

TO: The Board of Public Works

FROM: Greg Fries, Deputy City Engineer

RE: Requested design summary for Blackhawk Ave storm sewer design criteria

### Background

City Engineering staff have reviewed the drainage situation at/near the intersection Bluff Street and Blackhawk Avenue. The area draining to this intersection consists of approximately 36 acres of residential and park land. The current drainage system design, which was put in place during the initial development of this area circa 1950, consists of a relatively small (24" clay pipe) draining through side and back yards of private property. This pipe runs mid-block from Blackhawk to N. Owen, to N. Hillside, N. Meadow discharging to a box culvert system in Midvale Blvd. Blackhawk Ave and each of the subsequent roads being crossed has a low point in the middle of the block with no safe surface water overflow. The term used for this type of design is an "enclosed depression". As mentioned this situation exists in each block served by this storm sewer system and a storm exceeding the design capacity of the pipe/inlets results in private property flooding.

Current standards call for these types of enclosed depressions to be designed such that they are able to sustain the 100-year design event without significant flooding of private property. Currently, the 24" pipe serving this area has a capacity of approximately 25 cubic feet per second (CFS). The recently updated 100-year design event referenced above creates a system demand of approximately 120 CFS. The existing pipe system has approximately the capacity to convey a 2-year design storm.

### Proposed design

It is City Engineering's intention to install a new 48" pipe from the intersection of Bluff & Blackhawk north to University Ave. This new pipe will have a design capacity of approximately 121 CFS. This new pipe will only serve the enclosed depression at Bluff and Blackhawk, a separate and parallel pipe system will replace the existing storm system on Blackhawk from N Owen to University Avenue. These separate pipe systems are being installed such that street drainage further from areas further to the north of the Bluff/Blackhawk intersection do not use the capacity of the new 48" pipe, reducing the capacity available at the critical intersection/enclosed depression. Note: The areas drained by this separate system do not include enclosed depressions and safely overflow toward University Avenue.

The new 48" pipe being dedicated to the enclosed depression area at Bluff and Blackhawk cannot be connected to the storm sewer system in University Ave at this time. This connection cannot be made currently, as the existing system on University Ave does not have sufficient capacity to handle additional flow without flooding of private structures along University Avenue.

The storm sewer system in University Avenue from Shorewood Blvd to Grand Ave, the last segment requiring upgrades, is currently scheduled for a capacity upgrade with the University Ave project in 2022. The connection to the University Avenue system at Blackhawk would be

made once the upgrades to the storm system in University Avenue referenced above are completed.

To take advantage of the new storm sewer system in University Avenue and in Blackhawk Ave, the inlets at Bluff and Blackhawk must be substantially upgraded. Those upgrades would have to occur with a reconstruction of Blackhawk from the Southern limits of this year's project to the Southern end of Blackhawk Ave. This would be completed at some time after the University Avenue reconstruction (as noted above this is currently scheduled for 2022).

#### End Product

Upon completion of all the work mentioned above (likely 2023 or later) the design numbers indicate that the Blackhawk/Bluff area should be protected to the 100-year standard. Caution is indicated in that assumption. The new storm sewer pipe being proposed for University Avenue will only bring that system up to approximately the 10-year design standard (from the current 2-year) as a result, Blackhawk/Bluff will likely not operate as idealized in a limited hydraulic model.

Regardless of that limitation, the pipes in University are being upgraded as much as is physically possible and the pipe in Blackhawk is being designed to the current design standard so we are following best practices.