Post Flood Alternatives
for
Mosquito Flats

(an entirely amateur perspective)

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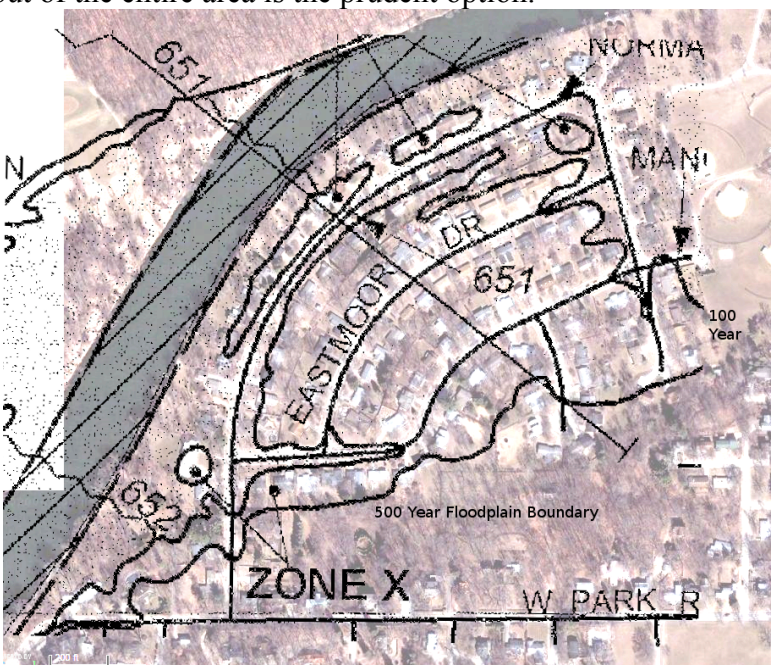
The flood of 2008 showed a number of problems in Mosquito Flats:

- As developed, this is a single-exit neighborhood. This never should have been allowed, and it was clearly a problem, both in the evacuation of the neighborhood and in the cleanup, when the Normandy – Park Road intersection approached gridlock.
- The storm drains serving Mosquito flats are very difficult to sandbag, and once sandbagged, they are very difficult to re-open.
- The low spot at the west intersection of Normandy and Manor was a serious bottleneck for emergency vehicle access during the evacuation and during the recovery. Elevating this would improve safety in the neighborhood during high water.
- With two serious floods in 15 years, and one failed attempt at building an emergency levee, it is worth investigating the construction of a permanent levee. As we will see, this can be combined with a second exit to the neighborhood and the elevation of Normandy Drive.

Solutions to each of these problems should be investigated as part of any plan for the reconstruction of the neighborhood. Should the aggregate cost of the best options exceed the value of the property protected, then a buyout of the entire area is the prudent option.



Mosquito Flats, composite of FEMA flood map and Google Earth imagery.

Adding a Second Exit

There are at least three options for adding a second exit to the Mosquito Flats neighborhood, as illustrated on the following page.

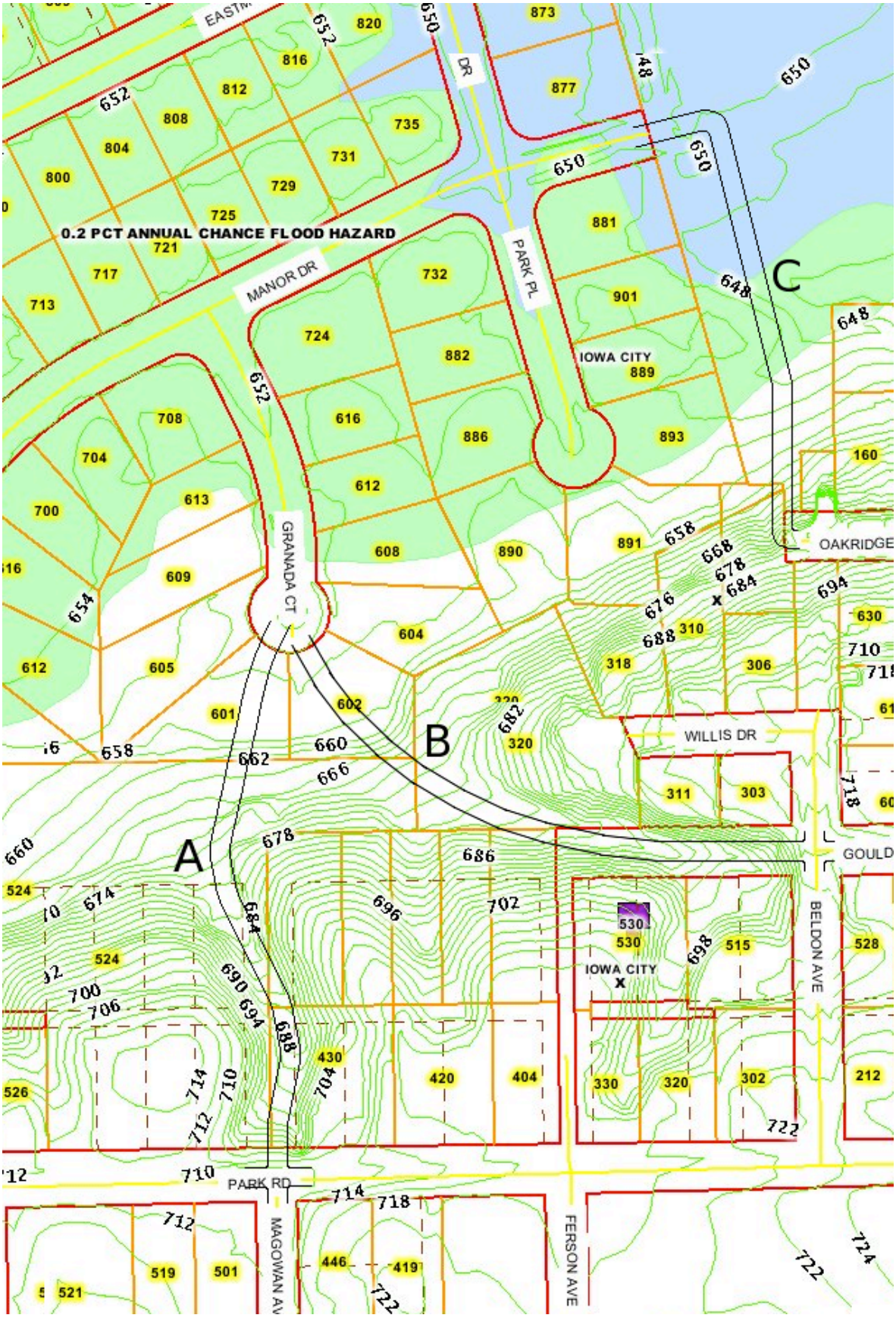
A) Granada Court to Magowan Avenue. Old timers report that the city originally asked for something like this second exit route when Mosquito Flats was originally developed. There is currently a gravel driveway along most of this route, and it has been heavily used during both the 1993 and 2008 floods. Opening this route as a permanent second exit to the neighborhood would pose the fewest civil engineering problems, but it would probably require a buy-out or condemnation of 601 Magowan Avenue to gain access to the Magowan cul de sac. Opening this exit would allow infill development of platted lots that currently have no road access.

B) Granada Court to Gould Street. As with alternative A, this follows an existing ravine in order to minimize civil engineering problems. As with alternative A, this would allow infill development of back lots that currently have no street access. Considerable fill would be required at the head of the Gould Street ravine, but a considerable part of this ravine is already a city right-of-way, so less land would need to be acquired. This route would probably require a buy-out or condemnation of 602 Granada.

C) Manor Drive to Oakridge. This route would largely pass through the southwest corner of City Park, requiring minimal land acquisition and no removal of existing dwellings. This route could be integrated with additional parking for the baseball fields in City Park. The fill requirements to climb the last 15 feet to Oakridge would be significant, but adding fill along the lower part of this route could make this road into a levee protecting the City Park sewage lift station. Note that the existing emergency levee constructed during the 2008 flood partially follows approximately this alignment.

Alternative A would encourage traffic to use this route to access Mosquito Flats, while alternatives B and C, because they do not connect directly to Park Road, would probably attract less traffic.

The possibility of integrating alternative C with permanent levee structures protecting Mosquito Flats might make it easier to obtain partial funding for this alternative from flood recovery grant money.



Alternative exit routes for Mosquito Flats. Base map from Johnson County GIS Online, with 2006 topography and FEMA layers included.

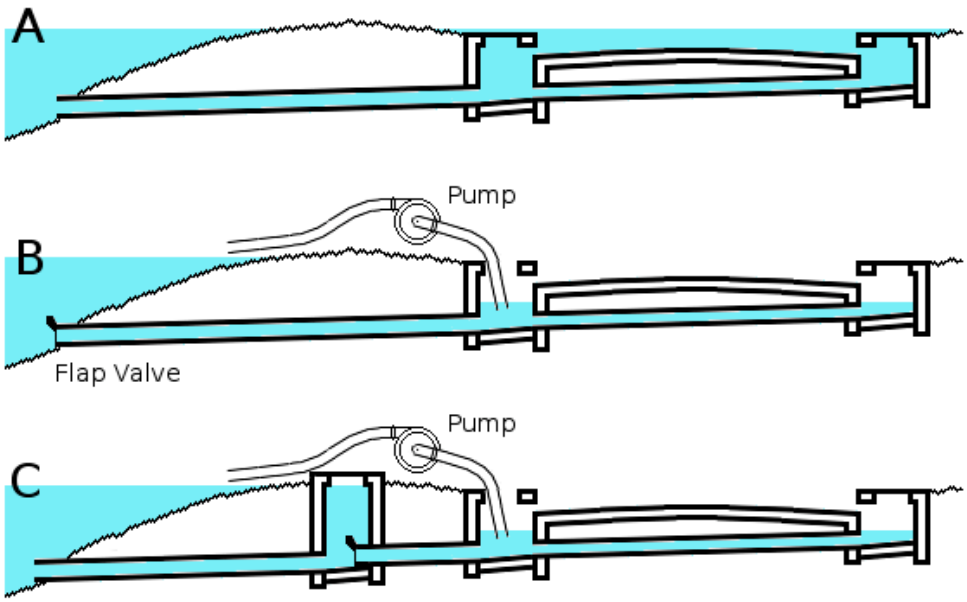
Storm Drains

The FEMA 100 year flood level is 652 feet at 820 Park Road and 651 at 801 Normandy. As a result, floodwater has entered the neighborhood through the drain between 601 and 609 Normandy. In that vicinity, the street elevation is 648 feet, over 3 feet under the local 100-year flood level. During flood, the water level in this area is controlled, to a significant extent, by the rise in the street at 721 Normandy, where the elevation is above 650 feet. During the flood of 1993, no effort was made to prevent backflow through these drains. In 2008, an ineffective attempt was made to sandbag the various storm drains serving the flats, although the initial efforts at this were done ineffectively, requiring emergency repair shortly before the river overtopped the sandbag levee. The upstream storm drain was then unplugged prematurely, allowing inflow comparable to that during 1993.

There are several options for improving storm drainage in the neighborhood.

A) Flap valves. The least expensive retrofit to the drainage system would be to add a flap valve at the outlet of each drain. This would prevent floodwater backflow and allow placement of a pump intake hose into the catch basin of the drain to pump the water level down below street level, greatly facilitating access. The problem with valves at the end of storm drains is that they are exposed to the river current and debris. One log floating down the river in the floodwater could dislodge the valve, leaving the neighborhood unprotected.

B) Better valves. At higher expense, a vault could be constructed, preferably at the highest point between the river and the street, to house a better backflow prevention valve. This would protect the valve from debris, at the cost of one vault per drain line.



Options for storm drain backflow prevention.

Levee and Floodway Alternatives

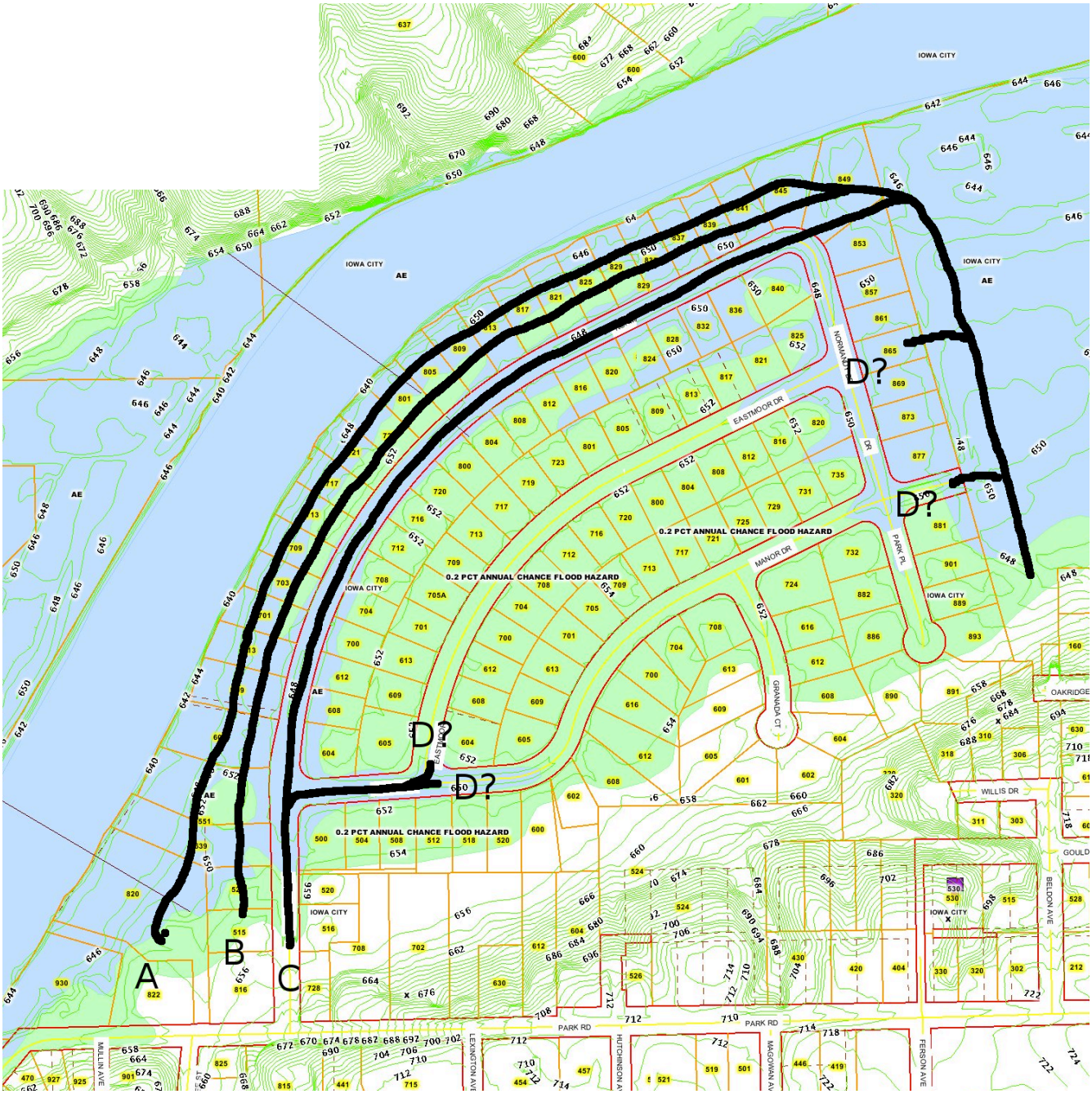
During the flood of 1993, the natural levee between Normandy Drive and the river would have provided significant protection if it had not been for the backflow through the storm drain between 601 and 609 Normandy. Only a small number of sandbags at a low areas sufficed to hold the level in the flooded streets significantly below river level. In 2008, the lessons of 1993 were taken to heart,. The storm drains were plugged and an organized attempt was made to reinforce the natural levee with sandbags. Unfortunately, the floodwaters overtopped this sandbag levee by well over a foot, filling the intersection of Normandy and Manor with over 5 feet of water at the flood's peak. Floodwaters in this intersection seriously hampered the evacuation of the neighborhood. This suggests that any attempt to improve the natural levee or build a new levee should include elevating Normandy Drive to at least 650 feet through this intersection. Beyond this, the following alternatives emerge:

A) Develop a permanent levee along the approximate line of the sandbag levee constructed in 2008, between the houses north and west of Normandy Drive and the river. This is a bad idea for numerous reasons: It minimizes floodway width, particularly between 809 and 829 Normandy, where the opposite riverbank is a rock cliff. Creating such a narrow floodway raises the water level upstream, certainly along Rocky Shore, and possibly as far upstream as the Coralville Strip. Any significant levee along this line would also detract from the value of riverfront homes by blocking river access and blocking the river view. Such a levee would be necessarily narrow and therefore vulnerable, but it would maximize development potential.

B) Develop a permanent levee along the crest of the natural levee between Normandy Drive and the river. This would require either demolition or elevation of all houses along the riverbank. Voluntary buyouts would not work well in this context, so eminent domain would almost certainly be involved. This option minimizes the volume of earth that must be moved, but it also leaves a the relatively narrow existing floodway.

C) Elevate Normandy Drive itself as the levee. This allows a broad levee, but it would leave a row of homes unprotected. Buyouts would have to be offered to these homes, although some homeowners would undoubtedly opt to elevate or otherwise floodproof their homes and continue to live outside of the levee. To the extent that homeowners opt for a buyout, this would greatly improve river access to those living in the interior of Mosquito Flats; furthermore, the natural levee in areas where homeowners accept a buyout could be mined for the fill required to raise Normandy, thereby widening the floodway. Even if the street were not raised to the level needed to withstand the level of the 2008 flood, the river-side sidewalk could be designed to serve as a foundation for a temporary sandbag levee far better (and lower) than the levee constructed in 2008. Elevating Normandy above the level of the homes immediately inland from the street would create drainage problems. Buyouts of these homes might be needed, and to the extent these homes are rebuilt, they should be elevated. A storm drain parallel to the street would be needed to drain the interior foot of the levee. The continuation of this levee into City Park would significantly improve the River Corridor Trail System.

D) Develop an inner line of defense, enlarging the area of the buyout in order to shorten and simplify the levee and further widen the floodway. For example, consider a levee along Eastmoor or Manor. Because of the shape of the neighborhood, these alternatives protect far less land while saving very little in the length of the levee that must be developed. They have lower benefit, aside from the widened floodway, at almost the same cost.



Alternative levee routes to protect Mosquito Flats. Base map from Johnson County GIS Online, with 2006 topography and FEMA layers included.

Conclusion

My personal recommendation is to consider the following alternatives:

- Alternative exit from the neighborhood through City Park up hill to Oakridge Street, plan C.
- Backflow prevention on storm drains using vaults set back from the riverbank, plan B.
- Elevating Normandy Drive as a levee to defend Mosquito Flats, plan C.

The city should, as soon as possible, come up with a cost estimate for this combination and a cost estimate for a buyout of the area of Mosquito Flats in the 500-year floodplain. If the flood protection system costs more than this buyout, the city should immediately proceed with developing a buyout plan for the entire 500-year floodplain (about 128 homes). If the flood protection plan costs less than a buyout of all homes in the 100-year flood plain (about 20 homes), then the city should plan on implementing it and homeowners should plan their reconstruction along these lines. If the flood protection plan is intermediate in cost between a buyout of just the homes in the 100-year flood plain and a buyout of those in the 500-year flood plain, then the decision becomes harder.

In any case, I strongly recommend that the city move forward on developing a buyout plan for the houses between Normandy and the river (about 25 homes). These houses cannot be reasonably protected by any neighborhood protection plan that does not unduly restrict the floodway and detract from the value of the houses. Note that the FEMA definiton of the floodway is given in terms of raising the level of the 100 year flood by no more than one foot. Development that raises the 100 year flood by one foot could potentially raise the 500 year flood by considerably more.

Additional Suggestions

The city and FEMA should reassess the climate data in order to recompute the peak flow rates used to derive the 100-year and 500-year floods. In the 50 years since the Coralville Dam was constructed, we have experienced two such floods. This makes me suspect that FEMA and the Corps of Engineers are not living in the same world.

Basements should be prohibited in the 500 year floodplain. Many homes in Mosquito Flats are appropriately built on slabs, but a surprising number of homes have full basements, even one that was constructed after the flood of 1993. Alternatively, basements constructed in the 500 year floodplain should be required to be specially reinforced and floodproofed in order to reduce the risk of foundation collapse.

North Dubuque Street and any other impediments to a flow of 12,000 cfs should be elevated. At the current elevation, the northbound lanes of Dubuque Street are only inches above the river level when the dam is releasing 10,000 cfs, while the southbound lanes can handle 12,000 cfs. In this flood, had the corps been able to routinely release 12,000 cfs during the normal spring flood, they would have been able to draw down the reservoir significantly during May, enough to have made a material difference in the peak flows of this flood, preventing many millions of dollars in damage.

When the time comes to replace or rebuild Park Road Bridge, increase the flood channel capacity and build a bridge that does not become a dam when the waters rise. Thin-deck design, fewer piers, lower approaches or a longer span would all have been helpful. As things stand, Park Road Bridge began to act as a dam when the flood waters reached the bridge beams, and the result was a sudden jump in the river level upstream, until the river overflowed Park Road west of the bridge.