

March 12, 2016 – updated August 6, 2016

City of Red Wing

Re: Baartman Apartments project – part of Villas at Rivers View development.

The project area for the Baartman Apartments is part of a development a decade ago when grading, streets, ponds and other infrastructure were installed then the project stopped. Other than streets, no impervious has been added to the development area.

This project is development of an apartment and associated drives and parking on one of the lots previously identified and for which there is downstream infrastructure in place. To address current stormwater treatment criteria, an infiltration basin will be constructed within the site. The new infiltration basin in conjunction with previously installed storm water conveyance and treatment infrastructure will address the City and State storm water criteria.

Overview:

The project area was previously modeled as part of a 16.5 acre watershed named P3 which flowed to what was defined as North Pond ‘A’ in the previous Hydrocad model. For modeling of the subwatershed draining to the infiltration basin, we separated 1.12 acres from P3 and called this new watershed P3A. The 1.12 acres was modeled in Hydrocad as a node P3A and routed through the infiltration basin (node IB1) with any overflow being routed directly to the previously completed North Pond ‘A’ (node 3P). On the grading and construction plans, you can see the pipe outlet for larger storm events is connected to the in-place storm sewer system within the right of way of Red Wing Ave South.

The soils in the location of the infiltration basin are N627A – Billett fine sandy loam. Excavation of the upper sandy loams will expose sand which will have a moderately high to high infiltration rate. For modeling, we followed the recommendations of the 0.80 inches per hour for sand as defined on Table 12.BIO.8 Design Infiltration Rates.

Modeling of the 2016 infiltration basin node IB1:

Storm Water Treatment Basin – IB1 – 2016 infiltration basin

Bottom: 814.0 – dry

Top: 818.0

1.10 inches across the 1.12 acres draining to the basin equates to 4,472 cubic feet. The basin between elevations 814.0 to 817.17 provides the required volume.

Outlet Structure: infiltration plus outflow structure at 817.8 plus overflow swale at elevation 818.0

| Rainfall Event (rainfall event) | 2yr | 10yr | 100yr |
|-----------------------------------|--------|--------|--------|
| Runoff flowing to the basin (cfs) | 1.63 | 2.92 | 4.51 |
| Runoff not infiltrating (cfs) | 0.0 | 0.27 | 3.27 |
| Height of water within basin | 817.12 | 817.86 | 818.06 |

100 year event overtops the emergency overflow by 0.06 feet with a velocity of 0.6 feet per second. Overflow runs along entrance drive where additional catchbasins are located prior to entering the public right of way.

NPDES water quality calculations:

Impervious area in watershed is 0.79 acres x 1" = 2868 cubic feet = Water Quality Volume
 Elevation of WQV in basin from 814 to 816.60 = 31.2 inches.
 At 0.8 inches per hour, 31.2 inches infiltrates within 39 hours < 48 hours – Passes WQV standard

North Pond 'A' – Previously modeled runoff rates

Bottom: 742.0

Top: 747.0

Outlet Structure: Control Structure with emergency overflow at 746.0 – infiltration not modeled

| Rainfall Event (rainfall event) | 2yr | 10yr | 100yr |
|-----------------------------------|--------|--------|--------|
| Runoff flowing to the basin (cfs) | 10.83 | 34.61 | 67.11 |
| Runoff leaving basin (cfs) | 4.56 | 32.73 | 65.74 |
| Height of water within basin | 745.35 | 745.98 | 746.40 |

100 year event overtops the emergency overflow by 0.40 feet with a velocity of 1.6 feet per second.

North Pond 'A' – Proposed modeled runoff rates with inline infiltration basin IB1

Bottom: 742.0

Top: 747.0

Outlet Structure: No change - Control Structure with emergency overflow at 746.0 – infiltration not modeled

| Rainfall Event (rainfall event) | 2yr | 10yr | 100yr |
|-----------------------------------|--------|--------|--------|
| Runoff flowing to the basin (cfs) | 8.76 | 30.88 | 63.66 |
| Runoff leaving basin (cfs) | 3.28 | 28.73 | 62.03 |
| Height of water within basin | 745.29 | 745.91 | 746.36 |

100 year event overtops the emergency overflow by 0.36 feet with a velocity of 1.5 feet per second.

Summary of changes:

Comparison of Previous modeled outflows versus newly Proposed outflows for North Pond 'A':

| Rainfall Event (flows in CFS) | 2yr | 10yr | 100yr |
|----------------------------------|-------|-------|-------|
| Existing Treated Runoff | 4.56 | 32.73 | 65.74 |
| Proposed Treated Runoff | 3.28 | 28.73 | 62.03 |
| Increase(+) /Reduction(-): (cfs) | -1.28 | -4.00 | -3.71 |

Summary:

The addition of the infiltration basin will aid in reducing the rate of flows leaving the overall development area previously studied.

Feel free to call with any questions or comments.

Best Regards,



Mark R. Welch, P.E.

MN Reg # 42736