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February 16, 2018

Mr. William Maurer, P.E. L.S
Town of Trumbull
5866 Main Street
Trumbull, CT 06611

Re: 147 Daniels Farm Road- Paugusett Village

Dear Bill:

Please find attached copies of the Site Maintenance Plan and Analysis of Detention Basin Failure as requested by your office.

Please feel free to contact us with any questions.

Very truly yours,
Spath-Bjorklund Associates, Inc.

David S. Bjorklund, Jr., P.E.

Enclosure

cc: File 4205x1

SITE MAINTENANCE PLAN

This Site Maintenance Plan and Schedule highlights the maintenance procedures for the development. However, this does not preclude the maintenance personnel's responsibility to perform maintenance procedures properly, add other procedures as necessary and conduct maintenance in accordance with current state laws and regulations.

The dates and results of the inspections and cleanings will be kept on file by the property owner, home owners association and/or its management company and will be made available for review upon request by the designated Town official.

After construction is completed, the owner will be assigned the responsibility for implementing this Site Maintenance Plan. This responsibility includes the inspection and maintenance of control measures and informing parties engaged in activities on the site of the requirements and objectives of the plan. When the land is transferred to the Homeowners Association, this Site Maintenance Plan shall be conveyed to the Association. It shall become the responsibility of the new owners to implement the Plan. The Plan, as with any land use approval, shall run with the land.

Detention Basin

The basin and the outlet structure should be inspected annually to evaluate plant sustainability, water levels, slope stability and overall operation.

During the first two growing seasons after the initial seeding of the basin and its surrounding upland meadow, reseeding bare and thinly vegetated areas with the specified seed mixture. The dead plant material should be removed from these areas. Any maintenance of the areas should be conducted outside of vegetative growing and wildlife seasons.

No fertilizer shall be applied to the basin or the upland review area.

Provide deer/wildlife netting over mitigation plantings to control wildlife browsing on new plantings.

The grass on the side slopes of the detention basin above the normal pool elevation should be mowed and grass clippings and accumulated trash removed at least twice during the growing season. Mowing should not be performed when the ground is soft to avoid the creation of ruts and compaction, which can reduce infiltration.

PAUGUSETT VILLAGE
ANALYSIS OF DETENTION BASIN FAILURE

This analysis was prepared at the request of the Town of Trumbull in response to comment by the public during public hearings.

There are several design factors used in the design of the detention basin that will negate to the possibility of the failure. The first of these is the depth of the berm which will impound the storm water. The maximum elevation of the storm water in the basin during a 100-year storm is 131.0. The existing ground under the berm ranges from elevation 132 to 127. There is about 100 feet where the depth from existing ground to the flood level in the basin is four feet. The average depth is two feet.

The second factor is the design criteria of the berm. The 2002 Guidelines for Soil Erosion and Sediment Control has several criteria for the design of the detention basins. "*The effective height of the dam for an embankment detention basin should be 15 feet or less. The effective height of the dam is defined as the difference in elevation in feet between the emergency spillway crest and the lowest point in the cross section taken along the centerline of the dam.*" The elevation of the overflow spillway is 131.0. The lowest point along the centerline is 126.5. The effective height is 4.5 or 30 percent of that allowed by the Guidelines.

The Guidelines criteria are "*The product of the storage times the effective height of the dam should be less than 3,000. Storage is the volume in acre-feet in the reservoir below the elevation of the crest of the emergency spillway. The effective height is defined above.*" The storage in the basin is 82,837 cubic feet or 1.9 acre-feet. The height is 4.5. Therefore, the product is 8.5 or 0.28 percent of the recommended.

The Guidelines criteria are "*The minimum top width of the embankment shall be 8 feet.*" The Town of Trumbull has a minimum width of 10 feet or 25 percent increase in the width. This additional width adds to the strength of the berm beyond that required by the Guidelines.

In order to further insure the safety of the berm, construction criteria and inspect requirements are included on Sheet D-1 of the plans. These include materials to be used for the berm, laboratory testing, construction techniques and compaction criteria.

Not with standing the above noted design safe guards, an analysis was made of the effects of a basin failure. An earthen berm failure will occur from by the overtopping of the berm and the erosion of the berm. This will form a V channel in the berm. The V will expand until the bottom of the V reaches the original undisturbed ground level. The attached cross section is drawn through the basin, through a saddle on the downhill side of the basin, to the River. It shows the maximum elevation in the basin during a 100-year storm is 131. The original ground under the berm is at elevation 130. Therefore, the maximum depth of the V channel will be one foot. Because the V will be formed by erosion, the side slopes of the V will be 1 to 1. When the 1-foot deep V channel is fully formed, the velocity through the V will 2.23 feet per second. In one hour, the water level in the basin will be lowered to elevation 130.6 and the velocity through

the V channel will be reduced to 1.78 feet per second. In two hours, the water level in the basin will be lowered elevation 130.3 and the velocity through the V channel will be reduced to 1.22 feet per second. It will take about 4 hours for the basin to drain to the level of the natural ground.

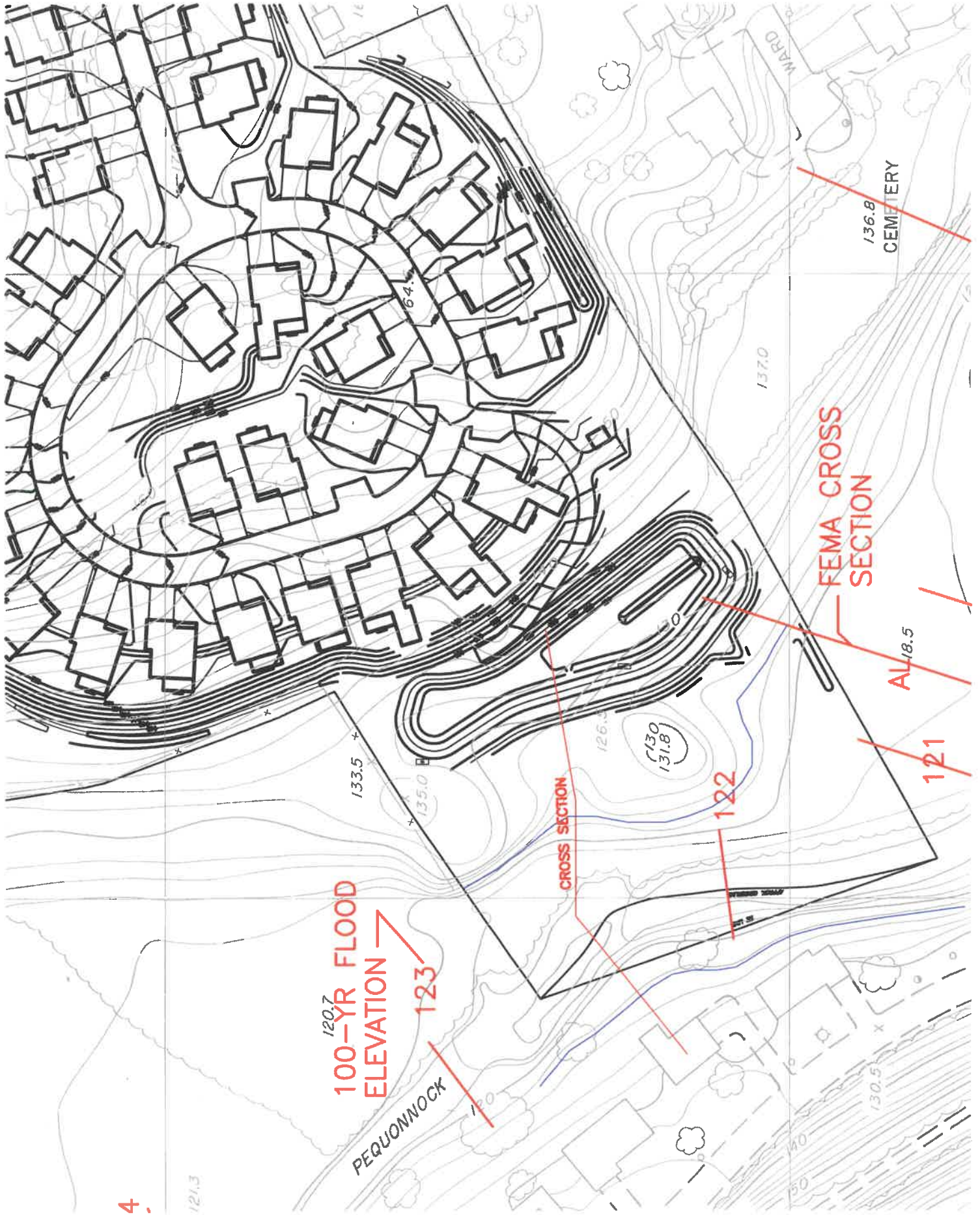
After the flow passes through the V channel opening in the berm, it will enter the natural saddle downhill of the basin. The saddle is about 70 feet in width. The surface characteristics are grass covered with trees. The Manning's coefficient is 0.03. The flow of 2.23 cubic feet per second will dissipate in depth from 3.0 feet to 0.089 feet and the velocity will reduce from 2.23 feet per second to 1.98 feet per second.

According to the 2002 Guidelines for Soil Erosion and Sediment Control (Figure OP-1), the maximum allowable velocities to prevent erosion are:

Soil type	velocity, in feet per second
Sand and sandy loam	2.5 fps
silt loam	3.0
Sandy clay loam	3.5
Clay loam	4.0
Clay, fine gravel, graded loam to gravel	5.0

The velocity on the natural ground below the berm is less than the 2002 Guidelines' maximum permissible velocity

During a 100-year flood event, the flow in the Pequonnock River at this site will be about 5.5 feet deep with a velocity of 6.9 feet per second and will be carrying about 5810 cubic feet per second. The introduction of 2.23 cubic feet per second with a depth of 0.089 feet and a velocity of 1.98 feet per second will have little to no effect on the flow in the River or impact on adjacent properties.



4.

100-YR FLOOD
ELEVATION
123

CROSS SECTION

FEMA CROSS
SECTION

AL 18.5

121

122

120.7

121.3

PEQUONNOCK

WARD

136.8
CEMETERY

137.0

133.5

135.0

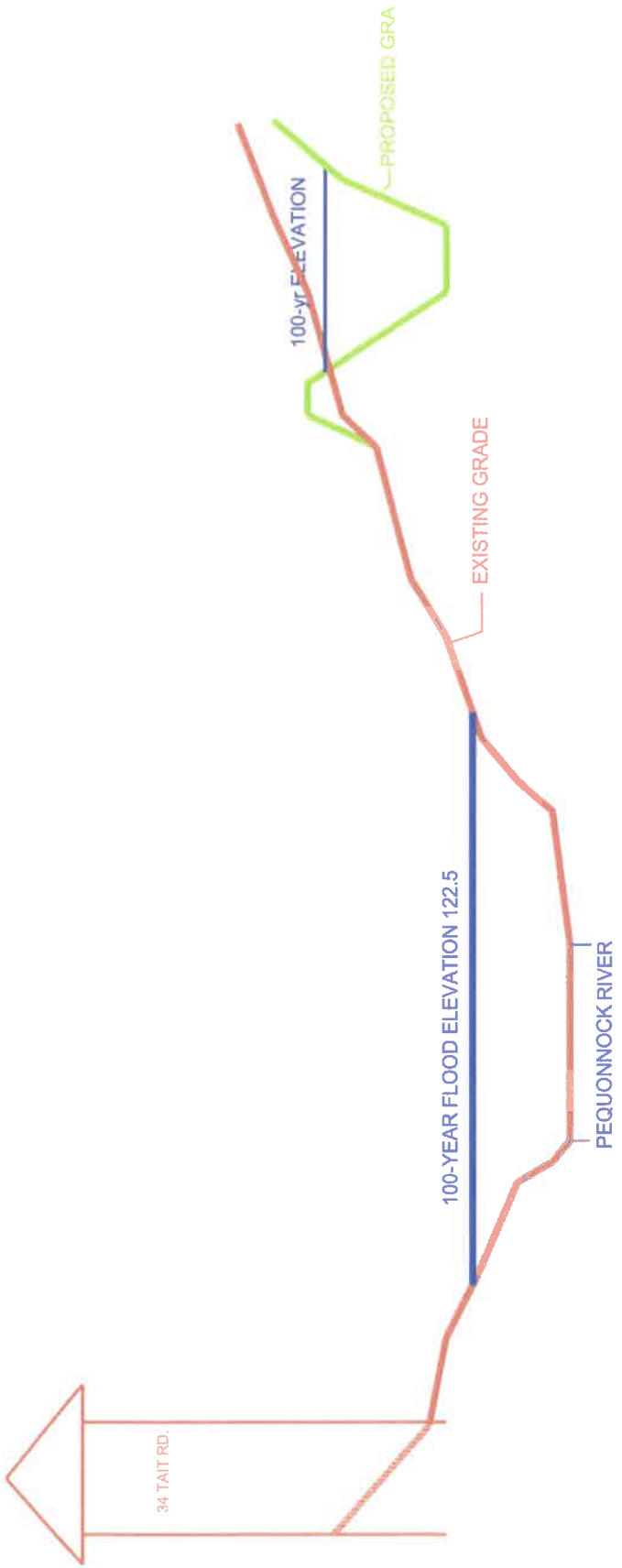
126.3

130
131.8

130.5

150

140



SCALE:
1" = 50' HORIZONTAL
1" = 250' VERTICAL