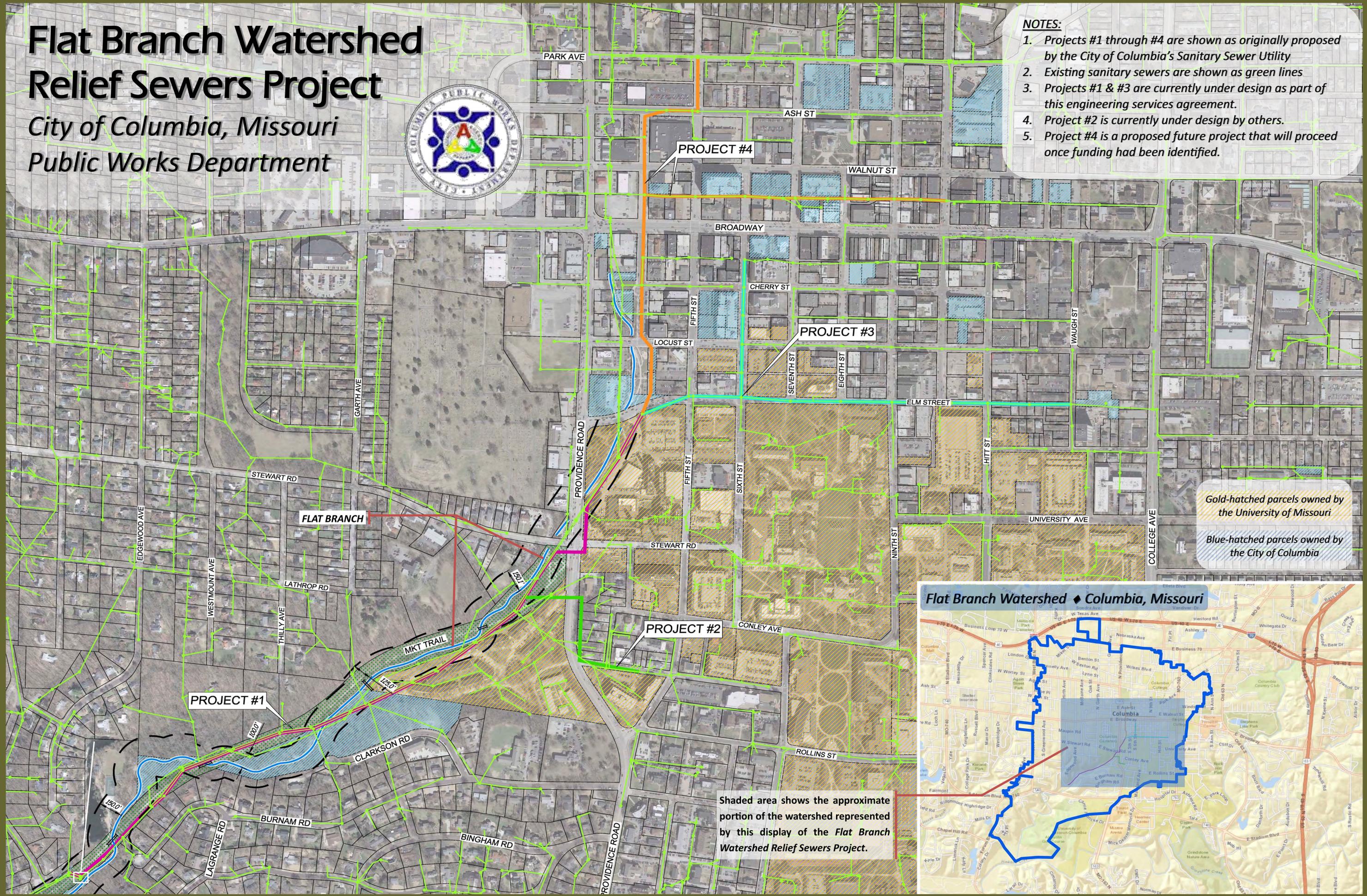


# Flat Branch Watershed Relief Sewers Project

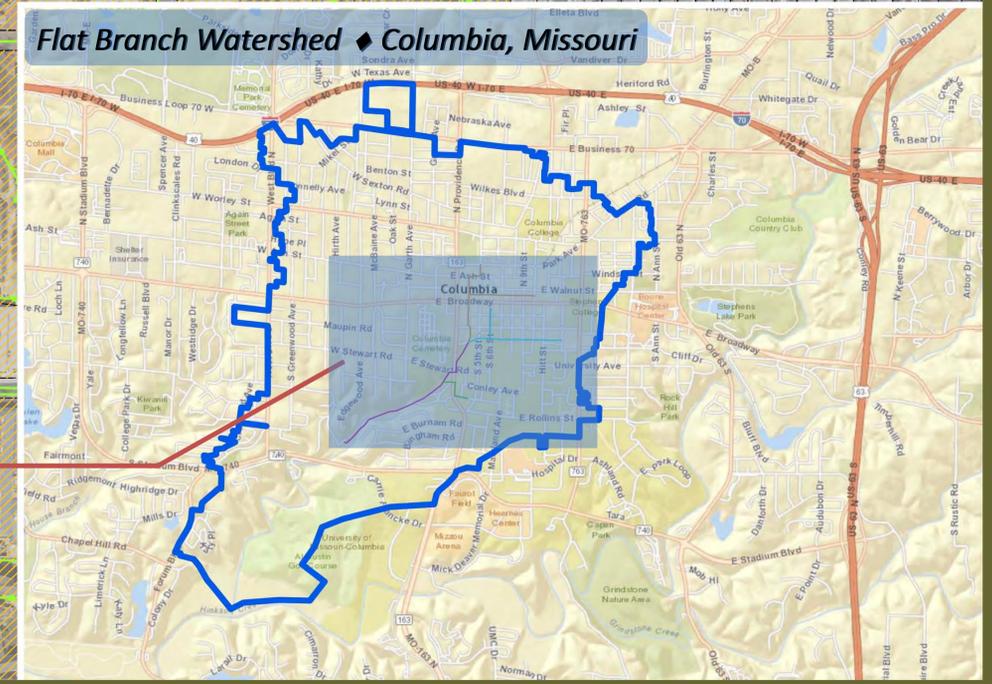
City of Columbia, Missouri  
Public Works Department



- NOTES:**
1. Projects #1 through #4 are shown as originally proposed by the City of Columbia's Sanitary Sewer Utility
  2. Existing sanitary sewers are shown as green lines
  3. Projects #1 & #3 are currently under design as part of this engineering services agreement.
  4. Project #2 is currently under design by others.
  5. Project #4 is a proposed future project that will proceed once funding had been identified.



Gold-hatched parcels owned by the University of Missouri  
Blue-hatched parcels owned by the City of Columbia



Shaded area shows the approximate portion of the watershed represented by this display of the Flat Branch Watershed Relief Sewers Project.

# Project Challenges & Opportunities

Here's what we know...what are we missing?



How can we avoid impacts to the MKT Trailhead?



Trail access interruptions—How can we minimize? How can we communicate & coordinate?

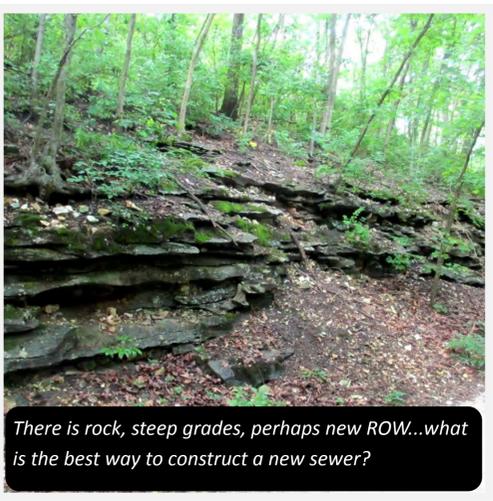
## Known Concerns



What can be done to protect the tree canopy and Flat Branch ecosystem?



Should we reduce the creek crossings with optional alignments?



There is rock, steep grades, perhaps new ROW...what is the best way to construct a new sewer?



Should we reduce the creek crossings with optional alignments?

- ◆ Avoid Trailhead Impacts
- ◆ Limiting Trail Access
- ◆ Impacts to Tree Canopy/Foliage
- ◆ Access for Materials & Equipment
- ◆ Creek Crossings
- ◆ Shallow Depths/Flat Slopes
- ◆ Installation Costs for Alt. Constr. Options
- ◆ Water Quality Protection
  - Flat Branch
  - Quarry Lake
- ◆ Coordinate with Project #2 for Providence Road Crossing
- ◆ Off-Season Construction
- ◆ Coordinate w/ Heavy Trail Users:
  - Neighborhood Associations
  - Parks and Recreation
  - University/CPS
  - PedNet, Columbia Multisport, etc.
- ◆ Optional Alignments & Construction Techniques
- ◆ Clearing of Nuisance & Invasive Vegetation

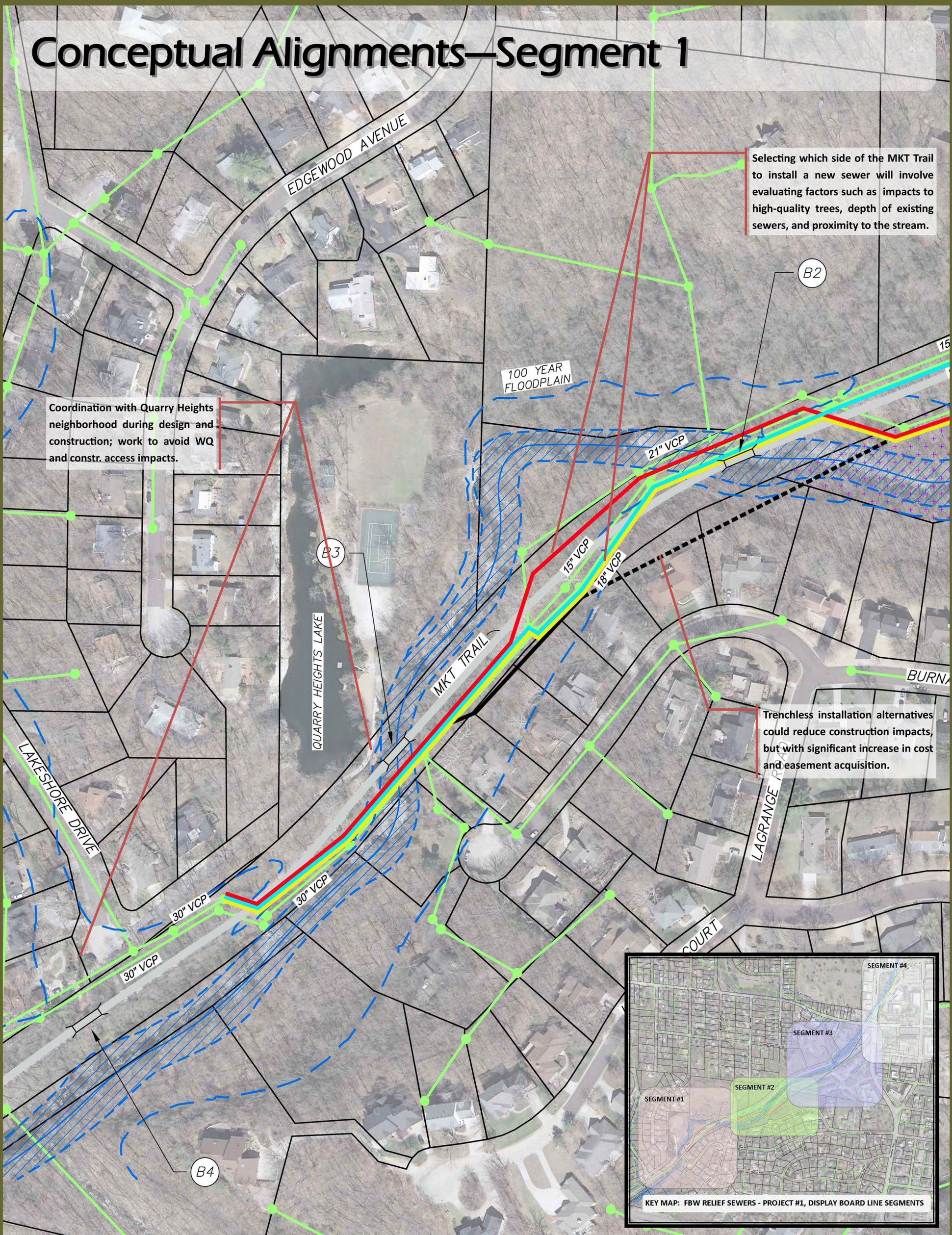
## Known Opportunities

# Flat Branch Watershed Relief Sewers

Project #1—MKT Trail Alignment



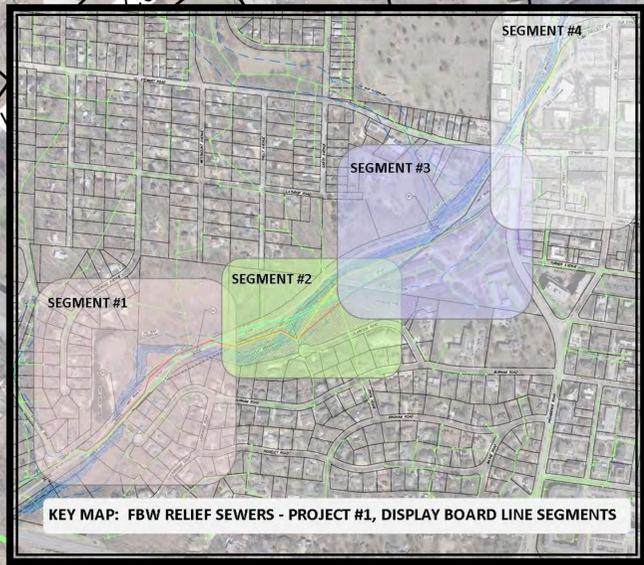
# Conceptual Alignments—Segment 1



Selecting which side of the MKT Trail to install a new sewer will involve evaluating factors such as impacts to high-quality trees, depth of existing sewers, and proximity to the stream.

Coordination with Quarry Heights neighborhood during design and construction; work to avoid WQ and constr. access impacts.

Trenchless installation alternatives could reduce construction impacts, but with significant increase in cost and easement acquisition.



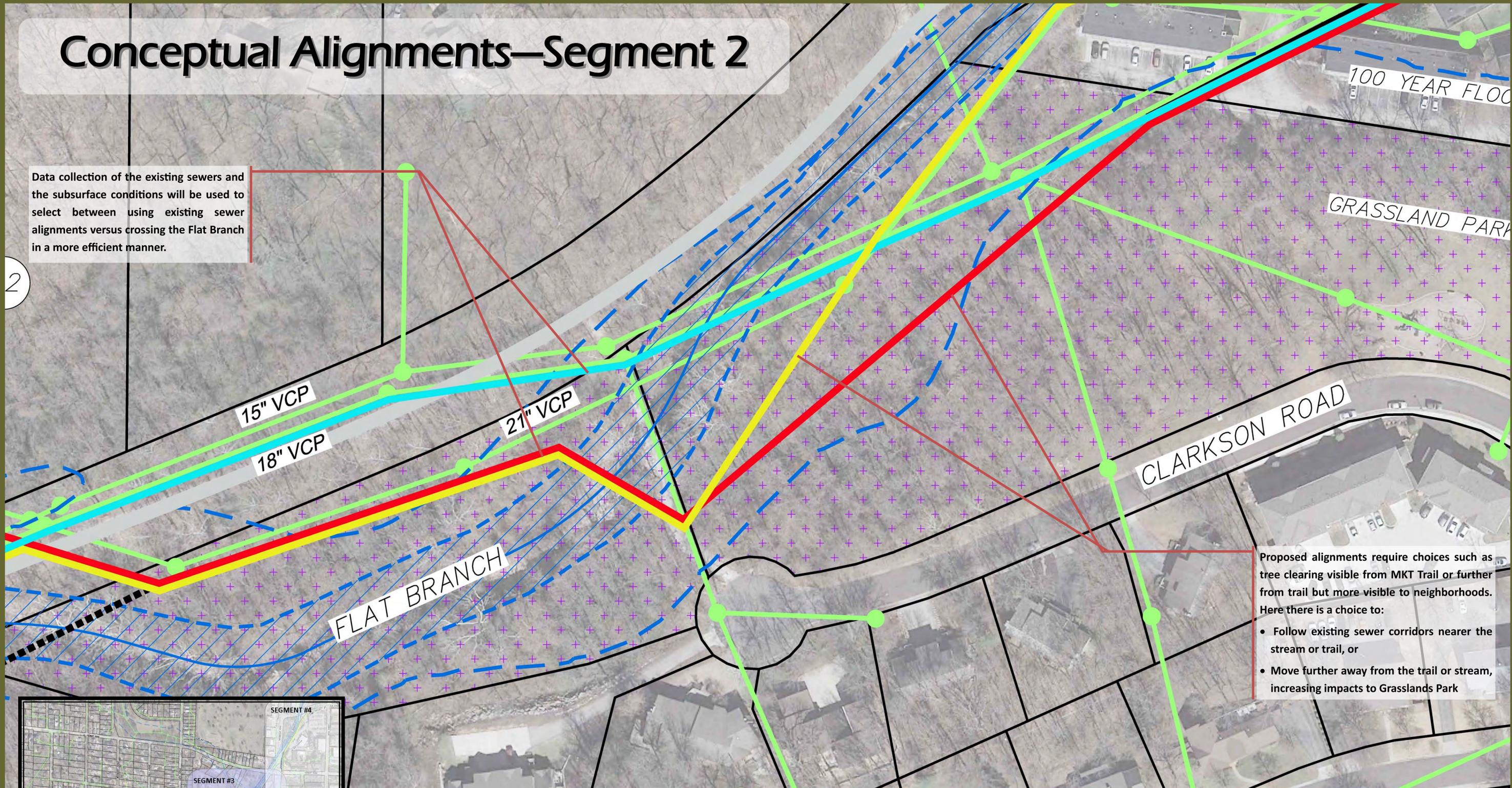
## Flat Branch Watershed Relief Sewers Project #1—MKT Trail Alignment



# Conceptual Alignments—Segment 2

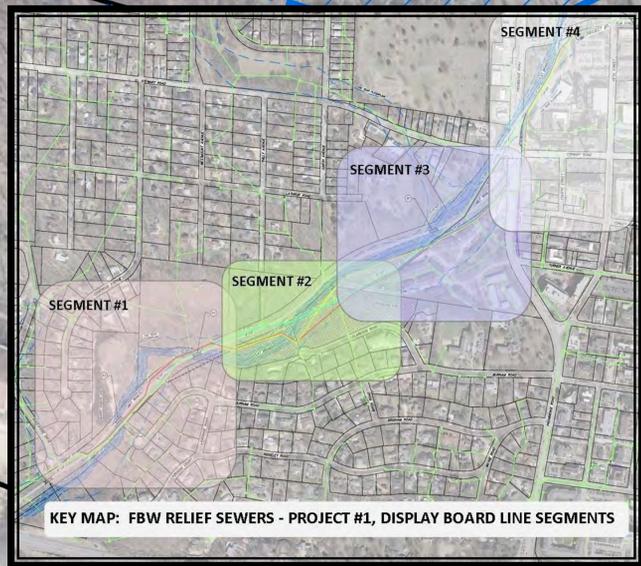
Data collection of the existing sewers and the subsurface conditions will be used to select between using existing sewer alignments versus crossing the Flat Branch in a more efficient manner.

2



Proposed alignments require choices such as tree clearing visible from MKT Trail or further from trail but more visible to neighborhoods. Here there is a choice to:

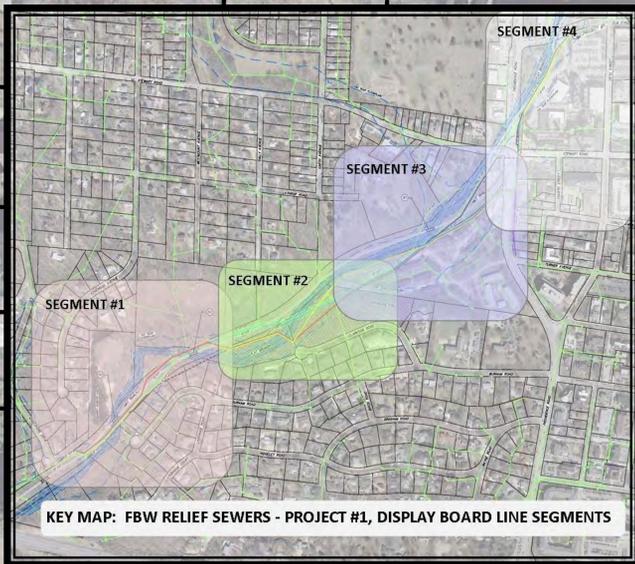
- Follow existing sewer corridors nearer the stream or trail, or
- Move further away from the trail or stream, increasing impacts to Grasslands Park



## Flat Branch Watershed Relief Sewers Project #1—MKT Trail Proposed Alignments



# Conceptual Alignments—Segment 3



Close coordination with the University of Missouri will be required to provide the most cost-effective and practical alignment on the former University Village parcel.

B1

18" VCP

15" VCP

18" VCP

18" VCP

MKT TRAIL

PROJECT #2

Combining the Providence Road crossing for Projects #1 & #2 is a key project goal, reducing installation costs and avoiding impacts to the MKT Trailhead.

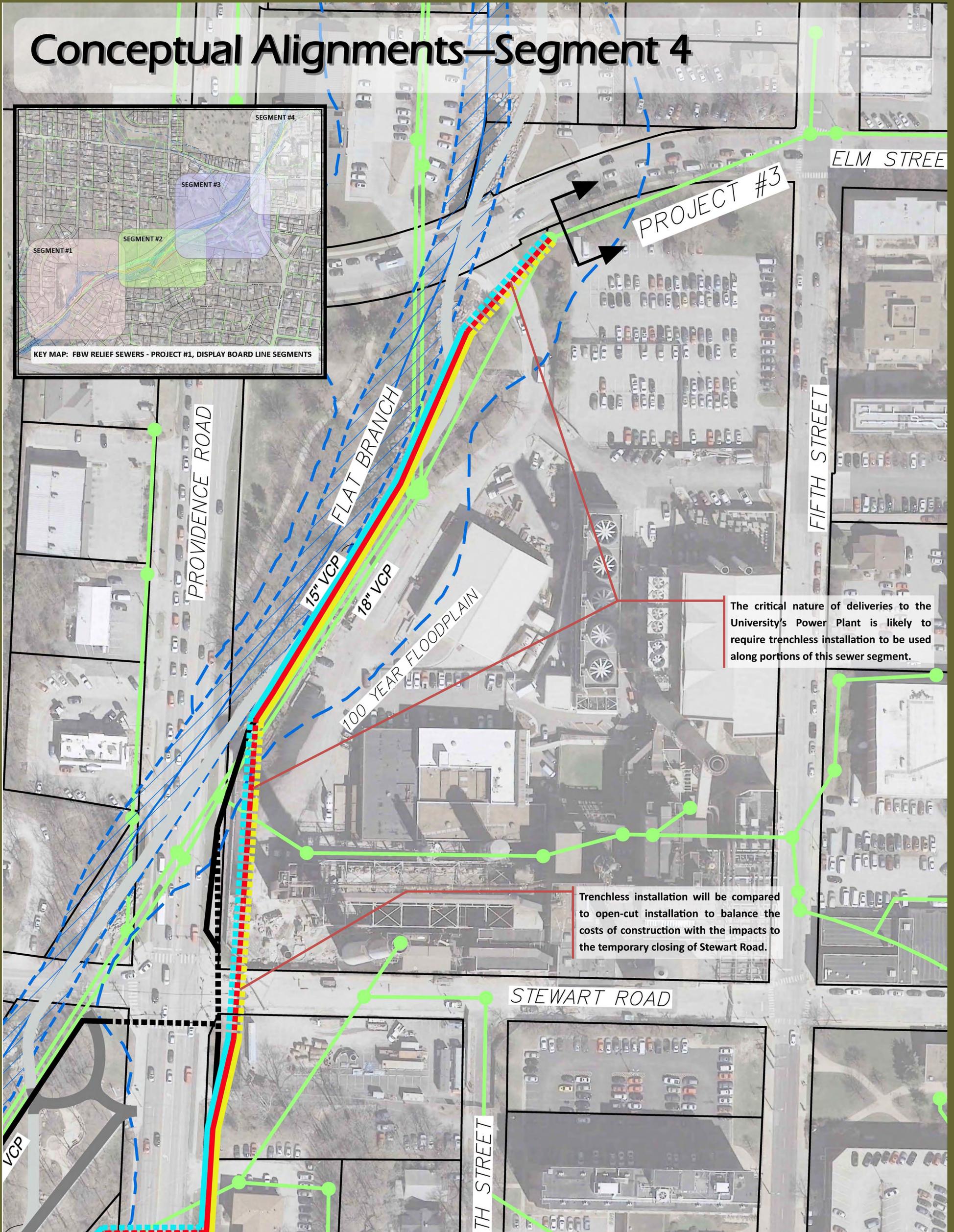
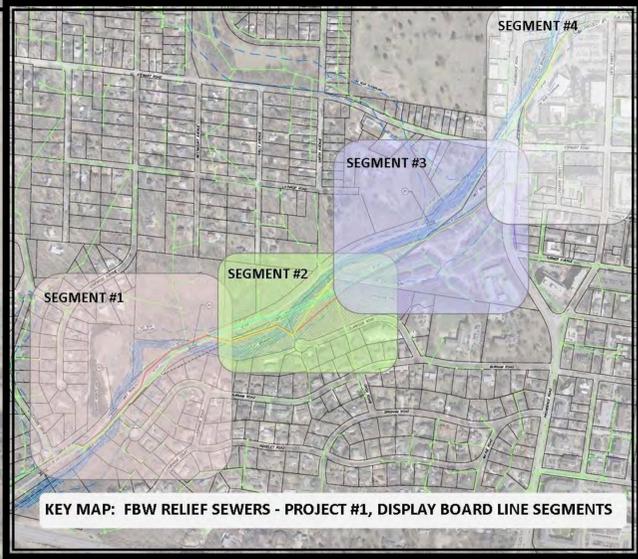
15" VCP

100 YEAR FLOODPL

## Flat Branch Watershed Relief Sewers Project #1—MKT Trail Proposed Alignments



# Conceptual Alignments—Segment 4



The critical nature of deliveries to the University's Power Plant is likely to require trenchless installation to be used along portions of this sewer segment.

Trenchless installation will be compared to open-cut installation to balance the costs of construction with the impacts to the temporary closing of Stewart Road.

## Flat Branch Watershed Relief Sewers Project #1—MKT Trail Proposed Alignments



# Minimizing Project Impacts

Measures we can take to avoid and reduce impacts along the corridor

## TREES/CANOPY

### AVOIDANCE:

- ◆ Use tree protection plan in evaluation of alignments
- ◆ Adjust manhole locations
- ◆ Physical barrier / bridge structure

### MITIGATION:

- ◆ Compressible material layering
- ◆ Root / Limb Pruning
- ◆ Not all trees are equal
- ◆ Trenchless construction



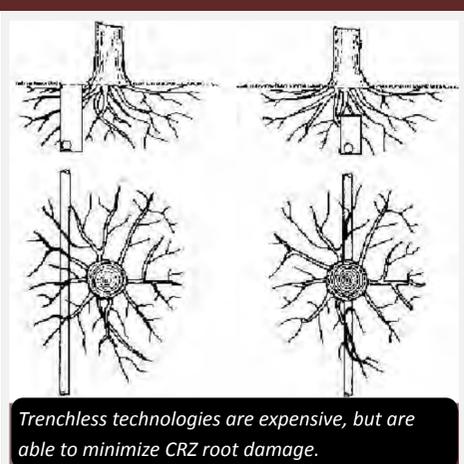
Tree protection plans support alignment selection.



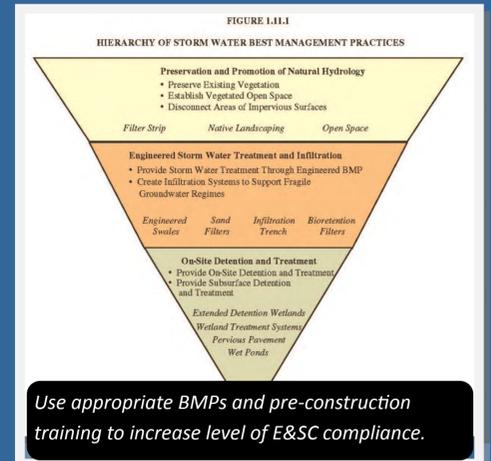
Fencing or other physical barriers can protect valuable trees near the project's clearing limits.



Root pruning limits damage to a tree's Critical Root Zone (CRZ).



Trenchless technologies are expensive, but are able to minimize CRZ root damage.



Maintaining a positive sediment barrier on access roads is crucial to avoid erosion from the site.

## WATER QUALITY

### AVOIDANCE

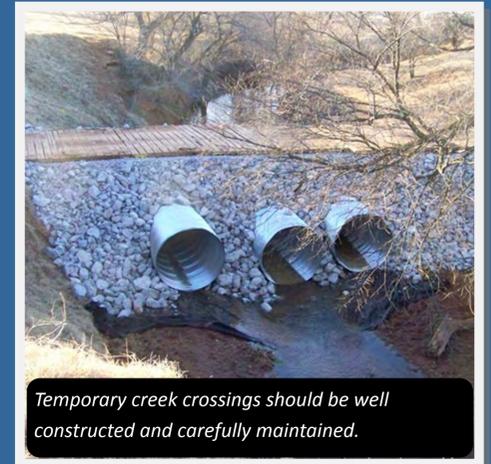
- ◆ Contractor training/SWPPP
- ◆ Alignment selection
  - Proximity to stream
  - Avoid stream crossings
- ◆ Prompt restoration

### MITIGATION:

- ◆ Inspect & maintain BMPs
- ◆ Optimize stream crossings
- ◆ Enforce good housekeeping
- ◆ Attention to residential & trail access points



Promptly restoring areas of excavation will greatly reduce erosion and off-site sediment loss.



Temporary creek crossings should be well constructed and carefully maintained.

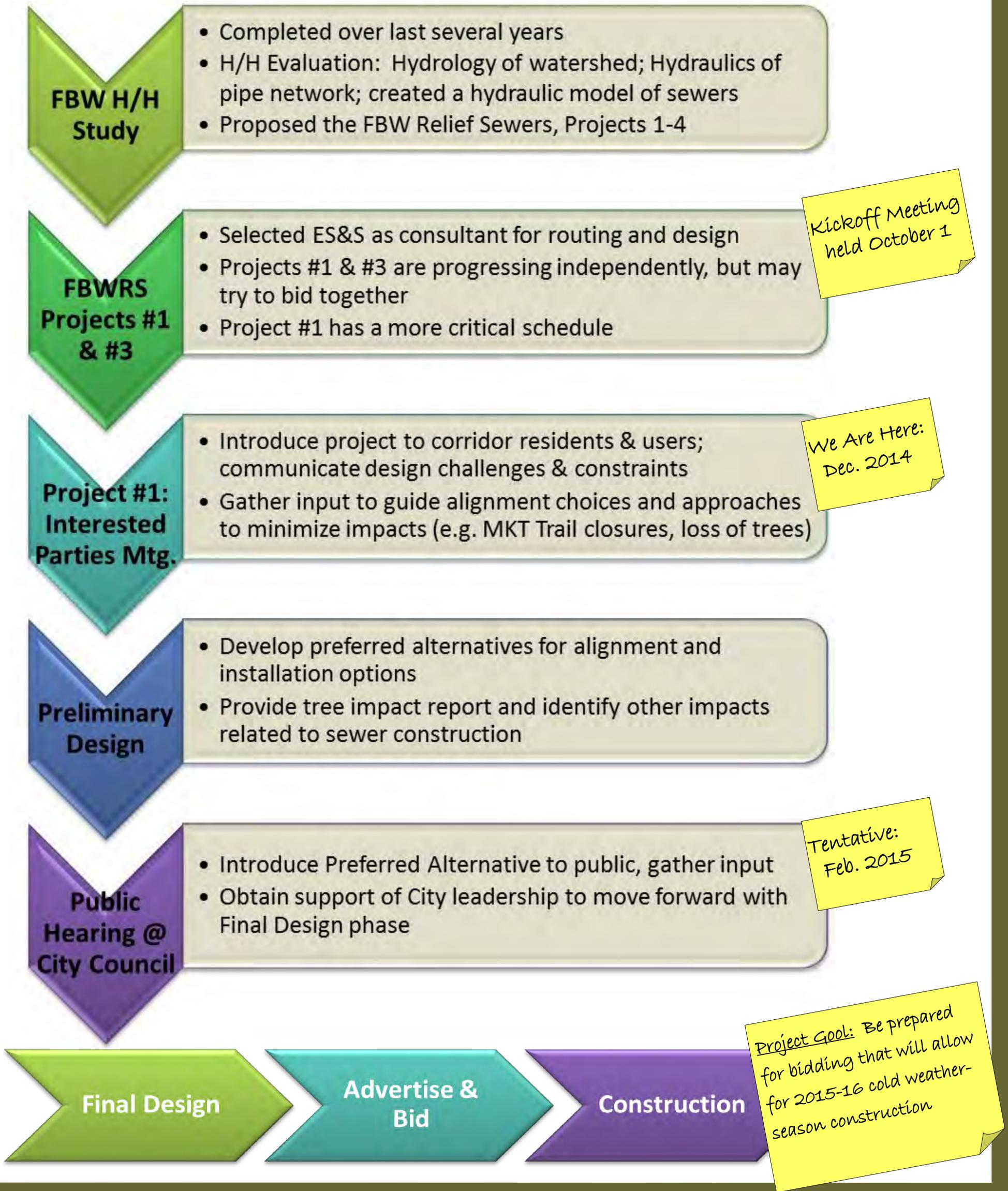
# Flat Branch Watershed Relief Sewers

Project #1—MKT Trail Alignment



# Project Process & Timeline

What are the next steps?



## Flat Branch Watershed Relief Sewers

Project #1—MKT Trail Alignment

