



Crump Road – Convenience Store Stormwater Narrative

April 30, 2014

The subject project is proposed on a 2.0 acre portion of the 6.58 acre parent parcel (1204200180000). The proposed site is located just north of the northeast corner of the intersection of Miccosukee Road and Crump Road in Leon County, FL. The proposed project involves the construction of a 2,904 SF convenience store and 7 fueling stations with the associated parking, sidewalks, and a retention stormwater management facility. The developer and owner of the property is William Glen Brown.

Pre-Development Site Conditions:

From review of Leon County GIS, NFWFMD GIS and surveyed data the site is located at the crest of a hill on Crump Road and the runoff within the right-of-way discharges to the north and south. The remainder of the runoff from the site is contained within the confinements of a “closed basin” and only discharges via a saddle condition to the northeast during the 100yr/24hr storm event. The runoff that discharges at the saddle location then cascades through a system of depressions and into a tributary that feeds the St. Marks River. The site is located within the Bird Sink Basin, more particularly within the Black Creek Watershed. According to the NRCS web soil survey, the predominant soil type for the site is Norfolk loamy sand, clayey substratum. There are several scattered permit size trees located on the property as shown on the survey. No significant wildlife or listed species were observed on the site.

Post-Development Site Conditions:

The proposed site development is the construction of a 2,904 sf convenience store with ten (10) regular off-street and one (1) ADA parking spaces. The proposed total impervious area is 22,163 sf. Due to the topography of the site, the proposed method of stormwater management is a shallow retention stormwater management facility (SWMF). The SWMF is located to the east/rear of the building in the existing low area. The site is graded such that the vehicular use area and interior islands in the front of the building drains to three (3) concrete flumes. Two (2) of these flumes drain south into a swale sized to convey the runoff to the proposed SWMF. The third concrete flume discharges directly into the SWMF. The contributing runoff for the flumes and swales is calculated per the sub-basin areas provided within the stormwater calculations and drainage area map and were sized using Bentley Flowmaster V8i. The provided FlowMaster calculations are for a flume with a minimum 1.0% slope, normal depth of 0.45 ft and critical depth of 0.53 ft which discharges a maximum allowable flow rate of 3.31 cfs. All of the proposed flumes have 25yr/24hr design flows less than that of the above mentioned conceptual model and are steeper than the minimum 1.0% slope and are therefore are considered adequate. Runoff generated by the pump canopy is to be

pipled directly to the south swale and SWMF using 8" roof drains. The roof drains were modeled in FlowMaster using a minimum 1.0% slope and the maximum 25yr/24hr design storm flow rate of 0.70 cfs. The proposed roof drains from the building, which discharge directly into the SWMF, have considerably less contributing drainage area than the pump canopy and, therefore, were not redundantly modeled given the previously calculated capacity. The sum of the contributing sub-basin flows was used to size the south swale using triangular shaped open channel simulations in FlowMaster with the 25yr/24hr design flows. The designed minimum 1' deep, south swale resulted in a normal depth of 0.54. The pre-treatment storm pipe network was modelled and evaluated for efficiency using Hydraflow with the 50yr/24hr storm event peak stage as the tailwater condition. A Stormceptor EOS 4-175 structure is proposed to remove petroleum products resulting from potential spills at the fuel stations and UST. Rinker Materials advised that the Stormceptor EOS 4-175 would be the best suited structure for this application since the EOS model provides "Extended Oil Storage". The SWMF is designed to attenuate post-development runoff generated by storms up to and including the 100yr/24hr design storm. The side slopes of the pond are designed at 4H:1V.

Pre-Post Stormwater Analysis:

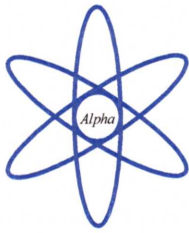
For the purposes of pre-development and post-development consistent comparison, the total 3.40 acre area of the closed basin was evaluated. The pre-development basin included a small amount of existing impervious area combined with the existing HSG B, Norfolk loamy sand to produce a 61.39 CN. The stage/storage for the pre-development area was calculated using a combination of survey topography and NFWFMD Lidar contours. The post-development basin included the proposed impervious area and HSG B, Norfolk loamy sand to produce a weighted 66.50 CN. The post-development stage/storage area was calculated using a combination of the proposed contours in the disturbed area and NFWFMD Lidar in the undisturbed area.

Per Leon County LDC 10-4.301(2)(iii) and using the total basin area of 3.40 ac., the treatment volume was calculated to be 5,228 cf. By interpolation, a treatment volume depth was calculated to be 4.09 inches within the proposed SWMF. The previous Stormwater Calculations submittal included the recommended design infiltration rate of 0.28 in/hr. This rate was based on the suggested Factor of Safety of 4.0. However, upon receiving comments from your office, the SWMF has been redesigned and now includes a large amount of undisturbed area. After reviewing the design revisions and the reduction of impact to natural soil, the geotechnical engineer now suggests a Factor of Safety of 2.5. Therefore, the provided calculations are now based on the infiltration rate of 0.44 in/hr. With this rate, a treatment volume recovery time of 9.30 hours was determined which is well within the required 72 hour timeframe. A signed and sealed letter of recommendation from the geotechnical engineer will be provided with this submittal.

The volume control, peak stage of the low area, and rate control were analyzed using ICPR V3.10 simulations for all design storms up to and including the 100yr/24hr storm. After review of the ICPR output reports and provided Pre-Post Comparison Table, the SWMF only discharges during the 100yr/24hr design storm event. However, the pre-post comparison table demonstrates that the peak stage, volume of discharge off-site ("Node Total Inflow"), and maximum outflow ("Channel Max. Outflow") are all reduced in the post development condition. Therefore, the proposed SWMF exceeds the requirements of the closed basin standards for volume control per Leon County LDC 10-4.301(3)(b). Also, the comparison table confirms that the peak stage of the on-site "semi" closed basin is reduced due to the added storage volume of the proposed SWMF. A time series report for the SWMF node in ICPR shows that 62.10 hours after (86.10 hours from the beginning of the simulation) a 100yr/24hr storm event, all volume within the pond has been recovered.

The construction plans require silt fence to be placed by the contractor along the north perimeter of the site prior to construction to prevent erosion and silt from entering the adjacent properties. These controls are required to be maintained by the contractor throughout the life of the project and removed once the site has been stabilized.

In conclusion, the proposed development's stormwater management system has been designed so that no off-site adverse impacts are anticipated.



**Alpha Geotechnical
and Testing Services, Inc.**

Certificate of Authorization No. 00007967

Foundation Evaluations
Environmental Studies
Construction Materials Testing

March 31, 2014
File No. 14-2589

Mr. Glen Brown
c/o Alday-Howell Engineering
2860 Highway 71 North, Suite B
Marianna, FL 32446

Subject: Revision to Recommended Safety Factor for Infiltration Rate at Proposed Crump Road Convenience Store Storm Water Management Facility, Crump Road at Miccosukee Road, Tallahassee

Gentlemen:

Based on discussions with the storm water management pond designer, Mr. Joseph Alday, PE, and from review of the Undisturbed Pond Bottom plan dated 3/19/14, it is our opinion that the previously recommended safety factor of 4.0 in our 2/18/14 letter report may be reduced to 2.5 with no adverse impact. It is our understanding that the excavated portion will be disced or otherwise aerated to enhance infiltration just before all grading is completed. The silty sands in the areas that will be left undisturbed will allow much faster infiltration than determined for the red clayey sand. Therefore, the weighted average design infiltration rate may be modified to 0.44 inch/hour.

Please contact us if you have any questions.

Sincerely,

Alpha Geotechnical and Testing Services, Inc.

S.P. Shanley
3/31/14

Stephen P. Shanley, PE
FL #40653