

Appendix A – Information on Bridge Maintenance Programs

Table A1- 1 Definitions of Maintenance – Selected Quotes

Source	Definition
NCHRP (Ref 36)	Highway maintenance is the act of preserving roadway, roadside, structure and facilities as nearly as possible in their as-constructed or subsequently improved condition.
AASHTO (Ref 16)	Operation and Maintenance (O&M) . Operations and maintenance encompasses all of the activities and services required to maintain infrastructure assets and provide services to the traveling public. O&M can generally be viewed as any activity other than new construction, roadway capacity improvements, expansion, or major rehabilitation.
FHWA (Ref 39)	"A preventive maintenance activity shall be eligible for Federal assistance under this title of the State demonstrates to the satisfaction of the Secretary that the activity is a cost-effective means of extending the useful life of a Federal-aid highway." Routine maintenance is defined as "Maintenance work that is planned and performed on a routine basis to maintain and preserve the condition of the highway system or to respond to specific conditions and events that restore the highway system to an adequate level of service."
AASHTO (Ref 2)	Physical Maintenance . Cleaning, painting, and repairing. Replacements (using approximately same design) of rails, floors, stringers, or beams. Replacement of walls in kind. Repair of drawbridges and ferries. Preventive bridge maintenance is directed at performing activities that will preserve bridge components in their present (or intended) condition, forestalling development of a structural deficiency. Preventive maintenance activities can be classified into two groups: scheduled and response. (1) Scheduled (programmed at intervals): Typical activities that are conducted on a scheduled interval basis include: <ul style="list-style-type: none"> • cleaning decks, seats, caps, and salt splash zones; • cleaning bridge drainage systems; • cleaning and lubricating expansion-bearing assemblies; and • sealing concrete decks or substructure elements. (2) Response (done as needed and as identified through the inspection process): Typical activities that are performed on an as-needed basis include: <ul style="list-style-type: none"> • resealing expansion joints; • painting structural steel members; • removing debris from waterway channels; • replacing wearing surfaces; • extending or enlarging deck drains; and • repairing damage from a vehicle hitting the structure. The concept of preventive bridge maintenance suggests that many relatively small repairs and activities are performed to keep the bridge in good condition and avoid large expenses in major bridge rehabilitation or bridge replacement.
California (Ref 27)	Bridge maintenance includes work such as repairing damage or deterioration in various bridge components; removing debris and drift from piers, bearing seats, abutments, etc.; cleaning out drains; repairing expansion joints; cleaning and painting structural steel; sealing concrete surfaces; etc. Also included are the maintenance of electrical and mechanical equipment on moveable span bridges and the operation of the moveable

Source	Definition
	<p>spans.</p> <p>(A) "The preservation and keeping of rights-of-way, and each type of roadway, structure, safety convenience or device, planting, illumination equipment and other facility, in the safe and usable condition to which it has been improved or constructed, but does not include reconstruction or other improvements."</p> <p>(B) "Operation of special safety conveniences and devices, and illuminating equipment."</p> <p>(C) "The special or emergency maintenance or repair necessitated by accidents or by storms or other weather conditions, slides, settlements or other unusual or unexpected damage to a roadway, structure or facility."</p>
Idaho (Ref 28)	<p>Preventative maintenance is a planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system.</p>
Michigan (Ref 6)	<p>Scheduled maintenance activities maintain the existing serviceability, and reduce deterioration rates on bridges.</p> <p>The anticipated work should have little or no impact to traffic and have very little traffic control costs.</p> <p>The work should be of short duration, typically completed within one working day.</p> <p>The work should be focused on activities that if left unattended will cause deterioration of the structure leading to more expensive repairs.</p> <p>Priority should be given to corridors where the same small task can be performed on many bridges.</p>
Montana (Ref 34)	<p>"Maintenance" is work that is performed to care for and maintain the highway and associated features so that it substantially retains its original intended use and function.</p>
Ohio (Ref 44)	<p>Routine Maintenance: 1) the maintenance which keeps a highway including all of its elements in or as close as possible to its original constructed condition or its subsequently improved condition and 2) those traffic services and operations which provide safe, convenient, and economic highway transportation for the public.</p>
Ohio (Ref 35)	<p>Preventive maintenance can be defined as the act of keeping a structure in its as-built condition and/or protecting it from inevitable deterioration due to environment, traffic vibration and deicing chemicals.</p>
Oregon (Ref 24)	<p>In ODOT, the term "maintenance" encompasses the activities associated with keeping up, preserving, repairing, or restoring existing transportation infrastructure, generally on the State Highway system. Those activities, and related work, comprise the Maintenance program for ODOT.</p> <ul style="list-style-type: none"> • Reactive. Reactive activities are incident driven. They are performed to correct or respond to an immediate problem, such as a pothole or a vehicle crash, or to react to weather conditions or associated problems, such as snowfall, ice, heavy rainfall, flooding, slides, etc. • Proactive. Proactive activities are generally planned in advance and are performed to forestall significant concerns or damage to the transportation infrastructure and to reduce lifecycle costs. They involve inspection, upkeep, preservation, or restoration activities. Proactive activities may require spending money now to perform an activity in order to require less future work, reduce the amount or cost of future work, or to postpone the more costly work.

Source	Definition
Texas (Ref 31)	<p>Bridge Maintenance Policy</p> <p>The structural and operational characteristics of all highway bridge structures should be preserved as near as practical to the originally constructed or subsequently modified conditions.</p> <p>Bridge joints are the causes of many bridge problems. Bridge joints should be evaluated during the routine bridge inspection and if needed, cleaned and resealed.</p> <p>Such objectives are accomplished by timely performance of preventive maintenance and repair as determined by constant alertness and deliberate inspection.</p> <p>Attention should also be given to routine or preventive maintenance work such as:</p> <ul style="list-style-type: none"> <input type="checkbox"/> cleaning the roadway <input type="checkbox"/> restoration, delineation and signing <input type="checkbox"/> cleaning and servicing joints and bearings <input type="checkbox"/> removal of drift from around substructures.
Texas (Ref 25)	<p>Definitions of Maintenance Work</p> <p>Maintenance work is categorized into three areas:</p> <ul style="list-style-type: none"> ◆ routine maintenance ◆ preventive maintenance ◆ major maintenance. <p>Structures:</p> <p>Routine Maintenance - Repair of substructures, superstructures, decks, joints, approach slabs and railing; spot painting; repair and operation of movable bridges; installation of temporary bridges; repair and installation of fender systems.</p> <p>Preventive Maintenance Steel structure cleaning and repainting or the installation of other coatings; installation of bridge deck protection; joint cleaning and sealing or replacement.</p> <p>Major Maintenance Bridge rehabilitation, reconstruction, or replacement. Replacement of structures only as a result of major disaster when no other funds or programs are available.</p>
Virginia (Ref 8)	<p>Preventive Maintenance (PM) – Planned activities that are performed in advance of a need for repair or in advance of accumulated deterioration, so as to avoid such occurrences and reduce or arrest the rate of future deterioration. The activities may correct minor defects as a secondary benefit.</p>
Washington (Ref 32)	<p>Area maintenance crews are also expected to maintain or repair minor approach settlements, approach guardrail damage, plugged bridge drains, sweeping of bridge decks, asphalt overlays and other items that are considered part of normal maintenance operations.</p> <p>Additionally, removal of dirt and debris accumulation on timber caps, timber stringers, steel expansion devices (bearings), lower chords of steel bridges and sign bridge bases are considered routine maintenance activity. However, at times these can become critical to a structure and will be added to the repair list.</p> <p>Minor repairs to railings, curbs, concrete decks, expansion joints, etc., can be performed without the individual approval of the WSDOT Headquarters Bridge and Structures Office. Similarly, drift may be removed, clearance lights changed, etc.</p>

Table A1- 2 Categories of Bridge Maintenance Work

Source	Category
AASHTO (Ref 2)	<p>(1)Scheduled (programmed at intervals):Typical activities that are conducted on a scheduled interval basis include:</p> <ul style="list-style-type: none"> • cleaning decks, seats, caps, and salt splash zones; • cleaning bridge drainage systems; • cleaning and lubricating expansion-bearing assemblies; and • sealing concrete decks or substructure elements. <p>(2)Response (done as needed and as identified through the inspection process):Typical activities that are performed on an as-needed basis include:</p> <ul style="list-style-type: none"> • resealing expansion joints; • painting structural steel members; • removing debris from waterway channels; • replacing wearing surfaces; • extending or enlarging deck drains; and • repairing damage from a vehicle hitting the structure.
Alabama (Ref 13)	<ol style="list-style-type: none"> 1. ROUTINE UNLIMITED ACTIVITIES - High priority performed when needed, in the amounts required to minimize the deficiency. Examples: Spot Premix Patching, Snow and Ice Control, and Emergency Maintenance. 2. ROUTINE LIMITED ACTIVITIES - Quantities of work can be established and firmly adhered to. Control exercised on the basis of planned work units. Examples: Mowing, Bridge Inspection 3. SPECIAL AUTHORITY ACTIVITIES - Work activities are not urgently needed. Planned quantity represents an average value. Activities need to be coordinated with the total highway improvement program. Examples: Erosion Control, Shovel Ditching, and Brush and Tree Cutting, Major Repairs of Bridges. Minor Maintenance Improvements. 4. OVERHEAD ACTIVITIES - Service and overhead activities required but not related to the maintenance of specific roadway or structure elements. Examples: Structure Attendant, Weighing Operations, Standby Time, Training, and Materials Handling.
Oregon (Ref 24)	<ul style="list-style-type: none"> • Reactive. Reactive activities are incident driven. They are performed to correct or respond to an immediate problem, such as a pothole or a vehicle crash, or to react to weather conditions or associated problems, such as snowfall, ice, heavy rainfall, flooding, slides, etc. • Proactive. Proactive activities are generally planned in advance and are performed to forestall significant concerns or damage to the transportation infrastructure and to reduce lifecycle costs. They involve inspection, upkeep, preservation, or restoration activities. Proactive activities may require spending money now to perform an activity in order to require less future work, reduce the amount or cost of future work, or to postpone the more costly work.
Texas (Ref 25)	<p>Routine Maintenance - Repair of substructures, superstructures, decks, joints, approach slabs and railing; spot painting; repair and operation of movable bridges; installation of temporary bridges; repair and installation of fender systems.</p> <p>Preventive Maintenance Steel structure cleaning and repainting or the installation of other coatings; installation of bridge deck protection; joint cleaning and sealing or replacement.</p> <p>Major Maintenance Bridge rehabilitation, reconstruction, or replacement. Replacement of</p>

Source	Category
	structures only as a result of major disaster when no other funds or programs are available.

Table A1- 3 Actions from the AASHTO Maintenance Manual

Component	Element	Action	Sub-Action
Approach embankment		Install	paving at discharge pipe
Approach embankment		Install	riprap at discharge pipe
Approach pavement	Concrete pavement	Modify	Install pavement relief joint
Approach embankment	Slope	Pave	At deck runoff
Bearings	bearing plate	Reset	lubricate
Bearings	elastomeric bearings	Reset	reposition
Bearings	pot bearings	Clean	
Bearings	pot bearings	Replace	
Bearings	rocker bearings	Clear	debris
Bearings	rocker bearings	Paint	spot
Bearings	rocker bearings	Replace	pins
Bearings	rocker bearings	Reset	lubricate
Bearings	roller bearing	Clean	Bearing area
Bearings	roller bearings	Replace	
Bearings	roller bearings (nest)	Reset	lubricate
Bearings	sliding plate bearing	Clean	Sliding area
Channel		Clear	debris
Channel		Clear	debris
Channel		Modify	channel
Channel		Modify	Construct check dams
Channel		Modify	Construct dikes
Channel		Modify	Construct retards
Channel		Modify	Construct spur dikes
Channel		Modify	Flood relief sections
Channel		Modify	Install bulkheads
Channel		Modify	Install concrete block matting revetment
Channel		Modify	Install concrete pavement revetment
Channel		Modify	Install concrete-filled fabric mat revetment
Channel		Modify	Install deflectors
Channel		Modify	Install dumped riprap revetment
Channel		Modify	Install gabion riprap
Channel		Modify	Install grout-bag revetment
Channel		Modify	Install grouted riprap revetment
Channel		Modify	Install hand-placed riprap revetment
Channel		Modify	Install jack fields

Component	Element	Action	Sub-Action
Channel		Modify	Install sacked concrete revetment
Channel		Modify	Install sediment trap
Channel		Modify	Install tetrapod revetment
Channel		Modify	Install vegetation revetment
Channel		Modify	Legislation (to reduce sediment source)
Channel	At substructure	Repair	Scour holes
Channel		Repair	Rebuild Scoured Streambeds
Curbs		Clean	flush
Curbs	Asphalt curbs	Repair	damage
Curbs	Concrete curbs	Seal	surface
Curbs	Concrete curbs	Replace	deteriorated
Curbs	Concrete curbs	Replace/splice	Reinforcing steel
Curbs	Concrete curbs	Seal	cracks
Curbs	Metal curbs	Paint	
Curbs	Metal curbs	Replace	Anchor bolts
Curbs	Metal curbs	Replace	damaged
Curbs	Stone curbs	Repoint	
Curbs	Stone curbs	Reset	Loose stones
Curbs	Timber curbs	Repair	Damaged, deteriorated
Curbs	Timber curbs	Install	Galvanized bolts
Curbs	Timber curbs	Install	Treated lumber
Deck		Clean	
Deck		Overlay	Cement-based, modified cement
Deck		Overlay	Membrane and asphalt
Deck		Overlay	polymer
Deck		Overlay	Steel fiber concrete
Deck		Patch	Type 'A' Epoxy polymer and sand
Deck		Patch	Type 'A' Above top steel
Deck		Patch	Type 'B' 25mm below top steel
Deck		Patch	Type 'C' Full depth
Deck		Replace	contaminated
Deck		Replace	deteriorated
Deck		Replace	Reinforced concrete
Deck		Replace	Steel grid
Deck		Replace	timber
Deck		Replace	Timber plank
Deck		Seal	cracks
Deck		Clean	Sweep or flush at joint
Deck		Repair	surface at joint
Deck	Concrete	Modify	Install impressed Cathodic protection
Deck	Concrete	Modify	Install sacrificial Cathodic protection

Component	Element	Action	Sub-Action
Deck		Seal	Cracks w/epoxy
Deck		Seal	Cracks w/urethane
Deck	steel grate decks	Clean	
Deck	surface	Seal	
Deck	wearing surface	Replace	
Drains		Modify	Install trough at expansion joints
Drains	expansion joint troughs	Clean	
Drains	downspouts	Clean	
Drains	scupper	Clean	
Drains	scupper	Enlarge	
Drains	scupper	Extend	
Joints	Filler	Replace	Joint filler
Joints	Filler	Re-seal	Joint filler
Joints	closed joints	Clean	
Joints	Cushion seal anchor	Replace	anchor
Joints	cushion seal joint	Repair	
Joints	cushion seal joint	Reset	Re-attach
Joints	cushion seal joints	Clean	
Joints	expansion joints	Resealing	
Joints	modular dam joints	Clean	
Joints	Modular joints	Inspect	For damage
Joints	neoprene compression seal	Inspect	For cracks and deterioration
Joints	neoprene membrane (strip) seals	Clean	Remove debris
Joints	neoprene membrane (strip) seals	Replace	
Joints	neoprene membrane (strip) seals	Reset	Re-attach
Joints	open joints	Clean	
Joints	open joints	Clean	troughs
Parapet		Repair	collision
Parapet	salt splash zones	Clean	
Railings	aluminum railing post	Caulk	Isolate from concrete
Railings	concrete railings	Repair	conduit
Railings	concrete railings	Repair	damaged
Railings	steel pipe/tubular railing	Repair	Weld new anchor to embed
Railings	steel pipe/tubular railing	Replace	Corroded section
Railings	steel pipe/tubular railing	Replace	Damaged anchor bolts
Railings	steel pipe/tubular railing	Spot paint	

Component	Element	Action	Sub-Action
Railings	steel pipe/tubular railing	Spot paint	At concrete
Railings	steel pipe/tubular railing	Spot paint	Zinc-rich
Railings	steel pipe/tubular railing	Repair	collision
Railings	steel pipe/tubular railing	Reset	Loose bolts
Railings	steel-to-aluminum contact surfaces	Caulk	connection
Railings	temporary railing	Install	temporary
Sidewalks		Seal	surface
Substructure		Clean	flush
Substructure		Clean	sweep
Substructure		Paint	Coatings against salt
Substructure		Repair	collision
Substructure	Abutment Faces	Repair	
Substructure	below grating	Install	shield
Substructure	At open joints	Paint	
Substructure	Bearing seats	Clean	
Substructure	Cap Piles	Modify	subfooting
Substructure	Concrete Piles	Patch	
Substructure	Concrete substructure	Paint	Protective coating
Substructure	Concrete substructure	Paint/coat	
Substructure	Concrete substructure	Patch	Deteriorated areas.
Substructure	Concrete substructure	Patch	Deteriorated. At water line
Substructure	Concrete substructure	Repair	Dense concrete application
Substructure	Concrete substructure	Repair	Fiberglass liners
Substructure	Concrete substructure	Seal	Cracks using pourable membrane
Substructure	Concrete substructure	Seal	surface
Substructure	Concrete substructure	Seal	underwater
Substructure	Concrete substructure	Seal	surface using silane, silicate, siloxane, or high-molecular-weight methacrylate (HMWM))
Substructure	Pier caps	Clean	
Substructure	Pier caps at grid deck	Clean	
Substructure	Pile Shell Repair	Repair	shell
Substructure	Pressure Inject Underwater Cracks	Seal	cracks
Substructure	Repair Settled Piers	Repair	Settlement
Substructure	Repair Spread Footings	Repair	
Substructure	Repair	Seal	Cracks with epoxy
Substructure	Repair	Seal	Cracks. V-cut and grout
Substructure	Repair Tilted Piers	Repair	Tilt

Component	Element	Action	Sub-Action
Substructure	Salt splash zones	Clean	
Substructure	Steel H-Piles	Repair	Splice H-pile
Substructure	Steel	Paint	At drains
Substructure	Steel pile	Repair	Steel scab plate
Substructure	Steel piles/bents	Paint	
Substructure	Timber caps	Repair	
Substructure	Timber caps	Repair	Splice new timbers
Substructure	Timber caps	Replace	
Substructure	Timber piles	Install	Steel armor
Substructure	Timber piles	Install	Helper bent
Substructure	Timber piles	Splice	Steel extension
Substructure	Timber substructure	Clear	Scalp. Grub.
Substructure	Timber substructure.	Coat	With preservative at new bolts.
Substructure	Wing Walls	Repair	
Superstructure		Clean	Salt splash zones
Superstructure		Clean	Beams and girders under grid deck
Superstructure		Repair	collision
Superstructure		Paint	Apply protective coatings below grating
Superstructure		Paint	at open joints
Superstructure	Prestressed-Concrete Beams	Repair	damaged
Superstructure	Reinforced-Concrete Beams	Repair	damaged
Superstructure	Steel	Paint	At drains
Superstructure	Steel Beam	Repair	Heat straighten
Superstructure	Steel Beams	Repair	damaged
Superstructure	Steel members	Clean and paint	All methods
Superstructure	Steel members	Clean and paint	Chemical clean
Superstructure	Steel members	Clean and paint	Hand clean
Superstructure	Steel members	Clean and paint	overcoat
Superstructure	Steel members	Clean and paint	Power clean
Superstructure	Steel members	Clean and paint	Remove lead-based paint
Superstructure	Steel members	Paint	
Superstructure	Timber beam	Modify	Sister timber beams
Superstructure	Timber beam	Modify	Steel scab plates
Superstructure	Truss	Modify	install cable
Superstructure	Truss	Modify	install strut
Superstructure	Truss	Modify	Steel scab plates
Superstructure	Truss	Modify	Top lateral bracing (for clearance)

Component	Element	Action	Sub-Action
Superstructure	Truss	Repair	Compression member
Superstructure	Truss	Repair	eyebars
Superstructure	Truss	Repair	member
Superstructure	Truss	Repair	Tension member
Superstructure	Truss	Replace	eyebars
Superstructure	Truss	Replace	member
Superstructure	Weathering steel	Clean and paint	
Traffic	flagging	Flag	
Traffic	signs	Set, maintain	
Traffic	Control devices	Set, maintain	

Table A1- 4 Alabama DOT – Maintenance Codes for Work Crews

Maintenance Manual (1995). Alabama Dept. of Transportation, Montgomery, 217p.

Work Activity	Name	Description
B01	Deck/Drain/Joint Cleaning	Regular cleaning of bridge deck, drain holes, drains, expansion joints, and bridge seats. Cleaning of expansion joints is specifically included in this activity.
B02	Curb/Rail/Fence Repair	Maintenance, repair or replacement of all types of bridge rails, handrails, posts, post blocks, post brackets, curbs, wheelguards, sidewalks, and other elements specifically related to the curbs, walks, and rails, including fencing on top of rails.
B03	Joint Repair – Open	Maintenance and repair of open bridge joints, such as grouting anchors, welding additional anchors, replacing or removing angles, plates and bolts.
B04	Joint Repair - Sealed	Maintenance and repair of sealed bridge joints including removal and/or replacement of sealed joint material, plates, angles, anchors, and bolts.
B05	Minor Deck Repair - Steel	Maintenance, repair or replacement of a small portion of the deck. Includes the placement/removal or repair of approved overlays. This includes the clean-up, capture, containment, and disposal of any residue.
B06	Minor Deck Repair - Concrete	Maintenance, repair or replacement of a small portion of the deck. Includes the placement/removal or repair of approved overlays. This includes the clean-up, capture, containment, and disposal of any residue.
B07	Minor Deck Repair - Timber	Maintenance, repair or replacement of a small portion of the deck. Includes the placement/removal or repair of approved overlays. This includes the clean-up, capture, containment, and disposal of any residue.
B08	Major Deck Repair - Steel	Major repair or replacement of a significant portion of the deck or components such as grid deck (filled or open) and plates. includes the clean-up, capture, containment, and disposal of any residue. Also includes placement or removal of overlay.
B09	Major Deck Repair - Concrete	Major repair or replacement of a significant portion of the deck. Includes the clean-up, capture, containment, and disposal of any residue. Also includes placement or removal of overlay.
B10	Major Deck Repair - Timber	Major repair or replacement of a significant portion of the deck or deck components such as runners, and transverse or diagonal flooring or sub-flooring. Includes clean-up, capture, containment, and disposal of any residue. Also includes placement or removal of overlays.
B11	Minor Superstructure Member Repair - Steel	Minor repair of steel superstructure members such as welding, rivet, or bolt replacement to diaphragms, bracing, trusses, and minor repair or servicing of bearing assemblies.
B12	Minor Superstructure Member Repair - Concrete	Minor repair of concrete superstructure members such as spall repair, crack repair (epoxy injection), and minor repair or servicing of bearing assemblies.
B13	Minor Superstructure Member Repair - Timber	Minor repair of timber superstructure members such as stringers and bracing.
B14	Major Superstructure Member Repair - Steel	Major repair or replacement of steel beams, girders, diaphragms, bracing, trusses, cables, and complete replacement of bearing assemblies.
B15	Major Superstructure Member Repair - Concrete	Major repair or replacement of concrete girders, diaphragms, girder ends, complete bearing assemblies replacement, and backwalls.

Work Activity	Name	Description
B16	Major Superstructure Member Repair - Timber	Major repair or replacement of timber stringers and bracing. Includes installation of additional stringers or beams to enhance load carrying ability.
B17	Minor Substructure Member Repair - Steel	Minor repair of steel piling, bracing, supports, caps, footings, abutments, and bents. Includes underwater repairs.
B18	Minor Substructure Member Repair - Concrete	Minor repair of concrete piling, bracing, supports, caps, footings, abutments, and bents. Includes underwater repairs.
B19	Minor Substructure Member Repair - Timber	Minor repair of timber piling, bracing, supports, caps, footings, abutments, and bents. Includes underwater repairs.
B20	Major Substructure Member Repair - Steel	Major repair, replacement or addition to substructure members such as footings, caps, piers, bents, piling, and abutments. Includes underwater repairs.
B21	Major Substructure Member Repair - Concrete	Major repair, replacement or addition to substructure members such as footings, caps, piers, bents, piling and abutments. Includes underwater repairs.
B22	Major Substructure Member Repair - Timber	Major repair, replacement or addition to substructure members such as footings, caps, piers, pilings, bents, and abutments. Includes underwater repairs.
B23	Bridge Painting - Spot	Cleaning and painting of a small portion of the paintable portions of the structure. This includes cleaning by chemical or mechanical means, capture and containment of residue as required, the application of the paint system, and any related clean-up and disposal of residue.
B24	Bridge Painting - Partial	Cleaning and painting of a significant part of the paintable portions of the structure. This includes cleaning by chemical or mechanical means, capture, and containment of residue as required, the application of the paint system and any related clean-up and disposal of residue.
B25	Bridge Painting - Complete	Cleaning and painting of all or the majority of the paintable portions of the structure. This includes cleaning by chemical or mechanical means, capture and containment of residue as required, the application of the paint system and any related clean-up and disposal of residues.
B26	Bridge Culvert Cleaning	Cleaning of bridge culverts (structures exceeding 6.1 meters measured along centerline of roadway) including drainage ditches to and from the structure, removing debris and deposits from the barrels, repairing and replacing rip-rap and any related clean-up and disposal of materials.
B27	Bridge Culvert Repair	Repair of bridge culverts (structures exceeding 6.1 meters measured along centerline of roadway) including components such as top and bottom slab, cutoff walls, wing walls, aprons, and filling or grouting voids. Cleaning and repair of drainage ditches to and from the structure are not included in this activity.
B28	Light/Navigation Light Repair	Maintenance or repair of illumination lights, navigation lights, electrical system and electrical appurtenances.
B29	Drift Removal	Maintenance or repair required to remove all debris obstructing normal channel flow from all bridge structures.
B30	Slope and Shore Protection Repair	Maintenance or repair to slope and shore protection devices, dolphins and pier protection systems including concrete and stone rip-rap, timber, steel and concrete sheeting. Includes placing additional shore protection devices such as sheeting at abutments for scour protection.
B31	Accident Repair	Repair of any bridge elements damaged as a result of accidents. Includes damage from automobiles and trucks or from waterway traffic such as boats and barges.

Work Activity	Name	Description
B32	Vandalism Repair	Repair of any bridge elements damaged as a result of vandalism. Includes the removal of graffiti, political signs attached to the structure, unauthorized painting, lettering or markings.
B33	Moveable Span Maintenance	Repair, replace, and/or service equipment, components, and facilities of the moveable span structure. Repairs to the deck, superstructure, substructure, and painting are not included in this activity
B34	Moveable Span Operations	Overhead costs necessary to the daily and continuing normal operation of the moveable span. Maintenance, repair, and service are not included in this activity. See activity "Moveable Span Maintenance".
B35	Tunnel Maintenance	Repair, replace, and/or service equipment, components, and facilities of the tunnel.
B36	Tunnel Operations	Overhead costs necessary to the daily and continuing normal operation. Maintenance, repair, and service are not included in this activity. See activity "Tunnel Maintenance".
B37	Bridge Inspection	Inspection of bridges by State or Division bridge inspection crew to evaluate the bridge in accordance with NBIS, AASHTO and FHWA inspection specifications. Also includes above water and underwater inspection done by contract or consultant.
B38	Other Structure Maintenance	Other structure maintenance activities that are not specifically identified as separate activities.
B39	Other Structure Maintenance	Engineering and inspection on maintenance construction projects by project personnel, Maintenance Bureau personnel, or other appropriate personnel.

Table A1- 5 Alabama MMS Maintenance Actions

MMS Activity	Name	Description
645	Bridge Cleaning	Regular cleaning of major and minor bridges including hand sweeping, cleaning drain holes and bridge seats, debris removal from expansion joints and waterway openings, vegetation control, and fireproofing of timber structures and removal of writing or painting on the structure.
646	Bridge Painting	Sandblasting, cleaning, priming and painting of structural elements including handrails or guardrails, to minimize deterioration. Minor painting of handrails only should be charged to Activity 654 - Other Structure Maintenance.
647	Minor Repairs of Bridges	Minor repairs including repair or replacement of handrails, curb, sidewalk, timber planks, minor joint and deck repair and other minor repairs.
648	Major Repairs of Bridges	Major repairs to bridge structural elements such as piling, piers or abutments. Also includes underwater repair work.
649	Movable Span Maintenance	Operation and maintenance of movable span bridges and the mechanical, electrical or structural maintenance on movable span bridges and mechanisms. Routine servicing and lubrication is to be performed periodically.
650	Tunnel Maintenance	Mechanical, electrical or structural maintenance on tunnels and related systems
654	Other Structure Maintenance	<ul style="list-style-type: none"> + Navigation light maintenance, + Replacing rip-rap, + Repair of slope paving, + Expansion joint maintenance, + Mechanical bridge deck sweeping, and + Minor handrail painting. Note: Utility costs on navigation lights are to be charged to Activity 644
675	Bridge Inspection	Inspection of bridges by State or Division Bridge Inspection crew to rate the bridge in accordance with AASHTO and FHWA inspection specifications. See Section 6.6 for "B" Codes which identify work activities for structures.
697	Structure Improvement Projects	All improvements to existing bridges on State Highway System, above and beyond routine repairs, which increase load capacity or clearance or improve safety and convenience, beyond original design, such as strengthening of deck or other elements, widening or increasing vertical clearance or adding railings, sidewalks or lights. Each structure improvement project will be identified by a separate project number.

Table A1- 6 Alabama MMS Maintenance Categories

MMS Structure Maintenance Operations		Measurement
645	Bridge Cleaning	Man Hours
646	Bridge Painting	Liters of Paint
647	Minor Repairs on Bridges	Man Hours
648	Major Repairs on Bridges	Man Hours
649	Moveable Span Maintenance	Man Hours
650	Tunnel Maintenance	Man Hours
654	Other Structure Maintenance	Man Hours

Table A1- 7 California DOT Maintenance Actions

IMMS Action	Description
H10001	INSPECTION - H FAMILY
H10002	COMPLAINT INVESTIG. H FAMILY
H10010	BMS SUB - PATCH SPALLS
H10011	BMS SUB - REPLACE
H10012	BMS SUB - REHAB
H10013	BMS SUB - EPOXY INJECT
H10021	INSTALL GRAFITTI DETERENT
H10040	BMS SUB - PROTECT
H10050	CLEAR DEBRIS/CHANNEL CLEANING
H10060	BMS SUB - PAINT
H10070	BIRD NETTING / EXCLUSION
H10090	BMS SUB - MISC.
H20001	INSPECTION - SUPER
H20002	COMPLAINT INVESTIGATION SUPER
H20010	BMS SUPER - PATCH SPALLS
H20011	BMS SUPER - REPLACE
H20013	BMS SUPER - EPOXY INJECT
H20070	REPLACE GATES - SUPER
H20090	BMS SUPER - MISC.
H30001	INSPECTION - DECK
H30002	COMPLAINT INVESTIGATION - DECK
H30011	BMS DECK - REPLACE
H30012	BMS DECK - REHAB
H30013	BMS DECK - RESURFACE
H30020	BMS DECK - PATCH SPALLS
H30030	BMS DECK - REPAIR POTHOLE
H30060	BMS DECK - PLACE OVERLAY
H30090	BMS DECK - MISC.
H31080	BMS APPROACH SLAB - MUDJACK
H40001	INSPECTION - JOINTS
H40002	COMPLAINT INVESTIG - JOINTS
H40010	BMS JOINTS - REPAIR

IMMS Action	Description
H10001	INSPECTION - H FAMILY
H40012	BMS JOINTS - REHAB
H41001	INSPECTION - BEARINGS
H41002	COMPLAINT INVESTIG - BEARINGS
H41011	BMS BEARINGS - REPLACE
H41012	BMS BEARINGS - REHAB
H41013	BMS BEARINGS - RESET
H41050	BMS BEARINGS - CLEAN
H50001	INSPECTION - RAILING
H50002	COMPLAINT INVESTIG - RAILING
H50010	BMS RAILING - REPAIR
H50010	BMS RAILING - REPAIR
H50011	BMS RAILING - REPLACE
H50012	BMS RAILING - REHAB
H50060	BMS RAILING - PAINT
H60001	INSPECTION - DRAINAGE
H60002	COMPLAINT INVESTIG - DRAINAGE
H60050	CLEAN PAN,GUTTER,DRAINAGE SYS
H70060	RIGGING CONTAINMENT - PAINT
H70061	SPOT REMOVAL and SPOT PAINT
H70062	SPOT REMOVAL and FULL PAINT
H70063	FULL REMOVAL and FULL PAINT
H70069	OTHER PAINT ACTIVITIES
H80001	INSPECTION - MECH/ELECTRICAL
H80002	COMPLAINT INVESTIG - MECH/ELEC
H80010	BMS MECH/ELECTRICAL REPAIR
H80011	BMS MECH/ELECTRICAL REPLACE
H80012	BMS MECH/ELECTRICAL REHAB
H80090	BMS MECH/ELECTRICAL MISC.
H91010	BMS SEISMIC - MAINTENANCE
H91040	BMS SEISMIC - RETROFIT
H92080	DRAWBRIDGE OPERATION and MAINT

Table A1- 8 Colorado Pontis-Related Maintenance Actions

Pontis Bridge Inspection Coding Guide (1998). Colorado DOT, Denver, 184p.

Activity Number	Activity
351.00	Bridge/structural visual inspection/monitoring
352.00 Cleaning or washing	
352.01	Clean out drains.
352.02	Remove sand and debris from bridge decks, sidewalks, curbs, joints, abutments, piers, or truss members.
353.00 Bridge deck repair, etc.	
353.01	Seal open joints (non-expansion).
353.02	Tighten/repair timber decks.
353.03	Shore up bad concrete decks or patch holes through them.
353.04	Patch delaminations, spalls, or potholes in deck surfaces (concrete or asphalt), seal concrete deck surfaces, install waterproofing membrane.
353.05	Repair/replace metal decking.
353.06	Repair/extend/redirect deck drains.
353.07	Repair joints (non-expansion) e.g. "D" cracking.
353.08	Pavement crack sealing.
353.09	Overlay candidate, contact Staff Bridge.
354.00 Superstructure	
354.01	Repair damaged girders/truss members (collision).
354.02	Repair girders/truss members(non-collision).
354.03	Not used.
354.04	Remove formwork/debris from inside box girders.
354.05	Repair or maintenance work in tunnels or at tunnel portals.
355.00 Clean and paint bridge	
355.01	Clean and paint bridge (include bearings).
355.02	Clean and spot paint bridge (include bearings).
355.03	Clean and paint bridge rail.
356.00 Curbs and rail	
356.01	Replace damaged bridge rail.
356.02	Repair/Replace curb/sidewalk or wheel guard.
357.00 Bearings	
357.01	Remove sand/debris from around bearings.
357.02	Clean, lubricate if necessary, and paint bearings if necessary.
357.03	Replace bearings/bearing area (pulpits or saddles).
357.04	Replace concrete bearing area.
357.05	Reset bearings.
358.00 Substructure	
358.01	Repair/replace backing planks/piles/caps in abutments or piers (timber only).
358.02	Repair, shore up, or replace damaged substructure where it could cause the bridge to fail (imminent only).
358.03	Fill scour holes around piers, abutments, and at ends of CBC's.
358.04	Remove water/wind borne debris from structure or channel.
358.05	Repair/replace damaged/deteriorated concrete/steel or exposed piles in abutments/piers/headwalls.

Activity Number	Activity
358.06	Repair/replace wingwalls, with piles, backing planks, deadman etc.
360.00 Approach Slabs and Slope Protection	
360.01	Repair low approaches.
360.02	Fill voids or holes at the backface of the abutments and the approaches.
360.03	Replace/repair berms/fill slopes and slope protection.
364.00 Expansion Joints	
364.01	Repair/replace expansion joints and seals.
364.02	Tighten expansion joint.
398.00	Miscellaneous Bridge Work - Describe the type of miscellaneous work needed that is not covered under another activity e.g. wrong structure number, loose utilities, etc.
399.00	Maintenance Requiring Engineering - Describe the condition that requires engineering before maintenance can proceed with the repair

Table A1- 9 Sample Maintenance Pay Items for Colorado DOT

2005 COST DATA Maintenance Projects (2006). Colorado DOT, Agreements and Market Analysis Branch, Denver, 100p

Bid Item	Title
201-00000	Clearing and Grubbing
210-00400	Reset Bridge Expansion Device
513-00600	Bridge Drain
514-00200	Pedestrian Railing (Steel)
515-00400	Concrete Sealer
515-00410	Concrete Sealer (Calcium Nitrite)
518-00000	Bridge Compression Joint Sealer
518-01004	Bridge Expansion Device (0-4 Inch)
518-01015	Bridge Expansion Device (0-15 Inch)
518-03100	Rapid Cure Silicone Joint Seal
601-03040	Concrete Class D (Bridge)
601-03041	Concrete Class D (Bridge) (Special)
601-04000	Concrete Class E
601-06100	Concrete (Patching)
601-10250	Slab Jacking
601-40301	Structural Concrete Coating

Table A1- 10 Florida Maintenance Activities

Source Florida DOT (2009) Florida Bridge Work Orders, powerpoint, FlaDOT.

Activity No.	Activity	Description
451	Clean Drainage Structures	Mechanical or manual cleaning of storm drains, french drains, manholes, side drains, cross drains, inlets, piped outfalls, box culverts and other miscellaneous drain structures. Not to include bridge drains.
457	Concrete Repair	Concrete repair on items such as catch basins, median inlets, headwalls, curb inlets, pedestrian underpasses, seawall, retention walls, barrier walls, and box culverts (under 20 foot span), curb and gutters, paved ditches, paved slopes, flumes or spillways, and rip rap. (Not to include bridge or sidewalk repair.)
526	Guardrail repair	Repair of damaged or deteriorated guardrail.
805	Bridge Deck Joint Repair	Clean existing deck joint or deteriorated material and repair with new material.
806	Bridge Deck Maintenance and Repair	Maintenance and/or repair to any bridge deck deficiency, such as spall, scale, crack repair, corrosion abatement, pothole patching, cleaning of joints, scuppers and gutters, replacement of deck material, securing connections and fasteners. Also to include sidewalk and catwalks.
810	Bridge Rail Maintenance and Repair	Maintenance and/or repair to any bridge rail deficiency, such as spall, scale, crack repair, corrosion abatement, reconstruction. Does not include rail on movable spans.
825	Superstructure Maintenance and Repair	Maintenance and/or repair of any superstructure deficiency. To include bearings, beams, girders, trusses, trestles, or suspension type construction. Not to include handrail, sidewalk, bridge railing and catwalks.
845	Substructure Maintenance and Repair	Maintenance and/or repair of any substructure deficiency.
859	Channel Maintenance	Maintain and/or repair any channel or fender deficiency.
861	Bridge Electrical Maintenance	Any maintenance or repair to the electrical system on a movable or fixed bridge. This can include electrical components on the fender system, traffic control devices and control house.
865	Movable Bridge Mechanical Maintenance	Any maintenance or repair to the mechanical system on a movable bridge. This can include greasing gears, alignment, shimming, adjusting or cleaning brakes, gears, bearings, shoes, buffers and locks, cable replacement and greasing, servicing traffic control devices, and any other mechanical components of the bridge.
869	Movable Bridge Structural Maintenance	Maintenance and/or repair to the structural components of a bascule, swing, and lift bridge deck, superstructures and substructure. Activities include maintenance and repair to main girders, floor beams, stringers, trusses, connections, fasteners, steel grating, bascule, swing and lift piers, barriers, handrails, parapets, control house structures. Must not include maintenance and repair of fixed approach spans which are reported under other function numbers.
888	Bridge Damage Repair	Repairs required on bridges due to factors other than natural deterioration.
996	Miscellaneous Routine Maintenance	Man-hours charged to this standard should represent work performed on routine maintenance activities that are too small in scope to be scheduled and cannot be anticipated in the long range planning process.

Table A1- 11 Georgia HMMS Activity Numbers

Source:

BIMS Online Coding Guide, Version 2.0 > Help Topics > Deficiencies and PONTIS > State Deficiency

Activity Number	Activity Title	Description
215	Undersealing of Approach Slabs	This activity includes filling voids beneath the Portland Cement Concrete slab by drilling holes and pumping a cement slurry underneath the slabs. This reduces the vertical movement of the slab
520	Brush and Tree Cutting	This activity includes using power or hand tools to cut, trim, or remove brush, trees, or limbs within the right of way to restore the visibility blocked by vegetation overgrowth for signs, driveways, side roads, bridge ends, drainage ditches, etc. Also includes removal of fallen trees, including those resulting from storms.
550	Erosion Control	This item shall include all placement of Rip Rap at bridges or culverts to repair or prevent scour conditions.
615	Repair of Existing Guardrail	This activity includes repairing guardrail at existing locations and repairing roadway attenuators.
800	Bridge Joint Sealing	This activity includes cleaning and sealing construction joints and expansion joints to restore a water-tight bridge deck joint using silicone or evazote.
805	Header Joint Reconstruction/Repair	This activity includes reconstruction or repair of header joints using epoxy concrete to restore a water-tight bridge deck joint, restore a smooth riding surface, and allow expansion and contraction of the bridge deck using epoxy concrete. Note: All repairs or removal of existing armored joints shall be reported under this activity.
810	Deck Repair	This activity includes restoring or preserving the deck and edge beams by removing and replacing the deck or patching the deck with concrete, epoxy, mortar, steel, or other material as appropriate
815	Bridge Curb/Rail Repair	Repair or replacement of all curbs, medians, or bridge railing damaged by deterioration, vandalism, or traffic accident.
820	Culvert Repair	All repairs to a culvert or any of its associated structures shall be reported under this activity. Wing wall, apron, or any retaining wall repairs or replacement shall be included.
825	Pile Replacement and Related Repairs	This activity includes all pile replacement and all repairs made during pile replacement. This activity also includes repairs to the cap, repair or replacement of the sway bracing, and repair to the deck if necessary for pile replacement.
830	Repair Main Structural Members	This activity includes replacing, repairing, or encasing any main structural members (wood, steel, concrete, masonry) which includes girders/beams, bearing assemblies, caps, columns, piles, or footings. Note: Encasement of corroded steel piles and/or steel piles located in a stream channel shall be reported under this activity.
835	Bridge Painting	This activity includes sandblasting, cleaning, and painting bridge components to prevent deterioration. This includes a complete 2, 3, or 4 coat system where applicable. This also includes 2P coatings for steel piling.

Activity Number	Activity Title	Description
		Note: This activity shall include full painting and/or spot painting.
845	Fill Voids	Pressure grouting or filling voids beneath endwalls, abutments, or slope paving
845	Other Bridge Maintenance	This activity includes performing all other bridge maintenance not specially identified as a separate activity: Channel excavation; Removing sediment deposits from within culverts; Removing debris from channel (including beaver dams); Reshaping flood plain (erosion repairs on end rows); Repairing fence; Repairing spur dikes; Repairing fender systems; Repairing slope paving; Pressure grouting or filling voids beneath endwalls; Pressure grouting or filling voids beneath abutments; Pressure grouting or filling voids beneath slope paving; Cleaning tops of caps; Cleaning bearing areas; Cleaning scuppers (drain holes, drainage systems, and catch basins); Removing debris from bridge decks; Removing graffiti from bridge components; Building or repairing approach slabs; Replacing navigational lights; Replacing or repairing tide clearance gauges; All scour related repairs

Table A1- 12 Georgia DOT Maintenance Actions

Action	Title
145	Deck/Wearing course repair - w/epoxy
343	Joints repair - Armor
352	Joints replace - Armor
547	Superstructure repair - truss sway bracing
553	Superstructure replace - truss sway bracing
565	Superstructure modify - Encase
666	Substructure modify - Encase
713	Channel clean/clear - Re-grade
722	Channel reset - Navigation lights
744	Channel repair - Fender at substructure
812	Approach/Embankment clean/clear - Tree trimming
845	Approach/Embankment repair - voids below slope protection
924	Parapets/Railings/Sidewalks reset - Attenuators
949	Parapets/Railings/Sidewalks repair - median
949	Parapets/Railings/Sidewalks repair - railing
1040	Culvert repair
1041	Culvert repair - apron
1042	Culvert repair - wingwall
1010	Culvert clean/clear
1031	Culvert coat/paint - Seal surface
1032	Culvert coat/paint - Seal cracks

Table A1- 13 Idaho Operations for Bridge Maintenance

Source:

Maintenance Manual (2005). Idaho Transportation Dept., 347p.

Action	Note
Cleaning	Yearly water flush of all decks, drains, bearings, joints, pier caps, abutment seats, concrete rails and parapets each spring.
Cleaning	Cleaning all bridge components that are susceptible to dirt, debris, bird dropping and deicing salts.
Preventive Maintenance	Painting, coating and sealant applications and, for routine, minor deck patching and railing repairs.
Repairs	Jacking up the structures, crack repairs, epoxy injection, repairing or adjusting bearing systems, repair and sealing of expansion joints
Structural repairs	Repair or reinforcement of main structural members to include stringers, beams, piers, pier and pile cap, abutments and footings,
Underwater repairs	
Coatings and sealants	Major applications

Table A1- 14 Idaho Components and Operations

Component	Operation(s)
Accessories	All repairs and modifications to approaches
Accessories	All repairs and modifications to drainage systems
Accessories	All repairs and modifications to catwalks
Accessories	All repairs and modifications to sidewalks
Accessories	All repairs and modifications to cathodic protection devices
Accessories	All repairs and modifications to ice detection and anti-icing devices
Accessories	All repairs and modifications to retaining walls
Accessories	All repairs and modifications to slope paving
Accessories	All repairs and modifications to fill material
Accessories	All repairs and modifications to fill stabilization systems
Accessories	All repairs and modifications to all other items except stream channel features
Bearings	All repair and adjustment work involving the bridge bearing units or systems
Bituminous Overlays (on Decks)	Surface seal
Bituminous Pavements (approach)	Surface seal
Bridge Joints	Provide functional expansion joints
Bridge Joints	Prevent water leakage onto the bearings and substructure
Bridge Joints	Rebuilding or patching the joint edges
Bridge Joints	Installation of modular or strip seal systems
Bridge Joints	Installation of joint filler/sealer material
Bridge Joints	Installation of drainage troughs
Bridge Joints	Adjustments or securement of joint components
Bridge Joints	Replacement of joint edges
Bridge Joints	Install elastomeric concrete header for decks with bituminous overlay
Channel	Debris removal
Channel	Stabilizing banks
Channel	Correcting erosion
Channel	Remove all drift, logs, trees, and other debris
Channel	Remove excessive overgrowth from grass and willows
Channel	Reset displaced rip-rap or shot rock, etc
Channel	Periodic re-shape of banks
Culverts, Catch Basins, And Inlets	Clear obstructions, excessive vegetative growth along banks, and sediment accumulation at the inlet and outlet of the structure
Culverts, Catch Basins, And Inlets	Protect headwall, ensure flow through, not around, culvert
Culverts, Catch Basins, And Inlets	Tighten/replace bolts in steel pipe culverts
Culverts, Catch Basins, And Inlets	Seal/fill cracks in concrete box culverts
Culverts, Catch Basins, And Inlets	Pump-out siphons at the end of each water season
Curb & Railing	repair or replacement of curbs, medians, parapets, and railing
Decks	Major repairs usually done by maintenance contract.
Decks	Minor repairs/temporary patches using plant mix pavement

Component	Operation(s)
Decks	Overlays (considered a betterment)
Paint/Coat/Seal	All protective and preventative maintenance
Rigid pavement (approach)	Slab Jacking
Sign & utilities	Repairs
Substructure	All repairs on pier caps, piers, bents, piles, abutments, wing walls, and footings
Substructure	Concrete patching
Substructure	Cracks repair with epoxy

Table A1- 15 Illinois Repair Codes

Source:

Illinois Highway Information System - Structure Information and Procedure Manual (2002). Illinois Dept. of Trans., 452p.

Repair Code	Component	Repair Code Description	
0000010	Bridge	Concrete Br Repl	R
0000020	Bridge	Steel Br Repl	R
0000030	Bridge	PPC D Br Repl	R
0000040	Bridge	PPC I Br Repl	R
5010110	Bridge	Remove Existing Structure	R
4060120	Deck	Bit Conc Sc Mix C Cl I	D
4060130	Deck	Bit Conc Surf Cse, Mix D, Cl I	D
4080630	Deck	Protective Coat	D
4110000	Deck	Bit Part Depth Patch	D
4130000	Deck	Bituminous Overlay	D
4160000	Deck	Crack & Joint Sealing-Hand Poured	D
4550000	Deck	Bridge Sealing	D
5160000	Deck	Crack & Joint Rtng & SIng Rub AspIt (CRAFCO)	D
5510000	Deck	Partial Depth Bridge Deck Patching	D
5520000	Deck	Full Depth Bridge Deck Patching	D
6170091	Deck	Bridge Wear Surf Rem (Deck)	D
6170100	Deck	Bituminous Concrete Surface Removal	D
6170110	Deck	Bit Conc Surf R & R	D
Z000600	Deck	Br Deck Conc Overlay	D
Z000620	Deck	Concrete Br Deck Scarification	D
Z001601	Deck	Deck Slb Rep (FD, TI)	D
Z001602	Deck	Deck Slab Rep (FD, Type II)	D
Z001620	Deck	Deck Slab Rep (Part)	D
Z100340	Deck	Br Curb or Hubguard Repr	D
Z100370	Deck	Br Dk Wear Surf R & R	D
Z105300	Deck	Waterprf Membrane Sys	D
4330000	Drains - Inlets	Inlet, Manhole and Catch Basin Cleaning	I
4340000	Drains - Inlets	Inlet, Manhole and Catch Basin Repair	I
5030010	Drains - Inlets	Floor Drains	I
5530000	Drains - Inlets	Deck Drain Cleaning	I
5540000	Drains - Inlets	Deck Drain Repair	I
7530000	Drains - Inlets	Collection Gutter Cleaning	I
7540000	Drains - Inlets	Collection Gutter Repair	I
DL01110	Drains - Inlets	Clean Inlets	I
X503200	Drains - Inlets	Floor Drain Extension	I
5010410	Handrail	Br Hdrl Removal	H
5080060	Handrail	Alum Railing Tyl	H
5590000	Handrail	Handrail Repair/Maintenance	H
DL00190	Handrail	Steel Rail Retrofit	H
DL00740	Handrail	4" Dia Alum Brdg Rail	H
5550000	Expansion Joints	Joint Protection Shielding	E

Repair Code	Component	Repair Code Description	
5560000	Expansion Joints	Joint Deck Slab Shoring	E
5570000	Expansion Joints	Expansion Joint Repair	E
DL00780	Expansion Joints	Pref Joint Seal 2	E
X503120	Expansion Joints	Pref Joint Seal 1 3/4	E
X503130	Expansion Joints	Pref Joint Seal 2 1/2	E
X503140	Expansion Joints	Pref Joint Seal 4	E
Z102790	Expansion Joints	Neoprene Expan Joint 2	E
Z102800	Expansion Joints	Neoprene Expan Joint 2 1/2	E
Z102810	Expansion Joints	Neoprene Expan Joint 4	E
Z103260	Expansion Joints	Pref Joint Filler	E
0000410	Superstructure	Temporary Support System	S
5070040	Superstructure	F & E Struct Steel	S
5090040	Superstructure	Cleaning & Painting	S
6580000	Superstructure	Spot Clean & Paint	S
6550000	Superstructure	Structural Steel Repair	S
6560000	Superstructure	Jacking and Cribbing	S
DL00450	Superstructure	Temp Slab Support	S
DL00790	Superstructure	Repr Conc Beam Ends	S
X074110	Superstructure	Beam Straightening	S
OXZ1384	Superstructure	Beam Straightening	S
XZ10050	Superstructure	Keyway Repair	S
XZ14220	Superstructure	Jack & Shor Ex Girder	S
Z102590	Superstructure	Jacking and Cribbing	S
0507006	Bearings	Adjust & Reposition Bearings	B
5070060	Bearings	Adjust & Reposition Bearings	B
6520000	Bearings	Bridge Bearing Maintenance (Exc. Actv. 6)	B
6530000	Bearings	Bridge Bearing Cleaning	B
6540000	Bearings	Bridge Bearing Painting	B
6570000	Bearings	Pin and Link Inspection and Maintenance	B
DL00120	Bearings	Clean and Paint Bearings	B
X057730	Bearings	Clean and Adjust Link Assy	B
X074540	Bearings	Bearing Pad Adjust	B
OZ10002	Bearings	Adjust Rocker & Sole Plate	B
Z100200	Bearings	Bearing Repositioning	B
1513004	Substructure	Fur and Drive Creo Pile	2
1513010	Substructure	Fur and Drive Met Pile Shell	2
1513014	Substructure	Fur and Drive Stl Pile Hp	2
5010500	Substructure	Rem Exist Sub Str	2
DL00330	Substructure	F & E Pier Protection Plates	2
DL00050	Substructure	Fur and Drive Stl Sht Pile	2
5010240	Concrete Repair	Concrete Removal	C
5040030	Concrete Repair	Class X Conc	C
7500000	Concrete Repair	Bridge Concrete Repair	C
7510000	Concrete Repair	Bridge Epoxy Injection	C
DL00150	Concrete Repair	Class X Concrete Rem & Rep	C
DL00200	Concrete Repair	Epoxy Mortar Repair	C
XZ13610	Concrete Repair	Epoxy Crack Sealing	C
6170480	Slopedwall	Slopedwall Rem	3
6180010	Slopedwall	Slopedwall	3

Repair Code	Component	Repair Code Description	
7520000	Slopedwall	Slopedwall Repair	3
ODL0070	Slopedwall	Aggregate Slopedwall 9"	3
DL00690	Slopedwall	Slopedwall Breaking	3
DL00700	Slopedwall	Aggregate Slopedwall	3
X080600	Slopedwall	Slopedwall Repair	3
6010100	Riprap	Dumped Riprap	P
6010120	Riprap	Dumped Riprap	P
7550000	Riprap	Riprap Placement	p
4100000	Approach Pavement - Shoulders	Approach Slab Pothole Patching	A
4180000	Approach Pavement - Shoulders	Mudjacking	A
4200000	Approach Pavement - Shoulders	Patch and Repair Paved Shoulders	A
5580000	Approach Pavement - Shoulders	Roadway Joint Maintenance	A
OZ10007	Approach Pavement - Shoulders	Approach Slab R & R	A
Z100070	Approach Pavement - Shoulders	Approach Slab R & R	A
4600000	Guardrail	Guardrail Maintenance	G
6280230	Guardrail	Rem Repl Spbgr	G
6500000	Guardrail	Bridge Guardrail Terminal Repair	G
4240000	Earth Repair - Cleaning	Cutting High Shoulders	1
4300000	Earth Repair - Cleaning	Repairing Earth Slopes	1
4310000	Earth Repair - Cleaning	Ditches - Hand	1
4320000	Earth Repair - Cleaning	Ditches - Machine	1
7560000	Earth Repair - Cleaning	Channel Maintenance	1
4400000	Brush - Vegetation	Tree, Brush and Shrub Removal	V
4430000	Brush - Vegetation	Mowing (Machine)	V
4440000	Brush - Vegetation	Area Vegetation Spraying	V
2110040	Miscellaneous	Sand Backfill	M
2410000	Miscellaneous	Highway Lighting Maintenance	M
4210000	Miscellaneous	Add and Spread Aggregate - Hand	M
4220000	Miscellaneous	Add and Spread Aggregate - Machine	M
4530000	Miscellaneous	Movable Span Bridges and Ferries	M
4540000	Miscellaneous	Bridge Inspection	M
4540001	Miscellaneous	Bridge Inspection For Repair	M
4610000	Miscellaneous	Fence Maintenance	M
4630000	Miscellaneous	Attenuator Maintenance	M
4670000	Miscellaneous	Delineator Maintenance	M
4680000	Miscellaneous	Sign Maintenance and Traffic Activities	M
5100010	Miscellaneous	Treated Timber	M
5100020	Miscellaneous	Untreated Timber	M
5100030	Miscellaneous	Hardware	M
5120020	Miscellaneous	Epoxy Rebar	M
5500000	Miscellaneous	Bridge Cleaning	M
6280310	Miscellaneous	Traf Bar Term	M
6480010	Miscellaneous	Traf Cont & Prot	M
6500010	Miscellaneous	Mobilization	M
6580001	Miscellaneous	Graffiti or Graffito Removal	M
9590000	Miscellaneous	Other Bridge Maintenance	M
9590001	Miscellaneous	Pigeon Control	M
DL00440	Miscellaneous	Bituminous Curb	M
DL00760	Miscellaneous	Clean Abut Seats	M

Figure A1- 1 Illinois Paint Codes (Ref 40)

ISIS Paint Type: A four-digit field composed of the following positions:

- 1st position - most extensively used paint system
- 2nd position - second paint system
- 3rd position - third paint system
- 4th position – handrail paint

Enter any combination of the codes listed below in the sequence listed above. Unused spaces can be left blank. Code Paint Type:

- A. Shop applied Basic Lead Silico Chromate or Red Lead primer/Maroon first field coat and interstate green final coat.
- B. Shop applied Basic Lead Silico Chromate or Red Lead primer/Aluminum first and final field coats.
- C. Combination of A and B.
- D. Field applied Basic Lead Silico Chromate or Red Lead primer/Maroon and interstate green 2nd and final coats.
- E. Field applied Basic Lead Silico Chromate or Red Lead primer/Aluminum 2nd and final coats.
- F. Combination of D and E.
- G. Shop applied Zinc Silicate and Field applied Vinyl paint system.
- H. Field applied Zinc Silicate and Vinyl paint system.
- I. Aluminum Epoxy Mastic Primer and Vinyl or Urethane overcoat system.
- J. Iron Oxide/Zinc Oxide Primer and Alkyd top coats.
- K. Iron Oxide/Zinc Oxide Primer and Aluminum Phenolic top coats.
- L. Miscellaneous Alkyd systems.
- M. Miscellaneous Epoxy systems.
- N. Miscellaneous Urethane primer systems.
- O. Base weathering Steel.
- P. Other coating systems.
- Q. Other protective systems.
- R. No protection system.
- S. Shop applied Zinc Silicate and Field applied Acrylic paint system.
- T. Field applied Zinc Silicate and Acrylic paint system.
- U. Field applied Aluminum Epoxy and Acrylic.
- V. Galvanized
- W. Shop applied Metallizing & Field applied Polyurethane
- X. Shop applied Zinc Silicate & Field applied Polyurethane
- Y. Shop applied Organic Zinc and Field applied Epoxy & Polyurethane
- Z. Field applied Organic Zinc, Epoxy & Polyurethane

Table A1- 16 Maryland DOT Maintenance Actions

Action	Title
801	Bridge Painting- Engineering Services
802	Repair of Bridges
803	Drawbridge Maintenance – Engineering Services
804	Construction Management
805	Incident Repairs – Structures
806	District Bridge Repair
807	Major Repair of Small Structures – Engineering Services
808	Major Repair of Retaining Walls- Engineering Services
809	Major Repair of Noise Barriers – Engineering Services

Table A1- 17 Michigan CSM Pay Items

Source:

Bridge Capital Scheduled Maintenance Manual. (2005). Michigan DOT 64p.

Code #	Pay Item	Pay Unit
1000001	Mobilization, Max \$_____	LS
2050012	Embankment, Structure, CIP	Cyd
2060002	Backfill, Structure, CIP	Cyd
6030021	Joint, Expansion, Erg	Ft
6037001	Joint, Pressure Relief, 4 inch	Ft
7060001	Concrete Grade D	Cyd
7060031	Expansion Joint Device	Ft
7060032	False Decking	Sft
7060035	Reinforcement, Steel, Epoxy Coated	Lbs
7060040	Water Repellant Treatment, Penetrating	Syd
7067001	Resealing Bridge Construction Joints	Ft
7067010	Bridge Deck Surface Repair	Sft
7067011	Epoxy Overlay	Syd
7067011	Substructure Horizontal Surface Sealer	Syd
7067011	Conc. Surface Coating	Syd
7067051	Substructure Horizontal Surface Sealer (Str. #)	LS
7067051	Conc. Surface Coating (Str. #)	LS
7120003	Hand Chipping, Shallow	Syd
7120004	Hand Chipping, Deep	Syd
7120007	Hand Chipping, Other Than Deck	Cft
7120017	Patch, Forming	Sft
7120028	Adhesive Anchoring of Horiz. Bars,	Ea
7120029	Adhesive Anchoring of Horiz. Bars,	Ea
7120070	Structures, Rehabilitation, Rem Portions (Str. #)	LS
7120071	Deck Joint, Remove	Ft
7120073	End Header Replacement	Ft
7120110	Patching Concrete, C	Cyd
7120111	Patching Concrete, C-HE	Cyd
7120112	Patching Concrete, C-L	Cyd
7120113	Patching Concrete, C-L-HE	Cyd
7120114	Patching Concrete, F-L	Cyd
7127001	Crack Sealer	Ft
7127050	Embedded Galvanic Anode	Ea
7127051	Patching Concrete, (Type C-L) – Special	LS
7157051	Steel Structure, Cleaning, Spot, Type 4 (Str. #)	LS
7157051	Steel Structure, Coating, Spot, Type 4 (Str. #)	LS
7170001	Drain Casting, Type 1	Ea
7170002	Drain Casting, Type 2	Ea
7170010	Drain Casting Assembly, Type 1	Ea
7170011	Drain Casting Assembly, Type 2	Ea
7170050	Downspout Replacement	Ea
7170065	Deck Drain, Extension	Ea

Code #	Pay Item	Pay Unit
7177050	PVC Downspout	Ea
7177050	PE End Header Box System	Ea
8127051	Maintaining Traffic	LS
8130001	Riprap, Grouted	Syd
8130005	Riprap, Heavy	Syd
8130010	Riprap, Plain	Syd
8130015	Slope Paving Header	Ft
8130020	Slope Paving, Concrete	Syd
8130025	Slope Paving, Precast Concrete	Syd

Table A1- 18 Montana Maintenance Actions

Source:

Maintenance Operations and Procedures Manual (2002). Montana Department of Transportation.

MMS 1201	Sweeping or Flushing
MMS 3101	Cleaning Culverts, Culvert Openings and Basin Inlets
MMS 3102	Culvert Repair and Replacement
MMS 2206	Slope Repair
MMS 4101-4113	Repairing damage or deterioration in various bridge components.
	Removing debris and drift adjacent to piers.
	Cleaning drains.
	Cleaning and painting timber bridge rails.
	Tightening or replacing bolts and nuts.
	Repairing concrete bridge deck surface.
	Replacing joint material.
	Repairing or replacing bridge rail, curb, or posts.
	Adjusting height of bridge after settlement.
Repairing and replacing timber stringers, caps, decks and/or piles.	

Figure A1- 2 Montana Maintenance Action Numbering System

Maintenance actions are identified by a 4-digit sequence (ABCD)
 The leading digit 'A' indicates the highway component. Codes are:

1-	Roadway
2-	Roadside
3-	Drainage
4-	Bridges
5-	Facilities
6-	Traffic Safety
7-	Winter Maintenance
8-	Material production/handling/stockpiling
9-	Equipment/supervision/overhead

The second digit 'B' indicates the kind (or goal) of the action. Codes are:

1.	Maintenance Activity	Designed to preserve and maintain the highway and its elements.
2.	Service Activity	Designed to provide a safe highway.
3	Betterment Activity	Designed to improve, adjust or make additions to the highway system, beyond its former condition.
4.	General Activity	designed to include producing materials, acquiring equipment,

The last two digits 'CD' list specific actions in sequence.

Table A1- 19 New Hampshire Bridge Maintenance Activities

050	Walls (LF)	065	Clean-up (HR)
051	Excavation and backfill, including cofferdam (CY)	066	Miscellaneous (HR)
052	Pilings (LF)	413	Joint & Crack filling (LF)
053	Abutments & Piers (LF)	415	Sweeping (HR)
054	Wingwalls (LF)	423	Roadway Construction (HR)
055	Invert (LF)	497	Traffic Maintenance (HR)
056	Truss – Girders – I-Beams (LF)	498	Washing & Oiling (U)
057	Floor Beams – Stringers (LF)	499	Temporary Bridge (LF)
058	Deck (SF)	502	Approach curbs (LF)
059	Bridge Railing (LF)	503	Security (HR)
060	Painting (LF)	517	Plowing & Sanding (HR)
061	Sidewalks & Curbs (SF)	519	Winter Stipend
062	Roadway (HR)	543	Operation of Drawbridges (
063	Guardrail (LF)	652	Training – Operations (HR)
064	Landscaping (HR)	654	Building Maintenance & Construction (HR)
067	Joints (LF)		Maintenance of equipment (HR)
068	Box Culvert (LF)		

Table A1- 20 New York Intervals for Selected Maintenance Actions

Source:

Weykamp,P. (2006). *Funding a preventive maintenance program for highway bridges*. New York State DOT, TRB Workshop on Bridge Preservation, PowerPoint, 38p.

Activity	Selection criteria	Cycle
Bridge Washing	All functional structures, priority to structures over highways	2 years
Deck Sealing	Concrete wearing surfaces (Present wearing surface codes 02, 03, 06, 12, 22, 32, 42, 45, 52 in RC15 of BDMS) rated ≥ 5.0 on structures rated 4.5 to 7.	6 years
Bearing Lubrication	Steel bearings (Bearing codes 02, 03, 04, 05, 06, 07, 22, 52,5 3, 64 in RC15 of BDMS) on structures rated 4.5 to 7	6 years
Bridge Painting	Painted Structures (Coating Types 1, 2, or 3 in RC15 of BDMS) on structures rated 4.5 to 7.	12 years
Deck Overlay	Wearing surfaces (Present Wearing Surface codes 04, 14, 24, 34, 44, 54, 64 in RC15 of BDMS) on structures rated 4.5 to 7.	12 years

Table A1- 21 New York Comparison of Cyclical Work & Bridge Work

Cyclical work	Bridge work
Programmed routine bridge work that is time dependent and does not address immediate bridge deficiencies.	Programmed bridge work that does not involve the evaluation of different alternates but addresses specific (not necessarily all) bridge deficiencies.
<ol style="list-style-type: none"> 1. Bridge Washing 2. Bridge Painting 3. Crack Sealing 4. Deck Sealing 5. Substructure Concrete Sealing 6. Asphalt Overlay Replacement 7. Bearing Lubrication 	<ol style="list-style-type: none"> 1. Bearing Replacements/ Repairs 2. Bridge Railing Upgrades 3. Monolithic Deck Overlays/ Asphalt Overlay Placement 4. Vulnerability Reduction Measures: Seismic, Collision, Hydraulic, Overload, Steel Detail, and Concrete Detail vulnerabilities. 5. Substructure Repairs 6. Primary/ Secondary Member Repair 7. Localized Deck/ Approach Slab Repairs 8. Joint Replacements/ Repairs 9. Repair or Replace Curbs, Sidewalks and Fasciae 10. Navigational Lights

Table A1- 22 New York DOT Bridge Preventive Maintenance Activities

Item	Title	HBP Eligible?
4E82	Remove brush – Spot location	Y
4G61	Maintain stream channels	Y
4G81	Walls	
4G81	Maintain bank protection and walls	Y
4H11	Clean substructure	Y
4H13	Seal substructure	Y
4H29	Lubricate bearings	Y
4H31	Repair bearings	Y
4H38	Clean superstructure and deck	Y
4H45	Protection	
4H53	Repair joints	Y
4H58	Remove wearing surface	Y
4H59	Replace wearing surface	Y
4H60	Place membrane	Y
4H69	Seal deck	Y
4H72	Seal curb, sidewalk, fascia	Y
4H73	Fill cracks and joints	Y
4H75	Clean drainage system	Y
4H81	Spot painting	Y
4H89	Paint bridges	Y
4H97	Maintain electrical and mechanical equipment	Y

Table A1- 23 New York DOT Bridge Non-Preventive Maintenance Activities

Action	Title
4H33	Repair
4H34	Repair concrete members
4H35	Repair other members
4H41	Repair seats and pedestals
4H42	Repair columns and cap beams
4H43	Wingwalls
4H45	Protection
4H47	Repair foundations
4H51	Repair decks
4H53	Repair joints
4H61	Repair curbs
4H62	Repair fascia
4H63	Repair sidewalk and medians
4H64	Repair parapets
4H65	Repair railings
4H67	Fixtures
4H76	Repair drainage systems
4H81	Spot painting
4H83	Paint railings
4H85	Paint concrete
4H87	Paint bridge curb

Table A1- 24 Ohio TMS Work Activity Codes

Source:

Transportation Management System Foreman's Manual (2005). Ohio Dept. of Transportation, 171p.

Code	Work Activity
ACC	Accident Damage- Use this code when an activity is performed to repair damages resulting from a vehicle accident.
FLD	Flood- Use this code when performing work that is the direct result of a flood.
GEO	Geological Hazards- Use this code when performing work associated to the following geological hazardous conditions: landslides, rockfalls, mine settlement or subsidences, sink hole subsidence, or shore erosion.
MOB	Mobilization-Pre-tripping equipment, gathering of materials, traveling to the first job location, travel time back to the garage and equipment cleanup at the end of the day. If multiple program activities are performed in a single day, separate mobilization charges could be reported. Only direct charge program activities apply. Half hour rule applies. If total crew MOB meets or exceeds 30 minutes per program activity, MOB must be charged.
MOT	Maintenance of Traffic-The maintenance of traffic while at the job site. Includes the setting of traffic control signs. Half hour rule applies. If total crew MOT meets or exceeds 30 minutes per program activity, MOT must be charged. Only direct charge program activities apply.
PM	Preventive Maintenance- Use this code when Preventive Maintenance work is performed (see PGAC 6124, 6125).
S	Scheduled Work- Use this code to identify work that was scheduled in advance.
TVL	Travel - Use this code to identify travel time to and from the job site. Only to be used if travel time exceeds 30 minutes per assignment during the day.
U	Unscheduled Work- Use this code to report routine, unscheduled work.

Table A1- 25 Ohio TMS Activity Codes (related to Bridges, Approaches, Culverts or Channels)

Source:

Transportation Management System Foreman's Manual (2005). Ohio Dept. of Transportation, 171p.

PGAC	Activity Title
6119	Bridge Inspection
6120	Pavement Underseal/Fill Voids
6121	Pothole Patching
6122	Surface Repairs
6123	Full Depth Repair
6124	Filling and Sealing Joints and Cracks
6125	Surface Treatment
6126	Pavement Jacking
6128	Hauling & Handling Materials or Equipment
6129	Surface Paving
6133	Repairing Slopes
6136	Partial Depth Repair
6140	Culvert Inspection
6142	Cleaning Channels
6143	Cleaning Drainage Structures
6144	Repairing Drainage Structures
6151	Bridge Cleaning
6152	Bridge Painting
6153	Bridge Deck Repair
6154	Bridge Joint Repair
6155	Substructure Repair
6156	Superstructure Repair
6157	Bridge Railing Repair
6160	Add Channel Protection for Bridges
6161	Sealing Bridge Decks/Gutters/Curbs/Railing
6162	Seal Bridge Abutments/Seats/Backwalls/Piers
6163	Removal of Loose Bridge Concrete Spalls
6164	Cleaning Channels/Removing Debris
6165	Extending Bridge Scuppers
6221	Mowing
6222	Vegetation Control - Chemical Spraying
6225	Graffiti Removal
6230	Guardrail End Assembly
6233	Guardrail Repair
6234	Fence Installation
6235	Crash Attenuator Repair
6237	Concrete Median Barrier Repair
6333	Guardrail Betterment
6343	Culvert Betterment
6344	Catch Basin Betterment
6351	Bridge Betterment
6526	Single Lane Closure

PGAC	Activity Title
6542	Lighting Maintenance

PGAC – Program Activity Code

Table A1- 26 Oregon MMS Activity Codes

Source:

Maintenance Guide (2004). Oregon Dept. of Transportation, <http://egov.oregon.gov/ODOT/HWY/OOM/MGuide.shtml> website viewed Feb. 2006

MMS Activity Code	Component	Action	Description
121	Culvert	Clean	Clean Culvert < 6ft width or diameter
123	Culvert	Repair	Repair culvert < 6ft width or diameter
160	Bridge, culvert, tunnel or other structure	Routine Maintenance	Performing routine, preventive maintenance to assure proper operation of, or to control or prevent further structural deterioration on, a bridge, major culvert, tunnel, or other structure classed as a bridge
161	Fence on bridge	Maintain or Repair	Maintaining and repairing protective screens on bridges to preserve their intended purpose of preventing objects from being thrown off of the bridge
162	Bridge, culvert, tunnel or other structure	Repair	Repairing bridges, major culverts (> 6 ft. in diameter), tunnels, and other structures classed as bridges to retain or restore design integrity.
163	Bridge	Paint or coat	Painting or otherwise coating bridge members.
65	Movable bridge	Operate or service or maintain or repair	Operating, servicing, and monitoring moveable bridges. It includes all maintenance, operation, and repair of all elements needed to accomplish the moveable operation of the bridge, including maintenance or repair of gate tender house. maintenance or repair of gates and/or barriers maintenance or repair of towers involving the moving devices Maintenance or repair of signing, flashers, and beacons warning of bridge operation, except for variable message signs Maintenance or repair of pavement legends related to operation of the moveable bridge Maintenance or repair of audible warning devices Maintenance or repair of electrical and mechanical systems
168	Bridge	Clean (graffiti)	Removing or painting over graffiti on structures, signs, traffic signal controllers or devices, retaining walls, and other roadside objects.
169	Sign bridge	Maintain or repair	maintaining and repairing miscellaneous structures including overhead flumes, sign bridges or cantilever supports, etc. that are not classed as bridges.
304	Bridge	Improve	Work will upgrade the structure or add new features.
305	Bridge	Inspect	Assisting with elements of the bridge inspection program.
305	Bridge	Inspect underwater	When performing or assisting with diving or other underwater work involved with the bridge inspection

MMS Activity Code	Component	Action	Description
			program, including diving and sounding

Table A1- 27 Oregon TEAMS Activity Codes

TEAMS Activity Code	Component	Element	Action	Description
L18	Movable Bridge	Variable message Sign	Maintain or repair	Maintenance or repair of variable message signs related to operation of the moveable bridge.
161	Railing	Fence	Maintain or repair	Maintaining and repairing protective screens on bridges
165	Movable Bridge		Repair or operate or service or monitor or maintain	All maintenance, operation, and repair of all elements needed to accomplish the moveable operation of the bridge.
213	Substructure	Timber cap/sill	Repair or replace	Repair or replace timber caps and sills.
214	Substructure	Steel cap/sill	Repair or replace	Repair or replace steel caps and sills.
215	Substructure	Concrete cap/sill	Repair or replace	Repair or replace concrete caps and sills.
217	Superstructure	Steel members	Repair or replace	Repair or replace steel superstructure members.
218	Superstructure	Timber members	Repair or replace	Repair or replace timber superstructure members.
221	Deck	Concrete deck	Repair or replace	Repair or replace concrete decks.
223	Deck	Timber deck	Repair or replace	Repair or replace wood decking.
225	Walks, curbs, railings		Repair or replace	Repair or replace curbs, bridge rail, or felloe guards.
226	Substructure	Timber posts/piles	Repair or replace	Repair or replace timber piling and posts.
227	Substructure	Concrete posts/piles	Repair or replace	Repair or replace concrete piling and posts.
228	Substructure	Steel posts/piles	Repair or replace	Repair or replace steel piling and posts.
229	Superstructure	Bracing	Repair or replace	Repair or replace wood or steel bracing.
231	Deck	Metal decking	Repair or replace	Repair or replace metal decking or metal decking inlaid with concrete.
233	Substructure	Abutments	Repair	Repairs at the abutment and bridge end panels.
235	Joints		Repair or replace	Repair or replace deck joints and paving dams.
237	Substructure		Investigation for repairs	Diving and related underwater work needed to plan and perform bridge repairs.
238	Channel		Sounding for depth	Sounding work to measure water depth at required locations, except for work involved with the bridge inspection program.
239	Bridge		Repair	Other structure repairs not listed in a separate activity.
340	Bearings,	Bearing seats	Repair or replace	Repair or replace bearings or seats.

TEAMS Activity Code	Component	Element	Action	Description
	Substructure			
341	Bridge	Rivets or bolts	Repair or replace	Repair or replace rivets or bolts not part of another activity.
342	Drain		Repair or replace	Repair or replace elements of storm water drainage system.
343	Channel	Riprap, other material	Reposition or replace	Reposition or replace riprap, bioremediation, or similar material.
344	Slope	Paving	Repair or replace	Repair or replace slope paving at these structures.
345	Culvert		Repair or replace	Repair or replace major culverts.
346	Channel		Clear brush, trees	Remove brush or trees near a structure or in the waterway underneath.
347	Channel		Clear drift, ice floes	Removing drift and ice floes from bridge supports and waterways.
348	Channel	Fender	Repair or replace	Repair or replace bridge fender systems.
358	Channel	Fish passage	Maintain	Perform routine bridge or waterway maintenance for fish passage.
359	channel	Fish passage	Repair or replace	All repair or replacement of elements for fish passage.
615	Substructure	Caps / sills	Clean	Clean debris from caps or sills.
616	Superstructure	Concrete members	Clean	Clean concrete superstructure members.
617	Superstructure	Steel members	Clean	Clean steel superstructure members.
618	Deck	concrete	Clean and spot patch	Sweep, remove debris, and spot patching concrete deck.
619	Walks, curbs		Clean	Clean wood, steel, or concrete curbs, rail, or felloe guards.
620	Substructure	Concrete pile/post	Clean	Clean concrete piling and posts.
621	Substructure	Steel pile/post	Clean	Clean steel piling and posts.
622	Substructure	abutment	Patch	Spot patch or perform other minor maintenance at the abutment or bridge end panel.
623	Joints		clean	Clean deck joints to preserve range of movement.
624	Bearings, abutment seats		Clean	Clean bearings and seats for proper movement.
625	Drain		Clean	Clean dirt and debris from storm water drainage system.
626	Culvert		Clean	Clean dirt and debris culvert.
640	Superstructure	Concrete members	Paint	Paint concrete superstructure members.
641	Superstructure	Steel members	Paint or coat	Paint or coating steel superstructure members.
642	Curb, rail		Paint	Paint curbs, rail, and felloe guards.
643	Substructure	Concrete pile/post	Paint	Paint concrete piling and posts.

TEAMS Activity Code	Component	Element	Action	Description
644	Substructure	Steel pile/post	Paint	Paint or coating steel piling and posts.

Table A1- 28 Pennsylvania Unique BMS Activity Numbers

Source:

Procedures and Standards for Bridge Maintenance. (2002). Pub 55 (1-02), Pennsylvania DOT, 281p.

BMS Activity	MORIS Cost Function	Component	Element	Action
A743101	711-7431-01 711-7431-03	Deck		Clean, Flush
A743201	711-7432-01	Superstructure		Paint, Spot
A743301	711-7433-01	Joints	Liquid seal	Reseal
A743401	711-7459-01	Deck		Coat
A743501	711-7435-01	Bearings		Lubricate
A744101	711-7433-02	Joints		Repair, Reseal
A744201	711-7442-01	Approach	Slab	Replace
A744501	711-7435-02	Bearings	Steel	Repair
A744601	711-7446-01	Superstructure	Timber stringer	Repair, Replace
A744602		Superstructure	Steel stringer	Repair, Replace
A744603		Superstructure	RC/PS concrete	Repair
A744701	711-7447-01	Superstructure	Steel truss	Repair, Replace, Modify
A744801	711-7448-01	Substructure	Backwall	Repair
A745101	711-7451-01	Substructure	Slopewall	Repair
A745201	711-7452-01	Culvert	Headwall, wingwalls	Repair, Replace
A745301	711-7453-01	Channel, Culvert	Paving	Repair, Replace
A745401	711-7454-01	Bridge		Temporary support
A745901	711-7459-01	Bridge		Routine maintenance
B743101	711-7431-01	Drains		Clean, Flush
B743201	711-7432-01	Substructure		Paint, Spot
B743401	711-7459-01	Substructure		Coat
B744102	711-7433-02	Joints	Compression	Repair, Replace
B744301	711-7443-01	Deck	Timber	Repair
B744401	711-7444-01	Drains		Repair, Replace
B744501	711-7435-02	Bearings	Steel	Replace
B744601	711-7446-01	Bridge	Timber	Repair, Replace
B744602		Superstructure	Steel floorbeam	Repair Replace
B744603		Superstructure	RC/PS concrete	Repair
B744701	711-7447-01	Superstructure	Steel truss portal	Modify
B744802	711-7448-02	Substructure	Concrete, stone masonry abutment	Repair, Replace
B745102	711-7451-01	Substructure	Slopewall	Install
B745202	711-7452-01	Culvert	Apron, cutoff wall	Repair
B745301	711-7453-01	Channel	Dumped riprap, Gabion baskets	Replace
B745401	711-7454-01	Culvert		Temporary pipes
Bitwrgrs	711-7443-01	Deck	Bituminous surface	Replace
C743102	711-7431-02	Bearings		Clean, Flush
C743201	711-7432-02	Superstructure		Paint, Full

BMS Activity	MORIS Cost Function	Component	Element	Action
C744102	711-7433-02	Joints		Repair, Replace
C744302	711-7443-01	Deck	Open grid	Repair, Replace
C744402	711-7444-01	Drains	Downspout	Repair
C744502	711-7435-02	Bearings	Rocker	Reset
C744602	711-7446-01	Superstructure	Steel girder	Replace, Section
C744603		Bridge	RC/PS concrete	Repair
C744702	711-7447-01	Superstructure	Steel truss member	Tighten, flame shorten
C744802	711-7448-02	Substructure	Wingwalls	Repair, Replace, Modify
C745203	711-7452-01	Culvert	Barrel	Repair
C745301	711-7453-02	Channel	Scour Hole	Repair
C745401	711-7454-01	Bridge		Temporary bridge
D743102	711-7431-02	Steel surfaces		Clean, Flush
D743201	711-7432-02	Substructure		Paint, Full
D744303	711-7443-01	Deck	Concrete	Repair
D744503	711-7435-03	Substructure	Bearing Seats	Repair, Raise
D744602	711-7446-01	Superstructure	Steel diaphragm or brace	Replace
D744802	711-7448-02	Substructure	Pier	Repair
D744102	711-7433-02	Joints	Steel	Repair
D745302	711-7453-01	Channel	Stream deflector	Repair
Drngrat	711-7444-01	Drains	Grate	Replace
E744102	711-7433-02	Joints		Repair
E744303	711-7443-02	Sidewalk	Concrete	Repair
E744803	711-7448-03	Substructure	Footing	Repair
Ecremdp	711-7453-03	Channel		Clear, Dredge
Ecremvg		Channel		Clear, Debris
F744303	711-7443-02	Curb/Parapet	Precast Concrete	Repair
F744804	711-7448-04	Substructure	Masonry	Repoint
None	711-7325-01	Bridge	Span < 8ft	Repair
None	711-7425-01	Culvert	Arch	Replace
None		Culvert	Box	Replace
None		Culvert	Rigid Frame	Replace
None		Bridge	Span > 8ft	Replace
None		Culvert	RC Arch	Replace
None		Culvert	Precast	Replace
None		Culvert	Prefab Metal Box	Replace
None		Culvert	RC Box	Replace
Rlgbrpr	711-7434-01	Railings, Parapets		Repair
Rlgmedb		Railings, Parapets	Median rail	Repair
Rlgpedn		Railings, Parapets	Pedestrian rail	Repair
Rlgstrm		Railings, Parapets	Structure mounted	Repair

Table A1- 29 Virginia Preventive Maintenance Actions, Intervals and Costs

Source:

Brown,M. and Ahmad,A. (2006). "Virginia's planned preventive maintenance initiative." VTRC, TRB Workshop on Bridge Preservation, PowerPoint, 35p

Activity	Interval	Avg. Unit Cost
Deck Washing (Concrete)	Yearly	\$1.30/SY Deck
Deck Sweeping	Yearly	\$0.40/SY
Seat & Beam End Washing	2 Years	\$3.75/SY
Cutting & Removing Vegetation	2 Years	\$700/Structure
Routine Maintenance of Timber Structures	2 Years	\$1,200/Structure
Lubricating Bearing Devices	4 Years	\$50/Each
Scheduled Replacement of Compression Joint Seal	10 Years	\$66/LF
Scheduled Replacement of Pourable Joint Seal	6 Years	\$50/LF
Scheduled Installation of Thin Epoxy Overlay	15 Years	\$35/SY
Beam/Girder Ends Painting	10 Years	\$750/Each
Removing Vegetation/Debris from Culverts	5 Years	\$1,000/Each

Figure A1- 3 Virginia Approved Preventive Maintenance List

1. Seal, replace, reconstruct, or eliminate deck joints.
2. Spot and zone paint/ coat structural steel. Includes bearings for prestressed concrete members.
3. Paint/ coat structural steel.
4. Retrofit fracture critical members.
5. Retrofit fatigue prone details.
6. Deck overlays.
7. Cathodic Protection (CP) Systems:
8. Electrochemical Chloride Extraction (ECE) Treatment
9. Concrete deck repairs and/or overlays.
10. Substructure concrete repairs
11. Install scour countermeasures.
12. Remove large debris from channels.
13. Apply concrete sealants, coatings or membranes for protection.
14. Bridge cleaning and/ or washing services.

Figure A1- 4 Washington Actions by Area Maintenance Crews

Source:

Maintenance Manual (2002). M 51-01, Washington DOT, 361p.

	Maintain or repair:	Minor approach settlements
		Approach guardrail damage
		Plugged bridge drains
		Sweeping of bridge decks
		Sweeping of asphalt overlays
	Removal of dirt and debris on:	Timber caps
		Timber stringers
		Steel expansion devices (bearings)
		Lower chords of steel bridges
		Sign bridge bases

Normal maintenance — budgeted work, performed routinely on a scheduled basis. It is intended to maintain the highway facility/element so that it substantially retains its original intended use and function.

Examples of Normal Bridge Maintenance Actions

- Sweeping and debris removal
- Clean ditches, culverts, and catch basins
- Drainage restoration
- Placing riprap
- Vegetation management and litter pickup
- Moderate bridge maintenance
- Bridge maintenance such as debris removal, scour

Examples of Emergency Bridge Maintenance Actions

- Erection, dismantling, and maintenance of a Bailey bridge
- Establishment of detours and temporary minor structures