Texas Department of Transportation

BOOK 2 – TECHNICAL PROVISIONS

FOR

US 181 HARBOR BRIDGE PROJECT

DESIGN-BUILD PROJECT

ATTACHMENT 19-5
ASSET CONDITION SCORE CALCULATION METHOD NEW HARBOR BRIDGE

ELEMENT CATEGORY	ELEMENT	INSPECTION AND MEASUREMENT METHOD	MEASURE-MENT REF	MEASUREMENT RECORD	WEIGHTING (1 TO 50) [1]	WEIGHTING FACTOR [1]	EXAMPLE RAW ASSET CONDITION SCORE [3]	WEIGHTED SCORE [4]	ELEMENT CATEGORY ASSET CONDITION SCORE [5]
1) ROADWAY									3.6
1.1	**Obstructions and debris**	Visual Inspection	1.1.1	Number of obstructions and debris	25	2.3%	3	0.07	
1.2	**Pavement**	**a) Ruts – Mainlanes, shoulders & ramps** Depth as measured using an automated device in compliance with TxDOT Standards.		*Percentage of wheel path length with ruts greater than ¼" in depth in each Performance Section*					
			1.2.1	• Mainlanes, shoulders and ramps - 3%	10	0.9%	4	0.04	
		10ft straight edge used to measure rut depth for localized areas.	1.2.3	Depth of rut at any location greater than ½"	10	0.9%	4	0.04	
		b) Ride quality		*NOT USED*					
		c) Failures Instances of failures exceeding the failure criteria set forth in the TxDOT PMIS Rater's Manual, including potholes, base failures, punchouts and jointed concrete pavement failures	1.2.4	Individual discontinuities greater than 1/4"	10	0.9%	4	0.04	
		d) Edge drop-offs Physical measurement of edge drop-off level compared to adjacent surface	1.2.12	Occurrence of any failure	5	0.5%	5	0.02	
			1.2.13	Number of instances of edge drop-off greater than 2"	5	0.5%	5	0.02	
1.2	**Pavement**	**e) Skid resistance** ASTM E 274 Standard Test Method for Skid Resistance Testing of Paved Surfaces at 50 MPH using a full scale smooth tire meeting the requirements of ASTM E 524	1.2.14	• Performance Sections with skid numbers for 0.5-mile section of mainlines, shoulders and ramps exceeding 30 and for which investigations as to potential risk of skidding accidents and appropriate remedial actions have been taken.	10	0.9%	5	0.05	
			1.2.15	• Performance Sections with skid numbers for 0.5-mile section of frontage roads exceeding 30 and for which investigations as to potential risk of skidding accidents and appropriate remedial actions have been taken.	10	0.9%	5	0.05	
			1.2.16	• When the skid number is below 25 and/or when required by the Wet Weather Accident Reduction Program, areas categorized as high risk, Developer shall perform a site investigation and perform required corrective action.	10	0.9%	2	0.02	
			1.2.17	Instances where road users are warned of a potential skidding hazard where remedial action is identified.	10	0.9%	2	0.02	
1.3	**Crossovers and other paved areas**	**a) Potholes**	1.3.1	Number of potholes of low severity or higher	5	0.5%	4	0.02	
		b) Base failures	1.3.2	NOT USED	0	0.0%	0	0.00	
1.4	**Joints in concrete**	Visual inspection of joints	1.4.1	Length of unsealed joints greater than ¼"	10	0.9%	3	0.03	
		Measurement of joint width and level difference of two sides of joints	1.4.2	Joint width more than 1" or faulting more than ¼"	10	0.9%	3	0.03	
1.5	**Curbs**	Visual inspection	1.5.1	Continuous curb lengths where more than 10% of the length has defects such as cracks and chips	5	0.5%	3	0.01	
		Physical measurement	1.5.2	Continuous curb lengths where more than 5% of the length has a separation exceeding 0.25" between curb face and adjacent roadway surface	5	0.5%	3	0.01	
		Survey and 10' straight edge	1.5.3	Continuous curb lengths where more than 5% of the length has either the top or face of curbs exceeding 0.5" from intended design alignment	5	0.5%	3	0.01	

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1.6	**Maintenance/Access Roads**	Crown: Flat A shape or super-elevation with 4% cross slopes maintained to minimize ponding	1.6.1	Cross slope less than 3% or more than 6%	2	0.2%	4	0.01	
		Shoulder: Maintain slope away from the travel way and shoulder flush with travel way	1.6.2	Shoulder cross slope less than travel way cross slope; shoulder lower or higher than travel way	2	0.2%	4	0.01	
		Ditch: Maintain size and shape of ditch for proper drainage	1.6.3	Sides of ditches slumping or eroding, or obstructed by debris	2	0.2%	5	0.01	
		Ruts/potholes: Depth as measured using an automated device in compliance with TxDOT standards	1.6.4	Depth of ruts or potholes at any location greater than 1”	2	0.2%	5	0.01	
		Subgrade: Identify and repair any subgrade failures	1.6.5	Locations where subgrade failure is evident	2	0.2%	5	0.01	
2) DRAINAGE									3.1
2.1	**Pipes and Channels**	Visual inspection supplemented by CCTV where required to inspect buried pipe work.	2.1.1	Length of pipe or channel in feet with less than 90% of cross sectional clear area, calculated as the arithmetic mean of the clear cross-sectional areas of individual 10 feet lengths of pipes and channels in each Performance Section.	5	0.5%	5	0.02	
2.2	**Drainage treatment devices**	Visual inspection	2.2.1	Number of devices functioning correctly with means of operation displayed.	5	0.5%	2	0.01	
2.3	**Travel Way**	Visual inspection of water on surface.	2.3.1	Number of instances of hazardous water build-up.	20	1.8%	2	0.04	
2.4	**Discharge systems**	Visual inspection and records	2.4.1	Performance Sections with surface water discharge systems performing their proper function and discharging in compliance with the relevant legislation and permits.	10	0.9%	3	0.03	
2.5	**Protected Species**	Visual inspection	2.5.1	Performance Sections with named species and habitats with protection of these named species and habitats.	20	1.8%	4	0.07	
3) STRUCTURES									3.9
3.1	**Structures having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or springlines of arches or extreme ends of openings or multiple boxes**	Inspection and assessment in accordance with the requirements of federal National Bridge Inspection Standards (NBIS) of the Code of Federal Regulations, 23 Highways – Part 650, the TxDOT Bridge Inspection Manual, and the Federal Administration’s Bridge Inspector’s Reference Manual.		*Records as required in the TxDOT Bridge Inspection Manual*					
		As above	3.1.1	Occurrence of condition rating, in accordance with the TxDOT Bridge Inspection Manual, below **seven** for any deck, superstructure or substructure	50	4.6%	5	0.23	
		As above	3.1.2	Performance Sections with structure components with condition states of one, in accordance with the TxDOT Field Inspection Manual	50	4.6%	5	0.23	

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3.2	**Structure components**	Inspection and assessment in accordance with the requirements of federal National Bridge Inspection Standards (NBIS) of the Code of Federal Regulations, 23 Highways – Part 650, the TxDOT Bridge Inspection Manual, and the Federal Administration's Bridge Inspector's Reference Manual.	3.2.1	Occurrence of condition rating, in accordance with the TxDOT Bridge Inspection Manual, below **seven** for any deck, superstructure or substructure	50	4.6%	3	0.14	
		Visual inspection of Elements listed in (i) through (vii) of the general performance requirement column in the Performance and Measurement Table.	3.2.2	Instances of condition of any element not meeting general performance requirement as determined in accordance with Good Industry Practice.	50	4.6%	4	0.18	
3.3	**Integral wearing surface**	Concrete cover measured at [10ft] intervals	3.3.1	Occurrence of any instance where integral wearing surface thickness is less than [50%] of design value	25	2.3%	4	0.09	
		Cracks measured at [3 ft] intervals on the surface of the deck prior to 3 hours after sunrise at concrete age greater than 28 days	3.3.2	Instances of cracks wider than [0.025] inches	25	2.3%	2	0.05	
		De-lamination or spalling	3.3.3	Instances of de-lamination or spalling	10	0.9%	2	0.02	
3.4	**Stay Cables**	Visual and hands-on inspection	3.4.1	Instances of damage or deterioration of the corrosion protection system including coatings, protective pipes and anchorage units	20	1.8%	3	0.06	
			3.4.2	Instances of damaged or broken strand / wire	50	4.6%	5	0.23	
			3.4.3	Instances of stay cable damping system not operating as intended including failure to provide the minimum design level of damping	20	1.8%	5	0.09	
			3.4.4	Instances of stay cable acoustic monitoring system not operating as intended including failure to transmit measured information.	20	1.8%	5	0.09	
3.5	**Inspection and access equipment**	Visual and hands-on inspection	3.5.1	Instances of loose assemblies or nuts and bolts not fully tightened	10	0.9%	2	0.02	
			3.5.2	Instances of defects in surface protection such as failures of coating systems to bare metal or loss of galvanizing	10	0.9%	1	0.01	
			3.5.3	Instances of failures to conform with relevant standards for fixed and mobile inspection facilities, hoists and lifts	10	0.9%	2	0.02	
			3.5.4	Instances where maintenance traveler fails to operate smoothly under power or braking, has uneven or inconsistent movement of any driven component or exhibits binding or swaying, in each case in a manner that exceeds normal operational parameters.	10	0.9%	3	0.03	
3.6	**Ship impact protection system**	Visual inspection	3.6.1	Instances of marine boring (timber systems)	10	0.9%	5	0.05	
			3.6.2	Instances of corrosion that would reduce the system resistance to below its intended design state	10	0.9%	5	0.05	
			3.6.3	Instances of damage from vessel impact that would reduce the system resistance to below its intended design state or would cause a material reduction in the remaining service life	10	0.9%	4	0.04	

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3.7	**Corrosion protection systems**	Visual inspection	3.7.1	Instances of failure of coating system down to bare metal	15	1.4%	3	0.04	
			3.7.2	Loss of galvanizing	10	0.9%	2	0.02	
			3.7.3	Damaged or peeling material	10	0.9%	3	0.03	
			3.7.4	Noncompliance with manufacturer's recommendations for the maintenance and re-application of coatings	10	0.9%	4	0.04	
3.8	**Lightning Protection Systems**	Inspection and assessment in accordance with the requirements of Underwriters Laboratories, Inc. (UL) 96 and Lightning Protection Institute (LPI) 175.	3.8.1	Noncompliance with specified standards.	5	0.5%	5	0.02	
			3.8.2	Instances of lightning protection system not operating as intended.	5	0.5%	5	0.02	
3.11	**Load Ratings**	Load rating calculations in accordance with the Manual for Bridge Evaluation and the TxDOT Bridge Inspection Manual and per the Technical Provisions	3.11.1	Number of structures with load restrictions for Texas legal loads (including legally permitted vehicles) in each Performance Section	10	0.9%	5	0.05	
3.12	**Access Points**	Visual Inspection	3.12.1	Number with defects in locks or entryways	5	0.5%	3	0.01	
3.14	**Structural Surfaces**	Visual Inspection	3.14.1	Number of areas where graffiti is present	5	0.5%	3	0.01	
4) PAVEMENT MARKINGS, OBJECT MARKERS, BARRIER MARKERS AND DELINEATORS									3.9
4.1	**Pavement markings**	**a) Markings - General**							
		Portable retroreflectometer, which uses 30 meter geometry, meeting the requirements described in ASTM E 1710	4.1.1	Percentage of total length of pavement marking in each Performance Section meeting the minimum retroreflectivity 175 med/sqm/lx for white	5	0.5%	3	0.01	
			4.1.2	Percentage of total length of pavement marking in each Performance Section meeting the minimum retroreflectivity 125 med/sqm/lx for white	5	0.5%	4	0.02	
		Physical measurement	4.1.3	Length of pavement marking in each Performance Section with more than 5% loss of area of material at any point	5	0.5%	4	0.02	
			4.1.4	Length of pavement marking in each Performance Section with spread more than 10% of specified dimensions.	5	0.5%	4	0.02	
		b) Profile Markings							
		Visual inspection	4.1.5	Percentage of total length of pavement marking in each Performance Section performing its intended function and compliant with relevant regulations	5	0.5%	3	0.01	
4.2	**Raised Reflective Markings**	Visual inspection	4.2.1	Number of markers associated with road markings that are ineffective in any 10 consecutive markers. (Ineffective includes missing, damaged, settled or sunk)	2	0.2%	5	0.01	
			4.2.2	A minimum of four markers are visible at 80' spacing when viewed under low beam headlights.	2	0.2%	5	0.01	
			4.2.3	Uniformity (replacement raised reflective pavement markers have equivalent physical and performance characteristics to adjacent markers).	2	0.2%	5	0.01	
4.3	**Delineators and Markers**	Visual inspection	4.3.1	Number of object markers or delineators in each Performance Section that is defective or missing	2	0.2%	4	0.01	

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5) GUARDRAILS, SAFETY BARRIERS AND IMPACT ATTENUATORS									3.8
5.1	**Guardrails and Safety Barriers**	Visual inspection	5.1.1	Performance Sections with all guard rails and safety barriers appropriately placed and correction installed	20	1.8%	3	0.06	
			5.1.2	Performance Sections with all guard rails and safety barriers free from defects	20	1.8%	5	0.09	
			5.1.3	Performance Sections with all guard rails and safety barriers at correct heights	5	0.5%	5	0.02	
			5.1.4	Performance Sections with all guard rails and safety barriers at correct distances from roadway obstacles	5	0.5%	3	0.01	
5.2	**Impact Attenuators**	Visual inspection	5.2.1	Performance Sections will all impact attenuators appropriately placed and correctly installed.	5	0.5%	2	0.01	
6) TRAFFIC SIGNS									3.9
6.1	**General - All Signs**	**a) Retroreflectivity** Determination of Coefficient of retro-reflectivity	6.1.1	Number of signs with actual reflectivity below the requirements of TxDOT's TMUTCD in each Performance Section	20	1.8%	3	0.06	
		b) Face damage Visual inspection	6.1.2	Number of signs in each Performance Section with face damage greater than 5% of area	10	0.9%	4	0.04	
		c) Placement Visual inspection	6.1.3	All signs in each Performance Section are placed in accordance with TxDOT's Sign Crew Field Book including not twisted or leaning	5	0.5%	4	0.02	
		d) Obsolete signs Visual inspection	6.1.4	Number of obsolete signs in each Performance Section	5	0.5%	5	0.02	
		e) Sign Information Visual inspection	6.1.5	All sign information in each Performance Section is of the correct size, location, type and wording to meet its intended purpose	5	0.5%	5	0.02	
		f) Dynamic Message Signs Visual inspection	6.1.6	Dynamic message signs are fully functioning	5	0.5%	3	0.01	
6.2	**Gantries**	Visual inspection	6.2.1	Number with defects in surface protection system	10	0.9%	5	0.05	
			6.2.1	Number with loose nuts and bolts	10	0.9%	4	0.04	
			6.2.3	Number with graffiti	10	0.9%	4	0.04	
7) TRAFFIC SIGNALS (NOT PART OF MAINTAINED ELEMENTS)									

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8) LIGHTING									4.3
8.1	**Roadway Lighting**	**a) Mainlane lights operable** Night time inspection or automated logs	8.1.1	Performance Sections with less than 90% of lights functioning correctly at all times	25	2.3%	4	0.09	
		b) Mainlane lights out of action Night time inspection or automated logs	8.1.2	Instances of more than two consecutive lights out of action	25	2.3%	5	0.12	
8.2	**Sign Lighting**	Night time inspection or automated logs	8.2.1	Number of instances of more than one bulb per sign not working in each Performance Section	10	0.9%	5	0.05	
8.3	**Electrical Supply**	Testing to meet NEC regulations, visual inspection	8.3.1	Inspection records showing safe installation and maintenance in each Performance Section	10	0.9%	4	0.04	
8.4	**Access Panels**	Visual Inspection	8.4.1	Number of instances of missing or damaged access panels in each Performance Section	5	0.5%	4	0.02	
8.5	**High Mast Lighting**			*NOT USED*					
8.6	**Navigational Lighting**	Night time inspection or automated logs	8.5.1	Number of instances of more than one bulb per sign not working in each Performance Section	15	1.4%	4	0.06	
8.7	**Architectural Lighting**	Night time inspection or automated logs	8.6.1	Instances of architectural lighting with more than 10% of lamps not functioning	25	2.3%	4	0.09	
8.8	**Bridge Inspection Lighting**	Night time inspection or automated logs	8.7.1	Instances of bridge inspection lighting where failures could adversely impact safety or security of inspections or access	10	0.9%	4	0.04	
9) FENCES, WALLS AND SOUND ABATEMENT				*NOT USED*					
9.1	**Design and Location**	Visual Inspection		*NOT USED*					
9.2	**Construction**	Structural assessment if visual inspection warrants		*NOT USED*					
9.3	**Operation**	Structural assessment if visual inspection warrants		*NOT USED*					
10) ROADSIDE MANAGEMENT (NOT USED)									
11) REST AREAS AND PICNIC AREAS (NOT USED)									
12) EARTHWORKS, EMBANKMENTS AND CUTTINGS (NOT USED)									
13) ITS EQUIPMENT									4.3
13.1	**ITS Equipment - Maintenance**	Visual Inspection	13.1.1	Inspection records showing compliance with requirements for maintenance of ITS equipment in each Performance Section.	5	0.5%	4	0.02	
13.2	**Dynamic Message Sign Equipment**	Defect measurement dependent on equipment	13.2.1	Inspection records showing compliance with requirements for Dynamic Message Signs in each Performance Section	5	0.5%	4	0.02	
13.3	**CCTV Equipment**	Defect measurement dependent on equipment	13.3.1	Inspection records showing compliance with requirements for CCTV equipment in each Performance Section	5	0.5%	4	0.02	
13.4	**Vehicle Detection Equipment**	Defect measurement dependent on equipment	13.4.1	Inspection records showing compliance with requirements for vehicle detection equipment in each Performance Section	5	0.5%	4	0.02	
			13.4.2	Traffic Detector Loop circuit's inductance to be > 50 and < 1,000 micro henries.	5	0.5%	5	0.02	
			13.4.3	Insulation resistance to be > 50 meg ohms.	5	0.5%	5	0.02	
14) TOLLING FACILITIES AND BUILDINGS (NOT USED)									
15) AMENITY (NOT USED)									

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16) SNOW AND ICE CONTROL (NOT PART OF ASSET CONDITION SCORE)									
16.1	**Travel lanes**	Maximum 1hr response time to complete manning and loading of spreading vehicles.	16.1.1	Inspection records showing compliance with requirements for snow and ice control in each Performance Section	0	0.0%			
		Maximum 2hrs from departure from loading point to complete treatment and return to loading point.	16.1.2	Inspection records showing compliance with requirements for snow and ice control in each Performance Section	0	0.0%			
		Maximum 1hr response time for snow and ice clearance vehicles to depart from base.	16.1.3	Inspection records showing compliance with requirements for snow and ice control in each Performance Section	0	0.0%			
16.2	**Weather Forecasting**	Operations plan details the process and procedures in place and followed.	16.2.1	Inspection records showing compliance with requirements for weather forecasting in each Performance Section	0	0.0%			
16.3	**Operational Plans**	Operations plan details the process and procedures in place and followed.	16.3.1	Inspection records showing compliance with snow and ice clearance plans in each Performance Section	0	0.0%			
16.4	**Operations and Maintenance Manual**	Operations and maintenance instructions detail the process and procedures in place and followed.	16.4.1	Inspection records showing compliance with operations and maintenance instructions in each Performance Section.	0	0.0%			
17) INCIDENT RESPONSE (NOT PART OF ASSET CONDITION SCORE)									
17.1	**General**	Response times are met for 98% of incidents measured on a 1 year rolling basis.	17.1.1	Inspection records showing compliance with the MMP and requirements regarding incident response times in each Performance Section	0	0.0%			
		No complaints from Emergency Services.	17.1.2	Inspection records showing compliance with the MMP and requirements regarding incident response times in each Performance Section	0	0.0%			
17.2	**Hazardous Materials**	MMP details the process and procedures in place and followed.	17.2.1	Inspection records showing compliance with the MMP details regarding hazardous materials in each Performance Section	0	0.0%			
17.3	**Structural Assessment**	Inspections and surveys as required by incident	17.3.1	Inspection records showing compliance with the MMP and requirements for incidents in each Performance Section	0	0.0%			
17.4	**Temporary and permanent remedy**	Review and inspection of the incident site	17.4.1	Inspection records showing compliance with requirements for temporary and permanent remedy for incidents in each Performance Section	0	0.0%			
18) CUSTOMER RESPONSE (NOT PART OF ASSET CONDITION SCRE)									
18.1	**Response to inquiries**	Contact the customer within 48 hours following initial customer inquiry.	18.1.1	Percentage of responses within specified times in each Performance Section.	0	0.0%			
		All work resulting from customer requests is scheduled within 48 hours of customer contact.	18.1.2	Demonstrated by O&M Records	0	0.0%			
		Follow-up contact with the customer within 72 hours of initial inquiry.	18.1.3	Demonstrated by O&M Records	0	0.0%			
		All customer concerns/requests are resolved to TxDOT's satisfaction within 2 weeks of the initial inquiry.	18.1.4	Demonstrated by O&M Records	0	0.0%			
18.2	**Customer Contact Line**	Instances of line out of action or unmanned	18.2.1	Number of operations records showing non availability of the customer contact line in each Performance Section including complaints from public.	0	0.0%			

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19) SWEEPING AND CLEANING									4.5
19.1	**Sweeping**	Buildup of dirt, ice, rock, debris, etc. on roadways and bridges not to accumulate greater than 24" wide or 1/2" deep	19.1.1	Inspection records showing compliance with requirements for sweeping in each Performance Section.	15	1.4%	4	0.06	
19.2	**Litter**	No more than 20 pieces of litter per roadside mile shall be visible when traveling at highway speed.	19.2.1	Inspection records showing compliance with requirements regarding litter pick-up in each Performance Section.	15	1.4%	5	0.07	
						100.0%			
AGGREGATED ASSET CONDITION SCORE FOR NEW HARBOR BRIDGE AFTER SUBSTANTIAL COMPLETION [6]								**3.89**	

NOTES FOR ASSET CONDITION SCORE CALCULATION

1 Weighting is the assigned weighting for each Measurement Record on a scale of 1-50 for purpose of Asset Condition Score

2 Weighting Factor is the Weighting expressed as a percentage for each Measurement Record and totaling 100%

3 Example Raw Asset Condition Score = Asset Condition Score for each Measurement Record across all inspected Performance Sections

4 Weighted Score = Raw Asset Condition Score x Weighting Factor

5 Element Category Asset Condition Score = Sum of Weighted Score / Sum of Weighting Factors for each Element Category

6 Aggregated Asset Condition Score = Sum of Weighted Scores for each Measurement Record for all Element Categories

92	Number of non-zero Weightings
1083	Total of Weightings
11.77	Average Weighting