## <u>STAFF REPORT</u>

**ITEM:** Floodplain Permit application is for the removal of the existing bridge and construction of a new bridge on Lindsey Street over Imhoff Creek along with associated channel improvements. The Floodplain Permit for the utility relocation portion of this project was approved by the Floodplain Permit Committee on May 18, 2015. Consideration of this floodplain permit was postponed from the January 4, 2016 Flood Plain Permit Committee meeting to allow the applicant more time to complete the application.

## **BACKGROUND:**

APPLICANT: City of Norman – Department of Public Works ENGINEER: Leidos Engineering, LLC

The project involves the removal and replacement of the existing bridge on Lindsey Stret over Imhoff Creek as part of the City's \$40 million West Lindsey Street Corridor Project. The project must begin construction in May 2016 in order to fulfill community expectations, to coincide with the replacement by ODOT of the Lindsey Street bridge over I-35 and to be eligible for \$14 million in federal funds. <u>All</u> permits for this project must be secured by February 23, 2016 in order to meet the project schedule. The City floodplain permit is the only remaining permit to be acquired.

On December 18, 2012, City Council approved Contract No. K-1213-126 with Leidos Engineering, LLC, (formerly known as SAIC), Inc. for the engineering design services needed to prepare the West Lindsey Street Corridor Project for construction in 2016. Included in the Leidos contract is the design of the Imhoff Creek Bridge Replacement and acquisition of all associated local, state and federal permits.

The West Lindsey Street Corridor Project includes transportation, storm water and aesthetic improvements to Lindsey Street between 24<sup>th</sup> Avenue SW and Berry Road. In order to transition from a 5-lane street at Berry Road to a 2-lane street east of Berry Road, the Imhoff Creek Bridge is also being replaced.

Proposed improvements for Lindsey Street include:

- Widening West Lindsey Street from 3 lanes to 4 lanes with additional lanes at intersections
- New bridge over Imhoff Creek
- Continuous sidewalks on both sides of the street
- Access management to adjacent properties
- Multi-modal improvements including bicycle lanes
- Aesthetic enhancements including decorative pavement, landscaping and roadway lighting
- Underground utilities
- Accessibility for disabled individuals

This project has an estimated total cost of \$40 million with an estimated construction cost of \$33 million. Federal funds are paying for approximately \$14 million of the construction cost. Since this project has federal funding, the construction project will be bid and administered by the Oklahoma Department of Transportation. The bid opening is currently scheduled on April 22, 2016.

The existing bridge structure at Imhoff Creek consists of a triple 8' by 6' by 32' long reinforced concrete box (RCB). The existing RCB is undersized which results in the overtopping of Lindsey Street at slightly less than the 2 year (50 percent) rainfall event. The City proposes to remove and replace the existing bridge structure with a 54' wide by 8' tall Conspan arch type bridge structure. The proposed structure is 56' wide edge to edge with an upstream flowline elevation of 1129.8' and a downstream flowline elevation of 1129.7'.

Channel improvements are proposed for a distance of approximately 100' upstream and 500' downstream of the proposed structure. The improved channel will have a 38' wide concrete bottom with 1:1 concrete side slopes extending 3' up the banks. The remainder of the banks will be either grass or grass paver blocks on a 3:1 slope, tying back into natural ground. (see attached photos, renderings)

Site located in Little River Basin or its Tributaries? yes \_\_\_\_ no  $\checkmark$ 

## STAFF ANALYSIS:

The project area is both in the floodway/floodplain of Imhoff Creek Zone AE (Base Flood Elevations have been determined). The Flood Insurance Rate Map and Base Flood Elevations (BFEs) for Imhoff Creek were revised by FEMA in 2008 based on the 1997 HEC-2 model. Leidos then converted the HEC-2 model to a HEC-RAS model which is a more current modeling standard to create a Duplicate Effective Model (DEM).

As part of the new bridge design, Leidos performed field survey work and analyzed the DEM to see what effect the new bridge would have on the BFE of this portion of Imhoff Creek. Analysis of the DEM indicated there are errors with the current FEMA model:

- The existing reinforced concrete box (RCB) under Lindsey Street dimensions and elevations were found to be incorrect
- The channel flowline elevations downstream of Lindsey Street were too low based on newly acquired survey data.

Leidos found other minor errors in the existing model and re-evaluated the model, accounting for the previous model errors and adding new channel cross sections and topographic survey information to create a Corrected Effective Model (CEM). The CEM indicated the published FEMA BFE's for this portion of Imhoff Creek are 0.13' to 4.16' too low.

Leidos compared the CEM to the model developed by PBS&J in the Storm Water Master Plan that was accepted by City Council in November, 2009. As part of their scope of work, PBS&J reviewed the FEMA model for Imhoff Creek and also discovered multiple errors in the current FEMA floodplain maps. As noted in the Storm Water Master Plan "a number of issues were identified and corrected as a result of their review." (See attached memo dated June 10, 2008 from PBS&J Norman SWMP – Imhoff Creek HEC-RAS Model Revisions). After PBS&J corrected the model, they noted "these and other minor changes resulted in a general increasing of the water surface elevation along the majority of the length of Imhoff Creek."

The Leidos CEM and the PBS&J model correlate well and indicate the published FEMA BFE's are too low and should be revised based on the best available information.

Leidos has proposed that a Conspan 54-foot wide by 8-foot tall arch bridge structure replace the existing RCB under Lindsey Street. In addition, channel improvements are proposed for a distance of 100 feet upstream and 500 feet downstream of the new bridge. The proposed channel will have a 38 foot wide concrete bottom with 1:1 concrete side slopes 3 feet up the banks. The remaining side slopes will be either grass or grass paver blocks on a 3:1 slope tying into the existing ground elevation. The proposed channel improvements are needed to discharge the water more efficiently at the bridge without increasing the Water Surface Elevation (WSE). The WSE is similar to the BFE and determined from the updated and more accurate modeling information.

Leidos has inserted the proposed bridge structure and channel improvements into the CEM to determine the effect on the WSE. The CEM with the proposed bridge and channel improvements included is referred to as the Post Project Conditions Model (PPCM).

The PPCM model indicates there will be a decrease in the predicted WSE due to the bridge and channel improvement project. The WSE will drop by approximately 0.1' to 0.2' from the bridge north to Station 12+224, a distance of approximately 1,255'. The water surface will drop by approximately 0.8' to 2.4' from the bridge south to Station 10+508, a distance of approximately 411'.

Table 3   Comparison Existing Conditions Model and Proposed Conditions   Model				
River Station	Existing W.S.	Proposed		
	Elevation (ft)	W.S.		
		Elevation (ft)		
12980	1146.23	1146.23		
12500	1146.62	1146.62		
12375	1146.48	1146.48		
Brooks Street Bridge				
12327	1145.49	1145.49		

Table 3 (continued)   Comparison Existing Conditions Model and Proposed Conditions   Model				
12244	1143.04	1142.92		
11840	1143.24	1143.03		
11322	1143.57	1143.42		
11154	1142.83	1142.62		
11024	1142.85	1142.65		
10989	1142.94	1142.94		
Lindsey Street Bridge				
10919	1143.18	1140.76		
10868	1142.70	1140.81		
10766	1142.48	1140.23		
10673	1142.69	1140.20		
10564	1141.93	1140.15		
10508	1140.21	1139.37		
10338	1138.16	1138.16		
10273	1137.88	1137.88		
10080	1137.00	1137.00		

Table 3 from Leidos Hydraulic Report dated October 2015

Due to other concerns in the Imhoff Creek watershed, the City of Norman contracted in 2015 with another floodplain expert, Meshek and Associates of Tulsa, Oklahoma to determine possible improvements to Imhoff Creek south of Lindsey Street. Meshek and Associates is currently designing a stream bank stabilization project along Imhoff Creek downstream of Lindsey Street. Their work includes the hydrologic and hydraulic modeling of the entire length of Imhoff Creek from Andrews Park south to the Canadian River. Meshek's model, when it is completed, will use recently updated rainfall data that was not available to either Leidos or PBS&J at the time of their studies. Staff anticipates using Meshek's model to prepare the LOMR application after the Lindsey Street Corridor Project is completed. Based on the preliminary results from the Meshek model, it is expected that the final 100 year floodplain boundaries will be smaller than the current corrected models of Leidos and PBS&J. This will lessen the impact of the corrected floodplain on the surrounding properties.

FEMA requires that a Letter of Map Revision (LOMR) be submitted to correct errors found in the published floodplain maps or BFE data. FEMA also requires that projects that change floodplain maps or BFE data be submitted to FEMA to obtain a LOMR. Staff recommends that upon completion of the current improvements in the Imhoff Creek floodplain, a single LOMR application be submitted to FEMA to correct errors in the entire Imhoff Creek floodplain maps and BFE data. Three other Imhoff Creek projects are currently under consideration by the City of Norman; one in Andrews Park adjacent to the new Central Library, one to repair the channel liner south of Lindsey Street that was damaged in the May 2015 floods and the other project near Imhoff Road where

major erosion has taken place. By including Imhoff Creek Bridge and other projects in the single LOMR application, the City will reduce expenses incurred by doing multiple LOMRs. By doing a single LOMR, property owners affected by changes in floodplain boundaries or BFEs will be notified once thus avoiding multiple notifications to the same property owners and creating confusion. Perhaps most importantly, the resulting corrected FEMA floodplain maps for Imhoff Creek will be more accurate and comprehensive than the current maps.

Applicable Or	dinance Sections:	Subject Area:
429.1	4(b)(1)(b)(c)	Fill restrictions in the floodplain
	4(b)(17)(iii)	City Council Approval of stream
		bank or flow line modifications
	5(a)(viii)	No rise considerations

4(b)(1)(b)(c) Fill Restrictions in the Floodplain – The use of fill is restricted in the floodplain because storage capacity is removed, natural drainage patterns are adversely altered and erosion problems can develop. However Sections (b) and (c) allow fill for the construction or repair of public roads and bridges, and river or stream bank stabilization or reinforcement projects. According to the new bridge and channel plans, more material is being removed from the floodplain than is being brought in; therefore additional compensatory storage is not required. In this case fill is considered concrete, concrete blocks and earth.

4(b)(17)(iii) The following floodplain modifications require approval by City Council – Any modifications of the stream banks or flow line within the area that would be regulatory floodway whether that channel has a regulatory floodplain, unless the work is being done by the City of Norman staff as part of a routine maintenance activity.

This project is not considered routine maintenance. Channel improvements are proposed for a distance of approximately 100' upstream and 500' downstream of the proposed structure. The improved channel will have a 38-foot concrete bottom with 1:1 concrete side slopes extending 3 feet up the banks. The remainder of the banks will be either grass or grass paver blocks on a 3:1 slope, tying back into natural ground. The Engineer determined and Staff concurred that concrete is the best material to use as channel liner material due to hydraulic considerations in keeping the proposed 100 year water surface elevation at or below the current BFE.

5(a)(viii) No Rise Considerations – For proposed development within any flood hazard area (except for those designated as regulatory floodways), certification that a rise of no more than 0.05 ft. will occur in the BFE on any adjacent property as a result of the proposed work. The applicant's engineer has certified that the project will not cause a rise in the corrected BFE (WSE) based upon the best available data, which meets the City's ordinance requirements.

**RECOMMENDATION:** Staff recommends Permit Application #558A be approved by the Norman Floodplain Permit Committee on the condition that the application must subsequently be considered by the City Council due to proposed changes to the Imhoff

Creek stream banks. If approved, Council will consider the application on Tuesday, February 23, 2016.

## ACTION TAKEN: \_\_\_\_\_