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Matthew Fountain
Director, Department of Stormwater Management
City of Charleston
2 George Street, Suite 2100
Charleston, South Carolina 29401
E-mail: Fountainm@charleston-sc.gov

Dear Matt,

Thank you again for your offer to respond to engineering questions as they arise.

I am writing to follow-up on my questions from September 17, 2020, regarding the sealed 42" stormwater outfall pipe at EME Apartments.

To recap, my previous memo raised questions regarding the e-mail that you sent on April 28, 2020, to 30 residents, consultants, attorneys, and city, county and state staff and elected officials. I understand that the purpose of the e-mail was to explain why the City of Charleston does not wish to unseal the 42" stormwater outfall pipe at the EME Apartments.

This is the passage from your e-mail that was confusing to me:

"The EME Apartment access road cross pipe has been a major area of questions in this email thread. We did review the current condition of that system as part of our work. The drainage box in the location of number 4 (see photo below) does have 2 pipes (a 42" diameter pipe, and a 48" diameter pipe) that leave the box to go under EME's Access Driveway. On the outfall side at the location of number 5, only the 48" diameter pipe is currently present. It does look like the 42" pipe was actually sealed shut a number of years ago rather than it being clogged.

As a result we reviewed the stormwater models that have been run recently for this area including the work by AECOM for the City on evaluating drainage improvement projects. The models have been using the single 48" pipe for the existing drainage condition based on the currently present condition.

We did have AECOM evaluate upsizing or reconstructing this pipe in our current model to determine if it has any benefit on reducing flooding. The drainage model shows that there are a number of upstream constrictions that also need to be improved before upsizing this pipe would reduce flooding in the area. For example, the pipes under Central Park Road are a 42" pipe

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and a 36" pipe, and between Central Park and this drainage box are another pair of 42" pipes, all of which already have less capacity than this downstream 48" pipe."

In my September 17 memo I used the Chézy Equation for gravity-driven flow to show that two parallel 36" and 42" pipes have the same flow capacity as a single pipe with diameter 51.7". Moreover, two parallel 42" pipes have the same flow capacity as a single pipe with diameter 55.4." In other words, both sets of parallel pipes have greater flow capacity than the single, unsealed 48" pipe at EME Apartments.

On the above basis, it seemed that the constriction is not upstream. The constriction is at the drainage box at the EME Apartments.

After I wrote the September 17 memo, Jimmy Maczyk brought to my attention the existence of additional 18" and 36" pipes that convey stormwater to the same drainage box. These pipes are discussed in the following videos:

https://youtu.be/05YSPrthJPE

https://youtu.be/x3yhZwZFFkM

In summary, it appears as if the drainage box at EME Apartments is fed by a 42" pipe, two 36" pipes, and an 18" pipe. Just like in the last memo, the Chézy Equation can be used to show that the above set of four parallel pipes has the same flow capacity as a single 60" pipe. That greatly exceeds the flow capacity of the single unsealed 48" pipe that conveys stormwater out of the drainage box.

On the other hand, if the 42" outfall pipe were unsealed, the combination of the 42" pipe and the 48" pipe would have the same flow capacity as a single 60" stormwater outfall pipe.

I do not think it is a coincidence that the inflow capacity (equivalent to a 60" pipe) would be exactly equal to the outflow capacity (equivalent to a 60" pipe) if the 42" outfall pipe were unsealed. These pipe diameters seem to have been deliberately chosen so as to balance the inflow and outflow capacity at the drainage box at EME Apartments.

On the above basis, I am even more confused as to why the City of Charleston does not wish to unseal the 42" stormwater outfall pipe.

If I have made some mistake, I would be grateful if you could let me know. Otherwise, I would be grateful if you could explain further why the City does not to wish to unseal the 42" stormwater outfall pipe at the EME Apartments.

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I thank you very much for your attention to this matter and look forward to hearing from you.

Best wishes,

Steven H. Emerman