

September 24, 2007

Ms. Nancy Washburn
Development Coordinator
Mastercraft Builders Inc.
5008 Green Bay Road
Kenosha, WI 53144

RE: **"Village Green" – Village of Fredonia, WI**
Village Green Site Visit Follow Up Summary

Dear Ms. Washburn:

At your request and in response to our August 30th Site Visit, Losik Engineering has reviewed the site design and calculations for the areas of interest and provides the following summary of results and/or recommendations:

1. STH 57 Ditch Reconstruction Plan

- a. The 09-17-07 "STH 57 Ditch Reconstruction" plan calls for regrading the STH 57 ditch from the existing 48" culvert to the East Pond pipe outfall and armoring with medium-heavy riprap over Pyramat geotextile fabric. Under this plan, the area surrounding the East Pond pipe outfall will be lowered approximately 1.5' with the ditch constructed to direct flows due east directly to the STH 57 ditch.
- b. The plan notes that ditch shall be reconstructed to continue to accept flows from Thistle's drain tiles and culverts.
- c. The proposed STH 57 ditch design has capacity for the 100-year event (and exceeds the capacity of the existing 48" RCP pipe).
- d. This plan allows for regrading the swale along the Thistle property to provide a minimum 1% slope to the STH 57 ditch and to accept surface runoff from the Thistle property.

2. Reconstruction of the drainage swale along the Thistle property

- a. The "Phase 1 Restoration & Remediation Plan-East Area" with a revision date of 9/21/07 calls for the following activities:
 - i. Regrade the perimeter drainage swale to a point 380' west of STH 57 to provide a minimum 1% ditch slope and increased depth below the Thistle property. The proposed plan will allow surface runoff from the Thistle property to flow directly into the ditch.
 1. With a 1% slope, 2.5' wide bottom and 1.25' depth, the swale will have a capacity of 32.4 cfs. The Rational Method calculations for the tributary drainage areas produce a 100-year flow rate of 30.7 cfs; therefore the swale will have capacity to pass the 100-year event with little to no overtopping.
 2. Note that the swale can achieve higher capacities if the Thistle's allow for temporary grading along their property line to increase the width of the bottom of the swale and soften the side slopes.

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- ii. Raise the “Grade Break High Point” to elevation 830.25. The stormwater calculations show that raising the grade break high point will ensure that runoff from the 100-year event gets to the East Pond without overtopping into the swale adjacent to the Thistle property. This elevation will also be the final elevation of the high point grade break in the full build-out condition.
- b. The “Phase 1 Restoration & Remediation Plan-East Area” notes that the following activities have been completed by the contractor:
 - i. The storm sewer bypass system was installed in spring 2007.
 - ii. A temporary ditch was constructed at the top of the fill area north of the swale parallel to the Thistle property to direct surface runoff to the East Pond.
 - iii. The stone ditch check near the pond outfall was removed to allow unimpeded flow from the pond outfall to the STH 57 ditch.

3. Inflow to the 24” Storm Sewer Bypass System to the East Pond

- a. The East Pond and Storm Sewer Bypass System were designed to accept runoff from the NOSD property and tributary areas for up to the 100-year event.
- b. Raising the “Grade Break High Point” to elevation 830.25 will ensure that runoff gets to the East Pond and does not overtop into the swale parallel to the Thistle property.
- c. There will be a few hours of temporary surface water ponding at the storm sewer pipe inflow as runoff collects in the swale and makes its way through the storm sewer system to the East Pond.
- d. Creating a model of the East Pond interconnected with the inflow area for the storm sewer bypass produces the following results:
 - i. Current Conditions:
 - 1. Assumes Village Green is fully developed and tributary to the East Pond per the Stormwater Report. This is a conservative estimate because the current tributary area is less than the full build out area. Also assumes NOSD property is left to current conditions.
 - 2. Without temporary orifice plates on the East Pond outfall, the 100-year peak water surface elevation at the inflow to the storm sewer will be 829.05.
 - 3. With the 2” and 5” orifice plates installed, the 100-year peak water surface elevation will be 829.29. The inflow area will have a 1’+ ponding depth for approximately 13.5 hours and a 2’+ ponding depth for 4.4 hours under this scenario.
 - ii. Build-out with 24” flared end section:
 - 1. Assumes that the NOSD property is left to current conditions.
 - 2. The 100-year peak water surface elevation will be 829.15 at the 24” storm sewer inflow if left to remain as a flared end section. The temporary ponding at the storm inflow could be confined to the Village Green site, but would require NOSD to grade their property to a higher elevation.
 - iii. Full Build-out with Inlet Structure and High Capacity Grate.

1. This is the anticipated build-out option that would replace the current flared end section with a high capacity inlet structure.
2. This option requires that NOSD raise the grade on their property adjacent to Village Green to provide positive drainage to the inlet and swale. The full build-out assumes that the swale to the inlet will be centered on the Village Green property. The swale is assumed to have an 8' wide bottom, 6:1 and 8:1 side slopes
3. The 100-year peak water surface elevation is calculated to be 830.02; the high capacity inlet grate is at elevation 828.10.

4. Temporary Ponding at the Existing 48" RCP culvert under STH 57

- a. To determine the extent of temporary ponding at the upstream end of the existing 48" RCP culvert under STH 57, the upstream area was modeled as a basin with the 48" culvert functioning as the outfall pipe.
- b. The existing areas tributary to the existing 48" RCP culvert include the NOSD property and northern section of the school building, parts of the Village Green site (areas X-A5 and X-A7 in the Stormwater Report), the Thistle property and STH 57 roadway.
- c. The calculations show that the existing condition, with no stormwater controls, has a 100-year peak water surface elevation of 820.73.
 - i. Playing "devil's advocate", if we assume that the largest area from Village Green (X-A5) has a time of concentration of 2 hours (which is over double the actual time), the peak water surface elevation is still 819.82.
- d. The proposed areas tributary to the existing 48" RCP include the remaining NOSD property not tributary to the East Pond, undetained areas from the Village Green site, the East Pond, the Thistle property and STH 57 roadway.
- e. The calculations show that with the proposed stormwater management devices, the 100-year peak water surface elevation will be 819.43.
- f. The invert elevation for the 48" RCP culvert is 814.99; the top of pipe is at elevation 818.99.
 - i. The existing condition surcharges the culvert for approximately 2 hours and has a maximum surcharge of 1.72 feet.
 - ii. The proposed condition surcharges the culvert for approximately 2 hours and has a maximum surcharge of 5 inches.
 - iii. The similarity in surcharge times but difference in peak surcharge heights is due to the reduced flow rates but longer release times associated with the detention basin.
- g. The existing conditions calculations are based on the existing topography for the site. The proposed conditions calculations are based on the proposed condition with the STH 57 Ditch Reconstruction completed.
- h. The topographic maps shows that the areas adjacent to the 48" RCP culvert are lower than the top of the 48" culvert pipe; therefore, the surrounding areas have been and will be temporarily inundated under extreme hydrologic events.

5. **Wetland Depression at the extension of Emerald Hills Drive**

- a. The existing condition assumes that the property contains the fill piles adjacent to the wetland area (condition at the time of land swap). The bottom of the wetland is set at elevation 833.5.
 - i. The 100-year peak water elevation is 834.26; the ponding volume is 0.202 acre-feet and the peak discharge is 13.45 cfs.
 - ii. The 100-year peak water elevation spreads beyond the wetland area onto the Village Green property only along the northern edge of the wetland.
- b. The proposed condition uses that the Village Green site is filled and developed and the landscape wall is constructed. The bottom of the wetland is again set at elevation 833.5.
 - i. The 100-year peak water elevation is 834.04; the ponding volume is 0.108 acre-feet; the peak discharge is 7.856 cfs.
 - ii. The 100-year peak water elevation is contained within the wetland area and does not encroach onto the Village Green property.
- c. Both conditions show that the 100-year ponding ponds beyond the limits of the wetland along the northeastern corner of the wetland depression, outside of the Village Green property.

The results of our analysis show that reconstruction of the STH 57 ditch, regrading of the perimeter drainage swale adjacent to the Thistle property and raising of the "high point grade break" will result in an improved condition to the areas adjacent to the Village Green site. The stormwater modeling also shows that the 48" RCP culvert under STH 57 surcharged onto the adjacent properties during extreme hydrologic events, with greater surcharge elevations shown under the existing condition. Because the elevation of the northeast corner of the Thistle property is significantly lower than the top of the 48" culvert, this area was and will be temporarily inundated under extreme events as stormwater flows through the culvert. The calculations also show that a majority of the ponding in the wetland depression at the extension of Emerald Hills Drive is and will continue to be confined to the limits of the wetland area; therefore, the filling associated with the Village Green subdivision have negligible impacts on the storage volume of the wetland. Lastly, the reconstruction efforts taken by Mastercraft Builders between August and September 2007 to alleviate the issues discussed in our August 2007 site visit have contributed to improving the conditions on and adjacent to the Village Green site.

Sincerely,

LOSIK ENGINEERING DESIGN GROUP, LTD

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Project Manager

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