

Designation: E2103/E2103M - 13

Standard Classification for Bridge Elements—UNIFORMAT II¹

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1. Scope

- 1.1 This standard establishes a classification of bridge elements within the UNIFORMAT II family of elemental classifications. It covers most highway bridges, railroad bridges, and pedestrian bridges.
- 1.2 UNIFORMAT II classifications have an elemental format similar to the original UNIFORMAT² building elemental classification. However, the title UNIFORMAT II differs from the original in that it now takes into consideration a wide range of constructed entities that collectively form the built environment.
- 1.3 Elements, as defined here and in other UNIFORMAT II Classifications, are major physical components that are common within constructed entities. Elements perform their given function(s), regardless of the design specification, construction method, or materials used.
- 1.4 This elemental classification serves as a consistent reference for analysis, evaluation, and monitoring during the feasibility, planning, and design stages when constructing bridges.
- 1.5 Using UNIFORMAT II elemental classifications ensures a consistency in the economic evaluation of construction projects over time and from project to project.
- 1.6 UNIFORMAT II classifications also enhance reporting at all stages of a constructed entity's life cycle—from feasibility and planning through the preparation of working documents, construction, maintenance, rehabilitation, and disposal.
- 1.7 This classification is unsuitable for process applications or for preparing trade estimates.
- 1.8 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each

system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.9 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:³

E631 Terminology of Building Constructions

E833 Terminology of Building Economics

Buildings and **Building** Systems

E917 Practice for Measuring Life-Cycle Costs of Buildings and Building Systems

E964 Practice for Measuring Benefit-to-Cost and Savingsto-Investment Ratios for Buildings and Building Systems E1057 Practice for Measuring Internal Rate of Return and Adjusted Internal Rate of Return for Investments in

E1074 Practice for Measuring Net Benefits and Net Savings for Investments in Buildings and Building Systems

E1121 Practice for Measuring Payback for Investments in Buildings and Building Systems

E1185 Guide for Selecting Economic Methods for Evaluating Investments in Buildings and Building Systems

E1369 Guide for Selecting Techniques for Treating Uncertainty and Risk in the Economic Evaluation of Buildings and Building Systems

E1699 Practice for Performing Value Engineering (VE)/ Value Analysis (VA) of Projects, Products and Processes

E1804 Practice for Performing and Reporting Cost Analysis During the Design Phase of a Project

E1946 Practice for Measuring Cost Risk of Buildings and Building Systems and Other Constructed Projects

E2013 Practice for Constructing FAST Diagrams and Performing Function Analysis During Value Analysis Study

E2506 Guide for Developing a Cost-Effective Risk Mitigation Plan for New and Existing Constructed Facilities

¹ This classification is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.81 on Building Economics.

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² The original UNIFORMAT classification was developed jointly by the General Services Administration (GSA) and the American Institute of Architects (AIA).

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- E2691 Practice for Job Productivity Measurement
- 2.1.1 ASTM UNIFORMAT II Classification Standards Family: 3
 - E1557 Classification for Building Elements and Related Sitework—UNIFORMAT II
 - E2083 Classification for Building Construction Field Requirements, and Office Overhead & Profit
 - **E2168** Classification for Allowance, Contingency, and Reserve Sums in Building Construction Estimating
 - E2514 Practice for Presentation Format of Elemental Cost Estimates, Summaries, and Analyses
 - E2516 Classification for Cost Estimate Classification System'
 - 2.2 ASTM Adjuncts:4
 - Discount Factor Tables Adjunct to Practices E917, E964, E1057, E1074, and E1121

3. Terminology

3.1 *Definitions*—For definitions of general terms related to building construction used in this classification, refer to Terminology E631, and for general terms related to building economics, refer to Terminology E833.

4. Significance and Use

4.1 This standard builds on the concepts and organizational framework first established in Classification E1557. This classification describes bridge elements that are major components of most highway, railroad, and pedestrian bridges. The elemental classification is the common thread linking activities and participants in a bridge project from initial planning through operations, maintenance, and disposal.

Note 1—As this classification refers solely to permanent, physical parts of any construction, two additional classifications, Classifications E2083 and E2168, need to be included when calculating construction cost. These standards provide for the inclusion of construction enabling, temporary, and risk mitigation cost figures. Procedures for reporting all these figures are described in Practices E1804 and E2514 and Classification E2516. While these three latter standards were primarily written for building construction, they are nonetheless appropriate and readily applied to other forms of construction as well.

- 4.2 The Users of Bridge UNIFORMAT II Include:
- 4.2.1 *Financial and Investment*—Typically owners, developers, bankers, lenders, accountants, and financial managers.
- 4.2.2 *Implementation*—Primarily project managers; facilities programmers; designers, including engineers; and project controls specialists, including cost planners, estimators, schedulers, specification writers, and risk analysts.
- 4.2.3 *Facilities Management*—Comprising property portfolio managers, operating staff, and maintenance staff.
- 4.2.4 *Others*—Public officials, manufacturers, educators, students, and other project stakeholders.
- ⁴ Available from ASTM International Headquarters. Order Adjunct No. ADJE091703. Original adjunct produced in 1984. Adjunct last revised in 1985.

- 4.3 Apply This Classification When Undertaking the Following Work on Bridges:⁵
 - 4.3.1 Financing and Investing:
- 4.3.1.1 Structuring costs on an elemental basis for economic evaluations (Guide E1185 and Practices E917, E964, E1057, E1074, E1121, and E1804) early in the design process helps reduce the cost of early financial analysis and can contribute to substantial design and operational savings before decisions have been made that limit options for potential savings.
 - 4.3.2 *Implementing:*
- 4.3.2.1 Cost Modeling, Cost Planning, Estimating and Controlling Project Time and Cost During Planning, Design, and Construction—Use the bridge UNIFORMAT II classification to prepare budgets and to establish elemental cost plans before design begins. Project managers and project controls specialists use these cost plans against which to measure and control project cost, and quality, and to set design-to-cost targets.
- 4.3.2.2 Conducting Value Engineering Workshops—Conducting value engineering workshops (Practices E1699 and E2013). Use this classification as a checklist to ensure that alternatives for all elements of significant cost in the bridge project are analyzed in the creativity phase of the job plan. Also, use the elemental cost data to expedite the development of cost models for bridge systems.
- 4.3.2.3 Developing Initial Project Master Schedules—Since projects are essentially built element by element, UNIFOR-MAT II classifications are an appropriate basis for preparing construction schedules at the start of the design process. Project managers and project controls specialists use these time plans against which to measure and control project time (Practice E2691), and to set milestone target dates.
- 4.3.2.4 Performing Risk Analyses—Simulation (Guides E1369 and E2506) is one technique for developing probability distributions of bridge costs when evaluating the economic risk in undertaking a bridge project. Use individual elements and group elements in this classification for developing probability distributions of elemental costs. From these distributions, build up probability distributions of total costs to establish project contingencies (Practices E1946 and E2168) or to serve as inputs to an economic analysis.
- 4.3.2.5 Structuring Preliminary Project Descriptions During the Conceptual Design Phase—This classification facilitates the description of the scope of the project in a clear, concise, and logical sequence for presentation to the client; it provides the basis for the preparation of more detailed elemental estimates during the early concept and preliminary design phases, and it enhances communication between designers and clients by providing a clear statement of the designer's intent.
- 4.3.2.6 Coding and Referencing Standard Details In Computer-Aided Design Systems—This classification allows a designer, for example, to reference an assembly according to

⁵ For a more comprehensive discussion of the uses of UNIFORMAT II, see Bowen, Charette, and Marshall, *UNIFORMAT II—A Recommended Classification for Building Elements and Related Sitework*, National Institute of Standards and Technology Special Publication 841, Gaithersburg, MD, 1992; and Charette and Marshall, *UNIFORMAT II Elemental Classification for Building Specifications, Cost Estimating, and Cost Analysis*, National Institute of Standards and Technology NISTIR 6389, Gaithersburg, MD, 1999.

this classification's element designations and build up a database of standard details. This is particularly appropriate to design modeling and building information modeling (BIM) applications.

- 4.3.3 Managing Facilities:
- 4.3.3.1 Recording and writing property condition assessment reports in a structured way, using UNIFORMAT II classifications, provides for a consistent, accessible, and searchable database of real property inventory.
 - 4.3.4 Other Activities:
- 4.3.4.1 Structuring cost manuals and recording construction, operating, and maintenance costs in a computer database. Having a cost manual or computer database in an elemental format assists the preparation of an economic analysis early in the design stage and at a reasonable cost.

5. Basis of Classification

- 5.1 The framework in Fig. 1 shows the various constructed entities that collectively are used to create the built environment. Each entity is treated as a module. Appropriate modules used together will effectively describe any planned or built development. This standard classification describes exclusively the elements that make up one of those constructed entities, bridge structures, shown as the shaded block under the heading of Heavy (Civil) Entities.
- 5.1.1 This bridge classification is applicable to most types of highway, railroad, and pedestrian bridges crossing over highways, railroads, walkways, and waterways. The classification includes slab bridges; beam/girder bridges; truss bridges;

- true and tied-arch bridges; cable-stayed bridges; and suspension bridges. The classification does not include the following movable bridge types: draw bridges; lift bridges; and bascule bridges.
- 5.2 The classification is consistent with typical costing practices used at the conceptual design phase.
- 5.3 Each element has a significant impact on the cost, and it usually occurs frequently.
 - 5.4 Each element performs a specific function.
- 5.5 Table 1 divides the classification of bridge elements into three hierarchical levels: Level 1—Major Group Elements, Level 2—Group Elements, and Level 3—Individual Elements. The major groups are listed in the normal chronological order of construction.
- 5.6 Sub-Classifications are named Sub-Elements and comprise as many hierarchical levels (Level 4 and below) as are deemed appropriate to the needs of that specific example. Appendix X1 provides an example Sub-Classification of bridge elements.
- 5.7 The decision as to where among the classification elements to include specific construction items will rely on professional judgment as to where professionals in current practice normally look for such items.
- 5.8 Only items that impact the choice and cost of the bridge elements are included. Other civil works in the transportation system are not included. Consequently, this classification does

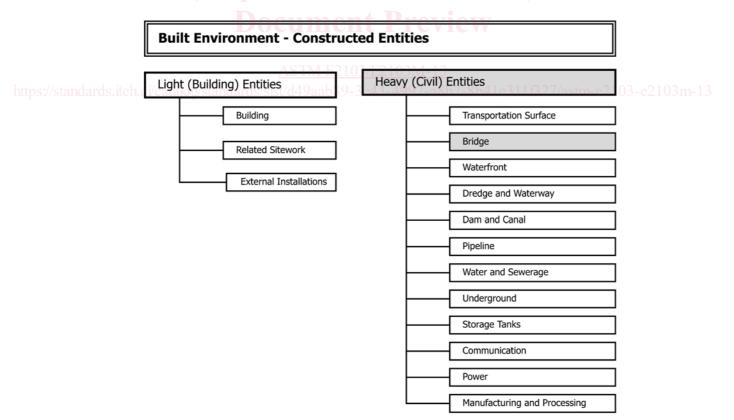


FIG. 1 List of Constructed Entities Suitable for Inclusion in the Family of UNIFORMAT II Elemental Classifications

TABLE 1 UNIFORMAT II Classification of Bridge Elements

Major Group Elements	Level 1	Level 2	Level 3
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Sound Barrier Walls Air Pressure Barriers Enclosure Sitework Site Preparation ASTM E2 103 M - 13 V/standards.iteh.ai/catalog/standards/sist/d49aab89-3e43-4997-a8b7-8b41e3113 Environmental Restoration/Replace		Other Protection	
Air Pressure Barriers Enclosure Sitework Site Preparation ASTM E2 103 M-13 Demolition and Relocation Earthwork Hazardous Material Handling Environmental Restoration/Replace			
Sitework Site Preparation ASTM E2103 M-13 Standards.iteh.ai/catalog/standards/sist/d49aab89-3e43-4997-a8b7-8b41e3115 Enclosure Clearing and Grubbing Demolition and Relocation Earthwork Hazardous Material Handling Environmental Restoration/Replace			
Sitework Site Preparation ASTM E2103/L2103M-13 Demolition and Relocation Earthwork Hazardous Material Handling Environmental Restoration/Replace			
AS IM EZ 103/EZ 103 M-13 Demolition and Relocation Standards.iteh.ai/catalog/standards/sist/d49aab89-3e43-4997-a8b7-8b41e3113 Earthwork Hazardous Material Handling Environmental Restoration/Replace			
AS IM EZ 103/EZ 103 M-13 Demolition and Relocation Standards.iteh.ai/catalog/standards/sist/d49aab89-3e43-4997-a8b7-8b41e3113 Earthwork Hazardous Material Handling Environmental Restoration/Replace	Sitework	Site Preparation	Clearing and Grubbing
7/standards.iteh.a/catalog/standards/sist/d49aab89-3e43-499 /-a8b /-8b41e31113 (Hazardous Material Handling 5111) Environmental Restoration/Replace		<u>ASTM E2103/E2103M-13</u>	Demolition and Relocation
7/Standards.fteh.a/catalog/standards/sist/d49aab89-3e43-499 /-a8b /-8b41e31113 (Hazardous Material Handling 5111) Environmental Restoration/Replace			Earthwork
Environmental Restoration/Replace			
Approach Construction Approach Slabs			Environmental Restoration/Replacemen
Approach Constitution Approach Class		Approach Construction	
Sleeper Slabs		Approxim Conditionin	
Earth Retention Systems			

not include utilities—pipelines (water, natural gas, and petroleum) and transmission lines (electrical, communication, and video)—sharing the same right of way as the transportation system.

- 5.9 Elements, as used and defined in UNIFORMAT II, will ideally display the following additional attributes:
 - 5.9.1 Capable of being defined precisely;
 - 5.9.2 Self explanatory;
 - 5.9.3 Separable at all stages of development;
 - 5.9.4 Quantifiable at all stages of development;
- 5.9.5 Capable of reconciliation with other elemental classifications:
- 5.9.6 Allow comparisons, project to project, in a meaningful way;
 - 5.9.7 Is a functional component of the constructed entity.

5.10 Sitework elements are provided for exclusive use in support of the construction of bridges, not to classify elements of major civil construction works. Sitework elements presented in Table 1 are designed to provide sufficient detail to planners so they will not need to resort to other elemental classifications when working on a bridge project.

6. Description of Project Elements

6.1 Elements and Functions—Table 2 provides, for each Level 3 Individual Element, the name, functions, description, inclusions, exclusions, and unit of measure. The functions are classified as Primary, Secondary, and Tertiary. All three levels of functions may be served. However, one or two functions may be the driving force behind the existence of the element, and they are classified as Primary functions.



TABLE 2 Description of UNIFORMAT II Bridge Elements

SUBSTRUCTURE	ription of UNIFORMAL II Bridge Elements	Excludes
Piers		Unit of N
Primary Function	Foundations Transfer load, Minimize settlement	Primary
Secondary Function	Minimize maintenance	Seconda
Tertiary Function	Facilitate construction	Tertiary
Description	Foundations are structures that transfer the load of the bridge substructures to the ground. They may be	Descript
	spread footings, piles, or drilled shafts. The type depends upon the soil conditions.	Includes Excludes
Includes	Excavation and backfilling	
Excludes	2 - 12	Unit of N
Unit of Measure	m³ [yd³] or m [ft] Walls	Abutme
Primary Function	Distribute load, Protect foundation	ributino
Secondary Function	Enhance appearance	Primary
Tertiary Function	Expedite construction	Seconda
Description	Walls are structures that support the columns; in	Tertiary
	addition to transferring the load from the columns to the foundation, they protect the pier against impacts from vehicles, vessels, and debris.	Descript
Includes	nom venicies, vesseis, and debits.	
Excludes		Includes
Unit of Measure	m³ [yd³] or kg [lb]	Excludes
	Columns	Unit of N
Primary Function	Distribute load	Primary
Secondary Function Tertiary Function	Enhance appearance Expedite construction	Seconda
Description	Columns are structures that support the cap beam	Tertiary
Description	and transfer the load from the cap beam to the wall below.	Descript
Includes		
Excludes Unit of Measure	m3 [ud3] or kg [lb]	Includes
Offic of Measure	m³ [yd³] or kg [lb] Cap Beams	Excludes
Primary Function	Distribute load	
Secondary Function	Enhance appearance	Unit of N
Tertiary Function	Expedite construction	Drimon
Description	Cap beams are structures that receive and transfer	Primary Secondar
Includes	beam loads from the deck to the bridge columns. Bridge seat	Tertiary
Excludes	Bearings and anchor bolts (see Bearings, Flexural	Descript
Licitates	Members)	
Unit of Measure	m^3 [yd ³] or kg [lb] ASTM F2103/F2	
SUBSTRUCTURE		Includes
Towers indards.ite	Foundations	Excludes
Primary Function	Transfer load, Minimize settlement	
Secondary Function	Minimize maintenance	Unit of N
Tertiary Function	Facilitate construction	SUBST
Description	Foundations are structures that transfer the load of	Other S
	the bridge substructures to the ground. They may be	Primary
	spread footings, piles, or drilled shafts. The type depends upon the soil conditions.	Seconda
Includes	Excavation and backfilling	Tertiary
Excludes		Descript
Unit of Measure	m³ [yd³] or m [ft] Walls	
Primary Function	Distribute load, Protect foundation	Includes
Secondary Function	Enhance appearance	
Tertiary Function	Expedite construction	Excludes
Description	Walls are structures that support the columns; in	
	addition to transferring the load from the columns to the foundation, they protect the pier against impacts	Unit of N
Includes	from vehicles, vessels, and debris.	Primary
Excludes		Seconda
Unit of Measure	m ³ [yd ³] or kg [lb]	Tertiary
	Columns	Descript
Primary Function	Distribute load	
Secondary Function	Enhance appearance	
Tertiary Function	Expedite construction	Includes
Description	Columns are structures that support the cap beam	moludes
	and transfer the load from the cap beam to the wall below.	Excludes
Includes	201011.	Unit of N

TABLE 2 Continued

Excludes	
Unit of Measure	m ³ [yd ³] or kg [lb]
	Cap Beams
Primary Function	Distribute load
Secondary Function	Enhance appearance
Tertiary Function	Expedite construction
Description	Cap beams are structures that receive and transfer
	beam loads from the deck to the bridge columns.
Includes	Bridge seat
Excludes	Bearings and anchor bolts (see Bearings, Flexural
Ulaik of Managema	Members)
Unit of Measure SUBSTRUCTURE	m ³ [yd ³] or kg [lb]
Abutments	
Abulments	Foundations
Primary Function	Transfer load, Minimize settlement
Secondary Function	Minimize maintenance
Tertiary Function	Facilitate construction
Description	Foundations are structures that transfer the load of
Boomption	the bridge substructures to the ground. They may be
	spread footings, piles, or drilled shafts. The type
	depends upon the soil conditions.
Includes	Excavation and backfilling
Excludes	Ŭ
Unit of Measure	m³ [yd³] or m [ft]
	Stems
Primary Function	Distribute load, Retain earth
Secondary Function	Minimize erosion
Tertiary Function	Minimize settlement
Description	Stems are usually supported on piles; they partially or
	fully retain earth behind, support the ends of the first
	and last spans of the bridge, and support the
dards	approach slab.
Includes	Bridge seat, reinforcing, concrete, and finishing
Excludes	Slope wall, foundation, and anchor bolts and bearings
Unit of Measure	(see Foundations, Barriers, Slope Wall, Bearings)
Unit of Measure	m³ [yd³] or kg [lb] Wing Walls
Primary Function	Retain earth
Secondary Function	Minimize erosion
Tertiary Function	Enhance appearance
Description	Wing walls (parallel, perpendicular, or angled) are
2 000p.::01.	structures connected to the abutment and supported
	by piles that retain the embankment below the
	approach road.
Includes a 8h7-8h41e	Reinforcing, concrete, and finishing 103 m 13
Excludes	Approach slab and parapet (see Approach Slab,
	Barriers)
Unit of Measure	m³ [yd³]
SUBSTRUCTURE	
Other Supports	
Dalamana Francis	Thrust Blocks
Primary Function	Transfer load, Transfer thrust
Secondary Function Tertiary Function	Minimizes movement
Description	Thrust blocks are a special substructure of a true
Description	arch bridge that receive loads from the ribs and
	transfer loads to the foundation.
Includes	Structure excavation, reinforcing, concrete, and
	finishing
Excludes	Furnishing and installation of anchor bolts, bearing
	plates, utility relocation (see Demolition and
	Relocation, Flexural Members)
Unit of Measure	m³ [yd³]
	Anchorages
Primary Function	Secure cable, Transfer load
Secondary Function	Maintain even distribution
Tertiary Function	
Description	Anchorages are a special substructure to which the
	weight of the deck and supporting superstructure is
	secured via cables and steel eye bars imbedded in
	solid rock or massive concrete blocks.
Includes	Structure excavation, reinforcing, concrete, finishing,
	and cable support (Steel Eye Bar)
Excludes	3 [3]
Unit of Measure	m ³ [yd ³]



TABLE 2 Continued

TABLE 2 Continued

	TABLE 2 Continued		TABLE 2 Continued
SUPERSTRUCTURE			Spandrels
Short Span Assemblies		Primary Function	Transfer load
	Flexural Members	Secondary Function	Increase reliability
Primary Function	Support Load	Tertiary Function	Enhance appearance
Secondary Function	Minimize deflection	Description	Spandrels are concrete or steel members that
Tertiary Function	Increase redundancy	Boothplion	connect the deck to the ribs (arch bridges); they
Description	Flexural members are commonly known as beams		receive loads from the deck and transfer loads to the
Description	•		ribs in compression. They are below the deck and
	and girders that support the bridge deck. When the		
	depth of the girder is shallow, it is referred to as a	la alcala a	above the rib.
	beam.	Includes	Concrete or steel members, protection
Includes	Fabrication and installation of beams and girders	Excludes	End connections (see Flexural Members and Ribs)
Excludes	Diaphragms, bracings, bearings (see Diaphragms,	Unit of Measure	m [ft]
	Bracings, Bearings)		Ties
Unit of Measure	kg [lb] or m [ft]	Primary Function	Eliminate thrust
	Diaphragms	Secondary Function	
Primary Function	Stabilize girder, Brace girders	Tertiary Function	
Secondary Function	Facilitate deck reconstruction	Description	A tie is a horizontal tension member that connects the
Tertiary Function		·	two ends of the compression ribs of an arch bridge
Description	Diaphragms are braces for shallow-depth beams.		and balances the horizontal thrust.
Includes	., ., .,	Includes	Fabrication and erection of structural steel, stiffeners,
Excludes			splices, and other connections
Unit of Measure	kg [lb] or m ³ [yd ³]	Excludes	Hangers, bearings (see Bearings, Hangers and
Offic of Measure		Excludes	
D : E ::	Bracings	Linit of Managemen	Spandrels)
Primary Function	Stabilize girders	Unit of Measure	kg [lb]
Secondary Function	Facilitate deck reconstruction	<u> </u>	Truss Members
Tertiary Function		Primary Function	Support load, Reduce weight
Description	Bracings are steel angles used to brace deep-depth	Secondary Function	Minimize deflection
	girders.	Tertiary Function	
Includes	Fabrication and erection of structural steel angles	Description	Truss members, connected at nodes by plates, are
Excludes			two-dimensional structures that support the
Unit of Measure	kg [lb]		superstructure.
	Bearings	Includes	Splices and other connections
Primary Function	Transfer load	Excludes	Bracings, bearings (see Bracings, Bearings)
Secondary Function	Facilitate expansion and contraction	Unit of Measure	kg [lb], or m ³ [yd ³], or m [ft]
Tertiary Function	Minimize maintenance	Offit of Weasure	Segmental Box Girders
-		Primary Function	Support Load
Description	Bearings are mechanical systems that transfer		
	vertical and longitudinal forces; expansion bearings	Secondary Function	Minimize deflection
	allow rotational and longitudinal movement, whereas	Tertiary Function	Facilitate Construction
	fixed bearings allow only rotational movement.	Description	Segmental box girders are concrete box sections with
Includes	Fabrication and erection of bearings and anchor bolts		or without overhanging flanges. The segments are
Excludes	Bridge seat (see Cap Beams, Stem Abutments)		precast sections which are post tensioned in the field.
Unit of Measure	EACH	Includes	Post tensioning
SUPERSTRUCTURE		Excludes	Bracings, bearings (see Bracings, Bearings)
Long Span Assemblies		Unit of Measure	m [ft]
	Ribs	SUPERSTRUCTURE	
Primary Function	Transfer load tandards/sist/d49aah89-3e43	_Deck 7_a 8h7_8h41e	
Secondary Function	Facilitate inspection		Structural Surface
Tertiary Function	Enhance appearance	Primary Function	Transfer load
Description	Ribs are rectangular-, square-, or circular-shaped	Secondary Function	Minimize maintenance
Description	parts of the superstructure for arch bridges; they	Tertiary Function	Facilitate future expansion
		Description	The structural surface supports the wearing surface
	receive loads from hangers and spandrels and	Description	
	transfer them to the foundation.		and traffic.
Includes		Includes	Reinforcing, concrete, and finishing
Excludes	Bracings, bearings (see Bracings, Bearings)	Excludes	Expansion joint assembly, parapet, barriers (see
Unit of Measure	kg [lb], or m ³ [yd ³], or m [ft]		Expansion Joints, Barriers, Drainage Systems)
	Cables	Unit of Measure	m ³ [yd ³] or EACH
Primary Function	Transfer load		Wearing Surface
Secondary Function	Enhance appearance	Primary Function	Protect structure, Guide traffic
Tertiary Function		Secondary Function	Comfort riders
Description	Cables, made of steel wires bound together and	Tertiary Function	Reduce maintenance
	draped over towers to anchors at each cable end,	Description	The wearing surface is the part of the road or rail
	receive through hangars the load from the deck.	Becomption	system that comes into contact with the vehicle or
Includes	Fabrication and installation of cables, cable support		train car wheels.
Includes Excludes	, , , , , , , , , , , , , , , , , , , ,	Includes	Concrete or asphalt overlay or rails, striping, marking,
	Anchorage (see Anchorage)		Concrete or aspiral overlay or rails, striping, marking,
Unit of Measure	m [ft]	Excludes	mo2 [c.d2]
	Hangers	Unit of Measure	m² [yd²]
Primary Function	Transfer load	PROTECTION	
Secondary Function	Increase vertical clearance	Structure Protection	
Tertiary Function	Enhance appearance		Slope Walls
Description	Hangers are rods or strands that connect the deck to	Primary Function	Protect abutment
	the ribs (arch bridges) or the main cable (cable-	Secondary Function	Prevent erosion
	stayed or suspension bridges); they receive loads	Tertiary Function	Enhance appearance
	from the deck and transfer loads to the ribs or main	Description	Slope walls, made of stone, concrete, gravel, or
	cable in tension.		gravel with asphalt mix, support the sloped surface
Includes	Splices (rod), strand assembly, protection		and protect the bridge abutment.
Excludes	End connections (see Flexural Members and Ribs)	Includes	Reinforcing, concrete, and finishing
Unit of Measure			Excavation and backfill (see Earthwork)
Onit of weasure	m [ft]	Excludes	LACAVATION AND DACKINI (SEE EARTHWORK)