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MEMORANDUM

TO : Terence L. Haynes, P.E.

DATE : July 20, 2009
Revised: July 24, 2009

Re: Earthwork in Floodway Fringe for Lot 1, Block A
Timber Grove Lake 2nd Addition
Wal-Mart Neighborhood Market #5855-00
Central & Maize
Wichita (W), Kansas

From: Muhammad Khan, P.E. CFM

The purpose of this memorandum is to describe the previous floodway fringe fill placement and proposed mitigation measures to accommodate the proposed Neighborhood Market development within Cowskin Creek drainage basin.

1. Site Description

The project site is located northwest of the Intersection of West Central Avenue and North Maize Road in Wichita, Sedgwick County, Kansas. The site is 11.24 acres in size and is bound by an existing stormwater retention system to the north and west and existing retail/commercial development to the east and south.

The topographic survey of the site shows the existing ground slightly rolling with a downward slope from the east to the west. The ground surface at the site is generally covered with grass with some areas of exposed soils. A drainage swale is located in the southwest portion of the site.

2. Cowskin Floodway and Floodway Fringe

According to the effective Flood Insurance Rate Map (FIRM) No. 20173C0330E, dated February 2, 2007, the subject Site is in Special Flood Hazard Area (SFHA) of Cowskin Creek. A SFHA is the area of land that would be inundated by a flood having a 1% or greater chance of occurring in any given year. The 1%-chance flood is also referred to as the base flood or the 100-year flood and is the regulatory standard for FEMA.

The area between the floodway boundary and the 100-year floodplain boundary is referred to as the floodway fringe. According to the FEMA Floodplain Development regulations, "The floodway fringe area could be blocked, restricting flow, without increasing the base flood elevation of the 100-year flood by more than the allowable surcharge. However, the allowable surcharge must be developed with a water surface profile computer program such as HEC-RAS." The project Site is located within floodway fringe of the Cowskin Creek.

3. FEMA and Kansas Division of Water Resources Permitting in 2002

In September 2002, the applicant "Star Lumber & Supply Company" submitted an application to the Division of Water Resources (DWR), Kansas Department of Agriculture requesting the permit authorization to place approximately 47,000 cubic yard of fill material within the floodway fringe of Cowskin Creek for future commercial development. The proposed fill work was shown to raise the whole site above the effective base flood elevation. The proposed earthwork cross section indicated approximately 4 to 5 foot of fill placement within the floodway fringe area.

In November 2002, the Kansas DWR approved the application authorizing placement of the fill in floodway fringe of the Cowskin Creek. It should be noted the regulations at the time, the application was approved, did not require a technical analysis verifying surcharge and showing the impact on surrounding properties by the placement of fill within the floodway fringe. The Engineer-of-Record on behalf of the applicant indicated that a technical analysis was not performed; since, it was not required by the Kansas DWR regulations at that time.

Following the Kansas DWR permit authorization; in December 2002, the applicant requested FEMA to revise the effective flood insurance rate map for the site based on fill. The elevation certificate for the proposed building slab was submitted with the City of Wichita's acknowledgment that the proposed fill work within the floodway fringe would raise the slab on grade above the base flood elevation.

In January 2003, FEMA issued the determination that the proposed slab on grade construction based on fill on Lot 1, Block A of the Timber Grove Lakes, 2nd Addition will be above the base flood elevation (BFE). The portion of the site was determined by FEMA to be removed from the special flood hazard area.

4. Proposed On-Site Storm Drainage System

The storm water runoff from Lots 2 and 4, Block A of the Timber Grove Lakes 2nd Addition will be intercepted by area inlet structures on the east-side of the Site. The intercepted runoff will be conveyed to a proposed Compensatory / Dry Detention Area (the "CDDA") via storm water conveyance system. The conveyance system is proposed to carry the developed 100-year event storm water runoff.

The developed on-site storm water runoff from the building, drive and parking lot areas will be intercepted by downspouts, parking lot inlets and curb inlets. The intercepted runoff will be conveyed to the proposed CDDA via storm water conveyance system. The on-site storm sewer

system is designed pursuant to the City of Wichita and the WAL-MART Site Development Guidelines. Areas northwest of the building will be intercepted by a grass swale to convey storm water runoff to the CDDA.

5. Proposed Compensatory / Dry Detention Area

As previously discussed, the FEMA effective flood insurance rate map shows the BFE across the Site is established at 1328.00 MSL. The proposed Wal-Mart Neighborhood Market building finished floor elevation (FFE) is established at 1331.00 MSL, three (3) feet above the BFE, meeting the federal, state and City's guidelines.

As indicated earlier that the applicant "Star Lumber & Supply Company" was permitted to place approximately 47,000 cubic yard of fill material within the floodway fringe of Cowskin Creek for future commercial development. SMC compared the digital topographic survey of the exiting fill area with the topographic survey data prior to the fill placement by the applicant. The earthwork volumetric calculations completed by SMC shows that the net amount of fill placed within floodway fringe of the Cowskin Creek below the BFE was 21,784 cubic yard (CY). In absence of any other mitigation measure, the volume of fill placed below the BFE causes reduction in storage capacity of the floodplain.

As stated by the City Drainage Engineer "In sensitive watersheds, like Cowskin Creek, the City will be requiring compensatory storage for the flood storage displaced. That means the fill or storage displaced below the BFE, will need to be provided at least 1 times the volume at the same incremental flood frequency elevation."

The design and construction of a Compensatory / Dry Detention Area is proposed to compensate flood storage displaced volume below the BFE. With the sensitive nature of urban floodplains and the City's desire to preserve the existing flood plain storage, the proposed mitigation action would reverse the previous adverse impact of flood storage volume displaced due to the placement of fill within the floodway fringe of Cowskin Creek below the BFE.

As stated earlier that the existing ground surface at the site is generally covered with grass with some areas of exposed soils. However, the proposed development would increase the impervious area by 4.329 acres. The increase in impervious area would generate additional volume of storm water runoff to Cowskin Creek. The USDA Technical Release-55, Urban Hydrology for Smaller Watersheds, Procedure was used to calculate the additional volume of runoff. Approximately, 2,115 CY of additional volume of storm water runoff will be generated by the proposed development. It will be required to compensate the additional volume of runoff to prevent the reduction of flood plain storage.

The total required volume of 23,899 C.Y. for the CDDA is calculated by combining the previous fill placed below the BFE (21,784 CY) and the additional fill required to develop the Site with increase in impervious and reduction in pervious surfaces (2,115 CY). The Total Storage Volume (TSV) of the CDDA provided is 24,526 CY. This TSV includes an additional safety factor of flood storage volume.

This TSV is determined for subject Site, Lot 1, Block A, to compensate for the flood storage displaced volume from previous fill placed within the floodway fringe and proposed development on the Site. The TSV does not compensate for fill placed within the floodway fringe on other developments upstream and downstream along Cowskin Creek.

According to the latest topographic survey of the adjacent floodway, the normal water surface elevation of Cowskin Creek is 1320.30 MSL. Thus, the CEC established the lowest elevation of the bottom of the proposed CDDA at 1320.30 MSL so that the bottom of the pond would remain dry. Flood water levels in the CDDA will rise and fall with the backwater fluctuation of the floodway in Cowskin Creek.

A fence will be installed around the perimeter of the CDDA to restrict unauthorized access.

6. Storm Water Quality Measures

The City is strengthening its regulations related to peak flow, water quality, channel protection, and flood plain requirements. Erosion Mitigation Measures for the development are completed using EPA Guidance Manual "Storm Water Management for Construction Activities" and the average annual soil loss analysis was analyzed using U.S. Department of Agriculture, Universal Soil Loss Equation, Agriculture Handbook 537. Construction phasing and Best Management Practices will be required during the construction of the development.

Snout[®] Oil & Debris or similar Best Management Practice devices will be installed in the most down-stream inlet and junction box in compliance with the City's Storm Water Quality requirements. Trash screens will be installed on the Outlet structure to prevent clogging, remove floating debris and trash from storm water runoff and improve downstream water quality.

Vegetated erosion control strips will be installed along the north property line where existing storm water runoff sheet flows into the adjacent floodway. Vegetated erosion control strips will also be installed between the drive/parking lot and the CDDA. The bottom of the CDDA will be sodded.

Attachments: KDWR Floodway Fringe Fill Permit
Drainage Plan for Wal-Mart Neighborhood Market #5855-00

