



KANSAS

Nonstructural Assessment for KS' Little Apple



Project Description

- The City of Manhattan is located at confluence of the Kansas River and Big Blue River, and at the bottom of Wildcat Creek.
- 2011 flood events required emergency disaster services from USACE and FEMA.
- Project evaluates 50 structures for nonstructural measures
- Provides property owners identifying and prioritizing mitigation options.
- City planners receive benefit-cost analyses to share with individual home and business owners.

Flood Risk Reduction Outcomes

- Nonstructural assessment:
- Reduces/Manages Flood Risk – FRM outreach will utilize the nonstructural assessment results to provide details to structure owners for potential mitigation measures.
 - Reduces Future Expenditures - personal and public disaster services may be reduced through implementation of nonstructural mitigation measures (i.e. elevation, relocation, flood proofing)
 - Results in action by others - not only are the results of this project applicable to implementation within Manhattan, but the assessment template is transferable to similar at-risk communities.

Challenges Overcome / Continuing Challenges

- Community has 250 at risk structures, so the subset of 50 presents next steps
- Acceptance by public that Tuttle Creek Dam provides limited flood protection.
- Significant cost to do any nonstructural mitigation measure.
- Develop a mind-set that acknowledges flood risk and then takes actions to reduce the risk and increase resiliency and sustainability.

Partners and Project Cost

Agency	Investment
USACE	\$100k
Manhattan, KS	\$120k In-kind
HUD	\$8k In-kind
KS	\$4k In-kind
Other partners	In-kind efforts
TOTAL	\$232k

Successes/Best Practices

- Working with other federal partners and leverage past efforts for use in application to HUD National Disaster Resiliency Competition
- Advantages of reflecting a diverse set of measures in a floodplain management plan
- Use public meetings on floodplain map updates to raise awareness of nonstructural measures.
- Use diorama / models to increase understanding.

USACE Project Point of Contact

Brian Rast
Kansas City District

NONSTRUCTURAL ASSESSMENT FOR KANSAS' LITTLE APPLE

This map presents **benefit-cost ratios** for multiple frequencies at select points. Cost engineers and architects use the USACE "nServo" cost tool, specifically enabled by the National Flood Proofing Committee for elevating structures. This first iteration evaluates 50 structures. The next iteration of plan formulation will do the remaining 250 at risk structures.

THE NONSTRUCTURAL PLAN FORMULATION MAP

This approach is great during outreach and engages the public in the decision making process!



Benefit-cost ratios

Buyouts, Green Credit

- + 0.00 - 0.99
- + 0.99 - 2.00
- + 2.00 - 9.00

Buyouts

- × 0.00 - 0.99
- × 0.99 - 2.00
- × 2.00 - 9.00

Basement Fill

- 0.00 - 0.99
- 0.99 - 2.00
- 2.00 - 9.00

Elevate 4-feet

- ◇ 0.00 - 0.99
- ◇ 0.99 - 2.00
- ◇ 2.00 - 9.00

National Flood Hazard Layer (NFHL)

Flood Hazard Zones

- 1% Annual Chance Flood Hazard

What's What? The symbols tied to each structure vary, depending on which flood risk management measure and allows the map users to more quickly make decisions on next steps, and getting property owners on board with measures that have more strength in numbers.

A Map For First Looks. The menu of flood risk management measures displayed serves as the **first iteration in plan formulation**. A subset of structures can be done in the first benefit-cost analysis. Results for plans can be overlaid (three on this map) to build capacity with stakeholders for follow-up formulation. The map can be used with the public to improve how they understand opportunities, including the possibility of getting funding aid from partnering agencies.

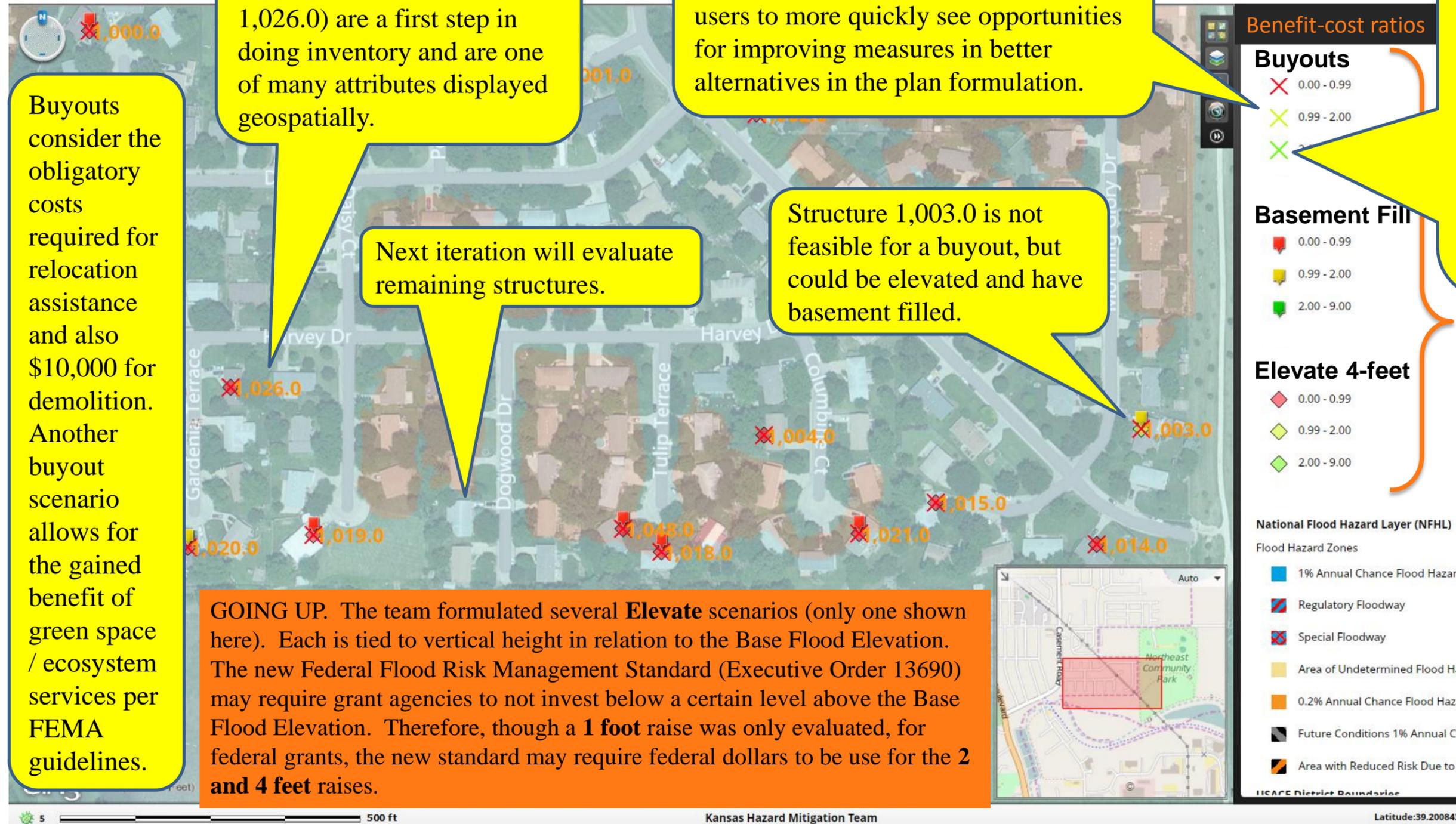
Going Up. The team formulated several **Elevate** scenarios (only one shown here). Each is tied to vertical height in relation to the new Base Flood Elevation (BFE). The new Federal Flood Risk Management Standard (Executive Order 13690) may require grant agencies to not invest below a certain level above the BFE. Therefore, though a **1 foot** raise was only evaluated, for federal grants, such as HUD's National Disaster Resiliency Competition, this may require federal dollars to be only for the **2 and 4 feet** raises.

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Buyouts consider the obligatory costs required for relocation assistance and also \$10,000 for demolition. Another buyout scenario allows for the gained benefit of green space / ecosystem services per FEMA guidelines.

TAKING STOCK. Structure identification number (ie. 1,026.0) are a first step in doing inventory and are one of many attributes displayed geospatially.

GREEN IS GOOD. The colors are setup in classes with ranges that allow users to more quickly see opportunities for improving measures in better alternatives in the plan formulation.

Next iteration will evaluate remaining structures.

Structure 1,003.0 is not feasible for a buyout, but could be elevated and have basement filled.

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WHAT'S WHAT? The symbols vary, using Xs, Diamonds, or Callout Squares to show the results and allows the map users to more quickly make decisions on next steps, and getting property owners on board with measures that have more strength in numbers.

A MAP FOR FIRST LOOKS. The menu of flood risk management measures displayed serves as the **first iteration in plan formulation.** A subset of structures can be done in the first benefit-cost analysis. Results for plans can be overlaid (**three** on this map) to build capacity with stakeholders for follow-up formulation. The map can be used with the public to improve how they understand opportunities, including the possibility of getting funding aid from partnering agencies.