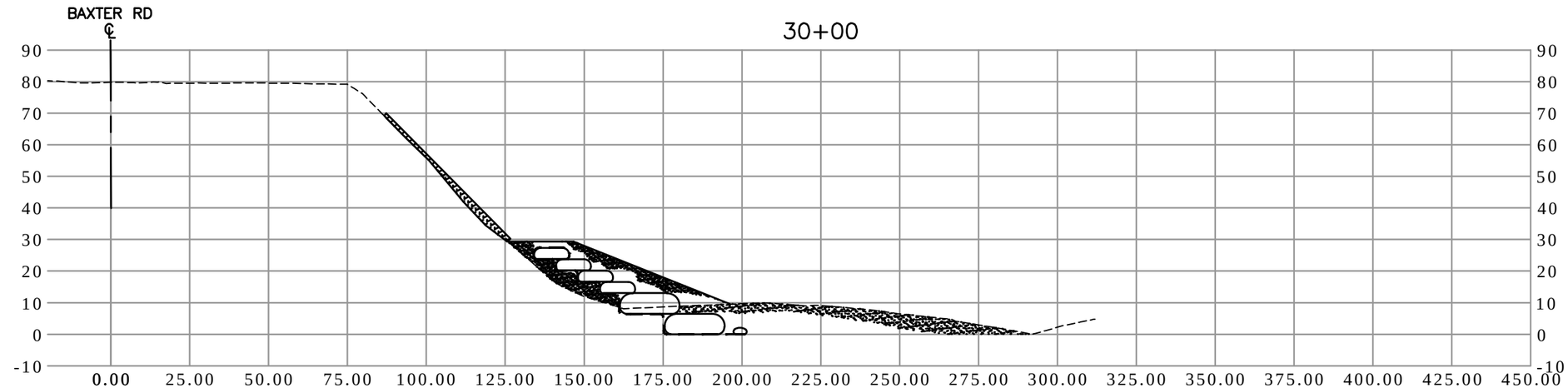
DATE: DEC. 3, 2013

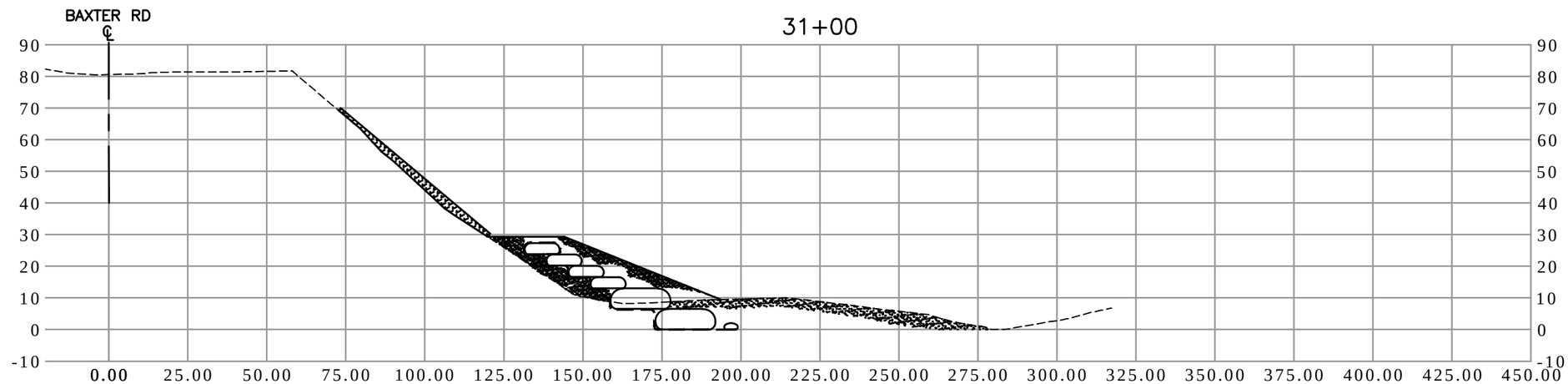
PROJECT NO.: 2967-11

SHEET NO.: 8 OF 11

SHEET NAME: X-SECTION







FOR PERMITTING PURPOSES ONLY

0' 20' 40'
0 1/2" 1"

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REVISIONS

CROSS SECTIONS - TEMPORARY SLOPE STABILIZATION

BAXTER ROAD TEMPORARY STABILIZATION HYBRID
GEOTUBE APPLICATION NOI SUBMISSION

NANTUCKET, MASSACHUSETTS

RSD	SMW	NEB
DESIGNED	DRAWN	CHECKED

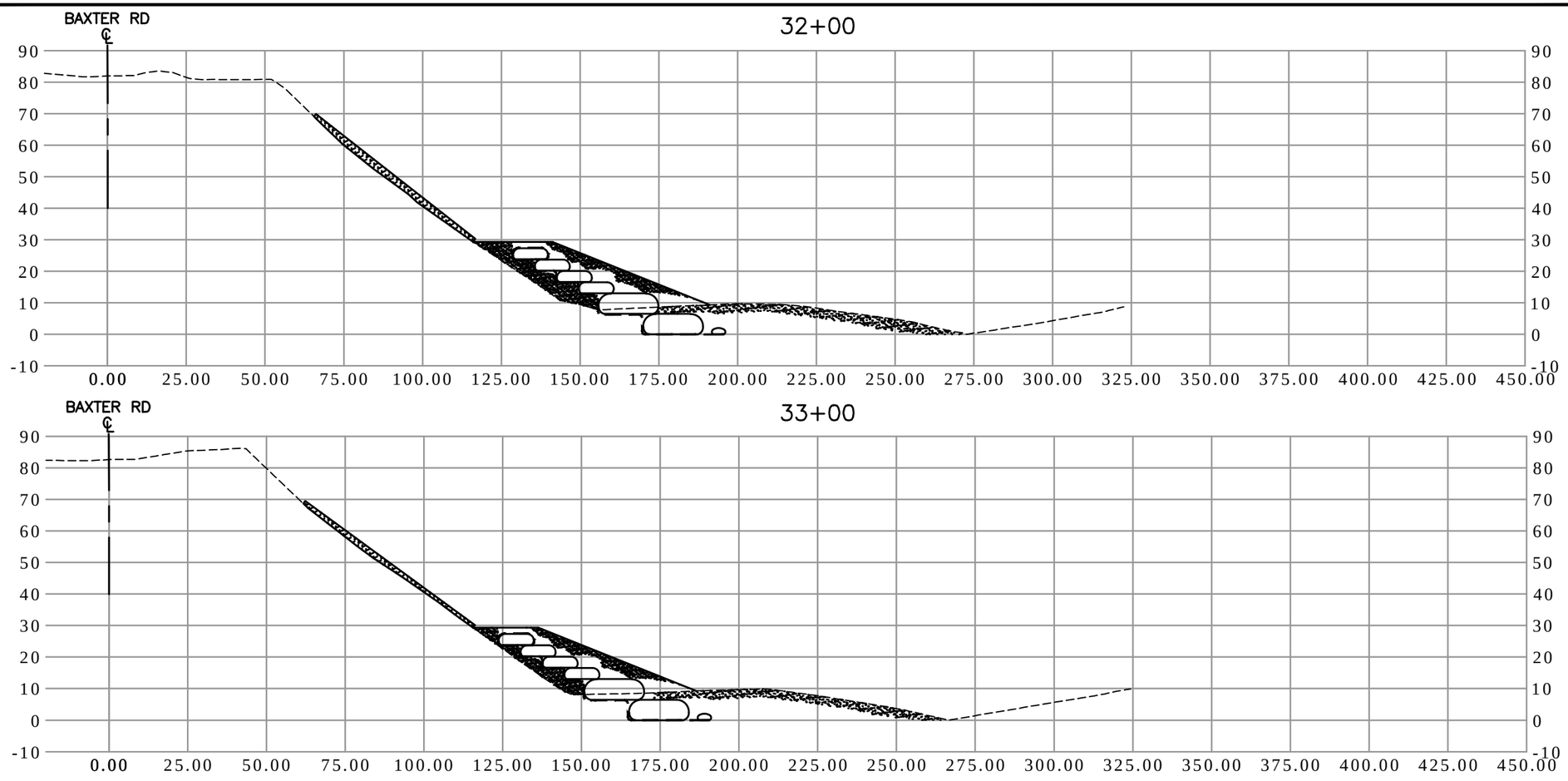
SCALE: HOR: 1"=40'
VERT: 1"=40'

DATE: DEC. 3, 2013

PROJECT NO.: 2967-11

SHEET NO.: 9 OF 11

SHEET NAME: X-SECTION



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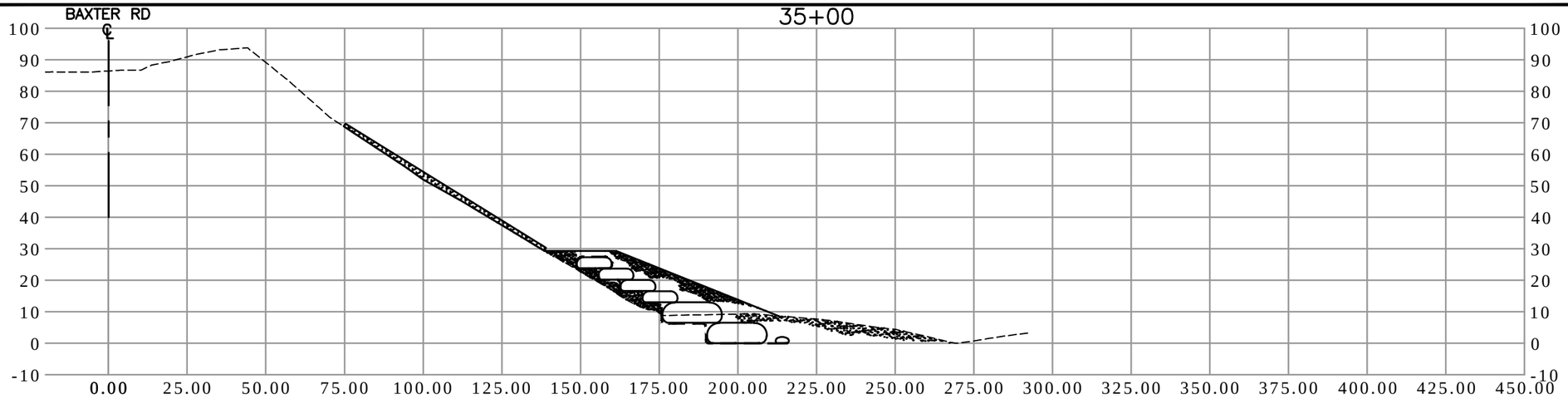
PROJECT NO.: 2967-11

SHEET NO.: 10 OF 11

SHEET NAME: X-SECTION



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SHEET NO.: 11 OF 11

SHEET NAME: X-SECTION