City of North Royalton
Ohio Turnpike 3\textsuperscript{rd} Lane Expansion Investigation Study

Followup Neighborhood Meeting

November 10, 2005
Agenda

- Study Objectives and Methodology
- Evaluation of Flooding Problems
- Relationship between Flooding and Turnpike Expansion
- Flood Control Alternatives
- Next Steps
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Study Objectives

- Determine if the expansion of the Turnpike has caused or contributed to increased property flooding
- Make recommendations on alternatives available to address resident flooding concerns in areas where Turnpike expansion has worsened flooding
Study Methodology

- Define Drainage System, Watershed and Problem Characteristics
  - Available Data Review
  - Neighborhood Meeting and Resident Interviews
  - Field Reconnaissance
- Drainage System Modeling
  - Historic Storms
  - Design Storms
  - Development Scenarios
- Alternative Development and Evaluation
- Reporting
Streams in the Flooding Problem Area

Legend
- Flooding Problem Area
- Tributary Drainage Area
- Streams
- Closed Conduit
- Model Node

Tributary 1.1
Tributary 2.1
Tributary 2.2
Tributary 2.3
Rocky River East Branch
Tributary 3.1
Tributary 3.2
Rocky River East Branch

Streams in the Flooding Problem Area
The natural drainage system has been modified in an attempt to address flooding and erosion issues.
Storm Water: Myths and Facts

Myth
◆ Streams stay in their banks

Fact
◆ Channels develop two stages

Stage 2: Floodplain
Stage 1: Bank Full Channel
.5-2 Year Event
Storm Water: Myths and Facts

Myth
- Streams do not move

Fact
- Streams move continuously

Salt Creek
Vinton County, Ohio
Total Imperviousness = 18 percent
Total Imperviousness = 25 percent
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Sites of Reported Problems

Legend
- Red: Flooding Problem Area
- Green: Tributary Drainage Area
- Blue: Streams
- Orange: Closed Conduit
- Yellow: Model Node
- Gray: Problem Report
- Green: Questionnaire
- Red: Interview
Flooding Model: June 9, 2004
Projected Flooding Model: 25-yr Design Storm

Legend
- Flooding Problem Area
- Tributary Drainage Area
- Watershed
- Catchment
- Streams
- Closed Conduit
- Model Node
Flooding Problem Assessment

- Flooding during May - June 2004 appears equivalent to a design flood with a 2-year to 10-year recurrence period.
- Changes in land cover since 1993 do not appear to have significantly affected the location and severity of flooding.
- Several factors influence flooding:
  - Various drainage improvements and floodplain encroachments on private property.
  - Increased runoff from the Ohio Turnpike have elevated flood stages by 0.1 ft or less.
  - Siltation of culverts under Valley Parkway redirects flow to alternative overland routes.
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How does Turnpike Expansion Change Drainage?

- More pavement = more runoff
- Removal of grass medians and shoulders speeds runoff
- Installation of storm inlets and sewers speeds runoff
- Changes in road crown re-direct runoff
Assessment of Turnpike Expansion on Drainage

- Except for Tributary 3, turnpike runoff represents a small fraction of total runoff.
- The most severe effects of turnpike runoff appear to be very localized:
  - At turnpike storm drain outlets
  - Within ditches parallel to turnpike
- Turnpike culverts do not affect upstream flooding.
- Increased runoff from the turnpike affects erosion more than flooding:
  - Visual evidence of erosion
  - Siltation at Valley Parkway Culverts
  - Modeling shows minimal flood stage increases
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Alternatives were developed for the following problems:

- Flooding affected by Ohio Turnpike expansion (limited to Tributary 3)
- Flooding during the 25-year design storm that:
  - Reaches the foundation of structures
  - Inundates roadways
Baseline Alternatives

- Remove Drainage System Obstructions
- Preserve Existing Floodplains
- Control Increased Runoff from Future Development
Alternative A: Conveyance Improvements

Summary of Improvements:
- Replace 4 roadway culverts
- Replace 5 driveway culverts
- Replace 1 backyard culvert
- 2,300 ft channel improvements

Estimated Construction Cost = $3.6 M
Alternative B: Detention Facilities

Summary of Improvements:
- Install 4 detention facilities
- Acquire 7.3 acres

Estimated Construction Cost = $2.3 M
Alternative C: Floodplain Management

Summary of Improvements:
- Purchase 8 flood-prone properties
- Install 2 flood protection berms
- Raise 1100 ft of Valley Parkway

Estimated Construction Cost = $3.7 M
**Alternative D: Combination Improvements**

Summary of Improvements:
- Replace 2 roadway culverts
- 1,600 ft channel improvements
- Install 2 detention facilities
- Acquire 3.4 acres

Estimated Construction Cost = $2.3 M

Note: Conveyance improvements may be reduced or eliminated with FEMA-funded property acquisition
# Alternative Evaluation

<table>
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<tr>
<th>Evaluation Criterion</th>
<th>Weight</th>
<th>Alternative</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>?</td>
<td>$3.6 M</td>
<td>$2.3 M</td>
<td>$3.7 M</td>
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<td>Flood Control Effectiveness</td>
<td>?</td>
<td>Prevents building flooding and roadway inundation during the 25-year design storm</td>
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<tr>
<td>Compatibility with Community Interests</td>
<td>?</td>
<td>Coordination w/ Property Owners</td>
<td>Facilities within MetroParks</td>
<td>Acquisition of Residences</td>
<td>Balanced property / MetroPark Impacts</td>
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<td>Consistency with Regulatory Requirements</td>
<td>?</td>
<td>Requires OEPA / ACOE Permits</td>
<td>Requires OEPA / ACOE Permits</td>
<td>No permits required</td>
<td>Requires OEPA / ACOE Permits</td>
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<tr>
<td>Water Quality Enhancement</td>
<td>?</td>
<td>Negative w/o restoring stream habitat</td>
<td>Positive – co-locate WQ pond</td>
<td>Neutral</td>
<td>Balances Alternatives A and B</td>
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<td>Implementation</td>
<td>?</td>
<td>Requires Extensive coordination with residents and Cleveland MetroParks</td>
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</table>
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Next Steps

- Receive neighborhood comments
- Finalize report
- Secure funding
  - City
  - FEMA
  - Property owners
- Develop solutions for other problems
  - Flooding
  - Erosion
Questions?