



Grobbel Environmental & Planning Associates

P.O. Box 58 Lake Leelanau Michigan 49653

November 10, 2014

Mr. John Iacoangeli
Beckett & Raeder, Inc.
101 William St., Ste. 101
Ann Arbor, Michigan 48103

RE: Review of Stormwater Management and Soil Erosion Control Measures, GTTC/VGT, M-72 Highway, Acme Township, Grand Traverse County, Michigan from November 7, 2014 Site Visit.

Dear Mr. Iacoangeli,

On November 7, 2014 I performed an additional site visit to inspect and assess the effectiveness of soil erosion control and stormwater treatment and control measures being implemented at the Grand Traverse Towne Center/Village at Grand Traverse (GTTC/VGT) in Acme Township, and offer the following comments.

- 1) **Storm Water Retention Basin #1 – South-central Portion of the GTTC/VGT Site** – As shown in Photographs #1 through #7 below, stormwater detention Basin #1 (i.e., the southern basin) slopes remain unstabilized with an estimated 5% to 10% of grass/cover crop seed germination at the basin berms. *See Photographs #1 and #2 below.* It is recommended that additional seeding be completed as soon as practicable to protect system components, down slope wetlands and Acme Creek. Basin #1 was observed to be discharging stormwater during the November 7, 2014 site visit, despite the placement of a plug within the culvert outlet. *See Photographs #3 and #4 below.* Stormwater within Basin #1 was noted as being very cloudy, while stormwater discharge was observed to be running clear. A trash pump was placed at the north end of Basin #1 on this date to pump stormwater from Basin #1 to Basin #2. *See Photograph #1 below.*

Of concern is the rip rap structure at the terminus of the grassed waterway conveyance from Basin #1 that had a gap in new silt fences on November 7, 2014 – precluding any meaningful sediment retention value. *See Photographs #6 and #7 below.* The discharge elevation within the Basin #1 outfall structure remains of concern which allows for stormwater pass through without retention within a majority of Basin #1's capacity, and is deemed incompatible with the required construction of wetlands at this location and/or the reconfiguration of Basin #1 in whole or in part to established the approved stormwater management plan.

It is recommended that the terminus of the grassed waterway conveyance from Basin #1 be re-designed, re-constructed and maintained with numerous layers of sediment retention best

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management practices (BMPs), such as exists at the terminus of the grassed waterway conveyance from Basin #2 and as shown below in Photographs #20 through #22 .



Photograph #1: Basin #1, south-central portion of the GTTC/VGT property looking northeasterly at the basin and berm and showing that berm is ~5 to 10% vegetated. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #2: Basin #1, south-central portion of the GTTC/VGT property looking southeasterly at outfall structure. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #3: south-central portion of the GTTC/VGT property looking northerly at plug within culvert outlet and showing clear stormwater discharge. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #4: Basin #1 discharge structure/grassed waterway, south-central portion of the GTTC/VGT property looking easterly and showing clear discharge/PAM flocculant blocks, waddle, and grassed waterway ~35 to 40% vegetated. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #5: Swale and discharge structure to Basin #1 south-central portion of the GTTC/VGT property looking north-easterly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #6: Basin #1 discharge structure/grassed waterway terminus, south-central portion of the GTTC/VGT property looking easterly and showing gap in silt fences. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #7: Basin #1 rip rap discharge structure/grassed waterway terminus, south-central portion of the GTTC/VGT property looking easterly and showing gap in silt fences. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.

- 2) **Storm Water Retention Basin #2 – West-central Portion of the GTTC/VGT Site** – As shown in Photographs #8 through #10 below, stormwater detention Basin #2 (i.e., southwestern basin) slopes remain unstabilized with an estimated 5% to 10% of grass/cover crop seed germination at the basin berms. *It is recommended that stabilization of basin berms be completed as soon as practicable to protect system components and downstream wetlands and Acme Creek.*

Basin #2 was plugged during the November 7, 2014 site visit (*refer to Photographs #14 and #15*), and a mobile stormwater treatment/filtration system was on-site. According to on-site Pro-Act personnel, Mr. Tony Chulski, this mobile stormwater treatment system is intended to remove suspended solids/clarify stormwater prior to discharge, and consists of two (2) Geotubes®, the addition of WaterSolve¹ - an organic polymer/flocculant in a mixing tank, three (3) sand and gravel filters, and four (4) ½ micro-fiber filters in series, and was reportedly brought on-site on Friday, October 31, 2014. *Refer to Photographs #10 through #13.* The mobile stormwater treatment system discharged treated stormwater from the basin to a sediment decant/filter bag on native soils south of Basin #2 on the date of the inspection. *Refer to Photographs #16 and #17.* No sediment was observed to be suspended within or picked up upon the discharge of treated stormwater from geotextile bags at the time of this site visit. *Refer to Photographs #18 and #19.* The system is reportedly operating 24 hours per day with remote telemetry to Mr. Chulski, the day shift system operator, if system upsets occur and require his off-hours visit to the system to maintain and/or put the system back on-line. Finally, the use of such polymers to enhance the removal of suspended solids from GTTC/VGT stormwater is likely the source of foam recently

¹ WaterSolve is an organic, water soluble polymer that is a flocculating and coagulating agent. These polymers are manufactured in powder, granular, bead, emulsion, dewatered emulsion, and solution forms, and remove suspended solids through cationic/anionic activity, molecular weight, and structure. They are commonly used in municipal and industrial and wastewater treatment and other applications include flotation, charge modification, thickening, and dewatering of agricultural sludge and dredged sediment in retention basins or Geotubes®.

observed in Acme Creek downstream of the GTTC/VGT site.

Of note was the presence of a pump/filtration system at the terminus of the grassed waterway from Basin #2 to return stormwater discharged from Basin #2 back to the same the basin, and suggesting the likelihood of sediment laden stormwater to Acme Creek/riparian wetlands sometime prior to this site inspection. No clay sediment was observed within wetlands or entering Acme Creek at and downstream/downslope this location on November 7, 2014.

Also, of continued concern is the discharge elevation within the Basin #2 outfall structure. The established elevation allows for stormwater pass through without retention within a majority of Basin #2's capacity, and is deemed incompatible with the required construction of wetlands at this location and/or the reconfiguration of Basin #2 in whole or in part to established the approved stormwater management plan.



Photograph #8: Basin #2, south-western portion of the GTTC/VGT property looking northwesterly at basin outflow control structure. Basin approximately full and showing cloudy retained stormwater. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #9: Basin #2, southwestern portion of the GTTC/VGT property looking north-northwesterly at basin approximately full and showing cloudy retained stormwater. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #10: Basin #2, south-western portion of the GTTC/VGT property looking north-northeasterly at basin approximately full, showing cloudy retained stormwater and mobile stormwater filtration/treatment unit. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #11: Basin #2, south-western portion of the GTTC/VGT property looking north-northwesterly at mobile stormwater filtration/treatment unit. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #12: Basin #2, south-western portion of the GTTC/VGT property looking northerly at basin approximately full, showing cloudy retained stormwater and mobile stormwater filtration/treatment unit intake and discharge hoses. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #13: Basin #2, south-western portion of the GTTC/VGT property looking northwesterly at basin approximately full, showing cloudy retained stormwater and mobile stormwater filtration/treatment unit intake. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #14: Basin #2, south-western portion of the GTTC/VGT property showing plug within basin outflow control structure. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #15: Basin #2, south-western portion of the GTTC/VGT property showing plug within basin outlet structure. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #16: Geotextile sediment decant/filter bag from mobile stormwater treatment/filtration unit from Basin #2, south-western portion of the GTTC/VGT property looking northwesterly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #17: Clear treated stormwater discharge from geotextile sediment decant/filter bag from mobile stormwater treatment/filtration unit at Basin #2, south-western portion of the GTTC/VGT property looking northerly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #18: Sheet flow of treated stormwater from geotextile bag from Basin #2 at riparian wetlands at south-western portion of the GTTC/VGT property, looking northerly and showing clear runoff. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #19: Sheet flow of treated stormwater from geotextile bag from Basin #2 to riparian wetlands at south-western portion of the GTTC/VGT property, looking easterly and showing clear runoff. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #20: Basin #2 rip rap discharge structure/grassed waterway terminus with pump/filter system back to Basin #2, PAM blocks and numerous layers of silt fence, southwestern portion of the GTTC/VGT property looking westerly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #21: Basin #2 rip rap discharge structure/grassed waterway terminus with pump/filter system back to Basin #2 and numerous layers of silt fence, south-western portion of the GTTC/VGT property looking northwesterly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #22: Basin #2 rip rap discharge structure/grassed waterway terminus with pump system back to Basin #2 and numerous layers of silt fence, south-western portion of the GTTC/VGT property looking northwesterly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.

- 3) **Swale at South-southwest Portion of the GTTC/VGT Site** – As shown in Photographs #23 through #28 below, top soil and erosion control matting has been properly placed within the swale at the south-southwest portion of the GTTC/VGT property. No sediment was observed on

November 7, 2014 beyond the silt fence/straw bale structure at this location, and no impact to downgradient wetlands or Acme Creek was observed. *It is recommended that the swale be effectively stabilized through vegetation as soon as possible at this location.*



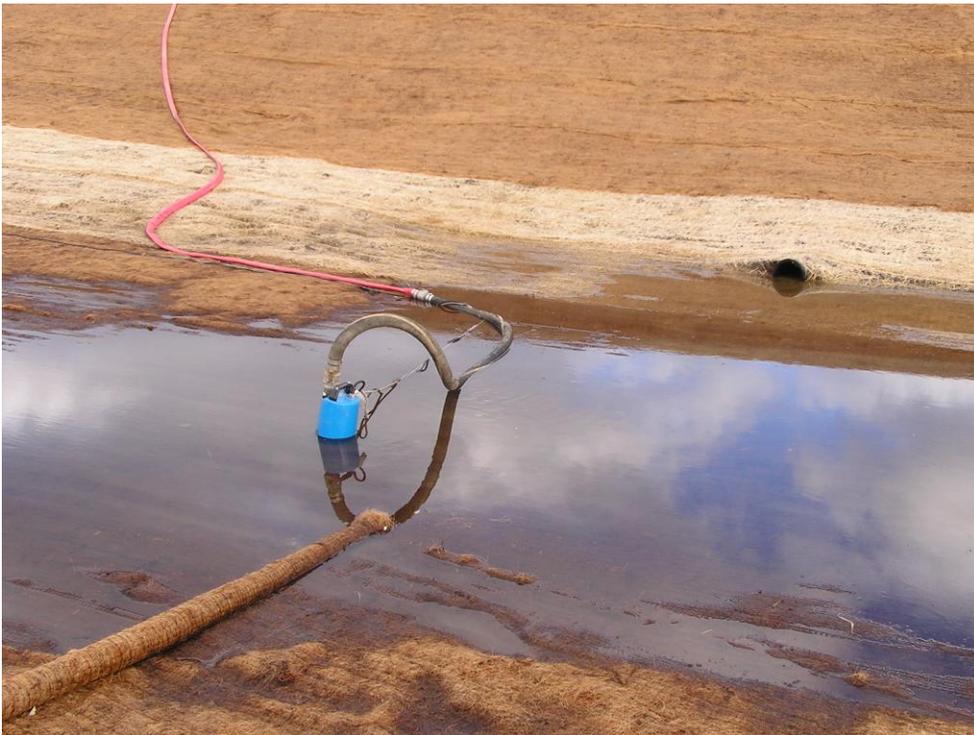
Photograph #23: Topsoil and erosion control matting being placed at the swale in the south-southwestern portion of the GTTC/VGT property looking easterly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #24: Erosion control matting, silt fence/straw bales and trash pump to Basin #2 at the discharge point of swale in the south-southwestern portion of the GTTC/VGT property looking southerly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #25: Erosion control matting, silt fence/straw bales and trash pump to Basin #2 at the discharge point of swale in the south-southwestern portion of the GTTC/VGT property looking westerly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #26: Trash pump to Basin #2 at the discharge point of swale in the south-southwestern portion of the GTTC/VGT property looking northerly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #27: Clear, sediment-free discharge from the swale in the south-southwestern portion of the GTTC/VGT property looking southerly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #28: Iron bacteria at tile discharge from the swale in the south-southwestern portion of the GTTC/VGT property looking northwesterly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.

- 4) **Northwestern Corner of the GTTC/VGT Site** – As shown in Photographs #29 and #30 from November 7, 2014. Stormwater control BMPs have been placed within the swale along the dinner theater property and stormwater from the GTTC/VGT is and has been discharged to the existing dinner theater stormwater treatment system. It is recommended that records for the Acme Township and Grand Traverse County-approved stormwater system at the dinner theater be evaluated to assess this system’s ability to receive additional flow and/or suspended solids from the GTTC/VGT site. It is typically unlawful for a development to increase stormwater flows to adjoining parcels/properties.

Additionally, the ultimate disposition of the stormwater retention basin at the dinner theater, ostensibly Acme Creek, should be determined and evaluated for potential impacts to the Creek from stormwater discharged from the northwest portion of the GTTC/VGT site. No sediment was observed to be eroding from or transported off the GTTC/VGT site, into wetlands or into Acme Creek on the time of this site visit.



Photograph #29: Stormwater collected within a swale upgradient of the stormwater retention pond at the adjacent dinner theater within the northwestern portion of the GTTC/VGT property looking northwesterly. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.



Photograph #30: Erosion control BMPs in the northwest corner of the GTTC/VGT property upgradient and adjacent to the dinner theater, looking north. Taken by C. Grobbel, Grobbel Environmental & Planning, November 7, 2014.

If you have any questions regarding this review, please contact me at cgrobbel@grobbelenvironmental.com. Thank you.

Sincerely,
Grobbel Environmental & Planning Associates

Christopher P. Grobbel, Ph.D.
Sr. Project Manager

cc Jeff Jocks, OBH
Jay Zollinger, Acme Township