

Glossary

NSUB = Substructure NBI rating

NSUP = Superstructure NBI rating

NDEC = Deck NBI rating

NCUL = Culvert NBI rating

SCCR = Scour Critical designation

LOADCAP<5 = load posted structure

FRCR = Fracture Critical designation (now called non-redundant steel tension member or NSTM)

BRIDGEAGE = current year – year the structure was built

DECKAGE = current year – year the deck was built

ADTON = annual average daily traffic volume carried by the structure

OVBD = measure of overburden depth

Q[x]OF[xxxx] = Quantity of condition state [1, 2, 3, or 4] of [element number or defect number]

QTOF[xxxx] = Total Quantity of [element number or defect number]

QTOF[xxxx]PARENT = Total Quantity of parent element of [element number or defect number]

Example: QTOF1080PARENT = Total quantity of parent element (deck or slab element) which has the defect 1080 for delamination, spall, patching, exposed rebar.

CONCATENATE = shorthand function which evaluates all rules for each part of a combined rule

Example: Rule 36 criteria = (Rule 20 or Rule 66 or Rule 67 or Rule 58) and Rule 27

[xx] NOT IN SPECIAL = special component [xx] is not associated with this structure

Example: Special component code 80 designates stainless steel

NUMOVERLAY = Count from construction history of the number of thick overlays (concrete or bituminous)

NUMCONCOVLY = Count from construction history of the number of concrete overlays

NUMTHINPOLYMEROVERLAYS = Count from construction history of the number of thin polymer overlays



WiSAMS rules

Rules listed in order of evaluation in each year of analysis. See Bridge Manual 41.2.1 for additional explanation of WiSAMS analysis.

Rule ID	Formula	Work Description
1	$NSUB \leq 3 \text{ AND } (SCCR = \text{TRUE OR } LOADCAP < 5 \text{ OR } NSUP \leq 3 \text{ OR } ((NDEC \leq 3 \text{ OR } FRCR = \text{TRUE}) \text{ AND } BRIDGEAGE > 50))$	REPLACE STRUCTURE
3	$NSUB < 3.5 \text{ AND } (Q3OF206 + Q4OF206 + Q3OF228 + Q4OF228)/(QTOF206 + QTOF228) > 0.50 \text{ OR } (Q4OF206 + Q4OF228)/(QTOF206 + QTOF228) > 0.30$	REPLACE STRUCTURE (added for local program only)
10	$BRIDGEAGE > 50 \text{ AND } NSUB < 4 \text{ AND } NSUP \leq 3 \text{ AND } NDEC \leq 3$	REPLACE STRUCTURE
11	$QTOF38 = 0 \text{ AND } NSUP < 3.5 \text{ AND } NSUB > 4.5 \text{ AND } NDEC \leq 4 \text{ AND } ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT > 0.15) \text{ OR } ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT > 0.15)$	REPLACE SUPERSTRUCTURE
59	$QTOF38 > 0 \text{ AND } NSUB > 4.5 \text{ AND } (NDEC \leq 4 \text{ AND } ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT > 0.20) \text{ OR } ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT > 0.20))$	REPLACE SUPERSTRUCTURE
12	$NSUP < 3.5 \text{ AND } LOADCAP \leq 4 \text{ AND } NSUB > 4.5$	REPLACE SUPERSTRUCTURE
18	$SCCR = \text{FALSE AND } LOADCAP \leq 4 \text{ AND } BRIDGEAGE \leq 40 \text{ AND } NDEC \leq 4 \text{ AND } ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT > 0.15) \text{ OR } ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT > 0.15) \text{ AND } NSUB \geq 5$	REPLACE SUPERSTRUCTURE
63	$ADTON \geq 15000 \text{ AND } (BRIDGEAGE < 75 \text{ AND } LOADCAP = 5 \text{ AND } QTOF38 = 0 \text{ AND } ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT > 0.14 \text{ OR } (Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT > 0.14) \text{ AND } NDEC \leq 4 \text{ AND } NSUB > 3.5 \text{ AND } NSUP > 3.5) \text{ AND } (BRIDGEAGE > 25 \text{ AND } NSUP > 4 \text{ AND } NSUB > 4 \text{ AND } ((Q3OF8516 + Q4OF8516)/QTOF8516) > 0.25)$	REPLACE DECK / THIN POLY OVLY / PAINT
37	$(BRIDGEAGE < 75 \text{ AND } LOADCAP = 5 \text{ AND } QTOF38 = 0 \text{ AND } ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT > 0.14 \text{ OR } (Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT > 0.14) \text{ AND } NDEC \leq 4 \text{ AND } NSUB > 3.5 \text{ AND } NSUP > 3.5) \text{ AND } (BRIDGEAGE > 25 \text{ AND } NSUP > 4 \text{ AND } NSUB > 4 \text{ AND } ((Q3OF8516 + Q4OF8516)/QTOF8516) > 0.25)$	REPLACE DECK / PAINT (COMPLETE)
62	$ADTON \geq 15000 \text{ AND } BRIDGEAGE < 75 \text{ AND } LOADCAP = 5 \text{ AND } QTOF38 = 0 \text{ AND } ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT > 0.14 \text{ OR } (Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT > 0.14) \text{ AND } NDEC \leq 4 \text{ AND } NSUB > 3.5 \text{ AND } NSUP > 3.5$	REPLACE DECK / THIN POLYMER OVERLAY
19	$BRIDGEAGE < 75 \text{ AND } LOADCAP = 5 \text{ AND } QTOF38 = 0 \text{ AND } ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT > 0.14 \text{ OR } (Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT > 0.14) \text{ AND } NDEC \leq 4 \text{ AND } NSUB > 3.5 \text{ AND } NSUP > 3.5$	REPLACE DECK



Rule ID	Formula	Work Description
36	CONCATENATE (Rule 20 or Rule 66 or Rule 67 or Rule 58) and Rule 27	OVERLAY DECK - THIN POLYMER / NEW JOINTS
20	DECKAGE <= 10 AND ADTON >= 15000 AND 80 NOT IN SPECIAL AND NUMOVERLAY = 0 AND QTOF8513 = 0 AND OVBD = 0 AND NUMTHINPOLYMEROVERLAYS = 0 AND (NDEC >= 6.5 AND ((Q3OF1080 + Q4OF1080)/QTOF1080PARENT < 0.01) AND ((Q2OF3210 + Q3OF3210 + Q4OF3210)/QTOF3210PARENT < 0.05))	OVERLAY DECK - THIN POLYMER
66	ADTON < 15000 AND ADTON >= 6500 AND 80 NOT IN SPECIAL AND DECKAGE = 9 AND NUMOVERLAY = 0 AND QTOF8513 = 0 AND OVBD = 0 AND NUMTHINPOLYMEROVERLAYS = 0 AND (NDEC > 6 AND ((Q3OF1080 + Q4OF1080)/QTOF1080PARENT < 0.01) AND ((Q2OF3210 + Q3OF3210 + Q4OF3210)/QTOF3210PARENT < 0.055))	OVERLAY DECK - THIN POLYMER
67	ADTON < 6500 AND ADTON > 0 AND 80 NOT IN SPECIAL AND DECKAGE = 12 AND NUMOVERLAY = 0 AND QTOF8513 = 0 AND OVBD = 0 AND NUMTHINPOLYMEROVERLAYS = 0 AND (NDEC > 6 AND ((Q3OF1080 + Q4OF1080)/QTOF1080PARENT < 0.01) AND ((Q2OF3210 + Q3OF3210 + Q4OF3210)/QTOF3210PARENT < 0.055))	OVERLAY DECK - THIN POLYMER
58	NUMOVERLAY = 0 AND NUMTHINPOLYMEROVERLAYS < 4 AND NDEC > 4 AND (Q2OF10004 + Q3OF10004 + Q4OF10004)/QTOF10004 < 0.05 AND (Q3OF8513 + Q4OF8513)/QTOF8513 > 0.15	OVERLAY DECK - THIN POLYMER
68	ADTON > 10000 AND NUMOVERLAY = 0 AND NDEC > 5 AND (((Q3OF1080 + Q4OF1080)/QTOF1080PARENT < 0.01) AND ((Q2OF10004 + Q3OF10004 + Q4OF10004)/QTOF10004 < 0.05) AND ((Q3OF8513 + Q4OF8513)/QTOF8513 > 0.15))	OVERLAY DECK - POLYESTER POLYMER
44	CONCATENATE (Rule 22 or Rule 64 or Rule 24 or Rule 65) and Rule 55	OVERLAY DECK - CONCRETE / PAINT
46	CONCATENATE (Rule 22 or Rule 64 or Rule 24 or Rule 65) and Rule 31 and Rule 27	OVERLAY DECK - CONCRETE / NEW RAIL AND JOINTS
21	NUMOVERLAY = 0 AND NUMTHINPOLYMEROVERLAYS = 4 AND DECKAGE > 50 AND NDEC < 6.5 AND NDEC > 5 AND ((Q3OF1130 + Q4OF1130)/QTOF1130PARENT < 0.25) AND (Q3OF8513 + Q4OF8513)/QTOF8513 > 0.50	OVERLAY DECK - CONCRETE
45	CONCATENATE (Rule 22 or Rule 64 or Rule 24 or Rule 65) and Rule 27	OVERLAY DECK - CONCRETE / NEW JOINTS
47	ADTON > 0 AND NUMOVERLAY = 0 AND NDEC >= 6 AND (QTOF31 > 0 OR QTOF54 > 0) AND (((Q2OF1140 + Q3OF1140 + Q4OF1140)/QTOF1140PARENT) > 0.20 OR ((Q2OF1150 + Q3OF1150 + Q4OF1150)/QTOF1150PARENT) > 0.20 OR ((Q2OF1180 + Q3OF1180 + Q4OF1180)/QTOF1180PARENT) > 0.20)	OVLY DECK - BIT. HOT MIX ASPHALT (HMA) W/ MEMBRANE
22	NUMOVERLAY = 0 AND NUMTHINPOLYMEROVERLAYS = 0 AND NDEC < 6.5 AND NSUB >= 4 AND ((Q3OF1130 + Q4OF1130)/QTOF1130PARENT < 0.25) AND ((Q2OF3210 + Q3OF3210 + Q4OF3210)/QTOF3210PARENT > 0.15 OR (Q3OF3220 + Q4OF3220)/QTOF3220PARENT > 0.20 OR (Q3OF8911 + Q4OF8911)/QTOF8911PARENT > 0.20)	OVERLAY DECK - CONCRETE



Rule ID	Formula	Work Description
64	$\text{NUMOVERLAY} = 0 \text{ AND } \text{NUMTHINPOLYMEROVERLAYS} > 0 \text{ AND } \text{NDEC} < 6.5 \text{ AND } \text{NSUB} \geq 4 \text{ AND } ((\text{Q3OF1130} + \text{Q4OF1130})/\text{QTOF1130PARENT} < 0.25) \text{ AND } ((\text{Q2OF10004} + \text{Q3OF10004} + \text{Q4OF10004})/\text{QTOF10004} > 0.15)$	OVERLAY DECK - CONCRETE
48	$\text{ADTON} > 0 \text{ AND } \text{NUMOVERLAY} < 4 \text{ AND } \text{NDEC} \geq 6 \text{ AND } (\text{QTOF31} > 0 \text{ OR } \text{QTOF54} > 0) \text{ AND } ((\text{Q2OF3210} + \text{Q3OF3210} + \text{Q4OF3210})/\text{QTOF3210PARENT} > 0.20) \text{ OR } ((\text{Q2OF3220} + \text{Q3OF3220} + \text{Q4OF3220})/\text{QTOF3220PARENT} > 0.20) \text{ OR } ((\text{Q2OF8911} + \text{Q3OF8911} + \text{Q4OF8911})/\text{QTOF8911PARENT} > 0.20)$	OVLY DECK - BIT. HOT MIX ASPHALT (HMA) W/ MEMBRANE
24	$\text{NUMOVERLAY} > 0 \text{ AND } \text{NUMTHINPOLYMEROVERLAYS} = 0 \text{ AND } 162 \text{ NOT IN SPECIAL AND } \text{NUMCONCOVLY} < 2 \text{ AND } \text{NSUB} \geq 4 \text{ AND } \text{NDEC} < 6.5 \text{ AND } ((\text{Q3OF1130} + \text{Q4OF1130})/\text{QTOF1130PARENT} < 0.25) \text{ AND } ((\text{Q2OF3210} + \text{Q3OF3210} + \text{Q4OF3210})/\text{QTOF3210PARENT} > 0.20) \text{ OR } ((\text{Q3OF3220} + \text{Q4OF3220})/\text{QTOF3220PARENT} > 0.50) \text{ OR } ((\text{Q3OF8911} + \text{Q4OF8911})/\text{QTOF8911PARENT} > 0.20)$	OVERLAY DECK - CONCRETE
65	$\text{NUMOVERLAY} > 0 \text{ AND } \text{NUMTHINPOLYMEROVERLAYS} > 0 \text{ AND } \text{NUMOVERLAY} < 3 \text{ AND } \text{NSUB} \geq 4 \text{ AND } \text{NDEC} < 6.5 \text{ AND } ((\text{Q3OF1130} + \text{Q4OF1130})/\text{QTOF1130PARENT} < 0.25) \text{ AND } ((\text{Q2OF10003} + \text{Q3OF10003} + \text{Q4OF10003})/\text{QTOF10003} > 0.20)$	OVERLAY DECK - CONCRETE
55	$\text{BRIDGEAGE} > 35 \text{ AND } \text{NSUP} > 4 \text{ AND } \text{NSUB} > 4 \text{ AND } ((\text{Q3OF8516} + \text{Q4OF8516})/\text{QTOF8516} > 0.25)$	PAINT
30	$\text{NCUL} < 2.5$	REPLACE STRUCTURE
27	$\text{NDEC} > 4 \text{ AND } ((\text{Q3OF2310} + \text{Q4OF2310})/\text{QTOF2310PARENT} > 0.25) \text{ OR } ((\text{Q4OF2310})/\text{QTOF2310PARENT} > 0.05) \text{ AND } ((\text{Q3OF2360} + \text{Q4OF2360})/\text{QTOF2360PARENT} > 0.25) \text{ OR } ((\text{Q4OF2360})/\text{QTOF2360PARENT} > 0.05)$	REPLACE JOINTS (not a stand-alone work action)
31	$\text{NDEC} \geq 5 \text{ AND } ((\text{Q4OFRAIL})/\text{QTOFRAIL}) > 0.25$	REPLACE RAILING OR PARAPET (not a stand-alone work action)