|  |  |  |
| --- | --- | --- |
| Rev. 8/14 | Bridge No. |       |
| Job No. |       |
| Missouri Department of Transportation |
| Bridge Hydraulics and Scour Report |
| Designer |       | Date |       |
| Route |       | County |       | Stream |       |
|  |
| Purpose of Hydraulic/Scour Study |
| *(Write a brief statement describing project and purpose of hydraulic study)*      |
|  |
| National Flood Insurance Program Information |
| Has a flood insurance study been performed for the community? *(*[*http://www.fema.gov/cis/MO.pdf*](http://www.fema.gov/cis/MO.pdf)*)* |       |
| Is the bridge in a special flood hazard area? *(If yes, a floodplain development permit will be required)* |       |
| Is the bridge in a designated floodway? *(If yes, a no-rise certification will be required)* |       |
| Has a Flood Insurance Rate Map (FIRM) been published for the area? |       |
| What is the flood hazard zone for the site (A, A1, B, C, AE, etc.)? |       |
| Base (100-yr) Flood Elevation |       (ft), Datum =       | Floodway width |       |
| Map panel number |       | Map date |       |
|  |
| **Additional comments on Flood Insurance Study:**       |
|  |
| Discharge Data |
| **Drainage Area** |       | (mi2) |
| **Valley Slope** (average slope between points 10% and 85% of valley length upstream) |       | (ft/mi) |
|  |
| **Method of Analysis** (choose one or more) | **Q25** | **Q50** | **Q100** | **Q500** | Use |
| USGS regression equations |       |       |       |       | **[ ]**  |
| - Rural | Publication year =       | Region =       |       |       |       |       | **[ ]**  |
| - Urban | Publication year =       | % Impervious =       |       |       |       |       | **[ ]**  |
| Stream Gage | USGS Station Number =       |       |       |       |       | **[ ]**  |
| FEMA Flood Insurance Study | Community Name =       |       |       |       |       | **[ ]**  |
| Other =       |       |       |       |       | **[ ]**  |
|  |
| **Comments on Discharge calculations:** *(method chosen and why, expected level of upstream development, etc.)*      |

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| **Observed Extreme High Water** |
| Elevation =       (ft), Datum =       | Location =       | Date =       |
| **Comments on Observed Extreme High Water:** *(discharge, if known, etc.)*      |
| **Discuss flow conditions in reach and describe existing conditions that may influence hydraulic behavior in reach:**       |
|  |
| **Streambed Slope** |
| Streambed Slope |       | (ft/ft) |
|  |
| Water Surface Profile Model |
| Model used: |
| [ ]  River Analysis System (HEC-RAS), Ver.       | [ ]  Other =       |
|  |
| Which cross sections were used in the model and why?       |
| Describe the channel/overbank conditions and the roughness coefficients chosen:       |
| **Describe existing and proposed bridges and methods used to model them:** *(Bridge loss method, pier loss coefficients, etc.)*       |
|  |
| Filenames |
| Describe files used in water surface profile model: *(HEC-RAS project and plan descriptions, WSPRO filenames and descriptions, etc.)*       |

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| Water Surface Profile Model Results |
|  | Existing Conditions | Proposed Conditions |
| Frequency | **Q****25** | **Q50** | **Q100** | **Q500** | **QOT** | Q25 | **Q50** | **Q100** | **Q500** | **QOT** |
| High Water Surface Elev. (ft) |       |       |       |       |       |       |       |       |       |       |
| Backwater (ft) |       |       |       |       |       |       |       |       |       |       |
| VAVE channelthru bridge (fps) |       |       |       |       |       |       |       |       |       |       |
| VAVE thru bridge opening (fps) |       |       |       |       |       |       |       |       |       |       |
| Freeboard (ft) |       |       |       |       |       |       |       |       |       |       |
| % Flow over roadway (%) |       |       |       |       |       |       |       |       |       |       |
| Overtopping (OT) frequency =     High Water Surface Elev. measured at      Backwater measured at       | VAVE = average velocityVAVE channel = average velocity in channel |
|  |
| **Additional comments on water surface profile model Results:** *(backwater, velocities, unusual conditions, model errors, etc. )*      |

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| **Scour Calculations** |
| **General Information:** *(Describe soil conditions in streambed and overbanks)*       |
| **Comments on Contraction Scour calculations:**      |
| **Comments on Pier Scour calculations:** *(Do calculations account for the expected footing, was drift considered in determining pier width, etc?)*       |
| **Comments on Abutment Scour calculations:**       |
|  |
| **Calculated Scour Depths** |
|  | Scour Design Flood\*  | **Scour Check Flood\*\*** | \*Minimum of Scour Design Flood (Interstate = 200-yr, all other routes = 100-yr) and Overtopping Flood.\*\* Minimum of Scour Check Flood (500-yr) and Overtopping Flood. |
| Frequency |       |       |
| Contraction Scour |       |       |
| Pier Scour – Piers       |       |       |
| Pier Scour – Piers       |       |       |
| Pier Scour – Piers       |       |       |
| Left Abutment Scour |       |       |
| Right Abutment Scour |       |       |
| *Left and Right as viewed looking downstream.* |
|  |
| Scour Protection Measures |
| What measures are required to protect against scour?      |
| **Additional comments on scour calculations and/or scour protection:**      |
| **General Information** |
| **Are there any improvements/buildings/crops/livestock that might be affected by alterations to the floodplain?** *(Include description and estimated value)*      |
| **Special Considerations:** *(Describe any other special conditions or considerations which affect this project)*       |
|  |
| **Bridge Layout Summary** |
| Span Layout |       |
| Loading |       | Roadway Width |       | Skew |       | Alignment |       |
| Fill exception: Sta. |       | To Sta. |       |
|  |
| **Design Exceptions:** *(Provide an explanation of any design exceptions requested and approved for this project)*       |

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| **Hydraulic Analysis Summary** |

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| Hydrologic Data |
| Drainage Area =       mi2 |
| **Roadway Design** |
| Design Frequency =      yearsDesign Discharge =      cfsDesign High Water (DHW) Elev. =     Design Elev. (1’ below shoulder) =      |
| **Backwater/Base Flood Data (100-year)** |
| High Water Elev. =     Base Flood Discharge =      cfsEstimated Backwater =      ftAverage Velocity thru Opening =      ft/s |
| Freeboard (50-year) |
| Freeboard Discharge =      cfsApproach High Water Elev. =     Freeboard =      ft |
| Roadway Overtopping |
| Overtopping Flood Discharge =      cfsOvertopping Flood Frequency =      years |