LAR BPWG
Technical Presentation
Geomorphic Setting and River Processes
December 19, 2017
Overview

- **Objective:** Quantify expected long-term changes due to ongoing river processes
- **North Levee Construction Impacts**
- **H-Street to Business 80**
  - Overall reach processes
  - Paradise Bend Chute Cutoff
  - Historic Observations
  - Expected Ongoing
- **Howe to H-Street**
  - Overall reach processes
  - Historic Observations
  - Expected Ongoing
North Levee Construction

1950 Flood 180,000 cfs
North Levee Construction

- **Reduced Floodplain Connectivity**
  - Increased in-channel flow/shear/streampower/sediment transport for flows above about 80,000 cfs in study reach
  - Reduces depositional overbank area/concentrates deposition within levees
Geomorphologic Setting: H Street to Business 80

- Depositional Reach
- Gravel to Sand Bed Transition
- Channel Widening
  - Pressure due to bar formation/growth
    - Flow Impingement
    - Bed material deposition/bank material erosion
Historic Processes

- **1964 Photo**
  - Post North Levee
  - Low Flow (1,190 cfs)
  - 115kcfs (twice), and 135 cfs

- **Considerations**
  - Quality of Photo
  - Width of Line
Medial Bar at Golf Course

- Consistent location since about 1953
- Minimal bar growth, some bar organization
- ~10-20’ of bank retreat
Medial Bar March 1977 260 cfs
Ongoing Processes

- **Upstream Sediment Transport Disrupted**
  - Limited bar growth
  - “Armoring” of bed material
- **Channel Reorganization when** $\tau > 2\tau_c$ **of bed material**
  - At 160kcfs $\tau \approx 1.5\tau_c$
  - Vegetation Establishment/stabilization
Ongoing Processes - Paradise Bend
H-Street to Howe Street

- Large constrained bend
- Conveyance Reach
- Relatively “new” channel
  - Mining Debris Deposition pre 1908
  - Channel incision to ERM
Geometry

- Left Bank regraded/armored
- Inside bend too high
- Loose unconsolidated soils on right bank.
- Oversteepened slopes
- Ongoing erosion
Quantifying Ongoing Processes

- Utilizing HEC6T Results
  - 1D sediment routing model accounts for sediment sinks upstream
  - Assume armored bed -> sediment from banks
  - Assume coarse material deposition replaced from fine material from the bankline.
  - Hindcast from past 70 years with new operations - No 160kcf/s events
Quantifying Ongoing Processes

Channel width adjustment by subreach

Subreach

Width (ft)

2.3 2.2 2.1 3.3 3.2 3.1
General Working Thoughts

- Over next 20-50 years, overall channel widths likely to widen about 10 feet to 20 feet on average.
- Individual events (115 kcf, 160 kcf) may cause local erosion up to 50 to 70 feet in an event.