BRIDGE SCOUR REPORT QUALITY CONTROL CHECKLIST

PROJECT DETAILS

Bridge Asset ID: _____
Route: _____
Stream crossing: _____
County: _____

Company: _____

QA Certification: _____

CHECKLISTS

Checklists Completed:	Designer(s):	Reviewer(s):	Date:
_____ Hydrology			
_____ Terrain			
_____ HEC-RAS			
_____ SRH 2D			
_____ Env. Curves			
_____ HEC-18			

Instructions:

1. For all applicable spreadsheets, reviewer shall indicate status of each item and provide comments if necessary.

2. Originator shall make corrections as indicated by comments, provide comment if necessary and resubmit the scour study to reviewer.

3. Reviewer shall update status of resubmitted items, and provide additional comments as needed.

4. If additional comments or corrections are necessary, originator shall make corrections and resubmit until all items have a status of 4 (N/A) or 5 (Closed)

5. These checklists are intended to provide documentation that a quality control review was performed. All applicable checklists must be completed and included, along with this summary sheet, for Scour Study Report submission.

Bridge Asset ID:	0	
Hydrology QC Checklist		**SCDOT Scour Critical Assessment and Management System**
	initial **date**	**instructions:**
Originator:		1. Populate "originator" & "review by" cells to left
Technical Review By:		2. Provide comments below per instructions on the Summary Sheet.
		3. For each round of comment, add additional lines.
QC Certified for Submittal:		4. When all comments are satisfied, reviewer fills in date certified for submittal

ID	QC Check and Description	Quality Control Review		
		Status*	QC Review Comment	Originator Response
1				
2				
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*Comment Status: 1 = Comment Submitted; 2 = Unresolved; 3 = Resolved; 4 = N/A; 5 = Closed

Bridge Asset ID:	0	
Hydrology QC Checklist		**SCDOT Scour Critical Assessment and Management System**

	initial	date
Originator:		
Technical Review By:		
QC Certified for Submittal:		

instructions:
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ID	QC Check and Description	Quality Control Review		
		Status*	QC Review Comment	Originator Response
	General			
1	If a previously accepted model is used as the source for peak discharge(s),the source model is identified			
2	If peak discharge(s) are from a previously accepted model, discharges used agree with the source			
3	If 0.2% AEP discharge is extrapolated from 1% AEP discharge, confirm correct methodology			
	StreamStats			
4	Basin delineation			
5	Confirm rural vs. urban regression scenario			
6	Basin characteristics			
7	Peak-flow report appears reasonable			
	Unsteady Flow Hydrographs			
8	Source of stillwater height appropriate			
9	Development of hydrograph in accordance with SCDOT 2009 HDM			
10	Duration of time series extends past recession of storm surge			
11	Timing of storm surge plus tide represents worst case condition			
12				
13				
14				

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Bridge Asset ID:	0	
Terrain QC Checklist		**SCDOT Scour Critical Assessment and Management System**

	initial	date
Originator:		
Technical Review By:		
QC Certified for Submittal:		

instructions:

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ID	QC Check and Description	Quality Control Review		
		Status*	QC Review Comment	Originator Response
	General			
1	Source and resolution information of the terrain data			
2	Digital terrain covers the entire 2D study area			
3	Terrain data show channel bed elevation or water surface?			
4	Vertical and horizontal distances in the same units (ft/m)			
5	Topographic abnormalities (No gaps, drops or rises due to underlying data errors.)			
6	Datum consistent			

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Bridge Asset ID:	0	
HEC-RAS 1D QC Checklist		**SCDOT Scour Critical Assessment and Management System**

	initial	date
Originator:		
Technical Review By:		
QC Certified for Submittal:		

instructions:

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2. Provide comments below per instructions on the Summary Sheet.
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ID	QC Check and Description	Quality Control Review		
		Status*	QC Review Comment	Originator Response
	General			
1	Latest HEC-RAS version			
2	Free of error messages and warnings are justified			
3	Ground profile is reasonable and WSEL profile is close to parallel to ground.			
4	No hydraulic jumps			
5	Water surface elevations do not decrease going upstream, profile looks reasonable, WSEL drops through the structures are not excessive.			
	Cross-section Geometry			
6	All data on same datum			
7	Streamline follows channel and is placed upstream to downstream.			
8	Cross sections are perpendicular to direction of flow and do not intersect.			
9	Cross sections are not overtopped.			
10	Cross section data is entered from left to right (looking downstream)			
11	A skew coefficient is applied to any cross sections that intersect the stream at an angle greater than 20 degrees.			
12	Manning's n values			
13	Bank stations			
14	Structure-related cross sections 2 and 3 are located outside of the roadway fill and are parallel to the top of road.			
15	Appropriate contraction/expansion coefficients			
16	Ineffective flow and blocked obstruction areas are properly defined			
	Bridge Geometry			
17	Deck geometry is represented correctly			
18	Abutment geometry represented correctly			
19	Piers represented correctly			
20	Modeling approach is appropriate			
	Flow data			
21	All profiles (design storm, 1%,0.2%) and any additional profiles scoped as part of study are included in analyses.			

22	Starting boundary condition is appropriate and reasonable and the model incorporates a reasonable number of cross-sections between the downstream boundary condition and the area of analysis.			
23	All flow changes are appropriate			

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	Boundary and Initial Conditions			
16	Boundary types & conditions established, documented, and reasonable			
17	Boundary locations reasonable & documented			
18	Flow distribution along Boundary Condition lines			
19	If a time series data such as a discharge/stage hydrograph or a rating curve are assigned as a boundary condition, references are provided.			
20	Cold (dry) start or warm (wet) start simulation			
	Computation Setup			
21	Selected equation set is appropriate/justified			
22	Simulation period agrees with the boundary conditions			
23	Flow regime selected appropriately (e.g., subcritical flow or mixed flow regime)			
24	Computation Time Step is appropriate			
25	Model output locations and time intervals			
	Output Check			
26	Inundation extents stopped by the computation mesh boundary			
27	Note volume continuity (Generally, this is less than 1%.)			
28	Warning messages are acceptable			
29	No unstable computation results (like numerical surges of output hydrographs, flow depth, flow velocity, and water surface, etc.)			
30	If a steady state model is prepared, are the discharges constant?			
31	Sensitivity analysis for inundation extents and discharges: roughness coefficient, computation time step, etc.			
32	Initial conditions and final conditions are reasonable			
33	Model simulation is long enough to pass the entire hydrograph(s) through the model			
34	Are the maximum velocities reasonable and representative of peak flow conditions?			
35	Check Inundation Area			
36	Calibration & Validation / Reasonableness			
37	No lower recurrence interval WSE is greater than a higher recurrence interval WSE at the same section.			
	Result Summary/Submittal			
38	Summary of the model result tables matches hydraulic model output, such as maximum water surfaces, peak discharges, flow velocities, etc.			

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Bridge Asset ID:	0	
Envelope Curve Scour QC Checklist		**SCDOT Scour Critical Assessment and Management System**

	initial	date
Originator:		
Technical Review By:		
QC Certified for Submittal:		

instructions:

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ID	QC Check and Description	Quality Control Review		
		Status*	QC Review Comment	Originator Response
	Site Information			
1	Physiographic region			
2	LEW & REW stations at approach cross-section			
3	Unconstricted approach cross-section topwidth			
4	LEW & REW stations at bridge cross-section			
5	Left and right abutment toe stations at bridge			
6	Left and right top of bank stations at bridge			
7	Channel topwidth			
8	Distance from toe to toe			
9	Left and right embankment lengths			
10	Geometric contraction ratio (m)			
11	WSEL used			
12	Left and right overbank widths			
	Clear-Water Abutment Scour Estimate			
13	Geometric-contraction ratio (m) range check			
14	Left embankment length range check			
15	Right embankment length range check			
16	Abutment scour depth (left)			
17	Abutment scour depth (right)			
18	Abutment scour hole topwidth curve (left)			
19	Abutment scour hole topwidth curve (right)			
20	Abutment scour hole topwidth (left)			
21	Abutment scour hole topwidth (right)			
	Clear-Water Contraction Scour Estimate			
22	Geometric contraction ratio(m) range check			
23	Clear water contraction scour depth (left)			
24	Clear water contraction scour depth (right)			
	Live-Bed Contraction Scour Estimate			
25	Geometric contraction ratio(m) range checks			
26	Live-bed contraction scour depth			
	Pier Scour Estimate			
27	Pier locations			
28	Pier or bent type			
29	Pier widths			
30	Pier lengths			
31	Pier angle of attack			

32	Estimate of minimum spacing			
33	Is final selected pier scour depth reasonable?			

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	Pier scour			
28	Pier shape			
29	Pier width and length			
30	Angle of attack			
31	Channel bed condition			
32	Confirm flow depth upstream of pier			
33	Confirm flow velocity upstream of pier			
34	D50 and D84 of bed material (for complex piers)			
35	Thickness of pile cap or footing (for complex piers)			
36	Height of pile cap or footing above bed before scour (complex piers)			
37	Distance from front of pile cap or footing to pier stem (complex piers)			
38	Number of columns per bent			
39	Pier spacing			
	Pier scour in cohesive bed materials			
40	Identify bed material			
41	Correct equations used			
	Pier scour in coarse bed materials			
42	Correct equations used			

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