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June 17, 2022

Mayor Weiss  
**City of Shaker Heights**  
3400 Lee Road  
Shaker Heights, OH 44120

Re: City of Shaker Heights Response Letter  
**Horseshoe Lake Dam**  
Cities of Shaker Heights and Cleveland Heights, Ohio

Dear Mayor Weiss:

This letter is in follow up to your questions regarding FOHSL's proposed plan to save Horseshoe Lake. As you know, FOHSL's proposed plan being developed by TRC is to construct a new dam immediately upstream of the existing historical dam. The historical stone spillway outlet will remain. The top of the new principal spillway riser will be lowered to provide additional flood storage and an option of a multi-stage spillway system is being evaluated to provide additional flood storage control. The lake will be dredged to the approximate depth of the original streambed and its footprint marginally smaller than its existing footprint, but a large portion of the lake surface area would remain. The design will use as much of the dredged materials on site as feasible to reduce the cost of removing dredge material from the site. This is also a more environmentally sound method to address re-use of dredge material in proximity to the Shaker Lakes. As part of the project, TRC is also evaluating opportunities for the beneficial use of the dredged material that cannot be incorporated into the design in other local construction projects. These proposed activities, along with installation of an emergency spillway, will be constructed to bring the dam back into ODNR Dam Safety compliance.

A narrative and summary table that compares NEORSD's preferred plan with the TRC's proposed FOHSL plan related to safety, flood control/stormwater management, cost and the environment is set forth below. Furthermore, it should be noted that TRC's FOHSL plan also addresses community and resident concerns related to aesthetics, community amenities and historic preservation. It is the opinion of FOHSL that these are all areas of concern that are not being fully addressed by the NEORSD's preferred plan. It is our understanding that NEORSD's position that these areas are not within the mandates of the program and would require outside funding sources to address. We believe the FOHSL's concerns are complimentary to NEORSD's focus and can be addressed simultaneously to achieve a balanced project for the both the District, the communities and the residents.

Item	NEORS D Preferred Plan	FOHSL Plan
<b>Safety</b>	N/A	Complies with ODNR Dam Safety Regulations
<b>Storm Design Criteria</b>	25- and 100-year Storm Events	Probable Maximum Flood and 100-year Storm Event
<b>Increase in Active Flood Storage Zone</b>	0 gallons	~15 MG if spillway lowered 2 ft
<b>Decrease in Flow Rates</b>	N/A	20%
<b>Dredged Material Management</b>	Off-site disposal of 71,400 CY (portion of sediment removed)	Beneficially use 135,000 CY on-site and local construction projects (sediment removed to original streambed)
<b>Dredging Management Costs</b>	\$12.8M (if dam reconstructed)	\$4-6M
<b>Preliminary Construction Costs</b>	\$28.3M	\$26.5M
<b>Emergency Spillway Cost</b>	\$1.9M (if dam reconstructed)	\$1M (if dam reclassified)
<b>ODNR Dam Classification</b>	Class I (if dam reconstructed)	Class II or III (pending ODNR concurrence)

### Flood Control/Stormwater Management

TRC’s preliminary hydrological modeling does not support the opinion that the presence of Horseshoe Lake caused flooding in University Circle. Based on evaluations completed by others, previous flooding was likely caused by the undersized culvert pipe near University Circle and debris that was restricting flow, which has since been removed.

NEORS D’s plan asserts that it will improve the downstream flooding in University Circle. However, based on H&H modeling completed by NEORS D’s consultant (as reported on Page 12 of the Shaker Lakes Alternatives Review and Preferred Alternative Demonstration, prepared by Wade Trim, dated Sept 2021) the Doan Brook culvert is currently sized to only handle a 10-year storm event and a 100-year storm could result in over 5 feet of flood depths within University Circle. Table 2-1 (page 15) of the Report also indicates that the total number of inundated buildings and impassable transportation assets, reported as 27, would be the same for a 100-year storm event for Alternative 2 (NEORS D’s preferred alternative where Horseshoe Lake Dam would be removed) and Alternative 4 (Horseshoe Lake Dam would remain and be reconstructed, similar to FOHSL’s design alternative). This does not suggest the presence of Horseshoe Lake Dam is causing a significant increase in flooding in University Circle.

Historically, the concern for the potential loss of life downstream was as a result of the poor conditions of both Lower Lake Dam and Horseshoe Lake Dam in the event that the dam(s) failed, not due to the hydrologic capacity of Horseshoe Lake Dam during normal operations.

Based on TRC’s preliminary hydrologic modeling, flow rates from the dam can be reduced by 20% and increase the active flood storage zone by approximately 15 MG by lowering the spillway at least two feet as proposed by FOHSL’s design alternative. This is anticipated to provide some

flood relief at University Circle. TRC is currently performing hydraulic modeling to estimate flood depths, the limits of the flooding, and flow velocities for FOHSL's design.

It is anticipated that FOHSL's plan will provide a flood control benefit as it will increase the active flood storage zone by lowering the principal spillway vertical pipe. FOHSL's design will need to consider ODNR's dam safety regulations, which require dam spillway systems to handle the Probable Maximum Flood (PMF) for Class I dams. The PMF is the theoretically largest flood resulting from a combination of the most severe meteorological and hydrologic conditions that could conceivably occur in a given area.

## **Costs**

FOSHSL's plan costs is expected to be millions less than the costs established in Wade Trim's report for repairing or replacing both dams. By not disposing all of the dredging material offsite and by including a more appropriate cost of dredging of between \$30-50 a cubic yard (based upon contractor pricing) instead of approximately \$100 a cubic yard for total dredging costs, the dredging costs can be reduced from \$12.8 million, as determined in Wade Trim's report, to approximately \$4-6 million.

As part of the FOSHSL's approach, TRC would attempt to reclassify the dam from a Class I structure per ODNR Dam Safety regulations. Based on preliminary discussions with ODNR, reclassification to a lower class could be possible provided Lower Lake Dam is reconstructed and is also brought back into dam compliance and H&H models demonstrate loss of life is no longer probable at University Circle as a result of a sudden failure of Horseshoe Lake Dam. ODNR has allowed dams to be reclassified from a Class I status, this includes a couple dams that are currently being analyzed by ODNR from Class I to a lower classification. Consequently, reclassification of a new dam while preserving the historic dam and lake will also reduce the cost of the necessary emergency spillway as the size of the spillway can be smaller for lower class dams.

NEORSD preliminary cost estimate for their preferred alternate is \$28.3 million, of which \$14.7 million is the cost estimate for the removal of Horseshoe Lake dam and \$13.6 million is the cost estimate to reconstruct Lower Lake dam. The cost estimate to solely reconstruct Horseshoe Lake dam is \$20.7 million, which includes \$12.8 million for dredged material management. To repair both dams, NEORSD estimated a cost of \$34.3. TRC estimated that FOHSL's alternate could result in cost savings of approximately \$8 million dollars. This brings the reconstruction of Lower Lake dam and the replacement of Horseshoe Lake dam to \$26.5 million. It should be noted that the construction costs presented by NEORSD and TRC are very preliminary and will need to be refined as the design progresses.

## **Ecological Habitat**

NEORSD removal of the dam may have an adverse impact on the existing ecological habitat. Due to the area being highly urbanized, Horseshoe Lake is a popular area for water bird migration. FOHSL's plan will continue to support the migratory bird population. The FOSHLS's plan can also incorporate components into the design, such as substrate (rock and vegetation), into the adjacent feeder streams, that will support fish habitat, along with possibly exposing and returning any natural springs, there were historically present in the area.

If you should have any further questions, please feel free to contact the undersigned directly at (440) 823-3910 or [SMcgee@TRCcompanies.com](mailto:SMcgee@TRCcompanies.com). FOHSL looks forward to sharing this information with your City Council in the near future.

Very truly yours,

TRC Engineers, Inc.



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cc. Jennifer Voelker  
Ilana Horowitz Ratner  
David Goldberg  
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