



October 29, 2013

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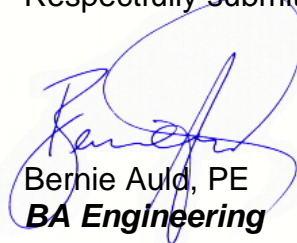
Re: **Storm Water Report**
Loves Travel Center Development
Jonesboro, Arkansas

VIA email: ross@rcce.co

Attached is the Storm Water Report for the referenced project. As you will note, the overall effect for this development is that detention will increase the peak discharge conditions of the Site Basin of Whiteman's Creek. Computations and analyses for this hydrologic evaluation demonstrate that on-site detention is not warranted. The development will require both temporary and permanent erosion control measures on-site.

Should you have any questions or request additional information please call me.

Respectfully submitted,



Bernie Auld, PE
BA Engineering

Storm Water Report
Loves Travel Center Development
Jonesboro, Arkansas
October 29, 2013

Purpose:

The objective of this study is to analyze the hydrology of the existing site conditions and compare these conditions to the proposed conditions for the Loves Travel Center Development (Loves) for site detention purposes. The results of the detention analyses will then be reviewed to determine the effects on Whiteman's Creek to establish whether on-site detention shall be required to comply with the City of Jonesboro Storm Water Management criteria.

Location:

The proposed 47-acre commercial development is located south of Joe Martin Expressway Intersection, Parker Road and east of BNSF Railroad and adjacent to Whiteman's Creek (refer to Appendix)

Site Detention Computations:

Storm Water runoff from the site will be conveyed across the property by overland flow, storm sewer structures, and a detention structure. Detention was analyzed at the western portion of the property. Due to the increase in impervious land use from this development, these areas have been routed through the basin to effectively reduce the peak flow rates to less than pre-developed conditions.

Runoff for site detention were computed using the United States Department of Interior's (USDI) Soil Conservation Service (SCS) 24-Hour Hydrograph Method. The method of calculation is computer generated using Hydraflow software. The topographic information was derived from the City of Jonesboro's LIDAR contours along with supplemental information obtained by Resource Consulting, LLC.

Maps of the site were examined to provide data input for the computer program. Alternatives were reviewed for the 100-year storm frequency event. The detention configuration was designed to accommodate the increased peak discharge from the developed conditions. Storage routing of the proposed hydrograph through the detention facility was calculated by computer using Hydraflow software. Due to the increase in impervious land use from the development, the proposed site has been routed through the basin to effectively reduce the peak flow rates to less than pre-developed conditions.

Pre-developed Flows:

Calculations for pre-developed flow of the 100-year storm event is shown within the Appendix. A summary of the input data is shown below:

*Note: Hydrologic Soil Group Classification are based upon existing soil conditions per National Cooperative Soil Service Web Soil Survey (refer to Appendix).

Area = 47 acres
CN = 90 (22-acres CN 88, 25-acres CN 91)
Tc = 53 minutes



Post-developed Flows:

Calculations for post-developed flow of the 100-year storm event is shown within the Appendix. A summary of the input data is shown below:

Area = 47 acres
CN = 95
Tc = 16.3 minutes

Summary - Detention Pond:

The detention basin has been designed to store and reduce the discharge of the proposed development. Computative analysis for the detention facility/basin is shown within the Appendix. A summary of the data is shown below:

Storage, Elevation, Storage, Discharge Outflow

Stage (ft)	Elev (ft)	Storage (cuft)	TotalOutflow (cfs)
0	230	0	0
1	231	26,062	5.83
2	232	54,296	16.48
3	233	84,774	30.28
4	234	117,568	46.62
5	235	152,750	65.15
6	236	190,392	85.65
7	237	230,566	107.93
8	238	273,344	131.86
9	239	318,798	157.34
10	240	367,000	184.28

Pond discharge structure:

1 each 1.75' wide Weir – invert @ 230

Summary of peak flow:

	100-year (cfs)
Pre-Developed Conditions	180.67
Post-Developed Conditions	376.36
Routed Outflow Conditions	176.17

Whiteman's Creek Watershed Hydrology Computations:

Storm Water runoff rates for Whiteman's Creek were computed with digital HEC-1 files provided by the Memphis District Corps of Engineers (COE) for the 100-year frequency event (1% annual chance). These files only represent the spatial dynamics of the Loves Site Development in relationship to the site basin as well as the overall basin at that locale.

The COE, HEC-1 model was then revised to reflect the discharge at the Loves Development along Whiteman's Creek and the impact from the proposed site conditions for the Development. The summary volumes and discharge conditions from the previous pond calculations were then edited into the same COE, HEC-1 model to demonstrate the detention pond routing effects. These models demonstrate the impact the Loves Development has on Whiteman's Creek with detention and without detention.

Summary of peak flow rates:

	Site Basin	Time	Overall Basin	Time
	100-year (cfs)	(hr)	100-year (cfs)	(hr)
Whiteman's Creek (Existing Conditions)	837	14.5	6367	16.25
Loves Development	807	14.5	6358	16.25
Loves Development + Detention	822	14.5	6361	16.25

The HEC-1 hydrograph results for the 100-year frequency event are presented in the Appendix.

Summary results of this report are as follows:

- Loves Development decreases Overall Basin discharge by 9-cfs without detention.
- Loves Development decreases Site Basin discharge by 30-cfs without detention.

Conclusions:

The overall effect for this development is that detention will increase the peak discharge conditions of Whiteman's Creek. Computations and analyses for this hydrologic evaluation demonstrate that on-site detention is not warranted. Based on and limited to the data and analysis and their applicability presented herein, the development does not appear to endanger life or property, public or private.

Whiteman's Creek Ditch Hydraulic Computations:

MT-2 Form 2

B. HYDRAULICS

4. Models Submitted

Duplicate Effective Model

(Natural Run) Datum ??

COE.dat (HEC-2) - Whiteman's Creek Existing Conditions per Memphis COE (Part 1 of 2)

Original HEC-2 Files for Whiteman's Creek per Memphis Dist COE, FEMA FIS part 1 of 2

Whit1-500.dat (HEC-2) - Whiteman's Creek Existing Conditions per LOMR (Part 2 of 2)]

Original HEC-2 Files for Whiteman's Creek per Memphis Dist COE, FEMA FIS part 2 of 2

Duplicate Effective Model

(Floodway Run) Datum ??

WHITFW.dat (HEC-2) - Whiteman's Creek Floodway Conditions per LOMR (Part 2 of 2)]

Original HEC-2 Files for Whiteman's Creek per Memphis Dist COE, FEMA FIS part 2 of 2

Corrected Effective Model

(Natural Run) Datum ??

Loves R2.prj

Imported Plan Geo+Flow-COE

Original HEC-2 Files combine Part 1 of 2 with Part 2 of 2 imported into HEC-RAS for affected zone

Corrected Effective Model

(Floodway Run) Datum ??

Loves R2.prj

Floodway-COE-R2

Original HEC-2 Files combine Part 1 of 2 with Part 2 of 2 imported into HEC-RAS for affected zone with Floodway computations

Existing or Pre-Project Conditions Model

(Natural Run) Datum ??

Loves R2.prj

Whiteman Creek Exist Multi

Cross-Sections from DFIRM survey added into HEC-RAS from RM 4.83=12031 to RM 3.668=5844

Existing or Pre-Project Conditions Model

(Floodway Run) Datum ??

Loves R2.prj

Whiteman Creek Exist FW

Cross-Sections from DFIRM survey added into HEC-RAS from RM 4.83=12031 to RM 3.668=5844 with Floodway computations

Revised or Post Project Conditions Model

(Natural Run) Datum ??

Loves R2.prj

Loves-Pro-Multi

Excavate from East toe of channel @ 2% then 3:1 tie to natural ground + 10' buffer then 3:1 above 100-year flood. An obstruction was placed above the flood event to represent the proposed fill material placed on the development from Cross-Section from RM 4.439=9943 to RM 4.208=8719

Revised or Post Project Conditions Model

(Floodway Run) Datum ??

Loves R2.prj

Loves-Pro-Multi

Excavate from East toe of channel @ 2% then 3:1 tie to natural ground + 10' buffer then 3:1 above 100-year flood. An obstruction was placed above the flood event to represent the proposed fill material placed on the development from Cross-Section from RM 4.439=9943 to RM 4.208=8719 with Floodway computations

APPENDIX

- EXISTING SITE
- PROPOSED SITE
- SOIL MAP – HYDROLOGIC SOIL GROUP
- HYDROLOGIC CALCULATIONS – POND STORAGE
- SITE BASIN AREA MAP
- HEC-1 COMPUTATIONS
 - EXISTING SITE CONDITIONS per Memphis COE [[LoveEX.dat](#)]
 - PROPOSED SITE CONDITIONS per Loves Development [[LoveDEV.dat](#)]
 - PROPOSED SITE CONDITIONS + DETENTION per Loves Development [[LoveDET.dat](#)]
- HEC-2 COMPUTATIONS
 - WHITEMAN'S CREEK EXISTING CONDITIONS per Memphis COE (Part 1 of 2) [[COE.dat](#)]
 - WHITEMAN'S CREEK EXISTING CONDITIONS per LOMR (Part 2 of 2) [[whit1-500.dat](#)]
 - WHITEMAN'S CREEK FLOODWAY CONDITIONS per LOMR (Part 2 of 2) [[WHITFWr.dat](#)]
- HEC-RAS COMPUTATIONS
 - IMPORTED PLAN (Imported HEC-2 files into HEC-RAS + X-Sections RM 6.13 – RM 0.21) [[natural plan name IMPORTED GEO+FLOW-COE, floodway plan name Floodway-COE, revised floodway plan name Floodway-COE-R2](#)]
 - WHITEMAN'S CREEK EXISTING CONDITIONS with NEW LiDAR X-SECTIONS (from RM 4.83=12031 to RM 3.668=5844) [[natural plan name Whiteman Creek Exist Multi, floodway plan name Whiteman Creek Exist FW](#)]
 - WHITEMAN'S CREEK PROPOSED CONDITIONS 10-28-13 (from RM 4.439=9943 to RM *4.12323=82669 Interpolated X-Section) Excavate from East toe @ 2% then 3:1 tie to natural ground + 10' buffer then 3:1 above 100-year flood [[natural plan name Loves-Pro-Multi, floodway plan name Loves-Pro-FW](#)]
 - HEC SUMMARY (100-year + Floodway) – Comparison
- City of Jonesboro FEMA FIS Map D05031C_0270
- Proposed FEMA FIS Map
- FEMA Forms
 - MT-2 Form 1 (Overview & Concurrence Form)
 - MT-2 Form 2 (Riverine Hydrology & Hydraulics Form)
 - MT-2 Form 3 (Riverine Structures Form)