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March 17, 2010

Mr. Von Shipman, P.E.
City Engineer
City of Valdosta
300 North Lee Street
Valdosta, Georgia 31603

Subject: Baytree Road Culvert Improvements - Preliminary Design Evaluation

Dear Mr. Shipman:

Camp Dresser & McKee Inc. (CDM) evaluated several alternatives for controlling stormwater litter and sediment load at Baytree Road by improving the existing culvert. In July 2009 CDM discussed several alternatives with the City of Valdosta (City), which included trash racks, baffle boxes, and the SNOUT. Based on the City's feedback, CDM evaluated in greater detail the benefits and potential impacts related to the installation of a SNOUT box. This letter summarizes the engineering analysis and results.

Project Description

The culvert upgrade consists of the addition of a sump at the culvert outlet and the construction of a concrete box that will house three SNOUTs. The SNOUT is a commercial skimmer that has been in use for litter and sediment control for many years in many parts of the United States. The proposed structure is 15 feet long, 23 feet wide and 15 feet deep, with a sump depth of 8 feet. The final design includes truck access and slope stability, as well as safety considerations.

Hydrologic Evaluation

CDM used the available topographic information, consisting of 10-ft topographic contours, combined with 2-ft interpolated contours to delineate the tributary area to the project site. A first draft delineation was verified against the National Pollutant Discharge Elimination System (NPDES) pipe survey shapefile, to consider underground drainage structures and confirm the tributary area. The results are shown on **Figure 1**, which corresponds to 189.3 acres of tributary area. The land use is mostly commercial, and highly impervious with an average percent of directly connected impervious area of 57 percent. The soil infiltration classification, based on the NRCS hydrologic groups, resulted in the majority of the soils being type "B" (45 percent) and "C" (34 percent).

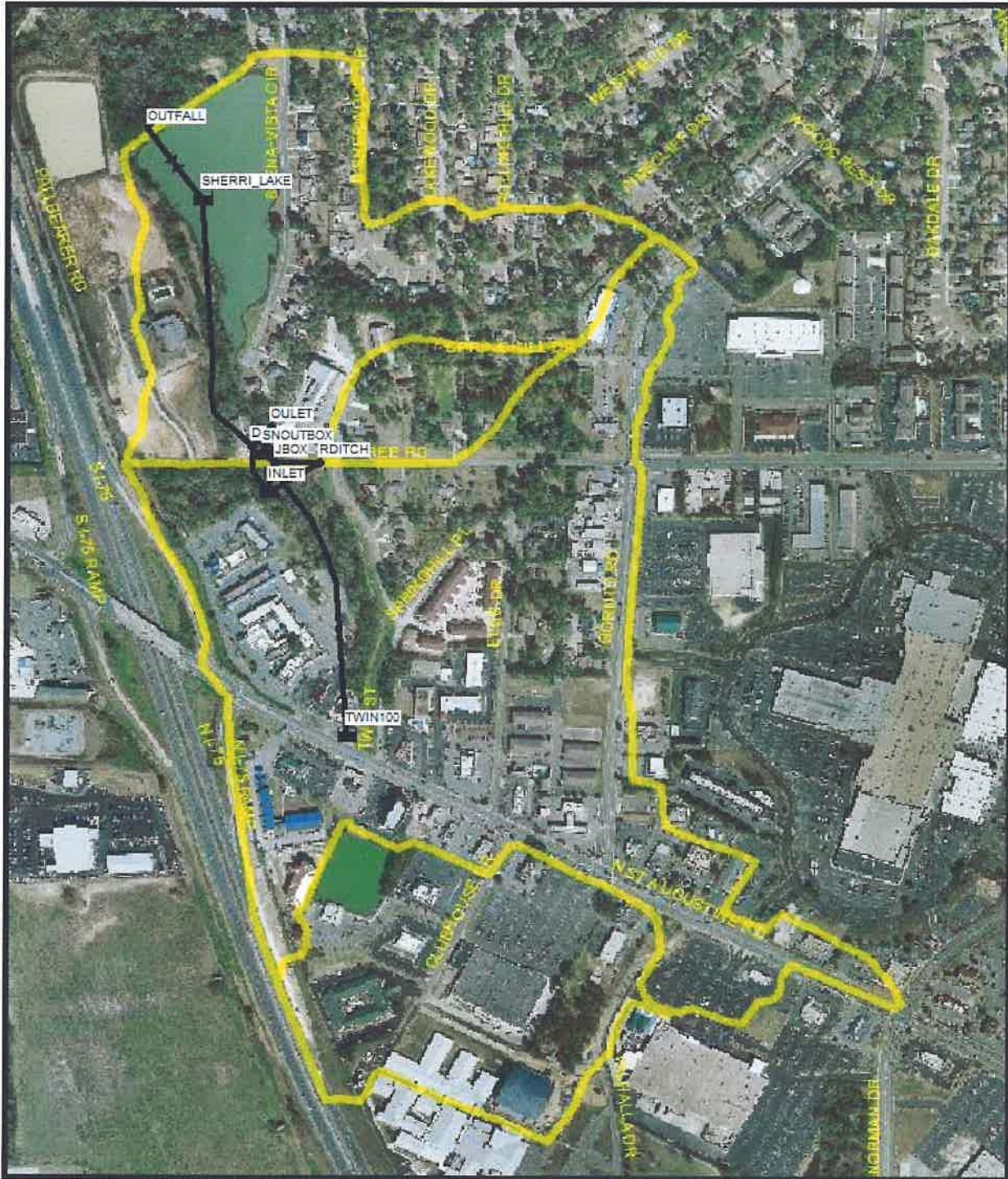


Figure 1
City of Valdosta, GA
Baytree Road Culvert Improvements
Preliminary Design Evaluation



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CDM estimated the surface runoff from the tributary area using the US EPA SWMM 5.0 RUNOFF module, using the Horton soil infiltration method, and considering the topographic characteristics of flowpaths. The proposed project does not include any change in the tributary areas, and therefore there is no proposed condition included in this analysis. The rainfall distribution used for this evaluation corresponds to an SCS Type II, with 24-hour duration and storm depths shown in the table below:

	1.2 inch	5-yr	10-yr	25-yr	100-yr
Storm Depth	1.2	5.5	6.5	7.7	9.1

Hydraulic Evaluation

The upstream areas receive surface runoff from roadway and parking inlets in the Valdosta Mall area, and discharge it to the Twin Road Ditch, which has an average steep slope of 2 percent. CDM used the US EPA SWMM 5.0 EXTRAN module to route the flows along the Twin Road ditch, through the Baytree Road culvert, and discharge the flows to Sherri Lake. A fixed boundary condition was used to account for the existing Sherri Lake weir invert elevation of 155 ft. The analysis consisted of routing several 24-hour storms and comparing the existing and the proposed condition. The existing condition includes the existing 4 ft by 4 ft box culvert, as well as the current debris fence installed by the City. The proposed condition eliminates the debris fence, located on the upstream side of the Baytree culvert, and includes details regarding the concrete sump, three 42-inch box openings, three 72FTB Snouts, and a protective metal grate. CDM obtained from the SNOOT manufacturer (BMP, Inc.) a table with the suggested loss coefficients to be used for the SNOUTs, which are dependent on the flow velocity through each of them, as shown in the table below.

Snout K Factor (based on table supplied by BMP Inc)

	1.2 inch	5 yr	10 yr	25 yr	100 yr
	0.37	1.31	1.30	1.30	1.30

Results

- **Baytree Road Flooding:** Baytree Road is currently classified as a local road at the project location, with very limited traffic since there is no urban development to the west. It is anticipated that in the future, an apartment complex will generate numerous traffic counts per day. Based on field survey, the road crown elevation is 170.5 ft-NAVD. The model results estimate that the proposed condition will have lower flood elevations for all of the storms with the exception of the 5-year storm, for which there shall be an increase of 0.4 foot in flood stages. This result is mostly associated with the fact that the proposed



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condition has three 42-inch pipes/SNOUTs that generate a lower head loss than the current chain link fence located at the culvert inlet.

Roadway Elevation: 170.5 ft

WSE in feet at Baytree Road (Junction: INLET)

	1.2 inch	5 yr	10 yr	25 yr	100 yr
Existing	161.7	169.5	171.4	173.1	174.3
3 Snouts	161.4	169.9	171.3	171.9	172.2

- **Structural Flooding:** There is an industrial warehouse located on the east bank of the existing ditch. Since no surveyed finished floor elevation is available, CDM staff considered an elevation of 171 ft as the benchmark, which corresponds to the closest survey spot elevation in the vicinity to the building. The model results show that the predicted flood elevation is lower for the proposed conditions for all the storms, particularly for the severe storms. This is due to the fact that under the proposed condition most of the head loss occurs in the initial portion of the existing culvert and generating a head difference between the upstream and downstream sections of Baytree Road. The model does include a roadway overflow that becomes active at elevation 170.0, but in most cases the flood levels are below this value.

Warehouse Estimated FFE: 171 ft

WSE in feet at Warehouse (Junction: RDITCH)

	1.2 inch	5 yr	10 yr	25 yr	100 yr
Existing	167.7	168.0	168.1	173.3	174.0
3 Snouts	167.7	168.0	168.1	168.7	169.3

- The peak flow through the existing culvert decreases for all of the design storms, due to the increased head loss that occurs through the SNOUTs.

Flow in CFS through existing 4x4 box culvert flow

	1.2 inch	5 yr	10 yr	25 yr	100 yr
Existing	63 cfs	304 cfs	355 cfs	485 cfs	499 cfs
3 Snouts	62 cfs	270 cfs	311 cfs	357 cfs	317 cfs

- The box is designed to overflow for the 10-year storm.



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Geotechnical Information

CDM visited the site in several occasions, and observed that the ditch is mostly dry, with no baseflow conditions. From conversations with City staff, it is anticipated that the groundwater table impacts, and ditch baseflow will be minimal, particularly during the dry season. CDM gathered geotechnical information at the proposed location of the concrete structure by digging a 15-foot deep boring. The soils are mostly clayey soils, and the groundwater level was not encountered during the exploration.

The method of installation of the proposed box can be complex given the limited information available, and the fact that no detailed geotechnical stability evaluation was part of the design work.

Conceptual Cost Estimate

CDM developed an opinion of probable construction costs for this project. CDM has no control over the cost of labor, materials, equipment, or services furnished over schedules, over contractor's methods of determining prices, market conditions or negotiating terms. The cost estimate includes labor, materials, and equipment but CDM cannot guarantee that this opinion will not vary from actual costs, or contractor's bids.

The underlying assumptions for the development of this cost estimate are:

- No rock excavation will be required
- Normal dewatering will be needed
- No hazardous contaminants will be found
- No labor overtime will be necessary
- No maintenance of traffic will be necessary
- Land acquisition, plat record, or land description are not included
- Permits are not included
- 7 percent sales tax

Baytree Road Culvert Improvements - Conceptual Cost Estimate

Item	Lump Sum
Concrete Structure	\$ 81,407
Ground Stabilization and Dewatering	\$ 31,120
72 FTB Snouts	\$ 19,500
Pavement	\$ 11,907
Rip Rap	\$ 11,150
Mobilization	\$ 6,265
Bollards	\$ 4,677
Guardrail	\$ 3,843
Aluminum Grate	\$ 3,337
Curb Gutter	\$ 2,344
As-Built Drawings	\$ 1,505
Aluminum Hatches	\$ 1,500
Project Sign	\$ 1,326
Erosion and Sedimentation Control	\$ 1,075
Site Preparation	\$ 1,000
Sodding	\$ 450
Construction Cost	\$ 182,406
Excavation Contingency	\$ 65,000
Dewatering Contingency	\$ 31,000
Hauling of Excess Material	\$ 6,500
Temporary Culver Support Contingency	\$ 14,600
Total Contingencies	\$ 117,100



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A total cost of \$182,406 was estimated, which is broken down in detail in the attached cost estimate table. CDM suggests gathering additional geotechnical information, as well as performing a geotechnical study to better assess site conditions. Given the possibility of a complex excavation and the limited amount of geotechnical data gathered during the design phase, CDM estimated a series of contingencies that should be considered as potential costs:

- Excavation Contingency: \$ 65,000
- Dewatering Contingency: \$ 31,000
- Hauling of Excess Material: \$ 6,500
- Temporary Culvert Support Contingency: \$ 14,600

Discussion

Based on the results of this evaluation, the proposed structure shall achieve the objective of controlling sediment and litter at the Baytree Road Culvert for design storms smaller than 5.5 inches. In order to maintain head loss values in the order of the existing structure, the existing chain link fence shall be removed to compensate for the increased head loss.

The project construction includes deep excavation, temporary support, and potential dewatering issues that should be further considered in order to better estimate the project cost.

Very truly yours,

José María Guzmán, P.E.
Camp Dresser & McKee Inc.

cc: Emily Davenport, City of Valdosta
Patrick R. Victor, P.E., D.WRE, CDM