Washington State
Department of Transportation

Washington State Bridge Inspection Manual

M 36-64.14

December 2023

Bridge Preservation Office/Local Programs

ENGLISH

Title VI Notice to Public

It is the Washington State Department of Transportation's (WSDOT) policy to assure that no person shall, on the grounds of race, color, national origin, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participation in, be denied the benefits of, or be otherwise discriminated against under any of its programs and activities. Any person who believes his/her Title VI protection has been violated, may file a complaint with WSDOT's Office of Equity and Civil Rights (OECR). For additional information regarding Title VI complaint procedures and/or information regarding our non-discrimination obligations, please contact OECR's Title VI Coordinator at 360-705-7090.

Americans with Disabilities Act (ADA) Information

This material can be made available in an alternate format by emailing the Office of Equity and Civil Rights at wsdotada@wsdot.wa.gov or by calling toll free, 855-362-4ADA(4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711.

ESPAÑOL

Notificación de Titulo VI al Público

La política del Departamento de Transporte del Estado de Washington (Washington State Department of Transportation, WSDOT) es garantizar que ninguna persona, por motivos de raza, color u origen nacional, según lo dispuesto en el Título VI de la Ley de Derechos Civiles de 1964, sea excluida de la participación, se le nieguen los beneficios o se le discrimine de otro modo en cualquiera de sus programas y actividades. Cualquier persona que considere que se ha violado su protección del Título VI puede presentar una queja ante la Oficina de Equidad y Derechos Civiles (Office of Equity and Civil Rights, OECR) del WSDOT. Para obtener más información sobre los procedimientos de queja del Título VI o información sobre nuestras obligaciones contra la discriminación, comuníquese con el coordinador del Título VI de la OECR al 360-705-7090.

Información de la Ley sobre Estadounidenses con Discapacidades (ADA, por sus siglas en inglés)

Este material puede estar disponible en un formato alternativo al enviar un correo electrónico a la Oficina de Equidad y Derechos Civiles a wsdotada@wsdot.wa.gov o llamando a la línea sin cargo 855-362-4ADA(4232). Personas sordas o con discapacidad auditiva pueden solicitar la misma información llamando al Washington State Relay al 711.

한국어 – KOREAN

제6조 관련 공지사항

워싱턴 주 교통부(WSDOT)는 1964년 민권법 타이틀 VI 규정에 따라, 누구도 인종, 피부색 또는 출신 국가를 근거로 본 부서의 모든 프로그램 및 활동에 대한 참여가 배제되거나 혜택이 거부되거나, 또는 달리 차별받지 않도록 하는 것을 정책으로 하고 있습니다. 타이틀 VI에 따른 그/그녀에 대한 보호 조항이 위반되었다고 생각된다면 누구든지 WSDOT의 평등 및 민권 사무국(OECR)에 민원을 제기할 수 있습니다. 타이틀 VI에 따른 민원 처리 절차에 관한 보다 자세한 정보 및/또는 본 부서의 차별금지 의무에 관한 정보를 원하신다면, 360-705-7090으로 OECR의 타이틀 VI 담당자에게 연락해주십시오.

미국 장애인법(ADA) 정보

본 자료는 또한 평등 및 민권 사무국에 이메일 wsdotada@wsdot.wa.gov 을 보내시거나 무료 전화 855-362-4ADA(4232)로 연락하셔서 대체 형식으로 받아보실 수 있습니다. 청각 장애인은 워싱턴주 중계 711로 전화하여 요청하실 수 있습니다.

русский – RUSSIAN

Раздел VI Общественное заявление

Политика Департамента транспорта штата Вашингтон (WSDOT) заключается в том, чтобы исключить любые случаи дискриминации по признаку расы, цвета кожи или национального происхождения, как это предусмотрено Разделом VI Закона о гражданских правах 1964 года, а также случаи недопущения участия, лишения льгот или другие формы дискриминации в рамках любой из своих программ и мероприятий. Любое лицо, которое считает, что его средства защиты в рамках раздела VI были нарушены, может подать жалобу в Ведомство по вопросам равенства и гражданских прав WSDOT (OECR). Для дополнительной информации о процедуре подачи жалобы на несоблюдение требований раздела VI, а также получения информации о наших обязательствах по борьбе с дискриминацией, пожалуйста, свяжитесь с координатором OECR по разделу VI по телефону 360-705-7090.

Закон США о защите прав граждан с ограниченными возможностями (ADA)

Эту информацию можно получить в альтернативном формате, отправив электронное письмо в Ведомство по вопросам равенства и гражданских прав по адресу wsdotada@wsdot.wa.gov или позвонив по бесплатному телефону 855-362-4ADA(4232). Глухие и слабослышащие лица могут сделать запрос, позвонив в специальную диспетчерскую службу штата Вашингтон по номеру 711.(4232). Глухие и слабослышащие лица могут сделать запрос, позвонив в специальную диспетчерскую службу штата Вашингтон по номеру 711.

tiếng Việt – VIETNAMESE

Thông báo Khoản VI dành cho công chúng

Chính sách của Sở Giao Thông Vận Tải Tiểu Bang Washington (WSDOT) là bảo đảm không để cho ai bị loại khỏi sự tham gia, bị từ khước quyền lợi, hoặc bị kỳ thị trong bất cứ chương trình hay hoạt động nào vì lý do chủng tộc, màu da, hoặc nguồn gốc quốc gia, theo như quy định trong Mục VI của Đạo Luật Dân Quyền năm 1964. Bất cứ ai tin rằng quyền bảo vệ trong Mục VI của họ bị vi phạm, đều có thể nộp đơn khiếu nại cho Văn Phòng Bảo Vệ Dân Quyền và Bình Đẳng (OECR) của WSDOT. Muốn biết thêm chi tiết liên quan đến thủ tục khiếu nại Mục VI và/hoặc chi tiết liên quan đến trách nhiệm không kỳ thị của chúng tôi, xin liên lạc với Phối Trí Viên Mục VI của OECR số 360-705-7090.

Thông tin về Đạo luật Người Mỹ tàn tật (Americans with Disabilities Act, ADA)

Tài liệu này có thể thực hiện bằng một hình thức khác bằng cách email cho Văn Phòng Bảo Vệ Dân Quyền và Bình Đẳng wsdotada@wsdot.wa.gov hoặc gọi điện thoại miễn phí số, 855-362-4ADA(4232). Người điếc hoặc khiếm thính có thể yêu cầu bằng cách gọi cho Dịch vụ Tiếp âm Tiểu bang Washington theo số 711.

ARABIC – العَرَبِيّة

العنوان 6 إشعار للجمهور

تتمثل سياسة وزارة النقل في ولاية واشنطن (WSDOT) في ضمان عدم استبعاد أي شخص، على أساس العرق أو اللون أو الأصل القومي من المشاركة في أي من برامجها وأنشطتها أو الحرمان من الفوائد المتاحة بموجبها أو التعرض للتمييز فيها بخلاف ذلك، كما هو منصوص عليه في الباب السادس من قانون الحقوق المدنية لعام 1964. ويمكن لأي شخص يعتقد أنه تم انتهاك حقوقه التي يكفلها الباب السادس تقديم شكوى إلى مكتب المساواة والحقوق المدنية (OECR) التابع لوزارة النقل في ولاية واشنطن. للحصول على معلومات إضافية بشأن إجراءات الشكاوى و/أو بشأن التزاماتنا بعدم التمييز بموجب الباب السادس، يرجى الاتصال بمنسق الباب السادس في مكتب المساواة والحقوق المدنية على الرقم 360-705-7090.

معلومات قانون الأمريكيين ذوي الإعاقة (ADA)

يمكن توفير هذه المواد في تنسيق بديل عن طريق إرسال رسالة بريد إلكتروني إلى مكتب المساواة والحقوق المدنية على wsdotada@wsdot.wa.gov أو عن طريق الاتصال بالرقم المجاني: (4232) 855-362-4ADA. يمكن للأشخاص الصم أو ضعاف السمع تقديم طلب عن طريق الاتصال بخدمة Washington State Relay على الرق 711.

中文 – CHINESE

《权利法案》Title VI公告

<華盛頓州交通部(WSDOT)政策規定，按照《1964 年民權法案》第六篇規定，確保無人因種族、膚色或國籍而被排除在WSDOT任何計畫和活動之外，被剝奪相關權益或以其他方式遭到歧視。如任何人認為其第六篇保護權益遭到侵犯，則可向WSDOT的公平和民權辦公室(OECR)提交投訴。如需關於第六篇投訴程式的更多資訊和/或關於我們非歧視義務的資訊，請聯絡OECR的第六篇協調員，電話 360-705-7090。

《美国残疾人法案》(ADA)信息

可向公平和民權辦公室發送電子郵件wsdotada@wsdot.wa.gov或撥打免費電話 855-362-4ADA(4232)，以其他格式獲取此資料。听力丧失或听觉障碍人士可拨打711联系Washington州转接站。

Af-soomaaliga – SOMALI

Ciwaanka VI Ogeysiiska Dadweynaha

Waa siyaasada Waaxda Gaadiidka Gobolka Washington (WSDOT) in la xaqiijiyo in aan qofna, ayadoo la cuskanaayo sababo la xariira isir, midab, ama wadanku kasoo jeedo, sida ku qoran Title VI (Qodobka VI) ee Sharciga Xaquuqda Madaniga ah ah oo soo baxay 1964, laga saarin ka qaybgalka, loo diidin faa'iidooyinka, ama si kale loogu takoorin barnaamijyadeeda iyo shaqooyinkeeda. Qof kasta oo aaminsan in difaaciisa Title VI la jebiyay, ayaa cabasho u gudbin kara Xafiiska Sinaanta iyo Xaquuqda Madaniga ah (OECR) ee WSDOT. Si aad u hesho xog dheeraad ah oo ku saabsan hanaannada cabashada Title VI iyo/ama xogta la xariirta waajibaadkeena ka caagan takoorka, fadlan la xariir Iskuduwaha Title VI ee OECR oo aad ka wacayso 360-705-7090.

Macluumaadka Xeerka Naafada Marykanka (ADA)

Agabkaan ayaad ku heli kartaa qaab kale adoo iimeel u diraaya Xafiiska Sinaanta iyo Xaquuqda Madaniga ah oo aad ka helayso wsdotada@wsdot.wa.gov ama adoo wacaaya laynka bilaashka ah, 855-362-4ADA(4232). Dadka naafada maqalka ama maqalku ku adag yahay waxay ku codsan karaan wicitaanka Adeega Gudbinta Gobolka Washington 711.

If you have difficulty understanding English, you may, free of charge, request language assistance services by calling 360-570-2530 or email us at: cheneyr@wsdot.wa.gov

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ESPAÑOL – SPANISH

Servicios de traducción

Aviso a personas con dominio limitado del idioma inglés: Si usted tiene alguna dificultad en entender el idioma inglés, puede, sin costo alguno, solicitar asistencia lingüística con respecto a esta información llamando al 360-570-2530, o envíe un mensaje de correo electrónico a: cheneyr@wsdot.wa.gov

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한국어 – KOREAN

번역 서비스

영어로 소통하는 것이 불편하시다면 360-570-2530, 으로 전화하시거나 다음 이메일로 연락하셔서 무료 언어 지원 서비스를 요청하실 수 있습니다: cheneyr@wsdot.wa.gov

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русский – RUSSIAN

Услуги перевода

Если вам трудно понимать английский язык, вы можете запросить бесплатные языковые услуги, позвонив по телефону 360-570-2530, или написав нам на электронную почту: cheneyr@wsdot.wa.gov

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tiếng Việt – VIETNAMESE

các dịch vụ dịch thuật

Nếu quý vị không hiểu tiếng Anh, quý vị có thể yêu cầu dịch vụ trợ giúp ngôn ngữ, miễn phí, bằng cách gọi số 360-570-2530, hoặc email cho chúng tôi tại: cheneyr@wsdot.wa.gov

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اَلْعَرَبِيَّةُ - ARABIC

خ دمات الترجمة

إذا كنت تجد صعوبة في فهم اللغة الإنجليزية، فيمكنك مجا نًا طلب خدمات المساعدة اللغوية عن طر يق الاتصال بالرقم 360-570-2530 أو مراسلتنا عبر البريد الإلكتروني : cheneyr@wsdot.wa.gov

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中文 – CHINESE

翻译服务

如果您难以理解英文 , 则请致电 : 360-570-2530 , 或给我们发送电子邮件 : cheneyr@wsdot.wa.gov , 请求获取免费语言援助服务。

Af-soomaaliga – SOMALI

Adeegyada Turjumaada

Haddii ay kugu adag tahay inaad fahamtid Ingiriisida, waxaad, bilaash, ku codsan kartaa adeegyada caawimada luuqada adoo wacaaya 360-570-2530 ama iimayl noogu soo dir: cheneyr@wsdot.wa.gov

Foreword

The *Washington State Bridge Inspection Manual* (WSBIM) is published jointly by the Bridge and Structures and the Local Programs offices of the Washington State Department of Transportation (WSDOT). This manual is the primary source of information and guidance for those who inspect bridges subject to the National Bridge Inspection Standards (NBIS), the National Tunnel Inspection Standards (NTIS) and managed by state and local agencies within Washington State.

This publication is the official source for all information relevant to Washington State's compliance with the NBIS, the National Bridge Inventory, the NTIS, the National Tunnel Inventory, and the Washington State Bridge Inventory. It is also the official source of information for the inspection of bridges* and selected structures on state right of way that are not subject to the NBIS, and for the recordkeeping requirements for these bridges and selected structures in the Washington State Bridge Inventory.

The WSBIM is managed by the Bridge Inspection Committee composed of individuals listed in this document. Suggestions for improvement and updating the manual are always welcome. All questions and comments regarding this manual will be reviewed by this committee and incorporated into subsequent revisions as appropriate.

Roman Peralta P.E
WSDOT Bridge Preservation Engineer/
Statewide Program Manager

Loren Wilson, P.E.
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**Bridge(s) is intended to mean all reportable structures which includes bridges, culverts and tunnels.*

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Comment Request Form

Date:	________________________________
From:	________________________________ Phone: ________________________________ ________________________________ Email: ________________________________ ________________________________
To:	Bridge Preservation Engineer Washington State Department of Transportation PO Box 47340 Olympia, WA 98504-7340
Subject:	*Bridge Inspection Manual* Comment
	Recommendation for Improvement:

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Introduction

Purpose

The *Washington State Bridge Inspection Manual* (WSBIM) has been developed to provide specific guidance, offer needed technical details, and serve as an information source to both state and local agency staff related to and involved with bridge inspections within the state of Washington. The intent of this manual is to serve as an operations manual for the collection, processing, and reporting of bridge inspection information.

The WSBIM consists of nine chapters. Chapters 1 – 3 explain the responsibilities within the bridge inspection organization, provide guidance to the structure of the Washington State Bridge Inventory System (WSBIS), and it further explains the types of inspections and the reports required to meet the federal mandate outlined in the Code of Federal Regulations. Chapter 4 describes the Washington State Bridge Management System (BMS) and defines the element level inspection used by both state and local agency bridge inspectors. Chapters 5 – 7 provide more detailed information to the inspector regarding load ratings, scour, damage/repair reporting, and quality control/quality assurance. Chapter 8, currently written as a stand-alone chapter, covers the aspects of mechanical and electrical inspections of moveable structures. Chapter 9 integrates the operation of tunnel inspections into the overall inspection program.

References

Bridge inspection staff may also refer to the most current editions of the following:

- *Bridge Inspector's Reference Manual* (BIRM), Publication No. FHWA NHI 23-024
- *The Manual for Bridge Evaluation (MBE)*, 3rd Edition, AASHTO
- *The Manual for Bridge Element Inspection*, 2nd Edition, AASHTO
- *Evaluating Scour at Bridges*, Hydraulic Engineering Circular (HEC) No. 18, 5th Edition, FHWA
- *Stream Stability at Highway Structures*, Hydraulic Engineering Circular (HEC) No. 20, 4th Edition, FHWA
- *Bridge Scour and Stream Instability Countermeasures*, Hydraulic Engineering Circular No. 23, 3rd Edition, FHWA
- Title 23 CFR 650 Subpart C – National Bridge Inspection Standards
- Title 23 CFR 650 Subpart E – National Tunnel Inspection Standards
- Title 23 CFR 500 Subpart A – Management and Monitoring Systems
- *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*, Report No. FHWA-PD-96-001, December 1995, FHWA. ***NOTE:*** use of this document will be discontinued after March 2025.
- *Specifications for the National Bridge Inventory* (SNBI), Publication No. FHWA-HIF-22-017. ***NOTE:*** use of this document is in transition until full use in 2026.
- *Specifications for the National Tunnel Inventory (SNTI)*, Publication No. FHWA-HIF-15-006.
- *Bridge Design Manual* (BDM) M 23-50, WSDOT
- *Transportation Structures Preservation Manual* M 23-11, WSDOT
- *Local Agency Guidelines* (LAG) M 36-63, WSDOT
- *Bridge List* M 23-09, WSDOT
- *Moveable Bridge Inspection, Evaluation, and Maintenance Manual*, 1st Edition, AASHTO
- *Dive Safety Manual* M 3107, WSDOT

Revisions

The WSBIM is a dynamic document that is updated annually to incorporate revisions based on new requirements from the Federal Highway Administration (FHWA), as well as newly adopted practices by either state or local agencies within the state. We encourage the user to submit to the Bridge Inspection Committee any proposed revisions or new material, by using the Comment Request Form provided.

In the event of conflicting information or requirements between the WSBIM and NBIS/NTIS, the NBIS/NTIS will govern. Agencies are not relieved of the responsibility of complying with the NBIS/NTIS even when a conflict exists. If a conflict is discovered, notify the WSDOT Bridge Condition Engineer or the Local Agency Bridge Engineer.

Chapter 1 Bridge Inspection Organization Requirements

1-1 General

The National Bridge Inspection Standards (NBIS) are published in the Code of Federal Regulations, 23 CFR 650, Subpart C. The NBIS sets the national standard for the proper safety inspection and evaluation of bridges and it applies to all structures defined as reportable structures located on all public roads, on and off Federal-aid highways, including tribally and federally owned tunnels.

The National Tunnel Inspection Standards (NTIS) are published in the Code of Federal Regulations, 23 CFR 650, Subpart E. The NTIS sets the national standard for the proper safety inspection and evaluation of all highway tunnels on all public roads, on and off Federal-aid highways, including tribally and federally owned tunnels.

Washington State's bridge inspection organization is required to meet the NBIS, NTIS, and functions under the authority of the Federal Highway Administration (FHWA) and state law. Washington State's bridge inspection organization, however, is only responsible for state and local agency-owned bridges and tunnels. Federally-owned bridges are inventoried and managed by federal agencies. Privately-owned highway bridges are not included in this requirement unless it is connected to a public road on both ends of the bridge. WSDOT encourages private bridge owners to inspect and maintain their bridges in conformance with the NBIS, NTIS, and this manual. There is an open invitation for private bridge owners to submit bridge records to the Washington State Bridge Inventory System (WSBIS).

1-1.1 *Definitions*

BEISt –Bridge Engineering Information System. The WSDOT internal website that holds electronic bridge files.

Bridge – All reportable structures that include bridges, culverts, and tunnels. See also definition of Reportable Structure below.

BridgeWorks – The software application that is used to record, process and report bridge inspections and which updates data in the inventory databases.

Bridge Condition Inspection Training (BCIT) – A comprehensive ten day training course offered by WSDOT based on the 2012 FHWA "*Bridge Inspectors Reference Manual* (BIRM)". The BCIT is an FHWA accepted equivalent to the course offered by the National Highway Institute (NHI), entitled "Safety Inspection of In-Service Bridges" with a course code of FHWA-NHI-130055.

Bridge File – A file containing historic and current information about a bridge, and meeting the intent of Chapter 2 of the AASHTO *Manual for Bridge Evaluation*.

Bridge Inspection – The act to assess the structural condition and collect pertinent data while on site of in-service bridges.

Bridge Inspection Certification – A process by which a Program manager, Team Leader and Underwater Bridge Inspection Diver is certified in the state of Washington to perform bridge inspections. See Section 1-5.

Bridge Inspection Committee (BIC) – A committee of state and local agency representatives that provides overall advisory input to the bridge inspection manual content and organization within the state of Washington. The current list of committee members is located within the Foreword of this manual.

Bridge Inspection Organization – See Section 1-2

Bridge Inspection Program – An organizational unit that functions as part of the Bridge Inspection Organization and that meets the requirements of 23 CFR 650.307, 23 CFR 650.507, and this manual. Agencies involved with the Bridge Inspection Program are led by delegated program managers, who work in coordination with the Statewide Program Manager.

Critical Finding – See Section 6-2

Culvert – A structure comprised of one or more barrels, beneath an embankment and designed structurally to account for soil-structure interaction. These structures are hydraulically and structurally designed to convey water, sediment, debris, and, in many cases, aquatic and terrestrial organisms through roadway embankments. Culvert barrels have many sizes and shapes and have inverts that are either integral or open, i.e. supported by spread or pile-supported footings. Many culverts take advantage of headwater submergence of the inlet to increase hydraulic efficiency and economy.

Delegated Program Manager (DPM) – See Section 1-4.2

Element Level Bridge inspection Data – Quantitative condition assessment data, collected during bridge inspections, that indicates the severity and extent of defects in bridge elements.

Hands-on inspection – Inspection within arm's length of the member. Inspection uses visual techniques that may be supplemented by nondestructive evaluation techniques.

Highway Lid – A structure built with green space which interconnects neighborhoods otherwise cut off or impacted by freeways, with or without local roads. If carrying local roads, the structure must have a deck area at least twice the area of the roads it carries. Highway lids shall be inventoried as tunnels under the NTIS.

Inventory Record – Data which has been coded according to this manual for each structure carrying public road traffic and/or for each inventory route which goes under a structure.

Inventory Route – The route for which the applicable inventory data is to be recorded. The inventory route may be on the structure or under the structure. Generally, inventories along a route are made from west to east and south to north.

Local Agency – Generally refers to city or county bridge owners but also includes all bridge owners other than state and federal.

National Bridge Inspection Standards (NBIS) – Title 23 Code of Federal Regulations 650 Subpart C defines the NBIS regulations, and establishes requirements for inspection procedures, inspection intervals, qualifications of personnel, inspection reports, and preparation and maintenance of a state bridge inventory. The NBIS apply to all structures defined as bridges located on all public roads.

National Bridge Inventory (NBI) – The aggregation of structure inventory and appraisal data collected nationally to fulfill the requirements of the National Bridge Inspection Standards. The state of Washington shall prepare and maintain an inventory of all bridges subject to the NBIS.

National Tunnel Inspection Standards (NTIS) – Title 23 Code of Federal Regulations 650 Subpart E defines the NTIS regulations, and establishes requirements for inspection procedures, inspection intervals, qualifications of personnel, inspection reports, and preparation and maintenance of a state tunnel inventory. The NTIS apply to all structures defined as highway tunnels located on all public roads.

National Tunnel Inventory (NTI) – The aggregation of structure inventory and appraisal data collected nationally to fulfill the requirements of the National Tunnel Inspection Standards. The state of Washington shall prepare and maintain an inventory of all tunnels subject to the NTIS.

Nationally Certified Bridge Inspector – An individual meeting the team leader requirements of Section 1-4.3.

Nonredundant Steel Tension Member (NSTM) – A primary steel member fully or partially in tension, and without load path redundancy, system redundancy or internal redundancy, whose failure may cause a portion of or the entire bridge to collapse. These elements were formerly referred to as Fracture Critical Members (FCM).

Public Road – Any road under the jurisdiction of and maintained by a public authority and open to public travel.

Rehabilitation – The major work required to restore the structural integrity of a bridge as well as work necessary to correct major safety defects.

Reportable Structure – The NBIS gives the following definition: "A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening." Reportable structures also include tunnels reported to the NTI.

The State – The Washington State Department of Transportation (WSDOT).

Statewide Program Manager (SPM) – See Section 1-4.1

Super User – Bridgeworks/WSBIS account that has permissions that allows user to approve changes (release) in the application that other users do not have sufficient permissions to perform. Examples of these types of data changes are changes of Program Manager, changes to the owner, and obsoleting of structures.

Tunnel – The term "tunnel" means an enclosed roadway for motor vehicle traffic with vehicle access limited to portals, regardless of type of structure or method of construction, that requires, based on the owner's determination, special design considerations that may include lighting, ventilation, fire protection systems, and emergency egress capacity. The term "tunnel" does not include bridges or culverts inspected under the National Bridge Inspection Standards (Title 23 Code of Federal Regulations 650 Subpart C). The state of Washington shall prepare and maintain an inventory of all tunnels subject to the NTIS.

Washington State Bridge Inventory System (WSBIS) – The aggregation of structure inventory, and appraisal data collected and used to fulfill the requirements of the NBIS/NTIS and additional data used to manage the state and local bridge inventories.

1-2 Description of Bridge Inspection Organization

In Washington State, the bridge inspection organization is structured as a collaborative effort between the Washington State Department of Transportation (WSDOT) Bridge Preservation Office (BPO), WSDOT Local Programs Office (LP), and local agency bridge owners with the Federal Highway Administration (FHWA) as a primary stakeholder. Collectively, all state and local agency owned bridges subject to the NBIS and NTIS are managed under this organization. The inspection organization is led by the State Bridge Preservation Engineer (who serves as the Statewide Program Manager) and is advised by the Bridge Inspection Committee.

The bridge inspection organization has the following responsibilities:

- Establishing an organizational structure within the state that clearly defines the roles and responsibilities of those agencies required to participate.
- Maintaining a registry of nationally certified bridge and tunnel inspectors that includes, at a minimum, a method to positively identify each inspector, inspector's qualification records, inspector's current contact information, and detailed information about any adverse action that may affect the good standing of the inspector.
- Maintaining a certification program for program managers, team leaders, load raters and underwater bridge inspection divers.
- Performing regularly scheduled in-service bridge inspections. This includes, but is not limited to, routine (low/high risk), underwater (low/high risk) and nonredundant steel tension member inspections.
- Performing regularly scheduled in-service tunnel inspections.
- Establishing state specific load rating procedures and maintaining load ratings based on current conditions of all NBI and NTI reportable structures.
- Following MBE criteria for load posting/restricting bridges.
- Establishing and specifying written inspection procedures for:
  - Nonredundant Steel Tension Members
  - Underwater Bridge Elements
  - Complex Bridge Features
  - Tunnels

- Performing scour appraisals for all bridges over water.
- Maintaining scour Plan of Action (POA) documents for all bridges documented to be vulnerable to scour.
- Establishing quality control and quality assurance procedures to maintain a high degree of accuracy and consistency within the inspection program.
- Responding to and reporting of critical findings to the FHWA Washington Division Bridge Engineer.
- Maintain a separate inventory of bridges and tunnels for the entire state.
- Maintaining a bridge/tunnel file (electronic and/or physical) for every bridge/tunnel in the inventory.
- Maintaining National Bridge Inventory (NBI) data that follows the Federal Coding Guide criteria or can be translated into that system during the annual submittal of data. Washington State is currently transitioning to the Specifications for the National Bridge Inventory with full transition scheduled to be complete by March of 2028.
- Maintaining National Tunnel Inventory (NTI) data that follows the Specifications for the National Tunnel Inventory criteria for the annual submittal of data.
- Maintaining Bridge Management System data that follows the National Bridge Element (NBE) condition assessment criteria or can be translated into that system during the annual submittal of data.
- Submitting required Washington bridge inventory data to FHWA for incorporation into the National Bridge Inventory (NBI).
- Submitting required Washington tunnel inventory data to FHWA for incorporation into the National Tunnel Inventory (NTI).

The bridge inspection organization’s activities also include the following which although are not explicitly required by the NBIS or NTIS, but are either strongly implied or required by other FHWA policies:

- Responding to FHWA Technical Advisories, FHWA Action Memoranda, and other policy or information requirements provided by the FHWA Washington Division Bridge Engineer.

The bridge inspection organization is also responsible for the following activities which are clearly part of managing bridges but not required by the NBIS.

- Bridge repair management.
- Managing non-NBIS structures.

1-3 Bridge Inspection Programs

The composition and size of each bridge inspection program varies widely, generally depending on the number of bridges/tunnels managed by each agency. Two state offices play key roles in the organization:

- **Bridge Preservation Office (BPO)** – This office is dedicated to running the bridge inspection program for all state owned bridges and tunnels. This includes bridges and tunnels managed by State Parks, Department of Enterprise Services, and other state agencies with bridges/tunnels subject to the NBIS/NTIS. BPO also co-manages bridges on the border with Oregon and Idaho. The BPO is led by the Bridge Preservation Engineer who also functions as the Statewide Program Manager.
- **Local Programs (LP)** – This office provides support and services to local agency bridge inspection programs. LP provides training, manages the inspector certification program, and many aspects of the local agency bridge and tunnel inventory data. The WSDOT Local Programs Bridge Engineer (LPBE) functions as a delegated program manager for all local agency bridges and tunnels.

Local agencies have a wide variety of bridge/tunnel inspection programs, which generally fall into the following categories:

- Local agencies with a delegated program manager and bridge/tunnel inspection staff working directly for them.
- Local agencies with a delegated program manager and agency contracts out to other agencies or consultants for completion of bridge/tunnel inspection work.
- Local agencies without a delegated program manager but with bridge/tunnel inspection staff.
- Local agencies without a bridge/tunnel inspection program. These agencies have agreements with other agencies or consultants to inspect and manage their bridges/tunnels.

1-4 Bridge Inspection Organization Roles and Responsibilities

The bridge inspection organization, and the various programs within it, are staffed by individuals who have defined roles and responsibilities described as follows.

1-4.1 *Statewide Program Manager (SPM)*

The Statewide Program Manager is the individual in Washington State who leads the bridge inspection organization. This position is held by the Bridge Preservation Engineer, who must ensure that the organization fulfills its NBIS and NTIS responsibilities, see Appendix 1-C. To qualify as the SPM, WSDOT requires this individual to have a current Professional Engineering license and qualify as a certified team leader. The SPM must also be recertified on a regular basis by attending a refresher training class according to state policy. The certification process is described in detail in Section 1-5.

1-4.2 Delegated Program Manager (DPM)

A delegated program manager assumes duties of the program manager for the selected subset of bridges and tunnels under their direct control, See Appendix 1-D. To qualify as a delegated program manager, the individual must meet, at a minimum, the program manager requirements as described in the NBIS and NTIS. Delegated program managers must be recertified on a regular basis by attending a refresher training class according to state policy. The certification process is described in detail in Section 1-5.

Note: Although delegated program managers perform duties for the bridge inspection organization, overall responsibility for NBIS and NTIS compliance still resides with the Statewide Program Manager as defined by the NBIS and NTIS.

1-4.3 Team Leader (TL)

A team leader is in charge of an inspection team and responsible for planning, preparing, and performing the field inspection of bridges and/or tunnels. The team leader also makes repair recommendations and is responsible for initiating the critical damage procedures including full bridge or tunnel closure if deemed necessary. To qualify as a team leader, the individual must meet, at a minimum, the team leader requirements as described in the NBIS and NTIS. Team leaders must be recertified on a regular basis by attending a refresher training class according to state policy. The certification process is described in detail in Section 1-5.

1-4.4 Assistant Inspector

An assistant inspector (Co-Inspector) may accompany the team leader during field bridge/tunnel inspections. Typical duties include helping to organize bridge/tunnel inspection trips, taking measurements, compiling notes, and taking photographs. When assistant inspectors also fully participate in the inspection process and prepare inspection reports under the direct supervision of a team leader, this work provides qualifying experience towards certification as a team leader.

Note: The NBIS/NTIS does not set specific training or educational requirements for assistant inspectors. However, bridge/tunnel inspector training is recommended and available to all assistant bridge/tunnel inspectors to serve as a good foundation for beginning inspectors as well as being a requirement for advancement to team leader.

1-4.5 Load Rating Engineer (LRE)

A load rating engineer manages all aspects of maintaining current and accurate load ratings for bridges/tunnels they are responsible for in their inventory. Responsibilities include reviewing inspection reports for changed conditions that warrant revisions to the load ratings on file, revising load ratings as needed, creating new load ratings for new bridges/tunnels, and ensuring that the findings from load ratings are implemented. In particular, the load rating engineer must track bridges/tunnels that require posting and ensure that the bridge/tunnel inventory has current data from the load ratings.

Note: To qualify as a load rating engineer in the BPO, the individual must have 4 years of bridge design or load rating experience and a current Professional Engineering license.

1-4.6 *Underwater Bridge Inspection Diver (UBID)*

To qualify as an underwater bridge inspection diver, the individual must meet, at a minimum, the underwater bridge inspection diver requirements as described in the NBIS. The certification process is described in detail in Section 1-5.

Note: The BPO has a Dive Safety Manual that regulates the diving activities for the BPO UBID's.

1-4.7 *FHWA Division Bridge Engineer (DBE)*

The Washington Division Office of the FHWA has assigned a Division Bridge Engineer to work collaboratively with the bridge inspection organization. The DBE works directly with the SPM and LPBE on resolving issues of compliance and is an active member of the BIC. The DBE has federal authority to approve the policy and procedures of this manual as noted in the Foreword of this manual.

1-5 Bridge/Tunnel Inspection Certification

Certification for bridge/tunnel inspection work within the state of Washington is a two-fold process that consists of the initial certification and subsequent certification renewals for the SPM, DPM's, TL's, and UBID's. For the purposes of simplifying the explanation of this procedure, the general term program manager (PM) will be used in place of SPM and DPM. The following requirements will pertain to both positions unless otherwise noted.

1-5.1 *Initial Certification*

The minimum qualifications for prospective individuals are described within Sections 309 and 509 of 23 CFR 650, Subpart C and E of the NBIS and NTIS respectively. To ensure that these requirements are met, the following steps outline the process for those individuals seeking initial certification.

- Fill out the WSDOT Bridge/Tunnel Inspector Experience and Training Record form, see Appendix 1-A.
- Submit an electronic copy of the completed form along with the following applicable documents to the WSDOT Local Programs Bridge Engineer (LPBE) for review:
  - Higher education degree(s).
  - Registered professional engineering license(s).
  - Certificate of successful completion of an FHWA approved comprehensive bridge inspection course such as the WSDOT *Bridge Condition Inspection Training (BCIT)* course (10 day), *NHI Safety Inspection of In-Service Bridges* course (10day), or *NHI Safety Inspection of In-Service Bridge for Professional Engineers* course (5 day) and score 70% or greater on an end-of-course assessment.
  - Certificate of completion of an FHWA approved comprehensive tunnel inspection training course and a score 70% or greater on an end-of-course assessment if the team leader is expected to perform tunnel inspections.
  - Certificate of completion of an FHWA-approved NSTM bridge inspection training course and a score of 70% or greater on an end-of-course assessment if the team leader is expected to perform NSTM inspections.

  - Certificate of completion of an FHWA-approved underwater bridge inspection training course and a score of 70% or greater on an end-of-course assessment if the team leader is expected to perform underwater inspections.
  - Certificates of completion for any special technical courses related to in-service bridge and/or tunnel condition inspection.
  - Any additional information documenting the bridge and/or tunnel inspection experience of the applicant.
- Approved applicants are issued a WSDOT Inspection Identification Number that is acknowledged through an email response from the LPBE. The Inspector ID number is stored within the BridgeWorks application and is used to identify certified team leaders and the applicable inspection types that they are permitted to perform, see Table BIE01a - Report Types and Subtypes, within Appendix C.
- In addition to the minimum qualifications, the SPM, TL's within the BPO, and the LPBE, are all required to be registered professional engineers in Washington State.

1-5.2 *Certification Renewal*

Certification renewal ensures that the PM's, TL's, and UBID's in any agency maintain a minimum level of training in the latest practices and technology in the area of bridge or tunnel inspections. The training may consist of inspection related courses, conferences, seminars and other sources of education deemed qualified by the SPM and LPBE. A list of approved courses is located in Appendix 1-B. This process within the State of Washington consists of a fixed 60 month period established for each individual PM, TL and UBID. Within this 60 month period, the following course credit hours are required for continuing education training.

- State PM and TL's and UBID's are required to have 80 hours.
- Local Agency PM's and TL's and UBID's are required to have 40 hours.

60 month certification period

- The 60 month certification period is to be managed between the individual and the designated PM.
- Depending on the individual's need, the *NHI Bridge Inspection Refresher Training (BIRT) course or other State, local or other federally developed and approved instruction* course must be taken at least once during each 60 month certification period.
- The hours for these two particular courses can only be counted once as credit during each 60 month certification period.
- The hours from BIRT course count toward completion of the designated hours of continuing education training required to maintain certification.
- For purposes of ensuring enrollment in a BIRT course, the BIRT can be taken within six months either side of the established certification expiration date of the current 60 month period for each employee to extend certification for the next 60 month period. The employee should be placed under probation and a plan of corrective action created if the expiration date is exceeded by going beyond the 60 month period. See Section 1-6.
- Complete a cumulative total of 18 hours of FHWA approved tunnel inspection refresher training over each 60-month period.

1-5.3 *Certification Roles and Responsibilities*

1. Employee Responsibilities:
   a. The PM, TL and UBID are responsible for maintaining an individual accounting of the approved training courses they have taken in the established 60 month re-certification period.
   b. The PM, TL and UBID are responsible to attend training when scheduled and to seek out attendance when needed.
   c. Continuing education courses, seminars or conferences pertaining to bridge inspection work, that are not pre-approved as qualifying classes are to be submitted to the SPM or LPBE for consideration. The following information is needed when submitting a class to the SPM or LPBE for approval.
      1. Course/Conference title
      2. Course/Conference description
      3. Course/Conference duration
      4. Course/Conference date
      5. Explanation of how the course/conference provides the latest practices and/or technology in the area of bridge inspections.

      Upon PM approval, the class will be added to the pre-approved class list.
2. Supervisor Responsibilities:
   a. Meet annually during the employee's annual evaluation to discuss training completed and overall status for re-certification.
   b. Ensure the employees have opportunity to attend training that qualifies for recertification.

1-6 Bridge Inspection Certification Probation, Suspension, Decertification and Reinstatement

To couple the process of certification above in Section 1-5, a process for decertification has been established to ensure that all PM's, TL's, UBID's are following the proper conduct of their respective positions.

Key Terms:

- **Appointing Authority** – The designated authority that oversees the sanctions of probation, suspension or decertification of a PM, TL and UBID.
- **Probationary Period** – A PM, TL or UBID is allowed to continue their duties for a prescribed timeframe in order to complete an approved Plan of Corrective Action.
- **Plan of Corrective Action** – A personalized plan approved by the Appointing Authority that identifies criteria the PM, TL, or UBID must complete within an established timeframe for inspection re-certification.
- **Suspension** – Temporary removal of inspection certification as PM, TL or UBID.
- **Decertification** – Permanent removal of inspection certification as PM, TL or UBID until a formal Plan of Corrective Action is administered by the Appointing Authority and fulfilled by the PM, TL or UBID.

Three examples in which a certified PM, TL or UBID may be placed on probation or suspended are listed below. Decertification can result immediately upon knowledge of conduct presented below or if the PM, TL or UBID does not meet the terms agreed upon in the plan of corrective action:

1. If a PM, TL or UBID does not fulfill the requirements for recertification (Section 1-5).
2. If a PM, TL or UBID is found to be using poor inspection practices or producing inadequate inspection documents as assessed by the QC/QA process.
3. If a PM, TL or UBID is found to be falsifying bridge inspection records, misrepresenting bridge hours on site or otherwise failing to meet general ethical standards.

Reinstatement of certification from suspension or completing probation requirements will require a formal plan of corrective action. This may be a simple process or more complex based on the nature of the situation.

This formal plan of corrective action consists of the following:

- The suspended PM, TL, or UBID will be notified in writing by the appointing authority that a plan of corrective action is needed.
- A plan of corrective action developed by the employee is to be approved by the appointing authority.
- Based on the circumstances in examples 1 and 2 above, the PM, TL, or UBID may be required to attend additional Bridge Inspector training classes beyond the continuing education requirements of Section 1-5 as specified by the appointing authority involved in the formal review. The PM, TL or UBID may also be required to receive additional field instruction by the direct supervisor.
- For the circumstance in example 3 above, the PM, TL or UBID may be subjected to more strict consequences as determined by the appointing authority.

A PM, TL or UBID who successfully completes the plan of corrective action will be considered to be in good standing. A PM, TL or UBID who does not satisfactorily complete the plan of corrective action may be decertified.

The DPM will notify the SPM when a PM, TL or UBID in a Local Agency is placed on probation or is suspended, as well as the resulting reinstatement or decertification.

1-7 Appendices

Appendix 1-A	WSDOT Bridge/Tunnel Inspector Experience and Training Record form
Appendix 1-B	Continuing Education Course List
Appendix 1-C	SPM delegation letter
Appendix 1-D	DPM delegation letters

Appendix 1-A WSDOT Bridge/Tunnel Inspector Experience and Training Record Form

Washington State Department of Transportation

WSDOT Bridge/Tunnel Inspector Experience and Training Record

Team Leader Name	Date
Agency Name	Phone
Address	Email

NBIS Qualification - select one. See detailed list on page 2. All require completion of comprehensive bridge inspection training from WSDOT or NHI or equivalent.

☐ 1a - PE + Experience ☐ 1b - Experience (10 years) ☐ 2 - Experience (5 years)
☐ 3 - Bachelor's + EIT + Experience ☐ 4 - Associate's + Experience

Inspection Type Qualifications

For each type, include course details below and attach course certificate

☐	Completed comprehensive bridge inspector training (NHI or equivalent)
☐	Completed NSTM training course (NHI or equivalent)
☐	Completed comprehensive tunnel inspector training (NHI or equivalent)
☐	Completed Underwater Bridge Inspection Diver training (NHI or equivalent)

Education

Institution (ABET accredited program)	*Major*	*Years*	*Degree*

Professional Registration (WA preferred, otherwise list any one active licensure location)

State	*Branch/Agency*	*Registration Number*

Bridge Inspection Training

Course	*Sponsor*	*Hours*	*Dates*

Special Technical Course

Course	*Sponsor*	*Hours*	*Dates*

Bridge Inspection Experience

Agency/Firm	*Bridge Duties*	*Years*

To the best of my knowledge, the above information is true and accurate.

Applicant's Signature ____________________ Date ____________________

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Having reviewed the above information, I conclude that this individual meets the minimum qualifications for a bridge/tunnel inspection team leader as specified in the current National Bridge Inspection Standards and National Tunnel Inspection Standards.

Team Leader's Signature ____________________ Date ____________________

Team Leader's Name (Print) ____________________ Title ____________________

Supplemental Training/Experience Information			
Bridge Inspection Training			
Course	***Sponsor***	***Hours***	***Dates***
Special Technical Course			
Course	***Sponsor***	***Hours***	***Dates***

Bridge Inspection Experience		
Agency/Firm	***Bridge Duties***	***Years***

National Bridge Inspection Standards Qualifications of Bridge Inspection Personnel (23 CFR §650.309) Team Leader (summarized)				
1a	Registered PE *and*	BCIT or equivalent*** *and*	6 months of bridge experience	
1b	10 years bridge inspection experience *and*	BCIT or equivalent***		
2	Five years of bridge inspection experience *and*	BCIT or equivalent*		
3	Bachelor's degree in engineering from and accredited program *and*	EIT** and	Two years of bridge inspection experience and	BCIT or equivalent*
4	Associate's degree in engineering or engineering technology from an accredited program *and*	Four years of bridge inspection experience and	BCIT or equivalent*	

*BCIT or equivalent requires successful completion of a Federal Highway Adminsitration (FHWA) approved comprehensive bridge inspection training course

**EIT requires successfully passed the NCEES Fundamentals of Engineering Exam

***Same as Program Manager

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Appendix 1-B Continuing Education Course List

For the purpose of continued certification as the SPM, TL, or UBID within the Bridge Preservation Office, the following list of courses are examples of qualifying courses for bridge inspection with estimated hours to acquire the necessary continuing education hours in an established 60 month period for each individual employee.

WSDOT/LTAP – Bridge Condition Inspection Fundamentals (BCIF)	24 hours
WSDOT/LTAP – Bridge Condition Inspection Training (BCIT)	72 hours
WSDOT/LTAP – Bridge Condition Inspection Update (BCIU)	16 hours
WSDOT/LTAP – Bridge Inventory Coding	18 hours
NHI Safety Inspection of In Service Bridges 74 hours	
NHI Bridge Inspection Refresher Training	18 - 20 hours
NHI Stream Stability and Scour at Highway Bridges for Bridge Inspectors	8 hours
NHI Stream Stability and Scour at Highway Bridges	24 hours
NHI Underwater Bridge Inspection	24 hours
NHI Fracture Critical Inspection Techniques for Steel Bridges	25 hours
NHI Tunnel Safety Inspection	31 hours
NHI Tunnel Safety Inspection Refresher WBT Prerequisite	4 hours
NHI Tunnel Safety Inspection Refresher ILT	17 hours
NDT – Dye Penetrant Testing	12 hours
NDT – Magnetic Particle Testing	20 hours
NDT – Ultrasonic Testing	32 hours
PNW Bridge Maintenance Conference	Credit as appropriate
Bridge & Tunnel Inspectors' Conference	Credit as appropriate
Annual Inspection Process Change Meeting	Credit as appropriate
Western Bridge Engineers Seminar	Credit as appropriate

Additional courses, seminars or conferences of similar content can be considered for approval by the SPM or LBPE.

Documents available as reference and training material include but are not limited to the following:

- Washington State *Bridge Inspection Manual* (WSBIM)
- *Bridge Inspection Reference Manual* (BIRM)
- *The Manual for Bridge Evaluation* (MBE)
- *Timber Bridges Manual* (USDA)
- Specifications for the National Tunnel Inventory (SNTI)
- *Tunnel Operations, Maintenance, Inspection, and Evaluation* (TOMIE) *Manual*
- WSDOT *Transportation Structures Preservation Manual*

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Appendix 1-C SPM Delegation Letter

Washington State Department of Transportation

Memorandum

November 16, 2023

TO: Roman Peralta, Bridge Preservation Engineer
Bridge and Structures Office, Development Division

THRU: Mark Gaines,
Development Division Director and State Design Engineer

FROM: R. Marshall Elizer, Jr., P.E., PTOE RME
Assistant Secretary for Multimodal Development Delivery

SUBJECT: Delegation of NBIS Program Manager for Statewide Bridge Inspection Program

This is to advise you that as the incumbent Bridge Preservation Engineer of the Bridge and Structures Office, you are hereby delegated authority as Program Manager for the statewide bridge inspection program, as defined in the National Bridge Inspection Standards (NBIS) 23 CFR §650.307(g), §650.307(e) (1) through (11), and the National Tunnel Inspection Standards (NTIS) 23 CFR §650.507(g), §650.507(e) (1), §650.507(e) (2), §650.507(e) (3) effective beginning on November 16, 2023.

These duties may be further delegated to individuals meeting the qualifications of 23 CFR §650.309(a) and §650.507(a). However, the responsibility must remain with you as the Program Manager in accordance with 23 CFR §650.307(f) and §650.507(f).

RME:tms

cc: Mark Gaines, Development Division Director, State Design Engineer
Evan Grimm, State Bridge & Structures Engineer
Loren Wilson, FHWA Washington Division Bridge Engineer

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Revised 5/99

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Appendix 1-D DPM Delegation Letters

Washington State Department of Transportation

Memorandum

November 20, 2023

TO: Tom Castor, P.E.
Marine Project Engineer
MS: TB-32

FROM: Roman G. Peralta, P.E. RGP
Bridge Preservation Engineer
MS: 47340

SUBJECT: Sub-delegation of Bridge Inspection Program Manager for Local Agencies

By authority granted to me as the Bridge Preservation Engineer and Statewide Bridge Program Manager, I am sub-delegating to you as the Washington State Ferry's Marine Project Engineer, Program Manager Duties for the federally reportable bridge inventory of the Washington Ferries. These duties are defined in the National Bridge Inspection Standards (NBIS) 23 CFR§650.307(g), §650.307(e) (3) through (11) for all the agency bridge inspection programs.

You may further sub-delegate these duties; however, I do not expect that you will have a need to do so.

Please note, that the overall bridge inspection program responsibility must remain with the Bridge Preservation Engineer as the Statewide Program Manager in accordance with 23 CFR§650.307(d).

RGP:tms

Cc (email): Mark Gaines, Development Division Director and State Design Engineer
Evan Grimm, State Bridge and Structures Engineer
George Comstock, Coding & Appraisal Engineer
Loren Wilson, FHWA Washington Division Bridge Engineer
David Sowers, Director of Terminal Engineering
Bryant Bullamore, Construction Engineering Manager

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Washington State Department of Transportation

Memorandum

November 20, 2023

TO: Sonia Lowry, P.E.
Local Programs Bridge Engineer
MS: 47390

FROM: Roman G. Peralta, P.E. RGP
Bridge Preservation Engineer
MS: 47340

SUBJECT: Sub-delegation of Bridge Inspection Program Manager for Local Agencies

By authority granted to me as the Bridge Preservation Engineer and Statewide Bridge Program Manager, I am sub-delegating to you as the Local Programs Bridge Engineer, Program Manager Duties for the federally reportable inventory of Local Agency bridges and tunnels, as defined in the National Bridge Inspection Standards (NBIS) 23 CFR§650.307(g), §650.307(e) (3) through (11), and the National Tunnel Inspection Standards (NTIS) 23 CFR§650.507(g), §650.507(e) (1), §650.507(e) (2), §650.507(e) (3) for all the local agency bridge inspection programs.

These duties can be further sub-delegated by you to any local agency representative who meets the qualifications stated in §650.309(a) or §650.509(a) as appropriate. This action must be done in writing.

Please note that the overall bridge inspection program responsibility must remain with the Bridge Preservation Engineer as the Statewide Program Manager in accordance with 23 CFR§650.307(f), and/or §650.507(f).

These qualifications need to be renewed as defined in WSBIM section 1-5.2 to maintain certification as program manager.

RGP:tms

Cc (email): Mark Gaines, State Design Engineer
Evan Grimm, State Bridge and Structures Engineer
George Comstock, Coding & Appraisal Engineer
Loren Wilson, FHWA Washington Division Bridge Engineer
Michelle Britton, Assistant State Local Programs Engineer
Kyle McKeon, Engineering Services Manager
Jay Drye, Director Local Programs

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Revised 5/99

Chapter 2 Bridge Files and Documentation

2-1 General

This chapter establishes policies on how the Washington State Department of Transportation (WSDOT) and local agencies maintain bridge files, both to meet Federal Highway Administration (FHWA) requirements and effectively manage physical assets (also sometimes called physical features) on WSDOT right of way. These policies apply to structures that are generally called bridges, culverts, tunnels, lids, detention vaults, overpasses, and undercrossings when they meet certain criteria commonly based on structure geometry, location, and use described in more detail below.

These policies also apply differently depending on bridge ownership and location and fall into three main categories:

1. WSDOT-owned structures on WSDOT right of way.
2. Local agency-owned structures on WSDOT right of way.
3. Local agency-owned structures on local agency right of way.

Unless otherwise specifically noted below, all policies apply to WSDOT and local agency owned structures on WSDOT right of way. However, only those policies directly associated with FHWA requirements apply to local agency owned structures on local agency right of way. There are occasionally special circumstances in which WSDOT owns a structure on local agency right of way. This chapter has no specific policies in this case, except that the bridge file must be maintained under all circumstances.

This chapter addresses the following topics associated with bridge files:

- Maintaining physical paper and electronic bridge files.
- Maintaining a state bridge inventory.
- Submitting state bridge inventory data to FHWA.
- Responding to FHWA and Statewide Program Manager (SPM) requests for information.

Each topic has components mandated by FHWA and components required by WSDOT policy. The following sections clearly identify the authorizing environment.

2-2 Maintaining Bridge Files and Documentation

This section is largely based on requirements established by Section 2 of the AASHTO *Manual for Bridge Evaluation* (MBE) with Interim Revisions. The MBE emphasizes three main points for maintaining a bridge file:

A. Bridge owners should maintain a complete, accurate, and current file of each bridge under their jurisdiction.

B. A bridge file always contains the current and sometimes the cumulative information about an individual bridge.

C. A bridge file may be stored electronically, on paper, or a mixture of both.

The remainder of this Section 2-2 describes WSDOT Bridge Preservation Office policy for maintaining bridge records. Local agencies are encouraged to follow a similar plan.

BridgeWorks Digital Signature

Starting in 2022, digital signatures can be applied to inspection reports as a feature within the BridgeWorks application. This feature is available to both state and local agency inspectors, but is not a requirement at this time. Inspecting agencies that wish to maintain their current signature process will be able to do so.

Digital signatures are applied to a pdf document which contains all the information associated with the inspection report or reports, including photos, attached files, and the federal SIA sheet. In cases where multiple inspections are performed simultaneously (routine and fracture critical, for instance) both reports will be included in this single pdf document and the digital signature will apply to all reports.

The original digitally signed inspection report(s) will be retained within WSBIS in a secured WSDOT server that prevents alteration of these documents once signed. These original documents will be available for viewing and copying from both the BridgeWorks application and the BEISt website. Copies can be downloaded by anyone with access to these sources.

Electronic Files

Electronic bridge files, including digitally signed inspection reports, are maintained on the BEISt internal website: http://beist/inventoryandrepair/inventory/bridge

This website contains the following:

1. Scanned copies of conventionally signed inspection reports in pdf format dating back to approximately the year 1998.
2. Scanned copies of the Washington State Structural Inventory and Appraisal (SIA) sheet dating back to 2011. Digitally signed inspection reports will include the SIA sheet in the inspection report pdf document.
3. Current inspection photographs in jpg format. Digitally signed inspection reports will include photos in the inspection report pdf document.
4. Current and historic repair recommendations displayed directly from the BPO database (See Section 2-3), dating back to approximately the year 2002. Digitally signed inspection reports will include all current repair recommendations in the inspection report pdf document.
5. Scanned copies of contract plans, as-builts when available, otherwise award plans. Note that the plan sheets on BEISt are not the official plans, which are owned by the WSDOT regions where the bridge is located.
6. In-house repair plans dating back to 2013.
7. Scanned copies of correspondence, historic repair and maintenance reports, miscellaneous studies, and other records are scanned from the paper files and loaded onto BEISt for selected bridges. This is generally done in response to a public disclosure request or a legal discovery requirement.

Paper Files

Appendix 2-A has a plan of the WSDOT Bridge Preservation Office indicating where paper files are maintained. Paper files must be maintained on WSDOT owned or maintained structures except as noted below, including:

1. All conventionally signed bridge inspection reports, including but not limited to routine, fracture critical, underwater, and special report types. Original signed reports are stored in paper files and digital copies are stored electronically. Signed damage inspections in response to fires, floods, earthquakes, etc. shall also be included. For inspection reports digitally signed within the BridgeWorks application, no paper files are required. As of 2022, documents digitally signed by another application are not approved for electronic storage without a conventional signature and stored as a paper file.
2. Any and all miscellaneous special inspections, studies, investigations, or file reviews. Examples include but are not limited to: load testing documentation, findings from FHWA technical advisory requests for information, survey results, or ground/slope stability studies. For inspection reports digitally signed within the BridgeWorks application, no paper files are required. As of 2022, documents digitally signed by another application are not approved for electronic storage without a conventional signature and stored as a paper file.
3. A current printout of any specific inspection requirements/procedures, usually but not necessarily associated with fracture critical, underwater, or special inspection reports.
4. A stamped Load Rating Summary sheet which shows the controlling ratings shall be placed in the letter file. The original load rating calculations for state owned bridges shall be filed in the Risk Reduction section at the WSDOT Bridge Preservation Office.
5. Scour files are located in the Risk Reduction section at the WSDOT Bridge Preservation Office.
6. All current agreements with other agencies for maintenance, rehabilitation, or shared ownership.

Note: The inspection reports, miscellaneous studies and inventory data is cumulative, meaning that all historic as well as current data must be kept in the bridge file. All documents listed above, and others listed in the MBE, may be stored electronically as a supplement to the paper files. WSDOT bridge files stored electronically have a backup system intended to protect the electronic data for the life of the structures.

Other Files – Some bridge records are not available electronically at the BEISt internal website or in paper files as indicated in Appendix 2-A. The WSDOT *Bridge Design Manual* M 23-50 provides some guidance on where these records are located. The following provides some additional information:

Contract Documents – For contracts let thru WSDOT Contract Ad and Award, Washington State Archive maintains a paper cumulative file by contract number of awarded contracts and construction documents as required by the *Construction Manual* Section 10-3. WSDOT Records and Information maintains electronic copies of finalized As-Built Contract Plans.

WSDOT Bridge and Structures Office maintains structural plans and selected shop drawings which are stored electronically. Structural plans include culvert shop drawings that contain plan and design information along with plan contracts from other agencies that complete work on the WSDOT system. Shop drawings include: steel structures, expansion joints, specialized bearings (such as pot or seismic isolation bearings), prestressed girders, post-tensioned structures, and special structural designs (such as pontoon, suspension, or movable bridges).

WSDOT maintains a state Contract History database that records all contract work completed on state managed structures. This database correlates contract number and contract work to structures maintained by the WSDOT bridge inventory and starting in 2017 associates this contract work to each BMS element in each structure affected by this contract.

In-House Repair Documents – WSDOT maintains a cumulative file of all in-house repair recommendations made by the Bridge Preservation Office, and follow-up verification information when repairs are completed. If maintenance reports prepared by region maintenance crews are provided to the bridge record, they are also permanently retained. In-house drawings and specifications supplementing the repair recommendations are also retained in the electronic record starting in 2013.

Correspondence on Significant Actions or Findings – WSDOT maintains a cumulative file of correspondence (letters, emails, memos, etc.) related to significant actions or findings, including but not limited to:

- Urgent or emergency actions including posting, restricting or closing a bridge
- Critical findings, including Critical Damage Bridge Repair Reports (see WSBIM Chapter 6)
- Special reports, including deck delamination/chloride testing, settlement/ movement monitoring, and life cycle studies

This correspondence may need a “summary memo to file” after the significant actions or findings are fully addressed. This memo is intended to provide full context and the final disposition of the actions or findings for the record.

2-2.1 *Transferring Bridge Ownership and/or Program Manager*

Whenever a bridge transfers ownership and/or program manager responsibility, the entire bridge file, both paper and electronic, must be transferred to the new owner/ program manager. Bridge transfers must be acknowledged and documented by both program managers involved along with any additional deeds, agreements, plans or other documentation available. All transfer documentation must be retained in the bridge file. See Appendix 2-B for a checklist and SPM signoff sheet. In some cases, the acknowledgement of the transfer by the program managers may be the only documentation available.

Transferring Bridge Ownership and/or Program Manager responsibilities are performed by the SPM or Local Programs DPM, but updating the electronic record in WSBIS must be performed by the Superuser account under the direct control of the SPM. This is intended to ensure that adequate documentation for these transfers are in place.

In cases where WSDOT transfers a bridge file to another agency, a complete electronic copy of the entire bridge file is made and retained permanently. Other agencies are encouraged to follow this practice, but are not required to.

2-2.2 *Dead/Obsolete Bridge Files*

When a bridge is demolished or permanently removed from service and no longer considered appropriate for inclusion in the bridge inventory, the program manager for the “dead” bridge shall add documented acknowledgement of the removal from the inventory into the bridge file which then must be retained for a minimum of five years. WSDOT maintains dead bridge files permanently. Local agencies are encouraged to maintain permanent dead bridge files as well, though there is no requirement to do so.

See Section 2-3.3 for more information on processing “dead” bridge electronic records in the WSBIS.

2-2.3 *Structures on WSDOT Right of Way*

WSDOT shall maintain a bridge file for all structures considered appropriate for inclusion in the WSBIS that are on the WSDOT right of way, including local agency bridges passing over state routes or adjacent to state routes, whether or not the structure is subject to the NBIS or reported to the NBI. For more information, see Section 2-3.4.

2-3 Maintaining a State Bridge Inventory – WSBIS

Washington State is required by 23 CFR 650.315 to maintain an inventory of all bridges (structures) subject to the National Bridge Inspection Standards (NBIS), from which selected data is reported to FHWA as requested for entry into the National Bridge Inventory (NBI). FHWA has a Stewardship Agreement with Washington State to submit NBI data on March 15 and October 1 each year.

The Moving Ahead for Progress in the 21st Century Act by the US Congress (MAP-21) has partially superseded 23 CFR Part 500, and mandates that National Bridge Elements be submitted to FHWA for all NBI bridges carrying National Highway System (NHS) routes. See www.fhwa.dot.gov/map21 for more information about MAP-21.

Federal law under 23 CFR Part 500 provides an option for state agencies to maintain a Bridge Management System (BMS), with the incentive that federal funding can be used with more flexibility. Washington State has chosen to implement a BMS and integrally incorporate it into the state inventory for bridges managed under the WSDOT bridge program. In addition, Washington State maintains an inventory to meet WAC 136-20-020, which requires that each county maintain an inventory of bridges in the state inventory. The Washington State Bridge Inventory System (WSBIS) is maintained to meet these federal and state laws and regulations. The WSBIS is also maintained to meet the WSDOT mission statement with respect to operating the state bridge structures, and provides a means for local agencies to do the same.

The WSBIS Coding Guide provides detailed instructions on how to create, update, and delete records in WSBIS, see Appendix 2-C. This coding guide is intended to define the data fields and how to edit them for use by bridge inspectors and inventory managers. This coding guide is largely based on the federal coding guide and must meet the following requirements:

1. Whenever a database field has to be translated to match the federal coding guide, this translation must be clearly defined.
2. The WSBIS coding guide cannot contradict the federal coding guide. In cases where the federal coding guide is either inconsistent with other FHWA requirements or vague, the WSBIS coding guide needs to clearly identify the issue and describe how the field should be coded into WSBIS.

3. Optional fields must be clearly identified.
4. Every field must clearly state what structure type or types it applies to, and clearly define how it should be coded for these various structure types. The current list of structure types are:
   - Structures and culverts carrying public roadways
   - Pedestrian, railroad, and other non-vehicular structures over public roadways. Private roads over public roadways are also included in this structure type.
   - Tunnels carrying public roadways within

   Structures not associated with any public roadway are not specifically included in this list, but when a field must be coded for these structures the coding guide will simply state "All structure records".
5. In cases where multiple routes interact with a structure, a "secondary" record is needed to maintain route information – usually an "undercrossing record". Every field that must be populated for secondary records will be clearly identified.

2-3.1 *WSBIS Inventory and Data*

The WSBIS needs to be understood clearly in two ways – which structures are included in the inventory and what data associated with these structures is maintained. Each of these categories has both mandated and optional components.

Beginning in October 2014 there is a requirement, from MAP-21, to collect National Bridge Element data for bridges carrying NHS routes. WSDOT is meeting this mandate by requiring these bridges to have BMS elements in WSBIS, which in turn will be translated into National Bridge Elements for submittal. See Appendix 2-E for the WSDOT BMS to NBE translation specifications. See www.fhwa.dot.gov/map21 for more information about MAP-21.

2-3.1.A Mandated Bridges and Culverts in the WSBIS – Reported to the NBI

In general, these are structures that conform to the NBIS definition of a bridge and must be reported to the NBI when the structure meets all of the following:

- Carries highway traffic.
- Is owned by a public agency or built on public right of way for a public agency. Bridges owned by road associations or individual property owners on private right of way do not qualify.
- Is open to the public. Bridges posted "no trespassing" or otherwise clearly identified that they are privately owned or restricted to authorized users are not considered public. Bridges behind locked gates are also not considered public.
- Has a clear span along centerline of roadway greater than 20 feet.

Utility and Detention Vaults – Based on an agreement between Washington State and FHWA, vaults under roadways are considered subject to the NBIS when the span length along the centerline of the roadway exceeds 20 feet AND is wider than 12 feet. The span length is measured from inside face to inside face of exterior walls for multicell structures or minimum clear span for single cell structures. This includes any structure with any portion directly under a lane or shoulder.

There are a few special circumstances that affect whether or not a bridge is subject to the NBIS and reported to the NBI not mentioned above (see Section 2-3.5).

Undercrossings - Structures over federal aid or STRAHNET highways must include an "under" record(s) in the WSBIS and be reported to the NBI.

SNBI – Starting in 2026, the 2022 Specifications for the National Bridge Inventory (SNBI) will determine the NBI data reported to FHWA. These new specifications will replace the existing 1995 Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges. WSBIS will adapt to the SNBI specifications in phases between 2023 and 2026. See Section 2-3.1.G below.

2-3.1.B Mandated Tunnels in the WSBIS – Reported to the NTI

In general, a tunnel that is subject to the NTIS and must be reported to the NTI when it meets all of the following:

- Carries highway traffic inside the tunnel.
- Is owned by a public agency or built on public right of way for a public agency. Bridges owned by railroads or other owners on private right of way do not qualify. Also tunnels under public roadways that do not carry traffic inside the tunnel do not qualify.
- Is open to the public. Tunnels posted "no trespassing" or otherwise clearly identified that they are privately owned or restricted to authorized users are not considered public. Tunnels behind locked gates are also not considered public.

NBI and NTI cannot inventory the same structure twice – There are cases where a structure has features that make it possible to consider either a bridge or a tunnel. In these cases, the owning agency can make the determination, but a structure that is coded as a bridge cannot be reported to the NTI, and similarly a structure that is coded as a tunnel cannot be reported to the NBI.

2-3.1.C Optional Structures in the WSBIS – Not reported to the NBI or NTI

Optional structures include any structure that the state or local agency manages as part of their structure inventory, but which do not qualify for reporting to the NBI or NTI. Typically this will include bridges with span lengths less than 20 feet (short spans), pedestrian structures that do not cross over or under a highway, "under" records for a route that is neither federal aid nor STRAHNET, and pedestrian or railroad tunnels under public roadways.

Note: Local agency structures on WSDOT right of way have special requirements as noted in Section 2-3.4.

2-3.1.D Mandated Data in the WSBIS

All data fields defined in the FHWA Coding Guide are required in the WSBIS. In cases where structures are maintained in WSBIS but not reported to the NBI, it is still required to complete all these fields in some consistent manner as defined in the coding guide.

2-3.1.E National Bridge Element (NBE) Data

All bridges subject to the NBIS and carrying NHS routes are required to include WSDOT Bridge Management System (BMS) elements and translated to National Bridge Elements and included with the annual NBI data submittal. See Appendix 2-E for detailed information on the translation process.

Starting in 2026, NBE data will be submitted to FHWA as part of the SNBI.

2-3.1.F Optional Data in the WSBIS

All other data, including BMS elements for bridges not on NHS routes, condition states, repairs, notes, and electronic photos and documents are not required in the WSBIS, and are not reported to the NBI.

2-3.1.G Specifications for the National Bridge Inventory (SNBI) Data

Starting in 2023, selected fields from the March 2022 SNBI will be available within the WSBIS for data entry. With three exceptions, all fields are optional for inspection and coding in 2023. The three exceptions are:

Inspection Begin Date (formerly the Inspection date)

Inspection Completion Date (new in 2023)

Inspection Interval (formerly the Inspection Frequency)

Appendix 2-D has the SNBI coding guide for these selected fields.

In 2024, 2025 and 2026, all remaining SNBI fields will be phased into the WSBIS. Starting in 2026, all SNBI fields must be entered for SNBI reportable structures when the SNBI inspection is completed, though of course agencies can enter this data earlier. All SNBI data for all SNBI reportable structures must be entered by January 2028.

Background information on these new specifications, including the complete March 2022 SNBI coding guide are available here: https://www.fhwa.dot.gov/bridge/nbis2022.cfm

2-3.2 *New Bridge Inventory in the WSBIS*

Newly built bridges must be added to the bridge inventory (WSBIS) and the inventory data entered within 90 days after the bridge is opened to public traffic in the anticipated final configuration as per 23 CFR 650.315(c).

New bridges to the inventory must have a unique Structure Identifier Item 1001 (Federal Coding Guide Item 8) in the WSBIS. In particular, when a bridge is replaced – either temporarily or permanently – with a new structure, this new structure must have a new Structure Identifier. The same Bridge Number and Bridge Name can be used.

Individuals who create new inventory records in the WSBIS need to be familiar with a wide variety of information sources. In preparation for creating a new inventory record, the following information should be available:

- Bridge plans
- Load rating calculations, or summary information to correctly code selected fields
- Scour calculations, or summary information to correctly code selected fields when bridge is over water
- Route information, including current State and/or Local Agency Linear Referencing System (LRS) data
- GIS location information
- Traffic information

Additional specific information may be required in many cases, including but not limited to maintenance agreements, navigable waterway permits, replacement cost estimates, and historical significance.

Individuals who create new inventory records need to coordinate closely with the inspectors who perform the initial routine/inventory inspection to ensure that all the data is collected. See Chapter 3 for inspection procedures and policies.

Temporary bridges that carry public traffic for less than 90 days or which are less than 20 feet in length do not need to be inventoried or inspected in accordance with the NBIS. In **all** other circumstances temporary bridges carrying public traffic must be inventoried and inspected in accordance with the NBIS, including:

- Temporary bridges installed either as an emergency response by agency staff or as a stand-alone contract without any other substantial work performed in the immediate vicinity of the bridge site.
- Temporary bridges that are an integral part of a larger construction project, located within that project, and maintained by a contractor.

2-3.3 *Deleting (Obsoleting) Bridges in the WSBIS*

WSBIS is designed to retain historical data indefinitely, including files of bridges that have been removed from service and are no longer part of the current bridge inventory. These bridges are called “obsolete” in the WSBIS and are called “dead” in the paper files (see Section 2-2.2).

WSDOT policy guides the requirements for deleting (obsoleting) structures in the WSBIS, and applies to all bridges in the WSBIS.

Structure records are obsoleted by the SPM or Local Programs DPM, but updating the electronic record in WSBIS must be performed by the Superuser account under the direct control of the SPM. This is intended to ensure that adequate documentation for these obsoletions are in place. Obsoleting structure records shall include the following steps:

- Create a new informational report describing the circumstances of the removal and the replacement structure information if appropriate. This informational shall include the completed and signed Record Change Form, see Appendix 2-B.
- The informational report is signed by the Statewide Program Manager (SPM).
- The paper bridge file (record), including the last signed informational report documenting removal from the bridge inventory, shall be retained for a minimum of five years.

See Section 2-2.2 for more information on maintaining “dead” bridge files.

2-3.4 *Bridges with Multi-Agency Responsibility in the WSBIS*

There are several ways in which a single bridge can have more than one agency responsible for the bridge inventory data. This section describes four cases where the responsibility is shared between WSDOT and a local agency, and where either WSDOT or a local agency shares responsibility with another state.

2-3.4.A Shared Responsibility between WSDOT and Local Agencies

There are the four cases of shared responsibility between WSDOT and a local agency, based on the principle of assigning data responsibility to the agency in the best position to maintain and report the data. These cases are WSDOT policy for all structures on WSDOT right of way. However, they can apply equally to any two agencies (a county and a city, for example). Regardless of how local agencies address these cases, it is a requirement that all bridge data in WSBIS that is reported to the NBI must be complete, accurate and current. This WSDOT policy is superseded by any written agreement between two agencies regarding bridge inventory record keeping.

Case 1: WSDOT-Owned Bridges on WSDOT Right of Way – WSDOT will be responsible for maintaining all bridge inventory data and federal reporting in this situation.

Note: This situation applies to any combination of "on" and "under" records, route owners, and federal reporting status. However, WSDOT will ask local agencies for specific data regarding local agency route and traffic, both for routes "on" and "under" the bridge as applicable.

Case 2: Local Agency-Owned Bridges Carrying Highway Traffic Over State Routes – This situation assumes that the bridge must have a federally reported "on" record and at least one federally reported "under" record. The "on" record shall be maintained by the local agency and the "under" record(s) shall be maintained by WSDOT.

Case 3: Local Agency-Owned Pedestrian Bridges Over State Routes – This addresses all situations in which there is no federally reported "on" record, and assumes that there is a federally reported "under" record, and possibly additional "under" records for the *Bridge List* M 23-09. The "under" record(s) shall be maintained by WSDOT. If the local agency chooses to maintain a record, it cannot be federally reported.

Case 4: Local Agency-Owned Bridges on State Right of Way Adjacent to a State Route – This addresses all situations in which a local agency owns a structure (usually a pedestrian bridge) on state right of way that does not cross over or under any routes, and is deemed appropriate by WSDOT for inclusion in the bridge inventory. In this case, no records are federally reported

In all situations where there is shared responsibility between WSDOT and a local agency, the structure records in WSBIS must be shared, using the same structure identifier Item 1001 (Federal Coding Guide Item 8). Any situations that do not fit into these four cases listed above shall be considered on a case-by-case basis by the program managers involved and should address the following questions:

- Does the bridge record include a federally reported "on" record? These are bridges that are subject to the NBIS.
- Does the bridge record include one or more federally reported "under" records? These are bridges with federal aid or STRAHNET routes under the bridge.
- Is this a bridge that doesn't qualify for either an "on" or "under" record? These are pedestrian or other bridges that are not subject to the NBIS, and do not cross over a highway.
- Who owns the bridge?
- What agency owns the route on the bridge, if applicable? It is relatively common for a state owned structure to carry a local agency route, usually over a state route.
- What agency owns the route (or routes) under the bridge, if applicable?
- Does either agency need to maintain "on" or "under" records that are not federally reported? WSDOT often maintains "under" records that are not reported to hold data for the *Bridge List* M 23-09.
- Are there any interagency agreements relevant to inspection and reporting responsibility?

Any interagency agreement should address these questions, and clearly assign bridge inspection and inventory responsibilities.

2-3.4.B Shared Responsibility with Other States

WSDOT shares bridge recordkeeping and FHWA reporting responsibility for all bridges that cross state lines. For all but one bridge this shared responsibility also extends to bridge ownership and maintenance. For all bridges, responsibility to perform inspections is assigned to one state agency as established by agreement.

One local agency bridge crosses the state line between Washington and Idaho. Inspection, FHWA reporting, ownership, and maintenance responsibility is established by agreement.

See Appendix 2-F for bridge specific information.

2-3.5 *Reporting WSBIS Data to the NBI – Special Circumstances*

Section 2-3.1 outlined requirements for bridges subject to the NBIS and reported to the NBI. However, there are several special circumstances that warrant additional discussion.

Bridges Owned by Public Agencies That Are Not Open to the Public – Public agencies can own bridges that are not part of the public right of way, intended only for access by agency staff or other authorized personnel. In general, these bridges should not be reported to the NBI, and these bridges should be signed or gated so the public either does not have access to the bridge or is clearly warned that the bridge is not part of the public way. WSDOT bridges are posted “No Trespassing” at the entrance to the bridge if they are not gated.

Bridges Owned by Public Agencies That Are Closed – Bridges that are permanently closed to highway traffic but still in place may be retained in the WSBIS, but cannot be reported to the NBI. Bridges that are closed but the agency plans to either re-open or replace with a new structure can be federally reported for up to five years.

Privately-Owned Bridges – These bridges may belong to individuals, community road associations, railroads, or corporations, and may be open to the public. One relatively common example is a bridge in a shopping mall parking lot. FHWA and WSDOT promote the incorporation of these bridges in the WSBIS and recommend they be reported to the NBI if they qualify, but there is no federal or state requirement that they be inventoried.

Public Transit Bridges – Bridges carrying public transit buses in service (carrying passengers) are subject to the NBIS, even if these bridges are restricted to only public transit vehicles. Bridges carrying light rail public transit rolling stock without any vehicular or bus traffic are not currently subject to the NBIS.

Whenever a special circumstance affects the reporting of a structure, a brief explanation of the reporting status shall be kept in the electronic bridge record for all bridges inventoried in the WSBIS.

In any situation where it is unclear if a bridge should be included in the WSBIS and reported to the NBI, please consult with the SPM.

2-3.6 *Washington State Bridge List M 23-09*

The WSBIS is the source of data for the *Bridge List* M 23-09 published by the Bridge and Structures Office. It is a list of structures carrying or intersecting Washington State highways, and structures for which WSDOT has a maintenance responsibility. Data specific to this list is maintained for nearly all structures on WSDOT right of way, including local agency owned structures.

For more information on the data maintained for the *Bridge List* M 23-09, see the Washington State Bridge Inventory System Coding Guide in Appendix 2-C.

2-4 FHWA Data Submittal Process

The WSDOT Bridge Preservation Office extracts data from the WSBIS and submits it to FHWA for inclusion in the NBI and NBE once per year. Submittals may also happen at other times at the request of the Washington Division of the FHWA. The scheduled submittal is March 15 or the first work day following this date. The data submitted includes all the data defined by the NBI federal coding guide, the NBE specifications, and the NTI specifications, and is provided in a very specific format also defined by these documents. This submittal is performed by the Bridge Preservation Office and submitted to the FHWA User Profile and Access Control System (UPACS) under the authority of the SPM.

Data drawn for submittal to the NBI, NBE and NTI is taken only from the most current "released" data from WSBIS, meaning that each structure record has been through the quality control process described in Chapter 7, including acceptance by the BPO and LP data stewards. However, in addition to this quality control process, prior to the scheduled FHWA submittal both the BPO and LP data stewards run systemic checks of the data to identify and correct data errors. In particular, these checks are intended to ensure the following:

- Structures added to the inventory are reviewed to determine if they should be reported to FHWA.
- Structures removed from the inventory are reviewed to determine if they should be reported to FHWA and to ensure the electronic records accurately and sufficiently document the obsolete record.
- Structures that are transferred between agencies are reviewed to ensure the electronic records accurately document the transfer.
- Structures with shared responsibility are reviewed to ensure the electronic records are complete and accurate.

The intent is to submit error free data each submittal. In cases when errors are found but cannot be corrected because a field visit is required, the intent is that these errors will be corrected at the next regularly scheduled inspection.

Data submitted to FHWA is used for performance measurements after the submittal, both by FHWA and WSDOT. Verifying timely inspections for the federally reported inspection types is a primary focus of these performance measures. For the March 15 data submittal, all inspection work due through December 31 of the previous year must be "released" into WSBIS prior to March 15.

2-5 Responding to FHWA

Information Requests – FHWA requests bridge inspection information from WSDOT on a periodic basis. The information requested can be in response to national technical advisories, FHWA's oversight of the NBIS program in Washington State, or based on the WSDOT/FHWA Stewardship Agreement.

The bridge inspection requests for information from FHWA will typically be in the form of an email request with an assigned completion date based on the specific request, but can be in any format. The FHWA Division Bridge Engineer will submit the information request to the SPM. The SPM will review the FHWA information request and forward/disseminate the request to the necessary individuals for response. All information will be provided back to the SPM who will then forward the requested information to the Washington FHWA Division Bridge Engineer by the deadline in the original request.

Communication Between FHWA and WSDOT – Appendix 2-H identifies the standard communication protocol for normal operations. There is no protocol for urgent or emergency situations. The Washington SPM will be included in all written and email communications to or from FHWA regarding any bridge inspection, bridge emergency, or critical finding issues within the state of Washington. The WSDOT LP DPM and the Washington SPM will be included in all written and email communications to or from FHWA where local agency bridges are involved.

Annual NBIS Program Review – FHWA conducts an annual review of the bridge inspection organization within the state of Washington. The purpose of this review is to assure compliance with the NBIS. The review examines all facets of the inspection program – the effectiveness of the overall organization, delegated functions, inspection personnel, inspection procedures, bridge records and files, and the inventory of bridge data. It is intended to identify and correct any weaknesses while building upon existing strengths. In addition, site reviews of bridge inspections and interviews of inspection personnel are conducted. FHWA also conducts reviews of NBI data that is submitted for Washington by WSDOT.

Additional information on the NBI and NBIS can be found on the FHWA Office of Bridges and Structures website at www.fhwa.dot.gov/bridge/nbis.htm.

2-6 Appendices

Appendix 2-A	WSDOT BPO Floor Plan with File Locations
Appendix 2-B	Record Change Form
Appendix 2-C	Washington State Bridge Inventory System Coding Guide
Appendix 2-D	SNBI Coding Guide Added to WSBIS in 2023
Appendix 2-E	WSDOT BMS to NBE Translation
Appendix 2-F	Border Bridge Information
Appendix 2-G	Sufficiency Rating Calculation
Appendix 2-H	WSDOT/FHWA Communication Protocol Flowchart

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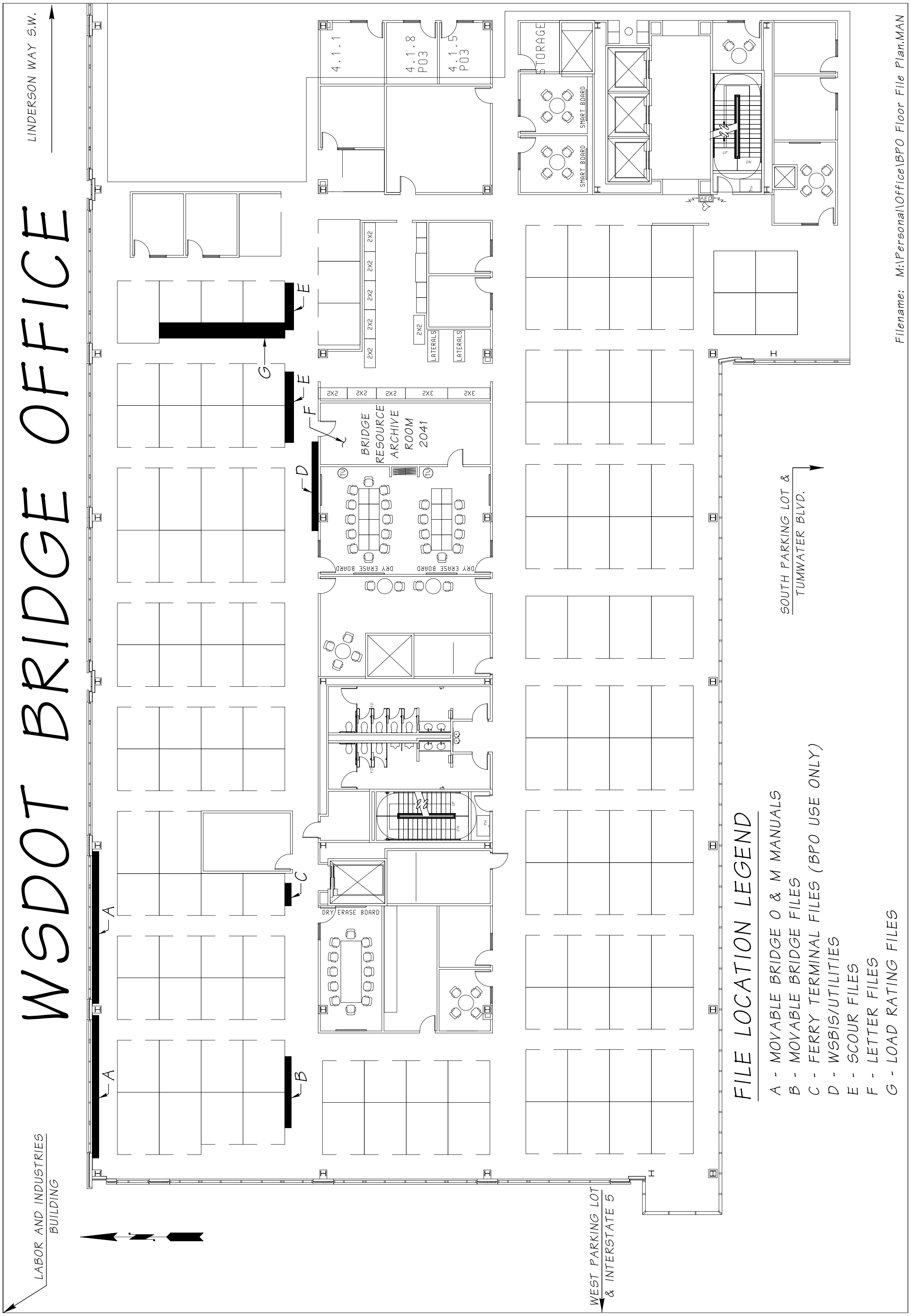
Appendix 2-A WSDOT BPO Floor Plan with File Locations



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Appendix 2-B Record Change Form

Washington State Department of Transportation

Record Change Form

Record change requiring Statewide Program Manager (SPM) approval

Structure Identifier	Structure Number
Structure Name	Date of Record Change
Requesting Agency	Contact
Structure Obsoleted ☐ Yes ☐ No	Ownership Transfer ☐ Yes ☐ No
If replaced with new structure, provide new structure identifier, number and name	
Describe reason for requested change	
Ownership Transfer from ________________________ to ________________________	

______________________________ ______________________________

Delegated Program Manager, if local agency record obsoleted Date

______________________________ ______________________________

Statewide Program Manager Date

WSDOT Form 220-033
Revised 01/2021

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Appendix 2-C Washington State Bridge Inventory System Coding Guide

Table 1 - WSBIS Items by Name and Tab Order

WSBIS Item No.	WSBIS Item Name	NBI Item No.	SNBI Item No.	NTI Item No.	Page No.
Coding Guide Instructions					2-C-19
	Report Types Tab				
BIE01	Report Types	-	B.IE.01	D.2-D.6	2-C-25
WIE01	Report Subtypes	-	B.IE.01	D.2-D.6	2-C-25
BIE05	Inspection Interval	-	B.IE.05	D.3	2-C-30
BIE02	Inspection Begin Date	-	B.IE.02	D.2	2-C-30
BIE03	Inspection Completion Date	-	B.IE.03	D.2	2-C-31
BIE06	Inspection Due Date	-	-	-	2-C-31
WIE02	Inspection Due Date Override	-	-	-	2-C-32
BIE11	Report Type Notes	-	B.IE.11	-	2-C-33
TD1	Target Inspection Date - SNTI	-	-	D.1	2-C-33
BIE07	Risk-Based Inspection Interval Method	-	B.IE.07	-	2-C-34
BIE04	Nationally Certified Bridge/Tunnel Inspector	-	B.IE.04	-	2-C-35
2654	Co-Inspector Initials	-	-	-	2-C-35
2642	Inspection Hours	-	-	-	2-C-35
2643	Inspection Overtime Hours	-	-	-	2-C-35
2900	Late Inspection Explanation	-	-	-	2-C-36
2901	Program Manager Response Date	-	-	-	2-C-36
2902	Program Manager Approval	-	-	-	2-C-36
BIE08	Inspection Quality Control Date	-	B.IE.08	-	2-C-37
7644	Inspection Report Hours	-	-	-	2-C-37
	Critical Findings Tab				
WCF01	Critical Finding Number	-	-	-	CH6
WCF02	Type of Critical Finding	-	-	-	CH6
WCF03	Entry Type	-	-	-	CH6
WCF04	Date of Finding or Entry Date	-	-	-	CH6
WCF05	Bridge Status	-	-	-	CH6
WCF06	Estimated Resolution Date	-	-	-	CH6
WCF07	Description	-	-	-	CH6
WCF08	Reported By	-	-	-	CH6
WCF09	Associated Repair	-	-	-	CH6
	SNBI Tab				
Component Condition Ratings					
BC12	Overall Condition Classification		B.C.12		2-C-41
BC01	Deck Overall Rating	-	B.C.01	-	2-C-42
BC05	Bridge Railings	-	B.C.05		2-C-44
BC06	Bridge Railing Transitions	-	B.C.06	-	2-C-45
BC08	Bridge Joints	-	B.C.08	-	2-C-46
BC02	Superstructure Overall	-	B.C.02	-	2-C-48
BC14	NSTM Inspection	-	B.C.14		2-C-49
BC07	Bridge Bearings	-	B.C.07	-	2-C-50
BC03	Substructure Overall	-	B.C.03	-	2-C-52

Table 1 - WSBIS Items by Name and Tab Order					
WSBIS Item No.	**WSBIS Item Name**	**NBI Item No.**	**SNBI Item No.**	**NTI Item No.**	**Page No.**
BC15	Underwater Inspection	-	B.C.15	-	2-C-54
BC04	Culvert Overall	-	B.C.04	-	2-C-55
BC11	Scour Condition - SNBI	-	B.C.11	-	2-C-58
BC09	Channel Condition	-	B.C.09	-	2-C-62
BC10	Channel Protection	-	B.C.10	-	2-C-64
1677	Channel Protection Condition - NBI	61	-	-	2-C-66
1679	Pier/Abutment Protection - NBI	111	-	-	2-C-67
Appraisals					
1680	Scour Critical - NBI	113	-	-	2-C-68
BAP03	Scour Vulnerability	-	B.AP.03	-	2-C-70
BAP04	Scour Plan of Action	-	B.AP.04	-	2-C-71
1662	Waterway - NBI	71	-	-	2-C-72
BAP02	Overtopping Likelihood	-	B.AP.02	-	2-C-73
1661	Alignment - NBI	72	-	-	2-C-74
BAP01	Approach Roadway Alignment - SNBI	-	B.AP.01	-	2-C-75
BIR02	Fatigue Details	-	B.IR.02	-	2-C-76
BAP05	Seismic Vulnerability	-	B.AP.05	-	2-C-77
1293	Open, Closed or Posted	41	-	L.4	2-C-78
1660	Operating Level - NBI	70	-	-	2-C-78
2613	NBIS Risk Category	-	-	-	2-C-79
Miscellaneous Fields					
BW01	Year Built	-	B.W.01	A.1	2-C-81
TA2	Year Rebuilt	106	-	A.2	2-C-81
2610	Asphalt Depth	-	-	-	2-C-82
2611	Design Curb Height	-	-	-	2-C-82
2612	Bridge Vehicle Rail Height	-	-	-	2-C-82
2675	Number of Utilities	-	-	-	2-C-82
2614	Subject to NBIS Flag	-	-	-	2-C-83
BIE09	Inspection Quality Assurance Date	-	B.IE.09	-	2-C-84
Inspection Flags					
2693	Soundings Flag	-	-	-	2-C-84
2694	Clearance Flag	-	-	-	2-C-84
2688	Revise Rating Flag	-	-	-	2-C-85
2691	Photos Flag	-	-	-	2-C-85
2695	QA Flag	-	-	-	2-C-85
Local Agency Appraisals					
7664	Drain Condition	-	-	-	2-C-87
7665	Drain Status	-	-	-	2-C-87
7666	Deck Scaling	-	-	-	2-C-87
7667	Deck Scaling Percent	-	-	-	2-C-88
7669	Deck Rutting	-	-	-	2-C-88
7670	Deck Exposed Rebar	-	-	-	2-C-88
7672	Curb Condition	-	-	-	2-C-89
7673	Sidewalk Condition	-	-	-	2-C-89
7674	Paint Condition	-	-	-	2-C-89
7681	Approach Condition	-	-	-	2-C-90

Table 1 - WSBIS Items by Name and Tab Order

WSBIS Item No.	WSBIS Item Name	NBI Item No.	SNBI Item No.	NTI Item No.	Page No.
7682	Retaining Wall Condition	-	-	-	2-C-90
7683	Pier Protection Condition	-	-	-	2-C-91
Bridge ID Tab					
BID01	Structure ID	-	B.ID.01	I.1	2-C-93
BID03	Previous Structure ID	-	B.ID.03	-	2-C-94
WID01	Structure Type	-	-	-	2-C-94
WID02	Bridge Number	-	-	-	2-C-95
WID03	Bridge Sort Number	-	-	-	2-C-96
BID02	Bridge Name	-	B.ID.02	I.2	2-C-96
1232	Features Intersected - NBI	6	-	-	2-C-97
1256	Facilities Carried - NBI	7	-	I.10	2-C-97
WID06	Program Manager	-	-	-	2-C-97
1286	Custodian - NBI	21	-	C.2	2-C-99
1019	Owner - NBI	22	-	C.1	2-C-99
BCL01	Owner - SNBI	-	B.CL.01	-	2-C-100
BCL02	Maintenance Responsibility	-	B.CL.02	-	2-C-101
BL02	County Code	-	B.L.02	I.4	2-C-102
BL03	Place Code	-	B.L.03	I.5	2-C-103
BL04	Highway Agency District	-	B.L.04	I.6	2-C-106
BL12	Metropolitan Planning Organization	-	B.L.12	-	2-C-107
WL05	City	-	-	-	2-C-108
WL06	Section	-	-	-	2-C-108
WL07	Township	-	-	-	2-C-108
WL08	Range	-	-	-	2-C-108
1285	Toll Code - NBI	20	-	C.4	2-C-109
BCL05	Toll - SNBI	-	B.CL.05	-	2-C-110
1289	Temporary Structure - NBI	103	-	-	2-C-111
1292	Historical Significance (NRHP) - NBI	37	-	-	2-C-112
BCL04	Historic Significance (NRHP) - SNBI	-	B.CL.04	-	2-C-113
WCL04	Historical Significance - HAER	-	-	-	2-C-114
7296	Historical Significance - Local Agency	-	-	-	2-C-114
7281	Legislative District 1	-	-	-	2-C-115
7283	Legislative District 2	-	-	-	2-C-115
2615	Special Structures Flag	-	-	-	2-C-115
2930	Obsolete Structure Flag	-	-	-	2-C-115
BL07	Border Structure ID	-	B.L.07	-	2-C-116
BL08	Border State or Country Code	-	B.L.08	-	2-C-116
1588	Border Bridge Percent - NBI	98B	-	-	2-C-116
BL09	Border Bridge Inspection Responsibility	-	B.L.09	-	2-C-117
BL10	Border Bridge Designated Lead State	-	B.L.10	-	2-C-118
Geometry Tab					
BG01	NBIS Bridge Length	-	B.G.01	-	2-C-119
BG02	Total Bridge Length	-	B.G.02	-	2-C-122
TG1	Tunnel Length - SNTI	-	-	G.1	2-C-126
BG04	Minimum Span Length	-	B.G.04	-	2-C-127
BG03	Maximum Span Length	-	B.G.03	-	2-C-129

Table 1 - WSBIS Items by Name and Tab Order

WSBIS Item No.	WSBIS Item Name	NBI Item No.	SNBI Item No.	NTI Item No.	Page No.
1360	Out-to-Out Deck Width - NBI	52	-	-	2-C-131
BG05	Out-to-Out Deck Width - SNBI	-	B.G.05	-	2-C-132
1356	Curb-to-Curb Width - NBI	51	-	-	2-C-135
BG06	Curb-to-Curb Width - SNBI	-	B.G.06	-	2-C-138
TG3	Curb-to-Curb Width - SNTI	-	-	G.3	2-C-141
BG07	Left Curb or Sidewalk Width	-	B.G.07	G.4	2-C-142
BG08	Right Curb or Sidewalk Width	-	B.G.08	G.5	2-C-144
TA8	Service in Tunnel - SNTI	-	-	A.8	2-C-146
1397	Approach Roadway Width	32	-	-	2-C-147
1291	Median Code - NBI	33	-	-	2-C-148
BG10	Median Code - SNBI	-	B.G.10	-	2-C-150
1310	Skew Angle - NBI	34	-	-	2-C-152
BG11	Skew Angle - SNBI	-	B.G.11	-	2-C-153
BG12	Curved Bridge	-	B.G.12	-	2-C-154
BG13	Maximum Bridge Height	-	B.G.13	-	2-C-156
BG14	Sidehill Bridge	-	B.G.14	-	2-C-157
BG15	Irregular Deck Area	-	B.G.15	-	2-C-158
BG16	Calculated Deck Area	-	B.G.16	-	2-C-159
1370	Minimum Vertical Clearance Over Deck - NBI	53	-	-	2-C-159
1374	Minimum Vertical Clearance Under Bridge - NBI	54B	-	-	2-C-160
TG2	Minimum Vertical Clearance Over Tunnel Roadway - SNTI	-	-	G.2	2-C-162
TS1	Number of Bores - SNTI	-	-	S.1	2-C-163
TS2	Tunnel Shape - SNTI	-	-	S.2	2-C-164
TS3	Portal Shape - SNTI	-	-	S.3	2-C-165
TS4	Ground Conditions - SNTI	-	-	S.4	2-C-165
TS5	Complex Tunnel - SNTI	-	-	S.5	2-C-166
TL10	Height Restrictions - SNTI	-	-	L.10	2-C-166
TL11	Hazardous Material Restriction - SNTI	-	-	L.11	2-C-167
TL12	Other Restrictions - SNTI	-	-	L.12	2-C-167
Crossing Tab					
2000	Main Listing Code	-	-	-	2-C-169
1432	On/Under Code	5A	-	-	2-C-169
2402	Crossing Description	-	-	-	2-C-170
BF03	Feature Name	-	B.F.03	-	2-D-16
BL11	Bridge Location	-	B.L.11	-	2-C-170
WF01	Feature Type Code	-	-	-	-
BF01	Feature Type	-	B.F.01	-	2-D-13
BF02	Feature Location	-	B.F.02	-	2-D-15
WF02	Crossing Manager	-	-	-	2-C-170
BL05	Latitude - SNBI	-	B.L.05	I.13	2-C-171
BL06	Longitude - SNBI	-	B.L.06	I.14	2-C-171
BH18	Crossing Structure ID	-	B.H.18	-	-
WH18	Crossing Feature Type	-	-	-	-
BRT01	Route Designation	-	B.RT.01	-	2-D-17
BRT02	Route Number - SNBI	-	B.RT.02	-	2-D-18
WRT02	Milepost - SNBI	-	-	-	-

Table 1 - WSBIS Items by Name and Tab Order					
WSBIS Item No.	**WSBIS Item Name**	**NBI Item No.**	**SNBI Item No.**	**NTI Item No.**	**Page No.**
BRT03	Route Direction - SNBI	-	B.RT.03	-	2-D-19
BRT04	Route Type - SNBI	-	B.RT.04	-	2-D-20
BRT05	Service Type - SNBI	-	B.RT.05	-	2-D-21
1435	Route - NBI	5D	-	I.7	2-C-172
2440	Milepost - NBI	-	-	-	2-C-172
1433	Highway Class - NBI	5B	-	I.9	2-C-173
1434	Service Level - NBI	5C	-	-	2-C-173
BH06	LRS Route ID	13A	B.H.06	I.11	2-C-174
BH07	LRS Milepost	11	B.H.07	I.12	2-C-174
WH07	LRS Milepost End	-	-	-	-
WH23	Directional Indicator	-	-	-	2-C-175
WH21	Ahead/Back Indicator	-	-	-	2-C-175
WH22	Ahead/Back Indicator End	-	-	-	-
WH19	LRS ARM	-	-	-	-
WH20	LRS ARM End	-	-	-	-
WH06	LRS Date	-	-	-	-
WA09	Speed Limit	-	-	-	2-C-176
BH08	Lanes On Highway - SNBI	-	B.H.08	-	2-D-29
TA3	Total Number of Lanes - SNTI	-	-	A3	SNTI 2-28
TC3	Direction of Traffic - SNTI	-	-	-	SNTI 2-39
1490	Lane Use Direction - NBI	102	-	C.3	2-C-176
BH03	NHS Designation - SNBI	-	B.H.03	-	2-D-24
1483	National Highway System - NBI	104	-	C.5	2-C-176
BH05	STRAHNET - SNBI	-	B.H.05	-	2-D-26
1485	STRAHNET - NBI	100	-	C.6	2-C-177
BH04	National Truck Freight Network	110	B.H.04	-	2-C-178
1487	Functional Classification - NBI	26	-	C.7	2-C-179
BH01	Functional Classification - SNBI	-	B.H.01	-	2-D-22
BH02	Urban Code - SNBI	-	B.H.02	C.8	2-C-180
BCL06	Emergency Evacuation Designation	-	B.CL.06	-	2-C-182
BCL03	Federal or Tribal Land Access	-	B.CL.03	-	2-C-183
BH11	AADT Year	30	B.H.11	A.6	2-C-184
BH09	AADT	29	B.H.09	A.4	2-C-184
BH10	Annual Average Daily Truck Traffic	-	B.H.10	A.5	2-C-185
1451	AADT Truck Percentage - NBI	109	-	A.5	2-C-185
BH17	Bypass Detour Length	19	B.H.17	A.7	2-C-186
BH12	Maximum Vertical Clearance Route	10	B.H.12	-	2-C-187
2501	Maximum Vertical Clearance Reverse Route	10	-	-	2-C-187
BH13	Minimum Vertical Clearance Route	-	B.H.13	-	2-C-189
2502	Minimum Vertical Clearance, Reverse Route	-	-	-	2-C-189
BH14	Minimum Horizontal Clearance Left	-	B.H.14	-	2-D-37
BH15	Minimum Horizontal Clearance Right	-	B.H.15	-	2-D-40
1491	Horizontal Clearance Route	47	-	-	2-C-189
BRR01	Railroad Service Type	-	B.RR.01	-	2-D-48
BRR02	Railroad Minimum Vertical Clearance	-	B.RR.02	-	2-D-50
BRR03	Railroad Minimum Horizontal Offset	-	B.RR.03	-	2-D-52

Table 1 - WSBIS Items by Name and Tab Order					
WSBIS Item No.	**WSBIS Item Name**	**NBI Item No.**	**SNBI Item No.**	**NTI Item No.**	**Page No.**
BN01	Navigable Waterway	-	B.N.01	-	2-D-54
BN02	Navigable Minimum Vertical Clearance	-	B.N.02	-	2-D-55
BN03	Movable Bridge Maximum Navigable Vertical Clearance	-	B.N.03	-	2-D-57
BN04	Navigation Channel Width	-	B.N.04	-	2-D-58
BN05	Navigable Channel Minimum Horizontal Clearance	-	B.N.05	-	2-D-60
BN06	Substructure Navigable Protection	-	B.N.06	-	2-C-190
WH24	NBI Reportable Flag	-	-	-	2-C-190
WH25	SNBI Reportable Flag	-	-	-	2-C-191
WH26	SNTI Reportable Flag	-	-	-	2-C-191
WH27	Bridge List	-	-	-	2-C-191
Crossing Tab Discontinued - Effective January 2026					
1354	Lanes Under	28B	-	A.3	2-C-192
1457	Future ADT	114	-	-	2-C-192
1463	Future ADT Year	115	-	-	2-C-192
1477	Linear Sub Route	-	-	-	2-C-193
1484	Base Highway Network	12	-	-	2-C-193
1486	Federal Lands Highway - NBI	105	-	-	2-C-193
1495	Horizontal Clearance, Reverse Direction	47	-	-	2-C-194
2368	Minimum Vertical Clearance Over Deck Override	-	-	-	2-C-195
2412	Maximum Vertical Clearance Override	-	-	-	-
2436	Route Sequencer	-	-	-	2-C-195
2437	Bridge List Override	-	-	-	2-C-196
2438	Milepost Sequencer	-	-	-	2-C-196
7479	Federal Aid Route Number	-	-	-	2-C-196
Materials & Types Tab					
1532	Main Span Material - NBI	43A	-	-	2-C-197
1533	Main Span Design - NBI	43B	-	-	2-C-197
1538	Number of Main Spans - NBI	45	-	-	2-C-198
1535	Approach Span Material - NBI	44A	-	-	2-C-198
1536	Approach Span Design - NBI	44B	-	-	2-C-199
1541	Number of Approach Spans - NBI	46	-	-	2-C-199
1546	Deck type - NBI	107	-	-	2-C-199
1547	Wearing Surface - NBI	108A	-	-	2-C-200
1548	Membrane - NBI	108B	-	-	2-C-200
1549	Deck Protection - NBI	108C	-	-	2-C-201
BSP01	Superstructure Configuration Designation	-	B.SP.01	-	2-C-201
WSP01	Superstructure Configuration Code	-	-	-	2-C-202
WSP02	Span Description	-	-	-	2-C-203
BSP02	Number of Spans	-	B.SP.02	-	2-C-204
BSP03	Number of Beam Lines	-	B.SP.03	-	2-C-205
BSP04	Span Material	-	B.SP.04	-	2-C-206
BSP05	Span Continuity	-	B.SP.05	-	2-C-208
BSP06	Span Type	-	B.SP.06	-	2-C-209
BSP07	Span Protective System	-	B.SP.07	-	2-C-211
BSP08	Deck Interaction	-	B.SP.08	-	2-C-213
BSP09	Deck Material & Type	-	B.SP.09	-	2-C-214

Table 1 - WSBIS Items by Name and Tab Order

WSBIS Item No.	WSBIS Item Name	NBI Item No.	SNBI Item No.	NTI Item No.	Page No.
BSP10	Wearing Surface	-	B.SP.10	-	2-C-215
BSP11	Deck Protective System	-	B.SP.11	-	2-C-216
BSP12	Deck Reinforcing Protective System	-	B.SP.12	-	2-C-217
BSP13	Deck Stay-In-Place Forms	-	B.SP.13	-	2-C-218
BSB01	Substructure Configuration Designation	-	B.SB.01	-	2-C-219
WSB01	Substructure Configuration Code	-	-	-	2-C-219
WSB02	Pier Description	-	-	-	2-C-221
BSB02	Number of Substructure Units	-	B.SB.02	-	2-C-221
BSB03	Substructure Material	-	B.SB.03	-	2-C-222
BSB04	Substructure Type	-	B.SB.04	-	2-C-223
BSB05	Substructure Protective System	-	B.SB.05	-	2-C-225
BSB06	Foundation Type	-	B.SB.06	-	2-C-226
BSB07	Foundation Protective System	-	B.SB.07	-	2-C-228
Roadside Hardware					
BRH01	Bridge Rail Crash Test	-	B.RH.01	-	2-C-231
WRH01	BRCT Document Year (YYYY)	-	-	-	2-C-232
BRH02	Bridge Rail Transition Crash Test	-	B.RH.02	-	2-C-232
WRH02	BRTCT Document Year (YYYY)	-	-	-	2-C-234
Load Rating Tab					
Rating					
2580	Reference Inspection Date	-	-	-	2-C-235
1550	Design Load - NBI	31	-	-	2-C-235
BLR01	Design Load - SNBI	-	B.LR.01	-	2-C-236
BLR02	Design Method	-	B.LR.02	-	2-C-237
BLR03	Load Rating Date	-	B.LR.03	-	2-C-238
2582	Rated By	-	-	-	2-C-238
1660	Operating Level - NBI	-	-	-	2-C-239
BLR08	Routine Permit Loads	-	B.LR.08	-	2-C-240
7557	Design Exception Date	-	-	-	2-C-240
NBI Loads					
1551	Operating Rating Method	63	-	-	2-C-241
1552	Operating Rating Tons	64	-	-	2-C-242
1553	Operating Rating Factor	64	-	L.3	2-C-243
1554	Inventory Rating Method	65	-	L.1	2-C-241
1555	Inventory Rating Tons	66	-	-	2-C-242
1556	Inventory Rating Factor	66	-	L.2	2-C-243
Legal Loads					
2587	Type 3 Rating Factor	-	-	-	2-C-243
2588	Type 3S2 Rating Factor	-	-	-	2-C-243
2589	Type 3-3 Rating Factor	-	-	-	2-C-243
2590	Notional Rating Load (NRL) Rating Factor	-	-	-	2-C-243
2591	Single Unit 4 (SU4) Rating Factor	-	-	-	2-C-243
2592	Single Unit 5 (SU5) Rating Factor	-	-	-	2-C-243
2593	Single Unit 6 (SU6) Rating Factor	-	-	-	2-C-243
2594	Single Unit 7 (SU7) Rating Factor	-	-	-	2-C-243
2598	Emergency Vehicle 2 (EV2) Rating Factor	-	-	-	2-C-244

Table 1 - WSBIS Items by Name and Tab Order					
WSBIS Item No.	**WSBIS Item Name**	**NBI Item No.**	**SNBI Item No.**	**NTI Item No.**	**Page No.**
2599	Emergency Vehicle 3 (EV3) Rating Factor	-	-	-	2-C-244
Permit Loads					
2596	Overload 1 (OL-1) Rating Factor	-	-	-	2-C-244
2597	Overload 2 (OL-2) Rating Factor	-	-	-	2-C-244
Posted Loads					
TL5	Posted Load – Gross - SNTI	-	TL5	L.5	2-C-246
TL6	Posted Load – Axle - SNTI	-	TL6	L.6	2-C-247
TL7	Posted Load – Type 3 - SNTI	-	TL7	L.7	2-C-248
TL8	Posted Load – Type 3S2 - SNTI	-	TL8	L.8	2-C-249
TL9	Posted Load – Type 3-3 - SNTI	-	TL9	L.9	2-C-250
Waterway Tab					
7832	Water Type	-	-	-	2-C-251
7833	Flood Plain Intrusion	-	-	-	2-C-251
7834	Flood Control	-	-	-	2-C-251
7835	Scour History	-	-	-	2-C-252
7836	Streambed Material Type	-	-	-	2-C-252
7837	Substructure Stability	-	-	-	2-C-252
7838	Waterway Obstruction	-	-	-	2-C-253
7839	Streambed Stability	-	-	-	2-C-253
7840	Streambed Anabranch	-	-	-	2-C-253
7841	Piers in Water	-	-	-	2-C-254
Discontinued Tab - Effective January 2026					
Proposed Improvements					
2883	Proposed Improvement Calculation	-	-	-	2-C-255
1844	Proposed Improvement Work Type	75A	-	-	2-C-255
1846	Proposed Improvement Work Method	75B	-	-	2-C-256
1847	Proposed Improvement Structure Length	76	-	-	2-C-256
2853	Proposed Improvement Roadway Width	-	-	-	2-C-256
2860	Proposed Improvement Cost Per SF of Deck	-	-	-	2-C-256
1867	Proposed Improvement Structure Cost	94	-	-	2-C-257
1873	Proposed Improvement Roadway Cost	95	-	-	2-C-257
2870	Proposed Improvement Eng. and Misc. Cost	-	-	-	2-C-257
1861	Proposed Improvement Total Cost	96	-	-	2-C-257
1879	Proposed Improvement Estimate Year	97	-	-	2-C-258
Other Discontinued					
1022	Urban Code - SNTI	-	-	-	2-C-258
1188	Latitude - NBI	16	-	-	2-C-258
1196	Longitude - NBI	17	-	-	2-C-258
1288	Parallel Structure	101	-	-	2-C-259
1312	Flared Flag	-	-	-	2-C-259
1336	Year Built - NBI	27	-	-	2-C-259
1352	Lanes On - NBI	28A	-	-	2-C-260
1378	Vertical Underclearance Code - NBI	54A	-	-	2-C-260
1379	Minimum Lateral Underclearance Right	55B	-	-	2-C-260
1382	Lateral Underclearance Code	55A	-	-	2-C-263
1383	Minimum Lateral Underclearance Left	56	-	-	2-C-263

Table 1 - WSBIS Items by Name and Tab Order					
WSBIS Item No.	**WSBIS Item Name**	**NBI Item No.**	**SNBI Item No.**	**NTI Item No.**	**Page No.**
1386	Navigation Control Code	38	-	-	2-C-264
1387	Navigation Vertical Clearance	39	-	-	2-C-264
1390	Navigation Horizontal Clearance	40	-	-	2-C-265
1394	Vertical Lift Minimum Clearance - NBI	116	-	-	2-C-265
1544	Service On	42A	-	-	2-C-265
1545	Service Under	42B	-	-	2-C-266
1657	Structural Evaluation	67	-	-	2-C-266
1658	Deck Geometry	68	-	-	2-C-267
1659	Underclearances	69	-	-	2-C-271
1684	Bridge Rails	36A	-	-	2-C-273
1685	Transitions	36B	-	-	2-C-275
1686	Guardrails	36C	-	-	2-C-276
1687	Terminals	36D	-	-	2-C-276
2537	Alpha Span Type	-	-	-	2-C-276
7710	Sufficiency Rating	-	-	-	2-C-278
7711	Structurally Deficient/Functionally Obsolete (SD/FO)	-	-	-	2-C-278
1436	Tunnel Route Direction	-	-	I.8	2-C-279
Auto-Generated Fields Section					
1	State Code	1	B.L.01	I.3	2-C-281
5E	Route Directional Suffix	5E	-	-	2-C-281
112	NBIS Bridge Length	112	-	-	2-C-281
I.15-I.18	Border Tunnel Data	-	-	I.15-I.18	2-C-281
N.1-N.3	Navigable Waterway Data	-	-	N.1-N.3	2-C-281
BIR01	NSTM inspection Required	-	-	-	2-C-282
BIE02	NSTM Inspection Date	93A	B.IE.02	-	-
BIE02	Underwater Inspection Date	93B	B.IE.02	-	-
BIE02	Special Feature Inspection Date	93C	B.IE.02	-	-
BIE05	Fracture Critical Inspection Interval	92A	B.IE.05	-	-
BIE05	Underwater Inspection Interval	92B	B.IE.05	-	-
BIE05	Special Feature Inspection Interval	92C	B.IE.05	-	-
BIE10	Inspection Data Update Date	-	B.IE.10	-	2-C-283
BIR03	Underwater Inspection Required	-	B.IR.03	-	2-C-283
BIR04	Complex Feature - SNBI	-	B.IR.04	-	2-C-284
BC13	Lowest Condition Rating Code	-	B.C.13	-	2-C-284
BIE09	Inspection QA Date	-	B.IE.09	-	2-C-285

Table 2 - WSBIS Item Numbers by Sequence

WSBIS Item No.	WSBIS Item Name	WSBIS Application Tab	Page No.
1	State Code	Auto-Generated Section	2-C-281
112	NBIS Bridge Length	Auto-Generated Section	2-C-281
1019	Owner - NBI	Bridge ID Tab	2-C-99
1022	Urban Code - SNTI	Discontinued Tab	2-C-258
1188	Latitude - NBI	Discontinued Tab	2-C-258
1196	Longitude - NBI	Discontinued Tab	2-C-258
1232	Features Intersected - NBI	Bridge ID Tab	2-C-97
1256	Facilities Carried - NBI	Bridge ID Tab	2-C-97
1285	Toll Code - NBI	Bridge ID Tab	2-C-109
1286	Custodian - NBI	Bridge ID Tab	2-C-99
1288	Parallel Structure	Discontinued Tab	2-C-259
1289	Temporary Structure - NBI	Bridge ID Tab	2-C-111
1291	Median Code - NBI	Geometry Tab	2-C-148
1292	Historical Significance (NRHP) - NBI	Bridge ID Tab	2-C-112
1293	Open, Closed or Posted	SNBI Tab	2-C-78
1310	Skew Angle - NBI	Geometry Tab	2-C-152
1312	Flared Flag	Discontinued Tab	2-C-259
1336	Year Built - NBI	Discontinued Tab	2-C-259
1352	Lanes On - NBI	Discontinued Tab	2-C-260
1354	Lanes Under	Crossing Tab	2-C-192
1356	Curb-to-Curb Width - NBI	Geometry Tab	2-C-135
1360	Out-to-Out Deck Width - NBI	Geometry Tab	2-C-131
1370	Minimum Vertical Clearance Over Deck - NBI	Geometry Tab	2-C-159
1374	Minimum Vertical Clearance Under Bridge - NBI	Geometry Tab	2-C-160
1378	Vertical Underclearance Code - NBI	Discontinued Tab	2-C-260
1379	Minimum Lateral Underclearance Right	Discontinued Tab	2-C-260
1382	Lateral Underclearance Code	Discontinued Tab	2-C-263
1383	Minimum Lateral Underclearance Left	Discontinued Tab	2-C-263
1386	Navigation Control Code	Discontinued Tab	2-C-264
1387	Navigation Vertical Clearance	Discontinued Tab	2-C-264
1390	Navigation Horizontal Clearance	Discontinued Tab	2-C-265
1394	Vertical Lift Minimum Clearance - NBI	Discontinued Tab	2-C-265
1397	Approach Roadway Width	Geometry Tab	2-C-147
1432	On/Under Code	Crossing Tab	2-C-169
1433	Highway Class - NBI	Crossing Tab	2-C-173
1434	Service Level - NBI	Crossing Tab	2-C-173
1435	Route - NBI	Crossing Tab	2-C-172
1436	Tunnel Route Direction	Discontinued Tab	2-C-279
1451	AADT Truck Percentage - NBI	Crossing Tab	2-C-185
1457	Future ADT	Crossing Tab	2-C-192
1463	Future ADT Year	Crossing Tab	2-C-192
1477	Linear Sub Route	Crossing Tab	2-C-193
1483	National Highway System - NBI	Crossing Tab	2-C-176
1484	Base Highway Network	Crossing Tab	2-C-193
1485	STRAHNET - NBI	Crossing Tab	2-C-177
1486	Federal Lands Highway - NBI	Crossing Tab	2-C-193

Table 2 - WSBIS Item Numbers by Sequence			
WSBIS Item No.	**WSBIS Item Name**	**WSBIS Application Tab**	**Page No.**
1487	Functional Classification - NBI	Crossing Tab	2-C-179
1490	Lane Use Direction - NBI	Crossing Tab	2-C-176
1491	Horizontal Clearance Route	Crossing Tab	2-C-189
1495	Horizontal Clearance, Reverse Direction	Crossing Tab	2-C-194
1532	Main Span Material - NBI	Materials & Types Tab	2-C-197
1533	Main Span Design - NBI	Materials & Types Tab	2-C-197
1535	Approach Span Material - NBI	Materials & Types Tab	2-C-198
1536	Approach Span Design - NBI	Materials & Types Tab	2-C-199
1538	Number of Main Spans - NBI	Materials & Types Tab	2-C-198
1541	Number of Approach Spans - NBI	Materials & Types Tab	2-C-199
1544	Service On	Discontinued Tab	2-C-265
1545	Service Under	Discontinued Tab	2-C-266
1546	Deck type - NBI	Materials & Types Tab	2-C-199
1547	Wearing Surface - NBI	Materials & Types Tab	2-C-200
1548	Membrane - NBI	Materials & Types Tab	2-C-200
1549	Deck Protection - NBI	Materials & Types Tab	2-C-201
1550	Design Load - NBI	Load Rating Tab	2-C-235
1551	Operating Rating Method	Load Rating Tab	2-C-241
1552	Operating Rating Tons	Load Rating Tab	2-C-242
1553	Operating Rating Factor	Load Rating Tab	2-C-243
1554	Inventory Rating Method	Load Rating Tab	2-C-241
1555	Inventory Rating Tons	Load Rating Tab	2-C-242
1556	Inventory Rating Factor	Load Rating Tab	2-C-243
1588	Border Bridge Percent - NBI	Bridge ID Tab	2-C-116
1657	Structural Evaluation	Discontinued Tab	2-C-266
1658	Deck Geometry	Discontinued Tab	2-C-267
1659	Underclearances	Discontinued Tab	2-C-271
1660	Operating Level - NBI	SNBI Tab	2-C-78
1660	Operating Level - NBI	Load Rating Tab	2-C-239
1661	Alignment - NBI	SNBI Tab	2-C-74
1662	Waterway - NBI	SNBI Tab	2-C-72
1677	Channel Protection Condition - NBI	SNBI Tab	2-C-66
1679	Pier/Abutment Protection - NBI	SNBI Tab	2-C-67
1680	Scour Critical - NBI	SNBI Tab	2-C-68
1684	Bridge Rails	Discontinued Tab	2-C-273
1685	Transitions	Discontinued Tab	2-C-275
1686	Guardrails	Discontinued Tab	2-C-276
1687	Terminals	Discontinued Tab	2-C-276
1844	Proposed Improvement Work Type	Discontinued Tab	2-C-255
1846	Proposed Improvement Work Method	Discontinued Tab	2-C-256
1847	Proposed Improvement Structure Length	Discontinued Tab	2-C-256
1861	Proposed Improvement Total Cost	Discontinued Tab	2-C-257
1867	Proposed Improvement Structure Cost	Discontinued Tab	2-C-257
1873	Proposed Improvement Roadway Cost	Discontinued Tab	2-C-257
1879	Proposed Improvement Estimate Year	Discontinued Tab	2-C-258
2000	Main Listing Code	Crossing Tab	2-C-169

Table 2 - WSBIS Item Numbers by Sequence

WSBIS Item No.	WSBIS Item Name	WSBIS Application Tab	Page No.
2368	Minimum Vertical Clearance Over Deck Override	Crossing Tab	2-C-195
2402	Crossing Description	Crossing Tab	2-C-170
2412	Maximum Vertical Clearance Override	-	-
2436	Route Sequencer	Crossing Tab	2-C-195
2437	Bridge List Override	Crossing Tab	2-C-196
2438	Milepost Sequencer	Crossing Tab	2-C-196
2440	Milepost - NBI	Crossing Tab	2-C-172
2501	Maximum Vertical Clearance Reverse Route	Crossing Tab	2-C-187
2502	Minimum Vertical Clearance, Reverse Route	Crossing Tab	2-C-189
2537	Alpha Span Type	Discontinued Tab	2-C-276
2580	Reference Inspection Date	Load Rating Tab	2-C-235
2582	Rated By	Load Rating Tab	2-C-238
2587	Type 3 Rating Factor	Load Rating Tab	2-C-243
2588	Type 3S2 Rating Factor	Load Rating Tab	2-C-243
2589	Type 3-3 Rating Factor	Load Rating Tab	2-C-243
2590	Notional Rating Load (NRL) Rating Factor	Load Rating Tab	2-C-243
2591	Single Unit 4 (SU4) Rating Factor	Load Rating Tab	2-C-243
2592	Single Unit 5 (SU5) Rating Factor	Load Rating Tab	2-C-243
2593	Single Unit 6 (SU6) Rating Factor	Load Rating Tab	2-C-243
2594	Single Unit 7 (SU7) Rating Factor	Load Rating Tab	2-C-243
2596	Overload 1 (OL-1) Rating Factor	Load Rating Tab	2-C-244
2597	Overload 2 (OL-2) Rating Factor	Load Rating Tab	2-C-244
2598	Emergency Vehicle 2 (EV2) Rating Factor	Load Rating Tab	2-C-244
2599	Emergency Vehicle 3 (EV3) Rating Factor	Load Rating Tab	2-C-244
2610	Asphalt Depth	SNBI Tab	2-C-82
2611	Design Curb Height	SNBI Tab	2-C-82
2612	Bridge Vehicle Rail Height	SNBI Tab	2-C-82
2613	NBIS Risk Category	SNBI Tab	2-C-79
2614	Subject to NBIS Flag	SNBI Tab	2-C-83
2615	Special Structures Flag	Bridge ID Tab	2-C-115
2642	Inspection Hours	Report Type Tab	2-C-35
2643	Inspection Overtime Hours	Report Type Tab	2-C-35
2654	Co-Inspector Initials	Report Type Tab	2-C-35
2675	Number of Utilities	SNBI Tab	2-C-82
2688	Revise Rating Flag	SNBI Tab	2-C-85
2691	Photos Flag	SNBI Tab	2-C-85
2693	Soundings Flag	SNBI Tab	2-C-84
2694	Clearance Flag	SNBI Tab	2-C-84
2695	QA Flag	SNBI Tab	2-C-85
2853	Proposed Improvement Roadway Width	Discontinued Tab	2-C-256
2860	Proposed Improvement Cost Per SF of Deck	Discontinued Tab	2-C-256
2870	Proposed Improvement Eng. and Misc. Cost	Discontinued Tab	2-C-257
2883	Proposed Improvement Calculation	Discontinued Tab	2-C-255
2900	Late Inspection Explanation	Report Type Tab	2-C-36
2901	Program Manager Response Date	Report Type Tab	2-C-36
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WSBIS Item No.	**WSBIS Item Name**	**WSBIS Application Tab**	**Page No.**
2930	Obsolete Structure Flag	Bridge ID Tab	2-C-115
7281	Legislative District 1	Bridge ID Tab	2-C-115
7283	Legislative District 2	Bridge ID Tab	2-C-115
7296	Historical Significance - Local Agency	Bridge ID Tab	2-C-114
7479	Federal Aid Route Number	Crossing Tab	2-C-196
7557	Design Exception Date	Load Rating Tab	2-C-240
7644	Inspection Report Hours	Report Type Tab	2-C-37
7664	Drain Condition	SNBI Tab	2-C-87
7665	Drain Status	SNBI Tab	2-C-87
7666	Deck Scaling	SNBI Tab	2-C-87
7667	Deck Scaling Percent	SNBI Tab	2-C-88
7669	Deck Rutting	SNBI Tab	2-C-88
7670	Deck Exposed Rebar	SNBI Tab	2-C-88
7672	Curb Condition	SNBI Tab	2-C-89
7673	Sidewalk Condition	SNBI Tab	2-C-89
7674	Paint Condition	SNBI Tab	2-C-89
7681	Approach Condition	SNBI Tab	2-C-90
7682	Retaining Wall Condition	SNBI Tab	2-C-90
7683	Pier Protection Condition	SNBI Tab	2-C-91
7710	Sufficiency Rating	Discontinued Tab	2-C-278
7711	Structurally Deficient/Functionally Obsolete (SD/FO)	Discontinued Tab	2-C-278
7832	Water Type	Waterway Tab	2-C-251
7833	Flood Plain Intrusion	Waterway Tab	2-C-251
7834	Flood Control	Waterway Tab	2-C-251
7835	Scour History	Waterway Tab	2-C-252
7836	Streambed Material Type	Waterway Tab	2-C-252
7837	Substructure Stability	Waterway Tab	2-C-252
7838	Waterway Obstruction	Waterway Tab	2-C-253
7839	Streambed Stability	Waterway Tab	2-C-253
7840	Streambed Anabranch	Waterway Tab	2-C-253
7841	Piers in Water	Waterway Tab	2-C-254
5E	Route Directional Suffix	Auto-Generated Section	2-C-281
BAP01	Approach Roadway Alignment - SNBI	SNBI Tab	2-C-75
BAP02	Overtopping Likelihood	SNBI Tab	2-C-73
BAP03	Scour Vulnerability	SNBI Tab	2-C-70
BAP04	Scour Plan of Action	SNBI Tab	2-C-71
BAP05	Seismic Vulnerability	SNBI Tab	2-C-77
BC01	Deck Overall Rating	SNBI Tab	2-C-42
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BC03	Substructure Overall	SNBI Tab	2-C-52
BC04	Culvert Overall	SNBI Tab	2-C-55
BC05	Bridge Railings	SNBI Tab	2-C-44
BC06	Bridge Railing Transitions	SNBI Tab	2-C-45
BC07	Bridge Bearings	SNBI Tab	2-C-50
BC08	Bridge Joints	SNBI Tab	2-C-46
BC09	Channel Condition	SNBI Tab	2-C-62

Table 2 - WSBIS Item Numbers by Sequence

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BC10	Channel Protection	SNBI Tab	2-C-64
BC11	Scour Condition - SNBI	SNBI Tab	2-C-58
BC12	Overall Condition Classification	SNBI Tab	2-C-41
BC13	Lowest Condition Rating Code	Auto-Generated Section	2-C-284
BC14	NSTM Inspection	SNBI Tab	2-C-49
BC15	Underwater Inspection	SNBI Tab	2-C-54
BCL01	Owner - SNBI	Bridge ID Tab	2-C-100
BCL02	Maintenance Responsibility	Bridge ID Tab	2-C-101
BCL03	Federal or Tribal Land Access	Crossing Tab	2-C-183
BCL04	Historic Significance (NRHP) - SNBI	Bridge ID Tab	2-C-113
BCL05	Toll - SNBI	Bridge ID Tab	2-C-110
BCL06	Emergency Evacuation Designation	Crossing Tab	2-C-182
BF01	Feature Type	Appendix 2D	2-D-13
BF02	Feature Location	Appendix 2D	2-D-15
BF03	Feature Name	Appendix 2D	2-D-16
BG01	NBIS Bridge Length	Geometry Tab	2-C-119
BG02	Total Bridge Length	Geometry Tab	2-C-122
BG03	Maximum Span Length	Geometry Tab	2-C-129
BG04	Minimum Span Length	Geometry Tab	2-C-127
BG05	Out-to-Out Deck Width - SNBI	Geometry Tab	2-C-132
BG06	Curb-to-Curb Width - SNBI	Geometry Tab	2-C-138
BG07	Left Curb or Sidewalk Width	Geometry Tab	2-C-142
BG08	Right Curb or Sidewalk Width	Geometry Tab	2-C-144
BG10	Median Code - SNBI	Geometry Tab	2-C-150
BG11	Skew Angle - SNBI	Geometry Tab	2-C-153
BG12	Curved Bridge	Geometry Tab	2-C-154
BG13	Maximum Bridge Height	Geometry Tab	2-C-156
BG14	Sidehill Bridge	Geometry Tab	2-C-157
BG15	Irregular Deck Area	Geometry Tab	2-C-158
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BH01	Functional Classification - SNBI	Appendix 2D	2-D-22
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BH03	NHS Designation - SNBI	Appendix 2D	2-D-24
BH04	National Truck Freight Network	Crossing Tab	2-C-178
BH05	STRAHNET - SNBI	Appendix 2D	2-D-26
BH06	LRS Route ID	Crossing Tab	2-C-174
BH07	LRS Milepost	Crossing Tab	2-C-174
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BH09	AADT	Crossing Tab	2-C-184
BH10	Annual Average Daily Truck Traffic	Crossing Tab	2-C-185
BH11	AADT Year	Crossing Tab	2-C-184
BH12	Maximum Vertical Clearance Route	Crossing Tab	2-C-187
BH13	Minimum Vertical Clearance Route	Crossing Tab	2-C-189
BH14	Minimum Horizontal Clearance Left	Appendix 2D	2-D-37
BH15	Minimum Horizontal Clearance Right	Appendix 2D	2-D-40
BH17	Bypass Detour Length	Crossing Tab	2-C-186

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BH18	Crossing Structure ID	-	-
BID01	Structure ID	Bridge ID Tab	2-C-93
BID02	Bridge Name	Bridge ID Tab	2-C-96
BID03	Previous Structure ID	Bridge ID Tab	2-C-94
BIE01	Report Types	Report Type Tab	2-C-25
BIE02	Inspection Begin Date	Report Type Tab	2-C-30
BIE02	NSTM Inspection Date	Auto-Generated Section	-
BIE02	Underwater Inspection Date	Auto-Generated Section	-
BIE02	Special Feature Inspection Date	Auto-Generated Section	-
BIE03	Inspection Completion Date	Report Type Tab	2-C-31
BIE04	Nationally Certified Bridge/Tunnel Inspector	Report Type Tab	2-C-35
BIE05	Inspection Interval	Report Type Tab	2-C-30
BIE05	Fracture Critical Inspection Interval	Auto-Generated Section	-
BIE05	Underwater Inspection Interval	Auto-Generated Section	-
BIE05	Special Feature Inspection Interval	Auto-Generated Section	-
BIE06	Inspection Due Date	Report Type Tab	2-C-31
BIE07	Risk-Based Inspection Interval Method	Report Type Tab	2-C-34
BIE08	Inspection Quality Control Date	Report Type Tab	2-C-37
BIE09	Inspection Quality Assurance Date	SNBI Tab	2-C-84
BIE09	Inspection QA Date	Auto-Generated Section	2-C-285
BIE10	Inspection Data Update Date	Auto-Generated Section	2-C-283
BIE11	Report Type Notes	Report Type Tab	2-C-33
BIR01	NSTM inspection Required	Auto-Generated Section	2-C-282
BIR02	Fatigue Details	SNBI Tab	2-C-76
BIR03	Underwater Inspection Required	Auto-Generated Section	2-C-283
BIR04	Complex Feature - SNBI	Auto-Generated Section	2-C-284
BL02	County Code	Bridge ID Tab	2-C-102
BL03	Place Code	Bridge ID Tab	2-C-103
BL04	Highway Agency District	Bridge ID Tab	2-C-106
BL05	Latitude - SNBI	Crossing Tab	2-C-171
BL06	Longitude - SNBI	Crossing Tab	2-C-171
BL07	Border Structure ID	Bridge ID Tab	2-C-116
BL08	Border State or Country Code	Bridge ID Tab	2-C-116
BL09	Border Bridge Inspection Responsibility	Bridge ID Tab	2-C-117
BL10	Border Bridge Designated Lead State	Bridge ID Tab	2-C-118
BL11	Bridge Location	Crossing Tab	2-C-170
BL12	Metropolitan Planning Organization	Bridge ID Tab	2-C-107
BLR01	Design Load - SNBI	Load Rating Tab	2-C-236
BLR02	Design Method	Load Rating Tab	2-C-237
BLR03	Load Rating Date	Load Rating Tab	2-C-238
BLR08	Routine Permit Loads	Load Rating Tab	2-C-240
BN01	Navigable Waterway	Appendix 2D	2-D-54
BN02	Navigable Minimum Vertical Clearance	Appendix 2D	2-D-55
BN03	Movable Bridge Maximum Navigable Vertical Clearance	Appendix 2D	2-D-57
BN04	Navigation Channel Width	Appendix 2D	2-D-58
BN05	Navigable Channel Minimum Horizontal Clearance	Appendix 2D	2-D-60

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WSBIS Item No.	**WSBIS Item Name**	**WSBIS Application Tab**	**Page No.**
BN06	Substructure Navigable Protection	Crossing Tab	2-C-190
BRH01	Bridge Rail Crash Test	Materials & Types Tab	2-C-231
BRH02	Bridge Rail Transition Crash Test	Materials & Types Tab	2-C-232
BRR01	Railroad Service Type	Appendix 2D	2-D-48
BRR02	Railroad Minimum Vertical Clearance	Appendix 2D	2-D-50
BRR03	Railroad Minimum Horizontal Offset	Appendix 2D	2-D-52
BRT01	Route Designation	Appendix 2D	2-D-17
BRT02	Route Number - SNBI	Appendix 2D	2-D-18
BRT03	Route Direction - SNBI	Appendix 2D	2-D-19
BRT04	Route Type - SNBI	Appendix 2D	2-D-20
BRT05	Service Type - SNBI	Appendix 2D	2-D-21
BSB01	Substructure Configuration Designation	Materials & Types Tab	2-C-219
BSB02	Number of Substructure Units	Materials & Types Tab	2-C-221
BSB03	Substructure Material	Materials & Types Tab	2-C-222
BSB04	Substructure Type	Materials & Types Tab	2-C-223
BSB05	Substructure Protective System	Materials & Types Tab	2-C-225
BSB06	Foundation Type	Materials & Types Tab	2-C-226
BSB07	Foundation Protective System	Materials & Types Tab	2-C-228
BSP01	Superstructure Configuration Designation	Materials & Types Tab	2-C-201
BSP02	Number of Spans	Materials & Types Tab	2-C-204
BSP03	Number of Beam Lines	Materials & Types Tab	2-C-205
BSP04	Span Material	Materials & Types Tab	2-C-206
BSP05	Span Continuity	Materials & Types Tab	2-C-208
BSP06	Span Type	Materials & Types Tab	2-C-209
BSP07	Span Protective System	Materials & Types Tab	2-C-211
BSP08	Deck Interaction	Materials & Types Tab	2-C-213
BSP09	Deck Material & Type	Materials & Types Tab	2-C-214
BSP10	Wearing Surface	Materials & Types Tab	2-C-215
BSP11	Deck Protective System	Materials & Types Tab	2-C-216
BSP12	Deck Reinforcing Protective System	Materials & Types Tab	2-C-217
BSP13	Deck Stay-In-Place Forms	Materials & Types Tab	2-C-218
BW01	Year Built	SNBI Tab	2-C-81
I.15-I.18	Border Tunnel Data	Auto-Generated Section	2-C-281
N.1-N.3	Navigable Waterway Data	Auto-Generated Section	2-C-281
TA2	Year Rebuilt	SNBI Tab	2-C-81
TA3	Total Number of Lanes - SNTI	-	SNTI 2-28
TA8	Service in Tunnel - SNTI	Geometry Tab	2-C-146
TC3	Direction of Traffic - SNTI	-	SNTI 2-39
TD1	Target Inspection Date - SNTI	Report Type Tab	2-C-33
TG1	Tunnel Length - SNTI	Geometry Tab	2-C-126
TG2	Minimum Vertical Clearance Over Tunnel Roadway - SNTI	Geometry Tab	2-C-162
TG3	Curb-to-Curb Width - SNTI	Geometry Tab	2-C-141
TL10	Height Restrictions - SNTI	Geometry Tab	2-C-166
TL11	Hazardous Material Restriction - SNTI	Geometry Tab	2-C-167
TL12	Other Restrictions - SNTI	Geometry Tab	2-C-167
TL5	Posted Load – Gross - SNTI	Load Rating Tab	2-C-246

Table 2 - WSBIS Item Numbers by Sequence

WSBIS Item No.	WSBIS Item Name	WSBIS Application Tab	Page No.
TL6	Posted Load – Axle - SNTI	Load Rating Tab	2-C-247
TL7	Posted Load – Type 3 - SNTI	Load Rating Tab	2-C-248
TL8	Posted Load – Type 3S2 - SNTI	Load Rating Tab	2-C-249
TL9	Posted Load – Type 3-3 - SNTI	Load Rating Tab	2-C-250
TS1	Number of Bores - SNTI	Geometry Tab	2-C-163
TS2	Tunnel Shape - SNTI	Geometry Tab	2-C-164
TS3	Portal Shape - SNTI	Geometry Tab	2-C-165
TS4	Ground Conditions - SNTI	Geometry Tab	2-C-165
TS5	Complex Tunnel - SNTI	Geometry Tab	2-C-166
WA09	Speed Limit	Crossing Tab	2-C-176
WCF01	Critical Finding Number	Critical Findings Tab	CH6
WCF02	Type of Critical Finding	Critical Findings Tab	CH6
WCF03	Entry Type	Critical Findings Tab	CH6
WCF04	Date of Finding or Entry Date	Critical Findings Tab	CH6
WCF05	Bridge Status	Critical Findings Tab	CH6
WCF06	Estimated Resolution Date	Critical Findings Tab	CH6
WCF07	Description	Critical Findings Tab	CH6
WCF08	Reported By	Critical Findings Tab	CH6
WCF09	Associated Repair	Critical Findings Tab	CH6
WCL04	Historical Significance - HAER	Bridge ID Tab	2-C-114
WF01	Feature Type Code	-	-
WF02	Crossing Manager	Crossing Tab	2-C-170
WH06	LRS Date	-	-
WH07	LRS Milepost End	-	-
WH18	Crossing Feature Type	-	-
WH19	LRS ARM	-	-
WH20	LRS ARM End	-	-
WH21	Ahead/Back Indicator	Crossing Tab	2-C-175
WH22	Ahead/Back Indicator End	-	-
WH23	Directional Indicator	Crossing Tab	2-C-175
WH24	NBI Reportable Flag	Crossing Tab	2-C-190
WH25	SNBI Reportable Flag	Crossing Tab	2-C-191
WH26	SNTI Reportable Flag	Crossing Tab	2-C-191
WH27	Bridge List	Crossing Tab	2-C-191
WID01	Structure Type	Bridge ID Tab	2-C-94
WID02	Bridge Number	Bridge ID Tab	2-C-95
WID03	Bridge Sort Number	Bridge ID Tab	2-C-96
WID06	Program Manager	Bridge ID Tab	2-C-97
WIE01	Report Subtypes	Report Type Tab	2-C-25
WIE02	Inspection Due Date Override	Report Type Tab	2-C-32
WL05	City	Bridge ID Tab	2-C-108
WL06	Section	Bridge ID Tab	2-C-108
WL07	Township	Bridge ID Tab	2-C-108
WL08	Range	Bridge ID Tab	2-C-108
WRH01	BRCT Document Year (YYYY)	Materials & Types Tab	2-C-232
WRH02	BRTCT Document Year (YYYY)	Materials & Types Tab	2-C-234

Table 2 - WSBIS Item Numbers by Sequence			
WSBIS Item No.	**WSBIS Item Name**	**WSBIS Application Tab**	**Page No.**
WRT02	Milepost - SNBI	-	-
WSB01	Substructure Configuration Code	Materials & Types Tab	2-C-219
WSB02	Pier Description	Materials & Types Tab	2-C-221
WSP01	Superstructure Configuration Code	Materials & Types Tab	2-C-202
WSP02	Span Description	Materials & Types Tab	2-C-203

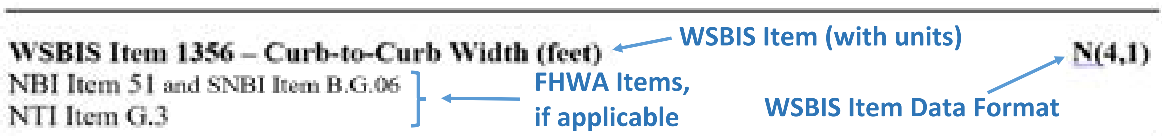
Coding Guide Instructions

This coding guide is intended as a companion to the BridgeWorks application, and provides more detailed definitions for many of the data entry fields visible in BridgeWorks. Those fields defined herein have the associated WSBIS Item Number in blue parentheses next to the data entry field. BridgeWorks users who need more information about how to code a field should click on these item numbers, which will take them to the relevant section in this coding guide.

This coding guide also identifies data fields that are reported to the NBI, SNBI (starting in 2026) and/or SNTI. Some WSBIS field definitions vary from the NBI or SNTI, and are automatically translated when submitted to FHWA. This coding guide identifies all translated fields. In some cases, NBI field definitions have been updated by memorandum or are subject to interpretation. These issues are addressed in the NBI Commentary subsection of each field definition when they occur.

I. **Item Format**

Item formats are migrating tothe SNBI standard, though modified somewhat for WSDOT use. Some fields, generally those which will be discontinued in 2026, follow the old format as shown here:



The **WSBIS Item (with units)** includes the 4 digit item number and item name. In some cases units are not applicable, and therefore not shown. The leading digit of the item numbers has the following significance:

- 1xxx item numbers are reported to the FHWA, either to the NBI, NTI, or both.
- 2xxx item numbers are not reported to the FHWA and are maintained by WSDOT Bridge Preservation Office.
- 7xxx item numbers are not reported to the FHWA and are maintained by WSDOT Local Programs.

The **FHWA Items, if applicable**, identify the equivalent FHWA items in the Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (aka the NBI coding guide) or the Specifications for the National Tunnel Inventory (aka the NTI coding guide).

The **WSBIS Item Data Format** describes the data type and size limitations for data entry into BridgeWorks, using the following codes:

N(x,y)	Numeric, with x identifying the total number of characters and y identifying the number of decimal places. This data format requires a decimal place and only allows numbers. For example N(4,1) would allow a number of 0.0 through 999.9.
AN(x)	Alphanumeric, with x identifying the total number of characters. This data format allows virtually any character to be placed in this field, either letters, numbers, dashes, spaces, etc.
Pulldown	Populated by using a pulldown menu of pre-selected options.
Date	Populated with a pop-up calendar or user data entry in mm/dd/yyyy format

Check Box	Clicking on the box adds a check mark, activating feature in BridgeWorks
Calculated	A calculated field, no direct data entry by user.
Integer	These fields are populated only by whole numbers, no decimals allowed.

The new SNBI format with WSDOT modifications will generally be used for fields that are either retained, added, or modified for reporting to the SNBI and SNTI, with this format:

<table>
<tr><th colspan="6">Section Name (Old Item ####)</th></tr>
<tr><td><u>Format</u></td><td><u>Translation</u></td><td><u>Frequency</u></td><td><u>WSBIS Item ID</u></td><td><u>SNBI Item ID</u></td><td><u>SNTI Item ID</u></td></tr>
<tr><td colspan="6">Applicable Structure Types</td></tr>
<tr><th colspan="3">Specification</th><th colspan="3">Commentary</th></tr>
<tr><td colspan="3">Requirements for reporting the data item.</td><td colspan="3">Expanded guidance on the specification.</td></tr>
<tr><th colspan="6">Specification Continued, Commentary Continued, or Exampes</th></tr>
<tr><td colspan="6">Additional space for Specification or Commentary, if needed. Examples are presented to further clarify the specification. Each item typically has brief examples. A more comprehensive example can be found at the end of each section or subsection.</td></tr>
</table>

II. **Structure Types**

WSBIS currently maintains records for 4 structure types:

Type 1 - Bridges and culverts carrying public roadways

Type 2 - Pedestrian, railroad and other non-vehicular bridges over public roadways

Type 3 - Tunnels carrying roadways within

Type 4 - Structures that do not cross over or under a public roadway

See "Structure Type" Item WID01 for more details.

III. **Establishing the Inventory Record**

The original inventory record needs to be established only once and is required when:

- A new structure has been built (usually before it is placed in service).
- An existing bridge has been replaced with a new structure **(the existing record and it's SID be obsoleted before a new record for the structure is established with a new unique SID)**.
- A detour structure has been built and remains in service for more than three years or beyond the life of the contract under which it was built.
- An existing structure not previously inventoried is added to the statewide inventory.

A structure's original inventory record can be established by the following steps.

1. In BridgeWorks, select the “Create Structure” icon from the Operation menu at the top of the main page. A new window will pop up with ten data entry fields. Two of these fields are automatically filled in by the BridgeWorks application. First, the Provisional (or temporary) SID will be assigned. Second, the “Sort Bridge Number” will be created when you fill the “Bridge Number” field. The last two digits of the

Provisional SID are for sequencing the creation of multiple new records (i.e., "01", 02). The permanent SID is assigned by WSDOT when the new record is released to the WSBIS. Enter valid data in all of the other fields.

After completing all fields, click the "Create Structure" button to close the window and add the new record to your inventory list. You can then choose the new record off the bridge list and continue adding the required inventory information.

2. Enter appropriate values in the data entry fields on the application forms (tabs).
3. A copy of this Inventory Report shall be kept in the bridge file.

IV. **Reestablishing the Inventory Record**

If an Inventory record for a bridge has been mistakenly deleted or obsoleted (as sometimes happens when a bridge has changed ownership), it can be recovered by emailing a request to the Local Agency Bridge Inventory Engineer for local agency bridges or to the BPO Bridge Inventory Engineer for State owned bridges. In the request, be sure to provide correct control field information.

Once the record has been recovered, it must be reviewed for errors and corrected. Submit the updated data in the manner described for updating the inventory.

V. **Updating the Inventory**

The original bridge inventory record needs to be updated whenever new data must be added or whenever changes must be made to the existing record.

Updates to the original inventory data may be required as a result of damage to the bridge, changed conditions noted during an inspection, safety improvements or rehabilitation, when new computations or measurements are made, or when the bridge changes ownership. Updates to a bridges' inventory record must be reported to the Local Agency Bridge Inventory Engineer or the BPO Bridge Inventory Engineer within 90 days. Updates that have not been Released to the bridge inventory will not be included in any submittals and reports prepared using that data.

To start the update process, select the bridge record from the Bridge List you want to change. Be sure the latest Master Control Data (MCD) in the Control Data Grid is highlighted and then click "Edit Control Data" from the Control Data menu to create an updatable copy. This new copy will be in a state of "Work" and is called an Update Control Data (UCD). To complete an update, this procedure will be followed.

1. Review the data displayed in the BridgeWorks forms (tabs). All of the forms except BMS, Notes, Repairs, Photos, Files, and Letters are arranged with two data fields after the field name. The left side data field will display existing information. The right side data field is for entering update information.
2. Enter new coding values in each Data Entry Field that must be updated. Make sure your entry is complete. Pressing F9 on your keyboard or clicking the "Inspector Data Check" icon on the Control Data menu will run a limited data check process for the selected Control Data (CD). Pressing F11 or clicking the "In-Depth Data Check" icon will run a full data check process. BridgeWorks will then provide you with a list of errors or will let you know that no errors were found. This process can be run on UCD's or MCD's.

- If you are entering new data, simply enter the appropriate values in the field.
- If you are making a change to existing data, the entire field must be re coded. For example, if the name shown in Item 1232 - Features Intersected, has been misspelled, the entire name must be reentered, not just one or two letters corrected.
- If you want to blank out an entire field, type an asterisk (*) in the update field. The existing data contained in that field will be erased and the field will be blank after the record is processed. Some fields cannot be blank, in which case the asterisk will not be processed.

3. When all updates are complete to the satisfaction of the Team Leader responsible for the bridge inspection, the report is submitted to the state of “Lock.” At this point, and depending on the procedures of the bridge owner, the inspection report and the inventory data is given to the Team Leader’s Program Manager or supervisor for their review. This internal review falls under the heading of Quality Control (QC) and is an important step in the release process. Once the Program Manager or supervisor is satisfied with the report, the UCD is sent to either the Local Agency or BPO Bridge Inventory Engineer for final review of the inventory data and subsequent release to the bridge inventory.
4. WSDOT Team Leaders typically submit paper copies of approved inspection reports to the BPO Bridge Inventory Engineer for review and release. See Chapter 7 for details on WSDOT procedures.

   Local agency Team Leaders and/or consultants should create a Selection Set of approved UCD’s which can be sent to the Local Agency Bridge Inventory Engineer for review.

   The UCD’s are reviewed to ensure correctness and consistency before the data is released to the Inventory.

   Any errors found will be noted and returned to the bridge owner or Team Leader for corrections. Once the corrections are made, the UCD is again submitted for review. Once the Inventory Engineer is satisfied with the correctness of the UCD it is released to the Bridge Inventory. At this point, the UCD becomes an MCD and can no longer be changed. An MCD is a permanent part of the bridge record history and further changes must be made through the UCD process.
5. After release for wet signature, the Bridge Inspection Report and the WSBIS Bridge Inventory Report are printed. The final validation of the inspection report is completed when the Bridge Inspection Team members sign the report. The report is then added to the inspection history in the official bridge file and the previous WSBIS Inventory Report is replaced with the current report. After release for digital signature, the inspectors will be notified by email to review and digitally sign the inspection report. Once signed, the completed inspection report will be available in the Records tab, Inspection Report subtab. Printout is optional for agency records.

   This process must be completed within 90 days of the inspection date but it is recommended that the release is done as soon as possible. The quality of the inspection report tends to degrade through an extended review. Instead, complete the release process on the UCD and make any later corrections through an Informational UCD.

VI. Deleting/Transferring the Inventory Record

When an inventory record becomes obsolete, it needs to be changed from "Active" to "Inactive" status in the WSBIS database. The reasons a record may become obsolete include:

- A structure has been bypassed and is no longer in use, or
- A structure has been demolished, or
- A structure has been permanently closed to traffic.

If a new structure replaces an existing structure, the agency must obsolete the old record and establish a new inventory record.

To obsolete the inventory record of a local agency sturcture, the bridge owner should send an email listing the control data for each bridge to be deleted to either the WSDOT Local Agency Bridge Engineer or the Local Agency Bridge Inventory Engineer. This email shall include the Structure Identification Number and Bridge Name along with instructions that the record is to be deleted. The Local Agency Bridge Engineer will request that the record be obsoleted under the procedures defined in Chapter 2 Section 2-3.4.

If the jurisdiction of a bridge is being transferred from one agency to another, the bridge record shall not be obsoleted.

Instead, the Owner Code, Custodian Code and, if necessary, the City Code shall be updated by the original owner prior to sending the bridge records to the new owner. For example:

> The city of Selah has expanded its boundaries and annexed a bridge from Yakima County.

Yakima County would update the Owner Code from 02 to 04, the Custodian Code the same if appropriate, and the City Code from 0000 to 1155 prior to the data being submitted for update. Selah would then be responsible to correct the Bridge Number and all other data for the Inventory record.

This will ensure that a given structure retains its unique Structure Identifier throughout the life of the bridge. See Chapter 2 Section 2-2.1 for additional information on structure ownership transfers.

A sample of the entire WSBIS Inventory Report is shown in the Chapter 2 Section 3-5.

Report Types Tab

Report Types *(Old Item 2920)* and Report Subtypes *(Old Item 2922)*					
Format	**Translation**	**Frequency**	**WSBIS Item ID**	**SNBI Item ID**	**SNTI Item ID**
Checkbox/ Pulldown	AN (1)	EI	BIE01, WIE01	B.IE.01	D.2,D.4,D.5,D.6

Applicable Structure Types
- **All structure records**

Specification	Commentary
Every structure in WSBIS must include at least one core report type and may also include additional supplemental report types as listed in Tables BIE01a, b and c. For more detailed information on these report types, refer to WSBIM Chapter 3. For Damage and Complex Feature supplemental report types WIE01, subtypes must also be coded as shown in Table BIE01a. WSBIS report types are translated for SNBI and SNTI submittals as indicated in Table BIE01a. Digital signature, lead inspector certification, and interval requirements are outlined in Table BIE01a.	**Editing Report Types**. A check is required in the Include in Report box on at least one Report Type every time you create an update. This check mark is reflected to the right of the Report Type label as a Green Check Mark indicating that this Report Type is the focus of the current update. Other Report Types not checked are not the current focus but should not be removed from the update in order to retain the continuity of the Structure record except under specific circumstances described below. **Adding and Removing Report Types**. Under most circumstances the assigned report type(s) never change for the life of the structure. Occasionally users may need to add or remove a report type based on changed circumstances or simply to update the record with information not collected as part of a field inspection. Report types are added and removed using the "Select Report Types button in the lower right corner of the input form. Users must clearly understand how inspection reports should be used before modifying the report types associated with a structure. Please refer to Tables BIE01a through c and Chapter 3 for more information.

Table BIE01a summarizes all the Report Types and Inspection Types, and how these fields relate to the SNBI and SNTI.

Table BIE01a - Report Types and Subtypes

WSBIS Report Type	SNBI Inspection Type	SNTI Report Type	Subtype Code	WSBIS Report Subtype	Digital Signature	Cert Required	Interval
Initial[1]	1-Initial	-	-		Yes	Yes	No
Routine (Disc)							
Routine Bridge[1]	2-Routine	-	-		Yes	Yes	Yes
Routine Tunnel[1]	-	Routine	-		Yes	Yes	Yes
Short Span	-	-	-		Yes	No	Yes
Condition	-	-	-		Yes	No	Yes
NSTM[1]	4-NSTM	-	-		Yes	Yes	Yes
Underwater[1]	3-Underwater	-	-		No	Yes	Yes
Damage	5-Damage	Damage	A	Overheight	Yes	Yes	No
			B	Lateral Damage to Vertical Member	Yes	Yes	No
			E	Flood	Yes	Yes	No
			G	Earthquake	Yes	Yes	No
			H	Bridge Rail	Yes	Yes	No
			O	Other	Yes	Yes	No
			S	Reported by Others - Overheight	No[3]	No	No
			T	Reported by Others - Lateral	No[3]	No	No
			U	Reported by Others - Bridge Rail	No[3]	No	No
			V	Reported by Others - Other Misc.	No[3]	No	No
Special Feature[1] (Disc)			Not shown		Yes	Yes	Yes
Complex Feature[1]	6-In Depth	In Depth	1	Movable	Yes	Yes	Yes
			2	Floating	Yes	Yes	Yes
			3	Suspension	Yes	Yes	Yes
			4	Redundant Pin and Hanger	Yes	Yes	Yes
			5	Segmental	Yes	Yes	Yes
			6	Ferry Terminal	Yes	Yes	Yes
			7	High Strength Steel	Yes	Yes	Yes
			8	Structure with Temporary Support	Yes	Yes	Yes
			9	Cable Stayed	Yes	Yes	Yes
			0	Other	Yes	Yes	Yes

Table BIE01a - Report Types and Subtypes

WSBIS Report Type	SNBI Inspection Type	SNTI Report Type	Subtype Code	WSBIS Report Subtype	Digital Signature	Cert Required	Interval
In-Depth	7-Special	Special	-		Yes	Yes	No
Interim	7-Special	Special	-		Yes	Yes	Yes
UW Interim	7-Special	Special	-		No	Yes	Yes
Primary Safety (Disc)							
WSDOT Safety	-	-	-		Yes	No	Yes
Secondary Safety (Disc)							
Local Agency Safety	-	-	-		Yes	No	Yes
Routine Mechanical[2]	-	-	-		No	Yes	Yes
Routine Electrical[2]	-	-	-		No	Yes	Yes
Geometric	-	-	-		No[3]	No	Yes
Inventory	-	-	-		No	No	No
Feature (Disc)	-	-	-		No	No	No
Equipment (Disc)	-	-	-		No[3]	No	Yes
2 Man UBIT (Disc)	-	-	-		No[3]	No	Yes
Informational	-	-	-		No[3]	No	No
Signed Informational	-	-	-		Yes	Yes	No
Scour Monitoring	9-Scour Monitoring	-	-		No[3]	No	No

1. These report types are used only for structures subject to the NBIS or NTIS. If a structure does not meet this criteria, another report type must be used (usually Short Span, WSDOT/Local Agency Safety or Condition report types). Refer to Chapter 3 for more detailed descriptions of report types.
2. Mechanical and Electrical report types created automatically by the Complex Structures system.
3. Digital signatures not normally used for these report types, but if associated with another report type that does use digital signature, all report types will be digitally signed.

Table BIE01b identifies four "core" report types. Every structure in WSBIS must have one of these report types, and except when structures have multi-agency inspections, only one of these core reports should be associated with each structure. Their usage is summarized in this table but more detailed guidance is provided in Chapter 3.

Table BIE01b - Core Report Types

Report Type	Structure Characteristics	Typical Examples
Initial	Structures subject to the NBIS	Highway bridges over 20 feet long receiving their first inspection after construction or significant rebuild.
Routine Bridge	Structures subject to the NBIS	Highway bridges over 20 feet long that do not need an Inital inspection.
Routine Tunnel	Structures subject to the NTIS	Tunnels carrying highways within

Table BIE01b - Core Report Types

Short Span	Structures not subject to the NBIS or NTIS and carry public roadways	Highway bridges 20 feet or less in length
Condition	Structures not subject to the NBIS or NTIS and don't carry public roadways	Pedestrian bridges based on owner defined need
WSDOT Safety	Structure has a state highway undercrossing and is not owned/ maintained by WSDOT	Railroad bridges over state highway OR multi-agency inspection responsibility1
Local Agency Safety	Structure has a local agency highway undercrossing and is not owned/ maintained by the local agency.	Railroad bridges over local agency highway OR multi-agency inspection responsibility1

1. Multi-agency bridges are only case where more than one core report type can be associated with a structure.

Table BIE01c identifies supplemental report types that can be added to a structure record in addition to one of the core report types. Their usage is summarized in this table but more detailed guidance is provided in Chapter 3.

Table BIE01c - Supplemental Report Types

Supplemental Report Type	Associated Core Report Type	Structure Characteristics	Typical Examples
NSTM	Routine Bridge	Use for bridges subject to the NBIS with non-redundant steel tension members (NSTM).	Steel Truss bridges.
Underwater	Routine Bridge	Use for bridges subject to the NBIS when piers or abutments are permanently underwater exceeding wading depths.	Bridges with foundations in deep water.
Special Feature (Disc)	Routine	Discontinued in 2024, replaced by Complex Feature	Suspension bridges, pin & hanger components
Complex Feature	Routine Bridge	Use for bridges subject to the NBIS with complex features.	Suspension bridges, pin & hanger components.
Damage	Any	Use when structure has sustained damage from a specific event, as opposed to environmental degradation or wear.	Earthquakes, floods, vehicle hits affecting bridges or tunnels.
In-Depth	Any	Use when a structure needs a one-time targeted inspection for any reason.	Preparing a detailed condition assessment for a repair or rehabilitation contract.
Interim	Routine Bridge/ Tunnel, Condition	Use when some structure components need more frequent inspection. Dovetail inspection date and frequency with associated report type.	Monitoring of localized deficiencies such as decayed timber, cracked steel components, structural movement, or scour accessible by wading.
UW Interim	Underwater	Use when some underwater structure components need more frequent inspections. Dovetail inspection date and frequency with Underwater report type.	Monitoring of localized deficiencies in underwater components such as decay, structural damage, or scour not accessible by wading.
Routine Mechanical	Routine Bridge/ Tunnel	Generated automatically when a mechanical inspection report is completed in the Complex Structures system.	Tunnels and movable bridges with mechanical components.

Table BIE01c - Supplemental Report Types

Supplemental Report Type	Associated Core Report Type	Structure Characteristics	Typical Examples
Routine Electrical	Routine Bridge/ Tunnel	Generated automatically when a electrical inspection report is completed in the Complex Structures system.	Tunnels and movable bridges with electrical components.
Geometric	Any	Use to document collection of vertical and horizontal clearance data	Bridges with highway and/or railroad undercrossings; through trusses or arches with superstructure over the deck.
Inventory	Any	Use when creating a new structure record or when an existing structure is significantly modified.	Adding a new structure to the inventory. Whenever a bridge is rehabilitated, widened, seismically retrofitted, or otherwise significantly modified.
Feature (Disc)	Any	Discontinued in 2024.	
Primary Safety	-	Discontinued in 2024. Replaced by WSDOT Safety	
Equipment (Disc)	-	Discontinued in 2024. Use Inspection Resources in appropriate inspection report type.	-
2 Man UBIT (Disc)	-	Discontinued in 2024. Use Inspection Resources in appropriate inspection report type.	-
Informational	Any	Use to update a structure record with information not generally collected during a field inspection.	Updating route data, including ADT, functional classification, and NHS designation. Also used for ownership transfers and obsoleting structures.
Signed Informational	Any	Use to update a structure record with information normally collected during a field inspection.	Updating mistakes in a field inspection, generally done by that inspector. Updating condition information based on completed contracts (deck rehabs, etc)
Scour Monitoring	Any	Use to update a structure record with information from Scour POA monitoring during flood events.	When scour POA's are activated, use to record findings from POA monitoring work. Expect one report for each POA event.

Inspection Interval *(Old Item 1991)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(3,0)	N(2,0)	EI	BIE05	B.IE.05	D.3

Applicable Structure Types
- **All structure records**

Specification	Commentary
For report types with intervals as noted in Table BIE01a, code the planned interval in months between the current and next scheduled inspection. For report types without intervals as noted in Table BIE01a, code 0.	The intent of this item is to record the planned interval at which the bridge is to be inspected per the NBIS and agency policies and procedures. This interval should be evaluated after each inspection, and adjusted as necessary based on the Risk-Based Inspection Interval BIE07. When the intent is to simply adjust the next inspection date for scheduling purposes, do not adjust the interval, but instead use the Inspection Due Override Date WIE06. For tunnels, also adjust the Routine Inspection Target Date TD1. See Chapter 3 for more information on inspection intervals associated with each report type.

Inspection Begin Date *(Old Item 1990)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BIE02	B.IE.02	D.2

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the date for the report type performed. For multiple day inspections, record the first day that field inspection begins. Begin Date Tolerances: When initiating a current inspection, the begin date can be later than the inspection due date within a tolerance window that varies based on report type. See Chapter 3 for details. When initiating a current inspection before the scheduled due date, the begin date tolerance will be adjusted to the new begin date.	The intent of this item is to record the inspection begin dates for the report types in Item BIE01, since the previous data submittal to FHWA. If multiple site visits occur for scour monitoring inspections, for a triggering storm event, report the first site visit date for that storm event.

Inspection Completion Date *(Old Item 1993)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BIE03	B.IE.03	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the completion date for the report type performed. For single day inspections, report the same date that field inspection begins.	The intent of this item is to record the field inspection completion dates for all inspections. If multiple site visits occur for scour monitoring inspections, for a triggering storm event, report the last site visit date for that storm event.

Examples

A Routine Bridge and NSTM inspection started on August 1, 2020. The Routine inspection was completed on August 2, 2020, and the NSTM inspection was completed on August 4, 2020.

- Report 8/2/2024 for the Routine inspection.
- Report 8/4/2024 for the NSTM inspection.

An Underwater inspection started on August 31, 2020 and completed on September 1, 2020. Report 9/1/2024.

Inspection Due Date *(Old Item 2922)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Calculated	-	EI	BIE06	B.IE.06	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
This field is automatically calculated based on the inspection begin date BIE02 and interval BIE05. When an inspection begins after the scheduled due date, this calculation will restore the next due date to the original due date in the next scheduled due year.	The intent of this item is to provide the inspection due date for the report types defined in the BIE01 (Report Type) where applicable. This item is only caslculated for report types which have an inspection interval.

Inspection Due Date Override *(Old Item 2923)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	WIE02	W.IE.02	-

Applicable Structure Types
- **All structure records**

Specification / Commentary

This field should remain blank under most circumstances. However, in cases where the calculated inspection due date BIE06 needs to be adjusted, insert the desired next inspection date in this field.

In cases where the override date is earlier than the next calculated inspection due date, no further action is required.

In cases where the override date is later than the next calculated inspection due date, the following report types require explanation and approval:

- Routine Bridge
- Routine Tunnel
- NSTM
- Underwater
- Interim
- UW Interim

See items WIE10, WIE11 and WIE12 for details on the late inspection and approval process.

Report Type Notes *(Old Item 2924)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN (unlimited)	AN (300)	EI	BIE11	B.IE.11	-

Applicable Structure Types
- **All structure records**

Specification / Commentary

Briefly summarize the purpose and Spans/ Piers inspected for the following report types:

- NSTM
- Underwater
- Special Feature
- Damage
- In-Depth
- Service
- Interim
- UW Interim
- Signed Informational
- Scour Monitoring

This field can also be used as needed for any report type and other purposes, including but not limited to:

- Recording time on site and weather conditions.
- Acknowledging incorporation of QA inspection reports
- Summarize updated fields in informational reports
- Identify construction contracts in inventory reports

Target Inspection Date - SNTI *(Old Item 1992)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	TD1	-	D.1

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification	Commentary
Record the routine inspection target date. Note that this date establishes the target month for all future inspections, but the actual future inspection days will fluctuate as needed for inspection scheduling and the actual future inspection years will advance as needed.	Initially, the target date is set by the program manager and should not be modified without prior notification to the FHWA Division Office. This date is intended to provide the baseline for scheduling future routine tunnel inspections. Actual inspection begin date tolerances are allowed, see Chapter 3 for details.

Risk Based Inspection Interval Method *(Old Item 1994)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(1)	-	EI	BIE07	B.IE.07	-

Applicable Structure Types

- **All structure records**

Specification	Commentary
Report the risk-based inspection interval method using one of the following codes. **Code** **Description** N Not Applicable 1 Method 1 2 Method 2 - Not used by WSDOT	The intent of this item is to record the risk- based inspection interval method, described in the NBIS, for determining the inspection interval. Method 1, as described in the NBIS, is when inspection intervals are determined by a simplified assessment of risk to classify each bridge into one of three risk levels with an inspection interval not to exceed 12, 24, 48, or 60 months. Method 2, as described in the NBIS, is when inspection intervals are determined by a more rigorous assessment of risk to classify each bridge, or a group of bridges, into one of four risk levels with an inspection interval not to exceed 12, 24, 48, or 72 months. As of January 1, 2024, enter 1 indicating Method 1 for the following report types: • Routine Bridge (48 month max interval) • NSTM (24 month max interval) • Underwater (60 month max interval) For all other report and structure types, enter N indicating not applicable.

<table>
<tr><th colspan="6">Nationally Certified Bridge/Tunnel Inspector (Old Item 2646 and 2649)</th></tr>
<tr><td>Format
Pulldown</td><td>Translation
-</td><td>Frequency
EI</td><td>WSBIS Item ID
BIE04</td><td>SNBI Item ID
B.IE.04</td><td>SNTI Item ID
-</td></tr>
<tr><td colspan="6">Applicable Structure Types
• All structure records</td></tr>
<tr><th colspan="3">Specification</th><th colspan="3">Commentary</th></tr>
<tr><td colspan="3">Report the unique code identifying the Nationally Certified Bridge Inspector (team leader) responsible for the report type performed.</td><td colspan="3">The intent of this item is to indicate the Nationally Certified Bridge Inspector (team leader) present at the inspection, for each report type required by the NBIS and/or WSDOT.

In WSBIS, the team leader certification number is selected by using the pulldown of inspector initials. In cases where multiple team leaders have the same initials, a separate pop-up window will display a full list of names associated with this initial, which the team leader will use to select the correct name.

Some report types do not require a Nationally Certified Bridge Inspector to lead an inspection. See Table BIE01a.</td></tr>
</table>

WSBIS Item 2654 – Co-Inspector Initials — Pulldown

Applicable Structure Types

- **All structure records**

Select the co-inspector initials from the pulldown menu who either assisted the lead inspector in performing an inspections or updated the bridge record using one of the reports types that doesn't require a lead inspector. See Table BIE01a.

In cases where there is no co-inspector, or the co-inspector is not listed in the pulldown menu, use the N/A inspector in the pulldown menu.

WSBIS Item 2642 – Inspection Hours — N(4,1)
WSBIS Item 2643 – Inspection Overtime Hours — N(4,1)

Applicable Structure Types

- **All structure records**

This is the total number of field inspection hours (to the nearest half hour) that the inspection team spent on the bridge while performing an inspection of the designated report type. When multiple inspection teams are needed for an inspection, code the cumulative hours for each team.

Leave blank for report types that are not field based (Informational, for example).

WSBIS Item	Format
WSBIS Item 2900 – Late Inspection Explanation	**AN(500)**
WSBIS Item 2901 – Program Manager Response Date	**Pulldown**
WSBIS Item 2902 – Program Manager Approval	**Pulldown**

Applicable Structure Types

- **All structures subject to the NBIS or NTIS**

The Program Manager Oversight information is made up of the following three fields:

1. **Late Inspection Explanation**

   For any SNBI or SNTI reportable inspection type, when an inspection is or will be performed later than the tolerance window as defined in Chapter 3, an explanation must be provided for the delinquency. Commonly acceptable explanations include:

   - Inspection performed on a week split between two months and the inspection was performed in the “late” month.
   - Severe weather (describe weather condition)
   - Inspector safety (describe safety issue)

   Other explanations will be considered on a case by case basis by the PM or DPM in coordination with FHWA.

2. **Program Manager Response Date**

   Enter the date of the Program Manager’s response to the Late Inspection Explanation. This field can only be edited using the Inventory Management managed operation and as directed by the PM or DPM.

3. **Program Manager Approval**

   Enter a Y – Approved or N – Disapproved to indicate the Program Manager’s response. This field can only be edited using the Inventory Management managed operation and as directed by the PM or DPM. If Washington State is under an active Plan of Corrective Action (PCA) then approval falls to the FHWA Washington Division Bridge Engineer.

Inspection Quality Control Date *(Old Item 1995)*					
Format	**Translation**	**Frequency**	**WSBIS Item ID**	**SNBI Item ID**	**SNTI Item ID**
Calculated	-	EI	BIE08	B.IE.08	-
Applicable Structure Types • **All structure records**					

Specification	Commentary
This field is automatically generated, and is the same as Inspection Data Update Date B.IE.10.	Every inspection is reviewed by a Data Steward prior to release into the permanent record. This review is the lowest level of quality control and applies to every report type. Some reports receive additional reviews by inspection supervisors, following WSDOT and local agency procedures.

WSBIS Item 7644 – Inspection Report Hours (LP view only) N(4,1)

Applicable Structure Types

- **Optional for all local agency structures**

This is the total number of hours that the inspection team spent on creating or updating the inspection report within BridgeWorks. This field is only used by local agency owners or their consultants.

Critical Findings Tab

Critical Findings					
Format	**Translation**	**Frequency**	**WSBIS Item ID**	**SNBI Item ID**	**SNTI Item ID**
-	-	-	-	-	-
Applicable Structure Types • **All structure records**					
Specification / Commentary					

See Chapter 6 for all critical findings descriptions for the fields noted below:

Code	Field Name
WCF01	Critical Finding Number
WCF02	Type of Critical Finding
WCF03	Entry Type
WCF04	Date of Finding or Entry Date
WCF05	Bridge Status
WCF06	Estimated Resolution Date
WCF07	Description
WCF08	Reported By
WCF09	Associated Repair

SNBI Tab

Component Condition Ratings

Overall Condition Classification

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Calculated	-	C	BC12	B.C.12	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
This item is calculated using the following codes:	For the purposes of national performance measures, the method of assessment to determine the classification of a bridge is the minimum (i.e. lowest) condition rating code from the following items:

Specification

Code	Condition	Lowest Condition Rating
G	Good	7, or 8
F	Fair	5 or 6
P	Poor	4, 3, 2, 1, or 0

Commentary

B.C.01 (*Deck Condition Rating*),
B.C.02 (*Superstructure Condition Rating*),
B.C.03 (*Substructure Condition Rating*), and
B.C.04 (*Culvert Condition Rating*).

Table 20. Condition codes with descriptions for BC01 through BC07, BC14 and BC15 condition ratings.

Table 20 Condition codes

Code	Condition	Description
N	NOT APPLICABLE	Component does not exist.
8	VERY GOOD	Isolated or some inherent defects.
7	GOOD	Some minor defects.
6	SATISFACTORY	Widespread minor or isolated moderate defects.
5	FAIR	Some moderate defects; strength and performance of the component are not affected.
4	POOR	Widespread moderate or isolated major defects; strength and/or performance of the component is affected.
3	SERIOUS	Major defects; strength and/or performance of the component is seriously affected. Condition typically necessitates more frequent monitoring, load restrictions, and/or corrective actions.
2	CRITICAL	Major defects; component is severely compromised. Condition typically necessitates frequent monitoring, significant load restrictions, and/or corrective actions in order to keep the bridge open.
1	IMMINENT FAILURE	Bridge is closed to traffic due to component condition. Repair or rehabilitation may return the bridge to service.
0	FAILED	Bridge is closed due to component condition, and is beyond corrective action. Replacement is required to restore service.

Deck Overall Rating *(Old Item 1663)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC01	B.C.01	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the deck component condition rating using one of the codes in Table 20. Report N when Item B.SP.09 (*Deck Material and Type*) is 0. Deck condition ratings are also associated with deck BMS elements as shown in Chapter 4. If the inspector determines a deck code should be different from that indicated in Chapter 4 guidance, an explanation for this difference should be noted in the inspection report.	This item represents the condition of the deck as determined from the inspection of all deck surfaces (top, underside, and edges). Visual assessments may be supplemented with non-destructive or destructive testing results.

Commentary Continued

Use destructive or non-destructive testing results or visual condition indicators of materials covering the surfaces being assessed when top, underside or both surfaces are not visible for assessment. Past inspection reports and repair records may also provide supplemental information to aid in the determination of the condition rating.

Do not consider the condition of non-monolithic wearing surfaces (i.e. overlays), stay-in-place deck forms, joint assemblies, expansion devices, bridge rails, or scuppers when determining the condition rating code for this item, except insofar as they indicate the condition of the deck itself.

Consider the condition of a joint header only when the deck serves as a joint header.

For bridges with integral decks/top flanges (e.g. rigid frames, decked girders or tee beams, voided slab beams, box girders, etc.), the deck condition may affect the superstructure condition rating; however, the superstructure condition does not affect the deck condition rating.

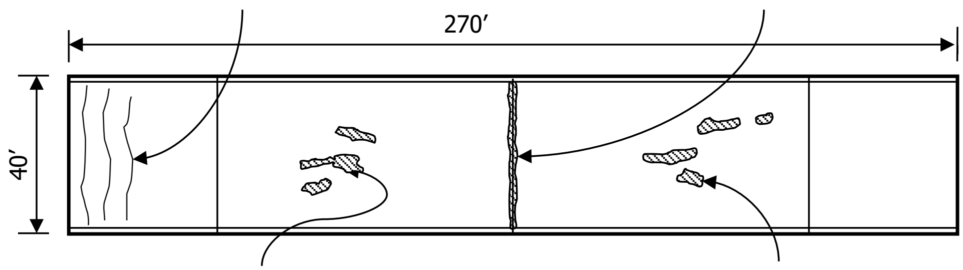
The deck and superstructure condition ratings are the same for slab bridges.

Example - Deck Overall Rating

Reinforced concrete (RC) bridge deck approximately 270′ long x 40′ wide with the following noted defects.

Location 1: Full width transverse cracks, 0.010″ wide, spaced at 3′ to 5′ for full length of deck.

Location 2: Spalls >1″ deep along full length of expansion joint *(Figure 132)*. ~40 ft^2 total area.



Location 3: Spalls up to 24″x18″ and >1″ deep with exposed rebar (no section loss) and patched areas that are unsound. ~100 ft^2 total area.

Location 4: Spalls up to 24″x12″ and >1″ deep with exposed rebar (no section loss) and patched areas that are unsound. ~130 ft^2 total area.

Figure 131. Deck plan view showing defects.

Figure 132. Deck spalling along joint. Location 2.

Figure 133. Typical deck spall with exposed rebar. Locations 3 and 4.

Bridge Railings *(Old Item 1664)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC05	B.C.05	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the bridge railing (traffic barrier) condition rating using one of the codes in Table 20. Report N when there are no bridge railings present	This item addresses the condition of all types and shapes of bridge railings (parapets, median barriers, or structure mounted) located on the bridge or that cross over buried structures. The condition assessment includes the portions of the railings, posts, blocking, and curbs that are part of the bridge railing system.

Commentary Continued

Do not consider pedestrian railings when coding this item, except to the extent that the pedestrian railing is integral to the traffic barrier.

Inspection report comments required when the condition code is 5 or less.

Do not consider the condition of protective coatings and other protection systems when determining the condition rating code for this item, except to the extent that problems with the protective coating system are indicative of problems with the underlying railing material.

Steel W-beam bridge railing on both sides of a 300′ long bridge. The following defect is noted:

Description: Damage-induced distortion of the rail for a length of 25′. Three posts are no longer connected to the deck. No other defects.

Defect: Distortion
Severity: Major
Extent: 25′ of the railing (isolated)

Figure 143. Collision-induced distortion of bridge railing.

Results: The railing is best characterized as having "isolated major defects." Report 4.

Bridge Railing Transitions *(Old Item 1665)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC06	B.C.06	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the bridge railing (traffic barrier) transitions condition rating using one of the codes in Table 20. Report N when there are no bridge railing transitions present.	This item addresses the condition of the transition from the bridge railing to the approach guardrail. The condition assessment includes the portions of the railings, posts, blocking, and curbs that are part of the bridge railing transitions. Inspection report comments required when the condition code is 5 or less. Do not consider the condition of protective coatings and other protection systems when determining the condition rating code for this item, except to the extent that problems with the protective coating system are indicative of problems with the underlying railing transition

Bridge Joints *(Old Item 1667)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC08	B.C.08	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification

Report the bridge deck joint condition using one of the following codes. The entire code description must be satisfied for the code to apply.

Code	Condition	Description
N	NOT APPLICABLE	Bridge does not have deck joints.
8	VERY GOOD	Isolated or some inherent defects.
7	GOOD	Some minor defects.
6	SATISFACTORY	Widespread minor or isolated moderate defects.
5	FAIR	Some moderate defects.
4	POOR	Widespread moderate or isolated major defects.
3	SERIOUS	Some major defects.
2	CRITICAL	Widespread major defects.
1	IMMINENT FAILURE	Joints have failed and are ineffective.
0	FAILED	Joints have failed and present a safety hazard.

Commentary

This item addresses the condition of all types and shapes of bridge deck joints. The condition assessment includes all aspects of the joints such as any seals, headers (metal or concrete), connections, and other metal members.

When a joint is designed as an open joint, leakage or lack of a seal is not considered a defect.

Do not consider the condition of protective coatings and other protection systems when determining the condition rating code for this item, except to the extent that problems with the protective coating system are indicative of problems with the underlying joint material.

In cases where the joint is not visible, the condition can be assessed based on other indirect indicators of the condition. Inspection report comments required when the condition code is 5 or less.

Example - Bridge Joints

Description: All compression seal joints are partially filled with debris, but are still free to move. Seals are intact.

Defect: Debris impaction
Severity: Minor
Extent: All joints (widespread)

Figure 147. Joint partially filled with debris.

Results: The joints are best characterized as having "widespread minor defects." Report 6.

Description: Strip seal joint 44′ long at each end of a bridge. 3″ deep x 12″ wide x 6′ long spall with exposed rebar in deck adjacent to joint header. Joint is loose, but functioning. Strip seal is intact. No other defects.

Defect: Adjacent deck or header
Severity: Moderate
Extent: 6′ of one joint (isolated)

Figure 148. Spall in joint header. (Source: Colorado DOT)

Results: The joints are best characterized as having "isolated moderate defects." Report 6.

Superstructure Overall *(Old Item 1671)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC02	B.C.02	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the superstructure component condition rating using one of the codes in Table 20. Report N when M, A, or W is not reported for Item B.SP.01 (*Span Configuration Designation*).	This item represents the condition of the superstructure as determined from the inspection of all superstructure members. Inspection report comments required when the condition code is 5 or less.

Commentary Continued

Consider primary load carrying members when determining the condition rating code for this item, which includes cross-frames and diaphragms for curved girder bridges. Consider secondary members only if they adversely impact the primary members. Visual assessments may be supplemented with non-destructive or destructive testing results.

The superstructure includes:
- members above the bearings for bridges with non-integral superstructure and substructure;
- girders/beams for integral superstructures;
- members above the spring line for arch bridges;
- slabs of concrete rigid frame bridges; and
- legs, knees and girders for concrete and steel rigid K-Frame or Delta-Frame bridges.

Consider the condition of integral headwalls and wingwalls to the first expansion joint.

Do not consider the condition of bearings when determining the condition rating code for this item except to the extent that the bearings are causing distress in the superstructure.

Do not consider the condition of protective coating systems when determining the condition rating code for this item except to the extent that problems with the protective coating system are indicative of problems with the underlying superstructure material. A well-formed patina on weathering steel is considered a protective coating and is not considered a defect.

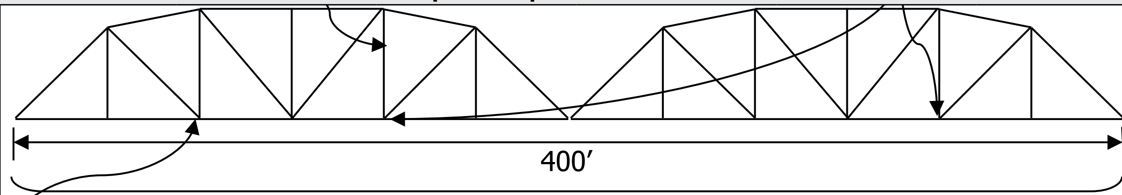
Do not consider the presence of drift, debris, and soil accumulation when determining the condition rating code for this item, except to the extent that these items are causing distress in the superstructure.

Superstructure types without substructures may be affected by scour. When observed conditions are not consistent with the scour design or the assumptions used in the scour appraisal, scour is considered when reporting the code for this item. In this case, observed conditions also indicate a need to reevaluate Item B.AP.03 (Scour Vulnerability). Observed scour that is less than the tolerable limit determined in the scour appraisal does not affect this item.

For structures with integral decks/top flanges (e.g. rigid frames, decked girders or tee beams, voided slab beams, box girders, etc.), the deck condition may affect the superstructure condition rating; however, the superstructure condition does not affect the deck condition rating.

The deck and superstructure condition ratings are the same for slab bridges.

Example - Superstructure Overall



Location 3: Freckled rust throughout trusses, floor beams, and stringers.

Location 4: Broken and missing rivets in 8 stringer-to-floor-beam connections. Structural review determined that strength has been affected, but does not necessitate more frequent monitoring, corrective actions, or load restrictions *(Figure 136)*.

Figure 134. Elevation view of a truss bridge showing superstructure defect locations.

Figure 135. Distortion in truss vertical. Location 1. (Source: Colorado DOT)

NSTM Inspection *(Old Item 1672)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC14	B.C.14	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the condition rating of the Non-Redundant Steel Tension Members (NSTM) using one of the codes in Table 20. Do not report this item when Item B.IR.01 (NSTM Inspection Required) is N. Report N when there is no NSTM report. This field will not be reported to FHWA when there is no NSTM report.	This item represents the condition of NSTM(s) identified to be inspected in the NSTM inspection procedures, and incorporated into the superstructure or substructure condition rating. Inspection report comments required when the condition code is 5 or less. For a bridge with NSTM(s) in both the superstructure and substructure, report only the lower of the two condition values for the condition of the NSTM(s).

Bridge Bearings *(Old Item 1666)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC07	B.C.07	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the bridge bearing condition rating using one of the codes in Table 20. Report N for bridges without bearings.	This item addresses the condition of all types and shapes of bridge bearings. Do not consider the condition of protective coatings and other protection systems when determining the condition rating code for this item, except to the extent that problems with the protective coating system are indicative of problems with the underlying bearing material. In cases where the bearing device is not visible, the condition can be assessed based on alignment, grade across the joint, or other indirect indicators of the condition.

Example - Bridge Bearings

Description: 5 of 25 bearings have 10% bearing area loss.

Defect: Loss of bearing area
Severity: Moderate
Extent: 20% of bearings (some)

Figure 144. Loss of bearing area for elastomeric bearing. (Source: Oregon DOT)

Results: The bearings are best characterized as having “some moderate defects.” Report 5.

Example - Bridge Bearings Continued

Description: 8 of 20 bearings are rotated beyond performance limits. The anchor bolts at these locations are bent and the nuts are loose. Surface rust is present on all bearings.

Defect: Alignment and connection
Severity: Major
Extent: 8 bearings (widespread)

Defect: Corrosion
Severity: Minor
Extent: All bearings

Figure 145. Misaligned rocker bearing. (Source: Alaska DOT)

Results: The bearings can best be characterized as having "major defects" affecting performance. Condition necessitates more frequent monitoring or corrective actions. Report 3.

Description: 20 of 20 bearings have surface rust with no section loss. Bearings are free to move and alignment is as expected for temperature conditions.

Defect: Corrosion
Severity: Minor
Extent: All bearings

Figure 146. Surface rust on moveable bearing.

Results: The bearings are best characterized as having "widespread minor defects." Report 6.

Substructure Overall *(Old Item 1676)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC03	B.C.03	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the substructure component condition rating using one of the codes in Table 20. Report N when only C and/or V is reported for Item B.SP.01 (Span Configuration Designation).	This item addresses the condition of piers, abutments, piles, footings, and other substructure members. Inspection report comments required when the condition code is 5 or less.

Commentary Continued

For bridges that have substructures not visible for inspection, use appropriate visual condition indicators from the superstructure or surrounding foundation materials to determine the applicable code. Visual assessments may be supplemented with non-destructive or destructive testing results.

Consider the condition of integral abutment wingwalls to the first construction or expansion joint when determining the condition rating code for this item.

Do not consider the condition of protective coatings, fenders and other substructure protection systems when determining the condition rating code for this item, except to the extent that these items indicate distress of the substructure, or adversely affect its condition.

Do not consider the presence of drift, debris, and soil accumulation when determining the condition rating code for this item, except to the extent that these items are causing distress in the substructure.

The substructure includes:

- backwalls and the members below the bearings for bridges with non-integral superstructure and substructure;
- members below the girders/beams for integral superstructures;
- thrust blocks and other members below the spring line for arch bridges;
- legs of concrete rigid frame bridges;
- abutments and footings/foundations below the leg bearings for concrete and steel rigid K-Frame or Delta-Frame bridges; and
- foundation piles exposed by erosion or scour.

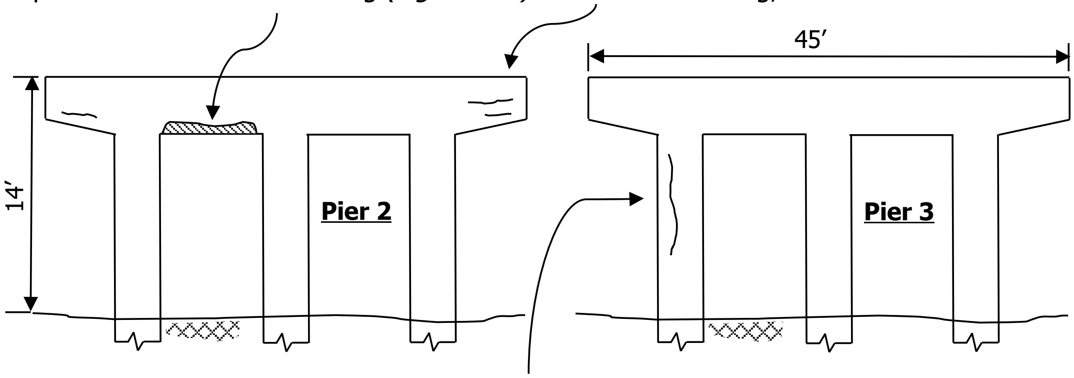
When observed conditions are not consistent with the scour design or the assumptions used in the scour appraisal, scour is considered in the coding of this item. In this case, observed conditions also indicate a need to reevaluate Item B.AP.03 (Scour Vulnerability). Observed scour that is less than the tolerable limit determined in the scour appraisal does not affect this item.

Example - Substructure Overall

Four span prestressed concrete bridge with reinforced concrete abutments and piers. No defects at the abutments or at Pier 1. The following defects are noted at the other piers:

Location 1: Spall 12′ long x 2″ deep with exposed rebar and rust staining *(Figure 138)*.

Location 2: Cracks 3′ long x 0.04″ wide with rust staining, both cantilevers.



Location 3: Previously noted crack 11′ long x 3/16″ wide *(Figure 139)*. Structural review determined that crack does not affect strength or performance.

Figure 137. Elevation view of two concrete column piers showing substructure defect locations.

Figure 138. Spall in Pier 2 cap beam. Location 1.

Figure 139. Crack in Pier 3 column. Location 3.

Summary of Findings:

Location	Defect(s)	Severity	Extent
1	Spall with exposed rebar; rust staining	Moderate	12′ of one cap beam (isolated)
2	Cracking with rust staining	Moderate	6′ of one cap beam (isolated)
3	Cracking	Moderate	11′ crack in one column (isolated)

Results: There are several areas of isolated moderate defects that can best be characterized together as "some moderate defects." Strength and performance of the component are not affected. Report 5.

Underwater Inspection *(Old Item 1673)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC15	B.C.15	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the condition rating of the underwater members of the substructure based on the underwater inspection using one of the codes in Table 20. Report N when there is no Underwater Inspection report. This field will not be reported to FHWA when there is no Underwater Inspection report.	This item represents the condition of underwater members identified to be inspected in the underwater inspection procedures, and incorporated into the substructure condition rating. Inspection report comments required when the condition code is 5 or less. If this item has previously been reported because an underwater inspection is generally required, it should continue to be reported even for instances of unusually low flow where all portions of the substructure can be inspected by wading and probing, and an underwater inspection is not required. This applies only if the low flow condition is truly unusual and is not likely to reoccur during the next inspection interval. The requirement to report this item may change in the rare circumstance where long-term environmental conditions change for inspection access to underwater portions of the substructure.

Culvert Overall (*Old Item 1678*)

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC04	B.C.04	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the culvert component condition rating using one of the codes in Table 20. Report N when C or V is not reported for Item B.SP.01 (Span Configuration Designation). Water Detention Vaults shall be coded as culverts When inspecting culverts, document the depth of the fill on both ends of the culvert. For cases where there is a significant amount of fill compared to the span length of the culvert, or total length of culverts where there are multiple barrels, estimate and document the depth of fill. Culverts with structure lengths greater than 20 feet are NBI reportable regardless of fill depth. Culverts with structure lengths less than or equal to 20 feet are inventoried and coded in accordance with short span inspection requirements.	This item addresses the condition of culverts. The condition assessment includes footings, piles, and other foundation members when present. Inspection report comments required when the condition code is 5 or less.

Culvert Overall - Commentary Continued

For culverts that have components not visible for inspection, use appropriate visual condition indicators from the roadway or surrounding foundation materials to determine the applicable code. Visual assessments may be supplemented with non-destructive or destructive testing results.

Consider the condition of integral wingwalls and headwalls to the first construction or expansion joint when determining the condition rating code for this item.

Do not consider the condition of protective coatings and other culvert protection systems when determining the condition rating code for this item, except to the extent that these items indicate distress of the culvert, or adversely affect its condition.

Do not consider the presence of drift, debris, and soil accumulation when determining the condition rating code for this item, except to the extent that these items are causing distress in the culvert.

The culvert includes:
- buried pipe or box;
- footings below the walls of a 3-sided box; and
- foundation piles exposed by erosion or scour.

When observed conditions are not consistent with the scour design or the assumptions used in the scour appraisal, scour is considered in the coding of this item. In this case, observed conditions also indicate a need to reevaluate Item B.AP.03 (Scour Vulnerability). Observed scour that is less than the tolerable limit determined in the scour appraisal does not affect this item.

Example - Culvert Overall

Three-span corrugated metal pipe culvert. Each pipe is 8′ in diameter and 100′ long. The pipes are spaced 4′ apart. The following defects are noted.

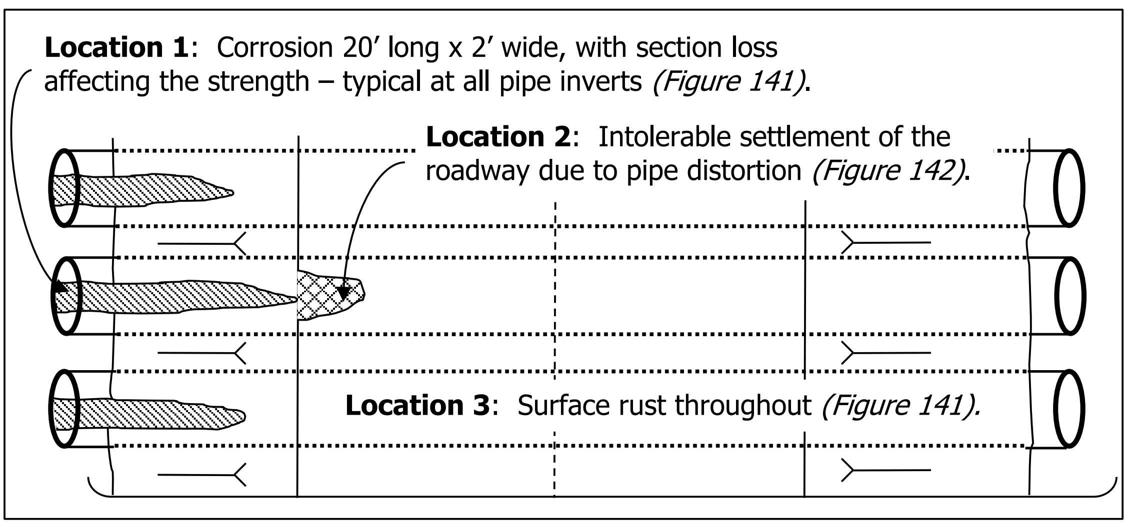


Figure 140. Plan view of pipe culvert showing defects.

Example - Culvert Overall Continued
 Figure 141. Corroded pipe culvert invert. Location 1 and 3. (Source: Alaska DOT)  Figure 142. Roadway settlement over pipe culvert. Location 2. (Source: Alaska DOT)
Results: The culvert has major defects that, together, seriously affect strength and performance. The condition necessitates more frequent monitoring or corrective actions. Report 3.

Scour Condition - SNBI

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC11	B.C.11	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification

Report the scour condition that represents the observed or measured scour using one of the following codes. The entire code description must be satisfied for the code to apply.

Code	Condition Description
N	Bridge does not cross over water.
8	No scour or insignificant scour.
7	Some minor scour.
6	Widespread minor or isolated moderate scour.
5	Moderate scour; strength and stability of the bridge are not affected.
4	Widespread moderate or isolated major scour; strength and/or stability of the bridge is affected.
3	Major scour; strength and/or stability of the bridge is seriously affected. Condition typically necessitates more frequent monitoring, load restrictions, and/or corrective actions.
2	Major scour; strength and/or stability of the bridge is severely compromised. Condition typically necessitates frequent monitoring, significant load restrictions, and/or corrective actions to keep the bridge open.
1	Bridge is closed to traffic due to scour condition. Channel rehabilitation may return the bridge to service.
0	Bridge is closed due to scour condition, and is beyond corrective action. Bridge replacement is needed to restore service.

Commentary Continued

Refer to Item B.AP.03 (Scour Vulnerability) to verify if the bridge has been determined to be stable or unstable for appraised scour conditions.

Consider design scour depth and critical scour depth, commonly found in hydraulic designs, scour evaluations, and POAs, when determining the scour condition ratings.

When observed conditions are not consistent with the scour design or the assumptions used in the scour appraisal, this indicates a need to reevaluate Item B.AP.03 (Scour Vulnerability).

Example - Scour Condition - SNBI

Description: Three span scour critical bridge founded on spread footings not on bedrock. The scour elevation for three spread footings at Pier 2 is at the bottom of the footings with one footing having one foot of undermining at one corner. Agency plans to monitor more frequently to keep the bridge open until repairs are completed.

Severity: Major
Extent: 3 of 6 pier footings

Figure 153. Exposed column footing in stream.

Results: The scour condition is best characterized as "major scour" that necessitates more frequent monitoring. Bridge is seriously affected. Report 3.

Description: Scour critical bridge. Critical scour limit was established in the Plan of Action. Inspectors measured the following streambed cross-section *(Figure 154)*.

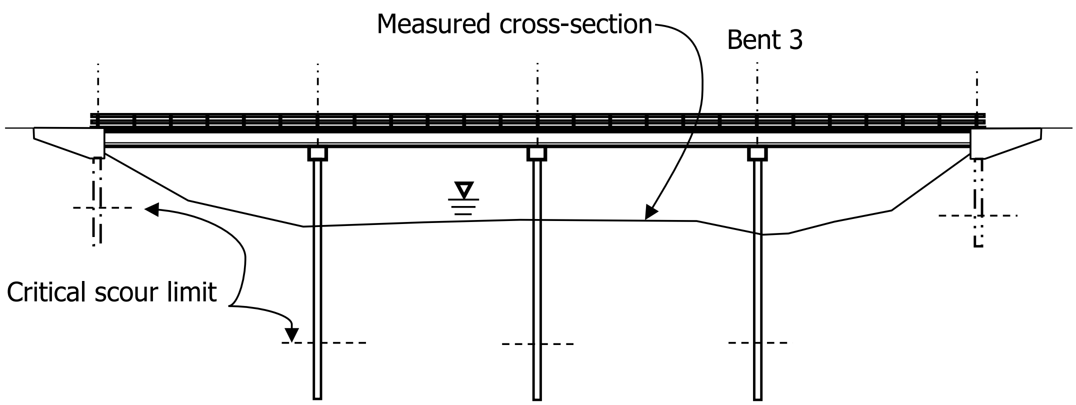


Figure 154. Elevation view showing scour elevations and stream cross-section for a bridge.

Severity: Minor (scour at Bent 3, does not exceed tolerable limit)
Extent: One of five substructure units (Isolated).

Results: The scour condition is best characterized as "isolated minor scour." Report 7.

Example - Scour Condition - SNBI Continued

Description: Scour critical bridge. Critical scour limit was established in the Plan of Action. Inspectors measured the following streambed cross-section *(Figure 155)*, which indicates a scour depth at one bent that is below the critical scour elevation.

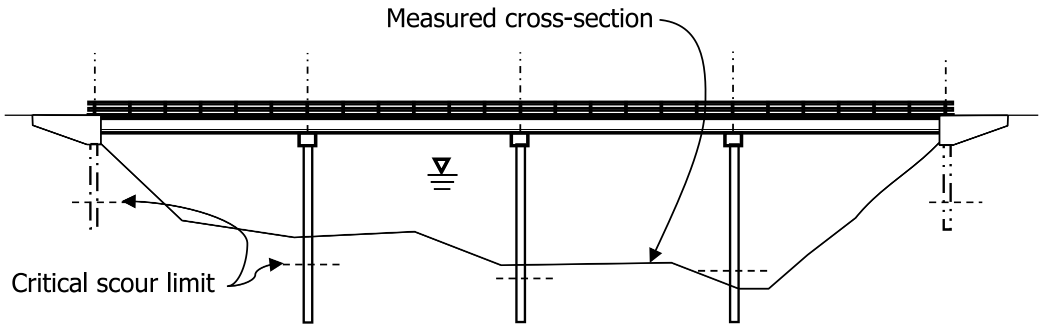


Figure 155. Elevation view showing critical scour limits and stream cross-section for a bridge.

Severity: Moderate
Extent: 2 of 5 substructure units (some)

Severity: Major
Extent: 1 of 5 substructure units (isolated)

Results: The scour condition is best characterized as "major scour". The bridge is closed until corrective actions are completed. Report 1.

Example - Scour Condition - SNBI Continued

Description: Bridge was appraised for scour vulnerability and not considered scour critical. No scour calculations and no structural stability analysis were performed. Piles are end bearing on rock. Inspectors measured the following streambed cross-section, which indicates a scour depth at two piers that is not consistent with the scour assessment assumptions.

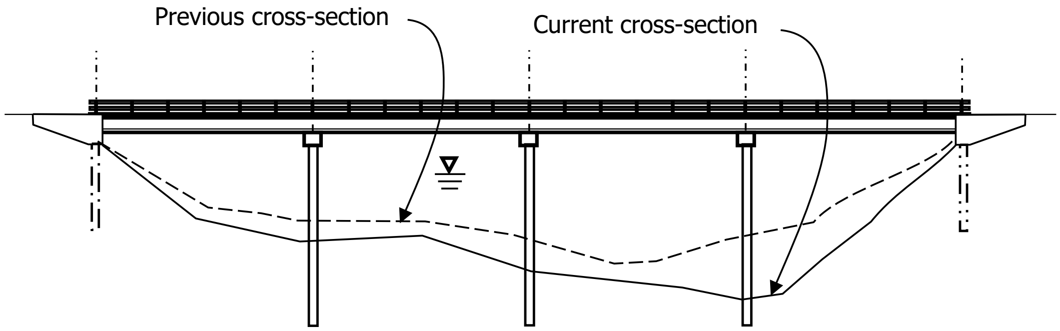


Figure 156. Elevation view showing current cross-section and previous cross-section for a bridge over water.

Severity: Moderate
Extent: 1 of 5 substructure units (isolated)

Severity: Major
Extent: 1 of 5 substructure units (isolated)

Results: The scour condition is best characterized as "isolated major scour". The defects warrant a structural and/or hydraulic review to determine the effect on strength and/or stability of the bridge. Report 4.

Since observed conditions are not consistent with the scour appraisal assumptions, then scour is considered in the coding of B.C.03 *(Substructure Condition Rating)*. In this case, observed conditions also indicate a need to reevaluate Item B.AP.03 (*Scour Vulnerability*).

Channel Condition *(Old Item 1674)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC09	B.C.09	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification

Report the channel condition using one of the following codes. The entire code description must be satisfied for the code to apply.

Code	Condition	Description
N	NOT APPLICABLE	Bridge does not cross over water.
8	VERY GOOD	No defects or inherent defects only.
7	GOOD	Some minor defects.
6	SATISFACTORY	Widespread minor or isolated moderate defects.
5	FAIR	Moderate defects; bridge and approach roadway are not threatened.
4	POOR	Widespread moderate or isolated major defects; bridge and/or approach roadway is threatened.
3	SERIOUS	Major defects; bridge or approach roadway is seriously threatened. Condition typically necessitates more frequent monitoring, load restrictions, and/or corrective actions.
2	CRITICAL	Major defects. Bridge or approach roadway is severely threatened. Condition typically necessitates frequent monitoring, significant load restrictions, and/or corrective actions in order to keep the bridge open.
1	IMMINENT FAILURE	Bridge is closed to traffic due to channel condition. Channel rehabilitation may return the bridge to service.
0	FAILED	Bridge is closed due to channel condition, and is beyond corrective action. Bridge location or design can no longer accommodate the channel, and bridge replacement is needed to restore service.

Commentary

This item is used to provide a condition rating for the channel at the bridge. Consider the channel upstream and downstream only insofar as it threatens the bridge and approach roadway.

Inspection report comments required when the condition code is 5 or less.

The condition of channel protection devices is addressed under a separate item. Refer to Item B.C.10 (Channel Protection Condition Rating).

For concrete lined channels, channel defects typically do not apply, except for Aggradation and Debris. The condition of the channel lining would be addressed by Item B.C.10 (Channel Protection Condition Rating).

Examples - Channel Condition

Single span bridge. Channel is aggrading and requires periodic excavation to maintain a tolerable hydraulic opening. The thalweg has migrated such that flow is directed at one abutment (*Figure 150*) and threatens the approach roadway. However, a structural and hydraulic review has determined that the stability of the bridge is not impacted.

Defects: Aggradation and migration
Severity: Moderate
Extent: Widespread

Figure 150. Bridge elevation view of channel condition. (Source: Alaska DOT)

Figure 151. Looking downstream from bridge at excavated material. (Source: Alaska DOT)

Results: The channel can best be characterized as having "widespread moderate defects." Report 4.

Channel Protection *(Old Item 1675)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BC10	B.C.10	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification

Report the condition of the channel protection device(s) using one of the following codes. The entire code description must be satisfied for the code to apply.

Code	Condition	Description
N	NOT APPLICABLE	Bridge does not cross over water or channel protection devices do not exist.
8	VERY GOOD	Isolated or some inherent defects.
7	GOOD	Some minor defects.
6	SATISFACTORY	Widespread minor or isolated moderate defects.
5	FAIR	Some moderate defects; performance of the channel protection is not affected.
4	POOR	Widespread moderate or isolated major defects; performance of channel protection is affected.
3	SERIOUS	Major defects; performance of channel protection is seriously affected. Condition typically necessitates more frequent monitoring or corrective actions.
2	CRITICAL	Major defects; channel protection is severely compromised. Condition typically necessitates more frequent monitoring or corrective actions.
1	IMMINENT FAILURE	Channel protection has failed, but corrective action could restore it to working condition.
0	FAILED	Channel protection is beyond repair and must be replaced.

Channel Protection - Commentary

This item is used to provide a condition rating for channel protection devices.

Inspection report comments required when the condition code is 5 or less.

Evaluate the condition and effectiveness of channel protection devices installed on banks or in the stream to mitigate channel issues that may impact the bridge. When reporting this item, consider erosion and scour, damage (unraveling, displacement, separation, and sagging), and material defects (scaling, abrasion, spalling, corrosion, cracking, splitting, and decay).

Channel protection devices are considered countermeasures that control, inhibit, delay, or minimize stream instability and scour problems, including river training and armoring countermeasures.

River training countermeasures may include: spurs, bendway weirs, guide banks, drop structures, and check dams. Additional river training countermeasures can be found in HEC-23 and elsewhere.

Armoring countermeasures may include: rock riprap, grouted riprap, concrete slope paving, articulating concrete blocks, gabion mattresses, and grout-filled mats. Additional armoring countermeasures can be found in HEC-23 and elsewhere.

For bridges that have countermeasures not visible for inspection, use appropriate visual condition indicators to determine the applicable code. These may include measurements taken at the bridge face(s) during every inspection to help determine degree of degradation, aggradation, and/or channel migration.

For this item, a minor defect does not limit the effectiveness of the channel protection, while a moderate defect may limit its effectiveness. A major defect indicates that the channel protection is missing or is no longer effective as determined by a hydraulic review.

Example – Channel Protection

Description: Some stones are missing and revetment has limited effectiveness. Streambed is scouring and undermining the remaining riprap and culvert.

Defects: Scour and damage
Severity: Moderate
Extent: Widespread

Figure 152. Scour and missing riprap at concrete box culvert outlet.

Results: The channel can best be characterized as having "widespread moderate defects." Performance of the channel protection is affected. Report 4.

WSBIS Item 1677 – Channel Protection Condition - NBI Pulldown

NBI Item 61

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways***

This item describes the physical conditions associated with the flow of water through the bridge such as stream stability and the condition of the channel, riprap, slope protection, or stream control devices including spur dikes. The inspector should be particularly concerned with visible signs of excessive water velocity which may affect undermining of slope protection, erosion of banks, and realignment of the stream. Accumulation of drift and debris on the superstructure and substructure should be noted on the inspection form but not included in the condition rating.

Inspection report comments are required when the condition is coded 7 or less.

Note: A bridge with no scour potential (piles founded or on bedrock) can have a very low channel rating based on a threat to the approach fill. In this situation this code is the only way to flag the problem. Also note that roadway embankment erosion due to bridge or roadway runoff is NOT included in this field. These issues are addressed in the abutment BMS field.

'* Pedestrian, RR, and other non-vehicular bridges over public roadways do not require condition codes. WSDOT policy for WSDOT owned structures is to provide condition codes when the Condition Report type is used.

Rate and code the condition in accordance with the following descriptive codes:

Table 1677 Channel Protection Condition Rating - NBI

WSBIS Code	Description
9	Not applicable. Use when bridge is not over a waterway (channel).
8	There are no noticeable or noteworthy deficiencies. Banks are protected or well vegetated. River control devices such as spur dikes and embankment protection are not required or are in a stable condition.
7	Bank protection is in need of minor repairs. River control devices and embankment protection have a little minor damage. Banks and/or channel have minor amounts of drift.
6	Bank is beginning to slump. River control devices and embankment protection have widespread minor damage. There is minor stream bed movement evident. Debris is restricting the channel slightly.
5	Bank protection is being eroded. River control devices and/or embankment have major damage. Trees and brush restrict the channel.
4	Bank and embankment protection is severely undermined. River control devices have severe damage. Large deposits of debris are in the channel.
3	Bank protection has failed. River control devices have been destroyed. Stream bed aggradation, degradation or lateral movement has changed the channel to now threaten the bridge and/or approach roadway.
2	The channel has changed to the extent the bridge is near a state of collapse.
1	Bridge closed because of channel failure. Corrective action may put back in light service.
0	Bridge closed because of channel failure. Replacement necessary.

WSBIS Item 1679 – Pier/Abutment Protection - NBI **Pulldown**
NBI Item 111

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

If WSBIS Item 1386 – Navigation Control has been coded 1, use the codes 1 through 5 below to indicate the presence and adequacy of pier or abutment protection features such as fenders, dolphins, etc. The condition of the protection devices may be a factor in the overall evaluation of WSBIS Item 1676 – Substructure.

If WSBIS Item 1386 is coded 0, code N for this field.

Table 1679 Pier/Abutment Protection Rating - NBI

WSBIS Code	NBI Code	Description
1	1	Navigation protection not required
2	2	In place and functioning
3	3	In place but in a deteriorated condition
4	4	In place but reevaluation of design suggested
5	5	None present but reevaluation suggested
N	null	Not applicable, not a navigable waterway

NBI Commentary:

WSDOT codes N where the NBI codes a blank. This field is translated in the NBI text file.

Appraisals

The items in the appraisal section are used to evaluate bridges and culverts carrying public roadways in relation to the level of service which it provides on the highway system of which it is a part. The structure will be compared to a new one which is built to current standards for that particular type of road as further defined in this section except for WSBIS Item 1661 – Approach Roadway Alignment. See WSBIS Item 1661 for special criteria for rating that item.

WSBIS Items 1657, 1658, 1659, 1661, and 1662 will be coded with a 1-digit code that indicates the appraisal rating for the item. The ratings and codes are as follows:

Table 4 Adequacy Appraisal Ratings - NBI

WSBIS Code	NBI Code	Description
9	N	Not applicable
8	9	Superior to present desirable criteria
8	8	Equal to present desirable criteria
7	7	Better than present minimum criteria
6	6	Equal to present minimum criteria
5	5	Better than minimum tolerable limits
4	4	Meets minimum tolerable limits to be left in place as is
3	3	Basically intolerable requiring high priority corrective action
2	2	Basically intolerable requiring high priority replacement
1	1	This value of rating code not used
0	0	Bridge closed

WSBIS Items 1657, 1658, and 1659 are calculated automatically based on other coded items.

Completed bridges not yet opened to traffic, if rated, shall be appraised as if open to traffic. Design values, for example ADT, shall be used for the evaluation. The data provided will include a code of G for WSBIS Item 1293 – Structure Open, Posted, or Closed to Traffic.

NBI Commentary:

WSBIS uses the 9 code to indicate "Not applicable," which is translated to N when reported to the NBI. WSBIS uses code 8 for "Superior or equal to present desirable criteria," which is a combination of NBI codes 8 and 9. (WSBIS does not submit a code 9 to the NBI.)

WSBIS Item 1680 – Scour Critical - NBI **Pulldown**
NBI Item 113

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code as indicated below to identify the current status of the bridge regarding its vulnerability to scour:

Table 1680 Scour Critical Rating - NBI

WSBIS Code	Description
N	Bridge not over waterway.
U	Bridge with unknown foundation that has not been evaluated for scour. Until risk can be determined, a plan of action should be developed and implemented to reduce the risk to users from a bridge failure during or immediately after a flood event (see HEC 23).
T	Bridge over tidal waters that has not been evaluated for scour, but considered low risk. Bridge will be monitored with regular inspection cycle and with appropriate underwater inspections. (Unknown foundations in tidal waters should be coded U.)
9	Bridge foundations (including piles) on dry land well above flood water elevations.
8	Bridge foundations determined to be stable for the assessed or calculated scour conditions. Scour is determined to be above top of footing or drilled shaft (Example A) by: • assessment (e.g., bridge foundations are on rock formations that have been determined to resist scour within the service life of the bridge), or • calculation (exposed drilled shafts may be included by calculations), or • installation of properly designed countermeasures (see HEC 23).
7	Countermeasures have been installed to mitigate an existing problem with scour and to reduce the risk of bridge failure during a flood event. Instructions contained in a plan of action have been implemented to reduce the risk to users from a bridge failure during or immediately after a flood event.
6	Scour calculation/evaluation has not been made.
5	Bridge foundations determined to be stable for assessed or calculated scour conditions. Scour is determined to be within the limits of footing or piles, including open pile bents, or drilled shafts (Example B) by: • assessment (e.g., bridge foundations are on rock formations that have been determined to resist scour within the service life of the bridge), or • calculations, or • installation of properly designed countermeasures (see HEC 23).
4	Bridge foundations determined to be stable for assessed or calculated scour conditions; field review indicates action is required to protect exposed foundations (see HEC 23).
3	Bridge is scour critical; bridge foundations determined to be unstable for assessed or calculated scour conditions: • Scour within limits of footing or piles, or drilled shafts (Example B) • Scour below spread-footing base or pile tips, or base of shafts (Example C)

Table 1680 Scour Critical Rating - NBI

2	Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by: • a comparison of calculated scour and observed scour during the bridge inspection, or • an engineering evaluation of the observed scour condition reported by the bridge inspector in WSBIS Item 1676 – Substructure.
1	Bridge is scour critical; field review indicates that failure of piers/abutments is imminent. Bridge is closed to traffic. Failure is imminent based on: • a comparison of calculated and observed scour during the bridge inspection, or • an engineering evaluation of the observed scour condition reported by the bridge inspector in WSBIS Item 1676 – Substructure.
0	Bridge is scour critical. Bridge has failed and is closed to traffic.

Scour Vulnerability *(Old Item 1681)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	I	BAP03	B.AP.03	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the scour vulnerability of the bridge using one of the following codes. **Code** **Description** N Not applicable, no waterway. 0 Scour appraisal has not been completed. A Scour appraisal completed. Bridge determined to be stable for scour. B Scour appraisal completed. Bridge determined to be stable for scour, dependent upon designed, and functioning countermeasures. C Scour appraisal completed. Bridge could become unstable for scour. Temporary (not designed) countermeasure installed to mitigate scour. Bridge is scour critical. D Scour appraisal completed. Bridge is, or may become, unstable for scour. Bridge is scour critical. E Scour appraisal has not been completed. Temporary (not designed) countermeasure installed to mitigate scour. U Scour appraisal has not been completed due to unknown foundations. If the bridge does not cross over a waterway as indicated in Item BF.01 (Feature Type), Code N. If coded N, this field will not be reported to FHWA	The intent of this item is to report the status and vulnerability determination from scour appraisals required by the NBIS. The codes for this item are based on the appraised scour vulnerability as described in HEC-18, Evaluating Scour at Bridges; HEC-23, Bridge Scour and Stream Instability Countermeasures; and HEC-20, Stream Stability at Highway Structures. Scour appraisals are typically performed by a multidisciplinary team of hydraulic, geotechnical, and structural engineers (Scour Appraisal Team). FHWA Hydraulic Technical Advisories, and manuals, and software can be found at: https://www.fhwa.dot.gov/engineering/hydraulics/ Refer to item B.C.11 (Scour Condition Rating) in the Component Condition Ratings subsection to address field observed scour conditions and the effect on bridge components. Use code B when designed, installed, and functioning countermeasures are used to address potential scour and to maintain bridge stability for new or existing bridges, or bridges with unknown foundations. Use code B when the Scour Appraisal Team determines that the in-place, non-designed countermeasures are fully functioning and are appropriate to mitigate the risk of scour. Use code C for bridges that could become unstable for the potential scour, and temporary countermeasures are installed that were not designed.

Scour Plan of Action

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	I	BAP04	B.AP.04	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report whether the bridge has a scour plan of action (POA) implemented using one of the following codes. **Code** **Description** 0 A scour POA is not required, or is not applicable (no waterway). N A scour POA is required, but not implemented. Y A scour POA is required and implemented. This item not reported to FHWA if the bridge does not cross over a waterway as indicated in Item B.F.01 (Feature Type).	The NBIS requires a scour POA for bridges over water that are determined to be scour critical or have unknown foundations. More information on scour POA can be found at the FHWA Hydraulics Engineering website: www.fhwa.dot.gov/engineering/hydraulics/bridgehyd/poa.cfm. Use code 0 if a bridge was considered scour critical, but now has designed, installed, and fully functional scour countermeasures. Code 0 also if structure does not pass over a waterway, and a scour plan of action is not applicable. A scour POA is a document that addresses, based on risk, a schedule for repair or installation of scour countermeasures, and/or the monitoring, inspection, closing, and opening a bridge to traffic during and after flood events to protect the traveling public. A scour POA is implemented when those responsible for actions under the plan are aware of their responsibilities, and are exercising them when called for during or after a triggering event. A bridge should have a scour POA when it could become unstable for scour, and temporary countermeasures are installed that were not designed.

WSBIS Item 1662 – Waterway - NBI **Pulldown**
NBI Item 71

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This item appraises the waterway opening with respect to passage of flow through the bridge. Site conditions may warrant somewhat higher or lower ratings than indicated by the table (e.g., flooding of an urban area due to a restricted bridge opening).

Where overtopping frequency information is available, the descriptions given in the table for chance of overtopping mean the following:

Remote – greater than 100 years
Slight – 11 to 100 years
Occasional – 3 to 10 years
Frequent – less than 3 years

Adjectives describing traffic delays mean the following:

Insignificant – Minor inconvenience. Highway passable within hours.

Significant – Traffic delays of up to several days.

Severe – Long term delays to traffic.

Table 1662 Waterway Adequacy Appraisal Rating - NBI

WSBIS Item 1487 – Functional Class			
01, 11, 12	02, 06, 07, 14, 16, 17	08, 09, 18, 19	
Waterway Adequacy Appraisal Rating			Description
9	9	9	Bridge not over a waterway.
8	8	8	Bridge deck and roadway approaches above flood water elevations. Remote chance of overtopping OR bridge deck above roadway approaches. Slight chance of overtopping roadway approaches.
6	6	7	Slight chance of overtopping bridge deck and roadway approaches.
4	5	6	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with insignificant traffic delays.
3	4	5	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with significant traffic delays.
2	3	4	Occasional overtopping of bridge deck and roadway approaches with significant traffic delays.
2	2	3	Frequent overtopping of bridge deck and roadway approaches with significant traffic delays.
2	2	2	Occasional or frequent overtopping of bridge deck and roadway approaches with severe traffic delays.
0	0	0	Bridge closed.

BPO Specific Instructions:

Bridges with scour records maintained by BPO must code this field as directed by the BPO Scour Engineer.

NBI Commentary:

WSBIS uses the 9 code to indicate “Not applicable,” which is translated to N when reported to the NBI.

Overtopping Likelihood

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BAP02	B.AP.02	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification

Report the scour vulnerability of the bridge using one of the following codes.

Code	Description
0	Never
1	Remote – once every 100 years or less frequently
2	Very low – once every 51 to 99 years
3	Low – once every 26 to 50 years
4	Moderate – once every 11 to 25 years
5	High – once every 3 to 10 years
6	Very High – once every 2 years or more frequently

Do not report this item if the bridge does not cross over a waterway as indicated in Item B.F.01 (Feature Type).

Commentary

An overtopping occurrence is when the waterway overtops the riding surface carried on the bridge.

Bridge overtopping likelihood, since the year built (B.W.01), is typically determined from historical bridge inspection or maintenance records, hydraulic studies, local residents/landowners, and/or site indicators including highwater marks on the bridge or its surroundings, debris remains on bridge upper members, etc.

For newer bridges with limited historical inspection or maintenance information, hydraulic design information can be used to establish an overtopping likelihood.

This item does not apply to the likelihood of the waterway overtopping approach roadways.

WSBIS Item 1661 – Alignment - NBI | Pulldown

NBI Item 72

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code the rating based on the adequacy of the approach roadway alignment. This item identifies those bridges which do not function properly or adequately due to the alignment of the approaches. It is not intended that the approach roadway alignment be compared to current standards but rather to the existing highway alignment. This concept differs from other appraisal evaluations. The establishment of set criteria to be used at all bridge sites is not appropriate for this item. The basic criteria is how the alignment of the roadway approaches to the bridge relate to the general highway alignment for the section of highway the bridge is on.

Speed reductions necessary because of structure width and not alignment shall not be considered in evaluating this item.

This field should be blank for tunnels and pedestrian, RR and other non-vehicular structures over public roadways.

Table 1661 - Approach Roadway Alignment Appraisal Rating - NBI

WSBIS Code	Description
8	No reduction in speed required for vehicle as it approaches the bridge.
6	Minor reduction in speed required for vehicle (less than 10 mph) as it approaches the bridge.
3	Substantial reduction in the speed of vehicle (10 mph or greater) as it approaches the bridge.

Approach Roadway Alignment - SNBI

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	EI	BAP01	B.AP.01	D3

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the operating speed reduction at the bridge using one of the following codes. **Code** / **Description** G Good F Fair P Poor	This item identifies bridges that do not function adequately due to the horizontal or vertical alignment of the bridge and approach roadway. It is not intended that the alignment be compared to current standards, but rather to the existing roadway alignment. The basic criterion is how the alignment of the bridge and approach roadway relates to the general highway alignment for the section of highway the bridge carries.

Examples

Do not consider speed reductions due to the bridge width or intersecting highways when reporting this item.

The operating speed reduction is in comparison to the posted speed limit for the highway segment.

Use code G when the operating speed is no different at the bridge than the rest of the highway segment that crosses the bridge.

Use code F when the operating speed is noticeably different at the bridge than the rest of the highway segment that crosses the bridge.

Use code P when the operating speed is substantially different at the bridge than the rest of the highway segment that crosses the bridge.

Fatigue Details

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	I	BIR02	B.IR.02	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report whether the bridge has AASHTO fatigue category E or E' details using one of the following codes. **Code** **Description** N No E/E details Y E/E details are present Do not report this item for bridges that do not have steel members as indicated in Items B.SP.04 (Span Material) and B.SB.03 (Substructure Material).	This item provides data to identify bridges that have details most prone to fatigue. Refer to the BIRM or AASHTO LRFD Bridge Design Specifications for fatigue categories.

Seismic Vulnerability

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	I	BAP05	B.AP.05	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the seismic vulnerability of the bridge using one of the following codes.	This item provides available information resulting from seismic evaluation and retrofit programs that an agency may have performed of their own volition. The codes allow for a broad interpretation based on the reporting agency's methods and evaluation criteria.
Code / **Description** 0 Seismic evaluation not completed. N Bridge does not require seismic evaluation due to low anticipated ground motion or agency prioritization. A Seismic evaluation completed. Bridge determined to meet the agency's performance criteria established for the evaluation without need for retrofit. B Seismic evaluation completed. Satisfactory performance is dependent upon a designed, installed, and functioning retrofit. Retrofit is in place. C Seismic evaluation completed. Satisfactory performance is dependent upon a designed, installed, and functioning retrofit. Partial retrofit is in place. D Seismic evaluation completed. Satisfactory performance is dependent upon a designed, installed, and functioning retrofit. Retrofit is not in place.	In lieu of agency-developed evaluation criteria, refer to the FHWA Seismic Retrofitting Manual for Highway Structures: Part 1 – Bridges, Publication No. FHWA-HRT-06-032, January 2006, for guidance on assessing the vulnerability of highway structures to the effects of earthquakes, and implementing retrofit measures to improve performance. Use code A when bridge is designed to meet applicable performance criteria established by the design specifications in effect at the time of construction and bridge would be expected to meet current agency established performance criteria. Use code C when only certain portions of the bridge have been retrofitted but not all portions of the bridge have been retrofitted to meet agency performance criteria.

WSBIS Item 1293 – Open, Closed or Posted - NBI **Pulldown**
NBI Item 41
NTI Item L.4

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

This item provides information about the actual operational status of a structure. One of the following codes shall be used:

Table 1293 - Open, Closed, Posted Code - NBI

WSBIS Code	Description
A	Open, no restriction to legal loads (see Table 1660a) and no physical posting sign at the bridge
B	Open, posting recommended but not legally implemented (all signs not in place or not correctly implemented)
D	Open, would be posted or closed except for temporary shoring, etc., to allow for unrestricted traffic
E	Open, temporary structure in place to carry legal loads while original structure is closed and awaiting replacement or rehabilitation
G	New structure not yet open to traffic
K	Structure closed to all traffic
P	Posted for load (may include other restrictions such as temporary structures which are load posted). Requires a physical posted sign at the bridge.
R	Posted for other load-capacity restriction (speed, number of vehicles on structure, etc.). Requires a physical posted sign at the bridge.

WSBIS Item 1660 – Operating Level - NBI **Pulldown**
NBI Item 70

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

The National Bridge Inspection Standards require the posting of load limits if the operating rating factor (RF) for any of the legal load configurations in the State is less than 1 based on the Load Factor Method (LFR) or the Allowable Stress Method (ASR); and less than 1 based on the Load and Resistance Factor Method. If the load capacity is such that posting is required, this item shall be coded 4 or less. If no posting is required at the operating rating, this item shall be coded 5.

This item evaluates the load capacity of a bridge in comparison to the State legal loads.

Although posting a bridge for load-carrying capacity is required only when the RF for any of the legal loads is less than 1, highway agencies may choose to post at a lower level. This posting practice may appear to produce conflicting coding when WSBIS Item 1293 – Structure Open, Posted or Closed to Traffic is coded to show the bridge as actually posted at the site and WSBIS Item 1660 – Bridge Posting is coded as bridge posting is not required. Since different criteria are used for coding these 2 items, this coding is acceptable and correct.

The use or presence of a temporary bridge affects the coding. The actual operating rating of the temporary bridge should be used to determine this item. However, the highway agency may choose to post at a lower level. This also applies to bridges shored up or repaired on a temporary basis.

The coding shall be based on the lowest rating factor of the legal loads.

The following are Washington State maximum legal load configurations and tonnages:

Table 1660a Legal Loads - NBI

Configuration	Tonnage
AASHTO Type 3	25 Tons
AASHTO Type 3-2	36 Tons
AASHTO Type 3-3	40 Tons
SU4	27 Tons
SU5	31 Tons
SU6	34.7 Tons
SU7	38.7 Tons
EV2	28.7 Tons
EV3	43 Tons

See the *Bridge Design Manual* Chapter 13 for more information.

For WSDOT owned structures, the BPO Load Rating Engineer shall make the change to the code, and not the field inspector.

Table 1660b Operating Level Code - NBI

WSBIS Code	Operating Legal Load Rating Factors based on LFR or ASR Methods or Legal Load Rating Factors based on LRFR
5	RF ≥ 1
4	1 > RF > 0.9
3	0.9 ≥ RF > 0.8
2	0.8 ≥ RF > 0.7
1	0.7 ≥ RF > 0.6
0	0.6 ≥ RF
N	No rating analysis performed (bridge does not carry traffic)

NBI Commentary:

WSDOT added code N to address structures which do not carry traffic.
Text supplemented to explicitly list Washington State legal loads and tonnages.

WSBIS Item 2613 – NBIS Risk Category — Calculated

Applicable Structure Types

- **All structure records**

The NBIS risk category is based on the FHWA Metrics for the Oversight of the National Bridge Inspection Program, also called the “23 metrics”: https://www.fhwa.dot.gov/bridge/NBIP_Compliance_Review_Manual_03212019_FY22-003.pdf

High risk structures are considered more vulnerable to failure and therefore are held to a higher standard of NBIS compliance in the 23 metrics, and applies only to Routine report types as defined in Table 2613.

Table 2613 FHWA Risk Category for Routine Bridge & Underwater Inspections

WSBIS Item	Risk Criteria
H	High risk based on any ONE of the following criteria:
	1. Low superstructure, substructure or culvert condition codes WSBIS Items 1671, 1676 or 1678 < 5
	2. Legal load posting required WSBIS Item 1660 < 5
	3. No load rating AND posting not required AND posting recommended or implemented WSBIS Item 1551=5 and WSBIS Item 1660=5 and WSBIS Item 1293=B, P, or R
	4. Scour critical or scour vulnerability unknown WSBIS Item 1680 = 0, 1, 2, 3, 6, T or U
L	Low risk, does not meet high risk criteria
N	Does not apply, no routine bridge inspection report type

Bridges that also have Underwater report types are separately identified as high risk in the 23 metrics based on criteria 1 without the superstructure code and criteria 4 as described in Table 2613.

These codes are generally determined based on scour analyses made by hydraulic, geotechnical, or structural engineers. However, bridge inspectors play a key role in determining selected scour codes:

- Scour code 4 can be determined by the bridge inspector regardless of any previous higher scour code, based on observed conditions.
- For scour codes of 2 or less, the WSBIS Item 1676 – Substructure code must have a matching code.
- For WSDOT bridges, all changes to the 1680 Scour Code must be reviewed and approved by the BPO Sour Engineer.

NBI Commentary:

This item has been modified based on an April 27, 2001 FHWA memo regarding FHWA Items 60 and 113 (WSBIS Items 1676 and 1680). This memo is available at https://www.fhwa.dot.gov/engineering/hydraulics/policymemo/revguide.cfm

Miscellaneous Fields

<table>
<tr><th colspan="6">Year Built (Old Item 1332)</th></tr>
<tr><td>Format
N(3,0)</td><td>Translation
-</td><td>Frequency
I</td><td>WSBIS Item ID
BW01</td><td>SNBI Item ID
B.W.01</td><td>SNTI Item ID
-</td></tr>
<tr><td colspan="6">Applicable Structure Types
• All structure records</td></tr>
<tr><th colspan="3">Specification</th><th colspan="3">Commentary</th></tr>
<tr><td colspan="3">Report the year in which original construction was completed and the bridge was able to carry traffic.

For phased construction, report the year in which the first phase was completed and the bridge was able to carry traffic.</td><td colspan="3">This date reflects the date when construction was completed, regardless of when the bridge was opened to traffic.

Rehabilitation and/or widening of a bridge does not change the year built. If any portion of the bridge remains, the year built does not change.

Provide a best estimate when the year built is unknown; do not assign a default value.</td></tr>
</table>

WSBIS Item 1336 – Year Rebuilt **N(4,0)**
NBI Item 106
NTI Item A.2

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Code the year of the last major rehabilitation of the structure. Code all four digits of the year in which reconstruction was completed. If there has been no reconstruction, code 0.

For a structure to be defined as rebuilt, the type of work performed, whether or not it meets current minimum standards, must have been eligible for funding under any of the federal aid funding categories. The eligibility criteria would apply to the work performed regardless of whether all state or local funds or federal aid funds were used.

Some types of work to be considered as rebuilt are widenings and retrofits designed to increase the original structural capacity.

Some types of eligible work **not** to be considered as rebuilt are:

- Safety feature replacement or upgrading (for example, bridge rail, approach guardrail or impact attenuators).
- Painting of structural steel.
- Overlay of bridge deck.
- Utility work.

- Emergency repair to restore structural integrity to the previous status following an accident.
- Retrofitting to correct a deficiency which does not substantially alter physical geometry or increase the load-carrying capacity.
- Work performed to keep a structure operational while plans for complete rehabilitation or replacement are under preparation (for example, adding a substructure element or extra girder).

WSBIS Item 2610 – Asphalt Depth (inches) N(5,2)

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code the average depth of asphalt in inches on the deck as observed from field measurements, or as determined from comparing the design curb height against the measured curb height from the top of asphalt. In cases where there is ballast, such as on timber decks, enter the full thickness of ballast and asphalt.

Code 0 when:

There is no asphalt on the deck.

When the structure does not have a deck, including when asphalt pavement is placed on fill over a culvert.

WSBIS Item 2611 – Design Curb Height (inches) N(5,2)

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code the curb height shown on current bridge plans in inches. Code 0 when there is no curb.

WSBIS Item 2612 – Bridge Vehicle Rail Height (inches) N(5,2)

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code the vehicle rail height as measured in the field, from the top of the rail system to the bridge deck.

WSBIS Item 2675 – Number of Utilities Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This field indicates the number of franchise utilities attached to the bridge. Utilities include, but are not limited to, water pipes, sewer lines, telephone lines, power lines, and gas lines. Conduit for electricity used on the bridge is not considered a utility. A conduit cluster (e.g., a telephone cluster) is considered one utility. This field is not used to evaluate the condition of utilities on the bridge, only the number of utilities present. If more than nine utilities are attached to the bridge, code 9. If there are no utilities, code 0.

WSBIS Item 2614 – Subject to NBIS Flag **Pulldown**

Applicable Structure Types

- **All structure records**

This field identifies whether or not the bridge is subject to the National Bridge Inspection Standards (NBIS).

Y Bridge is subject to the NBIS
N Bridge is not subject to the NBIS.

This field is based on 23 CFR 650.305, found at https://www.fhwa.dot.gov/legsregs/directives/fapg/cfr0650c.htm, and the Questions and Answers paragraphs Q303-1 through Q303-6, found at https://www.fhwa.dot.gov/bridge/nbis/index.cfm. Structures subject to the NBIS include all publicly owned highway structures carrying public roads over a depression or obstruction and having an opening measured along the center of the roadway of more than 20 feet between one of the following:

- Undercopings of abutments
- Spring lines of arches
- Extreme ends of openings for multiple box culverts
- Extreme ends of openings for multiple pipe culverts where the clear distance between pipes is less than half of the smaller contiguous pipe

Structures not subject to the NBIS include:

- Sign support structures
- High mast lighting
- Retaining walls
- Noise barrier structures
- Overhead traffic signs
- Tunnels
- Structures carrying only pedestrians
- Structures carrying only railroad

Ownership and access are also important factors. To be subject to the NBIS, a structure must be both publicly owned and publicly accessible. Structures not subject to the NBIS include:

- Privately owned structures accessible to the public (e.g., road association structures)
- Publicly owned bridges that are not accessible to the public (e.g., structures behind gates used to access dams for agency employees and contractors)

Inspection Quality Assurance Date *(Old Item 1999)*					
Format	**Translation**	**Frequency**	**WSBIS Item ID**	**SNBI Item ID**	**SNTI Item ID**
Pulldown	-	EI	BIE09	B.IE.09	-
Applicable Structure Types • **All structure records**					

Specification	Commentary
Report the date that the QA review was completed. This field is not reported to the FHWA when a QA review was not performed.	The intent of this item is to identify inspections that have had independent QA reviews to measure or verify the overall quality of the inspection program. Agency QA procedures often vary in the definition of a review period and number of inspections reviewed. Bridge inspections might be randomly selected for agency QA reviews or selected based on representative bridge type, region, district, or other agency defined bridge populations.

Inspection Flags

WSBIS Item 2693 – Soundings Flag **Pulldown**

Applicable Structure Types

- Bridges & Culverts carrying public roadways

This code indicates whether or not soundings of the streambed (streambed cross sections at the bridge) are required.

Y Soundings need to be taken.
* Null field, soundings are not required

This field is coded as part of the inspection planning process, and instructs the inspector to take soundings. When soundings are taken, the flag should be changed to null.

Note: Pedestrian bridges over waterways are managed for soundings and may be coded Y as appropriate.

WSBIS Item 2694 – Clearance Flag Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

This field indicates that an inspection team should collect clearance data.

C Measure horizontal/lateral and vertical clearances.
* Null field, measurements are not required, or were just collected.

This field is coded as part of the inspection planning process, and instructs the inspector to collect and record clearance measurements in accordance with WSDOT policy (see Chapter 3) and as indicated in the 2694 inspection note. Note that all vertical clearances in, on and under the structure need to be collected unless otherwise noted.

After measurements are collected and documents given to a Geometric Engineer for processing, change this code from C to * (null).

WSBIS Item 2688 – Revise Rating Flag Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

This code indicates whether or not the structure should be reviewed for a revised rating based on field conditions. A note shall be added by the inspector identifying the reason/condition that prompts reevaluation of the load rating.

Y Yes, review rating
* Null field, rating review is not required

See Section 5-2.

WSBIS Item 2691 – Photos Flag Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

This code indicates whether or not the structure needs photos taken.

D Deck photo needed
E Elevation or tunnel portal photo needed
P Deck and Elevation photos needed
* Null field, photos are not required

WSBIS Item 2695 – QA Flag **Pulldown**

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

This code indicates whether or not a quality assurance report was created for this structure.

Y	Quality assurance report on file.
*	Null field

Local Agency Appraisals

WSBIS Item 7664 – Drain Condition Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This is the condition rating of the drains in the bridge deck.A rating of 5 should be used to indicate the drains are completely plugged with dirt and debris. Use Table WB76-64 Condition Rating for Secondary Bridge Members (Drains).

Table WB76-64 Condition Rating for Secondary Bridge Members (Drains)

WSBIS Code	Description
9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minor deterioration.
5	Fair Condition. All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss, deterioration, cracking, spalling, or scour.

WSBIS Item 7665 – Drain Status Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This code describes the present status of the drains on the bridge.

Table WB76-65

WSBIS Code	Description
9	Drains status is unknown
4	Drains have been disconnected
3	Drains have been replaced by another type
2	Drains have been permanently blocked
1	Drains exist as built
0	Drains do not exist

WSBIS Item 7666 – Deck Scaling Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This code describes the severity of any deck scaling present.

The amount and type of deterioration present in the top surface of concrete bridge decks is to be rated. If the bridge does not have a concrete deck (for example, it has an asphalt overlay or a steel or timber deck), code N.

N None
L Light (scaling up to ¼″ deep)
M Moderate (scaling up to ½″ deep)
H Heavy (scaling or spalls up to 1″ deep)
S Severe (over 1″ deep)

WSBIS Item 7667 – Deck Scaling Percent N(2,0)

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This value is the percentage of the total deck area where scaling and/or spalling are present. It includes any areas which have been patched.

In scaled areas of more than 1 percent, estimate the percentage at 5 percent increments. The amount and type of deterioration present in the top surface of concrete bridge decks is to be calculated. If the bridge does not have a concrete deck (for example, it has an asphalt overlay or a steel or timber deck), code 00.

WSBIS Item 7669 – Deck Rutting Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

The amount and type of deterioration present in the top surface of concrete bridge decks is to be rated using the following codes. If the bridge does not have a concrete deck (i.e., it has an asphalt overlay or a steel or timber deck), code 0.

Table WB76-69 Condition Rating for Deck Rutting

WSBIS Code	Description
8	No wear
7	Exposed aggregate
5	Visible wheel track rutting
3	Wheel track rutting has exposed reinforcing steel
0	Not applicable

WSBIS Item 7670 – Deck Exposed Rebar — Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This code describes the degree to which the deck area shows exposed reinforcing steel.

The amount and type of deterioration present in the top surface of concrete bridge decks is to be rated. If the bridge does not have a concrete deck (for example, it has an asphalt overlay or a steel or timber deck), code 0.

Table WB76-70 Condition Rating for Deck Exposed Rebar

WSBIS Code	Description
8	None
7	Some cracking in deck over reinforcing steel
5	0 to 5 percent of deck area shows exposed reinforcing steel
3	More than 5 percent of deck area shows exposed reinforcing steel
0	Not applicable

WSBIS Item 7672 – Curb Condition — Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This is the condition rating of any curbs located on the bridge. Use Table WB7672 Condition Rating for Secondary Bridge Members (Curbs).

Table WB76-72 Condition Rating for Secondary Bridge Members (Curbs)

WSBIS Code	Description
9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minor deterioration.
5	Fair Condition. All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss, deterioration, cracking, spalling, or scour.

WSBIS Item 7673 – Sidewalk Condition — Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This is the condition rating of any sidewalks which are an integral part of or are attached to the bridge. This rating considers the condition of any structural members (i.e., stringers) which may support the sidewalk.

To be considered a sidewalk, the member must be greater than or equal to three feet in width. Use Table WB76-73 Condition Rating for Secondary Bridge Members (Sidewalk).

Table WB76-73 Condition Rating for Secondary Bridge Members (Sidewalk)

WSBIS Code	Description
9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minor deterioration.
5	Fair Condition. All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss, deterioration, cracking or spalling.

WSBIS Item 7674 – Paint Condition — Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This field contains the condition rating of any paint applied to the bridge to protect the primary structural steel members.

If paint has been applied only on secondary members such as bridge rails or light posts, code 9 in this field.

WB76-74 Condition Rating for Paint

WSBIS Code	Description
9	Not applicable.
8	Bridge has recently been painted.
7	Paint is in good condition with only minor weathering.
6	Bridge needs to be painted within five years.
5	Bridge needs to be painted within three years.
4	Bridge needs to be painted within two years.

A paint code of ‘5’ or ‘4’ needs to have at least one paint inspection form completed as part of the inspection report in the bridge file. The bridge is also a candidate for paint testing.

WSBIS Item 7681 – Approach Condition — Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This is the general physical condition rating of the approach roadway. This evaluation takes into consideration visible signs of wear, cracking, spalling, etc., but does not consider the alignment or width of this roadway.

WB76-81 Condition Rating for Approach Roadway

WSBIS Code	Description
9	Not applicable.
8	Smooth approach onto the bridge structure.
6	Less than 1″ of settlement of the approach roadway causing minor bouncing and load impact onto the bridge. Monitor the settlement.
3	More than 1″ of settlement of the approach roadway causing bouncing and load impact onto the bridge. Needs to be ACP feather repaired to provide a smooth transition onto the bridge.

Note: Code 6 for well maintained gravel roads. Code 3 for gravel roads in rough condition.

WSBIS Item 7682 – Retaining Wall Condition — Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This field contains the general condition rating of any retaining walls associated with the bridge. This evaluation should take into consideration whether movement, cracking, or settling has occurred.

Wingwalls and curtain walls should not be considered under this code as they are considered part of the abutment. Use Table WB76-82 Condition Rating for Retaining Walls.

Table WB76-82 Condition Rating for Retaining Walls

WSBIS Code	Description
9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minor deterioration.
5	Fair Condition. All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss, deterioration, cracking, spalling, or scour.
3	Serious Condition. Loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	Critical Condition. Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete maybe present or scour may have removed substructure support. Unless closely monitored, it may be necessary to close the bridge until corrective action is taken.
1	Imminent Failure Condition. Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put back in light service.
0	Failed Condition. Out of service. Beyond corrective action.

WSBIS Item 7683 – Pier Protection Condition — Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This rating describes the general condition rating of any pier and/or abutment protection features (i.e., fenders and dolphins) which have been put in place to protect the bridge against collisions from vessels or objects in tow.

This field is used for rating the general condition of the bridge's pier protection features and does not evaluate the adequacy of those features.

If no pier protection exists, code 9. Use Table WB76-83 Condition Rating for Secondary Bridge Members (Pier Protection).

Table WB76-83 Condition Rating for Secondary Bridge Members (Pier Protection)

WSBIS Code	Description
9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minor deterioration.
5	Fair Condition. All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss, deterioration, cracking, spalling, or scour.

Bridge ID Tab

Structure ID *(Old Item 1001)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(8)	AN(15)	I	BID01	B.ID.01	I.1

Applicable Structure Types

- **All structure records**

Specification	Commentary
WSBIS data stewards assign Structure Identifier (SID) numbers to all structures that qualify for inclusion in the Washington State Bridge Inventory System (WSBIS). See Chapter 2 for more details. Do not change the SID once it has been assigned and recorded. There may be exceedingly rare circumstances (none so far in WSBIS history) that require a one-time change. In that event, report the previous SID under BID03. Except in cases where elevated ramps merge or split, report all spans from abutment to abutment as one bridge.	This field must be unique for every structure in the Washington State Bridge Inventory. When a new structure replaces an old structure, a new unique SID must be coded. The old SID cannot be recycled. When any portion of the existing bridge is retained for a rehabilitated or partially replaced bridge, it is preferable to retain the existing SID. The BPO and LP Data Stewards assign SID when the original structure inventory record is processed. When initially creating a new structure in BridgeWorks, a temporary structure ID is generated with an X as the first character. This temporary structure ID will be changed when the record is “released” into the database.

Commentary Continued

It is preferable that any bridge or bridges with a closed median, where the area between the two roadways on the bridge is bridged over and can support traffic, be reported as one bridge. Closed medians may have either mountable or non-mountable curbs or barriers.

It is preferable that separate superstructures with an open median (not meeting the closed median criteria above) sharing a common substructure unit or units be reported as two bridges.

It is preferable that separate bridge numbers be reported for each mainline bridge and the ramp that connects to the mainline bridge, when the ramp has at least one distinct abutment and is greater than 20 feet in length. It is also preferable that separate bridge numbers be reported for a bridge that divides into two or more separate bridges, or two or more bridges that merge into one single bridge. In both cases, the separating point between bridges should be the closest deck joint, or substructure unit to the separating point, or other logical and reasonable location as determined by the bridge owner.

Double deck bridges may be reported as one or two bridges. However, all related data items need to be compatible with the method selected.

Consult with the local FHWA division office contact for questions concerning assigning bridge numbers to unique or complex bridges.

Previous Structure ID

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(15)	-	I	BID03	B.ID.03	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the bridge number previously associated with the bridge that has been replaced by the inventoried bridge, or when the inventoried bridge number has changed. Report 0 if no previous bridge number.	The purpose of this item is to retain a link to data for previous bridge numbers associated with this bridge in the NBI.

Structure Type

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	I	WID01	-	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
WSBIS currently maintains records for 4 structure types: **Code** / **Description** 1 Bridges and culverts carrying public roadways 2 Pedestrian, railroad and other non-vehicular bridges over public roadways 3 Tunnels carrying public roadways within 4 Structures that do not cross over or under a public roadway Each structure in WSBIS can only be one structure type. Public Roadways are Functionally Classified roadways as defined in BH01.	Type 1 structures may or may not be reportable to FHWA, but must always carry vehicular traffic, and almost always carry public roadways. There are occasions where Type 1 structures carry private or restricted roadways when these structures are connected to the public roadway system, and separated only by an "authorized use only" sign or a gate that is not permanently closed. Type 2 structures may or may not be reportable to FHWA through 2025. Starting in 2026, none will be reported to FHWA. These structures do not carry vehicular traffic, except for maintenance vehicles on bike paths and other non-vehicular routes not connected to the public roadway system. These structures must carry public highways under the structure. Type 3 structures are tunnels that carry vehicular traffic on public roadways within, and are reportable to FHWA. Railroad and pedestrian structures under public roadways that are structurally considered tunnels are coded as type 1 structures. Type 4 structures do not cross over or under a public roadway. These structures are not reported to FHWA, and are maintained in WSBIS at the structure owners convenience. WSDOT maintains these records for pedestrian or utility bridges on WSDOT right of way.

WSBIS Item WID02 – Bridge Number *(Old Item 2009)* AN(13)

Applicable Structure Types

- **All structure records**

This is a unique (to the owner agency) alphanumeric code assigned by the owner of the structure. This field does not require all spaces to be filled; however, the field cannot be left blank.

WSDOT owned structure numbers are formatted as follows:

[route number] / [alphanumeric character string]

WSDOT structure numbers follow several rules:

1. The forward slash (/) is always in the 4th position, with leading blanks as needed. For example, structures on I-5 are coded with two leading blanks followed by a 5 and a forward slash. Structures on US 395 have no leading blanks.
2. In general, every structure must have a unique structure number. The exception is when structures are replaced the structure number usually doesn't change. In this case, the obsoleted structure will have the same structure number.
3. The alphanumeric character string following the forward slash is numerically sequenced by increasing route milepoint, and is often followed by letter characters:

   Characters providing route-related information:

E	east structure of a pair on a divided south-north route
W	west structure of a pair on a divided south-north route
N	north structure of a pair on a divided west-east route
S	south structure of a pair on a divided west-east route
E-N	ramp carrying from eastbound to northbound (vary as needed)
ECD	eastbound collector distributor (vary as needed)
A	structure not on mainline
F	structure on frontage road
ALT	structure on alternate route mainline
SP	structure on spur route

   Characters providing structure design type information:

C	culvert
P	pedestrian bridge
DV	detention vault
LID	structure intended to reconnect severed residential areas

   Examples:

90/43S	Eastbound I-90 bridge at Mercer Slough in South Bellevue
5/26N-N	Ramp carrying northbound I-5 traffic to northbound 139th St.
5/313P	Pedestrian bridge over I-5 in Tumwater

4. Short span structure numbers are followed by a decimal point and a two digit number, e.g. 5/300.25.
5. The second portion of WSDOT structure numbers range from 1 to 99 within the first county in which the route occurs, 100 to 199 in the second county, 200 to 299 in the third county, and so on.

WSBIS Item WID03 – Bridge Sort Number *(Old Item 2010)* AN(20)

Applicable Structure Types

- **All structure records**

This field is used for sorting structure numbers within the application and in various database queries. This field is maintained for tunnels and culverts.

The Structure Sort Number uses three digits for the route number and three digits for the structure number, with leading zeroes as necessary. Any following alpha characters are included. A total of 20 characters can be used.

When a decimal place is used in the Structure number, the character z is used in the structure sort number. This facilitates correct sorting.

Many local agency Structure Sort Numbers begin with a 99 and a space.

Examples:

Structure Number	Structure Sort Number
97/140W	097140W
97/285.6C	097285z6C
5/344S-E	005344S-E
241/2	241002
1135-2	99 1135-2

For state owned structures, this item is coded by the BPO Information Group and is visible in the BridgeWorks Inventory Management mode.

Bridge Name *(Old Item 2132)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(50)	AN(300)	I	BID02	B.ID.02	I.2

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the commonly known name(s) for the bridge. For more than one name, report all names with the most common name first. Report multiple names separated by pipe (|) delimiters.	This is the name of the structure, either as determined by legislative action or as determined by the structure owner. If the structure name is more than one word, separate words with a blank space. If the name of the structure exceeds the 50 character limit, use abbreviations to shorten it.

WSBIS Item 1232 – Features Intersected - NBI **AN(24)**
NBI Item 6

Applicable Structure Types

- **All structure records**

This item contains a description of the features intersected by the structure. When the structure is a bridge, the feature will always describe something under the bridge. When the structure is a tunnel, it will always describe something on top of the tunnel. The data in this segment shall be left justified and is limited to 24 characters. When one of the features intersected is another highway, the signed number or name of the highway shall appear first in the field. The names of any other features shall follow, separated by a comma.

Examples:

SR 99, BLUE R, RR
I-405 N-E & N-W RAMPS
GOOSE CREEK
SR 524 SPUR/44TH AVE W
TERRAIN

NBI Commentary:

The NBI coding guide separates this field into two segments (6A with 24 characters and 6B with 1 character). However, it's also stated that 6B is not used. The WSBIS coding guide eliminates any reference to 6B, but a blank space is created automatically in the NBI text file.

WSBIS Item 1256 – Facilities Carried - NBI **AN(18)**
NBI Item 7
NTI Item I.10

Applicable Structure Types

- **All structure records**

The facility being carried by the structure shall be recorded and coded. For all bridges this item describes the use on the structure, and for all tunnels this describes the use in the tunnel. This item shall be left justified and is limited to 18 characters.

Examples:

US 12
RAILROAD
MAIN STREET
PEDESTRIANS
ISRAEL RD

WSBIS Item WID06 – Program Manager *(Old Item 2400)* Pulldown

Applicable Structure Types

- **All structure records**

This field identifies the individual responsible for bridge and tunnel inspection and reporting as described in the National Bridge Inspection Standards Title 23 CFR 650.307 and the National Tunnel Inspection Standards Title 23 CFR 650. 507. Both the NBI/NTI program manager and delegated program managers are listed in this field as appropriate.

In cases when the bridge is not subject to the NBIS or NTIS, this field identifies who is responsible for inspecting the structure and maintaining the structure records in accordance with WSDOT policies.

This field is set during record creation. After the record has been created this field can only be changed by the Super User Account.

WSBIS Item 1286 – Custodian - NBI **Pulldown**
NBI Item 21
NTI Item C.2
WSBIS Item 1019 – Owner - NBI **Pulldown**
NBI Item 22
NTI Item C.1

Applicable Structure Types

- **All structure records**

The actual name of the owner and custodian of the structure shall be recorded on the inspection form. In most cases the owner and custodian will be the same agency, but if they are different the two agencies should have an agreement. This agreement should be part of the bridge record if it's available. If more than one agency has equal ownership or shares custodianship, code one agency in the hierarchy of State, Federal, county, city, railroad, and other private.

Table 1286 Custodian and Owner Codes - NBI

WSBIS Code	NBI Code	NTI Code	Description
1	001	001	State Highway Agency
2	002	002	County Highway Agency
4	004	004	City or Municipal Highway Agency
11	011	011	State Park, Forest, or Reservation Agency
12	012	012	County Park, Forest, or Reservation Agency
13	012	012	City Park, Forest, or Reservation Agency
21	021	021	Other State Agencies
22	001	001	Washington State Ferries
24	025	025	Other County Agency
25	025	025	Other City or Local Agencies
26	026	026	Private (other than railroad)
27	027	027	Railroad
28	027	027	Light Rail
31	031	031	State Toll Authority
32	032	032	County Toll Authority
33	032	032	City or Other Toll Authority
60	060	060	Other Federal Agencies (not listed below)
61	061	061	Indian Tribal Government
62	062	062	Bureau of Indian Affairs
63	063	063	Bureau of Fish and Wildlife
64	064	064	U.S. Forest Service
66	066	066	National Park Service
68	068	068	Bureau of Land Management
69	069	069	Bureau of Reclamation
70	070	070	Corps of Engineers (Civil)
71	071	070	Corps of Engineers (Military)
72	072	072	Air Force
73	073	073	Navy/Marines
74	074	074	Army
80	080	080	Unknown
92	001	001	Idaho maintenance responsibility
93	001	001	Oregon maintenance responsibility

NBI and NTI Commentary:

Selected codes have been eliminated because they are not used by any structures in Washington State (NSA, Pentagon, etc.). Selected codes were added, generally to differentiate county agencies from other local agencies, provide a unique code for Washington State Ferries, and codes for Oregon and Idaho border bridges maintained by these other state agencies.

Owner - SNBI

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(4)	-	I	BCL01	B.CL.01	-

Applicable Structure Types
- **All structure records**

Specification

Report the agency that has ownership of the bridge using one of the following codes.

Code	Description
S01	State transportation department
S02	State park, forest, or reservation agency
S03	State toll authority
SX	Other State agency
L01	County highway agency
L02	Town or township highway agency
L03	City or municipal highway agency
L04	Local park, forest, or reservation agency
L05	Local toll authority
LX	Other local agency
F01	Agriculture Research Service (ARS)
F02	Department of Energy (DOE)
F03	General Services Administration (GSA)
F04	National Aeronautics and Space Administration (NASA)
F05	Smithsonian – National Zoo
F06	Tennessee Valley Authority (TVA)
F07	U.S. Department of Veterans Affairs
F08	Federal Emergency Management Agency (FEMA)
F09	International Boundary and Water Commission, United States Section (USIBWC)
FX	Other Federal agency

Specification Continued

continued...

Code	Description
FL01	Bureau of Indian Affairs (BIA)
FL02	Bureau of Land Management (BLM)
FL03	Bureau of Reclamation (USBR)
FL04	U.S. Fish and Wildlife Service (FWS)
FL05	National Park Service (NPS)
FL06	U.S. Army Corps of Engineers (USACE)
FL07	U.S. Forest Service (USFS)
FL0X	Other Federal Lands Management Agency
I	Indian Tribal Government
D01	Air Force
D02	Army
D03	Navy/Marines
D04	Pentagon
D05	National Security Agency (NSA)
DX	Other Department of Defense
T	Transit agency/authority
P	Private
R	Railroad
U	Unknown
X	Other

Owner - SNBI - Commentary
Use the hierarchy of State, Federal, county, city, railroad, transit, and other private entity for multiple owners of a bridge. Use codes FL01 through FLX for Federal Lands Management agencies identified at the following FHWA website: https://highways.dot.gov/federal-lands/programs/transportation Use codes D01 through DX for bridges owned by the Department of Defense. Use code T for transit agency or authority for air, bus, light rail, and port regardless of whether the entity is considered State, local, or private. Use code P for private owners other than railroad or transit. Use code R for highway bridges owned by railroad entities that are not considered a transit agency or authority.

Maintenance Responsibility

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(4)	-	I	BCL02	B.CL.02	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the agency that has primary maintenance responsibility for the bridge using one of the codes listed in Item B.CL.01 (Owner).	Use the hierarchy of State, Federal, county, city, railroad, and other private entity for determining primary responsibility for maintenance of a bridge. Use codes FL01 through FLX for Federal Lands Management agencies identified at the following FHWA website https://flh.fhwa.dot.gov/programs/fltp/. Use codes D01 through DX for bridges maintained by the Department of Defense. Use code T for transit agency or authority for air, bus, light rail, and port regardless of whether the entity is considered State, local, or private. Use code P for private entities other than railroad or transit. Use code R for highway bridges maintained by railroad entities that are not considered a transit agency or authority.

County Code *(Old Item 1021)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(3,0)	-	I	BL02	B.L.02	I.4

Applicable Structure Types
- **All structure records**

Specification

This code identifies the county in which the structure is located. If this is a jointly owned structure, the county that is responsible for reporting the data to the inventory should be entered here. For WSDOT structures, the county at the beginning of bridge is coded.

A map of county limits is available at https://www.wsdot.wa.gov/data/tools/geoportal/.

Table BL02 County Code

WSBIS Code	NBI/ NTI Code	County Name
1	001	Adams
2	003	Asotin
3	005	Benton
4	007	Chelan
5	009	Clallam
6	011	Clark
7	013	Columbia
8	015	Cowlitz
9	017	Douglas
10	019	Ferry
11	021	Franklin
12	023	Garfield
13	025	Grant
14	027	Grays Harbor
15	029	Island
16	031	Jefferson
17	033	King
18	035	Kitsap
19	037	Kittitas
20	039	Klickitat

WSBIS Code	NBI/ NTI Code	County Name
21	041	Lewis
22	043	Lincoln
23	045	Mason
24	047	Okanogan
25	049	Pacific
26	051	Pend Oreille
27	053	Pierce
28	055	San Juan
29	057	Skagit
30	059	Skamania
31	061	Snohomish
32	063	Spokane
33	065	Stevens
34	067	Thurston
35	069	Wahkiakum
36	071	Walla Walla
37	073	Whatcom
38	075	Whitman
39	077	Yakima

Place Code *(Old Item 1276)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(5)	N(5,0)	I	BL03	B.L.03	I.5

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Specification	Commentary
Report the FIPS place code for the city, town, township, village, and other census-designated place where the bridge is located. See Table BL03 below. Report 0 if there is no FIPS place code where the bridge is located NBI and NTI Commentary: Federal Information Processing Standards were withdrawn by the National Institute of Standards and Technology on January 1, 2006, with the intent to replace them with the Geographic Names Information System (GNIS). On this basis, WSDOT has chosen not to maintain FIPS codes. See the following links for more information: https://www.usgs.gov/us-board-on-geographic-names https://www.usgs.gov/national-hydrography/national-hydrography-dataset	Use the FIPS codes in the current version of the Census of Population and Housing - Geographic Identification Code Scheme to determine the city, town, township, village, or other census-designated place code, regardless of ownership.

Table BL03 Place Code

City/Town/ Village	Place Code	City/Town/ Village	Place Code	City/Town/ Village	Place Code
UNINCORPORATED = 0		Granite Falls	27995	Port Orchard	55785
Aberdeen	00100	Hamilton	29255	Port Townsend	55855
Airway Heights	00905	Harrah	29710	Poulsbo	55995
Albion	01010	Harrington	29745	Prescott	56240
Algona	01290	Hartline	29920	Prosser	56450
Almira	01500	Hatton	30060	Pullman	56625
Anacortes	01990	Hoquiam	32300	Puyallup	56695
Arlington	02585	Hunts Point	32755	Quincy	57115
Asotin	03075	Ilwaco	33000	Rainier	57220
Auburn	03180	Index	33175	Raymond	57430
Bainbridge Island	03736	Ione	33560	Reardan	57465
Battle Ground	04475	Issaquah	33805	Redmond	57535
Beaux Arts Village	04895	Kahlotus	34575	Renton	57745

Table BL03 Place Code

City/Town/ Village	Place Code	City/Town/ Village	Place Code	City/Town/ Village	Place Code
Bellevue	05210	Kalama	34645	Republic	57850
Bellingham	05280	Kelso	35065	Richland	58235
Benton City	05560	Kenmore	35170	Ridgefield	58410
Bingen	06085	Kennewick	35275	Ritzville	58725
Black Diamond	06330	Kent	35415	Riverside	58795
Blaine	06505	Kettle Falls	35485	Rock Island	59180
Bonney Lake	07170	Kirkland	35940	Rockford	59145
Bothell	07380	Kittitas	36045	Rosalia	59775
Bremerton	07695	Krupp	36395	Roslyn	60055
Brewster	07835	La Center	36710	Roy	60160
Bridgeport	07870	La Conner	36780	Royal City	60230
Brier	07940	Lacey	36745	Ruston	60510
Buckley	08570	LaCrosse	36850	Sammamish	61115
Bucoda	08605	Lake Forest Park	37270	SeaTac	62288
Burien	08850	Lake Stevens	37900	Seattle	63000
Burlington	08920	Lakewood	38038	Sedro-Woolley	63210
Camas	09480	Lamont	38215	Selah	63280
Carbonado	09970	Langley	38355	Sequim	63385
Carnation	10215	Latah	38495	Shelton	63735
Cashmere	10495	Leavenworth	38845	Shoreline	63960
Castle Rock	10565	Liberty Lake	39335	Skykomish	64855
Cathlamet	10635	Lind	39510	Snohomish	65170
Centralia	11160	Long Beach	40070	Snoqualmie	65205
Chehalis	11475	Longview	40245	Soap Lake	65345
Chelan	11615	Lyman	40770	South Bend	65625
Cheney	11825	Lynden	40805	South Cle Elum	65765
Chewelah	12140	Lynnwood	40840	South Prairie	66045
Clarkston	12630	Mabton	40980	Spangle	66290
Cle Elum	12945	Malden	42275	Spokane	67000
Clyde Hill	13365	Mansfield	42800	Spokane Valley	67167
Colfax	13785	Maple Valley	43150	Sprague	67175
College Place	13855	Marcus	43395	Springdale	67210
Colton	13890	Marysville	43955	St. John	60860
Colville	14170	Mattawa	44165	Stanwood	67455
Conconully	14310	McCleary	41225	Starbuck	67490
Concrete	14380	Medical Lake	44690	Steilacoom	67770
Connell	14485	Medina	44725	Stevenson	67875
Cosmopolis	14870	Mercer Island	45005	Sultan	68260
Coulee City	15080	Mesa	45180	Sumas	68330
Coulee Dam	15115	Metaline	45285	Sumner	68435
Coupeville	15185	Metaline Falls	45320	Sunnyside	68750
Covington	15290	Mill Creek	45865	Tacoma	70000
Creston	15710	Millwood	45985	Tekoa	70560

Table BL03 Place Code

City/Town/ Village	Place Code	City/Town/ Village	Place Code	City/Town/ Village	Place Code
Cusick	16340	Milton	46020	Tenino	70630
Darrington	16690	Monroe	46685	Tieton	71400
Davenport	16795	Montesano	46895	Toledo	71785
Dayton	16970	Morton	47175	Tonasket	71890
Deer Park	17320	Moses Lake	47245	Toppenish	71960
Des Moines	17635	Mossyrock	47315	Tukwila	72625
DuPont	18965	Mount Vernon	47560	Tumwater	72905
Duvall	19035	Mountlake Terrace	47490	Twisp	73080
East Wenatchee	20155	Moxee	47665	Union Gap	73290
Eatonville	20260	Mukilteo	47735	Uniontown	73360
Edgewood	20645	Naches	47805	University Place	73465
Edmonds	20750	Napavine	47980	Vader	73780
Electric City	21030	Nespelem	48540	Vancouver	74060
Ellensburg	21240	Newcastle	48645	Waitsburg	75565
Elma	21450	Newport	48820	Walla Walla	75775
Elmer City	21485	Nooksack	49275	Wapato	76125
Endicott	21730	Normandy Park	49415	Warden	76160
Entiat	22010	North Bend	49485	Washougal	76405
Enumclaw	22045	North Bonneville	49555	Washtucna	76440
Ephrata	22080	Northport	50045	Waterville	76510
Everett	22640	Oak Harbor	50360	Waverly	76720
Everson	22745	Oakesdale	50325	Wenatchee	77105
Fairfield	22990	Oakville	50430	West Richland	77665
Farmington	23340	Ocean Shores	50570	Westport	77630
Federal Way	23515	Odessa	50745	White Salmon	78330
Ferndale	23620	Okanogan	50920	Wilbur	78680
Fife	23795	Olympia	51300	Wilkeson	78925
Fircrest	23970	Omak	51340	Wilson Creek	79135
Forks	24810	Oroville	51970	Winlock	79275
Friday Harbor	25615	Orting	52005	Winthrop	79380
Garfield	26140	Othello	52215	Woodinville	79590
George	26455	Pacific	52495	Woodland	79625
Gig Harbor	26735	Palouse	52950	Woodway	79835
Gold Bar	27365	Pasco	53545	Yacolt	79975
Goldendale	27435	Pateros	53720	Yakima	80010
Grand Coulee	27855	Pe Ell	53930	Yarrow Point	80150
Grandview	27925	Pomeroy	55120	Yelm	80220
Granger	27960	Port Angeles	55365	Zillah	80500

Highway Agency District *(Old Item 1274)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	I	BL04	B.L.04	I.6

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Specification	Commentary
This is the WSDOT region in which the bridge is located.	

Table BL04 Highway Agency District - Region Code

WSBIS Code	NBI Code	NTI Code	Region Name
NW	1	NW	Northwest Region
NC	2	NC	North Central Region
OL	3	OL	Olympic Region
SW	4	SW	Southwest Region
SC	5	SC	South Central Region
EA	6	EA	Eastern Region

A region boundary map can be found at: https://www.wsdot.wa.gov/data/tools/geoportal/.

NBI and NTI Commentary:
This field is translated as shown in the table above for the NBI, but is not translated for the NTI.

Metropolitan Planning Organization *(Old Item 1024)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	AN(300)	I	BL12	B.L.12	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Specification	Commentary
Report the name(s) of the Metropolitan Planning Organization(s) in which the bridge is located, regardless of bridge owner or maintenance responsibility. Report each MPO when the bridge is located on a boundary between MPOs. Report multiple MPOs separated by pipe (|) delimiters. Report N if Bridge is not located in an MPO.	MPO maps are available here: https://www.wsdot.wa.gov/data/tools/geoportal/ Note that this field does not apply to Regional Transportation Planning Organizations (RTPO's).

WSBIS Item WL05 – City *(Old Item 2023)* **Pulldown**

Applicable Structure Types

- **All structure records**

This is the 1990 federal census place code, updated by OFM.

If the bridge is not in a city, code 0 - Unincorporated.

A map of city limits is available at https://www.wsdot.wa.gov/data/tools/geoportal/.

WSBIS Item WL06 – Section *(Old Item 2181)* **N(2)**
WSBIS Item WL07 – Township *(Old Item 2183)* **N(2)**
WSBIS Item WL08 – Range *(Old Item 2185)* **AN(3)**

Applicable Structure Types

- **All structure records**

Section, township, and range numbers are location markers established by survey mapping. If the structure runs along a section, township, or range line, use the smaller of the two numbers. If a structure crosses any line, use the number at the beginning of the structure.

WSBIS Item WL06 **– Section**

This is the number of the section in which the structure is located. Enter a numeric code from 01 to 36.

WSBIS Item WL07 **– Township**

This is the number of the township in which the structure is located. Enter a numeric code from 01 to 41. Township designations carry a directional suffix (north or south); however, since all townships in Washington are north, this directional indicator need not be entered.

WSBIS Item WL08 **– Range**

This is the number of the range in which this structure is located. There are two parts to this field. In the first two places, enter the number of the range in which the structure is located. Valid ranges are:

01 through 47 if the third column is E
01 through 16 if the third column is W.

In the third place, enter the directional suffix which indicates the position of the range in relation to the Willamette Meridian. Enter one of the following codes:

E East
W West

A map of section, township and range information is available at https://www.wsdot.wa.gov/data/tools/geoportal/.

WSBIS Item 1285 – Toll Code - NBI **Pulldown**
FHWA Item 20 – Toll
NTI Item C.4 - Toll

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

The toll status of the structure is indicated by this item. Interstate toll segments under Secretarial Agreement (Title 23 - United States Code - Highways Section 129 as amended by 1991 ISTEA and prior legislation) shall be identified separately. Use one of the following codes:

Table 1285 Toll Code - NBI

WSBIS Code	NBI Code	NTI Code	Description
1	1	1	Toll bridge. Tolls are paid specifically to use the structure.
2	2	2	On toll road. The structure carries a toll road, that is, tolls are paid to use the facility, which includes both the highway and the structure.
3	3	0	On free road. The structure is toll free and carries a toll free highway.
4	4	2	On Interstate toll segment under Secretarial Agreement. Structure functions as a part of the toll segment.
5	5	2	Toll bridge is a segment under Secretarial Agreement. Structure is separate agreement from highway segment.

NTI Commentary:

Toll codes translated for the NTI as shown in the table above.

Toll - SNBI

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	I	BCL05	B.CL.05	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Specification	Commentary
Report the inspection type or scour monitoring performed using one of the following codes. **Code** **Description** 1 Toll bridge not under FHWA Toll Agreement 2 Toll bridge under FHWA Toll Agreement 3 Bridge carries a toll road not under FHWA Toll Agreement 4 Bridge carries a toll road under FHWA Toll Agreement N Bridge does not carry a tool road and is not a toll bridge Structures are considered tolled if only a portion of the bridge is tolled such as if an HOV Toll (HOT) lane is on the same bridge as a freeway.	More tolling program information related to 23 U.S.C. 129 can be found at: https://www.fhwa.dot.gov/ipd/tolling_and_pricing/ and in the FHWA Informational Memorandum - Federal Tolling Programs under the Moving Ahead for Progress in the 21st Century Act.

WSBIS Item 1289 – Temporary Structure - NBI **Pulldown**

NBI Item 103

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

Code this item to indicate situations where a temporary structure or conditions exist.

Table 1289 Temporary Structure Code - NBI

WSBIS Code	Description
T	Temporary structure or conditions exist.
null	No temporary structure or conditions

A temporary structure or conditions are those which are required to facilitate traffic flow. This may occur either before or during the modification or replacement of a structure found to be deficient. Such conditions include the following:

- Bridges shored up, including additional temporary supports.
- Temporary repairs made to keep a bridge open.
- Temporary structures, temporary runarounds or bypasses.
- Other temporary measures, such as barricaded traffic lanes to keep the bridge open.

Any repaired structure or replacement structure which is expected to remain in place without further project activity, other than maintenance, for more than 5 years shall not be considered temporary. Under such conditions, that structure, regardless of its type, shall be considered the minimum adequate to remain in place and evaluated accordingly.

If this item is coded T, then all data recorded for the structure shall be for the condition of the structure without temporary measures, except for the following items which shall be for the temporary structure:

WSBIS Item 1499 – Inventory Route, Minimum Vertical Clearance
1293 – Structure Open, Posted, or Closed to Traffic
1491 – Inventory Route, Total Horizontal Clearance
1370 – Minimum Vertical Clearance Over Bridge Roadway
1374 – Minimum Vertical Underclearance
1379 – Minimum Lateral Underclearance on Right
1383 – Minimum Lateral Underclearance on Left
1660 – Bridge Posting

NBI Commentary:

WSDOT has defined a 5 year time period for which temporary structures or conditions can be in place and still considered temporary. The NBI coding guide refers to “a significant period of time.”

WSBIS Item 1292 – Historical Significance (NRHP) - NBI **Pulldown**

NBI Item 37

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

This item identifies historical significance based on a criteria established by the National Register of Historic Places (NRHP). Generally the Washington State Department of Archaeology and Historic Preservation (DAHP) performs a review based on this criteria.

Use one of the following codes:

Table 1292 Historical Significance (NRHP) - NBI

WSBIS Code	NBI Code	Description
1	1	Structure is on the NRHP.
2	2	Structure is eligible for the NRHP.
3	3	Structure is possibly eligible for the NRHP but requires further investigation before determination can be made. Alternately, structure is on a State or local historic register.
4	4	Historical significance has not been determined at this time. (This code should be used for all new structures.)
5	5	Structure is not eligible for the NRHP – reviewed by the DAHP.
6	5	Structure is not eligible for the NRHP – reviewed by agency other than the DAHP.

Historic Significance (NRHP) - SNBI

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(1)	-	EI	BCL04	B.CL.04	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Specification	Commentary
Report the inspection type or scour monitoring performed using one of the following codes. **Code** – **Description** 1 – Bridge is on the National Register 2 – Bridge is eligible for the National Register 3 – Bridge is in a historic district that is on or eligible for the National Register, and contributes to the eligibility of the district 4 – Bridge is in a historic district that is on or eligible for the National Register, but does not contribute to the eligibility of the district 5 – Bridge is potentially eligible for the National Register, or potentially contributes to a historic district, but has not been evaluated according to the criteria for listing 6 – Bridge is on a State or local historic register, but is not eligible for the National Register 7 – Historic significance of the bridge has not been determined N – Bridge is not eligible for the National Register, and is not in a historic district eligible for the National Register or when other codes do not apply.	This item is used to report the historic significance of bridges. Bridges that are historically significant are subject to Section 106 of the National Historic Preservation Act of 1966, and 36 CFR 800 (Protection of Historic Properties). 36 CFR 800 governs the Section 106 process, and outlines how agencies are to consult with various parties, identify historic properties, and assess the effects of undertakings to properties. Undertakings to historically significant bridges or their surroundings are also subject to Section 4(f) of the Department of Transportation Act of 1966, and 23 CFR Part 774 (Parks, Recreation Areas, Wildlife and Waterfowl Refuges, and Historic Sites). 23 CFR Part 774 governs the Section 4(f) process, considers how the property is used as a resource, and outlines the project approval process when undertakings are proposed. 36 CFR Part 70 (National Register of Historic Places) identifies the attributes that may make a property historically significant, and prescribes the evaluation criteria and procedures for listing properties on the National Register. Determinations of eligibility are generally not made with the purpose of eventual listing on the National Register of Historic Places. Rather, the evaluation criteria for listing is used to assess historical significance with the purpose of assessing the effects of undertakings, and to fulfill the goals of 23 USC 144(g) Historic Bridges. Determinations of eligibility are normally made by the relevant federal agency, typically FHWA for highway bridges, and can change when circumstances or conditions change, such as age or bridge integrity. As such, the eligibility status and reported code can change with time.

Historic Significance (NRHP) - SNBI Commentary Continued
Use code 2 when the bridge has been determined to be eligible for listing on the National Register even though the nomination and listing process have not concluded or are not being pursued. Use code 5 when the bridge has attributes that may make it historically significant as indicated by the National Register criteria for evaluation and listing. This code may also apply when a bridge was previously evaluated but requires reevaluation because its current attributes, such as age, may make it historically significant. Use code 6 when a bridge has local historic value, but has been determined to be not eligible for the National Register. Undertakings may be subject to the Section 4(f) process, but without the same level of consultation as prescribed by Section 106. Use code N when the other codes do not apply.

WSBIS Item WCL04 – Historical Significance – HAER *(Old Item 2295)* Pulldown

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

This item identifies historical significance based on a criteria established by the Historic American Engineering Record (HAER).

Use one of the following codes:

Table WCL04 Historical Significance - HAER

WSBIS Code	Description
1	Structure is on the HAER.
2	Structure is eligible for the HAER.
3	Structure is possibly eligible for the HAER but requires further investigation before determination can be made. Alternately, structure is on a State or local historic register.
4	Historical significance has not been determined at this time. (This code should be used for all new structures.)
5	Structure is not eligible for the HAER – reviewed by the DAHP.
6	Structure is not eligible for the NRHP – reviewed by agency other than the DAHP.

WSBIS Item 7296 – Historical Significance – Local Agency (LP view only) Pulldown

Applicable Structure Types

- **All structure records owned by local agencies**

This item identifies historical significance using a criteria established by the local agency that owns the structure.

Use one of the following codes:

Table 7296 Historical Significance - Local Agency

WSBIS Code	Description
0	Neither bridge nor crossing is on the local agencies registry or a determination has not been made.
1	Bridge is on the local agency registry.
2	Crossing is on the local agency registry.

WSBIS Item 7281 – Legislative District 1 (LP view only) N(2,0)

Applicable Structure Types

- **All structure records owned by local agencies**

This field identifies the first or only State Legislative District in which the bridge is located. If the legislative district is followed by a letter (District 19A, for example), disregard the letter and enter the 2 digit number only.

WSBIS Item 7283 – Legislative District 2 (LP view only) N(2,0)

Applicable Structure Types

- **All structure records owned by local agencies**

For bridges which span a State Legislative District dividing line, use this field to identify the second State Legislative District number. Use both this and the Legislative District 1 field to enter the two separate district numbers.

WSBIS Item 2615 – Special Structures Flag (Inv MO only) Pulldown

Applicable Structure Types

- **All structure records**

This code flags structures that are inspected by the BPO Special Structures group.

Y Yes, structure inspected by the BPO Special Structures group.
* Null, structure not inspected by the BPO Special Structures group.

WSBIS Item 2930 – Obsolete Structure Flag (Inv MO only) **Check Box**

Applicable Structure Types

- **All structure records**

This check box can only be edited in the Inventory Managed Operation, and is used to "obsolete" a structure record. See Sections 2.02.02 and 2.03.04 for more information.

Border Structure ID *(Old Item 1590)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(15)	-	I	BL07	B.L.07	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the neighboring State's exact bridge number as used in their Item B.ID.01 (SID). Report N when the bridge does not cross a border with another State or Country. Report 0 when the bordering country does not have a bridge number.	For the purposes of the NBI, only bridges that cross a State or international border are considered border bridges. The Neighboring State reports this item as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

Border State or Country Code *(Old Item 1585)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	AN (2)	I	BL08	B.L.08	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Specification	Commentary
Use one of the following codes: **Code** **Description** 410 Oregon 160 Idaho Leave blank if structure does not cross a border.	See WSBIM Appendix 2-F for a listing of border bridges on the Washington State inventory.

WSBIS Item 1588 – Border Bridge Percent - NBI **N(2,0)**
NBI Item 98B

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code a 2-digit number specifying the percentage of total deck area of the existing bridge that the neighboring State is responsible for funding.

Leave blank if the structure does not cross a state border.

Border Bridge Inspection Responsibility *(Old Item 1591)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(1)	-	I	BL09	B.L.09	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the border bridge inspection responsibility for any entity within the State geographical boundaries, regardless of ownership, using one of the following codes. . **Code** / **Description** 0 No responsibility 1 Shared responsibility with border State or country 2 Full responsibility Leave blank if structure does not cross a border.	Agency inspection responsibility must be documented in interagency agreements or memorandums of understanding and included as part of the bridge file or record.

Border Bridge Designated Lead State *(Old Item 1592)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	N(2,0)	I	BL10	B.L.10	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Use one of the following codes: **Code** **Description** 530 Washington 410 Oregon 160 Idaho Leave blank if structure does not cross a border	If Washington is the designated lead state, all inventory data will be reported to the SNBI. If another state is designated, then WSDOT will only report the following fields, which must match the data reported by the border state:

Commentary Continued

Item ID	Data Item
B.ID.01	Bridge Number
B.ID.03	Previous Bridge Number
B.L.01	State Code
B.L.02	County Code
B.L.03	Place Code
B.L.04	Highway Agency District
B.L.07	Border Bridge Number
B.L.08	Border Bridge State or Country Code
B.L.09	Border Bridge Inspection Responsibility
B.L.10	Border Bridge Designated Lead State
B.L.12	Metropolitan Planning Organization
B.F.01	Feature Type
B.F.02	Feature Location
B.F.03	Feature Name
B.RT.01	Route Designation
B.RT.02	Route Number
B.RT.03	Route Direction
B.RT.04	Route Type
B.RT.05	Service Type
B.H.03	NHS Designation
B.H.06	LRS Route ID
B.H.07	LRS Mile Point
B.H.18	Crossing Bridge Number

Geometry Tab

NBIS Bridge Length *(Old Item 2346)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(7,1)	-	I	BG01	B.G.01	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the NBIS bridge length to the nearest tenth of a foot measured along the roadway centerline between undercopings of abutments or spring lines of arches. For filled or closed spandrel arches, measure along the roadway centerline from inside faces of exterior spring lines. For other bridges under fill, measure along the roadway centerline from inside faces of exterior walls; this includes multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening. Vaulted abutments and enclosed spans or sections are included in the NBIS bridge length. Report the field measured NBIS bridge length when Item B.G.02 (Total Bridge Length) is less than 30 ft.	Structures that meet the NBIS bridge definition, and NBIS applicability in 23 CFR 650.303, are reported to FHWA. The roadway centerline is the physical center of the portion of the roadway for the movement of vehicles, regardless of striping, and exclusive of shoulders. The total bridge length for curved bridges is measured along the curved centerline. When item B.G.02 (Total Bridge Length) is greater than 30.0 feet the value for this item may be estimated.

Examples – NBIS Bridge Length

Report measurement A.

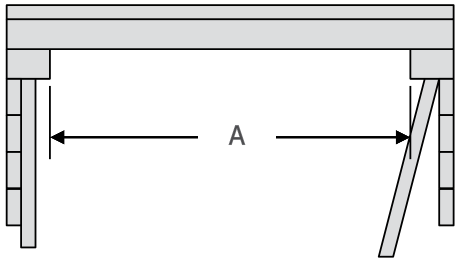


Figure 14. Profile view of a single span bridge with pile bent abutments.

Report measurement A.

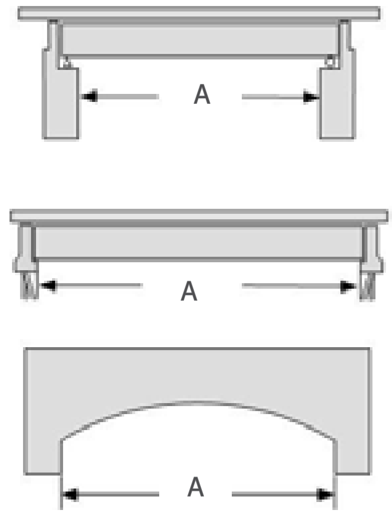


Figure 15. Profile views of various single span bridges.

Report measurement A.

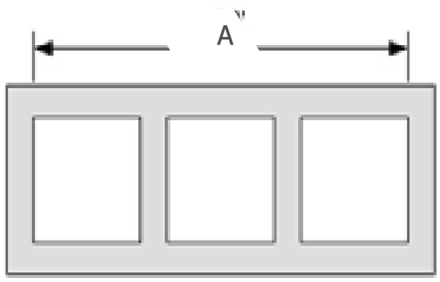


Figure 16. Profile view of a four-sided, multi-cell culvert under fill.

Report measurement A.

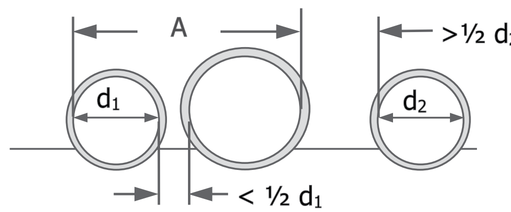


Figure 17. Profile view of a multi-pipe culvert under fill.

Examples - NBIS Bridge Length Continued
Skewed multi-pipe bridge under highway has an opening of 20.85 ft measured along the center of the roadway. Report 20.9.

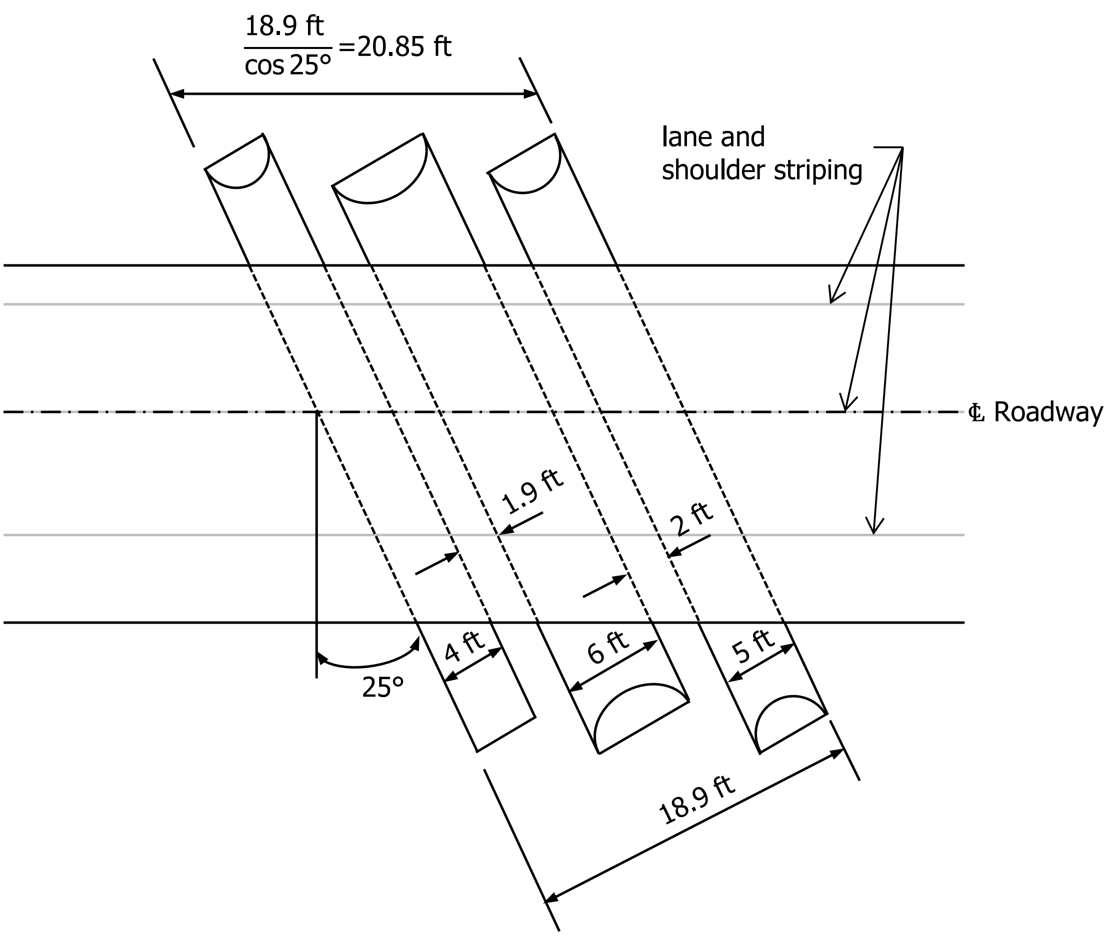


Figure 18. Plan view of a skewed, multi-pipe culvert under fill.

Total Bridge Length *(Old Item 1340)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(7,1)	-	I	BG02	B.G.02	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the total length of the bridge to the nearest tenth of a foot measured along the roadway centerline from back- to-back of backwalls or from paving notch to paving notch at abutments. For filled or closed spandrel arches, measure along the roadway centerline from inside faces of exterior spring lines when well-defined backwalls or paving notches do not exist. For other bridges under fill, measure along the roadway centerline from inside faces of exterior walls. For bridges with vaulted abutments and enclosed spans or sections, measure from back-to-back of backwalls or from paving notch to paving notch inclusive of the vaulted abutments and enclosed spans.	The total bridge length measurement can be used with the bridge width out-to-out to calculate an estimated deck area. The roadway centerline is the physical center of the portion of the roadway for the movement of vehicles, regardless of striping, and exclusive of shoulders. The total bridge length for curved bridges is measured along the curved centerline. For pedestrian RR and other non-vehicular structures, code this field when the owning agency performs Condition Inspections. The intent is to provide deck square footages associated with structure condition codes.

Examples – Total Bridge Length

Report measurement A.

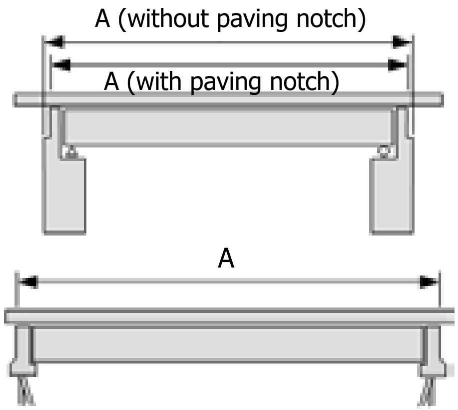
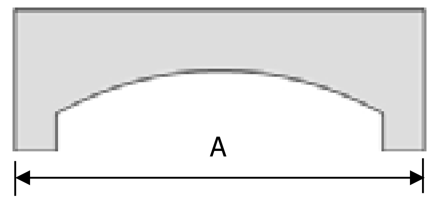
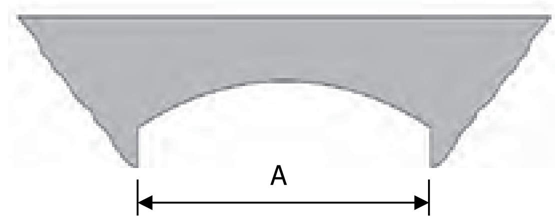


Figure 19. Profile views of various single span bridges.

Report measurement A.



Defined backwall or paving notch



No defined backwall or paving notch

Figure 20. Profile views of various spandrel arches.

Report measurement A.

Figure 21. Profile view of a single span bridge with pile bent abutments.

Examples - Total Bridge Length Continued

Report measurement A.

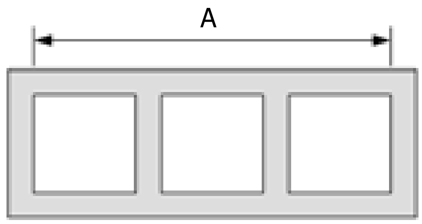


Figure 22. Profile view of a four-sided, multi-cell culvert under fill.

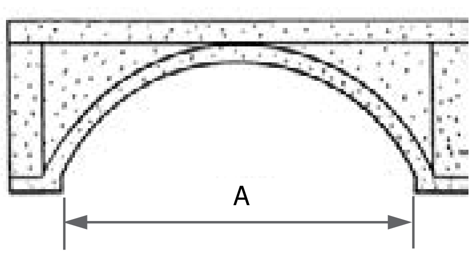


Figure 23. Profile view of a culvert under fill.

Report measurement A.

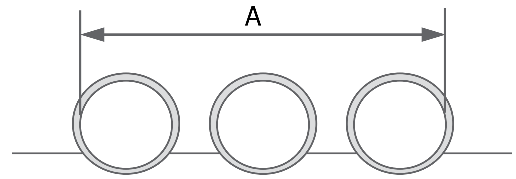


Figure 24. Profile view of a multi-pipe culvert under fill.

Four span bridge with variable skews. Total bridge length is measured along the roadway centerline from back-to-back of backwalls at abutments. Report 477.6.

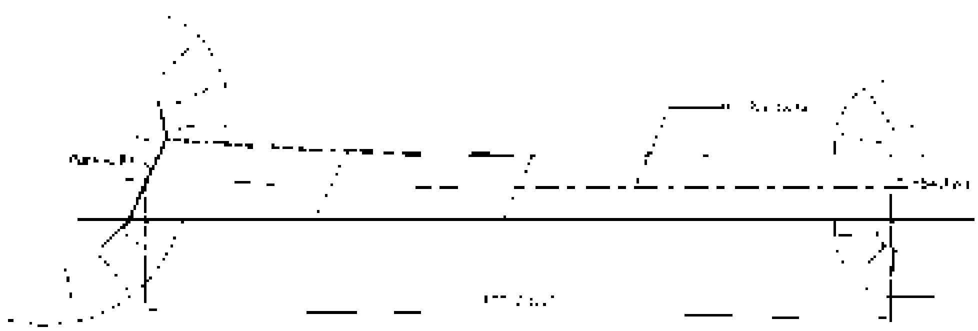


Figure 25. Plan view of a four-span bridge with variable skews.

Examples - Total Bridge Length Continued

Three span curved bridge. Total bridge length is measured along the roadway centerline from back-to-back of backwalls at abutments. Report 504.0.

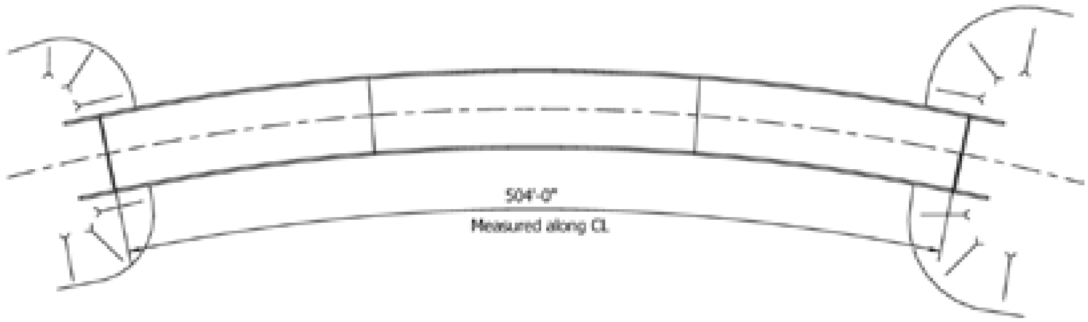


Figure 26. Plan view of a three-span curved bridge.

Skewed pipe bridge under a highway has an opening of 20.85 ft measured along the roadway centerline. Report 20.9.

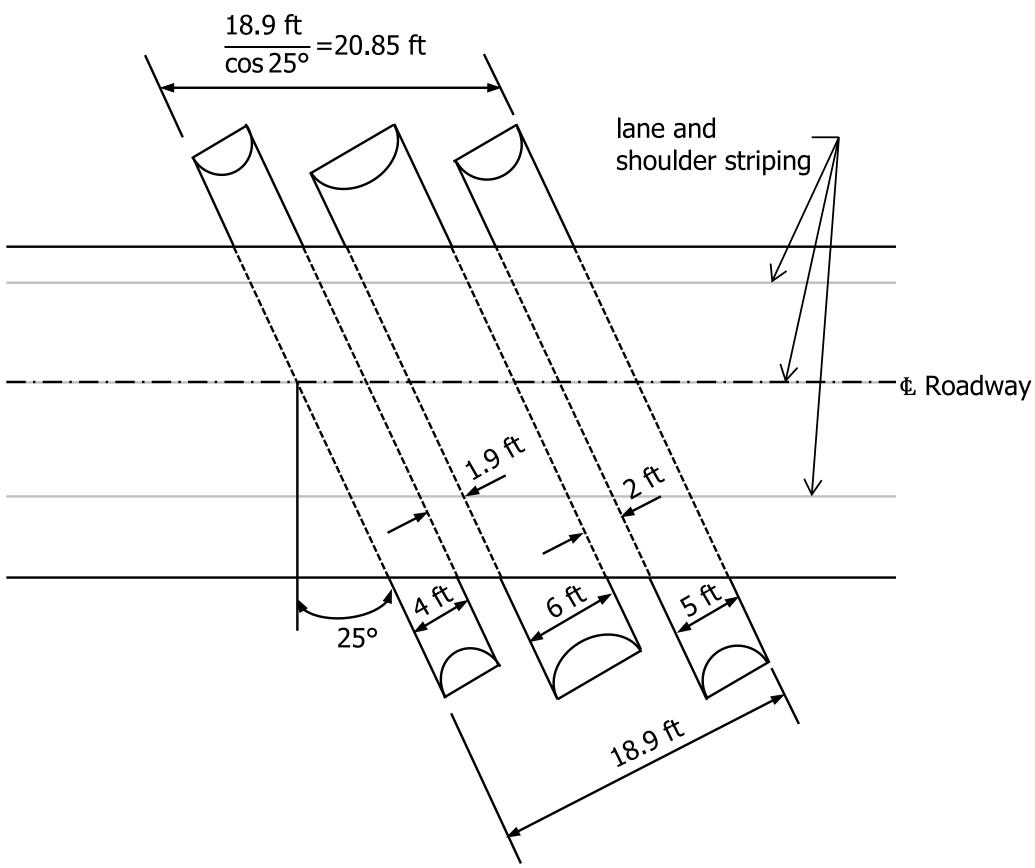


Figure 27. Plan view of a skewed, multi-pipe culvert under fill.

Tunnel Length - SNTI *(Old Item 1349)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(6,0)	-	EI	TG1	-	G.1

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification	Commentary
Record the length of the tunnel to the nearest foot. The length shall be measured along the centerline of the roadway.	When a tunnel is divided into segments, record the length of the segment. For example: if a 1000 foot tunnel is divided into 4- 250 foot segments, each segment will have a Tunnel Length of 250 feet. When multiple bores are reported as a single tunnel, record the length of the longest bore.

Example - Tunnel Length - SNTI

Tunnel Length	Code
860.4 feet	860
2,400	2400

Minimum Span Length *(Old Item 1347)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(5,1)	-	I	BG04	B.G.04	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the length of the minimum span to the nearest tenth of foot, measured from centerline of bearing to centerline of bearing, along the roadway centerline.	For rigid frames, arches, pipes, integral abutments, or similar type bridges where there is not a clear centerline of bearing, use the clear open distance between piers, bents, or abutments.

Examples - Minimum Span Length

Report measurement A.

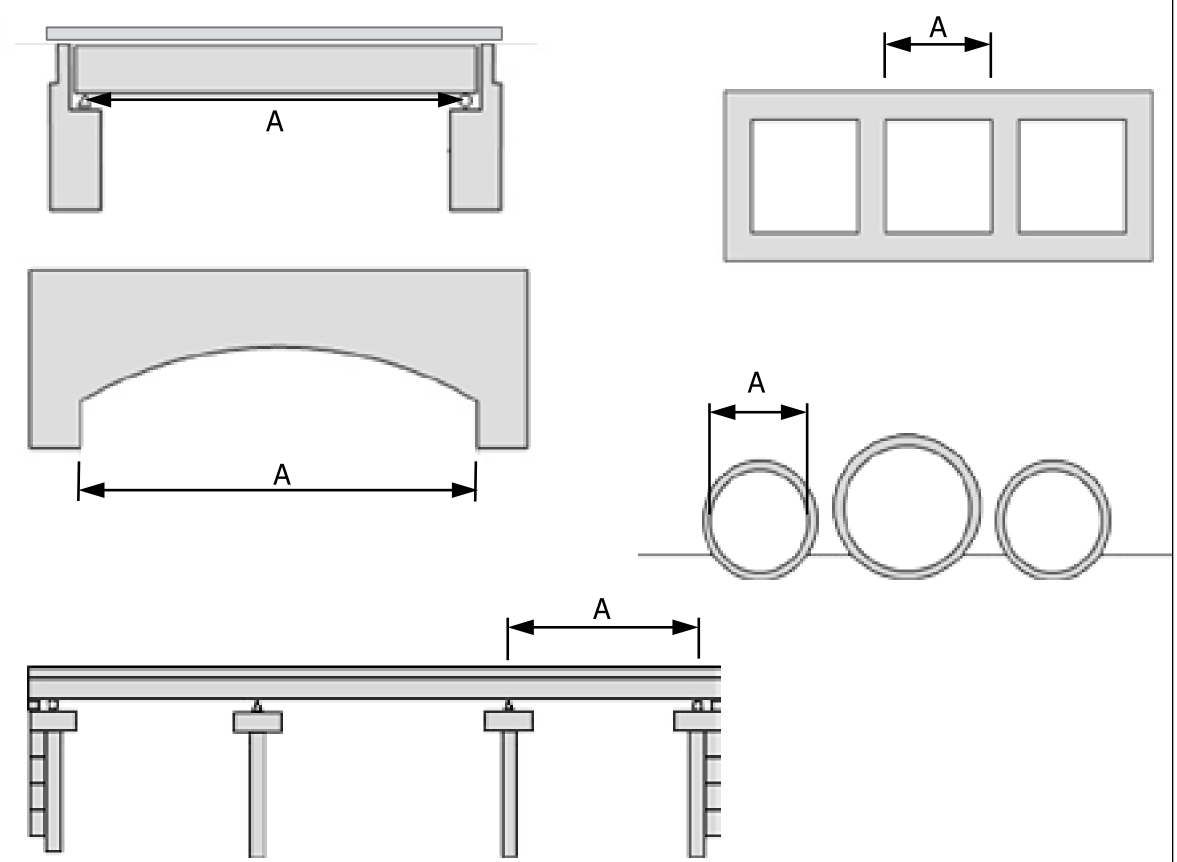


Figure 31. Profile views of various bridge types.

Examples - Minimum Span Length Continued

Four span bridge with variable skews. Span lengths are measured from centerline of bearing to centerline of bearing along the roadway centerline. Report 116.3.

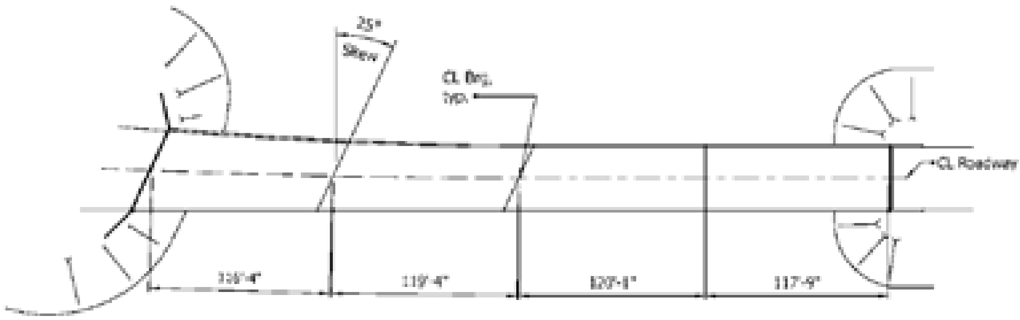


Figure 32. Plan view of a four-span bridge with variable skews.

Three span curved bridge. Span lengths are measured from centerline of bearing to centerline of bearing along the curved roadway centerline. Report 155.0.

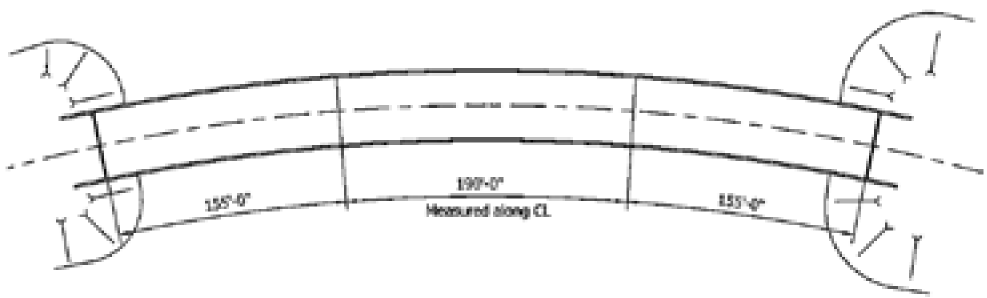


Figure 33. Plan view of a three-span curved bridge.

Maximum Span Length *(Old Item 1348)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(5,1)	-	I	BG03	B.G.03	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the length of the maximum span to the nearest tenth of foot, measured from centerline of bearing to centerline of bearing, along the roadway centerline	For rigid frames, arches, pipes, integral abutments, or similar type bridges where there is not a clear centerline of bearing, use the clear open distance between piers, bents, walls, or abutments. The roadway centerline is the physical center of the portion of the roadway for the movement of vehicles, regardless of striping, and exclusive of shoulders. The length for curved bridges would be measured along the curved centerline. For bridges with single spans this item has the same value as B.G.04 (Minimum Span Length).

Examples - Maximum Span Length

Report measurement A.

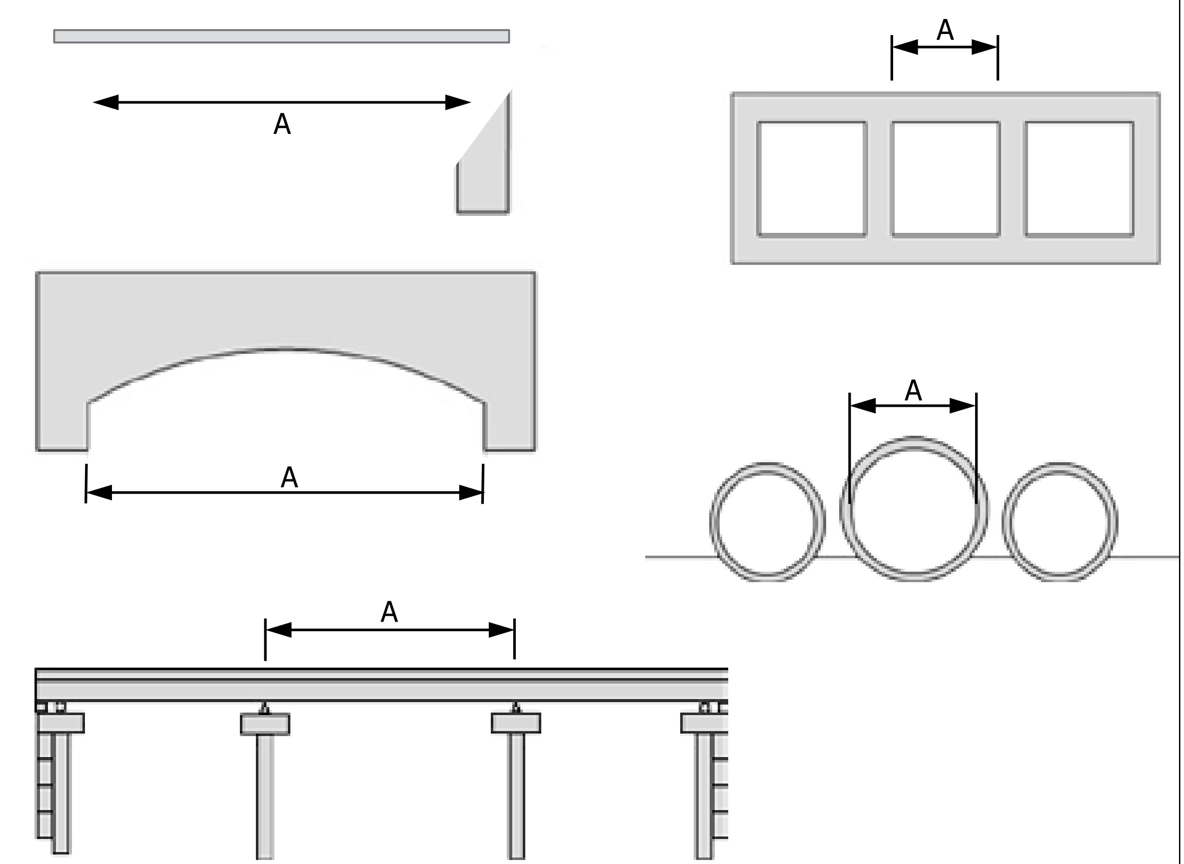


Figure 28. Profile views of various bridge types.

Examples - Maximum Span Length Continued

Four span bridge with variable skews. Span lengths are measured from centerline of bearing to centerline of bearing along the roadway centerline. Report 120.1.

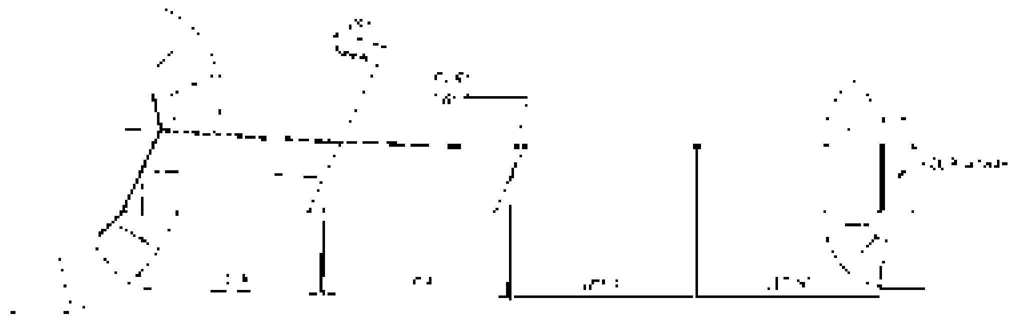


Figure 29. Plan view of a four-span bridge with variable skews.

Three span curved bridge. Span lengths are measured from centerline of bearing to centerline of bearing along the curved roadway centerline. Report 190.0.

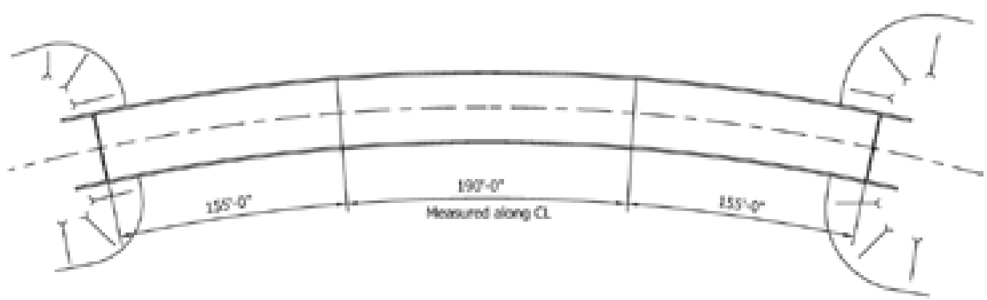


Figure 30. Plan view of a three-span curved bridge.

WSBIS Item 1360 – Out-to-Out Deck Width (feet) - NBI N(4,1)
NBI Item 52

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code the out-to-out width to the nearest tenth of a foot. If the structure is a through structure, the number to be coded will represent the lateral clearance between superstructure members. See example in Figure WSBIS 1364a.

The measurement will be the most representative out-to-out width on the bridge, and should be exclusive of flared areas for ramps. See examples in Figures WSBIS 1356a and 1364b.

Where traffic runs directly on the top slab (or wearing surface) of the culvert (e.g., an R/C box without fill) code the actual width (out-to-out). This will also apply where the fill is minimal and the culvert headwalls affect the flow of traffic. However, for sidehill viaduct structures code the actual out-to-out structure width. See Figure WSBIS 1356b.

Where the roadway is on a fill carried across a pipe or box culvert and the culvert headwalls do not affect the flow of traffic, code 0. This is considered proper inasmuch as a filled section over a culvert simply maintains the roadway cross-section.

SNBI measurements for Out_to_Out Deck Widths are enough different from this field that a separate field was created. This field can be used to populate the SNBI field in many cases, but thru trusses, thru arches, culverts, and cantilevered sidewalks are measured differently. See Appendix D, WSBIS Item 1361 for more details.

Bridge Width Out to Out - SNBI *(Old Item 1361)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(4,1)	-	I	BG05	B.G.05	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the minimum out-to-out width measured perpendicular to the centerline of the roadway to the nearest tenth of a foot. For multiple (double) deck bridges that are inventoried as one bridge, measure all levels, and report the sum of the measurements to account for the total width carried on the bridge. For bridges under fill, measure the width from out-to-out of the headwalls or barrel ends. For sidehill bridges, measure the out-to-out structure width. For bridges that carry multiple types of service, for example highway, pedestrian, and railroad, measure the out-to-out width that encompasses all service types.	For bridges under fill, the reported value can be limited to the width of the roadway section over the bridge for unusual situations where the bridge continues far beyond the roadway cross-section, and a lesser width would likely be constructed for a replacement project. For bridges under fill, in which the features that define the out-to-out width are not parallel, report the minimum out-to-out width. For pedestrian RR and other non-vehicular structures, code this field when the owning agency performs Condition Inspections. The intent is to provide deck square footages associated with structure condition codes.

Examples - Bridge Width Out to Out - SNBI

Report measurement A.

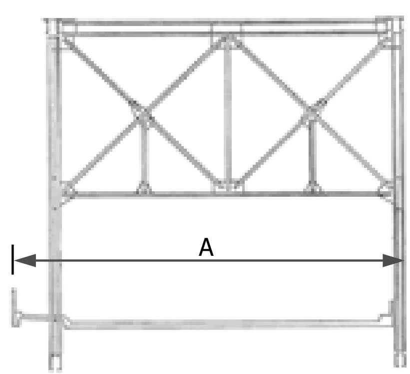
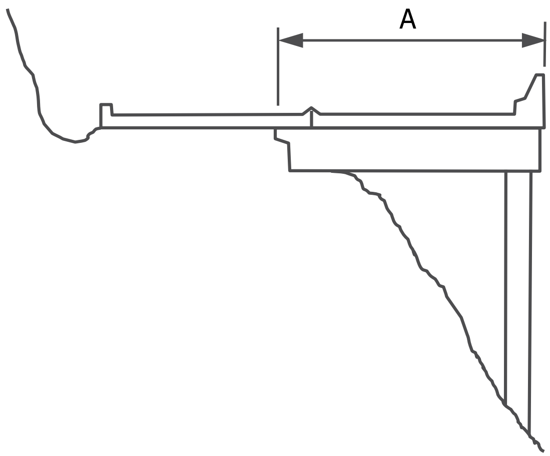
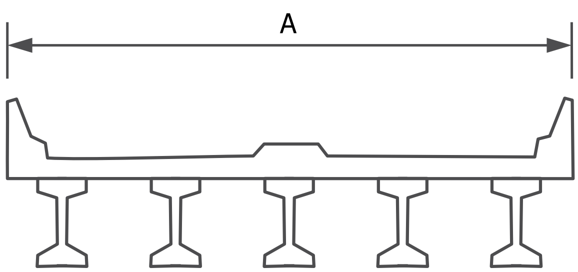
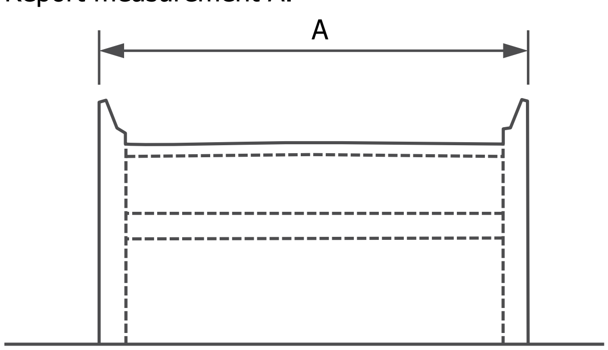


Figure 34. Cross-section view of a through truss bridge.

Examples - Bridge Width Out to Out - SNBI Continued
Report measurement A.  Figure 35. Cross-section view of a sidehill bridge.
Report measurement A.  Figure 36. Cross-section view of a multi-girder bridge.
Report measurement A.  Figure 37. Cross-section view of a filled arch bridge or culvert under fill with headwalls.

Examples - Bridge Width Out to Out - SNBI Continued

Report measurement A.

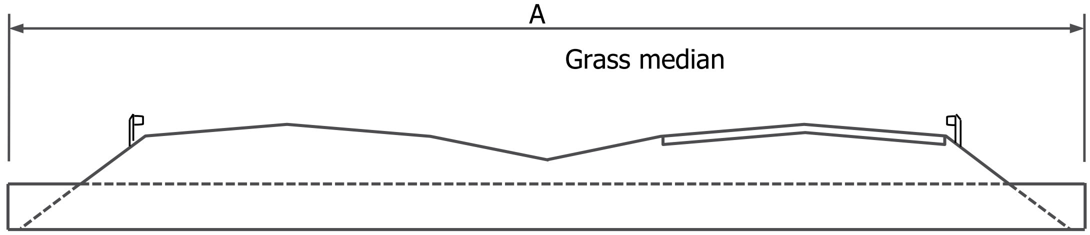


Figure 38. Cross-section view of a pipe culvert under fill.

Report measurement A.

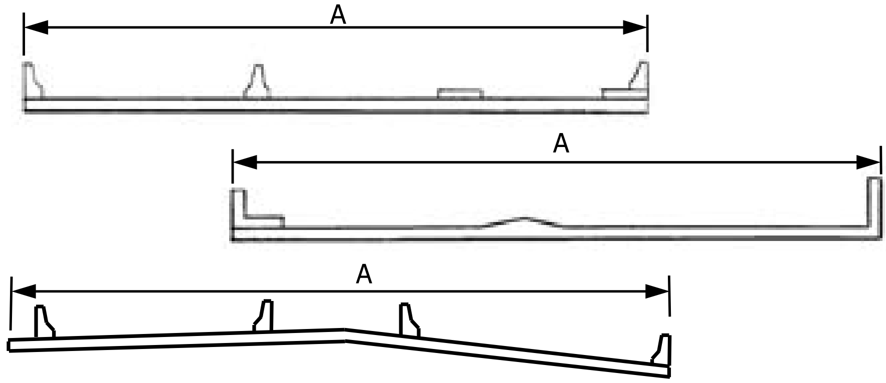


Figure 39. Cross-section views of various bridge decks with medians.

Report measurement A.

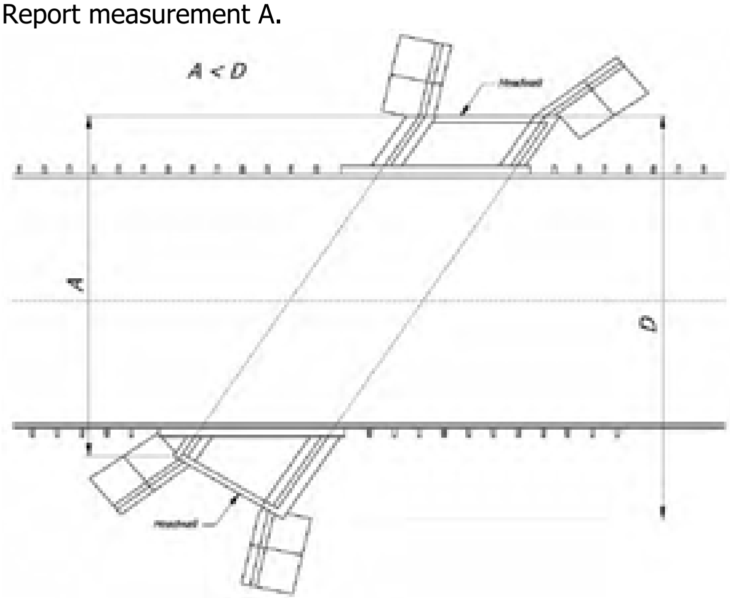
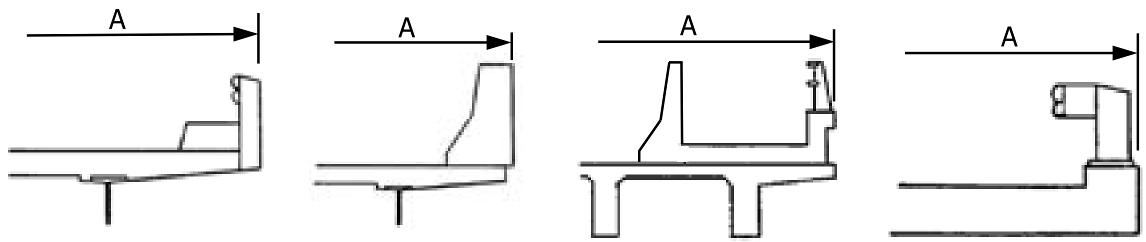
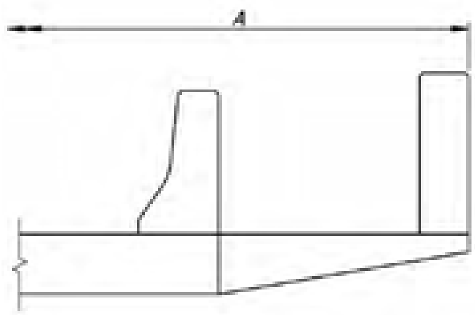


Figure 40. Plan view of a bridge with non-parallel fascias.

Examples - Bridge Width Out to Out - SNBI Continued
Report measurement A.  Figure 41. Partial cross-section views of various bridge decks with railings.
Report measurement A.  Figure 42. Cross-section view of a sidewalk retrofit.

WSBIS Item 1356 – Curb-to-Curb Width (feet) – NBI N(4,1)

NBI Item 51

Applicable Structure Types

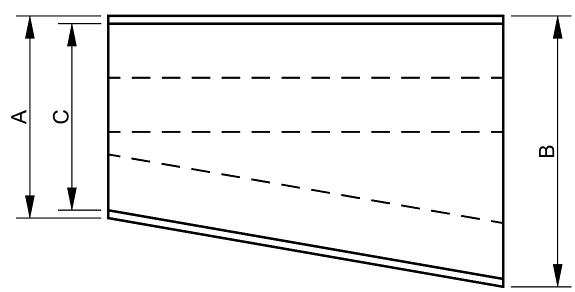
- **Bridges & culverts carrying public roadways**

Code the curb-to-curb width to the nearest tenth of a foot. The information to be recorded is the most restrictive minimum distance between curbs or rails on the structure roadway. The measurement should be exclusive of flared areas for ramps.

For structures with closed medians and usually for double decked structures, coded data will be the sum of the most restrictive minimum distances for all roadways carried by the structure*. The data recorded for this item must be compatible with other related route and structure data (e.g., Lanes On, Lanes Under, ADT, etc.). See examples in WSBIS Items 1364 and 1367.

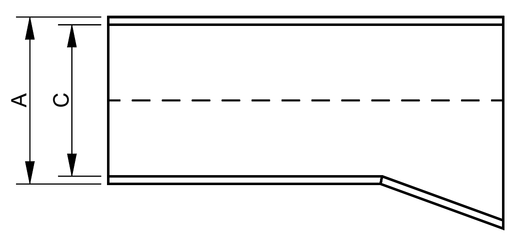
SNBI measurements for Curb_to_Curb Widths are enough different from this field that a separate field was created. This field can be used to populate the SNBI field in many cases, but thru trusses, thru arches, culverts, and cantilevered sidewalks are measured differently. See Appendix D, WSBIS Item 1358 for more details.

Figure WSBIS 1356a



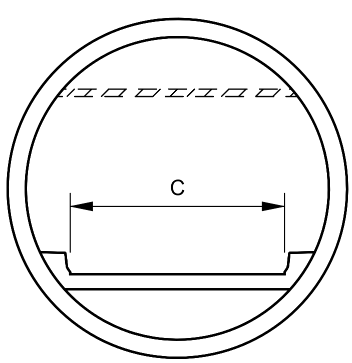
OUT TO OUT = (A + B) / 2
CURB TO CURB = C

EXAMPLE 1



OUT TO OUT = A
CURB TO CURB = C

EXAMPLE 2



CURB TO CURB = C
OUT TO OUT DOES NOT APPLY

EXAMPLE 3 (TUNNEL)

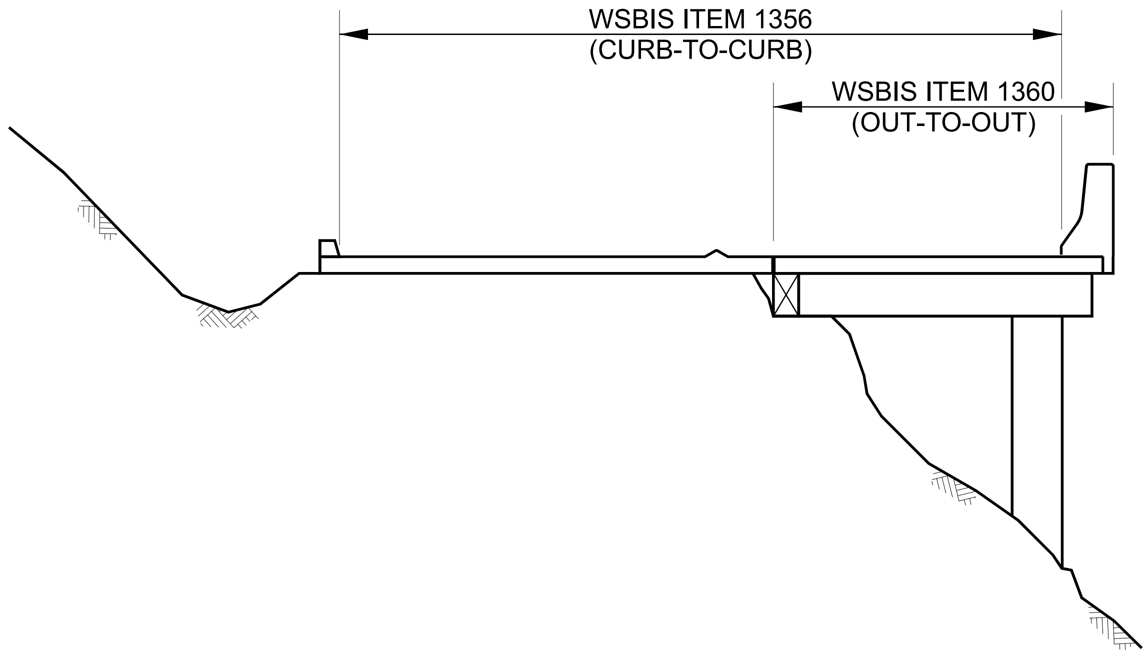
Where traffic runs directly on the top slab (or wearing surface) of a culvert-type structure (e.g., an R/C box without fill), code the actual roadway width (curb-to-curb or rail-to-rail).

Where the roadway is on fill carried across a structure and the headwalls or parapets do not affect the flow of traffic, code 0. This is considered proper inasmuch as a filled section simply maintains the roadway cross section.

*Raised or non-mountable medians, open medians, and barrier widths are to be excluded from the summation along with barrier-protected bicycle and equestrian lanes.

Coding a sidehill viaduct (half bridge):

Figure WSBIS 1356a



Bridge Width Curb to Curb - SNBI *(Old Item 1358)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(4,1)	-	I	BG06	B.G.06	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the sum of the most restrictive minimum usable distances for all roadways carried by the bridge. Measure the distance perpendicular to the centerline of the roadway between curbs or rails to the nearest tenth of a foot. Exclude from the usable distance measurement non-mountable medians, sidewalks, structurally inadequate shoulders, and other non-mountable areas. The measurement for this item shall be compatible with the measurements used for Item B.H.08 (Lanes On Highway), Item B.G.09 (Approach Roadway Width), and Item B.H.09 (Annual Average Daily Traffic). For multiple (double) deck bridges that are inventoried as one bridge, measure all levels, and report the sum of the most restrictive minimum usable distances carried by the bridge. For sidehill bridges measure the actual full curb-to-curb roadway width. For bridges that carry multiple types of service, for example highway, pedestrian, and railroad, report the usable distance that serves the highway service as denoted by curb or barrier separation, or other delineation that separates the service types.	Usable roadway width includes the width of traffic lanes and the widths of shoulders. Shoulders must be contiguous with the traveled way and must be structurally adequate for all weather and traffic conditions consistent with the facility carried. Unstabilized grass or dirt, with no base course, flush with and beside the traffic lane is not to be considered a shoulder for this item. For bridges under fill, the usable roadway width crossing the bridge is commonly the same value reported for Item B.G.09 (Approach Roadway Width). A barrier or curb greater than 6 inches high may be considered non-mountable for these specifications.

Examples - Bridge Width Curb to Curb - SNBI

Report measurement A.

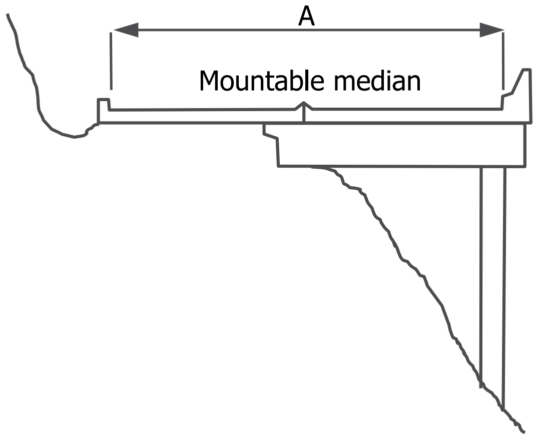


Figure 43. Cross-section view of a sidehill bridge.

Report measurement A.

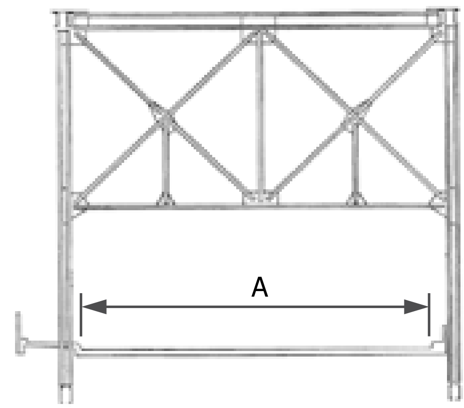


Figure 44. Cross-section view of a through truss bridge.

Report measurement A.

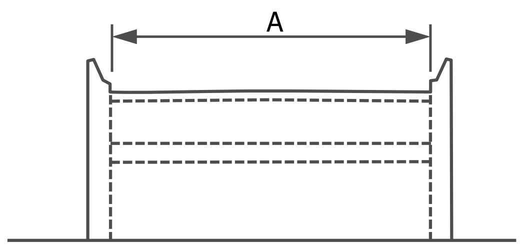


Figure 45. Cross-section view of a filled arch bridge or culvert under fill with headwalls.

Report measurement A.

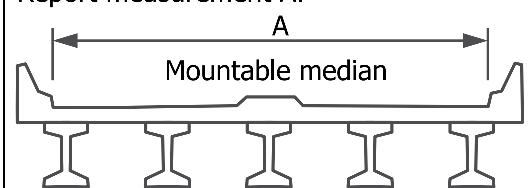


Figure 46. Cross-section view of a multi-girder bridge.

Report the sum of A+B.

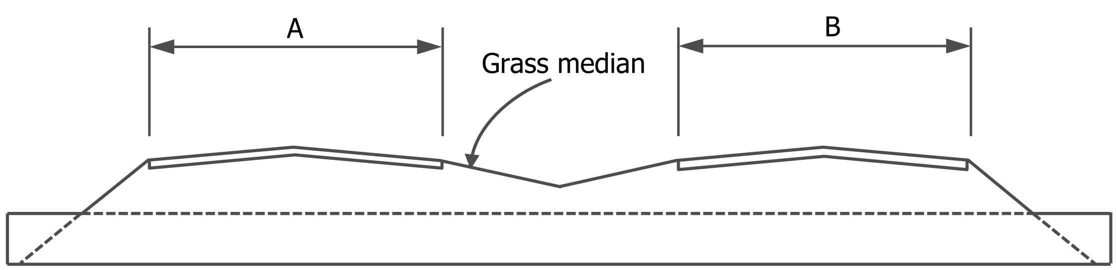


Figure 47. Cross-section view of a pipe culvert under fill.

Examples - Bridge Width Curb to Curb - SNBI Continued

Report measurement A.

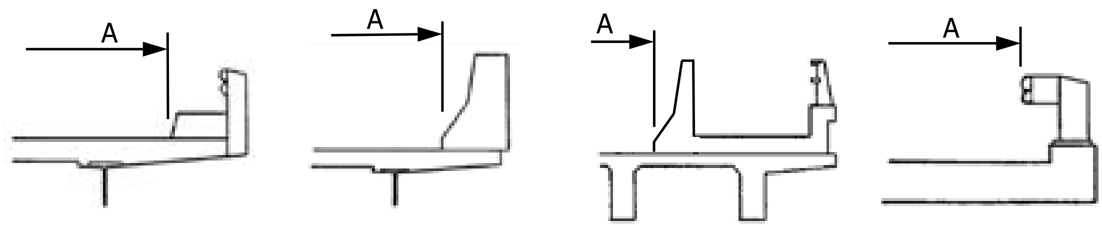


Figure 48. Partial cross-section views of various bridge decks with railings.

Report measurement A.

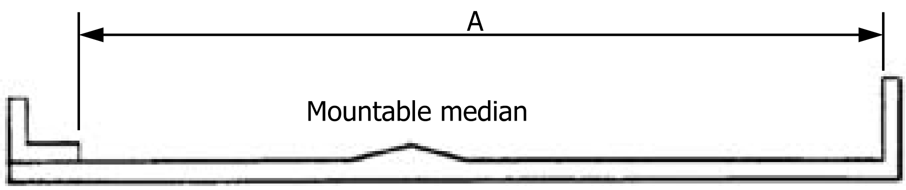


Figure 49. Cross-section view of a bridge deck with mountable median.

Report the sum of A+B+C.

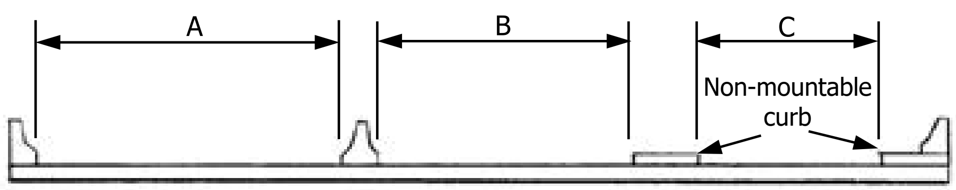


Figure 50. Cross-section view of a bridge deck with non-mountable curb and median barrier.

Report the sum of A+B.

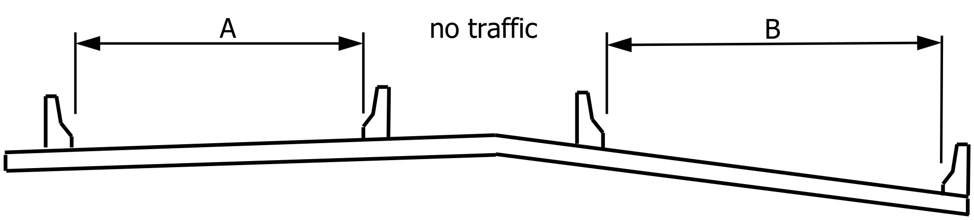


Figure 51. Cross-section view of a bridge deck with multiple median barriers.

Roadway Width Curb to Curb - SNTI *(Old Item 1357)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(4,1)	-	I	TG3	-	G.3

Applicable Structure Types

- **Tunnels carrying public roadways within**

Specification	Commentary
Record the most restrictive minimum distance between curbs or rails on the mainline tunnel roadway.	Ramps should be excluded when included as part of a tunnel system. The intent is to determine the restrictions of the primary route of the tunnel. Raised or non-mountable medians, and barrier widths are to be excluded from the summation.

Commentary Continued

Roadway Width, Curb to Curb	Code
24.00 feet	24.0
30.43 feet	30.4

Example - Roadway Width Curb to Curb - SNTI

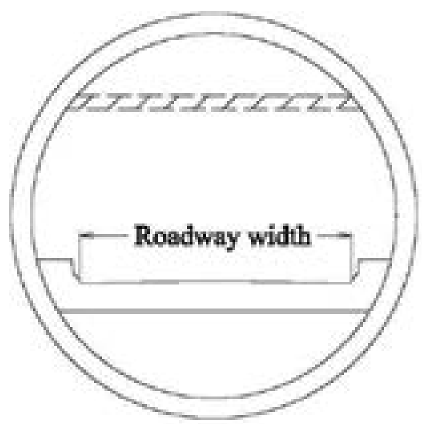


Figure 2.6.2 - Drawing of Width

Left Curb or Sidewalk Width *(Old Item 1364)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(3,1)	-	I	BG07	B.G.07	G.4

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Specification	Commentary
Report the minimum width of the left curb or sidewalk to the nearest tenth of a foot from the face of bridge rail to the face of curb. Measure the width perpendicular to the centerline of the roadway. Report 0.0 when the face of the curb does not extend beyond the face of the bridge rail. Report 0.0 when there is no left curb or sidewalk.	Left and right are determined based on the direction of the inventoried route carried by the bridge, commonly west to east or south to north. When a defined longitudinal joint exists between the curb and the sidewalk, such as a granite curb and concrete sidewalk, measure the width from the face of bridge rail to the face of the granite curb.

Examples - Left Curb or Sidewalk Width

Report measurement C.

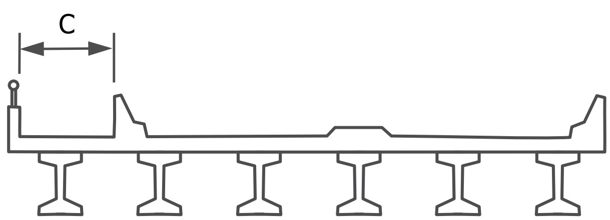


Figure 52. Cross-section view of a multi-girder bridge.

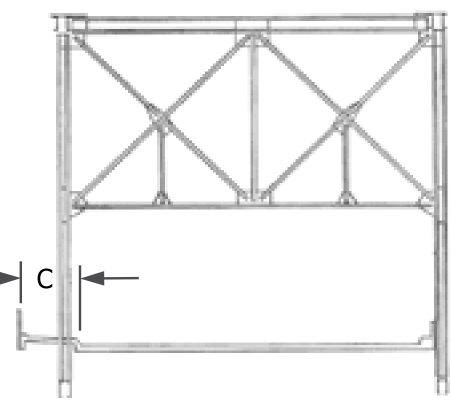


Figure 53. Cross-section view of a through truss bridge.

Report measurement C.

Figure 54. Cross-section view of a slab bridge.

Examples - Left Curb or Sidewalk Width Continued

Report measurement C.

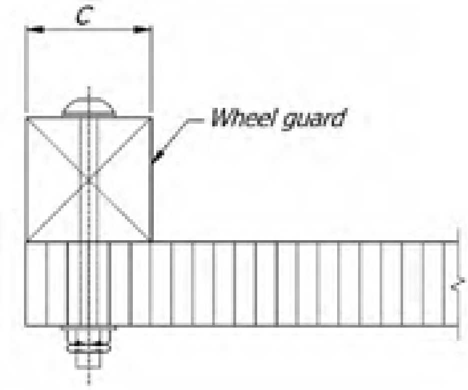


Figure 55. Cross-section view of a timber wheel guard.

Report measurement C.

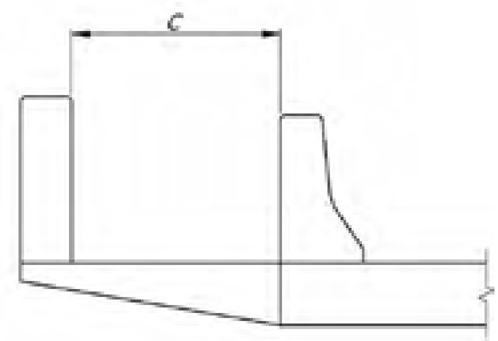


Figure 56. Cross-section view of a sidewalk retrofit.

Report measurement C.

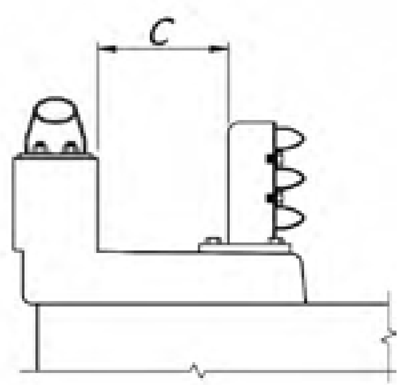


Figure 57. Cross-section view of a sidewalk retrofit.

Right Curb or Sidewalk Width *(Old Item 1367)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(3,1)	-	I	BG08	B.G.08	G.5

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Specification	Commentary
Report the minimum width of the right curb or sidewalk to the nearest tenth of a foot from the face of bridge rail to the face of curb. Measure the width perpendicular to the centerline of the roadway. Report 0.0 when the face of the curb does not extend beyond the face of the bridge rail. Report 0.0 when there is no right curb or sidewalk.	Right and left is determined based on the direction of the inventoried route carried by the bridge, commonly west to east or south to north. When a defined longitudinal joint exists between the curb and the sidewalk, such as a granite curb and concrete sidewalk, measure the width from the face of bridge rail to the face of the granite curb.

Examples - Right Curb or Sidewalk Width

Report measurement C.

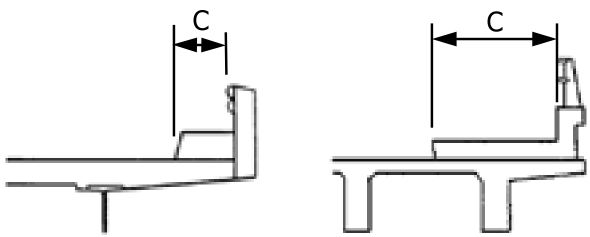


Figure 58. Partial cross-section views of various bridge decks with railings.

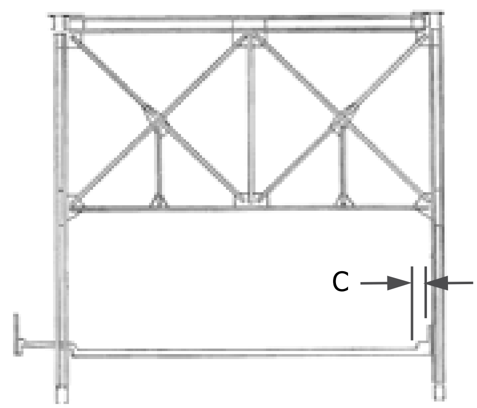
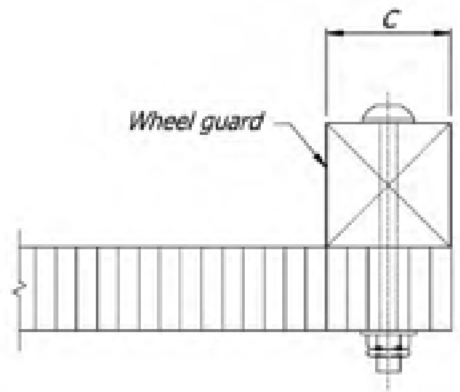
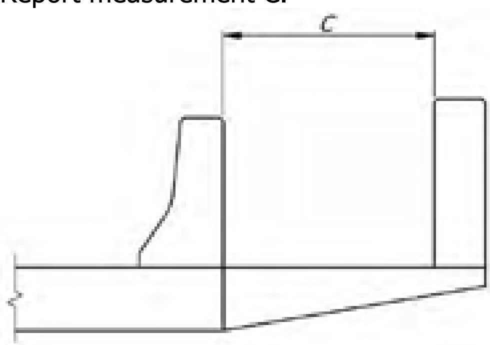
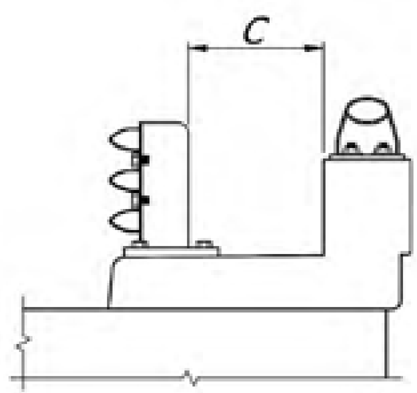


Figure 59. Cross-section view of a through truss bridge.

Figure 60. Cross-section view of a slab bridge with various medians.

Examples - Right Curb or Sidewalk Width Continued
Report measurement C.  Figure 61. Cross-section view of a timber wheel guard.
Report measurement C.  Figure 62. Cross-section view of a sidewalk retrofit.
Report measurement C.  Figure 63. Cross-section view of a sidewalk retrofit.

WSBIS Item TA8 – Service In Tunnel - SNTI *(Old Item 1543)* Pulldown

NTI Item A.8

Applicable Structure Types

- **Tunnels carrying public roadways within**

Record the type of service for the route in the tunnel using one of the following codes:

Table 1543 Service In Tunnel Code - SNTI

WSBIS Code	Description
1	Highway
2	Highway and Railroad
3	Highway and Pedestrian
4	Highway, Railroad, and Pedestrian
5	Other

Approach Roadway Width *(Old Item 1397)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(4,1)	-	I	BG09	B.G.09	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the minimum usable approach roadway width measured to the nearest tenth of a foot.	Usable roadway width includes the width of traffic lanes and the width of shoulders.
Measure the distance perpendicular to the centerline of the roadway between curbs or rails that is representative of the approach roadway within 100 feet of the bridge. Exclude from	Shoulders must be contiguous with the traveled way and must be structurally adequate for all weather and traffic conditions consistent with the facility carried. Unstabilized grass or dirt, with no base course, flush with and beside the traffic lane is not to be considered a shoulder for this item.
the usable distance measurement: non-mountable medians, sidewalks, and other protected areas with non- mountable curbs or barriers.	A curb greater than 6 inches high may be considered non-mountable for these specifications.
Report the lesser of the two approach roadway widths for bridges that carry two-way traffic.	
Report the width at the approach end for bridges that carry one-way traffic.	
For double decked structures, this item should be coded as the sum of the usable roadway widths for the approach roadway.	
If a ramp is adjacent to the through lanes approaching the structure, it shall be included in the approach roadway width.	

Examples - Approach Roadway Width

Both roadways are carried on one bridge. Report the sum of measurements A and B.

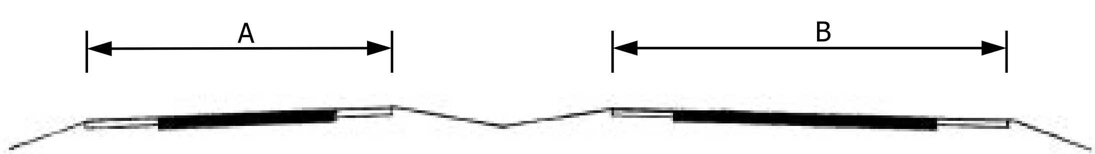


Figure 64. Cross-section view of two approach roadways that are carried across one bridge.

Examples - Approach Roadway Width Continued

Mainline and Ramp are both carried on one bridge. Report the sum of measurements A and B.

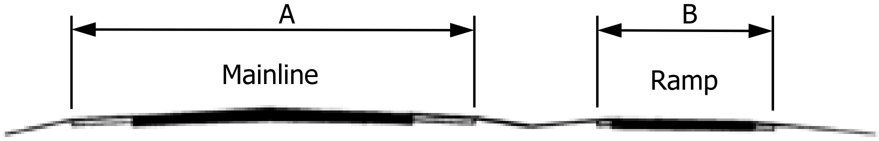


Figure 65. Approach roadway cross-section view for a mainline and a ramp that are carried across one bridge.

Mainline and Ramp are carried on separate bridges.

- Report measurement A for the Mainline bridge.
- Report measurement B for the Ramp bridge.

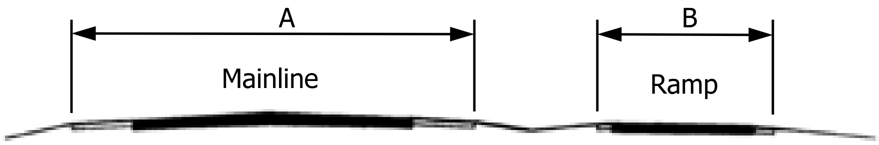


Figure 66. Approach roadway cross-section view for a mainline and a ramp that are carried across separate bridges.

Code the normal width of usable roadway approaching the structure measured to the nearest foot. Usable roadway width will include the width of traffic lanes and the widths of shoulders where shoulders are defined as follows:

Shoulders must be constructed and normally maintained flush with the adjacent traffic lane, and must be structurally adequate for all weather and traffic conditions consistent with the facility carried. Unstabilized grass or dirt, with no base course, flush with and beside the traffic lane, is not to be considered a shoulder for this item.

For structures with medians of any type and double decked structures, this item should be coded as the sum of the usable roadway widths for the approach roadways (i.e., all median widths which do not qualify as shoulders should not be included in this dimension). When there is a variation between the approaches at either end of the structure, code the most restrictive of the approach conditions.

If a ramp is adjacent to the through lanes approaching the structure, it shall be included in the approach roadway width.

WSBIS Item 1291 – Median Code - NBI **Pulldown**
NBI Item 33

Applicable Structure Types

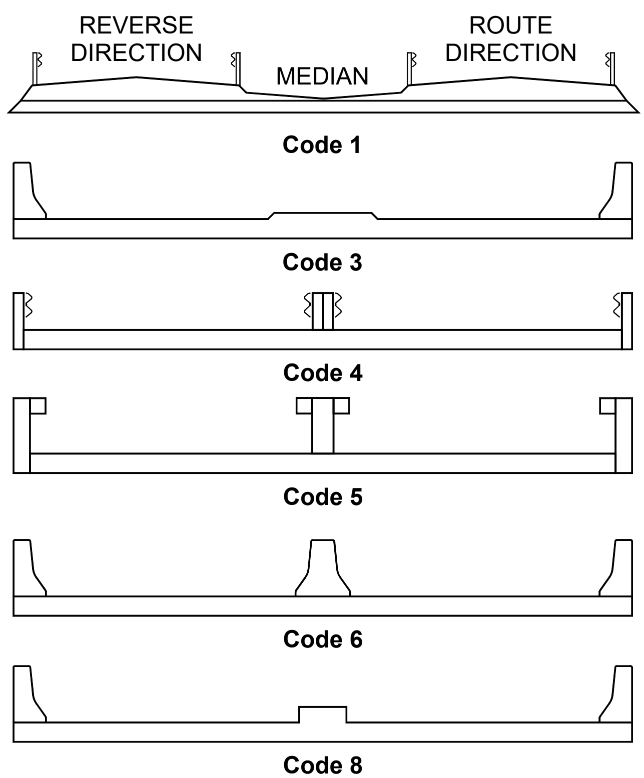
- **Bridges & culverts carrying public roadways**

Indicate with a 1-digit code if the median is nonexistent, open or closed. The median is closed when the area between the 2 roadways at the structure is bridged over and is capable of supporting traffic. All bridges that carry either 1-way traffic or 2-way traffic separated only by a centerline will be coded 0 for no median.

Table 1291 Median Code - NBI

WSBIS Code	NBI Code	Description
0	0	No median (undivided highway)
1	1	Open median
2	2	Closed median – painted only
3	2	Closed median – mountable curb (<6” vertical surface, or sloped surface)
4	3	Closed median – flex or thrie beam
5	3	Closed median – box beam guardrail
6	3	Closed median – concrete barrier
8	3	Closed median – non-mountable curb (6” or greater vertical surface)
9	3	Other median

Figure WSBIS 1291 Median Code - NBI



NBI Commentary:

This coding guide split out various types of medians that are translated to the NBI coding guide as described above.

Median Code - SNBI

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(1)	-	I	BG10	B.G.10	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the type of bridge median using one of the following codes. **Code** **Description** 0 No median 1 Open median 2 Closed median (mountable) 3 Closed median (non-mountable) Parallel bridges carrying a single divided route (usually interstates) are coded 0 unless there is a median on the bridge deck itself. Parallel bridges with divided or undivided routes separated only by a longitudinal deck joint are coded 1 when traffic cannot safely traverse the joint width. If the joint width is safely traversable, use one of the remaining codes. Joint condition does not affect the coding of this item. Adjacent bridges carrying separate routes are coded 0 unless there is a median on the bridge deck itself.	Code 0 when traffic either has no centerline or has traffic separated only by a centerline stripe. Code 1 for structures that pass continuously under separated roadways on fill without any barriers in place – usually culverts. Code 2 for mountable medians, including painted medians with no curbs, curbs less than 6” high, or sloped curbs. Code 3 for non-mountable medians, including medians separated with vertical curbs 6” high or greater, guardrails, or concrete rails.

Example - Median Code SNBI

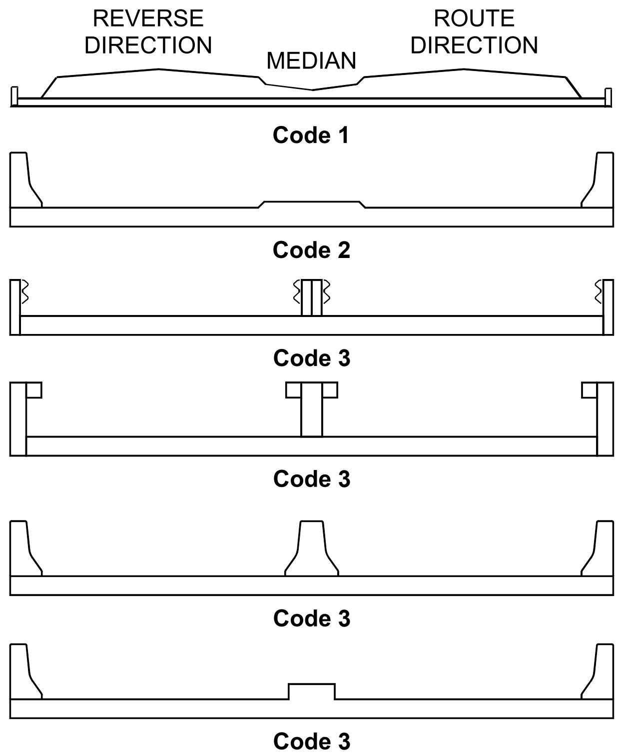


Figure BG10.

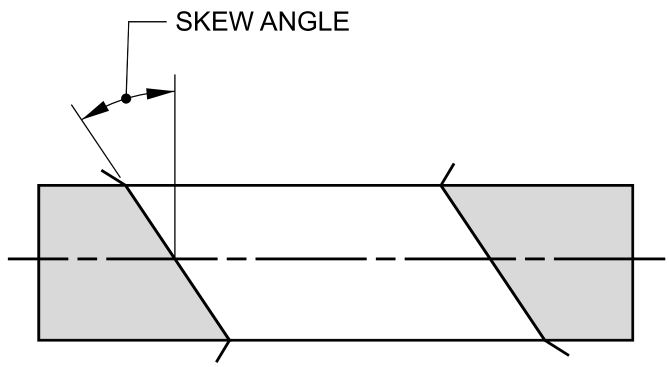
WSBIS Item 1310 - Skew Angle (degrees) - NBI **N(2,0)**
NBI Item 34

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

The skew angle is the angle between the centerline of a pier and a line normal to the roadway centerline. When plans are available, the skew angle can be taken directly from the plans. If no plans are available, the angle is to be field measured if possible. Record the skew angle to the nearest degree. If the bridge piers are perpendicular to roadway centerline, code 0. When the structure is on a curve or if the skew varies for some other reason, the average skew should be recorded, if reasonable. Otherwise, record 99 to indicate a major variation in skews of substructure units.

Figure WSBIS 1310



Skew Angle - SNBI

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(2,0)		I	BG11	B.G.11	

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the skew angle to the nearest degree. Measure the skew angle between the centerline of a substructure unit and a line perpendicular to the roadway centerline. Report the maximum skew when skews vary amongst substructure units. Report 0 if there is no skew.	The skew angle can be taken directly from the plans, if available, or measured in the field.

Example - Skew Angle - SNBI

Report the skew as the result of $Sin^{-1}(A/C)$, $Cos^{-1}(B/C)$ or $Tan^{-1}(A/B)$.

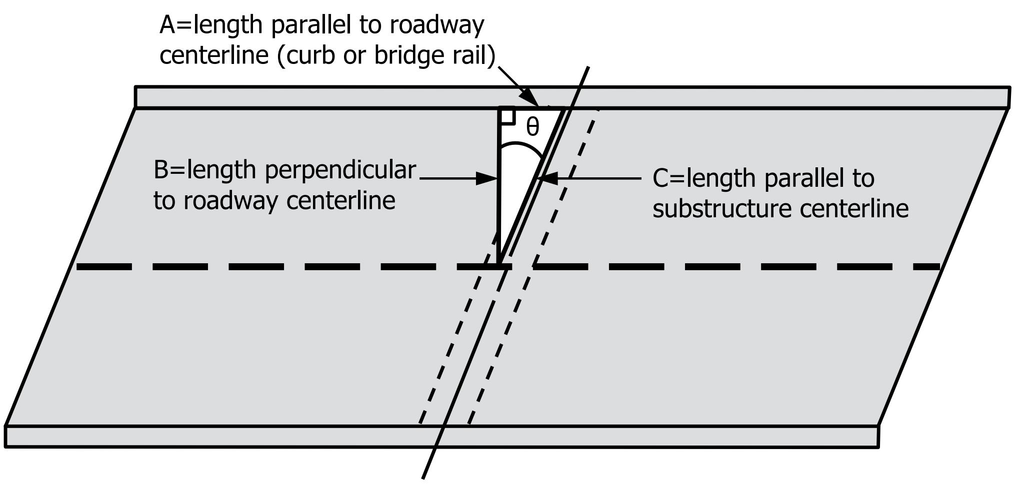


Figure 70. Plan view of a bridge deck indicating skew determination.

Curved Bridge *(Old Item 1313)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(2)	-	I	BG12	B.G.12	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report whether the bridge is horizontally curved using one of the following codes. **Code** **Description** CU Curved girder(s) CP Piecewise straight girders CK Kinked girder(s) N Not curved	A bridge is considered horizontally curved when at least one girder line forms a curve using either a curved girder(s), piecewise straight girders forming a segmented/chorded curve, or a kinked girder(s). For this specification, a piecewise straight girder line is comprised of girders with a longitudinal axis that changes orientation at one or more supports. The girder line may be simply supported or continuous at supports. A kinked girder is a girder with a longitudinal axis that changes orientation at a location(s) along the girder length excluding at the supports. Diaphragm and cross-frame members in horizontally curved bridges are primary members. Use code N for bridges that have curved deck geometry, or may be striped as curved, but the girders do not form a curve.

Examples - Curved Bridge

Report CU.

Figure 71. Curved bridge with curved girders. (Source: Alaska DOT)

Examples - Curved Bridge Continued

Report CP.

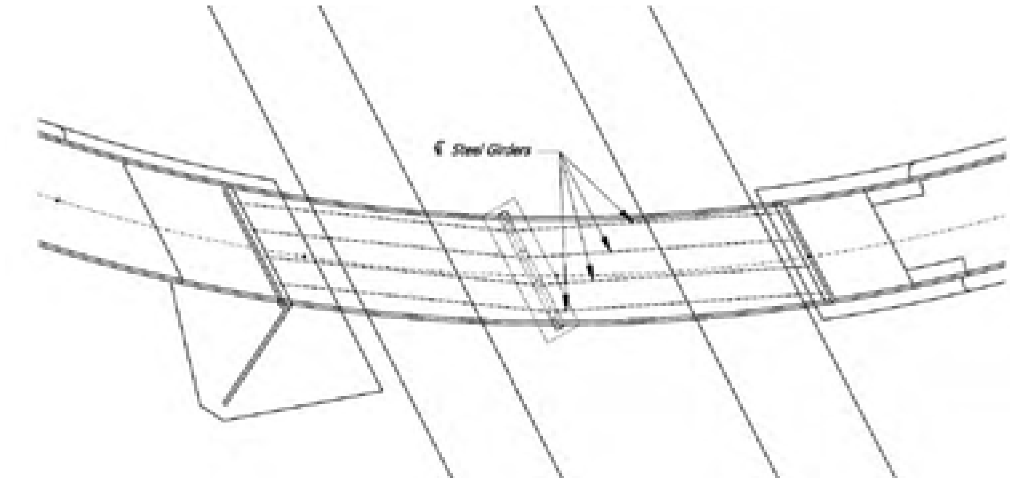


Figure 72. Plan view of a curved bridge with piecewise straight girders.

Report CK.

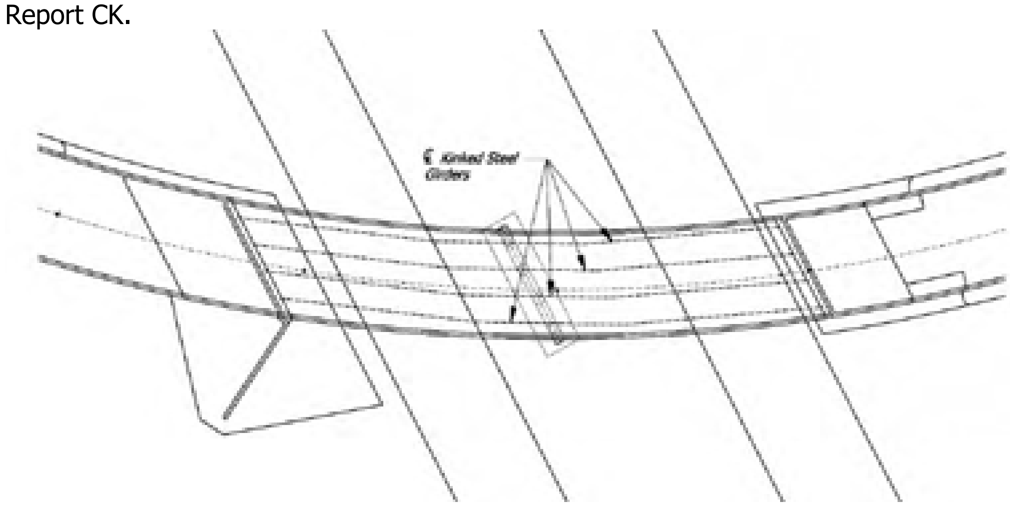


Figure 73. Plan view of a curved bridge with kinked girders.

Maximum Bridge Height *(Old Item 1314)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(4,0)	-	I	BG13	B.G.13	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Record the maximum height from top of deck to ground line or water surface elevation, whichever yield the largest value, rounded to the nearest foot.	For double-deck bridges inventoried as one bridge, measure from top of deck of the lower deck. For double-deck bridges inventoried as two bridges, measure from the top of deck of the inventoried bridge. Ground line represents dry terrain, pavement, or waterway bottom. Use the water surface elevation at the time the value for this item is established. This item may be estimated by field observation or from plans when it is not practical or is infeasible to measure, or height is more than 30 ft. This item does not need to be updated due to fluctuations in water surface elevation.

Examples

Bridge carries SR170 over Felix Creek and County Trail. Report 27.

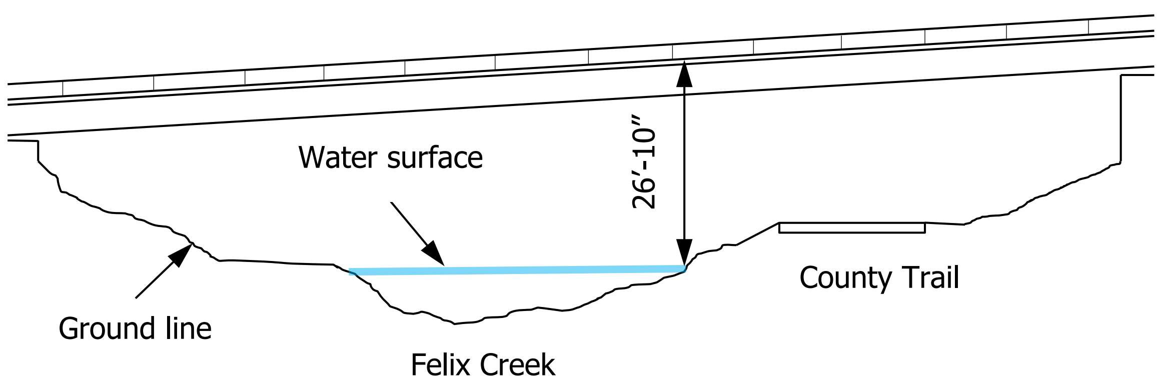


Figure 74. Profile view of a bridge over a creek and trail.

Sidehill Bridge *(Old Item 1315)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(1)	-	I	BG14	B.G.14	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the inspection type or scour monitoring performed using one of the following codes. **Code** **Description** N Not a sidehill bridge Y Is a sidehill bridge	A sidehill bridge is a structure built onto the side of terrain or earth material with the roadway centerline running nearly parallel to the face of the terrain or material. The roadway is carried partially on structure and partially on terrain that has been modified by cutting or filling to form the required roadway subgrade elevation. For sidehill bridges, Item B.G.06 (Bridge Width Curb-to-Curb) is typically larger than Item B.G.05 (Bridge Width Out-to-Out). For sidehill bridges with irregular geometry, reporting the actual deck area in Item B.G.15 (Irregular Deck Area) provides a more accurate value than using the default calculation described for that item. Use code N when no portion of the bridge is a sidehill structure.

Examples

A bridge is built onto the side of a hill with the roadway partially on ground and partially on structure. Report Y.

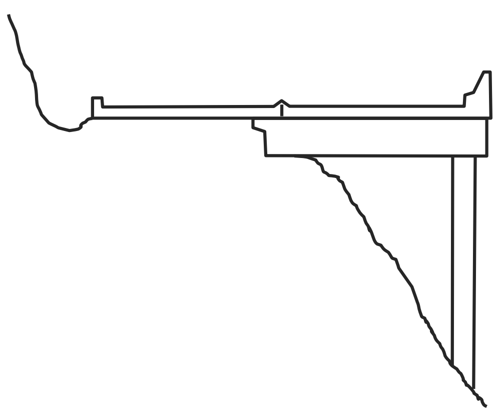


Figure 75. Cross-section view of a sidehill bridge.

Irregular Deck Area *(Old Item 1316)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(10,1)	-	I	BG15	B.G.15	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the total deck area rounded to the nearest tenth of a square foot. Only report this item when the actual area is obtained from plans or measurement of bridges with irregular geometry. The limits of measurement shall be in accordance with Items B.G.05 (Bridge Width Out-to-Out) and B.G.02 (Total Bridge Length). For bridges that carry multiple types of service, for example highway and railroad, report the deck area that encompasses all service types.	Reporting the deck area calculated from plans may more accurately reflect the deck area for bridges with unusual geometry (e.g. flared, sidehill, or bifurcated structures), or through structures with cantilevered sidewalks. This item can improve the accuracy of national performance measure computations, estimating cost, etc.

Calculated Deck Area *(Old Item 1317)*					
Format Calculated	**Translation**	**Frequency** I	**WSBIS Item ID** BG16	**SNBI Item ID** B.G.16	**SNTI Item ID**
Applicable Structure Types • **Bridges & culverts carrying public roadways** • **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**					
Specification			**Commentary**		
The default calculation for bridges is the value reported in Item B.G.05 (Bridge Width Out-to-Out) multiplied by the value reported in Item B.G.02 (Total Bridge Length) rounded to the nearest tenth of a square foot.			This default deck area will be used for national bridge performance measures unless the Irregular Deck Area BG15 is coded.		

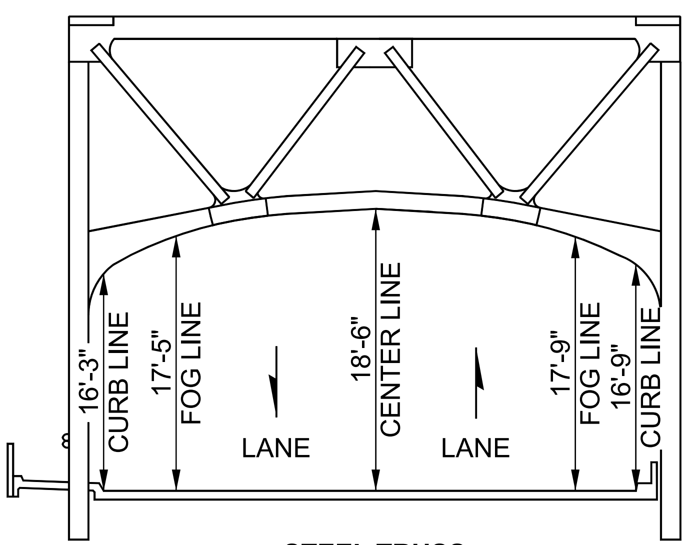
WSBIS Item 1370 – Min. Vert. Clearance Over Deck (ft & in) - NBI **N(4,0)**
NBI Item 53

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

The information to be recorded for this item is the actual minimum vertical clearance over the bridge roadway, including shoulders, to any superstructure restriction, in feet and inches, rounded to the lesser inch (e.g., 16′ 3¾″ is to be coded 1603). For double decked structures code the minimum, regardless whether it is pertaining to the top or bottom deck. When no superstructure restriction exists above the bridge roadway code 9999. When a restriction is 100 feet or greater code 9912.

Figure WSBIS 1370



STEEL TRUSS
CODE: **1603**

WSBIS Item 1374 – Min. Vert. Clearance Under Bridge (ft & in) - NBI **N(4,0)**
NBI Item 54B

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

Code the minimum vertical clearance from the roadway (travel lanes only)* or railroad track beneath the structure to the underside of the superstructure.

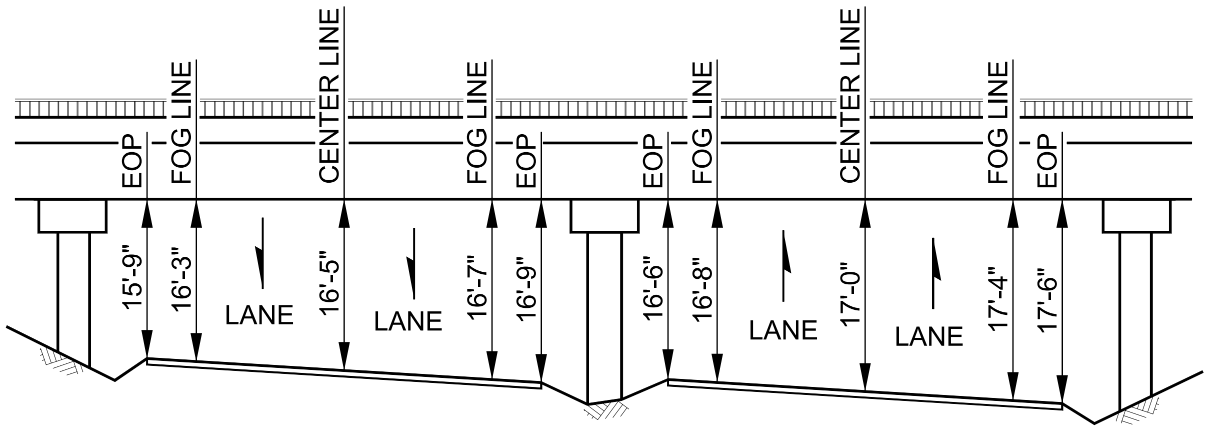
If the bridge crosses both a highway and a railroad, code the highway clearance UNLESS the railroad has a substandard clearance based on current design criteria and the roadway is NOT substandard. Roadway standard minimum clearance is 16' - 6" and RR standard minimum clearance is 22' - 6".

The information to be recorded is the actual minimum vertical clearance over the traveled way to the structure, in feet and inches, rounded to the lesser inch (e.g., 16′ 3¾″ is to be coded 1603). When a restriction is 100 feet or greater, code 9912.

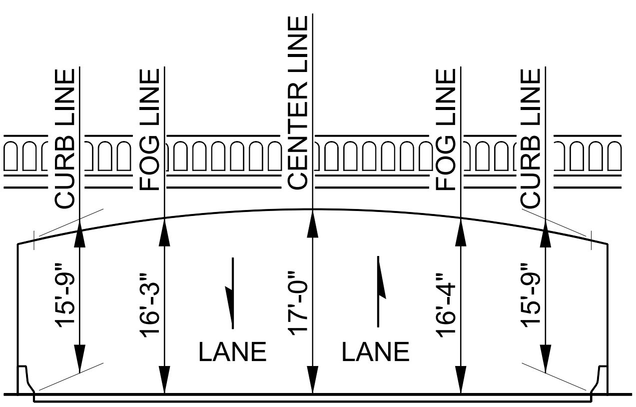
If the feature is not a highway or railroad, code the minimum vertical clearance 0. A highway is to be considered any functionally classified, public road. Private roads are not to be included.

* Traveled way, or travel lanes, is between fog lines and excludes shoulders or gore areas. In cases where there are no fog lines, judgement shall be used to determine edges of traveled way.

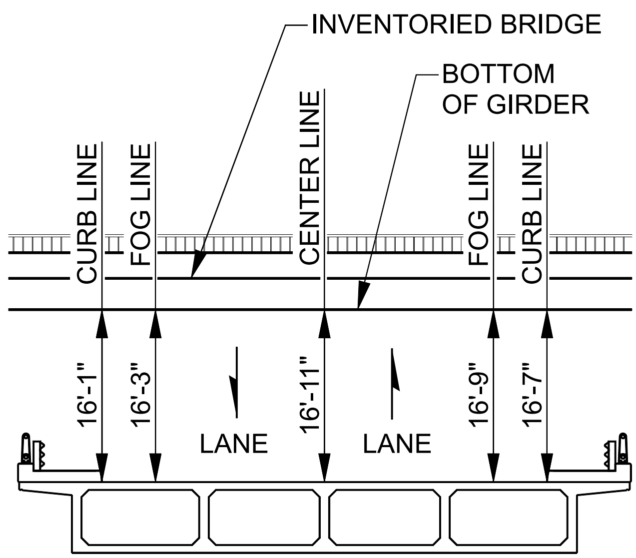
Figure WSBIS 1374



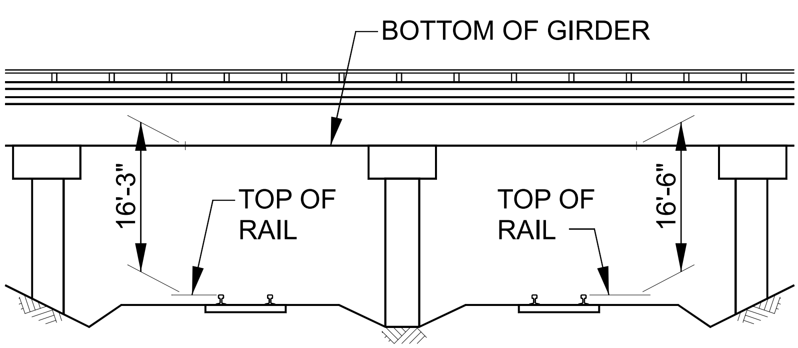
DIVIDED HIGHWAY (Fig. 1374a)
CODE: **1603**



UNDIVIDED HIGHWAY (Fig. 1374b)
CODE: **1603**



BRIDGE OVER BRIDGE (Fig. 1374c)
CODE: **1603**



RAILROAD (Fig. 1374d)
CODE: **1603**

WSBIS Item 1401 – Minimum Vertical Clearance Over Tunnel Roadway (ft) - SNTI N(5,1)
NTI Item G.2

Applicable Structure Types

- **Tunnels carrying public roadways within**

Record the minimum vertical clearance between the mainline tunnel roadway surface and any overhead restriction, i.e. tunnel ceiling, overhead signs, lighting, etc. The roadway surface includes any surface on which a vehicle can travel, including shoulders. Ramps should be excluded when included as part of a tunnel system. The intent is to determine the restrictions of the primary route of the tunnel.

Figure WSBIS 1401a

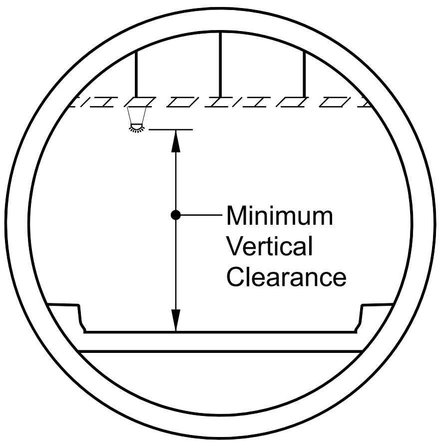
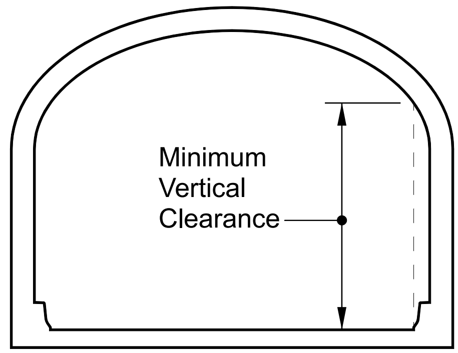


Figure WSBIS 1401b



Number of Bores - SNTI *(Old Item 1510)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-		TS1	-	S.1

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification	Commentary
Record the one digit number defining the number of bores in a tunnel. When recording and coding for this item, use the number of bores associated with Item ID I. - Tunnel Number.	Definition of a Tunnel Bore - an underground passageway for vehicles that pass under a mountain, waterway, or an urban area. A ramp should not be counted as a bore unless it is being coded as a separate tunnel.

Examples - Number of Bores - SNTI

Figure WSBIS TS1a Two Bores

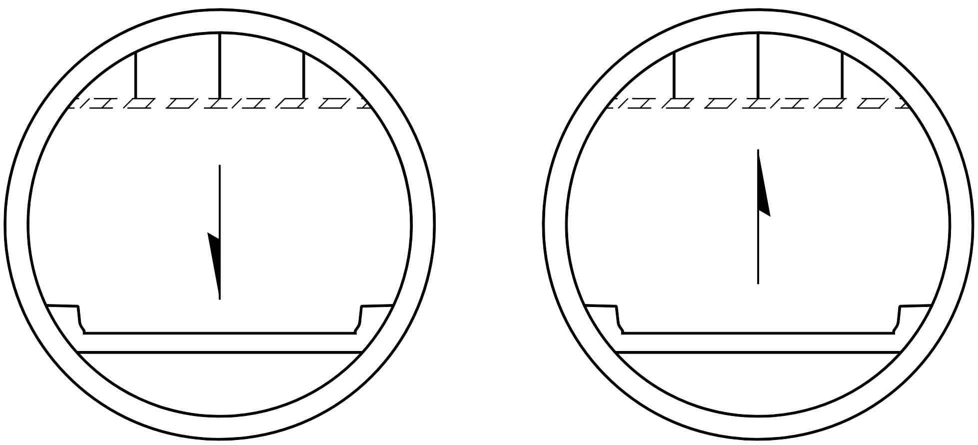
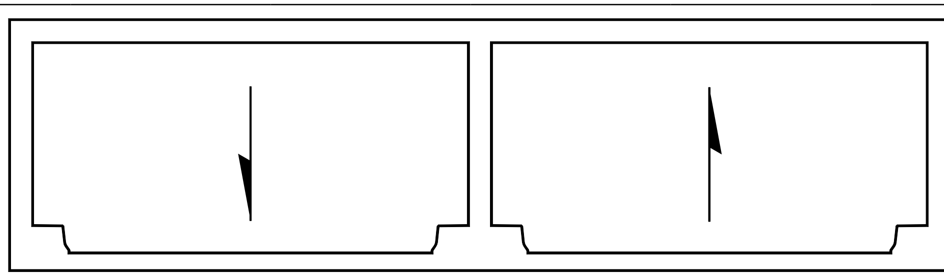


Figure WSBIS TS1b One Bore



Tunnel Shape - SNTI *(Old Item 1511)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-		TS2	-	S.2

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification

Record the type of tunnel shape.

Code	Description
1	Oval
2	Horseshoe
3	Rectangular
4	Circular

Commentary

Definition of a Tunnel Bore - an underground passageway for vehicles that pass under a mountain, waterway, or an urban area.

A ramp should not be counted as a bore unless it is being coded as a separate tunnel.

Examples - Tunnel Shape - SNTI

Figure WSBIS TS2a Circular Tunnel

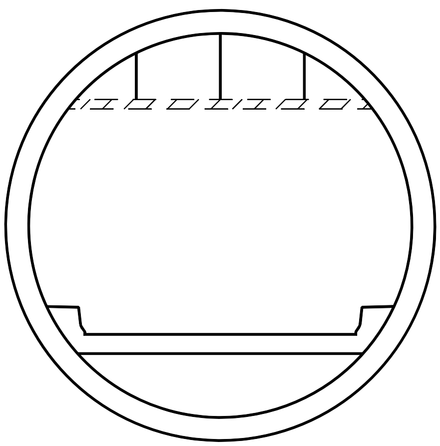


Figure WSBIS TS2b Horseshoe Tunnel

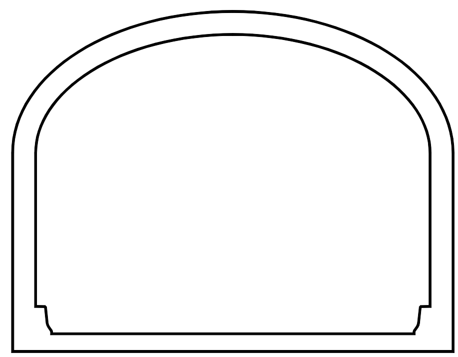


Figure WSBIS TS2c Rectangular Tunnel

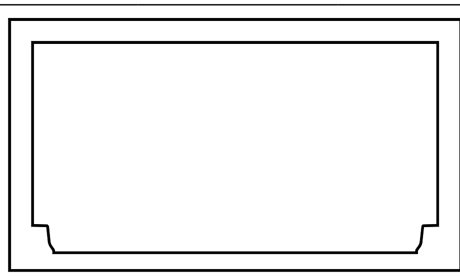
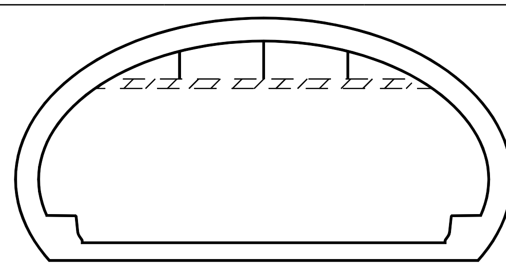


Figure WSBIS TS2d Oval Tunnel



Portal Shape - SNTI *(Old Item 1512)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-		TS3	-	S.3

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification	Commentary
Record the type of portal shape.	See example shapes shown for Item ID TS2 - Tunnel Shape - SNTI: Figures TS2a, TS2b, TS2c, TS2d

Code	Description
1	Oval
2	Horseshoe
3	Rectangular
4	Circular
5	Other

Ground Conditions - SNTI *(Old Item 1513)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-		TS4	-	S.4

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification	Commentary
Record the type of ground conditions.	Definitions: Soil is used to define ground conditions consisting primarily of clay, silt, sand, gravel or a mixture. Rock is used to define ground conditions consisting primarily of material that has rock structure in weathered to sound condition. The term mixed face usually refers to a situation where the soil conditions vary along the length and/or height of the tunnel.

Code	Description
1	Soil
2	Rock
3	Mixed Face

Complex Tunnel - SNTI *(Old Item 1514)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown		I	TS5		S5

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification	Commentary
Record whether the tunnel is complex using one of the following codes: **Code** **Description** 0 The tunnel is not complex 1 The tunnel is complex Do not report this item for bridges that do not have steel members as indicated in Items B.SP.04 (Span Material) and B.SB.03 (Substructure Material).	A complex tunnel is characterized by advanced or unique structural elements or functional systems. Complex tunnels may include mechanical or fire suppression equipment to ventilate exhaust from the tunnel or provide protection against tunnel fires. A non-complex tunnel in contrast is typically of a shorter length, not requiring any ventilation, and may or may not have lighting installed

Height Restrictions - SNTI *(Old Item 1402)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-		TL10	-	L.10

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification

Record whether the tunnel has a height restriction using one of the following codes:

Code	Description
1	Yes, there is a height restriction, with measured clearance < 14’-4”
0	No, there is no height restriction, with measured clearance => 14’-4”

Commentary

Hazardous Material Restriction - SNTI *(Old Item 1408)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-		TL11	-	L.11

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification

Record whether the tunnel has a hazardous material restriction using one of the following codes

Code	Description
1	Yes, there is a hazardous material restriction
0	No, there is no hazardous material restriction

Commentary

Other Restrictions - SNTI *(Old Item 1409)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-		TL12	-	L.12

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification

Record whether the tunnel has a restriction other than load posting, height or hazardous material using one of the following codes:

Code	Description
1	Yes, there are other restrictions
0	No, there are no other restrictions

Commentary

Other restrictions could include width restrictions or requirements for police escorts for permit vehicles.

Crossing Tab

WSBIS Item 2000 – Main Listing Code **Pulldown**

Applicable Structure Types

- **All structure records**

See Coding Guide Clarifications for a description of the Main Listing Flag.

This item is visible in the BridgeWorks Inventory Management mode.

WSBIS Item 1432 – On/Under Code **Pulldown**
NBI Item 5A

Applicable Structure Types

- **All structure records**

There are three types of WSBIS records: On, Under, and neither on or under. There are two types of NBI records: On and Under. The NTI makes no distinction for tunnels, and WSBIS treats all tunnel records as Under records.

Table 1432 On/Under Code

WSBIS Code	NBI Code	NTI Code	Description
1	1	n/a	Route carried on a bridge (not used for routes over a tunnel)
2	2	n/a	Single route goes under a bridge or through a tunnel
3 - 9	-	-	Route carried above bridge (FOR BPO USE ONLY IN 2024)
A – Z	A – Z	n/a	Multiple routes go under a bridge (no provision to code multiple routes through a tunnel)
0	n/a	n/a	No route on or under a structure

On signifies that the inventory route is carried on a bridge, but not over a tunnel. All of the NBI data items must be coded, unless specifically exceptive, with respect to the bridge and the inventory route on it.

Under signifies that the inventory route goes under the structure if it's a bridge, and through a structure if it's a tunnel. If an inventory route beneath a bridge is a Federal-aid highway, is a STRAHNET route or connector or is otherwise important, it must be reported to the NBI. The type code must be 2 or an alphabetic letter A through Z as follows:

- If a single route goes under a bridge or the structure is a tunnel, code 2 whether or not this undercrossing is NBI or NTI reportable.
- If two or more routes go under a bridge and only one undercrossing is NBI reportable, code 2, B, C, D, etc., consecutively for multiple routes on separate roadways under the same structure, and NBI reportable routes shall be listed as the "2" code.
- If two or more routes go under a bridge and multiple undercrossings are NBI reportable, code A, B, C, D etc. again prioritizing reportable routes at the beginning of the sequence.

When this item is coded 2 or A through Z for bridges, only selected items are coded, as specified in the item descriptions and in the list in Table 2.

It cannot be overemphasized that all route-oriented data must agree with the coding as to whether the inventory route is on or under a bridge.

There are situations of a route under a bridge, where the bridge does not carry a highway, but may carry a railroad, pedestrian traffic, or even a building. These are coded the same as any other Under record and no On record shall be coded.

For additional clarification of On and Under records, refer to Section II of the Appendix 2C Coding Guide Instructions.

NBI Commentary:

> WSDOT created code 0 to indicate the bridge does not carry nor cross over a highway. An example would be a pedestrian structure over a waterway. These are not NBI bridges but may be included in the WSBIS inventory at each agency's discretion.

WSBIS Item 2402 – Crossing Description AN(50)

Applicable Structure Types

- **All structure records maintained by WSDOT Bridge Preservation**

This item describes the bridge crossing from the perspective of the inventory route. When a bridge both carries a state route and crosses over another state route, each crossing record will have a separate crossing description:

Main listing On Record crossing description: SR 512 OVER I-5
Secondary listing Under Record crossing description: I-5 UNDER SR 512

For state owned structures, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

Bridge Location *(Old Item 1156)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(25)		EI	BL11	B.L.11	

Applicable Structure Types
- **All structure records**

Specification / Commentary

This item contains a narrative description of the structure location for the inventory route. Descriptions should be oriented ahead on station whenever possible. Do not use city limits, as these boundaries may move. This item shall be left justified.

Examples

- 19.3 E JCT SR 203
- 14.7 E MASON CO

WSBIS Item WF02 – Crossing Manager *(Old Item 2401)* — Pulldown

Applicable Structure Types

- **All structure records**

The Crossing Manager is the Program Manager responsible for the route identified in WSBIS Item 1435, whether that route is on or under the structure.

For state owned structures, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

Latitude - SNBI *(Old Item 1470)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(9,6)	Yes	I	BL05	B.L.05	I.13

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the latitude of the bridge in decimal degrees. Report the latitude at the same location as the LRS mile point reported for Item B.H.07 (LRS Mile Point). If the location of the LRS mile point is not known, report the latitude at the location of the bridge following agency procedures.	Values reported are assumed to be for the appropriate hemisphere and are to be consistent with LRS data that uses the North American Datum of 1983. When available, HPMS data should be used to update NBI items values.

Examples

Latitude is 50° 10’ 00.00” N. Report 50.166667. Latitude is 53° 52.457' N. Report 53.874285. Latitude is 14.291368° S. Report -14.291368.

Longitude - SNBI *(Old Item 1471)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(9,6)	Yes	I	BL06	B.L.06	I.14

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the longitude of the bridge in decimal degrees. Report the longitude at the same location as the LRS mile point reported for Item B.H.07 (LRS Mile Point). If the location of the LRS mile point is not known, report the longitude at the location of the bridge following agency procedures.	Values reported are assumed to be for the appropriate hemisphere and are to be consistent with LRS data that uses the North American Datum of 1983. When available, HPMS data should be used to update NBI items values.

Examples

Longitude is 125° 10’ 00.00” W. Report -125.166667. Longitude is 166° 32.784333' W. Report -166.546406. Longitude is 144.677519° E. Report 144.677519.

WSBIS Items 1432, 1435, 1433, and 1434
NBI Items 5A, 5B, 5C, 5D

The inventory route is composed of 4 segments.

Table 7 Inventory Route Items

WSBIS Item	NBI Item	NTI Item	Description
1432	5A	n/a	Record Type
1435	5D	I.7	Route Number
1433	5B	I.9	Route Signing Prefix
1434	5C	n/a	Designated Level of Service

WSBIS Item 1435 – Route - NBI **AN(5)**
NBI Item 5D
NTI Item I.7

Applicable Structure Types

- **All structure records**

Code the route number of the inventory route. This value shall be a five digit number, right justified with leading zeroes filled in.

If concurrent routes are of the same hierarchy level, denoted by the highway class, the lowest numbered route shall be coded. Code 00000 for structures on roads without route numbers.

Local agency bridge owners are encouraged to use one of the following methods to develop a route number where one has not already been assigned:

1. Federal Aid road will have a Federal Aid route number that can be used and padded with zeroes as needed.
2. City streets are often identified by the city number and padded with zeroes as needed.
3. The number of the route used to access the path to the structure can be used.
4. A unique (to the agency) number can be assigned.

Note for local agency users: While this item is identified as alpha-numeric, the use of alphabetic characters in a route number will cause the record to not import into Mobility for the bridge item comparison module.

WSBIS Item 2440 – Milepost (miles) - NBI **N(5,2)**

Applicable Structure Types

- **All structure records**

The milepost is displayed on the inspection report header with the associated route (WSBIS Item 1435). Both are intended to provide information about the location of the structure on the primary route used for inspection access, and should represent the structure milepost relative to nearby milepost signs or other permanent feature. The use of a zero milepost is undesirable and should be avoided when possible.

WSBIS Item 1433 – Highway Class - NBI — Pulldown

NBI Item 5B
NTI Item I.9

Applicable Structure Types

- **All structure records**

Identify the highway class for the LRS inventory route identified in Item 1467 using one of the following codes:

Table 1433 Highway Class - NBI

WSBIS Code	Description
1	Interstate highway
2	U.S. numbered highway
3	State highway
4	County road
5	City street
6	Federal lands road
7	State lands road
8	Other (include toll roads not otherwise identifiable above) OR when there is no inventory route

Code 8 when there is no inventory route.

When 2 or more routes are concurrent, the highest class of route will be used. The hierarchy is in the order listed above.

WSBIS Item 1434 – Service Level - NBI — Pulldown

NBI Item 5C

Applicable Structure Types

- **All structure records**

Identify the service level for the inventory route using one of the following codes, including tunnels:

Table 1434 Service Level - NBI

WSBIS Code	Description
1	Mainline (includes reversible routes)
2	Alternate
3	Bypass
4	Spur
6	Business
7	Ramp, Wye, Connector, etc.
8	Service and/or unclassified frontage road
0	None of the above OR when there is no inventory route

WSBIS Item BH06 – LRS Route ID *(Old Item 1467)* **AN(12)**
NBI Item 13A
NTI Item I.11

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

The linear referencing system (LRS) route is used to establish the location of the structure on the Base Highway Network (see WSBIS Item 1484). It must be from the same LRS route and milepost system as reported in the Highway Performance Monitoring System (HPMS).

Linear Reference is coded to correspond to the location of the crossing as it relates to the WSDOT standard Linear Referencing System (LRS), which must be used and is reported by our state's Highway Performance Monitoring System (HPMS). The HPMS reported LRS consists of both the Local Agency Public Roads (LAPR) LRS and the State Route LRS.

State Route LRS Examples:

599S500035
529SPEVERET (reported to NBI as 529SPEVERE)
005
005LX10130

LAPR Route LRS Examples

760000270 (Israel Road Over I-5)
460000700 (Taneum Creek Road Over I-90

NBI and NTI Commentary:

WSDOT maintains a 12 character, alphanumeric LRS route number, but the NBI receives only 10 digits. In most cases WSDOT does not use the 11th or 12th character. For the NBI submittal, any additional characters to the right of the 10th character are trimmed. Route numbers with fewer than 10 characters get reported with no additional leading zeroes added.

WSDOT codes LRS route numbers for all crossing records, but only routes on the Base Highway Network are submitted to the NBI.

The NTI allows up to 120 characters for this field, so complete data is submitted to the NTI.

WSBIS Item BH07 – LRS Milepost (miles) *(Old Item 1469)* **N(5,2)**
NBI Item 11
NTI Item I.12

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

The linear referencing system (LRS) milepost is used to establish the location of the structure on the Base Highway Network (see WSBIS Item 1484). It must be from the same LRS route and milepost system as reported in the Highway Performance Monitoring System (HPMS). The milepost coded in this item directly relates to WSBIS Item 1467 – LRS Route. For local agencies, this field generally matches Milepost Item 2440.

This item records the milepost at the beginning of the structure where typically both the LRS and the structure are oriented in the same direction (the lowest milepost on the structure is the beginning of the structure). In cases where the LRS and the structure are oriented in opposing directions, record the milepost from the end of the structure instead of the beginning. When the LRS Route goes under the structure (WSBIS Item 1432 coded 2 or A-Z), then code the milepost on the under passing route where the structure is first encountered.

Code to two decimal places. Code all zeroes in this field if the milepost is not available.

WSBIS Item WH23 – Directional Indicator *(Old Item 2468)* **Pulldown**

Applicable Structure Types

- **All structure records maintained by WSDOT Bridge Preservation**

The directional indicator specifies if the inventory route carries traffic in the direction of increasing mileposts, decreasing mileposts or both.

Table WH23 - Directional Indicator

WSBIS Code	Description
I	Increasing direction
D	Decreasing direction
B	Both directions
*	Null, no inventory route on or under structure

For state owned structures, or structures with crossings managed by the Statewide Program Manager, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

WSBIS Item WH21 – Ahead/Back Indicator *(Old Item 2470)* **Pulldown**

Applicable Structure Types

- **All structure records maintained by WSDOT Bridge Preservation**

The ahead/back indicator specifies whether a milepost value is the 'back' (B) duplicate of a milepost value 'ahead' on the route.

Table WH21 - Ahead/Back Indicator

WSBIS Code	Description
B	Back milepost
*	Null, either an Ahead milepost or does not apply

For state owned structures, or structures with crossings managed by the Statewide Program Manager, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

Speed Limit *(Old Item 7441)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Integer		EI	WA09	-	

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**
- **Local Agency Pedestrian, RR and other non-vehicular structures over public roadways**
- **Local Agency Tunnels carrying public roadways within**

Specification / Commentary

Code the speed limit in miles per hour for the inventory route at the bridge site.

WSBIS Item 1490 – Lane Use Direction - NBI **Pulldown**
NBI Item 102
NTI Item C.3

Applicable Structure Types

- **All Structure Records**

Code the direction of traffic of the inventory route identified in LRS Route WSBIS Item 1467 as a 1-digit number using one of the codes below. This item must be compatible with other traffic-related items such as WSBIS Item 1352 – Lanes on the Structure, WSBIS Item 1445 – Average Daily Traffic, WSBIS Item 1491 – Total Horizontal Clearance and WSBIS Item 1356 – Curb-to-Curb.

Table 1490 Lane Use Direction Code

WSBIS Code	NBI Code	NTI Code	Description
0	0	0	No public roadway on or under structure.
1	1	1	1 way traffic on inventory route
2	2	2	2 way traffic on inventory route
3	2	3	2 way and reversible traffic on inventory route
4	1	3	Reversible traffic only on inventory route
5	3	4	2 way traffic on 1 lane bridge (curb-to-curb must be <16 ft.)

NBI and NTI Commentary:

WSDOT provides additional codes to address reversible traffic lanes, which are translated to NBI and NTI codes as shown above.

WSBIS Item 1483 – National Highway System (NHS) - NBI **Pulldown**
NBI Item 104
NTI Item C.5

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

For the inventory route identified in WSBIS Item 1435, indicate whether the route is on the National Highway System (NHS) or not on that system. Ramps associated with NHS routes are included as NHS routes. Use one of the following codes:

Table 1483 National Highway System Code (NHS) - NBI

WSBIS Code	Description
0	Inventory Route is not on the NHS
1	Inventory Route is on the NHS

Maps identifying NHS routes are available at: https://hepgis.fhwa.dot.gov/fhwagis/.

NBI and NTI Commentary:

WSDOT codes ramps as NHS routes when the associated mainline route is also NHS, in accordance with the NBI federal coding guide, and applied to both bridges and tunnels. However, in accordance with the FHWA Highway Performance Monitoring System (HPMS), ramps are coded 0. The NTI coding guide doesn't specify how ramps in tunnels are coded.

WSBIS Item 1485 – STRAHNET Highway - NBI **Pulldown**
NBI Item 100
NTI Item C.6

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

This item shall be coded for all records in the inventory that are designated as part of the Strategic Highway Network. For the purposes of this item, the STRAHNET Connectors are considered included in the term STRAHNET. For the inventory route identified in WSBIS Item 1435, indicate STRAHNET highway conditions using one of the following codes:

Table 1485 STRAHNET Highway Code - NBI

WSBIS Code	NTI Code	Description
0	0	The inventory route is not a STRAHNET route
1	1	The inventory route is on an Interstate STRAHNET route
2	1	The inventory route is on a Non-Interstate STRAHNET route
3	1	The inventory route is on a STRAHNET connector route

Maps identifying NHS routes are available at: https://hepgis.fhwa.dot.gov/fhwagis/#

NTI Commentary:
Codes translated for the NTI as shown in the table above.

National Truck Freight Network *(Old Item 1156)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown		EI	BH04	B.H.04	

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Specification / Commentary

The national network for trucks includes most of the Interstate System and those portions of Federal-aid highways identified in the Code of Federal Regulations (23 CFR 658). The national network for trucks is available for use by commercial motor vehicles of the dimensions and configurations described in these regulations. For the inventory route identified in WSBIS Item 1435, indicate conditions using one of the following codes:

Table BH04 National Truck Freight Network Code

WSBIS Code	NBI Code	Description
N	0	The inventory route is not part of the national network for trucks
Y	1	The inventory route is part of the national network for trucks

WSBIS Item 1487 – Functional Classification - NBI **Pulldown**
NBI Item 26
NTI Item C.7

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

For the inventory route, code the functional classification using one of the following codes:

Table 1487 Functional Classification Code - NBI

WSDOT Code	NBI Code	NTI Code	Description
1	1	1	Rural Principal Arterial – Interstate
5	2	2	Rural Principal Arterial - Other Freeways or Expressways
2	2	3	Rural Principal Arterial – Other
6	6	4	Rural Minor Arterial
7	7	5	Rural Major Collector
8	8	6	Rural Minor Collector
9	9	7	Rural Local
11	11	1	Urban Principal Arterial – Interstate
12	12	2	Urban Principal Arterial – Other Freeways or Expressways
14	14	3	Urban Principal Arterial - Other
16	16	4	Urban Minor Arterial
17	17	5	Urban Major Collector
18	17	6	Urban Minor Collector
19	19	7	Urban Local

The structure shall be coded rural if not inside a designated urban area. The urban or rural designation shall be determined by the structure location and not the character of the roadway. The WSDOT Functional Classification Map is available at https://www.wsdot.wa.gov/data/tools/geoportal/?config=functionalclass

NBI and NTI Commentary:

Functional Classification codes are translated for the NBI and NTI as shown in the table above.

Urban Code - SNBI *(Old Item 1022)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(5)	N(5,0)	I	BH02	B.H.02	C.8

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the urbanized area code consistent with the State's HPMS urban boundaries for the highway feature reported in Item B.F.01 (Feature Type) at the bridge.	Urban codes can be found at: https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html. For bridges outside urbanized areas, use code 99999 for rural areas with population less than 5,000 and use code 99998 for small urban areas with population 5,000 to 49,999 in accordance with the HPMS Field Manual. FHWA approves adjusted urban boundaries submitted by State DOT planning offices. State's HPMS urban boundaries are based on the FHWA-approved adjusted urban boundaries. State maps of the unadjusted U.S. Census urban boundaries with highways (map layers: Labels, Transportation, and Urban Areas checked) can be found at: https://tigerweb.geo.census.gov.

Example

U.S. 13/113A over Saint Jones River. Report 24580.

Figure 80. TIGERweb screen shot for the bridge in Delaware. (Source: US Census Bureau)

Table BH02 Urban Code - SNBI

WSBIS Code	Urban Area Name
	Urban Areas with Populations of 50,000 or more as of 2017
06652	Bellingham-Ferndale
09946	Bremerton-Port Orchard-Bainbridge Island
44479	Kennewick-Pasco-Richland
49312	Lewiston-Clarkston
51283	Longview-Kelso
55333	Marysville-Tulalip
60490	Mount Vernon-Burlingto-Sedro-Woolley
65242	Olympia-Lacey-Tumwater
80389	Seattle-Tacoma-Everett
83764	Spokane-Spokane Valley
71317	Vancouver-Camas-Battle Ground
91405	Walla Walla-Milton-Freewater
93862	Wenatchee-East Wenatchee
97507	Yakima-Selah-Union Gap
	Urban Areas with Populations of 5,000 - 49,000 as of 2017
99998	Aberdeen-Hoquiam
99998	Anacortes
99998	Birch Bay-Blaine
99998	Camano Island
99998	Centralia-Chehalis
99998	Chelan-Manson
99998	Cheney
99998	Ellensburg
99998	Ephrata
99998	Grandview
99998	Granite Falls
99998	Indianola-Kingston
99998	Lynden
99998	Montesano-Elma
99998	Moses Lake
99998	Oak Harbor
99998	Ocean Shores
99998	Omak-Okanogan
99998	Othello
99998	Port Angeles
99998	Port Townsend
99998	Pullman
99998	Quincy
99998	Sequim
99998	Shelton
99998	Snoqualmie-North Bend
99998	Stanwood
99998	Sultan-Gold Bar
99998	Sunnyside
99998	Toppenish-Zillah
99998	Wapato
99998	Woodland
99998	Yelm
	All Other Locations
99999	Non Urbanized area

Emergency Evacuation Designation *(Old Item 1437)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(1)	-	I	BCL06	B.CL.06	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report whether the route carried on the bridge is an emergency evacuation route using one of the following codes. **Code** **Description** N Not an Emergency evacuation route Y Emergency evacuation route	This item is used by FHWA with other items, as per 23 U.S.C. 144(b), to classify bridges according to serviceability, safety, and essentiality for public use and considers the potential impacts to emergency evacuation routes and to regional and national freight and passenger mobility if the serviceability of the bridge is restricted or diminished. Emergency evacuation routes may be designated for various events such as hurricanes, earthquakes, tsunami, dam failure, and other hazardous events. Refer to the State Emergency Management Agency for designated emergency evacuation routes.

Federal or Tribal Land Access *(Old Item 1488)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(30)	-	I	BCL03	B.CL.03	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the Federally managed and/or Indian Tribal Government lands using one or more of the following codes, for the bridge owned by a State or local agency and carrying a highway that leads to or traverses through the Federal or Tribal lands. Report multiple codes separated by pipe (|) delimiters. **Code** — **Description** N — Not applicable BIA — Indian Tribal Government or Bureau of Indian Affairs BLM — Bureau of Land Management NPS — National Park Service USACE — U.S. Army Corps of Engineers USBR — Bureau of Reclamation USFS — U.S. Forest Service USFWS — U.S. Fish & Wildlife Service X — Other Report N when the highway carried by the bridge is not owned by a State or local agency and/or does not lead to or traverse through Federal or Tribal lands.	This item is used to identify bridges owned by State or local agencies on highways that lead to and/or traverse through any Federally managed land or Tribal government property. These bridges may be eligible to receive funding from the Federal Lands Access Program under 23 U.S.C. 204. Consider those bridges that are located on the identified highway to the nearest intersecting highway owned by a State or local agency. For assistance in locating Federal properties, contact Federal Lands Highway at: https://highways.dot.gov/federal-lands/about/contacts.

AADT Year *(Old Item 1453)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(4,0)		I	BH11	B.H.11	A.6

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Specification / Commentary

Record the year represented by the AADT in WSBIS Item BH09. Code all four digits of the year.

AADT Year information is available at the link in WSBIS Item BH09.

AADT *(Old Item 1445)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(6,0)		I	BH09	B.H.09	A.4

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Specification / Commentary

Code the average daily traffic (ADT) volume for the inventory route. Code the most recent ADT counts available. Included in this item are the trucks referred to in WSBIS Item 1451 – Average Daily Truck Traffic. If the structure is closed, code the actual ADT from before the closure occurred.

The ADT must be compatible with the other items coded for the structure. For example, parallel bridges with an open median are coded as follows: if WSBIS Item 1352 – Lanes On the Structure and WSBIS Item 1356 – Curb-to-Curb are coded for each bridge separately, then the ADT must be coded for each bridge separately (not the total ADT for the route).

ADT information for Washington State routes is available at
https://www.wsdot.wa.gov/data/tools/geoportal/?config=traffic

Annual Average Daily Truck Traffic					
Format N(6,0)	**Translation**	**Frequency** I	**WSBIS Item ID** BH10	**SNBI Item ID** B.H.10	**SNTI Item ID**

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Specification	Commentary
Report the Average Annual Daily Truck Traffic (AADTT) from the most recent count for the highway feature reported in Item B.F.01 (Feature Type). The AADTT must be compatible with the other items reported for the highway feature. Report the design AADTT for a newly inventoried highway feature when actual AADTT information is not yet available. Report the last open AADTT for a highway feature that is temporarily closed until repair or replacement can be completed.	The AADTT should be updated at intervals in accordance with the standards for the HPMS and standards/policies within the State. When HPMS or other planning data are not available, use a best estimate based on site familiarity or functional classification in accordance with State standards and policies. Do not include vans, pickup trucks, and other light delivery trucks in the AADTT. The AADTT represents vehicle classes 4-13 as described in FHWA's Traffic Monitoring Guide at: https://www.fhwa.dot.gov/policyinformation/tmguide/.

WSBIS Item 1451 – AADT Truck Percentage - NBI **N(2,0)**
NBI Item 109
NTI Item A.6

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Code the percentage of WSBIS Item 1445 – Average Daily Traffic that is truck traffic on the inventory route. Do not include vans, pickup trucks and other light delivery trucks in this percentage.

NBI Commentary:

The NBI does not require data for Average Daily Truck Traffic if WSBIS Item 1445, ADT, is less than 100. WSDOT requires this data for all routes, regardless of ADT.

NTI Commentary:

The NTI maintains an average daily truck count, not a percentage. WSBIS translates the percentage to a total count using the following formula: ADT x ADT Truck Percentage = ADT Count

Bypass Detour Length *(Old Item 1413)*					
Format	**Translation**	**Frequency**	**WSBIS Item ID**	**SNBI Item ID**	**SNTI Item ID**
N(2,0)		I	BH17	B.H.17	A.7

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Specification / Commentary

Indicate the actual length to the nearest mile of the detour length, which is considered the additional travel needed to return to the original route if the structure is closed.

If a ground level bypass is available at the structure site for the inventory route (ramps at a diamond interchange, for example), code the detour length as 0. If the detour exceeds 99 miles, code 99. If the bridge is one of twin bridges and is not at an interchange, code 1 where the other twin bridge can be used as a temporary bypass with a reasonable amount of crossover grading.

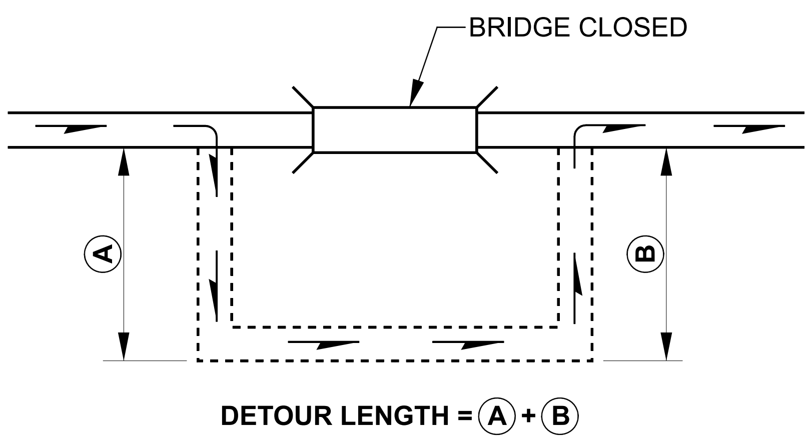
Code 0 for routes under a bridge, on the basis that a failed bridge over the route can be removed to allow passage. Routes through tunnels should be the actual detour length.

To the extent practical, the detour route should match the capacity and functionality of the original route. When this is not possible the following minimum standards shall apply:

1.The detour route cannot have weight restrictions lower than the original route.

2.The detour route cannot have vertical clearance limits over the roadway lanes less than 14 feet 3 inches (as measured) unless the original route also has vertical clearance restrictions, in which case the detour cannot further restrict clearances.

Figure BH17



NBI Commentary:

This coding guide provides additional direction on how to code routes under the structure, and additional criteria for determining acceptable detour routes.

WSBIS Item BH12 – Maximum Vertical Clearance Route (ft & in) *(Old Item 1499)* **N(4,0)**
WSBIS Item 2501 – Maximum Vertical Clearance Reverse (ft & in) *(Old Item 2501)* **N(4,0)**
NBI Item 10

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Code the practical maximum vertical clearance over the inventory route identified in WSBIS Item 1435 (travel lanes only)*, in the direction of increasing mileposts, whether the route is on the structure or under the structure. This field identifies the minimum vertical clearance for the lane that will carry the highest load. When no vertical clearance restriction exists leave this item blank.

To accurately code this field, all vertical clearance measurements for the inventory route must be collected over all lane stripes and at edges of pavement, recorded in a vertical clearance card, and kept on file.

When the entire undivided inventory route passes on or under a structure, code WSBIS Item 1499 as measured and WSBIS Item 2501 is blank.

When the divided inventory route passes on or under a structure, code WSBIS Item 1499 and WSBIS Item 2501 as measured in each direction.

When the inventory route consists of two parallel bridges carrying a divided route, for the bridge carrying the increasing route direction code WSBIS Item 1499 as measured and WSBIS Item 2501 is blank. For the bridge carrying the decreasing route direction, WSBIS Item 1499 is blank and code WSBIS Item 2501 as measured.

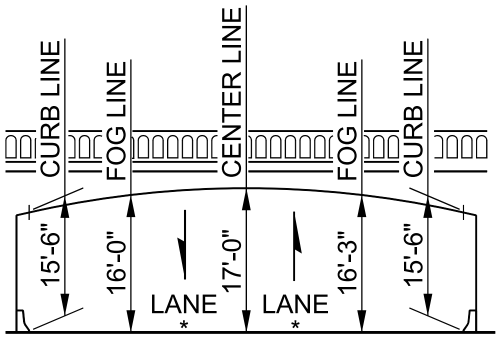
When a restriction is 100 feet or greater, code 9912.

* Traveled way, or travel lanes, is between fog lines and excludes shoulders or gore areas. In cases where there are no fog lines, judgement shall be used to determine edges of traveled way.

NBI Commentary:

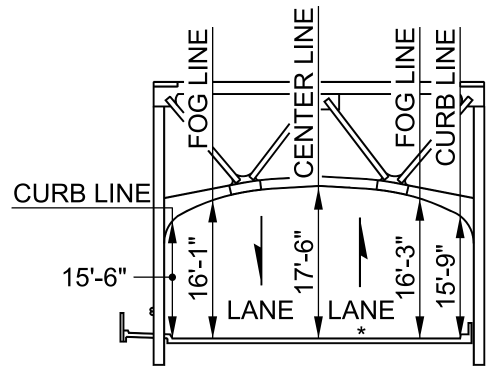
The maximum vertical clearance for each route is reported to the NBI, regardless of route direction.

Figure BH12



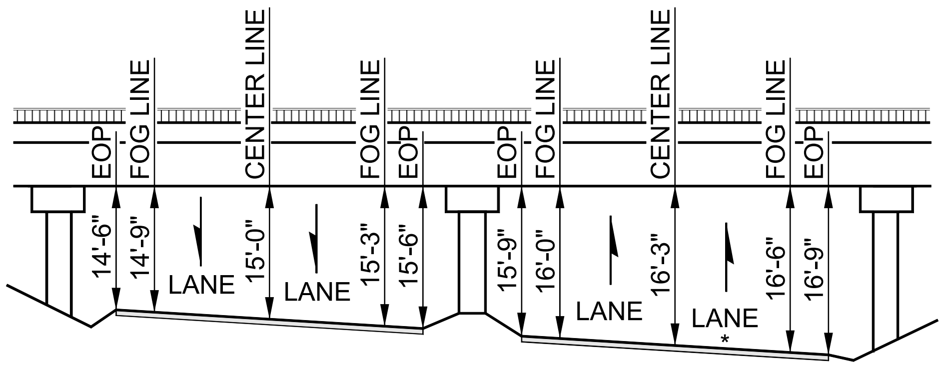
UNDIVIDED HIGHWAY EXAMPLE

Figure 1499a



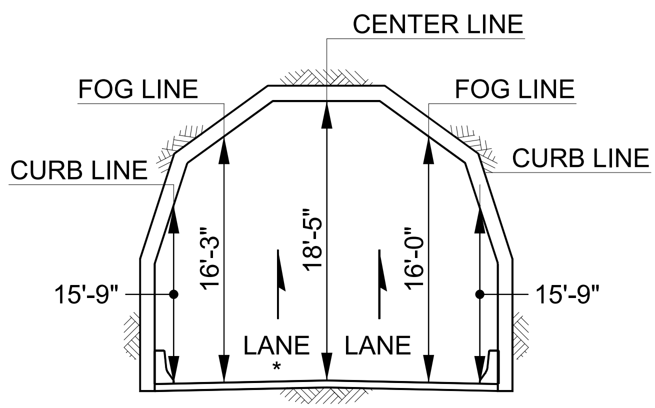
STEEL TRUSS EXAMPLE

Figure 1499b



DIVIDED HIGHWAY EXAMPLE

Figure 1499c



TUNNEL

Figure 1499d

Code "1603": THE MAXIMUM VERTICAL HEIGHT ALLOWED IN ANY 10 FOOT ROADWAY WIDTH IS THE LEAST VERTICAL CLEARANCE IN THE LANE OF ROADWAY WITH THE MAXIMUM VERTICAL CLEARANCE.

* CONTROLLING LANE.

NBI Commentary:

The NBI coding guide indicates that this measurement should be the minimum clearance for a 10 foot width of pavement or travelled part of the roadway. However, from a practical perspective this has been interpreted in this coding guide as the clearance for the lane that will pass the tallest load. The lanes are defined by striping.

Null and 9912 data in WSBIS are translated to 9999 for the NBI submittal.

The NBI requires coding only the maximum vertical clearance for divided highways. WSBIS has two fields. When the NBI submittal is prepared, the largest dimension is selected and reported.

WSBIS Item BH13 – Minimum Vertical Clearance Route (feet & inches) N(4,0)
WSBIS Item 2502 – Minimum Vertical Clearance Reverse (feet & inches) N(4,0)

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Code the practical minimum vertical clearance over the inventory route identified in WSBIS Item 1435, in the direction of increasing mileposts, whether the route is on the structure or under the structure.

For state owned structures, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

Horizontal Route Clearance *(Old Item 1491)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(4,0)		I	BH16	B.H.16	

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Specification / Commentary

WSBIS has two fields. When the NBI submittal is prepared, the largest dimension is selected and reported.

Substructure Navigable Protection)

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	I	BN06	B.N.06	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways when Condition Report type is part of the record**

Specification	Commentary
Report the presence and adequacy of substructure navigation protection for the waterway feature reported in Item B.F.01 (Feature Type), using one of the following codes.	Substructure navigation protection systems can be fender systems, dolphins, or other systems that either prevent the substructure from being impacted or adequately reduce the impact load that is transferred into the substructure.
Code / **Description** 0 – Navigation protection not required; bridge has been designed or assessed to have adequate capacity to resist anticipated impact loads without collapse. 1 – Navigation protection not required; assessment of navigation opening and vessel traffic has determined that there is a low probability that an errant vessel could impact the bridge. 2 – Protective system in place and functioning. 3 – Protective system in place, but damage or deterioration impacts ability to protect. 4 – Protective system in place, but reevaluation of design suggested. 5 – No protective system in place, but reevaluation of the need for a protective system is recommended.	Use codes 0 and 1 to indicate that an assessment of vessel traffic characteristics and/or bridge capacity has determined that navigation protection is not required. AASHTO's Guide Specifications and Commentary for Vessel Collision Design of Highway Bridges provides a method for assessing an existing bridge's vulnerability to vessel collision. Codes 0 and 1 should not be assigned based on field observation. Use codes 4 and 5 to indicate that observed conditions necessitate a review of vessel traffic characteristics, bridge capacity, and protective system capability to determine whether the bridge is adequately protected from vessel collision.
Report this item only when Item B.N.01 (Navigable Waterway) is Y.	

WSBIS Item WH24 – NBI Reportable Flag *(Old Item 2410)* Pulldown

Applicable Structure Types

- **All structure records**

Indicate if the crossing record is to be included in the National Bridge Inventory data submittal or not. Records required to be reported include all structures subject to the NBIS and all undercrossings identified as a Federal Aid Route. Other undercrossings can be reported at the owner's discretion.

For state owned structures, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

WSBIS Item WH25 – SNBI Reportable Flag *(Old Item 2408)* Pulldown

Applicable Structure Types

- **All structure records**

Indicate if the crossing record is to be included in the National Bridge Inventory data submittal or not. Records required to be reported include all structures subject to the NBIS and all undercrossings identified as a Federal Aid Route. Other undercrossings can be reported at the owner's discretion.

For state owned structures, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

WSBIS Item WH26 – SNTI Reportable Flag *(Old Item 2409)* Pulldown

Applicable Structure Types

- **All structure records**

Indicate if the crossing record is to be included in the National Tunnel Inventory data submittal or not.

For state owned structures, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

WSBIS Item WH27– Bridge List *(Old Item 2411)* Pulldown

Applicable Structure Types

- **All structure records maintained by WSDOT Bridge Preservation**

Indicate if the crossing record is to be included or not in the Bridge List M 23-09.

For state owned structures, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

Table WH27 Bridge List Code

WSBIS Code	Description
1	The crossing record is included in the Bridge List.
2	The crossing record is NOT included in the Bridge List.

Crossing Tab Discontinued Fields - Effective Jan 2026

The fields in this section will be fully discontinued in 2026. Until then, they still need to be maintained for FHWA submittal.

WSBIS Item 1354 – Lanes Under **N(2,0)**
NBI Item 28B
NTI Item A.3

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Code the number of lanes under the structure.

For On records, code WSBIS Item 1354 for all lanes under the bridge for all routes that are functionally classified (see WSBIS Item 1487).

For Under records, code WSBIS Item 1354 for only the lanes associated with the inventory route under.

For Tunnels, code all the lanes in the tunnel.

WSBIS Item 1457 – Future ADT **N(6,0)**
NBI Item 114

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

For On records, code WSBIS Item 1354 for all lanes under the bridge for all routes that are functionally classified (see WSBIS Item 1487).

Code the forecasted average daily traffic (ADT) for the inventory route. This shall be projected at least 17 years but no more than 22 years from the last year of routine inspection. If planning data is not available, use the best estimate based on site familiarity. The future ADT must be compatible with the other items coded for the structure. For example, parallel bridges with an open median are coded as follows: if WSBIS Item 1352 – Lanes On the Structure and WSBIS Item 1356 – Curb-to-Curb are coded for each bridge separately, then the future ADT must be coded for each bridge separately (not the total for the route).

WSBIS Item 1463 – Future ADT Year **N(6,0)**
NBI Item 115

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Code the forecasted average daily traffic (ADT) for the inventory route. This shall be projected at least 17 years but no more than 22 years from the last year of routine inspection. If planning data is not available, use the best estimate based on site familiarity. The future ADT must be compatible with the other items coded for the structure. For example, parallel bridges with an open median are coded as follows: if WSBIS Item 1352 – Lanes On the Structure and WSBIS Item 1356 – Curb-to-Curb are coded for each bridge separately, then the future ADT must be coded for each bridge separately (not the total for the route).

WSBIS Item 1477 – Linear Sub Route **N(2,0)**
NBI Item 13B

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

The LRS subroute number is always coded 00.

NBI Commentary:

WSDOT codes LRS subroute numbers for all crossing records, but only routes on the Base Highway Network are submitted to the NBI.

WSBIS Item 1484 - Base Highway Network **Pulldown**
NBI Item 12

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

The Base Highway Network includes the mainline portions of the NHS (WSBIS Item 1483 is coded 1), rural/urban principal arterial system and rural minor arterial system. Ramps, frontage roads and other roadways are not included in the Base Network. For the inventory route identified in WSBIS Item 1435 – Inventory Route, use one of the following codes:

Table 1484 Base Highway Network Code

Table 1484 Base Highway Network Code

WSBIS Code	Description
0	Inventory Route is not on Base Network
1	Inventory Route is on the Base Network

WSBIS Item 1486 – Federal Lands Highways - NBI **Pulldown**
NBI Item 105

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

This code identifies bridges on roads which lead to and traverse federal lands. These bridges may be eligible to receive funding from the Federal Lands Highway Program.

Washington State Forest Highways can be found in the Emergency Relief chapter of the Local Agency Guidelines (LAG) manual.

As of January 1, 2000, there are three Land Management Highway Systems (LMHS). There are two in Douglas County and one in Lincoln County.

0	Not applicable	4	Both IRR and FH
1	Indian Reservation Road (IRR)	5	Both IRR and LMHS
2	Forest Highway (FH)	6	Both FH and LMHS
3	Land Management Highway System (LMHS)	9	Combined IRR, FH and LMHS

For existing data in WSBIS, do not alter codes. For new records, code zero unless a data source is available.

NBI Commentary:
WSDOT has not been able to identify a source for this data, and will code zeroes for new records until an information source is identified.

WSBIS Item 1495 – Horizontal Clearance, Reverse Direction (feet & inches) **N(4,0)**
NBI Item 47

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

The horizontal clearance for the inventory route should be measured and recorded for each opening between restrictive features – curbs, rails, guardrails, walls, piers, slopes, or other structural features limiting the roadway (surface and shoulders).

The purpose of this item is to give the largest available clearance for the movement of wide loads. Flush and mountable medians are not considered to be restrictions. This clearance is defined in two ways:

1. Clear distance between restrictions of the inventory route either on or under the structure.
2. Edges of roadway surface including shoulders when there are no other restrictions.

When the entire undivided inventory route passes on or under a structure, code WSBIS Item 1491 as measured and WSBIS Item 1495 is blank.

When the divided inventory route passes on or under a structure, code WSBIS Item 1491 and WSBIS Item 1495 as measured in each direction. Note that when a bridge pier separates a single route, it is always considered divided.

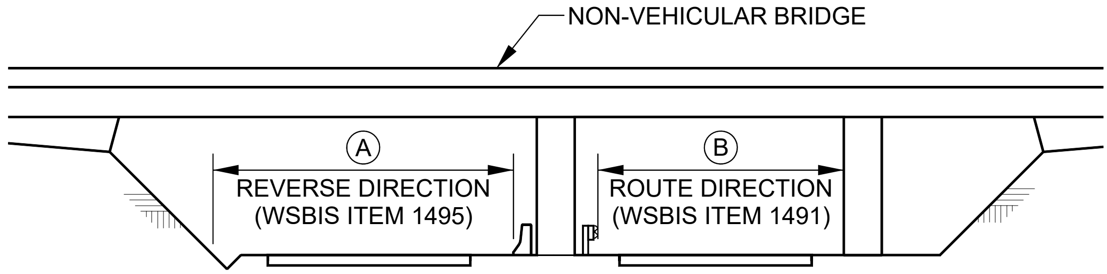
When the inventory route consists of two parallel bridges carrying a divided route, for the bridge carrying the increasing route direction code WSBIS Item 1491 as measured and WSBIS Item 1495 is blank. For the bridge carrying the decreasing route direction, WSBIS Item 1491 is blank and code WSBIS Item 1495 as measured.

When a restriction is 100 feet or greater, code 9912.

NBI Commentary:

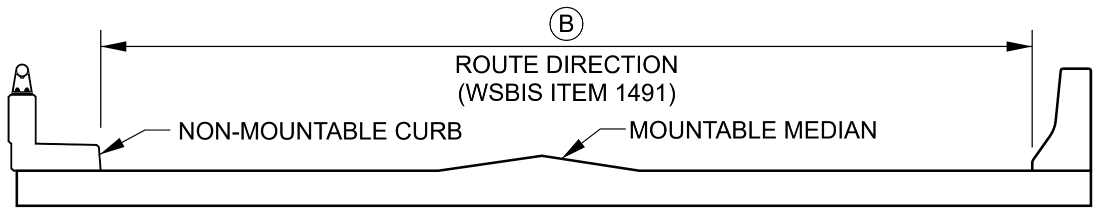
The minimum horizontal clearance for each route is reported to the NBI, regardless of route direction.

Figure 1495



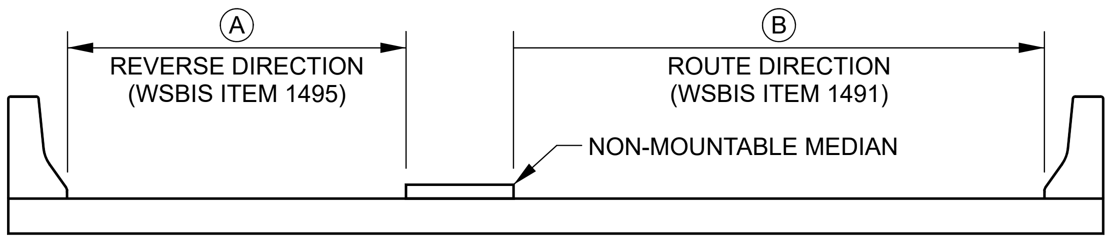
IF CLEARANCE A > B, CODE WSBIS ITEM 1495 = A & WSBIS ITEM 1491 = Blank

Figure 1



NO MEDIAN OR FLUSH OR MOUNTABLE MEDIAN

Figure 2



RAISED MEDIAN OR NON-MOUNTABLE MEDIAN

IF CLEARANCE B > A, CODE WSBIS ITEM 1491 = B & WSBIS ITEM 1495 = Blank

Figure 3

WSBIS Item 2368 – Min. Vert. Clrnc. Over Deck Override (ft & in.) N(4,0)

Applicable Structure Types

- Bridges & culverts carrying public roadways for records maintained by BPO

When a bridge is located underneath one or more bridges (stacked bridges), code the actual minimum vertical clearance over the bridge roadway, including shoulders, to the superstructure restriction caused by the controlling overhead bridge, in feet and inches, rounded to the lesser inch (e.g., 16’ 3¾” is to be coded 1603).

WSBIS Item 2436 – Route Sequencer — Integer

Applicable Structure Types

- **All structure records maintained by WSDOT Bridge Preservation**

The route sequencer is a two digit number used for placement of crossing records in the *Bridge List* M 23-09.

If the inventory route is not included in the bridge list, code 0.

For state owned structures, or structures with crossings managed by the Statewide Program Manager, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

WSBIS Item 2437 – Bridge List Override (miles) — N(5,2)

Applicable Structure Types

- **All structure records maintained by WSDOT Bridge Preservation**

The bridge list milepost override is used for placement of crossing records in the Bridge List M 23-09.

For state owned structures, or structures with crossings managed by the Statewide Program Manager, this item is coded by the BPO Information Group and is visible in the BridgeWorks Inventory Management mode.

WSBIS Item 2438 – Milepost Sequencer — Integer

Applicable Structure Types

- **All structure records maintained by WSDOT Bridge Preservation**

The milepost sequencer is a two digit number used for placement of crossing records in the Bridge List M 23-09.

If the inventory route is not included in the bridge list, code 0.

For state owned structures, or structures with crossings managed by the Statewide Program Manager, this item is coded by the BPO Information Group and is visible in BridgeWorks Inventory Management mode.

WSBIS Item 7479 – Federal Aid Route Number — AN(4)

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**
- **Local Agency Pedestrian, RR and other non-vehicular structures over public roadways**
- **Local Agency Tunnels carrying public roadways within**

If the route being inventoried is a federal aid highway, enter its federal aid route number in this field.

Federal Aid Route Numbers are shown on the Statewide National Functional Classification System Maps. These maps are located at local agency planning departments or at WSDOT Service Center Planning and at https://www.wsdot.wa.gov/data/tools/geoportal/.

If the bridge is not on a federal aid highway, the field should be filled with zeros.

Materials & Types Tab

WSBIS Item 1532 – Main Span Material - NBI | **Pulldown**
NBI Item 43A

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Indicate the kind of material and/or design for the main span.

Table 1532 Main Span Material Code - NBI

WSBIS Code	Description
1	Concrete
2	Concrete continuous
3	Steel
4	Steel continuous
5	Prestressed and/or post-tensioned concrete
6	Prestressed and/or post-tensioned concrete continuous
7	Wood or Timber
8	Masonry
9	Aluminum, Wrought Iron, or Cast Iron
0	Other (also to be used when not applicable for approach spans)

WSBIS Item 1533 – Main Span Design - NBI | **Pulldown**
NBI Item 43B

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Indicate the predominant type of design and/or type of construction.

Table 1533 - Main Span Design Code - NBI

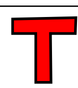
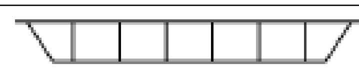
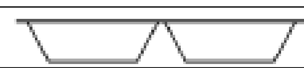
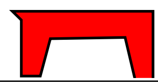
WSBIS Code	NBI Code	Description
1	01	Slab
2	02	Stringer/Multibeam or Girder
3	03	Girder and Floorbeam System
4	04	Tee Beam 
5	05	Box Beam or Girders – Multiple 
6	06	Box Beam or Girders – Single or Spread 
7	07	Frame (except frame culverts)
8	08	Orthotropic
9	09	Truss – Deck

Table 1533 - Main Span Design Code - NBI

WSBIS Code	NBI Code	Description
10	10	Truss – Thru
11	11	Arch – Deck
12	12	Arch – Thru
13	13	Suspension
14	14	Stayed Girder
15	15	Movable – Lift
16	16	Movable – Bascule
17	17	Movable – Swing
18	18	Tunnel (this code designates reporting to the NTI instead of the NBI)
19	19	Culvert (includes frame culverts)
20*	20*	Mixed types
21	21	Segmental Box Girder
22	22	Channel Beam (Bathtub Unit) 
0	00	Other (also to be used when not applicable for approach spans)

*Applicable only to approach spans – WSBIS Item 1536

Examples:
- Wood or Timber Through Truss = 710
- Masonry Culvert = 819
- Steel Suspension = 313
- Continuous Concrete Multiple Box Girders = 205
- Simple Span Concrete Slab = 101
- Tunnel in Rock = 018

WSBIS Item 1538 – Number of Main Spans - NBI N(3,0)

NBI Item 45

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Record the number of spans in the main or major unit. This item will include all spans of most bridges, the major unit only of a sizable structure, or a unit of material or design different from that of the approach spans.

A span that contains a drop-in span with cantilevers, or two cantilever spans with a hinge, is counted as one span (from pier to pier). Cantilever end spans are counted separately.

WSBIS Item 1535 – Approach Span Material - NBI Pulldown

NBI Item 44A

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

Indicate the type of structure for the approach spans to a major bridge or for the spans where the structural material is different. The codes are the same as for WSBIS Item 1532. If the kind of material is varied, code the most predominant.

Code 0 if this item is not applicable.

WSBIS Item 1536 – Approach Span Design - NBI **Pulldown**
NBI Item 44B

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

Indicate the type of structure for the approach spans to a major bridge or for the spans where the structural material is different using Table 1533. Use code 20 when no one type of design and/or construction is predominant for the approach units.

Code 00 if this item is not applicable.

WSBIS Item 1541 – Number of Approach Spans - NBI **N(3,0)**
NBI Item 46

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Record the number of approach spans to the major bridge, or the number of spans of material different from that of the major bridge.

Code 0 if this item is not applicable.

NBI Commentary:

This coding guide requires coding zeroes when there are no approach spans. The NBI coding guide assumes a zero entry.

WSBIS Item 1546 – Deck Type - NBI **Pulldown**
NBI Item 107

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways***

Record the type of deck system on the bridge. If more than one type of deck system is on the bridge, code the most predominant. Code A for a filled culvert or arch with the approach roadway section carried across the structure.

*Main Listing Under records (e.g., railroad bridges and pedestrian bridges) are to be coded N, with the following exception: WSDOT owned pedestrian bridges are to be coded with the appropriate Deck Type.

Use one of the following codes:

Table 1546 Deck Type Code - NBI

WSBIS Code	NBI Code	Description
1	1	Concrete Cast-in-Place
2	2	Concrete Precast Panels
3	3	Steel Grating – Open
4	4	Steel Grating – Filled with Concrete
5	5	Steel plate (includes orthotropic)
6	6	Corrugated Steel

Table 1546 Deck Type Code - NBI

7	7	Aluminum
8	8	Treated timber
9	8	Untreated timber
0	9	Other
A	N	Filled arches / Culverts
B	9	Precast integral with beam
N	N	Bridges with no deck

NBI Commentary:

WSDOT provides additional codes which are translated to NBI codes as shown above.

WSBIS Item 1547 – Wearing Surface - NBI **Pulldown**

NBI Item 108A

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways***

*Main Listing Under records (e.g., railroad bridges and pedestrian bridges) are to be coded N, with the following exception: WSDOT owned pedestrian bridges are to be coded with the appropriate Wearing Surface.

Table 1547 Wearing Surface Code

WSBIS Code	Description
1	Monolithic Concrete (concurrently placed with structural deck)
2	Integral Concrete (separate non-modified layer of concrete added to structural deck)
3	Latex Concrete or similar additive
4	Low Slump Concrete
5	Epoxy Overlay
6	Bituminous (ACP or BST)
7	Timber
8	Gravel
9	Other
0	None (no additional concrete thickness or wearing surface is included in the bridge deck)
N	Bridges with no deck

WSBIS Item 1548 – Membrane - NBI **Pulldown**

NBI Item 108B

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways***

*Main Listing Under records (e.g., railroad bridges and pedestrian bridges) are to be coded N, with the following exception: WSDOT owned pedestrian bridges are to be coded with the appropriate Membrane.

Table 1548 Membrane Code - NBI

WSBIS Code	Description
1	Built-up
2	Preformed Fabric
3	Epoxy
8	Unknown
9	Other
0	None
N	Bridges with no deck

WSBIS Item 1549 – Deck Protection - NBI — Pulldown

NBI Item 108C

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways***

*Main Listing Under records (e.g., railroad bridges and pedestrian bridges) are to be coded N, with the following exception: WSDOT owned pedestrian bridges are to be coded with the appropriate Membrane.

Table 1549 Deck Protection Code - NBI

WSBIS Code	Description
1	Epoxy Coated Reinforcing
2	Galvanized Reinforcing
3	Other Coated Reinforcing
4	Cathodic Protection
6	Polymer Impregnated
7	Internally Sealed
8	Unknown
9	Other
0	None
N	Bridges with no deck

Superstructure Configuration Designation

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSP01	B.SP.01	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Specification / Commentary

This item is populated automatically from the WSP01 field.

Superstructure Configuration Code

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Calculated	-	I	WSP01	-	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the assigned span configuration designation using one of the following codes. **Code** **Description** M## Main A## Approach C## Culvert V## Culvert extension W## Widening The ## characters in the above codes are auto-generated with sequential numbers, with leading zeros, assigned to each span configuration.	This item captures how spans of the reported bridge configuration are classified and designated. Except for culverts, each bridge has at least one main span. Main spans include all spans of most bridges or the major span(s) of a sizable bridge. The “##” characters in the codes with a sequential number (e.g., M01, A01, A02, etc.)identifies each unique span configuration present on the bridge.

Commentary Continued

A bridge may or may not have approach spans. Approach spans are typically those of a different material, type, or design than the main span and are typically at one or both ends of the main span.

Consider the span(s) of vaulted abutments as an approach span.

Use code C for spans that convey water through or under a roadway embankment and are designed hydraulically to take advantage of submergence to increase water carrying capacity.

Use code V when a culvert is extended using dissimilar construction.

Use code W for widened portions of main or approach spans with dissimilar construction. Widening data sets do not contribute to the calculation of the total number of spans for the bridge.

Examples - Superstructure Configuration Code
Four-span steel plate girder bridge. This bridge has one span data set. Report M01.
Double-leaf bascule bridge with four steel box girder approach spans. This bridge has two span data sets. • Report M01 for the bascule data set. • Report A01 for the steel box girder data set.
Six-span bridge with two continuous steel plate girder main spans and four simply supported steel plate girder approach spans. This bridge has two span data sets. • Report M01 for the continuous steel plate girder data set. • Report code A01 for the simply supported steel plate girder data set.
Four-barrel corrugated steel pipe culvert, modified by adding four additional HDPE round pipes along the roadway centerline to increase hydraulic capacity. This bridge has two span data sets. • Report C01 for the steel pipes data set. • Report C02 for the HDPE pipes data set.
Steel truss main span bridge with three prestressed concrete multi-beam approach spans at the north end, and two steel multi-beam approach spans at the south end. This bridge has three span data sets. • Report M01 for the steel truss data set. • Report A01 for the north approach data set. • Report A02 for the south approach data set.
Single span reinforced concrete tee-beam bridge widened with prestressed concrete box beams. This bridge has two span data sets. • Report M01 for the reinforced concrete tee-beam data set. • Report W01 for the prestressed concrete box beams data set.
Three-sided frame culvert, lengthened by adding a four-sided box culvert to the end of the barrel. This bridge has two span data sets. • Report C01 for the three-sided frame culvert data set. • Report V01 for the four-sided box culvert data set.
Single span steel beam bridge widened using the same superstructure/deck construction. This bridge has one span data set. Report M01.

Span Description

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	I	WSP02	-	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification / Commentary

Briefly identify the span numbers associated with the Span Configuration identified in WSP01.

Examples

- Main Spans 2, 3 and 4
- Approach Spans 1-3

Number of Spans

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(4,0)	-	I	BSP02	B.SP.02	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the number of spans.	This item captures the number of spans of the configuration(s) designated in item B.SP.01 (Span Configuration Designation). If the number of barrels or spans varies, report the maximum number.

Examples

Four-span steel plate girder bridge. This bridge has one span data set. Report 4.

Double-leaf bascule bridge with four steel box girder approach spans. This bridge has two span data sets.
- Report 1 for the bascule main span data set.
- Report 4 for the box girder approach span data set.

Six-span bridge with two continuous steel plate girder main spans and four simply supported steel plate girder approach spans. This bridge has two span data sets.

Report 2 for the main span data set.

Report 4 for the approach span data set.

Four-barrel corrugated steel pipe culvert, modified by adding four additional HDPE round pipes along the roadway centerline to increase hydraulic capacity. This bridge has two span data sets.
- Report 4 for the steel pipes data set.
- Report 4 for the HDPE pipes data set.

Three steel girder spans with concrete vaulted/cellular abutments that enclose a reinforced concrete slab span at each end of the bridge. This bridge has two span data sets.
- Report 3 for the steel girder main span data set.
- Report 2 for the reinforced concrete approach span data set.

Four-sided concrete box culvert that collects runoff at a single-barrel inlet at the northeast corner of an intersection, and at a three-barrel inlet at the northwest corner. The barrels merge beneath the intersection, and all four barrels outlet to the southeast corner. This bridge has one span data set. Report 4.

Three-sided frame culvert, lengthened by adding a four-sided box culvert to the end of the barrel. This bridge has two span data sets.
- Report 1 for the three-sided frame culvert data set.
- Report 1 for the four-sided box culvert data set.

Twin concrete box girder bridge that has eastbound and westbound lanes separated by a 1” median gap. Eastbound portion of superstructure is supported by two piers, and westbound portion is supported by three piers due to unusual terrain restrictions. This bridge has one span data set. Report 4.

Number of Beam Lines

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(3,0)	-	I	BSP03	B.SP.03	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the number of principal beam lines. Report 1 for bridges where Item B.SP.06 (Span Type) is F01, F02, S01, or S02. Report 0 for bridges where Item B.SP.06 (Span Type) is P01 or P02.	Principal beam lines include the main longitudinal load-carrying members of the superstructure such as beams, girders, trusses, and arches or arch ribs, but do not include stringers of a floor beam system or spandrel walls of an arch. Use the average number of beam lines for bridges with variable number of beam lines within a span configuration, rounded down.

Examples

Timber multi-beam bridge with 12 beams. Report 12.

Steel through truss bridge with two trusses and ten stringers. Report 2.

Flared three-span tee-beam bridge with 12 beams at the south end and 17 beams at the north end. Report 14.

Steel arch bridge with three arch ribs. Report 3.

Concrete arch bridge with masonry spandrel walls. Report 1.

Four-barrel corrugated steel pipe culvert, modified by adding four additional HDPE round pipes along the roadway centerline to increase hydraulic capacity. This bridge has two span data sets.
- Report 0 for the steel pipes data set.
- Report 0 for the HDPE pipes data set.

Three-sided frame culvert, lengthened by adding a four-sided box culvert to the end of the barrel. This bridge has two span data sets.
- Report 1 for the three-sided frame data set.
- Report 1 for the four-sided frame data set.

Span Material

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSP04	B.SP.04	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification

Report the principal span material type using one of the following codes.

Code	Description
A01	Aluminum
C01	Reinforced concrete - cast-in-place
C02	Reinforced concrete - precast
C03	Prestressed concrete - pre-tensioned
C04	Prestressed concrete - cast in place post-tensioned
C05	Prestressed concrete - precast post-tensioned
CX	Concrete - other
F01	FRP composite - aramid fiber
F02	FRP composite - carbon fiber
F03	FRP composite - glass fiber
FX	FRP composite - other
I01	Iron - cast
I02	Iron - wrought
M01	Masonry - block
M02	Masonry - stone
P01	Plastic - Polyethylene
PX	Plastic - other
S01	Steel - rolled shapes
S02	Steel - welded shapes
S03	Steel - bolted shapes
S04	Steel - riveted shapes
S05	Steel - bolted and riveted shapes
SX	Steel - other

Specification Continued

continued...

Code	Description
T01	Timber - glue laminated
T01	Timber - nail laminated
T01	Timber - solid sawn
T01	Timber - stress laminated
T01	Timber - other
X	Other

Span Material - Commentary
A principal span member includes the main longitudinal load-carrying members of the span such as beams, girders, trusses, arches, or pipes, but does not include the floor system. Use code C04 or C05, as applicable, for prestressed concrete superstructures that utilize both pre-tensioning and post- tensioning. Use code M01 for masonry made from bricks or concrete blocks. Use code M02 for natural stone. Use code P01 for plastics that include HDPE and PE materials typically used for pipes.

Examples – Span Material
Spliced concrete girder: post-tensioned, precast, pre-tensioned bulb-T. Report C05. Stress laminated timber slab. Report T04. Concrete encased steel rolled beam. Report S01. Bolted steel truss with timber stringers. Report S03. Cast-in-place reinforced concrete tee-beams strengthened with carbon fiber FRP. Report C01. Corrugated steel pipes with bolted seams. Report S03. Corrugated steel pipe culvert with welded seams, modified by adding additional HDPE round pipes to lengthen the culvert along the roadway centerline. This bridge has two span data sets. • Report S02 for the steel pipes data set. • Report P01 for the HDPE pipes data set. Three-sided, cast-in-place reinforced concrete frame culvert, lengthened by adding a four- sided precast reinforced concrete frame culvert to the end of the barrel. This bridge has two span data sets. • Report C01 for the three-sided frame data set. • Report C02 for the four-sided frame data set. Terra cotta pipes. Report X.

Span Continuity

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(1)	-	I	BSP05	B.SP.05	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the span continuity using one of the following codes. **Code** **Description** 1 Simple or single span 2 Continuous 3 Continuous for live loads only 4 Cantilever 5 Cantilever with pin and hanger 6 Frame 7 Buried	This item captures the continuity of the span(s) in the configuration. Use code 2 for bridges designed continuous for permanent (dead) loads and live loads. Also, use code 2 for cable stayed and suspension bridges, and for multi-span arches. Use code 3 for bridges designed as simple spans for permanent (dead) loads and continuous for live loads. When it is unknown if the superstructure was designed as continuous for live loads, code this item consistent with the assumption used in the load rating calculations. Use code 6 for three-sided and four-sided frames that are not buried. Use code 7 for pipe culverts and other structures that rely on soil-structure interaction to support vertical loads.

Examples - Span Continuity

Two prestressed concrete girder simple spans. Report 1.

Three-span bridge with cantilevered end spans that are unsupported at the extreme ends. Report 4.

Steel rigid K-frame. Report 6.

Two prestressed concrete girder simple spans with continuous deck designed to provide continuity for live load over the pier. Report 3.

Three-span concrete girder bridge with cantilever and suspended center span. Report 4.

Three-span steel girder bridge with cantilever and suspended pin and hanger center span. Report 5.

Three-barrel monolithic concrete frame bridge that is not buried. Report 6. Four-barrel corrugated steel pipe culvert. Report 7.

Span Type

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSP06	B.SP.06	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Specification

Report the span type using one of the following codes.

Code	Description
A01	Arch - under fill without spandrel
A02	Arch - open spandrel
A03	Arch - closed spandrel
A04	Arch - through
A05	Arch - tied
B01	Box girder/beam - single
B02	Box girder/beam - multiple adjacent
B03	Box girder/beam - multiple spread
B04	Box girder/beam - segmental
F01	Frame - three-sided
F02	Frame - four-sided
F03	Frame - K-shaped
F04	Frame - delta-shaped
G01	Girder/beam - I-shaped adjacent
G02	Girder/beam - I-shaped spread
G03	Girder/beam - tee-beam
G04	Girder/beam - inverted tee-beam
G05	Girder/beam - double-tee adjacent
G06	Girder/beam - double-tee spread
G07	Girder/beam - channel adjacent
G08	Girder/beam - channel spread
G09	Girder/beam - girder & floor beam
G10	Girder/beam - through girder
GX	Girder/beam - other

Specification Continued

continued...

Code	Description
L01	Cable - suspension
L02	Cable - suspension
L03	Cable - suspension
L04	Cable - other
M05	Moveable - vertical lift
M01	Moveable - vertical lift
M02	Moveable - vertical lift
M03	Moveable - other
P04	Pipe - rigid
P01	Pipe - flexible
S03	Slab - solid
S04	Slab - voided
T01	Truss - deck
T02	Truss - through
T03	Truss - pony
X04	Other - railroad flat car
X05	Other - ferry transfer
X06	Other - floating
X	Other

Span Type - Commentary
Adjacent girders/beams are those sections that are placed directly next to each other and are touching or nearly touching. Spread girders/beams are those sections that are spaced so that the deck spans the space between the sections. Box girder/beams include boxes, tubs, and cellular structures where interior surfaces may or may not be accessible. Use code F01 for three-sided rigid frames. Use code F02 for rigid four-sided concrete box bridges. Use code G01 or G02, as applicable, for bulb-tee and deck bulb-tee girders/beams. Use code G09 for superstructures with girder and floor beam systems regardless of the girder shape. Use code G10 for through girder type superstructures regardless of the girder shape. Use code P02 for pipes that rely on the stability of surrounding soils to maintain their structural shape.

Span Protective System

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSP07	B.SP.07	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the span protective system using one of the following codes.	Code this item consistent with the material reported for Item B.SP.04 (Span Material). In cases where the span configuration may have a combination of protective systems, use the code for the predominant protective system based on protected area. In cases where multiple systems protect the same area, use the code for the outermost protective layer. Use code 0 when the span is unprotected. Use code 0 when unprotected steels either never were coated or currently have no signs of coating systems, and have no protective systems such as cathodic protection or weathering chemistry. Non-protective anti-graffiti and aesthetic coatings are not considered when coding this item. Use code C01 for weathering steel that has been painted. Use code C02 for sealers such as silanes, siloxanes, linseed oils, etc. Use code P01 only for weathering grades of steel. For timber, use code T01 for oil-based or water-borne timber preservatives. Use code C01 for paints and stains. Use the appropriate code for span members under fill that have a protective system.

Code	Description
0	None
A01	Admixture – internally sealed
A02	Admixture – low permeability
A03	Admixture – polymer impregnated
A04	Admixture – ASR inhibitor
AX	Admixture – other
C01	Coating – paint
C02	Coating – sealer
C03	Coating – hot dip galvanizing
C04	Coating – metalizing/thermal spray
CX	Coating - other
E01	Encasement - concrete
EX	Encasement - other
M01	Membrane - built-up
M01	Membrane - sheet
M01	Membrane - liquid applied
M01	Membrane - unknown
MX	Membrane - other
P01	Patina - uncoated weathering steel
S01	Sacrificial - cathodic, passive
S02	Sacrificial - cathodic, active
SX	Sacrificial - other
T01	Treated - timber preservative
U	Unknown
X	Other

Examples – Span Protective System

Low permeability concrete slab bridge with waterproofing sheet membrane. Report M02.

Weathering steel multi-beam bridge that has the beam ends painted to protect from leakage through the joints. Report P01.

Deck Interaction

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(2)	-	I	BSP08	B.SP.08	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the type of interaction between the superstructure and deck for the span configuration using one of the following codes. **Code** **Description** CS Composite - shored construction CU Composite - unshored constructions IM Integral or monolithic NC Non-composite Do not report this item when Item B.SP.09 (Deck Material and Type) is 0.	This item captures the type of structural interaction that occurs between the bridge deck and superstructure, which may indicate the importance of the deck to the overall stability and capacity of the bridge. Use code NC to indicate that the deck and the superstructure act independently. Use code CU to indicate that the deck acts composite with the superstructure, and that the superstructure can carry its own self-weight, plus that of the deck concrete prior to curing.

Commentary Continued

Use code CS to indicate that the deck acts composite with the superstructure, but without the deck the superstructure requires shoring to carry its own self weight, the weight of the deck concrete prior to curing, or both.

Use code IM to indicate that the deck was cast or fabricated of the same material and at the same time as the superstructure and the two can be expected to act as a unit. Use code IM for slabs and orthotropic steel decks.

When the type of interaction is unknown, code this item consistent with the assumption used in the load rating calculations.

Examples - Deck Interaction

Steel rolled shape beams with cast-in-place deck. No shear connectors. Report NC.

Precast concrete bulb-tee with cast-in-place deck. Shear connectors extend into the deck. Deck was cast without shoring. Report CU.

Precast concrete double-tee beam bridge with an additional structural deck cast on top. Report CU.

Steel plate girder with cast-in-place deck. Shear connectors extend into the deck. Girders were shored during deck construction to maintain stability. Report CS.

Cast-in-place tee-beam bridge. Report IM. Adjacent box beam bridge. Traffic rides on the top flange of the box. Report IM.

Steel box girder with orthotropic deck. Deck plate acts as top flange of the box section. Report IM.

Deck Material & Type

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSP09	B.SP.09	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the deck material and type for the span configuration using one of the following codes.	In cases where the superstructure configuration may have a combination of deck materials and/or types, code the predominant deck material and type based on the deck area. Use the applicable code for superstructure types with integral top flanges that serve as the deck, such as concrete tee-beams and box beams/girders. For slabs, and for the slab portion of three-sided and four-sided concrete rigid frame bridges and culverts not under fill, use the same applicable material code as used in Item B.SP.04 (Span Material). Use code 0 for the following bridge and culvert types when under fill, as these do not have a deck component: slabs, arches without spandrels, closed spandrel arches, pipes, and three-sided or four-sided rigid frames. Use code C02, C03, or C05, as applicable, for full depth precast panels only. Use code C01 or C04, as applicable, for cast-in-place concrete on partial depth structural panels that are not just considered stay-in-place forms.

Code	Description
0	None
A01	Aluminum
C01	Reinforced concrete – cast-in-place
C02	Reinforced concrete – precast
C03	Prestressed concrete – pre-tensioned
C04	Prestressed concrete – cast-in-place post-tensioned
C05	Prestressed concrete – precast post-tensioned
CX	Concrete – other
F01	FRP composite - aramid fiber
F02	FRP composite - carbon fiber
F03	FRP composite - glass fiber
FX	FRP composite - other
S01	Steel - open grid
S02	Steel - filled or partially filled grid
S03	Steel - plate
S04	Steel - orthotropic
S05	Steel - corrugated
SX	Steel - other
T01	Timber - glue laminated
T02	Timber - nail laminated
T03	Timber - solid sawn
T04	Timer - stress laminated
T05	Timber - other
X	Other

Examples – Span Protective System

Low permeability concrete slab bridge with waterproofing sheet membrane. Report M02.

Weathering steel multi-beam bridge that has the beam ends painted to protect from leakage through the joints. Report P01.

Wearing Surface

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSP10	B.SP.10	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the predominant wearing surface material type protecting the deck or slab for the span configuration using one of the following codes. **Code** **Description** 0 None B01 Bituminous (asphalt) C01 Concrete – monolithic C02 Concrete – unmodified C03 Concrete – latex modified C04 Concrete – low slump C05 Concrete – fiber reinforced C06 Concrete – microsilica C07 Concrete – polyester CX Concrete – other CU Concrete – unknown E01 Earth – gravel or soil P01 Polymer – epoxy P02 Polymer – polyester PX Polymer – other S01 Steel T01 Timber - running planks X Other	When a span configuration has a combination of wearing surface types, code the predominant wearing surface type based on the deck or slab area. Do not consider patching materials when coding this item. Use code 0 when no additional sacrificial concrete thickness or wearing surface is included on the deck or slab. Use codes C01 through CU for overlays that contain portland cement. Use code C01 when there is an additional sacrificial thickness cast concurrently with the structural deck or slab. Use code C02 when an additional placement of concrete of the same concrete material as the deck or slab is placed after the deck or slab has cured. Use code CU when a concrete wearing surface exists, but the specific material composition is unknown. Use code S01 when a steel grid deck is fabricated with an additional sacrificial thickness. Code S01 is not intended for temporary steel plates. Use code T01 where running planks are added on timber decks or slabs.

Examples

Bridge with 2” asphalt wearing surface over a sheet waterproofing membrane. Report B01. Bridge with latex modified concrete overlay topped with an epoxy polymer overlay. Report P01.

Deck Protective System

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSP11	B.SP.11	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the deck protective system for the span configuration using one of the following codes. **Code** **Description** 0 None A01 Admixture – internally sealed A02 Admixture – low permeability A03 Admixture – polymer impregnated A04 Admixture – corrosion inhibitor A05 Admixture – ASR inhibitor AX Admixture – other C01 Coating – paint C02 Coating – silane/siloxane C03 Coating – methacrylate CX Coating - other M01 Membrane – built up M02 Membrane – sheet M03 Membrane – liquid applied MU Membrane – unknown MX Membrane – other P01 Patina – weathering steel X Other Do not report this item when Item B.SP.09 (Deck Material and Type) is 0.	Code this item consistent with the predominant material reported in Item B.SP.09 (Deck Material and Type). In cases where the deck may have a combination of protective systems, use the code for the predominant protective system based on protected area. In cases where multiple systems protect the same area, use the code for the outermost protective layer. Use code 0 when there is no known internal or external protective system in place. Use code A01 for internally sealed concrete systems that use wax beads in the concrete. After the concrete cures, it is heated to melt the wax and seal the concrete. Use code A02 when low permeability concrete is used with admixtures such as flyash, microsilica, or slag. Use code A05 when admixtures are used to inhibit alkali-silica reactivity (ASR). Do not use codes C02 and C03 when the material is applied for localized crack repair. Use code M01 when the membrane is built up using combined layers of liquid and preformed/ sheet membranes. Use code MU when a membrane exists, but the type is unknown. Use code MX when a membrane type is known, but does not match the types specified for codes M01, M02, or M03.

Examples

Bridge with 2” asphalt wearing surface over a sheet waterproofing membrane. Report M02.

Bridge deck constructed with polymer impregnated concrete and sealed with a flood coat of methacrylate. Report C03.

Deck Reinforcing Protective System

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSP12	B.SP.12	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification

Report the type of deck reinforcing protective system for the span configuration using one of the following codes for concrete decks and slabs.

Code	Description
0	None
C01	Coating – epoxy coated
C02	Coating – galvanized
C03	Coating – metalized
CX	Coating – other
R01	Reinforcing – stainless, clad
R02	Reinforcing – stainless, solid
R03	Reinforcing – high chromium
R04	Reinforcing – FRP, aramid fiber
R05	Reinforcing – FRP, carbon fiber
R06	Reinforcing – FRP, glass fiber
R07	Reinforcing – FRP, other
RX	Reinforcing – other
S01	Sacrificial – cathodic, passive
S02	Sacrificial – cathodic, active
SX	Sacrificial – other
X	Other

Report this item only if Item B.SP.09 (Deck Material and Type) is concrete (i.e. codes C01 to CX).

Commentary

In cases where the span(s) may have a combination of protective systems, use the code for the predominant protective system based on protected area. In cases where multiple systems protect the same area, use the code for the outermost protective layer. If the top and bottom mat have different protective systems, report the protective system for the top mat.

Do not consider bar chairs or other reinforcing steel supports when coding this item.

Use code 0 when steel reinforcement is unprotected, such as with black steel.

Use codes C01 to CX and R01 to RX when any (e.g., top mat only) or all the reinforcing steel in the deck is protected by the selected steel type.

Use code S02 when impressed currents are used as the cathodic protection system.

Examples

Bridge deck constructed with black reinforcing bars, later widened with a top mat of epoxy coated bars and bottom mat of black bars. This bridge has two span data sets.

- Report 0 for the original deck data set.
- Report C01 for the widened deck data set.

Deck Stay-In-Place Forms

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSP13	B.SP.13	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the type of deck stay-in-place form for the span configuration using one of the following codes. **Code** **Description** 0 None C01 Concrete – reinforced C02 Concrete – prestressed F01 FRP composite M01 Metal T01 Timber X Other Do not report this item when Item B.SP.09 (Deck Material and Type) is 0.	Use this item to identify forms used in construction that remain in place by design or owner preference. When a span configuration has a combination of stay-in-place form types, code the predominant type based on the deck area. Use code C01 when a precast reinforced concrete panel (partial depth) is used with a cast-in-place reinforced concrete placement on top. Use code C02 when a precast prestressed concrete panel (partial depth) is used with a cast-in-place reinforced concrete placement on top. This item is not intended to be used for materials installed only for debris shielding, or when Item B.SP.09 (Deck Material and Type) is S05 (Steel – corrugated).

Examples

Bridge constructed using 3” thick prestressed concrete form panels. Completed deck is 8” thick. Report C02.

Bridge with reinforced concrete deck placed originally with removable forms, subsequently widened with reinforced concrete deck placed on metal stay-in-place forms. This bridge has two span data sets.

- Report 0 for the original data set.
- Report M01 for the widened data set.

Substructure Configuration Designation

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSB01	B.SB.01	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification / Commentary

This item is automatically populated from WSB01

Substructure Configuration Code

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Calculated	-	I	WSB01	-	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the substructure set designation using one of the following codes. **Code** **Description** A## Abutment P## Pier or Bent W## Widening The ## characters in the above codes are auto-generated with sequential numbers, with leading zeros, assigned to each substructure configuration.	This item captures how the reported substructure configuration is designated. The substructure is the portion of a bridge below the bearings or below the springline of an arch, which transfers loads to the foundation. This includes the walls of three-sided and four-sided rigid frame bridges. The “##” characters in the codes with a sequential number (e.g., A01, A02, P01, etc.) identifies each unique substructure configuration present on the bridge.

Commentary Continued

An abutment is a substructure unit located at the end of a bridge that transfers loads from the superstructure to the foundation while providing lateral support for the approach roadway embankment. Typically, a bridge has two abutments, but there may be cases (such as bifurcated structures assigned two bridge numbers) where one end of the bridge does not mate up with the approach roadway.

A multiple span bridge with cantilevered end spans that are unsupported at the extreme ends does not have abutments.

Piers and bents are substructure units that support the spans of a multi-span superstructure at intermediate location(s) between abutments.

Use code W for widened portions of abutments or piers/bents with dissimilar substructure construction.

Examples
Single-span concrete rigid frame bridge. This bridge has one designated substructure data set. Report A01. Two-span concrete, three-sided, rigid frame culvert. This bridge has two designated substructure data sets. • Report A01 for the end support frame legs data set. • Report P01 for the intermediate support frame leg data set. Four-span multi-beam bridge with integral concrete abutments and concrete column piers. This bridge has two designated substructure data sets. • Report A01 for the abutment data set. • Report P01 for the pier data set. Three-span bridge with intermediate concrete pier walls and cantilevered end spans that are unsupported at the extreme ends. This bridge has one designated substructure data set. Report P01. Three-span suspension bridge with concrete tower piers, concrete pier walls supporting the ends of the suspension spans, eight timber bents supporting the approach spans, and concrete stub abutments at each end of the bridge. The north abutment has a spread footing on rock foundation and the south abutment has a steel H-pile foundation. This bridge has five designated substructure data sets. • Report A01 for the north abutment data set. • Report A02 for the south abutment data set. • Report P01 for the towers data set. • Report P02 for the concrete pier walls data set. • Report P03 for the timber bents data set. Five-span girder bridge with concrete stub abutments and concrete wall piers. Bridge is widened with concrete stub abutments and concrete column piers. This bridge has three designated substructure data sets. • Report A01 for the stub abutments (including the widening) data set. • Report P01 for the concrete wall piers data set. • Report W01 for the concrete columns data set.

Pier Description

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Pulldown	-	I	WSB02	-	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Specification / Commentary

Briefly identify the substructure numbers associated with the Substructure Configuration identified in WSB01.

Examples

- Abutments 1 and 5
- Piers 2-4

Number of Substructure Units

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(3,0)	-	I	BSB02	B.SB.02	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the number of substructure units.	This item captures the number of substructure units of similar material, design, and foundation type that are being reported.

Examples

Four-span multi-beam bridge with integral concrete abutments and concrete column piers. This bridge has two substructure data sets.

- Report 2 for the abutment data set.
- Report 3 for the pier data set.

Three-span bridge with intermediate concrete pier walls and cantilevered end spans that are unsupported at the extreme ends. This bridge has one substructure data set. Report 2.

Three-span suspension bridge with concrete tower piers, concrete pier walls supporting the ends of the suspension spans, eight timber bents supporting the approach spans, and concrete stub abutments at each end of the bridge. The north abutment has a spread footing on rock foundation and the south abutment has a steel H-pile foundation. This bridge has five substructure data sets.

- Report 1 for the north abutment data set.
- Report 1 for the south abutment data set.
- Report 2 for the towers data set.
- Report 2 for the concrete pier walls data set.
- Report 8 for the timber bents data set.

Five-span girder bridge with concrete stub abutments and concrete wall piers. Bridge is widened with concrete stub abutments and concrete column piers. This bridge has three substructure data sets.

- Report 2 for the stub abutments (including the widening) data set.
- Report 4 for the concrete wall piers data set.
- Report 4 for the concrete columns data set.

Substructure Material

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSB03	B.SB.03	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification

Report the principal substructure material type using one of the following codes.

Code	Description
0	None
A01	Aluminum
C01	Reinforced concrete – cast-in-place
C02	Reinforced concrete – precast
C03	Prestressed concrete – pre-tensioned
C04	Prestressed concrete – cast-in-place post-tensioned
C05	Prestressed concrete – precast post-tensioned
CX	Concrete – other
E01	Earth – reinforced soil
F01	FRP composite – aramid fiber
F02	FRP composite – carbon fiber
F03	FRP composite – glass fiber
FX	FRP composite – other
I01	Iron – cast
I02	Iron – wrought
M01	Masonry – block
M02	Masonry – stone
P01	Plastic - polyethylene
PX	Plastic - other

Specification Continued

continued...

Code	Description
S01	Steel - rolled shapes
S02	Steel - welded shapes
S03	Steel - bolted shapes
S04	Steel - riveted shapes
S05	Steel - bolted and riveted shapes
S06	Steel - pipes
SX	Steel - other
T01	Steel - rolled shapes
T02	Steel - rolled shapes
T03	Steel - rolled shapes
T04	Steel - rolled shapes
TX	Steel - rolled shapes
X	Other

Examples - Substructure Material

Closed spandrel arch founded on cast-in-place concrete spread footings on rock. Report C01. Reinforced concrete full height cantilever abutment. Report C01.

Pile bent abutment with timber piles, timber lagging, and concrete cap. Report C01. Pile bent abutment with steel H-piles, timber lagging, and rolled steel cap. Report S01. Reinforced concrete stub abutment on steel piles with a MSE wall. Report C01.

GRS abutment with precast, prestressed concrete box beams placed directly on the reinforced soil mass. Report E01.

Substructure Type

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSB04	B.SB.04	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification

Report the abutment, pier, or bent design type using one of the following codes.

Code	Description
0	None
A01	Abutment – cantilever/wall
A02	Abutment – stub
A03	Abutment – open/spill through
A04	Abutment – integral
A05	Abutment – semi-integral
A06	Abutment – gravity
A07	Abutment – counterfort
A08	Abutment – pile bent with lagging
A09	Abutment – crib
A10	Abutment – cellular/vaulted
A11	Abutment – reinforced soil
A12	Abutment – footing only
AX	Abutment – other
B01	Bent – column or open
B02	Bent – column with web wall
B03	Bent – pile
B04	Bent – straddle or c-shaped
BX	Bent - other

Specification Continued

continued...

Code	Description
P01	Pier – wall
P02	Pier – single column
P03	Pier – multiple column
P04	Pier – multiple column with web wall
P05	Pier – straddle or c-shaped
P06	Pier – movable bridge
P07	Pier – tower
P08	Pier – footing only
PX	Pier – other
U	Unknown
X	Other

Substructure Type - Commentary
In cases where the substructure may have a combination of designs due to retrofitting actions, use the code for the predominant design. Both piers and bents provide the same function; however, a pier has only one footing at each substructure unit (the footing may serve as a pile cap) while a bent has several footings or no footing, as is the case with a pile bent. Use code 0 when the superstructure rests directly on the foundation. Use codes A01 to A10, as appropriate, if the superstructure load is supported by a substructure unit, which is in turn supported by piles or the reinforced soil mass. Use code A11 when the superstructure rests directly on the reinforced soil mass. Use code A10 when the space between wingwalls, abutment stem, approach slab, and footings is hollow. Use code A12 or P08 when the superstructure rests only on a footing, grade beam, or thrust block. Use code B04 when a highway or railroad passes directly beneath or through the bent. Use code P06 for piers that support movable bridges and the equipment needed to open and close the bridge. Use code P07 for towers of complex bridges such as cable-stayed and suspension bridges.

Examples - Substructure Type
Reinforced concrete full-height cantilever abutment. Report A01. Reinforced concrete stub abutment on steel piles with a MSE wall. Report A02. Pile bent type abutment with painted steel piles, timber lagging, and steel cap. Report A08. Single-span closed spandrel arch that bears directly on a thrust block founded on rock. Report A12. Single-span timber beams resting on concrete grade beam. Report A12. Single-span railroad flat car with ends resting on unreinforced soil. Report AX. Intermediate bent supported on concrete-filled steel pipe piles connected with a concrete cap beam. Report B03. Reinforced concrete pier wall widened with a single reinforced concrete column. This bridge has two substructure data sets. • Report P01 for the pier data set. • Report P02 for the widening data set. Reinforced concrete pier with three concrete columns on concrete footing/pile cap. Report P03.

Substructure Protective System

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSB05	B.SB.05	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the substructure protective system using one of the following codes. **Code** **Description** 0 None A01 Admixture – internally sealed A02 Admixture – low permeability A03 Admixture – polymer impregnated A04 Admixture – corrosion inhibitor A05 Admixture – ASR inhibitor AX Admixture – other C01 Coating – paint C02 Coating – sealer C03 Coating – galvanizing/metalizing CX Coating – other E01 Encasement - concrete EX Encasement - other P01 Patina – weathering steel S01 Sacrificial – cathodic, passive S02 Sacrificial – cathodic, active SX Sacrificial – other T01 Bent – straddle or c-shaped X Other Do not report this item when Item B.SB.04 (Substructure Type) is 0.	Code this item consistent with the predominant material reported in Item B.SB.03 (Substructure Material). In cases where the substructure may have a combination of protective systems, use the code for the predominant protective system based on protected area. In cases where multiple systems protect the same area, use the code for the outermost protective layer. Use code 0 when the substructure is unprotected. Use code 0 when unprotected steels either never were coated or currently have no signs of coating systems and have no protective systems, such as, cathodic protection or weathering chemistry. Anti-graffiti coatings are not considered when coding this item. Use code C01 for weathering steel that has been painted. Use code C02 for sealers such as silanes, siloxanes, linseed oils, etc. Use code E01 for steel piles of pile bents that are encased in concrete. Use code P01 only for weathering grades of steel. For timber, use code T01 for oil-based or water-borne timber preservatives. Use code C01 for paints and stains.

Examples - Substructure Protective System
Painted weathering steel pier cap. Report C01. Pile bent with preservative treated timber piles and concrete cap sealed with siloxane. Report C02. Pile bent type abutment with painted steel H-pile foundation, timber lagging, and reinforced concrete cap with active cathodic protection. Report S02.

Foundation Type

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSB06	B.SB.06	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the substructure protective system using one of the following codes. **Code** **Description** 0 None E01 Earth – reinforced soil F01 Footing – not on rock F02 Footing – on rock F03 Footing – on reinforced soil P01 Pile – steel H-shape P02 Pile – steel pipe P03 Pile – concrete, cast-in-place P04 Pile – prestressed concrete P05 Pile – timber P06 Coating – other P07 Pile – micropile P08 Pile – composite P09 Pile – FRP composite PX Pile – other S01 Drilled shaft – single S02 Drilled shafts – multiple S03 Caisson U Unknown X Other Do not report this item when Item B.SB.04 (Substructure Type) is 0.	In cases where the substructure has a combination of foundations due to retrofitting actions, use the code for the predominant foundation. Do not consider localized repairs to original foundation types when reporting this item. Use code E01 when the superstructure bears directly on the reinforced soil mass. Use codes F01 to F03, as appropriate, when the substructure or footing bears directly on the ground, such as a grade beam, floor, or gravity wall. Use code F02 only if the design plans, or subsequent subsurface investigation, indicate that the entire foundation is supported by rock. Use code F03 if the superstructure load is supported by a substructure unit, which is in turn supported by the reinforced soil mass. Use code P02 for filled or unfilled steel pipe piles. Use code P03 for cased and uncased cast-in-place concrete piles, and for driven corrugated, fluted, or spiral-welded shell-cased concrete piles. Use code P04 for solid or hollow-core square, octagonal, or cylindrical piles. Use code P06 for piles that have concrete or grout placed by pumping through the stem of the auger pipe as the auger is withdrawn.

Foundation Type - Commentary Continued
Use code P07 for small diameter piles, typically less than 12 inches, that are drilled, then grouted. Use code P08 for piles in which the length is composed of two or more pile types or materials, excluding pile tips. Use code P09 when FRP composite piles are used for construction but not as repairs to existing piles of a different type. Use codes S01 and S02 for cased or uncased drilled shafts. Use code S03 for footings sunk into position by excavation through or beneath the caisson structure.

Examples - Foundation Type
Three-sided concrete frame culvert with a spread footing keyed into bedrock, modified by adding a four-sided box culvert placed on crushed stone bedding to the end of the barrel to widen the culvert. This culvert has two substructure data sets. • Report F02 for the three-sided concrete frame culvert data set. • Report F01 for the four-sided box culvert data set. Closed spandrel arch founded on spread footings on bedrock. Report F02. Pile bent abutment with steel H-piles, timber lagging, and rolled steel cap. Report P01. Reinforced concrete stub abutment on steel H-piles with an MSE wall. Report P01. Precast, reinforced concrete arch structure constructed on cast-in-place concrete footing with steel H-pile foundation. Report P01. Pile bent abutment with timber piles, timber lagging, and concrete cap. Report P05. GRS abutment with precast, prestressed concrete box beams placed directly on the reinforced soil mass. Report E01. Four corrugated steel circular pipes placed on crushed stone bedding. Do not report this item.

Foundation Protection System

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(3)	-	I	BSB07	B.SB.07	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the foundation protective system using one of the following codes. **Code** **Description** 0 None A01 Admixture – internally sealed A02 Admixture – low permeability A03 Admixture – polymer impregnated A04 Admixture – corrosion inhibitor A05 Admixture – ASR inhibitor AX Admixture - other C01 Coating – paint C02 Coating – sealer C03 Coating – galvanizing/metalizing CX Coating – other E01 Encasement - concrete EX Encasement – other P01 Patina - weathering steel S01 Sacrificial – cathodic, passive S02 Sacrificial – cathodic, active SX Sacrificial – other T01 Treated - timber preservative U Unknown X Other Do not report this item when Item B.SB.04 (Substructure Type) is 0.	Code this item consistent with the predominant material reported in Item B.SB.06 (Foundation Type). In cases where the foundation may have a combination of protective systems, use the code for the predominant protective system based on protected area. In cases where multiple systems protect the same area, use the code for the outermost protective layer. Use code 0 when the foundation is unprotected. Use code 0 when unprotected steels either never were coated or currently have no signs of coating systems and have no protective systems, such as cathodic protection or weathering chemistry. Anti-graffiti coatings are not considered when coding this item. Use code C02 for sealers such as silanes, siloxanes, linseed oils, etc. Use code E01 for steel piles of pile bents that are encased in concrete. Use code P01 only for weathering grades of steel. For timber, use code T01 for oil-based or water-borne timber preservatives. Use code C01 for paints and stains.

Examples - Foundation Protective System
Closed spandrel arch founded on spread footings on bedrock. Report 0. Pile bent abutment with timber piles treated with creosote, timber lagging, and concrete cap. Report T01. Pile bent with painted steel H-piles and rolled steel cap. Report C01. GRS abutment with precast, prestressed concrete box beams placed directly on the reinforced soil mass. Report 0. Three-sided concrete frame culvert with a spread footing keyed into bedrock, modified by adding a four-sided box culvert placed on crushed stone bedding to the end of the barrel to widen the bridge. The four-sided box was constructed with high performance concrete that provides for low permeability. • Report 0 for the three-sided concrete frame culvert data set. • Report A02 for the four-sided box culvert data set. Precast, reinforced concrete arch bridge constructed on cast-in-place concrete footing with unpainted steel H-pile foundation. Report 0.

Roadside Hardware

The data items in this subsection identify crash tested roadside hardware on the bridge. These data items are considered part of the Primary Data Set and have a one-to-one relationship with a bridge.

The data for these items typically remain static once a bridge has been inventoried. The following data items are included in this subsection.

Item ID	Data Item
B.RH.01	Bridge Rail Crash Test
B.RH.02	Bridge Rail Transition Crash Test

Roadside hardware is commonly associated with bridges and serves as a traffic safety feature to redirect errant vehicles and reduce crash severity. The items in this subsection are inventoried to indicate if hardware at the bridge is required, present, or has been crash tested. Do not consider the condition of the hardware when reporting these items.

Table 6 contains the applicable crash testing codes used for all the roadside hardware items in this subsection. The applicable code may be based on an approved analytical equivalency evaluation.

Refer to the FHWA Office of Highway Safety website for policy and guidance on roadside hardware (http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware). Also, refer to the Task Force 13 – Hardware Guide website for roadside hardware, systems specifications, and individual component details.

The AASHTO LRFD Bridge Design Specifications are currently used to design bridge railings. The AASHTO Manual for Assessing Safety Hardware (MASH), which replaces NCHRP Report 350, is currently used for testing and evaluating the safety performance of roadside hardware.

The AASHTO Roadside Design Guide addresses appropriate bridge railings, roadside barriers, barrier end treatments, and crash cushions

Table 6. Roadside Hardware codes.

Code	Test Level Code						Description
	1	2	3	4	5	6	
N							Not applicable – roadside hardware is not required.
	MYY1	MYY2	MYY3	MYY4	MYY5	MYY6	Roadside hardware successfully crash- tested for AASHTO MASH.
	3501	3502	3503	3504	3505	3506	Roadside hardware successfully crash- tested for NCHRP Report 350.
	2301	2302	2303				Roadside hardware successfully crash- tested for NCHRP Report 230.
	2391	2392	2393				Roadside hardware successfully crash- tested for NCHRP Report 239.
	891	892	893				Roadside hardware successfully crash- tested for 1989 AASHTO Guide Specifications for Bridge Railings.
X							Roadside hardware successfully crash- tested for other criteria.
AYY							Roadside hardware has not been crash-tested but meets AASHTO Standard Specifications for Highway Bridges.
SYY							Roadside hardware has not been crash-tested but meets approved agency standards.
I							Roadside hardware has not been crash-tested and does not meet approved agency standards.
0 (zero)							None - roadside hardware is required, but required roadside hardware is not present.

Note that YY, for codes in Table 6, represents the last two digits of the year for the crash testing publication, AASHTO Specifications, or agency approved standards.

Bridge Rail Crash Test

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(4)	-	I	BRH01	B.RH.01	-

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the crash-test level for the bridge railings using one of the codes in Table 6.	This roadside hardware includes all types and shapes of bridge railings (parapets, median barriers, or structure mounted) located on the bridge or that cross over culverts. Use the code that first applies going from the bottom (Code 0) of Table 6 to the top (MYY), if there are more than one type of bridge railing on the bridge.

Commentary Continued

A list of crash-tested bridge railings may be obtained from the FHWA Office of Highway Safety website at: http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware.

Bridge railings designed to meet AASHTO specifications prior to 1964 may not meet current specifications.

Prior to 1993, bridge railings were tested according to the AASHTO Guide Specifications for Bridge Railings, NCHRP Report 230, or NCHRP Report 239.

Since 1993, bridge railings were crash-tested and classified according to the guidelines shown in NCHRP Report 350.

Refer to the May 30, 1997 memo at the FHWA Office of Highway Safety website for a list of crash-tested bridge railings with equivalent NCHRP Report 350 test levels.

In 2009 the AASHTO Manual for Assessing Safety Hardware (MASH) replaced NCHRP 350. In 2015 AASHTO and FHWA entered into a MASH joint implementation agreement.

Refer to State, Federal agency, or Tribal government policies for acceptable bridge railing standards.

Use code I when no information is known about the crash test level or an agency approved standard.

Also, use code I when an overlay is applied to the deck/slab and the height no longer meets the original geometry requirements of the crash-tested rail.

BRCT Document Year (YYYY)

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(4,0)	-	I	WRH01	-	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

BRCT Document Year (YYYY) - Specification / Commentary

Code the year of the applicable specification when using codes with YY filler fields shown in Table 6.

Bridge Rail Transition Crash Test

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(4)	-	I	BRH02	B.RH.02	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification	Commentary
Report the crash-test level for transition railings using one of the codes in Table 6.	This roadside hardware serves as the transition from the roadside approach railing to the bridge railing and is firmly attached and anchored to the bridge railing to provide sufficient tension in the transition rail upon impact. Use the code that first applies going from the bottom (Code 0) of Table 6 to the top (MYY), if there are more than one type of transition.

Commentary Continued

A list of crash-tested transitions may be obtained from the FHWA Office of Highway Safety website at: http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware.

Since 1993, transitions to bridge railings have been crash tested and classified according to the guidelines shown in NCHRP Report 350.

In 2009 the AASHTO Manual for Assessing Safety Hardware (MASH) replaced NCHRP 350. In 2015 AASHTO and FHWA entered into a MASH joint implementation agreement.

Refer to State, Federal agency, or Tribal government policies for acceptable transition railing standards.

Use code I when no information is known about the crash test level or an agency approved standard. Also, use code I when an overlay is applied to the deck/slab and the height no longer meets the original geometry requirements of the crash-tested transition.

Examples - Bridge Rail Transition Crash Test

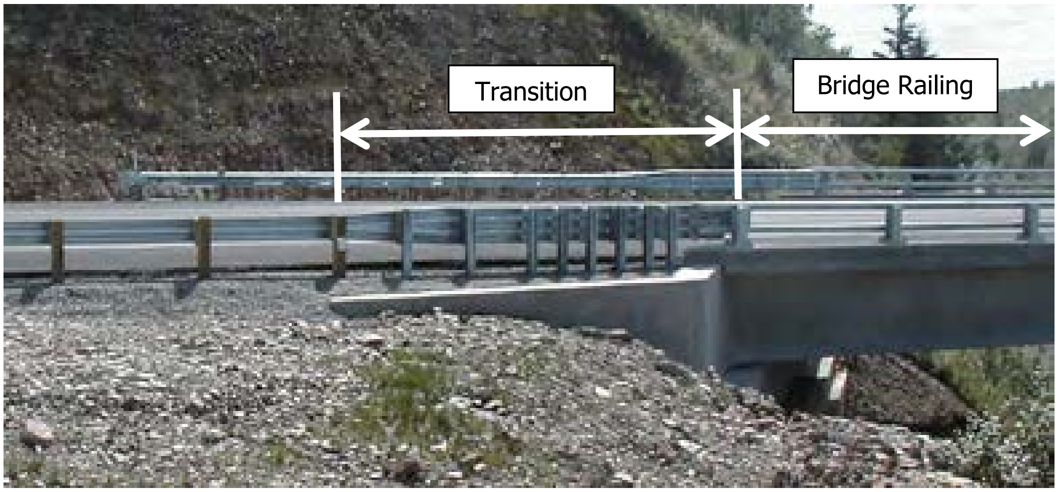


Figure 11. Metal bridge railing and transition. (Source: Alaska DOT)

Bridge carries an NHS route with the following roadside hardware.

Alaska Multi-State Bridge Rail successfully crash-tested for NCHRP 350 Test Level 4.

- Report 3504 for Item B.RH.01 *(Bridge Railings)*.

Alaska Multi-State Bridge Rail Thrie-Beam Transition successfully crash tested for NCHRP 350 Test Level 4.

- Report 3504 for Item B.RH.02 *(Transitions)*.

Figure 12. Metal bridge railing and transition for long-span application. (Source: Delaware DOT)

Concrete pipe bridge that carries a non-NHS route with the following roadside hardware.

Steel W-beam bridge rail with wood posts (long-span application) successfully crash tested to MASH 2009 Test Level 3.

- Report M093 for Item B.RH.01 *(Bridge Railings)*.

Steel W-beam transition with wood posts (long-span application) successfully crash tested to MASH 2009 Test Level 3.

- Report M093 for Item B.RH.02 *(Transitions)*.

BRTCT Document Year (YYYY)

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(4,0)	-	I	WRH02	-	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

Specification / Commentary

Code the year of the applicable specification when using codes with YY filler fields shown in Table 6.

Load Rating Tab

Rating

WSBIS Item 2580 – Reference Inspection Date **Date**

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Code the inspection report date used for the load rating calculations. Usually this field will be coded or updated by transcribing information from the most current Load Rating Summary Sheet.

WSBIS Item 1550 – Design Load - NBI **Pulldown**
NBI Item 31

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Use the codes below to indicate the live load for which the structure was designed. The numerical value of the railroad loading should be recorded on the form. Classify any other loading, when feasible, using the nearest equivalent of the loadings given below.

Table 1550 Design Load Code - NBI

WSBIS Code	Metric Description	English Description
0	Unknown	Unknown
1	M 9	H 10
2	M 13.5	H 15
3	MS 13.5	HS 15
4	M 18	H 20
5	MS 18	HS 20
6	MS 18 + Mod	HS 20 + Mod
7	Pedestrian	Pedestrian
8	Railroad	Railroad
9	MS 22.5 or greater	HS 25 or greater
A	HL 93	HL 93
B	Greater than HL 93	Greater than HL 93
C	Other	Other

NBI Commentary:

This field has been revised based on a February 2, 2011 FHWA memo available at https://www.fhwa.dot.gov/bridge/110202.cfm.

Design Load - SNBI

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(8)	-	I	BLR01	B.LR.01	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the live load for which the bridge was designed using one of the following codes. **Code** / **Description** H10 H-10 H15 H-15 H20 H-20 HS15 HS-15 HS20 HS-20 HS20M HS-20 and Military HS20Plus Greater than HS-20 HL93 HL-93 HL93Plus Greater than HL-93 RR Railroad U Unknown X Other	For widened or rehabilitated bridges, code the most restrictive design load governing any portion of the bridge. Use code HS20M when the bridge is designed to accommodate both the HS-20 and the alternate military load. Use codes HS20Plus and HL93Plus when the HS-20 or HL-93 design load configuration is increased proportionally above that specified in the AASHTO design specifications. Use code U when the design plans are not available and the likely design load cannot be inferred from design characteristics of the bridge or agency policy at the time the bridge was built. A code other than U can be reported when design plans are not available, but the design load can be inferred from design characteristics of the bridge or agency policy at the time the bridge was built. Use code X when the design is not based on AASHTO design load configurations.

Examples - Design Load - SNBI

A bridge designed for an HS-20 load is later widened. The widening is designed for the HL-93 load. Report HS20.

Per State design policy, a bridge is designed using LRFD, in which the truck load portion of the HL-93 load is increased by 25%. Report HL93Plus.

Per State design policy, a bridge is designed for the HL-93 design load, with further consideration of a State-defined permit vehicle. The permit vehicle controls the design of the superstructure. Report X.

Design Method

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(4)	-	I	BLR02	B.LR.02	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the method by which the bridge was designed using one of the following codes. **Code** — **Description** ASD — Allowable Stress Design LFD — Load Factor Design LRFD — Load and Resistance Factor Design U — Unknown X — Other	The codes describe the design methods used in accordance with AASHTO design specifications. For widened or rehabilitated bridges, code the design method associated with the code in Item B.LR.01 (Design Load). Use code U when the design plans are not available and the likely design method cannot be inferred from design characteristics of the bridge or agency policy at the time the bridge was built. A code other than U can be reported when design plans are not available, but the design method can be inferred from design characteristics of the bridge or agency policy at the time the bridge was built.

Examples

A bridge designed for an HS-20 load using Load Factor design is later widened. The widened portion is designed for the HL-93 load using Load and Resistance Factor design. Item B.LR.01 (Design Load) has code HS20 reported. Report LFD.

Load Rating Date *(Old Item 2581)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
YYYYMMDD	-	I	BLR03	B.LR.03	-

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Specification	Commentary
Report the date of the most recent load rating. Do not report this item if no rating analysis or evaluation has been performed **WSDOT Commentary:** Code the load rating calculation date. Usually this field will be coded or updated by transcribing information from the most current Load Rating Summary Sheet.	This item reflects the date of the most recent calculation or reevaluation of the load rating. The load rating may be performed independently and at a different date than the inspection. Defects discovered during inspections that may impact the strength or serviceability of the bridge typically require reevaluation of the load rating. When reevaluation of the load rating is completed, report the date of the reevaluation for this item. Refer to the following items when a new or updated load rating is completed: • B.LR.04 (Load Rating Method) • B.LR.05 (Inventory Load Rating Factor) • B.LR.06 (Operating Load Rating Factor) • B.LR.07 (Controlling Legal Load Rating Factor) • B.LR.08 (Routine Permit Loads)

Examples

Load rating calculations found in the bridge record are dated September 5, 1999. Report 19990905.

A bridge rated for an HS-20 load using Load Factor rating is later widened. The entire bridge is re-rated using Load and Resistance Factor rating on July 23, 2012. Report 20120723.

WSBIS Item 2582 – Rated By AN(16)

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Code the initials or engineering firm name indicating who performed the load rating. Usually this field will be coded or updated by transcribing information from the most current Load Rating Summary Sheet.

WSBIS Item 1660 – Operating Level - NBI **Pulldown**
NBI Item 70

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

The National Bridge Inspection Standards require the posting of load limits if the operating rating factor (RF) for any of the legal load configurations in the State is less than 1 based on the Load Factor Method (LFR) or the Allowable Stress Method (ASR); and less than 1 based on the Load and Resistance Factor Method. If the load capacity is such that posting is required, this item shall be coded 4 or less. If no posting is required at the operating rating, this item shall be coded 5.

This item evaluates the load capacity of a bridge in comparison to the State legal loads.

Although posting a bridge for load-carrying capacity is required only when the RF for any of the legal loads is less than 1, highway agencies may choose to post at a lower level. This posting practice may appear to produce conflicting coding when WSBIS Item 1293 – Structure Open, Posted or Closed to Traffic is coded to show the bridge as actually posted at the site and WSBIS Item 1660 – Bridge Posting is coded as bridge posting is not required. Since different criteria are used for coding these 2 items, this coding is acceptable and correct.

The use or presence of a temporary bridge affects the coding. The actual operating rating of the temporary bridge should be used to determine this item. However, the highway agency may choose to post at a lower level. This also applies to bridges shored up or repaired on a temporary basis.

The coding shall be based on the lowest rating factor of the legal loads.

The following are Washington State maximum legal load configurations and tonnages:

Table 1660a Legal Loads

Configuration	Tonnage
AASHTO Type 3	25 Tons
AASHTO Type 3-2	36 Tons
AASHTO Type 3-3	40 Tons
SU4	27 Tons
SU5	31 Tons
SU6	34.7 Tons
SU7	38.7 Tons
EV2	28.7 Tons
EV3	43 Tons

See the *Bridge Design Manual* Chapter 13 for more information.

Routine Permit Loads *(Old Item 1557)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
YAN(1)		I	BLR08	B.LR.08	

Applicable Structure Types
- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Specification	Commentary
Report the inspection type or scour monitoring performed using one of the following codes. **Code** — **Description** A — Bridge carries routine permit loads. Load capacity is adequate for all routine permit loads; no routine permit loads are restricted. B — Bridge carries routine permit loads. Load capacity is adequate for some routine permit loads but some routine permit loads are restricted. C — Bridge does not carry routine permit loads. Routine permit loads are restricted from the bridge. N — Bridge does not carry routine permit loads. Agency does not issue routine permits.	This item is used to identify bridges where State routine permit loads must be considered in load rating and posting evaluations and to identify bridges where routine permit loads are restricted due to bridge load capacity limitations. Agencies have varying policies for issuing routine permits, from not issuing routine permits to issuing various routine permits when these loads exceed State legal loads. Some agencies may utilize maps that indicate highways and bridges that are restricted to routine permit loads or that allow routine permit loads. Use code C when the agency issues routine permits, but all routine permit loads are restricted from the bridge. Use code N when the agency does not issue routine permits and therefore the bridge does not carry routine permit loads.

WSBIS Item 7557 – Design Exception Date (LP view only) — Date

Applicable Structure Types
- **Bridges & culverts carrying public roadways**

If a design exception has been granted by the FHWA to permit a deviation from required standards, this is the effective date of FHWA approval. For example, if approval to build a one-lane bridge on a low volume road was granted, enter the date approval was given for this exception. If no design exception has been granted, leave this field blank.

NBI Loads

WSBIS Item 1551 – Operating Rating Method **Pulldown**
NBI Item 63
WSBIS Item 1554 – Inventory Rating Method **Pulldown**
NBI Item 65
NTI Item L.1

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Code these fields with one of the following codes to indicate which load rating method was used to determine the rating for this bridge.

Table 1551 Operating and Inventory Rating Method Code

WSBIS Codes		NTI Codes	Description
Used by WSDOT	Used by Local Agencies		
N	N	N	No load rating required (only applicable to some tunnels)
0	0	0	Field evaluation and documented engineering judgment reported in tons using HS20 loading
1	1	-	Load Factor (LF) reported in tons using HS20 loading
2	2	-	Allowable Stress (AS) reported in tons using HS20 loading
-	3	-	Load and Resistance Factor (LRFR) reported in tons
4	4	-	Load Testing reported in tons using HS20 loading
5	5	5	No rating analysis or evaluation performed
-	6	1	Load Factor (LF) rating reported by rating factor using HS20 loading
-	7	2	Allowable Stress (AS) rating reported by rating factor using HS20 loading
8	8	3	Load and Resistance Factor Rating (LRFR) reported by rating factor using HL93 loading
F	-	A	Assigned rating method based on Load and Resistance Factor Design (LRFD) reported by rating factor using HL93 loading

Note: WSDOT uses codes 0, 1, 2, 4, 5, 8 and F for bridges and culverts carrying public roadways. Local Agencies uses codes 0 through 8 for bridges and culverts carrying public roadways. For tunnels carrying public roadways within, all agencies use WSBIS codes 0, 1, 2, 3, 5, A and N.

Code 0 is to be used when the load rating is determined by field evaluation and documented engineering judgment, typically done when plans are not available for concrete structures or in cases of severe deterioration. Field evaluation and engineering judgment ratings must be documented. See Chapter 5 for additional guidance.

Code 5 is to be used when the structure has not been load rated or load rating documentation does not exist.

NBI and NTI Commentary:

WSBIS Item 1551 has been modified based on a November 15, 2011 FHWA Memo available at www.fhwa.dot.gov/bridge/nbi/111115.cfm.

The NTI does not report load ratings in tons, only rating factors. This restricts load rating methods to only those that report in rating factors. Also, the NTI has only one field to assign the load rating method for both inventory and operating methods. WSBIS has chosen to use the NBI Inventory rating method for reporting to the NTI.

Codes A through E are not available in WSBIS because there are no agencies which use these methods.

WSBIS Item 1552 – Operating Rating Tons **N(3,0)**
NBI Item 64
WSBIS Item 1555 – Inventory Rating Tons **N(3,0)**
NBI Item 66

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

WSDOT enters rating data into the database as English tonnage for all cases noted in WSBIS Items 1551 and 1554 which have methods coded 0 through 4. For methods coded 5* through 8 or F, use WSBIS Items 1553 and 1556 to enter the rating factor.

If the bridge will not carry a minimum of 3 tons of live load, the operating rating tons shall be coded 0; and, consistent with the direction of the AASHTO Manual, it shall be closed.

The use or presence of a temporary bridge requires special consideration in coding. In such cases, since there is no permanent bridge, the inventory and operating rating tons should be coded 0 even though the temporary structure is rated for as much as full legal load.

A bridge shored up or repaired on a temporary basis is considered a temporary bridge and the inventory and operating rating tons shall be coded as if the temporary shoring were not in place. See WSBIS Item 1289 – Temporary Structure Designation for definition of a temporary bridge.

For a bridge that is closed (WSBIS Item 1293 is coded K), operating and inventory rating tons shall be coded 0.

Code 99 for a structure under sufficient fill such that, according to AASHTO design, the live load stress on the structure is insignificant in the structure load capacity.

*Rating Tons (Items 1552/1555) or Rating Factors (Items 1553/1556) can be entered when Items 1551/1554 are coded 5.

NBI Commentary:

WSBIS Items 1552 and 1555 have been modified based on a March 22, 2004, FHWA Memo available at www.fhwa.dot.gov/bridge/nbi/111115.cfm.

Note: This field is no longer restricted to reporting HS20 loads only – by WSBIS Item 1551 definition, in some cases HL93 load cases are reported here. Additional clarification on how to code these fields was also added.

When this 3-digit number is reported in the NBI submittal, the FHWA multiplies it by 32.4 and rounds it to tenths. This number represents metric tons. Due to the fact the FHWA cannot currently process metric tons greater than 99.9, any rating factor greater than 3.08 is truncated to 99.9 metric tons upon conversion.

WSBIS Item 1553 – Operating Rating Factor **N(4,2)**
NBI Item 64
NTI Item L.3
WSBIS Item 1556 – Inventory Rating Factor **N(4,2)**
NBI Item 66
NTI Item L.2

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

WSDOT enters rating data as factors for all cases noted in WSBIS Items 1551 and 1554 which have methods coded 5 through 8 or F. For methods coded 0 through 4, use WSBIS Items 1552 and 1555 to enter rating tonnage.

If WSBIS Item 1551 – Operating Rating Method has been coded 5, for new structures, the operating rating shall be coded with a rating factor of 1.30.

If WSBIS Item 1554 – Inventory Rating Method has been coded 5, for new structures, the inventory rating shall be coded with a rating factor of 1.00.

NBI Commentary:
When this number is reported in the NBI submittal, rating factors in excess of 9.99 will be reported to FHWA as 9.99.

Legal Loads

WSBIS Item 2587 – Type 3 Rating Factor **N(4,2)**
WSBIS Item 2588 – Type 3S2 Rating Factor **N(4,2)**
WSBIS Item 2589 – Type 3-3 Rating Factor **N(4,2)**
WSBIS Item 2590 – Notional Rating Load (NRL) Rating Factor **N(4,2)**

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Code the rating factors for the AASHTO legal load trucks as defined within the AASHTO *Manual for Bridge Evaluation* (MBE) Section 6. If the Load Factor or Working Stress method is used to rate this structure, enter the Operating Rating factor only.

Usually these fields will be coded or updated by transcribing information from the most current Load Rating Summary Sheet.

WSBIS Item 2591 – Single Unit 4 (SU4) Rating Factor N(4,2)
WSBIS Item 2592 – Single Unit 5 (SU5) Rating Factor N(4,2)
WSBIS Item 2593 – Single Unit 6 (SU6) Rating Factor N(4,2)
WSBIS Item 2594 – Single Unit 7 (SU7) Rating Factor N(4,2)

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Code the rating factor for the AASHTO legal load trucks as defined within the AASHTO *Manual for Bridge Evaluation* (MBE) Section 6. If the Load Factor or Working Stress method is used to rate this structure, enter the Operating Rating factors only.

Usually these fields will be coded or updated by transcribing information from the most current Load Rating Summary Sheet.

These fields can be null if WSBIS Item 2590 (NRL) is populated and equal to or greater than 1.00.

WSBIS Item 2598 – Emergency Vehicle 2 (EV2) Rating Factor N(4,2)
WSBIS Item 2599 – Emergency Vehicle 3 (EV3) Rating Factor N(4,2)

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Code the rating factor for the Emergency Vehicle legal load trucks as defined within the *Bridge Design Manual* M 23-50.14, Chapter 13. If the Load Factor or Working Stress method is used to rate this structure, enter the Operating Rating factors only.

Usually these fields will be coded or updated by transcribing information from the most current Load Rating Summary Sheet.

These fields can be null if the structure has not been rated for these loads.

Permit Loads

WSBIS Item 2596 – Overload 1 (OL-1) Rating Factor	**N(4,2)**
WSBIS Item 2597 – Overload 2 (OL-2) Rating Factor	**N(4,2)**

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Tunnels carrying public roadways within**

Code the rating factor for the WSDOT permit loads as defined within the *Bridge Design Manual* Chapter 13. If the Load Factor or Working Stress method is used to rate this structure, enter the Operating Rating factors only.

Usually this field will be coded or updated by transcribing information from the most current Load Rating Summary Sheet.

For local agencies, the following fields are mirrored in other tabs:

ADT	crossing tab
Truck percent	crossing tab
Design load code	design tab
Superstructure	NBI tab
Substructure	NBI tab
Culvert	NBI tab
Asphalt depth	NBI tab
Revise rating	NBI tab
Load rating note	(see Chapter 3)
Operating level note	NBI tab
Revise rating note	NBI tab

For these fields, see the applicable tab for field definitions.

Posted Loads

Posted Load - Gross - SNTI *(Old Item 1560)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(2,0)	-		TL5	-	L.5

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification / Commentary

Record the gross weight limit shown on the load posting sign rounded down to the nearest U.S. ton.

Leave this item blank if a gross load posting sign is not used.

Examples

Posting Load - Gross	Code
R12-1	10
R12-4	10
R12-3	3

Figure 2.7.1 - MUTCD Weight Limit Signs - R12-1, R12-4, and R12-3

Posted Load - Axel - SNTI *(Old Item 1561)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(2,0)	-		TL6	-	L.6

Applicable Structure Types

- **Tunnels carrying public roadways within**

Specification	Commentary
Record the axle weight limit shown on the load posting sign rounded down to the nearest U.S. ton. Leave this item blank if an axle load posting sign is not used.	This item can also be used for tandem axle load posting signs. The tandem axle weight can be recorded for this item when it is the lowest controlling axle weight limit.

Examples

Posting Load - Axel	Code
R12-2	5
R12-4	2

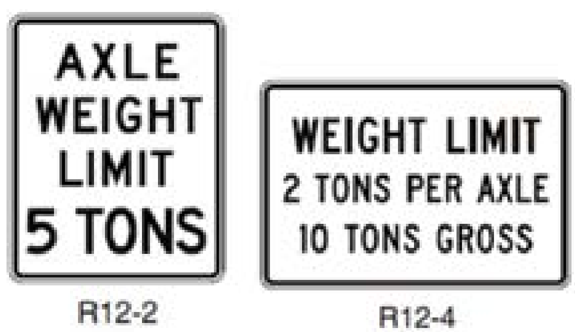


Figure 2.7.2 - MUTCD Weight Limit Signs - R12-5 and R12-4

Posted Load - Type 3 - SNTI *(Old Item 1562)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(2,0)	-		TL7	-	L.7

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification	Commentary
Record the weight limit value shown on the load posting sign for the AASHTO Type 3 vehicle or State equivalent rounded down to the nearest U.S. ton. Leave this item blank if no posting sign is used for this vehicle type.	A State equivalent vehicle is considered to have the same number of axles and similar axle spacing as the AASHTO Type 3 vehicle. Refer to the AASHTO Manual for Bridge Evaluation for legal load posting vehicle configurations.

Examples

Posting Load - Type 3	Code
R12-2	5

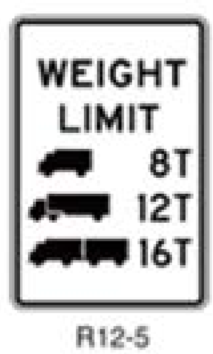


Figure 2.7.3 - MUTCD Weight Limit Signs - R12-5

Posting Load - Type 3S2 - SNTI *(Old Item 1563)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(2,0)	-		TL8	-	L.8

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification	Commentary
Record the weight limit value shown on the load posting sign for the AASHTO Type 3S2 vehicle or State equivalent rounded down to the nearest U.S. ton. Leave this item blank if no posting sign is used for this vehicle type.	A State equivalent vehicle is considered to have the same number of axles and similar axle spacing as the AASHTO Type 3S2 vehicle. Refer to the AASHTO Manual for Bridge Evaluation for legal load posting vehicle configurations.

Examples

Posting Load - Type 3S2	Code
R12-5	12

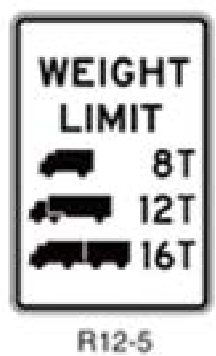


Figure 2.7.4 - MUTCD Weight Limit Signs - R12-5

Posted Load - Type 3-3 - SNTI *(Old Item 1563)*

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
N(2,0)	-		TL9	-	L.9

Applicable Structure Types
- **Tunnels carrying public roadways within**

Specification	Commentary
Record the weight limit value shown on the load posting sign for the AASHTO Type 3-3 vehicle or State equivalent rounded down to the nearest U.S. ton. Leave this item blank if no posting sign is used for this vehicle type.	A State equivalent vehicle is considered to have the same number of axles and similar axle spacing as the AASHTO Type 3-3 vehicle. Refer to the AASHTO Manual for Bridge Evaluation for legal load posting vehicle configurations.

Examples

Posting Load - Type 3S2	Code
R12-5	16

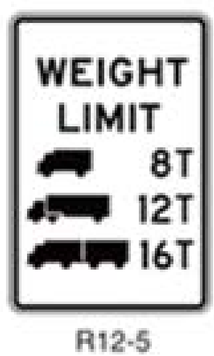


Figure 2.7.4 - MUTCD Weight Limit Signs - R12-5

Waterway Tab

WSBIS Item 7832 – Water Type — Pulldown

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**

This field describes the type of water the bridge crosses over.

B	Brackish (a mixture of fresh and salt water).
F	Fresh water.
S	Salt water.
T	Tidal.

Leave blank if not over water.

WSBIS Item 7833 – Flood Plain Intrusion — Pulldown

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**

This code indicates whether or not the structure's approach roadway or abutment intrude into the flood plain of the waterway (i.e., whether or not previous or possible flooding could cause or has caused water to rise so it touches the structure's approach roadway embankment or abutment).

A	No intrusion into the flood plain.
B	Bridge or approaches intrude into the waterway causing minor backwater.
C	Overtopping of approach roadway has occurred.
D	A portion of the superstructure has been under water.
U	Flood plain intrusion is unknown.

Leave blank if not over water.

WSBIS Item 7834 – Flood Control — Pulldown

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**

This field indicates if there is any existing type of flood control on the waterway under the bridge. To be considered, this flood control must be in place either upstream or downstream from the bridge and must be near enough to have an effect on the bridge. Flood control may be provided by dams, dikes, fill, or other means.

B	Both upstream and downstream.
U	Upstream.
D	Downstream.
N	No flood control.

Leave blank if not over water.

WSBIS Item 7835 – Scour History — Pulldown

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**

This code describes scour conditions at the bridge site.

C	Current scour problems.
H	History of scour problems but scour conditions are now stable.
N	No history of scour.
U	Scour history is unknown.

Leave blank if not over water.

WSBIS Item 7836 – Streambed Material Type — Pulldown

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**

This code describes the composition of the streambed at the bridge site.

Enter one of the following codes to indicate the predominant type of material that is evident.

1	Bedrock
2	Sediment
3	Gravel
4	Sand
5	Cobbles
6	Lined Canal
7	Vegetation
8	Alluvial Fan
9	Unknown

Leave blank if not over water.

WSBIS Item 7837 – Substructure Stability — Pulldown

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**

This code describes the type of material upon which the bridge's substructure rests. This code is used to determine the degree of stability that can be expected in the bridge substructure.

Code the lower number value If different sections of a continuous span bridge are supported by different materials.

1	Spread footing, simple spans.
2	Spread footing, continuous spans.
3	Pile foundation, simple spans.
4	Pile foundation, continuous spans.
5	Bedrock, simple spans.
6	Bedrock, continuous spans.
7	Unknown, simple spans.
8	Unknown, continuous spans

Leave blank if not over water.

WSBIS Item 7838 – Waterway Obstruction — Pulldown

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**

This code indicates any conditions in the waterway which affect the flow of water beneath the bridge.

A	Debris accumulates at the bridge.
B	Ice accumulates at the bridge.
C	The waterway is overgrown with vegetation.
D	A and C above.
E	A and B above.
F	B and C above.
G	A, B, and C above.
N	No obstruction to the flow of water beneath the bridge.

Leave blank if not over water.

WSBIS Item 7839 – Streambed Stability — Pulldown

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**

This code describes any existing stream conditions which may influence scour at the bridge site.

A	Sharp bends.
B	Significant lateral shifts.
C	Steep slopes.
D	High water velocity.
E	Degradation.
F	Aggredation.
G	No conditions influencing scour exist.
H	Streambed conditions are unknown.

Leave blank if not over water.

WSBIS Item 7840 – Streambed Anabranch — Pulldown

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**

This field indicates whether or not confluences or shifting anabranches are present in the waterway. A confluence is a flowing together of two or more streams. An anabranch is a river branch that re-enters the main stream, creating an island in the waterway.

Code only those conditions which exist near the bridge site.

A	Anabranches are present.
B	Both anabranches and confluences are present.
C	Confluences are present.
N	Neither anabranches nor confluences are present.
U	Waterway configuration is unknown.

Leave blank if not over water.

WSBIS Item 7841 – Piers in Water Pulldown

Applicable Structure Types

- **Local Agency Bridges & culverts carrying public roadways**

This field contains the number of the structure's piers in the water at normal yearly high water.

If the bridge is inspected at low water, look for evidence that the piers or pile bents have been in the water.

0	No piers in the water.
1-9	Number of piers in the water.
M	More than nine piers in the water.

Leave blank if not over water.

Discontinued Tab

Items in the Discontinued tab will be removed from Bridgeworks (WSBIS) in January 2026.

Proposed Improvements

WSBIS Item 2883 – Proposed Improvement Calculation **Check Box**

This checkbox directs the WSBIS system to compute costs for any proposed bridge improvements. It is checked by default for all structures. To prevent automatic calculation and to perform manual entry, uncheck the box.

For local agency bridge owners, the Proposed Improvement entries are required for NBIS bridges when the Sufficiency Rating (Item 2710) is 80 or less and Status (Item 2711) is SD or FO.

The following method is used to perform the automatic calculation:

If Work Type 31 or 32 is chosen:

Work Method = 1
Structure Length = Bridge Length + 10 feet
Roadway Width = (Lanes On x 12 feet) + 14 feet
Cost per SF of Deck = $950 (as of 2022)
Structure Cost = 0.50 x Total Cost
Roadway Cost = 0.10 x Total Cost
Engineering & Misc Cost = 0.4 x Total Cost
Total Cost = (Structure Imp Length x Prop Roadway Width) x Cost Per SF of Prop Deck
Estimate Year = (current year)

If Work Type 33 through 38 is chosen:

Work Method = 1
Structure Length = Bridge Length
Roadway Width = Approach Roadway Width + 2 feet
Cost per SF of Deck = $475 (as of 2022)
Structure Cost = 0.50 x Total Cost
Roadway Cost = 0.10 x Total Cost
Engineering & Misc Cost = 0.40 x Total Cost
Total Cost = (Structure Imp Length x Prop Roadway Width) x Cost Per SF of Prop Deck
Estimate Year = (current year)

WSBIS Item 1844 – Proposed Improvement Work Type **Pulldown**
NBI Item 75A

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Use one of the following codes to represent the proposed work type:

Table 1844 Work Type Code

WSBIS Code	Description
38	Other structural work, including hydraulic replacements.
37	Bridge deck replacement with only incidental widening.
36	Bridge deck rehabilitation with only incidental widening.
35	Bridge rehabilitation because of general structure deterioration or inadequate strength.
34	Widening of existing bridge with deck rehabilitation or replacement.
33	Widening of existing bridge or other major – structure without deck rehabilitation or replacement; includes culvert lengthening.
32	Replacement of bridge or other structure because of relocation of road.
31	Replacement of bridge or other structure because of substandard load carrying capacity or substandard bridge roadway geometry.

WSBIS Item 1846 – Proposed Improvement Work Method **Pulldown**
NBI Item 75B

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Use one of the following codes to indicate whether the proposed work is to be done by contract or by force account:

Table 1846 Proposed Improvement Work Method Code

WSBIS Code	Description
2	Work to be done by owner's forces
1	Work to be done by contract

WSBIS Item 1847 – Proposed Improvement Structure Length (feet) **N(6,0)**
NBI Item 76

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code the length of the proposed bridge improvement to the nearest foot. For replacement or rehabilitation of the entire bridge, the length should be back to back of backwalls of abutments or from pavement notch to pavement notch. For replacement or rehabilitation of only part of the structure, use the length of the portion to be improved.

For culvert improvements, use the proposed length measured along the centerline of the barrel regardless of the depth below grade. The measurement should be made between the inside faces of the top parapet or edge-stiffening beam of the top slab.

WSBIS Item 2853 – Proposed Improvement Roadway Width (feet) N(6,0)

Code the curb-to-curb width of the roadway on the proposed bridge. This measurement is coded to the nearest foot.

WSBIS Item 2860 – Proposed Improvement Cost per S.F. of Deck (dollars) N6,0)

Code the estimated cost per square foot of proposed deck. For State bridges, this number is provided by the WSDOT Bridge Management Engineer.

WSBIS Item 1867 – Proposed Improvement Structure Cost (thousand dollars) N(7,0)
NBI Item 94

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code a number to represent the estimated cost of the proposed bridge improvements (including replacement) in thousands of dollars. This cost does not include roadway, right of way, detour, demolition, or preliminary engineering costs.

NBI Commentary:

WSBIS allows up to seven digits each for Structure, Roadway and Total Costs (in thousands of dollars). Amounts coded greater than six digits will be converted to 999999 for the NBI data submittal.

WSBIS Item 1873 – Proposed Improvement Roadway Cost (thousand dollars) N(7,0)
NBI Item 95

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code a number to represent the cost of the proposed roadway improvement in thousands of dollars. This shall include only roadway construction costs, excluding bridge, right-of-way, detour, extensive roadway realignment costs, preliminary engineering, etc. Do not use this item for estimating maintenance costs.

NBI Commentary:

WSBIS allows up to seven digits each for Structure, Roadway and Total Costs (in thousands of dollars). Amounts coded greater than six digits will be converted to 999999 for the NBI data submittal.

WSBIS Item 2870 – Proposed Improvement Eng. and Misc. Cost (thousand dollars) N(7,0)

Code the estimated cost of engineering and other miscellaneous items. For State bridges, this number is provided by the WSDOT Bridge Management Engineer.

WSBIS Item 1861 – Proposed Improvement Total Cost (thousand dollars) N(7,0)
NBI Item 96

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code a number to represent the total project cost in thousands of dollars, including incidental costs not included in Structure Cost and Roadway Cost. This item should include all costs normally associated with the proposed bridge improvement project. The Total Project Cost will therefore usually be greater than the sum of Structure and Roadway Costs.

NBI Commentary:

WSBIS allows up to seven digits each for Structure, Roadway and Total Costs (in thousands of dollars). Amounts coded greater than six digits will be converted to 999999 for the NBI data submittal.

WSBIS Item 1879 – Proposed Improvement Estimate Year N(4,0)
NBI Item 97

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code the year that the costs of proposed work were estimated. The data provided for these items must be current; that is, the estimate year shall be no more than 8 years before the current year.

Other Discontinued

WSBIS Item 1022 – Urban Code - SNTI **Pulldown**

Applicable Structure Types

- **Tunnels carrying public roadways within**

Record the urbanized area code.

WSBIS Item 1188 – Latitude - NBI **(XX degrees XX minutes XX.XX seconds)**
NBI Item 16
NTI Item I.13
WSBIS Item 1196 – Longitude - NBI **(XXX degrees XX minutes XX.XX seconds)**
NBI Item 17
NTI Item I.14

Applicable Structure Types

- **All structure records**

Code the latitude and longitude in degrees, minutes and seconds to the nearest hundredth of a second using the NAD 83/91 - North American Datum of 1983, with 1991 adjustments. Note that true longitudes are a negative number at all locations in Washington State, but when coded in WSBIS a positive number is used.

Accurate data can be acquired using internet resources such as Google Maps or Bing Maps.

For bridges and culverts carrying public roadways, the reading should be taken at the beginning of the structure at centerline. When the inventory route has a Linear Referencing System (LRS) designation, the beginning of the structure is the lower milepoint for the LRS route.

For pedestrian, RR and other non-vehicular structures over public roadways, the reading should be taken at the centerline of the roadway under the bridge.

For tunnels carrying public roadways within, the reading should be taken at the beginning of the tunnel portal at the centerline.

SNBI Latitude and Longitude fields added in 2023 into the Crossing Tab in BridgeWorks and have a different format. See WSBIS Items 1470 and 1471 in Appendix D.

WSBIS Item 1288 – Parallel Structure **Pulldown**
NBI Item 101

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

Code this item to indicate situations where separate structures carry the inventory route in opposite directions of travel over the same feature. The lateral distance between structures has no bearing on the coding of this item.

For pedestrian, railroad and other non-vehicular structures over public roadways, always code N.

One of the following codes shall be used:

Table 1288 Parallel Structure Code

WSBIS Code	Description
R	The right structure of parallel bridges carrying traffic in the direction of increasing mileposts.
L	The left structure of parallel bridges carrying traffic in the direction of decreasing mileposts.
N	No parallel structure exists; OR pedestrian, railroad or other non-vehicular structure over public roadway.

WSBIS Item 1312 - Flared Flag **Pulldown**
NBI Item 35

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code this item to indicate if the structure is flared (i.e., the width of the structure varies). Generally, such variance will result from ramps converging with or diverging from the through lanes on the structure, but there may be other causes. Minor flares at ends of structures should be ignored.

Table 1312 Flared Flag

WSBIS Code	NBI Code	Description
N	0	No flare
Y	1	Yes, flared

WSBIS Item 1332 – Year Built - NBI **N(4,0)**
NBI Item 27
NTI Item A.1

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Code all 4 digits of the year in which construction of the structure was completed. If the year built is unknown, code best estimate or 1900. If the year built is earlier than 1900, code 1900.

WSBIS Item 1352 – Lanes On - NBI N(2,0)

NBI Item 28A

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

Code the number of lanes being carried on the structure. For pedestrian, RR and other non-vehicular structures, code 0.

Include all lanes carrying highway traffic (e.g., cars, trucks, buses) which are striped or otherwise operated as a full width traffic lane for the entire length of the structure. This shall include any full width merge lanes and ramp lanes, and shall be independent of directionality of usage (e.g., a 1-lane bridge carrying 2-directional traffic is still considered to carry only one lane on the structure).

It should be noted here that for the purpose of evaluating WSBIS Item 1658 Deck Geometry, any 1-lane bridge, not coded as a ramp (WSBIS Item 1434 = 7), which has a WSBIS Item 1356 Curb-to-Curb coded 16 feet or greater shall be evaluated as 2 lanes.

Double deck bridges may be coded as 1 or 2 structures, but all related data must be compatible with the method selected.

WSBIS Item 1378 – Vertical Underclearance Code Pulldown

NBI Item 54A

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

Code the reference feature from which the clearance measurement is taken:

Note: For waterways beneath structure, code the navigation control code 1386 as appropriate, but always code 1378 = N

Table 1378 - Vertical Underclearance Code

WSBIS Code	Description
H	Functionally classified public highway beneath structure
R	Railroad beneath structure
N	No ground based transportation feature (terrain, waterway, etc)
P	Other ground based transportation feature (parking lot, pedestrian/bike path, private road, etc.
*	Delete

WSBIS Item 1379 – Minimum Lateral Underclearance Right (feet) **N(3,1)**
NBI Item 55B

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

The purpose of this item is to identify the lateral restrictions caused by the structure on the railroad or roadway underneath.

Code the minimum lateral underclearance on the right to the nearest tenth of a foot. When both a railroad and highway are under the structure, code the lateral clearance for the reference feature coded in Item 1384.

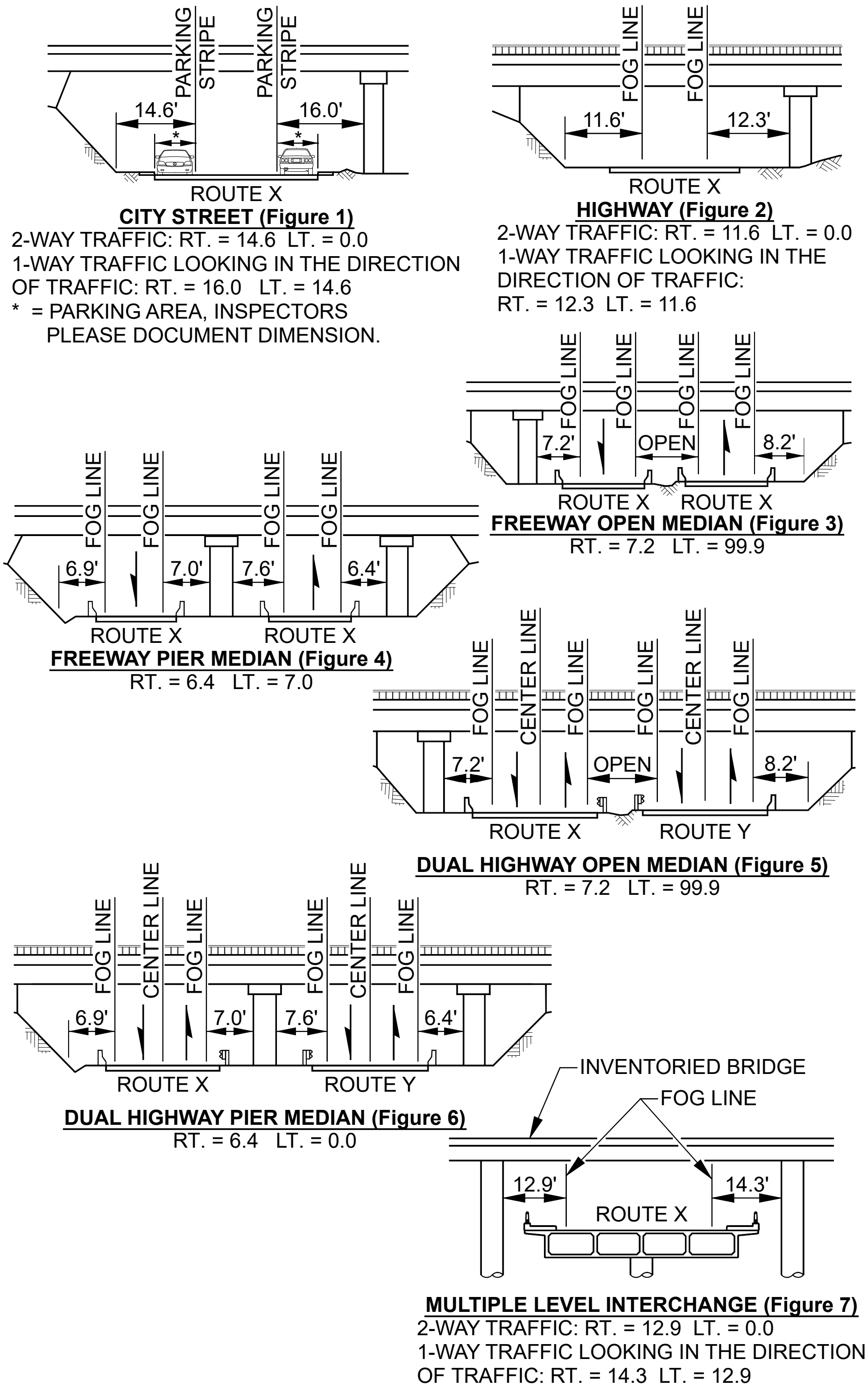
The lateral clearance should be measured from the right edge of the travelled way (outer edge of fog line) or from the centerline (between rails) of the right-hand track of a railroad to the nearest substructure unit (pier, abutment, etc.), a retaining wall or to a slope. If no fog line exists on the roadway, assume a 12 foot lane. The right/left orientation is based on traffic direction. The clearance measurements to be recorded will be the minimum after measuring the clearance in both directions of travel, perpendicular to the centerline of the undercrossing.

If two related features are below the bridge, measure both and record the lesser of the two. An explanation should be written on the inspection form as to what was recorded. When the clearance is 100 feet or greater, code 99.9.

If the feature beneath the structure is not a railroad or highway, code 0 to indicate not applicable.

The presence of ramps and acceleration or turning lanes is not considered in this item; therefore, the minimum lateral clearance on the right should be measured from the right edge of the through roadway.

Figure WSBIS 1379a



NBI Commentary:

The NBI coding guide text and drawings are not clear or consistent, particularly with respect to determining whether or not the lateral measurements extend to guardrails, concrete rails, non-mountable curbs, substructure units, or slopes. Attempts to define the steepness of slopes was also problematic. This coding guide clarifies that all measurements are to substructure units or "slopes" without defining the steepness. In addition, the NBI coding guide was not entirely clear about how to code dual highways in relation to substructure units or medians. This coding guide clarifies this through illustration.

WSBIS Item 1382 – Lateral Underclearance Code **Pulldown**
NBI Item 55A

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

This code identifies the type of reference feature from which the clearance measurement is taken.

Note: For waterways beneath structure, code the navigation control code 1386 as appropriate, but always code 1382 = N

Table 1382 - Lateral Underclearance Code

WSBIS Code	Description
H	Functionally classified public highway beneath structure
R	Railroad beneath structure
N	No ground based transportation feature (terrain, waterway, etc)
P	Other ground based transportation feature (parking lot, pedestrian/bike path, private road, etc.
*	Delete

WSBIS Item 1383 – Minimum Lateral Underclearance Left (feet) **N(3,1)**
NBI Item 56

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

The purpose of this code is to identify the lateral restrictions caused by the structure on the railroad or roadway underneath when restrictions exist to left lanes of divided highways, 1 way streets, and ramps. For all 2 direction, 2 lane routes which are undivided, code 0.

Code the minimum lateral underclearance on the left (median side for divided highways) to the nearest tenth of a foot. The lateral clearance should be measured from the left edge of travelled way (outer edge of fog line) to the nearest substructure unit, or to a slope. Refer to examples for WSBIS Item 1379 – Minimum Lateral Underclearance on Right.

For clearances greater than 100 feet, code 99.8.

In cases where there is an open median (no piers in median), code 99.9.

Code 0 to indicate not applicable.

NBI Commentary:
See WSBIS Item 1379 NBI Commentary.

WSBIS Item 1386 – Navigation Control Code **Pulldown**
NBI Item 38

Applicable Structure Types

- Bridges & culverts carrying public roadways
- Pedestrian, RR and other non-vehicular structures over public roadways

Indicate for this item whether or not navigation control (a bridge permit for navigation) is required. Use one of the following codes:

Table 1386 Navigation Control Code

WSBIS Code	Description
N	Not applicable, no waterway
0	No navigation control on waterway (bridge permit not required or bridge has received advance approval by the USCG1
1	Navigation control on waterway (bridge permit required)

1. The USCG provides "advance approval" of certain navigable waters. This item should be coded 0 when Title 33, Code of Federal Regulations, Section 115.70, as amended states that the U.S. Coast Guard Commandant has given advance approval to the location and plans of bridges to be constructed across reaches of waterways navigable in law, but not actually navigated other than by logs, log rafts, rowboats, canoes and small motorboats.

For state owned structures, this item is coded by the BPO Information Group. Local agencies need to contact USCG to determine the correct coding for this field:

Commander, Thirteenth Coast Guard District

Federal Building
915 Second Avenue
Seattle, WA 98174-1067
206-220-7282

NBI Commentary:

This coding guide provides additional guidance on how to code bridges crossing advance approval waterways.

WSBIS Item 1387 – Navigation Vertical Clearance (feet) **N(3,0)**
NBI Item 39

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

If WSBIS Item 1386 – Navigation Control has been coded 1, record the minimum vertical clearance imposed at the site as measured above a datum that is specified on a navigation permit issued by a control agency. The measurement shall be coded to the foot. This measurement will show the clearance that is allowable for navigational purposes. In the case of a swing or bascule bridge, the vertical clearance shall be measured with the bridge in the closed position (i.e., open to vehicular traffic). The vertical clearance of a vertical lift bridge shall be measured with the bridge in the raised or open position. Also, WSBIS Item 1394 – Vertical Lift Minimum Navigation Clearance shall be coded to provide clearance in a closed position. If WSBIS Item 1386 – Navigation Control has been coded 0 or N, code 0 to indicate not applicable.

For state owned structures, this item is coded by the BPO Information Group.

WSBIS Item 1390 – Navigation Horizontal Clearance (feet) **N(4,0)**
NBI Item 40

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

If WSBIS Item 1386 – Navigation Control has been coded 1, record the horizontal clearance measurement imposed at the site that is shown on the navigation permit. This may be less than the structure geometry allows. If a navigation permit is required but not available, use the minimum horizontal clearance between fenders, if any, or the clear distance between piers or bents. Code the clearance to the foot. If WSBIS Item 1386 – Navigation Control has been coded 0 or N, code 0 to indicate not applicable.

For state owned structures, this item is coded by the BPO Information Group.

WSBIS Item 1394 – Vertical Lift Minimum Navigation Clearance (feet) **N(3,0)**
NBI Item 116

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Code the minimum vertical clearance to the nearest lesser foot imposed at the site as measured above a datum that is specified on a navigation permit issued by a control agency.

Leave this item blank if the structure is not a vertical lift bridge (Item 1533 = 15).

For state owned structures, this item is coded by the BPO Information Group.

NBI Commentary:

Per FHWA guidance , ferry terminal structures coded as lift spans should have 0 coded in this field. See FHWA general index file.

WSBIS Item 1544 – Service On — Pulldown

NBI Item 42A

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

Table 1544 - Service On Code

WSBIS Code	Description
1	Highway
2	Railroad
3	Pedestrian-bicycle
4	Highway-railroad
5	Highway-pedestrian
6	Overpass structure at an interchange or second level of a multilevel interchange
7	Third level (Interchange)
8	Fourth level (Interchange)
9	Building or plaza
0	Other

WSBIS Item 1545 – Service Under — Pulldown

NBI Item 42B

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**

Table 1545 - Service Under Code

WSBIS Code	Description
1	Highway, with or without pedestrian
2	Railroad
3	Pedestrian-bicycle
4	Highway-railroad
5	Waterway
6	Highway-waterway
7	Railroad-waterway
8	Highway-waterway-railroad
9	Relief for waterway
0	Other (non-waterway)

WSBIS Item 1657 - Structural Evaluation **Calculated**

NBI Item 67

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This item is calculated automatically and cannot be edited.

Structural Evaluation rates the adequacy of the structure's condition, taking into account any major structural deficiencies. This rating is based on the overall condition of the superstructure, substructure, the inventory rating, and the ADT.

Table 1657 explains how the inventory rating and Proposed Improvements may further lower this code. The code for this item is no higher than the lowest of the condition codes for Superstructure Overall, Substructure Condition, or Culvert Condition.

Table 1657 Structural Evaluation

Inventory Rating HS Truck (Tons)			Structural Adequacy Appraisal Rating Code
ADT 0-500	ADT 501-5000	ADT >5000	
>36	>36	>36	9
36	36	36	8
31	31	31	7
23	25	27	6
18	20	22	5
12	14	18	4
Inventory rating less than value in rating code of 4 and requiring corrective action.			3
Inventory rating is less than above and bridge requires replacement (WSBIS Item 1844, Proposed Improvement Work Type is coded 31 or 32).			2
Bridge is closed and requires replacement.			0

NBI Commentary:

The use of the Proposed Improvement Work Type code in the calculation is not documented in the FHWA Coding Guide.

WSBIS Item 1658 - Deck Geometry **Calculated**
NBI Item 68

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This item is calculated automatically and cannot be edited.

The level of service provided by the bridge is evaluated with respect to the highway system of which it is a part. This appraisal is based on the number of traffic lanes, the curb-to-curb width, the minimum vertical clearance over the bridge deck, the ADT, and the federal functional classification.

The following tables explain how the values are determined with respect to the highway system of which the bridge is a part. The lowest code determined from the tables is used.

Use this guide to determine which table to use.

For all bridges with a vertical clearance restriction over the deck, also use Table 1658f. Use whichever rating code is lower.

Table 1658a Deck Geometry

Direction of Traffic	Number of Lanes	Curb to Curb Width	Table to Use
2 way non-interstate	3+		Table 1658d
2 way non-interstate	2		Table 1658b
2 way non-interstate	1	< 16'	Table 1658c
2 way non-interstate	1	≥16'	Table 1658b
1 way non-interstate	1		Table 1658b
1 way non-interstate	2 or more		Table 1658d
Ramp	any		Table 1658e
1 way interstate	any		Table 1658d
2 way interstate	any		Table 1658d

For all bridges with a vertical clearance restriction over the deck, also use Table WSBIS-1658f. Use whichever rating code is lower.

Table 1658b Deck Geometry

Curb-to-Curb Bridge Roadway Width						Deck Geometry Appraisal Rating Code
ADT 0-100	ADT 101-400	ADT 401-1000	ADT 1-2k	ADT 2-5k	ADT >5k	
not applicable						9
≥32	≥36	≥40	≥44	≥44	≥44	8
28	32	36	40	44	44	7
24	28	30	34	40	44	6
20	24	26	28	34	38	5
18	20	22	24	28	32(28)[2]	4
16	18	20	22	26	30(26)[2]	3
Bridge is open and has a width less than required for a rating code of 3 and bridge is open.						2
Bridge is closed.						0

Notes:
1. Use the lower rating code for roadway widths between those shown.
2. For structures longer than 200 feet, use the values shown in parentheses.

Table 1658c Deck Geometry

Curb-to-Curb Bridge Roadway Width		Deck Geometry Appraisal Rating Code
ADT 0-100	ADT >100	
not applicable		9
<16	-	8
15	-	7
14	-	6
13	-	5
12	-	4
11	<16	3
Bridge is open and has a width less than required for a rating code of 3.		2
Bridge is closed.		0

Note:
Use the lower rating code for roadway widths between those shown.

Table 1658d Deck Geometry

Curb-to-Curb Bridge Roadway Width - 2 or More Lanes in Each Direction				Deck Geometry Appraisal Rating Code
Number of Lanes (N) (Interstate)		Number of Lanes (N) (Other Roadways)		
2 Lanes	> 2 Lanes	2 Lanes	> 2 Lanes	
not applicable				9
≥ 42	≥ 12N + 24	≥ 42	≥ 12N + 18	8
40	12N + 20	38	12N + 15	7
38	12N + 16	36	12N + 12	6
36	12N + 14	33	11N + 10	5
34 (29)[2]	11N + 12 (11N + 7)[2]	30	11N + 6	4
33 (28)[2]	11N + 11 (11N + 6)[2]	27	11N + 5	3
Bridge is open and has a width less than required for rating code of 3 and bridge open to traffic.				2
Bridge is closed.				0

Notes:
1. Use the lower rating code for roadway widths between those shown.
2. For structures longer than 200 feet, use the values shown in parentheses.

Table 1658e Deck Geometry

Curb-to-Curb Ramp Bridge Roadway Width		Deck Geometry Appraisal Rating Code
1 Lane	> 1 Lane	
Not Applicable		9
≥ 26	≥ 12N + 12	8
24	12N + 10	7
22	12N + 8	6
20	12N + 6	5
18	12N + 4	4
16	12N + 2	3
Bridge is open and has deck width less than required for a rating code of 3.		2
Bridge is closed.		0

Note:
Use the lower rating code for roadway widths between those shown.

Table 1658f Deck Geometry

Functional Class				Deck Geometry Appraisal Rating Code
Interstate and Other Freeway		Other Principal and Minor Arterials	Major and Minor Collectors and Locals	
Designated Routes[2]	Undesignated Routes[2]			
Minimum Vertical Clearance				
not applicable				9
≥ 17' - 0"	≥ 16' - 0"	≥ 16' - 6"	≥ 16' - 6"	8
16' - 9"	15' - 6"	15' - 6"	15' - 6"	7
16' - 6"	14' - 6"	14' - 6"	14' - 6"	6
15' - 8"	14' - 3"	14' - 3"	14' - 3"	5
15' - 0"	14' - 0"	14' - 0"	14' - 0"	4
Vertical clearance is less than value for rating of 4; corrective action is required.				3
Vertical clearance is less than value for rating of 4 and bridge requires replacement (WSBIS Item 1844 Proposed Improvement Work Type is coded 31 or 32).				2
Bridge is closed.				0

Notes:
1. Use the lower rating code for vertical clearances between those shown.
2. Use the first column (Designated Routes) for all routes except designated routes in urban areas where there is an alternative interstate or freeway facility with a minimum clearance of at least 16' - 0". Use the second column (Undesignated Routes) for all undesignated interstate or freeway facilities.

WSBIS Item 1659 - Underclearances **Calculated**
NBI Item 69

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This item is calculated automatically and cannot be edited.

This appraisal is based on the vertical and lateral underclearances beneath the bridge as related to the federal functional classification of the roadway carried beneath the bridge. If the bridge is not over a highway or a railroad, the field will be set to 9.

Minimum vertical underclearance, minimum lateral underclearance on right, and minimum lateral underclearance on left are used to evaluate this item.

See the following tables for an explanation of how the values are calculated.

The functional classification used in the tables is for the route under the bridge. If no Under record exits, it is assumed that the route under the bridge is a major or minor collector or a local road for the purpose of using the tables.

Table 1659a Underclearances

Functional Class					Underclearance Adequacy Appraisal Rating Code
Interstate and Other Freeway		Other Principal and Minor Arterials	Major and Minor Collectors and Locals	Railroads	
Designated Routes[2]	Undesignated Routes[2]				
Minimum Vertical Underclearance					
not applicable					9
≥ 17' - 0"	≥ 16' - 0"	≥ 16' - 6"	≥ 16' - 6"	≥ 23' - 0"	8
16' - 9"	15' - 6"	15' - 6"	15' - 6"	22' - 6"	7
16' - 6"	14' - 6"	14' - 6"	14' - 6"	22' - 0"	6
15' - 9"	14' - 3"	14' - 3"	14' - 3"	21' - 0"	5
15' - 0"	14' - 0"	14' - 0"	14' - 0"	20' - 0"	4
Vertical Clearance is less than value for rating of 4; corrective action is required.					3
Vertical clearance is less than value for rating of 4 and bridge requires replacement (WSBIS Item 1844 Proposed Improvement Work Type is coded 31 or 32).					2
Bridge closed.					0

Notes:
1. Use the lower rating code for vertical clearances between those shown.
2. Use the first column (Designated Routes) for all routes except designated routes in urban areas where there is an alternative interstate or freeway facility with a minimum clearance of at least 16' - 0". Use the second column (Undesignated Routes) for all undesignated interstate or freeway facilities.

Table 1659b Underclearances

Functional Class							Underclearance Adequacy Appraisal Rating Code
1-Way Traffic				2-Way Traffic			
Principal Arterials (Interstate, etc.)				Other Principal & Minor Arterials	Major & Minor Collectors and Locals	Railroads	
Main Line		Ramp					
Lt.	Rt.	Lt.	Rt.				
Minimum Lateral Underclearance							
not applicable							9
≥ 30	≥ 30	≥ 4	≥ 10	≥ 30	≥ 12	≥ 20	8
18	21	3	9	21	11	17	7
6	12	2	8	12	10	14	6
5	11	2	6	10	8	11	5
4	10	2	4	8	6	8	4
Underclearance is less than value for rating of 4; corrective action is required.							3
Underclearance is less than value for rating of 4 and bridge requires replacement (WSBIS Item 1844 Proposed Improvement Work Type is coded 31 or 32).							2
Bridge is closed.							0

Notes:
1. Use the lower rating code for lateral clearances between those shown.
2. Use the value from the Right Ramp column to determine the rating code when acceleration or deceleration lanes or ramps are provided under 2-way traffic.

WSBIS Items 1684, 1685, 1686, 1687

NBI Item 36A - 36D

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Bridge inspection shall include the recording of information on traffic safety features so that the evaluation of their adequacy can be made.

Use the following codes for each of the four traffic safety segments:

Table 6 Traffic Safety Feature Codes

WSBIS Code	Description
0	Inspected feature does not meet currently acceptable standards or a safety feature is required and none is provided.
1	Inspected feature meets currently acceptable standards.
N	Not applicable (structure does not carry traffic) or a safety feature is not required (see item description for requirements).

NBI Commentary:

WSDOT has applied state safety standards to determine how these fields are coded.

WSBIS Item 1684 – Bridge Rails **Pulldown**
NBI Item 36A

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Bridge railings should be coded to reflect the current WSDOT standards. Refer to *Design Manual* Section 1610.07 Bridge Traffic Barriers.

Acceptable crash tested bridge rails fall into two general categories.

Thrie-beam Retrofit

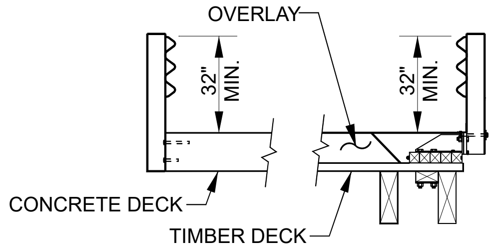
- Thrie-beam mounted to baluster rail
- Steel truss and Thrie-beam
- Edge mounted Thrie-beam
- Thrie-beam mounted to steel posts on concrete deck
- Thrie-beam mounted to open girder

Concrete Rail

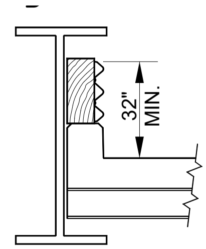
- New Jersey style rail
- F-shaped concrete rail
- Single slope concrete rail
- 32” vertical concrete parapet
- Type 7 concrete rail

Bridge rails are coded as N when there is sufficient roadway fill that there is no attachment to the structure.

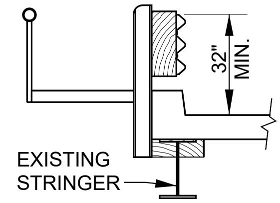
Table 1684 Bridge Rails



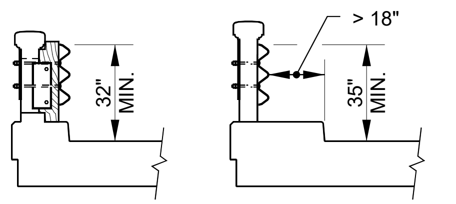
EDGE MOUNTED THRIEBEAM (Fig. a)



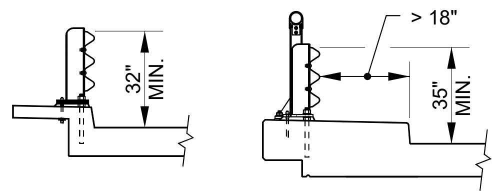
THRIE BEAM MOUNTED TO OPEN GIRDER (Fig. b)



STEEL TRUSS & THRIE BEAM (Fig. c)

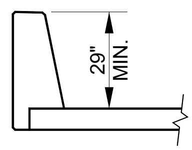


THRIE BEAM MOUNTED TO BALLUSTER RAIL (Fig. d)



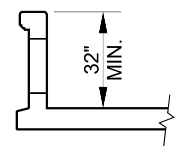
THRIE BEAM MOUNTED TO STEEL POSTS ON CONCRETE DECK (Fig. e)

THRIE BEAM RETROFIT



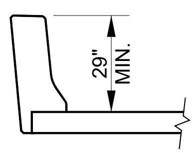
SINGLE SLOPE CONCRETE RAIL (Fig. a)

(NOTE: BARRIER IS ACCEPTABLE WITH ANY TYPE OF METAL RAIL MOUNTED TO IT)



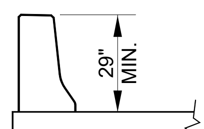
32" INCH VERTICAL CONCRETE PARAPET (Fig. b)

(NOTE: BARRIER IS ACCEPTABLE WITH ANY TYPE OF METAL RAIL MOUNTED TO IT)



F-SHAPE TYPE CONCRETE RAIL (Fig. c)

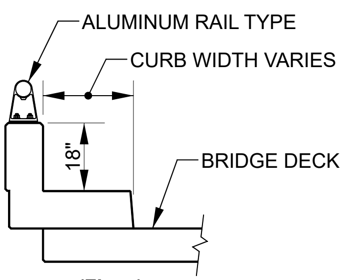
(NOTE: BARRIER IS ACCEPTABLE WITH ANY TYPE OF METAL RAIL MOUNTED TO IT)



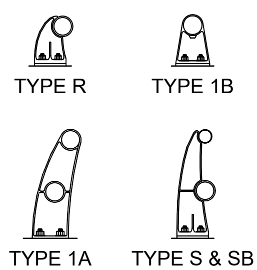
NEW JERSEY STYLE RAIL (Fig. d)

(NOTE: BARRIER IS ACCEPTABLE WITH ANY TYPE OF METAL RAIL MOUNTED TO IT)

CONCRETE RAIL



(Fig. a)



ALUMINUM RAIL TYPE	CURB WIDTH	
	9 INCHES OR LESS	GREATER THAN 9 INCHES
TYPE R, S, OR SB	CODE 1	CODE 1
TYPE 1B OR 1A	CODE 1	CODE 0

TYPE 7 BRIDGE RAIL

WSBIS Item 1685 – Transitions **Pulldown**

Item 36B

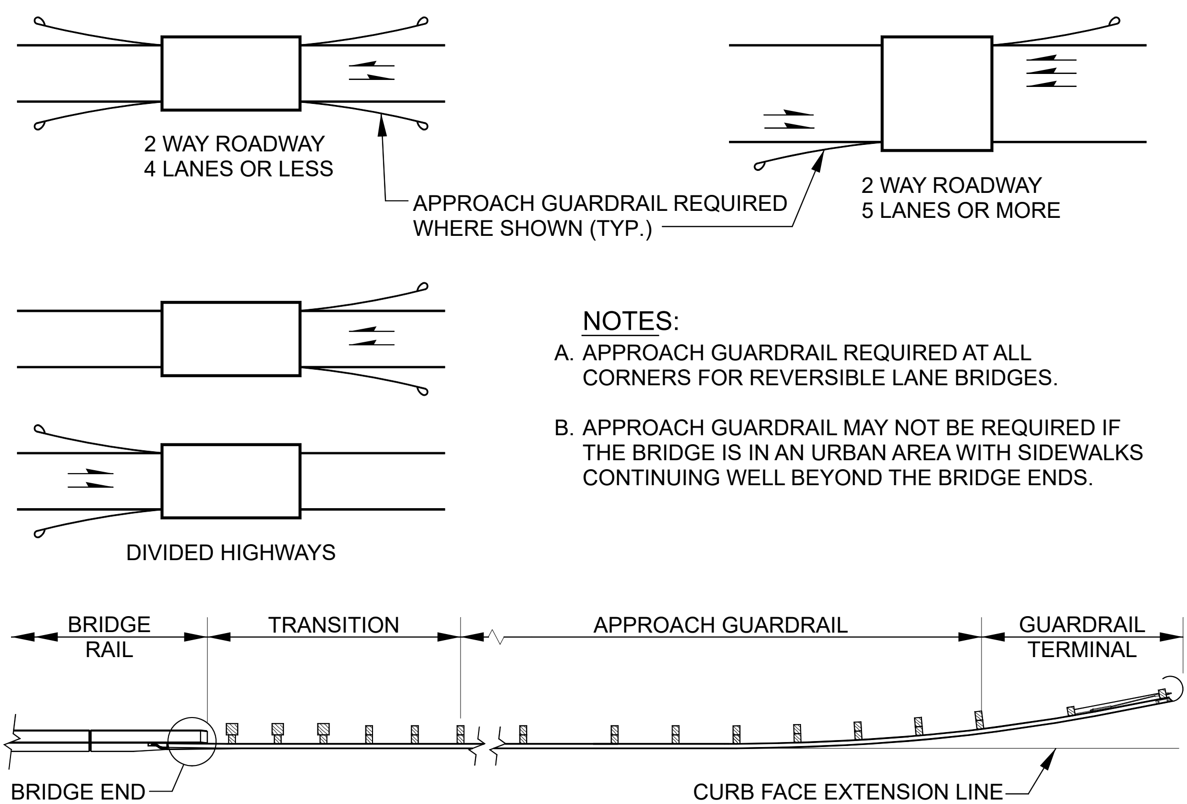
Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Transition details are shown in WSDOT Standard Plans Section C. Features that the inspector should note are:

- If guardrails are not required, the absence of transitions is automatically acceptable and coded as 1.
- Transitions must be nested (two layers). In most cases this will be Thriebeam. W-beam is allowed only when there is insufficient bridge rail height to accommodate the Thrie-beam transition, for example Type 7 bridge rail.
- Post spacing should decrease in the transition resulting in gradual stiffening as a vehicle moves along the transition from a flexible guardrail to the more rigid concrete bridge rail.
- Type III transitions (hollow steel post) have generally been retrofitted, but are only acceptable if they have been retrofitted with a block out less than or equal to 1' – 6" from rail to anchor. On oneway highways, the non-retrofitted posts are acceptable on the trailing edge. Unless further investigation shows that it meets current standards, this is the criteria for acceptance that will be used.
- Transitions are coded as N when there is sufficient roadway fill that there is no attachment to the structure.

Table 1685 Transitions



WSBIS Item 1686 - Guardrails **Pulldown**
NBI Item ##

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

W-beam and Thrie-beam are acceptable rail types. Details of these rails are shown in Standard Plans Section C. Features that the inspector should pay close attention to while inspecting the approach rail are:

- Rails are not necessarily required at all four corners of the bridge. Code Guardrails as 1 when not required.
- Posts should be 6″ × 8″ timber (nominal), or W6x9's, spaced at 6′ 3″ o.c. Nested Thrie-beam is also acceptable but requires lower post spacing.
- Guardrail height (from ground to top of W-beam) should be between 26″ and 28″.
- Guardrail height (from ground to top of Thrie-beam) should be 32″.
- Concrete rail is acceptable.

WSBIS Item 1687 - Terminals **Pulldown**
NBI Item ##

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

Terminals are to be coded as 1 or 0 if they are within a reasonable distance of the bridge. On a fill embankment, this would be near the bottom of the fill slope (*Design Manual* M 22-01). Otherwise they will be coded as an N.

If guardrails are not required, the absence of terminals is automatically acceptable and coded as 1.

Acceptable guardrail terminals are shown in the Washington State Standard Plans Section C or *Design Manual* M 22-01.

WSBIS Item 2537 – Alpha Span Type (INV MO only) **AN(20)**

Applicable Structure Types

- **Bridges & culverts carrying public roadways**
- **Pedestrian, RR and other non-vehicular structures over public roadways**
- **Tunnels carrying public roadways within**

Use Table 2537 to identify each group of span types that make up the entire bridge.

- List the main span Alpha type first, followed by the approach spans.
- Approach span Alpha types should be listed longest to shortest if there are different/variable approach span types.
- The Alpha types must be compatible with WSBIS Items 1532, 1533, 1535, and 1536 respectively.
- Separate each span group by a space.

Example:

Steel through truss main span has a 140 foot timber approach (treated with creosote) at one end of the truss, and a 30 foot concrete T-beam span at the other.

WSBIS Item 1532 = 3 – steel

WSBIS Item 1533 = 10 – through truss

WSBIS Item 1535 = 7 – wood or timber

WSBIS Item 1536 = 02 – girder

The Alpha Span Type would be enteres as follows: STrus TTC CTB

Table 2537 Alpha Span Type Codes

Alpha Span Type	Description
3SCCulv	3 Sided Concrete Culvert
3STCulv	3 Sided Timber Culvert
BAS	Bascule Lift Span
CA	Concrete Arch
CBox	Concrete Box Girder
CCulv	Concrete Culvert
CEFA	Concrete Earth Filled Arch
CESB	Concrete Encased Steel Beam
CFP	Concrete Floating Pontoon
CG	Concrete Girder
CLTun	Concrete Lined Tunnel
CS	Concrete Slab
CSS	Cable Stayed Span
CSTP	Concrete Slab on Timber Piling
CTB	Concrete T-Beam
CTrus	Concrete Truss
CVS	Concrete Voided Slab
LIDTun	Cut and Cover (LID) Tunnel
MCulv	Masonry Culvert
PCBTG	Prestressed Concrete Bulb-T Girder
PCG	Prestressed Concrete Girder
PCMWG	Prestressed Concrete Multi-Web Girder
PCS	Prestressed Concrete Slab
PCTG	Prestressed Concrete Trapizoidal Girder
Plaza	Park Plaza Structures
PRCB	Precast Reinforced Concrete Beam
PTCBox	Post-Tensioned Concrete Box Girder

Alpha Span Type	Description
PTCSeg	Post-Tensioned Segmental Box Girder
PTCTB	Post-Tensioned Concrete T-Beam
SA	Steel Arch
SBox	Steel Box Girder
SCulv	Steel Culvert
SFP	Steel Floating Pontoon
SG	Steel Girder (weld or rivet)
SLS	Steel Lift Span
SRB	Steel Rolled Beam
SSCG	Steel Stayed Concrete Girder
SSusS	Steel Suspension Span
SSwS	Steel Swing Span
STA	Steel Tied Arch
STrus	Steel Truss
TCulv	Timber Culvert
TLTun	Timber Lined Tunnel
TS	Timber Slab
TTC	Treated Timber (Creosote) Bridge
TTLB	Treated Timber Laminated Beam
TTS	Treated Timber (Salts) Bridge
TTTrus	Treated Timber Truss
UT	Untreated Timber Bridge
UTLB	Untreated Timber Laminated Beam
UTTrus	Untreated Timber Truss
UTun	Unlined Tunnel
WSBox	Weathering Steel Box Girder
WSG	Weathering Steel Girder

WSBIS Item 2710 - Sufficiency Rating **Calculated**
NBI Item ##

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This item is calculated automatically and cannot be edited.

The Sufficiency Rating (SR) formula provides a method of evaluating highway bridge data by calculating four separate factors to obtain a numeric value which is indicative of bridge sufficiency to remain in service. The result of this method is a percentage in which 100 percent would represent an entirely sufficient bridge and zero percent would represent an entirely insufficient or deficient bridge. The formula considers the structural adequacy, functional obsolescence, level of service and essentiality for public use.

See Appendix 2-G for the Sufficiency Rating formula.

WSBIS Item 2711 - Structurally Deficient/Functionally Obsolete (SD/FO) **Calculated**

Applicable Structure Types

- **Bridges & culverts carrying public roadways**

This item is calculated automatically and cannot be edited.

Bridges are considered Structurally Deficient (SD) if significant load carrying elements are found to be in poor condition due to deterioration and/or damage, or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to the point of causing overtopping with intolerable traffic interruptions.

SD is numerically defined as follows:

- A bridge component (deck, superstructure, substructure or culvert) having a condition rating of 4 or less (poor condition).
  or
- Structural Evaluation or Waterway Adequacy rated 2 or less (a bridge with a very low load rating capacity, or a bridge that is subject to overtopping with significant or severe traffic delays).

For a structure to be considered SD, one of the following items must be true:

Table 2711a Structurally Deficient/Functionally Obsolete (SD/FO)

WSBIS Item	Condition/Appraisal Rating
1657 – Structural Evaluation	≤ 2
1662 – Waterway Adequacy	≤ 2
1663 – Deck	≤ 4
1671 – Superstructure	≤ 4
1676 – Substructure	≤ 4
1678 – Culvert	≤ 4

Bridges are considered Functionally Obsolete (FO) when the deck geometry, load carrying capacity (comparison of the original design load to the current State legal load), clearance or approach roadway alignment no longer meet the usual criteria for the system of which it is an integral part. In general, FO means that the bridge was built to standards that are not used today. Examples of characteristics leading to an FO classification:

- Low load carrying capacity
- Low waterway adequacy
- Deck geometry (insufficient deck roadway width)
- Insufficient horizontal and vertical clearances
- Poor approach roadway alignment

For a structure to be considered FO, one of the following items must be true:

Table 2711b Structurally Deficient/Functionally Obsolete (SD/FO)

WSBIS Item	Appraisal Rating
1657 – Structural Evaluation	3
1658 – Deck Geometry	≤ 3
1659 – Underclearances	≤ 3
1661 – Approach Roadway Alignment	≤ 3
1662 – Waterway Adequacy	3

WSBIS Item 1436 – Route Direction - TUNNEL **Pulldown**
NTI Item I.8

Applicable Structure Types

- **Tunnels carrying public roadways within**

Record the route direction for the route in the tunnel using one of the following codes:

Table 1436 Route Direction Code

WSBIS Code	Description
4	West
3	South
2	East
1	North
0	Two route directions

Use code 0 when the tunnel carries both directions of a divided highway, and when the roadway is undivided. Route direction is considered the designated direction of the route, not geographic orientation.

Auto-Generated Fields Section

This section is auto-generated for the NBI, NTI and SNBI Items not maintained in Bridgeworks (WSBIS) but are reported to FHWA during submittal.

NBI Item 1 / NTI Item I.3 / SNBI Item BL01 - State Code

The Washington State Code is 530, and is created automatically for insertion in NBI, NTI and SNBI reports. This data field is not maintained in the Washington State Bridge Inventory.

NBI Item 5E – Route Directional Suffix

Washington State does not maintain directional suffixes to route numbers, so this information is not maintained in the Washington State Bridge Inventory. This code is automatically generated as 0 (not applicable) to the NBI.

NBI Item 112 – NBIS Bridge Length

The NBIS bridge length = Y for all On records reported to the NBI by definition, and is created automatically for insertion in NBI text file. This data field is not maintained in the Washington State Bridge Inventory.

NTI Items I.15 through I.18– Border Tunnel Data

Washington State has no tunnels across it's borders. These 4 fields are automatically reported as null to the NTI.

NTI Items N.1 through N.3 – Navigable Waterway Data

Washington State has no tunnels under navigable waters. These 3 fields are automatically reports as 0 to the NTI.

NSTM Inspection Required

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Calculated	-	I	BIR01	B.IR.01	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report whether the bridge requires an NSTM inspection using one of the following codes. **Code** **Description** N NSTM inspection not required Y NSTM inspection required I NSTM inspection not required - Internal redundancy S NSTM inspection not required - System redundancy Do not report this item for bridges that do not have steel members, as indicated in Items B.SP.04 (Span Material) and B.SB.03 (Substructure Material).	The intent of this item is to identify bridges that require NSTM inspection for any part of the bridge, to ensure they are inspected in accordance with the NBIS. It is the State's option to record a required NSTM inspection for any bridges meeting a State definition more rigorous than the FHWA definition of NSTM inspection. Use code N when an NSTM inspection is not required and codes I and S do not apply. Use code I when the bridge owner has demonstrated to FHWA, through the use of nationally recognized methods, that a member without load path redundancy is internally redundant, and it is determined that the bridge does not require an NSTM inspection. Use code S when the bridge owner has demonstrated to FHWA, through the use of nationally recognized methods, that a bridge without load path redundancy is system redundant, and it is determined that the bridge does not require an NSTM inspection.

Inspection Data Update Date

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Calculated	-	EI	BIE10	B.IE.10	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
This field is automatically generated.when the updated data is released into the permanent record by the data steward.	The intent of this item is to verify that a complete NBI inspection data set is accepted and is entered or updated in the inventory within the timeframes required by the NBIS.

Underwater Inspection Required

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Calculated	-	I	BIR03	B.IR.03	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report whether an underwater inspection is required under normal flow conditions using one of the following codes. **Code** **Description** N Underwater inspection not required Y Underwater inspection required Do not report this item for bridges that do not pass over water as indicated in Item B.F.01 (Feature Type).	The intent of this item is to identify bridges that require an underwater inspection per the NBIS. Use code Y when during a typical routine inspection, any portion of a bridge substructure and the surrounding channel cannot be inspected to the mudline at low water by wading or probing, generally requiring diving or other appropriate technique. Use code N when during a typical routine inspection, all portions of a bridge substructure and the surrounding channel can be inspected to the mudline at low water by wading or probing. If this item was previously reported as Y because an underwater inspection is generally required, it should continue to be reported as Y even for instances of unusually low flow where all portions of the substructure can be inspected by wading and probing, and an underwater inspection is not required. This applies only if the low flow condition is truly unusual and is not likely to reoccur during the next inspection interval. The reported code for this item may change in the rare circumstance where long-term environmental conditions change for inspection access to underwater portions of the substructure.

Complex Feature - SNBI

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
AN(1)	-	I	BIR04	B.IR.04	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report whether the bridge has a complex feature by using one of the following codes. **Code** **Description** N Bridge does not have complex feature Y Bridge has a complex feature Do not report this item for bridges that do not pass over water as indicated in Item B.F.01 (Feature Type).	The intent of this item is to identify bridges with complex features as defined by the NBIS. Bridges with complex features are typically identified in agency policies and procedures.

Lowest Condition Rating Code

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Calculated	-	I	BC13	B.C.13	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
This item is calculated by FHWA and is not required to be reported. The code for this item is the lowest condition rating code from the following items: B.C.01 (Deck Condition Rating),B.C.02 (Superstructure Condition Rating), B.C.03 (Substructure Condition Rating), and B.C.04 (Culvert Condition Rating).	

Examples - Lowest Condition Rating Code
Code 7 is calculated and recorded for a reinforced concrete closed-spandrel wall arch bridge with the following component condition rating item codes: • B.C.02 (Superstructure Condition Rating) = 7 • B.C.03 (Substructure Condition Rating) = 8 Code 5 is calculated and recorded for a corrugated metal pipe culvert with the following component condition rating item code: • B.C.04 (Culvert Condition Rating) = 5 Code 4 is calculated and recorded for a steel box girder bridge with the following component condition rating codes: • B.C.01 (Deck Condition Rating) = 4 • B.C.02 (Superstructure Condition Rating) = 6 • B.C.03 (Substructure Condition Rating) = 7

Inspection QA Date

Format	Translation	Frequency	WSBIS Item ID	SNBI Item ID	SNTI Item ID
Calculated	-	EI	BIE09	B.IE.09	-

Applicable Structure Types
- **All structure records**

Specification	Commentary
Report the date that the QA review was completed. Do not report when a QA review was not performed.	The intent of this item is to identify inspections that have had independent QA reviews to measure or verify the overall quality of the inspection program. Agency QA procedures often vary in the definition of a review period and number of inspections reviewed. Bridge inspections might be randomly selected for agency QA reviews or selected based on representative bridge type, region, district, or other agency defined bridge populations.

Examples
A Routine and NSTM inspection started on August 1, 2020. The Routine inspection was completed on August 2, 2020. The NSTM inspection was completed on August 4, 2020. An agency QC review was performed on the Routine and NSTM inspections on September 15, 2020. The Routine inspection was randomly selected for an agency QA review according to agency policies and procedures, which was performed on January 4, 2021. Report 20210104 for the Routine inspection.

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Inspection Equipment

Format	Frequency	Item ID
AN (120)	EI	B.IE.12

Specification	Commentary
Report all access and inspection equipment used to perform the inspection using one or more of the following codes. Report multiple codes separated by pipe (|) delimiters. Do not report this item if none of the equipment below was used. Code Description Access AN No access equipment used A01 Ladder A02 Bucket lift vehicle A03 Under bridge inspection vehicle A04 Rigging A05 Waders A06 Boat A07 Snorkel A08 SCUBA A09 Surface supplied air A10 Remotely Operated Vehicle (ROV) A11 Video pole A12 Borescope A13 Unmanned aerial systems (UAS) A14 Service Traveler AX Other Codes continued next page.	This item is used to provide information about access and inspection equipment used in addition to standard equipment for each inspection. Remotely operated vehicles include any remotely controlled device used to provide video access to members of a bridge via ground, water surface, or underwater. Use code AN when none of the listed access equipment codes apply for the inspection performed. Use code A13 when unmanned aerial systems (UAS), also referred to as drones, are used to supplement inspections. Use code IN when none of the listed inspection equipment codes apply for the inspection performed. Use code I13 when underwater imaging technologies such as side scan sonar are used to supplement underwater inspections. NDE and testing inspection equipment listed represent only more common or general types. Use the most closely related code, or use code IX for types not listed.

6.2 – INSPECTION EVENTS

Specification Continued – Inspection Equipment	
Code	Description
	Inspection
IN	No inspection equipment used
I01	Ultrasonic
I02	Ground-penetrating radar
I03	Infrared thermography
I04	Radiographic testing
I05	Impact echo
I06	Electromagnetic methods
I07	Rebound & penetration methods
I08	Acoustic emissions testing
I09	Dye penetrant
I10	Magnetic particle
I11	Eddy current
I12	Boring or drilling
I13	Underwater imaging
I14	Depth finder/fathometer
I15	Stress wave timer
IX	Other

Example – Inspection Equipment

A NSTM inspection was performed, including hands-on inspection of all girders and floor beams in spans 2 and 3. An under bridge inspection vehicle was used to gain access and magnetic particle testing was done to check fatigue details for cracking.

- Report A03|I10 for the NSTM inspection.

An underwater inspection was performed with divers using a boat and surface supplied air. Before the dive, side-scan sonar was performed to capture underwater images.

- Report A06|A09|I13 for the underwater inspection.

The bridge was struck by an over-height vehicle requiring a damage inspection. A hands-on inspection was performed using a bucket truck for access. Dye penetrant testing was used in several locations where cracks were suspected. The tip of identified cracks was determined using Eddy Current testing.

- Report A02|I09|I11 for the damage inspection.

A scour critical bridge experienced flood water elevations up to the web of the exterior girder. Per the scour POA, scour monitoring was immediately completed by a team leader. A remotely operated water vehicle was used that was equipped with underwater imaging technology.

- Report A10|I13 for the scour monitoring inspection.

7.2 – ELEMENT IDENTIFICATION

Element Number

Format	Frequency	Item ID
N (4,0)	EI	B.E.01

Specification	Commentary
Report the applicable element number (EN) for each element reported for the bridge.	Refer to *Table 22* for element numbers reported to FHWA.

Example

Values shown in the shaded cells, with italicized text, under column B.E.01 are the data for the elements in this example.

Element	B.E.01
	EN
RC Deck	*12*
Wearing Surface	*510*
Open Joint	*304*
RC Bridge Railing	*331*
Steel Beam/Girder	*107*
Steel Protective Coating	*515*
Elastomeric Bearings	*310*
RC Columns	*205*
RC Pier Wall	*210*
RC Abutment	*215*
RC Pier Cap	*234*

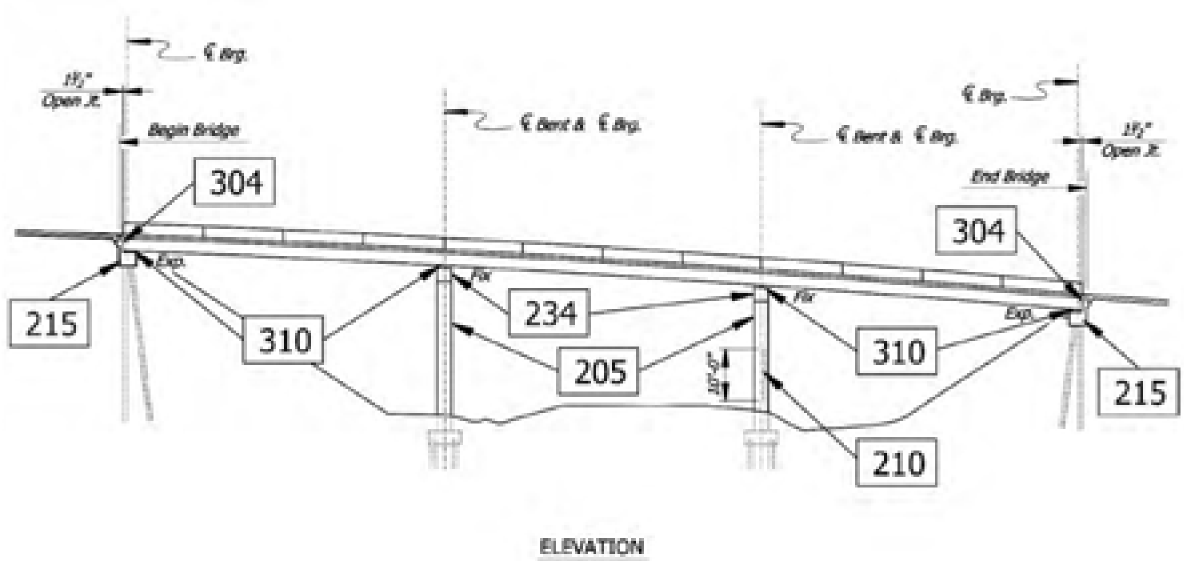


Figure 179. Bridge elevation view from construction plans for a three-span steel beam bridge. (Source: Alabama DOT)

7.2 – ELEMENT IDENTIFICATION

Example Continued – Element Number

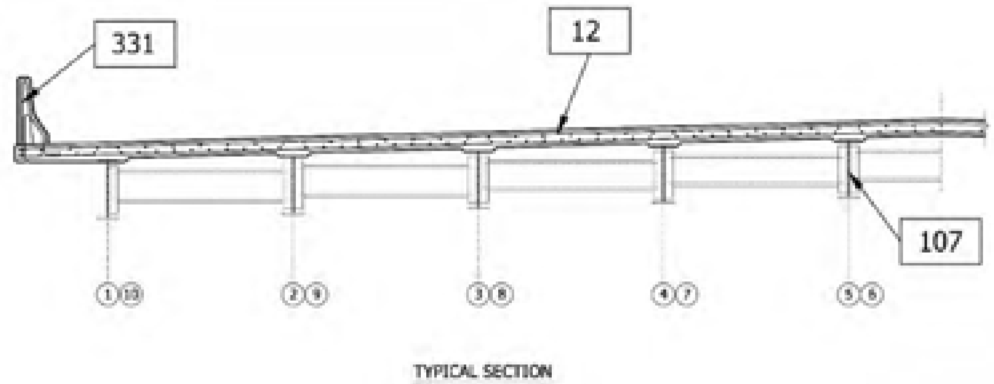


Figure 180. Typical bridge superstructure cross-section view from construction plans for a steel multi-beam bridge. (Source: Alabama DOT)

7.2 – ELEMENT IDENTIFICATION

Element Parent Number

Format	Frequency	Item ID
N (4,0)	EI	B.E.02

Specification	Commentary
Report the element number of the protected element for each protective system element reported for the bridge. Do not report this item for elements that do not have a protective system.	Refer to *Table 22* for wearing surface and protective coatings elements reported to FHWA.

Example

Values shown in the shaded cells, with italicized text, under column B.E.02 are the element parent number (EPN) data for the element numbers shown in column B.E.01 in this example.

Element	B.E.01	B.E.02
	EN	EPN
RC Deck	12	
Wearing Surface	510	*12*
Open Joint	304	
RC Bridge Railing	331	
Steel Beam/Girder	107	
Steel Protective Coating	515	*107*
Elastomeric Bearings	310	
RC Columns	205	
RC Pier Wall	210	
RC Abutment	215	
RC Pier Cap	234	

7.2 – ELEMENT IDENTIFICATION

Element Total Quantity

Format	Frequency	Item ID
N (8,0)	EI	B.E.03

Specification	Commentary
Report the total element quantity (Total Qty) to the nearest whole unit of measure for each applicable element reported for the bridge.	Refer to the AASHTO MBEI for details on the calculation of total element quantities for applicable elements.

Example

Quantities shown in the shaded cells, with italicized text, under column B.E.03 are the data for the element numbers shown in column B.E.01 in this example.

Element	B.E.01	B.E.02	B.E.03
	EN	EPN	Total Qty
RC Deck (ft^2)	12		*16217*
Wearing Surface (ft^2)	510	12	*15783*
Open Joint (ft)	304		*158*
RC Bridge Railing (ft)	331		*412*
Steel Beam/Girder (ft)	107		*2054*
Steel Protective Coating (ft^2)	515	107	*15728*
Elastomeric Bearings (each)	310		*40*
RC Columns (each)	205		*8*
RC Pier Wall (ft)	210		*54*
RC Abutment (ft)	215		*182*
RC Pier Cap (ft)	234		*150*

7.3 – ELEMENT CONDITIONS

Element Quantity Condition State One

Format	Frequency	Item ID
N (8,0)	EI	B.CS.01

Specification	Commentary
Report the element quantity assigned to condition state one (CS1 Qty) to the nearest whole unit of measure for each element reported for the bridge.	Refer to the AASHTO MBEI for element defect and condition state definitions.

Example

Quantities shown in the shaded cells, with italicized text, under column B.CS.01 are the data for the element numbers shown under column B.E.01 in this example.

Element	B.E.01	B.E.02	B.E.03	B.CS.01
	EN	EPN	Total Qty	CS1 Qty
RC Deck (ft^2)	12		16217	*0*
Wearing Surface (ft^2)	510	12	15783	*15083*
Open Joint (ft)	304		158	*100*
RC Bridge Railing (ft)	331		412	*360*
Steel Beam/Girder (ft)	107		2054	*1044*
Steel Protective Coating (ft^2)	515	107	15728	*0*
Elastomeric Bearings (each)	310		40	*30*
RC Columns (each)	205		8	*4*
RC Pier Wall (ft)	210		54	*44*
RC Abutment (ft)	215		182	*140*
RC Pier Cap (ft)	234		150	*105*

7.3 – ELEMENT CONDITIONS

Element Quantity Condition State Two

Format	Frequency	Item ID
N (8,0)	EI	B.CS.02

Specification	Commentary
Report the element quantity assigned to condition state two (CS2 Qty) to the nearest whole unit of measure for each element reported for the bridge.	Refer to the AASHTO MBEI for element defects and condition state definitions.

Example

Quantities shown in the shaded cells, with italicized text, under column B.CS.02 are the data for the element numbers shown under column B.E.01 in this example.

Element	B.E.01 EN	B.E.02 EPN	B.E.03 Total Qty	B.CS.01 CS1 Qty	B.CS.02 CS2 Qty
RC Deck (ft^2)	12		16217	0	*16000*
Wearing Surface (ft^2)	510	12	15783	15083	*500*
Open Joint (ft)	304		158	100	*58*
RC Bridge Railing (ft)	331		412	360	*40*
Steel Beam/Girder (ft)	107		2054	1044	*1000*
Steel Protective Coating (ft^2)	515	107	15728	0	*5628*
Elastomeric Bearings (each)	310		40	30	*5*
RC Columns (each)	205		8	4	*4*
RC Pier Wall (ft)	210		54	44	*5*
RC Abutment (ft)	215		182	140	*30*
RC Pier Cap (ft)	234		150	105	*30*

7.3 – ELEMENT CONDITIONS

Element Quantity Condition State Three

Format	Frequency	Item ID
N (8,0)	EI	B.CS.03

Specification	Commentary
Report the element quantity assigned to condition state three (CS3 Qty) to the nearest whole unit of measure for each element reported for the bridge.	Refer to the AASHTO MBEI for element defects and condition state definitions.

Example

Quantities shown in the shaded cells, with italicized text, under column B.CS.03 are the data for the element numbers shown under column B.E.01 in this example.

Element	B.E.01	B.E.02	B.E.03	B.CS.01	B.CS.02	B.CS.03
	EN	EPN	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty
RC Deck (ft^2)	12		16217	0	16000	*217*
Wearing Surface (ft^2)	510	12	15783	15083	500	*0*
Open Joint (ft)	304		158	100	58	*0*
RC Bridge Railing (ft)	331		412	360	40	*12*
Steel Beam/Girder (ft)	107		2054	1044	1000	*10*
Steel Protective Coating (ft^2)	515	107	15728	0	5628	*10000*
Elastomeric Bearings (each)	310		40	30	5	*5*
RC Columns (each)	205		8	4	4	*0*
RC Pier Wall (ft)	210		54	44	5	*5*
RC Abutment (ft)	215		182	140	30	*12*
RC Pier Cap (ft)	234		150	105	30	*15*

7.3 – ELEMENT CONDITIONS

Element Quantity Condition State Four

Format	Frequency	Item ID
N (8,0)	EI	B.CS.04

Specification	Commentary
Report the element quantity assigned to condition state four (CS4 Qty) to the nearest whole unit of measure for each element reported for the bridge.	Refer to the AASHTO MBEI for element defects and condition state definitions.

Example

Quantities shown in the shaded cells, with italicized text, under column B.CS.04 are the data for the element numbers shown under column B.E.01 in this example.

Element	B.E.01	B.E.02	B.E.03	B.CS.01	B.CS.02	B.CS.03	B.CS.04
	EN	EPN	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
RC Deck (ft^2)	12		16217	0	16000	217	*0*
Wearing Surface (ft^2)	510	12	15783	15083	500	0	*200*
Open Joint (ft)	304		158	100	58	0	*0*
RC Bridge Railing (ft)	331		412	360	40	12	*0*
Steel Beam/Girder (ft)	107		2054	1044	1000	10	*0*
Steel Protective Coating (ft^2)	515	107	15728	0	5628	10000	*100*
Elastomeric Bearings (each)	310		40	30	5	5	*0*
RC Columns (each)	205		8	4	4	0	*0*
RC Pier Wall (ft)	210		54	44	5	5	*0*
RC Abutment (ft)	215		182	140	30	12	*0*
RC Pier Cap (ft)	234		150	105	30	15	*0*

7.3 – ELEMENT CONDITIONS

Example Element Data Set

This example shows the progression of element data sets considering all inspections performed since the last reporting of data to FHWA and ending with the data set *(Table 26)* that would be reported to FHWA.

Table 24. Element data set for a complete routine inspection performed since the last reporting of data to FHWA.

B.E.01	B.E.02	B.E.03	B.CS.01	B.CS.02	B.CS.03	B.CS.04
EN	EPN	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
12		16217	0	16000	217	0
510	12	15783	15083	500	0	200
107		2054	1044	1000	10	0
515	107	15728	0	5628	10000	100
205		8	4	4	0	0
210		54	44	5	5	0
215		182	140	30	12	0
234		150	105	30	15	0
304		158	100	58	0	0
310		40	30	5	5	0
331		412	360	40	12	0

Preservation work was completed on the reinforced concrete deck (EN 12) and steel open girder/beam (EN 107). An inspection was performed prior to reporting data to FHWA to update the condition of the following elements: steel protective coating (EN 515), steel open girder/beam (EN 107 - with section loss), reinforced concrete deck (EN 12), new wearing surface (EN 510), and new pourable joints (EN 301). The element data for this inspection is shown in *Table 25*.

Table 25. Element data collected for a one-time special inspection performed to account for preservation work that occurred after the inspection data shown in *Table 24* and prior to reporting data to FHWA.

B.E.01	B.E.02	B.E.03	B.CS.01	B.CS.02	B.CS.03	B.CS.04
EN	EPN	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
12		16217	0	*16217*	*0*	0
510	12	15783	*15783*	*0*	0	*0*
107		2054	*2044*	*0*	10	0
515	107	15728	*15728*	*0*	*0*	*0*
301		158	*158*	*0*	0	0

Cells shaded, with italicized text, in columns B.E.01, B.CS.01, B.CS.02, B.CS.03, and B.CS.04 show changes in data from *Table 24*.

7.3 – ELEMENT CONDITIONS

Table 26. Element data set reported to FHWA reflecting all inspections performed since the last reporting of data to FHWA.

B.E.01	B.E.02	B.E.03	B.CS.01	B.CS.02	B.CS.03	B.CS.04
EN	EPN	Total Qty	CS1 Qty	CS2 Qty	CS3 Qty	CS4 Qty
12		16217	0	*16217*	*0*	0
510	12	15783	*15783*	*0*	0	*0*
107		2054	*2044*	*0*	10	0
515	107	15728	*15728*	*0*	*0*	*0*
301		158	*158*	*0*	0	0
205		8	4	4	0	0
210		54	44	5	5	0
215		182	140	30	12	0
234		150	105	30	15	0
310		40	30	5	5	0
331		412	360	40	12	0

Cells shaded, with italicized text, in columns B.E.01, B.CS.01, B.CS.02, B.CS.03, and B.CS.04 show changes in data from *Table 24*.

4.1 – FEATURE IDENTIFICATION

Feature Type

Format	Frequency	Item ID
AN (3)	I	B.F.01

Specification	Commentary
Report the feature that is above, below, or carried on the bridge using one of the following codes. Code Description H## Highway R## Railroad P## Pathway W## Waterway F## Relief for waterway B## Urban feature D## Dry terrain or side slope X## Other Replace the ## characters in the above codes with sequential numbers, with leading zeros, assigned to each feature type. For a double deck bridge that is inventoried with one unique bridge number, report a feature for each deck level. Report a railroad feature for each separate railroad service type, as identified in Item B.RR.01 *(Railroad Service Type)*, that is carried on or passes below the bridge. When a track carries multiple railroad service types, report only one feature. When multiple tracks carry the same railroad service type(s), report only one feature. Report one highway feature for a highway that is designated with two or more route numbers. Report multiple highway features when the highway is divided at the bridge.	All bridges have at least one feature carried on the bridge and one feature below the bridge. Some bridges have several features that are above, below, or carried on the bridge. Each feature type is numbered sequentially, starting with one (H01, R01, etc.). Highway features should be numbered beginning with the features carried on the bridge, followed by those below and above (H01, H02, H03, etc.). This item does not include ancillary structures and utilities. Reporting more than one Urban feature or Other feature is optional. For multi-level interchanges, report highway features directly above and below the bridge. The presence of a flush or mountable median on the bridge does not in itself indicate that the highway is divided. Use code R for each railroad service type listed in Item B.RR.01 *(Railroad Service Type)*. Use code P for separated pathways dedicated for pedestrian, bicycle, equestrian, or other non-highway modes of human transportation not covered in other codes. Use code W for each unique waterway. Do not use for roadside ditches or pipes that typically only carry roadway runoff from rain events. Use code F for bridges where one or more spans provide waterway openings for flow only during flood stages to provide additional hydraulic capacity, such as relief channels.

4.1 – FEATURE IDENTIFICATION

Commentary Continued – Feature Type

Use code B for urban features such as buildings, parking lots, etc.

Use code D for features such as a natural depression or sidehill slope when there is no discernable waterway channel and none of the other feature codes apply.

Use code X when no other code applies for features that exist below the bridge.

For border bridges, the Neighboring State reports this item for all highway features carried on or passing above the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

Examples – Feature Type

A bridge carries I-66 eastbound and I-66 westbound over County Route 601 and Passage Creek. I-66 eastbound and westbound are divided at the bridge by an opening between two superstructure units supported by abutments common to both superstructures.

- Report H01 for I-66 eastbound.
- Report H02 for I-66 westbound.
- Report H03 for County Route 601.
- Report W01 for Passage Creek.

A bridge carries I-68 eastbound and State Route 17 northbound over County Route 603, the Appalachian Trail, and Postage Creek. I-68 eastbound and State Route 17 northbound share a common highway that is not divided at the bridge. Above the bridge is a ramp connecting I-68 westbound to County Route 603 southbound.

- Report H01 for I-68/SR17.
- Report H02 for County Route 603.
- Report H03 for the ramp.
- Report P01 for the Appalachian Trail.
- Report W01 for Postage Creek.

A bridge carries Brookside Glen Drive over Union Creek. The bridge carries sidewalks on the north and south sides.

- Report H01 for Brookside Glen Drive.
- Report P01 for the sidewalks.
- Report W01 for Union Creek.

4.1 – FEATURE IDENTIFICATION

<table>
<tr><th colspan="6">Feature Location</th></tr>
<tr><td colspan="2"><u>Format</u>
AN (1)</td><td colspan="2"><u>Frequency</u>
I</td><td colspan="2"><u>Item ID</u>
B.F.02</td></tr>
<tr><th colspan="3">Specification</th><th colspan="3">Commentary</th></tr>
<tr><td colspan="3">Report the location for the feature reported in Item B.F.01 (Feature Type) that is above, below, or carried on the bridge using one of the following codes.

<u>Code</u> <u>Description</u>
C Carried on bridge
A Above bridge
B Below bridge
T Top level
L Lower level</td><td colspan="3">This item has a corresponding code for each feature reported for Item B.F.01 (Feature Type).

Use code T for the top level of a double deck bridge that is inventoried using one unique bridge number.

Use code L for the lower level of a double deck bridge that is inventoried using one unique bridge number.

For border bridges, the Neighboring State reports this item for all highway features carried on or passing above the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.</td></tr>
<tr><th colspan="6">Examples</th></tr>
<tr><td colspan="6">A bridge carries I-66 eastbound and I-66 westbound over County Route 601 and Passage Creek. I-66 eastbound and westbound are divided at the bridge by an opening between two superstructure units supported by abutments common to both superstructures.
• Report C for I-66 eastbound.
• Report C For I-66 westbound.
• Report B for County Route 601.
• Report B for Passage Creek.

A bridge carries I-68 eastbound and State Route 17 northbound over County Route 603, the Appalachian Trail, and Postage Creek. I-68 eastbound and State Route 17 northbound share a common highway that is not divided at the bridge. Above the bridge is a ramp connecting I-68 westbound to County Route 603 southbound.
• Report C for I-68/SR17.
• Report B for County Route 603.
• Report A for the ramp.
• Report B for the Appalachian Trail.
• Report B for Postage Creek.

A bridge carries Brookside Glen Drive over Union Creek. The bridge carries sidewalks on the north and south sides.
• Report C for Brookside Glen Drive.
• Report C for the sidewalks.
• Report B for Union Creek.</td></tr>
</table>

4.1 – FEATURE IDENTIFICATION

Feature Name

Format	Frequency	Item ID
AN (300)	I	B.F.03

Specification	Commentary
Report the commonly known name(s) for the feature reported in Item B.F.01 *(Feature Type)*. If the feature has no commonly known name, provide a general description. For more than one name, report all names with the most common name first. When applicable, report the route number first followed by other names. Report multiple names separated by pipe (|) delimiters.	This item has correlating data for each feature reported for Item B.F.01 *(Feature Type)*. The owner may include directional or other descriptive information in this field. Official names and local names may be included. For border bridges, the Neighboring State reports this item for all highway features carried on or passing above the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

Examples

I-90, commonly named Massachusetts Turnpike. Report I-90|Massachusetts Turnpike.

I-64, with no commonly known name. Report I-64.

US 50 & US 301 carried on one highway commonly named John Hanson Highway. Report US 50|US 301|John Hanson Highway.

I-95S carried on the lower deck of the George Washington Bridge. Report I95S|George Washington Bridge - Lower Deck.

I-495 northbound. Report I-495 NB.

A bridge carries I-68 eastbound (commonly named Harry Byrd Expressway), and State Route 17 northbound (commonly named Paris Pike) over County Route 603 (commonly named Blue Ridge Mountain Road), the Appalachian Trail, and Postage Creek. I-68 eastbound and State Route 17 northbound share a common highway that is not divided at the bridge. Above the bridge is a ramp connecting I-68 westbound to County Route 603 southbound.

- Report I-68|Harry Byrd Expressway|SR17|Paris Pike for I-68/SR17.
- Report County Route 603|Blue Ridge Mountain Road for County Route 603.
- Report I-68 WB to County Route 603 SB for the ramp.
- Report Appalachian Trail for the pathway.
- Report Postage Creek for the waterway.

A bridge carries Brookside Glen Drive over Union Creek. The bridge carries sidewalks on the north and south sides.

- Report Brookside Glen Drive for the highway.
- Report Sidewalks for the pathways.
- Report Union Creek for the waterway.

4.2 – ROUTES

Route Designation

Format	Frequency	Item ID
AN (3)	I	B.RT.01

Specification	Commentary
Report the assigned route designation for the highway reported in Item B.F.01 *(Feature Type)* using the following code. Code Description R## Unique Route Designation Replace the ## characters in the above code with sequential numbers, with leading zeros, assigned to each unique route designation carried on the highway feature (e.g., R01, R02, etc.). If a highway carries multiple routes, report only those routes that have a route number. If a highway carries only routes without route numbers, report one route designation.	This item captures how routes that share the reported highway feature are designated. Each highway feature has at least one route designation. Typically, the route with the highest-class route type is listed first, using the hierarchy shown in Item B.RT.04 *(Route Type)*. An interstate is considered the highest-class route. If the highway feature is carried on a ramp bridge, report all applicable routes for the highways that are being connected. For border bridges, the Neighboring State reports this item for all highway features carried on the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

Examples

I-35 southbound. Report R01.

Local road with no known route number. Report R01.

I-66 and State Route 17 northbound share one highway that is not divided at the bridge.
- Report R01 for I-66.
- Report R02 for State Route 17.

A ramp bridge departs from I-66 westbound and enters I-81 southbound.
- Report R01 for I-66.
- Report R02 for I-81.

One highway feature is signed for both State Highway 43 and Harlem Avenue.
- Report R01 for State Highway 43.
- Do not report a route record for Harlem Avenue.

4.2 – ROUTES

Route Number

Format	Frequency	Item ID
AN (15)	I	B.RT.02

Specification	Commentary
Report the route number for the route reported in Item B.RT.01 *(Route Designation)*. Include letters that are used as part of the route numbers. Report 0 for routes without route numbers.	For divided highways, do not report the route direction. Identify that information in Item B.RT.03 *(Route Direction)*. For border bridges, the Neighboring State reports this item for all highway features carried on the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

Examples

I-35 southbound. Report 35.

I-35W southbound. Report 35W.

State Highway 9A is not divided at the bridge. Report 9A.

Local road with no known route number. Report 0.

I-66 and State Route 17 northbound share one highway that is not divided at the bridge.

- Report 66 for the route designated as I-66.
- Report 17 for the route designated as State Route 17.

A ramp bridge departs from I-66 westbound and enters I-81 southbound.

- Report 66 for the route designated as I-66.
- Report 81 for the route designated as I-81.

4.2 – ROUTES

Route Direction

Format	Frequency	Item ID
AN (2)	I	B.RT.03

Specification	Commentary
Report the designated route direction for the route reported in Item B.RT.01 *(Route Designation)* using one of the following codes. Code Description NB Northbound EB Eastbound SB Southbound WB Westbound NS Northbound and Southbound EW Eastbound and Westbound	Use code NS when the route is not divided at the bridge, and carries traffic in both north and south directions. Use code EW when the route is not divided at the bridge, and carries traffic in both east and west directions. Use the designated route direction for the departure or entrance route when a bridge only carries a ramp; i.e. Item B.RT.05 *(Service Type)* is 7. Use the most applicable code when a route does not have a designated route direction. For border bridges, the Neighboring State reports this item for all highway features carried on the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

Examples

I-35 southbound. Report SB.

I-35W southbound. Report SB.

State Highway 9W is not divided at the bridge and carries traffic in north and south directions. Report NS.

A ramp bridge departs from I-66 westbound and enters I-81 southbound.
- Report WB for the route designated as I-66.
- Report SB for the route designated as I-81.

Bridge carries I-81 northbound and I-64 eastbound.
- Report NB for the route designated as I-81.
- Report EB for the route designated as I-64.

4.2 – ROUTES

Route Type

Format	Frequency	Item ID
AN (1)	I	B.RT.04

Specification	Commentary
Report the route type for the route reported in Item B.RT.01 *(Route Designation)* using one of the following codes. Code Description 1 Interstate route 2 U.S. route 3 State route 4 County route 5 City street 6 Federal lands road 7 State lands road X Other	Use code 4 for parish routes or other county route equivalents. Use code 5 for city or other municipal streets. Use code 6 when a public highway passes through Federal lands such as national parks, national forests, or DOD facilities and does not meet the description of codes 1 through 5. Use code 7 when a public highway passes through State lands such as State parks or State forests and does not meet the description of codes 1 through 5. Use code X when a public highway is not designated as one of the defined route type codes. For border bridges, the Neighboring State reports this item for all highway features carried on the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

Examples

Highway feature is signed for both I-35 and US-77.

- Report 1 for the route designated as I-35.
- Report 2 for the route designated as US-77.

Route is signed I-35 southbound. Report 1.

Route is signed State Highway 9W. Report 3.

A ramp bridge departs from VA-7 westbound and enters I-81 southbound.

- Report 3 for the route designated as VA-7.
- Report 1 for the route designated as I-81.

4.2 – ROUTES

Service Type

Format	Frequency	Item ID
AN (1)	I	B.RT.05

Specification	Commentary
Report the designated service type for the route reported in Item B.RT.01 *(Route Designation)*, using one of the following codes. Code Description 1 Mainline 2 Alternate 3 Bypass 4 Spur 6 Business 7 Ramp, connector, etc. 8 Service or frontage road X Other	The service type designation is determined by the agency, and typically included as part of the signage for the route. Use code 7 for all types, arrangements, and sizes of turning roadways that connect two or more highways at an interchange. Use code 8 for frontage roads. These are typically parallel to the traveled way, may be provided on one or both sides of the mainline, and may or may not be continuous. A frontage road may include a U-turn lane. For Federal agency roads, report the most logical description of the service type compared to other routes within the facility. For border bridges, the Neighboring State reports this item for all highway features carried on the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

Examples

A ramp bridge connects I-66 westbound to I-81 southbound. Report 7.

I-35W southbound. Report 1.

4.3 – HIGHWAYS

Functional Classification

Format	Frequency	Item ID
AN (1)	I	B.H.01

Specification	Commentary
Report the functional classification for the highway feature reported in Item B.F.01 *(Feature Type)* using one of the following codes. Code Description 1 Interstate 2 Principal Arterial – Other Freeways and Expressways 3 Principal Arterial – Other 4 Minor Arterial 5 Major Collector 6 Minor Collector 7 Local	Functional classifications result from the grouping of highways by the character of service they provide. Ensure that the functional classification designated in this item is consistent with the HPMS. When one highway feature carries multiple route types, report the code for the highest-class route following the hierarchy in the code descriptions; Interstate being the highest class. Use code 7 for State or Federal parkways and other park roads unless there is a through highway designated at a higher classification. FHWA Highway Functional Classification Concepts, Criteria, and Procedures website: http://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/.

4.3 – HIGHWAYS

Urban Code

Format	Frequency	Item ID
AN (5)	I	B.H.02

Specification	Commentary
Report the urbanized area code consistent with the State's HPMS urban boundaries for the highway feature reported in Item B.F.01 *(Feature Type)* at the bridge.	Urban codes can be found at: https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html. For bridges outside urbanized areas, use code 99999 for rural areas with population less than 5,000 and use code 99998 for small urban areas with population 5,000 to 49,999 in accordance with the HPMS Field Manual. FHWA approves adjusted urban boundaries submitted by State DOT planning offices. State's HPMS urban boundaries are based on the FHWA-approved adjusted urban boundaries. State maps of the unadjusted U.S. Census urban boundaries with highways (map layers: Labels, Transportation, and Urban Areas checked) can be found at: https://tigerweb.geo.census.gov.

Example

U.S. 13/113A over Saint Jones River. Report 24580.

Figure 80. TIGERweb screen shot for the bridge in Delaware. (Source: US Census Bureau)

4.3 – HIGHWAYS

NHS Designation

Format	Frequency	Item ID
AN (1)	I	B.H.03

Specification	Commentary
Report the NHS designation for the highway feature reported in Item B.F.01 *(Feature Type)*, using one of the following codes. Code Description N Non-NHS Y NHS	The National Highway System (NHS) includes the Interstate Highway System as well as other roads important to the nation's economy, defense, and mobility. The NHS was developed by the U.S. Department of Transportation (DOT) in cooperation with the states, local officials, and metropolitan planning organizations (MPOs). The NHS includes the following subsystems of highways: Interstate, other principal arterials, STRAHNET, major STRAHNET connectors, and intermodal connectors. NHS routes and connectors are identified in the HPMS. State maps of the NHS can be found at: *http://www.fhwa.dot.gov/planning/national_highway_system/nhs_maps/*. For border bridges, the Neighboring State reports this item for all highway features carried on the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

National Highway Freight Network

Format	Frequency	Item ID
AN (1)	I	B.H.04

Specification	Commentary
Report the National Highway Freight Network (NHFN) designation for the highway feature reported in Item B.F.01 *(Feature Type)*, using one of the following codes. Code Description 1 Primary Highway Freight System 2 Interstate portions not on the Primary Highway Freight System 3 Critical Rural Freight Corridor 4 Critical Urban Freight Corridor N Not on the NHFN	This item is used to identify the National Highway Freight Network and to report to Congress on the conditions and performance of the network. This item is also used with other items to classify bridges according to serviceability, safety, and essentiality for public use and considers the potential impacts to emergency evacuation routes and to regional and national freight and passenger mobility if the serviceability of the bridge is restricted or diminished. More information can be found at: *http://www.ops.fhwa.dot.gov/freight/infrastructure/index.htm.*

4.3 – HIGHWAYS

STRAHNET Designation

Format	Frequency	Item ID
AN (1)	I	B.H.05

Specification	Commentary
Report the Strategic Highway Network (STRAHNET) designation for the highway feature reported in Item B.F.01 *(Feature Type)*, using one of the following codes. Code Description 1 STRAHNET route 2 STRAHNET Connector route N Not a STRAHNET route	The STRAHNET is a system of Interstate and primary highways and connectors that provide access to major US military installations and strategic ports, and provides continuity and emergency capabilities for defense purposes. The STRAHNET is determined by the Surface Deployment and Distribution Command (SDDC) in coordination with FHWA. STRAHNET routes and STRAHNET Connector routes can be found on NHS State maps at: *http://www.fhwa.dot.gov/planning/national_highway_system/nhs_maps/*.

4.3 – HIGHWAYS

LRS Route ID

Format	Frequency	Item ID
AN (120)	I	B.H.06

Specification	Commentary
Report the LRS Route ID defined by the State that is reported to the HPMS for the highway feature reported in Item B.F.01 *(Feature Type)*. The LRS Route ID must match the HPMS data exactly. Report N if an LRS Route ID has not been assigned.	The LRS Route ID is not necessarily the same as the route number posted along the highway, but is a number used to uniquely identify a route within a county or a State for GIS analysis and mapping purposes. Refer to the FHWA HPMS Field Manual at *http://www.fhwa.dot.gov/policyinformation/hpms/fieldmanual/*. For border bridges, the Neighboring State reports this item for all highway features carried on the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

4.3 – HIGHWAYS

LRS Mile Point

Format	Frequency	Item ID
N (8,3)	I	B.H.07

Specification	Commentary
Report the LRS mile point for the highway feature reported in Item B.F.01 *(Feature Type)* to the nearest thousandth of a mile. The mile point must be consistent with the LRS route and mile point system for the HPMS. For highway features that carry an LRS route, report the mile point at the beginning of the bridge. When the LRS route passes below the bridge, report the mile point on the LRS route where the bridge is first encountered.	The LRS mile point is used to establish the location of the bridge along the LRS route. If the highway does not carry an LRS route, report the most appropriate mile point. Refer to the FHWA HPMS Field Manual at *http://www.fhwa.dot.gov/policyinformation/hpms/fieldmanual/*. For border bridges, the Neighboring State reports this item for all highway features carried on the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

Examples

LRS Mile Point from HPMS is 130.344. Report 130.344.

LRS Mile Point from HPMS is 9.600. Report 9.600.

The highway does not carry an LRS route. The beginning of the bridge is 0.2 miles past the 34.0 mile marker. Report 34.2.

4.3 – HIGHWAYS

Lanes On Highway

Format	Frequency	Item ID
N (2,0)	I	B.H.08

Specification	Commentary
Report the number of highway traffic lanes for the highway feature reported in Item B.F.01 *(Feature Type)*. Report 1 when a highway is signed or striped for one-lane, but carries two-way traffic. Report 1 for a highway feature carried on the bridge when Item B.G.06 *(Bridge Width Curb-to-Curb)* is less than 16 feet and the bridge is not striped for full width traffic lanes.	For highway features carried on the bridge, include all lanes that are striped or otherwise operated as full width highway traffic lanes and special use lanes (e.g., merge lanes, ramp lanes, and left-turn lanes) - and run the entire length of the bridge. For highway features below the bridge that are not carried on another bridge, include all lanes that are striped or otherwise operated as full width highway traffic lanes and special use lanes (e.g., merge lanes, ramp lanes, and left-turn lanes) that pass below the entire width of the bridge.

Commentary Continued

Do not include pedestrian sidewalks, bike paths, or railroad tracks as lanes, unless the railroad tracks are concurrent with the highway lanes.

For double deck bridges and parallel bridges, report the number of lanes consistent with the highway feature reported in Item B.F.01 *(Feature Type)*.

For sidehill bridges, report the total number of lanes for the highway feature regardless if carried on the bridge or terrain/earth material.

Examples

Highway feature carried on the bridge has one lane. Report 1.

Highway feature carries two-way traffic on unstriped lanes and has a curb-to-curb width of 18 ft. Report 2.

Double deck bridge inventoried as one unique bridge number. Highway feature on top level carries five lanes. Highway feature on lower level carries five lanes.

- Report 5 for the highway feature on the top level.
- Report 5 for the highway feature on the lower level.

4.3 – HIGHWAYS

Annual Average Daily Traffic

Format	Frequency	Item ID
N (8,0)	I	B.H.09

Specification	Commentary
Report the annual average daily traffic (AADT) from the most recent count for the highway feature reported in Item B.F.01 *(Feature Type)*. The AADT must be compatible with the other items reported for the highway feature. Report the design AADT for a newly inventoried highway feature when actual AADT information is not yet available. Report the last open AADT for a highway feature that is temporarily closed until repair or replacement can be completed.	The AADT should be updated at intervals in accordance with the standards for the HPMS and standards/policies within the State. All traffic, including trucks, is counted in the AADT. The number of trucks counted in the AADT is reported in Item B.H.10 *(Annual Average Daily Truck Traffic)*. When HPMS or other planning data are not available, use a best estimate based on site familiarity or functional classification in accordance with State standards and policies.

4.3 – HIGHWAYS

Annual Average Daily Truck Traffic

Format	Frequency	Item ID
N (8,0)	I	B.H.10

Specification	Commentary
Report the Average Annual Daily Truck Traffic (AADTT) from the most recent count for the highway feature reported in Item B.F.01 *(Feature Type)*. The AADTT must be compatible with the other items reported for the highway feature. Report the design AADTT for a newly inventoried highway feature when actual AADTT information is not yet available. Report the last open AADTT for a highway feature that is temporarily closed until repair or replacement can be completed.	The AADTT should be updated at intervals in accordance with the standards for the HPMS and standards/policies within the State. When HPMS or other planning data are not available, use a best estimate based on site familiarity or functional classification in accordance with State standards and policies. Do not include vans, pickup trucks, and other light delivery trucks in the AADTT. The AADTT represents vehicle classes 4-13 as described in FHWA's Traffic Monitoring Guide at: http://www.fhwa.dot.gov/policyinformation/tmguide/.

4.3 – HIGHWAYS

Year of Annual Average Daily Traffic

Format	Frequency	Item ID
N (4,0)	I	B.H.11

Specification	Commentary
Report the year associated with the data reported in Item B.H.09 *(Annual Average Daily Traffic)* for the highway feature reported in Item B.F.01 *(Feature Type)*.	The traffic data should be updated at intervals in accordance with the standards for the HPMS and standards/policies within the State.

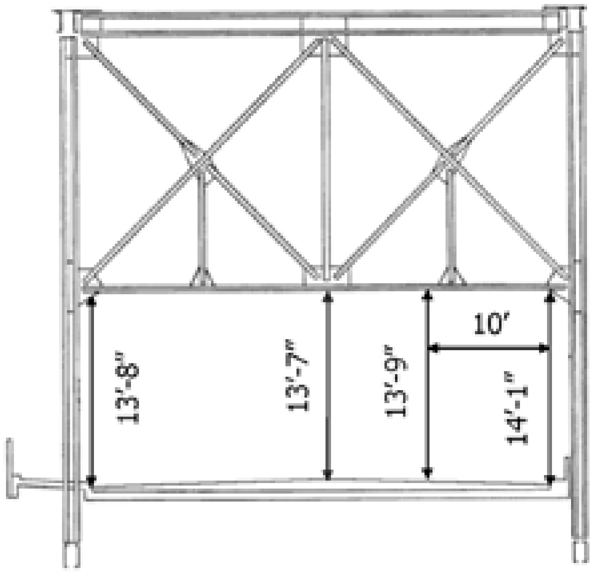
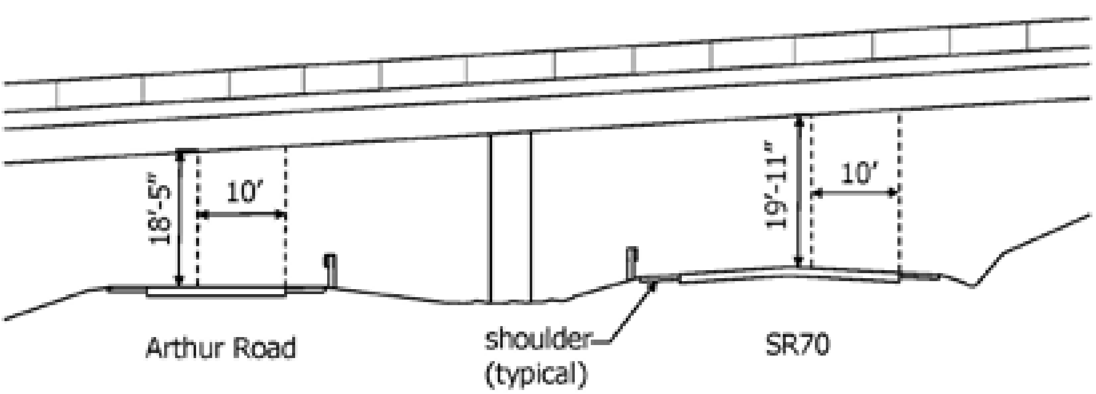
4.3 – HIGHWAYS

Highway Maximum Usable Vertical Clearance

Format	Frequency	Item ID
N (3,1)	EI	B.H.12

Specification	Commentary
Report the minimum vertical clearance for the highway feature reported in Item B.F.01 *(Feature Type),* measured over the 10-foot-wide envelope of the traveled part of the highway, that provides for the maximum usable clearance envelope, rounded down to the nearest tenth of a foot. Measure the vertical clearance plumb from the deck or highway surface to the lowest bridge member restriction, appurtenance (signs, utilities, etc.) attached to the bridge, or other structure. Report 99.9 when the clearance is 100 feet or greater or no restriction exists above the highway.	This item identifies the maximum height of a notional 10-foot wide vehicle that can pass on the highway feature(s) reported in Item B.F.01 *(Feature Type).* This information is sometimes used for preliminary military routing. The data may not represent the absolute minimum clearance over the highway feature. Refer to Item B.H.13 *(Highway Minimum Vertical Clearance)* for the absolute minimum clearance. The traveled part of the highway feature does not include shoulders. These data may be different than the posted vertical clearance due to agency vertical clearance posting policies and procedures. These data are not sufficient for permit routing as the location of the 10-foot-wide envelope that provides for the maximum usable clearance is not reported. For a double decked bridge inventoried as one bridge, report this information for each highway feature on each level of the bridge. Update field measurements when alterations are made to the bridge or highway that affect the previously measured clearance. Reporting this item is optional for highway features below the bridge that do not carry NHS routes as identified in Item B.H.03 *(NHS Designation).* Clearances greater than 30 feet may be estimated.

4.3 – HIGHWAYS

Example – Highway Maximum Usable Vertical Clearance
The bridge has a 13′-9″ maximum usable vertical clearance. Report 13.7.      Figure 81. Cross-section view of through truss bridge showing vertical clearances.
The bridge carries a highway with no vertical clearance restrictions. Report 99.9.   Arthur Road passes below the bridge and has an 18′-5″ maximum usable vertical clearance. SR70 also passes below the bridge and has a 19′-11″ maximum usable vertical clearance.   • Report 18.4 for the Arthur Road highway feature.   • Report 19.9 for the SR70 highway feature.      Figure 82. Elevation view with two separate highway features passing below the bridge.

4.3 – HIGHWAYS

Highway Minimum Vertical Clearance

Format	Frequency	Item ID
N (3,1)	EI	B.H.13

Specification	Commentary
Report the minimum vertical clearance measured over the highway feature reported in Item B.F.01 *(Feature Type)*, rounded down to the nearest tenth of a foot. Measure the vertical clearance plumb from the deck or highway surface (including paved or stabilized shoulders) to the lowest bridge member restriction, appurtenance (signs, utilities, etc.) attached to the bridge, or other structure. Report 99.9 when the clearance is 100 feet or greater or no restriction exists above the highway.	Several measurements may need to be made to determine the minimum vertical clearance. However, only the minimum measurement is reported. Shoulders must be contiguous with the traveled way and must be structurally adequate for all weather and traffic conditions consistent with the facility carried. Unstabilized grass or dirt, with no base course, flush with and beside the traffic lane is not to be considered a shoulder for this item. Refer to agency policy for when and where stabilized shoulders are used. When it is not readily known if stabilized construction details were used, the presence of rutting, heaving, water retention, or other distress may be used as indicators that the shoulder is not stabilized. These data may be different than the posted vertical clearance due to agency vertical clearance posting policies and procedures. Update field measurements when alterations are made to the bridge or highway that affect the previously measured clearance. Clearances greater than 30 feet may be estimated.

4.3 – HIGHWAYS

Examples – Highway Minimum Vertical Clearance

The bridge has a 13'-7" minimum vertical clearance. Report 13.5.

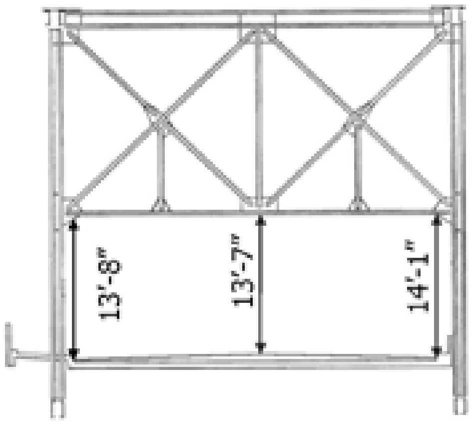


Figure 83. Cross-section view of a through truss bridge showing minimum vertical clearance.

The bridge carries a highway with no vertical clearance restrictions. Report 99.9.

Two highway features below the bridge. Arthur Road passes below the bridge and has an 18'-3" minimum vertical clearance. SR70 also passes below the bridge and has a 19'-9" minimum vertical clearance.

- Report 18.2 for the Arthur Road highway feature.
- Report 19.7 for the SR70 highway feature.

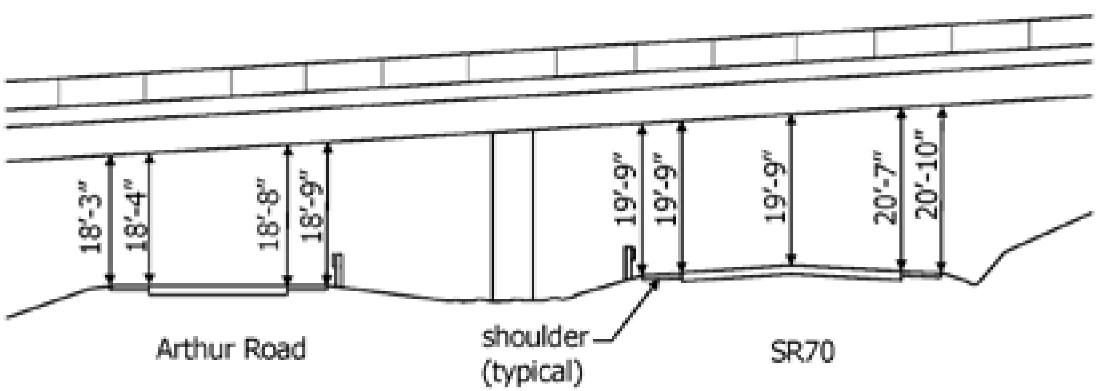


Figure 84. Elevation view with two separate highway features passing below the bridge.

4.3 – HIGHWAYS

Highway Minimum Horizontal Clearance, Left

Format	Frequency	Item ID
N (3,1)	I	B.H.14

Specification	Commentary
Report the minimum horizontal clearance on the left, for the highway feature reported in Item B.F.01 *(Feature Type)*, rounded down to the nearest tenth of a foot. Measure from the left edge line of the highway (excluding shoulders, turn lanes, acceleration, or deceleration lanes) in the direction of travel to the nearest substructure unit, rigid barrier, oncoming traffic lane, or toe of slope that is steeper than 1 to 3 (vertical to horizontal). Report 99.9 when the clearance is 100 feet or greater. Report 0 when the highway is a two-way highway that is not divided at the bridge. Do not report this item for highway feature(s) carried on the bridge.	This item provides data for the highway feature(s) reported in Item B.F.01 *(Feature Type)* that pass below the bridge. Highways undivided at the bridge are reported as 0 due to the adjacent oncoming traffic lane which provides no horizontal clearance to the left. Reinforced concrete and masonry traffic safety features are considered rigid barriers; metal and timber railings are not considered rigid barriers. Clearances greater than 30 feet may be estimated.

Examples

Highway feature below the bridge carries 1-way traffic, looking in the direction of travel. Report 20.0.

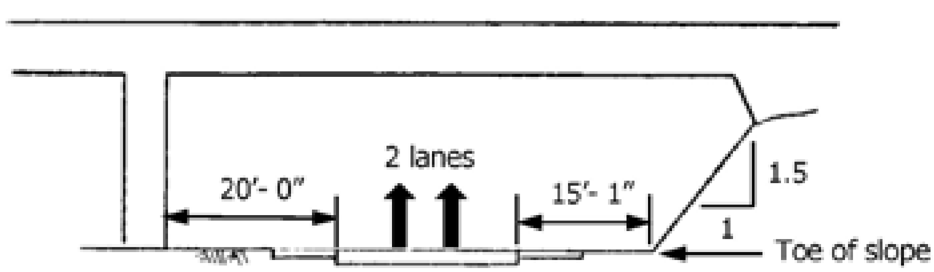


Figure 85. Bridge elevation view of horizontal clearances for a 2-lane highway with 1-way traffic below the bridge.

4.3 – HIGHWAYS

Examples Continued – Highway Minimum Horizontal Clearance, Left

Highway feature below the bridge carries two-way traffic. Report 0.

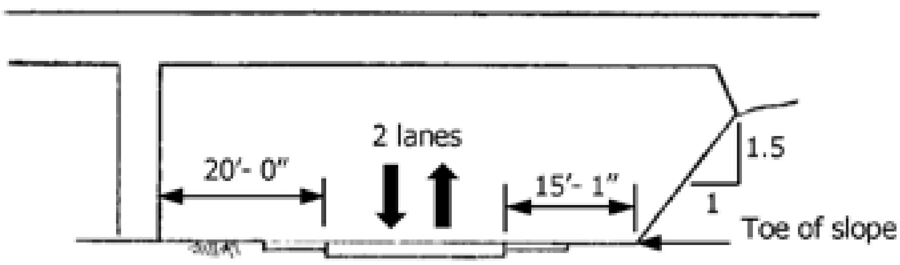


Figure 86. Bridge elevation view of horizontal clearances for a 2-lane highway with 2-way traffic below the bridge.

Two highway features below the bridge for a highway that is divided at the bridge. One highway feature carries 1-way traffic southbound and one carries 1-way traffic northbound.

- Report 18.0 for the southbound highway feature.
- Report 19.0 for the northbound highway feature.

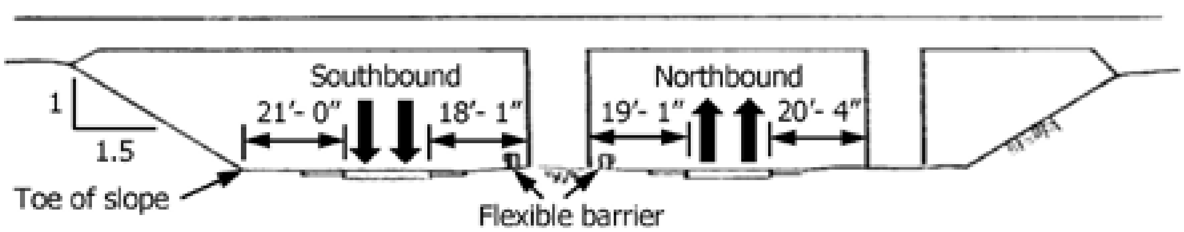


Figure 87. Bridge elevation view of horizontal clearances for separate southbound and northbound highway features below the bridge, with flexible barriers.

Two highway features below the bridge for a highway that is divided at the bridge. One highway feature carries 1-way traffic eastbound and one carries 1-way traffic westbound.

- Report 35.5 for the eastbound highway feature.
- Report 35.5 for the westbound highway feature.

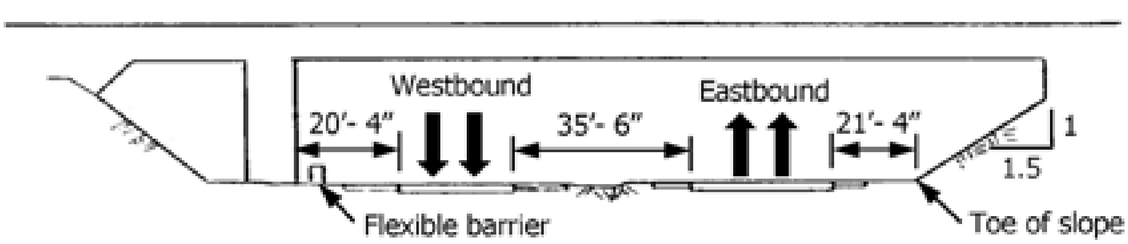


Figure 88. Bridge elevation view of horizontal clearances for separate westbound and eastbound highway features below the bridge, with flexible barrier.

Examples Continued – Highway Minimum Horizontal Clearance, Left

Highway feature below the bridge carries 1-way ramp traffic, looking in the direction of travel. Report 14.5.

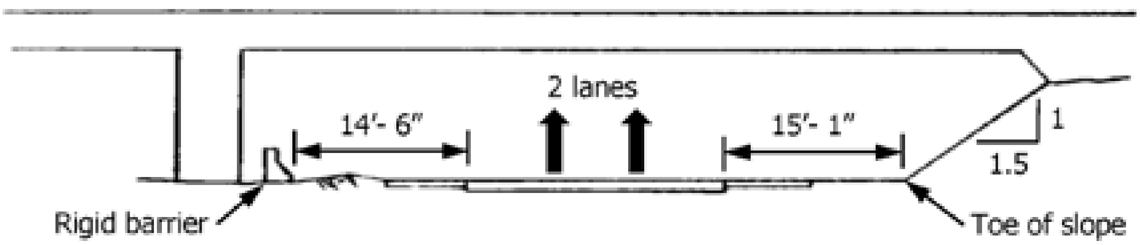


Figure 89. Bridge elevation view of horizontal clearances for a 2-lane, 1-way highway feature below the bridge, with a rigid barrier.

Highway feature below the bridge carries 1-way mainline traffic and 1-way ramp traffic, looking in the direction of travel. Report 20.0.

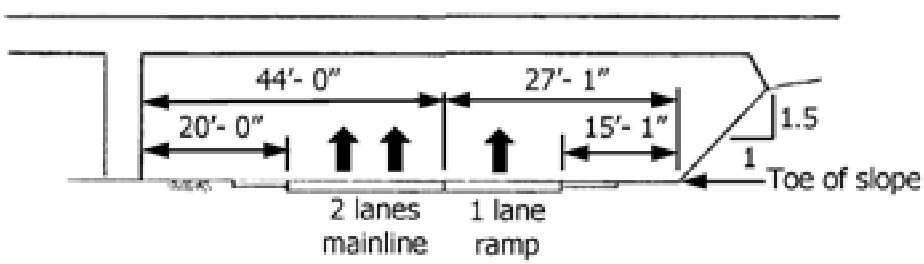


Figure 90. Bridge elevation view of horizontal clearances for a highway feature below the bridge carrying mainline and ramp.

4.3 – HIGHWAYS

Highway Minimum Horizontal Clearance, Right

Format	Frequency	Item ID
N (3,1)	I	B.H.15

Specification	Commentary
Report the minimum horizontal clearance on the right, for the highway feature below the bridge reported in Item B.F.01 *(Feature Type)*, rounded down to the nearest tenth of a foot. Measure from the right edge line of the highway (excluding shoulders, turn lanes, acceleration, or deceleration lanes) in the direction of travel to the nearest substructure unit, rigid barrier, oncoming traffic lane or toe of slope that is steeper than 1 to 3 (vertical to horizontal). Report 99.9 when the clearances are 100 feet or greater. Do not report this item for highway feature(s) carried on the bridge.	This item provides data for the highway feature(s) reported in Item B.F.01 *(Feature Type)* that pass below the bridge. Reinforced concrete and masonry traffic safety features are considered rigid barriers; metal and timber railings are not considered rigid barriers. Clearances greater than 30 feet may be estimated.

Examples

Highway feature below the bridge carries 1-way traffic, looking in the direction of travel. Report 15.0.

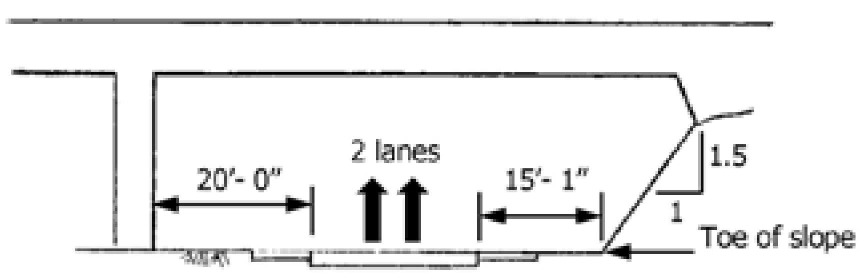


Figure 91. Bridge elevation view of horizontal clearances for a 2-lane highway feature with 1-way traffic below the bridge.

4.3 – HIGHWAYS

Examples Continued – Highway Minimum Horizontal Clearance, Right

Highway feature below the bridge carries two-way traffic. Report 15.0.

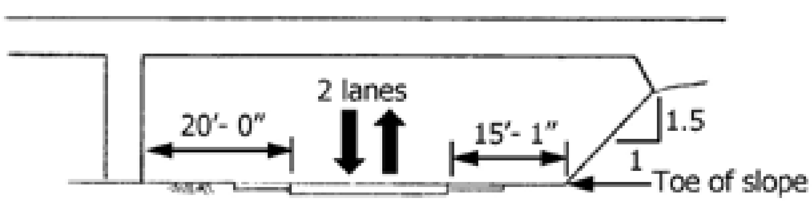


Figure 92. Bridge elevation view of horizontal clearances for a 2-lane highway feature with 2-way traffic below the bridge.

Two highway features below the bridge for a highway that is divided at the bridge. One highway feature carries 1-way traffic southbound and one carries 1-way traffic northbound.

- Report 21.0 for the southbound highway feature.
- Report 20.3 for the northbound highway feature.

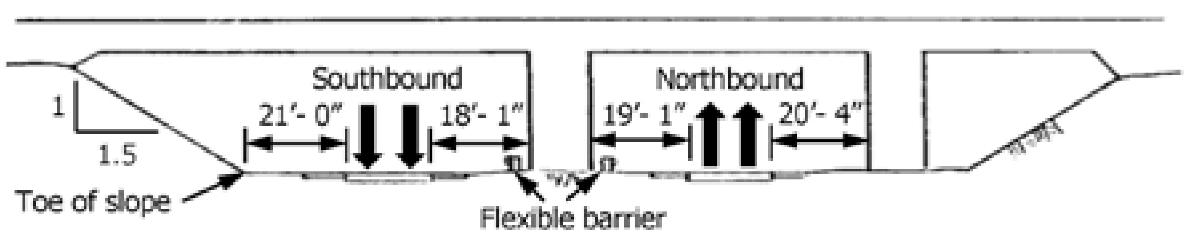


Figure 93. Bridge elevation view of horizontal clearances for separate southbound and northbound highway features below the bridge, with flexible barriers.

Two highway features below the bridge for a highway that is divided at the bridge. One highway feature carries 1-way traffic eastbound and one carries 1-way traffic westbound.

- Report 21.3 for the eastbound highway feature.
- Report 20.3 for the westbound highway feature.

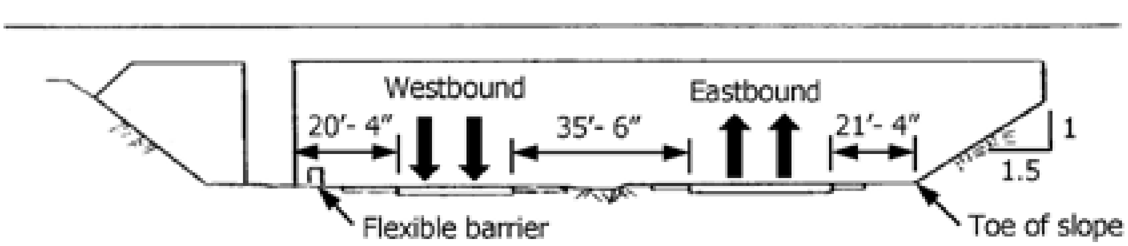


Figure 94. Bridge elevation view of horizontal clearances for separate westbound and eastbound highway features below the bridge, with a flexible barrier.

4.3 – HIGHWAYS

Examples Continued – Highway Minimum Horizontal Clearance, Right

Highway feature below the bridge carries 1-way ramp traffic, looking in the direction of travel. Report 15.0.

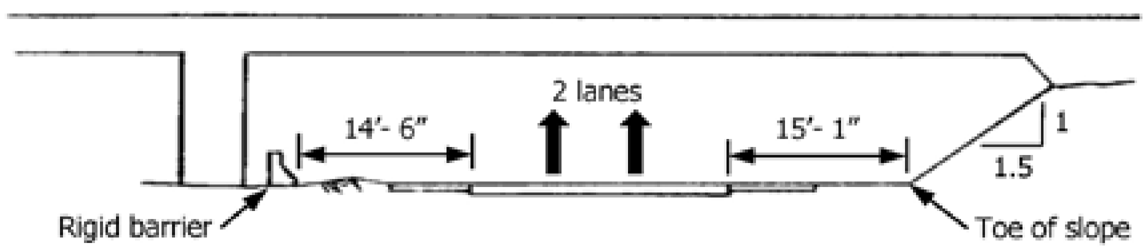


Figure 95. Bridge elevation view of horizontal clearances for a 2-lane, 1-way highway feature below the bridge, with a rigid barrier.

Highway feature below the bridge carries 2-way traffic. Report 14.5.

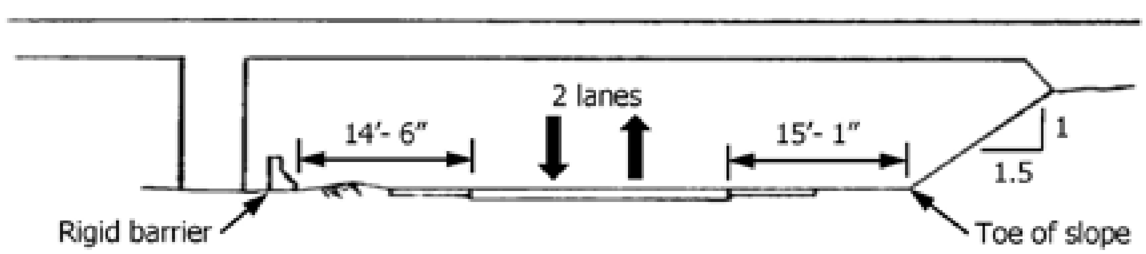


Figure 96. Bridge elevation view of a 2-lane, 2-way highway feature below the bridge, with a rigid barrier.

Highway feature below the bridge carries 1-way mainline traffic and 1-way ramp traffic, looking in the direction of travel. Report 15.0.

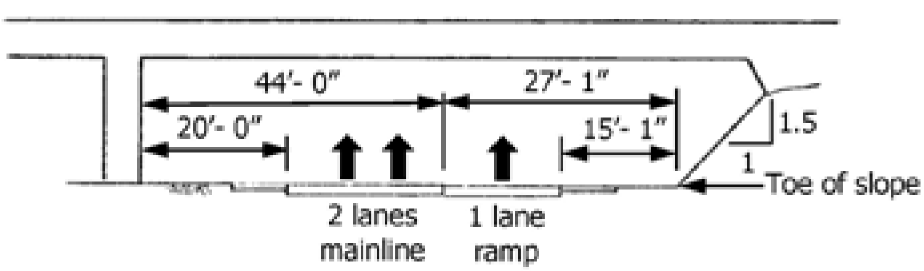


Figure 97. Bridge elevation view of horizontal clearances for highway feature carrying mainline and ramp traffic below the bridge.

4.3 – HIGHWAYS

Highway Maximum Usable Surface Width

Format	Frequency	Item ID
N (3,1)	I	B.H.16

Specification	Commentary
Report the maximum usable surface width for the highway feature reported in Item B.F.01 *(Feature Type)* that passes below or is carried on the bridge, rounded down to the nearest tenth of a foot. Measure the width perpendicular to the centerline of the highway (including paved or stabilized shoulders). Report 99.9 when the surface width is 100 feet or greater.	Shoulders are included when they are contiguous with the traveled way and structurally adequate for all weather and traffic conditions consistent with the facility carried. Unstabilized grass or dirt, with no base course, flush with and beside the traffic lane is not considered a shoulder for this item. Refer to agency policy for when and where stabilized shoulders are used. When it is not readily known if stabilized construction details were used, the presence of rutting, heaving, water retention, or other distress may be used as indicators that the shoulder is not stabilized.

Commentary Continued

Flush (striped) and mountable medians are not considered restrictions.

A curb greater than 6 inches high may be considered non-mountable for these specifications.

Use the least restrictive configuration when movable rigid barriers are used to accommodate reversible lanes for non-construction-related applications.

Reporting this item is optional for highway features below the bridge that do not carry NHS routes as identified in Item B.H.03 *(NHS Designation)*.

Examples

Two highway features below the bridge. One highway feature carries eastbound traffic and one carries westbound traffic.

- Report 34.6 for the eastbound highway feature.
- Report 42.4 for the westbound highway feature.

Figure 98. Bridge elevation view of two separate highway features below the bridge.

4.3 – HIGHWAYS

Examples Continued – Highway Maximum Usable Surface Width
One highway feature carried on the bridge. Highway feature carries 2-way traffic that is not divided at the bridge. Report measurement A.

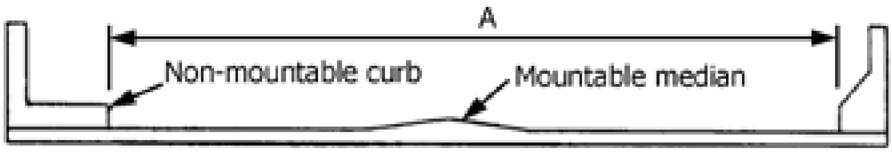


Figure 99. Cross-section view of a highway feature carried on the bridge with a mountable median.

Two highway features carried on the bridge. Highway 1 (H01) and Highway 2 (H02) are divided at the bridge by the non-mountable median.

- Report measurment A for H01.
- Report measurement B for H02.

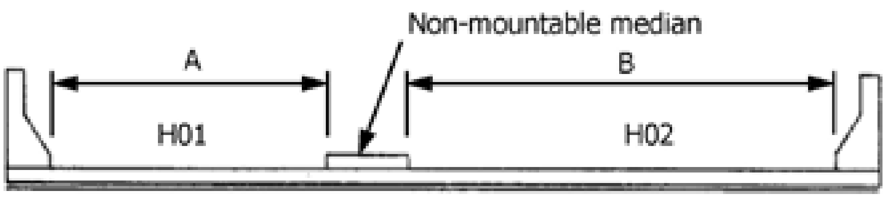


Figure 100. Cross-section view of two highway features carried on the bridge with a non-mountable median.

Two highway features carried on the pipe culvert under fill. Highway 1 (H01) and Highway 2 (H02) are divided at the bridge.

- Report measurement A for H01.
- Report measurement B for H02.

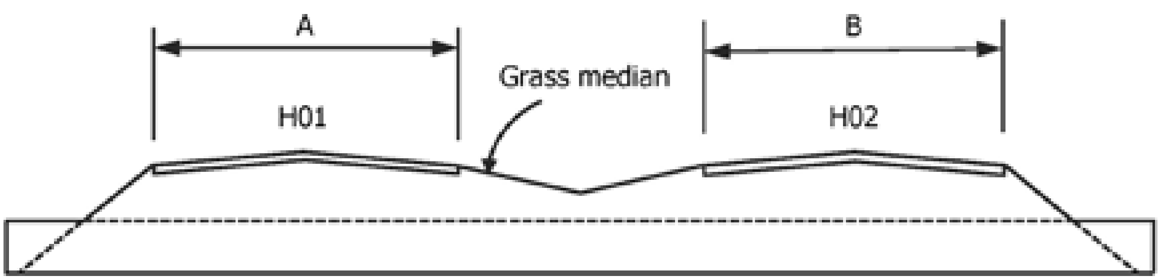


Figure 101. Cross-section view of two highway features carried on the pipe culvert under fill with a grass median.

4.3 – HIGHWAYS

Bypass Detour Length

Format	Frequency	Item ID
N (3,0)	I	B.H.17

Specification	Commentary
Report the length to the nearest mile of the total additional travel for a vehicle to bypass the bridge for the highway feature reported in Item B.F.01 *(Feature Type)*, that passes below or is carried on the bridge. Report 999 where a detour does not exist. Report 0 for available ground level bypass. Report 1 when the highway feature is carried by a bridge, is not at an interchange, and a parallel bridge can be used as a temporary bypass with a reasonable amount of crossover grading.	Determine bypass detour length by evaluating the potential to move traffic, including military vehicles and trucks, around bridges. • Avoid detour routes that have load, height, or capacity limitations unacceptable for the additional traffic detoured onto them. • Consider using the parallel bridge of dual bridges or temporary culverts if emergency detours can be constructed with a reasonable amount of grading within the existing right-of-way. • Consider using ramps and/or frontage roads in interchanges. • Review plans for strategic bridge detour routes.

Examples

Diamond interchange. Bridge can be bypassed. Report 0.

Cloverleaf. Bridge cannot be bypassed; 18-mile detour. Report 18.

Highway feature carried on the bridge with a 4-mile detour *(Figure 102)*. Report 4.

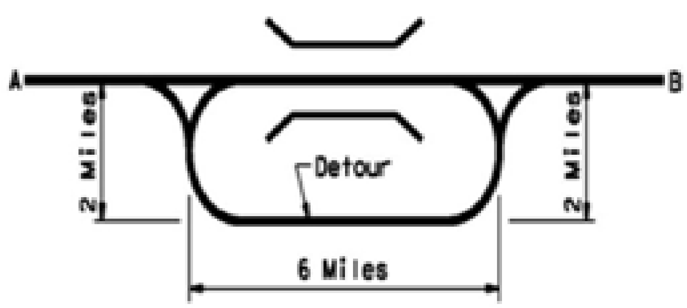
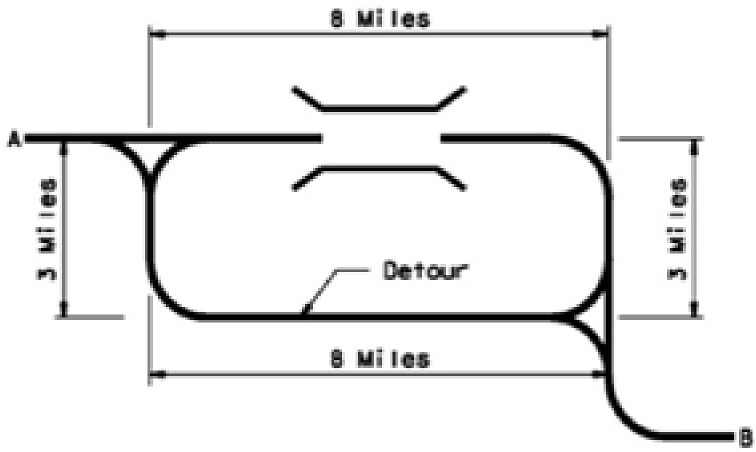


Figure 102. Detour map for a highway feature carried on the bridge.

4.3 – HIGHWAYS

Examples Continued – Bypass Detour Length
Highway feature passes below the bridge with a 0-mile detour *(Figure 103)*. Report 0.  Figure 103. Detour map for a highway feature that passes below the bridge.

4.3 – HIGHWAYS

Crossing Bridge Number

Format	Frequency	Item ID
AN (15)	I	B.H.18

Specification	Commentary
Report the exact bridge number(s) as assigned in Item B.ID.01 *(Bridge Number)* for the bridge carrying a highway feature that is located directly above or below the inventoried highway bridge. Do not report this item when the highway bridge does not pass above or below another bridge, or passes above or below a bridge that is not reportable to the NBI.	The intent of this item is to capture the bridge number for bridges of a multi-level interchange, where bridges pass directly above or below other bridges. For border bridges, the Neighboring State reports this item for all highway features that pass above the bridge, as part of their abbreviated bridge record. For more information, see the Border Bridges section of this document.

Example

The inventoried bridge number 300000B-X636010 passes above bridge number 300000B-X638012 and passes below 300000B-X635010 and 30000B-X634010.

- Report 300000B-X638012 for the bridge below.
- Report 300000B-X635010 for the bridge above.
- Report 300000B-X634010 for the other bridge above.

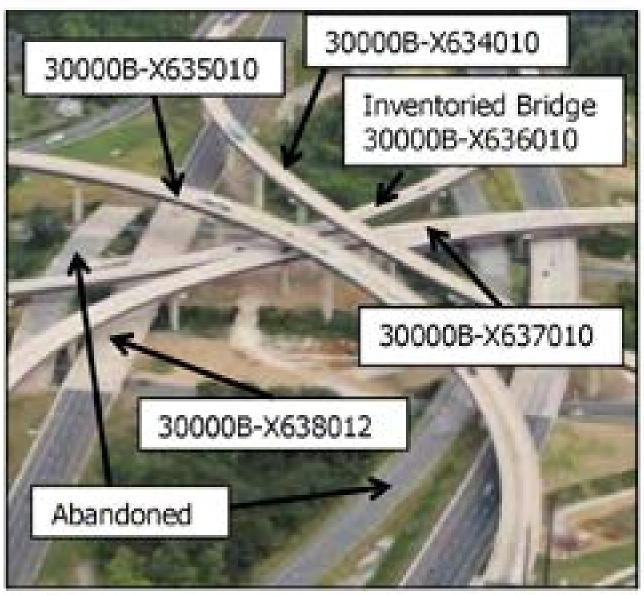


Figure 104. Multi-level interchange with bridges passing above and below other bridges. (Source: Maryland Transportation Authority)

4.4 – RAILROADS

Railroad Service Type

Format	Frequency	Item ID
AN (2)	I	B.RR.01

Specification	Commentary
Report the designated railroad service type for the railroad feature reported in Item B.F.01 *(Feature Type)* using one of the following codes. Code Description F Freight FE Freight - electrified P Passenger PE Passenger - electrified M Multiple services - not electrified ME Multiple services - electrified I Inactive	Electrified is intended for electricity-powered rail lines and third-rails, but not for battery or fuel cell powered lines. Use code M when multiple rail services (such as freight and passenger rail) use the same tracks and both services are not electrified. Use code ME when multiple rail services (such as freight and passenger rail) use the same tracks, and at least one is electrified.

Examples

The bridge carries two highway features separated by two electrified passenger rail tracks (i.e. one railroad feature). Two railroad tracks pass below the bridge that both carry freight (i.e. one railroad feature).

- Report PE for the railroad feature carried on the bridge.
- Report F for the railroad feature below the bridge.

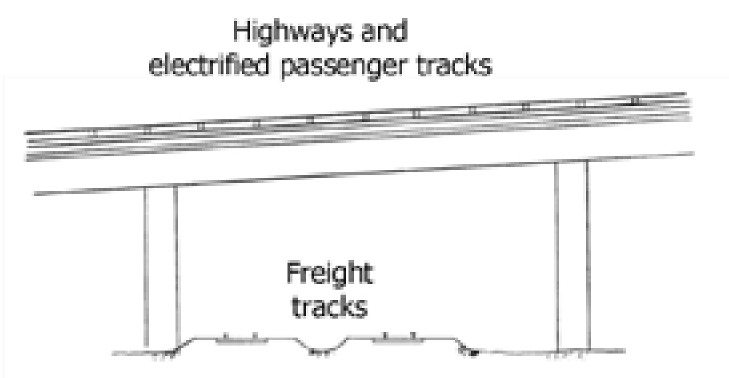


Figure 105. Bridge elevation view with two electrified passenger rail tracks carried on the bridge and two freight rail tracks below the bridge.

4.4 – RAILROADS

Examples Continued – Railroad Service Type

Two railroad tracks below the bridge. One carries passenger rail service and one carries freight (i.e. two railroad features).

- Report P for the passenger rail feature.
- Report F for the freight rail feature.

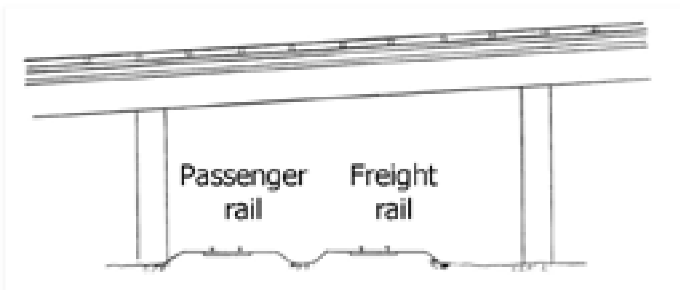


Figure 106. Bridge elevation view with one passenger rail and one freight rail track below the bridge.

Two railroad tracks below the bridge that both carry freight and passenger service (i.e. one railroad feature). Report M.

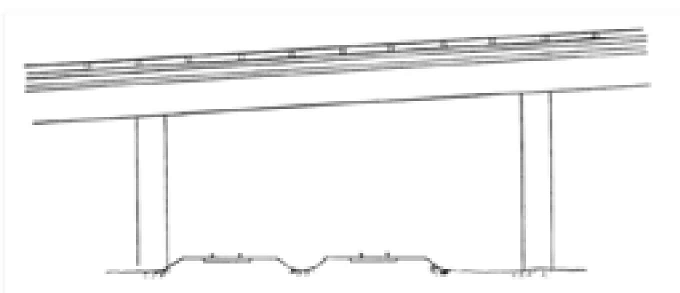


Figure 107. Bridge elevation view with two freight/passenger rail tracks below the bridge.

Two railroad tracks below the bridge. One carries electrified passenger service and one carries non-electrfied passenger service (i.e. two railroad features).

- Report PE for the electrified passenger rail feature.
- Report P for the non-electrified passenger rail feature.

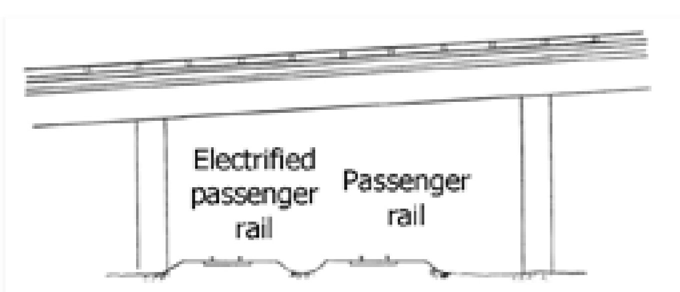


Figure 108. Bridge elevation view with an electrified passenger rail track and a non-electrified passenger rail track below the bridge.

4.4 – RAILROADS

<table>
<tr><th colspan="6">Railroad Minimum Vertical Clearance</th></tr>
<tr><td colspan="2"><u>Format</u>
N (3,1)</td><td colspan="2"><u>Frequency</u>
EI</td><td colspan="2"><u>Item ID</u>
B.RR.02</td></tr>
<tr><td colspan="3">Specification</td><td colspan="3">Commentary</td></tr>
<tr><td colspan="3">Report the minimum vertical clearance for the railroad feature reported in Item B.F.01 (Feature Type), rounded down to the nearest tenth of a foot.

Measure plumb from the top of rails to the lowest bridge restriction or appurtenance (signs, utilities, etc.) attached to the bridge. Appurtenances attached to the bridge that serve only a railroad purpose, such as catenary systems, are excluded from the measurement and do not reduce the vertical clearance measurement.

Report 99.9 when the clearance is 100 feet or greater.

Report this item only when Item B.F.02 (Feature Location) is B.</td><td colspan="3">Several measurements may need to be made to determine the minimum vertical clearance for each railroad feature when one or more railroad tracks pass below the bridge. However, only the minimum measurement is reported.

Update measurements when alterations are made to the bridge or railroad tracks that affect the previously measured clearance.

Clearances greater than 30 feet may be estimated.</td></tr>
<tr><td colspan="6">Examples</td></tr>
<tr><td colspan="6">Two railroad tracks below the bridge that both carry freight and passenger service (i.e. one railroad feature). Report 31.2.

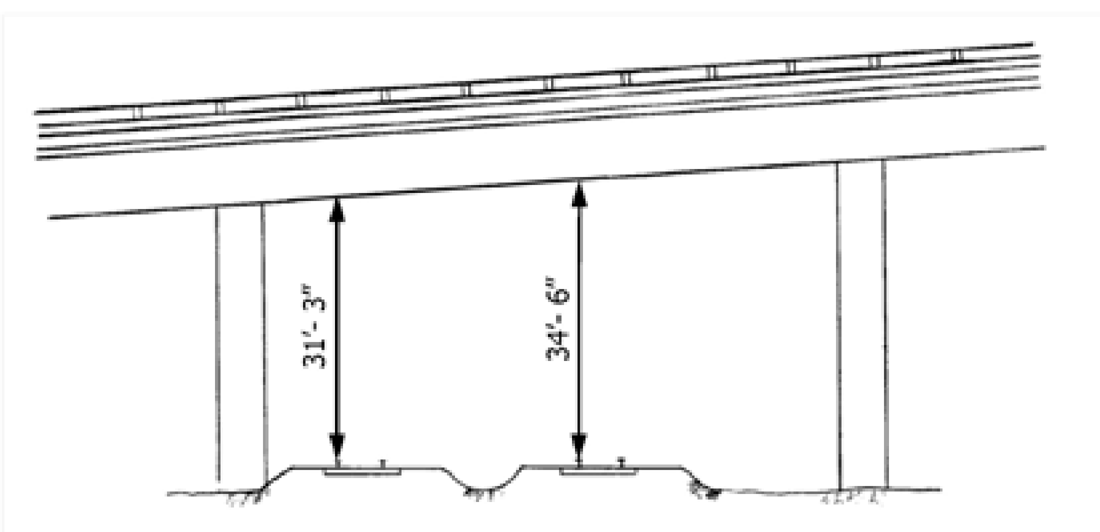


Figure 109. Bridge elevation view with two freight/passenger rail tracks below the bridge.</td></tr>
</table>

4.4 – RAILROADS

Examples Continued – Railroad Minimum Vertical Clearance

Two railroad tracks below the bridge. One carries passenger rail service, and one carries freight (i.e. two railroad features).

- Report 20.2 for the passenger rail feature.
- Report 21.2 for the freight rail feature.

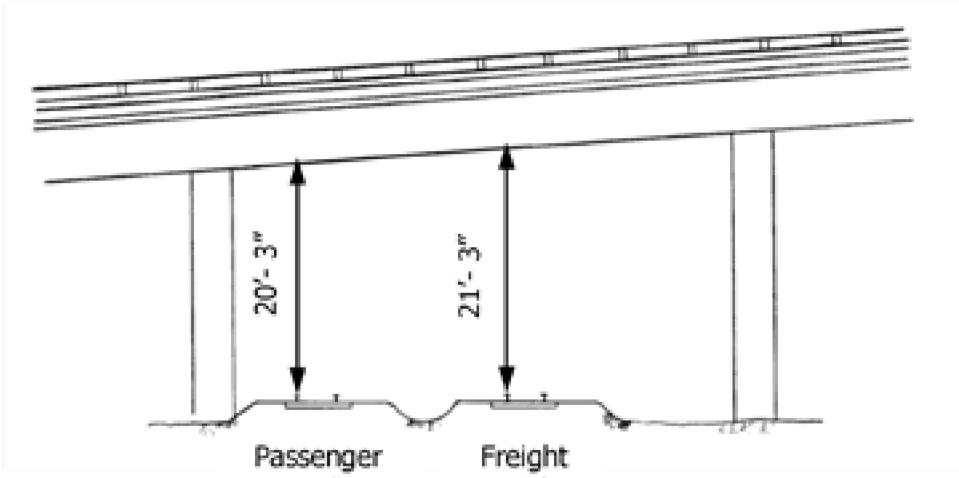


Figure 110. Bridge elevation view with one passenger rail and one freight rail track below the bridge.

4.4 – RAILROADS

Railroad Minimum Horizontal Offset

Format	Frequency	Item ID
N (3,1)	I	B.RR.03

Specification	Commentary
Report the minimum horizontal offset for the railroad feature reported in Item B.F.01 *(Feature Type)*, rounded down to the nearest tenth of a foot. Measure perpendicular from the centerline of the tracks to the nearest substructure unit or toe of slope that is steeper than 1 to 3 (vertical to horizontal). For multiple tracks with the same railroad service type, report the minimum distance after measuring the offsets in both directions from all tracks. Report 99.9 when the minimum horizontal offset is 100 feet or greater. Report this item only when Item B.F.02 *(Feature Location)* is B.	The intent of this item is to collect the minimum distance from the centerline of the railroad track to a bridge related obstruction. Offsets greater than 30 feet may be estimated.

Examples

One railroad track below the bridge. Report 20.3.

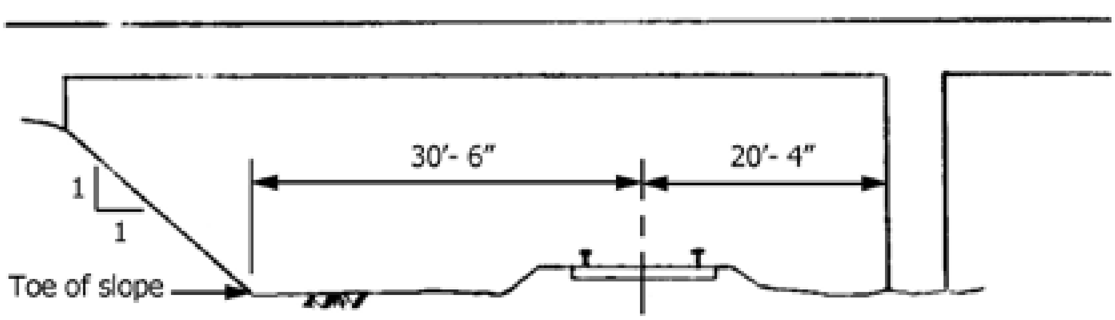


Figure 111. Bridge elevation view indicating horizontal offset for one railroad track below the bridge.

4.4 – RAILROADS

Examples Continued – Railroad Minimum Horizontal Offset
Two railroad tracks that both carry freight (i.e. one railroad feature). Report 18.5.

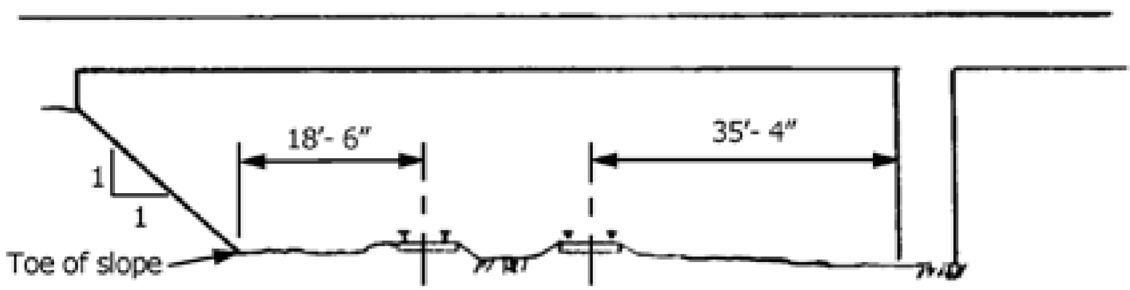


Figure 112. Bridge elevation view indicating horizontal offset for two railroad tracks below the bridge.

4.5 - NAVIGABLE WATERWAYS

Navigable Waterway

Format	Frequency	Item ID
AN (1)	I	B.N.01

Specification	Commentary
Report whether the waterway feature reported in Item B.F.01 *(Feature Type)* is considered navigable waters of the United States using one of the following codes. Code – Description N – Not navigable waters Y – Navigable waters U – Navigable waters designation is undetermined	This item identifies bridges over navigable waters where the United States Coast Guard may exercise jurisdiction, as defined in 33 CFR, Part 2. This information helps identify bridges at risk from vessel collision and bridges where a Coast Guard permit may be required for modifications to the structure. Information helpful in coding this item may be found in design and construction documentation or prior correspondence with the Coast Guard. Navigable waterways are determined by the Commandant of the United States Coast Guard per Title 33 of the Code of Federal Regulations, Section 2.36.

4.5 - NAVIGABLE WATERWAYS

Navigation Minimum Vertical Clearance

Format	Frequency	Item ID
N (4,1)	I	B.N.02

Specification

Report the minimum vertical clearance over the waterway feature reported in Item B.F.01 *(Feature Type)*, rounded down to the nearest tenth of a foot.

The reported clearance is from the highest datum plane referenced in the approved permit plans to the lowest superstructure restriction or other appurtenances attached to the bridge over the designated navigation channel.

For all movable bridges, the vertical clearance reported for this item is for the bridge in the closed position (i.e., open to vehicular traffic).

Report the most restrictive clearance when there are multiple designated navigation channels.

Report this item only when Item B.N.01 *(Navigable Waterway)* is Y.

Commentary

Reference datum, designated navigation channels, and vertical clearances can be found on permit plans approved by the United States Coast Guard.

When permit plans are not available, values can be established from field measurements obtained for known navigation channels and the most restrictive clearance recorded. Reference field measurements to the following datum:

Crossing Type	Datum
Tidal waters	Mean High Water
Non-tidal waters	Extreme High Water
River	Q50 Surface Elevation

Examples

Permit plans for a bridge over tidal waters with the navigation channel designated by cross-hatched area. Permit plans set the datum at mean higher-high water (M.H.H.W.) instead of mean high water. Report 50.0.

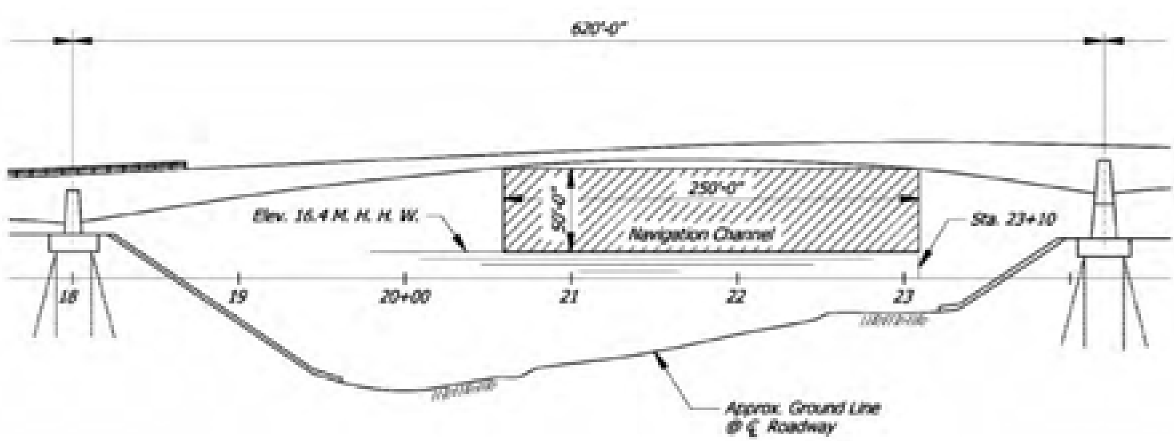


Figure 115. Bridge elevation view indicating navigation channel and vertical clearance. (Source: Alaska DOT)

4.5 - NAVIGABLE WATERWAYS

Examples Continued - Navigation Minimum Vertical Clearance

Permit plans for a bridge over tidal waters with multiple designated navigation channels. Permit plans set the datum at mean higher-high water (M.H.H.W.) instead of mean high water. Report 23.1.

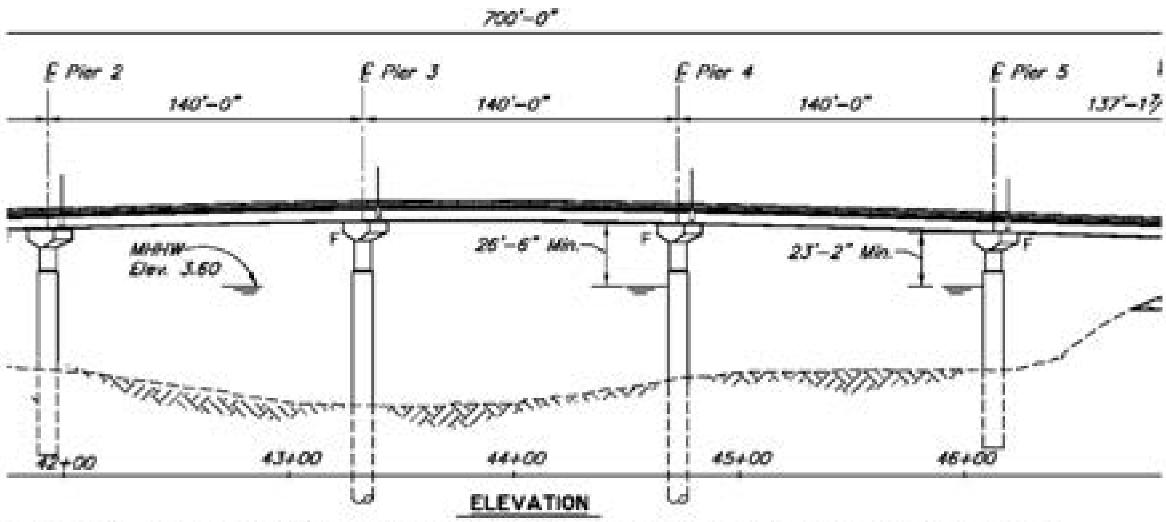


Figure 116. Bridge elevation view indicating multiple navigation channels and vertical clearances. (Source: Alaska DOT)

Vertical lift bridge. Information taken from "As-Built" plans as no permit plans are available. Mean High Water elevation is 3.2 ft. Minimum vertical underclearance is 12 ft – 3.2 ft = 8.8 ft. Report 8.8.

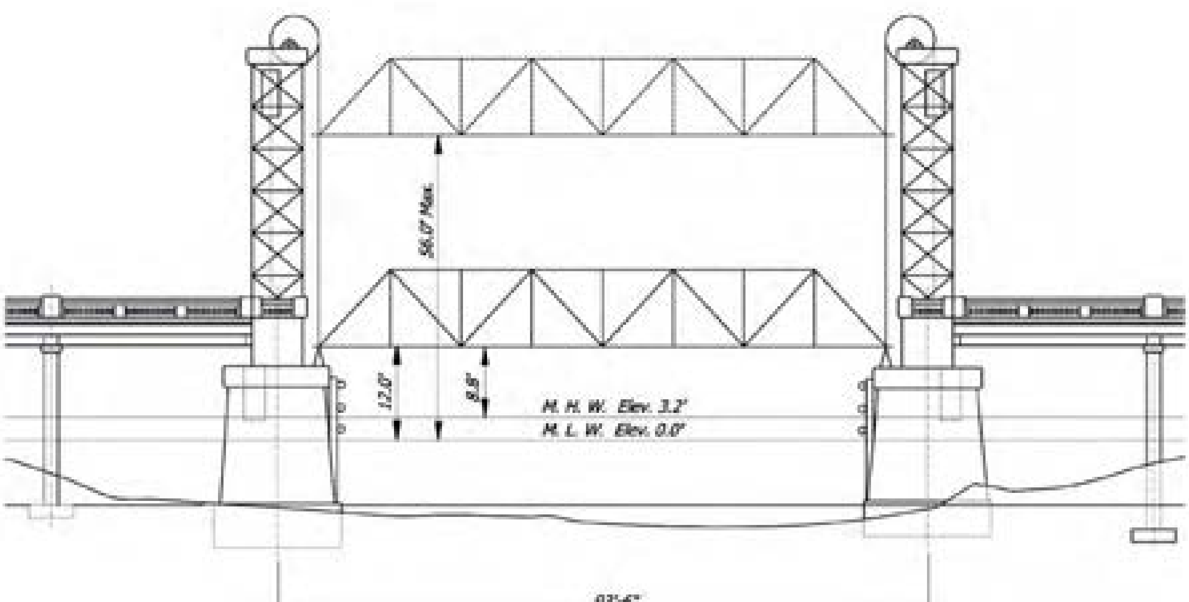


Figure 117. Bridge elevation view for a vertical lift bridge indicating vertical clearances. (Source: Florida DOT)

4.5 - NAVIGABLE WATERWAYS

Movable Bridge Maximum Navigation Vertical Clearance

Format	Frequency	Item ID
N (4,1)	I	B.N.03

Specification	Commentary
Report the maximum vertical clearance over the waterway feature reported in Item B.F.01 *(Feature Type)*, rounded down to the nearest tenth of a foot. The reported clearance is from the highest datum plane referenced in the approved permit plans to the lowest superstructure restriction or other appurtenances attached to the bridge over the designated navigation channel, when the movable bridge is in the open position. Report 999.9 when the bridge provides unlimited vertical clearance over the navigation channel in the open position. Report this item only when Item B.N.01 *(Navigable Waterway)* is Y and Item B.SP.06 *(Span Type)* begins with M, indicating that the span type is movable.	The value reported for this item is particularly useful for vertical lift bridges and for bascule bridges where the leaf (or leaves) does not provide unlimited vertical clearance over the designated navigation channel in the open position. When permit plans are not available, values can be obtained from field measurements. Reference field measurements to the following datum: Crossing Type — Datum Tidal waters — Mean High Water Non-tidal waters — Extreme High Water River — Q50 Surface Elevation

Example

Vertical lift bridge. Information taken from "As-Built" plans as no permit plans are available. Mean High Water elevation is 3.2 ft. Maximum vertical underclearance is 56 ft – 3.2 ft = 52.8 ft. Report 52.8.

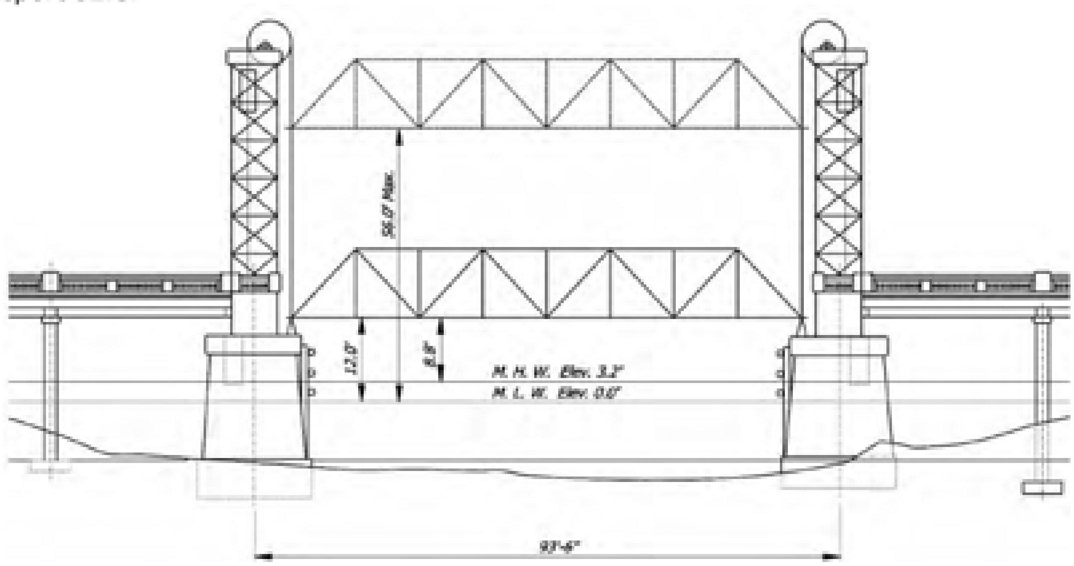


Figure 118. Bridge elevation view for a vertical lift bridge indicating vertical clearances. (Source: Florida DOT)

4.5 - NAVIGABLE WATERWAYS

Navigation Channel Width

Format	Frequency	Item ID
N (5,1)	I	B.N.04

Specification	Commentary
Report the navigation channel width for the waterway feature reported in Item B.F.01 *(Feature Type)*, rounded down to the nearest tenth of a foot. The width is as shown on the approved permit plans, or field measured when the navigation channel changes or is unmarked. For field measurements, measure the horizontal distance perpendicular to the centerline of the navigation channel. For marked channels measure between the markers designating the limits of the channel at the bridge. For unmarked channels, measure the minimum clear distance between fenders or piers. If multiple channels exist, report the most restrictive. Report this item only when Item B.N.01 *(Navigable Waterway)* is Y.	The width provided here should be consistent with the navigation channel used in the navigation vertical clearance items. The designated navigation channel width may be less than the distance between substructure units.

Examples

Permit plans for a bridge over tidal waters with the navigation channel designated by cross-hatched area. Report 250.0.

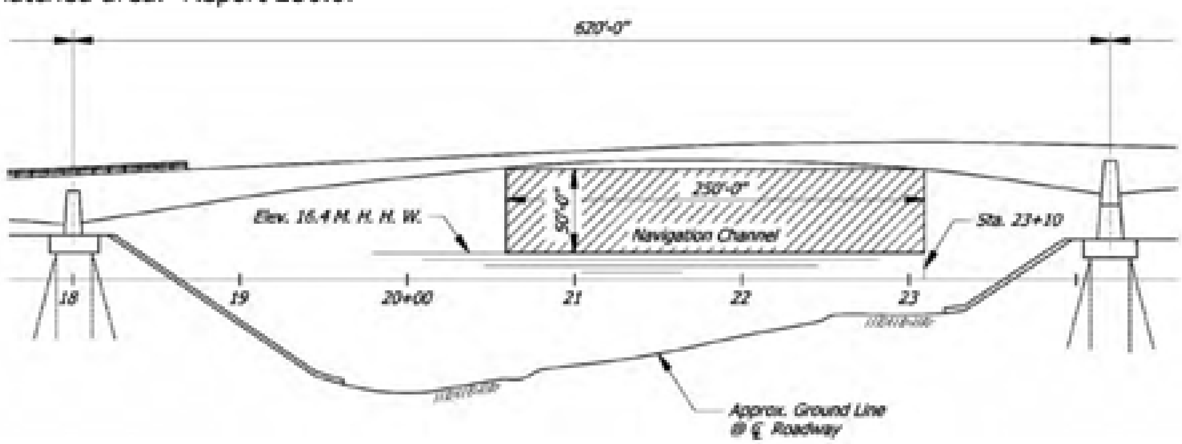


Figure 119. Bridge elevation view indicating navigation channel width dimensions. (Source: Alaska DOT)

4.5 - NAVIGABLE WATERWAYS

Examples Continued - Navigation Channel Width

Bridge with multiple designated navigation channels bounded by piers. Report 126.5.

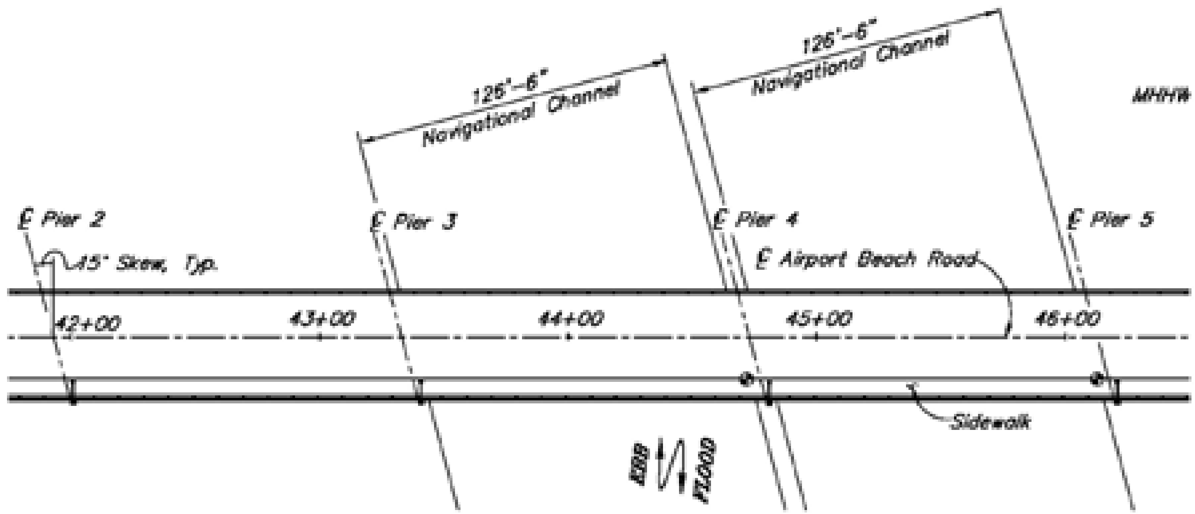


Figure 120. Bridge plan view indicating navigation channel width dimensions. (Source: Alaska DOT)

4.5 - NAVIGABLE WATERWAYS

Navigation Channel Minimum Horizontal Clearance		
Format N (5,1)	Frequency I	Item ID B.N.05

Specification	Commentary
Report the minimum horizontal clearance for the waterway feature reported in Item B.F.01 *(Feature Type)*, rounded down to the nearest tenth of a foot. The clearance is the minimum distance from either edge of the navigation channel shown on the approved permit plans, to the face of the nearest bridge substructure unit located within the waterway. The clearance may be field measured when the placement of navigation markers at the bridge is inconsistent with the permit plans, or if the presence of navigation markers indicates a navigation channel and no permit plans are available. For field measurements, measure the horizontal distance perpendicular to the centerline of the navigation channel from the markers designating the limits of the channel at the bridge, to the face of the nearest bridge substructure unit located within the waterway. Report 0 when substructure units in the waterway are the boundaries for the navigation channel. Report 9999.9 when no substructure unit is within the waterway. Report this item only when Item B.N.01 *(Navigable Waterway)* is Y.	The intent of this item is to collect the most restrictive distance from the edge of the navigational channel to a bridge substructure to assess risk for vessel collision. The clearance provided here should be consistent with the navigation channel used in Item B.N.04 *(Navigation Channel Width)*.

4.5 - NAVIGABLE WATERWAYS

Examples

Permit plans for a bridge over tidal waters with the navigation channel designated by cross-hatched area. No substructure units within the waterway. Report 9999.9.

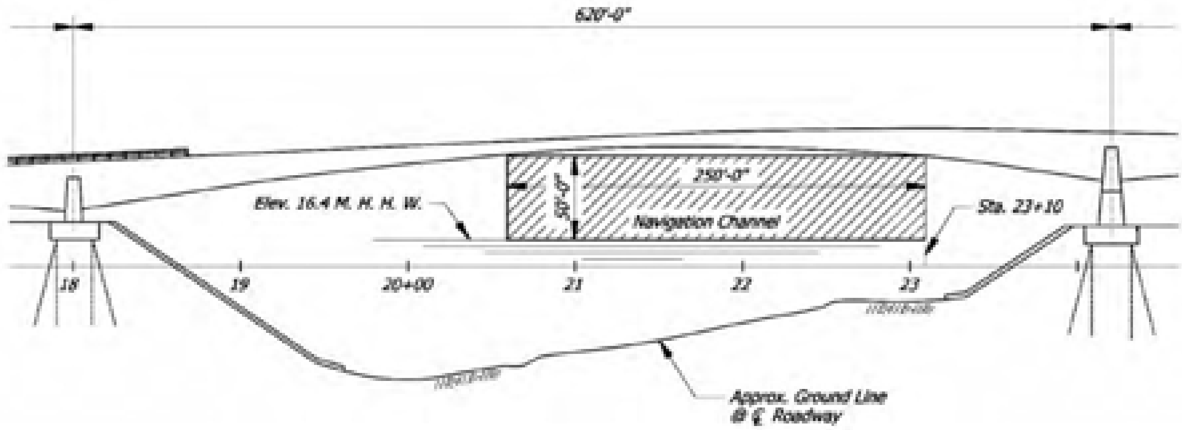


Figure 121. Bridge elevation view with no substructure units in the waterway. (Source: Alaska DOT)

Bridge with multiple designated navigation channels bounded by piers. Report 0.

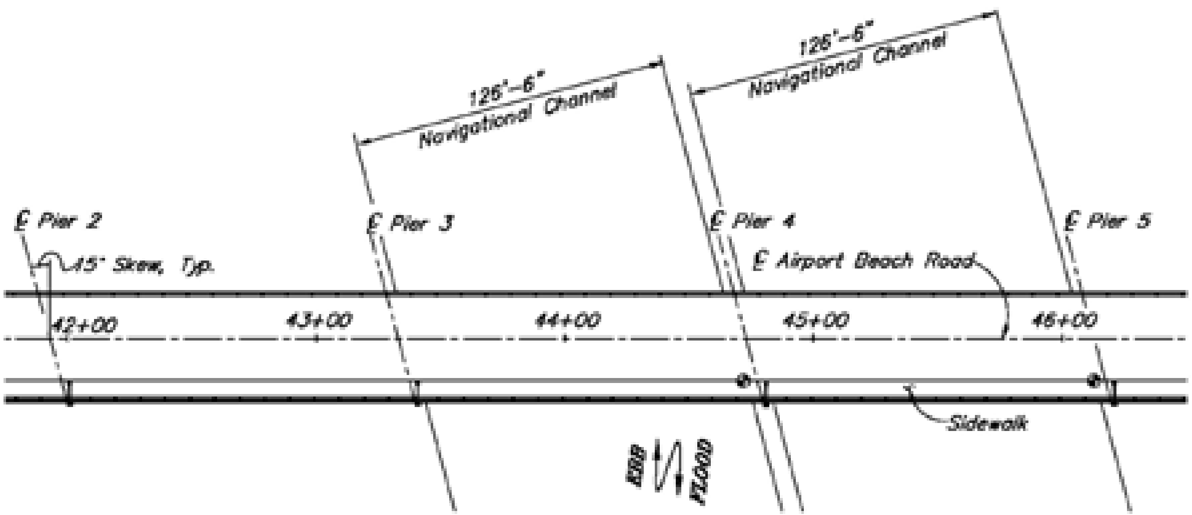


Figure 122. Bridge plan view indicating multiple navigation channel width dimensions to substructure units in the waterway. (Source: Alaska DOT)

Bridge with navigation channel designated by cross-hatched area. Substructure units within the waterway. Report 135.6.

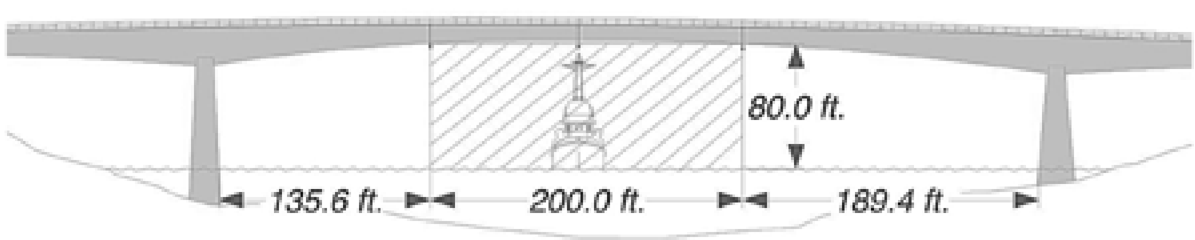


Figure 123. Bridge elevation view indicating navigation channel clearances to substructure units in the waterway.

5.1 – LOADS AND LOAD RATING

Load Rating Method

Format	Frequency	Item ID
AN (4)	I	B.LR.04

Specification	Commentary
Report the method used to calculate the load rating using one of the following codes. Code — Description LFR — Load Factor Rating ASR — Allowable Stress Rating LRFR — Load and Resistance Factor Rating LT — Load Testing AR — Assigned Rating EJ — Field evaluation and documented engineering judgment N — No rating analysis or evaluation has been performed	When different portions of a bridge are load rated using different methods, report the rating method associated with the controlling rating factor. For information on applicable load rating methods, refer to the October 30, 2006 FHWA memorandum at: http://www.fhwa.dot.gov/bridge/nbis/103006.cfm. For information on using code AR, refer to the September 29, 2011 FHWA memorandum at: http://www.fhwa.dot.gov/bridge/110929.cfm For information on using code EJ, refer to the February 2, 2011 FHWA memorandum at: http://www.fhwa.dot.gov/bridge/110202.cfm

Example

A bridge rated for an HS-20 load using Load Factor rating is later widened. The entire bridge is re-rated using Load and Resistance Factor rating. Report LRFR.

A steel truss bridge with steel beam approach spans originally rated using Allowable Stress Rating. The approach spans are re-rated using Load Factor Rating due to deterioration. The rating of the approach spans controls. Report LFR.

A bridge designed and checked using Load Factor Design and an HS-20 live load. The bridge meets the criteria stated in the September 29, 2011 FHWA memo and has an assigned load rating. Report AR.

A concrete bridge constructed in 1910 has no design plans. Load rating determined by a qualified engineer after field condition and live load history evaluation. Report EJ.

5.1 – LOADS AND LOAD RATING

Inventory Load Rating Factor

Format	Frequency	Item ID
N (4,2)	I	B.LR.05

Specification	Commentary
Report the inventory load rating factor, truncated to the hundredth, for the standard AASHTO HS-20 or HL-93 loadings, whichever is applicable based on the method reported in Item B.LR.04 *(Load Rating Method)*. When temporary or supported conditions exist, as indicated in Item B.PS.01 *(Load Posting Status)*, report the rating factor for the bridge including the temporary or supported conditions. Do not report this item when no rating analysis or evaluation has been performed.	For LRFR, this is the rating factor for the design load rating at the inventory level of reliability using the HL-93 loading considering all applicable strength and serviceability limit states. Refer to the AASHTO Manual for Bridge Evaluation for details of HS-20 and HL-93 loadings.

Example
A bridge has a calculated inventory load rating factor of 1.486. Report 1.48.

5.1 – LOADS AND LOAD RATING

Operating Load Rating Factor

Format	Frequency	Item ID
N (4,2)	I	B.LR.06

Specification	Commentary
Report the operating load rating factor, truncated to the hundredth, for the standard AASHTO HS-20 or HL-93 loadings, whichever is applicable based on the method reported in Item B.LR.04 *(Load Rating Method)*. When temporary or supported conditions exist, as indicated in Item B.PS.01 *(Load Posting Status)*, report the rating factor for the bridge including the temporary or supported conditions. Do not report this item when no rating analysis or evaluation has been performed.	For LRFR, this is the rating factor for the design load rating at the operating level of reliability using the HL-93 loading considering all applicable strength and serviceability limit states. Refer to the AASHTO Manual for Bridge Evaluation for details of HS-20 and HL-93 loadings.

Example
A bridge has a calculated operating load rating factor of 1.679. Report 1.67.

5.1 – LOADS AND LOAD RATING

Controlling Legal Load Rating Factor

Format	Frequency	Item ID
N (4,2)	I	B.LR.07

Specification	Commentary
Report the lowest (controlling) rating factor for the State's and AASHTO legal loads truncated to the hundredth. When temporary or supported conditions exist, as indicated in Item B.PS.01 *(Load Posting Status)*, report the rating factor for the bridge including the temporary or supported conditions. Do not report this item when no rating analysis or evaluation has been performed.	For LRFR this would be the "Legal Load Rating", a second level rating that provides a single safe load capacity (for a given truck configuration) applicable to AASHTO and State legal loads. For LRFR, when all State legal loads are enveloped by the HL-93 design loading and the design load rating factor at the operating level is greater than or equal to 1.0, then the value in Item B.LR.06 *(Operating Load Rating Factor)* can be reported for this item in lieu of calculating a "Legal Load Rating." For allowable stress and load factor rating this would be the operating load rating factor for the State's legal loads. If all State legal loads are enveloped by the design loading and the operating rating is greater than or equal to 1.0, then the value in Item B.LR.06 *(Operating Load Rating Factor)* can be reported for this item. State legal loads would typically be described in State laws (State vehicle codes).

Example

A bridge has the following calculated legal load rating factors for the AASHTO legal loads and a State-defined legal load:

Legal Load Configuration	Rating Factor
Type 3	1.07
Type 3S2	0.88
Type 3-3	0.80
SU4	0.70
SU5	0.65
FL120	1.15

Report 0.65.

5.2 – LOAD POSTING STATUS

Load Posting Status

Format	Frequency	Item ID
AN (2)	I	B.PS.01

Specification	Commentary
Report the load posting status of the bridge using one of the codes in *Table 15*.	When temporary or supported conditions exist ensure that data items related to physical characteristics of the bridge (e.g. geometry, clearances, condition, and load rating) represent those characteristics of the temporary or supported bridge. When both a weight and other load restriction exist at the bridge, use the code for the weight restriction (code PP, TP, or SP).

Specification Continued

Table 15. Load Posting Status Codes.

	No restriction			Posted or restricted				Closed
	New	Open	Needs Action	Weight	Other	Needs Reduction	Missing	
Permanent	N	PO	PA	PP	PR	PD	PM	C
Temporary		TO	TA	TP	TR	TD	TM	C
Supported		SO	SA	SP	SR	SD	SM	C

Terms:

Permanent (P) – Permanent bridge in place with no temporary supports.

Temporary (T) – Temporary bridge in place to carry traffic while the permanent bridge is closed and awaiting repair, rehabilitation, or replacement.

Supported (S) – Bridge with temporary shoring, supports, repairs, or supplemental members in place to keep the bridge open pending the completion of active or imminent repair, or replacement projects.

New (N) – Bridge is newly constructed and not yet open to traffic, but is expected to be open within 12 months.

Open (O) – Bridge is open with no restrictions.

Needs Action (A) – Bridge that is open with load posting recommended, but no posting signs in place, or a posting sign that is not legally enforceable.

Weight (P) – Bridge is posted with a weight limit sign or signs.

Other (R) – A posting sign or other traffic control device(s) at the bridge that reduces loading by reducing speed (to reduce impact), limiting the number of lanes or vehicles, or restricting commercial vehicles in general.

Needs Reduction (D) – Bridge is posted, with posting reduction recommended but not implemented.

Missing (M) – Bridge has a legally enforceable load posting and was posted, but one or more required signs are missing or illegible.

Closed (C) – Bridge is closed to all traffic.

5.2 – LOAD POSTING STATUS

Posting Status Change Date

Format	Frequency	Item ID
YYYYMMDD	I	B.PS.02

Specification	Commentary
Report the date the bridge entered the status reported in Item B.PS.01 *(Load Posting Status)*.	For bridges entering posted status, it is preferable that the reported date represent the date on which signs were properly installed at the bridge. The date the load posting became legally enforceable can also be used for this item when the installation date is unknown. When neither the installation nor legal enforcement date are known, the date the posting was first documented to be in place can be used for this item.

5.3 – LOAD EVALUATION AND POSTING

Legal Load Configuration

Format	Frequency	Item ID
AN (3)	I	B.EP.01

Specification	Commentary
Report the configuration of the AASHTO legal load using one of the following codes. Code / Description 3 — Type 3 3S2 — Type 3S2 3-3 — Type 3-3 SU4 — SU4 truck SU5 — SU5 truck SU6 — SU6 truck SU7 — SU7 truck NRL — Notional Rating Load EV2 — Type EV2 emergency vehicle EV3 — Type EV3 emergency vehicle	Refer to the AASHTO Manual for Bridge Evaluation for details of legal loading configurations. For information on the load rating and load posting of emergency vehicles, refer to the November 3, 2016 FHWA memorandum at: http://www.fhwa.dot.gov/bridge/loadrating/161103.cfm

5.3 – LOAD EVALUATION AND POSTING

Legal Load Rating Factor

Format	Frequency	Item ID
N (4,2)	I	B.EP.02

Specification	Commentary
Report the rating factor for the legal load configuration truncated to the hundredth. When temporary or supported conditions exist, as indicated in Item B.PS.01 *(Load Posting Status)*, report the rating factor for the bridge including the temporary or supported conditions.	For LRFR this would be the "Legal Load Rating", a second level rating that provides a single safe load capacity for a given AASHTO legal load. For allowable stress and load factor rating this would be the operating load rating factor calculated for a given AASHTO legal load as part of a posting analysis. Refer to the AASHTO Manual for Bridge Evaluation for details of legal loading configurations.

Example
A bridge has a calculated legal load rating factor of 0.926 for the Type 3S2 load. Report 0.92.

5.3 – LOAD EVALUATION AND POSTING

Posting Type

Format	Frequency	Item ID
AN (1)	I	B.EP.03

Specification	Commentary
Report the type of posting at the bridge restricting the vehicle reported in Item B.EP.01 *(Legal Load Configuration)* using one of the codes. Code — Description G — Gross Load A — Single Axle Load D — Tandem Axle Load T — Truck Load C — No commercial vehicles S — Speed reduction L — Number of lanes restricted V — Number of vehicles restricted X — Other Do not report this item if no posting sign is used for the legal load configuration.	This item is only reported for legal load configurations with a rating factor less than 1.0, as reported in Item B.EP.02 *(Legal Load Rating Factor)*.

Examples

Report G.

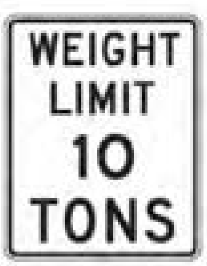


Figure 126. Weight limit sign – gross load.

Report T.

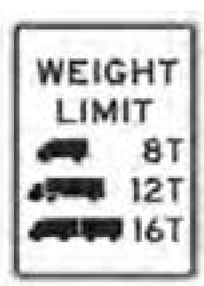


Figure 127. Weight limit sign – truck silhouettes.

5.3 – LOAD EVALUATION AND POSTING

Posting Value

Format	Frequency	Item ID
N (2,0)	I	B.EP.04

Specification	Commentary
Report the weight limit value shown on the load posting sign for the vehicle reported in Item B.EP.02 *(Legal Load Rating Factor)* rounded down to the nearest U.S. ton. Do not report this item if no posting sign is used for the legal load configuration. Do not report this item if Item B.EP.03 *(Posting Type)* has codes C, S, L, or V reported.	This item is only reported for legal load configurations with a rating factor less than 1.0, as reported in Item B.EP.02 *(Legal Load Rating Factor)*.

Example

Report 10.

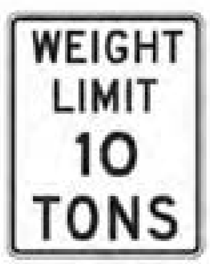


Figure 128. Weight limit sign – gross load (10T).

Report 8 for Type 3.

Report 12 for Type 3S2.

Report 16 for Type 3-3.

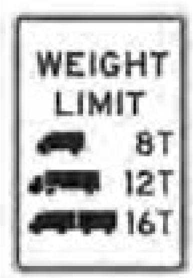


Figure 129. Weight limit sign – truck silhouettes (8T, 12T, and 16T).

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Appendix 2-E WSDOT BMS to NBE Translation

WSBIS ELEMENTS			Calendar Year 2024	NATIONAL BRIDGE ELEMENTS		
element_id		unit	TRANSLATION	element_id	name	unit
12	Concrete Deck (See Note 9)	SF			intentionally blank	
8217	Concrete Deck (See Note 9)	SF			intentionally blank	
14	Fully Supported Concrete Deck (See Note 9) Agency Defined to Change Later	SF			intentionally blank	
20	Concrete Deck - Lightweight Aggregate (See Note 9) Agency Defined to Change Later	SF		12	Reinforced Concrete Deck	SF
26	Concrete Deck w/Coated Bars (See Note 9) Agency Defined to Change Later	SF			intentionally blank	
35	Concrete Deck Soffit (See Note 9) Agency Defined to Change Later	SF			intentionally blank	
8216	Concrete Deck Soffit (See Note 9)	SF			intentionally blank	
16	Thin Concrete Deck Agency Defined to Change Later	SF			intentionally blank	
15	Post Tensioned Concrete Deck Agency Defined to Change Later	SF		13	Prestressed Concrete Deck	SF
	no state element equivalent			15	Prestressed Concrete Top Flange	SF
13	Bridge Deck Surface Agency Defined to Change Later	SF		16	Reinforced Concrete Top Flange	SF
8213	Bridge Deck Surface	SF			intentionally blank	
27	Steel Orthotropic Deck Agency Defined to Change Later	SF			intentionally blank	
30	Deck-Corrugated or Other Steel System Agency Defined to Change Later	SF		30	Steel Deck—Corrugated/Orthotropic/Etc.	SF
8222	Deck-Corrugated or Other Steel System	SF			intentionally blank	
28	Steel Deck Open Grid	SF		28	Steel Deck—Open Grid	SF
8218	Steel Deck Open Grid	SF			intentionally blank	
29	Steel Deck - Concrete Filled Grid	SF		29	Steel Deck—Concrete Filled Grid	SF
8219	Steel Deck - Concrete Filled Grid	SF			intentionally blank	
31	Timber Deck	SF		31	Timber Deck	SF
8221	Timber Deck	SF			intentionally blank	
32	Fiber Reinforced Polymer (FRP) Deck Agency Defined to Change Later	SF		60	Other Deck	SF
36	Deck Rebar Cover Flag	SF			intentionally blank	

WSBIS ELEMENTS element_id	WSBIS ELEMENTS	unit	Calendar Year 2024 TRANSLATION	NATIONAL BRIDGE ELEMENTS element_id	name	unit
38	Concrete Slab	SF			intentionally blank	
49	Concrete Hollow Slab Agency Defined to Change Later	SF			intentionally blank	
50	Prestressed Concrete Slab Agency Defined to Change Later	SF		39	Prestressed Concrete Slab To be added later	SF
8150	Prestressed Concrete Slab	SF		38	Reinforced Concrete Slab	SF
51	Prestressed Conc Slab w/Coated Bars Agency Defined to Change Later	SF			intentionally blank	
8151	Prestressed Conc Slab w/Coated Bars	SF			intentionally blank	
52	Concrete Slab w/Coated Bars Agency Defined to Change Later	SF			intentionally blank	
54	Timber Slab	SF		54	Timber Slab	SF
	no state element equivalent			65	Other Slab	SF
89	Prestressed Concrete Girder w/Coated Strands Agency Defined to Change Later	LF			intentionally blank	
98	Thin Flange Girder Agency Defined to Change Later	LF			intentionally blank	
103	Prestressed Concrete Super Girder Agency Defined to Change Later	LF			intentionally blank	
108	Prestressed Concrete Bulb-T Girder Agency Defined to Change Later	LF			intentionally blank	
8108	Prestressed Concrete Bulb-T Girder	LF		109	Girder/Beam - Prestressed Concrete	LF
109	Prestressed Concrete Multiple Web Girder Units Agency Defined to Change Later	LF			intentionally blank	
8109	Prestressed Concrete Multiple Web Girder Units	LF			intentionally blank	
115	Prestressed Concrete Girder Agency Defined to Change Later	LF			intentionally blank	
8111	Prestressed Concrete Girder	LF			intentionally blank	
97	Prestressed Concrete Tub Girder Agency Defined to Change Later	LF			intentionally blank	
100	Post-Tensioned Concrete Segmental Box Girder Agency Defined to Change Later	LF		104	Closed Web/Box Girder - Prestressed Concrete	LF
104	Post-Tensioned Concrete Box Girder Agency Defined to Change Later	LF			intentionally blank	
90	Steel Rolled Girder Agency Defined to Change Later	LF			intentionally blank	
8090	Steel Rolled Girder	LF				
91	Steel Riveted Girder Agency Defined to Change Later	LF			intentionally blank	
92	Steel Welded Girder Agency Defined to Change Later	LF		107	Girder/Beam - Steel	LF
107	Steel Open Girder Agency Defined to Change Later	LF			intentionally blank	
8201	Steel Open Girder	LF			intentionally blank	
96	Concrete Encased Steel Girder Agency Defined to Change Later	LF			intentionally blank	

WSBIS ELEMENTS			Calendar Year 2024	NATIONAL BRIDGE ELEMENTS		
element_id		unit	TRANSLATION	element_id	name	unit
	no state element equivalent			112	Girder/Beam - Other	LF
102	Steel Box Girder	LF		102	Closed Web/Box Girder - Steel	LF
8200	Steel Box Girder	LF			intentionally blank	
105	Concrete Box Girder	LF		105	Closed Web/Box Girder - Reinforced Concrete	LF
	no state element equivalent			106	Closed Web/Box Girder - Other	LF
110	Concrete Girder	LF			intentionally blank	
8110	Concrete Girder	LF		110	Girder/Beam - Reinforced Concrete	LF
114	Concrete Multiple Web Girder Unit Agency Defined to Change Later	LF			intentionally blank	
111	Timber Glue-Lam Girder Agency Defined to Change Later	LF			intentionally blank	
117	Timber Sawn Girder Agency Defined to Change Later	LF		111	Girder/Beam - Timber	LF
8112	Timber Sawn Girder	LF				
8114	Timber Laminated Girder	LF			intentionally blank	
113	Steel Stringer	LF		113	Stringer - Steel	LF
8209	Steel Stringer	LF			intentionally blank	
	no state element equivalent			115	Stringer - Prestressed Concrete	LF
116	Concrete Stringer	LF		116	Stringer - Reinforced Concrete	LF
118	Timber Stringer Agency Defined to Change Later	LF		117	Stringer - Timber	LF

WSBIS ELEMENTS			Calendar Year 2024	NATIONAL BRIDGE ELEMENTS		
element_id		unit	TRANSLATION	element_id	name	unit
	no state element equivalent			118	Stringer - Other	LF
119	Concrete Truss Agency Defined to Change Later	LF		136	Truss - Other	LF
126	Steel Thru Truss Agency Defined to Change Later	LF			intentionally blank	
8204	Steel Thru Truss	LF		120	Truss - Steel	LF
131	Steel Deck Truss Agency Defined to Change Later	LF			intentionally blank	
133	Truss Gusset Plates Agency Defined to Change Later	EA		162	Gusset Plate	EA
8210	Truss Gusset Plates	EA				
135	Timber Truss	LF		135	Truss - Timber	LF
139	Timber Arch Agency Defined to Change Later	LF		146	Arch - Timber	LF
140	Composite Arch Agency Defined to Change Later	LF		142	Arch - Other	LF
141	Steel Arch Agency Defined to Change Later	LF		141	Arch - Steel	LF
142	Steel Tied Arch Agency Defined to Change Later	LF			intentionally blank	
	no state element equivalent			143	Arch - Prestressed Concrete	LF
	no state element equivalent			145	Arch - Masonry	LF
144	Concrete Arch	LF		144	Arch - Reinforced Concrete	LF
145	Earth Filled Concrete Arch Agency Defined to Change Later	LF			intentionally blank	
143	Steel Suspender - Rolled Shape Agency Defined to Change Later	EA			intentionally blank	
147	Steel Suspender - Cable Agency Defined to Change Later	EA		148	Cable - Steel Secondary	EA
146	Suspension - Main Cable (see note 8) Agency Defined to Change Later	EA		147	Cable - Steel Main	LF
149	Cable Stayed Bridge - Cable (see note 8) Agency Defined to Change Later	EA			intentionally blank	
150	Concrete Column on Spandrel Arch	EA			intentionally blank	
160	Steel Column on Spandrel Arch	EA			intentionally blank	
152	Steel Floor Beam Agency Defined to Change Later	LF			intentionally blank	
8206	Steel Floor Beam	LF		152	Floor Beam - Steel	LF
8341	Lift Beam (FC)	LF			intentionally blank	
154	Prestressed Concrete Floorbeam	LF		154	Floor Beam - Prestressed Concrete	LF
155	Concrete Floor Beam	LF		155	Floor Beam - Reinforced Concrete	LF
156	Timber Floor Beam	LF		156	Floor Beam - Timber	LF

WSBIS ELEMENTS			Calendar Year 2024	NATIONAL BRIDGE ELEMENTS		
element_id		unit	TRANSLATION	element_id	name	unit
	no state element equivalent			157	Floor Beam - Other	LF
161	Steel Hanger (See Note 10) Agency Defined to Change Later	EA			intentionally blank	
162	Steel Pin Agency Defined to Change Later	EA		161	Pin, Pin & Hanger Assembly, or both	EA
8343	Apron Two Hinge Pin System/LL Hanger Pins (FC)	EA			intentionally blank	
8342	Live Load Hanger Bars (FC) (See Note 10)	EA			intentionally blank	
163	Tension Hold Down Anchor Assembly					
200	Abutment Fill	EA			intentionally blank	
202	Steel ~~Pile/~~Column Name Change to NBE	EA		202	Column/Pile Extension - Steel Re-name to Steel Columns	EA
203	Prestressed Concrete Hollow Column ~~Pile~~ Name Change to NBE			204	Column/Pile Extension - Prestressed Concrete Re-name to Prestressed Concrete Column	EA
204	Prestressed Concrete ~~Pile/~~Column Name Change to NBE	EA			intentionally blank	
205	Concrete ~~Pile/~~Column Name Change to NBE	EA			intentionally blank	
207	Concrete ~~Pile/~~Column - w/Steel Jacket Name Change to NBE	EA		205	Column/Pile Extension - Reinforced Concrete Re-name to Concrete Column	EA
208	Concrete Pile/Column w/Composite Wrap	EA			intentionally blank	
206	Timber ~~Pile/~~Column Name Change to NBE	EA		206	Column/Pile Extension - Timber Re-name to Timber Column	EA
	no state element equivalent			203	Column - Other	EA
	no state element equivalent			207	Column Tower (Trestle) - Steel	EA
	no state element equivalent			208	Column Tower (Trestle) - Timber	EA
209	Submerged Concrete Pile/Column w/Steel Jacket Obsolete in 2024, Merge notes and quantities to 207	EA		205	Concrete Pile/Column - w/Steel Jacket	EA
227	Concrete ~~Submerged~~ Pile~~/Column~~ Name Change to NBE	EA		227	~~Submerged~~ Pile - Reinforced Concrete Name Change to NBE	EA
8125	Concrete Submerged Pile/Column	EA			intentionally blank	
210	Concrete Pier Wall	LF		210	Pier Wall - Reinforced Concrete	LF
212	Concrete Submerged Pier Wall Obsolete and move notes and quantities to 210	LF			intentionally blank	
211	Other Pier Wall	LF		211	Pier Wall - Other	LF
213	Other Submerged Pier Wall Obsolete and move notes and quantities to 211	LF			intentionally blank	
214	Concrete Web Wall between Columns	LF			intentionally blank	

WSBIS ELEMENTS element_id		unit	Calendar Year 2024 TRANSLATION	NATIONAL BRIDGE ELEMENTS element_id	name	unit
	no state element equivalent			212	Pier Wall - Timber	LF
	no state element equivalent			213	Pier Wall - Masonry	LF
215	Concrete Abutment	LF			intentionally blank	
8102	Concrete Abutment	LF		215	Abutment - Reinforced Concrete	LF
219	Concrete Cantilevered Span Abutment Obsoleted in 2024 Notes moved to 200 Element	LF	Removed		intentionally blank	
216	Timber Abutment	LF		216	Abutment - Timber	LF
8103	Timber Abutment	LF			intentionally blank	
217	Other Abutment Obsolete in 2026 change to 218	LF		218	Abutment - Other	LF
218	Steel Abutment Obsolete in 2026 change to 219	LF		219	Abutment - Steel	LF
8101	Steel Abutment				intentionally blank	
	no state element equivalent			217	Abutment - Masonry	LF
220	~~Concrete Submerged Foundation~~ Revise name to **Concrete Pile Cap/Footing** in 2024	LF			intentionally blank	
8136	Concrete Submerged Foundation	LF		220	Pile Cap/Footing - Reinforced Concrete	LF
221	Concrete Foundation Obsolete in 2024 merged notes to 220 Pile Cap Footing	LF			intentionally blank	
222	Timber Foundation	LF			intentionally blank	
225	Steel ~~Submerged~~ Pile~~/Column~~ Name Change to NBE	EA			intentionally blank	
8129	Transfer Span/OHL Supercolumn	EA		225	~~Submerged~~ Pile - Steel Name Change to NBE	EA
8128	Steel Submerged Pile/Column	EA			intentionally blank	
226	Prestressed Concrete ~~Submerged~~ Pile~~/Column~~ Name Change to NBE	EA			intentionally blank	
8127	Prestressed Concrete Submerged Pile/Column	EA		226	~~Submerged~~ Pile - Prestressed Concrete Name Change to NBE	EA
232	Prestressed Concrete Hollow ~~Submerged~~ Pile~~/Column~~ Name Change in 2024	EA				
228	Timber ~~Submerged~~ Pile~~/Column~~ Name Change to NBE	EA		228	~~Submerged~~ Pile - Timber Name Change to NBE	EA
8124	Timber Submerged Pile/Column	EA			intentionally blank	

WSBIS ELEMENTS			Calendar Year 2024 TRANSLATION	NATIONAL BRIDGE ELEMENTS		
element_id		unit		element_id	name	unit
	no state element equivalent			229	Pile - Other	EA
229	Timber Cap Rehab with Steel Agency Defined to Change Later	LF			intentionally blank	
231	Steel Pier Cap/Crossbeam	LF		231	Pier Cap - Steel	LF
8130	Steel Pier Cap/Crossbeam	LF			intentionally blank	
233	Prestressed Concrete Pier Cap/Crossbeam	LF		233	Pier Cap - Prestressed Concrete	LF
234	Concrete Pier Cap/Crossbeam	LF		234	Pier Cap - Reinforced Concrete	LF
8132	Concrete Pier Cap/Crossbeam	LF			intentionally blank	
235	Timber Pier Cap	LF		235	Pier Cap - Timber	LF
8131	Timber Pier Cap	LF			intentionally blank	
	no state element equivalent			236	Pier Cap - Other	LF
236	Concrete Floating Pontoon	Cell			intentionally blank	
237	Pontoon Hatch/Bulkhead	EA			intentionally blank	
238	Floating Bridge - Anchor Cable Agency Defined to Change Later	EA		149	Cable - Other Secondary	EA
240	Metal Culvert	LF		240	Culvert - Steel	LF
241	Concrete Culvert	LF		241	Culvert - Reinforced Concrete	LF
242	Timber Culvert	LF		242	Culvert - Timber	LF
	no state element equivalent			244	Culvert - Masonry	LF
243	Other Culvert	LF		243	Culvert - Other	LF
	no state element equivalent			245	Culvert - Prestressed Concrete	LF
260	Steel Open Grid Sidewalk & Supports	SF			intentionally blank	
261	Steel Filled Grid Sidewalk & Supports	SF			intentionally blank	
8261	Steel Filled Grid Sidewalk & Supports	SF			intentionally blank	
262	Corrugated/Orthotropic Sidewalk & Supports	SF			intentionally blank	
8262	Corrugated/Orthotropic Sidewalk & Supports	SF			intentionally blank	
264	Timber Sidewalk & Supports	SF			intentionally blank	
8264	Timber Sidewalk & Supports	SF			intentionally blank	
266	Concrete Sidewalk & Supports	SF			intentionally blank	
8266	Concrete Sidewalk & Supports	SF			intentionally blank	

WSBIS ELEMENTS			Calendar Year 2024	NATIONAL BRIDGE ELEMENTS		
element_id		unit	TRANSLATION	element_id	name	unit
267	Fiber Reinforced Polymer(FRP) Sidewalk & Supports	SF			intentionally blank	
8265	Fiber Reinforced Polymer(FRP) Sidewalk & Supports	SF			intentionally blank	
310	Elastomeric Bearing	EA		310	Elastomeric Bearing	EA
311	Moveable Bearing (roller, sliding, etc)	EA		311	Moveable Bearing (roller, sliding, etc)	EA
8391	Moveable Bearing (roller, sliding, etc)	EA			intentionally blank	
312	Concealed Bearing or Bearing System	EA		312	Enclosed/Concealed Bearing	EA
313	Fixed Bearing	EA		313	Fixed Bearing	EA
8390	Fixed Bearing	EA			intentionally blank	
316	Isolation Bearing Agency Defined to Change Later	EA		316	Bearing - Other	EA
314	Pot Bearing	EA		314	Pot Bearing	EA
315	Disc Bearing	EA		315	Disk Bearing	EA
	no state element equivalent			320	Prestressed Concrete Approach Slab	SF
321	Concrete Roadway Approach Slab	SF		321	Reinforced Concrete Approach Slab	SF
322	Bridge Impact	EA			intentionally blank	
330	Metal Bridge Railing	LF		330	Metal Bridge Railing	LF
8810	Metal Bridge Railing	LF			intentionally blank	
331	Concrete Bridge Railing	LF		331	Reinforced Concrete Bridge Railing	LF
8811	Concrete Bridge Railing	LF			intentionally blank	
332	Timber Bridge Railing	LF		332	Timber Bridge Railing	LF
8812	Timber Bridge Railing	LF			intentionally blank	
333	Other Bridge Railing	LF		333	Other Bridge Railing	LF
8813	Other Bridge Railing	LF			intentionally blank	
	no state element equivalent			334	Masonry Bridge Railing	LF
340	Metal Pedestrian Railing	LF			intentionally blank	
8815	Metal Pedestrian Railing	LF			intentionally blank	
341	Concrete Pedestrian Railing	LF			intentionally blank	
8816	Concrete Pedestrian Railing	LF			intentionally blank	
342	Timber Pedestrian Railing	LF			intentionally blank	

WSBIS ELEMENTS			Calendar Year 2024	NATIONAL BRIDGE ELEMENTS		
element_id		unit	TRANSLATION	element_id	name	unit
8817	Timber Pedestrian Railing	LF			intentionally blank	
343	Other Pedestrian Railing	LF			intentionally blank	
8818	Other Pedestrian Railing	LF			intentionally blank	
355	Damaged Bolts or Rivets	EA			intentionally blank	
8355	Damaged Bolts or Rivets	EA			intentionally blank	
356	Steel Cracking	EA			intentionally blank	
8356	Steel Cracking	EA			intentionally blank	
357	Pack Rust	EA			intentionally blank	
8357	Pack Rust	EA			intentionally blank	
360	Bridge Movement	EA			intentionally blank	
8360	Bridge Movement	EA			intentionally blank	
351	Chloride Impact	EA			intentionally blank	
353	Encampment Impact	EA			intentionally blank	
361	Scour	EA			intentionally blank	
8361	Scour	EA			intentionally blank	
8362	Impact Damage	EA			intentionally blank	
378	State Undercrossing ~~Primary~~ Safety	EA			intentionally blank	
379	Local Agency Undercrossing ~~Secondary~~ Safety	EA			intentionally blank	
~~367~~	~~Movable Bridge~~ Obsoleted in 2024	~~EA~~			intentionally blank	
368	Seismic Pier Crossbeam Bolster	LF			intentionally blank	
369	Seismic Pier Infill Wall	EA			intentionally blank	
370	Seismic - Longitudinal Restrainer	EA			intentionally blank	
8370	Seismic - Longitudinal Restrainer	EA			intentionally blank	
371	Seismic - Transverse Restrainer	EA			intentionally blank	
8371	Seismic - Transverse Restrainer	EA			intentionally blank	
372	Seismic - Link/Pin Restrainer	EA			intentionally blank	
373	Seismic - Catcher Block	EA			intentionally blank	
374	Seismic - Column Silo	EA			intentionally blank	

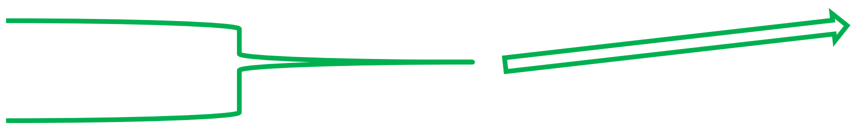
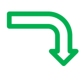
WSBIS ELEMENTS			Calendar Year 2024	NATIONAL BRIDGE ELEMENTS		
element_id		unit	TRANSLATION	element_id	name	unit
~~375~~	~~Cathodic Protection~~ Obsoleted in 2024	~~EA~~			intentionally blank	
8375	Cathodic Protection	EA			intentionally blank	
376	Concrete Deck Delamination Testing	SF			intentionally blank	
8376	Concrete Deck Delamination Testing	SF			intentionally blank	
381	Joint Seal/Gland Leaking	EA			intentionally blank	
400	Asphalt Butt Joint Seal (see note 11) Agency Defined to Change Later	LF			intentionally blank	
403	Concrete Bulb-T (see note 11) Agency Defined to Change Later	LF		301	Pourable Joint	LF
417	Silicone Rubber Joint Filler (see note 11) Agency Defined to Change Later	LF			intentionally blank	
401	Asphalt Open Joint Seal (see note 11) Agency Defined to Change Later	LF			intentionally blank	
402	Open Concrete Joint (see note 11) Agency Defined to Change Later	LF			intentionally blank	
407	Steel Angle Header (see note 11) Agency Defined to Change Later	LF		304	Open Joint	LF
8407	Steel Angle Header (see note 11)	LF			intentionally blank	
419	Steel Angle w/Raised Bars (see note 11) Agency Defined to Change Later	LF			intentionally blank	
408	Steel Sliding Plate (see note 11) Agency Defined to Change Later	LF			intentionally blank	
8408	Steel Sliding Plate (see note 11)	LF			intentionally blank	
409	Steel Sliding Plate w/Raised Bars (see note 11) Agency Defined to Change Later	LF		305	Assembly Joint without Seal	LF
414	Bolt Down - Sliding Plate w/Springs (see note 11) Agency Defined to Change Later	LF			intentionally blank	
410	Steel Fingers (see note 11) Agency Defined to Change Later	LF			intentionally blank	
411	Steel Fingers w/Raised Bars (see note 11) Agency Defined to Change Later	LF			intentionally blank	
404	Compression Seal / Concrete Header (see note 11)	LF			intentionally blank	
8404	Compression Seal / Concrete Header (see note 11)	LF			intentionally blank	
405	Compression Seal / Polymer Header (see note 11)	LF		302	Compression Seal	LF
406	Compression Seal / Steel Header (see note 11)	LF			intentionally blank	
8406	Compression Seal / Steel Header (see note 11)	LF			intentionally blank	
412	Strip Seal - Anchored (see note 11)	LF		300	Strip Seal	LF
413	Strip Seal - Welded (see note 11)	LF			intentionally blank	
416	Assembly Joint Seal (Modular) (see note 11)	LF		303	Assembly Joint Seal (Modular)	LF

WSBIS ELEMENTS			Calendar Year 2024 TRANSLATION	NATIONAL BRIDGE ELEMENTS		
element_id		unit		element_id	name	unit
415	Bolt Down Panel - Molded Rubber (see note 11)	LF			intentionally blank	
418	Asphalt Plug (see note 11)	LF		306	Joint - Other	LF
422	Flexible Joint Seal (see note 11)	LF			intentionally blank	
420	Joint Paved Over Flag	LF			intentionally blank	
421	Joint Over Steel Corbel Bearings	LF			intentionally blank	
501	Movable Bridge Steel Tower	LF			intentionally blank	
705	Bridge Luminaire Pole and Base	EA			intentionally blank	
8705	Bridge Luminaire Pole and Base	EA			intentionally blank	
707	Fender System/Pier Protection	EA			intentionally blank	
709	Ceramic Tile	SF			intentionally blank	
710	Bridge Mounted Sign Structure	EA			intentionally blank	
800	Asphaltic Concrete (AC) Overlay (see note 11)	SF			intentionally blank	
8223	Asphaltic Concrete (AC) Overlay (see note 11)	SF			intentionally blank	
801	AC Overlay with Waterproofing Membrane (see note 11)	SF			intentionally blank	
802	Thin Polymer Overlay (see note 11)	SF			intentionally blank	
8224	Thin Polymer Overlay (see note 11)	SF		510	Wearing Surfaces	SF
803	Modified Concrete Overlay (see note 11)	SF			intentionally blank	
804	Polyester Concrete Overlay (see note 11)	SF			intentionally blank	
805	AC Over a Polymer Overlay (see note 11)	SF			intentionally blank	
807	AC Overlay with High Performance Membrane (see note 11)	SF				
806	BST on Concrete (Chip Seal)	SF			intentionally blank	

WSBIS ELEMENTS			Calendar Year 2024	NATIONAL BRIDGE ELEMENTS		
element_id		unit	TRANSLATION	element_id	name	unit
901	Red Lead Alkyd Paint System	SF			intentionally blank	
8901	Red Lead Alkyd Paint System	SF			intentionally blank	
902	Inorganic-Zinc/Vinyl Paint System	SF			intentionally blank	
8902	Inorganic-Zinc/Vinyl Paint System	SF			intentionally blank	
903	Inorganic Zinc/Urethane Paint System	SF			intentionally blank	
8903	Inorganic Zinc/Urethane Paint System	SF			intentionally blank	
904	Organic Zinc/Urethane Paint System	SF			intentionally blank	
8904	Organic Zinc/Urethane Paint System	SF			intentionally blank	
905	Coal Tar Epoxy Paint System	SF		515	Steel Protective Coating	SF
8905	Coal Tar Epoxy Paint System	SF			intentionally blank	
906	Metallizing	SF			intentionally blank	
907	Galvanizing	SF			intentionally blank	
8907	Galvanizing	SF			intentionally blank	
908	Epoxy Paint for Weathering Steel	SF			intentionally blank	
909	Zinc Primer	SF			intentionally blank	
8909	Zinc Primer	SF			intentionally blank	
910	Weathering Steel Patina	SF			intentionally blank	
911	Paint System - Other	SF			intentionally blank	
	no state element equivalent			520	Concrete Reinforcing Steel Protective System	SF
	no state element equivalent			521	Concrete Protective Coating	SF
8225	Non-skid Metal Surfacing	SF			intentionally blank	
8263	Steel Open Grid Sidewalk w/Cover Plate & Suppt.	SF			intentionally blank	
8301	Apron Steel Orthotropic Deck	SF			intentionally blank	
8305	Apron Hinge Multi-Pin & Plate	EA			intentionally blank	
8307	Apron Lips & Pins	EA			intentionally blank	
8310	Apron Hoist/Cables/Spool/Platform/Supports/Rigging	EA			intentionally blank	
8312	Span Apron/Cab Gangplank Pivot/Raise/Rams/Fittings	EA			intentionally blank	

WSBIS ELEMENTS			Calendar Year 2024	NATIONAL BRIDGE ELEMENTS		
element_id		unit	TRANSLATION	element_id	name	unit
8413	Steel Tower	EA			intentionally blank	
8414	Timber Tower	EA			intentionally blank	
8415	Steel Headframe	LF			intentionally blank	
8416	Timber Headframe	LF			intentionally blank	
8417	Tower Base Platform	SF			intentionally blank	
8418	Counterweight Guides	EA			intentionally blank	
8419	Concrete Counterweights	EA			intentionally blank	
8420	CTWT Sheaves/Shafts(FC)/Bearings/Anchor Blts.	EA			intentionally blank	
8421	Counterweight Cable Protective Systems	LF			intentionally blank	
8423	Steel Counterweights	EA			intentionally blank	
8450	Timber Wingwalls	LF			intentionally blank	
8451	Steel Pile Frame Wingwalls	LF			intentionally blank	
8460	Timber Pile Dolphins	EA			intentionally blank	
8462	Steel Pile Frame Dolphins	EA			intentionally blank	
8463	Timber Floating Dolphin	LF			intentionally blank	
8464	Concrete Pontoon Floating Dolphin	LF			intentionally blank	
8640	Moveable Pedestrian Gangplank	LF			intentionally blank	
8650	Overhead Passenger Loading Cab	SF			intentionally blank	
8653	Passenger Cab Floor System and Lift Beam(FC)	LF			intentionally blank	
8701	Ferry Concrete Floating Pontoon	CELL			intentionally blank	
8702	Ferry Steel Floating Pontoon	CELL			intentionally blank	
8703	Spud Piling & Wells	EA			intentionally blank	
8704	Pontoon Anchors, Anchor Chain/Cables/Clamps	EA			intentionally blank	
8906	Epoxy Paint System	SF			intentionally blank	
8910	Safety Access Ladders	EA			intentionally blank	
8911	Safety Railing & Catwalks	LF			intentionally blank	

Translation Notes

1.	State elements highlighted in light blue are used for structures owned and maintained by the Washington State Ferry system.
2.	National bridge elements that do not have a state element equivalent are highlighted in orange.
3.	A green arrow:  Indicates that the state element should be directly translated to the national element, including total quantities and each quantity for each condition state.
4.	A green bracket with a green arrow:  Indicates that all state elements on a given bridge need total quantity and the quantity in each condition state to be summed prior to translation to the indicated national element.
5.	A green drop arrow:  Indicates the state element is not translated to a national element.
6.	A red arrow:  Indicates special treatment is required for the translation. See associated note for details.
7.	Vacant as of 2022.
8.	State Elements 146 and 149 will remain EA units. Quantities in each condition state and the total will be summed and reported in NBI element 147 as LF units without alteration.

WSBIS ELEMENTS			Calendar Year 2022	NATIONAL TUNNEL ELEMENTS		
element_id		unit	TRANSLATION	element_id	name	unit
10000	Steel Tunnel Liner	SF	→	10000	Steel Tunnel Liner	SF
10001	Cast-in-Place Concrete Tunnel Liner	SF	→	10001	Cast-in-Place Concrete Tunnel Liner	SF
10002	Precast Concrete Tunnel Liner	SF	→	10002	Precast Concrete Tunnel Liner	SF
10003	Shotcrete Tunnel Liner	SF	→	10003	Shotcrete Tunnel Liner	SF
10004	Timber Tunnel Liner	SF	→	10004	Timber Tunnel Liner	SF
10005	Masonry Tunnel Liner	SF	→	10005	Masonry Tunnel Liner	SF
10006	Unlined Rock Tunnel	SF	→	10006	Unlined Rock Tunnel	SF
10007	Rock Bolt/Dowel	EA	→	10007	Rock Bolt/Dowel	EA
10009	Other Tunnel Liner	SF	→	10009	Other Tunnel Liner	SF
10010	Steel Tunnel Roof Girders	LF	→	10010	Steel Tunnel Roof Girders	LF
10011	Concrete Tunnel Roof Girders	LF	→	10011	Concrete Tunnel Roof Girders	LF
10012	Prestressed Concrete Tunnel Roof Girders	LF	→	10012	Prestressed Concrete Tunnel Roof Girders	LF
10019	Other Tunnel Roof Girders	LF	→	10019	Other Tunnel Roof Girders	LF
10020	Steel Columns/Piles	EA	→	10020	Steel Columns/Piles	EA
10021	Concrete Columns/Piles	EA	→	10021	Concrete Columns/Piles	EA
10029	Other Columns/Piles	EA	→	10029	Other Columns/Piles	EA
10030	Steel Cross Passageway	LF	→	10030	Steel Cross Passageway	LF
10031	Concrete Cross Passageway	LF	→	10031	Concrete Cross Passageway	LF
10033	Shotcrete Cross Passageway	LF	→	10033	Shotcrete Cross Passageway	LF
10034	Timber Cross Passageway	LF	→	10034	Timber Cross Passageway	LF
10035	Masonry Cross Passageway	LF	→	10035	Masonry Cross Passageway	LF
10036	Unlined Rock Cross Passageway	LF	→	10036	Unlined Rock Cross Passageway	LF
10039	Other Cross Passageway	LF	→	10039	Other Cross Passageway	LF
10041	Concrete Interior Walls	SF	→	10041	Concrete Interior Walls	SF
10049	Other Interior Walls	SF	→	10049	Other Interior Walls	SF
10051	Concrete Portal	SF	→	10051	Concrete Portal	SF
10055	Masonry Portal	SF	→	10055	Masonry Portal	SF
10059	Other Portal	SF	→	10059	Other Portal	SF
10061	Concrete Ceiling Slab	SF	→	10061	Concrete Ceiling Slab	SF
10069	Other Ceiling Slab	SF	→	10069	Other Ceiling Slab	SF
10070	Steel Ceiling Girder	LF	→	10070	Steel Ceiling Girder	LF
10071	Concrete Ceiling Girder	LF	→	10071	Concrete Ceiling Girder	LF
10072	Prestressed Concrete Ceiling Girder	LF	→	10072	Prestressed Concrete Ceiling Girder	LF
10079	Other Ceiling Girder	LF	→	10079	Other Ceiling Girder	LF
10080	Steel Hangers and Anchorages	EA	→	10080	Steel Hangers and Anchorages	EA
10089	Other Hangers and Anchorages	EA	→	10089	Other Hangers and Anchorages	EA
10090	Steel Ceiling Panels	SF	→	10090	Steel Ceiling Panels	SF
10091	Concrete Ceiling Panels	SF	→	10091	Concrete Ceiling Panels	SF
10099	Other Ceiling Panels	SF	→	10099	Other Ceiling Panels	SF
10101	Concrete Invert Slab	SF	→	10101	Concrete Invert Slab	SF
10109	Other Invert Slab	SF	→	10109	Other Invert Slab	SF
10111	Concrete Slab-on-Grade	SF	→	10111	Concrete Slab-on-Grade	SF
10119	Other Slab-on-Grade	SF	→	10119	Other Slab-on-Grade	SF
10120	Steel Invert Girder	LF	→	10120	Steel Invert Girder	LF
10121	Concrete Invert Girder	LF	→	10121	Concrete Invert Girder	LF
10122	Prestressed Concrete Invert Girder	LF	→	10122	Prestressed Concrete Invert Girder	LF
10129	Other Invert Girder	LF	→	10129	Other Invert Girder	LF
10130	Strip Seal Expansion Joint	LF	→	10130	Strip Seal Expansion Joint	LF
10131	Pourable Joint Seal	LF	→	10131	Pourable Joint Seal	LF
10132	Compression Joint Seal	LF	→	10132	Compression Joint Seal	LF
10133	Assembly Joint With Seal	LF	→	10133	Assembly Joint With Seal	LF
10134	Open Expansion Joint	LF	→	10134	Open Expansion Joint	LF
10135	Assembly Joint Without Seal	LF	→	10135	Assembly Joint Without Seal	LF
10139	Other Joint	LF	→	10139	Other Joint	LF
10140	Gaskets	LF	→	10140	Gaskets	LF
10151	Concrete Wearing Surface	SF	→	10151	Concrete Wearing Surface	SF
10158	Asphalt Wearing Surface	SF	→	10158	Asphalt Wearing Surface	SF
10159	Other Wearing Surface	SF	→	10159	Other Wearing Surface	SF
10160	Steel Traffic Barrier	LF	→	10160	Steel Traffic Barrier	LF
10161	Concrete Traffic Barrier	LF	→	10161	Concrete Traffic Barrier	LF
10169	Other Traffic Barrier	LF	→	10169	Other Traffic Barrier	LF
10170	Steel Pedestrian Railing	LF	→	10170	Steel Pedestrian Railing	LF
10171	Concrete Pedestrian Railing	LF	→	10171	Concrete Pedestrian Railing	LF
10179	Other Pedestrian Railing	LF	→	10179	Other Pedestrian Railing	LF
10200	Ventilation System	EA	→	10200	Ventilation System	EA
10201	Fans	EA	→	10201	Fans	EA
10300	Drainage and Pumping System	EA	→	10300	Drainage and Pumping System	EA
10301	Pumps	EA	→	10301	Pumps	EA
10400	Emergency Generator System	EA	→	10400	Emergency Generator System	EA
10475	Flood Gate	EA	→	10475	Flood Gate	EA
10500	Electrical Distribution System	EA	→	10500	Electrical Distribution System	EA
10550	Emergency Distribution System	EA	→	10550	Emergency Distribution System	EA
10600	Tunnel Lighting Systems	EA	→	10600	Tunnel Lighting Systems	EA
10601	Tunnel Lighting Fixtures	EA	→	10601	Tunnel Lighting Fixtures	EA
10620	Emergency Lighting Systems	EA	→	10620	Emergency Lighting Systems	EA
10621	Emergency Lighting Fixtures	EA	→	10621	Emergency Lighting Fixtures	EA
10650	Fire Detection System	EA	→	10650	Fire Detection System	EA

10700	Fire Protection System	EA		10700	Fire Protection System	EA
10750	Emergency Communications System	EA		10750	Emergency Communications System	EA
10800	Tunnel Operations and Security System	EA		10800	Tunnel Operations and Security System	EA
10850	Traffic Sign	EA		10850	Traffic Sign	EA
10870	Egress Sign	EA		10870	Egress Sign	EA
10890	Variable Message Board	EA		10890	Variable Message Board	EA
10910	Lane Signal	EA		10910	Lane Signal	EA
10911	Lane Signal Fixture	EA		10911	Lane Signal Fixture	EA
10950	Steel Corrosion Protective Coating	SF		10950	Steel Corrosion Protective Coating	SF
10951	Concrete Corrosion Protective Coating	SF		10951	Concrete Corrosion Protective Coating	SF
10952	Fire Protective Coating	SF		10952	Fire Protective Coating	SF
10955	Reflective Tunnel Tile	SF			intentionally blank	

Note 9 - Deck Translation Specifications

For WSDOT elements 12, 14, 20, 26, and 8217, perform the following steps towards translation to NBE element 12:

Step	Description
1	Sum total quantities and all quantities in each condition state into an NBE Temp element 12.
2	Move all quantities in WSDOT CS4 into NBE Temp CS2, adding to the quantity of NBE Temp CS2 added in Step 1. NBE Temp CS4 will have zero quantity at this point.
3	Move all quantities in WSDOT CS3 into NBE Temp CS4.
4	Add WSDOT elements 35 and 8216 CS2 to NBE Temp CS2.
5	Add WSDOT elements 35 and 8216 CS3 to NBE Temp CS4.
6	If NBE Temp total quantity = NBE Temp CS1 + CS2 + CS3 + CS4, go to Step 11.
7	If NBE Temp total quantity > NBE Temp CS1 + CS2 + CS3 + CS4, deduct difference from NBE Temp CS1 to zero limit, then go to Step 6.
8	If NBE Temp total quantity > NBE Temp CS1 + CS2 + CS3 + CS4, deduct difference from NBE Temp CS2 to zero limit, then go to Step 6.
9	If NBE Temp total quantity > NBE Temp CS1 + CS2 + CS3 + CS4, deduct difference from NBE Temp CS3 to zero limit, then go to Step 6.
10	If NBE Temp total quantity > NBE Temp CS1 + CS2 + CS3 + CS4, set NBE Temp CS4 = NBE Temp total quantity, then go to Step 11.
11	Move NBE Temp total quantity and all Temp CS1 through CS4 quantities to final NBE element
12	Note that CS3 will have zero quantity in the final translation.

For WSDOT elements 13 and 8413, perform the following steps towards translation to NBE element 16:

Step	Description
1	Sum total quantities and all quantities in each condition state into NBE element 16.
2	Move all quantities in WSDOT CS4 into NBE CS2, adding to the quantity of NBE CS2 added in Step 1. NBE CS4 will have zero quantity at this point.
3	Move all quantities in WSDOT CS3 into NBE CS4. Note that NBE CS3 will have zero quantity in the final translation.

Note 10 - Pin, Pin & Hanger Translation Specifications

For WSDOT elements 162 and 8343, perform the following steps towards translation to NBE element 161:

Step	Description
1	Sum the WSDOT elements 162 and 8243 total quantities and all condition state quantiies into NBE Temp element 161.
2	Add the WSDOT element 161 and 8342 CS1 through CS4 to corresponding NBE Temp element 161 CS1 through CS4.
3	If NBE Temp total quantity = NBE Temp CS1 + CS2 + CS3 + CS4, go to Step 8.
4	If NBE Temp total quantity > NBE Temp CS1 + CS2 + CS3 + CS4, deduct difference from NBE Temp CS1 to zero limit, then go to Step 3.
5	If NBE Temp total quantity > NBE Temp CS1 + CS2 + CS3 + CS4, deduct difference from NBE Temp CS2 to zero limit, then go to Step 3.
6	If NBE Temp total quantity > NBE Temp CS1 + CS2 + CS3 + CS4, deduct difference from NBE Temp CS3 to zero limit, then go to Step 3.
7	If NBE Temp total quantity > NBE Temp CS1 + CS2 + CS3 + CS4, set NBE Temp CS4 = NBE Temp total quantity, then go to Step 8.
8	Move NBE Temp total quantity and all Temp CS1 through CS4 quantities to final NBE element 161.

Note 11 - Joint and Wearing Surface Translation Specifications

For WSDOT elements 400, 403 and 417, perform the following steps towards translation to NBE element 301:

Step	Description
1	Sum the WSDOT element total quantities and into NBE element total quantities.
2	Sum the WSDOT element CS1 quantities into NBE element CS2 quantities. Note that NBE will have zero quantities in CS1.
3	Sum the WSDOT element CS2 quantities into NBE element CS3 quantities.
4	Sum the WSDOT element CS3 quantities into NBE element CS4 quantities.

Perform these same steps listed above for the following translations:

- WSDOT elements 401, 402, 407 8407, and 419 translated into NBE element 304
- WSDOT elements 408, 8408, 409, 414, 410 and 411 translated into NBE element 305
- WSDOT elements 404, 8404, 405, 406 and 8406 translated into NBE element 302
- WSDOT elements 412 and 413 translated into NBE element 300
- WSDOT element 416 translated into NBE element 303
- WSDOT elements 415 and 418 translated into NBE element 306
- WSDOT elements 800, 8223, 801, 802, 8224, 803, 804, and 805 translated into NBE element 510

Note 12 - Paint/Coating Translation Specifications

For WSDOT elements 901, 8901, 902, 8902, 903, 8903, 904, 8904, 905, 8905, 906, 907, 8907, 908, 909, 8909, and 910, perform the following steps towards translation to NBE element 515:

Step	Description
1	Sum the WSDOT element total quantities and into NBE element total quantities.
2	Sum the WSDOT element CS1 quantities into NBE element CS1 quantities.
3	Sum the WSDOT element CS2 quantities into NBE element CS2 quantities.
4	Sum the WSDOT element CS3 quantities into NBE element CS4 quantities. Note that NBE CS3 will always have zero quantities.

Appendix 2-F Border Bridge Information

Oregon

Send all reports and any requests for their reports to

Erick Cain, OPMA, Erick.j.cain@odot.state.or.us
Bridge Inventory Coordinator
4040 Fairview Industrial Dr. SE MS #4
Salem, OR 97302
Phone: 503 986 3384 Fax: 503 986 3407

Region 1 - (Longview to Hood River) –
Joel Boothe, Joel.E.BOOTHE@odot.state.or.us
Office 503-652-5691, Cell 503-969-1091, Fax 503-653-3085

Inspected by Oregon:
5/1E – 000000PR – Columbia R Interstate (Oregon #01377A)
5/1W – 0005216A – Columbia R Interstate (Oregon #07333)
205/1 – 0010833A – Glen Jackson Bridge (Oregon #09555)
0259228300 – 08712700 – Br of the Gods (Oregon # 02592)

Inspected by Washington:
433/1 – 0003760A – Lewis & Clark (Oregon #02046)

Region 2 -
Bill Burns, 503-986-2659, Robert.W.BURNS@odot.state.or.us

Inspected by Oregon:
101/1 – 0007666A - Megler (Oregon #07949D) – Spans 1-4
101/1(A) – 0007666B - Megler(A) (Oregon #07949A) – Spans 5-19
101/1(B) – 0007666C - Megler(B) (Oregon #07949B) – Spans 20-159
101/1(C) – 0007666D - Megler(C) (Oregon #07949C) – Span 160

Region 4 - (Hood River to Biggs Jct.) –
Mike Pulzone, James.M.PULZONE@odot.state.or.us
Office 541-388-6188, Cell 541-419-1688, Fax 541-388-6108

Inspected by Oregon:
197/1 – 000000PC – The Dalles (Oregon #06635Q)

Inspected by Washington:
97/1 – 0006539A – Biggs Rapids-Sam Hill (Oregon #00849A)

Inspected by Consultants
06645 – 000000PH – Hood River (Oregon #06645)

Region 5 -
Kelley McAlister, Kelley.T.MCALISTER@odot.state.or.us
541-963-1371

Inspected by Washington:
82/280N – 0012819A – Umatilla (Oregon #16424)
82/280S – 000000PD – Umatilla (Oregon #02230A)

Oregon Underwater Reports –
Rick Shorb, Rick.L.SHORB@odot.state.or.us

Idaho

Patty Fish, patty.fish@itd.idaho.gov, 208-334-8847
cc to Kathleen Slinger, Kathleen.Slinger@itd,idaho.gov

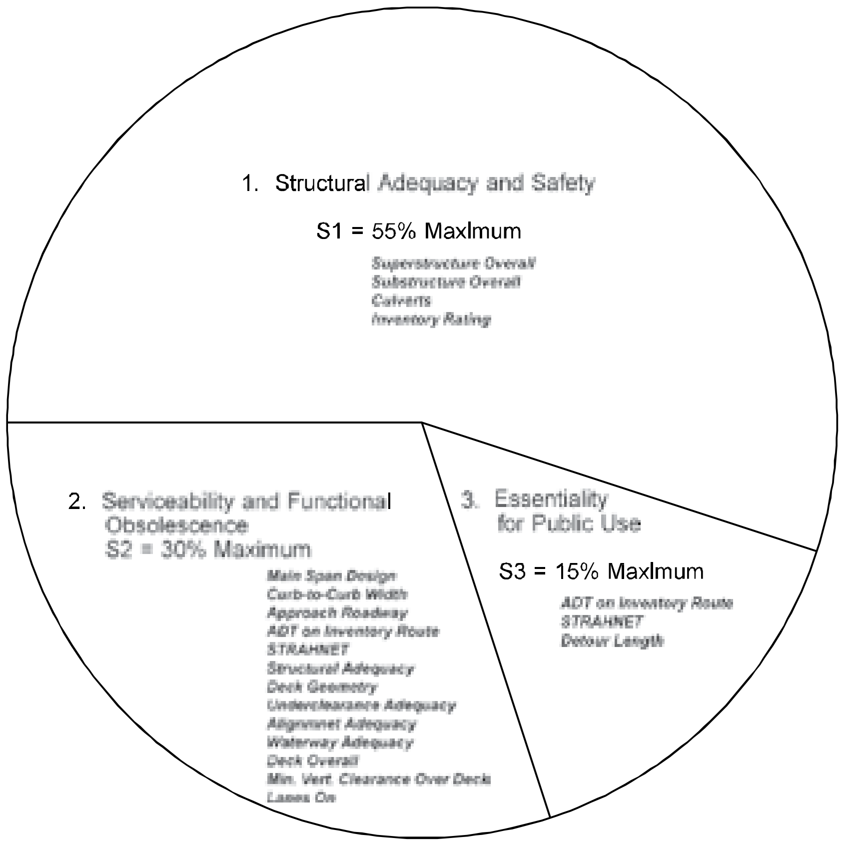
Inspected by Washington
12/915 – 0002348A – Snake R Clarkston (ID SID 000000000010360)

Inspected by Idaho
41/10 – 00000LLV – BNRR OC (ID SID 000000000014255)
90/594N – 00200520 – Spokane River (ID SID 000000000016735)
90/594S – 00200519 – Spokane River (ID SID 000000000016740)
5700-1 – 08374400 – Southway Bridge (ID SID 000000000021495) – Local Agency owned (Asotin County) – Idaho works directly with Asotin County

Appendix 2-G Sufficiency Rating Calculation

Sufficiency Rating Worksheet

An Illustration of Sufficiency Rating (SR) Factors



4. Special Reductions
S4 = 13% Maximum

Detour Length
Main Span Design
Bridge Rail
Transition
Guardrail
Terminal

Sufficiency Rating = S1 + S2 + S3 - S4

Sufficiency Rating shall not be < 0 nor > 100

If S1 + S2 + S3 $\geq$ 50, then subtract S4, otherwise SR = S1 + S2 + S3

Structure ID: ______________________________

Bridge Number: ______________________________

Bridge Name: ______________________________

Sufficiency Rating = S1 + S2 + S3 – S4 (Range: 0 to 100)

= (   ) + (   ) + (   ) - (   )

= ______________

SD/FO (WSBIS Item 2711) = ________________

Calculated by: ______________________________

Date: ______________________________

Note:

These calculations use English units. The final value may differ slightly from WSBIS Item 2710 as it is calculated using metric values.

STRUCTURAL ADEQUACY & SAFETY (S1)

1. Determine the value of A:

(a) Enter the condition codes for:

WSBIS 1671	*SUPERSTRUCTURE OVERALL*	_________
WSBIS 1676	*SUBSTRUCTURE CONDITION*	_________
WSBIS 1678	*CULVERT CONDITION*	_________

(b) Find A:

A = 55 : If the lowest code above is less than or equal to 2
A = 40 : If the lowest code is equal to 3
A = 25: If the lowest code is equal to 4
A = 10 : If the lowest code is equal to 5
A = 0 : If the lowest code is greater than 5

***A* = __________**

2. Determine the value of B:

***Either*:**

when the Inventory Rating uses Tons:

(a) Enter the Inventory Rating (IR):

*WSBIS 1555 INVENTORY RATING (IR)=*_________TONS

(b) Find the value of B:

$$B = (36 - IR)^{1.5} \times 0.2778$$

***B* = __________**

***Or*:**

when the Inventory Rating uses a Factor*:

(a) Enter the Inventory Rating (IR):

*WSBIS 1556 INVENTORY RATING (IR)=*________FACTOR

(b) Find the value of B:

$$B = (36 - (IR \times 36))^{1.5} \times 0.2778$$

***B* = __________**

3. Determine S1:

$$S1 = 55 - (A + B)$$

S1 = __________ (points range from 0 to 55)

* See article at http://www.fhwa.dot.gov/bridge/bridgeload01.cfm

SERVICEABILITY & FUNCTIONAL OBSOLESCENCE (S2)

1. Determine the value of C:

(a) Enter the adequacy or condition codes for the fields listed.
(b) Determine corresponding values for these codes from Table 1.
(c) For codes higher than those listed, use a value of 0.

TABLE 1

	Code	Value
If *STRUCTURAL EVALUATION* is:	≤ 3	= 4
WSBIS 1657	= 4	= 2
	= 5	= 1
If *DECK GEOMETRY* is:	≤ 3	= 4
WSBIS 1658	= 4	= 2
	= 5	= 1
If *UNDERCLEARANCES* is:	≤ 3	= 4
WSBIS 1659	= 4	= 2
	= 5	= 1
If *ALIGNMENT* is:	≤ 3	= 4
WSBIS 1661	= 4	= 2
	= 5	= 1
If *WATERWAY* is:	≤ 3	= 4
WSBIS 1662	= 4	= 2
	= 5	= 1
If *OVERALL DECK CONDITION* is:	≤ 3	= 5
WSBIS 1663	= 4	= 3
	= 5	= 1

(d) Add the values to determine C.

		Code	Value
WSBIS 1657	*STRUCTURAL EVALUATION*	_____	_____
WSBIS 1658	*DECK GEOMETRY*	_____	_____
WSBIS 1659	*UNDERCLEARANCES*	_____	_____
WSBIS 1661	*ALIGNMENT*	_____	_____
WSBIS 1662	*WATERWAY*	_____	_____
WSBIS 1663	*OVERALL DECK CONDTION*	_____	_____

TOTAL C = ______(13 maximum)

2. Determine the value of D:

(a) Enter measurements for the following fields:

WSBIS 1397	*APPROACH ROADWAY WIDTH*	________
WSBIS 1356	*CURB-TO-CURB WIDTH*	________

(b) Find the value of D: (For bridges that are <u>not</u> culverts (i.e., Main Span Design is not 19))

APPROACH ROADWAY WIDTH > (*CURB-TO-CURB WIDTH* + 2.0'), D = 5
APPROACH ROADWAY WIDTH ≤ (*CURB-TO-CURB WIDTH* + 2.0'), D = 0

***D* = ________**

3. Determine the value of E:

(a) Enter or determine the following values:

WSBIS 1352	*LANES ON*	________
WSBIS 1356	*CURB-TO-CURB WIDTH*	________
WSBIS 1445	*ADT ON INVENTORY ROUTE*	________
Lane Width (rounded to tenths):		
	CURB-TO-CURB WIDTH/LANES ON	________
ADT/Lane:		
	ADT ON INVENTORY ROUTE/LANES ON	________

(b) Find the value of E: (where the following conditions apply)

<u>For One-Lane Bridges:</u>

- Lane Width < 14, E = 15
- 14 ≤ Lane Width < 18, E = 15 ((18-Lane Width)/4) = ________
- Lane Width ≥ 18, E = 0

<u>For Two or More Lane Bridges:</u>

- *LANES ON* = 02 and Lane Width ≥ 16, E = 0
- *LANES ON* = 03 and Lane Width ≥ 15, E = 0
- *LANES ON* = 04 and Lane Width ≥ 14, E = 0
- *LANES ON* > 05 and Lane Width ≥ 12, E = 0

If the above calculations apply, <u>do not</u> continue.

- ADT/Lane > 50 and Lane Width < 9, E =15
- ADT/Lane ≤ 50 and Lane Width < 9, E =7.5
- ADT/Lane ≤ 50 and Lane Width ≥ 9, E = 0

- 50 < ADT/Lane ≤ 125 and Lane Width <10, E = 15
- 50 < ADT/Lane ≤ 125 and 10 ≤ Lane Width <13,
  E = 15 (13 - Lane Width)/3 = ______
- 50 < ADT/Lane ≤ 125 and Lane Width ≥13, E = 0

- 125 < ADT/Lane ≤ 375 and Lane Width < 11, E = 15
- 125 < ADT/Lane ≤ 375 and 11 ≤ Lane Width < 14,
  E = 15 (14 - Lane Width)/3 = ______
- 125 < ADT/Lane ≤ 375 and Lane Width ≥ 14, E = 0

- 375 < ADT/Lane ≤ 1350 and Lane Width < 12, E= 15
- 375 < ADT/Lane ≤ 1350 and 12 ≤ Lane Width < 16,
  E = 15 (16 - Lane Width)/4 = ______
- 375 < ADT/Lane ≤ 1350 and Lane Width ≥ 16, E = 0

- ADT/Lane > 1350 and Lane Width < 15, E=15
- ADT/Lane > 1350 and 15 ≤ Lane Width < 16,
  E = 15 (16 - Lane Width) = _______
- ADT/Lane > 1350 and Lane Width ≥ 16, E = 0

***E* =** ________

4. Determine the value of F:

(a) Enter the following values:

WSBIS 1370	*MIN. VERT. CLEARANCE OVER DECK*	___________
WSBIS 1485	*STRAHNET*	____________

(b) Find the value of F: (using the following conditions)

- *STRAHNET* > 0 and *MIN. VERT. CLEARANCE OVER DECK* ≥ 16 00, F = 0
- *STRAHNET* > 0 and *MIN. VERT. CLEARANCE OVER DECK* < 16 00, F = 2
- *STRAHNET* = 0 and *MIN. VERT. CLEARANCE OVER DECK* ≥ 14 00, F = 0
- *STRAHNET* = 0 and *MIN. VERT. CLEARANCE OVERDECK* < 14 00, F = 2

***F* =** ________

5. Determine S2:

S2 = 30 - (C +(D + E)+ F) *((D + E) cannot be more than 15)*

S2 = ________ (points range from 0 to 30)

ESSENTIALITY FOR PUBLIC USE (S3)

1. Determine the value of G:

(a) Enter the following values:

WSBIS 1445	*ADT ON INVENTORY ROUTE*	__________
WSBIS 1413	*DETOUR LENGTH*	___________
	S1 POINTS	__________
	S2 POINTS	__________

(b) Calculate the value of G:

$$G = \frac{(\textit{ADT ON INVENTORY ROUTE})(\textit{DETOUR LENGTH})(7.5)}{[(S1 + S2)/85](100{,}000)}$$

$$G = \frac{(\_\_\_\_\_\_\_\_\_)(\_\_\_\_\_\_\_\_\_)\,(7.5)}{[(\_\_\_\_\_\_\_\_\_+\_\_\_\_\_\_\_\_\_)/85](100{,}000)}$$

***G* =** ________ (15 maximum)

2. Determine the value of H:

(a) Enter the following value:

WSBIS 1485 *STRAHNET* __________

(b) Find the value of H:

- *STRAHNET* code is 1 or 2, H = 2
- *STRAHNET* code is 0, H = 0

***H* =** ________

3. Determine S3:

S3 = 15 - (G + H)

S3 = ________ (points range from 0 to 15)

SPECIAL REDUCTIONS (S4)

Use only if $S1 + S2 + S3 \geq 50$

1. Determine the value of I:

(a) Enter the following value:

WSBIS 1413 *DETOUR LENGTH* ____________

(b) Calculate the value of I:

$I = (DETOUR\ LENGTH)^4(5.205)(10^{-8})$

***I* =**____________(5 maximum)

2. Determine the value of J:

(a) Enter the following value:

WSBIS 1533 *MAIN SPAN DESIGN* ____________

(b) Find the value of J:

- If *MAIN SPAN DESIGN* is 10, 12, 13, 14, 15, 16, or 17, then J = 5
- Otherwise, J = 0

***J* =** ____________

3. Determine the value of K:

(a) Enter the following coding values:

WSBIS 1684 *BRIDGE RAIL* ___________
WSBIS 1685 *TRANSITION* ___________
WSBIS 1686 *GUARDRAIL* ___________
WSBIS 1687 *TERMINAL* ___________

(b) Find the value of K:

- If 2 of the above values are 0, then K = 1
- If 3 of the above values are 0, then K = 2
- If 4 of the above values are 0, then K = 3

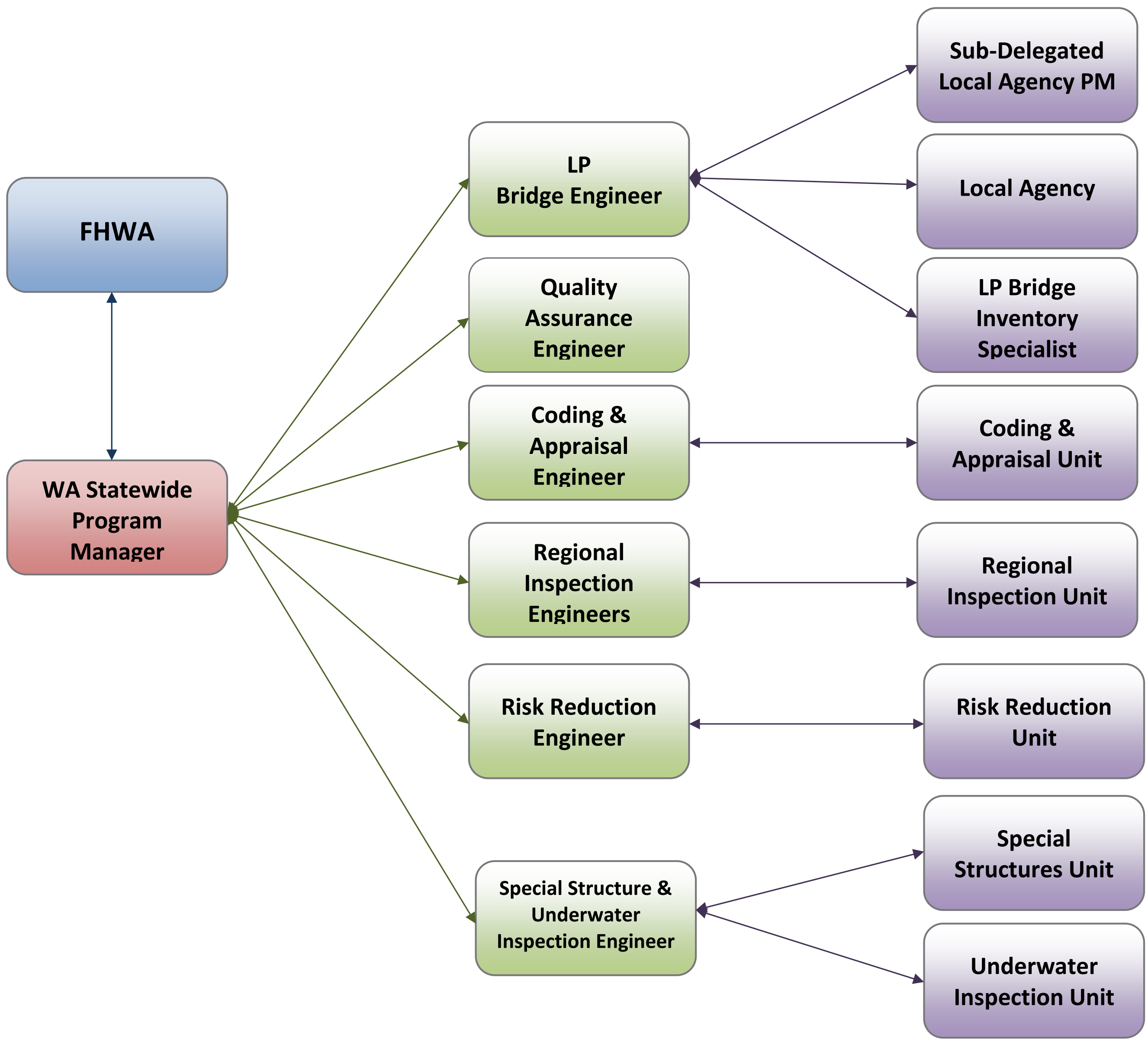
***K* = __________**

4. Determine S4:

S4 = I + J + K

S4 = _______ (points range from 0 to 13)

Appendix 2-H WSDOT/FHWA Communication Protocol Flowchart



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Chapter 3 Inspections and Reports

3-1 General

This chapter provides guidelines to inspect bridges, culverts and tunnels, including documentation.

The guidelines presented herein are those in use by the WSDOT Bridge Preservation Office (BPO). Local Agencies are encouraged to follow these guidelines so as to provide a consistent basis for evaluation and reporting of inspection data. Coding for non-mandatory items may deviate according to the needs of an individual agency. Agencies are encouraged to document such deviations in a manner so as to aid in the evaluation of the associated inspection data.

The basis for bridge inspection policies and procedures are referenced throughout the chapter by the updated versions of the two following manuals:

The AASHTO *Manual for Bridge Evaluation* (MBE), Section 4, provides uniformity in the procedures and policies for determining the physical condition, maintenance needs, and load capacity of the nation's highway bridges.

The FHWA NHI 12-049 *Bridge Inspector's Reference Manual* (BIRM) is a manual on programs, procedures, and techniques for inspecting and evaluating a variety of in-service bridges. It provides guidelines regarding what preparation is necessary, how to inspect, what to look for, what equipment and tools are needed, how to document the results of the inspections, and provide appropriate follow-up to the inspection.

Depending on the inspection type, bridges submitted to the NBI and NTI have regular inspection intervals that must adhere to the intervals defined within the NBIS and NTIS. When a bridge is inspected late, the agency must document a justifiable cause that pushed the inspection beyond the required interval. The justifiable cause, identified as an unusual circumstance in the preamble of the NBIS and NTIS regulation, should be documented within the inspection report. Examples of unusual circumstances include severe weather, concern for inspector safety, concern for inspection quality, the need to optimize scheduling with other bridges, or other unique situations. Bridges with late inspections will be scheduled for the original inspection month during subsequent inspection cycles.

3-2 Inspection Types and Reporting

This section identifies and describes several inspection types, used by both the state and local agencies, that have been developed to address specific needs. Below is a list of those inspection types followed by a description of each inspection/report type.

- Initial
- Routine Bridge
- Routine Tunnel
- Nonredundant Steel Tension Member (NSTM)
- Underwater
- Complex Feature
- Interim
- Underwater Interim
- Damage
- Condition Safety
- WSDOT Safety
- Local Agency
- Short Span
- Two-Man UBIT Discontinued
- Informational
- Inventory
- In-Depth
- Geometric
- Feature Discontinued
- Scour Monitoring

3-2.1 *Bridge Inspection Reports*

All bridge field inspection reports (BIR) must be prepared at the completion of each inspection type to record the inspection findings, provide a narrative description of conditions at the bridge site, and note any changes in the WSBIS coding information. The Team Leader shall record and submit the findings of the specified type of inspection into BridgeWorks. A Routine Inspection will be included with all NSTM and Special Feature inspection types. A bridge inspection report must be completed and released in the BridgeWorks program within 90 days from the end of the associated inspections.

3-2.1.A Opening and Completing Bridge Inspection Reports

(1) Select the appropriate report type to be included in the record and enter/select the: Team Leader initials, Team Leader identification number, Assistant Inspector initials, date of inspection, and total number of crew hours at the bridge site. The Team Leader and Assistant Inspector are required to sign the approved and released copy of the BIR that is placed in the bridge file.

(2) Confirm the condition and adequacy coding for the various bridge elements and make any changes as necessary. Review the Adequacy Appraisal codes, NBI/SNBI condition codes, BMS and SNTI elements and their respective condition states. Provide notes and narratives from field observations describing the existing conditions and supporting condition codes. Verify that the correct Program Manager is listed on the inspection report.

(3) Update photos representing current or monitored conditions or defects. Photo narratives must include location and direction photo was taken, including photos representing typical conditions. Photos for Deck and Elevations should be updated approximately every 10 years or as conditions, at or around bridge, change significantly. Ensure that photos are identified in the element and note narratives.

(4) Prepare recommendations for repair of any bridge elements in need of repair and provide photos and descriptions of locations to be repaired. Update repair photos as conditions change. Verify out any repairs that have been completed and take a photo of the existing condition of repair. Repair and verification photos should be attached to the associated repair. Ensure all repair numbers and relevant repair or verification photos are identified in the element and note narratives. See Section 6-4 for additional repair instructions and procedures.

(5) Update the Files Tab with all newly gathered or updated file information, such as Scour Field Evaluations, Ground Lines, Element Condition Spreadsheets, Relevant Supporting Documentation, or Information for Inspection Coordination or Planning. Once the files are attached, PDF versions of the files, (if they are not already PDF) need to be created. Prior to locking the report, select all the appropriated PDF files for inclusion in the intended report.

(6) If it is determined that a critical bridge deficiency has been identified resulting in an emergency load restriction, lane closure, bridge closure or a failed bridge, open a Damage Inspection report type to flag and identify the finding. This will be in addition to the report being conducted (if applicable). Open a Critical Finding and complete the known information under the Critical Findings Tab. See Damage Report and Chapter 6 for additional information.

(7) Complete the report resources information on any soundings, inspection resources, support, or third-party requirements to include date completed, interval if applicable and date of next resource requirement.

3-2.2 Initial Inspection (Triggered Inspection-No Interval, Next Routine Insp. at 24 months)

An Initial Inspection is essentially the first Routine Inspection performed on any new, replaced, rehabilitated, or temporary bridge. This inspection requires a Lead Inspector with a current Certification Number. It is conducted the same as a Routine Inspection outlined below and verifies any data already entered in BridgeWorks via the "Inventory" Report type. An Initial Inspection may also be performed when there is a change in bridge ownership. The initial inspection, for reportable structures is reported to the NBI and NTI. When the Initial Inspection is conducted, the necessary information to schedule the Routine Inspection report type will also be entered.

The purpose of this inspection is to add bridges to the inventory, or document significant structural changes due to widening or rehabilitation and establish certain baseline information.

1. **Gathering Inventory Data** – Establishing baseline information about the bridge from the original construction plans or as-built plans can be performed in the office prior to the site inspection. Agencies shall record the required WSBIS data into BridgeWorks along with the applicable Bridge Management System (BMS) elements for the structure. Any information not known, or which cannot be determined from the plans can be left blank until the site inspection.

   Depending on the type of structure built, one or more of the following inspection types may also be required to be performed with the initial inspection, in addition to entering the Routine Inspection information:

   - An NSTM Inspection if the bridge contains nonredundant steel tension members. See Nonredundant Steel Tension Member (NSTM) Inspection.
   - An Underwater Inspection is needed to inspect underwater portions of the bridge. See Underwater Inspection.
   - A Complex Features inspection if the bridge contains unique design or construction elements. See Complex Feature Inspection.

   Conclusions and findings from these items should be incorporated into the Bridge Inspection Report (BIR) to support the applicable codes and ratings.

   Team Leaders should coordinate the planning and timing of the inspection with the appropriate project or construction offices prior to visiting the site.

2. **Site Inspection** – The Initial Inspection site visit must be conducted after the bridge has been constructed, preferably before it is placed into service, but within 90 days after it is open to traffic. As part of the site inspection, the Team Leader will verify, complete and correct, if necessary, any inventory information that had been initially coded into BridgeWorks. At the bridge site, the Team Leader should review and confirm all geometric information such as actual bridge dimensions, and measurements, and verify the list of bridge elements including the quantity and condition of each. As part of the initial site visit, at least two photographs of the bridge shall be taken: an elevation and a deck

photograph. The elevation photograph should be taken (looking north or east) when possible, to show a view from one side of the bridge. The deck photograph should be taken (ahead on station) to show a view of the bridge looking onto the bridge deck.

Additional Information to Collect may include initial soundings (channel profile), vertical clearance for the carried route or vertical clearances for all routes below.

The Scour Field Evaluation Form and Vertical Clearance forms were developed for collecting this information and supplement the BIR scour. Examples of the forms are shown in Section 3-5.

3. **Check Coding** – The BIR form should note any inconsistencies found between the plans and the as-built bridge and should provide an explanation of any coding changes.
4. **Establish Routine Inspection Schedule and Resources** – Before releasing the report in bridge works, the inspection interval and next inspection date for Routine or any other required inspections needs to be entered. In the review process and prior to release, the next inspection date, program scheduling requirements, and resources for future inspections need to be evaluated. For the state, these will be coordinated with Supervisors, and Scour engineer, and then entered accordingly with correct interval and any force date to properly coincide with future scheduled inspections.

3-2.3 *Routine Bridge Inspection (Scheduled 12, 24 or 48-Month Interval)*

Routine Inspections are the regularly scheduled inspections of an entire structure to ensure that the structure continues to satisfy present service requirements. Inspections consist of observations, measurements, or both, as needed to determine the physical and functional condition of the bridge, to identify any changes from “Initial” or previously recorded conditions. This inspection requires a Lead Inspector with a current Certification Number. Generally, Routine Inspection intervals are not to exceed 24 months throughout the life of the bridge. The acceptable tolerance for intervals of 24 months or greater for the next Routine inspection is up to three (3) months after the month in which the inspection was due. The acceptable tolerance for intervals less than 24 months for the next Routine inspection is up to two (2) months after the month in which the inspection was due. For any inspection conducted outside the month in which the inspection was due, regardless of interval, the subsequent Routine inspection will be reset to the original target month. Changes to the target month will require PM approval within Bridgeworks. Routine Inspections are reported to the NBI and NTI.

1. **Inspecting Bridge Components –** The BIRM describes the general inspection procedures to be followed for inspecting any concrete, steel, or timber bridges, and the specific procedures to follow for inspecting given bridge elements (i.e., the bridge abutments). These steps can be used by the Team Leader as a checklist to help accomplish the inspection and identify types of problems a given bridge or bridge element will be prone to. Following these procedures will help ensure that a thorough and comprehensive inspection is achieved. However, specific problems not covered in these general procedures may be encountered. If that is the case, the Team Leader may contact their respective WSDOT Bridge Program Support personnel.
2. **Inspecting for Scour –** The Routine Inspection of any bridge over water should include an assessment of existing scour conditions, the effect of scour on the bridge, effectiveness of countermeasures, and recommendations for repair, if appropriate. The field inspection

is used in conjunction with the scour appraisal (see Section 5-3), to identify and verify the potential of harmful effects of scour to the bridge.

Field inspection documentation for scour should include the specific location and extent of any deterioration, damage, or undermining in the following:

- The stream channel and stream banks.
- Substructure elements (abutments, pier walls, web walls, columns, or shafts).
- Foundations (footings and seals). Measure and record the extent of foundation exposure and undermining.
- Channel protection devices (i.e., dams and levees).
- Scour countermeasures (riprap or shielding).
- Recommendations for any repairs, replacement, or maintenance required.
- Perform soundings on bridges as identified by the Scour Engineer using the Scour Field Evaluation form.

The Scour Field Evaluation form was developed to supplement the BIR for water crossings by measuring the streambed cross-section (soundings) at a bridge to document observations related to scour. A copy of this form is shown in Section 3-5.

Soundings of streambed elevations should be taken during the Initial Routine Inspection and during subsequent inspections as required. The form should note the location and depth of the streambed at each point where a sounding was taken. This information should then be plotted to identify long term changes in the channel cross section over time.

Further discussion of inspection procedures for bridges over water can be found in the BIRM *Bridge Inspectors Reference Manual* and *HEC 18 Evaluating Scour at Bridges*.

3. **Routine Inspections with Extended Intervals** – Routine Inspections with extended inspection intervals greater than 24 months but not exceeding 48 months, must meet the criteria of CFR 23 650.311 (a) (1) (iii) and as outlined in the WSDOT Extended Interval Policy sent to FHWA dated September 18th, 2023.
   - Reported bridges shall be re-evaluated against the policy criteria sent to FHWA after every inspection. Refer to the WSDOT Extended Interval Policy sent to FHWA, dated September 18th, 2023, under Appendix 3-C for further details.
   - The Coding and Appraisal Unit will run data checks on each BIR to determine the reported structure's eligibility prior to release into the database.
   - Team Leaders for the State shall place the following note in the zero (0) note of the BIR within BridgeWorks for existing extended interval bridges and candidate bridges:

     "Continue to validate the status of this bridge each inspection as a 48-month inspection candidate. Verify condition ratings, load ratings, vertical clearances, ADT, scour codes and that no major rehabilitation, or structural modification such as widening has occurred in the last two years."
4. **Routine Inspections with Inspection Intervals Less than 24 Months** – Bridges or culverts should be considered for more frequent inspections if structure or site conditions warrant more frequent inspection of the entire structure. Under CFR 23 (a) (1)(ii)(B) bridges included in the NBI that meet any of the following criteria must be inspected at intervals not to exceed 12 months.

   a. One or more of the NBI Deck, Superstructure, Substructure or Culvert code is rated equal to 3 or less.
   b. Observed scour condition is rated equal to a 3 or less.

   Where condition ratings are coded 3 or less due to localized deficiencies, a special or limited inspection (WSDOT Interim Inspection), limited to just those noted deficiencies can be used in conjunction with the regular interval Routine Inspection. In such cases there will be no more than 12 months between the two. See the description of Interim Inspection.

3-2.4 *Nonredundant Steel Tension Member (NSTM) (Scheduled 12- or 24-Month Interval)*

The National Bridge Inspection Standards (NBIS) require that an NSTM Inspection be performed, in addition to the required Routine Inspection, on regular intervals not to exceed 24 months on bridge members identified as NSTM's. This inspection requires a Lead Inspector with a current Certification Number and NSTM Endorsement. The acceptable tolerance for intervals of 24 months for the next NSTM inspection is up to three (3) months after the month in which the inspection was due. The acceptable tolerance for intervals of less than 24 months for the next NSTM inspection is up to two (2) months after the month in which the inspection was due. For any NSTM inspection conducted outside the month in which the inspection was due, regardless of interval, the subsequent NSTM inspection will be reset to the original target month. Changes to the target month will require PM approval within BridgeWorks.

According to the MBE, a nonredundant steel tension member is a steel tension member in a bridge whose failure could result in the partial or total collapse of the bridge. This section provides information to assist the Team Leader in identifying nonredundant steel tension bridge members, preparing written procedures, planning and performing effective NSTM Inspections and completing the required inspection report. The information presented here is meant as a summary of the main points of the NSTM Inspection. NSTM's were previously referred to as fracture critical members and a complete description can be found in the BIRM. NSTM Inspections are reported to the NBI.

1. **General** – Each agency shall identify the bridges within its jurisdiction which contain NSTM's. The agency can then identify, through documentation, the particular NSTM's within each bridge. For the member to be considered an NSTM, two conditions must exist.
   a. The member must be a steel member in tension. The area of the bridge where the member is located is subject to tensioning (expanding) forces.
   b. There is no load path, system, or internal redundancy in the member or the bridge. There must be no other structural elements able to carry the load of the member if the given member fails.

   There are four types of redundancy: load path, structural, system, and internal. Bridge owners in the past have mainly identified structures with only load path redundancy to determine whether a member is an NSTM. Load path redundancy is the number of supporting elements, usually parallel, such as girders or trusses. AASHTO neglects structural and internal redundancies in determining whether a member is an NSTM. For a bridge to be redundant, it must have more than two load paths. An exception to this is where steel three girder systems have pin and hangers. In this case, the pin and hangers are considered as NSTM's.

2. **Identify the Bridge Types** – The following is a list of the types of bridges in which NSTM's will be found. Figures are also shown which illustrate these bridge types and note the location of the NSTM areas.

   a. **Steel Two-Beam or Two-Girder Systems (Exhibit 3-1)**

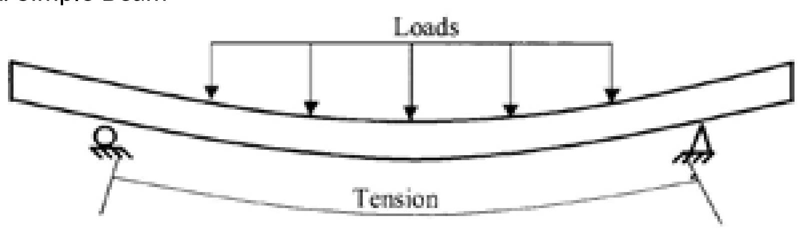
      (i) **Simple Spans** – Each beam or girder should be considered an NSTM as failure of either one could cause the bridge to collapse (Example A).

      (ii) **Continuous Spans** – In general, at the midpoint of the span, the bottom of the girder should be considered as an NSTM and over the pier, the top of the girder should be considered as an NSTM. A structural engineer may need to assess the bridge to determine the actual redundancy and presence of NSTM's (Example B).

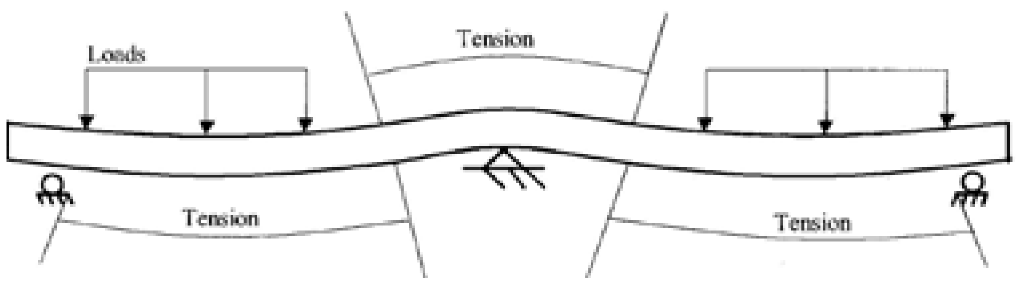
      (iii) **Cantilever-Suspended Span** – In addition to the bottom of the girder at mid-span and the top of the girder over the pier, the top flange and adjacent portion of the web in the area of the cantilevered support should be considered as an NSTM (Example C).

Exhibit 3-1 Steel Two-Beam or Two-Girder Systems

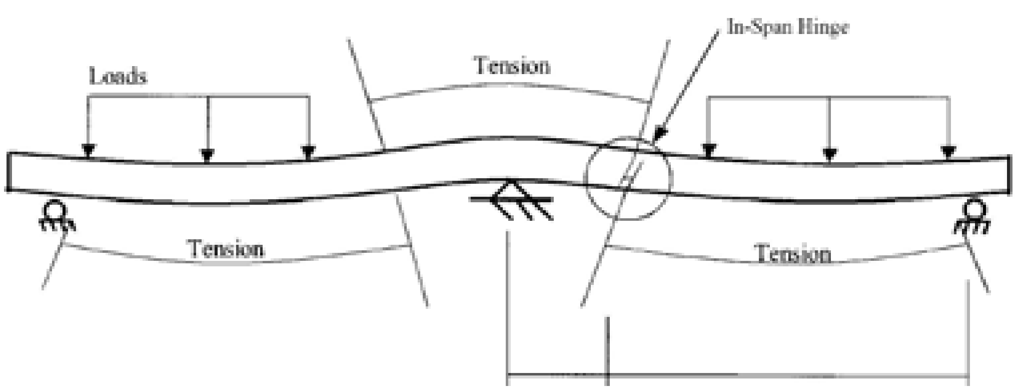
Example A: Simple Beam



Example B: Continuous Spans



Example C: Cantilever - Suspended Spans



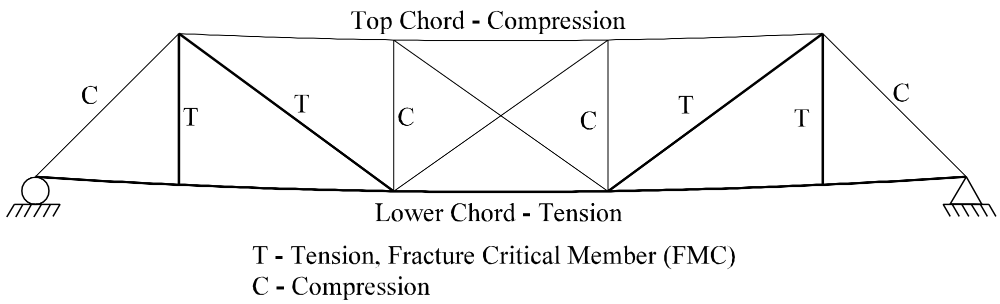
b. Steel Truss Systems (Exhibit 3-2) – Most truss bridges employ only two trusses and are thus considered as having NSTM's. All truss members in tension should be regarded as NSTM's. The exception is, when a detailed analysis by an experienced structural engineer, verifies loss of a member would not result in collapse of the bridge or major component.

The following elements within any truss bridge should also warrant special attention:

(i) **Pin-Connections** – Any load bearing pin connection in an NSTM or steel three girder system is considered as an NSTM.

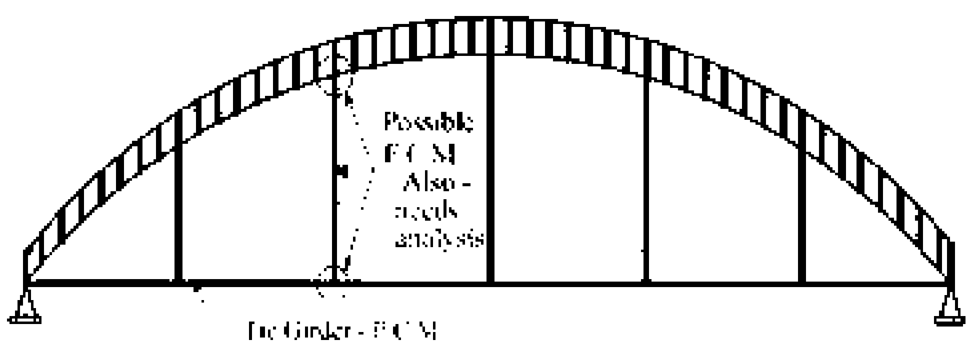
(ii) **Category D and E Welds –** On a truss bridge, any tension member containing a Category D or E weld.

Exhibit 3-2 Steel Truss Systems



c. **Tied Arches (Exhibit 3-3) –** The tie girder which keeps the supports from spreading apart is in tension and should be considered as an NSTM.

Exhibit 3-3 Tied Arches



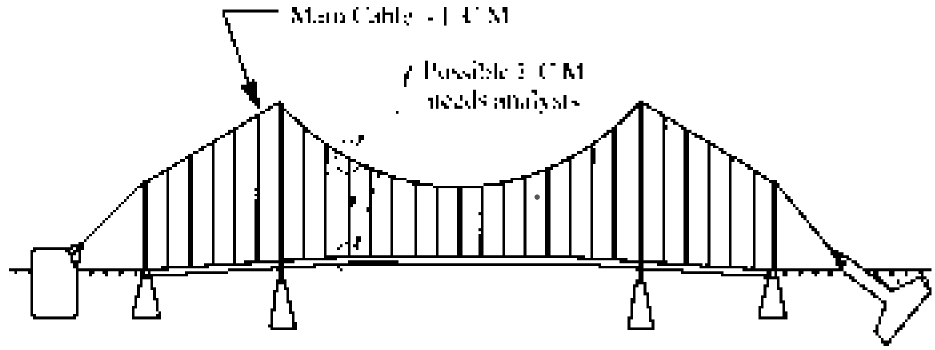
d. **Suspension Spans (Exhibit 3-4)**

(i) **Cables** – If the main suspension member is a cable, the cable should be considered as an NSTM (Example A).

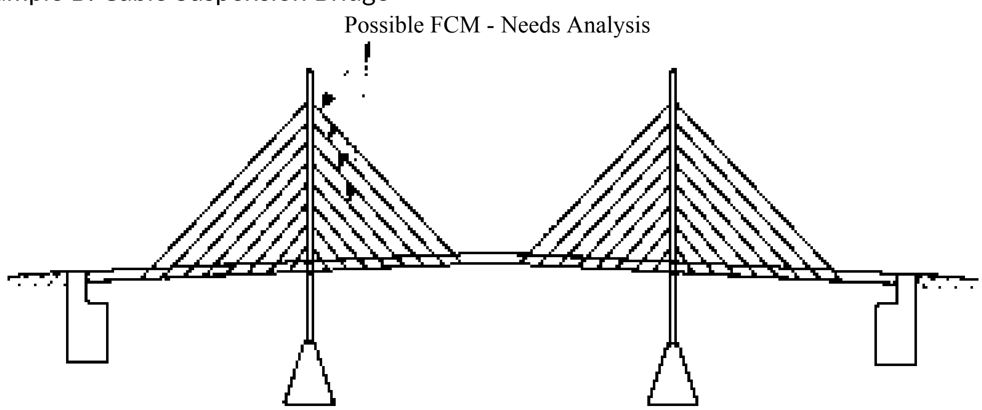
(ii) **Cable Stayed Bridge** – The bridge is of such complexity that it should be reviewed by a structural engineer to determine the criticality of the various stays to fracture (Example B).

Exhibit 3-4 Suspension Spans

Example A: Cable Suspension Bridge



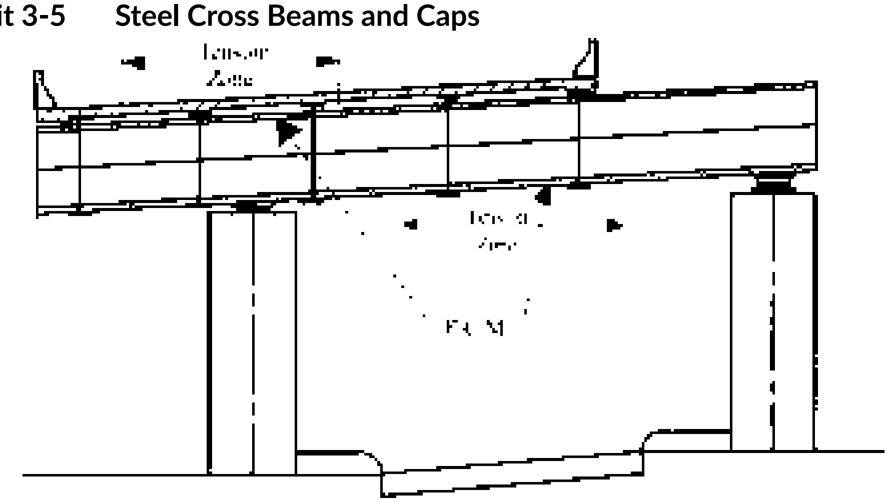
Example B: Cable Suspension Bridge



e. **Other NSTM Bridge Details**

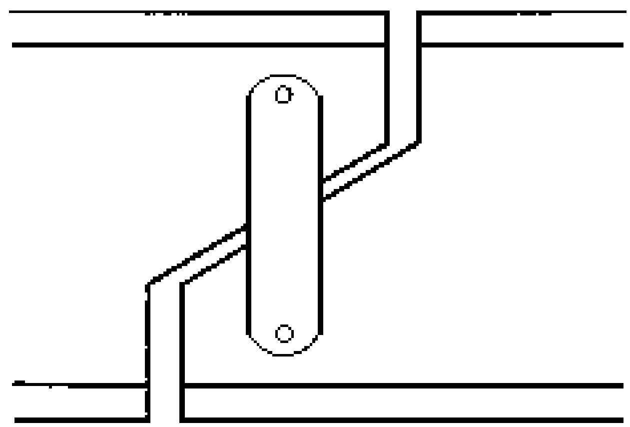
(i) **Steel Cross Beams and Caps** – Tension zones of the member or box beam should be considered as an NSTM (Exhibit 3-5).

Exhibit 3-5 Steel Cross Beams and Caps



(ii) **Pin and Hanger Supports** – The pin and hanger connection used to support a suspended span from a cantilever span should be considered as an NSTM if the member is non-redundant. The pin connection and hanger support in a two-girder or three-girder system are considered as NSTM's as the bridge has no built in redundancy. The same connections in a multi-beam system (more than 3 beams) are not NSTM's as the bridge has a high degree of redundancy. Pin connections in such bridges should be inspected with the same techniques and methods as NSTM pins (Exhibit 3-6).

Exhibit 3-6 Pin and Hanger Supports



3. **Prepare Written Procedures** – Once the NSTM's within a bridge have been identified, the agency must prepare a detailed plan as to how it will accomplish the NSTM Inspection. This written procedure may be developed by others being hired to perform the NSTM Inspection. However, if this is done, a qualified designee from the owner agency should carefully review the written plan to ensure that a sufficient analysis of the member will be made and that the task will be accomplished in a reasonable manner. These written inspection procedures are to be kept in each bridge file.

   NSTM Inspections can prove costly; therefore, in the development of the inspection plan, particular attention should be given to each of the following:

   a. **Scheduling** – Generally, it will be best to schedule an NSTM Inspection during cold weather (as cracks will be more visible), at low water (if the NSTM is underwater at high water), during daylight hours, and when traffic on the bridge will be lightest (as some form of traffic control may be necessary).

   b. **Equipment** – The Team Leader will require close access to each NSTM; thus, some type of equipment may be needed to provide sufficient access. Ladders, scaffolding, aerial work platforms, or UBITs may be deemed appropriate for a given situation. The choice of equipment will depend on the cost of rental, the time needed to perform the inspection using that equipment, and equipment availability. If a UBIT is used, it should be determined, before its use, whether it could overload the bridge, operate on the bridge grade, has sufficient reach, and if it might damage the deck. Use of a UBIT may also create a need for traffic control.

   c. **Workforce** – In order to keep the amount of time spent at the bridge site to a minimum, consideration should be given to the level of manpower needed. Once the number of individuals needed is determined, the duties to be performed by each individual should be clearly defined.

d. **Tools** – The standard tools common to any Routine Inspection should be on hand for the NSTM Inspection. In particular, a wire brush, a magnifying glass, and a light source able to provide 50 to 100 lumens should be considered. In addition, specialized tools for carrying out nondestructive testing may also be warranted (i.e., a dye penetrant kit or ultrasonic testing device).

e. **Inspection Procedures** – The NSTM inspection plan should identify the inspection interval and method(s) to be used. These should be developed depending on the criticality of the feature based on experience with other similar details or structures, calculated remaining fatigue life, current indications, material properties, consequences and likelihood of rapid failure, etc.

   If more than one type of inspection method is employed, identify when, where and how they are to be used. For example, a pinned truss bridge may require each of the pins to be examined visually during each inspection, supplemented by ultrasonic testing of ⅓ of the pins during each inspection. Therefore, all of the pins would be inspected ultrasonically in a 72-month period, if the inspection interval was 24 months.

4. **Perform the NSTM Inspection** – The purpose of the NSTM Inspection is to assess the structural condition of each bridge member identified as an NSTM. When inspecting these members, it is always best to err on the side of conservatism. The consequences of dismissing or failing to note a blemish on an NSTM are too great. Therefore, the inspection should be conducted carefully and thoroughly. Such close inspection of single members can be tedious; however, the Team Leader should work in a manner that ensures the same degree of care and attention to the last area inspected as the first. The previous pages described the general areas within a bridge where NSTM's will be located. The following pages describe the particular features to note.

   First, the Team Leader must gain access to the area with NSTM's. The Team Leader should be no further than 24 inches from the surface being inspected and should work with a light source of at least 50 to 100 lumens. The best viewing angle is at approximately 120°. The Team Leader will want to look for deteriorated surfaces or surface cracks. The BIRM discusses inspection procedures and the types of problems that may be found.

   The following areas or members should be checked:

   - Areas vulnerable to corrosion (under deck joints, on surfaces where water collects and in places where dissimilar materials meet).
   - Areas where there is a change in the bridge cross section, where stress is concentrated, or which show out-of-plane bending.
   - Web stiffeners (especially at the ends).
   - Coped sections and/or re-entrant corners.
   - Eye bars.
   - Shear connectors.
   - Pin and hanger assemblies.
   - Punched holes.
   - Rivet and bolt heads.
   - Tack welds and field welds (especially at weld ends or returns).

If any cracks, blemishes, or other irregularities are found, the Team Leader will need to evaluate these further, which may include the use of a magnifying glass. A dye penetrant kit can be used to establish the limits of a crack. Use of magnetic or ultrasonic testing devices may be required to detect internal problems not apparent to the eye. The agency will need to determine which devices will be the most cost effective and reliable for the given situation.

Finally, the Team Leader will need to record the location and size of any cracks found. Mark and date the crack ends in permanent marker for follow up on the structure.

In most cases, it will be helpful to take a photograph of such cracks to provide visual documentation. This information and the photographs are to be included in the Visual Nonredundant Steel Tension Member Inspection Report.

5. **Prepare the Visual NSTM Inspection Report** – At the conclusion of the NSTM Inspection, a Visual NSTM Inspection Report should be prepared to provide detailed verification of the inspection findings. The report should provide qualitative and quantitative information concerning the NSTM's. This information is important for a number of reasons: it can offer insight about the condition of the member, it can provide a history of the bridge, and it can be used to substantiate the thoroughness of the inspection effort in the event of litigation arising from a bridge failure. See Section 3-5 for a copy of the Visual NSTM Inspection Report form.

   The inspection report should:

   - Identify what parts of the bridge were inspected and the location of each NSTM. (This can be shown on a photograph or sketch of the bridge.)
   - Describe the procedures followed to inspect the NSTM.
   - Describe the condition of the NSTM.
   - Provide the following details about any defects found:
     - What the defect is.
     - Where the defect is located (a sketch may be used to illustrate its location relative to the ends of the member, and its position in the cross section of the member).
     - Summarize the inspection findings (addressing how individual defects affect the member's overall condition).
     - Make any appropriate recommendations (i.e., repair the NSTM, recalculate load ratings, close the bridge).

6. **Finalizing the report** – Once completed the NSTM report along with any supporting documentation should be uploaded to the files tab and all resources updated accordingly as described in the beginning of this chapter under 'Opening and Completing Bridge Inspection Reports'.

7. **NSTM Inspections with Inspection Intervals Less than 24 Months** – NSTM Bridges with an NSTM Inspection Condition Code rated 4 (Poor) or less must be inspected at intervals not to exceed 12 months. NSTM Bridges may be considered for more frequent inspection based on load posting, susceptibility to impact damage or other known deficiencies.

8. This report should be entered in conjunction with the scheduled Routine Inspection and will be signed as a part of that entry. It is eligible for Electronic Signature.

3-2.5 *Underwater Inspection (Scheduled Interval Not to Exceed 60 Months)*

Bridges over water have special inspection requirements. If the bridge has members in water too deep to permit a visual or tactile (hands-on and/or wading) inspection from the surface at low water or during seasonal low stream flows, an underwater bridge inspection diver, with an FHWA Underwater Bridge Inspection endorsement must conduct an Underwater Inspection. An evaluation of the bridge's susceptibility to scour also needs to be conducted, see Section 5-3. Many bridge failures are due to underwater or scour problems; therefore, the importance of these types of inspection cannot be overemphasized. There may be environmental restrictions that need to be taken into consideration prior to conducting an Underwater Inspection.

An Underwater Inspection of submerged bridge elements is required on an interval not to exceed 60 months. The acceptable tolerance for intervals of 60 months for the next Underwater inspection is up to three (3) months after the month in which the inspection was due. The subsequent Underwater inspection will be reset to the original target month. Changes to the target month will require PM approval within BridgeWorks.

The purpose of the Underwater Inspection is to examine the underwater elements to the extent necessary to determine their structural condition and adequacy. At a minimum, an underwater bridge inspection diver must swim by and examine all underwater portions of the bridge. If the underwater elements are covered with marine growth, portions of the structure need to be cleaned to positively ascertain the condition of the element. For concrete piers, this consists of cleaning 1 square foot patches near the surface, mid height, and bottom of all piers. For multiple pile bents, a one-foot band must be cleaned near the surface, mid-height, and bottom of one pile per bent, but no less than 10 percent of the piles. The underwater bridge inspection diver must also perform a visual or tactile inspection of the entire bridge footing at ground line to identify if any undermining of the footing exists, as well as probing to determine if scour holes are being filled in. If significant problems are encountered during the inspection, a more detailed inspection of the bridge may be needed.

Existing scour conditions must be evaluated during an Underwater Inspection. The Team Leader must assess condition and depth of the streambed, determine the susceptibility of the streambed to scour, and determine what countermeasures can be taken to safeguard the bridge. The primary requirement of the scour inspection is to establish a cross-section of the streambed. This is accomplished by sounding and can be carried out with either a fathometer (also known as a "fish finder") or a lead line. See the BIRM and the MBE for guidance on performing Underwater Inspections. Underwater Inspections are reported to the NBI.

1. **Prepare Written Procedures –** Written inspection procedures need to be developed for each bridge requiring an underwater inspection. The inspection plan should detail as a minimum:
   - Type and interval of required inspection.
   - Location of members to be inspected.
   - Type(s) of foundation.
   - Bottom of foundation elevation or pile tip elevation.
   - Identification of scour critical substructure units.
   - Special equipment requirements.
   - Follow-up actions taken on findings of last inspection.

2. **Document the Underwater Inspection** – Prepare a Daily Site Dive Log for each dive and prepare an Underwater Inspection Report when inspection of the entire underwater portion of the bridge is concluded.

    a. **Daily Site Dive Log** – The Daily Site Dive Log must be completed by the inspection Team Leader (in concert with the diver). Section 3-5, provides a sample of the Daily Site Dive Log form. The form should summarize what equipment was used in the dive, what procedures were employed, what problems were encountered (such as strong currents or underwater obstructions or accumulations of debris) and should provide any information which may be helpful for planning future dives. At the conclusion of every dive, the diver must go over the inspection findings with the Team Leader to verify that the notes taken by the staff on the surface are a correct representation of what the diver found. The diver should also go over all underwater photos, making sure that the photo numbers and descriptions are correct.

    b. **Underwater Inspection Report** – The Underwater Inspection Report must be completed by the underwater inspection Team Leader and reviewed by the diver. The report should be thorough and include the following information for the various levels of inspection performed.

        (i) For a **Routine Underwater Inspection**, note:

        - What conditions were found as a result of the visual inspection or cleaning.
        - The condition of any protective coatings.
        - Evidence of any significant defects or damage.
        - Evidence of scour or the build-up of debris at the piers.
        - The location of exposed foundation elements.
        - Ground line elevations at the base of all piles or pile groups, elevations of the tops of all exposed footings and/or seals, and ground line elevations of all footings or seals at their corners.
        - The condition of the streambed around each pier, including a description of any placed rock.
        - The water flow (whether high, medium, or low) and an approximation of the velocity (ft/sec.).
        - The influence of any significant environmental conditions (i.e., corrosive pollutants, salt water, etc.).
        - Any changes to the surrounding area which have or may alter the flow characteristics around the pilings or piers (i.e., logs upstream, construction going on nearby).
        - Any discrepancies between the bridge design and its actual configuration.
        - Any recommendations for repairs, a subsequent scour inspection, a change in inspection interval, or an in-depth inspection.

    In addition to the written information provided in the Underwater Inspection Report, problem areas in the bridge should be carefully identified and documented with drawings, photographs, and/or video recordings. Although underwater photos and video recordings are often preferred, they may not always offer clear views of the problem areas, so sketches and drawings are always needed to document findings.

3. **Finalizing the report** – Once completed the Underwater Report along with any supporting documentation should be uploaded to the files tab and all resources updated accordingly as described in the beginning of this chapter under ‘Opening and Completing Bridge Inspection Reports’.
4. **Underwater Inspections with Inspection Intervals Less than 60 Months –** Bridges that require an Underwater Inspection meeting any of the following criteria must be inspected at intervals not to exceed 24 Months.
   - Underwater Inspection Condition coded as serious (3) or less.
   - Channel or Channel Protection Condition coded as serious (3) or less.
   - Observed Scour Condition is coded as serious (3) or less.

   Where condition ratings are coded 3 or less due to localized deficiencies, a special or limited inspection (WSDOT Interim Dive Inspection), limited to just those noted deficiencies can be used in conjunction with the regular interval Dive Inspection. In such cases there will be no more than 24 months of interval between the two. See the description of Interim Inspection.
5. **Underwater Inspection Intervals Less than 24 Months** – The acceptable tolerance for intervals of less than 24 months between dive inspection is up to two (2) months after the month in which the inspection was due.

3-2.6 *Complex Feature Inspection (Scheduled 12- or 24-Month Interval) (SNBI In-Depth Inspection)*

The Special Feature Inspection Type is being discontinued and replaced with the Complex Feature Inspection. Certain bridges will receive Complex Feature Inspections due to their design, material or function and are performed, in addition to the required Routine Inspection and requires a Lead Inspector with a current Certification Number. Complex Inspections are performed on regular intervals not to exceed 24 months. The acceptable tolerance for intervals of 24 months is up to three (3) months after the month in which the inspection was due. The acceptable tolerance for intervals less than 24 months is up to two (2) months after the month in which the inspection was due. For any inspection conducted outside the month in which the inspection was due, regardless of interval, the subsequent inspection will be reset to the original target month. Changes to the target month will require PM approval within Bridgeworks.

1. Bridges with complex features include but are not limited to:
   - *Moveable Bridges
   - *Floating Bridges
   - *Suspension Bridges
   - *Cable Stay Bridges
   - Ferry Terminals
   - Bridges with Pin and Hanger Details
   - Bridges built with High Strength Steel
   - Segmental Post Tension Concrete Boxes

   *Movable Bridges, Floating Bridges, Suspension and Cable-Stayed Bridges considered to be bridges with complex features in accordance with the NBIS.

2. Written procedures must be developed and included in the bridge file for all Complex Feature Inspections. Procedures should include:
   - Type, detail, and interval of required inspection.
   - The location of members to be inspected.
   - Special equipment required.

   a. **Movable Bridges (Code '1' in BridgeWorks)** – There are three basic types of movable bridges: vertical lifts, bascules, and swings. All of these structures are operated by either electro-mechanical drive systems or hydraulic systems. See the BIRM and the MBE for guidance on performing inspections on movable bridges.

   b. **Suspension Bridges (Code '3' in BridgeWorks)** – Suspension bridges consist of a pair of main cables hanging between and passing over two towers and anchored by backstays into large counterweights on opposite shores. Suspender ropes hang from the main cables and support a pair of stiffening trusses or girders that run the length of the suspended spans. The stiffening trusses or girders support floor beams, stringers, and a roadway deck. Orthotropic decks may be used in place of the stringers and roadway deck. See the BIRM and the MBE for guidance on performing inspections of suspension bridges.

   c. **Cable-Stayed Bridges (Code '9' in BridgeWorks)** – Cable-stayed bridges are very distinct structures with many unique details that require special inspection. On a cable-stayed bridge the longitudinal structural components that support the road deck are supported by inclined cables or stays that extend directly into anchors or saddles in one or two towers. One cantilevered component is balanced by another cantilevered component on the opposite side of the support tower. Typically, the deck is anchored to the ground in at least one spot to resist seismic forces and any unbalance in the cantilevered spans. See the BIRM and the MBE for guidance on performing inspections on cable-stayed bridges.

   d. **Segmental Bridges (Code '5' in BridgeWorks)** – Segmental bridges are unique due to their construction. A segmental girder is a single or multiple box girder that is formed from segments post-tensioned together. This type of construction takes advantage of the standardization of the manufacturing process. See the BIRM and the MBE for guidance on performing inspections of concrete segmental bridges.

   e. **Floating Bridges (Code '2' in BridgeWorks)** – Floating bridges in Washington State consist of concrete pontoons that are bolted together longitudinally and are held in position by steel cables connected to anchors on the bottom of the waterway. Some of the bridges are reinforced with prestressing steel. Two of Washington State's floating bridges contain movable spans that have unique operating characteristics.

   f. **Ferry Terminals (Code '6' in BridgeWorks)** – Ferry Terminals (Code '6' in BridgeWorks) – Ferry terminals usually have a dock or holding area built over the water and a transfer span to carry traffic onto the ferry deck. The holding area can be constructed of treated timber, concrete, or steel components. The vehicle holding area or "dock" is typically considered a standard bridge structure and receives a Routine and Underwater Inspection. The transfer spans generally are steel trusses or girders with one end supported on the fixed pier and a free end which can be raised or lowered onto the boat to accommodate tidal changes. Transfer spans typically have their own structure I.D., and these structures are the ones with unique features which require the "Complex Feature" inspection. Ferry Terminal transfer spans have enough unique features that specific BMS elements and inspection procedures have been developed to help the inspector navigate through a ferry terminal inspection. The *Ferry Terminal Inspection Procedures Manual* is published as a stand-alone document and can be found as publication M 3105 at www.wsdot.wa.gov/publications/manuals/M3105.

g. **Pin and Hanger Connections (Code '4' in BridgeWorks)** – A pin and hanger is a system used to connect suspended spans to cantilevered spans. The hanger is connected to a beam or girder by a pin on one or both ends. In two-girder and three-girder systems, the pin and hanger connection is considered as an NSTM. Even when used in a multi-beam system where the bridge has a high degree of redundancy, the connection should still be inspected similar to an NSTM. This is due to problems experienced in other states with pins in multi beam suspended spans. See the BIRM and the MBE for guidance on performing inspections of pin and hanger assemblies.

h. **A-514 High Performance Steel (Code '7' in BridgeWorks)** – A-514 steel is used in high stress areas of larger steel bridges to reduce member size and total weight of steel. A typical location would be the top and bottom flanges of plate girders over the intermediate piers.

   Bridges fabricated from A514 steel have suffered from hydrogen cracks which occurred during fabrication. Also, higher strength steels generally are subject to larger stress ranges than the lower strength steels. In tension zones, cracks may initiate and propagate faster than in the lower strength steels. It is important that Team Leaders check tension zones closely for cracks particularly at welds, bolt holes, copes, and other fatigue prone locations.

3. This report should be entered in conjunction with the scheduled Routine Inspection and will be signed as a part of that entry. It is eligible for Electronic Signature.

3-2.7 *Interim Inspection (Scheduled 3, 6, 12- or 24-Month Interval) (SNBI Special Inspection)*

Interim Inspections for the State of Washington are considered Special Inspections under the NBIS. As a minimum, this inspection type is scheduled when condition ratings for Deck, Superstructure, Substructure or Culvert are coded 3 or less due to localized deficiencies, that need to be monitored between regular interval Routine Inspections. An Interim inspection may also be scheduled regardless of condition ratings, when a particular known or suspected deficiency, is identified as needing to be monitored. Interim Inspections are reported in the NBI.

The procedure for performing and documenting an Interim Inspection is the same as for a regular-interval Inspection, except that the focus is limited primarily to elements or areas identified with localized deficiencies or conditions that are being monitored.

Examples of conditions that may indicate Interim Inspection:

- Specifically identified bridge element or members show signs of advanced or rapid deterioration.
- Specific areas of damage needing to be monitored pending repair or replacement.
- Concerns over ongoing settlement that may adversely impact the supported structure.
- Foundation deterioration or damage may also warrant a visual inspection at an interval less than the mandatory 60 months.

1. **Determining the Interval** – The inspection interval will vary depending on the type of deficiency being monitored, and how rapidly the deterioration may be progressing. For Routine Inspections on 24-month intervals, Interim Inspections are typically done in the off year of the Routine Inspection. There are cases where Interim Inspections may occur several times during a calendar year on three- or six-month intervals. The inspecting agency along with the Team Leader will determine the appropriate inspection interval.
2. **Preparing for the Inspection –** The Team Leader should carefully review the past inspection reports to become familiar with the bridge, and to assure that the correct portions of the bridge receive the Interim Inspection. Notes in the report should instructed the inspector as to what to look for, what measurements to take, what results might be expected, and/or how the problem can affect the structural integrity of the bridge.
3. **Reporting** – A BIR documenting the inspection findings will be prepared by the individual who performed the inspection and will have specific language pertaining to the portions of the bridge needing the Interim Inspection, and what measurements need to be made.
4. **Documentation** – The Interim Inspection notes should detail the following:
   - The specific areas inspected.
   - Any measurements taken.
   - The procedures utilized to analyze and assess the given bridge element(s).
   - Testing results and/or findings.
   - Any recommendations for maintenance or repair.
   - Photos to document where and how to take repeatable measurements.

   In addition to the written information provided in the Interim Inspection Report, problem areas in the bridge should be carefully identified and documented with drawings/sketches, and photographs, to facilitate accurate comparison of changes in condition and to provide repeatable measurements.
5. **Finalizing the report** – Once the Interim Report is completed, any supporting documentation should be uploaded to the files tab and all resources updated accordingly as described in the beginning of this chapter under ‘Opening and Completing Bridge Inspection Reports’.
6. **Interim Inspection Intervals Less than 24 Months** – The acceptable tolerance for intervals of less than 24 months between inspections is up to two (2) months after the month in which the inspection was due.

3-2.8 *Underwater Interim (Scheduled 3, 6, 12, 24, 36 or 48-Month Interval) (SNBI Special Inspection)*

Underwater Interim Inspections for the State of Washington are considered Special Inspections under the NBIS. As a minimum, this inspection type is scheduled when condition ratings are coded 3 or less due to localized deficiencies, that need to be monitored between regular interval Underwater Inspections. An Underwater Interim inspection may also be scheduled regardless of condition ratings, when a particular known or suspected deficiency, is identified as needing to be monitored. Underwater Interim Inspections are reported in the NBI.

The procedure for performing and documenting an Interim Underwater Inspection is the same as for a regular-interval Underwater Inspection, except that the focus is limited primarily to elements or areas identified with localized deficiencies or conditions that are being monitored.

Examples of conditions that may indicate Interim Inspection:

- Extensive localized scour or rapidly progressing deterioration of the stream bed in which normally buried footings become exposed or pile supported footings become undermined. of the stream bed.
- Foundation deterioration or damage may also warrant a visual inspection at an interval less than the mandatory 60 months.

1. **Determining the Interval** – The inspection interval will vary depending on the type of deficiency being monitored, and how rapidly the deterioration may be progressing.
   a. For scour related findings where a normally buried spread footing is found exposed, or in the case of a pile supported footing which becomes undermined, the Interim Inspection is placed on a 12-month interval.

      During subsequent Interim Inspections, the interval may be adjusted upwards if the scour is determined to be stable and non-threatening to the structure. Adjusting a scour related Interim Inspection interval upwards is done slowly over time, i.e., 12, 24, 36, or 48 months, until the maximum 60-month inspection interval is reached.
   b. For non- scour related Underwater Inspection findings (i.e., foundation damage or deterioration) the Underwater Interim Inspection interval will usually be set at 24 months.
   c. There may be cases where Interim Inspections should occur several times during a calendar year on 3- or 6-month intervals. The inspecting agency along with the Team Leader will determine the appropriate inspection interval. The Underwater Inspection Note should detail the follow.
   d. Consideration should be given to performing an Underwater Interim Inspection for load posted bridges, provided the load restriction is due to element's that are only visible by Underwater Inspection techniques.
2. **Preparing for the Inspection –** The Team Leader should carefully review the past inspection reports to become familiar with the bridge, and to assure that the correct portions of the bridge receive the Underwater Interim Inspection.
3. **Reporting** – A BIR documenting the inspection findings will be prepared by the individual who performed the inspection and will have specific language pertaining to the portions of the bridge needing the Underwater Interim Inspection, and what measurements need to be made.
4. **Documentation** – The Underwater Inspection Note should detail the following:
   - The specific areas inspected for the Interim Inspection.
   - Any measurements taken.
   - The procedures utilized to analyze and assess the given bridge element(s).
   - Testing results and/or findings.
   - Any recommendations for maintenance or repair.
   - Recommendations for additional inspections and frequencies.

In addition to the written information provided in the Underwater Interim Inspection Report, problem areas in the bridge should be carefully identified and documented with drawings, photographs, and/or video recordings. Although underwater photos and video recordings are often preferred, they may not always offer clear views of the problem areas, so sketches and drawings are always needed to document findings.

5. **Finalizing the report** – Once completed the Interim Underwater Report along with any supporting documentation should be uploaded to the files tab and all resources updated accordingly as described in the beginning of this chapter under 'Opening and Completing Bridge Inspection Reports'.
6. **Underwater Interim Inspection Intervals Less than 24 Months** – The acceptable tolerance for intervals of less than 24 months between dive inspections is up to two (2) months after the month in which the inspection was due.

3-2.9 *Damage Inspection (Unscheduled-No Interval by WSDOT)*

A Damage Inspection is an unscheduled inspection with no assigned interval to assess structural damage resulting from an environmental or human event. The scope of inspection should be sufficient to determine the need for emergency load restrictions or closure of the bridge to traffic, and to assess the level of effort necessary to define a repair. Depending on the specific situation, the need for an In-Depth or more frequent Routine or Interim Inspections may be indicated. This determination should be made by the Team Leader in conjunction with their supervisor. Damage Inspections are reported to the NBI or NTI.

Damage Inspections are categorized by type based on the damage received or how it was found or is being reported. Team Leaders should create a Damage Inspection Report in BridgeWorks and choose one of the following events:

- A – Over Height
- B – Lateral Damage to Vertical Member
- E – Flood
- G –Earthquake
- H – Bridge Rail
- O – Other
- S – Reported by Others - Over Height
- T – Reported by Others – Lateral
- U – Reported by Others - Bridge Rail
- V – Reported by Others Miscellaneous

1. **Preparing for the Inspection –** If called upon to perform a Damage Inspection, Team Leaders should familiarize themselves with the type of bridge and the location of the damage. Office review of as-built plans and photos should take place prior to inspecting the damaged structure.
2. **Conducting the inspection –** When conducting a Damage Inspection for any reason, a thorough examination of the damaged areas should be made, along with an assessment of any residual damage to other bridge components. The amount of time and effort required to make this assessment will depend upon the extent and seriousness of the damage. For flood events, post event follow-up inspections may be necessary after the water fully subsides. When completed, the Team Leader should be able to provide the necessary information and assist in assessing the structure's safety and condition. Observations by the Team Leader for recommending or determining appropriate measures to protect the bridge from failure or further damage.

Assessments that need to be made during the inspection:

- Identify any damaged, fractured, and impacted members and elements.
- Measure/Calculate and record any section loss of materials and note location.
- Identify number, position/location and extent of any damaged reinforcement or tensioning strands.
- Measure any noted misalignment or movement.
- Determine any loss of foundation support.
- Compute the amount of any section loss.
- Measure the amount any member is out of alignment.
- Check connection locations adjacent to and around areas of damage.

For bridges impacted by flooding events:

- Identify scour around underwater bridge elements.
- Document channel bank erosion.
- Identify damage to designed channel protection such as riprap.
- Document any indication of lateral migrations in the channel.
- Document sediment transport or accumulation.
- Document debris transport or accumulation (especially around piers).
- Take soundings if possible.

3. **Reporting** – A BIR documenting the inspection findings will be prepared by the individual who performed the inspection and will have specific language identifying the cause and areas of damage, as well as individual elements and locations impacted.
4. **Documentation** – The Damage Inspection, date, time, and a short description should be documented in the "0" Note. Details of actual damage to members/elements, or areas around the bridge should be described and quantified within the affected element notes. Documentation should be detailed regarding specific members, location, quantities, or extent, and include measurements of section loss, deformity, or misalignment.

   Supporting materials and notes should include:

   - Drawings or sketches indicating location and extent of damage. See Section 3-5 for Girder Damage Templates.
   - Photographs providing overall, up close, and detailed depictions of damage elements that support evaluation and conclusions.
   - Records of measurements that may need to be verified or repeated.
   - Soundings and Ground Line representation of channel profiles.
   - Physical check for verification of clearances at damage locations.

   In addition to the documentation, of the damage and collection of supporting information, resulting conditions states of elements need to be quantified. Condition Codes for Deck, Superstructure, Substructure, Culvert, Underwater Inspection, Channel, Channel Protection and Observed Scour, all need to evaluate and adjusted appropriately.

Team Leaders writing the report, should work with their supervisor, the BPO Repair Section, and the BPO Risk Reduction Engineer throughout the writing and review process to assess the following:

- Overall bridge condition and status.
- Required repairs, and priorities.
- Need for any required posting or restrictions.
- Scheduling or inspection interval adjustment of future inspections.
- Requirements for CFDR documentation and FHWA notification.

5. **Finalizing the report** – Once the Damage Report is completed, to include any recommended repairs, postings or restrictions, any supporting documentation should be uploaded to the files tab and all resources updated accordingly as described in the beginning of this chapter under 'Opening and Completing Bridge Inspection Reports'.

   Prior to release, ensure that any additional required inspection types are scheduled or adjustments to other inspection frequencies are made. If required initiate and enter required CFDR information.

3-2.10 *CFDR (Critical Finding Damage Report) (Dedicated Tab in BridgeWorks)*

A Critical Finding Damage Report (CFDR) **is not an actual report**, but rather a tab entry into BridgeWorks of specific information to track information on open Critical Findings and facilitate reporting to FHWA on the status. When an incident or discovered condition results in the need for reporting of a Critical Finding, (Usually the temporary closure or restriction of a structure), an authorized BridgeWorks user for an agency is responsible for opening a CFDR using the "Critical Findings" tab. The CFDR should be opened at the time of the incident or discovery as part of a Routine or Damage Inspection but may be entered using an Informational Inspection. After the release of any associated report, the CFDR may be managed and updated for status using an open Informational Report.

Descriptions entered on the Critical Finding tab should only be a brief summary to accompany the dated entries reporting the Identification of a Critical Finding, Actions Taken, Updates and any Resolution. BridgeWorks uses these entries along with other structure inventory information and condition reporting already existing for the structure to generate a report for Program Managers. Historical and open Critical Findings will remain associated with the structure.

Inspectors should work with Supervisors, Organizational Engineers, and Program Managers for determining when a CFDR is required, how it should be reported and any necessary updates. For specific information on entry descriptions, see Chapter 6, "Completing the CFDR" and "CFDR Tracking and Reporting".

3-2.11 *Local Agency Safety (Interval set by agency, Not Reportable)*

A Local Agency Safety Inspection is used by agencies other than WSDOT to inspect structures owned by WSDOT or other agencies. Some examples include:

- a railroad bridge over local agency route.
- a state-owned pedestrian bridge over a local agency route.
- a state-owned bridge carrying traffic over a local agency route.

Local Agency Safety Inspections are performed at the discretion of agencies that do not own but have an interest in the structure. The inspection scope and inspection interval are also entirely determined by that agency. These inspections are not reported to the NBI or NTI and are not subject to the NBIS or NTIS. These inspections are intended to assess the safety of the structure for any immediate hazard to the route crossing under it, and the inspection is directed to only those portions of the structure that could affect that undercrossing route.

The agency performing a Local Agency Safety Inspection should limit inspection notes to BMS element 379 – Local Agency Safety. Repair recommendations should be limited to only those findings that directly affect the safety for users of the route under the bridge. In cases where the bridge owner also maintains an inspection record in WSBIS, the repair can be added to the repair report. In cases where the bridge owner doesn't use WSBIS (most railroads for example), entering repairs into the repair report will need to be supplemented with direct contact with the structure owner.

Agencies that own a non-reportable structure and maintain a record in WSBIS typically use the Condition report type for that structure.

3-2.12 *WSDOT Safety (Interval set by agency, Not Reportable)*

A WSDOT Safety Inspection is used by WSDOT to inspect structures owned by other agencies. For this report WSDOT will maintain the WSDOT Safety report type.

WSDOT Safety Inspections are performed at the discretion of WSDOT when it does not own but has an interest in the structure. The inspection scope and inspection interval are also entirely determined by WSDOT. These inspections are not reported to the NBI or NTI and are not subject to the NBIS or NTIS. These inspections are intended to assess the safety of the structure for any immediate hazard to the route crossing under it, and the inspection is directed to only those portions of the structure that could affect that undercrossing route.

WSDOT Safety Inspections should limit inspection notes to BMS element 378 – WSDOT Safety. Repair recommendations should be limited to only those findings that directly affect the safety for users of the route under the bridge. In cases where the bridge owner also maintains an inspection record in WSBIS, the repair can be added to the repair report. In cases where the bridge owner doesn't use WSBIS (most railroads for example), entering repairs into the repair report will need to be communicated through the region or rail office to the owner of the structure. Typically addressed by the region office.

For WSDOT owned non-reportable structures with a record in WSBIS, inspectors will typically use the Condition report type for that structure.

3-2.13 *Condition Inspection (Interval set by agency, Not Reportable)*

A Condition Inspection is used in cases where an agency owns a structure that is not reportable to the NBI or NTI but is using WSBIS to maintain a comprehensive record of the structure for both public safety and long-term maintenance. These inspections are separate from Short Spans and are conducted on structures that typically do not carry live traffic open to the public and are therefore not reportable. Examples include:

- A state or local agency pedestrian bridge, regardless of whether it crosses over a state or local agency route.
- A transit structure where the owner chooses to maintain a record in WSBIS, again. regardless of whether it crosses over a state or local agency route.

This inspection is performed at the discretion of the agency which owns the structure, and the inspection scope and inspection interval is also entirely determined by that agency. Condition Inspections are similar to Routine Inspections, but without specific federally mandated requirements for inspection interval, level of detail, or appraisal coding. These inspections are not reported to the NBI or NTI and are not subject to the NBIS or NTIS.

3-2.14 *Short Span Inspections (Interval set by agency, Not Reportable)*

This inspection type is used for bridges/culverts that have an opening of 20 feet or less as measured along the center of the roadway between under copings of abutments, spring lines of arches, or extreme end openings of multiple boxes. Short Span bridges may also include multiple pipe culverts, but the clear distance between openings must be less than half of the smaller contiguous opening. Short Spans are not reported to the NBI.

Even though short span bridges are not reported to the NBI, in the interest of public safety and long-term maintenance, it is recommended that agencies inspect short span bridges consistent with a full NBI inspection. If possible, assigned structure numbers should be unique to separate them from reportable structures. The interval of the inspections for these bridges will be at the discretion of the owner agency.

An Assistant Inspector who has 3 years of bridge condition inspection or the approval of their supervisor and has successfully completed a FHWA approved comprehensive bridge inspection training course can perform as a Team Leader for Short Span Inspections.

1. **Inspection Criteria** – Inspections are recommended for the following short span bridges:
    - Timber structures with spans between 4 and 20 feet.
    - Single span concrete or metal structures, other than metal corrugated pipes with spans between 6 and 20 feet.
    - Multiple span concrete structures with total openings between 8 and 20 feet.
    - Metal corrugated pipes with openings between 8 and 20 feet.
    - Multiple concrete or steel pipe structures with total openings from 10 and 20 feet.

    See Appendix 3-A1 through 3-A3 for clarification. These guidelines are not intended to replace sound engineering judgment. When in doubt, a conservative approach should be taken.
2. **Determine the Interval –** Recommended intervals are as follows:
    - **12 Months** – Timber with red/yellow tags, any other material in poor condition needing monitoring, scour issues, load posting, etc.
    - **24 Months** – All other structures, with BMS elements in Condition States 3 or 4.
    - **48 Months** – Metal structures in good condition or concrete with only minor problems.
    - **72 Months** – Concrete structures in good condition.
3. **Performing the inspection** – Conduct Short Span Inspections consistent with Routine Inspections and fill in all the applicable fields listed on the WSBIS coding form.
    - Provide all the same information and supporting documentation to include Deck and Elevation Photos, and Scour Field Evaluations.

An Underwater Inspection is performed on short span bridges with structural elements underwater. If the Team Leader is unable to assess the condition of the elements either visually or by probing, an underwater bridge inspection diver must conduct the Underwater Inspection. This inspection determines the structural condition and adequacy of the short span bridges underwater elements.

4. **Short Span Bridges Not Inspected** – If the short span bridge is not inspected, the following are some guidelines to follow:
   a. WSDOT Team Leaders should note the milepost, type of bridge, features carried, features intersected, take elevation, and deck photographs, and notify maintenance personnel that future inspections of the bridge are their responsibility.
   b. Local Agency Team Leaders should note the milepost, type of bridge, features carried, features intersected, take elevation, and deck photographs, and determine if the need for any future inspection of the bridge is necessary and coordinate with their maintenance personnel.
5. **Finalizing the report** – Once the Interim Report is completed, any supporting documentation should be uploaded to the files tab and all resources updated accordingly as described in the beginning of this chapter under 'Opening and Completing Bridge Inspection Reports'. Submit the data through normal bridge inspection reporting procedures.

3-2.15 *2-Man and 3-Man Agreement Inspections (2-Man Inspection Type Discontinued)*

Local agencies can enter into signed agreements with the State allowing WSDOT to assist those agencies with inspections requiring the use of specialized equipment such as UBITS. WSDOT can provide all the resources and perform the inspection (3-Man) or provide the UBIT with driver and bucket operator to assist the Agency in conducting their own inspection (2-Man).

The 2-Man inspection type in BridgeWorks was originally used to identify and schedule State UBIT resources used by Local Agencies but is being discontinued. The 2- Man Inspection resource is still available but will not be entered into BridgeWorks as an inspection type. WSDOT still provides the UBIT with driver and operator/assistant inspector at cost, and the Team Leader representing the Local Agency will still perform the inspection. Inspection intervals may vary depending on terms of the agreement between the State and the Local Agency. The Local Agency shall determine the level and inspection interval for their structures within the agreement. Going forward, agencies using the WSDOT UBIT resource either as a 2-Man Inspection or a 3-Man Inspection should do the following:

1. **Enter the Appropriate Report Type –** The agency or lead inspector for the agency will need to identify the reportable type of inspection being performed. This will normally be either a Routine or an NSTM.
2. **Enter the UBIT Resource** – The UBIT and Two Man Resources should be entered as a resource under the Routine or NSTM Inspection type (not both) for the bridges that require the resource.
   a. Under the Resource Box at the bottom of the Routine or NSTM Inspection type tabs in BridgeWorks, select the UBIT resource in the drop down.

b. Under the column “Used” select the type of UBIT used for the current or last inspection. Under the “Min”, “Max”, and ‘Pref” columns enter the appropriately desired size of UBIT.

c. Under the “Hours” and “OTHrs” (Over Time Hours) columns, enter the number of hours used for the current or last inspection.

d. Under the “Freq” and “Date”, columns enter the Interval and Date of the current or last inspection. The “Need” date will automatically populate. If it does not or there is already a “Date” entered, use the “Ovr Need” to enter the date and it will override. Enter the “Interval” and “Need Date” information to coincide with the inspection interval and due date month above. This will ensure that the equipment will be scheduled to coincide with the month the desired inspection is due.

e. To indicate that the UBIT will be needed with only the driver and operator, and the Lead Inspector will be agency provided (Two Man), under the “Resource” column select an additional resource as 2-Man. With out that, the UBIT resource will be scheduled as a full inspection team.

Examples

- Routine or NSTM Inspection conducted every two years with a UBIT in May, with next inspection required 5/8/2030. Agency desires WSDOT to do the complete inspection and write the report.

  i. Enter …. UBIT Resource……Freq = 24……Need Date 5/8/2030

- Routine or NSTM Inspection conducted every two years with a UBIT in May, with next inspection required 5/8/2030. Agency conducts inspection.

  i. Enter …. UBIT Resource……Freq = 24……Need Date 5/8/2030

  ii. Enter …. 2-Man Resource

- Routine Inspection conducted every two years in August, but only requires a UBIT every four years. Agency conducts inspection. Last Two Man Inspection 8/10/23, Next Routine 8/10/25. Next Routine Inspection with UBIT 8/10/27.

  i. Enter …. UBIT Resource……Freq = 48……Need Date 8/10/2027

  ii. Enter …. 2-Man Resource

f. WSDOT compiles inspection schedules and resource by month, up to 1-year in advance each year. If the Resources and Resource Need Dates are filled out and updated each inspection to coincide future Inspection Need Dates, resources under agreements will automatically get scheduled for the month those inspections are due. WSDOT should contact the agencies at least the month prior to the actual scheduled date.

3. **Performing the Inspection** – WSDOT should contact the agencies at least the month prior to the actual scheduled inspection need dates. If that does not happen or the agency is scheduling further out, the agency may contact WSDOT Bridge Preservation. In both cases of either 2-Man or 3-Man Inspections, WSDOT and the agency under agreement will coordinate the days and times of inspections. For agencies using private consultants to conduct the inspection, it is the agency under agreement that WSDOT will coordinate with. Local Agencies are responsible for providing traffic control, arranging for RR flagging or any other required coordination.

a. For 2-Man Inspections, WSDOT will provide the UBIT with driver and a bucket operator to also act as assistant inspector. The representative for the Local Agency must meet all the necessary qualifications to act as a Team Leader for the inspection being performed. The representative Team Leader needs to have the proper PPE for fall protection and have received all the required fall protection training necessary to utilize the UBIT. If there are any questions do not hesitate to contact WSDOT Bridge Preservation in advance for assistance.

b. For 3-Man Inspections WSDOT will coordinate with the agency under agreement for the days and times of the inspections to be performed. Local Agencies are responsible for providing traffic control, arranging for RR flagging or any other required coordination. WSDOT will provide the UBIT with driver, bucket operator/assistant inspector and the qualified Team Leader to conduct the inspection and prepare the report.

c. Assigned Team Leaders from either WSDOT or the agency under agreement should perform the necessary required inspection such a Routine, and or NSTM and enter them into BridgeWorks following the procedures for opening and completing those specific reports.

4. **Finalizing the report** – Once the associated report is completed, any supporting documentation should be uploaded to the files tab and all resources updated accordingly as described in the beginning of this chapter under 'Opening and Completing Bridge Inspection Reports'. Before releasing the report be sure to complete the following:

   a. Update the resources for the report as described above and insure that need dates for the resources coincide with required next inspection dates. If there are any questions, the agency or team leader may contact WSDOT Bridge Preservation Supervisors for assistance.

   b. For WSDOT UBIT drivers and bucket operators/co-inspectors performing 2-Man Inspection support, ensure the correct RO Number are used for each structure inspected and notify your supervisor when the inspections have been completed.

3-2.16 *Informational Report*

This report type is used to add notes, data, files or photos to a report between scheduled inspections. Additionally, the Informational Report can be used to change the inspection interval if necessary or to just assign a next scheduled inspection date without having to change the normal inspection interval. An Informational Report type does not involve field work and is typically used by inspection staff and the Bridge Information Group. Data that is updated through an Informational Report can be accessed from the SI&A report on BEISt. Depending on the type of data updated, it may be necessary to print out and sign the report for scanning into BEISt. (See "Signed Informational Report" type. This will be determined by the Team Leader and their supervisor. Informational Reports are not reported in the NBI or NTI. An Assistant Inspector who has 3 years of bridge condition inspection experience or the approval of their supervisor and has successfully completed a FHWA approved comprehensive bridge inspection training course can create an Informational Report.

3-2.17 *Signed Informational Report*

This report type is similar to the Informational Report type regarding the entry and updating of administrative information, photos, files, notes, or adjusting inspection dates and intervals. However, any time an Informational Report includes the changing of NBI condition codes that may directly affect and change the overall rating of a structure, possibly affecting the inspection interval and reporting requirements, the report must be signed. This type of report must be entered by a certified Team Leader, reviewed through the QC process, signed, and then uploaded into BEIST. An example of Informational Reports that may require a signature may include changes the below listed NBI or SNTI condition codes.

- Deck Condition
- Superstructure Condition
- Substructure Condition
- Culvert Condition
- Observed Scour Condition
- Underwater Inspection Condition
- Channel Condition
- Channel Protection Condition
- NSTM Inspection Condition

3-2.18 *Inventory*

This report type is used to administratively enter or update new or altered bridge records. The data entered is based off plan reviews and information derived from project documents or real-estate agreements. Once entered, this report generates information within the bridge record that will require field verification by inspectors when conducting Initial and Routine Inspections. This report type may also provide detailed information on a new or altered structure to assist the inspection team in field verification and is intended to stay in the bridge record until an Initial or follow up Routine Inspection is completed.

For Local Agency structures, the Inventory Report type is created and removed by the Local Programs Bridge Inventory Engineer (LPBIE) for new structures. When agencies need an inventory report, they will contact the LPBIE for assistance.

For WSDOT structures, the Inventory report type is always created and removed by the BPO Information Group and is closely coordinated with the Contract History database. BPO inspection teams shall always review the information in an inventory report type and update the record as needed, including clearly indicating when the construction work is completed.

Examples of construction work that tracked by this report type include:

- New structures
- Retrofits and rehabilitation (deck replacement, seismic retrofits, strengthening, etc.)
- Any new or replaced BMS elements (new joints, rails, overlays, etc.)
- Utility work
- Roadway alterations UNDER bridges that affect vertical and horizontal clearances (new pavement, roadway widening, etc.)
- Functional changes (bridge changed from 2 way to 1 way traffic due to construction of new parallel bridge, for example)

Examples of construction work NOT tracked by this report type include:

- Repair work tracked in the Repair List
- Any changes to the structure record which are not performed in the field by inspectors (updated ADT, NHS designation, etc.)

An Assistant Inspector who has 3 years of bridge condition inspection experience or the approval of their supervisor and has successfully completed a FHWA approved comprehensive bridge inspection training course can create an Inventory Report. This report type is not reported to the NBI or NTI.

In-Depth (SNBI Special Inspection)

Any time a bridge element or portion of the bridge requires further evaluation, analysis, or investigation to accurately assess its condition, complete an In-Depth Inspection. This inspection may involve testing, monitoring, targeted evaluation prior to a contract, or conducting specific analyses of given bridge elements. The need for an In-Depth Inspection generally arises resulting from a Routine or Interim Inspection; or just a need for additional information to support contract work or requests for information.

In-Depth Inspections are performed as needed and do not have inspection interval. They are treated as one-time only inspections typically to gather additional information. If the inspecting agency feels that subsequent inspections are needed on regular intervals, Interim Inspections should be utilized instead. They are not reported in the NBI or NTI.

1. **Performing the Inspection** – The In-Depth Inspection should include as detailed analysis as necessary to determine the condition of the given bridge element or elements. There can be no standard set of procedures to follow or observations to be made. Many factors will influence the depth and extent of analysis required. Prior to scheduling the inspection, Team Leaders should ensure they fully understand the purpose of the inspection and the information type and detail required.
2. **Reporting** – There is no standard form to be completed for reporting In-Depth Inspection findings. When the inspection is concluded, the Team Leader should prepare a BIR along with any additional documentation to note:
   - The location of each bridge element inspected.
   - The procedures used to analyze and assess the particular bridge element.
   - The names, titles, and observations made by any specialists who were consulted.
   - The results of any testing performed.
   - Any recommendations for maintenance or repair.

   On all In-Depth Inspections, all changes/updates to NBI or NTI data shall be released into the inventory within 90 days of the date of inspection.

3-2.19 *Geometric (Anticipated Discontinuance in 2025)*

This inspection type is used to collect vertical and horizontal roadway clearances for routes both on and under bridges and would also include a complete review and update of all. The vertical clearance cards associated with the bridge. Vertical and horizontal roadway clearances are collected at an 8-year interval for minimum vertical clearances of 16.5 feet and less, and at a 16-year interval for minimum vertical clearances greater than 16.5 feet. An Assistant Inspector can perform as a Team Leader for Geometric Inspections. Geometric data that has been collected using LIDAR can be used to update bridge inventory data. as a Geometric Inspection as long as the Team Leader has reviewed the LIDAR data. This inspection type is not reported to the NBI or NTI.

3-2.20 *Scour Monitoring*

This inspection type is used when scour monitoring is performed as required by a Scour Plan of Action (POA) for a triggering storm event. See Sections 5-3.2 and 5-3.3.1. This typically involves during event and post- event inspections by regional maintenance crews who then report the findings to the BPO Scour Engineer. If multiple site visits occur for a triggering storm event, this report type only needs to be recorded for that storm event with a start date and an end date. The start date is the first day the structure is observed for a triggered event. The end date is the day the inspected or monitoring closes out for the event in accordance with the scour plan of action (POA).

3-3 Bridge Inspection Orientation

Designation of bridge orientation and a component numbering system for the bridge elements is needed for consistency within the inspection reports. Typical bridge orientation convention is normally consistent with route orientation and the direction of increasing mileposts for the associated route. However, orientation and component numbering systems typically follow the conventions of the bridge owner and inspecting agency. To ensure consistency between inspections, the designated orientation will be identified at the beginning of each bridge inspection report.

State Owned Structures

- For east to west routes (typically even numbered routes) the designated beginning of a structure is at the west end moving to the east in the direction of increasing milepost. For south to north routes (typically odd numbered routes) the designated beginning of a structure is at the south end moving to the north. There are a few exceptions regarding route orientation and numbering within the state, as well as a few that are confusing regarding geographic orientation. In any case, the orientation should default to the direction of increasing milepost.
- For directional traffic ramp structures, such as on-ramps and off-ramps, orientation will normally be in the direction of traffic. This allows for inspections to start where the bridge is first accessed while traveling the associated route.
- For overcrossing structures, orientation will normally be crosswise to the orientation of the associated route and start at the west or south for consistency. For a south to north route, an overcrossing structure will be oriented west to east (left to right). Over a west to east route, an overcrossing structure will be oriented south to north (right to left).

Once the designated orientation of a structure is identified, subcomponents will typically be numbered from the left to the right looking ahead on stationing in the direction of orientation. If the State inspects bridges for another agency, unless the agency already has a clearly designated orientation within the report, designated orientation will typically follow State convention (See Exhibit 3-7 through Exhibit 3-10)

Exhibit 3-7 Bridge Nomenclature

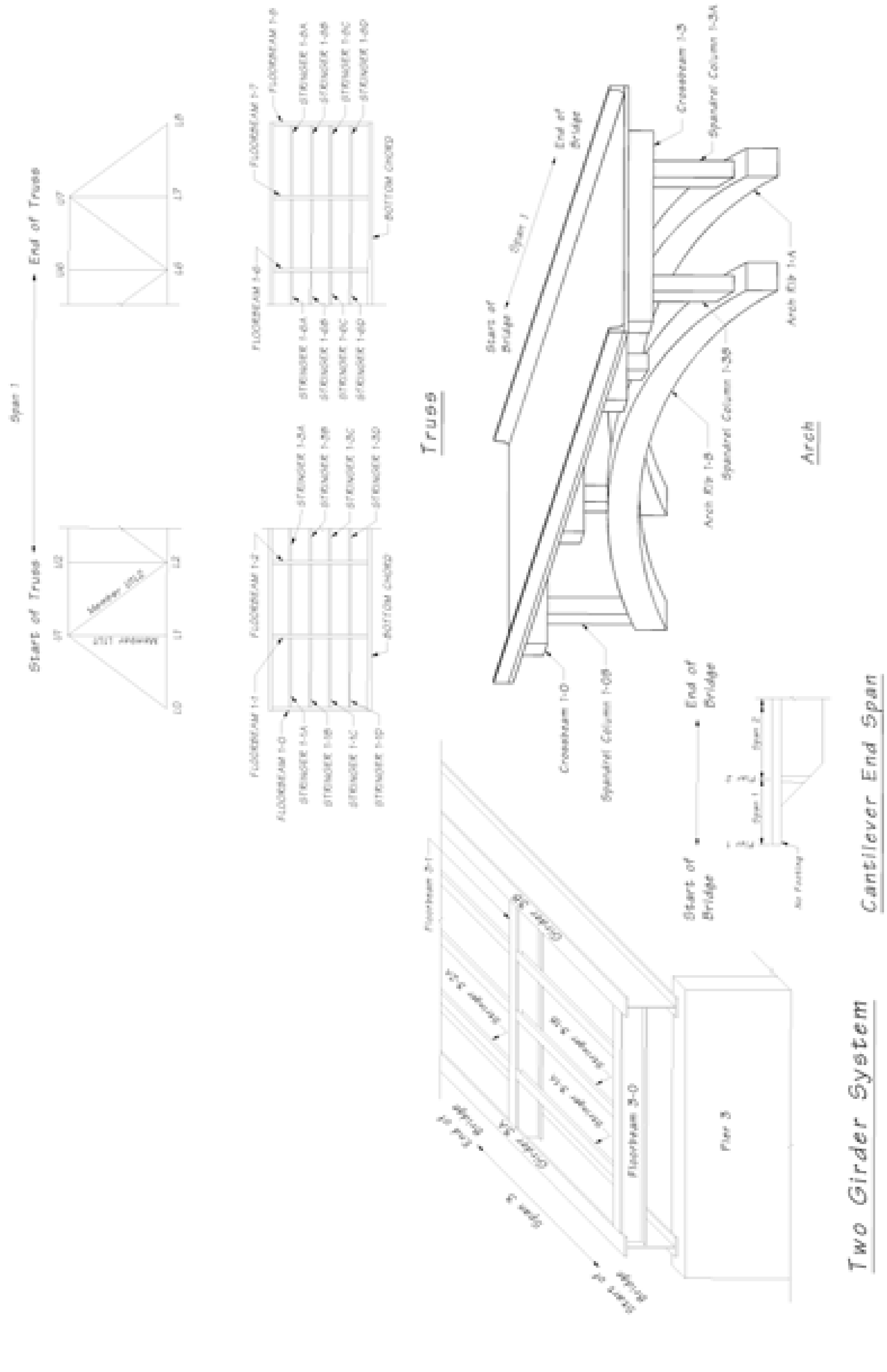
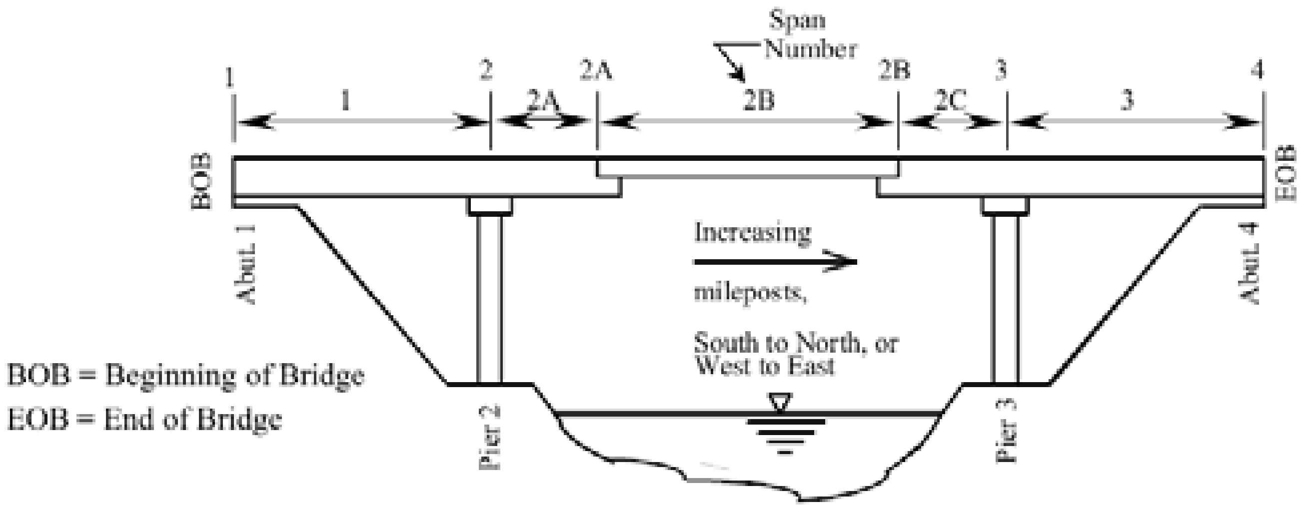


Exhibit 3-8 Component Location



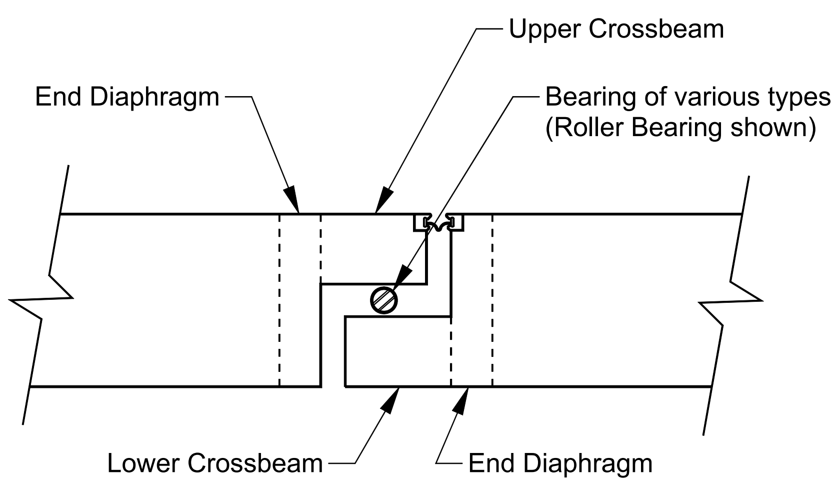
Orientation:
B.O.B. normally south or west ends following route orientation.

Exceptions Include:
One way ramps – B.O.B. = First end to receive traffic.

Selected bridges that follow plan orientation.

There is no golden rule about orientation except that B.O.B. Must always be identified in the '0' note along with basis for this assumption. It is helpful to refer to geographical markers (streets, rivers, etc) when describing the B.O.B.

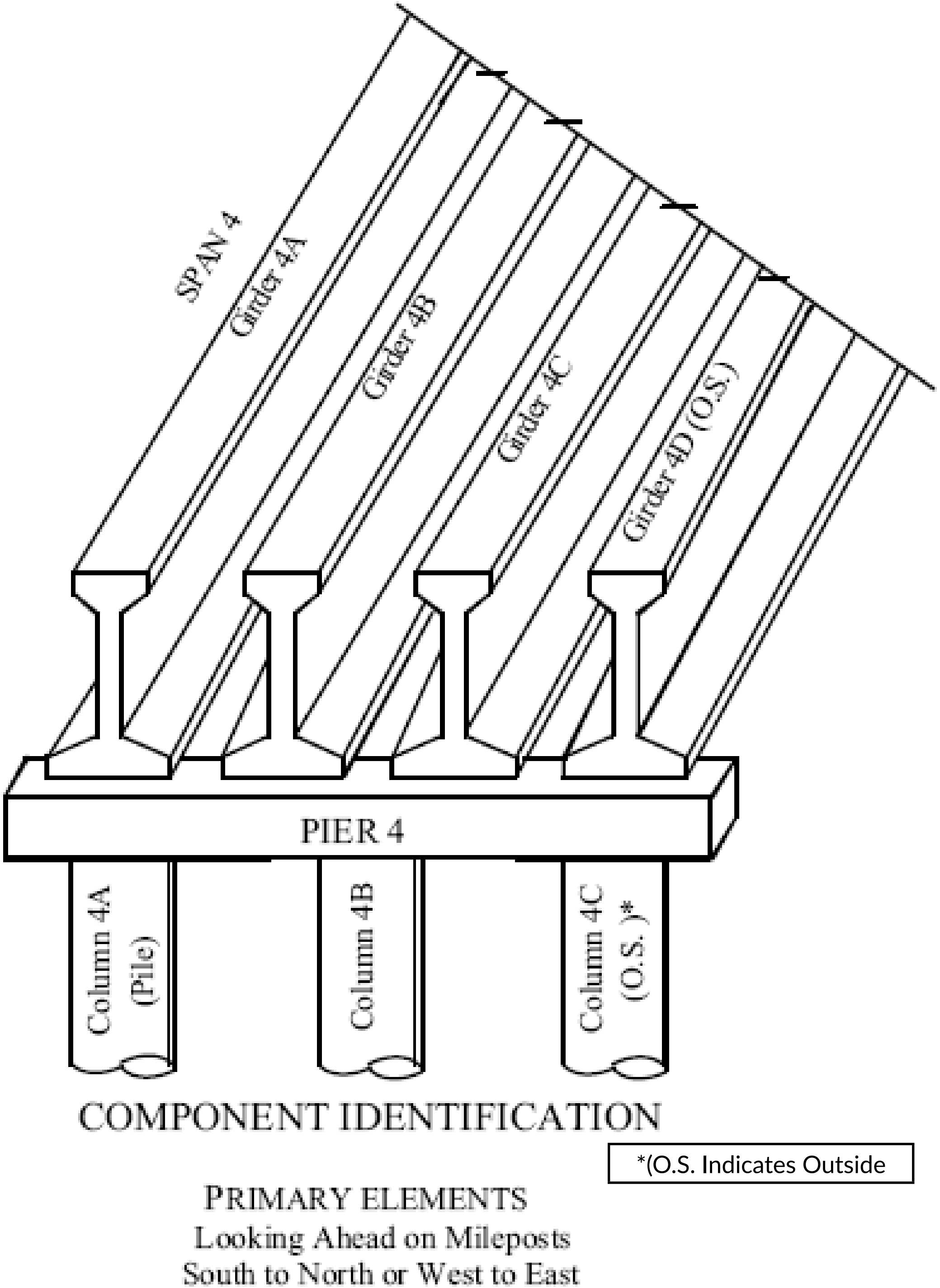
Exhibit 3-9 In-Span Hinge Callout



IN-SPAN HINGE CALLOUT

(Do not Quantify Crossbeams in BMS for Box Girder)

Exhibit 3-10 Component Identification



Section 3-4 provides guidelines for inspection processes and procedures specific to the State and the Office of Local Programs. These guidelines can be used as a reference or can be implemented.

3-4 Policy and Procedures

This section discusses the specific policies and procedures that are utilized in BPO or LP that are supplementary guidelines for field work and inspection report writing. These best management practices are utilized by inspection teams and are specific to each program.

3-4.1 *BPO Policy and Procedures*

3-4.1.A General Inspection and Report Writing

1. Columns on the first page of the BIR contain NBI and agency specific items with associated coding information for each structure within the inventory. The numbers within parenthesis next to these item titles are WSBIS item numbers and are unique to the BridgeWorks program corresponding to FHWA and/or agency specific items. Over the next several years, new SNBI coding requirements are being incorporated, phasing out older ones. Many of the items will start to show the new SNBI numbers in place or in addition to the existing numbers.
2. When circumstances (including obstruction of bridge elements) prevent any required work from being completed at the time of inspection, report the situation to your supervisor so a determination can be made whether or not the bridge needs to be rescheduled in the current inspection year. It is the responsibility of the Team Leader to ensure that the bridge inspection is completed unless the supervisor delegates the responsibility. Bridges that cannot be inspected due to high water will be rescheduled in the current inspection year during lower flows. Bridges that need cleaning or vegetation removed will require coordination with maintenance for dirt and/or vegetation removal prior to re-inspection. If the supervisor determines that the bridge does not need to be rescheduled in the current inspection year, clearly identify why the work wasn't completed and what is required of the next team leader to achieve the task.
3. Traffic lanes on a structure are numbered from right to left looking in the direction of traffic on one-way multilane routes. For reversible lanes assumed orientation should be described in the report.
4. Whenever an in-span hinge separates two bridges, the bearings, restrainers, and joint are to be coded with the "dependent" structure. Identify how these elements are associated in the report. Explain any exceptions to this rule in the 0 note.
5. Whenever measurements are taken, for joint openings, monitored conditions, or anything else, include in the report the date and the air temperature when the measurements were taken. Unless there is a warranted condition, only measurements from the last three inspections need to be maintained.
6. Refer to specific joints by pier or span numbers instead of joint numbers. There may be unique circumstances where using joint numbers are justified. Under these circumstances, justification for using joint numbers must be documented in the report.
7. Investigate fully and report any and all joint noises and their origination.

8. Compare Curb to Curb Width (B.G.06) with Horizontal Clearance (1491 and 1495). Typically, they should be the same, except for non-mountable medians.
9. Detailed notes are to be entered separately under each Bridge Management System (BMS) element. NBI notes should reference the appropriate BMS element note. Maintain any details of flagged defects or damage within the BMS element note.
10. Inspection report summary comments are required for any BMS element in Condition State (CS) 2, 3 or 4. Comments need to be detailed in accurately describing and supporting the assigned condition states. The comments can be supported with photos but should, on their own, contain the necessary details to document the location and extent of conditions.
11. Avoid using phrases for significant defects such as “open crack” without a further description such as width, and any repetitive nature. Mark the specific defect location on the bridge with any measurement and the date. Consider taking a photo of the marked defect to include in the inspection report. For concrete crack size guidelines, see the table in Section 4-4.
12. When submitting reports for initial review, include field notes in the review package along with a clean copy of the report, the WSBIS sheet, the inspection photographs, and other relevant reports (NSTM, soundings, etc.). The WSBIS sheet is required to reflect all current changes associated with the inspection.
13. Describe photos with respect to bridge orientation, not geographic direction. Photos should identify the orientation, location, and what is photographed. All photos, except deck and elevation photos, must be numbered and referenced in the notes or in an attached file such as a NSTM inspection Report.
14. Ensure that photographs are accurately titled and up to date in depicting the current condition as is described in the report notes. Report notes should contain the detailed information and be accurately supported by the photos.
15. Photos no longer relevant to the report should be deleted. Keep repair photos in the report for an additional inspection cycle so the Bridge Preservation Supervisor can compare them.
16. Deck and Elevation Photos should be assessed at each inspection. Update photos if there are new conditions or changes to the structure.

3-4.1.B Bridge Inspection Notes Standard Practice

1. Cardinal directions (north, south, east, and west) are not to be abbreviated and are never capitalized, except at the beginning of a sentence. The directions northeast, southeast, northwest, and southwest may be abbreviated NE, SE, NW, and SW.
2. For acronyms, follow the standard practice of spelling out the first time use with the acronym in parenthesis following (e.g., Local Programs (LP)).

3. Use of abbreviations should be limited. Common abbreviations:

F	Fahrenheit	A.M.	a.m.
in. or ″	inch (inches)	P.M.	p.m.
ft. or ‘	foot (feet) ‘symbol only used when followed by a dimension in inches.	NW NE SW SE	directions
L	length	D	depth
W	width	etc.	etcetera
sq. ft.	square feet or SF	LF	linear feet
psi	pounds per sq. in.	YT	Yellow tagged
psf	pounds per sq. ft.	RT	Red tagged
ACP	asphalt concrete pavement	LMC	latex modified concrete
BST	bituminous surface treatment	HMA	hot mix asphalt
SR	State Route	US	National Highway
I	Interstate	Jan	January, etc.

4. Limit the use of symbols to ° for degrees and % for percent.
5. Use of the “Tilde” (~) symbol is not allowed.

   Dimensions are noted with a space or hyphen between feet and inches, and a hyphen between whole inches and fractions of an inch. When combined with other dimensions, a ‘0’ should precede bare fractions of an inch. Measurements greater than 12″ may be listed in inches, if appropriate. Decimal inches may also be used. For example:

   1′ 1-1/16″ × 6′ 0-7/8″ 6″ × 14″ timber stringers

   8″ × 14″ × 1/2″ deep spall

   3 ft. wide × 14 ft. long × 2.5 ft. tall bridge corbel

   12 ft. (L) × 15′ 6″ (W) × 3″ (D) popout in south face of Pier 2 1′ 0-3/4″(l) × 0.125″(w) crack in east face of Girder 2F

   42.2″ long anchor bolts

3-4.1.C Report Notes Within BridgeWorks

0 Note – Orientation

- Bridge orientation and identification of the pier/span numbering system is always required, stating the basis of orientation such as “increasing mileposts,” “ramp direction,” or per plans. Any potentially confusing orientation issues or deviations from standards (west to east or south to north) must be clearly identified. Identifiable physical features at beginning or end of bridge may also be used.
- Place any special instructions and information that doesn’t fit anywhere else under the 0 note.
- For bridges receiving Routine Inspections that are still open to traffic while under construction, enter the standard note provided under 3-4.1. L, “Inspection of Structures Under Contract”
- For bridges receiving Extended Interval Routine Inspections at 48-months, enter the standard note provided under “Routine Inspection” for “Routine Inspections with Extended Intervals”.

1 Note – This note is maintained by the Team Leader and is used for explanatory information. regarding bridges that contain NSTM's and/or Complex Features. Use this note to explain any complex features, procedures, areas to be inspected or complicated scheduling. Do not redundantly repeat resource information or dates that an inspection occurred.

5 Note – Program Management Engineer maintains this note. It contains information regarding scheduled rehabilitation or replacement, and other upcoming program management items.

6 Note – **Agreements:** This note is maintained by WSDOT supervisors for use in documenting information, clarification and directions for inspections associated with other agency agreements, memorandums of understanding or larger umbrella agreements. This note would record and clarify the existence of any agreement or MOU obligation and may provide direction to inspectors for inspection work required, and any subsequent processing or dissemination of completed reports. Examples may include.

- Agreement with other State Agency requiring inspectors to perform a condition inspection on structures overcrossing a state route in conjunction with a State Safety Inspection.
- Memorandum with Federal Agency on shared structure requiring state to inspect the route above and report the structure on the NBIS as a Routine and provide a courtesy copy of the report.
- Umbrella agreement with Local or Other State Agency outlining shared responsibilities related to the inspection.

9 Note – The 9 note is used to create the executive summary for an Underwater Inspection Report.

11 Note – For state-owned structures, the Load Rating Engineer maintains this field. For Local Agency owned structures, the bridge owner can designate others, such as a load rating engineer, other personnel, or consultant, to maintain this field. This note is used to explain any load posting placed on a bridge. This note is closely associated with the Revise Rating flag (2688), see Section 3-4.1.E.

3-4.1.D Operating Level Code (1660)

Verify that load posting signs are in place at the bridge and in advance of the bridge when practicable. Advance load postings should be placed in advance of the nearest intersecting road, ramp, or wide point in the road where a driver can detour or turn around. Verify that load posting signs and advance load posting signs match the posting requirements in Note 11 and write a note within BridgeWorks under Operating Level Code (1660) to that effect. Take a photo of any existing posting signs and advance posting signs. Ensure that (1293) (open or closed) is coded appropriately.

If required posting signs are missing or inaccurate, inspectors shall notify the Risk Reduction Engineer for state-owned bridges and the Local Agency Bridge Engineer for locally owned bridges on the date of the inspection. The federally mandated timeframe for remediation is 30 days from the inspection date.

3-4.1.E Revise Rating Flag (2688)

For State owned bridges, any load rating issues should be addressed within the body of the BIR in the (2688) note. Delete any notes that don't have relevance to the existing condition of the bridge.

3-4.1.F Scour Code (1680) and SNBI B.AP.03

The Scour Engineer maintains the Scour code (1680) and SNBI B.AP.03 field and notes. Any scour comments by the Team Leader should be placed in BMS Element (#361) Scour Flag or Channel Protection (1677), depending upon which is most appropriate. Inspector codes for SNBI B.C.09, B.C.10, and B.C.11 are supported by the notes in BMS Element 361 and NBI 1677 fields.

3-4.1.G Soundings Resource

When preparing for an inspection that requires soundings, print any existing stream profile file to include in your inspection field packet. The inspector should take notice of the soundings resource 'Need' or 'Ovr Need' dates to determine if soundings are due during their inspection. The Scour Engineer determines which State bridges need stream cross sections (soundings) by placing a "Y" in the Soundings Flag (2693). When this is required as part of the inspection, perform the following:

1. Enter data into the Scour Field Evaluation Form, see Section 3-5.
    a. If you could not take soundings on the initial inspection trip, plan on getting them on another trip, either by coordinating with another Team Leader or by doing it yourself.
    b. If there is a reason soundings should be taken at a different time of the year (i.e., low water, low tide, or fish windows), add a resource with an explanation under the Report Types Tab.
2. Attach the completed form to the appropriate bridge inspection report File Tab, replacing any already existing form and remove the old one.
3. Change the Soundings Flag (2693) from "Y" to "*" for State bridges only.
4. When you return to the office submit an email to the scour section (to: Scour Assistant cc: Scour Engineer) with the Scour Field Evaluation attached. The email shall include any significant findings and/or repair need that need to be brought to the Scour Engineer's immediate attention.
5. The Scour Engineer will email an electronic stream profile file that you will attach to the report Files tab.
    a. Replace any existing stream profile file with the updated one and remove the old one.
    b. Print the new stream profile file and include it with your inspection review packet.

3-4.1.H Timber Structures

- Yellow Tagged (YT) members have rot and a shell greater than or equal to 1-½". A YT member requires a Priority 2 repair. The need for Interim Inspections is determined by the lead and the Regional Supervisors.
- Red Tagged (RT) members have rot and a shell less than 1-½". An RT member requires a Priority 1 repair. Schedule an Interim Inspection. Determine the extent, location, and significance of decay. Provide details for the Load Rating Engineer.

3-4.1.I Culverts

- Culverts are defined as identified in Chapter 1 and Appendix 3-A.
- NBIS Length (B.G.01), Total Length (B.G.02), Maximum Span (B.G.03), Minimum Span (B.G.04), Out-Out (B.G.05), and Curb-Curb (B.G.06), are determined in accordance with the associated SNBI listings.
- The BMS quantity is determined by measuring from inlet to outlet of one barrel/pipe and is not dependent upon the number of barrels or pipes. This will typically be equal to the SNBI Out-Out measurement for structures not located on a skew.
- When inspecting culverts as either a reportable structure or as a short span, record the maximum and minimum fill depths over the culverts at the outer edges of the traveled roadway.

3-4.1.J Vertical Clearances (1370, 1374, and 2694,)

Minimum Vertical Clearances

Every Routine, Short Span, Safety or Condition inspection shall include a verification statement of the vertical clearance (VC) card comparing it with the current condition and any significant changes (new asphalt, additional lanes, new curb/gutter, etc.). Verification will also include at least one vertical clearance measurement if traffic allows, and ideally at the low point if possible. If changes in conditions or conflicts with the VC card are identified, note discrepancies, and collect all new clearances if possible. If no changes or discrepancies are identified, no further action is required.

For structures with clearances greater than 16’-6”, and with no other noted changes or discrepancies, the verification of a vertical clearance measurement is optional.

Each Inspection

- Check for all postings on bridge, and in advance, are in place.
- Check that Posted clearances are consistent with existing conditions and documentation.
- Update 2694 as applicable.
- Update the WSBIS as applicable.

When to Collect or Verify Vertical Clearances

- Whenever a clearance card is missing, incomplete or inaccurate. High traffic volumes may prevent the ability to acquire this information without traffic control.
- When changes in alignments, geometry or conditions affecting current measurements are identified.
- At bridges where the clearances box has been populated with a “V”.
- When Team Leader feels that over height hit damage is occurring significantly enough to check the existing clearance information.
- As a part of over height load damage inspections.

Where to Collect or Verify Vertical Clearances

- Minimum clearances along all lane stripes, edges of pavement/curb or controlling grade breaks between these points.
- Appurtenances (lights, signs, utilities) that control minimum vertical clearances should be documented as well, but in most circumstances will be used only to create a repair recommendation to relocate appurtenance. Provide vertical clearance information to the Sign Bridge Engineer.
- For existing postings verify lowest accessible clearance location first and verify other locations as required.
- For over height impact Damage Inspections, measure all accessible lane stripe locations below and around the points of impact.

Documenting Vertical Clearances

- Document all measured clearances. Drawings should be neatly transcribed and turned in to the Bridge Geometry Engineer. Photos are to be placed in the Photos/2694 Clearance folder in BridgeWorks and the Bridge Geometry Engineer notified of this action.
- 2694 Note should reference: Vertical clearances taken or checked on (date). Minimum clearance below the bridge measured to be (measured minimum clearance) below (exact location). See photo #. REPAIR #00000. In situations where multiple structures are controlled by one structure that requires posting, the recommended posting locations and the presence or omission of signage shall be appropriately documented in the 2694 notes of each of the involved structures.
- Update WSBIS fields (1370), (1374) and (1499). Appurtenances are not coded. Consult with the Bridge Geometry Engineer for questions.

Posting Requirements and Recommendations

- Bridges with field measured minimum clearances over the traveled lanes equal to 14' 3" up to and including 15' 3" require posting on the structure at the controlling location and advance warning signs at one or both shoulders.
- All bridges with field measured minimum clearances less than 14' 3" require additional advance posting signs in advance of nearest intersecting roads, ramps, or a wide point in the road where a driver can detour or turn around.
- All posted clearances shall be 3" less than the actual lowest measured clearance, except as follows:

    a. In some cases, WSDOT intentionally posts clearances with more than a 3" buffer. This decision will be documented in the 2694 note, identifying the posting clearance required.

    b. The City of Spokane has a 1" buffer rule, so bridges are intentionally posted only 1" less than measured. This will be documented in the 2694 note for all affected bridges inspected by BPO staff.

c. A tolerance to the 3” buffer for existing bridge posting signs is allowed. See criteria listed below.
   - If the actual measured opening for a bridge or tunnel increases by 2” or less the existing signing may remain. *(i.e., a bridge clearance changes from 15’-0” to 15’-2”, the existing warning sign of 14’-9” may remain.)*
   - If the actual measure opening for a bridge or tunnel increases by more than 2” the signs shall be replaced. *(i.e., a bridge clearance changes from 14’-9” to 15’-0”, the existing warning sign of 14’-6” shall be corrected.)*
   - If the actual measured opening for a bridge or tunnel decreases by 1” or less the existing signs may remain. *(i.e., a bridge clearance changes from 15’-0” to 14’-11”, the existing warning sign of 14’-9” may remain.)*
   - If the actual measured opening for a bridge or tunnel decreases by more than 1” the existing signs shall be replaced. *(i.e., a bridge clearance changes from 14’-10” to 14’-8”, the existing warning sign of 14’-7” shall be corrected.)*

There are situations where bridges should be posted for minimum vertical clearances in the shoulders (outside traveled way). Check with the Bridge Geometry Engineer for details. Appurtenances such as lights or signs that suspend below those bridge elements are to be noted. Those that are 15’3” or less within a traveled path or have evidence of traffic impact damage are to be written up as a repair to be removed or relocated.

Vertical Clearance (V) Repair

- A Priority 1 or 2 Vertical Clearance (V) Repair is warranted as follows:
- Priority 1: When vertical clearance posting is found deficient (for example less than 2” buffer), missing, or where the signage on and in advance of the bridge do not match.
- Priority 2: When a vertical clearance posting on and in advance of the bridge is found conservative (more than 5” buffer) without prior documentation from the Region or other authorized authority.
- Each repair written should identify and include the following language:
- (Minimum clearance measured to be (measured clearance) located at (controlling location) on (date measured). Post for (3” less than measured clearance) in accordance with the most current WSDOT Low Vertical Clearance Signing Policy. Contact Bridge Geometry Engineer at Bridge Preservation 360-570-2544 with any questions.

3-4.1.K Horizontal Clearances

- Collect minimum shoulder widths on both sides of roadway and edge of traveled way (fog line) to permanent obstruction (columns, abutments, retaining walls, toe of slopes). See Item 1379 for ramps, gores, and other more complex configuration examples.
- Collect horizontal clearances where the clearance flag has been populated with an “H”.
- Update WSBIS fields (1379) and (1383) (Minimum Lateral under Clearance Right & Left).

3-4.1.L Inspection of Structures Under Contract

New bridges and bridges reopening from major retrofits, widening, or rehabilitation are required to have an Initial Inspection conducted on them within 90 days of opening to traffic. Bridges under rehabilitation or retrofit while still open to traffic are required to receive their scheduled Routine Inspections within the acceptable tolerance period.

New structures and structures closed under contract.

1. Information organized and provided under Inventory or Informational Report Types by the Bridge Inventory Technician will include the Project Office contact and contract numbers.
2. BPO inspector MUST contact the Project Office (Project Engineer if possible) prior to performing inspection. Do not directly talk to contractor without first contacting the region.
3. Perform the Initial Inspection within 90 days of opening or re-opening to traffic. If significant safety issues, or defects are identified, report the findings to the Inspection Supervisors first and then the Region Project Office.
4. Complete the Initial Inspection Report Type.

Structures under contract construction while still open to traffic.

1. If the inspectors identify that the structure is under contract prior to arriving on site, they should contact the Project Office (Project Engineer if possible) and let them know that the structure requires a Routine Inspection. If not and the inspectors arrive on site and can safely access the structure, proceed with the inspection without interfering with any ongoing construction activities.
2. Conduct the most complete Routine Inspection possible.
3. Do not change or alter element quantities in the bridge report based on any construction activities or expected final configuration.
4. Under each element that is impacted or not accessible, provide a comment stating the limitations of the inspection.
    - Example: South rail not accessible due to construction, temporary traffic rail in place to protect work zone.
    - Example: West abutment not accessible due to construction.
    - Example: Bearings at west abutment not accessible.
    - New girder line north of Girder Line A not inventoried as construction is not complete.
5. Leave previously noted defects and any associated condition states, or repairs for areas under construction in the report.
6. Attempt to identify when the contract is expected to be complete.
7. Notify regional supervisor of inspection completion, and anticipated contract completion date, but DO NOT force date inspections or resources without coordinating with supervisors.
8. Complete the Routine Report Type.

9. Under the “0 Note” provide the following statement:
    - “At the time of this inspection, the bridge is currently under contract construction for rehabilitation, retrofit or widening and is at least partially open to traffic. The scheduled Routine Inspection was performed in accordance with FHWA and Agency standards and guidelines. However, the scope of the inspection in inherently defined and limited to accessible areas and elements not directly impacted by construction and where activities will not interfere with the contract. Impacted areas and elements that were not fully accessible are described in the inspection notes. Previously identified element quantities, defects and condition states for elements or areas under construction are considered to remain the same and will not be changed until the contract is complete, and a new Initial Inspection is performed”. See photos.
10. Provide 2 or 3 photos showing the general areas and extent of construction.

3-4.1.M Bridge Scour for Local Agency Bridge Inspections

- Bridges with Scour Code (1680) of 2 and 3, or SNBI Scour Vulnerability (B.AP.03) of C or D, are scour critical. For reports with a scour code of “6”, “U”or “T” the bridge is assumed to be scour critical.
- Bridges with a scour code of “6”, “U”, or “T”, or SNBI Scour Vulnerability (B.AP.03) of “0”, “E”, or “U” the bridge is assumed to be scour critical and needs a priority 1 repair called out in the (1680) note.

  The call out in the (1680) note should read as follows: “This inspection report assumes the bridge is scour critical. REPAIR #XXXXX”

  The Repair should read as follows: “(1680) is coded [“U”, “T”, or “6”] indicating that the bridge foundation is not known, is tidal, and/or has not been evaluated. Perform evaluation of scour potential and any required mitigation. Indicate determination and any requirements under the (1680) note.”
- Scour critical bridges, and those that are assumed to be scour critical, that have exposed footings or have a history of exposed footings due to scour, REQUIRE a priority 1 scour repair documented in the BMS Element (#361) – Scour flag note in BridgeWorks. This repair should read as follows: “Scour mitigation needs to be evaluated.”
- All scour critical bridges need soundings at every Routine Inspection. The (2693) note needs the following comment: “Take soundings every Routine Inspection on this scour critical bridge.” Also ensure that the (2693) flag is set to “Y” at all times. This will help the process stay in place over time.
- Bridges that are not scour critical do not need cross sections unless there is some specific need that is documented in the report.

3-4.1.N Rental Equipment

The Enterprise and Risk Management Office has declared that equipment damage insurance must be purchased when renting access equipment. If the rental company does not offer insurance, insurance can be purchased through the Department of Enterprise Services (DES). The DES insurance option can take up to two weeks to process so plan accordingly.

For rented access equipment the following is required:

- Review the paperwork, when receiving the equipment, to ensure that it reflects insurance for the rented equipment.
- Review the invoice when you receive it from the BPO Accountant, making sure that the rate and time used are correct.
- Notify the rental office of any discrepancies found.
- Write the bridge number and dates used on the invoice.
- Return it to the BPO Accountant for processing.

3-4.1.O Bridge Inspection Safety

A Pre-Activity Safety Plan (PASP) is required prior to any field activity. A copy of the PASP form is located at W:\Data\Bridge\RegionalInsp\FORMS\SAFETY.

3-4.1.P Identifying the Purpose of Inspections in the Bridge Inspection Report

Within the Inspection Note (B.IE.11), under the specific inspection tab, indicate the purpose and schedule of any Interim, or Special Inspections that are required. Statement should briefly describe what is to be accomplished during the Interim or Special Feature Inspection. An example note may read:

- "Interim Inspections of YT and RT timber members are done on a 48-month interval next due xx/xx/xx. UBIT is required to access RT members at Pier X."

An abbreviated note identifying the scope should be placed in the 0 note of the actual Interim Inspection report.

- "Interim Inspection conducted to monitor YT and RT timber members.

3-4.1.Q Agreements Inspections

Team Leader will provide the complete submittal package for each bridge inspected, which includes the signed inspection report, the SI&A sheet, the inventory sheet, all photos and files. The inspection report may be digitally signed. This package is given to the Bridge Resource Technician (BRT) who checks them against the scope of work. If there is anything missing, the BRT needs to check with the inspectors and follow up with the Bridge Preservation Accountant (BPA) if there are problems with providing a complete submittal package. The complete submittal package for each bridge is scanned and loaded onto BEIST, and a hardcopy filed in the unofficial letter file in the resource room. The complete submittal packages for each bridge are sent to the agency via USPS to the address in the agreement along with a transmittal letter listing all inspection reports provided. A copy of the transmittal letter is given to the BPA for filing with the invoices and agreements.

3-4.2 LP Policy and Procedures

Local Agency Policy and Procedures differing from those in the WSBIM are detailed in the *Local Agency Guidelines* (LAG) Chapter 34. Electronic copies of the LAG are available on the WSDOT Local Programs website at www.wsdot.wa.gov/localprograms.

Local agencies are encouraged to review the BPO Policies and Procedures in the preceding section and adopt or modify the advice to the benefit of their Bridge Program. Local Agency bridge personnel are encouraged to contact the WSDOT Local Programs Bridge Engineer for guidance and advice on bridge program questions.

3-5 Forms

This section contains inspection forms typically used by the State. Local agencies have the option of developing their own forms with similar information or utilizing the forms in this section.

Exhibit 3-11	Bridge Inspection Report
Exhibit 3-12	WSBIS Form
Exhibit 3-13	Scour Field Evaluation
Exhibit 3-14	Daily Site Dive Log
Exhibit 3-15	Visual NSTM Inspection Report
Exhibit 3-16	DOT Form 234-030 Prestressed Concrete Damage Drawing Template
Exhibit 3-17	DOT Form 234-048 Girder Elevation Template
Exhibit 3-18	Ultrasonic UT Inspection Report
Exhibit 3-19	UT Inspection Schedule
Exhibit 3-20	Pin and Hanger Visual Inspection Report
Exhibit 3-21	Complex Features Inspection Report
Exhibit 3-22	Vertical Clearance Card Generic
Exhibit 3-23	Vertical Clearance Card Steel
Exhibit 3-24	Vertical Clearance Card Tunnel

Exhibit 3-11 Bridge Inspection Report

BRIDGE INSPECTION REPORT

Page 1 of 1

Status: Printed On: Agency:

CD Guid: Release Date: Program Mgr:

Br. No. **SID** **Br. Name**

Carrying **Route On** **Mile Post**

Intersecting **Route Under** **Mile Post**

Inspector's Signature Cert # Cert Exp Date Co-Inspector's Signature

Inspections Performed

Report Type	Inspection Type	Begin Date	Comp Date	Interval	Hours	Inspector	Cert No	Co-Insp.

Alignment (1661)	Operating Tons (1552)	Bridge Rails (1684)	No Utilities (2675)
Deck (1663)	Op RF (1553)	Transition (1685)	Asphalt Depth (2610)
Superstructure (1671)	Inventory Tons (1555)	Guardrails (1686)	Year Built (1332)
Substructure (1676)	Inv RF (1556)	Terminals (1687)	Year Rebuilt (1336)
Culvert (1678)	Operating Level (1660)	Bridge Rail Ht (2612)	
Chan/Protection (1677)	Open/Closed (1293)	Design Curb Ht (2611)	
Pier/Abut/Prot (1679)	Structural Eval (1657)		
Waterway (1662)	Deck Geometry (1658)		
Scour (1680)	Underclearance (1659)		

NBIS Risk Category
Routine:
Underwater:

Inspection Flags

Soundings (2693) Measure Clearance (2694) Revise Rating (2688) Photos (2691) QA Flag (2695)

BMS Elements

Element	Element Description	Total	Units	CS 1	CS 2	CS 3	CS 4

Notes

Repairs

Repair No	Pr	R	Repair Descriptions	BMS	Noted	Maint	Verified

Inspections Performed and Resources Required

Report Type Begin Date Comp Date Intvl Hrs Insp CertNo CoInsp Note

Used Hours Min Pref Max Intvl Date Need Date Override Notes

Used Hours Min Pref Max Intvl Date Need Date Override Notes

Exhibit 3-12 WSBIS Form

WSBIS Field Inventory Report

Washington State
Department of Transportation

Approved		
Revised		
RFC		
AAN		
Not Reviewed		

Bridge ID WB71

1001	2009	2132	1019	1021	2023	1156	1188	1196
Structure ID	Bridge Number	Bridge Name	Owner	County	City	Location	Latitude	Longtitude

Facilities WB72

1232	1256	1274	1286	1288	1289
Feature Intersected	Facilities Carried	Region	Custodian	Parallel	Temporary

Shaded fields are to be reviewed each inspection.

Fields in *italics* are for information only & are not editable.

Layout WB73

1332	1336	1340	2346	1348	1352	1356	1360	1364	1367	1370	1374	1378	1379	1382	1383	1386	1397	1310	1312	1291
Year Built	Year ReBuilt	Bridge Length	NBIS Length	Maximum Span Length	Lanes On	Curb to Curb Deck Width	Out to Out Deck Width	Sidewalk Left	Sidewalk Right	Min Vert Over Deck	Min Vert Under	Vert Code	Min Lat Under Right	Lat Code	Min Lat Under Left	Navigation Control Code	Approach Roadway	Skew Angle	Flared	Median

Crossing Route On WB74 (Route On)

2000	1432	1433	1434	1435	2440	1445	1451	1157	1487	1490	1354	1491	1495	1499	2500	2501	2502	1413
Main Code	On Under	Hwy Class	Service Level	Route Number	Milepost	ADT	Truck %	Crossing Description	Funct. Class	Lane Use Direction	Total Lanes Under	Horizontal Clearance Route Dir	Horizontal Clearance Reverse Dir	Max Vert Clearance Route	*Min Vert Clearance Route*	*Max Vert Clearance Reverse*	*Min Vert Clearance Reverse*	Detour Length

Crossing Route Under WB74 (Route Under)

2000	1432	1433	1434	1435	2440	1445	1451	1157	1487	1490	1354	1491	1495	1499	2500	2501	2502	1413
Main Code	On Under	Hwy Class	Service Level	Route Number	Milepost	ADT	Truck %	Crossing Description	Funct. Class	Lane Use Direction	Crossing Lanes Under	Horizontal Clearance Route Dir	Horizontal Clearance Reverse Dir	Max Vert Clearance Route	*Min Vert Clearance Route*	*Max Vert Clearance Reverse*	*Min Vert Clearance Reverse*	Detour Length

Control Data Date:

Design WB75

1532	1533	1535	1536	1538	1541	1544	1545	1546	1547	1548	1549	1551	1552	1553	1554	1555	1556
Main Span Material	Main Span Design	Appr Span Material	Appr Span Design	Number Main Spans	Number Appr Spans	Service On	Service Under	Deck Type	Wearing Surface	Membrane	Deck Protect	Oper Rating Method	Oper Rating Tons	Oper Rating Factor	Inv Rating Method	Inv Rating Tons	Inv Rating Factor

Sufficiency Rating:	
	Item 2710 SR
	Item 2711 SD/FO

Printed Date

Inspection Report Types

2920 Inspection	1990 Date	2646 Inspector	2649 Cert No	2654 Co-Inspector
Routine				
Fracture Critical				
Special Feature				
Underwater				

Inspection	Date	Inspector	Cert No	Co-Inspector
UW Interim				
Interim				
In Depth				
Damage				

Inspection	Date	Inspector	Cert No	Co-Inspector
Safety				
Short Span				
Geometric				
Info				
Inventory				

Control Data Guid:

Exhibit 3-13 Scour Field Evaluation

Washington State Department of Transportation

Scour Field Evaluation

Bridge Number	Bridge Name	Structure ID

Date	Lead Inspector	Co-Inspector

- [ ] Heavy Growth Along Banks
- [ ] Ice/Debris in Channel
- [ ] Channel/Embankments are Eroding/Sloughing
- [ ] Damage to Riprap/Abutments/Piers
- [ ] Scour Holes Near Piers/Abutments
- [ ] Riprap in Place at Piers/Abutments
- [ ] Boat Required
- [ ] Divers Required
- [ ] UBIT Required
- [ ] Winter Inspection
- [ ] Repair Required
- [ ] Monitoring Required

Soundings
(Taken from top of the upstream bridge rail)

Location	**Measurement (ft)**

Thalweg (ft):	
Distance to thalweg (ft):	
Distance was measured from:	
Rail Height from Deck (ft):	

Inspector's Remarks:

Repairs Warranted:

Exhibit 3-14 Daily Site Dive Log

Washington State
Department of Transportation

Daily Site Dive Log

Inspector	Generic WSDOT UBIT Operator	Date	1/1/2001
Bridge No.	00000000	Bridge Name	XGOCOUGS
Bridge Type		Waterway Name	
Dive Objective			

Diving Operation

Type of Operation ☐ SCUBA ☐ Snorkel ☐ ROV ☐ Other ____________

Equipment
- Suit ____________
- Air Supply ____________
- Site Access ____________
- Inspection Tools ____________

Conditions

Water	☐ Salt	☐ Fresh	☐ Brackish	Temperature ______ °F	Visibility ______ ft	
Surface	☐ Calm	☐ Choppy	☐ Rough			
Surf	☐ Small	☐ Medium	☐ Large	☐ N/A		
Tide	☐ High	☐ Low	☐ Flood	☐ Ebb	☐ N/A	
Current	☐ Fast	☐ Moderate	☐ Slow	Velocity ______ ft/sec		
Weather	☐ Sunny	☐ Cloudy	☐ Overcast	☐ Rain	Air Temp ______ °F	
Thermocline	Temperature ______ °F	Depth ______ ft				

Diver Checks

- ☐ First Aid Equipment on Site
- ☐ Communication for EMS
- ☐ Dive Gear Inspected
- ☐ Air Source Checked
- ☐ Pre-Activity Safety Plan Reviewed
- ☐ ____________
- ☐ Physical Condition of Diver(s) Checked
- ☐ Communications for Diver(s) Checked
- ☐ Team Briefed and Understands Dive Plan
- ☐ Special Site Hazards Noted
- ☐ ____________

Dive Plan and Dive Team Procedures

Assess site conditions and determine type of dive operation. Hold on-site pre-dive safety meeting to discuss and plan dive operation, determine roles and responsibilities, review emergency procedures, and check physical condition of diver(s). Assemble and check dive gear. Check communication for diver(s). After completion of dive, review notes, check condition of diver(s), take soundings and photos as required.

Exhibit 3-15 Visual NSTM Inspection Report (Page 1 of 2)

Washington State Department of Transportation

NONREDUNDANT STEEL TENSION MEMBER INSPECTION REPORT

Bridge Name:
Bridge No:
Structure ID:
Structure Type:
Agency:
Milepost:

Date:
Hours:
Inspector ID #:
Lead Inspector Initials:
Co-Inspector Initials:

Procedures:

Riveted Floor Truss

1. As required, use mirrors or other equipment to check inside surfaces of NSTM's.
2. Check for loose or unevenly loaded member sub-elements.
3. Check girder web at areas around floorbeam and lateral bracing.
4. For continuous spans with welded stud shear connectors, check top flange soffit for cracking in tension areas and document location in weld category C
5. Check all rivets at connection plates, with emphasis on the end row of cover plates and outside edges of splice plates.
6. Check for any welds, including plug, tack, or repair welds. Record location of welds, regardless of condition, and document weld type and category.
7. Check NSTM's and associated connection or gusset plates for areas of heavy or pitted corrosion, nicks, gouges, sharp bends, and collision damage. Record location of all these conditions and estimated section loss, if applicable.
8. Check all heat straightened or repaired areas. Record location of these areas, regardless of condition.
Steel Girder

Riveted Steel Girder

1. Check a sampling of rivets, with emphasis on the end row of cover plates and outside edges of splice plates.
2. Check girder web at areas around floorbeam and lateral bracing.
3. For continuous spans with welded stud shear connectors, check top flange soffit for cracking in tension areas and document location in weld category C.
4. Check for any welds, including plug, tack, or repair welds. Record location of welds and document weld type and category.
5. Check NSTM's for areas of heavy or pitted corrosion, nicks, gouges, sharp bends, and collision damage. Record location of all these conditions and estimated section loss, if applicable.
6. Check all heat straightened or repaired areas. Record location of these areas, regardless of condition.

Main Suspension Cable

1. Walk suspended line cables, inspecting the condition of paint protective system.

NSTM Location	NSTM Type	NSTM Per Girder or Truss Line	Plan Sheets		
			Sh. No.	Contr.	Sh. Name

Note: NSTM = Non-Redundant Steel Tension Member

Exhibit 3-15 Visual NSTM Inspection Report (Page 2 of 2)

Washington State Department of Transportation

NONREDUNDANT STEEL TENSION MEMBER INSPECTION REPORT

Bridge Name:
Bridge No.:
Structure ID:
Structure Type:
Agency:
Milepost:

Date:
Hours:
Inspector ID #:
Lead Inspector:
Co-Inspector:

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Remarks

NSTM Workbook - TNB blank file - Visual NSTM Findings

Printed 10/16/2023

Exhibit 3-16 DOT Form 234-030 Prestressed Concrete Damage Drawing Template

Bridge Number:_________________ Inspected By:___________________

Bridge Name:___________________ Notes:____

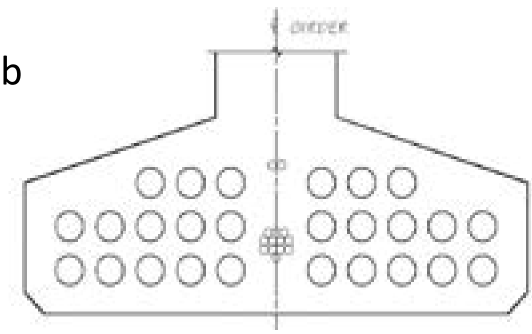
Date: _________________________ ____

Looking:_______________________ ____

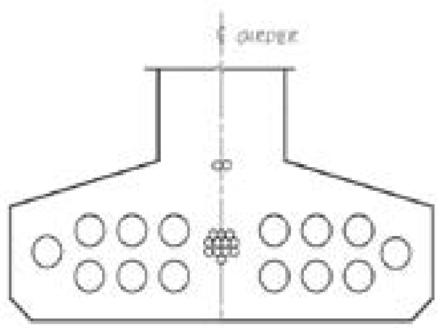
Location:______________________ ____

____

Bulb



W



WF

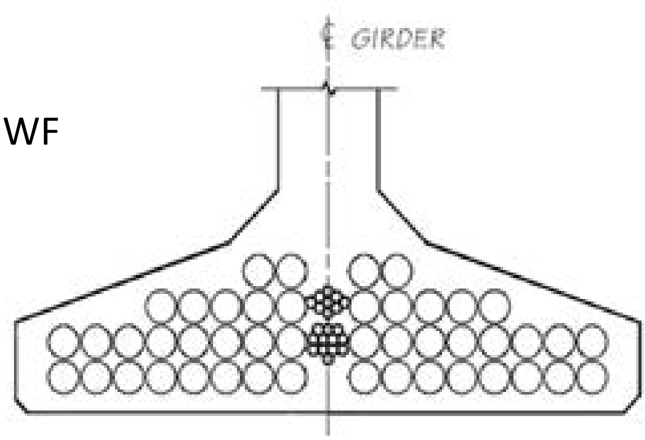
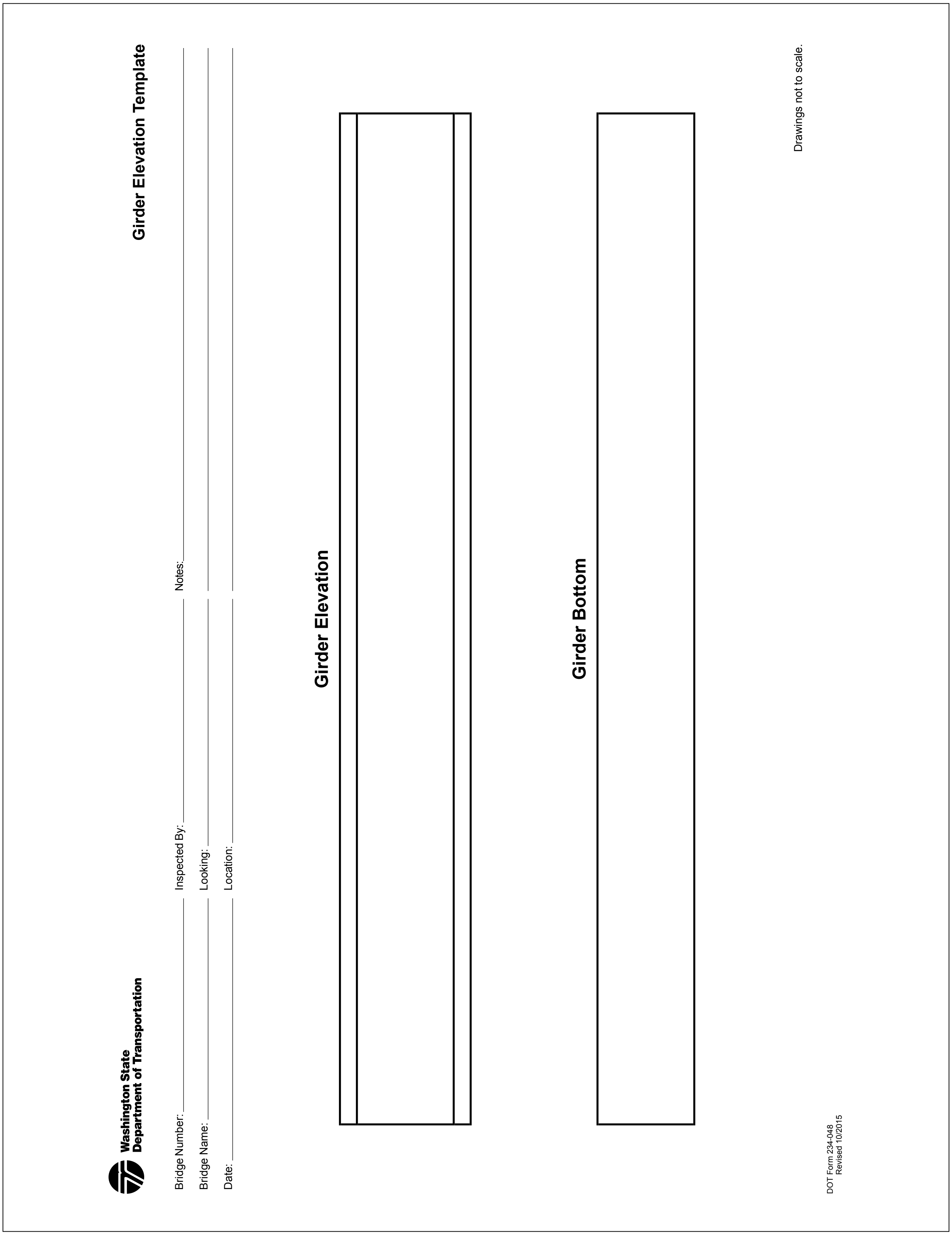


Exhibit 3-17 DOT Form 234-048 Girder Elevation Template


Washington State
Department of Transportation

Girder Elevation Template

Bridge Number: ______ Inspected By: ______ Notes: ______

Bridge Name: ______ Looking: ______

Date: ______ Location: ______

Girder Elevation

Girder Bottom

Drawings not to scale.

DOT Form 234-048
Revised 10/2015

Exhibit 3-18 Ultrasonic UT Inspection Report (Page 1 of 2)

Washington State Department of Transportation

UT INSPECTION REPORT

Bridge Name:
Bridge No:
Structure ID:
Structure Type:
Agency:
Milepost:

Date:
Hours:
Inspector ID #:
Lead Inspector Intials:
Co-Inspector Intials:

Inspected items:

Procedures:

Pins
1. When possible, test from both ends of pins.
2. Verify pin length shown on back reflection with plans. If back reflection does not match the plans, conduct manual length measurement and document correct pin length.
3. Start test with transducer at or near pin center for back reflection check, then run transducer around full perimeter of pin, searching for indications or significant loss of back reflection.
4. Whenever the test suggests that there is a defect in a pin, store and print out the indication with all associated equipment and settings documented. The location of the transducer shall also be documented using a clock hand convention (1 O'clock to 12 O'clock).

UTM Location	UTM Type	UTM Per Girder or Truss Line	Rivet Server Plans		
			Sh. No.	Contract	Sh. Name

Note: UTM = Ultrasonic Tested Member

Ultrasonic (UT) Inspection Report.xlsx 1 of 2

Exhibit 3-18 Ultrasonic UT Inspection Report (Page 2 of 2)

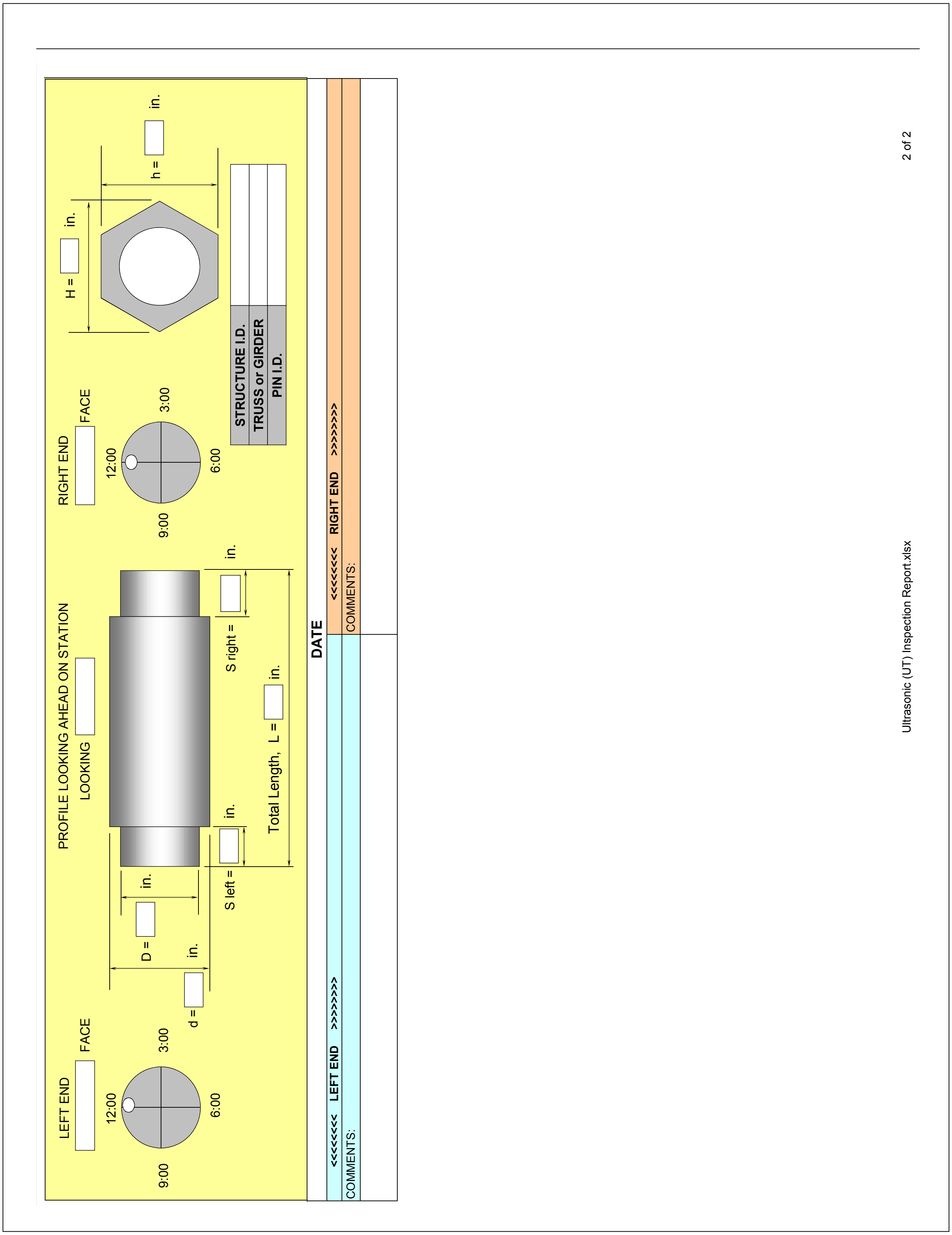


Exhibit 3-19 UT Inspection Schedule

Washington State
Department of Transportation

UT INSPECTION SCHEDULE

Bridge Name:
Bridge No.:
Structure ID:
Structure Type:
Agency:
Milepost:

Date:
Hours:
Inspector ID #:
Lead Inspector:
Co-Inspector:

Truss / Girder	Span	Location	Detail Description	Redundant	Condition State		Freq. (Months)	UT Inspection Date	Next Inspection Date
					VT	UT			

UT Inspection Schedule.xlsx

1 of 1

Exhibit 3-20 Pin and Hanger Visual Inspection Report (Page 1 of 2)

Washington State Department of Transportation

PIN AND HANGER VISUAL INSPECTION REPORT

Bridge Name:
Bridge No:
Structure ID:
Structure Type:
Agency:
Milepost:

Date:
Hours:
Inspector ID #:
Lead Inspector Intials:
Co-Inspector Intials:

Lead Inspector Signature: ____________________

Inspected Items: Pins & Hanger Assemblies

Co-Inspector Signature: ____________________

Procedures:

Hangers

1. As required, use mirrors or other equipment to check inside surfaces of members.
2. Check for loose or unevenly loaded member sub-elements.
3. Check all rivets at connection plates, with emphasis on first row. The first row is the row closest to the edge of the connection or gusset plate.
4. Check for any welds, including plug, tack, or repair welds. Record location of welds, regardless of condition, and document weld type and category.
5. Check members and associated connection or gusset plates for areas of heavy or pitted corrosion, nicks, gouges, sharp bends, and collision damage. Record location of all these conditions and estimated section loss, if applicable.
6. Check all heat straightened or repaired areas. Record location of these areas, regardless of condition.

Pins and Anchor Bolts

1. As required, use mirrors or other equipment to check inside surfaces of members.
2. Check for pitting, laminar rust, surface deformation, and pack rust. It is important to check the pin, pin nuts, and all members surrounding the pin for this kind of steel deterioration.
3. Check for mobility and noise of pin and surrounding members. If the pin is physically “frozen” it is important to note this because the added stress can affect other members in the structure.
4. Observe and record abnormalities like; alignment, pin wear, loose pin nuts, and amount of nut engagement. It’s important to note that full nut engagement is when the nut is flush with the pin or the pin is extending past the nut.
5. Check for paint system failure on pin nuts, pin, and surrounding members.

Location	Type	Member Per Girder or Truss Line	Rivet Server Plans		
			Sh. No.	Contract	Sh. Name

Pin and Hanger Visual Inspection Report.xlsx 1 of 2

Exhibit 3-20 Pin and Hanger Visual Inspection Report (Page 2 of 2)

Washington State Department of Transportation

PIN AND HANGER VISUAL INSPECTION REPORT

Bridge Name:
Bridge No.:
Structure ID:
Structure Type:
Agency:
Milepost:

Date:
Hours:
Inspector ID #:
Lead Inspector:
Co- Inspector:

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Remarks
Pins					
Hangers					

Pin and Hanger Visual Report Form.xls

2 of 2

Exhibit 3-21 Complex Features Inspection Report (Page 1 of 2)

Washington State Department of Transportation

COMPLEX FEATURES INSPECTION REPORT

Bridge Name:
Bridge No:
Structure ID:
Structure Type:
Agency:
Milepost:

Date:
Hours:
Inspector ID #:
Lead Inspector Initials:
Co-Inspector Initials:

Inspected items:

Procedures:

High strength steel welded girder top and bottom flanges, webs, and stiffeners:

1. Visually inspect for cracks in the welds in the areas of high strength steel.
2. Inspect areas where there is a change in the bridge cross section, where stress is concentrated, or which show out-of-plane bending.
3. Nondestructive testing, such as magnetic particle and liquid dye penetrant, will be used in suspect areas where visual inspection cannot confirm a defect.

Complex Features	Complex Feature Type	Feat Per Girder or Truss Line	Plan Sheets		
			Sh. No.	Contract	Sh. Name

1 of 1

Exhibit 3-21 Complex Features Inspection Report (Page 2 of 2)

Washington State Department of Transportation

COMPLEX FEATURES INSPECTION REPORT

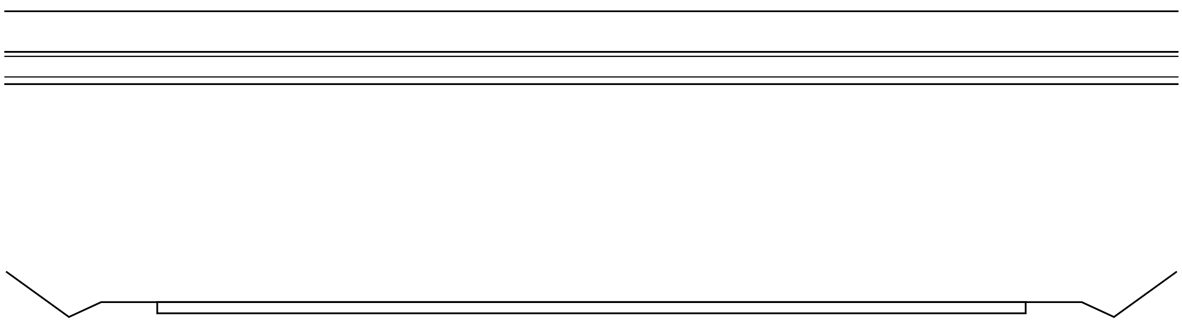
Girder	Location	Feature Inspected	Remarks

1 of 1

Exhibit 3-22 Vertical Clearance Card Generic

Bridge Number:	
Structure ID:	
Looking:	
Measurement Date:	
Photo Date:	
Inspection/Co Initials:	
Minimum Vertical Clearance Posted For:	
Posting on Structure:	
Posting on Shoulder:	
Advance Detour Intersection Posting for Vertical Clearance 14'-0" or less:	

Note:
Vertical measurements are actual measures rounded down to the nearest inch. Posted clearances are typically 3 inches less than the lowest clearance for a particular through movement.



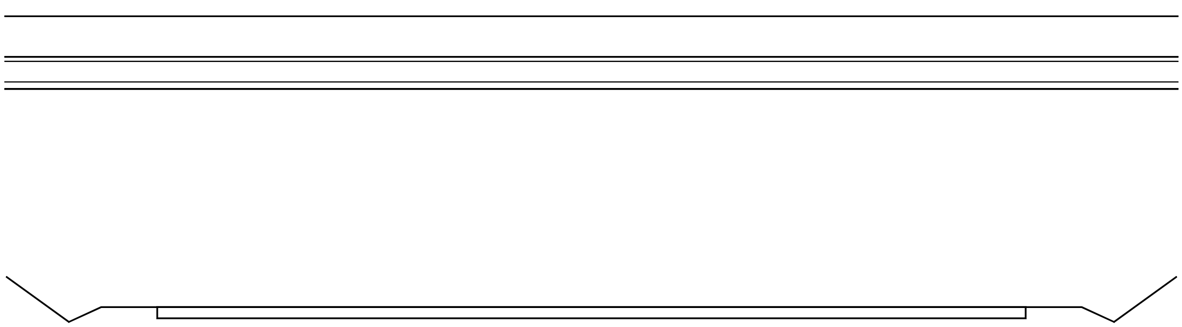
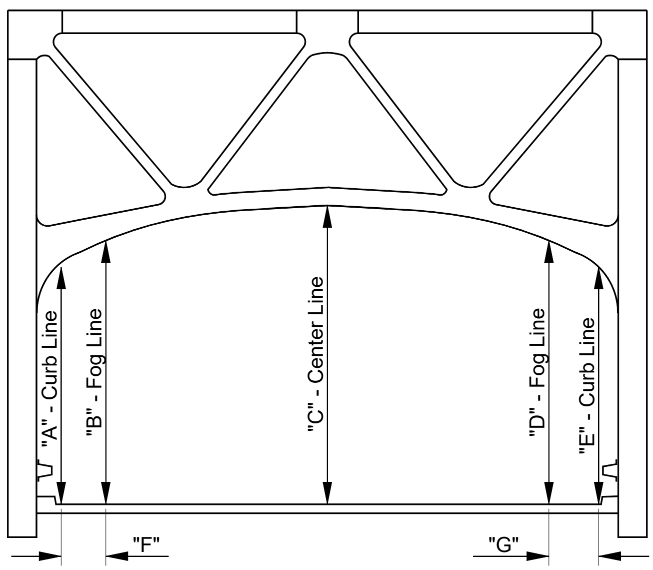


Exhibit 3-23 Vertical Clearance Card Steel

Bridge Number:	
Structure ID:	
Looking:	
Measurement Date:	
Photo Date:	
Inspection/Co Initials:	
Minimum Vertical Clearance Posted For:	
Posting on Structure:	
Posting on Shoulder:	
Advance Detour Intersection Posting for Vertical Clearance 14'-0" or less:	

Note:
Vertical measurements are actual measures rounded down to the nearest inch. Posted clearances are typically 3 inches less than the lowest clearance for a particular through movement.

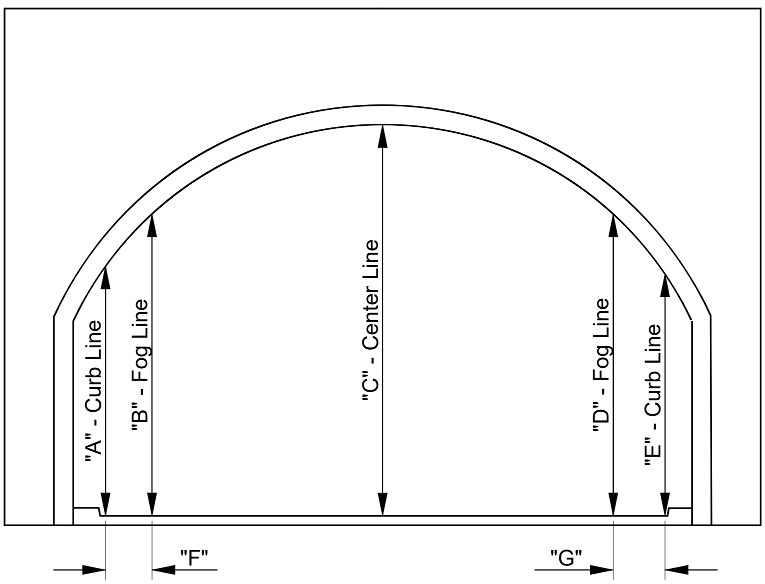


Location	Field Measurement						
	A	B	C	D	E	F	G

Exhibit 3-24 Vertical Clearance Card Tunnel

Bridge Number:	
Structure ID:	
Looking:	
Measurement Date:	
Photo Date:	
Inspection/Co Initials:	
Minimum Vertical Clearance Posted For:	
Posting on Structure:	
Posting on Shoulder:	
Advance Detour Intersection Posting for Vertical Clearance 14'-0" or less:	

Note:
Vertical measurements are actual measures rounded down to the nearest inch. Posted clearances are typically 3 inches less than the lowest clearance for a particular through movement.

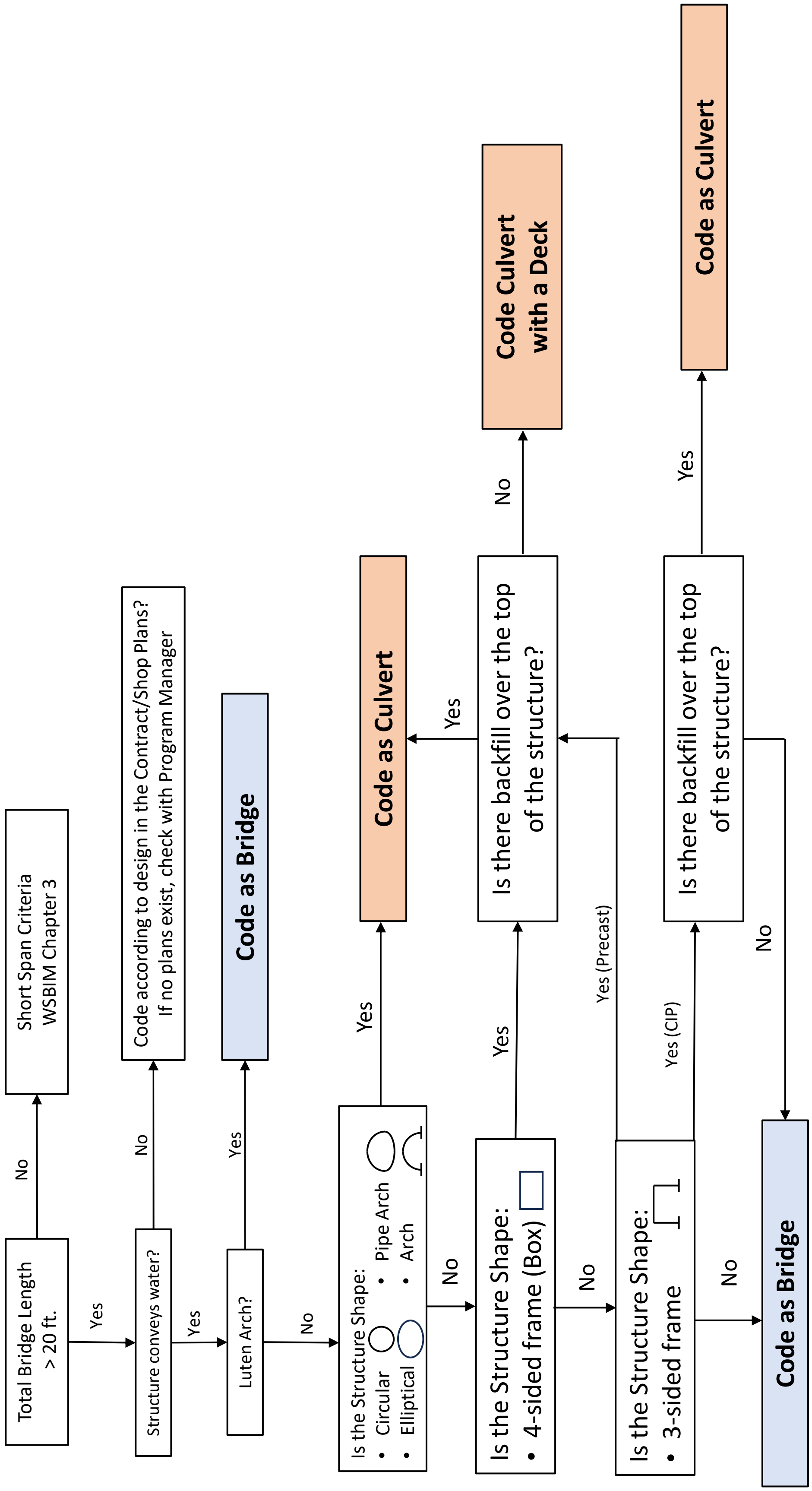


Location	Field Measurement						
	A	B	C	D	E	F	G

3-6 Appendices

Appendix 3-A	Bridge/Culvert Coding Matrix
Appendix 3-B	Short Span Bridge Criteria
Appendix 3-C	UBIT Inspections and Procedures
Appendix 3-D	FHWA Letter for Routine Extended Interval Inspections

Appendix 3-A Bridge/Culvert Coding Matrix



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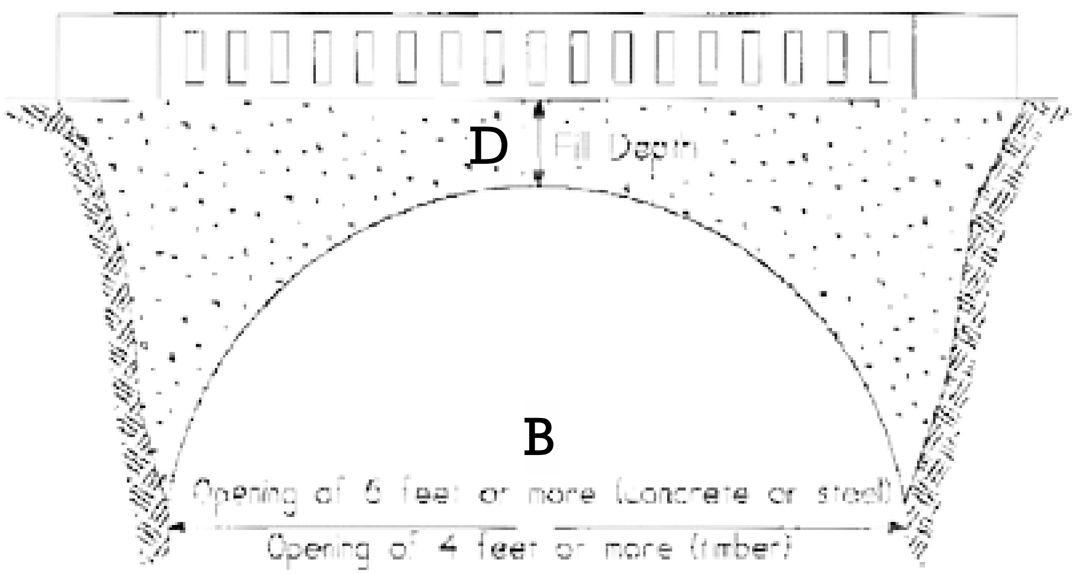
Appendix 3-B Short Span Bridge Criteria

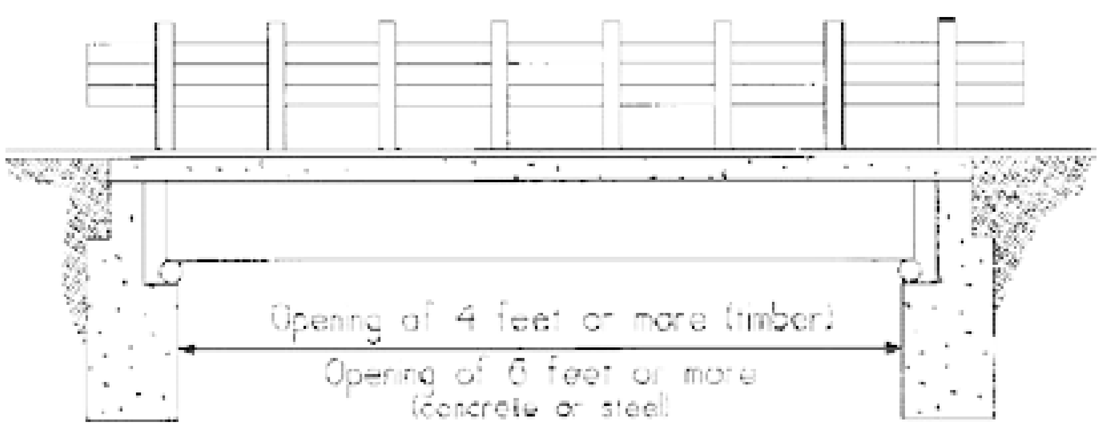
Short Span Inspections for bridges and culverts with a span of 20 feet or less, are recommended and performed by the Washington State Department of Transportation (WSDOT) Bridge Preservation Office when the outlined criteria are met. Structures not meeting one or more of the outlined criteria are turned over to region maintenance for responsibility of inspection and maintenance.

In the event that a structure is determined not to be inspected as a short span, the Team Leader making the determination will verify with Regional Supervisors and shall ensure that this information is passed on to the proper contacts within the region.

Single Span, Pipe, Barrel, or Box Culverts or Bridges

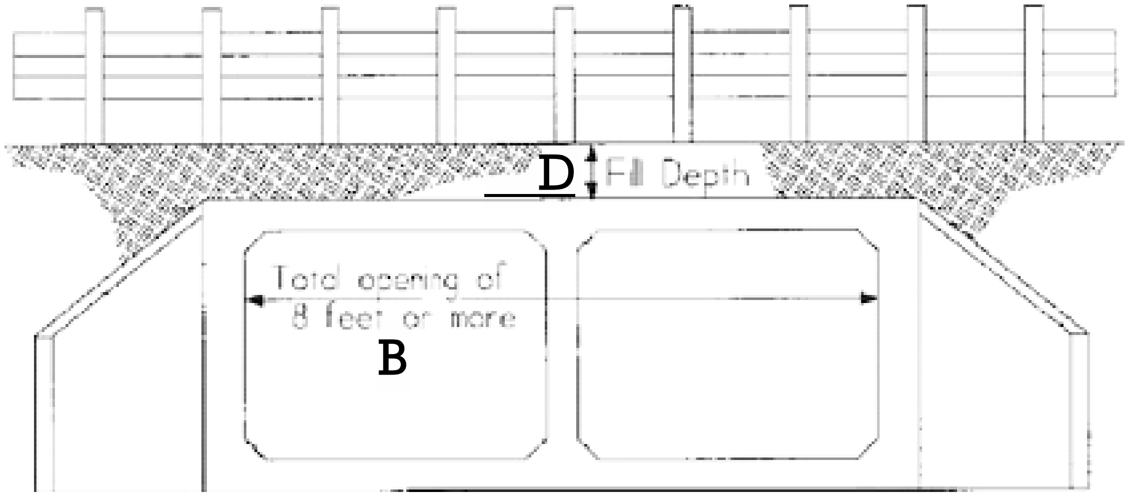
1. CONCRETE Structures: Opening of 6 feet or more.
   STEEL Structures: Opening of 6 feet or more.
   TIMBER Structures: Opening of 4 feet or more.
   Structures not meeting the minimum turned over to region maintenance for responsibility.
2. Depth of fill (D) must be less than B/2 (where B = Maximum opening distance).
   For structures 20 ft. and under, if the depth of fill is greater than B/2 the structure is turned over to region maintenance for responsibility of inspection and.

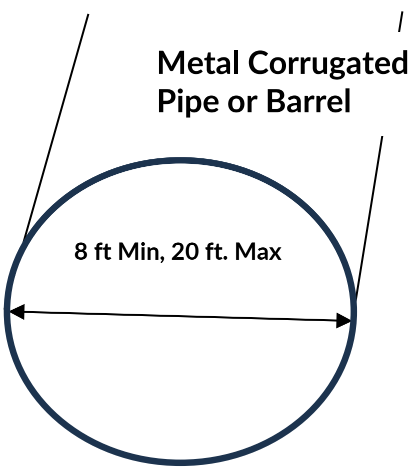




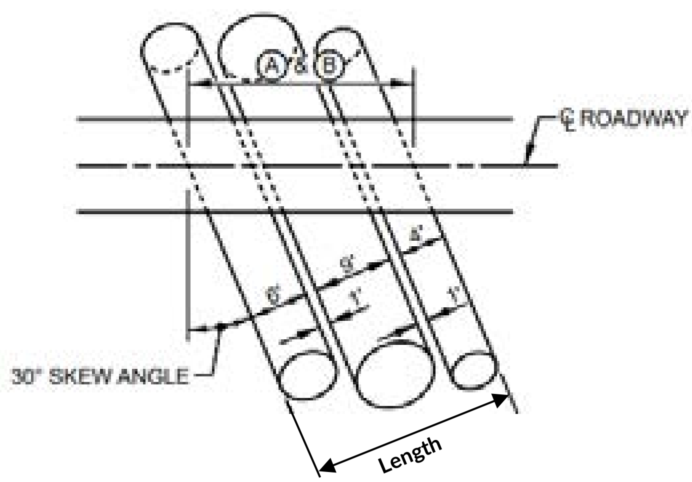
Multi Span/Structure Pipe Barrel or Box Culverts or Bridges.

1. Total Opening across all pipes, barrels, or boxes must be 8 feet or more.





Multiple Concrete or Steel Pipes or Barrels



A = $\frac{\text{Length}}{\text{Cos } 30^\circ}$ = 10 ft Min, 20 ft. Max   B = Blank

NOTE: THE DISTANCE BETWEEN CONSECUTIVE PIPES MUST BE EQUAL TO (=) OR LESS THAN (<) 1/2 THE DIAMETER OF THE SMALLEST PIPE IN THE SERIES FOR THE SERIES TO BE CONSIDERED ONE STRUCTURE.

Appendix 3-C UBIT Inspections and Procedures

1. **Determining Bridges to Receive Inspections with a UBIT –** Team Leaders will work with supervisors to determine the appropriate resources and need in scheduling of UBIT resources for bridge inspections. UBITS or other resources are often needed to gain sufficient access to determine the structural condition of bridge members. These may include floor beam and stringer connections, pier caps, bearings, restraint devices or other features at midspan or on top of interior piers that are too high for ladders.
2. **Record and Update the UBIT Resource in the Inspection Report –** The UBIT resource, under the Resources portion of the report has to be updated after every inspection to ensure that the date for the next required use of resource stays in synchronization with the associated report. If inspection due dates for associated Routine, NSTM or Complex Feature reports move, the Resource due dates must also be adjusted. Team leaders and supervisors will need to coordinate this to insure it is done properly on a case-by-case basis when moving them around.

   Local Agencies may reach out to Bridge Preservation or Local Programs for assistance with this if necessary. See "Two- and Three-Man Agreement Inspections" under Chapter 3 Report Types.
3. **Interval –** There is no set criteria on which bridges, or how often UBIT resource inspections need to occur. Need and interval should be determined by ability to access all elements of a bridge against bridge condition and history, type and location of elements, bridge configuration coincidence of required regularly scheduled inspections. New bridges that would require a UBIT for complete access should, at a minimum, receive a UBIT resource inspection for the Initial Inspection or the first Routine Inspection to follow. For bridges that do not need a UBIT resource each Routine Inspection, the inspection interval can be scheduled to alternate with inspection years. The following criteria is provided as a guideline:

Type of Structure	Maximum Interval (Months)
Timber	24
Steel Trusses NSTM	24
Steel Bridges with NSTM or Complex Features	24
Non-NSTM Steel Bridges	48
Concrete Bridges with Movable Bearings in the Interior Spans	48
Concrete Bridges with Fixed Bearings or No Bearings.	72

5. **Agreement Work and Cost Recovery –** For agreement work, private consultants, acting as an Agent for a Local Agency, may inspect using State Owned UBIT Resources as long as the Local Agency itself is operating under agreement with WSDOT. State work force drivers and inspectors, must always include equipment hours under the appropriate RO number on time sheets in order to accurately reflect in cost recovery billing.
6. **Fall Protection Plans –** As in all other inspection work, all Agency, State (WISHA) and Federal (OSHA) requirements for equipment operation, and employee safety, to include Personal Protective Equipment and Training must be observed for any personnel involved in the utilization and operation of the equipment. This will normally include a PASP (Pre-Activity Safety Plan. Refer to Agency Standards, State and Federal Regulations.

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Appendix 3-D FHWA Letter for Routine Extended Interval Inspections

Washington State
Department of Transportation

Transportation Building
310 Maple Park Avenue S.E.
P.O. Box 47300
Olympia, WA 98504-7300
360-705-7000
TTY: 1-800-833-6388
www.wsdot.wa.gov

September 18, 2023

Ralph Rizzo, Division Administrator
FHWA Washington Division
711 S. Capital Way, Suite 501
Olympia, WA 98501-1284

Attention: Loren Wilson, P.E., Division Bridge Engineer

RE: National Bridge Inspection Standards Extended Inspection Interval Policy

Dear Mr. Rizzo:

This letter represents WSDOT's response to FHWA's June 13, 2022 Memorandum regarding the Extended Bridge Inspection Interval Policy and Implementation in accordance with Sub Part C NBIS 650.311 Paragraph (a)(1)(iii)(B). This policy and the documented criteria for Routine inspections, utilizes WSDOT's "48 Month Inspection Policy" previously approved in 1998 by FHWA and includes refinements to conform with the requirements outlined in Paragraph (a)(1)(iii)(A) of the 2022 NBIS. WSDOT does not currently have an extended interval policy for Underwater or Non-redundant Steel Tension Member (NSTM) inspections.

Bridges meeting the outlined criteria may have the routine inspection interval extended to 48 months but not greater. Bridges eligible for extended intervals must meet specified criteria and will be identified based on program needs, resources, and requirements. The eligibility of bridges with extended interval inspections will be reviewed each inspection cycle against the outlined criteria for continued eligibility, notwithstanding changes in condition due to damage or deterioration that may occur or become evident between inspection cycles.

Bridges evaluated for Routine extended interval inspections at a 48-month frequency shall meet all of the following criteria.

1) Component Condition Ratings
    a. Deck (B.C.01) equal to or greater than 6.
    b. Superstructure (B.C.02) equal to or greater than 6.
    c. Substructure (B.C.03) equal to or greater than 6.
    d. Culvert (B.C.04) equal to or greater than 6.

2) For Bridges over Water
    a. Channel Condition (B.C.09) equal to or greater than 6.
    b. Channel Protection (B.C.10) equal to or greater than 6.
    c. Scour Vulnerability (B.AP.05) Coded A or B

d. Scour Condition (B.C.11) equal to or greater than 6.

3) Load Ratings
   a. Inventory Load Rating Factor (B.LR.05) equal to or greater than 1.
   b. Routine Permit Loads (B.LR.08) coded A or N.
   c. No Administrative Load Ratings.

4) Steel Bridges
   a. Fatigue Details (B.IR.02) coded N (for no category E or E' weld details)

5) Vertical Clearances
   a. All roadway vertical clearances (B.H.13) equal to or greater than 14 feet.

6) Superstructure
   a. Span Material (B.SP.04)
      i. C01-C02 Reinforced Cast-In-Place or Precast Concrete.
      ii. C03-Prestressed Pretensioned Concrete.
      iii. C04P-Prestressed Cast-In-Place Concrete Post Tensioned.
      iv. C05-Prestressed Precast Concrete Post Tensioned
      v. S01-S05 Steel (Rolled, Welded, Bolted, Riveted or Bolted/Riveted)
   b. Span Type (B.SP.06)
      i. A01-Filled Arch (No Spandrels)
      ii. B02-B03 Multiple Box Girder/Beam (Adjacent or Spread)
      iii. F01-F02 Three- and Four-Sided Frames
      iv. G01-G02 Girder/Beam I-Shaped (Adjacent and Spread)
      v. G03-G04 Girder T-Beam/T-Beam Inverted
      vi. G05-G06 Girder/Beam Double T (Adjacent and Spread)
      vii. G07-G08 Girder/Beam Channel (Adjacent and Spread)
      viii. S01-S02 Slab (Solid or Voided)
      ix. P01-P02 Pipe (Rigid or Flexible)

7) The maximum ADT (B.H.09) will be 100,000 and the maximum ADTT (B.H.10) will be 10,000.

8) Eligible bridges must receive an Initial Inspection and be in service for at least 24 months. This applies to:
   a. New bridges
   b. Rehabilitated bridges
   c. Structurally modified or widened bridges.

Washington State will be implementing these revisions within the upcoming 2024 Washington State Bridge Inspection Manual (WSBIM) updates and will continue to monitor structures for continued eligibility, in conjunction with the 2022 SNBI and any revisions or additions to it, going forward.

If you have any questions or concerns, please do not hesitate to contact me at 360-570-2557 or by email at peraltr@wsdot.wa.gov.

Sincerely,

Roman G Peralta Digitally signed by Roman G. Peralta
Date: 2023.09.18 14:21:16 -07'00'

Roman G. Peralta, P.E.
WSDOT Bridge Preservation Engineer

RGP:tms
GAS

cc: Sonia Lowry, WSDOT Local Programs Bridge Engineer
Greg Seipel, WSDOT Bridge Condition Engineer

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Chapter 4 WSDOT Bridge Elements

List of WSDOT Elements by Number

Bridge Decks

Superstructure

Substructure

Culverts

Sidewalk and Supports

Bearings

Approach Slab

Bridge Rail

Pedestrian Rail

Smart Flags

Seismic Retrofit

Expansion Joints

Movable Bridges

Other Bridge Elements

Overlays

Protective Coatings

List of WSDOT Elements by Subject

Sidewalk and Supports

Seismic Retrofit

Reinforced Concrete

Prestressed Concrete

Structural Steel

Pin & Hangers

Timber

Cables

Bearings

Reinforced Concrete

Prestressed Concrete

Structural Steel

Timber

Substructure - Other

Culverts

Movable Bridges

Other Bridge Elements

Protective Coatings

Smart Flags

4-1 Introduction

This chapter defines the Washington State Department of Transportation (WSDOT) approach for inspection, evaluation and recording of the structural condition state of the bridge structures within the WSDOT obligation to the National Bridge Inventory.

Local Agencies with inventory not on the National Highway System are encouraged, but not required, to use the WSDOT Bridge Element approach as defined in this chapter. Doing so will enable the Local Agency to benefit from WSDOT Management strategies and lessons learned.

The intent of the element-level condition reporting is to supplement the National Bridge Inventory (NBI) structural condition state of the Bridge Deck, Superstructure, and Substructure. NBI information such as bridge location, traffic, and geometry is useful, however, element-level condition reporting provides a greater degree of information from which to draw upon to more effectively apply solutions to emergent bridge preservation and management needs.

Though the NBIS provides a consistent standard for the collection of bridge data, it is not comprehensive enough to provide performance-based decision support that includes economic considerations.

Limitations within the NBI system include:

- Each bridge is divided into only three major components for condition assessment: deck, superstructure, and substructure. This level of detail is not sufficient to identify appropriate repair strategies, or to accurately estimate repair/rehabilitation/replacement costs.
- Each of the three major components are rated on a 0-9 scale by severity of deterioration, without identifying the deterioration process at work or the extent of deterioration.
- NBI condition ratings vary based on the broad language of the condition definitions. Because the bridges include multiple distress symptoms and ratings to describe the overall or "average" condition of the bridge, it is often difficult to decide what the "average" condition is when a bridge has mainly localized problems.
- NBI does not provide a method to inspect or track the performance of items such as paint, overlays, and expansion joints.

WSDOT recognized a different strategy towards future bridge preservation was needed in the early 1980's. A comprehensive deck testing program existed at the time and the Bridge Inspection Program needed to have a connection to the NBI bridge condition rating convention.

WSDOT elements have been in use since 1992 and are designed to be practical for the inspector, useful to a bridge manager, and accurately capture bridge conditions.

WSDOT elements have matured since 1992 and so have the national element philosophies:

- 1985 – NCHRP Project 12-28: Bridgit and Pontis Management software
- 1987 – NCHRP Report 300: Element based Bridge Management System (BMS)
- 1993 – FHWA CoRe Element Report recommendations
- 1996 – AASHTO CoRe Element Guidelines adopted
- 2011 – AASHTO Guidelines for Bridge Element Inspection

- 2014 – FHWA requirement to collect element level bridge inspection data for NHS bridges.
- 2015 – As a supplement to the National Bridge Inventory (NBI) data submission due April 1, 2015, and every year thereafter, each State and Federal agency will also provide element level bridge inspection data for bridges on the NHS to the FHWA for inclusion in the NBI.

Today, a successful Bridge Management System must use supplemental bridge condition data to ensure the effective use of available funds. WSDOT element data has supported WSDOT Bridge needs with minor changes since the year 2008 in the following ways:

- Element data is used to identify current bridge condition, need, and cost.
- Provides a logical and realistic method to prioritize bridge projects.
- Provides realistic and reliable forecasts of future preservation needs and costs.
- Adapts to changes in management philosophies without changing an element definition or category.
- Tracks the performance of desired bridge needs.

4-1.1 *Element Description*

A bridge is divided into three major components which includes the:

- Bridge deck
- Bridge superstructure
- Bridge sub-structure.

Bridge *elements* are individual members comprised of basic shapes and materials connected together to form bridge components. (Ref BIRM Sec. 4.2.2). The WSDOT Inspection program is based upon documenting the condition state of these elements. This is accomplished through documenting the results of the visual and physical examination of these elements.

4-1.2 *Smart Flag*

The “Smart Flag” provides supplemental information gathered by the Inspector concerning an observed condition or defect that may or may not be included in the National Bridge Inventory element condition state language – and is judged to be necessary in order to accurately document the element commentary.

4-1.3 *Identifying Elements Prior to Inspection*

Details about the design of the bridge are important when identifying the elements. As-built plans should be used to determine the correct elements, and then field verified during the inspection. If as-built plans are not available, then the elements will have to be defined or assumed at the bridge site. Many of the element dimensions for the element total quantity are difficult to determine in the field and it is highly recommended the total quantities be calculated based on contract plan dimensions.

For example, looking at the contract Plans is the only practical way to determine if a bridge deck has plain reinforced steel which is element 12, or epoxy coated steel which is element 26 because this information is not visible to the inspector. Likewise, field measuring the deck length and width in traffic would not be necessary and usually less accurate than if plan dimensions are available.

An average bridge made of the same material will have six to ten elements. A large or complex bridge may have up to 20 elements. A typical bridge will have a bridge deck, possibly a deck overlay, bridge rails, a primary load carrying member like a prestressed concrete girder, primary substructure support like concrete columns, other elements like abutments, expansion joints and/or bearings.

In order to maintain quality element data, the Inspector is responsible for updating the elements and quantities as they change with time by maintenance or by contract. Many bridges will have construction work that changes the joints, asphalt depth, rail, concrete overlay, or widens the structure, etc. These activities can change elements that apply to the bridge and must be updated accordingly. WSDOT uses a Contract History database to log contract work and for reference. See Section 2-2 for more information on the Contract History database.

4-1.4 *Application of Element Units*

Each element is assigned a unit of measure which quantifies the extent of an observed defect.

Unit descriptions are:

- **Square Feet (SF):** Where the surface area is used to document the element condition state, such as deck surface and paint surface elements.
- **Lineal Feet (LF):** Represents the total length of an element and is based on the way it was constructed. For example: A bridge may have been built using five "Prestressed Concrete Girders." Each girder was individually pre-cast and then put into place at the bridge site. If each girder were 100 feet in length, then the total element quantity would be "500 LF." If the same bridge was a "Concrete Box Girder" then the total quantity would be "100 LF" since the box girder was constructed as one unit.
- **Each (EA):** Applies to the number of members in a condition state. For example: A bridge may include 5 piles at 3 pier locations for a total pile element quantity of 15. Then, each pile is inspected, evaluated, and recorded in the appropriate condition state. Elements with units of "EA" are coded to reflect the entire member in one condition state, such as pile, where the entire pile is in one of the defined condition states. Other element units, such as "LF" or "SF" may have all or portions of the element in one or all the condition states in order to describe the existing element conditions.
- **"Cell":** Applies to floating bridge concrete pontoon segments.

4-1.5 *Quantifying Element Defects*

To quantify the condition of an element, the first step is to review the element condition state language. A complete list of the condition state descriptions is provided in pages 4-12 through 4-98 of this chapter.

Similar to the NBI system of evaluation, element condition requires the inspector to evaluate defects and also quantify the defect's impact to the element or possibly the bridge. A defect evaluation may result in element quantities in CS1, CS2, CS3, or CS4 depending on the location, size, structural importance, or element units.

Element condition state (CS) language is typically based on four condition state levels as noted above. However, it is important to note that only three condition states (CS1, CS2 & CS3) apply to Expansion Joint elements. Additionally certain Smart Flag defects may include only one or two condition states or use all four.

4-1.5.A Affected Quantity

The concept of the "Affected quantity" is relied on heavily when quantifying the defects in the primary structural elements and should be applied in two ways. Condition State 3 defines "Affected Quantity" of the defect as local damage to a member and the "Affected Quantity" is the actual length of the defect. Whereas Condition State 4 defines "Affected Quantity" as a reduced capacity of the member and the "Affected Quantity" is the length of the span. In the case of prestressed girders, damage that does not "Affect" capacity of a prestressed girder would only quantify the length of damaged concrete in CS3. Whereas, Condition State 4 does "Affect" the capacity of the girder and the quantity is the span length, not just the length of damaged concrete. Using this same rational to quantify repairs in CS2, a patch that covers damage to the concrete only is quantified as the length of the visible patch and a patch that covers repaired strand is quantified as the span length in CS2. In other words, the patch is quantified in CS2 based on the "Affected length" of the damage.

This philosophy applies directly to all beam type elements including concrete slab structures with side-by-side beam elements using square foot quantities. It is less obvious where there can be significant redistribution of stresses such as a timber deck or cast-in-place concrete slab. In these cases, a defect, such as a hole in the deck, would have to be evaluated as to whether the capacity of the span is "Affected" or not. Trusses are the most difficult because the linear feet quantities represent a 3-dimensional member with chords, verticals, horizontals, sway bracing, etc. Trusses should quantify CS3 defects by panel length of truss and CS4 truss capacity defects by span length of the truss.

4-1.5.B WSDOT Condition States for Structural Members

The following summarizes the WSDOT element condition state philosophy for primary structural members. Different condition philosophies apply to the non-primary structural elements such as deck/overlays, joints, paint, and smart flags which are specified for each element in Chapter 4, but not discussed in this section.

Condition State 1: Good Condition – Most parts of a bridge will be in this condition state for all WSDOT elements. The element may have some defects but is in good condition. Many times, new bridges have insignificant defects and older bridges will acquire insignificant defects with time. To determine if the defect is insignificant, the inspector must decide if the defect will impact the element load carrying capacity with time. Inspectors are cautioned to look at new construction that may not be CS1.

Condition State 2: Repaired Condition – This condition state documents repairs to structural members. A repair is defined as a defective member partially modified to carry design loads and still dependent on the remaining portions of the defective member, such as an in-span splice, helper member, or column splice. Generally, these are easy to identify and report. Common repairs do not have the same integrity or longevity as original construction. Many times, members are difficult to access and prohibit a good quality repair. Inspectors are cautioned to verify repairs to make sure they are functioning as intended. When a damaged or defective member has been entirely replaced, the member quantity is CS1 or considered a new member. If a repair is not completed correctly or is not functioning properly, then the repair should be coded as CS3 or CS4. For example:

- A timber helper stringer/pile that does not properly transfer design loads is not considered sufficient to be considered in CS2. A repair must properly block, brace, or connect to the stringer/pile as required by repair design.
- Timber pier caps are assumed to be designed as simple spans. Even though the member that has been partially replaced is not continuous at a support, if there is a positive connection to the supporting columns, the replaced portion may be considered in CS1.

The amount of repaired quantity to be coded in CS2 depends on the affected length of the repair for all primary structural members. In general terms, the quantity to be coded in CS2 is the quantity that was in CS3 or CS4 and is now repaired. For example:

- A prestressed girder with a high load hit that did not damage strand would code the length of the concrete patch as the repair quantity for CS2. If a strand is damaged, then the span length is the repair quantity for CS2.
- A repaired crack in a steel member that did not threaten capacity would code the minimum length or 1 foot for CS2. If the repaired crack did threaten capacity, then the span length is the repair quantity for CS2.

Condition State 3: Fair Condition – This condition state records any significant defect noticed by the inspector, but the defect does not significantly impact the capacity of the element. Capacity is not currently threatened, but if left unchecked, it could be threatened in the future. Repairs may apply to the elements in CS3 because the defects are more economical to address now than to wait and repair later.

Condition State 4: Poor Condition – This condition state documents members with defects that have impacted the structural capacity of the element. Based on the visual inspection, the owner of the bridge must address this deficiency to preserve or restore the capacity of the member and/or structure. Generally, these defects have reduced the structural capacity of the element but are still within safe operating limits of design.

4-1.6 *Reporting Structural History*

There are times when structural information may be known but not visible, or visible and then at a later time not visible to the inspector. This can happen to piles/footings that are buried or submerged one inspection and exposed the next. This also applies to asphalt overlays where the deck patching is not visible to the inspector. This type of element information should remain in the element notes until the element condition is known to have changed. An example of an element change would be deck delaminations recorded in CS4 which are not visible to the inspector and are removed by hydro milling during construction of a concrete overlay. The CS4 data does not apply after the concrete overlay is completed and WSDOT element 376 should be deleted from the report and the concrete deck CS4 quantity should be zero.

4-1.7 Concrete Element Cracking

The following table is reproduced from the *Bridge Inspector's Reference Manual* (BIRM), Volume 1, Table 2.2.3; and should be used to distinguish between different sizes of concrete cracks.

Exhibit 4-1 WSDOT Element Concrete Crack Width Guidelines

	Reinforced Concrete		Prestressed Concrete	
	English	Metric	English	Metric
Hairline (HL)	< 0.0625"	< 1.6 mm	< 0.004″	< 0.1 mm
	< 1/16″			
Narrow (N)	0.0625″ to 0.125″	1.6 to 3.2 mm	0.004″ to 0.009″	0.1 to 0.23 mm
	1/16″ to 1/8″			
Medium (M)	0.125″ to 0.1875″	3.2 to 4.8 mm	0.010″ to 0.030″	0.25 to 0.75 mm
	1/8″ to 3/16″			
Wide (W)	> 0.1875″	> 4.8 mm	> 0.030″	> 0.76 mm
	> 3/16″			

Concrete Structural Cracking – For the purpose of evaluating element condition, concrete structural cracks are narrow (or wider) in regions of high shear or moment (see BIRM). Crack width is significant to the extent that it indicates exposure of rebar to water and/or a structural problem in a concrete element. Generally, most concrete elements will exhibit some level of hairline cracking which is not considered significant from a structural standpoint.

4-1.8 WSDOT Deck Element to NBI Deck Table

WSDOT began testing concrete decks in the early 1980s and discovered a very poor correlation to the traditional assumptions of deck deterioration. In addition, the deck testing and crack surveys did not prioritize deck preservation projects in a fashion acceptable to the inspectors, maintenance, or management. Today, WSDOT recommends the use of the deck and soffit elements and Table 4.1.6 to evaluate the NBI Item 058, NBI Deck Overall Condition Code. This table originates from the 1973 FHWA Coding Guidelines and has been modified to reflect WSDOT's primary bridge deck management philosophies since the early 1990s.

Secondary and more subjective concrete deck conditions such as cracking, scaling, leaching, rebar cover, chloride content, Half-cell potential, etc. may be documented in the deck element notes, but not applied to the deck element evaluation of structural condition. These secondary conditions are applied during annual prioritization of the concrete bridge decks and should not determine the NBI code. To be clear, these types of secondary conditions visible below the deck in the soffit or other structural elements below the deck element require an evaluation of:

Exhibit 4-2 WSDOT Deck Condition to NBI Deck Overall

Percent of Concrete Deck Patches, Spalls, and Delaminations (CS2 + CS3 + CS4)	Percent of Concrete Deck Soffit in CS3 (CS3 only)	NBI Deck Condition Code
N/A	N/A	9
None	None	8
None	None	7
< 1%	< 1%	6
1% to 2%	1% to 2%	5
2% to 5%	2% to 5%	4
> 5%	> 5%	3

4-2 Bridge Decks

The intent of the bridge deck elements is to record the top surface deterioration. The Concrete Deck Soffit, slab, or deck-girder elements record the structural deterioration. Deck elements 12, 13, 14, 15, 16, 20, and 26 record deck patches in CS2, deck spalls in CS3, and delaminations in CS4. Other deck top surface distress such as cracking, scaling, and rutting are not tracked in the deck BMS condition states. These items should be described in the notes at the inspector's discretion. Do not count filling in of the rut as a patch. These locations have filled in a rut with Liquid Concrete or urethane-based repair materials and are not considered a deck structural repair.

All asphaltic patching material on a concrete bridge deck shall be considered a spalled area, or CS3, and is an unacceptable patching material. These materials can be picked out of the spall and will smell like tar.

All bridges will have at least one deck element, even though some bridges do not have a traditional deck and use elements 13 or 14. (The one exception is an earth filled arch structure with an asphalt pavement surface only.)

Traditional concrete bridge decks use elements 12, 20, or 26 to record the top surface deterioration; and have the WSDOT Soffit Element (35) to record the structural deterioration. It should be noted for element 26 that epoxy coated rebar in bridge decks became an industry standard in Washington State in the early 1980s.

Non-Traditional concrete decks use elements 13 or 14 to record the top surface deterioration and the slab or deck-girder elements record the structural deterioration.

Steel and Timber decks use elements 28, 29, 30, 31 to record structural deterioration of the top and bottom surface.

Inspectors are encouraged to take the time to locate and describe the patches and spalls on larger structures using photos and descriptions. The preferred documentation format for patching is the number and SF per span. This format is easiest for the next inspector to identify quantity changes.

Quantity estimates must be based on the sum of the estimated length and width of the patched or spalled areas. Approximations based on the percent of area are not useful.

Note: The total quantity for deck elements is the actual bridge deck area. Do not use the NBI Item 051, **"Bridge Roadway Width Curb-to-Curb" (or WSBIS Item 1356 "Curb-to-Curb Width")** when deck curb-to-curb dimensions vary.

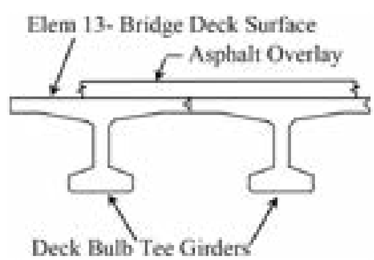
12 Concrete Deck Units – SF

This element defines a concrete bridge deck constructed with uncoated steel reinforcement. The total quantity for this element is the actual bridge deck area from curb line to curb line.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Deck area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Deck area with spalling. Do not add delaminations found in the field, see condition State 4.
4. Record the delaminated area (CS4) from WSDOT element 376 in the deck CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.

13 Bridge Deck Surface Units – SF

This WSDOT element defines a surface of a bridge deck that consists of a slab or girder without a traditional deck. Usually there is a deck protection system (overlay) present, but in some cases, traffic may be driving directly on the girder or slab. The Bridge Deck Surface consists of precast or prestressed girders with no span between the flanges. This WSDOT element is generally used with superstructure elements 38, 49, 50, 51, 52, 54, 108, 109, or 114. The total quantity for this element is the actual bridge deck area from curb line to curb line.

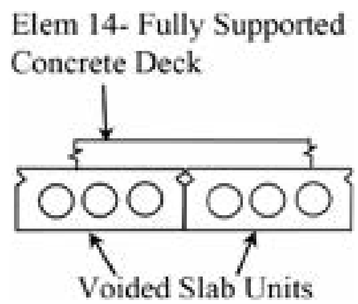


14	Fully Supported Concrete Deck	Units – SF

This WSDOT element defines a fully supported concrete bridge deck constructed with one layer of coated reinforcement (epoxy, galvanizing, stainless steel, etc.). The bridge support surface consists of precast or prestressed girders with no span between the flanges. This WSDOT element may apply to superstructure WSDOT elements 50, 51, 108, 109, or 114. The total quantity for this element is the actual bridge deck area from curb line to curb line.

Condition States for WSDOT Elements 13 and 14

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces have no exposed reinforcing. The deck surfaces may have hairline cracks, rock pockets and/or be worn exposing aggregate.
2. If the top of the slabs or girders are visible, area of deck with repairs.
3. Deck area with spalling. Do not add delaminations found in the field, see condition State 4.
4. Record the delaminated area (CS4) from WSDOT element 376 in the deck CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.



15	Post Tensioned Concrete Deck	Units – SF

This element is defined by a concrete bridge deck that has transverse or longitudinal post tensioning; and includes the deck on elements 100 Post Tensioned Segmental and 104 Post Tensioned Concrete Box. These decks require a higher level of care for maintenance, special attention by management, and have a higher replacement cost. This element does not include the deck of elements 105 Concrete Box and 97 Trapezoidal. The total quantity for this element is the actual bridge deck area from curb line to curb line.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Deck area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Deck area with spalling. Do not add delaminations found in the field, see condition State 4.
4. Record the delaminated area (CS4) from WSDOT element 376 in the deck CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.

16 Thin Concrete Deck < 6” Thick Units – SF

This element defines a concrete bridge deck constructed with a deck that is less than 6” in thickness. The total quantity for this element is the actual bridge deck area from curb line to curb line.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Deck area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Deck area with spalling. Do not add delaminations found in the field, see condition State 4.
4. Record the delaminated area (CS4) from WSDOT element 376 in the deck CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.

20 Concrete Deck – Lightweight Aggregate Units – SF

This WSDOT element defines a lightweight concrete bridge deck constructed with lightweight aggregate and steel reinforcement. The total design weight of the deck is approximately 120 lbs./C.Y. The total quantity for this element is the actual bridge deck area from curb line to curb line.

26 Concrete Deck w/Coated Bars Units – SF

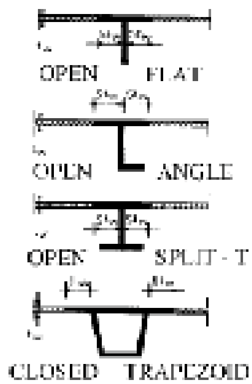
This WSDOT element defines a concrete bridge deck constructed with coated (epoxy, galvanizing, stainless steel, fiber reinforced polymer (FRP), etc.) reinforcement. The total quantity for this element is the actual bridge deck area from curb line to curb line.

Condition States for WSDOT Elements 20 and 26

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Deck area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Deck area with spalling. Do not add delaminations found in the field, see condition State 4.
4. Record the delaminated area (CS4) from WSDOT element 376 in the deck CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.

27	Steel Orthotropic Deck	Units – SF

This WSDOT element defines a bridge deck constructed of a flat, deck plate stiffened either longitudinally or transversely, or in both directions. See BIRM, Volume 1, Figure P.1.2.7. The total quantity for this element is the actual bridge deck area curb to curb.



28	Steel Deck – Open Grid	Units – SF

This WSDOT element defines a bridge deck constructed of steel grids that are open and unfilled. The total quantity for this deck WSDOT element is the actual bridge deck area from curb line to curb line.

29	Steel Deck – Concrete Filled Grid	Units – SF

This WSDOT element defines a bridge deck constructed of steel grids with either all of the openings or just those in the wheel lines filled with concrete. The total quantity for this element is the actual bridge deck area from curb line to curb line.

30	Deck – Corrugated or Other Steel System	Units – SF

This WSDOT element generally defines a bridge deck constructed of corrugated metal filled with Portland cement concrete or asphaltic concrete. This element may also be used to identify other non-standard steel decks. The total quantity for this element is the actual bridge deck area from curb line to curb line.

Condition States for WSDOT elements 27, 28, 29, and 30 (Structural Decks)

1. Defects are superficial. The connectors (such as welds, rivets, etc.) or concrete/asphalt filler are functioning as designed.
2. Deck area with repairs or replaced panels.
3. Deck area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Deck area with damage in locations or quantity and has reduced the structural capacity of the element. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

31 Timber Deck Units – SF

This WSDOT element defines a bridge deck constructed of timber. The deck may be longitudinally or transversely laminated or of planks. The deck may have an overlay or may be constructed with runners of metal or timber. The total quantity for this element is the actual bridge deck area from curb line to curb line.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Timber deck area with repairs, plates, or replaced timbers.
3. Timber deck area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. These areas are typically marked with a YELLOW TAG by inspectors.
4. Timber deck area with damage in locations or quantity and has reduced the structural capacity of the WSDOT element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. These areas are typically marked with a RED TAG by inspectors.

32 Fiber Reinforced Polymer (FRP) – Deck Units – SF

This WSDOT element defines a bridge deck constructed of fiber reinforced polymer. The total quantity for this element is the actual bridge deck area from curb line to curb line.

1. Defects are superficial. Cracking or delamination of layers may be present.
2. FRP Deck area with repairs, patches, or plated.
3. FRP Deck area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. FRP Deck area with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

35 Concrete Deck Soffit Units – SF

This WSDOT element defines the bottom (or undersurface) and edge of a concrete deck and is to be included with concrete WSDOT deck elements 12, 20, and 26. It is extremely valuable when an asphalt overlay exists on the top surface of the deck. The purpose of the element is to identify decks that may have a reduced structural capacity through visual inspections of the deck soffit. Element 35 does not apply if steel stay-in-place forms are present since the soffit is not visible. To be consistent with the deck quantity, the total quantity for this element is the actual bridge deck area from curb line to curb line. Delaminations on concrete soffits over roadways may pose a danger to traffic below the bridge. In this situation, a repair should be recommended to correct the condition.

1. The undersurface of the deck is not showing signs of distress. There may be rust stains from rebar chairs, spalls without exposed rebar, or cracks with efflorescence.
2. Deck soffit area with repairs or patches.

3. Deck soffit area showing signs of reduced structural capacity. Typical indications include areas with heavy to severe rust staining from deck reinforcement, Spalling with corroded rebar indicating active corrosion, Cracks that are full depth, severe or leaking water.

36 Deck Rebar Cover Flag Units – SF

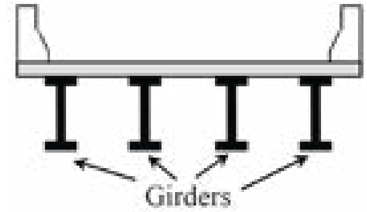
This does not apply to deck spalling with exposed rebar. This element is used to identify the top surface of bridge decks with concrete cover less than 1 inch and having rebar exposed. This condition results from either lack of cover during construction or general rutting that has exposed rebar. Deck patching is often difficult at these locations. This flag will determine method of deck rehabilitation. Report square foot of visible deficiency in CS2. The total quantity for this element is the actual bridge deck area curb to curb.

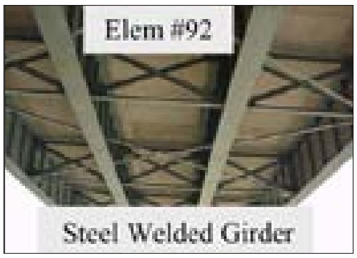
1. Deck top surface area with adequate concrete cover.
2. Concrete deck area with visible lack of cover due to construction or general rutting that has exposed rebar.

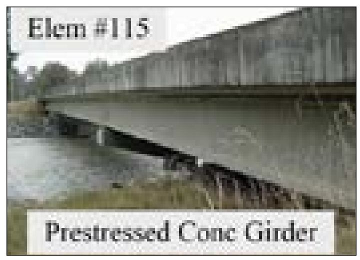
4-3 Superstructure

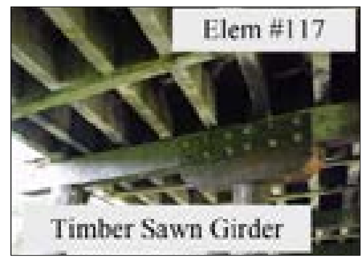
4-3.1 *Girders*

A girder is defined as any longitudinal structural member (single web or box section) that directly supports the bridge deck. A girder type bridge will typically have two or more girders. Girders may be constructed of the following typical materials: Rolled, welded or bolted (riveted), steel sections; Post tensioned, prestressed or reinforced concrete sections; or Timber sections.









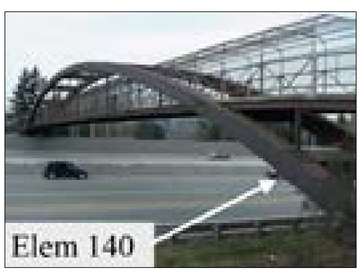
4-3.2 *Diaphragms*

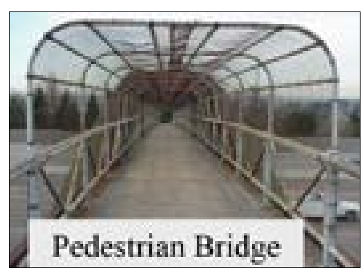
Diaphragms are structural members used to tie adjoining girders together to improve the strength and rigidity of the girder and to distribute forces in the lateral direction.

Diaphragms do not have an element but if a diaphragm has advanced deterioration, it should be noted in the element comments of the associated girder.

4-3.3 *Pedestrian Bridges*

The same WSDOT elements used for bridges that carry vehicular traffic can be used for pedestrian bridges. Do not use the WSDOT sidewalk elements (#260 through #266) for pedestrian bridges.





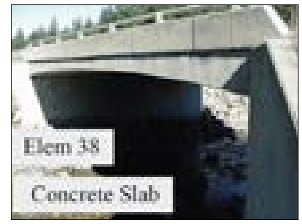
4-3.4 *Slab Bridges*

Slab bridges can have precast segments or cast in place concrete. The bridge in the picture is a cast in place concrete slab and will have a deck element for the deterioration of the top surface. Structural deficiencies of the slab bottom and edge are documented in WSDOT element 38 "Concrete Slab."

Note: The total quantity for slab elements is the actual bridge deck area. Do not use the NBI Item 051, **"Bridge Roadway Width Curb-to-Curb" (or WSBIS Item 1356 "Curb-to-Curb Width")** when a deck curb-to-curb dimensions vary.

38	Concrete Slab	Units – SF

This element defines a concrete slab bridge and edge that has been constructed with uncoated reinforcement. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.



49	Concrete Hollow Slab	Units – SF

This element defines a concrete slab bridge and edge that has been constructed with sono-tubes and uncoated reinforcement. Structural deficiencies of the edge and bottom surface are addressed in the condition states. This type of bridge was typically built in the 50's and 60's on the state highway system. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.

50	Prestressed Concrete Slab	Units – SF

This element defines a concrete slab bridge that has been constructed with prestressed concrete and uncoated steel reinforcement. This element may be solid or have built in voids. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.

51	Prestressed Concrete Slab w/Coated Bars	Units – SF

This element defines a concrete slab bridge that has been constructed with prestressed concrete and coated steel reinforcement (epoxy, etc.). This element may be solid or have built in voids. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.

52	Concrete Slab w/Coated Bars	Units – SF

This element defines a concrete slab bridge and edge that has been constructed with coated (epoxy, etc.) reinforcement. This element may or may not contain a hollow core. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.

Condition States for WSDOT Elements 38, 49, 50, 51, and 52

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Concrete slab area with repairs or patches.
3. Concrete slab area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Concrete slab area with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. For slabs made with beam units, the affected area should be based on the span length.

54	Timber Slab	Units – SF

This element defines a slab that is constructed of timber. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this slab element is the actual bridge slab area from curb line to curb line.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Slab area with repairs, plates or replaced timbers.
3. Slab area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. These areas are typically marked with a YELLOW TAG by inspectors.
4. Slab area with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. These areas are typically marked with a RED TAG by inspectors.

89	Prestressed Concrete Girder w/Coated Strands	Units – LF

This element defines a girder constructed of precast prestressed concrete and epoxy coated strand that supports the bridge deck. The element quantity should equal the sum of each girder length. The element total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

90	Steel Rolled Girder	Units – LF

This element defines a girder unit of structural steel that has an integral web and flanges and was fabricated in a steel mill by the rolling process. This element may have bolted, riveted or welded cover plates. This element directly supports the bridge deck and is part of a two or more longitudinal girder system. The total quantity for this element is the sum of each girder length.

91	Steel Riveted Girder	Units – LF

This element defines a girder unit of structural steel that directly supports the bridge deck. This element has a web and flanges that are connected with rivets. This element is part of a two or more longitudinal girder system. The total quantity for this element is the sum of each girder length.

92 Steel Welded Girder Units – LF

This element defines a girder unit of structural steel that directly supports the bridge deck. This element has a web and flanges that are connected with welds. This element is part of a two or more longitudinal girder system. The total quantity for this element is the sum of each girder length.

Condition States for WSDOT Elements 90, 91, and 92

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Girder length affected by repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Girder length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

96 Concrete Encased Steel Girder Units – LF

This element defines a steel girder that is encased in concrete. The total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking.
2. Girder length affected by repairs or patches.
3. Girder length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth), concrete delaminations or spalls in a tension zone.
4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

97 Prestressed Concrete Tub Girder Units – LF

This element defines a prestressed concrete box girder or Tub Girder as defined in the *Bridge Design Manual* M 23-50. Post-tensioning and span field splices may or may not be present.

The total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

98 Thin Flange Girder Units – LF

This element defines a precast prestressed concrete girder unit where the top flange is not designed to carry live load and must have a concrete deck. There may be asphalt or a concrete overlay on the concrete slab. This element represents the WSDOT - WFxxTDG girder sections: WF36TDG, WF42TDG, WF50TDG, WF58TDG, WF66TDG, WF74TDG, WF83TDG, WF95TDG, and WF100TDG. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this element is the sum of each girder length.

100 Post Tensioned Concrete Segmental Box Girder Units – LF

This element defines a post-tensioned concrete box girder constructed using the segmental precast process. The total quantity for this element is the length of segmental box girders.

Condition States for WSDOT Elements 97, 98, and 100

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

102 Steel Box Girder Units – LF

This element defines a box girder unit constructed with structural steel. This element directly supports the bridge deck. The total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Girder length affected by repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Girder length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

103	Prestressed Concrete Super Girder	Units – LF

This element defines a prestressed WSDOT girder WF83G, WF95G, WF100G, WF83PTG, WF95PTG, WF100PTG. Girders may or may not be post-tensioned. The total quantity for this element is the sum of each girder length.

104	Post Tension Concrete Box Girder	Units – LF

This element defines a box girder unit constructed of post-tensioned, cast in place concrete. The total quantity for this element is the sum of each girder length.

105	Concrete Box Girder	Units – LF

This element defines a box girder superstructure unit constructed with cast in place reinforced concrete. The total quantity for this element is the sum of each girder length.

Condition States for WSDOT Elements 103, 104, and 105

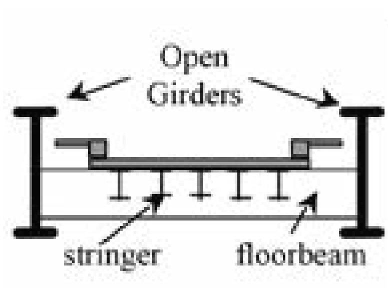
1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

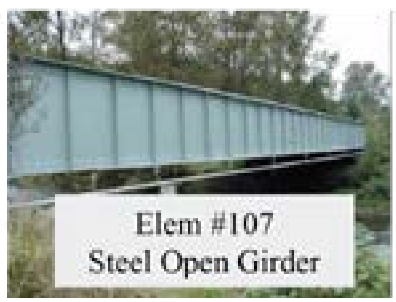
4. Girder span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

107 Steel Open Girder Units – LF

This element defines an open girder unit that is constructed of structural steel. An open or "through" girder is part of a two-girder system with stringer and floor beam elements that support a bridge deck. Open girders are located on the outside of the bridge. The bridge deck and any sidewalks are contained between the open girders. Bridges with open girders were generally built prior to 1950 and usually have built up riveted steel members. The total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Steel open girder length affected by repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Steel open girder length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Steel open girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.





108 Prestressed Concrete Bulb-T Girder Units – LF

This element defines a precast prestressed concrete Bulb-Tee girder unit which has little or no span between the top flanges. There may be asphalt, a concrete slab, a concrete overlay, or nothing on the top flange. This element represents the following WSDOT girder sections: W35DG, W41DG, W53DG, W65DG, WF39DG, WF45DG, WF53DG, WF61DG, WF69DG, WF77DG, WF86DG, WF98DG, WF103DG. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this element is the sum of each girder length.

109 Prestressed Concrete Multiple Web Girder Units Units – LF

This element defines a precast prestressed concrete girder that has more than one web. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this element is the sum of each girder length.

110 Concrete Girder Units – LF

This element defines a girder (including T-Beams) constructed of non-prestressed reinforced concrete. The total quantity for this element is the sum of each girder length.

Condition States for WSDOT Elements 108, 109, and 110

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

111 Timber Glue-Lam Girder Units – LF

This element defines a girder unit constructed of glue-lam timber. This element directly supports the bridge deck. The total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Glue-Lam girder length affected by repairs, patches, or plated.
3. Glue-Lam girder length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. These areas are typically marked with a YELLOW TAG by inspectors.
4. Glue-Lam girder span length with damage in locations or quantity and has reduced the structural capacity of the girder or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. These areas are typically marked with a RED TAG by inspectors.

113 Steel Stringer Units – LF

This element defines a stringer constructed of structural steel that supports the deck in a stringer-floor beam system. A stringer is connected to a floor beam and directly supports a bridge deck. A steel stringer and floor beam combination is commonly used in steel truss and steel open girder bridges. The total quantity for this element is the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Stringer length affected by repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Stringer length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Stringer span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

114 Concrete Multiple Web Girder Unit Units – LF

This element defines a girder constructed of non-prestressed reinforced precast concrete. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The total quantity for this element is the sum of each girder length. Check the NBIS main span type.

115 Prestressed Concrete Girder Units – LF

This element defines a girder constructed of precast prestressed concrete that may or may not be post-tensioned and supports the bridge deck. The total quantity for this element is the sum of each girder length.

116 Concrete Stringer Units – LF

This element defines a stringer constructed of reinforced concrete that supports the bridge deck in a stringer-floor beam system. The total quantity for this element is the sum of each stringer length. See Steel Stringers and Floor Beams for a more general description.

Condition States for WSDOT Elements 114, 115, and 116

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Girder length affected by repair or patch.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Girder span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

117 Timber Sawn Girder Units – LF

This element defines a girder constructed of sawn timber that supports the bridge deck. The total quantity for this element is the sum of each girder length.

118 Timber Stringer Units – LF

This element defines a stringer constructed of timber that supports the bridge deck. The element total quantity is the sum of each stringer length. See Steel Stringers, WSDOT Element 113, for a more general description.

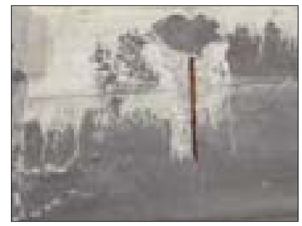
Condition States for WSDOT Elements 117 and 118

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Girder or stringer length affected by repairs or plates.
3. Girder or stringer length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½″ are marked with a YELLOW TAG.
4. Girder or stringer span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

119 Concrete Truss Units – LF

This element defines all members in a truss that is constructed of concrete. There is only one concrete truss on the state highway system. The total quantity for this element is the sum of each concrete truss length, which is two times the truss span length.

1. Truss panel length with superficial defects that have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Truss panel length with repairs or patches.
3. Truss panel length affected with structural defects. The defects do not significantly affect structural capacity. Defects do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.



4. Length of truss span affected with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

126 Steel Thru Truss Units – LF

This element includes all structural steel truss members. Code this element for through and pony trusses only. The total quantity for this element is the sum of each truss length, which is two times the truss span length.

131 Steel Deck Truss Units – LF

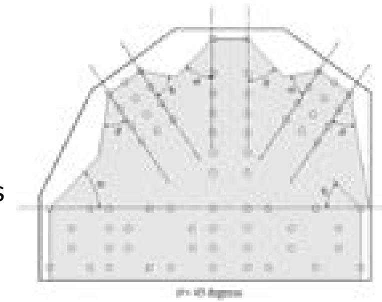
This element includes all truss members of a structural steel deck truss. The top and bottom chords are included in this element. The total quantity for this element is the sum of each truss length, which is two times the truss span length.

Condition States for WSDOT Elements 126 and 131

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Truss panel length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Truss panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Truss span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

133 Truss Gusset Plates Units – EA

This element documents structural defects on gusset plates at the panel points of a truss element. Gusset plates are defined as any plate attached to primary members that transfer primary or secondary load at the panel joint. Significant defects should be considered when they are within the stress zones of the gusset. Stress zones are approximately illustrated as the shaded portion in Figure at right. The total quantity for a truss is the total number of all node points of all trusses.



1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of panel points with repairs or have been reinforced.
3. Number of panel points with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of panel points with structural deficiencies in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

135 Timber Truss Units – LF

This element defines a truss constructed of timber members. The total quantity for this element is the sum of each truss length, which is two times the truss span length.

1. Truss panel length with defects that are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Truss panel length with repairs or plates.
3. Truss panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½″ are marked with a YELLOW TAG.
4. Truss span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

139 Timber Arch Units – LF

This element includes all members of an arch constructed of Timber. The total quantity for this element is the length measured from one arch support to the other.

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Arch panel length with repairs or plates.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½″ are marked with a YELLOW TAG.
4. Arch span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

140 Composite Arch Units – LF

This element includes all members of an arch constructed of Composite material. The total quantity for this element is the length measured from one arch support to the other.

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element.
2. Arch panel length with repairs or patches.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Arch span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

141 Steel Arch Units – LF

This element includes only the arch constructed of structural steel. When coding NBI, pier caps, cross beams, and any other coded substructure elements within the arch span are considered superstructure elements. The total quantity for this element is the length measured from one arch support to the other.

142 Steel Tied Arch Units – LF

This element includes all members of a tied arch constructed of structural steel. The bottom and top chords are included in this element. The total quantity for this element is the length measured from one arch support to the other.

Condition States for WSDOT Elements 141 and 142

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element.
2. Arch panel length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Arch span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

143 Steel Suspender Units – EA

This element defines a steel member used to suspend a bridge deck from an arch or truss. The total quantity for this element is the total number of suspenders.

1. Number of suspenders with defects that are superficial and have no effect on the structural capacity of the element.
2. Number of suspenders with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Number of suspenders with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of suspenders with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

144 Concrete Arch Units – LF

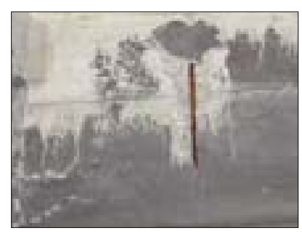
This element only defines the arch (open/closed spandrel, bowstring, etc.) and is constructed of non-prestressed reinforced concrete. When coding NBI, pier caps, cross beams, and any other coded substructure elements within the arch span are considered superstructure elements. The total quantity for this element is the length measured from one arch foundation to the other.

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Arch panel length with repairs or patches.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Arch span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

145 Earth Filled Concrete Arch Units – LF

This element defines an earth filled arch constructed of reinforced concrete. The total quantity for this element is the length measured from one arch foundation to the other. If there is a concrete deck constructed on the fill, WSDOT element 14 applies. If there is an ACP wearing surface, WSDOT element 800 or 801 applies.

1. Arch span length with defects that are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Arch span length with repairs or patches.
3. Arch span length with structural defects. The defects The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.



4. Arch span length affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

146 Suspension – Main Cable Units – EA

This element defines a main steel cable used to support the superstructure in a suspension bridge. The total quantity for this element is the number of cables.

147 Suspension – Suspender Cable Units – EA

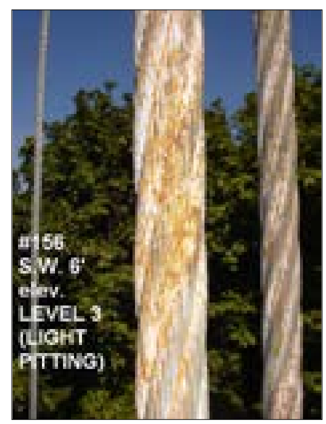
This element defines a suspender steel cable that connects the bridge superstructure to the main suspension cable. Suspender cables include the anchor device at the ends and the zinc protection on the wires. The outer protection system is usually a form of a paint element. The total quantity for this element is the number of steel cables.

149 Cable Stayed Bridge – Cable Units – EA

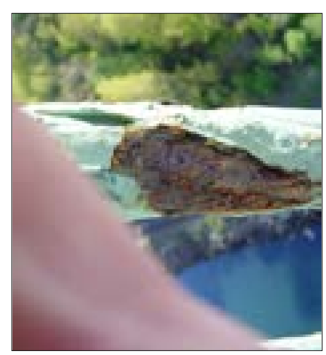
This element defines a steel cable used to support the superstructure in a cable stayed bridge. The cable stays include the anchor device at the ends. The total quantity for this element is the number of steel cables.

Condition States for WSDOT Elements 146, 147, and 149

1. Number of cables with no defects. Zinc coating may be dull gray showing early signs/stages of zinc oxidation. New replacement cables are coded in this condition state.
2. Number of cables with defects that are insignificant and do not affect the capacity of the cable. Zinc coating has white spots or areas of the surface which indicate corrosion of the zinc protection.
3. Number of cables or anchors with defects that are beginning to affect the capacity of the cable but are within acceptable design limits. Localized areas of zinc depletion and showing rust spots, but there is no visible section loss.



4. Number of cables or anchors with defects that have clearly affected the capacity. This includes broken wires or localized section loss due to other defects. The zinc protective coating is largely depleted with ferrous rust prevalent in many locations along the cable length.



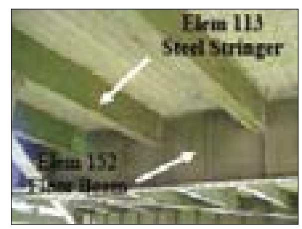
150 Concrete Column on Spandrel Arch Units – EA

This element defines the column supports on a spandrel arch bridge. The total quantity for this element is the number of columns supported by the arch.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Number of columns with repairs or patches.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Number of columns with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

152 Steel Floor Beam Units – LF



This element defines a floor beam constructed of structural steel that supports stringers in a stringer-floor beam system. Floor beams are load carrying elements located transversely to the general bridge alignment. Floor beams transmit the loads from the deck and/or stringers to the outside open girders or to the bottom chord of a truss bridge. The total quantity for this element is the sum of each floor beam length.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Floor beam length affected by repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Floor beam length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Floor beam span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

154 Prestressed Concrete Floor Beam Units – LF

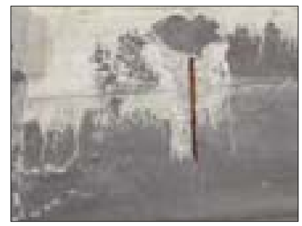
This element defines a floor beam constructed of prestressed concrete that supports the bridge deck in a stringer-floor beam system. The total quantity for this element is the sum of each floor beam length.

155 Concrete Floor Beam Units – LF

This element defines a floor beam constructed of reinforced concrete that supports the bridge deck in a stringer-floor beam system. Floor beams are load carry elements located transversely to the general bridge alignment. Floor beams transmit the loads from the deck and/or stringers to the outside open girders. The total quantity for this element is the sum of each floor beam length.

Condition States for WSDOT Elements 154 and 155

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Floor beam length affected by repairs or patches.
3. Floor beam length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.



4. Floor beam span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

156 Timber Floor Beam Units – LF

This element defines a stringer constructed of timber that supports the bridge deck. The total quantity for this element is the sum of each floor beam length. See Steel Floor beam, WSDOT Element 152, for a more general description.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Floor beam length affected by repairs or plates.
3. Floor beam length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½″ are marked with a YELLOW TAG.
4. Floor beam span length with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½ shell thickness are marked with a RED TAG.

160 Steel Column on Spandrel Arch Units – EA

This element defines the column supports on a spandrel arch bridge. The total quantity for this element is the number of columns supported by the arch.

161 Steel Hanger Units – EA

This element defines the hanger portion of a pin and hanger usually on a steel girder. Truss "hanger" members are not included in this element. The total quantity for this element is the number of steel hangers on the bridge. Generally, there will be two hangers at each location.

Condition States for WSDOT Elements 160 and 161

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of steel columns or hangers with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Number of steel columns or hangers with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of steel columns or hangers with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

162 Steel Pin Units – EA

This element defines a structural pin used in any connection joint in a girder or truss.

The total quantity for this element is the number of pins on the bridge. Zero force and construction pins are not included in the quantity. Pins in bearing elements are not included unless they have uplift loadings.

1. Number of pins and associated connection plates are in good condition. Visual Inspection: There may be minor rust or shallow surface deformations on the exposed pin surfaces. Minor amounts of rust powder or paint damage may be present suggesting minor pin rotation in place. No pack rust is present between associated connection plates. There is no noise associated with the pin connection. Ultrasonic Testing (UT): Transducer can be applied to both ends of pin allowing a complete scan of pin grip surfaces, there are strong shoulder and end reflections, and there are no UT indications. UT indications are defined as pips in the grip area that are three times larger (3:1) than the background noise when the GAIN is adjusted to produce a 90 to 100 percent reflection height for the far shoulder.
2. Number of pins and associated connection plates have defects that do not affect the strength or serviceability of the bridge. Visual Inspection: Corrosion with pitting or laminar rust may be present. Minor abnormalities may be observed in alignment, pin wear, or deck joint movement. Pack rust may be present between connection plates but is not judged to put a jacking force between the pin nuts. The connection may have some rust powder and/or make noise under loading. Ultrasonic Testing (UT): For pins UT inspected from both ends, there may be non-coincident indications between 10 and 20 percent of the far shoulder reflection height. There may be loss in shoulder or back reflections which can be explained by pin end conditions (dents, holes, corrosion). Pins that can be UT inspected from one end only are considered CS2, even if they have no indications or have indications less than 10 percent of the far shoulder reflection height.

3. Number of pins and associated connection plates have defects that may affect the strength or serviceability of the bridge. Visual Inspection: Significant corrosion may be present, suggesting that pin is “frozen” in place. Measurable abnormalities may be observed in alignment, pin wear, or deck joint movement. Pack rust may be present between connection plates that place a jacking force between the pin nuts. The connection may have significant amounts of rust powder and/or make noise under loading. Ultrasonic Testing (UT): For pins UT inspected from both ends, there may be coincident indications (of any size) or non-coincident indications greater than 20 percent of the far shoulder reflection height. There may be loss in shoulder or back reflections that cannot be explained by pin end conditions (dents, holes, corrosion). Pins that can be UT inspected from one end only are considered CS3 if there are indications greater than 10 percent of the far shoulder reflection height.
4. Number of pins and associated connection plates have defects that are judged to affect the strength or serviceability of the bridge. Visual Inspection: There may be “frozen” pins designed for free rotation as part of normal bridge movement. Pack rust may be present between connection plates that are causing distortion/displacement of plates or pins.

163 Tension Hold Down Anchor Assembly Units – EA

This is a NSTM of the bridge that carries uplift loads from the superstructure to the substructure. The anchorage may consist of several parts with built-up steel members. Each location has anchor bolts in tension that must be evaluated and included in the NSTM Report. The element is defined as all parts in tension between the lower tip of the anchor bolts to the first pin or truss member. A pin is usually present and included in element 162 because it carries uplift loads. The total quantity for this element is the number of Tension Hold-Down Anchor Assemblies on the bridge.

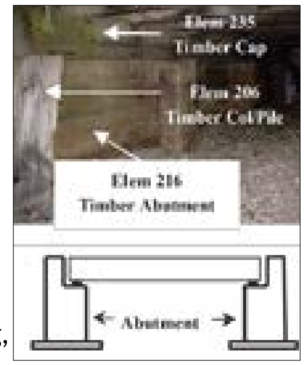
WSDOT bridges known to have Tension Hold Down Anchor Assemblies are: 2/35, 20/204, 25/130, 169/8, 261/125, 305/10 and 395/545.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of Tension Hold-Down Anchor Assemblies with repairs.
3. Number of Tension Hold-Down Anchor Assemblies with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of Tension Hold-Down Anchor Assemblies with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

4-4 Substructure

The evaluation of the substructure elements is based on those portions of the member that are exposed for visual inspection and included in the element quantity. If an element is added to a bridge or quantities are changed due to exposure or discovery by other means, do not delete the historical information in subsequent inspections. Simply note the prior exposure or those members not visible and document the current condition.

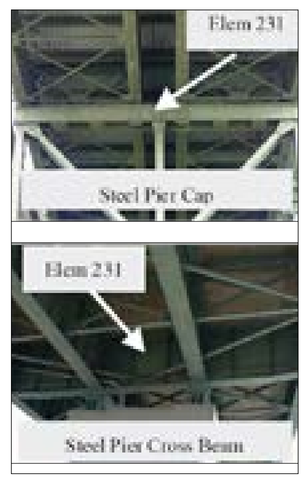
4-4.1 *Abutments*



An abutment is a substructure unit located at the end of a bridge that is designed to retain the fill supporting the roadway and support the bridge superstructure. Bridges that terminate in mid-span or at a pier that is not at grade do not have an abutment substructure unit and do not have abutment elements. These cases will use other appropriate structural elements to evaluate condition.

All abutments shall be evaluated for the capacity to transfer design loads to a foundation thru structural elements. The roadway embankment with non-monolithic concrete wingwalls, timber planking, or other abutment retaining systems are included in the evaluation of the WSDOT Abutment Fill element 200 (EA) where the evaluation is limited to no more than 25 feet from the abutment. Timber Abutment element 216 (LF) is equivalent to element 200.

4-4.2 *Pier Cap/Cross Beam*

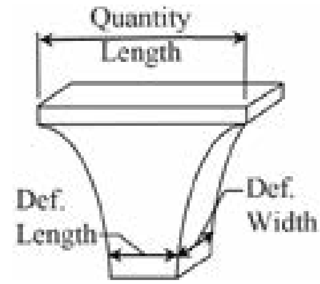


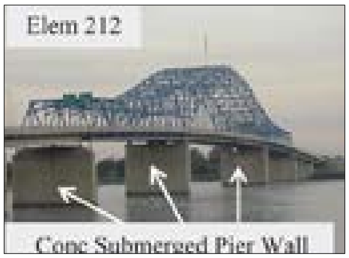
A pier cap is an element that is attached to the top of a pier and is used to support the superstructure of a bridge. A pier cross beam is generally attached to the girders and is used to distribute the loads from the girders to the pier.

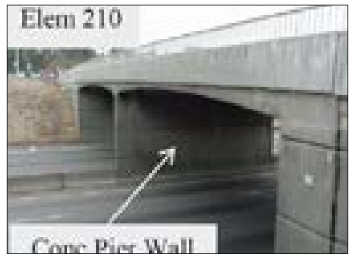
One WSDOT element is used to define either a cap or cross beam constructed of the same material.

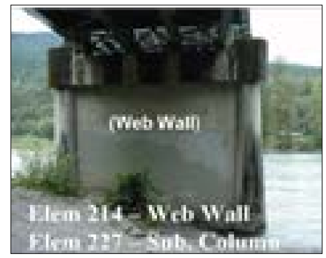
4-4.3 Pier Wall Definition

A pier wall is a substructure pier element. For WSDOT elements, a pier wall is defined using two criteria: if the length (transverse direction) is 3 times greater than the width (longitudinal direction) at the bottom; and the wall extends full height from the foundation to the superstructure. If the pier does not meet these two criteria, then the element would be coded as a column or other pier.









4-4.4 Pile/Column Elements

These long slender members transfer load normally as a part of the bridge substructure. The bottom of a column element may be visible or supported on unknown foundations. For element and inspection purposes, a pile is inspected as a designed column for the visible portion above ground or if visible in the past. Single columns supported on a single shaft are to be considered the same as one column or column length even though a part of the shaft is visible.

4-4.5 Foundation Elements

WSDOT Timber Foundation and Concrete Foundation elements document that a foundation is visible, and the structural condition may or may not be related to scour. The foundation may be a spread footing, or a footing supported by piles or drilled shafts. The foundation element is based on the footing material and the piles may be of any material. The condition of the foundation is the focus of these elements, not the pile design or material.

If the supporting piles are visible, then the pile element should be added to the bridge. Do not delete the pile element in subsequent inspections. The total quantity is the quantity of piles supporting the exposed foundation, not just the number of exposed piles. When scour threatens or reduces the condition, the scour documentation and condition is recorded separately in WSDOT element 361 and not recorded in the foundation element.

200 Abutment Fill Units – EA

This element is defined as the soil retained behind a concrete or steel abutment and includes the materials retaining the embankment such as non-monolithic concrete wing walls or other retaining wall system. The evaluation of the fill or retaining systems should not extend beyond 25 feet or the approach slab, whichever is greater. This element also includes abutment ends of cantilevered spans (formerly element 219).

Normally structures have two abutments at grade. When bridges terminate at intermediate piers or in mid-span (not on the ground), then this element does not apply. In addition, WSDOT Element 200 is equivalent to and does not apply to structures with WSDOT Timber Abutment 216 (LF).

Erosion outside of the abutment/wingwalls can be documented in the notes but is not included in the evaluation or condition of the element.

1. Defects are superficial and have no effect on the structural capacity or performance of the fill.
2. Number of abutments that have been repaired.
3. Number of abutments with a fill problem which does not significantly affect the support of the traveled lanes. Deficiencies do not warrant analysis but may require repairs.
4. Number of abutments with a fill problem in locations or quantity and has reduced the structural capacity of the soil to support the approach or roadway. It is a threat to traffic. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

202 Steel Column Units – EA

This element defines a column or portion of a column constructed of structural steel visible for inspection.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of columns with repairs such as: welded, bolted or riveted connections have been replaced; steel cracks or corrosion that has been mitigated or plated.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, connections with steel cracking, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of columns with damage. Locations or quantity of damage has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, welded bolted or welded bracing connections. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

203 Prestressed Hollow Concrete Column Units – EA

This element defines a column or portion of a column constructed of prestressed concrete and hollow. Inspection includes the visible portion above ground line.

204 Prestressed Concrete Column Units – EA

This element defines a column or portion of a column constructed of prestressed concrete visible for inspection.

205 Concrete Column Units – EA

This element defines a column or portion of a column constructed of reinforced concrete visible for inspection. Usually, WSDOT concrete piles are designed and constructed inside a sacrificial steel pipe casing.

Condition States for WSDOT Elements 203, 204 and 205

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Number of columns that has been repaired or patched.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Number of columns with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

206 Timber Column Units – EA

This element defines a column or portion of a column constructed of timber visible for inspection.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Number of columns with repairs, plates, or splices.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½″ are marked with a YELLOW TAG.
4. Number of columns with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

210 Concrete Pier Wall Units – LF

This element defines a pier wall, including submerged pier walls (formerly under Element 212), constructed of reinforced concrete. The total quantity for this element is the length at the top of the wall.

211 Other Pier Wall Units – LF

This element defines a pier wall including submerged non-standard material (rock and mortar) or non-standard construction type walls (formerly element 213), that is constructed of a non-standard material (rock and mortar) or non-standard construction. The total quantity for this element is the length at the top of the wall.

Condition States for WSDOT Elements 210, 211

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Length of pier wall with repairs.
3. Length of pier wall with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Entire length of pier wall with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

214 Concrete Web Wall between Columns Units – LF

This element defines a secondary concrete wall constructed between pier columns. This element includes railroad crash barriers. The total quantity for this element is the length at the top of the wall.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Affected length of Web wall with repairs.
3. Length of Web wall with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Entire length of Web wall with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

215 Concrete Abutment Units – LF

This element is defined as a concrete abutment or a concrete cap at the abutment which are designed to carry design loads to a foundation. A concrete abutment is a short or tall wall supporting the superstructure. An abutment cap is generally a rectangular beam supporting the superstructure. An abutment cap is included in this element and excluded from the quantity of element 234, Concrete Caps, elsewhere in the bridge. An abutment cap may be supported with concrete, steel, or timber columns or piles and the columns are coded separately and not included in this element but are included with the quantity and evaluation of the other the similar columns in the bridge. The columns are only coded if they are visible or have been visible in the past.

The element quantity is measured along the skew and includes concrete monolithic wingwalls up to the first open joint or expansion joint when oriented parallel to the abutment or skewed towards the approaching roadway. Wingwalls extending inboard towards the bridge are not included in the quantity (Fig. 1). Skewed wingwalls are measured from either the back of the pavement (when parallel to roadway, Fig. 2) or from the abutment wall angle point. Wingwalls monolithic with the abutment shall be included in the evaluation of the abutment. The length of monolithic wingwall shall not exceed 20 feet per corner.

The embankment and retaining system, or retaining system beyond a monolithic wingwall, are documented in WSDOT element 200.

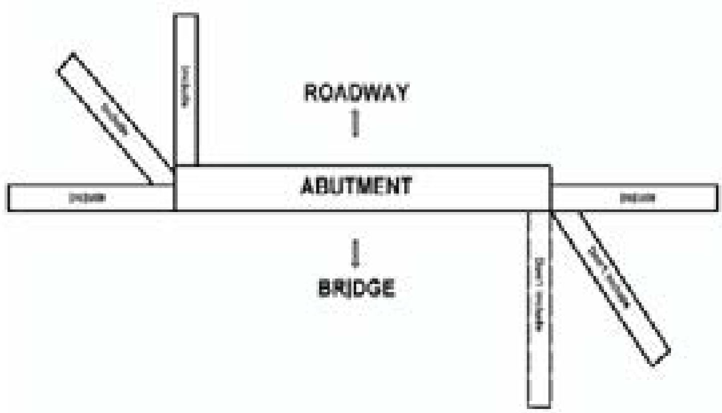


Fig. 1

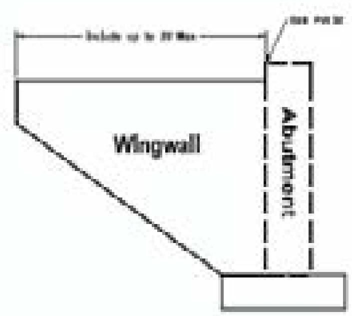


Fig. 2

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Affected length of abutment with repairs.
3. Length of abutment with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Entire length of abutment when damage exists in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

216 Timber Abutment Units – LF

This element defines the roadway embankment fill behind a timber cap and includes the sheet materials retaining the embankment. The total quantity is the length of the timber cap. Timber caps at the abutment and the piles supporting the caps are not included in this element. The caps are included in the element 235 with other timber caps and the piles are included with the other pile elements in the bridge.

Erosion outside of the abutment/wingwalls can be documented in the notes but is not included in the evaluation of the element condition states.

1. Defects are superficial and have no effect on the structural capacity or performance of the fill.
2. Length of abutment that has been repaired.
3. Length of abutment with a fill problem which does not significantly affect the support of the traveled lanes. Deficiencies do not warrant analysis but may require repairs.
4. Length of abutment with a fill problem in locations or quantity and has reduced the structural capacity of the soil to support the approach or roadway. It is a threat to traffic. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

217 Other Abutment Units – LF

This element defines an abutment not constructed of steel, timber, or concrete such as rock/mortar. The element quantity is the length of abutment measured along the skew. The element quantity includes monolithic wing walls but not to exceed 20 feet per corner.

Document the condition of the embankment and the embankment retaining system conditions in WSDOT element 200.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Affected length of abutment with repairs
3. Affected length of abutment with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Entire length of abutment when damage exists in locations or quantity and has reduced the structural capacity of the abutment. Structural analysis is warranted or has determined repairs are essential to restore the full abutment capacity.

218 Steel Abutment Units – LF

This element defines an abutment constructed of structural steel which is usually a steel cap at the abutment. Similar to concrete abutment caps, steel abutment caps are included in this element and are not included in the quantity of element 233, steel cap/crossbeam. The columns supporting the steel cap are coded separately or included with other similar columns in the bridge. The element quantity is the length of steel abutment cap measured along the skew.

Document the embankment conditions and the embankment retaining system conditions in WSDOT element 200.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Length of abutment with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Length of abutment with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Entire length of abutment affected when damage exists in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

220 Concrete Pile Cap/Footing Units – LF

This element defines a reinforced concrete pile cap/footing supported by shafts, piles, or soil (spread footing) that is visible for inspection and may be always, or seasonably covered by water. (Formerly covered by Elements 220 and 221). Scour deficiencies at a concrete pile cap/footing are included in WSDOT element 361 and are not included in this element. Plinths are a form of spread footing and included in this element which are a small concrete base that supports a column. Quantity is sum of the length of footings or pile caps along the skew angle.

The supporting piles may be timber, concrete, or steel. If the supporting piles become visible, then the pile element should be added to the bridge.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Number of Pile Caps/Footings with repairs.
3. Number of Pile Caps/Footings with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Number of Pile Caps/Footings with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

222 Timber Foundation Units – LF

This element defines a timber foundation element that includes a mud sill which is a spread footing and the rare case of a pile supported footing. A timber pile supported footing is where a timber horizontal footing member provides support for the columns and the timber member is supported by piles. The total quantity for this element is the length of timber foundation.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Total length of foundation if repairs exist.
3. Total length of foundation if structural defects exist, but the defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½″ are marked with a YELLOW TAG.
4. Total length of foundation where damage exists in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½ shell thickness are marked with a RED TAG.

225 Steel Pile Units – EA

This element defines a pile or pile portion of a pile constructed of structural steel visible for inspection. Do not delete the element from the bridge because the element is no longer visible. The exposure may be intentional or caused by scour.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of piles with repairs such as: welded, bolted or riveted connections have been replaced; steel cracks or corrosion that has been mitigated or plated.
3. Number of piles with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, connections with steel cracking, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of piles with damage. Locations or quantity of damage has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, welded bolted or welded bracing connections. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

226	Prestressed Concrete Pile	Units – EA

This element defines a pile or portion of a pile constructed of prestressed concrete and is visible for inspection. This includes all prestressed concrete piles, submerged or not. Do not delete the element from the bridge because the element is no longer visible. The exposure may be intentional or caused by scour.

227	Concrete Pile	Units – EA

This element defines a pile or portion of a pile constructed of reinforced concrete and is visible for. This includes all concrete piles, submerged or not. Do not delete the element from the bridge because the element is no longer visible. The exposure may be intentional or caused by scour.

Condition States for WSDOT Elements 225, 226, and 227

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Number of pile with repairs.
3. Number of pile with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Number of pile with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

228	Timber Pile	Units – EA

This element defines a pile or portion of a pile constructed of timber and is visible for inspection. This includes all timber piles, submerged or not. Do not delete the element from the bridge because the element is no longer visible. The exposure may be intentional or caused by scour.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Number of pile with repairs, plates, or splices.
3. Number of pile with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½″ are marked with a YELLOW TAG.
4. Number of pile with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

229 Timber Cap Rehab with Steel Units – LF

This element consists of a timber cap rehabilitation where alternate load paths to piling are provided by steel members on the exterior of the cap and the timber cap remains in place. The timber conditions are excluded from the condition evaluation. The total quantity for this element is the length of the existing timber pier cap, where this quantity is deducted from the total quantity of Element 234.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Steel span length of pier cap rehabilitation with repairs.
3. Steel length of pier cap rehabilitation with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Steel span length of pier cap rehabilitation with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

231 Steel Pier Cap/Crossbeam Units – LF

This element defines a steel pier cap or crossbeam. The total quantity for this element is the length at the top of the crossbeam.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Steel span length of pier cap/crossbeam with repairs.
3. Steel span length of pier cap/crossbeam with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Steel span length of pier cap/crossbeam with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

232 Prestressed Hollow Concrete Pile — Units – EA

This element defines a pile or portion of a pile constructed of prestressed concrete pile that has an interior void or is hollow. This includes all hollow prestressed concrete piles, submerged or not.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Number of piles that have been repaired or patched.
3. Number of piles with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Number of piles with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

233 Prestressed Concrete Pier Cap/Crossbeam — Units – LF

This element defines a prestressed concrete pier cap or crossbeam. The total quantity for this element is the length at the top of the crossbeam.

234 Concrete Pier Cap/Crossbeam — Units – LF

This element defines a reinforced concrete pier cap or crossbeam. Integral pier caps with girders framed directly into the crossbeam are also included in this element. The total quantity for this element is the length at the top of the crossbeam.

Condition States for WSDOT Elements 233 and 234

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Length of pier cap/crossbeam affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Length of pier cap/crossbeam affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Concrete span length of pier cap/crossbeam affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

235	Timber Pier Cap	Units – LF

This element defines a timber pier cap that directly supports the superstructure. The total quantity for this element is the length at the top of the crossbeam.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Length of pier cap with repairs, plates, or splices.
3. Length of pier cap with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½″ are marked with a YELLOW TAG.
4. Timber span length of pier cap with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1 ½ shell thickness are marked with a RED TAG.

236	Concrete Floating Pontoon	Units – Cell

A concrete floating bridge is a series of post-tensioned floating pontoons which are subdivided into internal compartments called cells. Traffic may ride directly on the top of the pontoon, or the roadway may be elevated above the pontoon and supported by columns. This element includes all pontoons regardless of size or configuration and all cells shall be evaluated at the same risk to the bridge condition. Deck elements will apply for the entire length of the pontoon structure. Pontoon condition will include the top slab where the deck/soffit elements exist on the pontoon. The deck/soffit elements are not included where the deck is elevated above the pontoon. The total quantity for the Concrete Floating Pontoon element is the total number of pontoon cells for the bridge.

Concrete pontoons are specially designed to be watertight and dry while in service. The concrete is specifically designed to be visually crack free and have low permeability with watertight construction joints. Watertight design is the basis for condition evaluation of the pontoon below water line and is to include but is not limited to the assessment of post-tensioned concrete, connections between pontoons, WSDOT element 237-Pontoon Hatch/Bulkheads, and the risk to buoyancy. Watertight criteria shall not apply to the evaluations of conventionally designed concrete conditions above the waterline.

Concrete cracking shall be assessed on the location:

- Above or below the waterline.
- Whether it is in an exterior or interior wall.
- Whether it is active or in-active.
- And based on the design criteria that visible cracking should not exist on submerged surfaces.

An active crack is defined for this element as a crack that allows water to pass into or through a concrete section which is a risk for transporting fine materials out of the section or a source of contaminates into the section. Active cracks may be visible under normal bridge loading or only visible under storm conditions.

The presence of water in a cell is evaluated based on the time required to obtain a measured depth of water. Stated another way, the evaluation is based on the rate of accumulation, not the total depth of water. For example, seepage in a cell is defined as, less than 1” of water accumulated over a period of one year. Ballasted cells shall establish a void ratio of the ballast to calculate a volume of water in a cell, and also the actual infiltration rate of water assuming no ballast was present.

This Concrete Floating Pontoon element also defines the relationship between the bridge element condition and the corresponding NBI Substructure Condition rating or NBI Item 060. For cases where defects are observed in pontoons underwater and defects are independent of those seen on the interior of pontoons, Underwater Inspection Condition (SNBI Item B.C.15) coding will follow the same coding correlations as defined below for NBI Substructure Condition rating.

1. Number of pontoon cells with defects that are superficial and are insignificant to structural capacity or buoyancy of the cell, pontoon or bridge. The cell concrete surfaces may have structurally insignificant hairline cracks, possibly sealed with Crystalline during construction, with no history of seepage. The cell is dry. A cell may have water present due to condensation or from water accumulating at a rate slower than would be considered a CS3 “trace’ amount of water.
    - If the total quantity is in CS1, then NBI Item 060 shall be an 8.
2. Number of pontoon cells with a repair such as, but not limited to a concrete patch or an epoxy injected sealed crack.
    - If repairs are above water level, or on interior walls between cells, then NBI Item 060 shall be a 7.
    - If repairs are below water level, then NBI Item 060 shall be a 6.
3. Number of pontoon cells with significant defects. Conventional concrete defects which do not affect structural capacity of the bridge. Watertight defects below the waterline which may affect buoyancy of the cell, pontoon or the bridge. Typical CS3 submerged defects include but are not limited to seepage of less than 1” of water accumulation in a year (trace). Trace is further defined as the amount of water required to manifest as puddled water over more than 50% of the pontoon floor. Below this amount of water, the pontoon cell is considered dry. Pontoon cells which have water present but does not increase in amount for 3 consecutive years are considered CS1 cells.

    Pontoon cells will be monitored annually for water when there is more than 1” accumulation in a year, but do not meet the leaking requirements of CS4.
    - If cells are in CS3 due to seepage, then NBI Item 060 shall be a 6.
    - If eight or more adjacent or contiguous cells in a single pontoon are in CS3, then NBI Item 060 shall be a 5.
    - If 20 percent of the cells in one pontoon, or a total of 10 percent of the cells in adjoining pontoons or 5 percent of the total element quantity are in CS3, then NBI Item 060 shall be a 4.

4. Number of pontoon cells with damage in locations or quantity, which has reduced the structural capacity of the pontoon or threatens the buoyancy of a cell, the pontoon, or the bridge. Wet conditions that indicate a threat to a cell's buoyancy include, but not limited to: Water leaks 1 inch or more per year in three consecutive years; Water leaks 2 inches or more in a year; Any cell visually leaking water at a rate greater than what would be classified as seepage for a CS3 cell. Any cell with a pontoon hatch or bulkhead in CS4, see WSDOT element 237.
    - If cells are in CS4, then NBI Item 060 shall be a 4.
    - If eight or more non-adjacent cells in a single pontoon are in CS4 or one cell leaks ½ inch per month, then NBI Item 060 shall be a 3.
    - If eight or more adjacent cells in a single pontoon are in CS4, or one cell leaks 1 inch of water per month, then NBI Item 060 shall be a 2.
    - If 20 percent of the cells in one pontoon, or a total of 10 percent of the cells in adjoining pontoons or 5 percent of the total element quantity are in CS4, then NBI Item 060 shall be a 2.
    - If one cell leaks 1 inch of water per month, for three consecutive months, then the NBI Item 060 shall be a 1 and the bridge shall be closed to traffic.
    - If there is a measurable or visual change in the alignment or the free board distance at any location on the pontoon, then the NBI Item 060 shall be a 1 and the bridge shall be closed to traffic.

237 Pontoon Hatch/Bulkhead Units – EA

This element defines a deck or bulkhead access hatch made of steel or aluminum. Deck hatches are accessed from the exterior of a pontoon and bulkhead hatches provide access between cells. The condition evaluation of a pontoon hatch is based on the condition of the hatch and the ability of a hatch to provide a watertight structural seal. The performance of the hatches is critical to the design buoyancy of the pontoon structure during extreme events. The total element quantity is the total number of hatches on a bridge.

1. Defects are superficial and are insignificant to the performance of the hatch to moderate surface corrosion with no appreciable pitting or section loss. Insignificant amounts of water enter a cell when a deck hatch is closed.
2. Number of hatches with temporary repairs such as: partially replaced seals, repaired hold-down dogs or locks. Light to moderate surface corrosion with some pitting resulting in section loss of up to 5% of the surface area of the hatch.
3. Number of hatches with structural defects. The defects do not threaten performance of the hatch. Moderate to heavy surface corrosion with more frequent section loss due to pitting. Section loss estimated between 5% and 25% of the surface area of the hatch. Heavy pitting and section loss along seal edges which compromises the watertight integrity of the hatch. Superficial chipping noted in hatch components. Number of hatches which allow water accumulation into a cell of less than 1" per year.
4. Number of hatches with damage that threatens performance during an extreme event. Heavy surface corrosion with more uniform pitting. Visually corresponds to approximately 25% or more section loss of the surface area of the hatch. Cracking present in hatch components. Chips or broken hatch components that compromise the strength of the hatch or the watertight seal. Number of hatches which allow water accumulation into a cell of 1" or more per year. All pontoon cells in WSDOT element 236 shall be coded CS4 that have a deck hatch or bulkhead hatch coded CS4.

238 Floating Bridge – Anchor Cable Units – EA

This element defines a steel anchor cable or structural strand used to stabilize the position of a floating bridge. The condition of a floating pontoon anchor cable is evaluated during underwater inspections performed by divers and remotely operated vehicles. Condition evaluation is based on the cable protection system, breakage of wires within the cable and the condition of the cable anchor. The total element quantity should equal the number of floating pontoon anchor cables attached to the bridge.

Floating bridge anchor cables Condition Definitions: The amount of corrosion noted corresponds to the following criteria.

LIGHT (CS2) – Light surface corrosion (freckle rust, not white oxidation) and rusting of the outer layers of wires, no appreciable rust nodules or section loss detected.

LIGHT TO MODERATE – More significant corrosion with scattered rust nodules 1/16 inch thick, very early stages of section loss due to occasional pitting less than 1/32 inch deep.

MODERATE (CS3) – Rust nodules more uniform and typically 1/16 to ¼ inch thick with more frequent section loss due to pitting, typically still less than 1/32 inch deep, but with occasional pitting up to 1/32 inch deep. Visually corresponds to approximately 5% section loss in outer wires.

MODERATE TO HEAVY – Uniform rust nodules typically ¼ inch thick with uniform section loss due to pitting typically 1/32 inch deep. Outer wire section loss estimated between 5% and 25%.

HEAVY (CS4) – Uniform rust nodules typically ¼ inch to 3/8 inch thick with uniform section loss due to pitting typically 1/32 to 1/16 inch deep. Visually corresponds to approximately 25% section loss to the outer wires (obvious flattening of the wires, with grooves between the wires still visible).

1. Number of cables or anchors with no defects in the cable or anchor and the galvanized protection system is functioning properly, which includes white zinc oxidation. New replacement cables are coded in this condition state. (Corresponds to NBI Substructure (NBI Item 060) and SNBI Underwater Inspection Condition (SNBI Item B.C.15) rating of 7 or 8.)
2. Number of cables or anchors with defects that are insignificant and do not affect the capacity of the cable. The galvanized protection system is showing signs of failure, and surface or freckled rust may exist with no measurable loss of section. Any individual wire up to 75% out of lay and no closer than 30 LF apart is CS2. If any portion of the cable or anchor is CS2, then the NBI Substructure Condition rating (NBI Item 060) and SNBI Underwater Inspection Condition (SNBI Item B.C.15) shall be a maximum of 6.
3. Number of cables or anchors with defects that are beginning to affect the capacity of the cable but are within acceptable design limits. Corrosion section loss is not more than 25% of the outer wire layer. Single wire failures of the cable may exist due to corrosion or hydrogen embrittlement, but no closer than 30 feet apart. Gaps in the outer wires exposing the inner layer with no ferrous corrosion to inner layer. Multiple adjacent wires up to 100% out of lay. Wires more than 100% out of lay with second layer exposed are considered broken wires. If any portion of the cable or anchor is CS3, then the NBI Substructure Condition rating (NBI Item 060) and SNBI Underwater Inspection Condition (SNBI Item B.C.15) shall be a maximum of 5.

4. Number of cables or anchors with defects that have significantly affected the capacity. Two or more broken wires, or equivalent section loss due to other defects, are within 30 feet. Outer wire section loss greater than 25%. Exposed inner wires with measurable section loss. Any cable which exhibits permanent deformation. If any portion of the cable or anchor is CS4, then the NBI Substructure Condition rating (NBI Item 060) shall be a maximum of 4. If two or more adjacent cables (on the same side or opposite sides of the pontoon) or more than four cables on the structure are CS4, then the NBI Substructure Condition rating (NBI Item 060) and SNBI Underwater Inspection Condition (SNBI Item B.C.15) shall be 3.

4-5 Culverts

240	Metal Culvert	Units – LF

This element defines a metal (steel, aluminum, etc.) culvert including arches, round or elliptical pipes, etc. The total quantity is the length of culvert from inlet to outlet along the bottom of the culvert and does not include the apron.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be corrosion, erosion, scour, distortion, or roadway settlement.
2. Length of culvert with repairs.
3. Length of culvert with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Length of culvert affected by damage in locations or quantity and has reduced the structural capacity of the culvert. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to: distortion, deflection, roadway settlement, or misalignment of the barrel.

241	Concrete Culvert	Units – LF

This element defines all precast and cast-in-place (conventional or prestressed) concrete arch, pipe and box culverts. The total quantity is the length of culvert from inlet to outlet along the bottom of the culvert and does not include the apron.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Length of culvert with repair or patch.
3. Length of culvert affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Length of culvert affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the culvert. Structural deficiencies are not limited to distortion, deflection, roadway settlement, or misalignment.

242 Timber Culvert Units – LF

This element defines all timber box culverts. The total quantity is the length of culvert from inlet to outlet along the bottom of the culvert and does not include the apron.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Length of culvert that has been replaced, repaired, patched, or plated.
3. Length of culvert with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Typically, locations in a load path with a shell thickness greater than or equal to 1½″ are marked with a YELLOW TAG.
4. Length of culvert affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the structural capacity of the culvert. Structural deficiencies are not limited to distortion, deflection, roadway settlement, or misalignment of the barrel. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

243 Other Culvert Units – LF

This element defines all culverts not included under steel, concrete, or timber culvert elements. It may include masonry or combinations of other materials. The total quantity is the length of culvert from inlet to outlet along the bottom of the culvert and does not include the apron.

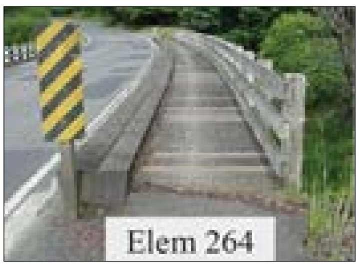
1. Defects are superficial and have no effect on the structural capacity of the culvert.
2. Length of culvert with repairs.
3. Length of culvert with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Length of culvert affected by damage in locations or quantity and has reduced the structural capacity of the culvert. Structural analysis is warranted or has determined repairs are essential to restore the structural capacity of the culvert. Structural deficiencies are not limited to distortion, deflection, roadway settlement, or misalignment of the barrel.

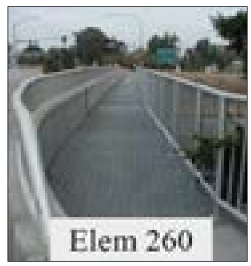
4-6 Sidewalk and Supports

A sidewalk is an element that provides pedestrian access across a bridge. A sidewalk is supported by a bridge deck and/or by sidewalk brackets that consist of several types of materials. The purpose of the sidewalk BMS is to record the structural integrity of the support system and sidewalk. Identify these elements in BMS if the sidewalk width is greater than or equal to 3 feet.

However, there are exceptions that must be accommodated. When there is a true sidewalk on a bridge as determined by the design, approach sidewalks, and location, it is appropriate to enter a sidewalk element in the BMS. Timber sidewalks, for example, may be narrow and have a support system. These exceptions should include a sidewalk WSDOT element. A specific note explaining the reasoning for including the sidewalk element should be provided.

If a rail retrofit or a wide curb has been determined to NOT be a sidewalk, then Bridge Rail elements will be used to document defects.





260 Steel Open Grid Sidewalk and Supports Units – SF

This element defines a sidewalk constructed of steel grids that are open and unfilled. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

261 Steel Concrete Filled Grid Sidewalk and Supports Units – SF

This element defines a sidewalk constructed of steel grids that have been filled with concrete. This element also includes the members used to provide support like stringers and braces.

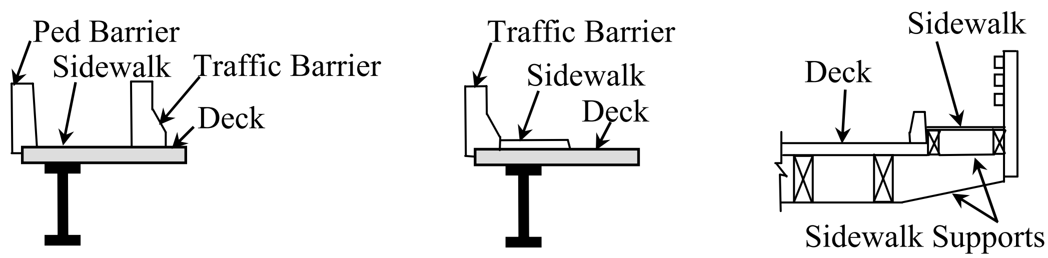
The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

262 Corrugated/Orthotropic Sidewalk and Supports Units – SF

This element defines a sidewalk constructed of corrugated metal filled with Portland cement concrete or asphaltic concrete or an orthotropic steel deck. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

264 Timber Sidewalk and Supports Units – SF

This element defines a sidewalk constructed of timber. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.



266 Concrete Sidewalk and Supports Units – SF

This element defines a sidewalk constructed of reinforced concrete. The concrete sidewalk may be supported by the roadway deck, bracing, diaphragms, or sidewalk stringers. The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

267 Fiber Reinforced Polymer (FRP) Sidewalk and Supports Units – SF

This element defines a sidewalk constructed of fiber-reinforced polymer. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length which includes sidewalk supported by structural bridge members such as a wing wall or approach slab.

Condition States for WSDOT Elements 260, 261, 262, 264, 266, and 267

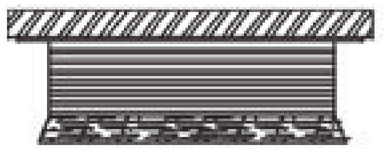
1. Defects are superficial and have no effect on the structural capacity of the sidewalk or supports.
2. Sidewalk area (or support projected area) with repairs or patches.
3. Sidewalk area (or support projected area) with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Sidewalk area (or support projected area) affected by damage in locations or quantity and has reduced the structural capacity of the sidewalk support. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

4-7 Bearings

When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependent (or supported) structure only.

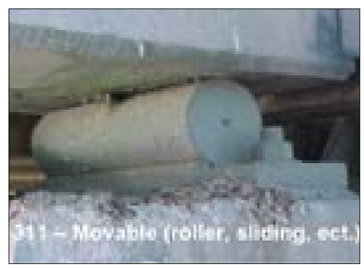
310	Elastomeric Bearing	Units – EA

This element defines a bridge bearing that is constructed primarily of elastomers, with or without fabric or metal reinforcement.



311	Moveable Bearing (Roller, Sliding, etc.)	Units – EA

This element defines those bridge bearings that provide for both deflection and longitudinal movement by means of roller, rocker or sliding mechanisms.

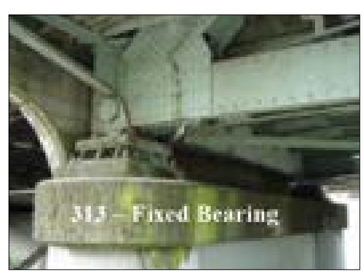


312	Concealed Bearing or Bearing System	Units – EA

This element defines those bridge bearings and/or bearing seats that are not accessible with tools or equipment and therefore are not open for detailed inspection.

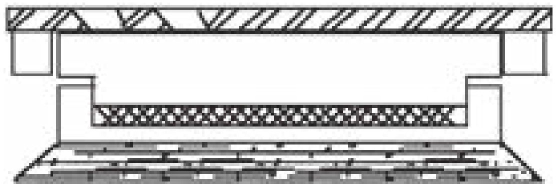
313	Fixed Bearing	Units – EA

This element defines those bridge bearings that provide for rotation only.



314	Pot Bearing	Units – EA

This element defines those high load bearings with a confined elastomer. The bearing may be fixed against horizontal movement, guided to allow sliding in one direction, or floating to allow sliding in any direction.



315	Disc Bearing	Units – EA

This element defines a high load bearing with a hard plastic disc. The bearing may be fixed against horizontal movement, guided to allow sliding in one direction, or floating to allow sliding in any direction.

316	Isolation Bearing	Units – EA

This element defines a bearing that is laminated and is a sandwich of neoprene and steel plates. The bearing contains a lead core that is primarily used for seismic loads. The isolation bearing is used to protect structures against earthquake damage.

Condition States for WSDOT Elements 310, 311, 312, 313, 314, 315, and 316

1. Defects are superficial and have no effect on the superstructure movements or safe transfer of load to the substructure. Shear deformation, displacement, or cracking of grout pad may be present. Top and bottom surfaces may not be parallel.
2. Number of bearings with a repair.
3. Number of bearings with structural defects. The defects are not detrimental to the superstructure or the safe transfer of load to the substructure. Deficiencies do not warrant analysis but may require repairs.
4. Number of bearings with defects that are detrimental to the superstructure or the safe transfer of load to the substructure. Loss of minimum bearing area may be imminent. Structural analysis is warranted or has determined bearing repairs are essential to restore the safe movement or transfer of load to the substructure.

4-8 Bridge Approach

321	Concrete Roadway Approach Slab	Units – SF

This element defines a structural concrete slab supported at the bridge abutment and the roadway pavement. This element is essentially a concrete deck element that documents the surface conditions of the approach slab. The element quantity is the total area of both concrete approach slabs attached to the bridge. Do not include asphalt shoulder if present. Whether surface of approach slab is visible or covered by an asphalt overlay, a WSDOT element shall exist.

1. Defects are superficial. The slab surface does not have spalls/delaminations or previous repairs. The deck surfaces may have cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Slab area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Slab area with spalling. Do not add delaminations found in the field.
4. This condition state documents when an approach slab has failed and needs to be replaced. Failure is normally due to the slab falling off the bridge seat with a visible grade separation and/or excessive gap at the pavement seat. Code the total SF of approach slab in condition state 4.

4-9 Bridge Rail

WSDOT element for bridge railing are to be entered for each type of rail. For example, if there is W-beam or Thrie beam guardrail mounted on the concrete bridge rail, then the length of each metal and concrete element should be entered. If the original concrete bridge rail has aluminum rail installed on top (with or without a rail retrofit), enter that quantity into the appropriate WSDOT element as well. In the element notes, describe what type of metal bridge or pedestrian rail has been entered.

330	Metal Bridge Railing	Units – LF

This element defines all types and shapes of metal bridge railing aluminum, metal beam, rolled shapes, etc. The quantity should equal the total length measured along each bridge rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

331	Concrete Bridge Railing	Units – LF

This element defines all types and shapes of reinforced concrete bridge railing. The quantity should equal the total length measured along each bridge rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

332	Timber Bridge Railing	Units – LF

This element defines all types and shapes of timber railing. All elements of this rail (except connectors) must be timber. The quantity should equal the total length measured along each bridge rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

333	Other Bridge Railing	Units – LF

This element defines all types and shapes of bridge railing except those defined as METAL, CONCRETE or TIMBER. This element will include cable rails, and combinations of materials. The quantity should equal the total length measured along each bridge rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

Condition States for WSDOT Elements 330, 331, 332, and 333

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Bridge rail length with a repair.
3. Bridge rail length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth), decay, or spalling.
4. Bridge rail length with damage in locations or quantity and has reduced the structural capacity of the rail. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

4-10 Pedestrian Rail

A pedestrian rail will typically be on the outside of a sidewalk and protected from traffic by a Bridge Rail.

340	Metal Pedestrian Rail	Units – LF

This element defines all types and shapes of metal pedestrian bridge railing including steel (excluding weathering steel), aluminum, metal beam, rolled shapes, etc. The quantity should equal the total length measured along each pedestrian rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

341	Concrete Pedestrian Rail	Units – LF

This element defines all types and shapes of reinforced concrete pedestrian bridge railing. The quantity should equal the total length measured along each pedestrian rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

342	Timber Pedestrian Rail	Units – LF

This element defines all types and shapes of timber pedestrian bridge railing. All elements of this rail (except connectors) must be timber. The quantity should equal the total length measured along each pedestrian rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

343	Other Pedestrian Rail	Units – LF

This element defines all types and shapes of pedestrian bridge railing except those defined as METAL, CONCRETE or TIMBER. This element will include cable rails, and combinations of materials. The quantity should equal the total length measured along each pedestrian rail within the limits of the bridge which includes rail permanently attached to structural bridge members such as the deck, a wing wall or approach slab.

Condition States for WSDOT Elements 340, 341, 342, and 343

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Pedestrian rail length with a repair.
3. Pedestrian rail length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth), decay, or spalling.
4. Pedestrian rail length with damage in locations or quantity and has reduced the structural capacity of the rail. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

4-11 Smart Flags

322	Approach Roadway Impact – Smart Flag	Units – EA

Assigned to document the increase to the bridge live load, or impact, due to hammering or dynamic response of the bridge from traffic (specifically trucks) coming onto the bridge. Traffic speed may be considered when slower speeds reduce the impact. Total quantity is based on the direction of traffic coming onto the bridge. Bridges with two-way traffic will have two approaches and bridges with one way traffic such as ramps or divided main line structures will have only one approach. Code the approach roadway lanes in the condition state that best indicates the severity of the problem. For the roadway lanes where traffic is leaving the structure, deficiencies will be described and repairs may be called out; however, the trailing roadway will not be quantified in the condition states.

1. The number of approach roadways that are smooth. Hammer or dynamic response to the structure is not significant. There may be small bumps or minor raveling of the pavement in the approach roadway.
2. The number of approach roadways (not approach slab) that have been repaired or feather patched to correct an approach problem. If a paving project has removed the repairs, maintain the CS2 condition and note the year of the new asphalt.
3. The number of approach roadways that are rough, but the increase in live load to the structure is minor. Hammering impact is minor due to the wheels passing over surface discontinuities such as joints, cracks, or potholes. Dynamic response is minor due to a dip or rise in the approach roadway alignment.
4. The number of approach roadways that are causing significant increase in live load to the structure. Hammering impact is significant due to the wheels passing over surface discontinuities such as joints, cracks, or potholes. Dynamic response is significant due to a dip or rise in the approach roadway alignment.

351 Chloride Impact – Smart Flag Units – EA

Assigned when chloride contamination of a structure is identified through testing or field evaluation. Contamination may be in any of the Deck, Superstructure or Substructure elements. Condition state coding represents levels of impact, deterioration and degree of mitigation or rehabilitation expected to be necessary to extend structure life or restore it.

1. Structure has been identified to have chloride contamination through testing and or field evaluation by the Bridge Preservation Repair section. Best practices are required to extend the life of the structure to include:
   - Maintain the seal of all deck expansion joints to protect superstructure and substructure elements below.
   - Seal all cracking in deck surface or overlay and restore membranes prior to new overlay.
   - Seal barrier expansion joints within 6” above the deck surface and all leaking deck to barrier construction joints.
   - Direct all bridge and roadway drainage away from the structure to include extending any bridge drains away from pier caps and columns.
   - Initiate practices to minimize or eliminate use of chlorides on or in vicinity of the bridge.
2. Chloride contamination is actively contributing to deterioration of bridge elements with areas of concrete cracking, discoloration and delamination primarily concentrated in locations exposed to chloride use. Corrosion of reinforcement may not be openly evident but is occurring. These include the deck surface or soffit and areas of the superstructure and substructure exposed to water spray or uncontrolled drainage. Mitigation is required to reduce further impact, protect damaged elements, and slow the progression of ongoing damage. By the nature of chloride impacts, deterioration will continue, but without mitigation and extensive repair, damage will spread in extent and severity at increasing rates.
   - Once contamination reaches reinforcing steel. patching with cementitious products can result in a “Halo Effect” pattern of deterioration, accelerating corrosion of the steel. All chloride contaminated concrete and steel must be removed and replaced as part of a proper repair. (See ACI 364.6T-02, July 2002)
3. Chloride contamination has caused damage and decay of bridge Deck, Superstructure, or Substructure elements. Damage is widespread with areas of delamination, possible spalling, and open cracking progressing into and throughout structural elements. Corrosion of reinforcement has resulted in section loss that is directly impacting the overall serviceability and integrity of elements. Loss of capacity may or may not be indicated. Current condition risks necessity for restrictions or closure. Additional invasive evaluation may be necessary to fully determine the extent of damage. Extensive rehabilitation is indicated to extend useable life of the structure.
4. Chloride contamination has caused extensive damage and decay of bridge Deck, Superstructure, or Substructure elements and continues at increased rates. Damage is widespread with areas of delamination, spalling and open cracking progressing throughout structural elements. Corrosion of reinforcement has resulted in heavy section loss that is directly impacting the serviceability, integrity, and capacity of elements. Overall damage is extensive and expected to expand at increased rates reducing or eliminating options for rehabilitation. Remaining structure life is limited with high risk of near-term restrictions or closure that precipitate replacement.

353 Encampment Impact– Smart Flag Units – EA

Assigned when encampment activity is impacting inspection, maintenance, and condition of a bridge. Activity indicates the presence of encampments and/or encampment related activity or debris that prevents full access for adequate inspection or maintenance of a structure. Activity may be causing or has previously caused damage to the structure. Condition state coding represents levels of impact, or damage. Write any repairs for removal or clean up under the “0” Note”.

1. Encampment activity is evident with accumulations of debris under and/or in the immediate vicinity of the structure. Activity may be hindering inspection and maintenance activities in one or more areas making access and thorough examination of bridge elements difficult.
2. Heavy encampment activity and accumulations of related debris under and around the immediate vicinity of the bridge is creating a hazardous situation and prevents full and adequate inspection of the structure.
3. Encampment is causing or has caused physical damage to the structure through vandalism, break-in, theft or excavation of footings or slope protection. Damage may or may not require repairs. Graffiti is not considered.
4. Encampment is causing or has caused physical damage as a result of fire. Damage may or may not require repairs but may affect longevity of bride element conditions. Resulting access conditions may be hazardous.

355 Damaged Bolts or Rivets – Smart Flag Units – EA

Assigned to identify superstructure steel elements that have broken or missing bolts and/or rivets.

Report a quantity of one unit in the appropriate condition states identified, but no more than one unit per condition state total.

1. Bolts or rivets missing, damaged or replaced in the superstructure due to fatigue.
2. Bolts or rivets missing, having more than 10% section loss in the superstructure due to corrosion.

356 Steel Cracking – Smart Flag Units – EA

Assigned to identify superstructure steel elements with cracks. Report a quantity of one unit in the appropriate condition states identified, but no more than one unit per condition state total. If fatigue damage exists, which may warrant analysis of the element or the serviceability of the element is uncertain, contact a supervisor immediately. Any cracks (typically cope cracks) on WSDOT bridges must be repaired accordance with WSDOT Bridge Preservation Office procedures.

1. Steel cracks, of any length, are present in a secondary member(s).
2. Steel cracks within a load path that have been repaired or arrested are present.
3. Steel cracks within a load path that are not arrested and less than 1 inch.
4. Steel cracks within a load path that are not arrested and 1 inch or greater in length are present.

357 Pack Rust – Smart Flag Units – EA

Assigned to identify the presence of pack rust within steel connections. Steel connections where pack rust is significant or rust expansion is visually deflecting steel plates and should be addressed when the bridge is painted. Structural impacts to pack rust overstressing are recorded within the steel elements. Report a quantity of one unit in the appropriate condition states identified, but no more than one unit per condition state total.

1. Pack rust exists and is less than ¼ inch thick.
2. Pack rust exists where rust is more than ¼ inch thick and/or the deformation of connection steel members is evident.

360 Bridge Movement – Smart Flag Units – EA

Assigned to identify structural movement that is causing significant distress to the bridge. Movements may be horizontal, vertical, or rotational. Evidence of movement should be documented (photo) in such a way that future measurements can determine if the structure is still moving or has stabilized.

1. The entire bridge appears to have stabilized due to repairs or recent history of measurements. Tilt meters, piezometer tubes, or monitoring system show no movement in the past two years.
2. Bridge elements are moving but do not cause a significant problem for the bridge. Bearings may be approaching design limits. Substructure elements may be moving.
3. Bridge movement is at or beyond design limits. Investigation and repair analysis of the bridge is warranted.

361 Scour – Smart Flag Units – EA

Assigned to identify foundation scour for bridge crossing waterways as observed during inspections. Its primary purpose is to identify bridge piers or abutments that are subject to scour and to provide some measure of the magnitude of that scour. Piers in normal high water are typically considered for this element but there are instances where piers above high water may be subject to scour. Maintain historical information related to scour documented in previous inspections such as measurements and/or comments of exposed footings.

1. Number of pier/abutment foundations where no Scour exists, or where scour is superficial and has no effect on the foundation's structural capacity.
2. Number of pier/abutment foundations where scour has been mitigated and the repair is functioning and in place as designed. Evaluate and comment on any riprap or other scour countermeasures that are in place.
3. Number of pier/abutment foundations where scour exists. The scour does not significantly affect the foundations structural capacity. Scour does not warrant analysis but may require repairs. If left unchecked, could adversely impact the foundations structural capacity.

   Scour at this level should not impact the NBI Substructure Overall rating code, item 060 (WSBIS Item 1676).

Examples:

- Top of spread footings are exposed due to scour.
- Bottom of pile caps are exposed due to scour.
- Minimum known pile embedment is between 5’ and 10’ or the column unbraced length has increased, but does not threaten pile capacity.

4. Number of pier/abutment foundations with scour damage in significant locations or quantity and has reduced the foundations structural capacity. Structural analysis is warranted. Repair and or action are required to protect exposed foundation and to restore capacity to the pier.

   Scour at this level may impact the NBI Substructure Overall rating code, item 060 (WSBIS Item 1676). A comment is necessary if the NBI Substructure Overall rating code is lowered.

   Examples:

   - Undermining of spread footings or foundation material is occurring.
   - Minimum known pile embedment is less than 5’ or the column unbraced length has increased and threatens pile/column capacity. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

376 Concrete Deck Delamination Testing – Smart Flag Units – SF

Assigned to document the deck delamination testing and must be included in the evaluation of a concrete deck and overlay. ASTM4580, Chain Drag Testing will locate and quantify the patches, spalls, delaminations not visible to the inspector and other defects on the entire top surface of the bridge deck. This information is supplemental to the deck/overlay elements and the quantities do not change. For Washington State bridges, the BMS engineer will provide the condition state quantities and notes for this element based on a Chain Drag Report produced by Design or Construction.

For decks covered with an Asphalt Overlay, the 376 data will be updated each time the asphalt is removed from the concrete surface and must be used to evaluate the deck element even though defects are not visible to the inspector. This information does not expire, and the element must not be deleted from the report unless the deck is replaced, or new information is provided.

1. Deck area with no delaminations.
2. For decks covered with asphalt, this quantity of patching must be recorded in the Deck CS2 and used to evaluate the deck. Do not include this quantity in the evaluation of a bare deck.
3. For decks covered with asphalt, this quantity of spalling must be recorded in the Deck CS3 and used to evaluate the deck. Do not include this quantity in the evaluation of a bare deck.
4. For concrete decks and concrete overlays, the CS4 delamination quantities must be applied to the deck/overlay element CS4. If the Chain Drag Report is more than 10 years old, then the 376 element is deleted from the report because the test results are no longer accurate and also must be removed from the evaluation of the deck/overlay element. If a Chain Drag was completed before the concrete overlay was constructed, then the 376 element must be deleted from the report since patching and delaminations are addressed during the construction.

378 WSDOT Undercrossing Safety - Smart Flag Units – EA

Assigned to cover the WSDOT Safety Inspection report type, to be used when the structure is not owned by WSDOT but interacts with a route that is. WSDOT Safety Inspections only address significant safety issues on those parts of the structure that affect the route that is owned by WSDOT.

This smart flag is intended to hold all notes associated with the primary safety inspection, and the inspector should not create or edit any other inspection notes except for repair recommendations, if warranted.

Examples include:

- railroad owned structures over state or local agency routes.
- locally owned structures over state routes.
- state owned structures over locally owned routes.

1. Report the entire bridge in condition state 1 (EA).

379 Local Agency Undercrossing Safety Inspection – Smart Flag Units – EA

Assigned to cover the Local Agency Safety Inspection report type, to be used when the structure is not owned by the local agency performing the inspection but interacts with a route that is. Local Agency Safety Inspections only address significant safety issues on those parts of the structure that affect the route that is owned by the local agency performing the inspection.

This smart flag is intended to hold all notes associated with the secondary safety inspection, and the inspector should not create or edit any other inspection notes except for repair recommendations, if warranted.

Examples include:

- railroad owned structures over local agency routes.
- a state route crosses over a city street and a county road.

1. Report the entire bridge in condition state 1 (EA).

381 Joint Seal/Gland Leaking – Smart Flag Units – EA

Assigned when inspection identifies that the joint seal or gland is no longer effective in providing a watertight seal within the joint gap, or the joint design does not include a seal, allowing water to pass through on to bridge elements below. Active corrosion or damage may or may not already be present in the elements below. Identify the joints in the notes for the flag and describe any joint defects and impacts under the joint BMS Element. Code a quantity for each joint identified as leaking.

In cases where a leaking joint only affects roadway or embankment fill (joints at integral abutments and approach slabs, for example) do not use this smart flag.

1. Seal/Gland is separated or missing, whole or in part, allowing water to pass through the joint gap onto structural bridge elements below.

4-12 Seismic Retrofit

Earthquake restrainers have been installed on WSDOT bridges since the 1980s. The typical longitudinal restrainer uses epoxy coated Dywidag bars with a designed gap maintained by double nuts. An earlier system using springs to maintain the required restrainer gap was used until the early 1990s when it was discontinued. Gap measurements are required during an inspection if visual inspection or loose double nuts indicate the gaps are not uniform.

207	Concrete Column w/Steel Jacket	Units – EA

This element defines a column, including a submerged column (formerly Element 209) or portion of a concrete column where the exposed surface has been retrofitted top to bottom with a steel jacket visible for inspection. This changes the deterioration and management of the pile. Element 207 replaces existing column elements 204 and 205 where the existing column quantities decrease, and Element 207 quantities increase by the number of steel jacketed columns. Construction of the steel jacket also rehabilitates any pre-existing defects, and the quantities are initially coded in condition state one.

Columns that are not jacketed top to bottom are considered a repair and Element 207 does not apply, such as a timber element with a steel splice. Code these repairs as CS2 in the original element 204 or 205.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of columns with repairs.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of columns with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member.

208 Concrete Pile/Column w/Composite Wrap Units – EA

This element defines a concrete pile/column or portion of a pile/column where the exposed surface has been retrofitted top to bottom with a composite wrap. Examples of composite material are carbon fiber and fiberglass. This changes the deterioration and management of the pile/column. Element 208 replaces existing pile/column elements 204, 205, 226, or 227 where the existing pile/column quantities decrease, and Element 208 quantities increase by the number of composite piles/columns. Composite wrapping also rehabilitates any pre-existing defects and the quantities are initially condition state one.

Pile/columns that are not wrapped top to bottom are considered a repair and Element 208 does not apply, such as a fiberglass repair to a timber pile at the ground line. Code these repairs as CS2 in the existing pile element.

The structural condition should be based on the quantity and location of visible defects. Defects should be documented well enough to determine a change in condition. Defects include cracked or damaged composite reinforcement, abrasions, or seepage of moisture. Sounding with a rock hammer should use caution and not damage the resin materials.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, superficial cracked resin, debonding, or blisters on the surface.
2. Number of composite wrapped pile/columns with repairs.
3. Number of composite wrapped pile/columns with structural defects. The defects do not significantly affect structural capacity of the wrap or pile/column. Deficiencies do not warrant analysis but may require repairs.
4. Number of composite wrapped pile/columns with damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

368 Seismic Pier Crossbeam Bolster Units – LF

This element identifies those piers that have been seismically retrofit with crossbeam bolsters. The quantity for this element is the length along the top of each crossbeam face (typically two lengths) that has been retrofitted with a bolster.

Condition States for WSDOT Element 368

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls, or delaminations.
2. Length of bolster/crossbeam bolster affected by repair.
3. Length of bolster/crossbeam bolster affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs. Structural deficiencies are not limited to delaminations, spalls, or structural cracking, exposed or corroded reinforcing.
4. Length of bolster/crossbeam bolster affected by damage in locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

369 Seismic Pier Infill Wall Units – EA

This element identifies concrete piers with seismic structural improvements.

Number of piers with a seismic pier infill wall.

370 Seismic – Longitudinal Restrainer Units – EA

This element is used to identify longitudinal seismic restrainers. When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependent (or supported) structure only. The quantity should equal the total number of longitudinal restrainers on the bridge.

371 Seismic – Transverse Restrainer Units – EA

This element identifies existing bridges that have been retrofitted or newer structures that have been equipped with transverse restrainers designed to restrain transverse movement during a seismic event. The quantity should equal the total number of transverse restrainers on the bridge. When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependent (or supported) structure only. Concrete girder stops located at the ends of girders attached to the abutment or intermediate pier caps/crossbeams provide lateral restraint however it is not the intention to include these in with this element.

372 Seismic – Link/Pin Restrainer Units – EA

This element is used to identify link/pin seismic restrainers. When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependent (or supported) structure only. The quantity should equal the total number of link/pin restrainers on the bridge.

Condition States for WSDOT Elements 370, 371, and 372

1. Restrainer is in good condition and will function as designed. Anchor plate nuts have been checked and are in good condition.
2. Number of restrainers with misaligned seismic-longitudinal restrainer rods. Anchor plate nuts that are tight, but that have epoxy running down their bolts or are of varying lengths. The gap between adjacent longitudinal restrainers varies between ¼ inch and ¾ inch. Short transverse pipe restrainer length. Measure the depth of the diaphragm hole to the restrainer. Take a picture of the hole and tape measure.
3. Number of restrainers with improper anchor plate installation. Loose or inadequately bonded anchor nuts. A repair is warranted if over 25 percent of the anchor nuts have more than 2 inches of bolt thread exposed below the nut. Restrainer gap variation in a series of longitudinal seismic restrainers is greater than ¾ inches (measure and add the two gap distances on both sides of each restrainer in making your comparisons). Loose double nuts. Specify the replacement of the double nuts with (new) nuts having (with) setscrews and the resetting of the restrainer gaps according to the design tables. The inspector shall specify the required gaps, according to the bridge plans, in the repair.

373 Seismic – Catcher Block Units – EA

This element is used to identify a catcher block attached to a pier or abutment installed as part of a seismic retrofit. The quantity should equal the total number of catcher blocks on the bridge.

1. Number of catcher blocks in good condition.
2. Number of catcher blocks with deficiencies that need correction.

374 Seismic - Column Silo Units – EA

This element is used to identify when a column has been designed to be isolated from the surrounding soil during a seismic event. This will usually consist of a corrugated metal pipe buried in the ground with a cap at the base of a column. The inspection note needs to identify the individual columns that are siloed along with the planned depth (relative to an identifiable elevation) at each one. In cases with small numbers of siloed columns, that could be done in the note. In other situations, a spreadsheet attached as a file or something similar may be useful. In-depth inspections are required upon the occurrence of a seismic event that is judged to have potentially affected the structure. Due to the dimensional variation of the column isolation feature at each structure, the In-depth inspection may require means (equipment and manpower) to open and then reclose/reseal the capping system along with tools to measure the silo depth and to roughly assess column and silo condition below the capping system. Each bridge with siloed columns may require an individual in-depth inspection procedure.

1. Silo capping system is intact as designed and is accessible with no visible deterioration.
2. Minor deterioration of silo capping system elements such as hardware corrosion, visible seal deterioration, access hardware broken/missing.
3. Capping system has been buried and is not visible for inspection. (Write repair – priority 2 or higher)
4. Capping system has failed allowing solid foreign material to enter the intended gap and potentially restrict column movement. (Write repair – priority 1)

4-13 Expansion Joint Elements

The expansion joint evaluation considers the overall function of the joint assembly including any observed structural defects such as spalling, cracking, patches, raveling, or defects connected with the joint seal, filler or gland component.

If any portion of a joint falls into a lower condition state, code the entire length of the joint in the lower condition state. Joints with structural defects are coded in CS2. Joints that require replacement are tracked in CS3. In general, joints in Condition State 3 will be programmed for rehabilitation or replacement. Note that condition state CS4 is not used within this section.

When a joint is entirely reconstructed or replaced with a new joint type, then revise the WSDOT element to reflect the new joint type. These new joint types may include the use of a header assembly to form the new joint configuration. These headers may consist of cementitious or polymer types of concrete material and are to be included within the joint element, not the deck surface element.

Deck surface spalling, cracking, or raveling within 1′-0″ of a joint or joint header assembly is considered a joint defect, not a deck surface defect.

Assign Smart Flag 381 when inspection identifies that the joint seal or gland is no longer effective in providing a watertight seal within the joint gap, or the joint design does not include a seal, allowing water to pass through on to bridge elements below. Certain joint types are designed to allow the passage of water through the joint gap, and in such cases, Smart Flag 381 still applies. Active corrosion or damage may or may not already be present in the elements below. Identify the joints in the notes for the flag and describe any joint defects and impacts under the joint BMS Element.

Do not use more than one WSDOT element for a joint location, unless the structure has been widened and there are two joint systems present. Joint notes should reference specific joints by pier or span number. If multiple joint types exist within a joint location where the deck has not been widened, then record the joint type that represents the larger quantity of the skewed length. Make a note of the other (lesser quantity) joint type.

When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependent (or supported) structure only.

400 Asphalt Butt Joint – Paving Joint Seal Units – LF

This element defines a butt joint between concrete and asphalt pavement that is an asphalt sawcut filled with hot poured rubber. This joint is shown in WSDOT Standard Plan A-40.20, Bridge Paving Joint Seals, Detail 3 or 4.

This element applies to the asphalt butt joint located at the back of the abutment pavement seat. It does not apply to the asphalt butt joint located at the roadway end of an approach slab. The quantity should equal the length measured along the joint.

1. The joint is functioning as designed. Defects are superficial and have no effect on the performance of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location. “D” spalls, patches, cracking or raveling is present in the concrete or asphalt within one foot of either side of the joint but no more than 10 percent of the length.
3. Skewed joint length at each location with the following typical criteria: When the concrete or asphalt must be rebuilt to maintain a reliable roadway surface; More than 10 percent of the joint length has spalls or patches adjacent to the seal; Asphalt was placed without a sawcut or the sawcut was not in the proper location.

401 Asphalt Open Joint – Paving Joint Seal Units – LF

This element represents a sealed and sawcut contraction joint or an asphalt joint in bridge paving over an open concrete joint in a bridge deck or truss panel joint, as shown in WSDOT Standard Plan A-40.20, Bridge Paving Joint Seals, Detail 1, 2, 5, or 6. The joint consists of hot poured rubber placed in an open concrete joint and a membrane may or may not exist. After the asphalt is placed, a sawcut is placed over the concrete joint and the gap filled with hot poured rubber. WSDOT Elements 402 - Open Concrete Joint and 420 - Joint Paved Over flag do not apply at these locations. The quantity should equal the length measured along the joint. It does not apply to the asphalt open joint located at the roadway end of an approach slab.

WSDOT Element 420 - the Joint Paved Over flag does apply for all locations of a buried steel joint due to the risk of planing equipment damaging the bridge deck.

1. The joint is functioning as designed. Defects are superficial and have no effect on the performance of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location. “D” spalls, patches, cracking or raveling is present in the concrete or asphalt within one foot of either side of the joint but no more than 10 percent of the length.
3. Skewed joint length at each location with the following typical criteria: When the concrete or asphalt must be rebuilt to maintain a reliable roadway surface; More than 10 percent of the joint length has potholes or patches adjacent to the seal; Asphalt was placed without a sawcut or the sawcut was not in the proper location.

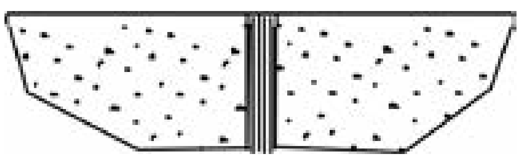
402 Open Concrete Joint – Paving Joint Seal Units – LF

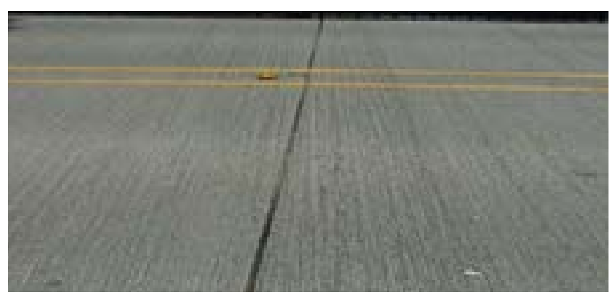
This element defines a joint designed to have concrete edges at the joint opening in a concrete wearing surface. The original design is usually filled with hot poured rubber or pre molded joint filler and the design materials may or may not be present. This joint is typical for panel joints at a truss floorbeam, interior joints on older bridges, and at the concrete roadway/approach slab joint. At the back-of-pavement seat, if a compression seal has been removed and replaced with Hot Poured Rubber (crack sealant), then quantities for the 402 element apply and the quantities for the compression seal must be reduced. The quantity should equal the length measured along the expansion joint. It does not apply to the open concrete joint located at the roadway end of an approach slab.

This joint type does not apply to: WSDOT Element 403 - Concrete Bulb-T joint, WSDOT Elements 405 or 406 Compression Seals with the seal missing, or WSDOT Element 417 - Rapid Cure Silicone (RCS) joint.

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the performance of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot of either side of the joint and is less than 25 percent of the joint length.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

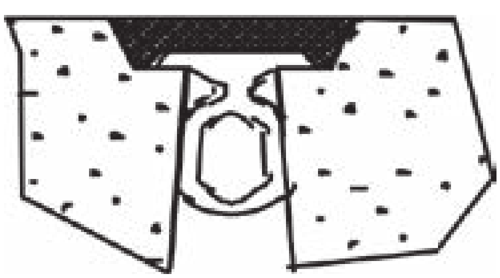
   A repair to reseal the joints is required for bridges at each steel floor beam where water is corroding the top flange and/or connections.





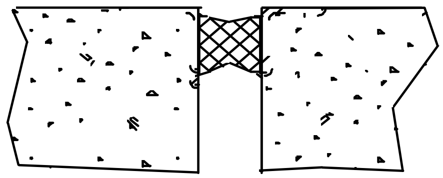
403 Concrete Bulb-T Units – LF

This element defines a joint formed to accept a Bulb-T preformed seal. The seal may be missing, or other materials present to provide a seal. The quantity should equal the length measured along the expansion joint.



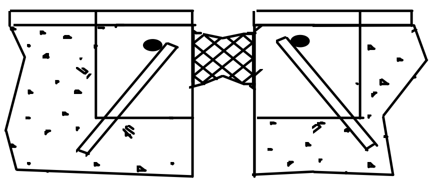
404 Compression Seal/Concrete Header Units – LF

This element defines a joint with concrete headers formed during the original construction of the bridge. The joint is filled with a pre-formed compression type seal. The quantity should equal the length measured along the expansion joint.



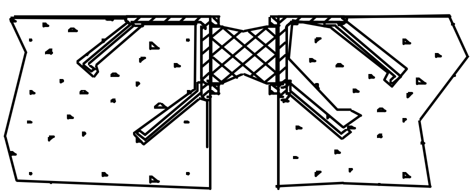
405 Compression Seal/Polymer Header Units – LF

This element defines those joints that have been rehabilitated with a polymer header and filled with a pre-formed compression type seal. The quantity should equal the length measured along the expansion joint.



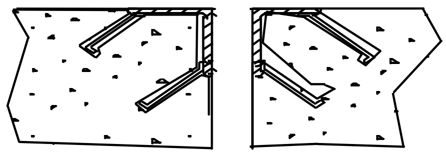
406 Compression Seal/Steel Header Units – LF

This element defines a joint with steel angle plate headers that have a pre-formed compression type seal. The quantity should equal the length measured along the expansion joint.



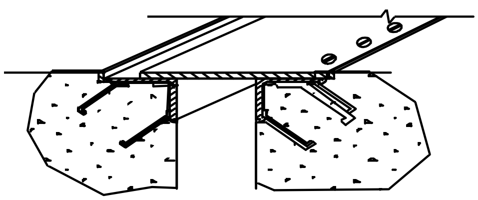
407 Steel Angle Header Units – LF

This element defines an open joint with steel angle plate headers. The quantity should equal the length measured along the expansion joint.



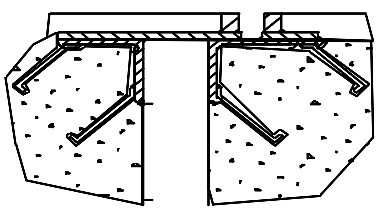
408 Steel Sliding Plate Units – LF

This element defines a joint with steel sliding plates. The quantity should equal the length measured along the expansion joint.



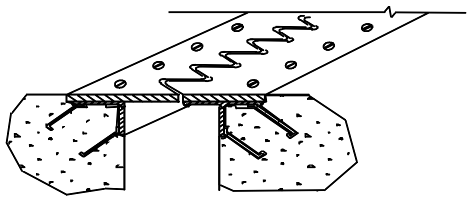
409 Steel Sliding Plate w/Raised Bars Units – LF

This element defines a joint with steel sliding plates and steel raised bars welded to the plates to accommodate an overlay. The quantity should equal the length measured along the expansion joint.



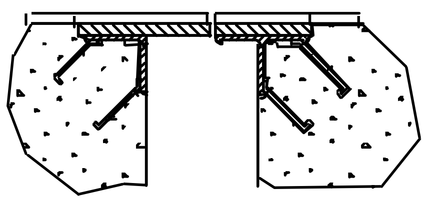
410	Steel Fingers	Units – LF

This element defines a joint with open steel fingers. The quantity should equal the length measured along the expansion joint.



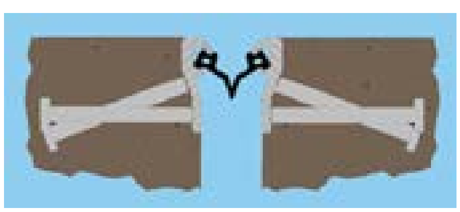
411	Steel Fingers w/Raised Bars	Units – LF

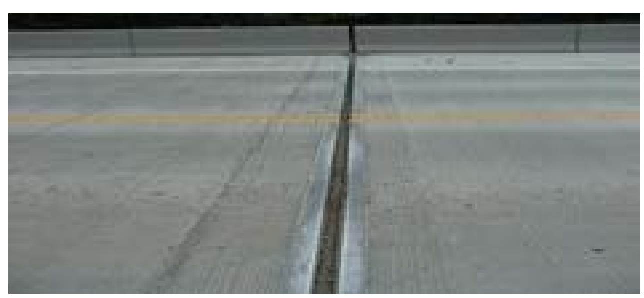
This element defines a joint with bars or plates welded to the steel finger plates to accommodate an overlay. The quantity should equal the length measured along the expansion joint.



412	Strip Seal – Anchored	Units – LF

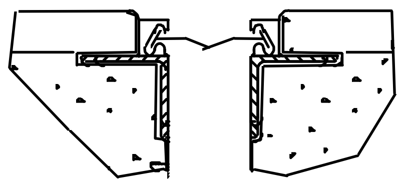
This element defines an expansion joint that uses a neoprene type waterproof gland with steel extrusion or other system to anchor the gland. The steel extrusion is anchored into the concrete deck or header. The quantity should equal the length measured along the expansion joint.





413 Strip Seal – Welded Units – LF

This element defines an expansion joint that uses a neoprene type waterproof gland with steel extrusion or other system to anchor the gland. The steel extrusion is welded to a preexisting steel expansion joint. The quantity should equal the length measured along the expansion joint.



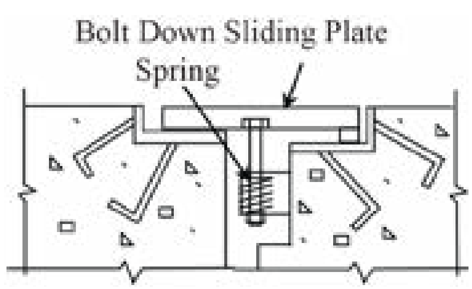
414 Bolt Down – Sliding Plate w/springs Units – LF

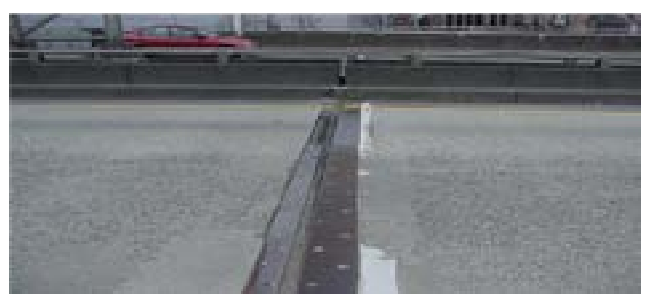
This element defines a bolted sliding plate expansion joint that uses steel springs. The quantity should equal the length measured along the expansion joint.

Condition States for WSDOT Elements 403,404, 405, 406, 407, 408, 409, 410, 411, 412, 413, and 414

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

   Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.

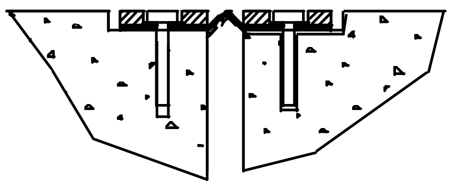
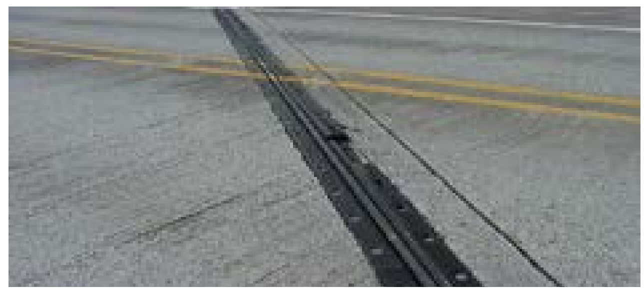




415 Bolt-Down Panel – Molded Rubber Units – LF

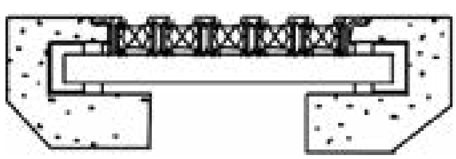
This element defines an expansion joint that uses a waterproof gland that is held in place by molded rubber panels that are attached with bolts. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Molded Rubber panels are secure and have no defects. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint. Some of the bolts may be broken but they represent less than 10 percent of the total for that panel.
3. Skewed joint length at each location where more than 10 percent of the bolts in a panel are missing, loose, or broken. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

416 Assembly Joint Seal (Modular) Units – LF

This element defines a large movement joint that has an assembly mechanism with multiple neoprene type waterproof glands. The quantity should equal the length measured along the expansion joint.



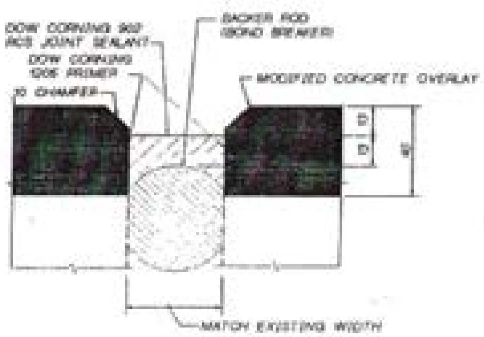

417 Silicone Rubber Joint — Units – LF

This element defines an expansion joint that has been repaired with a single or two component rubber joint filler. The quantity should equal the length measured along the expansion joint.

Condition States for WSDOT Elements 416 and 417

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with “D” spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

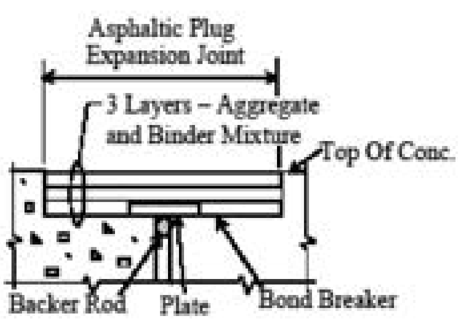
   Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.

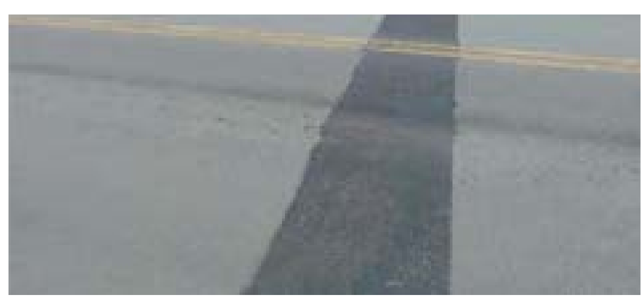


418 Asphalt Plug — Units – LF

This element defines an expansion joint that has been replaced with an asphalt plug system. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with rutting in the joint is minor. “D” spalls or patches are present in the joint, or in deck adjacent to joint.
3. Skewed joint length at each location where the asphalt material in the joint has significant rutting, bulging or is missing. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.



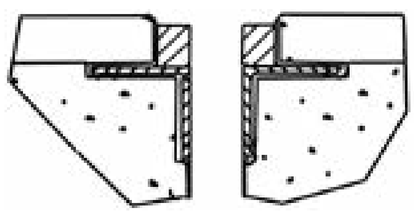


419 Steel Angle w/Raised Bars Units – LF

This element defines a joint with steel angles and steel raised bars welded to the angles to accommodate an overlay. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

   Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.



420 Joint Paved Over Flag Units – LF

This element identifies when a steel joint system that has been paved over with asphalt. This is a high risk to damaging the steel joint or bridge deck by the paving operations. When this flag is used, a cost for joint work will be included in the next paving contract to correct the problem. Since the joint cannot be inspected, the joint element condition states should remain unchanged (and so noted). Some steel joints may have more than 2.5" of asphalt may not require rehabilitation. The Total quantity will be the sum total length of all joint systems on the bridge.

1. Skewed joint length at each location that is paved over, but rehabilitation is not required.
2. Skewed joint length at each location that requires rehabilitation. A photo is helpful to determine the type of rehabilitation.

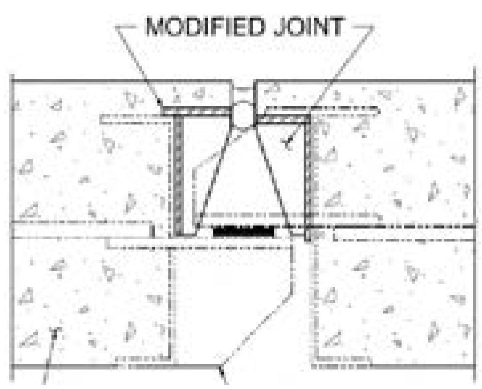
421 Concrete Slab In-Span Joint Units – LF

This element is defined as a modified joint at an In-Span bearing in a slab superstructure. These joints are distinct because the joint anchorages are in concrete structurally significant to supporting slab. This joint element applies at these locations regardless of the current joint type. As of 2016, all current modified joints are RCS joints. The quantity should equal the length measured along the expansion joint.

WSDOT bridges known to have this modified s are: 5/539E&W, 5/536E&W, 5/535E, 5/537E-S, 5/537N &S, 5/537N-W, 5/538E, 5/543E&W, 5/543NCD, 5/543SCD, 5/545NCD, 5/545SCD. As with all WSDOT contracts, work that affects bridge elements will have a record in the Contract History for reference by the inspector.

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

   Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.

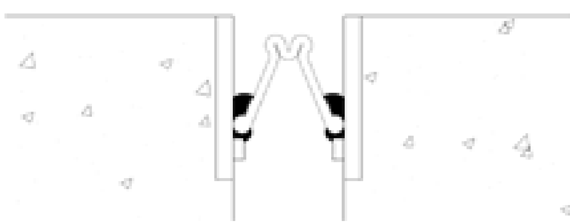


422 Flexible Joint Seal Units – LF

This element defines a joint with a flat extruded gland that is flexible. The gland is folded, held in place with adhesive, and may be supported by steel or concrete materials. This element supersedes other joint elements where maintenance has replaced the existing gland with a flexible joint seal. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Defects are superficial and have no effect on the structural capacity of the joint. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

   Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.



4-14 Movable Bridges

501	Movable Bridge Steel Tower	Units – LF

This element defines the structural steel columns and members used to support a counterweight of a vertical lift span. The total quantity is the total of the supporting column lengths.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Tower column length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Tower column length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis but may require repairs.
4. Tower column length affected by damage in locations or quantity and has reduced the structural capacity of the column or the tower. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

4-15 Other Bridge Elements

705	Bridge Luminaire Pole and Base	Units – EA

This element is defined by a light pole and anchor system attached to a bridge. It does not include the mast arm or other types of lights that may be attached to the bridge. The condition states describe the structural condition of the pole, anchor bolts, and support. WSDOT Region maintenance may need to be contacted prior to inspection in to remove bolt covers or otherwise provide access for inspection. The total element quantity should equal the number of luminaire poles attached to the bridge.

1. There are no significant structural defects in the pole or support, and the grout pad is solid. Poles or supports that have been replaced are coded in this condition state.
2. Number of poles where structural inspection requires special equipment to access.
3. Number of poles with structural defects. The defects do not significantly affect the structural capacity.
4. Number of poles affected by damage in locations or quantity and has reduced structural capacity. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Visual inspection indicates a base plate that is not supported by leveling nuts.

707 Fender System/Pier Protection Units – EA

Piers in the water can be vulnerable to rot, corrosion, and collision damage from ships or ice flows. This element is limited to external pier collision systems such as dolphins and fenders designed to resist vessels in the water. Dolphins are placed in front of a pier to re-direct an impact such as a large mass structure or pile clusters tied together. Fenders are protective fences or bumpers that surround a pier to absorb impacts from marine traffic. This element is coded separately from the pier elements and does not include extended concrete footings or coffer dams that are designed and constructed to primarily support vertical pier loads.

This element defines a protection system made of wood, steel, or concrete that is designed to protect the pier from vessel damage. The total element quantity should equal the number of piers with protection. In the case of a log boom, count the one pier connected to the boom.

1. There are no significant structural defects in the pier protection system. A protection system that has been replaced is coded in this condition state.
2. Number of pier protection systems that have been repaired.
3. Number of pier protection systems with structural defects. The defects do not significantly affect the structural capacity or function of the system.
4. Number of pier protection systems affected by damage in locations or quantity and has reduced structural capacity. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

709 Ceramic Tile Units – SF

This is an element to identify ceramic tile. The total quantity is the area of tile visible for inspection.

1. Tile is bonded with no cracks, chips, or blemishes. Tile may be dirty but reflectivity is enhanced during regular washing operations.
2. Tile area that has been repaired.
3. Tile area that is bonded, but cracked and may have efflorescence or small amounts of section loss. Tile may be blemished from impact or other causes resulting in major loss of reflectivity.

Tile area with delaminations based on soundings, is completely missing, or has major section loss warranting replacement.

710 Bridge Mounted Sign Structures Units – EA

This element defines bridge mounted sign structures anchored to the bridge. This includes signs mounted to the outside face of the bridge or over the deck using a beam, truss, or cantilevered support. The condition states address any physical damage defects with the sign or its anchorage and the inventory status of the sign. The inventory status may be determined by the presence of a "Bridge Preservation Sign Structure Identification Tag". The quantity should equal the number of signs mounted to the bridge.

1. The sign has been inventoried and has the appropriate identification tag. The sign, support, and anchorage are in good condition with no significant structural defects.
2. The sign has not been inventoried. The sign, support, and anchorage are in good condition with no apparent defects.
3. The sign may or may not have been inventoried and has defects to the structure or anchorage but is safe and the structural capacity has not been significantly reduced.

   This may include loose, missing or damaged bolts, or hardware within the sign structure where redundant framework or hardware prevents the identified defects from creating an immediate hazard. Anchorage defects may include corrosion or cracks; grout may be loose or missing. A repair should be written, and the sign bridge engineer notified.
4. The sign may or may not have been inventoried. Defects to the structure or anchorage threaten or have reduced the structural capacity. This may include loose, missing or damaged bolts, or hardware in multiple locations, and cracks within structural sections. Anchorage defects may include loose, missing, or broken hardware, broken or delaminating anchor locations, or loss of embedment due to creep or pull out. An emergent repair should be specified with written notification to region maintenance and the sign bridge engineer.

4-16 WSDOT Bridge Deck Overlay Elements

WSDOT categorizes overlays into two different types. The first type consists of Asphalt Concrete Pavements (ACP) and Thin Overlays. These are deck protection systems intended to prolong the life of the deck by removing the traffic wear from the surface of the concrete deck. The second type is a Concrete Overlay which is intended to rehabilitate the deck and provide a new concrete wearing surface.

ACP Overlays represented by the WSDOT element 800 can generally be identified in the field where as WSDOT element 801 represents asphalt with a membrane below it that is not visible. Thin overlays may be identified in the field if the system has failed, and areas of the thin layers are missing.

Deterioration of the ACP and thin overlays is not generally associated with the deterioration of the deck. The ACP may be replaced several times without exposing the concrete deck and the condition states for the deck and overlay elements are independent and DIFFERENT. Paving contracts attempt to repair all concrete spalls and delaminations on WSDOT bridges before placing the overlay. If the area of patching/spalls/delams is known, then the quantity should be noted and recorded in the WSDOT concrete deck element as CS2, CS3 or CS4 respectively, while the Overlay quantities of CS2 and CS3 are based on the visible inspection of the surface. In a similar fashion, if a new Bituminous Surface Treatment (BST) has been applied to an asphalt surface, then the overlay element CS2 and CS3 are equal to zero.

800	Asphalt Concrete (AC) Overlay	Units – SF

This element defines an Asphalt Concrete (AC) bridge deck overlay, with or without a Bituminous Surface Treatment (BST). The quantity should equal the overlay's width times the length.

801	Asphalt Concrete (AC) Overlay with Waterproofing Membrane	Units – SF

This element defines an asphaltic concrete with waterproofing membrane bridge deck overlay. The quantity should equal the overlay's width times the length.

802	Thin Polymer Overlay	Units – SF

This defines a thin polymer bridge deck overlay that is less than or equal to 0.5 inches in thickness (i.e., epoxy, methyl-methacrylate). The quantity should equal the overlay's width times the length.

Condition States for WSDOT Elements 800, 801, and 802

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have cracking.
2. Total area of overlay patches.
3. Total area of overlay spalls or potholes. Thin Polymer Overlays (802) may have visible delaminations and should be considered as spalls and coded in CS3.

Concrete Overlay elements are difficult to discern in the field and are identified in special provisions or Plans. When constructing modified concrete overlays, the material removed by the deck preparation (spalls and delams) is replaced with the overlay material. WSDOT considers this construction deck rehabilitation; or in other words, the concrete overlay and deck are monolithic. Therefore, CS2 and CS3 for the deck and concrete overlay will be the SAME. All defects noted in the concrete overlay (SF) apply to the deck. It is not uncommon to have the overlay break up when there is a problem in the deck below it.

803 Modified Concrete Overlay Units – SF

This defines a rigid modified concrete bridge deck overlay that is normally 1.5 inches or greater in thickness (i.e., Latex (LMC), Microsilica (MMC), Fly Ash (FMC), Fiber Reinforced (FRC)). The quantity should equal the overlay's width times the length.

804 Polyester Concrete Overlay Units – SF

This defines a rigid polyester concrete bridge deck overlay that is normally 0.75 inches in thickness. The quantity should equal the overlay's width times the length.

Condition States for WSDOT Elements 803 and 804

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets.
2. Concrete overlay area with repairs or patches. Do not include the rare cases of rutting that has been filled with patching material.
3. Concrete overlay area with spalling.
4. Record the delaminated area (CS4) from WSDOT element 376 in the overlay CS4. If new delaminations are found, do not add delaminations found in the field unless approved by Bridge Management. Chain Drag testing by the Bridge Inspector must chain the entire deck, record the results in a Chain Drag Report available on the Bridge Website under Bridge Overlays, and send the file to Bridge Management.

805 AC Over a Polymer Overlay Units – SF

This defines an asphaltic concrete applied over a thin polymer bridge deck overlay (i.e., epoxy, methyl-methacrylate). The quantity should equal the overlay's width times the length.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have cracking.
2. ACP overlay area with patches.
3. ACP overlay area with spalls or potholes.

806 BST on Concrete (Chip Seal) Units – SF

This defines a Bituminous Surface Treatment (BST), or commonly known as a chip seal, mistakenly applied directly on a concrete deck and is to be removed. This severely limits the inspection of the deck. Code the area of BST covering the concrete deck in CS1.

Note: Element 800 or 801 is used when a chip seal is intentionally applied to a structure. WSDOT discontinued use of this element in the year 2012.

807 Asphalt Concrete (AC) Overlay W/High Performance Membrane — Units – SF

This element is defined as asphaltic concrete overlay with a higher quality waterproof membrane on a bridge deck. These membranes are spray-on polymers that cover rough surfaces or bridge decks that are considered significant. The condition states are based on the overlay, not the membrane. The quantity should equal the overlay width times the length.

As of 2016, there are three WSDOT bridges with this element: 16/110W, 5/504W, and 5/814.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have cracking.
2. Total area of overlay patches.
3. Total area of overlay spalls or potholes.

4-17 Protective Coatings

The steel paint area is equal to the surface area of the steel members in the bridge. An estimate of the steel paint area may be made if bridge plans are not available but the steel tonnage is known. The following table provides an approximate conversion factor:

Bridge Type	Square Feet Per Ton
Rolled or Plate Girder	110
Truss	160

901 Red Lead Alkyd Paint System — Units – SF

This paint protection system is a 3-coat alkyd system incorporating lead-based paint. Use this paint element as a default if the paint was installed prior to 1991.

902 Inorganic Zinc/Vinyl Paint System — Units – SF

This paint protection system consists of an inorganic zinc silicate shop applied primer system and a vinyl is paint applied after erection, cleaning, and spot priming.

903 Inorganic Zinc/Urethane Paint System — Units – SF

This paint protection system consists of a inorganic zinc silicate shop applied primer system and an epoxy, aliphatic urethane paint system applied after erection, cleaning, and spot priming. **This paint system is used on new WSDOT steel bridges.**

904 Organic Zinc/Urethane Paint System — Units – SF

This paint protection system is a 3-coat system incorporating an organic zinc primer, an epoxy second coat and a moisture cured urethane topcoat and is typically used on existing WSDOT steel bridges.

905	Coal Tar Epoxy Paint System	Units – SF

This paint protection system incorporates a coal tar epoxy-based product.

906	Metalizing	Units – SF

This protection system consists of a sprayed coating of zinc or zinc/aluminum.

907	Galvanizing	Units – SF

This protection system consists of zinc applied to steel in a variety of spray-on methods.

908	Epoxy Paint for Weathering Steel	Units – SF

This protection system consists of a clear epoxy coating applied to weathering steel to prevent excessive corrosion.

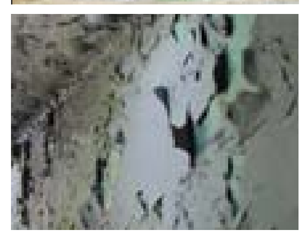
909	Zinc Primer	Units – SF

This paint protection system consists of a zinc silicate shop applied primer system.

Condition States for WSDOT Elements 901 thru 909

1. The protection system is sound and functioning as intended to protect the metal surface.

2. Protection system area that has been painted by maintenance.

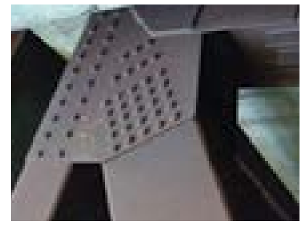


3. Protection system area with chalking, peeling, curling or showing other early evidence of paint system distress, but there is no exposure of metal.
4. Protection system area that is no longer effective. The metal substrate is exposed.

910	Weathering Steel Patina	Units – SF

This protection system consists of a chemical compound formed on the surface of weathering steel elements and is called the patina. When exposed to the atmosphere, weathering steel develops a patina, which seals and protects the steel from further corrosion. This oxide film is an intended layer of surface rust, which protects the member from further corrosion and loss of material thickness. The patina acts like a paint system to protect the steel. The color is an indicator of the condition of the patina may vary from orange to dark brown or purple-brown.

1. Weathering steel area that is chocolate brown or purple, brown in color (boldly exposed) and in good condition. The patina is tightly adhered, capable of withstanding hammering or vigorous wire brushing. The patina system is sound and functioning to protect the metal surface.



2. Weather steel area that has been painted by maintenance.
3. Weathering steel color is yellow orange to light brown. Some areas may not have rust. Patina has a dusty to granular texture.

4. Weathering steel area that is black in color indicating non-protective patina. Area that remains damp for long periods of time due to rain, condensation, leaky joints, traffic spray or other source of moisture. Area where debris has accumulated on a horizontal surface and the steel is continuously wet. Area with a texture of large granules (greater than ⅛″ diameter); flaking (greater than ¼″ diameter) or laminar rusting in thin sheets.

911	Paint System – Other	Units - SF

This element applies to any protective structural steel coating system not included in the previously listed protective coating elements.

Examples may include:

- High Ratio Calcium Sulfonate Alkyd (HRCSA) which is typically a single-coat system and behaves as a flexible elastomeric film once applied to steel surfaces.
- Two-coat Polyurethane based (Polyaspartic) coatings applied to steel surfaces.
- Polysiloxane based coatings applied to steel surfaces.

Condition State for WSDOT Element 911

1. Defects are superficial. The protection system is sound and functioning as intended to protect the metal surfaces.
2. Protection system area that has been painted by maintenance.
3. Protection system area with chalking, peeling, curling, or showing other early evidence of paint system distress, but there is no exposure of metal.
4. Protection system area that is no longer effective. The metal substrate is exposed.

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Chapter 5 Load Rating and Scour

5-1 General

The National Bridge Inspection Standards (NBIS) requires a load rating be calculated for each reportable bridge* as well as a scour evaluation for any reportable structure over water. Temporary structures that will be in service for more than 90 days shall be load rated as well as assessed for scour.

The load rating calculations and scour evaluations are a permanent part of the bridge file and are to be updated when the condition of the bridge changes. All load rating calculations and new and updated Scour analysis shall be stamped, signed, and dated by a registered professional engineer.

5-2 Bridge Load Rating

Load rating of structures shall be completed per *Bridge Design Manual* (BDM) Chapter 13 and the AASHTO Manual for Bridge Evaluation (MBE). See BDM Section 13.4 for summary sheets and information included in the Load Rating Report. See the appendix in the MBE for examples of load rating different types of structures. Newly discovered or transfer of ownership of bridges shall have load ratings completed and data entered into the inventory within 90 days.

5-2.1 *General Load Rating and Re-Rating Guidelines*

- The Load rating of new structures shall be completed within 90 days of opening the structure to the traveling public in the anticipated final configuration.
- The ratings of existing bridges shall be re-examined when the "Revise Rating Flag" is turned on. The condition of identified bridge elements shall be reviewed and the load ratings shall be updated if needed. In cases where the capacity of a member is reduced significantly, such as impact damage to a girder with loss of reinforcing or damage to steel members, ratings shall be updated within 30 days. In other cases such as increase in dead load, a preliminary assessment can be made based on the increase in dead load, condition of the structure and existing ratings. If in the Load Rating Engineer's judgment, the ratings will not be affected significantly, and will not require a need to post or lower the load restriction on the bridge, ratings should be updated within 12 months, however, the decision and findings shall still be documented in the Load Rating File.

  Load ratings of structures shall be reviewed and updated as necessary. Factors to be reviewed to assess the need for updating the rating should be changes in the design code or changes in the load rating criteria as well as the criteria listed in Section 5-2.2 below or updates to load rating models due to software upgrades.

5-2.1.A Load Posting Review Period

Load rating of a structure can be an iterative process due to the assumptions and simplifications made during the calculation phase. WSDOT has developed a load posting review period to address this concern. Bridges that pose a safety concern and require immediate posting will be exempt from this process.

1. Initial load rating completed, and load posting is recommended. This may be a complete stamped and signed load rating package.
2. Load rating is reviewed by the owner. Assumptions and simplifications in the calculations are considered. Load rater and owner discuss possible mitigations:
   a. Refined calculations, including advanced modeling, or assumptions.
   b. Material testing, field measurements, nondestructive testing, or other techniques to verify material properties or conditions followed by refined calculations.
   c. Third party QC/QA of the load rating or new load rating completed.
   d. No refinements or investigation recommended.
3. If the bridge poses a safety risk while mitigations are explored or if the process will likely take more than 60 days, the bridge shall be posted within 30 days. Each structure will be tracked throughout this process with updates provided to FHWA monthly.
4. Updated or new load rating is reviewed by the owner.
5. If bridge requires posting, FHWA is notified and 30-day timeline to have signage in place begins.
   a. If repair or strengthening is required, the bridge shall be posted until the work is complete and the load rating is updated.

5-2.2 *Bridge Load Rating Revision Criteria*

WSBIS Item 2688, Revise Rating should be coded as "Y" when one or more of the following items apply:

1. The Superstructure or Cross-beams/ Floor-beams Elements' State condition changes from either Condition State 1, 2 or 3 to Condition State 4, or Superstructure or Substructure Condition Code is reduced to 4 or less.
2. If the approach condition to the structure causes severe impact to the bridge, call for a high priority repair to fix the approaches so the transition onto the structure is smooth.
3. If the deck has potholes on the surface or at the joints, call for a high priority repair to patch the potholes in the deck at the joints.
4. The thickness of the overlay has increased.
5. The railing is replaced with a heavier traffic barrier.
6. New utilities such as water main or sewer line have been installed on the structure.
7. The number of striped lanes has increased on 2 line superstructure members such as trusses or 2-line girder bridge, and box girder bridges.
8. Damaged or deficient structural elements have been repaired/ replaced, such as replacement of timber caps or girders or replacement or repair of damaged girders due to high load hits or other deterioration.

When a deficiency is observed in the field such as rot pockets in timber or section loss in a steel member, the inspector should provide the following items to assist in providing accurate rating factors:

1. The description "shell thickness" shall state whether the thickness is all around the member or on one side and whether it is full depth and location.
2. Section loss in steel members shall include, if possible, the remaining section thickness, location of the section loss and required dimensions.

Provide a sketch of the deficient member and show deterioration as stated above and provide the dimensions of the deteriorated area. It is of great importance to provide as accurate information as possible instead of estimates. Posting or restricting a bridge is greatly dependent on this information. When trying to figure what information should be provided, inspectors should ask the question, can an engineer calculate accurate capacity of the element/member in question?

The load rating group shall write a comment under "Note 11" addressing the "Revise Rating" flag. The comments should state whether the ratings were updated based on the Inspector's findings or that no need for updating the rating with the reasoning.

5-2.3 *Bridges With Unknown Structural Components*

For concrete and masonry bridges with no design plans, and when the necessary reinforcing details are unknown and cannot be measured, load capacity ratings may be determined based on field inspection by a qualified bridge inspector followed by evaluation by a qualified engineer. Such a bridge does not need to be posted for load restrictions if it has been carrying normal traffic for an appreciable period of time and shows no sign of distress; Reference the AASHTO *Manual for Bridge Evaluation* (MBE) second edition, Sections 6.1.4 and 6A.8.1. General rating guidelines for these structures are:

- Inventory rating shall be equal to the design truck at the time the bridge was constructed. Operating rating shall be equal to the inventory rating multiplied by 1.667.
- Legal trucks rating factors shall be equal to 1 when the Superstructure, Substructure, or culvert NBI code is equal or greater than 5. Restriction of permit loads shall be assessed.
- Posting or restricting of a bridge shall be assessed when NBI code of the superstructure, substructure or culvert is 4 or less or when there are signs of structural distress.

The Load Rating Methods WB1551 and WB1554 shall be coded as "0", Administrative.

Full documentation for an administrative rating shall be placed in the bridge load rating file.

The table below shows typical design loads and the era they were utilized. The information in the table is based on State bridge inventory and it is dependent on the class of highway.

	Design Load in Tons	Design Era
H-10	10	Early 1900- mid 20's
H-15	15	Mid 1910's-Mid 1960's
H-20	20	Mid 1910's-1920's
HS-15	27	Mid 1940's-Late 60's
HS-20	36	Mid-1940's- Early 2000's

*Administrative ratings imply ratings based on Field evaluation and Documented Engineering Judgment.

5-2.4 *Data Management*

The WSBIS database shall be updated within 30 days from the completion and approval of a load rating of a structure.

5-2.5 *Posting Requirements*

Posting of a structure shall occur when the Operating rating factor for any of the legal loads is less than 1 based on the Load Factor or Allowable Stress Methods or the rating factor for any of the legal loads is less than 1 based on the Load and Resistance Factor Method. Legal loads in the State consist of the three AASHTO legal trucks, Type 3 (Single Unit), Type 3S2 (Truck-Semi Trailer) and Type 3-3 (Truck Trailer), the SUV's (SU4, SU5, SU6 and SU7). Emergency Vehicles EV2 and EV3 are also considered legal loads on the Interstate and within one road mile from the interstate per FHWA Memo dated November 3, 2016.

Agencies generally post a bridge between the Inventory Rating and the Operating Rating using the Load Factor Method and Allowable Stress Methods. The minimum permissible posting value is three tons at inventory or operating levels. Bridges not capable of carrying a minimum gross live load of three tons shall be closed. Follow the MBE for calculating the posting limits.

In general, posting of a structure, when warranted, shall occur as soon as possible but not to exceed 30 days. In instances where the load carrying capacity of a bridge is significantly reduced, such as by impact to the structure, posting or closing of the bridge shall occur as soon as it is determined it is not safe to carry legal vehicular loads.

The procedures for notification of postings for reportable structures to FHWA is as follows:

1. When it is determined that a bridge requires posting, notification as indicated below is required within 5 business days.
    a. WSDOT Bridge Load Rating Engineer shall notify the WSDOT Bridge Preservation Engineer.
    b. Local Agencies shall notify the WSDOT Local Programs Bridge Engineer.
2. The WSDOT Bridge Preservation Engineer or WSDOT Local Programs Bridge Engineer will notify the FHWA Division Bridge Engineer within 48 hours of notification as described above.
3. Bridges subject to this notification process will be tracked in a database maintained by WSDOT Bridge Preservation Office for state-owned structures and WSDOT Local Programs for local agency-owned structures.
4. An update will be provided to FHWA Division Bridge Engineer every two weeks.

For State structures, a posting memo from the Statewide Program Manager would be addressed to the Region Administrator; the Bridge and Structures Engineer, FHWA Bridge Engineer, Region Maintenance and Operation Engineer, Region Traffic Engineer, State Traffic Engineer, and Commercial Vehicle Services. The posting memos would state that the Restricted List on Commercial Vehicles website will be updated within thirty days from the date the posting memo is sent. It would also request that the region email the Risk Reduction Engineer when posting signs have been placed and include photos of the posting. At the thirty day point, if the region doesn't respond to the memo, the Risk reduction Engineer will contact the region and request a status update and follow up after fifteen days thereafter. After sixty days, if the posting signs haven't been installed, the issue would be elevated to upper management. To track the postings, a spreadsheet shall be developed which shows the bridge Number, Structure Id, Date Load rating was completed, Date memo sent to region, and date the posting was implemented, and it shall be maintained by the Risk reduction group.

When possible, additional tests such as concrete strength or steel yield strength shall be performed to validate the assumption in the load rating analysis, hence mitigate the need for posting or restriction of the bridge. Strengthening or repair of an element should also be considered to eliminate the need for posting or restriction.

Load Posting Signs for structures where needed, shall follow the Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT *Sign Fabrication Manual* M 55-05. See Exhibit 5-1 through Exhibit 5-3 for additional signage information.

All bridges requiring load posting shall have posting signs at the bridge and additional advance posting signs, when practicable, in advance of the nearest intersecting roads, ramps or a wide point in the road where a driver can detour or turn around.

Exhibit 5-1 AASHTO Legal Trucks Posting

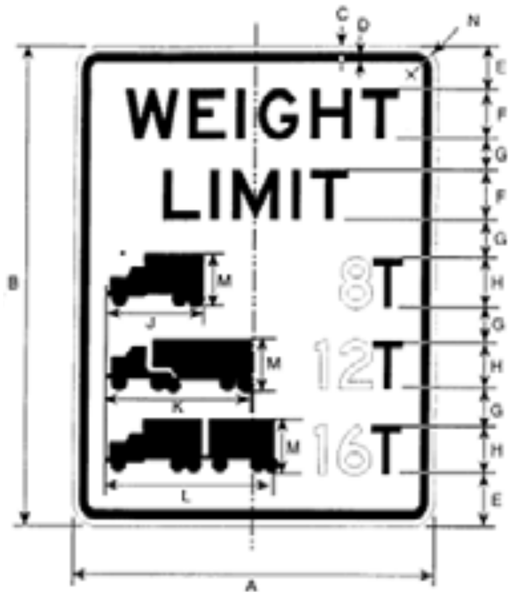


Exhibit 5-2 Emergency Vehicles Posting

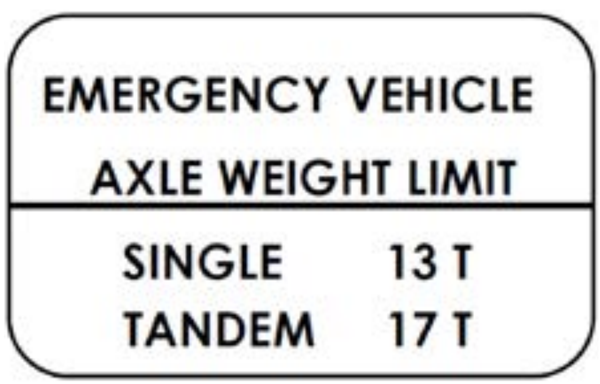
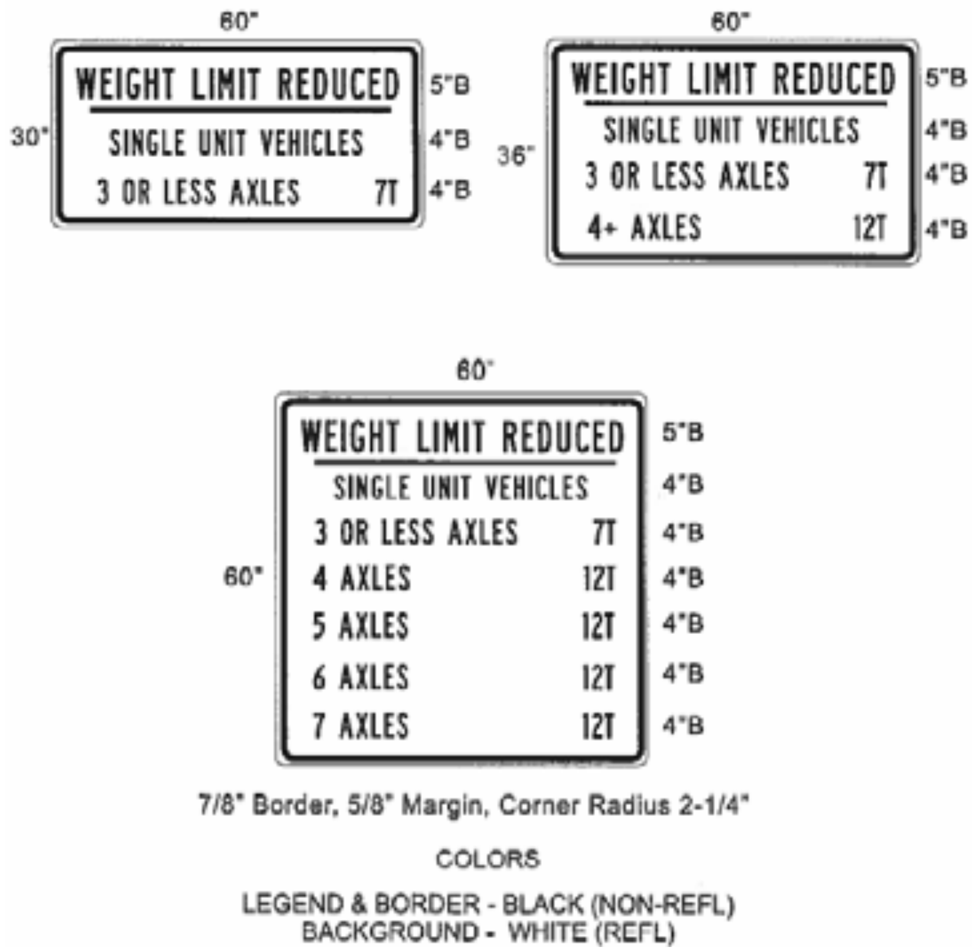


Exhibit 5-3 SUV Posting Signs



5-2.6 *Overload Permits*

Overweight loads traveling over state or local agency roads are required to obtain permits/ approval from the state, county, or city maintaining those roadways. No permit loads shall be allowed over posted bridges. The first step in evaluating a permit is to determine if the configuration meets RCW 46.44 for maximum gross weight, load per axle, or axle group (E-Snoopi) is a tool on WSDOT Commercial Vehicle website is used to calculate axle weight per RCW). The second step is to evaluate the structures on the traveled route. This can be accomplished in two methods.

The first method, which is more precise for a specific structure, is to model the permit load moving on the bridge and calculating its load rating factor. A single lane distribution factor can be used in the model, which means that no other trucks are permitted in the adjacent lanes. A rating factor equal to or above 1 means the permit truck can safely travel over the particular structure. Permit loads that have unusual configuration or have more than 4 tires per axle shall be evaluated using this method.

The second method is more general and the engineer shall be extremely cautious when applying it to ensure that the permit load is enveloped by one of the typical rated trucks. The method calculates the maximum weight per axle allowed over a bridge and is dependent on the load rating factors for the particular structure, as follows:

- **Truck Type SA**

  Definition: Construction Equipment Tires (a.k.a., Super Single Axle) (RCW 46.44.091(3))

  Range: Up to 45,000 lbs. per axle.

  Criteria: Using the Load Rating Factor for the Overload 1 Truck (a.k.a., OL1), which has a dual axle weighing 43,000 lbs., the equation is 45,000 lbs.* Rating Factor* *43/45 rounded to the nearest 500 lbs.

- **Collection Truck (RCW 46.44.041) Restriction List Truck Type S/A**

  Definition: Two-axle trucks where the rear drive axle is the item in question on non-interstate routes only.

  Range: Up to 26,000 lbs. on rear axle.

  Criteria: Using the Load Rating Factor for the AASHTO1 Truck (a.k.a., Type 3), which has a dual axle weighing 34,000 lbs., the equation is **26,000 lbs.* Rating Factor* 26/34** rounded to the nearest 500 lbs.

- **Truck Type T/D**

  Definition: Three-axle trucks where the rear tandem drive axles are the item in question on non-interstate routes only.

  Range: Up to 42,000 lbs. on rear dual.

  Criteria: Using the Load Rating Factor for the AASHTO1 Truck (a.k.a., Type 3), which has a dual axle weighing 34,000 lbs., the equation is **42,000 lbs.* Rating Factor* 34/42** rounded to the nearest 500 lbs.

- **Tow Truck (RCW 46.44.015) Restriction List**

  Truck Type: Tow truck with tandem (dual) drive axles.

  Definition: Three axle tow truck with tandem drive axles towing a variety of vehicles.

  Range: Up to 48,000 lbs. on drive dual axles.

  Criteria: Using the Load Rating Factor for the AASHTO2 Truck (a.k.a., Type 3S2), which has dual weighing 31,000 lbs., the equation is **48,000 lbs.* Rating Factor* 31/48** rounded to the nearest 500 lbs.

- **Truck Type CL8**

  Definition: Class 8 Short Hitch five-axle combination (three-axle tractor with a two-axle trailer).

  Range: Up to 21,500 lbs. per axle in dual group and 20,000 to 22,000 for a single axle.

  Criteria: Use the Load Rating Factor for the OL1 Truck based on single lane distribution factor. The equation is **22,000 lbs.* Rating Factor** rounded to the nearest 500 lbs.

- **Truck Type BL**

  Definition: Big load six plus axle combination and three to four axle single units.

  Range: Up to 22,000 lbs. per axle in dual and tridem groups and up to 22,000 lbs. for a single axle.

  Criteria: Use the Load Rating Factor for the OL2 Truck based on a single lane distribution factor. The equation is **22,000 lbs.* Rating Factor*** Modifying Factor (MF)* rounded to the nearest 500 lbs. In some instances engineering judgment may be used in establishing restrictions on a structure.

  *Modifying Factor (MF) is 1.15 if Superstructure or Substructure Condition is 6 or above; 1.10 for Condition of 5 and 1 for 4 or less. The MF is applicable to concrete and steel members. For timber members the MF is 1.

For permits traveling over State routes, WSDOT can request the weighing of a permit load at any time, however, here are typical triggers:

- Analysis shows that the load is close to overstressing one or more bridges.
- Multiple load requests: 10 or more loads in the 200-300 thousand pound range.
- 5 or more loads over 300 thousand pounds.
- Any load over 500,000 pounds.

Commentary: *The SA load is assumed to act as a tandem axle due to the size of the tire. The occurrence of these permitted loads are occasional, hence, the OL1 was used to envelope these vehicles due to the lower Live Load Factor instead of the Type 3S2 which was previously used.*

The MF multiplier applied to the BL is used since the OL2 is an envelope truck and is not permitted in the State. The Engineer shall use the MF with extreme caution and it shall not be applied to every permit load.

5-3 Scour Appraisal

All reportable structures spanning waterways are required by the NBIS/SNBI to have a scour appraisal to identify the susceptibility to erosion of streambed material and the degree to which it affects foundation stability. The documentation should include pertinent information that supports the conclusions of the appraisal such as: as-built foundation details, current condition of the foundation, a stream bed cross section profile, stream flow rates, scour calculations, etc. A scour appraisal starts with a qualitative assessment using a rational approach following engineering judgement. The qualitative assessment is a screening tool to determine the susceptibility of a structure to scour. Based on the assessment, initial scour (1680/113/SNBI BAP03), waterway adequacy (1662/72), and channel protection (1677/61) codes are determined. If a scour code (1680/113/SNBI BAP03) cannot be determined using the qualitative approach, a quantitative analysis shall be conducted and the NBI 1680 (113) scour code set to '3' and SNBI BAP03 set to 'D', Scour Critical, in the interim.

Qualitative assessments and quantitative analyses are to be performed by the BPO Scour Engineer, a hydraulics engineer, a professional engineer with knowledge of hydraulics engineering, or any subject matter expert (SME) deemed appropriate by the bridge owner. Reports will be dated and signed by the person conducting the evaluation. Reports written by engineers outside of the bridge owner agency shall also be stamped by the engineer conducting the evaluation. Bridge owners take responsibility for the content of the reports done by their designated SME.

Quantitative analyses shall include calculated scour depths based on the effects of the flood event that causes the worst predicted scour (design flood). The scour elevations are compared to the structure foundations and a determination of stability is made from which the scour code is set. When a quantitative analysis determines a bridge is scour critical, additional analysis is required to help establish monitoring triggers. The additional analysis shall determine, as a minimum (items 1, 2, and 3):

1. The flow at which the structure becomes scour critical (based on structural analysis or to the bottom of the spread footing or to within 10' of the average pile tip elevation),
2. The estimated water surface elevation (WSEL) at the structure that coincides with the flow which causes the bridge to become scour critical (see 1. above),
3. The flow and WSEL at the structure where scour depths start to become a concern (close to scour critical elevations). This level is to be set by the bridge owner or Structural Engineer based on structural stability. But, in the lack of structural analysis, can be taken as scour to the top of spread footings or to within 15 feet of the shallowest pile tip.
4. Quantitative analyses may also include recommendations for the design of countermeasures that will protect the structure from the scour potential and to prevent channel migration to protect the piers, abutments, and approach roadways.

NOTE (Discussion on scour critical and scour concern depths): The scour critical depth is the precise scour elevation that triggers the decision of whether the bridge is or is not scour critical. The scour analysis may show that the design flood scour elevation is well below the scour critical depth. Further analysis shall determine what event takes the scour depth to the brink of becoming scour critical. Scour concern depth is the scour elevation that the bridge owner sets. Above this elevation, scour is of no concern. Below this level, the bridge owner starts to raise concern. This is the depth that periodic monitoring should start to ensure safety to the travelling public.

As the bridge foundation condition changes and/or the stream bed characteristics change, the scour criticality may have to be reanalyzed. Scour appraisals shall be reviewed as necessary.

Upon determining that a bridge is scour critical, the agency needs to develop a written plan of action (POA) to manage the structure (see 5-3.2 Action Plans for Scour Critical Bridges). For additional information, see FHWA HEC 18 Evaluating Scour at Bridges.

Scour evaluations of new bridges completed during the design phase that are provided to the Scour Engineer shall be used to complete an appraisal and entered into the data inventory within 90 days of the structure being open to traffic. Newly discovered or transfer of ownership bridges shall have scour appraisal completed and entered into inventory within 12 months.

5-3.1 *Determining Susceptibility to Scour*

Each bridge's susceptibility to scour damage must be determined to be either:

1. Stable for calculated scour conditions (NBI 1680/113 scour code 8, 7, 5, 4/SNBI BAP03 code A. Or code B in the case of an engineered repaired scour critical bridge).
2. Scour critical (NBI 1680/113 scour code 3, 2, 1, 0/SNBI BAP03 code C if temporary countermeasures are in place or D if no countermeasures are placed).
3. Scour risk cannot be determined due to unknown foundations (scour code U for NBI and SNBI)
4. Structures that have not had an appraisal made (NBI 1680/113 scour 6/SNBI BAP03 code 0) must have an appraisal complete before the next submittal to NBI.
5. Structures over tidal water that have not been evaluated for scour but considered low risk are coded T in NBI (NBI 1680/113 scour code 5 (SNBI BAP03 code A) for WSDOT owned bridges). If the tidal structure is considered high risk, the scour code shall be NBI 1680/113 code 6 (SNBI BAP03 code 0) and an appraisal shall be completed before the next submittal to NBI. If the tidal structure has unknown foundations, it shall be coded U. Scour NBI 1680/113 code 'T' is not used by WSDOT.
6. Structures over waterways with foundations on dry land well above floodwaters and channel migration to the piers is not likely in the life of the bridge (NBI 1680/113 scour code 9/SNBI BAP03 code A).

See FHWA coding guide revision at
www.fhwa.dot.gov/engineering/hydraulics/policymemo/revguide.cfm.

The results of the scour appraisal are to be recorded by the scour engineer in the Scour Summary Sheet (See Section 5-4) and to be placed in the scour files. Upon completion of all scour appraisals, there should not be any bridges with an NBI 1680/113 code "6" (SNBI BAP03 code 0). The completed scour appraisals, information required to do the appraisals, and the best mitigation option for the bridge are to be incorporated into the bridge scour file located at W:\Data\Bridge\RiskReduction\Scour\SCOUR FILES.

Table 5-1 Default Maximum Soundings Frequency

NBI/SNBI Code	Soundings Max. Frequency (months)
2/D	12
3/C or D	24
U/U	24
4/ no SNBI equivalent	24
5/A	72
7/B	72
8/A	72

The soundings frequency for state bridges are determined by the Scour Engineer as needed based on field and/or historic observations as well as scour appraisals. In the absence of further guidance by the Scour Engineer, Table 5-1 (Default Maximum Soundings Frequency) shall govern. The list of bridges that require soundings for State bridges is created by the Scour Engineer and provided to the Information Group within BPO no later than December 31st of each year to be added to Bridge Works.

5-3.2 *Action Plans for Scour Critical Bridges*

For each bridge that has been determined to be scour critical SNBI BAP 03 equals C, D, or U, SNBI BAP 04 should equal N or Y. A Scour Plan of Action (POA) shall be developed to identify the appropriate measures necessary to monitor and/or to make the bridge less vulnerable to damage or failure due to scour. The POA is to provide specific direction as to essential actions required at the site for region field staff and inspectors to observe and take the appropriate action without further communication. It should have details of whom to contact after a bridge has been closed due to scour. The action to be taken must be documented in the POA in sufficient detail that is easy to follow and thorough enough that field personnel can make appropriate decisions without higher approval.

Region field staff inspecting the condition of structures and elements susceptible to scour must have the authority to close a bridge and must know how to conduct an emergency closure. They must have the necessary equipment with them to take this action at the time of the determination without leaving the bridge or calling for assistance.

The two primary components of the POA are instructions regarding the frequency of inspections to be made at the bridge, and a schedule for the timely design and construction of scour countermeasures (see Section 5-4 for WSDOT and FHWA POA templates). The POA should have defined triggering events that initiate a flood scour inspection and actions to be performed. Triggering events are defined during the scour evaluation and should have the ability to be monitored 24/7. The POA's for WSDOT are updated by the Scour Engineer as needed when condition changes warrant it. Current POAs are available on BEISt with changes made in real time.

The POA should include:

- Physical site identification (bridge, route, stream, etc.); features that are vulnerable (approach roadway, pier/s, pier orientation/beginning of bridge)
- Hydrologic and Hydraulic Characteristics (water surface elevation as appropriate).
- Party responsible for decision on closure/reopen.
- Responsible party contact information.
- Trigger mechanisms for closure and opening. On-site water surface elevation marked on piers or abutments such that field crews can observe them from riverbank.
- Communication to public (detour signage, law enforcement, press, etc.)
- Records of mitigation in place (quarry spall, weirs, mats, barbs, etc.) with photo and original dimensions for future examination and reference. This information to be made available to inspectors and region field staff to utilize during inspections and flood events.

Monitoring – It is important that all scour critical bridges be monitored during and after flood events. The POA should include specific instructions to bridge inspectors or maintenance workers on what to look for, at what locations, and methods of inspection to use. Guidance should also be included as to when a bridge should be closed to traffic. Agencies should also develop and inform appropriate personnel of bridge closure procedures. The intensity of the monitoring effort is related to the risk of the scour hazard, as determined from the scour evaluation. Some of the items to consider when developing the monitoring plan include:

- Amount of existing rotational movement or settlement of substructure units
- Degree of streambed degradation, aggradation, or lateral movement
- Recommended procedures and equipment for taking measurements of streambed elevations (rods, probes, weights, portable sonic equipment, etc.)
- Instructions for inspecting existing countermeasures such as riprap, dikes, barbs, mats, etc.
- Guidance on maximum permissible scour depths, flood flows, water surface elevations, etc. beyond which the bridge should be closed to traffic.
- Instructions for checking the operation of fixed scour monitoring devices.
- Reporting procedures for conditions that warrant bridge closure. Establish the chain of command with authority to close bridges.
- Forms and procedures for documenting inspection results and instructions regarding follow-up actions when necessary.

Temporary Countermeasures – Temporary countermeasures provide a degree of protection for scour critical bridges. They may prevent damage for most flows, but are sacrificial, low-cost treatments that help ensure the safety of a bridge during normal flood events. Use of such measures may postpone the need to close a bridge during high flows. Temporary countermeasures, such as riprap, should not be viewed as an alternative to monitoring, but rather as a supplement.

Permanent Countermeasures – Permanent countermeasures are engineered to make a bridge safe from damage due to scour. A variety of methods exist including channel improvements, structural strengthening or underpinning, drop structures, relief bridges or constructing additional spans. These types of fixes would eliminate the bridge from being “scour critical,” but are more costly. Agencies prioritize permanent countermeasures to address the most critical needs as funds permit.

5-3.3 *Recording Bridge Scour Information*

The completed bridge scour appraisal shall include the resulting WSBIS 1680 scour code (SNBI BAP 03 code), the information required to do the appraisals, and the written action plan to mitigate scour risk if appropriate. The appraisal is to be incorporated into the permanent bridge scour file for the bridge. Any changes to bridge inventory data should be accomplished within 90 days after the appraisal or field review are complete. The scour monitoring information or schedule should be communicated to all affected parties.

Fields that relate to bridge hydraulics and/or scour are:

- Waterway Adequacy Appraisal- WSBIS 1662 (NBI Item 71) and SNBI BAP 02 (Overtopping Likelihood)
- Substructure Condition - WSBIS 1676 (NBI Item 60)
- Channel Protection - WSBIS 1677 (NBI Item 61), SNBI BC 09 (Channel Condition) and BC 10 (Channel Protection Condition)
- Pier/Abutment Protection – WSBIS 1679 (NBI Item 111)
- Scour – WSBIS 1680 (NBI Item 113) and SNBI BAP03 (Scour Vulnerability Appraisal)

5-3.3.A Scour Monitoring Report (SNBI BIE 01)

Whenever a scour POA triggering event occurs, a Scour Monitoring Report (BIE 01 = 9) shall be entered into WSBIS. These inspections may have multiple site visits for the same event. In such cases, the first day the inspection is conducted is the start date. The last day the bridge is inspected for the event is the end date of the inspection.

5-3.3.B Transitioning from NBI to SNBI

When transitioning from NBI to SNBI, use Table 5-2 (Scour Critical to Scour Vulnerability Translation) to set initial codes. All codes should be reviewed for accuracy.

Table 5-2 NBI Scour Critical to SNBI Scour Vulnerability Translation

Scour Critical Code NBI 1680/113	Scour Vulnerability Appraisal SNBI BAP03	Scour Condition SNBI BC11 (suggested)	Comments
9	A	8	Bridge is not likely to ever have its substructure exposed to channel flow
8	A	7 or better	
7	B	5 or better	Bridge has engineered repairs to protect the foundations from destabilizing scour.
6	0	TBD	Bridge needs a scour appraisal completed
5	A	5 or better	
4	A	5 or less	Not scour critical but has active pier/abutment scour
3	D	3 or better	Scour Critical. Code D until a review determines countermeasures in place warrants a code of C
2	D	2 or 3	BC11 could be 3 if the bridge has not been restricted or posted due to scour.
1	D	1	Imminent failure of the foundations due to scour – Bridge is closed
0	D	0	Bridge has failed due to scour and is closed.
U	U	3 or better	Unknown foundations, treat as if it is scour critical
T	See 5-3.1 5	5 or better	No equivalent in SNBI
N	NULL	N	Not used in SNBI

5-3.4 *Scour Analysis*

The procedure for analyzing stream stability and scour shall be per HEC Publications (see Exhibit 5-4) which could involve the following three levels of analysis:

- **Level 1** – Application of simple geomorphic concepts and other qualitative analyses.
- **Level 2** – Application of basic hydrologic, hydraulic and sediment transport engineering concepts.
- **Level 3** – Application of mathematical or physical modeling studies.

Data Needs for Level 1 Qualitative and Other Geomorphic Analyses – The data required for a qualitative assessment include maps, aerial photographs, notes, and photographs from field inspections, historic channel profile data, information on human activities, changes in stream hydrology and hydraulics over time, stream gage data, bridge foundation plans, and geotechnical studies.

A flowchart of the typical steps in qualitative geomorphic analyses is provided in Exhibit 5-5.

The six steps are generally applicable to most stream stability problems. As shown in the figure, the qualitative evaluation leads to a conclusion regarding the need for more detailed (Level 2) analysis or a decision to complete a screening or evaluation based on the Level 1 analysis. A Level 1 qualitative analysis is a prerequisite for a Level 2 engineering analysis for bridge design or rehabilitation.

Exhibit 5-4 Scour and Stream Stability Analysis

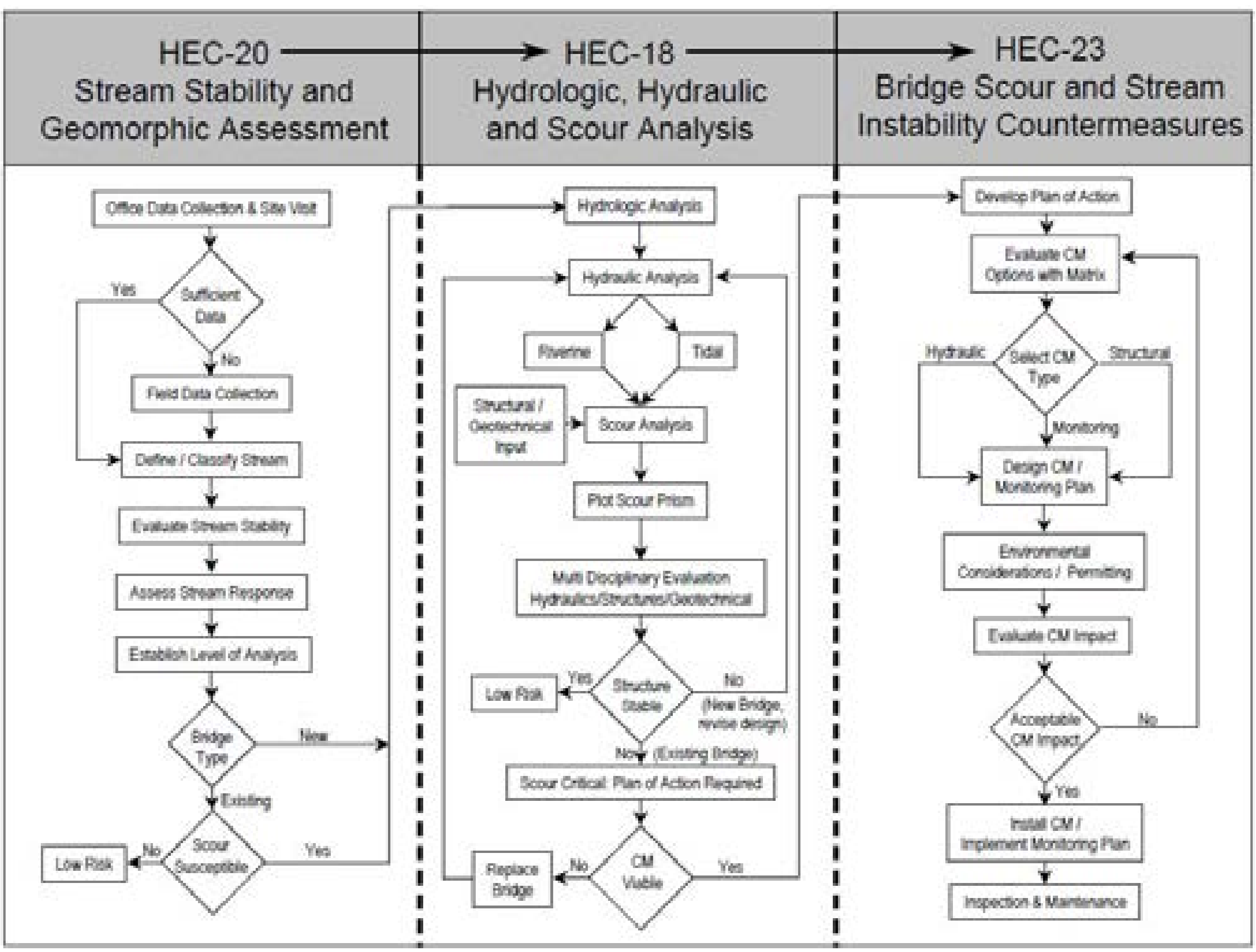
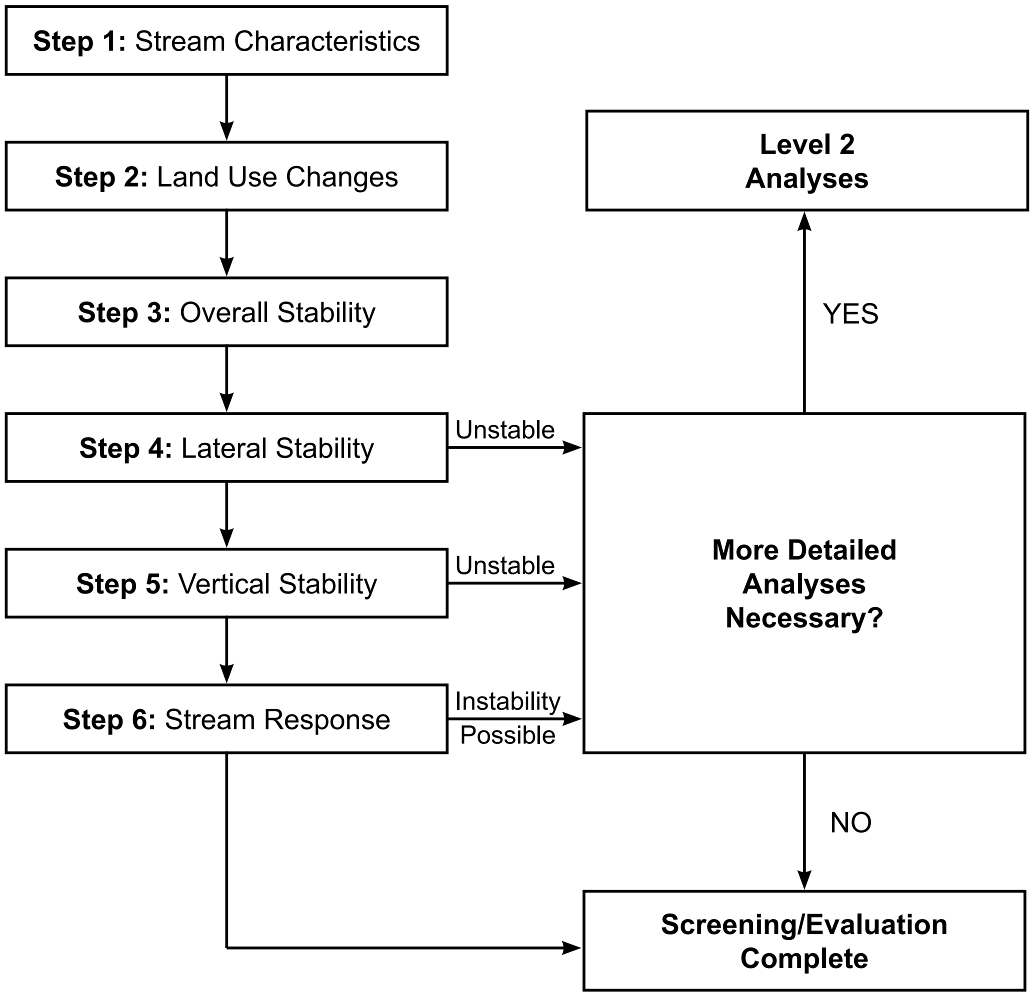


Exhibit 5-5 Level 1 Analysis

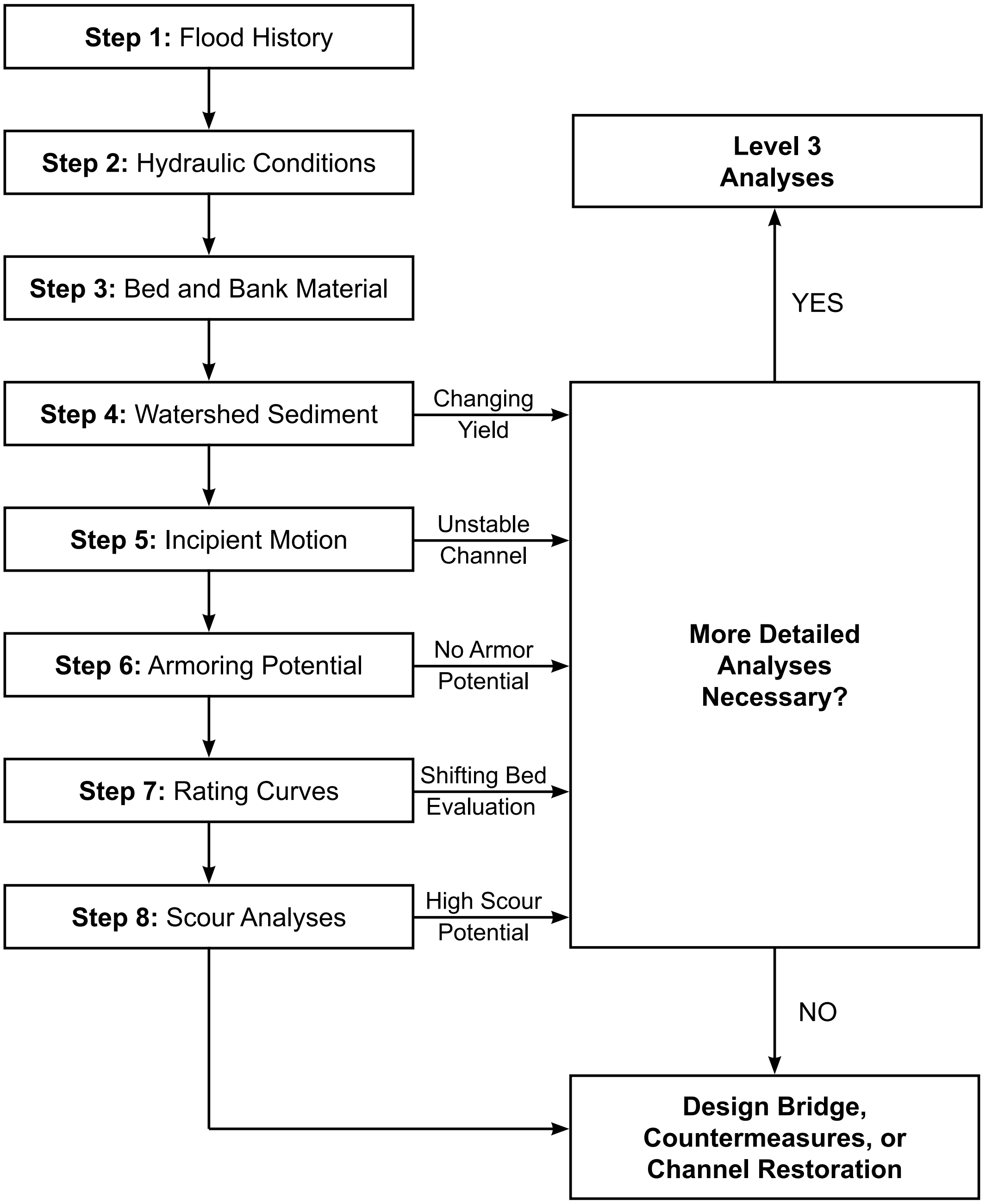


Data Needs for Level 2 Basic Engineering Analyses – Data requirements for basic hydrologic, hydraulic and sediment transport engineering analyses are dependent on the types of analyses that must be completed. Hydrologic data needs include dominant discharge (or bank full flow), flow duration curves, and flow frequency curves. Hydraulic data needs include: cross sections, channel and bank roughness estimates, channel alignment, and other data for computing channel hydraulics, up to and including water surface profile calculations. Analysis of basic sediment transport conditions requires information on land use, soils, geologic conditions, watershed and channel conditions, and available measured sediment transport rates (e.g., from USGS gauging stations).

More detailed quantitative analyses require data on the properties of bed and bank materials and field data on bedload and suspended-load transport rates. Properties of bed and bank materials that are important to a study of sediment transport include size, shape, fall velocity, cohesion, density, and angle of repose.

Level 3 analyses are performed by a professional engineer with hydraulic expertise or bridge owner designated subject matter expert (SME) (see Exhibit 5-6).

Exhibit 5-6 Level 2 Analysis



Appendices

Appendix 5-A	WSDOT Scour Summary Sheet
Appendix 5-B	WSDOT Plan of Action Template
Appendix 5-C	Instructions for Completing WSDOT Plan of Action
Appendix 5-D	FHWA Plan of Action Template
Appendix 5-E	Instructions for Completing FHWA Plan of Action

Appendix 5-A WSDOT Scour Summary Sheet

SCOUR SUMMARY SHEET

Bridge Number:	
Waterway	
Scour Code	
Owner	
SID	
Analyzed By:	
Date of Analysis:	

Place PE Stamp Here

Q100 (cfs)		Q100 Water Surface Elev. (ft.)	
Q500 (cfs)		Q500 Water Surface Elev. (ft.)	
V100 (ft./sec)		V500 (ft/sec)	
Angle of Attack		Thalweg Elevation	
Superstructure Low Point (pt. obstructs water flow) Elev. (ft.)			
Q When High Water Touches Bottom of Bridge if less than Q500 (cfs)			

Scour Analysis

Pier Number		Bottom of Foundation Elev. (ft.)		Calculated Scour Elev. (ft.)		Monitor (UW, R, F)		Inspection Frequency
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Mitigation

In Place and Functioning (Y/N)

Description of Mitigation

Comments

Frequencies:

Type of Inspection	Frequency (years)	Year Frequency Established
Stream Cross Section from U/S Rail		
Underwater		
Fathometric		

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Appendix 5-B WSDOT Plan of Action Template

SCOUR CRITICAL BRIDGE - PLAN OF ACTION

Structure ID | Brg No | Bridge Name

Region | Route | Mile Post

Owner | Last Inspection Date

Waterway | Brg Length | Main Span | Appr Spans

Foundations: | Date POA Modified:

Subsurface soil information: ☐ Non-Cohesive ☐ Cohesive ☐ Rock | Modified By:

Title:

Does the bridge provide service to emergency facilities and/or an evacuation route? ☐ ☐ N/A

SCOUR VULNERABILITY

NBIS coding :

Scour Code NBIS	Item 113 WS 680
Substructure NBIS	Item 60 WS 676
Channel Protection	Item 60 WS 677
Waterway Adequacy	Item 71 WS 662

Source of Scour Rating ☐ Observed ☐ Assessment ☐ Calculated

Scour Evaluation Summary:

9 Note:

361 Note:

677 Note:

680 Note:

Scour Critical Elements:

RECOMMENDED ACTION(S)

	Recommended		Implemented	
a. Flood Monitoring Program	☐ Yes	☐ No	☐ Yes	☐ No
b. Hydraulic/Structural Countermeasures	☐ Yes	☐ No	☐ Yes	☐ No

MONITORING PROGRAM

☐ Regular Inspection Program ☐ w/ cross sections

Items to Watch:

☐ Underwater Inspection Program

Items to Watch:

☐ Flood Monitoring Program ☐ Visual Inspection

☐ Flood monitoring required during event:

Flood monitoring event defined by (check all that apply):

☐ Discharge ☐ Staqe

☐ Elevation measured from

☐ Flood warning system:

Frequency of flood monitoring:

Post-flood monitoring required: ☐ within

Frequency of post-flood monitoring:

Criteria for termination of flood monitoring:

Agency and Department responsible for monitoring:

Contact
Number

COUNTERMEASURE RECOMMENDATIONS

Countermeasure implementation project type:

Contact person:

Target design completion date:

Target construction completion date:

Countermeasures already completed:

BRIDGE CLOSURE PLAN

Scour monitoring criteria for consideration of bridge closure:

Agency and department responsible for closure:

Closure contact name:

Criteria for reopening the bridge:

Person responsible for Re-opening bridge after inspection:

DETOUR ROUTE

Detour route description (route number, from/to, distance from bridge, etc.) :

Bridges on Detour Route:

Traffic control equipment (detour signing and barriers) and locations(s):

News release, other public notice (include authorized person(s),information to be provided and limitaions):

Scour Files (From BEIST)

Appendix 5-C Instructions for Completing WSDOT Plan of Action

SECTION 1: General Information

- The general bridge information is usually available via BEISt or from Bridge Works.
- Subsurface soil information is available from boring logs or site visits.
- Included under this section is whether the bridge provides service to emergency services or is a part of an evacuation route.
- POA updates (date, person, and title) provided here.

SECTION 2: Scour Vulnerability

- NBI codes 1680, 1676, 1677, and 1682 obtained from most recent bridge inspection report via a query.
- Source of scour rating (observed, assessment, or calculated) defined.
- The Scour Evaluation Summary lists pier foundation elevations and calculated scour elevations when available.
- The bridge inspection notes 9, 361, 1677, and 1680 are obtained from the most recent bridge inspection report via a query.
- The scour critical bridge elements are listed in this section.

SECTION 3: Recommended Actions

- Check boxes determine whether a flood monitoring program and hydraulic/structural countermeasures have been recommended and/or implemented.

SECTION 4: Monitoring Program

- Regular and underwater inspection programs items to watch as well as cross sections included (under regular inspections).
- Flood monitoring program and visual inspection (during the flood) check boxes listed in this section.
- Flood monitoring required during the event checkbox. Provided with region input.
- Flood monitoring definition checkboxes listed (discharge, stage, elevation measured from, flood warning system).
- Flood elevations tied to bridge structure when possible.
- Specific USGS river gauge listed.
- Flood monitoring and post flood monitoring frequencies listed. These frequencies are provided by the regions.
- Criteria for flood monitoring termination stated.
- Agency, department responsible for flood monitoring along with contact information listed.

SECTION 5: Countermeasure Recommendations

- Countermeasure implementation project type as well as targeted design and construction completion dates provided. A list of completed scour countermeasures is included here.
- Scour engineer contact information listed here.

SECTION 6: Bridge Closure Plan

- Scour monitoring criteria (flood elevations, debris piles, obvious bridge distress) listed for consideration of bridge closure.
- Agency, department, closure contact information listed here.
- Criteria for reopening bridge, person responsible for reopening bridge (BPO engineer) contact information listed.

SECTION 7: Detour Route

- Detour route description (route number, distance from bridge) provided by regions.
- Bridges on detour route along with any load or geometric restrictions provided by regions.
- Traffic control equipment (signing and barriers) and locations provided by region maintenance.
- News releases, other public notices including authorized persons provided by region public relations.

SECTION 8: Scour files

- Electronic scour file locations listed.

Appendix 5-D FHWA Plan of Action Template

SCOUR CRITICAL BRIDGE - PLAN OF ACTION

1. GENERAL INFORMATION

Structure number: _____	**City, County, State:** _____	**Waterway:** _____
Structure name: _____	**State highway or facility carried:** _____	**Owner:** _____
Year built: ____	**Year rebuilt:** ____	**Bridge replacement plans (if scheduled):** _____ **Anticipated opening date:** _____

Structure type: ☐ Bridge ☐ Culvert
Structure size and description: _____

Foundations: ☐ Known, type: _____ Depth: _____ ☐ Unknown

Subsurface soil information (*check all that apply*): ☐ Non-cohesive ☐ Cohesive ☐ Rock

Bridge ADT: _____	**Year/ADT:** _____	**% Trucks:** _____

Does the bridge provide service to emergency facilities and/or an evacuation route (Y/N)? ____
If so, describe: _____

2. RESPONSIBILITY FOR POA

Author(s) of POA (name, title, agency/organization, telephone, pager, email):

Date: _____

Concurrences on POA (name, title, agency/organization, telephone, pager, email):

POA updated by (name, title, agency, organization): _____ **Date of update:** ___
Items update: _____

POA to be updated every _____ **months by (name, title, agency/organization):**_____

Date of next update:_____

3. SCOUR VULNERABILITY

a. Current Item 113 Code: ☐ 3 ☐ 2 ☐ 1 Other: _____

b. Source of Scour Critical Code: ☐ Observed ☐ Assessment ☐ Calculated Other: _____

c. Scour Evaluation Summary: _____

d. Scour History: _____

Scour Critical Bridge - Plan of Action Page 1 of 5

4. RECOMMENDED ACTION(S) (see Sections 6 and 7)

	Recommended		Implemented	
a. Increased Inspection Frequency	☐ Yes	☐ No	☐ Yes	☐ No
b. Fixed Monitoring Device(s)	☐ Yes	☐ No	☐ Yes	☐ No
c. Flood Monitoring Program	☐ Yes	☐ No	☐ Yes	☐ No
d. Hydraulic/Structural Countermeasures	☐ Yes	☐ No	☐ Yes	☐ No

5. NBI CODING INFORMATION

	Current	Previous
Inspection date		
Item 113 Scour Critical		
Item 60 Substructure		
Item 61 Channel & Channel Protection		
Item 71 Waterway Adequacy		
Comments: (drift, scour holes, etc. - depict in sketches in Section 10)	____	____

6. MONITORING PROGRAM

☐ **Regular Inspection Program** ☐w/surveyed cross sections
Items to Watch: _____
☐ **Increased Inspection Frequency of __ mo.** ☐w/surveyed cross sections
Items to Watch: _____

☐ **Underwater Inspection Required**
Items to Watch: _____
☐ **Increased Underwater Inspection Frequency of __ mo.**
Items to Watch: _____

☐ **Fixed Monitoring Device(s)**
Type of Instrument: _____
Installation location(s): _____
Sample Interval: ☐ 30 min. ☐ 1 hr. ☐ 6 hrs. ☐ 12 hrs. ☐ Other: _____
Frequency of data download and review: ☐ Daily ☐ Weekly ☐ Monthly ☐ Other _____
Scour alert elevation(s) for each pier/abutment: _____
Scour critical elevations(s) for each pier/abutment:_____
Survey ties: _____
Criteria of termination for fixed monitoring: _____

Scour Critical Bridge - Plan of Action **Page 2 of 5**

☐ **Flood Monitoring Program**
Type: ☐ Visual inspection
☐ Instrument (*check all that apply*):
☐ Portable ☐ Geophysical ☐ Sonar ☐ Other: _____
Flood monitoring required: ☐ Yes ☐ No
Flood monitoring event defined by (*check all that apply*):
☐ Discharge _____ ☐ Stage _____
☐ Elev. measured from _____ ☐ Rainfall _____ (in/mm) per _____ (hour)
☐ Flood forecasting information: _____
☐ Flood warning system: _____
Frequency of flood monitoring: ☐1 hr. ☐3 hrs. ☐6 hrs. ☐ Other: _____
Post-flood monitoring required: ☐ No ☐Yes, within _____ days
Frequency of post-flood monitoring: ☐Daily ☐Weekly ☐Monthly ☐Other: _____
Criteria for termination of flood monitoring: _____
Criteria for termination of post-flood monitoring: _____
Scour alert elevation(s) for each pier/abutment: _____
Scour critical elevation(s) for each pier/abutment: _____

Note: Additional details for action(s) required may be included in Section 8.
Action(s) required if scour alert elevation detected (*include notification and closure procedures*): _____
Action(s) required if scour critical elevation detected (*include notification and closure procedures*): _____

Agency and department responsible for monitoring: _____

Contact person (*include name, title, telephone, pager, e-mail*): _____

7. COUNTERMEASURE RECOMMENDATIONS

Prioritize alternatives below. Include information on any hydraulic, structural or monitoring countermeasures.

☐ **Only monitoring required (see Section 6 and Section 10 – Attachment F)**
Estimated cost $_____

☐ **Structural/hydraulic countermeasures considered (see Section 10, Attachment F):**

Priority Ranking	**Estimated cost**
(1) _____	$ _____
(2) _____	$ _____
(3) _____	$ _____
(4) _____	$ _____
(5) _____	$ _____

Basis for the selection of the preferred scour countermeasure: _____

Countermeasure implementation project type:
☐ Proposed Construction Project ☐ Maintenance Project
☐ Programmed Construction - Project Lead Agency:
☐ Bridge Bureau ☐ Road Design ☐ Other _____

Agency and department responsible for countermeasure program (if different from Section 6 contact for monitoring): _____

Scour Critical Bridge - Plan of Action **Page 3 of 5**

Contact person (*include name, title, telephone, pager, e-mail*): _____

Target design completion date: _____

Target construction completion date: _____

Countermeasures already completed: _____

8. BRIDGE CLOSURE PLAN

Scour monitoring criteria for consideration of bridge closure:

- ☐ Water surface elevation reaches _____ at _____
- ☐ Overtopping road or structure
- ☐ Scour measurement results / Monitoring device (See Section 6)
- ☐ Observed structure movement / Settlement
- ☐ Discharge: _____ cfs/cms
- ☐ Flood forecast: _____
- ☐ Other: ☐ Debris accumulation ☐ Movement of riprap/other armor protection
  ☐ Loss of road embankment

Emergency repair plans (*include source(s), contact(s), cost, installation directions*): _____

Agency and department responsible for closure: _____

Contact persons (name, title, agency/organization, telephone, pager, email): _____

Criteria for re-opening the bridge: _____

Agency and person responsible for re-opening the bridge after inspection: _____

9. DETOUR ROUTE

Detour route description (route number, from/to, distance from bridge, etc.) - Include map in Section 10, Attachment E.

Bridges on Detour Route:

Bridge Number	Waterway	Sufficiency Rating/ Load Limitations	Item 113 Code

Traffic control equipment (detour signing and barriers) and location(s): _____

Additional considerations or critical issues (susceptibility to overtopping, limited waterway adequacy, lane restrictions, etc.) : _____

News release, other public notice (include authorized person(s), information to be provided and limitations): _____

10. ATTACHMENTS

Please indicate which materials are being submitted with this POA:

- ☐ **Attachment A: Boring logs and/or other subsurface information**
- ☐ **Attachment B: Cross sections from current and previous inspection reports**
- ☐ **Attachment C: Bridge elevation showing existing streambed, foundation depth(s) and observed and/or calculated scour depths**
- ☐ **Attachment D: Plan view showing location of scour holes, debris, etc.**
- ☐ **Attachment E: Map showing detour route(s)**
- ☐ **Attachment F: Supporting documentation, calculations, estimates and conceptual designs for scour countermeasures.**
- ☐ **Attachment G: Photos**
- ☐ **Attachment H: Other information: _____**

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Appendix 5-E Instructions for Completing FHWA Plan of Action

The existing bridge management system in your state will provide much of the information required to fill out this template.

Note: All blocks in this template will expand automatically to allow as much space as you require. All fields can be modified to accommodate local terminology, as desired. Where check boxes are provided, they can be checked by double-clicking on the box and selecting the "checked" option. If you include additional attachments, please indicate this in Section 10.

Section 1

Foundations – It is recommended that substructure depths be shown in the bridge elevation, Attachment C (see Section 10). The minimum depth should be reported in Section 1 as a worst-case condition.

Subsurface Soil Information – If conditions vary with depth and/or between substructure units, this should be noted and included in Attachments A and/or C (see Section 10).

Sections 1, 2, 3, and 4

These sections are intended as an executive summary for the reviewer/manager who may not need the details of Sections 5 through 10, and show:

- **Section 1** – General information
- **Section 2** – Who prepared the POA
- **Section 3** – The source of the problem
- **Section 4** – What actions are recommended and their status

Section 3

Reasons why the bridge has been rated scour critical for Item 113:

Scour Critical

- Aggressive stream or tidal waterway (high velocity, steep slope, deep flow).
- Actively degrading channel.
- Bed material is easily eroded.
- Large angle of attack (> 10°).
- Significant overbank or floodplain flow (floodplain >50 m or 150 feet wide).
- Possibility of bridge overtopping (potential for pressure flow through bridge).
- Evidence of scour and/or degradation.
- Evidence of structural damage due to scour.
- Foundations are spread footings on erodible soil, shallow piles, or embedment unknown.
- Exposed footing in erodible material.
- Exposed piles with unknown or insufficient embedment.
- Loss of abutment and/or pier protection.
- No countermeasures or countermeasures in poor condition.
- Needs countermeasures immediately.

Unknown Foundations

- No record of foundation type (spread footing vs. piles).
- Depth of foundation or pile embedment unknown.
- Condition of foundation or pile embedment unknown.
- Subsurface soil strata not documented.

Section 5

This section highlights recent changes in the scour/hydraulics coding items as an indication of potential problems or adverse trends. See FHWA Policy Memorandum on Revision of Coding Guide, Item 113 - Scour Critical Bridges dated April 27, 2001, for details on Items 113 and 60 which can be found at www.fhwa.dot.gov/engineering/hydraulics/policymemo/revguide.cfm.

Section 6

Multiple individuals responsible for various monitoring activities may be listed, as appropriate.

Section 7

Guidance on the selection and design of scour countermeasures may be found in FHWA Hydraulic Engineering Circular No. 23, Bridge Scour and Stream Instability Countermeasures, Second Edition, 2001. To facilitate the selection of alternative scour countermeasures, a matrix describing the various countermeasures and their attributes is presented in this circular and can be found at http://isddc.dot.gov/olpfiles/fhwa/010592.pdf.

Section 8

Standard closure and reopening procedures, if available, may be appended to the POA (see Section 10, Attachment H).

Section 9

In some situations, public transportation (e.g., bus routes) may be of importance to the public, and therefore could be included in the POA (see Section 10, Attachment).

Chapter 6 Damage and Repairs

6-1 General

The purpose of this chapter is to provide consistent procedures for reporting bridge repair needs and following up on bridge repair work performed. FHWA has general reporting requirements related to critical findings (discussed later), but otherwise leaves the tracking of repair and maintenance to the owning agency.

Recommendations for repairs arising from bridge inspections range from preventive maintenance that will preserve the life of the structure by slowing down the processes of deterioration, to routine repairs that correct existing minor problems, to critical repairs that must be undertaken immediately to restore service or safeguard the public. The ability to identify and track bridge repair needs and to follow the status of repairs is a vital element of a quality bridge management program. Bridge program managers rely on accurate, timely information provided by concise reports and thorough procedures. The following sections outline both the reports to use and procedures to follow for various types of repair and maintenance needs.

This chapter is specifically written for the use of state forces conducting inspections on both state and locally owned structures. For inspection work performed by state forces on locally owned structures, it is important for the Local Agency to be aware of the procedures that will be used by the state inspectors. Local Agencies are encouraged to also follow these guidelines but are able to tailor internal procedures to their specific organizational need.

6-2 Critical Finding and Critical Finding Damage Report (CFDR)

The NBIS (23 CFR 650.313(q))/MBE (Chapter 4) make reference to critical findings/ deficiencies as a special category of repair need requiring immediate attention of the bridge owner with timely notification to FHWA and subsequent tracking of repair status.

In Washington State, a critical finding is defined as a structural or safety related deficiency that requires immediate action. Judgment must be used in determining whether to categorize a finding as critical. Some examples that may be considered a critical finding are provided in the BIRM. To provide greater clarity, the following examples are expected to result in a critical finding.

- The condition necessitates closing, posting, or restriction of a structure, a portion of a structure, or access under a structure.
- NBI Deck code is downgraded to 2 or less.
- NBI Scour code is downgraded to 2 or less.
- NBI Superstructure, Substructure or Culvert codes are downgraded to 3 or less.
- The condition warrants a structural review to determine the effect on the safety of the structure.

Critical findings can be the result of many factors. Examples include scour, fire, structural deterioration, vehicular impact or extreme events such as floods and earthquakes. A relatively frequent cause is vehicular impact. Short-term closure or restriction of a facility to clean up debris and perform inspections does not qualify as a critical finding incident by itself.

The Bridge Preservation Engineer (BPE) (for State bridges) or the WSDOT Local Programs Bridge Engineer (LPBE) (for Local Agency bridges) is to be notified by phone or email within one working day of identifying structural deficiencies to a structure that will likely result in a critical finding. For an incident on the state system, the BPE shall ensure that relevant WSDOT executives and staff are notified as soon as practical (usually via email). Similarly, for an incident involving a local agency structure, the LPBE shall ensure relevant local agency and WSDOT support staff are notified as soon as practical. In either case, the FHWA Division Bridge Engineer shall be included in the notification for an incident involving an NBI reportable structure. Incident information shall also be entered into the CFDR tracking system within five (5) business days after determination that the event qualifies as a CFDR event.

Initial notification for a critical finding is followed up by completing a Critical Finding Damage Report (CFDR) within BridgeWorks under the CFDR for the identified structure. Initiating and updating the CFDR is necessary to assist in documenting and tracking critical structural and safety related deficiencies on damaged structures.

FHWA will periodically review any generated reports and the tracking system to verify the needed repairs were promptly reported and the recommended repairs were completed within a reasonable period of time. FHWA may also conduct field checks to verify that critical repair work was accomplished.

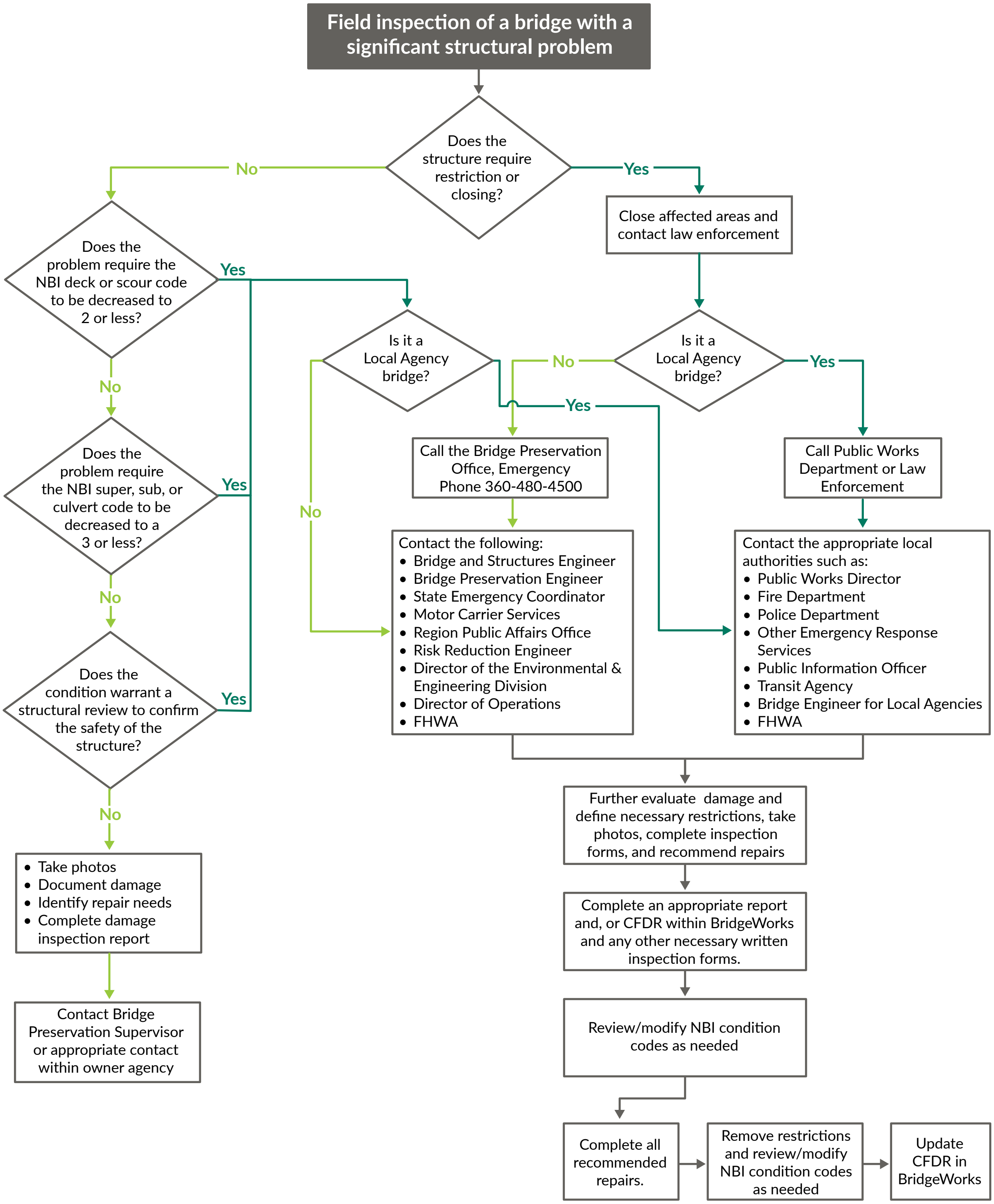
See Exhibit 6-1 for guidance on determining when a CFDR is required.

The CFDR must be filled in as completely as possible, as soon as practical after the post-incident inspection. See Section 6-2.2 for CFDR submittal requirements.

CFDR incidents will be registered in the database by completing a Routine, Damage, or Informational Report within BridgeWorks (BW). These report types are discussed further in Chapter 3. After initializing the CFDR in BridgeWorks attach all supporting materials (photos, sketches, etc.) to the Files Tab. All repair recommendations arising from the Critical Finding should be identified in the report and attached to the Critical Finding entry. Critical Finding repairs that must be completed to allow the lifting of any closure or restriction shall be assigned a priority of “C”.

Any time the recommended repairs cannot be accomplished immediately, the applicable NBI and BMS condition codes should be reviewed to ensure that the data accurately reflects the bridge’s current condition and status.

Exhibit 6-1 Field Inspection Procedure



The following procedure describes how to fill out the CFDR.

6-2.1 *Completing the CFDR*

Generally, the author of the Critical Finding Damage Report (CFDR) will be the team leader of the team that inspected the structure and identified the critical finding. On occasion, there may be no inspection associated with the critical finding or an incident may be determined to be a critical finding sometime after the inspection has been completed. In such cases, the Bridge Repair Engineer or Bridge Owner can use an Informational Report type to enter it and shall be responsible to ensure the CFDR is completed and appropriately reported.

When filling out the CFDR within BridgeWorks, keep in mind the purpose of the CFDR entry is to provide a means of generating reports for managers and FHWA to track Critical Findings and their status. Detailed information can be referenced in the reports for the structures. The author should adhere to the following:

1. Select a unique Critical Finding Number for each new Critical Finding prior to entering additional information.
2. For follow on entries, always select the Critical Finding Number they will be associated with prior to entering additional information.
3. Select the proper entry type. Identified is for the initial entry. A complete process for any Critical Finding will usually include “Identified”, “Action Taken”, and “Resolved” entries, as well as any “Updates” entered in the process.
4. Always identify the current bridge status with each entry.
5. Estimated Resolution Date should be entered with as an update when it becomes known.
6. Keep descriptions brief, do not repeat, or copy detailed report information into the Critical Finding.
   - **Identified** entries, provide a short executive summary identifying the incident, effected elements and conditions warranting the Critical Finding. Complete and specific details on element condition or damage should be identified within the body of the report.
   - **Actions Taken** entries, provide a description of mitigating measures including temporary closing or restricting the structure, or putting temporary repairs in place while conducting additional evaluations of the structure for solutions to permanently mitigate the deficiencies.
   - **Update** entries can include results of follow up evaluations or inspections, changes in restriction or status, entering estimated resolution dates, or anticipated plans for repair or resolution. Updates can be entered at any step in the process after the Identification entry and as additional information or change in status becomes available.
   - **Resolved** entries close out a Critical Finding and any description should include information on completion of repairs that restore the structure or that a permanent solution has been implemented to completely mitigate the deficiencies and protect public safety. Aside from permanent repair, this could involve, long term closure, or permanent restrictions/barriers put in place pending replacement.
7. Provide the initials for the person entering the information on that line.
8. Go to the Repairs Tab and attach the Critical Finding to the appropriate repair if one has been written.

9. State team leaders are required to send an email to the Bridge Preservation Engineer and the Bridge Preservation Supervisor, with a cc to the Load Rating Engineer and the Bridge Repair Engineers, informing them that the CFDR Initial entry and supporting information is complete and saved within the BridgeWorks program.

   See Appendix 6-A for further CFDR Instructions.

6-2.2 *CFDR Tracking and Reporting*

1. **CFDR Submittals –** After the Initial entry for a CFDR is completed, the owner agency is responsible for continuing to update status of open (Un-Resolved) Critical Findings until they are Resolved. It is not uncommon that permanent repairs or mitigation of a CFDR event can take an extended time to complete, especially for replacement or substantial rehabilitation. When final repair/replacement is expected to occur at some unidentified future time, Update entries may should the status of the bridge at the time of the update and outline repair/replacement plans to the extent they are known. On a long-term basis, this can be done by the Inspector/Author, Repair Engineer, or other designated Program Engineers with access to BridgeWorks, through the use of open Informational Reports.

   For NBI reportable structures, the Bridge Preservation Engineer or the WSDOT Local Programs Bridge Engineer shall ensure that the FHWA Division Bridge Engineer is notified of the event as soon as possible but no later than five (5) business days after determination that the event qualifies as a CFDR event.

   To maintain ongoing CFDR status tracking the Bridge Repair Engineers with work with Informational Group, the Bridge Condition Engineer and the WSDOT Local Programs Bridge Engineer, at 6-month intervals (April 30 and October 31) to generate accurate reports, in the FHWA requested format, for submittal to the Bridge Preservation engineer. After review/approval, the reports will be forward to the FHWA Division Bridge Engineer within 1 month (June 1 and Dec 1).

   Local Agencies may develop their own systems for tracking and reporting CFDR events. CFDR reporting for Local Agency events shall be through the Local Programs Bridge Engineer. Local Agencies are encouraged to submit CFDR tracking reports to FHWA on the same schedule as the state system.

2. **Post Repair Reporting –** As Critical Findings are updated and resolved, accurate and timely information regarding the repairs and resolution must be submitted to program managers and other interested parties, informing them of the resolution and the removal of any traffic restrictions.

   The individual who completes the final Resolved entry on a CFDR may have to rely on reports and photos from those who have actually done the repair work. This is understandable and justified, recognizing that those who actually perform the work may not be the same person responsible for the bridge inspection and reporting. It is permissible in certain circumstances to verify the work and complete a post-repair Update or Resolved entry from the office based upon reports received from others. Consult with your supervisor, the Bridge Preservation Supervisor, or the Bridge Preservation Engineer to make the decision and to determine how the information is to be entered into the database (Usually by Informational Report).

However, it remains good and expected practice to have trained team leaders field verify that all the repairs are complete and satisfactory. If changes in condition coding are not anticipated, a Routine or In-Depth Inspection to verify the work should be conducted within six months of completion of the required work. But in cases where NBI/BMS condition codes were reduced due to the incident and may be considered for increase after completion of the repair work, the follow-up inspection work should be conducted as soon as possible following completion of the repair work. When a bridge is being reopened to traffic following closure and extensive rehabilitation or replacement, an Initial Inspection may need to be performed. Chapter 3 provides a description of reports.

After the repair verification is complete (from the office or by field inspection) the Critical Finding Tab shall be updated and with a Resolved entry and any NBI and BMS data will be updated as necessary. An e-mail providing notice of the update should be sent to the Bridge Preservation Engineer for State bridges, or the WSDOT Local Programs Bridge Engineer for Local Agency bridges.

6-3 Other Damage Reports

Most damage inspections do not end up requiring a CFDR. The most common case is related to vehicular impact damage, but other situations (e.g. scour, fire, sudden joint failure) are possible.

For those damage inspections that do not require a CFDR, complete the Damage Inspection Report (DIR) as outlined in Chapter 3. For some cases of minor damage that are not likely to require a structural repair and where the region has not specifically requested our assistance a field inspection may not be required by BPO. Consult with your supervisor, the Bridge Preservation Supervisor, or the Bridge Preservation Engineer for further guidance. For such cases, the DIR may be completed using information provided by the region or other sources. On occasion, a DIR may not be needed at all for vehicular impact incidents requiring nothing more than minor cosmetic repair provided there are no legal, or cost recovery issues involved. Consult BPO management to make the determination.

For all cases involving reported damages to structures, the assigned inspector receiving the report shall refer to the Emergency Phone Procedures and as a minimum provide an e-mail Supervisors and the Bridge Repair Engineers, including:

- Structure ID; Bridge Number; Bridge Name; Bridge Location (MP)
- Date of Incident (if known; note if unknown)
- Description of Incident
- Identity and contact info of the person or office who reported the incident to BPO. (Note if unknown)
- Date the incident was initially reported to BPO.
- Date of BPO Inspection; names of Lead Inspector and Co-inspector (actual date, expected date, or a note if no field inspection is expected)
- Brief description of damage to the structure
- Brief description of anticipated repair recommendations
- Status of inspection/report (for those cases where an inspection is expected)

All inspection related damage photos and sketches shall be uploaded to the Damage Directory on the network (W:\Data\Bridge\BridgeDamage\Year xxxx\[bridge no.] [structure type] [incident date]).

Permission levels for this network location are set such that information can be uploaded to and/or copied from this directory but edits and deletions can only be made by select individuals (Bridge Preservation Supervisor, Bridge Repair Engineer, and QA Engineer). Notify one of these individuals if corrections/deletions are needed.

6-4 Bridge Repairs

6-4.1 *New Repair Entries*

When a bridge inspection identifies a routine structural or non-structural deficiency, i.e., any deficiency that is not identified as a Critical Finding in Section 6-2, a repair note describing the deficiency and recommended repair should be written in the Bridge Inspection Report (BIR).

1. **BIR Repair Note –** The State utilizes the following guidelines when describing and documenting deficiencies needing repair.
   - Deficiencies that require repairs shall be documented in the body of the BIR with the associated BMS elements.
   - The description of the deficiency should be concise and detailed, including location and size of the defect.
   - Photos of deficiencies requiring repairs shall be taken for proposed and completed repair of any priority. Multiple photographs of a defect, including an overall view along with close-ups, are recommended.
   - A "REPAIR" notation should be put in the individual element note with the appropriate repair number. The repair number is generated by BridgeWorks and is referenced in the "Repairs" tab of the program.

   Example: Stringer F in Panel 2 at Floor Beam 2 has a 4-½" long crack at the top cope. See photo #7. REPAIR #12345.

2. **Repair Entry –** Repair entries for deficiencies found during the course of a bridge. inspection shall be entered within the "Repairs" tab found in the BridgeWorks program.

   The repair entry should include:
   - Priority for the repair.
   - Repair responsibility for the repair.
   - Date when the repair was first noted.
   - Accurate description of the repair required.
   - Proper identification of specific repair locations. (In addition to notes in the description, consider adding a map and/or spreadsheet to the Files tab to clarify locating a deficiency when a structure layout or terminology may be confusing.
   - Photographs of the damaged area.
   - Associate the repair entry to the appropriate BMS elements or condition notes.
   - Describe any difference in the bridge orientation (pier numbering) from that in the plan drawings accessible on BEISt.

   Repair entries with multiple items similar in nature (same element) are contained within the same repair. Do not put multiple repair items in the same repair note unless they are similar (same element).

Similar – Replace 10 ft. red tagged (RT) timber cap at Pier 2 and 5 ft. RT timber cap at Pier 3.

Not Similar – Replace upper 10 ft. RT timber Pile 5A and entire RT timber cap at Pier 6.

Due to the number of repairs generated for similar components, the WSDOT BPO strives to utilize consistent descriptions for similar types of repairs called the "Repair Protocols" which are located at W:\Data\Bridge\BridgeRepair\Repair Protocols. Contact BPO for examples and additional guidance for the protocols. For any repairs that are likely to require additional repair instructions from the BPO office, advise the Bridge Preservation Supervisor and the Bridge Repair Engineer of that need.

3. **Repair Responsibility –** Repair responsibilities utilized within the BridgeWorks program organizes repairs into separate repair types. The WSDOT BPO utilizes these repair types to assign responsibility to the various entities that will, in most cases, ultimately perform the repair.

   It is not the intent of this manual to direct region maintenance staff in their assignment of work. The following merely reflects our understanding of the most likely assignment.

   The following repair responsibility codes are utilized by team leaders for the state.

   - **B – Bridge Repair**

     These repair responsibilities are generally associated with the bridge structure or conditions that impact the bridge and its elements. These may include structural deficiencies, non-scour related erosion or conditions preventing proper inspection. Drift and debris that can cause scour, channel migration, and/or added lateral forces to the structure are to be entered as B repairs but noted in the appropriate scour or channel notes in the BIR (See scour repair below for more detail). Regional bridge crews are typically charged with completing these types of repairs for state structures.

     Note: BPO Regional Inspection staff are not expected to conduct in-depth inspection on bridge mounted signs and sign supports, but are expected to stay alert to obvious defects that can be safely observed and that may need further inspection and/or repair. Such defects on bridge mounted signs are to be communicated to the BPO sign bridge team at the first opportunity. They will typically provide repair recommendations via the Sign Bridge Repair List. But for a severe defect, direct communication to the regional bridge maintenance crew can and should be made if the BPO sign bridge crew is not available for quick response. Keep a record of any such communication and provide it to the BPO sign bridge team.

   - **V – Vertical Clearance Repair**

     This indicates that the bridge has restrictive overhead clearance for vehicular traffic and that no signing or improper signing is in place. Vertical clearance signs are required for measured clearances less than or equal to 15´-3˝. The policy for the WSDOT is to post clearances at 3" less than the actual measured clearance with a +2" or-1" tolerance when evaluating any existing posting. Measured clearances less than 14´-3˝ require advanced restrictive height warning signs as defined in the updated MUTCD. State team leaders shall follow the guidelines in Section 3-4.1.J for further instructions on vertical clearance repairs. The Bridge Preservation Office (BPO) Geometry Engineer is tasked with keeping track of vertical clearance issues and repairs for State structures. Regional Sign crews are typically charged with completing these types of repairs for state structures.

- **S – Scour Repair**

  This indicates that the bridge site needs to be evaluated for scour mitigation. A description of the condition of concern must be provided in the inspection notes. Repair actions to correct the condition should be included in the repair description. The BPO Scour Engineer, a hydraulics engineer, or other person with knowledge and expertise of the hydraulics at the bridge will review and may revise the recommended repair, the repair priority, or may deactivate the repair altogether after careful review of the bridge site. A note by the reviewer should be added to the inspection report detailing their findings, typically within the note of WSBIS Item 1680 or repair description.

  Engineering scour mitigation requires the bridge owner to work closely with environmental agencies to develop the best corrective action plan for all. Erosion caused by runoff from the bridge is not considered a scour repair.

  Team leaders for the state shall apply the following guidelines when selecting a Scour repair responsibility.

  – For new scour repairs or monitoring, a discussion with the BPO scour engineer regarding the site conditions should take place to determine what mitigation, if any, is needed to include the repair priority. Provide the BPO Bridge Scour Engineer, with all necessary information to include photos, sketches, and any measurements. Update the BMS Scour and Channel Element Notes in accordance with the scour engineer's directions and comments. Typically, all debris/drift removal scour repairs will be assigned to (B) Bridge Repair responsibility. Photos will however be flagged as scour photos.

  – For an existing scour related repair (responsibility S) with a previously set priority, leave the existing priority as it is set. If the inspector feels the field conditions justify a change in the current priority, notify the BPO Scour Engineer for review prior to releasing the report.

  – When an existing scour related repair responsibility is not S, ensure that the repair (responsibility) is correct and make changes if indicated. Notify the BPO Scour Engineer, including photos, sketches, and any other information. Code BMS Element #361 and describe the change noting the date that the scour engineer was contacted.

- **R – Railroad Repair**

  WSDOT conducts limited scope (non-structural and non-mandated) "WSDOT Safety." inspections of railroad owned bridges that cross over state-owned highways. The R repair indicates that a railroad owned bridge crossing over a public highway has a condition that could pose a hazard to the motoring public, such as ballast falling onto the roadway. The repair description should include some indication of the relative urgency of the recommended repair. The inspecting highway agency (WSDOT or local agency) must ensure that all such repair recommendations are communicated to the appropriate department/individual at the correct railroad. For higher priority conditions, consider reducing the inspection interval.

  Note: Vertical clearance signage needs on a railroad overcrossing will likely become the responsibility of the region. Assign such repairs the responsibility code V as outlined above.

- **U – Utility Repair**

  This indicates that there is a deficiency with a utility (not owned by the bridge owner) mounted to the bridge. The inspecting highway agency (WSDOT or local agency) should ensure that all such repair recommendations are communicated to the appropriate department/individual at the correct utility. If the deficiency poses a safety risk to the traveling public or to bridge inspection and maintenance crews, or if the deficiency is creating a problem for the structural integrity of the bridge, then the repair recommendations must be communicated to the appropriate department/individual at the correct utility. The Risk Reduction Engineer may be able to facilitate the communication in urgent situations.

- **J – Roadway Repair**

  This inspection responsibility is used by Local Agencies and may indicates that there is a non-bridge related deficiency in the roadway approach to a bridge. Roadway maintenance crews, separate from bridge crews may typically be charged with completing these types of repairs. WSDOT no longer uses or assigns J repairs.

4. **Repair Priority –** The priority of the required repair establishes the urgency at which the repair shall take place. The priority may evolve into a more urgent priority if repairs are not completed.

   - **Emergency/Urgent –** Describe situations presenting an immediate hazard to the traveling public. These situations are independent of repairs and priorities entered into Bridge Inspection Reports. Situations may require prompt action and must be completed as soon as possible to mitigate or remove the immediate hazard. Emergency or Urgent situations must be communicated directly to the region maintenance staff (or bridge owner) via phone call and follow-up email. Copy the Bridge Preservation Supervisor and the Bridge Repair Engineer on any such communication. Some situations may result in documented repairs in the report once the hazard has been mitigated. Whenever an emergency or urgent situation results in a repair being entered into the BIR, the repair entry must be assigned an appropriate priority from the following listings. This will usually be a Priority 1 or a Priority C when a CFDR event is involved.
   - **Priority C –** Priority C is to be assigned to any CFDR related repair entry that must be completed before the bridge may be returned to the level of unrestricted service that existed before the event and/or the associated low NBI codes can be increased. Priority C is to only be used in conjunction with a CFDR event. Do not use Priority C for repairs that do not directly lead to a lifting of the restrictions imposed as a result of the CFDR event. Completion of a Priority C repair (by maintenance or by contract) will require follow-up by inspectors to verify the repair, review the condition coding, update the CFDR, and disseminate the information to the appropriate individuals. Completion of a Priority C repair must be communicated directly to the Bridge Preservation Supervisor and the Bridge Repair Engineer. See Section 6-2.2 for CFDR reporting requirements.
   - **Priority 1 –** A Priority 1 repair describes a major deficiency to primary bridge elements or serious conditions that could cause a major impact to the bridge such as closure or load restrictions. This type of deficiency may lead to more extensive and costly structural repairs if not completed in a timely manner.

     Priority 1 is the highest priority assigned to a repair which if left uncompleted, could turn into an urgent or emergency situation with little or no warning.

Priorities 1 and C are the highest priorities that can be assigned within the inspection application.

These repairs are top priority to ensure:

- Public Safety
- Reliability of the Transportation System
- Protection of Public Investments
- Maintenance of Legal Federal Mandates

On occasion, the structure inspection interval may need adjustment to monitor that conditions do not deteriorate to urgent or emergency status, that safety of the traveling public does not become compromised, and to verify that repairs have been done in a timely manner. Additionally, the Rating Revision flag (WSBIS Item 2688) may require a “Y” to re-evaluate a bridge load rating.

Examples of deficiencies requiring Priority 1 repairs are as follows:

- Repairing exposure of damaged strands and/or rebar.
- Removing or mitigating any existing potential for material falling from the bridge.
- Repairing significant joint defects that impact the bridge or create traffic hazards such as ‘D’ spalls in the header with exposed steel.
- Mitigation of significant erosion or scouring that may indicate possible loss of support.
- Trimming or removal of trees, brush or debris that interfere with inspection procedures or equipment access. List the month and year of the next inspection by which this repair needs to be completed.

• **Priority 2 –** A Priority 2 repair describes a minor to moderate deficiency to a primary bridge element, a major deficiency to a secondary bridge element or existing conditions that may eventually elevate to a Priority 1. This type of deficiency would not cause major impact to the level of service of the bridge or compromise safety at its current level. However, this type of deficiency may lead to more extensive and costly structural repairs if not completed in a reasonable timeframe.

Priority 2 is different from Priority 1 in that a Priority 2 deficiency does not immediately jeopardize:

- Public Safety
- Reliable Transportation System
- Protection of Public Investments
- Maintenance of Legal Federal Mandates

A Priority 2 repair would not generally be cause for a reduction in inspection interval or a re-evaluation of a bridge’s load rating.

Examples of deficiencies requiring Priority 2 repairs are as follows:

- Repair Yellow-tagged (YT) timber members.
- Repair spalling in secondary members.
- Repair spalling in the deck soffit and/or concrete girders. If not excessive, this could be a Priority 3.

- **Priority 3 –** A Priority 3 repair is generally a minor nonstructural or "Housekeeping" type of repair that could evolve into a higher priority if not corrected. Examples of deficiencies requiring Priority 3 repairs are as follows:
  - Cleaning of drains, bridge members or deck and sidewalk surfaces.
  - Remove debris from off of pier caps and abutments.
  - Remove garbage, debris, or vegetation from around abutments, piles, or retaining walls.

  Repairs shall be elevated to priority 1 if the material of concern is significantly impeding operation of bridge structural components or is making complete structural inspection of the bridge impossible.
- **Priority M –** Monitor repairs require no action from the region bridge crews, but they should be aware of the condition, since the problem/defect could evolve into a repair. A reduced inspection interval may be necessary in order to monitor the problem/defect. The state utilizes the following guidelines when implementing and administering monitor repairs.
  - Every monitor repair note must be updated at each routine or interim inspection with a clear statement of findings. This update should include the inspection date, inspector initials, and notes on any change in condition, and will be appended to the existing repair note. If the condition is unchanged state "No changes noted" and include the year and initials. This specific instruction applies to monitor repairs only. The "no changes" note is generally not expected for priority C, 1, 2, or 3 repairs.
  - Every monitor repair note must include measurable information about the condition of being monitored, allowing subsequent inspectors to more easily and accurately determine if the condition is changing. Photos, sketches, and/or measurements are among the ways to provide this information, which must also clearly include location and date. It may be appropriate to reference an attached file with historical data in the monitor repair note.
  - Over time, every monitor repair note will provide information on what circumstances warrant repair action and/or eliminate the need for further monitoring. Inspectors will be expected to provide this information, when possible, but it is recognized that this information may require more detailed evaluation and structural analysis beyond the scope of bridge inspection work.

    Some existing monitor repairs may not meet the requirements listed above. In this case, please coordinate with the Bridge Preservation Supervisor to determine if a monitor repair is appropriate.
- **Priority 0 –** A Priority 0 repair is no longer used by WSDOT. Existing Priority "0" Repairs should be migrated to Priority 3 as being the lowest priority.

6-4.2 *Modifying Existing Repairs*

When there is need to significantly change or update the verbiage within a repair entry after subsequent inspections, team leaders for the State shall apply the following guidelines when modifying the repair.

- The team leader shall add his/her initials along with a date in parenthesis with a brief description of any changes to an existing repair note, including a priority change.
- Minor edits to repair text (spelling, caps, and minor grammatical changes) should generally be avoided unless something else is being done to the entry.
- Edits to repair priority entries other than priority M need be made only when the conditions/needs change sufficiently to warrant an update.
- If a significant change to a repair is needed, eliminate the original repair entry by entering a date in the "Verified" column. Add a note in parenthesis in the repair description stating reasons for its removal, and then enter a new repair with the original repair date in the "Noted" field. The BridgeWorks application typically enters the "Report Opened Date" in the Noted field when a new repair is created. The Noted date can be changed by the inspector and must be changed in all cases where the contents of a previous repair entry are entered into a new repair entry.)
- Break out and rewrite repairs when dissimilar elements are called out in the same repair as described in Section 6.4.1.2. Date the new repair with the original repair date for the respective elements.

6-4.3 *Repair Verification*

At each routine inspection, the current status of all open (not previously verified) repair entries must be reviewed by the inspection team and field reviewed provided the necessary access equipment is available. If the recommended work has been completed, the repair entry in the BIR shall be verified in accordance with the following guidelines.

- BMS element condition states and notes where the repairs are referenced must be updated to accurately describe the repaired condition after the inspection.
- Any portion of a primary BMS element that has been repaired is typically coded in Condition State 2. Primary members that have been completely replaced should be returned to Condition State 1.
- A completed repair should have before and after photos with the verification date and the repair number referenced in the individual BMS element note. Remove this verification note during the subsequent inspection.

  Example: Stringer F in Panel 2 at Floor Beam 2 crack has been stop drilled. REPAIR #12345 verified on 1/20/02. See photos #7 and #9.
- In the "Repairs" tab of BridgeWorks, the team leader should enter the verification date within the "Verified" column and attach the after photos to the "Photo" column.
- Explain in the repair description why verification could not be accomplished and what it will take to do so for the next inspection (equipment, environment, etc.).
- For scour repair verification, follow guidance above AND send communication to the BPO Scour Engineer who will add the structure to the next annual scour review.

Repairs to state structures are most often performed by region bridge maintenance crews. Their work is sometimes reported to BPO via a Maintenance Bridge Repair Report (MBRR) (See also Section 6-5). When this is done, the BridgeWorks application uses the info entered in the MBRR to enter a Maintenance Date (Maint.).

The Maint. date informs the bridge inspection team that the work specified by the repair entry has been completed. Once the date is entered, the responsible maintenance crew does not see this entry on the Bridge Repair List and typically does not revisit this repair entry. The bridge inspection crew's responsibility at this point is to verify that the reported maintenance satisfactorily completes the recommended repair(s). When a Maintenance date has been entered, consideration should be given to the need to schedule appropriate access equipment prior to heading out to the field. Discuss with your supervisor as needed.

There are, on occasion, repair entries within BridgeWorks that contain inappropriate or unexplained maintenance completion dates. Scenarios include, but are not limited to:

1. The work performed does not complete the full scope of the original repair recommendation.
2. The work performed is not satisfactory.
3. Further deterioration has occurred rendering the work performed inadequate.
4. There is no visual evidence of any work done; (e) the work performed belongs in fact to a different repair entry (i.e., the MBRR was improperly entered).

In cases such as these, correction is needed to ensure that the repair needs continue to be properly communicated back to the region bridge maintenance crews.

The team leader shall apply case-by-case judgment in making these corrections. Two primary options should be considered:

- **Option A –** Add a verified date with photos and/or notes in the repair description (does not have to be both provided there is no question of the intent). Write a new repair entry with appropriate supporting information and noting the changes being made. (Example: A repair entry of large scope has been partially completed. The existing entry could be verified, the description modified to note the portion that was completed, and the new entry would be referenced. The new repair entry would reference the old entry, note the partial completion and would describe the remaining scope. In most cases, the noted date of the new entry should be the same as the original entry.)
- **Option B –** Enter an Override Date in the BridgeWorks application. Modify the repair description to explain the reason for the override and provide the date and initials of the author. (This option may be most appropriate for a case where the Bridge Repair report was incorrectly entered. It could also be appropriate for the case where only a small part of the overall scope of a repair was addressed by the work in the Bridge Repair Report.)

In some extreme and/or complex cases, direct communication with the region bridge maintenance crew to explain the situation may also be advisable.

6-5 Maintenance – Bridge Repair Report (MBRR)

The repair descriptions from the inspection reports for WSDOT-owned bridges are entered into the "Bridge Repair List" (BRL - a state document), which can be viewed on the internal homepage (BEISt) of the WSDOT website. The BRL is updated twice a year. Maintenance crews for the State will review the list and schedule the work to complete selected bridge repairs. When a repair is completed, the maintenance crew may submit a Maintenance – Bridge Repair Report (MBRR) documenting the completed repair. The MBRR is typically submitted electronically via a link provided on the Bridge Repair List website. If submitted electronically, the program inserts a "maintenance date" for that repair into the database.

Entering the maintenance date will automatically remove the repair from the next edition of the printed active "Bridge Repair List". However, the unverified repair along with the maintenance date will still appear in the next Bridge Inspection Report (BIR). The MBRR is a state document, but it is available to Local Agencies for utilization if they do not have a bridge repair documentation process in place.

An example of a completed Maintenance - Bridge Repair Report can be found at the end of this chapter.

6-6 Appendices

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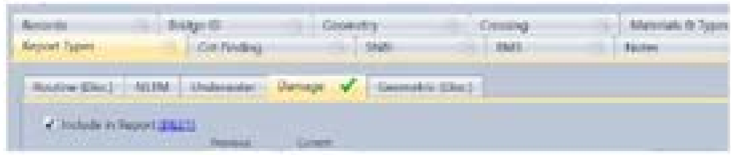
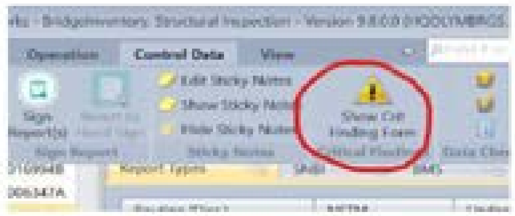
Appendix 6-A Critical Finding/Damage Report Instructions

Critical Findings will normally be identified and entered as part of a Routine or Damage Inspection entered as described in Chapter 3.

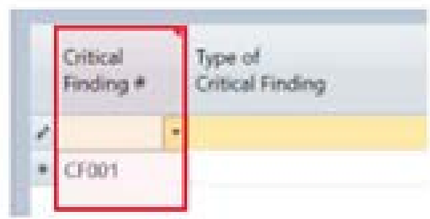


The Critical Finding Tab will only be visible if the current structure already has a Critical Finding associated with it. To open the Critical Finding Tab, look under Control Data tools.

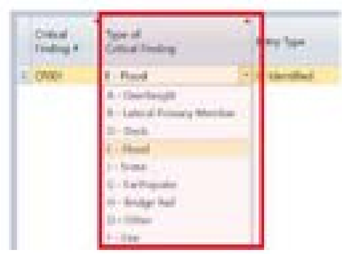


The Critical Finding Tab is only a means to identify and track open Critical Findings and their status. It is not an actual report type.

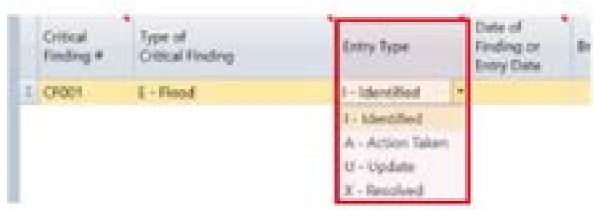
The initial step for every entry must be to select the correct Critical Finding # to associate the entry with. This will be the next available number for newly entered Critical Finding. Failure to select the associated **Critical Finding #** will prevent the entry from being properly recorded and ordered for reporting.



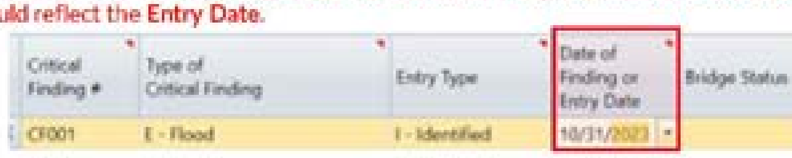
Select the **Type of Critical Finding** by type of damage or type of event. The selection shown in the drop down may actually appear differently. After the first entry of a new Critical Finding, the Type should self-populate when that Critical Finding number is selected for follow on entries.



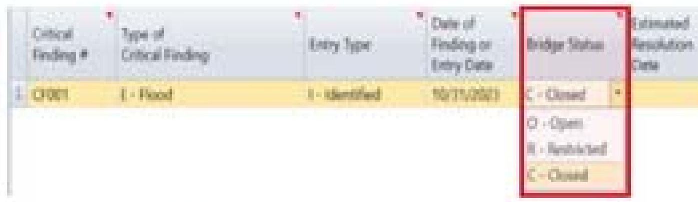
Select the **Entry Type** for the entry being made. The first entry for a new Critical Finding should always self-populate as "I- Identified".



Enter the **Date of Finding** or the **Entry Date** for the entry being made. For the **initial** entry, this should be the **Date of Finding**. All follow on entries should reflect the **Entry Date**.



Enter the current **Bridge Status** that reflects the current entry being made. **If this is a change in Bridge Status, ensure that the same status is updated within the bridge inventory information. This may require a signed report type to be associated with it.**

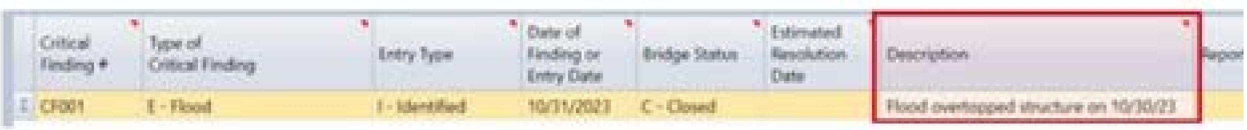


Critical Finding #	Type of Critical Finding	Entry Type	Date of Finding or Entry Date	Bridge Status	Estimated Resolution Date
CF001	E - Flood	I - Identified	10/31/2023	C - Closed	
				O - Open	
				R - Restricted	
				C - Closed	

Provide an **Estimated Resolution Date** when it becomes available. This date may not be identified until more is known or until a later entry date.

Critical Finding #	Type of Critical Finding	Entry Type	Date of Finding or Entry Date	Bridge Status	Estimated Resolution Date	Description	Reported By	Associa Repair
CF001	E - Flood	I - Identified	10/31/2023	C - Closed				

Provide a brief **Description** of the event, or defect as a cause of the finding or reason for the updated entry. Keep in mind this is a brief summary. In-depth details should be entered into the body of the report within the affected BMS elements. Information in the report is supported by any photos or files, but not within this entry.

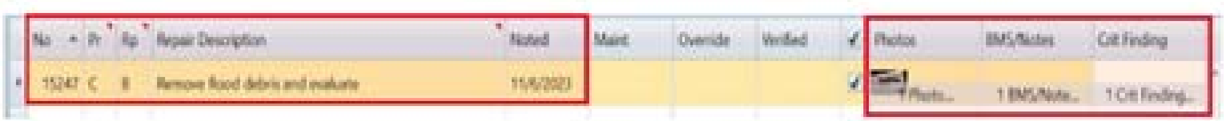


Critical Finding #	Type of Critical Finding	Entry Type	Date of Finding or Entry Date	Bridge Status	Estimated Resolution Date	Description	Repor
CF001	E - Flood	I - Identified	10/31/2023	C - Closed		Flood overtopped structure on 10/30/23	

Enter the initials of the person making the entry and then go to the Repair Tab to attach any associated repair that has been written in relation to the critical finding. There may or may not be a repair identified, but if so, it will usually be a C -Priority Repair. The included box at the end of the entry line, indicates whether or not to include the critical fining within the printed report.

Critical Finding #	Type of Critical Finding	Entry Type	Date of Finding or Entry Date	Bridge Status	Estimated Resolution Date	Description	Reported By	Associated Repair	Inc
CF001	E - Flood	I - Identified	10/31/2023	C - Closed		Flood overtopped structure on 10/30/23	SDG	15247	✓

Any repair associated with the Critical Finding will identify the associated Photos and BMS Notes.



No	Pr	Rp	Repair Description	Noted	Maint	Override	Verified	✓	Photos	BMS/Notes	Crit Finding
15247	C	8	Remove flood debris and evaluate	11/6/2023				✓	1 Photo...	1 BMS/Note...	1 Crit Finding...

Appendix 6-B Maintenance - Bridge Repair Report

BEISt - Maintenance Report

Page 1 of 1

To: Bridge Preservation Office
PO Box 47341, Olympia, WA 98504-7341

Maintenance Date 2006-07-18

Structure Identifier **0005090A** 10000

Bridge Number **5/321** Bridge Name **CAPITOL LAKE**

Mile Post **104.52** Location **0.5 N JCT US 101**

Repairs Completed By
B - Bridge Maintenance

Origin of Repairs
B - Bridge Repair List Repair No **S10000**, Priority **1**, Dated **2003-12-03**

Repair Description
Repair the strip seal at the north abutment. (Verified - repair completed but has failed again; see new repairs 10002-4)

Type of Materials Used - Suppliers
Sand blast and sika-flex with backer rod

Repair Remarks and Details
Cleaned expansion joint by sand blasting and poured sika- flex joint.

Weather Conditions

Completed By Steve McIntyre **Posted Date** 2006-07-18 **Map Repair** No

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7-1 General

This chapter establishes policies on how the Washington State Department of Transportation (WSDOT) conducts quality control/quality assurance (QC/QA) on its respective bridge and tunnel inspection programs to meet FHWA requirements within 23 CFR 650.307(c), §650.313(g), §650.507(c) and §650.513(i).

The guidelines presented herein are those in use by the WSDOT Bridge Preservation Office (BPO). Sections 7-2 through 7-8 pertain to the QC/QA program implemented by the BPO. The QC/QA procedures established for local agencies previously documented in this chapter have been removed from this manual and incorporated into the Local Agency Guidelines (LAG) Manual.

The QC/QA programs documented in this chapter, including the appendices, have been approved for use by the Federal Highway Administration (FHWA).

Any QC/QA program being developed will want to reflect on the five areas identified in §650.307 through §650.315 and §650.507 through §650.515. A thorough QC/QA program will examine these five areas as well as any internal policies and procedures established within a given agency as a means of determining whether the inspection program maintains what FHWA defines as a high degree of accuracy and consistency.

The five topics identified in 23 CFR 650 include:

- Bridge Inspection Organization (§650.307 and §650.507)
- Inspection Staff Qualifications and Re-Certification (§650.309 and §650.509)
- Inspection Interval (§650.311 and §650.511)
- Inspection Procedures (§650.313 and §650.513)
- Inventory (§650.315 and §650.515)

There are also many sources of information available that can help an agency in developing their own QC/QA programs. One particularly helpful is a document written by Dr. Glen Washer and Dr. C. Alec Chang entitled *Guideline for Implementing Quality Control and Quality Assurance for Bridge Inspection*. AASHTO sponsored the creation of this document completed in June 2009 to help those agencies in need of assistance in developing their own QC/QA programs. Section 1-4 from that document identifies seven characteristics that are common to effective programs.

These include:

1. Independent Reviews.
2. Objective and quantitative measures of quality.
3. Quality program documentation.
4. Comprehensive coverage of the inspection and load rating program.
5. Established procedures for corrective actions.
6. Established schedule for evaluations.
7. Documented review procedures.

The section concludes by saying that these characteristics of effective programs can be used in many ways and methodologies depending upon an agency's specific programmatic characteristics and needs.

It is the intent throughout this chapter that the term "bridge" refers to all structures including bridges, culverts and tunnels.

7-2 WSDOT Bridge Preservation Office Quality Control Program

7-2.1 *Purpose*

To establish within management a diverse set of quality control (QC) procedures to maintain a high degree of accuracy and consistency within the BPO inspection program. These procedures have been developed uniquely for each of the different units in the office. The procedures focus on the following areas:

- Qualifications of designated positions within the office.
- Maintaining bridge information (electronic and physical information).
- Management/analysis of bridge load rating and bridge scour.
- Office review and Field verification of information and conditions collected in bridge inspection reports.

The QC program's role is to evaluate and communicate directly with staff, any assessments made of their work. BPO policy and practices should be evaluated throughout this process and be addressed and adjusted accordingly to create a more consistent and accurate inspection program.

7-2.2 *Definitions*

Both the *National Bridge Inspection Standards (NBIS) Regulation 23 CFR 650.305 and National Tunnel Inspection Standards (NTIS) regulation 23 CFR 650.505 define Quality Control* as those procedures intended to maintain the quality of a bridge/tunnel inspection and load rating at or above a specified level. QC is performed within a work group.

7-2.3 *Time Frame of Evaluation*

This is an ongoing process throughout the year by each of the individual units within the office.

7-2.4 *Personnel*

To meet the federal requirements identified in 23 CFR 650 for Bridges, Tunnels, Structures and Hydraulics, the BPO has six distinct units that work together. These units consist of the following:

- Coding and Appraisal Unit
- Regional Inspection Unit
- Risk Reduction Unit
- Special Structures Unit
- Underwater Inspection Unit
- Movable Bridge Unit (Ch. 8 is dedicated to this unit and the work performed)

The QC program will be administered by the supervisor in each of these respective units. There may be portions of the work that are delegated to staff positions. This work will be addressed further below in each of the individual units.

7-3 Coding and Appraisal Unit

The Coding and Appraisal Unit is led by the Coding and Appraisal Engineer and is responsible for administering QC procedures within the unit. Listed below are those areas identified in 23 CFR 650 that require defined QC procedures. These procedures may be delegated to others within the unit at the discretion of the Coding and Appraisal Engineer.

7-3.1 *Bridge File Maintenance*

The WSDOT Coding and Appraisal Unit maintains bridge and tunnel inspection reports for WSDOT structures in accordance with the NBIS 23 CFR 650.307(e)((5) and the NTIS 23 CFR 650.507(e)(2).

As of 1/1/2022, all inspection reports are maintained electronically as final and complete documents in pdf format. Inspection reports prior to 1/1/2022 are maintained as physical paper documents in a dedicated room within the WSDOT Bridge Office. See Appendix 2A.

7-3.2 *Processing Inspection Reports*

Field Inspections – Bridge inspection reports are processed by the Bridge Data Steward after QC is complete between inspectors and supervisors. The Bridge Data Steward performs the following QC actions:

- Validates that the QC process between the inspectors and supervisors was performed (initials required on WSBIS sheet used to initiate inspection processing).
- Checks changes made to all codes in WSBIS report for reasonableness and consistency.
- Runs automated error checks within BridgeWorks application. See BPO coding guide for a detailed list of error checks.
- Checks to ensure that inspection report types are used correctly, and that when multiple report types are used in a single inspection that they all have the same inspection date.

When these checks are completed and errors corrected, the Bridge Data Steward “releases” the inspection data into the “State System Bridge Inventory” database.

When inspection reports released for digital signature, the Bridge Data Steward has completed the process. The inspectors are automatically notified via email to digitally sign the reports using the BridgeWorks application, and when both signatures are added the report is automatically loaded onto BEISt.

When inspection reports are released for hand signature, the Bridge Data Steward then coordinates with the inspectors and others in the Unit to get the reports signed, scanned, and loaded onto the BEISt website. For both digitally signed and hand signed reports, the Bridge Data Steward then sends the WSBIS report with initials validating the inspector QC process to the Bridge Resource Technician, who also receives any hand signed inspection reports from the inspectors.

Informational Inspections – The “State System Bridge Inventory” database often needs updated information from sources other than field bridge inspections. This includes updates to traffic or route information and setting flags for inspectors to take measurements or other specific field work that should be performed during the next field inspection. In all cases, a note is added to the informational inspection describing the changes made.

7-3.3 *Coding New and Repaired/Rehabilitated Structures*

This Unit tracks bridge and tunnel construction with regular monitoring of several WSDOT sources, including CCIS and Unifier. Contracts are reviewed and when new or repaired/rehabilitated structures are identified they are tracked in the ContractHistory database. When plans are available and the construction work is nearing completion, new or updated inventory inspections are added to the “State System Bridge Inventory” database. For new bridges, inspection supervisors are notified to coordinate the initial inspection. For repaired/rehabilitated bridges, inspection supervisors are not notified but contract information is available in the record for use by the next scheduled inspection team.

QC of the inventory process consists of the following:

- All plan sheets are reviewed by the Bridge Resource Technician prior to loading onto BEISt to ensure that the sheet labels are correct and that the image is complete and legible.
- The new bridge inventory data is created as an Inventory report type and is reviewed by the Bridge Data Steward prior to release into the “State System Bridge Inventory” database.

7-3.4 *Data Concurrency*

The Bridge Geometric Engineer is responsible to make sure that selected WSBIS fields have data that is reasonably concurrent with other WSDOT databases which serve as sources for these fields. Since this is a manual operation at this time, data queries are initiated with several other offices once per year in the late summer and the WSBIS is updated with the revised data in the following winter. The WSBIS fields managed this way are included in Appendix 7-C.

To obtain complete information on these selected fields from other databases in WSDOT, these external databases must have a complete and current list of bridges in the WSBIS and selected location information accurately coded. Regular communication and cross checking between the Bridge Geometric Engineer and the data stewards for these other external databases ensures this data integrity and concurrency and has significant quality benefits for both the WSBIS and other databases with shared information.

7-3.5 *Vertical Clearance and Clearance Posting*

The Bridge Geometric Engineer manages the collection of vertical clearance data for all bridges intersecting state routes. In most cases, this consists of providing guidance to bridge inspectors on when and how to collect vertical clearance data and reviewing and entering this data after it has been collected. This work serves as a QC mechanism for the vertical clearance data and for any bridge posting recommendations that result from vertical clearance findings.

7-3.6 *Inspector Certification*

Every Team Leader is responsible for keeping their own records. Their supervisors will validate certification training records during each annual performance evaluation and provide this information to BridgeWorks Application Engineer for implementation into the Bridgeworks software. Acceptable recertification courses or conferences as established by the Statewide Program Manager (SPM) can be found in Chapter 1. Inspectors who meet the qualifications retain active certification in the BridgeWorks software and retain accounts as needed to create bridge inspection reports.

7-3.7 *Inspection Status Report and Performance Indicators*

The BridgeWorks Application Engineer maintains a database and reporting tool called the Inspection Status Report (ISR) that serves as a "management dashboard" for the BPO. The ISR identifies bridges due for inspection and tracks their inspection progress. It also creates a record of NBI compliance for on-time inspection for federally reported inspection types. The ISR is considered a QC process for the entire bridge inspection operation.

7-4 Risk Reduction Unit (Load Rating)

The Load Rating group is led by the Risk Reduction Engineer who is responsible for administering QC within the group. QC consists of procedures defined below that will assess load rating work completed by consultants as well as what is completed in-house. Currently those load ratings completed by consultants and in-house consist of state-owned bridges that meet the federal definition of a bridge. QC levels 1 and 2 listed below will be applied to all ratings submitted to the load rating section.

7-4.1 *QC Criteria*

All structures with new load ratings shall be fully checked by another engineer. For updated ratings by BPO, the Engineer of Record shall do a QC of the existing rating as part of the update; a checker might not be needed. Ratings submitted to WSDOT by consultants shall be reviewed as described below.

- Verify that a stamped summary sheet is included in the rating file.
- Evaluate the rating factors, do they make sense? For example, is the OL1 RF greater than OL2 or the RF for AASHTO 1 greater than HS20.
- Verify that all elements/members that require ratings are rated.
- Verify that preliminary calculations are included in the submittal, especially for complex structures for accuracy. These files might include dead loads, factors, and any assumptions used in the calculations.
- Verify that the rating represents the condition of the structure based on the latest inspection report.
- Verify that each bridge's physical characteristics are modeled properly.
- Verify reinforcing/pre-stressing; typically check points at maximum stress.
- Verify that dead and live loads are modeled properly.
- Verify that the inventory and operating tons are updated in BridgeWorks and the posting matches the rating where needed.

Data Check: Query database for superstructure or substructure with SNBI Condition 4 or less. Evaluate whether any of the structures will require updating and address accordingly. QC or independently load rate a minimum of eight structures per calendar year for state bridges. Condition of the superstructure or substructure will be the main factors in choosing the bridges as well as evaluating ratings completed by consultants or by WSDOT.

7-5 Risk Reduction Unit (Scour Group)

The Scour Group is also led by the Risk Reduction Engineer and is responsible for administering QC within the group. QC tasks may be delegated to the Scour Engineer at the discretion of the Risk Reduction Engineer. QC of scour items will consist of procedures defined below to assess the scour work completed by the Regional and Special Structures Inspection Units as well as that of the Scour Group. QC will also verify that new structures added to the inventory are properly designed for scour and are not scour critical.

Note: The criteria set below contain QA elements.

7-5.1 *Bridge Selection Criteria*

- All state bridges in which the scour code has changed since the last inspection.
- All state bridges in which the POA has changed regarding new directions to the regions.
- All new state bridges over water.
- All state bridges with a scour code of 2 or less.

These four items will be verified for validity.

In addition, a list of 60 bridges over water will be selected randomly from the previous inspection season. Of the bridges selected, 40 of them shall have a scour code of 3, 4, or 7.

7-5.2 *Office Review*

- Verify that each bridge over water has a scour summary sheet, scour calculations if appropriate, a bridge layout sheet and initial ground line drawings.
- Verify that the bridge is properly coded **(NBI 1680 and SNBI B.AP.03)** based on **a documented scour assessment. If scour calculations have been made and are available for review, verify that the assessment complies with the calculated scour or that documented justification to disregard the calculations is available.**
- Verify that each scour critical bridge has a Scour Plan of Action and that it has clear direction for the field staff to follow.
- Review waterway adequacy code (1662) for accuracy.

7-5.3 *On Site Field Review*

- Verify when the scour code (1680) is coded a 7, 4 and 2 or less in the bridge inspection report that it reflects the field conditions.
- Verify from both office and field that the scour note (1680) added to all bridges over water has clear and direct information.
- Verify any scour related concerns such as exposed footings, channel migration, presence or need for countermeasures.
- Verify that the POAs reflect the conditions in the field.
- Verify the channel protection code (1677, **SNBI B.C0.9 and B.C.10**) for accuracy.
- Verify that the channel protection note (1677) adequately reflects site conditions.
- **Verify BMS 361 (SNBI B.C.11) for completeness and accuracy of coding/condition states.**
- **Review 1662 code and note, if applicable, and observe for indications of highway or bridge deck overtopping.**

7-6 Regional and Special Structures Inspection Units

The responsibility of structural inspections has been divided between three supervisors within the BPO. There are two Regional Inspection Engineers that oversee the bulk of the state inventory of bridges within the state of Washington. One Special Structures Engineer oversees the more unique types of structures within the inventory.

7-6.1 *Office Review of Structural Inspections*

A Regional Inspection Engineer or a second Team Leader will review 100 percent of High Risk, NSTM, In-Depth, Interim, Damage, Complex Feature, 48-month Interval, Inventory and Local Agency inspection reports under their responsibility. Reports outside the above criteria, and not meeting “Team Leader Approval” criteria, receive a lower level of review. See Appendix 7-D for specific criteria. The reviews are random regarding Team Leaders and are based on complexity and risk of structures and report.

The Special Structures Engineer reviews 100 percent of the following structural reports: Special Structures Bridges, Tunnels, and Ferry Terminals. In rare cases, a review by a second Team Leader may be substituted for Special Structures Engineer review.

The office review of reports will consist of the following validation for accuracy and consistency:

- **Inspection Type** – The appropriate inspection types are identified.
- **Inspection Date** – Ensure that bridges are inspected on time.
- **Inspection Interval –** Verify that inspection interval is based on condition or office policy (i.e., 48-month interval criteria).
- **Inspection Hours** – Verify that the correct inspection hours are reported based on history of previous report hours, structure type and condition.
- **Accounting Codes** – Verify that the correct accounting codes are used.
- **Organization of Report** – Verify that the report is organized, understandable, uses correct photo and file references that follow office policy.
- **Proper Inspection Forms** – Verify that the appropriate inspection forms are included in the reports.
- **Soundings and Ground Lines** – Verify if bridge requires soundings. If required, verify that soundings and ground lines are correct and completed.
- **Inspection Resources** – Verify that the appropriate resources needed for safety, access, and adequate inspection are being used.
- **NBI Codes** – Verify that the NBI codes are supported by inspection report content.
- **BMS Elements** – Verify that the BMS elements are complete and accurate.
- **BMS Condition States** – Verify that the BMS condition states are supported by the inspection report content.
- **Repair Recommendation and Priorities** – Verify that appropriate repairs and repair priorities are recommended based on current inspection report content.
- **Follow-Up Actions on Critical Findings** – Ensure deficiencies that require immediate action have had the proper parties notified and are being monitored and/or followed up on.
- **Follow-Up on Damage and Critical Finding Damage Repair Report (CFDR) –** Verify that CFDR’s and Alerts have updated information added such as future repaired dates and/or completed repairs.

Additional QC measures that are associated with the inspection program consist of the following:

- Regional Inspection Team Leaders are generally scheduled to inspect bridges randomly. This limits the same bridges getting inspected by the same Team Leader repetitively.
- Both Regional Inspection Engineers can review bridge inspection reports written by all Team Leaders that perform regional bridge inspections at the BPO.
- All changes made or suggested for any report during the QC review process must be agreed upon by the Team Leader responsible for the final submittal of the report. In the event of a disagreement, the Bridge Condition Engineer or Program Manager shall intervene as arbitrator to determine a final solution to the matter.

Documentation of reports reviewed includes, but is not limited to bridge name, inspector name, date bridge inspected, date reviewed and review state (APPROVED, APPROVED AS NOTED(AAN) OR RETURN FOR CORRECTION(RFC)). Example office review forms are included in Appendices 7-E and 7-F.

7-6.2 *Field Review of Structural Inspections*

Each year, up to 2 percent of all structural inspections should be selected for field review. Structures are selected from a list of current year inspections, along with a concurrent review of the prior inspection. The reviews are targeted in such a manner that all Team Leaders have close to an equal number of bridges reviewed.

During the field review, the primary focus is to evaluate the accuracy of:

- NBI inventory items.
- NBI ratings of condition codes.
- Bridge BMS elements.
- Bridge BMS element condition states.
- Written or omitted repairs.
- Proper safety procedures.
- Areas of improvement.

Field reviews allow the regional and special structure inspection engineers an opportunity to observe how all Team Leaders are evaluating structures, relative to the NBI and office procedures, policies and requirements

The following are the expectations that the regional and special structures inspection engineers have regarding the variance of coding elements, condition codes and condition states:

- NBI Condition Codes "Deck, Superstructure, and Substructure," shall be within plus or minus 1 for codes 5 or higher. Codes of 4 or less will not deviate.
- BMS elements: there should be no missing elements.
- BMS condition states: verbiage in the report should be supportive of the condition state ratings and quantities.
- Repairs, all repairs need to be supported by inspection observations.

All deviations from the above standards are documented, and the regional and special structures inspection supervisors shall dialogue one-on-one with the Team Leader responsible for the report concerning all deviations. It is the responsibility of the team leaders direct supervisor to determine if more training is necessary for the Team Leader to ensure consistency of the bridge inspection reports. A field review form is included in Appendix 7-G.

7-7 Underwater Inspection Unit

The Underwater Inspection (UW) Unit within the BPO focuses on the structural inspection of substructure bridge elements identified to be in water deeper than 4 feet. The Special Structures Engineer has the responsibility of administering QC procedures identified below for this unit.

7-7.1 *Underwater Inspection Office Report Review Process*

Reviews of UW inspection reports are based on the type and condition of the bridge inspected. A complete office review is performed for all bridges that fall into one of the following categories:

The review ensures that all documentation is included to support the underwater findings. This includes:

- Correct substructure coding (based on inspection findings).
- Sketches and drawings showing the extents of underwater inspection.
- Documentation of ground lines around all piers.
- Drawings showing the location and extents of all defects.
- Drawings showing the current channel cross section.
- Repairs must be adequately described and written into the text of the inspection findings.

A UW report checklist is used to make sure the report package is complete.

7-7.2 *Field Review of Underwater Bridge Inspections*

The Special Structures Engineer accompanies the underwater bridge inspection team for 5 percent of all of the inspections performed each year.

7-8 WSDOT Bridge Preservation Office Quality Assurance Program

7-8.1 *Purpose*

To conduct an independent annual evaluation of the adequacy of the bridge and tunnel inspection program within the BPO in meeting the FHWA requirements as defined in the §650.307 through §650.315 and §650.507 through §650.515, as well as office policy, procedures and best management practices established in the WSBIM. The program will also assess the adequacy and consistency of QC procedures in place within the BPO.

7-8.2 *Definitions*

Quality assurance (QA) is defined in §650.305 and §650.505 as the use of sampling and other measures to assure the adequacy of QC procedures to verify or measure the quality level of the entire bridge inspection and load rating program. QA is administered from outside a work group.

7-8.3 *Timeframe of the Quality Assurance Evaluation*

QA will be conducted on bridges inspected in the previous inspection season.
See Appendix 7-H for details on the selection process.

7-8.4 *Personnel*

To meet the federal requirement identified in §650.307(c), §650.313(g), §650.507(e), and §650.513(i) the BPO created a Quality Assurance Engineer (QAE) position. This position is responsible for administering the QA program. The QAE must meet the same qualifications and re-certification requirements as a TL.

7-8.5 *Quality Assurance*

The QA program treats the separate units within BPO as one when evaluating the following areas below for accuracy and consistency and produces an annual summary of findings. In addition to that, the QAE will participate in an annual office wide "Process Change" meeting, a meeting with management and staff prior to the beginning of the next inspection season. This will consist of a summary of the information that is contained in the annual report submitted to the SPM.

1. **Staff Qualifications and Re-Certification** – Document validity of qualifications and re-certification of SPM, TL, LRE and UBID based on roles and responsibilities defined in Chapter 1.
2. **Office Records and Procedures** – Review and document the accuracy and completeness of the following for those bridges selected using the selection criteria described in Appendix 7-H:
   - Contents of bridge letter and electronic files (see Appendix 7-A).
   - Load ratings.

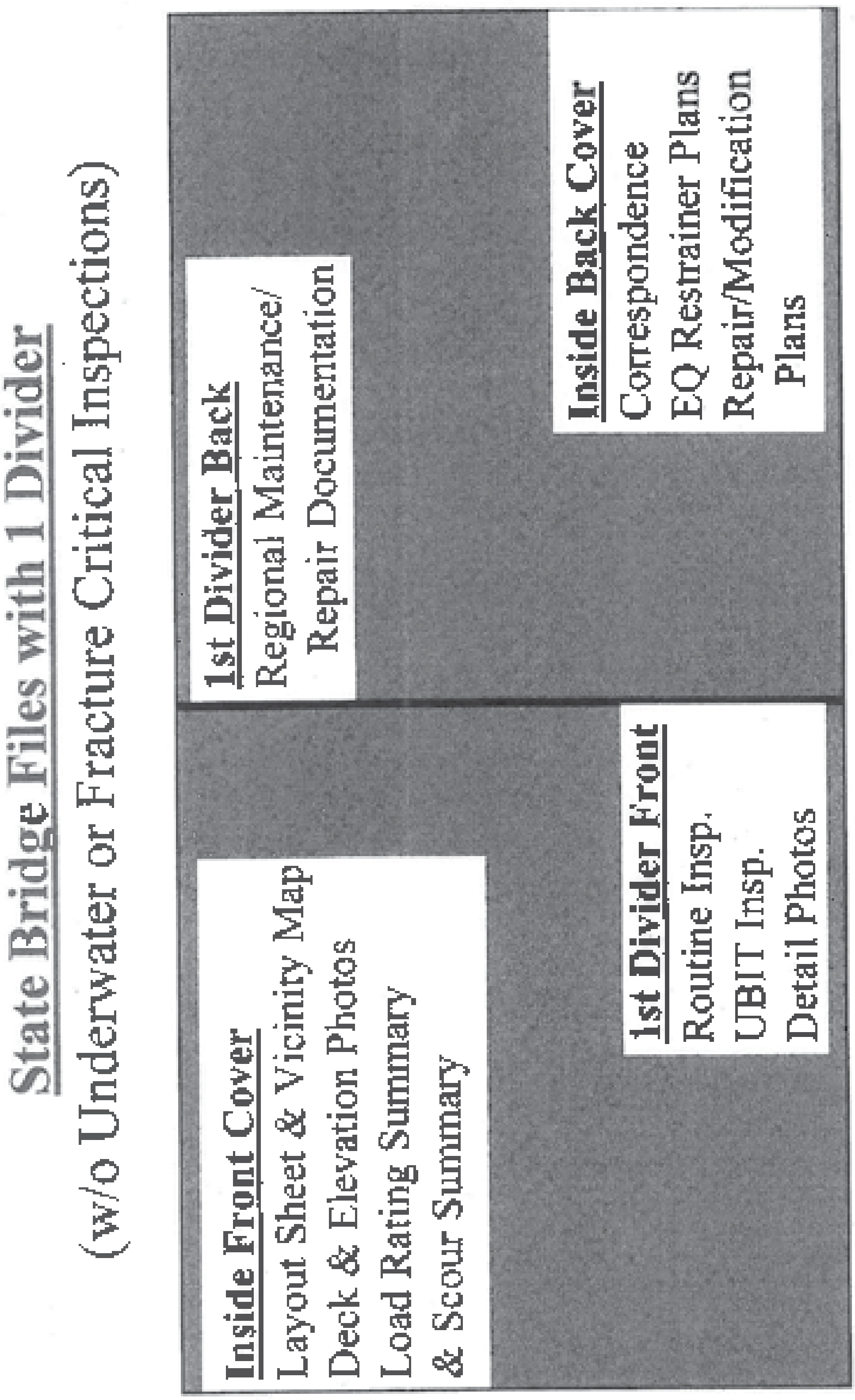
   Review of load rating information:
   - Load posting at bridge matches that of load rating documentation.
   - Operating level codes match legal load ratings and posting codes.
   - Summary sheet in the letter file is signed and stamped by Engineer of Record (EOR).

   Inspection reports:
   - Appropriate report forms:
     - NSTM report
     - Underwater Inspection report
     - Complex Feature Inspection report
     - Damage inspections
   - Bridges on 48-month interval.
   - Scour Evaluation of bridges over water.

3. **Field Procedures** – Review and document the accuracy and completeness of the following for those bridges selected using the selection criteria described in Appendix 7-H:
   - Appropriate forms used.
   - NBI appraisal coding, NBI inventory data and Bridge Management System (BMS) condition state coding.
   - Inspection notes.
   - Photographs and sketches.
   - Maintenance recommendations.
   - Resources used to conduct bridge inspections.
   - Safety hazards addressed.
4. **Data Quality** – The Coding and Appraisal Unit completes QC/QA processes that include error checks, incorporated results from FHWA provided error checks, persistent error reports, and State developed consistency, compatibility and accuracy checks.
5. **De-certification/Reinstatement** – For process on de-certification and reinstatement see Chapter 1.
6. **Deliverables** – A written report will be provided to the SPM prior to the beginning of the next inspection season that will include:
   - Executive summary.
   - Selection breakout by category. See Appendix 7-H for details.
   - Individual QA field and office reports for each bridge selected.
   - Findings (from both office and field procedures).
   - Recommendations to management.

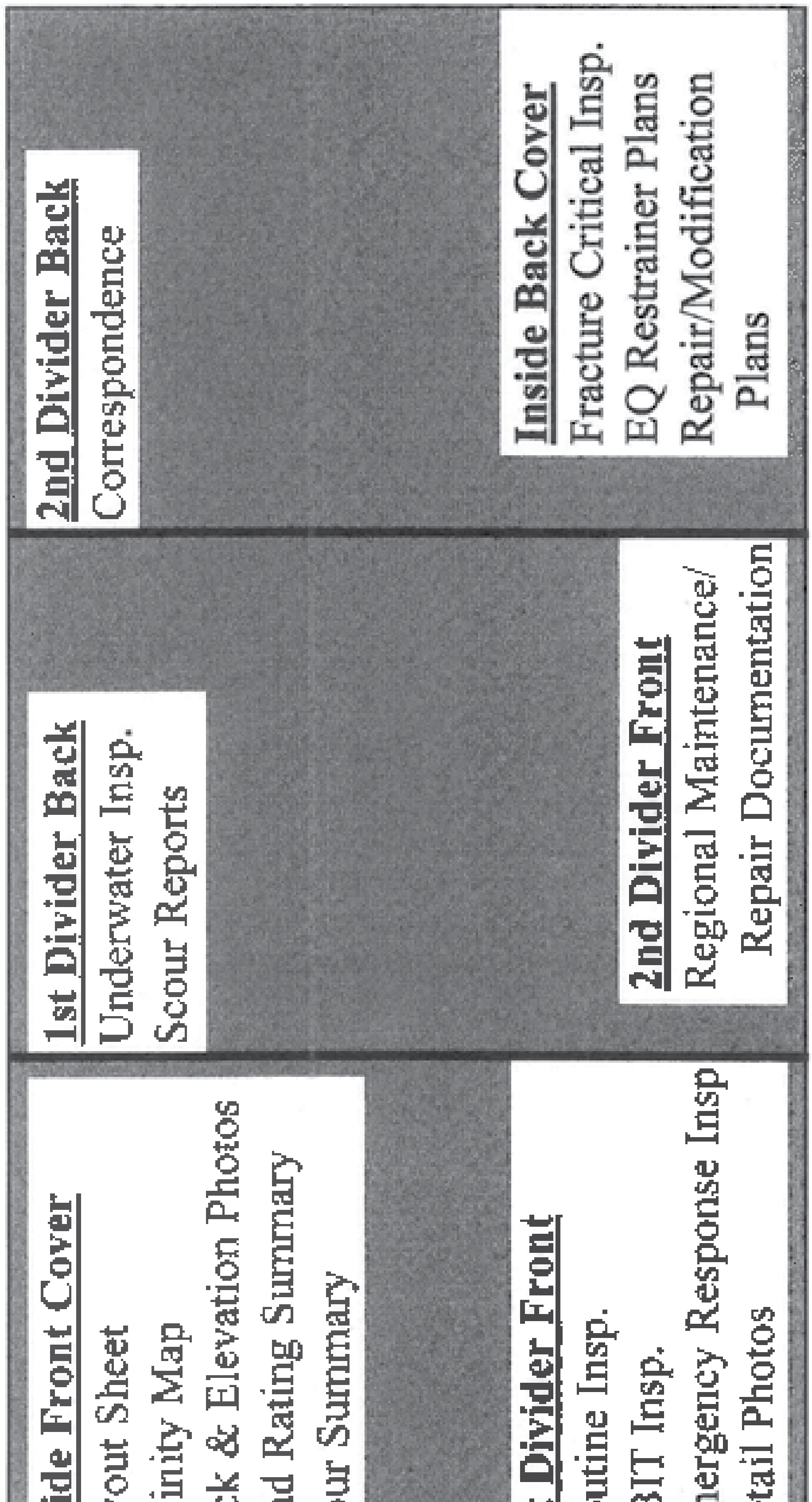
7-9 Appendices

Appendix 7-A Bridge Letter File Contents for State Bridges



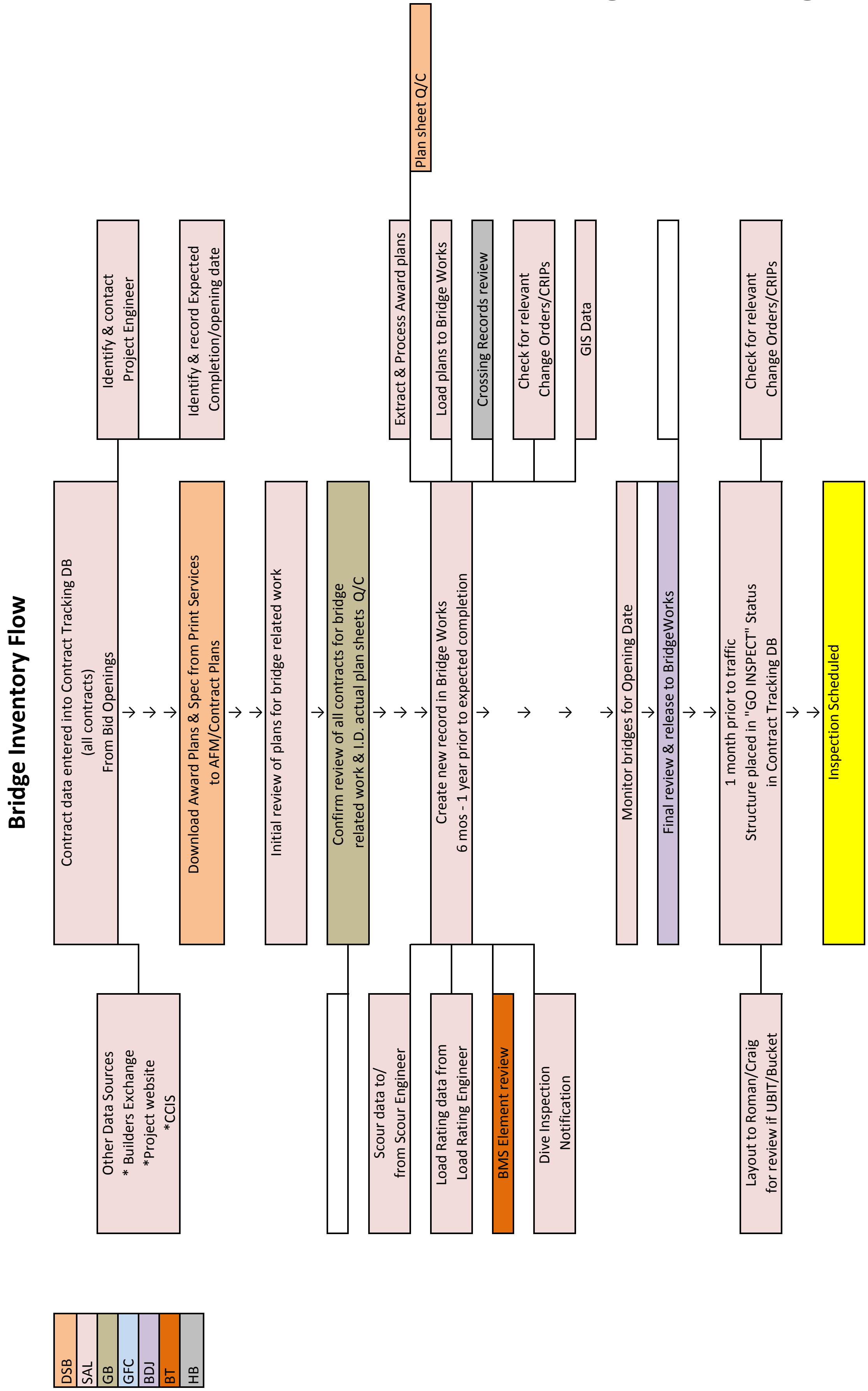
(page 1 of 2)

State Bridge Files with 2 Dividers
(including Underwater and Fracture Critical Inspections)



(page 2 of 2)

Appendix 7-B Flowchart for Tracking New Bridges



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Appendix 7-C WSBIS Fields Maintained With Other WSDOT Database Source Information

1. Fields that BPO would like to get from TDO to check for NBI submittal (new SNBI fields will be identified in 2025):

   hwy_class (char(1), null) – This code identifies what type of highway the inventoried route is one using the following:

   1 Interstate highway
   2 U.S. numbered highway
   3 State Highway
   4 County road
   5 City street
   6 Federal lands road
   7 State lands road
   8 Other (included toll roads not otherwise identified.)

   serv_level_code(char(1), null) – This code describes the designated level of service provided by the inventoried route:

   1 Mainline (most local agency bridges)
   2 Alternate
   3 Bypass
   4 Spur
   6 Business
   7 Ramp or "Y"
   8 Service and/or unclassified Frontage Road
   0 None of the above

   When two or more routes are concurrent, the highest class of route will be used. The hierarchy is as listed above

   adt(numeric(6,0), null) – This is the Average Daily Traffic (ADT) volume carried on the route being inventoried. If bridges on a divided highway are coded as parallel, then the ADT is the volume carried on the individual bridge, not the cumulative volume carried on the route. The determined ADT volume must be no more than four (4) years old. Add leading zeros to fill all spaces in the field.

   adt_truck_pct (numeric(2,0),null) – This is the percentage of the ADT volume that is truck traffic. It does not include vans, pickups, or other light delivery trucks. Code to the nearest whole percent.

   adt_year(numeric(4,0), null) – This is the year in which the estimate of the ADT volume was determined. If the year entered in this field is more than four years in the past, a new ADT volume must be determined and entered in the ADT and the year the ADT was determined in this field.

   Future_adt(numeric(6,0), null) – This is the ADT volume that the inventory route is expected to carry 20 years in the future. This field may be updated whenever a new projection is made. The field must be updated any time the projected date of this forecast is less than 17 years, but not more than 22 years from the current year.

Future_adt_year(numeric(4,0), null) – This is the year for which future_adt has been projected. This date must be at least 17, but no more than 22 years from the current year. If the date in this field is outside these limits, then a new value will be required for and a new year will need to be entered in this field.

strahnet_hwy(char(1),null – For the inventory route identified indicate STRAHNET highway status using one of the following codes:

0 The inventory route is not a STRAHNET highway.
1 The inventory route is an Interstate STRAHNET highway.
2 The inventory route is a non-Interstate STRAHNET highway.
3 The inventory route connects with a Department of Defense facility.

nat_truck_ntwrk_flag(char(1),null)

fed_hwy_system_code(char(1),null) – This item shall be coded for all records in the inventory. For the inventory route identified indicate whether the inventory route is on the NHS or not on that system. This code shall reflect an inventory route on the NHS as described in the TRANSPORTATION EQUITY ACT FOR THE 21ST CENTURY (TEA21).

If more than one federal aid highway is carried on or under the bridge, indicate only the classification of the more primary route.

0 Inventory Route is not on the NHS.
1 Inventory Route is on the NHS.

fed_functional_class(class(2),null) – This code describes the Federal Functional classification of the inventory route as classified according to Statewide National Functional Classification System maps. Statewide National Functional Classification System maps are located at local agency planning departments or WSDOT Service Center Planning.

Separate codes are used to distinguish roadways located in rural or in urban areas. Routes shall be coded rural if they are not inside a designated urban area, Codes 08, 09, and 19 are for off-system roads.

Rural Codes

01	Principal Arterial – Interstate
02	Principal Arterial – Other
06	Minor Arterial
07	Major Collector (Federal Aid Secondary)
08	Minor Collector
09	Local

Urban Codes

11	Principal Arterial – Interstate
12	Principal Arterial – Other Freeway or Expressway
14	Other Principal Arterial
16	Minor Arterial
17	Collector
19	Local

f**ed_lands_hwy_code(char(1),null)** – This code identifies bridges on roads which lead to and traverse through federal lands. These bridges may be eligible to receive funding from the Federal Lands Highway Program. Use one of the following codes:

0 Not Applicable
1 Indian Reservation Road (IRR)
2 Forest Highway (FH)
3 Land Management Highway System (LMHS)
4 Both IRR and FH
5 Both IRR and LMHS
6 Both FH and LMHS
9 Combined IRR, FH, and LMHS

For definition of IRR (Indian Reservation Roads), see Title 23 USC Section 101.

2. Fields BPO would like to get from TDO if available:

Region_code(char(2),null) – This is a two-digit code, which identifies the WSDOT region in which the bridge is located.

County_id(int,null) – This is a two-digit code, which identifies the county in which the bridge is located. If this is a jointly owned bridge, the county that is responsible for reporting the data to the inventory should be entered here. Use one of the following codes.

City_id(int,null) – This is the city in which the bridge is located. (Codes for cities and towns are identified according to the most recent U.S. Bureau of the Census Identification Schedule.) Contact the Bridge Engineer for Local Agencies for newly incorporated municipalities.If the bridge is outside of corporate limits or in an unincorporated city, code all zeros.

Leg_dist_code_1(int, null) – This field identifies the first or only State Legislative District in which the bridge is located.If the legislative district number is followed by a letter (District 19A, for example), disregard the letter and enter the two-digit number only

Leg_dist_code_2(int, null) – For bridges which span a State Legislative District dividing line, use this field to identify the second State Legislative District number.Use both this and the Legislative District Number (1) field to enter the two separate State Legislative District numbers. If no code is applicable, enter all zeroes.

speed_limit(tinyint, null) – Speed limit on the bridge.

- These are coming from the Data Mart process…an ARM value is returned as well.
- These are going to be populated by HPMS.

Appendix 7-D Bridge Preservation Office Lead Approval Criteria

Please use the following criteria to help you determine which reports can be sent directly to the Bridge Information Group without further review by a supervisor or a second Team Leader.

A “Bridge Inspection Report” that fits any one of the following nine criteria must be reviewed by a Regional Bridge Inspection Engineer or a second Team Leader .

1. If NBI codes for Deck Overall, Superstructure or Substructure are less than “6”.
2. Structures with repairs or conditions to be monitored (excluding ‘J’ type repairs).
3. New bridge structures (Inventory Inspections).
4. Interim Inspections to monitor deterioration of BMS elements.
5. NSTM bridges.
6. Local Agency bridges.
7. UBIT Bridge Inspections with NBI codes for Deck, Superstructure or Substructure are less than 6.
8. Any inspection with a interval >24 months.
9. Any bridge that is currently having issues with scour.
10. Any time an inspection/report type and/or interval is either changed, added, or deleted.

Additionally, the Team Leader may submit for review any report that the Team Leader feels needs further input from the Regional Bridge Inspection Engineer.

For quality assurance reasons, the “Bridge Inspection Report” can be randomly reviewed at the Regional Bridge Inspection Engineer’s option.

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Appendix 7-E Bridge Preservation Office Quality Control Review Tracking Form

2011 Inspection Report Status

EXAMPLE

	Total	Structure ID	Bridge Number	Bridge Name	Lead Inspector	CO-Inspector	Inspection Date	Date Received	Non UBIT Totals = 10: Routine	Short	Damage	Interim	Safety	Hours	UBIT Totals= 10: Routine	Interim	F.C.	Special	UBIT Hours	Returned to Lead
									8	0	1	0	1	10.5	3	1	6	0	107.5	
Routines	1	0009245A	16/120	OLYMPIC DR NW OVER SR 16	WDS	HDR	1/4/11	1/6/11			1			1.5						1/6/11
Routines	2	0017677A	285/10P	GEORGE SELLAR PED TUNNEL	GAS	GAS	1/8/11	3/21/11					1	1.0						3/22/11
Routines	3	0013077C	2/101	SLOUGH	DCC	TKK	4/7/11	5/4/11	1					1.0						5/6/11
Routines	4	0013077D	2/102	STREAM	DCC	TKK	4/7/11	5/4/11	1					1.0						5/6/11
Routines	5	0006347A	9/117	SNOHOMISH R OVERFLOW	DCC	TKK	4/7/11	5/4/11	1					1.0						5/6/11
Routines	6	0008375C	405/103E	228TH ST OC	DCC	TKK	4/4/11	5/4/11	1					1.0						5/6/11
Routines	7	0008375D	405/103W	228TH ST OC	DCC	TKK	4/4/11	5/4/11	1					1.0						5/6/11
Routines	8	0008673D	512/23N	FRUITLAND AVE OC	DCC	TKK	4/4/11	5/4/11	1					1.0						5/6/11
Routines	9	0008673C	512/23S	FRUITLAND AVE OC	DCC	TKK	4/4/11	5/4/11	1					1.0						5/6/11
Routines	10	0008761A	522/142	SR 522 OVER W MAIN ST	DCC	TKK	4/7/11	5/4/11	1					1.0						5/6/11
UBITS	1	0003477A	285/10	SEN. GEORGE SELLAR BR.	GFC	ABK	1/8/11	[illegible]									1		28.0	1/27/11
UBITS	2	0002001B	2/215	WENATCHEE R	DCC	TKK	4/5/11	[illegible]									1		7.0	5/10/11
UBITS	3	0002657A	207/4	WENATCHEE RIVER	DCC	TKK	4/6/11	5/4/11									1		8.0	5/10/11
UBITS	4	0008116A	5/345W	NISQUALLY R	DAG	AES	4/17/11	[illegible]									1		14.0	5/10/11
UBITS	5	0013731C	504/36	MARATTA CREEK	RAA	RCD	[illegible]	[illegible]							1				2.5	5/12/11
UBITS	6	0005358A	509/30	DRY GULCH	RAA	RCD	[illegible]	[illegible]								1			1.0	5/12/11
UBITS	7	0013620A	504/27	HOFFSTADT CREEK	RAA	RCD	5/5/11	[illegible]									1		23.0	6/6/11
UBITS	8	0002069A	5/345E	NISQUALLY RIVER	RAA	RCD	[illegible]	[illegible]									1		18.0	6/7/11
UBITS	9	0008175E	167/127E	BN RR OC (NP)	RAA	RCD	[illegible]	6/8/11							1				3.0	6/8/11
UBITS	10	0008175F	167/127W	BN RR OC (NP)	RAA	RCD	[illegible]	6/8/11							1				3.0	6/8/11

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Appendix 7-F Bridge Preservation Office Quality Control Report Review Tracking Form

2011 REPORT REVIEW STATUS

REVIEW DATE	REPORT DATE	006/115	INSPECTOR	APPROVAL STATUS	COMMENTS
03/26	02/28	006/101	FPP/WAW	AAN	
03/29	03/19	099/540NB	DCC/GAS	AAN	
03/29	03/19	099/540SB	DCC/GAS	AAN	
03/30	03/20	099/540W-S	DCC/GAS	APPROVED	
03/30	03/07	08507600	WDS/AES	AAN	LA Centralia
03/30	03/21	08039100	WDS/TJN	APPROVED	LA Klickitat County
03/30	03/21	08118500	WDS/TJN	AAN	LA Klickitat County
03/30	03/08	08201200	WDS/AES	AAN	LA Lewis County
03/31	03/24	08647200	WDS/SMP	AAN	LA State Parks
03/31	03/23	08276000	WDS/TJN	AAN	LA Clark County
03/31	03/22	0012160A	WDS/TJN	AAN	LA Skamania County
03/31	03/22	08218700	WDS/TJN	AAN	LA Klickitat County
03/31	03/07	08288400	JED/TJN	AAN	LA Yakima County
04/01	03/08	08396900	JED/TJN	AAN	LA Yakima County
04/01	03/07	08651000	JED/TJN	AAN	LA Yakima County
04/04	03/17	08271700	DAG/TJN	AAN	LA Cowlitz County
04/04	03/15	08557500	DAG/TJN	AAN	LA Longview
04/04	03/15	08558400	DAG/TJN	AAN	LA Longview
04/04	03/03	0009236C	DAG/TKK	APPROVED	LA Cowlitz County
04/05	03/03	167/112W	DAG/TKK	AAN	
04/05	02/28	167/110	DAG/TKK	AAN	
04/05	03/03	167/116	DAG/TKK	APPROVED	
04/05	03/03	167/112W-N	DAG/TKK	AAN	
04/05	03/03	167/111W-N	DAG/TKK	AAN	
04/05	03/02	167/123W	DAG/TKK	AAN	
04/05	03/02	167/129	DAG/TKK	AAN	
04/05	03/02	167/131.25	DAG/TKK	AAN	
04/05	03/28	0010756A	DAG/HDR	AAN	LA Cowlitz County
04/05	03/29	08492300	DAG/HDR	AAN	LA Cowlitz County
04/05	03/14	0003093A	DAG/TJN	AAN	LA Kelso
04/06	03/09	08230200	WDS/AES	AAN	LA Cowlitz County
04/06	03/31	08164100	DAG/[illegible]	AAN	LA Cowlitz County
04/06	03/03	005/626.5A	JHL/RCD	APPROVED	
04/06	03/01	020/223N	JHL/RCD	APPROVED	
04/06	03/02	005/706	JHL/RCD	AAN	
04/06	03/03	005/651W	JHL/RCD	AAN	void under south approach
04/06	03/02	005/708	JHL/RCD	AAN	
04/06	03/03	005/726E	JHL/RCD	APPROVED	

EXAMPLE

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Appendix 7-G Bridge Preservation Office Quality Control Field Review Form

Field Review

2012 WASHINGTON STATE
QUALITY CONTROL REVIEW

Bridge Number:	____________	Bridge Name:	____________________________
Inspectors:	____________	QC Reviewer:	____________________________
Inspection Date:	____________		
Frequency:	____________		
Previous Report Date	____________		

Description of Quality Control Method		
Are all the applicable FHWA items for the structure properly coded?	Yes _____	No _____
Are all the BMS elements for the structure correctly identified?	Yes _____	No _____
Are all the BMS element condition states for the structure properly coded?	Yes _____	No _____
Do the BMS codes support the NBI Codes?	Yes _____	No _____

(page 1 of 2)

Field Review

2012 WASHINGTON STATE QUALITY CONTROL REVIEW

Bridge Number: ____________ Bridge Name: ____________________________

Inspectors: ____________ QC Reviewer: ____________________________

Inspection Date:

Does the verbiage within the report support the condition states?	Yes _____ No _____
Were proper safety procedures practiced?	**Yes _____ No _____**
Are the existing repairs supported by the inspection findings?	**Yes _____ No _____**
Are improvement processes necessary?	**Yes _____ No _____**

(page 2 of 2)

Appendix 7-H Bridge Preservation Office Quality Assurance Bridge Selection Process

The following table identifies categories used to help evaluate whether or not the random selection is representative sample of the previous seasons inspections. If a particular category is not considered to be covered sufficiently, additional bridges can be traded out in order to establish more representative coverage. The selection set for the office and field review will include a minimum of 100 bridges of the previous year's routine reportable inspections. The set of 100 bridges may also include bridges with a 48-month inspection interval that will be due the following year rather than selecting those done the previous year and not due for inspection again for another three years.

One of two methods may be incorporated during the selection process. The first method, like the NBIP compliance review trips performed in Washington state, the QA selection process may use a three-year cycle in which bridges are selected from two different regions each year. In this three-year cycle, a random set of state bridges are selected and receive a QA inspection from two of the six regions. In addition to this cycle and due to the number of bridges in the Northwest Region, a smaller sampling of bridges (one or at most two inspection trips depending on complexity of bridges) will be selected from this region. This will be done in the off-cycle years to maintain a representative sample of bridges within that region in the overall three-year cycle.

The three-year cycle will pair up the following regions:

- SCR and EAR (includes a small set in NWR)
- OLR and SWR (includes a small set in NWR)
- NWR and NCR

The second method will take a random set of state bridges representing all six regions within the state. Due to the disparity in the number of bridges within each region and to get a representative sample, this method may be required. Bridges within the Northwest Region will represent the largest percentage of the random sample due to the number of bridges within that region.

The final list developed prior to generating a random sample is screened for inspection types that consist of a reportable Routine type inspection. The list is also screened for bridges that have been previously QA'd. Once a final list of bridges is developed, a random list is generated. The first 100 bridges are selected and represent the final short list for a QA office and field review for that year. This final short list is then validated for reasonable representation of the categories listed below.

As an option, a maximum of five bridges previously receiving a QA review, excluding work from the previous QA inspection season, can be added to the final short list for the season. The goal of doing this is to validate whether suggested changes in the report that reflect correct office procedures and federal requirements have been implemented or not. These bridges may be chosen by the QA Engineer to best fit within proximities of the randomly selected bridges.

- Region
- Scour Code
- Primary Material Type
- Open/Closed/Posted
- Primary Design Type
- Year Built
- Inspection Type
- Inspection Interval
- By Team Leader
- NBI Reportable
- Bridge Length
- High Risk

BPO Scope of Field Review

The selection process above does not eliminate any bridges because of size or complexity. The typical bridge will be inspected in its entirety. However, the scope of field review for larger and more complex bridges is entirely a different matter. The process for QA inspection for these types of structures will be more case by case. The idea will be that some of all of the components for these particular bridges will be inspected. The QA process should consider both time and size in determining how to reach this goal for these types of bridges. Traffic windows, lane closure manpower, species windows, and equipment availability are other factors that will influence the ability for one QA team to accomplish a smaller scale inspection of a larger more complex structure.

Appendix 7-I Bridge Preservation Office Field Review

The following is a list of contents in a typical bridge file for structures owned by the State of Washington which also includes Washington State Ferries (WSF) structures.

- Letter file contents include:
- Deck and Elevation Photos (More recent photos are stored on BEISt)
- Vicinity map
- Load Rating summary sheet
- Scour Summary sheet**
- Signed Inspection reports
- NSTM Inspection report*
- Complex Feature Inspection report*
- Underwater (U/W) Inspection report*
- WSBIS forms (in file drawer)
- Correspondence
- Maintenance records
- Plan sheets (Most plans are stored on BEISt)

*For bridges that may include an underwater, NSTM and/or Complex Feature inspections.
**For bridges over water.

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Chapter 8 Electrical and Mechanical

8-1 General

The National Bridge Inspection Standards (NBIS)/National Tunnel Inspection Standards (NTIS), 23 CFR 650, requires that complex bridges and tunnels have specialized inspection procedures, and additional inspector training. These structures have numerous mechanical and electrical systems requiring inspection, troubleshooting, repair, and rehabilitation. This chapter serves as a guideline to illustrate inspection and reporting procedure as followed by the Complex Bridge and Tunnel section of the Bridge Preservation Office.

8-1.1 *References*

Inspection staff may refer to the following:

- AASHTO *LRFD Movable Highway Bridge Design Specifications*, 2010
- AASHTO *Movable Bridge Inspection, Evaluation, and Maintenance Manual*, 2017
- AASHTO *Standard Specifications for Movable Highway Bridges*, 1988
- FHWA *Bridge Inspector's Manual for Movable Bridges* IP 77-10
- *Emergency Operations Manual* M 54-11
- Blue Ribbon Commission, Resolution No. 398
- FHWA *Tunnel Operations, Maintenance, Inspection and Evaluation* (TOMIE) *Manual*, 2015
- FHWA *Specifications for the National Tunnel Inventory*, 2015

8-1.2 *Definitions*

Some definitions for use with this chapter are as follows:

Complex Bridge – Complex bridges are defined in the NBIS as movable, suspension, cable stayed, and other bridges with unusual characteristics.

Complex bridges in Washington are referred to as "Complex Feature" bridges where discussed in other chapters of this manual.

Complex Tunnel – Complex tunnels are defined in this manual as tunnels characterized by advanced or unique structural elements or functional systems.

National Bridge Inspection Standards (NBIS) – Title 23 Code of Federal Regulations 650 Part C defines the NBIS regulations, and establishes requirements for inspection procedures, interval of inspections, qualifications of personnel, inspection reports, and preparation and maintenance of a state bridge inventory. The NBIS apply to all structures defined as bridges located on all public roads.

National Tunnel Inspection Standards (NTIS) – Title 23 Code of Federal Regulations 650 Subpart E defines the NTIS regulations, and establishes requirements for inspection procedures, interval of inspections, qualifications of personnel, inspection reports, and preparation and maintenance of a state tunnel inventory. The NTIS apply to all structures defined as highway tunnels located on all public roads.

See Section 1-1.1 for additional definitions used in this manual.

8-2 Description of Complex Bridges and Tunnels

In accordance with the description of the Bridge Inspection Organization offered in Section 1-2, a bridge inspection program/tunnel inspection program as required by the NBIS and NTIS has been constructed to ensure safe and reliable operation of electrical/mechanical systems present on the bridges and tunnels listed in Appendix 8-E.

The Complex Bridge and Tunnel section is staffed by individuals, specialized in electrical or mechanical engineering, who have defined roles and responsibilities. Their roles and qualifications are as follows:

8-2.1 *Delegated Program Manager (DPM)*

A delegated program manager assumes some functions for the statewide program manager for the selected subset of structures under their direct control. To qualify as a delegated program manager, the individual must meet, at a minimum, the requirements as follows:

1. The individual in charge of the organizational unit that has been delegated the responsibilities for bridge inspection, reporting, and inventory shall possess the following minimum qualifications:
    a. Be a registered professional engineer in the State of Washington; or
    b. Have a minimum of 10 years' experience in complex bridge or tunnel inspection assignments in a responsible capacity.

Note: Although DPMs perform functions for the bridge inspection organization, overall responsibility for NBIS compliance still resides with the Statewide Program Manager.

8-2.2 *Electrical/Mechanical Complex Bridge Lead Inspector (CBLI)*

A CBLI is in charge of inspections and is responsible for planning, preparing, performing the field inspection of bridges/tunnels, and reporting observations/findings. The CBLI also makes repair recommendations and is responsible for initiating the critical damage procedures including full bridge or tunnel closure if deemed necessary. To qualify as a CBLI, the individual must meet, at a minimum, the requirements as follows:

(a) An individual in charge of an inspection team shall possess the following minimum qualifications:
    (1) Be a registered professional engineer in the State of Washington.
    (2) Have a minimum of 4 years' experience in complex bridge or tunnel inspection.

A continued certification of complex bridge inspection personnel has been developed in order to ensure that all program managers and CBLIs are kept up to date with the latest practices and technology in the areas of complex bridge and tunnel inspections. The continued certification of complex bridge inspection personnel is detailed in Appendix 8-D.

8-3 Inspections

Several different types of inspections are in place to adhere to the requirements of the NBIS and NTIS. This section identifies and describes the inspection types and reporting procedures used for mechanical and electrical inspections by the Bridge Preservation Office (BPO).

8-3.1 *Routine Inspections*

Regularly scheduled comprehensive safety and operational reliability inspections encompassing all mechanical/electrical elements of the structures listed in Appendix 8-E. Routine inspections are performed by a licensed professional engineer to evaluate safety as well as whether the electrical and mechanical systems are performing as designed, identify any changes from initial or previously recorded conditions, and ensure that electrical and mechanical components of structures pertaining to the Complex Bridge and Tunnels section continue to satisfy present service requirements.

1. **Interval** – Routine electrical and mechanical inspections are conducted at a maximum of every 24 months as required by NBIS, Section §650.311 and NTIS, Section §650.511. Every complex bridge is inspected annually as suggested by AASHTO *Movable Bridge Inspection, Evaluation, and Maintenance Manual* Chapter 2.3 and required by the *Transportation Structures Preservation Manual*, Bridge Inventory and Inspection Rules.
2. **Inspecting Methodology** – Critical electrical and mechanical components are visually and operationally inspected. Non-destructive testing methods adhering to guidelines established by the AASHTO *Movable Bridge Inspection, Evaluation, and Maintenance Manual* Chapter 2, are used in evaluation of bridge components as well. Following these procedures throughout routine inspections helps ensure the safety and operational reliability of the mechanical and electrical systems by providing a thorough and comprehensive inspection.
3. **Inspection Report** – A routine inspection report (RIR) shall be prepared at the completion of each routine inspection to record the inspection findings, provide a narrative description of conditions at the site, and note any changes in the coding information. The CBLI shall record and submit the findings of the routine inspection into BridgeWorks as follows:
    a. At the conclusion of the routine inspection, confirm the Numerical Rating Condition (NRC), Appendix 8-C, coding for the various elements and make any changes necessary. Complete the narrative portion corresponding to any condition rating change describing the existing condition of its respective element. For tunnels, the FHWA *Specifications for the National Tunnel Inventory* is used as a guideline for rating tunnel specific elements which are submitted to the NTI by the following process:
        - Tunnels with mechanical and/or electrical elements are entered into Bridgeworks by the CBLIs via the corresponding RIR. The same table is attached to both reports in cases where a structure has both mechanical and electrical elements. Condition states and quantities are the same in both RIRs when a tunnel has both mechanical and electrical elements.
        - Every NTI table included in a RIR contains a complete set of Mechanical, Electrical, Fire/Life Safety/Security Systems and Signs NTI elements with quantities other than zero for applicable elements to the structure.
        - All applicable electrical and mechanical elements are then combined with the structural elements from the structural inspection for submittal to the NTI. These elements are always pulled from the NTI table of the Electrical RIR. See Chapter 9 for inspection responsibilities between the structural and mechanical/electrical inspectors.

b. Enter onto the inspection report: CBLI initials, CBLI identification number, date of inspection, total number of crew hours at the site, average bridge openings per month since last inspection, average marine traffic bridge openings per month since last inspection, average maintenance bridge openings per month since last inspection, and the number of inspection bridge openings.

c. Prepare a list of elements in need of repair and recommend the type of repair that should be done. A photo of repair areas should be taken with each type of recommended repair. Assign each repair a priority level. Text describing each repair should appear in the relevant element description. Deficiency photos are to be referenced in the column alongside the element description as well as the repair.

8-3.2 *Blue Ribbon Inspections*

Shall be unannounced random inspections intended to assess the reliability of the mechanical and electrical systems, identify needed preventative maintenance activities and develop the scope of required rehabilitation projects on the floating bridges. Blue ribbon inspections and the corresponding reports are completed by consultants considered to be experts in their field, managed by CBLIs, in accordance with Resolution No. 398. When blue ribbon electrical and mechanical inspections are performed, they are used in conjunction with the routine inspection for that structure.

1. **Interval** – Due to permissions granted by the Bridge and Structures Engineer in 1994, blue ribbon inspections shall be conducted unannounced at least once every two years. This augmentation to the original annual inspection schedule recommended by Resolution No. 398 is provided in the memo in Appendix 8-A.
2. **Inspection Methodology** –Blue ribbon inspections consist of visual and operational inspection of the electrical and mechanical systems. Disassembly of electrical and mechanical components for closer inspection is also conducted throughout these inspections to gather a higher level of detail than is typical in the routine inspections. Non-destructive testing methods adhering to guidelines established by the AASHTO *Movable Bridge Inspection, Evaluation, and Maintenance Manual* Chapter 2, are used in evaluation of bridge components as well. Following these procedures throughout blue ribbon inspections helps ensure the safety and operational reliability of the mechanical and electrical systems by providing a thorough and comprehensive inspection.
3. **Reporting** – After completion of a blue ribbon inspection a RIR is to be entered into BridgeWorks in the same fashion as outlined in Section 8-3.1.3. In addition to this RIR another inspection report is to be generated by a consulting engineer. Consultant reports are detailed reports to be formatted as dictated by the document provided in Appendix 8-B. These reports include identified deficiencies, recommended actions to correct deficiencies, and cost estimates to complete recommended rehabilitation items. The DPM will coordinate the implementation of the recommended repairs and rehabilitation items with the Region maintenance staff.

8-3.3 *In-Depth Inspection*

Shall be a close-up inspection of one, several, or all electrical and mechanical elements to identify any deficiencies not readily detectable using routine inspection procedures. The results of these inspections are used to assess the reliability of mechanical and electrical systems, identify needed preventative maintenance activities, review and correct as-built schematics, review and correct OIM manuals, and develop the scope of required rehabilitation projects. In-depth electrical and mechanical inspections are used in conjunction with the routine inspection. Consultants, specialized in the specific field of interest, are used in conducting these inspections due to constant change in demand of disciplines, equipment, and vendors needed to accomplish the various in-depth inspections. Consulting engineers are managed by CBLIs in the same manner as those used in blue ribbon inspections.

1. **Interval** – An in-depth inspection shall be performed in conjunction with a routine inspection every six years in accordance with the AASHTO *Movable Bridge Inspection, Evaluation, and Maintenance Manual* Chapter 2 Section 2.2.3. An in-depth inspection may also be performed as a follow-up inspection to a routine or blue ribbon inspection to better identify any deficiencies found. The first inspection on a new or rehabilitated structure shall be an in-depth inspection in order to establish a detailed baseline for the structure file.
2. **Inspection Methodology** – In-depth inspections consist of visual and operational inspections of the electrical and mechanical systems. Extensive disassembly of electrical and mechanical components for closer inspection is conducted throughout these inspections to gather a higher level of detail than is typical in blue ribbon and routine inspections. Non-destructive testing methods adhering to guidelines established by the AASHTO *Movable Bridge Inspection, Evaluation, and Maintenance Manual* Chapter 2, are used in evaluation of bridge components as well. Following these procedures throughout in-depth inspections helps ensure the safety and operational reliability of the mechanical and electrical systems by providing a thorough and comprehensive inspection.
3. **Reporting** – After completion of an in-depth inspection an RIR is to be entered into BridgeWorks in the same fashion as outlined in Section 8-3.1.3. In addition to this RIR another inspection report is to be generated by a consulting engineer. Consultant reports are detailed reports to be formatted as dictated by the document provided in Appendix 8-B and 8-G. These reports include identified deficiencies, recommended actions to correct deficiencies, and cost estimates to complete recommended rehabilitation items. The DPM will coordinate the implementation of the recommended repairs and rehabilitation items with the Region maintenance staff.
4. **Specialized Inspections** – Occasionally certain components/systems have their own specialized inspections carried out separately. Examples of components/systems that may require special inspections are trunnion bearings, counterweight ropes, and cathodic protection. Each of these inspections is functionally an in-depth inspection, pertaining only to that component or system, which are conducted and reported as such. This practice is suggested by AASHTO *Movable Bridge Inspection, Evaluation, and Maintenance Manual* Chapter 2 Section 2.2.4.

8-4 Complex Bridge and Tunnel QC/QA Program

The CBLIs review 100% of inspection reports under their responsibility prior to release. The majority of inspections involving the Complex Bridge and Tunnel section only concern one inspection engineer of each discipline. If multiple CBLIs of the same discipline participated in an inspection then that report will be reviewed by both engineers prior to submittal to the DPM.

An effort shall be made to rotate which CBLIs conduct routine inspections on each structure on an annual basis to add variation to the Complex Bridge and Tunnel section's internal QC program.

The DPM reviews 100% of all Complex Bridge and Tunnel reports under his area of responsibility prior to release.

The office review of reports will consist of validation for accuracy and consistency of the following:

- **Inspection Type** – The appropriate inspection types are identified.
- **Inspection Date** – Ensure that bridges are inspected on time.
- **Inspection Interval** – Verify that inspection interval is based on condition or policy (i.e., 12 month interval criteria).
- **Inspection Hours** – Verify that the correct inspection hours are reported based on history of previous report hours, structure type and condition.
- **Organization of Report** – Verify that the report is organized, understandable, uses correct photo and file references that follow office policy.
- **Inspection Resources** – Verify that the appropriate resources needed for safety, access, and adequate inspection are being used.
- **NRC Codes** – Verify that the Numerical Rating Condition codes are supported by inspection report content. Coding information available in Appendix 8-C.
- **Elements** – Verify that the elements are complete and accurate.
- **Repair Recommendations and Priorities** – Verify that appropriate repairs and repair priorities are recommended based on inspection report content.
- **Follow-Up Actions on Significant/Critical Findings** – Ensure deficiencies that require immediate action have had the proper parties notified and are being monitored and/or followed up on.

Utilizing consultants on blue ribbon and in-depth inspections serves to act as QA for the Complex Bridge and Tunnel section. An effort is made to rotate which consultant conducts each blue ribbon or in-depth inspection. This process helps to ensure delivery of a comprehensive and high quality inspection program.

8-5 Tunnel Inspection Duties

Routine inspections of the electrical and mechanical systems present in highway tunnels are to be conducted at a maximum of 24 month intervals. Routine inspections result in an inspection report created and submitted through BridgeWorks. In-depth inspections result in detailed consultant reports that are reviewed by CBLIs in addition to a standard RIR. In-depth inspections of the mechanical and electrical systems are to be conducted at least once every six years on complex tunnels. Maintenance and inspection guidelines for mechanical and electrical systems present in tunnels are outlined in the FHWA *Tunnel Operations, Maintenance, Inspection and Evaluation* (TOMIE) *Manual*.

8-6 Complex Bridge and Tunnel Records

8-6.1 *Operation, Inspection and Maintenance Manuals*

Operation, Inspection, and Maintenance (OIM) Manuals developed by the Bridge Preservation Office as mandated by *Transportation Structures Preservation Manual* M 23-11 exist for nearly all complex bridges in WSDOT's inventory. OIM manuals contain important information relevant to their corresponding structure including but not limited to specific operational procedures, emergency procedures, recommended maintenance scheduling and procedure, as well as inspection procedures. OIM manuals are invaluable for planning of inspection and maintenance activities. They are a source of information recommended by AASHTO *Movable Bridge for Inspection, Evaluations, and Maintenance Manual* Section 2.6.1.1 and AASHTO *LRFD Movable Highway Bridge Design Specifications* Section 1.7.1.1. Critical information needs mentioned in FHWA *Tunnel Operations, Maintenance, Inspection and Evaluation* (TOMIE) *Manual* Sections 2.4 and 3.3 are standard in an OIM manual.

Both of these manuals as well as any as-builts must be periodically updated as structures are rehabilitated and the information contained within them becomes obsolete. Region(s) input is invaluable in the process of creating OIM manuals and correctly identifying operating procedures for each structure. OIM Manuals are developed partially using the Operations and Maintenance (O&M) manuals provided to WSDOT as a result of *Standard Specifications* Section 1-06.5. O&M manuals consist of catalog cuts or shop drawings of each piece of equipment found on its corresponding structure. Contract documents, special provisions, and as-builts are also used in the process of generating the OIM manual.

Master copies of each OIM manual are retained by the BPO and the regions are provided with copies of every manual relevant to their bridges. A complete list of OIM manuals developed by the BPO is included in Appendix 8-F.

8-6.2 *Structure Files*

Every complex bridge and tunnel has its own structure file maintained in accordance with the standards set in Chapter 2 of this manual to satisfy the FHWA. The physical location of structure file documents is indicated in Appendix 2-A "Bridge Preservation Floor Plan." A more detailed explanation of the legend is as follows:

- "B- Movable Bridge Files" refers to project files, signed copies of every bridge inspection report, signed copies of every tunnel inspection report, contract documents, microfilm cards and antiquated pictures from old inspections.
- "F- Letter Files" refers to the movable bridge letter files as well as reports generated by consultants. These reports are the original stamped and signed copies that come as a result of a Blue Ribbon inspection or an In-Depth inspection.

The current Routine and In-Depth inspection databases containing inspection dates and intervals for scheduling purposes are available to view on the Corporate drive. These files are only editable by members of the Complex Bridge and Tunnel section. These databases are available along the following file path on the Corporate drive: \Data\Bridge\Movable. Folders labeled "Routines" and "In-Depth Database" contain the relevant files.

8-7 Bridge Damage/Emergency Responsibilities

As dictated in the WSDOT *Emergency Operations Plan* M 54-11 BPO personnel are provided with emergency responder training. The BPO employs multiple mechanical and electrical engineers with offset schedules such that in the event of an emergency situation involving an electrical or mechanical component failure, personnel will be available to provide technical assistance to the Region(s). Should an emergency situation occur the Region(s) are to contact the BPO at which point technical assistance will be dispatched. After any emergency response situation the CBLI onsite for the incident shall prepare a report to be distributed amongst the BPO and the Region(s) via email. The BPO can always be reached via the emergency response phone at 360-480-4500.

8-8 Plans, Specifications and Estimates

The BPO assists the region with preparation of Plans, Specifications & Estimates documentation for the purpose of special inspections, requiring consultants, as well as rehabilitation activities. In the event electrical and mechanical components need to be acquired through the bidding process, the BPO provides assistance to the region with preparation of the proper documentation. During construction of repairs or rehabilitation of structures the BPO is available to assist the Region(s) and the Project Engineer Office as needed.

8-9 Appendices

Appendix 8-A	BPO Memo for Blue Ribbon Inspection Schedule Alteration
Appendix 8-B	Guideline for Writing Bridge Electrical and Mechanical Inspection Reports
Appendix 8-C	Numerical Rating Condition Description
Appendix 8-D	Continued Certification of Bridge Inspection Personnel
Appendix 8-E	Complex Bridge and Tunnel Inspection List
Appendix 8-F	Operations, Inspection, and *Maintenance Manual* List
Appendix 8-G	Guideline for Writing Tunnel Electrical and Mechanical Inspection Reports

Appendix 8-A BPO Memo for Blue Ribbon Inspection Schedule Alteration

ROUTING SLIP

DATE

TO: ORG

RECEIVED

MAY 31 1994

DEPT. OF TRANSPORTATION

ADDRESS

FROM: MML

PHONE

- [ ] For Action
- [ ] For Approval
- [ ] For Signature
- [ ] For Your Request
- [ ] Read and Return
- [ ] For Your Information
- [ ] Per Our Conversation
- [ ] Read & Route to Files
- [ ] For Your Comments

The random inspection shall include an element of "surprise" and an element of "independence" to and from the regular maintenance folks and their activities. Are we accomplishing this?

Please include me in the random inspections that are coming up. Thanks.

Washington State
Department of Transportation

Memorandum

Date: May 10, 1994

From: O. R. George ORG
Phone: 753-4739

To: M. Myint Lwin
Bridge & Structures - 7340

Subject: Proposed Schedule For Floating Bridge Random Inspections

Random inspections of the four floating bridges are conducted by our office as outlined in the attached June 8, 1993 memorandum from A. H. Walley to S. A. Moon. We propose to delay the mechanical and electrical inspections on the Evergreen Point Bridge (520/8) until 1995 due to the major mechanical and electrical renovations taking place this summer. Inspections by our office during the construction phase would be redundant since the designer, Sverdrup Corporation will be assisting with construction services.

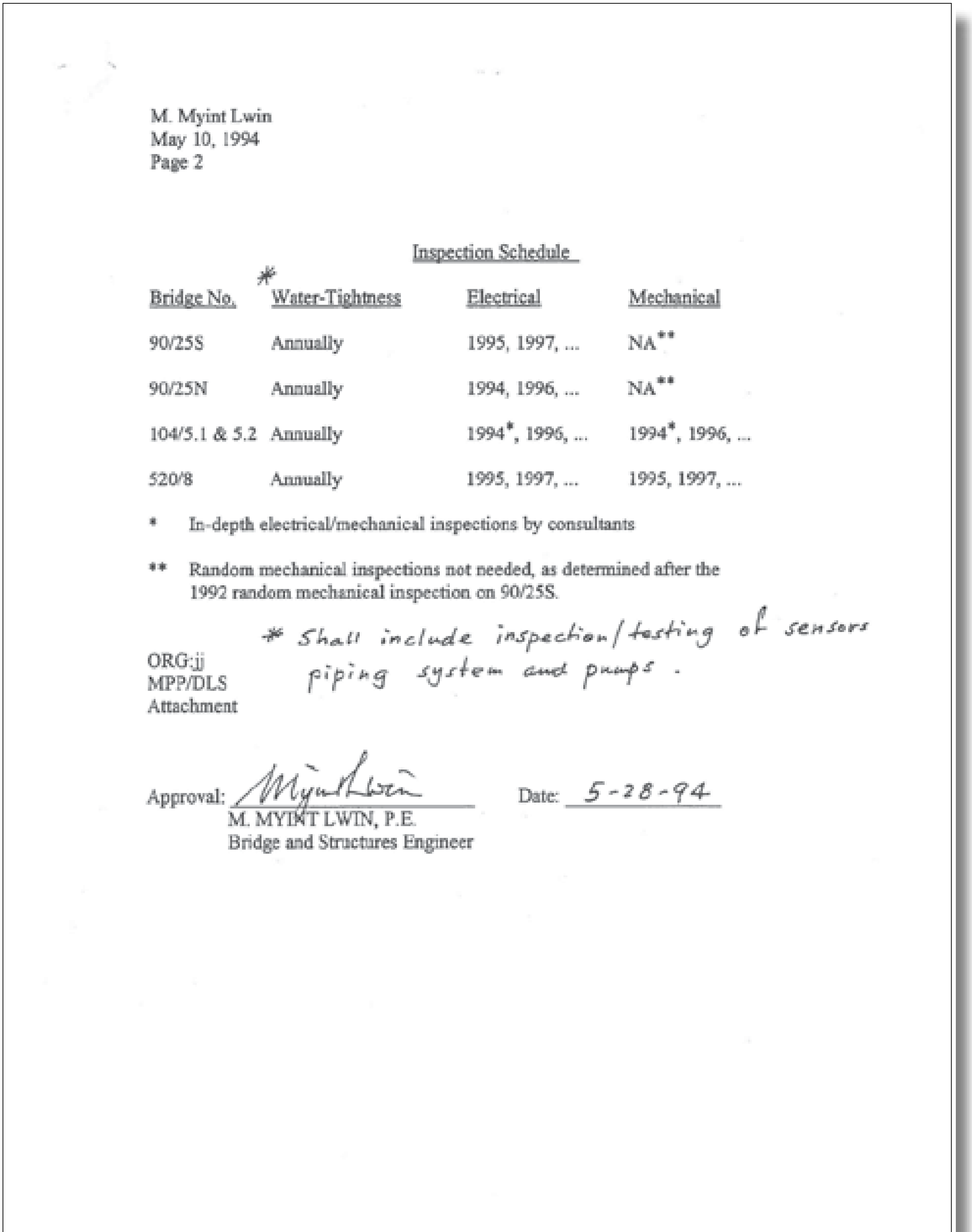
We also propose to conduct the first electrical random inspection on the Lacey V. Murrow Bridge (90/25S) in 1995. This first inspection will be within 2 years of opening the bridge to traffic and will meet the requirements of the June 8, 1993 memorandum. It was determined after the 1992 mechanical inspection of the Third Lake Bridge (90/25N) that mechanical inspections on both of the I-90 floating bridges are not needed due to their lack of mechanical components.

When in-depth mechanical/electrical inspections performed by consultants coincide with the random mechanical/electrical inspections, we will use the in-depth inspections in place of the random inspections. This occurs on the Hood Canal Bridge in 1994 and is denoted on the schedule by an asterisk.

With your approval, we would like to adopt the inspection schedule shown below which allows us to conduct 1 mechanical and 2 electrical inspections per year, rather than 2 mechanical and 4 electrical inspections every other year.

RECEIVED
MAY 12 1994
DEPT. OF TRANSPORTATION
BRIDGE & STRUCTURES

DOT 700-008X
Revised 6/92



M. Myint Lwin
May 10, 1994
Page 2

Inspection Schedule

Bridge No.	*Water-Tightness	Electrical	Mechanical
90/25S	Annually	1995, 1997, ...	NA**
90/25N	Annually	1994, 1996, ...	NA**
104/5.1 & 5.2	Annually	1994*, 1996, ...	1994*, 1996, ...
520/8	Annually	1995, 1997, ...	1995, 1997, ...

* In-depth electrical/mechanical inspections by consultants

** Random mechanical inspections not needed, as determined after the 1992 random mechanical inspection on 90/25S.

* Shall include inspection/testing of sensors piping system and pumps.

ORG:jj
MPP/DLS
Attachment

Approval: Myint Lwin
M. MYINT LWIN, P.E.
Bridge and Structures Engineer

Date: 5-28-94

Washington State Department of Transportation

Memorandum

Date: June 8, 1993

From: A. H. Wall
J. F. Conrad

Subject: Floating Bridge Random Inspections

Thru: E. R. Burch
J. R. Buss

To: S. A. Moon

As directed by the Transportation Commission, random inspections have been conducted on the three state floating bridges. Based on our office's evaluation of the initial inspections, we request your approval of the following proposals on the process to be used in the future:

1. Responsibility for planning and conducting the random inspections should be delegated to the Bridge Office, and clearly defined in Directive D23-11.

2. A report on findings on each inspection should be prepared by the Bridge Office and sent to the Chief Maintenance Engineer for further transmittals to the districts.

3. Annual random inspections should be conducted to verify water-tightness of the bridge pontoons.

   Random inspections focusing on reliability of mechanical and electrical systems of the bridges should be conducted at two year intervals.

The following background is provided to assist in your consideration of the above proposals:

The Report issued on May 2, 1991 by the Blue Ribbon Panel investigating the sinking of the Lacey V. Murrow Bridge included a recommendation for "Independent Random Inspections" of the state's floating bridges. These inspections were to be "in addition to the scheduled major inspections" and were to be conducted by people not responsible for bridge maintenance". Emphasis of the inspections was to be "placed on the water-tightness of the bridge and on the reliability of electrical and mechanical" systems.

S. A. Moon
June 8, 1993
Page 2

Transportation Commission Resolution 398 directed the department to "carefully review, analyze and, if feasible incorporate certain recommendations of the Blue Ribbon Panel". The Resolution's "implementing action document" directs us to address random inspections as follows:

> "The Department will hire a consultant or utilize an independant division internal to the Department to provide random inspections on the floating bridges. These inspections are to occur unannounced at least once a year for each bridge and will be an in-depth review of the water-tightness of the structure plus an inspection of the mechanical and electrical component of each bridge. A detailed report will be required."

Copies of pertinent sections of the Blue Ribbon Panel Report and Resolution 398 are attached.

An initial random inspection was conducted on the Hood Canal, Evergreen Point and 3rd Lake Floating Bridges in August and September of 1992. The inspection team consisted of members from the Bridge and Structures and Marine Transportation Offices and from the office of the State's mechanical and electrical consultant; the Sverdrup Corporation. Reports on inspection findings were prepared by the Bridge Office and provided to the districts through the HQ Maintenance Office. Inspection recommendations are now being implemented or considered for implementation by the districts.

A post inspection review of the random inspection process by our offices led to the recommendations in this letter. Responsibilities for these inspections need to be clearly defined in a Department Directive. Also, although a one year interval for random inspection of pontoon watertightness appears to be appropriate, a longer interval is needed between random inspections of the electrical and mechanical systems. The longer interval is needed to provide sufficient time to cost effectively address any problems identified on these complex systems.

AHW/JFC:sf
ORG
Attachments

Approval: S.A. Moon Date: 6-22-93
Deputy Secretary of Transportation

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Appendix 8-B Guideline for Writing Bridge Electrical and Mechanical Inspection Reports

GUIDELINE FOR WRITING BRIDGE ELECTRICAL AND MECHANICAL INSPECTION REPORTS FOR WSDOT

General - Format and fonts used in the electrical and mechanical inspection reports must be the same. The reports shall be written in the past tense. Single side print. The body of the text shall be left-justified. Condition descriptions shall be consistent with the verbiage in the Numerical Rating Condition Description in Appendix B.

See page 5 of 15 for a sample cover page.

The first submittal received by WSDOT shall be an unsigned final report. This submittal shall consist of 2 copies of each report. Unsigned final reports shall be signed and dated by person(s) who conducted internal quality control review. The stamp shall remain unsigned.

The title of the report and the bridge name and bridge number will be indicated exactly as spelled out in the scope of work for the inspection.

A photograph of the general outline of the bridge will appear on the cover of the reports.

The Consultant's Company name will appear under the photograph.

The PE Seal shall be placed below the photograph on the first submittal but not signed. When the final submittal is ready for the PE Seal it shall be placed on the original report and signed by the Consultant. Color copies will then be made of the original report.

The Table of Contents page shall be page number i. Each page of the report will be numbered sequentially and will agree with the page numbers listed in the Table of Contents. Font size shall be No. 12.

See page 6 of 15 for a sample Table of Contents.

The footers for each report page and appendices shall have the bridge name and number on two lines on the bottom left, the page number in the bottom center and the type of inspection and month and year on two lines on the bottom right. The font shall be No. 10.

The font for the report titles and text shall be No. 12. Heading shall be capitalized and bold.

The report shall include the following sections in the order listed:

The Executive Summary should be brief but give a general assessment of the condition of the bridge systems and major conclusions.

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The Purpose and Scope of Inspection should state that the purpose of the inspection is to determine the condition of the bridge equipment and identify any deficiencies. The dates of the inspection and the Consultant's Company name should also be indicated. Reference shall be made to the Scope of Work provided by WSDOT in the inspection request for proposal and it shall be attached to the report in Appendix A.

See page 7 of 15 for a sample of the Executive Summary and the Purpose and Scope of Inspection.

Any deviations from the Scope of Work should be identified with an explanation of why the deviations occurred.

Inspection Methodology should briefly describe the type of inspections, tests or measurements performed. The following text shall be included in the Inspection Methodology: "The ratings in this report are based upon the field conditions. These ratings may be low due to conditions that cannot be repaired or do not require immediate rehabilitation. Listed deficiencies are used to identify repair or rehabilitation items. If a component has a Condensed Mechanical/Electrical Rating of minor or moderate deterioration, there may be no associated deficiency or repair item for that component."

A general description of the bridge is not required. We know where the bridge is, what river it crosses and how it operates.

Inspection Findings shall identify the condition of the systems in the order that they are listed in the Scope of Work. Inspection findings that are not considered repair or rehabilitation items shall be included as observations in paragraph format. All deficiencies shall be identified and reference shall be made to any corresponding photograph. Deficiencies shall be listed in bullet format. Deficiencies that were repaired during the inspection shall be listed in bullet format. The condition statement for each Scope of Work item shall be the last sentence of its respective Inspection Findings section. The photographs shall be the last Appendix in the report except when additional data such as oil sample analysis or other sub-consultant reports are attached. The photos shall be referenced in the body of the report as follows: (See Photo ___ in Appendix ___). Data such as motor currents, insulation resistance, gear tooth measurements, etc. shall be tabulated and included in the Appendices. The tabulated data shall be referenced in the body of the report as follows: (See Table ____ in Appendix ___).

See pages 8 and 9 of 15 for a sample of the Inspection Findings section.

Conclusions shall summarize major findings and condition of the structure. The conclusion is intended to be brief. Major findings shall be listed in the order in which they appear in the Scope of Work. The Conclusions and Executive Summary should not be identical.

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Recommendations shall include Emergency Repairs, Maintenance Repairs or Rehabilitation Recommendations. Emergency Repair recommendations which are not addressed during the inspection shall be made in writing within 48 hours of the finding from the Consultant to the Bridge Preservation Engineer. Recommendations for Maintenance Repairs must be within the capabilities of the available maintenance forces. The order of the Maintenance Repairs shall match the order of the deficiencies in the body of the report. Rehabilitation recommendations should be made for conditions which will provide 20+ years of extended service. The order of the rehabilitation recommendations shall match the order of the deficiencies in the body of the report. See page 10 of 15 for an example Recommendations section.

Cost estimates shall be listed for each rehabilitation recommendation in the order that the system appears in the Scope of Work. (Service Entrance; Power Distribution; Motors and Brakes; Control System; Wire and Conduit; etc.) Do not say Electrical and Mechanical Rehabilitation and give a lump sum figure. Beneath the cost estimate a note shall indicate that cost estimates are for material and installation labor (bridge items only). They do not include cost for design engineering, maintenance, traffic control, construction management or administration. See page 10 of 15 for an example cost estimate.

Appendices shall be attached in the following order:

Appendix A – Scope of Work – This should be the Scope of Work document provided by the WSDOT, not a retyped version.

Appendix B – Condensed Mech/Elect Rating Summary
B1 Numerical Rating Condition Description (WSDOT provided with Scope of Work)
B2 Condensed Mech/Elect Rating Summary

Appendices C, D, etc – tabulated data, schematics, tables of measurements etc.

See pages 11 through 13 of 15 for an example of Appendix B.

The last Appendix should be photographs unless there are Co-Consultant documents like oil analysis in which case the photographs are the next to last and the Co-Consultant data is last. There shall be two photographs on each page.

Appendices shall have a cover page with a Table of Contents.

See page 14 of 15 for a sample Appendix Table of Contents
Appendices sheets shall have the same footer as the report but the page number will be prefaced with the letter of the Appendix.

Data sheets and measurement sheets shall be arranged in the order that the subject appears in the Scope of Work.

See page 15 of 15 for a sample photograph page.

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All reports are to be comb bound with clear plastic front covers and black plastic rear covers. The unsigned final report submittal shall consist of 2 copies of each report. The final submittal shall consist of one bound final report with original photographs which shall be stamped and signed by an Engineer of the appropriate discipline licensed in the State of Washington and six color copies of the report. An electronic copy of the final report in PDF format and an electronic copy of all photographs in jpeg format along with photo logs shall be submitted <u>with the signed final reports</u> on a credit card size USB drive.

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

(TYPE) INSPECTION REPORT
MONTH, YEAR

NAME OF BRIDGE
BRIDGE NO. (W/XYZ)

PREPARED BY
COMPANY NAME
CITY, STATE

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TABLE OF CONTENTS

Name of Bridge i Type of Inspection
Bridge No. Month, Year

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EXECUTIVE SUMMARY

This report documents the condition of the Bridge Name and Bridge Number, electrical (or mechanical) systems as they existed during the In-Depth Electrical (or Mechanical) Inspection performed Month XX through XX, XXXX.

Overall, the electrical(or mechanical) systems exhibited minor deterioration and operated in an acceptable manner during the inspection.

There were no emergency repairs identified during the inspection.

(Items requiring rehabilitation should be documented in paragraph format. Do not just copy the rehabilitation recommendation list, write a summary.)

The electrical(or mechanical depending on report) systems, in general, require maintenance repairs to improve and maintain safety and operational reliability. Maintenance repair items are listed in the Recommendations section of this report. (Do not include the repair list, the reader can reference that if they are interested.)

PURPOSE AND SCOPE OF INSPECTION

The purpose of this inspection was to determine the condition of the electrical(mechanical) systems and identify deficiencies.

The inspection was performed from Month XX through Month XX, 20XX by XXXXX.

The Scope of Work for this inspection was provided by the WSDOT and is attached as Appendix A.

Name of Bridge 1 Type of Inspection
Bridge No. Month, Year

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INSPECTION FINDINGS

POWER DISTRIBUTION

SERVICE ENTRANCE

The 240-vac service entrance equipment was located at the west approach utility pole.

The service entrance equipment was visually inspected and operationally tested. Utility voltages were measured prior to and during operation. The measurements were tabulated (See Table 1 in Appendix C). The measurements were acceptable in all cases.

The following deficiency was noted and repaired during the inspection:

- There was damaged insulation and part of the conductor was exposed for one of the incoming phases. The exposed conductor had additional insulation and heat shrink added to insulate the exposed conductor and prevent further damage.

Based upon the field survey, the service entrance was observed to have minor deterioration.

GROUNDING SYSTEM

The structure had a ground connection embedded in the west pier. The ground resistance and current of the electrical grounding conductor at the west pier were measured and the results tabulated (See Table 2 in Appendix C). The measurements were acceptable in all cases.

The grounding system was visually inspected.

No deficiencies were noted during this inspection.

Based upon the field survey, the grounding system was observed to have minor deterioration.

ELECTRICAL DISTRIBUTION SYSTEM

The electrical distribution equipment was located in the control house and at the top of the east and west towers. The MCC in the control house distributed power to the roadway equipment and to the east and west towers. The east and west towers also had load centers for distributing power to lights, receptacles, and other ancillary equipment.

The electrical distribution equipment was visually inspected and operationally tested.

Infrared testing was performed on the electrical distribution equipment.

No deficiencies were noted during this inspection.

Based upon the field survey, the electrical distribution equipment was observed to have minor deterioration.

Name of Bridge 4 Type of Inspection
Bridge No. Month, Year

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MOTOR STARTERS, CONTACTORS AND DISCONNECTS

The motor starters and contactors were located in the motor control centers. The drive motors, synchrotie motors, and thrustor brakes had disconnect switches located within sight of the equipment they isolated. The traffic gates and traffic barriers had disconnect switches located in their enclosures.

The motor starters, contactors, and disconnects were visually inspected and operationally tested.

No deficiencies were noted during this inspection.

Based upon the field survey, the motor starters, contactors, and disconnects were observed to have minor deterioration.

MOTORS AND BRAKES

DRIVE MOTORS AND SYNCHROTIE MOTORS

There were four motors that drove the span, one drive motor and one synchrotie motor in the east tower and one drive motor and one synchrotie motor in the west tower. The motor inspection covers were removed, and the motor interior and brushes were inspected. Insulation resistance measurements were performed on the motors. The measurements were tabulated (See Table 3 in Appendix C). The insulation resistance measurements were acceptable in all cases.

The motor nameplate and current measurements were tabulated (See Table 4 in Appendix C). The current measurements were acceptable in all cases.

The following deficiency was noted and repaired during the inspection:

- Three missing fasteners were replaced on the inspection covers over the motor brushes for the East Drive Motor.

The following deficiencies were noted:

- One motor brush holder was damaged and temporarily repaired with a ziptie in the East Drive Motor (See Photo 1 in Appendix D).
- One motor brush holder was damaged and temporarily repaired with a ziptie in the West Drive Motor (See Photo 2 in Appendix D).

Based upon the field survey and above deficiencies, the drive motors and synchrotie motors were observed to have minor deterioration.

RECOMMENDATIONS

EMERGENCY REPAIRS
There were no emergency repairs.

MAINTENANCE REPAIRS

POWER DISTRIBUTION
SERVICE ENTRANCE

1. Sample repair number one.
2. Sample repair number two.

CONTROL SYSTEM
CONTROL DESK

3. Sample repair number three.

MOTORS AND BRAKES
DRIVE MOTORS AND SYNCHROTIE MOTORS

4. Sample repair number four.
5. Sample repair number five.
6. Sample repair number six.

REHABILITATION RECOMMENDATIONS

1. Sample recommendation number one.

COST ESTIMATE

1. Sample recommendation number one.	$100,000

The provided cost estimate is for material and installation labor (bridge items only). This cost does not include design engineering, maintenance, traffic control, construction management or administration.

APPENDIX B

CONDENSED ELECTRICAL RATING SUMMARY

NUMERICAL RATING CONDITION DESCRIPTION	
Rating Condition	Description of Condition
1	FAILED CONDITION. Item not operational.
2	POTENTIALLY HAZARDOUS. Deterioration or damage to span drive or stabilizing machinery which could cause movable span to become imminently unstable in any position. Malfunction or deterioration of electrical system which could cause loss of control of the moving span. Deficiency in electrical system design, maintenance, or operational procedure which could cause loss of control of moving span. Inoperable vehicular traffic control device. Also, extreme cases of defects listed under higher rating numbers. Bridge may not be opened to marine traffic. If problem is with stabilizing machinery in the closed position, temporary shoring or support may be necessary to permit safe vehicular traffic over the closed bridge at reduced speed or rating. However, if problem, is with counterweight components of vertical lift bridge stabilizing machinery, bridge may be closed to all traffic until shored or repaired.
3	VERY SERIOUS DETERIORATION. Deterioration or damage to machinery which will not cause imminent instability of a non-redundant span drive but reduces allowable load on drive and may cause future instability if not corrected. Stabilizing machinery damaged, deteriorated, or improperly operated such that movable structure is not properly supported causing structure not to behave as designed and resulting in structural overstress and movements under vehicular traffic that severely affect quality. Severe misalignment of stabilizing machinery, resulting in overload of electrical system and consequent overstress of span drive machinery. Severe interference between moving span and fixed structure due to substructure movements. Deterioration of electrical control system such that many of the safety interlocks are normally by-passed, inconsistent control of moving span, and inoperable or missing traffic control devices. Operation of movable span may be restricted in terms of opening angle, number of openings, and allowable wind velocity. If problem is with stabilizing machinery, shoring may be necessary to permit vehicular traffic.
4	SERIOUS DETERIORATION. Severe wear, deterioration or damage to span drive or stabilizing machinery due to overloading, inadequate maintenance, improper operation, or movement of the structure or substructure. Electrical system malfunctions and numerous safety interlocks are by-passed. Results are inconsistent, noisy, and unreliable operation of the movable span. Improper closure, affecting structural action and vehicular ride quality. Electrical system has archaic components for which replacements are no longer available and open bus panelboards that are considered unsafe nowadays.
5	MODERATE DETERIORATION. Excessive wear, some damage and deterioration of span drive and stabilizing mechanical machinery. Repairs and replacement of some machinery components required. Bearings may need liner adjustment. Machinery may be misaligned due to shifting of structure and substructure but not enough to seriously overload span drive: correctable by adjusting machinery component location using shims, etc. Replacement of corroded machinery fasteners required. Moving span under control but some indicating and safety devices may be inoperable and may be by-passed, and span limit switch may need adjustment.
6	MINOR DETERIORATION. None of the major mechanical machinery components are worn or damaged to the extent that replacement is now required. Some components of the span drive may need to be replaced, such as flex-couplings grids, brake linings, etc. Span stabilizing machinery functioning except that wear may have caused excessive clearances in lock bar guides, etc. Shimming of lock bar guides, replacement of limit switches and adjustments necessary. Machinery needs cleaning, painting, lubrication and adjustment. Electrical system generally functioning as designed. Replacement of some relays, indicating devices and lights may be required. Traffic control devices need repair or maintenance.
7	ALMOST NEW CONDITION. No extensive repairs required. Machinery needs cleaning, painting, lubrication, and adjustment. Electrical systems functioning as designed; may need replacement of indicating lights and minor limit switch adjustment, cleaning of relay contacts and housekeeping in panelboard. Traffic control devices functioning but may need replacement of obstruction lights, object markers, painting of housings, lubrication and adjustment of limit switches.
8	NEW CONDITION. Virtually no repairs required. Mechanical machinery may need cleaning, touch-up painting and lubrication. Electrical system and traffic devices functioning but may need replacement of bulbs and minor housekeeping.
9	NOT APPLICABLE. This device or equipment is not on the structure being inspected.
N/I	NOT INSPECTED. This device or equipment was not included in the inspection.

Name of Bridge B1 Type of Inspection
Bridge No. Month, Year

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Condensed Electrical Rating Summary	
Item	Rating
Power Distribution	
Service Entrance	6
Grounding System	5
Emergency Generator	7
Manual Transfer Switch	6
Electrical Distribution Equipment	7
Motor Starters, Contactors, and Disconnects	6
Hubbell Motor Drive	7
Motors and Brakes	
Span Drive Motors	7
Thrustor Brakes	7
Endlift Motors	6
Traffic Gate Motors	7
Yielding Barrier Motor	6
Control System	
Control Desk	7
Control System	6
Instrumentation and Control Devices	5
Wire, Conduit and Junction Boxes	
Motor and Thrustor Brake Feeders	6
Aerial Cable	6
Droop Cables	6
Conduits and Junction Boxes	6
Traffic Control	
Traffic Signals and Signs	7
Traffic Gates	6
Yielding Barrier	6
Navigation Control	
Navigation Lights	6
Navigation Horn	7
Miscellaneous	
Lighting and Receptacles	6
Public Address System	6
Closed Circuit TV System	5
Overall Rating	6

Name of Bridge B2 Type of Inspection
Bridge No. Month, Year

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APPENDIX D

PHOTOGRAPHS

Photo 1 Control Desk

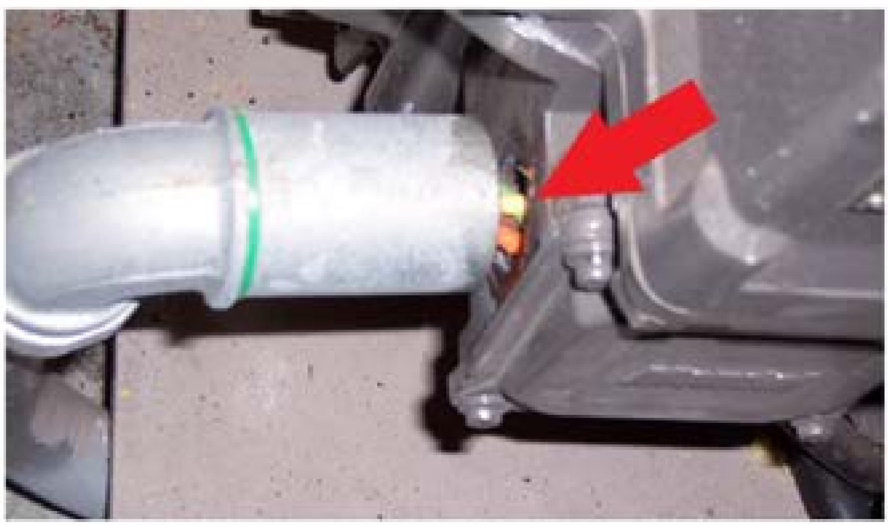

Photo 2 Broken conduit fitting on NE Thrustor Brake

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Appendix 8-C Numerical Rating Condition Description

NUMERICAL RATING CONDITION DESCRIPTION

Rating Condition	Description of Condition
1	FAILED CONDITION. Item not operational.
2	POTENTIALLY HAZARDOUS. Deterioration or damage to span drive or stabilizing machinery which could cause movable span to become imminently unstable in any position. Malfunction or deterioration of electrical system which could cause loss of control of the moving span. Deficiency in electrical system design, maintenance, or operational procedure which could cause loss of control of moving span. Inoperable vehicular traffic control device. Also, extreme cases of defects listed under higher rating numbers. Bridge may not be opened to marine traffic. If problem is with stabilizing machinery in the closed position, temporary shoring or support may be necessary to permit safe vehicular traffic over the closed bridge at reduced speed or rating. However, if problem, is with counterweight components of vertical lift bridge stabilizing machinery, bridge may be closed to all traffic until shored or repaired.
3	VERY SERIOUS DETERIORATION. Deterioration or damage to machinery which will not cause imminent instability of a non-redundant span drive but reduces allowable load on drive and may cause future instability if not corrected. Stabilizing machinery damaged, deteriorated, or improperly operated such that movable structure is not properly supported causing structure not to behave as designed and resulting in structural overstress and movements under vehicular traffic that severely affect quality. Severe misalignment of stabilizing machinery, resulting in overload of electrical system and consequent overstress of span drive machinery. Severe interference between moving span and fixed structure due to substructure movements. Deterioration of electrical control systems such that many of the safety interlocks are normally by-passed, inconsistent control of moving span, and inoperable or missing traffic control devices. Operation of movable span may be restricted in terms of opening angle, number of openings, and allowable wind velocity. If problem is with stabilizing machinery, shoring may be necessary to permit vehicular traffic.
4	SERIOUS DETERIORATION. Severe wear, deterioration or damage to span drive or stabilizing machinery due to overloading, inadequate maintenance, improper operation, or movement of the structure or substructure. Electrical system malfunctions and numerous safety interlocks are by-passed. Results are inconsistent, noisy, and unreliable operation of the movable span. Improper closure, affecting structural action and vehicular ride quality. Electrical system has archaic components for which replacements are no longer available and open bus panelboards that are considered unsafe nowadays.
5	MODERATE DETERIORATION. Excessive wear, some damage and deterioration of span drive and stabilizing mechanical machinery. Repairs and replacement of some machinery components required. Bearings may need liner adjustment. Machinery may be misaligned due to shifting of structure and substructure but not enough to seriously overload span drive; correctable by adjusting machinery component location using shims, etc. Replacement of corroded machinery fasteners required. Moving span under control but some indicating and safety devices may be inoperable and may be by-passed, and span limit switch may need adjustment.
6	MINOR DETERIORATION. None of the major mechanical machinery components are worn or damaged to the extent that replacement is now required. Some components of the span drive may need to be replaced, such as flex-couplings grids, brake linings, etc. Span stabilizing machinery functioning except that wear may have caused excessive clearances in lock bar guides, etc. Shimming of lock bar guides, replacement of limit switches and adjustments necessary. Machinery needs cleaning, painting, lubrication and adjustment. Electrical system generally functioning as designed. Replacement of some relays, indicating devices and lights may be required. Traffic control devices need repair or maintenance.
7	ALMOST NEW CONDITION. No extensive repairs required. Machinery needs cleaning, painting, lubrication, and adjustment. Electrical systems functioning as designed; may need replacement of indicating lights and minor limit switch adjustment, cleaning of relay contacts and housekeeping in panelboard. Traffic control devices functioning but may need replacement of obstruction lights, object markers, painting of housings, lubrication and adjustment of limit switches.
8	NEW CONDITION. Virtually no repairs required. Mechanical machinery may need cleaning, touch-up painting and lubrication. Electrical system and traffic devices functioning but may need replacement of bulbs and minor housekeeping.
9	NOT APPLICABLE. This device or equipment is not on the structure being inspected.
N/I	NOT INSPECTED. This device or equipment was not included in the inspection.

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Appendix 8-D Continued Certification of Complex Bridge Inspection Personnel

A continued certification of complex bridge and tunnel inspection personnel has been established to ensure that all program managers and inspectors are kept up to date with the latest practices and technology in the areas of bridge and tunnel inspections. This continued certification program requires that each Electrical/Mechanical Complex Bridge Lead Inspector (CBLI) and their Delegated Program Manager (DPM) must participate in the following during a 60 month period to maintain certification:

- 30 hours of bridge related continuing education courses and training including WSDOT sponsored bridge training, bridge conferences and other NHI bridge training courses as approved by the delegated program manager.

Continued Certification Course and Training List

The following is a list of courses that are examples of what would qualify in combination to acquire 30 hours of continuing education hours in the designated five-year period. It is the inspector's responsibility to ensure that the information is given to their manager within the necessary timeframes to ensure continued certification.

National Electric Code	16 hours
Grounding and Bonding Training	16 hours
NFPA 70E Arc Flash Electrical Safety	16 hours
Programmable Logic Controller Training	24 hours
AC/DC Motors and Drives Training	16 hours
Cathodic Protection	40 hours
National Fire Alarm and Signaling Code	24 hours
Non-Destructive Testing Training	24 hours
Hydraulics & System Troubleshooting	16 hours
Principles of Bearings and Lubrication	16 hours
Coupling and Shaft Alignment	16 hours
Strain Gage Workshop	40 hours
Pacific NW Bridge Maintenance Conference	16 hours
Pacific NW Bridge Inspection Conference	16 hours
Heavy Movable Structures Conference	16 hours
Western Bridge Engineers' Seminar	16 hours
WSDOT/LTAP – Bridge Condition Inspection Training (BCIT)	72 hours
NHI Bridge Inspection Refresher Training (BCIR)	16 hours
NHI Tunnel Safety Inspection	16 hours
NHI Tunnel Safety Inspection Refresher	16 hours

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Appendix 8-E Complex Bridge and Tunnel Inspection List

The following is a list of complex bridges and tunnels that require electrical and mechanical inspections in accordance with the NBIS and NTIS. The regularly scheduled inspections for each structure are listed along with their interval. Special inspections in addition to those listed may be conducted if deemed necessary.

12/12N – Wishkah River Bridge

Electrical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

12/12S – Heron Street Bridge

Electrical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

12/915 – Snake River Clarkston

Electrical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (12 months)
In-Depth Inspection (72 months)
Counterweight Rope Inspection (72 months)
Trunnion Bearing Inspection (72 months)

16/110E – Tacoma Narrows

Electrical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

16/110W – Tacoma Narrows

Electrical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

90/25N – Homer M. Hadley

Electrical
Routine Inspection (12 months)
Blue Ribbon Inspection (24 months)
Blue Ribbon Cathodic Protection Inspection (24 months)
In-Depth Inspection (72 months)
In-Depth Cathodic Protection Inspection (72 months)

90/25S – Lacey V. Murrow

Electrical
Routine Inspection (12 months)
Blue Ribbon Inspection (24 months)
Blue Ribbon Cathodic Protection Inspection (24 months)
In-Depth Inspection (72 months)
In-Depth Cathodic Protection Inspection (72 months)

99/530E – Duwamish River Br

Electrical	**Mechanical**
Routine Inspection (12 months)	Routine Inspection (12 months)
In-Depth Inspection (72 months)	In-Depth Inspection (72 months)
	Trunnion Bearing Inspection (72 months)

99/530W – Duwamish River Br

Electrical	**Mechanical**
Routine Inspection (12 months)	Routine Inspection (12 months)
In-Depth Inspection (72 months)	In-Depth Inspection (72 months)

101/115 – Chehalis River Bridge

Electrical	**Mechanical**
Routine Inspection (12 months)	Routine Inspection (12 months)
In-Depth Inspection (72 months)	In-Depth Inspection (72 months)

101/125E – Hoquiam River - Riverside

Electrical	**Mechanical**
Routine Inspection (12 months)	Routine Inspection (12 months)
In-Depth Inspection (72 months)	In-Depth Inspection (72 months)
	Counterweight Rope Inspection (72 months)

101/125W – Hoquiam River - Simpson

Electrical	**Mechanical**
Routine Inspection (12 months)	Routine Inspection (12 months)
In-Depth Inspection (72 months)	In-Depth Inspection (72 months)

104/5.1 – Hood Canal-W.A. Bugge Bridge W

Electrical	**Mechanical**
Routine Inspection (12 months)	Routine Inspection (12 months)
Blue Ribbon Inspection (24 months)	Blue Ribbon Inspection (24 months)
Blue Ribbon CP Inspection (24 months)	In-Depth Inspection (72 months)
In-Depth Inspection (72 months)	
In-Depth CP Inspection (72 months)	

104/5.2 – Hood Canal-W.A. Bugge Br E

Electrical	**Mechanical**
Routine Inspection (12 months)	Routine Inspection (12 months)
Blue Ribbon Inspection (24 months)	Blue Ribbon Inspection (24 months)
Blue Ribbon CP Inspection (24 months)	In-Depth Inspection (72 months)
In-Depth Inspection (72 months)	
In-Depth CP Inspection (72 months)	

513/12 – Montlake Bridge

Electrical	**Mechanical**
Routine Inspection (12 months)	Routine Inspection (12 months)
In-Depth Inspection (72 months)	In-Depth Inspection (72 months)

520/8 – Albert D. Rosellini Bridge

Electrical
Routine Inspection (12 months)
Blue Ribbon Inspection (24 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (12 months)
Blue Ribbon Inspection (24 months)
In-Depth Inspection (72 months)

529/10E – Snohomish River Bridge

Electrical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (12 months)
In-Depth Inspection (72 months)
Counterweight Rope Inspection (72 months)

529/10W – Snohomish River Bridge

Electrical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (12 months)
In-Depth Inspection (72 months)
Counterweight Rope Inspection (72 months)

529/20E – Steamboat Slough

Electrical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

529/20W – Steamboat Slough

Electrical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (12 months)
In-Depth Inspection (72 months)

5/549CNC – Wash St Convention Center

Electrical
Routine Inspection (24 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (24 months)
In-Depth Inspection (72 months)

90/22LID – Martin Luther King LID

Electrical
Routine Inspection (24 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (24 months)
In-Depth Inspection (72 months)

90/24N – Mt Baker Ridge Tunnel

Electrical
Routine Inspection (24 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (24 months)
In-Depth Inspection (72 months)

90/24S – Mt Baker Ridge Tunnel

Electrical
Routine Inspection (24 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (24 months)
In-Depth Inspection (72 months)

90/26LID – First Hill LID

Electrical
Routine Inspection (24 months)
In-Depth Inspection (72 months)

Mechanical
Routine Inspection (24 months)
In-Depth Inspection (72 months)

99/540 – Alaskan Way Tunnel

Electrical	**Mechanical**
Routine Inspection (24 months)	Routine Inspection (24 months)
In-Depth Inspection (72 months)	In-Depth Inspection (72 months)

304/9 – Bremerton Tunnel

Electrical	**Mechanical**
Routine Inspection (24 months)	Routine Inspection (24 months)
In-Depth Inspection (72 months)	In-Depth Inspection (72 months)

The following is a list of tunnels that require electrical and mechanical inspections in accordance with NTIS. All of these tunnels have relatively small electrical and mechanical systems. They all receive routine inspections on a 2 year cycle.

5/546REN – 5th EXP TUNNEL

5/548PN – I-5 Under N Park Plaza

5/548PS – I-5 Under S Park Plaza

5/553R – Express Lanes Tunnel

5/555E-S – E-S Ramp Tunnel

5/555N-W – N-W Ramp Tunnel

5/568S-E – I-5 Over S-E Ramp Tunnel

5/577E-S – Ravenna-S Ramp Tunnel

20/316 – Tunnel

90/16S-E – S-E Ramp Tunnel

90/33E-S – E-S Ramp Tunnel

90/33N-W – N-W Ramp Tunnel

90/55 – SE 35th ST Tunnel Under I-90

90/112.8N – Wildlife Crossing Tunnel

90/563 – Perry St Tunnel Under I-90

97/359ALT – Knapps Hill Tunnel

101/3 – Fort Columbia Tunnel

405/22A – Houser Way Tunnel

405/35N-W – I-90 Over N-W Ramp Tunnel

405/35S-E – I-90 Over S-E Ramp Tunnel

520/9LID – Evergreen Point Road LID

520/11LID – 84th Ave NE Over SR 520

520/12LID – 92nd Ave NE Over SR 520

522/15 – Roosevelt Way Tunnel

525/1S-S – S-E Ramp Tunnel Under S-S Ramp

526/12 – SR 526 Over E-N Ramp Tunnel

526/22E-N – SR 526 Over E-N Ramp Tun

Appendix 8-F Operations, Inspections, and Maintenance Manual List

The following is a tabulated listing of all of the OIM manuals generated by the BPO. They are updated as necessary when rehabilitations of bridge systems occur or major components are changed.

Bridge #	Bridge Name	Manual Date	Revision Date	Document Number
12/12N	Wishkah River	Jun-03	Aug-08	M 23-25
12/12S	Wishkah River - Heron	Jun-03	Dec-07	M 23-19
12/915	Snake River - Clarkston	Jun-96	Feb-16	M 23-26
16/110E	Tacoma Narrows	Jun-95	--	*
90/25N	Homer M. Hadley	Jul-06	Sept-18	*
90/25S	Lacey V. Murrow	Jul-06	--	*
99/530E	Duwamish River	Jun-01	Jun-08	M 23-31
99/530W	Duwamish River	Jun-01	Jun-07	*
101/115	Chehalis River	Oct-99	Aug-16	M 23-23
101/125E	Hoquiam River - Riverside	Jun-97	Mar-13	M 23-22
101/125W	Hoquiam River - Simpson	Jan-12	--	M 23-33
104/5.1 & 5.2	Hood Canal	Jan-15	Feb-16	M 23-12
513/12	Montlake Bridge	Nov-02	Jan-23	M 23-30
520/8	Albert D. Rosellini Bridge	Jun-22	Jan-23	*
529/10E & W	Snohomish River	Mar-01	Jun-07	M 23-21
529/20E & W	Steamboat Slough	Jan-05	--	M 23-28

*Document number not yet assigned.

No OIM manuals have been developed for complex tunnels yet.

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Appendix 8-G Guideline for Writing Tunnel Electrical and Mechanical Inspection Reports

GUIDELINE FOR WRITING TUNNEL ELECTRICAL AND MECHANICAL INSPECTION REPORTS FOR WSDOT

General - Format and fonts used in the electrical and mechanical inspection reports must be the same. The reports shall be written in the past tense. Single side print. The body of the text shall be left-justified. Condition descriptions shall be consistent with the verbiage in the Numerical Rating Condition Description in Appendix B.

See page 5 of 16 for a sample cover page.

The first submittal received by WSDOT shall be an unsigned final report. This submittal shall consist of 2 copies of each report.

The title of the report and the tunnel name and tunnel number will be indicated exactly as spelled out in the scope of work for the inspection.

A photograph of the tunnel portal will appear on the cover of the reports.

The Consultant's Company name will appear under the photograph.

The PE Seal shall be placed below the photograph on the first submittal but not signed. When the final submittal is ready for the PE Seal it shall be placed on the original report and signed by the Consultant. Color copies will then be made of the original report.

The Table of Contents page shall be page number i. Each page of the report will be numbered sequentially and will agree with the page numbers listed in the Table of Contents. Font size shall be No. 12.

See page 6 of 16 for a sample Table of Contents.

The footers for each report page and appendices shall have the tunnel name and number on two lines on the bottom left, the page number in the bottom center and the type of inspection and month and year on two lines on the bottom right. The font shall be No. 10.

The font for the report titles and text shall be No. 12. Heading shall be capitalized and bold.

The report shall include the following sections in the order listed:

The Executive Summary should be brief but give a general assessment of the condition of the tunnel systems and major conclusions.

The Purpose and Scope of Inspection should state that the purpose of the inspection is to determine the condition of the tunnel equipment and identify any deficiencies. The dates of the inspection and the Consultant's Company name should also be indicated. Reference shall be made to the Scope of Work provided by WSDOT in the inspection request for proposal and it shall be attached to the report in Appendix A.

See page 7 of 16 for a sample of the Executive Summary and the Purpose and Scope of Inspection.

Any deviations from the Scope of Work should be identified with an explanation of why the deviations occurred.

Inspection Methodology should briefly describe the type of inspections, tests or measurements performed. The following text shall be included in the Inspection Methodology: "The ratings in this report are based upon the field conditions. These ratings may be low due to conditions that cannot be repaired or do not require immediate rehabilitation. Listed deficiencies are used to identify repair or rehabilitation items. If a component has a Condensed Mechanical/Electrical Rating of minor or moderate deterioration, there may be no associated deficiency or repair item for that component."

A general description of the tunnel is not required. We know where the tunnel is and how it operates.

Inspection Findings shall identify the condition of the systems in the order that they are listed in the Scope of Work. Inspection findings that are not considered repair or rehabilitation items shall be included as observations in paragraph format. All deficiencies shall be identified and reference shall be made to any corresponding photograph. Deficiencies shall be listed in bullet format. Deficiencies that were repaired during the inspection shall be listed in bullet format. The condition statement for each Scope of Work item shall be the last sentence of its respective Inspection Findings section. The photographs shall be the last Appendix in the report except when additional data such as oil sample analysis or other sub-consultant reports are attached. The photos shall be referenced in the body of the report as follows: (See Photo ___ in Appendix ___). Data such as motor currents, insulation resistance, gear tooth measurements, etc. shall be tabulated and included in the Appendices. The tabulated data shall be referenced in the body of the report as follows: (See Table ____ in Appendix ___).

See pages 8 and 9 of 16 for a sample of the Inspection Findings section.

Conclusions shall summarize major findings and condition of the structure. The conclusion is intended to be brief. Major findings shall be listed in the order in which they appear in the Scope of Work. The Conclusions and Executive Summary should not be identical.

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Recommendations shall include Emergency Repairs, Maintenance Repairs or Rehabilitation Recommendations. Emergency Repair recommendations which are not addressed during the inspection shall be made in writing within 48 hours of the finding from the Consultant to the Bridge Preservation Engineer. Recommendations for Maintenance Repairs must be within the capabilities of the available maintenance forces. The order of the Maintenance Repairs shall match the order of the deficiencies in the body of the report. Rehabilitation recommendations should be made for conditions which will provide 20+ years of extended service. The order of the rehabilitation recommendations shall match the order of the deficiencies in the body of the report. See page 10 of 16 for an example Recommendations section.

Cost estimates shall be listed for each rehabilitation recommendation in the order that the system appears in the Scope of Work. (Service Entrance; Power Distribution; Motors and Brakes; Control System; Wire and Conduit; etc.) Do not say Electrical and Mechanical Rehabilitation and give a lump sum figure. Beneath the cost estimate a note shall indicate that cost estimates are for material and installation labor (tunnel items only). They do not include cost for design engineering, maintenance, traffic control, construction management or administration. See page 10 of 16 for an example cost estimate section.

Appendices shall be attached in the following order:

Appendix A – Scope of Work

Appendix B – Combined Mechanical & Electrical NTIS Rating Summary

Tabulated condition state data on FHWA reportable elements relevant to Tunnel Mechanical Systems, Electrical Systems, Fire/Life Safety/Security Systems and Signs as defined in the Specifications for the National Tunnel Inventory.

This table is to be identical in both discipline's reports. The ratings are based off the coordinated efforts of the mechanical and electrical inspection teams.

See page 11 of 16 for an example of the Combined Mechanical & Electrical NTIS Rating Summary table.

Appendix C – Condensed Mech/Elect Rating Summary

C1 Numerical Rating Condition Description (WSDOT provided with Scope of Work)

C2 Condensed Mech/Elect Rating Summary per Scope of Work item

This rating summary is unique to each discipline based off the Scope of Work.

See pages 12 through 14 of 16 for an example of Appendix C.

Appendix D, E, etc – tabulated data, schematics, tables of measurements etc.

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The last Appendix should be photographs unless there are Co-Consultant documents like oil analysis in which case the photographs are the next to last and the Co-Consultant data is last. There shall be two photographs on each page.

Appendices shall have a cover page with a Table of Contents.

See page 15 of 16 for a sample Appendix Table of Contents
Appendices sheets shall have the same footer as the report but the page number will be prefaced with the letter of the Appendix

Data sheets and measurements sheets shall be arranged in the order that the subject appears in the Scope of Work.

See page 16 of 16 for a sample photograph page.

All reports are to be comb bound with clear plastic front covers and black plastic rear covers. The unsigned final report submittal shall consist of 2 copies of each report. The final submittal shall consist of one bound final report with original photographs which shall be stamped and signed by an Engineer of the appropriate discipline licensed in the State of Washington and shall also have a current NTIS tunnel inspection certification. Six stamped and signed color copies of the report shall be included with the final report. An electronic copy of the final report in PDF format and an electronic copy of all photographs in jpeg format along with photo logs shall be submitted with the signed final reports on a credit card size USB drive.

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WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

(TYPE) INSPECTION REPORT
MONTH, YEAR

NAME OF TUNNEL
TUNNEL NO. (W/XYZ)

PREPARED BY
COMPANY NAME
CITY, STATE

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TABLE OF CONTENTS

Name of Tunnel i Type of Inspection
Tunnel No. Month, Year

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EXECUTIVE SUMMARY

This report documents the condition of the Tunnel Name and Tunnel Number, electrical (or mechanical) systems as they existed during the In-Depth Electrical (or Mechanical) Inspection performed Month XX through XX, XXXX.

Overall, the electrical(or mechanical) systems exhibited minor deterioration and operated in an acceptable manner during the inspection.

There were no emergency repairs identified during the inspection.

(Items requiring rehabilitation should be documented in paragraph format. Do not just copy the rehabilitation recommendation list, write a summary.)

The electrical(or mechanical depending on report) systems, in general, require maintenance repairs to improve and maintain safety and operational reliability. Maintenance repair items are listed in the Recommendations section of this report. (Do not include the repair list, the reader can reference that if they are interested.)

PURPOSE AND SCOPE OF INSPECTION

The purpose of this inspection was to determine the condition of the electrical(mechanical) systems and identify deficiencies.

The inspection was performed from Month XX through Month XX, 20XX by XXXXX.

The Scope of Work for this inspection was provided by the WSDOT and is attached as Appendix A.

INSPECTION FINDINGS

POWER DISTRIBUTION

SERVICE ENTRANCE

The three phase, 480-vac service entrance equipment was located outside the Puget Sound Naval Shipyard Museum.

The service entrance equipment was visually inspected and operationally tested. Utility voltages were measured under no load and under load at the Motor Control Center. The measurements were tabulated (See Table 1 in Appendix D). The measurements were acceptable in all cases.

No deficiencies were noted during this inspection.

Based upon the field survey, the service entrance was observed to have minor deterioration.

GROUNDING SYSTEM

The grounding system had a ground rod at the incoming service and two no. 1/0 AWG conductors routed to the service panel.

The ground resistance and current were measured at the ground conductor in the Automatic Transfer Switch (ATS) and the measurements were tabulated (See Table 2 in Appendix D). The measurements were acceptable in all cases.

The grounding system was visually inspected.

No deficiencies were noted during this inspection.

Based upon the field survey, the grounding system was observed to have minor deterioration.

EMERGENCY GENERATOR

A generator was located adjacent to the tunnel electrical room.

The generator was visually inspected and operationally tested. Voltage readings were measured under no load and under load at the Motor Control Center. The measurements were tabulated (See Table 1 in Appendix D). The measurements were acceptable in all cases.

No deficiencies were noted during the inspection.

Based upon the field survey, the emergency generator was observed to have minor deterioration.

Name of Tunnel 4 Type of Inspection
Tunnel No. Month, Year
$ v1.$

AUTOMATIC TRANSFER SWITCH

An ATS was in the tunnel electrical room. The ATS was a Kohler Model rated for 800A.

The ATS was visually inspected and operationally tested.

No deficiencies were noted during the inspection.

Based upon the field survey, the automatic transfer switch was observed to have minor deterioration.

ELECTRICAL DISTRIBUTION SYSTEM

The tunnel electrical room had one Motor Control Center (MCC), eight panelboards, two step down transformers and circuit breakers to distribute power to the electrical equipment.

Each transformer's nameplate data and measured surface temperature were tabulated (See Table 3 in Appendix D). All measurements were acceptable and within the nameplate rating.

The electrical distribution equipment was visually inspected and operationally tested.

Infrared testing was performed on the electrical distribution equipment.

The following deficiency was noted and repaired during the inspection:

- Transformer LP-E was not equipped with a nameplate to identify the transformer. A nameplate was generated and installed on the transformer.

The following deficiency was noted:

- Panelboard LP-D was missing a plastic cover for a space in the panelboard that had no circuit breaker. The space was temporary covered with electric tape (See Photo 1 in Appendix E).

Based upon the field survey and above deficiency, the electrical distribution equipment was observed to have minor deterioration.

Name of Tunnel 5 Type of Inspection
Tunnel No. Month, Year

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RECOMMENDATIONS

EMERGENCY REPAIRS
There were no emergency repairs.

MAINTENANCE REPAIRS

POWER DISTRIBUTION
ELECTRICAL DISTRIBUTION SYSTEM
1. Sample repair number one.

MOTORS
SUMP PUMP MOTORS
2. Sample repair number two.

WIRE, CONDUIT AND JUNCTION BOXES
CONDUIT, CABLE TRAY AND JUNCTION BOXES
3. Sample repair number three.
4. Sample repair number four.
5. Sample repair number five.

REHABILITATION RECOMMENDATIONS
1. Sample recommendation number one.

COST ESTIMATE

1. Sample recommendation number one. $100,000

The provided cost estimate is for material and installation labor (tunnel items only). This cost does not include design engineering, maintenance, traffic control, construction management or administration.

Name of Tunnel 8 Type of Inspection
Tunnel No. Month, Year

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COMBINED MECHANICAL & ELECTRICAL NTIS RATING SUMMARY

Element Number	Element Name	Unit	Quantity	Condition State 1	Condition State 2	Condition State 3	Condition State 4
10200	Ventilation System	each	1	1	0	0	0
10201	Fans	each	6	6	0	0	0
10300	Drainage and Pumping System	each	1	1	0	0	0
10301	Pumps	each	2	2	0	0	0
10400	Emergency Generator System	each	1	1	0	0	0
10475	Flood Gate	each	0	0	0	0	0
10500	Electrical Distribution System	each	1	1	0	0	0
10550	Emergency Distribution System	each	1	1	0	0	0
10600	Tunnel Lighting Systems	each	1	1	0	0	0
10601	Tunnel Lighting Fixtures	each	172	172	0	0	0
10620	Emergency Lighting Systems	each	0	0	0	0	0
10621	Emergency Lighting Fixtures	each	0	0	0	0	0
10650	Fire Detection System	each	1	1	0	0	0
10700	Fire Protection System	each	1	1	0	0	0
10750	Emergency Communications System	each	1	0	0	1	0
10800	Tunnel Operations and Security System	each	1	0	1	0	0
10850	Traffic Sign	each	5	5	0	0	0
10870	Egress Sign	each	0	0	0	0	0
10890	Variable Message Board	each	0	0	0	0	0
10910	Lane Signal	each	6	6	0	0	0
10911	Lane Signal Fixture	each	6	6	0	0	0

Name of Tunnel
Tunnel No.

B1

Type of Inspection
Month, Year

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APPENDIX C

CONDENSED ELECTRICAL RATING SUMMARY

NUMERICAL RATING CONDITION DESCRIPTION	
Rating Condition	Description of Condition
1	FAILED CONDITION. Item not operational.
2	POTENTIALLY HAZARDOUS. Deterioration or damage to span drive or stabilizing machinery which could cause movable span to become imminently unstable in any position. Malfunction or deterioration of electrical system which could cause loss of control of the moving span. Deficiency in electrical system design, maintenance, or operational procedure which could cause loss of control of moving span. Inoperable vehicular traffic control device. Also, extreme cases of defects listed under higher rating numbers. Bridge may not be opened to marine traffic. If problem is with stabilizing machinery in the closed position, temporary shoring or support may be necessary to permit safe vehicular traffic over the closed bridge at reduced speed or rating. However, if problem is with counterweight components of vertical lift bridge stabilizing machinery, bridge may be closed to all traffic until shored or repaired.
3	VERY SERIOUS DETERIORATION. Deterioration or damage to machinery which will not cause imminent instability of a non redundant span drive but reduces allowable load on drive and may cause future instability if not corrected. Stabilizing machinery damaged, deteriorated, or improperly operated such that movable structure is not properly supported causing structure not to behave as designed and resulting in structural overstress and movements under vehicular traffic that severely affect quality. Severe misalignment of stabilizing machinery, resulting in overload of electrical system and consequent overstress of span drive machinery. Severe interference between moving span and fixed structure due to substructure movement. Deterioration of electrical control system such that many of the safety interlocks are normally by passed, inconsistent control of moving span, and inoperable or missing traffic control devices. Operation of movable span may be restricted in terms of opening angle, number of openings, and allowable wind velocity. If problem is with stabilizing machinery, shoring may be necessary to permit vehicular traffic.
4	SERIOUS DETERIORATION. Severe wear, deterioration or damage to span drive or stabilizing machinery due to overloading, inadequate maintenance, improper operation, or movement of the structure or substructure. Electrical system malfunctions and numerous safety interlocks are by-passed. Results are inconsistent, noisy, and unreliable operation of the movable span. Improper closure, affecting structural action and vehicular ride quality. Electrical system has archaic components for which replacements are no longer available and open bus panelboards that are considered unsafe nowadays.
5	MODERATE DETERIORATION. Excessive wear, some damage and deterioration of span drive and stabilizing mechanical machinery. Repairs and replacement of some machinery components required. Bearings may need liner adjustment. Machinery may be misaligned due to shifting of structure and substructure but not enough to seriously overload span drive: correctable by adjusting machinery component location using shims, etc. Replacement of corroded machinery fasteners required. Moving span under control but some indicating and safety devices may be inoperable and may be by-passed, and span limit switch may need adjustment.
6	MINOR DETERIORATION. None of the major mechanical machinery components are worn or damaged to the extent that replacement is now required. Some components of the span drive may need to be replaced, such as flex-couplings grids, brake linings, etc. Span stabilizing machinery functioning except that wear may have caused excessive clearances in lock bar guides, etc. Shimming of lock bar guides, replacement of limit switches and adjustments necessary. Machinery needs cleaning, painting, lubrication and adjustment. Electrical system generally functioning as designed. Replacement of some relays, indicating devices and lights may be required. Traffic control devices need repair or maintenance.
7	ALMOST NEW CONDITION. No extensive repairs required. Machinery needs cleaning, painting, lubrication, and adjustment. Electrical systems functioning as designed, may need replacement of indicating lights and minor limit switch adjustment, cleaning of relay contacts and housekeeping in panelboard. Traffic control devices functioning but may need replacement of obstruction lights, object markers, painting of housings, lubrication and adjustment of limit switches.
8	NEW CONDITION. Virtually no repairs required. Mechanical machinery may need cleaning, touch-up painting and lubrication. Electrical system and traffic devices functioning but may need replacement of bulbs and minor housekeeping.
9	NOT APPLICABLE. This device or equipment is not on the structure being inspected.
N/I	NOT INSPECTED. This device or equipment was not included in the inspection.

Name of Tunnel C1 Type of Inspection
Tunnel No. Month, Year

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Condensed Electrical Rating Summary	
Item	Rating
Power Distribution	
Incoming Service	6
Grounding System	6
Emergency Generator	6
Automatic Transfer Switch	6
Electrical Distribution Equipment	6
Motor Starters, Contactors, and Disconnects	6
Tunnel Fan Motor Soft Starts	6
Motors	
Tunnel Fan Motors	6
Sump Pump Motors	6
Control System	
Control Consoles	5
Control System	6
Alarm Auto-dialer	6
Sump Pump and Hydrocarbon Detection Controls	6
Uninterruptible Power Supplies	6
Limit Switches, Photo Electrics, Relays, Contactors, Solenoids and other control devices	6
Wire, Conduit and Junction Boxes	
Motor Feeders	6
Power Feeders	6
Conduits, Cable Tray and Junction Boxes	5
Traffic Control	
Traffic Signals, Lane Control Lights and Signs	5
Traffic Detection Loops	6
Fire Detection System and Emergency Service Cabinets	
Fire Detection System	6
Emergency Service Cabinets	6
Miscellaneous	
Lighting and Receptacles	6
Public Address System	3
Closed Circuit TV System	5
Tunnel Lighting	6
Overall Rating	6

Name of Tunnel C2 Type of Inspection
Tunnel No. Month, Year

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APPENDIX E

PHOTOGRAPHS

Name of Tunnel E1 Type of Inspection
Tunnel No. Month, Year

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Photo 1 Exhaust Fan Shaft – paint peeling and blistering (typical)

Photo 2 Standpipe Labels – non-compliant with ANSI/ASME A13.1

Name of Tunnel B1 Type of Inspection
Tunnel No. Month, Year
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Chapter 9 Tunnels

9-1 General

The National Tunnel Inspection Standards (NTIS) are published in the Code of Federal Regulations, 23 CFR 650, Subpart E. The NTIS requires that tunnel owners establish a program for the inspection of highway tunnels, to maintain a tunnel inventory, to report the inspection findings to FHWA, and to correct any critical findings found during these inspections. The Washington State's tunnel inspection program functions fully within the umbrella of the Washington State's bridge inspection organization.

Washington State's tunnel inspection organizationis only responsible for state and local agency-owned tunnels. Federally-owned tunnels are inventoried, inspected, and managed by federal agencies. Privately-owned highway tunnels are not included in this requirement, although WSDOT encourages private tunnel owners to inspect and maintain their tunnels in conformance with the NTIS and this manual. There is an open invitation for private tunnel owners to submit tunnel records to the Washington State Bridge Inventory System (WSBIS).

9-1.1 *Definitions*

Complex Tunnel – A tunnel characterized by advanced or unique structural elements or functional systems.

Highway LID – A structure built with green space which interconnects neighborhoods otherwise cut off or impacted by freeways, with or without local roads. If carrying local roads, the structure must have a deck area at least twice the area of the roads it carries. Highway "LIDS" shall be inventoried as tunnels under the NTIS.

National Tunnel Inspection Standards (NTIS) – Title 23 Code of Federal Regulations 650 Subpart E defines the NTIS regulations, and establishes requirements for inspection procedures, frequency of inspections, qualifications of personnel, inspection reports, and preparation and maintenance of a state tunnel inventory. The NTIS apply to all structures defined as highway tunnels located on all public roads.

Tunnel – The term ''tunnel'' means an enclosed roadway for motor vehicle traffic with vehicle access limited to portals, regardless of type of structure or method of construction, that requires, based on the owner's determination, special design considerations that may include lighting, ventilation, fire protection systems, and emergency egress capacity. The term ''tunnel'' does not include bridges or culverts inspected under the National Bridge Inspection Standards (Title 23 Code of Federal Regulations 650 Subpart C). The state of Washington shall prepare and maintain an inventory of all tunnels subject to the NTIS.

Specifications for the National Tunnel Inventory (SNTI) – The SNTI is intended to supplement the NTIS and provide the specifications for coding data required to be submitted to the National Tunnel Inventory (NTI). Data in the NTI will be used to meet legislative reporting requirements and provide tunnel owners, the Federal Highway Administration (FHWA) and the general public with information on the number and condition of the Nation's tunnels.

National Tunnel Inventory (NTI) – The aggregation of structure inventory and appraisal data collected to fulfill the requirements of the National Tunnel Inspection Standards.

Tunnel Operations, Maintenance, Inspection, and Evaluation Manual (TOMIE) – The TOMIE provides uniform and consistent guidance on the operation, maintenance, inspection, and evaluation of tunnels.

See Section 1-1.1 for additional definitions used in this manual.

9-2 Description of Tunnel Inspection Organization

In accordance with the description of the Bridge Inspection Organization offered in Section 1-2, a tunnel inspection organization as required by the NTIS has been developed. The tunnel inspection organization functions completely under the umbrella of the Washington State bridge inspection organization. The makeup of the tunnel organization is identical in all aspects as the bridge inspection organization.

9-3 Tunnel Inspection Programs

In accordance with the description of the Bridge Inspection Programs offered in Section 1-3, a tunnel inspection program as required by the NTIS has been developed. The tunnel inspection program functions completely under the umbrella of the Washington State bridge inspection organization. The makeup of the tunnel inspection program is identical in all aspects as the bridge inspection program.

9-4 Tunnel Inspection Organization Roles and Responsibilities

In accordance with the description of the Bridge Inspection Organization Roles and Responsibilities offered in Section 1-4, tunnel inspection Organization Roles and Responsibilities as required by the NTIS has been developed. Tunnel inspection roles and responsibilities fall completely under the umbrella of the Washington State bridge inspection organization with the additional requirement for the Team Leader as described below.

9-4.1 *Team Leader (TL)*

A team leader is in charge of an inspection team and responsible for planning, preparing, and performing the field inspection of tunnels. The team leader also makes repair recommendations and is responsible for initiating the critical damage procedures including full tunnel closure if deemed necessary. To qualify as a team leader, the individual must meet, at a minimum, the team leader requirements as described in the NTIS. Team leaders must be recertified on a regular basis by attending a refresher training class according to federal policy. The certification process is described in detail in Section 1-5.

9-5 Tunnel Inspection Certification

Certification for tunnel inspection work within the state of Washington is in accordance with the requirements described in Section 1-5 with the additional requirement of having a Certificate of completion of an FHWA approved comprehensive tunnel inspection course such as the NHI Tunnel Safety Inspection course.

9-6 Tunnel Inspection Certification Probation, Suspension, Decertification and Reinstatement

A process for decertification has been established to ensure that all PM's and TL's are following the proper conduct of their respective positions. The requirements for Tunnel inspectors are identical to that of Bridge Inspectors as described in Section 1-6.

9-7 Inspections

A multi-disciplined approach to tunnel inspection has been adopted by the WSDOT Bridge Preservation Office to comply with the requirements of the NTIS. Routine inspections for the Civil and Structural components are described in Chapter 3 while the Electrical and Mechanical inspection are described in Chapter 8.

9-8 Tunnel Elements

Tunnels elements are listed in Appendix 9-A SNTI condition definitions are consolidated in Appendix 9-A for inspector use, but the guidance therein is intended to be identical in practice to that of the SNTI. In any instance of disagreement in coding definition, SNTI takes precedent.

WSDOT divides inspection responsibility and reporting based on functional systems within the tunnels. For State owned structures, division of labor and reporting is as follows.

Structural Inspectors cover the following element Sections of the SNTI:

- 3.2 – Structural
- 3.3 – Civil
- 3.8 – Protective Systems

Mechanical and Electrical Inspectors are jointly responsible for the following element sections of the SNTI:

- 3.4 – Mechanical Systems
- 3.5 – Electrical and Lighting Systems
- 3.6 – Fire/Life Safety/Security Systems
- 3.7 – Signs

In cases where the tunnel contains no elements from SNTI Sections 3.4-6, and any signs present have no associated mechanical or electrical functionality, any signs present under SNTI Section 3.7-Signs are the responsibility of the Structural Inspectors to inventory and inspect.

9-9 Tunnel QC/QA Program

In accordance with the description of the WSDOT Bridge Preservation Office Quality Control Program offered in Section 7-2, a tunnel QC program as required by the NTIS has been developed. The tunnel inspection program functions completely under the umbrella of the Washington State bridge inspection organization. The makeup of the tunnel QC program is identical in all aspects as the bridge inspection QC program except for Mechanical and Electrical QC, which is developed and documented in Section 8-4.

9-10 Tunnel Records

9-10.1 *SNTI Coding Guide*

In accordance with the description of the WSDOT Bridge Preservation Office Bridge Files and Documentation offered in Section 2-1, Tunnel Files and Documentation as required by the NTIS has been developed. Tunnel Files and Documentation functions completely under the umbrella of the Washington State bridge inspection organization.

The SNTI Coding Guide Section 2 Inventory data has been incorporated into the WSBIS Coding Guide, available in Appendix 2-C. A summary of the SNTI codes with associated WSBIS codes are in Appendix 9-C.

9-11 Appendices

Appendix 9-A	Tunnel BMS Elements
Appendix 9-B	Vacant
Appendix 9-C	WSBIS / NTI Tunnel Inventory Codes

Appendix 9-A Tunnel BMS Elements

Tunnel BMS Element Listing

Element Type	Element Number	Element Description	Unit	Page
Liners	10000	Steel Tunnel Liner	SF	9-A-1
	10001	Cast-In-Place Tunnel Liner	SF	9-A-4
	10002	Precast Concrete Tunnel Liner	SF	9-A-4
	10003	Shotcrete Tunnel Liner	SF	9-A-5
	10004	Timber Tunnel Liner	SF	9-A-5
	10005	Masonry Tunnel Liner	SF	9-A-7
	10006	Unlined Rock Tunnel	SF	9-A-7
	10007	Rock Bolt/Dowel	EA	9-A-7
	10009	Other Tunnel Liner	SF	9-A-8
Tunnel Roof Girders	10010	Steel Tunnel Roof Girders	LF	9-A-8
	10011	Concrete Tunnel Roof Girders	LF	9-A-9
	10012	Prestressed Concrete Tunnel Roof Girders	LF	9-A-9
	10019	Other Tunnel Roof Girders	LF	9-A-10
Columns / Piles	10020	Steel Column / Piles	EA	9-A-10
	10021	Concrete Column / Piles	EA	9-A-11
	10029	Other Column / Piles	EA	9-A-11
Cross Passageway	10030	Steel Cross Passageway	LF	9-A-12
	10031	Concrete Cross Passageway	LF	9-A-13
	10033	Shotcrete Cross Passageway	LF	9-A-13
	10034	Timber Cross Passageway	LF	9-A-14
	10035	Masonry Cross Passageway	LF	9-A-15
	10036	Unlined Rock Cross Passageway	LF	9-A-16
	10039	Other Cross Passageway	LF	9-A-16
Interior Walls	10041	Concrete Interior Walls	SF	9-A-17
	10049	Other Interior Walls	SF	9-A-17
Portals	10051	Concrete Portal	SF	9-A-18
	10055	Masonry Portal	SF	9-A-19
	10059	Other Portal	SF	9-A-19
Ceiling Slab	10061	Concrete Ceiling Slab	SF	9-A-20
	10069	Other Ceiling Slab	SF	9-A-20
Ceiling Girder	10070	Steel Ceiling Girder	LF	9-A-21
	10071	Concrete Ceiling Girder	LF	9-A-21
	10072	Prestressed Concrete Ceiling Girder	LF	9-A-22
	10079	Other Ceiling Girder	LF	9-A-22
Hangers and Anchorages	10080	Steel Hangers and Anchorages	EA	9-A-23
	10089	Other Hangers and Anchorages	EA	9-A-24
Ceiling Panels	10090	Steel Ceiling Panels	SF	9-A-25
	10091	Concrete Ceiling Panels	SF	9-A-25
	10099	Other Ceiling Panels	SF	9-A-26
Invert Slab	10101	Concrete Invert Slab	SF	9-A-27
	10109	Other Invert Slab	SF	9-A-27
Slab-on-Grade	10111	Concrete Slab-on-Grade	SF	9-A-28
	10119	Other Slab-on-Grade	SF	9-A-28

Tunnel BMS Element Listing

Element Type	Element Number	Element Description	Unit	Page
Invert Girder	10120	Steel Invert Girder	LF	9-A-29
	10121	Concrete Invert Girder	LF	9-A-29
	10122	Prestressed Concrete Invert Girder	LF	9-A-30
	10129	Other Invert Girder	LF	9-A-30
Joints	10130	Strip Seal Expansion Joint	LF	9-A-31
	10131	Pourable Joint Seal	LF	9-A-32
	10132	Compression Joint Seal	LF	9-A-33
	10133	Assembly Joint With Seal	LF	9-A-34
	10134	Open Expansion Joint	LF	9-A-34
	10135	Assembly Joint Without Seal	LF	9-A-35
	10139	Other Joint	LF	9-A-35
Gaskets	10140	Gaskets	LF	9-A-36
Wearing Surface	10151	Concrete Wearing Surface	SF	9-A-37
	10158	Asphalt Wearing Surface	SF	9-A-37
	10159	Other Wearing Surface	SF	9-A-38
Traffic Barrier	10160	Steel Traffic Barrier	LF	9-A-38
Pedestrian Railing	10161	Concrete Traffic Barrier	LF	9-A-39
	10169	Other Traffic Barrier	LF	9-A-39
	10170	Steel Pedestrian Railing	LF	9-A-40
	10171	Concrete Pedestrian Railing	LF	9-A-40
	10179	Other Pedestrian Railing	LF	9-A-41
Ventilation System	10200	Ventilation System	EA	9-A-41
	10201	Fans	EA	9-A-42
Drainage and Pumping System	10300	Drainage and Pumping System	EA	9-A-42
	10301	Pumps	EA	9-A-43
Emergency Generator System	10400	Emergency Generator System	EA	9-A-44
Electrical Distribution System	10500	Electrical Distribution System	EA	9-A-45
Emergency Distribution System	10550	Emergency Distribution System	EA	9-A-45
Tunnel Lighting	10601	Tunnel Lighting Fixtures	EA	9-A-46
Emergency Lighting	10620	Emergency Lighting Systems	EA	9-A-47
	10621	Emergency Lighting Fixtures	EA	9-A-47
Fire Detection	10650	Fire Detection System	EA	9-A-48
Fire Protection	10700	Fire Protection System	EA	9-A-48
Emergency Communications	10750	Emergency Communications System	EA	9-A-49
Operations and Security	10800	Tunnel Operations and Security System	EA	9-A-49
Traffic Guidance	10850	Traffic Sign	EA	9-A-50
Egress Signs	10870	Egress Sign	EA	9-A-50

Tunnel BMS Element Listing

Element Type	Element Number	Element Description	Unit	Page
Variable Message Boards	10890	Variable Message Board	EA	9-A-51
Lane Signal	10910	Lane Signal	EA	9-A-51
	10911	Lane Signal Fixture	EA	9-A-52
Protective Systems	10950	Steel Corrosion Protective Coating	SF	9-A-53
	10951	Concrete Corrosion Protective Coating	SF	9-A-53
	10952	Fire Protective Coating	SF	9-A-54
	10955	Reflective Tunnel Tile	SF	9-A-54

Tunnel liner quantities are based on the shape of the liner perimeter which does not include the roadway because the roadway/slab elements document these conditions. The total quantity for circular tunnel shape has a circular perimeter multiplied by the length of tunnel. The total quantity for a horseshoe tunnel is the perimeter exposed to traffic minus the roadway surface multiplied by the length of tunnel.

10000 Steel Tunnel Liner — Units – SF

Record this element for all steel tunnel liners. Steel tunnel liners function as a shell for the exterior of the tunnel and as a divider between different bores of the tunnel.

The area of a tunnel liner is the product of the length (along the centerline) of the tunnel and the perimeter of the liner.

1. Defects are superficial and have no effect on the structural capacity of the tunnel.
2. Tunnel Liner area corrosion of steel has initiated and there may be areas of freckled rust. Cracking that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar may exist in the liner. Connections have loose fasteners or pack rust without distortion, but the connections are in place and functioning as intended. Distortion in the liner is present and has received a structural review and has been mitigated. Liner surfaces are saturated indicating seepage may be present or evidence of past seepage.
3. Tunnel Liner area with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Areas of corrosion may exist where section loss is evident, or pack rust is present. Cracks may exist and have not been arrested. Connections may have missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion. Liner surfaces may have areas that are fully saturated with seepage.
4. Tunnel liner area condition warrants a structural review to determine the effect of strength or serviceability of the liner, OR a structural review has been completed and the defects impact strength and serviceability of the liner. Liner surfaces may have areas with seepage that ranges from dripping to flowing.

10001 Cast-in-Place Concrete Tunnel Liner Units – SF

Record this element for all cast-in-place concrete tunnel liners. Cast-in place concrete tunnel liners function as a shell for the exterior of the tunnel and as a divider between different bores of the tunnel.

The area of a tunnel liner is the product of the length (along the centerline) of the tunnel and the perimeter of the liner.

1. Defects are superficial and have no effect on the structural capacity of the tunnel liner. Cracking may exist with widths less than 0.012 in. or spacing greater than 5.0 ft.
2. Tunnel Liner area delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.10 in. or spacing between 1.0 – 5.0 ft. Distortion of liner has received structural review and has been mitigated. Liner surfaces are saturated indicating seepage may be present or evidence of past seepage.
3. Tunnel Liner area with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.10 in. below the spring line or greater than 0.012 in. above the spring line or spacing less than 1.0 ft. Liner surfaces may have areas that are fully saturated with seepage.
4. Tunnel Liner area condition warrants a structural review to determine the effect of strength or serviceability of the liner, OR a structural review has been completed and the defects impact strength and serviceability of the liner. Liner surfaces may have areas with seepage that ranges from dripping to flowing.

10002 Precast Concrete Tunnel Liner Units – SF

Record this element for all precast concrete tunnel liners. Precast concrete tunnel liners function as a shell for the exterior of the tunnel and as a divider between different bores of the tunnel.

The area of a tunnel liner is the product of the length (along the centerline) of the tunnel and the perimeter of the liner.

See Cast-in-Place Concrete Tunnel Liner (10001) for condition state specifications.

10003 Shotcrete Tunnel Liner Units – SF

Record this element for all shotcrete tunnel liners. Shotcrete tunnel liners function as a shell for the exterior of the tunnel and as a divider between different bores of the tunnel.

The area of a tunnel liner is the product of the length (along the centerline) of the tunnel and the perimeter of the liner.

See Cast-in-Place Concrete Tunnel Liner (10001) for condition state specifications.

10004 Timber Tunnel Liner Units – SF

Record this element for all timber tunnel liners consisting of timber sets with or without timber lagging. Timber tunnel liners function as a shell for the exterior of the tunnel and as a divider between different bores of the tunnel.

The area of a tunnel liner is the product of the length (along the centerline) of the tunnel and the perimeter of the liner.

1. Defects are superficial and have no effect on the structural capacity of the tunnel.
2. Tunnel Liner area with decay that has started in the timber sets or lagging, no fungus growth or discoloration is present. Small voids may exist in the annular space behind the lagging. Cracks, splits, or checks may exist in the timber sets or lagging. Distortion or misalignment between timber members may exist but is 0.125 in. or less. Insect infestation has started in the timber sets or lagging. Connections have loose bolts, or fasteners are present, but the connections are in place and functioning as intended. Timber surfaces are saturated indicating seepage may be present or evidence of past seepage.
3. Tunnel Liner area with structural defects. Decay has resulted in loss of strength, deflection, or crushing of the element but not of a sufficient magnitude to affect the strength and serviceability of the tunnel. Fungus growth and discoloration is present. Large voids may exist in the annular space behind the lagging. Cracks, splits or checks exist in the timber sets or lagging and has impacted strength and/or serviceability but does not warrant a structural review. Distortion or misalignment between timber members may exist and is between 0.125 in. and 0.25 in. Insect infestation exists in the timber sets or lagging and has produced loss of strength or deflection of the element but not of a sufficient magnitude to affect the strength and/or serviceability of the tunnel. Connections have missing bolts or fasteners but does not require a structural review. Timber surfaces are fully saturated with seepage.
4. Tunnel liner area condition warrants a structural review to determine the effect of strength or serviceability of the liner, OR a structural review has been completed and the defects impact strength and serviceability of the liner. Liner surfaces may have areas with seepage that ranges from dripping to flowing.

10005 Masonry Tunnel Liner Units – SF

Record this element for all masonry tunnel liners. Masonry tunnel liners function as a shell for the exterior of the tunnel and as a divider between different bores of the tunnel.

The area of a tunnel liner is the product of the length (along the centerline) of the tunnel and the perimeter of the liner.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Surface is dry.
2. Tunnel liner area with cracking or voids in less than 10% of joints. Efflorescence may include white surfaces without build-up or leaching without rust staining. Block or stone has split or spalled with no shifting and all patching is sound. Block or stone has only shifted slightly out of alignment. Distortion has received structural review and has been mitigated. Saturated surface indicating seepage may be present or evidence of past seepage.
3. Tunnel liner areas of efflorescence may exist with heavy build-up and rust staining. There is cracking or voids in 10% or more of the joints. Block and stone have split or spalled with shifting but does not warrant a structural review or patching is unsound. Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review. Distortion has received structural review and does not require mitigation. Surface is fully saturated with seepage.
4. Tunnel liner area condition warrants a structural review to determine the effect of strength or serviceability of the liner, OR a structural review has been completed and the defects impact strength and serviceability of the liner. Liner surfaces may have areas with seepage that ranges from dripping to flowing.

10006 Unlined Rock Tunnel Units – SF

Record this element for all unlined rock tunnels. Unlined rock tunnels function as the exterior of the tunnel and as a divider between different bores of the tunnel.

The area of an unlined rock tunnel is the product of the length of the tunnel (along the centerline) and the perimeter of the unlined rock.

1. Tunnel has no drummy rock, blocks, or slabs apparent, and no shear zones are in evidence. There are no displacements visible along joints and cracks, and the surface is dry.
2. Tunnel has rockfall with any blocks or slabs that are tightly interlocked with the surrounding rock and are not in danger of separating from the parent rock mass. Any displacements along shear zones, joints, or cracks appear to be old, i.e., to have come about prior to the existence of the tunnel. The drummy areas are less than or equal to 1.0 ft. in diameter. All patches are sound. Saturated surface indicating seepage may be present or evidence of past seepage.
3. Tunnel has rockfall with any blocks or slabs that are not tightly interlocked with the surrounding rock that are less than 1 ft. in diameter. Displacements along shear zones, joints, or cracks have occurred since construction. The drummy areas are greater than 1.0 ft in diameter. Patches are unsound. Surface is fully saturated with seepage.
4. Tunnel condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. Tunnel may have areas with seepage that ranges from dripping to flowing.

10007 Rock Bolt/Dowel Units – EA

Record this element for all rock bolts or dowels and is not a tunnel liner element. This documents all rock or soil nails used to stabilize the earth in the tunnel, or at and above the portals. Dowels used to connect pieces of precast concrete tunnel liner are considered part of the tunnel liner element and not included in this element.

The total number of rock bolt/dowels is the sum of all the number of rock bolts and dowels.

1. Defects are superficial and have no effect on the structural capacity of the tunnel.
2. There are loose or missing nuts, but the bolt/dowel is in alignment and functioning as intended. There is deformation or cracking of liner or supported rock.
3. There are loose or missing nuts; the bolt/dowel is out of alignment or loose. There is deformation or crackling and spalling of liner or supported rock.
4. The condition warrants a structural review to determine the effect on strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10009 Other Tunnel Liner Units – SF

Record this element for all tunnel liners composed of other materials. Other tunnel liners function as a shell for the exterior of the tunnel and as a divider between different bores of the tunnel.

The area of a tunnel liner is the product of the length (along the centerline) of the tunnel and the perimeter of the liner.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. There are cracks are present but they have not allowed the rock to shift.
2. Tunnel liners may have cracks present and rock has minor shifting. Distortion has received structural review and has been mitigated, and all patches are sound. Saturated surface indicating seepage may be present or evidence of past seepage.
3. Tunnel liner may have rocks that are cracked with face deformation. There are rocks missing. Distortion has received structural review and does not require mitigation. Unsound patches. Surface is fully saturated with seepage.
4. Tunnel liner area condition warrants a structural review to determine the effect of strength or serviceability of the liner, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. Liner surfaces may have areas with seepage that ranges from dripping to flowing.

10010 Steel Tunnel Roof Girders Units – LF

Record this element for all steel tunnel roof girders. Tunnel roof girders support the tunnel roof liner or exposed rock which constitutes the tunnel roof.

The total length of tunnel roof girder is the sum of all the lengths of each tunnel roof girder.

1. Defects are superficial and have no effect on the structural capacity of the tunnel.
2. Roof Girder length where corrosion of steel has initiated and there may be areas of freckled rust. Cracking that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar may exist in the element or tunnel. Connections have loose fasteners or pack rust without distortion, but the connections are in place and functioning as intended. Distortion is present and has received a structural review and has been mitigated. Surfaces are saturated indicating seepage may be present or evidence of past seepage.
3. Roof Girder length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Areas of corrosion may exist along the length of the girder where section loss is evident, or pack rust is present. Cracks may exist and have not been arrested. Connections may have missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion. Surfaces may have areas that are fully saturated with seepage.
4. Roof Girder condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. Surfaces may have areas with seepage that ranges from dripping to flowing.

10011 Concrete Tunnel Roof Girders Units – LF

Record this element for all concrete tunnel roof girders. Tunnel roof girders support the tunnel roof liner or exposed rock which constitutes the tunnel roof.

The total length of tunnel roof girder is the sum of all the lengths of each tunnel roof girder.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Roof Girder length with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft.
3. Roof Girder length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft.
4. Roof Girder condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10012 Prestressed Concrete Tunnel Roof Girders Units – LF

Record this element for all prestressed concrete tunnel roof girders. Tunnel roof girders support the tunnel roof liner or exposed rock which constitutes the tunnel roof.

The total length of tunnel roof girder is the sum of all the lengths of each tunnel roof girder.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Cracking may exist with widths less than 0.004 in. or spacing greater than 3.0 ft.
2. Roof Girder length with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.004 – 0.009 in. or spacing between 1.0 – 3.0 ft. Exposed prestressing is present without section loss.
3. Roof Girder length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.009 in. or spacing less than 1.0 ft. Exposed prestressing is present with section loss but does not warrant a structural review.
4. Roof Girder condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10019	Other Tunnel Roof Girders	Units – LF

Record this element for all tunnel roof girders composed of other materials. Tunnel roof girders support the tunnel roof liner or exposed rock which constitutes the tunnel roof.

The total length of tunnel roof girder is the sum of all the lengths of each tunnel roof girder.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Roof Girders are in good condition with no notable distress.
2. Roof Girder lengths are in fair condition with isolated breakdowns or deterioration.
3. Roof Girder lengths are in poor condition with widespread deterioration or breakdowns without reducing load capacity
4. Roof Girder condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Column/Piles

10020	Steel Columns/Piles	Units – EA

Record this element for all steel columns/piles. Tunnel columns support the tunnel roof girders, tunnel ceiling girders and/or tunnel invert girders. Tunnel piles provide support for the tunnel columns.

The total number of columns/piles is the sum of all the number of columns and piles.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. The connection is in place and is functioning as intended.
2. Column/Pile area where corrosion of steel has initiated and there may be areas of freckled rust. Cracking that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar may exist in the columns/piles. Connections have loose fasteners or pack rust without distortion, but the connections are in place and functioning as intended. Distortion in the columns/piles is present and has received a structural review and has been mitigated.
3. Column/Pile area with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Areas of corrosion may exist where section loss is evident, or pack rust is present. Cracks may exist and have not been arrested. Connections may have missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion.
4. Column/Pile area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10021	Concrete Columns/Piles	Units – EA

Record this element for all concrete columns/piles. Tunnel columns support the tunnel roof girders, tunnel ceiling girders and/or tunnel invert girders. Tunnel piles provide support for the tunnel columns.

The total number of columns/piles is the sum of all the number of columns and piles.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Column/Pile area with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft.
3. Column/Pile area with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft.
4. Column/Pile area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10029	Other Columns/Piles	Units – EA

Record this element for all columns/piles composed of other materials. Tunnel columns support the tunnel roof girders, tunnel ceiling girders and/or tunnel invert girders. Tunnel piles provide support for the tunnel columns.

The total number of columns/piles is the sum of all the number of columns and piles.

1. Column/Pile is in good condition with no notable distress.
2. Column/Pile is in fair condition with isolated breakdowns or deterioration.
3. Column/Pile is in poor condition with widespread deterioration or breakdowns without reducing load capacity.
4. Column/Pile condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Passageway

10030	**Steel Cross Passageway**	**Units – LF**

Record this element for all steel cross passageways. Cross passageways are typically oriented transverse to the tunnel bores and are comprised of doors to allow egress between separated tunnel bores.

The total length of cross passageways is the sum of all the lengths of each cross passageway.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Connection is in place and functioning as intended.
2. Cross Passageway length where corrosion of steel has initiated and there may be areas of freckled rust. Cracking that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar may exist in the element or tunnel. Connections have loose fasteners or pack rust without distortion, but the connections are in place and functioning as intended. Distortion is present and has received a structural review and has been mitigated. Surfaces are saturated indicating seepage may be present or evidence of past seepage.
3. Cross Passageway length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Areas of corrosion may exist where section loss is evident, or pack rust is present. Cracks may exist and have not been arrested. Connections may have missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion. Surfaces may have areas that are fully saturated with seepage.
4. Cross Passageway condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. Surfaces may have areas with seepage that ranges from dripping to flowing.

10031 Concrete Cross Passageway Units – LF

Record this element for all concrete cross passageways. Cross passageways are typically oriented transverse to the tunnel bores and are comprised of doors to allow egress between separated tunnel bores.

The total length of cross passageways is the sum of all the lengths of each cross passageway.

1. Defects are superficial and have no effect on the structural capacity of the tunnel liner. Cracking may exist with widths less than 0.012 in. or spacing greater than 5.0 ft.
2. Cross Passageway length with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.10 in. or spacing between 1.0 – 5.0 ft. Distortion of passageway has received structural review and has been mitigated. Surfaces are saturated indicating seepage may be present or evidence of past seepage.
3. Cross Passageway length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.10 in. below the spring line or greater than 0.012 in. above the spring line or spacing less than 1.0 ft. Surfaces may have areas that are fully saturated with seepage.
4. Cross Passageway condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. Surfaces may have areas with seepage that ranges from dripping to flowing.

10033 Shotcrete Cross Passageway Units – LF

Record this element for all shotcrete cross passageways. Cross passageways are typically oriented transverse to the tunnel bores and are comprised of doors to allow egress between separated tunnel bores.

The total length of cross passageways is the sum of all the lengths of each cross passageway.

See Concrete Cross Passageway (10031) for condition state specifications.

10034 Timber Cross Passageway Units – LF

Record this element for all timber cross passageways. Cross passageways are typically oriented transverse to the tunnel bores and are comprised of doors to allow egress between separated tunnel bores.

The total length of cross passageways is the sum of all the lengths of each cross passageway.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Timber distortion has no off-set or misalignment between the timber members with good compression fit.
2. Cross Passageway length with decay that has started in the timber sets or lagging, no fungus growth or discoloration is present. Small voids may exist in the annular space behind the lagging. Cracks, splits, or checks may exist in the timber sets or lagging. Distortion or misalignment between timber members may exist but is 0.125 in. or less. Insect infestation has started in the timber sets or lagging. Connections have loose bolts, or fasteners are present, but the connections are in place and functioning as intended. Timber surfaces are saturated indicating seepage may be present or evidence of past seepage.
3. Cross Passageway length with structural defects. Decay has resulted in loss of strength, deflection, or crushing of the element but not of a sufficient magnitude to affect the strength and serviceability of the tunnel. Fungus growth and discoloration is present. Large voids may exist in the annular space behind the lagging. Cracks, splits or checks exist in the timber sets or lagging and has impacted strength and/or serviceability but does not warrant a structural review. Distortion or misalignment between timber members may exist and is between 0.125 in. and 0.25 in. Insect infestation exists in the timber sets or lagging and has produced loss of strength or deflection of the element but not of a sufficient magnitude to affect the strength and/or serviceability of the tunnel. Connections have missing bolts or fasteners but does not require a structural review. Timber surfaces are fully saturated with seepage.
4. Cross Passageway condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. Surfaces may have areas with seepage that ranges from dripping to flowing.

10035 Masonry Cross Passageway Units – LF

Record this element for all masonry cross passageways. Cross passageways are typically oriented transverse to the tunnel bores and are comprised of doors to allow egress between separated tunnel bores.

The total length of cross passageways is the sum of all the lengths of each cross passageway.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Surface is dry.
2. Cross Passageway length with cracking or voids in less than 10% of joints. Efflorescence may include white surfaces without build-up or leaching without rust staining. Block or stone has split or spalled with no shifting and all patching is sound. Block or stone has only shifted slightly out of alignment. Distortion has received structural review and has been mitigated. Saturated surface indicating seepage may be present or evidence of past seepage.
3. Cross Passageway length of efflorescence may exist with heavy build-up and rust staining. There is cracking or voids in 10% or more of the joints. Block and stone have split or spalled with shifting but does not warrant a structural review and/or patching is unsound. Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review. Distortion has received structural review and does not require mitigation. Surface is fully saturated with seepage.
4. Cross Passageway condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. Surfaces may have areas with seepage that ranges from dripping to flowing.

10036 Unlined/Rock Cross Passageway Units – LF

Record this element for all unlined rock cross passageways. Cross passageways are typically oriented transverse to the tunnel bores and are comprised of doors to allow egress between separated tunnel bores.

The total length of cross passageways is the sum of all the lengths of each cross passageway.

1. Passageway has no drummy rock, blocks, or slabs apparent, and no shear zones are in evidence. There are no displacements visible along joints and cracks, and the surface is dry.
2. Passageway length has rockfall with any blocks or slabs that are tightly interlocked with the surrounding rock and are not in danger of separating from the parent rock mass. Any displacements along shear zones, joints, or cracks appear to be old, i.e., to have come about prior to the existence of the tunnel. The drummy areas are less than or equal to 1.0 ft. in diameter. All patches are sound. Saturated surface indicating seepage may be present or evidence of past seepage.
3. Passageway length has rockfall with any blocks or slabs that are not tightly interlocked with the surrounding rock that are less than 1 ft. in diameter. Displacements along shear zones, joints, or cracks have occurred since construction. The drummy areas are greater than 1.0 ft in diameter. Patches are unsound. Surface is fully saturated with seepage.
4. Passageway condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. Passageway may have areas with seepage that ranges from dripping to flowing.

10039 Other Cross Passageway Units – LF

Record this element for all other cross passageways. Cross passageways are typically oriented transverse to the tunnel bores and are comprised of doors to allow egress between separated tunnel bores.

The total length of cross passageways is the sum of all the lengths of each cross passageway.

1. Defects are superficial and have no effect on structural capacity. Cracks may be present but they have not allowed for the rock to shift. Surfaces are dry.
2. Cross Passageway length where cracks are present and rock has minor shifting and all patches are sound. Distortion has received structural review and has been mitigated. A saturated surface may indicate present or previous seepage.
3. Cross Passageway length where rocks are cracked with face deformation and rocks are missing and patches are unsound. Distortion has received structural review and does not need mitigation. Surface is fully saturated with seepage.
4. Cross Passageway condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. Seepage could range from dripping to flowing.

Tunnel Interior Walls

10041 Concrete Interior Walls Units – SF

Record this element for all concrete interior walls. This element defines those internal walls in tunnels which are usually placed to separate traffic travelling in opposite directions. The internal wall also serves as a barrier between tunnel segments in an emergency to protect evacuees from smoke inhalation, fire or hazardous conditions.

The area of the interior wall is the product of the length (along the centerline) of the tunnel and the height.

1. Defects are superficial and have no effect on the structural capacity of the interior wall. Cracking may exist with widths less than 0.012 in. or spacing greater than 5.0 ft.
2. Interior Wall area with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking in liners may exist with widths 0.012 – 0.10 in. or spacing between 1.0 – 5.0 ft.
3. Interior Wall area with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.10 in. below the spring line or greater than 0.012 in. above the spring line or spacing less than 1.0 ft.
4. Interior Wall area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10049 Other Interior Walls Units – SF

Record this element for all interior walls composed of other materials. This element defines those internal walls in tunnels which are usually placed to separate traffic travelling in opposite directions. The internal wall also serves as a barrier between tunnel segments in an emergency to protect evacuees from smoke inhalation, fire or hazardous conditions.

The area of the interior wall is the product of the length (along the centerline) of the tunnel and the height.

1. Interior Wall is in good condition with no notable distress.
2. Interior Wall is in fair condition with isolated breakdowns or deterioration.
3. Interior Wall is in poor condition with widespread deterioration or breakdowns without reducing load capacity.
4. Interior Wall area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Portal

10051	**Concrete Portal**	**Units – SF**

Record this element for all concrete portals. This element defines the portal façade, which comprise the architectural/structural that are above the roadway at the opening of the tunnel bore.

The area of the portal is the product of the width and height of the portal minus the area of the roadway opening. The area may include wingwalls which retain soil and rock near the portal but does not include walls leading up to the portal.

1. Defects are superficial and have no effect on the structural capacity of the portal. Cracking may exist with widths less than 0.012 in. or spacing greater than 5.0 ft.
2. Portal area with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.10 in. or spacing between 1.0 – 5.0 ft. Settlement exists within tolerable limits or is arrested with no observed structural distress.
3. Portal area with structural defects that do not require a structural review. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.10 in. below the spring line or greater than 0.012 in. above the spring line or spacing less than 1.0 ft. Settlement exceeds tolerable limits but does not warrant structural review.
4. Portal area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10055 Masonry Portal Units – SF

Record this element for all masonry portals. This element defines the portal façade, which comprise the architectural/structural that are above the roadway at the opening of the tunnel bore.

The area of the portal is the product of the width and height of the portal minus the area of the roadway opening. The area may include wingwalls which retain soil and rock near the portal but does not include walls leading up to the portal.

1. Defects are superficial and have no effect on the structural capacity of the portal.
2. Portal area with cracking or voids in less than 10% of joints. Efflorescence may include white surfaces without build-up or leaching without rust staining. Block or stone has split or spalled with no shifting and all patching is sound. Block or stone has only shifted slightly out of alignment. Settlement exists within tolerable limits or is arrested with no observed structural distress.
3. Portal areas of efflorescence may exist with heavy build-up and rust staining. There is cracking or voids in 10% or more of the joints. Block and stone have split or spalled with shifting but does not warrant a structural review or patching is unsound. Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review. Settlement exceeds tolerable limits but does not warrant structural review.
4. Portal area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10059 Other Portal Units – SF

Record this element for all portals composed of other materials. This element defines the portal façade, which comprise the architectural/structural that are above the roadway at the opening of the tunnel bore.

The area of the portal is the product of the width and height of the portal minus the area of the roadway opening. The area may include wingwalls which retain soil and rock near the portal but does not include walls leading up to the portal.

1. Portal is in good condition with no notable distress.
2. Portal is in fair condition with isolated breakdowns or deterioration. Settlement exists within tolerable limits or arrested with no observed structural distress.
3. Portal is in poor condition with widespread deterioration or breakdowns without reducing load capacity. Settlement exceeds tolerable limits but does not warrant a structural review.
4. Portal area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Ceiling Slab

10061 Concrete Ceiling Slab Units – SF

Record this element for all concrete ceiling slabs. This element defines those structural slabs which separate the space above the roadway from the upper plenum.

The area of the ceiling slab is the product of the width and the length of the slab.

1. Defects are superficial and have no effect on the structural capacity of the ceiling slab. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Ceiling Slab area with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft.
3. Ceiling Slab area with structural defects that do not require a structural review. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft.
4. Ceiling Slab area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10069 Other Ceiling Slab Units – SF

Record this element for all ceiling slabs composed of other materials. This element defines those structural slabs which separate the space above the roadway from the upper plenum.

The area of the ceiling slab is the product of the width and the length of the slab.

1. Ceiling Slab is in good condition with no notable distress.
2. Ceiling Slab is in fair condition with isolated breakdowns or deterioration.
3. Ceiling Slab is in poor condition with widespread deterioration or breakdowns without reducing load capacity.
4. Ceiling Slab area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Ceiling Girder

10070	**Steel Ceiling Girder**	**Units – LF**

Record this element for all steel ceiling girders. This element defines the girders that support the structural ceiling slabs which separate the space above the roadway from the upper plenum.

The total quantity for ceiling girder is the sum of all the lengths of each tunnel ceiling girder.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Connection is in place and functioning as intended.
2. Ceiling Girder length where corrosion of steel has initiated and there may be areas of freckled rust. Cracking that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar may exist in the liner. Connections have loose fasteners or pack rust without distortion, but the connections are in place and functioning as intended. Distortion is present and has received a structural review and has been mitigated.
3. Ceiling Girder length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Areas of corrosion may exist where section loss is evident, or pack rust is present. Cracks may exist and have not been arrested. Connections may have missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion.
4. Ceiling Girder condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10071	**Concrete Ceiling Girder**	**Units – LF**

Record this element for all concrete ceiling girders. This element defines the girders that support the structural ceiling slabs which separate the space above the roadway from the upper plenum.

The total quantity for ceiling girder is the sum of all the lengths of each tunnel ceiling girder.

1. Defects are superficial and have no effect on the structural capacity of the ceiling slab. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Ceiling Girder length with delamination’s, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft.
3. Ceiling Girder length with structural defects that do not require a structural review. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft.
4. Ceiling Girder condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10072 Prestressed Concrete Ceiling Girder Units – LF

Record this element for all prestressed concrete ceiling girders. This element defines the girders that support the structural ceiling slabs which separate the space above the roadway from the upper plenum.

The total quantity for ceiling girder is the sum of all the lengths of each tunnel ceiling girder.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Cracking may exist with widths less than 0.004 in. or spacing greater than 3.0 ft.
2. Ceiling Girder length with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.004 – 0.009 in. or spacing between 1.0 – 3.0 ft. Exposed prestressing is present without section loss.
3. Ceiling Girder length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.009 in. or spacing less than 1.0 ft. Exposed prestressing is present with section loss but does not warrant a structural review.
4. Ceiling Girder condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10079 Other Ceiling Girder Units – LF

Record this element for all ceiling girders composed of other materials. This element defines the girders that support the structural ceiling slabs which separate the space above the roadway from the upper plenum.

The total quantity for ceiling girder is the sum of all the lengths of each tunnel ceiling girder.

1. Ceiling Girder is in good condition with no notable distress.
2. Ceiling Girder is in fair condition with isolated breakdowns or deterioration.
3. Ceiling Girder is in poor condition with widespread deterioration or breakdowns without reducing load capacity.
4. Ceiling Girder area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Hangers/Anchors

10080	Steel Hangers and Anchorages	Units – EA

Record this element for all steel hangers and anchorages. Hangers are tension members that support ceiling girders or ceiling panels. The anchorages of the hangers are typically attached to the tunnel roof and ceiling panels.

The total quantity for hangers and anchorages is the sum of all the number of hanger and anchorage units.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Connection is in place and functioning as intended.
2. Steel Hanger and Anchorages where corrosion of steel has initiated and there may be areas of freckled rust. There may be cracking that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar may exist in the liner. Connections have loose fasteners or pack rust without distortion, but the connections are in place and functioning as intended. Isolated hangers are bowed or elongated. Creep displacement is visible and anchorage has received a structural review and has been mitigated. There is cracking around the anchorage areas, but concrete is sound.
3. Steel Hanger and Anchorages with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Areas of corrosion may exist where section loss is evident, or pack rust is present. Cracks may exist and have not been arrested. Connections may have missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion. Multiple adjacent hangers are bowed and elongated and anchors has a gap greater than 0.125 in or are visibly elongated. Creep displacement is visible and anchorage has received a structural review and does not require mitigation. There is cracking and/or spalling around the anchorage areas and concrete is not sound
4. Steel Hanger and Anchorage condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10089 Other Hangers and Anchorages Units – EA

Record this element for all hangers and anchorages composed of other materials. Hangers are tension members that support ceiling girders or ceiling panels. The anchorages of the hangers are typically attached to the tunnel roof and ceiling panels.

The total quantity for hangers and anchorages is the sum of all the number of hanger and anchorage units.

1. Hanger and Anchorage are in good condition with no notable distress and connections and anchorage area are sound.
2. Hanger and Anchorages are in fair condition with isolated breakdowns or deterioration. Isolated fasteners are loose at their connections. Isolated hangers are bowed or elongated. Displacement is visible and anchorage has received structural review and has been mitigated. There is cracking around the anchorage areas, but the concrete is sound.
3. Hanger and Anchorages are in poor condition with widespread deterioration or breakdowns without reducing load capacity. Adjacent hangers are loose and/or fasteners are missing from the connections at isolated locations. Multiple adjacent hangers are bowed or elongated, and/or anchors have a gap greater than 0.125 inches or are visible elongated. Displacement is visible and anchorage has received a structural review and does not require mitigation. There is cracking or spalling around the anchorage area and the concrete is not sound.
4. Hanger and Anchorage condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Ceiling Panels

10090	**Steel Ceiling Panels**	**Units – SF**

Record this element for all steel ceiling panels. Ceiling panels separate the upper plenum from space above the tunnel roadway. Ceiling panels are typically supported by hangers.

The area of the ceiling panel is the product of the width and length of the panel.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Connection is in place and function as needed.
2. Ceiling Panel area where corrosion of steel has initiated and there may be areas of freckled rust. Cracking that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar may exist in the liner. Connections have loose fasteners or pack rust without distortion, but the connections are in place and functioning as intended. Distortion is present and has received a structural review and has been mitigated.
3. Ceiling Panel area with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Areas of corrosion may exist where section loss is evident, or pack rust is present. Cracks may exist and have not been arrested. Connections may have missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion.
4. Ceiling Panel area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10091	**Concrete Ceiling Panels**	**Units – SF**

Record this element for all concrete ceiling panels. Ceiling panels separate the upper plenum from space above the tunnel roadway. Ceiling panels are typically supported by hangers.

The area of the ceiling panel is the product of the width and length of the panel.

1. Defects are superficial and have no effect on the structural capacity of the ceiling panel. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Ceiling Panel area with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft.
3. Ceiling Panel area with structural defects that do not require a structural review. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft.
4. Ceiling Panel area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10099 Other Ceiling Panels Units – SF

Record this element for all ceiling panels composed of other materials. Ceiling panels separate the upper plenum from space above the tunnel roadway. Ceiling panels are typically supported by hangers.

The area of the ceiling panel is the product of the width and length of the panel.

1. Ceiling Panel is in good condition with no notable distress.
2. Ceiling Panel is in fair condition with isolated breakdowns or deterioration.
3. Ceiling Panel is in poor condition with widespread deterioration or breakdowns without reducing load capacity.
4. Ceiling Panel area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Invert Slab

10101	**Concrete Invert Slab**	**Units – SF**

Record this element for all concrete invert slabs. This element defines those structural slabs which support the roadway and traffic loads.

The total area of the invert slab is the product of the width and length of the slab.

1. Defects are superficial and have no effect on the structural capacity of the invert slab. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Invert Slab area with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft.
3. Invert Slab area with structural defects that do not require a structural review. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft.
4. Invert Slab area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10109	**Other Invert Slab**	**Units – SF**

Record this element for all invert slabs composed of other materials. This element defines those structural slabs which support the roadway and traffic loads.

The total area of the invert slab is the product of the width and length of the slab.

1. Invert Slab is in good condition with no notable distress.
2. Invert Slab is in fair condition with isolated breakdowns or deterioration.
3. Invert Slab is in poor condition with widespread deterioration or breakdowns without reducing load capacity.
4. Invert Slab area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Slab on Grade

10111 Concrete Slab on Grade Units – SF

Record this element for all concrete slabs-on-grade. This element defines a slab that is supported continuously on a subbase material.

The area of the slab-on-grade is the product of the width and length of the slab.

1. Defects are superficial and have no effect on the structural capacity of the slab-on-grade. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Slab-on-Grade area with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Settlement exists with tolerable limits or is arrested with no observed structural distress. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft.
3. Slab-on-Grade area with structural defects that do not require a structural review. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Settlement exceeds tolerable limits but does not require a structural review. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft.
4. Slab-on-Grade area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10119 Other Slab on Grade Units – SF

Record this element for all slabs-on-grade composed of other materials. This element defines a slab that is supported continuously on a subbase material.

The area of the slab-on-grade is the product of the width and length of the slab.

1. Slab-on-Grade is in good condition with no notable distress.
2. Slab-on-Grade is in fair condition with isolated breakdowns or deterioration. Settlement exists within tolerable limits or arrested with no observed structural distress.
3. Slab-on-Grade is in poor condition with widespread deterioration or breakdowns without reducing load capacity. Settlement exceeds tolerable limits but does not warrant a structural review.
4. Slab-on-Grade area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Invert Girder

10120	**Steel Invert Girder**	**Units – LF**

Record this element for all steel invert girders. This element defines the invert girders which support the invert slabs.

The total quantity for invert girder is the sum of all the lengths of each invert girder.

1. Defects are superficial and have no effect on the structural capacity of the invert girder. Connection is in place and function as needed.
2. Invert Girder length where corrosion of steel has initiated and there may be areas of freckled rust. Cracking that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar may exist in the liner. Connections have loose fasteners or pack rust without distortion, but the connections are in place and functioning as intended. Distortion is present and has received a structural review and has been mitigated.
3. Invert Girder length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Areas of corrosion may exist where section loss is evident, or pack rust is present. Cracks may exist and have not been arrested. Connections may have missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion.
4. Invert Girder condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10121	**Concrete Invert Girder**	**Units – LF**

Record this element for all concrete invert girders. This element defines the invert girders which support the invert slabs.

The total quantity for invert girder is the sum of all the lengths of each invert girder.

1. Defects are superficial and have no effect on the structural capacity of the invert girder. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Invert Girder length with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft.
3. Invert Girder length with structural defects that do not require a structural review. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft.
4. Invert Girder condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10122 Prestressed Concrete Invert Girder Units – LF

Record this element for all prestressed concrete invert girders. This element defines the invert girders which support the invert slabs. The total quantity for invert girder is the sum of all the lengths of each invert girder.

1. Defects are superficial and have no effect on the structural capacity of the tunnel. Cracking may exist with widths less than 0.004 in. or spacing greater than 3.0 ft.
2. Invert Girder length with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.004 – 0.009 in. or spacing between 1.0 – 3.0 ft. Exposed prestressing is present without section loss.
3. Invert Girder length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.009 in. or spacing less than 1.0 ft. Exposed prestressing is present with section loss but does not warrant a structural review.
4. Invert Girder condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10129 Other Invert Girder Units – LF

Record this element for all invert girders composed of other materials. This element defines the invert girders which support the invert slabs. The total quantity for invert girder is the sum of all the lengths of each invert girder.

1. Invert Girder is in good condition with no notable distress.
2. Invert Girder is in fair condition with isolated breakdowns or deterioration.
3. Invert Girder is in poor condition with widespread deterioration or breakdowns without reducing load capacity.
4. Invert Girder area condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Joints

10130 Tunnel Strip Seal Joint **Units – LF**

Record this element for all strip seal expansion joints. This element defines those roadway and tunnel expansion joint devices which utilize a neoprene type waterproof gland with some type of metal extrusion or other system to anchor the gland.

The total quantity for expansion joints is the sum of all the lengths of each joint.

1. Seal adhesion is fully adhered. No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint. Adjacent deck or header is sound with no spalling, delamination or unsound patch.
2. Seal joint has minimal leakage with minor dripping through the joint. The seal is adhered for more than 50% of the joint height and there are no punctures with only surface cracks. Debris is only partially filled with hard-packed material, but still allows free movement. Adjacent deck or header has edge delamination or spalling 1 in or less deep or 6 in or less in diameter with no exposed rebar and patching that is sound. Metal has freckled rust, no cracks, or impact damage and may be loose but functioning as usual.
3. Leakage is moderate with more than a drip but less than free flow of water. The seal is adhered 50% or less of the joint height but there is still some adhesion, punctured, ripped, or partially pulled out, and/or has cracks that partially penetrate the seal. Debris is filled completely and impacts joint movement. Adjacent deck or header has edge delamination or spalling greater than 1 in deep or 6 in or more in diameter with exposed rebar and patching that is unsound, making the joint loose. Metal has section loss, missing or broken fasteners, cracking, or impact damage but the joint is still functioning.
4. There is a free flow of water through the joint. The seal has a complete loss of adhesion, is punctured through completely, pulled out, or missing, and/or a crack has fully penetrated the seal. Debris is filled completely and prevents joint movement. Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended on the adjacent deck or header. The metal is cracking with section loss, damage, or connection failure that prevents the joint from functioning as intended.

10131 Tunnel Pourable Joint Seal — Units – LF

Record this element for all pourable joint seals. This element defines those roadway and tunnel joints filled with a pourable seal with or without a backer.

The total quantity for expansion joints is the sum of all the lengths of each joint.

1. Seal adhesion is fully adhered. No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint. Adjacent deck or header is sound with no spalling, delamination or unsound patch.
2. Seal joint has minimal leakage with minor dripping through the joint. The seal is adhered for more than 50% of the joint height and there are no punctures with only surface cracks. Debris is only partially filled with hard-packed material, but still allows free movement. Adjacent deck or header has edge delamination or spalling 1 in or less deep or 6 in or less in diameter with no exposed rebar and patching that is sound.
3. Leakage is moderate with more than a drip but less than free flow of water. The seal is adhered 50% or less of the joint height but there is still some adhesion, punctured, ripped, or partially pulled out, and/or has cracks that partially penetrate the seal. Debris is filled completely and impacts joint movement. Adjacent deck or header has edge delamination or spalling greater than 1 in deep or 6 in or more in diameter with exposed rebar and patching that is unsound, making the joint loose.
4. There is a free flow of water through the joint. The seal has a complete loss of adhesion, is punctured through completely, pulled out, or missing, and/or a crack has fully penetrated the seal. Debris is filled completely and prevents joint movement. Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended on the adjacent deck or header.

10132 Tunnel Compression Seal Units – LF

Record this element for all compression joint seals. This element defines those roadway and tunnel joints filled with a preformed compression type seal. This joint does not have an anchor system to confine the seal.

The total quantity for expansion joints is the sum of all the lengths of each joint.

1. Seal adhesion is fully adhered. No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint. Adjacent deck or header is sound with no spalling, delamination or unsound patch.
2. Seal joint has minimal leakage with minor dripping through the joint. The seal is adhered for more than 50% of the joint height and there are no punctures with only surface cracks. Debris is only partially filled with hard-packed material, but still allows free movement. Adjacent deck or header has edge delamination or spalling 1 in or less deep or 6 in or less in diameter with no exposed rebar and patching that is sound.
3. Leakage is moderate with more than a drip but less than free flow of water. The seal is adhered 50% or less of the joint height but there is still some adhesion, punctured, ripped, or partially pulled out, and/or has cracks that partially penetrate the seal. Debris is filled completely and impacts joint movement. Adjacent deck or header has edge delamination or spalling greater than 1 in deep or 6 in or more in diameter with exposed rebar and patching that is unsound, making the joint loose.
4. There is a free flow of water through the joint. The seal has a complete loss of adhesion, is punctured through completely, pulled out, or missing, and/or a crack has fully penetrated the seal. Debris is filled completely and prevents joint movement. Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended on the adjacent deck or header.

10133 Tunnel Assembly Joint w/ Seal Units – LF

Record this element for all assembly joints with seals. This element defines only those roadway and tunnel joints filled with an assembly mechanism that have a seal.

The total quantity for expansion joints is the sum of all the lengths of each joint.

1. Seal adhesion is fully adhered. No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint. Adjacent deck or header is sound with no spalling, delamination or unsound patch.
2. Seal joint has minimal leakage with minor dripping through the joint. The seal is adhered for more than 50% of the joint height and there are no punctures with only surface cracks. Debris is only partially filled with hard-packed material, but still allows free movement. Adjacent deck or header has edge delamination or spalling 1 in or less deep or 6 in or less in diameter with no exposed rebar and patching that is sound. Metal has freckled rust, no cracks, or impact damage and may be loose but functioning as usual.
3. Leakage is moderate with more than a drip but less than free flow of water. The seal is adhered 50% or less of the joint height but there is still some adhesion, punctured, ripped, or partially pulled out, and/or has cracks that partially penetrate the seal. Debris is filled completely and impacts joint movement. Adjacent deck or header has edge delamination or spalling greater than 1 in deep or 6 in or more in diameter with exposed rebar and patching that is unsound, making the joint loose. Metal has section loss, missing or broken fasteners, cracking, or impact damage but the joint is still functioning.
4. There is a free flow of water through the joint. The seal has a complete loss of adhesion, is punctured through completely, pulled out, or missing, and/or a crack has fully penetrated the seal. Debris is filled completely and prevents joint movement. Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended on the adjacent deck or header. The metal is cracking with section loss, damage, or connection failure that prevents the joint from functioning as intended.

10134 Tunnel Open Expansion Joint Units – LF

Record this element for all open expansion joints. This element defines only those roadway and tunnel joints that are open and not sealed.

The total quantity for expansion joints is the sum of all the lengths of each joint.

1. No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint. Adjacent deck or header is sound with no spalling, delamination or unsound patch.
2. Debris is only partially filled with hard-packed material, but still allows free movement. Adjacent deck or header has edge delamination or spalling 1 in or less deep or 6 in or less in diameter with no exposed rebar and patching that is sound.
3. Debris is filled completely and impacts joint movement. Adjacent deck or header has edge delamination or spalling greater than 1 in deep or 6 in or more in diameter with exposed rebar and patching that is unsound, making the joint loose.
4. Debris is filled completely and prevents joint movement. Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended on the adjacent deck or header.

10135 Tunnel Assembly Joint without Seal Units – LF

Record this element for all assembly joints without seals. This element defines only those roadway and tunnel assembly joints that are open and not sealed. These joints include finger and sliding plate joints.

The total quantity for expansion joints is the sum of all the lengths of each joint.

1. No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint. Adjacent deck or header is sound with no spalling, delamination or unsound patch.
2. Debris is only partially filled with hard-packed material, but still allows free movement. Adjacent deck or header has edge delamination or spalling 1 in or less deep or 6 in or less in diameter with no exposed rebar and patching that is sound. Metal has freckled rust, no cracks, or impact damage and may be loose but functioning as usual.
3. Debris is filled completely and impacts joint movement. Adjacent deck or header has edge delamination or spalling greater than 1 in deep or 6 in or more in diameter with exposed rebar and patching that is unsound, making the joint loose. Metal has section loss, missing or broken fasteners, cracking, or impact damage but the joint is still functioning.
4. Debris is filled completely and prevents joint movement. Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended on the adjacent deck or header. The metal is cracking with section loss, damage, or connection failure that prevents the joint from functioning as intended.

10139 Other Tunnel Joint Units – LF

Record this element for all other expansion joints. This element defines those roadway and tunnel expansion joint devices which utilize a neoprene type waterproof gland with some type of metal extrusion or other system to anchor the gland.

The total quantity for expansion joints is the sum of all the lengths of each joint.

1. No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint. Adjacent deck or header is sound with no spalling, delamination or unsound patch.
2. Seal joint has minimal leakage with minor dripping through the joint. Debris is only partially filled with hard-packed material, but still allows free movement. Adjacent deck or header has edge delamination or spalling 1 in or less deep or 6 in or less in diameter with no exposed rebar and patching that is sound. Metal has freckled rust, no cracks, or impact damage and may be loose but functioning as usual.
3. Leakage is moderate with more than a drip but less than free flow of water. Debris is filled completely and impacts joint movement. Adjacent deck or header has edge delamination or spalling greater than 1 in deep or 6 in or more in diameter with exposed rebar and patching that is unsound, making the joint loose. Metal has section loss, missing or broken fasteners, cracking, or impact damage but the joint is still functioning.
4. There is a free flow of water through the joint. Debris is filled completely and prevents joint movement. Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended on the adjacent deck or header. The metal is cracking with section loss, damage, or connection failure that prevents the joint from functioning as intended.

10140 Gaskets Units – LF

These joints are design to prevent water from penetrating a tunnel liner such as the seal between a segmental tunnel liner. The condition states focus on leakage and other SNTI defects such as header conditions should be ignored.

1. Seal adhesion is fully adhered. No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint. Adjacent deck or header is sound with no spalling, delamination or unsound patch.
2. Seal joint has minimal leakage with minor dripping through the joint. The seal is adhered for more than 50% of the joint height and there are no punctures with only surface cracks. Debris is only partially filled with hard-packed material, but still allows free movement. Adjacent deck or header has edge delamination or spalling 1 in or less deep or 6 in or less in diameter with no exposed rebar and patching that is sound. Metal has freckled rust, no cracks, or impact damage and may be loose but functioning as usual.
3. Leakage is moderate with more than a drip but less than free flow of water. The seal is adhered 50% or less of the joint height but there is still some adhesion, punctured, ripped, or partially pulled out, and/or has cracks that partially penetrate the seal. Debris is filled completely and impacts joint movement. Adjacent deck or header has edge delamination or spalling greater than 1 in deep or 6 in or more in diameter with exposed rebar and patching that is unsound, making the joint loose. Metal has section loss, missing or broken fasteners, cracking, or impact damage but the joint is still functioning.
4. There is a free flow of water through the joint. The seal has a complete loss of adhesion, is punctured through completely, pulled out, or missing, and/or a crack has fully penetrated the seal. Debris is filled completely and prevents joint movement. Spall, delamination, unsound patched area or loose joint anchor that prevents the joint from functioning as intended on the adjacent deck or header. The metal is cracking with section loss, damage, or connection failure that prevents the joint from functioning as intended.

Tunnel Wearing Surface

10151	Concrete Wearing Surface	Units– SF

This element defines a roadway surface made of Portland Cement Concrete Pavement (PCCP). The condition states do not address faulting, cracking, or smoothness of the profile at this time, but these defects should be described in the element notes. The quantity should equal the overlay's width times the length.

1. Defects are superficial and have no effect on the structural capacity of the wearing surface. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Wearing surface area with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft. The wearing surface is substantially effective and deterioration of the protected element has slowed.
3. Wearing surface area with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress or a full depth pothole. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft. The wearing surface has limited effectiveness and deterioration of the protected element has progressed.
4. The concrete wearing surface is no longer effective.

10158	Asphalt Wearing Surface	Units– SF

This element defines a roadway surface made of Asphalt Concrete Pavement (ACP), Hot Mixed Asphalt (HMA), or covered with a Bituminous Surface Treatment (BST) which is also called a Chip Seal. The condition states do not address faulting, cracking, or smoothness of the profile currently. The quantity should equal the overlay's width times the length.

1. Wearing surface is in good condition and is fully effective with no evidence of leakage or further deterioration of the protected element.
2. Wearing surface is in fair condition with isolated breakdowns or deterioration and is substantially effective. Deterioration has slowed.
3. Wearing surface is in poor condition with widespread deterioration or breakdowns without reducing load capacity and has limited effectiveness. Deterioration has progressed.
4. The wearing surface is no longer effective.

10159	Other Wearing Surface	Units– SF

This tunnel element defines a roadway surface, or top layer, that is not asphalt or concrete such as a polyester, epoxy, or cementitious overlay on the roadway. The quantity should equal the overlay's width times the length.

1. Wearing Surface is in good condition with no notable distress. It is fully effective with no evidence of leakage or furth deterioration of the protected element.
2. Wearing Surface is in fair condition with isolated breakdowns or deterioration. It is substantially effective and deterioration of the protected element has slowed.
3. Wearing Surface is in poor condition with widespread deterioration or breakdowns without reducing load capacity. It has limited effectiveness and deterioration of the protected element has progressed.
4. The wearing surface is no longer effective.

Tunnel Traffic Barrier

10160	Steel Traffic Barrier	Units – LF

Record this element for all steel traffic barriers. This element defines those tunnel barriers adjacent to a roadway. Horizontal members must be steel; however, posts may be made of steel, timber, concrete or other materials.

The total quantity for traffic barrier is the sum of all the lengths of each traffic barrier.

1. Defects are superficial and have no effect on the structural capacity of the barrier. Connection is in place and function as needed.
2. Traffic Barrier length where corrosion of steel has initiated and there may be areas of freckled rust. Cracking that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar may exist in the liner. Connections have loose fasteners or pack rust without distortion, but the connections are in place and functioning as intended. Distortion is present and has received a structural review and has been mitigated.
3. Traffic Barrier length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Areas of corrosion may exist where section loss is evident, or pack rust is present. Cracks may exist and have not been arrested. Connections may have missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion.
4. Traffic Barrier condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10161 Concrete Traffic Barrier Units – LF

Record this element for all concrete traffic barriers. This element defines those tunnel barriers adjacent to a roadway. All element of the barrier must be concrete.

The total quantity for traffic barrier is the sum of all the lengths of each traffic barrier.

1. Defects are superficial and have no effect on the structural capacity of the barrier. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Traffic Barrier length with delamination’s, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft.
3. Traffic Barrier length with structural defects that do not require a structural review. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft.
4. Traffic Barrier condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10169 Other Traffic Barrier Units – LF

Record this element for all traffic barriers composed of other materials. This element defines those tunnel barriers adjacent to a roadway.

The total quantity for traffic barrier is the sum of all the lengths of each traffic barrier.

1. Traffic Barrier is in good condition with no notable distress.
2. Traffic Barrier is in fair condition with isolated breakdowns or deterioration.
3. Traffic Barrier is in poor condition with widespread deterioration or breakdowns without reducing load capacity.
4. Traffic Barrier condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Pedestrian Barrier

10170	Steel Pedestrian Railing	Units – LF

Record this element for all steel pedestrian railing. This element defines those tunnel railings adjacent to a walkway.

The total quantity for pedestrian railing is the sum of all the lengths of each pedestrian railing.

1. Defects are superficial and have no effect on the structural capacity of the railing. Connection is in place and function as needed.
2. Pedestrian Railing length where corrosion of steel has initiated and there may be areas of freckled rust. Cracking that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar may exist in the liner. Connections have loose fasteners or pack rust without distortion, but the connections are in place and functioning as intended. Distortion is present and has received a structural review and has been mitigated. Out-of-Plumb has minor tilt which is barely noticeable.
3. Pedestrian Railing length with structural defects that do not require a structural review or may require a structural review but does not require mitigation. Areas of corrosion may exist where section loss is evident, or pack rust is present. Cracks may exist and have not been arrested. Connections may have missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion. Out-of-Plumb has excessive tilt that affects operations or causes near failure.
4. Pedestrian Railing condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10171	Concrete Pedestrian Railing	Units – LF

Record this element for all concrete pedestrian railing. This element defines those tunnel railings adjacent to a walkway.

The total quantity for pedestrian railing is the sum of all the lengths of each pedestrian railing.

1. Defects are superficial and have no effect on the structural capacity of the railing. Cracking may exist with widths less than 0.012 in. or spacing greater than 3.0 ft.
2. Pedestrian Railing length with delamination's, spalls 1 in. or less deep or 6 in. or less diameter, and/or patched areas that are sound. Areas of exposed rebar may be present but without measurable section loss. Efflorescence may include white surfaces without build-up or leaching without rust staining. Cracking may exist with widths 0.012 – 0.05 in. or spacing between 1.0 – 3.0 ft. Out-of-Plumb has minor tilt which is barely noticeable.
3. Pedestrian Railing length with structural defects that do not require a structural review. Spalls greater than 1.0 in. deep or greater than 6 in. diameter may exist, patched areas are unsound or showing distress. Areas of exposed rebar are present with measurable section loss. Areas of efflorescence may exist with heavy build-up and rust staining. Cracking may exist with widths greater than 0.05 in. or spacing less than 1.0 ft. Out-of-Plumb has excessive tilt that affects operations or causes near failure.
4. Pedestrian Railing condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

10179 Other Pedestrian Railing Units – LF

Record this element for all pedestrian railing composed of other materials. This element defines those tunnel railings adjacent to a walkway.

The total quantity for pedestrian railing is the sum of all the lengths of each pedestrian railing.

1. Pedestrian Railing is in good condition with no notable distress.
2. Pedestrian Railing is in fair condition with isolated breakdowns or deterioration. Out-of-Plumb has a minor tilt that is barely noticeable.
3. Pedestrian Railing is in poor condition with widespread deterioration or breakdowns without reducing load capacity. Out-of-Plumb has an excessive tilt that affects operations or induces near failure.
4. Pedestrian Railing condition warrants a structural review to determine the effect of strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel.

Tunnel Mechanical Systems

10200 Ventilation System Units – EA

Record this element for all tunnel lighting fixtures. This element describes the components that provide the supply of fresh air to the tunnel while removing stale air and contaminants. The ventilation system may include the following subcomponents: Fans - Fan Motors, Fan Controller, Airways, Sound Attenuators, Dampers, Damper Motor, Damper Controller, Air Quality Monitoring Equipment (CO), Control Panels and Conduit. For this element, a separate ventilation system is one system. Tunnels with twin bores may have separate ventilation systems and would be considered as two. Some tunnels may have a ventilation system at each portal that work independently and would also be considered as two.

The total quantity for ventilation system is the sum of all the ventilation systems.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

10201	Fans	Units – EA

Record this element for all fans. This element describes the components that produce a current of air which provides the supply of fresh air to the tunnel while removing stale air and contaminants. The fans may include the following subcomponents: Fan Motors, Fan Controller, etc.

The total quantity for fans is the sum of all the fans.

1. The fan is in good condition with no notable distress. Fan operates on all speeds and in all modes with no noticeable temperature rise.
2. The fan is in fair condition with isolated breakdowns or deterioration. Fan requires manual restart or manual control to operates on all speeds and in all modes. Drive(s) require some adjustment. More than normal play observed, and/or belt has minor wear/deterioration. Less than 40-degree Fahrenheit temperature rise form ambient temperatures during operation.
3. The fan is in poor condition with widespread deterioration or breakdowns without reducing load capacity. Fan operates on at least one speed or only operates in manual mode. Drive(s) require major adjustment. Severe play and/or belt/chain noise is observed, and/or belt has moderate wear/deterioration. Between 40-degree Fahrenheit and 80-degree Fahrenheit temperature rise form ambient temperatures during operation.
4. The fan condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel. Fan will not operate on any speed and/or there is over an 80-degree Fahrenheit temperature rise for ambient temperatures during operation.

10300	Drainage and Pumping System	Units – EA

Record this element for all drainage and pumping systems. This element includes storm drains, piping, pumps and water treatment equipment for the removal of water that may enter the tunnel from the portals, vent shafts, and cracks in the tunnel lining. Drainage at the tunnel facility also handles the drippings from vehicles traversing the tunnel and potential spills from trucks hauling liquid materials. The drainage and pumping system may include the following subcomponents: Pumps – Sump Pumps, Pump Motors, Pump Controller, Piping, Drains and Water Treatment Equipment. For this element, a separate drainage and pumping system is one system. Tunnels with twin bores may have separate draining and pumping systems and would be considered as two. Some tunnels may have a draining and pumping system at each portal that work independently and would also be considered as two.

The total quantity for drainage and pumping system is the sum of all the draining and pumping systems.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

10301 Pumps Units – EA

Record this element for all pumps. This element includes the component that moves water that may enter the tunnel from the portals, vent shafts, and crack in the tunnel lining. The pumps may include the following subcomponents: Sump Pumps, Pump Motors, Pump Controller, etc.

The total quantity for pumps is the sum of all the pumps.

1. Pump operates at all speeds and in all modes. The shut-off valves operate freely and without binding. There is a fair amount of noise and vibration velocity has a value of 100 in/s or less. No oil leakage, leakage is observed at pump seal, or water leakage noted in immediate piping and valves in observed. Motor temperature is within expected limits.
2. Pump operates at all speeds and in all modes in a reduced capacity. The shut-off valves operate with some resistance and binding but do appear to fully open/seal. There is some slightly rough noise and vibration velocity between 100 and 300 in/s. There is limited exterior staining from oil seepage at seals and limited water seepage from seals with seals appearing wet. Motor temperature is slightly increased during motor operation.
3. Pump operates intermittently or haltingly. The shut-off valves are difficult or impossible to operate. There is a rough noise and vibration velocity exceeds 300 in/s. There is extensive exterior staining from oil seepage around seals and measurable water seepage around seals that can be quantified in drips per minute. Motor temperature is moderately above what is expected and/or hot spots of temperature exist.
4. Pump will not operate. There is pooling of oil on exterior surfaces of seals or significant reduction of interior lubricant level. There is a visible stream of water on exterior surfaces of seals or significant reduction of pump performance. Motor temperature is drastically increased and motor function is influenced.

10400	Emergency Generator System	Units – EA

Record this element for all emergency generator systems. These elements are the mechanical components of an emergency generator and power system which consist of fuel delivery, fuel storage, an engine cooling and exhaust systems. The emergency generator provides a back-up power source in the event of utility service failure to the tunnel. The mechanical systems support the proper operation of the generator to provide back-up power. The emergency generator system may include the following subcomponents: Fuel Main Storage Tank, Fuel Day Tanks, Circulating Fuel Pumps, Fuel Tank Venting, Fuel Tank Sensors, Coolant Systems, Exhaust Manifold Insulation and Lagging, Exhaust Air Louver and Damper Actuator, Supply Air Louver and Damper Actuator, Generator, Generator Control Equipment, Control Panels and Conduit. For this element, a separate emergency generator system is one system. Tunnels with twin bores may have separate emergency generator systems and would be considered as two.

The total quantity for emergency generator is the sum of all the emergency generator systems.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

10400	Emergency Generator System	Units – EA

Record this element for all flood gates. These elements are the actual gates, seals, mechanical components, and power supply of a flood gate system. The flood gates are typically located at each portal for each bore. The flood gates are usually used when the tunnel roadway is closed and the bores are threatened with taking on water at the portals. For this element, a separate flood gate is one gate. Some tunnels may have a flood gate at each portal that work independently and would be considered as two.

The total quantity for flood gate is the sum of all the flood gates.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

Tunnel Electrical Systems

10500 Electrical Distribution System Units – EA

Record this element for all electrical distribution systems. The electrical distribution system consists of the electrical equipment, wiring, conduit, and cable used for distributing electrical energy from the utility supply (service entrance) to the line terminals of utilization equipment. The electrical distribution system may include the following subcomponents: Switchgear, Unit Substations, Switchboard, Motor Control Centers, Starters, Transformers, Transfer Switches, Panelboards, Conduits and Raceways, and Electrical Outlets/Receptacles For this element, a separate electrical distribution system is one system. Tunnels with twin bores may have separate electrical distribution systems and would be considered as two.

The total quantity for electrical distribution system is the sum of all the electrical distribution systems.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

10550 Emergency Distribution System Units – EA

Record this element for all emergency distribution systems. This system consists of the electrical equipment, wiring, conduit, and cable used for providing electrical power in case of utility service failure. Equipment included in this system consists of emergency generators and/or uninterruptible power supply (UPS) systems, transfer switches, and other equipment supplying emergency power. The emergency distribution system may include the following subcomponents: Uninterruptable Power Supply (UPS), batteries and battery charging equipment. For this element, a separate emergency distribution system is one system. Tunnels with twin bores may have separate emergency distribution systems and would be considered as two.

The total quantity for emergency distribution system is the sum of all the emergency distribution systems.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

10600 Tunnel Lighting System Units – EA

Record this element for all tunnel lighting systems. These systems consist of the light fixtures, supports, bulb housings, lenses, light switches, junction boxes, wiring, conduit, cable, sensors, and controllers used to provide lighting for the tunnel. The tunnel lighting system may also include the following subcomponents: photo controls, and remote ballasts. For this element, a separate tunnel lighting system is one system. Tunnels with twin bores may have separate tunnel lighting systems and would be considered as two.

The total quantity for tunnel lighting system is the sum of all the tunnel lighting systems.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

10601 Tunnel Lighting Fixtures Units – EA

Record this element for all tunnel lighting fixtures. This element includes the physical housing of the tunnel lights and their connections to the support but does not include the blub. When a lighting fixture serves the dual purpose of general tunnel lighting and emergency tunnel lighting, it is only counted under the tunnel lighting fixture element. However, those fixtures will have an impact on both tunnel lighting system and emergency lighting system elements.

The total quantity for tunnel lighting fixture is the sum of all the tunnel lighting fixtures.

1. The system is in good condition with no notable distress. There are no deficient support conditions.
2. The component supports have loose anchorage or component housing connection hardware. There is freckled rust, and/or corrosion of the steel has initiated. The component housing or enclosure has a single crack.
3. The component supports have missing anchorage or component housing connection hardware which does not result in an unstable situation. There is section loss evident or pack rust is present but does not warrant structural review. The component housing or enclosure has multiple cracks.
4. The condition warrants a structural review to determine the effect on strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. The component supports have failed anchorage or component connection hardware which results in an unstable situation. Holes are present in the component housing or enclosure.

10620 Emergency Lighting System Units – EA

Record this element for all emergency lighting systems. These systems consist of the light fixtures, supports, bulb housings, lenses, light switches, junction boxes, wiring, conduit, cable, sensors, and controllers used to provide emergency lighting for the facility. The emergency lighting system may also include the following subcomponents: exit signs, batteries; and support space sighting, and remote ballasts. For this element, a separate emergency lighting system is one system. Tunnels with twin bores may have separate emergency lighting systems and would be considered as two.

The total quantity for emergency lighting system is the sum of all the emergency lighting systems.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

10621 Emergency Lighting Fixture Units – EA

Record this element for all emergency lighting fixtures. This element includes the physical housing of the emergency lights and their connections to the tunnel. Component supports include anchorage to the supporting member and connecting hardware for the component housing. When a lighting fixture serves the dual purpose of general tunnel lighting and emergency tunnel lighting, it is only counted under the tunnel lighting fixture element. However, those fixtures will have an impact on both tunnel lighting system and emergency lighting system elements.

The total quantity for emergency lighting fixture is the sum of all the emergency lighting fixtures.

1. The system is in good condition with no notable distress. There are no deficient support conditions.
2. The component supports have loose anchorage or component housing connection hardware. There is freckled rust, and/or corrosion of the steel has initiated. The component housing or enclosure has a single crack.
3. The component supports have missing anchorage or component housing connection hardware which does not result in an unstable situation. There is section loss evident or pack rust is present but does not warrant structural review. The component housing or enclosure has multiple cracks.
4. The condition warrants a structural review to determine the effect on strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. The component supports have failed anchorage or component connection hardware which results in an unstable situation. Holes are present in the component housing or enclosure.

Fire/Life Safety/Signs/Security Systems

10650 Fire Detection System Units – EA

Record this element for all fire detection systems. These systems consist of control panels, initiating devices (heat and smoke detectors, pull-stations, etc.), notification appliances (strobes, horns, etc.), wiring, conduit, and cable used to detect a fire in the tunnel. The fire detection system may also include the following subcomponents: sensors, controls, and alarms. For this element, a separate fire detection system is one system. Tunnels with twin bores may have separate fire detection systems and would be considered as two.

The total quantity for fire detection system is the sum of all the fire detection systems.

1. The system is in good condition with no notable distress. All detection sensors are operational.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel. Detection sensors are not operational in one zone.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel. Detection sensors are not operational in multiple zones.

10700 Fire Protection System Units – EA

Record this element for all fire protection systems. These systems consist of fire extinguishers, hose connections, storage tanks, fire hydrants, building sprinklers, pumping systems, piping, circulating pumps, and hose reels used as fire protection in the tunnel. The fire protection system may include the following subcomponents: main fire pump, pressure maintenance/jockey pump, dry pipe valve, valves and tamper switches, storage tanks, tunnel standpipe, pressure relief and air release valves, backflow prevention, hose stations, hose reels, building sprinklers, fire department connections and fire hydrants. For this element, a separate fire protection system is one system. Tunnels with twin bores may have separate fire protection systems and would be considered as two.

The total quantity for fire protection system is the sum of all the fire protection systems.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

10750 Emergency Communication System — Units – EA

Record this element for all emergency communication systems. The components of the emergency communication system include the communication device itself (i.e., intercom, radios, cellphone), receivers, wiring, exchange devices, etc. The emergency communications system may also include the following subcomponents: signs, controllers, speakers and audio input equipment. For this element, a separate emergency communication system is one system. Tunnels with twin bores may have separate emergency communication systems and would be considered as two.

The total quantity for emergency communication system is the sum of all the emergency communication systems.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

10800 Tunnel Operations and Security System — Units – EA

Record this element for all tunnel operations and security systems. These systems consist of the communication equipment (CCTV cameras, telephones, radios, etc.) used to provide communication within and from the tunnel. The tunnel operations and security system may also include the following subcomponents: closed-circuit camera system, cell phone antennas, door access, controller and radio. For this element, a separate tunnel operation and security system is one system. Tunnels with twin bores may have separate tunnel operations and security systems and would be considered as two.

The total quantity for tunnel operations and security system is the sum of all the tunnel operations and security systems.

1. The system is in good condition with no notable distress.
2. The system is in fair condition with isolated breakdowns or deterioration.
3. The system is in poor condition – widespread deterioration or breakdowns reducing operational capacity, without impacting the serviceability of the element or tunnel.
4. The condition warrants evaluation to determine the effect on serviceability of the element or tunnel or the evaluation has determined there is an impact on the serviceability of the element or tunnel.

10850 Traffic Sign Units – EA

Record this element for all traffic signs. These elements consist of the traffic sign and supports. Signs for pedestrians, variable message signs and lane signals are not covered under this element. The MUTCD Chapter 2 contains the requirements for the shape and wording of regulatory, warning and guide signs on a highway or road. It also contains requirements for maintaining minimum retro reflectivity of signs.

The total quantity for traffic signs is the sum of all the traffic signs.

1. The system is in good condition with no notable distress. There are no deficient support conditions.
2. The component supports have loose anchorage or component housing connection hardware.
3. The component supports have missing anchorage or component housing connection hardware which does not result in an unstable situation.
4. The component supports have failed anchorage or component connection hardware which results in an unstable situation.

10870 Egress Sign Units – EA

Record this element for all egress signs. This element consists of egress signs and their supports that are not related to the emergency lighting system. The MUTCD Chapter 2 contains the requirements for the shape and wording of regulatory, warning and guide signs on a highway or road. It also contains requirements for maintaining minimum retro reflectivity of signs.

The total quantity for egress sign is the sum of all the egress signs.

1. There are no deficient support conditions.
2. The component supports have loose anchorage or component housing connection hardware.
3. The component supports have missing anchorage or component housing connection hardware which does not result in an unstable situation.
4. The component supports have failed anchorage or component connection hardware which results in an unstable situation.

10890 Variable Message Board Units – EA

Record this element for all variable message boards. This element consists of the variable message board, supports and associated electrical connections. The MUTCD Chapter 2 contains the requirements for the shape and wording of regulatory, warning and guide signs on a highway or road. It also contains requirements for maintaining minimum retro reflectivity of signs.

The total quantity for variable message board is the sum of all the variable message boards.

1. The sign is functional and operates when tested. There are no deficient support conditions.
2. The sign operates with minor decrease in light output, flicker, or reduced display area. The component supports have loose anchorage or component housing connection hardware.
3. The sign operates with significant decrease in light output, flicker, and/or reduced display area. The component supports have missing anchorage or component housing connection hardware which does not result in an unstable situation.
4. The sign is not operational. The component supports have failed anchorage or component connection hardware which results in an unstable situation.

10910 Lane Signal Units – EA

Record this element for all lane signals. The components of the tunnel lane signal system include the lane signals themselves, their supports and the control system.

The lane signals may include the following subcomponents: signals/fixtures, control station, control cabinets and conduit. The MUTCD Chapter 2 contains the requirements for the shape and wording of regulatory, warning and guide signs on a highway or road. It also contains requirements for maintaining minimum retro reflectivity of signs.

The total quantity for lane signal is the sum of all the lane signals.

1. The sign is functional and operates when tested. There are no deficient support conditions.
2. The sign operates with minor decrease in light output, flicker, or reduced display area. The component supports have loose anchorage or component housing connection hardware.
3. The sign operates with significant decrease in light output, flicker, and/or reduced display area. The component supports have missing anchorage or component housing connection hardware which does not result in an unstable situation.
4. The sign is not operational. The component supports have failed anchorage or component connection hardware which results in an unstable situation.

10911 Lane Signal Fixture Units – EA

Record this element for all lane signal fixtures. The components of the tunnel lane signal fixtures include the fixtures themselves, the supports and the wiring. The lane signal fixtures may also include the following subcomponents: fixtures and conduits. The MUTCD Chapter 2 contains the requirements for the shape and wording of regulatory, warning and guide signs on a highway or road. It also contains requirements for maintaining minimum retro reflectivity of signs.

The total quantity for lane signal fixture is the sum of all the lane signal fixtures.

1. The system is in good condition with no notable distress. There are no deficient support conditions.
2. The component supports have loose anchorage or component housing connection hardware. There is freckled rust, and/or corrosion of the steel has initiated. The component housing or enclosure has a single crack.
3. The component supports have missing anchorage or component housing connection hardware which does not result in an unstable situation. There is section loss evident or pack rust is present but does not warrant structural review. The component housing or enclosure has multiple cracks.
4. The condition warrants a structural review to determine the effect on strength or serviceability of the element or tunnel, OR a structural review has been completed and the defects impact strength and serviceability of the element or tunnel. The component supports have failed anchorage or component connection hardware which results in an unstable situation. Holes are present in the component housing or enclosure.

Protective Systems

10950	**Steel Corrosion Protective Coating**	**Units – SF**

Record this element for all steel corrosion protective coating used in the tunnel. The element is for steel elements that have a protective coating system such as paint, galvanization, or other topcoat steel corrosion inhibitor. Effectiveness is an evaluation made by the inspector to classify the degree to which the protection system is functioning to protect the steel beneath. Protective coatings only apply to those elements listed under the structural and civil sections.

The total quantity for protective coatings is the product of the length and width of the entire exposed surface of the element.

1. Coating is fully effective. Oxide film degradation color is yellow-orange or light brown for early development, chocolate-brown to purple-brown for fully developed. Texture is tightly adhered, capable of withstanding hammering or vigorous wire brushing.
2. Coating surface is dulling and only substantially effective. The texture is granular and the finishing coat is peel, bubbling, and/or cracking.
3. The coating has a loss of pigment and has limited effectiveness. The finishing and primer coats have peeling, bubbling, and/or cracking. The texture adherence has small flakes that are less than ½ inch in diameter.
4. The coating has an exposure of bare metal and has failed with no protection of the underlying metal. The oxide film degradation color is dark black. The texture adherence has large flakes that are ½ inch in diameter or greater or has laminar sheets or nodules.

10951	**Concrete Corrosion Protective Coating**	**Units – SF**

Record this element for all concrete corrosion protective coating used in the tunnel. This element is for concrete elements that have a protective coating applied to them. These coatings include silane/siloxane water proofers, crack sealers such as High Molecular Weight Methacrylate (HMWM), or any topcoat barrier that protects concrete from deterioration and reinforcing steel from corrosion. Effectiveness is an evaluation made by the inspector to classify the degree to which the protection system is functioning. Protective coatings only apply to those elements listed under the structural and civil sections.

The total quantity for protective coatings is the product of the length and width of the entire exposed surface of the element.

1. Underlying concrete is not exposed and coating is fully effective.
2. Coating is substantially effective. Underlying concrete is not exposed, coating is showing signs of wear from UV exposure, and/or friction course is missing.
3. The coating has limited effectiveness. The underlying concrete is not exposed, but thickness of coating is reduced.
4. The coating has failed with no protection. The underlying concrete is exposed.

10952 Fire Protective Coating Units – SF

Record this element for all fire protective coatings used in the tunnel. This element is the coating applied on the tunnel elements to protect these elements from fire.

The total quantity for protective coatings is the product of the length and width of the entire exposed surface of the element.

1. Fire protective coating is fully effective and will function as designed in a fire.
2. Fire protective coating area is substantially effective.
3. Fire protective coating area that has limited effectiveness.
4. Fire protective coating area that has failed and is no longer protecting the underlying material.

10955 Reflective Tunnel Tile Units – SF

This element identifies tunnel tile attached to a tunnel liner whether it is reflective or not. The total quantity is the area of tile visible for inspection.

1. Tile is bonded with no cracks, chips, or blemishes. Tile may be dirty but reflectivity is enhanced during regular tunnel washing operations.
2. Tile area that has been repaired.
3. Tile area that is bonded, but cracked and may have efflorescence or small amounts of section loss. Tile may be blemished from impact or other causes resulting in major loss of reflectivity.
4. Tile area with delamination’s based on soundings, is completely missing, or has major section loss warranting replacement.

Appendix 9-B Vacant

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Appendix 9-C WSDOT/NTI Tunnel Inventory Codes

WSBIS	NTI Item ID	NTI Inventory Item Name	Comments
1001	I.1	Tunnel Number	
1132	I.2	Tunnel Name	
n/a	I.3	State Code	autogenerated for the NTI submittal
1021	I.4	County Code	
1276	I.5	Place Code	
1274	I.6	Highway Agency District	
1435	I.7	Route Number	
1436	I.8	Route Direction	
1433	I.9	Route Type	
1256	I.10	Facility Carried	
1467	I.11	LRS Route ID	
1469	I.12	LRS Mile Point	
1188	I.13	Tunnel Portal's Latitude	
1196	I.14	Tunnel Portal's Longitude	
n/a	I.15	Border Tunnel State or Country Code	Washington State has no border tunnels, autogenerated for NTI submittal
n/a	I.16	Border Tunnel Financial Responsibility	Washington State has no border tunnels, autogenerated for NTI submittal
n/a	I.17	Border Tunnel Number	Washington State has no border tunnels, autogenerated for NTI submittal
n/a	I.18	Border Tunnel Inspection Responsibility	Washington State has no border tunnels, autogenerated for NTI submittal
1332	A.1	Year Built	
1336	A.2	Year Rehabilitated	
1354	A.3	Total Number of Lanes	
1445	A.4	Average Daily Traffic	
1451	A.5	Average Daily Truck Traffic	
1453	A.6	Year of Average Daily Traffic	
1413	A.7	Detour Length	
1543	A.8	Service in Tunnel	
1019	C.1	Owner	
1286	C.2	Operator	
1490	C.3	Direction of Traffic	
1285	C.4	Toll	
1483	C.5	NHS Designation	
1485	C.6	STRAHNET Designation	
1487	C.7	Functional Classification	
1022	C.8	Urban Code	
1349	G.1	Tunnel Length	
1401	G.2	Minimum Vertical Clearance over Tunnel Roadway	
1356	G.3	Roadway Width, Curb-to-Curb	
1364	G.4	Left Sidewalk Width	
1367	G.5	Right Sidewalk Width	

WSBIS	NTI Item ID	NTI Inventory Item Name	Comments
1992	D.1	Routine Inspection Target Date	
n/a	D.2	Actual Routine Inspection Date	Inspection dates for routine report type will be reported to the NTI.
n/a	D.3	Routine Inspection Interval	Inspection frequencies for routine report type will be reported to the NTI.
n/a	D.4	In-Depth Inspection	Structures with this report type will be flagged as such in the NTI submittal.
n/a	D.5	Damage Inspection	Structures with this report type will be flagged as such in the NTI submittal.
n/a	D.6	Special Inspection	Structures with this report type will be flagged as such in the NTI submittal.
1554	L.1	Load Rating Method	
1556	L.2	Inventory Load Rating Factor	
1553	L.3	Operating Load Rating Factor	
1293	L.4	Tunnel Load Posting Status	
1560	L.5	Posting Load – Gross	
1561	L.6	Posting Load – Axle	
1562	L.7	Posting Load – Type 3	
1563	L.8	Posting Load – Type 3S2	
1564	L.9	Posting Load – Type 3-3	
1402	L.10	Height Restriction	
1408	L.11	Hazardous Material Restriction	
1409	L.12	Other Restrictions	
n/a	N.1	Under Navigable Waterway	Washington state has no tunnels under waterways, autogenerated for the NTI submittal.
n/a	N.2	Navigable Waterway Clearance	Washington state has no tunnels under waterways, autogenerated for the NTI submittal.
n/a	N.3	Tunnel or Portal Island Protection from Navigation	Washington state has no tunnels under waterways, autogenerated for the NTI submittal.
1510	S.1	Number of Bores	
1511	S.2	Tunnel Shape	
1512	S.3	Portal Shapes	
1513	S.4	Ground Conditions	
1514	S.5	Complex	